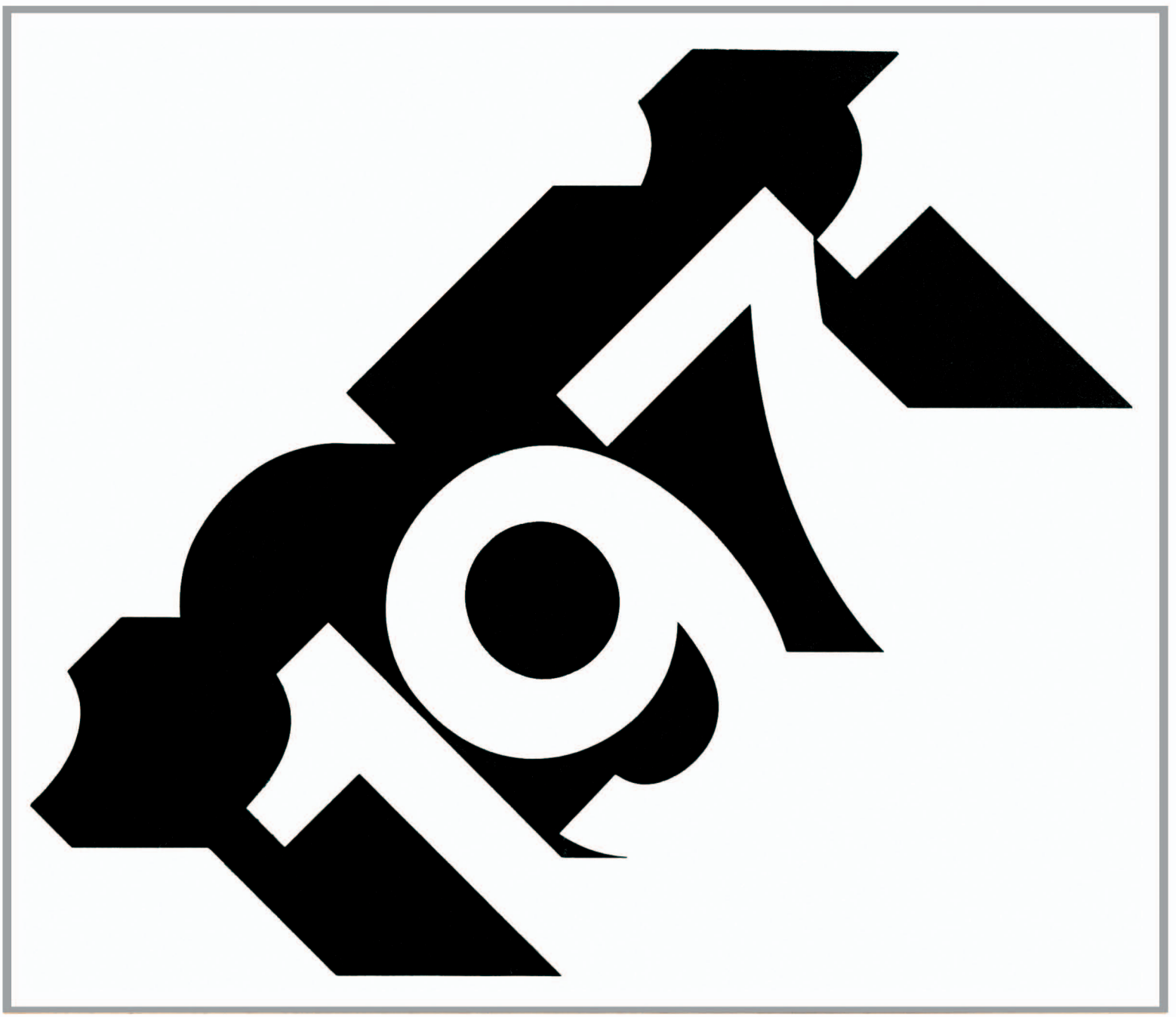
Plymouth
CHRYSLER
IMPERIAL

Chassis Service Manual



IMPERIAL CHRYSLER *Plymouth*

Passenger Car 1971

Chassis Service Manual

FOREWORD

This Imperial, Chrysler and Plymouth Chassis Service Manual has been prepared with the latest service information available for use on 1971 models. Diagnosis, disassembly, repair, assembly and installation procedures coupled with complete specifications and tightening references can be found in each group. This publication is one of the most important "tools" available to the service technician. It will prove an invaluable aid in properly performing any phase of service necessary to maintain or restore the fine performance and reliability characteristics designed, engineered and manufactured into these outstanding automobiles. Body information including frame is contained in a separate Imperial, Chrysler and Plymouth Body Service Manual.

MODELS

IMPERIAL

LE BARON

CHRYSLER

Town and Country
300
Chrysler Newport
New Yorker
Newport Custom

PLYMOUTH

Sport Fury GT
Sport Fury
Fury III
Fury II
GTX
Satellite Brougham
Satellite Custom
Road Runner
Cuda
Barracuda
Duster
Sport Suburban
Custom Suburban
Suburban
Fury I
Satellite Regent
Satellite Sebring Plus
Satellite Sebring
Satellite
Grand Coupe
Duster 40
Valiant

For information relative to ordering the special service tools used and illustrated in this manual, or for additional copies of this manual, please refer to the instructions on inside back cover of this manual.

CHRYSLER CORPORATION

Chrysler Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

Litho in U. S. A.

QUICK REFERENCE INDEX. To use, move either the hand or selection tool directly over the section you desire to reference. Simply click once with the mouse button and the manual will automatically jump to that section.

GROUP INDEX

Introduction, General Specifications and Conversion Tables
0 Lubrication and Maintenance
2 Front Suspension
3 Rear Axle
5 Brakes—Service Parking
6 Clutch
7 Cooling
8 Electrical
9 Engine
9A Cleaner Air System
11 Exhaust System
14 Fuel System
16 Propeller Shaft and Universal Joints
17 Springs and Shock Absorbers
19 Steering Gear—Manual Power
21 Transmission—Standard Automatic
22 Wheels, Bearings and Tires
24 Heaters and Air-Conditioning
— Alphabetical Index

Mopar
AUTHENTIC RESTORATION™ PRODUCT

MANUAL DESCRIPTION

INTRODUCTION

This publication contains the essential removal, installation, adjustment and maintenance procedures for servicing all Body Styles. This information is current as of time of publication.

INDEX

The preceding page contains a "Table of Contents" which lists the group number and subject title of each main group. The first page in each main group has an index to the subjects included in that group.

PAGE NUMBERS

All page numbers consist of two sets of digits separated by a dash. The digits preceding the dash indentify the main body. The digits following the dash represent the consecutive page number within the particular body unit. The page numbers can be found on the upper left or right of each page.

TEXT

Unless otherwise specified, each service procedure covers all body styles. Procedures covering specific styles are indentified by the car line letter, body type or similar designation. A description of these designations is covered in this unit under **"VEHICLE AND ENGINE NUMBERS".**

ILLUSTRATIONS

Where possible, illustrations are placed in close proximity to the accompanying text and should be used as part of the text.

ALPHABETICAL INDEX

An alphabetical index is found at the rear of the Service Manual to aid in locating specific subject and components.

MASTER TECHNICIAN'S SERVICE CONFERENCE (M.T.S.C.)

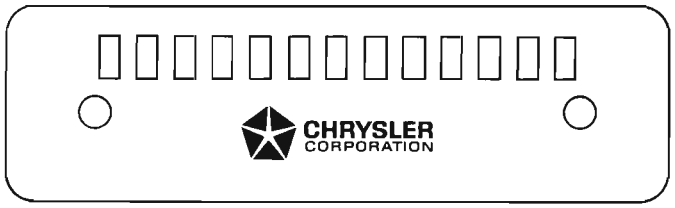
Throughout the service manual, reference to M.T.S.C. material for the subject can be found at the beginning of the particular section. Example: M.T.S.C. 69-3 may be called out in the beginning of the subject matter. This refers to the year 1969 and the session issue number 3.

The Master Technician Service Conference is a training supplement available wherever Chrysler Corporation automotive services are available.

It should be clearly understood that the Master Technician's Service Conference does not constitute legal authority for performing service operations. It's value lies in greater understanding of a specific subject, which results in increased ability to accurately diagnose malfunctions.

VEHICLE AND ENGINE NUMBERS

VEHICLE NUMBER: The vehicle number (serial number) is located on a plate (Fig. 1) which is attached to the instrument panel between the left windshield wiper pivot and the left "A" post. It can easily be seen by looking through the windshield from the outside.



VEHICLE IDENTIFICATION NUMBER PLATE
INSTRUMENT PANEL LOCATED NR464

Fig. 1-Vehicle Identification Number Plate

All vehicle numbers contain thirteen digits. The vehicle number is a code which tells the carline (1st digit), price class (2nd digit), body type (3rd and 4th digit), engine displacement (5th digit), model year (6th digit), assembly plant (7th digit), and vehicle sequence number (last six digits).

This vehicle number is also stamped on the engine block. On six cylinder engines it is on a pad located below the number 6 spark plug at the cylinder head joint face. On eight cylinder engines it is on a pad located just to the rear of the right engine mount on the pan rail.

1st Digit Carline	2nd Digit Price Class	3rd & 4th Digits Body Type	5th Digit Eng. Displacement Cu. In.	6th Digit Model Year	7th Digit Assembly Plant
V-Valiant	E-Economy	21-1 Dr. Sedan	B-198	1-1971	A-Lynch Road
	L-Low	23-2 Dr. Hardtop	C-225		B-Hamtramck
B-Barracuda	M-Medium	27-Convertible	E-Spec. Ord. 6		C-Jefferson
	H-High	29-2 Dr. Sport Hardtop	G-318		D-Belvidere
R-Satellite	P-Premium	41-4 Dr. Sedan	H-340		E-Los Angeles
	K-Police	43-4 Dr. Hardtop	K-360		F-Newark
	T-Taxi	45-2 Seat Station Wagon	L-383		G-St. Louis
P-Fury	S-Special	46-3 Seat Station Wagon	N-383 H/Perf.		H-New Stanton
	O-Superstock		R-426 Hemi		P-Wyoming
	N-New York Taxi		T-440		(Export)
C-Chrysler			U-440 H/Perf.		R-Windsor
Y-Imperial			V-440 3/2 Bbl.		
			Z-Spec. Ord. 8		

ENGINE NUMBERS: All engine serial numbers contain fourteen characters and digits. The first two designate power train, the next three are the cubic inch displacement, the next one designates low compression, the next four are based on a 10, 000 day calendar and the last four designate engine built that day. All 198 and 225 cubic inch engines have the serial numbers stamped on the joint face at right corner, adjacent to number 1 cylinder bore. All 318, 340 and 360 cubic inch engines have the serial numbers stamped on the front of the block just below the left cylinder head. All 383, 426 and 440 cubic inch engines have the serial numbers stamped on the cylinder block pan rail at the left rear corner below the starter opening.

On all engines, information identifying undersized crankshaft, oversized tappets, low compression, oversized cylinder bores, engine built that day, the shift and 10,000 day calendar is stamped on the cylinder block at various locations depending on engine. There can be as many as fifteen characters and digits in this location. 198 and 225 cubic inch engines are stamped on the joint face at right corner, adjacent to number 1 cylinder bore, after serial number. 318, 340 and 360 cubic inch engines are stamped on the front of the block just below the left cylinder head. 383 cubic inch engines are stamped on the right bank joint face just forward of the number 2 cylinder bore. 426 and 440 cubic inch engines are stamped on the left bank pad, adjacent to front tappet rail. For additional information on engines, see **Group 9 in this Manual.**

BODY CODE PLATE: Includes schedule date, body type, engine code, transmission code, tire code, trim code and paint codes (Fig. 2).

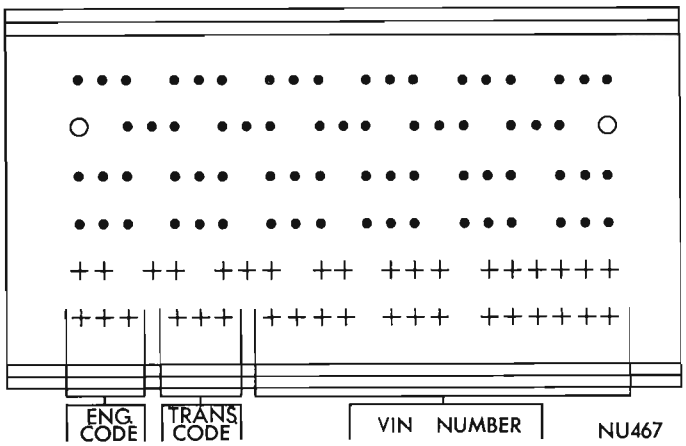


Fig. 2 - Body Equipment Identification Plate

It is located on the left front fender side shield or wheel housing.

TIRE PRESSURE: A decal showing the recommended tire pressure is located on the body pillar at the rear of the left front door opening ("B" post).

CAPACITY CONVERSION TABLE

U.S.	Imperial	U.S.	Imperial	U.S.	Imperial
1/4	1/4	7	5 3/4	15	12 1/2
1/2	3/8	7 1/4	6	15 1/2	13
3/4	5/8	7 1/2	6 1/4	16	13 1/4
		7 3/4	6 1/2	16 1/2	13 3/4
1	3/4			16 3/4	14
1 1/4	1	8	6 3/4		
1 1/2	1 1/4	8 1/4	6 3/4	17	14 1/4
1 3/4	1 1/2	8 1/2	7	17 1/2	14 1/2
		8 3/4	7 1/4	18	15
2	1 3/4	9	7 1/2	18 1/2	15 1/2
2 1/4	1 3/4	9 1/4	7 3/4	19	15 3/4
2 1/2	2	9 1/2	8	19 1/2	16 1/4
2 3/4	2 1/4	9 3/4	8	20	16 3/4
				20 1/2	17
3	2 1/2	10	8 1/4		
3 1/4	2 3/4	10 1/4	8 1/2	21	17 1/2
3 1/2	3	10 1/2	8 3/4	21 1/2	18
3 3/4	3	10 3/4	9	22	18 1/4
				22 1/2	18 3/4
4	3 1/4	11	9 1/4	23	19 1/4
4 1/4	3 1/2	11 1/4	9 1/4	23 1/2	19 1/2
4 1/2	3 3/4	11 1/2	9 1/2	24	20
4 3/4	4	11 3/4	9 3/4	24 1/2	20 1/2
5	4 1/4	12	10	25	20 3/4
5 1/4	4 1/4	12 1/4	10 1/4	25 1/2	21 1/4
5 1/2	4 1/2	12 1/2	10 1/2	26	21 3/4
5 3/4	4 3/4	12 3/4	10 1/2	26 1/2	22
				27	22 1/2
6	5	13	10 3/4	27 1/2	23
6 1/4	5 1/4	13 1/2	11 1/4	28	23 1/4
6 1/2	5 1/2	14	11 3/4	29	24 1/4
6 3/4	5 1/2	14 1/2	12	30	25

CAPACITY CONVERSION U.S. GALLONS TO LITERS

Gallons	0	1	2	3	4	5
	Liters	Liters	Liters	Liters	Liters	Liters
0	00.000	3.7853	7.5707	11.3560	15.1413	18.9267
10	37.8533	41.6387	45.4240	49.2098	52 9947	56.7800
20	75.7066	79.4920	83.2773	87.0626	90.8480	94.6333
30	113.5600	117.3453	121.1306	124.9160	128.7013	132.4866
40	151.4133	155.1986	158.9840	162.7693	166.5546	170.3400

GENERAL DATA AND SPECIFICATIONS

BODY STYLE	Valiant and Barracuda	Satellite	Fury	Chrysler	Imperial
Two Door Sedan/Coupe		Satellite	Fury I, II		
Two Door Hardtop	Barracuda, Grand Coupe, 'Cuda	Satellite Sebring, GTX, Road Runner Satellite Sebring "Plus"	Fury II, III, Sport Fury, GT	Newport, Newport Custom, 300, New Yorker	LeBaron
Convertible	Barracuda, Grand Coupe, 'Cuda				
Two Door Special	Duster, Duster 340				
Four Door Sedan	Valiant	Satellite, Custom, Brougham	Fury I, II, III, Sport Fury	Newport, Newport Custom, New Yorker	
Four Door Hardtop			Fury III, Sport Fury	Newport, Newport Custom, 300, New Yorker	LeBaron
Station Wagon (2 seat)		Satellite, Satellite Regent, Satellite Custom	Suburban, Custom Suburban, Sport Suburban	Town & Country	
(3 seat)		Satellite, Satellite Custom, Satellite Regent	Suburban, Custom Suburban, Sport Suburban	Town & Country	
Wheelbase (Except Station Wagon)	108"	115"-2 DR. 117.5"-4 DR.	119.5"	123.5"	126.5"
Station Wagon			121.5"	121.5"	
Tread (Front)	60.2" (Barracuda) 57.4" (Valiant)	59.7"	62.1"	62.1"	62.4"
Tread (Rear)	60.7" (Barracuda) 55.6" (Valiant)	62.0"	63.4"	63.4"	63.4"
Length With Bumper (Except Station Wagon)	186.6" (Barracuda) 188.4" (Valiant)	204.6"	214.9"	224.6"	229.7"
Station Wagon		210.9"	220.2"	224.8"	
Width With Bumper (Except Station Wagon)	74.5" (Barracuda) 71.1" (Valiant)	76.4"	79.6"	79.1"	79.1"
Station Wagon		71.6" Front	76.5" Front	78.3" Front	
		75.6" Rear	78.6" Rear	78.6" Rear	

TORQUE REFERENCES

HEAD MARKINGS—Head marking identification shall consist of radial lines extending to the across flats top circle. The identification shall be easily legible and distinct from manufacturer's trade mark, but need not be in any particular relation to the hexagon. The manufacturer's trade mark shall be legible, in the center of the bolt head, and not over 1/3 of the cross flats dimension.

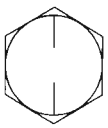
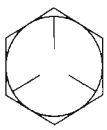
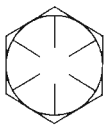
SAE CLASSIFICATION	GRADE 3	GRADE 5	GRADE 8
HEAD MARKINGS	 180°	 120°	 60° PB283

Fig. 3 - Bolt Head Identification

BOLT TORQUE

SIZE	GRADE 1	GRADE 5	GRADE 8
6-32	10	Above dotted line In. Lbs.	
8-32	12	Below dotted line—Ft. Lbs.	
10-24	17		
10-32	20		
12-24	25		
1/4-20	40	130	185
1/4-28	45	130	185
5/16-18	100	200	280
5/16-24	110	20	28
3/8-16	180	30	42
3/8-24	200	35	49
7/16-14		55	70
7/16-20		60	75
1/2-13		85	105
1/2-20		95	120
9/16-12		115	145
9/16-18		130	160
5/8-11		170	210
5/8-18		180	225
3/4-16		200	245

LUBRICATION AND MAINTENANCE

CONTENTS

	Page
ALTERNATOR	12
BATTERY	12
BRAKES	10
CAPACITIES	4
CARBURETOR AIR CLEANERS	20
CARBURETOR CHOKE VALVE SHAFT	1
CERTIFIED CAR CARE	1
CHASSIS LUBRICATION	7
CLASSIFICATION OF LUBRICANTS	2
CLUTCH LINKAGE	11
COOLING SYSTEM	12
CRANKCASE VENTILATION SYSTEM	16
DISTRIBUTORS	13
ENGINE OIL FILTERS	15
ENGINE OIL—SELECTION OF	13
ENGINE PERFORMANCE DIAGNOSIS	19
FREQUENCY OF OIL CHANGES	14
FRONT WHEEL BEARINGS	25
FUEL FILTERS	21
HEADLIGHTS	13
HOISTING	7
HYDRAULIC BRAKE SYSTEM	10
LUBRICATION AND MAINTENANCE GUIDE	2
LUBRICATION AND MAINTENANCE SCHEDULES	
Normal Service	3
Trailer Towing and Severe Service	4
MANIFOLD HEAT CONTROL VALVES	19
MATERIALS ADDED TO ENGINE OILS	14
PARKING BRAKE MECHANISM	11
PARTS REQUIRING NO LUBRICATION	27
PROPELLER SHAFT AND UNIVERSAL JOINTS	21
REAR AXLES	9
SPEEDOMETER CABLE	26
STEERING GEAR	22
SUMMARY OF LUBRICATION AND MAINTENANCE SERVICES	1
THROTTLE LINKAGE	26
TIRES	25
TRANSMISSION (Automatic)	24
TRANSMISSION (Manual)	23
WINDSHIELD WIPER BLADES	13

CERTIFIED CAR CARE

Certified Car Care is a thorough servicing program that helps make sure the cars you sell receive the regular attention you know they need.

Certified Car Care helps build business for you in the best way known—through customer satisfaction. Inform your customers that the best approach to trouble-free driving is Certified Car Care.

This is a practical plan to help you build up sales and service volume, by providing regular service customer visits.

SUMMARY OF LUBRICATION AND MAINTENANCE SERVICES

Maintenance and lubrication service recommendations for Chrysler Corporation-built vehicles have been compiled to provide maximum protection for the car owner's investment against all reasonable types of driving conditions.

Since these conditions vary with the individual car owner's driving habits, the area in which the car is operated and the type of service to which the car is subjected, it is necessary to prescribe lubrication and maintenance service on a time frequency as well as mileage interval basis.

Information pertaining to Lubrication and Maintenance requirements is shown on the guide (Fig. 1) and on the Schedule.

Vehicles operating under severe service conditions require more frequent service.

Component service information is included in each unit under the heading "Trailer Tow and/or Severe Service" for vehicles operating under one or more of the following conditions:

(1) Police, Taxi and Limousine Operation
(2) Trailer Towing
(3) Operation of Vehicle:
(a) In extremely dusty areas
(b) 50 percent or more of the time in heavy city traffic in hot temperatures (90 degrees or higher)
(c) Prolonged idling
(d) Extremely short run operation
(e) Commercial type operation

CLASSIFICATION OF LUBRICANTS

Oils, lubricants and greases are classifed and graded according to standards recommended by the Society of Automotive Engineers (SAE), the American Petroleum Institute (API) and the National Lubricating Grease Institute (NLGI).

Engine Oil

The SAE grade number indicates the viscosity of engine oils, for example, SAE 30, which is a single grade oil. Engine oils are also identified by a dual number, for example, SAE 10W-30, which indicates a multigrade oil.

The API classification system defines oil performance in terms of engine usage. Only engine oils designated "For Service MS" (or new API classification "SD") should be used. These oils contain sufficient chemical additives to provide maximum engine protection. Both the SAE grade and the API designation must be found on the container.

Gear Lubricants

The SAE grade number also indicates the viscosity of Multi-Purpose Gear Lubricants, defined by MIL-L-2105B. An example is SAE 75, which is a light viscosity lubricant.

Lubricants—Greases

Semi-solid lubricants, such as specified for suspension ball joints, bear the NLGI designation. They are further classified as grades "O" or "2."

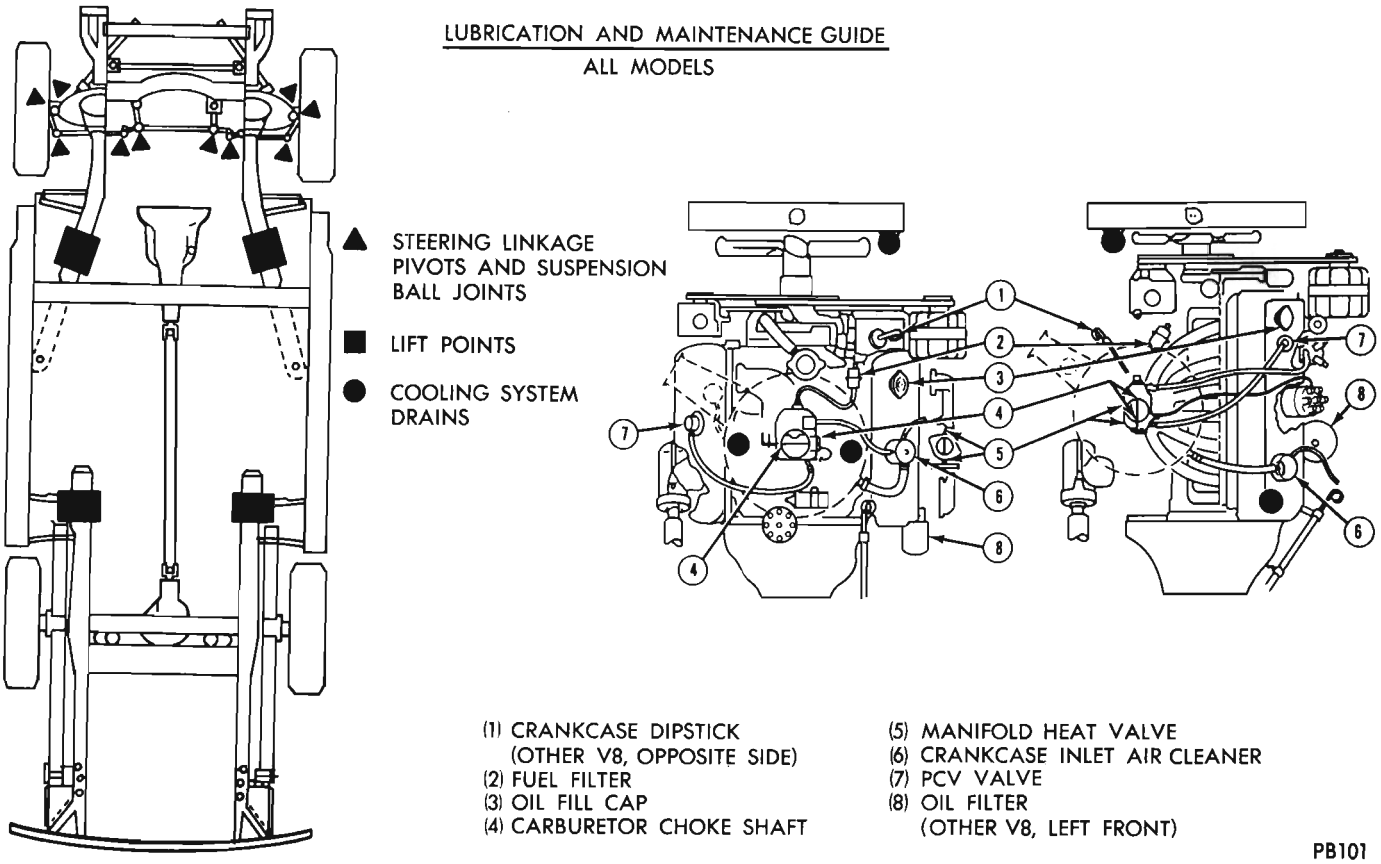


Fig. 1 Lubrication and Maintenance Guide

LUBRICATION AND MAINTENANCE SCHEDULE

SERVICE INTERNAL	ITEM	Page	Replace	Check Fluid Level	Inspect and/or Clean	Lubricate	Service
Every Month	Battery	12		X			
	Cooling System	12		X			
3 Months or 4,000 Miles, whichever occurs first	Engine Crankcase Oil	13	X				
Every Engine Oil Change	Manifold Heat Control Valve	19					X
	Power Steering Fluid	23		X			
	Carburetor Air Filter—Paper**	20			X		
Every Second Oil Change	Engine Oil Filter	15	X				
	Tire Rotation	25					X
Every 6 Months	Carburetor Air Filter—Paper	20			X		
	Crankcase Ventialtion System	16			X		X
	Carburetor Choke Shaft	21			X		X
	Crankcase Inlet Air Cleaner	16			X		
	Transmission	23		X			
	Rear Axle	9		X			
	Steering Gear (Manual)	22		X			
	Steering Linkage	8			X		
	Suspension Ball Joints	7			X		
	Universal Joints	21			X		
	Brake Master Cylinder	10		X			
	Brake Hoses	11			X		
	Headlight Aiming	13					X
	Hood Latch and Safety Catch	—			X	X	
Every 12 Months	Cooling System	12					X
	Crankcase Ventilator Valve	16	X				
	Carburetor Air Filter—Paper**	20	X				
	Throttle Linkage	26				X	
Every 12 Months or 12,000 Miles whichever occurs first	Engine Performance Evaluation	19					X
	Brakes*	10			X		X
	Front Wheel Bearing Lubricant	25			X	X	
Every 24 Months or 24,000 Miles whichever occurs first	Carburetor Air Filter—Paper	20	X				
	Fuel Filter	21	X				
	Brake Pedal Linkage Bushings	11				X	X
Every 36 Months or 36,000 Miles, whichever occurs first	Front Suspension Ball Joints	7				X	
	Steering Tie Rod Ends	8				X	
	Clutch Torque Shaft Bearings	11				X	
When Necessary	Distributor	13				X	X
	Body Mechanisms	—				X	
	Clutch Release Bearing Sleeve, Fork Fingers and Pivot	12				X	
	Column-Mounted Gearshift Linkage	23				X	
	Floor Mounted Gearshift Controls	24				X	
	Parking Brake Mechanism	11				X	
	Speedometer Cable	26				X	
Points that Should Not Be Lubricated		27					

*Replace lining if necessary

**Vehicles equipped with Fresh Air Induction System

TRAILER TOWING AND/OR SEVERE SERVICE

SERVICE INTERNAL	ITEM	Page	Replace	Check Fluid Level	Inspect and/or Clean	Lubricate	Service
Every 3 Months or 4,000 Miles, whichever occurs first	Transmission	24		X			
	Rear Axle	9		X			
	Universal Joints	21			X		
Every 36,000 Miles	Manual Transmission Fluid	23	X				
	Rear Axle Lubricant	9	X				
	*Universal Joints	21					X
Every 24,000 Miles	Automatic Transmission Fluid, Filter and Band Adjustment	24	X				X

*Police and Taxi

CAPACITIES

	U.S. MEASURE	IMPERIAL MEASURE
CRANKCASE		
Satellite and Barracuda Models **only** when equipped with 426 Hemi, 440 HP or 440 three 2 BBL engines	6 qts.	5 qts.
All other engines	4 qts.	3-1/4 qts.
Add 1 quart (3/4 Imperial quart) when filter is replaced		
COOLING SYSTEM		
198-225 Cu. In. Engine		
Manual Transmission (All)	13 qts.	10-3/4 qts.
Automatic Transmission-Valiant, Fury	13 qts.	10-3/4 qts.
Barracuda, Satellite and (Fury, Police/Taxi)	14 qts.	11-3/4 qts.
Maximum Cooling or Air Conditioning (All)	14 qts.	11-3/4 qts.
318 Cu. In. Engine		
Manual or Automatic Transmission (All)	13 qts.	10-3/4 qts.
Air Conditioning-Valiant, Barracuda	17 qts.	14-1/4 qts.
-Satellite, Fury	17-1/2 qts.	14-1/2 qts.
Maximum Cooling - Valiant	17 qts.	14-1/4 qts.
- Barracuda, Satellite	17-1/2 qts.	14-1/2 qts.
- Fury.	18-1/2 qts.	15-1/2 qts.
318 Cu. In. Engine-Police/Taxi-(All)	18-1/2 qts.	15-1/2 qts.
340 Cu. In. Engine		
Manual Transmission-Valiant.	15 qts.	12-1/2 qts.
-(All Other)	15-1/2 qts.	13 qts.
360 Cu. In. Engine		
Manual or Automatic Transmission (All)	15-1/2 qts.	13 qts.
Air Conditioning or Maximum Cooling (All).	16 qts.	13-1/4 qts.
360 Cu. In. Engine-Police/Taxi-(All)	16 qts.	13-1/4 qts.
383 (2-BBL.) Cu. In. Engine		
Manual or Automatic Transmission (All)	14-1/2 qts.	12 qts.
Air Conditioning-Barracuda, Satellite.	16 qts.	13-1/4 qts.
-Fury, Chrysler.	15 qts.	12-1/2 qts.
Maximum Cooling-Barracuda, Satellite.	15 qts.	12-1/2 qts.
-Fury, Chrysler	16 qts.	13-1/4 qts.
383 (2 or 4BBL) Cu. In. Engine-Police		
Manual Transmission (383-2 BBL Only).	16 qts.	13-1/4 qts.
Automatic Transmission or Air Conditioning-(Satellite)	16 qts.	13-1/4 qts.
Maximum Cooling.	17 qts.	14-1/4 qts.
All Other.	18 qts.	15 qts.

383 (4-BBL.) Cu. In. Engine		
Manual or Automatic Transmission	14-1/2 qts.	12 qts.
Air Conditioning-Barracuda, Satellite, Chrysler.	16 qts.	13-1/4 qts.
-Fury.	15 qts.	12-1/2 qts.
Maximum Cooling-Barracuda, Satellite.	15 qts.	12-1/2 qts.
-Fury, Chrysler.	16 qts.	13-1/4 qts.
440 Cu. In. Engine		
Manual Transmission	17 Qts.	14-1/4 Qts.
Automatic Transmission-Barracuda, Satellite.	15-1/2 Qts.	13 Qts.
-Fury, Chrysler.	14-1/2 Qts.	12 Qts.
Air Conditioning*-Barracuda, Chrysler.	17 Qts.	14-1/4 Qts.
-Satellite.	18 Qts.	15 Qts.
440 Cu. In. Engine (Imperial) All.	17-1/2 Qts.	14-1/2 Qts.
426 Hemi (All).	17 Qts.	14-1/4 Qts.

*Not available on Models with 3-2 BBL. Carburetors.

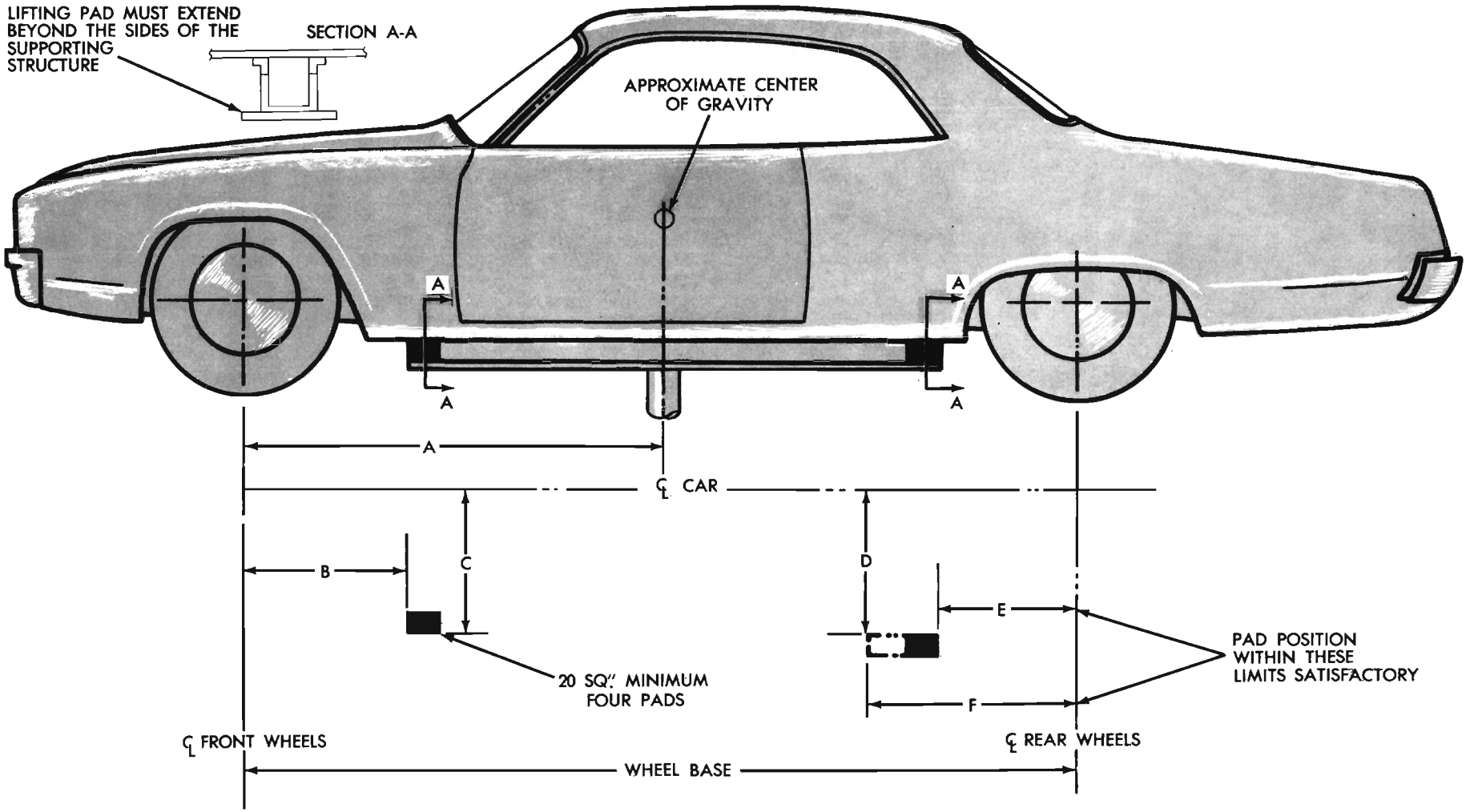
NOTE: Models with Rear Seat Heater, add 1-1/2 Qts. (1-1/4 Imperial Quarts).

TRANSMISSIONS (TORQUEFLITE)		
All 6 cylinder engines (except Police-Taxi)	17 pts.	14 pts.
Valiant, Barracuda, Satellite with 318 Cu. In. Engines	17 pts.	14 pts.
Fury with 318 Cu. In. Engine with 904 Transmission†	17 pts.	14 pts.
Fury with 318 Cu. In. Engine with 727 Transmission	16.3 pts.	13-1/4 pts.
Fury with 318 Cu. In. Engine with 727 Transmission Police-Taxi and/or Trailer Tow	19 pts.	15-3/4 pts.
340 and 360 Cu. In. Engines	16.3 pts.	13-1/4 pts.
383 Cu. In. Engines—2 BBL	19 pts.	15-3/4 pts.
383 Cu. In. Engines—4 BBL	16.3 pts.	13-1/4 pts.
All 440 Cu. In. Engines	19 pts.	15-3/4 pts.
426 Hemi	16.8 pts.	13-1/2 pts.

NOTE: Models equipped with Auxiliary Cooler
Add approximately 1/2 pint to above quantities

† Fury models only, 318 Cu. In. Engine with A-904 TorqueFlite, Identify by part number and support webs cast on servo at right rear of case.

TRANSMISSION 3-SPEED (MANUAL)		
Model A-903 6 Cylinder Valiant, Satellite	6-1/2 pts.	5-1/2 pts.
Model A-230 (8 Cyl. Models and 6 Cyl. Police and Taxi)	4-3/4 pts.	4 pts.
TRANSMISSION 4-SPEED (MANUAL)		
Model 833 Valiant	7 pts.	5-34 pts.
Barracuda, Satellite	7-1/2 pts.	6-1/4 pts.
REAR AXLE		
7-1/4 Axle	2 pts.	1-3/4 pts.
8-1/4 and 8-3/4 Axle	4.4 pts.	3-1/2 pts.
9-3/4 Axle	5.5 pts.	4-1/2 pts.
FUEL TANK		
Valiant	17 gals.	14-1/4 gals.
Barracuda	18 gals.	15 gals.
Satellite	21 gals.	17-1/2 gals.
Satellite Station Wagon	21 gals.	17-1/2 gals.
Fury, Chrysler and Imperial	23 gals.	19-1/4 gals.
Fury, Chrysler Station Wagon	23 gals.	19-1/4 gals.
POWER STEERING		
All	4 pts.	3-1/4 pts.



	VALIANT	BARRACUDA	SATELLITE	FURY	CHRYSLER	IMPERIAL
W.B.	108"	108"	115.0"-117.5"	119.5"-121.5"	121.5"-123.5"	126.5"
A	48.0"	48"-49"	x51.0"-56.0"	xxx 54.0"-60.0"	xxx54.0"-60.0"	60.0"
B	22.3"	26.5"	27.5"	26.7"	26.7"	29.7"
C	14.2"	18.5"	18.5"	22.2"	22.2"	22.2"
D	16.2"	15.6"	xx18.8"	18.8"	18.8"	18.8"
E	23.7"	20.0"	23.0"	25.6"	25.6"	25.6"
F	32.7"	29.0"	33.0"	34.6"	34.6"	34.6"

x 60.0" TO 65.0" FOR STATION WAGONS
xx 21.2" ROAD RUNNER MODELS
xxx 65.0" FOR STATION WAGONS

PB129

Fig. 2 Support Locations-Frame Contact Hoist

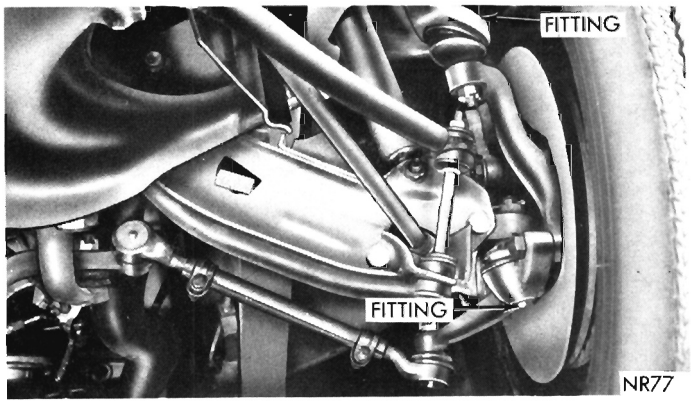


fig. 3 - Upper and Lower Ball Joint Lubrication (Valiant Models)

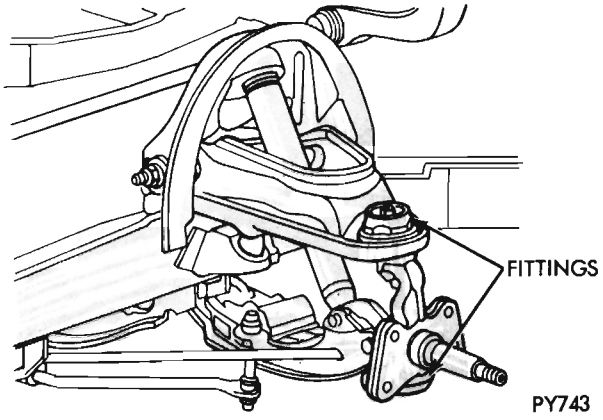


Fig. 4 - Upper and Lower Ball Joint Lubrication (Satellite and Barracuda Models)

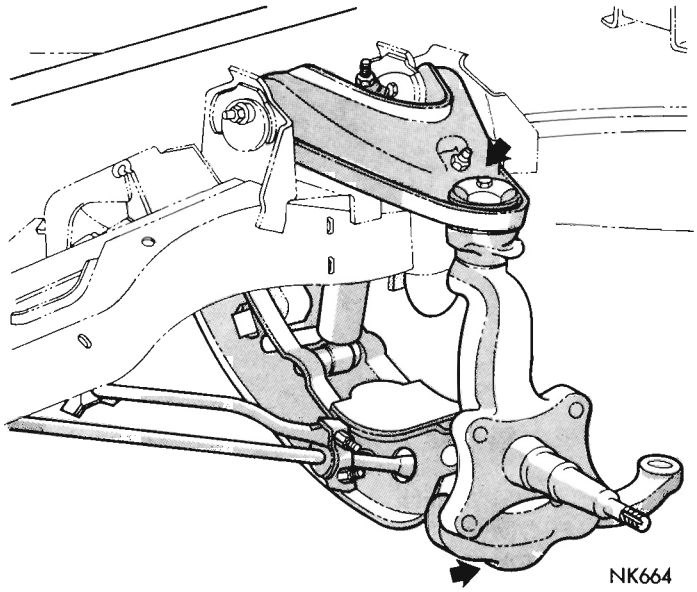


Fig. 5 Upper and Lower Ball Joint Lubrication (Chrysler and Fury Models)

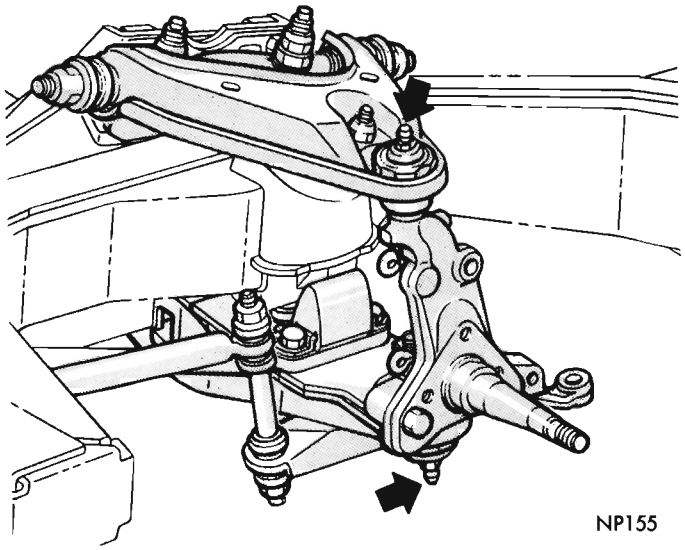


Fig. 6 Upper and Lower Ball Joint Lubrication (Imperial Models)

HOISTING

Post Type

Special care should be taken when raising the vehicle on a frame contact type hoist. The hoist must be equipped with the proper adapters in order that the vehicle will be supported in the correct locations (Fig. 2).

Conventional hydraulic hoists may be used after determining that the adapter plates will make firm contact with the lower control arms and the rear axle housing.

Floor Jack

A regular floor jack may be used under the rear axle housing, or under the front suspension lower control arms, **however, a floor jack must never be used on any parts of the underbody.**

CAUTION: Do not attempt to raise one entire side of the vehicle by placing a jack midway between front and rear wheels. This practice may result in permanent damage to the body.

Bumper Jack

The bumpers are designed to accept a bumper jack in an emergency, if it becomes necessary to change a tire on the road. Notches are provided in the bumpers for the purpose of raising the vehicle with the bumper jack.

CHASSIS LUBRICATION

Front Suspension Ball Joints

All models have two upper and two lower front suspension ball joints (Figs. 3, 4, 5 and 6) that require periodic servicing. The ball joints should be inspected twice a year or whenever a car is serviced for other reasons. Damaged joints or seals should be replaced to prevent leakage or contamination of the grease. SOME MODELS ARE DE-

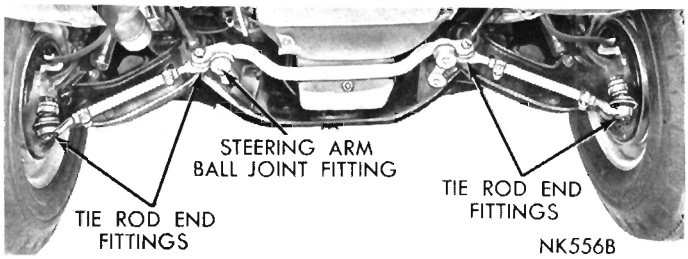


Fig. 7 - Steering Linkage Lubrication (Valiant Models)

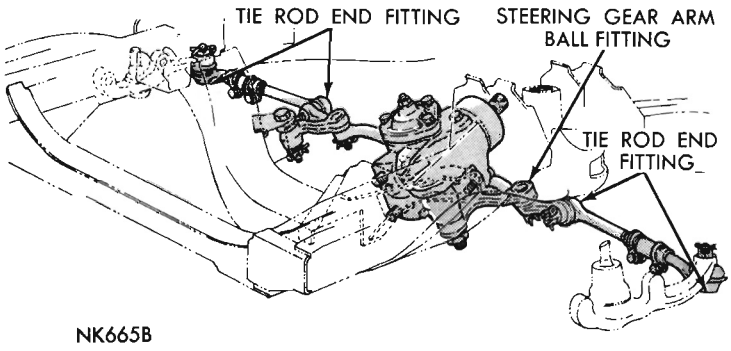


Fig. 9 - Steering Linkage Lubrication (Chrysler and Fury Models)

SIGNED TO OPERATE WITH BALL JOINT FREE PLAY. REPLACEMENT SHOULD BE MADE ONLY WHEN THE FREE PLAY EXCEEDS THE SPECIFICATIONS SHOWN IN **"FRONT SUSPENSION", Group 2.**

Ball joints are semi-permanently lubricated at the factory with a special grease. When relubricating ball joints use only a special long life chassis grease intended for this purpose such as Multi-Mileage Lubricant, Part Number 2525035, or equivalent.

Frequency of Lubrication

1 **Normal Service.**

Lubricate every three years or 36000 miles, whichever occurs first.

2 **Severe Service** (Police, Taxi or Limousine).

Lubricate every eighteen months or 18,000 miles, whichever occurs first.

Relubrication Procedure

1. Clean the accumulated dirt and grease from the outside surface of the seal to permit complete inspection.
2. Remove the threaded plug from each ball joint and install standard grease fittings, these fittings can remain for future regularly scheduled lubrication.
3. Fill and flush the joint with lubricant. If high pressure equipment is used, care must be taken to fill and flush the joint slowly to avoid damaging the seals.

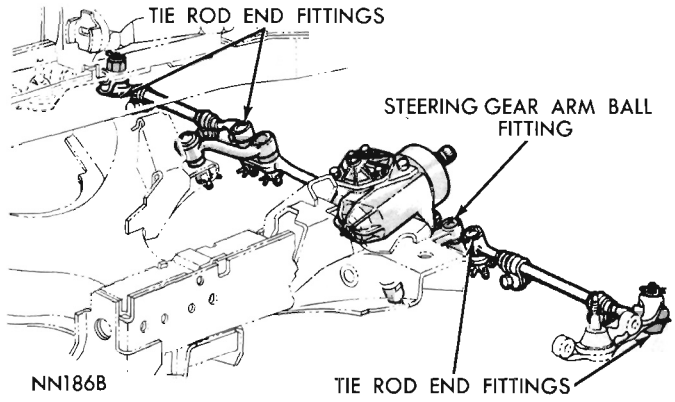


Fig. 8 - Steering Linkage Lubrication (Satellite and Barracuda Models)

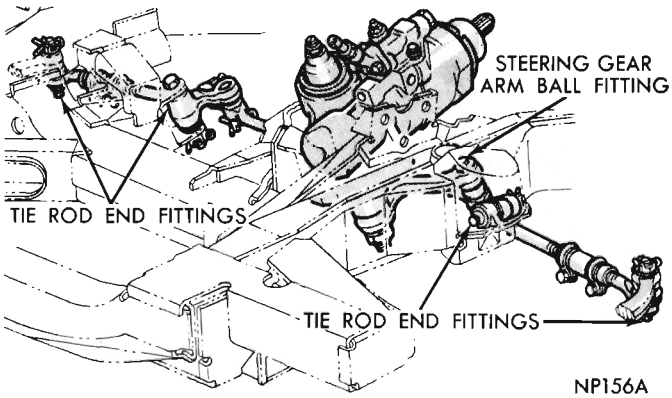


Fig. 10 - Steering Linkage Lubrication (Imperial Models)

STOP FILLING WHEN GREASE BEGINS TO FLOW FREELY FROM THE BLEED AREA AT THE BASE OF THE SEAL, OR IF THE SEAL BEGINS TO BALLON.

Steering Linkage Ball Joints

All models have four tie rod end ball joints and a pitman-arm joint that require perodic servicing (Figs. 7, 8, 9 and 10).

These should be inspected twice a year, or whenever the car is serviced for other reasons. Damaged joints or seals should be replaced to prevent leakage or contamination of the grease.

The ball joints and pitman-arm are semi-permanently lubricated at the factory with a special grease. When relubricating the steering linkage, use only special long life chassis grease intended for this purpose such as Multi-Mileage Lubricant, Part Number 2525035 or equivalent.

Frequency of Lubrication

1 **Normal Service**

Lubricate every three years or 36,000 miles whichever occurs first.

2 **Severe Service** (Police, Taxi or Limousine)

Lubricate every eighteen months or 18,000

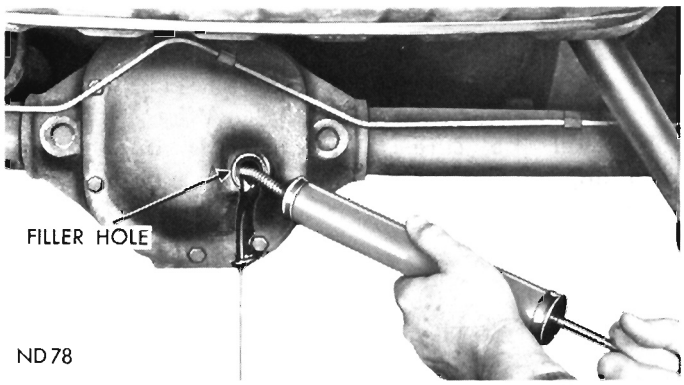


Fig. 11 Removing Rear Axle Lubricant (7 1/4-Inch Axle)

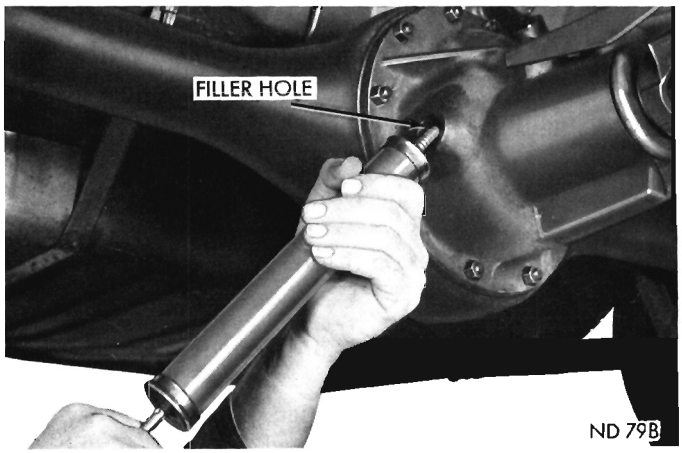


Fig. 13 Removing Rear Axle Lubricant (8-3/4 Inch Axle)

miles, whichever occurs first.

Relubrication Procedure:-

1. Clean the accumulated dirt and grease from the outside surface of the seal to permit complete inspection.
2. Remove the threaded plug from each ball joint and install standard grease fittings, these fittings can remain for future regularly scheduled lubrication
3. Fill and flush the joint with lubricant. If high pressure equipment is used, care must be taken to fill and flush the joint slowly to avoid damaging the seals.

STOP FILLING WHEN GREASE BEGINS TO FLOW FREELY FROM THE BLEED AREA AT THE BASE OF THE SEAL, OR IF THE SEAL BEGINS TO BALLOON.

REAR AXLE

Standard and Sure-Grip

The lubricant installed in the rear axle at time of assembly is a high quality product and regular-

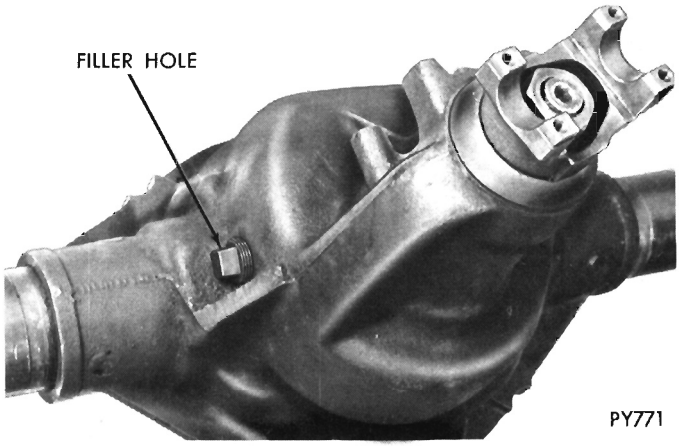


Fig. 12 Filler Plug Location (8-1/4 Inch Axle)

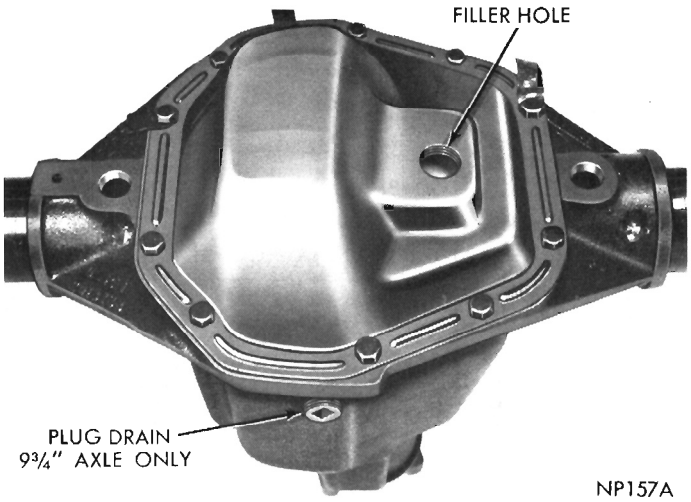


Fig. 14 Drain and Filler Plug Location (9-3/4 Inch Axle)

ly scheduled changes of the lubricant are not recommended in vehicles where operation is classified as normal passenger car service.

The only exceptions, however, would be where the lubricant has become contaminated with water, or to provide the correct viscosity grade for the anticipated temperature range, as indicated by the accompanying table:

The factory fill lubricant is satisfactory to—30 degrees F. ambients.

Anticipated Temperature Range	Viscosity Grade
Above −10° F.	SAE 90
As low as −30° F.	SAE 80
Below −30° F.	SAE 75

If necessary to change lubricant in 7-1/4, 8-1/4, or 8-3/4 inch axle remove old lubricant with suction pump through filler plug hole (Figs. 11,12 and 13).

For 9-3/4 inch axle remove the drain plug from the bottom of the axle housing (Fig. 14).

Type of Lubricant

Chrysler Corporation recommends that Multi-Purpose Gear Lubricant as defined by API GL-5 (MIL-L-2105B) should be used in all rear axles with conventional differentials; Chrysler Hypoid Lubricant (Part Number 2933565) or equivalent, is an oil of this type and is recommended.

In Sure Grip axles, it is recommended that only Chrysler Hypoid Lubricant Part Number 2933565 or its equivalent is used. This lubricant, recommended for conventional differentials too, contains special additives necessary to provide proper differential durability and performance.

Every six months check the fluid level in the axle through the filler plug hole. **When checking the level, be sure the vehicle is in a level position, on an axle or drive-on type hoist.** Identify axle, fluid level and capacity in the accompanying chart.

AXLE IDENTIFICATION CHART

Axle Size	Filler Location	Cover Fastening	Capacity Pints	Lubricant Level
7-1/4	Cover	9 Bolts	2.0	Bottom of Filler Hole to 5/8 Inch Below
8-1/4	Carrier right side	10 Bolts	4.4	* From 1/8 Inch Below Filler Hole to 1/4 Inch Below
8-3/4	Carrier right side	Welded	4.4	Maintain At Bottom of Filler Hole
9-3/4	Cover	10 Bolts	5.5	Bottom of Filler Hole To 1/2 Inch Below

* Do not raise oil level to bottom of filler hole, this will result in "Overfill" condition.

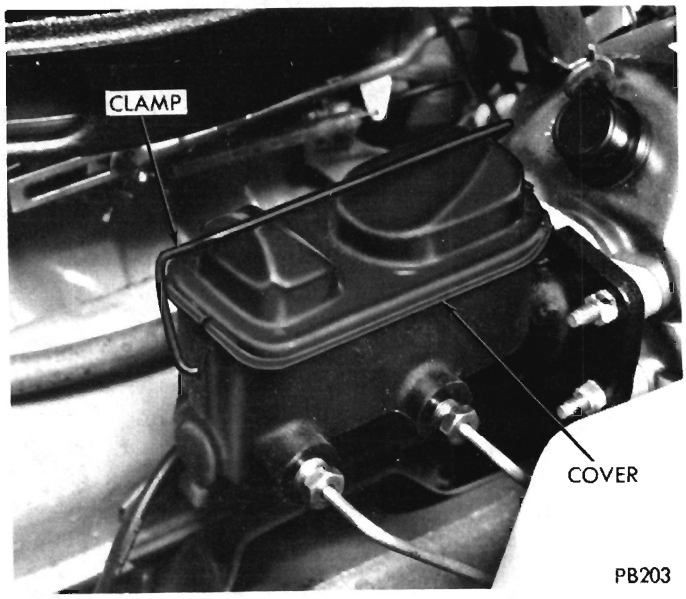


Fig. 15 - Brake Master Cylinder

For vehicles used for police, taxi or trailer towing service; the axle fluid level should be checked every 3 months or 4,000 miles, whichever occurs first. The lubricant should be drained and axle refilled with the specified lubricant every 36,000 miles.

If the axle is submerged in water, such as on a boat launching ramp where water can enter the axle vent, and contamination is suspected or evident, replace the lubricant immediately to avoid early axle failure.

For Limousine service change lubricant every 24,000 miles. Check lubricant level at each engine oil change.

BRAKES

The brakes on all models equipped with drum brakes, except Taxi, are equipped with a self-adjusting mechanism which makes it unnecessary to perform major brake adjustments.

Inspect brake linings for wear every 12 months or 12,000 miles, whichever occurs first. Replace linings if necessary. At this time, lubricate contact areas of brake shoe supports, on models with drum brakes, with a thin film of high-temperature lubricant such as Chrysler Support Plate Lubricant available under Part Number 2932524 or equivalent.

To perform this service, first remove the brake shoes. Next, clean the contact surfaces on the shoes and supports by sanding lightly with fine sandpaper. Then, carefully apply lubricant.

On models equipped with disc brakes, inspect the discs, calipers and linings every 12 months or 12,000 miles whichever occurs first, as outlined under "Brakes," Group 5.

HYDRAULIC BRAKE SYSTEM

Every 6 months the fluid level in the master cyl-

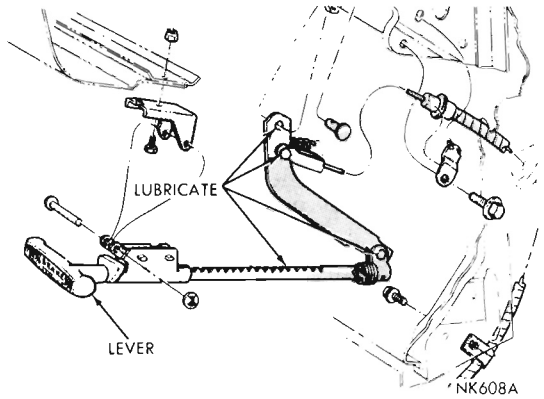


Fig. 16 Hand Operated Parking Brake Lubrication (Valiant Models)

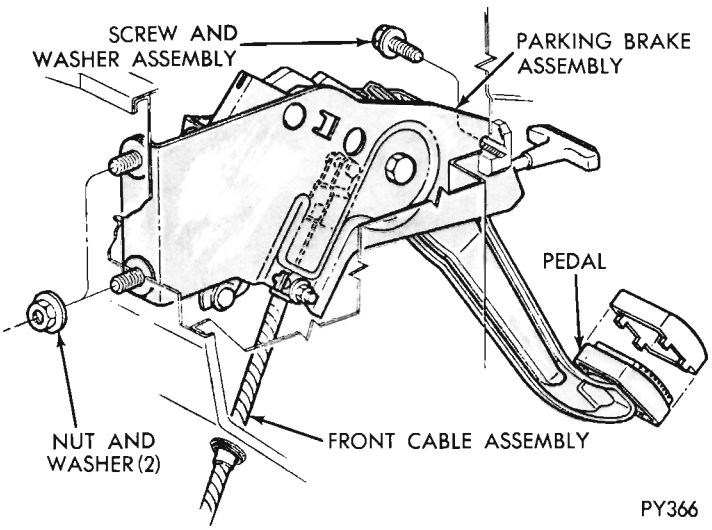


Fig. 17 Foot Operated Parking Brake Lubrication (Satellite and Barracuda)

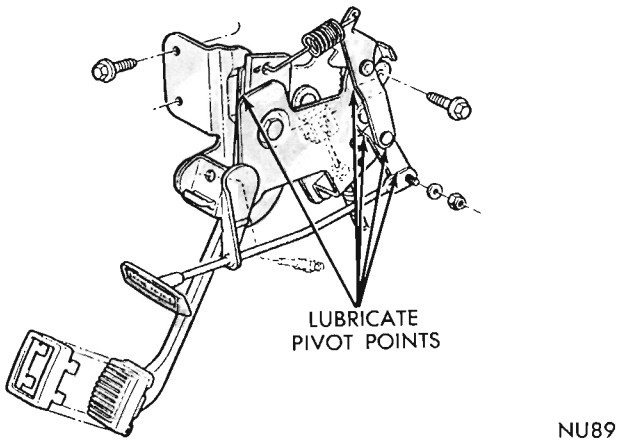


Fig. 18 Foot Operated Parking Brake Lubrication Points (Typical, Fury-Chrylser-Imperial)

inder should be checked (Fig. 15) **Before removing the master cylinder cover wipe it clean to prevent dirt and other foreign matter from dropping into the master cylinder.**

If necessary, add fluid to bring level to within 1/4 inch of the top of the reservoir. **With disc brakes the fluid level can be expected to fall as the brake pads wear. No noticeable drop in level should occur in a car equipped entirely with drum brakes. Low fluid level may have been caused by a leak and a checkup may be needed.**

Only brake fluid conforming to SAE J1703 (70R3 type) should be used. Chrysler Parts Brake Fluid or equivalent, is recommended to provide best brake performance. **Use of a brake fluid that may have a lower initial boiling point, such as fluid identified as 70R1 or unidentified as to specifications, may result in sudden brake failure during hard prolonged braking.**

Brake Hoses

Inspect brake hoses for cracking abrasion, cuts or tears in the outer covering. Examine all connections for leakage. Correct leakage and replace hose where cover damage exposes the fabric braid.

PARKING BRAKE MECHANISM

Valiant models use a hand-operated parking brake lever (Fig. 16). Imperial, Chrysler, Fury, Satellite and Barracuda Models use a foot-operated lever (Figs. 17 and 18).

Pivot points indicated should be lubricated, as required, to maintain ease of operation. Apply a film of smooth, white body hardware lubricant conforming to NLGI grade 1. Chrysler Parts Lubriplate, Part Number 1064768, or equivalent, is recommended for this purpose.

When the hand lever can be pulled out more than four inches, or the foot pedal depressed more than four and one half inches, the brake cable should be adjusted. To adjust, refer to "Parking Brake," Group 5.

CLUTCH LINKAGE

Clutch Torque Shaft Bearings

Inspect clutch torque shaft bearings (Fig. 19) for wear and relubricate every 36 months or 36,000 miles, whichever occurs first. To perform this service, refer to "Clutch," Group 6. After removing torque shaft assembly, disassemble and thoroughly clean all parts in a suitable solvent and inspect for wear. Damaged bearings and/or ball studs should be replaced.

When reassembling shaft, coat inside surfaces at ends of shaft, inside and outside surfaces of bearings and ball studs with Multi-Mileage Lubricant,

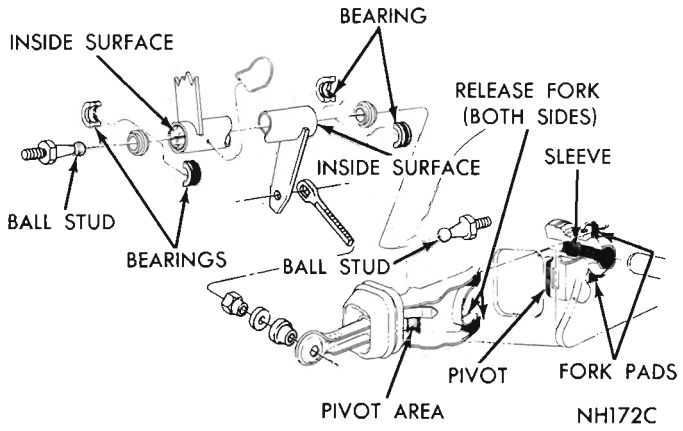


Fig. 19 Clutch Torque Shaft Bearings and Linkage Lubrication (Typical)

Part Number 2525035, or equivalent.

Clutch Drive Lugs, Release Bearing Sleeve, Release Fork and Fork Pivot

If the effort required to depress the clutch pedal becomes excessive, or the linkage begins to squeak or grunt, release bearing sleeve, and fork fingers and pivot should be relubricated with a thin film of Multi-Purpose Grease NLGI Grade 2, E.P. or with Multi-Mileage Lubricant, Part Numer 2525035 or equivalent.

To gain access to this area, remove the clutch inspection plate at the bottom of the clutch housing, the clutch fork boot, and fork.

Apply lubricant to the points of contact on fork pivot, fork fingers, fork pads on sleeve and sleeve cavity. (Fig. 19). The clutch drive lugs should be relubricated only with a high temperature adhesive grease such as Multi-Mileage Lubricant, Part Number 2525035 or equivalent, to minimize the possibility of lubricant travel and clutch contamination.

DO NOT LET GREASE GET ON THE CLUTCH DISC AND PRESSURE PLATE.

COOLING SYSTEM

The cooling system of all cars is protected against corrosion and freezing as they leave the factory. A permanent type anti-freeze is added to provide protection to -20 degrees F. Higher percentages of anti-freeze must be added where temperatures below -20 degrees F. are anticipated.

All engines are equipped with 185 degree thermostats and only permanent (ethylene glycol) type anti-freeze should be used. Plain water or alcohol-base anti-freezes should not be used because their boiling points are too low.

Inspect coolant level every month and maintain coolant level at approximately 1-1/4 inches below the bottom of the filler neck. Overfilling will cause loss through the overflow tube.

Once a year, preferably in the fall, the cooling system should be drained and refilled. This draining and refilling procedure, however, need not be performed until the fall following the vehicle's first full year operation. Drain V-8 engine cooling system by removing drain plugs in sides of cylinder block and opening drain cock in lower radiator tank. On 6-cylinder engines, remove the single drain plug in right side of engine and open drain cock in lower radiator tank. **Discard old solutions.**

Flush the system thoroughly with water. If there is an indication that the system contains a considerable amount of sediment, use a reliable cooling system cleaner to loosen the sediment. Rinse thoroughly to remove deposits.

At this time, check water pump belt tension and check hose connections for tightness. Refill cooling system with clean soft water and a suitable high, quality ethylene glycol anti-freeze in sufficient quantity to provide full protection for the lowest anticipated temperature, but never less than 44 percent of the cooling system capacity to ensure adequate protection against corrosion and boiling. A convenient ratio of 50% ethylene glycol type anti-freeze and 50% water will provide protection to -34 degrees F.

If it becomes necessary to add coolant during the cold weather season, be sure the system contains sufficient anti-freeze to provide protection at least to -20 degrees F. A suitable high quality permanent type anti-freeze, available under Part Number 2932531 or equivalent, should be used. When using a high-quality anti-freeze coolant, it is not necessary to add additional rust inhibitors or an anti-rust type product.

If the vehicle is equipped with air conditioning, the cooling system must contain anti-freeze coolant all year-round. This is necessary because in the reheat cycle, cold, refrigerated air passes through the heater core. Anti-freeze is necessary to prevent coolant in the heater core from freezing in hot weather when the air conditioner is being used.

ALTERNATOR

The alternator is provided with prelubricated bearings, which require no periodic lubrication.

BATTERY

Every two months, or more often in hot weather and on long trips, check fluid level of cells. Restore level to 3/8 inch above plates, using only water of a known low mineral content. **Do not overfill.**

Check specific gravity, using a reliable hydrometer, every 12 months or 12,000 miles, whichever occurs first, or more often if there is

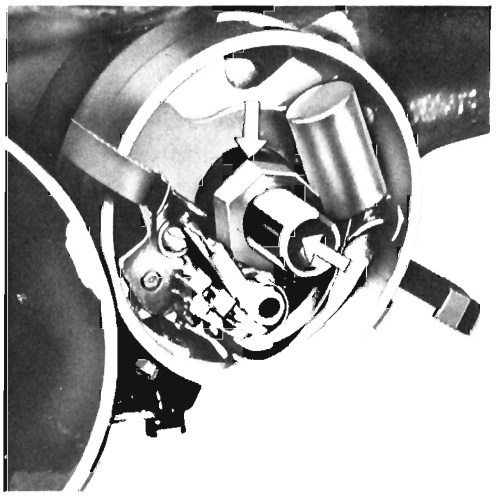


Fig. 20 Distributor Lubrication Points

excessive use of water. Clean battery posts and cable terminals and tighten terminals. Coat connections with light mineral grease or petrolatum.

Refer to "Electrical," Group 8, for complete servicing.

DISTRIBUTORS

Two types of distributors are used. One type (with double breaker points) is provided with an oil cup. When servicing breaker points apply 3 to 5 drops of light engine oil in the cup. Distributors without the oil cup have permanent lubrication and no periodic lubrication is required.

Whenever breaker points are serviced, lubricate cam surfaces. Wipe old lubricant from cam and rubbing block (Fig. 20) and apply a thin film of Cam Lubricant, Part Number 1473595, or equivalent. At this time, apply 1 drop of light engine oil to felt wick under rotor.

CAUTION: Avoid over-oiling and applying an excessive amount of cam lubricant to prevent lubricants from spreading to breaker contacts.

HEADLIGHTS

To assure correct adjustment of headlight aiming, it is recommended that the headlights be checked and, if necessary, re-aimed properly every six months.

Changes in front and rear suspension, such as front suspension height and/or deflection of rear springs, due to heavy loading, will change the headlight beam pattern and may cause unsafe nightime driving conditions.

If a vehicle is to be loaded abnormally, such as for a vacation trip, or with a salesman's products, the headlight aiming should be checked and adjusted to serve the new conditions. Refer to "Lighting System," Group 8, for adjusting procedures.



Fig. 21 — Shaded Area Covers Region Where Minimum Temperatures May Be Consistently Below +10 degrees F During Some Winter Months

WINDSHIELD WIPER BLADES

Long exposure to heat and road splash tend to harden rubber wiper blades, thus destroying their efficiency. When blades smear or in general do not satisfactorily clean the windshield, they should be replaced.

On models with concealed wipper blades, raise hood to expose blade assembly or raise blades above recess by turning on wiper and ignition switch. Stop blades at convenient location by turning off ignition switch and remove one battery cable terminal for safety.

To remove the concealed windshield wiper blade assembly press down on release button in center section of blade. (Some models are released by inserting a small screwdriver in slot in center section). Pull blade assembly up and off the arm assembly mounting pin.

To replace, depress release on end of blade bridge and slide out rubber blade. Slide new rubber blade refill into bridge and lock it in place. Refer to Parts List for correct rubber blade refill.

ENGINE OIL—SELECTION OF

For best performance, and to provide for maximum protection of all engines for all types of operation, only those lubricants should be selected which:

(a) Conform to the requirements of the API classification "FOR SERVICE MS" or "SD".

(b) Have the proper SAE grade number for the expected ambient temperature range (Fig. 21)

Lubricants which do not have both an SAE grade number and an MS Service classification on the container **should not** be used.

Oils used in our engines, labeled "For Service MS", should equal or exceed the Engine Oil Performance Rating Sequence Tests for varnish, sludge and rusting, when tested according to the methods established by the car manufacturer.

All Season Supreme and Supreme Motor Oils or their equivalent, available through the Parts Division, meet these requirements.

Oil Viscosity Recommendations

Multigrades

SAE 20W-50 SAE 20W-40 SAE 10W-40 or SAE 10W-30	Where temperatures are consistently above +32° F.
SAE 10W-30 or SAE 10W-40	Suitable for year long operation in many parts of the U.S.; may be used where temperatures occasionally drop as low as -10° F.
SAE 5W-30 or SAE 5W-20	Recommended where minimum temperatures are consistently below +10° F.

Single Grades

SAE 30	Where temperatures are consistently above +32° F.
SAE 10W	Where temperatures range between +32° F. and -10° F.

IMPORTANT: If the vehicle is to be used for maximum performance service (very high speeds or very rapid acceleration), the engine requires heavier than normal lubricating oil. This is due to the high speeds, loads, and temperature of moving parts developed in these engines during this type of operation.

FOR BEST PROTECTION OF THE ENGINE UNDER THESE CONDITIONS THE HEAVIEST AVAILABLE ENGINE OIL OF MS OR SD QUALITY SHOULD BE USED THAT WILL PERMIT SATISFACTORY COLD STARTING. SAE 30 AND 40 ARE RECOMMENDED; MULTI-VISCOSITY OILS SAE 20W-40 AND SAE 20W-50 MAY ALSO BE USED. IT IS ALSO RECOMMENDED THAT A ONE PINT CONTAINER OF CHRYSLER PARTS HI PERFORMANCE SPERM OIL ADDITIVE, PART NUMBER 3549586 OR EQUIVALENT, BE ADDED TO THE CRANKCASE AT EVERY ENGINE OIL CHANGE IN ADDITION TO THE REGULAR CRANKCASE ENGINE OIL FILL.

MATERIALS ADDED TO ENGINE OILS

It is not necessary to add any materials to crankcase oils for most types of service. In order to provide optimum engine component protection in high performance engines equipped with four-barrel and three two-barrel carburetors, it is recommended that one pint of Chrysler Parts Hi Performance Sperm Oil Additive, Part Number 3549586 or equivalent, be added at every oil change. It is strongly recommended that this additive be added to the initial oil fill of these engines to aid break-in following engine overhaul and/or new piston installation. This material may be used in any engine, but its use in high performance engines is strongly recommended.

FREQUENCY OF ENGINE OIL CHANGES

The by-products of combustion, such as unburned fuel, condensation and carbon deposits, in addition to dust and other abrasive materials, tend to contaminate engine oil. If permitted to remain in the crankcase for too great a period of time, the contaminants reduce the lubricating qualities of the oil causing excessive wear which can materially affect the operating efficiency of the engine.

To provide maximum protection to engine parts, it is recommended under normal operating conditions, that engine oil be drained and replenished with new oil of the proper viscosity and API classification every three (3) months or 4,000 miles, whichever occurs first.

When draining the old oil, it is recommended that the engine be at normal operating temperature, as the warmed oil will drain more readily and carry with it foreign matter which might otherwise cling to the sides of the crankcase and the various moving parts.

A greater degree of contamination of the engine oil takes place when the vehicle is operated under adverse conditions, such as frequent driving in dusty areas, short trips, stop-and-go driving and where long periods of idling are experienced. For oil change frequencies under these operating conditions, refer to the recommendations in the paragraphs under Severe Operating Conditions and Taxi and Police Operation.

During Break-In

Cars should be driven moderately during the first 300 miles. Speeds up to 50 to 60 mph are desirable. While cruising, brief full-throttle accelerations contribute to a good break-in. Wide-open throttle accelerations in low gear can be detrimental and should be avoided for at least 500 miles.

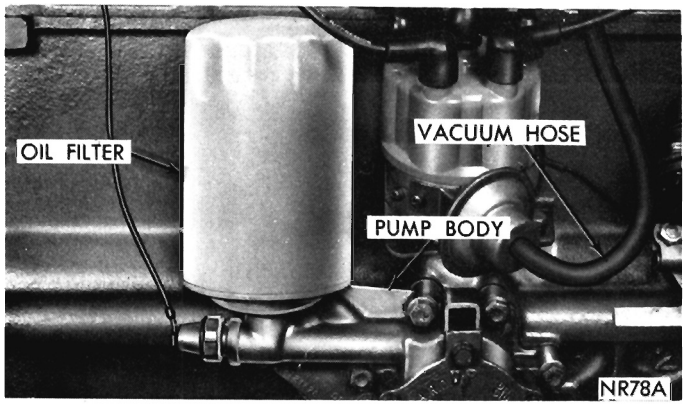


Fig. 22 Engine Oil Filter (6 Cylinder Engines)

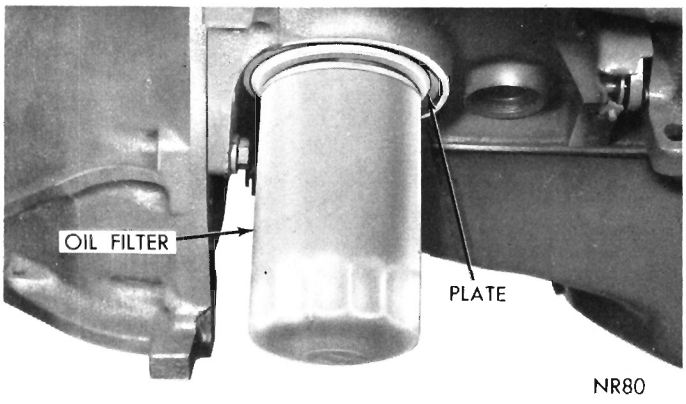


Fig. 23 Engine Oil Filter (318, 340 and 360 Cu. In. Engines) Except Valiant Models

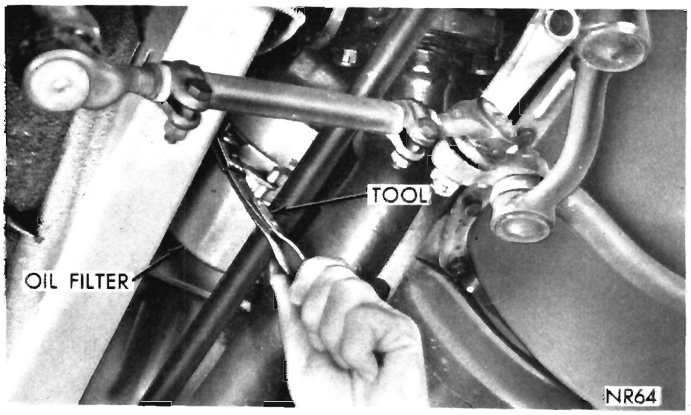


Fig. 24 Engine Oil Filter (318 and 340 Cu. In. Engines) Valiant Models

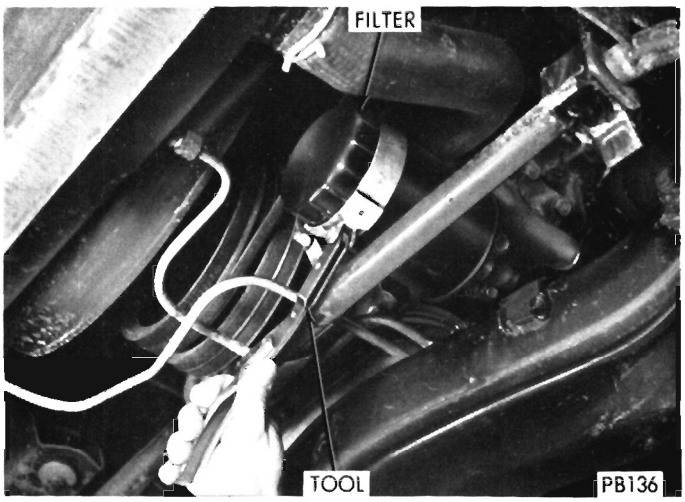


Fig. 25 Engine Oil Filter (383 and 440 Cu. In. Engines)

The oil installed in the engine at the factory is a high quality lubricant, classified "For Service MS" or "SD," **should be retained** until the first regularly scheduled three-month or 4,000-mile oil change, whichever occurs first. If it becomes necessary to add oil during this initial period, an oil with the "For Service MS" classification and of the proper viscosity grade should be used. **Nondetergent or straight mineral oils must never be used.**

Oil level should be checked during each stop for gasoline. Oil should be added only when level on oil level indicator **is at or below** "ADD OIL" mark. Frequently, a new engine will consume some oil during its first few thousand miles of operation. This should be considered as a normal part of the break-in and not interpreted as an indication of difficulty.

Severe Service (Frequency of Oil and Oil Filter Change).

1. Police, Taxi and Limousine Operation.

(a) Change oil every two months or 2,000 miles, whichever, occurs first.

(b) Change oil filter at each oil change.

2. Police Equipped with High Performance Engine.

(a) Change oil every month or 2,000 miles, whichever, occurs first.

(b) Change oil filter at each oil change.

Private vehicle owner operation with frequent short trip operation where engine never reaches normal operating temperature, prolonged idling, very dusty operating conditions or heavy duty trailer towing.

(a) Change oil every two months or 2,000 miles, whichever, occurs first.

(b) Change oil filter every second oil change.

ENGINE OIL FILTERS

All engines are equipped with full-flow, throwaway oil filters (Figs. 22,23,24 and 25) to provide efficient filtering of engine oil for maximum engine protection.

The filter should be replaced every second oil change. Since filters vary widely in quality, it is recommended that a Chrysler Corporation Engine Oil Filter, or equivalent, be used for replacement to assure most efficient service.

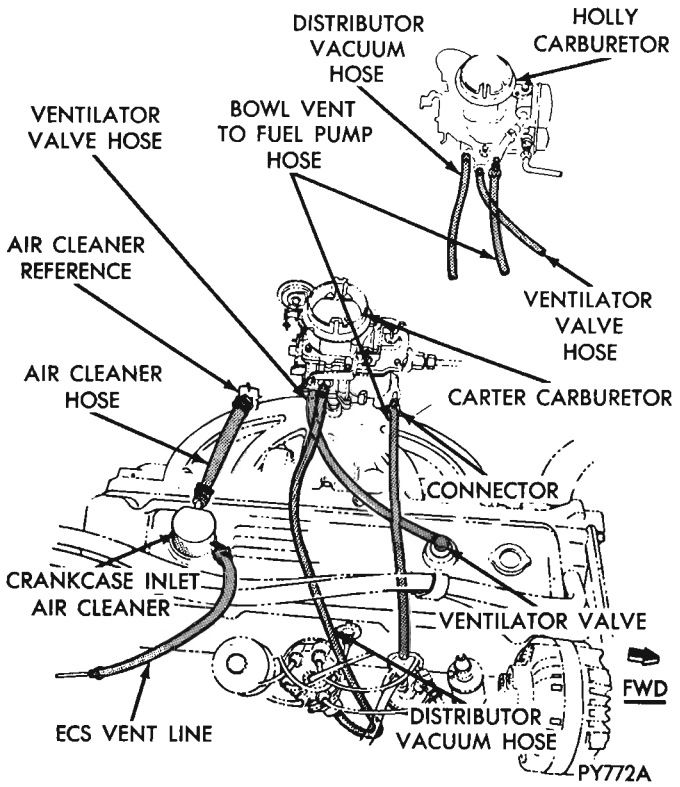


Fig. 26 Crankcase Ventilation System (6 Cylinder Models)

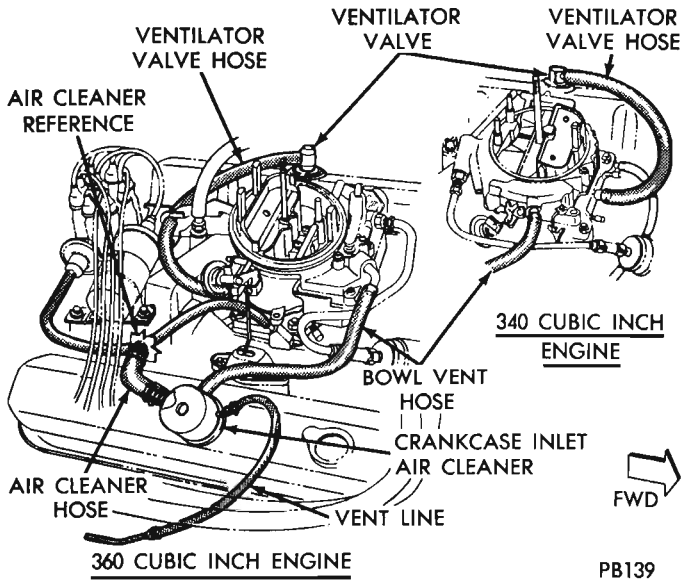


Fig. 28 Crankcase Ventilation System (340 and 360 Cu. In. Engines)

CRANKCASE VENTILATION SYSTEM

All models are equipped with a closed crankcase ventilating system (Figs. 26, 27, 28, 29, 30, 31 and 32). This system consists of a crankcase ventilator valve mounted on the cylinder head cover, and a carburetor with a hose from its base connected to the ventilator valve.

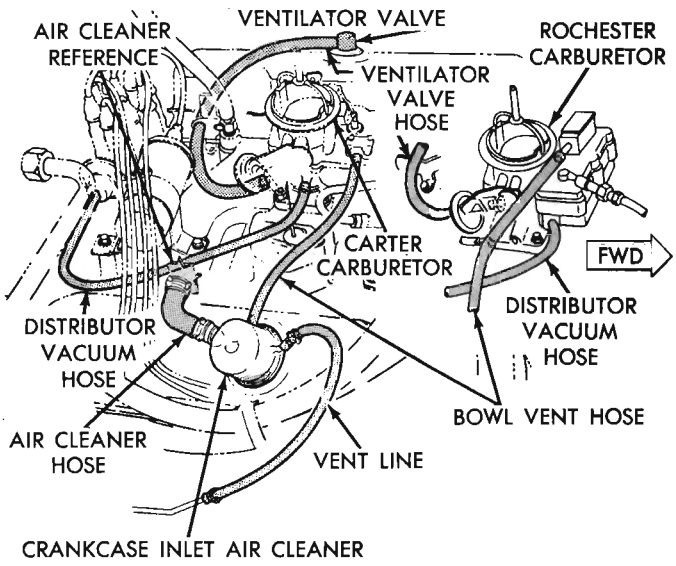


Fig. 27 Crankcase Ventilation System (318 Cu. In Engine)

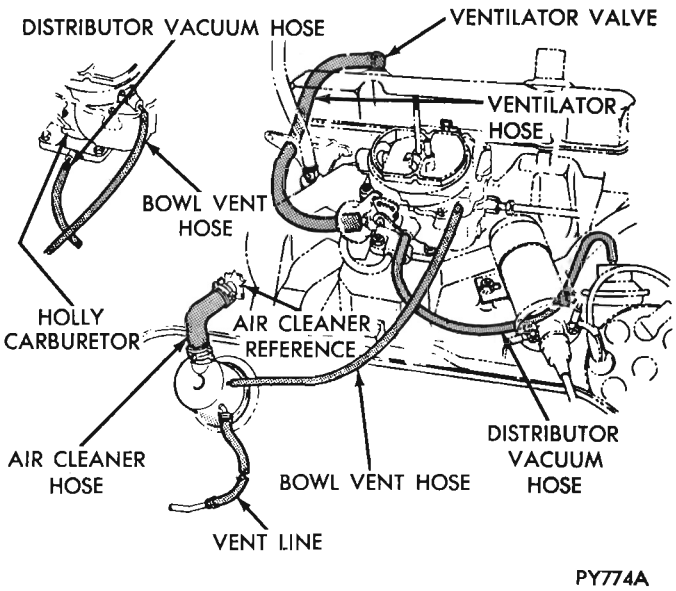


Fig. 29 Crankcase Ventilation System (383 Cu. In. Engine with 2-Barrel Carburetor)

A closed crankcase inlet air cleaner with a hose connecting it to the carburetor air cleaner housing provides the air inlet for the system.

The crankcase inlet air cleaner is also provided with inlet fittings for a bowl vent hose and vent line hose (eight cylinder engines), or vent line only (six cylinder engines).

VENTILATION SYSTEM OPERATION

The ventilating system operates by manifold vacuum. Air is drawn from the carburetor air cleaner through the air cleaner hose and crankcase inlet air cleaner into the crankcase, circulated through the engine and drawn out through the

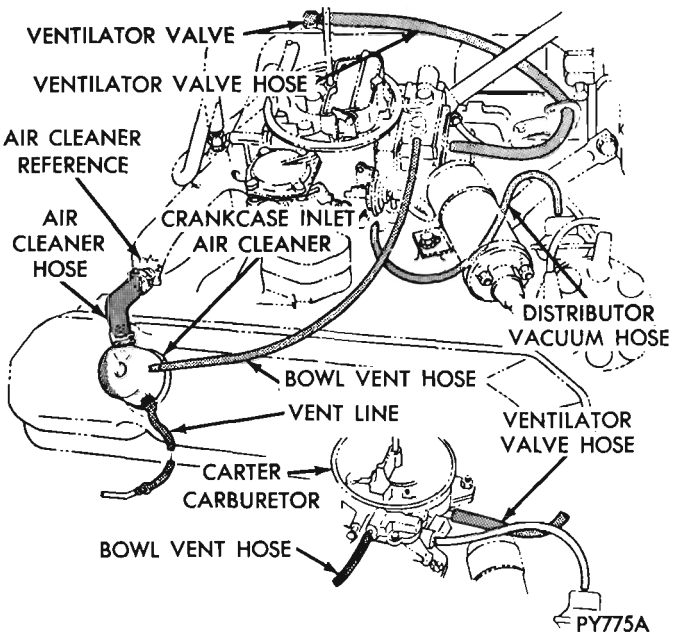


Fig. 30 Crankcase Ventilation System (383 and 440 Cu. In Engine)

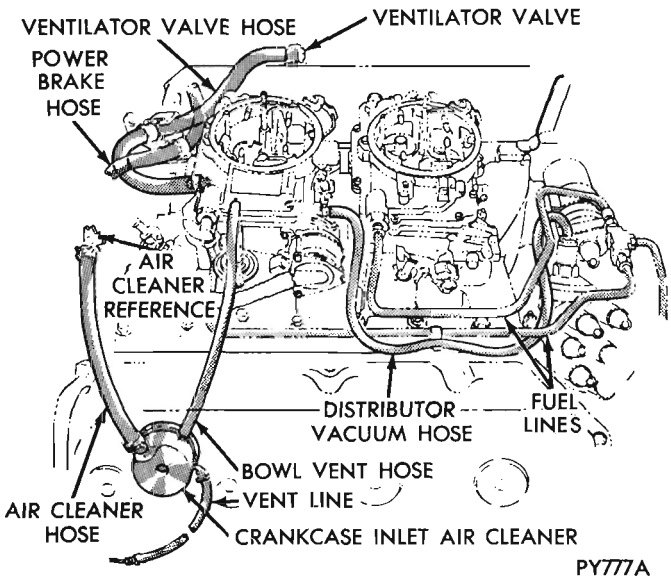


Fig. 32 Crankcase Ventilation System (426 Hemi)

ventilator valve, pass through the ventilator valve hose and passage in the carburetor throttle body, into the combustion chamber, are burned and expelled with the exhaust gases.

Servicing Frequencies

Proper maintenance of the crankcase ventilation system is required to keep the system clean and maintain good engine performance and durability. Periodic servicing is required to remove combustion products from the ventilator valve, hoses, carburetor passages and crankcase inlet air cleaner.

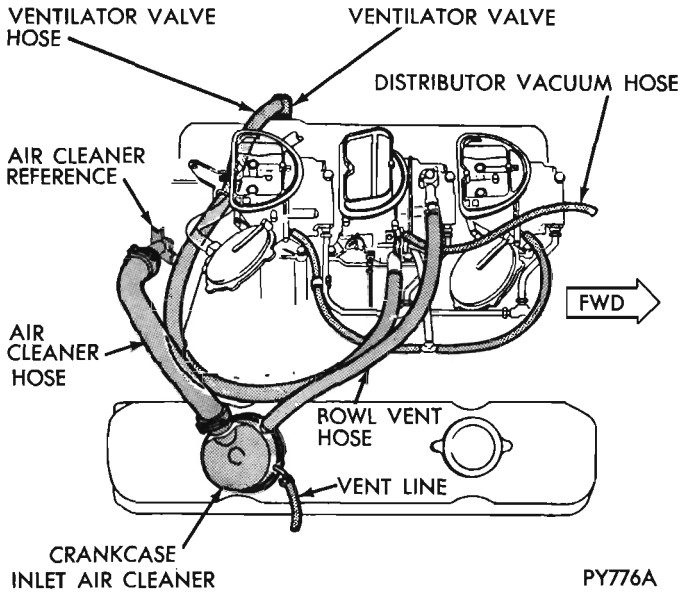


Fig. 31 Crankcase Ventilation System (Three 2 Barrel Carburation)

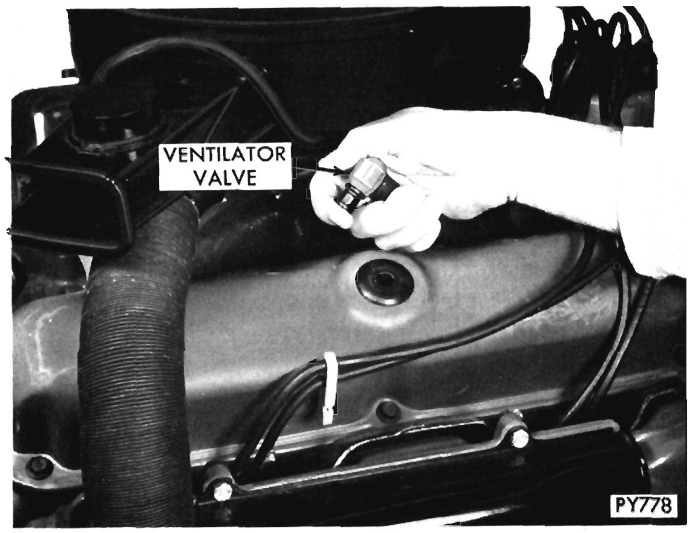


Fig. 33 Check Vacuum at Ventilator Valve

Every **six months** the system must be tested for proper operation and cleaned if necessary. This includes inspecting the operation of the valve, checking the hoses and carburetor passages for deposits and cleaning the crankcase inlet air cleaner and carburetor air cleaner.

The crankcase ventilator valve must be replaced with a new one **every year.** The carburetor air cleaner filter element must be replaced **every year** on High Performance Vehicles equipped with "Fresh Air Induction System", and **every 2 years** for vehicles equipped with standard air cleaner.

If the car is used extensively for short trips with frequent idling, the ventilation system may require servicing more frequently.

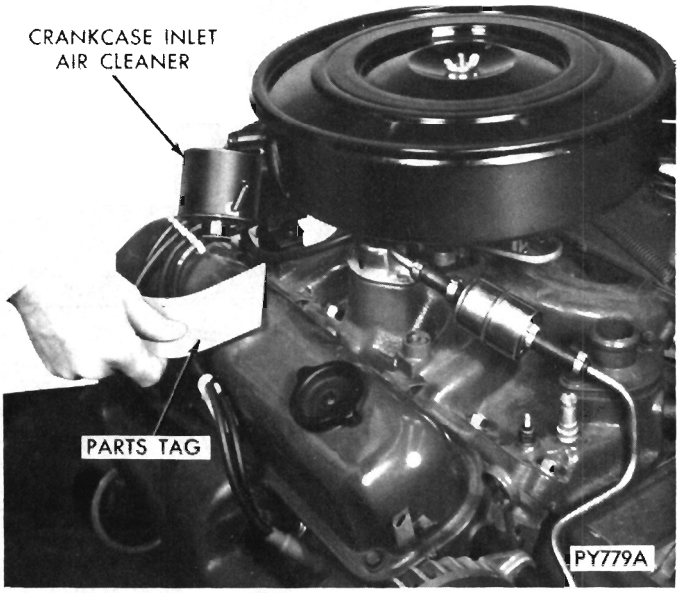


Fig. 34 Checking Vacuum at Crankcase Inlet Air Cleaner Opening

Inspection and Service Procedure:

1. With engine idling—

a. Remove ventilator valve from rocker cover. If the valve is not plugged, a hissing noise will be heard as air passes through the valve, and a strong vacuum should be felt when a finger is placed over the valve inlet (Fig. 33).

b. Reinstall the ventilator valve, then remove the crankcase inlet air cleaner. Loosely hold a piece of stiff paper, such as parts tag, over the opening in the rocker cover (Fig. 34).

After allowing about a minute for the crankcase pressure to reduce, the paper should be sucked against the opening in the rocker cover with a noticeable force.

NOTE: For 6 cylinder 198 and 225 CID engines, it will be necessary to clamp off or plug the carburetor bowl vent to fuel pump hose (Fig. 26) in order to perform this check.

2. With engine stopped—

(a) Remove ventilator valve from rocker cover and shake (Fig. 35). A clicking noise should be heard to indicate that the valve is free.

3. If the ventilation system meets the tests in (1) and (2) above, no further service is required; if not, the ventilation valve should be replaced and the system rechecked. Install a new Chrysler Ventilator Valve, Part Number 3577098, or equivalent. DO NOT ATTEMPT TO CLEAN THE VENTILATOR VALVE.

4. With a new ventilator valve installed, if the paper is not sucked against the crankcase inlet air cleaner opening in the rocker cover with noticeable force, it will be necessary to clean the ventilator hose, vent tube and passage in the lower part of the carburetor.

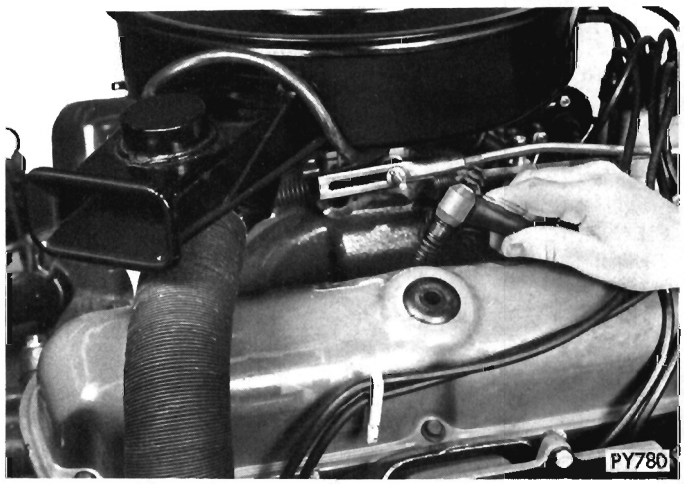


Fig. 35 Shake Ventilator Valve

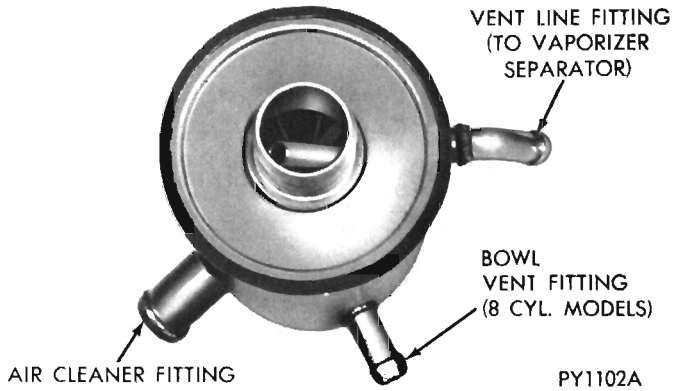


Fig. 36 Crankcase Inlet Air Cleaner (Model For 8 Cylinder Engines)

Carburetor Vent Tube

Remove carburetor. Hand turn a 1/4 inch drill through vent tube passage to dislodge solid particles, then blow clean.

IMPORTANT: make sure drill size used will not remove any metal. Use smaller size if necessary. It is not necessary to disassemble carburetor for this service.

Crankcase Inlet Air Cleaner

Disconnect the hoses from the crankcase inlet air cleaner. Inspect the hose from the crankcase inlet air cleaner to the carburetor inlet air cleaner and clean if necessary. Remove the crankcase inlet air cleaner and wash it thoroughly in kerosene, or similar solvent. Lubricate or wet the filter, by inverting the crankcase inlet air cleaner and filling with SAE-30 engine oil. Position the air cleaner to allow excess oil to drain throughly through the 5/8 inch diameter vent nipple located on the top of the air cleaner (Fig. 36).

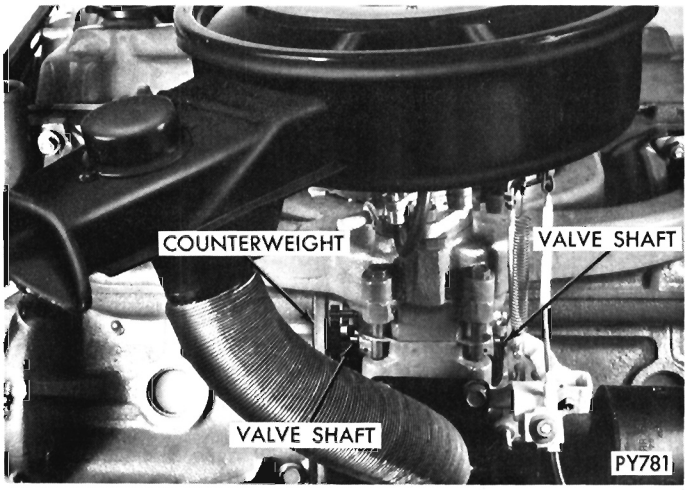


Fig. 37 Manifold Heat Control Valve (6 Cylinder Engine)

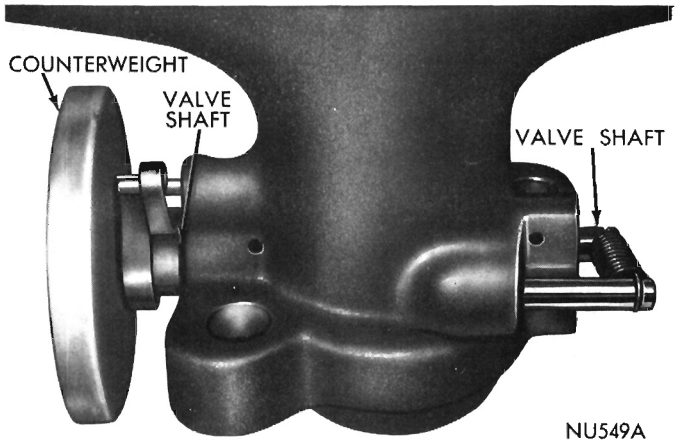


Fig. 38 Manifold Heat Control Valve (318-340 and 360 Cu. In. Engines)

Hoses

Clean hoses with Combustion Chamber Conditioner Part Number 2933500 or equivalent, followed by drying with compressed air. **Hoses should not remain in solvent more than one-half hour.**

ENGINE PERFORMANCE DIAGNOSIS

The following services should be performed every 12,000 miles or 12 months to provide best vehicle operation and lowest emissions of hydrocarbons and carbon monoxide.

1—SPARK PLUGS—Remove and inspect each spark plug. Most plugs can be cleaned, adjusted, and reinstalled. Rough idle, hard starting, frequent engine miss at high speeds, or apparent physical deterioration; are indications that the spark plugs should be replaced.

2—CABLES—Check all secondary distributor cables for cleanliness and proper connections. Replace all cracked, damaged, or faulty cables. See "Ignition System" Group 8—Electrical for tests.

3—DISTRIBUTOR—Inspect distributor cap and rotor, for carbon tracking and abnormal wear. Check condenser, and points for abnormal pitting, blueing or misalignment, and adjust, if serviceable, or replace. Lubricate cam and wick. See "Ignition System" Group 8—Electrical for tests and adjustments.

4—AIR CLEANER—Clean and/or replace if necessary. See "Carburetor Air Cleaners."

5—CRANKCASE VENT VALVE—Replace. Check function of the entire crankcase ventilating system. See page 16

6—IGNITION TIMING—Check timing and set as required. See decal located in engine compartment or "Ignition System" Group 8—Electrical.

7—IDLE RPM—Check after carburetor or ignition timing service. See decal located in engine compartment or "Fuel System" Group 14.

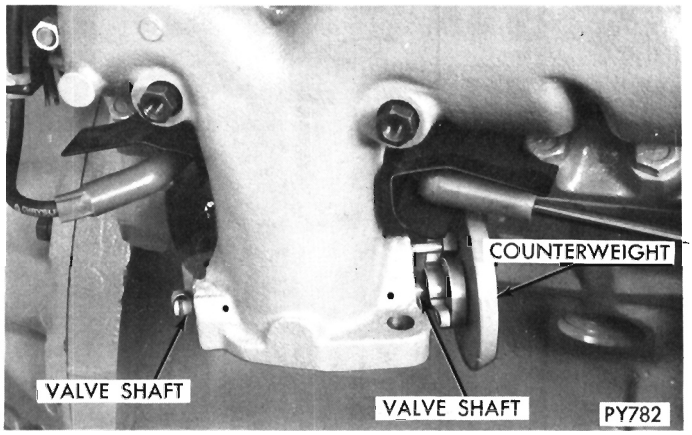


Fig. 39 Manifold Heat Control Valve (383-440 Cu. In. Engine)

8—MANIFOLD HEAT CONTROL VALVE—Clean pivot areas as necessary.

9—BATTERY—Check specific gravity, clean and tighten terminals; apply grease to posts and terminals after tightening.

10—VALVE LASH—(198, 225, and 426 cu. in. engines): If engine continues to be noisy and/or the idle rough after the above services have been performed, adjust the valve lash to specifications. See "Engine" Group 9 for lash specifications. Idle adjustments of the carburetor should be rechecked after setting lash.

MANIFOLD HEAT CONTROL VALVE

Freedom of movement of the heat control valve, by removing lead deposits from the valve shaft bearings, is assured by application of suitable solvent. Such a solvent is available under Part Number 3419129 Mainfold Heat Control Solvent-Penetrating Fluid.

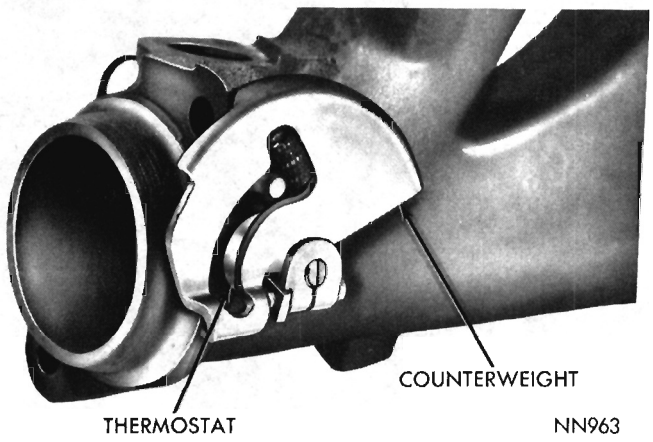


Fig. 40 Header Heat Control Valve (426 Hemi Engine)

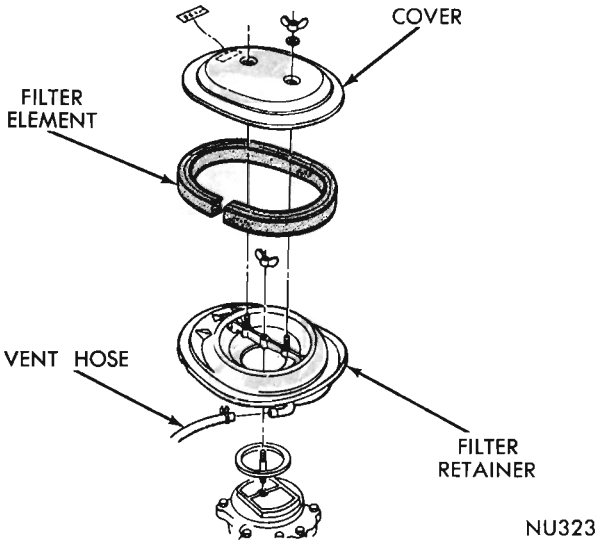


Fig. 42 - Carburetor Air Cleaner (Fresh Air System)

Every engine oil change, spray solvent on both ends of valve shaft where it rotates in bushings (Figs. 37, 38, 39 and 40. CAUTION: **APPLY SOLVENT ONLY WHEN MANIFOLD IS COOL.** Allow solvent to soak a few minutes, then work valve shaft back and forth until it moves freely.

CARBURETOR AIR CLEANERS

Paper Element Type

The paper filter element (Figs. 41 or 42) in the air cleaner should be inspected and cleaned every six months and replaced every two years, with the follwing exceptions.

(a) Vehicles operated in extremely dusty areas.
(b) Vehicles with Fresh Air Induction System.
(c) Police, Taxi or Limousine.

For vehicles or type of service listed above, clean and inspect filter element every engine oil change and replace every year.

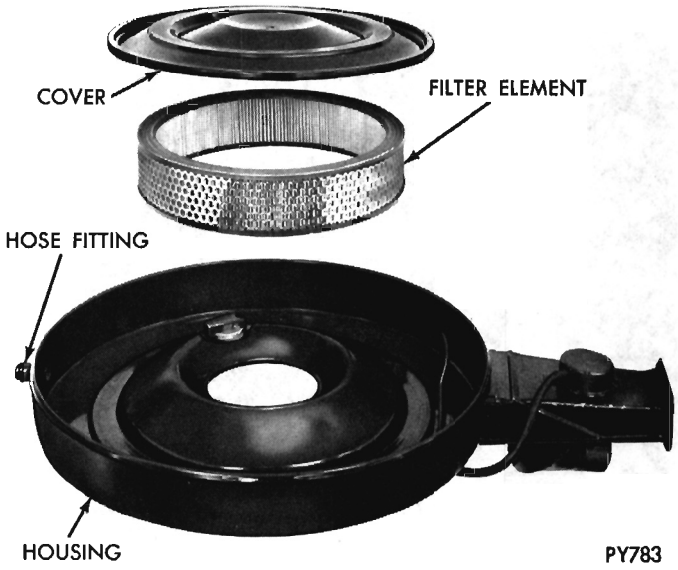
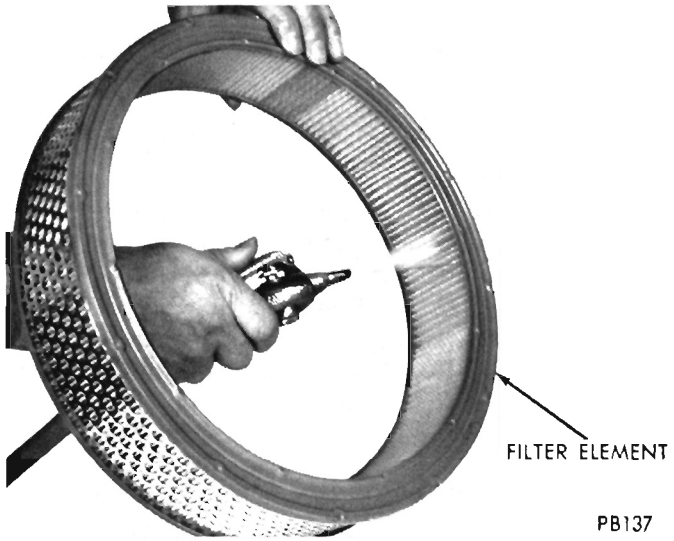


Fig. 41 - Carburetor Air Cleaner (Dry Type)



Fig, 43 Cleaning Filter Element

Disconnect the air cleaner hose at the air cleaner. Remove cleaner from carberetor and remove filter element from cleaner.

Examine filter element. If the filter element is saturated with oil for more than one-half its circumference, replace the element and check the rest of the crankcase ventilating system for proper functioning.

To clean the element, use compressed air by holding air nozzle at least two inches from inside screen (Fig. 43). **CAUTION: Do not use compressed air on outside surface of element as this will embed foreign matter in the element paper.**

After cleaning, examine element for punctures. Discard an element that has small pin-point punctures. Examine soft plastic sealing rings on

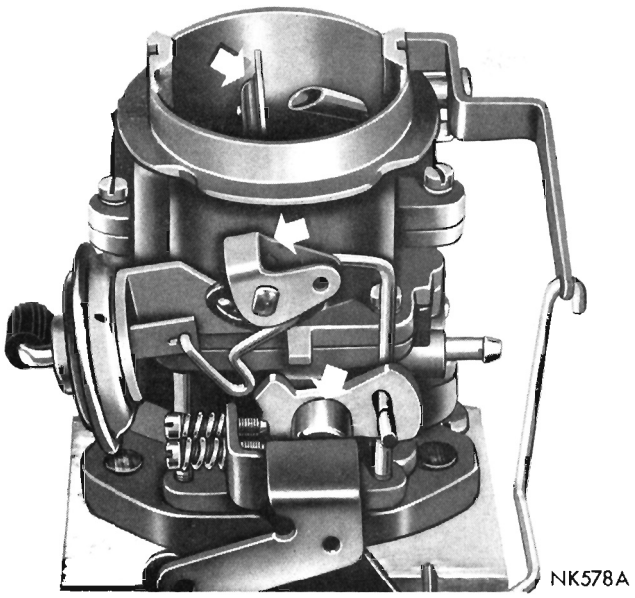


Fig. 44 Choke Valve Shaft and Fast Idle Cam.

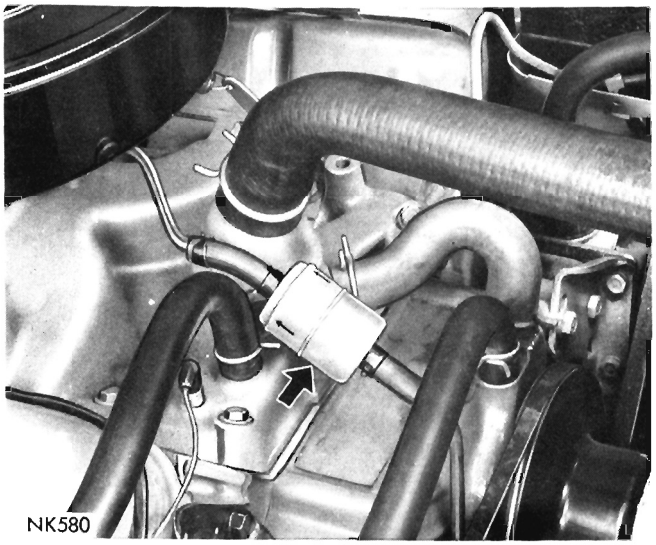


Fig. 46 Fuel Filter 340 Cu In Engine (Typical, 340-440 Cu. In. Engines with three 2-Barrel Carburetors)

both sides of element for smoothness and uniformity.

At this time, also, service the Carburetor Choke Valve Shaft and Fast Idle Cam as outlined.

Reassemble cleaner and install on carburetor.

Use a Chrylser Corporation filter element, or equivalent, for replacement.

CARBURETOR CHOKE VALVE SHAFT

Every six months, apply Chrysler Combustion Chamber Conditioner Part Number 2933500 or equivalent, to both ends of choke valve shaft where it passes through the air horn (Fig. 44). At same time, move choke shaft back and forth until deposits are flushed out. Run engine at idle to clean out excess cleaner from carburetor and intake manifold.

Also, apply same type of cleaner to fast idle cam and pivot pin to remove dirt, oil and any other deposits that may have collected and cause sticking or erratic motion.

This service will assure freedom of movement of the choke mechanism.

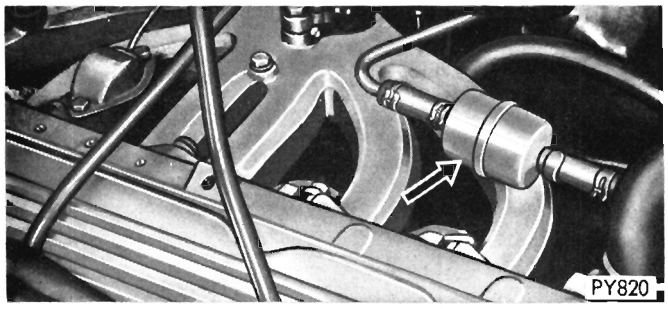


Fig. 45 Fuel Filter (6 Cylinder Engine)

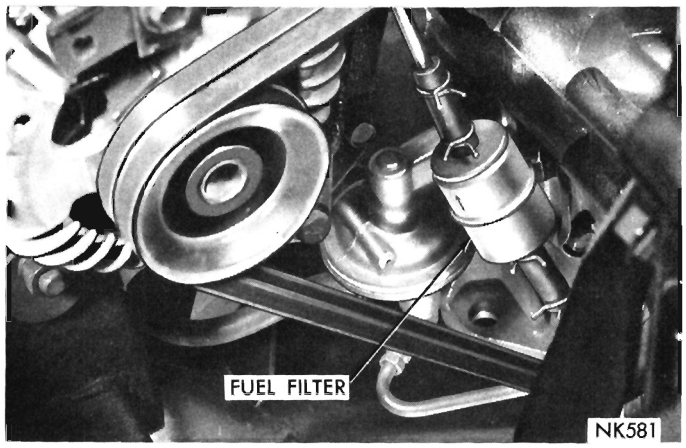


Fig. 47 Fuel Filter (383, 426 and 440 Cu. In. Engines)

FUEL FILTERS

The fuel filters (Figs. 45, 46 and 47) are of the disposable type (318 Cu. In. Engines, Fuel Filter is on suction side of Fuel Pump). Under normal operating conditions, filter should be replaced every 24 months or 24,000 miles, whichever occurs first. Should an excessive amount of foreign matter accumulate in fuel tank, filter may require replacing more frequently.

After installing new filter, run engine for several minutes and check for leaks at connections.

PROPELLER SHAFT AND UNIVERSAL JOINTS

Under normal operating conditions, relubrication of the universal joints is not required.

Universal joints on Imperial models cannot be relubricated and must be replaced when seals are damaged and leakage is evident.

Every six months, however, the front and rear universal joints on all models (Figs. 48, 49, 50 and 51) should be inspected for external leakage

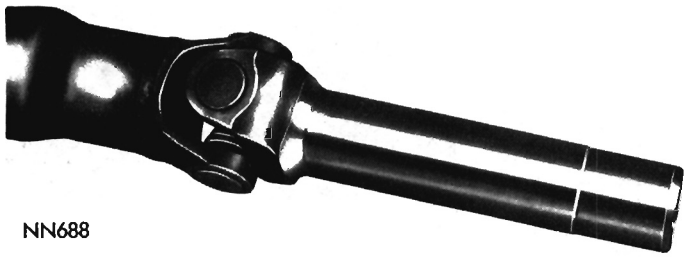
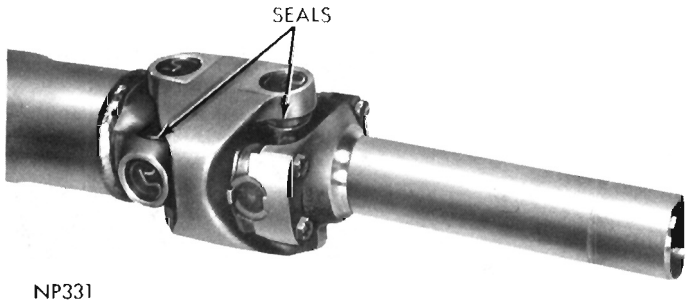
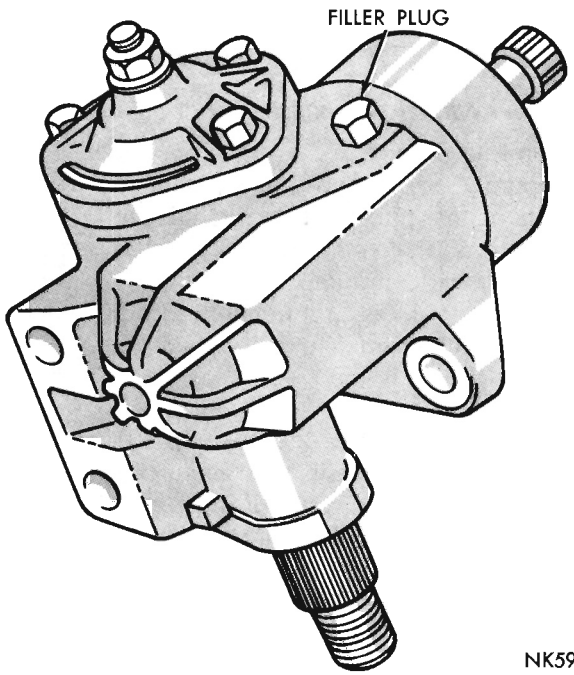

NN688

Fig. 48 Front Universal Join (Except Imperial)



NP331

Fig. 50 Front Universal Joint (Imperial Models)



NK593

Fig. 52 Manual Steering Gear Filler Plug

or damaged seals.

If external leaks or damage is evident, the universal joint should be replaced.

Severe Service Requirements

When the vehicle is operated under the severe conditions as in police and taxi service the universal joints should be disassembled, cleaned and relubricated every 36,000 miles or 3 years. The units should be disassembled, cleaned, and relubricated with Multi-purpose Grease, NLGI Grade 2,

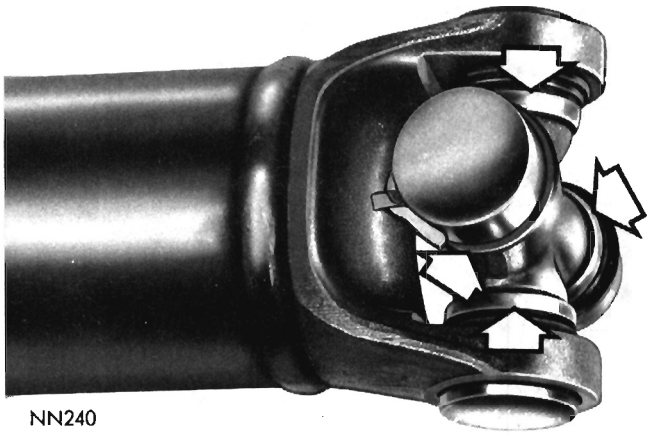
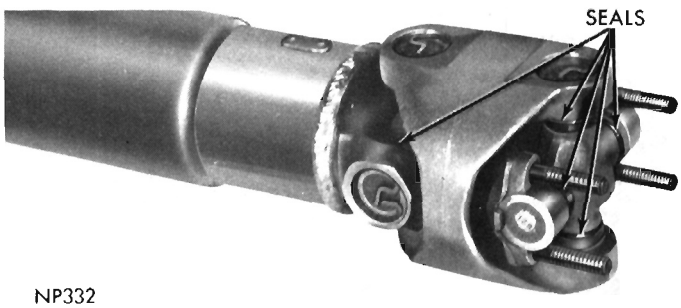

NN240

Fig. 49 Rear Universal Joint (Except Imperial)



NP332

Fig. 51 Rear Universal Joint (Imperial Models)

E.P., such as Multi-Mileage Lubricant part number 2525035, or equivalent.

STEERING GEAR

Manual

The lubricant installed in the steering gear at time of assembly is a high quality product and regularly scheduled changes are not required.

Every six months, remove plug in steering gear housing (Fig. 52) and check lubricant level. Lubricant should cover worm gear.

If lubricant is below prescribed level, replenish with Multi-Purpose Gear Oil SAE 90, as defined by MIL-L-2105B. This is suitable for all temperatures. Special Sure-Grip Lubricant, Part Number 2585318, and Chrysler Hypoid Lubricant, part number 2933565, or there equivalent, are lubricants of this type and are recommended.

CAUTION: When filling, do not use a pressure gun as high pressure may damage the seals.

Power Steering

At every engine crankcase oil change, the power steering fluid level should be checked at the power steering pump reservoir. Before removing the reservoir cover, wipe outside of cover and case so that no dirt can fall into reservoir.

On the 1.06 pump (Fig. 53) when the fluid is

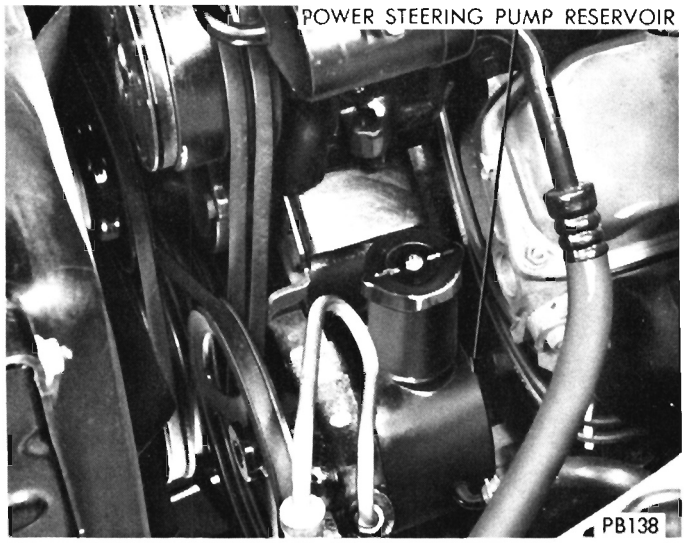


Fig. 53 Power Steering Pump Reservoir (1.06 Pump)

checked when hot, the fluid level will be approximately 1/2 to 1 inch below the top of the filler neck.

At room temperature (approximately 70 degrees F.) the fluid level should be above the joint of the filler neck and reservoir (between 1-1/2 to 2 inches below the top of the filler neck).

Units equipped with a dipstick (Fig. 54) should be filled to the required indicated oil level.

If necessary to add fluid to restore these levels, use only petroleum fluids specially formulated for minimum effect on the rubber hoses, Power Steering Fluid, Part Number 2084329, or its equivalent, is recommended. **Caution: Do not use Automatic Transmission Fluid.**

TRANSMISSION (Manual)

Frequency of Oil Change

For vehicles whose operations are considered normal service for passenger cars, the transmission fluid installed at the factory will give satisfactory lubrication for the life of the vehicle. Regularly scheduled oil changes therefore, will not be required. If the vehicle is used for police, taxicab, limousine, or other commercial type operation or for towing trailers, the transmission fluid should be changed every 36,000 miles.

Fluid Level Check

The fluid level should be checked every six months. The correct level is at the bottom of the filler plug hole. (Fig. 55). If lubricant is below this specified level, replenish with automatic transmission fluid of the type labeled DEXRON such as Chrysler Parts DEXRON, Part Number 3549660, or equivalent. This type of lubricant is recommended for all anticipated temperature

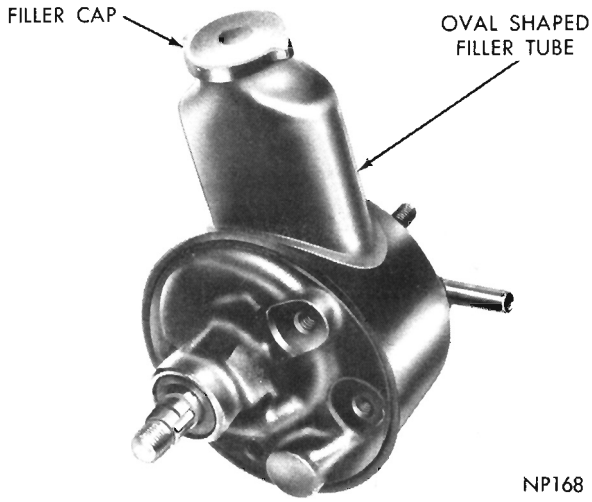


Fig. 54 Power Steering Pump Reservoir (.94 Pump)

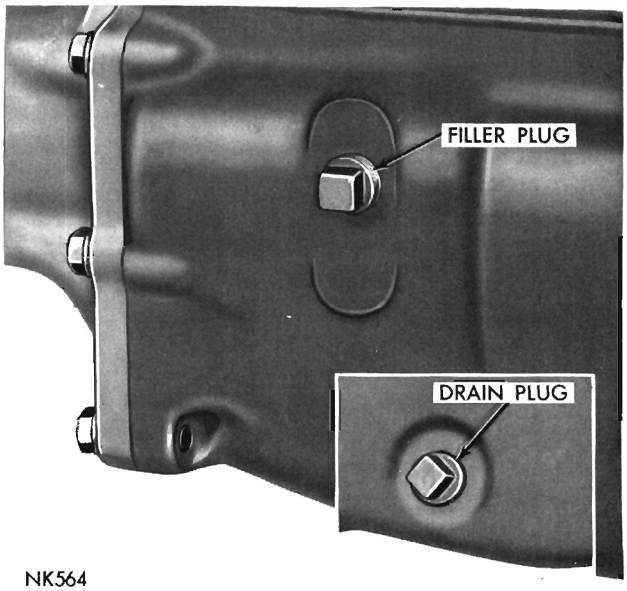


Fig. 55 Transmission Filler and Drain Plugs

ranges with the following exceptions.

THREE SPEED

In warm climates, if desired, the Automatic Transmission fluid may be drained, (Model A-903 use suction gun) and the transmission refilled with Multi-Purpose Gear Lubricant SAE 90, as defined by MIL-L-2105B.

FOUR-SPEED

If objectional gear rattle at idle speed is apparent, factory fill fluid may be drained and the transmission filled with Multi-Purpose Gear Lubricant SAE 140.

Column-Mounted Transmission

Gearshift Controls

If operation of the gearshift controls becomes

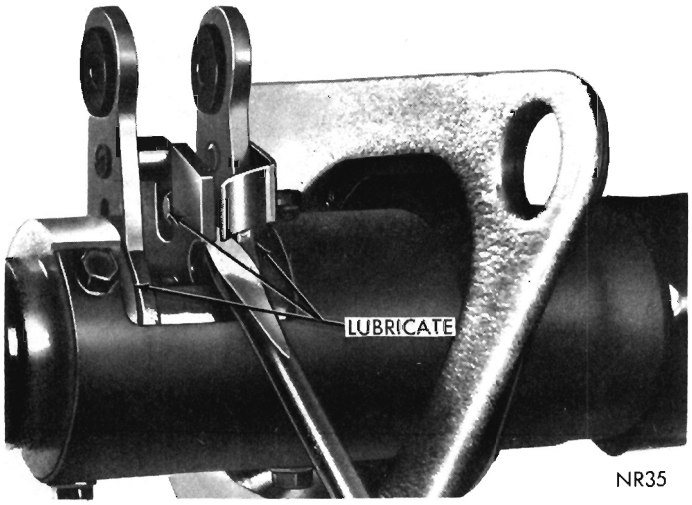


Fig. 56 Column Mounted Transmission Gear Shift Control Lubrication

noisy or the shift effort becomes objectionable, lubricate linkage at lower end of steering column (Fig. 56).

Apply a film of Mulit-Mileage Lubricant, Part Number 2525035, or equivalent, or Multi-Purpose Grease, NLGI Grade 2 EP, to contact surfaces on levers (Fig. 56).

Floor-Mounted Transmission

Gearshift Mechanism

If operation of the mechanism becomes difficult, remove rubber boot on floor panel and apply a few drops of light engine oil to the mechanism.

In addition, from under vehicle, apply light engine oil to rod ends in operating levers (Fig. 57).

TRANSMISSION (Automatic)

Automatic transmisions should be maintained and serviced by an authorized Chrysler Corporation dealer or service center to obtain best performance and long life. It is important that the transmission fluid be maintained at the level prescribed.

Selection of Lubricant

Use only fluids of the type labeled DEXRON Automatic Transmission Fluid or Chrysler Parts DEXRON Automatic Transmission Fluid Part Number 3549660, or there equivalent.

Fluid Level Check

The fluid level should be checked every six months. This check should be made when engine temperature gauge indicates a normal warmed-up condition and transmission fluid is heated to its normal operating temperature. Check level with parking brake applied firmly and the engine idling. **CAUTION: Before removing level indicator, wipe off cap and top of filler tube to prevent accumulated dirt from dropping into transmission filler tube.**

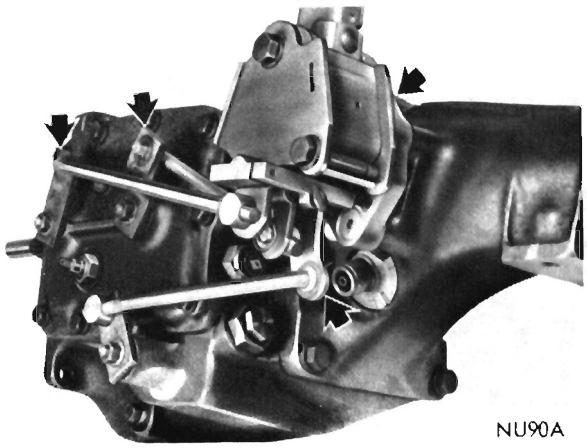


Fig. 57 Floor Mounted Transmission Gearshift Mechanism Lubrication



Fig. 58 Transmission Level Indicator Markings

After engine has idled for about two mintues, move gearshift lever slowly through all gear positions, pausing momentarily in each and ending with lever in "N" position.

When fluid is "hot," level should be at the "FULL" mark, or slightly below, but **never above** the "FULL" mark (Fig. 58). Fluid should be added or extracted, depending upon the reading, to restore level as specified.

FLUID AND FILTER CHANGES

Automatic transmission fluid and filter should be changed, and the bands adjusted as follows:

Type Service	Required Service
Normal Usage (Pass. Cars)	No service required
Severe Usage	Every 24,000 miles

(1) More than 50% operation in heavy city traf-

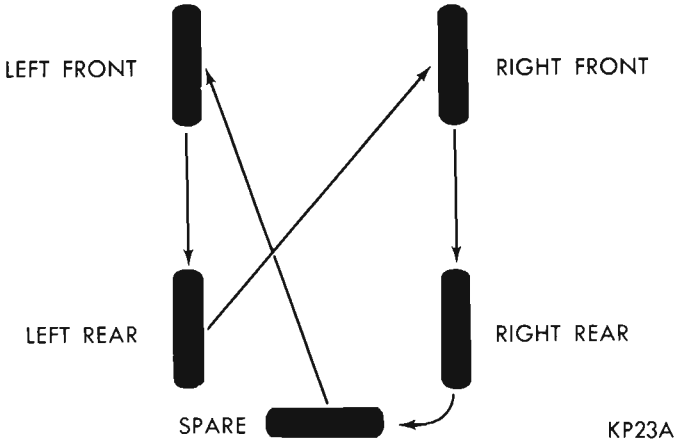


Fig. 59 Tire Rotation Diagram—5 Tires

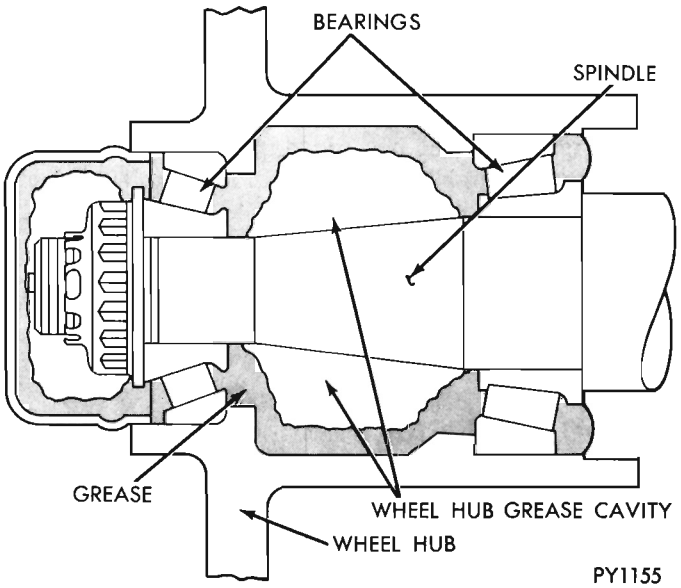


Fig. 61 Front Wheel Bearing Lubrication

fic during hot weather (above 90 F.).

(2) Police, Taxi, Limousine, Commercial Type Operation, Trailer Tow.

(3) Vehicles powered with 426 Hemi, or 340 and 440 cubic inch engine with three 2-barrel carburetors.

NOTES:

(1) When the factory fill fluid is changed as recommended above, only fluids of the type labeled "DEXRON" Automatic Transmission Fluid should be used. A band adjustment and filter change should be made at the time of the oil change.

(2) If the transmission is disassembled for any reason, the fluid and filter should be changed, and the bands adjusted.

Special Additives

Chrysler Corporation does not recommend the addition of any fluids to the transmission other than those from the automatic transmission fluids

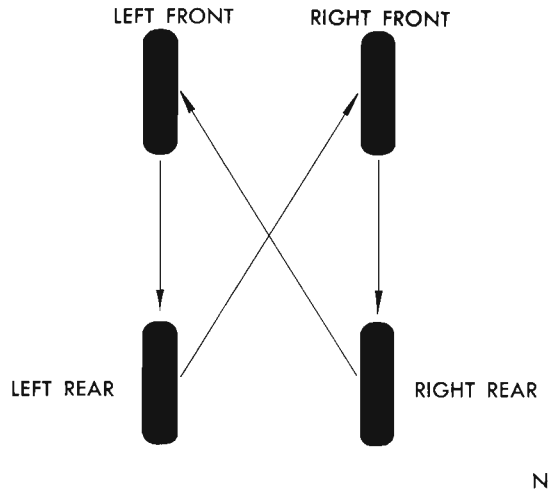


Fig. 60 Tire Rotation Diagram —4 Tires

listed above. Exceptions to this policy are the uses of special dyes to aid in detecting fluid leaks, and the use of Chrysler Automatic Transmission Sealer which introduces a small amount of swelling of the seals to reduce fluid leakage resulting from hardening or shrinking of the seals in high mileage vehicles. Such a product is available under Part Number 2298923 Transmission Sealer, or its equivalent.

TIRES

All tires, especially wide tread, 70 Series and Fiberglass belted tires should be rotated no later than every second oil change (Fig. 59) and should be in correct balance to obtain the most uniform treadwear.

If owner insists on a four tire switch only rotate tires according to diagram (Fig. 60).

Tires should be examined at every oil change for unusual wear patterns, foreign material and proper inflation pressures. If irregular tread wear has developed, rotation is suggested at this time.

Unusual wear conditions may indicate a need for a change in driving habits or that mechanical corrections are necessary.

A decal showing the recommended tire pressure is located on the body pillar at the rear of the left front door opening ("B" post). Refer to "Tires", Group 22, for additional information.

FRONT WHEEL BEARINGS

The condition and quantity of the lubricant in the front wheel bearings on cars equipped with either drum or disc type brakes should be inspected whenever the wheels are removed to inspect or service the brake system. Brake system inspection is recommended every 12 months or 12,000 miles whichever occurs first.

When inspection of the wheel bearing lubricant indicates it is low in quantity, contains dirt, or

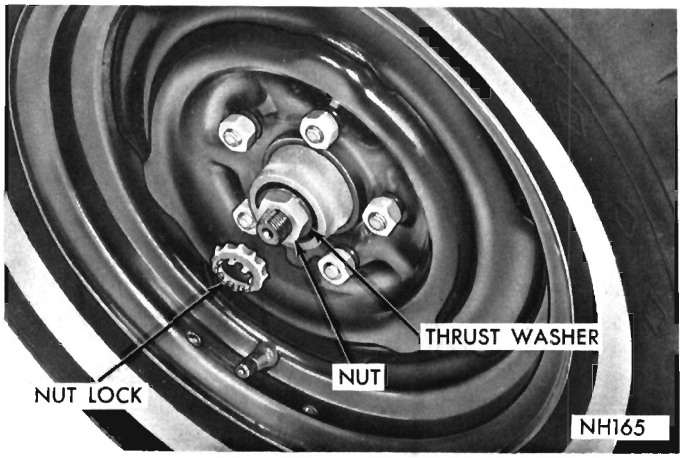


Fig. 62 Front Wheel Bearing Adjustment

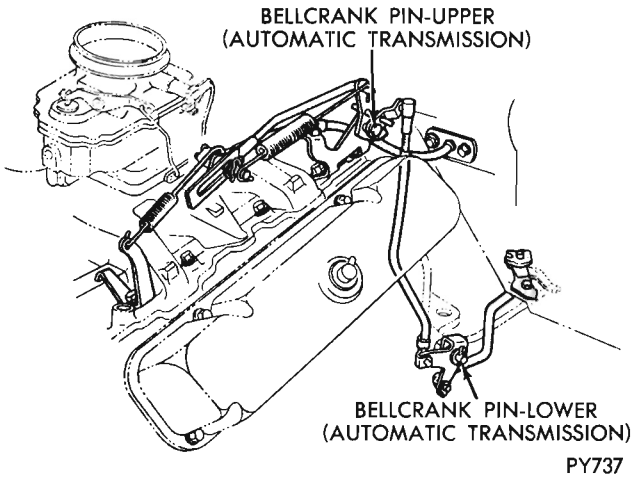


Fig. 64 Throttle Linkage Lubrication, Valiant Models with 318 Cu. In. Engine

has been contaminated by water to produce a milky appearance, bearings and hub should be cleaned, inspected and relubricated.

CAUTION: To avoid possible contamination of lubricant by mixing lubricants that are not compatible, do not add lubricant to the bearings.

Thoroughly clean old lubricant from bearings and hubs. After cleaning, carefully examine cups, rollers, and inner race of cone for brinneling or spalling. Bearing should be replaced if any defects exist.

Discard old seals. Repack bearings and hubs with new Multi-Purpose Grease, NLGI grade 2 EP, such as Multi-Mileage Lubricant, Part Number 2525035, or equivalent. When repacking hubs (Fig. 61) make sure all surfaces of hub and outer grease cup interiors are covered with lubricant to minimize condensation and lubricant travel out of bearing. **DO NOT OVER FILL.**

Adjust bearings as follows:

(1) Install wheel and drum assemblies and tighten wheel nuts on Valiant models to 55 foot-pounds. On all other models tighten nuts to 65 foot-pounds.

(2) Tighten wheel bearing adjusting nut (Fig. 62) to 70 inch-pounds on Valiant models and 90 inch-pounds on all other models, while rotating wheel.

(3) Position nut lock on adjusting nut so one pair of cotter pin slots align with hole in spindle.

(4) Back off adjusting nut and nut lock to the next slot and install cotter pin.

(5) Install wheel covers.

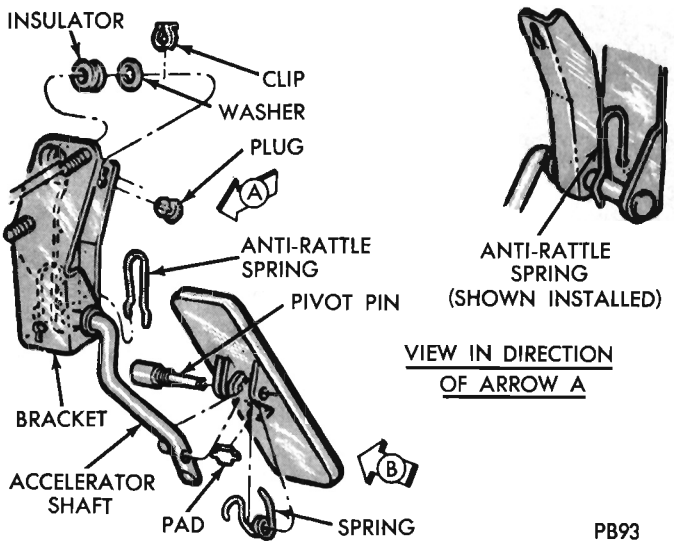


Fig. 63 Accelerator Components Lubrication

SPEEDOMETER CABLE

To service a noisy speedometer cable, disconnect housing at speedometer head. Remove shaft and clean it thoroughly. Apply a very thin film of speedometer cable lubricant on the shaft. Such a lubricant is available under Part Number 1243632, Speedometer Cable Lubricant, or equivalent. Wipe excess lubricant from the top one-foot of the shaft and from the ferrule.

CAUTION: Excessive lubricant may cause malfunction of the speedometer.

ACCELERATOR LINKAGE COMPONENTS

Every 12 months the accelerator linkage components should be lubricated with Multi-Purpose Grease, NLGI grade 2 EP, such as Multi-Mileage Lubricant, Part Number 2525035 or equivalent, as described in the following paragraphs. **Do not lubricate ball joints or throttle control cable.**

PASSENGER COMPARTMENT

On Valiant models only, apply a thin film of the prescribed lubricant on the accelerator shaft where it turns in the bracket and where it is contacted by the anti-rattle spring (Fig. 63).

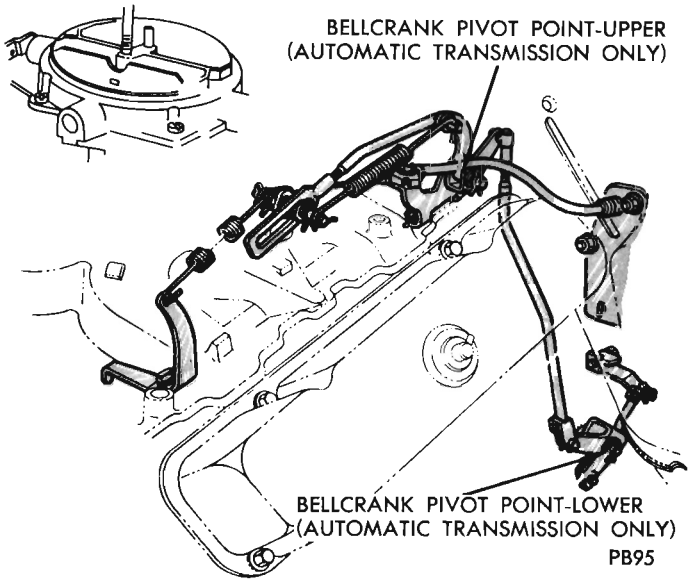


Fig. 65 Throttle Linkage Lubrication, Valiant and Barracuda Models with 340 Cu. In. Engines and 4 Barrel Carburetors)

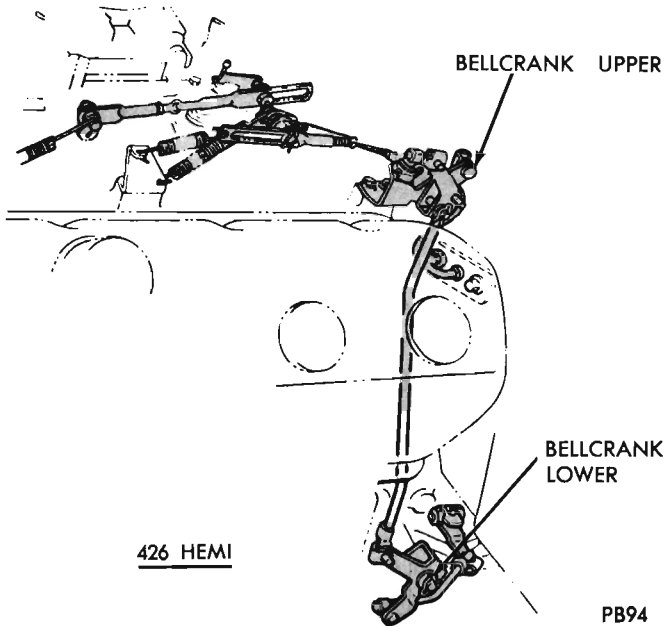


Fig. 66 Throttle Linkage Lubrication, Barracuda and Satellite Models with 426 Hemi

ENGINE COMPARTMENT

On all six cylinder models with automatic transmission, apply a thin film of the prescribed lubricant to the engine mounted bellcrank pivot pin.

On the following eight cylinder models only, with automatic transmissions, apply a thin film of the prescribed lubricant to the upper and lower bellcrank pivot areas.

Valiant models with 318 cubic inch engines (Fig. 64).

Valiant and Barracuda models with 340 cubic inch engines and 4 barrel carburetor (Fig. 65).

Barracuda and Satellite models with 426 Hemi engines (Fig. 66).

PARTS REQUIRING NO LUBRICATION

There are many points that should not be lubricated, some because they are permanently lubricated, some because lubricants will be detrimental to their operating characteristics, and some because lubricants will cause component failures. In any event, rubber bushings should not be lubricated, not only because lubricants will cause rubber to fail, but also will destroy their necessary friction characteristics.

The following parts should not be lubricated.

All Rubber Bushings
Alternator Bearings
Automatic Transmission
Controls and Linkage
Carburetor Air Cleaner
(Paper Element Type)
Clutch Pedal Push
Rod Ends
Clutch Adjustment
Rod Ends
Clutch Release Bearing
Drive Belts
Fan Belt Idler Pulley
Rear Springs
Rear Wheel Bearings
Starting Motor Bushings
Throttle Linkage Ball
Joints
Throttle Control Cable
Upper and Lower Control
Arm Bushings
Water Pump Bearings

FRONT SUSPENSION AND STEERING LINKAGE

CONTENTS

	Page
LOWER BALL JOINTS	14
LOWER CONTROL ARM AND SHAFT	11
LOWER CONTROL ARM STRUT	14
PRE-ALIGNMENT INSPECTION	4
Height Adjustment	4
RUBBER ISOLATED FRONT CROSSMEMBER (Imperial)	20
SPECIFICATIONS	20
STEERING KNUCKLES	7
STEERING LINKAGE	8
SWAY BAR	9
TIGHTENING REFERENCE	22
TORSION BAR	6
TORSION BAR RUBBER ISOLATOR (Imperial)	6
UPPER BALL JOINTS	18
UPPER CONTROL ARM	16
WHEEL ALIGNMENT	3
Camber	3
Caster	3
Steering Axis Inclination	3
Toe-In	3
Toe-Out	3

GENERAL INFORMATION

The Chrysler front suspension system is basically the same as in previous models, where the torsion bar rear anchors are integral with the engine rear support member. The front anchors are part of the lower control arms and provide the means of adjusting the vehicle front height. Compression type lower ball joints are integral with the steering arm.

The Imperial front suspension system is the same as the previous years model with a front "K" crossmember that is isolated from the stub frame by four large rubber bushing type isolators. The torsion bar rear anchor crossmember is isolated from the stub frame crossmember by two sandwich type rubber insulators. The front torsion bar anchors are part of the lower control arms and provide the means of adjusting the vehicle front height. The upper control arm is mounted on a pivot bar and the front wheel alignment is set by the adjustment of two vertically mounted cam bolts. The sway bar is the link type and mounts to the lower control arm and front crossmember.

The Imperial rubber isolated front suspension system reduces engine and road noises entering the body structure.

All ball joints and the torsion bars at the front of the rear anchors on all model Chrysler and Imperial vehicles are effectively sealed against road splash by tightly fitted balloon type flexible seals.

On all models except Imperial the lower ball joints, and steering arm assemblies should not be replaced for looseness if the axial end play (Up and Down movement) is under .070 inch. Looseness of this nature is not detrimental and will not affect front wheel alignment or vehicle stability.

on Imperial models the lower ball joints are preloaded (zero axial end play). Therefore, if any axial end play (Up and Down movement) is observed the ball joint and lower control arm should be replaced. The lower ball joints on the Imperial will be serviced as a lower control arm and ball joint assembly complete. This is due to the lower ball joint being a press in type requiring very high removing and installing forces.

The ball joints on all model vehicles are of the semi-permanent lubricated type. When lubrication of the ball joints and tie rod end assemblies is required, remove the plugs and install a lubrication fitting. After lubricating, reinstall the plugs.

Service replacement ball joints are equipped with a "Knock-Off" type lubrication fitting. After lubricating, knock off that portion of the fitting over which the lubrication gun was installed. A ball check installed in the remaining portion of the fitting prevents foreign materials from passing through the fitting.

The tie rod end seals, ball joint and torsion bar balloon seals should be inspected for damage at all oil change periods.

All front suspension points that contain rubber should be tightened while the suspension is at the specified height (see specifications), with full weight of vehicle on its wheels.

Rubber bushings should not be lubricated at any time.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
FRONT END NOISE	(a) Ball joint needs lubrication.	(a) Lubricate ball joint.
	(b) Loose shock absorber mounting. Shock absorber inoperative or bushings worn.	(b) Tighten shock absorber mounting nuts. Replace bushings or shock absorber.
	(c) Worn strut bushings.	(c) Replace bushing.
	(d) Loose struts—Lower control arm bolts and nuts, (Imperial Only).	(d) Tighten all bolts and nuts.
	(e) Loose steering gear on frame.	(e) Tighten the steering gear mounting bolts.
	(f) Worn upper control arm bushings.	(f) Replace worn bushings.
	(g) Worn lower control arm shaft bushings.	(g) Replace worn bushings.
	(h) Worn upper or lower ball joint.	(h) Replace ball joint.
	(i) Worn tie rod ends.	(i) Replace tie rod end.
	(j) Loose or worn front wheel bearings.	(j) Adjust or replace bearings as necessary.
	(k) Steering knuckle arm contacting the lower control arm wheel stop.	(k) Smooth off the contacting area and lubricate with a water resistant grease.
INSTABILITY	(a) Low or uneven tire pressure.	(a) Inflate tires to correct pressure.
	(b) Loose wheel bearings.	(b) Adjust wheel bearing.
	(c) Improper steering cross shaft adjustment.	(c) Adjust steering cross shaft.
	(d) Steering gear not centered.	(d) Adjust steering gear.
	(e) Worn idler arm bushing.	(e) Replace bushing.
	(f) Loose or excessively worn front strut bushings.	(f) Replace bushings.
	(g) Weak or broken rear spring.	(g) Replace spring.
	(h) Incorrect front wheel alignment.	(h) Measure and adjust front wheel alignment.
	(i) Shock absorber inoperative.	(i) Replace shock absorber.
HARD STEERING	(a) Ball joints-require lubrication.	(a) Lubricate ball joints.
	(b) Low or uneven tire pressure.	(b) Inflate tires to recommended pressures.
	(c) Low power steering fluid level.	(c) Fill pump reservoir to correct level.
	(d) Lack of assist of power steering system.	(d) Inspect, test, and service the power steering pump and gear as required.
	(e) Incorrect front wheel alignment (particularly caster) resulting from a bent control arm, steering knuckle or steering knuckle arm.	(e) Replace bent parts and adjust the front wheel alignment.
	(f) Steering gear low on lubricant.	(f) Fill gear to correct level.
	(g) Steering gear not adjusted.	(g) Adjust steering gear.
	(h) Idler arm binding.	(h) Replace idler arm.
CAR PULLS TO ONE SIDE	(a) Low or uneven tire pressure.	(a) Inflate tires to recommended pressure.
	(b) Front brake dragging.	(b) Adjust brakes.
	(c) Grease, lubricant or brake fluid leaking onto brake lining.	(c) Replace brake shoe and lining as necessary and stop all leaks.
	(d) Loose or excessively worn strut bushings.	(d) Tighten or replace strut bushings.
	(e) Power steering control valve out of adjustment.	(e) Adjust steering gear control valve.
	(f) Incorrect front wheel alignment (particularly camber).	(f) Adjust front wheel alignment.
	(g) Broken or weak rear spring.	(g) Replace spring.
EXCESSIVE PLAY IN STEERING	(a) Worn or loose front wheel bearings.	(a) Adjust or replace wheel bearings as necessary.
	(b) Incorrect steering gear adjustment.	(b) Adjust steering gear.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(c) Loose steering gear to frame mounting bolts.	(c) Tighten steering gear to frame bolts.
	(d) Worn ball joints or tie rod.	(d) Replace ball joints or tie rods as necessary.
	(e) Worn steering gear parts.	(e) Replace worn steering gear parts and adjust as necessary.
	(f) Worn upper or lower ball joints.	(f) Replace ball joints.
	(g) Worn idler arm bushing.	(g) Replace bushing.
FRONT WHEEL SHIMMY	(a) Tire, wheel out of balance.	(a) Balance wheel and tire assembly.
	(b) Uneven tire wear, or excessively worn tires.	(b) Rotate or replace tires as necessary.
	(c) Worn or loose wheel bearings.	(c) Replace or adjust wheel bearings as necessary.
	(d) Worn tie rod ends.	(d) Replace tie rod ends.
	(e) Strut mounting bushings loose or worn.	(e) Replace strut mounting bushings.
	(f) Incorrect front wheel alignment (particularly caster).	(f) Adjust front wheel alignment.
	(g) Worn or loose upper control arm ball joints.	(g) Inspect ball joints and replace where required.

SERVICE PROCEDURES

WHEEL ALIGNMENT

Front wheel alignment is the proper adjustment of all the interrelated suspension angles affecting the running and steering of the front wheels of the vehicle. The importance of wheel alignment and wheel balancing is considered essential in order to maintain ease of steering, good directional stability and to prevent abnormal tire wear.

Under every day driving conditions the front wheel alignment angles change and therefore it becomes necessary that every vehicle should have an alignment check at least once a year. Such an inspection of the front suspension and steering components is a preventitive maintenance service and also has a definite bearing on the safe operation of the vehicle.

The method of checking front alignment will vary depending on the type of equipment being used. The instructions furnished by the manufacturer of the equipment should always be followed, with the exception of the specifications are recommended by the Chrysler Motors Corporation should always be used.

There are six basic factors which are the foundation to front wheel alignment; height, caster, camber, toe-in, steering axis inclination and toe-out on turns (Fig. 1). All are mechanically adjustable except steering axis inclination and toe-out on turns. The latter two are valuable in determining if parts are bent or damaged particularly when the camber and caster adjustments cannot be brought within the recommended specifications.

Do not attempt to modify any suspension or steering components by heating or bending.

All adjustments should be made in the following sequence:

(a) Front suspension height
(b) Caster and Camber
(c) Toe-in
(d) Steering Axis Inclination
(e) Toe-out on Turns.

Caster is the number of degrees of forward or backward tilt of the spindle support arm at the top. Forward tilt of the spindle support arm at the top is negative caster. Backward tilt of the spindle support arm at the top from true vertical is positive caster.

Camber is the number of degrees the top of the wheel is tilted inward or outward from a true vertical. Inward tilt of the top of the wheel from true vertical is negative camber. Outward tilt of the wheel at the top is positive camber. Excessive camber is a tire wear factor: negative camber causes wear on the inside of the tire, while positive camber causes wear to the outside.

Toe in is measured in inches and is the distance the leading edges of the tires are closer than the trailing edges. Toe-in is considered the most serious cause for excessive tire wear. Toe-in is the last of the alignment angles to be set in the front wheel alignment operation.

Steering Axis Inclination is measured in degrees and is the amount the spindle support center line is tilted from true vertical. It has a fixed relationship with camber settings and does not change except when components are damaged or bent. This angle is not adjustable and damaged parts must be replaced.

Toe-out on Turns (Turning Radius) is measured in degrees and is the amount one front wheel turns sharper than the other on a turn. This angle

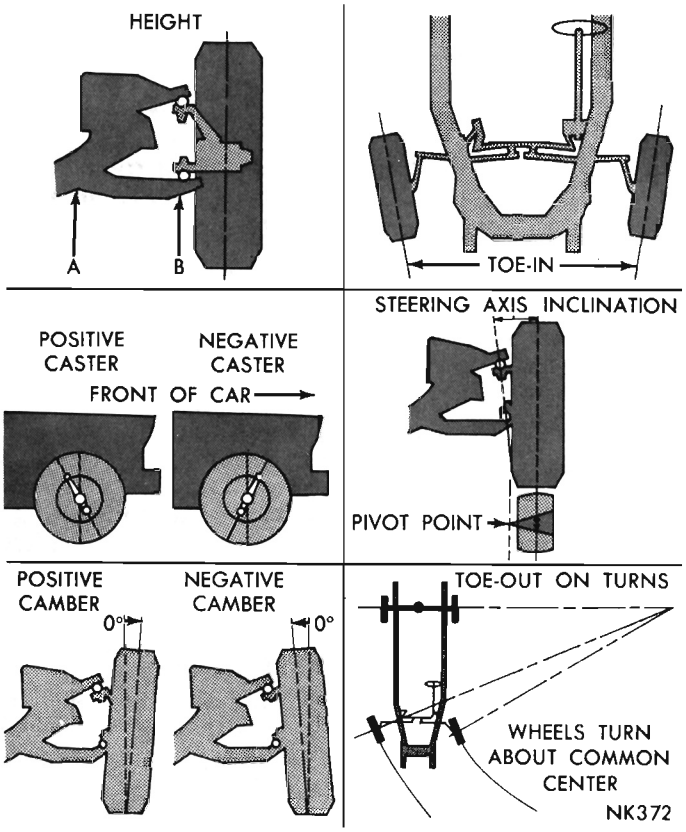


Fig. 1 - Wheel Alignment Factors

is designed into the steering arms in relationship to the wheelbase of the vehicle and is not adjustable. When checking the turning radius and it is found not to be within the recommended specifications, look for possible bent or damaged components.

PRE-ALIGNMENT INSPECTION

Before any attempt is made to change or correct the wheel alignment factors the following inspection and necessary corrections must be made on those parts which influence the steering of the vehicle.

(1) Check and inflate tire to recommended pressure. All tires should be same size and be in good condition and have approximately same wear. Note type of tire tread wear which will aid in diagnosing (Group 22).

(2) Check and adjust front wheel bearings (Group 22).

(3) Check front wheel and tire assembly for radial and lateral runout (follow the Equipment Manufacturers Instructions (Group 22).

(4) Check wheel and tire for unbalance conditions both static and dynamic which could affect steering.

(5) Inspect ball joints and all steering linkage pivot points for excessive looseness.

(6) Check shock absorbers for proper control.

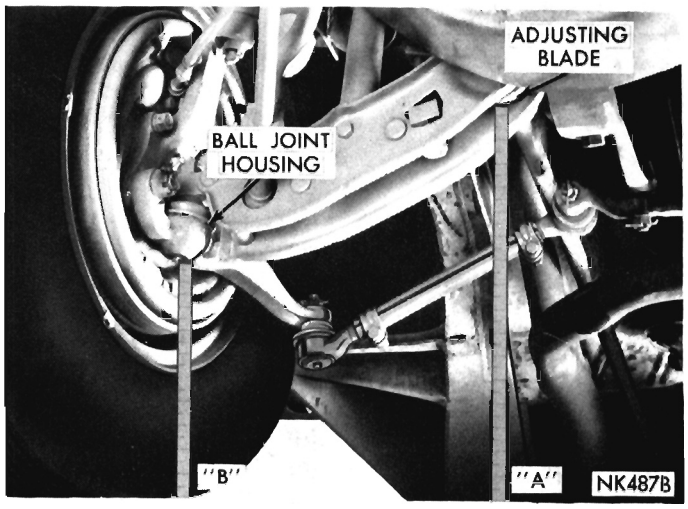


Fig. 2-Measuring Front Suspension Height.

(7) Check steering gear for roughness, binding or sticking condition and adjust as necessary.

(8) Check rear springs for cracks or broken leaves and "U" bolts for proper tightness and measure height differential between left and right sides of vehicle. (Vehicle should be on level floor or on alignment rack) with a full tank of fuel and no luggage or passenger load.

(9) Front suspension heights must only be checked after vehicle has the recommended tire pressures, full tank of fuel, no passenger or luggage compartment load and is on a level floor or alignment rack.

To obtain accurate readings, vehicle should be jounced in following manner just prior to taking each measurement(Height - Caster - Camber and Toe) Grasp bumpers at center (rear bumper first) and jounce up and down several times. Always release bumpers on the down cycle after jouncing both rear and front ends an equal number of times.

WHEEL ALIGNMENT ADJUSTMENTS

Front wheel alignment settings must be held to specifications to hold tire wear to a minimum and to maintain steering ease and handling of vehicle.

The equipment manufacturers recommended procedure should always be followed. Any parts of the front suspension system should be replaced if they are found to be bent. **Do not attempt to straighten any bent part.**

Height

Front suspension heights must be held to specifications for a satisfactory ride, correct appearance, proper front wheel alignment and reduced tire wear.

The heights should only be measured when vehicle has the recommended tire presses, a full tank of fuel, no passenger or luggage compartment load

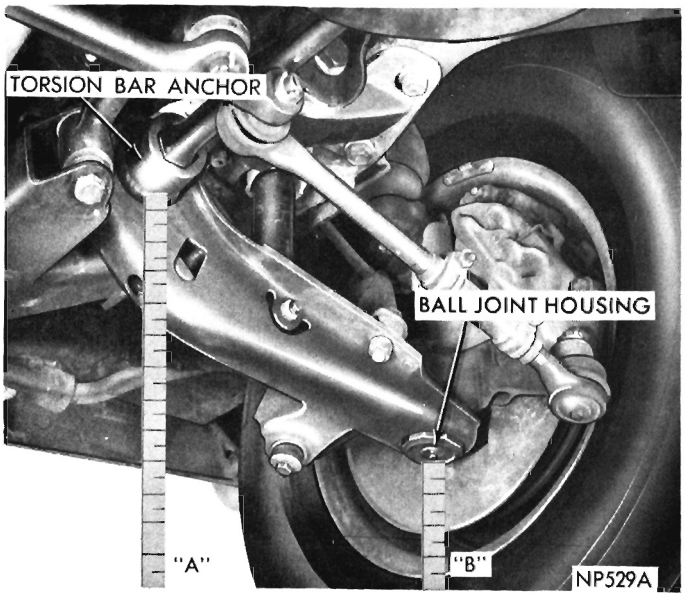


Fig. 3-Measuring Front Suspension Height Imperial

and is on a level floor or an alignment machine rack.

(1) **On all Models except Imperial** clean foreign material from bottom of steering knuckle arm assemblies and from lowest area of the height adjusting blades directly below center of lower control arm inner pivots.

On Imperial Models clean all foreign material from bottom of lower ball joint assemblies and bottom of torsion bar front anchors.

(2) Jounce vehicle several times releasing it on the downward motion.

(3) **On all models except Imperial** measure distance from lowest point of one adjusting blade to floor (measurement A) and from lowest point of steering knuckle arm, at the centerline, on same side (measurement B) to floor (Fig. 2). Measure only one side at a time.

On Imperial Models measure distance from lowest point of front torsion bar anchor at the rear of lower control arm flange to floor (measurement A) and from lowest point of ball joint housing on same side (measurement B) to floor (Fig. 3) measure only one side at a time.

The difference between A and B (A always being greater than B) is the front suspension height.

(4) Refer to Specifications and adjust if necessary by turning torsion bar adjusting bolt clockwise to increase height and counterclockwise to decrease height.

(5) After each adjustment, jounce vehicle before remeasuring. Both sides should be measured even though only one side has been adjusted.

(6) Measure other side in same manner. The maximum allowable difference in suspension height from side to side is 1/8 inch on all Models.

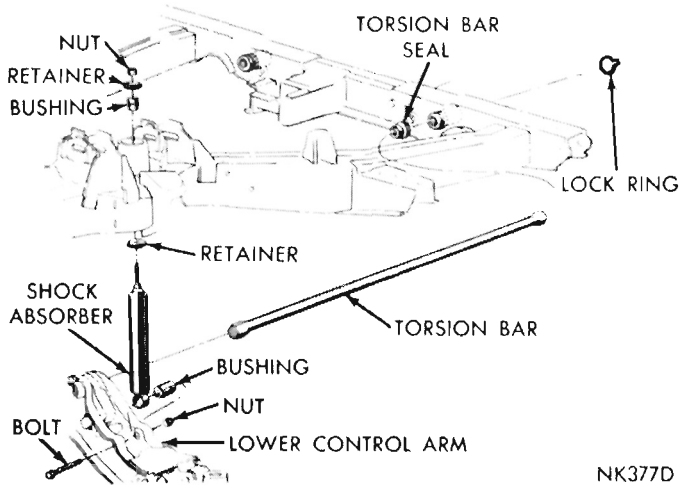


Fig.4-Torsion Bar

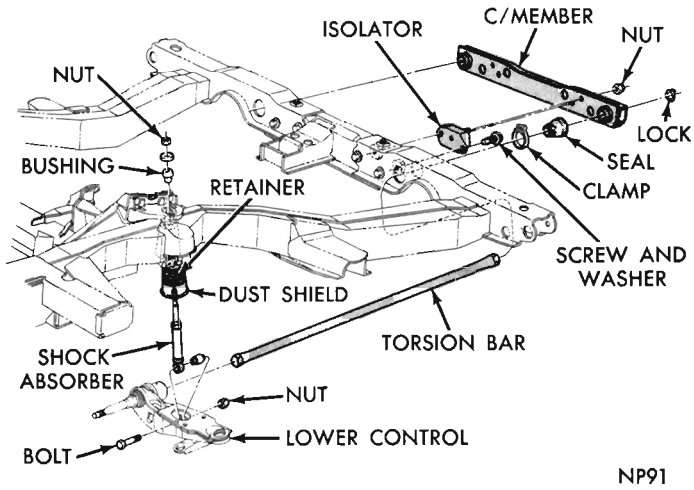


Fig.5-Torsion Bar Imperial

Camber and Caster

(1) Prepare vehicle for measuring wheel alignment.

(2) Remove all foreign material from exposed threads of cam adjusting bolts.

(3) Record initial camber and caster readings before loosening cam bolt nuts.

(4) Camber settings should be held as close as possible to "preferred" setting. Caster should be held as nearly equal as possible on both wheels. Tighten cam bolt nuts as specified, after wheel alignment adjustment.

Toe-In

The toe setting should be the final operation of the front wheel alignment adjustments. The front wheels must be in a straight ahead position. Follow the equipment manufacturers procedure. The steering wheel should be centered during this operation.

Turning both tie rod sleeves will "center" the

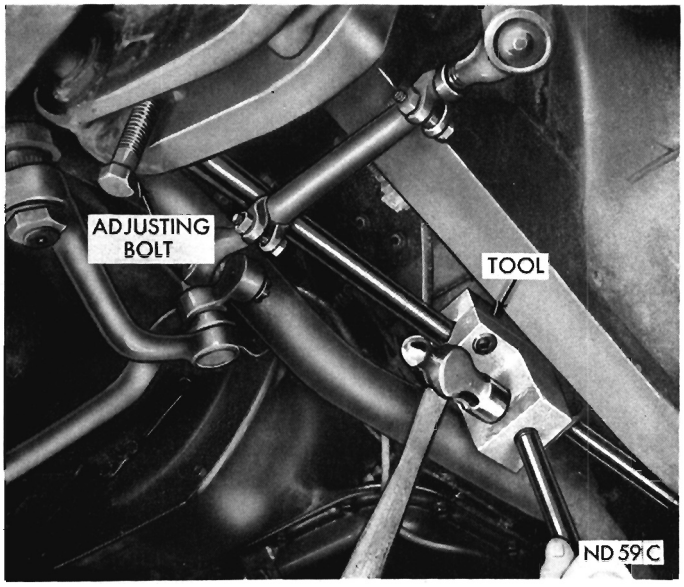


Fig. 6-Removing Torsion Bar

steering wheel. If the steering wheel was centered, make the toe-in adjustment by turning both sleeves an equal amount. Tighten clamp bolt nuts as specified, with the clamp rotated so bolts are on bottom, otherwise interference with torsion bars in jounce may result.

TORSION BARS (Figs 4 and 5)

The torsion bars are not interchangeable side for side. The bars are marked either right or left by an "R" or an "L" stamped on one end of bar.

Removal

(1) Remove upper control arm rebound bumper.

(2) If vehicle is to be raised on a hoist, make sure it is lifted on body only so front suspension is in full rebound (under no load).

(3) **On models other than Imperial** release load from torsion bar by turning anchor adjusting bolt counterclockwise.

(4) **On Imperial models** load on **both** torsions bars will have to be released by turning anchor adjusting bolts counterclockwise. **This is necessary because the rubber isolator rear crossmember would be under load and could possibly cause severe damage or personal injury.**

(5) Slide rear anchor balloon seal off of rear anchor and remove lock ring from anchor. **In some instances, it may be necessary to use Tool C-3728 to aid in removing torsion bar.**(Fig. 6). It is advisable to place Tool C-3728 toward rear of torsion bar to allow sufficient room for striking pad of tool. **Do not apply heat to torsion bar, front anchor or rear anchor.**

(6) Remove tool and slide torsion bar out through rear anchor. Use care not to damage balloon seal when it is removed from torsion bar.

Inspection

(1) Inspect balloon seal for damage and replace if necessary.

(2) Inspect torsion bar for scores and nicks. Dress down all scratches and nicks to remove sharp edges, then paint repaired area with a rust preventative.

(3) Remove all foreign material from hex openings in anchors and from hex ends of torsion bars.

(4) Inspect torsion bar adjusting bolt and swivel and replace if there is any sign of corrosion or other damage. Lubricate for easy operation.

Installation

(1) Insert torsion bar through rear anchor.

(2) Slide balloon seal over torsion bar (cupped end toward rear of bar).

(3) Coat both hex ends of torsion bar with Multi-Mileage Lubricant, Part Number 2525035 or equivalent.

(4) Slide torsion bar in hex opening of lower control arm.

(5) Install lock ring, making sure it is seated in its groove.

(6) Pack annular opening in rear anchor completely full of Multi-Mileage Lubricant, Part Number 2525035 or equivalent. Position lip of balloon seal in groove of anchor. On Imperial models, install balloon seal clamp.

(7) **On other than Imperial models**, turn adjusting bolt clockwise to place a load on torsion bar.

(8) On Imperial models, turn both adjusting bolts clockwise to place a load on both torsion bars.

(9) Lower vehicle to floor and adjust front suspension height.

(10) Install upper control arm rebound bumper and tighten nut 200 inch-pounds.

TORSION BAR RUBBER ISOLATOR (Imperial Fig. 5)

Removal

(1) Raise vehicle so front suspension is in full rebound.

(2) Remove all load from torsion bars by turning adjusting bolts counterclockwise.

(3) Remove lock rings from rear anchors and loosen torsion bar seal clamp and slide seal forward on torsion bar.

(4) Loosen and remove two bolts each side attaching torsion bar rear anchor crossmember to the isolators.

(5) Remove crossmember from torsion bars.

(6) Remove nuts attaching rubber isolator assembly to engine rear support crossmember and re-

move isolator assembly.

Installation

The rubber isolator and mounting bracket is serviced as an assembly only.

(1) Position isolator assembly on engine rear support crossmember bolts and install nuts and tighten nuts 30 foot-pounds.

(2) Position torsion bar anchor crossmember over the hex ends of torsion bars and install bolts and tighten 75 foot-pounds.

(3) Install lock rings in rear anchors and position seal over lip of crossmember and install clamp.

(4) Place a load on torsion bars by turning adjusting bolts clockwise.

(5) Lower vehicle and adjust front suspension heights.

STEERING KNUCKLES

ON MODELS EQUIPPED WITH DISC BRAKES, SEE BRAKES GROUP 5 FOR BRAKE DISC AND CALIPER REMOVAL AND INSTALLATION PROCEDURE.

Removal

(1) Remove upper control arm rebound bumper.

(2) Raise vehicle so front suspension is in full rebound (under no load).

(3) Remove wheel, tire and drum as an assembly.

(4) Remove all load from torsion bar by turning the adjusting bolt counterclockwise.

(5) Remove tie rod end from steering knuckle using Tool C-3894.

(6) Remove upper ball joint stud from steering knuckle using Tool C-3711 (Fury and Chrysler models use Tool C-3964).

(7) Remove two upper bolts securing steering knuckle to brake support.

(8) Remove two lower bolts attaching steering arm to steering knuckle and remove steering knuckle. **Support the brake assembly during this operation to prevent damage to brake hose when lower bolts are removed.**

Installation

(1) Position steering knuckle on brake support and install upper mounting bolts and nuts finger tight only.

(2) Position steering knuckle arm on steering knuckle and install mounting bolts and nuts finger tight only.

(3) Install upper ball joint stud in steering knuckle and tighten the ball joint stud nut as specified and install cotter pin.

(4) Tighten steering knuckle upper bolt nuts 55 foot-pounds. Tighten lower bolt nuts as specified and install cotter pin.

(5) Place a load on torsion bar by turning adjusting bolt clockwise.

(6) Install tie rod end in steering knuckle arm and install nut, tighten 40 foot-pounds and install cotter pin.

(7) Install wheel tire and drum assembly and adjust front wheel bearing (Group 22).

(8) Lower vehicle to floor and install upper control arm rebound bumper. Tighten nut 200 inch-pounds.

(9) Adjust front wheel alignment as necessary.

ALL IMPERIAL MODELS ARE EQUIPPED WITH FRONT WHEEL DISC BRAKES. FOR BRAKE DISC AND CALIPER REMOVAL AND INSTALLATION, SEE BRAKES GROUP 5 FOR CORRECT PROCEDURE.

Removal-Imperial

(1) Raise vehicle so front suspension is in full rebound (under no load).

(2) Remove wheel and tire assembly.

(3) Remove all load from **both** torsion bars by turning adjusting bolts counterclockwise.

(4) Disconnect brake hose to disc brake caliper brake line.

(5) Remove disc brake caliper and brake disc, see Brakes Group 5.

(6) Remove tie rod end from steering knuckle arm using Tool C-3894. **Use care not to damage seals.**

(7) Remove upper and lower ball joint studs from steering knuckle using Tool -C3964. Turn threaded portion of tool locking it securely against ball joint stud. Spread tool enough to place ball joint stud under pressure, then strike steering knuckle sharply with a hammer to loosen stud. Do not attempt to force stud out of knuckle with tool alone.

(8) Remove bolts attaching steering arm to steering knuckle and remove steering knuckle.

Installation-Imperial

(1) Align steering knuckle mounting holes with those of steering arm, insert mounting bolts and tighten finger tight at this time.

(2) Install upper and lower ball joint studs in steering knuckle and install nuts, tighten upper 125 and lower 155 foot-pounds and install cotter pins.

(3) Tighten steering knuckle bolts to 160 foot-pounds.

(4) Install tie rod end stud in steering knuckle arm and install nut. Tighten 40 foot-pounds and install cotter pin.

(5) Install disc brake caliper and brake disc, see Brakes Group 5.

(6) Connect brake hose to disc brake caliper

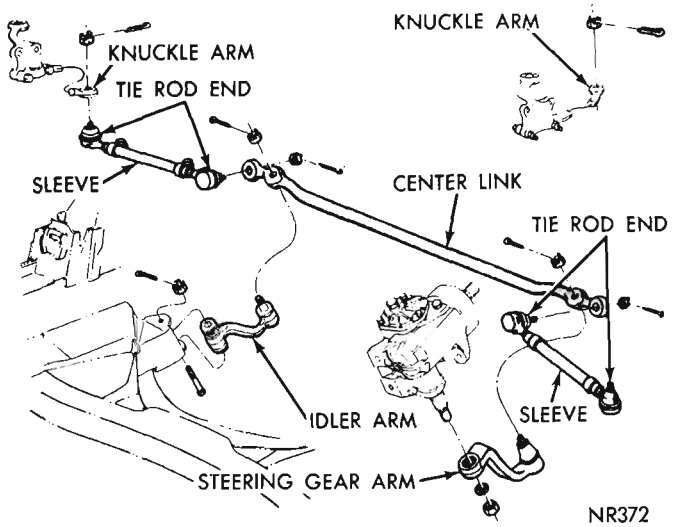


Fig. 7-Steering Linkage (Valiant)

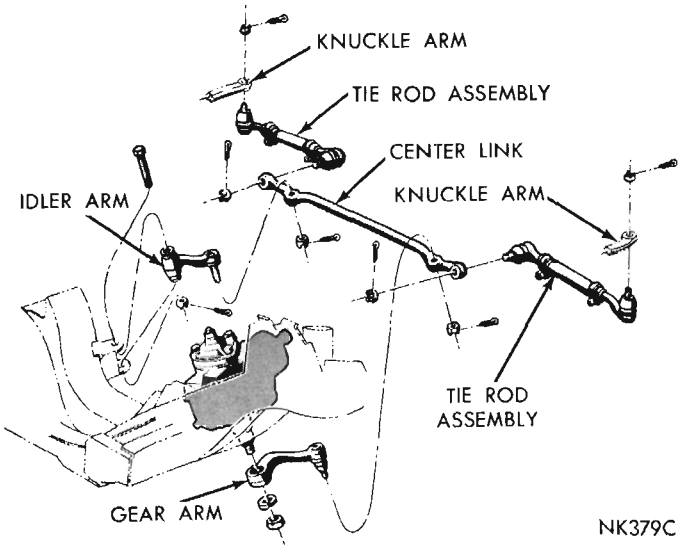


Fig. 9-Steering Linkage (Fury-Chrysler)

brake line and bleed brakes.

(7) Place a load on **both** torsion bars by turning adjusting bolts clockwise.

(8) Install wheel and tire assembly and adjust front wheel bearings (Group 22).

(9) Lower vehicle to floor and adjust front suspension heights and wheel alignment as necessary.

STEERING LINKAGE (Figs. 7,8,9 and 10)

The tie rod end seals should be inspected at all oil change periods. **Removal of tie rod ends from the steering knuckle arm or center link by methods other than using the recommended tools may damage tie rod end seal.**

Damaged seals require removal of the seals and inspection of the tie rod assembly end at the throat opening. If the parts have not lost all the lubricant and are not contaminated, worn or

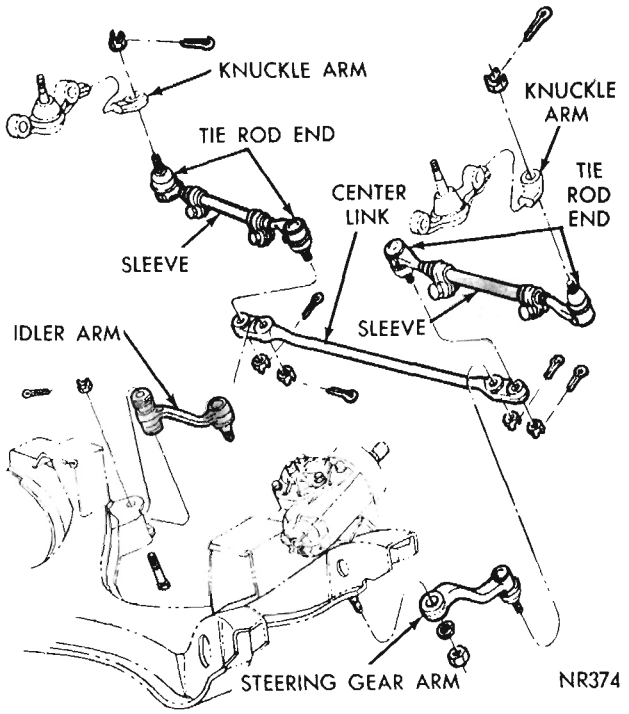


Fig. 8-Steering Linkage (Barracuda - Satellite)

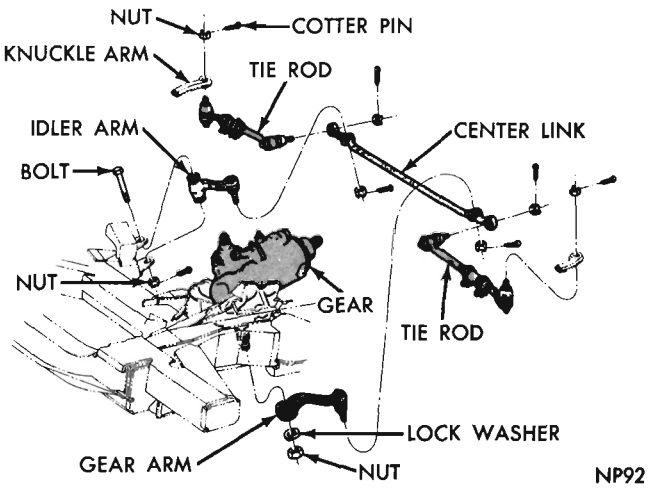


Fig. 10-Steering Linkage (Imperial)

rusted, use new seals and reinstall, otherwise, a new complete tie rod end assembly should be installed. Lubricate the tie rod end assembly. Special long-life chassis greases such as Multi-Mileage Lubricant, Part Number 2525035 or equivalent is intended for this purpose.

Removal

(1) Remove tie rod ends from steering knuckle arms using Tool C-3894 (Fig. 11).

Use care not to damage seals.

(2) Using Tool C-3894 remove inner tie rod ends from center link.

(3) Remove idler arm stud from center link using Tool C-3894. Remove idler arm bolt from corssmember.

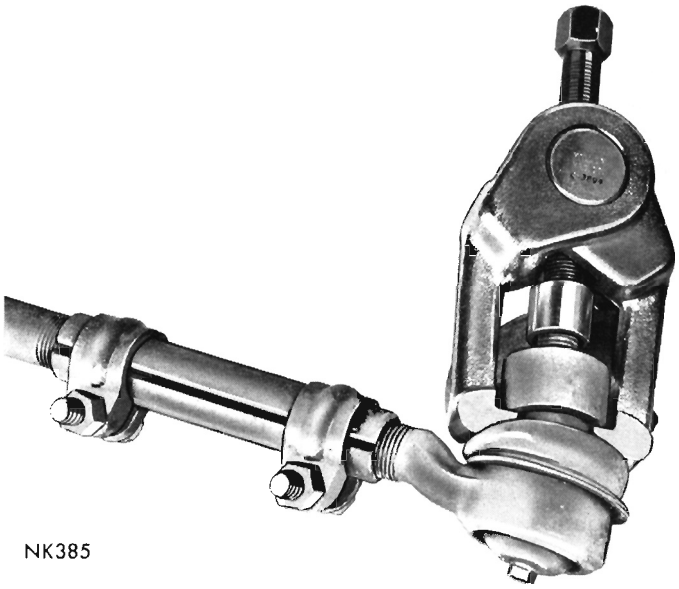


Fig. 11-Removing Outer Tie Rod End

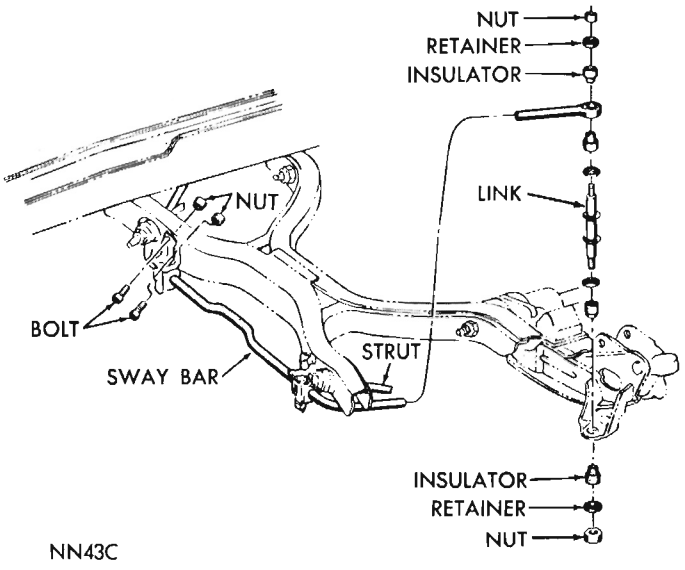


Fig. 12-Sway Bar Assembly (Valiant)

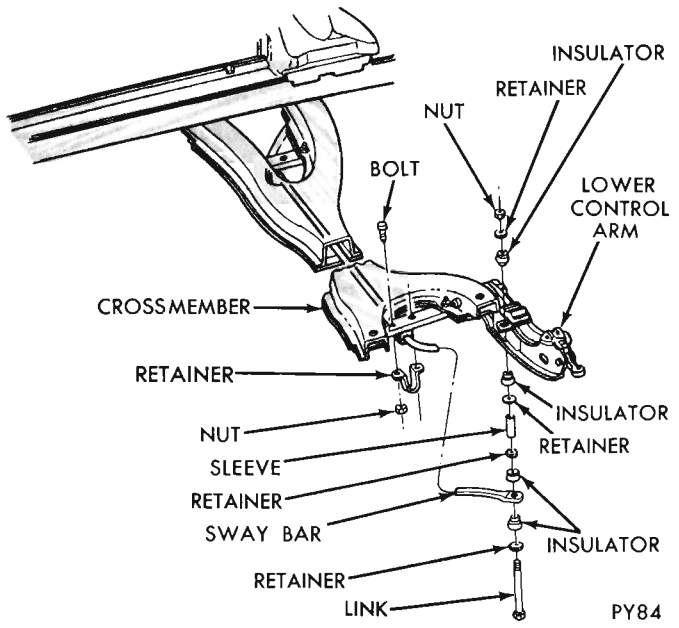


Fig. 13-Sway Bar Assembly (Barracuda-Satellite)

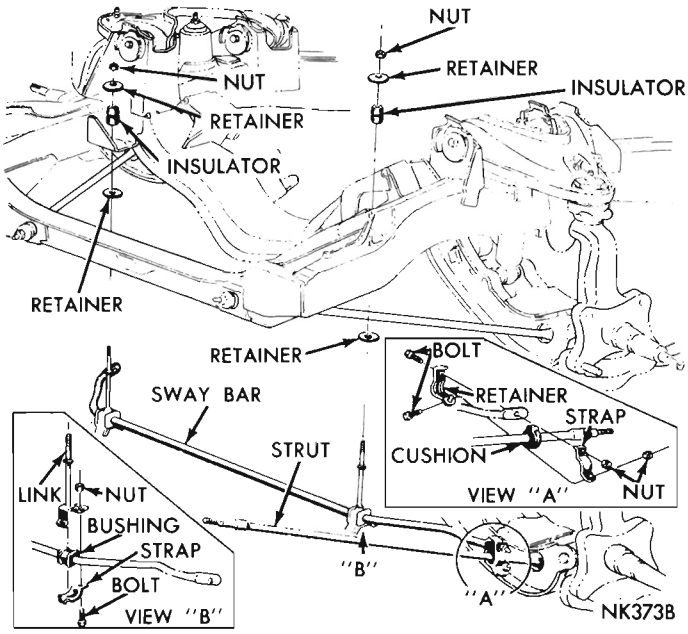


Fig. 14-Sway Bar (Fury-Chrysler)

(4) Remove steering gear arm stud from center link, using Tool C-3894.

(5) Remove steering gear arm from gear.

Installation

Replace all tie rod and steering arm assemblies that are damaged or worn.

(1) Position idler arm assembly in bracket and install bolts. Tighten nut 65 foot-pounds and install cotter pin.

(2) Place center link over idler arm and steering gear arm studs and tighten nuts 40 foot-pounds. Install cotter pins.

(3) Connect tie rod ends to steering knuckle arms and center link. Tighten nuts 40 foot-pounds and install cotter pins.

(4) Measure and adjust front wheel toe.

SWAY BAR (Figs. 12,13, 14 and 15)

Removal-Valiant

(1) Loosen and remove upper link nut, retainer and rubber insulator on both sides.

(2) Loosen and remove bolts attaching both brackets to front crossmember.

(3) Remove sway bar from vehicle.

(4) Loosen and remove nuts, retainers and rubber insulators and remove links from lower con-

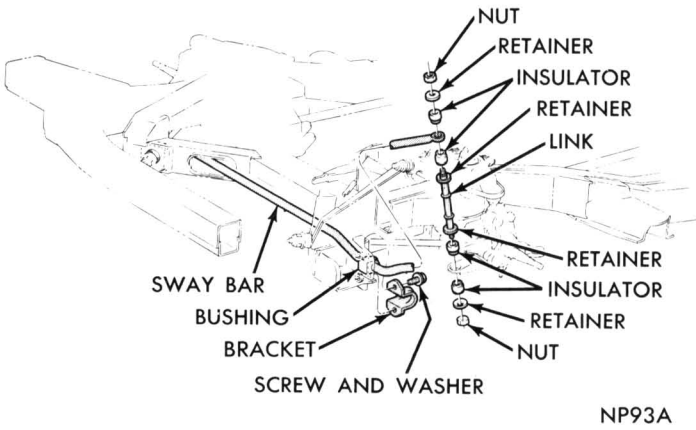


Fig. 15-Sway Bar (Imperial)

trol arm bracket.

(5) If the rubber insulator bushings show excessive wear or deterioration of rubber, install new bushings.

The sway bar cushions are not serviced separately. If replacement is necessary, install a new sway bar assembly.

Installation-Valiant

(1) Position link with retainer and rubber insulator in lower control arm bracket, followed by rubber insulator and retainer (concave side toward rubber insulator) and nut. Tighten nut to 100 inch-pounds.

(2) Position sway bar assembly in vehicle and install attaching bolts and nuts and tighten to 200 inch-pounds.

(3) Install retainer on link, followed by rubber insulator and sway bar. Using a screwdriver or pinch bar between strut and sway bar, if necessary apply pressure and install upper rubber insulator, retainer and nut, tighten nuts 100 inch-pounds.

Removal-Barracuda-Satellite

(1) Loosen and remove upper link nut, retainer and rubber insulator on both sides of car.

(2) Loosen and remove bolts and nuts attaching both retainer brackets to front crossmember.

(3) Remove sway bar link bolt from sway bar followed by rubber insulators, retainers, sleeve spacer.

(4) Remove the center rubber insulator bracket and turn sway bar toward front of car and remove by sliding out thru opening in front crossmember.

(5) If the rubber insulator bushings show excessive wear or deterioration of rubber, install new bushings.

The sway bar cushions are serviced separately.

Installation-Barracuda-Satellite

(1) With sway bar ends pointed toward front of car, insert sway bar thru hole in front crossmember into its correct position.

(2) Install sway bar cushion retainer brackets and attaching bolts and nuts and tighten to 200 inch-pounds.

(3) Position link bolt with retainer and rubber insulator thru sway bar mounting hole. Install other mounting components in correct sequence (Fig. 13). (Always making sure the concave side of retainers are toward the rubber insulators).

(4) Position the link bolt, sway bar and the stack up of parts thru mounting bracket hole in lower control arms. Install upper rubber insulator, retainer and nut. Tighten link nut to 100 inch-pounds.

Removal-Fury and Chrysler

(1) Remove two sway bar link retaining nuts and concave retainers.

(2) Remove two sway bar cushion retaining nuts, retainers, straps, and bolts, (one to each strut). Slide sway bar out through control arm struts and away from vehicle. **The sway bar bushings are not serviced separately. If replacement is necessary, install a new sway bar assembly. Remove lower concave retainer.**

(3) Remove sway bar link insulating bushings from frame bracket. If bushings are worn or deteriorated, install new bushings as required.

Installation-Fury and Chrysler

(1) Dip sway bar link bushing in water and install in frame bracket, using a twisting motion. When installed properly, groove in bushing will index with hole in frame bracket.

(2) Thread sway bar into position over top of lower control arm struts.

(3) Engage sway bar cushion housing with struts and install straps, bolts, lockwashers and nuts. Tighten to 30 foot-pounds.

(4) Install retainers over ends of links (concave side up), then slide links up through bushings. Install retainers (concave side down) over ends of links and down on bushings. Install nuts and tighten to 100 inch-pounds.

Removal-Imperial

(1) Raise vehicle on hoist so front suspension is in full rebound (under no load).

(2) Remove one wheel and tire assembly from vehicle, which will aid in removal of sway bar.

(3) Loosen and remove upper link nut, retainer and rubber insulator on both sides.

(4) Loosen and remove screw and washer assemblies attaching both bushing reatiners to front

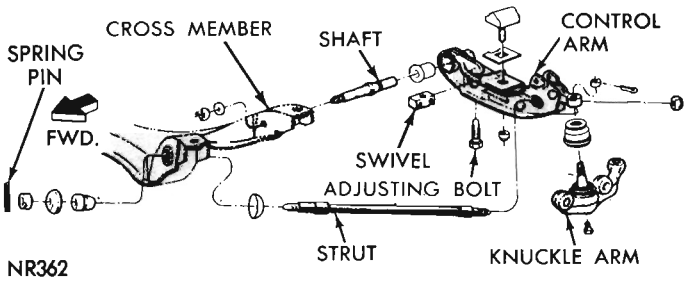


Fig. 16-Lower Control Arm (Valiant)

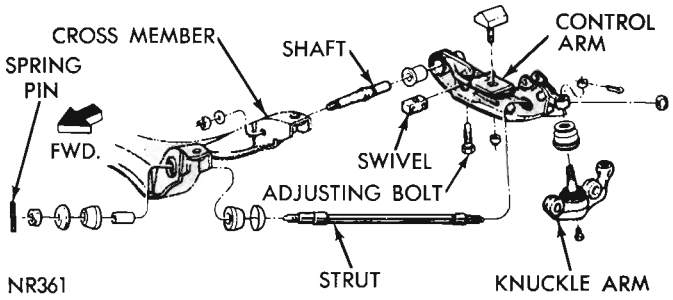


Fig. 17-Lower Control Arm (Barracuda-Satellite)

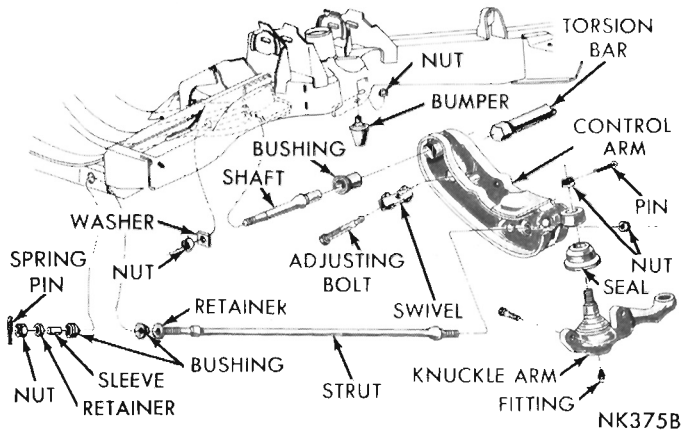


Fig. 18-Lower Control Arm (Fury-Chrysler)

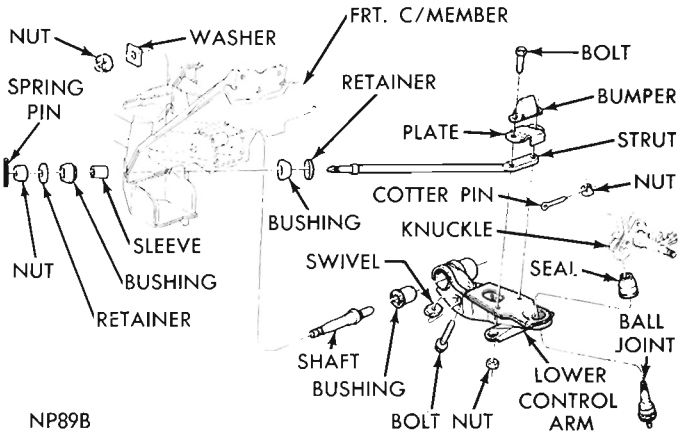


Fig. 19-Lower Control Arm (Imperial)

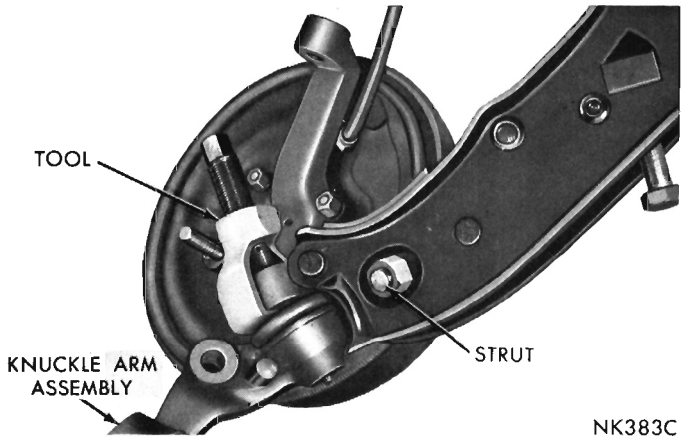


Fig. 20-Removing Lower Ball Joint Stud

crossmember.

(5) Remove sway bar from vehicle.

(6) Loosen and remove nuts, retainers and rubber insulators and remove links from lower control arm bracket.

(7) If the rubber insulator bushings show excessive wear or deterioration of rubber, install new bushings.

The sway bar bushings are not serviced separately. If replacement is necessary, install a new sway bar assembly.

Installation-Imperial

(1) Position link with retainer and rubber insulator in lower control arm bracket followed by rubber insulator and retainer (concave side toward rubber insulator) and nut. Tighten nut to 100 inch-pounds.

(2) Position sway bar assembly in vehicle and install attaching screw and washer assemblies and tighten finger tight only.

(3) Install retainer on link followed by rubber insulator and sway bar. Using a screwdriver or pinch bar between strut and sway bar apply pressure and install upper rubber insulator retainer and nut and tighten nut 100 inch-pounds.

(4) Lower vehicle to floor so full weight is on wheels. Tighten the bushing retainer screw and washer assemblies to 200 inch-pounds.

LOWER CONTROL ARM AND SHAFT (Figs. 16, 17, 18 and 19)

ON MODELS EQUIPPED WITH DISC BRAKES, SEE BRAKES GROUP 5 FOR BRAKE DISC AND CALIPER REMOVAL AND INSTALLATION PROCEDURE.

(1) Remove the wheel, tire and drum as an assembly.

(2) Remove lower shock absorber attaching bolt and push up and out of way, and remove torsion

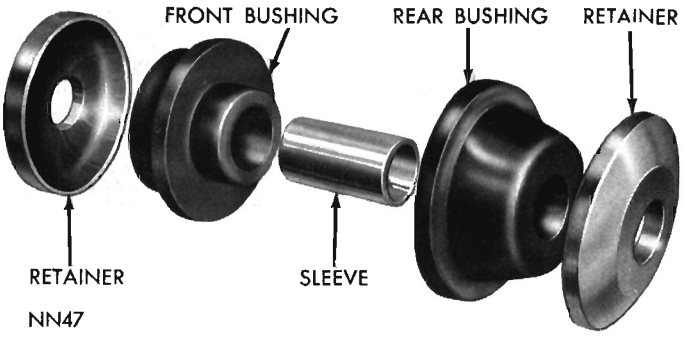


Fig. 21-Strut Crossmember Bushings (Barracuda-Satellite)

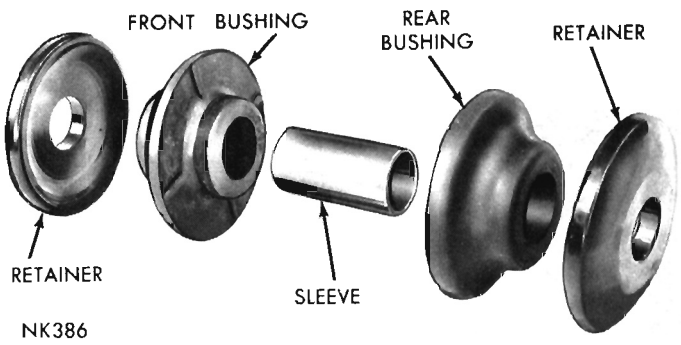


Fig. 22-Strut Crossmember Bushings (Fury-Chrysler)

bar from lower control arm.

(3) Remove tie rod end from steering knuckle arm using Tool C-3894 (Fig. 9). **Use care not to damage seal.**

(4) Remove sway bar to strut strap (Fury and Chrysler Models) or remove sway bar link from lower control arms (Valiant, Satellite).

(5) Remove steering knuckle arm to brake support bolts and remove steering knuckle arm. Move brake support assembly out of way.

(6) Remove ball joint stud from lower control arm using Tool C-3964 (Fig. 20). The bottom portion of tool must be positioned between seal and control arm to avoid seal damage.

(7) Remove strut spring pin, front nut and bushing retainer (Figs. 16 thru 19) from forward end of crossmember.

(8) Remove nut and washer from lower control arm shaft.

(9) Tap end of lower control arm shaft with a "soft end" hammer to aid in removal of shaft from crossmember.

(10) Remove lower control arm, shaft and strut as an assembly.

(11) Remove strut bushing from crossmember only if damaged. All models (except Valiant) use a two piece bushing and sleeve arrangement (Figs. 21 and 22).

(12) Remove strut bushing inner retainer from strut.

Disassembly

(1) Place strut portion of control arm assembly in a vise and remove strut nut.

(2) Remove strut from control arm.

(3) Remove torsion bar adjusting bolt and swivel.

(4) Place lower control arm assembly in an arbor press with torsion bar hex opening up and with a support under outer edge of control arm.

(5) Place a brass drift into hex opening and press shaft out of lower control arm. The bushing inner shell will remain on shaft. (Fig. 23).

(6) Cut and remove rubber portion of bushing

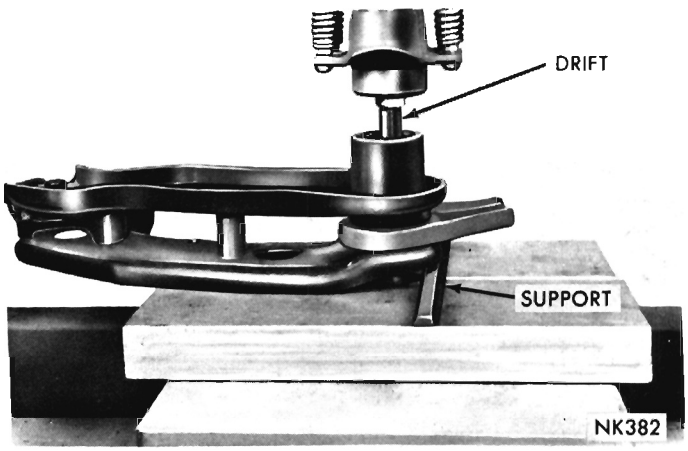


Fig. 23-Removing Pivot Shaft

from control arm shaft.

(7) Remove bushing outer shell by cutting with a chisel. **Use care not to cut into control arm.**

(8) Remove bushing inner shell from pivot shaft. Cut off if necessary.

Assembly

(1) Position new bushing on shaft (flange end of bushing first). Press shaft into inner sleeve until bushing seats on shoulder of shaft.

(2) Press shaft and bushing assembly into lower control arm using Tool C-3848 and an arbor press. Fury and Chrysler Models use Tool C-3556. In some instances it may be necessary to reduce the diameter of shaft shoulder to facilitate use of tool.

(3) Install torsion bar adjusting bolt and swivel.

(4) Position strut in lower control arm and tighten nut as specified.

Installation

On Valiant models, install new strut bushing in crossmember with a twisting motion. Water may be used as a lubricant to aid in installation.

(1) Place strut bushing inner retainer on strut and install lower control arm, shaft, and strut assembly. Install strut, strut bushing outer retainer

and nut finger tight only.

(2) On Barracuda and Satellite models, position front strut bushing half and sleeve into crossmember. Place rear retainer and rear strut bushing on strut and position control arm, shaft and strut assembly into crossmember. Install strut bushing outer retainer and nut finger tight only.

(3) Install lower control arm shaft washer and nut finger tight only.

(4) Position lower ball joint stud into lower control arm and tighten nut as specified. Install cotter pin.

(5) Position brake support on steering knuckle and install two upper bolts and nuts finger tight only.

(6) Position steering knuckle arm on steering knuckle and install two lower bolts and nuts.

(7) Tighten upper bolt nuts 55 foot-pounds. Tighten lower bolt nuts as specified.

(8) Inspect tie rod end seal and replace if damaged. Connect tie rod end to steering knuckle arm and tighten nut 40 foot-pounds. Slide tie rod end seal protector over tie rod end and install cotter pin.

(9) Connect shock absorber to control arm and tighten finger tight only. (Valiant install bolt from rear only).

(10) Install torsion bar

(11) Install wheel, tire and drum assembly and adjust front wheel bearing (Group 22).

(12) Lower vehicle to floor, adjust front suspension heights and tighten strut nut, at crossmember as specified and install strut spring pin.

Tighten shock absorber nut 50 foot-pounds.

(13) Tighten lower control arm shaft nut as specified.

(14) Measure and adjust front wheel alignment as necessary.

Removal-Imperial

(1) Raise vehicle on hoist so front suspension is in full rebound (under no load).

(2) Remove wheel and tire assembly.

(3) Remove all load from both torsion bars by turning adjusting bolts counterclockwise.

(4) Disconnect shock absorber at lower control arm shock mounting bolt, then push shock absorber up into frame out of way.

(5) Remove nuts and bolts attaching strut to lower control arm.

(6) Disconnect brake hose to disc brake caliper brake line.

(7) Remove upper and lower ball joint stud nuts. Slide Tool C-3964 over upper stud until tool rests on steering knuckle. Turn threaded portion of tool locking it securely against lower stud. Tighten tool enough to place lower ball joint stud under pressure, then strike steering knuckle sharply with a hammer to loosen stud. **Do not attempt to force stud out of knuckle with tool alone.**

(8) Remove tool and disengage ball joint from knuckle.

(9) Remove nut and washer attaching lower control arm pivot shaft to frame.

(10) Using a brass drift and hammer, tap end of shaft to loosen (shaft is a tapered fit in front crossmember). This will aid in removal of shaft from crossmember.

(11) Remove lower control arm and shaft as an assembly. **The lower control arm and ball joint will be serviced, as an assembly only. This is necessary due to lower ball joint being a very tight press fit into the arm.**

Disassembly-Imperial

(1) Position lower control arm in an arbor press with torsion bar hex opening up and with a support under out edge of control arm.

(2) Insert a brass drift into hex opening and press shaft out of lower control arm. The bushing inner shell will remain on shaft.

(3) Remove bushing inner shell from pivot shaft.

(4) Remove bushing outer shell in torsion bar anchor by cutting with a chisel. Use care not to cut into control arm.

(5) Remove torsion bar adjusting bolt and swivel from lower control arm.

Assembly-Imperial

(1) Position new bushing on shaft, flange end of bushing first, and seat bushing on shoulder of shaft.

(2) Press shaft and bushing assembly into control arm using Tool C-4037.

(3) Install torsion bar adjusting bolt and swivel.

(4) Position new ball joint seal on ball joint body and using Tool C-4034 install seal. **To facilitate installation of seal, the ball joint stud should be perpendicular to ball joint body.** Lubricate ball joint, see Lubrication section Group O.

Installation-Imperial

(1) Postion lower control arm assembly in frame crossmember in approximate operating position. Install washer and nut. **DO NOT TIGHTEN** nut until full weight of vehicle is on wheels.

(2) Raise the lower control arm assembly and insert the lower ball joint stud in steering knuckle. Install ball joint stud nuts (upper and lower) and tighten upper 125 and lower 155 foot-pounds and install cotter pins.

(3) Position strut bushing rear half and rear retainer on strut and insert strut through crossmember.

(4) Install strut bushing front half and retainer

on strut. Install nut finger tight only.

(5) Position rear of strut over lower control arm strut mounting holes and install bumper and plate assembly and insert bolts and install nuts, and tighten to 115 foot-pounds.

(6) Connect shock absorber to lower control arm and install nut finger tight.

(7) Install torsion bar and apply some load on both torsion bars by turning adjusting screws clockwise.

(8) Connect brake hose to disc brake caliper brake line and bleed brakes.

(9) Install wheel and tire assembly and adjust wheel bearings (Group 22).

(10) Lower vehicle to floor and tighten strut nut at crossmember to 52 foot-pounds with full weight of vehicle on wheels and install spring pin. Tighten lower control arm pivot shaft nut 190 foot-pounds and install cotter pin. Tighten lower shock absorber nut to 50 foot-pounds.

(11) Measure and adjust front suspension height and wheel alignment as necessary.

LOWER CONTROL ARM STRUT (Figs. 16, 17, 18 and 19)

Removal

(1) Remove lower control arm, shaft and strut as an assembly.

(2) Remove nut holding strut to lower control arm and remove strut from control arm.

(3) Inspect strut bushings (Fig. 22). If bushings are worn or deteriorated, install new bushings.

Installation

(1) Install new strut bushings, if necessary.

(2) Position strut into control arm and tighten nut 105 foot-pounds.

(3) Position strut bushing rear retainer and strut bushing rear half on strut. (Concave side of retainer in contact with bushing). Position control arm shaft and strut assembly into crossmember. Install strut front bushing, sleeve and retainer. Tighten nut finger tight only.

(4) Install control arm pivot shaft washer and nut finger tight only.

(5) Connect shock absorber to lower control arm and tighten nut finger tight only.

(6) Lower vehicle to floor so full weight is on its wheels.

(7) Adjust front suspension heights to specifications.

(8) Tighten front strut nut to as specified and install spring pin. Tighten pivot shaft nut as specified. Tighten shock absorber nut 50 foot-pounds.

(9) Adjust front wheel alignment as necessary.

Removal-Imperial

(1) Raise vehicle on hoist so front suspension is in full rebound (under no load).

(2) Loosen and remove lower control arm strut spring pin nut and retainer.

(3) Loosen and remove attaching bolts to lower control arm bumper and plate assembly and remove bumper assembly.

(4) Slide strut and bushing retainer from strut bushing in frame.

(5) Separate front and rear halves of strut bushing from frame using a screwdriver. If the rubber bushings show excessive wear or deterioration of rubber, install new bushings.

Installation-Imperial

(1) Position rear retainer and strut bushing rear half on strut (concave side of retainer in contact with bushing).

(2) Insert strut into frame. Install strut bushing front half, spacer and retainer (concave side of retainer in contact with bushing) on strut and install nut finger tight.

(3) Position rear of strut over lower control arm strut mounting holes and install bumper and plate assembly and insert bolts and install nuts and tighten to 115 foot-pounds.

(4) Lower vehicle to floor and with weight of vehicle on wheels, tighten forward end strut nut to 52 foot-pounds and install strut spring pin.

(5) Check and adjust front wheel alignment.

LOWER BALL JOINTS

ON MODELS EQUIPPED WITH DISC BRAKES, SEE BRAKES GROUP 5 FOR BRAKE DISC AND CALIPER REMOVAL AND INSTALLATION PROCEDURE.

The lower ball joints, steering arm assemblies on all models except Imperial should not be replaced for looseness if the axial end play (Up and Down movement) is under .070 inch. Looseness of this nature is not detrimental and will not affect front wheel alignment or vehicle stability.

On Imperial models the lower ball joints are preloaded (zero axial end play). Therefore, if any axial end play (Up and Down movement) is observed the ball joint and lower control arm should be replaced. The lower ball joints on the Imperial will be serviced as a lower control arm and ball joint assembly complete. This is due to the lower ball joint being a press fit and requires very high removing and installing forces.

Inspection-

(1) Raise the front of vehicle and install safety floor stands under both lower control arms as far

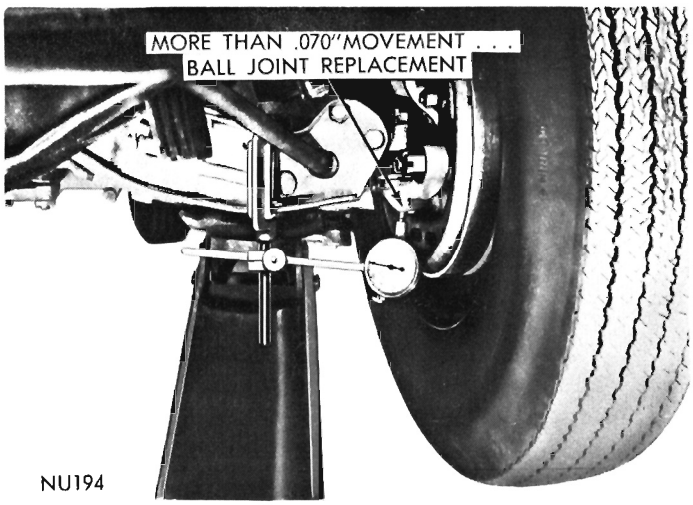


Fig. 24-Measuring Lower Ball Joint Axial Travel

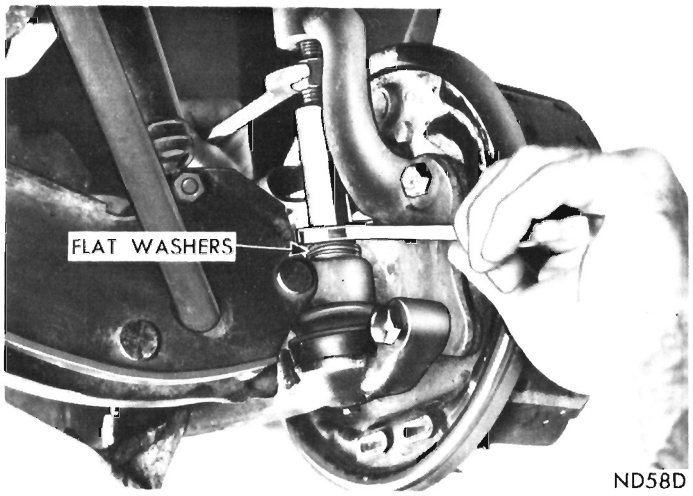


Fig. 25 - Removing Upper Ball Joint Stud (Valiant)

outboard as possible. The upper control arms must not contact the rubber rebound bumpers.

(2) With the weight of vehicle on the control arm, install dial indicator and clamp assembly to lower control arm (Fig. 24).

(3) Position dial indicator plunger tip against ball joint housing assembly and zero dial indicator.

(4) Measure axial travel of the ball joint housing arm with respect to the ball joint stud, by raising and lowering the wheel using a pry bar under the center of the tire.

(5) If during measurement you find the axial travel of the housing arm is .070 inches or more, relative to the ball joint stud, the ball joint should be replaced.

Removal

The lower ball joint is integral with the steering arm and is not serviced separately. Compression type lower ball joints are used on all models.

(1) Remove upper control arm rebound bumper.

(2) Raise vehicle so front suspension is in full rebound. Remove all load from torsion bar by turning adjusting bolt counterclockwise. If jacks are used to raise vehicle it is essential that a support be used between the crossmember and jack.

(3) Remove wheel, tire and drum as an assembly. It may be necessary to back-off the brake shoes to facilitate removal of drum assembly.

(4) Remove two lower bolts from the brake support attaching steering arm and ball joint assembly to steering knuckle.

(5) Remove tie rod end from steering arm using Tool C-3894. **Use care not to damage seal.**

(6) Using Tool C-3964 remove ball joint stud from lower control arm (Fig. 20, and remove steering arm and ball joint assembly.

Installation

(1) Place a new seal over ball joint (if necessary) and using a 1-7/8 inch socket, press retainer portion of seal down on ball joint housing until it is securely locked in position (Valiant, Barracuda and Satellite use Tool C-4039).

(2) Position steering arm and ball joint assembly on steering knuckle and install two mounting bolts. Tighten nuts 100 foot-pounds (Valiant), 120 foot-pounds (Barracuda, Satellite, Fury and Chrysler.

(3) Insert ball joint stud into opening in lower control arm.

(4) Install stud retaining nut and tighten as specified, Install cotter pin and lubricate ball joint, see Lubrication Section Group "O".

(5) Inspect tie rod seal for damage and replace if damaged. Connect tie rod end to steering knuckle arm, tighten nut 40 foot-pounds, and install cotter pin.

(6) Place a load on torsion bar by turning adjusting bolt clockwise.

(7) Install wheel, tire and drum assembly and adjust front wheel bearing (Group 22).

(8) Lower vehicle to floor and install upper control arm rebound bumper. Tighten to 200 inch-pounds.

(9) Measure front suspension height and adjust if necessary.

(10) Measure front wheel alignment and adjust if necessary.

Replacement-Imperial

The lower ball joints on the Imperial will be serviced only as a lower control arm and ball joint assembly complete. This is due to the lower ball joint being a press fit and requires very high removing and installing forces. See Lower Control Arm and Shaft for replacement procedure.

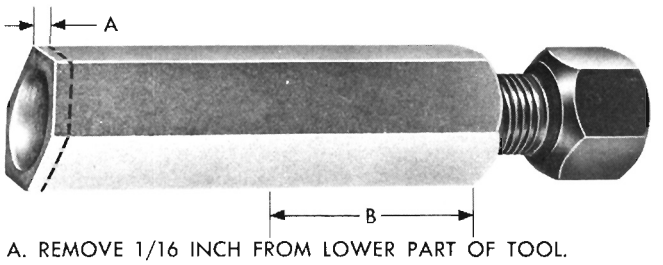


Fig. 26 - Tool C-3711 Modified

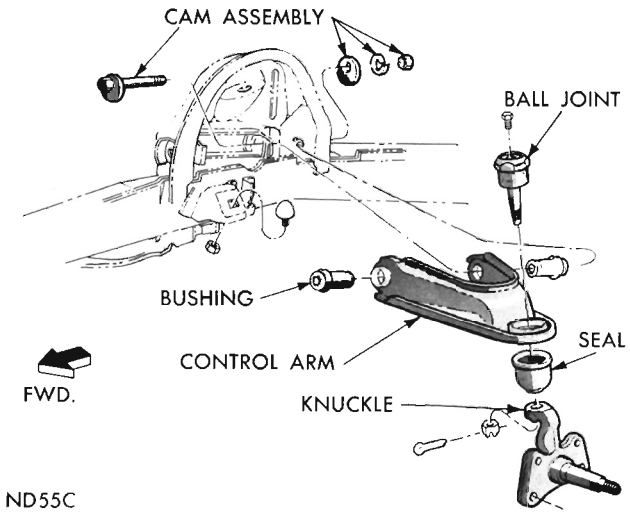


Fig. 28 - Upper Control Arm (Barracuda-Satellite)

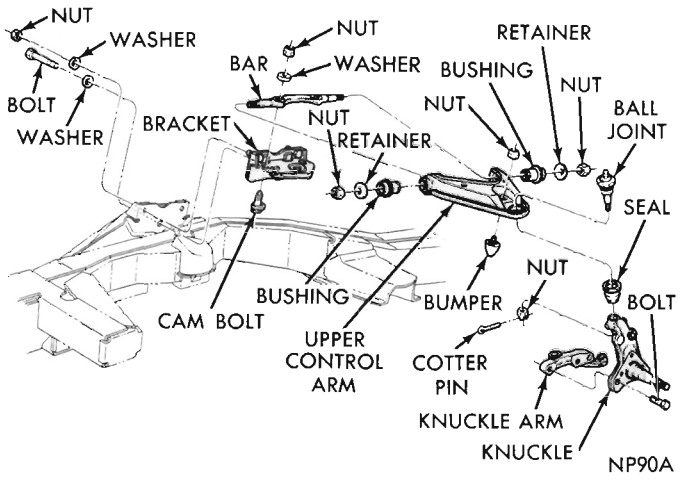


Fig. 30 - Upper Control Arm (Imperial)

UPPER CONTROL ARM (Figs. 27, 28, 29 and 30)

Removal and Disassembly

(1) Place a jack under lower control arm as close to wheel as possible and raise vehicle until wheel clears floor.

(2) Remove wheel and tire as an assembly.

(3) On Valiant, Barracuda and Satellite models, remove upper and lower ball joint stud nuts using Tool C-3711. On Valiant models, it may be necessary to add approximately 7/16 inch of flat washers over lower ball joint stud to allow the use of Tool C-3711 without damaging threads on lower ball joint stud. Place Tool C-3711 over stud. Turn threaded portion of tool locking it securely against the upper stud (Fig. 25).

To use Tool C-3711 as outlined, it may be necessary to modify the tool (Fig. 26).

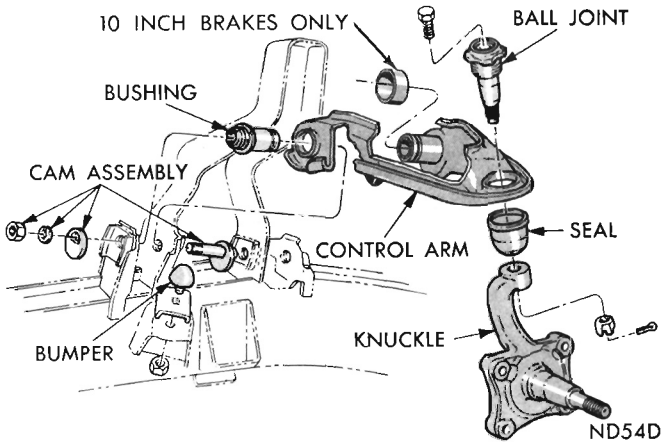


Fig. 27 - Upper Control Arm (Valiant)

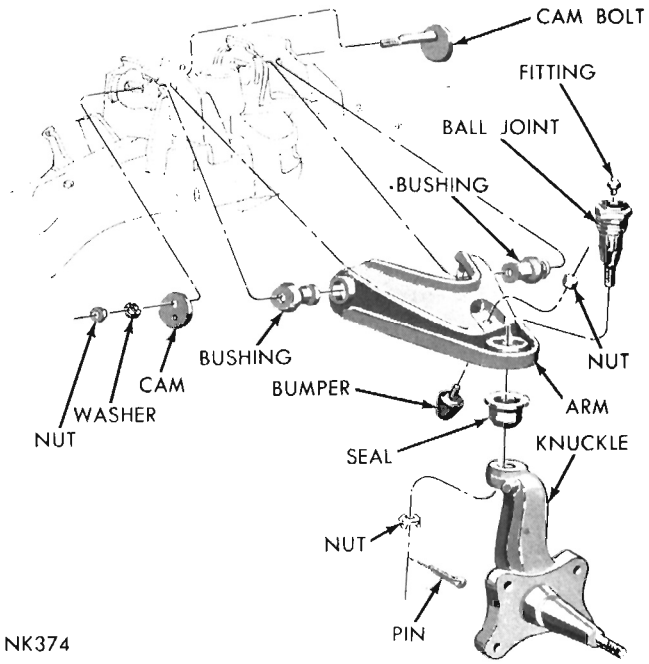


Fig. 29 - Upper Control Arm (Fury-Chrysler)

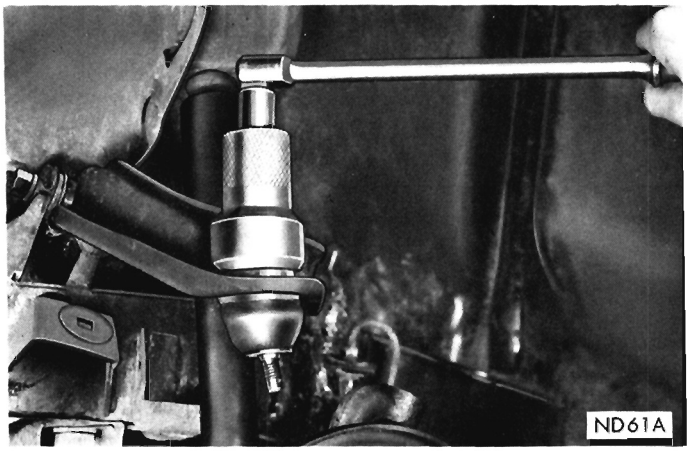


Fig. 31 - Removing Or Installing Upper Ball Joint

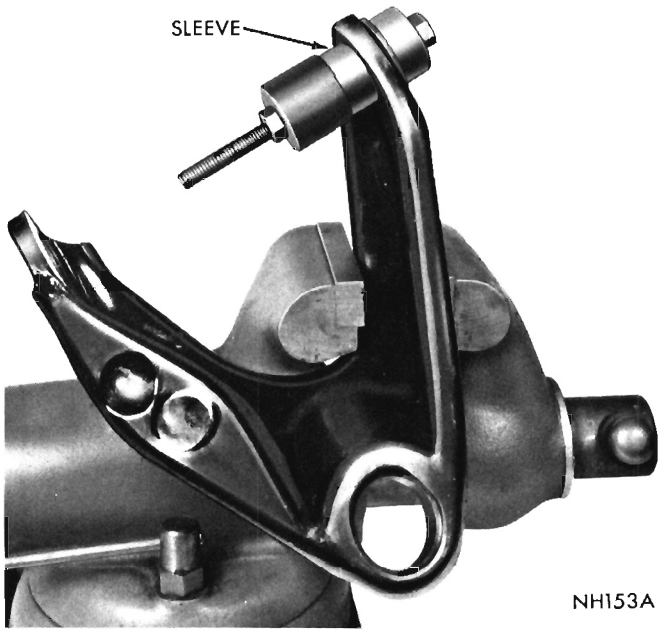


Fig. 33 - Installing Support Sleeve On Bushing

(4) Spread tool enough to place upper stud under a load, then strike steering knuckle sharply with a hammer to loosen stud. **Do not attempt to force stud out of steering knuckle with tool alone.**

(5) On Fury models, remove upper ball joint nut and remove stud from steering knuckle using Tool C-3964.

(6) Remove nuts, lockwashers, cams and cam bolts attaching upper control arm and bushings (Figs. 27, 28, 29 and 30) to support brackets. Lift control arm up and away from support.

Disassembly

(7) Remove ball joint (Fig. 31) using Tool C-3560 (Tool C-3714 Valiant). The seal will come off as ball joint is removed.

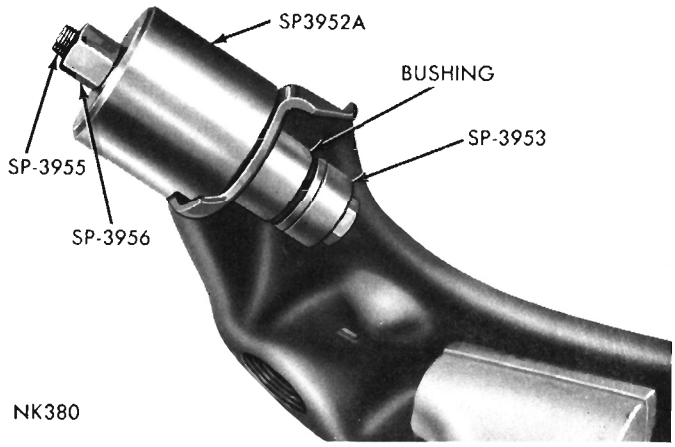


Fig. 32 - Removing Upper Control Arm Bushing

(8) Assemble Tool C-3710A (Tool C-3962 using adapter SP 3953 Fury and Chrysler over bushing and press bushing out of arm (from inside out) (Fig. 32).

Be sure control arm is firmly supported if a hammer and drift is used in place of tool.

To remove upper control arm rear bushing support sleeve (used on Valiant models with 10 inch front brakes and Satellite police and taxi application) assemble Tool C-3710A using adaptor SP-3826 in place of adaptor SP-3088, over bushing and press bushing out of arm.

Assembly

When installing new bushings, be sure control arm is supported squarely at the point where bushing is being pressed in. Do not use oil or grease to aid in installation.

(1) Position flange end of new bushing in Tool C-3710A, (Tool C-3962 Fury and Chrysler) support control arm squarely, and press bushings into control arm (from outside) until tapered portion of bushing seats on the arm. **On Valiant, Barracuda models with 10 inch front brakes and Satellite police and taxi application (using bushing support sleeve) remove Tool C-3710A after bushing has been installed and install adaptor SP-3827 in place of SP-3233A cup on tool and install support sleeve on rear bushing only (Fig. 33).**

(2) Install ball joint into arm using Tool C-3560 (Tool C-3714 Valiant). Tighten until seated (125 foot-pounds minimum). The ball joint will cut threads into a new arm during tightening operations.

(3) Install a new ball joint seal using a 2 inch socket, making sure it is seated fully on ball joint housing. On Valiant Models install seal using Tool C-4039.

Installation

(1) Slide control arm into position and install

cam bolts, cams, washers and nuts (Figs. 27, 28 and 29). Tighten nuts in preparation for final adjustments.

(2) Position new ball joint seal on ball joint body and press seal on using a 2 inch socket making sure it is seated fully down on housing. To facilitate installation of seal the ball joint stud should be perpendicular to ball joint body. Lubricate ball joint, see "Lubrication" section, Group O.

(3) Position stud in steering knuckle and install washer and nut. Tighten nut as specified and install cotter pin.

(4) Install wheel and tire and adjust front wheel bearing (Group 22)and lower vehicle to floor.

(5) Adjust suspension height and wheel alignment as necessary.

Removal—Imperial

(1) Place a jack under lower control arm as close to wheel as possible and raise vehicle until front wheel clears floor, and rebound bumper is free.

(2) Remove wheel and tire assembly.

(3) Disconnect brake hose at disc brake caliper brake line.

(4) Remove upper and lower ball joint stud nuts. Slide Tool C-3964 down over lower ball joint stud until tool rests on steering knuckle. Turn threaded portion of tool locking it securely against upper stud. Tighten tool enough to place upper stud under pressure then strike knuckle sharply with a hammer to loosen stud. **Do not attempt to force stud out of knuckle with tool alone.**

(5) Remove tool, then disengage ball joint from knuckle.

(6) Remove cam bolt nuts, cone washers attaching upper control arm pivot bar and control arm assembly to front "K" member bracket assembly.

(7) Lift upper control arm and pivot bar assembly up and away from bracket. **The upper control arm and pivot bar including bushings are not serviced separately. If replacement is necessary, install a new upper control arm which will include pivot bar and bushings installed.**

Disassembly—Imperial

(1) Remove upper control arm pivot bar nuts and retainers.

(2) Remove upper control arm bumper assembly.

(3) Remove ball joint using Tool C-3561. The ball joint balloon type seal will come off as ball joint is removed.

Assembly—Imperial

(1) Position upper control arm in a vise supported squarely for ease of installation of upper ball joint.

(2) Thread ball joint into upper control arm using Tool C-3561. Make sure threads properly engage those in control arm.

(3) Tighten to a minimum of 150 foot-pounds until seated. The ball joint will cut threads into a new arm during tightening operation.

(4) Install upper ball joint balloon seal using Tool C-4034. **To facilitate installation of seal the ball joint stud should be perpendicular to ball joint body.** Lubricate ball joint, see "Lubrication" section, Group 0.

(5) Install upper control arm bumper assembly and tighten nut 200 inch-pounds.

(6) Install upper control arm bushing retainers and nuts and tighten finger tight only. All front suspension pivot points should be tightened when front suspension heights are as specified with full weight of vehicle on wheels.

Installation—Imperial

(1) Position upper control arm assembly into position over cam bolts and install cone washers and nuts and tighten to 160 foot-pounds. (After setting alignment).

(2) Insert upper ball joint stud in steering knuckle. Install ball joint stud nuts (upper and lower) and tighten upper 125 and lower 155 foot-pounds and install cotter pins.

(3) Connect brake hose to disc brake caliper brake line and bleed brakes.

(4) Install wheel and tire assembly and adjust front wheel bearing (Group 22).

(5) Lower vehicle to floor and adjust front suspension heights and wheel alignment as necessary.

UPPER BALL JOINTS

ON MODELS EQUIPPED WITH DISC BRAKES, REFER TO GROUP 5 FOR BRAKE DISC REMOVAL AND INSTALLATION PROCEDURES.

Removal

(1) Raise vehicle by placing a jack under lower control arm as close as possible to wheel.

(2) Remove wheel, tire and drum.

(3) On Valiant, Barracuda and Satellite Models, remove upper and lower ball joint stud nuts. On Valiant models, it will be necessary to add approximately 7/16 inch of flat washers over lower ball joint stud to allow the use of Tool C-3711 without damaging threads on lower ball joint stud. Place Tool C-3711 over studs. Turn threaded portion of tool locking it securely against upper stud (Fig. 25). To use Tool C-3711 as outlined it will be necessary to modify it, as shown in Figure 26).

(4) Spread tool enough to place upper stud under a load, then strike steering knuckle sharply with a hammer to loosen stud. **Do not attempt to force stud out of steering knuckle with tool**

alone.

(5) **On Fury and Chrysler Models,** remove upper ball joint stud nut and remove stud from control arm using Tool C-3964.

(6) Remove tool, then remove ball joint stud from steering knuckle.

(7) Using Tool C-3560, (Tool C-3714 Valiant) unscrew ball joint from upper control arm (Fig. 31). The seal will come off as ball joint is being removed.

Installation

When installing a ball joint, make certain the ball joint threads engage those of the control arm squarely if original arm is being used. Balloon type seals should always be replaced once they have been removed.

(1) Screw ball joint squarely into control arm as far as possible by hand.

(2) Using Tool C-3560 (Tool C-3714 Valiant) tighten ball joint until it bottoms on housing. Tighten to a minimum of 125 foot-pounds.

If ball joint cannot be torqued to 125 foot-pounds, inspect threads on ball joint and also in control arm and replace as necessary.

(3) Position a new seal over ball joint stud and install using a 2 inch socket making sure it is seated fully on ball joint housing. On Valiant Models, install seal using Tool C-4039.

(4) Position ball joint stud in steering knuckle and install a retaining nut.

(5) Tighten nut as specified. Install cotter pin, lubricate ball joint.

(6) Install lower ball joint stud nut and tighten 85 foot-pounds, (Fury, and Chrysler 115 foot-pounds).

(7) Install wheel, tire and drum assembly and adjust front wheel bearings (Group 22).

(8) Lower vehicle and adjust front suspension height.

Removal—Imperial

(1) Raise vehicle by placing a jack under lower control arm as close as possible to wheel.

(2) Remove wheel and tire assembly.

(3) Disconnect brake hose at disc brake caliper brake line.

(4) Remove upper and lower ball joint stud nuts. Slide Tool C-3964 down over lower ball joint stud until tool rests on steering knuckle. Turn threaded portion of tool locking it securely against upper stud. Tighten tool enough to place upper stud under pressure then strike knuckle sharply with a hammer to loosen stud. **Do not attempt to force stud out of knuckle with Tool alone.**

(5) Remove tool then disengage ball joint from knuckle.

(6) Remove upper ball joint using Tool C-3561

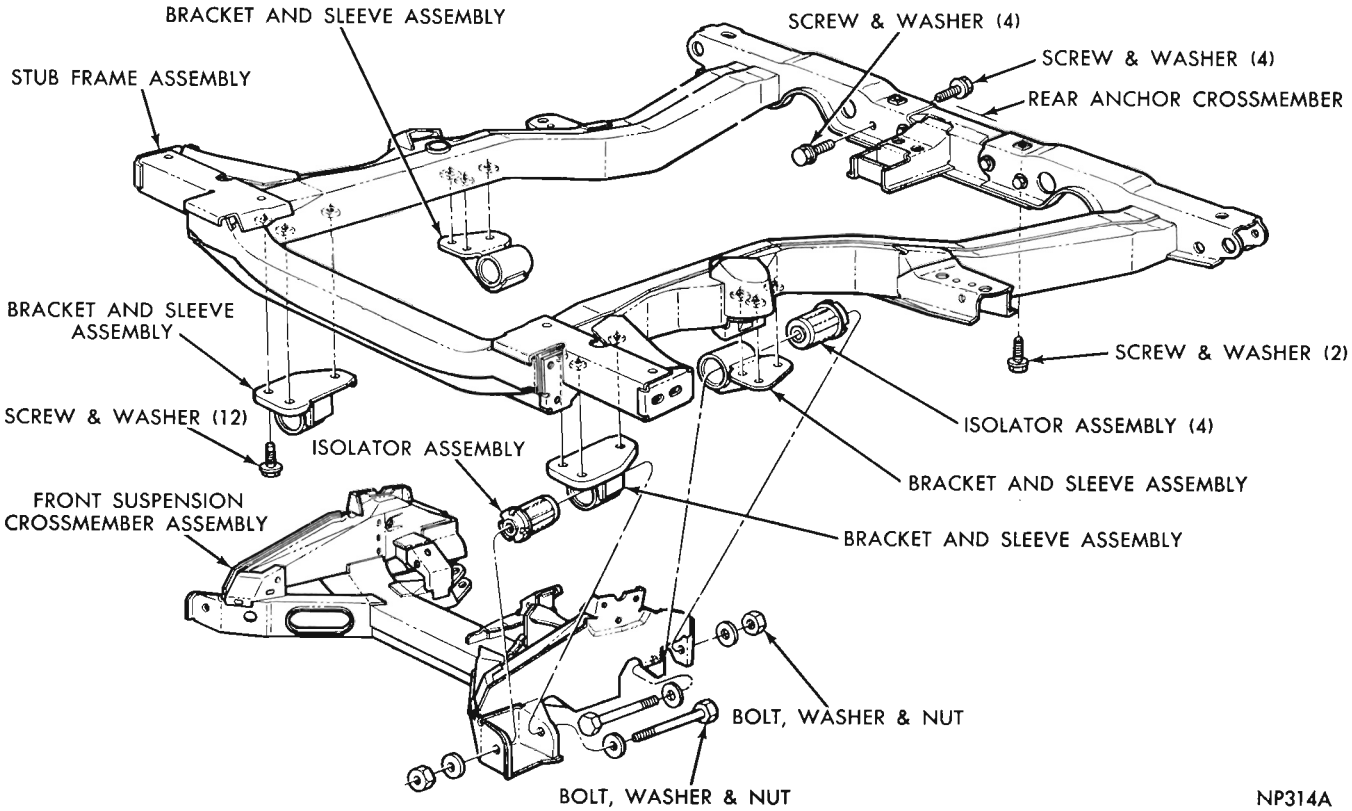


Fig. 34 - Rubber Isolated Crossmember And Stub Frame Assembly

to unscrew ball joint from upper control arm. The ball joint balloon type seal will come off as ball joint is removed.

Installation—Imperial

When installing a new ball joint, it is very important that ball joint threads properly engage those in control arm. Balloon type seals should always be replaced once they have been removed.

(1) Screw ball joint squarely into control arm as far as possible by hand.

(2) Using Tool C-3561 tighten until ball joint housing is seated on control arm. Tighten to a minimum of 150 foot-pounds. **If ball joint cannot be tightened to 150 foot-pounds, inspect threads on ball joint and also in control arm and replace ball joint or control arm as necessary.**

(3) Install upper ball joint balloon seal using Tool C-4034. **To facilitate installation of seal, the ball joint stud should be perpendicular to ball joint body.** Lubricate ball joint, see "Lubrication" section Group O.

(4) Insert upper ball joint stud in steering knuckle. Install ball joint stud nuts (upper and lower) and tighten upper 125 and lower 155 foot-pounds and install cotter pins.

(5) Connect brake hose to disc brake caliper brake line and bleed brakes.

(6) Install wheel and tire assembly and adjust front wheel bearing (Group 22).

(7) Lower vehicle to floor and adjust front suspension heights and alignment as necessary.

RUBBER ISOLATED FRONT CROSSMEMBER (Imperial)

Refer to body and frame alignment for crossmember replacement.

The rubber isolated front crossmember is a drop out member which is isolated from the stub frame assembly by four bushing type rubber isolators (Fig. 34). **The bracket and sleeve assembly with rubber isolator will be serviced as an assembly only.**

Removal

(1) Raise vehicle so front suspension is in full rebound (under no load).

(2) Position a jackstand under front crossmember, which will support crossmember when bracket and sleeve assembly is loosened and removed.

(3) Loosen and remove bracket and sleeve assembly attaching bolts and washer assemblies.

(4) Loosen and remove nut, washer and bolt attaching isolator bracket and sleeve assembly in front crossmember brackets.

(5) Using a screwdriver, pry bracket and sleeve with rubber isolator from front crossmember.

Installation

(1) Position bracket and sleeve with isolator assembly in front crossmember mounting brackets so holes align and install bolt followed by washer and nut and tighten finger tight only.

(2) Align bracket and sleeve assembly holes with those in stub frame and install bolt and washer assemblies, tighten 75 foot-pounds.

(3) Remove jackstand and lower vehicle to floor and tighten isolator assembly nuts 30 foot-pounds.

(4) Adjust front suspension heights as necessary.

SPECIFICATIONS

Camber
Left (All Models) +1/4° to 3/4° (Preferred +1/2°)
Right (All Models) 0° to +1/2° (Preferred +1/4°)

Caster
Manual Steering (All Models) 0° to - 1° (Preferred - 1/2°)
Power Steering (All Models) +1/4° to +1-1/4° (Preferred +3/4°)

	Valiant	Barracuda	Satellite	Fury	Chrysler	Imperial
Model Height	4-Dr. Sdn. 2-Dr. Sdn.					
(Inches)	2-1/8 1-5/8	1	1-5/8	1-3/8	1-1/8	1-3/4
(Tolerance ±1/8) - Side to Side Difference 1/8 (Maximum)						
Steering Axis Inclination	7-1/2°	7-1/2°	7-1/2°	7-1/2°	7-1/2°	9°

SPECIFICATIONS

	Valiant	Barracuda	Stelllite	Fury	Chrysler	Imperial
Toe-In (All Models) 3/32 inch to 5/32 inch (Preferred 1/8 inch)						
Toe-Out on Turns (Inner Wheel at 20° Outer Wheel is)	17.5°	17.5°	17.8°	18.8°	18.8°	17.9°
Torsion Bars						
Length (Inches)	38.5	41	41	44	47	50
Diameter (Inches)						
6 Cyl. Std.	.83	.86	.86	.94		
With A/C	.85	.86	.86	.94		
318 C.I. Engine	.85	.86	.88	.94		
With A/C	.87	.86	.88	.96		
340 C.I. Engine	.87	.90	.90			
383 C.I. Engine (2V)		.88	.88	.94	.96	
383 C.I. Engine (6V)		.90	.88		.96	
With A/C		.90	.88	.94	.98	
Police, 426 & 440 C.I. Engines		.92	.92	.98	.98	1.00
440 C.I. Engine						
With A/C		.92	.92	.98	.98	1.00
Heavy Duty Suspension			.90	.98	.98	1.06
Station Wagon			.86	.94	.98	
360 C.I. Engine				.94	.96	
Tread (Inches)						
Front-with 9 inch brakes	57.5		—	—	—	—
Front-with 10 inch brakes	58.2	59.7	59.6	—	—	—
Front-with 11 inch brakes	—	60.2	60.1	62.1	62.1	62.4
Front-with Disc brakes	57.7	60.2	—	—	—	—
Tread (Inches)						
Rear with 7-1/4 Axle	55.6	61.6	61.6	—	—	—
Rear with 8-3/4 Axle	55.6	60.7	62.0	63.4	63.4	63.4
Station Wagon	—	—	63.4	63.4	63.4	—
Wheel Base	108.0	108.0-2 Dr. 4 Dr.	115.0 117.5	119.5	123.5	126.5
Station Wagon	—	—	117.5	121.5	121.5	—

* TIGHTENING REFERENCE

	Valiant	Barracuda	Satellite	Chrysler Fury	Imperial
Ball Joint to Control Arm (Upper)	125	125	125	125	150
Ball Joint Stud Nut (Upper)	55	100	100	125	125
Ball Joint Stud Nut (Lower)	85	85	85	115	155
Rebound Bumper (All)	200**	200**	200**	200**	200**
Cam Bolt (Upper Control Arm)	65	65	65	65	160
Pivot Shaft (Lower Arm)	145	145	145	190	190
Steering Knuckle Bolts (Upper)	55	55	55	55	–
Steering Knuckle Bolts (Lower)	100	120	120	120	160
Strut to Lower Control Arm	105	105	105	105	115
Strut to Frame	45	52	52	52	52
Isolator to Cross Member	–	–	–	–	–
Isolator to Frame (Rear)	–	–	–	–	75
Isolator Bracket & Sleeve Ass'y. to Frame	–	–	–	–	75
Isolator Assembly Nut (Front)	–	–	–	–	30
Sway Bar Link Nut	100**	100**	100**	100**	100**
Sway Bar to Frame	200**	200**	200**	–	200**
Sway Bar to Strut	–	–	–	30	–
Sway Bar Plat to Cross Member	–	30	30	–	–
Idler Arm	65	65	65	65	65
Tie Rod End (All)	40	40	40	40	40
Tie Rod Sleeve Clamps	115**	115**	115**	150**	150**
Shock Absorber (Upper)	25	25	25	25	25
Shock Absorber (Lower)	50	50	50	50	50

* Foot Pounds, except where indicated
** Inch Pounds

REAR AXLE

CONTENTS

	Page
REAR AXLE ALIGNMENT CHECKING PROCEDURE	5
REAR AXLE ASSEMBLY (7-1/4 IN.) RING GEAR	5
REAR AXLE ASSEMBLY (8-1/4 IN.) RING GEAR	15
REAR AXLE ASSEMBLY (8-3/4 IN.) RING GEAR	28
REAR AXLE ASSEMBLY (9-3/4 IN.) RING GEAR	45
REAR AXLE NOISE DIAGNOSIS	2
SERVICE DIAGNOSIS	1
SPECIFICATIONS	62
SURE-GRIP DIFFERENTIAL	59
TIGHTENING REFERENCE	64

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
REAR WHEEL NOISE	(a) Wheel loose.	(a) Tighten loose wheel nuts.
	(b) Spalled wheel bearing cup or cone.	(b) Check rear wheel bearings. If spalled or worn, replace.
	(c) Defective, brinelled wheel bearing.	(c) Defective or brinelled bearings must be replaced. Check rear axle shaft end play.
	(d) Excessive axle shaft end play.	(d) Readjust axle shaft end play.
	(e) Bent or sprung axle shaft flange.	(e) Replace bent or sprung axle shaft.
SCORING OF DIFFERENTIAL GEARS AND PINIONS	(a) Insufficient lubrication.	(a) Replace scored gears. Scoring marks on the pressure face of gear teeth or in the bore are caused by instantaneous fusing of the mating surfaces. Scored gears should be replaced. Fill rear axle to required capacity with proper lubricant. See Specification Section.
	(b) Improper grade of lubricant.	(b) Replace scored gears. Inspect all gears and bearings for possible damage. Clean out and refill axle to required capacity with proper lubricant. See Lubrication section.
	(c) Excessive spinning of one wheel.	(c) Replace scored gears. Inspect all gears, pinion bores and shaft for scoring, or bearings for possible damage. Service as necessary.
TOOTH BREAKAGE (RING GEAR AND PINION)	(a) Overloading.	(a) Replace gears. Examine other gears and bearings for possible damage. Replace parts as needed. Avoid Overloading.
	(b) Erratic clutch operation.	(b) Replace gears, and examine remaining parts for possible damage. Avoid erratic clutch operation.
	(c) Ice-spotted pavements.	(c) Replace gears. Examine remaining parts for possible damage. Replace parts as required.
	(d) Improper adjustment.	(d) Replace gears. Examine other parts for possible damage. Make sure ring gear and pinion backlash is correct.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
REAR AXLE NOISE	(a) Insufficient lubricant.	(a) Refill rear axle with correct amount of the proper lubricant. See Specification section. Also check for leaks and correct as necessary.
	(b) Improper ring gear and pinion adjustment.	(b) Check ring gear and pinion tooth contact.
	(c) Unmatched ring gear and pinion.	(c) Remove unmatched ring gear and pinion. Replace with a new matched gear and pinion set.
	(d) Worn teeth on ring gear or pinion.	(d) Check teeth on ring gear and pinion for contact. If necessary, replace with new matched set.
	(e) End play in drive pinion bearings.	(e) Adjust drive pinion bearing preload.
	(f) Side play in differential bearings.	(f) Adjust differential bearing preload.
	(g) Incorrect drive gearlash.	(g) Correct drive gearlash.
	(h) Sure-Grip Differential moan and chatter.	(h) Drain and flush lubricant. See procedure in Sure-Grip section of Group 3.
LOSS OF LUBRICANT	(a) Lubricant level too high.	(a) Drain excess lubricant by removing filler plug and allow lubricant to level at lower edge of filler plug hole.
	(b) Worn axle shaft oil seals.	(b) Replace worn oil seals with new ones. Prepare new seals before replacement.
	(c) Cracked rear axle housing.	(c) Repair or replace housing as required.
	(d) Worn drive pinion oil seal.	(d) Replace worn drive pinion oil seal with a new one.
	(e) Scored and worn companion flange.	(e) Replace worn or scored companion flange and oil seal.
	(f) Clogged vent.	(f) Remove obstructions.
	(g) Loose carrier housing bolts or housing cover screws.	(g) Tighten bolts or cover screws to specifications and fill to correct level with proper lubricant.
OVERHEATING OF UNIT	(a) Lubricant level too low.	(a) Refill rear axle.
	(b) Incorrect grade of lubricant.	(b) Drain, flush and refill rear axle with correct amount of the proper lubricant. See Specification Section.
	(c) Bearings adjusted too tightly.	(c) Readjust bearings.
	(d) Excessive wear in gears.	(d) Check gears for excessive wear or scoring. Replace as necessary.
	(e) Insufficient ring gear to pinion clearance.	(e) Readjust ring gear and pinion backlash and check gears for possible scoring.

REAR AXLE NOISE DIAGNOSIS

Most rear axle failures are relatively simple to locate and correct, although rear axle noise is a little more difficult to diagnose and make the necessary repairs. The most essential part of rear axle service is proper diagnosis of the problem.

All rear axles are noisy to a certain degree. Axles can be noisy if they are not properly adjusted or lack lubrication. Usually when new improperly set gears are noisy; the disturbing noise can be "adjusted out".

If the axle noise complaint is made within the first 5,000 miles, and the gears are not scored due to lack of lubrication, the gear adjustment should be checked and corrected if necessary. Poor tooth pattern, incorrect drive gear backlash and loose pinion nuts are the primary causes of gear noise in new cars. Regardless of what you've heard to the contrary, noisy gears will not get quieter with

added mileage . . . they will stay the same or get worse.

Slight axle noise heard only at certain speeds or under remote conditions must be considered normal. Axle noise tends to "peak" at varying speeds and the noise is **NOT ALWAYS** indicative of trouble in the axle.

If noise is present in an objectionable form, loud or at all speeds, an effort should be made to isolate the noise as being in one particular unit of the vehicle. Many noises, reported as coming from the rear axle actually originate from other sources such as tires, road surfaces, wheel bearings, engine, transmission, exhaust, propeller shaft vibration, universal joint noise or body drumming. A thorough and careful check should be made to determine the source of the noise before any disassembly and teardown of the rear axle is attempted.

Axle noises normally fall into two categories; gear noise and bearing noise. The complete isolation of noise in any one unit requires considerable skill and previous experience. Eliminating certain type noises often baffle even the most experienced personnel. Often such practices as raising tire pressures to eliminate tire noise, listening for the noise at varying speeds under different load conditions such as; drive, float and coast, and under certain highway conditions, swerving the car from left to right to detect wheel bearing noise, will aid even the beginner in detecting axle shaft bearing noise in axles that use the tapered roller bearing axle shaft.

To make a good diagnostic check for rear axle noise **a thorough road test is necessary.** Select a level smooth blacktop or asphalt road. This will reduce tire noise and body drumming. Drive the car far enough to thoroughly warm up the axle to normal operating temperature.

Drive the car and note speed at which noise occurs. Then stop car and, with clutch disengaged or automatic transmission in neutral, run engine slowly up and down through engine speeds, corresponding to car speed at which noise was most pronounced, to determine if it is caused by exhaust roar, or other engine conditions. Repeat, while engaging and disengaging clutch (transmission in neutral), to determine if noise can only be isolated by removing propeller shaft and operating transmission in high.

TIRE NOISE

Tire noise is often mistaken for rear axle noise even though the noisy tires may be located on the front wheels. Tires that are unbalanced or worn unevenly or have surfaces of non-skid type design, or worn in a saw tooth fashion are usually noisy and often produce noises that seem to originate in the rear axle.

Tire noise changes with different road surfaces, but rear axle noise does not. Inflate all tires to approximately 50 pounds pressure (for test purposes only.) This will materially alter noise caused by tires, but will not affect noise caused by rear axle. Rear axle noise usually ceases when coasting at speeds under 30 miles per hour; however, tire noise continues, but with lower tone, as car speed is reduced. Rear axle noise usually changes when comparing drive and coast, but tire noise remains about the same.

Distinguish between tire noise and differential noise by noting if noise varies with various speeds or sudden acceleration and deceleration; exhaust and axle noise show variations under these conditions while tire noise remains constant and is more pronounced at speeds of 20 to 30 miles per hour. Further check for tire noise by driving car over smooth pavements or dirt roads (not gravel) with tires at normal pressure. If noise is caused by tires, it will noticeably change or disappear and reappear with changes in road surface.

FRONT WHEEL BEARING NOISE

Loose or rough front wheel bearings will cause noise which may be confused with rear axle noises; however, front wheel bearing noise does not change when comparing drive and coast. Light application of brake while holding car speed steady will often cause wheel bearing noise to diminish, as this takes some weight off the bearing. Front wheel bearings may be easily checked for noise by jacking up the wheels and spinning them, also by shaking wheels to determine if bearings are loose.

Rear suspension rubber bushings and spring insulators help to dampen out rear axle noise when properly and correctly installed. Check to see that no metallic interference exists between the springs and spring hangers, shackles or "U" bolts. Metal to metal contact at those points may result in telegraphing road noise and normal axle noise which would not be objectionable if properly installed and tightened to specifications.

GEAR NOISE

Abnormal gear noise can be recognized easily because it produces a cycling tone and will be very pronounced through the speed range in which it occurs. Gear noise may be developed under one or more of the following conditions, "drive", "road load", "float" or "coast". Gear noise usually tends to peak in a narrow speed range or ranges. Gear noise is more prominent between 30 to 40 mph and 50 to 60 mph. Abnormal gear noise is quite rare and if present it usually originates from scoring of the ring and drive pinion gear as a result of insufficient or improper

lubrication of the axle assembly. The differential side gears and pinions very seldom cause trouble as they are only under loads when the rear wheels travel at different speeds; such as when turning corners. If the gear noise is on coast at all speeds, check for a loose pinion nut and readjust per this manual if necessary.

When objectionable axle noise is heard, note the driving condition and speed range. Remove the housing cover on the 7-1/4 in., 8-1/4 in. and 9-3/4 in. axles or remove differential and carrier from the axle housing on the 8-3/4 in. axle. Perform a tooth contact pattern check to determine if the best possible pattern has been obtained. If pattern is found to be unacceptable, reshim and adjust to obtain the best possible tooth pattern. If after readjustment noise still persists, replace with new gear set.

PRE-DISASSEMBLY INVESTIGATION

A close examination of the rear axle assembly prior to disassembly can often reveal valuable information as to the extent and type of repairs or adjustments necessary. This information coupled with the road test results will provide a basis for determining the degree of disassembly required. Since the most frequent causes of axle noise are improper backlash or differential bearing preload, or both a few simple adjustments may be all that is necessary to correct the complaint.

Therefore, before disassembly the following check should be made; drive gear and pinion backlash, pinion bearing preload, and tooth contact pattern and these results recorded and analyzed. It is felt that these measurements and their results will aid you in making the necessary repairs to the axle assembly.

BEARING NOISE (DRIVE PINION AND DIFFERENTIAL)

Defective or damaged bearings generally produce a rough growl or grating sound, that is constant in pitch and varies with the speed of the vehicle. This fact will allow you to diagnose between bearing noise and gear noise.

Drive pinion bearing noise resulting from defective or damaged bearings can usually be identified by a constant rough sound. Front pinion bearing noise is usually most pronounced on "coast", whereby rear pinion bearing is loudest on "drive". Pinion bearings are rotating at a higher rate of speed than the differential side bearings or the axle shaft bearings. These particular noises can be picked up best by road testing the vehicle in question on a smooth road (black top). However, extreme caution should be taken not to confuse tire noise with bearing or gear noise. If doubt should exist tire treads should be examined for irregularities that will often produce such noise.

Differential bearing noise will usually produce a constant rough tone which is much slower than the noise caused by the pinion bearings.

REAR WHEEL BEARING NOISE

Defective or damaged rear wheel bearings produce a vibration or growl which continues with car coasting and transmission in neutral. A brinneled rear wheel bearing causes a whirring noise. Spalled rear wheel bearings normally produce a noise similar to a growl, created from either flaked or pitted rollers or bearings races. Unless the damage is severe, rear axle bearing noise is seldom heard above 30 mph.

To differentiate between wheel bearings and gear noise, road test the vehicle on a smooth road (blacktop) at medium and low speed. With traffic permitting, swerve the vehicle sharply right to left. If the noise in question is caused by wheel bearings, it will usually increase when the vehicle is swerved and will probably be coming from the bearing on the loaded side. (tapered roller bearing axle shaft only).

If the noise in question cannot be isolated an inspection of bearings will be necessary.

KNOCK AT LOW SPEEDS

Low speed knock is usually caused by brinneled universal joints or differential side gear hub to counterbore clearance being too great. Inspect and replace universal joint or differential case and side gear as required.

DRIVE-LINE SNAP

A snap on a sudden start, either forward or reverse, may be caused by a loose companion flange. Remove the propeller shaft, flange and reinstall 180 degrees from original position. Pinion bearing preload and pinion nut torque must be reset to original settings upon reinstallation.

BACKLASH CLUNK

Excessive clunk on acceleration and deceleration can be caused by anyone of the following items or a combination; (excessive clearance between) (1) Differential pinion shaft to differential case, (2) Axle shaft to differential side gear splines, (3) Differential side gear hub to differential case counterbore, (4) Differential side gear to pinion, (5) Worn thrust washers, (6) Drive gear backlash. Measure and inspect components and replace as required and/or adjust to proper specifications.

ENGINE AND TRANSMISSION NOISE

Sometimes noises which seem to originate in the rear axle are actually that of the engine or transmission. To diagnose which unit is actually

causing the noise, observe the approximate vehicle speed and conditions under which the noise is most pronounced; stop the vehicle in a quiet place to avoid any interfering noises. With engine running and transmission in neutral, run engine slowly up and down through engine speeds corresponding to approximate car speed at which the noise was most pronounced. If a noise similar is produced in this manner it usually can be assumed that the noise was caused by the engine or transmission and not that of the rear axle.

PROPELLER SHAFT VIBRATION

Objectional vibrations at high speed (65 MPH or higher) may be caused by a propeller shaft that is out of balance or worn universal joints. Out of balance may be due to a damaged or bent shaft.

To determine whether propeller shaft is causing the vibration in question; road test the vehicle through speed range and note speed at which vibration is most pronounced. Shift transmission into lower gear range and drive car at same engine speed as when vibration was most pronounced in direct drive and note any effect on vibration.

If the vibration is still present at the same engine speed, whether in direct drive or in the lower gear, since the propeller shaft speed varies, this cannot be the fault. If the vibration decreases or is eliminated in the lower gear, then propeller shaft is at fault and should be rebalanced or replaced.

For additional diagnosis tips see, Master Technicians Service Conference session 67-6.

REAR AXLE ALIGNMENT CHECKING PROCEDURE

The following describes the procedure for checking rear axle alignment to determine if a complaint of abnormal rear tire wear is the result of a "bent" rear axle housing:

(1) Raise both rear wheels off ground using a frame contact hoist.

(2) Place a one inch long piece of masking tape in the center of each tire tread for use as "reference marks".

(3) With both "reference marks" pointing to front of vehicle, measure the distance between the outside edges of the two pieces of tape. Record this measurement as the "front of tire" reading.

(4) Rotate the rear wheels so that the "reference marks" of each rear wheel now point to the rear of vehicle. Measure the distance between the outside edges of the two pieces of tape and record this measurement as the "rear of tire" reading.

(5) Subtract the "rear of tire" measurement from the "front of tire" measurement to obtain the "toe out" condition of the axle being checked. **The specification is 1/16 inch toe-in to 3/16 inch toe-out.**

(6) Rotate both rear wheels so that the "reference marks" are pointing down. Measure the distance between the outside of the two pieces of tape and record this measurement as "bottom" of tire reading.

(7) Average the sum of the "front of tire" reading (FTR) and the "rear of tire" reading (RTR), then from this average figure subtract "bottom of tire" reading (BTR) to obtain the camber. **The specification is -1/16 inch to +3/32 inch camber.**

$$\frac{FTR + RTR}{2} - BTR = \pm \text{ Camber}$$

NOTE: If BTR is smaller than the average figure, the camber reading is positive (+): If the BTR is larger than the average figure, the camber reading is negative (-).

REAR AXLE ASSEMBLY 7-1/4 IN. RING GEAR

INDEX

	Page
Axle Shafts and Bearings	6
Differential	8
Drive Gear and Pinion Backlash	12
Drive Pinion Depth of Mesh	11
Pinion Bearing Cup Installation	11
Pinion Installation and Bearing Preload	11
Rear Axle Assembly	7
Removal	7
Installation	15
Lubrication	15

GENERAL INFORMATION

The 7-1/4 Rear Axle Assembly shown in (Fig. 1), is a semi-floating type which incorporates a unitized rear axle housing assembly. The drive pinion and the differential case with drive gear are mounted directly into the center section of the rear axle housing assembly. Access to the differential, drive gears and bearings is obtained by removal of the carrier cover. Axle shaft bearings, oil seals and drive pinion oil seal can be removed and serviced without removing the complete assembly from the vehicle, but the unit should be removed for any additional operation.

A Sure Grip Differential is available in the 7-1/4 in. Axle Assembly, similar to those used in the 8-3/4 in. axle. Refer to the Sure Grip Differential Section of the Axle Group for the Servicing procedure.

A hooded breather is attached to the left leg of the axle housing approximately 15 in. inboard of the flange face. Gear ratio identification is stamped on the front face of the pad at the bottom of the housing.

SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE.

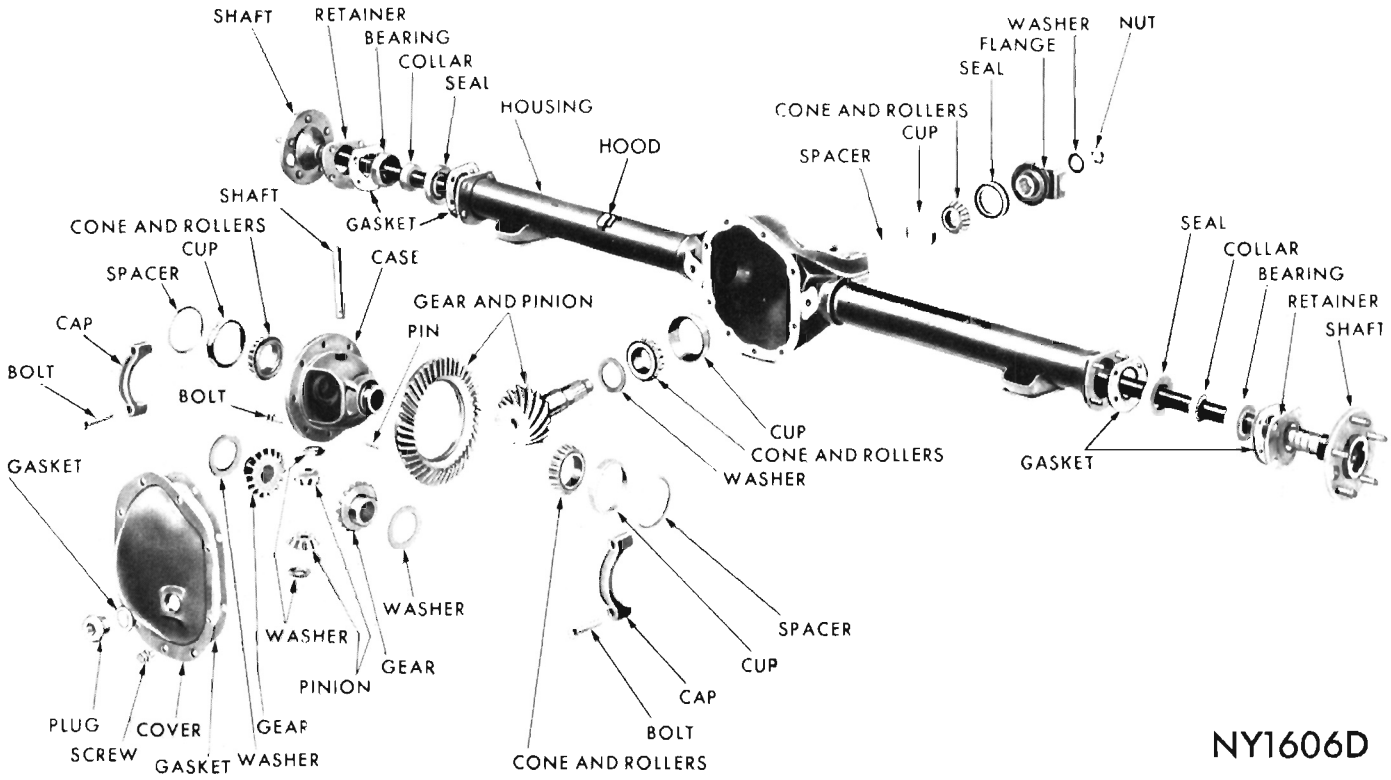


Fig. 1 7-1/4 in. Rear Axle Assembly

SERVICE PROCEDURES

AXLE SHAFTS AND BEARINGS

CAUTION: It is absolutely necessary that anytime an axle assembly is serviced, and the axle shaft is loosened and removed, both brake support plate gaskets and the inner axle shaft oil seal must be replaced.

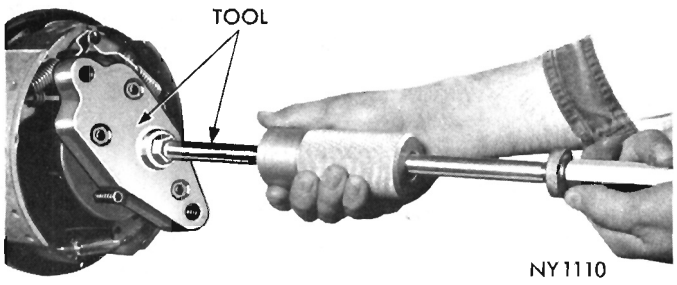


Fig. 2 Removing Axle Shaft

Removal and Disassembly

(1) With wheels removed, remove clips holding brake drum on axle shaft studs and remove brake drum.

(2) Disconnect brake lines at wheel cylinders.

(3) Using access hole in axle shaft flange, remove retainer nuts.

(4) Attach axle shaft remover tool C-3725A components to axle shaft flange and remove axle shaft. Remove brake assembly (Fig. 2).

(5) Remove axle shaft oil seal from housing.

CAUTION: Under no circumstances should axle shaft collars of bearings be removed using a torch. The use of a torch in the removal of the

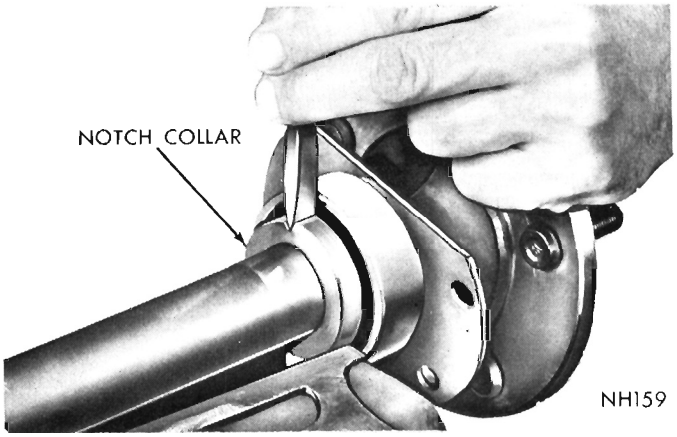


Fig. 3 Removing Axle Shaft Collar

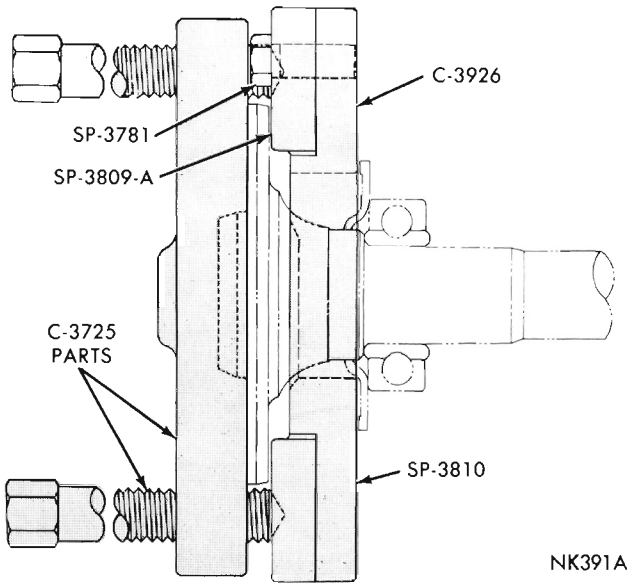


Fig. 4 Removing Axle Shaft Bearing

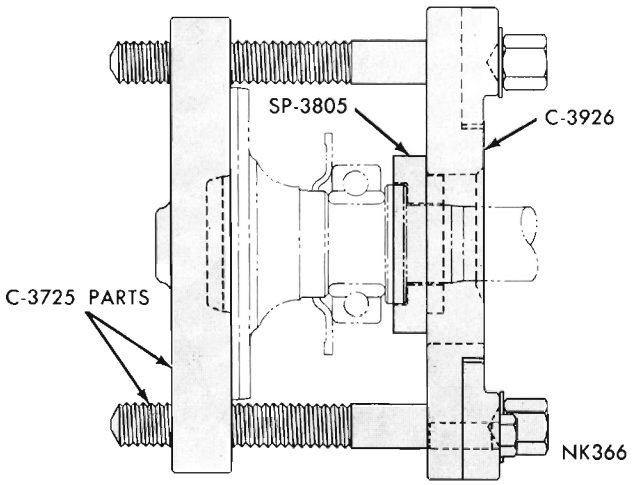


Fig. 5 Installing Rear Axle Shaft Bearing

axle shaft collars or bearings is an unsafe practice because heat is fed into the axle shaft bearing journal and thereby weakens this area.

(6) Position axle shaft bearing retaining collar on a heavy vise or anvil and using a chisel cut deep grooves into retaining collar at 90 degree intervals (Fig. 3). This will enlarge bore of collar and permit it to be driven off of axle shaft. The bearing can now be removed using tool C-3725A and C-3926 (Fig. 4).

On certain models equipped with 7-1/4 inch axle assembly to remove bearing use tool C-3971, adapter and protective sleeve SP-5142 over bearing race.

Assembly and Installation

(1) Install axle shaft retainer plate, new bearing, and bearing retainer collar on axle shaft. Using tool C-3725A and C-3926 with adapter C-3805, press them into place by tightening bolts in tool alternately (Fig. 5). **Some models equipped with 7-1/4 inch axle, install bearings and retainer collars using Tool C-3971 and adapter SP-5126.**

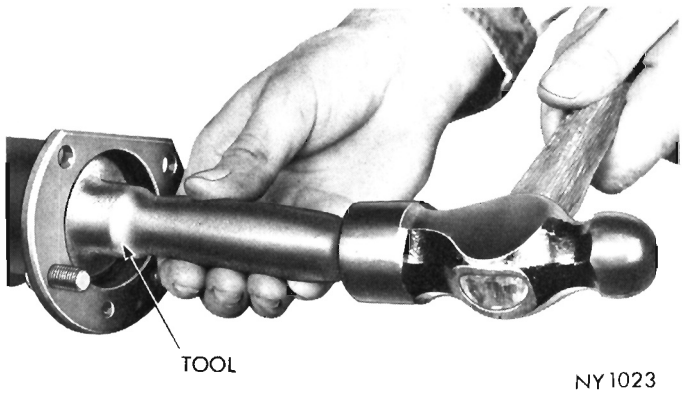


Fig. 6 Installing Axle Shaft Oil Seal

(2) Install new axle shaft oil seals in axle housing, using tool C-3734 (Fig. 6).

(3) Apply a light film of Multi-purpose Lubricant NLGI grade 2 EP or equivalent on outside diameter of bearing to prevent rust and corrosion.

(4) Install a foam gasket on studs of axle housing and position brake support plate assembly on axle housing studs, followed by outer gasket.

(5) Carefully slide axle shaft assembly through oil seal and engage splines in differential side gear.

(6) Tap end of axle shaft lightly with a non-metallic mallet to position axle shaft bearing in housing bearing bore. Position retainer plate over axle housing studs. Install retainer nuts and tighten to 35 foot-pounds.

REAR AXLE ASSEMBLY

Removal

(1) Raise rear of vehicle until rear wheels clear floor. Support body at front of rear springs.

(2) Block brake pedal in the up position using a

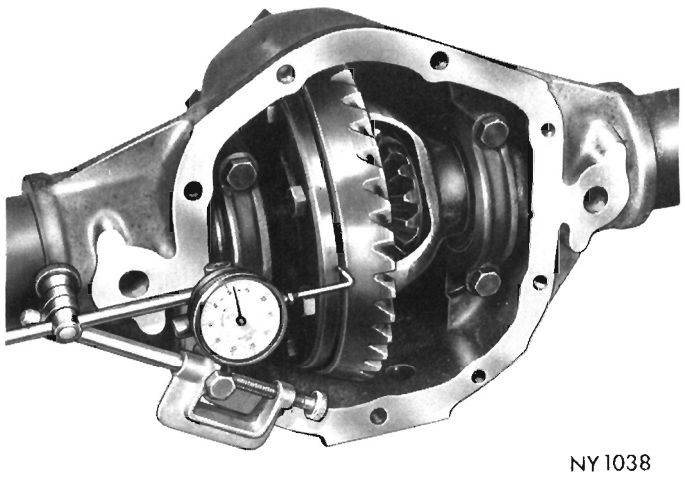


Fig. 7 Measuring Drive Gear Runout

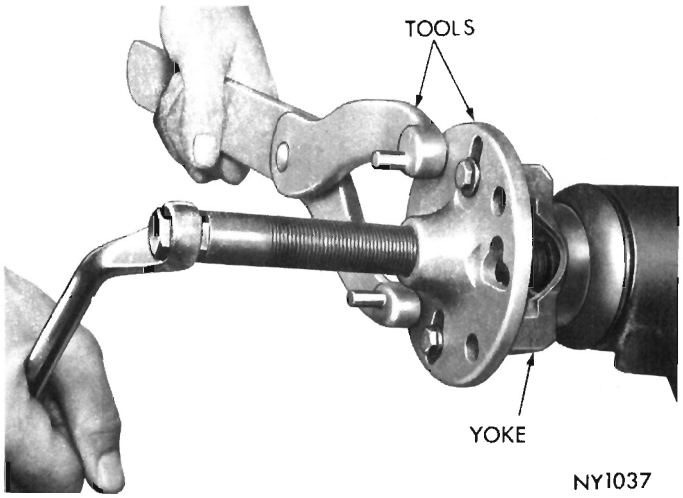


Fig. 8 Removing Companion Flange

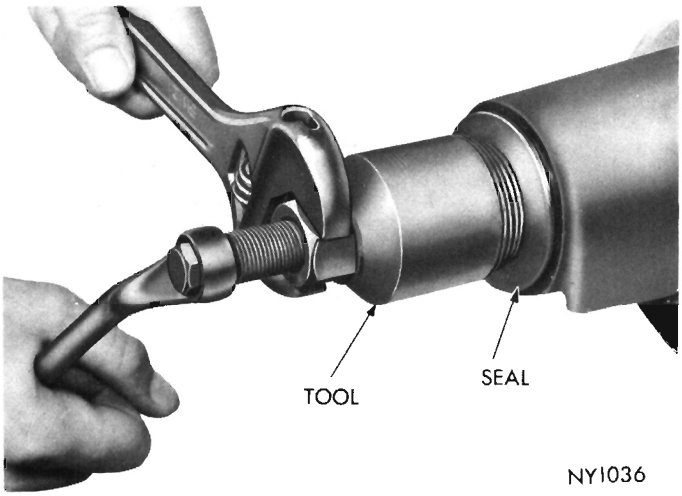


Fig. 9 Removing Pinion Oil Seal

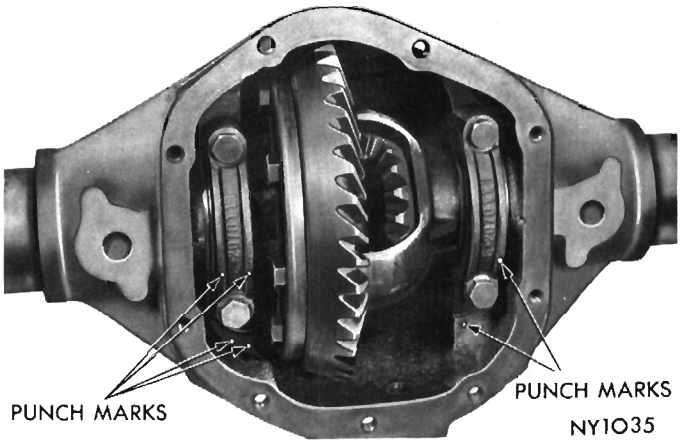


Fig. 10 Bearing Cap Identification

wooden block.

(3) Remove rear wheels.

(4) Disconnect hydraulic flexible line.

(5) Disconnect parking brake cable.

To maintain proper drive line balance when reassembling, make scribe marks on the propeller shaft universal joint and the pinion flange before removal.

(6) Disconnect propeller shaft at differential pinion yoke and secure in an upright position to prevent damage to front universal joint.

(7) Remove shock absorber from spring plate studs and loosen rear spring "U" bolt nuts and remove "U" bolts.

(8) Remove axle assembly from vehicle.

DIFFERENTIAL

Removal and Disassembly

Side play and runout checks taken during disassembly will be very useful in reassembly.

(1) Remove drain plug in cover assembly and drain lubricant from housing.

(2) Remove cover and with a suitable cleaning solvent, clean inside the axle housing and differential case and drive gear assembly.

(3) Measure for differential side play. Position a screwdriver or pinch bar between left side of axle housing and differential case flange, then using a prying motion determine if side play is present. THERE SHOULD BE NO SIDE PLAY.

(4) In preparing to measure drive gear runout on differential case, (provided no side play was found) mount a dial indicator tool C-3339 on pilot stud C-3288, and load the indicator stem slightly when plunger is at right angles to back face of drive gear (Fig. 7).

(5) Measure drive gear runout by turning drive gear several complete revolutions and reading dial indicator. Mark drive gear and differential case at point of maximum runout. The marking of differential case will be very useful later in checking differential case runout. Total indicator reading should be no more than .005 inch. If runout exceeds .005 inch the differential case may be

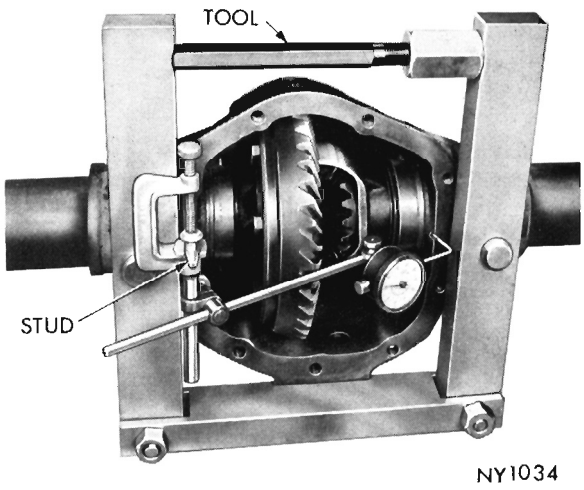


Fig. 11 Spreading Rear Axle Housing

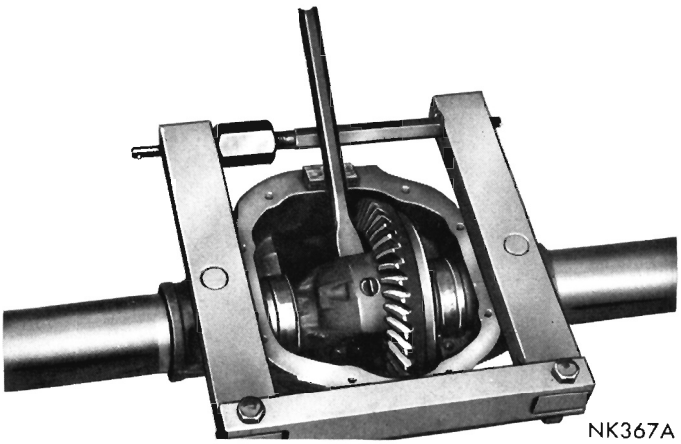


Fig. 12 Loosening Differential Assembly

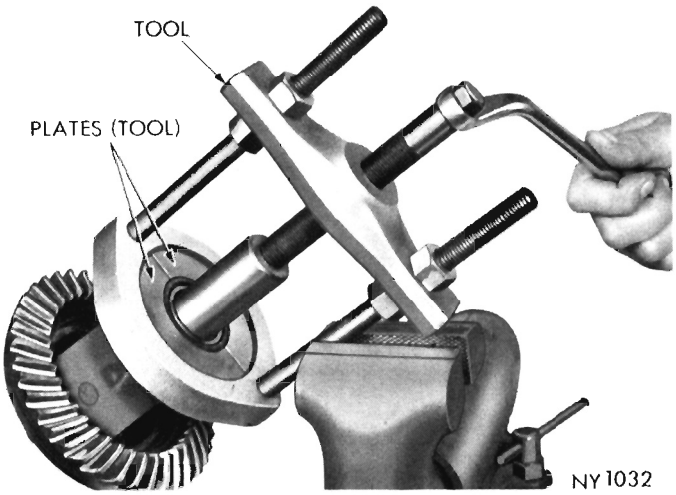


Fig. 13 Remove Differential Bearing Cone

damaged. A test for case runout will be described later.

(6) Remove drive pinion nut and washer. Using Tool C-452 and holding Tool C-3281, remove drive pinion flange (Fig. 8).

(7) Using Tool C-748 remove drive pinion oil seal (Fig. 9). Remove front pinion bearing cone and preload shim.

(8) Mark axle housing and differential bearing caps for location in reassembly (Fig. 10).

(9) Remove differential bearing caps and locate spreader Tool C-3721 with tool dowel pins seated in locating holes of axle housing. Turn tool screw finger tight at this time.

(10) Install pilot stud, Tool C-3288, on left side of axle housing. Attach dial indicator and load indicator stem slightly against opposite side of axle housing (Fig. 11).

(11) Tighten spreader tool nut sufficiently to obtain .012 to .015 inch movement of dial indicator to permit removal of differential case assembly. (Do not spread over .020 inch.)

(12) Remove dial indicator and remove differential and ring gear assembly from axle housing. A light prying action must be used to unseat the differential assembly from the housing (Fig. 12). Differential bearing cups and preload adjusting spacers must be kept with respective bearing cones. Do not remove spreader tool.

(13) Remove drive pinion and rear bearing assembly from axle housing.

(14) Using a flat end brass drift, remove front and rear bearing cups from housing.

(15) Mount differential case and ring gear assembly in a vise equipped with soft jaws (brass).

(16) Remove drive gear bolts. BOLTS ARE LEFT HAND THREAD. With a non-metallic hammer tap drive gear loose from differential case pilot and remove.

(17) If drive gear runout exceeded .005 inch in step 4, differential case flange runout should be remeasured. Install differential case with appropriate bearing cups and shims in axle housing. Loosen nut of spreader tool and remove, mount dial indicator in contact with drive gear flange face to take runout readings as in steps 3, 4 and 5. Total allowable runout should not exceed .003 inch. It is often possible to reduce high runout by positioning drive gear 180 degrees from point of maximum runout when re-assembling ring gear on differential case.

(18) With small drift remove differential pinion shaft lock pin from drive gear side of case.

(19) With a brass drift remove differential pinion shaft.

(20) Rotate differential side gears until differential pinions appear at differential case windows and remove.

(21) Remove differential side gears and thrust

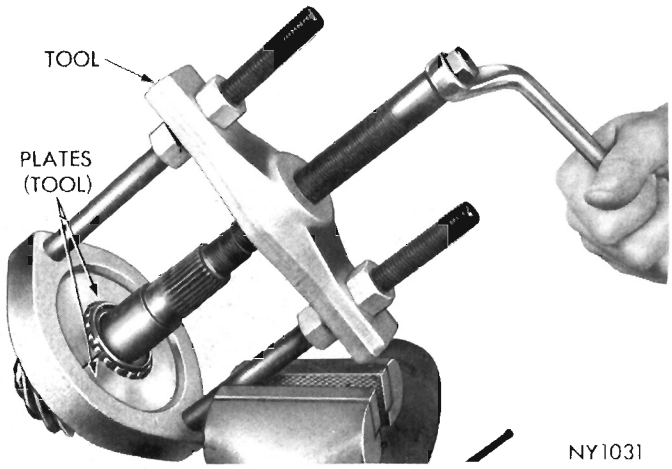


Fig. 14 Removing Rear Pinion Bearing Cone

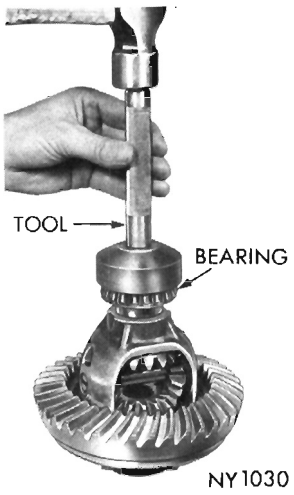


Fig. 15 Installing Differential Bearing Cone

washers.

(22) Remove differential bearings using Tool C-293 and #44 plates (Fig. 13).

(23) Remove rear pinion bearing cone from pinion stem using Tool C-293 and #40 plates (Fig. 14).

Cleaning and Inspection

(1) Clean all parts except axle shaft bearings with a suitable cleaning solvent. With oil dampened cloth wipe axle shaft bearing outer race. Clean off all rust and corrosion. To clean axle housing tubes insert a stiff wire into tube, attach a clean cloth to wire at center section and withdraw from center outward.

(2) All machined contact surfaces in the axle housing and differential bearing caps should be smooth and free of any raised edges. Front and rear pinion bearing cup bore machined surfaces should be smooth. Raised metal on shoulders of bores incurred in removal of cups should be flattened by use of a flat nosed punch.

(3) The axle drive shaft bearing and oil seal bores at both ends of housing should be smooth and free of rust and corrosion. This also applies to the brake support plate and housing flange face area.

(4) The axle shaft splines should be smooth and free of excessive wear. The axle shaft oil seal journal should be smooth and free of nicks, scratches or blemishes. To remove any imperfections polish with #600 crocus cloth (without reducing diameter of axle shaft oil seal surface).

(5) If axle shaft bearings, collars and retainers are removed from shafts they are unfit for further use and MUST BE REPLACED. Refer to axle shaft assembly procedure.

(6) Differential bearings and front and rear pinion bearing cone and cup assemblies should have a smooth appearance with no broken or dented surfaces on rollers or roller contact surfaces. The bearing roller retainer cages must not be distorted or cracked.

(7) Differential side gears and pinions should have smooth teeth with a uniform contact pattern without excessive wear or broken surfaces. The differential side gear hub surfaces and thrust washer contact surfaces should be smooth and free from any scoring or metal pickup.

(8) The machined thrust washer surface areas inside the differential case should be polished and with no surface imperfections. The pinion shaft bore in differential case should be round and smooth. The differential pinion shaft should be round and without excessive wear in areas of contact with either differential case or differential pinions.

(9) The ring gear and drive pinion teeth should have a uniform contact pattern with smooth and unbroken surfaces without excessive wear. Machined surfaces of the pinion stem (at points of contact, with either rear pinion bearing contact journal or rear pinion bearing mounting shim surface should be smooth.

Assembling the Differential

Lubricate all parts when assembling and adjusting.

(1) Install thrust washers on differential side gears and position gears in case.

(2) Place thrust washers on both differential pinion gears and mesh the pinion gears with the side gears, having pinion gears exactly 180 degrees apart.

(3) Rotate side gears to align pinion gears and washers with differential pinion shaft holes in case.

(4) Install differential pinion shaft with care not to damage thrust washers. Hole in pinion shaft must align with lock pin hole in differential case.

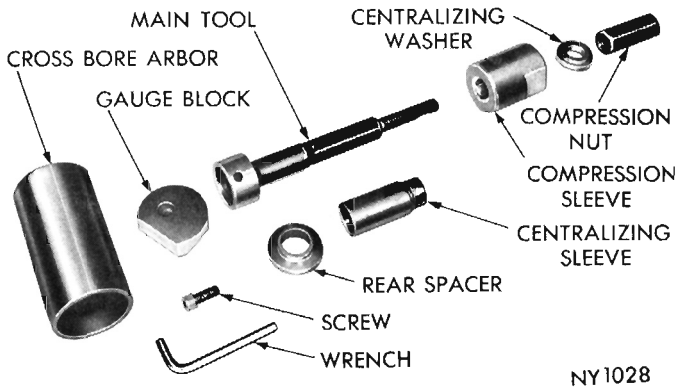


Fig. 16 Pinion Setting Gauge Tool C-3715

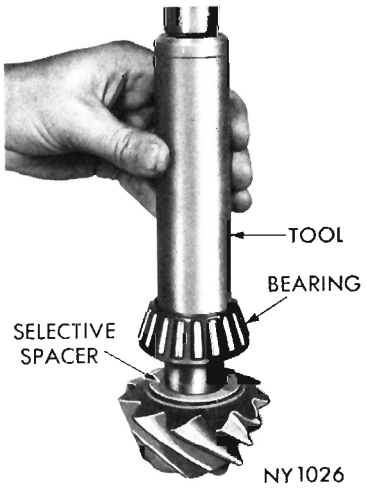


Fig. 18 Installing Pinion Shim and Rear Bearing Cone

(5) Install lock pin in differential case from drive gear tooth side.

(6) Position drive gear on differential case to separate the points of maximum runout 180 degrees apart and start all bolts through case into drive gear. Finger tighten. (LEFT HAND THREAD.)

(7) Tap drive gear against differential case flange with non-metallic mallet. Tighten bolts to 55 foot-pounds.

(8) Install differential bearing cones with Tool C-3716 (Fig. 15).

PINION BEARING CUP INSTALLATION

Rear axle gauge Tool C-3715 is used to install drive pinion bearing cups as well as to determine pinion depth of mesh (Fig. 16).

(1) Start both drive pinion bearing cups into axle housing.

(2) Place rear spacer SP-3244 on main tool. Seat rear pinion bearing cone on spacer and hold tool in housing.

(3) Place centralizing sleeve SP-3245 on tool and place front pinion bearing cone on centralizing sleeve, followed by tool sleeve, centralizing washer and nut.

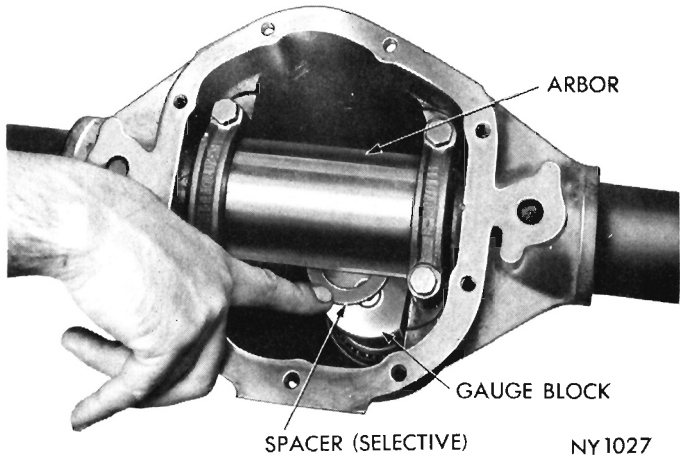


Fig. 17 Measuring Housing For Pinion Shim Thickness

(4) While holding compression sleeve from turning with Tool C-3281, tighten nut, thereby drawing pinion bearing cups into axle housing bearing cup bores. Permit tool to turn several revolutions during tightening operation to permit bearing rollers to align. Leave tool in carrier for determining depth of mesh.

DRIVE PINION DEPTH OF MESH

(Using Tool C-3715)

(1) With main tool left in axle housing after installing drive pinion bearing cups, loosen tool nut and re-tighten to produce 15-25 inch-pounds of turning torque. Attach gauge block to main tool using allen screw.

(2) Position cross bore arbor in axle housing differential bearing seats and install bearing caps. Tighten cap bolts lightly.

(3) Select rear pinion bearing mounting shim which will fit between cross bore arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge) (Fig. 17).

If the mark on the pinion head is plus (+2), select a shim that many thousandths thinner for installation. If mark on pinion has a minus (-2), select a shim that many thousandths thicker for installation. Treat other pinion markings in a similar manner. Spacers are available in one thousandths of an inch increments from .084 to .100 inch.

(4) Remove tool arbor and tool from axle housing.

PINION INSTALLATION AND BEARING PRELOAD

Pinion bearing mounting shims are chamfered on one side and must be installed on the pinion stem

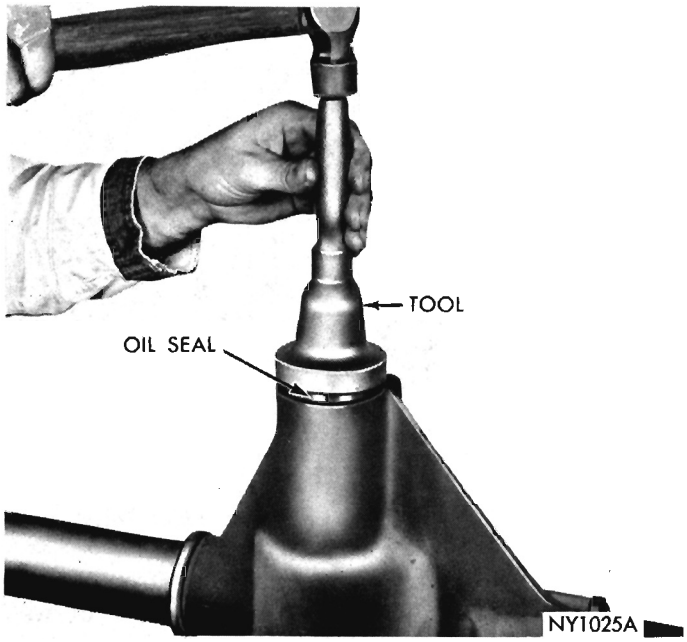


Fig. 19 Installing Pinion Oil Seal

with chamfered side toward pinion head.

(1) Place selected shim and rear pinion bearing cone on pinion stem. Using installing sleeve Tool C-3717, press bearing on pinion stem (Fig. 18).

(2) Hold drive pinion and bearing assembly in axle housing and install original preload shim (chamfered side toward shoulder), followed by front pinion bearing cone, pinion flange, belleville washer (convex side of washer up) and pinion nut.

(3) Position housing with nose up. Tighten pinion nut to 240 foot-pounds (minimum) with torque wrench C-4053, using holding Tool C-3281 on pinion flange. Position holding Tool C-3281 in several positions to make a complete revolution while tightening. Remove holding tool and rotate pinion assembly several revolutions in both directions to align rollers. Recheck torque to 240 foot-pounds. Torque may have diminished as bearing rollers were aligned by rotating.

(4) Using inch pound torque wrench C-685, measure pinion bearing preload by rotating pinion with handle of wrench floating. Take readings while handle is moving through several revolutions. Accurate readings can be made only with nose of axle in upright position. Correct preload is 15-25 inch-pounds. Bearing preload should be uniform during full revolution. A reading which varies during rotation indicates a binding condition which should be corrected. **Use thinner shim to increase preload and thicker shim to decrease preload.** Always perform steps 3 and 4 in exactly the same manner each time to obtain accurate readings. Preload shims are available in one thousandths of an inch increments from .074 to .106 inch.

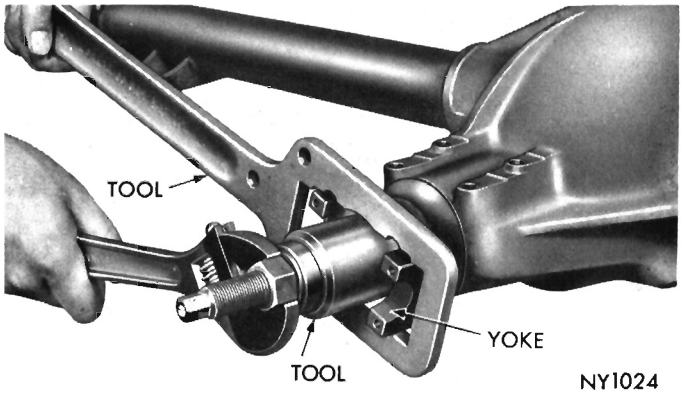


Fig. 20 Installing Companion Flange

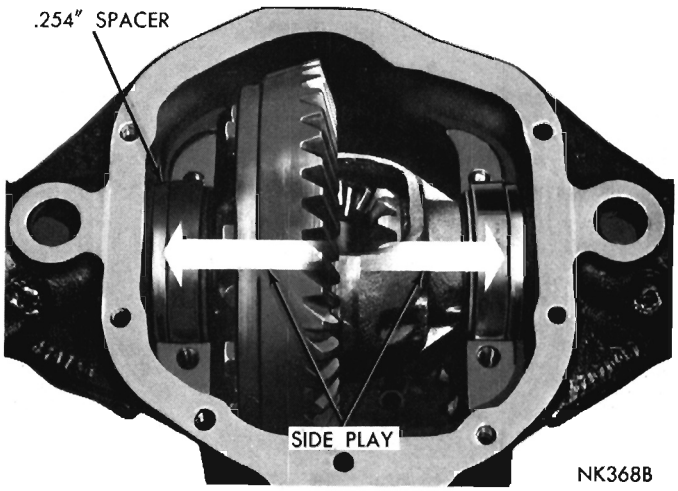


Fig. 21 Temporarily Install Thinnest Spacer

(5) When front pinion bearing preload is correct, remove pinion nut, washer and flange.

(6) Apply a light coat of sealer in drive pinion oil seal bore of axle housing.

(7) Install drive pinion oil seal (lip toward pinion head) with Tool C-4002 (double lip synthetic rubber oil seal) or Tool C-3719 (single lip leather oil seal). The proper tool must be used in order to position the seal the proper depth into the housing (Fig. 19).

(8) Install drive pinion flange using Tool C-496 and holding Tool C-3281 (Fig. 20).

(9) Remove Tool C-3718 and install belleville washer, (convex side of washer up) and pinion nut. Tighten nut to 240 foot-pounds.

DRIVE GEAR AND PINION BACKLASH

(1) With drive pinion and bearings installed and bearing preload set, install differential case and ring gear assembly, and cups. Insert a .254 inch preload adjusting spacer on ring gear side (Fig. 21) of axle housing. Do not install bearing caps.

(2) Install a preload spacer on right side of housing that will fit snugly but still leave a slight amount of end play.

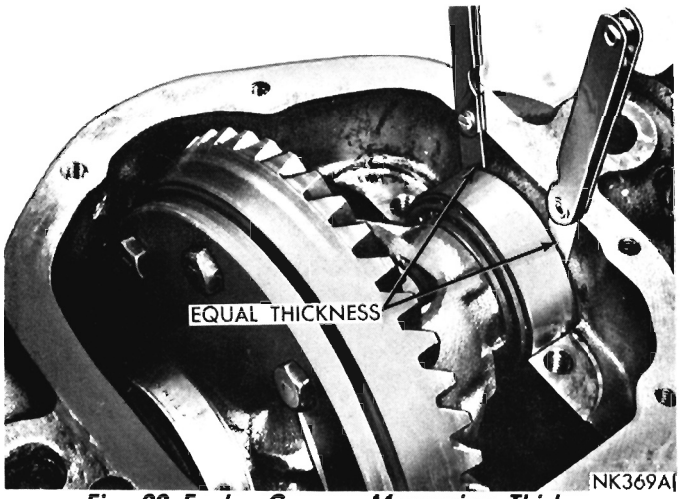


Fig. 22 Feeler Gauges Measuring Thickness

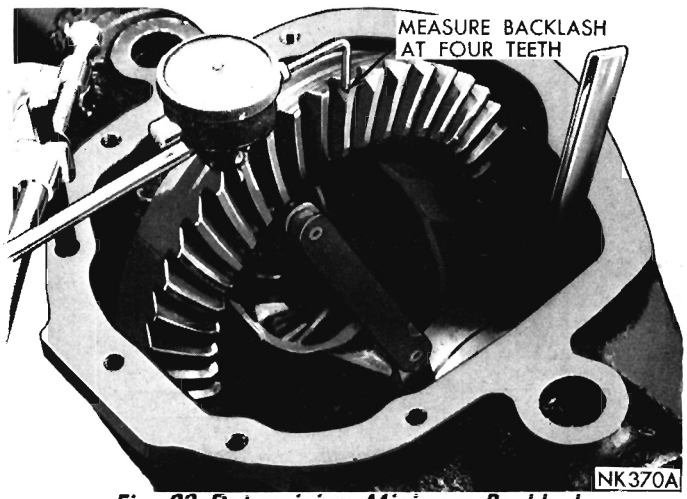


Fig. 23 Determining Minimum Backlash

(3) To measure, move differential to the left side or ring gear side of rear axle housing. Using two sets of feeler gauges, insert feeler gauges between the spacer and the right side of the axle housing above the center line of the case (Fig. 22). Insert the same thickness of feeler gauges between the spacer and the axle housing below center line of case. Increase thickness of gauges until heavy drag is felt.

(4) Rotate differential and ring gear assembly several times in both directions to seat bearings and cups and re-check feeler gauge drag.

(5) Install a spacer totaling the combined thickness of spacer and feeler gauge. This will provide zero end play.

(6) Measure drive gear backlash at 4 positions at approximately 90 degrees intervals (Fig. 23). Refer to "Differential Preload Spacer Chart" for selection of proper spacers to provide .004 in. to .007 in. backlash.

(7) Remove differential case and ring gear assembly from axle housing.

(8) With proper spacers selected for left and right sides of assembly as specified by "Differential Preload Spacer Chart", attach spreader Tool C-3721 with tool dowel pins seated in locating holes of axle housing. Tighten tool screw

DIFFERENTIAL PRELOAD SPACER SELECTION CHART

Backlash at Zero End Play	Change Left Spacer Thickness by:	Change Right Spacer Thickness by:	Backlash at Zero End Play	Change Left Spacer Thickness by:	Change Right Spacer Thickness by:
.020	+ .026	– .016	.010	+ .012	– .002
.019	+ .024	– .014	.009	+ .010	– .000
.018	+ .022	– .012	.008	+ .008	+ .002
.017	+ .022	– .012	.007	+ .008	+ .002
.016	+ .020	– .010	.006	+ .006	+ .004
.015	+ .020	– .010	.005	+ .004	+ .006
.014	+ .018	– .008	.004	+ .002	+ .008
.013	+ .016	– .006	.003	+ .002	+ .008
.012	+ .014	– .004	.002	+ .000	+ .010
.011	+ .014	– .004	.001	+ .000	+ .012

Should the zero end play backlash measure more than .020 (Maximum chart figure) increase the thickness of the left spacer from the specified .254" to a thickness great enough to reduce the zero end play backlash within the chart limits; then follow the recommended procedure.

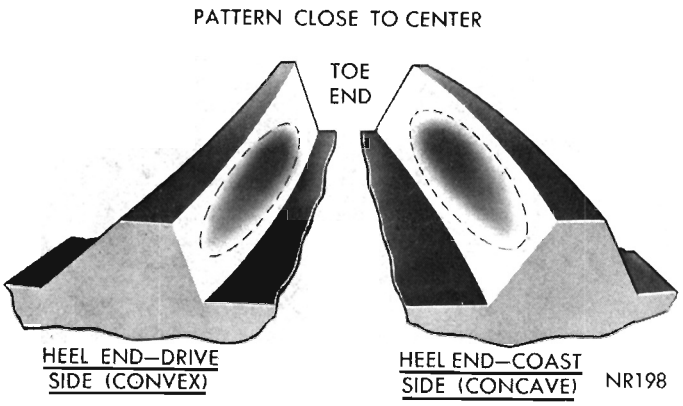


Fig. 24 Desired Tooth Contact Pattern Under Light Load

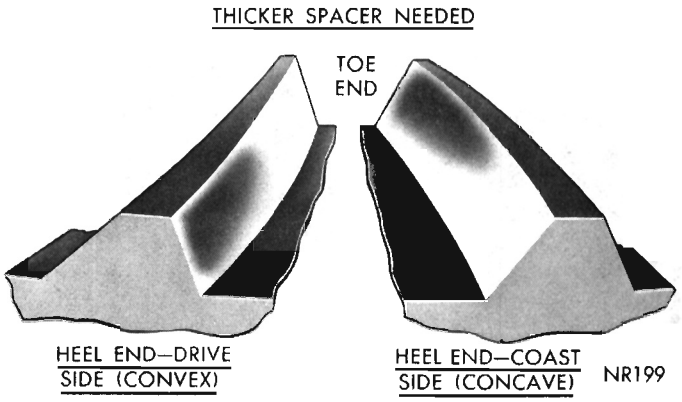


Fig. 25 Incorrect Tooth Contact Pattern (Increase Spacer Thickness)

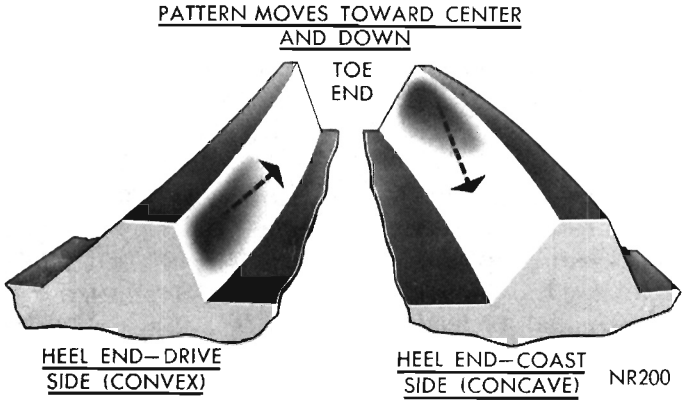


Fig. 26 Effect on Tooth Pattern as Spacer Thickness is Increased

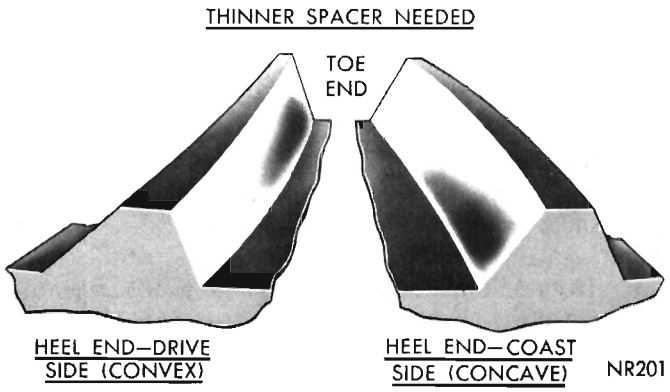


Fig. 27 Incorrect Tooth Contact Pattern (Decrease Spacer Thickness)

only finger tight at this time.

(9) Install pilot stud Tool C-3288 on left side of axle housing. Attach dial indicator and load indicator stem slightly against opposite side of axle housing (Fig. 11).

(10) Tighten spreader tool nut sufficiently to obtain .012 in. to .015 in. movement of dial indicator to permit installation of differential case assembly. Do not spread over .020 inch.

(11) Remove dial indicator.

(12) Holding differential assembly with bearing cups on respective bearing and selected preload spacers, carefully install differential and ring gear assembly into axle housing.

(13) Loosen spreader tool nut and remove spreader.

(14) Install differential bearing caps on respective sides and alternate tightening bolts to 40 foot-pounds.

(15) Install dial indicator to axle housing with indicator parallel to drive gear. With pointer of indicator contacting the drive side of ring gear tooth, measure drive gear backlash. At least four readings should be taken on teeth approximately 90 degrees apart to find the point of least backlash, and mark the tooth.

(16) At point of minimum backlash, dial indicator should read .004 to .007 inch. If reading is not within this tolerance, it will be necessary to refer to chart and Install Differential Spacers and re-check backlash to bring within proper specifications.

(17) Apply a thin film of red or white lead on both the drive and coast side of the drive gear teeth. Rotate drive gear one complete revolution in both directions while prying with a round bar or screwdriver between the casting and differential case flange. This action creates a load and produces a distinct tooth contact pattern on the drive gear teeth.

(18) Observe the contact pattern on the drive gear teeth and compare with those in (Fig. 24) to determine if pattern is properly located. If pinion depth of mesh and gear backlash are correct, the heaviest most distinct part of contact pattern should be centered on both drive and coast sides of the drive gear teeth.

If your tooth contact resembles that in (Fig. 25), the drive pinion is too far away from centerline of the ring gear, the contact pattern will appear high on the heel on drive side and high on toe on coast side. To correct this type tooth contact

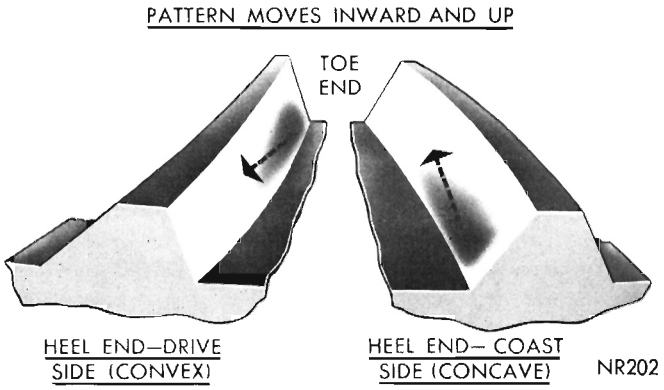


Fig. 28 Effect on Tooth Pattern as Spacer Thickness is Decreased

pattern, increase the thickness of the rear pinion bearing mounting spacer (Fig. 26), which will cause the high heel contact on drive side to lower and move toward the toe; the high toe contact on coast side will lower and move toward the heel.

If the tooth contact pattern resembles that in (Fig. 27), the drive pinion is too close to the ring gear, the pattern will appear low on the toe on drive side and low heel contact on the coast side. To correct this type tooth contact pattern, decrease the thickness of the rear pinion bearing mounting spacer (Fig. 28), which will cause the low toe contact on drive side to raise and move toward the heel; low heel contact on coast side will raise and move toward the toe.

(19) When correct tooth contact pattern is obtained, and cover and gasket surface is thoroughly clean, install cover with new gasket on housing and insert cover bolts and tighten to 20 foot-pounds.

Installation

Refer to Paragraph "Axle Shaft Assembly" when installing the rear axle shafts.

(1) With body supported at front of rear spring, position rear axle assembly spring seats over the spring center bolts.

(2) Install spring "U" bolts and tighten nuts to 45 foot-pounds and install shock absorbers on spring plate studs.

(3) Connect hand brake cable.

(4) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(5) Connect brake lines to rear wheel cylinders and connect hydraulic flexible line and bleed wheel cylinder.

(6) Install brake drums and rear wheels and tighten to 55 foot-pounds and adjust brakes.

LUBRICATION

Multipurpose Gear Lubricant, as defined by MILL-2105B (API GL-5) should be used in all rear axles with conventional differentials; Chrysler Hypoid Lubricant part number 2933565 is an oil of this type and is recommended or equivalent.

In Sure-Grip axles it is recommended that only Chrysler Hypoid Lubricant part number 2933565 or an equivalent be used. This lubricant, recommended for conventional differentials too, contains special additives to provide proper differential durability and performance.

Anticipated Temperature	Viscosity Grade
Above – 10°F.	SAE 90
As low as – 30°F.	SAE 80
Below – 30°F.	SAE 75

"SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE."

REAR AXLE ASSEMBLY 8-1/4 IN. RING GEAR

INDEX

	Page
Axle Shaft and Bearings	17
Differential	19
Differential Case	20
Differential Bearing Preload And Drive Gear And Pinion Backlash	25
Drive Pinion Depth Of Mesh	23
Gear Tooth Contact Pattern	26
Pinion Bearing Cup Installation	23
Rear Axle Assembly	19
Removal	19
Installation	27
Removal And Replacement Of Drive Pinion Flange And Oil Seal In Vehicle	27
Lubrication	28

GENERAL INFORMATION

This 8-1/4 in. diameter axle assembly shown in (Fig. 1), is of the integral carrier housing hypoid gear type in which the centerline of the drive pinion is mounted below the centerline of the ring gear.

The rear axle housing is an iron casting with



NU969

Fig. 1 8 1/4 in. Rear Axle Assembly

tubular legs pressed into and welded to the carrier to form a complete carrier and tube assembly. A removable stamped steel cover bolted to the rear of the carrier, permits inspection and service of the differential without removing the complete rear axle from the vehicle.

A stamped small metal tag is attached beneath one of the cover screws to identify the axle ratio.

The drive pinion is supported by two preloaded taper roller bearings. The front and rear pinion bearing cones are a press-fit on the pinion stem. The front and rear pinion bearing cups are a press-fit against a shoulder that is recessed in carrier casting. The drive pinion depth of mesh adjustment is controlled by the use of metal shims which are installed between the rear pinion bearing cup and the carrier casting.

Drive pinion bearing preload is obtained by means of a metal collapsible spacer positioned between the front and rear pinion bearing cones. The spacer is compressed to provide the necessary required pinion bearing preload by tightening the pinion flange nut.

The differential case is of one-piece construction. Two side gears and two pinion gears are housed within the case and are backed by thrust washers. The two side gears are splined internally to drive each of the axle shafts, and are positioned to turn in machined counterbores in the case. The differential pinion gears have a smooth surface and are held in position by a solid pinion shaft mounted and locked in the case by means of a lock screw. All four of the gears are in mesh with each other, and because the differential pinions turn freely on the pinion shaft, they act as idler gears when the rear wheels are turning a different speed.

The differential case is supported in the carrier by two tapered roller bearing cones which are a press-fit on the differential case hubs. A new type threaded differential bearing adjuster is located in each bearing pedestal cap and perform three functions. They eliminate the differential case side play; they adjust and maintain the backlash between the ring gear and drive pinion; and establish a means of obtaining differential bearing preload.

The rear axle shaft wheel bearings are of a straight roller type and roll directly on the axle shaft. The bearing consists of an outer race, bearing cage and rollers and retaining snap rings which retain the cage and rollers in the outer race. The bearing assembly is a snug press-fit to loose fit in the axle housing tube and is held in position by the axle shaft seal. The axle shaft slides into position through the seal and bearing. Both the seal and bearing rollers ride directly on a common ground journal surface on the axle shaft. The axle shaft splines engage the differential side gear with a loose fit. The axle shaft has two machined circular grooves near the inner end of the axle shafts. The axle shafts are retained in the assembly by means of the "C" washers positioned

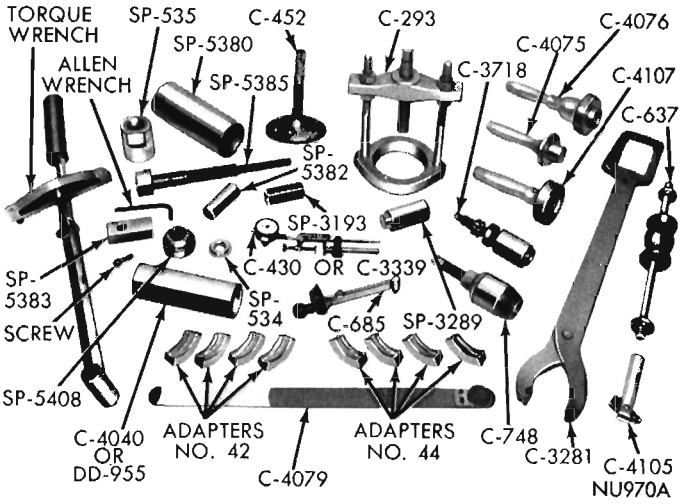


Fig. 2, 8-1/4 Rear Axle Tools

in the circular grooves. When the axle shafts and "C" washers are properly installed, the outer portion of the "C" washer will be positioned in the machined recess of the side gear which will prevent the removal of the washer and axle shaft. With the differential pinion shaft installed, and retained by its lock screw, axle shaft retainers are securely locked in place and cannot slide out. Therefore, with the axial movement of the axle shafts controlled in this way, no axle shaft bearing end play adjustment is required.

The axle shaft bearings are lubricated by means of rear axle lubricant level being maintained in the tubes of the housing during operation.

Considering the precise nature and the special tools required for proper adjustment of the interrelated components, replacing worn or damaged components, the following suitable factory approved tools (Fig. 2) are considered essential in order to properly service the 8-1/4 in. rear axle assembly.

For additional tips on 8-1/4 axles see, Master Technicians Service Conference session 69-5.

SERVICE PROCEDURES

AXLE SHAFT AND BEARINGS

Removal

(1) Raise vehicle to a good desirable working height and remove the rear wheel and tire assembly and brake drum.

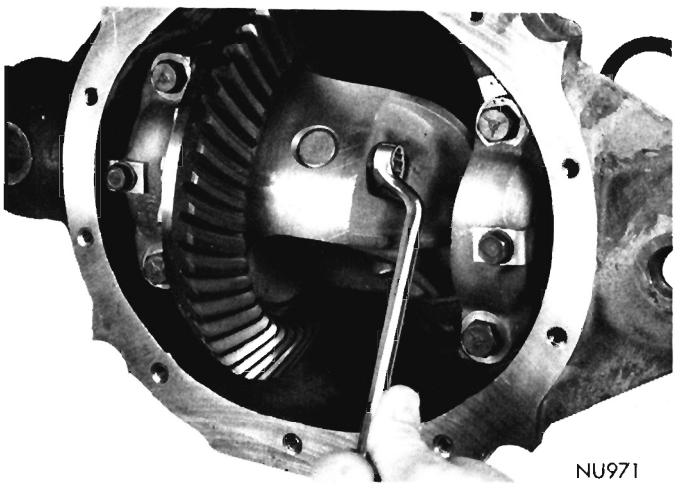


Fig. 3 Removal or Installation of Differential Pinion Shaft Lock Pin

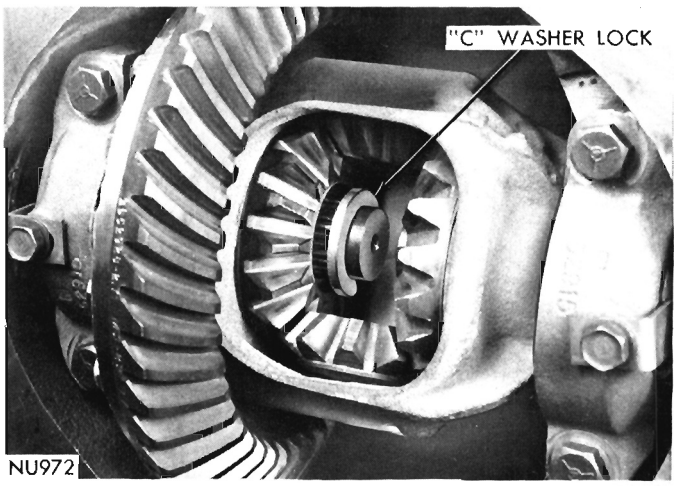


Fig. 4 Removal or Installation of Axle Shaft "C" Washer Locks.

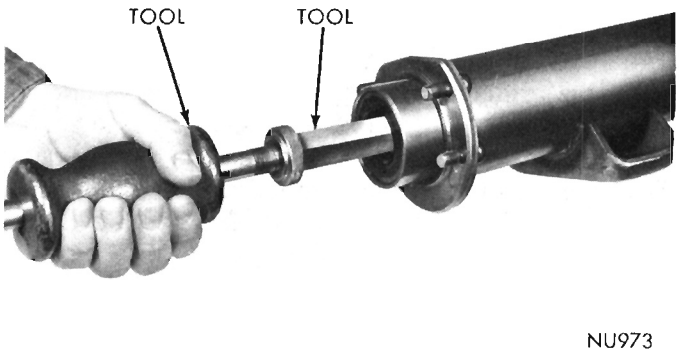


Fig. 5 Removing Axle Shaft Bearing and Seal

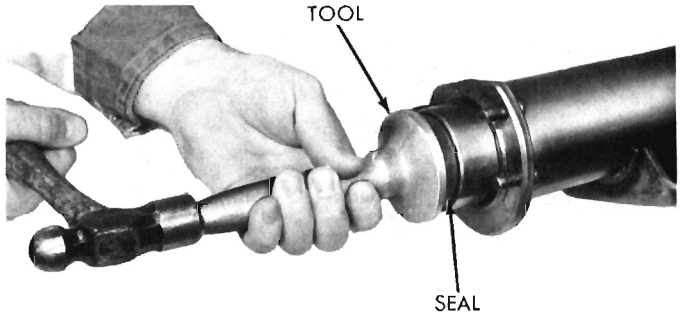


Fig. 6 Installing Axle Shaft Oil Seal

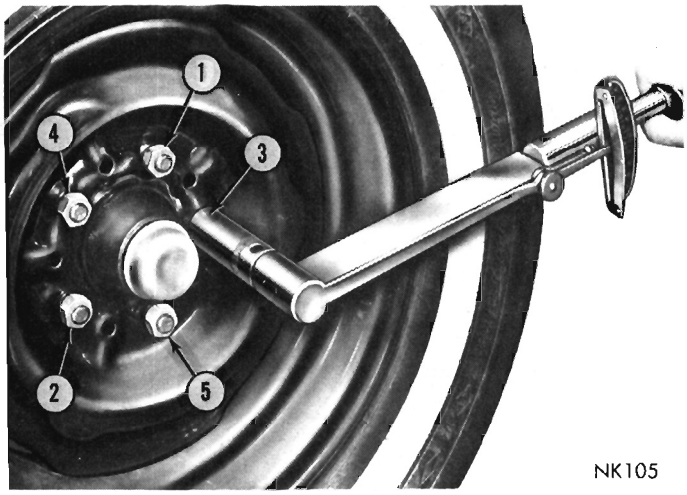


Fig. 7 Proper Wheel Nut Tightening Sequence

(2) Clean all dirt and foreign material from area of housing cover.

(3) Loosen housing cover and drain lubricant from rear axle and proceed to remove cover.

(4) Turn differential case to make differential pinion shaft lock screw accessable and remove lock screw and pinion shaft (Fig. 3).

(5) Push axle shafts toward center of vehicle and remove the "C" washer locks from recessed groove of axle shaft (Fig. 4).

(6) Remove axle shaft from housing being careful not to damage the straight roller type axle shaft bearing which will remain in the rear axle housing.

(7) Inspect the axle shaft bearing surfaces for signs of brinnelling, spalling or pitting. The normal bearing contact on the shaft will be a dull grey and may appear lightly dented, under no circumstances should an axle shaft or bearing showing any of the above mentioned conditions be reused.

Always replace the bearing when the shaft is replaced due to the above conditions.

(8) Remove axle shaft seal from housing bore using the button end of axle shaft. The axle shaft splines will cause sharp dents on the end of the housing. Polish these dents smooth or they will tear the rubber on the outside diameter of the seal and cause the seal to leak.

(9) To remove the axle shaft bearing from axle housing on small bore models, use Tool C-4105 (Fig. 5). Tool C-4105 damages bearing separator and **bearing must be discarded and a new bearing used.** To remove bearing on large bore models use Tool C-4131. Attach Tool C-637 to end of selected remover, using a slide hammer motion, remove axle shaft bearing and inspect and discard if axle shaft or bearing shows any of the conditions in step 7. If large bore axle shaft and bearing show no signs of distress, they can be reinstalled along with a **new** axle shaft seal. Never reuse an axle shaft seal under any circumstances once it has been removed.

CAUTION: Inspect housing bearing shoulder for burrs, and remove any if present, otherwise bearing could be cocked during installation.

Installation

(1) Wipe axle shaft bearing cavity of axle housing clean.

(2) Insert axle shaft bearing onto pilot of proper Bearing Installer (small bore) use Tool C-4137, (large bore) use Tool C-4139. Insert axle shaft bearing into cavity making sure it is not cocked in bore and bottoms against the shoulder.

(3) Install axle shaft bearing seal (small bore) use Tool C-4138, (large bore) use Tool C-4130 (Fig. 6) until the outer flange of tool bottoms against housing flange face. This positions the seal to the proper depth beyond the end of the flange face.

(4) Slide axle shaft into place being careful that splines of shaft do not damage oil seal and properly engage with splines of differential side gears.

(5) With axle shaft in place, install the "C" washer locks in recessed grooves of axle shaft, and pull outward on shaft so the "C" washer lock seats in the counterbore of differential side gear.

(6) Install differential pinion shaft through case

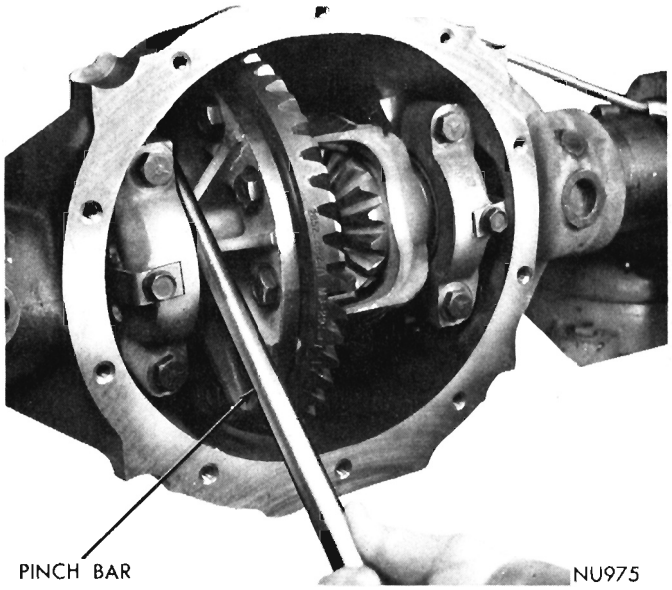


Fig. 8 Checking Differential Side Play

and pinions, aligning hole in shaft with lock screw hole. Install lock screw and tighten securely.

(7) Clean housing and cover gasket surfaces and using a new gasket, install cover and torque cover bolts to 15-25 foot-pounds. Beneath one of the cover bolts, install the ratio identification tag.

(8) Fill axle with lubricant to proper level with Multi-Purpose gear lubricant meeting MIL-L-2105B requirements. Chrysler Part No. 2933565 or an equivalent.

(9) Install brake drum and wheel and tire assembly torque wheel nuts to 65 foot-pounds in the proper sequence (Fig. 7).

(10) Lower vehicle and test operation of brake and axle assembly.

REAR AXLE ASSEMBLY

Removal

Should it become necessary to remove the rear axle assembly for overhaul or repair proceed as follows:

(1) Raise vehicle to a comfortable working height that will permit floor stands to be installed at front of rear springs.

(2) Block brake pedal in the "up" position using a wooden block.

(3) Loosen and remove rear wheels and brake drums.

(4) Disconnect hydraulic brake lines at wheel cylinders and cap fittings to prevent loss of brake fluid.

(5) Disconnect parking brake cables.

To maintain proper drive line balance when reassembling, make scribe marks on the propeller shaft universal joint and the pinion flange before removal.

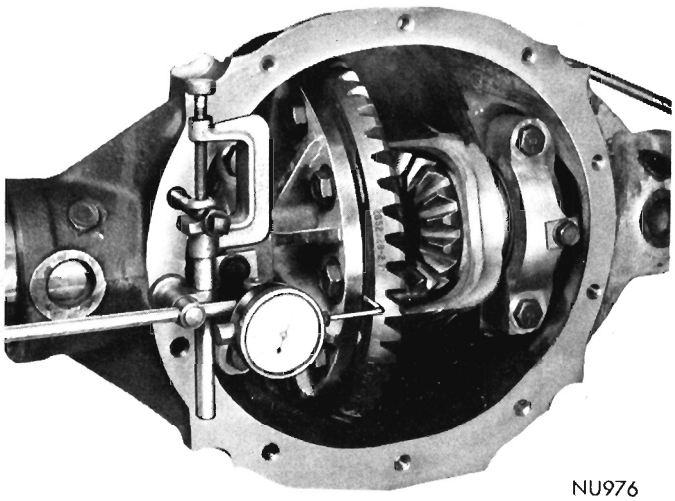


Fig. 9 Measuring Drive Gear Runout

(6) Disconnect propeller shaft at differential pinion flange and secure in an upright position to prevent damage to front universal joint.

(7) Remove shock absorbers from spring plate studs and loosen rear spring "U" bolts nuts and remove "U" bolts.

(8) Remove axle assembly from vehicle.

(9) Using a suitable cleaning solvent wash and clean the outer surface of axle assembly and blow dry with compressed air.

DIFFERENTIAL

Removal and Disassembly

(1) Position axle assembly in a suitable holding device; such as the jaws of a vise with housing cover facing upward.

(2) Loosen and remove housing cover screws and remove cover. Tilt assembly and drain lubricant into a container.

(3) Using a suitable cleaning solvent wash and clean differential bearing ring gear and pinion and internal surfaces and blow dry with compressed air.

(4) Measure for differential side play. Position a screwdriver or pinch bar between left side of axle housing and differential case flange, then using a prying motion determine if side play is present. **There should be no side play. (Fig. 8).**

(5) Apply an even coating of either red or white lead to the gear tooth surfaces. Using a pinch bar or screw driver apply force between housing and differential case rim. Turn pinion each direction so a distinct pattern will be reproduced on the teeth. Compare the pattern appearing on the teeth with those in Figs. 27, 28, 30 and determine if proper depth of mesh can be achieved.

(6) In preparing to measure drive gear runout on differential case, (provided no side play was found) mount a dial indicator tool C-3339 on pi-

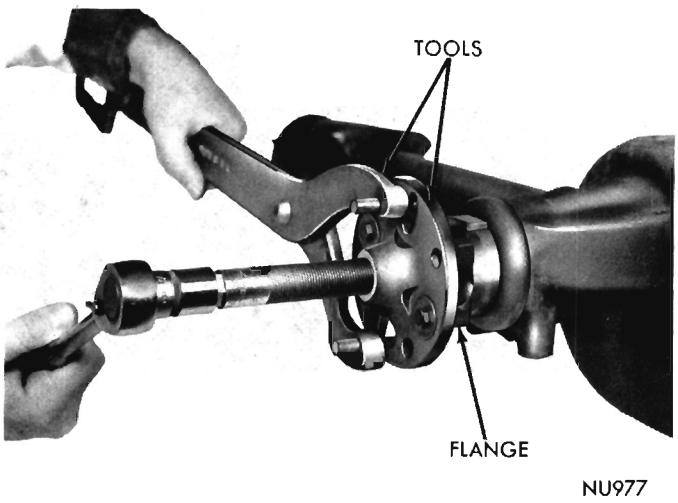


Fig. 10 Removing Drive Pinion Companion Flange

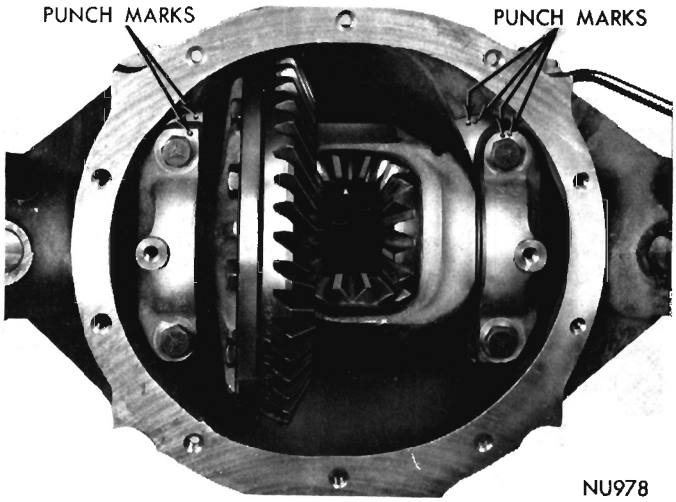


Fig. 11 Marking Bearing Caps and Housing for Proper Identification

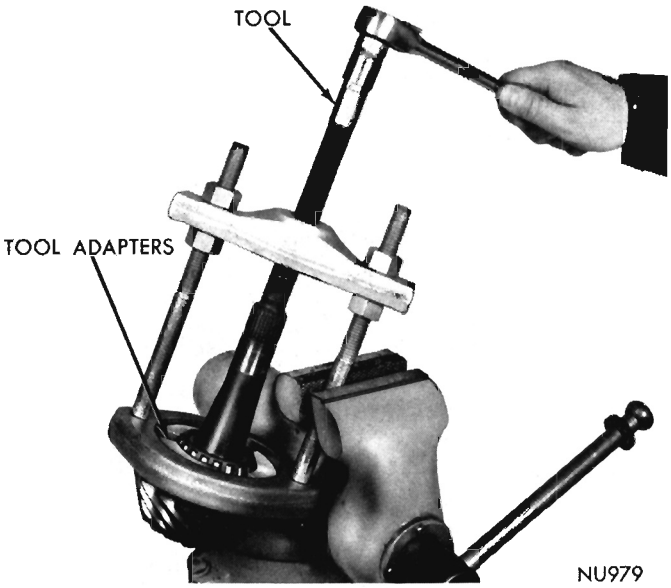


Fig. 12 Removing Drive Pinion Rear Bearing Cone

lot stud and load the indicator stem slightly when plunger is right angles to back face of drive gear(Fig. 9).

(7) Measure drive gear runout by turning drive gear several complete revolutions and reading dial indicator. Mark drive gear and differential case at point of maximum runout. The marking of differential case will be very useful later in checking differential case runout. Total indicator reading should be no more than .005 inch. If runout exceeds .005 inch the differential case may be damaged. A test for case runout will be described later.

(8) Using an inch-pound torque wrench, measure pinion bearing preload and record. Remove drive pinion nut and washer. Using Tool C-452 and holding Tool C-3281 remove drive pinion flange (Fig. 10).

(9) Using a screwdriver tip and hammer, remove the drive pinion oil seal from carrier casting and discard.

(10) Mark axle housing and differential bearing caps for proper relocation during reassembly (Fig. 11).

(11) Loosen and remove differential bearing cap bolts and remove bearings caps and threaded adjusters.

(12) Remove differential case and ring gear assembly from rear axle assembly. A possible light prying action might be necessary to unseat the differential. Differential bearings cups and threaded adjuster must be kept with respective bearing cones.

(13) To remove drive pinion or front pinion bearing cone, the pinion stem must be driven rearward out of the bearing. **This will result in damage to bearing rollers and cup and both bearing cone and cup must be replaced with new parts. Discard collapsible spacer.**

(14) Using a flat end brass drift and hammer, remove front and rear bearing cups from housing. Remove the shim from behind rear bearing cup and **record thickness** which can be very helpful during reassembly. Discard the damaged shim.

(15) Remove rear bearing cone from drive pinion stem using Tool C-293 and adapters No. 42. Care must be taken to insure that the adapters are located so as not to pull on bearing cage (Fig. 12).

DIFFERENTIAL CASE

Disassembly

(1) Mount differential case and ring gear assembly in a vise equipped with soft jaws (brass).

(2) Remove drive gear bolts. **Bolts are left hand thread.** With non-metallic hammer or brass drift, tap drive gear loose from differential case pilot and remove.

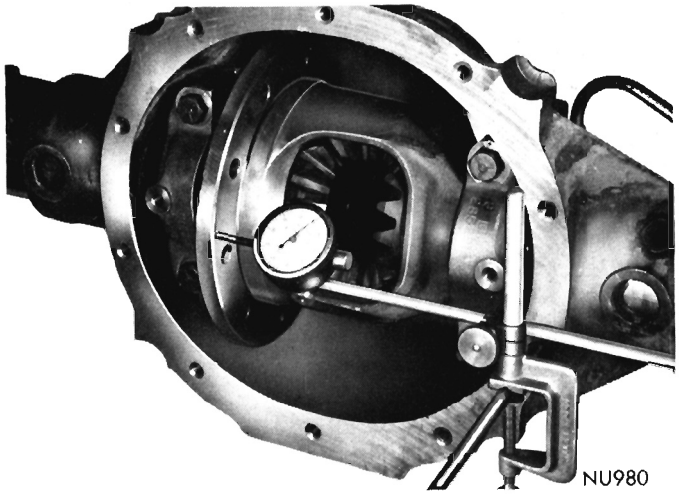


Fig. 13 Checking Drive Gear Mounting Flange Face Runout

(3) If drive gear runout exceeded .005 inch in step 7 (under "Differential Removal and Disassembly"), recheck the case as follows: Install differential case and respective bearing cups, caps and adjusters in axle housing.

(4) Using differential bearing adjusting wrench C-4079 turn in adjusters to eliminate all side play and tighten pedestal cap bolts snugly.

(5) Mount dial indicator in contact with drive gear flange face and measure runout as described in step 7. Total allowable runout should not exceed .003 inch. It is often possible to reduce excessive runout by positioning drive gear 180 degrees from point of original assembly when reassembling ring gear on differential case (Fig. 13).

(6) Loosen and remove pedestal cap bolts and remove differential case assembly from carrier and tube assembly.

(7) Loosen and remove pinion shaft lock screw and remove pinion shaft.

(8) Rotate differential side gears until differential pinions appear at differential case window opening and remove.

(9) Remove differential side gears and thrust washers.

(10) Remove differential bearing cones using Tool C-293 and adapter plates No. 44 (Fig. 14).

Cleaning and Inspection

(1) Wash and clean all parts in a suitable cleaning solvent and with the exception of bearings, dry with compressed air. To clean axle housing tubes, insert a stiff wire into tube, attach a clean cloth to wire at center section and withdraw from center outward.

(2) All machined contact surfaces in the axle housing and differential bearing caps should be smooth and free of any raised edges. Front and rear pinion bearing cup bore machine surfaces

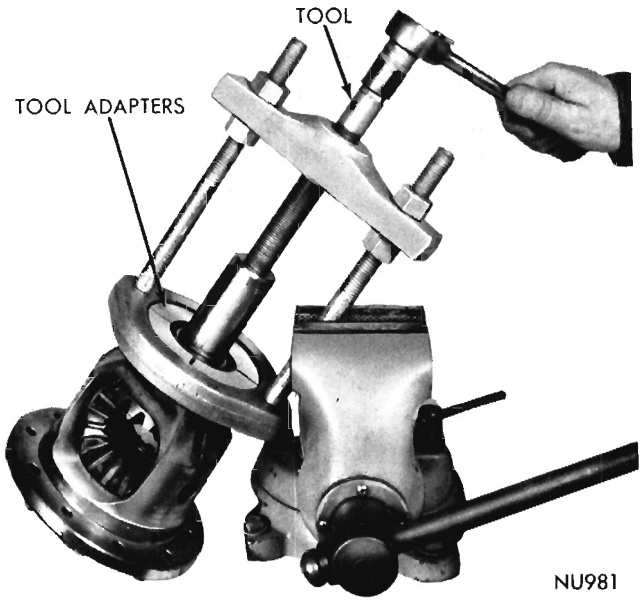


Fig. 14 Removing Differential Bearing Cone

should be smooth. Raised metal on shoulders of bores incurred in removal of cups should be flattened by use of a flat nosed punch.

(3) Axle shaft oil seal bores at both ends of housing should be smooth and free of rust and corrosion. This also applies to brake support plate and housing flange face surface.

(4) Axle shaft bearings should be washed and cleaned and inspected for pitting, spallings or imperfections in axle shaft roller surface or bearing rollers. If either or both are found to be unfit for further use, discard and replace with new parts. (The axle shaft and bearing are serviced separately).

(5) The axle shaft splines should be smooth and free of excessive wear. The axle shaft oil seal journal should be smooth and free of nicks, scratches or blemishes. To remove any imperfections, polish with No. 600 crocus cloth (without reducing diameter of axle shaft oil seal surface).

(6) Differential bearings and front and rear pinion bearing cone and cup assemblies should have a smooth appearance with no broken or dented surfaces on rollers or roller contact surfaces. The bearing roller retainer cages must not be distorted or cracked. **When replacing bearings, always replace the cup and cone in a set only.**

(7) Inspect drive gear and pinion for worn or chipped teeth or damaged attaching bolt threads. If replacement is necessary, replace both the drive gear and drive pinion as they are available in matched sets only.

(8) Inspect universal joint flange for cracks, worn splines, pitted, rough or corroded oil seal contact surface. Repair or replace universal joint flange as necessary.

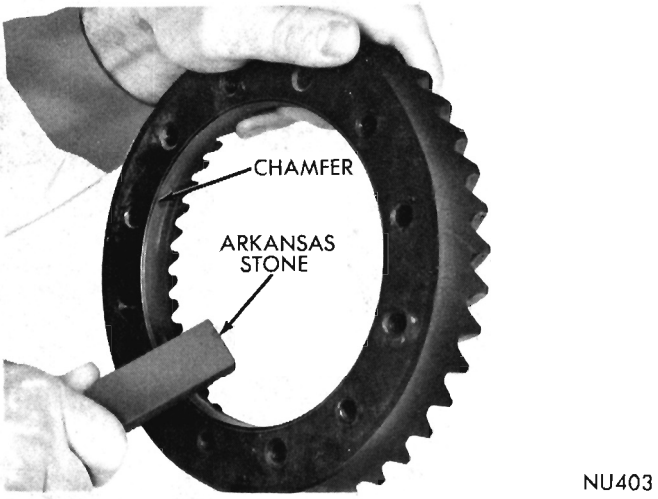


Fig. 15 Stoning Chamfer of Ring Gear.

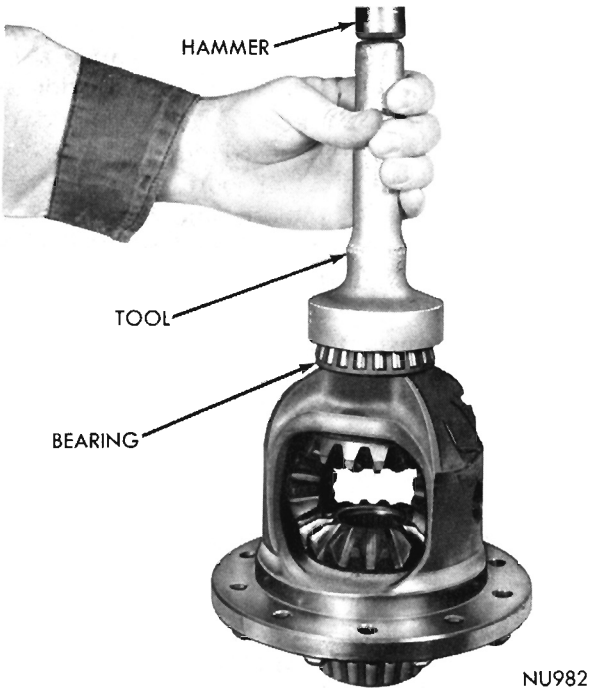


Fig. 16 Installing Differential Bearing Cone

(9) Inspect drive pinion bearing shim for breakage or distortion and replace if necessary during the establishment of setting depth of mesh.

(10) Differential side gears and pinions should have smooth teeth with a uniform contact pattern without excessive wear or broken surfaces. The differential side gear hub surfaces and thrust washer contact surfaces should be smooth and free from any scoring or metal pickup.

(11) The machined thrust washer surface areas inside the differential case should be polished and with no surface imperfections. The pinion shaft bore in differential case should be round and without excessive wear in areas of contact with either differential case or differential pinions.

(12) Inspect axle shaft "C" lock washers for signs of cracks or wear and replace if necessary.

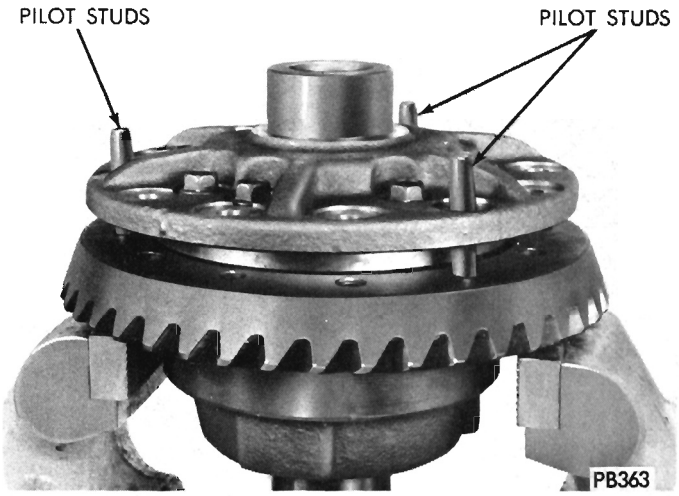


Fig. 15A Using Pilot Studs To Locate Case To Heated Ring Gear

Assembling the Differential

Lubricate all components before assembly with lubricant as specified in (Lubrication Group "O".)

(1) Install thrust washers on differential side gears and position gears in counterbores of differential case.

(2) Position thrust washers on both differential pinion gears and mesh the pinion gears with the side gears, having pinion gears exactly 180 degrees apart.

(3) Rotate side gears to align pinion gears and washers with differential pinion shaft holes in case.

(4) Install differential pinion shaft with care not to damage thrust washers. Hole in pinion shaft must align with lock screw hole in differential case.

(5) The contact surface of the drive gear and differential case flange must be clean and free of all burrs.

(6) Using an Arkansas stone, relieve the sharp edge of the chamfer on the inside diameter of the ring gear (Fig. 15). This is very important otherwise during the installation of ring gear on differential case, the sharp edge will remove metal from the pilot diameter of case and can get imbedded between differential case flange and gear; causing ring gear not to seat properly.

(7) Heat the ring gear with a heat lamp or by immersing the gear in a hot fluid (water or oil). The temperature should not exceed 300 degrees Fahrenheit. **DO NOT USE A TORCH.** It is advantageous to use pilot studs equally spaced in three positions to align the gear to the case (Fig. 15A).

(8) Insert drive gear screws (Left Hand Threads) through case flange and into drive gear.

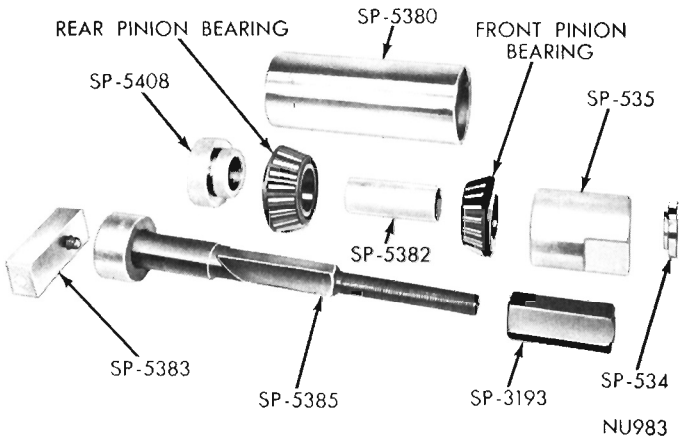


Fig. 17 Rear Axle Setting Gauge Tool C-3715 and Adapter Set C-4084

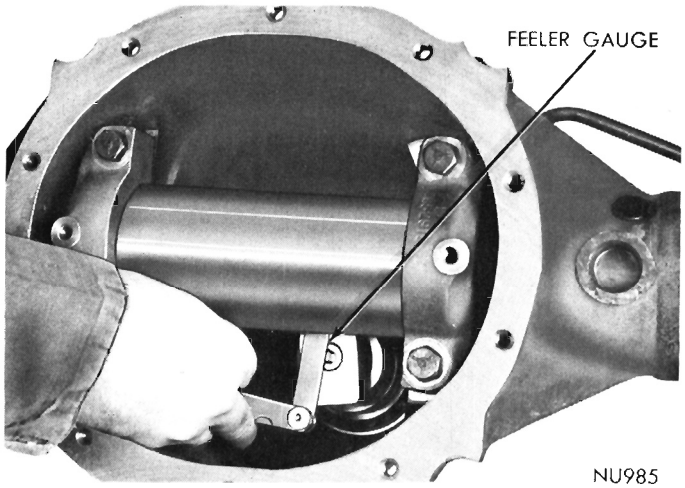


Fig. 19 Determining Proper Shim Pack Thickness For Drive Pinion Depth of Mesh

(9) Position unit between brass jaws of a vise and alternately tighten each screw to 55 foot-pounds.

(10) Position each differential bearing cone on hub of differential case (taper away from drive gear) and with installing Tool C-4107 install bearing cones. An arbor press may be used in conjunction with installing Tool (Fig. 16). **CAUTION:** Never exert pressure against the bearing cage, since this would damage the bearing.

PINION BEARING CUP INSTALLATION

Rear axle pinion setting gauge Tool C-3715 and adapter set C-4084 is used to install drive pinion bearing cups as well as to determine pinion depth of mesh (Fig. 17).

LUBRICATE ALL PARTS BEFORE ASSEMBLY WITH LUBRICANT AS SPECIFIED UNDER LUBRICATION.

(1) Start both drive pinion bearing cups into axle housing bores making sure they are not cocked.

(2) Assemble spacer SP-5408 on main stem

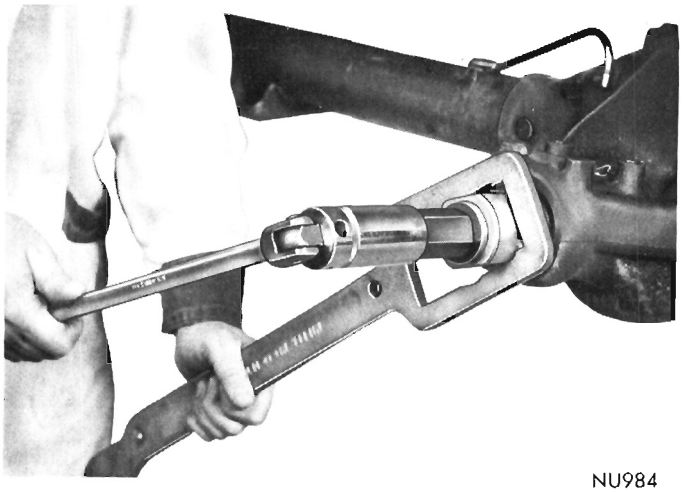


Fig. 18 Seating Bearing Cups In Axle Housing

SP-5385 followed by rear pinion bearing cone and insert into axle carrier from rear side.

(3) While holding assembly in carrier, install front pinion bearing cone over spacer SP5382 and position on stem of tool followed by compression sleeve SP-535, Centralizing washer SP-534 and main screw nut SP-3193. Hold compression sleeve with companion flange holding Tool C-3281 and tighten nut (Fig. 18) allowing tool to rotate as nut is being tightened in order not to brinnel bearing or cups: Do not remove tool after installing cups. Pinion depth of mesh will be determined next.

DRIVE PINION DEPTH OF MESH

Using Tool C-3715 and Adapter C-4084

The 8-1/4 in. axle with the tapered drive pinion stem using the collapsible spacer for bearing preload requires the pinion depth of mesh setting first and preload last.

The position of the drive pinion with respect to the drive gear (depth of mesh) is determined by the location of the bearing cup shoulders in the carrier and by the portion of the pinion in back of the rear bearing. The thickness of the rear pinion bearing mounting shim suitable for the axle can be determined by using Tool C-3715 and Adapter C-4084.

(1) With main tool left in axle housing after installing drive pinion bearing cups, loosen tool nut and retighten nut to produce 10-30 inch-pounds of preload. Rotate after tightening to align bearing rollers. Make sure bearing rollers are lubricated otherwise a false reading could occur.

(2) Install gauge block SP-5383 on main tool and tighten screw with an Allen wrench securely.

(3) Position cross bore arbor SP-5380 in axle housing differential bearing seats. Center the arbor so that an approximate equal distance is main-

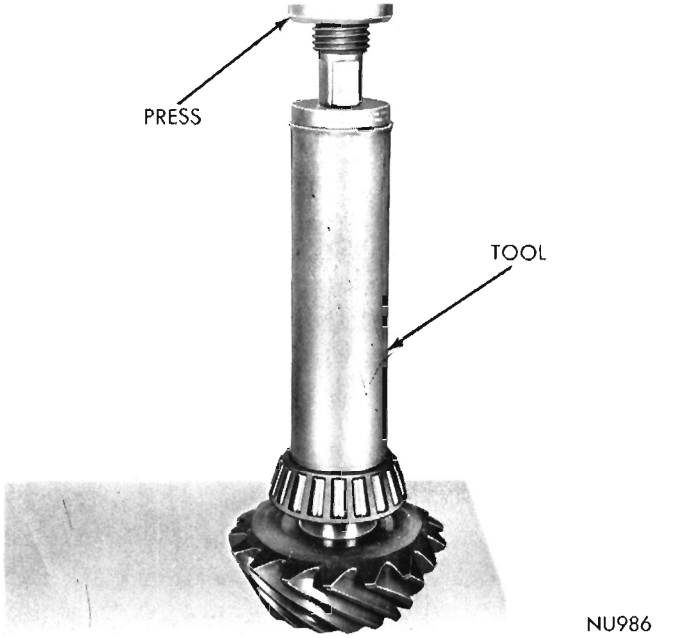


Fig. 20 Installing Drive Pinion Rear Bearing Cone

tained at both ends. Position bearing caps and attaching bolts on carrier pedestals and insert a piece of .002 inch shim stock between arbor and each cap. Tighten cap bolts to 10 foot-pounds.

(4) Using a feeler gauge select the proper thickness of shims that will snugly fit between arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge). This measurement is then used in determining the correct thickness shim pack for installation behind the rear pinion bearing cup and carrier casting (Fig. 19).

(5) To select a shim pack for installation, read the markings on the end of the pinion head (—0, —1, —2, +1,+2, etc.). When marking is —(minus), add that amount to the thickness of shim pack selected in step (4). When the marking is +(plus), subtract that amount. Treat other pinion markings in a similar manner. Shims are available in increments of .001 in. from .061 in. thru .078 in.

(6) Remove the tool arbor and tool from axle housing.

(7) Using a brass drift or soft punch and hammer, remove rear pinion bearing cup from casting.

(8) Position the correct thickness shim in axle housing cup bore and install rear bearing cup as described previously in steps (1 thru 3). When cup is properly seated, remove tool and pinion bearing cones.

(9) Lubricate rear drive pinion bearing cone and install bearing cone on pinion stem using Tool C-4040 or DD-955. An arbor press may be used in conjunction with Tool (Fig. 20).

(10) Insert drive pinion with rear bearing and

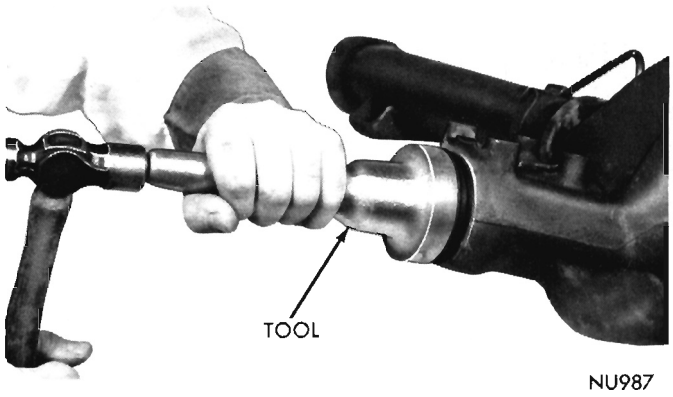


Fig. 21 Installing Drive Pinion Oil Seal

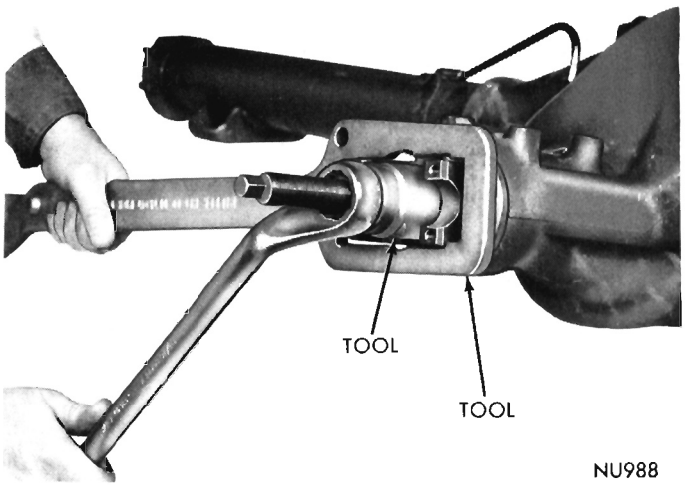


Fig. 22 Installing Drive Pinion Companion Flange

new collapsible spacer through axle casting and install the pinion front bearing cone on the pinion from the front of the casting.

Install companion flange using Tool C-3718 and holding Tool C-3281. This is necessary in order to properly install front pinion bearing cone on stem due to interference fit. Remove tool and flange from pinion stem. **CAUTION:** During the installation of front pinion bearing be careful not to collapse the spacer.

(11) Install drive pinion oil seal using Tool C-4076 until the seal flange contacts the housing flange face (Fig. 21). The outside diameter of seal is precoated with a special sealer so no sealing compound is required.

(12) With pinion supported in axle assembly, install anti-clang washer on pinion stem followed by companion flange. Using Tool C-3718 and holding Tool C-3281 (Fig. 22) draw flange into position.

(13) Remove tools and install Belleville washer (convex side of washer up) and pinion nut.

(14) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to remove end play in pinion, while rotating the pinion to insure proper bearing roller seating.

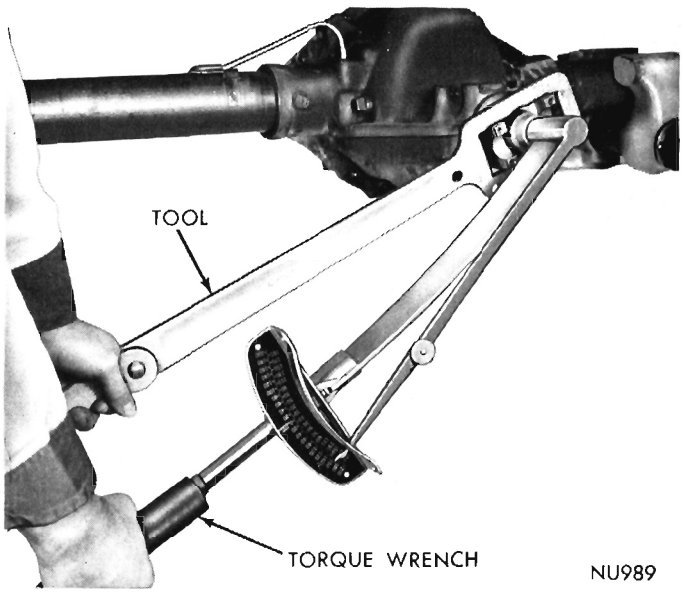


Fig. 23 Tightening Drive Pinion Nut

(15) Remove holding tool and rotate pinion several complete revolutions in both directions to permit bearing rollers to seat.

(16) Tighten pinion nut to 170 foot-pounds and measure pinion bearing preload by rotating pinion using an inch-pound torque wrench. The correct bearing preload specifications are 20-35 inch-pounds for new bearings with the pinion nut tightened to 170 foot-pounds minimum (Figs. 23, 24). If when rebuilding the axle and the **original** rear pinion bearing and a **new** front pinion bearing are used, the correct bearing preload is 10 inch-pounds more than the reading you got at time of tear down with a minimum of 170 foot-pounds of torque on the pinion nut. Correct bearing preload readings can only be obtained with nose of carrier in upright position. If correct preload cannot be obtained at 170 foot-pounds, continue tightening pinion nut in small increments and checking until proper preload is obtained. Bearing preload should be uniform during complete revolution. A preload reading that varies during rotation indicates a binding condition which must be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within specifications.

NOTE: UNDER NO CIRCUMSTANCES SHOULD THE PINION NUT BE BACKED OFF TO LESSEN PINION BEARINGS PRELOAD. IF THE DESIRED PRELOAD IS EXCEEDED A NEW COLLAPSIBLE SPACER MUST BE INSTALLED AND NUT RETIGHTENED UNTIL PROPER PRELOAD IS OBTAINED.

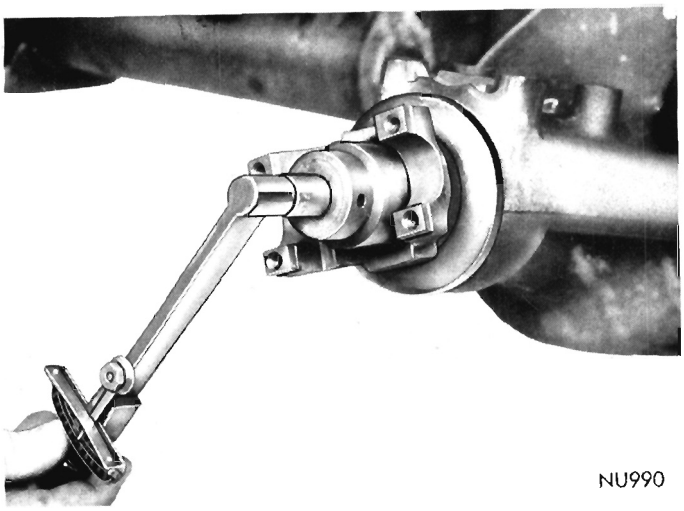


Fig. 24 Measuring Drive Pinion Bearing Preload

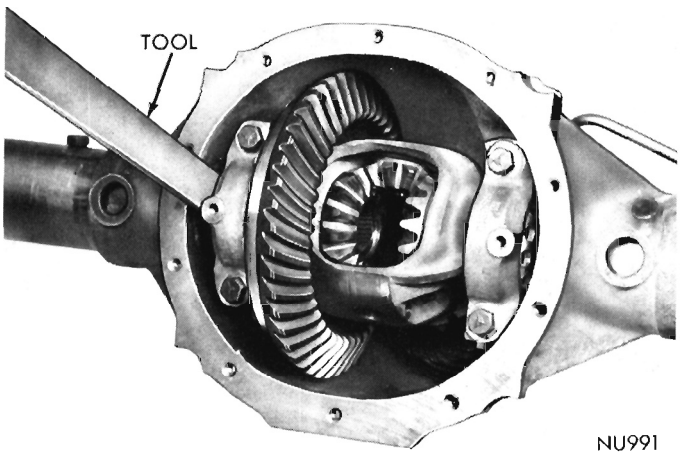


Fig. 25 Adjusting Differential Bearings to Eliminate Free Play

DIFFERENTIAL BEARING PRELOAD AND DRIVE GEAR AND PINION BACKLASH

(1) With drive pinion bearings installed and bearing preload set, install differential case and ring gear assembly with their respective bearing caps and adjusters flush with bearing cap; otherwise you will not be able to get Tool C-4079 in position to turn bearing adjuster. Align identification marks and tighten both cap bolts on each cap to 10 inch-pounds.

(2) Using Tool C-4079 turn right adjuster in until the assembly has approximately .005 in. spread. Using torque wrench tighten all four (4) cap bolts to 60 foot-pounds. Back off right adjuster until all spread is removed.

(3) Turn adjusters in using Tool C-4079 until bearing free play is eliminated and so some backlash exists between the ring gear and drive pinion (Fig. 25). Rotate drive pinion and ring gear several revolutions in both directions in order to seat

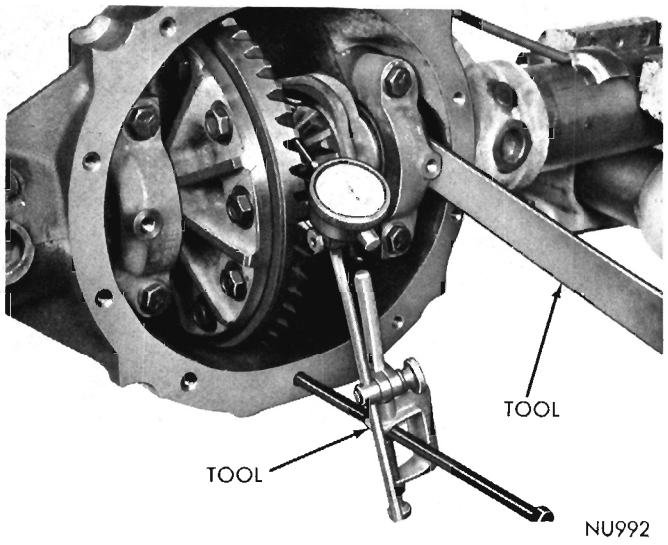


Fig. 26 Measuring and Adjusting Backlash Between Drive Gear and Pinion.

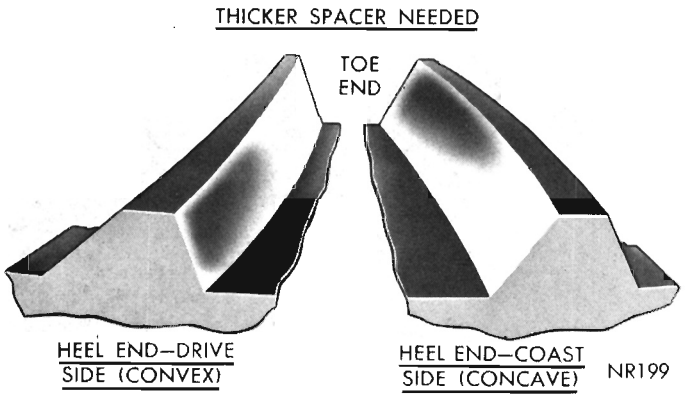


Fig. 28 Incorrect Tooth Contact Pattern (Increase Spacer Thickness)

the bearing rollers. This is necessary before setting backlash.

(4) Install dial indicator and position the contact point against back face of ring gear tooth. Check backlash at 4 positions at approximately 90 degrees intervals around the circumference of the gear (Fig. 26).

(5) Rotate gear to position where least backlash exists. Turn both adjusters the same amount, and in the same direction, until gear backlash is .001 in. to .002 in.

(6) Turn right bearing adjuster (tooth side of drive gear) in until .006 in. to .008 in. minimum backlash is obtained. By setting the proper backlash this will provide the required differential bearing preload.

It is important to rotate the gears several revolutions prior to each reading to insure that the bearings have seated. Make sure that the lash reading is taken each time on the same gear tooth.

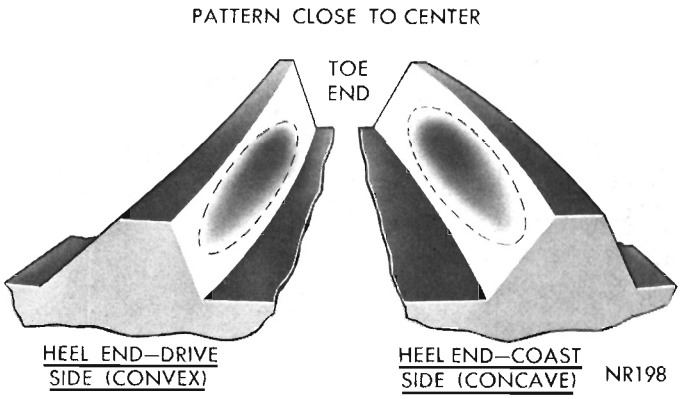


Fig. 27 Desired Tooth Contact Under Light Load

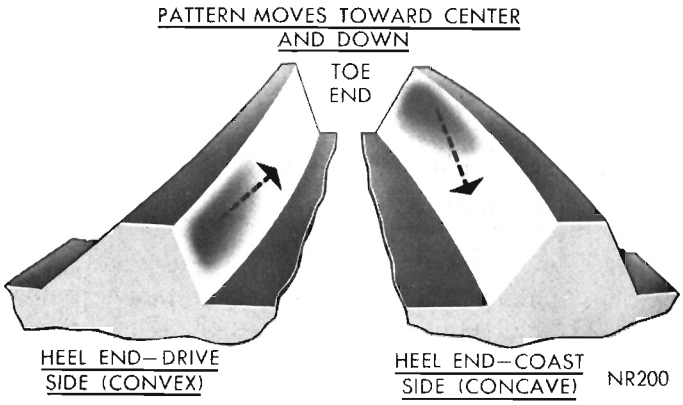


Fig. 29 Effect on Tooth Contact Patern as Spacer Thickness is Increased

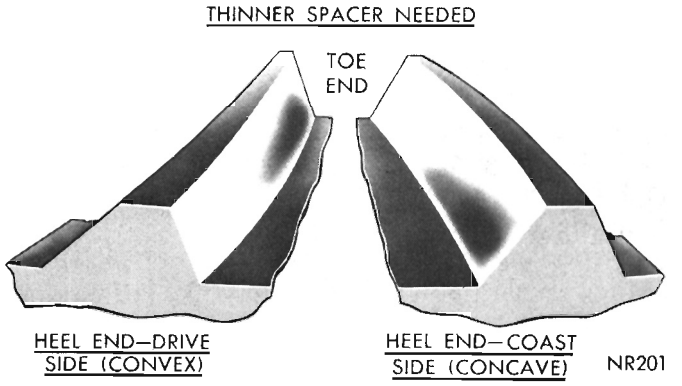


Fig. 30 Incorrect Tooth Contact Pattern (Decrease Spacer Thickness)

GEAR TOOTH CONTACT PATTERN

The gear tooth contact pattern will disclose whether the correct rear pinion bearing mounting shim has been installed and the drive gear backlash set properly. Backlash between the drive gear and pinion must be maintained within the specified limits until correct tooth contact pattern is obtained.

(1) Apply a thin film of red or white lead on both the drive and coast side of the drive gear

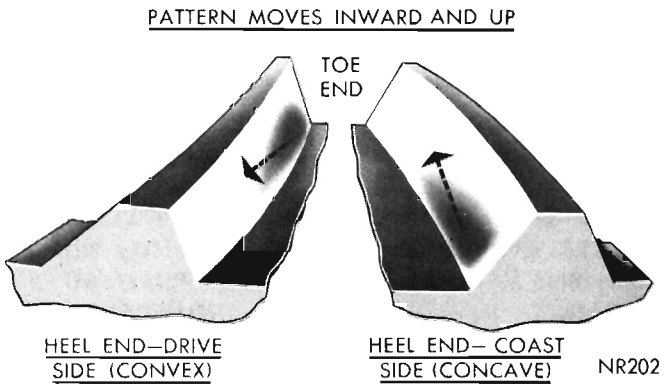


Fig. 31 Effect on Tooth Contact Pattern as Spacer Thickness is Decreased.

teeth. Rotate drive gear one complete revolution in both directions while load is being applied with a round bar or screwdriver between the carrier casting and differential case flange. This action will leave a distinct contact pattern on both the drive and coast side of the drive gear teeth.

(2) Observe the contact pattern on the drive gear teeth and compare with those in Figs. 27, 28 and 30 to determine if pattern is properly located. With pinion depth of mesh and gear backlash set properly, your contact pattern should resemble that in Fig. 27. Notice that the correct contact pattern is well centered on both drive and coast sides of the teeth. When tooth contact patterns are obtained by hand, they are apt to be rather small. Under the actual operating load, however, the contact area increases.

(3) If after observing the contact pattern you find it resembles that in Fig. 28, the drive pinion is too far away from centerline of the ring gear, the contact pattern will appear high on the heel on drive side and high on toe on coast side. To correct this type tooth contact pattern, increase the thickness of shim pack located behind the rear pinion bearing cup (Fig. 29), which will cause the high heel contact on drive side to lower and move toward the toe; the high toe contact on coast side will lower and move toward the heel.

(4) If after observing the contact pattern you find it resembles that in Fig. 30, the drive pinion is too close to the ring gear, the pattern will appear low on the toe on drive side and low heel contact on coast side. To correct this type tooth contact pattern, decrease the thickness of shim pack located behind the rear pinion bearing cup (Fig. 31), which will cause the low toe contact on drive side to raise and move toward the heel; low heel contact on coast side will raise and move toward the toe.

REAR AXLE ASSEMBLY

Installation

(1) Making sure the gasket surfaces of both the cover and carrier housing are clean, install a new gasket followed by the cover and tighten the cover bolts to 15-25 foot-pounds. Beneath one of the cover bolts, install the ratio identification tag.

(2) For correct procedure when installing axle shafts and bearings, see "Axle Shafts and Bearings".

(3) With body supported at front of rear springs, position rear axle assembly spring pads over the spring center bolts.

(4) Install spring "U" bolts and tighten nuts to 45 foot-pounds and install shock absorbers on spring plate studs.

(5) Connect parking brake cables.

(6) Connect hydraulic brake lines at wheel cylinders, install brake drums, adjust brakes and bleed brakes.

(7) Install rear universal joint of propeller shaft in same position as removed (match scribe marks on propeller shaft universal joint and pinion flange). Tighten universal joint clamps to 170-200 inch-pounds.

(8) Install rear wheels and tighten nuts to 65 foot-pounds in the proper tightening sequence.

REMOVAL AND REPLACEMENT OF DRIVE PINION FLANGE AND OIL SEAL IN VEHICLE

On 8-1/4 in. rear axle assemblies using the collapsible spacer to obtain pinion bearing preload, the following procedure for the removal and replacement of the drive pinion flange and pinion oil seal must be followed to assure that the proper bearing preload is maintained in the axle assembly. If this procedure is not followed it could result in a premature failure of the axle.

(1) Raise vehicle on hoist and make scribe marks on propeller shaft, shaft universal joint, drive pinion flange and end of pinion stem.

(2) Disconnect propeller shaft at pinion flange and secure in an upright position to prevent damage to front universal joint.

(3) Remove the rear wheels and brake drums to prevent any drag or a possible false preload reading could occur.

(4) Using inch-pound torque wrench C-685 measure pinion bearing preload by rotating pinion with handle of wrench floating, read the torque while wrench is moving through several complete revolutions and record. This operation is very important because preload must be carefully reset when reassembling.

(5) With Tool C-3281 hold companion flange and remove drive pinion nut and Belleville washer.

(6) Install companion flange remover Tool C-452 and remove flange. Lower rear of vehicle to prevent lubrication leakage.

(7) Using a screwdriver and hammer, remove the pinion oil seal from the carrier and clean the oil seal seat.

(8) Check splines on pinion shaft stem to be sure they are free of burrs or are not worn badly. If burrs are evident remove them using crocus cloth by working in a rotational motion. Wipe the pinion stem clean.

(9) Inspect companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace companion flange as necessary.

(10) The outside diameter of the seal assembly is precoated with a special sealer so no sealing compound is required for installing. Install the anti-clang washer on pinion stem. Install seal using Tool C-4076 until the seal flange contacts the housing flange face.

(11) Position companion flange on pinion stem being careful to match scribe marks made previously before removal.

(12) Install companion flange with installing Tool C-3718 and holding Tool C-3281.

(13) Remove tool and install Belleville washer (convex side of washer up) and pinion nut.

(14) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to 170 foot-pounds. Rotate pinion several complete revolutions to assure that bearing rollers are properly seated. Using an inch-pound torque wrench C-685 measure pinion bearing preload. Continue tightening pinion nut and checking preload until preload is at the original established setting you found in Step 4. Under no circumstances should the preload be more than 10 inch-pounds over the established setting found at time of checking in Step 4 of procedure.

Bearing preload should be uniform during a complete revolution. A preload reading that varies during rotation indicates a binding condition which has to be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within the correct specifications.

CAUTION: UNDER NO CIRCUMSTANCES SHOULD THE PINION NUT BE BACKED OFF TO LESSEN PINION BEARING PRELOAD. IF THE DESIRED PRELOAD IS EXCEEDED A NEW COLLAPSIBLE SPACER MUST BE INSTALLED AND NUT RETIGHTENED UNTIL PROPER PRELOAD IS OBTAINED. IN ADDITION, THE UNIVERSAL JOINT FLANGE MUST NEVER BE HAMMERED ON OR POWER TOOLS USED.

(15) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 170-200 inch-pounds.

(16) Install the rear brake drums and wheels and tighten nuts 65 foot-pounds.

(17) Raise the vehicle to a level position so axle assembly is at correct running position and check lubricant level. Add the correct type of lubricant required to bring the lubricant to proper level.

LUBRICATION

Refill axle assembly with Multipurpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used in all rear axles with conventional differentials; Chrysler Hypoid Lubricant part number 2933565 is an oil of this type and is recommended or equivalent.

Anticipated Temperature Range	Viscosity Grade
Above −10 degrees F	SAE 90
As low as −30 degrees F	SAE 80
Below −30 degrees F	SAE 75

"SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE."

REAR AXLE ASSEMBLY 8-3/4 IN. RING GEAR

INDEX

	Page
Axle Shafts and Bearings	30
Axle Shaft End Play	33
Differential and Carrier (Removal)	33
Differential and Carrier (Installation)	44
Differential Case	34
Drive Gear and Pinion Backlash	42
Gear Tooth Contact Pattern	43
Lubrication	44
Pinion Bearing Cup Installation	38
Pinion Bearing Preload and Pinion Setting Using Tool C-758-D-4	38
Small Stem Step Pinion	38
Large Stem Pinion With Collapsible Spacer	40
Pinion Bearing Preload and Pinion Setting Without Using Tool C-758-D4	41
Rear Axle Housing	33
Removal and Replacement of Drive Pinion Flange and Oil Seal in Vehicle	44

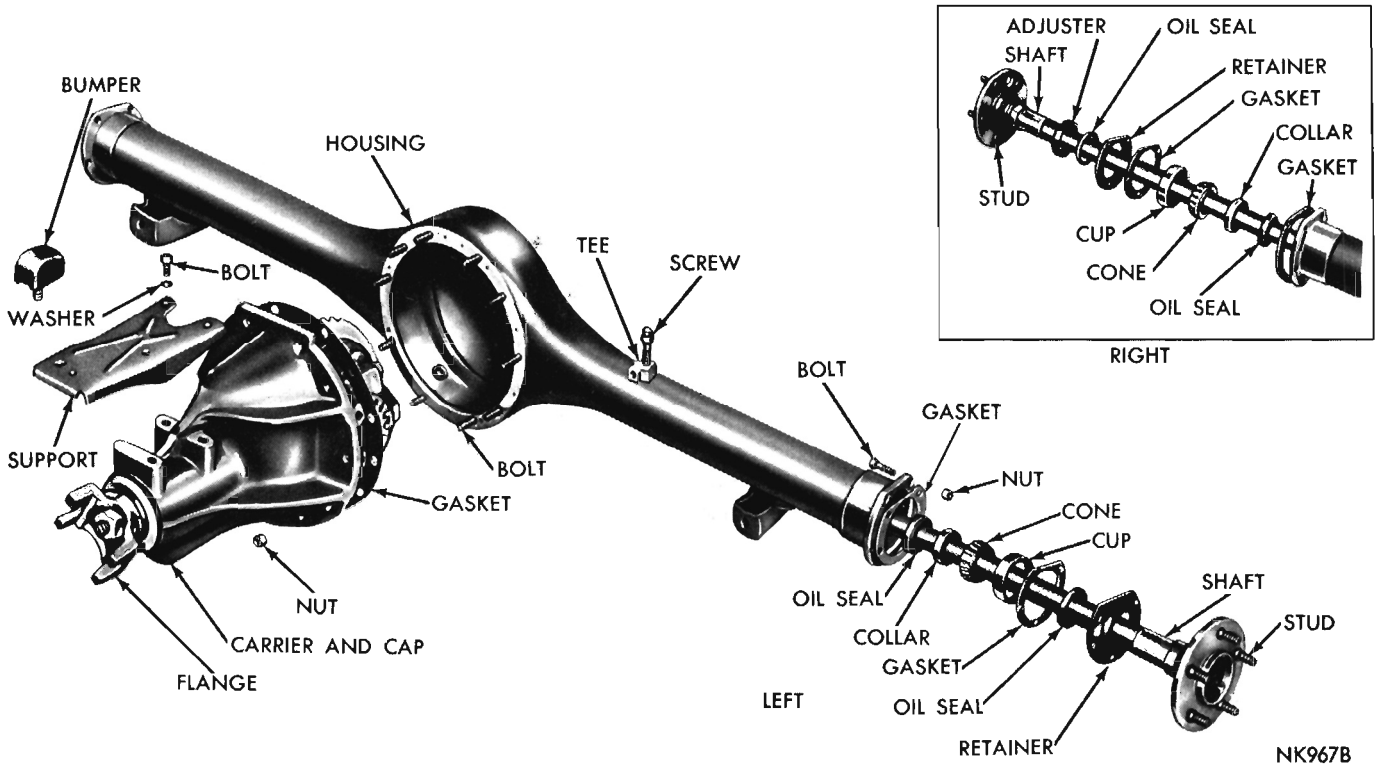


Fig. 1 - 8-3/4 in. Rear Axle Assembly

GENERAL INFORMATION

The 8-3/4 in. Rear Axle Assembly shown in (Fig. 1), is a semi-floating type and may be divided into four subassemblies; flanged axle drive shafts with related parts (Fig. 2) differential with drive gear, drive pinion with carrier, and the axle housing. Servicing of the above mentioned subassemblies, with exception of the axle housing may be performed without removing the complete rear axle assembly from the vehicle.

Gear ratio identification numbers will be stamped on a metal tag and attached by means of the rear axle housing-to-carrier bolt.

Some 8-3/4 in. large stem differential and carrier assemblies have incorporated a collapsible spacer which bears against the inner races of the front and rear bearings. This collapsible spacer is used to establish preload on the pinion bearings.

Adjustment of pinion depth of mesh is obtained by placing a machined shim between the pinion head and the rear pinion bearing cone.

A Sure-Grip Differential is available as optional equipment. The Sure-Grip Differential is of a two piece construction similar to the old type and is completely interchangeable with the previous type and will be serviced as a complete assembly only. Refer to the Sure Grip Differential Section of the Axle Group for the servicing procedure.

SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT.

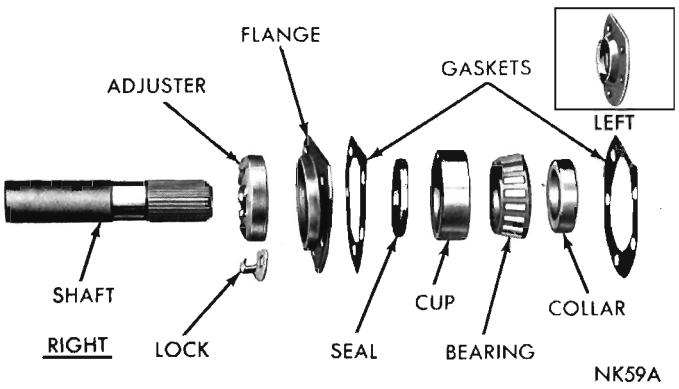


Fig. 2 Axle Shaft Disassembled

SERVICE PROCEDURES

INNER AXLE SHAFT SEAL REPLACEMENT

Inner axle shaft seal leaks are usually given visibility by the fact that the axle oil also escapes through the outer seal and contaminates the brake shoes with oil. The function of the outer seal is to prevent outside water and dust from entering the bearing cavity and to seal the bearing grease from leaking out, and in general will not seal the axle oil from leaking when the inner seal has failed. Therefore, it is not necessary to replace this seal when servicing an inner seal leak.

Also, it is not necessary to replace the axle shaft bearing. Simply repack the bearing with grease before reassembling.

Inner seal leaks are usually caused by damaged axle shaft seal journals or housing seal bores. Polish the damaged journal with No. 600 crocus cloth.

If the leak is due to a damaged housing bore, coat seal O.D. with permatex or equivalent.

For servicing procedures, follow steps 1 through 5 for axle shaft bearing removal and steps 1 through 7 for axle shaft installation.

AXLE SHAFTS AND BEARINGS

CAUTION: It is absolutely necessary that anytime an axle assembly is serviced, and the axle shafts are loosened and removed, the axle shaft gaskets and inner axle shaft oil seals must be replaced.

Removal

(1) With wheels removed, remove clips holding brake drum on axle shaft studs and remove brake drum.

(2) Using access hole in axle shaft flange, remove retainer nuts, the right shaft with threaded adjuster in retainer plate will have a lock under one of the studs that should be removed at this time.

(3) Attach axle shaft remover Tool C-3971-A (Fig. 3) (adapter SP-5168 may be required) to axle shaft flange and remove axle shaft. Remove brake assembly and gaskets.

(4) Remove axle shaft oil seal from axle housing using Tool C-637 (Fig. 4).

(5) Wipe axle housing seal bore clean and install a new axle shaft oil seal using Tool C-839 (Fig. 5).

Disassembly

CAUTION: To prevent the possibility of damaging axle shaft seal surface, slide protective sleeve SP-5041 over the seal surface next to

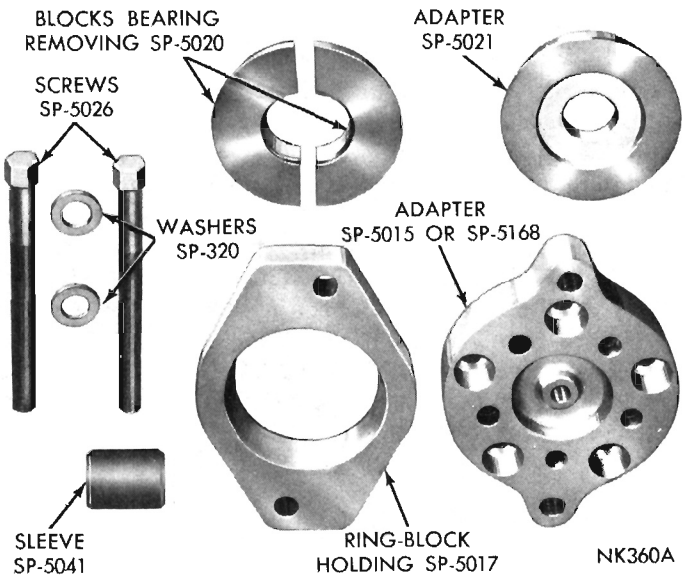


Fig. 3 Tool Set C-3971

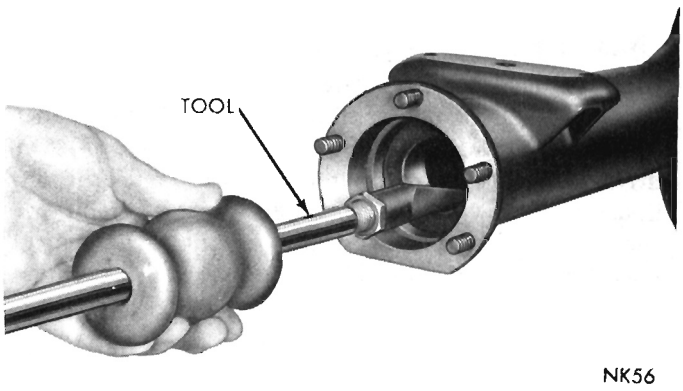


Fig. 4 Removing Axle Shaft Oil Seal

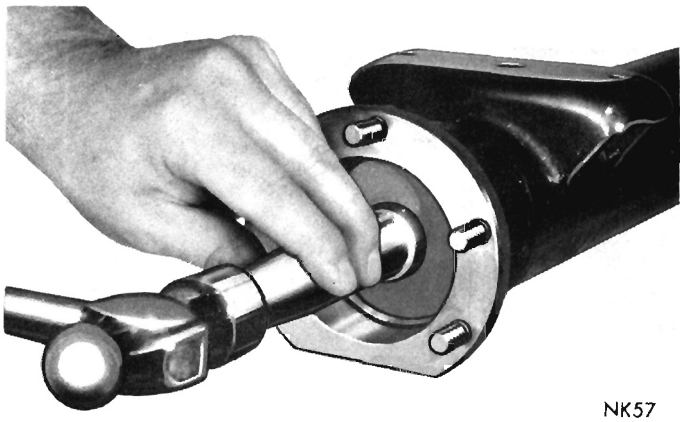


Fig. 5 Installing Axle Shaft Oil Seal

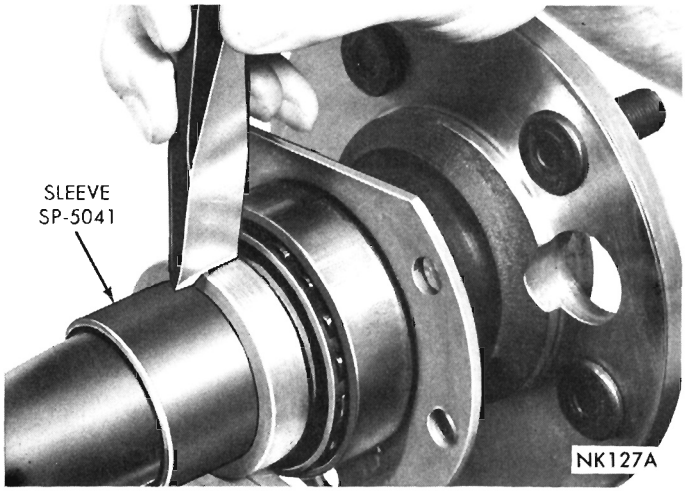


Fig. 6 Notching Bearing Retainer Collar

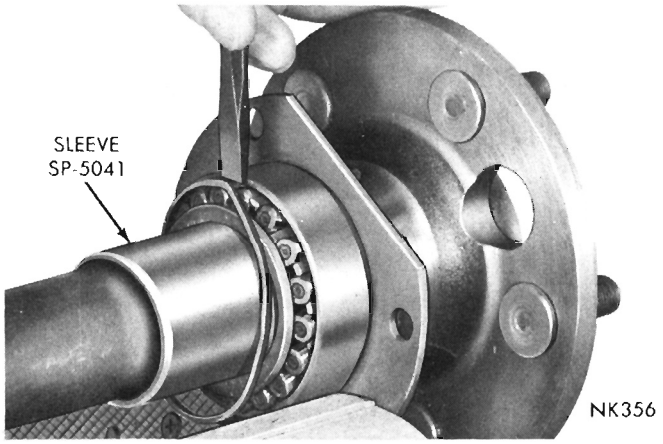


Fig. 7 Removing Roller Retainer

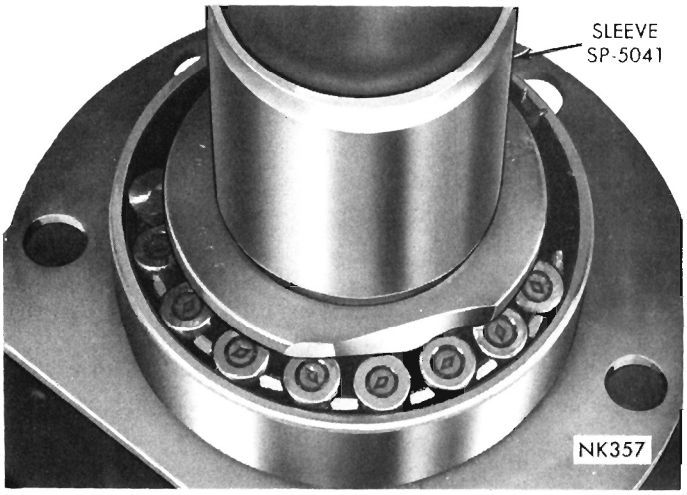


Fig. 8 Flange Ground Off Inner Cone

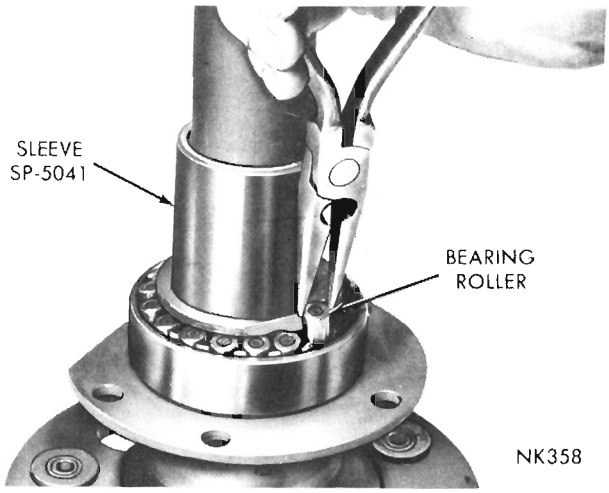


Fig. 9 Removing Bearing Rollers

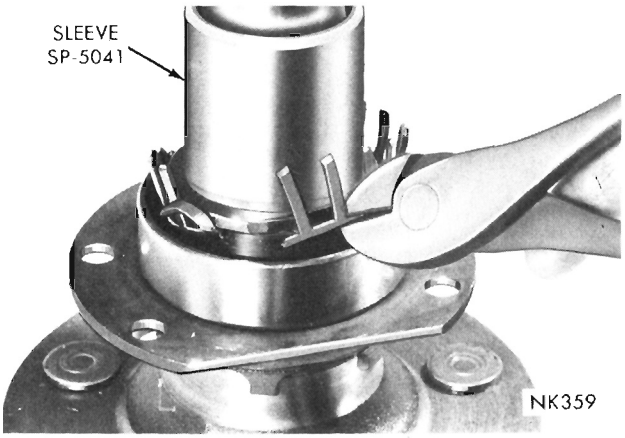


Fig. 10 Cutting Out Roller Bearing Retainer

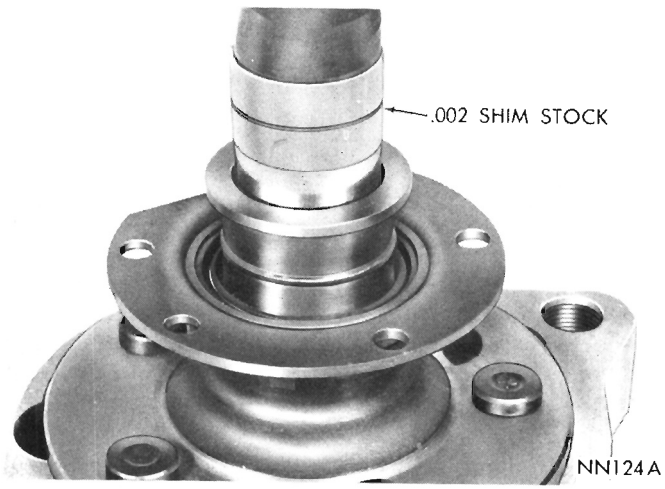


Fig. 11 Seal Journal Protection

bearing collar.

CAUTION: Under no circumstances should axle shaft collars or bearings be removed using a torch. The use of a torch in the removal of the axle shaft collars or bearings is an unsafe practice, because heat is fed into the axle shaft bearing journal and thereby weakens this area.

(1) Position axle shaft bearing retaining collar on a heavy vise or anvil and using a chisel, cut deep grooves into retaining collar at 90 degrees intervals (Fig. 6). This will enlarge bore of collar and

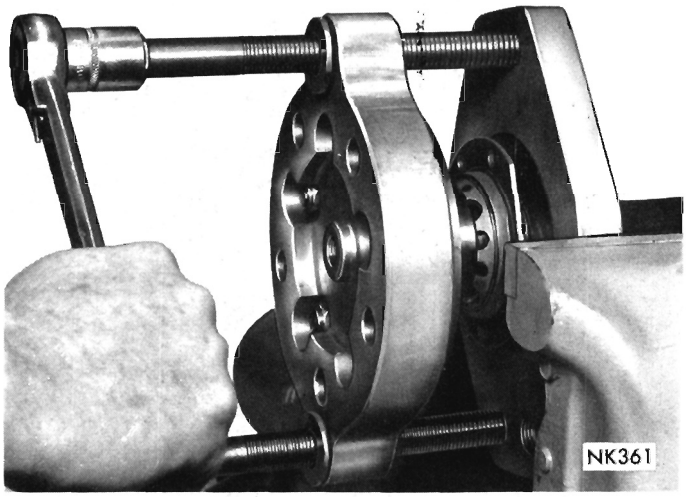


Fig. 12 Removing Bearing Cone with Tool C-3971

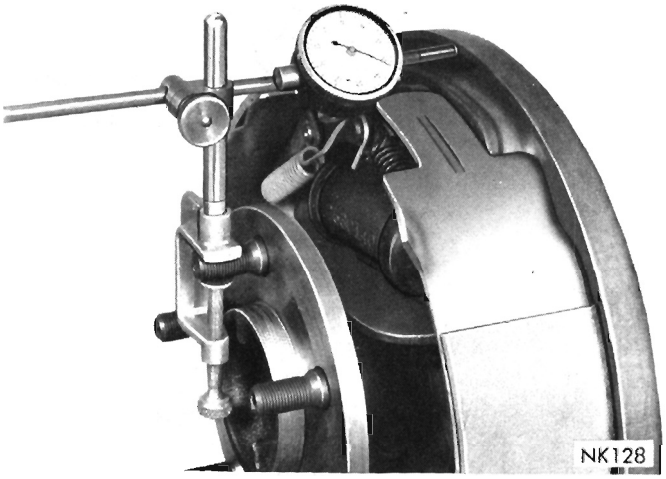


Fig. 14 Measuring Axle Shaft End Play

permit it to be driven off of axle shaft.

(2) Remove bearing roller retainer flange by cutting off lower edge with a chisel (Fig. 7)

(3) Grind a section off flange of inner bearing cone (Fig. 8) and remove bearing rollers (Fig. 9).

(4) Pull bearing roller retainer down as far as possible and cut with a pair of side cutters and remove (Fig. 10).

(5) Remove roller bearing cup and protective sleeve SP-5041 from axle shaft.

CAUTION: Sleeve SP-5041 should not be used as a protector for the seal journal when pressing off the bearing cone, as it was not designed for this purpose.

(6) To avoid scuffing seal journal when bearing cone is being removed, it should be protected by single wrap of .002 thickness shimstock held in place by a rubber band (Fig. 11).

(7) Remove the bearing cone using Tool C-3971-A (Fig. 3). Tighten bolts of tool alternately until cone is removed (Fig. 12).

(8) Remove seal in bearing retainer plate and replace with new seal.

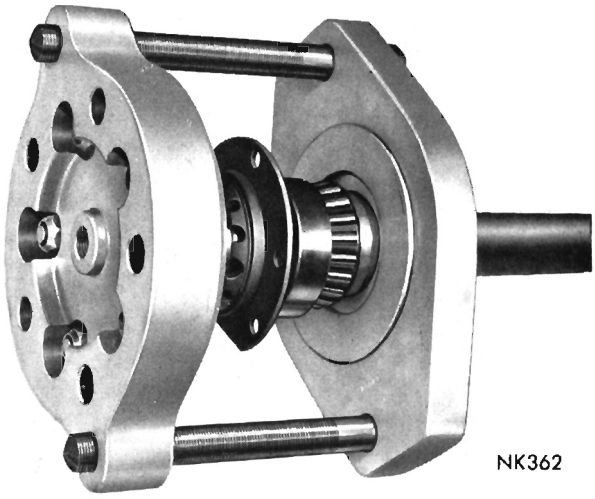


Fig. 13 Installing New Bearing and Collar.

Assembly

(1) Install retainer plate and seal assembly on axle shaft.

(2) Lubricate wheel bearings with Multi-Purpose Grease NLGI Grade 2 EP.

(3) Install a new axle shaft bearing cup, cone and collar on shaft using Tool C-3971-A (Fig. 13) and tighten bolts of tool alternately until bearing and collar are seated properly.

(4) Inspect axle shaft seal journal for scratches and polish with No. 600 crocus cloth if necessary.

Installation

(1) Clean axle housing flange face and brake support plate thoroughly. Install a new rubber coated steel gasket on axle housing studs, followed by brake support plate assembly on left side of axle housing.

(2) Apply a thin coating of Multi-Purpose Grease, NLGI Grade 2 E.P. or equivalent to the outside diameter of the bearing cup prior to installing in the bearing bore. This operation is necessary as a corrosion preventative.

(3) Install foam gasket on the studs of axle housing and carefully slide axle shaft assembly through oil seal and engage splines in differential side gear.

(4) Tap end of axle shaft lightly with a non-metallic mallet to position axle shaft bearing in housing bearing bore. Position retainer plate over axle housing studs. Install retainer nuts and tighten 30-35 foot-pounds. Start by tightening bottom nut.

(5) Repeat step (1) for right side of axle housing.

(6) Back off threaded adjuster of right axle shaft assembly through oil seal and engage splines in differential side gears.

(7) Repeat step (4).

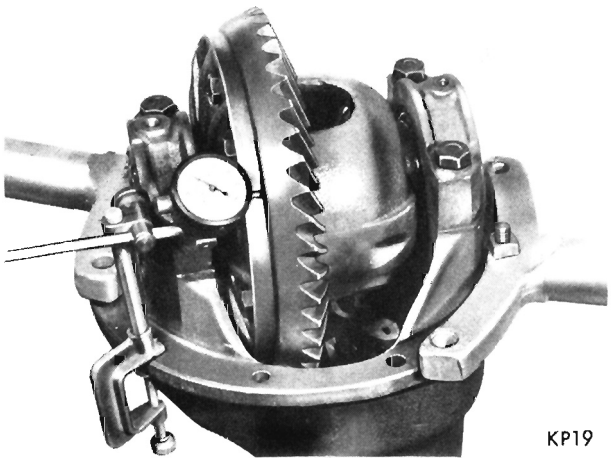


Fig. 15 Checking for Runout and Zero End Play

AXLE SHAFT END PLAY

CAUTION: When setting axle shaft end play, both rear wheels must be off the ground, otherwise a false end play setting will occur.

(1) Using a dial indicator mounted on the left brake support (Fig. 14), **TURN THE ADJUSTER CLOCKWISE UNTIL BOTH WHEEL BEARINGS ARE SEATED AND THERE IS ZERO END PLAY IN THE AXLE SHAFTS. BACK OFF THE ADJUSTER COUNTERCLOCKWISE APPROXIMATELY FOUR NOTCHES TO ESTABLISH AN AXLE SHAFT END PLAY OF .008-.018 INCH.**

(2) Tap end of left axle shaft lightly with a non-metallic mallet to seat right wheel bearing cup against adjuster, and rotate axle shaft several revolutions so that a true end play reading is indicated.

(3) Remove one retainer plate nut, install adjuster lock. If tab on lock does not mate with notch in adjuster, turn adjuster slightly until it does. Install nut and tighten 30-35 foot-pounds.

(4) Recheck axle shaft end play. If it is not within the tolerance of .008-.018 inch, then repeat adjustment procedure.

(5) Remove dial indicator and install brake drum, retaining clips and wheel.

REAR AXLE HOUSING

Removal

(1) Raise vehicle and support body at front of rear springs.

(2) Block brake pedal in the up position using a wooden block.

(3) Remove rear wheels.

(4) Disconnect hydraulic brake hose at connection on left side of underbody.

(5) Disconnect parking brake cable.

To maintain proper drive line balance when reassembling, make scribe marks on the propeller shaft universal joint and the pinion flange before removal.

(6) Disconnect propeller shaft at differential yoke and secure in an upright position to prevent damage to front universal joint.

(7) Remove shock absorber from spring plate studs and loosen rear spring "U" bolt nuts and remove "U" bolts.

(8) Remove the assembly from vehicle.

Installation

(1) With body of vehicle supported at front of rear springs, position the rear axle assembly spring seats over the spring center bolts.

(2) Install spring "U" bolts and tighten nuts to 45 foot-pounds and install shock absorbers on spring plate studs. **(DO NOT OVER TIGHTEN "U" BOLT NUTS.)**

(3) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(4) Connect parking brake cable.

(5) Connect hydraulic brake hose, bleed and adjust brakes.

(6) Install rear wheels.

(7) If carrier was removed from axle housing during the removal operation, fill axle with proper amount and type of lubricant; see "Specifications" in Lubrication section Group "O"

Welding Rear Axle Housing

The axle housing should be completely disassembled if it is to be welded with arc welding equipment. It is also possible to weld the assembled housing with gas welding equipment, if precaution is taken to protect gaskets and heat treated parts.

DIFFERENTIAL AND CARRIER

Removal

(1) Remove flanged axle drive shafts.

(2) Disconnect rear universal joint and support propeller up and out of the way to prevent damage to the front universal joint.

(3) Remove the rear axle lubricant.

(4) Loosen and remove the carrier-to-housing attaching nuts and lift the carrier assembly from axle housing.

Disassembly

Side play and runout check taken during disassembly will be very useful in reassembly.

(1) Mount carrier in Stand DD-1014 and attach dial indicator Tool C-3339 to differential carrier flange in a position so pointer of indicator squarely contacts back face of ring gear (Fig. 15). With

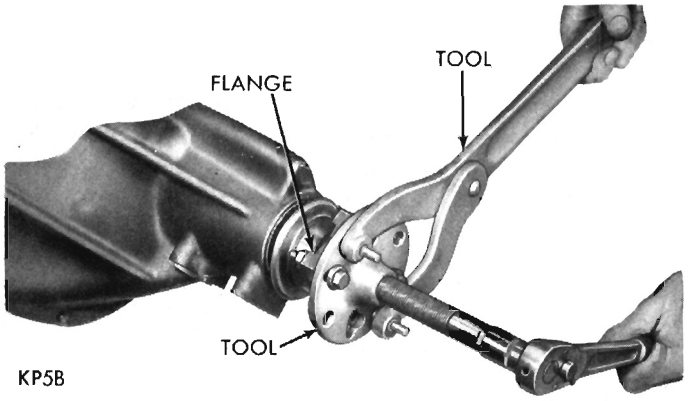


Fig. 16 Removing Companion Flange

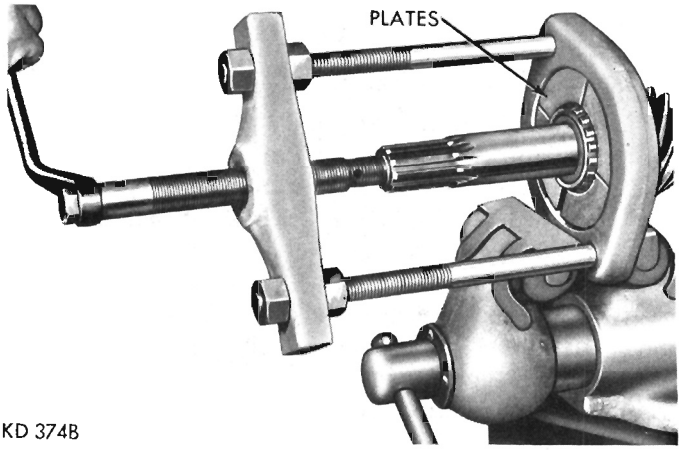


Fig. 18 Removing Drive Pinion Rear Bearing

a screw driver positioned between bearing cap and differential case flange, then using a prying motion determine if side play is present. If side play is evident, remove adjuster lock and loosen adjuster slightly and retighten adjuster sufficiently to eliminate side play.

(2) Rotate drive gear several complete revolutions while noting total indicator reading. Mark drive gear and differential case at point of maximum runout. The marking of differential case will be very useful later in checking differential case runout. Total indicator reading should be no more than .005 inch. If runout exceeds .005 inch the differential case may be damaged, and a second reading will be required after drive gear has been removed. This operation is covered during "Differential Disassembly". Remove dial indicator.

(3) With Tool C-3281 hold companion flange and remove drive pinion nut and Belleville washer.

(4) Install companion flange remover Tool C-452 and remove flange (Fig. 16).

(5) Using a screwdriver and hammer, remove the drive pinion oil seal from the carrier.

(6) While holding one hand over nose end of carrier, invert carrier in stand. The front pinion bearing cone, shim pack and bearing spacer

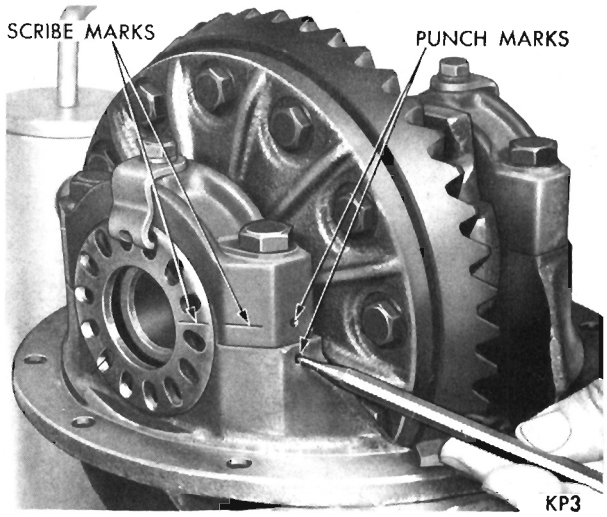


Fig. 17 Marking Bearing Caps and Adjusters

(where used) will drop from carrier.

(7) Apply identifying punch marks on differential bearing pedestals of carrier, differential bearing caps and bearing adjusters for reassembly purposes (Fig. 17).

(8) Remove both differential bearing adjuster lock screws and locks.

(9) With a 3/4 inch socket, loosen bearing cap bolts (one on each side) and back off bearing adjusters slightly using spanner wrench Tool C-406A; to remove differential bearing preload. Remove bearing cap bolts, caps and bearing adjusters.

(10) Remove differential and ring gear assembly with bearing cups. Differential bearing cups must be kept with respective bearing cones.

(11) Remove drive pinion and rear bearing assembly from carrier.

Rear Pinion Bearing Removal

(1) Remove drive pinion rear bearing from small stem pinion with Tool C-293 and four (4) No. 36 plates, or four (4) No. 37 plates on large stem step pinion or large stem pinion using a collapsible spacer (Fig. 18).

(2) Using a flat end brass drift, remove front and rear pinion bearing cups.

DIFFERENTIAL CASE

Disassembly

(1) Mount differential case and ring gear assembly in a vise equipped with soft jaws (brass).

(2) Remove drive gear bolts. **BOLTS ARE LEFT HAND THREAD.** With a non-metallic hammer, tap drive gear loose from differential case pilot and remove.

(3) If drive gear runout exceeded .005 inch in step 2 (under "Carrier Disassembly"), recheck the

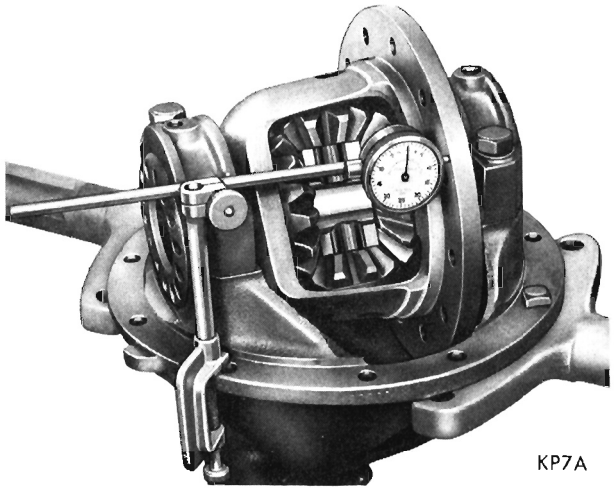


Fig. 19 Checking Drive Gear Mounting Flange Runout

case as follows: Install differential case and respective bearing cups in carrier.

(4) Install bearing caps, cap bolts and bearing adjusters. Tighten bearing cap bolts down lightly and screw in both adjusters with spanner wrench Tool C-406A.

(5) Tighten cap bolts and adjusters sufficiently to prevent any side play in bearings.

(6) Attach a dial indicator Tool C-3339 to carrier flange so pointer of indicator squarely contacts drive gear surface of differential case flange between outer edge flange and drive gear bolt holes (Fig. 19).

(7) Rotate differential case several complete revolutions while noting total indicator reading. This reading must not exceed .003 inch runout. If runout is in excess of .003 inch, differential case must be replaced. **In a case where the runout does not exceed .003 inch it is often possible to reduce the runout by positioning the drive gear 180 degrees from point of maximum runout when reassembling drive gear on differential case.**

(8) With a flat nose drift and hammer, remove differential pinion shaft lock pin from back side of drive gear flange. (The hole is reamed only part way through, making it necessary to remove lock pin from one direction.)

(9) With a brass drift and hammer, remove differential pinion shaft and axle drive shaft thrust block.

(10) Rotate differential side gears until each differential pinion appears at large opening of case. Remove each pinion and thrust washer at that time.

(11) Remove both differential side gears and thrust washers.

Cleaning and Inspection (Figs. 20 and 21)

(1) Clean all parts in a fast evaporating mineral spirits or a dry cleaning solvent and with the exception of bearings, dry with compressed air.

(2) Inspect differential bearing cones, cups and rollers for pitting, spalling or other visible damage. If replacement is necessary, remove bearing cones from differential case with Tool C-293 and adapter plates No. 43 (Fig. 22).

(3) Inspect differential case for elongated or enlarged pinion shaft hole. The machined thrust washer surface areas and counterbores must be smooth and without metal deposits or surface imperfections. If any of the above conditions exist, satisfactory correction must be made or the case replaced. Inspect case for cracks or other visible damage which might render it unfit for further service.

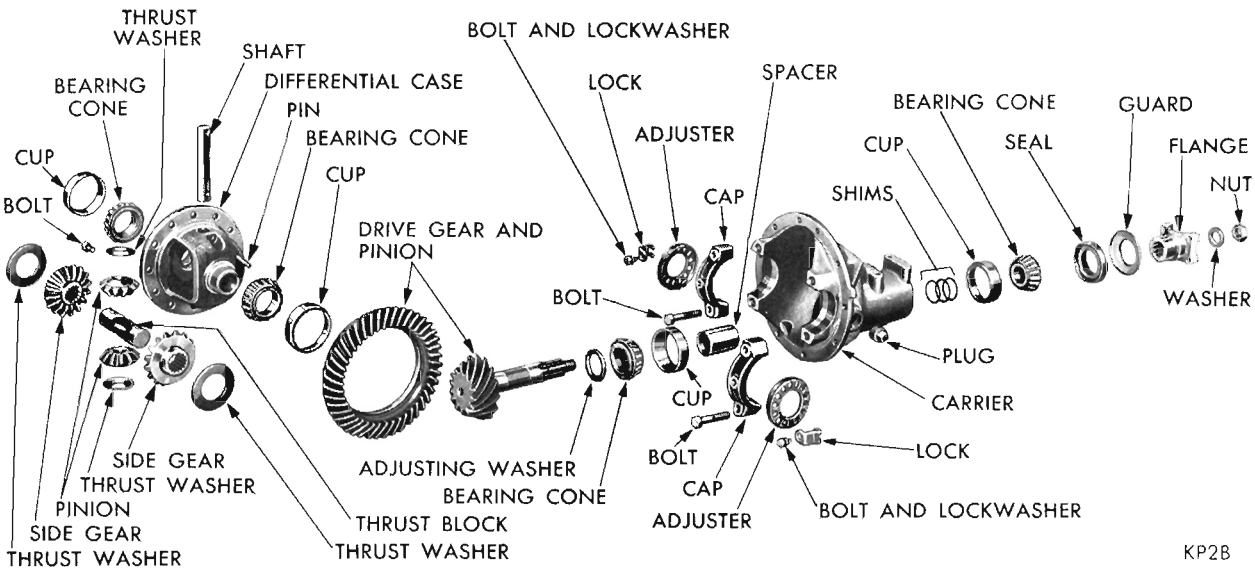


Fig. 20 Differential Carrier Assembly (Small Stem Step Pinion)

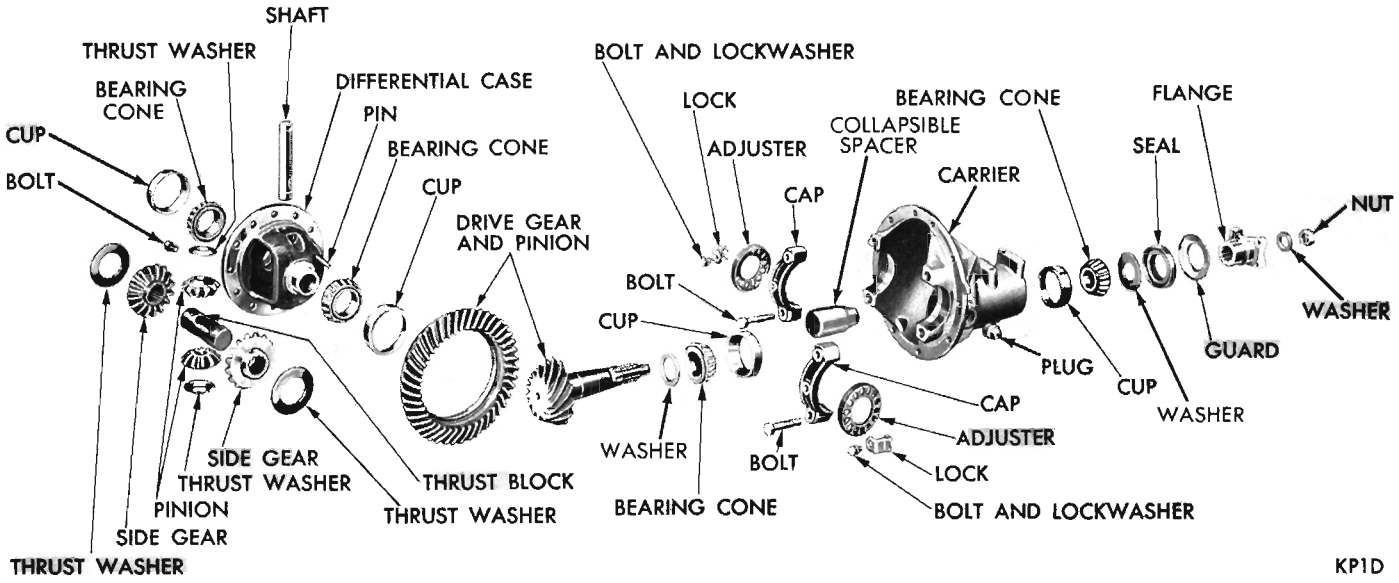


Fig. 21 Differential Carrier Assembly (Large Stem Tapered Pinion)

(4) Inspect differential pinion shaft for excessive wear in contact area of differential pinions. Shaft should be smooth and round with no scoring or metal pickup.

(5) Inspect differential side gears and pinions, they should have smooth teeth with a uniform contact pattern without excessive wear or broken surfaces. The differential side gear and pinion thrust washers should be smooth and free from any scoring or metal pickup.

(6) Inspect axle shaft thrust block for excessive wear or visible damage. The wear surface on the opposite ends of the blocks, must be smooth.

(7) Inspect differential pinion shaft lock pin for damage or looseness in case. Replace pin or case as necessary.

(8) Inspect drive gear and pinion for worn or chipped teeth or damaged attaching bolt threads. If replacement is necessary, replace both the drive gear and drive pinion as they are available in matched sets only.

(9) Inspect drive pinion bearing cones, cups and rollers for pitting, spalling, excessive wear, or other visible damage. If inspection reveals that either are unfit for further service, replace both cup and cone.

(10) Inspect differential carrier for cracks or other visible damage which would render it unfit for further service. Raised metal on the shoulder of bearing cup bores incurred in removing pinion cups should be flattened by use of a flat nose punch.

(11) Inspect drive pinion for damaged bearing journals and mounting shim surface or excessively

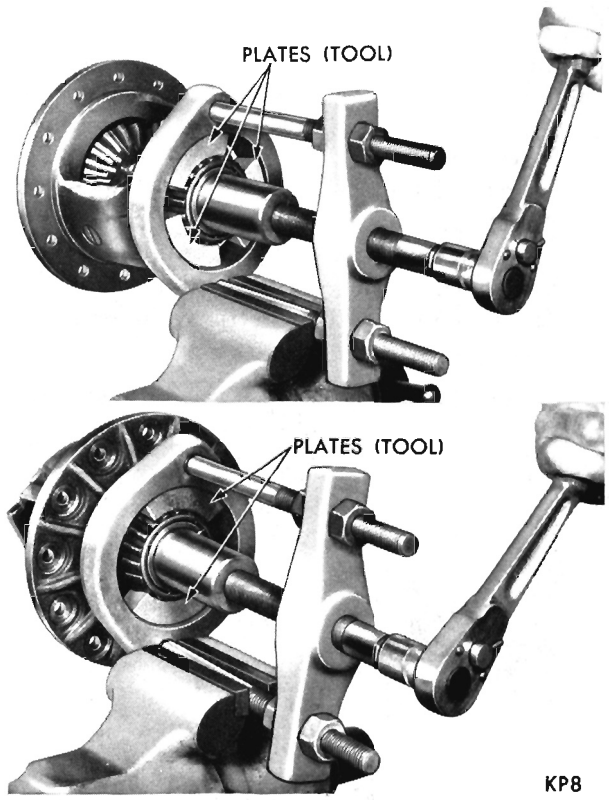


Fig. 22 Removing Differential Bearings

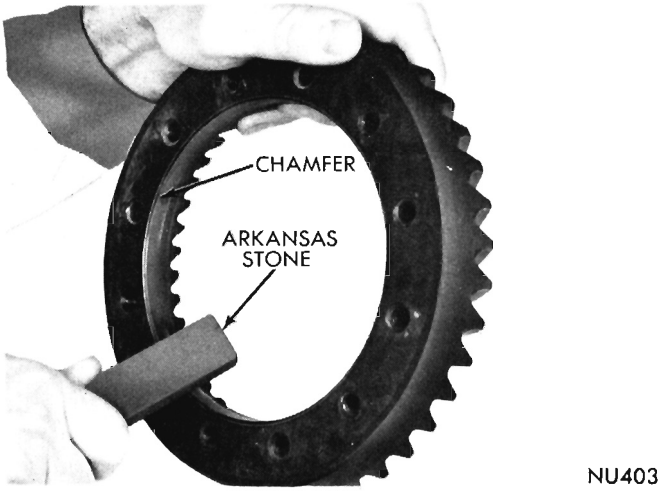


Fig. 23 Stoning Chamfer of Ring Gear

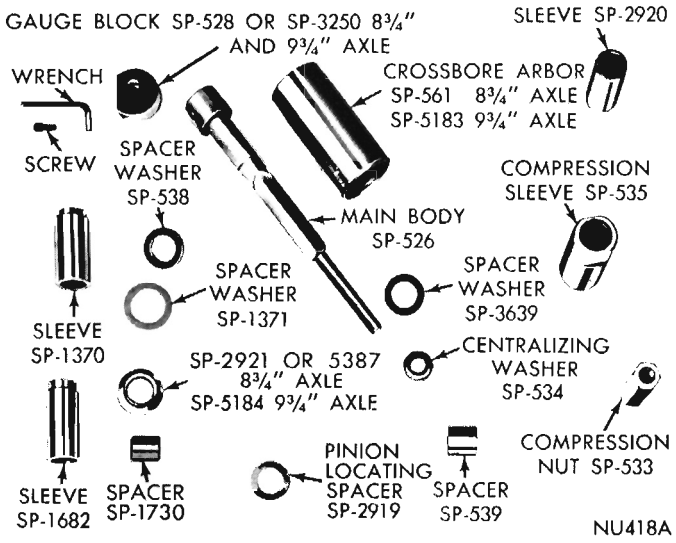


Fig. 24 Rear Axle Setting Gauge Tool C-758-D4

worn splines. If replacement is necessary, replace both the drive pinion and drive gear as they are available in matched sets only.

(12) Inspect companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace companion flange as necessary.

(13) Inspect drive pinion bearing shim pack for broken, damaged or distorted shims.

Replace if necessary during establishment of pinion bearing preload. Use new collapsible spacer on tapered stem pinion.

ASSEMBLY

LUBRICATE ALL PARTS BEFORE ASSEMBLY WITH LUBRICANT AS SPECIFIED IN (LUBRICATION GROUP "O")

(1) Install thrust washers on differential side gears and position gears in case.

(2) Place thrust washers on both differential pinions and through large window of differential case, mesh the pinion gears with the side gears, having pinions exactly 180 degrees opposite each other.

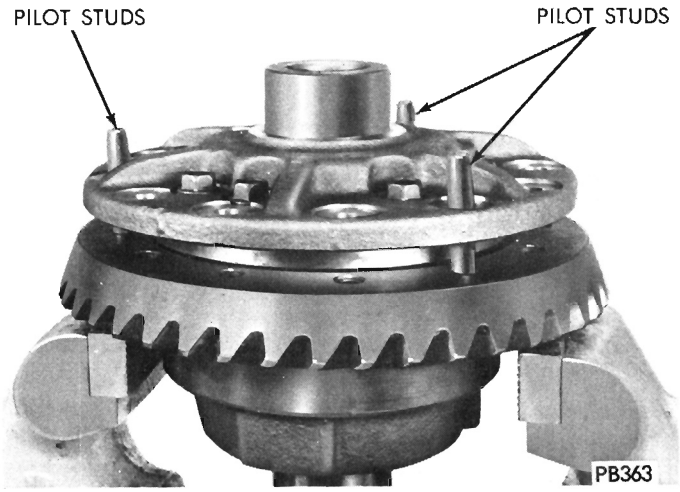


Fig. 23A Using Pilot Studs To Locate Case To Heated Ring Gear

(3) Rotate side gears 90 degrees to align pinions and thrust washers with differential pinion shaft holes in case.

(4) From pinion shaft lock pin hole side of case, insert slotted end of pinion shaft through case, and the conical thrust washer, and just through one of the pinion gears.

(5) Install thrust block through side gear hub, so that slot is centered between the side gears.

(6) While keeping all of these parts in proper alignment, push pinion shaft into case until locking pin hole in pinion shaft is in exact alignment with its respective hole in case. Install pinion shaft lock pin through hole in case from pinion shaft side of drive gear flange. **The contacting surfaces of the drive gear and differential case flange must be clean and free of all burrs.**

(7) Using an Arkansas stone, relieve the sharp edge of the chamfer on the inside diameter of the ring gear (Fig. 23). **This is very important otherwise during the installation of ring gear on differential case, the sharp edge will remove metal from the pilot diameter of case and can get imbedded between differential case flange and gear; causing gear not to seat properly.**

(8) Heat the ring gear with a heat lamp or by immersing the gear in a hot fluid (water or oil). The temperature should not exceed 300 degrees Fahrenheit. **DO NOT USE A TORCH.** It is advantageous to use pilot studs equally spaced in three positions to align the gear to the case (Fig. 23A).

(9) Insert drive gear screws **(LEFT HAND THREADS)** through case flange and into drive gear.

(10) Position unit between brass jaws of a vise and alternately tighten each cap screw to 55

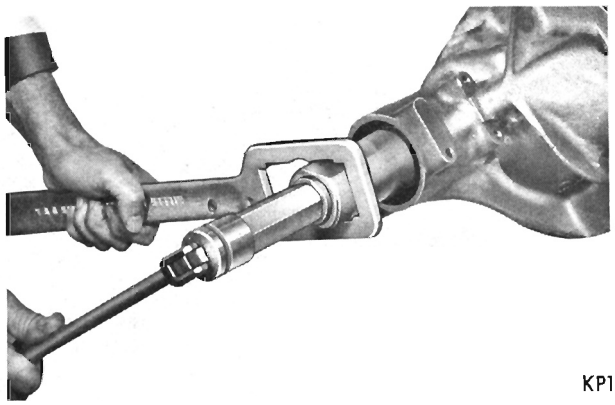


Fig. 25 Seating Bearing Cups in Carrier Housing

foot-pounds.

(11) Position each differential bearing cone on hub of differential case (taper away from drive gear) and with installing Tool C-4086 install bearing cones. An arbor press may be used in conjunction with installing tool.

CAUTION: Never exert pressure against the bearing cage, since this would damage the bearing.

PINION BEARING CUP INSTALLATION

(1) Position pinion bearing cups squarely in bores of carrier. Assemble Tool C-758-D4 (Fig. 24) by placing spacer SP-2919 followed by rear pinion bearing cone over main screw of tool and inserting it into carrier from gear side.

(2) Place front pinion bearing cone over main screw of tool followed by compression sleeve SP-535, centralizing washer SP-534, and main screw nut SP-533. Hold compression sleeve with the companion flange holding Tool C-3281 and tighten nut (Fig. 25) allowing tool to rotate as nut is being tightened in order not to brinnel bearing cone or cups. **Do not remove tool after installing cups.**

PINION BEARING PRELOAD AND DEPTH OF MESH SETTING USING TOOL C-758-D4

The 8-3/4 in. axle incorporates two types of pinions. The method of determining pinion depth of mesh and bearing preload are the same for the small and large stem pinions; however, the sequence of making the two adjustments change. Small stem pinions require the bearing preload adjustment first while large stem pinions require the depth of mesh adjustment first.

The position of the drive pinion with respect to the drive gear (depth of mesh) is determined by the location of the bearing cup shoulders in the carrier and by the portion of the pinion in back of the rear bearing. The thickness of the rear pinion bearing mounting shim suitable for the carrier can be determined by using Tool C-758-D4.

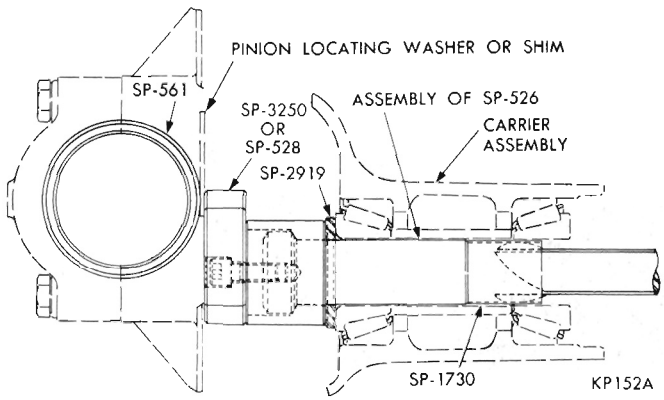


Fig. 26 Pinion Preload with Spacer (8-3/4 in. Ring Gear)

PINION BEARING PRELOAD WITH BEARING SPACER

(Small Stem Step Pinion)

Bearing Preload

(1) With tool installed in carrier, remove main screw nut, centralizing washer, compression sleeve and front pinion bearing cone.

(2) Install the pinion bearing spacer, larger bore of spacer next to rear bearing.

(3) Position sleeve (SP-1730) in front bearing cone making sure sleeve is flush with rear of bearing.

(4) Position original shims, previously removed from drive pinion stem, over the sleeve and slide the sleeve, bearing and shims over main screw of tool until shims rest against spacer (Fig. 26).

(5) Install tool compression sleeve (SP-535) (square end out), centralizing washer (SP-534) and main screw nut (SP-533). Turn carrier in stand to bring nut on top.

(6) Tighten tool nut to 240 foot-pounds with a torque wrench, using holding Tool C-3281 on the compression sleeve to hold the assembly in several positions to make a complete revolution while tightening. Remove holding tool and rotate the pinion several revolutions in both directions to seat the bearing rollers. Recheck torque to 240 foot-pounds (torque may have diminished as bearing rollers were seated by rotating). **Correct bearing preload reading can only be obtained with nose of carrier up.**

(7) Using inch-pound torque wrench C-685, measure pinion bearing preload by rotating pinion with handle of wrench floating, read the torque while wrench is moving through several complete revolutions. Correct preload setting is 20-30 inch-pounds for a new bearing and 0-15 inch-pounds

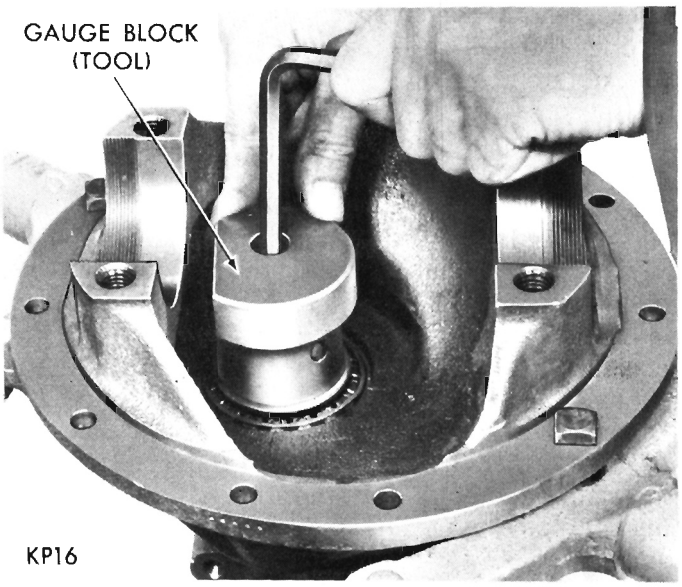


Fig. 27 Installing Gauge Block on Tool

for original bearing. Bearing preload should be uniform during complete revolution. A reading that varies considerably during rotation of pinion indicates a binding condition which requires correction. **Use a thinner shim pack to increase preload and a thicker shim pack to decrease preload.** Preload shims are available in two thousandths of an inch increments from .014-.026 inch.

After correct pinion bearing preload is set, **DO NOT REMOVE THE TOOL.**

Depth of Mesh

(1) Reverse carrier in stand and install gauge block SP-528 on end of tool and secure it to tool with Allen screw. The flat portion of gauge block should be facing differential bearing pedestals (Fig. 27). Tighten screw with Allen wrench.

(2) Position arbor SP-561 (part of Tool C-758-D4) in differential bearing pedestals of carrier (Fig. 28). Center the arbor so that an approximate equal distance is maintained at both ends. Position differential bearing caps and attaching bolts on carrier pedestals, and insert a piece of .002 inch shim stock between arbor and each cap. Tighten cap bolts to 10 foot-pounds.

(3) Select a rear pinion bearing mounting shim which will fit between cross arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge) (Fig. 29). This shim is then used in determining the correct thickness shim for installation.

(4) To select a shim for installation, read the marking on end of pinion head (—0, —1, —2, +1,+2 etc.). When marking is —(minus), add that amount to the thickness of shim selected in step (3). When the marking is+(plus), subtract that amount. Example: With a shim .086 inch thick and a pinion marked —2, install a shim .088 inch

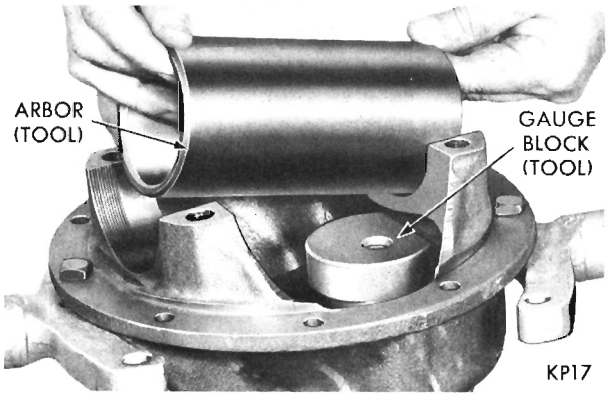


Fig. 28 Installing Arbor in Carrier

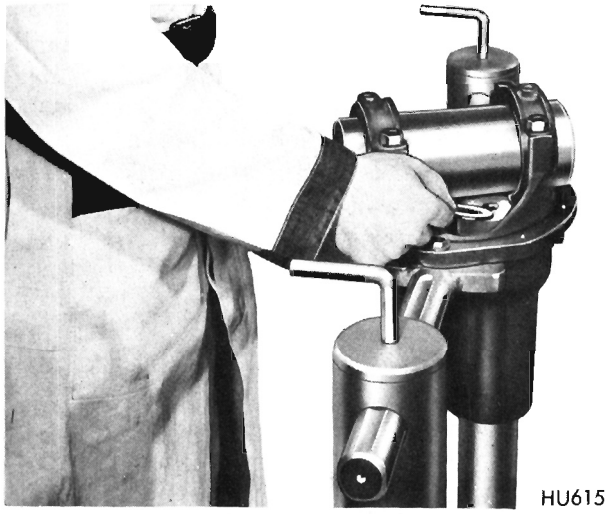


Fig. 29 Determining Spacer Thickness

thick. (.086 +.002 = .088). Example: With a shim .086 inch thick and a pinion marked +2, install a washer .084 inch thick, (.086 — .002 = .084) or when a shim .086 inch thick is too loose and .088 inch too tight, use .086 inch shim. Treat other pinion markings in a similar manner. Shims are available in two thousandths of an inch increments. Mounting shims differ in diameter, depending on which pinion they are used on.

(5) Remove tool arbor from carrier.

(6) Remove tool and bearings out of carrier.

(7) Remove shims, spacer, tool sleeve and rear bearing cone from tool main screw.

(8) With stem of pinion facing up, install correct shim on pinion stem. **Shims are chamfered on one side and must be installed on the pinion stem with chamfered side toward pinion head.**

(9) Position rear bearing cone on pinion stem (small side away from pinion head). Make certain that the contacting surfaces of correct shim, pinion head shim contact surface and rear bearing cone are perfectly clean and free of any foreign particles.

(10) Using installing Tool DD-996 press bearing on pinion stem. An arbor press may be used in conjunction with tool.

(11) Install bearing tubular spacer on pinion stem (large bore facing rear bearing cone).

(12) Install selected shim pack.

(13) Lubricate front and rear pinion bearing cones with lubricant as specified in (Lubrication Group "O").

(14) Position front pinion bearing cone in its cup in carrier.

(15) Apply a light coat of sealer in seal bore of carrier and install drive pinion oil seal into carrier using Tool C-4109 or C-3980 (double lip synthetic rubber oil seal) or Tool C-3656 (single lip leather oil seal). The proper tool must be used in order to position the seal the proper depth into the carrier casting.

(16) Insert drive pinion and bearing assembly up through carrier. While supporting pinion in carrier, install companion flange with installing Tool C-496 or DD-999 and holding Tool C-3281.

(17) Remove tools and install Belleville washer (convex side of washer up) and pinion nut.

(18) Hold companion flange with holding Tool C-3281 and tighten pinion nut to 240 foot-pounds. Rotate pinion several revolutions in both directions to seat bearing rollers. Recheck torque to 240 foot-pounds (torque may have diminished as bearing rollers were seated by rotating).

DEPTH OF MESH

(Large Stem Pinion With Collapsible Spacer)

Inspect differential bearing cups and cones, carrier for grit and dirt or other foreign material. Clean all parts in fast evaporating mineral spirits or a dry cleaning solvent and with the exception of bearing cones, dry with compressed air. **Front Pinion Bearing Cone and Cup Must Never Be Reused Under Any Circumstances discard collapsible spacer.**

(1) Assemble spacer SP-5387 to main section of tool followed by spacer SP-1730. Install rear pinion bearing cone over spacer SP-1730 and against spacer SP-5387.

(2) Insert assembly into carrier and install front pinion bearing cone over tool shaft and in its proper position in bearing cup. Install tool spacer, tool thrust washer and tool nut on shaft.

(3) With nose of carrier up, place flange holding Tool C-3281 on compression sleeve. Allow assembly to rotate while tightening nut to not more than 25-50 foot-pounds. **Always make sure bearing cones are lubricated with hypoid gear lubricant.**

(4) Turn tool several complete revolutions in both directions to permit bearing rollers to seat. After bearing rollers are properly seated, check bearing preload by rotating tool with an inch-pound torque wrench. The correct bearing preload should be from 20-30 inch-pounds for new bearings and 0-15 inch-pounds for the original bearings.

(5) With proper bearing preload set, invert carrier in stand and install gauge block SP-528 or SP-3250 to the main screw attaching it with Allen screw securely (Fig. 27). The flat portion of gauge block should be facing differential bearing pedestals.

(6) Position tool arbor SP-561 in differential bearing pedestals of carrier (Fig. 28). Center the arbor so that an approximate equal distance is maintained at both ends. Position differential bearing caps and attaching bolts on carrier pedestals, and insert a piece of .002 inch shim stock between arbor and each cap. Tighten cap bolts to 10 foot-pounds.

(7) Select a rear pinion bearing mounting shim which will fit between cross arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge. (Fig. 29). This shim is then used in determining the correct thickness shim for installation.

(8) To select a shim for installation, read the marking on end of pinion head (—0, —1, —2, +1,+2, etc.). When marking is —, (minus) add that amount to the thickness of shim selected in step (7). When the marking is + (plus), subtract that amount. Example: With a shim .036 inch thick and a pinion marked —2, install a shim .038 inch thick (.036 + .002 = .038). Example. With a shim .036 inch thick, (.036 — .002=.34) or when a shim .036 inch thick is too loose and .038 inch too thick, use .036 inch shim. Treat other pinion markings in a similar manner. Shims are available in one thousandths of an inch increments.

(9) Remove differential bearing caps and remove tool arbor from carrier.

(10) Reverse carrier in stand so nut of tool is in upright position. Loosen compression nut, and support lower portion of tool in carrier with one hand, remove tool nut, centering washer and compression sleeve. Lower tool down and out of carrier.

(11) Remove front pinion bearing cone from carrier housing.

(12) With stem of drive pinion facing up, add rear pinion bearing mounting shim you selected on pinion stem.

PINION BEARING PRELOAD

(Large Stem Pinion With Collapsible Spacer)

(1) Position rear pinion bearing cone on pinion

stem (small side away from pinion head). Make certain that the contacting surfaces of selected shim, rear bearing cone and pinion head are perfectly clean and free of any foreign particles.

(2) Lubricate front and rear pinion bearing cones with hypoid gear lubricant. Install rear pinion bearing cone onto pinion stem, using Tool C-3095, press bearing cone into place. An arbor press may be used in conjunction with tool.

(3) Insert drive pinion bearing and collapsible spacer assembly up through carrier and install the front pinion bearing cone on pinion stem. Install companion flange using Tool C-496 or DD-999 and holding Tool C-3281. This is necessary in order to properly install front pinion bearing cone on stem due to interference fit. Remove tool from pinion stem.

CAUTION: During the installation of the front pinion bearing be careful not to collapse the spacer.

(4) Apply a light coat of sealer in seal bore of carrier casting and install drive pinion oil seal into carrier using Tool C-4109 or C-3980 (double lip synthetic rubber oil seal) or Tool C-3656 (single lip leather oil seal). The proper tool must be used in order to position the seal the proper depth into the carrier casting.

(5) With pinion supported in carrier, install anti-clang washer on pinion stem. Install companion flange with installing Tool C-496 or DD-999 and holding Tool C-3281.

(6) Remove tools and install Belleville washer (convex side of washer up) and pinion nut.

(7) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to remove end play in pinion, while rotating the pinion to insure proper bearing seating.

(8) Remove holding tool and rotate pinion several complete revolutions in both directions to permit bearing rollers to seat.

(9) Tighten pinion nut to 170 foot-pounds and measure pinion bearing preload by rotating pinion using an inch-pound torque wrench. The correct preload specifications are 20-35 inch-pounds for new bearings or 10 inch-pounds over the original if the old rear pinion bearing is being reused. Correct bearing preload readings can only be obtained with nose of carrier in upright position. Continure tightening of pinion nut in small increments and checking pinion bearing preload until proper preload is obtained. Bearing preload should be uniform during complete revolution. A preload reading that varies during rotation indicates a binding condition which has to be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within the correct specifications.

CAUTION: UNDER NO CIRCUMSTANCES SHOULD THE PINION NUT BE BACKED OFF TO LESSEN PRELOAD. IF THIS IS DONE A NEW COLLAPSIBLE SPACER MUST BE INSTALLED AND NUT RETIGHTENED UNTIL PROPER PRELOAD IS OBTAINED.

PINION BEARING PRELOAD AND PINION SETTING

(Without Using Tool C-758-D4

If the differential assembly was satisfactorily quiet before being disassembled, the drive pinion may be assembled with the original components except the pinion front bearing and the collapsible spacer on the collapsible spacer type axle. If replacement parts are installed, a complete readjustment is necessary; the proper thickness shim must be selected and installed. The drive gear and pinion are manufactured and lapped in matching sets and are available in matched sets only. The adjustment position in which the best tooth contact is obtained is marked on the end of the pinion head.

To obtain the proper pinion setting in relation to the drive gear, the correct thickness mounting shim must be selected before the drive pinion is installed in the carrier. The pinion bearing mounting shims are available in two thousandths increments from .084 to .100 inch (small stem) or .020-.038, inch in increments of .001 inch (large stem pinion with collapsible spacer). To select the proper thickness shim, proceed as follows: It will be noted that the head of the drive pinion is marked with a plus (+) or minus(—) sign followed by a number ranging from 1 to 4, or zero (0) marking.

Depth of Mesh

If the old and new pinion have the same marking and if the original bearing is being reused, use a mounting shim of the same thickness. But if the old pinion is marked zero (0) and the new pinion is marked +2, try a .002 inch thinner shim. If the new pinion is marked —2, try a .002 inch thicker shim.

Pinion Bearing Preload -- Small Stem Step Pinion

If the bearings are being replaced, place the new bearing cup in position in the carrier and drive the cups in place with a suitable drift. After properly positioning the bearing cups in the carrier, assemble the drive pinion mounting shim (chamfered side down toward gear) on the drive pinion stem. Install the tubular spacer (if so equipped) and the preload shims on the pinion stems. Insert the pinion assembly into the carrier. Install the front pinion bearing cone, universal joint flange, Belleville washer (convex side of

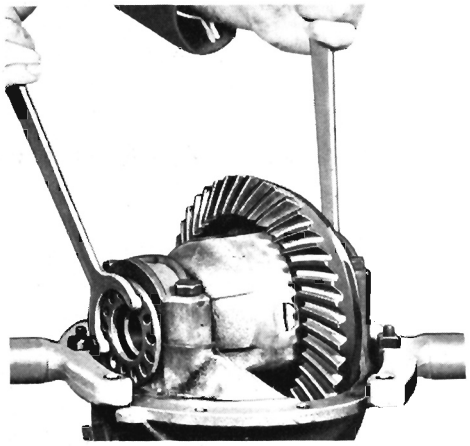


Fig. 30 Adjusting Differential Bearings

washer up) and nut. **DO NOT INSTALL THE OIL SEAL.** Rotate the drive pinion after tightening the flange nut to 240 foot-pounds, to properly seat the bearing rollers in the bearing cups. The preload torque required to rotate the pinion with the bearings oiled should be 20-30 inch-pounds for new bearings and 0-15 inch-pounds for used bearings. **Use a thinner shim pack to increase preload and a thicker shim pack to decrease preload.** After the correct pinion depth of mesh has been established and correct bearing preload obtained, remove the drive pinion flange. Apply a light coat of sealer to drive pinion oil seal and carrier casting bore and install drive pinion oil seal with Tool C-4109 or C-3980 (synthetic rubber seal) or Tool C-3656 (leather seal). Install the pinion flange, washer and nut and tighten nut to 240 foot-pounds.

Installation of Differential and Ring Gear in Carrier

(1) Holding differential and ring gear assembly with bearing cups on respective bearing cones, carefully install the assembly into carrier.

(2) Install differential bearing caps, on respective sides, making certain that identification marks on caps correspond with those on carrier. Install cap bolts and tighten bolts of each cap by hand.

(3) Install differential bearing adjusters, on respective sides, making certain that identification marks correspond. Screw adjuster in by hand. No attempt should be made to apply any excessive pressure at this time.

(4) Using spanner wrenches Tool C-406A to square bearing cups with bearing cone, turn adjusters "IN" until cups are properly square with bearings and end play is eliminated with some backlash existing between the drive gear and pinion (Fig. 30).

(5) Tighten one differential bearing cap bolt on each side to 85-90 foot-pounds.

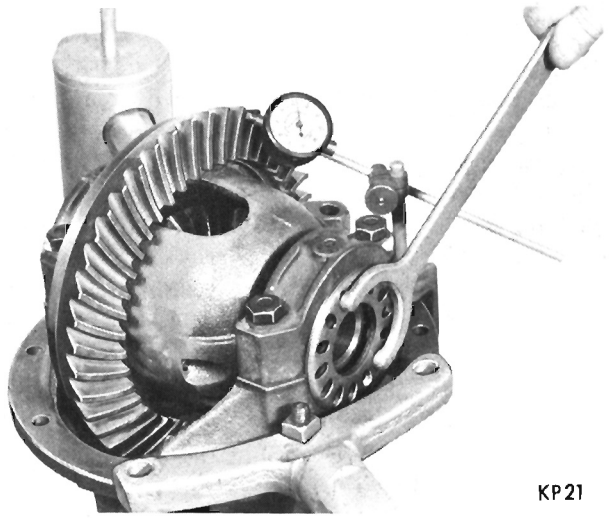


Fig. 31 Measuring Backlash Between Drive Gear and Pinion

DRIVE GEAR AND PINION BACKLASH

Correct drive gear and pinion backlash when properly set is .006 to .008 inch at point of minimum backlash. Rotate drive gear and ring gear several revolutions in both directions in order to seat the bearing rollers. This is necessary before setting backlash.

(1) Attach a dial indicator Tool C-3339 to carrier flange so pointer of indicator is squarely contacting one drive gear tooth (drive side) (Fig. 31).

(2) Measure backlash between drive gear and pinion at four positions, approximately 90 degrees apart. After point of least backlash has been determined, mark drive gear. **Do not rotate drive gear from point of least backlash until all adjustments have been completed.**

(3) Using Tool C-406A (spanner wrench) turn both bearing adjusters equally (in same direction) until backlash between drive gear and pinion is .0005 to .0015 inch. **This backlash variation is given to permit alignment and installation of the bearing adjuster lock, lockwasher and attaching screw. The adjuster (ring gear side) must only be turned in a clockwise direction and under no circumstances should be backed off.**

(4) Install adjuster lock on bearing cap, backface side of drive gear. Tighten lock screw to 15 to 20 foot-pounds.

Differential Bearing Preload

(1) Turn bearing adjuster (tooth side of drive gear) (Fig. 31) in a notch at a time (notch referred to is the adjuster lock holes) until backlash between drive gear and pinion is a minimum of .006 to .008 inch. This will preload differential bearings and establish correct backlash. Rotate

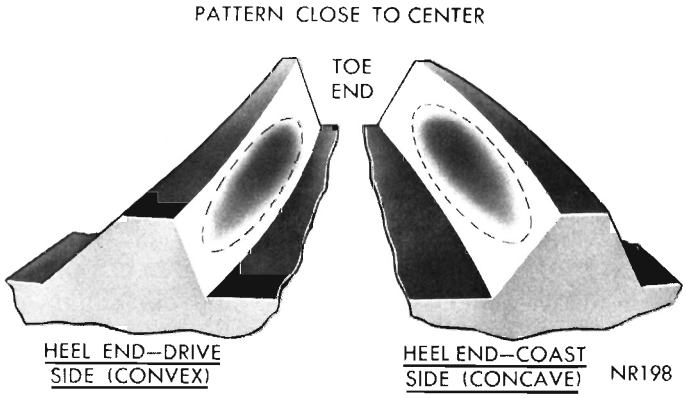


Fig. 32 Desired Tooth Contact Under Light Load

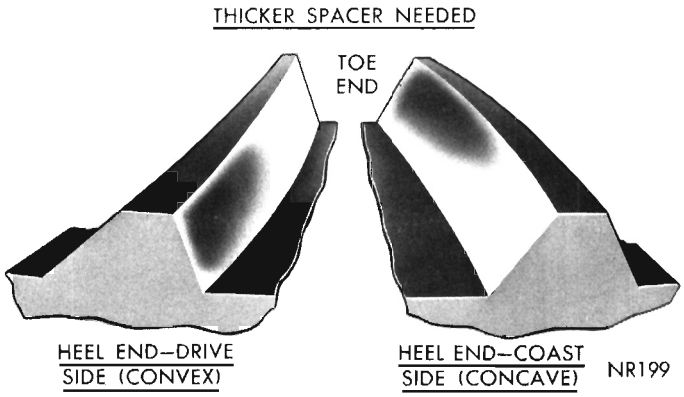


Fig. 33 Incorrect Tooth Contact Pattern (Increase Spacer Thickness)

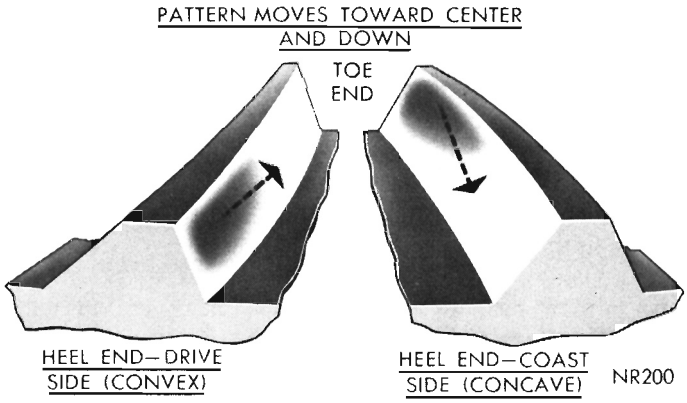


Fig. 34 Effect on Tooth Contact Pattern as Spacer Thickness is Increased

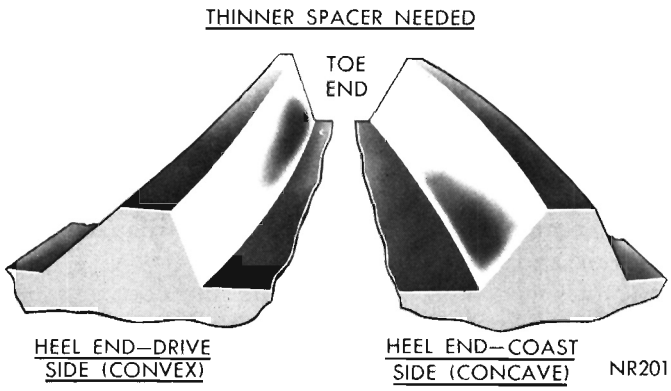


Fig. 35 Incorrect Tooth Contact Pattern (Decrease Spacer Thickness)

gear several times and recheck lash. Readjust with same adjuster as before, if necessary. **NOTE: Final adjustment on either adjuster must be in tightening direction.**

(2) Tighten the remaining two differential bearing cap bolts to 85-90 foot-pounds.

(3) Install remaining adjuster lock, lockwasher and attaching screw. Tighten to 15-20 foot-pounds.

GEAR TOOTH CONTACT PATTERN

The gear tooth contact pattern will disclose whether the correct rear pinion bearing mounting shim has been installed and the drive gear backlash set properly. Backlash between the drive gear and pinion must be maintained within the specified limits until correct tooth contact pattern is obtained.

(1) Apply a thin film of red or white lead on both the drive and coast side of the drive gear teeth. Rotate drive gear one complete revolution in both directions while load is being applied with a round bar or screwdriver between the carrier casting and differential case flange. This action will leave a distinct contact pattern on both the drive and coast side of the drive gear teeth.

(2) Observe the contact pattern on the drive gear teeth and compare with those in figures 32, 33 and 35 to determine if pattern is properly located. With pinion depth of mesh and gear backlash set properly, your contact pattern should resemble that in (Fig. 32). Notice that the correct contact pattern is well centered on both drive and coast sides of the teeth. When tooth contact patterns are obtained by hand, they are apt to be rather small. Under the actual operating load, however, the contact area increases.

(3) If after observing the contact pattern you find it resembles that in (Fig. 33), the drive pinion is too far away from centerline of the ring gear, the contact pattern will appear high on the heel on drive side and high on toe on coast side. To correct this type tooth contact pattern, increase the thickness of the rear pinion bearing mounting spacer (Fig. 34), which will cause the high heel contact on drive side to lower and move toward the toe; the high toe contact on coast side will lower and move toward the heel.

(4) If after observing the contact pattern you find it resembles that in (Fig. 35), the drive pinion is too close to the ring gear, the pattern will appear low on the toe on drive side and low heel contact on coast side. To correct this type tooth contact pattern, decrease the thickness of the rear

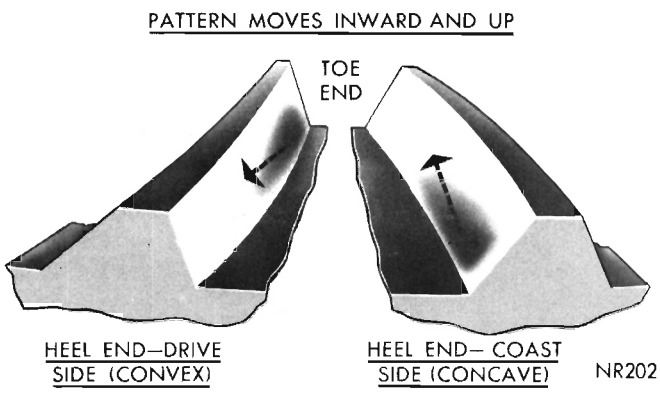


Fig. 36 Effect on Tooth Contact Pattern as Spacer Thickness is Decreased

pinion bearing mounting spacer (Fig. 36), which will cause the low toe contact on drive side to raise and move toward the heel; low heel contact on coast side will raise and move toward the toe.

DIFFERENTIAL AND CARRIER

Installation

(1)Thoroughly clean the gasket surfaces of the carrier and rear axle housing.

(2) Using a new gasket, install the carrier assembly into the axle housing. Tighten the carrier to axle housing nuts to 45 foot-pounds.

(3) Refer to "Installation of Rear Axle Shaft," when installing and setting axle shaft end play.

(4) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(5) Remove wooden block from under brake pedal and bleed and adjust brakes.

(6) Install rear wheels and tighten to 65 foot-pounds.

LUBRICATION

Every six months check the fluid level in the axle through the filler plug hole. When checking the level, be sure the vehicle is in a level position on an axle or drive on type hoist. "See Lubrication Section" for proper level of specific axle assembly.

In Sure-Grip Differentials, use only the Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant than this special lubricant or equivalent.

Anticipated Temperature Range	Viscosity Grade
Above – 10° F.	SAE 90
As low as – 30° F.	SAE 80
Below – 30° F.	SAE 75

"SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE."

REMOVAL AND REPLACEMENT OF DRIVE PINION FLANGE AND OIL SEAL IN VEHICLE

On large stem carriers which use the collapsible spacer to obtain pinion bearing preload, the following procedure for the removal and replacement of the drive pinion flange and pinion oil seal must be followed to assure that the proper bearing preload is maintained in the axle assembly. If this procedure is not followed it could result in a premature failure of the axle.

(1) Raise vehicle on hoist and make scribe marks on propeller shaft, shaft universal joint, drive pinion flange and end of pinion stem.

(2) Disconnect propeller shaft at pinion flange and secure in an upright position to prevent damage to front universal joint.

(3) Remove the rear wheels and brake drums to prevent any drag or a possible false preload reading could occur.

(4) Using inch-pound torque wrench C-685 measure pinion bearing preload by rotating pinion with handle of wrench floating, read the torque while wrench is moving through several complete revolutions and record. **This operation is very important because preload must be carefully reset when reassembling.**

(5) With Tool C-3281 hold companion flange and remove drive pinion nut and Belleville washer.

(6) Install companion flange remover Tool C-452 and remove flange. Lower rear of vehicle to prevent lubricant leakage.

(7) Using a screwdriver and hammer, remove the pinion oil seal from the carrier and clean the oil seal seat.

(8) Check splines on pinion shaft stem to be sure they are free of burrs or are not worn badly. If burrs are evident remove them using crocus cloth by working in a rotational motion. Wipe the pinion shaft clean.

(9) Inspect companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace companion flange as necessary.

(10) Apply a light coat of sealer in seal bore of carrier and install drive pinion oil seal into carrier using Tool C-4109 or C-3980 (Double lip synthetic rubber oil seal) or Tool C-3656 (single lip leather oil seal). The proper tool must be used in order to properly position the seal the correct depth into the carrier casting.

(11) Position companion flange on pinion stem being careful to match scribe marks made previously before removal.

(12) Install companion flange with installing Tool C-496 or DD-999 and holding Tool C-3281.

(13) Remove tool and install Belleville washer (convex side of washer up) and pinion nut.

(14) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to 170 foot-pounds. Rotate pinion several complete revolutions to assure that bearing rollers are properly seated. Using an inch-pound torque wrench C-685 measure pinion bearing preload. Continue tightening pinion nut and checking preload until preload is at the original established setting you found in step 4. Under no circumstances should the preload be more than 5 inch-pounds over the established setting found at time of checking in step 4 of procedure.

Bearing preload should be uniform during a complete revolution. A preload reading that varies during rotation indicates a binding condition which has to be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within the correct specifications.

CAUTION: Never back off the pinion nut to lessen pinion bearing preload. If the desired preload is exceeded a new collapsible spacer must be installed and nut retightened until proper preload is obtained. In addition, the universal joint flange must never be hammered on, or power tools used.

(15) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(16) Install the rear brake drums and wheels and tighten nuts 65 foot-pounds.

(17) Raise the vehicle to a level position so axle assembly is at correct running position and check lubricant level.

REAR AXLE ASSEMBLY 9-3/4 IN. RING GEAR

INDEX

	Page
Axle Shaft and Bearings	47
Differential (Removal)	50
Differential Bearing Preload and Drive Gear and Pinion Backlash	56
Differential (Installation)	52
Differential Case	52
Differential Noise	47
Drive Pinion Depth Of Mesh Setting (Using Pinion Depth Gauge Tool DD 1244)	53
Drive Pinion Depth Of Mesh Setting (Using Tool C-758-D4)	55
Gear Tooth Contact Pattern	57
Lubrication	58
Pinion Bearing Preload	56
Rear Axle Assembly (Removal)	50
Rear Axle Assembly (Installation)	58

GENERAL INFORMATION

With the increased torque output of the 440 cubic inch engine with Power Pak or the 426 cubic inch Hemi engine in vehicles equipped with 4-speed manual transmission, the 9-3/4 in. rear axle assembly will appear on those models that are so equipped (Fig. 1).

The standard differential used in both instances will be a SURE-GRIP differential with a plate-type clutch. The new differential in this year's 9-3/4 rear axle assembly has a one-piece case and two pinions. It is not a locking differential. Torque from the ring gear is transmitted through clutch packs between the side gears and differential case. The multiple disc clutches with radial grooves on the plates and concentric grooves on the discs are engaged by a preload from Belleville springs, plus separating forces from the side gears, as torque is applied through the ring gear. In normal driving conditions the controlled internal friction is easily overcome during cornering so that the driving wheels can turn at different speeds. Extreme differences in traction conditions at the driving wheels may permit one wheel to spin.

The standard factory ratio gear set used with both the 440 and 426 engines will be 3.54. A factory option of 4.10 is also offered. Additional matched gear sets with ratios of 4.56 and 4.88 will be available as dealer installed options. For 4.56 and 4.88 ratios, a new differential assembly partial will have to be purchased and installed due to the difference in ring gear mounting dimensions.

The rear axle is of the integral carrier-housing, hypoid gear type in which the centerline of the drive pinion is mounted below the centerline of the ring gear.

The rear axle housing is an iron casting with tubular legs pressed into and welded to the carrier to form a carrier and tube assembly. A removable stamped steel cover is bolted to the rear of the carrier to permit visual inspection of the differential without removing the complete rear axle from the vehicle.

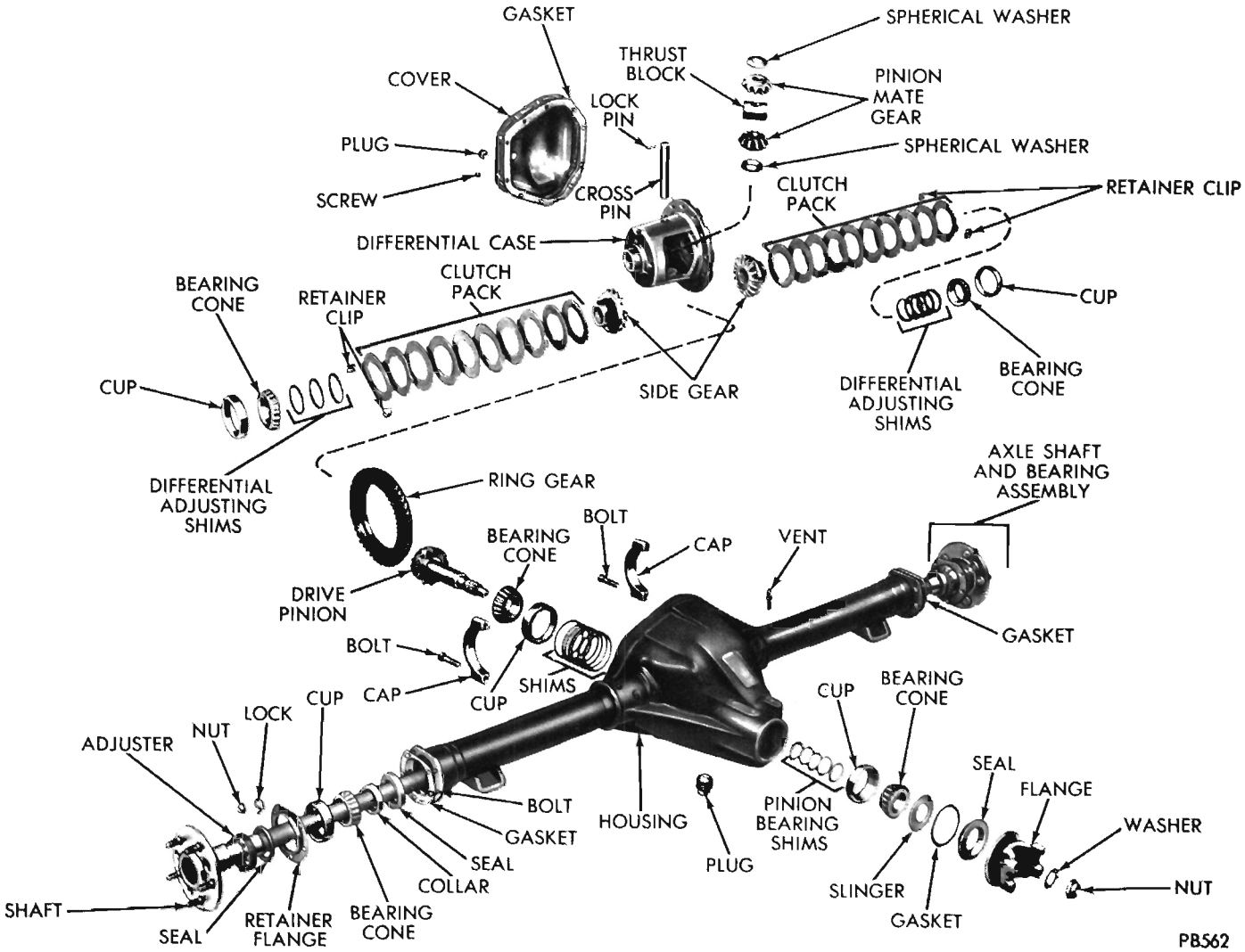


Fig. 1—9-3/4" Rear Axle Assembly

A small metal tag is attached beneath one of the cover screws to identify the axle ratio. This tag is stamped with the number of teeth on the drive pinion and ring gear, and by dividing the larger number (ring gear teeth) by the smaller number (drive pinion) the axle ratio can be determined.

The drive pinion is supported by two preloaded taper roller bearings. The rear pinion bearing cone is a tight press-fit on the pinion stem. The front pinion bearing is a light-press fit to a close sliding fit on the pinion stem. The front and rear bearing cups are a press-fit against a shoulder recessed in the carrier. The drive pinion depth of mesh adjustment is controlled by locating shims, which are installed between the rear pinion bearing cup and the carrier casting.

Drive pinion bearing preload is maintained by using different thicknesses of shim packs between the drive pinion bearing shoulder and front pinion bearing cone.

The differential case is supported by two taper roller bearing cones which are a press-fit on the differential case hubs. Shims installed between the bearing cone and shoulder of hub of differential case, perform three functions: They eliminate the differential case side play; they adjust and maintain the backlash between the ring gear and drive pinion; and establish a means of obtaining differential bearing preload.

The rear axle shafts are mounted on taper roller bearings which are located at the outer ends of the axle housing tubes. The bearings are pressed onto the shoulder of the shaft and held in place by a collar that has a very tight interference fit. The bearings are lubricated with Multi-Purpose Grease NLGI grade 2 E.P. or equivalent. Oil seals are pressed into the outer ends of the housing tubes to prevent oil leakage from the center section of the axle into the wheel bearings and onto the brake assembly. The outer retainer clamps the bearing and cup into the housing bore and also clamps the brake support plate to the studs of the housing tube. Axle shaft end play is adjusted by means of a threaded adjuster located in the right axle shaft bearing retainer. Axle shaft end play must be maintained at .008 in.-.012 in.

SERVICE PROCEDURES

CAUTION: When servicing cars equipped with 9-3/4 in. axles, DO NOT use the engine to rotate axle components unless both wheels are clear. These axles can exert significant driving force with one wheel.

DIFFERENTIAL NOISE

(CHATTER-MOAN)

It is suggested that before the axle assembly is disassembled for any type noise complaint, that the lubricant be changed. An improper lubricant can cause such noises as chatter and moan as well as scoring of the differential clutch plates and discs resulting in a possible failure of the unit.

(1) With lubricant of rear axle assembly at operating temperature raise car on hoist so rear wheels are free to turn.

(2) Loosen and remove drain plug and drain out as much of the old lubricant as possible.

(3) Fill to proper level with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(4) Start engine of vehicle and engage in gear and run on hoist with rear wheels free to turn at approximately 40 (MPH) for ten (10) minutes. This thoroughly circulates the lubricant and brings it to operating temperature.

(5) Stop vehicle and remove drain plug and drain as much of the old lubricant as possible.

(6) Refill axle to proper level with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(7) Lower car on hoist and return to customer to drive and evaluate for approximately 100 miles to determine if lubricant corrects the noise condition.

If after driving vehicle approximately 100 miles and the differential noise is still evident, remove the axle assembly and service the differential with the necessary parts.

AXLE SHAFTS AND BEARINGS

CAUTION: It is absolutely necessary that anytime an axle assembly is serviced, and the axle shafts are loosened and removed, the axle shaft gaskets and inner axle shaft oil seals must be replaced.

CAUTION: Under no circumstances should axle shaft collars or bearings be removed using a torch. The use of a torch in the removal of the axle shaft collars or bearings is an unsafe practice, because heat is fed into the axle shaft bearing journal and, thereby weakens this area.

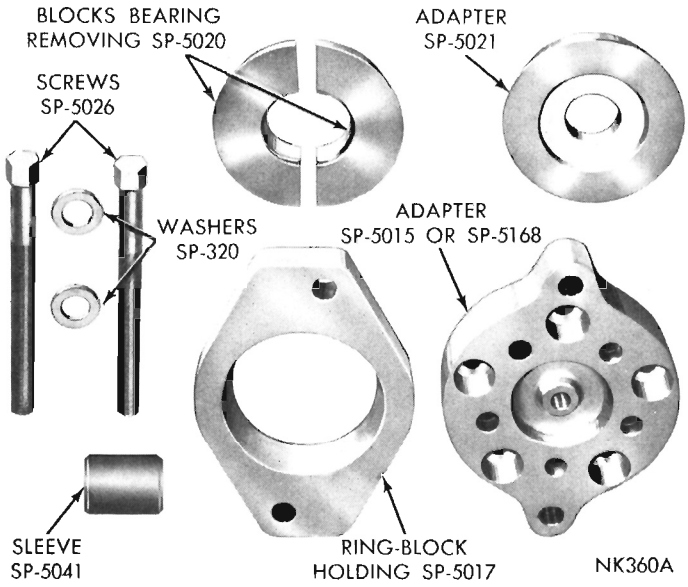


Fig. 2 Tool Set C-3971

Removal

(1) With wheels removed, remove clips holding brake drum on axle shaft studs and remove brake drum.

(2) Using access hole in axle shaft flange, remove retainer nuts, the right shaft with threaded adjuster in retainer plate will have a lock under one of the studs that should be removed at this time.

(3) Remove parking brake strut.

(4) Attach axle shaft remover Tool C-3971-A (Fig. 2) to axle shaft flange and remove axle shaft. Remove brake assembly and gaskets.

(5) Remove axle shaft oil seal from axle housing using Tool C-637 (Fig. 3).

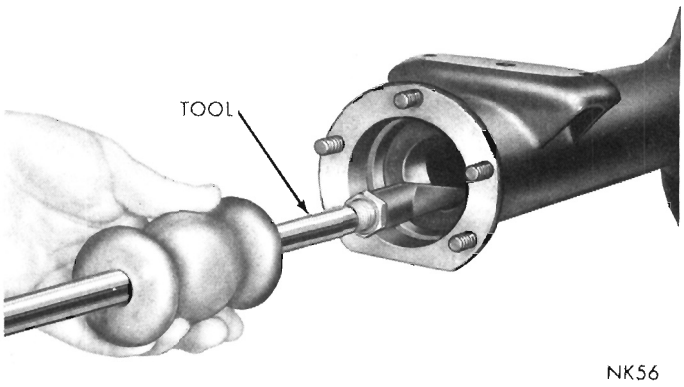


Fig. 3 Removing Axle Shaft Oil Seal

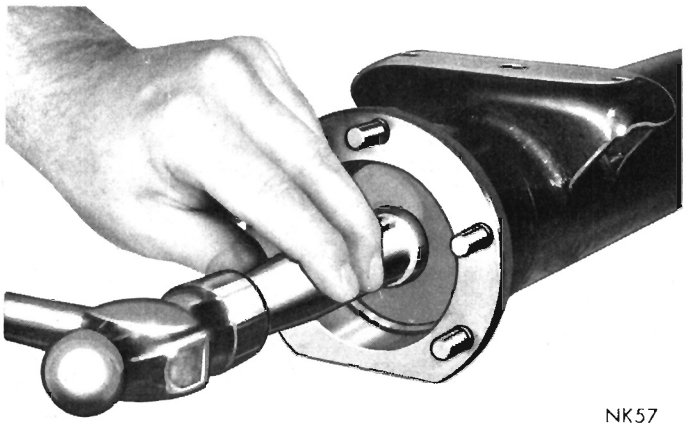


Fig. 4 Installing Axle Shaft Oil Seal

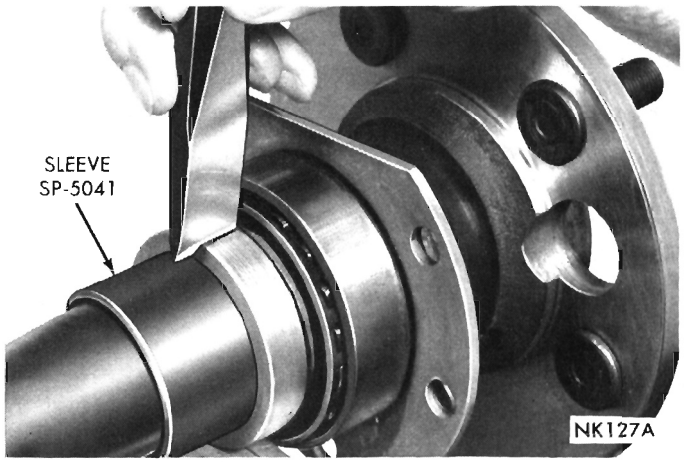


Fig. 5 Notching Bearing Retainer Collar

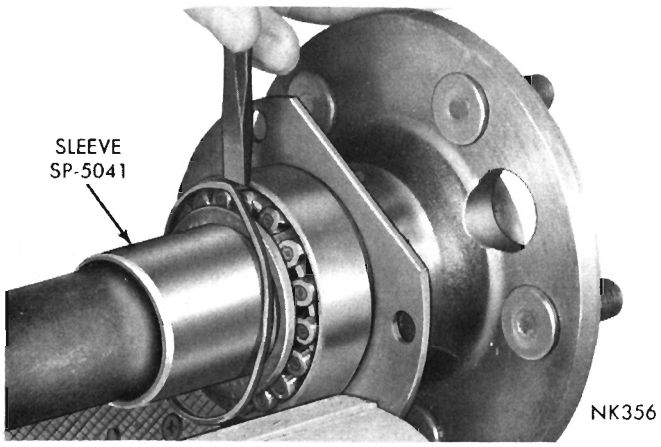


Fig. 6 Removing Roller Retainer

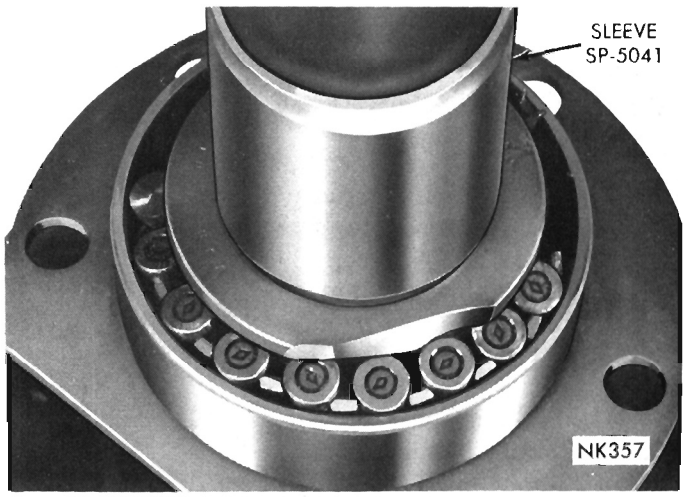


Fig. 7 Flange Ground Off Inner Cone

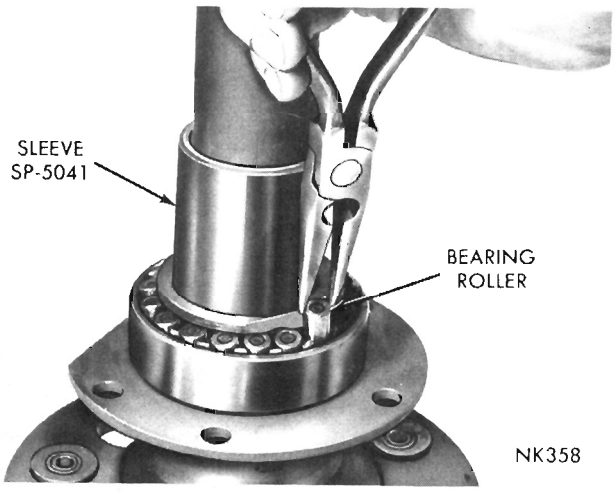


Fig. 8 Removing Bearing Rollers

(6) Wipe axle housing seal bore clean and install a new axle shaft oil seal using Tool C-4026 (Fig. 4). The above tool positions the seal the proper dimension from the axle shaft bearing shoulder in the axle housing in order that seal will definitely contact the machined sealing surface of the axle shaft.

Disassembly

CAUTION: To prevent the possibility of damaging axle shaft seal surface, slide protective sleeve SP-5041 over the seal surface next to bearing collar.

(1) Position axle shaft bearing retaining collar on a heavy vise or anvil and using a chisel, cut deep grooves into retaining collar at 90 degree intervals (Fig. 5). This will enlarge bore of collar and permit it to be driven off of axle shaft.

(2) Remove bearing roller retainer flange by cutting off lower edge with a chisel (Fig. 6).

(3) Grind a section off flange of inner bearing cone (Fig. 7) and remove bearing rollers (Fig. 8).

(4) Pull bearing roller retainer down as far as possible and cut with a pair of side cutters and remove (Fig. 9).

(5) Remove roller bearing cup and protective sleeve SP-5041 from axle shaft.

CAUTION: Sleeve SP-5041 should not be used as a protector for the seal journal when pressing off the bearing cone, as it was not designed for this purpose.

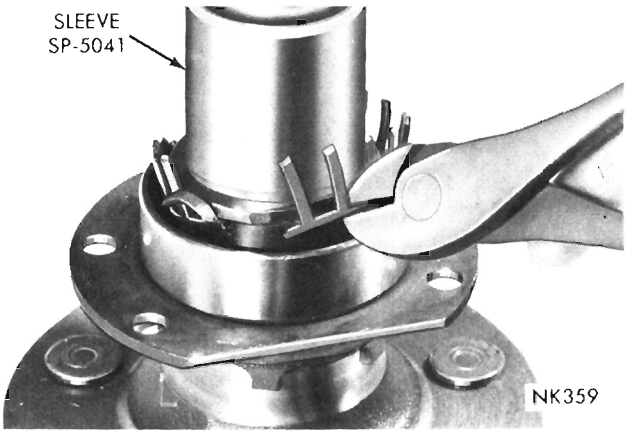


Fig. 9 Cutting Out Roller Bearing Retainer.

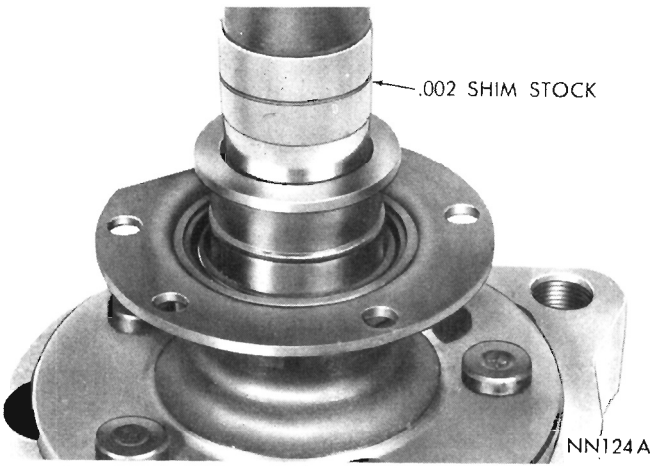


Fig. 10 Seal Journal Protection

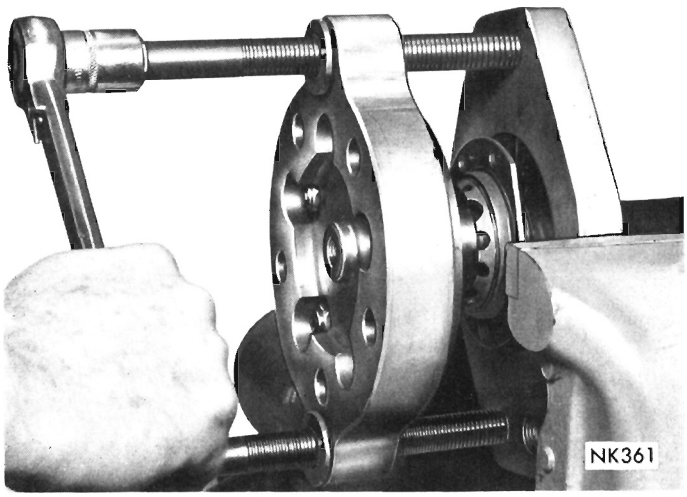


Fig. 11 Removing Bearing Cone with Tool C-3971

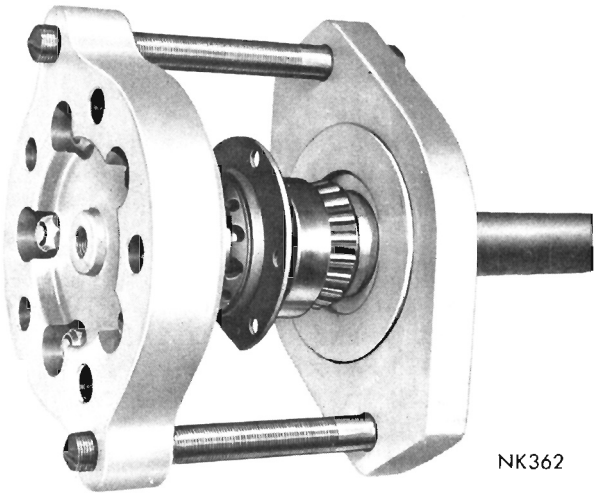


Fig. 12 Installing New Bearing And Collar

(6) To avoid scuffing seal journal when bearing cone is being removed, it should be protected by single wrap of .002 thickness shimstock held in place by a rubber band (Fig. 10).

(7) Remove the bearing cone using Tool C-3971-A (Fig. 2). Tighten bolts of tool alternately until cone is removed (Fig. 11).

(8) Remove seal in bearing retainer plate and replace with new seal.

Assembly

(1) Install retainer plate and seal assembly on axle shaft.

(2) Lubricate wheel bearings with Multi-Purpose Grease, NLGI grade 2 E.P. or equivalent.

(3) Install a new axle shaft bearing cup, cone and collar on shaft using Tool C-3971-A (Fig. 12) and tighten bolts of tool alternately until bearing and collar are seated properly.

(4) Inspect axle shaft seal journal for scratches and polish with No. 600 crocus cloth if necessary.

Installation

(1) Clean axle housing flange face and brake support plate thoroughly. Install a new rubber asbestos gasket on axle housing studs, followed by brake support plate assembly on left side of axle housing.

(2) Apply a thin coating of Multi-Purpose Grease, NLGI grade 2 E.P. or equivalent to the outside diameter of the bearing cup prior to installing in the bearing bore. **This operation is necessary as a corrosion preventative.**

(3) Install foam gasket on the studs of axle housing and carefully slide axle shaft assembly through oil seal and engage splines in differential side gear.

(4) Tap end of axle shaft lightly with a non-metallic mallet to position axle shaft bearing in housing bearing bore. Position retainer plate over axle housing studs. Install retainer nuts and tighten 30-35 foot-pounds. Start by tightening bottom nut.

(5) Repeat step (1) for right side of axle housing.

(6) Back off threaded adjuster of right axle shaft assembly until inner face of adjuster is flush with inner face of retainer plate. Carefully slide axle shaft assembly through oil seal and engage splines

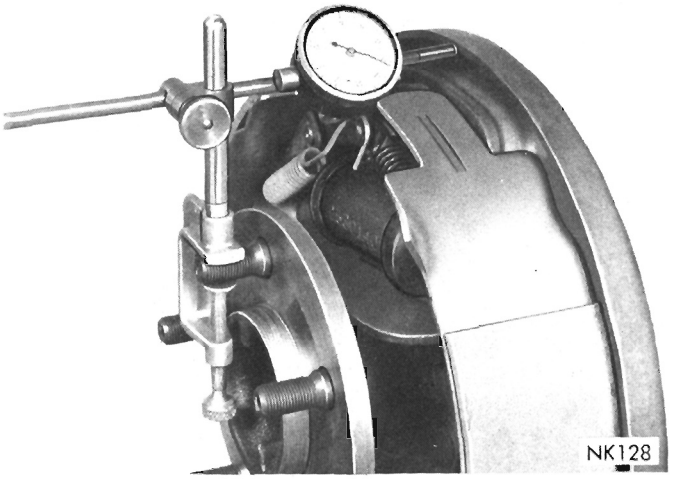


Fig. 13 Measuring Axle Shaft End Play

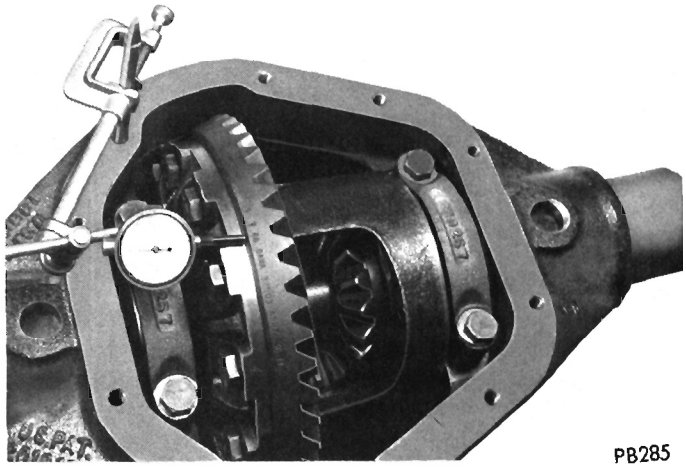


Fig. 14 Measuring Drive Gear Runout

in differential side gears.

(7) Repeat step (4).

AXLE SHAFT END PLAY

CAUTION: When setting axle shaft end play, both rear wheels must be off the ground, otherwise a false end play setting will occur.

(1) Using a dial indicator mounted on the left brake support (Fig. 13), **TURN THE ADJUSTER CLOCKWISE UNTIL BOTH WHEEL BEARINGS ARE SEATED AND THERE IS ZERO END PLAY IN THE AXLE SHAFTS. BACK OFF THE ADJUSTER COUNTERCLOCKWISE APPROXIMATELY FOUR NOTCHES TO ESTABLISH AN AXLE SHAFT END PLAY OF .008-.012 INCH.**

(2) Tap end of left axle shaft lightly with a non-metallic mallet to seat right wheel bearing cup against adjuster, and rotate axle shaft several revolutions so that a true end play reading is indicated.

(3) Remove one retainer plate nut, install adjuster lock. If tab on lock does not mate with notch in adjuster, turn adjuster slightly until it does. Install nut and tighten 30-35 foot-pounds.

(4) Recheck axle shaft end play. If it is not within the tolerance of .008-.012 inch, then repeat adjustment procedure.

(5) Remove dial indicator and install brake drum, drum retaining clips and wheel.

REAR AXLE ASSEMBLY

Removal

Should it become necessary to remove rear axle assembly for overhaul or repair, proceed as follows:

(1) Raise rear of vehicle until rear wheels clear floor. Support body at front of rear springs.

(2) Block brake pedal in the up position using a wooden block.

(3) Remove rear wheels.

(4) Disconnect hydraulic brake lines at wheel cylinders and cap fittings to prevent loss of brake fluid.

(5) Disconnect parking brake cables.

To maintain proper drive line balance when reassembling, make scribe marks on the propeller shaft universal joint and the pinion flange before removal.

(6) Disconnect propeller shaft at differential pinion flange and secure in an upright position to prevent damage to front universal joint.

(7) Remove shock absorbers from spring plate studs and loosen rear spring "U" bolts nuts and remove "U" bolts.

(8) Remove axle assembly from vehicle.

DIFFERENTIAL

Removal and Disassembly

(1) Position carrier and tube assembly in a suitable holding device; such as the jaws of a vise with the carrier cover facing upward. Thoroughly clean the outer area of carrier and tubes with a suitable cleaning solvent and blow dry with compressed air.

(2) Loosen and remove cover screws and remove carrier cover. Tilt assembly and drain lubricant into a container.

(3) Using a suitable cleaning solvent wash and clean differential, bearings, ring gear and pinion and internal surfaces and blow dry with compressed air.

(4) In preparing to measure drive gear back face runout (provided no side play was found) mount a dial indicator Tool C-3339 on pilot stud (Fig. 14), and load the indicator stem slightly when plunger is at right angles to back face of drive gear.

(5) Measure drive gear back face runout by rotating drive gear several complete revolutions and reading dial indicator. Mark drive gear and differential case at point of maximum runout. The

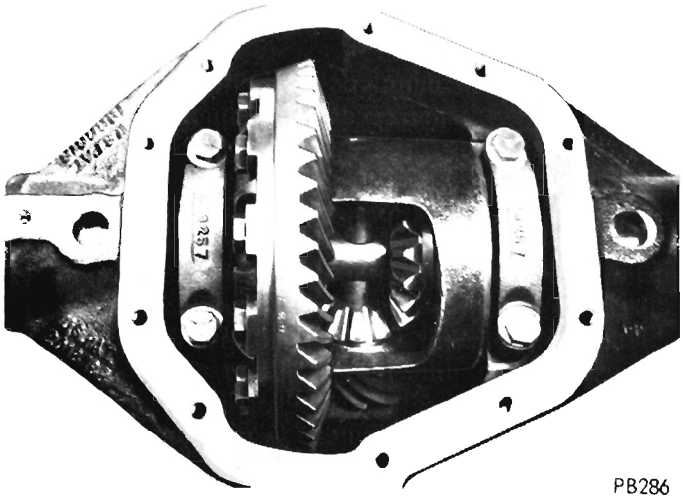


Fig. 15 Bearing Cap Identification

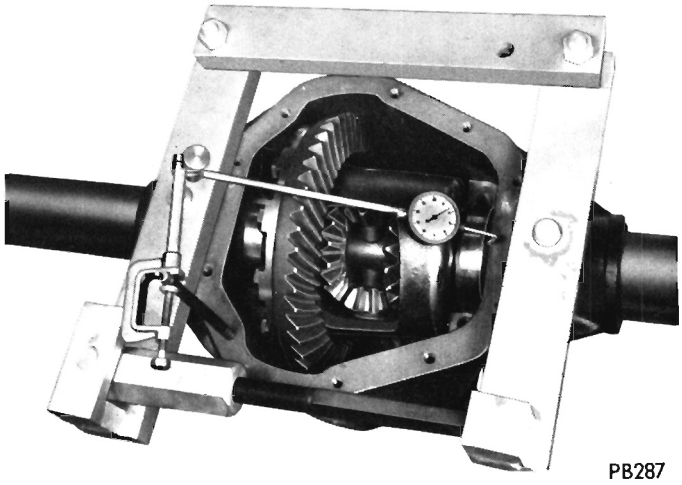


Fig. 16 Spreading Rear Axle Housing

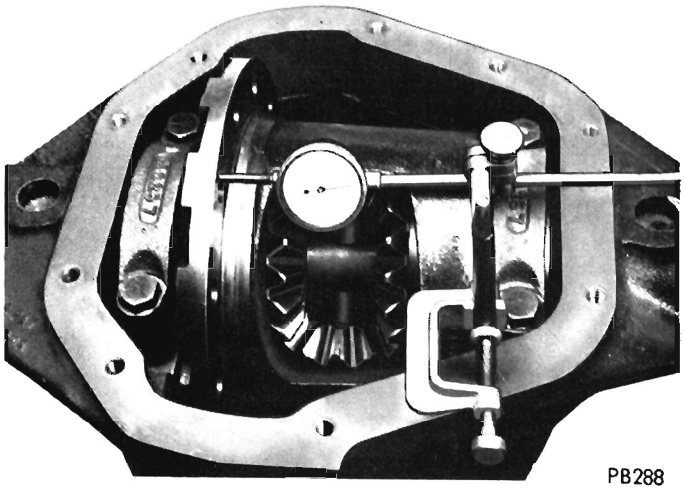


Fig. 17 Measuring Differential Case Drive Gear Mounting Flange Face Runout

marking of differential case will be very helpful later in checking differential case runout. Total indicator readings in excess of .006 inch might indicate possible loose drive gear or damaged differential case. A test for differential case runout will be described later.

(6) Check the clearance between the differential bearing cap and bearing cup by trying to insert a piece of .003 inch feeler stock between them. A .003 inch feeler should not enter between the bearing cap and cup. A clearance of more than .003 inch could be caused by bearing cup having turned in carrier, causing excessive wear.

(7) Note identifying letters stamped on bearing caps and face of carrier housing seal surface (Fig. 15). Letters stamped on left side are in horizontal position while right side are in vertical position. Always match identifying letters for proper reassembly.

(8) Loosen and remove the differential bearing caps and locate spreader Tool W-129 with tool dowel pins seated in locating holes of axle housing. Turn tool screw finger tight at this time.

(9) Install pilot stud on left side of axle housing. Attach dial indicator and load indicator stem slightly against opposite side of axle housing (Fig. 16).

(10) Tighten spreader tool nut sufficiently to obtain .015 inch movement of dial indicator to permit removal of differential case and ring gear assembly.

DO NOT SPREAD OVER .020 INCH AS IT WILL RESULT IN PERMANENT DAMAGE TO CARRIER CASTING.

(11) Remove dial indicator and remove differential case and ring gear assembly from axle housing. A light prying action with a screwdriver or pinch bar will loosen assembly for easy removal. Pry up differential case and ring gear as straight up as possible using leverage against differential case and carrier to prevent damage. Keep respective bearing cups with bearing cones, if they are not worn or damaged and are to be reassembled.

(12) Place the differential case between the soft jaws of a vise and remove the drive gear screws and discard. Using a fiber mallet, tap the drive gear loose from the differential case pilot and remove.

(13) If the drive gear runout exceeded .006 inch in step 5 differential case flange runout should be remeasured. Install differential case with respective bearing cups into axle housing. Loosen nut of spreader tool and remove. Install bearing caps and tighten snugly. Mount dial indicator in contact with flange face of differential case (Fig. 17), and measure runout as described in Step 5. Total allowable runout should not exceed .003 inch. It is often possible to reduce excessive runout by positioning drive gear 180 degrees from point of maximum runout when reassembling ring gear on differential case.

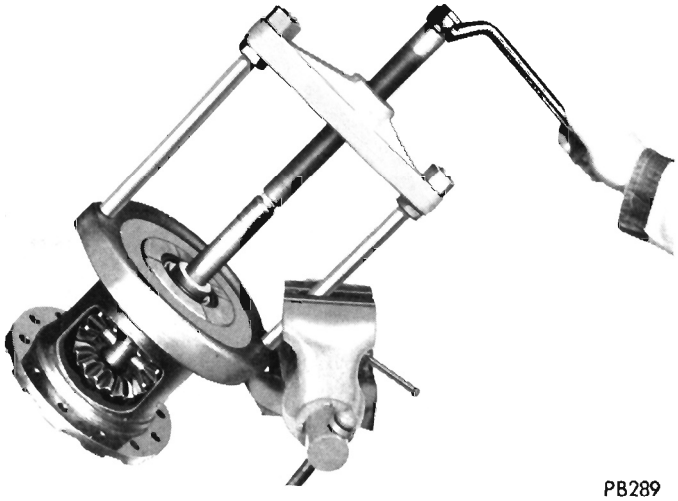


Fig. 18 Removing Differential Bearings

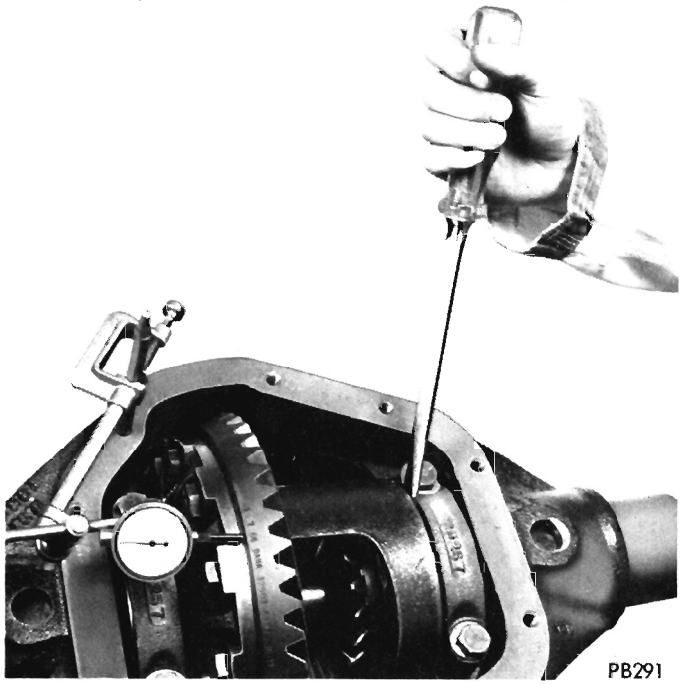


Fig. 20 Determining Shims To Obtain "O" End Clearance

(14) Position carrier and tube assembly in vise with nose of carrier in the up position. Remove drive pinion nut and washer. Using Tool C-452 and holding Tool C-3281, remove drive pinion flange.

(15) Using Tool C-748, remove drive pinion oil seal. Remove slinger, gasket, front pinion bearing cone and preload shim pack. Record the thickness of the shims in case they should be lost.

(16) Position the carrier and tube assembly on an arbor press, then press out the drive pinion stem and rear bearing cone assembly.

(17) With the aid of a brass drift and hammer, drive out the front and rear pinion bearing cups from housing. Remove the shim from behind the rear bearing cup and record the thickness of shim pack.



Fig. 19 Installing Differential Bearing Cones

(18) Remove rear bearing cone from drive pinion stem using Tool DD-914C or Tool C-293 and adapters No. 37.

(19) Remove differential bearing cones from differential case hubs using Tool DD-914C or Tool C-293 and adapters No. 62 (Fig. 18). Care must be taken to insure that bearing remover adapters are located so as not to pull on bearing cage.

(20) Remove the shims located behind each bearing and record thickness to aid in reassembly.

DIFFERENTIAL CASE

The Sure-Grip Differential and its internal parts are serviced as an assembly only.

DIFFERENTIAL—INSTALLATION

The contacting surfaces of the drive gear and differential case flange must be clean and free of all burrs. Dress down surfaces with a file as needed.

(1) Position drive gear on differential case pilot, aligning threaded holes of drive gear with those in differential case flange.

(2) Insert drive gear screws through case flange and into drive gear. After all cap screws are properly started, tap drive gear against differential case flange with a non-metallic mallet.

(3) Clamp unit between brass jaws of a vise and alternately tighten each cap screw to 100-120 foot-pounds.

(4) Position each differential bearing cone on hub of differential case (without shims), small end away from drive gear, using Tool C-4025 (Fig. 19) An arbor press may be used in conjunction with installing Tool.

CAUTION: Never exert pressure against the bearing cage, since this would damage the bearing and make it unfit for further use.

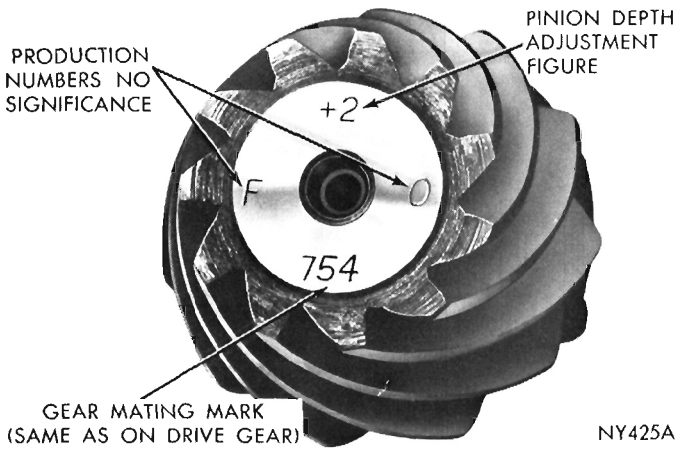


Fig. 21 Drive Pinion Markings

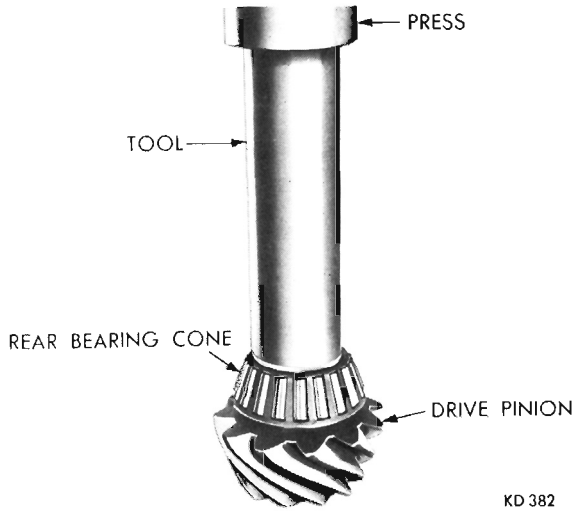


Fig. 22 Installing Rear Pinion Bearing Cone

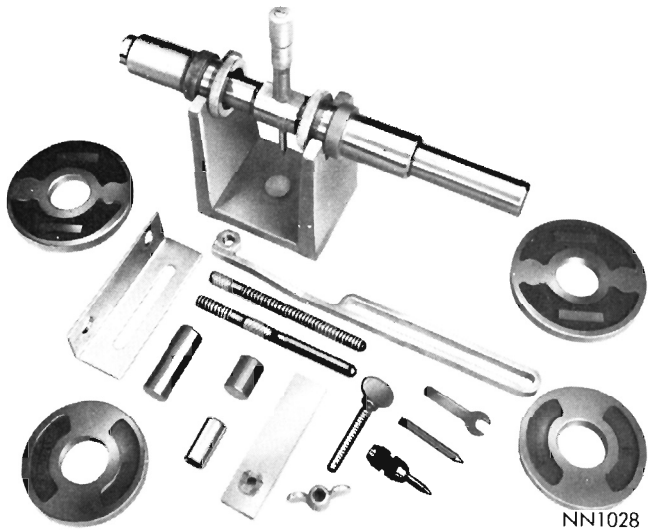


Fig 23 Pinion Depth Gauge Tool DD-1244

(5) Position differential bearing cups on their respective cones and insert differential case in carrier. Install bearing caps in their correct positions and tighten bearing cap bolts finger tight.

(6) Install dial indicator fixture with indicator pointer contacting back face of drive gear.

(7) Insert a screwdriver blade between bearing cup and housing and pry case assembly as far as possible to one side of housing (Fig. 20). Set dial indicator at zero. Using screwdriver, pry case to opposite side of housing and record the reading.

This reading indicates the amount of shims needed to take up the clearance between the differential bearing cups and the case. The shim pack thickness to be placed on bearing hub between bearing cone and differential case will be calculated later in the procedure after installation of drive pinion and depth of mesh setting.

(8) Remove dial indicator, loosen bearing cap bolts and remove bearing caps. Remove differential assembly from housing.

DRIVE PINION DEPTH OF MESH SETTING

(Using Pinion Depth Gauge Tool DD-1244)

Note the figures etched on the head of the drive pinion and observe (Fig. 21). One figure is found on both the drive pinion and ring gear and indicates a matched gear set. Directly opposite this figure will be one with a + or — before it, or if not a + or —, the figure will be 0. This number must be positively identified before continuing with the assembly procedure. Midway between the two sets of figures described above are numbers and letters. These numbers and letters are etched for manufacturing purposes only, but as one of these numbers may be 0, it might be confused with the number needed for assembly procedure. A rule to follow would be to first examine the shaft end for a + or — number. If a + or — number is not etched on the pinion head, then the number will be 0.

(1) Install rear drive pinion bearing cup and shim pack in carrier. The starting shim pack to be placed between the rear cup and carrier can be determined from the shims removed and the etched marking on the pinion. The + or — figure indicates the variation from the nominal distance between the front of the pinion and the center line of the carrier. For example, if a pinion marked +2 was originally installed with a shim pack .035 inch and the new pinion is marked —1, the shim pack should be increased .003 inch to bring the new pinion to its correct position and the new shim pack would be .038 inch. This will give an approximate setting of the pinion. A pinion depth gauge should be used for final setting of the pinion, see steps 6 through 14. Shims are available in .003, .005 and .010 inch thickness.

(2) Install front pinion bearing cup in carrier.

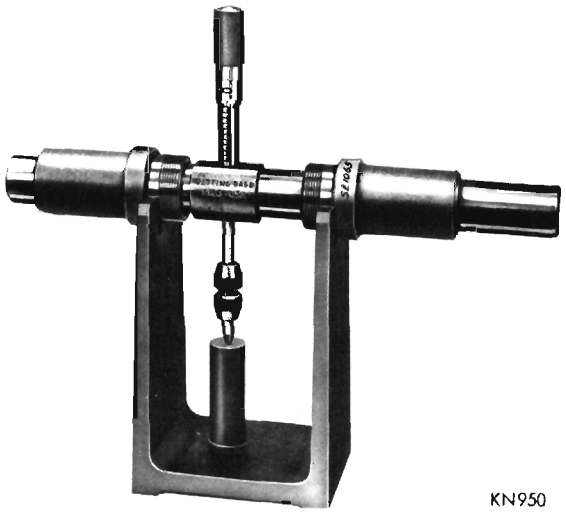


Fig. 24 Checking Gauge In Master Gauge Assembly

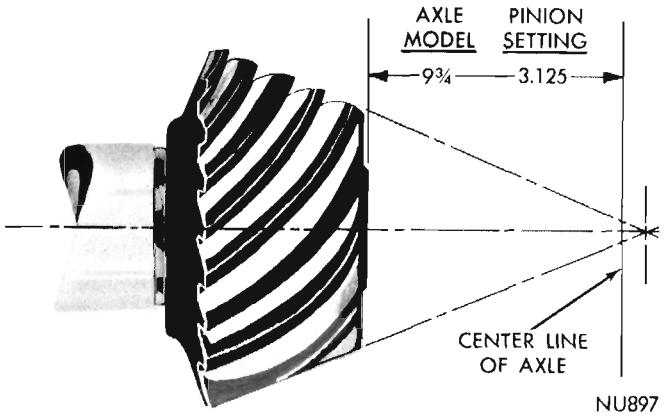


Fig. 26 Pinion Setting Dimension

(3) Lubricate rear drive pinion bearing cone with Chrysler Hypoid Lubricant Part Number 2933565, or equivalent, and install bearing cone on pinion stem with Tool C-3095 (Fig. 22).

(4) Position drive pinion and bearing assembly in carrier and install front pinion bearing cone on pinion stem. Do not install preload shims behind front pinion bearing at this time.

(5) Install universal joint pinion flange followed by washer and nut. Tighten nut just enough to obtain 10-30 inch-pounds of preload. Rotate drive pinion while tightening to seat bearing rollers.

(6) The pinion depth gauge Tool DD-1244 (Fig. 23), is a direct reading precision micrometer, mounted in an arbor and is calibrated to show the distance from the end of the anvil to the centerline of the gauge set. To check the accuracy of the gauge, install the micrometer and arbor in the master gauge. Install the checking block and read the micrometer, it should be accurate within less than .0005 inch (Fig. 24).

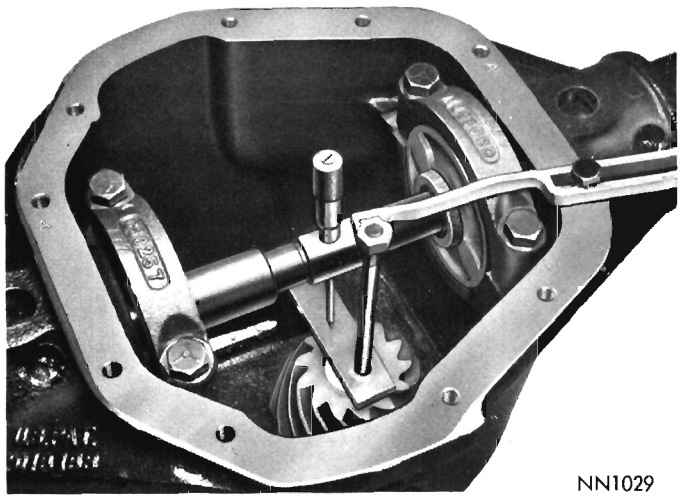


Fig. 25 Determining Pinion Depth Setting

(7) Select the proper adapters from the gauge set that fits the differential bearing cup bores. Install the adapters on the arbor and position in carrier housing. Install bearing caps and tighten cap bolts up snug.

(8) Install the step plate clamp assembly on the carrier housing. Position step plate over pinion and tighten step plate screw against step plate. Make sure the four step plate feet are squarely positioned on the pinion.

(9) Adjust the micrometer so it is directly over and at a 90 degree angle to the step plate. Screw the micrometer down until the anvil contacts the top of the step plate (Fig. 25). Read the micrometer and make a note of the reading. The step plate measures .400 inch thick, therefore, add the .400 inch step plate thickness to the micrometer reading.

(10) Figure 26 shows the nominal pinion setting dimensions for 0(zero) marked pinion. Pinions with a + or — marking require a different pinion setting. For example, if a pinion marked +2 is being installed in a 9-3/4 in. axle, add the +2 to pinion setting dimensions 3.125 which will be the corrected dimension of 3.127.

(11) If pinion setting is within —.001 inch to +.003 inch, the pinion position can be assumed to be correct. If the setting is outside these limits, it should be corrected by adding or removing the proper thickness shim behind the rear pinion bearing cup.

(12) Remove the drive pinion depth gauge and drive pinion.

(13) If shim adjustment is necessary, remove drive pinion rear bearing cup and add or remove shims as determined in preceding Step 9. Measure each shim separately with a micrometer.

(14) Reinstall drive pinion rear bearing cup and shims and recheck pinion depth measurement, described previously.

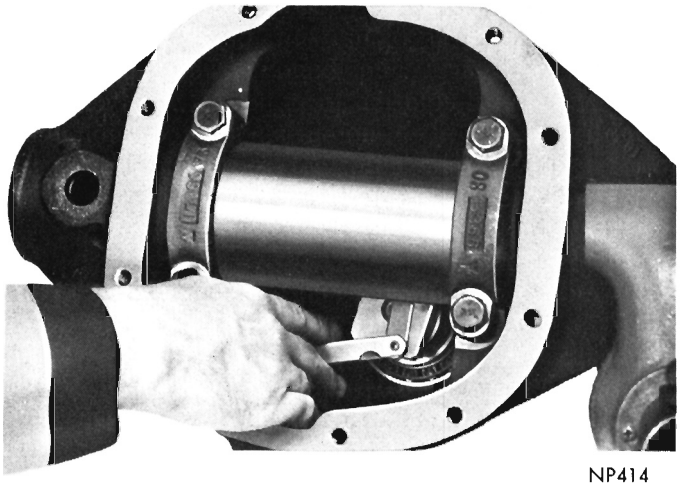

NP414

Fig. 27 Determining Shim Pack Thickness For Drive Pinion Depth Of Mesh

DRIVE PINION DEPTH OF MESH

(Using Tool C-758-D4)

Rear axle setting gauge Tool C-758-D4 is used to install drive pinion bearing cups as well as to determine pinion depth of mesh.

(1) Start both drive pinion bearing cups into axle housing.

(2) Assemble Tool C-758-D4 by positioning spacer SP-5184 on main screw of tool. Position rear pinion bearing cone on tool screw and insert into axle housing.

(3) Position front pinion bearing cone over main screw of tool followed by compression sleeve SP-535, centralizing washer SP-534, and main screw nut SP-533.

(4) Lubricate drive pinion bearing cones with Chrysler Hypoid Lubricant Part Number 2933565, or equivalent.

(5) To install pinion bearing cups, hold compression sleeve from turning with Tool C-3281, tighten nut, thereby drawing pinion bearing cups into axle housing bearing cup bores. Permit tool to turn several revolutions during tightening operation to permit bearing rollers to align and prevent brinnelling of bearing cups. **Do not remove tool after installing cups. Pinion depth of mesh will be determined next.**

(6) With main tool left in axle housing after installing drive pinion bearing cups, loosen tool nut and re-tighten nut to produce 10-30 inch-pounds of preload. Rotate while tightening to align bearing rollers.

(7) Install gauge block SP-528 on main tool and tighten screw with an Allen wrench securely.

(8) Position cross bore arbor SP-5183 in axle housing in differential bearing seats. Center the arbor so that an approximate equal distance is maintained at both ends. Correctly position differential bearing caps and insert bolts and tighten to 10 foot-pounds.

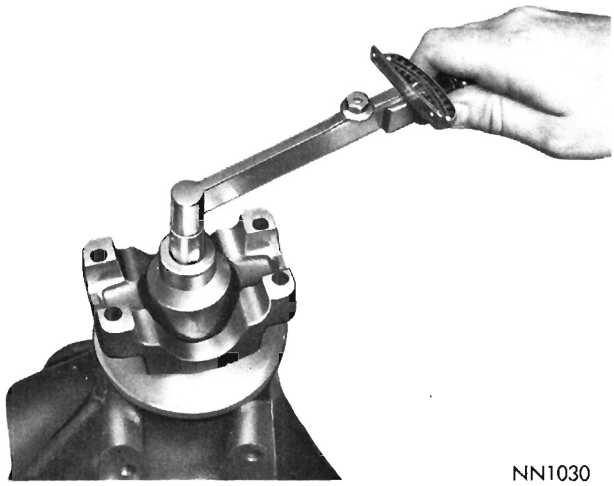

NN1030

Fig. 28 Checking Pinion Bearing Preload

(9) Using a feeler gauge select the proper thickness of shims that will snugly fit between arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge). This measurement is then used in determining the correct thickness shim pack for installation behind the rear pinion bearing cup and carrier casting (Fig. 27).

(10) To select a shim pack for installation, read the markings on the end of pinion head (—0, —1, —2, +1, 2, etc.). When marking is —(minus), add that amount to the thickness of shim pack selected in step (9). When the marking is +(plus), subtract that amount. Treat other pinion markings in a similar manner. Shims are available in .003, .005, and .010 inch thickness.

(11) Remove the tool arbor and tool from axle housing.

(12) Using a brass drift or soft punch and hammer, remove rear pinion bearing cup from casting.

(13) Position the correct shim pack in axle housing cup bore and install rear bearing cup as described previously in steps (1 thru 5). When cup is properly seated, remove tool and pinion bearing cones.

(14) Lubricate rear drive pinion bearing cone with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent and install bearing cone on pinion stem using Tool C-3095. An arbor press may be used in conjunction with tool (Fig. 22).

(15) Install drive pinion and bearing assembly in carrier and install the original front pinion bearing shim pack followed by the bearing cone. **Do not install oil seal at this time.**

(16) Install universal joint flange, washer and nut. Tighten nut 250-270 foot-pounds. Rotate pin-

ion several complete revolutions to seat bearing rollers.

(17) Using an inch-pound torque wrench C-685, measure pinion bearing preload by rotating pinion with handle of wrench floating (Fig. 28). Take reading while handle is moving through several complete revolutions. Accurate reading can be made only with nose of axle in upright position. Correct preload is 10-20 inch-pounds. **Add** shim to decrease preload and **Subtract** shims to increase preload. Shims are available in the following thicknesses: .003, .005, .010, and .030 inch.

(18) After the correct pinion bearing preload has been established, remove the universal joint flange, nut and washer.

(19) Install oil slinger and gasket. Using pinion seal installing Tool C-3719, install drive pinion oil seal.

(20) Install universal joint flange washer and nut. Tighten nut 250-270 foot-pounds.

PINION BEARING PRELOAD

(1) Remove universal joint flange, washer, nut and front pinion bearing cone.

(2) Install the original front pinion bearing shim pack followed by the bearing cone. Do not install oil seal at this time.

(3) Install universal joint flange washer and nut. Tighten nut 250-270 foot-pounds. Rotate pinion several complete revolutions to align and seat bearing rollers.

(4) Using an inch-pound torque wrench C-685, measure pinion bearing preload by rotating pinion with handle of wrench floating (Fig. 28). Take reading while handle is moving through several complete revolutions. Accurate reading can be made only with nose of axle in upright position. Correct preload is 10-20 inch-pounds. **Add** shims to decrease preload and **Subtract** shims to increase preload. Shims are available in the following thicknesses: .003, .005, .010, and .030 inch.

(5) After the correct bearing preload has been established, the pinion depth setting should be rechecked.

(6) Remove universal joint flange nut and washer.

(7) Install oil slinger and gasket. Using Tool C-3719, install drive pinion oil seal.

(8) Install universal joint flange, washer and nut. Using Tool C-3281 to hold flange, tighten pinion nut 250-270 foot-pounds. Recheck pinion bearing pre-load.

DIFFERENTIAL BEARING PRELOAD AND DRIVE GEAR AND PINION BACKLASH

(1) With drive pinion and bearings installed and bearing preload set, install differential case and ring gear assembly with their respective bearing cups. Install bearing caps in their positions, align identification marks and tighten cap bolts finger tight.

Refer to the measurement taken previously in step (7) of "Differential—Installation.

This reading taken before the drive pinion was installed represents the total clearance between the differential bearing cups and the carrier casting. Perform the following steps to determine the thicknesses of shims required behind each bearing cone to take up the clearance and establish the correct bearing preload and backlash.

(2) Install a dial indicator and position the contact point against back face of ring gear. Move the differential and ring gear assembly tight against the drive pinion, set the dial indicator on 0. Move the differential and ring gear assembly in the opposite direction as far away from pinion as possible and note the reading on dial indicator.

This reading represents the thickness of shim pack necessary to take up the clearance between the bearing cup and the case on the ring gear side of the differential assembly. Subtract this reading from the previously recorded total reading to obtain the amount of shims necessary to take up the clearance between the bearing cup and the case at the pinion side of the differential.

(3) Remove differential and ring gear assembly from carrier.

(4) Remove differential bearing cones. Install the correct thickness shim pack as determined in step 2 between bearing cone and differential case hub shoulder using Tool C-4025. Add an additional .015 inch shims to the drive gear side of differential and install the differential bearing cones. This additional .015 inch shim pack provides the correct bearing preload and backlash.

(5) Position spreader Tool W-129 in locating holes of carrier and tighten screw finger tight. Install dial indicator and spread carrier .015 to .020 inch. Do not exceed this limit to permit placing of differential and ring gear assembly in carrier.

(6) Install the bearing caps in their respective positions as indicated by identification marks on caps and carrier. Remove the spreader tool. Coat the bearing cap bolt threads with sealing compound and install and tighten bolts snugly.

(7) Tap the drive gear lightly with a rawhide hammer to properly seat the differential bearing and cups. **Care must be taken in this operation to prevent nicking the teeth of ring gear or drive pinion as they are meshed together.** Tighten the bearing cap bolts to 70-90 foot-pounds.

(8) Attach a dial indicator to carrier and with indicator contact point contacting ring gear tooth (Fig. 29), measure the backlash between the ring gear and drive pinion.

(9) Check backlash at four equally spaced points

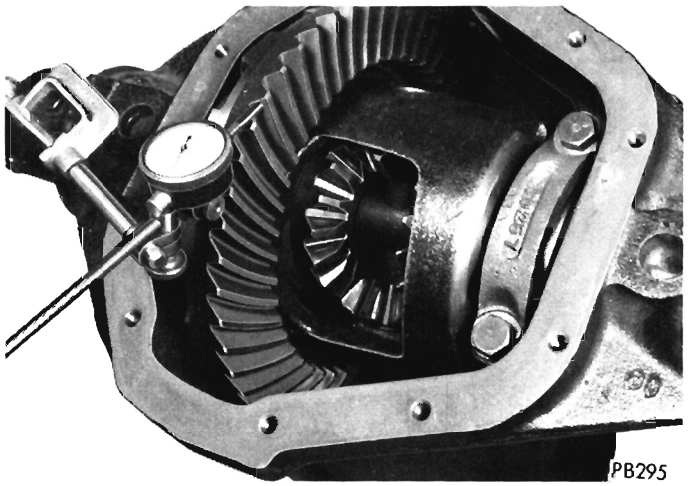


Fig. 29 Checking Backlash Between Drive Gear and Pinion

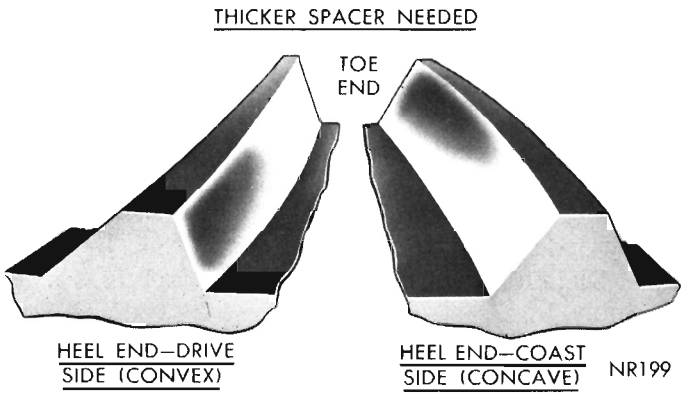


Fig. 31 Incorrect Tooth Contact Pattern (Increase Shim Pack Thickness)

around circumference of ring gear. Backlash must be held between .004-.009 inch and cannot vary more than .002 inch between the four positions checked.

If backlash does not fall within these specifications, change shim pack thickness on both differential bearing hubs to maintain proper bearing preload and backlash.

GEAR TOOTH CONTACT PATTERN

The gear tooth contact pattern will disclose whether the correct rear pinion bearing mounting shim has been installed and the drive gear backlash set properly. Backlash between the drive gear and pinion must be maintained within the specified limits until correct tooth contact pattern is obtained.

(1) Apply a thin film of red or white lead on both the drive and coast side of the drive gear teeth. Rotate drive gear one complete revolution in both directions while load is being applied with a round bar or screwdriver between the carrier casting and differential case flange. This action will leave a distinct contact pattern on both the

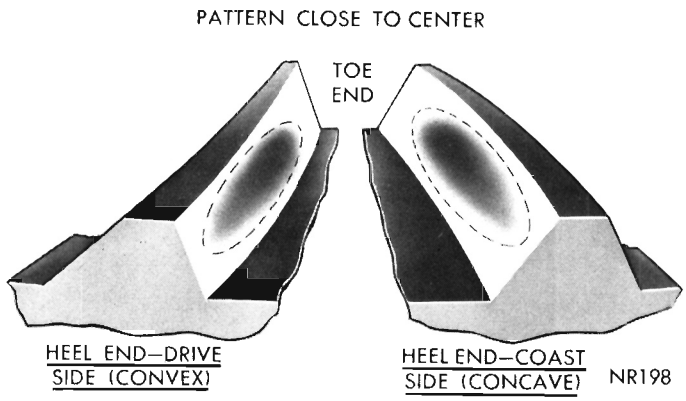


Fig. 30 Desired Tooth Contact Under Light Load

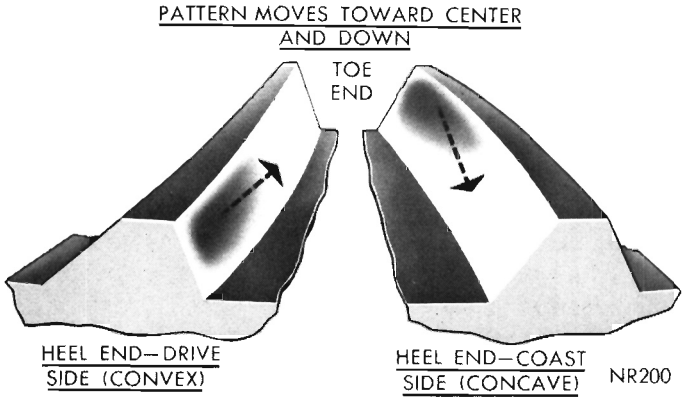


Fig. 32 Effect On Tooth Contact Pattern As Shim Pack Thickness Is Increased

drive and coast side of the drive gear teeth.

(2) Observe the contact pattern on the drive gear teeth and compare with those in figures 30, 31 and 33 to determine if pattern is properly located. With pinion depth of mesh and gear backlash set properly, your contact pattern should resemble that in (Fig. 30). Notice that the correct contact pattern is well centered on both drive and coast sides of the teeth. When tooth contact patterns are obtained by hand, they are apt to be rather small. Under the actual operating load, however, the contact area increases.

(3) If after observing the contact pattern you find it resembles that in (Fig. 31), the drive pinion is too far away from centerline of the ring gear, the contact pattern will appear high on the heel on drive side and high on toe on coast side. To correct this type tooth contact pattern, increase the thickness of shim pack located behind the rear pinion bearing cup (Fig. 32), which will cause the high heel contact on drive side to lower and move toward the toe; the high toe contact on coast side will lower and move toward the heel.

(4) If after observing the contact pattern you find it resembles that in (Fig. 33), the drive pinion is too close to the ring gear, the pattern will appear low on the toe on drive side and low heel contact on coast side. To correct this type tooth

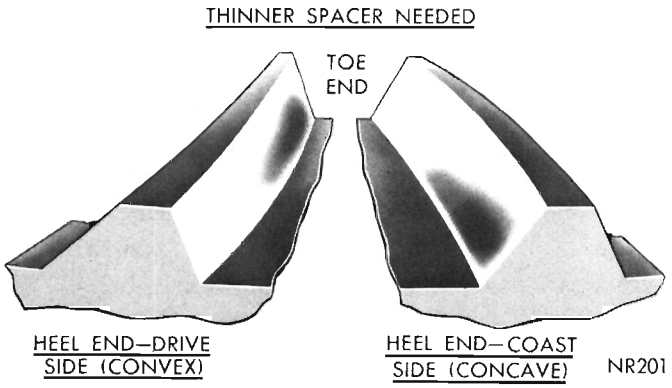


Fig. 33 Incorrect Tooth Contact Pattern (Decrease Shim Pack Thickness)

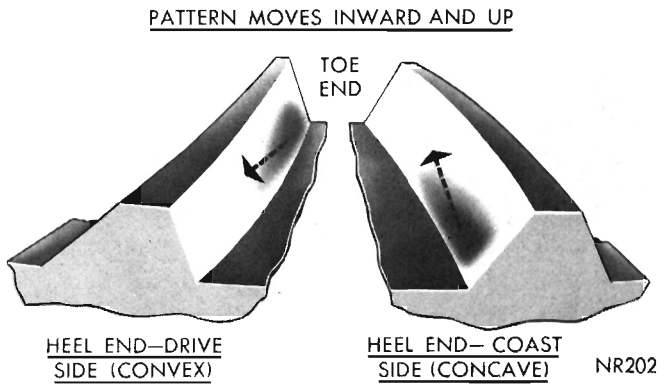


Fig. 34 Effect On Tooth Contact Pattern As Shim Pack Thickness Is Decreased

contact pattern, decrease the thickness of shim pack located behind the rear pinion bearing cup (Fig. 34), which will cause the low toe contact on drive side to raise and move toward the heel; low heel contact on coast side will raise and move toward the toe.

REAR AXLE ASSEMBLY

Installation

(1) Making sure the gasket surfaces of both the cover and carrier housing are clean, install a new gasket followed by the cover and tighten the cover bolts to 15-25 foot-pounds. Beneath one of the cover bolts, install the ratio identification tag.

(2) For correct procedure when installing axle shafts and bearings and setting axle shaft end play see "Axle Shafts and Bearings".

(3) With body supported at front of rear springs, position rear axle assembly spring pads over the spring center bolts.

(4) Install spring "U" bolts and tighten nuts to 45 foot-pounds and install shock absorbers on spring plate studs.

(5) Connect parking brake cables.

(6) Connect hydraulic brake lines at wheel cylinders and bleed brakes, install brake drums and adjust brakes.

(7) Install rear universal joint of propeller shaft in same position as removed (match scribe marks on propeller shaft universal joint and pinion flange). Tighten universal joint clamps to 170-200 inch pounds.

(8) Install rear wheels and tighten nuts to 65 foot-pounds in the proper tightening sequence.

LUBRICATION

Every six months check the fluid level in the axle through the filler plug hole. When checking the level, be sure the vehicle is in a level position on an axle or drive on type hoist. "See Lubrication Section" for proper level of specific axle assembly.

In Sure-Grip Differentials, use only the Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant than this special lubricant or equivalent.

Anticipated Temperature Range	Viscosity Grade
Above – 10°F.	SAE 90
As low as – 30° F.	SAE 80
Below – 30° F.	SAE 75

"SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE."

SURE-GRIP DIFFERENTIAL

INDEX

	Page
Installing Sure Grip Differential and Carrier Assembly	62
Lubrication	62
Sure Grip Differential Identification	59
Sure Grip Differential Noise	60
Sure Grip Differential	61
Removal	61
Cleaning and Inspection	61
Assembly	61
Testing Sure Grip Differential	61

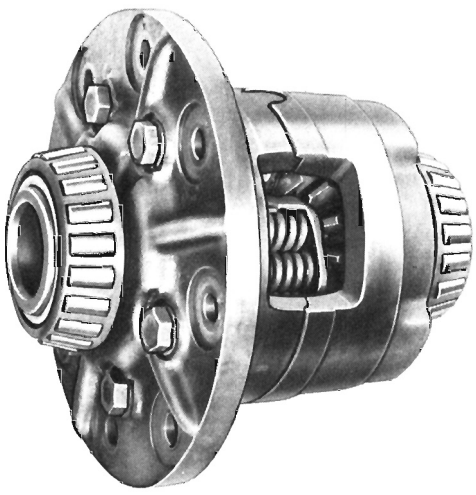
GENERAL INFORMATION

The **Sure-Grip** differential being offered as a special equipment option in the 7-1/4 in. and 8-3/4 in. rear axles only (Fig. 1).

The **Sure-Grip** differential design is basic and simple and consists of a two piece case construction and is completely interchangeable with the conventional differential and also the previous type **Sure-Grip** differential (Fig. 2).

A conventional differential allows the driving wheels to rotate at different speeds while dividing the driving torque equally between them. This function is ordinarily desirable and satisfactory. However, the total driving torque can be no more than double the torque at the lower-traction wheel. When traction conditions are not the same for both driving wheels, a portion of the available traction cannot be used.

The **Sure-Grip** differential allows the driving wheel with the better traction condition to develop more driving torque than the other wheel, so that the total driving torque can be significantly greater than with a conventional differential.



NU404

Fig. 1 Sure-Grip Differential

Sure-Grip is not a locking differential. In normal driving conditions the controlled internal friction is easily overcome during cornering and turning so that the driving wheels can turn at different speeds. Extreme differences in traction conditions at the driving wheels may permit one wheel to spin.

Sure-Grip has been engineered to perform its specialized functions with minimum effect on normal vehicle operations.

The cone clutch **Sure-Grip** differentials are similar to corresponding 8-3/4 conventional differentials except for the incorporation of the helix-grooved cones that clutch the side gears to the differential case. The grooves assure maximum lubrication of the clutch surface during operation. The cones and side gears are statically spring preloaded to provide an internal resistance to differential action within the differential case itself. This internal resistance provides pulling power while under extremely low tractive conditions such as mud, snow or ice when encountered at one of the rear wheels.

During torque application to the axle, the initial spring loading of the cones is supplemented by the gear separating forces between the side gears and differential pinions which progressively increases the friction in the differential. It should be remembered that this differential is not a positive locking type and will release before excessive driving force can be applied to one wheel.

SURE-GRIP DIFFERENTIAL IDENTIFICATION

Identification of **Sure-Grip** differential assembly can easily be made by lifting both rear wheels off the ground and turning them. If both rear wheels turn in the same direction simultaneously, the vehicle is equipped with a **Sure-Grip** Differential. Another means of identification is by removing the filler plug and using a flashlight to look through the filler plug hole to identify the type of differential case.

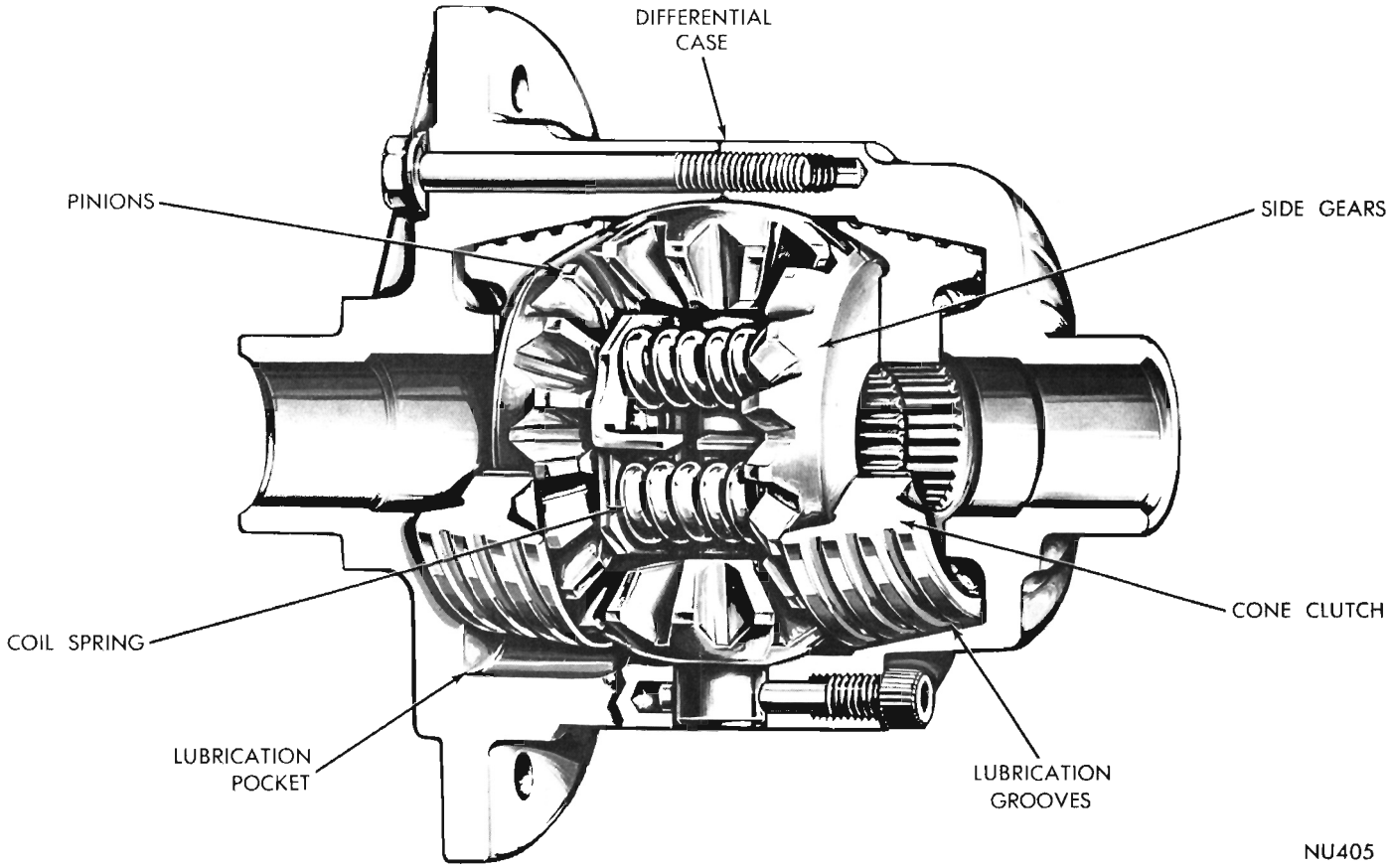


Fig. 2 Sure-Grip Differential (Schematic)

SERVICE PROCEDURES

SURE-GRIP DIFFERENTIAL NOISE

(Chatter—Moan)

Noise complaints related to rear axles equipped with cone-clutch **Sure-Grip** should be checked to determine the source of the noise. If a vehicle ride check produces the noise in turns but not straight ahead, the probable cause is incorrect or dissipated rear axle lubricant. The following draining and flushing procedure has been established for the **Sure-Grip** Differential before it is removed from the vehicle and replaced.

CAUTION: When servicing vehicles equipped with Sure-Grip differentials do not use the engine to rotate axle components unless both rear wheels are off the ground. Sure-Grip equipped axles can exert a significant driving force if one wheel is in contact with floor and could cause the vehicle to move.

(1) With lubricant of rear axle assembly at operating temperature raise car on hoist so rear wheels are free to turn.

(2) Loosen and remove fill plug and using a suction gun remove as much of the old lubricant as possible.

(3) Fill axle to proper level with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(4) Start engine of vehicle and engage in gear and run on hoist with rear wheels free to turn to approximately **40 MPH** for ten (10) minutes. This thoroughly circulates the lubricant and brings it to operating temperature.

(5) Stop vehicle and remove the fill plug and using a suction gun remove as much of the lubricant as possible.

(6) Refill axle to proper level with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(7) Lower vehicle on hoist and return to customer to drive and evaluate for approximately 100 miles to determine if lubricant corrects the noise complaint.

If after the vehicle is driven approximately 100 miles and the noise condition is still evident, remove the differential and carrier assembly and replace the **Sure-Grip** Differential. **The Sure-Grip Differential and the internal parts are serviced as an assembly only.**

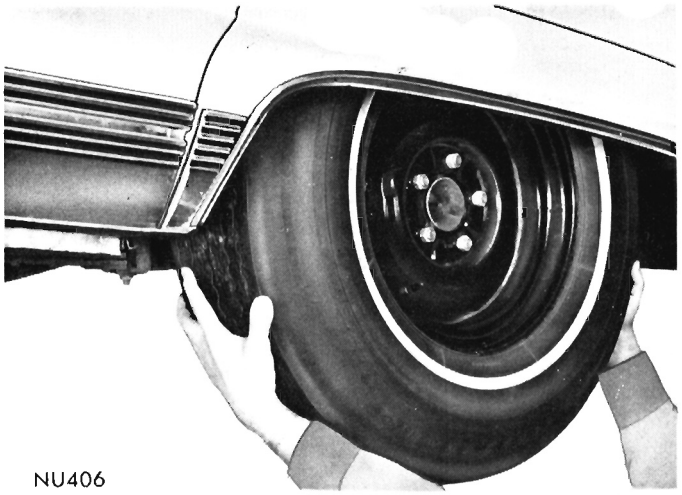


Fig. 3 Testing Sure-Grip Differential Effectiveness

TESTING SURE-GRIP DIFFERENTIAL

The **Sure-Grip** differential can be checked to determine if its performance is satisfactory without removing the differential and carrier assembly from the vehicle.

(1) Position vehicle on a hoist with engine off and the transmission selector lever in park if automatic or in low gear if manual.

(2) Attempt to rotate wheel by applying turning force with hands gripping tire tread area (Fig. 3).

(3) If you find it extremely difficult, if not impossible to manually turn either wheel, you can consider the **sure-grip** differential to be performing satisfactorily. If you find it relatively easy to continuously turn either wheel the differential is not performing properly and should be removed and replaced. The **Sure-Grip** Differential and internal parts are serviced as a complete assembly only. **Under no circumstances should the differential be removed and disassembled and reinstalled.**

SURE-GRIP DIFFERENTIAL

CAUTION: During removal and installation of axle shafts, DO NOT rotate an axle shaft unless both are in position. Rotation of one axle shaft without the other in place may result in misalignment of the two spline segments with which the axle shaft spline engages, and will necessitate difficult realignment procedures when shaft is installed.

Removal

Follow the same procedure outlined under conventional differential removal.

Cleaning and Inspection

(1) Clean the **Sure-Grip** differential assembly in a fast evaporating mineral spirits or a dry cleaning solvent and with exception of bearings, dry with compressed air.

(2) Inspect differential bearing cones, cups and rollers for pitting, spalling or other visible damage. If replacement is necessary, remove bearing cones from differential case using Tool C-293 and adapter plates No. 43.

(3) Visually inspect differential case for cracks or other visible damage which might render it unfit for further service.

Assembly

If during cleaning and inspection the differential bearings were found to be unfit for further use and were removed follow this procedure for installation of new bearings.

(1) Position each differential bearing cone on hub of differential case (taper away from drive gear) and with installing Tool C-4086, install bearing cones. An arbor press may be used in conjunction with installing tool. **CAUTION:** Never exert pressure against the bearing cage, since this would damage the bearing.

(2) If the ring gear was removed from the **Sure-Grip** differential case or is being replaced with a new ring gear for any reason, new nylok drive gear screws must be installed.

IMPORTANT: **The procedure for installing the ring gear on differential case for the 8-3/4 in. axle differs from that of the 7-1/4 in. axle. This procedure must be followed so the ring gear seats on the differential case properly.**

(3) Using an Arkansas stone, relieve the sharp edge of the chamfer on the inside diameter of the ring gear (Fig. 23 in 8-3/4 in. Axle section of this group). This is very important, otherwise during the installation of ring gear on differential case, the sharp edge will remove metal from the pilot diameter of case and can get imbedded between differential case flange and gear; causing gear not to seat properly.

(4) Position ring gear on differential case pilot aligning threaded holes of ring gear with those in differential case flange.

(5) Insert drive gear screws (left hand threads) through case flange and into ring gear. After all cap screws are properly started, tap ring gear against differential case flange with a non-metallic mallet.

(6) Position differential case unit between brass jaws of a vise and alternately tighten each cap screw to 55 foot-pounds.

NOTE: **Before installation of differential case into carrier lubricate the inside of differential assembly with Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant than this special lubricant.**

(7) Follow procedure outlined in conventional axle assembly for setting drive pinion depth of mesh, drive gear backlash adjustment and bearing preload adjustment.

INSTALLING SURE-GRIP DIFFERENTIAL AND CARRIER ASSEMBLY

(1) Using a new gasket install carrier assembly in axle housing. Tighten mounting nuts to 45 foot-pounds.

(2) Refer to "Installation of Rear Axle Shaft", when installing axle shafts.

(3) Connect the rear universal joint.

(4) Before lowering the rear wheels of the vehicle to be raised off the floor when adjusting brakes.

LUBRICATION

Every six months check the fluid level in the axle through the filler plug hole. When checking the level, be sure the vehicle is in a level position on an axle or drive on type hoist. "See Lubrication Section" for proper level of specific axle assembly.

In **Sure-Grip** Differentials, use only the Chrysler Hypoid Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant than this special lubricant.

Anticipated Temperature Range	Viscosity Grade
Above – 10°F.	SAE 90
As low as – 30°F.	SAE 80
Below – 30° F.	SAE 75

"SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT HOLE."

SPECIFICATIONS

	7-1/4" Axle
TYPE	Semi-Floating Hypoid
Ring Gear Diameter	7.250
Number of Differential Pinions	2
DIFFERENTIAL BEARINGS	
Adjustment by	Spacer Washer
	.254-.284 inch in .002 inch graduations
Carrier Bearing Preload Spread	.003-.006
PINION AND DRIVE GEAR BACK LASH	.004-.007" at point of minimum back lash
PINION BEARING PRELOAD ADJUSTMENT BY	Spacer Washers
	.074-.106 inch in .001 variations
PINION BEARING DRAG TORQUE	15-25 inch-pounds
PINION DEPTH OF MESH ADJUSTMENT BY	Spacer Washers
	.084-.100 inch in .002 inch graduations
RUNOUT-CASE AND DRIVE GEAR	.005 inch Maximum
WHEEL BEARING TYPE	Single Row Sealed Ball
LUBRICATION	
Capacity	2 Pints (1-3/4 Imperial)
Type	Multi-Purpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used on all rear axles; such a lubricant is available under Part No. 2933565 Chrysler Hypoid Gear Lubricant or an equivalent be used.

	8-1/4" Axle
TYPE	Semi-Floating Hypoid
Ring Gear Diameter	8.250"
PINION BEARINGS	
Type	Taper Roller
Number Used	Two
Adjustment	Collapsible Spacer
Pinion Bearing Preload New Bearings	20-35 Inch-Pounds
Used Rear And New Front	10-25 Inch-Pounds

DIFFERENTIAL	Conventional
Bearings (Type)	Taper Roller
Number Used	Two
Preload Adjustment	Threaded Adjustment
RING GEAR AND PINION	Hypoid
Serviced In	Matched Sets
Pinion Depth Of Mesh Adjustment	Select Shims
Pinion and Ring Gear Backlash	.006-.008" At Point Of Minimum Backlash
Runout-Differential Case and Ring Gear Backface	.006" Maximum
WHEEL BEARINGS	
Type	Straight Roller
Adjustment	None
End Play	Built-In
Lubrication	Rear Axle Lubricant
LUBRICATION	
Capacity	4.4 PTS. (3-1/2 Imperial)
Type	Multi-Purpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used on all rear axles; such a lubricant is available under Part No. 2933565 Chrysler Hypoid Gear Lubricant or an equivalent be used.

8-3/4" Axle

TYPE	Semi-Floating Hypoid
Ring Gear Diameter	8.750
PINION BEARINGS	
Type	Tapered Roller
Number Used	2
Adjustment (Small Stem) (Step Type Pinion)	Selected Shims
(Large Stem) (Tapered Pinion)	Collapsible Spacer
Pre-Load Torque (Seal Removed)	20 to 30 inch-pounds
DIFFERENTIAL BEARINGS	
Type	Tapered Roller
Number Used	2
Adjustment	Adjusting Nut
RING GEAR AND PINION	
Serviced in	Matched Sets
Ring Gear Runout	.005" Max.
Back Lash	.006 to .008"
DIFFERENTIAL SIDE GEAR CLEARANCE	
With Gauge	.001 to .012"
WHEEL BEARINGS	
Type	Tapered Roller
Adjustment	Adjusting Nut
End Play	.008-.018
Lubrication	Multi-Purpose Grease NLGI grade 2 E.P.
LUBRICATION	
Capacity	4.4 Pints (3-1/2 Imperial)
Type	Multi-Purpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used on all rear axles; such a lubricant is available under Part No. 2933565 Chrysler Hypoid Gear Lubricant, or an equivalent be used.

	9-3/4" Axle
TYPE	Semi-Floating Hypoid
Ring Gear Diameter	9.750
PINION BEARINGS	
Type	Taper Roller
Number Used	2
Adjustment	Select Shims
Pinion bearing drag Torque (seal removed)	10-20 inch-pounds
DIFFERENTIAL	Sure-Grip
Bearings(Type)	Taper Roller
Number Used	2
Pre-Load Adjustment	Select Shims
RING GEAR AND PINION	Hypoid
Serviced in	Matched Sets
Pinion depth of mesh adjustment	Select Shims
Pinion and Ring Gear Backlash	.004-.009" at point of minimum backlash
Runout-differential case and ring gear backface	.006" maximum
WHEEL BEARINGS	
Type	Taper Roller
Adjustment	Threaded Adjusting Nut
End Play	.008-.012
Lubrication	Multi-Purpose Grease NLGI grade 2 E.P.
LUBRICATION	
Capacity	5-1/2 Pts. (4-1/2 Imperial)
Type	Multi-Purpose Gear Lubricant as defined by MIL-L-2105B (API GL-5) should be used on all rear axles; such a lubricant is available under Part No. 2933565 Chrysler Hypoid Gear Lubricant or an equivalent be used.

TIGHTENING REFERENCE

	7-1/4" Axle Pounds Foot	Inch
Differential Bearing Cap Bolts	40	
Ring Gear to Differential Case Bolts (Left Hand Thread)	55	
Drive Pinion Flange Nut	240 (Min.)	
Carrier Cover Bolts	20	
Axle Shaft Retainer Nuts	35	
Propeller Shaft Bolts (Rear)	15	
Spring Clip (U Bolt) Nuts	40 Max.)	
Wheel Stud Nuts	55	
Shock Absorber Stud Nuts (Lower)	50	

	8-1/4" Axle Pounds Foot	Inch
Differential Bearing Cap Bolts	55	
Ring Gear to Differential Case Bolts	55	
Drive Pinion Flange Nut	170 (Min.)	
Carrier Cover Bolts	15-25	
Brake Support Plate Retainer Nuts	30-35	
Propeller Shaft Bolts (Rear)		170-200
Spring Clip (U Bolt) Nuts	45	
Wheel Stud Nuts	65	
Shock Absorber Stud Nuts	50	

	8-3/4" Axle Pounds	
	Foot	Inch
Differential Bearing Cap Bolts	90	
Ring Gear to Differential Case Bolts (Left Hand Thread)	55	
Drive Pinion Flange Nut (Small Stem Step Pinion)	240 (Min.)	
(Large Stem Tapered Pinion)	170 (Min.)	
Carrier to Axle Housing Bolt Nuts	45	
Axle Shaft Retainer Nuts	35	
Propeller Shaft Bolts (Rear)	15	
Spring Clip (U Bolt) Nuts	45	
Wheel Stud Nuts	65	
Shock Absorber Stud Nuts (Lower)	50	

	9-3/4" Axle Pounds	
	Foot	Inch
Differential Bearing Cap Bolts	70-90	
Differential Case Half Retaining Bolts	35-45	
Ring Gear To Differential Case Bolts	100-120	
Drive Pinion Flange Nut	250-270	
Carrier Cover Bolts	15-25	
Axle Shaft Retainer Nuts	30-35	
Propeller Shaft Bolts (Rear)		170-200
Spring Clip (U-Bolt) Nuts	45	
Wheel Stud Nuts	65	
Shock Absorber Stud Nuts	50	

BRAKES

CONTENTS

	Page		Page
DISC BRAKES - FIXED CALIPER	30	PARKING BRAKES	19
DISC BRAKES - FLOATING CALIPER	41	POWER BRAKES	24
DRUM BRAKES	1 and 6	SERVICE DIAGNOSIS	1
GENERAL INFORMATION	1	SPECIFICATIONS	64
MASTER CYLINDERS	13, 56, 60	WHEEL CYLINDERS	16

GENERAL INFORMATION

The new Models are equipped with servo contact, two shoe, internal expanding brakes with application adjusters. The lower ends of the brake shoes are connected by a tubular star wheel adjusting screw (Fig. 1).

DRUM BRAKES

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
PEDAL GOES TO FLOOR	(a) Fluid low in reservoir.	(a) Fill and bleed master cylinder.
	(b) Air in hydraulic brake system.	(b) Fill and bleed hydraulic brake system.
	(c) Improperly adjusted brake.	(c) Repair or replace self-adjuster as required.
	(d) Leaking wheel cylinders.	(d) Recondition or replace wheel cylinder and replace both brake shoes.
	(e) Loose or broken brake lines.	(e) Tighten all brake fittings or replace brake line.
	(f) Leaking or worn master cylinder.	(f) Recondition or replace master cylinder and bleed hydraulic system.
	(g) Excessively worn brake lining.	(g) Reline and adjust brakes.
SPONGY BRAKE PEDAL	(a) Air in hydraulic system.	(a) Fill master cylinder and bleed hydraulic system.
	(b) Improper brake fluid (low boiling point).	(b) Drain, flush and refill with brake fluid.
	(c) Excessively worn or cracked brake drums.	(c) Replace all faulty brake drums.
	(d) Broken pedal pivot bushing.	(d) Replace nylon pivot bushing.
BRAKES PULLING	(a) Contaminated lining.	(a) Replace contaminated brake lining.
	(b) Front end out of alignment.	(b) Align front end.
	(c) Incorrect brake adjustment.	(c) Adjust brakes and check fluid.
	(d) Unmatched brake lining.	(d) Match primary, secondary with same type of lining on all wheels.
	(e) Brake shoes distorted.	(e) Replace faulty brake shoes.
	(f) Restricted brake hose or line.	(f) Replace plugged hose or brake line.
	(g) Broken rear spring.	(g) Replace broken spring.
SQUEALING BRAKES	(a) Glazed brake lining.	(a) Cam grind or replace brake lining.
	(b) Saturated brake lining.	(b) Replace saturated lining.
	(c) Weak or broken brake shoe retaining spring.	(c) Replace retaining spring.
	(d) Broken or weak brake shoe return spring.	(d) Replace return spring.
	(e) Incorrect brake lining.	(e) Install matched brake lining.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(f) Distorted brake shoes.	(f) Replace brake shoes.
	(g) Bent Support Plate.	(g) Replace support plate.
	(h) Dust in brakes or scored brake drums.	(h) Blow out brake assembly with compressed air and reface brake drums.
CHIRPING BRAKES	(a) Out of round drum or eccentric axle flange pilot.	(a) Repair as necessary, and lubricate support plate contact areas (6 places).
DRAGGING BRAKES	(a) Incorrect wheel or parking brake adjustment.	(a) Adjust brakes and check fluid.
	(b) Parking brakes engaged.	(b) Release parking brakes.
	(c) Weak or broken brake shoe return spring.	(c) Replace brake shoe return spring.
	(d) Brake pedal binding.	(d) Free up and lubricate brake pedal and linkage.
	(e) Master cylinder cup sticking.	(e) Recondition master cylinder.
	(f) Obstructed master cylinder relief port.	(f) Use compressed air and blow out relief port.
	(g) Saturated brake lining.	(g) Replace brake lining.
	(h) Bent or out of round brake drum.	(h) Reface or replace faulty brake drum.
	(i) Incorrect stop light switch adjustment.	(i) Adjust stop light switch.
HARD PEDAL	(a) Brake booster inoperative.	(a) Replace brake booster.
	(b) Incorrect brake lining.	(b) Install matched brake lining.
	(c) Restricted brake line or hose.	(c) Clean out or replace brake line or hose.
	(d) Frozen brake pedal linkage.	(d) Free up and lubricate brake linkage.
WHEEL LOCKS	(a) Contaminated brake lining.	(a) Reline both front or rears of all four brakes.
	(b) Loose or torn brake lining.	(b) Replace brake lining.
	(c) Wheel cylinder cups sticking.	(c) Recondition or replace wheel cylinder.
	(d) Incorrect wheel bearing adjustment.	(d) Clean, pack and adjust wheel bearings.
BRAKES FADE (HIGH SPEED)	(a) Incorrect lining.	(a) Replace lining.
	(b) Overheated brake drums.	(b) Inspect for dragging brakes.
	(c) Incorrect brake fluid (low boiling temperature).	(c) Drain, flush, refill and bleed hydraulic brake system.
	(d) Saturated brake lining.	(d) Reline both front or rear or all four brakes.
SURGE Below 15 MPH	(a) Bent or out of round rear brake drum.	(a) Reface or replace brake drum.
CHATTER 80 to 40 MPH	(a) Bent or out of round front brake drum.	(a) Reface or replace brake drum.
SHOE KNOCK	(a) Machine grooves in contact face of brake drum.	(a) Sand, reface or replace brake drum.
	(b) Weak hold down springs.	(b) Replace hold down springs.
BRAKES DO NOT SELF ADJUST	(a) Adjuster screw frozen in thread.	(a) Clean and free-up all thread areas.
	(b) Adjuster screw corroded at thrust washer.	(b) Clean threads and replace thrust washer if necessary.
	(c) Adjuster lever does not engage star wheel.	(c) Repair, free up or replace adjuster as required.
	(d) Adjuster installed on wrong wheel.	(d) Install correct adjuster parts.

SERVICE PROCEDURES

INDEX

	Page
Ajusting Service Brakes	3
Bleeding Brake System	3
Brake Hose and Tubing	4
Stop Lamp Switch Adjustment	6
Test for Fluid Contamination	4
Testing Application Adjusters	3

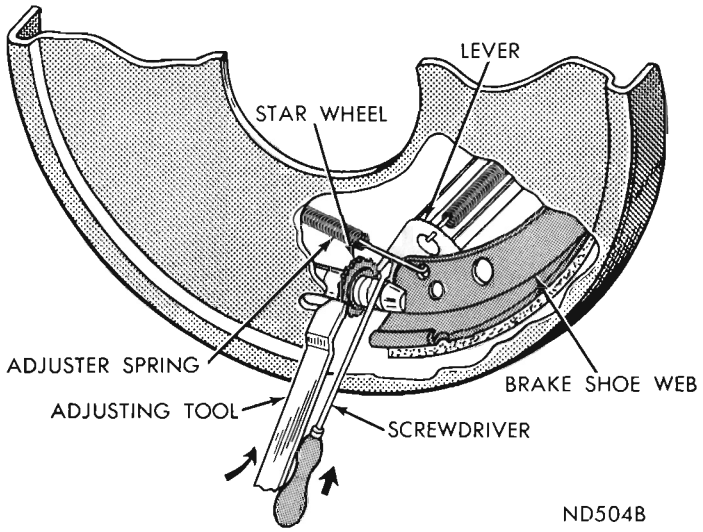


Fig. 1 - Adjusting Brakes

ADJUSTING SERVICE BRAKES

Normally self adjusting brakes will not require manual adjustment but in the event of a brake reline it may be advisable to make the initial adjustment manually to speed up the adjusting time.

(1) Jack up vehicle so all wheels are free to turn.

(2) Remove rear adjusting hole cover from brake supports of vehicle.

(3) **Be sure parking brake lever is fully released, then back off parking brake cable adjustment so there is slack in cable.**

(4) Insert adjusting tool C-3784, into star wheel of adjusting screw. Move handle of tool upward until a slight drag is felt when road wheel is rotated.

(5) Insert a thin screwdriver into brake adjusting hole and push adjusting lever out of engagement with star wheel. **(Care should be taken so as not to bend adjusting lever or distort lever spring** (Fig. 1), while holding adjusting lever out of engagement, back off star wheel to insure a free wheel with no brake shoe drag.

(6) Repeat above adjustment at each wheel. The adjustment must be equal to all wheels. Install adjusting hole covers in brake supports.

(7) Adjust parking brake **after** wheel brake adjustment.

It is important to follow the above sequence to avoid the possibility of the parking brake system causing brake drag as may occur if the parking brakes are adjusted before the service brakes.

TESTING APPLICATION ADJUSTER OPERATION

Place the vehicle on a hoist, with a helper in the driver's seat to apply the brakes. Remove the plug from the rear adjustment slot in each brake support plate to observe the adjuster star wheel. Then, to exclude the possibility of maximum adjustment; that is, the adjuster refuses to operate because the closest possible adjustment has been reached; the star wheel should be backed off approximately 30 notches. It will be necessary to hold the adjuster lever away from the star wheel to allow backing off of the adjustment.

Spin the wheel and brake drum in the reverse direction and apply the brakes vigorously. This will provide the necessary inertia to cause the secondary brake shoe to leave the anchor. The wrap up effect will move the secondary shoe, and the cable will pull the adjuster lever up. Upon application of the brake pedal, the lever should move upward, turning the star wheel. Thus, a definite rotation of the adjuster star wheel can be observed if the automatic adjuster is working properly. If by the described procedure one or more adjusters do not function properly, the respective drum must be removed for adjuster servicing.

BLEEDING BRAKE SYSTEM

Clean all dirt and foreigh material from the cover of the master cylinder to prevent any dirt from falling into the master cylinder reservoir when the cover is removed.

Using the one man bleeder tank C-3496-B (with adapter) provides a convenient means of keeping the master cylinder full while pressurizing the hydraulic system for bleeding. (Complete bleeding of the dual master cylinder is important! See Bleeding the Master Cylinder in this Section.) **Manual**

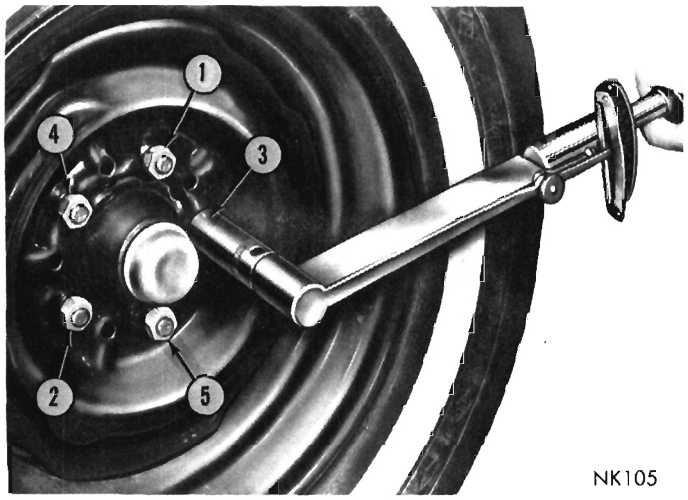


Fig. 2 - Wheel Stud Nut Tightening Sequence

Bleeding is not recommended because of reduced fluid flow.

Tighten the brakes of each wheel until the brakes are locked. (This reduces the movement of the wheel cylinder cups and assists in bleeding).

Starting with the right rear wheel clean all dirt from the bleeder valve. Place bleeder hose C-650 on the bleeder valve and insert the other end of the bleeder hose into a clear jar half filled with clean brake fluid. (This will permit the observation of air bubbles as they are being expelled from the hydraulic system and also prevent air from being drawn back into the system. Follow the manufacturers instructions in the use of the bleeder tools.)

Continue this bleeding operation on the other wheels, starting with the left rear wheel, then the right front and finishing with the left front wheel.

If necessary, repeat this bleeding operation if there is any indication (a low, soft or spongy brake pedal) of air remaining in the hydraulic system. Readjust the brakes as described previously.

TEST FOR FLUID CONTAMINATION

To determine if contamination exists in the brake fluid (as indicated by swollen or deteriorated rubber cups), the following test can be made.

Place a small amount of the drained brake fluid into a small clear glass bottle. Separation of the fluid into distinct layers will indicate mineral oil content.

If there is any question of mineral oil content, as indicated by swollen or deteriorated rubber parts, drain and flush thoroughly and replace all rubber parts.

WHEEL STUD NUT TIGHTENING

The tightening sequence and torquing of the wheel stud nuts is of great importance to insure efficient brake operation. The use of an impact or long handled wrench may distort the drum.

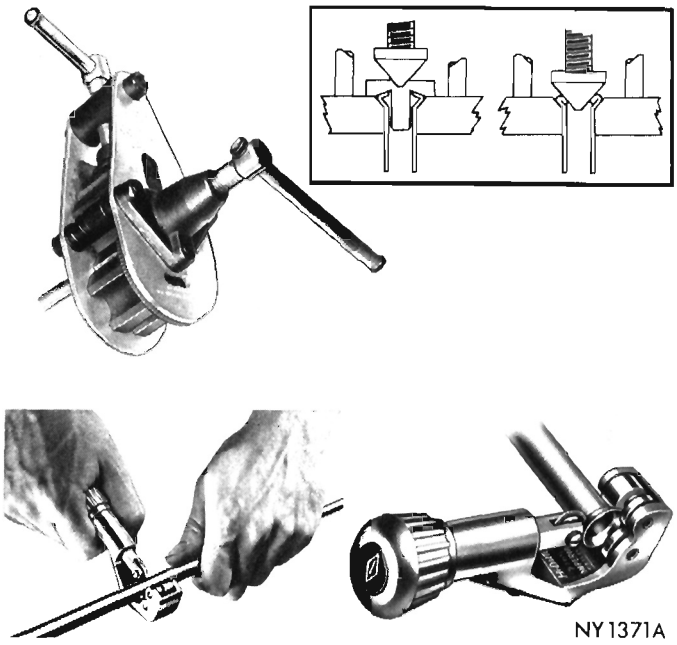


Fig. 3 - Cutting and Flaring Steel Tubing

A criss-cross tightening sequence should be used (Fig. 2). Tighten all the stud nuts to one-half the specified torque first, (30 ft. lbs.), and then repeat the sequence tightening to the specified 55 foot-pounds. (65 foot pounds on 10 and 11 inch brakes).

BRAKE HOSE AND TUBING

The flexible hydraulic brake hose should always be installed in the vehicle by first tightening the male end of the hose in the wheel cylinder or rear axle housing tee. The hose is then clipped to the hose bracket in a manner to give minimum twist. Excessive twist can result in hose interference problems with possible hydraulic system failure.

Inspection of brake hose and tubing should be included in all brake service operations. The hoses should be checked for:

(1) Correct length, severe surface cracking, pulling scuffing or worn spots. **(Should the cotton fabric casing of the hose be exposed by cracks or abrasions in the rubber hose cover, the hose should be replaced).** Eventual deterioration of the hose can take place with possible burst failure.

(2) Faulty installation to cause twisting, wheel, tire or chassis interference.

Always use factory recommended hose to insure quality, correct length and superior fatigue life. Care should be taken to make sure that the tube and hose mating surfaces are clean and free from nicks and burrs. New copper seal washers should be used and the tube nuts and connections should

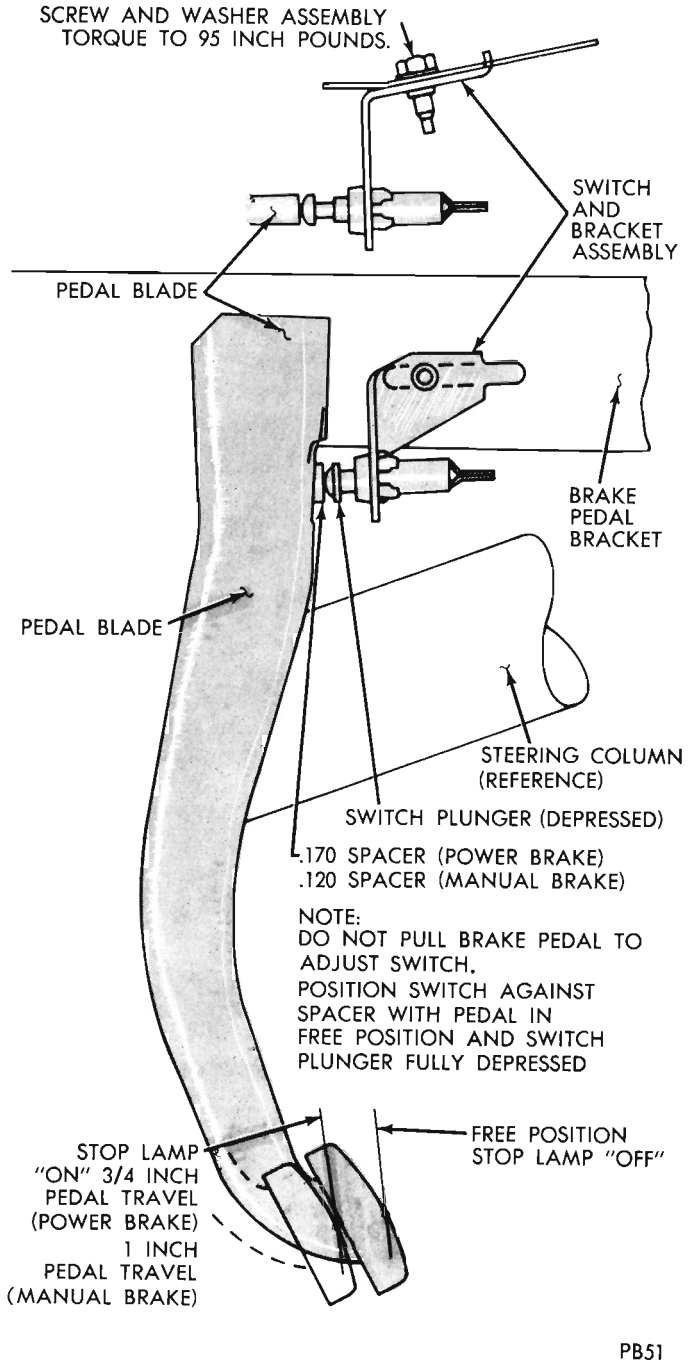


Fig. 4 - Stop Light Switch Adjustment (Valiant Models)

be properly made and tightened. Double wall steel tubing should always be used to insure superior fatigue life. Care should be taken when replacing brake tubing, to use the proper bending and flaring tools and to avoid routing the tubes against sharp edges, moving components or in hot areas. All tubes should be properly attached with recommended retaining clips.

Steel tubing is used to conduct hydraulic pressure to the front and rear brakes. Flexible rubber hose is used at both front brakes and at a rear axle junction block. Steel tubing is used from the

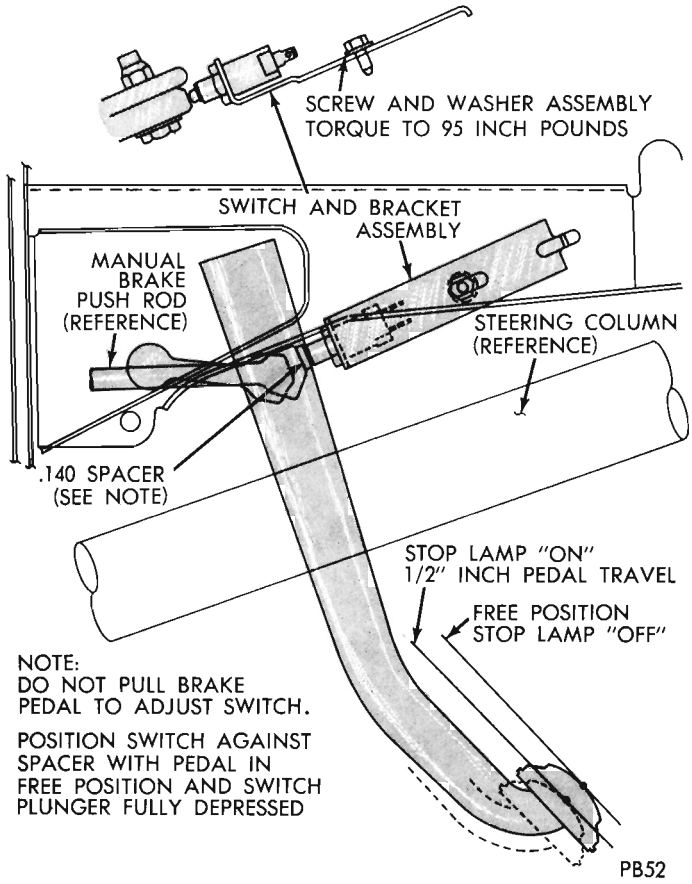


Fig. 5 - Stop Light Switch Adjustment (Satellite and Barracuda Models)

junction block to both rear wheel cylinders. All fittings, tubing and hoses should be inspected for rusted, damaged or defective flaring seats. The steel tubing is equipped with a double flare or inverted seat to insure more positive seating in the fitting. To repair or reflare tubing proceed as follows:

(1) Using Tool C-3478, or equivalent, cut off damaged seat or damaged tubing (Fig. 3).

(2) Ream out any burred or rough edges showing on inside edges of tubing. This will make the ends of tubing square and insure better seating of flared end tubing. **Place compression nut on tubing prior to flaring tubing.**

(3) To flare tubing open handles of flaring Tool C-3838 and rotate jaws of tool until the mating jaws of tubing size are centered in area between vertical posts.

(4) Slowly close handles with tubing inserted in jaws but do not apply heavy pressure to handle as this will lock tubing in place.

(5) Place gauge "Form A" on edge over end of tubing and push tubing through jaws until end of tubing contacts the recessed notch of gauge matching the size of tubing (Fig. 3).

(6) Squeeze handles of flaring tool and lock tubing in place.

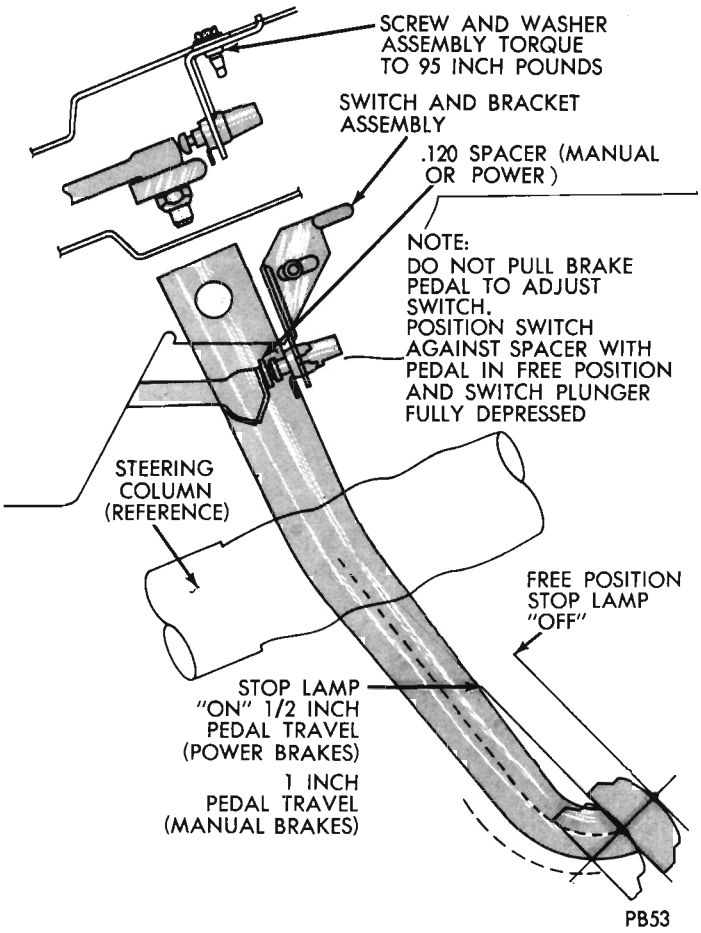


Fig. 6 - Stop Light Switch Adjustment (Fury, Chrysler and Imperial Models)

(7) Place proper sized plug of gauge "A" down in end of tubing. Swing compression disc over gauge and center tapered flaring screw in recess of disc.

(8) Lubricate taper of flaring screw and screw in until plug gauge has seated on jaws of flaring tool. This action has started to invert the extended end of the tubing.

(9) Remove gauge and apply lubricant to tapered end of flaring screw and continue to screw down until tool is firmly seated in tubing.

(10) Remove tubing from flaring tool and inspect seat.

(11) Clean seat and tube of any lubricant before connecting to hydraulic system.

Stop Light Switch Adjustment

The stop light (or stop light/speed control) switch and mounting bracket assembly is attached to the brake pedal bracket. The switch is actuated by the pedal blade on Valiant models and by the brake push rod on all other models.

Refer to figures 4, 5 or 6 for proper switch adjustment as follows:

(1) Loosen switch assembly to pedal bracket attaching screw and slide assembly away from pedal blade or brake push rod.

(2) Push brake pedal down and allow to return to free position, **do not pull brake pedal back at any time.**

(3) Place proper spacer gauge on pedal blade or push rod.

(4) Slide switch assembly toward pedal blade or push rod until switch plunger is fully depressed against spacer gauge (on heavy duty or stop light/speed control switches, depress plunger until switch body contacts spacer gauge).

(5) Re-tighten switch bracket screw to 95 inch pounds.

(6) Remove spacer.

DRUM BRAKES

INDEX

	Page
Brake Drum Removal	7
Front Brake Drums	7
Rear Brake Drums	7
Brake Shoe Removal	7
Front Brake Shoes	7
Rear Brake Shoes	10
Brake Drum Installation	12
Front Brake Drums	12
Rear Brake Drums	12
Brake Shoe Installation	11
Front Brake Shoes	11
Rear Brake Shoes	11
Cleaning and Inspection	10
Grinding and Refacing Recommendations	10

SERVICE PROCEDURES

The eleven inch brakes used on taxi vehicles, (Fig. 4) are equipped with manual adjusters. The service procedures covering these brakes are identical to the passenger car, with the exception of reference to application adjusters. Illustrations of the various service procedures will not always show any one specific brake.

BRAKE DRUM REMOVAL

Removing Front Brake Drums

To aid in brake drum removal loosen brake star adjusting wheel.

(1) Remove rear plug from brake adjusting access hole.

(2) Insert a thin screwdriver into brake adjusting hole and push adjusting lever away from star adjusting wheel. **Care should be taken not to bend adjusting lever.**

(3) Insert Tool C-3784 into brake adjusting hole and engage notches of brake adjusting star wheel. Release brake adjustment by prying down with adjusting tool.

(4) Remove wheel cover, grease cap, cotter pin, lock, adjusting nut, outer wheel bearing and remove wheel and drum assembly from spindle to expose brake linings (Figs. 1, 2, 3 or 4).

(5) Inspect brake lining for wear, shoe alignment, or contamination from grease or brake fluid.

Removing Rear Brake Drums

(1) Remove rear plug from brake adjusting access hole.

(2) Insert a thin screwdriver into brake adjusting hole and hold adjusting lever away from notches of adjusting screw.

(3) Insert Tool C-3784 into brake adjusting hole and engage notches of brake adjusting screw. Release brake by prying down with adjusting tool.

(4) Remove rear wheel and clips from wheel studs that holds drum on axle. Discard clips. Remove drums.

(5) Inspect brake lining for wear, shoe alignment or contamination from grease or brake fluid.

BRAKE SHOE REMOVAL

Removing Front Brake Shoes

(1) Using Tool C-3785 remove brake shoe return springs (Fig. 5). (Note how secondary spring over-

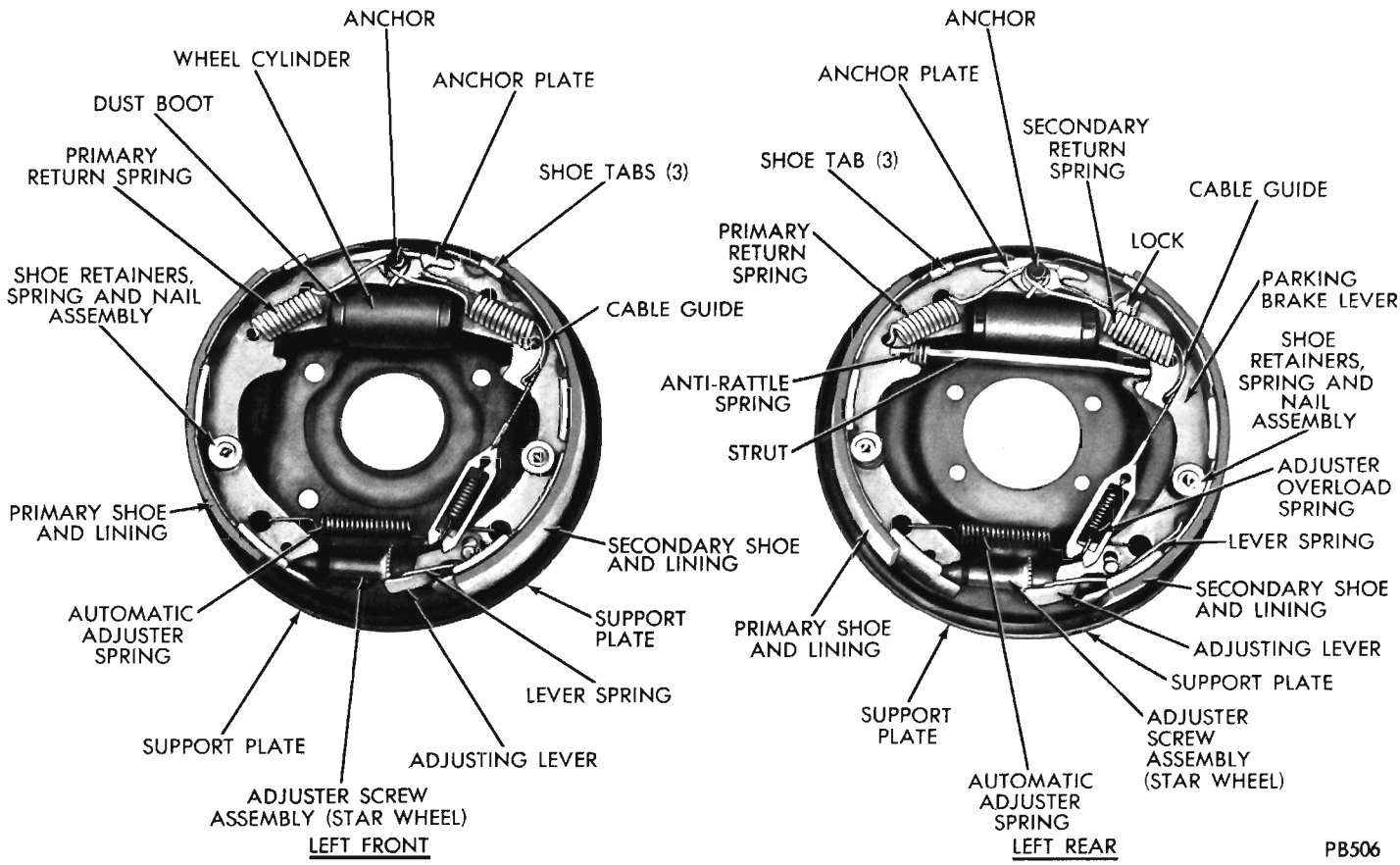


Fig. 1 - Nine Inch Brake Assemblies

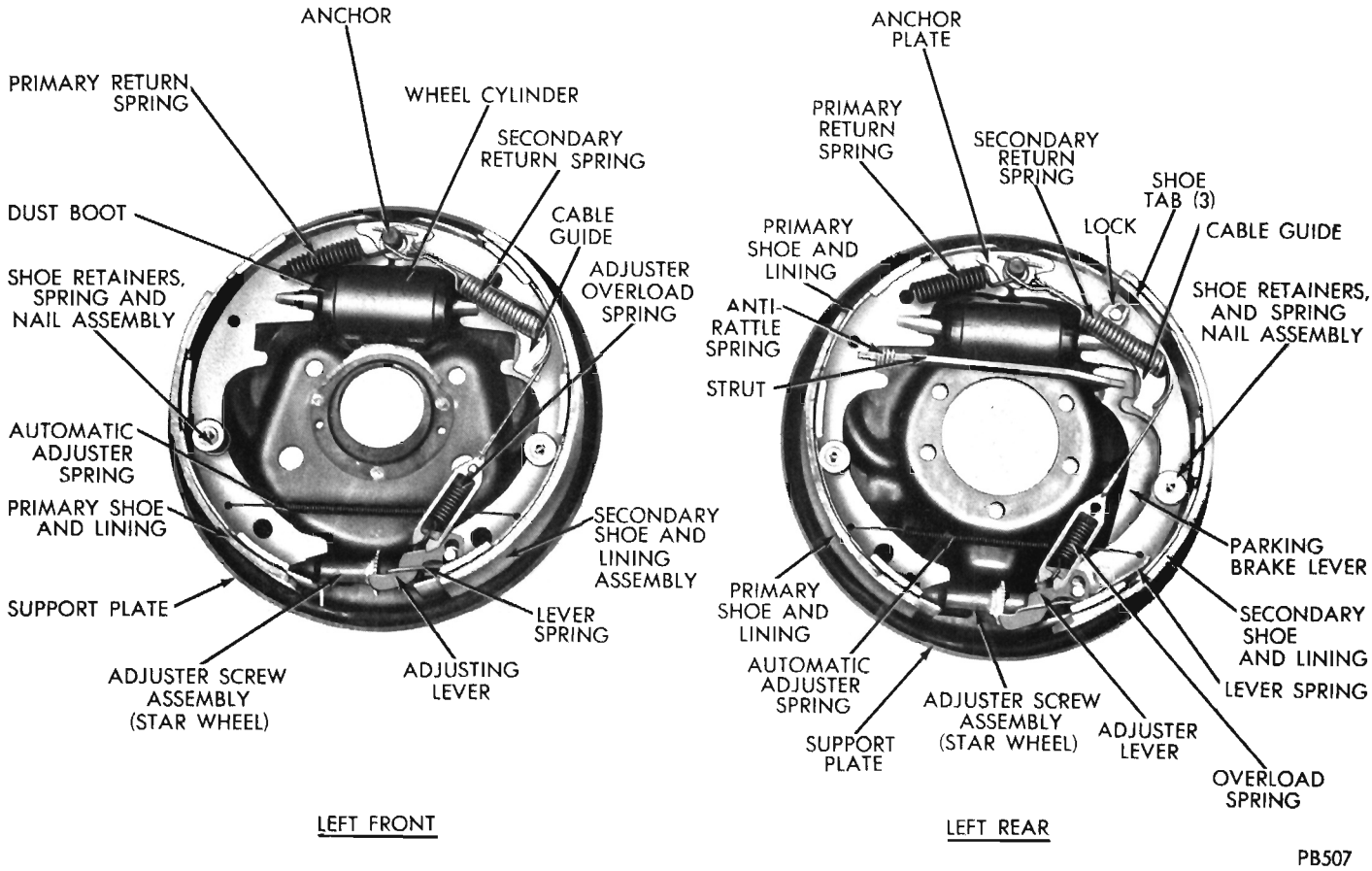


Fig. 2 - Ten Inch Brake Assemblies

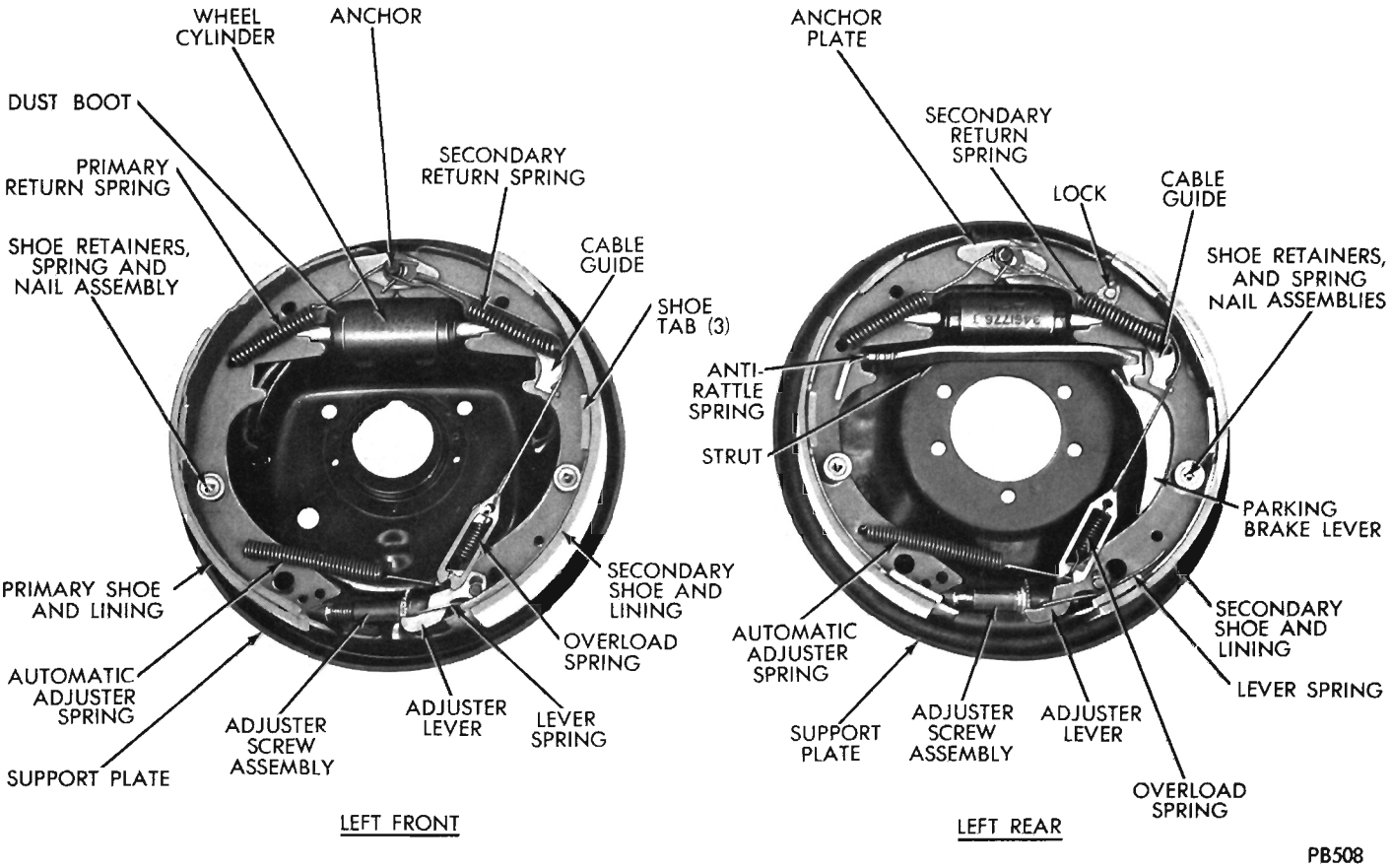


Fig. 3 - Eleven Inch Brake Assemblies

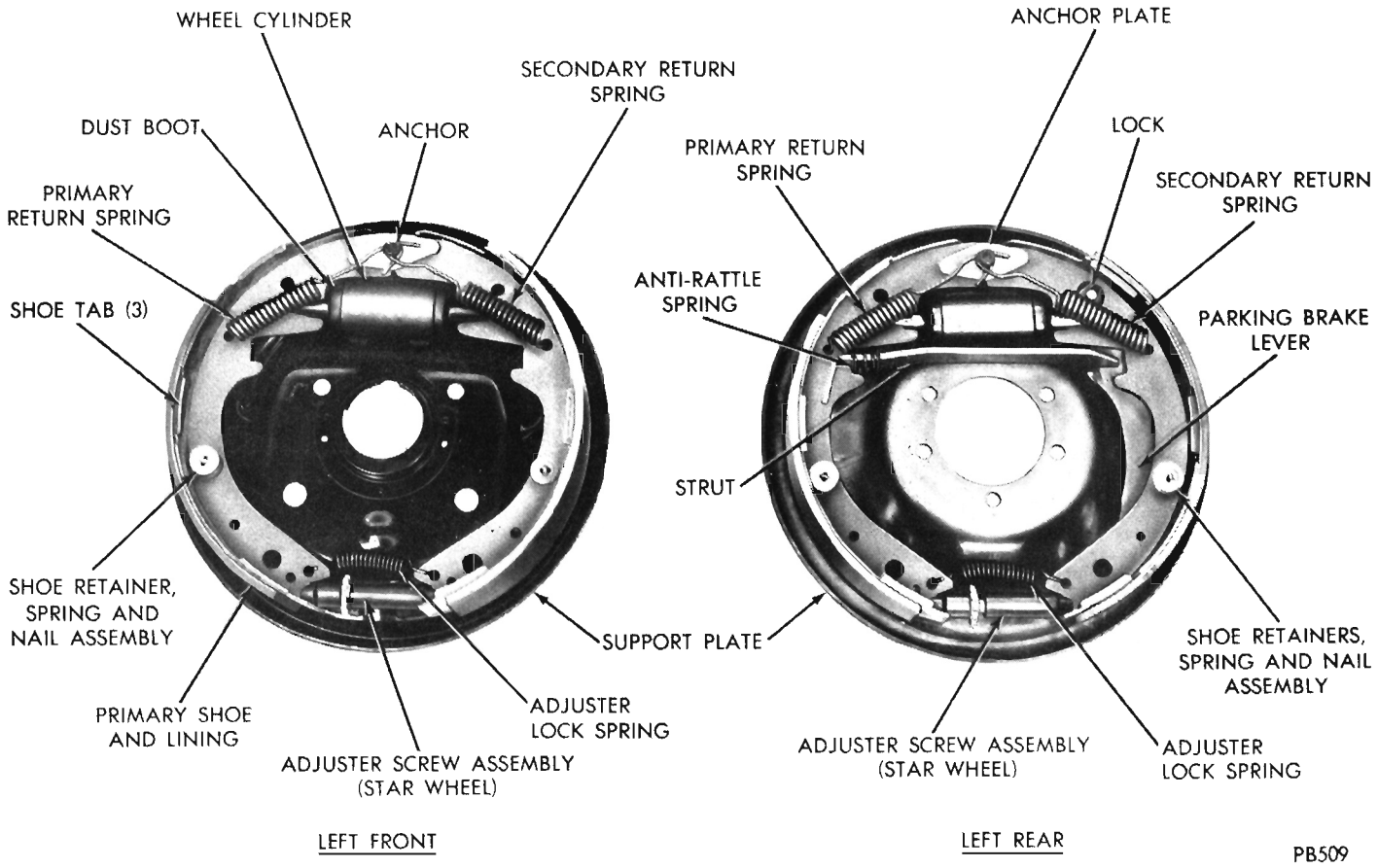


Fig. 4 - Eleven Inch Brake Assemblies (Without Automatic Adjusters)

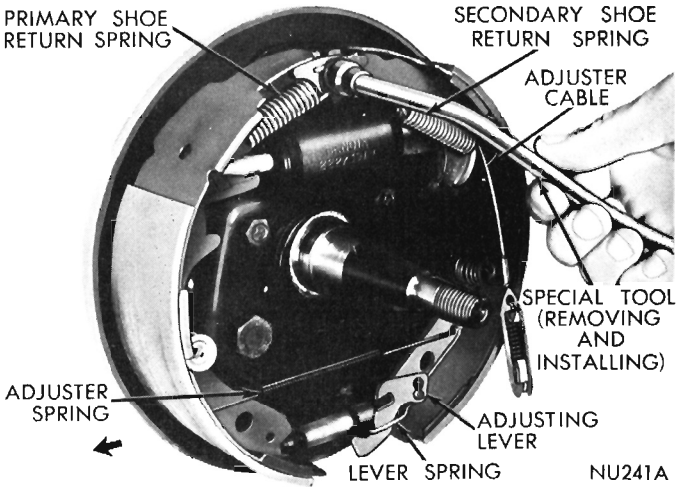


Fig. 5 - Removing Shoe Return Springs (Left Front)

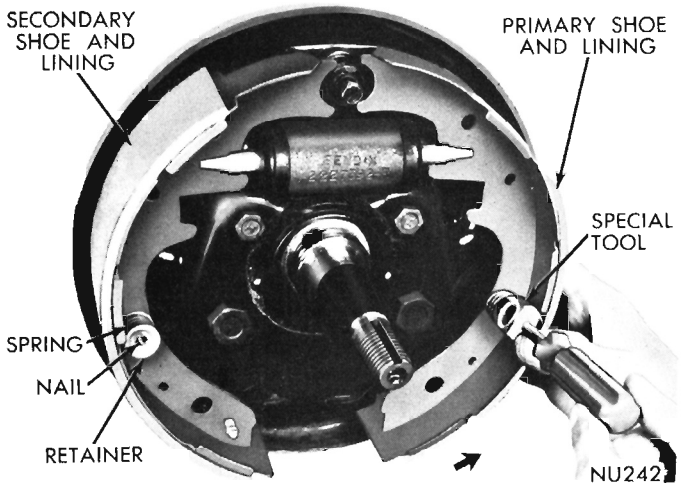


Fig. 6 - Removing or Installing Shoe Retainers, Springs and Nails (Right Front)

laps primary spring). (Fig. 1).

(2) Slide eye of automatic adjuster cable off anchor and unhook from adjusting lever. Remove cable, overload spring, cable guide and anchor plate.

(3) Disengage adjusting lever from spring by sliding forward to clear pivot, then working out from under spring. Remove spring from pivot. Remove automatic adjuster spring from secondary shoe web and disengage from primary shoe web. Remove spring. (Eleven inch brake only).

(4) Remove brake shoe retainers, springs and nails, using Tool C-4070, (Fig. 6).

(5) Disengage primary and secondary shoes from push rods (if so equipped) and remove from support. Remove adjusting star wheel assembly from shoes.

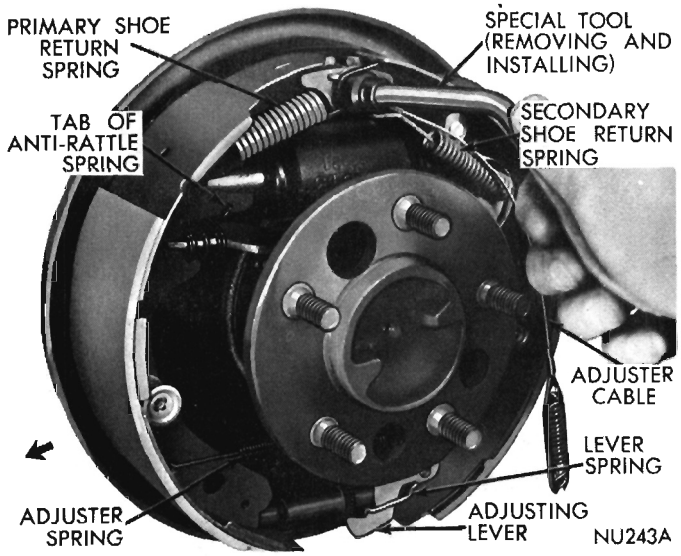


Fig. 7 - Removing Shoe Return Springs (Left Rear)

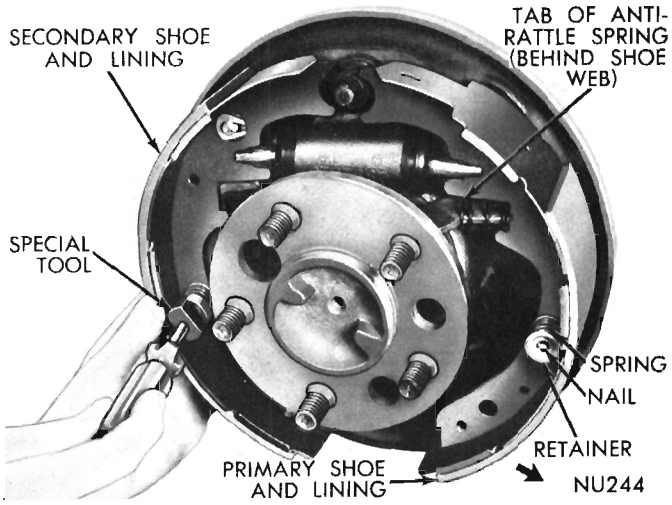


Fig. 8 - Removing or Installing Shoe Retainers, Springs and Nails (Right Rear)

Removing Rear Brake Shoes

(1) Remove rear wheel, and drum retaining clips. Remove drum.

(2) Using Tool C-3785, remove brake shoe return springs (Fig. 7). (Note how secondary spring overlaps primary spring). (Fig. 1).

(3) Slide eye of automatic adjuster cable off anchor and then unhook from adjusting lever. Remove cable, overload spring, cable guide and anchor plate.

(4) Disengage adjusting lever from spring by sliding forward to clear pivot, then working out from under spring. Remove spring from pivot. Remove automatic adjuster spring from secondary shoe web and disengage from primary shoe web. Remove spring. (Eleven inch brake only).

(5) Disengage primary and secondary shoes from push rods (if so equipped) and remove adjusting star wheel assembly from shoes.

(6) Spread anchor ends of primary and secondary shoes and remove parking brake lever strut and anti-rattle spring (Fig. 12).

(7) Remove brake shoe retainers, springs and nails. Using Tool C-4070, (Fig. 8), and remove from support.

(8) Disengage parking brake cable from parking brake lever.

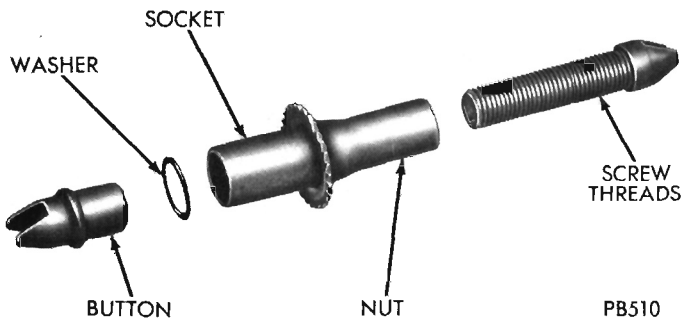


Fig. 9 - Adjusting Screw Assembly

CLEANING AND INSPECTION

Wipe or brush clean (dry) the metal portions of the brake shoes. Examine the lining contact pattern to determine if the shoes are bent. The lining should show contact across the entire width, extending from heel to toe. Shoes showing contact only on one side should be replaced. Shoes having sufficient lining but lack of contact at toe and heel should be measured for proper grind.

Clean the support, using a suitable solvent, then inspect for burrs. Remove if necessary. Clean and inspect the adjusting screws for pulled or stripped threads, then apply a thin film of lubricant to the threads, socket and washer (Fig. 9).

New brake shoe return springs and hold down springs should be installed where the old springs have been subjected to overheating or if their strength is questionable. Spring paint discoloration or distorted end coils would indicate an overheated spring.

GRINDING AND REFACING RECOMMENDATIONS

Brake Shoe Lining—New lining should be measured and ground .060 in. to .080 in. (maximum under the drum diameter). When replacing brake shoe and lining assemblies, always check them in

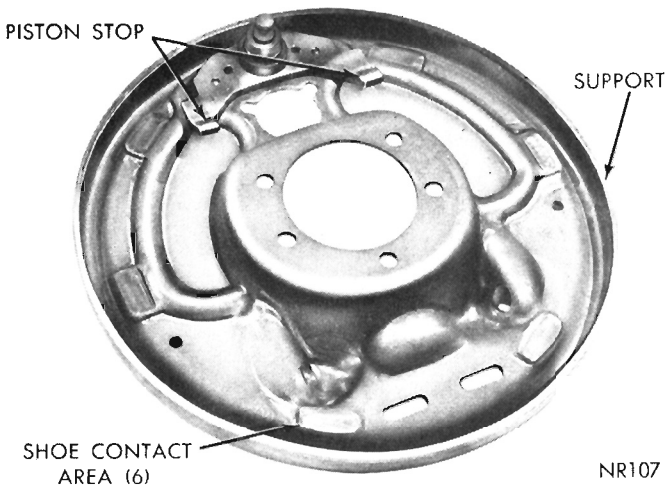


Fig. 10 - Shoe Contact Area on Support

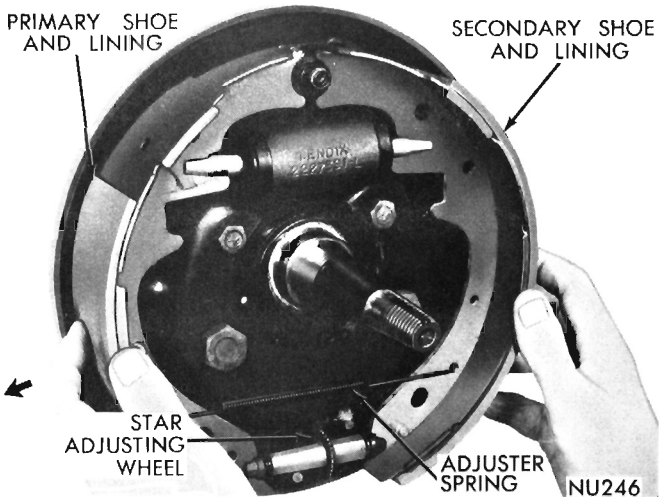


Fig. 11 - Installing Brake Shoes (Left Front)

the drum they are to be used with to insure that they have the recommended radius grind. This grind, which should provide at least .004 inch heel and toe clearance, is necessary for proper lining to drum contact during brake application.

Drum Refacing—Measure the drum runout and diameter with an accurate gauge. There should be no variation in the drum diameter greater than .002 inch. Drum runout should not exceed .006 inch out of round. If the drum runout or diameter variation exceed these values the drum should be refaced. Remove only as much material as is necessary to clean up the drum. It is recommended the front drums be refaced with the wheel and tire mounted. **Do not reface more than .060 inch over the standard drum diameter.**

NOTE: All drums will show markings of maximum allowable diameter. For example; a nine inch drum will have a marking of MAX. DIA. 9.090". This marking includes .030" for allowable drum wear beyond the recommended .060" of drum refacing.

BRAKE SHOE INSTALLATION

Installing Front Brake Shoes

Lubricate with a **thin film** the shoe tab contact area (6 places) on support plate with Chrysler support plate lubricant, Part number 2932524 or equivalent (Fig. 10).

(1) Match a primary with a secondary brake shoe and place them in their relative position on a work bench.

(2) Install adjusting star wheel assembly between primary and secondary shoes, with a star wheel next to secondary shoe (Fig. 1). (The left star wheel adjusting stud end is stamped "L" which indicates its position on vehicle). The left side star wheel is cadmium plated. The right is black, and the adjusting stud end is **not** stamped.

(3) Install adjuster spring in primary shoe and hook other end in web of secondary. (Eleven inch brake only). Install adjusting lever spring over pivot pin on shoe web. Install adjusting lever under spring and over pivot pin. Slide lever slightly rearward to lock in position (Fig. 1).

(4) Spread anchor ends of brake shoe to hold star adjusting wheel assembly in position.

(5) Holding brake shoes firmly, place assembly on support plate, and at the same time engage shoe webs with push rods. (If so equipped). (Fig. 11).

(6) Using Tool C-4070, install shoe retaining nails, springs and retainers. (Fig. 6).

(7) Install anchor plate over anchor.

(8) Slide "eye" of adjusting cable over anchor and against anchor plate. Engage end of primary shoe return spring in shoe web and install other end over anchor, using Tool C-3785.

(9) Install cable guide in secondary shoe web. Holding in position, engage secondary shoe return spring through guide and into web. Install other end over anchor, using Tool C-3785. (Be sure cable guide remains flat against shoe web, and that secondary spring overlaps primary). (Fig. 1). Using pliers, squeeze ends of spring loops (around anchor) until parallel.

(10) Thread adjuster cable over guide and hook end of overload spring in lever (Fig. 1). (Be sure "eye" of cable is pulled tight against anchor and in a straight line with guide).

Installing Rear Brake Shoes

Lubricate with a **thin film** the shoe tab contact area (6 places) on support plate with Chrysler support plate lubricant, Part number 2932524 or equivalent (Fig. 10).

(1) Install parking brake lever on inner side of secondary shoe web after lubricating pivot with support plate lubricant. Secure with wave washer

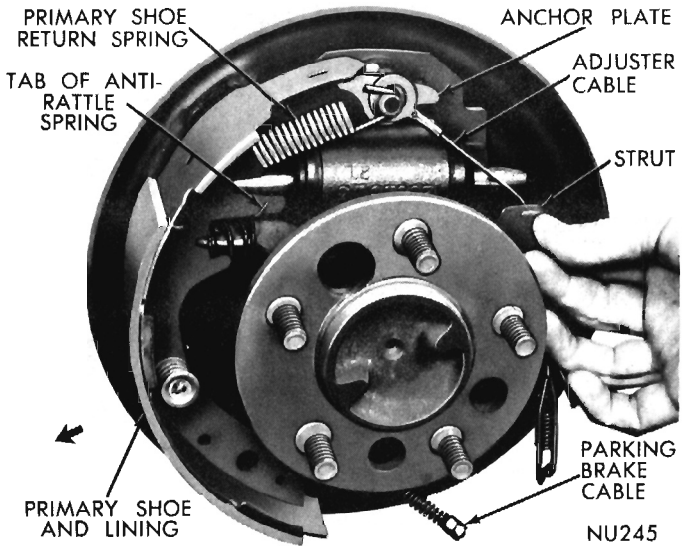


Fig. 12 - Removing or Installing Parking Brake Strut and Spring (Left Rear)

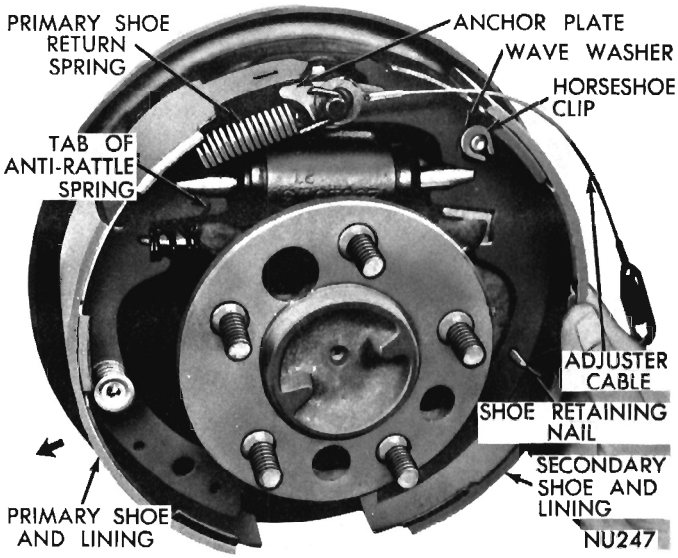


Fig. 13 - Installing Brake Shoes (Left Rear)

and horseshoe clip.

(2) Engage parking brake lever with cable, then slide secondary shoe against support plate, and at the same time engage shoe web with push rod, (if so equipped) and against anchor.

(3) Slide parking brake strut behind hub and into slot in parking brake lever. Slide anti-rattle spring over free end of strut. (Fig. 12). On ten inch brakes, be sure spring tab is pointing rearward and up on outside of shoe web (Left Brake), and pointing frontward and down behind shoe web (Right Brake) (Fig. 12). On eleven inch brakes, be sure spring tab is pointing forward and down and outside of shoe web (Left Brake), and pointing frontward and down behind shoe web (Right Brake) (Fig. 3).

(4) Slide primary shoe into position and engage with push rod (if so equipped) and free end of strut. Install anchor plate over anchor, then install eye of adjuster cable over anchor. (Fig. 13).

(5) Engage primary shoe return spring in web of shoe and install free end over anchor, using Tool C-3785. (Fig. 7).

(6) Install cable guide in secondary shoe web. Holding in position, engage secondary shoe return spring through guide and into web. Install other end over anchor, using Tool C-3785. (Be sure cable guide remains flat against shoe web and that secondary spring overlaps primary). (Fig. 1). Using pliers, squeeze ends of spring loops (around anchor) until parallel.

(7) Install adjusting star wheel assembly between primary and secondary shoes, with star wheel next to secondary shoe. (Fig. 1). The left star wheel adjusting stud end is stamped "L" which indicates its position on vehicle. The left side star wheel is cadmium plated. The right is black, and the adjusting stud end is **not** stamped. Install adjuster spring between shoes (Fig. 1). (Engage primary shoe first). (Eleven inch brake only).

(8) Install adjusting lever spring over pivot pin on shoe web. Install adjusting lever under spring and over pivot pin. Slide lever slightly rearward to lock in position.

(9) Using Tool C-4070, install shoe retaining nails, retainers and springs. (Fig. 8).

(10) Thread adjuster cable over guide and hook end of overload spring in lever. (Fig. 1). (Be sure eye of cable is pulled tight against anchor and in a straight line with guide).

Installing Front Brake Drums

(1) Lubricate wheel bearings and install brake drum and adjust wheel bearing to proper preload.

(2) Adjust brakes as described under "Service Procedures" at front of this Section.

Installing Rear Brake Drums

(1) Install brake drum. Reinstallation of retaining clips is not necessary. Install wheel and tire assembly.

(2) Adjust brakes as described under "Service Procedures" at front of this Section.

MASTER CYLINDER (Drum Brakes)

INDEX

	Page
Bleeding Master Cylinder	15
Brake Warning Switch	16
Cleaning and Inspection	14
Disassembling Master Cylinder	13
General Information	13
Installing Master Cylinder	15
Master Cylinder Removal	13
Reassembling Master Cylinder	15
Testing Master Cylinder	16

GERERAL INFORMATION

The tandem master cylinder (Fig. 1) is of the compensating type with the reservoirs cast integrally. The master cylinder consists of a front and rear piston (in tandem) two outlets, each contain a residual pressure valve and spring (Fig. 4).

The **front** outlet tube from the master cylinder is connected to the hydraulic system warning switch (Figs. 9 and 10) and then to the **rear** brakes. The **rear** outlet tube from the master cylinder is also connected to the warning switch and the **front** brakes.

The master cylinder used on vehicles not equipped with power brake units is serviced in the same manner as the master cylinder with power brakes, with one exception, the master cylinder for power brakes does not include the push rod.

The disc brake master cylinder is different than the standard drum brake master cylinder and is covered in the disc brake section of the brake group.

SERVICE PROCEDURES

MASTER CYLINDER REMOVAL

(1) Disconnect front and rear brake tubes from master cylinder (residual pressure valves will keep cylinder from draining).

(2) Remove nuts that attach master cylinder to cowl panel and/or power brake unit (if so equipped).

(3) Disconnect pedal push rod (manual brakes) from brake pedal.

(4) Slide master cylinder straight out from cowl panel and/or power brake unit (if so equipped).

DISASSEMBLING MASTER CYLINDER

To disassemble the master cycinder, (Figs. 1 and 5) clean outside of master cylinder thoroughly.

(1) Press bail to one side, remove cover and gasket. Empty brake fluid from reservoirs.

(2) Remove front piston retainer screw from inside reservoir, then remove snap ring from outer end of cylinder bore (Fig. 2). Slide rear piston assembly out of cylinder bore.

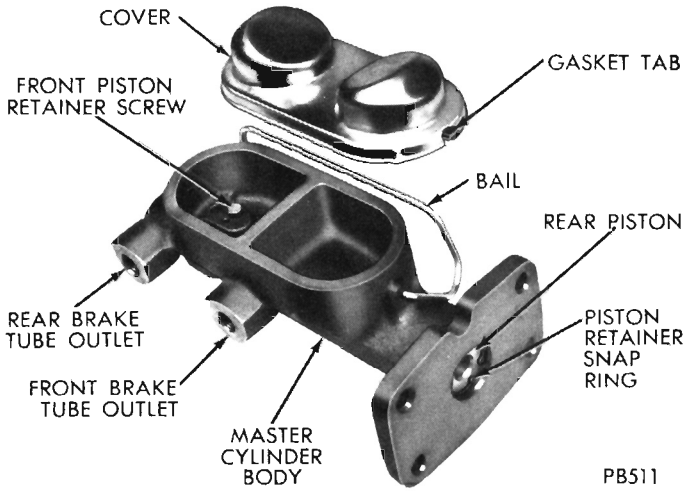


Fig. 1 - Tandem Master Cylinder

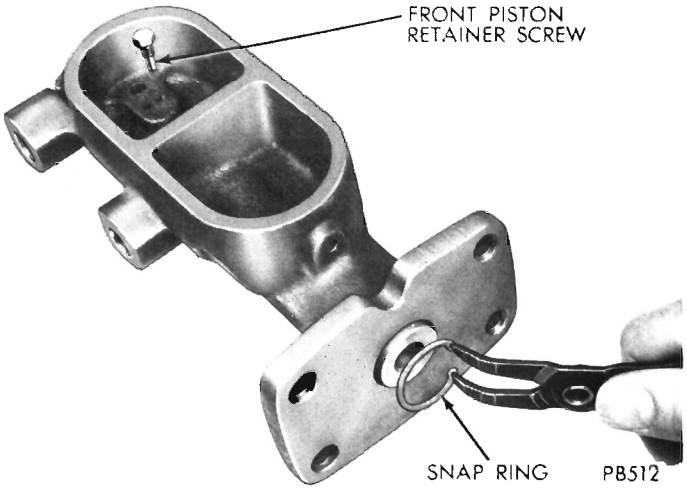


Fig. 2 - Removing Retainer Screw and Snap Ring

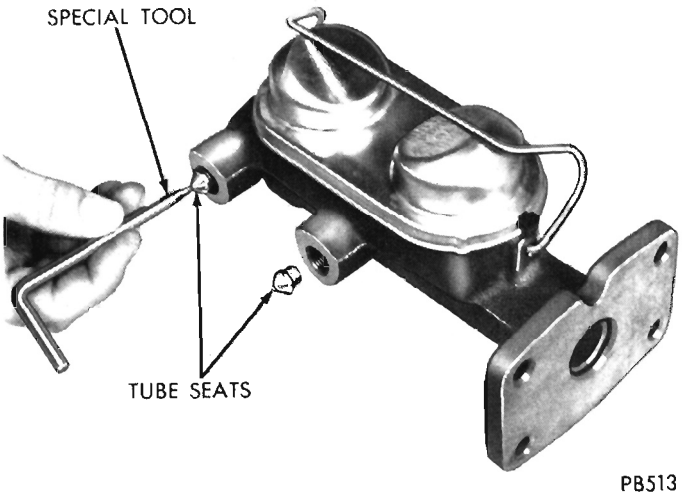


Fig. 3 Removing Tube Seats

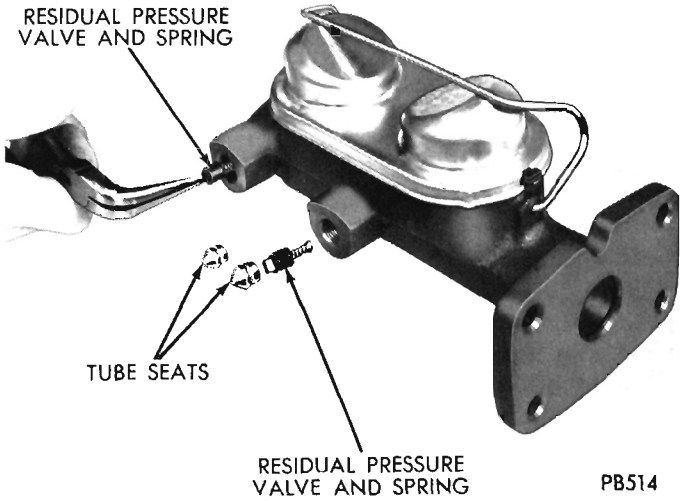


Fig. 4 Removing or Installing Residual Pressure Valve

(3) Tamp open end of master cylinder on bench to remove front piston. If front piston sticks in bore of cylinder, use air pressure to force piston out of cylinder. New cups must be installed at reassembly if air pressure is used.

(4) Remove front piston compression spring from bore.

(5) Remove rubber cups from pistons, after noting positions of cup lips.

Do not remove the primary cup of the rear piston. If cup is damaged or worn, install a new rear piston assembly.

(6) Using Tool T109-178 (or an easy out) remove tube seats by threading tool firmly into seat, tap tool and seat out of cylinder body. (Fig. 3).

(7) Remove two residual pressure valves and springs (Fig. 4).

CLEANING AND INSPECTION

Clean master cylinder thoroughly, using a suitable solvent and dry with compressed air. Wash the cylinder bore with clean brake fluid and inspect for scoring or pitting. Master cylinder bore walls that have light scratches or show signs of corrosion, can usually be cleaned with crocus cloth. However, cylinder bores that have deep scratches or scoring may be honed, providing diameter of bore is not increased more than .002 inch. If master cylinder bore does not clean up at .002 inch when honed, the master cylinder should be discarded and a new master cylinder installed.

If master cylinder pistons are badly scored or

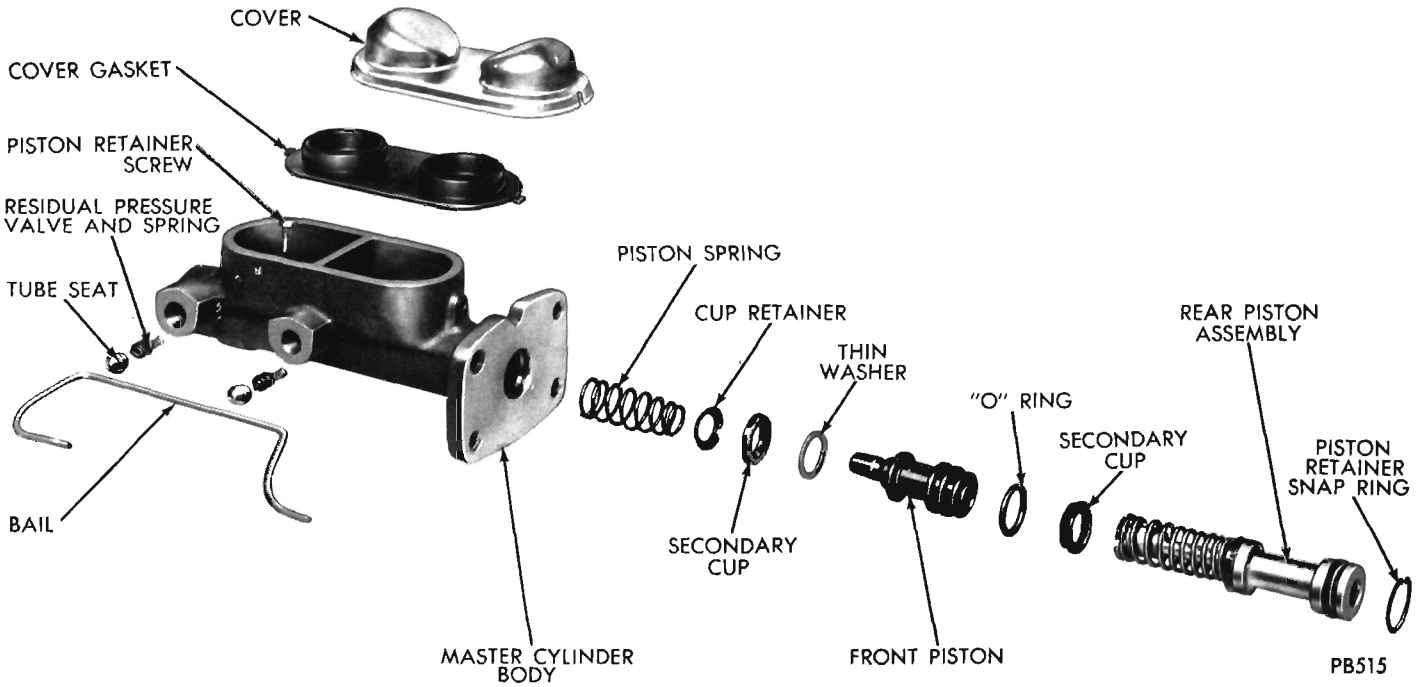


Fig. 5 Tandem Master Cylinder (Exploded View)

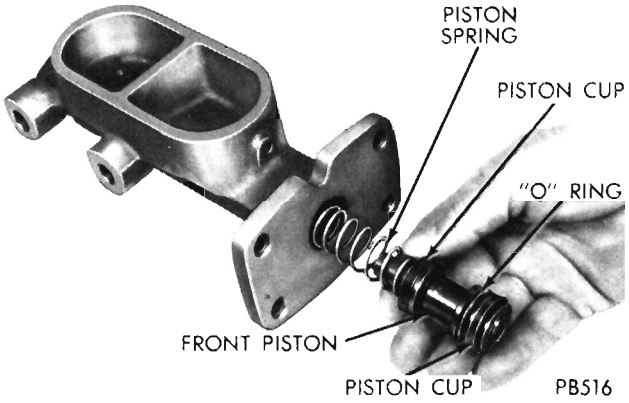


Fig. 6 Installing Front Piston and Spring.

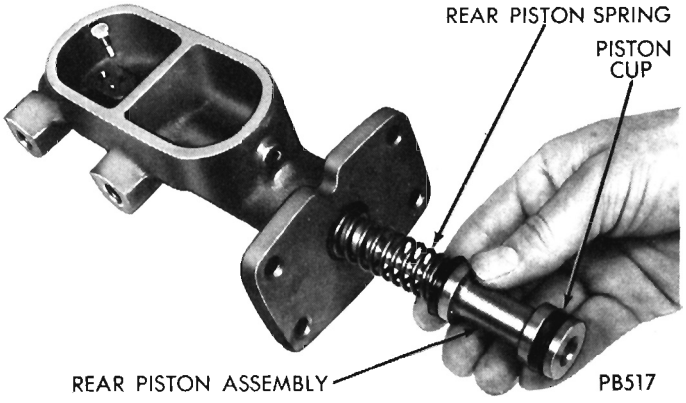


Fig. 7 Installing Rear Piston Assembly

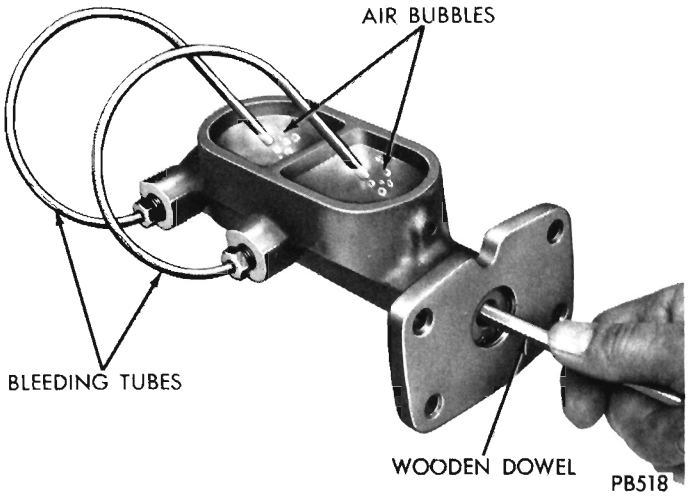


Fig. 8 Bleeding Master Cylinder

corroded, replace them with new ones. The piston cups and seals should be replaced when reconditioning a master cylinder.

When overhauling a master cylinder, use all parts furnished in repair kit. **Discard all used rubber parts.**

REASSEMBLING MASTER CYLINDER

Front Piston

Before assembling the master cylinder, dip all component parts in clean brake fluid and place on a clean shop towel or paper (assembling seals dry, can ruin them).

(1) Carefully work primary cup on end of front piston with the lip away from piston (Fig. 5).

(2) Slide "O" ring over the rear end of front piston and into correct land.

(3) Carefully work front piston secondary cup (Fig. 5) into rear land, with the cup lip away from piston.

(4) Slide cup retainer over front end of piston, followed by piston spring (Fig. 5).

(5) Install piston spring, piston cup reatiner, piston and cups into bore of master cylinder (Fig. 6)

Be sure the lip of cups enter bore evenly in order not to damage sealing qualities of cups. (Keep well lubricated with brake fluid.)

Rear Piston

(1) Carefully work secondary cup over rear end of rear piston with lip of cup toward piston (Fig. 5).

(2) Center spring retainer of rear piston assembly over shoulder of front piston. Push piston assemblies into bore up to center piston cup. Carefully work cup into bore then push piston in up to the rear cup. Carefully work lip of rear cup into bore, then push in on piston until seated (Fig. 7).

(3) Holding piston in seated position, install snap-ring (Fig. 2).

(4) Install front piston retaining set screw in reservoir and tighten securely (Fig. 2).

(5) Install residual pressure valves and springs in outlet ports and install tube seats, firmly.

BLEEDING MASTER CYLINDER

Before installing the master cylinder on vehicle, it must be bled on the bench as follows:

(1) Clamp master cylinder in a vise and attach bleeding tubes Tool C-4029 (Fig. 8).

(2) Fill both reservoirs with approved brake fluid.

(3) Using a wooden stick or dowel (power brake equipped vehicles) depress push rod slowly and allow the pistons to return under pressure of springs. Do this several times until all air bubbles are expelled. (Fig. 8).

(4) Remove bleeding tubes from cylinder and install cover and gasket. (As tubes are removed, fluid remaining in tubes will syphon out.)

(5) Remove from vise and install master cylinder on vehicle as follows:

INSTALLING MASTER CYLINDER

(1) Install master cylinder on vehicle, aligning push rod with cowl panel opening (manual brakes)

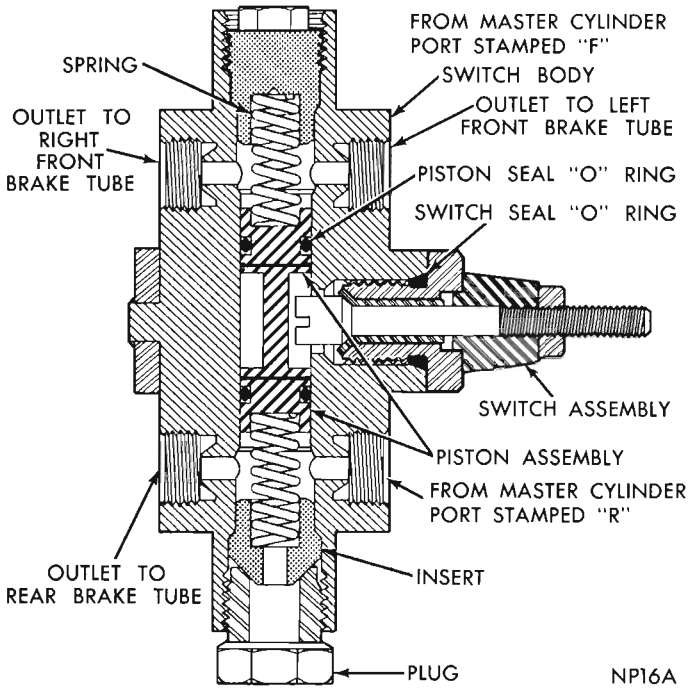


Fig. 9 Brake Warning Switch (Sectional)

or power brake push rod with cylinder piston.

(2) Slide over mounting studs. Install attaching nuts and tighten 200 inch pounds. Connect push rod to brake pedal.

(3) Connect front and rear brake tubes and tighten to 150 inch-pounds.

(4) Bleed brakes at wheel cylinders using regular procedure, being sure fluid level is maintained. (See Bleeding the Brake System.)

TESTING MASTER CYLINDER

Be sure that the master cylinder compensates at both ports. This can be done by applying the pedal lightly with the engine running (power brakes) and observing for a gyser of fluid squirting up in the reservoirs. This may only occur in the front chamber and so to determine if the rear compensating port is open, it will be necessary to pump up the brakes rapidly and, then, hold the pedal down. Have an observer watch the fluid in the rear reservoir while the pedal is raised. A disturbance in the fluid indicates that the compensating port is open.

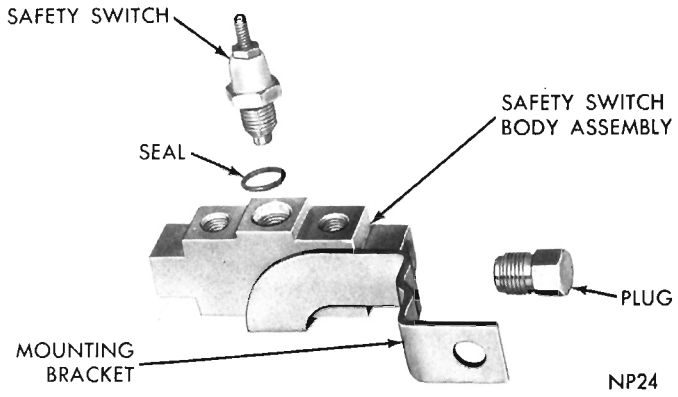


Fig. 10 Brake Warning Switch (Exploded View)

BRAKE WARNING SWITCH

The hydraulic system brake warning switch (Figs. 9 and 10) is used to warn the vehicle operator that one of the hydraulic systems has failed. A failure in one part of the brake system does not result in failure of the entire hydraulic brake system. As an example, failure of the rear brake system will leave the front brake system still operative.

As pressure falls in one system, the other system's normal pressure forces the piston to the inoperative side contacting the switch terminal, causing a red warning light to come on in the instrument panel, thus, warning the operator of the vehicle that one of the systems has failed and should be repaired.

The safety switch is mounted on the frame in a vertical position, with the brake tubes connected. (Fig. 9).

If a malfunction occurs within the switch, disconnect tubes from body assembly and install a new assembly. The component parts of the switch body are not serviced. However, the terminal unit can be removed if a malfunction occurs and a new terminal unit installed.

If a new body is installed, bleed the brake system.

WHEEL CYLINDERS

INDEX

	Page
Assembling Wheel Cylinders	18
Disassembling Wheel Cylinders	17
Installing Brake Supports	19
Installing Wheel Cylinders	18
Removing Brake Supports	18
Removing Wheel Cylinders	17

GENERAL INFORMATION

A piston stop (Fig. 1) is welded to the support plates to prevent the pistons from moving out far enough to lose brake fluid. The piston boots are of the press-on type and prevents moisture from entering the wheel cylinder.

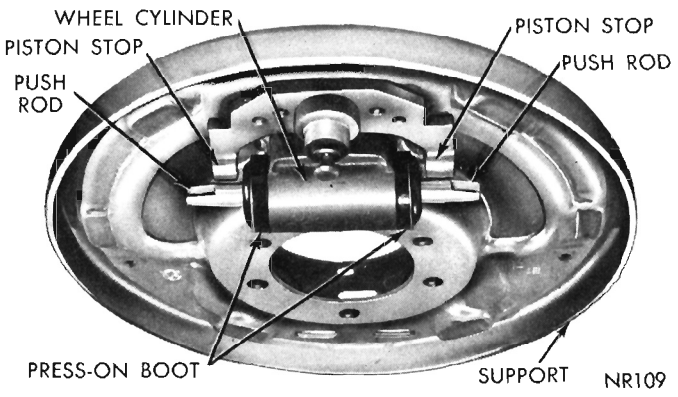


Fig. 1 Wheel Cylinder Piston Stops

To perform service operations or inspections of the wheel cylinders, it will be necessary to remove the cylinders from the support plate and disassemble on the bench.

REMOVING WHEEL CYLINDERS

Front or Rear

With all the brake drums removed, inspect the wheel cylinder boots for evidence of a brake fluid leak. Visually check the boots for cuts, tears, or heat cracks, and if any of these conditions exist, the wheel cylinders should be completely cleaned, inspected and new parts installed. (A slight amount of fluid on the boot may not be a leak, but may be preservative fluid used at assembly.)

(1) In case of a leak, remove brake shoes, (replace if soaked with grease or brake fluid.)

(2) Disconnect brake hose from brake tube at frame bracket (front wheels) or disconnect brake tube from wheel cylinder (rear wheels).

(3) Disconnect brake hose or tube from wheel cylinder (front). Remove wheel cylinder attaching bolts (front or rear), then slide wheel cylinder assembly out of support.

DISASSEMBLING WHEEL CYLINDERS

Front or Rear

To disassemble the wheel cylinders, (Figs. 2 or 3) proceed as follows:

(1) Using a suitable tool, pry boots away from cylinders and remove. Remove push rods (if so equipped).

(2) Press **in** on one piston and force out piston, cup, spring cup and piston.

(3) Wash wheel cylinder, pistons, and spring in clean brake fluid or alcohol; clean thoroughly and blow dry with compressed air. Inspect cylinder bore and piston for scoring and pitting. (Do not use a rag as lint from the rag will adhere to bore surfaces.)

Wheel cylinder bores and pistons that are badly scored or pitted should be replaced. Cylinder walls that have light scratches, or show signs of corrosion, can usually be cleaned with crocus

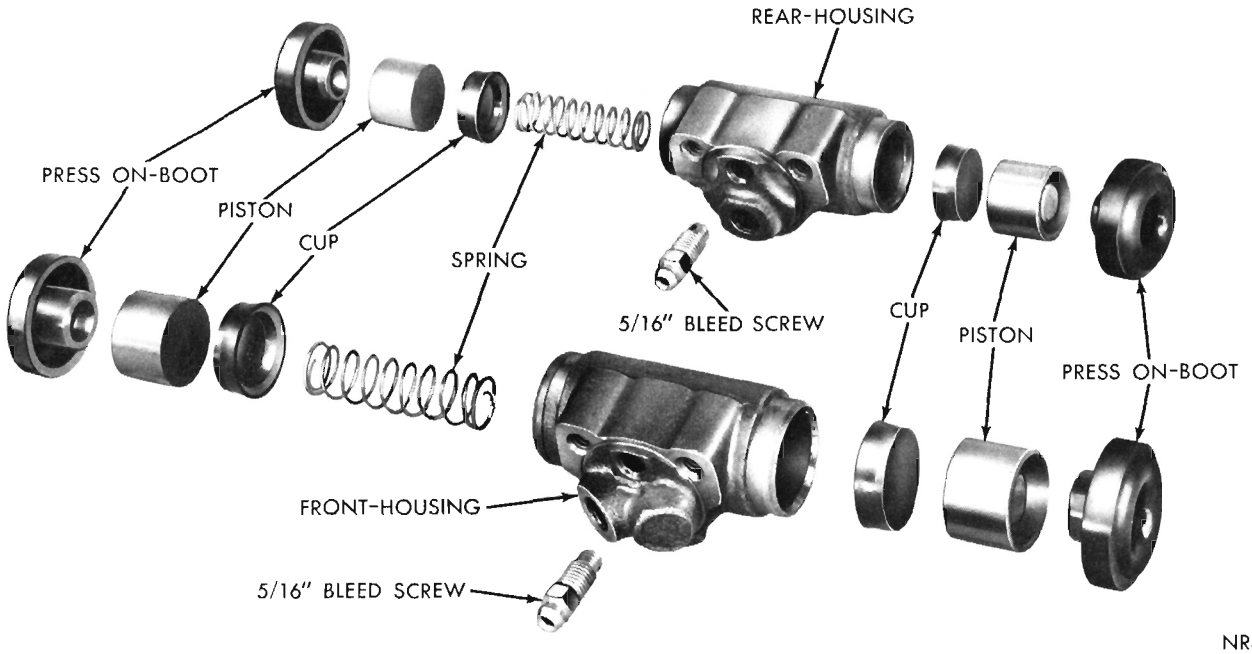


Fig. 2 Wheel Cylinder 9 Inch Brake (Front & Rear)

cloth, using a circular motion. Black stains on the cylinder walls are caused by piston cups and will not impair operation of cylinder.

ASSEMBLING WHEEL CYLINDERS

Front or Rear (Figs. 2 or 3)

Before assembling the pistons and new cups in the wheel cylinders, dip them in clean brake fluid. If the boots are deteriorated, cracked or do not fit tightly on the push rods or the cylinder casting, new boots must be installed.

(1) Coat cylinder bore with clean brake fluid.

(2) Install expansion spring in cylinder. Install cups in each end of cylinder with open end of cups facing each other.

(3) Install pistons in each end of cylinder with recessed end of pistons facing open ends of cylinder.

(4) Install boots over ends of cylinder and press over ends until boot is seated against cylinder shoulder. **Use care not to damage boot.**

INSTALLING WHEEL CYLINDERS

Front or Rear

(1) Slide wheel cylinder into position on support (front or rear). Install mounting screws and torque to 110 inch-pounds (9 inch brakes) or 220 inch-pounds (10 and 11 inch brakes).

(3) **All except Valiant.** Connect brake hose to front wheel cylinder, using a new gasket. Torque to 25 foot-pounds, before attaching brake hose to frame bracket. **Should hose be connected to wheel cylinder last, tightening of the hose into wheel cylinder will twist hose and can result in suspension interference.**

Valiant only. Connect jumper tube into wheel cylinder and torque to 115 inch-pounds. Attach brake hose to frame bracket and connect brake line to hose and torque to 115 inch-pounds. Position brake hose through stand off bracket and thread jumper tube into brake hose. Attach brake hose to stand off bracket and then torque jumper tube to 105 inch-pounds.

(4) Connect brake line to hose and torque to 115 inch pounds.

REMOVING BRAKE SUPPORT

(Front)

(1) Disconnect brake line from brake hose at frame bracket.

(2) With wheel and brake drum removed, remove four support attaching nuts and washers.

(3) Remove support and brake assembly from spindle.

(Rear)

(1) With wheel and brake drum removed, remove support attaching nuts and washers.

(2) Remove rear axle shaft and retainer.

(3) Disconnect hydraulic brake line from wheel cylinder.

(4) Disengage brake cable from parking brake lever.

(5) Using a suitable tool compress three flared legs of cable retainer and pull brake cable out of

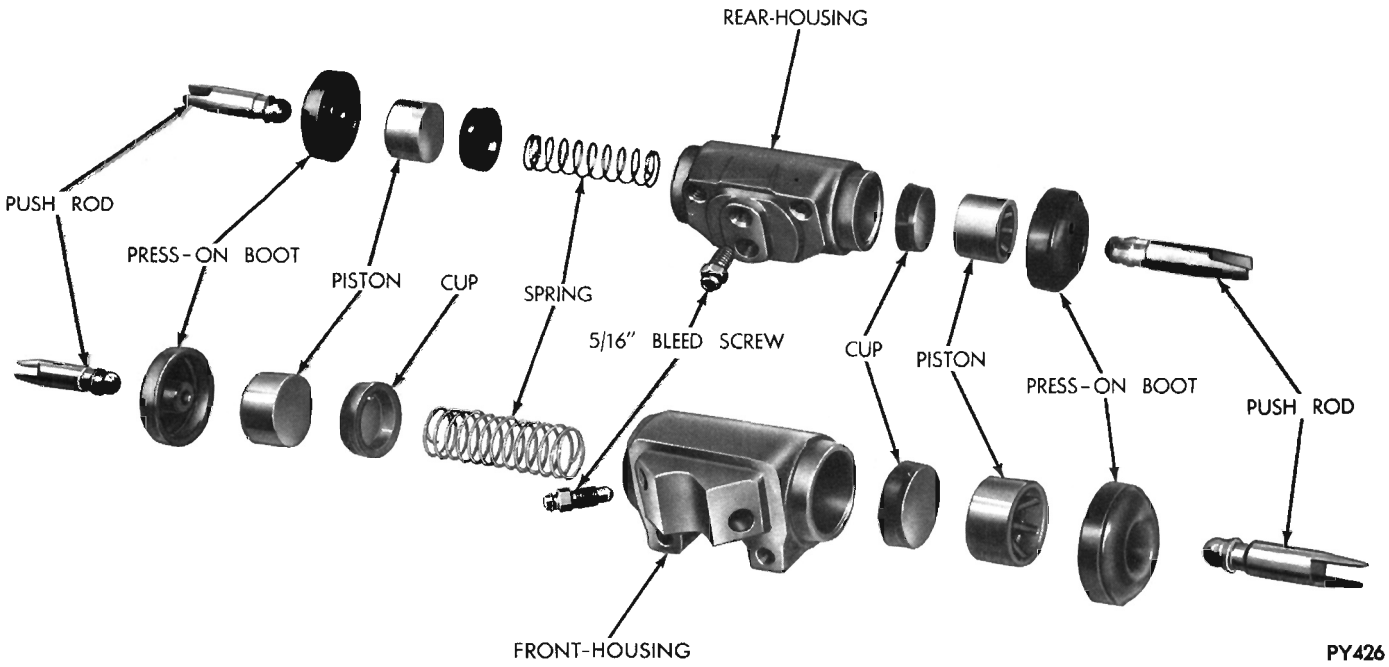


Fig. 3 Wheel Cylinders 10 and 11 Inch Brake

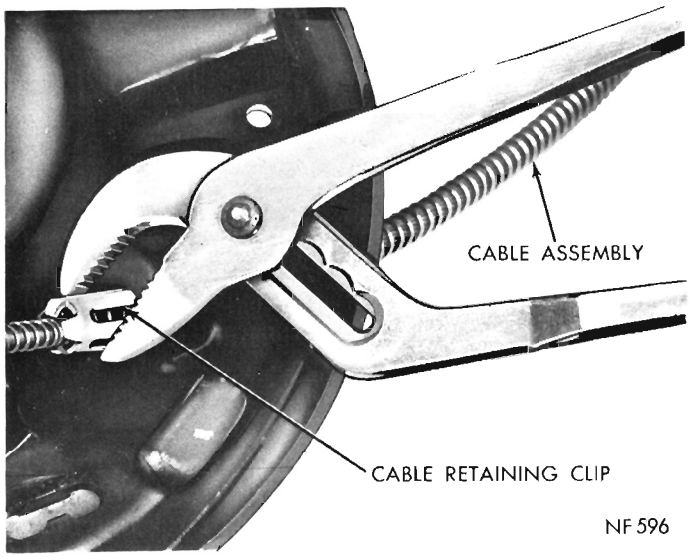


Fig. 4 Removing Brake Cable From Support

support (Fig. 4).

(6) Remove brake support from rear axle housing.

INSTALLING BRAKE SUPPORT

(Front)

(1) **All except Valiant**

Place support on spindle and install attaching bolts, nuts, and washers. Torque the top attaching bolts to 55 foot-ouunds. The bottom attaching bolts are to be torqued to 120 foot-pounds.

(2) **Valiant only**

Place support on spindle and install attaching bolts, nuts,and washers. Torque the top attaching bolts to 55 foot-pounds. The bottom attaching bolts are to be torqued to 100 foot-pounds.

(3) Connect brake hose to wheel cylinder and tighten to 25 foot-pounds, before connecting brake hose to frame bracket. **Should hose be connected to wheel cylinder last, tightening of hose into wheel cylinder will twist hose, which can result in suspension or tire interference problems.**

(4) Connect brake line to brake hose and torque to 115 inch-pounds.

(Rear)

(1) Install brake shoes on support.

(2) Install support onto rear axle housing.

(3) Insert rear axle shaft and retainer into housing and install axle retainer nuts and washers. Tighten retainer nuts to 35 foot-pounds.

4) Attach brake line to wheel cylinder and tighten to 115 inch-pounds.

(5) Insert parking brake cable into support plate and attach cable to parking brake lever.

(6) Install brake drum and wheel. Bleed and adjust brakes.

PARKING BRAKES

INDEX

INDEX

	Page		Page
Adusting Parking Brake	20	Installing Rear Parking Brake Cable	22
General Information	19	Removing Front Parking Brake Cable	23
Istalling Front Parking Brake Cable	24	Removing Rear Parking Brake Cable	22
		Service Diagnosis	19

GENERAL INFORMATION

The rear wheel service brakes also act as parking brakes. The brake shoes are mechanically operated by a lever and strut connected to a flexible steel cable. The wheel brake cables are joined together by a forward brake cable and equalizer extending to the parking brake pedal or release handle (Figs. 1, 2 and 3).

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
DRAGGING BRAKE	(a) Improper cable or brake shoe adjustment.	(a) Properly adjust the service brakes, then adjust the parking brake cable.
	(b) Broken brake shoe return spring.	(b) Replace any broken return spring.
	(c) Broken brake shoe retainer spring.	(c) Replace the broken retainer spring.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(d) Grease or brake fluid soaked lining.	(d) Replace the grease seal or recondition the wheel cylinders and replace both brake shoes.
	(e) Improper stop light switch adjustment	(e) Adjust stop light switch
	(f) Sticking or frozen brake cable.	(f) Replace cable.
	(g) Broken rear spring.	(g) Replace the broken rear spring.
	(h) Bent or rusted cable equalizer.	(h) Straighten, or replace and lubricate the equalizer.
	(h) Heat set parking brake cable spring.	(h) Replace parking brake cable.
BRAKE WILL NOT HOLD	(a) Broken or rusted brake cable.	(a) Replace cable.
	(b) Improperly adjusted brake or cable.	(b) Adjust brakes and cable as necessary.
	(c) Soaked brake lining.	(c) Replace the brake lining.
	(d) Ratchet or pedal mechanism worn.	(d) Replace pedal assembly.

SERVICE PROCEDURES

ADJUSTING PARKING BRAKE

The service brakes must be properly adjusted before adjusting the parking brake.

(1) Release parking brake lever and loosen cable adjusting nut to insure cable is slack, (Figs. 1, 2 or 3). Before loosening cable adjusting nut, clean threads with wire brush and lubricate with grease.

(2) Tighten cable adjusting nut until a slight drag is felt while rotating wheel, loosen cable adjusting nut until both rear wheels can be rotated freely, then back off cable adjusting nut two full turns on Valiant, Barracuda and Satellite models. On Fury, Chrysler and Imperial models back off

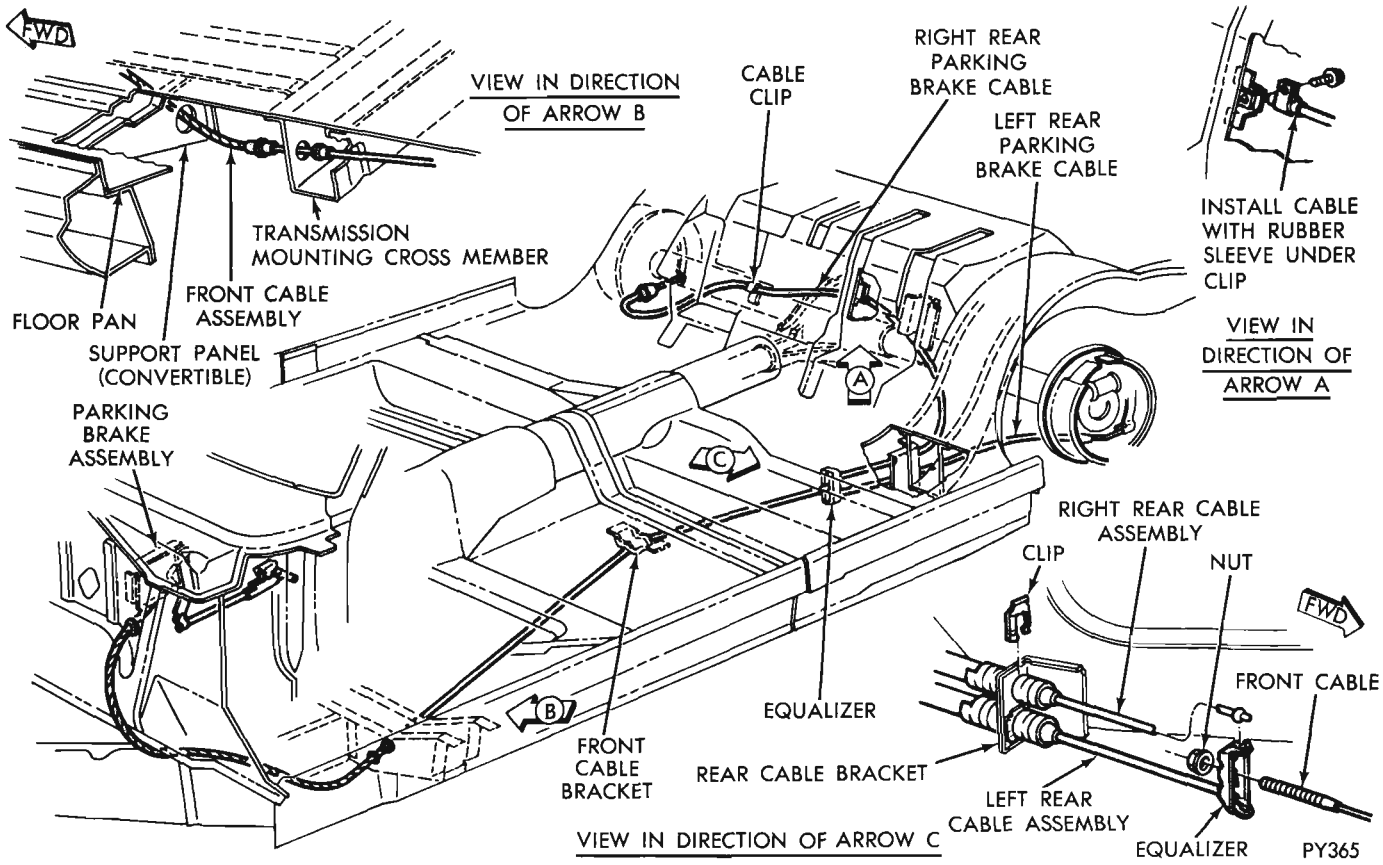


Fig. 1 Parking Brake Cable Routing (Valiant)

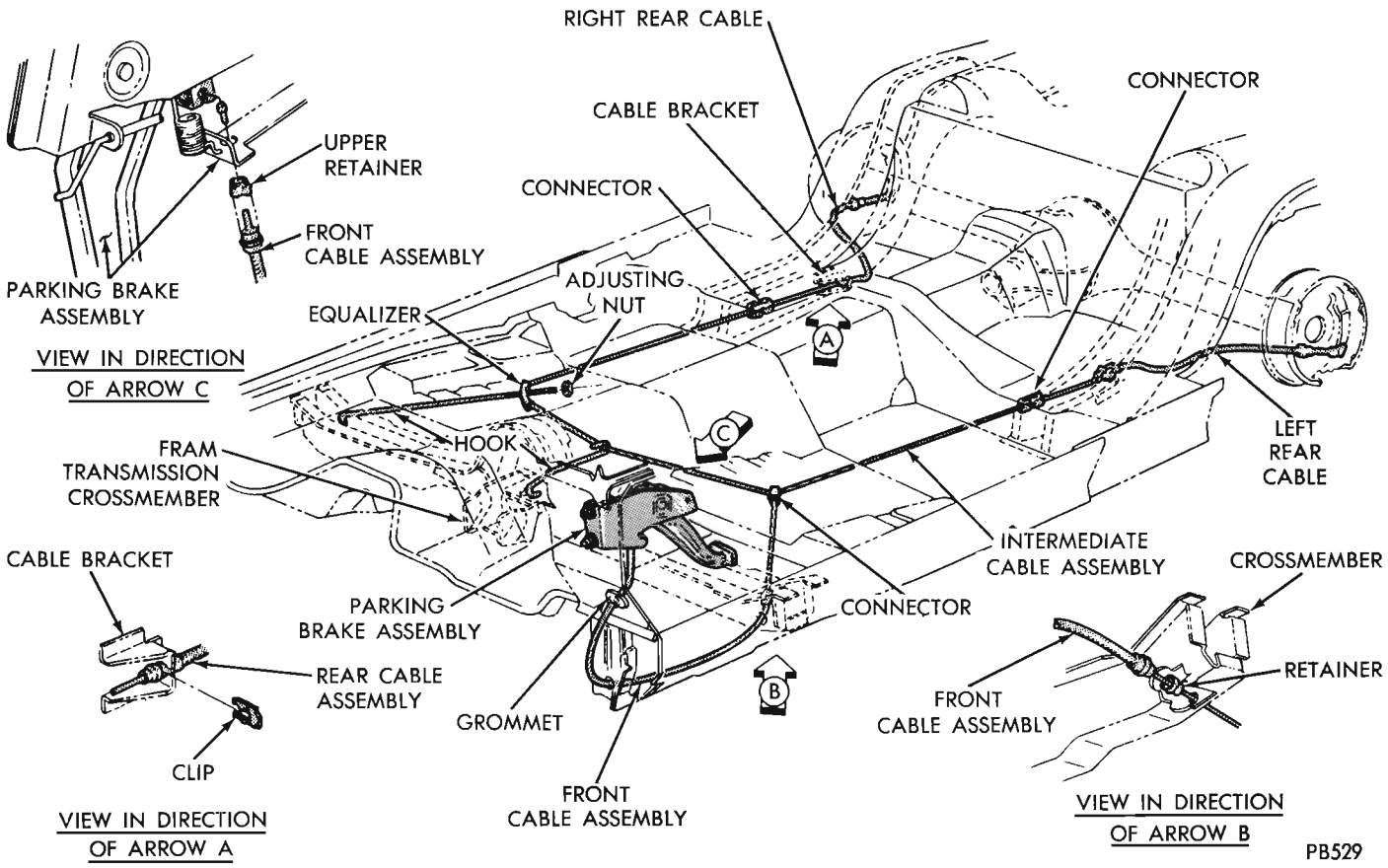


Fig. 2 Parking Brake Cable Routing (Barracuda and Satellite)

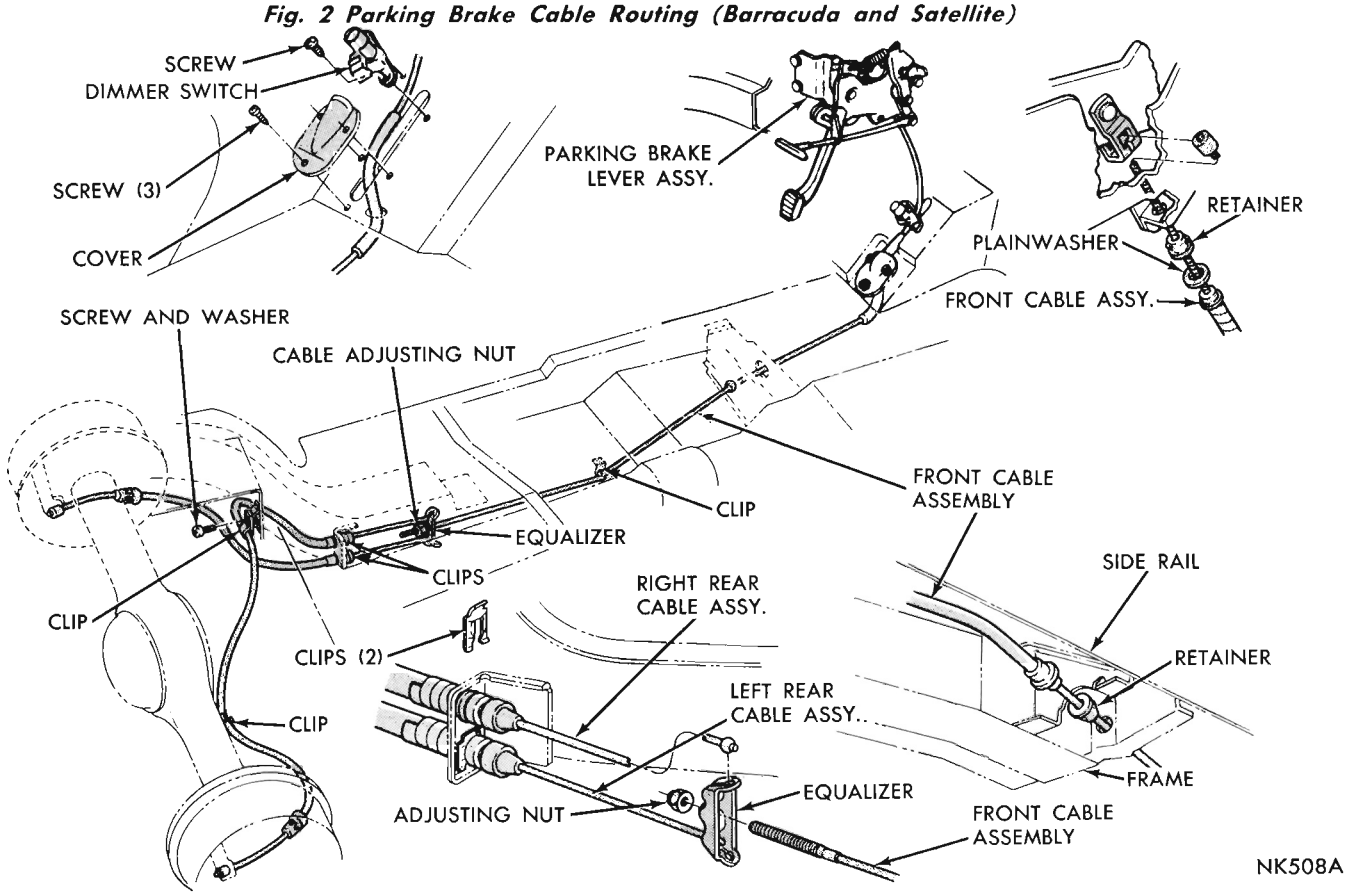


Fig. 3 Parking Brake Cable Routing. (Fury, Chrysler, Imperial)

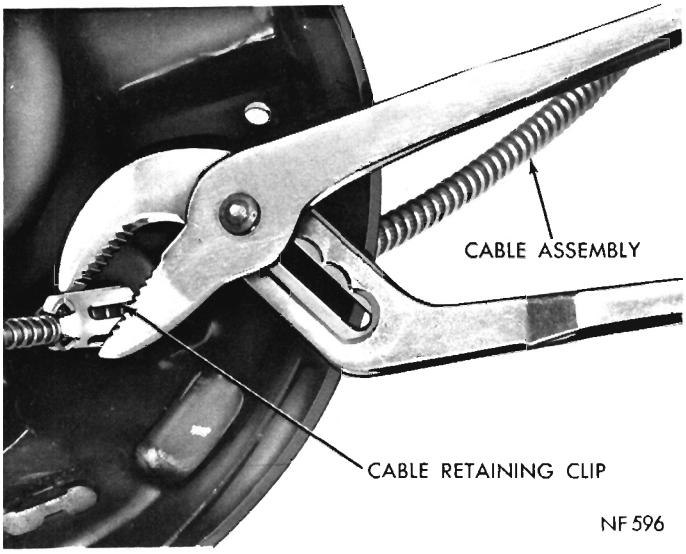


Fig. 4 - Removing Brake Cable From Support

adjusting nut 6 full turns.

(3) Apply parking brake srveral times, then release and test to see that rear wheels rotate freely without dragging.

REMOVING REAR PARKING BRAKE CABLE

The independent rear brake cables are attached to an equalizer (Figs. 1, 2 or 3). The front cable is adjusted at the equalizer.

Should it become necessary to remove the parking brake cable (rear) for installation of a new cable, proceed as follows.

(1) With vehicle jacked up or on a suitable hoist, remove rear wheels.

(2) Disconnect brake cable from equalizer.

(3) Remove retaining clip from brake cable bracket.

(4) Remove brake drum from rear axle.

(5) Remove brake shoe return springs.

(6) Remove brake shoe retaining springs.

(7) Remove brake shoe strut and spring from brake support and disconnect brake cable from operating arm.

(8) Compress retainers on end of brake cable housing (Fig. 4) and remove cable from support.

INSTALLING REAR PARKING BRAKE CABLE

When installing a new brake cable, lubricate the cable with short fibre grease at the contact points.

(1) Insert brake cable and housing into brake support plate making certain that housing retainers (Fig. 4) lock the housing firmly into place.

(2) Holding brake shoes in place on support plate, engage brake cable into brake shoe operating lever. Install parking brake strut and spring.

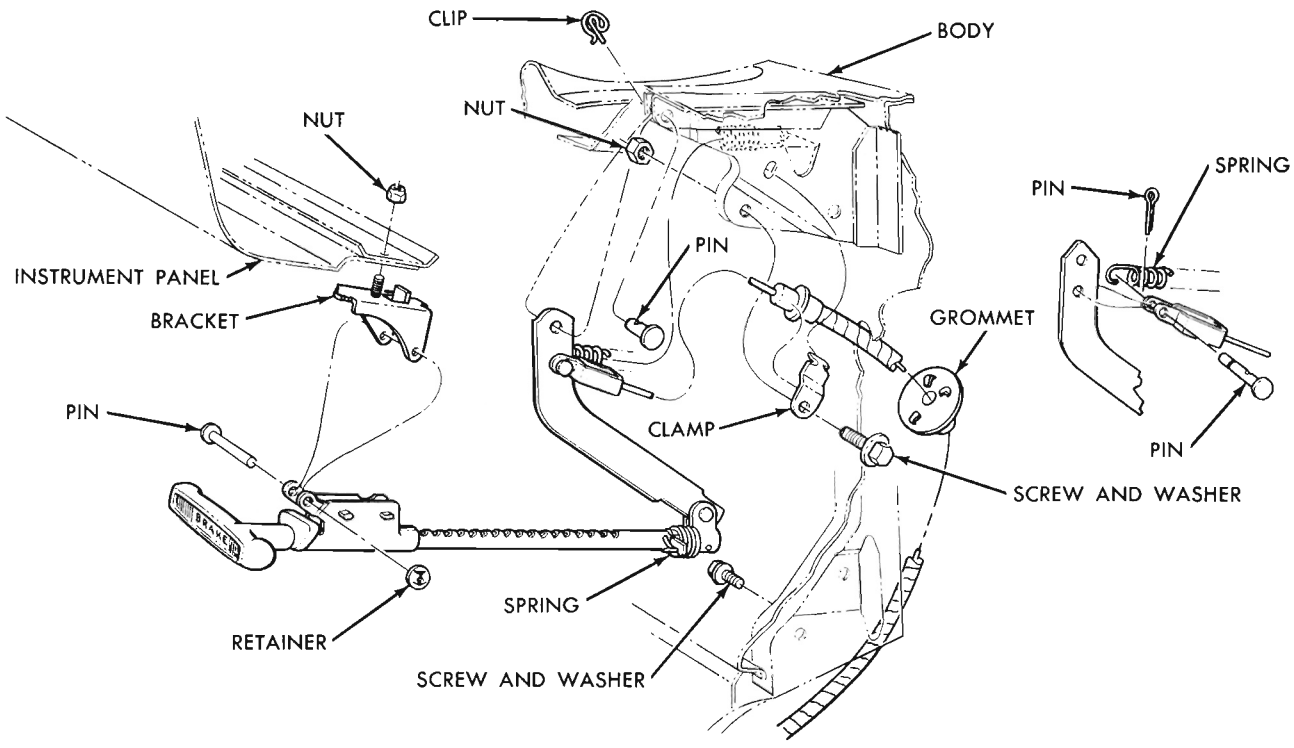


Fig. 5 Parking Brake Lever (Valiant)

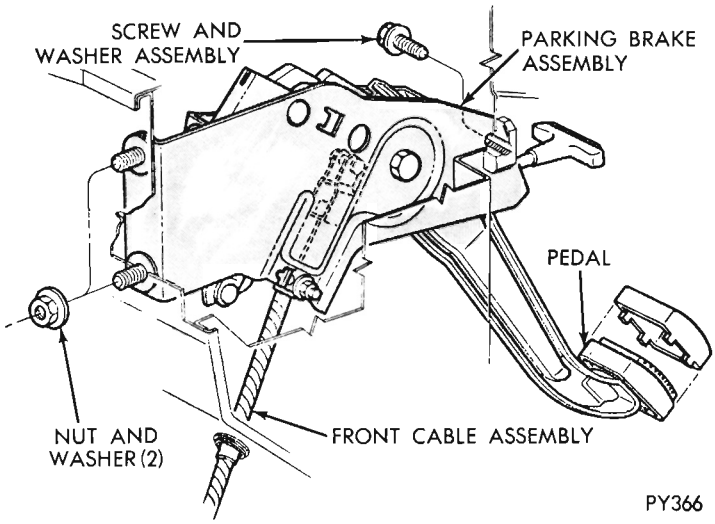


Fig. 6 Parking Brake Pedal (Barracuda Satellite)

(3) Install brake shoe retaining springs, and brake shoe return springs.

(4) Install brake drum and wheel.

(5) Insert brake cable and housing into cable bracket and install retaining clip.

6) Insert brake cable into equalizer. Note different size slot for corresponding cable end fitting.

(7) Adjust service brakes and parking brake cable.

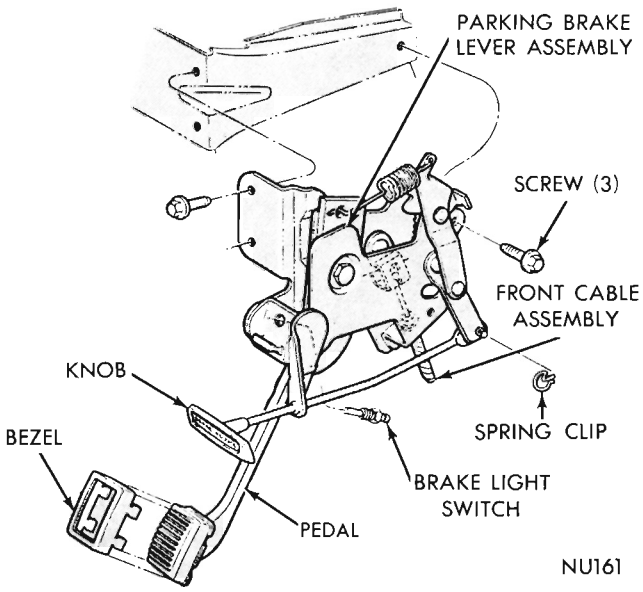


Fig. 7 Parking Brake Pedal (Fury and Chrysler)

REMOVING FRONT PARKING BRAKE CABLE

(1) Disengage front parking brake cable from equalizer bar (Figs. 1, 2 or 3).

(2) Disengage cable from guide clip.

(3) Using a screwdriver force cable housing and attaching clip out of body crossmember.

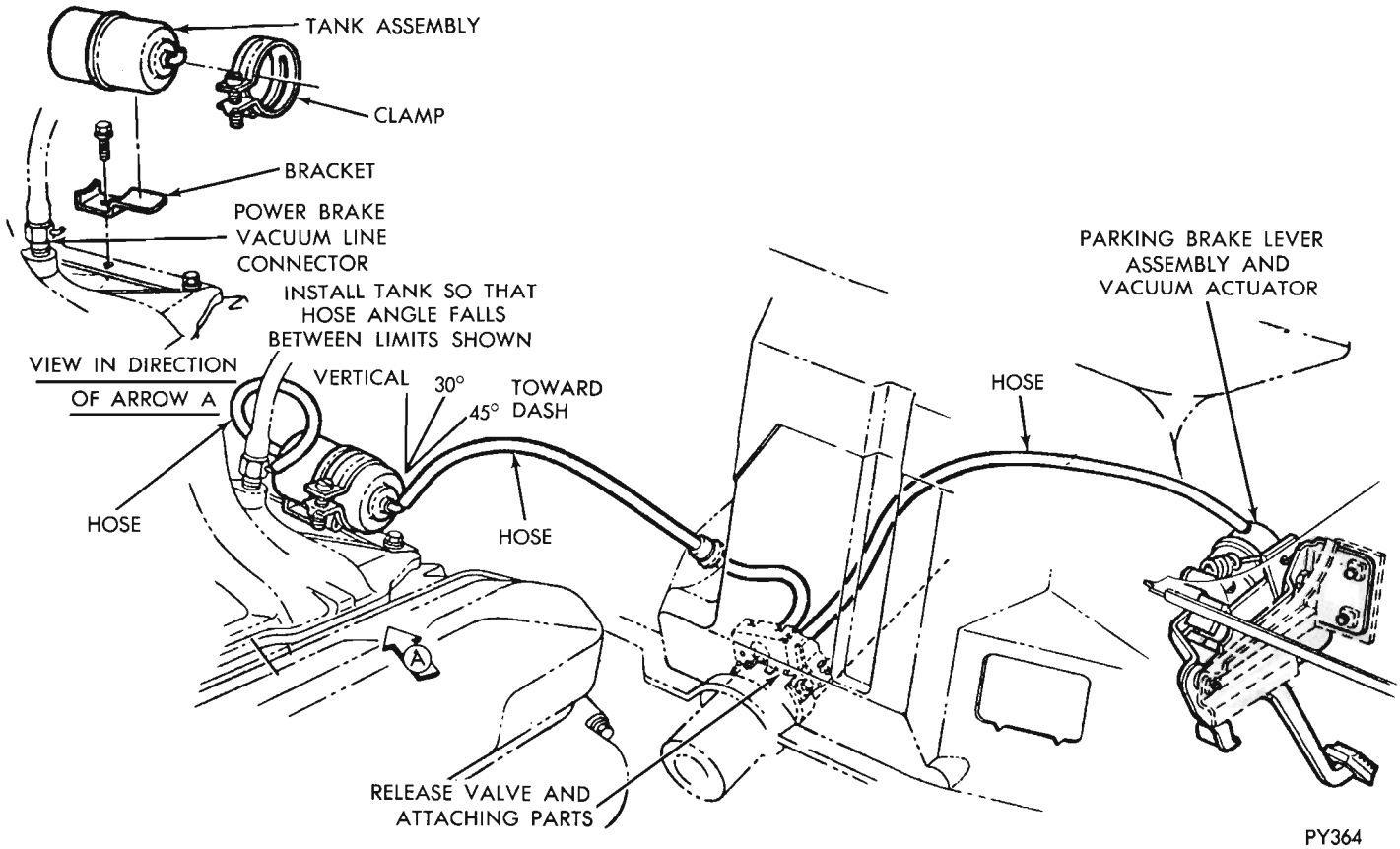


Fig. 8 Parking Brake Vacuum Valve, Actuator and tank (Imperal)

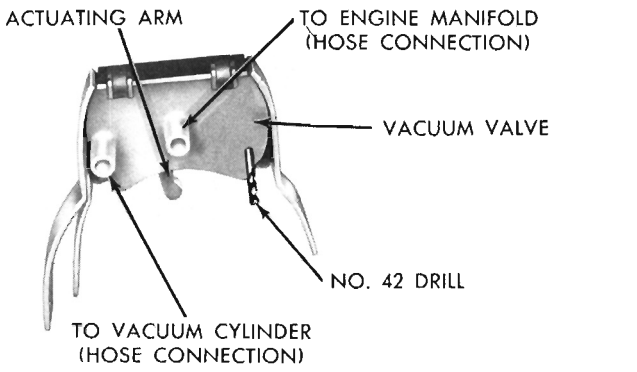


Fig. 9 Parking Brake Vacuum Valve

(4) Fold back left front edge of floor mat and remove rubber cable cover from floor pan.

(5) Engage parking brake and work brake cable up and out of brake pedal linkage, (Figs. 5, 6, 7 or 8).

(6) Using a screwdriver force upper end of cable housing and clip down out of pedal assembly bracket.

(7) Remove cable to floor pan clip and work cable and housing assembly up through floor pan.

INSTALLING FRONT PARKING BRAKE CABLE

(1) Insert parking brake cable down through floor pan.

(2) Install cable housing into underbody mounting bracket.

(3) Insert end fitting of cable into parking brake clevis and force housing and retaining clip into pedal bracket assembly.

(4) Insert cable through crossmember and force housing and retaining clip into crossmember.

(5) Attach cable to equalizer and adjust parking brake cable.

(6) Apply brakes several times and test for free wheel rotation.

(7 Test operation of vacuum release valve (Imperial only).

PARKING BRAKE VACUUM VALVE (IMPERIAL)

(1) Place transmission shift selector lever in "Drive" (engine off).

(2) Remove vacuum hoses from unit (Fig. 9).

(3) Remove screws that attach vacuum unit to steering column jacket, then remove vacuum valve.

To install vacuum valve unit, (Fig. 9), proceed as follows:

(1) Move actuating arm on valve against spring to extreme position, or until locating holes line up. Install a number 42 drill in hole to properly position valve for installation (Fig. 9).

(2) Move transmission shift selector lever into "Park" position.

(3) Place valve in position on steering column jacket and install attaching screws. (Do not tighten.) Rotate valve clockwise (viewed from drivers position) until actuating arm contacts tab inside steering column jacket. Tighten screws securely.

(4) Remove drill from locating hole.

(5) Install vacuum hoses. (Be sure hose from engine manifold is attached to center fitting on valve (Fig. 9).

(6) Start engine and check to see that parking brake can be set in neutral and park position, and will release in reverse and drive positions.

POWER BRAKES

INDEX

	Page
General Information	24
Power Brakes	24
Service Diagnosis	25
Service Procedures	25

GENERAL INFORMATION

The power brakes (Figs. 1,2,3,4 and 5) are self contained vacuum hydraulic power braking units which utilizes engine intake manifold vacuum and atmosphere pressure to provide power assisted application of the vehicle brakes. This provides lighter pedal effort in combination with reduced pedal travel, bringing the brake pedal height down to the approximate height of the accelerator when at closed throttle conditions.

The Midland Ross power brake units can be identified by a clamp type band method of attaching the housing and cover together. Bendix units use a twist lock method of attaching the housing and cover.

The power brake unit mounts on the engine side of the cowl panel and is externally connected to the brake system by a pedal link to the brake pedal, by a vacuum line to the intake manifold (through a check valve) and hydraulic tubes from the master cylinder to the wheel units.

The master cylinder is part of the power brake unit. This master cylinder contains all of the

standard brake master cylinder elements, except for a special push rod which is part of the power brake unit.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
DRAGGING BRAKES (ALL WHEELS)	(a) Brake shoes improperly adjusted.	(a) Adjust brakes.
	(b) Brake pedal linkage binding.	(b) Free up linkage.
	(c) Excessive hydraulic seal friction.	(c) Lubricate seal.
	(d) Compensator port plugged.	(d) Clean out master cylinder.
	(e) Fluid cannot return to master cylinder.	(e) Inspect pedal return.
	(f) Parking brake not returning.	(f) Free up as required.
	(g) Disc brake metering valve malfunction.	(g) Replace metering valve.
	(h) Contaminated brake fluid.	(h) Drain and flush system-replace all rubber parts in hydraulic system.
GRABBING BRAKES	(a) Grease or brake fluid on linings.	(a) Inspect for a leak and replace lining as required.
PEDAL GOES TO FLOOR (OR ALMOST TO FLOOR)	(a) Self-adjusters not operating.	(a) Inspect self-adjuster operations.
	(b) Air in hydraulic system.	(b) Bleed brakes.
	(c) Hydraulic leak.	(c) Locate and correct leak.
	(d) Fluid low in master cylinder.	(d) Add brake fluid.
	(e) Shoe hanging up on rough platform.	(e) Smooth and lubricate platforms.
	(f) Loose disc brake rotor	(f) Check wheel bearing adjustment.
HARD PEDAL (POWER UNIT TROUBLE)	(a) Faulty vacuum check valve.	(a) Replace check valve.
	(b) Collapsed or leaking vacuum hose.	(b) Replace hose.
	(c) Plugged vacuum fittings.	(c) Clean out fittings.
	(d) Leaking vacuum chamber.	(d) Replace unit.
	(e) Diaphragm assembly out of place in housing.	(e) Replace unit.
	(f) Vacuum leak in forward vacuum housing.	(f) Replace unit.

MIDLAND-ROSS POWER BRAKE

(Small Tandem Diaphragm)

SERVICE PROCEDURES

REMOVING POWER BRAKE

(1) Remove nuts attaching master cylinder to brake unit. Remove master cylinder from unit.

(2) Disconnect vacuum hose from power brake check valve.

(3) Remove nut attaching brace and support to power unit (Fig. 1).

(4) Remove nut and bolt that attach power brake pedal link to pedal. (Under instrument panel.)

(5) Remove nuts and washers that attach power brake unit to dash panel.

(6) Remove power brake from vehicle.

INSTALLING POWER BRAKE ON VEHICLE

(1) Install new dash panel to power brake gasket.

(2) Position power brake unit on dash panel, then install attaching nuts and washers and tighten to 150 inch-pounds.

(3) Using lubriplate or equivalent, coat the bearing surface of bolt that connects power brake pedal link with brake pedal linkage. Install bolt and nut. Tighten to 30 foot pounds.

(4) Connect vacuum hose to unit.

(5) Attach brace and support, secure with nut and torque to 150 inch-pounds.

(6) Install master cylinder to front cover mount-

ing studs and tighten nuts to 200 inch pounds.

With power brake attached to dash panel and vacuum supplied to unit, the master cylinder should compensate (force jet fluid up through front chamber compensation port.)

(7) Check stop light operation.

CAUTION: Do not attempt to disassemble brake booster as this unit will be serviced by Manufacturer's Service Station.

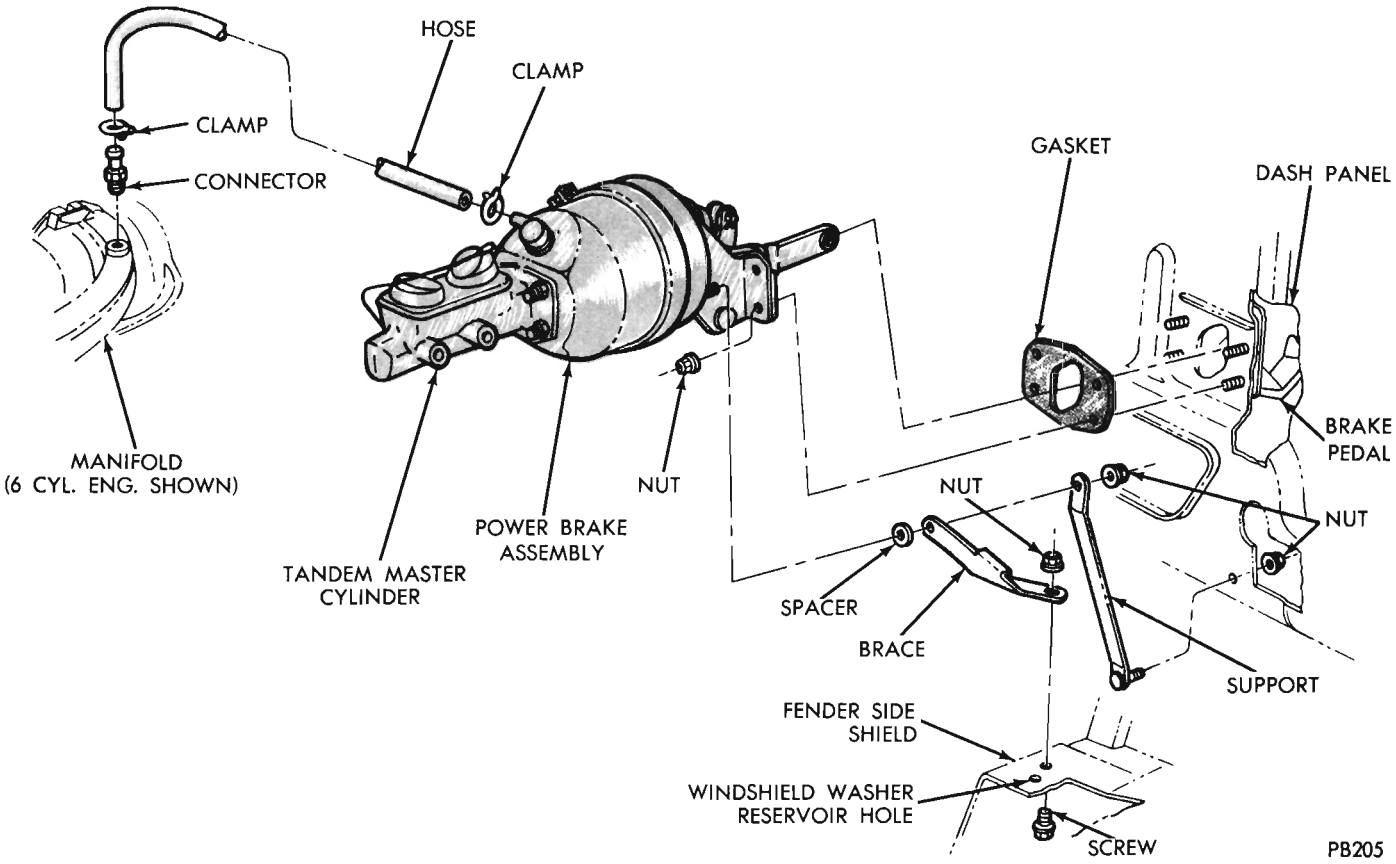


Fig. 1 Power Brake Assembly (Valiant Models)

POWER BRAKE ASSEMBLY

(Single Diaphragm)

Service Procedures

REMOVING POWER BRAKE

(1) Remove nuts attaching master cylinder to brake unit. Remove master cylinder.

(2) Disconnect vacuum hose from power brake.

(3) From under instrument panel, remove nut and attaching bolt from power brake input push rod and brake pedal blade. On linkage type power brake unit, remove lower pivot retaining bolt. (Fig. 2).

(4) Remove four power brake attaching nuts and washers.

(5) Remove power brake, and linkage (if so equipped), from vehicle.

INSTALLING POWER BRAKE

(1) Install power brake assembly into dash and tighten attaching nuts 150 inch-pounds.

(2) Install master cylinder on power brake. Tighten mounting nuts to 200 inch-pounds. With power brake attached to dash panel and vacuum supplied to unit, the master cylinder should compensate (force jet of fluid up through front chamber compensation port).

(3) Connect vacuum hose.

(4) Using lubriplate, or equivalent, coat the bearing surface of bolt that connects power brake pedal link with brake pedal linkage. Install bolt and

nut. Tighten to 30 foot pounds. Connect lower pivot bolt (if so equipped).

(5) Check stop light operation.

CAUTION: Do not attempt to disassemble brake booster as this unit will be serviced by Manufacturer's Service Station.

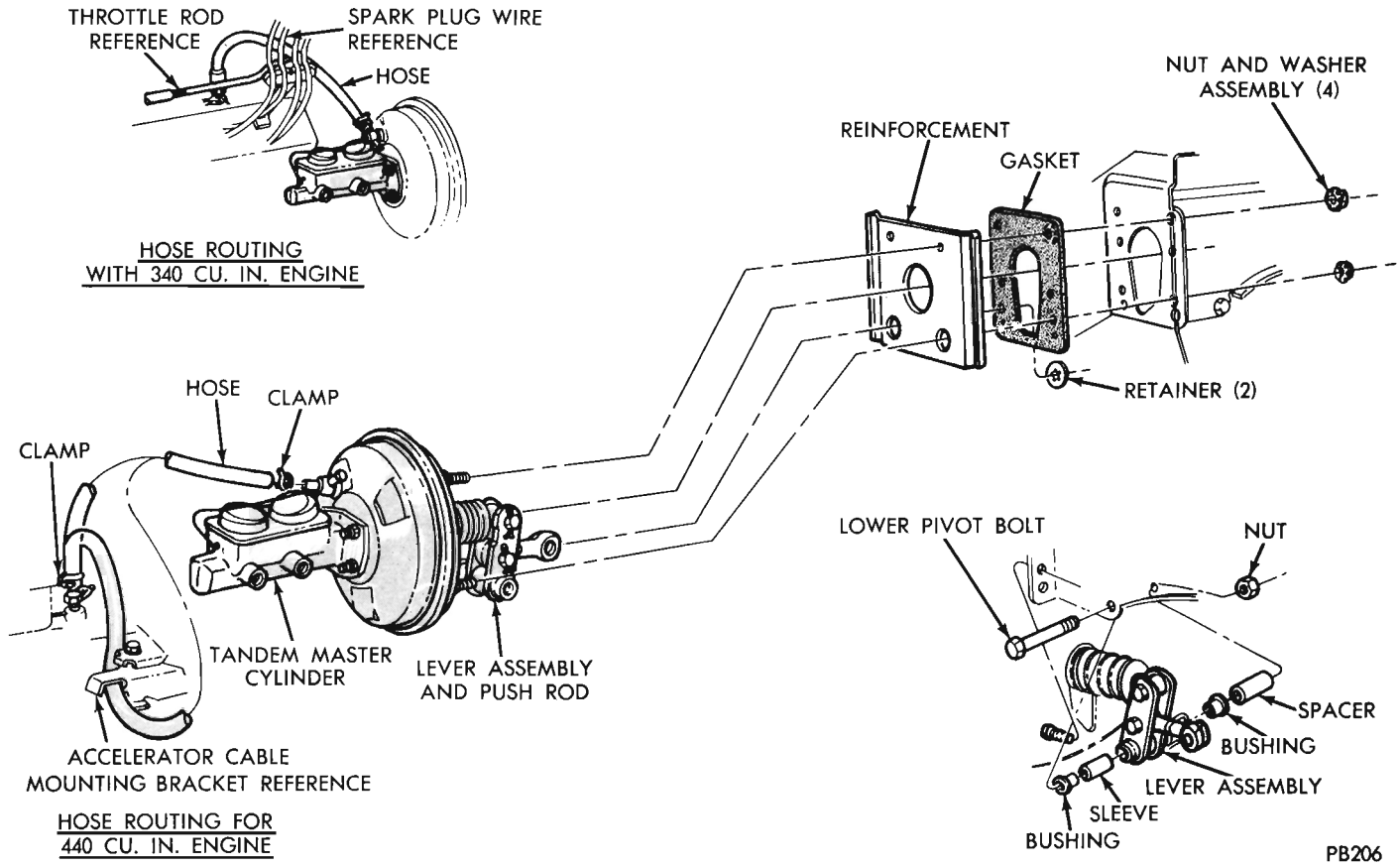


Fig. 2 Power Brake Assembly (Satellite and Barracuda Models with 10 Inch Brakes)

MIDLAND ROSS POWER BRAKE

(Large Single Diaphragm)

SERVICE PROCEDURES

REMOVING POWER BRAKE

(1) Remove nuts attaching master cylinder to brake unit. Remove master cylinder from unit.

(2) Disconnect vacuum line from check valve.

(3) From under instrument panel, remove nut and bolt from power brake link and brake pedal (Fig. 3).

(4) From under instrument panel remove four brake unit attaching nuts and washers.

(5) Withdraw brake unit assembly from vehicle.

INSTALLING POWER BRAKE

(1) Install power brake and linkage assembly (if so equipped) into dash panel. Install attaching nuts and washers. Tighten nuts to 150 inch-pounds.

(2) Using lubriplate, coat the bearing surface of bolt that connects power brake pedal link with brake pedal. Install bolt and nut. Tighten to 30 foot-pounds. Install lower pivot bolt (if so equipped).

(3) Attach vacuum hose to check valve.

(4) Install master cylinder on power brake, Tighten mounting nuts to 200 inch pounds. With power brake attached to dash panel and vacuum supplied to unit, the master cylinder should compensate (force jet of fluid up through front chamber compensation port).

(5) Inspect adjustment of stop light switch.

CAUTION: Do not attempt to disassemble brake booster as this unit will be serviced by Manufacturer's Service Station.

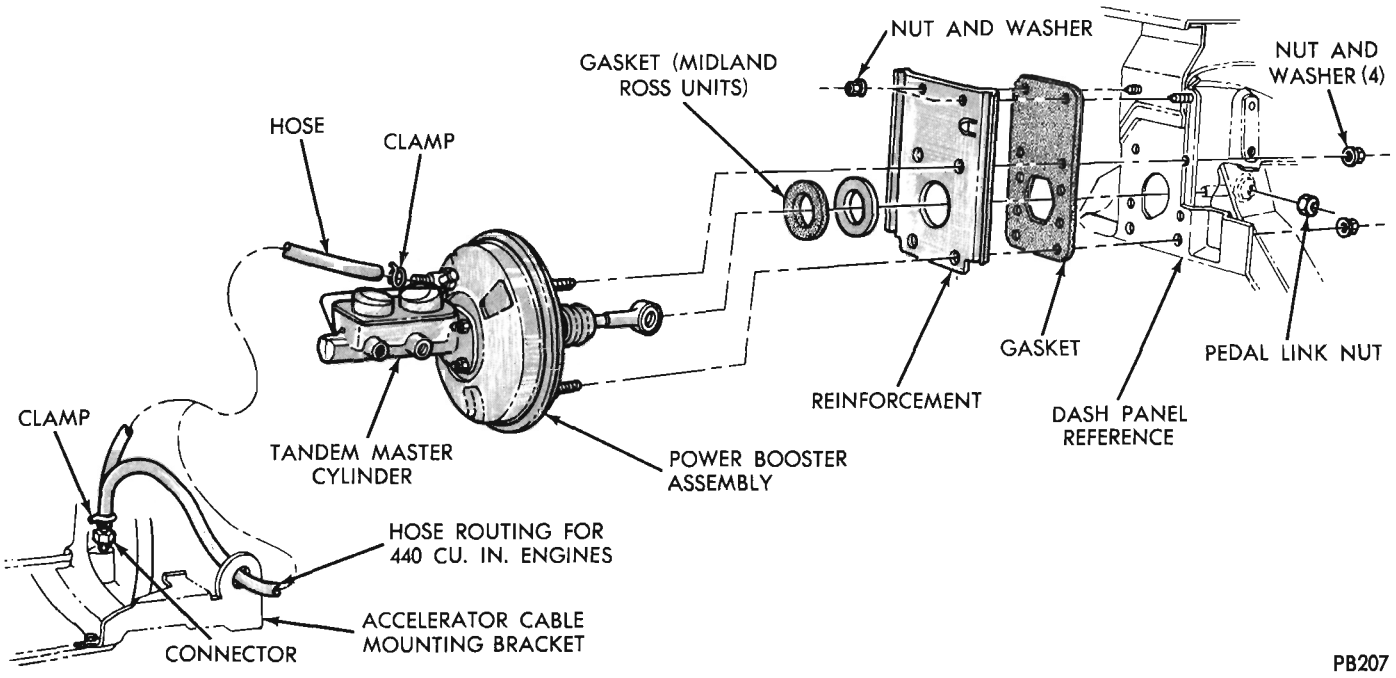


Fig. 3 Power Brake Assembly (Satellite and Barracuda Models with 11 Inch Brakes) (Fury and Chrysler Models with Automatic Transmission

MIDLAND-ROSS POWER BRAKE

(Large Tandem Diaphragm)

SERVICE PROCEDURES

REMOVING POWER BRAKE

(1) Disconnect master cylinder from power brake unit.

(2) Disconnect vacuum line from check valve.

(3) From under instrument panel, remove push rod nut and bolt from power brake and brake pedal (Fig. 4).

(4) From under instrument panel remove four brake unit attaching nuts and washers.

(5) Withdraw brake unit assembly from brake support bracket.

INSTALLING POWER BRAKE

(1) Install power brake and linkage assembly (if so equipped) into dash panel. Install attaching nuts and washers. Tighten nuts to 150 inch-pounds.

(2) Using lubriplate or equivalent coat the bearing surface of bolt that connects power brake pedal link with brake pedal linkage. Install bolt and nut. Tighten to 30 foot pounds.

(3) Attach vacuum hose to check valve.

(4) Install master cylinder on power brake. Tighten mounting nuts to 200 inch pounds. With power brake attached to dash panel and vacuum supplied to unit, the master cylinder should compensate (force jet of fluid up through front chamber compensation port).

(5) Inspect adjustment of stop light switch.

CAUTION: Do not attempt to disassemble brake booster as this unit will be serviced by Manufacturer's Service Station.

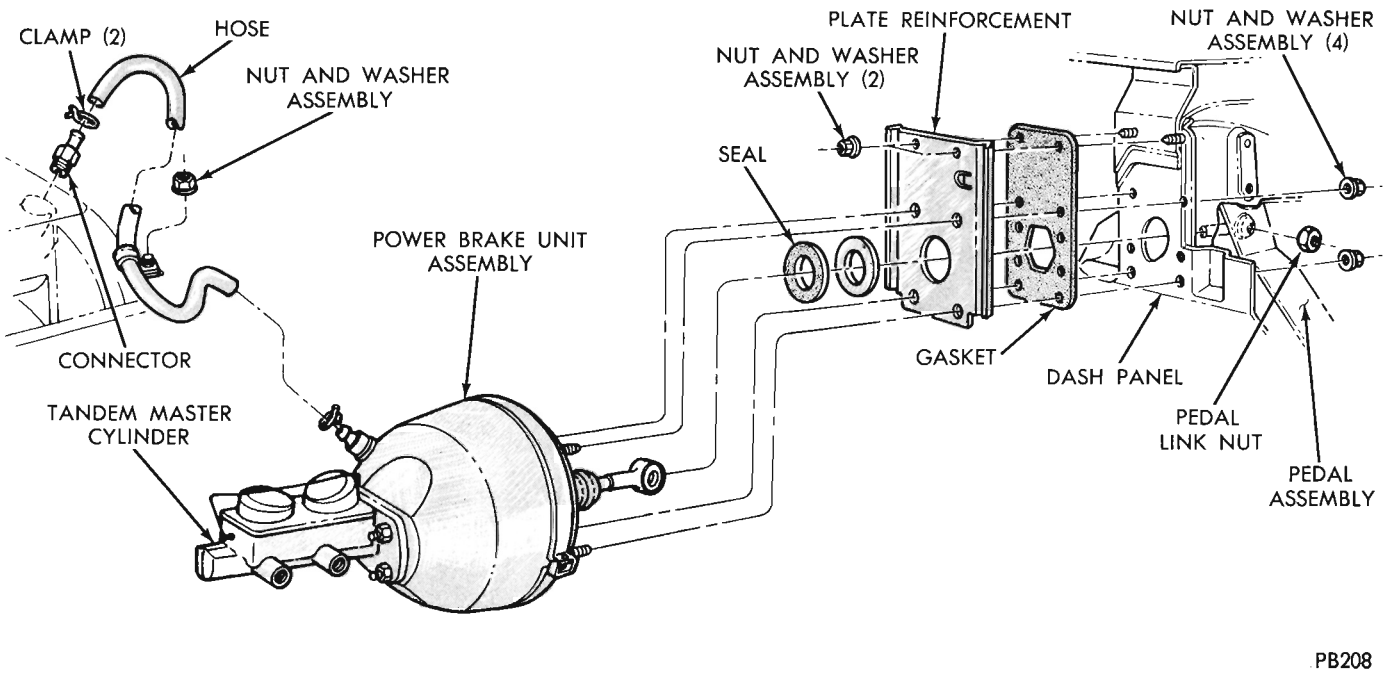


Fig. 4 - Power Brake Assembly (Fury, Chrysler Suburban or Manual Transmission and All Imperial Models)

POWER BRAKE—BENDIX

(Tandem Diaphragm)

SERVICE PROCEDURES

REMOVING POWER BRAKE

(1) Disconnect master cylinder from power brake unit.

(2) Disconnect vacuum line from check valve.

(3) From under instrument panel, remove push rod nut and bolt from power brake and brake pedal. (On linkage type power brake, remove lower pivot bolt.)

(4) From under instrument panel remove four brake unit attaching nuts and washers.

(5) Withdraw brake unit assembly from brake support bracket (Fig. 5).

INSTALLING POWER BRAKE

(1) Install power brake and linkage assembly (if so equipped) into dash panel. Install attaching nuts and washers. Tighten nuts to 150 inch-pounds.

(2) Using lubriplate, or equivalent, coat the bearing surface of bolt that connects power brake pedal link with brake pedal linkage. Install bolt and nut. Tighten to 30 foot pounds. (Install lower pivot bolt, if so equipped).

(3) Attach vacuum hose to check valve.

(4) Install master cylinder on power brake. Tighten mounting nuts to 200 inch pounds. With power brake attached to dash panel and vacuum supplied to unit, the master cylinder should compensate (force jet of fluid up through front chamber compensation port).

(5) Inspect adjustment of stop light switch.

CAUTION: Do not attempt to disassemble brake booster as this unit will be serviced by Manufacturer's Service Station.

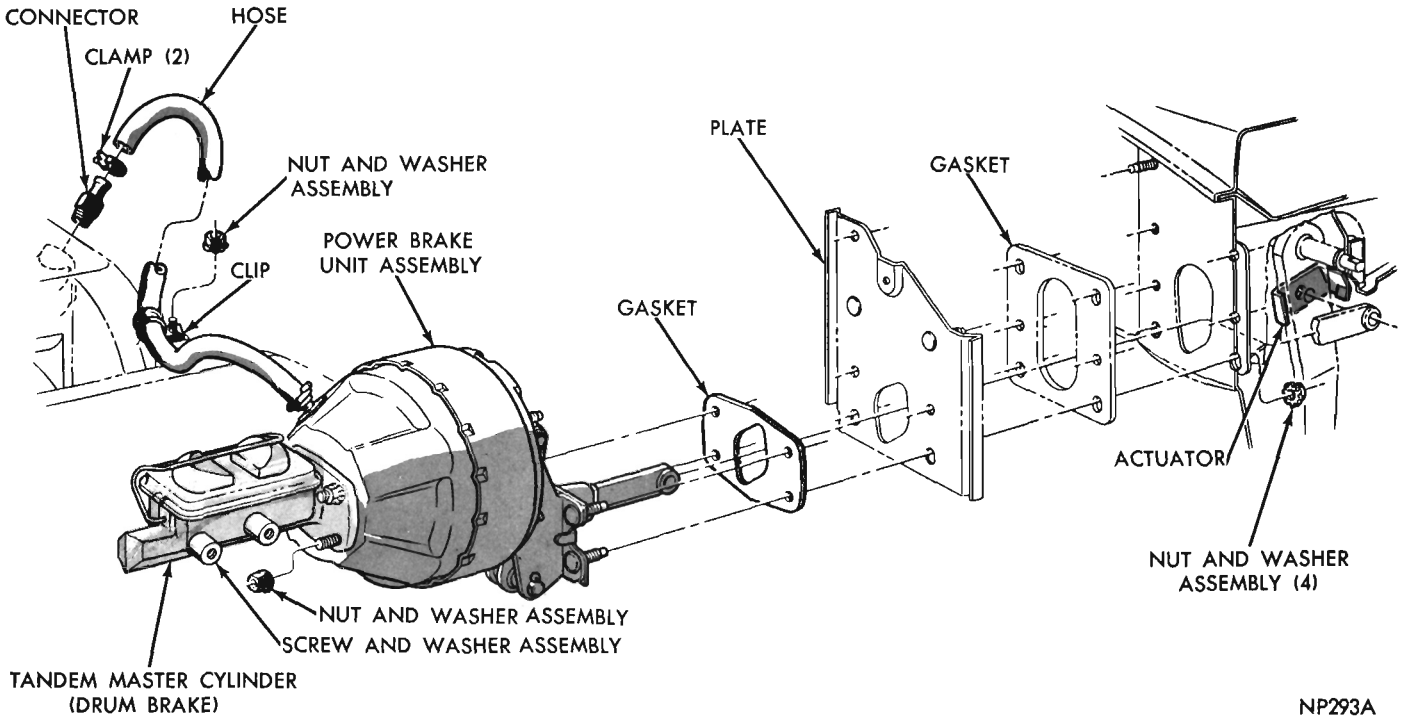


Fig. 5 Power Brake (Tandem Diaphragm) 426 Hemi, Drum or Disc Brakes

DISC BRAKES

(FIXED CALIPER)

INDEX

	Page
Assembling Caliper	38
Assembling Master Cylinder	58
Bleeding Disc Brake	40
Brake Shoe Installation	36
Brake Shoe Removal	35
Cleaning and Inspection (Master Cylinder)	58
Disassembling Caliper	37
Disassembling Master Cylinder	57
Disc Brake Service Precautions	33
General Information	30
Installing Brake Disc and Hub	39
Installing Caliper	39
Installing Master Cylinder	59
Proportioning Valve	41
Removing Braking Disc and Hub	39
Removing Caliper	36
Removing Master Cylinder	57
Routine Maintenance	32
Service Diagnosis	34

GENERAL INFORMATION

The disc brake (Fig. 1) is a fixed caliper, opposed piston, non-energized, ventilated disc type, actuated by the hydraulic system. There is no lateral movement of either the disc or the caliper. The caliper assembly consists of two caliper housings, bolted together. Each half contains two cylinder bores of 1-5/8 inch diameter. Each cylinder contains a seal, piston and externally attached molded rubber dust boot to seal the cylinder from contamination. The pistons are sealed by "rectangular section" rubber piston seals, positioned in grooves machined in the cylinder bores, which provide hydraulic sealing between the pistons (Fig. 2), and the cylinder bores.

The cylinders are connected hydraulically by means of internal passages in the caliper housings and by an external transfer tube between the two halves of the caliper assembly. A bleeder screw and a fluid inlet fitting are provided on each caliper assembly (Fig. 1).

The shoe and lining assemblies are located between parallel machined abutments within the

caliper, (Fig. 6) and are supported radially by "ears" on the outer ends of the shoe assemblies. The shoes slide axially in the abutments and ride on machined ledges (bridges) when hydraulic pressure is applied to the pistons. The lining assembly consists of organic friction material, bonded to a metal plate called the shoe, and is replaced as a unit. Brake torque is absorbed by the reaction of

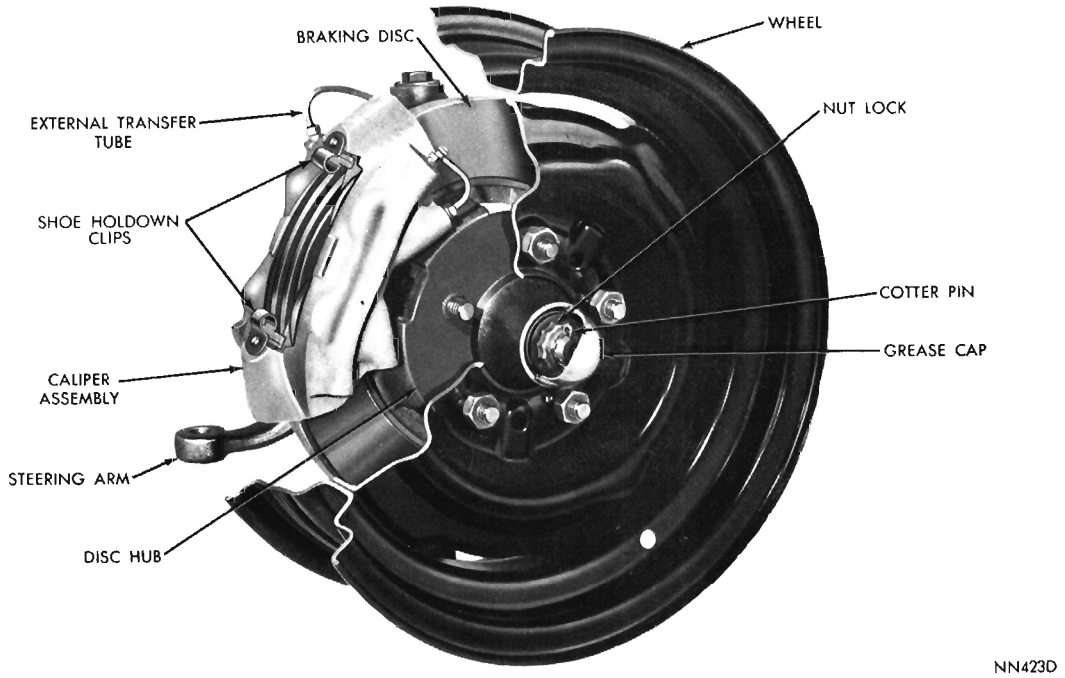


Fig. 1 - Disc Brake Assembly (Sectional)

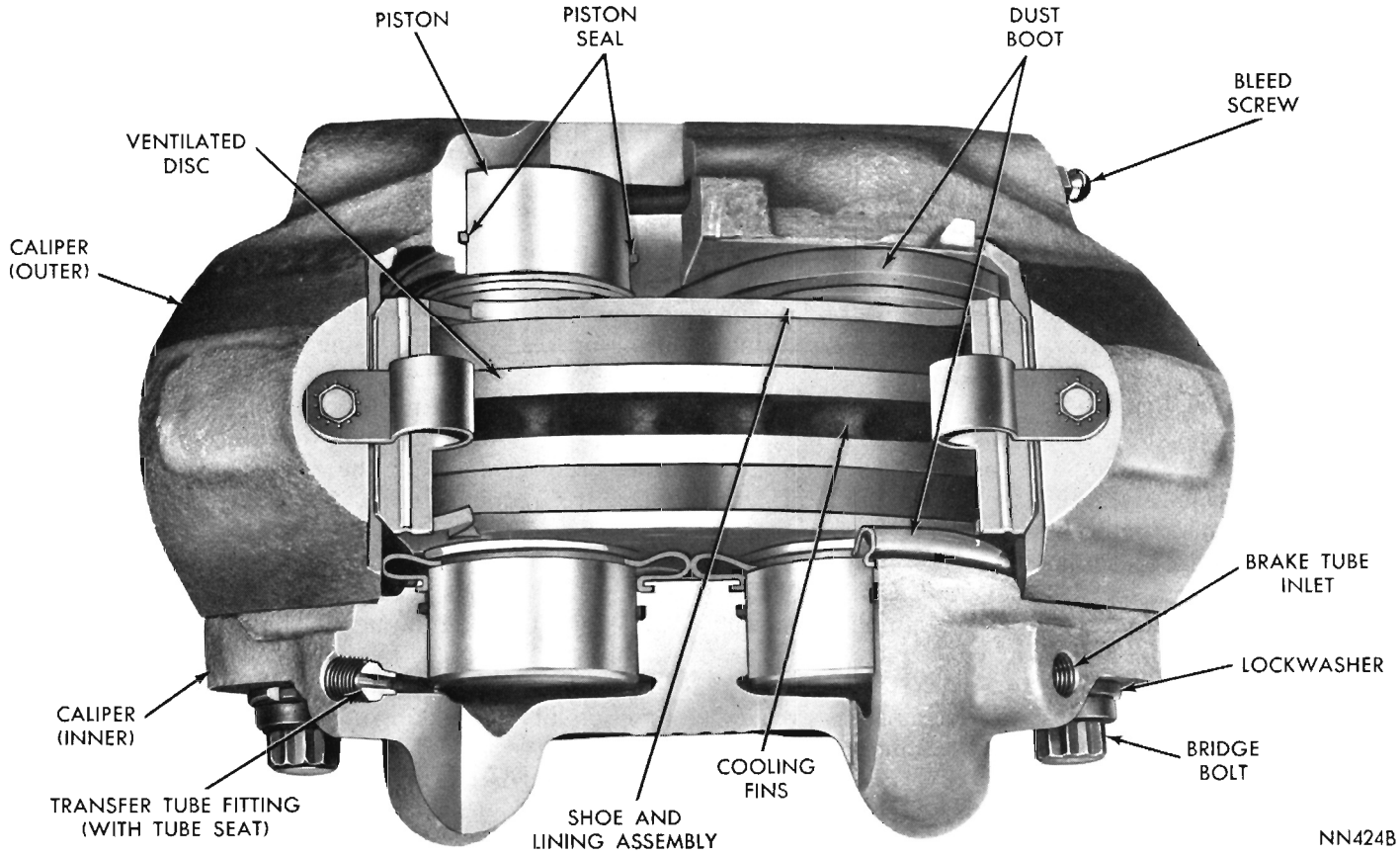


Fig. 2 - Disc Brake Caliper Assembly (Sectional)

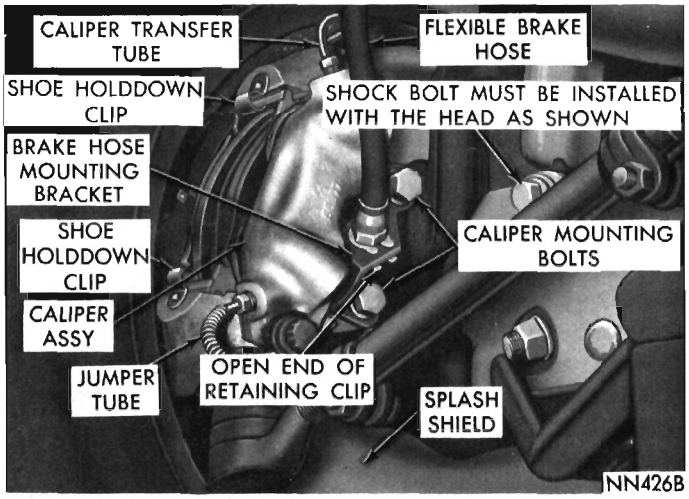


Fig. 3 - Disc Brake Caliper Mounting.

the shoe end against the caliper abutments. Two spring clips bolted in the top opening of the caliper act as shoe retaining springs. The caliper is mounted directly to the front wheel spindle and at the rear of the wheel's vertical centerline (Fig. 3).

The cast iron braking disc is of the ventilated type and incorporates cooling fins. This increases the cooling area and permits circulation of air through the disc, resulting in more rapid cooling of the brake. The disc is attached to the wheel hub by five flathead serrated bolts. The outside diameter of the disc is 11.04 inches and the inside is 6.91 inches. A splash shield bolted to the spindle is used to prevent road contaminates from contacting the inboard side of the disc and lining surfaces (Fig. 3). The wheel, itself, provides protection for the outboard surface of the disc.

Braking action begins immediately upon application of the brake pedal as hydraulic pressure from the master cylinder to the system applies pressure to the co-axially aligned caliper pistons forcing the linings against both sides of the braking disc, thus applying the brakes. During brake application, the piston seals are deflected by the hydraulic pressure (Fig. 4). When the pressure is released, the seals relax or retract, pulling the pistons back from the shoe and lining assemblies approximately .005 in. (This reaction is called "seal retraction" and provides the required running clearance as the linings relieve their force on the disc.) Inherent disc run-out also contributes to maintaining running clearance. Automatic adjustment is achieved by the pistons sliding outward from the cylinder bore as the lining wears. The piston assumes a new position relative to the seal and maintains the correct adjustment location at all time (Fig. 4).

There is no residual pressure in the disc brake hydraulic system since the residual pressure valve normally used in drum brake system is located only in the front outlet port of the master

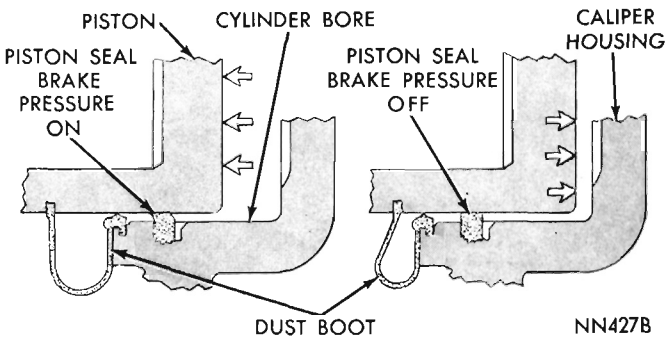


Fig. 4 Piston Seal Function for Automatic Adjustment

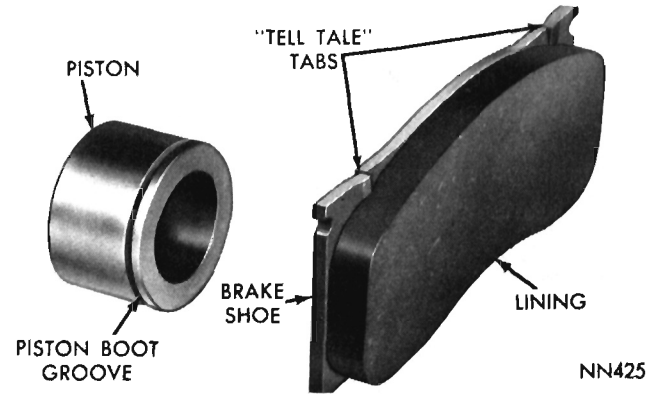


Fig. 5 Disc Brake Piston, Shoe and Lining Assembly

cylinder. (See Master Cylinder Section of the Group).

The hydraulic system contains a proportioning valve between the master cylinder and the rear brake wheel cylinders which provides balanced braking action between the front and rear brakes under a wide range of braking conditions. The valve regulates the hydraulic pressure applied to the rear wheel cylinders, thus limiting rear braking action when high pressures are required at the front brakes. In this manner, premature rear wheel skid is prevented.

An additional feature of this disc brake system is a "tell-tale" tab sounding device which indicates when replacement of the shoe and lining assemblies are required (Fig. 5). The tabs located on the shoes create an audible metallic scraping noise from the brake by metal to metal contact on the braking disc. This warns the driver that the lining has worn to a minimum thickness and the vehicle should be returned to the dealer for relining of the brakes. This device is not detrimental to the function of the braking disc.

ROUTINE MAINTENANCE

Check Brake Lines and Linings

Raise all four wheels. Remove one of the front wheel and tire assemblies and inspect the braking

disc, caliper and linings. (The wheel bearings should be inspected at this time and repacked if necessary.) **The caliper must be removed to inspect and pack the inner wheel bearing.**

Do not get oil or grease on the disc or the linings. If the linings are worn to within .030 inch of the surface of the shoe, replace both sets of shoe and lining assemblies (inboard and outboard) on the front wheels. It is recommended that both front wheel sets be replaced whenever a respective shoe and lining is worn or damaged.

If the caliper is cracked or fluid leakage through the casting is evident, it must be replaced as a unit.

Shoe and Lining Wear

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary.

To check the amount of lining wear, remove the wheel and tire assembly, the spring clips and the shoe and lining assemblies (see "Brake Shoe Removal" paragraph). Three (3) thickness measurements with a micrometer should be taken across the middle section of the shoe and lining; one reading at each side and one reading in the center. When an assembly has worn to a thickness of .180 inch, it should be replaced. If shoes do not require replacement, reinstall making sure to replace to their original inner and outer positions (see "Brake Shoe Installation" paragraph).

When shoe and lining replacement is required, a "scraping" noise from the front brakes will be heard. This noise is metal-to-metal contact between the tabs on the shoe assemblies and the braking disc. When the noise becomes audible to the driver, the lining has worn to the metal tabs and the brakes must be relined. The contact between the metal tab and disc will not affect the functioning of the disc brake system, but continued use until lining is completely worn away will cause disc damage.

Running Clearance

To check the shoe and lining assembly to the braking disc clearance, remove the wheel and tire assembly. Insert a feeler gauge between the lining and the braking disc. Ordinarily, the clearance should be .003 to .006 inch. However, if the vehicle was stopped by a brake application just prior to checking the clearance, it is considered normal for the brakes to drag slightly.

Brake Roughness

The most common cause of brake chatter on disc brakes is a variation in thickness of disc. If roughness or vibration is encountered during highway operation or if pedal pumping is experienced at low speeds, the disc may have excessive thickness variation. To check for this condition, measure the disc at 12 (twelve) points with a micrometer at a radius approximately one inch (1 in.) from edge of disc. If thickness measurements vary by more than .0005 inch the disc should be replaced with a new one.

Braking Disc Runout

Excessive lateral runout of the braking disc will cause a "knocking back" of the pistons, which will create increased pedal travel and vibration when the brakes are applied.

Before checking the runout, the wheel bearing end play should be eliminated by tightening the adjusting nut. **The readjustment is very important and will be required at the completion of the test to prevent bearing failure.** After tightening the adjusting nut, be sure that the braking disc can still be rotated.

Dial indicator C-3339 should be clamped to the steering knuckle so that the stylus contacts the braking disc at a point approximately one (1) inch from the outer edge, (Fig. 15). Rotate the disc and check the indicator reading. The maximum total indicator reading on the gauge should not exceed .0025 inch. If the reading exceeds this specification, the disc should be replaced. **Do not attempt to refinish a disc that indicates runout in excess of the specification.**

DISC BRAKE SERVICE PRECAUTIONS

(1) Grease or any other foreign material must be kept off the caliper assembly, surfaces of the braking disc and external surfaces of the hub, during service procedures. Handling the braking disc and caliper should be done in a way to avoid deformation of the braking disc and nicking or scratching the brake linings.

(2) If inspection reveals the square sectioned rubber piston seals are worn or damaged, they should be replaced immediately.

(3) During removal and installation of a wheel and tire assembly, exercise care so as not to interfere with or damage the bleeder screw or the transfer tube.

(4) The front wheel bearing end play is important and must be within specifications.

(5) Be sure vehicle is centered on the hoist before servicing any of front end components to avoid bending or damaging disc splash shield on full right or left wheel turns.

(6) Before vehicle is moved after any brake service work, **be sure and obtain a firm brake pedal.**

(7) The assembly bolts of two caliper housings should not be disturbed, unless servicing of caliper assembly is required.

(8) **Riding brake pedal** (common left foot application) should be avoided during vehicle operation.

(9) The wheel, tire, hub and disc assembly **cannot** be removed as an assembly. The caliper assembly must be removed before removal of hub and disc assembly.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
EXCESSIVE PEDAL TRAVEL	(a) Rear brake adjustment required.	(a) Check and adjust rear brakes.
	(b) Air leak, or insufficient fluid in system or caliper.	(b) Check system for leaks.
	(c) Warped or excessively tapered shoe and lining assembly.	(c) Install new shoe and linings.
	(d) Excessive disc runout.	(d) Check disc for runout with dial indicator. Install new disc.
	(e) Loose wheel bearing adjustment.	(e) Readjust wheel bearings to specified torque.
	(f) Improper brake fluid (boil).	(f) Drain and install correct fluid.
	(g) Damaged caliper piston seal.	(g) Install new piston seal.
BRAKE ROUGHNESS OR CHATTER (Pedal Pulsating)	(a) Excessive out-of-parallelism of braking disc.	(a) Check disc for runout with dial indicator. Install new disc.
	(b) Rear brake drums out-of-round.	(b) Loosen and retorque wheel nuts to specifications.
	(c) Excessive lateral runout of braking disc.	(c) Check disc for lateral runout with dial indicator. Install new disc.
	(d) Excessive front bearing clearance.	(d) Readjust wheel bearings to specified torque.
	(e) Rear brake drums distorted by improper tightening of nuts.	(e) Check drums for out-of-round and reface if necessary.
EXCESSIVE PEDAL EFFORT	(a) Power brake malfunction.	(a) Replace
	(b) Frozen or seized pistons.	(b) Disassemble caliper and free up pistons. Clean parts.
	(c) Shoe and lining worn below .180 in. (Lining only— .30 in.)	(c) Install new shoe and linings.
	(d) Brake fluid, oil or grease on linings.	(d) Install new shoe linings as required.
	(e) Incorrect lining.	(e) Remove lining and install correct lining.
PULL	(a) Loose calipers.	(a) Tighten caliper mounting bolts from 45 to 60 ft. pounds.
	(b) Frozen or seized pistons.	(b) Disassemble caliper and free up pistons.
	(c) Rear brake pistons sticking.	(c) Free up rear brake pistons.
	(d) Front end out of alignment.	(d) Check and align front end.
	(e) Broken rear spring.	(e) Install new rear spring.
	(f) Out-of-round rear drums.	(f) Check and reface drums if necessary.
	(g) Incorrect tire pressure.	(g) Inflate tires to recommended presures.
	(h) Brake fluid, oil or grease on linings.	(h) Install new shoe and linings.
	(i) Restricted hose or line.	(i) Check hoses and lines and correct as necessary.
	(j) Rear brakes out of adjustment.	(j) Adjust rear brakes.
	(k) Unmatched linings.	(k) Install correct lining.
	(l) Distorted brake shoes.	(l) Install new brake shoes.
NOISE Groan—Brake noise emanating when slowly releasing brakes (creep—groan)	(a) Not detrimental to function of disc brakes—no corrective action required. (Indicate to operator this noise may be eliminated by slightly increasing or decreasing brake pedal efforts).	

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
Rattle-Brake noise or rattle emanating at low speeds on rough roads, (front wheels only).		
	(a) Excessive clearance between shoe and caliper.	(a) Install new shoe and lining assemblies.
Scraping—	(a) Loose wheel bearings.	(a) Readjust wheel bearings to correct specifications.
	(b) Braking disc rubbing housing.	(b) Check for rust or mud buildup on caliper mounting and bridge bolt tightness.
	(c) Mounting bolts too long.	(c) Install mounting bolts of correct length.
FRONT BRAKES HEAT UP DURING DRIVING AND FAIL TO RELEASE	(a) Residual pressure valve in master cylinder.	(a) Remove valve from cylinder.
	(b) Frozen or seized piston.	(b) Disassemble caliper, hone cylinder bore, clean seal groove and install new pistons, seals and boots.
	(c) Operator riding brake pedal.	(c) Instruct owner how to drive with disc brakes.
	(d) Sticking pedal linkage.	(d) Free up sticking pedal linkage.
	(e) Power brake malfunction.	(e) Replace
LEAKY WHEEL CYLINDER	(a) Corroded bore.	(a) Hone bore and replace boots and cups.
	(b) Damaged or worn caliper piston seal.	(b) Disassemble caliper and install new seal.
	(c) Scores or corrosion on surface of piston.	(c) Disassemble caliper and hone cylinder bore. If neccessary, install new pistons.
GRABBING OR UNEVEN BRAKING ACTION	(a) Causes listed under "Pull."	(a) Corrections listed under "Pull."
	(b) Power brake malfunction.	(b) Replace unit.
BRAKE PEDAL CAN BE DEPRESSED WITHOUT BRAKING EFFECT	(a) Air in hydraulic system or improper bleeding procedure.	(a) Bleed system.
	(b) Leak in system or caliper.	(b) Check for leak and repair as required.
	(c) Pistons pushed back in cylinder bores during servicing of caliper (shoe and lining not properly positioned).	(c) Reposition brake shoe and lining assemblies. Depress pedal a second time and if condition persists, check following causes:
	(d) Leak past piston cups in master cylinder.	(d) Recondition master cylinder.
	(e) Damaged piston seal in one or more of cylinders.	(e) Disassemble caliper and replace piston seals as required.
	(f) Leak in rear brake cylinder.	(f) Hone cylinder bore. Install new piston cylinder cups.
	(g) Rear brakes out of adjustment.	(g) Adjust rear brakes.
	(h) Bleeder screw open.	(h) Close bleeder screw and bleed entire system.

SERVICE PROCEDURES

BRAKE SHOE REMOVAL

To remove the disc brake shoe and lining assembly, (Fig. 1), proceed as follows:

(1) Raise vehicle on a hoist or jackstands.

(2) Remove wheel covers, and wheel and tire assembly.

(3) Remove shoe retainer hold down clips.

(4) Using two pair of pliers, grasp tabs on outer ends of shoes, remove shoe and lining by pulling outward (Fig. 6). Due to a ridge of rust that may build up on rotor surface outside of lining contact area, it may be necessary to force piston back slightly into bores. Pistons can be forced back into

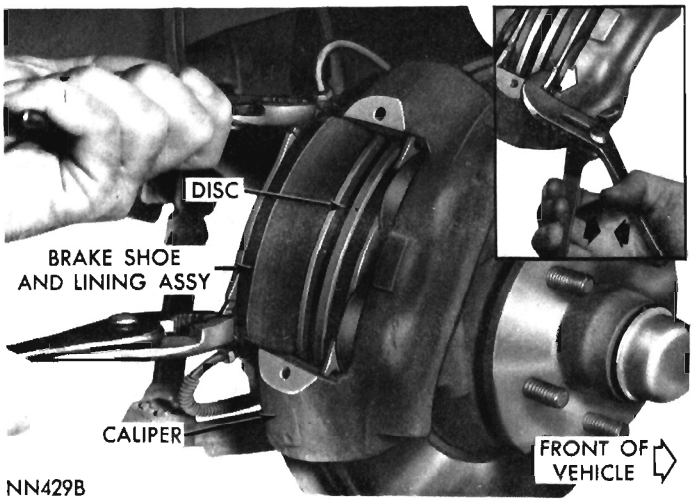


Fig. 6 - Removing Brake Shoe and Lining

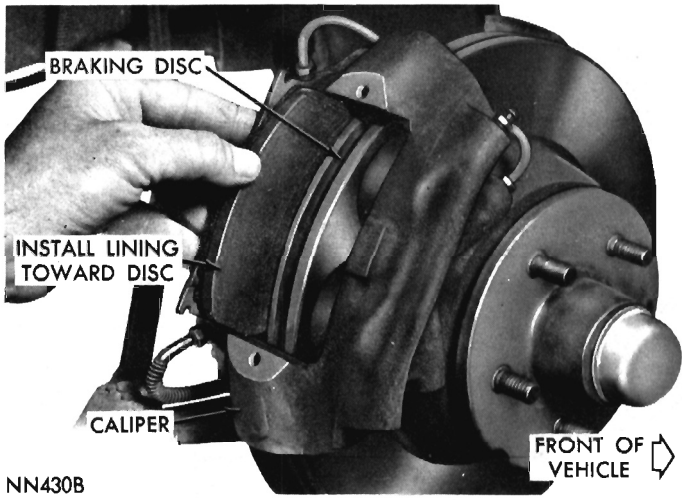


Fig. 7 - Installing Brake Shoes and Lining

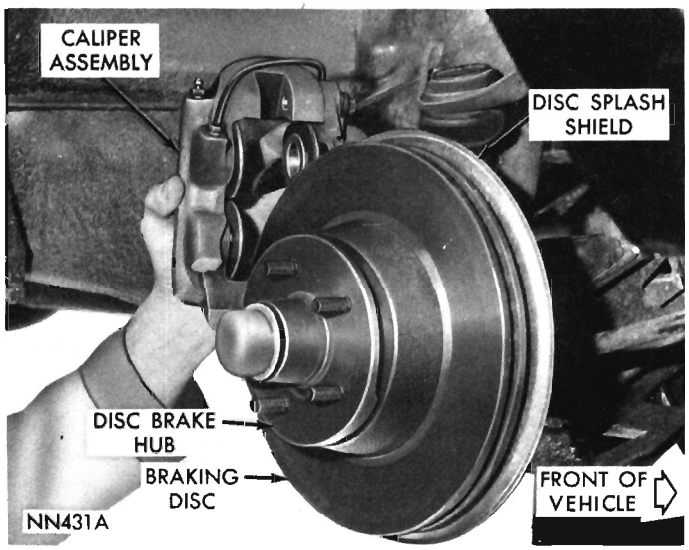


Fig. 8 - Removing or Installing Disc Brake Caliper

bores by forcing shoe back with a water pump pliers placed on corner of the shoe and caliper housing (Fig. 6).

Check the caliper for seal leaks (evident by fluid moisture around the cavity) and for any damage to the piston dust boot. Wipe the cavity clean (between the inner and outer caliper housings) with a shop towel. Check the piston dust boot for proper seating in the piston bore and the caliper housing. If excessive fluid moisture is evident, it will be necessary to install a new piston seal and piston dust boot. (Refer to "Disassembling the Caliper" paragraph.)

BRAKE SHOE INSTALLATION

(1) Push all pistons back into their bores until bottomed to allow for installation of new thick shoes. This can be done by placing a flat sided metal bar or tool against piston and exerting a steady force until bottomed. This will cause fluid to rise in the master cylinder reservoir so be sure and remove a quantity of fluid from the reservoir before hand.

(2) Slide new shoe and lining into caliper with ears of shoe resting on bridges of caliper (Fig. 7). Be sure shoe is fully seated and lining is facing disc.

(3) Slide remaining shoe and lining into caliper, using same procedure as described above.

(4) Place shoe retainer spring assemblies in position on caliper.

(5) Pump brake pedal several times until a firm pedal has been obtained and shoe and lining have been properly seated.

(6) Install wheel and tire. Tighten wheel stud nuts to 55 foot-pounds. Install wheel cover.

(7) Check and refill master cylinder reservoir with brake fluid as required.

CAUTION: Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the linings. The vehicle may pull to one side or the other if this is not done.

REMOVING CALIPER

Should it become necessary to remove the caliper for installation of a new piston seal or boot, (Fig. 4), proceed as follows:

(1) Raise car on hoist or jackstands.

(2) Remove wheel cover and wheel and tire assembly.

(3) Disconnect front brake flexible hose from brake tube at frame mounting bracket. (Plug brake tube to prevent loss of fluid.)

(4) Remove bolts that attach caliper assembly to steering knuckle. Should it become necessary to install a new flexible brake hose on a disc brake equipped vehicle, scribe a mark on hose bracket on side where hose enters, and position of hose retaining clip underneath (Fig. 3). **Be sure at**

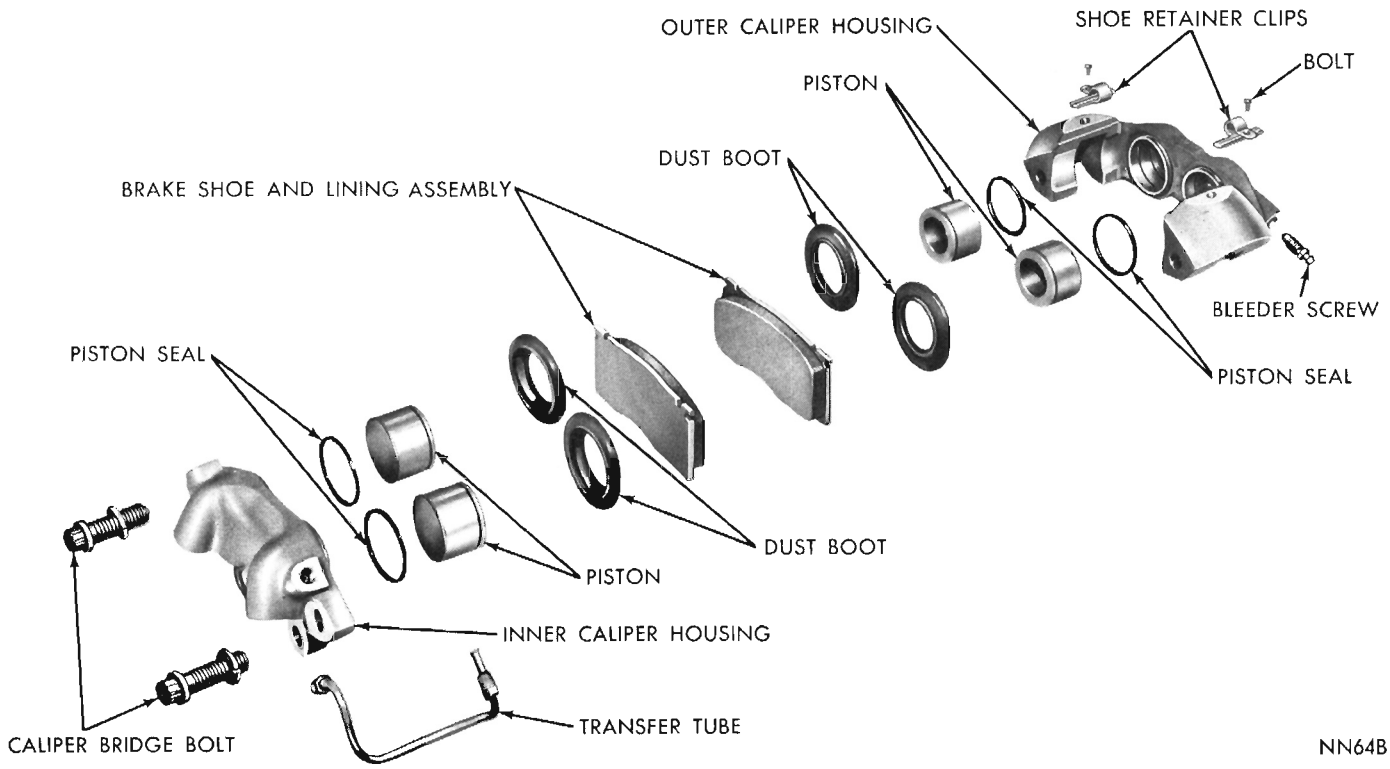


Fig. 9 - Caliper Assembly (Exploded View)

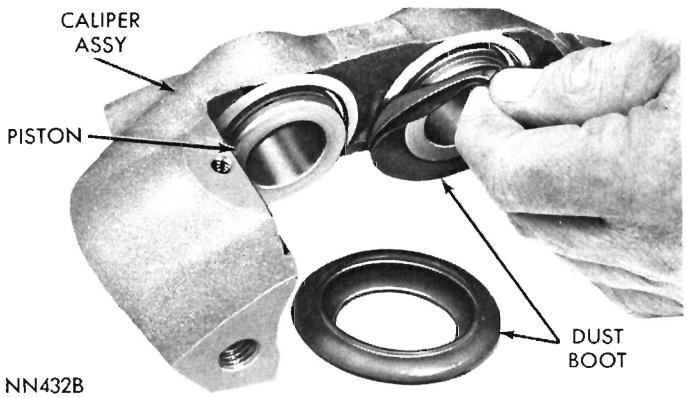


Fig. 10 - Removing Dust Boot from Piston and Caliper

reassembly, that open end of retaining clip is facing out and away from caliper.

(5) Slowly slide caliper assembly up and away from brake disc (Fig. 8) and remove to bench for disassembly.

DISASSEMBLING CALIPER

To disassemble the caliper for the installation of new parts (Fig. 9), proceed as follows:

(1) Remove shoe ratiner spring clips. Remove transfer tube (armored) at caliper.

(2) Mount caliper assembly in a vise equipped with protector jaws. (Use caliper mounting lugs.) Remove transfer tube.

(3) Remove shoe and lining assemblies.

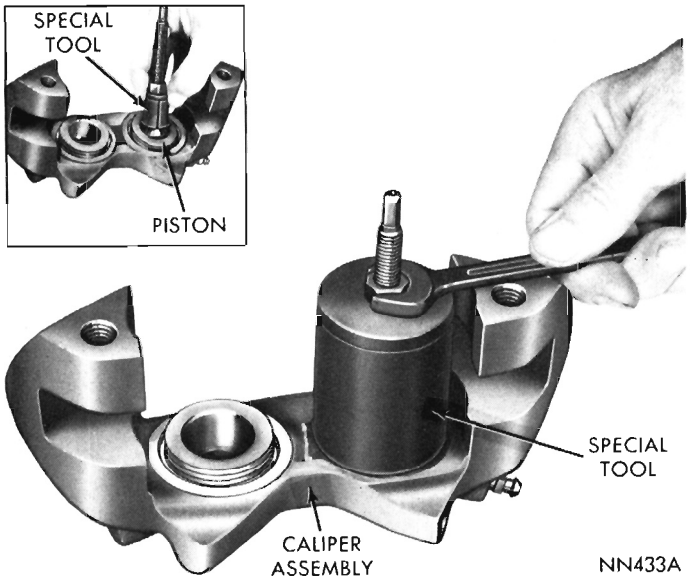


Fig. 11 - Removing Pistons from Caliper

(4) Remove bridge bolts that hold two halves of caliper together. **(Make sure at reassembly that these two bolts are used and tightened to correct torque.)** Separate assemblies.

(5) Peel dust boot out and away from caliper housing retainer and out of piston groove (Fig. 10). Remove remaining dust boots in same manner.

(6) Using Tool C-3999, remove each of pistons (Fig. 11). **Care must be used so as not to**

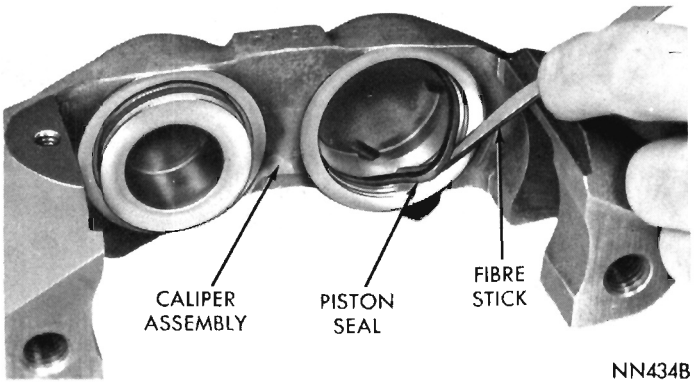


Fig. 12 - Removing Piston Seals from Caliper

scratch, burr or otherwise damage piston on outside diameter. To do so effects sealing qualities of piston. Draw piston straight out of its bore. If a piston becomes cocked, removal is more difficult and piston or bore may be damaged.

(7) Using a small pointed wooden or plastic tool, remove piston seals from groove in cylinder bore (Fig. 12). Discard old seals. (Use care so as not to scratch bore or the seal groove.)

CLEANING AND INSPECTION

Clean all parts in brake fluid and wipe dry, using clean, lint free, shop towels. Using an air hose, blow out the drilled passages and bores. Check the dust boots for punctures or tears. If punctures or tears are evident, new boots should be installed at reassembly. Inspect the piston bores in both housings for scoring or pitting. Install a new piston if it is pitted, scored or the chrome plating is worn off. Bores that show light scratches or corrosion, can usually be cleaned with crocus cloth. However, bores that have deep scratches or scoring may be honed, using Tool C-3993, providing the diameter of the bore is not increased more than .002 inch. If the bore does not clean up within this specification, a new caliper housing should be installed. (Black stains on the bore walls are caused by the piston seals and will do no harm.)

When using hone C-3993 (Fig. 13) be sure and install the hone baffle before honing bore. The baffle is used to protect the hone stones from damage. After honing the bore carefully, clean the seal groove with a stiff non-metallic rotary brush.

Use extreme care in cleaning the caliper after honing. Remove all dust and grit by flushing the caliper with brake fluid; wipe dry with a clean lintless cloth and then clean a second time in the same manner.

ASSEMBLING CALIPER

To reassemble the disc brake caliper, (Fig. 9),

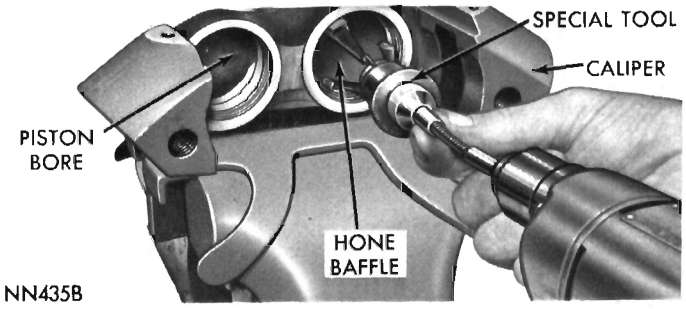


Fig. 13 - Honing Piston Bores

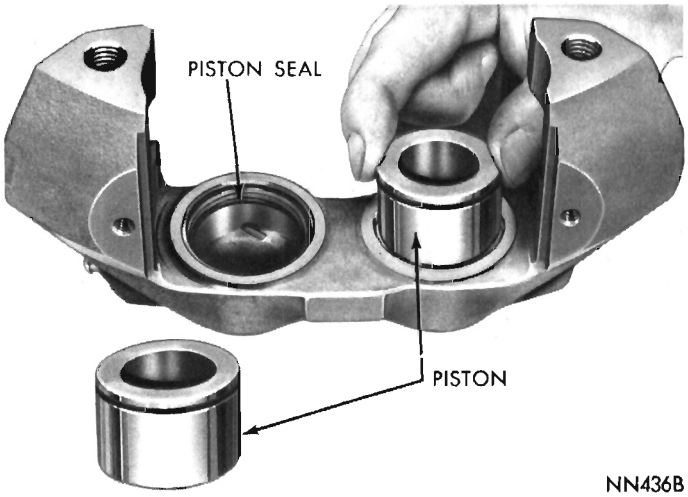


Fig. 14 - Installing Pistons in Caliper

proceed as follows:

(1) Clamp inner caliper half in a vise (with protector jaws) by mounting lugs.

(2) Dip new piston seals in clean brake fluid and install in caliper grooves. The seal should be positioned at one area in groove and gently worked around cylinder bore with a finger until properly seated. **Never use an old piston seal.** (Be sure seals are not twisted or rolled.)

(3) Coat outside diameter of pistons with clean brake fluid and install them in cylinder bores (Fig. 14), with open end of piston and boot retaining groove facing out of cylinder.

(4) Position piston squarely in bore and apply slow steady pressure until piston is positioned. **If piston will not position itself, remove piston and check position of seal for proper position in groove.**

(5) Install a new dust boot in position in groove in caliper and in piston. **Be sure dust boot is properly seated.** Install new remaining dust boots in same manner.

(6) Install caliper half on one clamped in vise, then install assembly bolts (bridge bolts) and tighten from 70 to 80 foot-pounds. **(Under no condition should these bolts be substituted or replaced by an inferior bolt. The use of bolts other than those specified for this purpose, could**

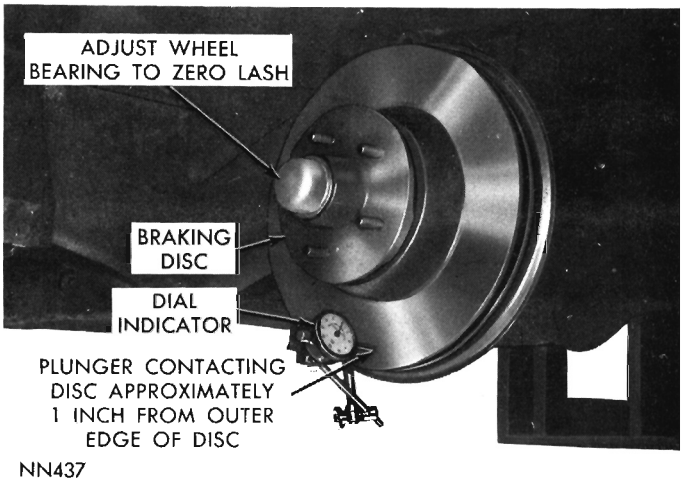


Fig. 15 - Checking Braking Disc Run-out

cause a caliper failure resulting in an accident).

(7) Install transfer tube and tighten securely. (Be sure tube is under protective eyebrow.)

(8) Install bleeder screw but do not tighten.

INSTALLING CALIPER

Before installing the caliper assembly over the brake disc, check the disc for runout and thickness variation. Mount a dial indicator (Fig. 15) and check the lateral runout. Runout should not exceed .0025 inch. If runout exceeds the specified figure, remove the disc and install a new one. (Be sure the wheel bearings are adjusted to zero lash during this check.) Readjust wheel bearings after check.

Thickness variation of the disc, measure the disc at 12 (twelve points) with a micrometer at a radius approximately one inch (1 in.) from edge of disc. If thickness measurements vary by more than .0005 inch, the disc should be replaced with a new one.

(1) Install caliper assembly over disc and align mounting holes. Install mounting bolts and tighten from 50 to 80 foot-pounds. **A check should be made to be sure that braking disc runs squarely and centrally within caliper opening. There should be approximately .090 to .120 inch clearance between outside diameter of braking disc and caliper. There should also be a minimum of .050 inch from either disc face to machined groove in outboard caliper.**

(2) Install shoe and lining assemblies between caliper and braking disc.

(3) Install shoe retainer springs in position on caliper.

(4) Open bleeder screw, then reconnect brake line at caliper housing. Allow caliper to fill with brake fluid; then, close bleeder screw. (Be sure all air bubbles have escaped; bleeding caliper.) Replenish brake fluid in master cylinder.

(5) **"Pump" brake pedal several times to actuate piston seals and position shoe and lining assemblies.**

(6) After assembling caliper unit be sure and check for fluid tightness under maximum pedal pressures. (Recheck master cylinder reservoir lever.) **Check and be sure that lower shock absorber mounting bolt has been installed from rear and nut toward front of vehicle. This is important. (Fig. 3).**

(7) Install wheel and tire assembly and tighten wheel stud nuts (in a star pattern) to 30 foot pounds, then to 55 foot-pounds. **This is important.**

(8) Remove jackstands or lower hoist.

CAUTION: Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the linings. The vehicle may pull to one side or the other if this is not done.

REMOVING BRAKING DISC AND HUB

Should it become necessary to remove the braking disc for installation of a new disc, proceed as follows:

(1) Remove wheel cover and wheel and tire assembly.

(2) Remove caliper assembly as described under "Removing Caliper" paragraph, (but do not disconnect brake line). Suspend caliper from wire hook or loop to avoid strain on hose and damage to transfer tube.

(3) Remove grease cup, cotter pin, nut lock, nut, thrust washer and outer wheel bearing.

(4) Pull disc and hub off wheel spindle.

INSTALLING BRAKING DISC AND HUB

(1) Slide brake disc and hub assembly on spindle.

(2) Install outer bearing, thrust washer, and nut.

(3) Tighten wheel bearing adjusting nut to 90 inch-pounds while rotating hub and disc.

(4) Position lock nut on nut with one pair of slots in line with cotter pin hole.

(5) Back off adjusting nut and lock assembly one slot then install cotter pin. The resulting adjustment should be zero (no preload) end play. (This is very important, when checking disc runout.)

(6) Install a dial indicator C-3339 (Fig. 15) and check runout of disc on both sides. The runout should not exceed .0025 inch. Readjust wheel bearing clearance after checking braking disc runout.

(7) Clean grease cap, coating inside with wheel grease (do not fill) and install cap.

(8) Install caliper assembly as described in "Installing the Caliper" paragraph.

(9) Install wheel and tire assembly and wheel cover.

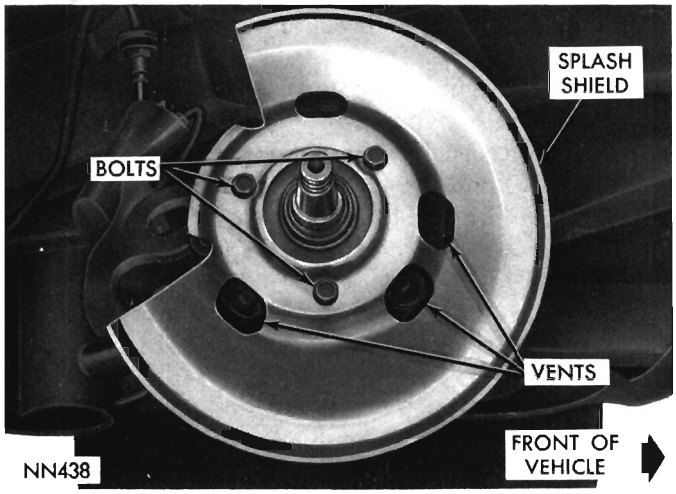


Fig. 16 - Disc Splash Shield Mounting

(10) Remove jackstends or lower hoist.

(11) Road test vehicle as described in "Brake Shoe Installation" paragraph.

REMOVING SPLASH SHIELD

Should it become necessary to remove the braking disc splash shield because of damage or the installation of the steering knuckle, proceed as follows:

(1) Raise vehicle on a hoist or jackstands.

(2) Remove wheel cover and wheel and tire assembly.

(3) Remove caliper assembly, as described under "Removing Caliper" paragraph. Do not disconnect brake line.

(4) Remove grease cup, cotter pin, nut lock, nut, thrust washer and outer wheel bearing.

(5) Pull braking disc and hub off wheel spindle.

(6) Remove bolts that attach splash shield (Fig. 16) to steering knuckle.

INSTALLING SPLASH SHIELD

To install the braking disc splash shield, (Fig. 16), proceed as follows:

(1) Position styrafoam gasket and install splash shield in position on steering knuckle, with cutout section toward rear.

(2) Align mounting holes and install attaching bolts. Tighten to 200 inch pounds.

(3) Reinstall braking disc and hub assembly. Install outer bearing, thrust washer and nut. Tighten front wheel bearing as described previously. Install nut lock, cotter pin and grease cap.

(4) Install caliper assembly as described under "Installing Caliper" paragraph.

(5) Install wheel and tire. Tighten wheel stud nuts (in a star pattern) to 30 foot-pounds, then to 55 foot-pounds. Install wheel cover.

(6) Remove jackstands or lower hoist.

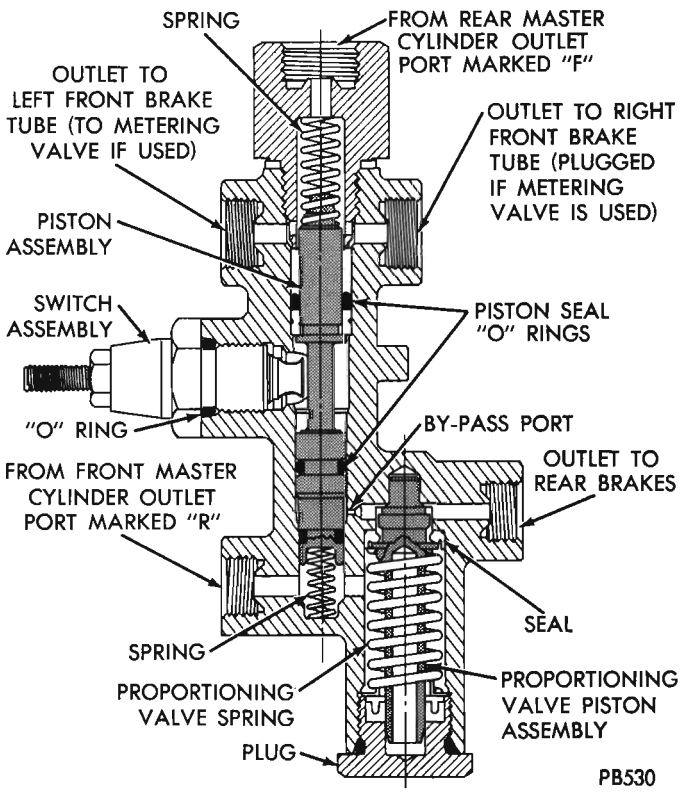


Fig. 17 - Brake Warning Switch/Proportioning Valve (Sectional)

BLEEDING DISC BRAKE

The disc brake hydraulic system can be bled (preferably) **with pressure bleeding equipment.** On disc brake equipped vehicles, the brake pedal will require more pumping, and frequent checking of the fluid level in the master cylinder during the bleeding operation, if pressure bleeding equipment is not used.

It will be necessary to remove the front wheel and tire assemblies in order to gain access to the bleeder screw, located on the outboard caliper housing at the top. (Fig. 1).

Never use brake fluid that has been drained from the hydraulic system, when bleeding the brakes.

On vehicles equipped with disc brakes, be sure that the disc brake pistons are returned to their normal positions and that the shoe and lining assemblies are properly seated.

Before driving the vehicle, check the operation of the brakes to be sure that a firm pedal has been obtained.

(1) Remove wheel covers, then raise vehicle using a hoist or jackstands.

(2) Remove wheel and tire assemblies.

(3) Bleed the front brakes first, then proceeding to the right rear and left rear in order.

After bleeding the brakes, proceed as follows:

(1) Install wheel and tire assemblies, tightening

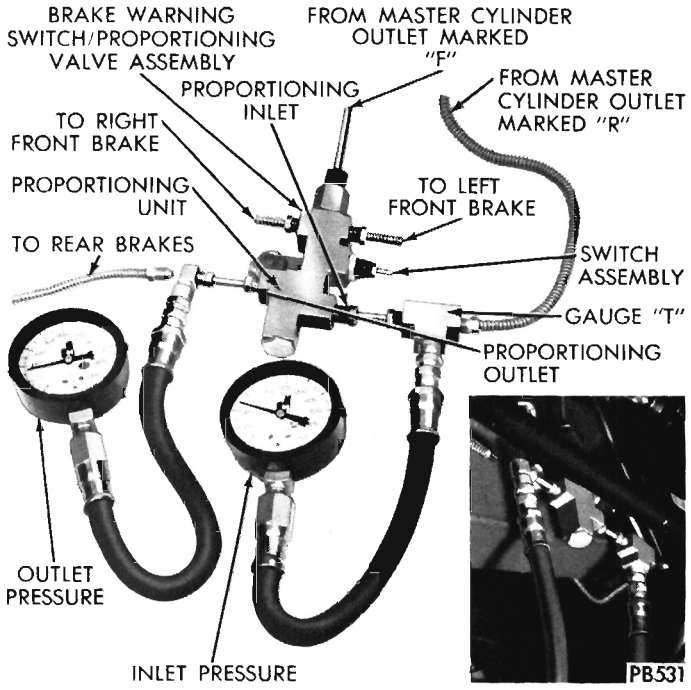


Fig. 18 - Testing Proportioning Valve Unit

wheel stud nuts to 55 foot-pounds.

(2) Install wheel covers.

(3) Remove jackstands or lower hoist.

BALANCING FRONT WHEELS (DISC BRAKE EQUIPPED VEHICLES)

To balance front wheels on a disc brake equipped vehicle, the normal procedure for static balancing as described under "Wheel Balance" in the Wheels, Bearings and Tires Section of this manual should be followed. Dynamic balancing of front wheels can be accomplished by the normal procedure when wheels are removed from the vehicle, but Manufacturer's recommendations should be followed closely when attempting to balance wheels while on the vehicle.

PROPORTIONING VALVE

The proportioning valve unit of the brake warning switch/proportioning valve assembly (Fig. 17), operates by restricting, at a given ratio, hydraulic pressure to the rear brakes when system hydraulic pressure reaches a certain point.

On light pedal application the valve allows full brake hydraulic pressure to the rear brakes.

If hydraulic pressure is lost in the front brake system, rear brake system hydraulic pressure moves the brake warning switch piston and opens a by-pass in the proportioning unit allowing full rear brake hydraulic pressure.

TESTING PROPORTIONING VALVE UNIT

When a premature rear wheel slide is obtained on brake application, it usually is an indication that the fluid pressure to the rear brakes is above the reduction ratio for the rear line pressure and that a malfunction has occurred within the proportioning valve, which should be tested.

To test the proportioning valve, proceed as follows:

(1) Install one of gauge set C-4007A and "T" between brake line from master cylinder port marked R and brake warning switch/proportioning valve assembly, and remaining gauge between output end of valve unit and rear brake line (Fig. 18) be sure all joints are fluid tight.

(2) Have a helper exert pressure on brake pedal (holding pressure). Obtain a reading on master cylinder output of approximately 500 p.s.i.

(3) While pressure is being held as above, reading on valve outlet Gauge should be 360-405 p.s.i.

If the proportioning valve pressure readings do not meet the specifications, the assembly should be replaced.

For Brake Warning Switch service, see "Master Cylinders".

DISC BRAKE (FLOATING CALIPER)

INDEX

	Page
Assembling Caliper	50
Bleeding Disc Brake	56
Brake Shoe Installation	48
Brake Shoe Removal	47
Cleaning and Inspection	48
Checking Braking Disc for Run-out and Thickness	51
Disassembling Caliper	49
Disc Brake Service Precautions	46
General Information	43
Installing Brake Disc and Hub	53
Installing Caliper	51
Metering Valve	44
Proportioning Valve	54
Refinishing (Refacing) Braking Disc	53
Removing Braking Disc and Hub	52
Removing Caliper from Vehicle	49
Routine Maintenance—30,000 Miles	46
Service Diagnosis	42
Specifications	64

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
EXCESSIVE PEDAL TRAVEL	(a) Air, leak, or insufficient fluid in system or caliper.	(a) Check system for leaks and bleed.
	(b) Warped or excessively tapered shoe and lining assembly.	(b) Install new shoe and linings.
	(c) Excessive disc runout.	(c) Check disc for runout with dial indicator. Install new or refinished disc.
	(d) Rear brake adjustment required.	(d) Check and adjust rear brakes.
	(e) Loose wheel bearing adjustment.	(e) Readjust wheel bearing to specified torque.
	(f) Damaged caliper piston seal.	(f) Install new piston seal.
	(g) Improper brake fluid (boil).	(g) Drain and install correct fluid.
	(h) Power brake malfunction.	(h) Replace.
BRAKE ROUGHNESS OR CHATTER (PEDAL PUMPING)	(a) Excessive thickness variation of braking disc.	(a) Check disc for thickness variation using a micrometer.
	(b) Excessive lateral runout of braking disc.	(b) Check disc for lateral runout with dial indicator. Install new or refinished disc.
	(c) Rear brake drums out-of-round.	(c) Reface rear drums and check for out-of-round.
	(d) Excessive front bearing clearance.	(d) Readjust wheel bearings to specified torque.
EXCESSIVE PEDAL EFFORT	(a) Brake fluid, oil or grease on linings.	(a) Install new shoe linings as required.
	(b) Incorrect lining.	(b) Remove lining and install correct lining.
	(c) Frozen or seized pistons.	(c) Disassemble caliper and free up pistons.
	(d) Power brake malfunction.	(d) Replace.
PULL	(a) Brake fluid, oil or grease on linings.	(a) Install new shoe and linings.
	(b) Unmatched linings.	(b) Install correct lining.
	(c) Distorted brake shoes.	(c) Install new brake shoes.
	(d) Frozen or seized pistons.	(d) Disassemble caliper and free up pistons.
	(e) Incorrect tire pressure.	(e) Inflate tires to recommended pressures.
	(f) Front end out of alignment.	(f) Align front end and check.
	(g) Broken rear spring.	(g) Install new rear spring.
	(h) Rear brake pistons sticking.	(h) Free up rear brake pistons.
	(i) Restricted hose or line.	(i) Check hoses and lines and correct as necessary.
	(j) Caliper not in proper alignment to braking disc.	(j) Remove caliper and reinstall. Check alignment.
NOISE	Groan—Brake noise emanating when slowly releasing brakes (creep-groan)	
	(a) Not detrimental to function of disc brakes—no corrective action required. (Indicate to operator this noise may be eliminated by slightly increasing or decreasing brake pedal efforts.)	
	Rattle—Brake noise or rattle emanating at low speeds on rough roads, (front wheels only).	
	(a) Shoe anti-rattle spring missing or not properly positioned.	(a) Install new anti-rattle spring or position properly.
	(b) Excessive clearance between shoe and caliper.	(b) Install new shoe and lining assemblies.
	Scraping— (a) Mounting bolts too long.	(a) Install mounting bolts of correct length.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(b) Loose wheel bearings.	(b) Readjust wheel bearings to correct specifications.
FRONT BRAKES HEAT UP DURING DRIVING AND FAIL TO RELEASE	(a) Operator riding brake pedal.	(a) Instruct owner how to drive with disc brakes.
	(b) Stop light switch improperly adjusted.	(b) Adjust stop light to allow full return of pedal.
	(c) Sticking pedal linkage.	(c) Free up sticking pedal linkage.
	(d) Frozen or seized piston.	(d) Disassemble caliper and free up piston.
	(e) Residual pressure valve in master cylinder.	(e) Remove valve.
	(f) Power brake malfunction.	(f) Check and correct power unit.
LEAKY WHEEL CYLINDER	(a) Damaged or worn caliper piston seal.	(a) Disassemble caliper and install new seal.
	(b) Scores or corrosion on surface of cylinder bore.	(b) Disassemble caliper and hone cylinder bore. Install new seal.
GRABBING OR UNEVEN BRAKING ACTION	(a) Causes listed under "Pull".	(a) Corrections listed under "Pull".
	(b) Power brake malfunction.	(b) Replace.
BRAKE PEDAL CAN BE DEPRESSED WITHOUT BRAKING EFFECT	(a) Air in hydraulic system or improper bleeding procedure.	(a) Bleed system.
	(b) Leak past primary cup in master cylinder.	(b) Recondition master cylinder.
	(c) Leak in system.	(c) Check for leak and repair as required.
	(d) Rear brakes out of adjustment.	(d) Adjust rear brakes.
	(e) Bleeder screw open.	(e) Close bleeder screw and bleed entire system.

GENERAL INFORMATION

The single piston, floating caliper disc brake assembly (Fig. 1), consists of the hub and disc assembly, the caliper, shoes and linings, splash shield and adaptor.

The cast iron braking disc has cooling fins (or louvres) that are cast integrally between the two machined braking surfaces (Fig. 2). When the wheel is in motion, the rotation of the disc cooling fins supplies air circulation between the braking surfaces for efficient cooling of the disc and prolonged lining life. The braking disc is protected from road splash (inboard side) by a shield bolted to the steering knuckle and by the wheel and tire on the outboard side.

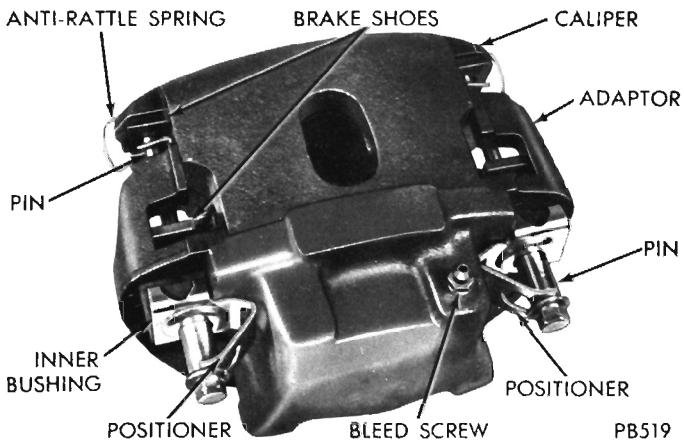


Fig. 1 - Floating Caliper Assembly (Single Piston)

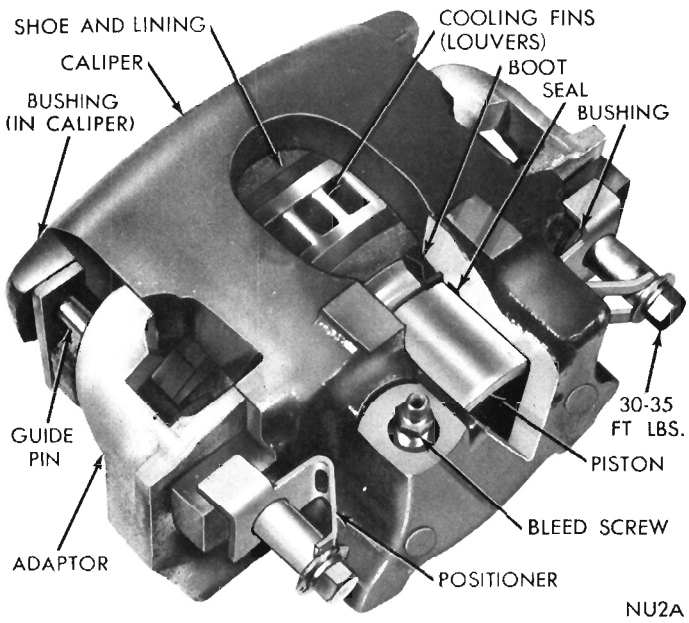


Fig. 2 - Floating Caliper Assembly (Sectional)

The single piston caliper assembly floats through four rubber bushings on two steel guide pins threaded into the adaptor. Two of the bushings are inserted in the outboard portion of the caliper and two on the inboard side (Fig. 3). Four machined abutments on the adaptor, position and align the caliper, fore and aft. Two positioners installed over the guide pins, control the movement of the caliper along with the piston seal, and assists in maintaining proper shoe clearance and are also required to hold the inner bushing in place.

The guide pins are also used to radially locate and restrain both shoes, while all of the braking force is taken by the caliper on the outboard shoe and machined lug (Fig. 9) on the adapter for the inboard shoe.

The caliper is a one piece casting with the inboard side containing the single piston cylinder bore. The steel piston is 2-3/4 inches in diameter and is nickle and chrome plated for anti-corrosion and long wear. The square cut rubber piston seal is located in a machined groove in the cylinder bore and provides a hydraulic seal between the piston and the cylinder wall (Fig. 4). The adaptor is mounted to the steering knuckle by two special nylock bolts (Fig. 5).

A moulded rubber dust boot installed in a groove in the cylinder bore and piston, keeps contamination from the cylinder wall and piston. The boot has a wiping lip (Fig. 6) that prevents contamination in the bore area.

As the brake pedal is depressed, hydraulic pressure is applied against the piston. This force is transmitted to the inboard brake shoe and lining and the inboard braking surface of the disc. As force increases against the disc from the inner lining, the caliper assembly moves inboard, sliding on the guide pins, thus providing a clamping force on the disc.

When the brake pressure is released, the piston seal (distorted by applied pressure) returns to its normal position, pulling the piston back to released position, while the two postioners force the caliper outboard to create a slight running clearance between outer shoe and the disc.

Automatic adjustment is obtained by outward relocation of the piston as the inboard lining wears and the inward movement of the caliper as the outboard lining wears, thus maintaining correct adjustment at all times.

METERING VALVE

All Floating Caliper disc brake equipped vehicles are equipped with a pressure metering valve. The use of the metering valve is to better match the front disc brakes with the rear drum brakes on the vehicle. This results in improved braking and steering control on icy surfaces.

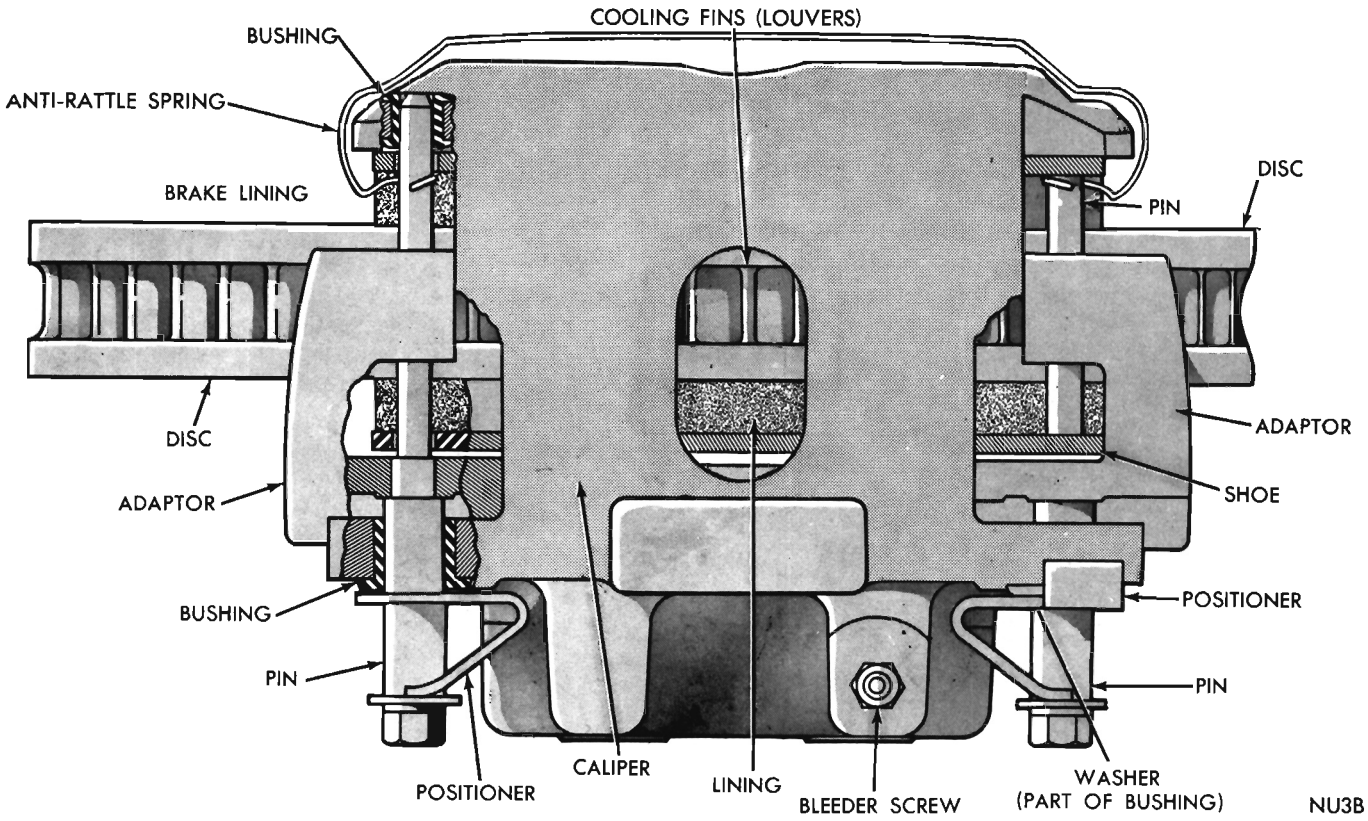


Fig. 3 - Floating Caliper Assembly (Sectional)

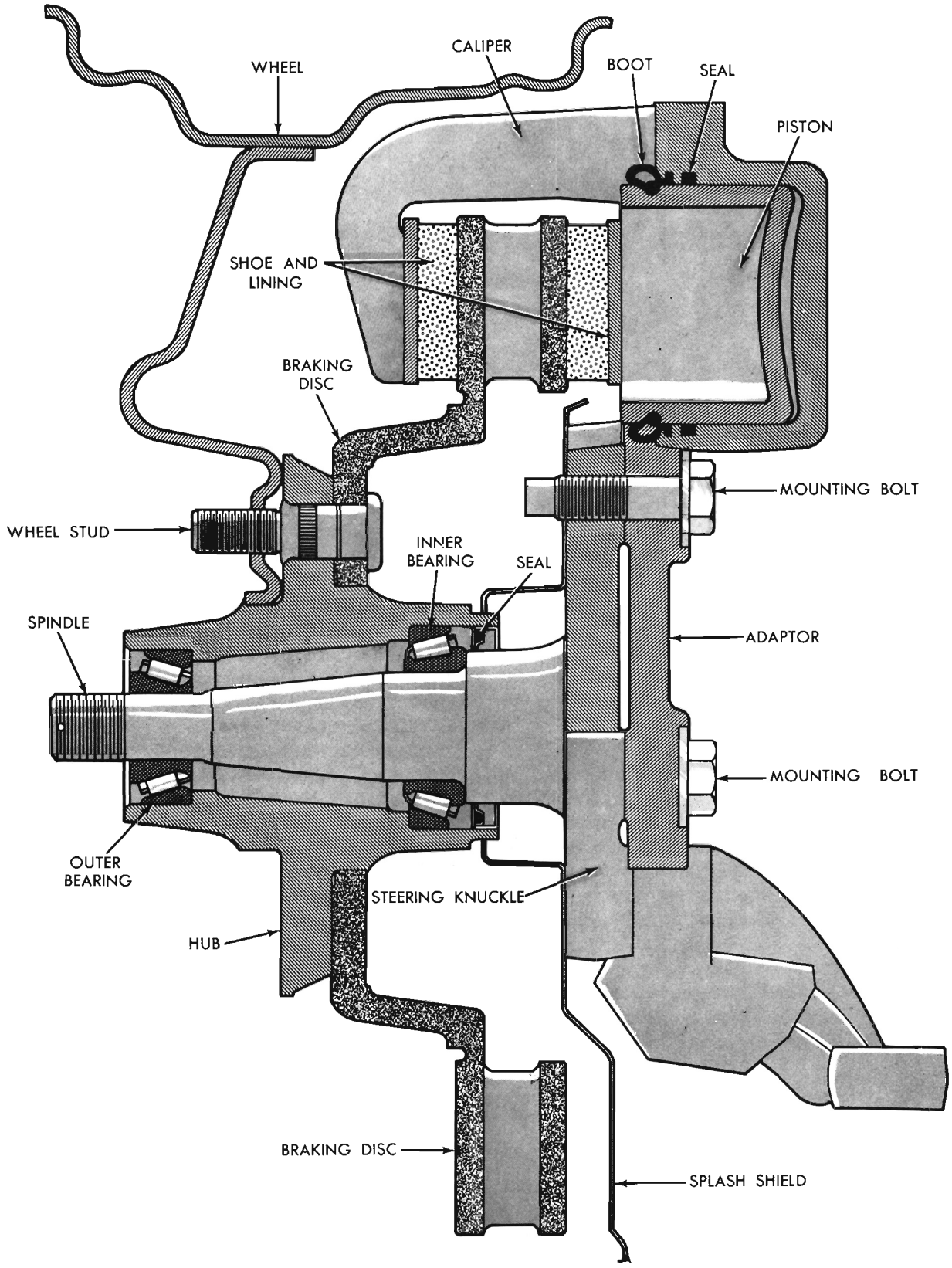


Fig. 4 - Disc Brake Assembly (Sectional)

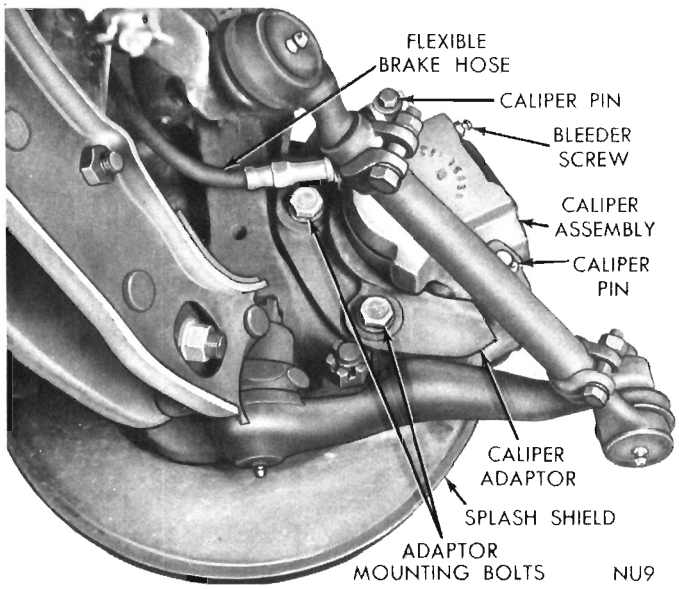


Fig. 5 - Disc Brake Caliper Mounting

ROUTINE MAINTENANCE—30,000 Miles

Check Brake Lines, Hoses and Linings

Raise all four wheels. Remove one of the front wheel and tire assemblies and inspect the braking disc, linings and caliper. Inspect front brake flexible hose for signs of cracking or deterioration. **Replace brake hose if rubber cover is penetrated**. The wheel bearings should be inspected at this time and repacked if necessary). **The caliper assembly must be removed in order to inspect the inner wheel bearing**. (Refer to "Brake Shoe Removal" paragraph).

Do not get oil or grease on the braking disc or linings. If the linings (pads) are worn to within .030 inch of the shoe, replace both sets of shoe and lining assemblies, (inboard and outboard) on the front wheels. It is necessary that both front wheel sets be replaced whenever a respective shoe and lining is worn beyond specifications or damaged.

Check all brake tube connections for possible leaks. Install new flexible hoses as required.

Check adapter plate to knuckle bolts for specified torque (75 to 100 Foot Pounds).

Shoe and Lining Wear

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the wheel and tire assemblies, and the calipers. Remove the shoe and lining assemblies. (See "Brake Shoe Removal" paragraph)

Three (3) thickness measurements with a micrometer should be taken across the center of the shoe and lining; One reading at each end and one reading in the center. When an assembly has been worn to a thickness of .230 inch, it should be replaced. If a shoe and lining does not require replacement, reinstall, making sure each shoe and positioner is returned to their original positions. (See "Brake Shoe Installation" paragraph). It is normal for the inboard lining to show slightly more wear than the outboard.

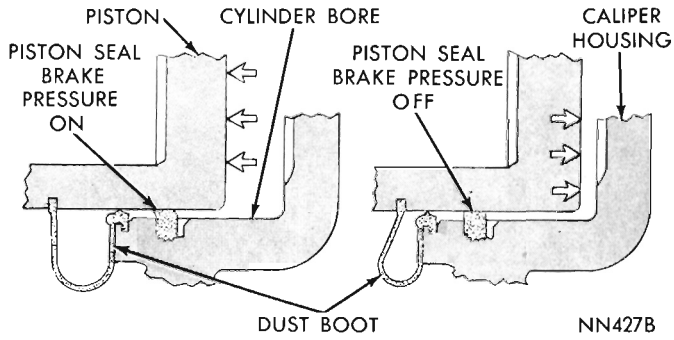


Fig. 6 - Piston Seal Function for Automatic Adjustment

Brake Roughness

The most common cause of brake roughness (or chatter) with disc brakes are excessive variation in disc thickness and/or excessive disc face runout. These can be easily checked with a dial indicator and a 2 in. micrometer (vernier type preferred). If either of the measurements are out of specification, the disc must be refinished or replaced. Refer to "Refinishing (Refacing) Braking Disc" paragraph.

Other less prevalent causes of roughness can be the use of some types of non-standard lining and extreme abrasion of the disc faces. Also, vehicles which stand unused for periods of time in areas of high humidity or salt air may incur rust on the disc which could cause a temporary brake surge and roughness. Normally however, this condition should correct itself after a short period of usage. If rust is severe enough roughness will not clear up and the disc must be resurfaced or replaced.

DISC BRAKE SERVICE PRECAUTIONS

(1) Grease or any other foreign material must be kept off the caliper assembly, surfaces of the braking disc and external surfaces of the hub, during service procedures. Handling the braking disc and caliper should be done in such a way as to avoid deformation of the disc and scratching or nicking the brake linings (pads).

(2) If inspection reveals that the square sectioned caliper piston seal is worn or damaged, it should be replaced immediately.

(3) During removal and installation of a wheel

and tire assembly, use care not to strike the caliper.

(4) The front wheel bearing end play is important and must be within specifications.

(5) Be sure vehicle is centered on the hoist before servicing any of the front end components to avoid bending or damaging disc splash shield on full right or left hand turns.

(6) Before vehicle is moved after any brake service work, **be sure and obtain a firm brake** pedal.

(7) Dragging the brakes (common result of left foot application) should be avoided during vehicle operation.

(8) The wheel, tire, hub and disc assembly **cannot** be removed as an assembly. The caliper assembly must be removed before removal of the hub and disc assembly.

(9) As lining wears, reservoir level will go down. If fluid has been added between relines, then reservoir overflow may occur when the piston is pushed back into the new lining position. Overflowing can be avoided in this case by removal of a small amount of fluid before overflow occurs.

SERVICE PROCEDURES

BRAKE SHOE REMOVAL

(1) Raise vehicle on a hoist or jackstands.

(2) Remove front wheel covers, and wheel and tire assemblies.

(3) Remove caliper guide pins, positioners that attach caliper to adaptor and anti-rattle spring.

(4) Remove caliper from disc by slowly sliding caliper assembly out and away from braking disc (Fig. 7). Support caliper firmly so as not to damage flexible brake hose.

(5) Slide outboard shoe and lining assembly out of caliper. Slide inboard shoe and lining assembly out of adaptor (Fig. 8).

(6) Remove outer bushings from caliper by pressing out of bore (Figs. 9 and 13) using a suitable tool. **Discard bushings**.

(7) Slide inner bushings (flanged) off guide pins and discard. Remove positioners from guide pins and discard.

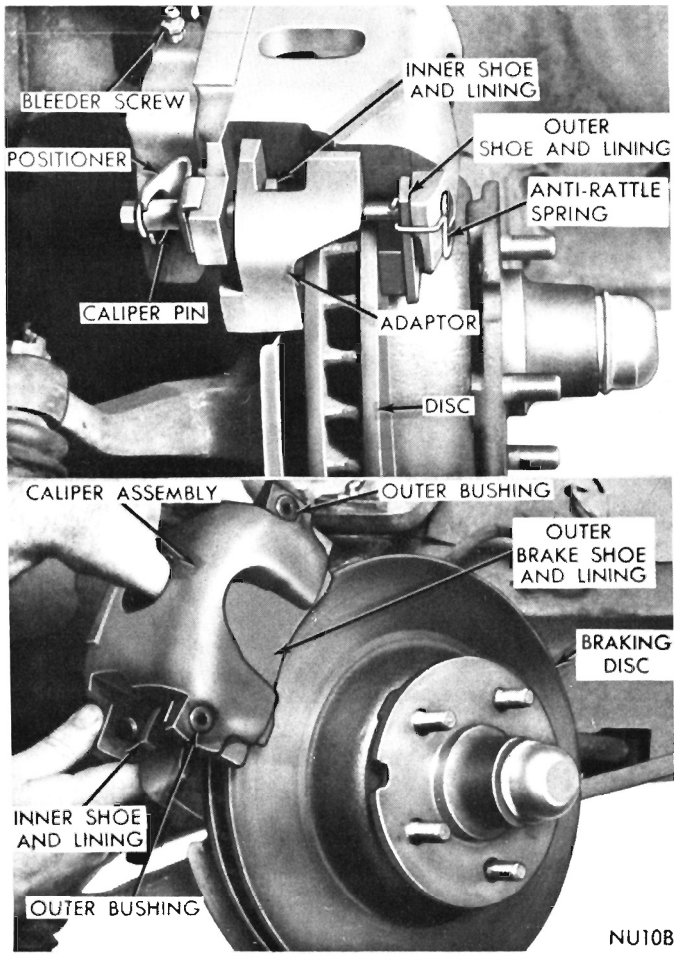


Fig. 7 - Removing or Installing Caliper

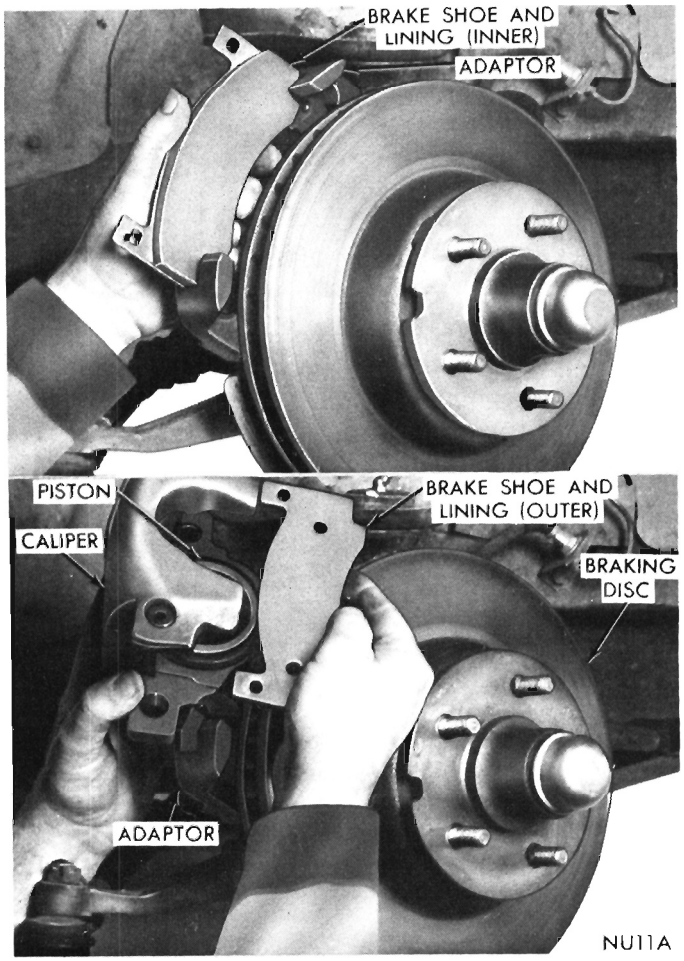


Fig. 8 - Removing or Installing Brake Shoes and Lining

CLEANING AND INSPECTION

Check for piston seal leaks (evident by brake fluid in and around boot area and inboard lining) and for any ruptures of piston dust boot. If boot is damaged, or fluid is evident, it will be necessary to disassemble caliper assembly and install a new seal, boot, (and piston if damaged or corroded.) (Refer to "Disassembling Caliper Assembly" paragraph). Check the mating surfaces of the abutments on the caliper and adaptor. If corroded or rusty, clean surfaces with wire brush. Inspect braking surfaces of disc.

BRAKE SHOE INSTALLATION

When installing new shoe and lining assemblies, it will be necessary to also install new POSITIONERS, INNER BUSHINGS AND OUTER BUSHINGS.

(1) Slowly and carefully push piston back into bore until it is bottomed. Watch for possible reservoir overflow. See Step 9 of "Disc Brake Service Precautions".

(2) Install new inner guide pin bushings in caliper with flanged end on inboard side (Fig. 3). Compress flanges of outboard bushing in fingers and work into position in hole from the outboard side of caliper (Fig. 18).

(3) Slide new shoe and lining assemblies into position in adaptor and caliper (Fig. 8), being sure that metal portion of shoe is fully in recess of caliper and adaptor.

(4) Holding outboard lining in position, carefully slide caliper down into position in adaptor and over disc. Align guide pin holes of adapter, inboard and outboard shoes. (Fig. 3).

(5) Install new positioners over guide pins with open ends toward outside, **and with stamped arrows pointing upwards** (Fig. 1). Install assembled guide pins through bushing, caliper, adaptor, inboard and outboard shoes, into outer bushings in caliper and anti-rattle spring.

(6) Press **IN** on end of guide pins and thread pin into adaptor, **USING EXTREME CARE SO AS NOT TO CROSS THREADS**. Tighten from 30 to 35 foot-pounds. Be sure tabs of positioners are over machined surfaces of caliper (Fig. 1).

(7) Pump brake pedal several times until a firm pedal has been obtained.

(8) Check and refill master cylinder reservoirs (if necessary) with approved brake fluid as required. (It should not be necessary to bleed the system after shoe and lining removal and installation). However, if a firm pedal cannot be obtained bleed the brake system as described in "Bleeding Brake

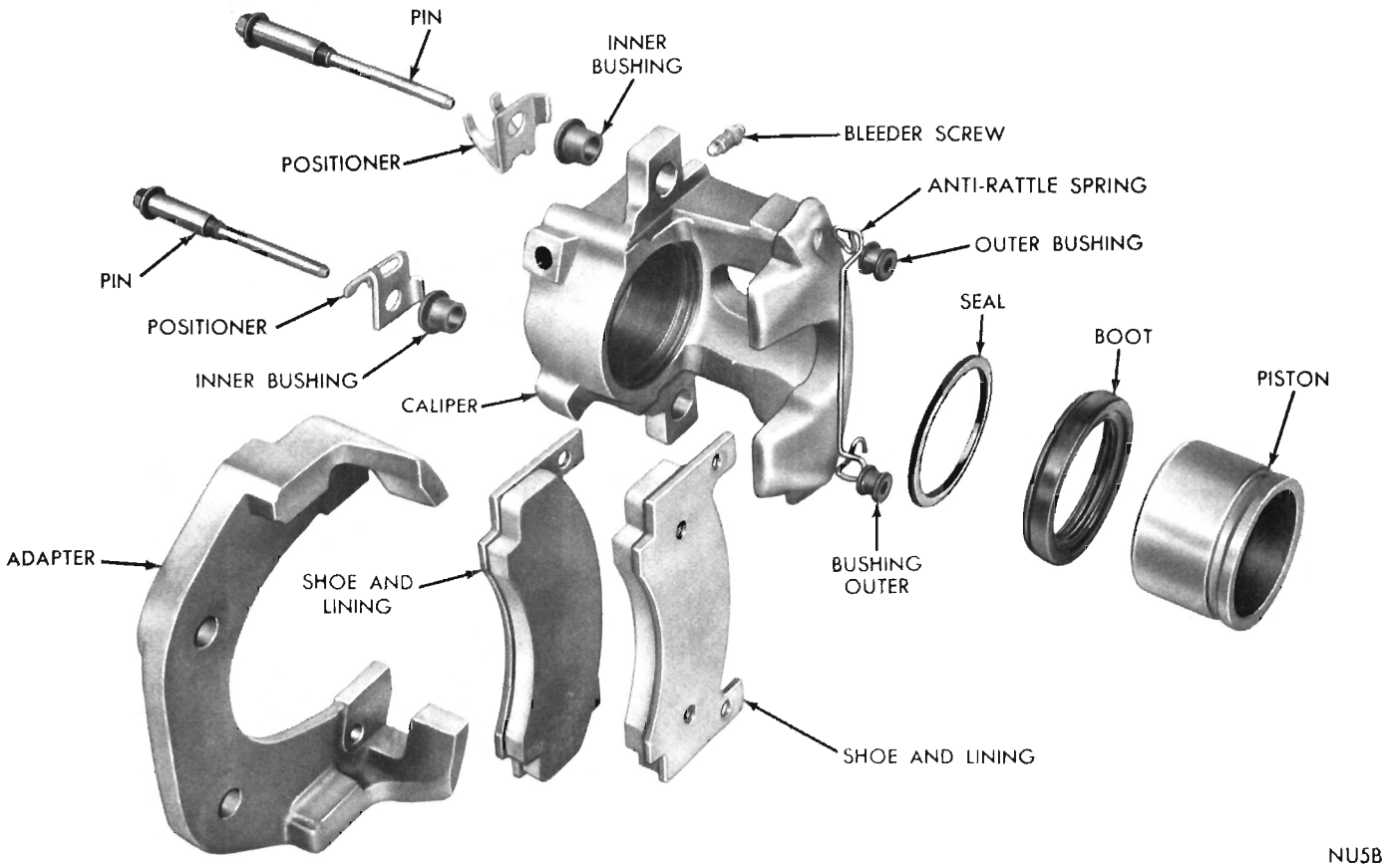


Fig. 9 - Caliper Assembly (Exploded View)

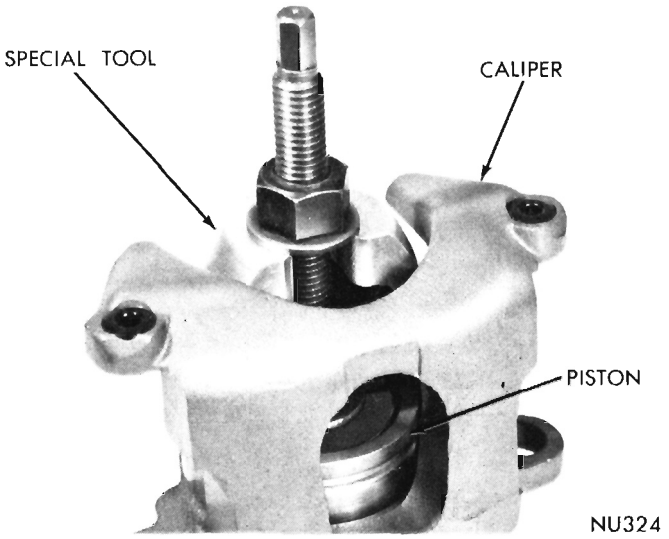


Fig. 10 - Removing Piston From Caliper

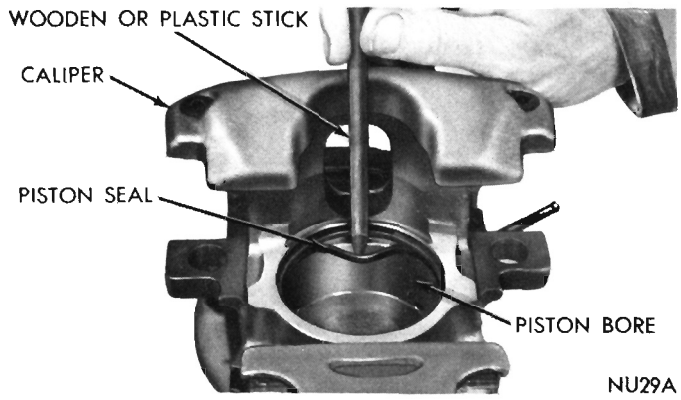


Fig. 12 - Removing Piston Seal

System" paragraph. **It may have been necessary to remove fluid to put in new linings as fluid is pushed back into master cylinder.**

(9) Install wheel and tire assemblies and wheel covers.

(10) Remove jackstands or lower hoist.

REMOVING CALIPER FROM VEHICLE

It will be necessary to remove the caliper to install a new piston seal and boot.

(1) Raise vehicle on a hoist or jackstands.

(2) Remove front wheel covers and wheel and tire assemblies.

(3) Disconnect front brake flexible hose from tube at frame mounting bracket. Plug brake tube to prevent loss of fluid, or prop brake pedal to any position below the first inch of travel. Disconnect hose from caliper.

(4) Remove guide pins and positioners that attach caliper to adaptor. Carefully slide caliper out and away from disc and adaptor, while holding outboard shoe and lining assembly. Remove inboard shoe and lining from adaptor.

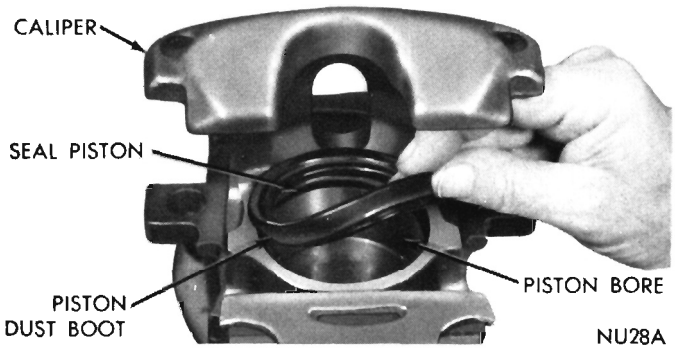


Fig. 11 - Removing or Installing Piston Dust Boot

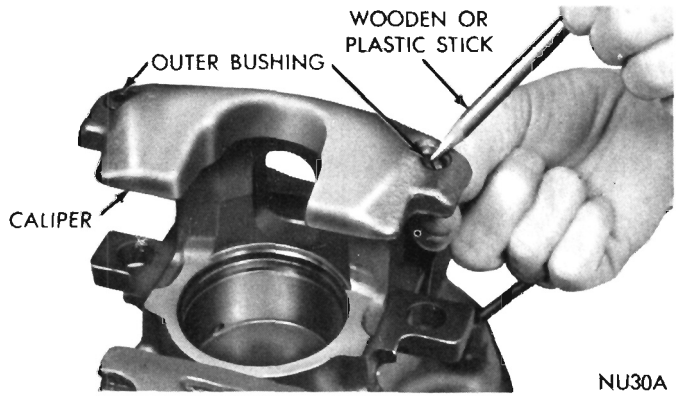


Fig. 13 - Removing Outer Bushings

DISASSEMBLING CALIPER

(1) Mount caliper assembly in a vise equipped with protector jaws (Fig. 10). **(Caution: Excessive vise pressure will cause bore distortion and binding of piston).**

(2) Remove Dust boot (Fig. 11).

(3) Using Tool C-4087 (and SP 5518 for Barracuda and Satellite Models), remove piston from caliper (Fig. 10). Care must be used so as not to scratch, burr or otherwise damage piston on outside diameter. To do so effects sealing qualities of piston. Draw piston straight out of its bore. If a piston becomes cocked removal is more difficult and piston or bore may be damaged. **CAUTION; UNDER NO CONDITION SHOULD AIR PRESSURE BE USED TO REMOVE PISTON FROM BORE. PERSONAL INJURY COULD RESULT FROM SUCH PRACTICE.**

(4) Using a small, pointed, wooden or plastic stick, work piston seal out of its groove in piston bore (Fig. 12). Discard old seal. **Do not use a screwdriver or other metal tool for this operation, because of possibility of scratching piston bore or burring edges of seal groove.**

(5) Remove outer bushings from caliper by pressing out of bore, (Fig. 13) using a suitable tool. Discard bushings.

(6) Remover inner bushing and discard. Remove

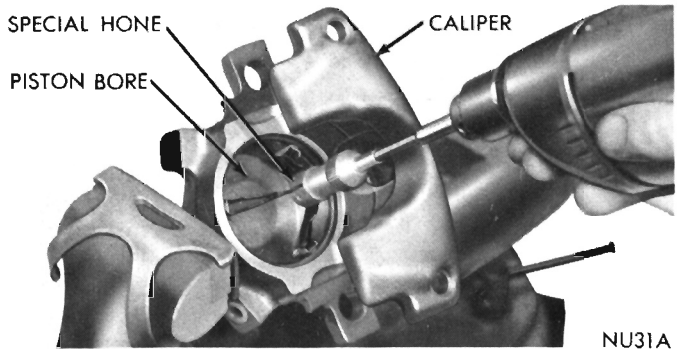


Fig. 14 - Honing Piston Bore

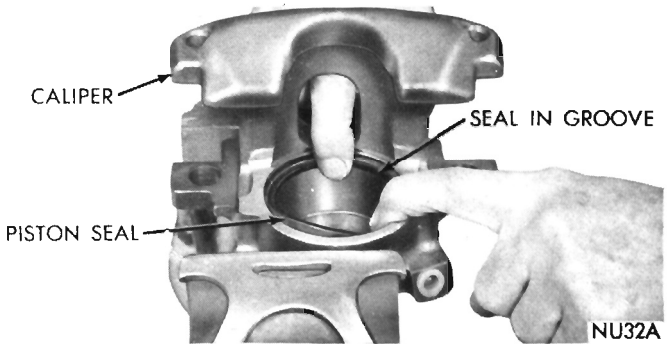


Fig. 15 - Installing Piston Seal

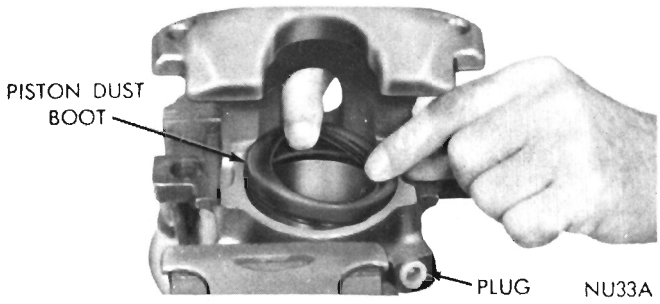


Fig. 16 - Installing Piston Dust Boot

bleeder screw.

CLEANING AND INSPECTION

Clean all parts using alcohol or a suitable solvent and blow dry, using compressed air. Blow out all drilled passages and bores. (Whenever a caliper has been disassembled, and a new boot and seal must be installed at reassembly). Inspect the piston bore for scoring or pitting. Install a new piston if it is pitted, scored or the plating is severely worn. Bores that show light scratches or corrosion, can usually be cleared with crocus cloth. However, bores that have deep scratches or scoring should be honed, using Tool C-4095, providing the diameter of the bore is not increased more than .002 inch. If the bore does not clean up within this specification, a new caliper housing should be installed. Black stains on the piston are caused by the piston seal and will do no harm.

When using Hone C-4095, coat the stones and bore with brake fluid. After honing the bore, carefully clean the seal and boot grooves with a stiff non-metalic rotary brush (Fig. 14).

Use extreme care in cleaning the caliper after honing. Remove all dirt and grit by flushing the caliper with brake fluid; wipe dry with a clean, lintless cloth and then clean a second time in the same manner or until clean cloth shows no signs of discoloration.

ASSEMBLING CALIPER

(1) Clamp caliper in vise (with protector jaws),

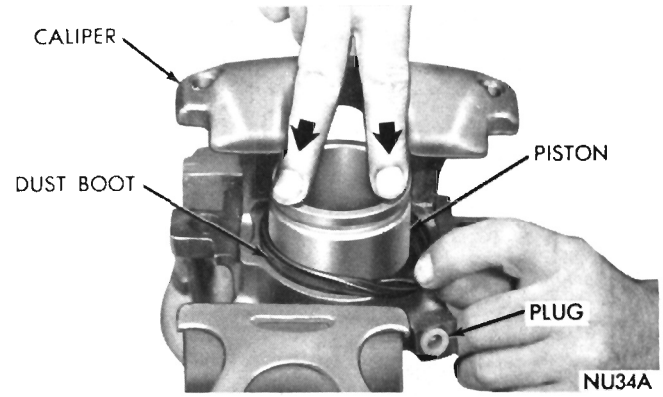


Fig. 17 - Installing Piston (Through Boot)

(Fig. 10). **Caution: Excessive vice pressure will cause bore distortion and binding of piston.**

(2) Dip new piston seal in lubricant (supplied with kit) Ucon LB1145Y24 (or equivalent) and install in groove in bore. Seal should be positioned at one area in groove and gently worked around the groove, using clean fingers, until properly seated. **NEVER USE AN OLD PISTON SEAL.** (Be sure seal is not twisted or rolled). (Fig. 15).

(3) Coat new piston boot with lubricant (as specified above) leaving a generous amount of lubricant inside of boot. Install in caliper by working into outer groove, using fingers only. (Boot will seem larger than diameter of groove, but will snap into place when properly positioned in groove. (Fig. 16). Using a forefinger, slide around inside of boot to be sure it is seated, or correctly installed.

(4) Plug high pressure inlet to caliper and bleeder screw hole, then coat piston with a generous amount of lubricant (as specified above). With fingers spreading boot, work piston into boot and press down on piston. (The entrapped air below piston will force boot around piston and into its groove as piston is depressed). (Fig. 17). Remove plug, then carefully push piston down the bore until bottomed. **Caution: Force must be applied uniformly to avoid cocking.**

(5) Install new inner guide pin bushings in cali-

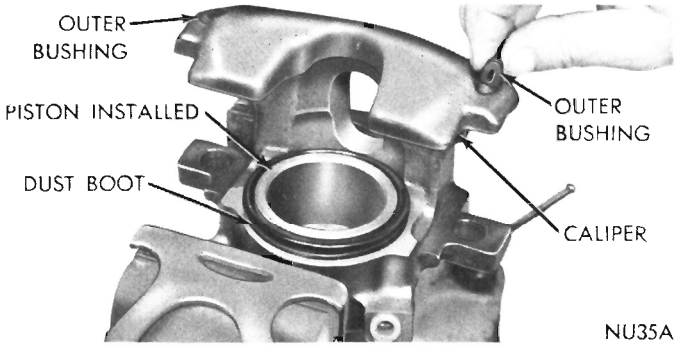


Fig. 18 - Installing Outer Bushings

per with flanged end on inboard side (Fig. 3). Compress flanges of outboard bushing in with fingers and work into position in hole from the outboard side of the caliper (Fig. 18). Press **IN** on bushing, using finger tips or small plastic stick (Fig. 18) until seated. Be sure flanges extend over caliper casting evenly on both sides. Install bleeder screw.

Before installing caliper assembly on vehicle, inspect braking disc. Conditions as described in "Checking Braking Disc for Runout and Thickness" paragraph.

INSTALLING CALIPER

(1) Examine lining for wear damage, or fluid contamination if its condition is found satisfactory it may be reused. If not usable both front brakes must be relined with new. If old lining is to be reused, be sure linings and positioners are installed in their original position.

(2) Connect flexible brake hose to caliper and tighten securely.

(3) Install new inboard shoe and lining into adaptor (Fig. 8). Holding outboard shoe and lining in position in caliper, carefully slide caliper down into position in adaptor and over disc. Align pin holes of caliper, adaptor and inboard and outboard shoes and anti-rattle spring.

(4) Install positioners over guide pins with open ends toward outside and arrows pointing upwards. (Fig. 1). Install assembled guide pins through bushing, caliper, adaptor, inboard and outboard shoes and into outer bushings in caliper and anti-rattle spring.

(5) Press **IN ON END GUIDE PINS AND THREAD PINS INTO ADAPTOR. USING EXTREME CARE SO AS NOT TO CROSS THREADS**. Tighten from 30 to 35 foot-pounds. (Be sure tabs of positioners are over machined surfaces of caliper) (Fig. 1).

(6) Remove plug from brake tube and install flexible brake hose. Tighten securely. Avoid twisting hose.

(7) With bleeder screw open, allow caliper to "gravity" fill with brake fluid, then close bleeder screw. (Be sure all air bubbles have escaped; replenish brake fluid in master cylinder. Bleed brakes as described under "Bleeding Brakes" paragraph).

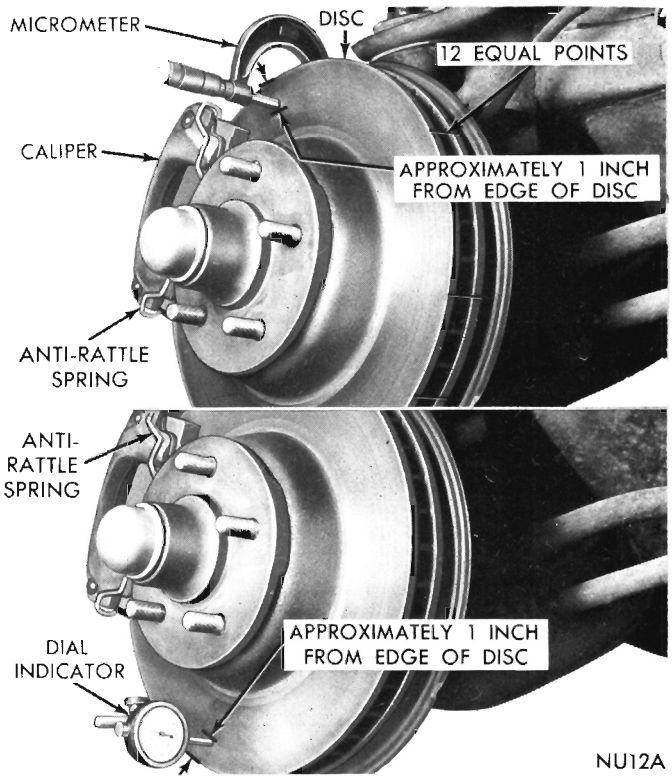


Fig. 19 - Checking Braking Disc Run-out and Thickness

(8) **Pump brake pedal several times until a firm pedal has been obtained.**

(9) After bleeding caliper, check for fluid tightness under maximum pedal pressures. (Recheck master cylinder reservoir level).

(10) Install wheel and tire assembly and tighten wheel stud nuts to 65 foot-pounds. **This is important**. Install wheel cover.

(11) Remove jackstands or lower hoist.

(12) **Road test vehicle and make several stops to wear off any foreign material on the brakes and to seat the linings. The vehicle may pull to one side or the other if this is not done.**

CHECKING BRAKING DISC FOR RUNOUT AND THICKNESS

(1) Mount dial indicator C-3339 on steering arm with plunger contacting disc approximately one (1) inch from edge of disc. (Fig. 19).

(2) With wheel bearings adjusted to zero end play, check lateral runout. (Both sides of disc). Runout should not exceed .0025 inch. If runout is in excess of specification, install a new disc and hub assembly or reface disc, being careful to remove as little as possible from each side of disc.

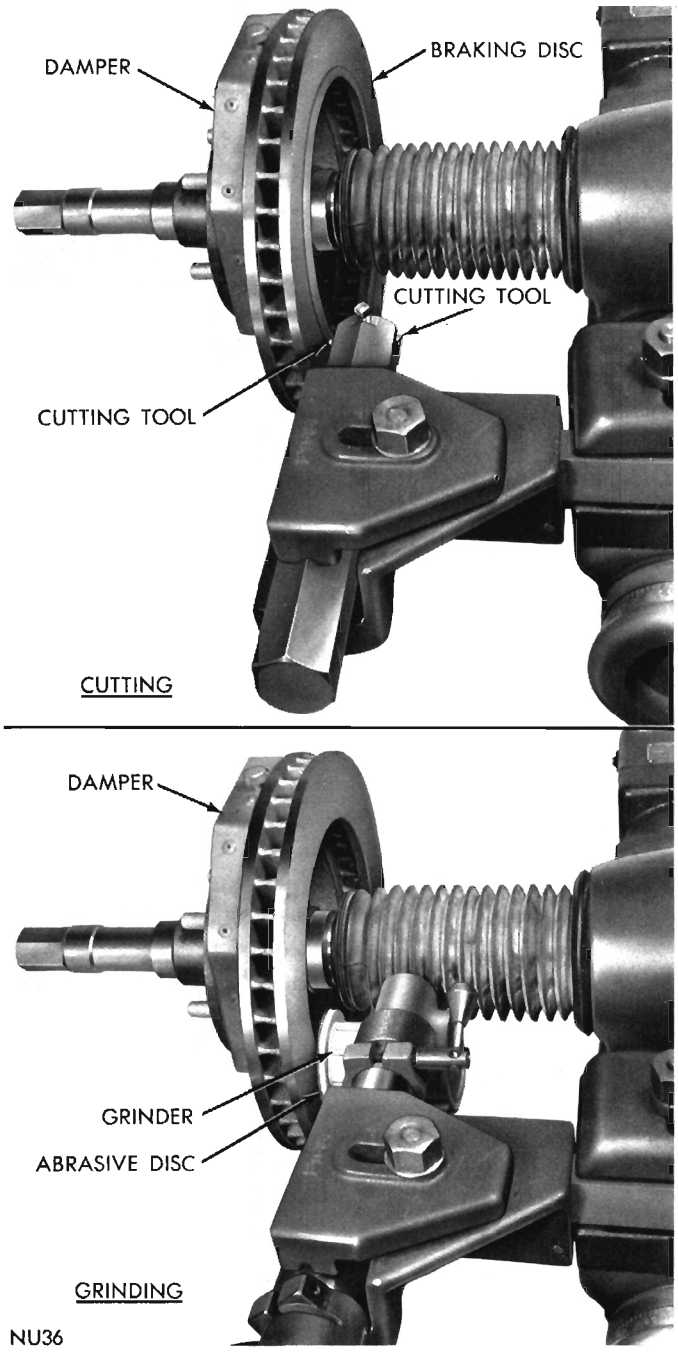


Fig. 20 - Refacing Braking Disc

Remove equal amounts from each side of disc. Do not reduce thickness below minimum thickness shown in refinishing section below. Be sure and readjust wheel bearings after check.

(3) Thickness variation of disc should be made in conjunction with runout. Measure thickness of disc at twelve (12) equal points with a micrometer at a radius approximately one (1) inch from edge of disc. If thickness measurements vary by more than .0005 inch, disc should be removed and resurfaced or a new disc and hub assembly installed. (Fig. 19).

(4) Light scoring and/or wear is acceptable if heavy scoring or warping is evident, the disc must be refinished or replaced (See Refinishing (Refacing) Braking Disc). If cracks are evident the hub and disc assembly must be replaced.

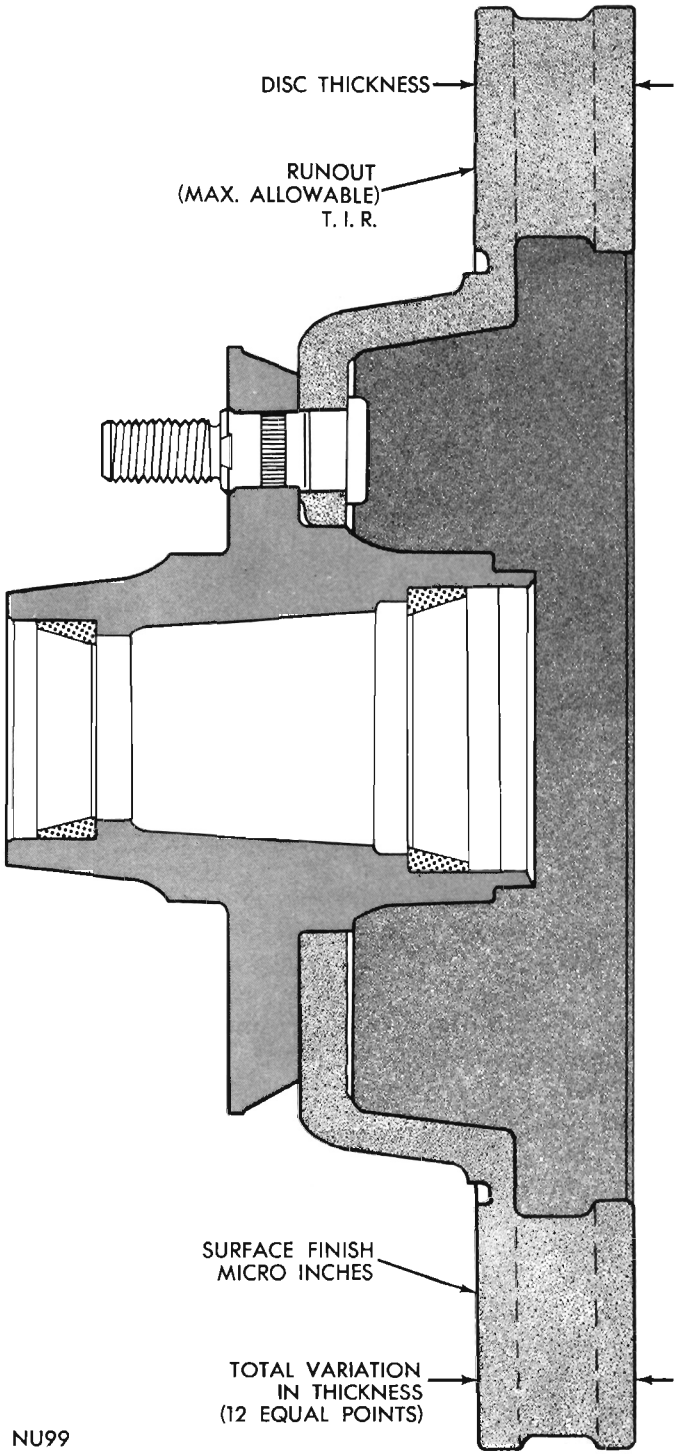


Fig. 21 - Disc Specifications

REMOVING BRAKING DISC AND HUB

(1) Raise vehicle on hoist or jackstands. Remove wheel cover and wheel and tire assembly.

(2) Remove caliper assembly, as described under "Removing Caliper" paragraph, (but do not dis-

connect brake line). Suspend caliper from wire hook or loop to avoid strain on flexible hose.

(3) Remove grease cap, cotter pin, nut lock, nut, thrust washer and outer wheel bearing.

(4) Pull disc and hub off wheel spindle.

INSTALLING BRAKING DISC AND HUB

(1) Slide brake disc and hub assembly on spindle.

(2) Install outer bearing, thrust washer and nut.

(3) Tighten wheel bearing adjusting nut to 90 inch pounds while rotating disc and hub. Recheck disc runout as described previously.

(4) Position lock nut on nut with one pair of slots in line with cotter pin hole.

(5) Back off adjusting nut and lock assembly one slot.

(6) Clean grease cap, coating inside with wheel grease (do not fill cap) and install cap. Clean both sides of braking disc with alcohol or suitable solvent.

(7) Install caliper assembly, as described in "Installing Caliper" paragraph.

REFINISHING (REFACING) BRAKING DISC

Before refinishing or refacing a braking disc, the disc should be checked and inspected for the following conditions:

(1) Scoring, rust, impregnation of lining material and worn ridges.

(2) Runout or wobble.

(3) Thickness variation (Parallelism).

(4) Dishing or distortion (Flatness).

If a vehicle has not been driven for a period of time, the discs will rust in the area not covered by the lining and cause noise and chatter, excessive wear and scoring of the discs and lining. Wear ridges on the discs can cause temporary improper lining contact if ridges are not removed before installation of new lining (pads).

Lining deposit on the disc, may cause erratic friction characteristics if new lining is installed without resurfacing or cleaning the disc.

Excessive runout or wobble in a disc can increase pedal travel due to piston knockback and increase seal bushing wear due to necessity of caliper to follow the disc wobble.

Thickness variation in a disc can also result in pedal pulsation, chatter and surge due to variation in brake output when disc section is uneven.

Dishing or distortion can be caused by extreme heat and abuse of the brakes.

Resurfacing Braking Disc

This operation can be used when the disc surface is rusty or has lining deposits. A sanding disc attachment will remove surface contamination without removing much material. It will generally follow variations in thickness which are in the disc.

Refacing Braking Disc

If scoring is deep, runout or thickness variation is beyond limits, or other distortion is apparent, the disc should be refaced on a brake lathe equipped for disc machining. (Fig. 20). After machining a disc, a grinder may be used to remove tool marks.

A new disc and hub assembly should be installed if the old one cannot be refaced to bring it within specifications without removing an excessive amount of material. Do not remove more than .050 inch per disc. Brake operation may be affected if an excess of material is removed.

Both sides of the braking surface should be machined or ground an equal amount when servicing since small variations in resurfacing machines may cause the newly finished surface to be out of parallel with the opposite unfinished side resulting in a thickness variation beyond acceptable limits. Disc brakes are very sensitive to thickness variation.

The following chart and (Fig. 21) shows the location and tolerances of required specifications when servicing the braking disc:

	Thickness	Minimum Thickness	Thickness Variation	Runout	Micro Finish
Braking Disc (Floating Caliper)					
All Except, Satellite and Barracuda	1.250-1.240	1.180	.0005	.0025	15-80
Satellite and Barracuda	1.000-1.010	0.940	.0005	.0025	15-80

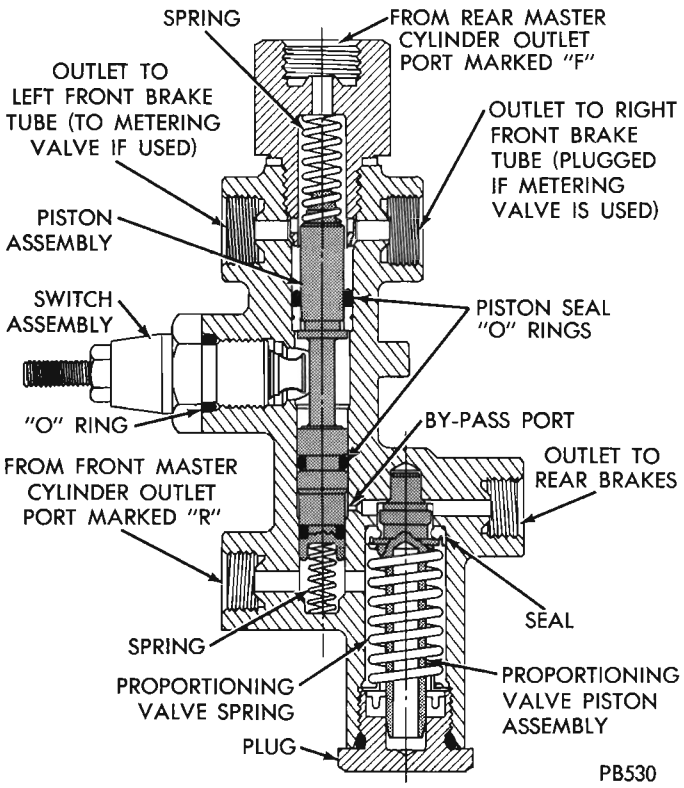


Fig. 22 - Brake Waring Switch/Proportioning Valve Assembly (Sectional)

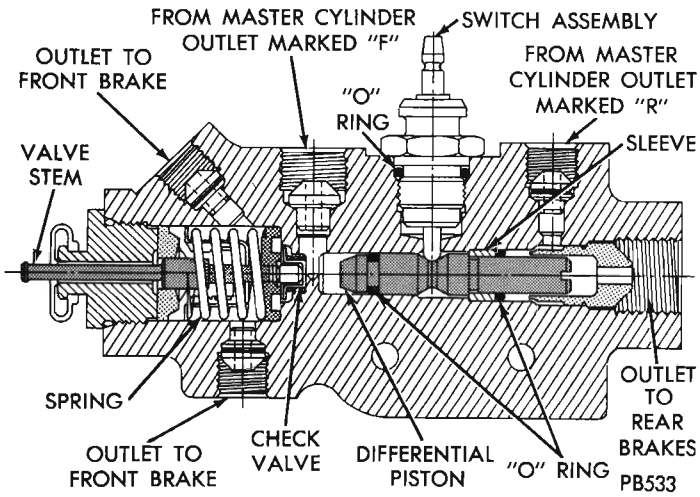


Fig. 24 - Brake Warning Switch/Metering Valve Assembly (Sectional)

CAUTION:
When refacing a braking disc (Fig. 20), the manufacturers of the refacing equipment instructions should be followed closely, and the correct brake disc mounting adaptors must be used to obtain the required specifications.

PROPORTIONING, METERING VALVES

Two brake control valve systems are used with floating caliper disc brake, depending on models, as follows:

(1) Satellite and Barracuda Models use a dual unit, brake warning switch/proportioning valve assembly (Fig. 22), and separate metering valve (Fig. 23).

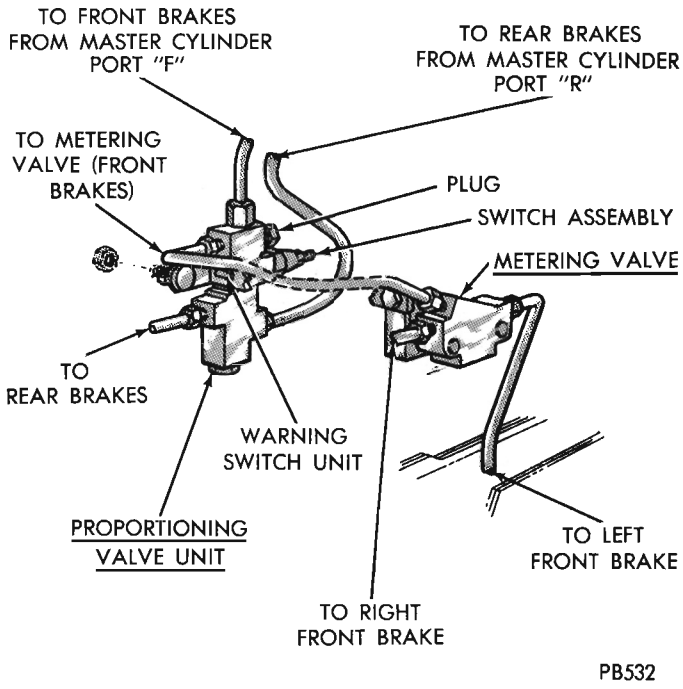


Fig. 23 - Brake Warning Switch/Proportioning Valve and Metering Valve Assembly

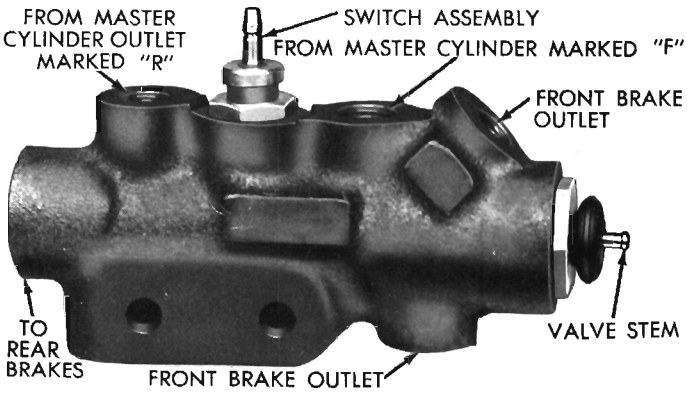


Fig. 25 - Brake Warning Switch/Metering Valve

(2) Fury, Chrysler and Imperial models use a dual unit, brake warning switch/metering valve assembly (Figs. 24 and 25).

PROPORTIONING VALVE

The proportioning valve unit operates by restricting, at a given ratio, hydraulic pressure to the rear brakes when system hydraulic pressure reaches a certain point.

On light pedal application the valve allows full brake hydraulic pressure to the rear brakes.

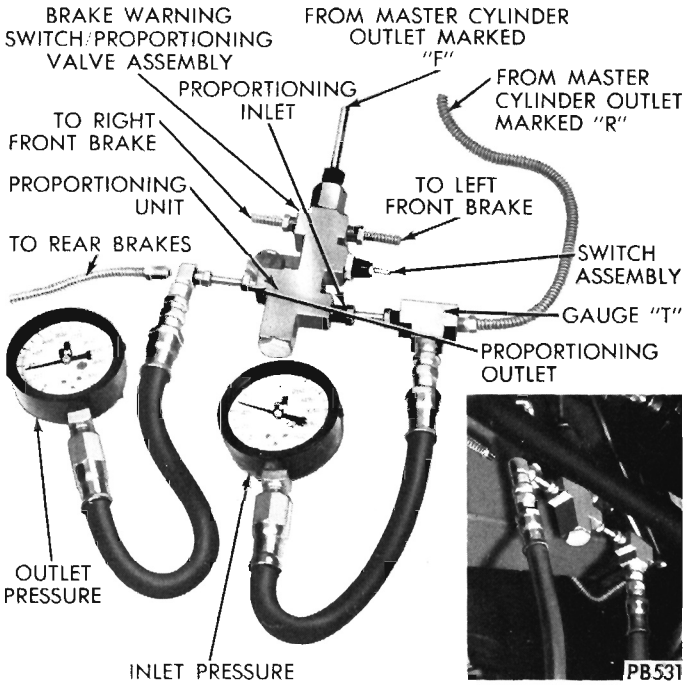


Fig. 26 - Testing Proportioning Valve Unit

If hydraulic pressure is lost in the front brake system, rear brake system hydraulic pressure moves the brake warning switch piston and open and by-pass in the proportioning unit allowing full rear brake hydraulic pressure.

TESTING PROPORTIONING VALVE

When a premature rear wheel slide is obtained on brake application, it usually is an indication that the fluid pressure to the rear brakes is above the 50% reduction ratio for the rear line pressure and that a malfunction has occurred within the proportioning valve, which should be tested.

To test the proportioning valve, proceed as follows:

(1) Install one of gauge set C-4007A and "T" between brake line from master cylinder port marked R and brake warning switch/proportioning valve assembly, and remaining gauge between output end of valve unit and rear brake line (Fig. 26) be sure all joints are fluid tight.

(2) Have a helper exert pressure on brake pedal (holding pressure). Obtain a reading on master cylinder output of approximately 500 p.s.i.

(3) While pressure is being held as above, reading on valve outlet Gauge should be 360-405 p.s.i.

If proportioning valve pressure readings do not meet specifications, the valve should be removed and a new valve installed.

PRESSURE METERING VALVE

All disc brake vehicles except Valiant models, are equipped with a pressure metering valve (Figs. 27 and 28). The valve is located on the left frame rail. The use of the metering valve is to better match front disc brakes with the rear drum brakes, resulting in improved braking and steering control on icy surfaces.

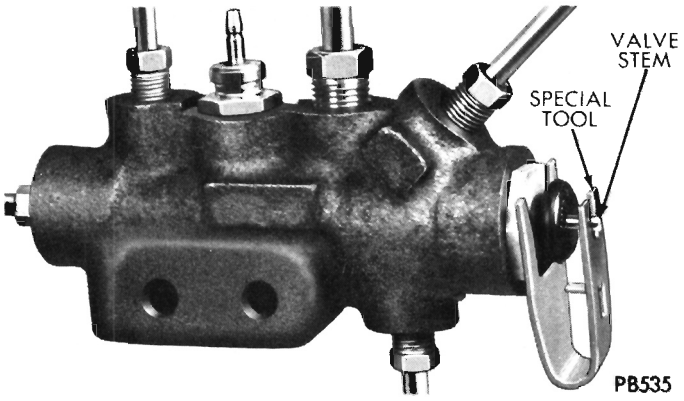


Fig. 27 - Holding Valve open (Brake Warning Switch/Metering Valve Assembly)

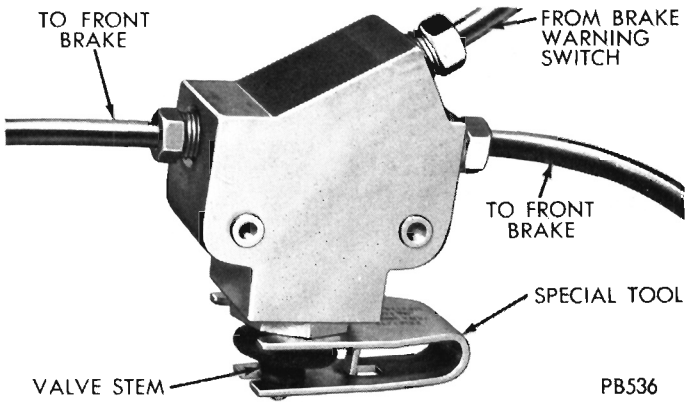


Fig. 28 - Holding Valve open (Metering Valve)

Due to operating characteristics of the valve, which causes complete shut-off of the flow of brake fluid between approximately 3 and 135 psi, front brake bleeding procedures should be done as follows:

(1) **Gravity Bleed:** This method of bleeding is not effected by the metering valve, as fluid pressures are always below 3 psi. Remove master cylinder reservoir cover and gasket, then fill reservoirs with approved brake fluid. Open disc brake bleeder screws, and allow fluid and air to drain until stream of fluid is free of air.

(2) **Pedal Bleed:** This method of bleeding is not effected by the metering valve, as fluid pressures are in excess of 135 psi. Follow normal procedure of pumping pedal and opening bleeder screws. **Do not pump master cylinder dry!**

(3) **Pressure Bleed:** This method of bleeding is influenced by the metering valve. Bleed pressure, which is normally about 35 psi, is high enough to cause the metering valve to close, stopping the flow of fluid to the front brakes. However, the valve (Fig. 27 or 28) can be held open manually

by using **Tool C-4121**, to pull the valve stem out. **CAUTION: Under no condition should a rigid clamp, wedge or block be used to depress the valve stem, as this can cause an internal failure in the valve, resulting in complete loss of front brakes.**

It should be noted that the pressure release valve stem is in its innermost position when there is no pressure present. No attempt should be made to further depress the valve stem.

Checking Metering Valve

(1) A sligh "bump" can be felt by the foot as the brake pedal is stroked. This bump will occur after the pedal has been stroked about 1 inch.

(2) A visual check will show that the valve stem extends slightly when the brakes are applied and retracts when the brakes are released.

(3) In case of a metering valve malfunction, remove valve and install a new one.

For Brake Warning Switch service, see "Master Cylinders".

BLEEDING DISC BRAKE

The disc brake hydraulic system can be bled manually or with pressure bleeding equipment. Refer to "Pressure Metering Valve" section for lock-out during bleeding procedure. On disc brake equipped vehicles, the brake pedal will require more pumping, and frequent checking of the fluid level in the master cylinder during the bleeding operation. **Never use brake fluid that has been drained from the hydraulic system, when bleeding the brakes.**

On vehicles equipped with disc brakes, be sure that the disc brake piston is returned to a normal position and that the shoe and lining assemblies are properly seated.

Before driving the vehicle, check the operation of the brakes to be sure that a firm pedal has been obtained.

(1) Raise vehicle using a hoist or jackstands.

(2) Bleed brakes in usual manner, starting with-right rear, then proceeding to left rear, right front and left front in order.

After bleeding the brakes, proceed as follows:

(1) Remove jackstands or lower hoist.

(2) Test drive vehicle to be sure brakes are operating correctly and that pedal is solid.

MASTER CYLINDER

Disc Brakes

INDEX

	Page
Bleeding Master Cylinder	59
Brake Warning Switchs	60
Cleaning and Inspection	58
Disassembling Master Cylinder	57
General Information	56
Installing Master Cylinder	54
Master Cylinder Removal	57
Reassembling Master Cylinder	58
Testing Master Cylinder	59
Testing Brake Warning Switchs	60

GENERAL INFORMATION

The tandem master cylinder (Fig. 1) is of the compensating type with the reservoirs cast integrally. The master cylinder consists of a front and rear piston (in tandem) two outlets, with 1 containing a residual pressure valve and spring (rear brake line outlet only), (Fig. 3).

The **front** outlet tube from the master cylinder is connected to the brake warning switch proportioning valve assembly (Fig. 10) and then to the rear brakes. The **rear** outlet tube from the master cylinder is also connected to the switch and the **front** brakes.

The master cylinder used on vehicles not equipped with power brake units is serviced in the same manner as the master cylinder with power brakes with one exception, the master cylinder with power brakes does not include the push rod.

The drum brake master cylinder is different than the disc brake master cylinder and is covered in the service brake section of this group.

SERVICE PROCEDURES

MASTER CYLINDER REMOVAL

Should it become necessary to service the master cylinder, remove from the vehicle as follows:

(1) Disconnect front and rear brake tubes from master cylinder and install a plug in rear outlet. (The residual pressure valve in front outlet will keep cylinder from draining).

(2) Disconnect pedal push rod (drum type brakes) from brake pedal.

(3) Remove nuts that attach master cylinder to cowl panel and/or power brake unit, (if so equipped).

(4) Slide master cylinder straight out from cowl panel and/or power brake unit, (if so equipped).

DISASSEMBLING MASTER CYLINDER

To disassemble the master cylinder, (Figs. 1 and 6) clean the outside of the master cylinder thoroughly.

(1) Press bail to one side and remove cover and gasket. Empty brake fluid from reservoirs.

(2) Remove front piston retainer screw from inside reservoir (Fig. 2), then remove snap ring from outer end of cylinder bore (Fig. 3). Slide rear piston assembly out of cylinder bore.

(3) Upend master cylinder and tamp (open end down) on bench to remove front piston and spring. If front piston sticks in bore of cylinder, use air pressure to force piston out of cylinder. **New cups must be installed at reassembly if air pressure is used.**

(4) Remove front piston compression spring from bore.

(5) Using Tool T109-178 (or an easy out) remove tube seats by threading tool firmly into seat, tap tool and seat out of cylinder body. (Fig. 4). Discard seats.

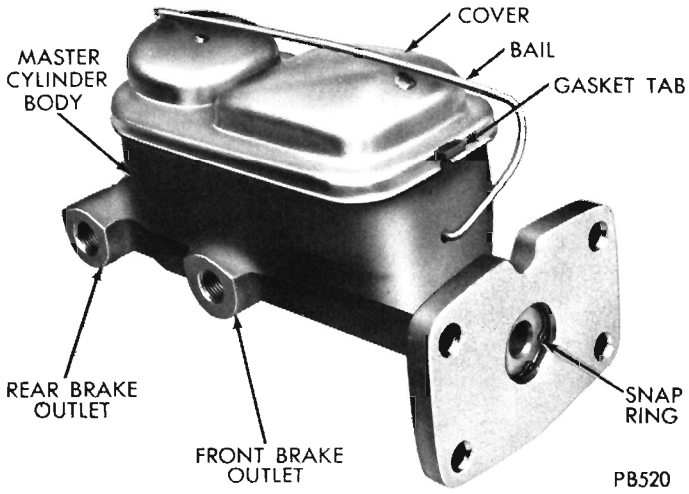


Fig. 1 - Tandem Master Cylinder Assembly

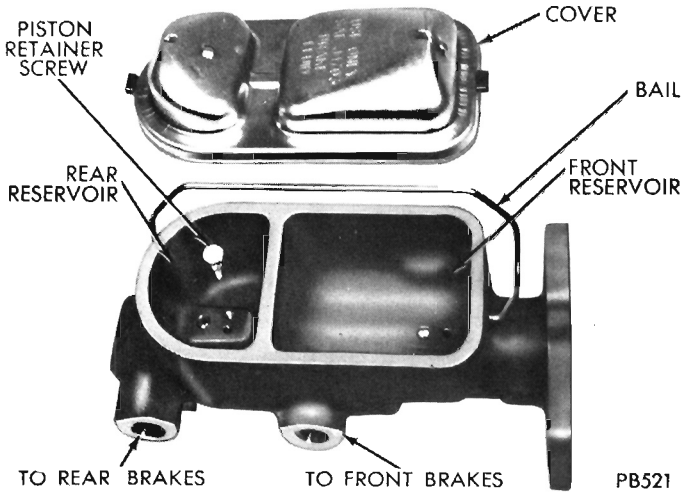


Fig. 2 — Piston Retainer Screw

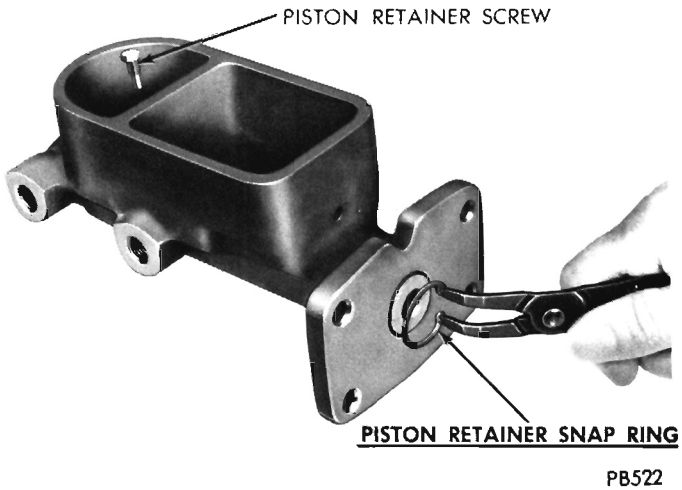


Fig. 3 - Piston Retainer Snap-Ring

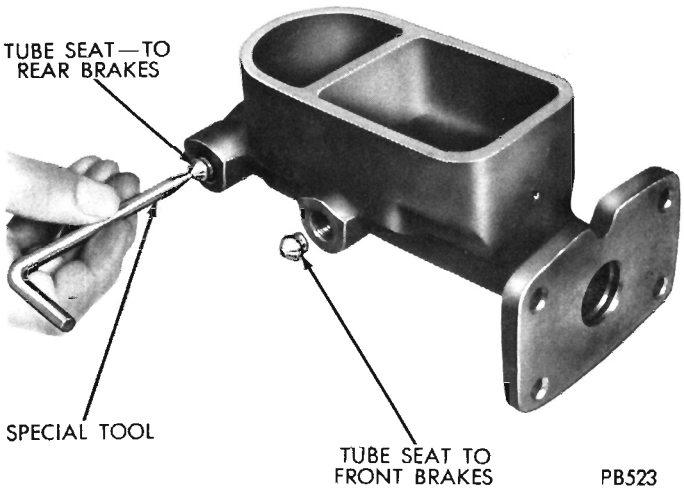


Fig. 4 - Removing Tube Seats

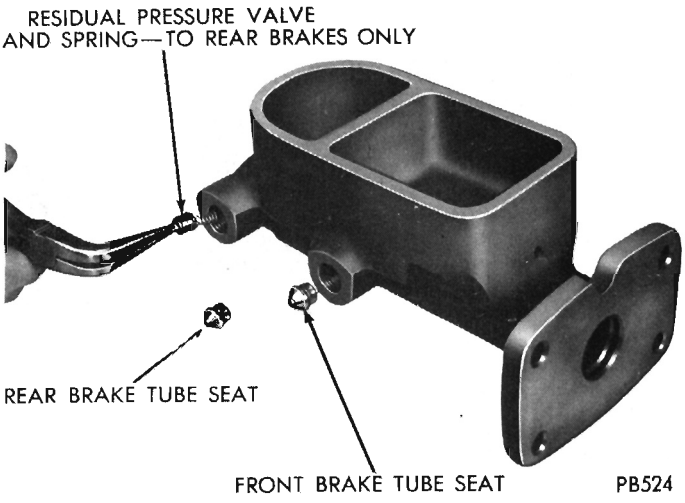


Fig. 5 - Removing or Installing Residual Pressure Valve and Spring

(6) Remove residual pressure valve and spring from front outlet (Fig. 5).

(7) Remove rubber cups from pistons after noting position of cup lips. Do not remove center cup of rear piston. If cup is damaged or worn. Install a new rear piston assembly.

CLEANING AND INSPECTION

Clean master cylinder thoroughly, using a suitable solvent and dry with compressed air. Wash the cylinder bore with clean brake fluid and inspect for scoring or pitting. Master cylinder bore walls that have light scratches or show signs of corrosion, can usually be cleaned with crocus cloth. However, cylinder bores that have deep scratches or scoring may be honed, providing the diameter of the bore is not increased more than .002 inch. If master cylinder bore does not clean up at .002 inch when honed, the master cylinder should be discarded and a new master cylinder installed.

If master cylinder pistons are badly scored or corroded, replace them with new ones. The piston cups and seals should be replaced when reconditioning a master cylinder.

When overhauling a master cylinder, use all parts furnished in repair kit. **Discard all used rubber parts.**

REASSEMBLING MASTER CYLINDER

Front Piston

Before assembling the master cylinder, dip all component parts in clean brake fluid and place on a clean shop towel or paper. (Assembling seals dry. can ruin them.)

(1) Carefully work primary cup on end of front piston with the lip away from piston (Fig. 6).

(2) Carefully work second seal cup over rear end of piston and into second land. (Be sure lip of cup is facing front of piston). (Fig. 6).

(3) Carefully work rear secondary cup over piston and into rear land. The lip must be facing toward rear (Fig. 6).

(4) Slide cup retainer over stem of front piston

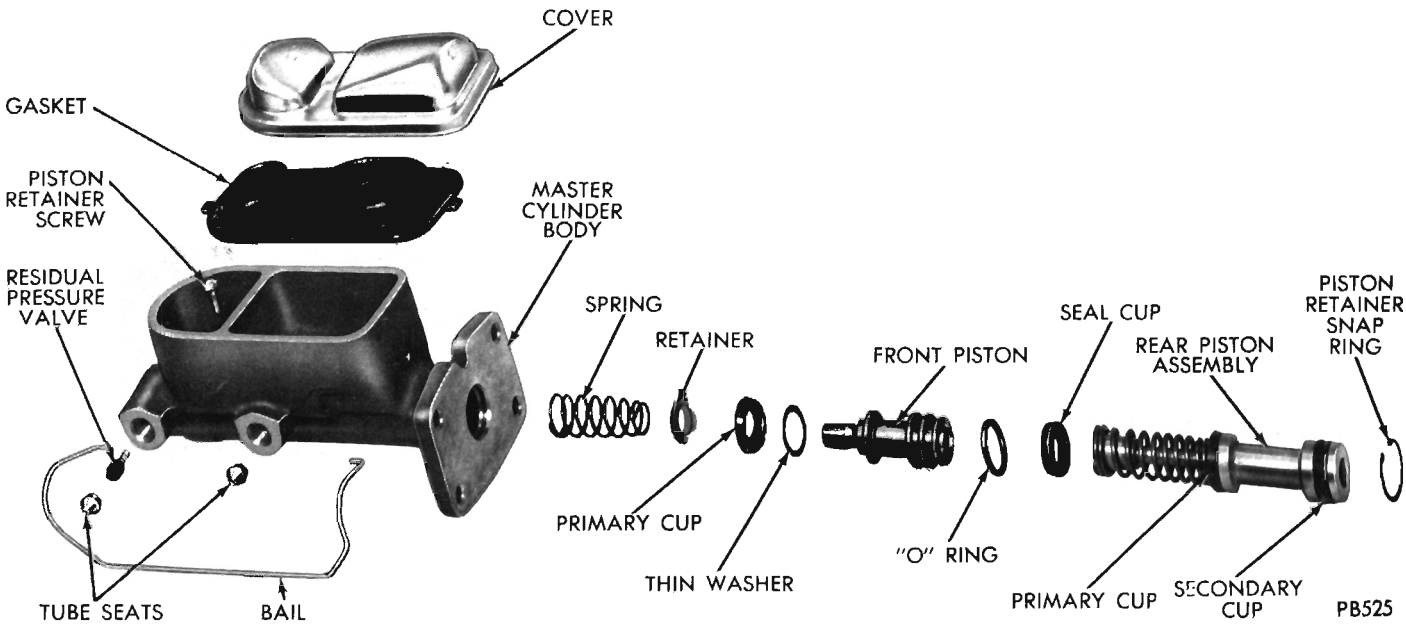


Fig. 6 - Tandem Master Cylinder (Exploded View)

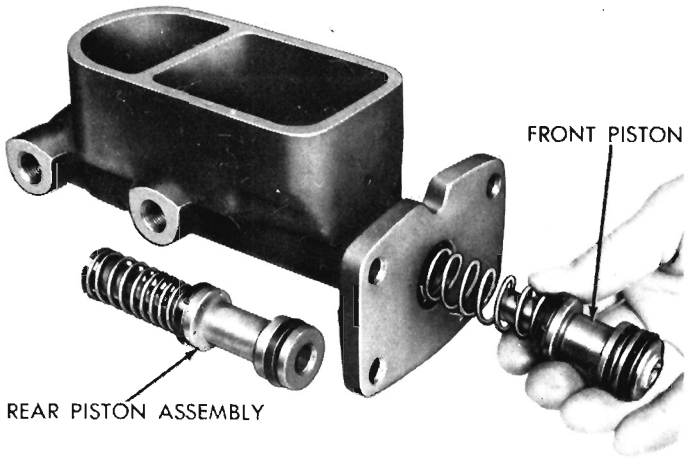


Fig. 7 - Installing Front Piston and Spring

with beveled side away from piston cup (Fig. 6).

(5) Position small end of pressure spring into retainer, then slide assembly into bore of cylinder (Fig. 7. **Be sure cups enter bore evenly in order not to damage sealing quality of cups. (Keep well lubricated with brake fluid.)**

Rear Piston

(1) Carefully work secondary cup over rear end of rear piston with lip of cup toward front (Fig. 6).

(2) Center spring retainer of rear piston assembly over shoulder of front piston. Push piston assemblies into bore. Carefully work lips of cups into bore, then seat piston assemblies. (Fig. 8).

(3) Holding pistons in seated postion, install piston retaining screw. Tighten securely (Fig. 2).

(4) Install residual pressure valve and spring (Fig. 5) in **front** outlet then install tube seats firmly. (When the bleeding tubes are attached, the tube seats will be positioned correctly.)

BLEEDING MASTER CYLINDER

Before installing master cylinder on vehicle, it must be bled on the bench as follows:

(1) Clamp master cylinder in a vise and attach bleeding tubes Tool C-4029 (Fig. 9).

(2) Fill both reservoirs with approved brake fluid.

(3) Using a wooden stick or dowel (power brake equipped vehicles) depress push rod slowly. (Note air bubbles.) Allow pistons to return under pressure of springs. Do this several times or until bubbles cease to appear (Fig. 9).

(4) Remove bleeding tubes from cylinder and install plug in rear outlet. (As tubes are removed, fluid remaining in tubes will syphon out.)

(5) Place cover and gasket over reservoirs and secure with bail.

(6) Remove master cylinder from vise and install

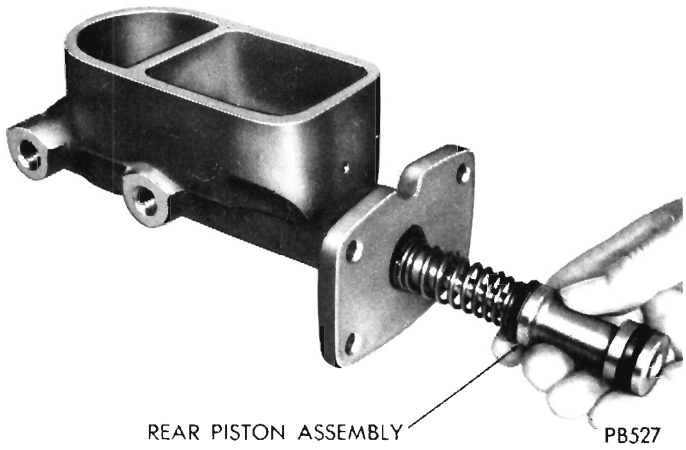


Fig. 8 - Installing Rear Piston Assembly

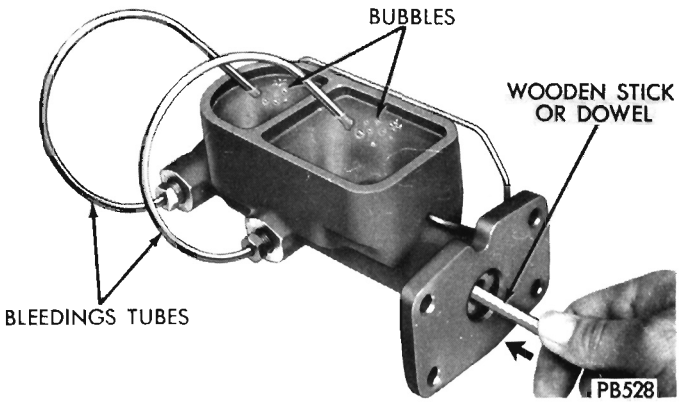


Fig. 9 - Bleeding Master Cylinder

on vehicle as follows:

INSTALLING MASTER CYLINDER

(1) Install master cylinder on vehicle, aligning push rod with cowl panel opening (manual) or power brake push rod with master cylinder piston.

(2) Slide over mounting studs. Install attaching nuts and tighten to 200 inch pounds.

(3) Connect front and rear brake tubes and tighten to 150 inch-pounds.

(4) Bleed brakes at wheel cylinders, using regular procedure, being sure fluid level is maintained. (See Bleeding the Brake System).

TESTING MASTER CYLINDER

Be sure that the master cylinder compensates at both ports. This can be done by applying the pedal lightly with the engine running (power brakes) and observing for a gyser of fluid squirting up in the reservoirs. This may only occur in the front chamber and so to determine if the rear compensating port is open, it will be necessary to pump up the brakes rapidly and then hold the pedal down. Have an observer watch the fluid in the rear reservoir while the pedal is raised. A disturbance in the fluid indicates that the compensating

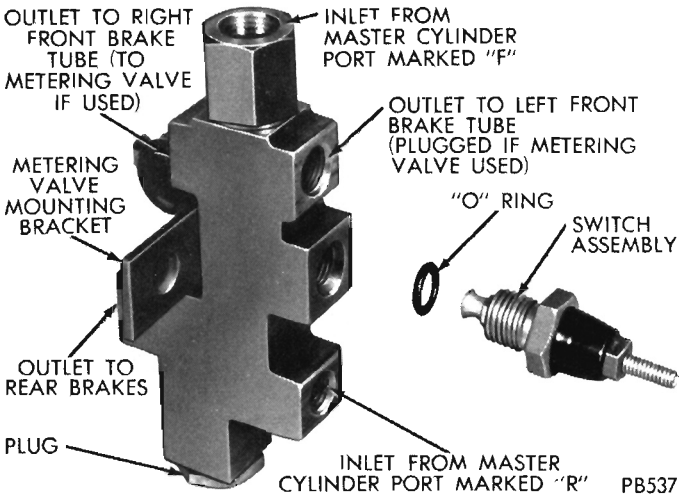


Fig. 10 Brake Warning Switch/Proportioning Valve (Exploded)

port is open.

BRAKE WARNING SWITCH

The brake warning switch unit of the brake warning switch/proportioning or metering valve assembly (Figs. 10 or 11) is used to warn the vehicle operator that one of the hydraulic systems have failed. A failure in one part of the brake system does not result in failure of the entire hydraulic brake system. As an example, failure of the rear brake system will leave the front brake system still operative.

As pressure falls in one system, the other system's normal pressure forces the piston to the inoperative side; contacting the switch terminal, causing a red warning light to come on in the instrument panel, thus warning the operator of the vehicle, that one of the systems has failed and should be repaired.

If a malfunction occurs within the switch, disconnect tubes from body assembly and install a new assembly. **The component parts of the switch body are not serviced.** However, the terminal

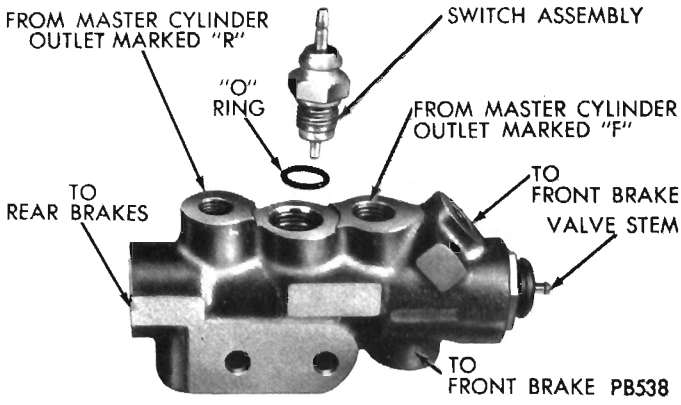


Fig. - 11 Brake Warning Switch/Metering Valve (Exploded)

unit can be removed if a malfunction occurs, and a new terminal unit installed.

If a new warning switch body assembly is installed, bleed the brake system.

TESTING BRAKE WARNING SWITCH

The brake warning light flashes only when the parking brake is applied with the ignition key turned "ON". The same light will also illuminate should one of the two service brake systems fail when the brake pedal is applied. To test the system turn the ignition key "ON", and apply the parking brake. If the light fails to light, inspect for a burned out bulb, disconnected socket, a broken or disconnected wire at the switch.

To test the service brake warning system, raise the car on a hoist and open a wheel cylinder bleeder while a helper depresses the brake pedal and observes the warning light. If the light fails to light, inspect for a burned out bulb, disconnected socket, a broken or disconnected wire at the switch. If the bulb is not burned out and the wire continuity is proven, replace the brake warning switch in the brake line Tee fitting mounted on the frame rail in the engine compartment below the master cylinder.

MASTER CYLINDER

(MODELS with DISC BRAKES and HEMI ENGINE)

INDEX

	Page
Bleeding Master Cylinder	63
Brake Warning Switch	63
Cleaning and Inspection	61
Disassembling Master Cylinder	61
General Information	61
Installing Master Cylinder	63
Master Cylinder Removal	61
Reassembling Master Cylinder	62
Testing Master Cylinder	63
Testing Hydraulic System Safety Switch	64

GENERAL INFORMATION

The tandem master cylinder (Fig. 1) (1 and 1/8 inch bore) is of the compensating type with the reservoirs cast integrally. The master cylinder consists of a front and rear piston (in tandem) two outlets, with 1 containing a residual pressure valve and spring (rear brake line outlet only) (Fig. 3).

The **front** outlet tube from the master cylinder is connected to the brake warning switch/proportioning valve assembly (Fig. 8 or 9) and then to the rear brakes. The **rear** outlet tube from the master cylinder is also connected to the safely switch and the **front** brakes.

SERVICE PROCEDURES

MASTER CYLINDER REMOVAL

(1) Disconnect front and rear brake tubes from master cylinder and install a plug in **rear** outlet. (The residual pressure valve in **front** outlet will keep cylinder from draining).

(2) Remove nuts that attach master cylinder to cowl panel and/or power brake unit (if so equipped).

(3) Slide master cylinder straight out from cowl panel and/or power brake unit (if so equipped).

DISASSEMBLING MASTER CYLINDER

To disassemble the master cylinder, (Figs. 1 and 4), clean the outside of the master cylinder thoroughly.

(1) Press bail to one side and remove cover and gasket. Empty brake fluid from reservoirs.

(2) Remove piston retaining screw and gasket (Fig. 4), then slide rear piston assembly out of cylinder bore.

(3) Upend master cylinder and tamp (open end down) on bench to remove front piston and spring. If front piston sticks in bore of cylinder, use air pressure to force piston out of cylinder. **New cups must be installed at reassembly if air pressure is used.**

(4) Remove front piston compression spring from bore.

(5) Using Tool T-109-178 (or an easy out) remove tube seats by threading tool firmly into seat, **tapping tool gently with a hammer** (Fig. 2). Discard seats.

(6) Remove residual pressure valve and spring from front outlet (Fig. 3).

(7) Remove rubber cups from pistons after noting postions of cup lips. Do not remove center cup of rear piston. If cup is damaged or worn, install a new rear piston assembly.

CLEANING AND INSPECTION

Clean master cylinder thoroughly, using a suitable solvent and dry with compressed air. Wash the cylinder bore with clean brake fluid and inspect for scoring or pitting. Master cylinder bore

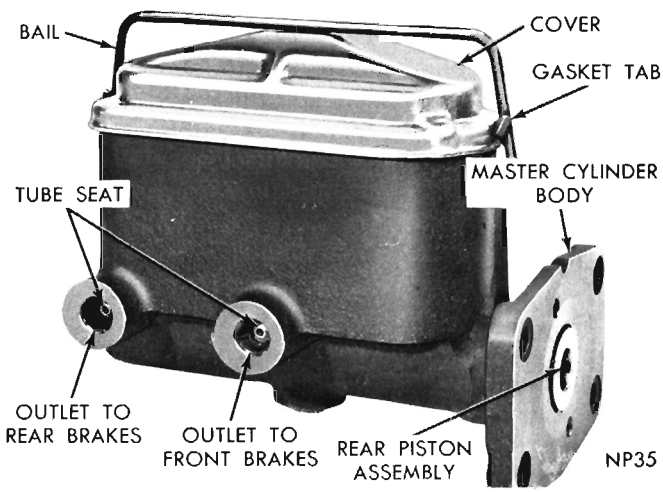


Fig. 1 - Tandem Master Cylinder

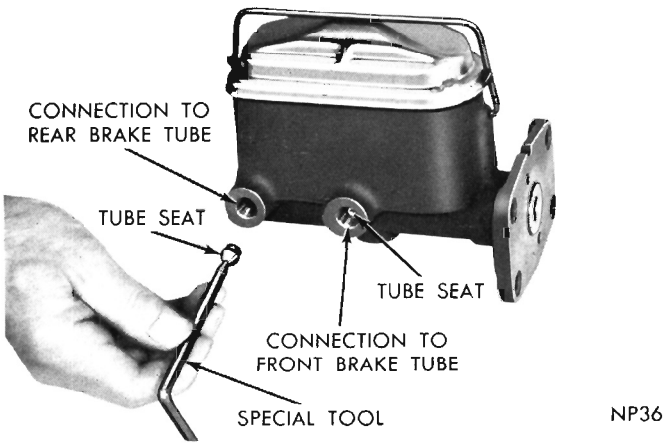


Fig. 2 - Removing Tube Seats

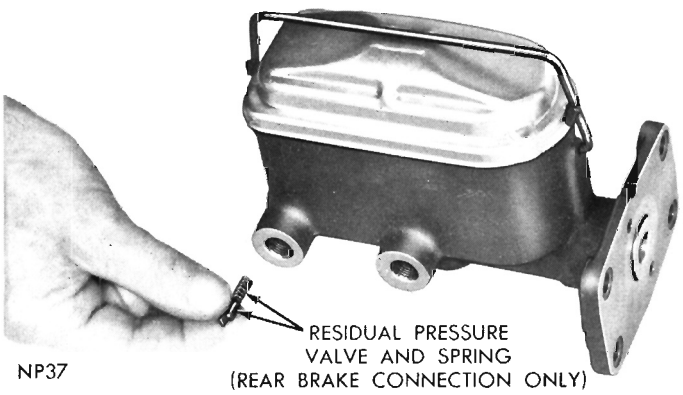


Fig. 3 Removing or Installing Residual Presssure Valve and Spring

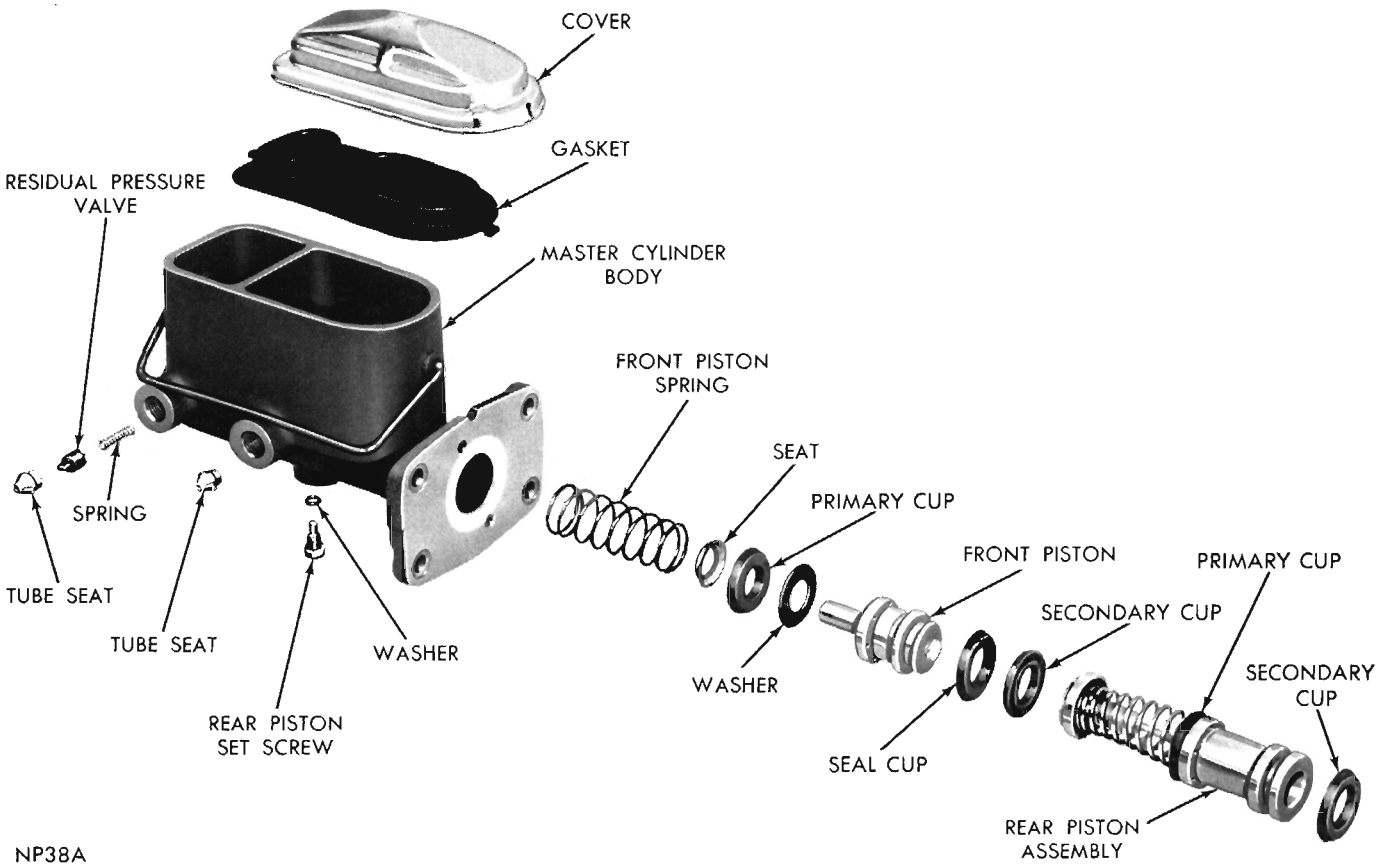


Fig. 4 - Tandem Master Cylinder (Exploded View)

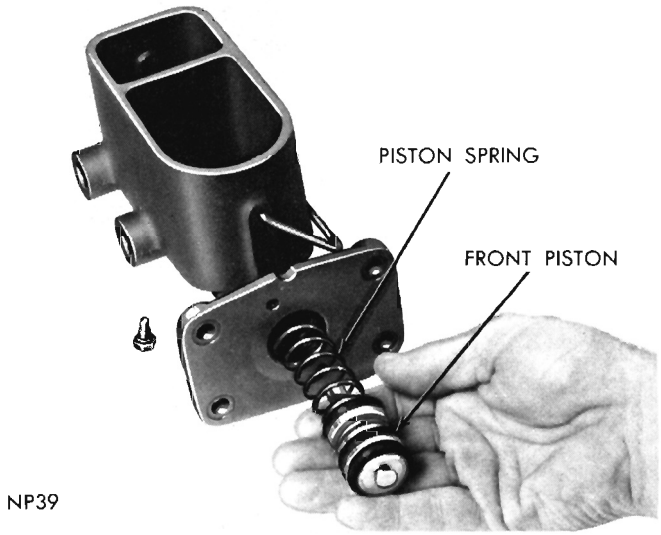


Fig 5 — Installing Front Piston and Spring

walls that have light scratches or show signs of corrosion, can usually be cleaned with crocus cloth. However, cylinder bores that have deep scratches or scoring may be honed, providing the diameter of the bore is not increased more than .002 inch. If master cylinder bore does not clean up at .002 inch when honed, the master cylinder should be discarded and a new master cylinder installed.

If master cylinder pistons are badly scored or corroded, replace them with new ones. The piston cups and seals should be replaced when reconditioning a master cylinder.

When overhauling a master cylinder, use all parts furnished in repair kit. **Discard all used rubber parts.**

REASSEMBLING MASTER CYLINDER

Front Piston

Before assembling master cylinder, dip all component parts in clean brake fluid and place on a clean shop towel or paper (assembling seals dry, can ruin them).

(1) Slide thin washer over stem of front piston, followed by primary cup. (Be sure lip is away from piston.) (Fig. 4).

(2) Carefully work seal cup over rear end of piston and into second land. (Be sure lip of cup is facing front of piston.) (Fig. 4).

(3) Carefully work secondary piston cup over piston and into rear land. The lip must be facing toward rear (Fig. 4).

(4) Position small end of pressure spring into retainer, then slide assembly into bore of cylinder (Fig. 5). **Be sure cups enter bore evenly in order**

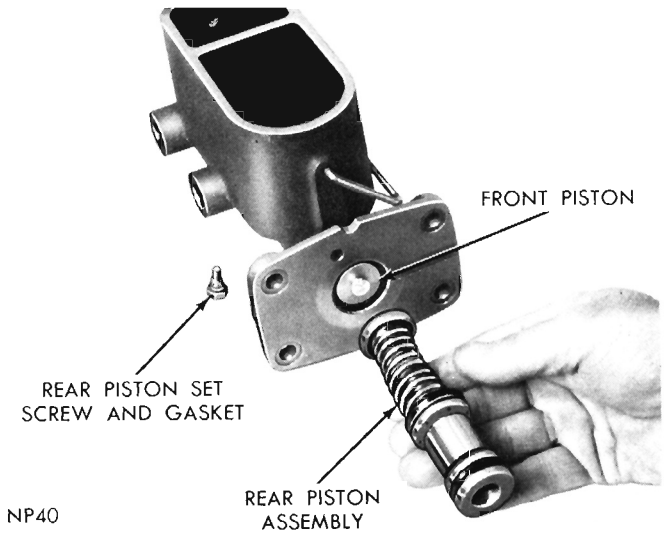


Fig. 6 - Installing Rear Piston Assembly

not to damage sealing quality of cups. (Keep well lubricated with brake fluid.)

Rear Piston

(1) Carefully work secondary cup over rear end of rear piston with lip of cup toward front (Fig. 4).

(2) Center spring retainer of rear piston assembly over shoulder of front piston. Push piston assemblies into bore. Carefully work lips of cups into bore, then seat piston assemblies (Fig. 6).

(3) Holding pistons in seated position, install piston retaining screw and gasket. Tighten securely (Fig. 6).

(4) Install residual pressure valve and spring (Fig. 3) in **front** brake outlet, then install tube seats firmly. (When the bleeding tubes are attached, the tube seats will be positioned correctly.)

BLEEDING MASTER CYLINDER

Before installing master cylinder on vehicle, it must be bled on bench as follows:

(1) Clamp master cylinder in a vise and attach bleeding tubes Tool C-4029 (Fig. 7).

(2) Fill both reservoirs with approved brake fluid.

(3) Using a wooden stick or dowel (power brake equipped vehicles depress push rod slowly. (Note air bubbles.) Allow pistons to return under pressure of springs. Do this several times or until bubbles cease to appear (Fig. 7).

(4) Remove bleeding tubes from cylinder and install plug in rear outlet. (As tubes are removed, fluid remaining in tubes will syphon out.)

(5) Place cover and gasket over reservoirs and secure with bail.

(6) Remove master cylinder from vise and install

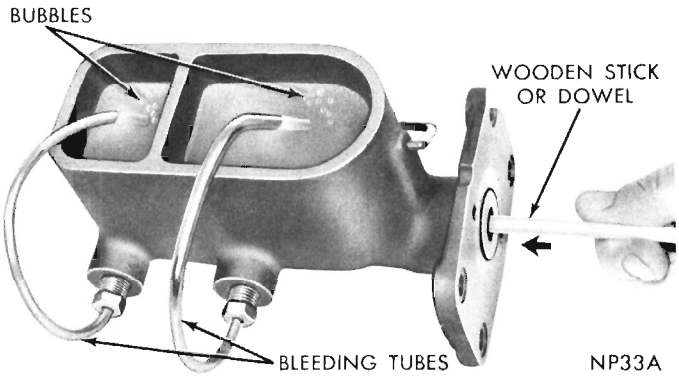


Fig. 7 - Bleeding Master Cylinder

on vehicle as follows:

INSTALLING MASTER CYLINDER

(1) Install master cylinder on vehicle, aligning power brake push rod with master cylinder piston.

(2) Slide over mounting studs. Install attaching nuts and tighten to 200 inch pounds.

(3) Connect front and rear brake tubes and tighten to 150 inch-pounds.

(4) Bleed brakes at wheel cylinders, using regular procedure, being sure fluid level is maintained. (See "Bleeding Brake System".)

TESTING MASTER CYLINDER

Be sure that the master cylinder compensates at both ports. This can be done by applying the pedal lightly with the engine running (power brakes) and observing for a gyser of fluid squirting up in the reservoirs. This may only occur in the front chamber and so to determine if the rear compensating port is open, it will be necessary to pump up the brakes rapidly and then hold the pedal down. Have an observer watch the fluid in the rear reservoir while the pedal is raised. A disturbance in the fluid indicates that the compensating port is open.

BRAKE WARNING SWITCH

The brake warning switch unit of the brake warning switch/proportioning valve assembly (Fig. 8) is used to warn the vehicle operator that one of the hydraulic systems has failed. A failure in one part of the brake system does not result in failure of the entire hydraulic brake system. As an example, failure of the rear brake system will leave the front brake system still operative.

As pressure falls in one system, the other system's normal pressure forces the piston to the inoperative side; contacting the switch terminal, causing a red warning light to come on in the instrument panel, thus warning the operator of the vehicle, that one of the systems has failed and should be repaired.

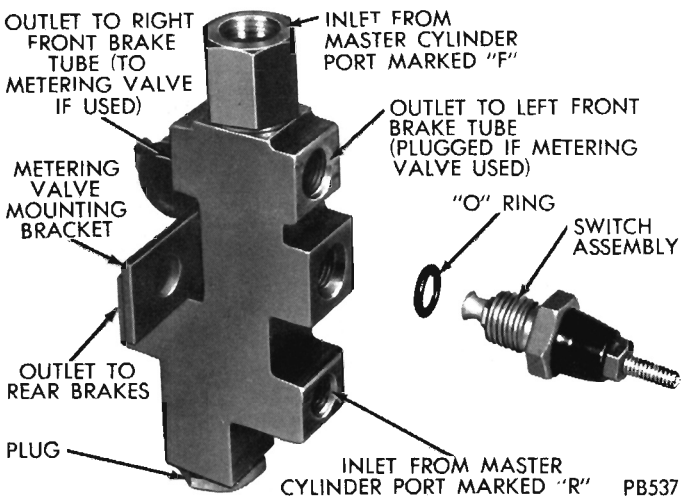


Fig. 8 - Brake Warning Switch/Proportioning Valve (Exploded)

The warning switch is mounted on the frame in a vertical position, with the brake tubes connected, as shown in (Fig. 8).

If a malfunction occurs within the switch, disconnect tubes from body assembly and install a new assembly. **The component parts of the switch body are not serviced.** However, the terminal unit can be removed if a malfunction occurs, and a new terminal unit installed.

If a new warning switch body assembly is installed, bleed the brake system.

TESTING BRAKE WARNING SWITCH

The brake warning light flashes only when the parking brake is applied with the ignition key turned "ON". The same light will also illuminate should one of the two service brake systems fail when the brake pedal is applied. To test the system turn the ignition key "ON", and apply the parking brake. If the light fails to light, inspect for a burned out bulb, disconnect socket, a broken or disconnected wire at the switch.

To test the service brake warning system, raise the car on a hoist and open a wheel cylinder bleeder while a helper depresses the brake pedal and observes the warning light. If the light fails to light, inspect for a burned out bulb, disconnected socket, a broken or disconnected wire at the switch. If the bulb is not burned out and the wire continuity is proven, replace the brake warning switch in the brake line Tee fitting mounted on the frame rail in the engine compartment below the master cylinder.

SPECIFICATIONS

BRAKES—SERVICE AND PARKING

VALIANT MODELS	6 Cyl.	V-8 & H.D.
Type	Duo-Servo Single Anchor	Duo-Servo Single Anchor
DRUM DIAMETER	9"	10"
NUMBER OF BRAKE SHOES	8	8
BRAKE LINING	Extruded and Molded Asbestos-Bonded	Extruded and Molded Asbestos-Bonded
WIDTH		
Front	Pri. 2-1/4" Sec. 2-1/2"	2-1/4"
Rear	2"	1-3/4"
LENGTH		
Front Primary	7-5/8"	8-1/2"
Front Secondary	9-5/8"	11"
Rear Primary	7-5/8"	8-1/2"
Rear Secondary	9-5/8"	11"
THICKNESS		
Primary	3/16"	3/16"
Secondary	1/4"	1/4"
WHEEL CYLINDER	4 per car	4 per car
Front Wheel Cylinder Bore	1"	1-3/16"
Rear Wheel Cylinder Bore	13/16"	15/16"
MASTER CYLINDER BORE	1-1/32"	1-1/32"

SATELLITE and BARRACUDA MODELS	6 Cyl.	V-8 & H.D. & Sub.
Type	Duo-Servo Single Anchor	Duo-Servo Single Anchor
DRUM DIAMETER	10"	10"
(Heavy Duty)	11"	11"
NUMBER OF BRAKE SHOES	8	8
WIDTH (Standard)		
Front	2-1/2"	2-1/2"
Rear	2-1/2"	2-1/2"
(HEAVY DUTY)		
Front	3"	3"
Rear	2-1/2"	2-1/2"
BRAKE LINING (10-INCH)	Extruded Asbestos-Bonded	Extruded Asbestos-Bonded
LENGTH		
Front Primary	8-1/2"	8-1/2"
Front Secondary	11"	11"
Rear Primary	8-1/2"	8-1/2"
Rear Secondary	11"	11"
BRAKE LINING (11 INCH HEAVY DUTY)		
LENGTH		
Front Primary	9-1/4"	9-1/4"
Front Secondary	12-1/8"	12-1/8"
Rear Primary	9-1/4"	9-1/4"
Rear Secondary	12-1/8"	12-1/8"
Thickness Primary	3/16"	3/16"
Secondary	1/4"	1/4"
WHEEL CYLINDER		
Front Wheel Cylinder Bore	1-3/16"	1-3/16"
Rear Wheel Cylinder Bore	15/16"	15/16"
MASTER CYLINDER BORE	1-1/32"	1-1/32"

FURY MODELS	
TYPE	Duo-Servo Single Anchor
DRUM DIAMETER	11 in.
(Police & Heavy Duty)	11 in.
NUMBER OF BRAKE SHOES	8 in.
WIDTH	
Front (Up to, including 360 Cu. In. Engine)	2-3/4 in.
Rear (Automatic Transmission)	2 in.
(Manual Transmission)	2-1/2 in.
(HEAVY DUTY)	
Front	3 in.
Rear	2-1/2 in.
Station Wagon (Front)	Disc
Station Wagon (Rear)	2-1/2 in.
BRAKE LINING	Extruded and Moulded Asbestos-Bonded
LENGTHS	
Front Primary	9-1/4 in.
Front Secondary	12-1/8 in.
Rear Primary	9-1/4 in.
Rear Secondary	12-1/8 in.
(HEAVY DUTY)	
Front Primary	9-1/4 in.
Front Secondary	12-1/8 in.
Rear Primary	9-1/4 in.
Rear Secondary	12-1/8 in.
Thickness – Secondary	1/4 in.
Thickness – Primary	3/16 in.

WHEEL CYLINDER	
Front Wheel Cylinder Bore (Drum)	1-3/16 in.
(Disc)	2-3/4 in.
Rear Wheel Cylinder Bore (Including Disc Brake Equipped Vehicles)	15/16 in.
MASTER CYLINDER BORE (Drum or Disc)	1-1/32 in.

CHRYSLER-IMPERIAL MODELS	Newport	300 and New Yorker	Imperial
TYPE		Duo-Servo Single Anchor	
DRUM DIAMETER	11 in.	11 in.	11 in.
(Heavy Duty)	11 in.		
NUMBER OF BRAKE SHOES	8	8	4
WIDTH			
Front	2-3/4 in.	Disc	Disc
Rear	2-1/2 in.	2-1/2 in.	3 in.
(Heavy Duty Including Station Wagon)			
Front	3 in.		
Rear	2-1/2 in.		
BRAKE LINING	Extruded and Moulded Asbestos-Bonded		
LENGTH			
Front Primary	9-1/4"		
Front Secondary	12-1/8"		
Rear Primary	9-1/4"		
Rear Secondary	12-1/8"		
WHEEL CYLINDER			
Front Wheel Cylinder Bore (Drum)	1-3/16"		
(Disc)	2-3/4"		
Rear Wheel Cylinder Bore	15/16"		
MASTER CYLINDER BORE (Drum or Disc)	1-1/32"		

DISC BRAKE (FIXED CALIPER)

VALIANT

Type of Brake	Fixed Caliper Disc
Location	Front Wheels Only
Master Cylinder Reservoir	Horizontal Tandem (Dual)
Proportioning Valve Location	Left Sill (Brake Warning Switch Assembly)
Brake Adjustment	None (Automatic)
Residual Valve Location	In Master Cylinder Outlet (to rear brakes only

CALIPER ASSEMBLY

Shoe and Lining Removal	Radially Outward (Remove Clips)
Number of Pistons	4 (Each Unit)
Piston Diameter	1-5/8"
Piston Bore Diameter	1.636"
Maximum Allowable (After Honing)	1.638"
Piston Seals	Moulded Rubber (Square Section .092" Wide, .100" Radial Thickness
Piston Dust Boots	External Moulded Rubber 4 Per Unit
Bleeder Screw Location	Outer Housing 3/8"
Transfer Tube Type	Short Overhead

BRAKING DISC

Type	Ventilated Cast Iron
Diameter Outside	11.04"
Inside	6.91"
Disc Runout (Maximum Allowable) T.I.R.	.0025"
Disc Surface Finish	15 to 80 Micro Inches
Disc Thickness	.810"
Disc Parallelism (Total Variation in Thickness)	.0005"

BRAKE SHOE AND LINING

Type	Bonded
Lining Thickness	.400" (Nominal)
Width	1.84"
Length	4.82"
Braking Area	8.50" Sq. In./Segment
Maximum Wear (Minimum Thickness Allowed)	Not less than 1/32" lining at any point or a minimum shoe and lining thickness of .180"

MASTER CYLINDER

Piston Bore Diameter	1-1/32"
Maximum Bore Diameter Allowable (After Honing)	.002" o.s.
Residual Valve	Rear Brakes Only

DISC SPLASH SHIELD

Type	Vented-Stamped Steel
Mounting	3 Bolts to Knuckle

PROPORTIONING VALVE

Type	Pressure Control
P.S.I.	300 P.S.I.
Reduction in Rate of Rear Line Pressure Build Up	After 300 P.S.I. Actuation Pressure

DISC BRAKE (Floating Caliper)

IMPERIAL CHRYSLER FURY SATELLITE BARRACUDA

Type of Brake	Floating Caliper
Location	Front Wheels Only
Master Cylinder	Horizontal Tandem (Dual)
Metering Valve Location	Below Master Cylinder, Combined with Brake Warning Switch
Proportioning Valve (Satellite-Barracuda, Models)	Below Master Cylinder, Combined with Brake Warning Switch
Brake Adjustment	None Required
Residual Valve Location (Rear Brakes Only)	In Master Cylinder Outlet

CALIPER ASSEMBLY

Shoe and Lining Removal	Bottom, Caliper Removed
Number of Pistons	1 Each Unit
Piston Diameter	2-3/4" (2.751"-2.753")
Piston Bore Diameter Maximum Allowable (After Honing)	2.757"
Piston Seal	Moulded Rubber (Square Section) .126" Wide—120" Radial Thickness
Dust Boot	Moulded Rubber (External) 1 Per Unit
Bleeder Screw Location	Inner Housing 3/8"

BRAKING DISC	
Type	Ventilated Cast Iron
Diameter (Outside)	
Fury-Chrysler-Imperial Models	11.75"
Satellite—Barracuda Models	10.97"
Diameter (Inside)	
Fury—Chrysler—Imperial Models	7.725"
Satellite—Barracuda Models	7.04"
Disc Run-out (Maximum Allowable) T.I.R.	.0025"
Disc Surface Finish	15 to 80 Micro Inches
Disc Thickness	
Fury—Chrysler—Imperial Models	1.250-1.240
Satellite—Barracuda Models	1.000-1.010
Disc Parallelism (Total Variation in Thickness)	.0005"
BRAKE SHOE AND LINING	
Type	Bonded
Lining Thickness	.400" (Nominal)
Wide	1.80" (At Center)
Long	6.02"
Braking Area	10.0" (Square inches per pad)
Maximum Wear (Minimum Thickness Allowed	Not less than .030" lining at any point or a minimum shoe and lining thickness of .230 Inch
MASTER CYLINDER	
Piston Bore Diameter	1-1/32"*
Maximum Bore Diameter Allowable (After Honing)	.002" O.S.
Residual Valve	Rear Brakes Only
DISC SPLASH SHIELD	
Type	Vented-Stamped Steel
Mounting	3 Bolts to Knuckle

*1-1/8", Models with 426 Hemi Engine

TIGHTENING REFERENCE

	Foot Pounds	Inch Pounds
HYDRAULIC BRAKE LINES		
Brake Line Tube Nuts, 3/8 or 7/16		80-150
1/2 or 9/16		125-175
Flexible Brake Hose		
To Brake Line Tubes (All)		80-150
To Brake "T" (Rear)		200
To Wheel Cylinders (All)	25	
MASTER CYLINDER		
Master Cylinder to Dash Panel or Booster front cover		200
Master Cylinder Pedal Link Bolt	30	
POWER BRAKE		
Power Brake Assembly to Dash		200
Power Brake Brace and Support Nuts (Small Tandem Diaphragm)		150
WHEEL CYLINDERS		
Wheel Cylinder to Support Plate 9" Brake		110
Wheel Cylinder to Support Plate 10" and 11" Brake		220

BRAKE SUPPORT PLATE		
Front (To Steering Knuckle)		
Except Valiant, Top attaching bolts	55	
Bottom attaching bolts	120	
Valiant, Top attaching bolts	55	
Bottom attaching bolts	100	
Rear (To Axle Flange)		
All	35	
WHEEL BEARING NUT		
All except Valiant (Wheel rotating)		90
Valiant (Wheel rotating)		70
WHEEL STUD NUTS		
All except Valiant	65	
Valiant	55	
DISC BRAKE (FIXED CALIPER)		
Caliper Mounting Bolts	50-80	
Caliper Assembly Bridge Bolts	70-80	
Disc Splash Shield Bolts		220
Caliper Bleeder Screw		100
Shoe Clips (Retainers)	7-9	
Proportioning Valve to Frame Screw		180
DISC BRAKE (FLOATING CALIPER)		
Adapter Mounting Bolts	75-100	
Guide Pins	30-35	
Disc Splash Shield Screws		220
Proportioning-Metering Valve Assembly to Frame Screw		200

CLUTCH

CONTENTS

	Page
CLUTCH—SERVICING	6
CLUTCH HOUSING ALIGNMENT	10
CLUTCH PEDAL FREE PLAY	5
CLUTCH RELEASE BEARING	9
CLUTCH RELEASE FORK	9
PILOT BUSHING—CRANKSHAFT TO TRANSMISSION DRIVE PINION	8
SERVICE DIAGNOSIS	4
SERVICE PROCEDURES	5
SPECIFICATIONS	12
STEAM CLEANING PRECAUTIONS	11
TIGHTENING REFERENCE	13
TORQUE SHAFT AND BEARINGS	10

GENERAL INFORMATION

The clutches used in all models are a single, dry disc type (Figs. 1 and 2), with no adjustment for wear being provided in the clutch itself. The clutch pedal linkage, however, is provided with an adjustable rod to maintain specified pedal free play.

The three pressure plate release levers are preset during manufacture and no attempt should be made to adjust them in service.

The clutch sizes for the various car models are described in specification charts at end of this section.

The Semi-Centrifugal type clutch (Fig. 2) combines the feature of low pedal effort with that of a clutch capable of transmitting the full torque of the engine.

Some models have centrifugal rollers assembled between the pressure plate and cover. These rollers are provided to increase the normal load on the disc assembly at higher engine speeds. As the engine speed increases, the centrifugal force of the rollers causes them to act as wedges between the cover and pressure plate and exert greater force against the disc.

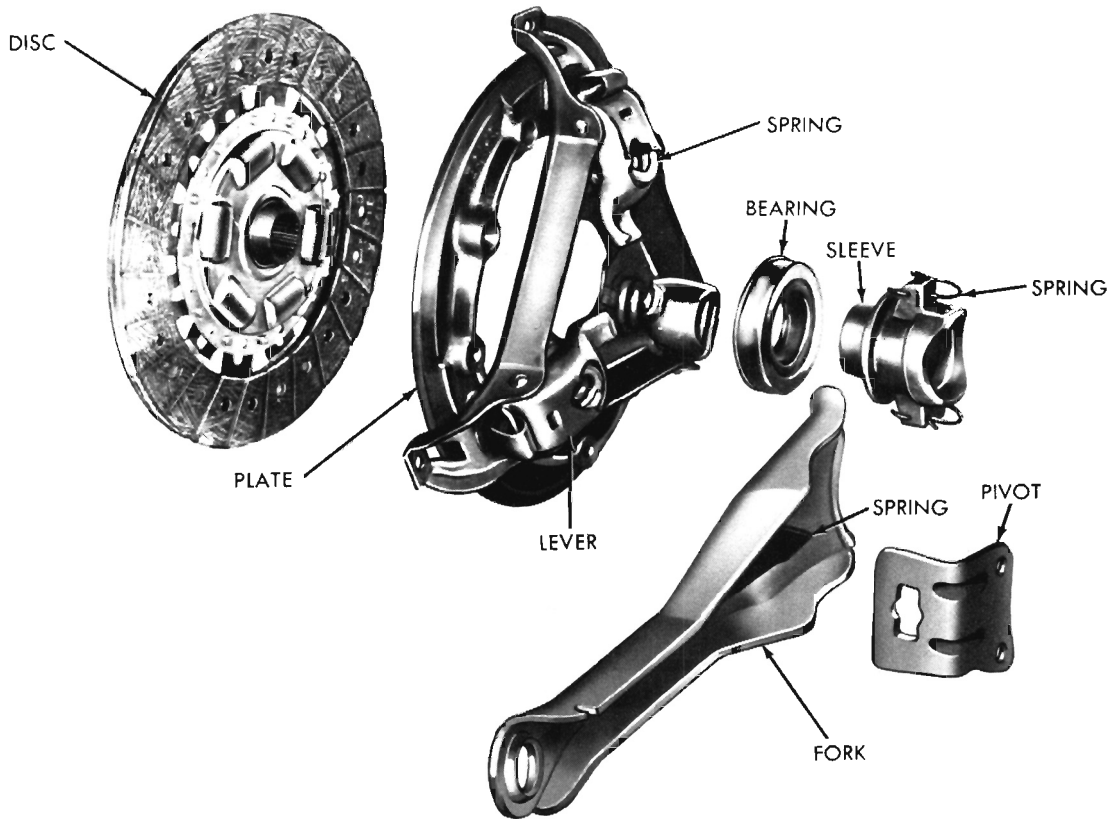


Fig. 1 Clutch Disassembled

Clutch Pedal and Bracket (Figs.3, 4, 5 and 6)

The clutch pedal is connected to the torque shaft through a vertically positioned rod. A non-adjustable over-center spring is provided between the pedal and the pedal bracket to allow easy clutch pedal operation.

The upper end of the clutch pedal pivots in the pedal bracket on two needle bearings or nylon bushings. These bearings do not require periodic lubrication.

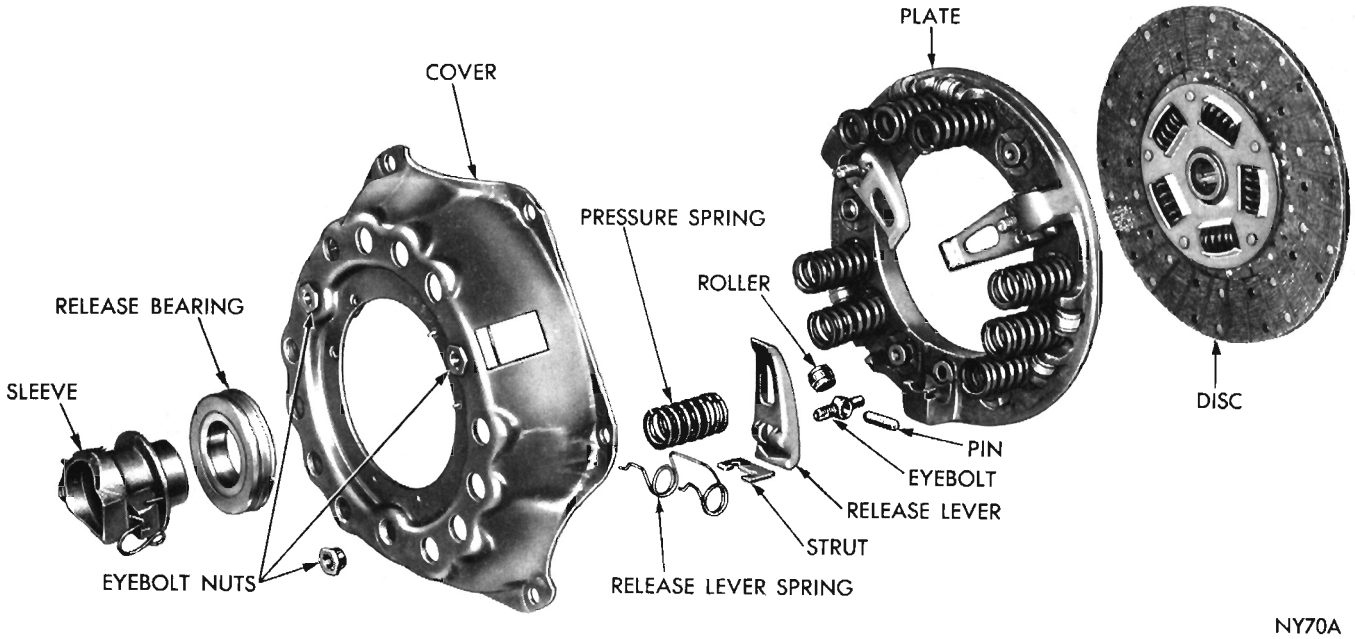


Fig. 2 Clutch Disassembled (Semi Centrifugal)

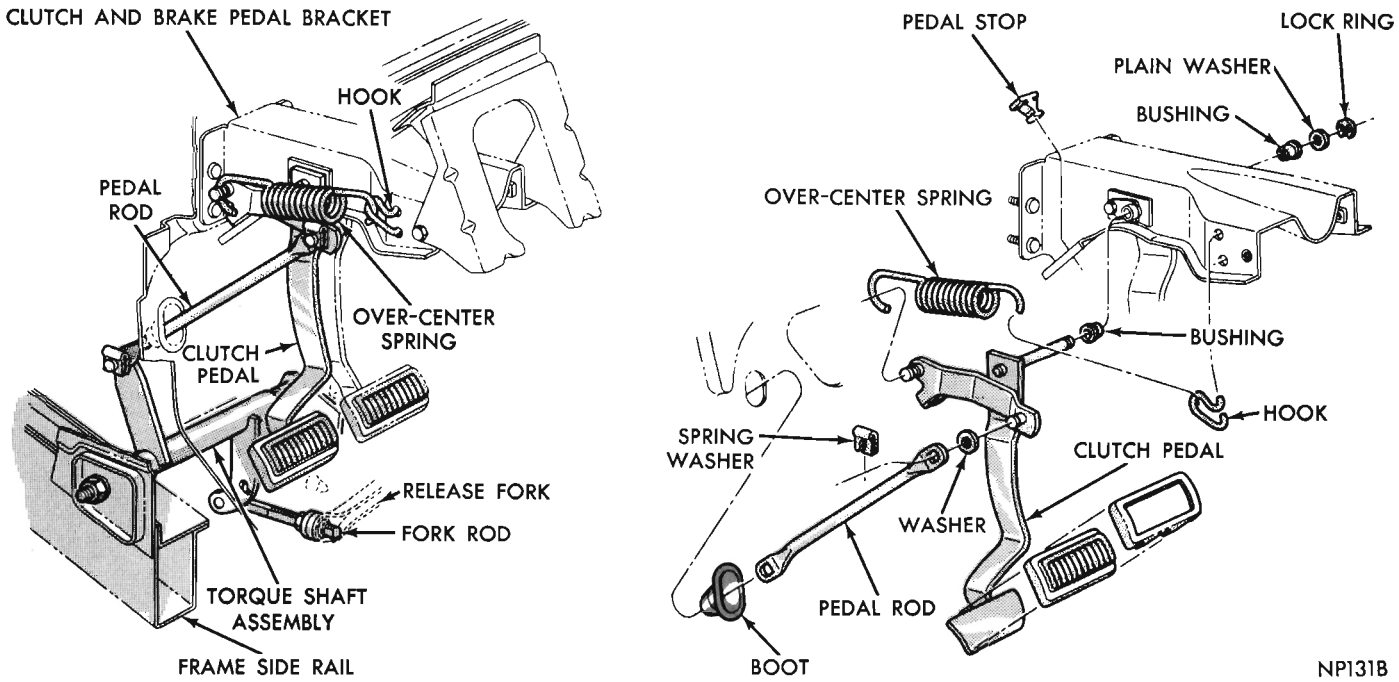


Fig. 3 Clutch Pedal and Linkage (Valiant)

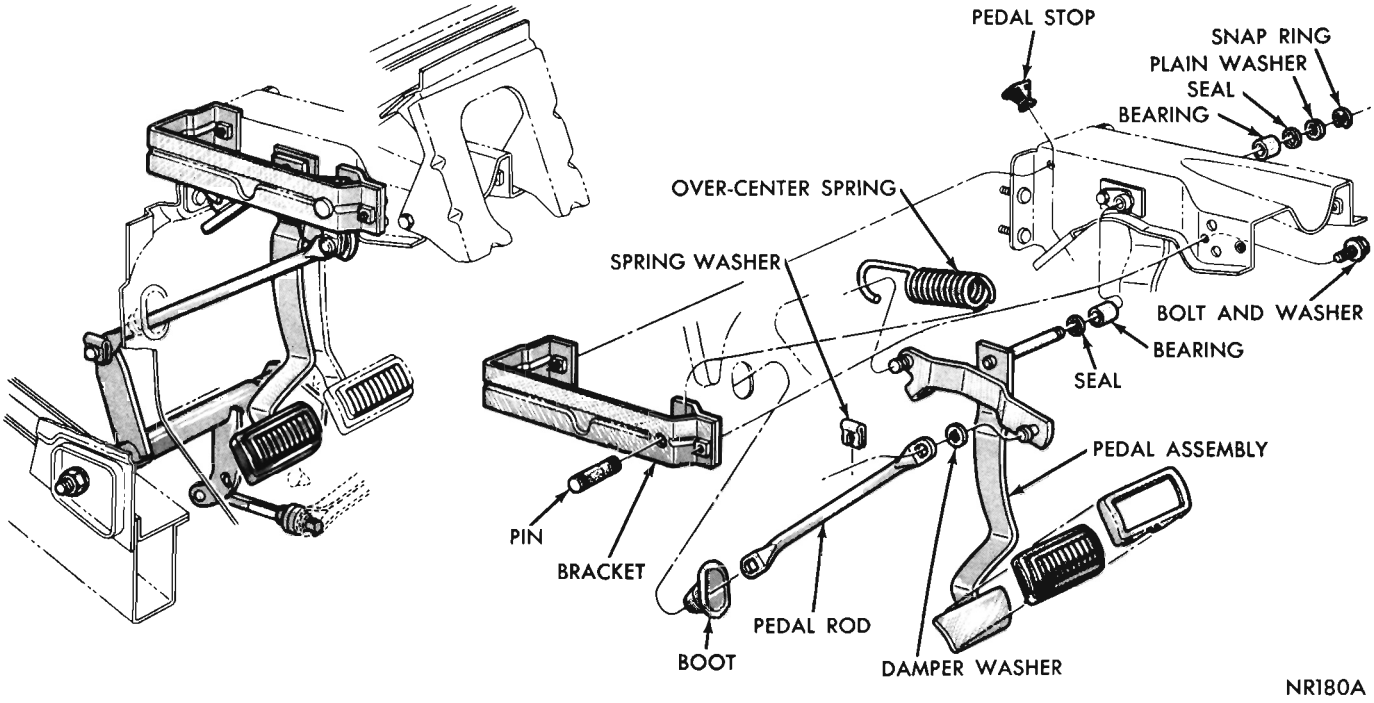


Fig. 4 Clutch Pedal and Linkage (Valiant Heavy Duty)

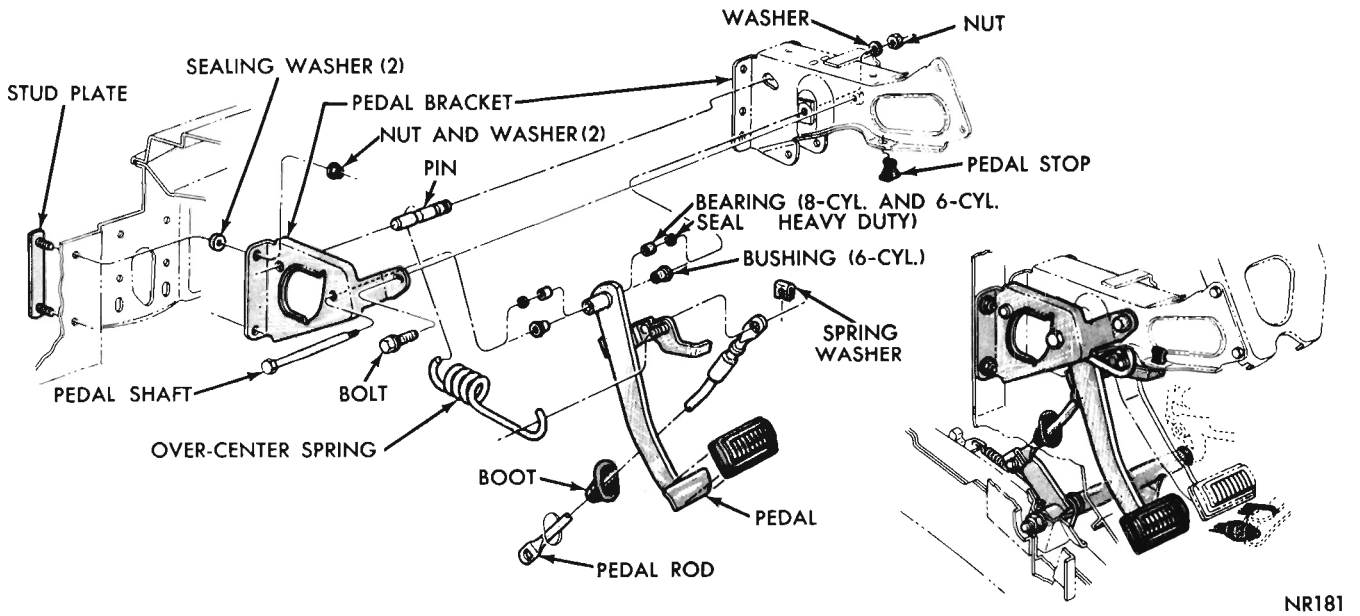


Fig. 5 Clutch Pedal and Linkage (Barracuda and Satellite)

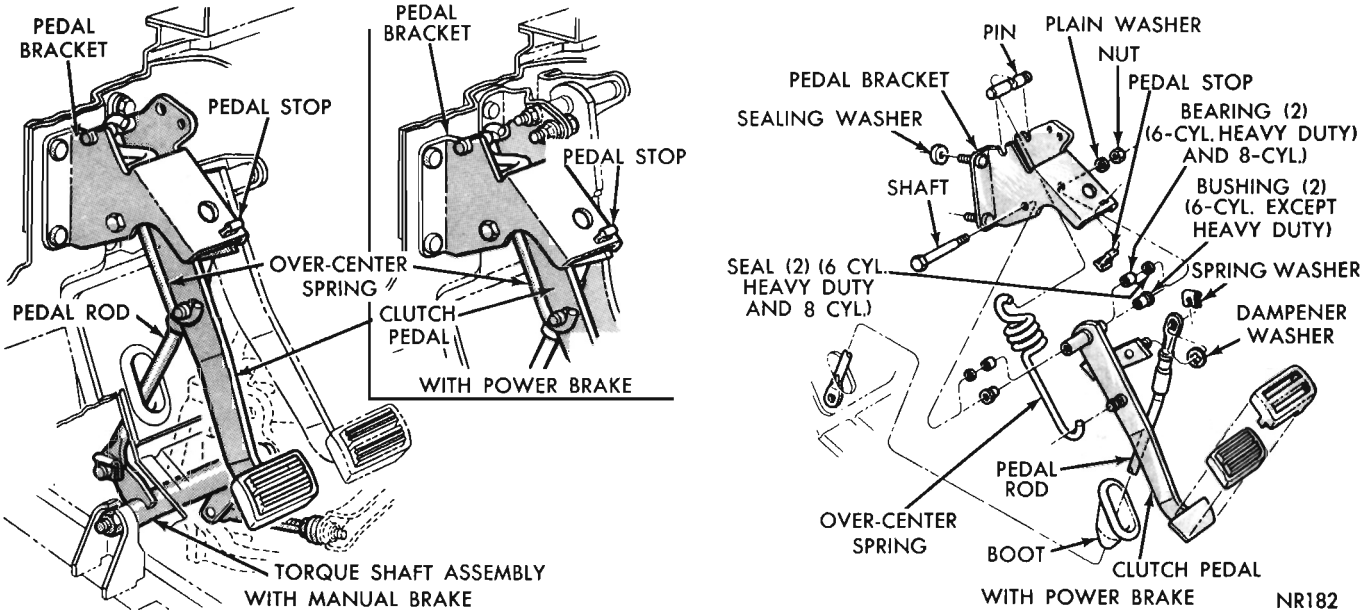


Fig. 6 Clutch Pedal and Linkage (Fury)

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
CLUTCH CHATTER	(a) Worn or damaged disc assembly.	(a) Replace disc assembly.
	(b) Grease or oil on disc facings.	(b) Replace disc assembly and correct cause of contamination.
	(c) Improperly adjusted cover assembly.	(c) Replace cover assembly.
	(d) Broken or loose engine mounts	(d) Replace or tighten mounts
	(e) Misaligned clutch housing	(e) Align clutch housing
CLUTCH SLIPPING	(a) Burned, worn, or oil soaked facings.	(a) Replace disc assembly and correct cause of contamination.
	(b) Insufficient pedal free play.	(b) Adjust release fork rod.
	(c) Weak or broken pressure springs.	(c) Replace cover assembly.
DIFFICULT GEAR SHIFTING	(a) Excessive pedal free play.	(a) Adjust release fork rod.
	(b) Excessive deflection in linkage or firewall.	(b) Repair or replace linkage.
	(c) Worn or damaged disc assembly.	(c) Replace disc assembly.
	(d) Improperly adjusted cover assembly.	(d) Replace cover assembly.
	(e) Clutch disc splines sticking.	(e) Remove disc assembly and free up splines or replace disc.
	(f) Worn or dry pilot bushing.	(f) Lubricate or replace bushing.
	(g) Clutch housing misaligned.	(g) Align clutch housing.
CLUTCH NOISY	(a) Dry clutch linkage.	(a) Lubricate where necessary.*
	(b) Worn release bearing.	(b) Replace release bearing.
	(c) Worn disc assembly.	(c) Replace disc assembly.
	(d) Worn release levers.	(d) Replace cover assembly.
	(e) Worn or dry pilot bushing.	(e) Lubricate or replace bushing.*
	(f) Dry contact-pressure plate lugs in cover.	(f) Lubricate very lightly.*

* Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

SERVICE PROCEDURES

CLUTCH PEDAL FREE PLAY

The only adjustment required for the clutch is the pedal linkage adjustment to provide the prescribed clutch pedal free play. The adjustment is necessary to restore pedal free play reduced by normal clutch wear.

Adjusting Clutch Pedal Free Play

(1) Inspect condition of clutch pedal rubber stop and if stop is damaged, install a new one.

(2) On 6 cyl. models equipped with A-903 transmissions disconnect gearshift interlock rod by loosening rod swivel clamp screw (Fig 7).

(3) Adjust fork rod by turning self-locking adjusting nut (Figs. 8, 9 or 10) to provide 5/32 inch free movement at end of fork. This movement will provide prescribed one-inch free play at pedal

(4) Adjust interlock rod as described below.

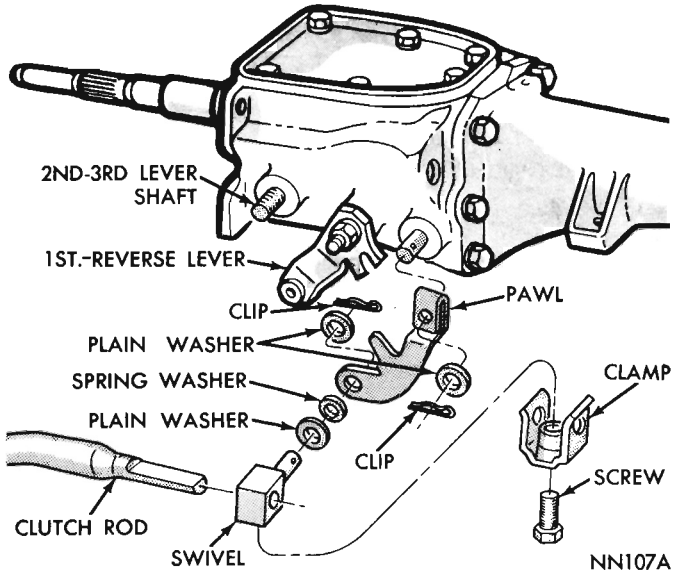


Fig. 7 Gearshift Interlock (6 Cyl. and A-903 Transmissions only).

Gearshift Interlock (A-903 trans. only)

(1) Disconnect clutch rod swivel from interlock pawl (Fig. 7).

(2) Adjust clutch pedal free play as specified.

(3) When first-reverse lever on transmission is in neutral (middle detent) position, the interlock pawl will enter the slot in first-reverse lever.

(4) Loosen swivel clamp bolt and slide swivel on rod to enter pawl. Install washers and clip. Hold interlock pawl forward and tighten swivel clamp bolt to 100 inch-pounds. Clutch pedal has to be in full returned position during this adjustment.

CAUTION: Do not pull clutch rod rearward to engage swivel in the pawl.

(5) Shift transmission in normal manner from neutral to first, and from neutral to reverse (disengage clutch while shifting and engage clutch when in gear). Clutch action should be normal.

(6) Disengage clutch and shift halfway to first or reverse. Clutch should now be held down by interlock to within 1 or 2 inches of floor.

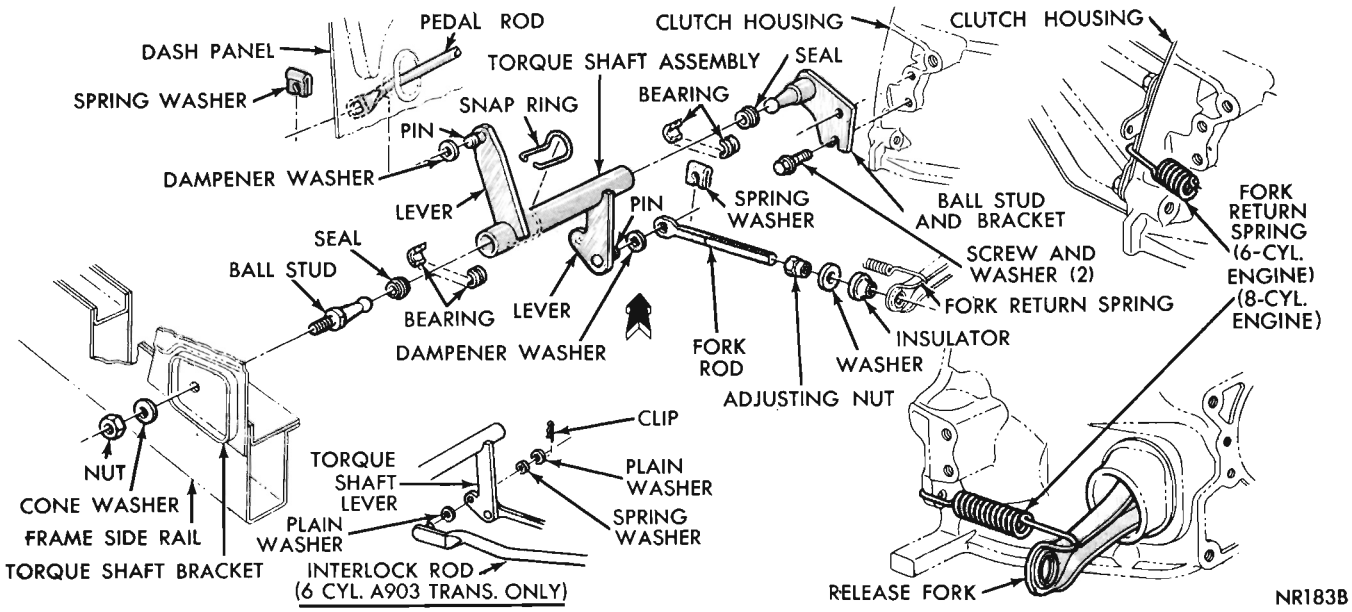


Fig. 8 Torque Shaft and Linkage (Valiant)

CLUTCH — SERVICING

Improper operation or excessive wear may impair the clutch function to a point where it may be necessary to remove and replace the disc and/or cover assembly. Should this operation become necessary, proceed as follows:

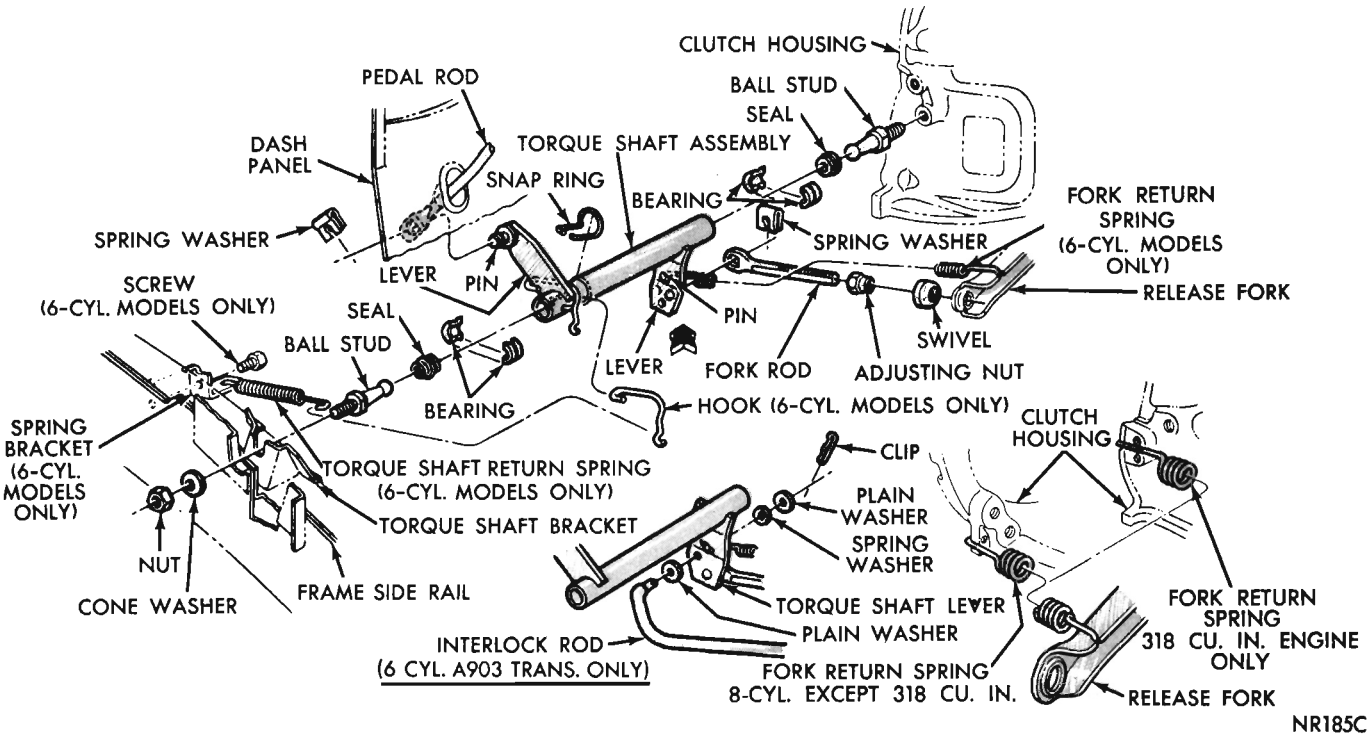


Fig. 9 Torque Shaft and Linkage (Barracuda and Satellite)

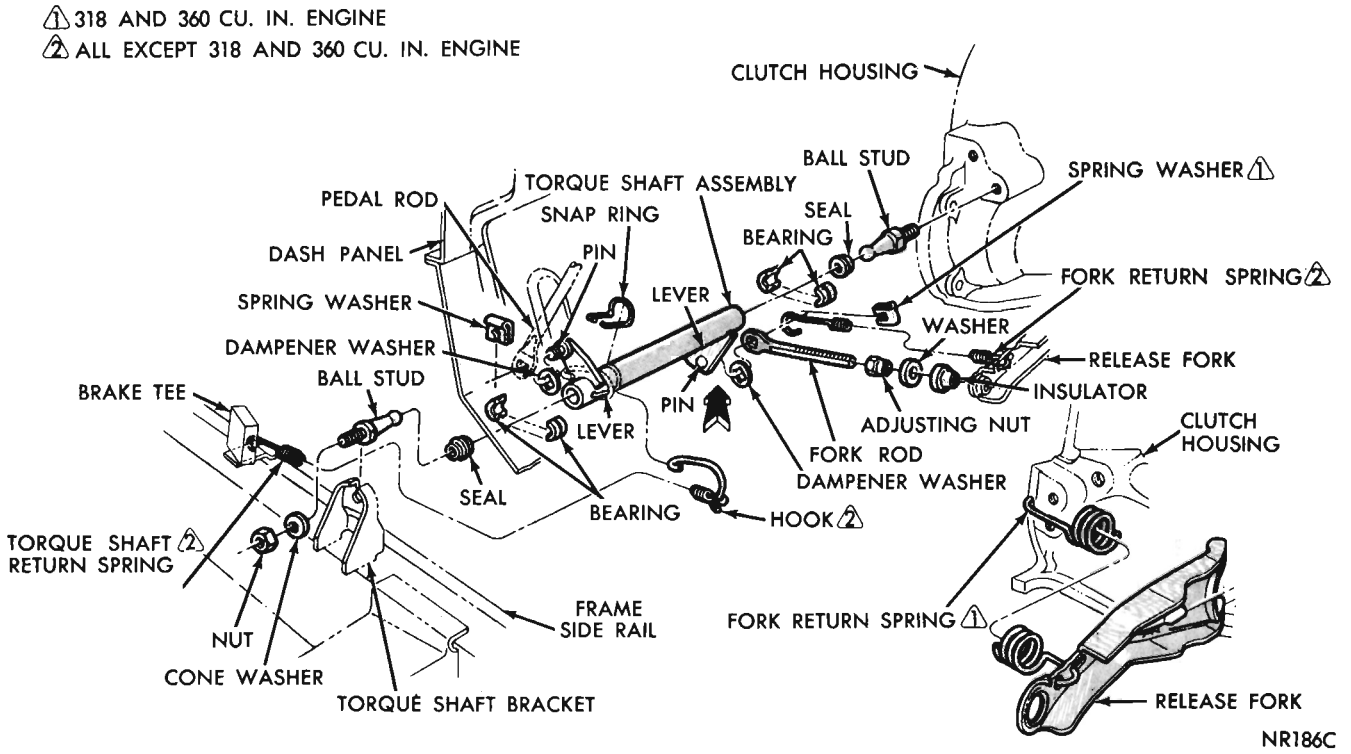


Fig. 10 Torque Shaft and Linkage (Fury)

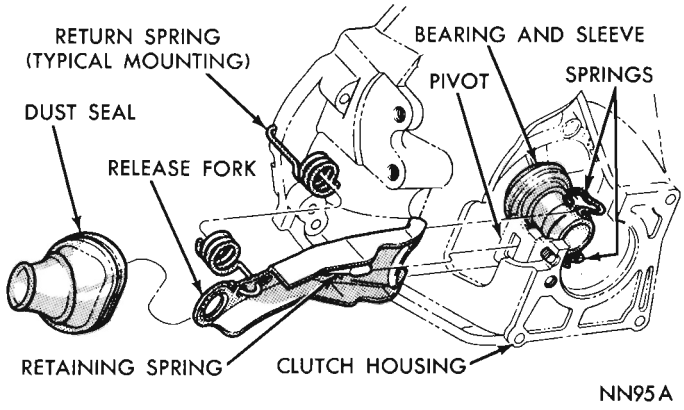


Fig. 11 Clutch Release Fork, Bearing and Sleeve

Removal

(1) Remove transmission. See "Manual Transmission," Group 21, for detailed procedure.

(2) Remove clutch housing pan.

(3) Remove return spring from clutch release fork and clutch housing or torque shaft lever (Fig. 8, 9 or 10).

(4) Remove spring washer securing fork rod to torque shaft lever and remove rod from torque shaft and release fork.

(5) On 6 cylinder models with the A-903 transmission, remove clip and plain washer securing interlock rod to torque shaft lever and remove spring washer, plain washer and rod from torque shaft.

(6) Remove clutch release bearing and sleeve assembly from clutch release fork (Fig. 11), then remove release fork and boot from clutch housing.

(7) Mark clutch cover and flywheel (Fig. 12) to maintain their same relative positions when reinstalling clutch assembly.

(8) Loosen and back off clutch cover attaching bolts, one or two turns at a time, in succession, to avoid bending cover flange.

(9) Remove clutch assembly and disc from clutch housing.

CAUTION: Handle clutch and disc carefully to avoid contaminating the friction surfaces.

Cleaning and Inspection

(1) Use compressed air to clean dust out of clutch housing. Inspect for oil leakage through engine rear main bearing oil seal and transmission drive pinion seal. If leakage is noted, it should be corrected at this time.

(2) Friction face of flywheel should have a uniform appearance throughout entire disc contact area. If there is evidence of heavy contact on one portion of wear circle and a very light contact 180 degrees from that portion, flywheel may be improperly mounted or sprung. In either case, a dial indicator mounted on clutch housing with plunger in contact with wear circle, should show **no more** than .003 inch runout throughout a complete rotation of flywheel.

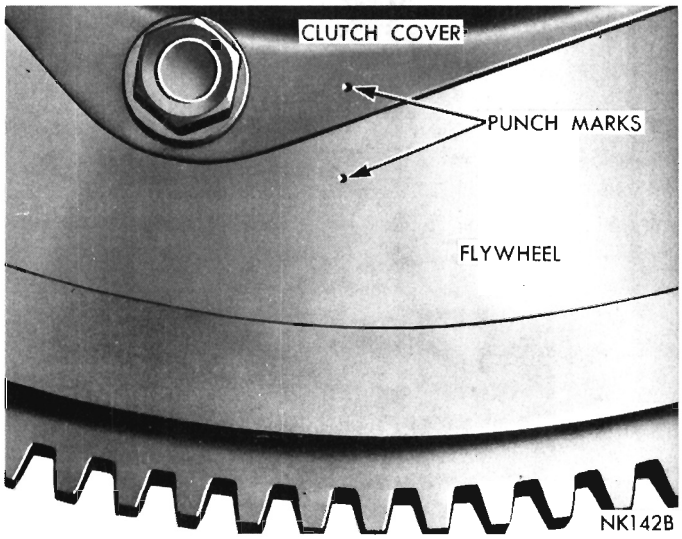


Fig. 12 Marking Clutch and Flywheel

(3) Friction face of flywheel should also be free from discoloration, burned areas, small cracks, grooves or ridges.

(4) The drive pinion pilot bushing pressed in rear end of crankshaft should be smooth and show no excessive wear. A new transmission main drive pinion can be used to gauge size of bushing. If necessary to replace bushing, proceed as detailed under "Crankshaft to Transmission Drive Pinion Pilot Bushing."

(5) The end of the transmission main drive pinion should be smooth and bright, without grooves and ridges.

(6) The disc assembly should be handled without touching facings. Replace disc if facings show evidence of grease or oil soakage, or wear to within less than .015 inch of the rivet heads. The hub splines and splines on transmission main drive pinion should be a snug fit without signs of excessive wear. Metallic portions of disc assembly should be dry and clean and show no evidence of having been hot. Each of the arched springs between facings should be unbroken and all rivets should be tight.

(7) Wipe friction surface of pressure plate with a suitable solvent.

(8) Using a straight edge, check pressure plate for flatness. The pressure plate friction area should be flat within .015 inch and free from discoloration, burned areas, cracks, grooves or ridges.

(9) Inner ends of release levers should have a uniform wear pattern.

(10) Using a surface plate, test cover for flatness. All sections around attaching bolt holes should be

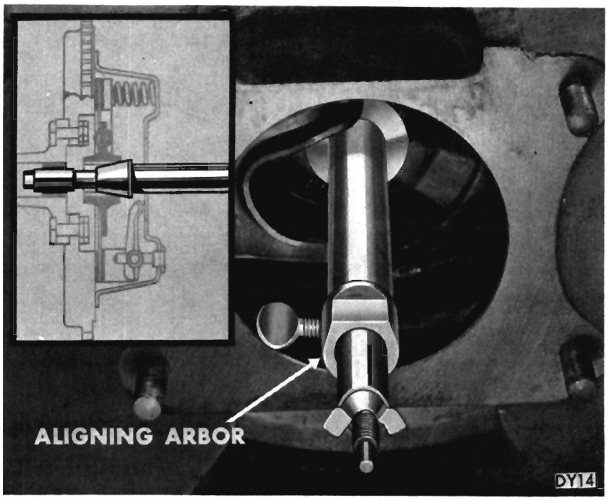


Fig. 13 Clutch Disc Aligning Arbor

in contact with surface plate within .015 inch.

(11) The cover should be a snug fit on pressure plate lugs.

If the clutch assembly does not meet these requirements, it should be replaced.

(12) Examine condition of clutch release bearing. **CAUTION: The clutch release bearing is a prelubricated, sealed thrust bearing and should not be immersed in solvent.**

The bearing should turn freely, when held in the hands under light thrust load, with no evidence of roughness.

(13) If bearing is noisy, rough or dry, install a new one on sleeve as detailed under Clutch Release Bearing"

Installation

The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

(1) Lubricate transmission drive pinion pilot bushing in end of crankshaft with about one-half teaspoon of grease. Place lubricant in radius back of bushing.

(2) Clean the surfaces of flywheel and pressure plate thoroughly with fine sandpaper or crocus cloth, and make certain that all oil or grease has been removed.

(3) Hold clutch disc, pressure plate and cover in mounting position, with springs on disc damper facing away from flywheel. **Do not touch disc facing, as contamination may result in clutch chatter.** Insert a Clutch Disc Aligning Arbor through hub of disc and into bushing (Fig. 13). If an Arbor is not available, use a spare transmission drive pinion.

(4) Install clutch cover attaching bolts (after aligning balance punch marks (Fig. 12), but do not tighten them. The special 12 point bolts used

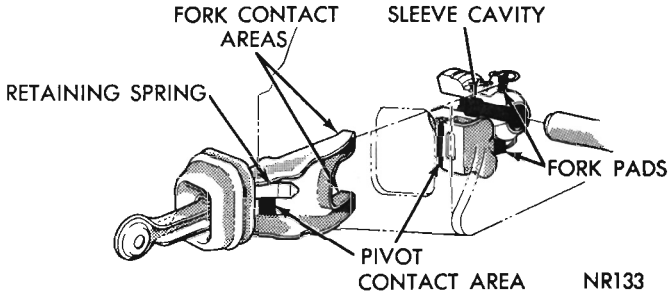


Fig. 14 Clutch Lubrication Points

on 11 inch clutches for 383 cu. in. and larger engines, require no lock washers. The use of lock washers would create interference problems.

(5) To avoid distortion of the clutch cover, bolts should be tightened a few turns at a time (alternately) until they are all snug. Tighten 5/16 inch bolts to 200 inch-pounds, 3/8 inch bolts to 30 foot-pounds. Remove Arbor (or drive pinion if used).

(6) Fill cavity of bearing sleeve with Lubricant. Also apply a film to release fork pads of sleeve (Fig. 14)

(7) Lubricate fork fingers and retaining spring at the pivot contact area (Fig. 14) with a film of grease.

(8) Engage fork fingers under bearing sleeve retaining springs while engaging fork spring into fork pivot (Fig. 11).

(9) Be sure groove in dust seal is engaged on seal opening flange in clutch housing (Fig. 11).

(10) Insert threaded end of fork rod assembly in hole in end of release fork (Figs. 8, 9 or 10). Install eye end of fork rod on torque shaft lever pin and secure with spring washer or return spring.

(11) Install return spring to clutch release fork and clutch housing or torque shaft lever (fig. 8, 9 or 10).

(12) On 6 cylinder models with A-903 transmission, install spring washer, plain washer and interlock rod on torque shaft lever and secure with plain washer and clip.

CAUTION: Do not lubricate splines or pilot end of transmission drive pinion, when installing transmission. These areas must be kept dry.

(13) Install transmission as detailed in "Transmission Installation," Group 21.

(14) Adjust clutch linkage as detailed under "Adjusting Clutch Pedal Free Play."

PILOT BUSHING — CRANKSHAFT TO TRANSMISSION DRIVE PINION

Tools called out are part of Bushing Service Tool Kit C-3887-A.

Removal

(1) Thread bushing puller SP-3631 into bushing

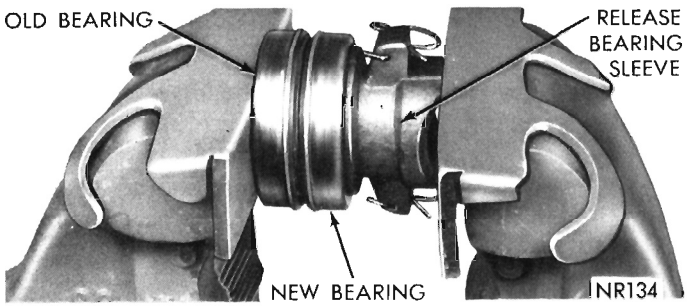


Fig. 15 Replacing Clutch Release Bearing

firmly and squarely, about 3 or 4 turns.

(2) Place receiving cup SP-3633 over threaded shaft of puller and install nut SP-1191 down against cup.

(3) Hold puller and turn nut to draw bushing out of crankshaft.

Installation

(1) Soak new bushing in oil before installing.

(2) Place handle SP-3549 on head SP-3551 and use this tool to drive new bushing into crankshaft flush to end.

(3) Place one-half teaspoon of grease in crankshaft cavity behind bushing.

CLUTCH RELEASE FORK

Removal

(1) Remove return spring from clutch release fork and clutch housing or torque shaft lever (Fig. 8, 9 or 10).

(2) Remove spring washer securing fork rod to torque shaft lever and remove rod from torque shaft and release fork.

(3) Pry dust seal out of clutch housing and remove from release fork (Fig. 11).

(4) Grasp outer end of clutch fork and pull fork out and free of retaining springs and pivot (Fig. 11). **The clutch fork has a riveted flat retaining spring that is engaged in a hole in the pivot. The clutch release fork pivot is an "L" shaped bracket bolted inside the clutch housing.**

(5) Remove clutch housing pan.

Installation

(1) The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

(2) Before installing release fork, lubricate both sides of fork contact areas, pivot contact area, edge of pivot, also the clutch sleeve fork pads (Fig 14).

(3) Install clutch release fork in housing, being careful to engage flat retaining spring in hole in pivot and under retaining springs of bearing sleeve.

(4) Install dust seal over release fork and engage groove of seal in clutch housing. Install housing pan.

(5) Insert threaded end of fork rod assembly in hole of release fork (Figs. 8, 9 or 10). Install eye end of fork rod on torque shaft lever pin and secure with spring washer or return spring.

(6) Install return spring to clutch release fork and clutch housing or torque shaft lever.

CLUTCH RELEASE BEARING (Removed from Clutch)

Removal

(1) Examine condition of bearing. If bearing is noisy, rough or dry when rotated by hand under light thrust load, remove bearing from sleeve.

(2) Support bearing and sleeve in a vise or press and carefully press out sleeve.

(3) Clean sleeve in solvent and remove all old lubricant.

Assembly

CAUTION:Exercise care when installing a new clutch release bearing to avoid damaging bearing race. Never drive bearing on sleeve with a hammer. Use either of following two methods.

Vise Method

(1) Position new bearing on sleeve and place old bearing against face of new bearing.

(2) Support parts in a vise and carefully press new bearing on sleeve (Fig. 15). **Make certain bearing is seated on shoulder of bearing sleeve. Rotate bearings as they are pressed together.**

Press Method

(1) Support sleeve on press bed.

(2) Position new bearing on sleeve and place old bearing on new one.

(3) Bring press ram into contact with old bearing and apply sufficient pressure to **seat new bearing against shoulder of sleeve. Rotate bearings as they are pressed together.**

Lubrication

Before installing bearing and sleeve assembly, lubricate parts as follows:

(1) Fill cavity of bearing sleeve with the previously recommended Automotive Multi-Purpose Grease, NLGI grade 2 EP (Fig. 14).

(2) Also, apply a film of this same lubricant to release fork pads of sleeve.

(3) A film of the same type lubricant should be applied to the pivot contact area of fork retaining spring and contact areas of fork fingers.

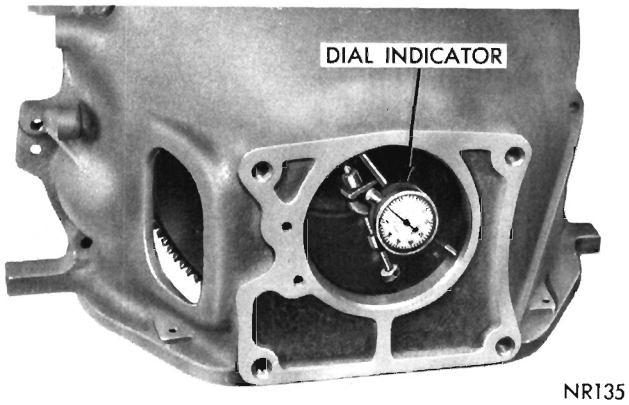


Fig. 16 Measuring Clutch Housing Bore Runout

Installation

(1) Install bearing and sleeve assembly in clutch housing engaging fork under sleeve springs (Fig. 11). **Be sure springs have lateral freedom.**

CAUTION: Do not lubricate splines or pilot end of transmission drive pinion, when installing transmission. These areas must be kept dry.

(2) Install transmission as detailed in "Transmission Installation," Group 21.

(3) Adjust clutch linkage as detailed in "Adjusting Clutch Pedal Free Play."

TORQUE SHAFT AND BEARINGS

Removal

(1) On all models, remove spring washer securing pedal rod to torque shaft lever pin (Figs. 8, 9, or 10) and remove pedal rod from pin.

(2) On 6 cylinder models equipped with A-903 transmission, remove clip and plain washer securing gearshift interlock rod to torque shaft lever and remove spring washer, plain washer and rod from torque shaft.

(3) Refer to (Fig. 8, 9 or 10) for model application, and remove linkage return spring or springs as shown.

(4) Remove spring washer securing fork rod assembly to torque shaft lever pin and remove rod from pin.

(5) Remove nut and cone washer from frame end of torque shaft ball stud.

(6) On **Valiant** models, remove two screws and washers securing ball stud and bracket to clutch housing (Fig. 8).

(7) On all other models, unscrew ball stud from clutch housing (Fig 9 or 10).

(8) Slide or lift frame end of torque shaft from torque shaft bracket, depending on type of bracket, and remove torque shaft assembly from vehicle.

(9) Disassemble torque shaft assembly by removing snap ring, ball studs, seals and bearings.

Cleaning and Inspection

(1) Clean all parts in a suitable solvent. Remove all grease from inside torque shaft.

(2) The two ball studs should be bright and free from scratches, ridges or other surface imperfections.

(3) The inner surfaces of bearings should also be smooth and free from surface scratches or embedded foreign material. The wear pattern should be uniform over the entire surface.

(4) Replace worn or cracked rubber seals.

Installation

(1) Install new seals on ball studs (Figs. 8, 9 or 10).

(2) Coat counterbored ends of torque shaft, torque shaft bearings and ball studs with Multi-Mileage Lubricant, Part Number 2525035, or Automotive Multi-Purpose Grease, NLGI grade 2 EP.

(3) Install bearings on ball studs and push studs and bearings into torque shaft. Install snap ring on frame end of shaft.

(4) On **Valiant** models, insert ball stud through frame side rail bracket and position inner stud and bracket against clutch housing (Fig. 8). Install two bracket screws and washers and tighten to 200 inch-pounds. Install washer and nut on end of outer stud and tighten to 40 foot-pounds.

(5) On all other models, place torque shaft in approximate position and thread inner ball stud into clutch housing. Tighten stud to 40 foot-pounds. Position frame end of torque shaft in slotted frame bracket. Install lockwasher and nut on stud and tighten to 40 foot-pounds.

(6) Install pedal rod on torque shaft lever pin and secure with spring washer.

(7) Insert threaded end of fork rod assembly in hole in end of release fork. Install eye end of fork rod on torque shaft lever pin and secure with spring washer or return spring.

(8) Install return spring to clutch release fork and clutch housing or torque shaft lever.

(9) On models so equipped, connect outer torque shaft return spring between spring hook on torque shaft and spring bracket forward of torque shaft bracket, or to brake tee.

(10) Install gearshift interlock rod, plain washer and spring washer on torque shaft lever and secure with plain washer and clip. (A-903 Trans. only).

(11) Adjust clutch linkage.

(12) Adjust interlock rod.

CLUTCH HOUSING ALIGNMENT

When performing adjustments or repairs that involve removing the clutch housing, it will be necessary to check transmission mounting bore runout

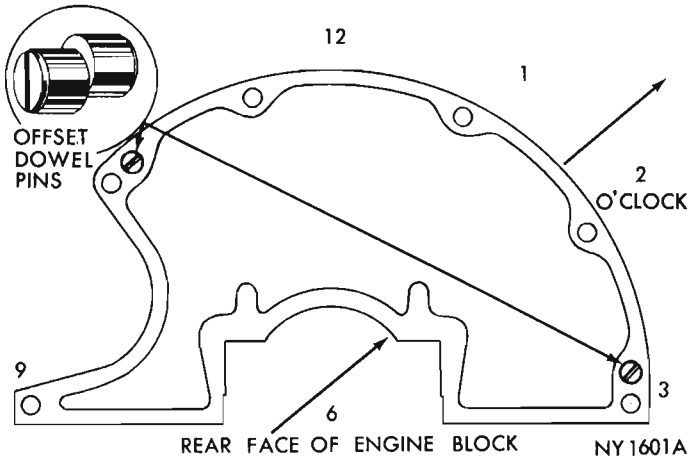


Fig. 17 Offset Dowel Diagram

and squareness to the crankshaft when reassembling.

Bore Runout

(1) Replace one flywheel to crankshaft bolt with a bolt about 3 inches long. Mount Dial Indicator C-3339 on this bolt with a "C" clamp (Fig. 16).

(2) With C-771 Flywheel Turning Tool, turn flywheel while noting dial indicator needle deflection. Bore out-of-round must not exceed .008 inch maximum total indicator reading, or .004 inch, one-half total indicator reading.

(3) Excess bore runout can be corrected by installing correct size offset dowels (Fig. 17). These dowels are available in three offset sizes and they **must be** installed in pairs of the same size: .007 inch, Part Number 1736347; .014 inch, Part Number 1736348 and .021 inch, Part Number 1736353.

(4) To illustrate recommended correction procedure, assume total indicator reading is .020 inch, in a direction which approximates 2 o'clock on engine block (Fig. 17).

(5) In this case, housing is off crankshaft centerline .010 inch (one-half total indicator reading) which is .006 inch greater than allowable limit of .004 inch (one-half total indicator reading).

(6) In the case under consideration, installation of two .007 inch dowels will bring runout within the allowable limits of .004 inch or .010 inch minus .007 inch (dowels) which equals .003 inch runout.

(7) The amount of eccentricity of the dowel will produce a total indicator reading change of double the dowel eccentricity, therefore, select a pair of dowels with the nearest to one-half of total indicator runout of bore. For runout (total indicator reading) of .009 in. through .020 in., use a .007 in. dowel (No. 1736347); and .022 in. through .034 in., use .014 in. dowel (No. 1736348) and .036 in. through .050 in., use .021 in. dowel (No. 1736353).

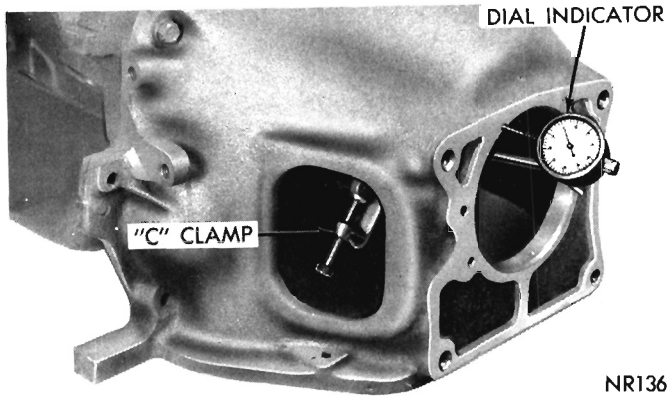


Fig. 18 Measuring Clutch Housing Face Squareness

(8) To install dowels, remove clutch housing and old dowels from rear face of engine block.

(9) Install both dowels with slots parallel and aligned in direction to correct bore runout. (Slot indicates direction of maximum dowel eccentricity.) Both dowels must be inserted into engine block, up to offset shoulder.

(10) Install clutch housing to engine block bolts. Tighten 7/16 inch bolts to 50 foot-pounds and 3/8 inch bolts to 30 foot-pounds.

(11) Remount dial indicator and remeasure bore runout. Small corrections can be made by removing clutch housing (if necessary) and turning dowels with a screwdriver to shift housing and bring bore within limits.

Face Squareness

(1) Relocate Dial Indicator (Fig. 18) and rotate flywheel, using Tool C-771. If total indicator reading is greater than .006 inch, note amount of total indicator reading and location of lowest indicator reading (i.e., point where indicator arm or follower is extended farthest).

(2) To correct squareness, place proper thickness of shim stock between clutch housing and engine block or between transmission and clutch housing. After remeasuring squareness, tighten 7/16 inch housing bolts to 50 foot-pounds and 3/8 inch bolts to 30 foot-pounds.

(3) Install clutch release bearing, fork, linkage and transmission. Adjust clutch linkage.

STEAM CLEANING PRECAUTIONS

Since the clutch housing has provisions for ventilation, condensation from steam vapors tend to accumulate on the internal clutch mechanism when the vehicle is steam cleaned. The facings of the disc will absorb moisture, and the force exerted by the pressure plate will bond the facings to flywheel and/or, pressure plate, if car is allowed to stand for some time before use. If this condition occurs, it will necessitate replacement of disc

assembly, flywheel and/or clutch assembly. **Immediately after cleaning operation, start engine and "slip clutch" in order to dry off disc assembly, pressure plate and flywheel.**

SPECIFICATIONS

CLUTCH APPLICATION CHART

Size	Trans. Speeds	Cover & Press Plate Assy. No.*	Disc Assy. No.*	Engine Cu. In.	Car Model **
9-1/4"	3	2525464	2448336	198-225	VBRP
9-1/2"	3	2800820	2401120	198-225 Opt.	V
10-1/2"	3 or 4	3515301	2266232	318	VBRP
10-1/2"	4	2409688	2266232	340	VB
10-1/2"	3	3515150	2266232	360	P
11"	3	2409682	2409683	225 Opt.	RP
11"	3 or 4	3410157	3410160	383	BRPC
11"	4	3410158	3410161	426	BR
11"	4	3410159	3410161	440	BR

**V=Valiant B=Barracuda R=Satellite P=Fury C=Chrysler

COVER AND PRESSURE PLATE ASSY. IDENTIFICATION CHART

Size	Part Number*	Springs No. & Color	Mounting Bolt Circle Dia.	Centrifugal Assist Roller
9-1/4"	2525464	3 Red Stripe	10-5/8"	0
9-1/2"	2800827	3 White	10-5/8"	0
10-1/2"	3515301	3 White—6 Plain	11-5/8"	3
10-1/2"	2409688	6 White—6 Tan	11-5/8"	6
10-1/2"	3515150	6 White—6 Tan	11-5/8"	6
11"	2409682	3 White—6 Plain	12-5/8"	0
11"	3410157	6 Green—6 Tan	11-5/8"	6
11"	3410158	9 Green—3 Purple	11-5/8"	3
11"	3410159	9 Green—3 Purple	11-5/8"	6

CLUTCH DISC ASSY. IDENTIFICATION CHART

Size	Part Number*	Facing Dia. Outside x Inside	Springs No. & Color	Spline Inside Dia.
9-1/4"	2448336	9-1/4" x 6"	6 Enclosed	15/16"
9-1/2"	2401120	9-1/2" x 6-1/2"	6 Enclosed	15/16"
10-1/2"	2266232	10-1/2" x 6-1/2"	5 Green—5 Tan	15/16"
11"	2409683	11" x 6-1/2"	6 Blue	15/16"
11"	3410160	11" x 6-1/2"	5 Green—5 Tan	15/16"
11"	3410161	11" x 7"	5 Plain	1-1/16"

*Part Numbers subject to change during model year.

TIGHTENING REFERENCE

	POUNDS FOOT	POUNDS INCH
Clutch Cover to Flywheel Bolts (5/16")		200
Clutch Cover to Flywheel Bolts (3/8")	30	
Clutch Fork Pivot Bolts		200
Clutch Housing to Engine Bolts (3/8")	30	
Clutch Housing to Engine Bolts (7/16")	50	
Clutch Housing Pan Bolts		200
Flywheel Bolts (All except 426 Hemi)	55	
Flywheel Bolts (426 Hemi)	85	
Torque Shaft Ball Stud	40	
Torque Shaft Ball Stud Nut	40	
Torque Shaft Ball Stud Bracket Bolts		200
Transmission to Clutch Housing Bolts	50	

COOLING

CONTENTS

	Page
ACCESSORY BELT DRIVES	11
CONVERSION TABLE	20
ENGINE WATER TEMPERATURE GAUGE	11
FAN	4
FLUID FAN DRIVE	4
PRESSURE TESTING COOLING SYSTEM	9
PRESSURE TESTING RADIATOR CAP	9
RADIATOR	6
RADIATOR HOSES	9
RADIATOR PRESSURE CAP	9
REVERSE FLUSHING COOLING SYSTEM	7
SERVICE DIAGNOSIS	1
SPECIFICATIONS	13
TEMPERATURE OPERATED VACUUM BY-PASS VALVE	9
TIGHTENING REFERENCE	20
THERMOSTAT	8
TRANSMISSION OIL COOLER	6
WATER PUMP	5

GENERAL INFORMATION

In order to provide satisfactory protection for the wide variety of corporation models the cooling system of each must be tailored to specific needs. To do this effectively the Corporation offers five basic systems:

(1) Standard
(2) Air Conditioning
(3) High Capacity Fan
(4) Maximum Cooling
(5) Trailer Towing

The standard system consists of a tube and spacer type radiator, 16 psi radiator pressure cap, centrifugal water pump, 185 degrees F. thermostat, and a four or seven blade fan. See specifications for application.

The cooling system for air conditioned equipped vehicles generally requires a greater capacity radiator along with a fan shroud, air seals, special centrifugal water pump, larger fan, and thermostatically controlled fan drive and drive ratio, (in some installations). See specifications for applications.

An optional capacity fan to protect against overheating for unusual operating conditions is available.

The maximum cooling system consisting of a larger radiator and on some models radiator shrouds and/or hood-to-yoke and bumper to yoke seals are used to provide protection against overheating for unusually severe operation requirements.

The trailer towing package is a combination of the maximum cooling package and the high capacity fan, as necessary to provide protection against overheating when towing trailers. (Vehicles with trailer tow and air conditioning use air conditioning fan).

For internal cooling system protection each cooling system is factory equipped with sufficient permanent type anti-freeze for —20 degrees F. protection. It is recommended that the coolant be changed annually to insure adequate anti-freeze and corrosion protection. Air conditioned cars require year round protection with permanent type anti-freeze with a minimum of 15 degrees F. protection for summer operation to prevent freeze-up in the heater core and additional anti-freeze in the winter according to the prevailing temperatures. Protection to —20 degrees F is recommended year around.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
EXTERNAL LEAKAGE	(a) Loose hose clamp.	(a) Replace the hose clamp.
	(b) Hose leaking.	(b) Replace the hose.
	(c) Leaking radiator.	(c) Repair or replace the radiator as necessary.
	(d) Water pump leaking through vent hole.	(d) Replace the water pump.
	(e) Loose core hole plug.	(e) Install new core hole plug.
	(f) Damaged gasket, or dry gasket, if engine has been stored.	(f) Replace gaskets as necessary.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(g) Cylinder head bolts loose, or tightened unevenly.	(g) Replace the cylinder head gasket and torque head in correct sequence.
	(h) Leak at heater connection.	(h) Clean the heater connections and replace the hoses and clamps if necessary.
	(i) Leak at water temperature sending unit.	(i) Tighten the water temperature sending unit.
	(j) Leak at water pump attaching bolt.	(j) Tighten the water pump attaching bolts to 30 foot-pounds.
	(k) Leak at exhaust manifold stud.	(k) Seal and re-drive the stud.
	(l) Cracked thermostat housing.	(l) Replace the thermostat housing.
	(m) Dented radiator inlet or outlet tube.	(m) Straighten the radiator inlet or outlet tube as necessary.
	(n) Leaking heater core.	(n) Repair or replace the heater core.
	(o) Cracked or porous water pump housing.	(o) Replace the water pump assembly.
	(p) Warped or cracked cylinder head.	(p) Replace the cylinder head.
	(q) Cracked cylinder block.	(q) Replace the cylinder block.
	(r) Sand holes or porous condition in block or head.	(r) Replace the cylinder block or cylinder head as necessary.
	(s) Faulty pressure cap.	(s) Replace pressure cap.
	(t) Loose or stripped oil cooler fittings.	(t) Tighten or replace as necessary.
INTERNAL LEAKAGE	(a) Faulty head gasket.	(a) Install a new head gasket.
	(b) Refer to causes (f), (g), (p), (q), (r) and (t) listed under External Leakage.	(b) Refer to corrections (f), (g), (p), (q), (r) and (t) listed under External Leakage.
	(c) Crack in head into valve compartment.	(c) Pressure test cooling system, replace the cylinder head.
	(d) Cracked valve port.	(d) Pressure test cooling system, replace the cylinder head.
	(e) Crack in block into push rod compartment.	(e) Pressure test cooling system, replace the cylinder block.
	(f) Cracked cylinder wall.	(f) Pressure test cooling system, replace the cylinder block.
	(g) Leaking oil cooler.	(g) Repair or replace the oil cooler.
POOR CIRCULATION	(a) Low coolant level.	(a) Fill radiator to correct level.
	(b) Collapsed radiator hose. (A bottom hose with faulty spring may collapse only at medium or high engine speeds.)	(b) Replace the hose and spring.
	(c) Fan belt lose, glazed, or oil soaked.	(c) Tighten or replace the fan belt as necessary.
	(d) Air leak through bottom hose.	(d) Reposition hose clamps or replace the hose. Check radiator outlets for dents or out-of-rounds.
	(e) Faulty thermostat.	(e) Replace the thermostat.
	(f) Water pump impeller broken or loose on shaft.	(f) Replace the water pump.
	(g) Restricted radiator core water passages.	(g) Flush the radiator thoroughly or rod out if necessary.
	(h) Restricted engine water jacket.	(h) Flush the engine cooling system thoroughly.
OVERHEATING (refer to Causes and Corrections listed under "Poor Circulation")	(a) Blocked radiator air passages.	(a) Clean out the radiator air passages.
	(b) Incorrect ignition timing.	(b) Time the engine ignition system.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(d) Incorrect valve timing.	(d) Correct the engine valve timing.
	(e) Inaccurate temperature gauge.	(e) Replace the temperature gauge.
	(f) Restricted overflow tube.	(f) Remove restriction from overflow tube.
	(g) Faulty radiator pressure cap or seat.	(g) Replace the radiator cap. Clean or replace seat.
	(h) Frozen heat control valve.	(h) Free up manifold heat control valve.
	(i) Dragging brakes.	(i) Adjust the brakes.
	(j) Excessive engine idling.	(j) Increase idle R.P.M. or stop engine.
	(k) Frozen coolant.	(k) Thaw out cooling system, add anti-freeze as required.
	(l) Faulty fan drive unit.	(l) Replace the fan drive unit.
	(m) Faulty temperature sending unit.	(m) Replace the sending unit.
	(n) Faulty vacuum By-Pass valve.	(n) Replace valve.
OVERFLOW LOSS (Also refer to Causes and Corrections listed under "Poor Circulation and Overheating")	(a) Overfilling.	(a) Adjust coolant to the correct level.
	(b) Coolant foaming due to insufficient corrosion inhibitor.	(b) Flush the radiator and add antifreeze as required.
	(c) Blown head gasket.	(c) Replace the head gasket.
	(d) Broken or shifted lower hose spring.	(d) Replace lower hose.
CORROSION	(a) Use of water containing large concentration of lime and minerals.	(a) Use only clean soft water with anti-freeze.
	(b) Insufficient corrosion inhibitor.	(b) Use antifreeze as required.
	(c) Use of antifreeze for extended length of time.	(c) Drain cooling system and replace with new antifreeze.
TEMPERATURE TOO LOW—SLOW ENGINE WARM-UP	(a) Faulty thermostat.	(a) Replace the thermostat.
	(b) Inaccurate temperature gauge.	(b) Replace the temperature gauge.
	(c) Faulty temperature sending unit.	(c) Replace the sending unit.
	(d) Faulty heater controls.	(d) Adjust heater controls see "Group 24".
WATER PUMP NOISY	(a) Seal noisy.	(a) Add Water Pump Lube.
	(b) Bearing corroded.	(b) Replace water pump.

ACCESSORY DRIVE BELTS

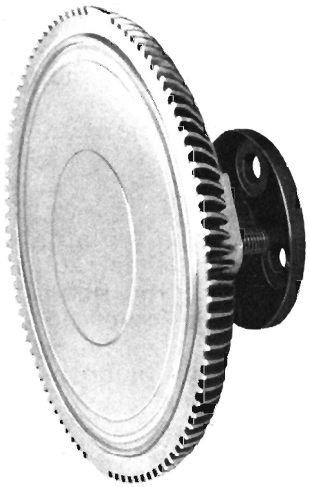
SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
INSUFFICIENT ACCESSORY OUTPUT DUE TO BELT SLIPPAGE	(a) Belt too loose.	(a) Adjust belt tension.
	(b) Belt excessively glazed or worn.	(b) Replace and tighten as specified.
BELT SQUEAL WHEN ACCELERATING ENGINE	(a) Belts too loose.	(a) Adjust belt tension.
	(b) Belts glazed.	(b) Replace belts.
BELT SQUEAK AT IDLE	(a) Belt too loose.	(a) Adjust belt tension.
	(b) Dirt and paint imbedded in belt.	(b) Replace belt.
	(c) Non-uniform belt.	(c) Replace belt.
	(d) Misaligned pulleys.	(d) Align accessories (file brackets or use spacers as required).
	(e) Non-uniform groove or eccentric pulley.	(e) Replace pulley.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
BELT ROLLED OVER IN GROOVE		
	(a) Broken cord in belt.	(a) Replace belt.
	(b) Belts not matched (A/C).	(b) Install matched belts.
BELT JUMPS OFF	(a) Belt too loose.	(a) Adjust belt tension.
	(b) Belts not matched (A/C).	(b) Install matched belts.
	(c) Misaligned pulleys.	(c) Align accessories.

SERVICE PROCEDURES



NK480A

Fig. 1 - Torque Control Fan Drive



NK479A

Fig. 3 - Thermal Control Fan Drive (318, 340, 360, 383, 440 Cubic Inch Engine with 2.93:1 or Higher Axle Ratio)

FAN

There are no repairs to be made to the fan. If the fan is bent or damaged it should be replaced.

Removal

(1) Remove shroud attaching screws, separate shroud from radiator, position shroud rearward on engine. Fan attaching screws can now be removed.

(2) On models equipped with fluid fan drive, remove fan drive attaching screws. The fan and fluid fan drive are removed as a unit.



NP541

Fig. 2 - Thermal Control Fan Drive (318, 360, 383, 440 Std. Cubic Inch Engine with 2.76:1 or Lower Axle Ratio)

Installation

Use correct fan spacer, if required, so clearance between fan blades and radiator is 3/4 to 1-1/4 inches. No fan spacer permitted with fluid fan drive regardless of fan blades to radiator clearance. Install one piece shroud on vehicles so equipped. Tighten fan belt as outlined in "Belt Tension Specifications".

FLUID FAN DRIVE

CAUTION: To prevent silicone fluid from draining into fan drive bearing and ruining the grease, do not place drive unit with shaft pointing downward.

Torque Control Drive

The Torque Control Drive (Fig. 1) is a silicone fluid filled coupling connecting the fan to the fan pulley. The unit allows fan to be driven in normal

manner at low engine speeds while limiting the top speed of the fan to a pre-determined level at higher engine speeds.

Thermal Control Drive

Air conditioned vehicles only, the Thermal Control Drive (Figs. 2 and 3) is essentially the same as the Torque unit except for a thermostatic spring on the drive face. This thermostat senses temperature from the radiator discharge air and engages the drive for higher fan speed if temperature from the radiator rises above a certain point.

In case of engine overheating during slow car speed or idle operation, increase engine speed to approximately 1000 rpm in neutral gear. If condition is not corrected by increasing engine speed, replace fan drive unit with a unit known to be operating properly and test by operating vehicle under same conditions. Replace original drive unit assembly if trouble was corrected with test unit.

WATER PUMP

Note: The water pump is serviced only as an assembly. When replacing the water pump do not install a standard water pump on any air conditioned vehicle or vice versa. See specifications for proper pump.

Removal

(1) Drain the cooling system. (Remove fan shroud if so equipped and set back on engine).

(2) Loosen power steering pump, idler pulley and alternator. Remove all belts.

(3) Remove fan, spacer (or fluid drive) and pulley.

CAUTION: To prevent silicone fluid from draining into fan drive bearing and ruining the grease, do not place drive unit with shaft pointing downward.

(4) Remove the bolts attaching the water pump body to the housing. Remove the water pump and discard gasket.

Installation

(1) Install water pump body on housing, using a new gasket.

(2) Tighten bolts to 30 foot-pounds. Rotate pump shaft by hand to be sure it rotates freely. Install pulley, spacer (or fluid drive) and fan.

(3) Tighten nuts to 15 foot-pounds. Install fan shroud if so equipped. Fill the cooling system and test for leaks. Tighten belts as outlined in "Belt Tension Specifications".

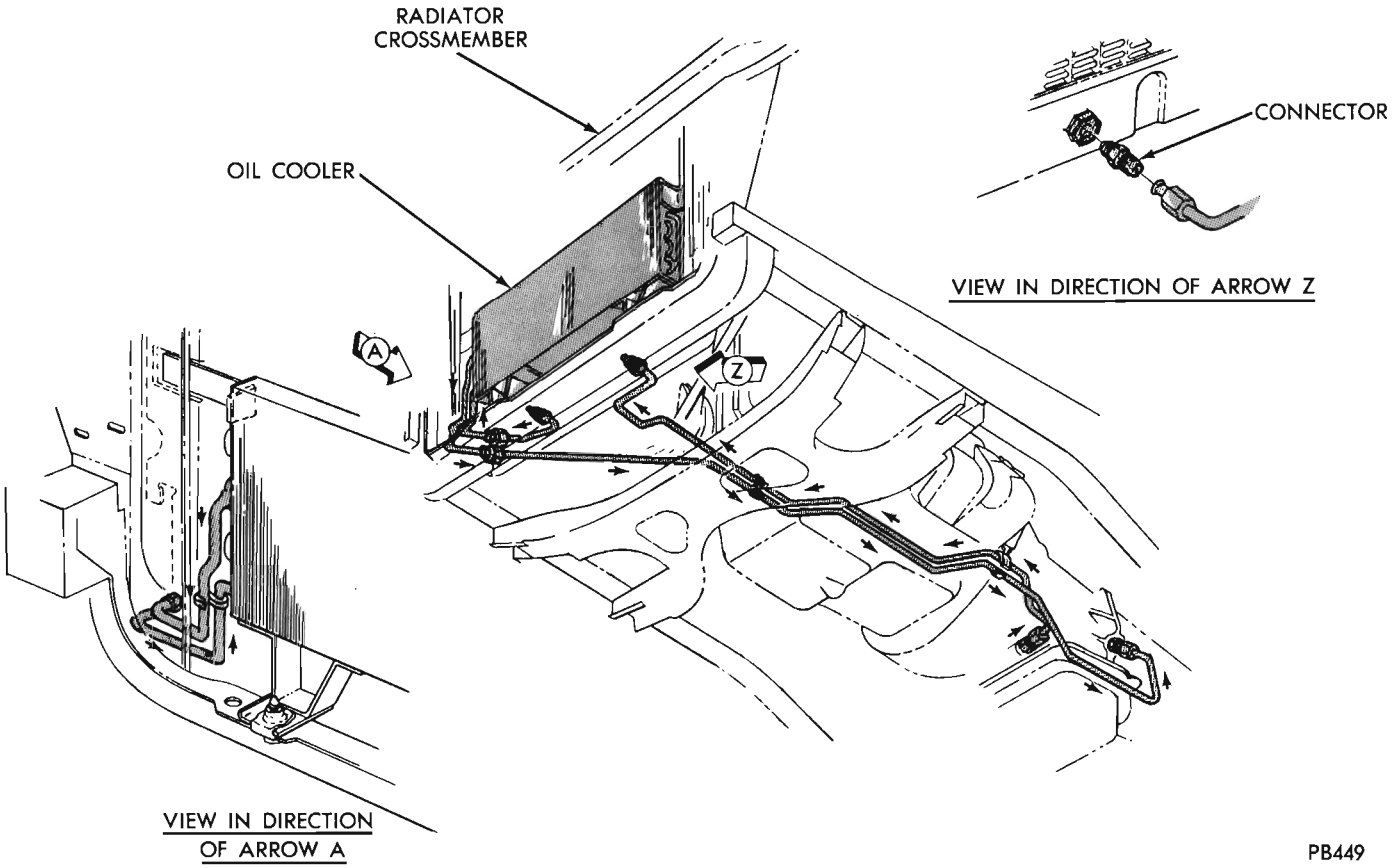


Fig. 4 - Oil Flow - Transmission Cooler, Models with 426 Hemi

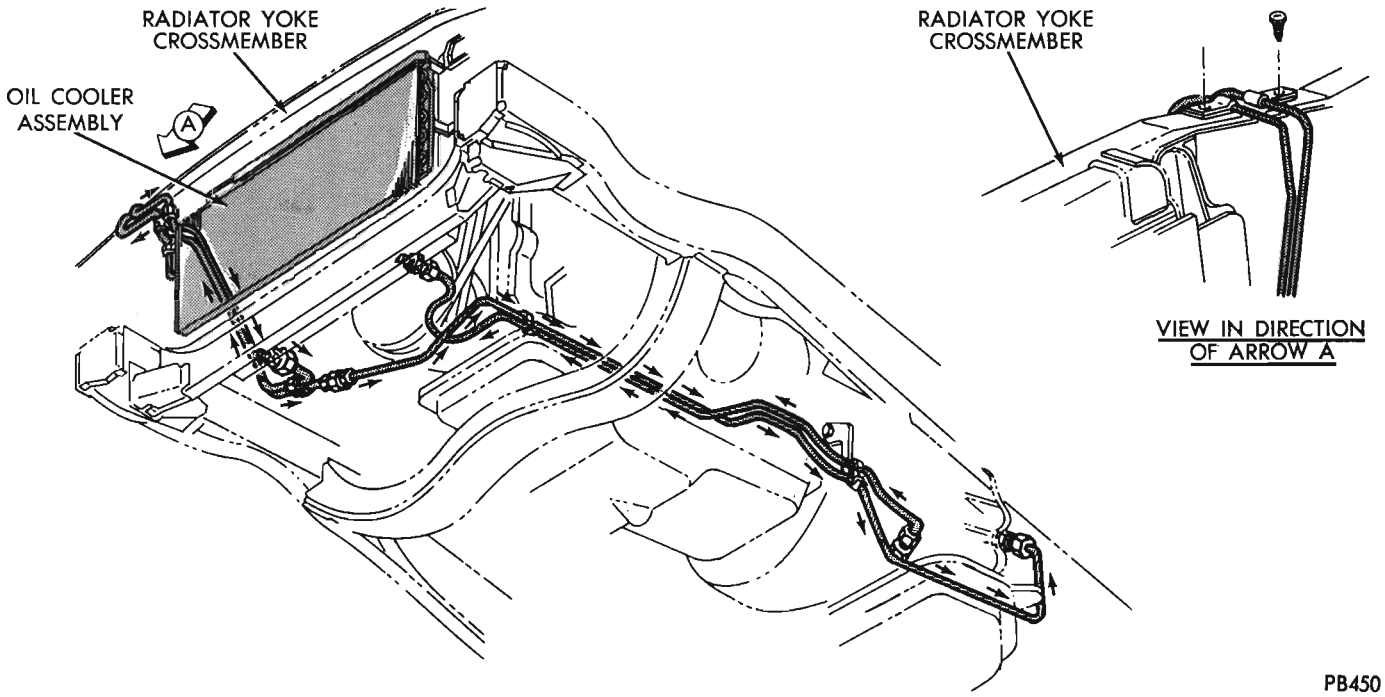


Fig. 5 - Oil Flow - Transmission Cooler, Fury and Chrysler Models

RADIATOR

Removal

(1) Drain cooling system.

(2) On vehicles with automatic transmission, disconnect oil cooler lines at radiator bottom tank.

(3) Remove upper and lower radiator hoses (using pliers C-3250).

(4) Remove shroud attaching screws, separate shroud from radiator, position shroud rearward on engine for maximum clearance.

(5) Remove radiator attaching screws.

(6) Radiator can now be lifted free from engine compartment. **Care should be taken not to damage radiator cooling fins or water tubes during removal. Fan damage should always be avoided.**

Installation

(1) Slide radiator down into position behind radiator support and install attaching screws.

(2) Install fan shroud (if so equipped), connect hoses, and connect transmission oil cooler lines, if so equipped.

(3) Fill cooling system to 1-1/4 in. below filler neck seat with water and anti-freeze, as required. After warm-up, re-check coolant level. Maintain at 1-1/4 in. below filler neck.

(4) On vehicles with automatic transmission measure transmission oil level after warm-up and add oil as required.

Cleaning

(1) Drain cooling system and refill with clean **soft** water and a reliable cooling system cleaner.

(2) Operate engine according to directions on Cleaner label.

(3) After cleaning operation, flush entire cooling system until water runs clean.

(4) Regardless of climate, the cooling system should be refilled with sufficient permanent type anti-freeze for —20 degrees F protection. To insure adequate corrosion protection.

(5) If vehicle is equipped with **air conditioning** the cooling system must contain anti-freeze all year round. This is necessary because in the reheat-cycle system used on all vehicles except Valiant models, cold refrigerated air passes through the heater core. Anti-freeze is necessary to prevent the heater core from freezing in hot weather when the air conditioner is being used.

TRANSMISSION OIL COOLER

The transmission oil cooler is located in the bottom radiator tank (water cooled), which is an integral part of the radiator.

Some models are equipped with an auxiliary oil cooler (air cooled) mounted ahead of the radiator and is connected in series with the standard transmission oil cooler (Figs. 4, 5 and 6).

In case of a leak, engine coolant may become mixed with transmission fluid, also, transmission fluid may enter cooling system. Both cooling sys-

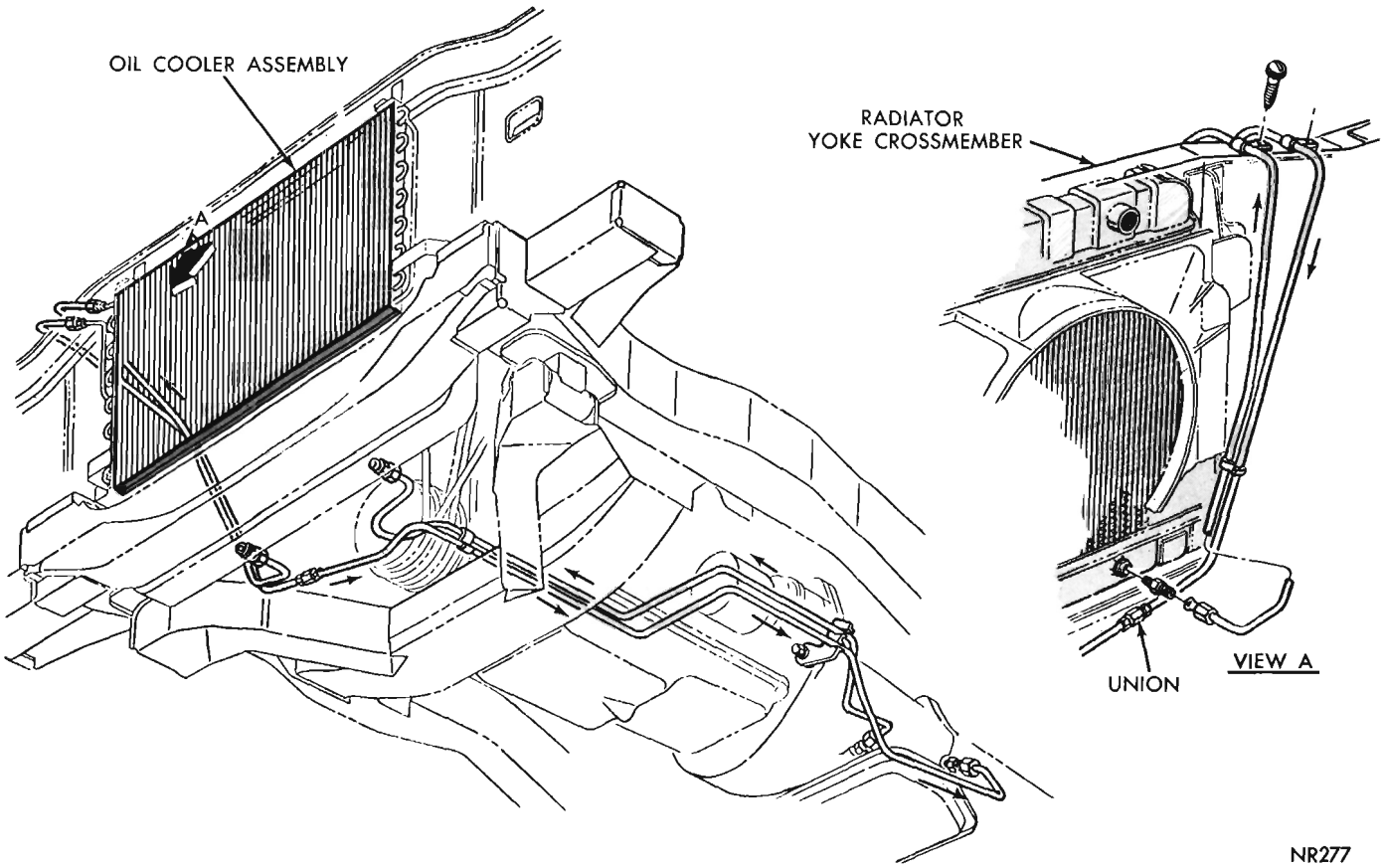


Fig. 6 - Oil Flow - Transmission Cooler, Imperial Models

tem and transmission should be inspected in event cooler is leaking.

Testing Oil Cooler for Leaks

(1) Disconnect both oil cooler lines at radiator.
(2) Connect a pressure gauge to one cooler connection and a shut off valve to the other. Close the valve.
(3) Connect a source of air pressure to the valve.
(4) Coat all fittings with oil.
(5) Open the test valve and apply (up to 100 psi) air pressure. Oil bubbles will identify any fitting joint leaks. Repair all joint leaks.
(6) Close the valve. Gauge reading will then drop if cooler is leaking.

Repairing Oil Cooler

The transmission auxiliary oil cooler being all aluminum can be repaired by a local reliable radiator service having the equipment for alumibrazing or heliarc.
(1) Remove radiator from vehicle.
(2) Remove radiator bottom tank.
(3) Melt the soft solder holding the cooler to the tank.
(4) Remove the stamped retainer nuts holding the cooler fittings to the bottom tank and remove the cooler.
(5) Install a new cooler or repair the old cooler with **silver solder** and reinstall as follows:
(6) Position oil cooler in bottom tank and install the stamped retainer nuts on oil cooler fittings.
(7) Use soft solder to secure the cooler in the tank.
(8) Attach bottom tank to radiator using soft solder.
(9) Install radiator as described in Paragraph "Radiator".
(10) Fill cooling system and test for leaks.

If the transmission operates properly after repairing the leak, drain the transmission and torque converter while hot, remove the transmission oil pan and inspect for sludge, rust, dirty or plugged inlet filter. If none of these conditions are found, reconditioning may not be necessary. Reassemble, using transmission fluid of the type labeled DEXRON.

REVERSE FLUSHING THE COOLING SYSTEM

Reverse flushing of the cooling system is the forcing of water through the cooling system, using air pressure in a direction opposite to that of the normal flow of water.

Flushing Cylinder Block

(1) Drain radiator and remove hoses at radiator.
(2) Remove thermostat and reinstall thermostat

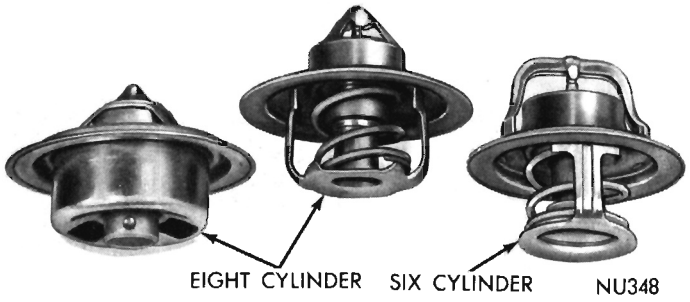


Fig. 7 - Thermostats

housing.

(3) Install Tool C-3514, or other suitable flushing gun to inlet hose.

(4) Connect water hose of gun to a pressure water source and air hose of gun to a pressure air source.

(5) Turn on water, and when cylinder block is filled, turn on air (up to 20 psi) in short blasts.

(6) Allow cylinder block to fill between blasts of air.

(7) Continue this procedure until water runs clean. Test thermostat and if satisfactory, reinstall: otherwise, replace using a new housing gasket.

(8) Fill cooling system to 1-1/4 inches below filler neck, using **soft** water and anti-freeze, depending on season or if equipped with air conditioning.

(9) Engine should be operated until temperature gauge indicates normal operating temperature, then, continue an additional five minutes to release any air trapped in system.

(10) Check for leaks and coolant level; correct as necessary. Maintain coolant level to 1-1/4 in. below bottom of filler neck.

Reverse Flushing Radiator

(1) Drain cooling system and remove hoses from engine.

(2) Install Tool C-3514, or other suitable flushing gun in radiator lower outlet.

(3) Fill radiator and turn on air in short blasts.

CAUTION: Internal radiator pressure must not exceed 20 psi, as damage to radiator may result.

(4) Continue this procedure until water runs clean.

It is a good policy to reverse flush heater core any time the radiator is reverse flushed.

(5) Fill cooling system to 1-1/4 inches below filler neck, using **soft** water and anti-freeze, depending on season or if equipped with air conditioning.

(6) Engine should be operated until temperature gauge indicates normal operating temperature, then, continue an additional five minutes to release any air trapped in system.

(7) Check for leaks and coolant level; correct as necessary.

THERMOSTAT

The thermostat is actuated by a pellet containing a copper-impregnated wax, as shown in (Fig. 7). As the temperature of the pellet increases, the wax expands and opens the valve. A 185° degrees thermostat is standard equipment. **The use of alcohol type anti-freeze is not recommended.**

If the thermostat does not close completely when cold, the engine will warm up slowly or not at all, and heater performance will also be impaired. Poor heater performance may also be due to valve opening at too low a temperature. Too high a valve opening temperature or a valve that will not open can cause overheating.

Removal

(1) Drain cooling system down to thermostat level or below.

(2) Remove upper radiator hose from thermostat housing.

(3) Remove thermostat housing bolts and remove thermostat and housing.

Testing Thermostat

(1) Visually inspect thermostat to make sure valve closes tightly. If valve does not close completely due to dirt, sand or other foreign material, carefully clean the sealing edge making sure the sealing edge is not damaged. If valve does not close tightly when clean, install a new thermostat.

(2) Immerse thermostat in a container of warm water so that pellet of thermostat is completely covered. The pellet must not touch bottom or sides of container.

(3) Heat the water and stir it continuously (to insure uniform temperature) and check water temperature with a thermometer at the point when a .001 in. feeler gauge can be inserted into valve opening. The feeler gauge should pass freely into the valve opening at a water temperature of 182 degrees to 189 degrees F. for the 185 degrees thermostat. If outside of this range, replace thermostat.

(4) Continue heating water to approximately 210 degrees F for the 185 degrees thermostat. The thermostat valve should be fully open at this temperature. If it is not, replace thermostat.

Installation

(1) Using a new gasket, position thermostat so pellet end is toward engine and attach with bolts through thermostat housing.

(2) If removed, reinstall or replace the upper hose.

(3) Fill cooling system to 1-1/4 inches below filler neck with water and anti-freeze.

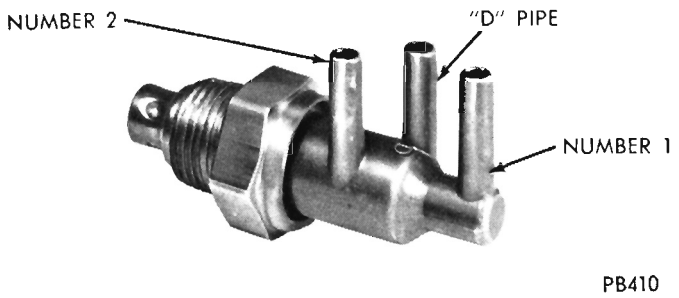


Fig. 8 - Temperature Operated Vacuum By-Pass Valve

TEMPERATURE OPERATED VACUUM BY-PASS VALVE

The valve is used on Satellite models with High Performance 440 cubic inch engine, and Barracuda, Satellite, Fury and Chrysler models without air conditioning and with automatic transmission using 383 cubic inch engine with two barrel carburetor.

On Chrysler models the valve is installed in the thermostat housing.

The valve has three ports (Fig. 8). "D" Port to the distributor vacuum diaphragm, number "1" Port to carburetor vacuum above the throttle valve (Normal Operation) and number "2" Port to manifold vacuum. When coolant temperature at idle reaches 225 degrees F, the valve switches from carburetor vacuum to manifold vacuum advancing ignition timing to full vacuum advance at idle, this increases engine speed one hundred rpm or more and aids in reducing the possibility of engine overheating under extremely high temperature operating conditions.

Test Valve Operation as follows:

(1) Check vacuum hose routing and installation (Fig. 9). Check coolant level.

(2) Attach a tachometer to engine.

(3) Bring engine to normal operating temperature, be sure choke is open.

(4) Disconnect distributor solenoid ground lead at carburetor and adjust idle speed to 600 rpm.

(5) Disconnect the hose from number "2" port (manifold inlet) and plug hose.

(6) Check engine idle speed, no change indicates valve is holding and valve is acceptable up to this point. If idle speed drops 100 rpm or more the valve should be replaced.

(7) Re-install vacuum hose to number "2" port.

(8) Cover radiator to increase engine coolant temperature. DO NOT OVERHEAT ENGINE.

(9) Idle engine until temperature is approximately 225 degrees F. (Abnormally high temperature is indicated on models with temperature gauge when indicator needle reaches top of normal bar, 235 degrees F. Warning light on models so equipped will come on at 245 degrees F). If engine idle speed has not increased 100 rpm or more before gauge indicator reaches top of normal bar or warning light has come on valve is defective and should be replaced.

(10) Idle engine (radiator uncovered) until temperature is normal, reconnect distributor solenoid wire at carburetor and re-adjust idle rpm.

RADIATOR HOSES

The hoses are removed and installed using hose clamp pliers C-3250.

A hardened, cracked, swollen or restricted hose should be replaced.

The reinforcement spring inside the lower hose is necessary to prevent collapsing of the hose due to suction at medium or high engine speeds. If this spring is misplaced in hose, it should be repositioned. If this spring is deformed hose must be replaced.

RADIATOR PRESSURE CAP

Radiators are equipped with a 16 psi cap, as standard equipment (Fig. 10).

WARNING: When removing pressure cap, turn counterclockwise to stop, without downward pressure on cap, permitting built-up pressure to escape through over-flow tube. This will prevent hot water from spraying out of radiator filler opening. To complete removal apply downward pressure and turn counterclockwise.

PRESSURE TESTING RADIATOR CAP

Select the short neoprene seal and metal adapter from the kit, Tool C-4080. Slip the seal on the tube at the bottom of the instrument. Then attach either end of the short adapter to the instrument. Dip the pressure cap in water and apply cap to end of adapter. Working the plunger, as shown in (Fig. 11) bring the pressure to 16 pounds on the gauge. If the pressure cap fails to hold the pressure within a range of 14-17 pounds, replace the cap with a **new tested** cap.

The brass vent valve at the bottom of the cap should hang freely. If the rubber gasket has swollen and prevents the valve from hanging loosely, replace the cap. **Do not use a replacement cap without this vent valve.**

PRESSURE TESTING COOLING SYSTEM

(1) With engine not running, wipe the radiator filler neck sealing seat clean. The water level should be 1/2 inch below neck of radiator.

(2) Attach the Tester Tool C-4080 to the radiator, as shown in (Fig. 12) and apply 15 pounds pressure. If the pressure drops inspect all points for external leaks.

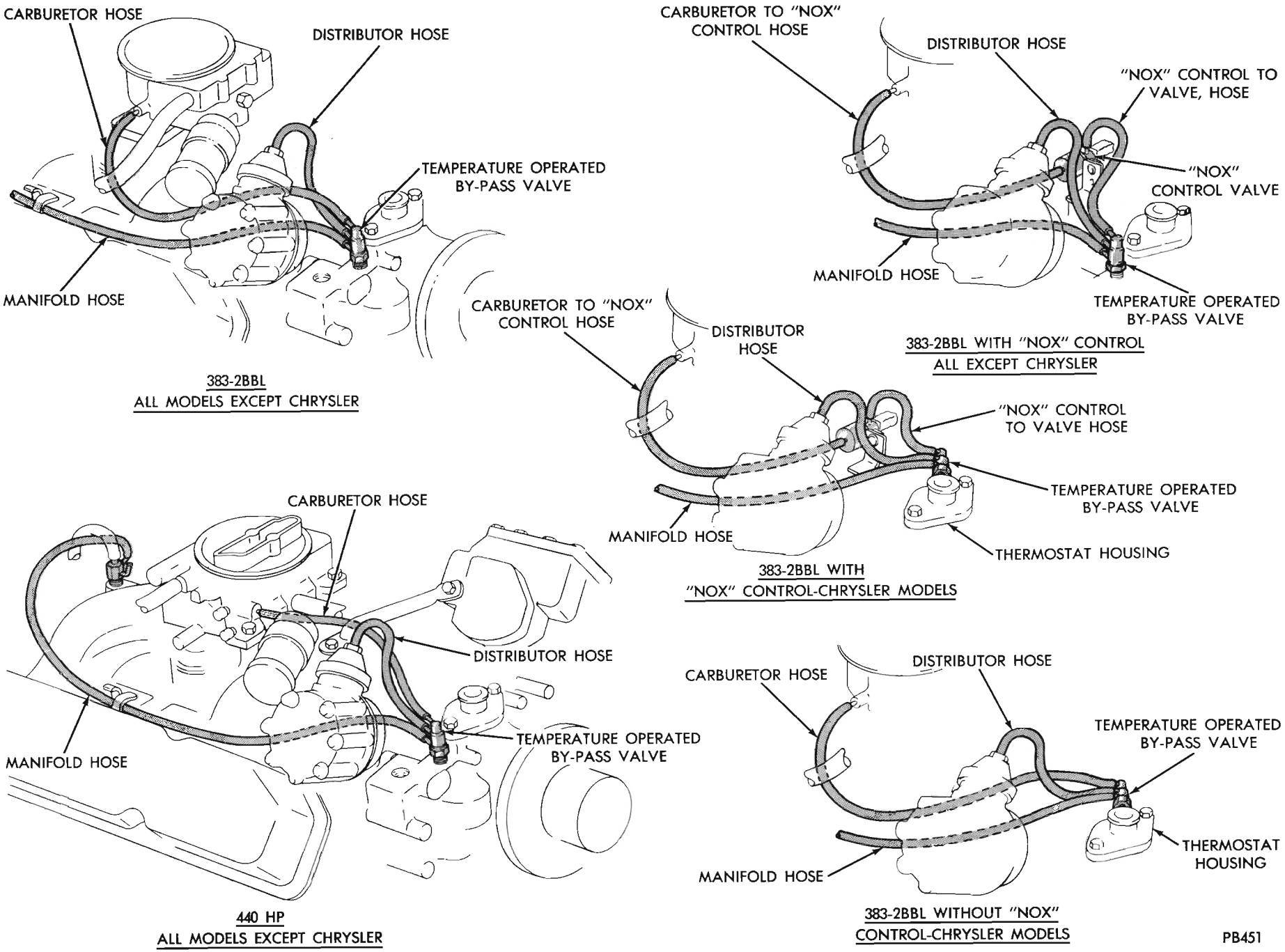


Fig. 9 Vacuum Hose Routing Temperature Operated By-Pass Valve

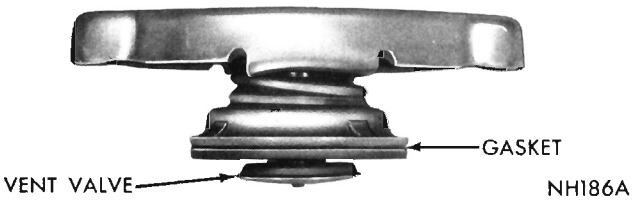


Fig. 10 - Radiator Pressure Cap

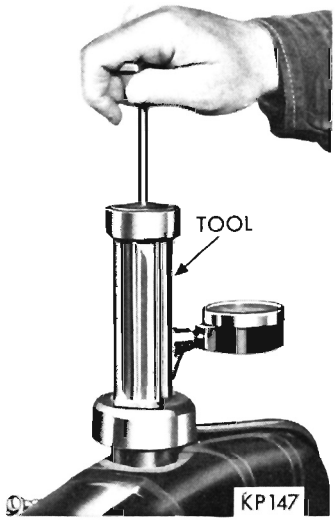


Fig. 12 - Pressure Testing Cooling System

(3) If there are no external leaks, after the gauge dial shows a drop in pressure, detach the tester, start engine and run the engine to operating temperature in order to open the thermostat and allow the coolant to expand. Reattach the tester and pump to 7 lbs. pressure while the engine is running. Race the engine, and if the needle on the dial fluctuates it indicates a combustion leak, usually a head gasket.

WARNING: Pressure builds up fast. Any excessive amount of pressure built up by continuous engine operation must be released to a safe pressure point. NEVER PERMIT PRESSURE TO EXCEED 20 lbs.

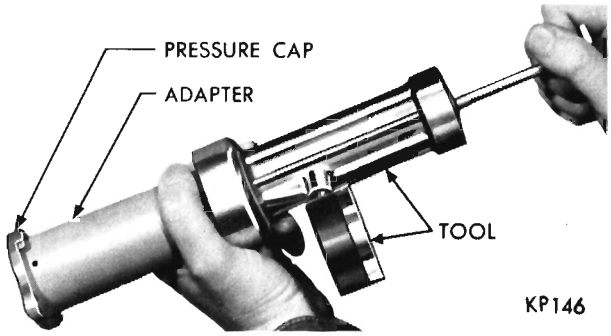


Fig. 11 - Testing Pressure Cap

(4) Remove the wires from the spark plugs on one bank and operate the engine on the opposite bank. If the needle continues to fluctuate, it indicates a leak on the bank still in operation. If the needle ceases to fluctuate, the leak is in the bank, from which combustion has been released.

(5) If the needle on the dial does not fluctuate, race the engine a few times and if an abnormal amount of water emits from the exhaust system at the tail pipe, it may indicate a leak that can be a faulty head gasket, cracked engine block, or the cylinder head near the exhaust ports.

(6) If the above pressure test of the cooling system holds without fluctuation, then there is no leak, however, there may be internal leaks which can be determined by removing the oil dip-stick and if water globules appear intermixed with the oil it will indicate a serious internal leak in the engine. If there is an internal leak, the engine must be disassembled, the leak located and necessary new parts installed.

ENGINE WATER TEMPERATURE GAUGE

For Removal, Installation and Testing procedures of the water temperature sending and receiving units, refer to "Electrical" Group 8 "Gauges".

ACCESSORY BELT DRIVES

PROPER BELT TENSION

Satisfactory performance on belt drive accessories depends on maintenance of proper belt tension. Either the "Belt Tension Gauge Method" or the "Torque Method" may be used as follows:

Belt Tension Gage Method

This method is preferred because it gives a direct reading of belt tension.

Loosen attaching bolts and attach gauge C-4162 to belt as shown in (Figs. 13 or 14) (for dual belts, attach gauge to front belt only). Apply torque using the 1/2 inch square hole in the brackets or tool C-3841A for the alternator (attach tool to heavily ribbed section of alternator to prevent damage). The gauge should read to "Specifications" after all bolts are tightened.

Where it is difficult to attach the gauge to a belt because of poor access, the gauge extension can be used.

Torque Method

All belts can be adjusted to the specified tension by use of a torque wrench. The alternator belts are adjusted by using tool C-3841A. The tool should be hooked at the heavily ribbed section of the alternator to prevent damage. Other belts are

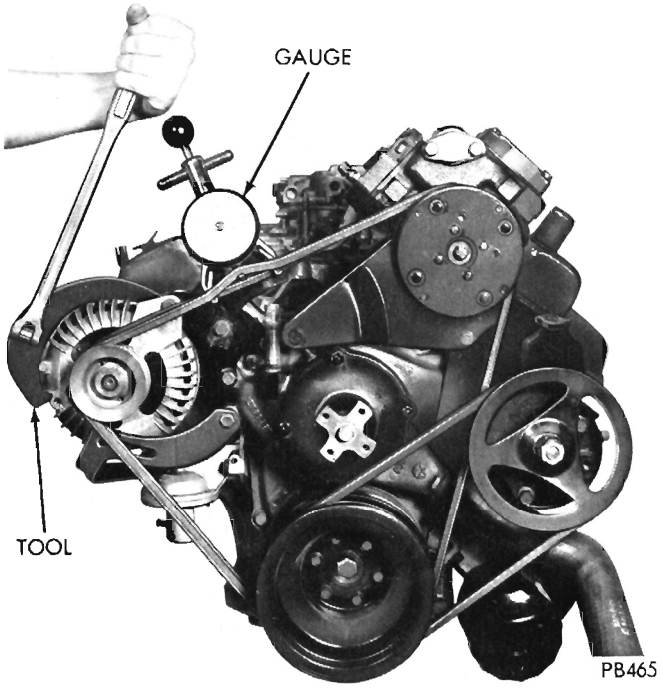


Fig. 13 - Belt Tension Gauge and Alternator Belt Tension Adjusting Tool

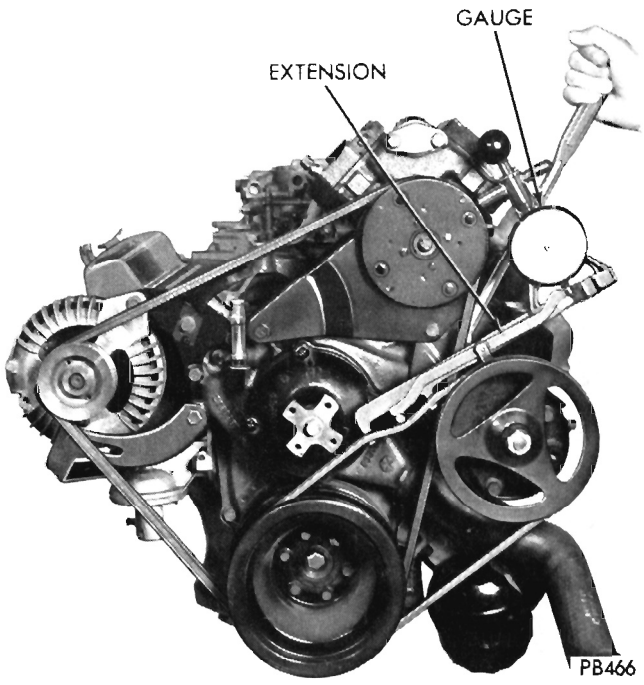


Fig. 14 - Belt Tension Gauge and Extension

tightened by torque wrench using the square hole in the brackets.

To tighten belts by the torque method, loosen all mounting bolts and apply specified torque to the components (See Specifications). Initial orientation of torque wrench should be approximately vertical to obtain proper tension. Tighten all mounting bolts while torque is applied to the accessory. If it is difficult to use the torque wrench because of clearance use an extension.

SPECIFICATIONS

VALIANT

ENGINE SIZE	198	225	318	340
CAPACITY Quarts (With Heater)*				
Radiator Width	13–19″ 14–22″	13–19″ 14–22″	16–19″ 17–22″	15–22″
RADIATOR–Identification Number–Width				
Transmission Manual 903	3443987–19″	3443987–19″		
230			3443978–19″	3443975–22″
833				
Automatic 904	3443986–19″	3443986–19″	3443978–19″	
727				3443975–22′
Air Conditioning	N/A	3443985–22″	3443977–22″	3443976–22″
Maximum Cooling	3443988–22″	3443988–22″	3443976–22″	3443976–22″
Oil Cooler Size Standard	6″	6″	10″	10″
Air Conditioning	N/A	6″	10″	12″
Maximum Cooling	6″	6″	12″	12″
Shroud Transmission Manual	None	None	None	Yes
Automatic	None	None	None	Yes
Air Conditioning	N/A	Yes	Yes	Yes
Maximum Cooling	None	Yes	Yes	Yes
Seal				
Hood to Yoke	None	Yes**	Yes	Yes
FAN				
Diameter–Number Blades–Width				
Standard	17–4–1-1/2	17–4–1-1/2	18–7–2	18–7–2-1/4
Automatic	17–4–1-1/2	17–4–1-1/2	18–7–2	18–7–2-1/4
Air Conditioning	N/A	17–7–1-1/2	18–7–2-1/4	18–7–2-1/4
High Capacity	17–7–1-1/2	17–7–1-1/2	18–7–2-1/4	N/A
Spacer				
Standard	1.06″	1.06″	1.40″	Torque
Air Conditioning	N/A	1.06″	Thermal	Thermal
High Capacity	1.06″	1.06″	1.40″	N/A
Ratio (Fan to Crankshaft)				
Standard	1.07:1	1.07:1	.95:1	.95:1
Air Conditioning	N/A	1.10:1	1.3:1	1.3:1
High Capacity	1.07:1	1.07:1	.95:1	N/A
WATER PUMP IMPELLER				
Diameter–Number Blades				
Standard	3.50″–6	3.50″–6	4.38″–8	4.38″–8
Air Conditioning	N/A	3.50″–6	3.50″–6	3.50″–6

** Air Conditioning and Maximum Cooling only.

BARRACUDA

ENGINE	198	225	318	340	383-2 BBL	383-4 BBL	440-HP & 3-2 BBL	426 HEMI
CAPACITY (With Heater) Quarts–								
Radiator Width	13–19"	13–19"	16–19"	15.5--26"	14.5–22"	14.5–22"	15.5–22"	17–26"
	14–22"	14–22"	17.5–26"*		15–26"	15–26"**	17–26"**	
RADIATOR–Identification Number–Width								
Transmission Manual 230	3443984–19"	3443984–19"	3443973–19"	3443969–26"				
833					N/A	3443962–22"	3443960–26"	3443959–26"
Automatic 904	3443945–19"	3443945–19"	3443972–19"					
727				3443969–26"	3443961–22"	3443961–22"	3443938–22"	3443959–26"
Air Conditioning	3443944–22"	3443944–22"	3443971–26"	3443969–26"	3443960–26"	3443940–26"	3443959–26"**Δ	N/A
Maximum Cooling	3443981–22"	3443981–22"	3443970–26"	3443970–26"	3443959–26"	3443959–26"	3443959–26"	N/A
Oil Cooler Size--Standard	10"	10"	10"	10"	12"	12"	12"	12"****
Air Conditioning	10"	10"	10"	10"	12"	12"	12"Δ	N/A
Maximum Cooling	12	12"	12"	12"	12"	12"	12"	N/A
Shroud Transmission Manual	None	None	None	Yes	N/A	Yes	Yes	Yes
Automatic	None	None	None	Yes	None	Yes	Yes	Yes
Air Conditioning	Yes	Yes	Yes	Yes	Yes	Yes	YesΔ	N/A
Maximum Cooling	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Seal								
Hood to Yoke	Yes****	Yes****	Yes	Yes	Yes	Yes	Yes	Yes
FAN								
Diameter–Number Blades–Width								
Standard	17–4-1/2	17–4–1-1/2	18–4–2 B.T.	18-1/2–7–2-1/2		18–7–2	18-1/2–7–2-1/2	18-1/2–7–2-1/2
Automatic	17–4-1/2	17–4–1-1/2	18–4–2 B.T.	18-1/2–7–2-1/2	18–7–2	18–7–2	18–7–2	18-1/2–7–2-1/2
Air Conditioning	18–4–2 P.T.	18–4–2 P.T.	18-1/4–5–2.31	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2Δ	N/A
High Capacity	12–7–1-1/2	18–7–1-1/2	18–7–2-1/4	N/A	18–7–2-1/8	18–7–2-1/8	18–7–2-1/8	N/A
Spacer								
Standard	1.72	1.72"	2.20"	Torque	1.60"	1.60"	Torque–Manual 1.60"–Automatic	Torque–Manual Torque–Automatic
Air Conditioning	1.72	1.72"	Thermal	Thermal	Thermal	Thermal	ThermalΔ	N/A
High Capacity	1.72	1.72"	2.20"		1.60"	1.60"	1.60"	N/A
Ratio (Fan to Crankshaft)								
Standard	1.07:1	1.07:1	.95:1	.95:1	.95:1	.95:1	.95:1	1.20"1
Air Conditioning	1.10:1	1.10:1	1.2:1	1.3:1	1.4:1	1.4:1	1.4:1	N/A
High Capacity	1.071	1.07:1	.95:1		.95:1	.95:1	.95:1	N/A
WATER PUMP IMPELLER								
Diameter–Number Blades								
Standard	3.50"–6	3.50"–6	4.38"– 8	4.38"–8	4.38"–8	4.38" –8	4.38"–8	4.38"–8
Air Conditioning	3.50"–6	3.50"–6	3.50"–6	3.50"–6	3.50"–6	3.50"–6	3.50"–6Δ	N/A

* Add one quart with Maximum Cooling.
** Add one quart with Air Conditioning.
*** Auxiliary 7" x 26" Oil Cooler (air cooled) in series with standard oil cooler.
**** Air Conditioning and Maximum Cooling only.
Δ Air Conditioning not available on 440 Cubic Inch Engine with 3–2BBL

ENGINE	225	225 POLICE TAXI	318	318 POLICE TAXI	340
CAPACITY (With Heater) Quarts–Radiator Width	13–19″ 14–22″	13–19″ 14–22″	16–19″ 17.5–26″	18.5–26″	15.5–26″
RADIATOR–Identification Number–Width					
Transmission Manual 903	2443984–19″				
230		3443984–19″	3443973–19″	3443970–26″	3443969–26″
833		N/A			
Automatic 904	3443981–22″		3443968–19″		
727	N/A	3443981–22″		3443970–26″	3443969–26″
Air Conditioning	3443981–22″	3443981–22″	3443969–26″	3443970–26″	3443969–26″
Maximum Cooling	3443981–22″	3443981–22″	3443970–26″	3443970–26″	3443970–26″
Oil Cooler Size Standard	10″	12″	10″	12″	10″
Air Conditioning	10″	12″	10″	12″	10″
Maximum Cooling	12″	12″	12″	12″	12″
Shroud Transmission Manual	None	None	None	Yes	Yes
Automatic	None	None	None	Yes	Yes
Air Conditioning	Yes	Yes	Yes	Yes	Yes
Maximum Cooling	None	Yes	Yes		Yes
Seal					
Hood to Yoke	Yes[1]	Yes	Yes	Yes	Yes
Bumper to Yoke	None	None	None	None	None
FAN (Fan to Crankshaft)					
Diameter–Number Blades–Width					
Standard	17–4–1-1/2	18–4–2 P.T.	18–4–2 B.T.	18–7–2	18-1/2–7–2-1/2
Automatic	17–4–1-1/2	18–4–1 P.T.	18–4–2 B.T.	18–7–2	18-1/2–7–2-1/2
Air Conditioning	18–4–2 P.T.	18–4–2 P.T.	18-1/4–5–2.31	18-1/2–7–2-1/2	18-1/2–7–2-1/2
High Capacity	18–7–1-1/2	18–7–1-1/2	18–7–2-1/4	18–7–1-1/4	
Spacer					
Standard	1.72″	1.72″	2.20″	2.20″	Thermal
Air Conditioning	1.72″	1.72″	Thermal	Thermal	Thermal
High Capacity	1.72″	1.72″	2.20″		Thermal
Ratio (Fan to Crankshaft)					
Standard	1.07:1	1.07:1	.95:1	.95:1	.95:1
Air Conditioning	1.10:1	1.10:1	1.2:1	1.2:1	1.3:1
High Capacity	1.07:1	1.07:1	.95:1	.95:1	
WATER PUMP IMPELLER					
Diameter–Number Blades					
Standard	3.50″–6	3.50″–6	4.38″–8	4.38″–8	4.38″–8
Air Conditioning	3.50″–6	3.50″–6	3.50″–6	3.50″–6	3.50″–1

[1] Air Conditioning and Maximum Cooling Only.
[2] Add One Quart with Air Conditioning.
[3] Add One Quart with Maximum Cooling.
[4] Air Conditioning Not Available with 440–6 BBL.

SATELLITE

ENGINE	383-2 BBL	383 2 & 4 BBL POLICE	383-4 BBL	440 4 & 6 BBL	426 HEMI
CAPACITY (With Heater) Quarts—Radiator Width	14.5—22" 15—26"[2]	16—26"[3]	14.5—22" 15—26"[2]	15.5—22" 17—26"[2]	17—26"
RADIATOR—Identification Number—Width					
Transmission Manual 903					
230	N/A	N/A	3443962—22"	N/A	
833		N/A		3443960—26"	3443959—26"
Automatic 904					
727	3443961—22"	3443940—26"	3443961—22"	3443938—22"	3443959—26"
Air Conditioning	3443960—26"	3443959—26"	3443940—26"	3443959—26"[4]	N/A
Maximum Cooling	3443959—26"	3443959—26"	3443959—26"	3443959—26"	N/A
Oil Cooler Size Standard	12"	12"	12"	12"	12"
Air Conditioning	12"	12"	12"	12"*	N/A
Maximum Cooling	12"	12"	12"	12"*	N/A
Shroud Transmission Manual	None	N/A	Yes	Yes	Yes
Automatic	Yes	Yes	Yes	Yes	Yes
Air Conditioning	Yes	Yes	Yes	Yes[4]	N/A
Maximum Cooling	Yes	Yes	Yes	Yes	N/A
Seal					
Hood to Yoke	Yes	Yes	Yes	Yes	Yes
Bumper to Yoke	None	None	None	None	None
FAN (Fan to Crankshaft)					
Diameter—Number Blades—Width					
Standard	N/A	N/A	18—7—2	18-1/2—7—2-1/2	18-1/2—7—2-1/2
Automatic	18—7—2	17—7—2-1/8	18—7—2	18—7—2	18-1/2—7—2-1/2
Air Conditioning	18-1/2—7—2-1/2	18-1/2—7—2-1/2	18-1/2—7—2-1/2	18-1/2—7—2-1/2[4]	N/A
High Capacity	18—7—2-1/8	N/A	18—7—2-1/8	18—7—1-1/8	N/A
Spacer					
Standard	1.60"	1.60"	1.60"	Torque—Manual 1.60"—Automatic	Torque
Air Conditioning	Thermal	Thermal	Thermal	Thermal[4]	N/A
High Capacity	1.60"	N/A	1.60"	1.60"	N/A
Ratio (Fan to Crankshaft)					
Standard	.95:1	.95:1	.95:1	.95:1	1.20:1
Air Conditioning	1.4:1	1.4:1	1.4:1	1.4:1[4]	N/A
High Capacity	.95:1	N/A	.95:1	.95:1	N/A
WATER PUMP IMPELLER					
Diameter—Number Blades					
Standard	4.38"—8	4.38"—8	4.38"—8	4.38"—8	3.50"—6
Air Conditioning	3.50"—6	3.50"—6	3.50"—6	3.50"—6[4]	N/A

[1] Air Conditioning and Maximum Cooling Only.
[2] Add One Quart with Air Conditioning.
[3] Add One Quart with Maximum Cooling.
[4] Air Conditioning Not Available with 440—6 BBL.

ENGINE SIZE	225	225 POLICE Taxi	318 Except Police-Taxi	318 POLICE Taxi	360
CAPACITY (With Heater)					
Quarts—Radiator—Width	13—19"	13—19"	16—19"	18.5—26"	15.5—22"
	14—22"	14—22"	17.5-26 A/C		16.—26"
			18.5-26 M/C		
RADIATOR—Identification Number—Width					
Transmission Manual 230	3443980—19"	3443980—19"	3443967—19"	3443966—26"	3443964—22"
Automatic 904	3443980—19"		3443967—19"	N/A	
727		3443979—22"	3443967—19"****	3443966—26"	3443964—22"
Air Conditioning	N/A		3443966—26"	3443966—26"	3443963—26"
Maximum Cooling	3443979—22"	3443979—22"	3443965—26"	3443965—26"	3443965—26"
Oil Cooler Size Standard	10"	12"	10"	12"	12"
Air Conditioning	12"		12"	12"	12"
Maximum Cooling	12"	12"	12"	12"	12"
Shroud Transmission—Manual	None	None	None	Yes	None
Automatic	None	None	None	Yes	None
Air Conditioning	N/A	N/A	Yes	Yes	Yes
Maximum Cooling	None	Yes	Yes	Yes	Yes
Seal Hood to Yoke	No	Yes	Yes***	Yes	Yes
Bumper to Yoke	No	Yes	Yes***	Yes	Yes***
FAN					
Diameter—Number Blades—Width					
Standard	17—4—1-1/2	18—4—2 PT	18—4—2 B.T.	18—7—2	18—7—2
Automatic	17—4—1-1/2	18—4—2 PT	18—4—2 B.T.	18—7—2	18—7—2
Air Conditioning	N/A	N/A	18-1/4—5—2.31	18-1/2—7—2-1/2	18-1/2—7—2-1/2
High Capacity	18—7—1-1/2	18—7—1-1/2	18—7—2-1/4	18—7—2-1/4	18—7—2-1/4
Spacer					
Standard	1.72"	1.72"	1.40"	1.40"	2.00
Air Conditioning	N/A	N/A	1.72"	Thermal	Thermal
High Capacity	1.72"	1.72"	1.40"	1.40"	1.40
Ratio (Fan to Crankshaft)					
Standard	1.07:1	1.07:1	.95:1	.95:1	.95:1
Air Conditioning	N/A	N/A	1.2:1	1.2:1	1.3:1
High Capacity	1.07:1	1.07'1	.95:1	.95:1	.95:1
WATER PUMP IMPELLER					
Diameter—Number Blades					
Standard	3.50"—6	3.50"—6	4.38"—8	4.38"—8	4.38"—8
Air Conditioning	N/A	3.50"—6	3.50"—6	3.70"—6	3.50"—6

△ Maximum Cooling Add One Quart.
* 383-2 BBL Only.
** Auxiliary 11" x 26" Oil Cooler (Air Cooled) in Series With Standard Oil Cooler With Trailer Tow.
*** Air Conditioning and Maximum Cooling Only.
**** With Trailer Tow
A/C with Air Conditioning
M/C with Maximum Cooling

FURY - SPORT—FURY - SUBURBAN

ENGINE SIZE	360 Police	383–2BBL Except Police	383–4BBL Except Police	383–2or 4BBL 440 Police	440 STD. H.P.
CAPACITY (With Heater)				383 C.I.E.	15.5–22"
Quarts–Radiator–Width	16.–26"	14.5–22"	14.5–22"	16–26"	17–26"
		15–26"△	15–26"A/C	440 C.I.E.	
RADIATOR–Identification Number–Width			16–26"M/C	18–26"	
Transmission Manual 230	3443965–26"	3443952–22"	N/A	3443947–26"*	N/A
Automatic 904		N/A	N/A	N/A	N/A
727	3443965–26"	3443952–22"	3443950–22"	3443947–26"	3443950–26"
Air Conditioning	3443965–26"	3443951–26"	3443959–26"	3443953–26"	3443947–26"
Maximum Cooling	3443965–26"	3443953–26"	3443953–26"	3443953–26"	3443953–26"*
Oil Cooler Size Standard	12"	12"	12"	12"	12"
Air Conditioning	12"	12"	12"	12"	12"
Maximum Cooling		12"	12"**	12"	12"
Shroud Transmission–Manual	Yes	None	N/A	Yes*	N/A
Automatic	Yes	Yes	Yes	Yes	Yes
Air Conditioning	Yes	Yes	Yes	Yes	Yes
Maximum Cooling	Yes	Yes	Yes	Yes	Yes
Seal Hood to Yoke		Yes	Yes	Yes	Yes
Bumper to Yoke		Yes***	Yes***	Yes	Yes***
FAN					
Diameter–Number Blades–Width					
Standard	18–7–2-1/4	18–7–2	N/A	18–7–2-1/8*	N/A
Automatic	18–7–2-1/4	18–7–2	18–7–2	18–7–2-1/8	18–7–2
Air Conditioning	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2
High Capacity		18–7–2-1/8	18–7–2-1/8	N/A	18–7–2-1/8
Spacer					
Standard	1.40	1.60"	1.60"	1.60"	1.60"
Air Conditioning	Thermal	Thermal	Thermal	Thermal	Thermal
High Capacity		1.60"	1.60"	N/A	1.60"
Ratio (Fan to Crankshaft)					
Standard		.95:1	.95:1	.95:1	.95:1
Air Conditioning		1.4:1	1.4:1	1.4:1	1.4:1
High Capacity		.95:1	.95:1		.95:1
WATER PUMP IMPELLER					
Diameter–Number Blades					
Standard	4.38"–8	4.38"–8	4.38"–8	4.38"–8	4.38"–8
Air Conditioning	3.50"–6	3.50"–6	3.50"–6	3.50"–6	3.50"–6

△ Maximum Cooling Add One Quart.
* 383-2 BBL Only.
** Auxiliary 11" x 26" Oil Cooler (Air Cooled) in Series With Standard Oil Cooler With Trailer Tow.
*** Air Conditioning and Maximum Cooling Only.
**** With Trailer Tow
A/C with Air Conditioning
M/C with Maximum Cooling

CHRYSLER AND IMPERIAL

ENGINE	383-2BBL	383-4BBL	440	IMPERIAL
CAPACITY (With Heater) Quarts–	14.5–22"	14.5–22"	15.5–22"	17.5–28"
Radiator Width	15–26" A/C 16–26" M/C	16–26"	17–26" A/C 18–26" M/C	
RADIATOR–Identification Number–Width				
Transmission Manual 230	3443952–22"	N/A	N/A	N/A
Automatic 727	3443952–22"	3443950–22"	3443950–22"	3443946–28"
A/C	3443951–26"	3443944–26"	3443947–26"	3443946–28"
Max. Cooling	3443953–26"	3443953–26"	3443953–26"	3443946–28"
Oil Cooler Size Standard	12"	12"	12"	12"
A/C	12"	12"	12"	12"
Max. Cooling	12"	12"**	12"	
Shroud–Transmission Manual	None			
Automatic	Yes	Yes	Yes	Yes
A/C & Max. Cooling	Yes	Yes	Yes	Yes
Seal				
Hood to Yoke	Yes	Yes	Yes	Yes
Bumper to Yoke Air Conditioning and Maximum Cooling	Yes	Yes	Yes	All
FAN				
Diameter–Number Blades–Width				
Standard	18–7–2	N/A	N/A	N/A
Automatic	18–7–2	18–7–2	18–7–2	18-1/2–7–2-1/2
A/C	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2	18-1/2–7–2-1/2
High Capacity	18–7–1-1/8	18–7–2-1/8	18–7–2-1/8	N/A
Spacer				
Standard	1.60"	1.60"	1.60"	Torque
A/C	Thermal	Thermal	Thermal	Thermal
High Capacity	1.60"	1.60"	1.60"	N/A
Ratio (Fan to Crankshaft)				
Standard	.95:1	.95:1	.95:1	.95:1
A/C	1.4:1	1.4:1	1.4:1	1.4:1
High Capacity	.95:1	.95:1	.95:1	N/A
WATER PUMP IMPELLER				
Diameter–Number Blades				
Standard	4.38"–8	4.38"–8	4.38"–8	4.38"–8
A/C	3.50"–6	3.50"–6	3.50"–6	3.50"–6

* Add 1-1/2 quarts for rear seat heater.
**Auxiliary 11" x 26" oil cooler (air cooled) in series with standard oil cooler with trailer tow.
A/C With air conditioning.
M/C With maximum cooling.

BELT TENSION SPECIFICATIONS

BELT TENSION GAUGE METHOD

NEW BELT (All)	*USED BELT (All)
120 Lbs. Gauge Reading	70 Lbs. Gauge Reading*

TORQUE METHOD

TORQUE (FT.-LBS) TO BE APPLIED TO COMPONENTS

	NEW BELT			* USED BELT		
Engine Displacement (Cubic Inches)	198 225	318 340 360	383 426 440	198 225	318 340 360	383 426 440
POWER STEERING	90	50	120	50	35	90
ALTERNATOR						
With A/C	15	100	120	10	70	80
(Except Imperial)						
With A/C			45			30
(Imperial)						
All Without A/C	15	35	70	10	25	40
AIR COND. IDLER	25			15		
FAN IDLER		35	30		20	20

* A belt is considered "used" after 15 minutes of running.

TIGHTENING REFERENCE

	Inch Pounds	Foot Pounds	Thread Size
Water Pump Bolts	–	30	–
Fan Attaching Bolts	–	15-18	–
Thermostat Housing Bolts	–	30	–
Shroud Mounting Bolts	12	–	8-32
	75	–	1/4-20
Radiator Mounting Bolts	95	–	1/4-20
Drain Cock	150	–	–
Oil Cooler Fittings – To Radiator	110	–	–
Lines to Fittings	85	–	–
Lines to Auxiliary Cooler	85	–	–
Lines to Connector	50	–	–

CONVERSION CHART

U.S. Quart	12	13	14	14½	15	15½	16	17	17½	18	18½	19
Imperial Quart	10	10¾	11¾	12	12½	13	13¼	14¼	14½	15	15½	15¾

ELECTRICAL

CONTENTS

	Page
ALTERNATOR AND VOLTAGE REGULATOR	23
BATTERY	1
HORNS	96
IGNITION SYSTEM 6-CYLINDER	36
IGNITION SYSTEM 8-CYLINDER	45
INSTRUMENT PANELS	57
SPECIFICATIONS	123
SPEED CONTROL	98
STARTER - DIRECT DRIVE	16
STARTER - REDUCTION GEAR	6
RADIO	82
TURN SIGNALS AND EMERGENCY FLASHER	107
WINDSHIELD WIPER SYSTEM	108
WINDSHIELD WASHERS	118
WIRING DIAGRAMS	147

BATTERY

INDEX

	Page
Adjustment of Acid Gravity	4
Battery Visual Inspection	1
Charging the Battery	4
High Rate Discharge Test of Battery Capacity	4
Specifications	123
Specific Gravity Test	1

SERVICE PROCEDURES

BATTERY VISUAL INSPECTION

(1) Protect paint finish with fender covers.

(2) Disconnect battery cables at battery.

(3) Remove battery hold-down clamp and remove battery from vehicle.

(4) Inspect battery carrier and fender side panel for damage caused by loss of acid from battery.

(5) Clean top of battery with a solution of clean warm water and baking soda. Scrub areas with a stiff bristle brush being careful not to scatter corrosion residue. Finally wipe off with a cloth moistened with ammonia or baking soda in water.

CAUTION: Keep cleaning solution out of battery cells to eliminate weakening the electrolyte.

(6) Replace damaged or frayed cables.

(7) Clean battery terminals and inside surfaces of clamp terminals with Cleaning Tool MX-75.

(8) Examine battery case and cover for cracks.

(9) Install battery.

(10) Tighten battery hold-down screw nuts to 3 foot-pounds. **Observe polarity of battery terminals to be sure the battery is not reversed.**

(11) Connect cable clamps to battery posts and tighten securely. Coat all connections with light mineral grease or petrolatum **after tightening.**

(12) If electrolyte level is low, fill to recommended level with mineral-free water.

SPECIFIC GRAVITY TEST

A hydrometer Tool 40-B is used to measure specific gravity of electrolyte in battery cells. This gives an indication of how much unused sulphuric acid remains in the solution.

A hydrometer should be graduated to read from 1.160 to 1.320, in graduations of .005 specific gravity. Graduated markings should be not less than 1/16 inch apart and accurate to within .002 specific gravity. Graduated portion of stem should be about two inches long. Clearance between float and glass barrel, at smallest diameter, should be a minimum of 1/8 inch around all sides and barrel must be clean.

Liquid level of battery cell should be at normal height and electrolyte should be thoroughly mixed with any battery water which may have just been added by charging battery before taking hydrometer readings. See "Adjustment of Acid Gravity".

In reading a hydrometer, the gauge barrel must be held vertically and just right amount of fluid be drawn up into gauge barrel with pressure bulb fully expanded to lift float freely so it does not

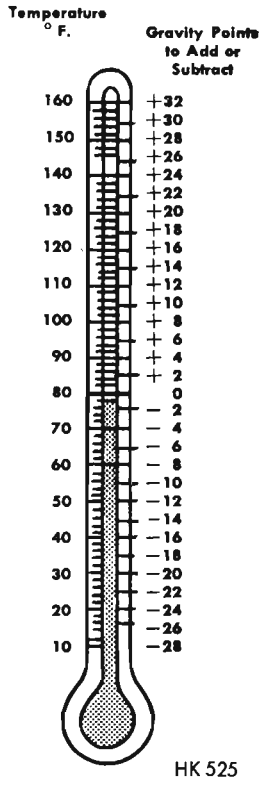


Fig. 1 - Hydrometer Reading Correction Chart

touch the sides, top or bottom of the barrel. Take a reading with eye on level with liquid level in the gauge barrel. **DO NOT TILT** hydrometer.

Hydrometer floats are calibrated to indicate correctly only at one fixed temperature.

Specific gravity of battery electrolyte strength or density varies not only with the quantity of the acid in solution but also with temperature. As temperature increases, the density of the electrolyte decreases, and specific gravity is reduced. As temperature drops, the density of the electrolyte increases and the specific gravity increases.

Specific gravity variations caused by temperatures must be considered and corrected to 80 degrees F. in the analysis of the battery, otherwise specific gravity readings will not give a true indication of state of charge.

Use a battery immersion type thermometer of the mercury-in-glass type, having a scale reading as high as 125 degrees F. and designed for not over a 1-inch bulb immersion. A suitable dairy type thermometer may prove satisfactory for the purpose.

Draw electrolyte in and out of the hydrometer barrel several times to bring the temperature of the hydrometer float to that of the acid in the cell and then measure the electrolyte temperature in the cell.

The temperature correction in specific gravity reading at 80 degrees Fahrenheit is zero. Add .004 specific gravity points for every 10 degrees

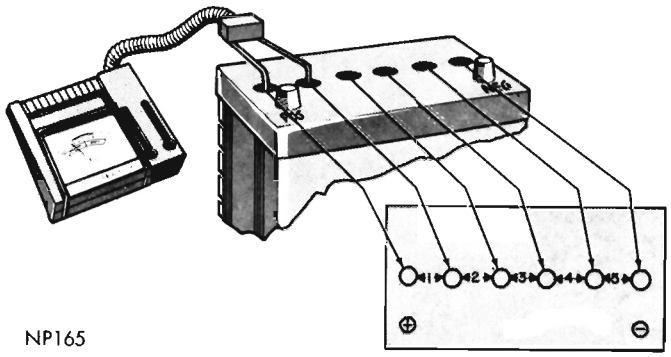


Fig. 2 - Testing Battery Cells with Cad-Tip Battery Cell Analyzer

over 80 degrees F. and subtract .004 specific gravity points for every 10 degrees under 80 degrees F. All readings must be corrected at 80 degrees Fahrenheit. Refer to Figure 1 and examples one and two as follows:

Example 1—

Hydrometer Reading	1.260
Acid Temperature	20 degrees Fahrenheit
Subtract Specific Gravity	.024
Correct Specific Gravity is	1.236

Example 2—

Hydrometer Reading	1.255
Acid Temperature	100 degrees Fahrenheit
Add Specific Gravity	.008
Corrected Specific Gravity is	1.263

A fully charged relatively new battery has a specific gravity reading of 1.260 plus .015 minus .005.

Test Conclusions

(a) Battery specific gravity is less than 1.220 battery should be recharged. Make a high rate discharge test for capacity. If battery cells test O.K., recharge and adjust gravity of all cells uniformly. Test voltage regulator setting. Thoroughly test the electrical system for short circuits, loose connections and corroded terminals.

(b) **Cells show more than 25 points (.025 Specific Gravity) Variation,** — Short circuit low cell. Loss of electrolyte by leakage or excessive overcharge; try to recharge battery. See "Charging the Battery." See "Adjustment of Acid Gravity".

(c) Battery specific gravity is above 1.220 and all cells are even. Battery state of charge may be satisfactory. Test by making "High Rate Discharge Test of Battery Capacity". Test voltage regulator setting and all electrical connections are clean and tight.

TEST BATTERY CONDITION AND STATE OF CHARGE WITH CAD-TIP ANALYZER — Part Number 1-369 (Fig. 2)

(1) Check electrolyte level in all cells and add mineral-free water to proper level. **When a car is running, the battery is receiving a charge from the alternator. This charge builds up a "surface charge" in the battery that must be removed before an accurate test can be made.**

(2) Remove the surface charge by turning the headlights "on" for one minute before testing battery. **If the battery has not been operating in a car for at least 8 hours prior to testing, Step 2 is not necessary.**

IMPORTANT: Be sure that headlights, ignition and all accessories are "off" during test.

(3) Remove battery filler plugs and place the RED probe in the POSITIVE (+) CELL and the BLACK probe in the SECOND CELL. NOTE READING. (There will be no meter reading if the probes are reversed.) **A manual set index pointer is provided to assist in making cell comparisons. Set the manual index pointer for reference.**

(4) Move RED probe to SECOND CELL and BLACK probe to THIRD CELL; them move RED probe to THIRD CELL and BLACK probe to FOURTH CELL, etc., until all cells have been tested. Note each cell reading so that CELL COMPARISONS CAN BE MADE. **Always store probe assembly in the space provided in the meter case.**

TEST READING INTERPRETATIONS (Fig. 3)

A — If the readings of any two cells vary FIVE scale divisions or more on the TOP scale — regardless of the colored sections in which they may fall on the bottom scale — **The battery is at or near the point of failure and should be replaced.**

B — If all cells vary LESS than five scale divisions on the TOP scale and all are in the GREEN section of the Bottom Scale — **The battery is in good condition and a safe state of charge.**

C — If all cells vary LESS than five scale divisions on the TOP scale but if any of the cells test in the RED section of the BOTTOM scale — the battery is in good condition but is in a low state of charge — **Recharge at once to avoid a starting failure.**

D — If ANY cell readings are in the "RECHARGE AND RETEST" section of the TOP SCALE and the balance of the readings are within the first four scale divisions — the battery is too low to make an accurate condition test — Recharge battery and retest.

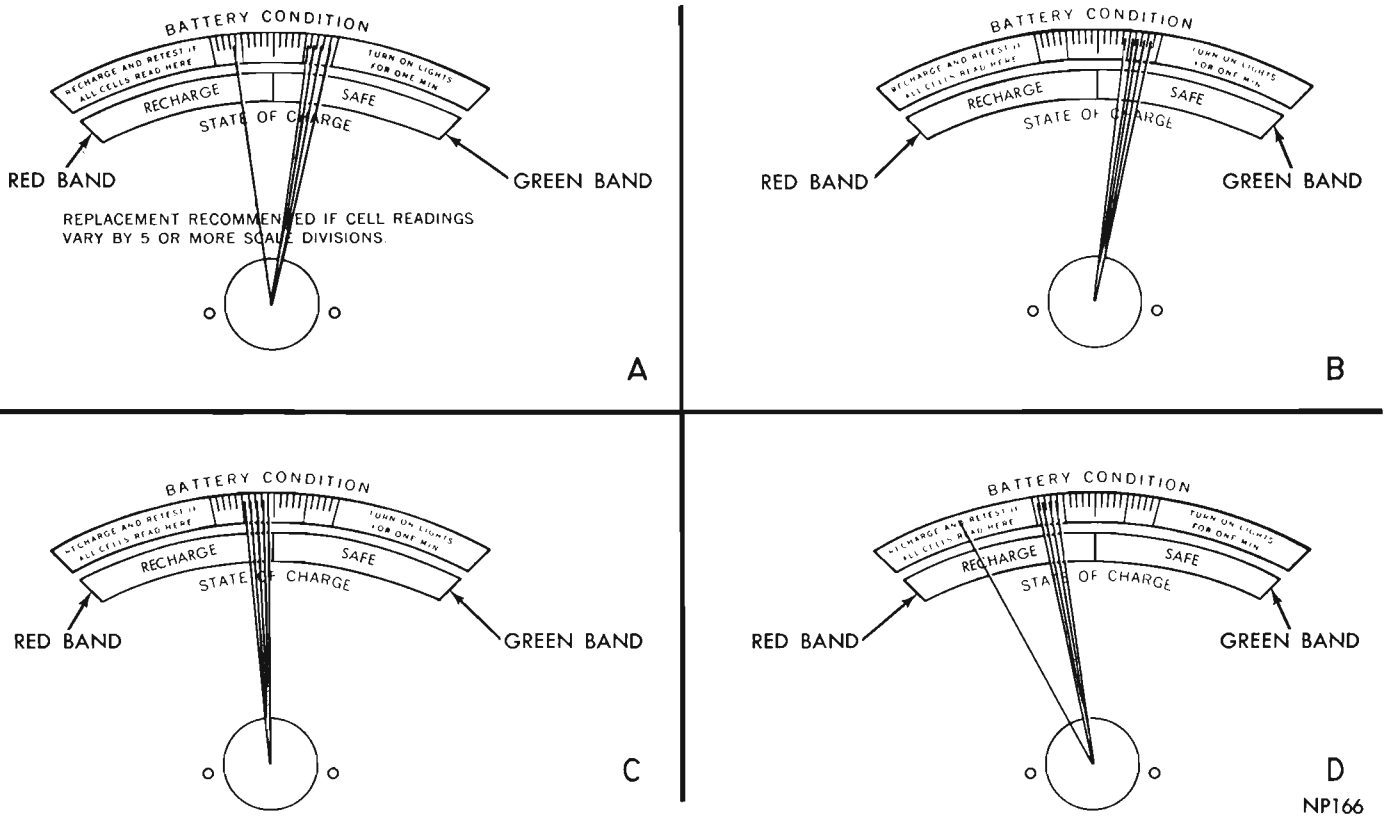


Fig. 3 - Battery State of Charge

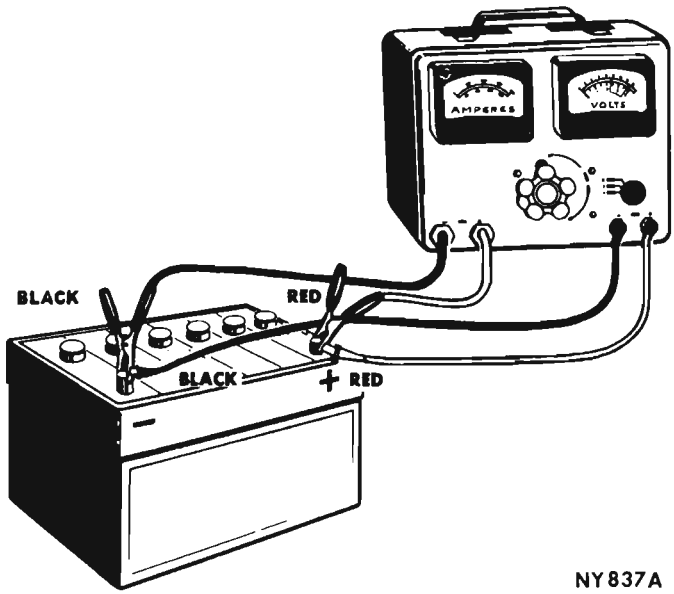


Fig. 4 - High Rate Discharge Test

CAUTION: Be certain to remove "surface charge" after recharge and before retesting. See "Step 2."

ADJUSTMENT OF ACID GRAVITY

Hydrometer floats usually are not calibrated below 1.160 specific gravity and cannot indicate the condition of a battery in a very low state of charge. Therefore, it may be necessary to give the battery several hours charge before a hydrometer reading will indicate that the battery is taking a charge.

If the specific gravity of all cells are not within .015 points of specified value, corrected to 80 degrees F, at the end of a full charge, remove some of the electrolyte with a hydrometer and add a like amount of distilled water to reduce the gravity if too high, or add 1.400 Specific Gravity acid to raise specific gravity, if too low. Continue the charge so as to give the electrolyte a chance to mix and then read the gravity after another hour of charge to note the effect of the additions. Continue this adjusting procedure until gravity is brought to the desired value by charging for one hour after each adjustment.

Never adjust the specific gravity of any battery cell which does not gas freely on charge. Unless electrolyte has been lost through spilling or leaking, it should not be necessary to add acid to a battery during its life. Acid should never be added unless one is certain that the cell will not come up to normal gravity by continued charging. Always make the temperature correction for hydrometer readings, as warm electrolyte will read low and this might be mistaken for failure of the battery to rise normally in gravity. It could also be falsely concluded that the battery would not take a full charge.

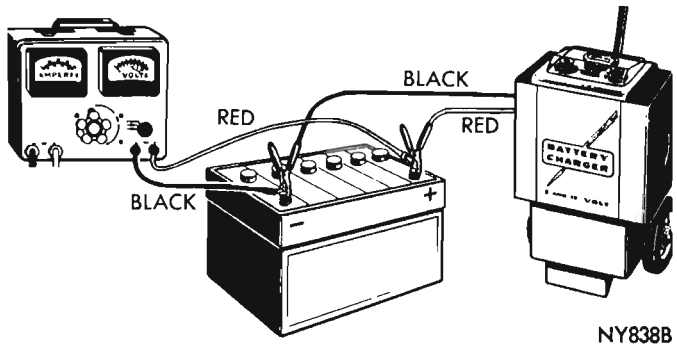


Fig. 5 - Three Minute Charge Test

HIGH RATE DISCHARGE TEST OF BATTERY CAPACITY

Satisfactory capacity tests can be made only when battery equals or exceeds 1.220 specific gravity at 80 degrees Fahrenheit. If the reading is below 1.220 the battery should be slow charged until fully charged in order to secure proper test results.

Test Procedure

(1) Turn control knob of Battery-Starter-Tester to **OFF** position.

(2) Turn Voltmeter Selector Switch to the 16 volt position on test units so equipped.

(3) Connect test ammeter and voltmeter positive leads to battery positive terminal. Connect ammeter and voltmeter negative leads to battery negative terminal (Fig. 4). **Voltmeter clips must contact battery posts or cable clamps and not ammeter lead clips.**

(4) Turn control knob clockwise until ammeter reading is equal to three times ampere hour rating of battery.

(5) Maintain this load for 15 seconds; voltmeter should read 9.5 volts or more, which will indicate that the battery has good output capacity.

(6) After the 15 second test, turn Battery-Starter-Tester control knob to the **OFF** position.

If the voltage in the "High Rate Discharge Test" was under 9.5 volts, the battery should be test charged to determine whether the battery can be satisfactorily charged.

Charging the Battery

Three Minute Charge Test (Fig. 5)

This test should not be used if battery temperature is below 60 degree F.

(1) Connect Battery Charger positive (+) lead to battery positive terminal and negative (—) lead to battery negative terminal.

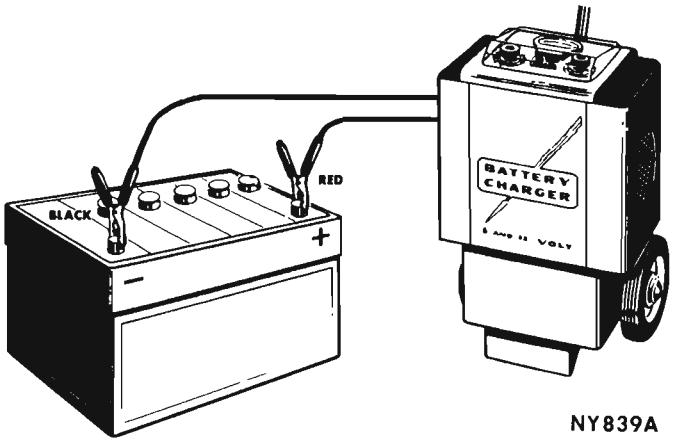


Fig. 6 - Fast Charging the Battery

IMPORTANT: Be sure of correct polarity when charging batteries.

(2) Trip Battery Charger Power Switch to **ON** position. Turn timer switch past three minute mark then back to the three minute mark.

(3) Adjust Battery Charger Switch to highest possible rate not exceeding 40 amperes.

(4) When timer switch cuts off at the end of 3 minutes, turn timer switch back to fast charge.

(5) Use the 16 volt scale of the Battery Starter Tester and measure total voltage of battery posts while battery is being fast charged. If total voltage during charge exceeds 15.5 volts, battery is sulphated and should be cycled and slow-charged until specific gravity reaches 1.260 (See Slow Charging")

A slow charge is preferable to bring the battery up to a full charge.

If specific gravity remains constant after testing battery at one hour intervals for three hours, battery is at its highest state of charge.

(6) Make another capacity test. If capacity test does not meet specifications, replace battery.

Fast Charging the Battery (Fig. 6)

If adequate time for a slow charge is not available, a high rate (FAST) charge is permissible and will give a sufficient charge in one hour enabling the battery and alternator to continue to carry the electrical load.

Connect Battery Charger positive (+) lead to battery positive terminal and negative (—) lead to battery negative terminal. If battery is not removed from vehicle, **BE SURE** ignition switch is turned off and all electrical accessories are turned off during charging.

CAUTION: The battery can be damaged beyond repair unless the following precautions are taken:

(1) Battery electrolyte temperature must **NEVER** exceed 125 degrees Farenheit.

If this temperature is reached, battery should be cooled by reducing charging rate or remove battery from the circuit.

(2) As batteries approach full charge electrolyte in each cell will begin to gas or bubble. Excessive gassing must not be allowed.

(3) Do not fast charge longer than one hour.

If battery does not show a significant change in specific gravity after one hour of "FAST" charge, the slow charge method should be used.

Remember to use temperature correction when checking specific gravity. **The manufacturers of high rate charging equipment generally outline the necessary precautions and some models have thermostatic temperature limiting and time limiting controls.**

WARNING: When batteries are being charged an explosive gas mixture forms beneath the cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at the terminals of the batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from the battery.

Slow Charging of Batteries

Many discharged batteries can be brought back to good condition by slow charging; especially batteries that are sulphated.

Battery should be tested with a hydrometer and a record kept of the readings taken at regular intervals throughout the charge. When a cell has a specific gravity reading that is 25 points (.025) or more below other cells, that cell is faulty and battery should be replaced.

Safe slow charging rates are determined by allowing one ampere per positive plate per cell. Proper slow charging rate would be 4 amperes for a 46 ampere hour battery; 5 amperes for a 59 ampere hour battery; and 6 amperes for a 70 ampere hour battery.

The average length of time necessary to charge a battery by the slow charge method at normal rates is from 12 to 16 hours, however, when a battery continues to show an increase in specific gravity, battery charge should be continued even if it takes 24 hours or more. **Watch the temperature of batteries carefully and if the temperature of any one of them reaches 110 degrees F., lower the charging rate.**

Battery will be fully charged when it is gassing freely and when there is no further rise in specific gravity after three successive readings taken at hourly intervals. Make sure hydrometer readings are corrected for temperature.

The rate of charge for a sulphated battery should be no more than 1/2 the normal slow charge rate. Many sulphated batteries can be brought back to a useful condition by slow charg-

ing at half the normal charging rate from 60 to 100 hours. This long charging cycle is necessary to reconvert crystalline lead sulphate into active materials. **When a battery takes a full charge, but is returned several times in need of a recharge, check for a cracked cell partition with a syringe to provide air pressure; bubbles will appear in an adjacent cell if a crack is present.**

REDUCTION GEAR STARTER

INDEX

	Page
Amperage Draw Test	8
Assembling the Starter	13
Brushes and Springs Replacement	12
Bushings Replacement	13
Cleaning the Starter Parts	12
Disassembling the Starter	10
Field Coils Replacement	12
General Information	6
Ground Circuit Test	9
Insulated Circuit Test	8
Installing the Starter	16
Removing the Starter	9
Resistance Test	9
Service Diagnosis	7
Servicing the Starter Clutch Unit	13
Specifications	123
Testing the Starter (Bench Test)	9
Testing Armature	12
Testing Field Coils for Ground	12

GENERAL INFORMATION

The starter has a 3.5 to 1 reduction gear set built into the Starter assembly, which is housed in an aluminum die casting, Fig. 1. The starter utilizes a solenoid shift device, the housing of the solenoid is integral with the starter drive end housing.

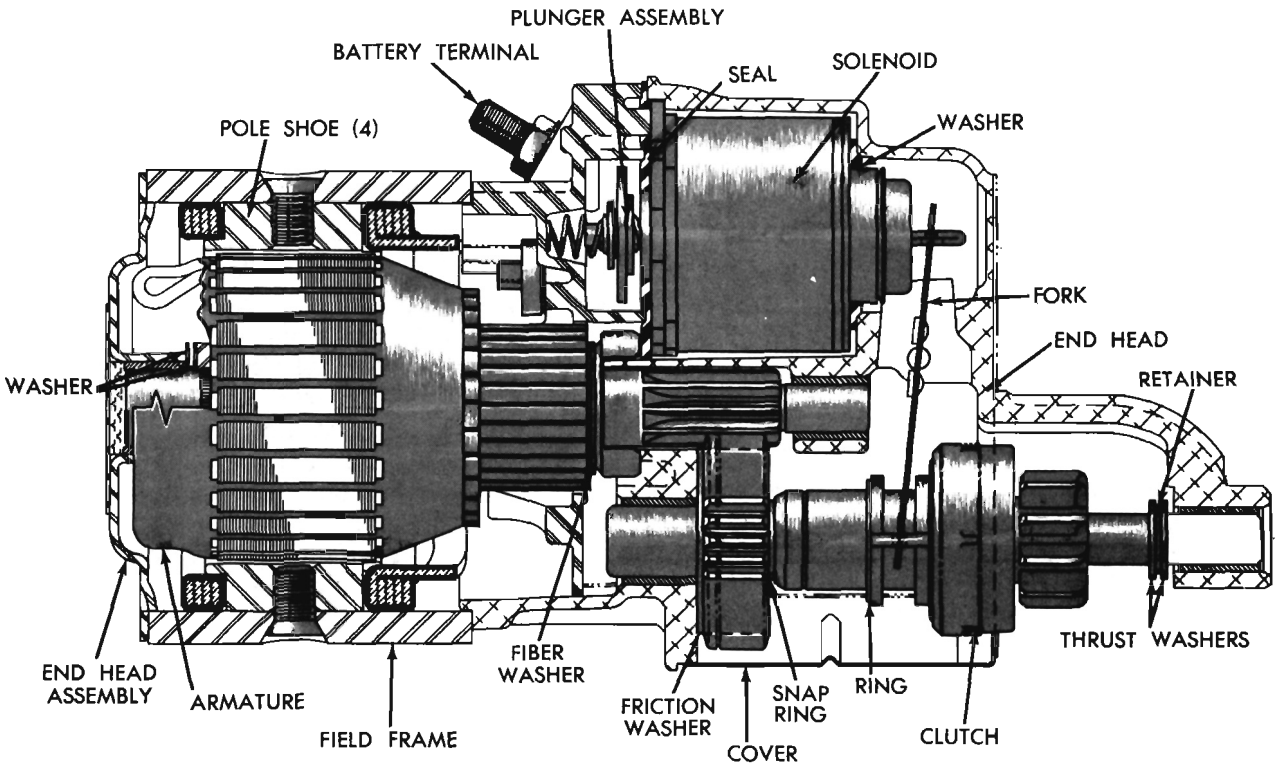


Fig. 1 - Starter Cross Section

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
STARTER FAILS TO OPERATE	(a) Weak battery or dead cell in battery.	(a) Test specific gravity. Recharge or replace battery as required.
	(b) Ignition switch faulty.	(b) Test and replace switch if necessary.
	(c) Loose or corroded battery cable terminals.	(c) Clean terminals and clamps, replace if necessary. Apply a light film of petrolatum to terminals after tightening.
	(d) Open circuit, wire between the ignition — starter switch and ignition terminal on starter relay.	(d) Inspect and test all the wiring.
	(e) Starter relay defective.	(e) Test relay and replace if necessary.
	(f) Faulty starter.	(f) Test and repair as necessary.
	(g) Armature shaft sheared.	(g) Test and repair.
	(h) Open solenoid pull-in wire.	(h) Test and replace solenoid if necessary.
STARTER FAILS AND LIGHTS DIM	(a) Weak battery or dead cell in battery.	(a) Test for specified gravity. Recharge or replace battery as required.
	(b) Loose or corroded battery cable terminals.	(b) Clean terminals and clamps, replace if necessary. Apply a light film of petrolatum to terminals after tightening.
	(c) Internal ground in windings.	(c) Test and repair starter.
	(d) Grounded starter fields.	(d) Test and repair starter.
	(e) Armature rubbing on pole shoes.	(e) Test and repair starter.
STARTER TURNS, BUT ENGINE DOES NOT ENGAGE	(a) Starter clutch slipping.	(a) Replace clutch unit.
	(b) Broken clutch housing.	(b) Test and repair starter.
	(c) Pinion shaft rusted, dirty or dry, due to lack of lubrication.	(c) Clean, test and lubricate.
	(d) Engine basic timing wrong.	(d) check engine basic timing and condition of distributor rotor and cap.
	(e) Broken teeth on engine ring gear.	(e) Replace ring gear. Inspect teeth on starter clutch pinion.
STARTER RELAY DOES NOT CLOSE	(a) Battery discharged.	(a) Recharge or replace battery.
	(b) Faulty wiring.	(b) Test for open circuit, wire between starter relay ground terminal post and neutral starter switch (automatic transmission only). Also test for open circuit; wire between ignition-starter switch and ignition terminal and starter relay.
	(c) Clutch start switch or neutral starter switch on automatic transmission faulty.	(c) Test and replace the switch if necessary.
	(d) Starter relay faulty.	(d) Test and replace if necessary.
RELAY OPERATES BUT SOLENOID DOES NOT	(a) Faulty wiring.	(a) Test for open circuit wire between starter-relay solenoid terminal and solenoid terminal post.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(b) Faulty solenoid switch or connections.	(b) Test for loose terminal connections between solenoid and starter field.
	(c) Solenoid switch contacts corroded.	(c) Test and replace solenoid if necessary.
	(d) Broken lead or a loose connection inside solenoid switch (brush holder plate).	(d) Test and replace solenoid if necessary.
SOLENOID PLUNGER VIBRATES BACK AND FORTH WHEN SWITCH IS ENGAGED	(a) Battery low.	(a) Test for specific gravity of battery. Replace or recharge battery.
	(b) Faulty wiring.	(b) Test for loose connections at relay, ignition-starter switch and solenoid.
	(c) Lead or connections broken inside solenoid switch cover (brush holder plate) or open hold-in wiring.	(c) Test and replace solenoid if necessary.
	(d) Check for corrosion on solenoid contacts.	(d) Test and clean the contacts.
STARTER OPERATES BUT WILL NOT DISENGAGE WHEN IGNITION STARTER SWITCH IS RELEASED	(a) Broken solenoid plunger spring or spring out of position.	(a) Test and repair.
	(b) Faulty ignition-starter switch.	(b) Test and replace the switch if necessary.
	(c) Solenoid contact switch plunger stuck in solenoid.	(c) Remove contact switch plunger, wipe clean of all dirt, apply a film of SAE 10 oil on plunger, wipe off excess.
	(d) Insufficient clearance between winding leads to solenoid terminal and main contactor in solenoid.	(d) Test and repair.
	(e) Faulty relay.	(e) Test and replace relay if necessary.

SERVICE PROCEDURES

AMPERAGE DRAW TEST (with Starter Tester)

Check battery electrolyte gravity with a reliable hydrometer. Gravity should be not less than 1.220 (temperature corrected). Or see that battery passes the High Rate Discharge Test shown in the "Battery" section of this manual.

Turn Battery — Starter Tester **CONTROL KNOB** to "OFF" position.

Turn voltmeter Selector Switch to 16 Volt position. Connect heavy **Positive** ammeter lead (Red) to **Positive** battery terminal. Connect heavy **Negative** ammeter lead (Black) to **Negative** battery terminal.

Connect **Positive** voltmeter lead (Red) to **Positive** battery terminal. Connect **Negative** voltmeter lead (Black) to **Negative** battery terminal.

DISCONNECT ignition primary lead from ignition ballast resistor, or primary wire from either side of coil, to prevent engine from starting.

Crank engine with a remote control starter switch and observe **Exact** reading on Voltmeter. Stop cranking engine. Without cranking engine, turn tester **CONTROL KNOB** clockwise until voltmeter reads **Exactly** the same as when engine was being cranked with the remote control starter switch. Ammeter now indicates starter amperage draw. Check specification. **Engine should be up to operating temperature. Extermely heavy oil or a tight engine will increase starter amperage draw.**

INSULATED CIRCUIT TEST

(1) Test battery electrolyte specific gravity. Specific gravity should be 1.220 or above. If battery specific gravity is below 1.220, recharge battery to full charge before proceeding with test.

(2) Turn voltmeter selector switch to 4 volt

position.

(3) Disconnect ignition coil secondary cable.

(4) Connect voltmeter positive lead to battery positive post and voltmeter negative lead to solenoid connector which connects to the starter field coils.

The voltmeter will read off scale to the right until starter is actuated.

(5) Connect remote control switch to battery and solenoid terminal of starter relay.

(6) Crank engine with a remote starter control starter switch and observe voltmeter reading. Voltmeter reading should not exceed .3 volt. A voltmeter reading .3 volt or less indicates voltage drop is normal in cables, starter relay switch solenoid switch and connections between battery and starter motor. See "Starter Ground Circuit Test."

If voltmeter reading is more than .3 volt, it indicates high resistance in starter insulated circuit. Make following tests to isolate point of excessive voltage loss:

(a) Remove voltmeter lead from solenoid connector and connect to the following points, repeating test at each connection. Starter terminal of solenoid, battery terminal of solenoid, battery cable terminal at solenoid, starter relay and cable clamp at the battery.

(b) A small change will occur each time a normal portion of the circuit is removed from test. A definite change in the voltmeter reading indicates that the last part eliminated in test is at fault.

Maximum allowable voltage loss is as follows:

Battery insulated cable	.2 volt
Solenoid switch	.1 volt
Each connection	.0 volt

Replace faulty cables. Clean and tighten all connections.

RESISTANCE TEST

(1) Test battery electrolyte specific gravity. Specific gravity should be 1.220 or above.

(2) Disconnect positive battery lead from battery terminal post. Connect an 0 to 300 scale ammeter between disconnected lead and battery terminal post.

(3) Connect a test voltmeter with 10 volt scale division between battery positive post and starter switch terminal at starter solenoid.

(4) Crank engine and observe reading on voltmeter and ammeter. Voltage should not exceed .3 volt. A voltage reading that exceeds .3 volt indicates there is high resistance caused from loose circuit connections, a faulty cable, burned starter relay or burned solenoid switch contacts. A current that is high and is combined with slow cranking speed, indicates starter should be removed and repaired.

GROUND CIRCUIT TEST

(1) Connect test voltmeter positive lead to starter housing and voltmeter negative lead to battery negative post.

(2) Crank engine with a remote control starter switch and observe voltmeter reading. Voltmeter reading should not exceed .2 volt. A reading of .2 volt or less indicates the resistance of the ground cable and connections is normal. If voltmeter reading is more than .2 volt, it indicates excessive voltage loss in starter ground circuit. Make the following tests to isolate point of excessive voltage loss. Repeating test at each connection.

(a) Starter drive housing.

(b) Cable terminal at engine.

(c) Cable clamp at battery.

A small change will occur each time a normal portion of circuit is removed from the test. A definite change in voltmeter reading indicates that last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery ground cable .2 volt
Engine ground circuit .1 volt
Each connection .0 volt

REMOVING THE STARTER

(1) Disconnect ground cable at battery.

(2) Remove cable at starter.

(3) Disconnect solenoid lead wires at solenoid terminals.

(4) Remove one stud nut and one bolt attaching starter to flywheel housing, slide automatic transmission oil cooler tube bracket off the stud (if so equipped) and remove the starter. **Do not damage cylinder block seal.**

TESTING THE STARTER (Bench Test)

Free Running Test

(1) Place starter in a vise and connect a fully charged, 12 volt battery to starter as follows:

(a) Connect a test ammeter (100 amperes scale) and a carbon pile rheostat in series with battery positive post and starter terminal.

(b) Connect a voltmeter (15 volt scale) across starter.

(c) Rotate carbon pile to full-resistance position.

(d) Connect battery cable from battery negative post to starter frame.

(e) Adjust the rheostat until battery voltage shown on voltmeter reads 11 volts. Amperage draw should be as shown in specifications.

Locked-Resistance Test

(1) Install starter in a test bench.

(2) Follow instructions of test equipment manu-

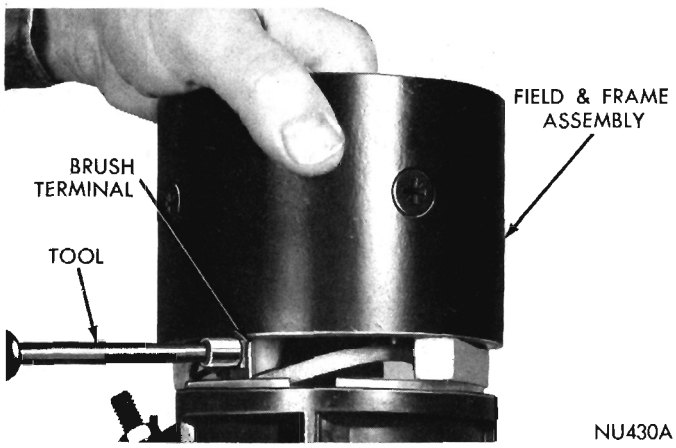


Fig. 2 - Removing or Installing Terminal Screw

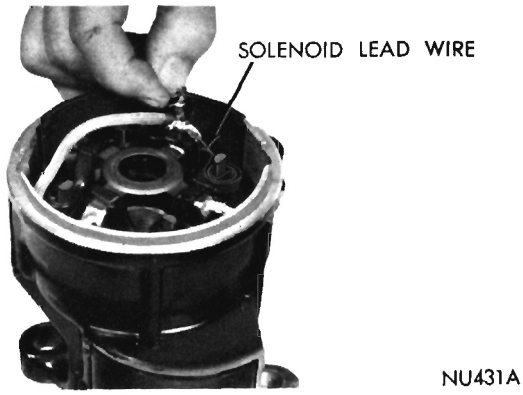


Fig. 3 - Unwinding or Winding Solenoid Lead Wire

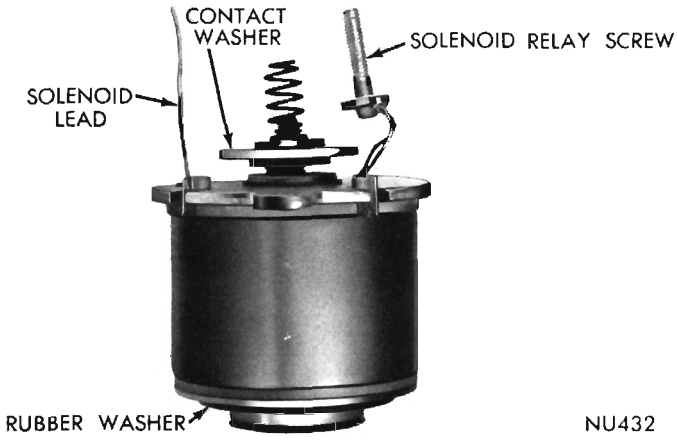


Fig. 4 - Solenoid Assembly

facturers and test starter against following specifications. With applied battery voltage adjusted to 4 volts. Amperage draw should be as shown in specifications.

DISASSEMBLING THE STARTER

(1) Place the starter gear housing in a vise equipped with soft jaws. Use the vise as support fixture only. **DO NOT** clamp.

(2) Remove two through bolts and starter end head assembly.

(3) Carefully pull armature up and out of gear housing and starter frame and field assembly. Remove steel and fiber thrust washer. **The wire of shunt field coil is wrapped on the brush terminal. One set of brushes are connected to this terminal. The other pair of brushes is attached to the series field coils by means of a terminal screw. Carefully pull frame and field assembly up just enough to expose terminal screw and wire wrap connection of shunt field at brush terminal. Place two wood blocks between starter frame and starter gear housing to facilitate removal of terminal screw, Fig. 2**

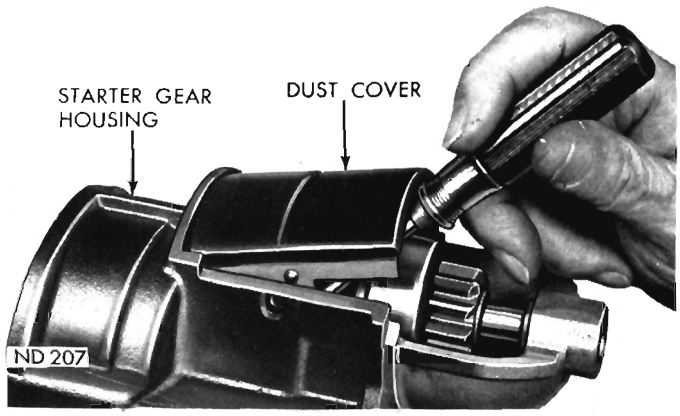


Fig. 5 - Removing Dust Cover

(4) Support brush terminal by placing a finger behind the terminal and remove terminal screw.

(5) Unwrap shunt field coil lead from starter brush terminal. **Starter brush holder plate with starter brush terminal, contact and brushes is serviced as an assembly.**

(6) Unwrap solenoid lead wire and unwind wire from starter brush terminal (Fig. 3).

(7) Remove nut (11/32 wrench), steel washer and insulating washer from solenoid terminal.

(8) Straighten solenoid wire and remove brush holder plate with brushes and solenoid as an assembly.

(9) Remove solenoid assembly from gear housing well (Fig. 4).

(10) Remove nut from starter battery terminal.

(11) Remove starter battery terminal from holder plate.

(12) Remove solenoid contact and plunger from solenoid.

(13) Remove solenoid return spring from well of solenoid housing moving core.

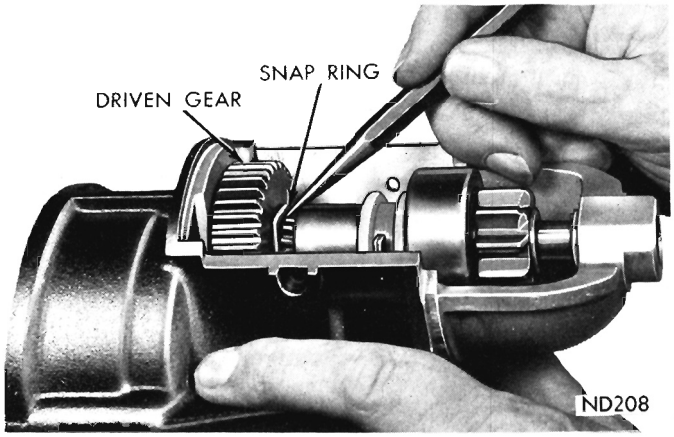


Fig. 6 - Removing the Driven Gear Snap Ring

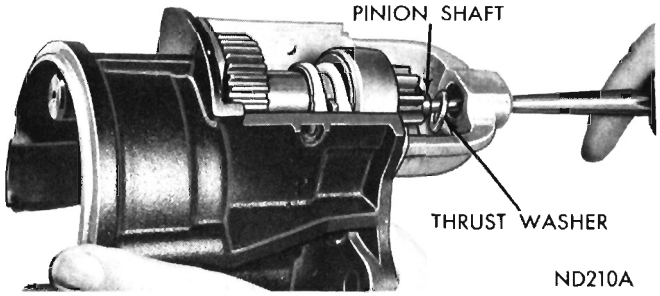


Fig. 8 - Removing Pinion Shaft

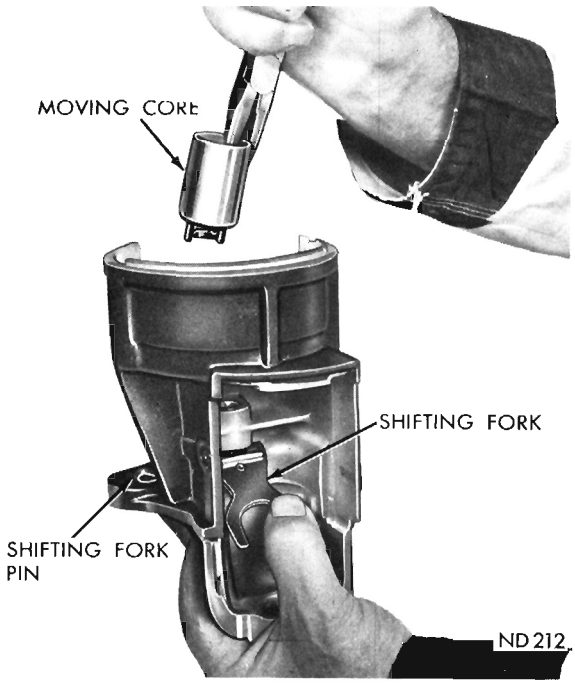


Fig. 10 Removing or Installing Moving Core

(14) Remove dust cover from gear housing (Fig. 5).

(15) Release retainer clip that positions driven gear on pinion shaft (Fig. 6).

CAUTION: Retainer is under tension and a cloth should be placed over the retainer to prevent it from springing away after removal.

(16) Release retainer ring at front of pinion shaft (Fig. 7). **Do not spread retainer ring any greater than outside diameter of pinion shaft otherwise lock ring can be damaged.**

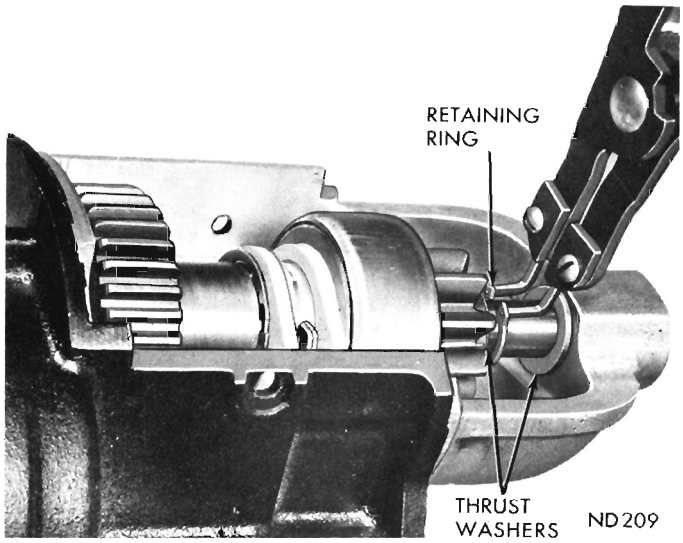


Fig. 7 - Removing or Installing Pinion Shaft Retainer Ring

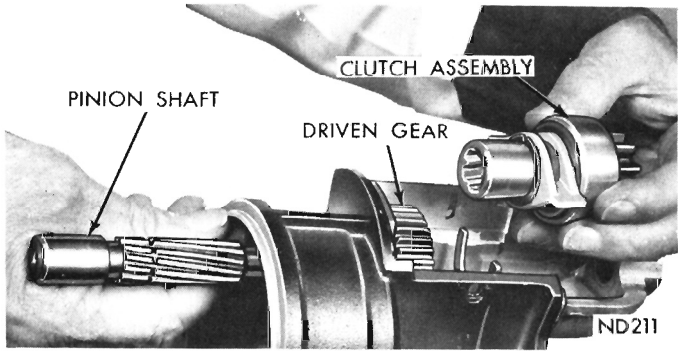


Fig. 9 - Removing or Installing Clutch Assembly

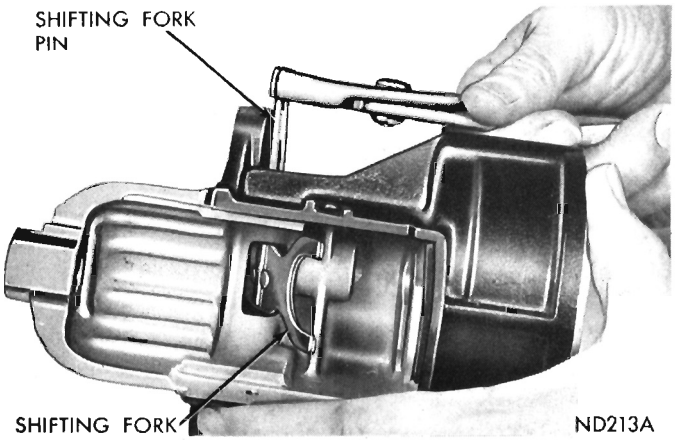


Fig. 11 - Removing or Installing Shifting Fork Pin

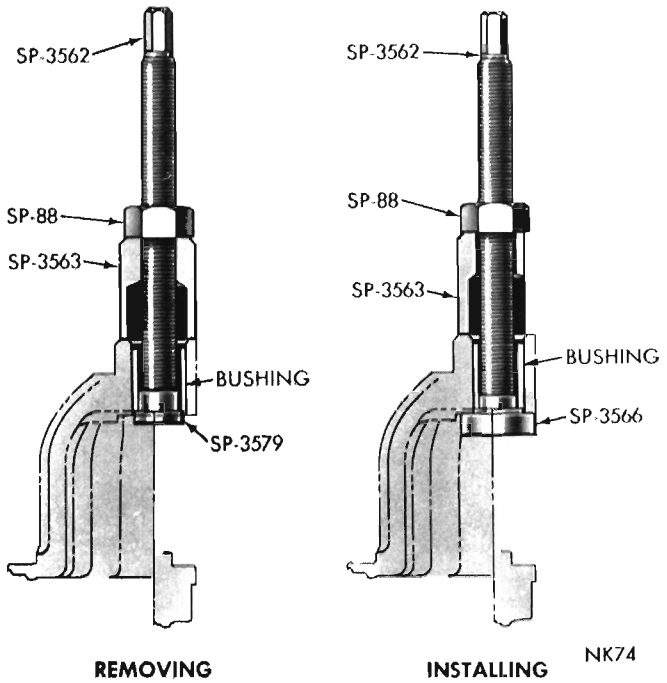


Fig. 12 - Removing and Installing Pinion Housing End Bushing

(17) Push pinion shaft towards rear of housing (Fig. 8) and remove retainer ring and thrust washers, clutch and pinion assembly, with the two shift fork nylon actuators as an assembly (Fig. 9).

(18) Remove driven gear and friction washer.

(19) Pull shifting fork forward and remove solenoid moving core (Fig. 10).

(20) Remove shifting fork retainer pin (Fig. 11) and remove clutch shifting fork assembly.

CLEANING THE STARTER PARTS

(1) Do not immerse parts in cleaning solvent. Immersing field frame and coil assembly and/or armature will damage insulation. Wipe these parts with a clean cloth **only.**

(2) Do not immerse clutch unit in cleaning solvent. The clutch is pre-lubricated at the factory and solvent will wash lubricant from the clutch.

(3) The starter-clutch outer housing and pinion gear may be cleaned with a cloth moistened with cleaning solvent and wiped dry with a clean dry cloth.

(4) Clean all corrosion from solenoid assembly and inside of solenoid housing. These metal parts are part of the solenoid hold-in ground circuit and must be clean.

(5) Clean terminal contacts and contactor with crocus cloth.

(6) Thoroughly clean outside area of brush plate to remove all oil and dirt.

REPLACEMENT OF BRUSHES AND SPRINGS

(1) Brushes that are worn more than 1/2 the length of new brushes, or are oil-soaked, should be replaced.

(2) When **resoldering** the shunt field and solenoid lead, make a strong low resistance connection using a high temperature solder and resin flux. **Do not use acid** or acid core solder. **Do not** break the shunt field wire units, when removing and installing brushes.

(3) Measure brush spring tension with a spring scale hooked under the spring near the end. Pull scale on a line parallel to the edge of brush and take a reading just as spring leaves brush. Spring tension should be 32 to 36 ounces. Replace springs that do not meet specifications.

TESTING ARMATURE

Testing Armature for Short Circuit

Place armature in growler and hold a thin steel blade parallel to the core and just above it, while slowly rotating armature in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace armature if shorted.

Testing Armature for Ground

Contact armature shaft and each of the commutator riser bars with a pair of test lamp test probes. If lamp lights, it indicates a grounded armature. Replace grounded armature.

Testing Commutator Run-Out, and Refacing

Place armature in pair of "V" blocks and measure runout with dial indicator. Measure both shaft and commutator. A bent shaft requires replacement of armature. When commutator runout exceeds .003 inch, commutator should be refaced. Remove only a sufficient amount of metal to provide a smooth, even surface.

Testing Field Coils for Ground

(1) Remove field frame assembly from starter.

(2) Carefully drill out the rivet attaching the series field coil ground lead and shunt field coil lead to field frame.

(3) Insulate field coil leads from field frame.

(4) Test for ground using a 110 volt test lamp. Touch one probe of test lamp to series field coil lead and other probe to field frame. Lamp should not light. Repeat the procedure for shunt field coil.

If lamp lights, it indicates that field coils are grounded and require replacement.

REPLACING THE FIELD COILS

A pole shoe impact screwdriver Tool C-3475 should be used to remove and install field coils to prevent damage to pole shoe screws and for proper tightening. Pole shoes that are loose and not

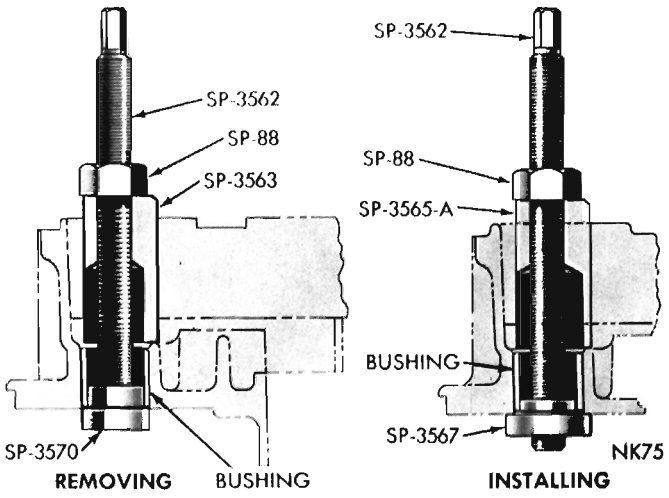


Fig. 13 - Removing and Installing Pinion Housing Drive Shaft Bushing

properly seated may cause armature core to rub on pole shoes. **Make sure area between the leads and starter frame is clean. Peen new rivet securely to insure a good electrical contact.**

SERVICING THE STARTER BUSHINGS

Inspect armature shaft bearing, pinion shaft surfaces and bushings for wear. Try the bushings for wear by inserting the shafts and test for side play. **Pre-sized starting motor bushings are available as service bushings. Use Tool C-3944 to remove old bushings and install the new. No burnishing or reaming is required to fit pre-sized bushings.**

The C-3944 Tool and its adaptors are designed to service all of the gear reduction motor bushings with the exception of the end head bushing. End head bushing and end head are serviced as an assembly.

Remove and install bushings (Figs. 12, 13 and 14).

SERVICING THE STARTER CLUTCH UNIT

Do not immerse starter clutch unit in a cleaning solvent. Starter clutch is pre-lubricated at the factory and a solvent will wash lubricant from the clutch.

The starter clutch outer housing and pinion gear may be cleaned with a cloth moistened with a cleaning solvent and wiped dry with a clean dry cloth.

Rotate the pinion. Pinion gear should rotate smoothly in one direction (not necessarily easily), but should not rotate in opposite direction. If starter clutch unit does not function properly, or pinion is worn, chipped or burred, replace starter clutch unit.

ASSEMBLING THE STARTER (Fig. 15)

The shifter fork consists of two spring steel plates assembled with two rivets. There should be approximately 1/16 inch side movement as shown in Figure 16 to insure proper pinion gear engagement. Lubricate between the plates sparingly with SAE 10 engine oil.

(1) Position shifter fork in drive housing and install shifting fork retainer pin. One tip of pin should be straight, other tip should be bent at a 15 degree angle away from the housing. The fork and retainer pin should operate freely after bend-

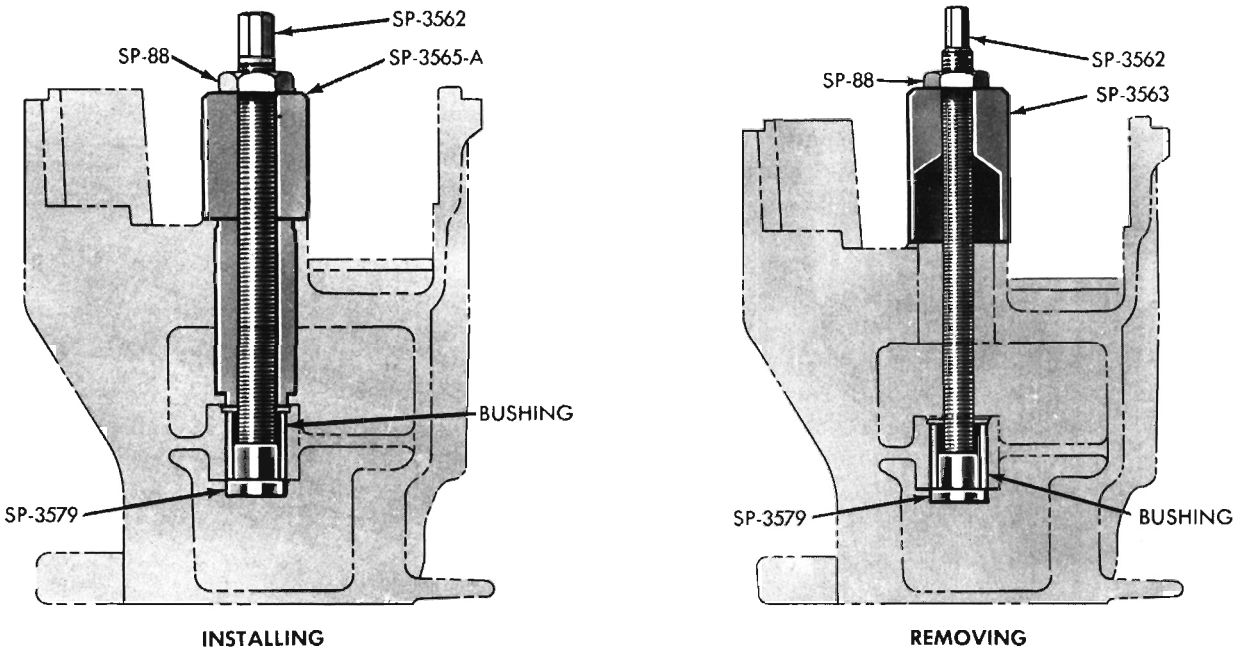


Fig. 14 Removing and Installing Pinion Housing Armature Shaft Bushing

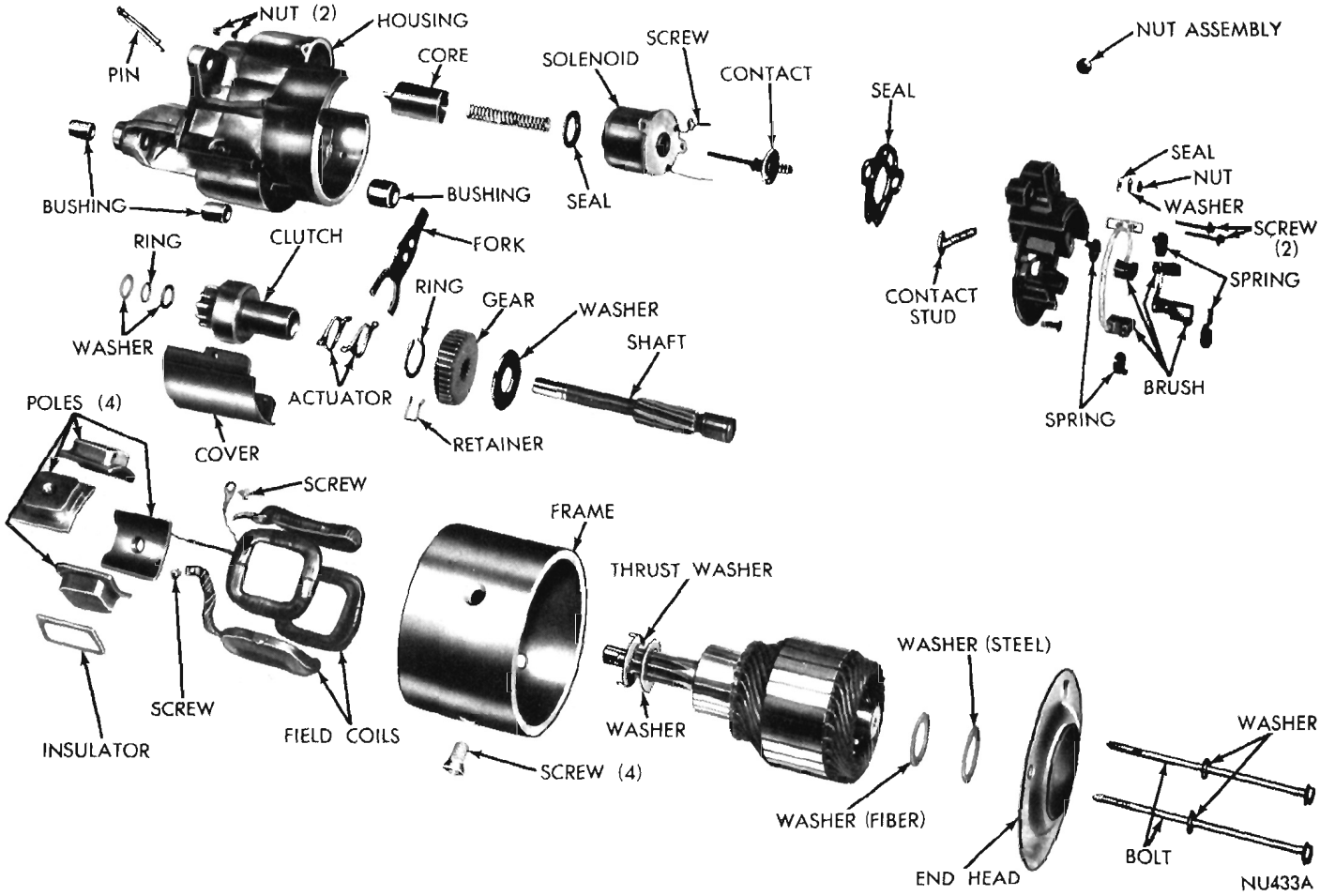


Fig. 15 - Starter (Exploded View)

ing tip of pin.

(2) Install solenoid moving core and engage shifting fork (Fig. 10).

(3) Enter pinion shaft into drive housing and install friction washer and drive gear.

(4) Install clutch and pinion assembly, thrust washer, retaining and thrust washer (Fig. 9).

(5) Complete installation of pinion shaft, engaging shifting fork with clutch actuators. Figures 16 and 17 show correct relation of parts at assembly.

The friction washer must be positioned on shoulder of splines of the pinion shaft before driven gear is positioned.

(6) Install driven gear snap ring (Fig. 6).

(7) Install pinion shaft retaining ring (Fig. 7).

(8) Install starter solenoid return spring into bore of movable core.

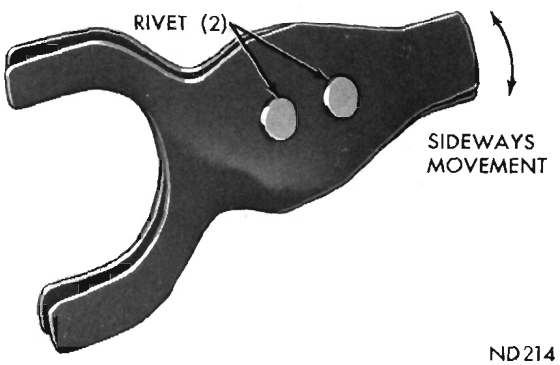


Fig. 16 - Shifter Fork Assembly

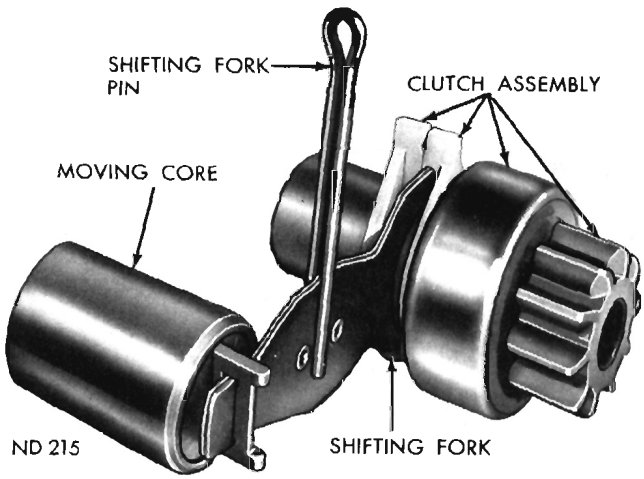


Fig. 17 - Shifter Fork and Clutch Arrangement

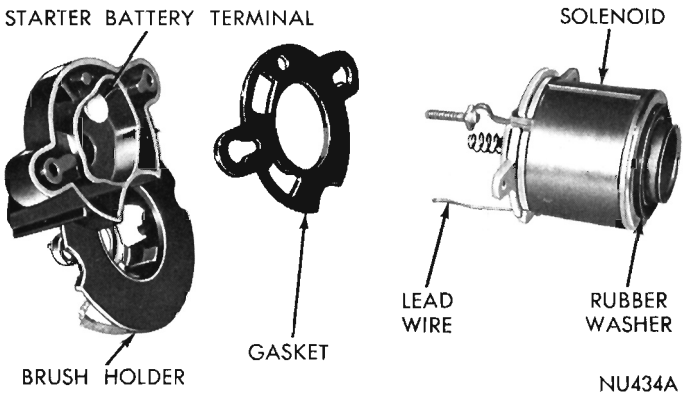


Fig. 18 - Assembling Solenoid to Brush Holder Plate

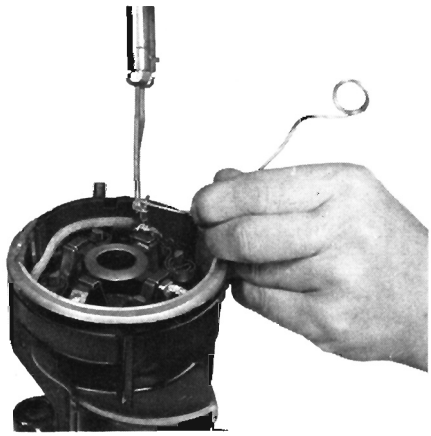


Fig. 19 - Soldering Solenoid Winding Lead to Brush Terminal

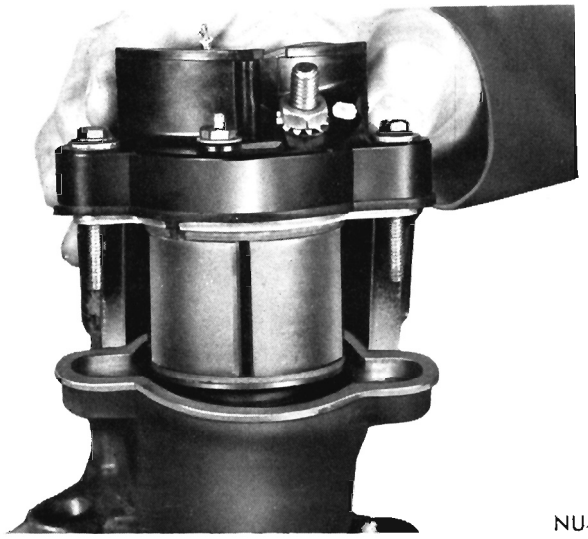


Fig. 20 - Installing Solenoid and Brush Holder Into Gear Housing



Fig. 21 - Soldering Shunt Coil Lead Wire

Inspect condition of starter solenoid switch contacting washer, if top of washer is burned from arcing, disassemble contact switch plunger assembly and reverse the washer.

(9) Install solenoid contact plunger assembly into solenoid and reform double wires to allow for proper entry of terminal stud into brush holder with the double wires curved around the contactor.

CAUTION: The contactor must not touch the double wires when solenoid is energized after assembly is completed (Fig. 4).

Make sure contact spring is positioned on the shaft of the solenoid contact plunger assembly.

(10) Assemble battery terminal stud in brush holder.

Inspect condition of the contacts in brush holder plate. If contacts are badly burned, replace brush holder with brushes and contacts as an assembly.

(11) Position seal on brush holder plate.

(12) Enter solenoid lead wire through hole in brush holder (Fig. 18) and install solenoid stud, insulating washer, flat washer and nut.

(13) Wrap solenoid lead wire tightly around brush terminal post as shown in Figure 19 and solder securely with a high temperature resin core solder and resin flux.

(14) Install brush holder to solenoid attaching screws.

(15) Carefully enter solenoid coil and brush plate assembly into bore of gear housing and position brush plate assembly into starter gear housing (Fig. 20) and install housing attaching nuts. Tighten securely.

(16) Position brushes with armature thrust washer as shown in Figure 19. This will hold brushes out and facilitate proper installation of armature.

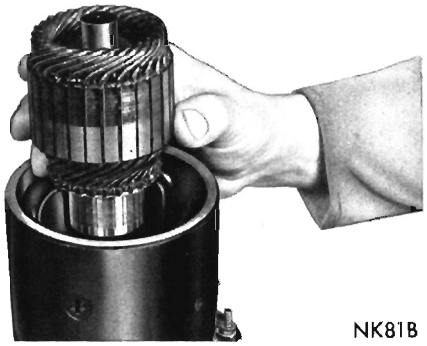


Fig. 22 - Installing Starter Armature

(17) Solder shunt coil lead wire to starter brush terminal (Fig. 21).

(18) Install brush terminal screw (Fig. 2).

(19) Position field frame to the exact position on gear housing and enter armature into field frame and starter gear housing (Fig. 22) carefully engaging splines of shaft with reduction gear by rotating armature slightly to engage the splines.

(20) Install thrust washer (fiber) and washer (steel) on armature shaft.

(21) Position starter end head assembly and install starter frame lockwashers and through bolts. Tighten through bolts securely.

INSTALLING THE STARTER

(1) Before installing the starter, make sure starter and flywheel housing mounting surfaces are free of dirt and oil, to insure a good electrical contact.

(2) Position starter to flywheel housing removable seal (if removed).

(3) Install the starter, washer and bolt, the automatic transmission oil cooler tube bracket (if so equipped) and washer and nut. **When tightening attaching bolt and nut be sure to hold the starter pulled away from the engine to insure proper alignment.**

(4) Attach wire at solenoid switch terminal, and cable to starter terminal.

(5) Connect battery ground cable and test operation of the starter for proper engine cranking.

DIRECT DRIVE STARTER

INDEX

	Page
Amperage Draw Test	16
Assembling the Starter	22
Brushes and Springs Replacement	19
Bushings — Servicing	22
Cleaning the Starter Parts	19
Disassembling the Starter	18
Drive Unit — Servicing	22
Drive Gear Pinion Clearance — Adjusting	22
Field Coils — Replacement	21
Free Running Test	17
Installing the Starter	22
Insulated Circuit Test	17
Removing the Starter	17
Resistance Test	17
Specifications	123
Starter Circuit Tests	17
Ground Circuit Test	17
Insulated Circuit Test	17
Testing Armature	20
Armature for Short Circuit	20
Armature for Ground	20
Commutator Runout	20
Field Coils for Ground	20
Testing Starting Motor (Bench Test)	17

SERVICE PROCEDURES

CHECK AMPERAGE DRAW TEST

(With Starter Tester)

Check battery electrolyte gravity with a reliable hydrometer. Gravity should be not less than 1.220 (temperature corrected). See that battery passes High Rate Discharge Test shown in the" Battery" section of this manual.

Turn Battery — Starter Tester **CONTROL KNOB** to "OFF" POSITION.

Turn voltmeter Selector Switch to 16 Volt position. Connect **Positive** ammeter lead (Red) to **Positive** battery terminal. Connect heavy **Negative** ammeter lead (Black) to **Negative** battery terminal.

Connect **Positive** voltmeter lead(Red) to **Positive** battery terminal. Connect **Negative** voltmeter lead (Black) to **Negative** battery terminal.

Disconnect ignition primary lead from ignition ballast resistor, or primary wire from either side of coil, to prevent engine from starting.

Crank engine with a remote control starter switch and observe **Exact** reading on Voltmeter. Stop cranking engine. Without cranking engine, turn tester **CONTROL KNOB** clockwise until voltmeter reads **Exactly** the same as when engine was being cranked with the remote control starter

switch. Ammeter now indicates starter amperage draw. Check specifications.

Engine should be up to operating temperature. Extremely heavy oil or a tight engine will increase starter amperage draw.

STARTER RESISTANCE TEST

(1) Test battery electrolyte specific gravity. Specific gravity should be 1.220 or above.

(2) Disonnect positive battery lead from battery terminal post. Connect a 0 to 300 scale ammeter between disconnect lead and battery terminal post.

(3) Connect a test voltmeter with 10 volt scale division between battery positive post and starter switch terminal at starter solenoid.

(4) Crank engine and observe reading on voltmeter and ammeter. The voltage should not exceed .3 volt. A reading of voltage that exceeds .3 volt indicates there is high resistance caused from loose circuit connections, a faulty cable, burned starter relay or solenoid switch contacts. A current that is high and is combined with slow cranking speed, indicates that starter should be removed and repaired.

INSULATED CIRCUIT TEST

(1) Test battery electrolyte specific gravity. Specific gravity should be 1.220 or above.

(2) Turn Voltmeter Selector Switch to 4 volt position.

(3) Disonnect ignition coil secondary cable.

(4) Connect voltmeter positive lead to battery positive post and voltmeter negative lead to solenoid connector which connects to starter field coils. **The voltmeter will read off scale to the right until starter is actuated.**

(5) Connect remote control switch to the battery and solenoid terminal of starter relay.

(6) Crank engine with a remote control starter switch and observe voltmeter reading. Voltmeter reading should not exceed .3 volt. A voltmeter reading of .3 volt or less indicates voltage drop is normal in the cables, starter relay switch, solenoid switch and connections between battery and starter is normal. See "Starter Ground Circuit Test."

If voltmeter reading is more than .3 volt, it indicates high resistance in the starter insulated circuit. Make following tests to isolate point of excessive voltage loss.

(a) Remove the voltmeter lead from the solenoid connector and connect to the following points, repeating test at each connection. Starter terminal of solenoid, battery terminal of solenoid, battery cable terminal at solenoid, starter relay and cable clamp at battery.

(b) A small change will occur each time a normal portion of the circuit is removed from the test. A definite change in voltmeter reading indicates that the last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery ground cable	.2 volt
Engine ground circuit	.1 volt
Each connection	.0 volt

Replace faulty cables. Clean and tighten all connections.

STARTER GROUND CIRCUIT TEST

(1) Connect the voltmeter positive lead to starter housing and negative voltmeter lead to battery negative post.

(2) Crank engine with a remote control starter switch and observe voltmeter reading. Voltmeter reading should not exceed .2 volt a reading of .2 volt or less indicates voltage loss in ground cable and connections are normal. If voltmeter reading is more than .2 volt, it indicates excessive voltage loss in starter ground circuit. Make the following tests to isolate point of excessive voltage loss, repeating test at each connection.

(a) Starter drive housing.

(b) Cable terminal at engine.

(c) Cable clamp at battery.

A small change will occur each time a normal portion of the circuit is removed from test. A definite change in voltmeter reading indicates the last part eliminated in the test is at fault.

Maximum allowable voltage loss is as follows:

Battery ground cable	.0 volt
Engine ground circuit	.2 volt
Each connection	.1 volt

REMOVING THE STARTER

(1) Disconnect ground cable at battery.

(2) Remove starter cable at starter.

(3) Disconnect solenoid lead wire from solenoid.

(4) Remove bolts attaching starter to flywheel housing and remove starter.

(Bench Test)

FREE RUNNING TEST

(1) Place starter in a vise equipped with soft jaws and connect a fully-charged, 12 volt battery to starter as follows

(2) Connect a test ammeter (100 amperes scale) and a carbon pile rheostat in series with battery positive post and starter terminal.

(3) Connect voltmeter (15 volt scale) across starter.

(4) Rotate carbon pile to full-resistance position.

(5) Connect battery cable from battery negative

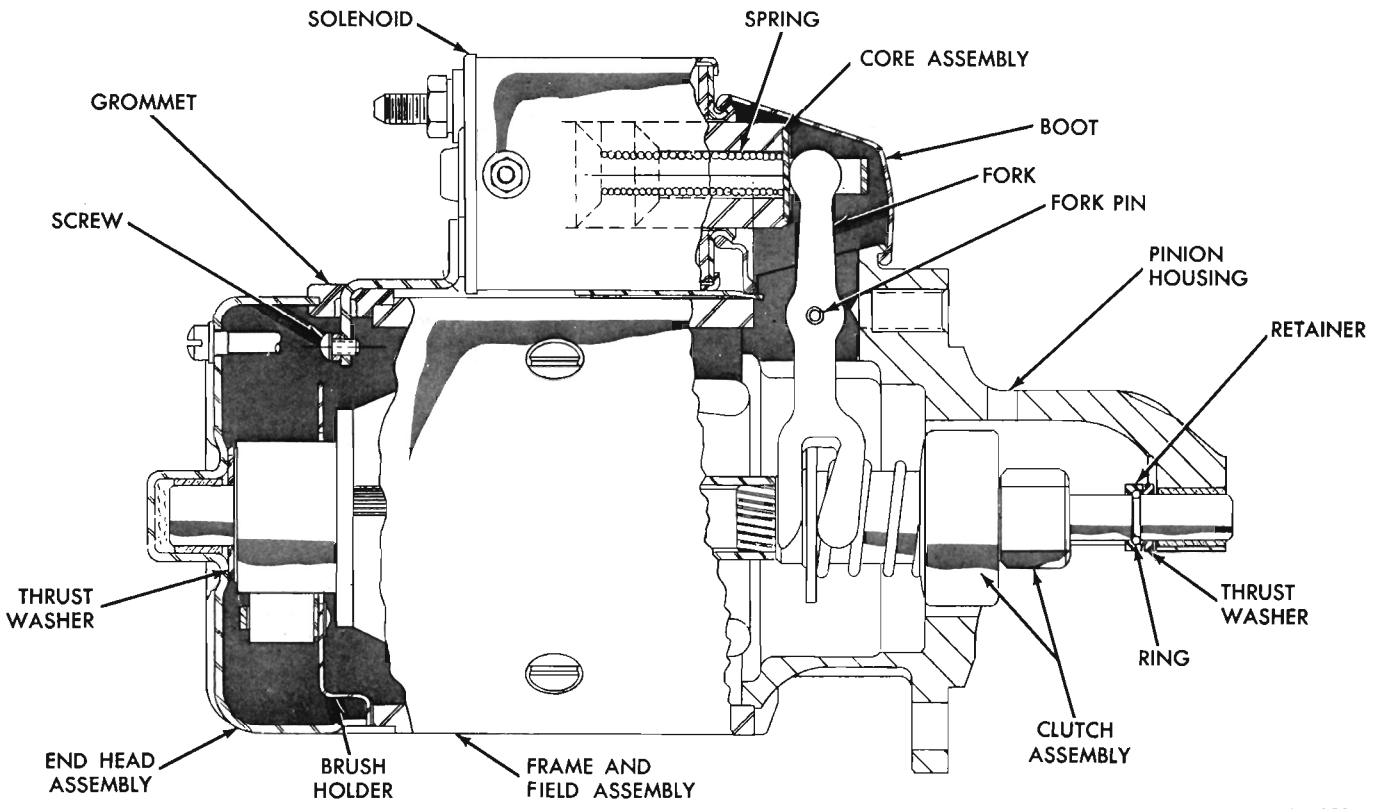


Fig. 1 - Starter - Cross Section

post to starter frame.

(6) Adjust rheostat until battery voltage shown on voltmeter reads 11 volts.

(7) Current draw should be 78 amperes maximum at 3800 minimum rpm.

Locked Resistance Test

(1) Install starter in test bench.

(2) Follow instructions of test equipment manufacturer and test the locked-resistance of the starter as follows:

With applied battery voltage adjusted to 4 volts, current draw should be as shown in specifications.

DISASSEMBLING THE STARTER

(1) Refer to Figure 1, remove through bolts and tap commutator end head from field frame.

(2) Remove thrust washers from armature shaft.

(3) Lift brush holder springs and remove brushes from brush holders.

(4) Remove brush plate (Fig. 2).

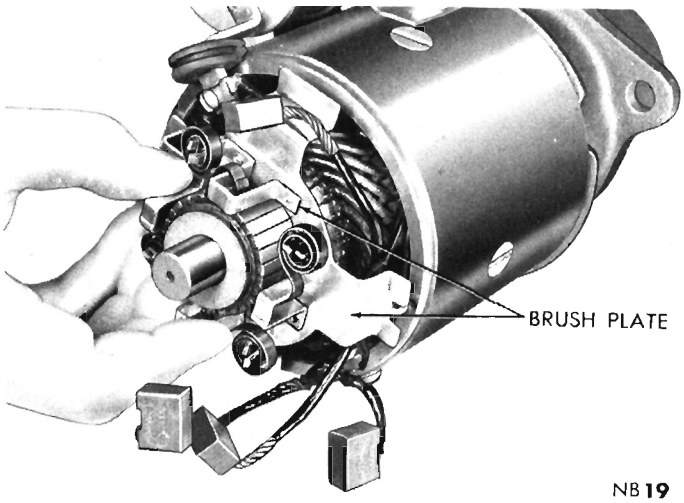


Fig. 2 - Removing Brush Plate

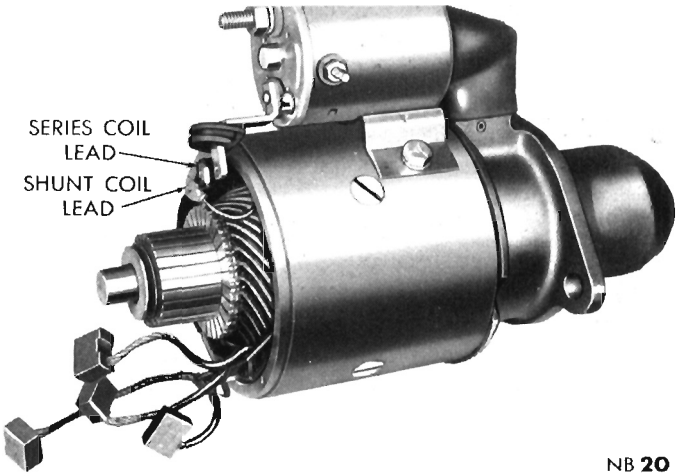


Fig. 3 - Field Coil Leads Disconnected from Solenoid Connector

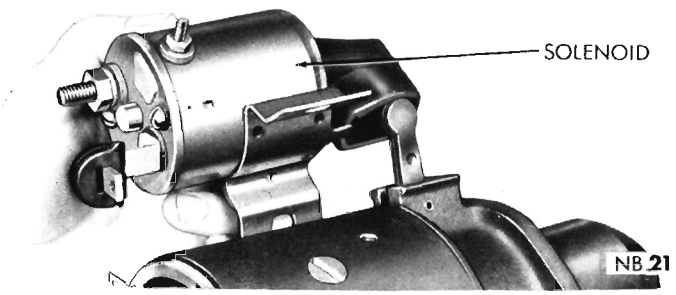


Fig. 4 - Removing or Installing Starter Solenoid

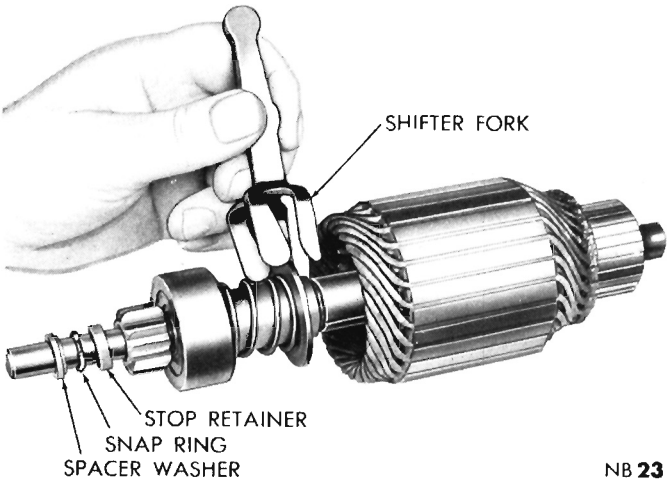


Fig. 6 - Removing or Installing Shift Fork

(5) Disconnect field coil leads at solenoid connector (Fig. 3).

(6) Remove solenoid attaching screws and remove solenoid and boot assembly (Fig. 4).

(7) Drive out overrunning clutch shift fork pivot pin (Fig. 5).

(8) Remove drive end pinion housing and spacer washer. Replace the pinion housing assembly, if the rubber seal (Fig. 1) is damaged (units so equipped).

(9) Note position of shifter fork on starter drive and remove shifter fork (Fig. 6).

(10) Slide overrunning clutch pinion gear toward commutator end of armature, drive stop retainer toward clutch pinion gear to expose snap ring and remove snap ring.

(11) Slide overrunning clutch drive from armature shaft.

(12) If it is necessary to replace field coils, remove the ground brushes terminal attaching screw and raise the brushes with terminal and shunt wire up and away from field frame (Fig. 7). Remove pole shoe screws with special pole shoe impact screwdriver, Tool C-3475.

CLEANING THE STARTER PARTS

(1) Do not immerse parts in cleaning solvent. Immersing the field frame and coil assembly

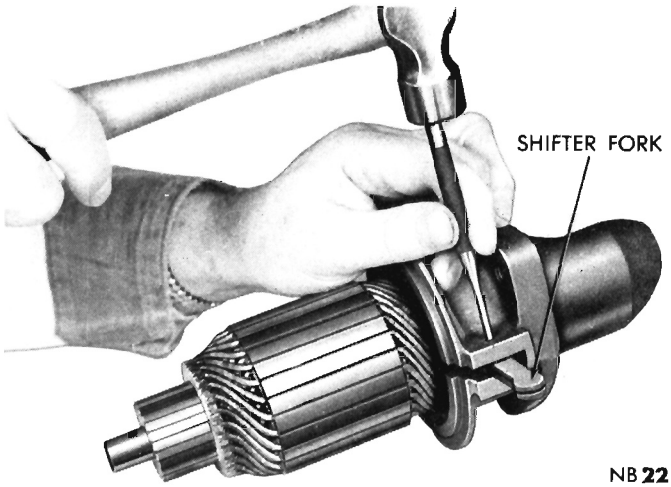


Fig. 5 - Removing Shifter Fork Pivot Pin

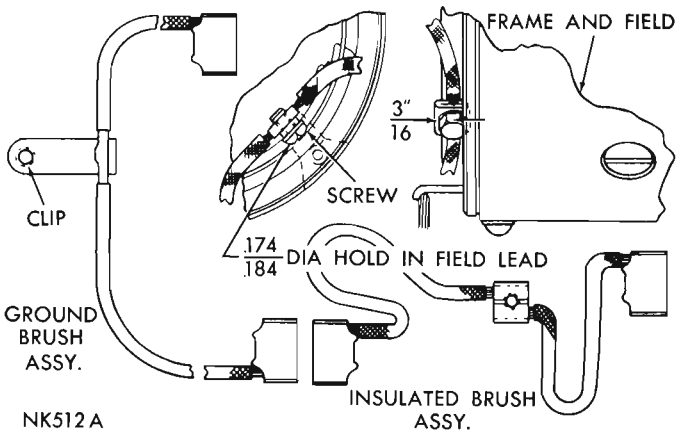


Fig. 7 - Brush Replacement

and/or armature will damage insulation. Wipe these parts with a cloth **only**.

(2) Do not immerse drive unit in cleaning solvent. Drive clutch is pre-lubricated at the factory and solvent will wash lubrication from clutch.

(3) The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.

BRUSHES AND SPRINGS — REPLACEMENT

(1) Brushes that are worn more than 1/2 the length of new brush, or are oil-soaked, should be replaced. Brushes and springs can be replaced after removing commutator end head and brush plate.

(2) Disengage brushes from brush holders and remove brush plate.

(3) Disconnect series coil and shunt field coil terminal at solenoid connector (Fig. 3).

(4) Remove ground brush terminal screw and carefully remove ground brush set to prevent breaking shunt field lead.

(5) Remove shunt field from old brush set to

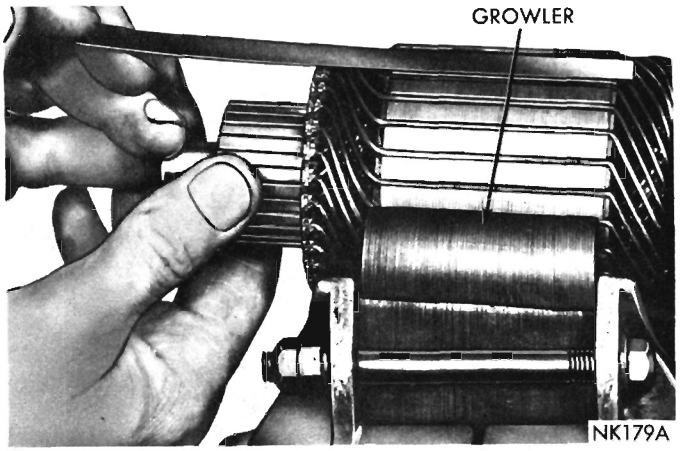


Fig. 8 - Testing Armature for Short

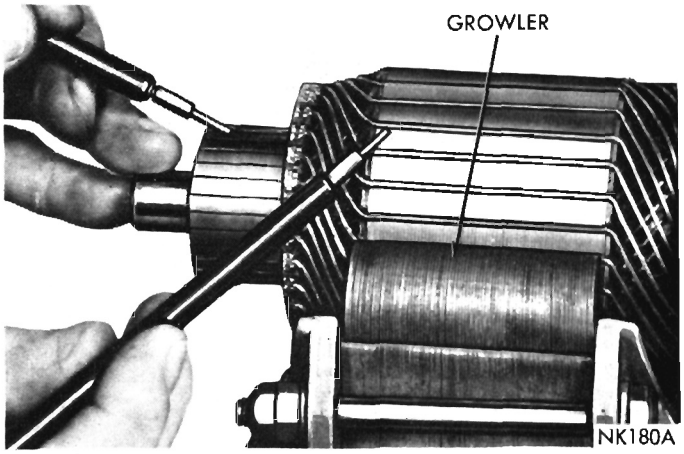


Fig. 9 - Testing Armature for Ground

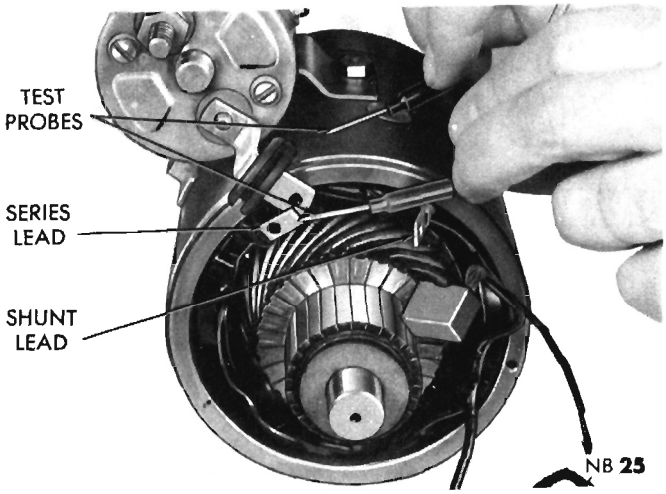


Fig. 10 Testing Series Coil for Ground

ensure as much length as possible.

(6) Remove field terminal plastic covering and remove old brushes. Use side cutters to break the weld by rolling the stranded wire off the terminal.

(7) Drill a .174 to .184 inch hole in the series coil terminal 3/16 of an inch from top of terminal to centerline of hole (Fig. 7). (Use a number 16 drill.)

CAUTION Do not damage the field coil during the drilling operation.

(8) Attach insulated brush set to series field terminal with flat washer and number 8 self-tapping screw.

(9) Attach shunt field lead to new ground brush set by making a loop around the terminal and soldering lead to the terminal with resin core solder.

(10) Attach ground brush terminal to field frame with attaching screw. Fold surplus shunt field lead back along the brush lead and secure with rubber insulating tape.

(11) Measure brush spring tension with a spring scale hooked under spring near brush end. Pull scale on a line parallel to edge of brush and take a reading just as spring end leaves the brush. Spring tension should be 32 to 36 ounces. Replace springs that do not meet specifications.

(12) Brush springs can be removed by spreading the retainers and disengaging the springs from retainer legs.

TESTING THE ARMATURE

Testing Armature for Short Circuit

Place armature in a growler (Fig. 8) and hold a thin steel blade parallel to the core and just above it, while slowly rotating armature in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.

Testing Armature for Ground

Touch armature shaft and the end of each commutator bar with a pair of test lamp prods (Fig. 9). If lamp lights, it indicates a grounded armature. Replace grounded armature.

Testing Commutator Runout, Refacing

Place armature in a pair of "V" blocks and check runout with a dial indicator. Check both shaft and commutator. A bent shaft requires replacement of armature.

When commutator runout exceeds .003 inch, commutator should be refaced. Remove only a sufficient amount of metal to provide a smooth, even surface.

TESTING FIELD COILS FOR GROUND

(1) Remove through bolts and commutator end frame.

(2) Remove brushes from brush holders and remove brush plate (Fig. 2).

(3) Disconnect field lead wires at solenoid connector and separate field leads to make sure they

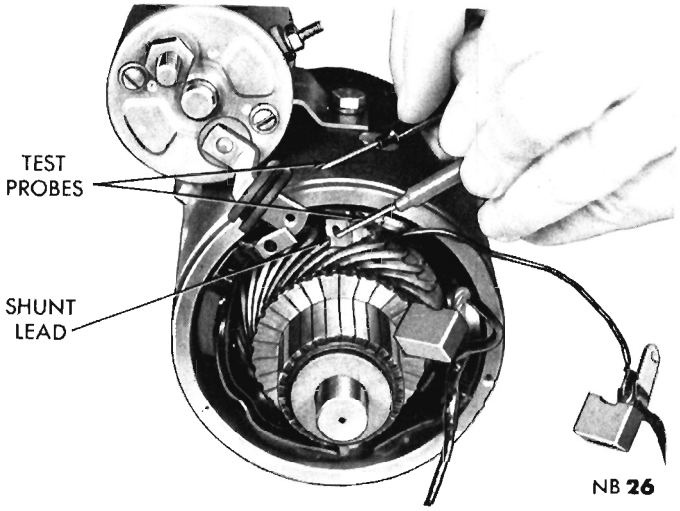


Fig. 11- Testing Shunt Coil for Ground

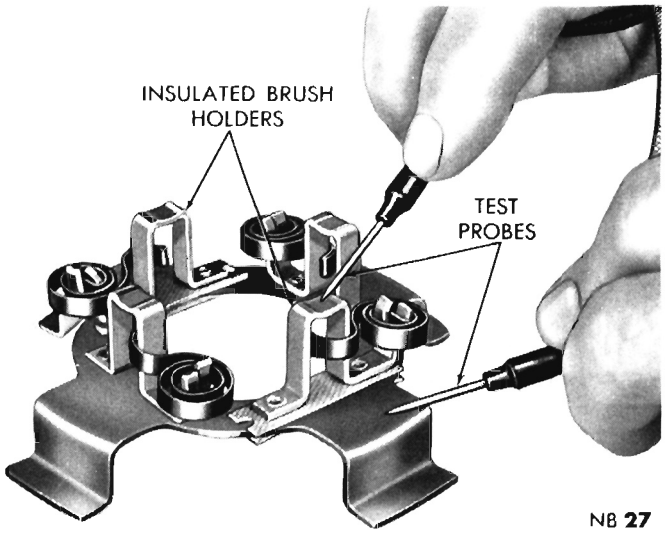


Fig. 12 - Testing Insulated Brush Holder for Ground

do not touch solenoid connector (Fig. 3).

(4) Remove ground brushes attaching screw, and raise brushes with terminal and shunt wire up and away from field frame.

(5) Touch one probe of test lamp to series field coil lead and other probe to field frame (Fig. 10). Lamp should not light.

(6) Touch one probe to shunt field coil lead and other probe to field frame (Fig. 11).

If lamp lights in either test (5) or (6), field coils are grounded. If field coils are grounded, test each coil separately after unsoldering connector wires. Replace grounded field coils.

(7) Touch each of the brush holders with one test probe, while holding other test probe against brush ring. Two brush holders that are 180 degrees apart should cause test lamp to light as they are intentionally grounded. The other two brush holders (Fig. 12) should not cause lamp to light when tested as they are insulated. If insulated brush holders cause lamp to light when tested, it indicates that brush holders on brush ring are grounded. Replace brush ring assembly if brush holders are grounded.

REPLACING FIELD COILS

A pole shoe impact screwdriver Tool C-3475 should be used to remove and install field coils to prevent damage to the pole shoe screws and for proper tightening.

Pole shoes that are loose and not properly seated may cause armature core to rub on pole shoes.

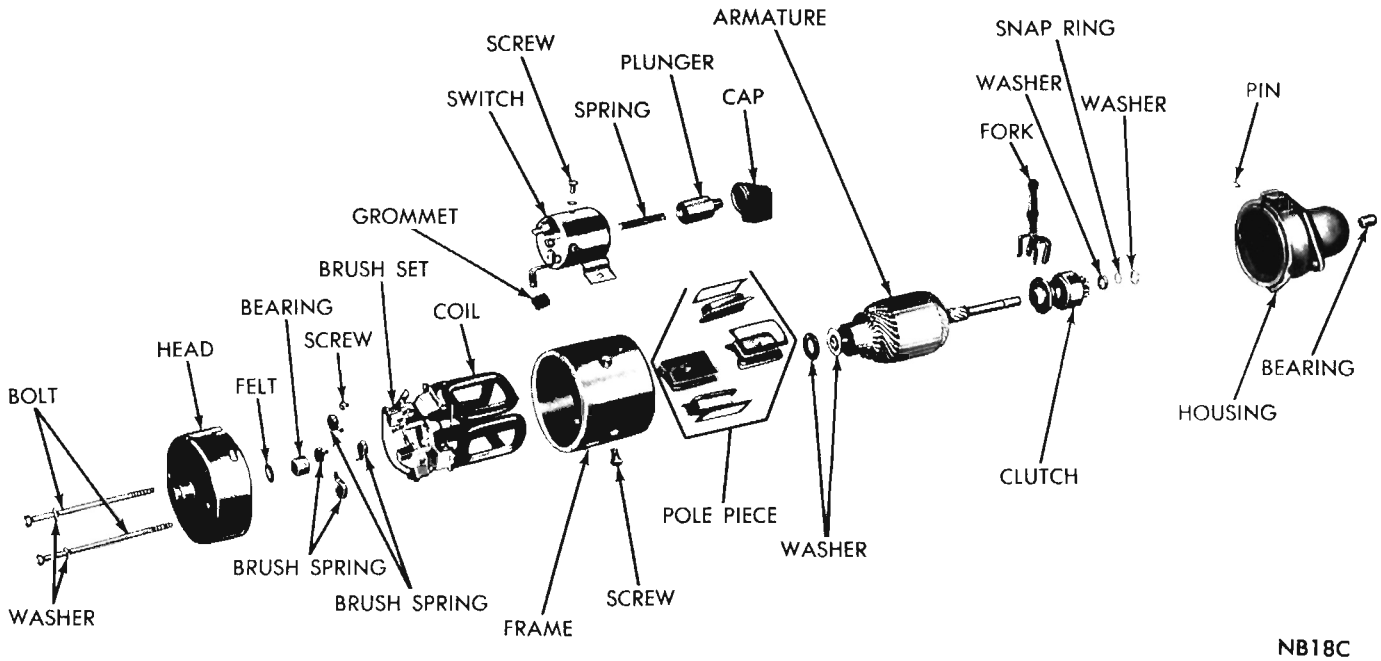


Fig. 13 - Starter - Disassembled View

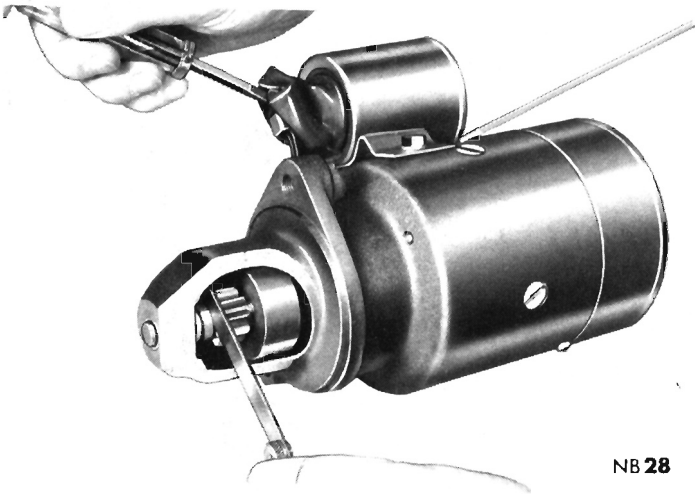


Fig. 14 - Checking Starter Drive Pinion Clearance

This will decrease starter efficiency and damage armature core. **Scribe a mark in the pole shoe and field frame to ensure pole shoes are assembled in their original position.**

SERVICING BUSHINGS

Inspect armature shaft bearing surfaces and bushings for wear by placing armature core in a vise equipped with soft jaws. Do not squeeze tightly. Try the commutator end frame, drive end frame, and armature support bushings for wear by placing them on shafts and checking for side play. Replace commutator end frame and bushing assembly if bushing is worn. Replace drive end bushing if worn. The bushing should be well soaked in SAE 30 engine oil before it is installed. New pre-sized bushings should be pressed into the housing until bushing is flush with inner side of housing to provide proper clearance. Use Tool C-3944 to remove and install bushing.

SERVICING THE DRIVE UNIT

Place drive unit on armature shaft and, while holding armature, rotate the pinion. Drive pinion should rotate smoothly in one direction (not necessarily easily), but should not rotate in opposite direction. If drive unit does not function properly, or if pinion is worn or burred, replace drive unit.

ASSEMBLING THE STARTER

Refer to Figs, 1 and 13)

(1) Lubricate armature shaft and splines with SAE 10-W oil or SAE 30 rust preventative oil.

(2) Install starter drive, stop collar (retainer), lock ring and spacer washer.

(3) Install shifter fork over starter drive spring retainer washer with narrow leg of fork toward the commutator (Fig. 6). This is important, if the fork is not properly positioned starter gear travel will be restricted causing a lockup in the clutch mechanism.

(4) Install drive end (pinion) housing on armature shaft, indexing shifting fork with slot in drive end housing.

(5) Install shifter fork pivot pin (Fig. 5).

(6) With clutch drive, shifter fork, and pinion housing assembled to the armature, slide armature into field frame until pinion housing indexes with slot in field frame.

(7) Install solenoid and boot assembly (Fig. 4). Tighten bolts to 60-70 inch-pounds.

(8) Connect field coil leads at solenoid connector (Fig. 3). **Be sure terminals do not touch field frame.**

(9) Install brush holder plate (Fig. 2) indexing tang of ring in hole of field frame.

(10) Position brushes in brush holders. Be sure field coil lead wires are properly enclosed behind brush holder ring and do not interfere with brush operation.

(11) Install thrust washers on commutator end of armature shaft to obtain .010 inch minimum end play.

(12) Install commutator end head.

(13) Install through bolts and tighten to 40 to 50 inch-pounds.

ADJUSTING STARTER DRIVE GEAR (PINION) CLEARANCE

(1) Place starter assembly in a vise equipped with soft jaws and tighten vise sufficiently to hold starter.

Place a wedge or screwdriver between bottom of solenoid and starter frame to eliminate all deflection in the solenoid when making the pinion clearance test.

(2) Push in on solenoid plunger cage (Fig. 14) (NOT THE FORK LEVER) until plunger bottoms.

(3) Measure clearance between end of pinion and pin stop with plunger seated and pinion pushed toward the commutator end. Clearance should be 1/8 inch. Adjust for proper clearance by loosening solenoid attaching screws and move solenoid fore and aft as required.

(4) Test starter operation under a "Free Running Test."

INSTALLING THE STARTER

(1) Before installing the starter, be sure starter and flywheel housing mounting surfaces are free of dirt and oil. These surfaces must be clean to make good electrical contact.

(2) Position starter to flywheel housing removable seal (if removed).

(3) Install starter from beneath the engine.

(4) Tighten attaching bolts securely.
(5) Attach the wires to solenoid switch and starter terminal.
(6) Install battery ground cable and test operation of starter for proper engine cranking.

ISOLATED FIELD ALTERNATOR AND ELECTRONIC VOLTAGE REGULATOR

INDEX

	Page
Assembling the Alternator	35
Bench Tests	29
Disassembling the Alternator	30
General Information	23
Output Tests	25
Rectifier (Diode) Testing	31
Regulator Testing	27
Replacing Slip Rings	33
Service Diagnosis	23
Specifications	123
Voltage Regulator (Electronic)	25

GENERAL INFORMATION

The alternator (Figs. 1 and 2) is fundamentally an A.C. current generator, with six (6) built-in silicon rectifiers, that convert A.C. current into D.C. current. D.C. current is available at the "output" "BAT" terminal.

The main components of the alternator are the rotor, stator, rectifiers, the end shields and the drive pulley.

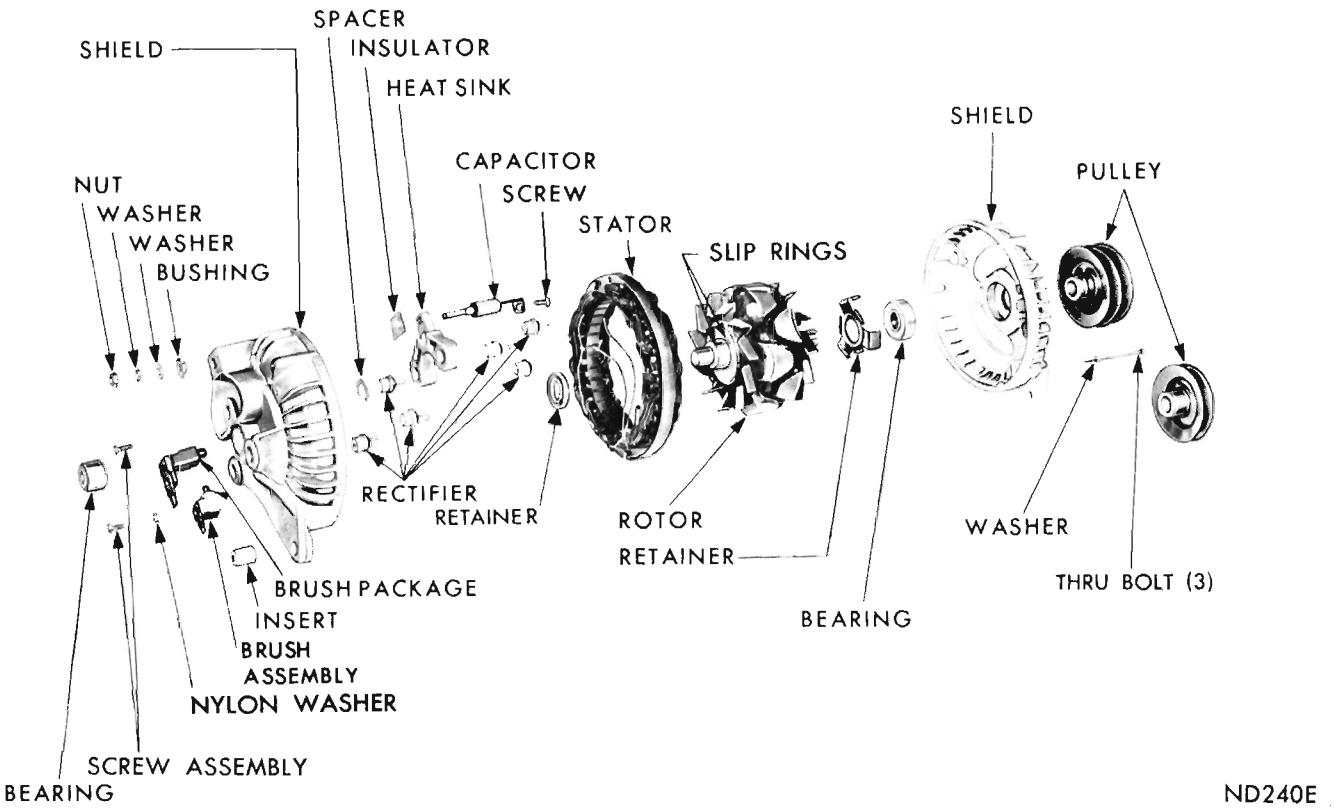


Fig. 1 - Isolated Field Alternator (Disassembled View)

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
ALTERNATOR FAILS TO CHARGE (No Output or Low Output)	(a) Alternator drive belt loose.	(a) Adjust drive belt to specifications.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(b) Regulator Base improperly grounded.	(b) Connect regulator to a good ground.
	(c) Worn brushes and/or slip rings.	(c) Install new brushes and/or slip rings.
	(d) Sticking brushes.	(d) Clean slip rings and brush holders. Install new brushes if necessary.
	(e) Open field circuit.	(e) Test all the field circuit connections, and correct as required.
	(f) Open charging circuit.	(f) Inspect all connections in charging circuit, and correct as required.
	(g) Open circuit in stator windings.	(g) Remove alternator and disassemble. Test stator windings. Install new stator if necessary.
	(h) Open recitfiers.	(h) Remove alternator and disassemble. Test the recitfiers. Install new recitfiers if necessary.
LOW, UNSTEADY CHARGING RATE	(a) High resistance in body to engine ground lead.	(a) Tighten ground lead connections. Install new ground lead if necessary.
	(b) Alternator drive belt loose.	(b) Adjust alternator drive belt.
	(c) High resistance at battery terminals.	(c) Clean and tighten battery terminals.
	(d) High resistance in charging circuit.	(d) Test charging circuit resistance. Correct as required.
	(e) Open stator winding.	(e) Remove and disassemble alternator. Test stator windings. Install new stator if necessary.
LOW OUTPUT AND A LOW BATTERY	(a) High resistance in charging circuit.	(a) Test charging circuit resistance and correct as required.
	(b) Shorted rectifier. Open recitfier.	(b) Perform current output test. Test the rectifiers and install new rectifiers as required. Remove and disassemble the alternator.
	(c) Grounded stator windings.	(c) Remove and disassemble alternator. Test stator windings. Install new stator if necessary.
	(d) Faulty voltage regulator.	(d) Test voltage regulator.
EXCESSIVE CHARGING RATE TO A FULLY CHARGED BATTERY	(a) Faulty ignition switch.	(a) Install new ignition switch.
	(b) Faulty voltage regulator.	(b) Test voltage regulator. Replace as necessary.
NOISY ALTERNATOR	(a) Alternator mounting loose.	(a) Properly install and tighten alternator mounting.
	(b) Worn or frayed drive belt.	(b) Install a new drive belt and adjust to specifications.
	(c) Worn bearings.	(c) Remove and disassemble alternator. Install new bearings as required.
	(d) Interference between rotor fan and stator leads or rectifiers.	(d) Remove and disassemble alternator. Correct interference as required.
	(e) Rotor or rotor fan damaged.	(e) Remove and disassemble alternator. Install new rotor.
	(f) Open or shorted rectifier.	(f) Remove and disassemble alternator. Test rectifiers. Install new recitfiers as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(g) Open or shorted winding in stator.	(g) Remove and disassemble alternator. Test stator windings. Install new stator if necessary.
EXCESSIVE AMMETER FLUCTUATION	(a) High resistance in the alternator and voltage regulator circuit.	(a) Clean and tighten all connections as necessary.

SERVICE PROCEDURES

DESCRIPTION OF ELECTRONIC VOLTAGE REGULATOR OPERATION

The electronic voltage regulator is a device that regulates the vehicle electrical system voltage by limiting the output voltage that is generated by the alternator. This is accomplished by controlling the amount of current that is allowed to pass through the alternator field winding. The electronic voltage regulator has no moving parts and requires no adjustment after it is set internally at the factory. There are several semiconductor components, transistors and diodes, in the regulator plus some resistors and a capacitor. Basically the electronic regulator operates as a voltage sensitive switch. There is a large transistor which is placed in series with the alternator field winding and a control circuit that senses the system voltage and turns the large transistor on and off as required. As alternator speed and electrical system load conditions change, the control circuit is turning the transistor on and off many times per second almost all of the time that the vehicle is in operation. The only time that the transistor is not turning on and off rapidly is during low engine speed operation when high electrical loads are present and require that the alternator field be in the on state continuously. One other important feature of the electronic regulator is the ability of its control circuit to vary the regulated system voltage up or down as the temperature changes. This provides the best charging conditions for the batttery throughout the seasons of the year.

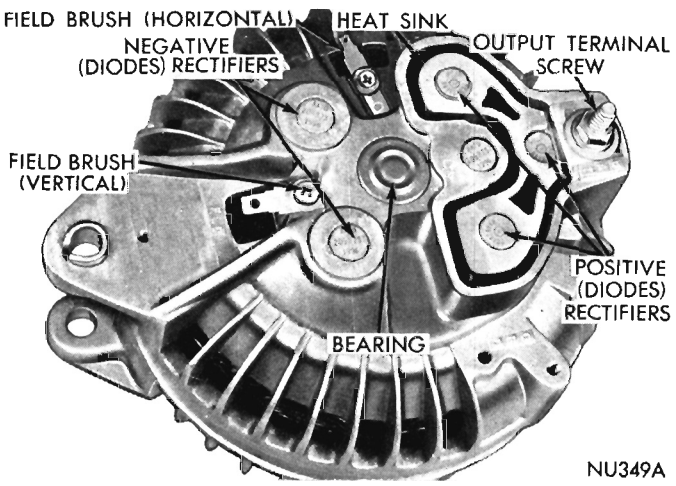


Fig. 2 - Alternator Assembly

ISOLATED FIELD ALTERNATOR

CHARGING CIRCUIT RESISTANCE TEST AND CURRENT OUTPUT TEST

(1) Disconnect the battery ground cable.

(2) Disconnect the "Batt" lead at the alternator output terminal.

(3) Connect a 0-75 ampere scale D.C. ammeter in series between the alternator "Batt" terminal and the disconnected "Batt" lead (Fig. 3).

(4) Connect the positive lead of a test voltmeter to the disconnected "Batt" lead. Connect the negative lead of the test voltmeter to battery positive terminal.

(5) Disconnect the field lead from the alternator.

(6) Connect a "jumper" lead from the alternator field terminal to ground.

(7) Connect an engine tachometer. Connect the battery ground cable.

(8) Connect a variable carbon pile to the battery terminals.

(9) Start and operate the engine at idle. **Immediately after starting, reduce engine speed to idle.**

(10) Adjust the engine speed and carbon pile to obtain 20 amperes flowing in the circuit. Observe the voltmeter reading. The voltmeter reading should not exceed .7 volts. If a higher voltage drop is indicated, inspect, clean and tighten all connections in the charging circuit. A voltage drop test may be performed at each connection to locate the connection with excessive resistance. If the charging circuit resistance tested satisfactorily, reduce engine speed, turn off carbon pile and turn off ignition switch.

(11) Then, to make the current output test, move the negative lead of the voltmeter to a good ground. Move the position lead of the voltmeter to "Batt" terminal of the alternator (Fig. 4).

(12) Start and operate the engine at idle.

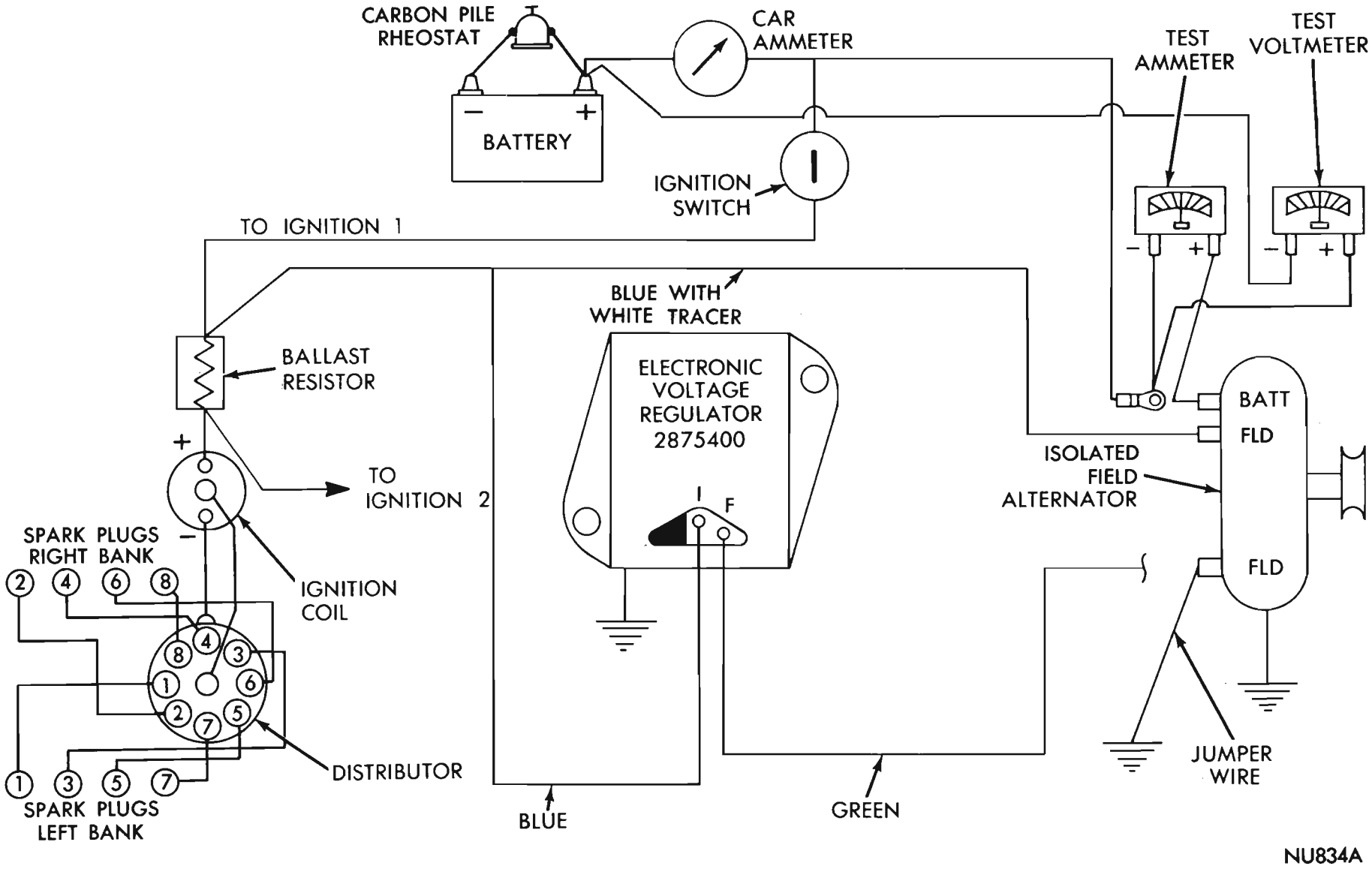


Fig. 3 - Charging Circuit Resistance Test

Immediately after starting, reduce engine speed to idle.

(13) Adjust the carbon pile and engine speed in increments until a speed of 1250 rpm and a voltmeter reading of 15 volts is obtained.

(14) **CAUTION: Incremental increases in engine speed should not be large enough to allow voltage to go above 16 volts.**

(15) Observe the reading on the test ammeter. The output current should be withing the limits shown in the "Specifications". If the output is slightly less (5 to 7 amperes) than specified, it may be an indication of possible "open" rectifier or other alternator internal problems. If the output is considerably lower than that specified, it may be an indication of a possible "shorted" rectifier or other internal problems. In either case, the alternator should be removed and tested on the bench before disassembly. If the alternator current output tested satisfactorily, reduce engine speed, turn off carbon pile, and turn off ingition switch.

(16) Disconnect battery ground cable.

(17) Remove test ammeter, voltmeter, tachometer, and carbon pile.

(18) Remove jumper between alternator field and ground. Connect the field wire to the alternator field terminal.

(19) Connect the battery ground cable.

ELECTRONIC VOLTAGE REGULATOR

VOLTAGE REGULATOR TEST (When Tester C-4133 is Not Available)

(1) Clean the battery terminals and check the specific gravity. It should be above 1.200 to allow a prompt regulated voltage check.

If the specific gravity is below 1.200, charge or use another battery and do not leave the uncharged battery in the circuit.

(2) Connect the positive lead from a voltmeter to the ignition Number one (1) terminal of the ballast resistor. (The Ignition number one (1) terminal of the ballast resistor is the end which has one or two blue wires connected to it). The other end, Ignition Number two (2), will have a brown and blue wire or just a brown wire connected to it (Fig. 5).

(3) Connect the negative lead from the voltmeter to a good vehicle body ground.

(4) Start and operate engine at 1250 rpm with all lights and accessories turned off. Check voltmeter, the regulator is working properly if the voltage readings are in accordance with the following chart.

It is normal for the car ammeter to show an immediate charge and then gradually return to normal position. The duration the ammeter hand remains to the right will be dependent on the length of cranking time.

AMBIENT TEMPERATURE NEAR VOLTAGE REGULATOR	VOLTAGE RANGE
-20°F	14.3 15.3
80°F	13.8 14.4
140°F	13.3 14.0
Above 140°F	Less than 13.8

(5) If the voltage is below limits, proceed as follows:

(a) Check for a good voltage regulator ground. Check for voltage drop between cover of voltage regulator and body on low voltage scale of voltmeter.

(b)Turn off ignition switch and disconnect voltage regulator connector.

(c) Turn on the ignition switch, but do not start car, check for battery voltage at the wiring harness terminal connected to the blue and green leads. **Disconnect wiring harness from voltage regulator when checking the leads.**

Turn off ignition switch. If voltage is not present at either lead, the problem is in the vehicle wiring or alternator field circuit. **DO NOT DISTORT TERMINALS WITH VOLTMETER PROBE.**

(d) If the previous steps, 5(a) through 5(c) tested satisfactorily, change the voltage regulator and repeat step 4.

(6) If the voltage is slightly above the limits shown in chart or is fluctuating, proceed as follows:

(a) Check ground between voltage regulator and vehicle body.

(b) Check ground between vehicle body and engine.

(c) Check ignition switch circuit between battery terminal of ignition switch and voltage regulator.

(7) If the voltage is more than one-half (1/2) a volt above limits shown in chart, change the voltage regulator and repeat step 4.

(8) Remove the test voltmeter.

ELECTRONIC VOLTAGE REGULATOR TEST (With Tester Tool C-4133)

(1) Remove connector from Electronic Voltage Regulator on vehicle.

(2) Plug in power cord of Voltage Regulator Tester to 110 Volt A.C. 60 cycle source.

(3) Connect the ground wire from the voltage regulator tester to a good body ground near the voltage regulator (at voltage regulator mounting screw Figs. 6 and 7).

(4) Plug connector of voltage regulator tester on voltage regulator on vehicle.

(5) Place knob on the tester to the regulator test position.

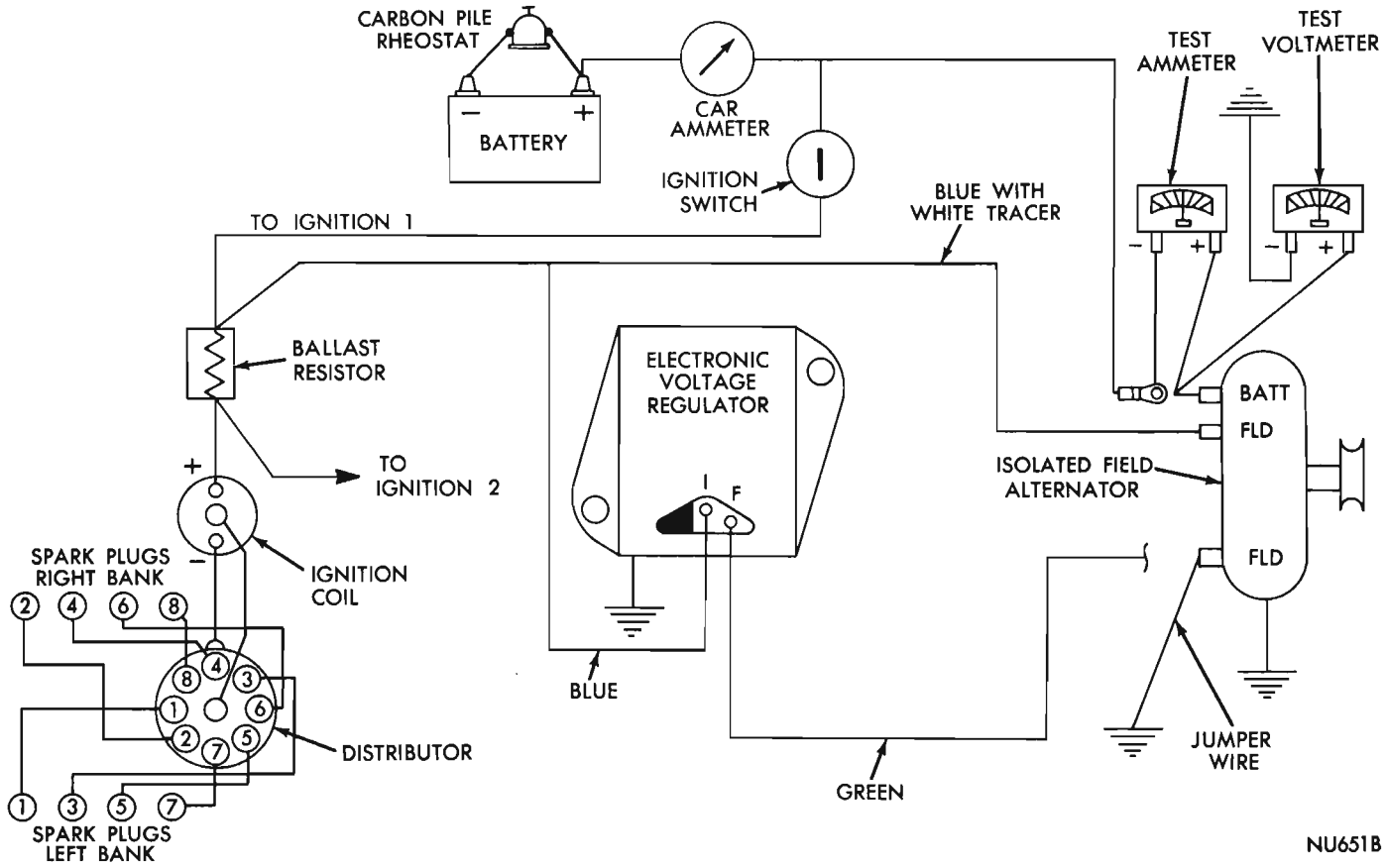


Fig. 4 - Current Output Test

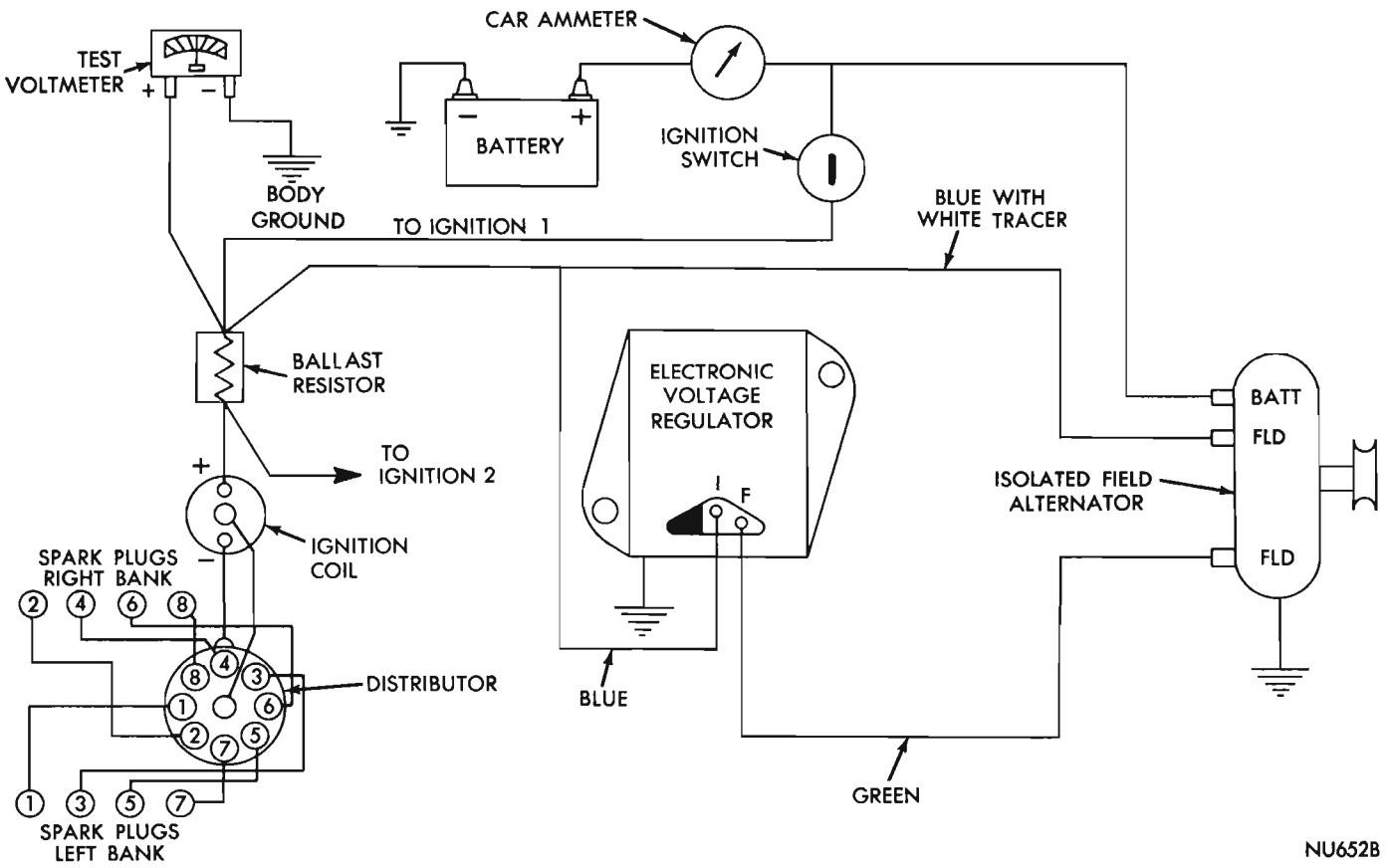


Fig. 5 - Voltage Regulator Test (Without Tester Tool C-4133)

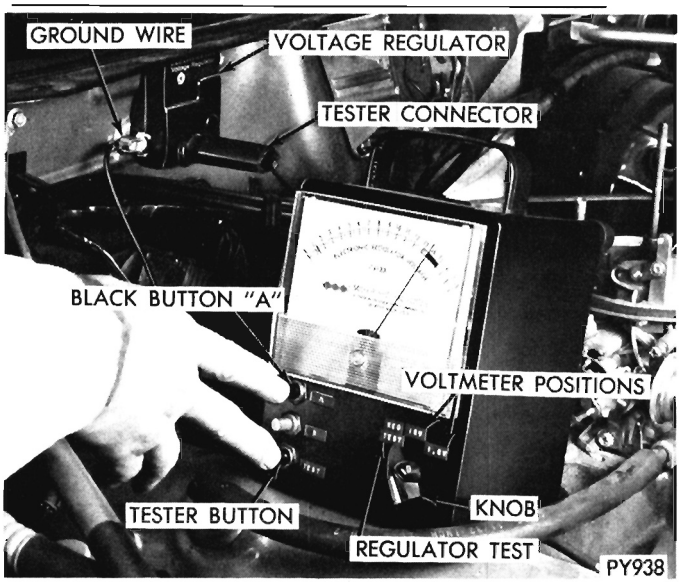


Fig. 6 - Voltage Regulator Test (Depressing Test Button and Black Button "A")

(6) Press the test button on the voltage regulator tester. The voltage reading should be in accordance with the following:

(a) If the voltage regulator temperature is at room temperature (80 degrees F.) or above, the meter reading should be in the green or yellow range.

(b) If the voltage regulator is at room temperature (80 degrees F.) or below, the meter reading should be in the green or blue range.

(7) While holding the test button in, depress **Black Button** (A) (Fig. 6), the meter reading should remain within the limits of step 6.

(8) While holding the test button in, depress **Red Button** (B) (Fig. 7), the meter should read above the red line.

(9) If all tests remain within limits the voltage regulator is good.

The tester may be used as a C.D. Voltmeter by placing tester knob in either the 18 volt or 1.8 volt position. Use the red probe and black clip leads for testing.

ALTERNATOR SERVICE PROCEDURES

If alternator performance does not meet current output specifications limits, it will have to be removed and disassembled for further test and servicing.

(1) Disconnect battery ground cable at battery negative terminal.

(2) Disconnect alternator output "BATT" and field "FLD" leads and disconnect ground wire.

(3) Remove alternator mounting bolts and remove alternator.

BENCH TESTS

Field Coil Draw

If alternator field coil draw has not been tested on vehicle it may be tested on test bench as follows:

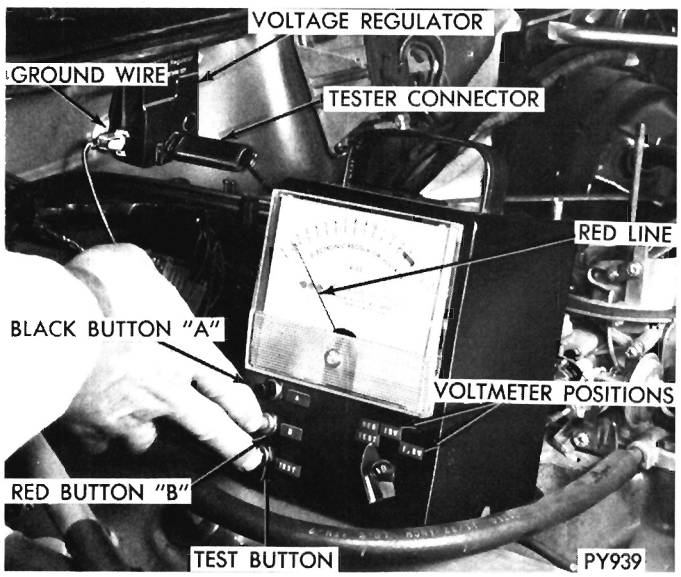


Fig. 7 - Voltage Regulator Test (Depressing Test Button "B")

(1) Connect a wire between one field terminal of the alternator and the positive terminal of a fully charged battery. Connect test ammeter positive lead to the other field terminal of the alternator and the negative lead to the battery negative terminal.

(2) Slowly rotate alternator rotor by hand. Observe ammeter reading. Field coil draw should be 2.3 amperes to 2.7 amperes at 12 volts. **A low rotor coil draw is an indication of high resistance in field coil circuit, (brushes, slip rings, or rotor coil). A higher rotor coil draw indicates possible shorted rotor coil or grounded rotor.**

Testing Alternator Internal Field Circuit for Ground

(1) To test internal field circuit for ground, touch one test probe from a 110 volt test lamp to one of the alternator field brush terminals and remaining test probe to the end shield. If rotor assembly or field brush is not grounded, lamp will not light.

(2) If lamp lights, remove field brush assemblies (noting how the parts are assembled) and separate the end shields by removing the three through bolts.

(3) Again test by placing one of the test probes to a slip ring and remaining test probe to the end shield. If lamp lights, rotor assembly is grounded and requires replacement. If lamp does not light after removing the field brush and separating the end shields, the cause of the ground at the first ground test was a grounded brush.

(4) Examine plastic insulator and screw. Screw is a special size and must not be substituted.

(5) Install brush holders, terminals, insulated washers, and screws. If the parts were not assembled in this order this could be the cause of the ground condition.

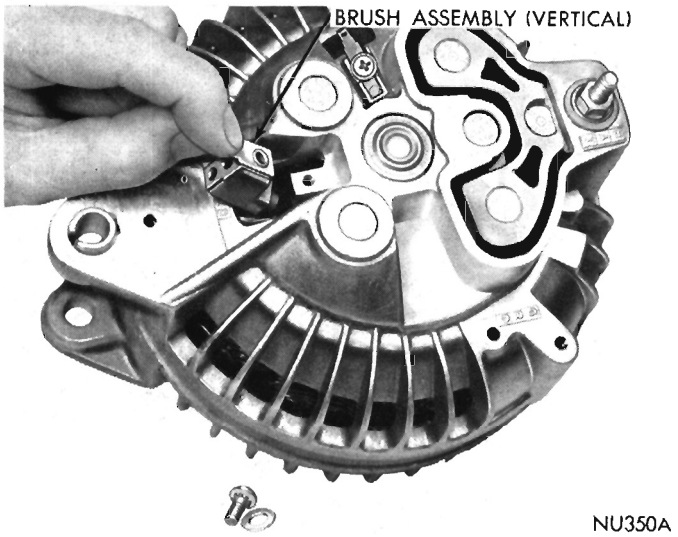


Fig. 8 - Removing or Installing Field Brushes

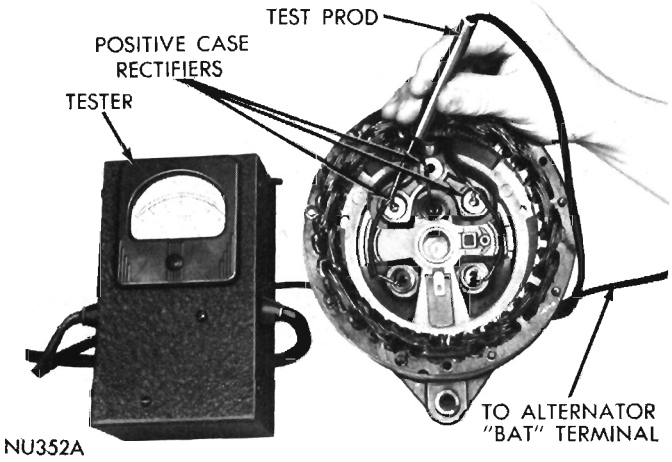


Fig. 10 Testing Positive Rectifiers

DISASSEMBLING THE ALTERNATOR

To prevent possible damage to brush assemblies, they should be removed before proceeding with disassembly of the alternator. The field brushes are mounted in plastic holders that position the brushes against the slip rings of the rotor.

(1) Remove retaining screw lockwasher, insulated washer, and field terminal, and carefully lift plastic holder containing spring and brush assembly from end housing (Fig. 8).

(2) Remove the brush screws, insulating nylon washers and lift brush assemblies from end shield. **CAUTION: Stator is laminated, do not burr stator or end shield.**

(3) Remove through bolts and pry between the stator and drive end shield with blade of a screwdriver (Fig. 9). Carefully separate drive end shield, pulley and rotor assembly away from stator and rectifier shield assembly.

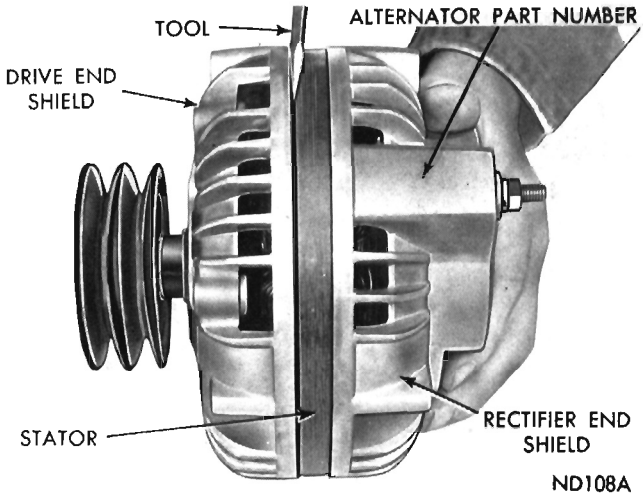


Fig. 9 - Separating Drive End Shield From Stator

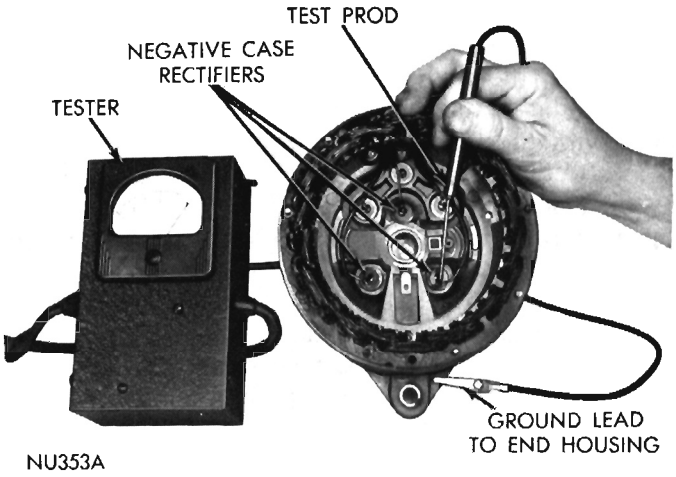


Fig. 11 Testing Negative Rectifiers

Testing the Rectifiers with Tool C-3829

The Rectifier Tester Tool C-3829 provides a quick, simple and accurate test of the alternator rectifiers without the necessity of disconnecting soldered rectifier leads. With alternator rectifier end shield separated from drive end housing proceed with rectifier test as follows:

Positive Case Rectifier Test (Fig. 10)

(a)Place alternator on an insulated surface. Connect test lead clip to the alternator (BAT) output terminal.

(b) Plug in Tool C-3829 power source lead into a 110 volt A.C. power supply. Touch exposed bare metal connections of each of the positive case rectifiers, with test prod.

The reading for satisfactory rectifiers will be 1-3/4 amperes or more. Reading should be approximately the same for three rectifiers.

When two rectifiers are good and one is shorted, reading taken at the good rectifiers will be low, and reading at shorted rectifier will be zero. Disconnect lead to the rectifier reading zero and retest. The reading of the good rectifiers will now be within satisfactory range.

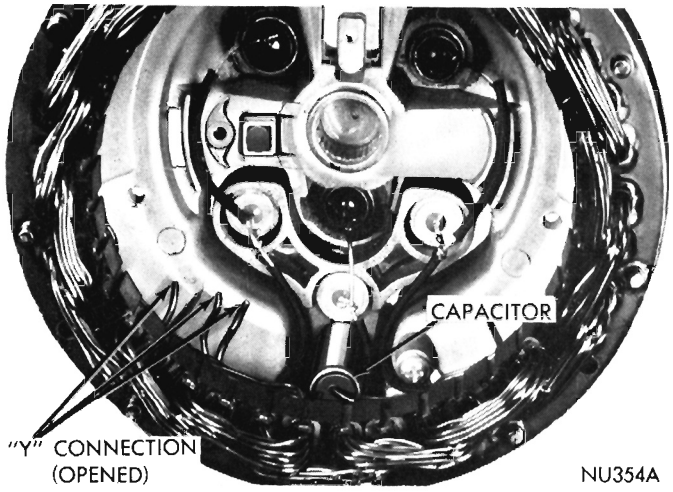


Fig. 12 - Separating the Three Stator Leads

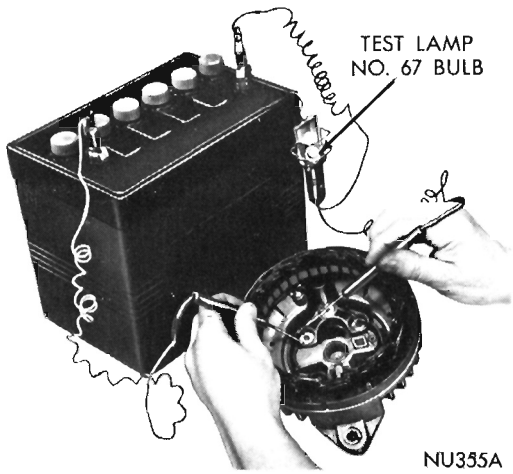


Fig. 13 - Testing Rectifiers with Test Lamp

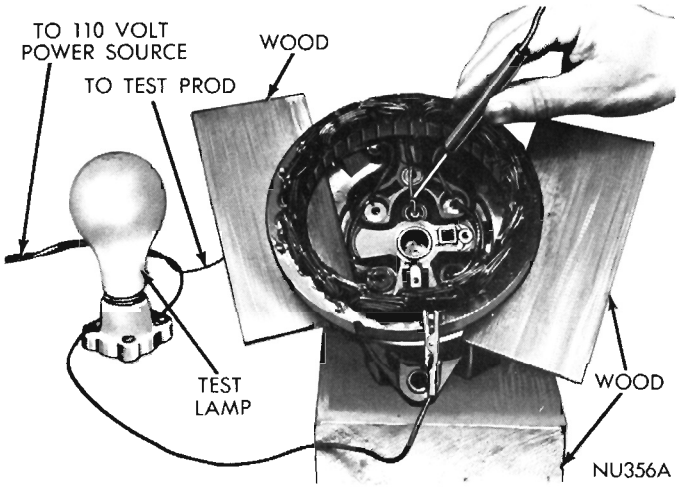


Fig. 14 - Testing Stator for Ground

When one rectifier is open it will read approximately one ampere, and two good rectifiers will read within satisfactory range.

Negative Case Rectifier Test (Fig. 11)

(a) Connect test lead clip to rectifier end housing.

(b) Touch exposed connection of each of the negative case rectifiers with test probe.

CAUTION: Do not break the sealing around rectifier lead wire. The sealing material is for protection against corrosion. Always touch test probe to exposed metal connection nearest rectifier.

Test specifications are the same, and test results will be approximately the same as for positive case rectifiers, except meter will read on opposite side of scale.

TESTING Rectifiers and stator (When Tool C-3829 is not available)

(a) Separate the three (3) stator leads at "Y" connection (Fig. 12). Cut stator connection as close to connector as possible. If they are cut too short it may be difficult to get them together again for soldering.

(b) Test rectifiers with a 12 volt battery and a test lamp equipped with a number 67 bulb (4 candle power) by connecting one side of test lamp to positive battery post; other side of test lamp to a test probe with other test probe connected to the negative battery post.

(c) Contact outer case of rectifier with one probe and other probe to wire in center of recitifier (Fig. 13).

(d) Reverse the probes, moving probe from rectifier outer case to rectifier wire, and the probe from rectifier wire to rectifier outer case.

If test lamp "lights" in one direction but does "not light" in other direction, rectifier is satisfactory. If lamp lights in "both directions," **rectifier** is "shorted." If test lamp does "not light" in either direction, rectifier is "open." **Possible cause of an open or blown rectifier is a faulty capacitor or a battery that has been installed in reverse polarity. If battery is installed properly and the rectifiers are open, test capacitor capacity — .50 microfarad (plus or minus 20%).**

(e) Unsolder rectifier leads from stator leads. **Do not blow solder off with air — fine particles of solder can short other rectifiers.**

(f) Test stator for grounds using a 110 volt test lamp (Fig. 14). Use wood slats to insulate the stator from rectifier shield. Contact one prod of test lamp to stator pole frame, and contact the other prod to each of the three stator leads. Test lamp should "not light." If test lamp lights, stator windings are "grounded."

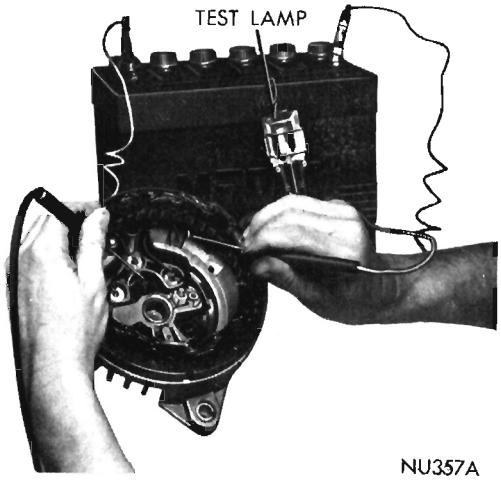


Fig. 15 -Testing Stator Windings for Continuity

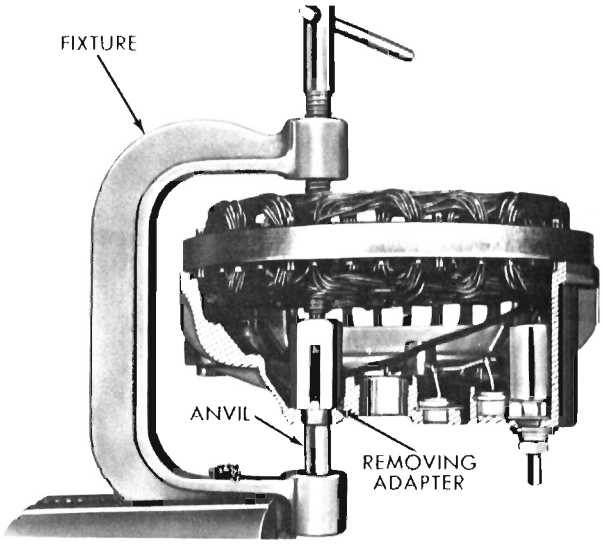


Fig. 16 Removing the Rectifiers

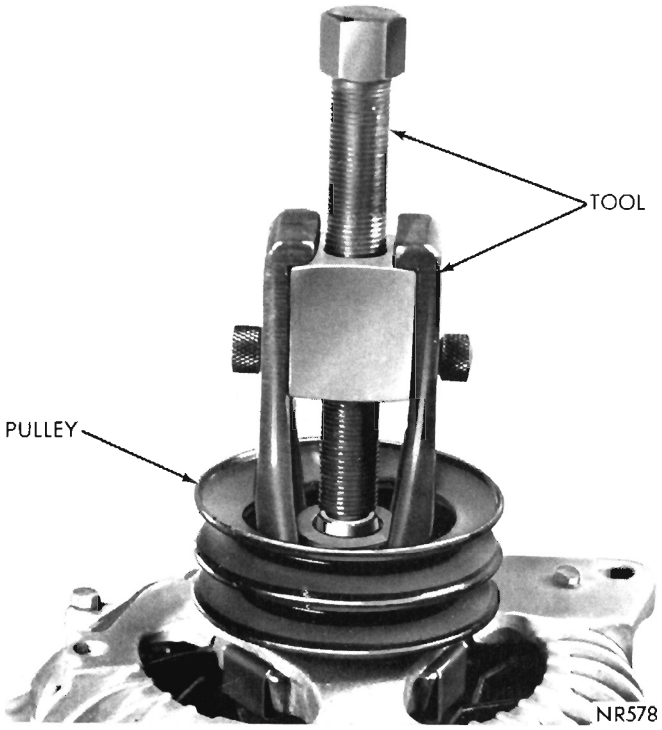


Fig. 17 Removing the Pulley

(g) Test stator windings for continuity, by contacting one prod of test lamp to all three stator leads at "Y" connection. Contact each of the three stator leads (disconnected from rectifiers). Test lamp should "light" when prod contacts each of the three leads. If lamp does not light stator winding is "open" (Fig. 15).

(h) Install a new stator if stator tested is "grounded" or "open". If stator tested satisfactorily, tin the three stator wires and resolder. Tape connector and cement down to stator to make sure the "Y" connector does not shortout to end shield. If the rectifiers must be replaced, unsolder the rectifier wire from the stator lead wire at the soldered joint. **When removing rectifiers, it is necessary to support end shield and/or heat sink to prevent damage to these castings.**

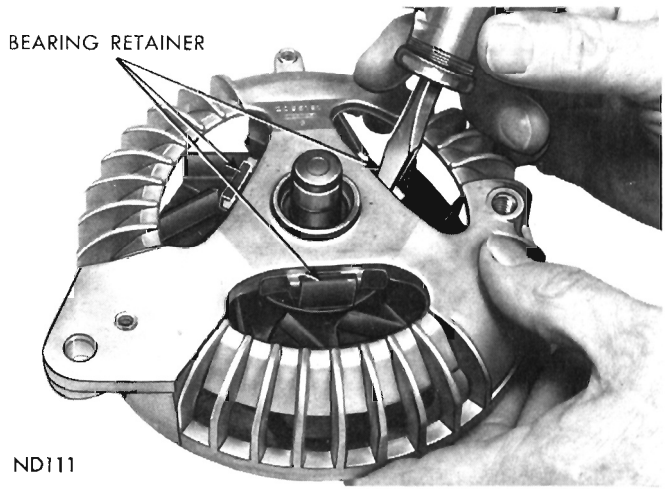


Fig. 18 - Disengaging Bearing Retainer from End Shield

(4) Place Rectifier Removing and Installing Press in a vise and support end shield on clamp anvil under rectifier to be removed (Fig. 16). **Make sure bore of tool completely surrounds rectifier during removal process.**

(5) Carefully apply pressure with tool pressure screw until support tool, rectifier end shield, and remover pin, and remover adapter are in alignment then press the rectifier out of end shield or heat sink.

(6) The pulley is an interference fit on rotor shaft. Remove pulley with Puller Tool C-4068 (Fig. 17).

(7) Pry drive end bearing spring retainer from end shield with a screwdriver (Fig. 18).

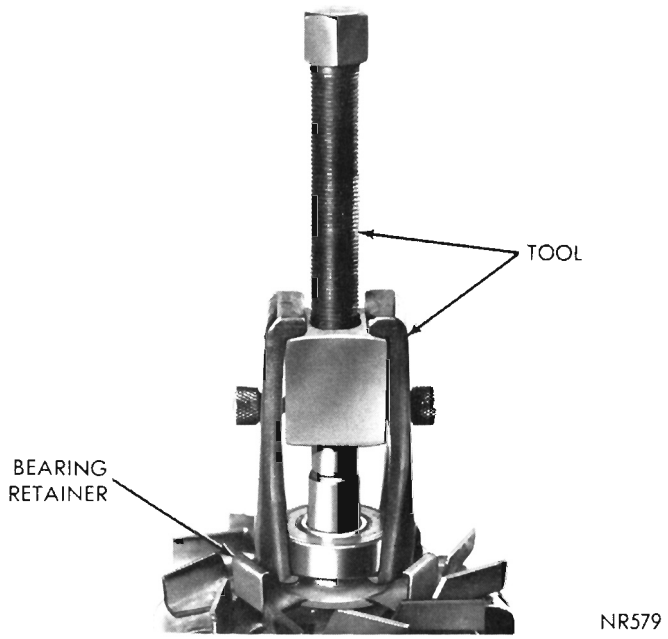


Fig. 19 - Removing Bearing from Rotor Shaft

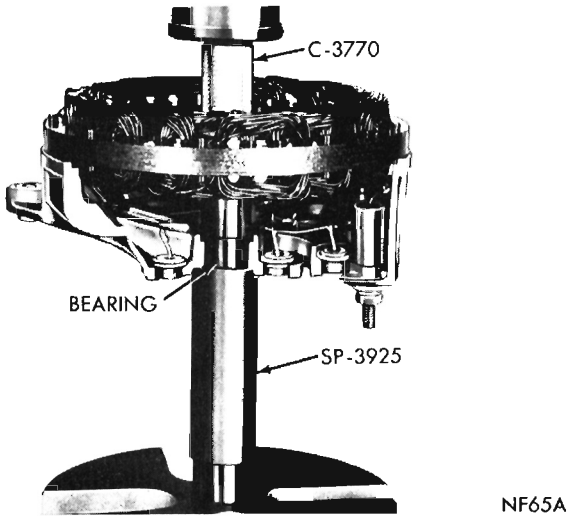


Fig. 21 - Removing Rectifier End Shield Bearing

(8) Support end shield and tap rotor shaft with a plastic hammer to spearate rotor from end shield. **The new bearing is lubricated with a predetermined amount of special lubricant and does not require additional lubrication.**

(9) The drive end ball bearing is an interference fit with the rotor shaft. Remove bearing with Puller Tool C-4068, (Fig. 19).

(10) Remove output terminal nuts and washers and remove terminal screw and inside capacitor. **The heat sink is also held in place by the terminal screw.**

(11) Remove insulator (Fig. 20).

(12) The needle roller bearing in rectifier end shield is a press fit. If necessary to remove rectifier end frame needle bearing, protect end shield by supporting shield with Tool C-3925 when pressing bearing out with Tool C-3770A (Fig. 21). Make sure notches in tool clear raised section of heat sink. **The new bearing is prelubricated and no additional lubricant should be added, as an excessive amount of lubricant will contaminate the slip rings and cause premature brush and rotor failures.**

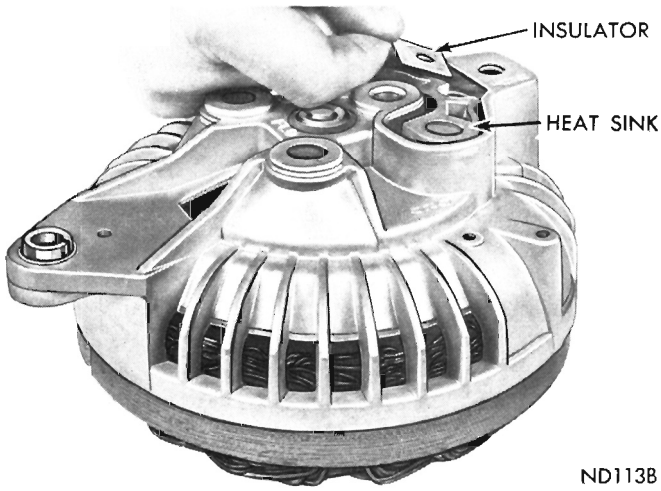


Fig. 20 - Removing Heat Sink Insulator

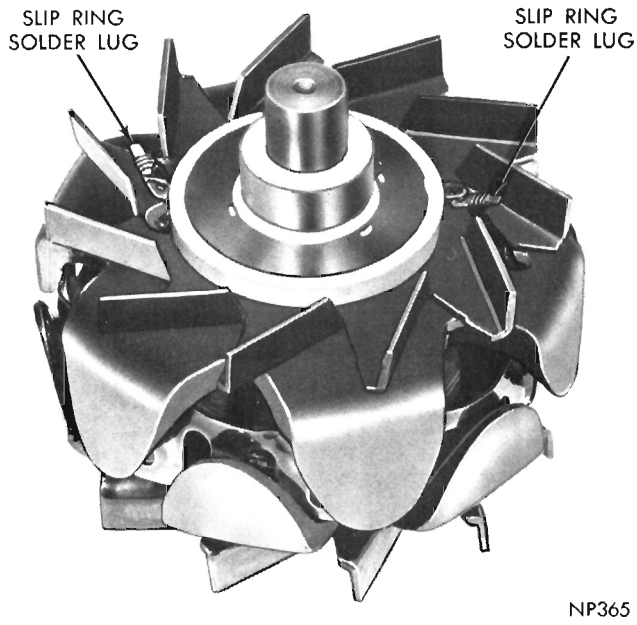


Fig. 22 - Solder Points - Slip Ring Installed

REPLACING SLIP RINGS

Slip rings that are damaged can be replaced as follows:

(a) Remove rotor plastic grease retainer.

(b) Unwind field coil leads from slip ring lugs (Fig. 22) being careful not to break the wire leads.

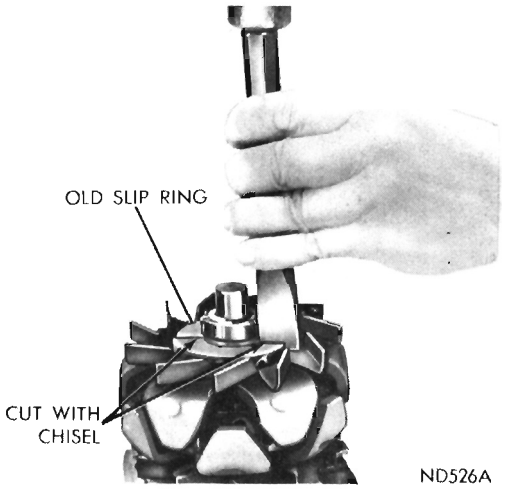


Fig. 23 - Cutting Old Slip Rings

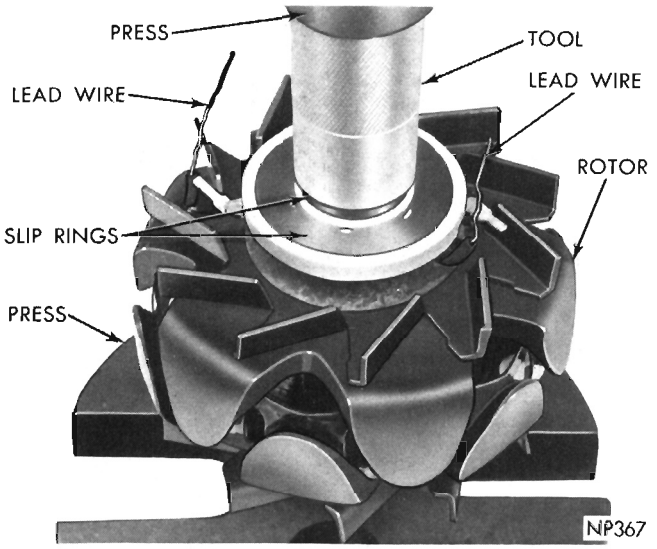


Fig. 25 - Installing Slip Rings

(c) Use a chisel to cut through the copper of both slip rings at opposite points (180 degrees apart) (Fig. 23).

(d) Break the plastic insulator and remove the old slip ring.

(e) Clean away dirt and particles of old slip ring from rotor.

(f) Scrape ends of field coil wires clean for good electrical contact.

(g) Position field coil wires so as to clear path for new slip ring.

(h) Position new slip ring carefully on rotor shaft to insure that slip ring lugs will be in proper position for connecting field coil wires (Fig. 24)

(i) Place installing Tool C-3900 over rotor shaft and position rotor, slip ring and tool assembly in arbor press (Fig. 25). Press slip ring on shaft.

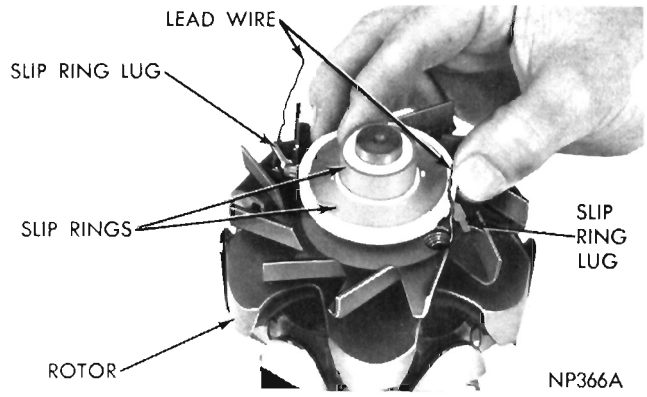


Fig. 24 - Aligning Slip ring with Field Lead Wires

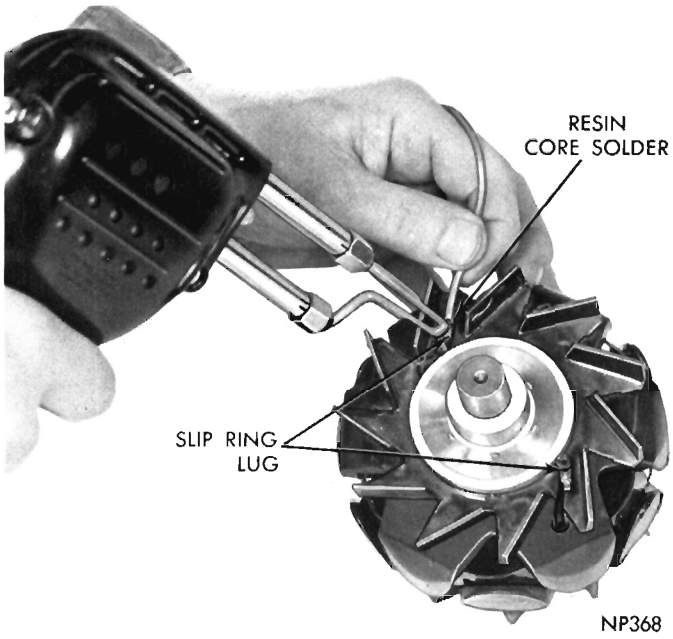


Fig. 26 - Soldering Field Coil Leads

When slip ring is bottomed on rotor fan, the field lead wire (insulated brush ring) should clear the access hole, the fan and pole piece.

(j) Tin field coil lead wires.

(k) Coil each field lead wire around the slip ring lug, starting first wrap against shoulder of lug and winding outward. Solder with resin core solder (Fig. 26).

(l) Test slip rings for ground with a 110 volt test lamp by touching one test lead prod to rotor pole piece and remaining prod to slip ring. Test lamp should not light. If lamp lights, slip rings are shorted to ground.

(m) Test slip ring for continuity by placing one test prod on the positive and the other test prod on the ground slip ring. Light should go on showing the field circuit is completed.

(n) If rotor is not grounded and field circuit is continuous, lightly clean slip rings surface with 00 sandpaper.

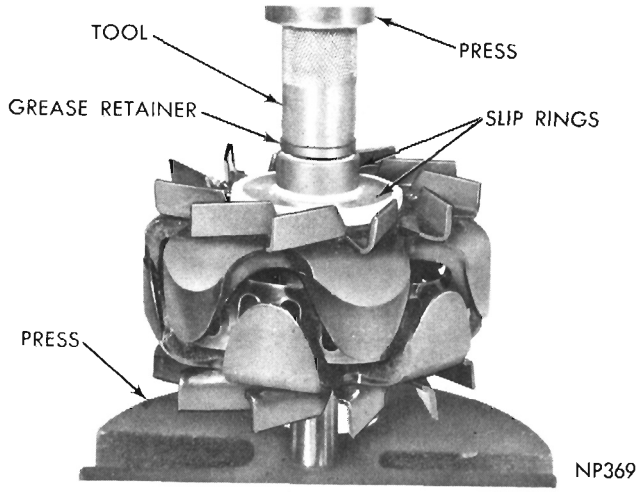


Fig. 27 - Installing Grease Retainer

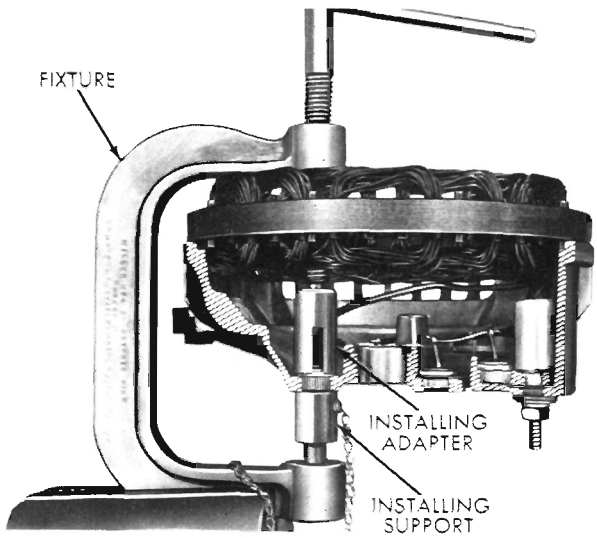


Fig. 28 - Installing a Rectifier

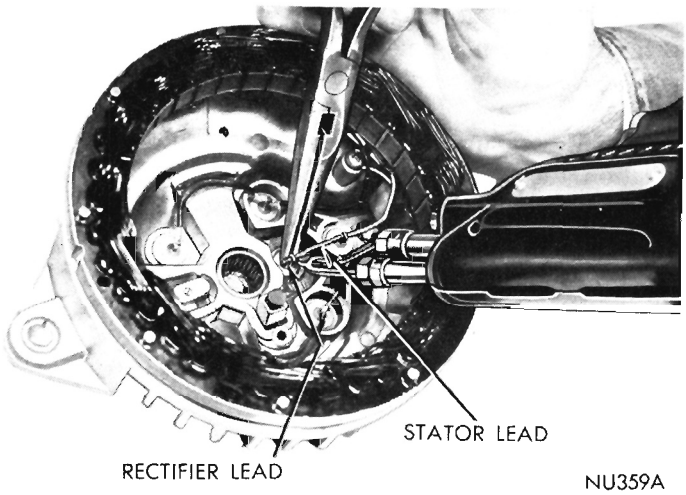


Fig. 29 - Soldering Rectifier and Stator Leads

(o) Position grease retainer on rotor shaft and press retainer on shaft with installer Tool C-3921 (Fig. 27). The plastic retainer is properly positioned when the inner bore of the installer tool bottoms on the rotor shaft.

ASSEMBLING THE ALTERNATOR

(1) Check rectifier identification to make sure correct rectifier is being installed. Refer to Parts List for rectifier identification.

(2) Start rectifier squarely into mounting hole.

(3) Support heat sink or rectifier end shield on installer adapter of Tool C-3928. With the installing adapter positioned on the rectifier, carefully apply pressure with tool pressure screw until the installer tool, rectifier, rectifier end shield or heat sink are in alignment and after determining that rectifier is started squarely in the casting, slowly apply pressure with tool pressure screw until you feel the collar of rectifier bottom against casting (Fig. 28). **Make sure installer support adapter fits square around the rectifier inner boss and that pressure is applied on outer rim of rectifier.**

CAUTION: DO NOT USE a hammer to start the rectifier into its bore in end shield. DO NOT HAMMER OR SHOCK the rectifier in any manner as this will fracture the thin silicon wafer in the rectifier causing complete rectifier failure.

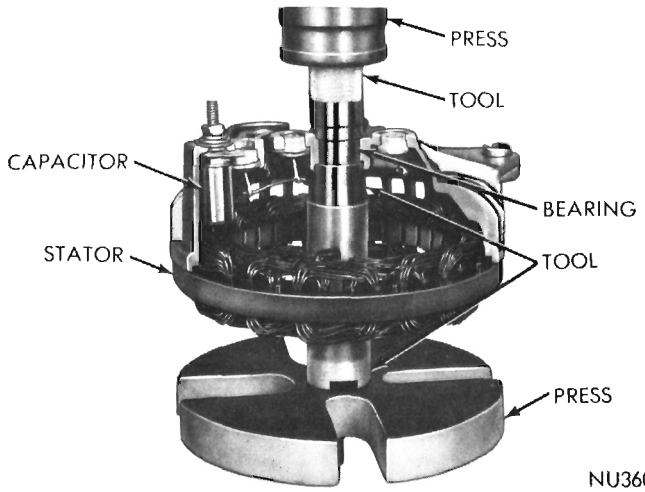


Fig. 30 - Installing Rectifier End Shield Bearing

(4) Clean the leads and mate stator lead with rectifier wire and bend the loop snugly around stator lead to provide a good electrical and mechanical connection. Solder wires with resin core solder. Hold rectifier lead wire with pliers just below the joint while soldering (Fig. 29). Pliers will absorb heat from the soldering operation and protect rectifier. **After soldering, quickly cool soldered connection; touch a dampened cloth against it. This will aid in forming a solid joint.**

(5) After soldering, stator leads must be pushed down into the slots cast into the end shield and cemented with Cement Part Number 2299314 or equivalent to protect the leads against possible in-

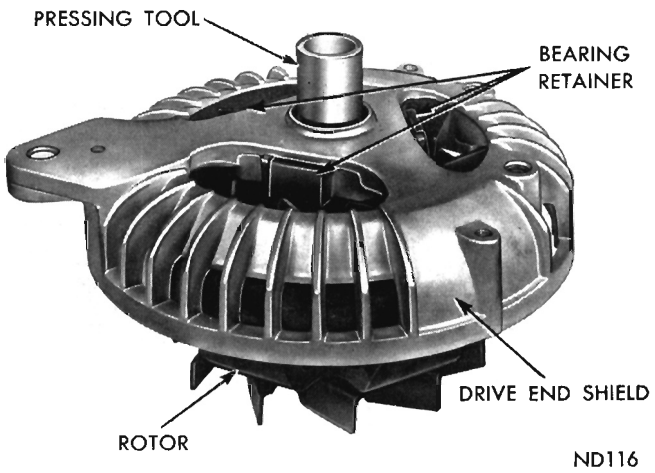


Fig. 31 - Installing Drive End Shield Bearing

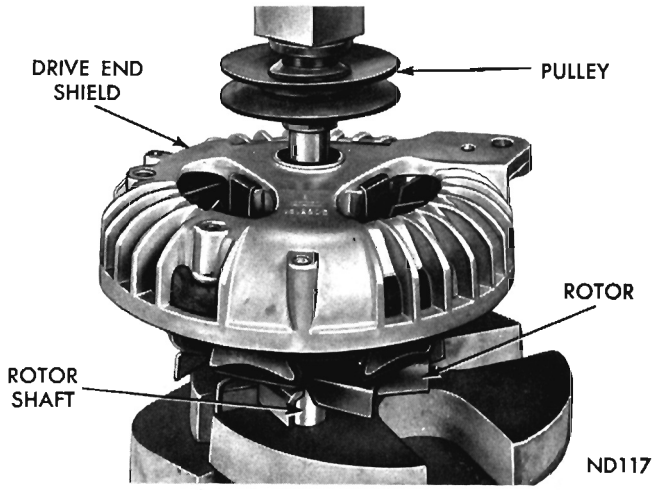


Fig. 32 - Installing Alternator Pulley

ference with the rotor fans. Test each replacement rectifier to make certain rectifier was not damaged by the soldering or pressing operations.

(6) Support end shield on Tool C-3925 so that notches in the support tool will clear the raised section of the heat sink and press the bearing into position with Tool SP-3381 (Fig. 30), until bottomed on support tool **New bearings are pre-lubricated, additional lubrication is not required.**

(7) Insert drive end bearing in drive end shield and install bearing retainer plate to hold bearing in place.

(8) Position bearing and drive end shield on rotor shaft and, while supporting base of rotor shaft, press bearing end shield into position on rotor shaft with arbor press and Tool C-3858 (Fig. 31). **CAUTION: Make sure bearing is installed squarely at installation; otherwise, damage to bearing will result. Press bearing on rotor shaft until bearing contacts shoulder on rotor shaft fan hub.**

(9) Install pulley on rotor shaft. Shaft of rotor must be supported in a manner so all pressing force is on pulley hub and rotor shaft (Fig. 32). **Press pulley on rotor shaft until pulley contacts inner race of drive and bearing. Do not exceed 6800 pounds, pressure. Do not hammer.**

(10) The alternators have the capacitor mounted internally. Make sure heat sink insulator is in place (Fig. 20).

(11) Install output terminal screw and capacitor through heat sink and end shield.

(12) Install insulating washers, lockwashers and lock nuts.

(13) Make sure heat sink and insulator are in position then tighten lock nut.

(14) Position stator on rectifier end shield.

(15) Position rotor and end shield assembly on stator and rectifier end shield assembly. Align through bolt holes in the stator, rectifier end shield and drive end shield.

(16) Compress stator and both end shields by hand and install through bolts, washers and nuts. Tighten bolts evenly to 20-30 inch-pounds.

(17) Install field brushes in holder. Place one vertical and one horizontal holder in rectifier end shield.

(18) Place nylon washer on each terminal and install lockwashers and attaching screws.

(19) Rotate pulley slowly by hand to be sure rotor fans do not hit rectifiers, capacitor lead, and stator connections.

(20) Install alternator and adjust drive belt to specifications.

(21) Connect (output) "BAT" and (field) "FLD" leads and connect ground wire.

(22) Connect battery ground cable.

(23) Start and operate engine, and observe alternator operation.

(24) Test current output and regulator setting.

IGNITION SYSTEM — 6-CYLINDER

INDEX

	Page		Page
Assembling the Distributor	42	Distributor Advance Testing	44
Ballast Resistor	45	Distributor Contact Dwell	39

Distributor Contacts 43
Distributor Disassembly 41
Distributor Installation 44
Distributor Lubrication 44
Distributor Removal 40
Distributor Resistance Test 38
Dwell Variation 39
General Information 37
Idle R.P. M. Test 39
Ignition Coil 45
Ignition Timing 39
Installing and Aligning Contacts 43
Secondary Circuit Inspection 37
Service Diagnosis 37
Shaft and Bushing Wear Test 41
Spark Plugs 56
Specifications 123
Testing Contact Arm Spring Tension 43

GENERAL INFORMATION

The ignition system consists of two separate circuits. The battery, ammeter, ignition switch, ballast resistor, primary winding of the ignition coil, distributor contacts and condenser, vehicle frame, and primary wiring make up the low voltage primary circuit. The secondary high voltage circuit includes the coil secondary winding, distributor cap and rotor, spark plug cables, spark plugs and vehicle frame.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
BURNED OR PITTED DISTRIBUTOR CONTACTS	(a) Dirt or oil on contacts.	(a) If oil is on contact face, determine cause and correct condition. Clean distributor cam of dirt and grease, apply a light film of distributor cam lubricant to cam lobes; wipe off excess. See "Distributor Lubrication." Replace contact set and adjust as necessary.
	(b) Alternator voltage regulator setting too high.	(b) Test alternator voltage regulator setting, adjust as necessary. Replace contact set and adjust as necessary.
	(c) Contacts misaligned or gap too small.	(c) Align and adjust contacts.
	(d) Faulty coil.	(d) Test and replace coil if necessary. Replace and adjust contacts.
	(e) Ballast resistor not in circuit.	(e) Inspect conditions, and correctly connect the coil.
	(f) Wrong condenser or faulty condenser.	(f) Test condenser and replace if necessary. Replace and adjust contacts.
	(g) Faulty ignition switch.	(g) Replace ignition switch.
	(h) Bushings worn.	(h) Replace housing.
	(i) Touching contacts with the hands during installation.	(i) Replace and adjust contacts.
IGNITION COIL FAILURE	(a) Coil damaged by excessive heat from engine.	(a) Replace coil. Inspect condition of the distributor contacts.
	(b) Coil tower carbon-tracked.	(b) Replace the coil.
	(c) Oil leak at tower.	(c) Replace the coil.

SERVICE PROCEDURES

SECONDARY CIRCUIT INSPECTION

Check the high tension cable connections for good contact at the coil and distributor cap towers and at the spark plugs. Terminals should be fully seated. The nipples and spark plug covers should be in good condition. Nipples should fit tightly on the coil cap towers and spark plug cover should fit tight around spark plug insulators. Cable connections that are loose will corrode and increase the resistance and permit water to enter the towers causing ignition malfunction. **To maintain proper sealing between the towers and nipples, cable and nipple assemblies should not be removed from the distributor or coil towers unless nipples are damaged or cable testing indicates high resistance or broken insulation.**

Clean high tension cables with a cloth moistened with a non-flammable solvent and wipe dry. Bend cable to check for brittle or cracked insulation.



Fig. 1 - Installing Secondary Cable and Nipples at Distributor Cap Towers

When testing secondary cables for punctures and cracks with an oscilloscope follow the instructions of the equipment manufacturers.

If an oscilloscope is not available, secondary cables can be tested as follows:

(a) Engine not running, connect one end of a test probe to a good ground, other end free for probing.

(b) Disconnect cable at spark plug end. Insulate cable end from grounding.

(c) With engine running, move test probe along entire length of wire. If punctures or cracks are present there will be a noticeable spark jump from the faulty area to the probe. Secondary coil wire may be checked in the same manner. **Be sure one spark plug cable is disconnected from spark plug while running probe along coil wire secondary cable. Cracked, leaking or faulty cables should be replaced.**

When installing new cable assemblies, install new high tension cable and nipple assembly over cap or coil tower, entering the terminal into the tower, push lightly, then pinch the large diameter of nipple (Fig. 1) to release trapped air between the nipple and tower. Continue pushing on the cable and nipple until cables are properly seated in the cap towers. Use the same procedure to install cable in coil tower (Fig. 2). Wipe the spark plug insulator clean before reinstalling cable and cover.

Resistance type cable is identified by the words " Electronic Suppression" printed on cable jacket. No additional resistors are necessary.

An ohmmeter can be used to check resistance type cables for open circuits, loose terminals or high resistance as follows:

(a) Remove cable from spark plug and install the proper adapter between cable and the spark plug.

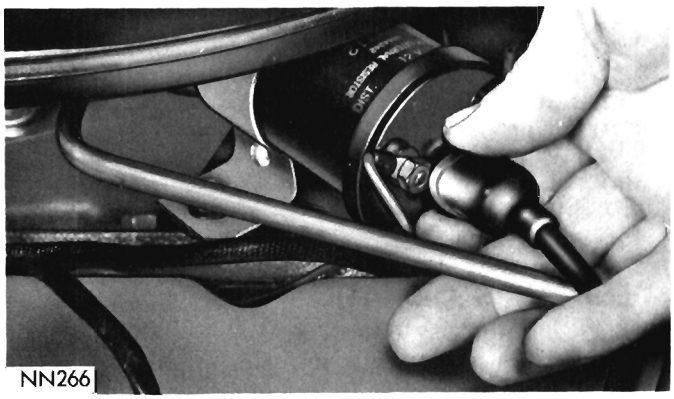


Fig. 2 - Installing Secondary Cable and Nipple at Coil Tower

(b) Lift distributor cap from distributor with cables intact **Do not remove cables from the cap.**

(c) Connect the ohmmeter between spark plug adapter and the corresponding electrode inside the cap, making sure ohmmeter probers are in good contact. If resistance is more than 30,000 ohms, remove cable at cap tower and check cable resistance. If resistance is more than 30,000 ohms on cables under twenty-five inches, or 50,000 ohms on cables over twenty-five inches long, replace cable assembly. Test all spark plug cables in same manner.

To test coil to distributor cap high tension cable, remove distributor cap with the cable intact. **Do not remove cable from the coil or cap.** Connect the ohmmeter between center contact in the cap and either primary terminal at coil. If the combined resistance of coil and cable is more than 25, 000 ohms, remove the cable at coil tower and check cable resistance. If resistance is more than 15,000 ohms, replace cable. If resistance is less, check for a loose connection at the tower or for a faulty coil.

Inspect coil tower for cracks, carbon tracking or oil leaks.

DISTRIBUTOR RESISTANCE TEST

This test indicates the resistance of the ignition primary circuit from the distributor side of the coil, through the contacts and distributor ground. Excessive resistance in this portion of the ignition system will prevent the coil from producing sufficient output for good overall ignition. To perform test, proceed as follows:

(1) Turn Selector Switch of a Tach-Dwell unit to CALIBRATE position and adjust Dwell Calibrator until Dwell Meter reads on the set line (test leads separated).

(2) Leave Selector Switch in CALIBRATE position, connect Tach-Dwell red lead to distributor terminal of coil and black lead to a good ground.

(3) Turn ignition switch "ON". Observe dwell meter reading. Meter pointer should be within bar marked "DISTRIBUTOR RESISTANCE." If reading is zero or outside of bar, crank engine with the starter until meter pointer moves as far to the right as possible. (This will indicate that contacts are closed.) A reading now within the bar indicates a normal distributor primary circuit.

If reading is outside the bar, high resistance is present in distributor primary circuit.

(4) Remove test lead from distributor terminal of coil and connect to the following points:

(a) Distributor primary terminal (outside)
(b) Distributor primary terminal (inside)
(c) Contact terminal bracket (insulated bracket)
(d) Ground side of contacts.
(e) Distributor housing.

(5) Repeat test at each connection until a noticeable change occurs in meter reading. If a poor connection or faulty lead is indicated, clean, tighten or replace as necessary and repeat test (3).

If faulty contacts are indicated, remove distributor for complete inspection, service, testing and calibration.

IDLE RPM TEST

Engine idle rpm setting should be tested and recorded as it is when the vehicle is first brought into the shop for testing. This will assist in diagnosing complaints of engine stalling or complaints of creeping and hard shifting on vehicles equipped with automatic transmissions.

Test procedures are as follows:

(1) Turn Selector Switch to CALIBRATE position and adjust Dwell Calibrator until Dwell Meter reads on SET line (test leads separated).

(2) Connect red lead of the test unit to the distributor primary terminal at the coil and the black lead to a good ground.

(3) Turn Selector Switch to the 6 LOBE position.

(4) Turn Tach-Dwell RPM Switch to the 1000 RPM position.

(5) With engine at normal operating temperature (off fast idle), momentarily open the throttle and release to make sure there is no bind in the linkage and that idle speed screw is against its stop.

(6) Note engine RPM on 1000 RPM scale and adjust carburetor idle speed to specifications shown in Fuel System "Specifications."

DISTRIBUTOR CONTACT DWELL

The degrees of distributor dwell are the degrees of rotation through which the breaker contacts remain closed. This is also commonly referred to as "dwell angle" or "cam angle."

Correct distributor contact dwell is essential for good ignition performance and contact life.

Test procedures are as follows:

(1) Disconnect vacuum line.

(2) CONNECT Tach-Dwell red lead to distributor terminal of coil and black lead to a good ground.

(3) Turn Selector Switch to 6 LOBE position.

(4) Start engine and operate at idle speed.

(5) Observe Dwell-Meter reading. If dwell reading is within "Specifications," contact gap, cam rubbing block and contact arm are all in satisfactory condition.

If dwell reading is not within specifications, incorrect contact gap, worn cam, worn rubbing block or distroted movable contact arm may be indicated.

DWELL VARIATION

This test indicates the mechanical condition of the distributor. Excessive wear in distributor mechanical parts cause dwell variations which will affect ignition timing.

Test procedures are as follows:

(1) With engine at idle speed, **vacuum hose disconnected,** and with test leads connected as in Contact Dwell Test, turn the Tach-Dwell RPM Switch to 5000 RPM

(2) Slowly increase engine speed to 1500 RPM then slowly reduce to idle speed while observing Dwell Meter reading.

If dwell reading varies more than 2 degrees from initial reading between idle speed and 1500 RPM, probable wear in the distributor shaft, bushings or breaker plate is indicated. Remove distributor for complete inspection and testing on a distributor tester. **Dwell variation at speeds above 1500RPM does not necessarily indicate distributor wear.**

IMPORTANT: Dwell and gap of the contacts must be within their specified limits at the same time. If this cannot be accomplished, it is probable that wrong contacts are installed, the rubbing block or cam lobes are badly worn or the movable contact arm is distorted.

IGNITION TIMING

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing.

The ignition timing test will indicate timing of the spark at No. 1 cylinder at idle (only).

Test procedures are as follows:

(1) Disconnect vacuum hose at distributor.

(2) Connect secondary lead of Power Timing Light to No. 1 spark plug, red primary lead to positive terminal of battery and black primary lead to negative battery terminal. **Do not puncture cables, boots or nipples with test probes. Always use proper adapters. Puncturing spark plug**

cables with a probe will damage the cables. The probe can separate the conductor and cause high resistance. In addition, breaking the rubber insulation may permit secondary current to arc to ground.

(3) Start engine and set idle to "Specifications" (Transmission in Neutral).

(4) Loosen distributor hold-down arm screw just enough so the distributor housing can be rotated in its mounting.

(5) Aim Power Timing Light at timing plate on chain case cover. If light flash occurs when timing mark on the vibration damper is located ahead of the specified degree mark on timing plate in the direction of engine rotation, timing is advanced. To adjust, turn distributor housing in direction of rotor rotation.

If flash occurs when the vibration damper timing mark is located past the specified degree mark in the direction of engine rotation, timing is retarded. To adjust, turn distributor housing against direction of rotor rotation. Refer to "Specifications." (Moving the distributor housing counterclockwise advances ignition timing and clockwise retards timing.)

(6) Tighten distributor hold-down arm screw after timing has been set and recheck timing adjustment with a Power Timing Light.

(7) When ignition timing is correct, reconnect vacuum hose to distributor.

Ignition Timing (with C-744 Test Lamp)

(1) Connect C-744 test lamp between distributor primary terminal and battery positive post.

(2) Turn engine until number 6 exhaust valve is just closing; continue turning the engine slowly until mark on the crankshaft pulley is at specified degree mark at case cover.

(3) Loosen distributor clamp bolt so distributor housing can be rotated with a slight drag, then turn distributor in the normal rotation until test lamp lights.

(4) Turn distributor against normal distributor rotation until test lamp goes out. **If test lamp lights immediately when connected, turn distributor against normal distributor rotation until light goes out.**

(5) Tighten distributor clamp bolt securely and remove test lamp. If operation is performed properly the engine is timed to specifications. **If engine is turned beyond the timing mark, continue turning engine for two full revolutions of the crankshaft; this will place the distributor rotor in approximately the initial position.**

CAUTION: DO NOT reverse rotation of crankshaft if you have passed the timing mark as this would affect valve timing and distributor timing.

DISTRIBUTOR REMOVAL

(1) Disconnect vacuum hose at distributor.

(2) Disconnect primary lead wire at coil.

(3) Unfasten distributor cap retaining clips and lift off distributor cap.

(4) Rotate engine crankshaft until the distributor rotor is pointing toward the cylinder block, scribe a mark on block at this point to indicate position of the rotor as reference when reinstalling distributor.

(5) Remove distributor hold-down arm screw.

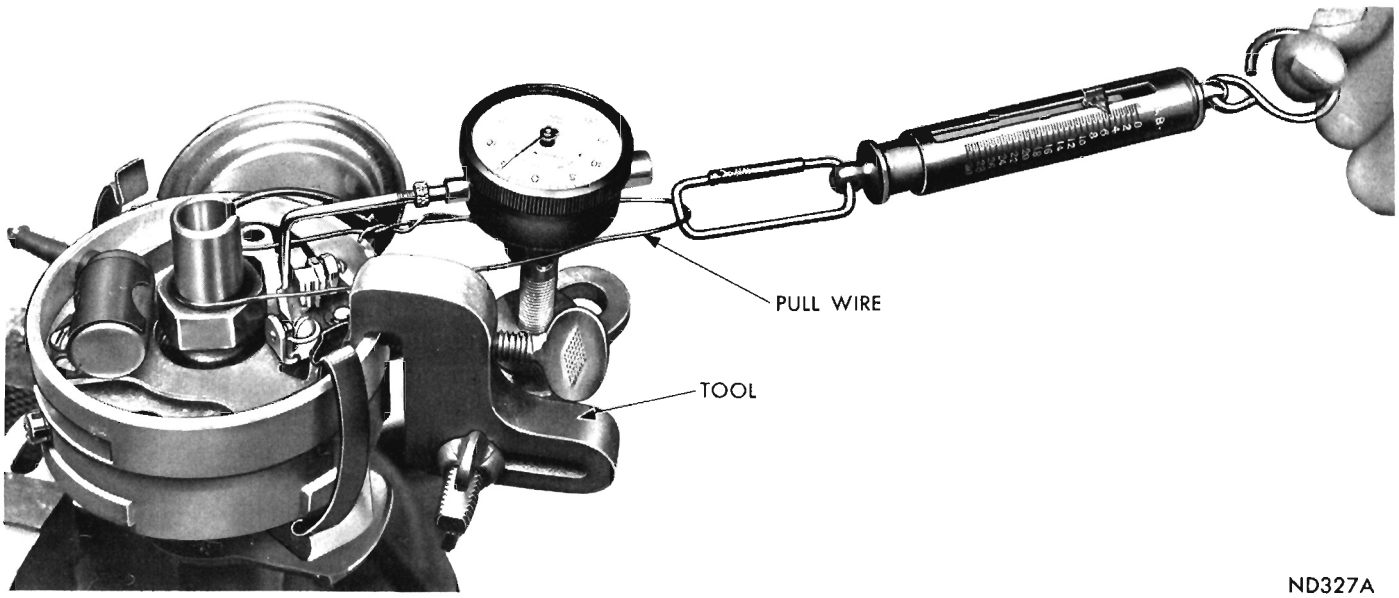


Fig. 3 - Shaft and Bushing Wear Test

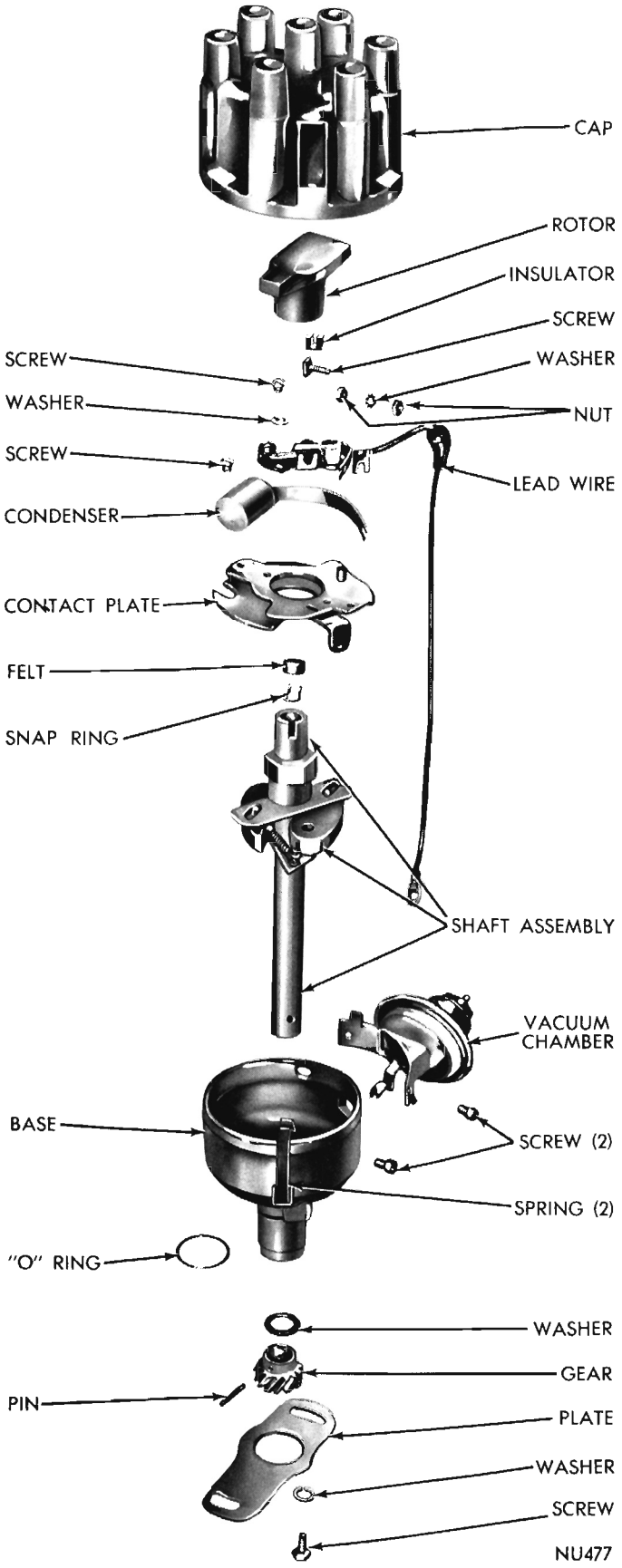


Fig. 4 - Distributor Disassembled View

(6) Carefully lift the distributor from the engine, shaft will rotate slightly as the distributor gear is disengaged from the camshaft gear.

SHAFT AND BUSHING WEAR TEST

(1) Remove distributor rotor.

(2) Disconnect primary lead wire at distributor terminal. **Do not loosen** removable contact arm spring retaining nut.

(3) Clamp distributor hold-down arm in a vise equipped with soft jaws and apply only enough pressure to restrict any movement of the distributor during this test.

(4) Attach a dial indicator to distributor housing so indicator plunger arm rests against movable arm at rubbing block and with rubbing block of movable contact arm on highest point of a cam lobe (Fig. 3).

(5) Place one end of a wire loop around the top of distributor shaft. Hook a spring scale in the other end of the wire loop and pull on a line with the plunger of the indicator gauge. The wire loop must be down on the distributor shaft to insure a straight pull; also be sure that the wire loop does not interfere with the indicator or indicator holding bracket. Apply a five pound pull and read the movement of the plunger on the indicator dial. (Be sure the rubbing block of the movable contact arm is on the highest point of the cam lobe during this test.) If the plunger movement exceeds .006 inch, replace the distributor housing or shaft assembly, see "Distributor Disassembly."

DISTRIBUTOR DISASSEMBLY (Fig. 4)

(1) Remove distributor rotor.

(2) Remove the two screws and lockwashers attaching the vacuum control unit to distributor housing and remove vacuum control unit.

(3) Disconnect primary lead at terminal screw and slide primary lead off the contact plate terminal. Remove wire and grommet as an assembly. (Push grommet towards inside of distributor to remove — **Do not pull the wire.)**

(4) Remove two screws and lockwashers attaching contact plate to the housing and lift out contact plate, contacts and condenser as an assembly. **Distributor cap clamp springs are held in place by peened metal around the openings and should not be removed.**

(5) If the side play exceeds .006 inch in "Shaft and Bushing Wear Test", replace distributor housing assembly or shaft and governor assembly as follows:

(a) Remove distributor drive gear retaining pin and slide gear off end of shaft. If gear is worn or damaged see "Assembling-Distributor" step 5.

CAUTION: Support hub of gear in a manner that pin can be driven out of gear and shaft without

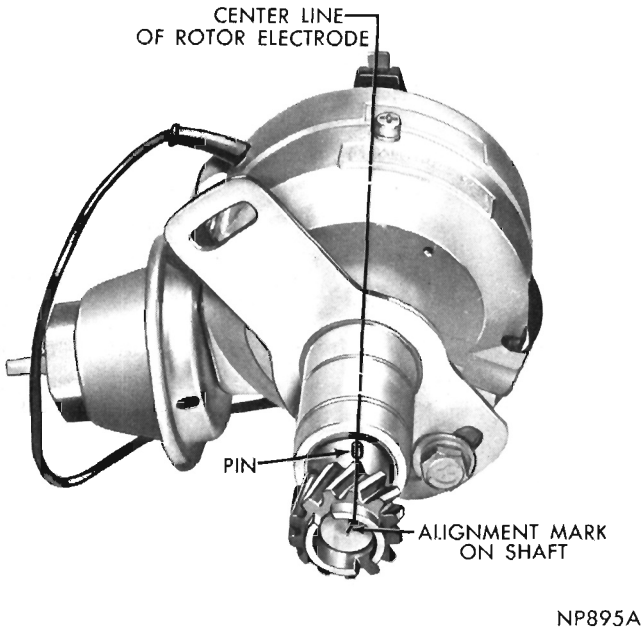


Fig. 5 - Scribe Line on Distributor Shaft

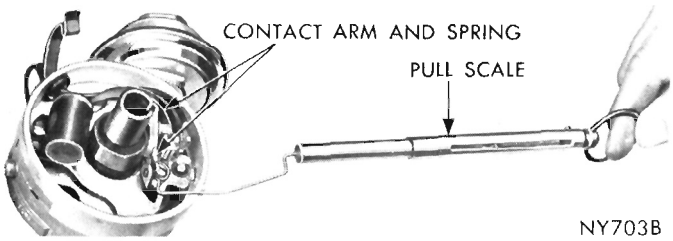


Fig. 7 Testing Contact Arm Tension Spring

damaging gear teeth.

(b) Use a file to clean burrs, from around pin hole in the shaft and remove the lower thrust washer.

(c) Push shaft up and remove shaft through top of distributor body.

ASSEMBLING THE DISTRIBUTOR

(Refer to Fig. 4)

(1) Test operation of governor weights and inspect weight springs for distortion.

(2) Lubricate governor weights.

(3) Inspect all bearing surfaces and pivot pins for roughness, binding or excessive looseness.

(4) Lubricate and install upper thrust washer (or washers) on the shaft and slide the shaft into the distributor body.

(5) If gear is worn or damaged, replace as follows:

(a) Install lower thrust washer and old gear on lower end of shaft and temporarily install rollpin.

(b) Scribe a line on the end of shaft from center to edge, so line is centered between two gear teeth

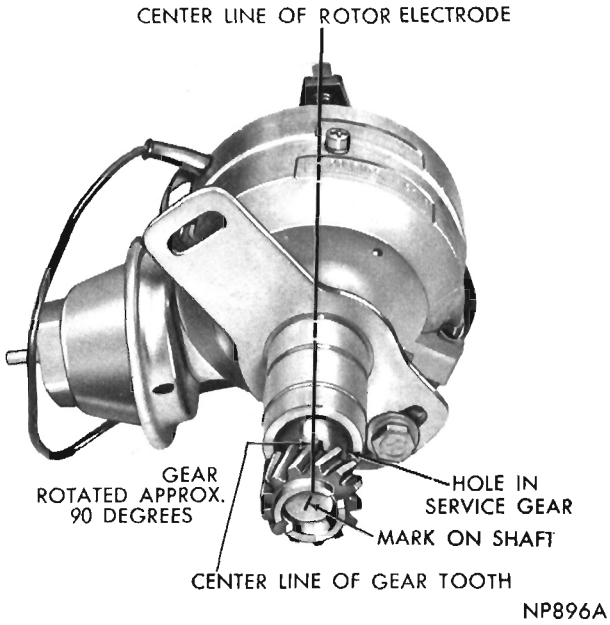


Fig. 6 - Aligning Gear Teeth with Centerline of Rotor Electrode

as shown in Figure 5. **Do not Scribe completely across the shaft.**

(c) Remove rollpin and gear. Use a fine file to clean burrs from around pin hole.

(d) Install new gear with thrust washer in place. Drill hole in gear and shaft approximately 90 degrees from old hole in shaft and with scribed line centered between the two gear teeth as shown. **If it appears that the new pin hole may interfere with the shaft oil groove, rotate gear to the centerline of the next pair of gear teeth, aligning again with scribe mark on the end of shaft.**

(e) Before drilling through shaft and gear, place a .007 feeler gauge between gear and thrust washer and after again observing that the centerline between two of the gear teeth is in line with centerline of rotor electrode (Fig. 6) drill a .124-.129 inch hole and install the rollpin.

CAUTION: Support hub of gear when installing roll pin so that gear teeth will not be damaged.

(6) Install contact plate assembly, align the condenser lead, movable contact spring, primary lead, and install attaching screws.

(7) Attach vacuum advance unit arm to the contact plate.

(8) Install vacuum unit attaching screws and washers.

(9) Test contact arm spring tension.

(10) Adjust contact cap.

(11) Lubricate the felt pad in top of distributor cam with 1 drop of light engine oil and install the rotor.

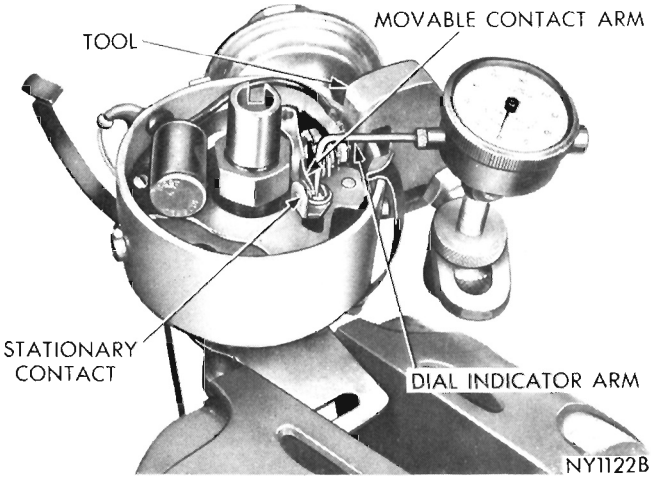


Fig. 8 Adjusting Contact Clearance with Indicator

TESTING CONTACT ARM SPRING TENSION

(1) Hook a spring scale MTU-36 on contact arm and pull in a straight line at a right angle to the contact surfaces (Fig. 7). Take a reading as contacts start to separate under slow and steady pull of the scale. Spring tension should be 17 to 20 ounces. If reading is outside these limits, loosen the screw which holds the end of contact arm spring, and slide end of spring in or out, as necessary.

(2) Tighten screw and measure spring tension. **Just the right amount of contact spring tension is very important for effective ignition and efficient engine performance. Spring tension that is too great, will cause excessive wear on distributor cam and on the nylon block of the movable contact arm. Spring tension that is too weak, is unable to keep the contacts in contact with each other when they close. This is particularly true as engine speed is increased, causing high-speed misfiring.**

DISTRIBUTOR CONTACTS

Contact Wear

Contacts which have undergone several thousand miles of operation will have a rough surface, but this should not be interpreted as meaning that contacts are worn out. If the contact area has a gray color and roughness between the contacts matches so that a large contact area is maintained, the contacts will continue to provide satisfactory service.

However, if the contact area is oily, mottled or dark in color, or is badly pitted, the contacts will soon become unsatisfactory for further operation. Not only must they be replaced, but the ignition system and engine must be checked to determine the cause of the trouble so it can be eliminated. **Unless the condition causing contact burning or excessive pitting is corrected, new contacts will provide no better service than the old contacts.**

Burning of Contacts

Contact burning will result from high primary voltage, presence of oil or other foreign material, defective condenser and improper contacts adjustment. High voltage causes an excessively high current flow through the contacts which burns through them rapidly. High voltage can result from an improperly adjusted or inoperative voltage regulator.

Oil or crankcase vapors which work up into the distributor and deposit on the contact surfaces will cause them to burn rapidly. This is easy to detect since the oil produces a smudgy line under the contacts. Clogged engine breather pipes permit crankcase pressure to force oil or vapors up into the distributor. Over-oiling of the distributor will also cause burning.

If contact opening is too small (cam angle too large), arcing will occur between the contacts resulting in low secondary voltage and engine miss.

High series-resistance in the condenser circuit will prevent normal condenser action so the contacts will burn rapidly. This resistance may be caused by a loose condenser mounting or lead connection, or by poor connections inside the condenser.

Pitting of Contacts

Contact pitting results from the transfer of material from one contact to the other so that a tip builds up on one contact while a pit forms in the other.

A small amount of pitting in several thousand miles is normal and does not affect the distributor operation. However, excessive pitting such as long sharp spikes is harmful and causes arcing and voltage loss. Contacts with this condition should be replaced.

Excessive pitting can be due to too small a contact opening, high primary voltage or wrong condenser capacity. Inspect to be certain the condenser capacity, contact spring tension, and contact gap are within the specified range. See "Specifications".

INSTALLING AND ALIGNING CONTACTS

(1) Loosen the terminal screw nut, and remove primary lead and condenser lead.

(2) Remove the stationary contact lock screw and remove the old contact set.

(3) Install a new contact set the sleeve at one end of the adjustable bracket fits over and pivots on the upper contact plate mounting pin.

(4) Connect the condenser and primary leads.

(5) Align the contacts, if necessary, by bending the stationary contact bracket only. **Never bend** the movable contact arm to obtain alignment.

(6) After aligning the contacts, adjust contact clearance to "Specifications," using dial indicator (Fig. 8). Recheck the contact arm spring tension.

(7) Test the dwell angle to show proper degree of closure. See Paragraph, "Distributor Contact Dwell." The lock screw should be loosened just enough so that the stationary contact bracket can be moved with a slight drag; otherwise, it will be difficult to set the contacts accurately. After setting the contacts to the correct gap, tighten the stationary bracket lock screw.

DISTRIBUTOR LUBRICATION

(1) Lubricate the felt wick under the rotor in top of distributor cam with 1 drop of SAE 10W oil.

(2) Wipe the distributor cam free of dirt and old grease with a clean lintless cloth. Apply a light film of new distributor cam lubricant Number 1473595 or equivalent over the entire cam surface. Lubricant must be able to adhere to the cam surface thereby resisting being thrown from the cam by centrifugal force, must not melt at operating temperatures and must not harden or dry out with age, must not chemically react or be affected by ozone or cause corrosion or pitting of the metal, must possess moisture control properties to prevent rust formation on the cam.

CAUTION: A thin film is all that is required. Do not over-lubricate. Excess grease will be thrown from the distributor cam when engine is running. If this grease strikes the contacts, arcing and burning of contacts will result.

DISTRIBUTOR ADVANCE TESTING

Centrifugal Advance Curve

Carefully mount distributor assembly (less cap and rotor in a reliable stroboscope-type distributor tester so that gear is not damaged and proceed with tests as follows:

(1) Turn the Tach-Dwell switch to the 6 LOBE position and Motor Switch to correct direction of rotation. Refer to "Distributor Advance Specifications" in this manual.

(2) Turn battery switch "ON".

(3) Regulate tester speed control to operate distributor at 200 distributor rpm.

(4) Align the "O" of distributor tester degree ring with any of the arrow flashes.

(5) Adjust tester speed control to operate distributor at speeds called for under "Specifications" and observe arrow flashes opposite tester degree ring to determine degrees of advance.

(6) If advance is not according to specifications, replace with correct distributor shaft assembly (shaft, cam, yoke, governor weights as complete assembly) or distributor assembly, less cap and rotor.

Vacuum Diaphragm Leak Test

With distributor mounted in Distributor Tester and with vacuum unit attached to distributor, proceed as follows:

(1) Place thumb over end of vacuum pump hose and adjust the regulator control knob to give a reading of 20 inches of vacuum with hose closed off to be sure tester hose does not leak.

(2) Attach tester vacuum pump hose to the tube on vacuum unit. Vacuum gauge should hold on maximum vacuum obtainable if no leaks exist.

(3) Observe breaker plate while performing leak test to test response of the breaker plate. There should be instant response to pull of the diaphragm, moving plate without a drag, bind or jerk in either direction.

(4) If leakage is indicated, replace vacuum unit assembly.

Vacuum Advance Curve

If only the vacuum advance curve is to be checked, connect tester vacuum pump hose to distributor vacuum advance unit and perform operations 1 through 4 under "Centrifugal Advance Curve", then proceed as follows:

(1) Turn tester vacuum pump "ON". Adjust vacuum pump regulator to vacuum test specifications. See "Specifications" and observe arrow flashes on tester degree ring to determine degrees of advance.

(2) If vacuum advance is below or above specifications, replace the vacuum advance unit. Retest vacuum advance curve.

DISTRIBUTOR INSTALLATION

(1) Position distributor on engine. Make certain the rubber "O" ring seal is in the groove of distributor shank.

(2) Carefully engage distributor drive gear with camshaft drive gear so that when distributor is installed properly, rotor will be in line with previously scribed line on cylinder block. **If engine has been cranked while distributor is removed, it will be necessary to establish proper relationship between the distributor shaft and Number 1 piston position as follows:**

(a) Rotate the crankshaft until number one piston is at top of compression stroke. Mark on inner edge of crankshaft pulley should be in line with the "O" (TDC) mark on timing chain case cover.

(b) Rotate rotor to a position just ahead of the number one distributor cap terminal.

(c) Lower the distributor into the opening, en-

gaging distributor gear with drive gear on camshaft. With distributor fully seated on engine, rotor should be under the cap number 1 tower with distributor contacts just separating.

(3) Install the distributor cap (make sure all high tension wires "snap" firmly in the cap towers).

(4) Install hold-down arm screw and tighten finger tight.

(5) Attach primary lead wire to the coil **Do not connect distributor vacuum hose at this time.**

(6) Connect secondary lead of Power Timing Light to the Number 1 spark plug (using proper adaptor) and red primary lead to the positive terminal of battery with black primary lead to negative battery terminal. **Do not puncture the cable cap nipples or spark plug covers to make a contact. Use proper adapters.**

(7) Start engine and run engine at idle speed.

(8) Rotate distributor housing so that timing mark on crankshaft damper is aligned with specified degree mark on chain case cover. Refer to "Specifications" (Moving distributor housing counter-clockwise advances timing and clockwise retards timing).

(9) Tighten distributor hold down arm screw after timing has been set and recheck timing adjustment with a Power Timing Light.

(10) When timing is correct, connect vacuum hose to the distributor.

(11) Remove Power Timing Light from engine.

IGNITION COIL

The ignition coil is designed to operate with an external ballast resistor. When testing the coil for output, include resistor in tests. Inspect the coil for external leaks and arcing.

Test coil according to coil tester Manufacturer's instructions. Test coil primary resistance. Test ballast resistor resistance. Test coil secondary resistance. Replace any coil or ballast resistor that does not meet specifications.

Every time an ignition coil is replaced because of a burned tower, carbon tracking, or any evidence of arcing at the tower, the nipple or boot on the coil end of the secondary cable, replace cable. Any arcing at the tower will carbonize the nipple so that placing it on a new coil will invariably cause another coil failure.

If secondary cable shows any signs of damage, cable should be replaced with a new cable with a neoprene nipple since the old cable can cause arcing, and therefore, ruin a new coil.

BALLAST RESISTOR

The ballast resistor is a compensating resistance in the ignition primary circuit. During low speed operation, when primary circuit current flow is high, ballast resistor temperature rises, increasing resistance. This reduces current flow, thereby prolonging ignition contact life. At high speed operation, when primary current flow is low, the ballast resistance cools off allowing more current flow, which is required for high speed operation. During starter operation, the ballast resistor is bypassed, allowing full battery voltage to ignition primary circuit.

IGNITION SYSTEM — 8 CYLINDER

INDEX

	Page
Assembling the Distributor	53
Ballast Resistor	56
Contact Arm Spring Tension	53
Distributor Contact Dwell	48
Distributor Contacts	54
Distributor Disassembly	52
Distributor Installation	55
Distributor Removal	50
Distributor Resistance Test	47
Dual Contacts	48
Dwell Variation	48
General Information	45
Idle R.P.M. Test	48
Ignition Coil	56
Ignition Timing	49
Installation and Aligning Contacts	54
Lubrication	54
Secondary Circuit Inspection	46
Service Diagnosis	46
Shaft and Bushing Wear Test	52
Spark Plugs	56
Specifications	123
Testing Distributor Advance	55

GENERAL INFORMATION

The ignition system consists of two separate circuits. The battery, ammeter, ignition switch, ballast resistor, primary winding of the ignition coil, distributor contacts and condenser, vehicle frame, and primary wiring make up the low voltage primary circuit. The secondary high voltage

circuit includes the coil secondary winding, distributor cap and rotor, spark plug cables, spark plugs and vehicle frame.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
BURNED OR PITTED DISTRIBUTOR CONTACTS	(a) Dirt or oil on contacts.	(a) If oil is on contact face, determine cause and correct condition. Clean distributor cam of dirt and grease, apply a light film of distributor cam lubricant to cam lobes; wipe off excess. See "Distributor Lubrication." Replace contact set and adjust as necessary.
	(b) Alternator voltage regulator setting too high.	(b) Test alternator voltage regulator setting, adjust as necessary. Replace contact set and adjust as necessary.
	(c) Contacts misaligned or gap too small.	(c) Align and adjust contacts.
	(d) Faulty coil.	(d) Test and replace coil if necessary. Replace and adjust contacts.
	(e) Ballast resistor not in circuit.	(e) Inspect conditions, and correctly connect the coil.
	(f) Wrong condenser or faulty condenser.	(f) Test condenser and replace if necessary. Replace and adjust contact.
	(g) Faulty ignition switch.	(g) Replace ignition switch.
	(h) Bushings worn.	(h) Replace housing*.
	(i) Touching contacts with the hands during installation.	(i) Replace and adjust contacts.
IGNITION COIL FAILURE	(a) Coil damaged by excessive heat from engine.	(a) Replace coil. Inspect condition of the distributor contacts.
	(b) Coil tower carbon-tracked.	(b) Replace the coil.
	(c) Oil leak at tower.	(c) Replace the coil.

*Prestolite—Recondition distributor.

SERVICE PROCEDURES

SECONDARY CIRCUIT INSPECTION

Check high tension cable connections for good contact at the coil and distributor cap towers and at the spark plugs. Terminals should be fully seated. The nipples and spark plug covers should be in good condition. Nipples should fit tightly on the coil cap towers and spark plug covers should fit tight around spark plug insulators. Cable connections that are loose will corrode and increase the resistance and permit water to enter the towers causing ignition malfunction. **To maintain proper sealing between the towers and nipples, cable and nipple assemblies should not be removed from the distributor or coil towers unless nipples are damaged or cable testing indicates high resistance or broken insulation.**

Clean high tension cables with a cloth moistened with a non-flammable solvent and wipe dry. Bend cables to check for brittle or cracked insulation.

When testing secondary cable for punctures and cracks with an oscilloscope follow the instructions of the equipment manufacturers.

If an oscilloscope is not available, secondary cables can be tested as follows:

(a) Engine not running, connect one end of a test probe to a good ground, other end free for probing.

(b) Disconnect cable at spark plug end. Insulate cable end from grounding.

(c) With engine running, move test probe along entire length of wire. If punctures or cracks are present there will be a noticeable spark jump from the faulty area to the probe. Secondary coil wire may be checked in the same manner, be sure one spark plug cable is disconnected from spark plug while running probe along coil wire secondary cable. Cracked, leaking or faulty cables should be replaced.

When installing new cable assemblies, install new high tension cable and nipple assembly over cap or coil tower, entering the terminal into the tower, push lightly, then pinch the large diameter of the nipple (Fig. 1) to release trapped air be-



Fig. 1-Installing Secondary Cable and Nipple at Distributor Cap Tower

tween nipple and tower. Continue pushing on the cable and nipple until cables are properly seated in the cap towers. Use the same procedure to install cable in coil tower (Fig. 2).

Use the following procedure when removing the high tension cable from the spark plug. First, remove the cable from the retaining bracket. Then grasp the cover as close as possible to the spark plug and use a straight and steady pull (Fig. 3). **Do not use pliers and do not pull the cable at an angle.** Doing so will damage the insulation, cable terminal or the spark plug insulator. **Wipe spark plug insulator clean before reinstalling cable and cover.**

Resistance type cable is indentified by the words "Electronic Suppression" printed on the cable jacket. No additional resistors are necessary.

Use an ohmmeter to check resistance type cable for open circuits, loose terminals or high resistance as follows:

(a) Remove cable from spark plug and install the proper adapter between cable and spark plug.

(b) Lift distributor cap from distributor with cables intact. **Do not remove cables from cap.**

(c) Connect the ohmmeter between spark plug adapter and the corresponding electrode inside the cap, making sure ohmmeter probes are in good contact. If resistance is more than 30,000 ohms, remove cable at cap tower and check the cable resistance. If resistance is more than 30,000 ohms on cables under twenty-five inches long or 50,000 ohms on cables over twenty-five inches long, replace cable assembly. Test all spark plug cables in same manner.

To test coil to distributor cap high tension cable, remove distributor cap with the cable intact. **Do not remove cable from the coil or cap.** Connect

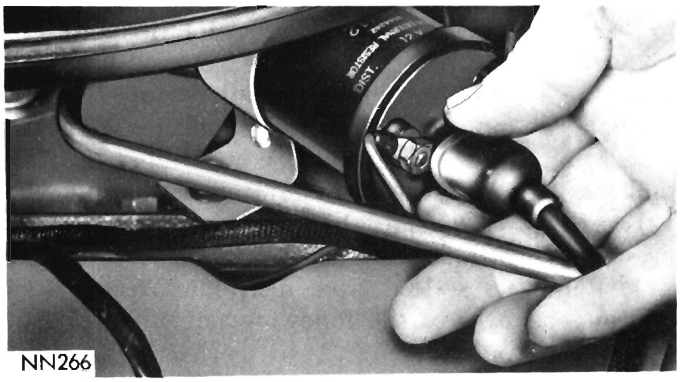


Fig. 2-Installing Secondary Cable and Nipple at Coil Tower



Fig. 3-Removing Secondary Cable and Cover from Spark Plug (Typical)

the ohmmeter between center contact in the cap and either primary terminal at coil. If the combined resistance of coil and cable is more than 25,000 ohms, remove the cable at coil tower and check cable resistance. If resistance is more than 15,000 ohms, replace the cable. If resistance is less, check for a loose connection at the tower or for a faulty coil.

Inspect coil tower for cracks, carbon tracking or oil leaks.

DISTRIBUTOR RESISTANCE TEST

This test indicates the resistance of the ignition primary circuit from the distributor side of the coil, through the points and the distributor ground. Excessive resistance in this portion of the ignition system will prevent the coil from producing sufficient output for good over-all ignition. To perform test, proceed as follows:

(1) Turn Selector Switch of a Tach-Dwell unit to CALIBRATE position and adjust Dwell Calibrator until Dwell Meter reads on the set line (test leads separated).

(2) Leave Selector Switch in CALIBRATE position, connect Tach-Dwell red lead to distributor terminal of coil and black lead to a good ground.

(3) Turn ignition switch "ON." Observe dwell meter reading. Meter pointer should be well within bar marked "DISTRIBUTOR RESISTANCE." If reading is zero or outside of bar, crank engine with the starter until meter pointer moves as far to right as possible. (This will indicate that contacts are closed.) A reading now within the bar indicates a normal distributor primary circuit.

If reading is outside the bar, high resistance is present in distributor primary circuit.

(4) Remove test lead from distributor terminal of coil and connect to the following points:

(a) Distributor primary terminal (outside).
(b) Distributor primary terminal (inside).
(c) Contact terminal bracket (insulated bracket).
(d) Ground side of the contacts.
(e) Distributor housing.

(5) Repeat test at each connection until a noticeable change occurs in the meter reading. If a poor connection or faulty lead is indicated, clean, tighten or replace as necessary and repeat test (3).

If faulty contact are indicated remove distributor for complete inspection, service, testing and calibration.

IDLE RPM TEST

Engine idle rpm setting should be tested and recorded as it is when the vehicle is first brought into the shop for testing. This will assist in diagnosing complaints of engine stalling, creeping and hard shifting on vehicles equipped with automatic transmissions.

Test procedures are as follows:

(1) Turn Selector Switch to CALIBRATE position and adjust Dwell Calibrator until Dwell Meter reads on SET line (test leads separated).

(2) Connect red lead of the test unit to distributor primary terminal at coil and black lead to a good ground.

(3) Turn Selector Switch to 8 LOBE position.

(4) Turn the Tach-Dwell RPM Switch to the 1000 rpm position.

(5) With engine at normal operating temperature (off fast idle), momentarily open the throttle and release to make sure there is no bind in the linkage and that idle speed screw is against its stop.

(6) Note engine RPM on 1000 RPM scale and adjust carburetor idle speed to specifications. See "Fuel System" specifications.

CAUTION: On engines equipped with idle speed solenoids, the solenoid must be energized. Adjust curb idle speeds with the fast curb idle adjusting screw resting on the solenoid plunger.

DISTRIBUTOR CONTACT DWELL

The degrees of distributor dwell are the degrees of rotation through which the contacts remain closed. This is also commonly referred to as "dwell angle" or "cam angle."

The correct distributor point dwell is essential for good ignition performance and contact point life.

Test procedures are as follows:

(1) Disconnect vacuum line and solenoid lead at carburetor, if so equipped.

(2) Connect Tach-Dwell red lead to distributor terminal of coil and black lead to a good ground.

(3) Turn Selector Switch to 8 LOBE position.

(4) Start engine and operate engine at idle speed.

(5) Observe dwell meter reading. If the dwell reading is within "Specifications" the contact gap, cam rubbing block and contact arm are all in satisfactory condition.

If dwell reading is not within specifications, incorrect contact gap, worn cam, worn rubbing block or distorted contact arm may be indicated.

DUAL CONTACTS

Block one set of contacts with a clean insulator and adjust the opposite set of contacts to specifications using the dwell meter. **Loosen stationary contact lock screw just enough, so stationary contact can be moved with a slight drag; otherwise it will be difficult to set contacts accurately.**

When one set of contacts has been adjusted for correct clearance tighten stationary contact lock screw.

Block adjusted set of contacts with an insulator and adjust remaining set of contacts in the same manner as the first set. Remove insulator and recheck tightness of stationary contact lock screw.

If contacts have been properly adjusted the dwell should be as specified for two contact sets.

DWELL VARIATION

This test indicates the mechanical condition of the distributor. Excessive wear in distributor mechanical parts cause dwell variations which will affect ignition timing.

Test procedures are as follows:

(1) With engine at idle speed **vacuum hose and solenoid lead at carburetor disconnected,** and test leads connected as in "Contact Dwell Test," turn Tach-Dwell RPM Switch to the 5,000 RPM position.

(2) Slowly increase engine speed to 1500 RPM then slowly reduce to idle speed while observing dwell meter reading.

If dwell reading varies more than 2 degrees from initial reading between idle speed and 1500 RPM, probable wear in the distributor shaft, bushings or

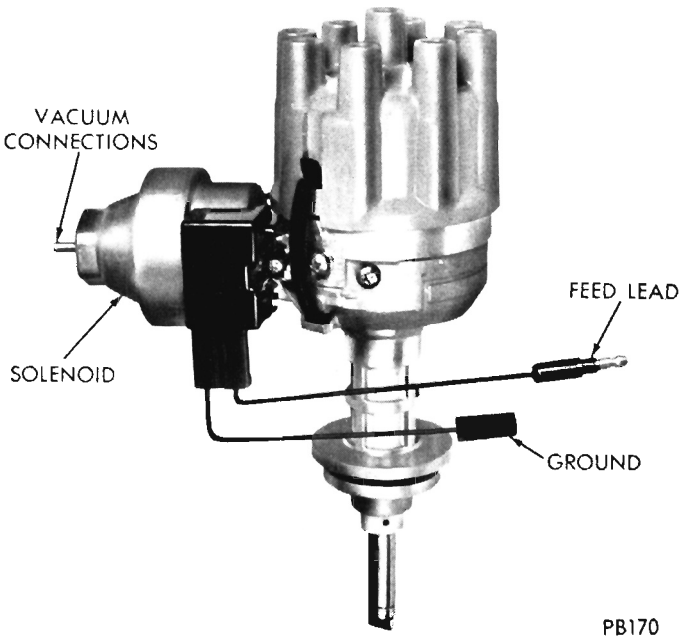


Fig. 4-Solenoid Retard Distributor Connections

contact plate bearing and pivot pin is indicated. Remove distributor for complete inspection and testing on a distributor tester. **Dwell variation at speeds above 1500 does not necessarily indicate distributor wear. Dwell and gap of the contacts must both be within their specified limits at the same time. If this cannot be accomplished, it is probable that wrong contacts are installed or the rubbing block or cam lobes are badly worn or movable contact is distorted.**

IGNITION TIMING (383 Cu. In. 440 Cu. In)

(Solenoid Distributor—Fig. 4)

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing. The ignition timing test will indicate the timing of the spark at No. 1 cylinder at curb idle (Hot only).

Test procedures are as follows:

(1) **Disconnect vacuum hose at distributor, and plug hose.**

(2) Connect the secondary lead of a power timing light to No. 1 spark plug, red primary lead to positive terminal of the battery and the black primary lead to the negative battery terminal. **Do not puncture cables, boots or nipples with test probles. Always use proper adapters. Puncturing the spark plug cables with a probe will damage the cables. The probe can separate the conductor and cause high resistance. In addition breaking the rubber insulation may permit secondary current to arc to ground.**

(3) Loosen the distributor hold-down mounting screw just enough so distributor housing can be rotated in its mounting.

(4) Start the engine and set the curb idle as shown in "Specifications". (Transmission in Neutral and Engine Hot).

(5) Aim the power timing light at the timing marks on the chain case cover. If the timing light flash occurs when the timing mark on the vibration damper is located ahead of specified degree mark on the timing plate. The timing is advanced. To adjust turn distributor housing **(Not Vacuum Chamber)** Counter clockwise. **Do not use vacuum chamber as a turning handle.** If the timing light flash occurs when the timing mark on the vibration damper is located past the specified degree mark on the timing plate. The timing is retarded. **To adjust turn distributor housing clockwise.** Timing may vary from the specified specifications a plus or minus 2-1/2 degrees and still fall within range, but if the timing is checked it should be adjusted to the specification shown on the distributor charts.

(6) To check the distributor solenoid for proper operation, disconnect the ground lead at the carburetor. (Do not disconnect idle stop solenoid on engines so equipped). Aim the timing light at the timing marks on the chain case. The timing should advance as shown in "SPECIFICATIONS" and the engine speed should increase. If not check that ground switch on carburetor is making contact. Connect and disconnect ground lead. If operation is still not within "SPECIFICATIONS" remove and replace the solenoid assembly. **DO NOT ATTEMPT TO USE JUMPER WIRES OR METERS TO CHECK THE SOLENOID.**

(7) Stop the engine and tighten the distributor hold-down screw.

(8) Reconnect the wire at the carburetor throttle stop.

(9) Reconnect the vacuum hose to the distributor.

(10) Remove the timing light.

IGNITION TIMING (318 Cu. In., 340 Cu. In and 360 Cu. In.)

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing.

The ignition timing test will indicate the timing of the spark at No. 1 cylinder at idle (only).

Test procedures are as follows:

(1) **Disconnect vacuum hose at distributor.**

(2) Connect secondary lead of Power Timing Light to No. 1 spark plug, red primary lead to positive terminal of battery and black primary lead to negative battery terminal. **Do not puncture cables, boots or nipples with test probes. Always use proper adapters. Puncturing the spark plug cables with a probe will damage the**

cables. The probe can separate the conductor and cause high resistance. In addition breaking the rubber insulation may permit secondary current to arc to ground.

(3) Start engine and set idle to "Specifications" (Transmission in Neutral).

(4) Loosen distributor hold-down arm screw just enough so distributor housing can be rotated in its mounting.

(5) Aim Power Timing Light at timing plate on chain case cover. If light flash occurs when timing mark on vibration damper is located ahead of specified degree mark on timing plate in the direction of engine rotation, timing is advanced. To adjust, turn distributor housing in direction of rotor rotation.

If flash occurs when the vibration timing mark is located past the specified degree mark in the direction of engine rotation, timing is retarded. To adjust, turn distributor housing against direction of rotor rotation. Refer to "Specification." (Moving the distributor housing against shaft rotation advances timing and with shaft rotation retards timing.

(6) Tighten distributor hold-down arm screw after timing has been set and recheck timing adjustment with a Power Timing Light.

(7) When ignition timing is correct, reconnect vacuum hose to distributor.

Ignition Timing (with C-744 Test Lamp)

(1) Conncet C-744 test lamp between distributor primary terminal and battery positive post.

(2) Turn engine until number 6 exhaust valve is just closing; continue turning engine slowly until specified degree mark on the crankshaft pulley is at specified degree mark at timing case cover.

(3) Loosen distributor clamp bolt so distributor housing can be rotated with a slight drag, then turn distributor in the normal rotation until test lamp lights.

(4) Turn distributor against normal distributor rotation until test lamp goes out. **If test lamp lights immediately when connected, turn distributor against normal distributor rotation until light goes out.**

(5) Tighten distributor clamp bolt securely and remove test lamp. If the operation is performed properly the engine is timed to specifications. **If engine is turned beyond the timing mark, continue turning engine for two full revolutions of the crankshaft; this will place the distributor rotor in approximately the initial position.**

CAUTION: DO NOT reverse rotation of the crankshaft, if you have passed the timing mark as this would affect valve timing and distributor timing.

DISTRIBUTOR REMOVAL

(1) Disconnect vacuum hose at distributor.

(2) Disconnect primary lead wire at coil.

(3) Unfasten distributor cap retaining clips and lift off distributor cap.

(4) Scribe a mark on the edge of distributor housing to indicate position of the rotor as reference when reinstalling distributor.

(5) Remove distributor hold-down clamp screw and clamp.

(6) Carefully lift distributor from engine.

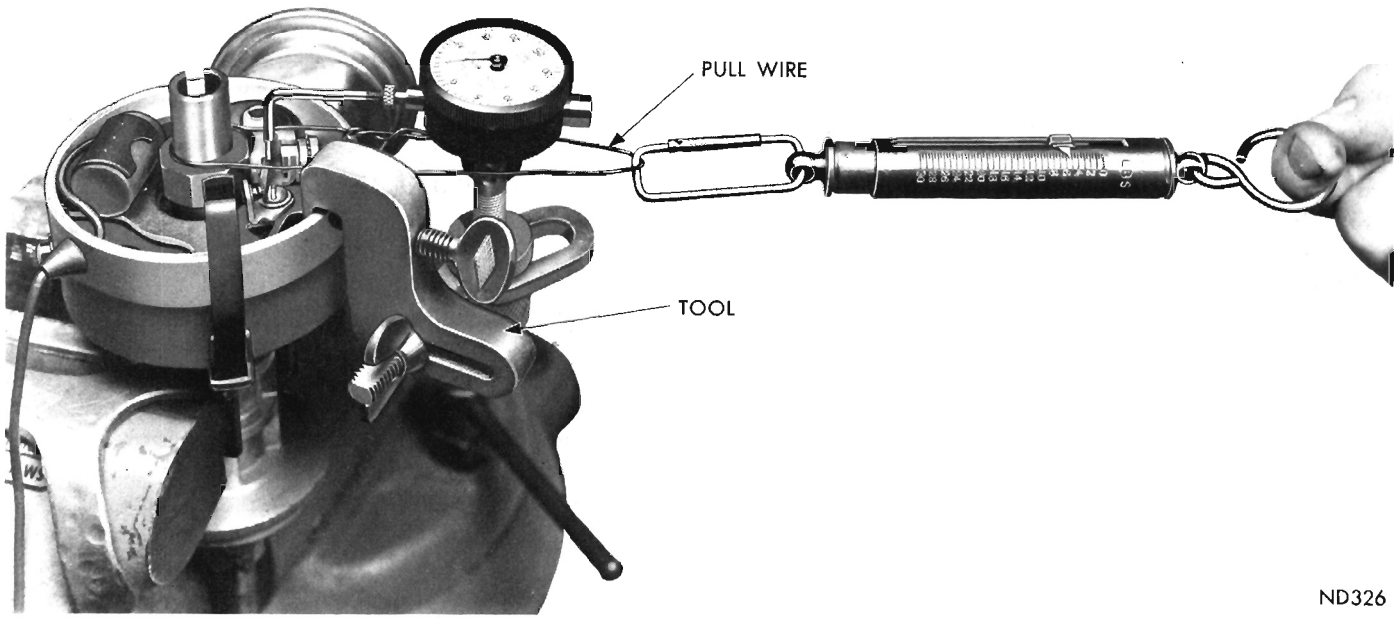


Fig. 5-Shaft and Bushing Wear Test

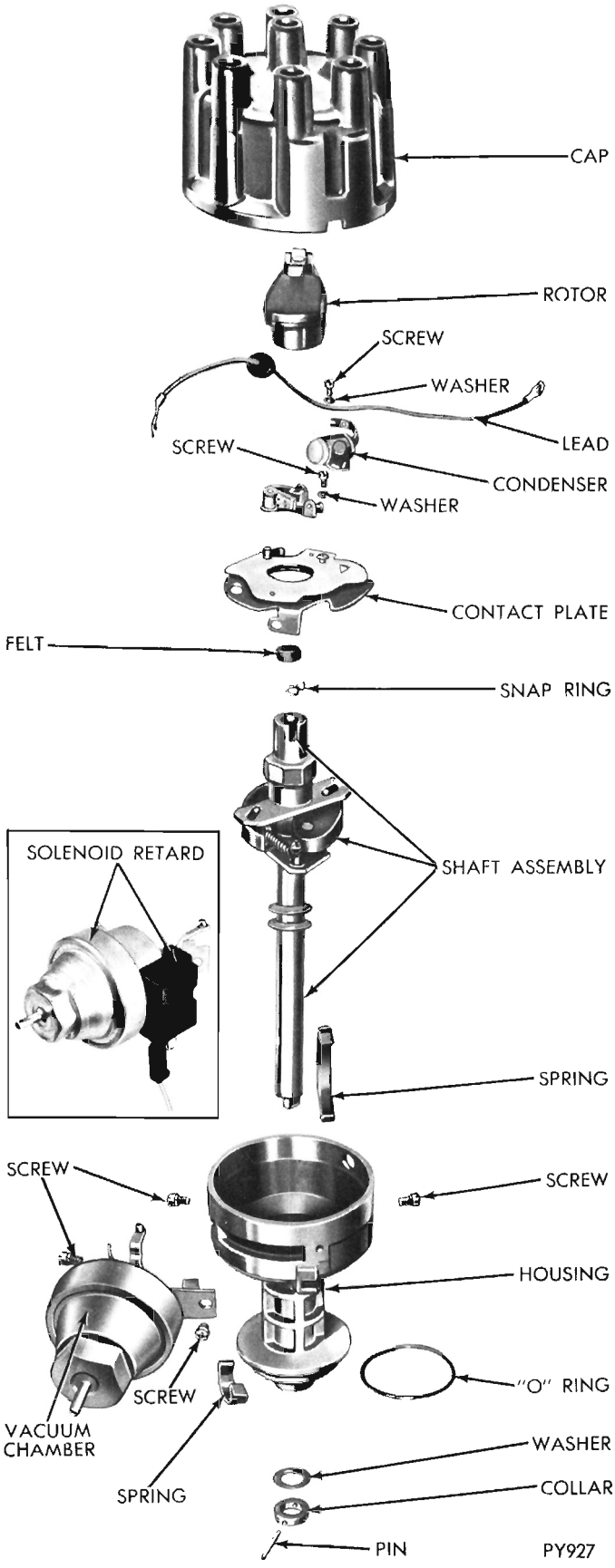


Fig. 6-Distributor (Disassembled View)-Chrysler Built (Typical)

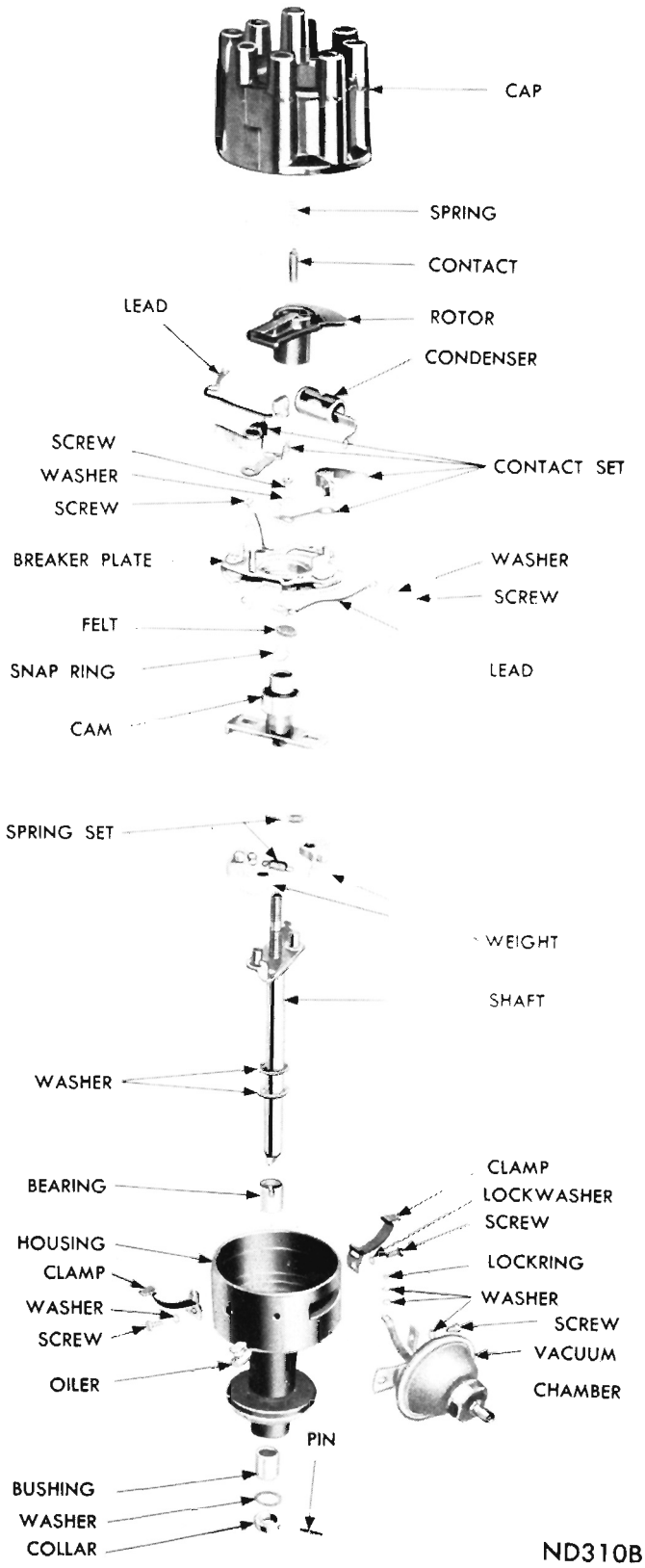


Fig. 7-Distributor (Disassembled View)-Prestolite

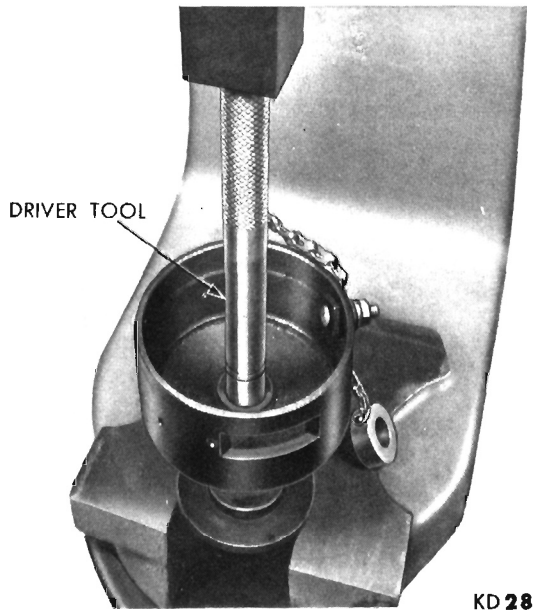


Fig. 8-Removing Distributor Drive Shaft Bushings

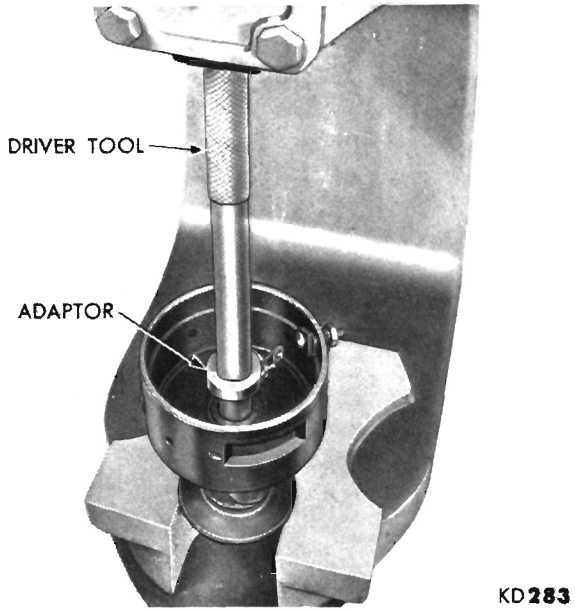


Fig. 9-Installing Upper Bushing

SHAFT AND BUSHING WEAR TEST

(1) Remove distributor rotor.

(2) Disconnect primary lead wire at distributor terminal. DO NOT LOOSEN inner nut that holds movable contact arm tension spring to terminal post.

(3) Clamp the ribbed section of distributor housing lightly in a vise equipped with soft jaws and attach dial indicator to body of distributor with the indicator plunger arm resting against movable contact arm at the rubbing block and with the rubbing block of contact arm on the highest point of cam lobe (Fig. 5).

(4) Place one end of a wire loop around the top of distributor shaft. Hook a spring scale in the other end of wire loop and pull on a line with the plunger of indicator guage. Be sure wire loop on shaft end is down on the shaft to insure a straight pull and also that wire loop does not interfere with indicator or holding bracket. Apply a five pound pull and read the movement of plunger on indicator dial. (Be sure rubbing block of contact arm is on highest point of the cam lobe during this test.) If plunger movement exceeds .006 inch, replace housing and/or distributor shaft, see "Distributor Disassembly."

DISTRIBUTOR DISASSEMBLY (Figs. 4,6 and 7)

(1) Remove distributor rotor. **The distributor cap clamp springs on Chrysler built distributors are held in place by peened metal around the openings and should not be removed.**

(2) Remove the retainer attaching vacuum advance unit to the contact plate advance arm (Prestolite).

(3) Remove the two screws and lockwashers attaching vacuum advance unit to distributor housing and remove the advance unit.

(4) Remove primary lead wire and rubber grommet as an assembly. Push gromment towards inside of distributor to remove. **Do not pull on the wire.**

(5) Remove two screws, and lockwashers attaching the contact plate to housing and lift out the contact plate, contacts and condenser as an assembly.

(6) Remove oil wick from the distributor cam well. Remove spring clip from oil well in cam and remove cam and yoke assembly and spacer (Prestolite).

(7) If side play exceeded .006 inch in "Shaft and Bushing Wear Test," (Chrysler Built distributors) replace housing or shaft and cam assembly as necessary. **Prestolite** distributors replace bushing and/or distributor shaft as follows:

(a) Remove distributor drive collar retaining pin and slide collar off end of shaft.

(b) Use a fine file to clean burrs from around pin hole in the shaft and remove lower thrust washer.

(c) Push shaft up and remove it through the top of distributor body. Remove upper thrust washer.

(d) Remove shaft oiler and lift out oiler wick.

(e) Place housing in an arbor press and press out upper and lower bushings from bottom of housing using Driver Tool C-3041 (Fig. 8).

(f) Soak new bushings in light engine oil for approximately 15 minutes.

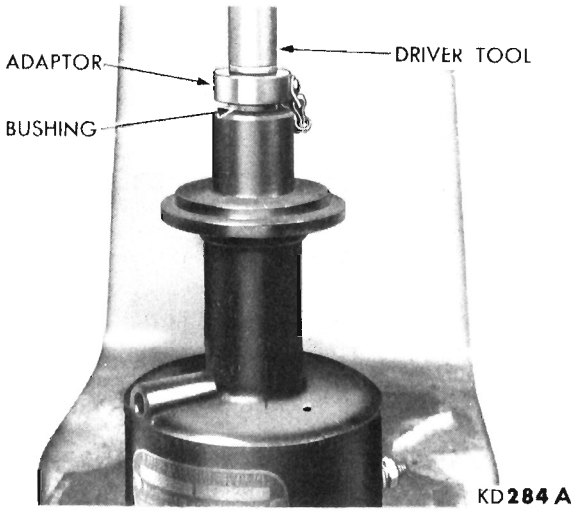


Fig. 10-Installing Lower Bushing

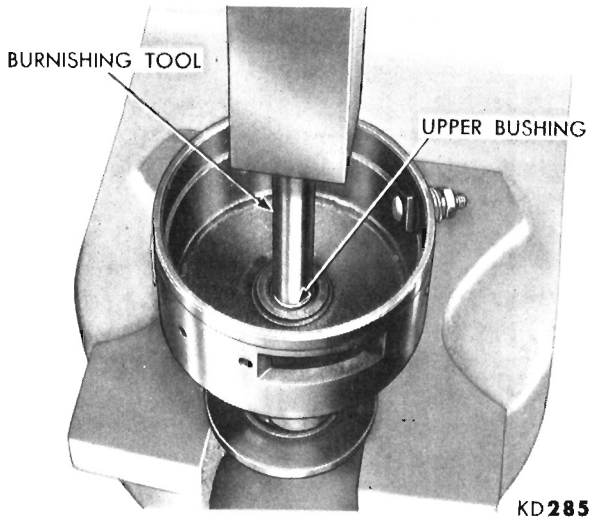


Fig. 11-Burnishing Distributor Drive Shaft Bushings

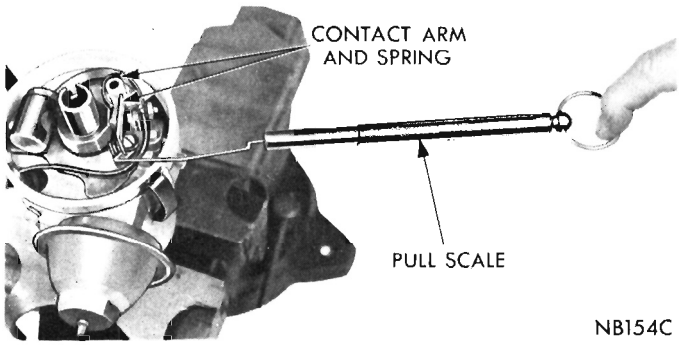


Fig. 12-Testing Contact Arm Spring Tension

(g) Position new upper bushing with hole in bushing **up** and in line with oil hole in housing, then press bushing into distributor housing with Tool C-3041 and tool adapter until adapter bottoms on housing. The bushing will measure .094 inch below the top of the housing bore (Fig. 9). Place a straight-edge on machined surface of housing and measure from bottom face straight-edge to the top of the bushing. Invert housing and install other bushing flush with the face of distributor base (Fig. 10).

(h) Insert a 3/32 inch rod through housing oiler hole to See if the hole in bushing indexs with oiler hole in the housing. If rod cannot be inserted through the housing and bushing, drill a 1/8 in. hole through the upper bushing by drilling through the oil wick hole. Remove burrs caused by drilling operation.

(i) Install burnishing tool part of C-3041 tool set and force the burnisher through both bushings (Fig. 11). Correct bushing inside diameter is .4995 to .5000 inch.

ASSEMBLING THE DISTRIBUTOR

(1) Test operation of governor weights and inspect weight springs for distortion. Lubricate governor weights.

(2) Inspect all bearing surfaces and pivot pins for roughness, binding or excessive looseness.

(3) Install cam spacer, chamfered end down on distributor shaft, (Prestolite only).

(4) Slide cam and yoke on distributor shaft, engage weight lugs with slots in the yoke. Install cam retaining spring clip. Be sure it is properly seated in the groove of distributor shaft, (Prestolite only).

(5) Lubricate and install flat thrust washer. Position washer on distributor shaft and slide shaft into distributor body. Position lower thrust washer and drive the collar on the lower end of shaft. Install retainer pin.

(6) Install oiler wick and oiler, (Prestolite only).

(7) Install contact plate assembly. Align condenser lead, contact point spring, primary lead and install attaching screw.

(8) Install felt wick in the tip of distributor cam.

(9) Attach vacuum advance unit arm to contact plate and install the retainer (Prestolite only). Install vacuum unit attaching screws and washers.

(10) Test contact arm spring tension, and adjust contact gap.

(11) Lubricate felt pad in the top of distributor cam with 1 drop of light engine oil and install rotor.

CONTACT ARM SPRING TENSION

(1) Hook a spring scale Tool MTU-36 on the breaker arm and pull in a straight line at a right angle to the contact surfaces (Fig. 12). Take a reading as the contacts start to separate under the slow and steady pull of the scale. Spring tension should be as shown in specifications. If the reading is outside these limits, loosen the screw which holds the end of the contact arm spring, and slide

the end of the spring in or out, as necessary.

(2) Tighten the screw and measure the spring tension. **Just the right amount of contact spring tension is very important for effective ignition and efficient engine performance. Spring tension that is too great, will cause excessive wear on the distributor cam and on the nylon block of the movable contact arm. Spring tension that is too weak, is unable to keep the contacts in contact with each other when they close. This is particularly true as engine speed is increased, causing high-speed misfiring.**

DISTRIBUTOR CONTACTS

Contact Wear

Contacts which have undergone several thousand miles of operation will have a rough surface, but this should not be interpreted as meaning that the contacts are worn out. If the contact area has a gray color and the roughness between the contact matches so that a large contact area is maintained, the contacts will continue to provide satisfactory service.

However, if the contact area is oily, mottled or dark in color, or is badly pitted, the contacts will soon become unsatisfactory for further operation. Not only must they be replaced, but the ignition system and engine must be checked to determine the cause of the trouble so it can be eliminated. **Unless the condition causing contact burning or excessive pitting is corrected, new contacts will provide no better service than the old contacts.**

Burning of Contacts

Contact burning will result from high primary voltage, presence of oil or other foreign material, defective condenser and improper contacts adjustment. High voltage causes an excessively high current flow through the contacts which burns them rapidly. High voltage can result from an improperly adjusted or inoperative volatge regulator.

Oil or crankcase vapors which work up into the distributor and deposit on the contact surfaces will cause them to burn rapidly. This is easy to detect since the oil produces a smudgy line under the contacts. Clogged engine breather pipes permit crankcase pressure to force oil or vapors up into the distributor. Over-oiling of the distributor will also cause burning of the contacts.

If the contact opening is too small (cam angle too large), arcing will occur between the contacts resulting in low secondary voltage and engine miss.

High series-resistance in the condenser circuit will prevent normal condenser action so the contacts will burn rapidly. This resistance may be caused by a loose condenser mounting or lead connection, or by poor connections inside the condenser.

Pitting of Contacts

Contact pitting results from the transfer of material from one contact to the other so that a tip builds up on one contact while a pit forms in the other.

A small amount of pitting in several thousand miles is normal and does not affect the distributor operation. However, excessive pitting such as long sharp spikes is harmful and causes arcing and voltage loss. Contacts with this condition should be replaced.

Excessive pitting can be due to too small a contact opening, high primary voltage or wrong condenser capacity. Inspect to be certain the condenser capacity, contact spring tension, and contact gap are within the specified ranges. See "Specifications".

INSTALLING AND ALIGNING CONTACTS

(1) Loosen terminal screw nut, and remove primary lead and condenser lead.

(2) Remove stationary contact lock screw and remove old contact set.

(3) Install a new contact set; the sleeve at one end of adjustable bracket fits over the pivots on upper contact plate mounting pin.

(4) Connect condenser and primary leads.

(5) Align contacts, if necessary, by bending stationary contact bracket only. **Never bend** movable contact arm to obtain alignment.

(6) After aligning contacts, adjust contact clearance to "Specifications," using dial indicator (Fig. 13). Recheck contact arm spring tension.

(7) Test dwell angle to show proper degree of closure. See Paragraph, "Distributor Contact Dwell." The lock screw should be loosened just enough so stationary contact bracket can be moved with a slight drag; otherwise, it will be difficult to set contacts accurately. After setting contacts to the correct gap, tighten stationary bracket lock screw.

DISTRIBUTOR LUBRICATION

(1) Add 3 drops of SAE 10W oil to the oiler on outside of distributor base, (Prestolite only).

(2) Lubricate felt wick under the rotor in top of distributor cam with 1 drop of SAE 10W oil.

(3) Wipe the distributor cam free of dirt and old grease with a clean lintless cloth. Apply a light

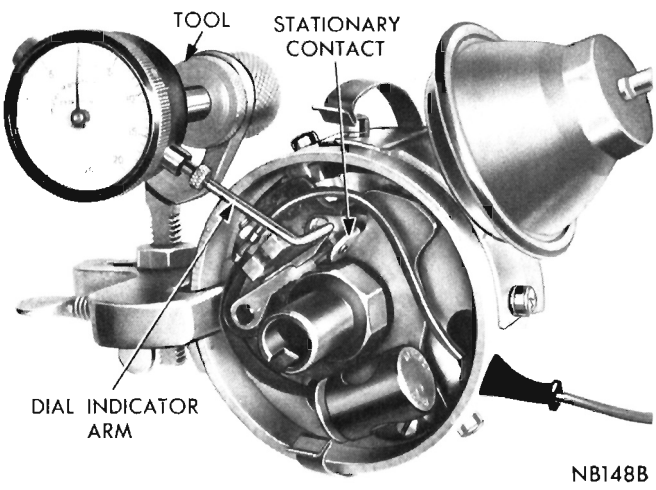


Fig. 13-Adjusting Contact Clearance

film of new distributor cam lubricant Number 1473595 or equivalent over the entire cam surface. Lubricant must be able to adhere to the cam surface thereby resisting being thrown from the cam by centrifugal force, must not melt at operating temperatures and must not harden or dry out with age, must not chemically react or be affected by ozone or cause corrosion or pitting of the metal, must possess moisture control properties to prevent rust formation on the cam.

CAUTION: A thin film is all that is required. Do not over-lubricate. Excess grease will be thrown from the distributor cam when engine is running. If the grease strikes the contacts, arcing and burning of contacts will result.

TESTING DISTRIBUTOR ADVANCE

Centrifugal Advance Curve

Mount distributor assembly (less cap and rotor) in a reliable stroboscope-type distributor tester and proceed with test as follows: **Clamp around ribbed section of distributor housing. The bottom section of distributor housing is not a machined surface and concentricity would be affected, causing a wobble.**

(1) Turn Tach-Dwell switch to 8 "LOBE" position and Motor Switch to correct direction of rotation. Refer to "Distributor Specification" in this manual.

(2) Turn battery switch "ON".

(3) Regulate tester speed control to operate distributor at 200 distributor rpm.

(4) Align the "O" of the distributor tester degree ring with any one of the arrow flashes.

(5) Adjust tester speed control to operated distributor at speeds called for under "Specifications" and observe arrow flashes opposite tester degree ring to determine degrees of advance.

(6) If advance is not according to specifications, replace with a new distributor shaft with correct calibration (shaft, cam, yoke, governor wieghts and springs as an assembly) or with a new distributor assembly, less cap and rotor.

For Prestolite distributors corrections can be attempted by bending the primary and secondary spring tabs on the cam yoke to increase or decrease spring tension.

DO NOT attempt calibration of Chrysler built distributors.

VACUUM Diaphragm Leak Test

With distributor mounted in distributor tester and with vacuum unit attached to distributor, proceed as follows:

(1) Place thumb over end of vacuum pump and hose and adjust regulator control knob to give a reading of 20 inches with hose closed off to be sure tester hose does not leak.

(2) Attach tester vacuum pump hose to the tube on the distributor vacuum unit. The vacuum gauge should hold on maximum vacuum obtainable if no leak exists.

(3) Observe contact plate while performing leak test to test response of contact plate. There should be instant response to the pull of the diaphragm, moving the plate without a drag or bind.

(4) If leakage is indicated, replace vacuum unit assembly.

Vacuum Advance Curve

Connect tester vacuum pump hose to the distributor vacuum advance unit and perform operations 1 through 4 under "Centrifugal Advance Curve." Then proceed as follows:

(1) Turn tester vacuum pump "ON." Adjust vacuum pump regulator to vacuum test specifications. See "Specifications" and observe arrow flashes on tester degree ring to determine degrees of advance.

(2) If vacuum advance is above or below specifications, replace vacuum advance unit. Retest vacuum advance curve.

DISTRIBUTOR INSTALLATION

(1) Position distributor on engine. Align rotor with marks previously scribed on distributor housing. **Clean top of cylinder block to insure a good seal between distributor base and block.**

(2) Engage tongue of distributor shaft with slot in distributor and oil pump drive gear. **If engine has been cranked while distributor is removed, it will be necessary to establish the proper relationship between distributor shaft and NO. 1 piston position as follows:**

(a) Rotate crankshaft until number one piston is at top of compression stroke.

(b) Rotate rotor to the position of number one distributor cap terminal.

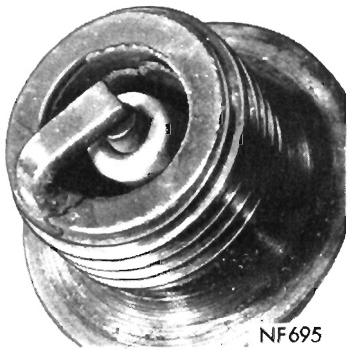


Fig. 14-Normal Conditions

(c) Lower distributor into the opening, connect primary lead and install distributor cap. Make sure all high tension wires "snap" firm in cap towers. Install distributor hold-down clamp screw. Tighten screw finger tight.

(d) Connect secondary lead of a Power Timing Light to NO. 1 spark plug (using proper adapter). Connect red primary lead to positive terminal of battery and black primary lead to negative battery terminal.

(e) Start and operate engine at idle speed. Rotate distributor housing so that specified timing mark and pointer are in alignment (Moving the distributor housing against shaft rotation advances timing and with shaft rotation retards timing).

(f) Tighten distributor clamp screw after timing has been set and recheck timing adjustment with a Power Timing Light.

(g) If timing is correct, connect vacuum hose to distributor and remove timing light from engine.

IGNITION COIL

The ignition coil is designed to operate with an external ballast resistor. When testing the coil for output, include resistor in tests.

Inspect coil for external leaks and arcing. Always make two tests when testing the coil. One when the coil is cold, the other after the coil has been warmed up.

Test coil according to coil tester Manufacturer's instructions. Test coil primary resistance. Test ballast resistor resistance. Test coil secondary resistance. Replace any coil and ballast resistor that does not meet specifications.

Every time an ignition coil is replaced because of a burned tower, carbon tracking or any evidence of arcing at the tower, the nipple or boot on the coil end of the secondary cable, replace cable. Any arcing at the tower will carbonize the nipple so that placing it on a new coil will invariably cause another coil failure.

If the secondary cable shows any signs of damage, the cable should be replaced with a new cable with a neoprene nipple since the old cable can cause arcing, and therefore, ruin a new coil.



Fig. 15-Cold Fouling

BALLAST RESISTOR

The ballast resistor is a compensating resistance in the ignition primary circuit. During low speed operation, when the primary circuit current flow is high, ballast resistor temperature rises, increasing resistance. This reduces current flow, thereby prolonging ignition contact life. At high speed operation, when primary current flow is low, the ballast resistance cools off allowing more current flow, which is required for high speed operation. During starter operation, the ballast resistor is bypassed, allowing full battery voltage to the ignition primary circuit.

SPARK PLUGS

Spark plug appearance or conditions can reflect a wide variety of engine conditions as follows:

Normal Conditions

Normal conditions (Fig. 14). This plug has been running at the correct temperature in a "healthy" engine. The few deposits present will probably be light tan or gray in color with most regular grades of commercial gasoline. Electrode burning will not be in evidence; gap growth will average not more than about .001 in./ 1000 miles. Chances are the plug, as pictured, could be cleaned, the gap electrodes filed, regapped and reinstalled with good results.

Cold Fouling

Cold fouling or carbon deposits (Fig. 15). This dry black appearance is fuel carbon and can be due to over rich fuel-air mixture, possibly resulting from a faulty choke, clogged air cleaner, improper carburetor idle adjustment, or dirty carburetor. However, if only one or two plugs in a set are fouled like this it is a good idea to check for sticking valves or faulty ignition cables. This condition also results from prolonged operation at idle. If the vehicle is operated extensively at idle and low speeds, improved plug service will be obtained by using the next step hotter spark plugs.

Wet Fouling

Wet fouling (Fig. 16) tells you that the plug has



Fig 16-Wet Fouling



Fig. 17-Overheating

drowned in excess oil. In an old engine, suspect worn rings or excessive cylinder wear. Use of a hotter plug may relieve such fouling, but plugs can't take the place of needed engine overhaul. **Remember that "break-in" fouling of new engines may occur before normal oil control is achieved. In new or recently overhauled jobs, such fouling plugs can be cleaned and reinstalled.**

Overheating

Overheating (Fig. 17) is indicated by a white or light wear rate will be considerable in excess of .001in./ 1000 miles. This suggests that a cooler heat range should be used . . . however, over-advanced ignition timing, detonation and cooling system stoppages can also overheat the **correct** spark plug heat ranges.

Cleaning and Regapping

Carefully clean the spark plugs in an abrasive type cleaner. Use a pin type feeler gauge to check spark plug gap. Reset gaps to .035 inch. **Before setting spark plug gap, file center electrode flat, make adjustment by bending ground (side) electrode, never bend the center electrode.**

When installing spark plugs, tighten to 30 foot-pounds.

INSTRUMENT PANELS

INDEX

	Page
Brake System Warning Light	61
Buzzer System	80
Circuit Breakers	71
Fuse Block	70
General Information	57
Heater or Air Conditioning Controls	73
Ignition and Steering Lock	80
Instruments	68
Instrument Clusters	63
Light Bulb Replacement	61
Panel Rollout	78
Printed Circuit Board Replacement	69
Service Diagnosis	58
Specifications	123
Speedometer Replacement	69
Switch Replacement	71
Test in Vehicle	59
Test Out of Vehicle	70
Trim Pad Replacement	77

GENERAL INFORMATION

The fuel and temperature and oil pressure gauges operate on the constant voltage principle through a voltage limiter. On models equipped with the low fuel warning system, the voltage limiter is part of the low fuel relay and supplies power for the fuel gauge only.

FUEL LEVEL INDICATING SYSTEM

A hinged float arm in the fuel tank raises or lowers dependent on the fuel level. The float arm contacts a variable resistor in the gauge sending unit that provides a change of resistance in the fuel gauge circuit with any up or down movement of the float. This resistance registers on the instrument panel gauge, metered to the capacity of the tank.

When the fuel level in the tank is low, the resistance of the circuit is increased restricting current flow and consequently positions the instrument panel gauge pointer to low.

Resistance in the circuit is at a minimum when the tank is full and the float arm is raised. With resistance at a minimum, current flow is high registering full on the instrument panel gauge.

Imperial models are equipped with a "Sentry Signal Light" which serves as a warning to the driver if the oil pressure is low, the engine coolant temperature is above normal or the fuel level is to low. Separate sending units for the oil pressure and temperature indicating operation of the

Sentry Signal are mounted on the engine and are connected to a low fuel warning relay (Fig. 1) located on the right lower instrument panel reinforcement channel near the glove box. (Low fuel warning system is also optional on other models).

TEMPERATURE AND OIL INDICATING SYSTEM

The operation of the temperature and oil pressure indicating system are identical in operation with the fuel system with the exception of the method of varying the resistance of the sending unit. In the temperature system the sending unit resistance varies in direct relation to the temperature of the coolant.

When the engine is cold the resistance of the disc in the temperature sending unit is high and a low temperature will be indicated on the gauge.

Chrysler instrument clusters are equipped with **two** temperature indicator lights; one green for cold indication and a red one for overheating indication. When the engine temperature is low the green light will remain lite until engine temperature reaches normal operating range. If the engine should overheat, the red light will illuminate.

In the oil pressure indicating system the sending unit resistance is actuated by a diaphram as the oil pressure increases or decreases.

ALTERNATOR INDICATING SYSTEM

The alternator gauge is an ammeter which senses the direction and rate of flow of electrical current to or from the battery to indicate whether the battery is being charged or discharged.

OIL PRESSURE WARNING LIGHT

The oil pressure warning switch, mounted on the engine, is controlled by engine oil pressure.

When engine oil pressure is high (normal operating condition of the engine) the switch is held in the **"OFF"** or **"OPEN"** position allowing no current to flow to the oil pressure warning lamp on instrument panel.

When engine oil pressure is low the switch is in the **"ON"** or **"CLOSED"** position allowing current to flow to the oil pressure warning lamp on the instrument panel causing the warning lamp to be illuminated.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
ALL GAUGES READ HIGH ("against the peg") AFTER IGNITION SWITCH IS TURNED "ON"	(a) Faulty voltage limiter (stuck points or an open heater coil).	(a) Test voltage limiter.
	(b) Cluster not properly grounded to panel.	(b) Tighten cluster mounting screws.
GAUGE POINTERS DO NOT MOVE WHEN IGNITION SWITCH IS TURNED "ON"	(a) Faulty voltage limiter or an open circuit on battery side (input of limiter).	(a) Test voltage limiter. Test wiring, repair or replace as necessary.
TEMPERATURE AND OIL GAUGES* INDICATE NORMAL OPERATION BUT THE FUEL GAUGE INDICATES A HIGHER OR LOWER FUEL LEVEL THAN ACTUALLY EXISTS	(a) Fuel tank sending unit or instrument panel fuel gauge is faulty.	(a) Test sending unit and gauge.
	(b) Fuel tank is improperly grounded.	(b) Test fuel tank for a good ground. **NOTE:** Testing the system with the tank sending unit positioned for both "empty" and "full" is usually sufficient to determine the calibration in the range between these positions.
	(c) Low fuel warning relay faulty.	(c) Test relay.
	(d) Fuel tank deformed.	(d) Remove the lock ring on the sending unit, feel if the filter is resting on the tank bottom. If it is not, reform the sending unit pick up tube so the filter is resting on the bottom of the fuel tank.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
FUEL AND OIL GAUGES INDICATE CORRECTLY BUT TEMPERATURE GAUGE INDICATES HIGHER OR LOWER TEMPERATURE THAN ACTUAL ENGINE TEMPERATURE	(a) Faulty instrument panel temperature gauge, wiring or faulty temperature sending unit in engine.	(a) Test wiring, repair or replace as necessary. Test gauge and sending unit.
ERRATIC TEMPERATURE GAUGE OPERATION	(a) Loose or dirty electrical connections.	(a) Clean and tighten all electrical connections and test the gauge operation.
ERRATIC OPERATION OF FUEL GAUGE	(a) Loose or dirty electrical connections or faulty tank sending unit.	(a) Test fuel gauge sending unit, and proceed as follows: (1) Clean and tighten all electrical connections. (2) Make sure that the fuel tank sending unit is grounded to the tank and that the tank is grounded to the frame.
	(b) Faulty Low Fuel Warning Relay.	(b) Test Relay.
ERRATIC OIL GAUGE OPERATION	(a) Loose or dirty electrical connections.	(a) Clean and tighten all electrical connections and test the gauge operation.

SERVICE PROCEDURES

TESTS IN VEHICLE

VOLTAGE LIMITER—All Models

The voltage limiter can be tested in the vehicle or with the instrument cluster removed. To quickly test the voltage limiter in the vehicle, connect one lead of a voltmeter or test light to the temperature sending unit and the other lead to a good ground. Leave the sending unit lead wire attached to the sending unit.

Turn the ignition switch to the "ON" position. A fluctuating voltmeter or a flashing light indicates the voltage limiter is operating. The Imperial model has an in-line choke for radio noise suppression. The choke is built in the low fuel relay.

FUEL GAUGE CIRCUIT (With Low Fuel Warning)

Some models incorporate a Low Fuel Warning (Part of the Sentry Signal on Imperial) on the instrument panel. A relay is used in the circuit to feed the fuel gauge separately. The tank unit is a standard tank unit, connected to the one terminal of the fuel gauge (Fig. 1). The relay has a built in limiter to supply 5 volts to the fuel gauge. A choke is built in the relay for radio noise suppression.

FUEL GAUGE AND LOW FUEL WARNING RELAY—Test

(1) Disconnect wire at the fuel tank unit. Connect one lead of tester C-3826 to wire terminal and other lead to a good ground.

(2) Turn ignition key on, turn tester knob to "H" position and observe instrument panel gauge. Gauge should read full plus 3/32 inch or minus 1/32 inch.

Turn tester knob to "M", gauge should read 1/2. **Thermal gauges are slow in operation and time should be allowed for gauge to respond.**

(3) Turn tester knob to "L", panel gauge should read empty plus 1/32 inch or minus 3/32 inch.

The low fuel warning relay will trigger the low fuel or Sentry Signal Lamp when the gauge pointer is moving from the 1/2 position to the "E" position. **(Temperature and oil switches must be disconnected for this test or engine must be running. Imperial Only).**

(4) If instrument panel gauge does not perform as described, check output of relay (terminal marked gage) use procedure outlined under Voltage Limiter Test. (All Models)

(5) To check the Imperial Sentry Signal, position of relay (light will not trigger) use a jumper wire to ground terminal marked lamp. Light should illuminate. If no light, check bulb and wiring. If

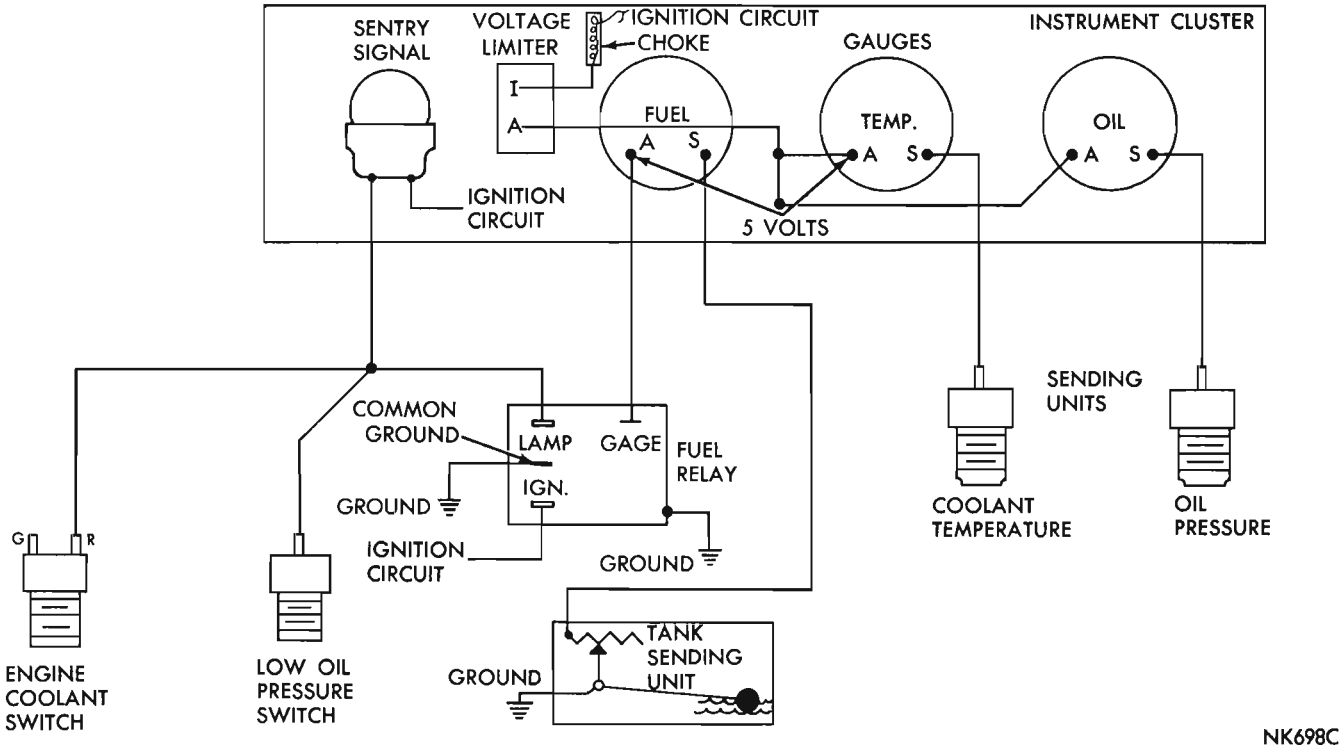


Fig. 1 - Sentry Signal Circuit

lamp lights, relay is faulty and should be replaced.

(6) To check the low fuel warning lamp on all models (except Imperial), use a jumper wire between terminals 2 and 3 in the low fuel warning relay. The indicator bulb should illuminate. If there is no light, check bulb and wiring. If bulb and wiring check o.k., the relay is faulty and should be replaced.

(7) If panel gauge does not perform as described, continuity of circuit from tank sending unit to panel unit should be tested with special attention to printed circuit board before replacing panel gauge.

(8) Should panel unit perform properly, fuel tank sending unit ground strap should be inspected for proper installation on fuel line. If ground continuity is satisfactory, remove tank unit for testing. See "Fuel System." Group 14.

FUEL TANK SENDING UNIT—Test

Before removing any unit of the fuel level indicating system, the panel fuel gauge should be tested first. See "Tests in Vehicle". If the panel gauge performs properly **make sure the fuel tank ground strap on the fuel line at the tank is making a good ground.** Should the gauge perform properly and the ground strap be properly installed, remove the fuel tank sending unit as outlined in "Fuel System", Group 14 and test as follows:

(1) Using an ohmmeter with a 0 to 100 ohm scale, connect one lead to body of sending unit and the other lead to terminal in center of unit.

(2) Hold unit so float arm contacts "Empty Stop." The reading on ohmmeter scale should be 73 ohms, plus or minus 12.0 ohms.

(3) Raise arm to "Full Stop." The reading should now be 9.6 ohms, plus or minus 1 ohm.

If the unit does not perform to these specifications, inspect the stops or arm for possible distortion. If the stops or arm cannot be repaired or are not damaged, the unit should be replaced.

TEMPERATURE GAUGE TEST (except Chrysler)

Disconnect the terminal from the temperature sending unit on the engine. Connect one test lead of tester C-3826 to the terminal and the other test lead to a good ground. Place the pointer of the gauge tester on the **"L"** position and turn the ignition switch to "on." The temperature gauge should show "C" plus or minus 1/8 inch. **Thermal gauges are slow in operation. Allow time for gauge to heat up.**

Place the pointer of the tester on the **"M"** position and the temperature gauge should advance to the driving range left of 1/2 position of the dial. Place the pointer of the tester in the **"H"** position

and the gauge should advance to the "H" position of the dial. Should the gauge respond to the above tests but not operate when the terminal is attached to the sending unit, indications are of a defective sending unit and it should be replaced.

Should the gauge fail to respond to the above tests, indications are of possible loose connections, broken wire, open printed circuit, or faulty gauge. The instrument cluster should be removed for further inspection. See "Instrument Cluster Removal."

TEMPERATURE INDICATING SYSTEM TEST (Chrysler)

To test the temperature indicator turn the ignition key to the ignition position (on). Disconnect the wires from the temperature sensing switch on the engine and one at a time touch the wires momentarily to ground. When the wire from the "G" terinal is grounded the "Cold" (green) bulb of the indicator should light. When the wire from the "R" terminal is grounded the "Hot" (red) bulb of the indicator should light. If one of the bulbs fail to light, the bulb that did not light is faulty and should be replaced. If both of the bulbs fail to light indications are of a faulty circuitry in the system or possibly both of the indicator bulbs are faulty. Repair or replace as necessary.

AMMETER TEST (Valiant, Duster, Barracuda and Satellite)

Turn the headlight on (do not start engine). The ammeter needle should move toward the "D" or discharge scale. If no movement of the needle is observed, check the terminals for loose wires. If the terminals are secure, the ammeter is defective. If the needle moves toward "C" or charge the connections are reversed.

AMMETER TEST (Shunt type)

(Fury, Chrysler and Imperial)

With the shunt type ammeter, the main car current is in a separate lead located in the engine compartment wiring. A small portion of the current tapped off to supply the ammeter.

CAUTION: Do not connect any accessories to the ammeter studs. The test for the shunt type ammeter is the same as for the standard ammeter.

OIL PRESSURE WARNING LIGHT

To test the oil pressure warning light, remove the terminal from the oil pressure sending unit. Connect one lead of the gauge tester to the terminal and the other test lead to a good ground.

With the ignition switch in the "on" position and the gauge tester in the "L" position, the indicator light should not light. With the gauge tester in the "M" position, the indicator light should show a dull glow. With the gauge tester in the "H" position, the indicator light should show full brilliance.

Should the oil pressure warning light fail to respond to the above tests, indications are of possible loose connections, broken wire, or burned out lamp.

OIL PRESSURE GAUGE—(If so equipped)

Disconnect wire from the oil pressure sending unit on the engine. Connect one test lead of Tester Tool C-3826 to the removed wire terminal the other test lead to a good ground. Place the pointer of the gauge tester on the "L" position and turn the ignition switch to "on." Do not start engine. The oil pressure gauge should show "L" plus or minus 1/8 inch. **Thermal gauges are slow in operation. Allow time for gauge to heat up.**

Place the pointer on the tester on the "M" position and the oil pressure gauge should advance to the 1/2 position of the dial. Place the pointer of the tester in the "H" position and the gauge should advance to the "H" position of the dial.

Should the gauge respond to the above tests, but not operate when the wire is attached to the sending unit, it should be replaced. Should the gauge fail to respond to the above tests indications are of possible loose connections, broken wire, or faulty gauge. The instrument cluster should be removed for further tests. See "Instrument Cluster."

BRAKE SYSTEM WARNING LIGHT

The brake warning light flashes only when the parking brake is applied with the ignition key turned "ON". The same light will also illuminate should one of the two service brake systems fail when the brake pedal is applied. To test the system turn the ignition key "ON", and apply the parking brake. If the light fails to light, inspect for a burned out bulb, disconnected socket, a broken or disconnected wire at the switch.

To test the service brake warning system, raise the car on a hoist and open a wheel cylinder bleeder while a helper depresses the brake pedal and observes the warning light. If the light fails to light, inspect for a burned out bulb, disconnected socket, a broken or disconnected wire at the switch. If the bulb is not burned out and the wire continuity is proven, replace the brake warning switch in the brake line "Tee" fitting mounted on the frame rail in the engine compartment below the master cylinder.

LIGHT BULB REPLACEMENT—Valiant (Standard Cluster)

Instrument cluster light bulbs can be replaced from under the instrument panel by performing

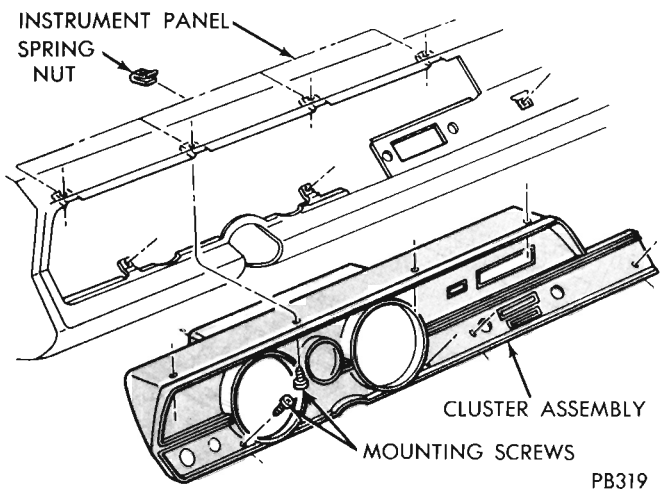


Fig. 4 - Rallye Cluster - Removal and Installation - Valiant

Installation

(1) Rest cluster in opening and connect ammeter wires, windshield wiper, headlight, emergency flasher connectors. Roll cluster into panel, lower edge first and secure with six metal screws.

(2) Reaching up behind instrument panel, connect printed circuit board multiple connector and speedometer cable.

(3) Install steering column upper clamp and mounting bolts finger tight. Install floor plate mounting bolts and tighten column upper clamp bolts. Install column cover.

INSTRUMENT CLUSTER—Valiant (Fig. 4) Rallye Cluster

Removal

(1) Disconnect battery ground cable.

(2) Tape top of steering column to prevent damaging painted surface. Reaching up under panel, disconnect speedometer cable and multiple connector from left printed circuit board.

(3) Remove four cluster retaining screws from underside of crash pad and three retaining screws from lower front face of cluster. Remove clock reset cable.

(4) Pull cluster out far enough to reach around behind and disconnect right printed circuit board multiple connector, ammeter wires, vacuum gauge hose or tachometer wire.

(5) Remove radio knobs and mounting nuts.

(6) Loosen air conditioning or heater knob(s) and remove from slide control. Remove air conditioner or heater control mounting screws and move control out of way.

(7) Depress headlight switch knob release button on bottom side of switch and pull knob and shaft out of switch. Using Tool C-3824, remove switch bezel and allow switch to remain connected to wire harness.

(8) Pull windshield wiper knob from shaft. Remove wiper switch bezel nut with Tool C-3824 and allow switch to remain connected to wire harness.

(9) Roll cluster out from panel opening, face down and to the right.

Installation

(1) Work cluster in to place from right of steering column face down in front of panel opening. Reaching around behind, connect ammeter wires, right printed circuit board connector, wiper, emergency warning switch connectors and vacuum gauge hose or tachometer wire (if so equipped.)

(2) While holding headlight switch in position, install switch bezel and tighten with Tool C-3824. Insert knob and shaft in headlight switch until shaft engages with a distinct "click".

(3) Reaching up under panel, guide wiper switch into position and install bezel nut with Tool C-3824. Slip knob on shaft.

(4) Position air conditioning or heater controls and tighten mounting screws. Install slide control knobs.

(5) Roll cluster up into panel opening and install four screws in under side of crash pad and three screws in front lower face of cluster.

(6) Reaching up under panel, connect left printed circuit board multiple connector and speedometer cable.

(7) Remove tape from top of steering column, connect battery ground cable and test operation of gauges and switches.

INSTRUMENT CLUSTER—Barracuda (Fig. 5 and Fig. 6)

Removal

Before performing this operation it is advisable to put a protective cover over the top of the instrument panel and steering column to prevent damage.

(1) Disconnect battery ground cable.

(2) Remove the six lamp panel mounting screws. Carefully slide lamp panel out and lay on top of instrument panel. It is not necessary to disconnect wiring harness.

(3) Remove the four switch bezel mounting screws, let bezel hang loose. It is not necessary to disconnect switches.

(4) Remove the three steering column "Duffy" plate mounting screws and the two column support clamp retainer nuts. Allow column to rest on seat.

(5) From under instrument panel disconnect speedometer cable.

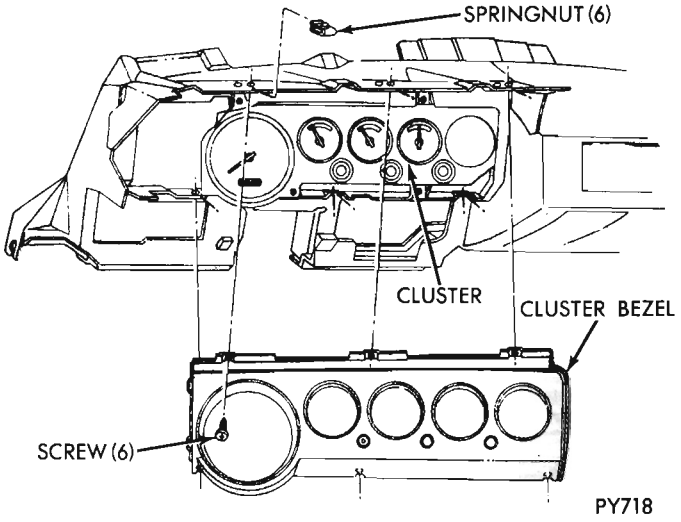


Fig. 5 - Instrument Cluster Bezel - Removal and Installation - Barracuda

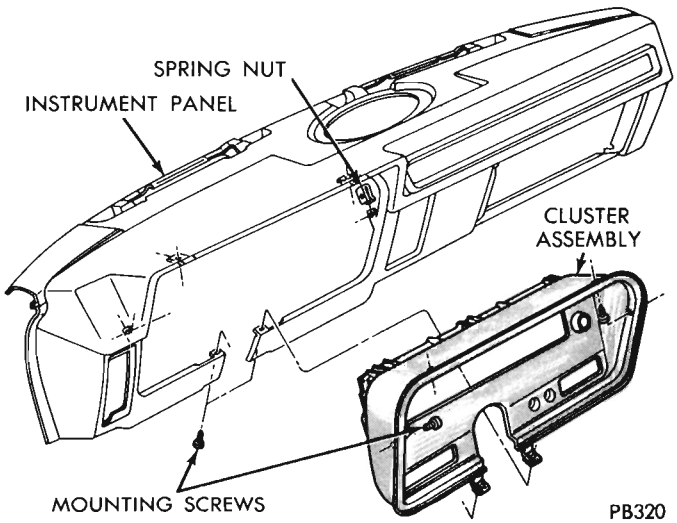


Fig. 7 - Instrument Cluster Removal and Installation - Satellite

(6) Remove six cluster bezel mounting screws, angle bezel out in such a manner as to clear the clock reset button. Reach between bezel and panel and disconnect stereo control wiring harness (if so equipped). On Rallye cluster, clock reset knob and odometer reset knob must be removed from cluster bezel to remove clock.

(7) Remove the four cluster to panel mounting screws.

(8) Disconnect all wiring harnesses and remove cluster.

Installation

(1) Rest cluster in opening and connect wiring harnesses. Replace the cluster to panel mounting screws.

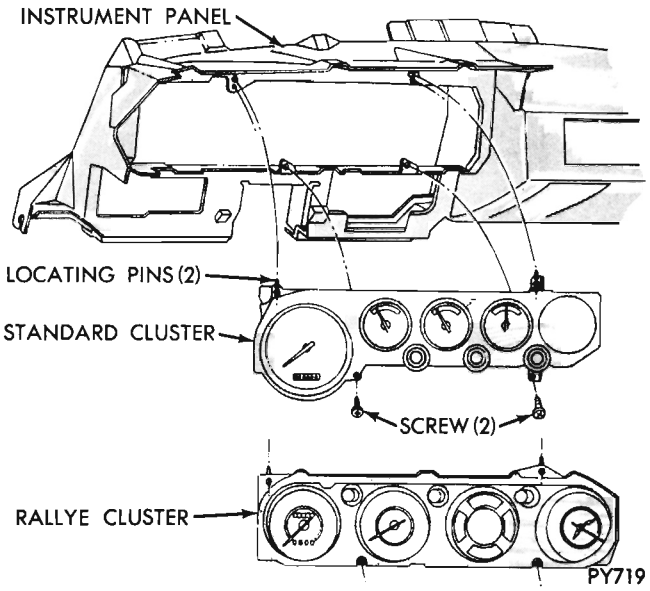


Fig. 6 - Instrument Cluster - Removal and Installation - Barracuda

(2) Position cluster bezel and connect stereo control wiring harness (if so equipped).

CAUTION: When installing cluster bezel be sure stereo control harness is tucked into panel to avoid being trapped by bezel.

Install bezel mounting screws.

(3) Connect speedometer cable and install clock reset knob and odometer reset knob.

(4) Raise steering column into position and install column support clamp retainer nuts and "Duffy" plate.

(5) Position switch panel and install mounting screws.

(6) Install lamp panel.

(7) Remove protective covering. Connect battery ground cable and check cluster operation.

INSTRUMENT CLUSTER—Satellite (Fig. 7)

Removal

(1) Disconnect battery ground cable.

(2) Remove Ash Tray

(3) Remove radio knobs and mounting nuts.

(4) Remove radio

(5) Remove heater control panel.

(6) Remove upper steering column clamp and lower steering column.

(7) Remove instrument cluster mounting screws.

(8) Disconnect speedometer cable assembly.

(9) Disconnect all wiring harness and remove cluster assembly.

INSTRUMENT PANEL—Fury (Fig. 8)

LAMP PANEL

Removal

(1) Remove the radio volume control knobs.
(2) Remove (9) lamp panel mounting screws.
(3) Lower the lamp panel assembly slightly and disconnect the lamp harness from the main harness.
(4) Remove the lamp panel from the instrument panel.

LEFT TRIM PANEL (Air Conditioner Spot Cooler Bezel)

Removal

(1) Remove lamp panel.
(2) Remove steering column cover.
(3) Remove the two top trim bezel mounting screws and remove bezel (spot cooler).

Installation

(1) Position and install bezel and mounting screws.
(2) Install steering column cover.
(3) Install lamp panel.

INSTRUMENT CLUSTER (Fury)

Removal

(1) Disconnect battery ground cable.
(2) Remove lamp panel.
(3) Remove steering column cover.
(4) Remove radio trim bezel.
(5) Remove left trim bezel and/or spot cooler (if so equipped).
(6) Remove left air conditioner duct and center air conditioner connector (if so equipped).
(7) From under instrument panel disconnect electrical leads to switches and clocks, lamp assemblies from cluster, and speedometer cable from speedometer head.
(8) Remove gear shift indicator pointer from column.
(9) Tape steering column to protect paint finish.
(10) Remove three steering column upper clamp nuts and three bolts at lower support at floor.
(11) Carefully lower steering column and allow steering wheel to rest on seat cushion.
(12) Remove eight screws mounting cluster to instrument panel; roll cluster assembly out, disconnect electrical connections to high beam indicator, fuel gauge, alternator (ammeter) and temperature gauge and remove cluster to padded work bench for service.

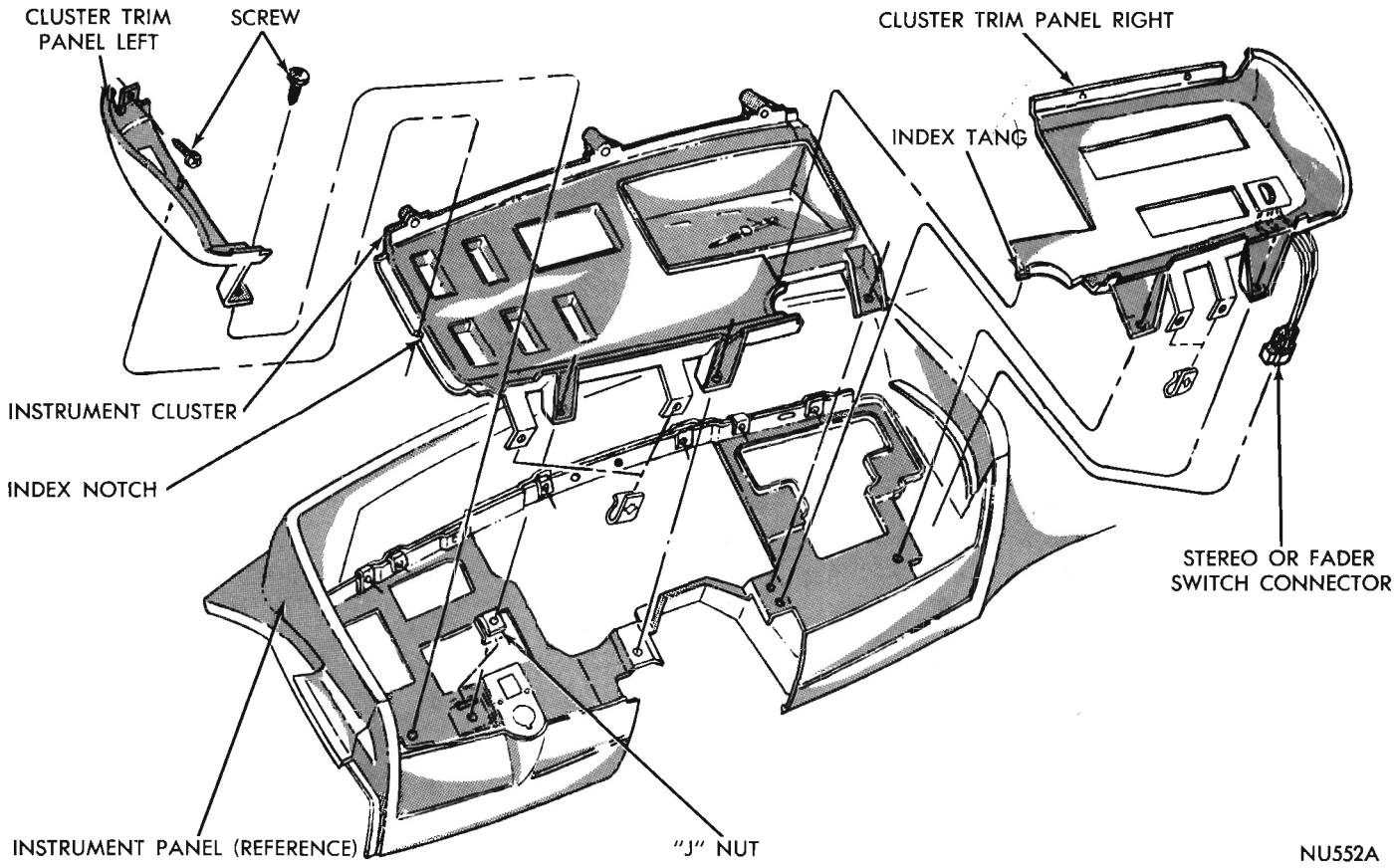


Fig. 8 - Instrument Panel - Removal and Installation - Fury

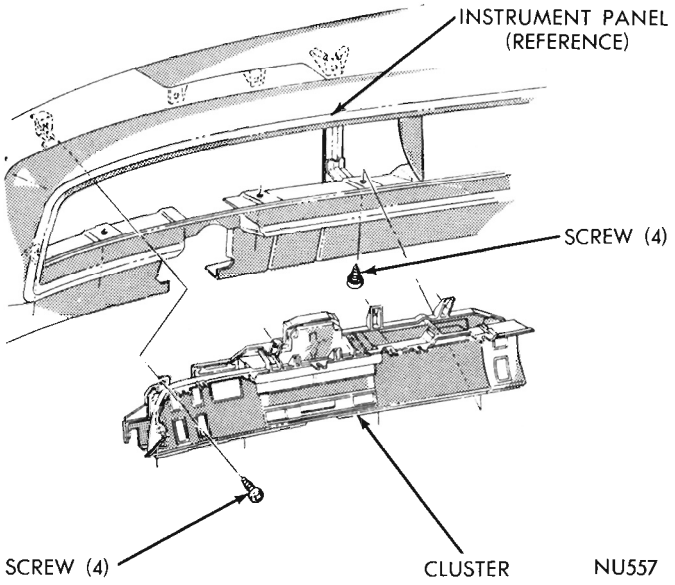


Fig. 9 - Instrument Cluster - Removal and Installation - Chrysler

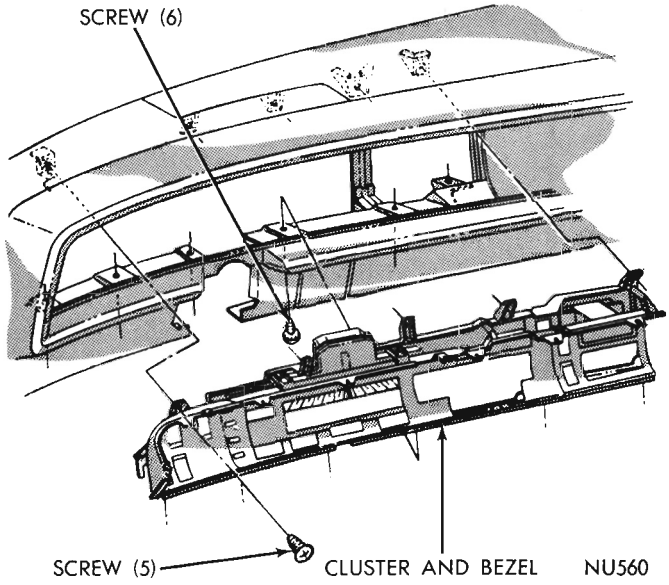


Fig. 10 - Instrument Cluster and Bezel Removing and Installing - Imperial

Installation

(1) Rest cluster in panel opening and connect electrical connections to temperature gauge, ammeter, fuel gauge and high beam indicator then roll cluster into panel opening, top edge first.

(2) Install all cluster attaching screws finger tight then tighten all screws securely.

(3) Raise steering column into position and install upper clamp nuts and lower support bolts. Tighten securely.

(4) Install gear shift indicator.

(5) From underside of instrument panel connect speedometer cable at speedometer head, electrical leads to switches, and clock, and install lamp assemblies into cluster base.

(6) Connect left and center air conditioner ducts and install attaching screw at instrument panel.

(7) Install left trim bezel spot cooler.

(8) Install radio trim bezel.

(9) Install steering column cover.

(10) Install lamp panel.

(11) Connect battery ground cable and test operation of all switches lamps and gauges.

(12) Remove tape from steering column.

INSTRUMENT CLUSTER (Chrysler) Fig. 9

Removal

(1) Remove maplamp, lamp panel end and lamp panel

(2) Remove head lamp switch

(3) Remove radio and A.T.C. controls

(4) Lower steering column cover by removing 4 screws. (Do not disconnect vent control cables)

(5) Remove the gear shift indicator pointer

(6) Lower the steering column by removing the 3 duffy plate mounting screws, the steering column ground nut and wire, and the 3 upper steering column attaching nuts. Allow the steering wheel to rest on the seat cushion

(7) Disconnect the speedometer cable

(8) Remove the 5 lower cluster mounting screws working thru the access holes in the lower instrument panel.

(9) Remove the screw holding the A.T.C. sensor assembly to the instrument cluster bezel and take the sensor assembly loose from the bezel.

(10) Working over the top of the cluster, remove the 5 upper cluster mounting screws.

(11) Carefully remove the instrument cluster by pulling it rearward in the car and rolling the bottom up slightly to clear the upper legs on the cluster. Disconnect the wiring as access is attained.

INSTRUMENT CLUSTER—Imperial (Fig. 10)

Removal

(1) Remove map lamp panel and lamp panel.

(2) Remove headlamp switch.

(3) Remove radio and ATC control.

(4) Remove steering column cover by removing 4 screws. (Do not disconnect vent control cables.)

(5) Remove the gear shift indicator pointer.

(6) Lower the steering column by removing the 3 duffy plate mounting screws, and steering column ground nut and wire, and 3 upper steering column attaching nuts, and allow the steering wheel to rest on the seat cushion.

(7) Disconnect the speedometer cable.

(8) Remove the screw holding the A.T.C. in car

sensor to the cluster bezel and take the sensor housing loose from the bezel.

(9) Remove the clock assembly.

(10) Working thru the access holes in the lower panel remove the 6 lower cluster mounting screws.

(11) Working over the cluster remove the 5 upper cluster mounting screws.

(12) Disconnect all accessible wiring connectors at the cluster connections.

(13) Remove the instrument cluster by moving it rearword in the car and rolling the bottom out first. Disconnect the remainder of the wiring connectors as access is attained, being careful not to bend any of the connector pins. Caution must be exercised to prevent damage to the trim pad as the cluster is removed.

INSTRUMENT REPLACEMENT—Valiant, Barracuda, Satellite

To service the instruments of any cluster, it is necessary to remove the cluster first. See "Instrument Cluster Removal and Installation".

(1) On all models place cluster face down on padded bench, remove housing to bezel screws and carefully separate the two.

(2) Remove terminal nuts of gauge to be serviced and remove gauge from front of housing.

(3) Position new gauge in housing and install mounting nuts.

(4) Carefully position bezel on cluster housing. Install retaining screws and odometer reset knob.

Replacement—Fury

(1) Place cluster assembly on a padded area of the work bench.

(2) Remove gear shift indicator housing from cluster housing (two screws).

(3) Remove cluster from bezel assembly (four screws).

(4) Remove cluster lens from cluster housing by turning up the two upper cluster housing mounting tabs.

(5) Remove the two speedometer mounting screws located on the back of cluster housing.

(6) Remove the speedometer assembly, ammeter, temperature gauge or fuel gauge as necessary.

Replacement—Chrysler

Ammeter Gauge

(1) Remove the instrument cluster.

(2) Remove the tripmeter reset knob.

(3) Remove 2 wiper/washer switch assembly mounting screws and the switches.

(4) Remove 2 accessory switch bezel mounting screws and remove the switch and bezel assembly.

(5) Remove the 4 center A/C spotcooler assembly mounting screws and the center A/C spotcooler assembly.

(6) Remove the 8 cluster bezel to housing mounting screws and remove the cluster bezel.

(7) Remove the 8 cluster lens snap pins and remove the lens.

(8) Remove the 2 ammeter mounting nuts and the insulator.

(9) Remove the ammeter.

Fuel Gauge

(1) Remove the instrument cluster.

(2) Remove the 2 fuel gage mounting nuts.

(3) Remove the fuel gage.

Radio Suppression Capacitor

(1) Remove the instrument cluster.

(2) Remove the voltage limiter.

(3) Remove the screw holding the radio suppression capacitor to the cluster housing.

(4) Disconnect the radio suppression capacitor wire from the printed circuit board connector and remove the capacitor.

Voltage Limiter

(1) Lower the steering column cover.

(2) Lower the steering column.

(3) Working thru the column opening unplug the voltage limiter from the printed circuit board and remove the voltage limiter.

Replacement—Imperial

Ammeter Gauge

(1) Remove the instrument cluster and wiper-washer switch assembly.

(2) Remove the accessory switches and the accessory bezel.

(3) Remove the tripmeter reset knob.

(4) Remove 10 screws holding the instrument cluster bezel to the cluster housing.

(5) Remove the bezel.

(6) Remove 9 snap pins holding the lens to the instrument cluster housing.

(7) Remove the 2 ammeter mounting nuts and the insulator.

(8) Remove the ammeter.

Oil Pressure Gauge

(1) Remove the instrument cluster.

(2) Remove the 2 oil pressure gauge mounting nuts.

(3) Remove the oil pressure gauge.

Fuel and Temperature Gauges

Note: The fuel and temperature must be serviced as a unit.

(1) Remove the instrument cluster.

(2) Remove the 4 fuel and temperature gauge

mounting nuts.
(3) Remove the fuel and temperature gauge assembly.

Voltage Limiter

(1) Remove steering column cover, the gear shift indicator pointer, and lower the column.
(2) Working thru the column opening disconnect wires to voltage limiter.
(3) Remove snap pin and screw holding the voltage limiter to the cluster.
(4) Remove the voltage limiter.

Noise Suppression Choke

(1) Remove the steering column cover, the gear shift indicator pointer and lower the steering column.
(2) Working thru the column opening disconnect the wires at the voltage limiter.
(3) Unplug the noise suppression choke from the printed circuit board and remove the choke.

SPEEDOMETER—Valiant

Removal

(1) Remove instrument cluster. See "Instrument Cluster Removal".
(2) With cluster face down on padded work bench, remove eight screws retaining cluster bezel to cluster housing.
(3) Carefully separate housing from bezel. Loosen two fuel gauge mounting nuts.
(4) Remove two speedometer mounting screws and rubber washers from back of cluster housing.
(5) Carefully lift speedometer head out of housing.

Installation

(1) Position new or repaired speedometer head in housing, aligning screw holes with holes in speedometer head.
(2) Install two rubber washers and retaining screws in back of housing and tighten. Tighten two fuel gauge mounting nuts.
(3) Carefully position housing on bezel and install retaining screws.

SPEEDOMETER—Barracuda

Removal

To replace the speedometer, it is necessary to remove the instrument cluster. See "Instrument Cluster Removal and Installation."
(1) Place cluster face down on a padded work bench.
(2) Remove the seven cluster lens snap pin retainers and lift lens from housing.
(3) Remove two speedometer mounting screws with attached insulators. Remove speedometer from cluster housing.

Installation

(1) Position speedometer on cluster housing and install mounting screws and insulators.
(2) Assemble cluster lens to cluster housing and secure with snap pins.

SPEEDOMETER—Satellite

Removal

To replace the speedometer, it is necessary to remove the instrument panel cluster assembly. See Instrument Panel Cluster Removal.
(1) Place cluster on padded work bench.
(2) Remove cluster bezel assembly.
(3) Remove cluster face plate.
(4) Remove speedometer mounting screws and carefully remove speedometer.

SPEEDOMETER—Fury

Removal

To replace the speedometer, it is necessary to remove the instrument cluster. See "Instrument Cluster Removal and Installation."
(1) Place cluster on padded work bench.
(2) Remove gear shift indicator housing from cluster housing (two screws).
(3) Remove cluster assembly from bezel assembly (four screws).
(4) Remove cluster lens from cluster housing by relieving the two upper cluster housing mounting tabs.
(5) Remove two speedometer mounting screws located on the back of the cluster housing and carefully remove the speedometer.

SPEEDOMETER—Chrysler, Imperial

Removal

(1) Remove the instrument cluster and disassemble.
(2) Remove the 3 speedometer mounting screws.
(3) Remove the speedometer.

PRINTED CIRCUIT BOARD REPLACEMENT

To replace the printed circuit board on the cluster housing, it is necessary to remove the instrument cluster. See "Instrument Cluster Removal and Installation."

The printed circuit board is removed from the instrument cluster by removing the screws retaining the cluster bezel to the cluster housing. Remove the fuel gauge and temperature gauge terminal nuts and remove the gauges. Remove the screws from the printed circuit board and lift

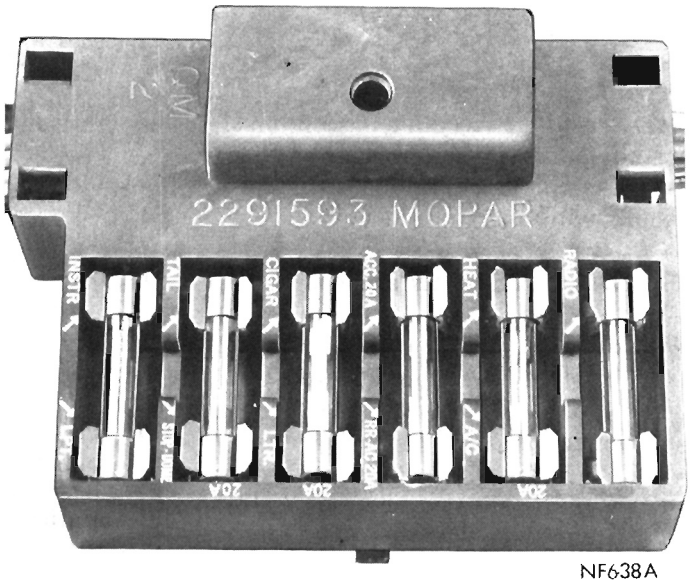


Fig. 11 - Fuse Block - Valiant

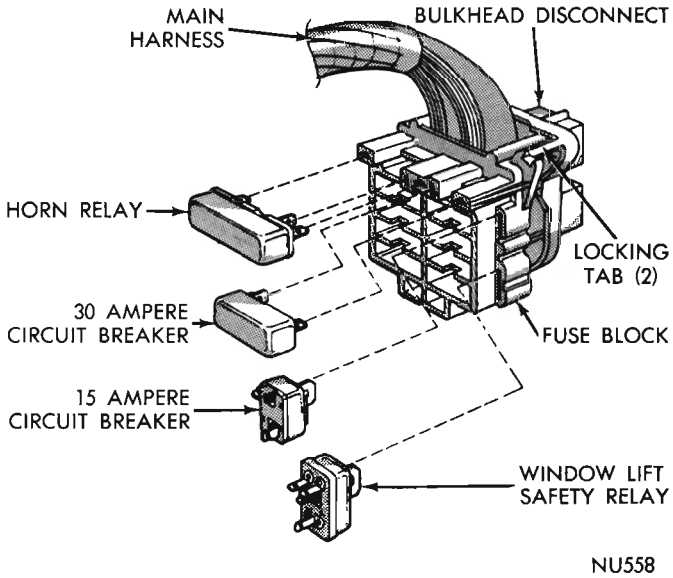


Fig. 12 - Removing and Installing Circuit Breakers or Relays

printed circuit board from back of the housing.

After installation of a new printed circuit board, transfer the light sockets and the voltage limiter from the old one. Upon completion of the instrument cluster installation, test all instruments.

TESTS OUT OF VEHICLE

Printed Circuit Board

A visual inspection of the conductors should be made for cracks or damaged circuits. If no visual damage is evident, each circuit should be tested for continuity with an ohmmeter or a test light. Should an open circuit be detected, the printed circuit board should be replaced.

Instruments

(1) Connect a jumper wire to voltage limiter input terminal. Connect other end of the jumper wire to positive post (+) of a 12 volt test battery.

(2) Connect a jumper wire from negative (-) post of battery to instrument cluster base (ground).

(3) Connect one lead from Tester C-3826 to gauge sending terminal being tested.

(4) Connect remaining tester lead to instrument cluster base (ground).

When the gauge tester is in "L" position, the gauge being tested should read on the low side of dial. With gauge tester on "M", the gauge should read in the center of the dial scale and on the high end of the dial when pointer of tester is placed on "H". If gauges do not perform as stated, inspect for an open printed circuit before replacing gauge.

Caution: A direct connection from a 12 volt battery will damage the gauges or printed circuit boards.

FUEL TANK SENDING UNIT

Before removing any unit of the fuel level indicating system, the panel fuel gauge should be tested first. See "Tests in Vehicle". If the panel gauge performs properly **make sure the fuel tank ground strap on the fuel line at the tank is making a good ground.** Should the gauge perform properly and the ground strap be properly installed, remove the fuel tank sending unit as outlined in "Fuel System", Group 14 and test as follows:

(1) Using an ohmmeter with a 0 to 100 ohm scale, connect one lead to body of sending unit and the other lead to terminal in center of unit.

(2) Hold unit so float arm contacts "Empty Stop." The reading on ohmmeter scale should be 73 ohms, plus or minus 12.0 ohms.

(3) Raise arm to "Full Stop." The reading should now be 9.6 ohms, plus or minus 1 ohm.

If the unit does not perform to these specifications, inspect the stops or arm for possible distortion. If the stops or arm cannot be repaired or are not damaged, the unit should be replaced.

FUSE BLOCK—Valiant Fig. 11

The fuse block is located at the lower edge of the instrument panel and is retained to the instrument panel lower reinforcement by a self tapping screw.

In the fuse block are mounted radio, cigar lighter, air-conditioner or heater, tail-stop-dome light, and accessory fuses. The fuse capacity is printed on the fuse block as an aid to replacement requirements.

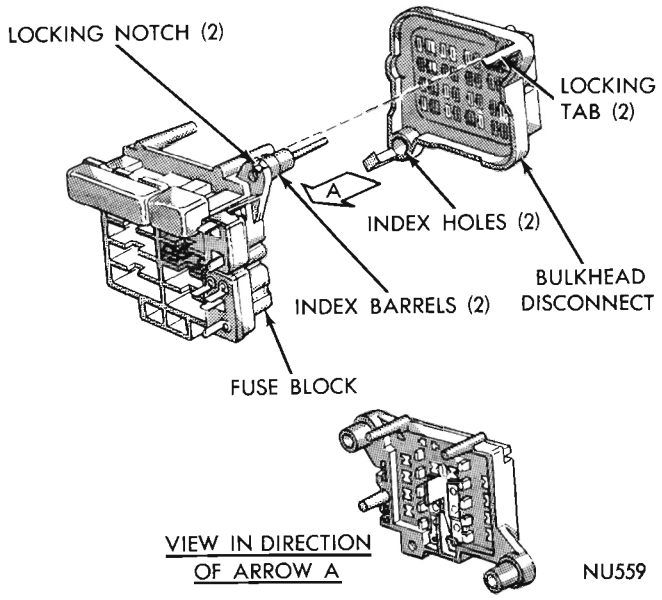


Fig. 13 - Removing or Installing Fuse Block Barracuda Satellite Fury Chrysler and Imperial

FUSE BLOCK—Barracuda-Satellite Fury-Chrysler and Imperial Fig. 12 and 13

The fuse block is located in the passenger compartment under the instrument panel to the left of the brake pedal and is retained to the bulkhead disconnect by two locking tabs.

To release the fuse block from the bulkhead disconnect, unlock locking tabs from fuse block and slide indexing barrels out of the bulkhead disconnect. The fuse name and capacity is printed on the front face of the fuse block. Refer to "Specifications."

CIRCUIT BREAKERS

Use only identical type and amperage value circuit breakers as replacements for service. See "Specification" for the location of circuit breakers.

SWITCH REPLACEMENT

Headlight Switch—Valiant

The headlight switch is serviced from under the instrument panel after removing the fuse block mounting screw. Move the fuse block out of the way.

Remove the knob by depressing the release button on the switch and pull the knob out. After removing the bezel with Tool C-3824, lower the switch and disconnect the multiple connector.

Windshield Wiper Switch—Valiant

(1) Remove air conditioning duct (if so equipped).

(2) Loosen set screw and remove switch knob.

(3) Remove spanner nut with Tool C-3824.

(4) Remove wiring harness from harness clip for access.

(5) Disconnect wiring connector at switch and remove switch.

SWITCH REPLACEMENT—Barracuda

Removal

Before performing this operation it is advisable to put a protective cover over the top of the instrument panel and steering column to prevent damage.

(1) Disconnect battery ground cable.

(2) Remove the six lamp panel mounting screws. Carefully slide lamp panel out and lay on top of instrument panel. It is not necessary to disconnect wiring harness.

(3) Remove the four switch bezel mounting screws. Carefully slide assembly out and to the right overlapping cluster, then lower it until free then disconnect wiring harness.

(a) **Wiper Switch**—Pull control knob from shaft. Remove mounting nut and remove switch from bezel assembly.

(b) **Headlamp Switch**—Remove the two switch mounting screws and remove switch from bezel assembly.

(c) **Rear Defogger or Top Lift Switch**—Remove the two switch mounting screws and remove switch from bezel assembly.

(d) **Dimmer Switch**—Remove the seven screws holding mounting plate to bezel. Remove wiper and dimmer switch knobs and separate plate from bezel. Remove dimmer switch mounting nut and separate switch from mounting plate.

Installation

(1) Connect wiring harness to switch bezel. Slide bezel into position and install mounting screws.

(2) Install lamp panel and mounting screws.

(3) Remove protective covering. Connect battery ground cable and check switch operation.

SWITCH REPLACEMENT—Satellite

Removal

The switches are serviced from underneath the instrument panel.

Head Lamp

(1) Disconnect electrical leads to switch.

(2) Remove switch mounting screws.

(3) Remove switch from panel.

Instrument Panel Lamp Switch

(1) Disconnect electrical leads to switch.

(2) Remove switch mounting screws.

(3) Remove switch from panel.

Windshield Wiper and Washer Switch.
(1) Disconnect electrical leads to switch.
(2) Remove switch mounting screws.
(3) Remove switch from panel.

SWITCH REPLACEMENT—Fury

Removal
Switches Serviced from Underneath Instrument Panel

Head Lamp
(1) Disconnect electrical leads to switch
(2) Remove (2) switch mounting screws
(3) Remove switch from panel

Panel Dimmer Switch
(1) Disconnect electrical leads to the switch.
(2) Remove (2) switch mounting screws
(3) Remove switch from panel.

Accessory Switch (Rear Defogger)
(1) Disconnect electrical leads to the switch.
(2) Remove (2) switch mounting screws.
(3) Removal switch from panel.

Windshield Washer Switch
(1) Disconnect electrical leads to switch
(2) Remove (2) switch mounting screws
(3) Remove switch from panel

Windshield Wiper Switch
(1) Roll cluster down and towards you
*NOTE: It is not necessary to remove bezel assembly, only roll it far enough to gain access to W/S wiper switch mounting screws and wiring.
(2) Disconnect electrical leads to switch
(3) Remove (2) switch mounting screws
(4) Remove Switch

SWITCH REPLACEMENT—Chrysler

Removal

Headlamp Switch
(1) Remove the left spotcooler duct
(2) Remove the head lamp knob and shaft assembly by pulling the switch to on, depressing the release button on the bottom of the switch case, and pulling the knob and shaft assembly out.
(3) Remove the head lamp sentinel and auto dimmer control knobs. (If so equipped)
(4) Remove the head lamp switch mounting nut
(5) Remove the head lamp switch from under the instrument panel and disconnect the wiring connector

Accessory Switches
(1) Remove center A/C connector assembly
(2) From under the panel, disconnect the vacuum and/or wiring connectors from the accessory switches.
(3) From under the panel, remove the 2 screws which attach the accessory bezel to the instrument cluster (1 screw at upper left corner and 1 at lower right corner of accessory bezel)
(4) Remove accessory bezel and switches from the front of the instrument panel (Roll top of bezel out and down)
(5) Remove 2 screws holding switch

Windshield Wiper/Washer Switch Assembly
(1) Remove the instrument cluster
(2) Remove the 2 screws securing the switch and plate assembly to the cluster housing.
(3) Remove the assembly
(4) Remove the 2 screws holding the switch to the mounting plate.
(5) Remove and service the switch

SWITCH REPLACEMENT—Imperial

Removal

Head Lamp Switch
(1) Remove the left spotcooler duct
(2) Remove the head lamp switch knob and shaft by pulling the switch to on, depressing the release button on the bottom of the switch case, and pulling on the knob.
(3) Remove the head lamp sentinel and automatic dimmer control knobs, (if so equipped).
(4) Remove the head lamp switch mounting nut.
(5) Remove the headlamp switch from under the instrument panel and disconnect the wiring connector.

Acessory Switches
(1) Remove the center air conditioning connector assembly
(2) Disconnect the wiring and/or vacuum harness from the accessory switch
(3) Remove 2 screws securing the accessory switch to the cluster.
(4) Remove the switch.

Windshield Wiper or Washer Switch
(1) Remove the instrument cluster
(2) Remove 2 screws holding the wiper washer switch mounting plate to the instrument cluster.
(3) Remove the switches and mounting plate from the cluster
(4) Remove 2 screws holding the switch to the mounting plate

(5) Remove the switch.

HEATER OR AIR CONDITIONING CONTROLS—Valiant

Removal

(1) Disconnect battery ground cable.
(2) Remove radio. See "Radio Removal".
(3) Loosen set screw(s) in bottom of control lever knob(s) and remove.
(4) From behind instrument panel, remove 2 control assembly retaining nuts. (2 bolts on rally cluster)
(5) Lower assembly below instrument panel and disconnect blower switch wires, control cables or vacuum connector if air conditioning equipped.

The blower switch is attached to the control assembly with two metal screws.

Installation

(1) From a position below instrument panel, connect and adjust control cables, blower switch wires or the vacuum connector.
(2) Position control assembly on mounting studs and install two retaining nuts.
(3) Install control lever knob(s).
(4) Install radio. See "Radio Installation".
(5) Connect battery ground cable and test operation of controls.

HEATER OR AIR CONDITIONING CONTROLS—Barracuda

Removal

(1) Disconnect battery ground cable.
(2) Remove the control assembly mounting bracket.
(3) Remove the control assembly mounting screws.
(4) Disconnect the wiring, vacuum harness and the control cable.
(5) Remove control assembly from panel.

Installation

(1) Connect the wiring vacuum harness and control cable to control assembly.
(2) Position control assembly behind instrument panel and install mounting screws.
(3) Install control assembly mounting bracket.
(4) Connect battery ground cable.

HEATER CONTROLS—Barracuda

Removal

Before performing this operation it is advisable to put a protective cover over the top of the instrument panel and steering column to prevent damage.

(1) Disconnect battery ground cable.
(2) Remove the six lamp panel mounting screws. Carefully slide lamp panel out and place on top of instrument panel. It is not necessary to disconnect wiring harness.
(3) Remove the four switch bezel mounting screws. Carefully slide assembly out and to the right, overlapping cluster, then lower it until free from instrument panel. Disconnect wiring harness and remove switch bezel.
(4) Remove left trim bezel by removing the four exterior screws and one from under instrument panel.
(5) Remove the six cluster bezel mounting screws. Slide bezel forward allowing it to rest on steering column.
(6) Using the access area provided through the switch bezel removal, remove top screw of heater-defroster linkage.
(7) From under instrument panel remove screw from temperature control linkage, then remove the two screws from heater control bracket, (one is located on bottom of panel and the other is behind the heater unit).
(8) Remove wiring harness from blower motor switch.
(9) Remove the four remaining control mounting screws and slide unit out of panel.

Installation

(1) Position control in instrument panel and install four mounting screws.
(2) Connect wiring harness to blower switch.
(3) Install the two control bracket screws the one in the temperature control linkage and the top screw of the heater-defroster linkage.
(4) Position cluster bezel in instrument panel and install the six mounting screws. Connect wiring harness.
(5) Install left trim bezel.
(6) Connect wiring harness to switch bezel. Slide bezel into position and install mounting screws.
(7) Install lamp panel and mounting screws.
(8) Remove protective covering. Connect battery ground cable and check control operation.

HEATER OR AIR CONDITIONING CONTROLS—SATELLITE

Removal

The control assembly may be serviced from underneath the instrument panel.
(1) Disconnect battery ground cable.
(2) Remove control assembly mounting screws.
(3) Disconnect the wiring harness and control cable.
(4) Remove control assembly from panel.

HEATER AND AIR CONDITIONER CONTROLS—Fury

Removal

(1) Remove lamp panel.
(2) Remove steering column cover.
(3) Remove radio trim bezel.
(4) Remove the two heater control or air conditioner control mounting nuts.
(5) Remove lower center air conditioner duct, (if so equipped).
(6) Disconnect electrical leads and vacuum hoses.
(7) Remove heater, air conditioner mounting bracket (one screw) and remove control.

Installation

(1) Install heater or air conditioner control and bracket.
(2) Connect electrical leads and vacuum hoses to the control.
(3) Install lower center air conditioner duct.
(4) Install control mounting nuts.
(5) Install radio trim bezel.
(6) Install steering column cover.
(7) Install lamp panel.

UPPER LEVEL VENTILATION AND HEATER CONTROL—Fury

Removal

(1) Remove lamp panel.
(2) Remove column cover.
(3) Remove radio trim bezel.
(4) Remove (2) control mounting nuts.
(5) Disconnect electrical and vacuum leads.
(6) Remove control bracket mounting screw at lower reinforcement.
(7) Remove control from underneath instrument panel.

HEATER OR AIR CONDITIONING CONTROLS—Chrysler—Imperial

Removal

A.T.C. Controls

(1) Remove the center A/C connector assembly.
(2) Remove the radio.
(3) Remove the two A.T.C. control mounting nuts.
(4) Disconnect the vacuum harness and wiring connectors, while removing the controls from under the panel.

AIR CONDITIONER OUTLET—(Center)—Fury

Removal

(1) Remove air conditioner distribution duct (center only).
(2) Remove center outlet bezel mounting screws (two).
(3) Remove center outlet from panel.

Installation

(1) Position center outlet and install bezel mounting screws.
(2) Install center distribution duct. Reach up under instrument panel and install center cooler hose to bezel outlet, then reinstall center distribution duct.

Left Spot Cooler—Fury

Removal

(1) Remove lamp panel.
(2) Remove steering column cover.
(3) Remove two moulding screws and two spot cooler bezel mounting screws and remove spot cooler.

Installation

(1) Position spot cooler bezel on instrument panel and install mounting screws.
(2) Install steering column cover.
(3) Install lamp panel.

Right Spot Cooler—Fury

Removal

(1) Remove two spot cooler mounting screws and remove spot cooler from panel.

Installation

(1) Install spot cooler and two mounting screws. Reach up under instrument panel and insert right spot cooler duct into housing.

Center Spot Cooler—Chrysler

Removal

(1) Remove center A/C connector.
(2) Remove 3 screws holding A/C distribution duct to A/C unit.
(3) Remove A/C distribution duct.
(4) Remove screw holding center spot cooler duct to lower reinforcement.
(5) Remove center spot cooler duct.
(6) Remove 4 screws holding center spot cooler housing to the instrument cluster.
(7) Remove center spot cooler from underneath the panel.

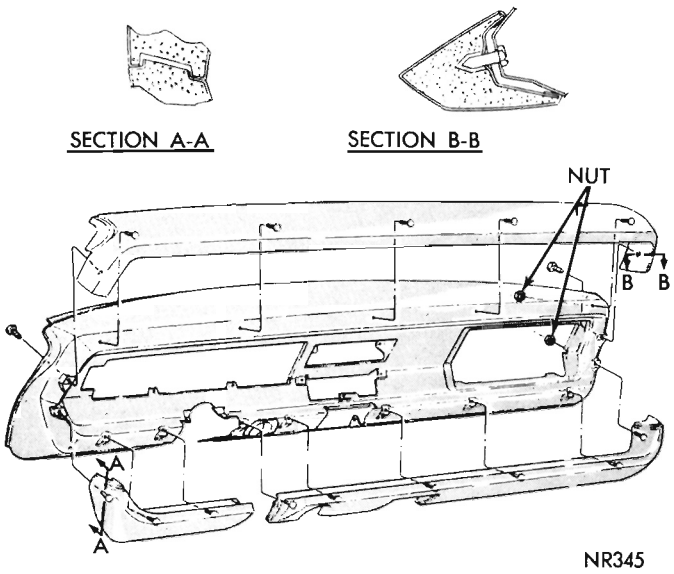


Fig. 14 - Instrument Panel Trim Pads - Valiant

Center Spot Cooler—Imperial

Removal

(1) Remove the center air conditioning connector assembly.
(2) Remove 3 screws holding A/C distribution duct to A/C unit.
(3) Remove the A/C distribution duct.
(4) Remove screw holding the center spot cooler duct to the lower reinforcement and remove the duct.
(5) Remove accessory switches.
(6) Remove 4 screws holding accessory bezel to the instrument cluster.
(7) Remove the accessory bezel.
(8) Remove 4 screws holding the center spot cooler to the instrument cluster.
(9) Remove the center spot cooler assembly.

Left Spot Cooler—Chrysler—Imperial

Removal

(1) Remove the center A/C connector assembly.
(2) Remove the screw which secures the left spot cooler duct assembly to the lower reinforcement.
(3) Remove the left spot cooler duct.

Right Spot Cooler—Chrysler—Imperial

(1) Remove the screw holding the right spot cooler duct to the lower reinforcement.
(2) Remove the right spot cooler duct.
(3) Remove the 5 nuts which assemble the right spot cooler and attach it to the lower instrument panel.
(4) Remove the spot cooler bezel and the spot cooler housing.

CLOCK—Satellite

Removal

(1) Disconnect battery ground cable.
(2) Remove cluster assembly.
(3) Remove clock.

CLOCK—Fury

Removal

(1) Remove clock reset knob.
(2) Roll cluster bezel down and towards you.
NOTE: It is not necessary to remove the bezel assembly, only roll it far enough to gain access to clock wiring and mounting screws.
(3) Disconnect clock wiring.
(4) Remove (2) clock mounting screws.
(5) Remove clock from bezel.

CLOCK—Chrysler

Removal

(1) Remove the center A/C connector.
(2) Disconnect the power lead to the clock.
(3) Remove the screw mounting the clock to the cluster.
(4) Roll the bottom of the clock up and away from the cluster to clear the reset knob.
(5) Lower the clock to disengage the upper mounting tabs. Remove the clock from under the instrument panel.

CLOCK—Imperial

Removal

(1) Remove the center air conditioning connector assembly, the air conditioning distribution duct and the center spot cooler duct.
(2) Disconnect clock wiring.
(3) Loosen 2 screws (left side) holding the clock to the cluster housing.
(4) Remove 2 screws (right side) holding clock to cluster housing.
(5) Move clock to right to clear cluster housing and rotate the clock out of the cluster housing, left side first.
(6) Remove the clock from underneath the panel.

INSTRUMENT PANEL TRIM PAD—Valiant (Fig. 14)

On Valiant models, screws are used at the lower end. When installing a trim panel, do not tighten nuts until trim panel has been aligned.

INSTRUMENT PANEL TRIM PAD—Barracuda (Fig. 15)

The Barracuda trim pad is mounted to the sheet

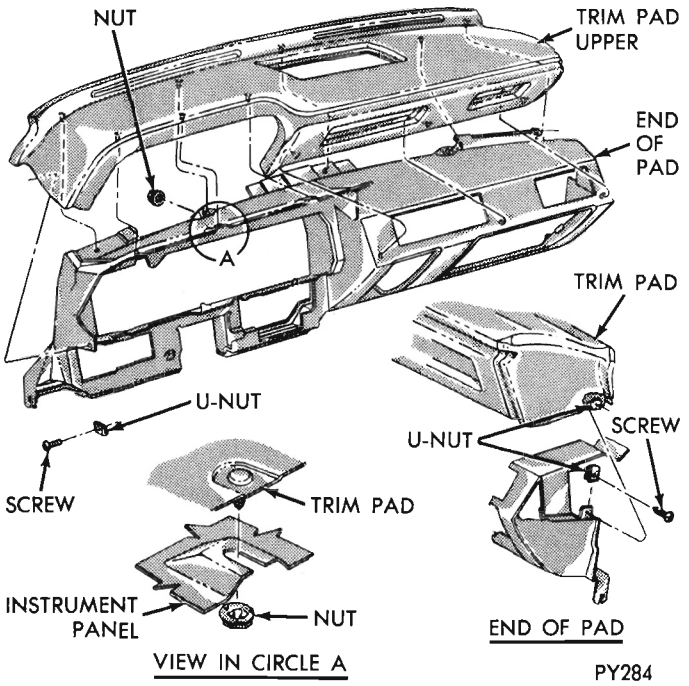


Fig. 15 - Instrument Panel Trim Pads - Barracuda

metal panel with nuts. Be sure to align the ends of trim pad to instrument panel and secure with screws.

INSTRUMENT PANEL TRIM PAD—Satellite (Fig. 16)

The instrument panel trim pad on Satellite is attached with stud type retainers and nuts.

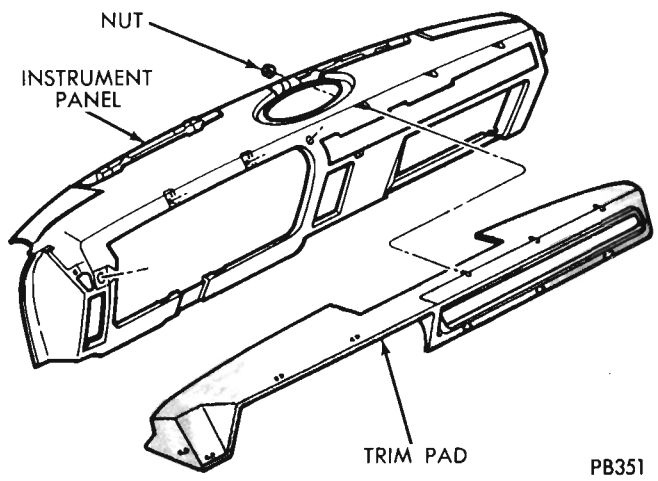


Fig. 16 - Instrument Panel Trim Pad - Satellite

INSTRUMENT PANEL TRIM PAD—Fury

Disassembly

(1) Disconnect battery.

(2) Remove glove box door and glove box.

(3) Take out "A" post moulding mounting screws and remove mouldings from car.

(4) Remove steering column cover mounting screws. Remove steering column cover from instrument panel.

(5) Lower steering column, see Section 19 in Service Manual for procedure.

(6) Remove lamp panel mounting screws. Lower lamp panel assembly slightly to disconnect lamp

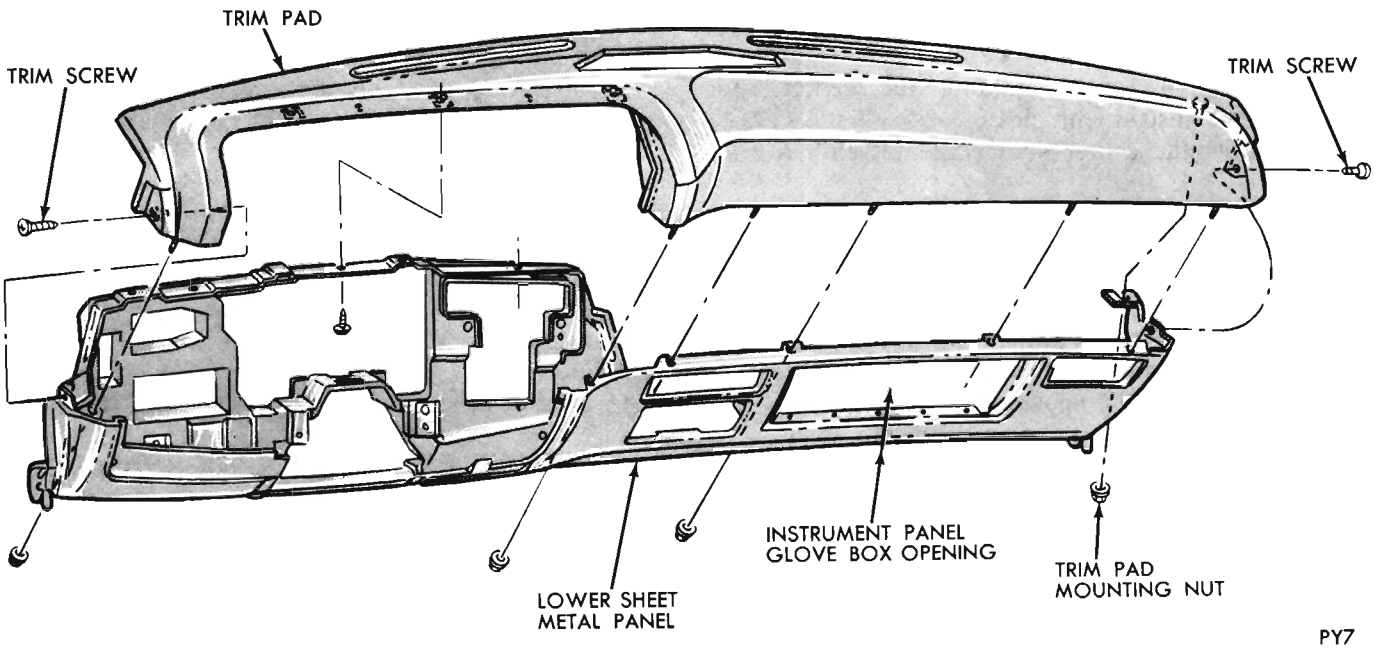


Fig. 17 - Instrument Panel Trim Pad - Fury

harness from lamp panel. Let harness hang on instrument panel. Remove lamp panel from instrument panel.

(7) After lamp panel and steering column cover have been removed, radio bezel and left trim bezel, may be removed. First unscrew tape player program selector button if so equipped. Then remove two mounting screws at radio bezel. Disconnect electrical leads. Remove radio bezel.

(8) Remove two screws and remove left trim bezel from panel.

(9) Remove three lower instrument cluster bezel attaching screws and three upper instrument panel cluster bezel mounting screws.

(10) Working through glove box opening, remove five upper trim pad to lower sheet metal mounting nuts. Working from right and left side of instrument cluster remove two sheet metal mounting nuts (Fig. 17).

(11) Working through glove box opening release instrument panel wiring from upper retainer and disconnect electrical leads from center speaker, right stereo speaker and crossover assembly.

(12) Remove four trim pad to panel cowl attaching bolts, located across top side of instrument panel by windshield. Also remove two trim screws, one on left end and one on right end of pad.

(13) Raise pad slightly, and reaching over instrument cluster, release remaining harness from wiring clips, also disconnect left stereo speaker electrical leads.

(14) Remove instrument panel trim pad from lower sheet metal carefully, so components mounted on underside of trim pad are not damaged.

INSTALLATION

(1) Place trim pad on lower instrument panel sheet metal.

(2) Working through glove box opening replace (6) upper trim pad to lower panel mounting nuts. Working from under left side of instrument panel replace (4) upper panel trim pad to lower sheet metal mounting nuts.

(3) Align trim pad to cowl and replace the 4 cowl to trim pad mounting bolts.

(4) Reaching through glove box opening replace wire harness in wiring clips and connect center speaker to harness.

(5) Working over cluster replace wire harness in wiring clips.

(6) Replace (3) upper cluster mounting screws to upper trim pad.

(7) Install left trim bezel to panel.

(8) Reassemble radio bezel to instrument panel.

(9) Replace lamp panel to instrument panel trim pad upper.

(10) Replace steering column. (For assembly procedure see Section 19 in your Service Manual).

(11) Install steering column cover.

(12) Replace "A" post mouldings.

(13) Replace glove box and glove box door.

(14) Replace battery cable and check function of all instruments.

INSTRUMENT PANEL TRIM PAD (FIG. 18)

Replacement

Trim Pad Assembly—Chrysler

(1) Remove the instrument cluster.

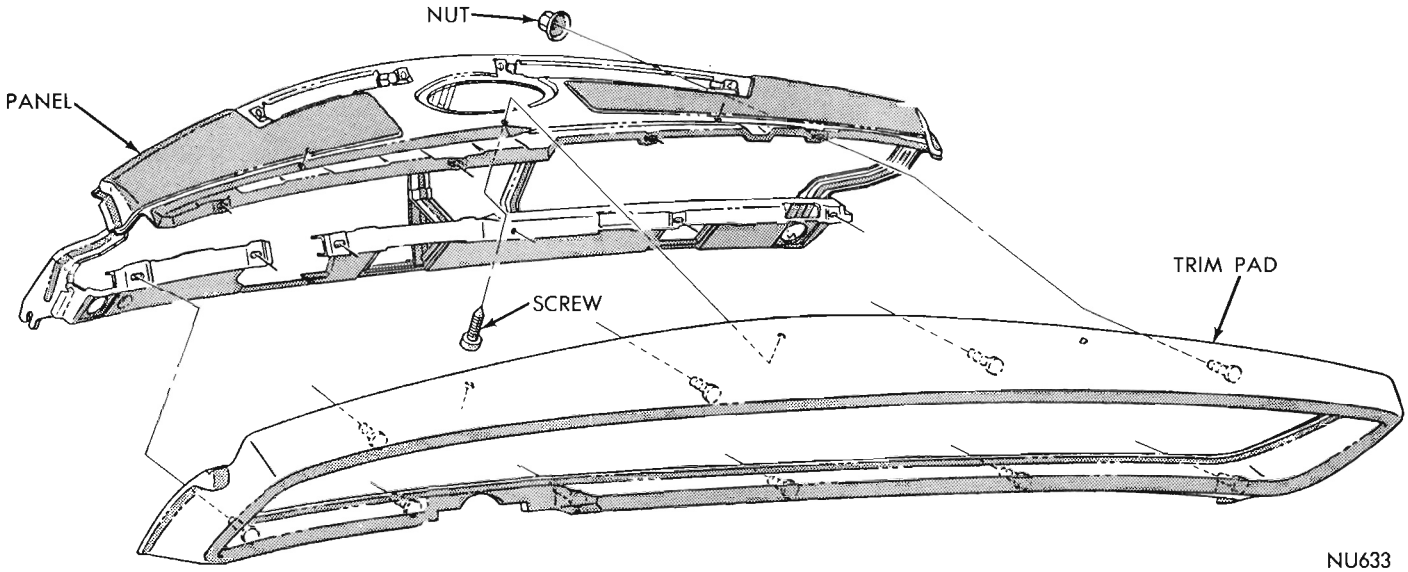


Fig. 18 - Instrument Panel Trim Pad - Chrysler - Imperial

(2) Remove the upper and lower glove box.
(3) Remove the glove box door.
(4) Working thru the cluster and glove box opening remove the 11 nuts which attach the trim pad assembly to the instrument panel.
(5) Working thru the cluster and glove box opening remove the 3 screws which attach the upper part of the trim pad to the instrument panel.
(6) Remove the trim pad.

Trim Pad Assembly—Imperial

(1) Remove the instrument cluster.
(2) Remove the upper and lower glove box, the glove box door, and the instrument panel bezel.
(3) Working thru the glove box opening, remove the 4 screws which fasten the instrument panel bezel bracket to the upper trim pad retainer, and remove the bracket.
(4) Working thru the cluster and glove box opening remove the 11 nuts which attach the trim pad assembly to the upper instrument panel.
(5) Remove the 3 upper trim pad attaching screws.
(6) Remove the trim pad assembly.

INSTRUMENT PANEL ROLL OUT—Fury

Removal

(1) Place front seat in its most rearward position.
(2) Disconnect battery ground cable.
(3) Remove steering column cover screws.
(4) Remove left air conditioner duct.
(5) Disconnect gear shift indicator pointer connector.
(6) On all models, remove steering column duct and disconnect turn signal connectors.
(7) Remove steering column floor plate mounting screws.
(8) Disconnect shifter linkage from levers at lower end of steering column (if so equipped).
(9) With front wheels and steering wheel in the straight-ahead position, remove the steering shaft lower coupling to worm shaft roll pin.
(10) Remove three nuts and bolts and two studs attaching steering column bracket to instrument panel. Remove ground strap.
(11) Carefully pry lower coupling from the steering gear worm shaft, then remove steering column with steering wheel, out through passenger compartment being careful not to damage paint or trim.
(12) Remove the vent control mounting screws from the assemblies mounted on the lower end of instrument panel and move the vent controls against heater away from the instrument panel.
(13) Disconnect speedometer cable at speedometer.
(14) Remove brake release handle pin at rear of assembly; push handle forward.
(15) Remove left "A" post moulding screw and left upper corner windshield moulding screw.
(16) Loosen upper left corner of windshield moulding and remove left "A" post moulding.
(17) Remove right "A" post moulding screw and right upper corner windshield moulding screw.
(18) Loosen upper right corner of windshield moulding and remove right "A" post moulding.
(19) Remove two screws from right and left door sill plates.
(20) Remove two screws from right and left cowl trim kick panels and remove panels.
(21) Loosen the left and right instrument panel lower reinforcement screws.
(22) Remove the four screws attaching the upper instrument panel to cowl panel. A universal joint ratchet will facilitate removal of the screws.
(23) Carefully roll the instrument panel down, disconnecting the main wire harness from the center wiring clamps.

Installation

(1) Carefully roll instrument panel up; position wire harness in center clips and install panel upper mounting screws.
(2) Tighten instrument panel lower pivot screws.
(3) Connect speedometer cable.
(4) Install cowl trim panels and sill plates.
(5) Install mouldings at windshield and "A" posts.
(6) Install vent controls and attaching screws.
(7) Enter steering column through passenger compartment; insert column through floor pan opening and with front wheels in straight-ahead position and master splines on wormshaft and coupling aligned, engage coupling with wormshaft and install the roll pin.
(8) Install instrument panel bracket studs and attaching nuts but do not tighten. After centering the steering shaft coupling at midpoint of its travel, tighten the two upper bracket nuts to 140 inch-pounds.
(9) Install steering column floor plate and three mounting screws.
(10) Connect gear shift indicator pointer to the operating bracket on shift tube in its approximate original location. Shift to each selector position. The indicator must align with each selector. If necessary, loosen the bolt and readjust pointer.
(11) On all models, install steering column duct and connect turn signal wiring harness connectors.
(12) Connect left air conditioner duct.
(13) Install steering column cover.
(14) Connect battery ground cable.
(15) Check operation of all controls.

INSTRUMENT PANEL ROLL OUT—Chrysler and Imperial

Removal

(1) Place front seat in its most rearward position.
(2) Disconnect battery ground cable.
(3) Remove steering column cover.
(4) Disconnect gear shift indicator pointer connector.
(5) Disconnect aspirator hose at aspirator housing (auto temp only).
(6) On all models, remove steering column duct and disconnect turn signal connectors.
(7) Remove the three steering column floor plate mounting screws.
(8) Disconnect shifter linkage from levers at lower end of steering column (if so equipped).
(9) With front wheels and steering wheel in the straight-ahead position, remove the steering shaft lower coupling to worm shaft roll pin.
(10) Remove the three upper column mounting nuts at instrument panel.
(11) Remove two studs attaching steering column bracket to instrument panel. Remove ground strap.
(12) Carefully pry lower coupling from the steering gear worm shaft, then remove steering column with steering wheel, out through passenger compartment being careful not to damage paint or trim.
(13) Remove left "A" post moulding screw and upper corner moulding screw.
(14) Loosen upper left corner of top moulding and remove left "A" post moulding.
(15) Remove right "A" post moulding screw and right upper corner moulding screw.
(16) Loosen upper right corner of top moulding and remove right "A" post moulding.
(17) Remove two screws from right and left sill plates.
(18) Remove two screws from right and left cowl trim panels and remove trim panels.
(19) Disconnect fresh air door control cables at the fresh air doors.
(20) Remove speaker defroster grille mounting screws and remove grille.
(21) Disconnect speedometer cable at speedometer.
(22) Loosen the left and right instrument panel lower reinforcement screws.
(23) Remove the four screws attaching the upper instrument panel to cowl panel (at windshield). A universal joint ratchet will facilitate removal of the screws.
(24) Carefully roll the instrument panel down, disconnecting the main wire harness from the center wiring clamps.

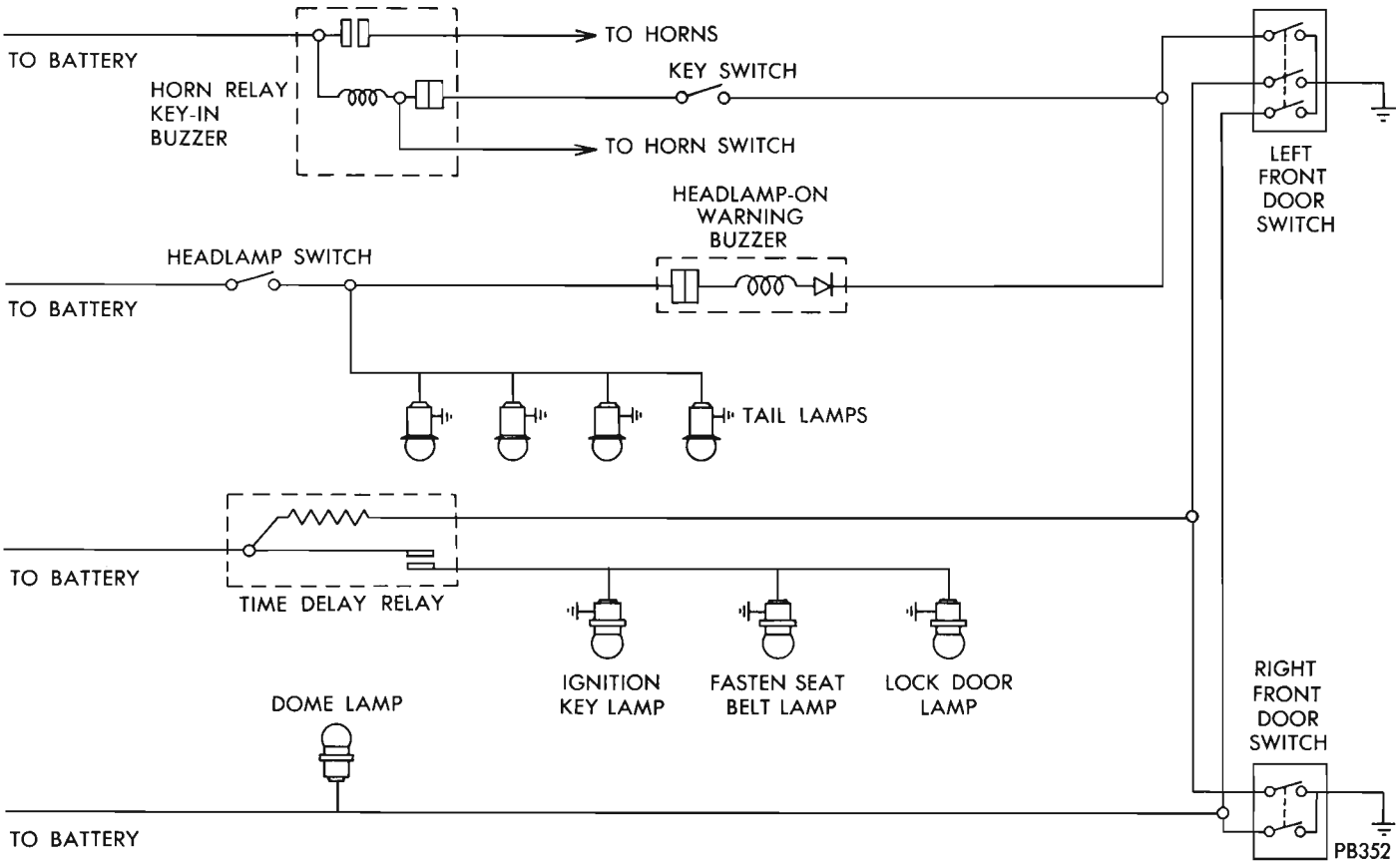


Fig. 19 - Buzzer System

Installation

(1) Carefully roll instrument panel up, position wire harness in center clips and install panel upper mounting screws.

(2) Connect speedometer cable and fresh air door control cables.

(3) Tighten instrument panel lower screws.

(4) Connect aspirator hose at aspirator housing.

(5) Install speaker grille (seven screws).

(6) Install cowl trim panels and sill plates.

(7) Install mouldings at windshield and "A" posts.

(8) Enter steering column through passenger compartment; insert column through floor pan opening and with front wheels in straight-ahead position and master splines on wormshaft and coupling aligned, engage coupling with wormshaft and install the roll pin.

(9) Install instrument panel bracket and attaching nuts but do not tighten. After centering the steering shaft coupling at midpoint of its travel, tighten the two upper bracket nuts to 140 inch-pounds.

(10) Install steering column floor plate mounting screws.

(11) Install ground strap to steering column support.

(12) Connect gear shift indicator pointer to the operating bracket on shift tube in its approximate original location. Shift to each selector position. The indicator must align with each selector. If necessary, loosen the bolt and readjust pointer.

(13) On all models, install steering column duct and connect turn signal wiring harness connectors.

(14) Install steering column cover.

(15) Connect battery ground cable.

(16) Check operation of all controls.

BUZZER SYSTEM

The Buzzer Warning System consists of a Key Warning Buzzer - Horn Relay and an optional Headlamp Buzzer. The key warning buzzer and horn relay are combined into one unit. This unit has a single pole double throw relay in which the buzzer contacts are normally closed and the horn relay contacts are normally open. The horn relay and buzzer coils may be considered as one coil performing a dual function or two coils wound on the same relay base.

Operating the horn switch provides the ground circuit for the horn relay, which when energized closes its contacts to complete the horn circuit. The relay is designed for intermittent duty. Continuous operation will cause it to overheat.

The key warning buzzer is energized whenever the key is in the ignition switch, regardless of position (Accessories, Off, On), and the driver's door is open. Under these conditions, the key buzzer switch and door switch contacts are closed, completing the buzzer circuit.

The headlamp "On" warning buzzer is a separate unit. It is energized whenever the headlamp switch is in the headlamp "On" or "Park" position and the driver's door is open. This buzzer contains a diode to prevent circuit feedback.

IGNITION AND STEERING LOCK

The ignition lock is located on the right side of the steering column.

The ignition switch has five positions. Starting from the full counterclockwise position they are:

Accessory, Lock, Off, On and Start. In "Lock" or "Accessory" positions, the steering and ignition systems are locked to provide anti-theft protection for the car.

The ignition key cannot be turned to the lock position until the gear selector is placed in the Park (P) position for automatic transmissions or reverse gear position for manual transmissions with column selector.

With floor or console mounted selector the steering column may be equipped with a rotating lever. If so equipped this lever must be rotated toward the ignition lock before you can lock the ignition.

The Accessory position permits the operation of the electrical accessories when the engine is not running.

The "Off" position allows the engine to be turned off without locking the steering.

The key can be inserted or withdrawn only in the "Lock" position. Do not attempt to pull the shift lever out of Reverse or Park after the key has been turned to the lock position.

Removal

(1) Disconnect negative battery terminal at battery.

(2) Remove steering column cover and remove two screws attaching wiring trough (cover) from steering column.

(3) Disconnect wiring connectors at steering column.

(4) Remove horn ring ornament, horn ring or rim blow switch pad and ornament (if so equipped).

(5) Disconnect horn wires at steering wheel hub.

(6) Remove horn ring.

(7) Loosen steering wheel nut several turns and install steering wheel puller Tool C-3428B. Loosen steering wheel first, then remove steering wheel nut and steering wheel.

(8) Remove screw attaching turn signal operating lever and remove lever. **On Tilt and Tel Columns, lever screws out.**

Attach a piece of string or fine wire to turn

signal switch wiring before removing switch from steering column. When switch is removed leave string or wire in steering column jacket tubes as an aid to replacement of wiring.

(9) Remove screws attaching turn signal switch and upper bearing retainer screws and remove retainer and turn signal switch and flasher switch.

(10) Remove one retaining screw and lift out the ignition key lamp assembly.

(11) Remove snap ring from upper end of steering shaft.

(12) Remove three bearing housing attaching screws.

(13) With Tool C-3044 attached to the three threaded holes for the turn signal switch retaining screws, pull bearing and housing from steering shaft.

(14) Remove the lower snap ring from the steering shaft.

(15) Remove the lock plate pin retaining ring from the lock plate hub. Some resistance may be encountered due to the friction of the ring retaining tangs.

(16) Use Tool C-4113 pin removing and installing tool and press the steering shaft lock plate retaining pin out of the shaft and plate and remove the lock plate. **DO NOT attempt removal of the plate by hammering as damage to the collapsible column may result.**

(17) Remove the lock lever guide plate screws and plate.

(18) With a small probe tool inserted in the access hole provided in the housing boss, depress the key cylinder retainer toward the cylinder to disengage it from the slot in the housing bore, then withdraw the key cylinder from the lock housing. **If key warning buzzer switch removal is necessary, the additional steps must be performed.**

(19) Remove two screws attaching switch.

(20) Disconnect switch wires at bottom of steering column and pull out switch.

IGNITION AND STEERING LOCK

Installation

Before installing ignition switch and key cylinder make sure the shift housing is in a lockable position (park with automatic, or reverse with manual transmission). When installing the key cylinder it must be turned to "lock" position, key removed. Insert cylinder, insert key and turn to "Off" position. Make sure ignition switch is turned to the "Off" position to index its cam with the lock cylinder position.

(1) Install ignition switch and screws.

(2) Install lock lever guide plate and two screws.

(3) Install warning buzzer switch if removed.

(4) Install lock plate and retaining pin.

(5) Install the steering shaft bearing lower snap ring and place the bearing and housing assembly on the steering shaft.

(6) Install bearing housing on steering shaft.

(7) Use Tool C-3879 and a steering wheel nut and flat washer to draw the steering shaft up into the bearing and housing assembly until the lower snap ring contacts the bearing, then install the upper snap ring.

(8) Install the three bearing housing to lock housing attaching screws.

(9) Install bearing upper snap ring.

(10) Install key lamp assembly, retainer and one screw.

(11) Attach string or wire left in steering column jacket tube during removal, to turn signal switch wiring and carefully pull string or wire down through column jacket tube until directional switch wires can be connected. Position turn signal switch in steering column jacket tube and install switch retainer and attaching screws.

(12) Install turn signal switch actuating lever.

(13) Install steering wheel, on steering shaft with master splines aligned.

(14) Install washer and nut. Tighten nut to 27 foot-pounds.

(15) Install horn switch parts previously removed from steering wheel.

(16) Connect horn switch wires.

(17) Connect wiring connectors at steering column.

(18) Install wiring trough (cover) and steering column cover.

(19) Connect battery ground cable, test operation of turn signals and horns.

RADIO AND ANTENNA

INDEX

	Page
Antennas	88
Antenna Trimming	88
Fader Control	86
Front Speaker	94
Interference Elimination	88
Radios Replacement	94
Rear Seat Speakers	96
Service Diagnosis	86
Stereo Speakers	95

GENERAL INFORMATION

OPERATION

Setting Push Button To Station

(1) Extend antenna fully and turn radio on for five minutes.

(2) Unlock push button by pulling it out and manually tune in desired station.

(3) Push button back into position to lock adjustment.

(4) Repeat operation on the other push buttons.

The radio push button adjustment for FM is the same as for the standard AM radio.

Schematic Wiring Diagrams

The manufacturers of the radios make repair service available through their authorized service depots. If a schematic wiring diagram is desired, it should be obtained from the manufacturer of the particular unit.

AM Pushbutton Radio (Fig. 1)

To operate the radio the ignition switch must be in the **ON** or **Accessory** position. Operation is by two rotary controls and five push buttons.

Left Center Knob—On-Off and Volume
Left Outer (Ring) Knob—Tone Control
Right Center and Outer (Ring)
Knob or Push Buttons—Station Selection



PB214

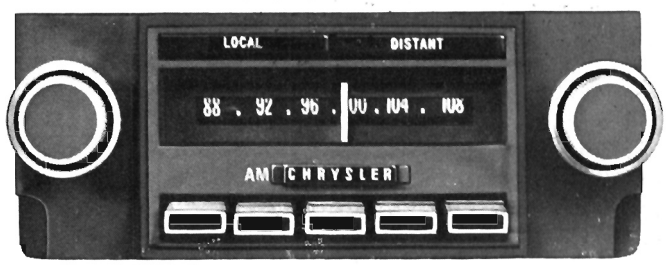
Fig. 1 - AM Push Button Radio

AM/FM Radio (Fig. 2)

To operate the radio the ignition switch must be in the **ON** or **Accessory** position. Turn the left hand knob clockwise to "On" position. This same knob adjusts the volume level. The ring behind the left knob, provides selection of tone quality.

AM or FM can be selected by moving the slide switch above the push buttons to the right or left.

Station selection is accomplished either manually by pressing the push buttons fully in, or by turning knob at right. With the search tune radio in addition station selection is accomplished by automatically by pressing the bars marked "Loc" (local) or "DIST" (distant) or by foot-operated button located to the left of the brake pedal.



PB215

Fig. 2 - AM/FM Radio

AM RECEPTION

AM is an abbreviation for Amplitude Modulation. The voice is super-imposed upon a carrier signal in such a way as to vary the amplitude or strength of the signal. Due to the carrier, frequencies used, 550 KHZ to 1600 KHZ long range is easily achieved. At night the signals travel further than during the day and station mixing becomes a problem. Many stations are required to go off the air or reduce their power at dusk. AM radio waves are reflected by the atmosphere which provides the long range reception.

The AM method of transmitting is subject to noise, and elimination of noise, is only possible by listening to strong stations. Most electrical disturbances will enter an AM radio, and weak stations will suffer the most interference.

The Chrysler AM-FM radio has fine AM circuitry which produces the AM reception that our customers have learned to know and appreciate.

A doubler type Automatic Gain Control (AGC) Circuit is used on AM, which responds very well to changes in signal strength and keeps the volume at a constant level. Although radio reception on AM is not generally good when passing under bridges, the doubler type AGC circuit is superior

to any other system in maintaining listenable stations under these conditions.

FM RECEPTION

FM is the abbreviation for Frequency Modulation, which is a method of varying the frequency of a carrier wave in such a manner as to represent the audio signal. The FM band is from 88 to 108 megahertz and each station is assigned a frequency in this band. With no audio signal present, the station is exactly on its assigned frequency. The audio information is then applied and it shifts the frequency slightly from one side to the other of the center of assigned frequency. The amplitude or strength remains constant and only the frequency changes.

Since the operating frequencies are high, 88 to 108 megahertz, the FM wave is not reflected by the atmosphere. The range is limited due to this fact, similar to television broadcasts. This type of wave is often called "Line of Sight" since the receiver antenna must see the transmitting antenna. This is particularly true in the fringe areas where the signals are very weak. A building or hill can very easily blank out the FM wave. In metropolitan areas where the signal is very strong, the waves can bounce off buildings and reception is possible even though the transmitter is not in line of sight. In metropolitan areas reception is possible in tunnels due to the reflectability of the FM wave, whereas AM reception is impossible.

FM reception is usually noise-free due to the fact that the receiver responds to frequency changes rather than amplitude changes, which can contain noise. This factor alone makes FM reception very desirable. An FM radio will have more noise when not tuned to a station than AM but this noise completely disappears when a station is tuned in. Under certain conditions (weak signals) the FM radio will pick up noise. The noise cancelling features of an FM radio require a certain signal strength before they can perform their function. An FM radio operated in the fringe area where signals are weak will pick up motor noise from cars and other electrical disturbances.

The household FM radio has a decided advantage over the FM automobile radio. Once the radio is placed in motion, the problems multiply. Customers purchasing FM automobile radios up to now have been personally trained on the problems involved when placing an FM radio in motion. Since the introduction of the Chrysler AM-FM radio it has been very important that the customer understands what to expect from FM reception.

The factors governing FM automobile reception are listed below with a brief description of the design features which minimize reception difficulties. These reception difficulties are restricted primarily to the fringe area and metropolitan reception is excellent.

Range

Normal range for Chrysler AM-FM radio is approximately 35 miles. There are naturally exceptions to this. On flat terrain, and with powerful transmitters, the range could be considerably extended. Educational stations that are generally weak may be listenable only at a distance of from a few blocks to a few miles. If the automobile is not moving, reception can be very satisfactory at distances over 25 miles. Once the automobile is set into motion, it is possible to drive past hills or buildings in the fringe area and momentarily lose the station.

Reception under 25 miles is reliable on practically all commercial stations and "flutter" due to hills and buildings will not be troublesome.

For maximum range capabilities the Chrysler AM-FM contains four stages of Intermediate Frequency Amplification.

Flutter

Flutter is produced in the fringe area when objects come between the station and the receiver. The signal will be lost momentarily then it will return. The rate which the flutter occurs is dependent upon the car's speed in passing objects. The effect is very similar to the way a television set flutters in the fringe area when an airplane passes between it and the station.

Flutter is kept at an absolute minimum in the Chrysler AM-FM radio due to its high gain.

Automatic Frequency Control (AFC)

Due to the higher frequencies used in FM reception, it is imperative that the receiver does not drift off station. A home radio has constant voltage and is rarely subjected to wide variations in temperature. The FM car radio operates under more severe conditions. The temperatures may range from below freezing to well over 100 degrees fahrenheit. The supply voltage of 12 volts may go as high as 14.5 volts with the alternator charging.

The easiest method of combatting these variables is to build a strong AFC system which can draw the station back in even though the receiver oscillator frequency has drifted off. This was thought to be undesirable for several reasons. With a strong AFC circuit, station tuning becomes very broad and the "capture effect" is very bad. (See the section on "Capture Effect.")

Rather than design an overpowering AFC circuit, the FM tuner was designed to operate from a zener diode-controlled power supply. The zener diode maintains the same voltage on the FM tun-

er under all driving conditions. An AFC circuit was then designed to provide excellent "holding" on frequency without the disadvantages of broad tuning and the "capture effect".

The Chrysler AM-FM will stay on frequency under all driving conditions due to the properly designed AFC circuit and zener diode regulated power supply.

Capture Effect

The capture effect is noticed when driving in the downtown area of large cities with the radio tuned to a distant station. The AFC circuit will attach itself to, or "capture" the strongest station located where the dial pointer is set. If you are listening to a station which is not located in the downtown area and you pass the transmitter of a station close to the one you are tuned to, the AFC may possibly attach itself to, or "capture" the stronger signal. Each time you drive past a building or other object which can cause the station to which you are tuned to become weak, it is possible for the AFC to jump to a strong local station close to the same point on the dial.

FM receivers are unlike AM receivers in this respect, since they do not mix the two stations but decide which is the stronger of the two and shift to it.

The "capture effect" is kept at a minimum in the Chrysler AM-FM receivers by using a zener diode power supply for the FM tuner and an AFC system of sufficient strength to keep the receiver on frequency. Receivers with strong AFC circuits (due to unregulated power supplies) are troubled by the "capture effect".

Motor Noise

Passing noise in general is no problem in FM receivers, provided sufficient signal is available from the station. FM receivers, however, are only immume to noise under signal conditions. With no signal, or a very weak one, motor noise can be received from passing cars and trucks. This is particularly true of passing cars that do not use TVRS suppression spark plug wires. As the station signal strength increases the FM circuit rejects the noise and it disappears. Noise will not be noticed in metropolitan areas or within approximately 25 miles of the station.

The four Intermediate Frequency stages, and FM Detector circuit in the Chrysler AM-FM radio, keep motor noise pickup in the fringe area to a minimum.

Combination AM/FM and AM Radio with Stereo 8 Track Tape Player (Fig. 3)

To operate: Ignition switch must be at "On" or "Acc" position.

The operating controls consist of two knobs and a tape program selector button. The left knob turns on the radio and controls the volume. The right knob is for station selection and controls tone quality.

The four program—eight-track stereo tape player provides full stereo reproduction.

To operate, insert the tape cartridge, label side up, into the tape chamber. The door will swing inward and the tape player will begin to play when the cartridge is in position. The tape player unit will play all four programs automatically and in sequence unless manually changed.

Depressing the program selector push button will manually override the automatic sequence of the tape player and allow the driver to change programs at will.

When the tape player is shut off by either the ignition switch or the volume on/off switch, the tape cartridge is automatically ejected. Automatic ejection can also be accomplished by pulling outward on the program selector button.

CAUTION: Avoid removing the cartridge without using automatic eject mechanism.

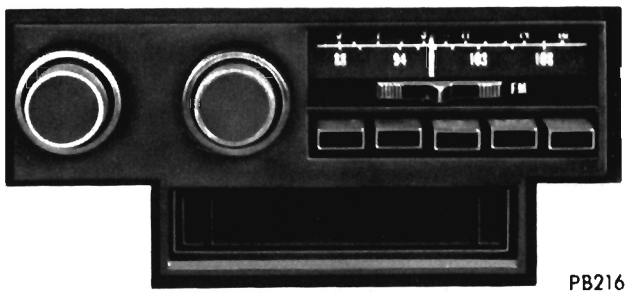


Fig. 3 - AM/FM with Stereo Tape

Tape Cartridge (8 Track)

(1) Stereophonic tape players are designed to use a pre-recorded, four program (eight-track) stereophonic tape contained in a special tape cartridge. **Do Not Use Four-Track Cartridges.**

(2) Protect open end of the cartridge from damage, dirt, water, oil, grease, etc.

(3) Do not attempt to pull out the tape from the cartridge.

(4) Do not attempt to open up the cartridge.

(5) To assure maximum life, tape cartridges should be stored in a cool, clean and dry place, with the open (tape) end down to keep dust out of the cartridge.

(6) Do not expose cartridge to direct sunlight or other temperature extremes.

Do not store tape cartridges in high temperature areas, such as on top of the instrument panel or the rear package shelf.

Playback Head and Capstan Cleaning

The playback head and capstan in your tape

player may accumulate tape coating residue (oxide) as the tape passes over the head. This accumulation should be periodically removed, as part of normal maintenance. Clean the playback head with a cotton swab, slightly moistened with alcohol while holding the player cartridge door open. To clean the capstan, hold the player cartridge door open and swab the surface of the capstan with alcohol. **Do not use carbon tetrachloride.** Dry parts with a clean rag.

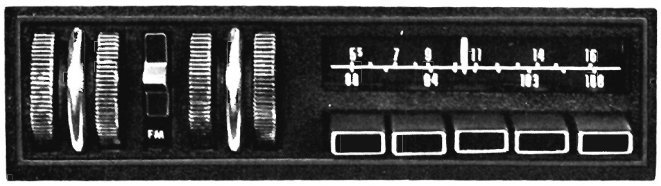
Fader Control

The speaker fader control, located remotely from the stereo unit, serves to proportion the sound level between the front and rear speakers.

AM/FM Multiplex-Thumbwheels (Fig. 4)

To operate: Ignition switch must be at "On" or "Acc" position.

The operating controls consist of four thumbwheels. The left outside thumbwheel turns on the radio and controls the volume. The right outside thumbwheel is for station selection. The right inside thumbwheel controls tone quality. The left inside thumbwheel controls balance between the left and right channel. At mid-rotation a detent is provided.



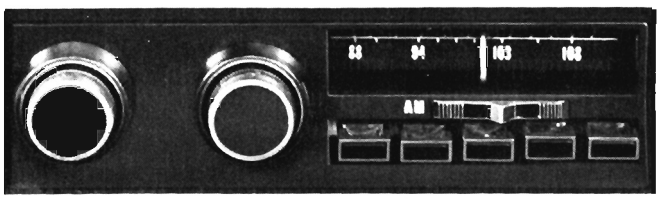
PB217

Fig. 4 - AM/FM Multiplex-Thumbwheels

AM/FM—Multiplex Knobs (Fig. 5)

To operate: Ignition switch must be at "On" or "Acc" position.

Turn the left hand knob clockwise to "On" position. This same knob adjusts the volume level. The ring behind left knob, provides selection of tone quality.



PB218

Fig. 5 - AM/FM Multiplex-Knobs

Stereo Cassette Tape Recorder - Available With A Special AM OR FM/AM Multiplex Radios (Fig. 6)

The radio portion of this unit operates as previously described under "Push Button AM Radio" or "FM/AM Multiplex Radio". The Cassette system is an exciting Chrysler inovation that gives you the versatility of a fine tape recorder plus the pure enjoyment of a stereo tape player.

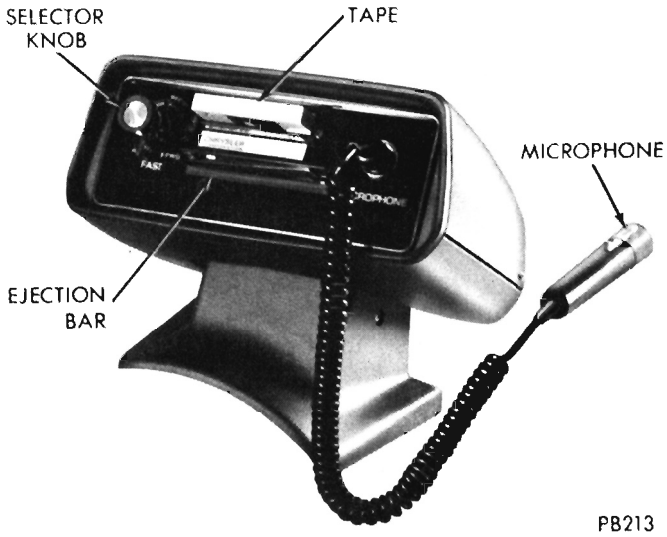


Fig. 6 - Stereo Cassette Tape Recorder

Operation of the Stereo Tape Player:-

Three simple steps are necessary to start the tape player. First turn on the radio, then place the Selector Knob in the "Play" position. Now insert the cassette with the tape openings to the right (If one spool is empty, insert that end first or the cassette will not stay engaged), and press the cassette holder down to engage the motor. The tonal quality (bass or treble) and the speaker balance are adjusted by the radio controls. When revolving these controls a slight detent can be felt that indicates the mid point. The rewind control overrides the play or record systems and allows you to reverse the tape to re-play a selection, or advance it to the next selection. If you should want to stop the tape for a moment without disengaging the cassette, place the Selector Knob in "Stop". To stop the tape and disengage it you may press in on the Selector Knob. The tape will, of course, disengage when the radio or ignition is turned off. To eject the tape cassette you must press up on the Ejection Bar.

Operation of the Radio Record System (Monaural):

To record from your car radio first carefully tune in the desired station for best reception. Then place Selector Knob in the "Radio Record" position. Press in the Selector Knob to interlock

record system and press down on the tape holder to engage tape. The program selected will then record directly from radio and is not subject to the radio volume or tone controls. The means of stopping the tape, rewinding and disengaging, are the same as described under "Operation of the Stereo Tape Player".

If you wish to put the record system in "standby", so that a program may be picked up without delay, it can be accomplished in either of the following ways:

(1) Place the Selector in "Stop", depress the Selector Knob and press down the tape holder to engage tape. Then it is only necessary to turn Selector to Radio or Microphone Record to start system.

(2) Place the Selector in Radio or Microphone Record, depress Selector Knob but do not depress tape until you wish to record.

Remember that when you are recording you are erasing anything previously on the tape.

Operation of the Remote Microphone - (Optional):-

For recording from the microphone it is first necessary to plug the mike cord into the jack on the face of the Cassette Unit. Then turn the Selector to "Record Mike", press in the Selector Knob and depress tape holder. For added convenience there is an On/Off rocker switch on the microphone. This switch overrides all other controls when microphone is plugged in. It must be in the "On" position to record or play the Cassette. With the switch in the "Off" position the tape remains engaged so that recording can be resumed by simply pressing the switch to "On".

When either Record mode or "Standby Record" is selected, a light on the face of the unit alerts you that you are in the record mode. This helps prevent accidental erasing of the tape.

Caution: To preclude the possibility or foreign matter accidentally entering the Recorder, it is recommended that a cassette be left in cassette holder at all times. Store cassettes in a cool, dry, and clean place, away from direct sunlight.

Fader Control (Optional)

The fader control is used only when the vehicle is equipped with a rear seat speaker. Fully rotated one way allows operation of the front speaker. Fully rotated in the opposite direction the control allows operation of the rear seat speakers. Partial rotation of the control blends the volume of the speakers.

Foot Switch For Search Tuning

The foot switch for search tuning is located on the left forward end of the floor panel. By depressing the foot switch, it will select a station on the radio.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
RADIO INOPERATIVE	(a) Blown fuse.	(a) Replace fuse, check for short or open in wiring harness.
	(b) Antenna open or shorted.	(b) Test with an auxiliary antenna with lead-in plugged into the receiver set and test antenna head outside of car. If radio plays with test antenna, use original antenna and check antenna mostly for shorts to ground while rocking antenna slightly. Unplug antenna lead from radio and use ohmmeter to check from center contact of antenna to outside of case. If reading on ohmmeter is less than 500,000 ohms, replace antenna. See "Windshield Antenna Test" for Imperial windshield antenna.
	(c) Receiver or speaker connections loose or faulty.	(c) Test the voltage at the fuse and tighten all connections. With speaker control tuned to either stop, rotate control to other stop. If radio plays, replace faulty speaker. If radio does not play, remove radio receiver for servicing.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
RADIO RECEPTION WEAK	(a) Unbalanced antenna trimmer.	(a) Carefully adjust the antenna trimmer for maximum volumn on a weak station above 1400 KHZ on AM.
	(b) Shorted antenna lead-in.	(b) Turn on radio and wiggle antenna. If speaker static is heard, check for antenna mounting tightness. If speaker static is still heard after tightening, disassemble antenna and test for faulty insulators or presence of moisture. Make an ohmmeter check step (b) under "Radio Inoperative". If no static is heard, test for faulty or loose receiver or antenna connections at receiver. Also check antenna lead-in at antenna. If antenna checks OK, remove radio receiver for servicing.
RADIO NOISY	(a) Outside electrical interference.	(a) Move the car or eliminate interference.
	(b) Insufficient or faulty interference suppression.	(b) Install effective capacitor in ignition system or voltage limiter.
	(c) Faulty antenna.	(c) Turn on radio and wiggle antenna lead and listen for speaker static. If static is heard, disassemble antenna and check for faulty insulators or presence of moisture. Make an ohmmeter test, Step (b) "Radio Inoperative". If static is heard, check for a loose or faulty capacitor. If capacitor is OK, remove antenna plug from radio receiver and bummp receiver with heel of hand. If no static is heard, start engine, turn on headlights and slowly, accelerate engine speed. If a whining noise is heard, turn off headlights and if whining noise is still present, tune in AM to a weak station at left end of dial. With power antenna run antenna up and down; if a loud whirring noise is present in the radio unit, the antenna cable connection is loose and should be tightened to 20 to 40 inch pounds. Check alternator for burned out diodes, and voltage regulator setting if OK remove radio receiver for servicing.
RADIO RECEPTION DISTORTED	(a) Speaker voice coil leads rubbing on speaker cone.	(a) Install an auxiliary speaker and compare. Replace if improved.
	(b) Torn speaker cone.	(b) Replace the speaker.
	(c) Faulty radio.	(c) Send radio to authorized radio service station for repair.
	(d) Foreign material in speaker.	(d) Clean or replace speaker.
	(e) Torn cover.	(e) Replace speaker.
INTERMITTENT RECEPTION	(a) Broken or shorted antenna lead-in wire.	(a) Test with a substitute antenna and replace if necessary.
	(b) Faulty radio.	(b) Send radio to authorized radio service station for repair.

SERVICE PROCEDURES

INTERFERENCE ELIMINATION

Capacitors are used to suppress engine interference. The alternator is equipped with an internal capacitor integral with the output stud. A second capacitor is mounted on the back of the instrument cluster with a self tapping screw. The lead wire of capacitor is connected to the input terminal of the voltage limiter Fig. 7 and 8. A third capacitor is installed on the ignition coil with the lead connected to the positive primary terminal of the coil (Fig. 9).

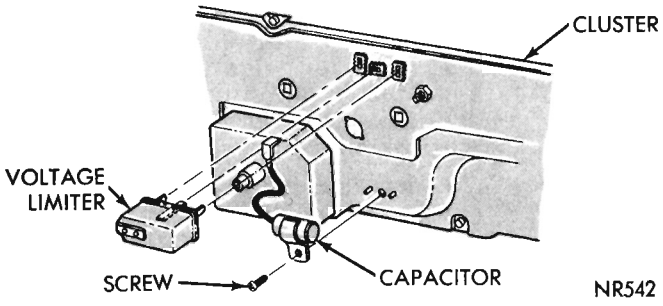


Fig. 7 - Radio Interference Capacitor to Cluster-Installation

On models equipped with the windshield antenna, a choke is mounted in series with the voltage limiter. The choke replaces the capacitor. **Resistor spark plugs are also required with windshield antenna.**

Radio resistance type wires in the high tension circuit of the ignition system complete the interference suppression.

If radio noises are evident, be sure the capacitor lead wires are making good contact on their respective terminals and are securely mounted. Faulty or deteriorated spark plug wires should be replaced.

ANTENNA TRIMMING

All radios are trimmed at the factory and should require no further trimmer adjustment. However, whenever a radio is being installed after repair, or if verification of trimmer adjustment is desired, proceed as follows:

(1) Operate radio for 5 minutes.

(2) Extend antenna to 40 inches.

(3) Manually tune radio to a weak signal between 1400 and 1600 KHZ on AM.

(4) Increase radio volume to full volume and set tone control to maximum treble (fully clockwise).

Adjust antenna trimmer by carefully turning back and forth until position is found that gives peak response in volume. Maximum output indicates proper point of antenna trimmer adjustment.

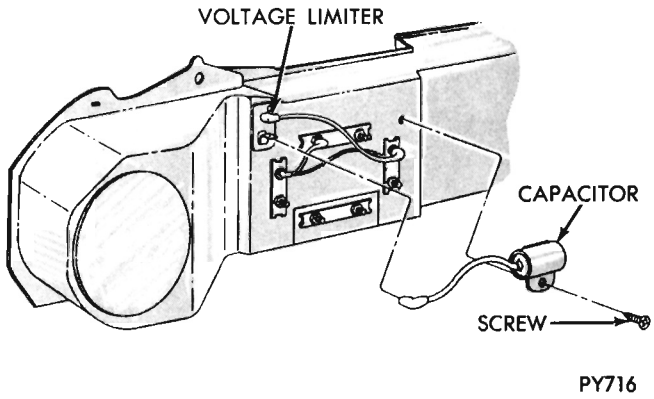


Fig. 8 - Radio Interference Capacitor to Cluster Installation

ANTENNAS (MANUAL)

Removal—All Models

(1) Unplug antenna lead from radio receiver.

(2) Remove antenna mast by unscrewing mast from antenna body (Fig. 10).

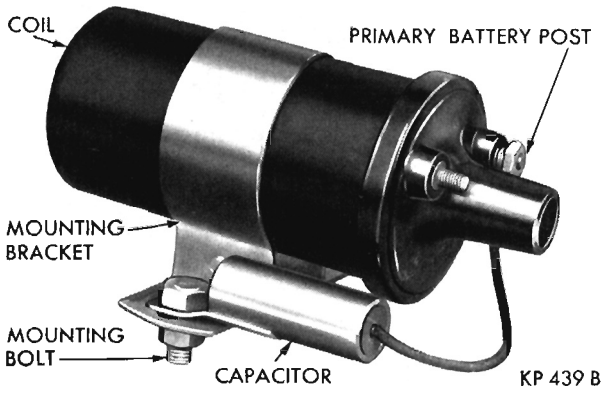


Fig. 9 - Ignition Coil Capacitor

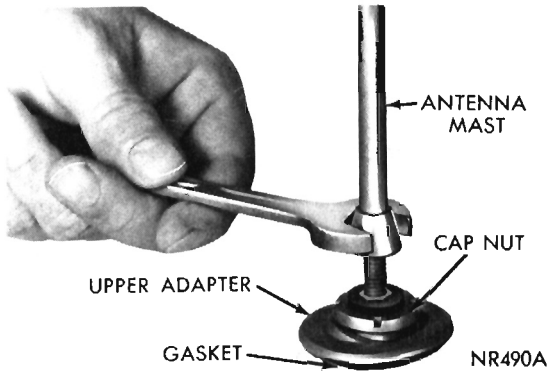


Fig. 10 - Antenna Mast Removal and Installation

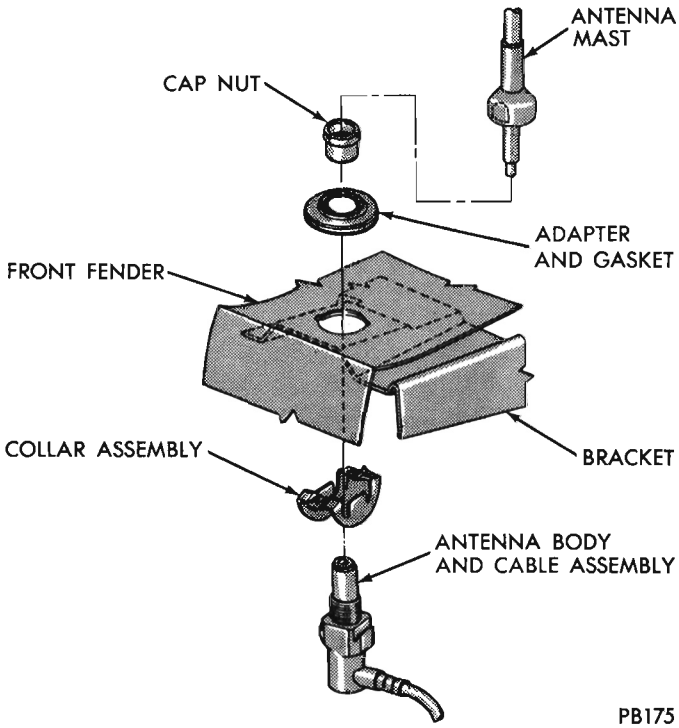


Fig. 11 - Front Antenna Installation

(3) Remove capnut (Figs. 10, 11 and 12).

(4) Remove the antenna snap-on fender adapter and gasket.

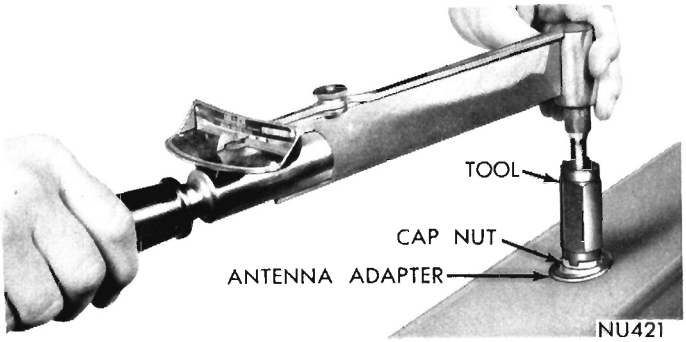


Fig. 13 - Tightening Antenna Cap Nut

(5) From under fender remove the lower adapter mounting collar and antenna lead and body assembly.

Installation—All Models

(1) Assemble mounting collar to antenna body (if removed).

(2) Enter antenna body from underneath fender and insert through mounting hole in fender.

(3) Install gasket, adapter and capnut. Tighten capnut to 155 inch-pounds, plus or minus 25 inch-pounds with Tool C-4085 (Fig. 13).

(4) Install antenna mast into antenna body until sleeve bottoms on antenna body.

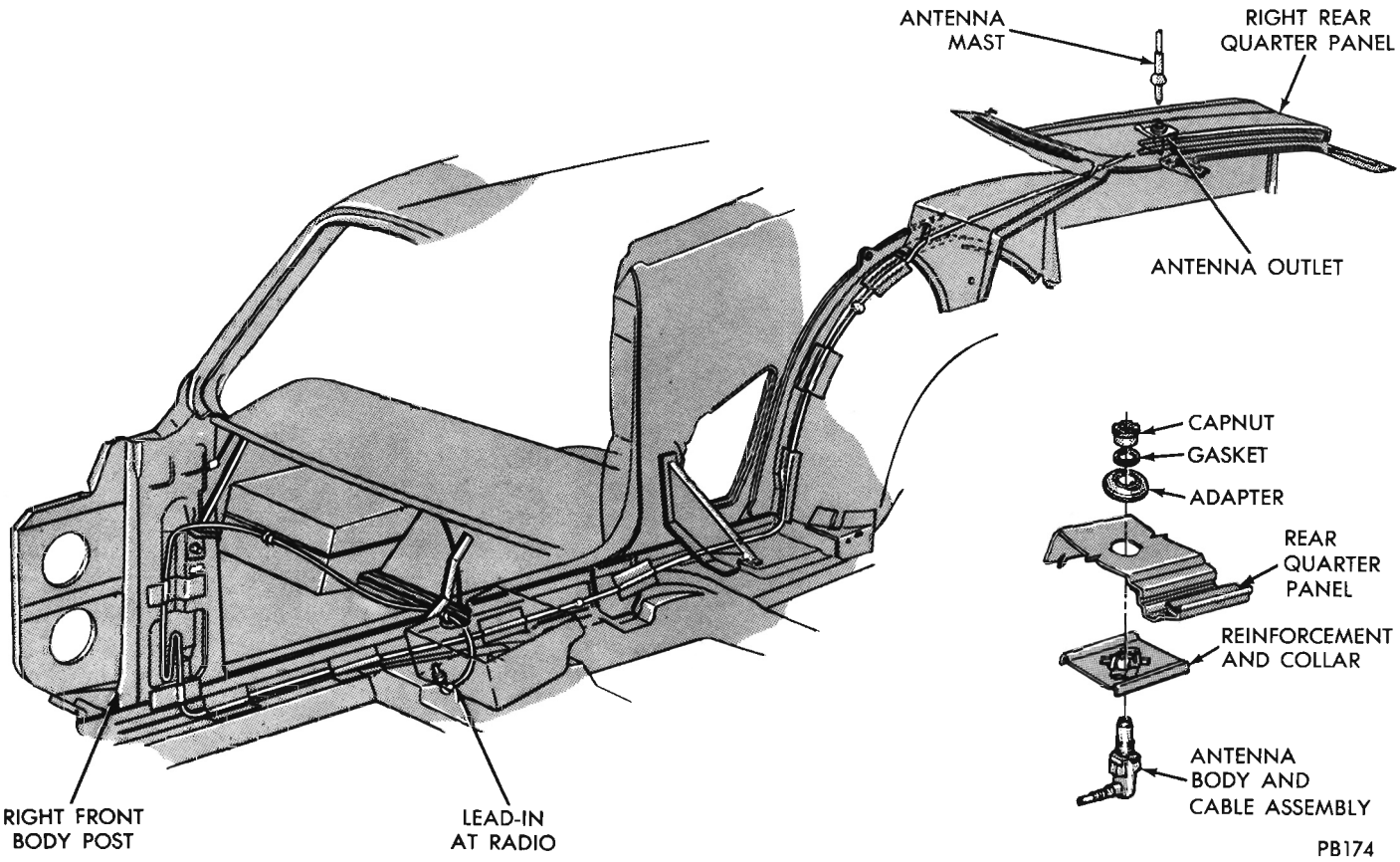


Fig. 12 - Rear Antenna Routing and Installation

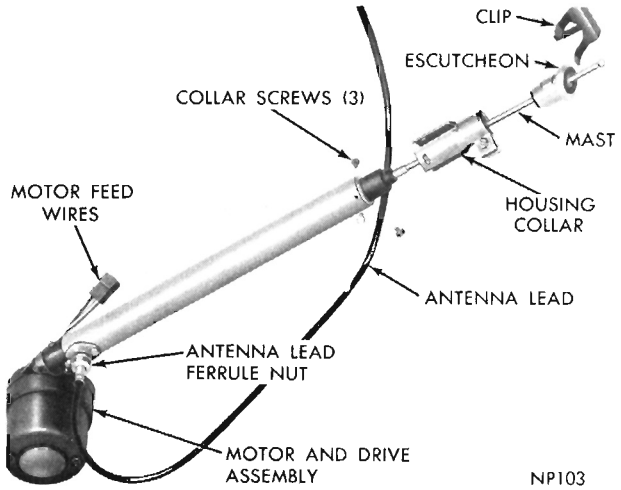


Fig. 14 - Power Antenna

ANTENNAS (POWER)

The power operated radio antenna (Fig. 14) is a telescoping type antenna, extended and retracted by a coiled nylon cord actuated by a reversible electric motor. The main components of the power antenna are the motor and drive assembly, the mast assembly and the support tube assembly. The antenna is serviced as a mast assembly, motor and the drive assembly, connector, pad and pin assembly, lead-in assembly and the necessary switches.

Many antenna problems may be avoided by frequent cleaning of the antenna mast telescoping sections. This may be performed when the vehicle is being washed by cleaning the antenna mast sections with a clean soft cloth. In the winter, wipe the clean antenna sections with a cloth moistened with light oil.

Before an antenna is removed, the antenna performance should be tested to determine whether it is a reception problem or an operational problem.

Power Antenna Test

Clean the antenna and drive assembly before test or disassembly.

(1) With a source of 12 volt (D.C.) power, test the operation of the drive mechanism by grounding the negative (—) lead to the drive housing and with the positive (+) lead, contact the "yellow" (up) lead terminal to extend the antenna, and contact the "brown" (down) lead terminal to retract the antenna.

If the motor will not operate, replace the motor and drive assembly. If the motor runs freely and the antenna does not extend or retract, mast or drive assembly is at fault and should be replaced by either a new mast or motor and drive assembly. If the motor labors and the antenna extends and retracts very slowly, it may be caused by excessive dirt on the telescoping sections or bent telescoping mast rods. Clean and straighten the telescoping mast rods.

(2) Occasionally poor reception can be corrected by proper adjustment of radio antenna trimmer. If this fails to produce desired results, a substitute antenna known to be satisfactory may be plugged into radio with extended mast held out of car window. (Do not ground mast.)

Upon establishing that the fault is in antenna assembly, it may be traced to one or more of the following conditions:

(a) Broken lead-in wire or shielding.

(b) Grounded lead-in wire or mast assembly.

(c) Moisture in support tube or lead-in assembly.

(3) Poor connection (antenna lead-in assembly or shielding ground).

If preliminary testing indicates removal of the antenna is necessary for repairs or parts replacement, proceed as follows:

Removal—(Figs. 15 and 16)

(1) Disconnect battery cable at battery negative post.

(2) Fully lower antenna.

(3) Turn front wheels all the way to the left and remove the right front fender splash shield screws and pull shield away from the wheel housing.

(4) Disconnect motor leads at the connector.

(5) Remove antenna lead ferrule nut at antenna mast and disconnect lead.

(6) Remove one screw attaching antenna to antenna brace on Chrysler models, and dash bracket for Imperial models.

(7) Loosen screw from clamp attaching antenna to antenna fender adapter.

(8) Remove antenna from under fender being careful not to bend antenna mast.

Installation

(1) Position antenna from under fender and through fender adapter.

(2) Tighten screw on power antenna clamp. Tighten to 25 inch pounds plus or minus 10 inch pounds.

(3) Position antenna on antenna brace (Chrysler), bracket (Imperial), and install attaching screw. Tighten to 25 inch pounds plus or minus 10 inch pounds.

(4) Connect antenna lead to antenna housing. Tighten antenna lead ferrule nut to 20 to 40 inch pounds.

(5) Connect motor leads at connector.

(6) Position right front fender splash shield and install attaching screws.

(7) Connect battery cable at battery and test operation of antenna.

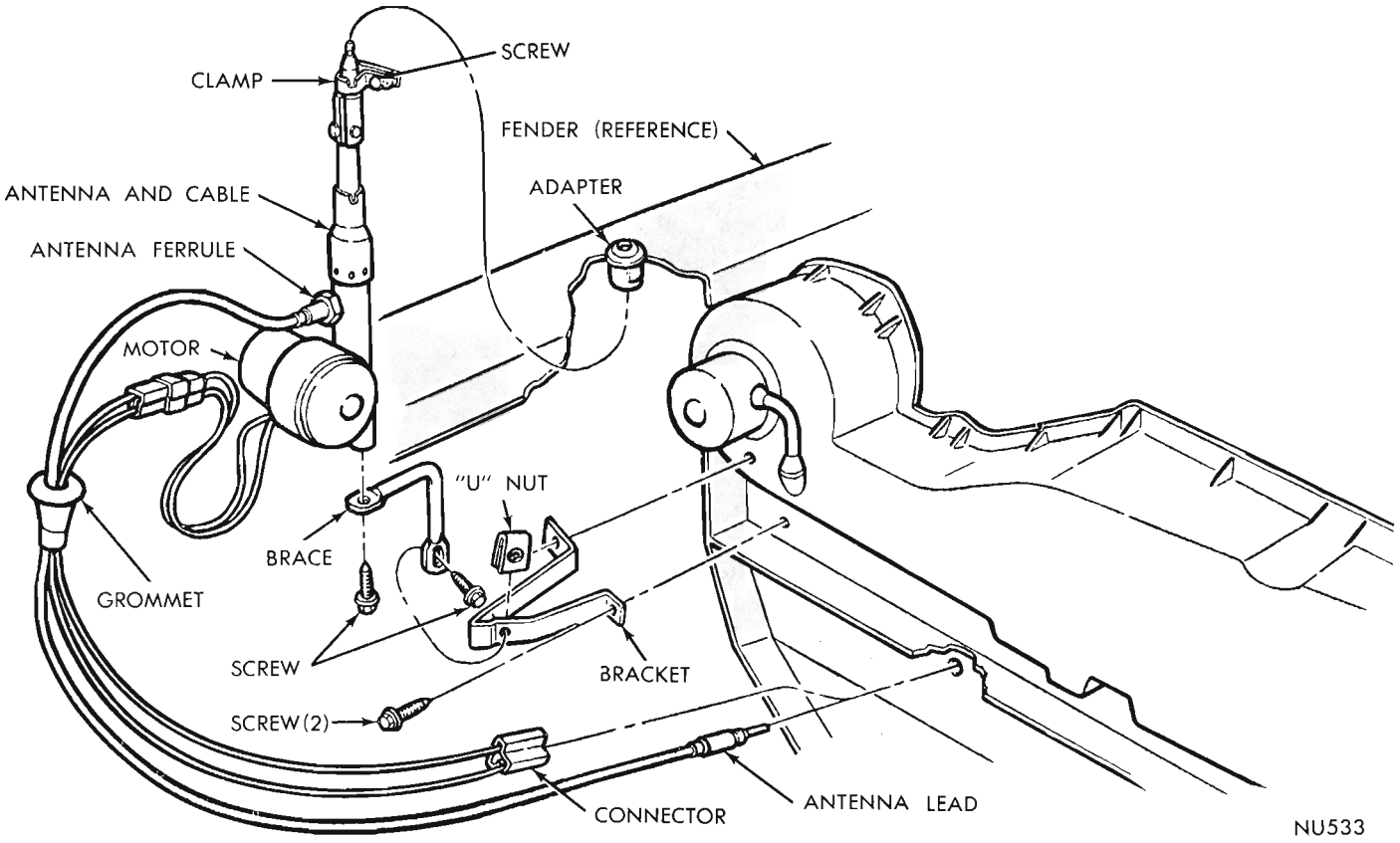


Fig. 15 - Removing or Installing Power Antenna-Chrysler

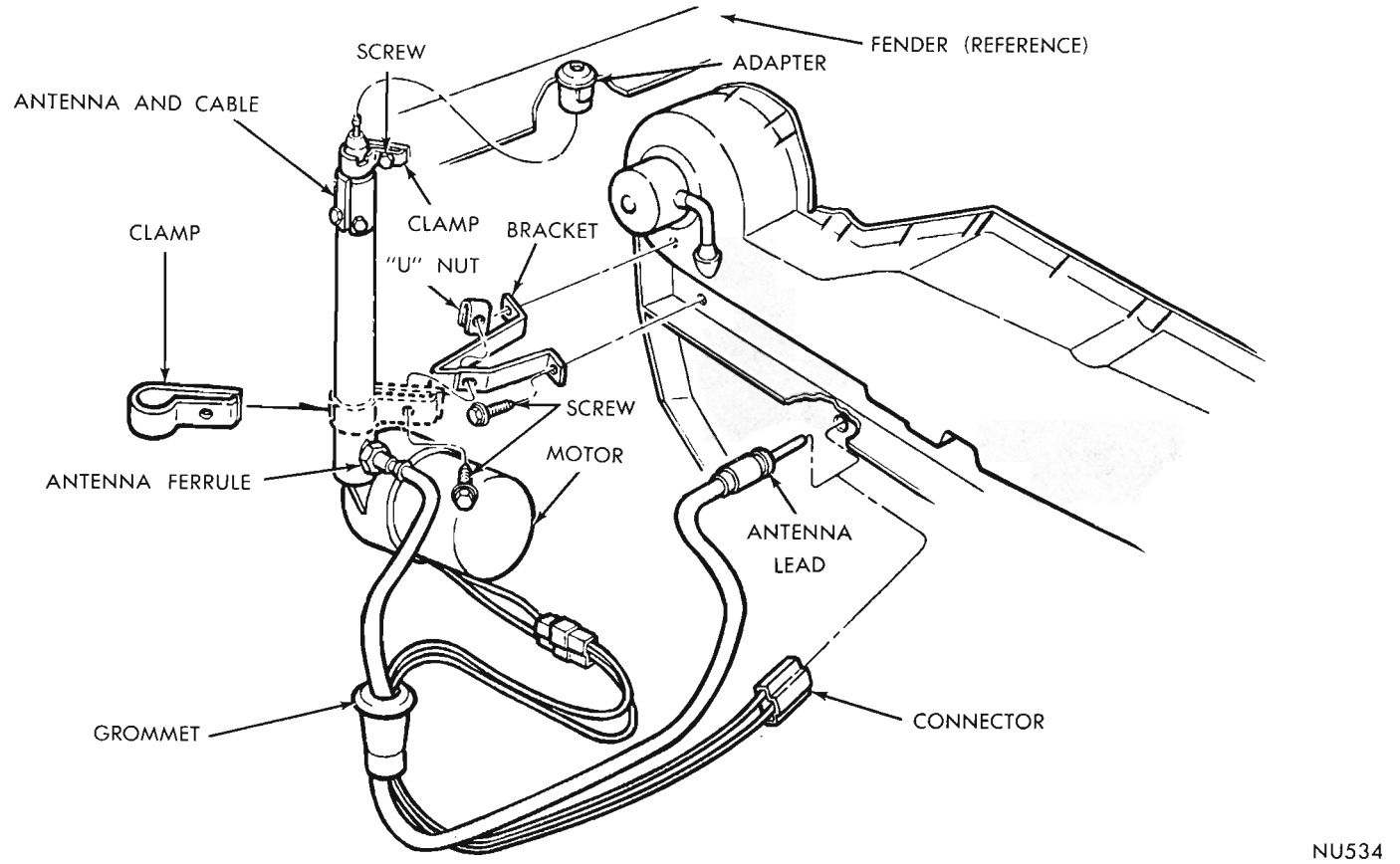


Fig. 16 - Removing or Installing Power Antenna-Imperial (Service Only)

Bench Test for Reception Malfunction

(1) With test lamp and battery in circuit attach one test lead to concentric pin on "lead-in" connector and other test lead to mast sections. The lamp should "light" indication continuity.

(2) Keeping one lead on connector pin, clip other lead on antenna support tube assembly. The lamp should "not light." If it does, look for a ground between mast and support tube or inner conductor from pin and pad.

(3) Remove clip lead from connector pin and clip on outer shell of connector. Connect other clip lead to antenna support tube assembly. The lamp should "light" again. If it does not "light," antenna shielding has an open circuit.

(4) Locate ground or open circuit and repair or replace component parts as required.

DO NOT attempt to service the details of the Motor and Drive Assembly. This sub-assembly must be serviced as a complete unit.

Disassembly

(1) Remove two screws holding "lead-in" receptacle.

(2) Unsolder pin from wire.

(3) Remove three screws which hold support tube to motor and drive assembly.

(4) Holding motor and drive assembly in one hand and support tube in other hand, pull (applying back and forth rotary motion at same time) until support tube assembly is removed from antenna.

(5) Holding motor and drive assembly in one hand and mast assembly in other hand (grasp near bottom of mast assembly), rock the mast assembly back and forth and pull at the same time to remove housing from motor assembly.

(6) Apply 12 volts D.C. to "yellow" (up) power lead and ground, until entire length of nylon cord has been expelled from the drive. To prevent a kink or bend in nylon cord, keep it taut by pulling on mast.

CAUTION: DO NOT DISASSEMBLE MOTOR AND DRIVE ASSEMBLY FOR ANY PURPOSE.

In order to remove nylon cord from disabled motor and drive assembly, place assembly in a vise so that normal plane of nylon cord is parallel with floor, then using both hands pull on nylon cord until completely expelled from drive.

(7) Remove bottom insulator and water seal washer (Fig. 17) from tubular fitting using a wire hook and long nose pliers.

Assembly

(1) If original mast assembly is reused, thread nylon cord through bottom insulator with tubular projection down (Fig. 18). Then thread nylon cord through water seal washers. The bottom insulator and water seal washer are included on service replacement mast assembly.

(2) Apply 12 volts D.C. to "brown" (down) power lead and ground. Feed approximately 12 inches of nylon cord into the drive. Push water seal washer and bottom insulator all the way down into the tubular fitting. Apply 12 volts D.C. power until nylon cord disappears.

(3) Push housing down onto tubular fitting. Make sure upper edge of flange on insulator bushing is below center of the three holes in tubular fitting.

(4) Install support tube assembly in proper position making sure hook-up wire is extended through large hole in body (Fig. 19).

(5) Install three screws to attach support tube assembly to motor and drive assembly.

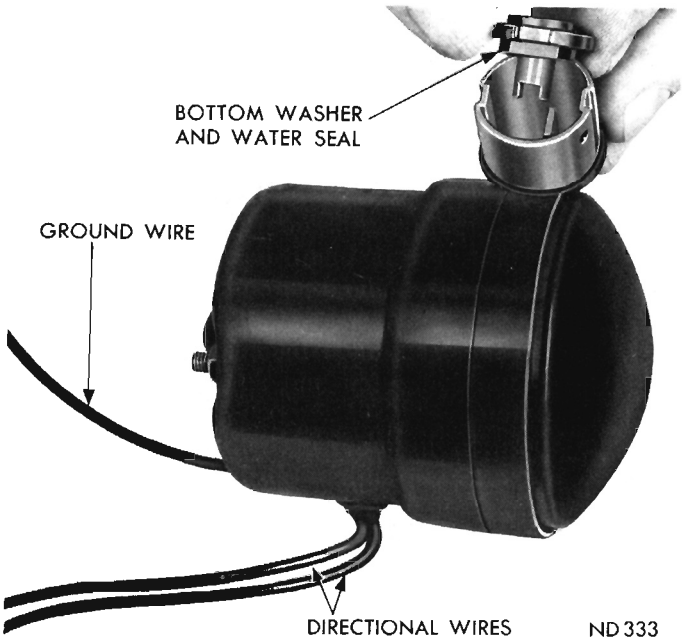


Fig. 17 - Removing Bottom Insulator and Water Seal Washer

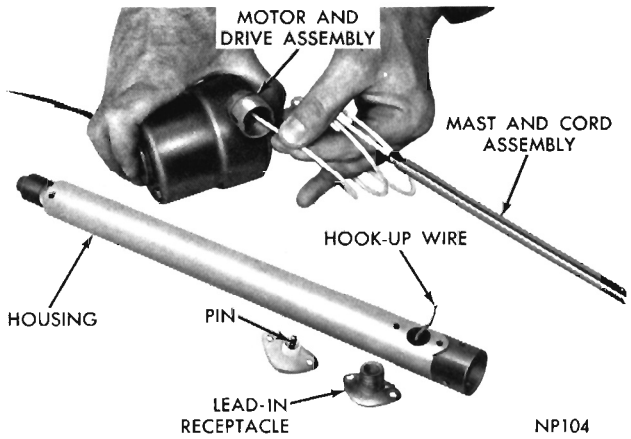


Fig. 18 - Assembling Power Antenna

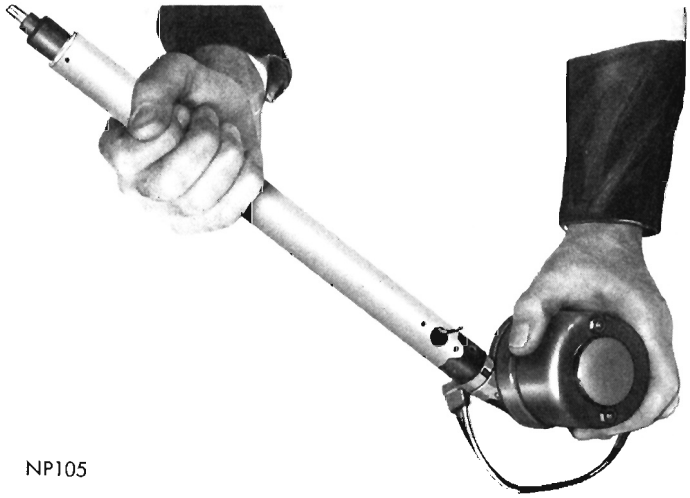


Fig. 19 - Installing Antenna Housing

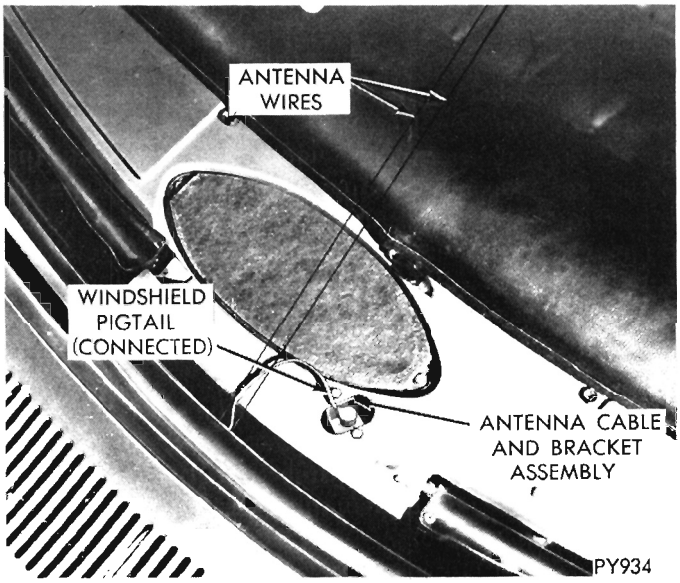


Fig. 21 - Windshield Mounted Antenna (with Antenna Pigtail Connected)

(6) Solder hook-up wire to pin.

(7) Assemble lead-in receptacle with the two screws.

(8) Apply 12 volt power to "yellow" and "brown" antenna leads and test for up and down operation.

Power Antenna Location

The power antenna, mounted in the right front fender (Figs. 15 and 16). On Imperial models (service only) use the template found in the parts package for locating the antenna mounting hole.

Winshield Antenna (Imperial Only)

The Imperial radio antenna is concealed in the windshield glass (Fig. 20). The antenna consists of two of very fine copper wire positioned between the center laminate material of the windshield and the inner glass surface. One wire starts at the

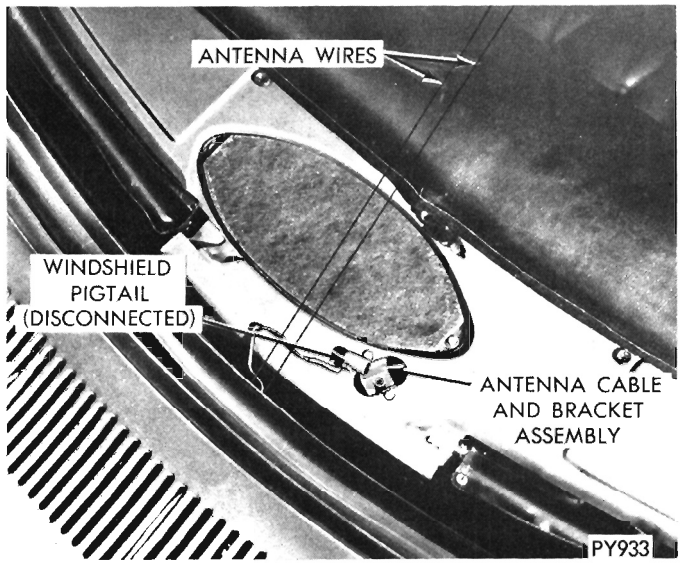


Fig. 20 - Windshield Mounted Antenna (with Antenna Pigtail Disconnected).

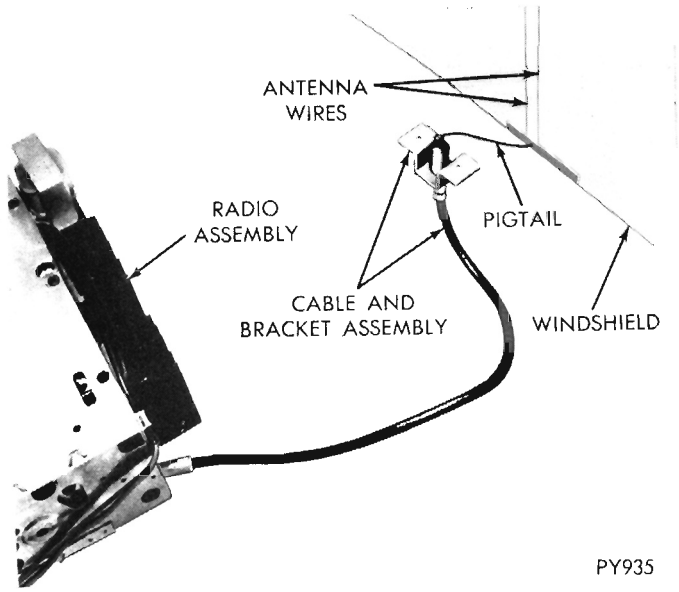


Fig. 22 - Antenna Lead and Radio Cable and Bracket Installation

right top corner of the windshield glass, the other wire starts at the left top corner and run along the upper part of the windshield glass approximately two inches from the top then down to the center of the glass to a copper termination strip where they are joined by a pigtail terminal which is part of the windshield assembly.

Figure 21 illustrates how the pigtail plugs into the separate rado cable assembly just to the left of the front speaker (Fig. 22). **The radio and defroster grille assembly must be removed before the pigtail can be removed or installed on the cable.** The molded pigtail is installed by placing it over the cable connector and carefully pushing on the connector with the fingers. It must be re-

moved by carefully lifting this molded terminal from the cable connector without tugging at the pigtail as its connection to the windshield is **very fragile**. The bracket end of the radio cable is mounted to the instrument panel with two hexagon head screws, the other end of cable is plugged into the radio as shown in Figure 22.

Windshield Antenna Electrical Test

If radio is inoperative, check for blown fuse, if fuse is O.K. and radio receiver and speaker connections are proven satisfactory, see "Service Diagnosis" for method for testing, test with an auxiliary antenna with lead-in plugged into the radio receiver and with test antenna mast outside of car.

If radio plays, the antenna cable or pigtail may be the cause of the low resistance to ground and should be checked after carefully unplugging the windshield pigtail at the calbe lead bracket. If the resistance of the antenna cable is less than 500, 000 ohms, replace this cable and recheck radio performance. If antenna system is still bad even on strong signals, check pigtail for breaks in the insulation which may be exposed to metal contact, if O.K. it will be necessary to replace the windshield.

Windshield replacement should be made only after radio receiver, speaker, antenna cable or suppression have been eliminated as the source of poor reception. This can be done by substituting known good components.

RADIO REPLACEMENT

Caution: Do not operate the radio with speaker leads detached since damage to the transistors may result.

Removal-Valiant and Barracuda

(1) Disconnect battery ground cable at battery.
(2) Remove channel selector shaft and knobs.
(3) Remove the two radio mounting bolts at lower front of radio.
(4) Disconnect electrical leads and antenna lead at radio.
(5) While holding radio in position, remove rear support bracket and remove radio.

Removal-Valiant (Rallye Cluster)

(1) Disconnect battery ground cable.
(2) Remove control knobs from front of radio.

On air conditioned models, remove the two outlet duct retaining nuts and remove duct. It is also necessary to remove the right defroster hose and hose bracket from back of radio.

(3) Remove bottom screw from radio mounting bracket.
(4) Remove left defroster tube.
(5) Loosen top screw on radio mounting bracket and remove bracket.
(6) Disconnect speaker and antenna leads.
(7) Remove mounting nuts from front of radio.
(8) Remove radio bezel.
(9) Lower radio and disconnect radio power feed cable.
(10) Remove radio from under instrument panel.

Removal-Satellite

(1) Disconnect battery ground cable.
(2) Remove ash tray.
(3) Remove radio knobs and mounting nuts.
(4) Remove radio.

Removal-Fury

(1) Disconnect battery ground cable.
(2) Remove nine lamp panel mounting screws, lower lamp panel assembly slightly, disconnect lamp harness from main harness and remove lamp panel from instrument panel.
(3) Remove steering column cover (seven screws).
(4) Remove radio trim bezel mounting screws and remove bezel.
(5) Remove center lower air conditioner duct (if so equipped).
(6) Disconnect electrical leads and antenna lead at radio.
(7) Remove radio support mounting bracket.
(8) Remove the two radio mounting bolts.
(9) Remove radio by moving radio down through bottom of instrument panel carefully to avoid damage to vacuum hoses and electrical leads.

Removal-Chrysler Imperial

(1) Disconnect battery ground cable.
(2) Remove left ash receiver.
(3) Remove steering column cover.
(4) Unscrew stereo tape reset knob (if so equipped).
(5) Disconnect battery lead, crossover lead and speaker leads (on top of radio).
(6) Disconnect antenna lead.
(7) Loosen defroster vacuum actuator (dash pad) mounting screws.
(8) Move defroster vacuum actuator to facilitate radio removal.
(9) Remove two radio mounting screws through access openings in the lower instrument panel.

RADIO SPEAKER

Front Speaker Removal—Valiant and Barracuda

(1) From top of instrument, remove the four speaker grille mounting screws and remove grille.
(2) Remove the two speaker mounting screws.

(3) Lift speaker from instrument panel and disconnect leads.

Front Speaker Removal-Satellite

(1) From top of instrument, remove the four speaker grille mounting screws and remove grille.
(2) Remove the two speaker mounting screws.
(3) Lift speaker from instrument panel and disconnect leads.

Front Speaker Removal-Fury

(1) Disconnect battery ground cable.
(2) Remove air conditioner lower distribution duct at center, (if so equipped).
(3) Remove radio mounting bracket.
(4) Disconnect wire leads to speaker.
(5) Remove four speaker mounting nuts and remove speaker from under instrument panel.

Front Speaker Removal-Chrysler-Imperial

(1) Remove the radio speaker and defroster grille (seven screws).
(2) Remove the radio speaker mounting screws (two) and lift the speaker from the top instrument panel.
(3) Disconnect the speaker leads and remove the speaker.

STEREO SPEAKER LEFT

Removal

(1) Remove the instrument cluster.
(2) Remove the four stereo speaker grille mounting nuts from under the instrument panel.
(3) Remove the stereo speaker grille from top of instrument panel.
(4) Remove four mounting screws and remove speaker from grille.

STEREO SPEAKER RIGHT

Removal

(1) Remove the glove box.
(2) Remove the four stereo speaker grille mounting nuts from under the instrument panel.
(3) Remove the stereo speaker grille from the top of instrument panel.
(4) Remove four mounting screws and remove speaker from grille.

STEREO MULTIPLEX CROSSOVER

Removal

(1) Remove glove box door.
(2) Remove glove box door check arm (two screws).

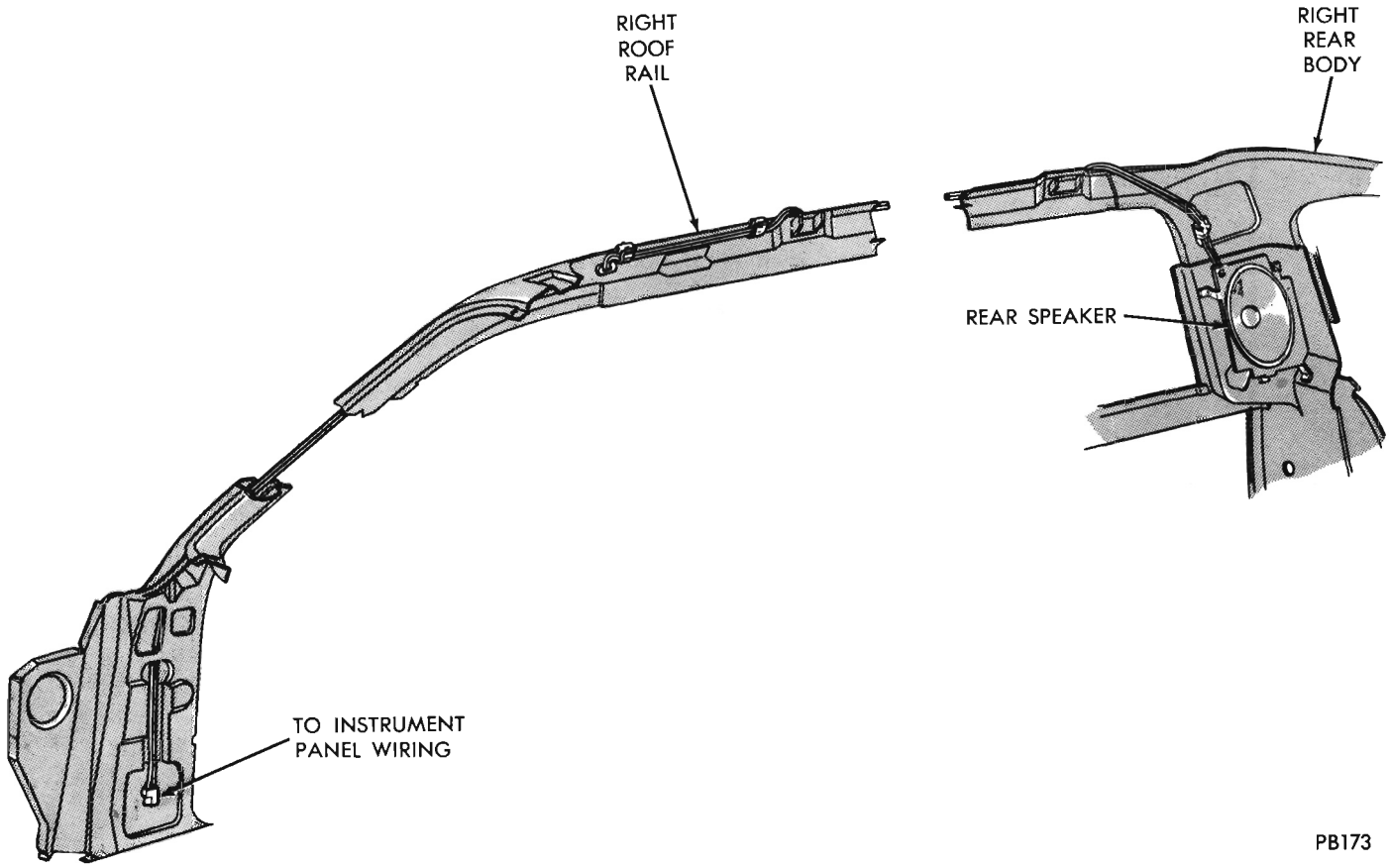


Fig. 23 - Rear Speaker Station Wagon-Satellite

(3) Remove glove box mounting screws (six).
(4) Remove latch catch.
(5) Remove glove box through glove box opening.
(6) Disconnect electrical leads.
(7) Remove crossover attaching screws at panel upper retainer (two).
(8) Carefully remove crossover assembly.

REAR SEAT SPEAKER

Removal

(1) Working through trunk compartment, disconnect speaker leads.
(2) Remove the four sheet metal screws holding speaker to shelf panel.

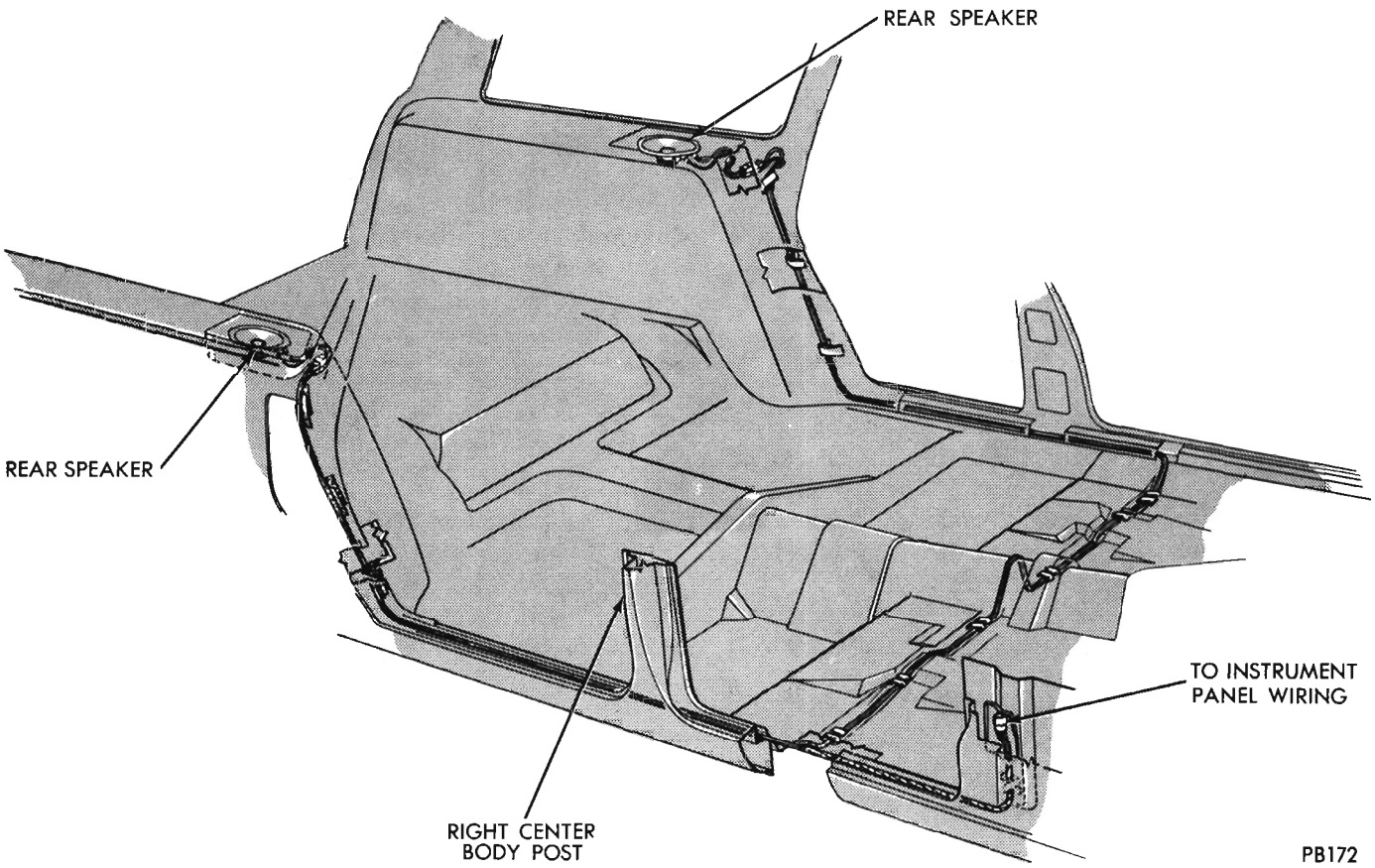


Fig. 24 - Rear Speaker Station Wagon-Fury-Chrysler

HORNS

INDEX

	Page
Adjusting	98
General Information	96
Service Diagnosis	97
Service Procedures	97
Testing	97

GENERAL INFORMATION

The horn circuit consists of a horn switch located in the steering wheel hub and a horn relay is mounted in the passenger compartment under the instrument panel at left pad or on the fuse block. Battery current from the "B" terminal of the starter relay flows to the "B" terminal of the horn relay. When the horn ring or steering wheel rim horn switch is depressed, the horn ring completes a ground circuit to the horn relay closing a set of points in the relay and allowing battery current to flow from the relay to the horns which are grounded to the sheet metal of the vehicle.

The steering wheel rim horn switch is a full circle rubber insert mounted on the inside rim of the steering wheel, (Fig. 1). The insert has two metal contact strips running through the center of the strip with a plastic insulator at each end. When any portion of the insert is depressed the contacts touch, completing the circuit causing the horns to sounds.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HORNS WILL NOT SOUND	(a) Improper adjustment.	(a) See "Adjusting".
	(b) Broken or faulty wiring.	(b) See "Testing."
	(c) Faulty horn.	(c) See "Testing." Replace horn if necessary.
	(d) Faulty relay.	(d) See "Testing." Replace relay if necessary.
HORNS SOUND CONTINUOUSLY (Immediately disconnect wires from horns and wire from the "B" terminal of horn relay).	(a) Shorted wiring.	(a) See "Testing."
	(b) Horn switch sticking.	(b) See "Testing"; Replace horn switch if necessary.
	(c) Relay sticking.	(c) See "Testing"; Replace relay if necessary.

SERVICE PROCEDURES

Testing

(A) Horns will not sound

Should the horns fail to sound, disconnect wire connector at horn and connect one lead of a test light to the connector terminal and the other lead of test light to a good body ground. Depress the horn ring or button. Should the test light illuminate, the horns are faulty. Replace or adjust horns.

If the test light fails to light, reconnect the connector to the horn terminal and connect one lead of test light to the horn relay "B" terminal and the other test light lead to a good body ground. If the light fails to illuminate, inspect for corroded battery terminals, dead battery or an open circuit in the wire from the starter relay to the "B" terminal of the horn relay.

Should the test light illuminate, touch a jumper wire from relay "S" terminal to good body ground. Sounding of the horns will indicate a poor ground circuit in the horn switch, an open wire from the "S" terminal of the horn relay or a poorly grounded steering column.

To determine if the horn relay is defective, connect a jumper wire from "B" to "H" terminals. If horns operate, the horn relay is faulty and should be replaced.

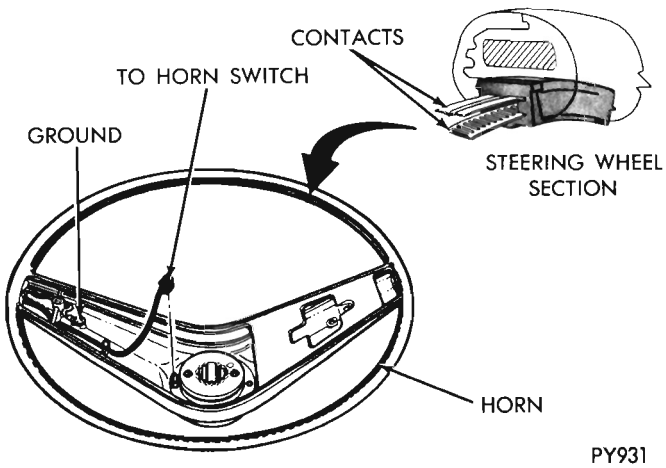


Fig. 1 - Steering Wheel - Rim Horn Switch

(B) Horns sound continuously

Should the horns sound continuously, disconnect wires from horns and the positive wire from "B" terminal of horn relay. Remove wire from "S" terminal of horn relay and place one lead of a test light (with its own battery) to the wire connector and the other lead to a good ground. If the light illuminates; either the wire is shorted to ground or the horn switch is faulty. Remove steering wheel trim and disconnect wire from horn switch. Repeat above test and if light still illuminates; wire is shorted to ground. Repair or replace wire.

If light does not illuminate; horn switch is grounded. Replace horn switch.

If the light does not illuminate on the first test; connect one lead of a test light (without integral battery) to the horn wire connector (green wire) and the other lead to a good body ground. If test light illuminates, there is a short in the horn wiring. Repair or replace wire. If the test light does not illuminate; connect the positive lead back on the "B" terminal of the horn relay and repeat above test. If the light now illuminates, then relay

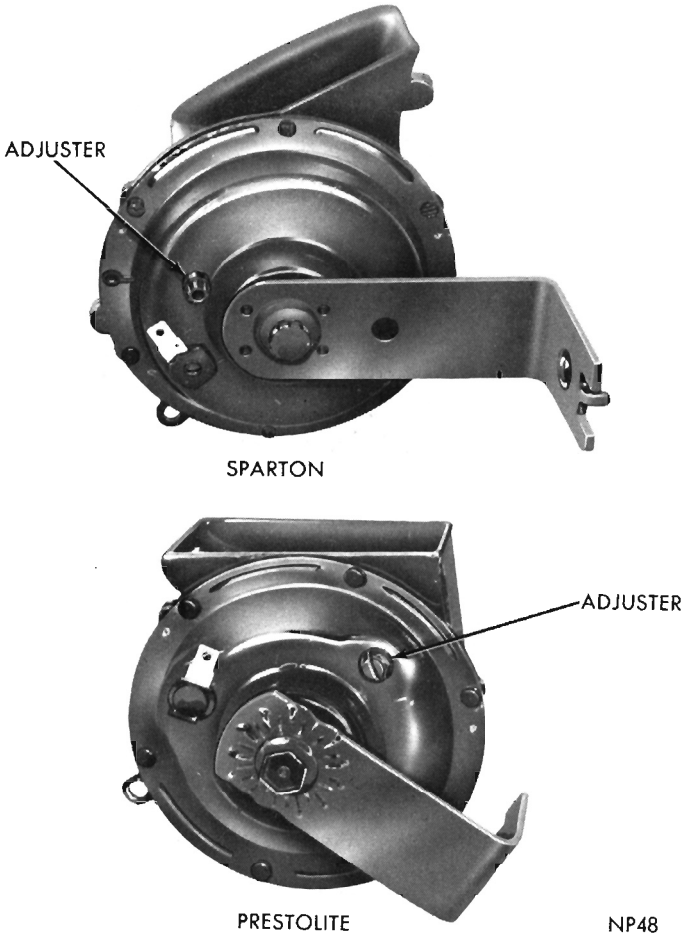


Fig. 2 - Horn Adjustments

contacts are sticking. Replace horn relay.

Adjusting

(1) Disconnect connections at each horn to determine which horn is not operating.

(2) Remove horn and bracket assembly.

(3) With a suitable tool (Fig. 2), turn tone adjuster counterclockwise until there is no vibration (sound).

(4) Turn tone adjuster clockwise, approximately 1/4 turn at a time until tone has a clear mellow sound. Do not turn tone adjuster while horn is sounding. **Adjustment will only clear up sound and cannot change horn tone frequency.**

(5) Connect a test ammeter between positive post of a 12 volt battery and horn terminal post. Connect a jumper lead from negative battery post to horn base. Clean paint from horn bracket where connection is made. Turn adjusting screw to obtain a reading of four amperes minimum to six amperes maximum.

Amperage must be within the range of 3.5 minimum to 4.5 maximum for Road Runner Horn.

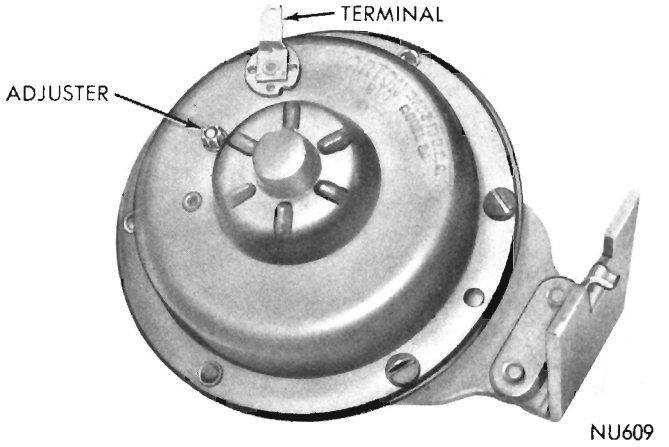


Fig. 3 - Horn Adjustment - Road Runner

SPEED CONTROL SYSTEM

INDEX

	Page
General Information	98
Installation	105
Removal	102
Service Diagnosis	100
Test and Adjustments	101

GENERAL INFORMATION

The speed control system (Figs. 1 and 2) is electrically actuated and vacuum operated. The turn signal lever on the steering column incorporates a CONTROL RING which when rotated, turns the

system "OFF", "ON" or "RESUME SPEED". A SPEED SET button is located in the end of the lever. This device is designed to operate at speeds above approximately 30 M.P.H.

WARNING: The use of "Speed Control" is not recommended when driving conditions do not permit maintaining a constant speed, such as heavy traffic or on roads that are winding, icy, snow covered or slippery.

TO ENGAGE: Rotate control ring to the "ON" position, attain desired speed then momentarily depress and release "SPEED SET" button establishing speed memory and engaging system. Remove foot from accelerator. Speed will be maintained at this level. Turning the control ring from "OFF" to "ON" while the vehicle is in motion establishes memory without system engagement at that speed.

TO DISENGAGE: Normal brake application or a soft tap on the brake pedal will disengage control unit without erasing speed memory. Fully rotating the control ring in the "OFF" direction or turning the ignition "OFF" also disengages the system and in addition erases the speed memory.

TO RESUME: Rotate control ring fully in the "RESUME" direction. Vehicle will resume to the previously memorized speed.

TO VARY SPEED SETTING: To increase speed, depress accelerator to desired speed and momentarily depress and release SPEED SET button. When speed control units is engaged, tapping SPEED SET button may increase speed setting incrementally.
To decrease speed, tap brake pedal lightly disengaging system. When desired speed has been obtained depress and release SPEED SET button. Decrease in speed can also be attained by holding set button depressed until desired speed is attained. Releasing the button engages the system at that speed.

TO ACCELERATE FOR PASSING: Depress accelerator as needed, when passing is completed, release accelerator and vehicle will return to previous speed setting.

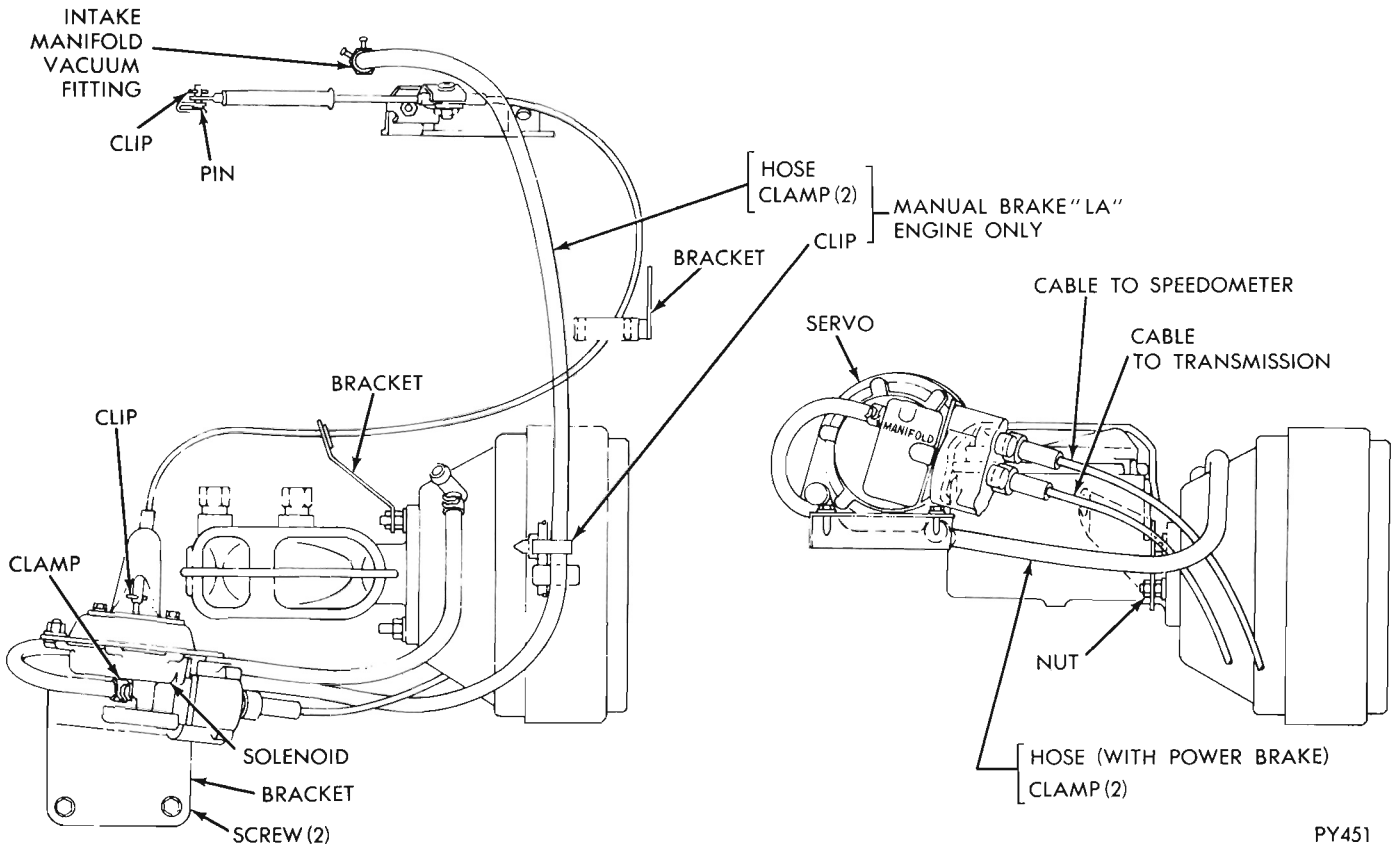


Fig. 1 - Speed Control Servo Adaptation-Satellite

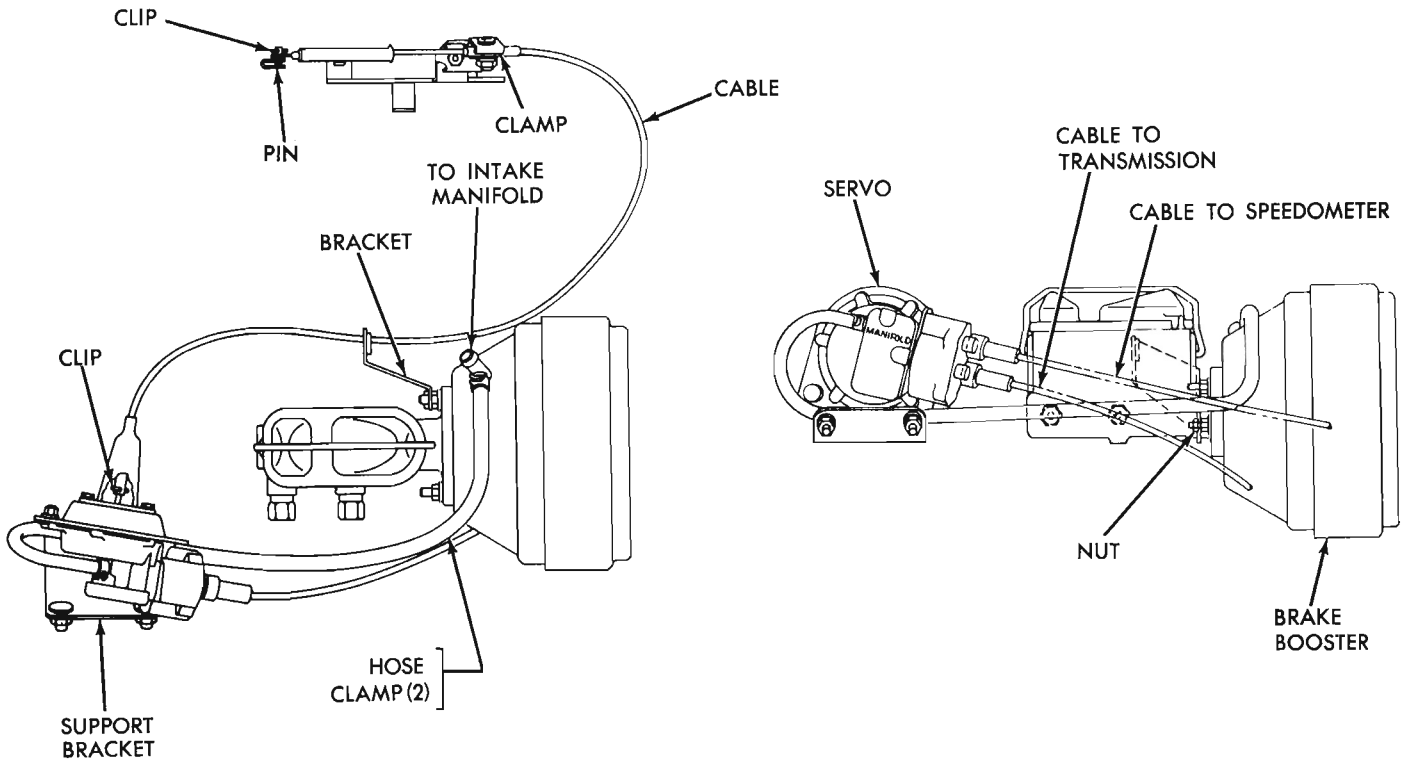


Fig. 2 - Speed Control Servo Adaptation-Fury, Chrysler and Imperial

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
NO SPEED CONTROL WHEN BUTTON PRESSED.	(a) Control ring in "OFF" position.	(a) Turn ring to "ON" position.
	(b) Fuse blown.	(b) Replace fuse.
	(c) Vacuum leak.	(c) Check vacuum lines.
	(d) Speed control throttle cable disconnected.	(d) Connect and adjust control cable. See "Tests and Adjustments".
	(e) Improper stop lamp and speed control switch adjustment.	(e) Adjust stop lamp and speed control switch. See "Tests and Adjustments".
	(f) Faulty electrical circuit.	(f) See "Electrical Tests".
NO RESUME WHEN CONTROL RING IS ROTATED	(a) Insufficient rotation of control ring.	(a) Rotate ring fully toward "Resume".
	(b) Faulty electrical circuit.	(b) See "Electrical Tests".
NO SYSTEM DISENGAGEMENT WHEN BRAKE PEDAL IS DEPRESSED	(a) Speed control cable kinked or damaged.	(a) Repair or replace cable.
	(b) Improper adjustment of stop lamp and speed control switch.	(b) Adjust switch. See "Tests and Adjustments".
	(c) Faulty electrical circuit.	(c) See "Electrical Tests".
SPEED CONTROL ENGAGES WITHOUT ACTUATING THE SWITCH	(a) Faulty electrical circuit.	(a) See "Electrical Tests".
CARBURETOR DOES NOT RETURN TO NORMAL IDLE	(a) Speed control throttle cable kinked or damaged.	(a) Repair or replace cable.
	(b) Speed control throttle cable maladjusted.	(b) Adjust speed control throttle cable. See "Tests and Adjustments".

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(c) Standard throttle linkage faulty.	(c) Repair or replace linkage.
SPEEDOMETER NOISE, EXCESSIVE NEEDLE WAIVER OR ERRATIC SERVO LOCK-IN PERFORMANCE	(a) Speedometer cable kinked or damaged.	(a) Align cables to avoid sharp bends or replace cable.
	(b) Cable core bent or too long.	(b) Replace core.
	(c) Cable ferrule nut loose at speedometer head, transmission or speed control servo.	(c) Tighten cable ferrule nuts.
	(d) No lubricant on speedometer cable core.	(d) Lubricate cables.
	(e) Noisy speedometer head assembly.	(e) Repair or replace the speedometer as necessary.
SPEED SETTING AFTER LOCK-IN, TOO HIGH OR TOO LOW.	(a) Improper adjustment of speed control throttle cable.	(a) Adjust speed control throttle cable.
	(b) Vacuum leak.	(b) Check all vacuum hose connections.
	(c) Improper speed control servo lock-in adjustment.	(c) See "Servo Lock-in Screw Adjustment".
UNIT DISENGAGES ON ROUGH ROAD.	(a) Improper adjustment of stop lamp and speed control.	(a) Adjust as necessary. See "Tests and Adjustments".
RESUME SPEED IS POSSIBLE BELOW 20 M.P.H.	(a) Faulty low speed inhibit switch in servo unit.	(a) Replace servo unit.
	(b) Faulty electrical circuit.	(b) See "Electrical Tests".
SPEED CONTROL ENGAGES WHEN ENGINE IS STARTED, OR DOES NOT DISENGAGE WHEN BRAKE PEDAL IS DEPRESSED.	(a) Faulty electrical circuit.	(a) See "Electrical Tests".

SERVICE PROCEDURES

Tests and Adjustments

Servo Lock-in Screw Adjustment

The Lock-in Screw Adjustment (Fig. 3) controls the accuracy of the speed control unit. When the SPEED-SET button is depressed and released at speeds above approximately 30 M.P.H.; the speed control system is activated, the system "locks in" and should hold the vehicle at virtually the same speed at which it is traveling.

IMPORTANT: Lock-in accuracy will be affected by:

(a) **Poor engine performance (need for tune-up etc.)**

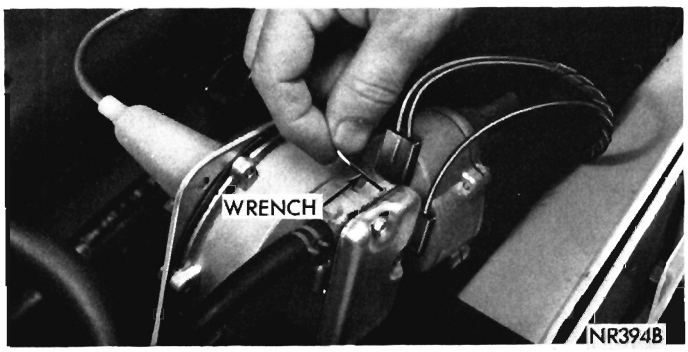


Fig. 3—Lock-in Screw Adjustment

(b) **Power to weight ratio (loaded gross weight of car; trailering).**

(c) **Improper slack in throttle control cable, (See "Throttle Control Cable Adjustment").**

This screw should never be adjusted indiscriminately. Need for adjustment can be determined only after accurate diagnosis of the Speed Control System operation.

After the steps (a) (b) and (c) have been considered and speed "sags" (drops) more than 2 to 3 M.P.H. when speed control is activated, the lock-in adjusting screw should be turned counter-clockwise (approximately 1/4 turn per one M.P.H. correction required): If "Pull-up" (speed increase) of more than 2 to 3 M.P.H. occurs, the lock-in adjusting screw should be turned clockwise (approximately 1/4 turn per one M.P.H. correction required. If the screw is loose, stake side of servo housing adjacent to screw to INSURE a snug fit.

CAUTION: This adjustment must not exceed two turns in either direction or damage to unit may occur.

Speed Control Throttle Cable Adjustment

Optimum servo performance is obtained with a given amount of free play in the throttle control cable. To obtain proper free play, insert a 1/16 inch diameter pin between forward end of slot in

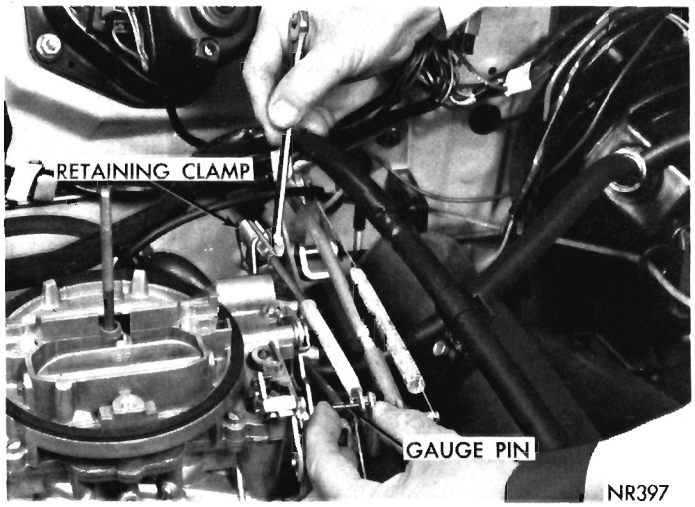


Fig. 4—Servo Throttle Cable Adjustment

cable carburetor linkage pin. Use hair pin clip removed from carburetor linkage pin as a gauge (Fig. 4). With choke in full open position and carburetor at curb idle, pull back on cable (toward dash panel) without moving carburetor linkage until all free play is removed. Tighten cable clamp bolt to 45 inch-pounds, remove 1/16 inch diameter pin and install hair pin clip.

Stop Lamp and Speed Control Switch Adjustment (Fig. 5 and 6)

Refer to Figure for proper switch adjustment as follows:

(1) Loosen switch bracket.

(2) Insert proper spacer gauge between brake push rod and switch with pedal in free position.

(3) Push switch bracket assembly toward brake push rod until plunger is fully depressed and switch body contacts spacer.

(4) Retighten switch bracket bolt to 100 inch-pounds.

(5) Remove spacer.

Electrical Tests:

Refer to "Speed Control Wiring Diagram", (Fig. 7). It is suggested that the electrical tests be made in the following sequence:

(1) **Check accessory fuse for continuity.**

(2) **Speed control switch (turn signal lever) test.**

(a) Disconnect the four wire electrical connector at the steering column.

(b) Connect a twelve volt positive source to the black wire terminal in the speed control harness connector (male).

(c) With the lever rotary switch in the **ON** position, attach one lead of a test lamp to the connector yellow wire, other lead to a good ground; test lamp should light and should go off when the "Speed Set" button is depressed.

(d) Move the test lamp lead to the connector blue wire; test lamp should light and should go off when the rotary switch is turned to the **OFF** position.

(e) With the rotary switch in the **ON** position, move test lamp lead to the connector white wire; test lamp should light by either depressing the Speed Set button or by rotating the rotary switch fully toward the "Resume" position.

(f) Reconnect speed control lever harness connector to harness connector.

(3) **Stop lamp and speed control switch test:**

(a) Disconnect the double connector at the switch pigtail and connect a twelve volt source to either terminal and connect a test lamp from other terminal to a good ground: test lamp should light when brake pedal is in the normal position and should go off when the brake pedal is depressed to a maximum of approximately one half inch after proper adjustment as outlined under "Stop Lamp and Speed Control Switch Adjustment".

(b) Remove test lamp and reconnect pigtail connector to harness connector.

(4) **Servo unit tests:**

(a) **Locking coil test;** turn ignition to the **Accessory** or **ON** position and rotate the speed control rotary switch to the **ON** position.

(b) Momentarily disconnecting and connecting the double connector at the servo terminals should produce a clicking sound in the servo. Replace the servo if no clicking sound is heard.

(c) **Holding coil and Low Speed switch test;** without removing either connector at servo, place a test lamp probe to the black (with tracer) wire terminal of servo, other probe to a good ground. Block front wheels; raise rear wheels and drive rear wheels to 35 miles per hour; with speed control lever rotary switch in the **ON** position and ignition switch in the **ON** position, depress and release "Speed Set" button. The speed should increase above 35 miles per hour and the test lamp should remain **ON** until the brake pedal is depressed to disengage the system and test light should go **off.**

(d) Remove test lamp.

Speed Control Servo (Fig. 1)

Removal

(1) Remove two self-locking nuts attaching the servo cable cover to servo housing. Pull cover away from servo to expose cable retaining clip (Fig. 8) and remove clip attaching cable to servo diaphragm pin.

(2) Disconnect speedometer and transmission drive cables at the servo housing.

(3) Disconnect vacuum hoses at servo housing (Fig. 9) and electrical connectors.

(4) Remove servo from mounting bracket (two self-locking nuts).

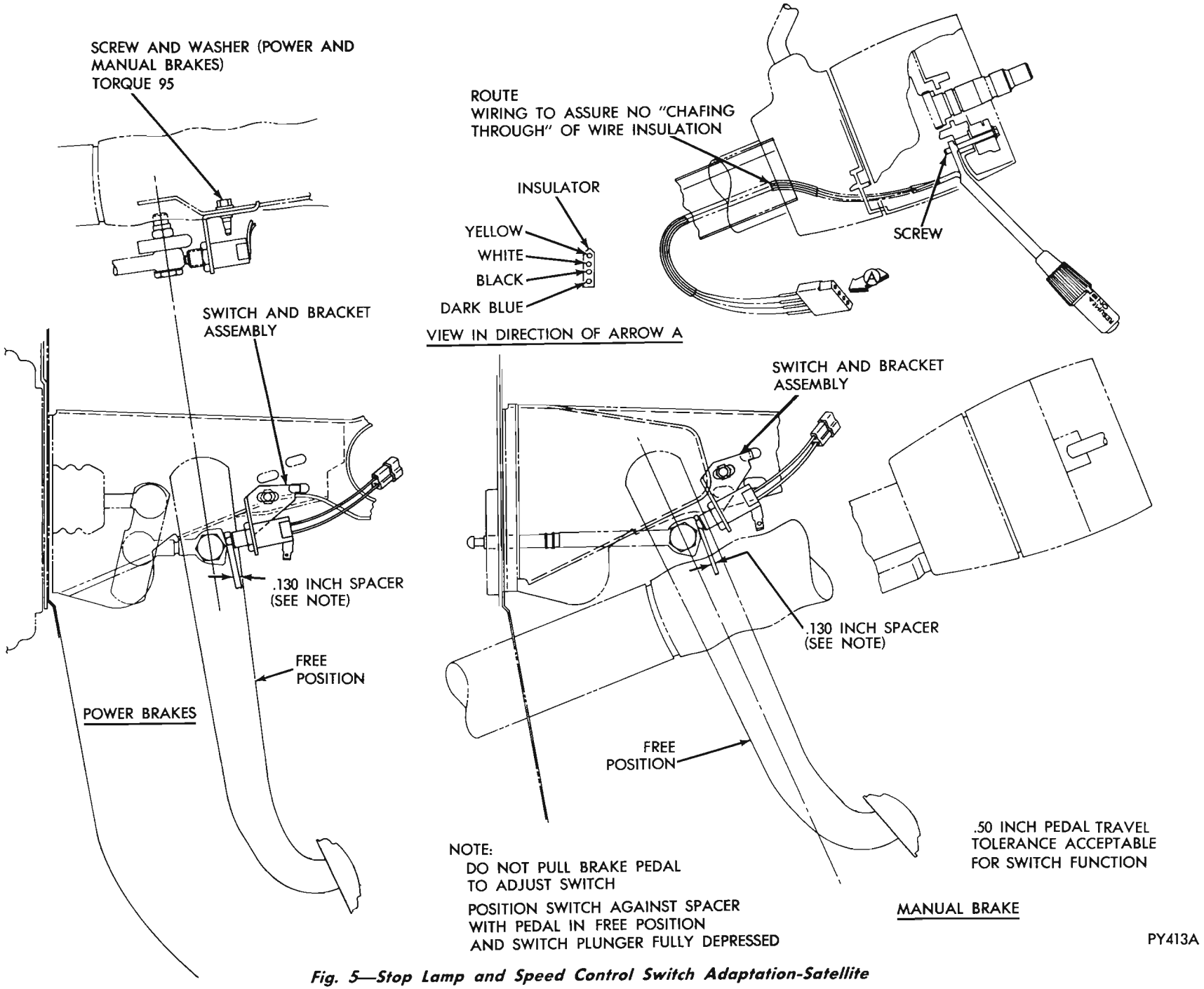


Fig. 5—Stop Lamp and Speed Control Switch Adaptation-Satellite

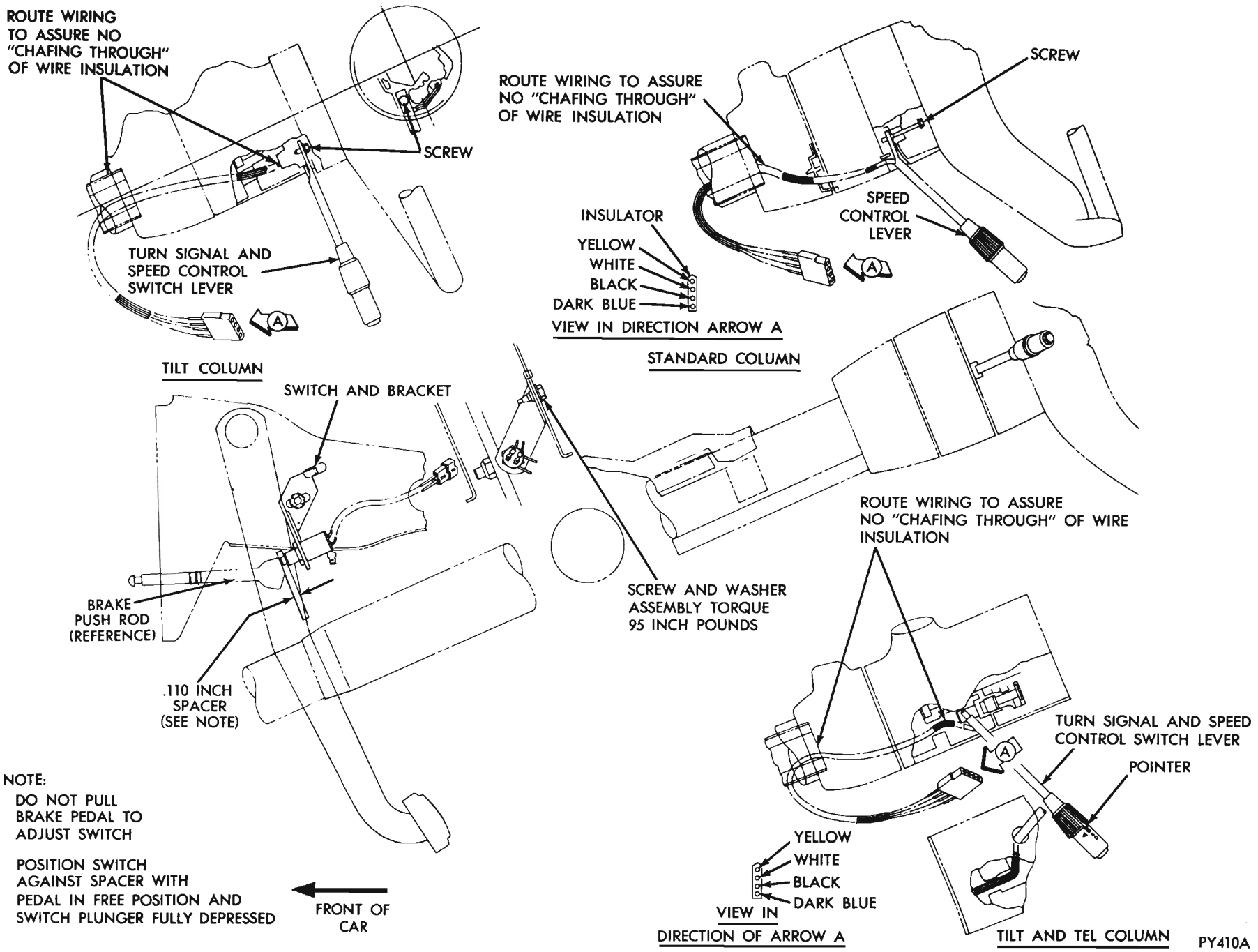


Fig. 6—Stop Lamp and Speed Control Switch Adaptation-Fury, Chrysler-Imperial

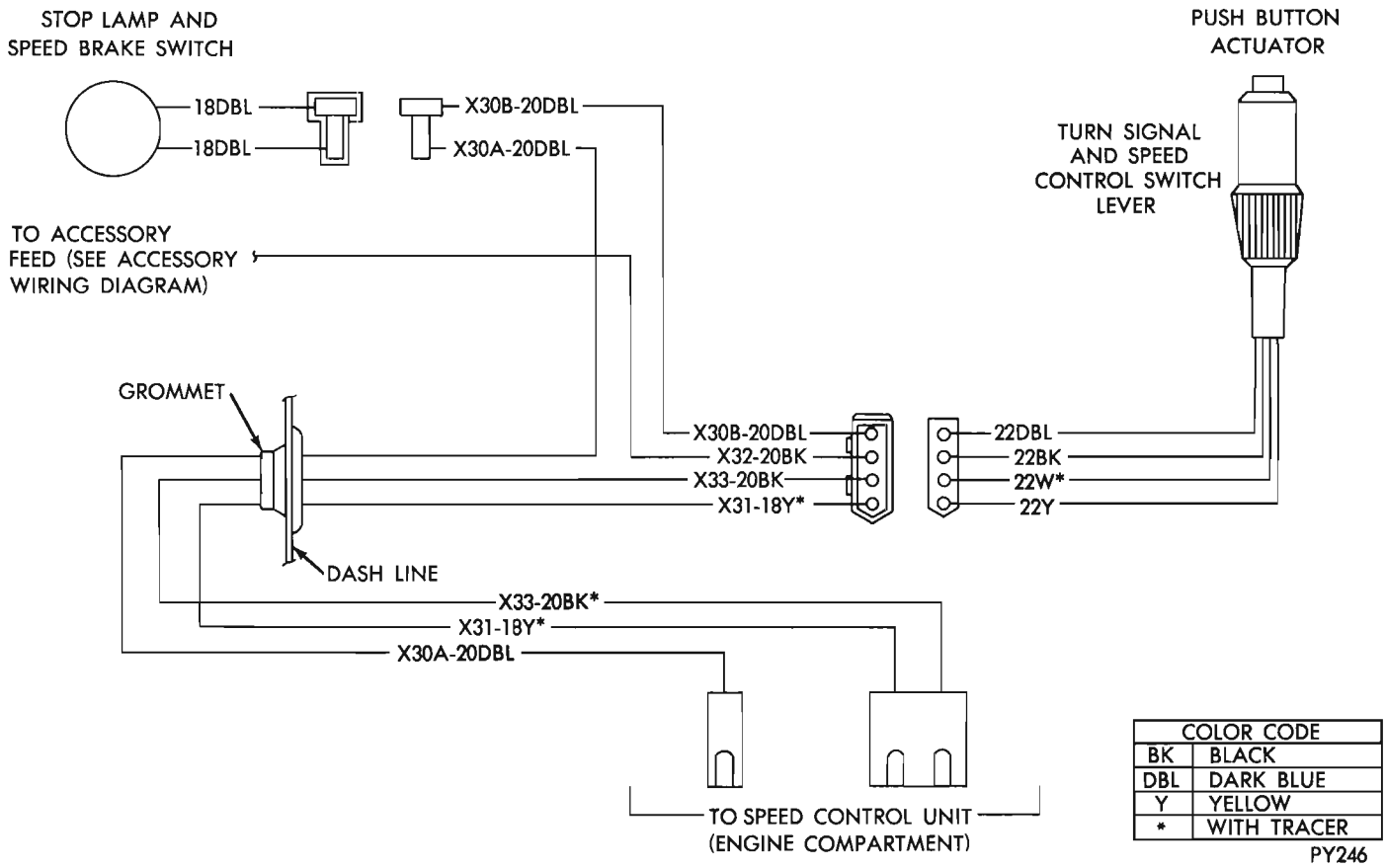


Fig. 7—Speed Control Wiring Diagram

Installation

(1) Position servo on mounting bracket studs and install attaching nuts. Tighten to 95 inch-pounds.

(2) Install vacuum hose and clamp. Make sure the hose clamp is locked securely.

(3) Connect speedometer and transmission drive cables at servo.

(4) With choke in full open position, align throttle cable to servo pin and install retaining clip.

(5) Install cable cover on servo studs and install attaching nuts. Tighten nuts securely.

(6) Install electrical connectors at servo.

Servo Throttle Cable Assembly (Servo to Carburetor)

Removal

(1) Remove air cleaner.

(2) Disconnect cable at retaining clamp and at carburetor lost motion link, removing hair pin clip.

(3) Disconnect cable at servo (Fig. 8) and remove cable assembly.

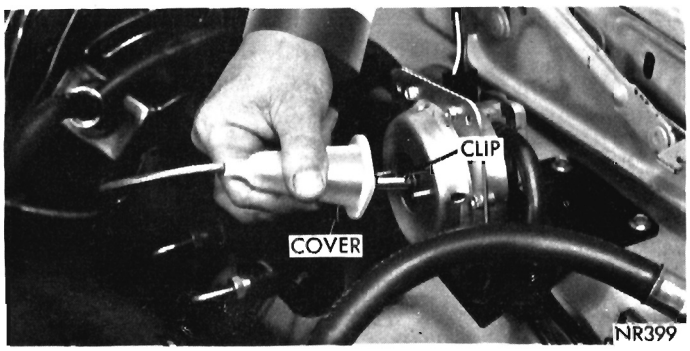


Fig. 8—Removing or Installing Throttle Cable Cover

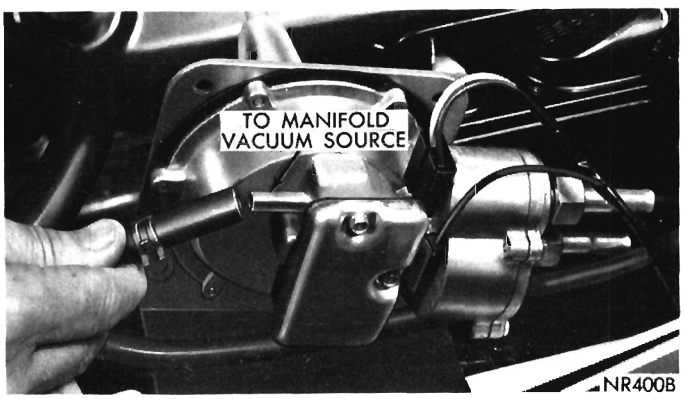


Fig. 9—Removing or Installing Servo Hose

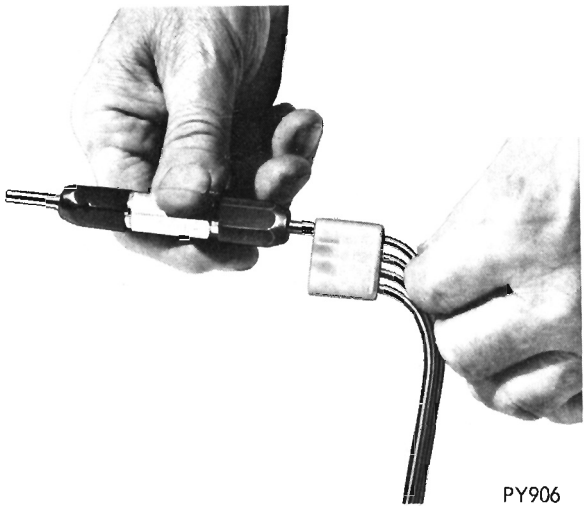


Fig. 10—Removing Wire Terminals with Tool C-4135

Installation

(1) Locate cable through routing brackets on dash panel and on master cylinder studs, (so equipped).

(2) Connect cable at servo housing.

(3) Route cable through retaining clamp and connect at carburetor lost motion link lever pin.

(4) Adjust cable free play as described under "Speed Control Throttle Cable Adjustment".

Speed Control Switch (Turn Signal Lever) (Standard Columns)

Removal

(1) Disconnect battery negative terminal at battery negative post and speed control connector at lower end of column.

(2) Remove steering wheel. See Group 19 "Steering".

(3) Remove turn signal switch and lever attaching screw.

(4) Remove steering column cover plate and support steering column while clamp is removed to prevent column from sagging.

(5) Remove wire harness trough to facilitate reaching the lower end of speed control switch lead wires (Figs. 4 and 5) and remove wires and terminals from connector with Wire Harness Tool C-4135.

CAUTION: Check color coding of wires to insure they are installed in the proper connector at reassembly. See Figures 5, 6 and 7.

(6) Tape terminals, then turn direction indicator lever sideways and pull lever up and wires out through opening between column and tube.

Installation

(1) Make a guide wire and thread the harness through the opening in column. **Make guide wire long enough so that it can be reached at bottom of column before harness is attached to the upper hook.** When harness has been pulled through, install terminal clips into switch connector and connect to harness connector (be sure wires are connected to proper cavity).

(2) Install harness trough, steering column cover plate and column support clamp.

(3) Install turn signal lever (speed control lever switch) and turn signal switch attaching screw.

(4) Install steering wheel, steering column cover plate. See Group 19 "Steering".

(5) Connect battery negative terminal at battery negative post.

Speed Control Switch (Turn Signal Lever) Tilt and Tel Steering Column

Removal

(1) Disconnect battery negative terminal at battery negative post and speed control harness connector from main harness connector at steering column.

(2) Remove wires and terminals from speed control lever harness (male connector) with "Wire Harness" Tool C-4135. (Fig. 10)

CAUTION: Check color coding of wires to insure they are installed in the proper cavity of connector at installation and assembly. See Figures 5, 6 and 7.

(3) Tape the wire terminals together then make up a guide wire, attaching the hook end to the taped terminals. Make guide wire long enough so that it can be reached at bottom of column tube when harness is withdrawn at speed control lever access hole.

(4) Pull wires out through speed control lever access hole, then unscrew the lever from the turn signal switch.

Installation

(1) With wires held close to speed control lever shank, screw the lever into the turn signal switch until the lever is hand tight.

(2) With a wrench, screw the lever in four full turns, then complete the installation by continuing to turn the lever in the clockwise direction no more than one full turn until the wiring harness has the correct angular index with the steering column. **Do Not turn the lever in a counterclockwise direction at any time during installation.**

(3) Tape terminals of new speed control lever harness and attach the hook of guide wire to wire terminals, pulling on guide wire should guide harness through opening in the steering column hub and down through the hub casting allowing sufficient wire to loop over the end of speed control lever to facilitate screwing the lever into the turn

signal switch. Pull wires through to assure there is no wire chafing with hub lever opening.

(4) When wire harness has been pulled through, remove guide wire and install wire terminals in proper cavity of harness connector.

(5) Connect speed control harness connector to main harness and connect battery terminal at battery post.

TURN SIGNALS AND EMERGENCY FLASHER

INDEX

	Page
Emergency Flasher	108
General Information	107
Service Diagnosis	107
Turn Signal Switch	108

GENERAL INFORMATION

The turn signals are activated with a lever mounted on the left side of the steering column just below the steering wheel. When the driver wishes to signal his intentions to change direction of travel, moving the lever up causes the right turn signals to flash. Moving the lever down causes the left turn signals to flash.

After completion of a turn the system is deactivated automatically. As the steering wheel returns to the straight ahead position, a lobe mounted to the underside of the steering wheel contacts one of two canceling cams in the turn signal switch mounted in the steering column upper housing. Contact of the lobe with the canceling cam returns the switch to the off position.

When the system is activated, one of two indicator lights mounted in the instrument cluster or on the front fender flashes in unison with the turn signal lights indicating to the driver that the system is operating.

If only momentary signalling is desired, such as indication of a lane change, the switch should be moved to an intermediate detent which causes the light to flash but returns to neutral when the lever is released.

On Imperial and Chrysler

The turn signal flasher is a plug in type mounted on the instrument panel lower reinforcement to the left of the steering column.

ON ALL OTHER MODELS;

The flasher is mounted on the ash receiver.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
EXTERNAL LAMPS OPERATE NORMALLY, NO INDICATIONS ON INSTRUMENT CLUSTER	(a) Faulty pilot bulb in instrument cluster.	(a) Replace bulb.
SYSTEM DOES NOT FLASH	(a) Faulty flasher unit.	(a) Replace flasher.
	(b) Faulty external bulb.	(b) Replace faulty bulb.
	(c) Faulty contact in switch.	(c) Replace switch.
SYSTEM DOES NOT CANCEL AFTER COMPLETION OF TURN	(a) Broken or loose cancelling finger.	(a) Replace cancelling finger.
	(b) Improperly aligned cancelling finger.	(b) Align cancelling finger properly.
	(c) Broken or faulty switch.	(c) Replace switch.
ENTIRE SYSTEM DOES NOT OPERATE	(a) Open circuit in feed wire to switch.	(a) Check wiring circuits. Refer to "Wiring Diagrams."
	(b) Faulty fuse.	(b) Replace fuse.
	(c) Faulty flasher unit.	(c) Replace flasher.
PILOT LAMP ILLUMINATES BRIGHTLY, EXTERNAL LAMPS GLOW DIMLY WITH NO FLASH	(a) Loose or corroded external lamp ground connection.	(a) Clean and tighten ground connection.

SERVICE PROCEDURES

TURN SIGNAL SWITCH

Removal

(1) Disconnect negative battery terminal at battery.

(2) Remove steering column cover and remove two screws attaching wiring trough (cover) from steering column.

(3) Disconnect wiring connectors at steering column.

(4) Remove horn ring ornament, horn ring or rim blow switch pad and ornament (if so equipped).

(5) Disconnect horn wires at steering wheel hub.

(6) Remove horn ring.

(7) Loosen steering wheel nut several turns and install steering wheel puller Tool C-3428B. Loosen steering wheel first, then remove steering wheel nut and steering wheel.

(8) Remove screw attaching turn signal operating lever and remove lever. **On Tilt and Tel Columns, the lever screws out.**

Attach a piece of string or fine wire to turn signal switch wiring before removing switch from steering column. When switch is removed leave string or wire in steering column jacket tubes as an aid to replacement of wiring.

(9) Remove screws attaching turn signal switch and upper bearing retainer screws and remove retainer and turn signal switch and flasher switch.

Installation

(1) Attach string or wire left in steering column jacket tube during removal, to turn signal switch wiring and carefully pull string on wire down through column jacket tube until directional switch wires can be connected. Position turn signal switch in steering column jacket tube and install switch retainer and attaching screws.

(2) Install turn signal switch actuating lever.

(3) Install steering wheel, on steering shaft with master splines aligned.

(4) Install washer and nut. Tighten nut to 27 foot-pounds.

(5) Install horn switch parts previously removed from steering wheel.

(6) Connect horn switch wires.

(7) Connect wiring connectors at steering column.

(8) Install wiring trough (cover) and steering column cover.

(9) Connect battery ground cable, test operation of turn signals and horns.

EMERGENCY FLASHER

The emergency flasher system is energized by a switch mounted in the steering column and is part of the turn signal switch. When the switch is activated all turn signal lights and the turn signal indicators flash simultaneously.

Before the switch is activated, the turn signal switch should be in the neutral position to prevent a characteristic feed back through the accessory circuit causing intermittent operation of the accessories.

When the flasher is operating, application of the brake pedal will override the system and interrupt the flasher. All lights will remain on bright until the brake pedal is released on Tilt or Tilt and Tel column equipped vehicles only.

The system consists of a switch and flasher unit.

The flasher is a plug-in type and is not to be confused with the turn signal flasher.

The flasher is mounted on the brake bracket on Valiant which is mounted on the instrument panel support.

WINDSHIELD WIPER AND WASHER SYSTEMS

INDEX

	Page
End Play Adjustment	111
Gear and Park Switch Replacement	113
General Information	109
Links	115
Lubrication	118
Motor Installation	114
Motor Removal	114
Motor Testing	112
Panel Switch Tests	111
Pivot Replacement	115
Service Diagnosis	118
Windshield Washers	118
Wiper Arm Adjustment	110

GENERAL INFORMATION

The windshield wipers can be operated with the windshield wiper switch only when the ignition switch is in the **Accessory** or **Ignition** position. A circuit breaker, integral with the wiper switch protects the circuitry of the wiper system and the vehicle.

The two speed wiper system is standard equipment on most models. A variable speed wiper system or a three speed system is offered as optional equipment.

Variable speed and three speed wiper motors are controlled by resistors in the field circuit. Variable speed motors have a rheostat built into the wiper switch. Three speed motors have a high speed resistor mounted on the switch and a resistance wire in the harness for medium speed.

Two speed wiper motors have permanent magnet fields and are controlled by feeding power to two different brushes for low and high speed. For low speed operation the current first flows through the torque limiting resistor and then to the low speed brush. For high speed, current is fed directly to the high speed brush.

The two speed wiper system on non-concealed wipers will complete the wipe cycle and return to the park position when the switch is turned "Off". The blades park in the lowest portion of the wipe pattern.

All variable speed wiper systems and three speed wiper system has the depressed parking feature. It is accomplished by reversing the rotation of the motor and the use of an eccentric motor shaft. When the wiper switch is turned "Off" the motor rotation is reversed, the motor inner shaft stops and the outer shaft rotates 180 degrees. This in effect, lengthens the drive link slightly to park the blades in the depressed position. The linkage shortens again when the motor is turned "On" and reverses the action.

The two speed wiper system used on concealed wiper systems accomplishes its depressed parking action by reversing the rotation of the motor and the use of a parking cam on the motor crank pin. When the wiper switch is turned "Off", the motor direction is reversed and at the same time, the parking cam rotates 180 degrees, lengthening the drive link slightly to park the blades in a depressed position. Motor operation in the wipe direction returns the cam to "run" position to restore the normal link and wipe pattern.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
WIPER FAILS TO OPERATE	(a) Binding Linkage.	(a) Relieve binding condition.
	(b) Faulty instrument panel switch.	(b) Test Switch. See "Panel Switch Tests."
	(c) Linkage disconnected.	(c) Repair as necessary.
	(d) Open or grounded wiring.	(d) Test wiring for continuity. Repair as necessary.
MOTOR DRAWS EXCESSIVE CURRENT	(a) Jammed gearbox mechanism.	(a) Replace motor assembly (two speed). Replace damaged parts (variable and three speed).
	(b) Shorted park switch.	(b) Replace motor assembly (two speed). Replace damaged parts (variable and three speed).
	(c) Shorted motor.	(c) See "Motor Testing" to be sure that motor is shorted. Replace motor.
	(d) Gearbox unlatched (variable and three speed only).	(d) Replace latch assembly.
MOTOR OVERHEATED	(a) Binding linkage.	(a) Relieve binding condition.
	(b) Motor o.k.	(b) A good motor can be hot to touch after engine or motor has been run for a time.
WIPER BLADES NOT PARKING PROPERLY	(a) Arm set at incorrect position.	(a) Adjust arm. See "Wiper Arm Adjustment."
BLADES SLAP AGAINST WINDSHIELD MOULDINGS ON DRY GLASS	(a) Improperly adjusted wiper arm.	(a) See "Wiper Arm Adjustment."
	(b) Looseness of the motor crank or other drive parts.	(b) Tighten or replace part.
BLADES CHATTER	(a) Twisted arm holds blade at wrong angle to glass.	(a) Replace wiper arm. Do not attempt to straighten bent or twisted arm.
	(b) Bent or damaged blades.	(b) Replace blades.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(c) Foreign substances such as body polish on glass or blades.	(c) Clean the glass or blades.
MOTOR WILL NOT STOP WHEN INSTRUMENT PANEL SWITCH IS TURNED "OFF"	(a) Park Mechanism Failure.	(a) Replace Motor Assembly (Two Speed Motor) Replace Gear and/or Park Switch (Variable or three speed Motor).
MOTOR STOPS IN ANY POSITION WHEN INSTRUMENT PANEL SWITCH IS TURNED "OFF"	(a) Motor park switch failure in the open position.	(a) Replace Motor Assembly (Two Speed) Replace Park Switch and Gear (Variable or Three Speed).
	(b) Open parking circuit or open field circuit.	(b) Test continuity of blue, red and green wiring circuit and correct as necessary.
MOTOR STOPS intermittently in any position when instrument switch is turned "Off" (variable and three speed only)	(a) Gearbox unlatched.	(a) Replace latch assembly.
	(b) Intermittent park switch continuity.	(b) See "Gear and Park Switch Replacement". Replace damaged parts.
NO SPEED CONTROL	(a) Open circuit in red or green wiring (Variable or 3-speed); (red or brown wire—2-speed).	(a) Test continuity and correct as necessary.
	(b) Defective control switch.	(b) Replace switch.

SERVICE PROCEDURES

WIPER ARM ADJUSTMENT (With Concealed Wipers)

To determine if an adjustment is required, apply a constant upward force fo 50 ounces parallel to the windshield glass at the end of the wiper arm (where the blade is attached to the arm). With the force applied, pull the wiper blade away from the windshield glass once or twice to prevent glass friction from affecting upward movement of the wiper arm and blade. With the force applied, the clearance between the side of the wiper blade and the blade should be as follows:

MODEL	Clearance in Inches	
	Right	Left
Barracuda	1.25 to 3.00	.75 to 2.00
Satellite	0 to 1.75	0 to 1.50
Fury, Chrysler and Imperial	.75 to 2.50	.25 to 2.00

WIPER ARM ADJUSTMENT (With Non-Concealed Wipers and Variable Speed Motor)

Using the same 50 ounce upward force and method of application as with the concealed wipers, measure the clearance between the tip of the wiper blade and the lower windshield molding. Clearance should be as follows:

MODEL	Clearance in Inches	
	Right	Left
All	.5 to 2.25	.25 to 2.00

WIPER ARM ADJUSTMENT (With Non-Concealed Wipers and Two Speed Motor)

To determine if an adjustment is required apply a constant **downward** force of 25 ounces, parallel to the windshield glass, at the end of the wiper arm (where the wiper blade is attached to the arm). With the 25 ounce force applied pull the wiper blade away from the windshield glass once or twice to prevent glass friction from affecting downward movement of the wiper arm and blade. With this force applied the clearance between the tip of the wiper blade and the windshield moulding should be as follows:

MODELS	Clearance in Inches Between Tip of Blade and Windshield Moulding	
	Right	Left
All	.5 to 2.25	.25 to 2.00

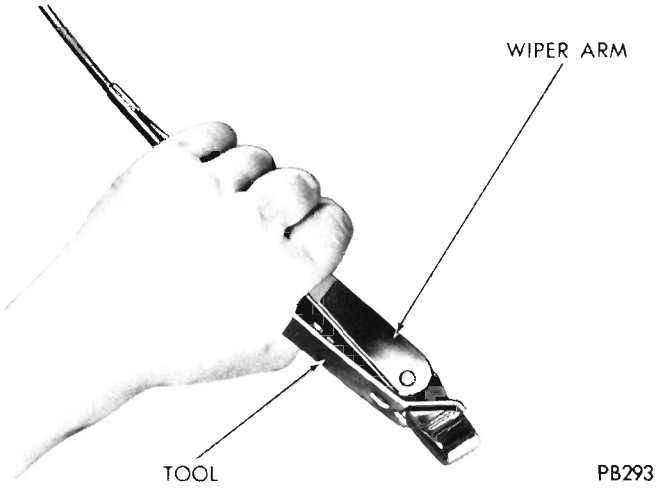


Fig. 1 - Removing Wiper Arm and Blade Assembly

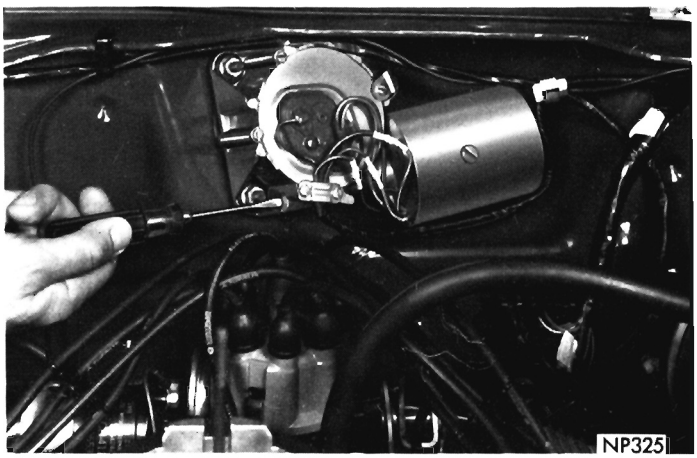


Fig. 3 - End Play Adjustment (Variable and Three Speed Motor)

If clearances are not in the specified ranges reposition the wiper arm using tool C-3982 (See Fig. 1 or if the arm is equipped with a release latch, see Fig. 2, lift the arm to permit the latch to be pulled out to the holding position. Remove the arm from the pivot using a rocking motion and reposition it correctly.

CAUTION; The use of a screwdriver or other prying tool to remove an arm may distort it in a manner that will allow it to come off the pivot shaft in the future, regardless of how carefully it is installed. NEVER under any circumstances push or bend the spring clip in the base of the arm in an attempt to release the arm.

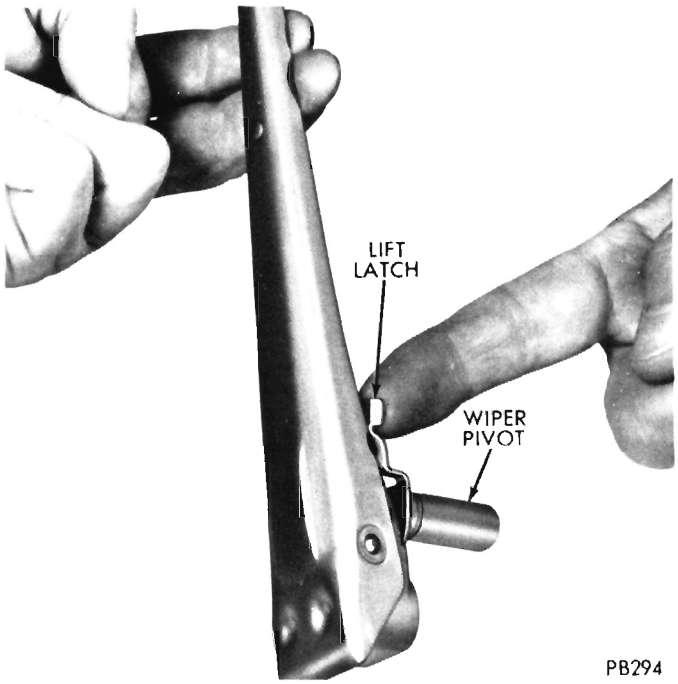


Fig. 2 - Removing Wiper Arm and Blade Assembly

END PLAY ADJUSTMENT

(Variable and Three Speed Motors)

To adjust the armature shaft end play, turn the adjustment screw in until it bottoms then back-off 1/8 turn (Fig. 3). This adjustment can be made without removing the wiper motor from the vehicle.

PANEL SWITCH TESTS

Two-Speed

To test the switch, disconnect the wiring and remove from the instrument panel. For removal and installation of the wiper switch see "Instrument Panels".

Using a continuity tester or an ohmmeter, test for continuity (no resistance) between the contact terminals of the switch as shown in the following chart. For test purposes, the first position is the "Off" position. The "Low" position is the first detent past the "Off" position. The "High" position is the second detent of the switch. The bench test of the switch does not require the use of a twelve volt battery. "Ground" is the case of the switch.

SWITCH CONTINUITY CHART

Two Speed Motor (With Non-Concealed Wipers)

Off	Low	High
B to B/U.	B to B/U.	B to B/U.
B to P1.	B to P1.	B to P1.
A to P2.	B to A.	B to H.
H-open	P2-open	P2-open
	H-open	A-open

SWITCH CONTINUITY CHART

Two Speed Motor (With Concealed Wipers)

Off	Low	High
B to B/U	B to B/U	B to B/U
B to P		
A to Ground	B to A	B to H
	F2 to Ground	F2 to Ground
F2-Open	P-Open	P-Open
H-Open	H-Open	A-Open

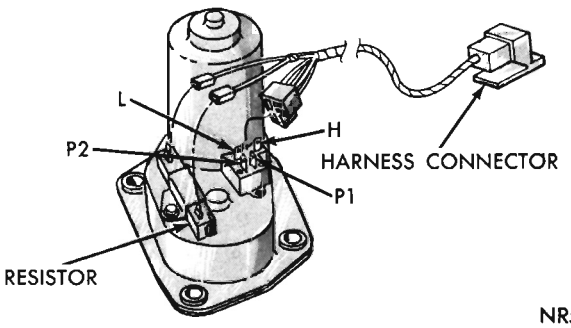


Fig. 4 - Two Speed Motor

Variable and Three Speed

The two and three speed switches contain a resistor while the variable speed uses a rheostat to provide a means of controlling the current flow to the motor. The switch is designed to provide a circuit to the motor to reverse the current to the field winding which reverses the direction of the armature. A circuit breaker, built into the switch, protects the circuitry.

To test the switch, disconnect the wiring to the switch and remove the switch from the instrument panel. For removal and installation of the wiper switch, see "Instrument Panels."

Using a continuity tester or an ohmmeter, test for continuity (no resistance) between the contact terminals of the switch as shown in the following chart. For test purposes the "Park" position is the switch "Off" position. The "Low" speed is the position immediately past the "Off" detent and the High position is at the extreme position of the switch travel. **In the test chart the reference "Ground" means to attach one lead of the continuity tester or ohmmeter to the switch case.**

MOTOR TESTING

CAUTION: The testing procedure for two speed motors used with non-concealed wipers differs from that used when testing two speed motors used with concealed wipers. Use of the improper procedure will result in a false indication of motor conditions.

TWO SPEED MOTOR (With Non-Concealed Wipers)

(1) Disconnect motor leads at motor. Connect jumper from battery positive terminal to motor terminal "H". Motor should run a high speed.

SWITCH CONTINUITY CHART

Variable and Three Speed Motors

Off	Low	Medium (3 Speed Only)	High
B to B/U.	B to B/U.	B to B/U.	B to B/U.
B/U to P.	B/U to A.	B/U to A.	B/U to A.
A to F2.	A to F1.	F1 to R1.	
			*A through the rheostat or resistor to F1.
F1 to Ground.	F2 to Ground. P-open.	F2 to Ground. P-open.	F2 to Ground. P-open.

*As the switch knob of the variable speed switch is rotated the resistance shown on the ohmmeter should vary from a high reading to a low reading in a smooth rate of change.

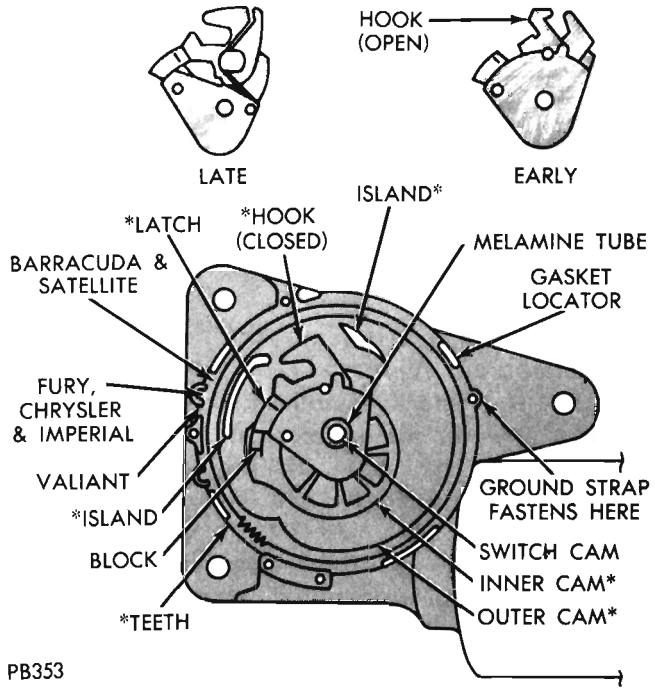


Fig. 5 - Gear and Park Switch Replacement

(The ground circuit is completed to the car body through a brass ground strap. Be certain that this is a good connection). Remove jumper. (Fig. 4).

(2) Connect jumper from battery positive terminal to resistor terminal. Connect second jumper from terminal "L" to the second resistor terminal. The motor should run at low speed. Remove jumpers.

(3) Connect jumper from battery positive terminal to motor terminal "P1". Connect a second jumper from motor terminal "P2" to terminal "L". The motor should park. (If the wiper blades are near the bottom of the glass, the motor may be parked. Run the motor as in step (2) until the blades are high on the glass. Then repeat step (3) to observe parking.)

TWO SPEED REVERSING MOTOR (With Concealed Wipers)

(1) Disconnect motor leads at motor. Connect jumper from battery positive terminal to motor (terminal "H"). Connect second jumper from (terminal "P2") to ground. Motor should run at high speed. Remove jumpers.

(2) Connect jumper from battery positive terminal to resistor terminal. Connect second jumper from (terminal "L") to the second resistor terminal. Connect a third jumper from (terminal "P2") to ground. The motor should run forward at low speed. Remove jumpers.

(3) Connect jumper from battery positive terminal to motor (terminal "P1"). Connect a second jumper from motor (terminal "L") to ground. The motor should run in reverse rotation for at least a half revolution and park.

VARIABLE SPEED AND THREE SPEED MOTORS

(1) Disconnect motor leads at bulkhead disconnect. Connect a jumper from the green lead to ground. Connect a second jumper wire from the battery positive terminal to brown and red leads in bulkhead disconnect. (The ground circuit is completed through the car body, be certain of a good connection at the motor ground strap). The motor should run continuously. If motor does not run but appears to be shorted analyse the excessive current draw as follows while the motor is still on the car. Unsolder the two green leads at the park switch. Fasten the two green leads together, isolated from the motor frame. Connect the test leads as previously described. If the motor runs replace the park switch. The park switch may or may not be shorted after running the motor. If motor continues to draw excessive current look for binding linkage. If linkage is not binding, remove the park switch plate, see "Gear and Park Switch Replacement". If switch plate is jammed and difficult to remove or motor runs when jumpers are connected again replace the latch assembly as it is unlatched. If motor continues to draw excessive current, remove and replace motor assembly. Do not proceed with step 2 until the green wires are resoldered to the park switch. Disconnect leads as the wiper blades sweep downward.

(2) Connect jumper wire from green lead to brown lead. Connect red lead to ground. Connect third jumper wire from battery positive terminal to blue lead. The wiper should run to the park position.

CAUTION: Motor can be damaged if not wired correctly.

GEAR AND PARK SWITCH REPLACEMENT (Variable and Three Speed Motors)

(1) Run motor out of park to close hook and to prevent damage to park switch. If motor does not run check for open or excessive current. See "Motor Testing".

(2) Remove the five switch plate screws and ground strap.

(3) Carefully remove park switch plate and gasket. Hook should be closed, as shown in Fig. 5. If open motor is unlatched, replace latch assembly.

(4) Remove motor from car if necessary to replace park switch. See "Motor Removal".

(5) Remove gear and latch assembly from gear box.

(6) Inspect all components for damage or wear paying special attention to the following. (Refer to

Figure 5).

(a) Bent parking switch blade.
(b) Melted switch cam.
(c) Chipped, scraped or broken islands.
(d) Chipped or scraped inner or outer cam.
(e) Bent hook where it latches to inner cam.
(f) Loose hook (early).
(g) High reinforcement pin in inner cam.

NOTE: When replacing components, lubricate all areas marked (*) and metal surfaces with lubricant contained in package.

(7) Switch plate replacement. Unsolder switch plate leads. Solder leads to new switch plate, making sure the two green leads are together in their original location.

(8) Insert latch assembly into gear. The early latch assembly is to be inserted open. Rotate the early latch assembly counter clockwise until it stops against the block. Rotate the hook counter clockwise until it closes against the latch. Closing the latch should require some force. Re-examine latch and gear at this time if they do not fit snuggly. The latch assembly is spring loaded and inserted closed with the latch against the block as shown in Figure 5. The late latch assembly may be used with either a steel inner cam (preferred) or the plastic inner cam. Insert gear and latch assembly, with washer between gear and gearbox, with the gear approximately in the position as shown in Figure 5. NOTE: - The gear and latch assembly must be in the position as shown in Figure 5 with the latch closed when the switch plate is installed to prevent damage to switch plate.

(9) Install the melamine tube on the switch cam as shown in Figure 5. Place a small amount of grease on the tip of the switch cam taking care to keep grease off the melamine tube.

(10) - Install the gasket with the slot over the gasket locator. (See Figure 5).

(11) - Rotate the rocker arm lever, which is riveted to the switch plate, counter clockwise to its stop. Install the switch plate so that the tab aligns with the correct notch as indicated in Figure 5. Replace the five screws, making sure the ground strap is under the screw next to the gasket locator.

(12) - Bench test motor according to "motor testing" in service manual. Motor must be grounded when bench testing.

(13) - Install motor.

MOTOR REMOVAL (With Non-Concealed Wipers).

(1) Disconnect the battery ground cable.

(2) Disconnect the wiper motor wiring harness.

(3) Remove the three wiper motor mounting nuts. (On vehicles without air conditioning it is easier to remove crank arm nut and crank arm from under instrument panel) first and omit steps (4) and (5).

(4) Work motor off mounting studs far enough to gain access to crank arm mounting nut. **Caution: Do not force or pry motor from mounting studs, as drive link can be easily distorted.**

(5) Using a 1/2 inch open end wrench, remove motor crank arm nut. Carefully pry crank arm off shaft.

(6) Remove wiper motor.

MOTOR INSTALLATION (With Non-Concealed Wipers)

*** CAUTION: Before installing the motor crank arm to the wiper motor, examine the index flats on the motor crank arm. If they are noticeably deformed or damaged, the motor crank arm should be replaced.**

Before installing motor, be sure all three spacers are inserted in holes of motor grommets.

(1) Balance wiper motor on upper right motor grommet.

(2) Index flats on motor shaft to mate with flats on crank arm. Start and tighten crank arm nut on shaft, being careful that crank arm remains indexed and fully seated on shaft. (On vehicles without air conditioning, it is easier to do step (3) before doing step (2) from under instrument panel.)

(3) Position wiper motor, then install and tighten the three mounting nuts, being sure that ground strap is attached securely.

(4) Connect wiper motor harness.

(5) Connect battery ground cable and test operation of windshield wiper system.

MOTOR REMOVAL (With Concealed Wipers)

(1) Disconnect battery ground cable.

(2) Remove wiper arm and blade assemblies (See Fig. 2).

(3) Remove cowl screen.

(4) Remove drive crank arm retaining nut and drive crank. Disconnect wiring to motor.

(5) Remove three wiper motor mounting nuts and remove motor.

MOTOR INSTALLATION (With Concealed Wipers)

(1) Position motor on the three studs on dash panel. Make certain rubber gasket and spacers between motor and dash panel, are properly positioned.

(2) Install the three nuts that mount motor to dash panel and connect wiring to motor. Make sure ground strap is installed under one nut.

(3) Position drive crank on motor and install nut. Tighten to 140 inch-pounds.

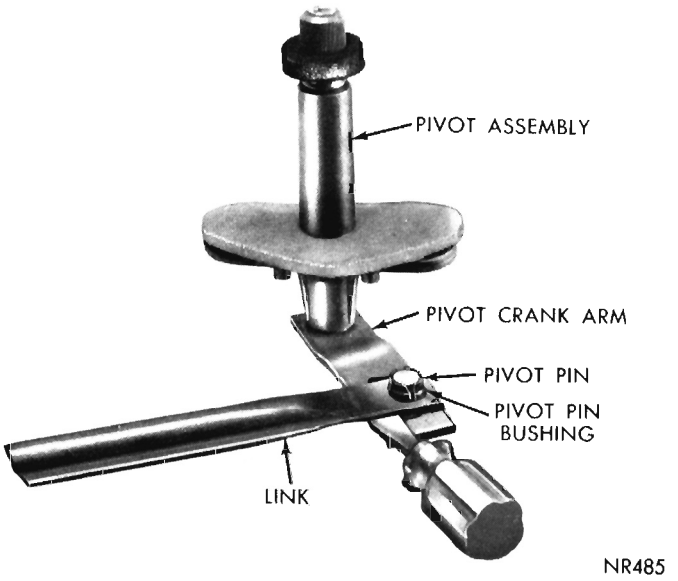


Fig. 6 - Removing Link and Bushing (with Non-Concealed Wipers)

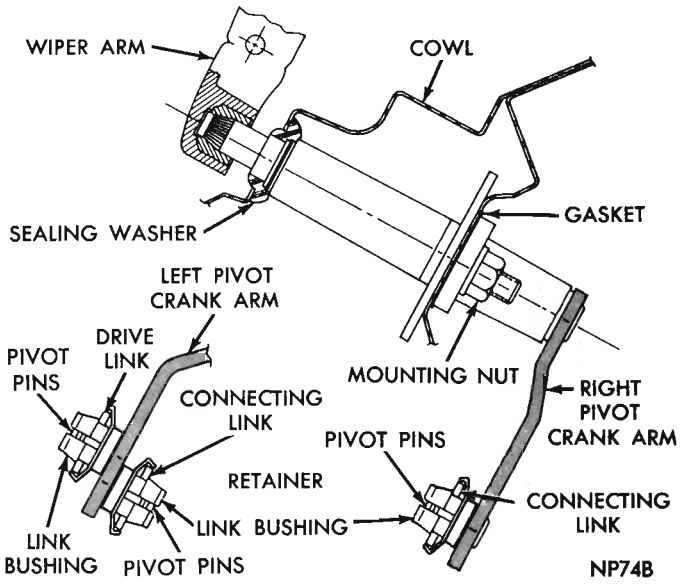


Fig. 8 - Pivot Arm and Link Assemblies (with Non-Concealed Wipers)

(4) Connect battery ground cable and test operation of wiper motor.

(5) Install cowl screen.

(6) Carefully install wiper arm and blade assemblies. (See Wiper Arm Adjustments).

LINKAGE AND PIVOT REMOVAL (With Non-Concealed Wipers)

(1) Disconnect battery ground cable.

(2) If air conditioning equipped, remove the duct supplying left spot cooler to provide easier access to the left wiper pivot.

Insert a wide blade screwdriver between plastic link bushing and the pivot crank arm. Gently twist the screwdriver to force the bushing and link from the pivot pin (Fig. 6). Remove three motor mounting nuts, pull motor away from bulkhead and remove motor crank arm retaining nut. After crank arm is removed from motor shaft, remove drive link assembly from under left side of panel.

In heater equipped models, remove motor drive crank arm retaining nut and pry crank arm off of motor shaft. Gently pry drive link and bushing from left pivot crank arm pin and withdraw assembly from under panel. Remove motor drive crank arm from drive link after removal of assembly from vehicle (Fig. 7).

(3) To remove connecting link from pivots, remove glove box. Reaching through glove box opening, gently pry the bushing and link from the right pivot pin. (Fig. 8). Lift the link from the

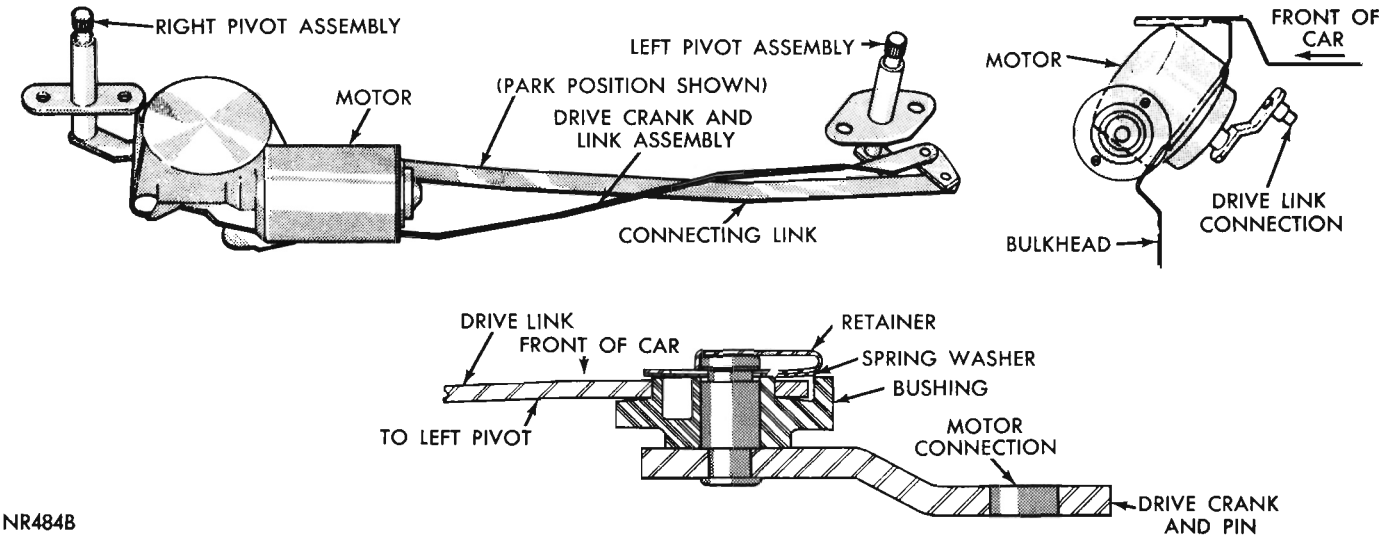


Fig. 7 - Variable or Three Speed Wiper (with Non-Concealed Wipers)

pivot crank arm pin and repeat operation at left pivot (Fig. 8). Withdraw from under left side of panel.

The wiper pivots can be removed if required by the removal of the 1/2 inch mounting nuts at this time.

Lubrication

The crank arm pin and the pivot pins for all systems should be lubricated with Automotive Multi-purpose Lubricant NLG12.

LINKAGE AND PIVOT INSTALLATION (With Non-Concealed Wipers)

When installing wiper pivots provide adequate sealing at the gaskets to prevent water leakage.

(1) Install bushing on motor crank arm pin, position drive link on bushing so large side of pivot bushing faces away from drive crank arm. Large side of pivot bushing will be on same side of link as crank arm retainer.

(2) Install spring washer, convex side towards link and install retainer (Fig. 7).

If retainer was distorted in removal, it should be replaced.

(3) In heater equipped vehicles, insert drive link assembly under left side of instrument panel, position crank arm on motor shaft indexing flats on motor shaft with flats of crank arm and install crank arm retaining nut.

In models equipped with air conditioning, install drive link from under instrument panel. Install motor crank arm on motor shaft from engine compartment side of bulkhead. Position motor on studs and secure with three nuts. Place plastic bushing at end of drive link over proper pin on left pivot (Fig. 8) and press into position. Be certain that the plastic bushing is fully seated to assure locking action in the groove on the pivot pin.

(4) Insert connecting link into place with "R" (right side) and "L" (left side) stamped in link facing instrument panel side. Press each link bushing fully into place on the pivot crank pins.

(5) Reconnect battery cable and test the operation of the wiper system. Reinstall glove box if necessary.

LINKAGE AND PIVOT REMOVAL (With Concealed Wipers)

To service drive link, connecting link or either pivot, it is necessary to remove the wiper arms and blade assemblies, and the cowl screen to provide access to the wiper system.

(1) Disconnect battery ground cable.

(2) Remove the crank arm nut and crank arm from motor shaft.

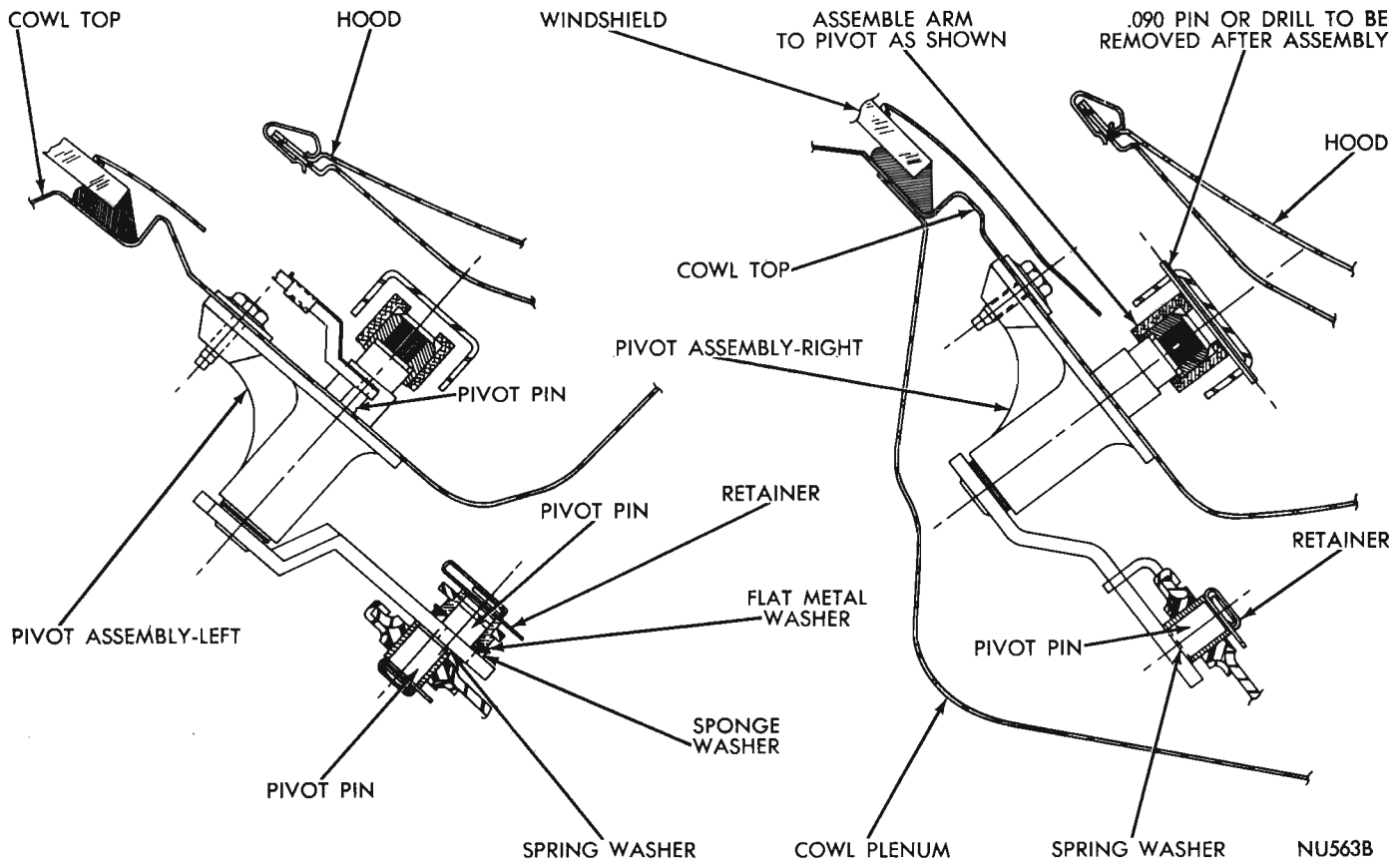


Fig. 9 - Pivot Arm and Link Assemblies (with Concealed Wipers)

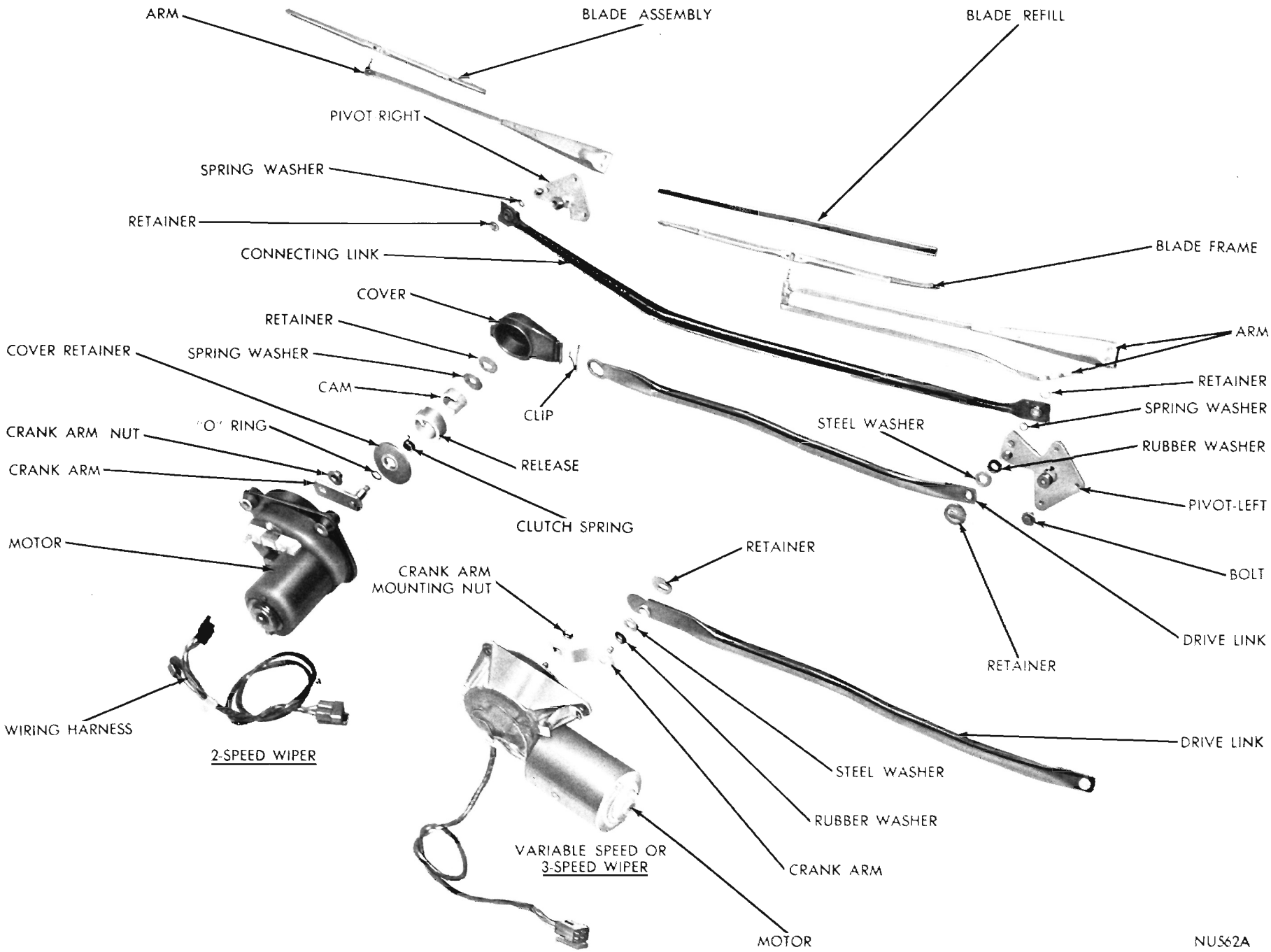


Fig. 10 - Variable or Two and Three Speed Wipers System (with Concealed Wipers)

(3) Remove bolts mounting left and right pivots to body (Fig. 9).

(4) Remove links and pivots through cowl top opening. The linkage and pivots can be serviced on bench after removal from the vehicle. (Refer to Figure 10).

LUBRICATION

Should it be necessary to service the wiper system for any reason, the parking spring in the two speed parking mechanism should be lubricated with Mopar Lubricant provided with service package. Apply the lubricant to inside coils of spring first and to the outside of the spring coils after installation of the spring.

The three speed crank arm pin and all pivot pins for all systems should be lubricated with Automotive Multi-Purpose Lubricant NLGI2.

LINKAGE AND PIVOT INSTALLATION (With Concealed Wipers)

If servicing of the mechanism on the 2-speed motor crank is required, be certain that during reassembly, the link is positioned between the ears of the cover retainer. Seat the rubber cover fully in the groove provided for it on the cover retainer.

Any retainer clips distorted during rmoval should be replaced.

When installing connecting link on pivot pin place spring washer on pin and lubricate pin. Install connecting link and retaining clip. When installing drive link, place foam rubber washer and flat metal washer on pins. Lubricate pin and install links and retaining clips.

(1) Insert the linkage and pivots, assembled as a unit, through the cowl panel opening.

(2) Bolt pivots in position.

(3) Position crank arm on motor shaft and tighten mounting nut to 140 inch-pounds.

(4) Connect battery ground cable.

(5) Test wiper system operation.

(6) Install cowl screen.

(7) Carefully install wiper arm and blade assemblies. (See Wiper Arm Adjustments).

WINDSHIELD WASHERS

GENERAL INFORMATION

Valiant and Barracuda models are equipped with a foot operated pump as standard equipment or electric washers as part of an option. Satellite, Fury, Chrysler and Imperial models are equipped with push button electric washers as standard equipment.

Foot pump equipped models have a different reservoir mounted in the engine compartment. Check valves are built into the rear of the foot pump to control the direction of fluid flow from the reservoir to the pump and from the pump to the nozzles.

Electric pump equipped models have the electric pump assembly mounted directly to the reservoir. A permanently lubricated sealed motor is coupled to a rotor type pump. Fluid, gravity fed from the reservoir, is forced by the pump through rubber hoses to the nozzles which direct the streams to the windshields.

The pump and reservoir in either system are serviced as separate assemblies.

FOOT PUMP

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HIGH OPERATING EFFORT	(a) Low aimed nozzles. (b) Pinched hoses.	(a) Adjust nozzles. (b) Correct as necessary.
LOW OUTPUT	(a) Low aimed nozzles. (b) Leaky hoses. (c) Defective pump.	(a) Adjust nozzles. (b) Correct as necessary. (c) Replace pump.

ELECTRIC PUMP

As an aid to determine if the pump assembly is defective, connect a jumper wire from the blade terminal of the pump to the positive terminal of the battery. If pump operates, check wiring and switch. If pump does not operate, it may be defective or frozen. Replace the pump and motor assembly if defective.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
INTERMITTENT OPERATION OF SYSTEM	(a) Loose wiring connections.	(a) Repair as necessary.
	(b) Faulty switch.	(b) Replace switch.
	(c) Faulty motor.	(c) Replace motor and pump assembly.
MOTOR RUNS DOES NOT PUMP FLUID	(a) Nozzle jets plugged.	(a) Clean nozzle jets.
	(b) Broken or loose hose.	(b) Replace hose.
	(c) Faulty pump.	(c) Replace motor and pump assembly.
	(d) Nozzle jet under air intake grille.	(d) Adjust nozzles.
PUMP ASSEMBLY INOPERATIVE	(a) Poor ground.	(a) Clean ground wire terminal and tighten mounting screw.
	(b) Loose wiring terminals.	(b) Tighten terminals.
	(c) Corroded terminals.	(c) Clean and tighten terminals.
	(d) Broken wires.	(d) Repair or replace the wires.
	(e) Faulty switch.	(e) Replace switch assembly.
	(f) Faulty motor.	(f) Replace motor and pump assembly.
LOW OUTPUT	(a) Low aimed nozzles.	(a) Adjust nozzles.
	(b) Poor electrical connections.	(b) Clean and tighten terminals.
	(c) Pinched or leaky hoses.	(c) Correct as necessary.
	(d) Defective motor.	(d) Replace motor and pump assembly.

SERVICE PROCEDURES

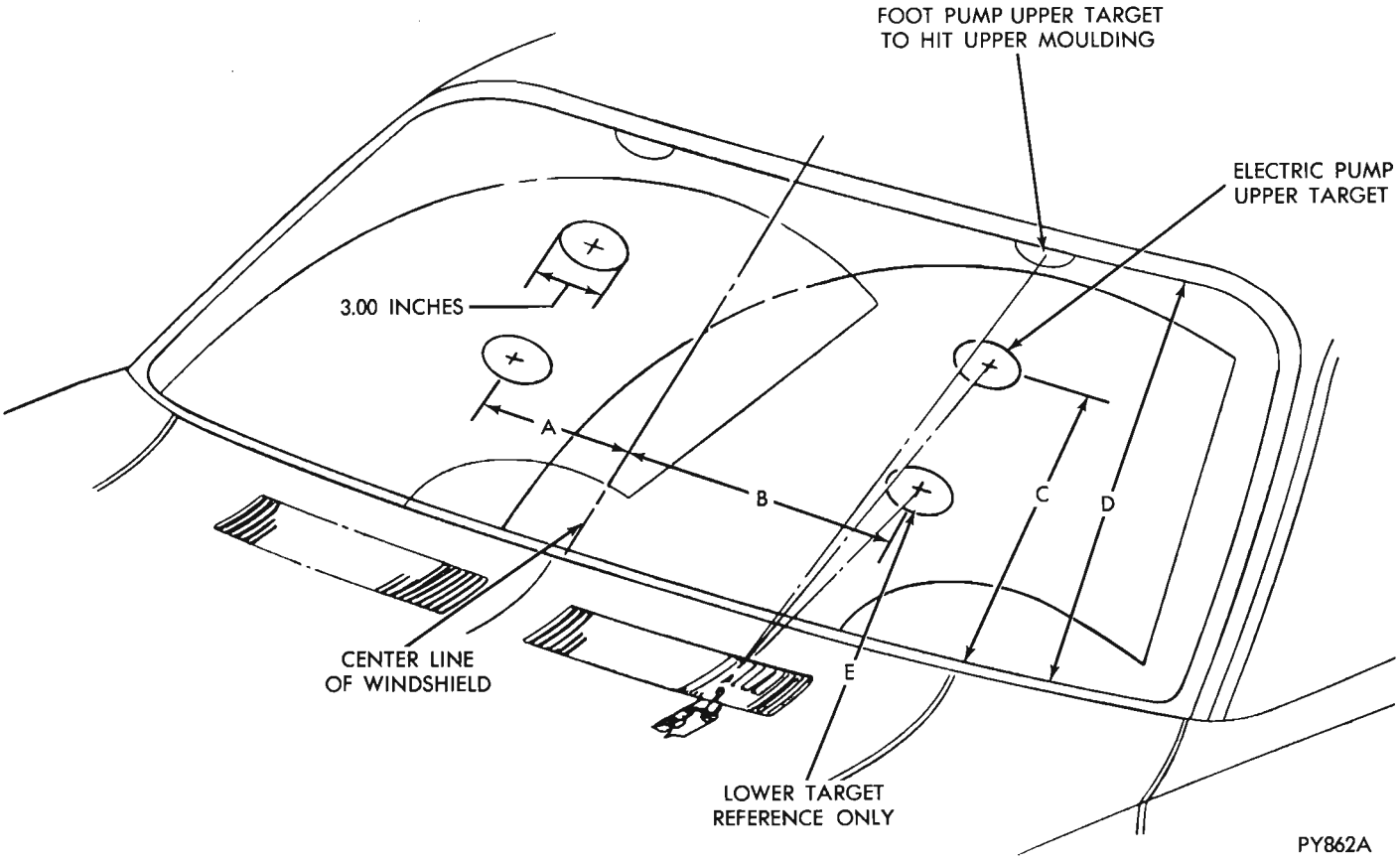


Fig. 1 - Washer Aiming Diagram

NOZZLE ADJUSTMENT—Valiant, Barracuda and Satellite

For lateral adjustment loosen the mounting screws and move the nozzle and bracket assembly until the nozzle is centered between the grille louvers. Vertical nozzle adjustment is made by bending the nozzle mounting bracket up or down by the tab provided.

Foot pump models are aimed higher for improved water distribution.

Adjust nozzles so that the impact point of the upper stream contacts the windshield glass as shown in Figure 1 and 2. The lower stream should impact the glass in the wiper pattern area, when the upper stream is aimed properly. If not the nozzle is defective and should be replaced.

Fury, Chrysler and Imperial

The nozzles are mounted on the underside of the hood. No lateral adjustment is necessary since the nozzle body is keyed into the hood inner panel. Vertical adjustment is made by using a screwdriver to rotate the metal insert, this adjustment must be made with the hood latched. A very small adjustment of the nozzle tip will move the washer stream up or down a significant amount.

CAUTION: To prevent possible injury do not adjust the nozzles while the wipers are operating.

Note: On cars equipped with the deluxe wiper system the wipers are automatically turned on when the washer button is pushed.

ELECTRIC PUMP

Removal

(1) Remove reservoir mounting screws, remove reservoir and pump assembly. Empty fluid from reservoir. (On Barracuda models equipped with air conditioning it will be necessary to loosen the upper horn at mounting bracket and allow horn to rotate down out of the way to remove reservoir).

(2) Disconnect motor feed wire connector and rubber hose from bottom of pump.

(3) Using a suitable extension and a 7/8 inch deepwell socket through filler neck, remove pump mounting nut inside reservoir. Remove ground wire. **It may be necessary in some older pumps to use a 15/16 in. deep-well socket due to the expansion of the nylon nut through absorption of windshield washer fluid.**

(4) Remove pump from bottom of reservoir and discard rubber gasket.

Installation

NOTE: Two different pump assemblies are used.

WINDSHIELD WASHER AIMING SPECIFICATIONS

MODELS	A DISTANCE FROM RIGHT OF CAR CENTERLINE	B DISTANCE FROM LEFT OF CAR CENTERLINE	C UPPER TARGET IMPACT POINT (ELECTRIC PUMP ONLY)	D UPPER TARGET IMPACT POINT (FOOT PUMP ONLY)	E LOWER TARGET IMPACT POINT (ELECTRIC AND FOOT PUMP MODELS)
VALIANT, DUSTER	7½"	12¾"	14¼"	UPPER MOLDING	REFERENCE ONLY
BARRACUDA, 'CUDA	7"	14½"	16"	UPPER MOLDING	REFERENCE ONLY
SATELLITE, ROAD RUNNER, GTX	7"	14½"	15½"	———	REFERENCE ONLY
FURY, SUBURBAN	12"	14¾"	15½"	———	REFERENCE ONLY
CHRYSLER	12"	14¾"	15½"	———	REFERENCE ONLY
IMPERIAL	12"	14¾"	15½"	———	REFERENCE ONLY

PB168

Fig. 2 - Washer Aiming Chart

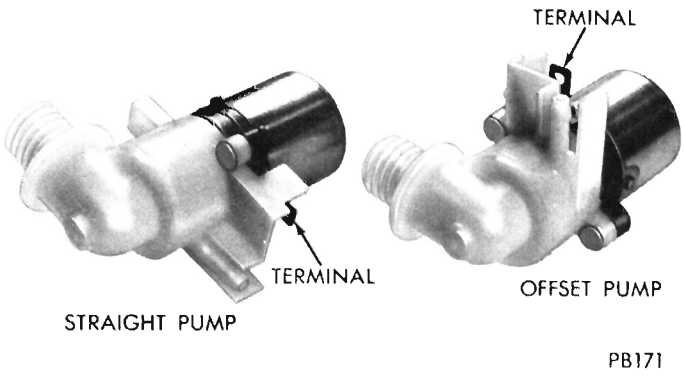


Fig. 3 - Windshield Washer Pump Assemblies

The Valiant, Fury, Chrysler and Imperial use the straight pump as shown on the left in Figure 3. The Barracuda and Satellite models use the offset pump. When servcing the windshield washers the straight pump can be used in place of the offset pump.

Any time the pump is removed from the reservoir, always replace the rubber gasket.

(1) Install new rubber gasket on reservoir.

(2) Install pump assembly through gasket. Place plastic washer under screen and nut assembly and tighten securely (approximately 25 inch pounds). **Do not overtighten.**

(3) Reconnect ground wire. Ground wire may be spliced, soldered or recrimped.

Crimping may be facilitated by making small cuts along the brass barrel, using diagonal cutters and then peening using a center punch and hammer.

(4) Install pump and reservoir in vehicle with mounting screws **making sure motor ground wire is installed under one of the mounting screws.** (On Barracuda models equipped with air conditioning reposition horn and tighten mounting screw).

(5) Connect motor feed wire connector and rubber hose to pump. Fill reservoir, inspect for leaks and test operation of washer system, making sure the nozzles are adjusted properly.

FOOT PUMP

Removal

CAUTION: Before removing foot pump, clamp the hose at the reservoir to prevent the siphoning of washer fluid into the passenger compartment.

(1) Remove the two screws which mount the pump to the floor pan.

(2) Disconnect hoses.

Installation

(1) Attach the hoses first.

(2) Mount pump assembly and install mounting.

(3) Tighten the mounting screws securely.

(4) Remove the clamp from the hose at the reservoir.

(5) Check for leaks and test the operation of the system, making sure the nozzles are aimed properly.

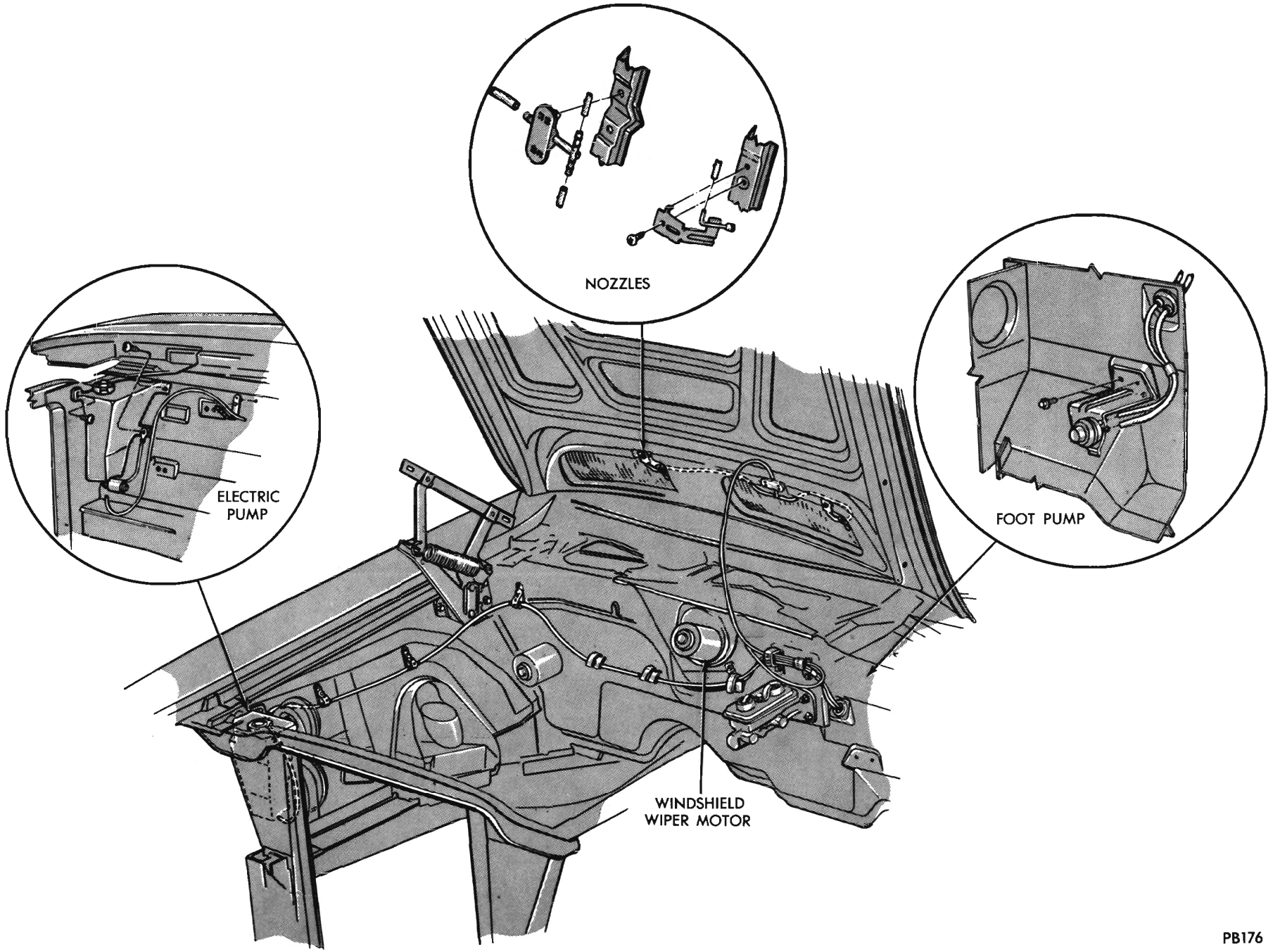


Fig. 4 - Windshield Washer System (Foot and Electric Pump with Concealed Wipers)

SPECIFICATIONS

ELECTRICAL

BATTERY

Engine-Cubic Inch Displacement	Standard Equipment Battery Part Number	Special Equipment Battery Part Number
198	2875951	2875320 2444564
225	2875951	2875320 2444564
318	2875951	2875320 2444564
340	2875951	2444564
360	2875320	2642967
383	2875320	2642967
426	2642969	—
440	2642969	2642967

Battery Part Number	Capacity (Amperes)	Number Plates Per Cell
2875951	46	9
2875320	59	11
2642969	70	13
2444564	70	11
2642967	70	13
3438581	80	13

All Batteries are 12 Volts with Negative Ground Terminal.

REDUCTION GEAR STARTING MOTOR

Starting Motor Model	2875560
Make	Chrysler
Voltage	12
Number of Fields	4 (3 Series, 1 Shunt)
Number of Poles	4
Brushes	4
Spring Tension	32 to 36 Ounces
Drive	Solenoid Shift Overrunning Clutch

End Play	.010"-.045"
*Cranking Amperage Draw	155 to 170 Amps. 198 Cu. In. 165 to 180 Amps. 225, 318, 340 Cu. In. 180 to 200 Amps. 360, 383, 426, 440 Cu. In.
Free-Running Test	
Voltage	11
Amperage Draw Maximum	90
Speed RPM	1925 to 2600
Locked Resistance Test	
Voltage	4
Amperage Draw	400 to 450
Solenoid Switch	
Pull-In Coil	13.3 to 14.9 Amps. @ 6.0 Volts @ 77°F.
Hold-In Coil	8.0 to 9.0 Amps. @ 6.0 Volts @ 77°F.

*Engine should be at operating temperature.

DIRECT DRIVE STARTING MOTOR

(Taxi with 11-inch Clutch and 225 cu. in. Engine)

Starting Motor Model	1889100
Make	Chrysler
Voltage	12
Number of Fields	4 (3 Series, 1 Shunt)
Number of Poles	4
Brushes	4
Spring Tension	32 to 36 Ounces
Drive	Solenoid Shift Overrunning Clutch
End Play	.005" Minimum
*Cranking Amperage Draw	165 to 185 Amps.
Free Running Test	
Voltage	11
Amperage Draw	78 Amps. Maximum
Minimum Speed RPM	3800 RPM
Locked Resistance Test	
Voltage	4
Amperage Draw	310 to 445
Solenoid Switch	
Pull-In Coil	22.4 to 24.0 Amps. @ 6 Volts @ 77°F.
Hold-In Coil	8.3 to 9.3 Amps. @ 6 Volts @ 77°F.

*Engine should be at operating temperature.

ALTERNATOR

Rotation	Clockwise at Drive End
Voltage	12 Volt System
Current Output	Design Controlled
Voltage Output	Limited by Voltage Regulator
Brushes (Field)	2
Condenser Capacity	50 Microfarad plus or minus 20%
Field Current Draw	
Rotating Rotor by Hand @ 12 Volts	2.38 to 2.75 Maximum amperes

Current Output

Standard with 198 and 225 Cu. In. Engines	26 plus or minus 3 amperes*
Standard (All Other Models)	34.5 plus or minus 3 amperes*
Special Equip., Heavy Duty and/or Air Conditioning	44.5 plus or minus 3 amperes*
Special Equipment (Fleets)	51 plus or minus 3 amperes*

*Plus or minus three ampere tolerance is provided to allow for temperature variation. Current output is measured at 1250 engine rpm and 15 volts at the alternator. If measured at the battery, current output will be approximately 5 amperes lower than above value.

Voltage is controlled by variable load (carbon pile) across the battery.)

ELECTRONIC VOLTAGE REGULATOR

Part Number 3438150

The battery specific gravity should be above 1.200 when checking the regulated voltage.

The voltage regulator is working properly if the voltage is in accordance with the following chart:—

Ambient Temperature 1/4" From Voltage Regulator	Voltage Range
–20°F.	14.3–15.3
80°F.	13.8–14.4
140°F.	13.3–14.0
Above 140°F.	Less than 13.8

FUSES

	Car Model and Ampere Rating		
Title on Fuse Block	Valiant	Barracuda	Satellite
Accessories	20	20	20
Console	—	20	20
Dome/Stop Lamps	20	20	20
Emergency Flasher	20	20	20
Heater/Air Conditioning	20	20	20
Instrument Lights	3	5	5
Miscellaneous	—	20	20
Radio/Back-up Lamps	20	20	20
Tail/Cigar Lighter	20	—	—

FUSES

Title on Fuse Block	Car Model and Ampere Rating		
	Fury	Chrysler	Imperial
Accessories	20	20	20
Cigar Lighter/Console	–	20	20
Console	20	20	20
Dome/Stop Lamp	20	20	20
Emergency Flasher	20	20	20
Heater/Air Conditioning	20	20	20
Instrument Lamps	5	5	5
Miscellaneous	20	20	20
Radio/Back-up Lamps	20	20	20
Tail Lamps	20	20	20

FUSES (In-Line)

Circuit	Car Model and Ampere Rating					
	Valiant	Barracuda	Satellite	Fury	Chrysler	Imperial
Automatic Temperature Control	–	–	–	–	1	1
Courtesy Lamps (Console)	–	–	–	20	–	–
Deck Lid Solenoid	–	–	20	20	–	–
Headlamp Delay Relay	20	20	20	20	20	20
Headlamp Dimmer	–	–	–	–	4	4
Headlamp Wash Relay (On Imperial includes Rear Defoger, Rear Heater and Rear Air Conditioning, if so equipped)	–	–	–	20	–	20
Heater/Air Conditioning-Blower Motor (Tilt Column)	–	–	20	20	20	20
Spot Light Wiring	–	–	–	10	–	–
Tail Gate Lock Solenoid	–	–	20	–	–	

CIRCUIT BREAKERS

Circuit	Location	Car Model and Ampere Rating					
		Valiant	Barracuda	Satellite	Fury	Chrysler	Imperial
Cigar Lighter (Door or Rear)	On Fuse Block	—	—	—	—	30	30
Concealed Headlamps	Integral with Relay Left End of Instrument Panel	—	—	—	5	5	5
Convertible Top Lift	On Fuse Block	—	30	—	—	—	—
Door Locks	On Fuse Block	—	—	—	15	15	15
Front Seat Back Latch	On Fuse Block	—	—	—	15	15	15
Headlamps	Integral with H/L Switch	15	20	20	20	20	20
Power Seats	On Fuse Block	—	—	—	30	30	30
Power Tailgate	On Fuse Block	—	—	30	30	30	—
Power Windows	On Fuse Block	—	30	30	30	30	30
Tail Gate Lock	On Fuse Block	—	—	15	—	—	—
Windshield Wiper	Integral with Wiper Switch-						
	2 Speed Motor	6.0	6.0	6.0	6.0	6.0	—
	3 Speed Motor	—	—	7.5	7.5	7.5	7.5
	Variable Speed Motor	7.5	7.5	—	—	—	—

LIGHT BULBS

	Valiant	Barracuda	Barracuda (Rallye)	Satellite	Satellite (Rallye)
Air Conditioner Control and Auto-Temp	**1445	**1815	**1815	**53(2)	**53(2)
Ash Receiver	**1892	**1445	**1445	1445	**1445
Back-up Lights	1156(2)	1156(2)	1156(2)	1156(2)	1156(2)
Brake System Warning Indicator	158	57	57	158	57
Clock	–	*	*	*	*
Courtesy Lamp	89	89	89	–	–
Dome Lamp	1004	211-1 or 1004	211-1 or 1004	1004	1004
Door Ajar Indicator	–	1892	1892	1892	1892
Fender Mounted Turn Signal Indicator	330 (2)	330(2)	330(2)	330(2)	330(2)
Front Park and Turn Signal	1157NA (2)	1157NA(2)	1157NA (2)	1157A or 1157NA	1157A or 1157NA
Gear Selector Indicator (Column)	**161	** 161	** 161	** 161	** 161
Gear Selector With Console	–	** 57	** 57	** 57	** 57
Glove Compartment	1891	1891	1891	1891	1891
Headlamp Switch Rheostat Value	28 OHMS	15.5 OHMS	15.5 OHMS	15 OHMS	15 OHMS
High Beam Indicator	158	57	57	158	57
Instrument Cluster and Speedometer	** 158(3)	**1816(3)	**1893(4)	** 158(4)	** 57(7)
Ignition Lamp	1445	1445	1445	1445	1445
License Light	67	67	67	67	67
Low Fuel Indicator	–	1892	1892	1892	1892
Map and Courtesy Lamp	89	89	89	562	562
Oil Indicator	158	57	–	158	–
Pocket Panel Lamp	–	90	90	90	90
Radio—AM and AM with Tape	**1816	**1816	**1816	**1816	**1816
Radio—AM—FM Stereo		**1815	**1815	**1815	**1815
Reverse 4-Speed Transmission Indicator	53	53	53	53	53
Sealed Beam—Hi-Beam (No. 1)	–	4001	4001	4001	4001
Sealed Beam—Hi-Lo Beam (No. 2)	–	4000	4000	4000	4000
Sealed Beam—Single "7"	6012	–	–	–	–
Seat Belts Indicator	53	1892 or 53	1892 or 53	1892	1892
Side Marker	1895(4)	1895(4)	1895(4)	194(4) Sta. Wagon Front 194(2) Rear 1893(2)	194(4)
Stereo Indicator	–	1445	1445	1445	1445
Switch Lighting	*	**1445	**1445	**1892(3)	**1892(3)
Tachometer	–	–	*	–	*
Tail, Stop and Turn Signal	1157(2)	1157(2)	1157(2)	1157(2)	1157(2)
Trunk and/or Under Hood Lamp	1004	1003	1003	1003	1003
Turn Signal Indicator (Panel)	158(2)	57(2)	57(2)	158(2)	57(2)
Heat Control					

*—Included in Instrument Cluster Lighting **—Headlamp Rheostat Dimming

LIGHT BULBS

	Fury	Chrysler	Imperial
Arm Rest Lamp	———	———	1445
Ash Receiver	**1445	**1892(2)	**1892(2)
Auto-Temp	*	*	*
Back-up Lights	1156	1156	1156
Brake System Warning Lights	57	57	57
Clock	*	*	*
Cornering Light	1293	1293	1293
Courtesy Lamp	90	90	———
Dome and/or "C" Pillar Light	211-2	211-2	———
Door and Pocket Panel and/or Reading Light	90	90	90
Fasten Belts Indicator	53	57	158
Fender Mounted Turn Signal Indicator	330(2)	330(2)	330(2)
Fuel Indicator	57	———	———
Gear Selector Indicator (Column)	*	*	*
Gear Selector with Console	**57	**57	———
Glove Compartment	1891	1891	1891
Head Lamp Wash Indicator	1445	———	1445
Heater and/or A/C Control	*	*	*
High Beam Indicator	1892	57	158
Instrument Cluster and Speedometer Illumination	**1893(3)	**1816(4)	**1816(4)
Ignition Lamp	1445	1445	1445
License Light	67	67	67
Low Fuel Indicator	———	158	———
Lock Doors Indicator	57	57	158
Map Lamp	———	562	562
Oil Pressure Indicator	57	57	———
Open Door Indicator	———	———	———
Panel Rheostat Valve	24 Ohms	15.5 Ohms	15.5 Ohms
Park and Turn Signal (Front)	1157(2)	1157(2)	1157NA(4)
Portable Reading Light	———	———	89
Radio	*	*	*
Reading Lamp	———	———	90
Sealed Beam—Hi-Beam (No. 1)	4001(2)	4001(2)	4001(2)
Sealed Beam—Hi-Low Beam (No. 2)	4000(2)	4000(2)	4000(2)
Sentry Signal	———	———	158
Side Marker	1895(4)	1895(4)	1895(2)
Stereo Indicator	1445	1445	1445
Switch Lighting	* or 1892	*	*
Tail Light (only)	———	1095	1095(2)
Tail, Stop and Turn Signal	1157	1157	1157
Temperature Indicator	———	57	———
Trunk and/or Under Hood Light	1003	1003	1003
Turn Signal Indicator (Panel)	57	57	———

*Included in Instrument Cluster Lighting.
**Headlamp Reostat Dimming.

NOTE: All of the above bulbs are brass base. Aluminum base bulbs are not approved and not to be used.

IGNITION SYSTEM

Engine Application	198 Single Barrel Carburetor Manual Transmission	198 Single Barrel Carburetor Automatic Transmission
Engine Displacement	198 Cu. In.	198 Cu. In.
Distributor Part No.-(Chrysler Built)	3438509	3438509
Advance-Centrifugal Distributor Degrees at Distributor RPM)	1° to 6.5° @ 550 RPM 8° to 10° @ 750 RPM 12° to 14° @ 2000 RPM	1° to 6.5° @ 550 RPM 8° to 10° @ 750 RPM 12° to 14° @ 2000 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3° @ 7" 6° to 8.5° @ 11"	0.5° to 3° @ 7" 6° to 8.5° @ 11"
Contact Gap	.017" to .023"	.017" to .023"
Dwell Angel	41° to 46°	41° to 46°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2-1/2° BTC**	2-1/2° BTC**
Spark Plug Type	N14Y-Champion or *** P-6-6P Mopar***	N14Y-Champion or *** P-6-6P Mopar***
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70° -80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70° -80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70° -80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System".
***No gaskets required.

IGNITION SYSTEM

Engine Application	198 Single Barrel Carburetor Manual Transmission	198 Single Barrel Carburetor Automatic Transmission
Engine Displacement	198 Cu. In.	198 Cu. In.
Distributor Part No.-(Chrysler Built)	3438524	3438524
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	2° to 6° @ 700 RPM 8.5° to 10.5° @ 900 RPM 12° to 14° @ 2000 RPM	2° to 6° @ 700 RPM 8.5° to 10.5° @ 900 RPM 12° to 14° @2000 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3.5° @7" 5.25° to 7.75° @10"	0.5° to 3.5° @7" 5.25° to 7.75° @10"
Contact Gap	.017" to .023"	.017" to .023"
Dwell Angle	41° to 46°	41° to 46°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2-1/2° BTC**	2-1/2° BTC**
Spark Plug Type	N14Y-Champion or*** P-6-6P Mopar***	N14Y-Champion or*** P-6-6P Mopar***
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
***No gaskets required.

IGNITION SYSTEM

Engine Application	225 Single Barrel Carburetor Manual Transmission	225 Single Barrel Carburetor Automatic Transmission
Engine Displacement	225 Cu. In.	225 Cu. In.
Distributor Part No.-(Chrysler Built)	2875822	2875826
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	1° to 5° @550 RPM 9.2° to 11.2° @ 900 RPM 12° to 14° @ 2000 RPM	1° to 5° @550 RPM 9.2° to 11.2° @ 900 RPM 12° to 14° @2000 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3.5° @10" 5.25° to 7.75° @15"	0.5° to 3.5° @7" 5.25° to 7.75° @10"
Contact Gap	.017" to .023"	.017" to .023"
Dwell Angle	41° to 46°	41° to 46°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	TDC**	TDC**
Spark Plug Type	N14Y-Champion or*** P-6-6P Mopar***	N14Y-Champion or*** P-6-6P Mopar***
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
***No gaskets required.

IGNITION SYSTEM

Engine Application	225 Single Barrel Carburetor Manual Transmission	225 Single Barrel Carburetor Automatic Transmission
Engine Displacement	225 Cu. In.	225 Cu. In.
Distributor Part No.-(Chrysler Built)	3438440	3438442
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	0.5° to 3.5° @ 800 RPM 8° to 10.5° @ 1200 RPM 12° to 14° @ 2200 RPM	0.5° to 3.5° @ 800 RPM 8° to 10.5° @ 1200 RPM 12° to 14° @2200 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3.5° @10" 5.25° to 7.75° @15"	0.5° to 3.5° @ 7" 5.25° to 7.75° @ 10"
Contact Gap	.017" to .023"	.017" to .023"
Dwell Angle	41° to 46°	41° to 46°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2.5° BTC**	2.5° BTC**
Spark Plug Type	N14Y-Champion or*** P-6-6P Mopar***	N14Y-Champion or*** P-6-6P Mopar***
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-5-3-6-2-4	1-5-3-6-2-4
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
***No gaskets required.

IGNITION SYSTEM

Engine Application	LA-318 2-Barrel Carburetor Manual Transmission	LA-318 2-Barrel Carburetor Automatic Transmission
Engine Displacement	318 Cu. In.	318 Cu. In.
Distributor Part No.-(Chrysler Built)	3438255	3438225
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	1° to 6° @ 550 RPM 8.5° to 10.5° @ 800 RPM 14° to 16° @ 2100 RPM	1° to 6° @ 550 RPM 8.5° to 10.5° @ 800 RPM 14° to 16° @2100 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 10.5" 8.25° to 10.75° @15"	1.25° to 4.25° @ 12" 8.25° to 10.75° @ 15"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	30° to 34°	30° to 34°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	000" to .003"*	000" to .003"
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	TDC**	TDC**
Spark Plug Type	N14Y-Champion or P-6-6P Mopar	N14Y-Champion or P-6-6P Mopar
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	LA-318 2-Barrel Carburetor Manual Transmission	LA-318 2-Barrel Carburetor Automatic Transmission
Engine Displacement	318 Cu. In.	318 Cu. In.
Distributor Part No.-(Chrysler Built)	3438453	3438453
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	0° to 4° @ 600 RPM 8° to 10.5° @ 1000 RPM 14° to 16° @ 2100 RPM	0° to 4° @ 600 RPM 8° to 10.5° @ 1000 RPM 14° to 16° @2100 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 9.5" 8° to 10.5° @15"	1° to 4° @ 9.5" 8° to 10.5° @ 15"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	30° to 34°	30° to 34°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	000" to .003"*	000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	TDC**	TDC**
Spark Plug Type	N14Y-Champion or P-6-6P Mopar	N14Y-Champion or P-6-6P Mopar
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	340 4-Barrel Carburetor Manual Transmission	340 4-Barrel Carburetor Automatic Transmission
Engine Displacement	340 Cu. In.	340 Cu. In.
Distributor Part No.-(Chrysler Built)	3438522	3438517
(Prestolite Built)	IBS4018C	
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0.5° to 4° @ 650 RPM 5.5° to 8.5° @ 850 RPM 10° to 12° @ 2000 RPM	0.5° to 4° @ 600 RPM 9.5° to 12° @ 1000 RPM 10° to 12° @ 2100 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3.5° @ 7" 7° to 10° @ 11"	0.5° to 3.5° @ 9" 7° to 10° @ 12.5"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	One set points 27°-32° both sets points 37°-42°	30° to 34°
Contact Arm Spring Tension	17 to 21.5 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	5° BTC**	5° BTC**
Spark Plug Type	N9Y-Champion	N9Y-Champion
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	340 6-Barrel Carburetor Manual Transmission	340 6-Barrel Carburetor Automatic Transmission
Engine Displacement	340 Cu. In.	340 Cu. In.
Distributor Part No.-(Chrysler Built)	3438615	3438617
(Prestolite Built)	IBS4018D	IBS4018E
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0.5° to 4° @ 700 RPM 9° to 11° @ 1100 RPM 13° to 15° @ 2200 RPM	0.5° to 4° @ 700 RPM 9° to 11° @ 1100 RPM 13° to 15° @ 2200 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 3.5° @ 7" 7° to 10° @ 11"	0.5° to 3.5° @ 9" 7° to 10° @ 12.5"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	One set points 27°-32° both sets points 37°-42°	30° to 34°
Contact Arm Spring Tension	17 to 21.5 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2.5° BTC**	2.5° BTC**
Spark Plug Type	N9Y-Champion	N9Y-Champion
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	360 2-Barrel Carburetor Manual Transmission	360 2-Barrel Carburetor Automatic Transmission
Engine Displacement	360 Cu. In.	360 Cu. In.
Distributor Part No.-(Chrysler Built)	3438422	3438422
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	1° to 6° @ 550 RPM 8.5° to 10.5° @ 800 RPM 14° to 16° @ 2100 RPM	1° to 6° @ 550 RPM 8.5° to 10.5° @ 800 RPM 14° to 16° @2100 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 9.5" 8° to 10.5° @ 15"	1° to 4° @ 9.5" 8° to 10.5° @ 15"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	30° to 34°	30° to 34°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	000" to .003"*	000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2.5° BTC**	2.5° BTC**
Spark Plug Type	N13Y-Champion	N13Y-Champion
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501 9	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	360 2-Barrel Carburetor Manual Transmission	360 2-Barrel Carburetor Automatic Transmission
Engine Displacement	360 Cu. In.	360 Cu. In.
Distributor Part No.-(Chrysler Built)	3438453	3438453
Advance-Centrifugal (Distributor Degrees at Distributor RPM)	0° to 4° @ 600 RPM 8° to 10.5° @ 1000 RPM 14° to 16° @ 2100 RPM	0° to 4° @ 600 RPM 8° to 10.5° 1000 RPM 14° to 16° @2100 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 9.5" 8° to 10.5° @ 15"	1° to 4° @ 9.5" 8° to 10.5° @ 15"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	30° to 34°	30° to 34°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	000" to .003"*	000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Clockwise	Clockwise
Timing	2.5° BTC**	2.5° BTC**
Spark Plug Type	N13Y-Champion	N13Y-Champion
Size	14MM-3/4" Reach	14MM-3/4" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	383 2-Barrel Carburetor Manual Transmission	383 2-Barrel Carburetor Automatic Transmission
Engine Displacement	383 Cu. In.	383 Cu. In.
Distributor Part No.-(Chrysler Built)	3438534	3438534
Advance-Centrifugal Distributor Degrees at Distributor RPM)	1° to 4.5° @ 600 RPM 5° to 7° @ 800 RPM 12° to 14° @ 2000 RPM	1° to 4.5° @ 600 RPM 5° to 7° @ 800 RPM 12° to 14° @ 2000 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 3.5° @ 9" 8° to 10° @ 15"	1° to 3.5° @ 9" 8° to 10° @ 15"
Contact Gap	.016" to .021"	.016" to .021"
Dwell Angle	28.5° to 32.5°	28.5° to 32.5°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Counterclockwise	Counterclockwise
Timing	TDC**	2.5° BTC**
Spark Plug Type	J-14Y Champion or P-3-6P Mopar	J-14Y Champion or P-3-6P Mopar
Size	14MM-3/8" Reach	14MM-3/8" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	383 2-Barrel Carburetor Manual Transmission	383 2-Barrel Carburetor Automatic Transmission
Engine Displacement	383 Cu. In.	383 Cu. In.
Distributor Part No.-(Chrysler Built)	3438544	3438544
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0.5° to 3.5° @ 700 RPM 5° to 7.5° @ 900 RPM 12° to 14° @ 2000 RPM	0.5° to 3.5° @ 700 RPM 5° to 7.5° @ 900 RPM 12° to 14° @ 2000 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 3.5° @ 9" 8° to 10° @ 15"	1° to 3.5° @ 9" 8° to 10° @ 15"
Contact Gap	.016" to .021"	.016" to .021"
Dwell Angle	28.5° to 32.5°	28.5° to 32.5°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Counterclockwise	Counterclockwise
Timing	TDC**	2.5° BTC**
Spark Plug Type	J-14Y Champion or P-3-6P Mopar	J-14Y Champion or P-3-6P Mopar
Size	14MM-3/8" Reach	14MM-3/8" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

IGNITION SYSTEM

Engine Application	383 4-Barrel Carburetor Manual Transmission	383 4-Barrel Carburetor Automatic Transmission
Engine Displacement	383 Cu. In.	383 Cu. In.
Distributor Part No.-(Chrysler Built)	3438690	3438690
Advance-Centrifugal Distributor	0.5° to 3.5° @ 650 RPM 6° to 8° @ 900 RPM 12° to 14° @ 2400 RPM	0.5° to 3.5° @ 650 RPM 6° to 8° @ 900 RPM 12° to 14° @ 2400 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 10.5" 8° to 10° @ 15"	1° to 4° @ 10.5" 8° to 10° @ 15"
Contact Gap	.016" to .021"	.016" to .021"
Dwell Angle	28.5° to 32.5°	28.5° to 32.5°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Counterclockwise	Counterclockwise
Timing	TDC**	2.5° BTC**
Spark Plug Type	J-11Y Champion or P-3-4P Mopar***	J-11Y Champion or P-3-4P Mopar***
Size	14MM-3/8" Reach	14MM-3/8" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

***J-11Y Champion. If J-11Y are not available, use Mopar P-3-4P or Champion J-10-Y.

IGNITION SYSTEM

Engine Application	440 Standard Cam 4-Barrel Carburetor Automatic Transmission	
Engine Displacement	440 Cu. In.	
Distributor Part No.-(Chrysler Built)	3438559	
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0.5° to 3.5° @ 700 RPM 3.5° to 5.5° @ 900 RPM 10° to 12° @ 2400 RPM	
Advance-Vacuum (Distributor Degrees at Inches of Mercury	1° to 4.5° @ 12" 8° to 10° @ 16"	
Contact Gap	.016" to .021"	
Dwell Angle	28.5° to 32.5°	
Contact Arm Spring Tension	17 to 20 oz.	
Condenser Capacity	.25 to .285 mfd.	
Shift Side Play (New and Rebuilt)	.000" to .003"*	
Shaft End Play (After Assembly)	.003" to .017"	
Rotation	Counterclockwise	
Timing	5° BTC**	
Spark Plug Type	J-13Y Champion or Mopar P-3-5P***	
Size	14MM-3/8" Reach	
Gap	.035"	
Firing Order	1-8-4-3-6-5-7-2	
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	24444242
Primary REsistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.

**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."

*** Use RJ13Y only on Imperial

IGNITION SYSTEM

Engine Application	440 Special Cam 4-Barrel Carburetor Manual Transmission	440 Special Cam 4-Barrel Carburetor Automatic Transmission
Engine Displacement	440 Cu. In.	440 Cu In.
Distributor Part No.-(Chrysler Built)	3438572	3438694
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0° to 3.5° @ 600 RPM 4.5° to 6.5° @ 800 RPM 8° to 10° @ 2200 RPM	0.5° to 4° @ 700 RPM 5° to 7° @ 900 RPM 8° to 10° @ 2200 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0.5° to 4.3° @ 10.5" 9.7° to 12° @ 15.5"	0.5° to 4.3° @ 10.5" 9.7° to 12° @ 15.5"
Contact Gap	.016" to .021"	.016" to .021"
Dwell Angle	28.5° to 32.5°	28.5° to 32.5°
Contact Arm Spring Tension	17 to 20 oz.	17 to 20 oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Counterclockwise	Counterclockwise
Timing	TDC**	2.5° BTC**
Spark Plug Type	J-11Y Champion or P-3-4P Mopar***	J-11Y Champion or P-3-4P Mopar***
Size	14MM-3/8" Reach	14MM-3/8" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
***J-11Y Champion. If J-11Y are not available, use Mopar P-3-4P or Champion J-10-Y.

IGNITION SYSTEM

Engine Application	440 Special Cam 6-Barrel Carburetor Manual Transmission	440 Special Cam 6-Barrel Carburetor Automatic Transmission
Engine Displacement	440 Cu. In.	440 Cu In.
Distributor Part No.-(Chrysler Built)	3438577	3438577
Advance-Centrifugal Distributor Degrees at Distributor RPM)	1° to 3° @ 700 RPM 4.5° to 6.5° @ 950 RPM 4.5° to 6.5° @ 2200 RPM	1° to 3° @ 700 RPM 4.5° to 6.5° @ 950 RPM 4.5° to 6.5° @ 2200 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	1° to 4° @ 10.5" 7.5° to 10° @ 15"	1° to 4° @ 10.5" 7.5° to 10° @ 15"
Contact Gap	.014" to .019"	.014" to .019"
Dwell Angle	One set points 27°-32° both set points 37°-42°	One set points 27°-32° both set points 37°-42°
Contact Arm Spring Tension	17 to 21.5 oz.	17 to 21.5oz.
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Shaft Side Play (New or Rebuilt)	.000" to .003"*	.000" to .003"*
Shaft End Play (After Assembly)	.003" to .017"	.003" to .017"
Rotation	Counterclockwise	Counterclockwise
Timing	5° BTC**	5° BTC**
Spark Plug Type	J-11Y Champion or P-3-4P Mopar***	J-11Y Champion or P-3-4P Mopar***
Size	14MM-3/8" Reach	14MM-3/8" Reach
Gap	.035"	.035"
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
***J-11Y Champion. If J-11Y are not available, use Mopar P-3-4P or Champion J-10-Y.

IGNITION SYSTEM

Hemi-426 Engine-A102

Engine Application	Two 4-Barrel Carburetor Manual Transmission	Two 4-Barrel Carburetor Automatic Transmission
Engine Displacement	426 Cu. In.	426Cu In.
Distributor Part No.-(Chrysler Built)	2875987	3438579
(Prestolite Built)	IBS-4017B	IBS-4017E
Advance-Centrifugal Distributor Degrees at Distributor RPM)	0° to 4.5° @ 650 RPM 12.2° to 14.2° @ 1050 RPM 14° to 16° @ 1600 RPM	0° to 4° @ 600 RPM 9.5° to 12.5° @ 1250 RPM 13° to 15° @ 1600 RPM
Advance-Vacuum (Distributor Degrees at Inches of Mercury)	0° to 3.5° @ 9" 6.7° to 9.2° @ 13.5"	0° to 3.5° @ 9" 6.7° to 9.2° @ 13.5"
Contact Gap	.014" to .019"	
Dwell Angle	Individual Contacts 27°-32° Total Dwell 37°-42°	
Contact Arm Spring Tension	17 to 21.5 oz.	
Condenser Capacity	.25 to .285 mfd.	
Shaft Side Play (New or Rebuilt)	.000" to .003"	
Shaft End Play (After Assembly)	.003" to .017"	
Rotation	Counterclockwise	
Timing	TDC**	2.5° BTC**
Spark Plug Type	N-10Y Champion***	
Size	14MM-3/4" Reach	
Gap	.035"	
Firing Order	1-8-4-3-6-5-7-2	
Coil	Chrysler-Essex -or-	Chrysler-Prestolite
Identification Number	2444241	2444242
Primary Resistance @ 70°-80°F	1.41 to 1.55 Ohms	1.65 to 1.79 Ohms
Secondary Resistance @ 70°-80°F	9200 to 10700 Ohms	9400 to 11700 Ohms
Ballast Resistor	2095501	
Resistance @ 70°-80°F	0.5 to 0.6 Ohms	
Current Draw (Coil and ballast resistor in circuit) Engine Stopped	3.0 amperes	
Engine Idling	1.9 amperes	

*Service wear tolerance should not exceed .006 inch.
**Plus or minus 2-1/2°. Set at curb idle speed; See "Fuel System."
*** No gaskets required.

WIRING DIAGRAMS

INDEX

	Page
Engine Wiring-Valiant	151
Engine Wiring-Barracuda-Satellite	152-153
Engine Wiring-Hemi-Barracuda-Satellite	157
Engine Wiring, 65 Ampere Leece Neville Alternator-Satellite	156
Engine Wiring-Fury	154-155
Engine Wiring, 65 Ampere Leece Neville Alternator-Fury	156
Engine Wiring-Chrysler	158-159
Engine Wiring-Imperial	184
Instrument Panel Wiring-Fury	182-183
Instrument Panel Wiring-Chrysler	190-191
Instrument Panel Wiring-Imperial	192-195
Instrument Panel Wiring (Rallye Cluster) -Valiant	162-163
Instrument Panel Wiring (Standard Cluster) -Barracuda	168-169
Instrument Panel Wiring (Rallye Cluster) -Satellite	176-177
Instrument Panel Wiring (Standard Cluster) -Valiant	160-161
Instrument Panel Wiring (Rallye Cluster) -Barracuda	166-167
Instrument Panel Wiring (Standard Cluster) -Satellite	174-175
Instrument Panel Accessory Wiring-Valiant	164-165
Instrument Panel Accessory Wiring-Barracuda	170-173
Instrument Panel Accessory Wiring-Satellite	178-181
Instrument Panel Accessory Wiring-Fury	186-189
Instrument Panel Accessory Wiring-Chrysler-Imperial	196-201
NOx System Wiring	185
Radio-Rear Speaker Wiring-Fury Chrysler and Imperial	185

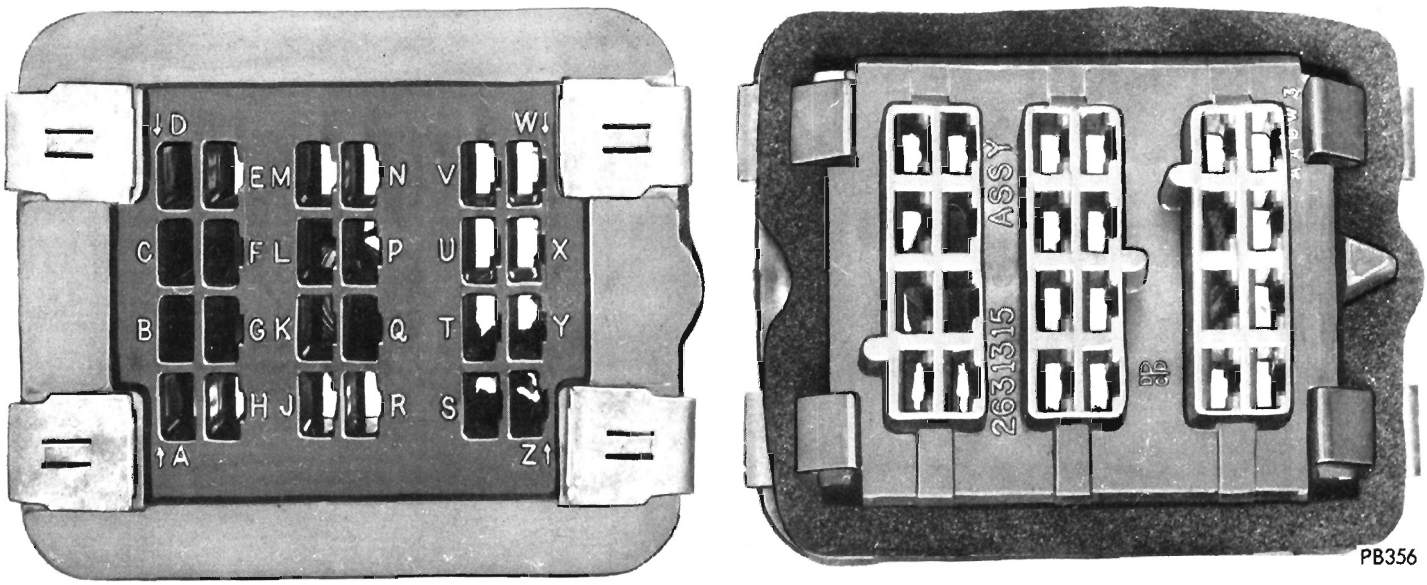


Fig. 1 - Bulkhead Disconnect - Valiant

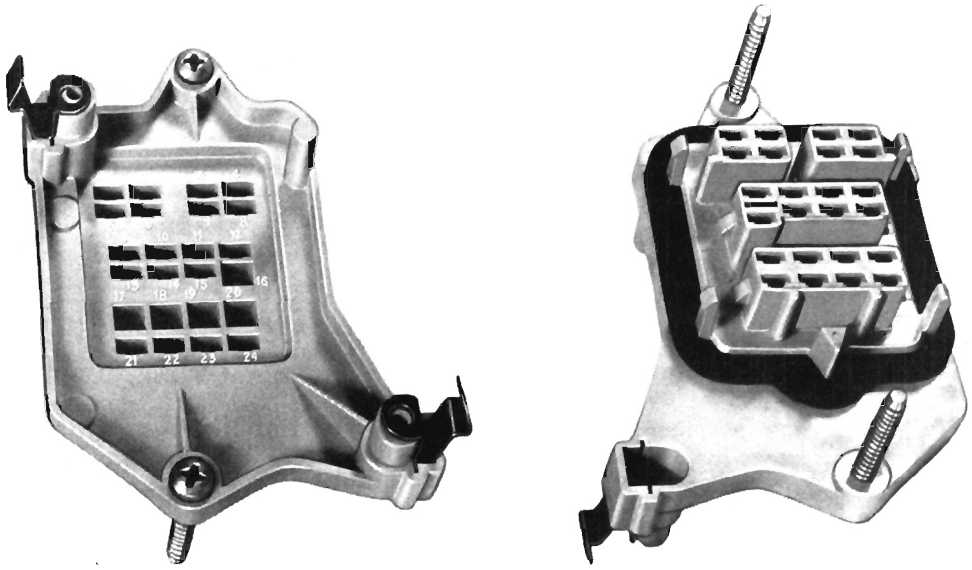


Fig. 2 - Bulkhead Disconnect - Baracuda, Satellite



Fig. 3 - Bulkhead Disconnect - Fury, Chrysler and Imperial

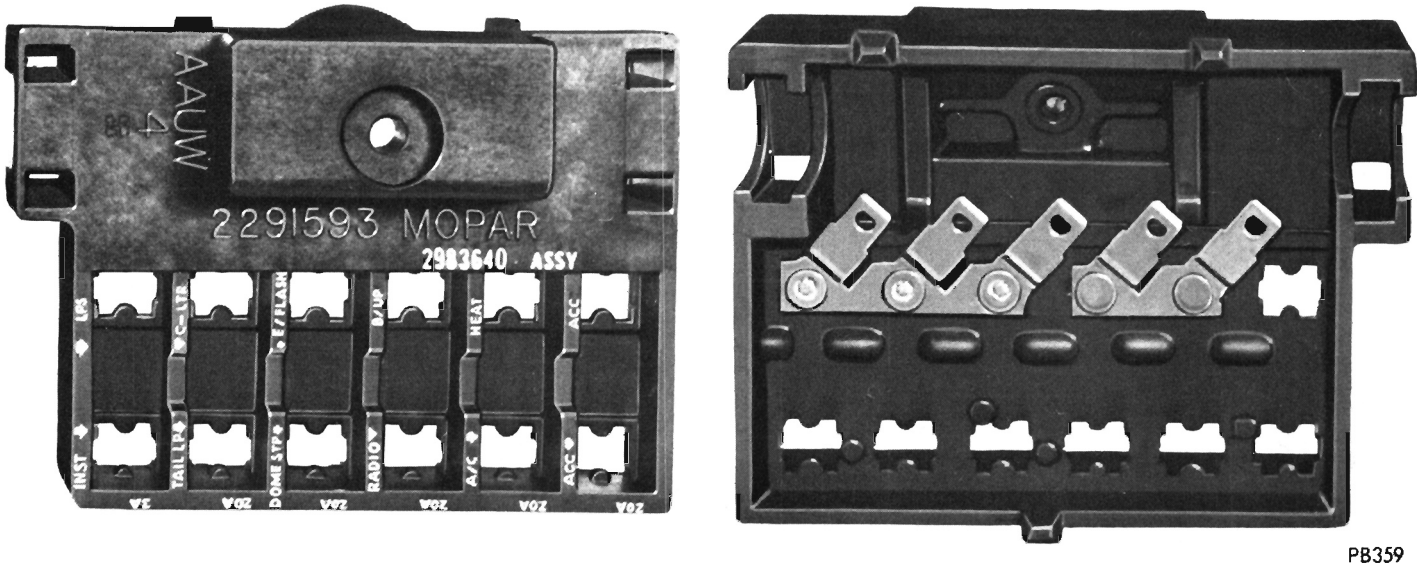


Fig. 4 - Fuse Block - Valiant

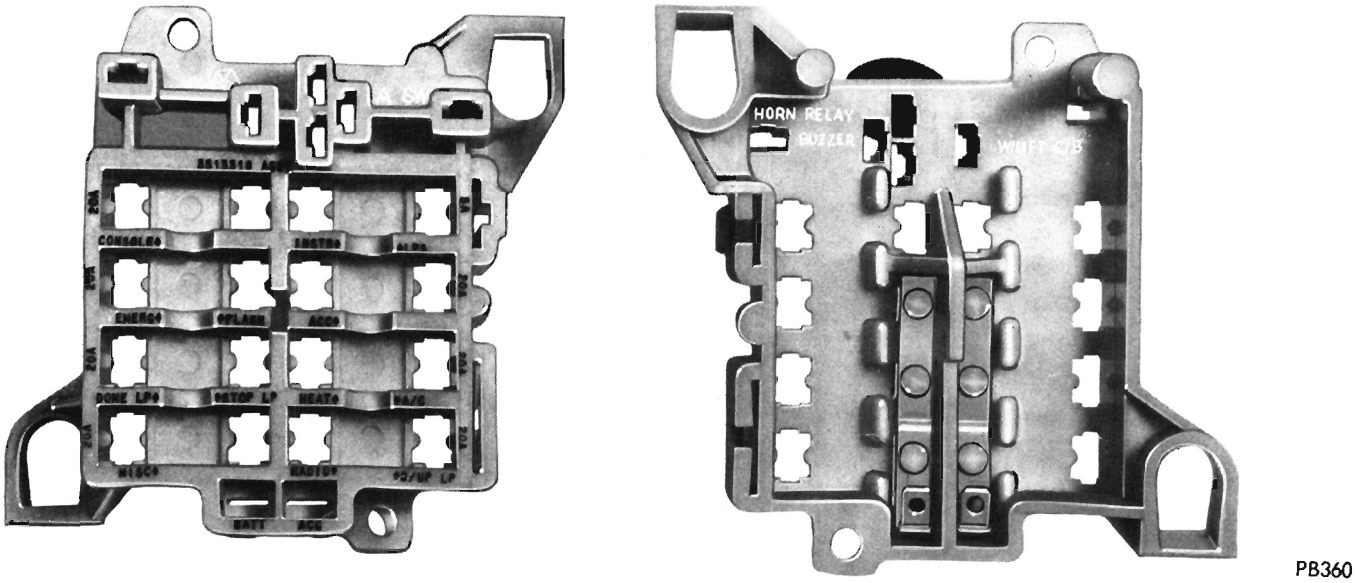
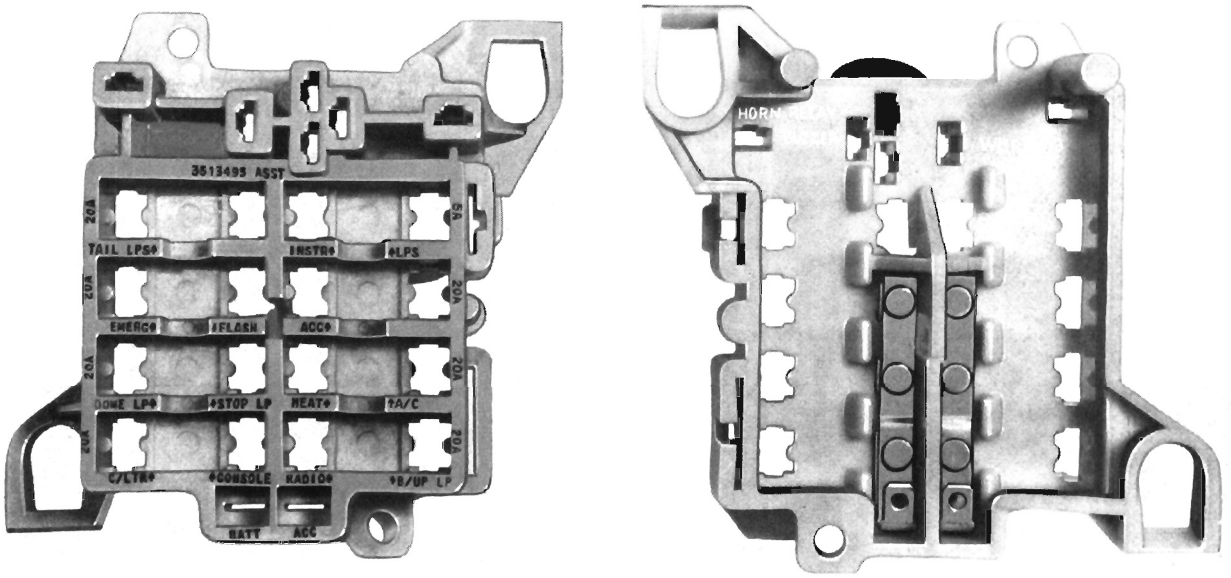


Fig. 5 - Fuse Block - Barracuda, Satellite



PB361

Fig. 6 - Fuse Block - Fury, Chrysler and Imperial

LEGEND
SPLICE OR
MALE FEMALE
MALE FEMALE
INSULATORS VIEWED FROM TERMINAL SIDE

COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
GY	GRAY
LBL	LIGHT BLUE
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

PB362

Fig. 7 - Color Code and Legend

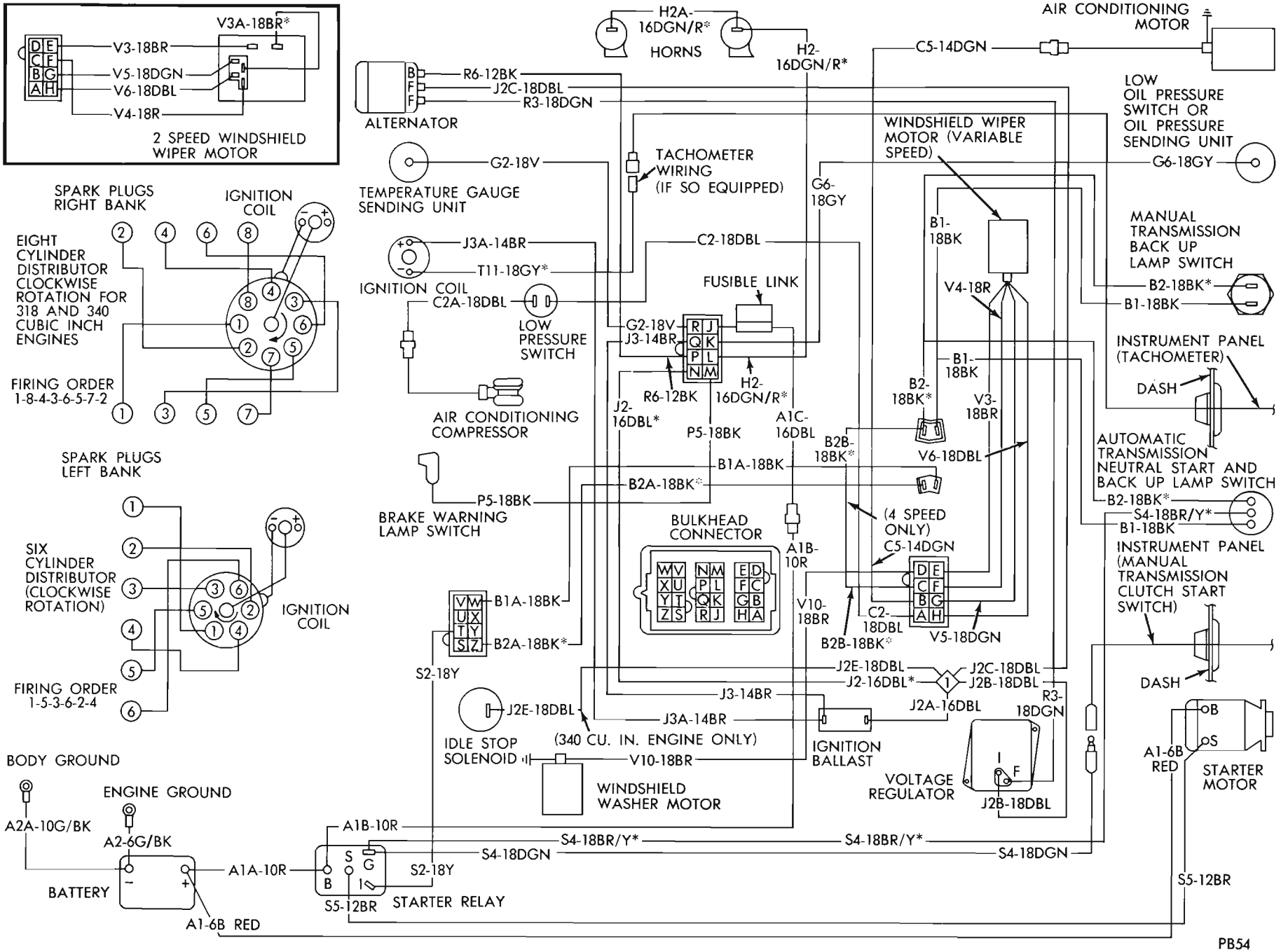


Fig. 8 - Engine Wiring - Valiant

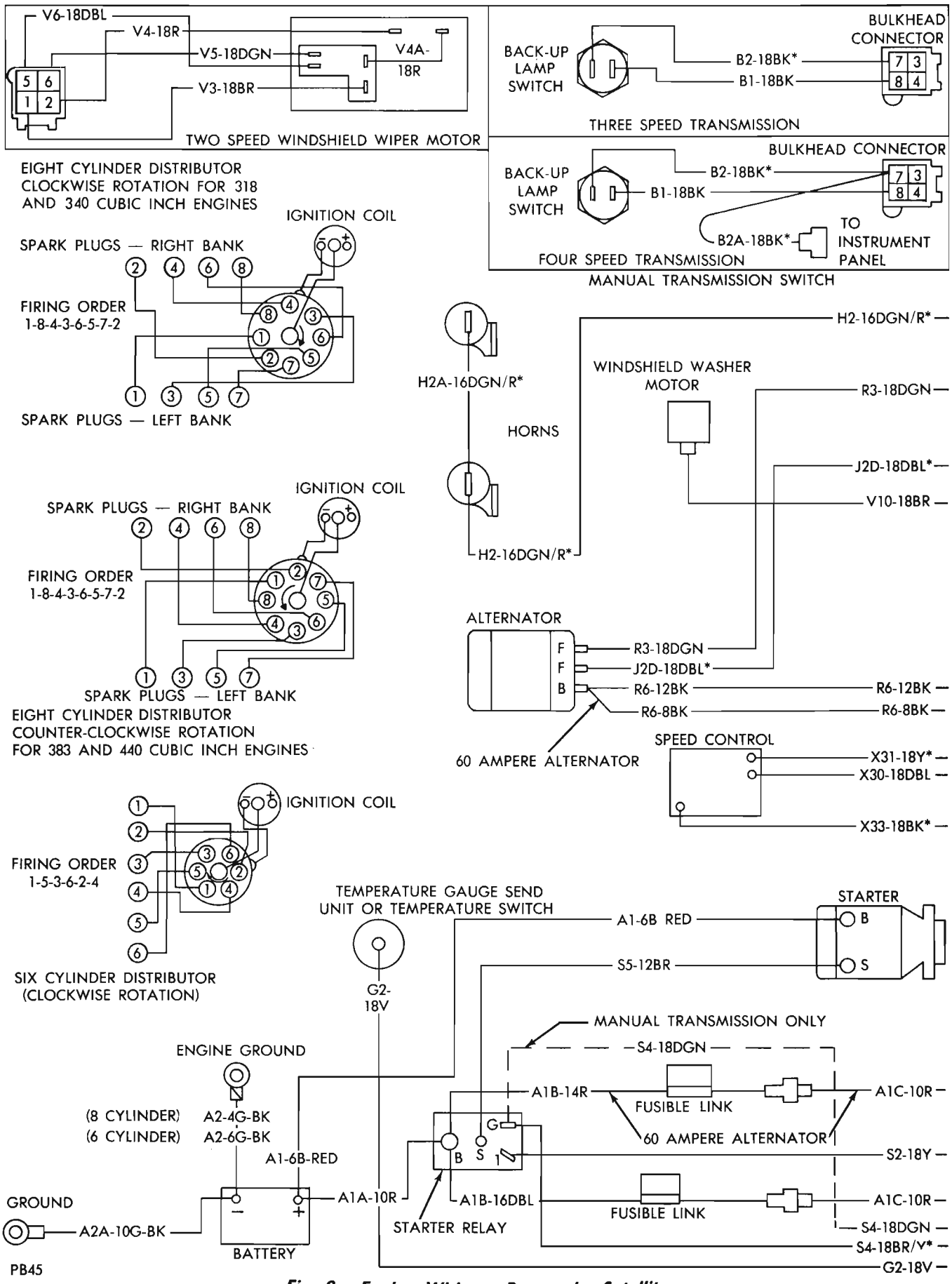


Fig. 9 - Engine Wiring - Barracuda, Satellite

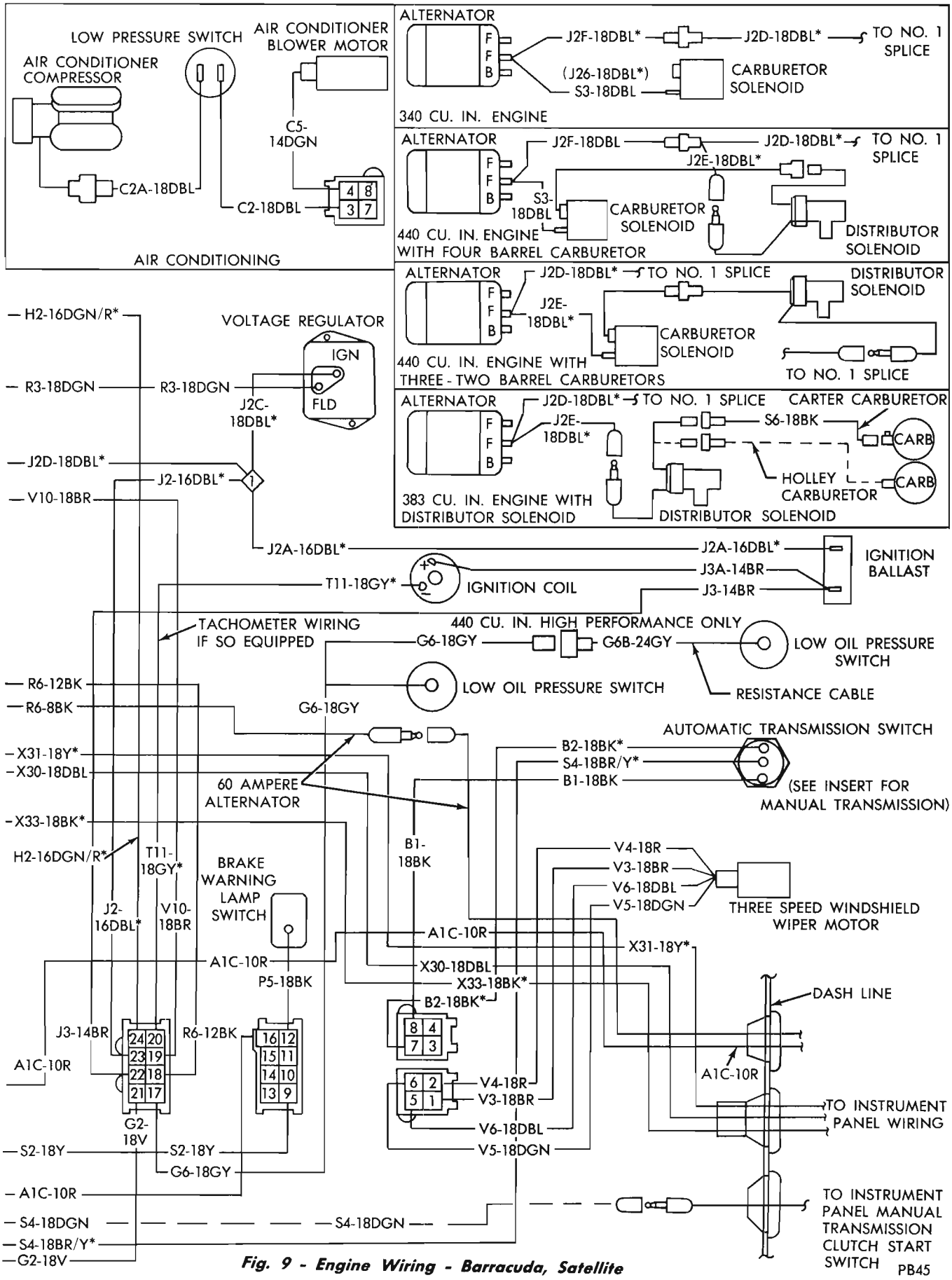


Fig. 9 - Engine Wiring - Barracuda, Satellite

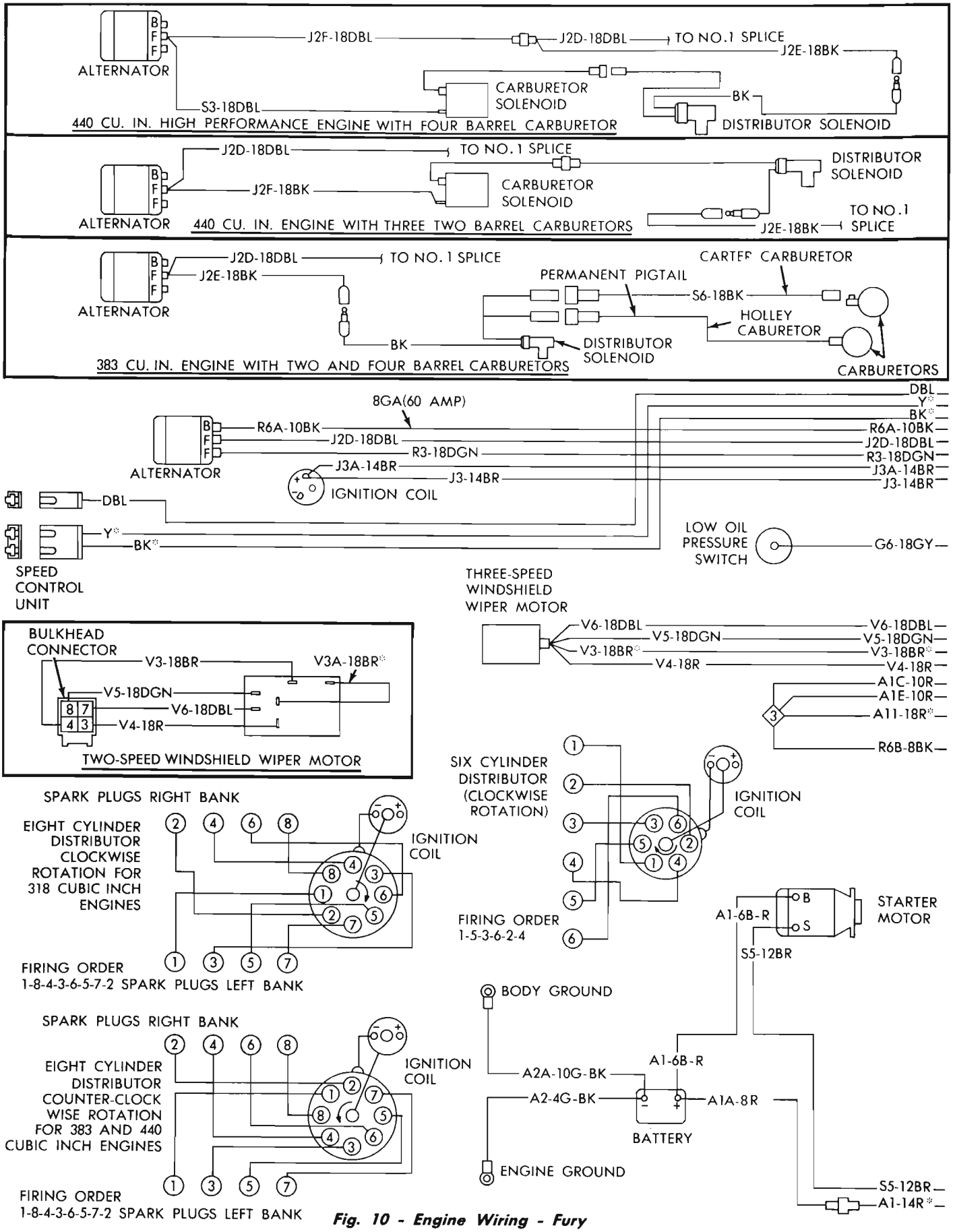


Fig. 10 - Engine Wiring - Fury

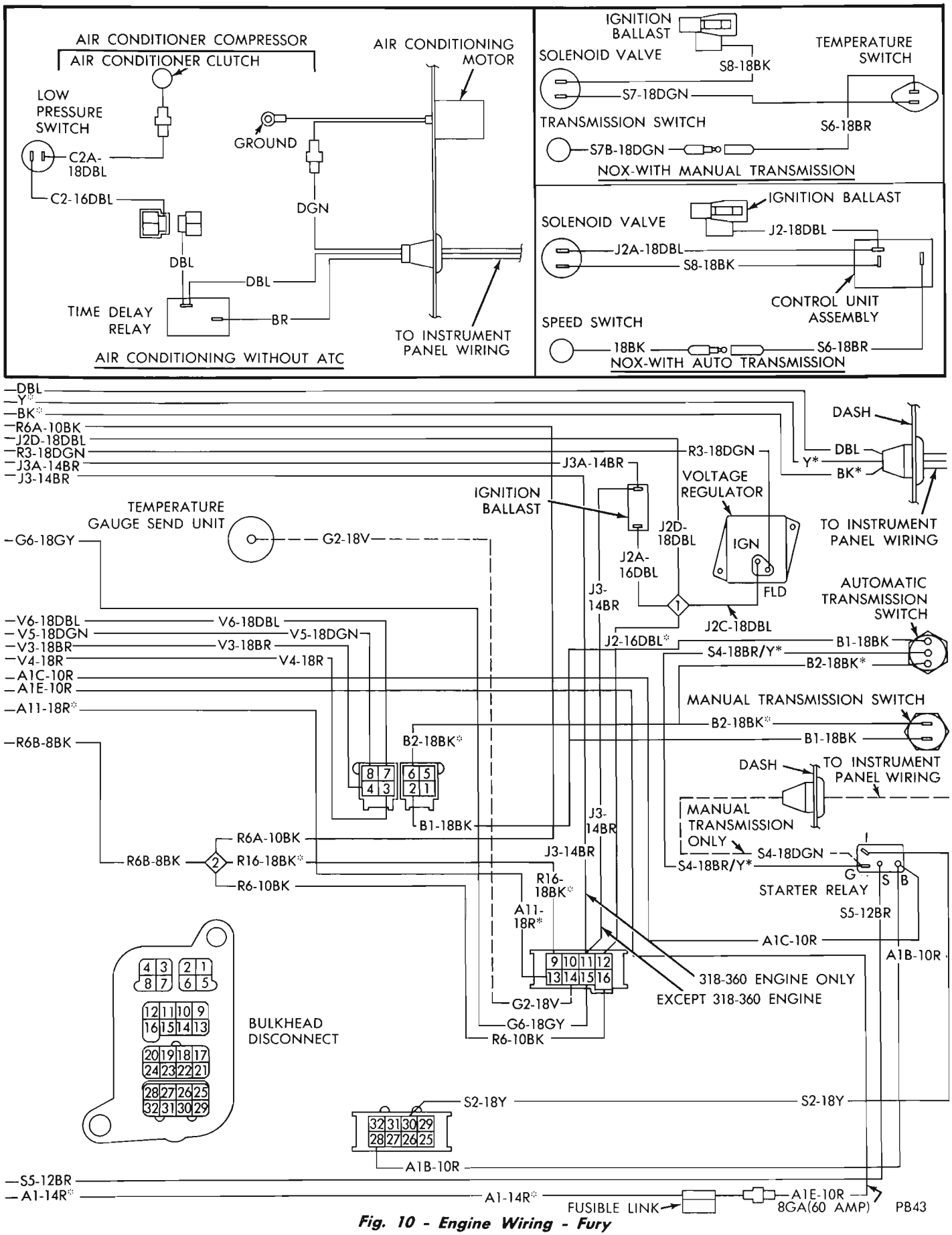


Fig. 10 - Engine Wiring - Fury

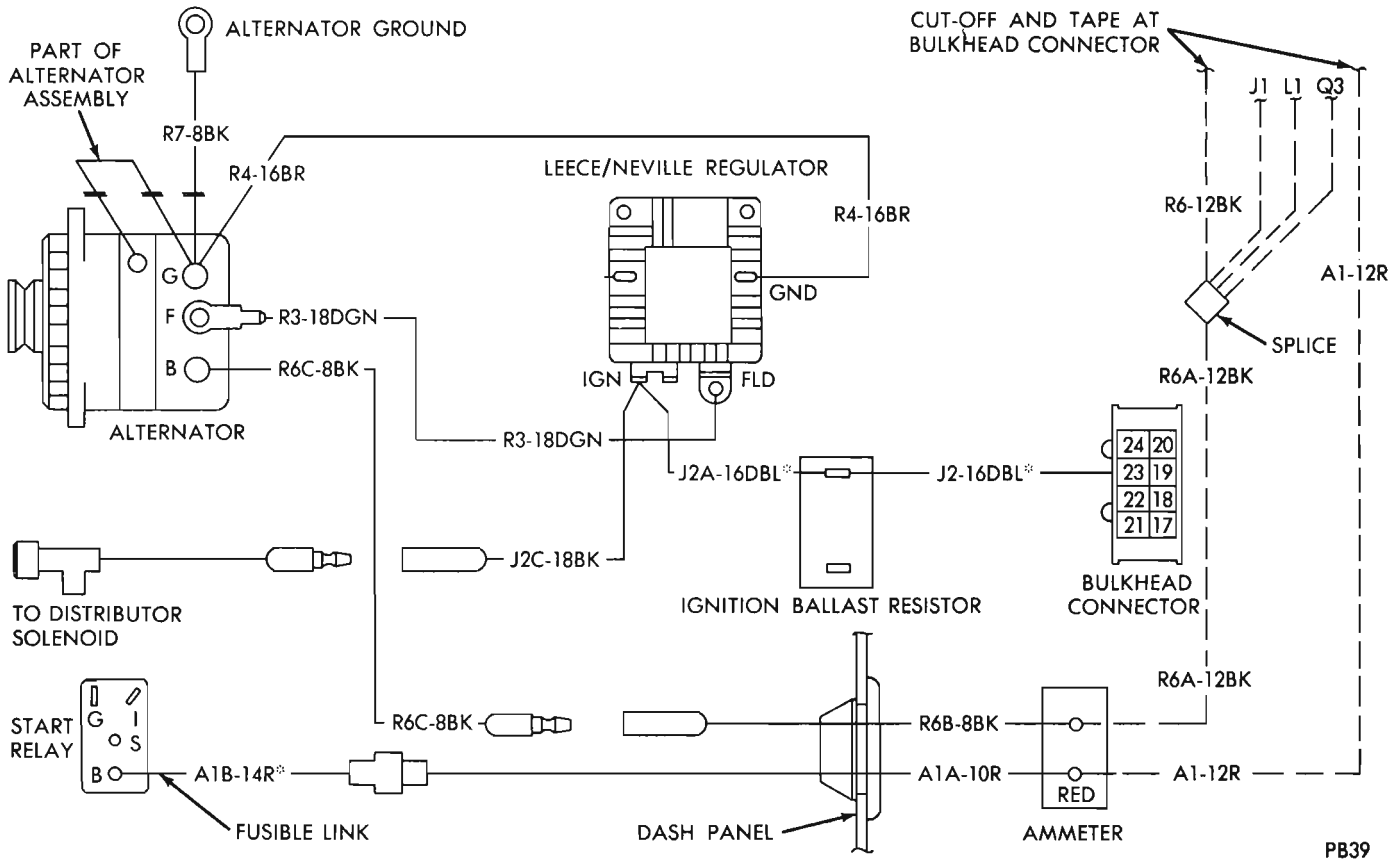


Fig. 11 - Engine Wiring 65 Ampere Leece Neville Alternator - Satellite

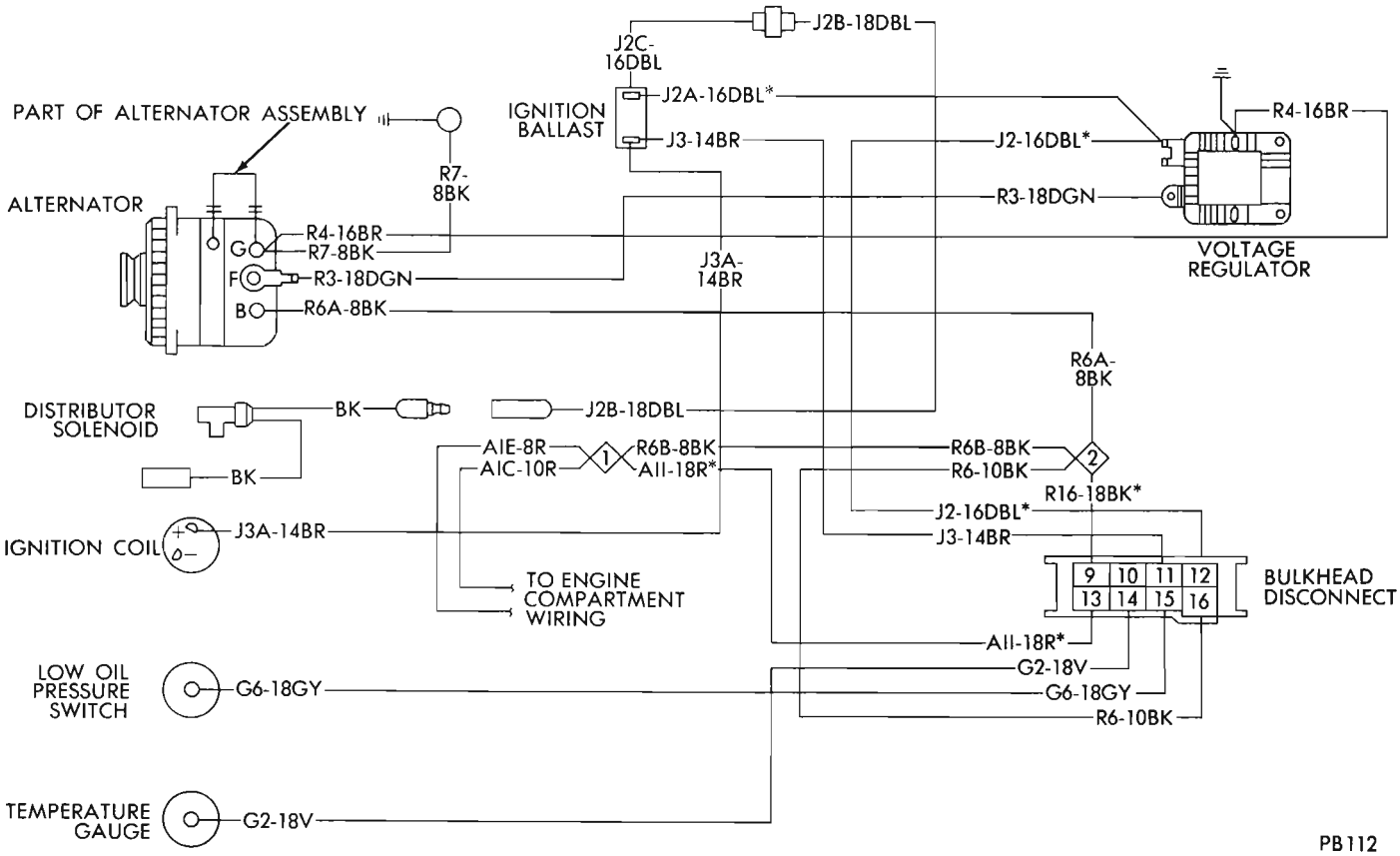


Fig. 12 - Engine Wiring 65 Ampere Leece Neville Alternator - Fury

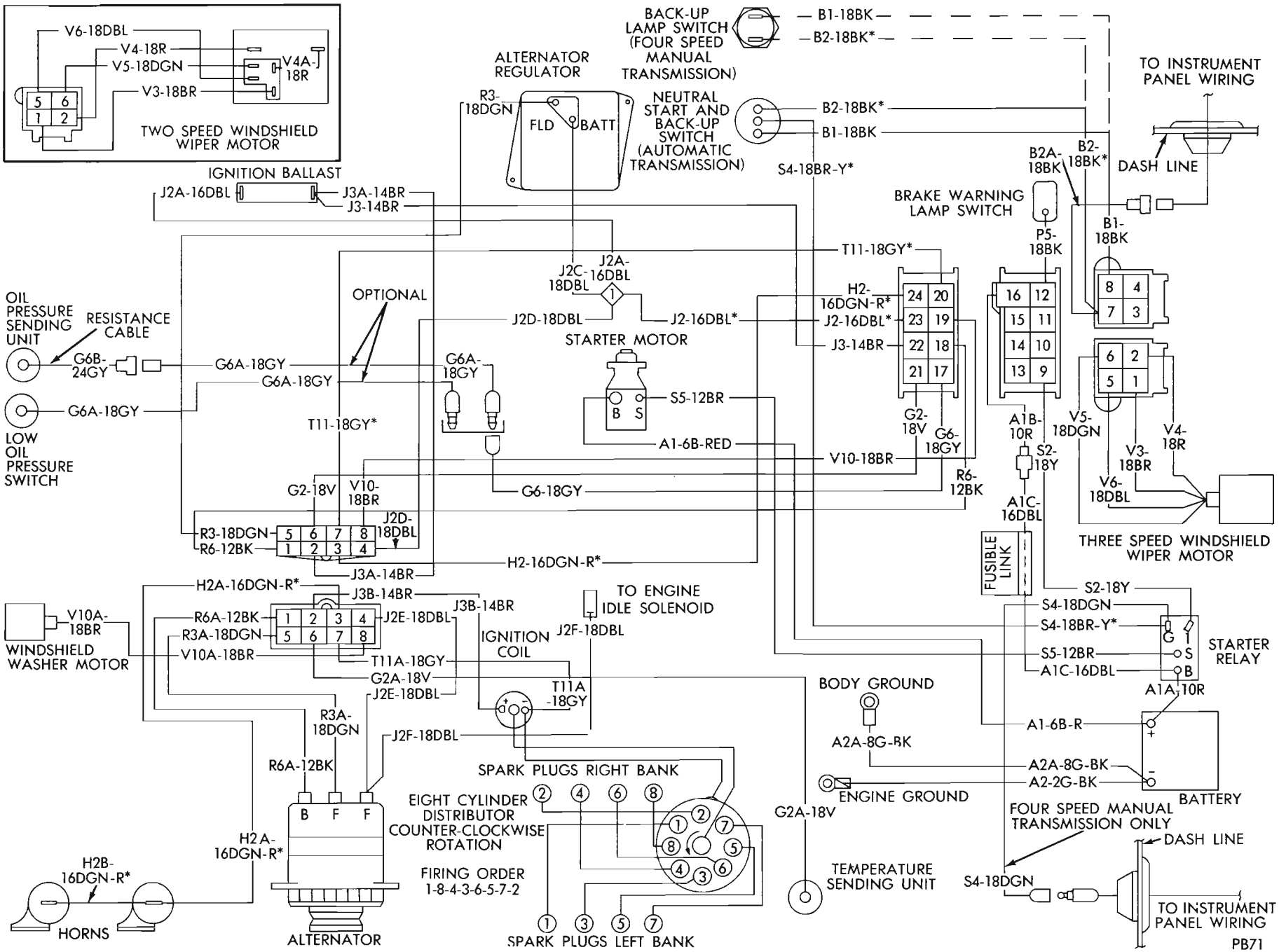


Fig. 13 - Engine Wiring - Hemi - Barracuda, Satellite

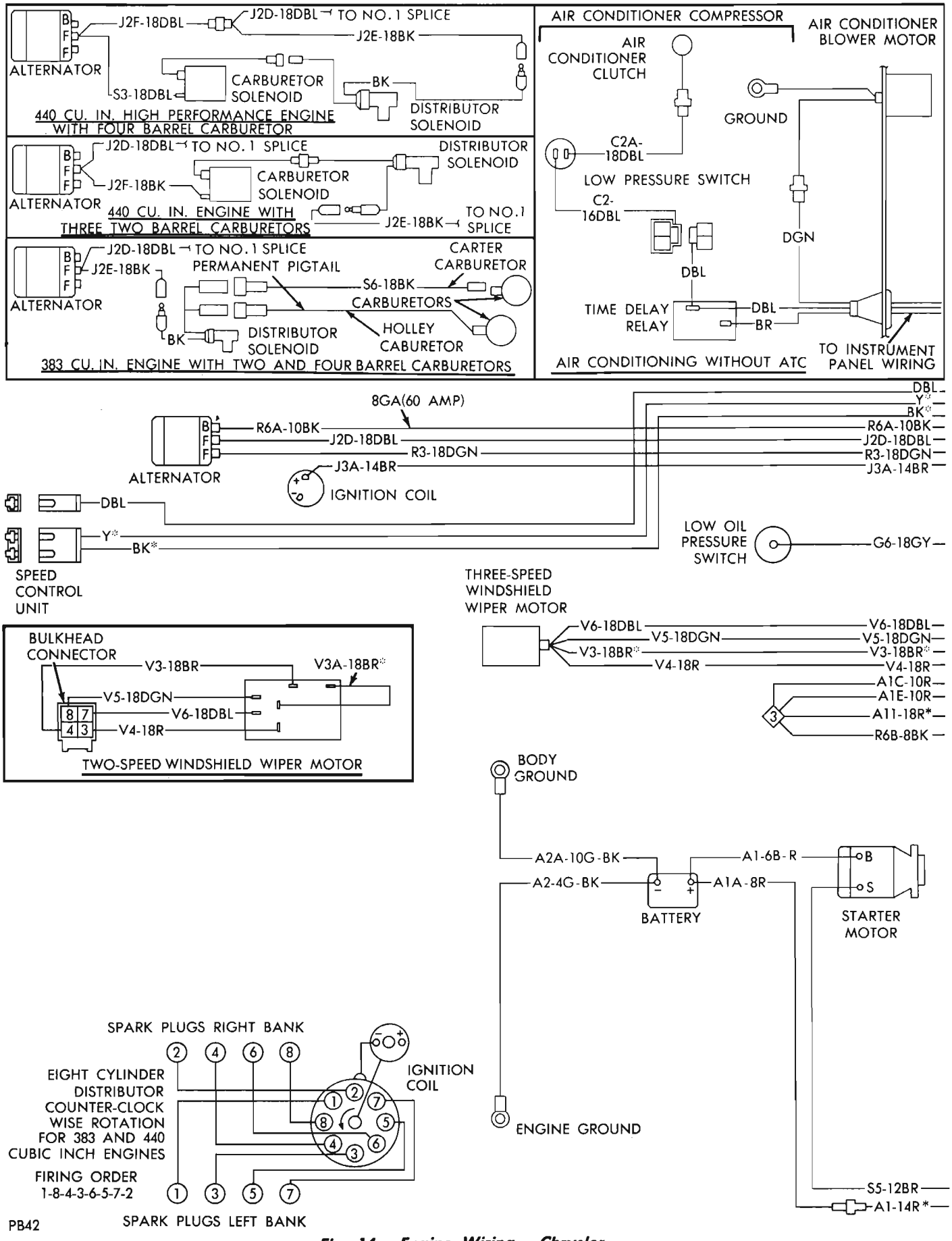


Fig. 14 - Engine Wiring - Chrysler

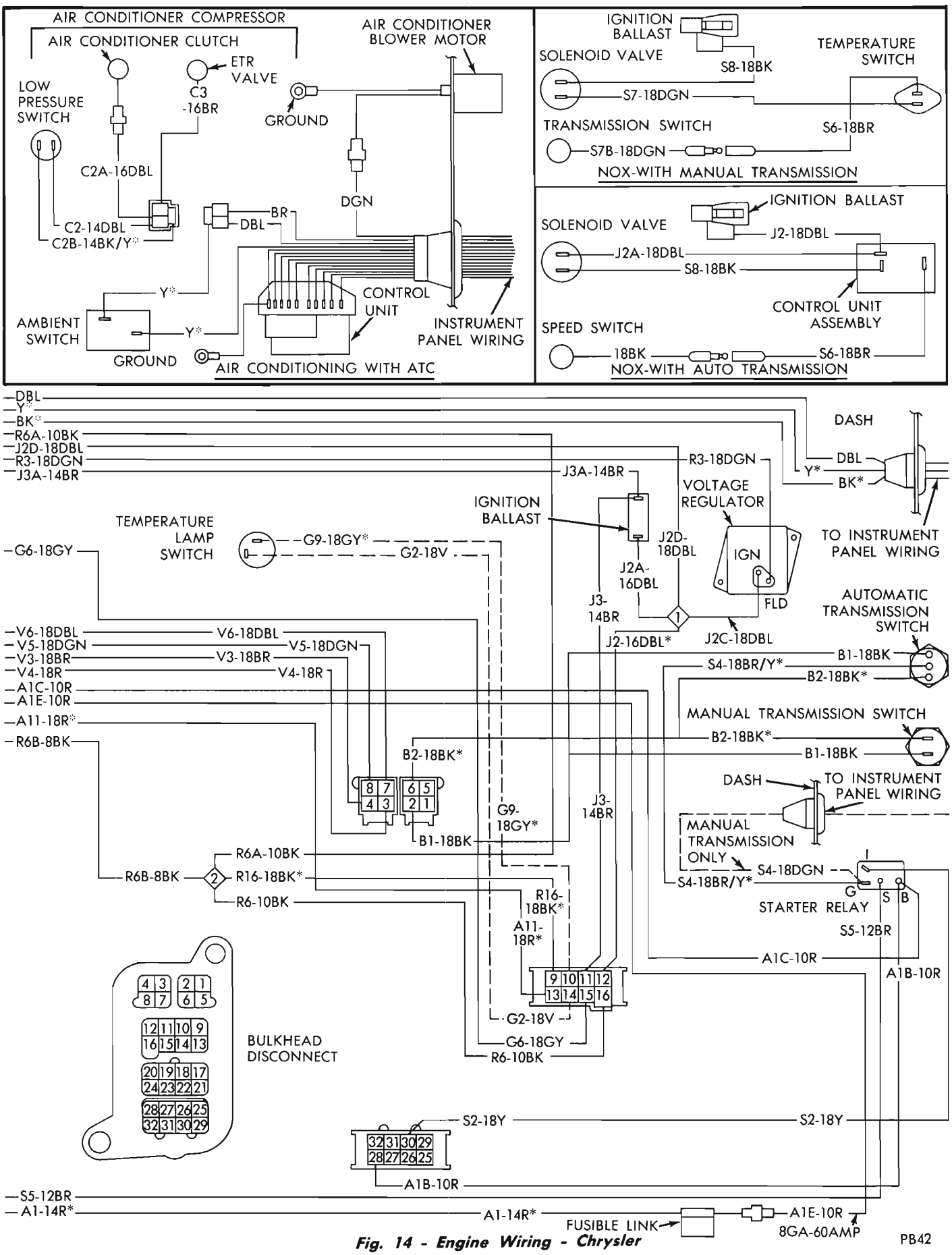


Fig. 14 - Engine Wiring - Chrysler

PB42

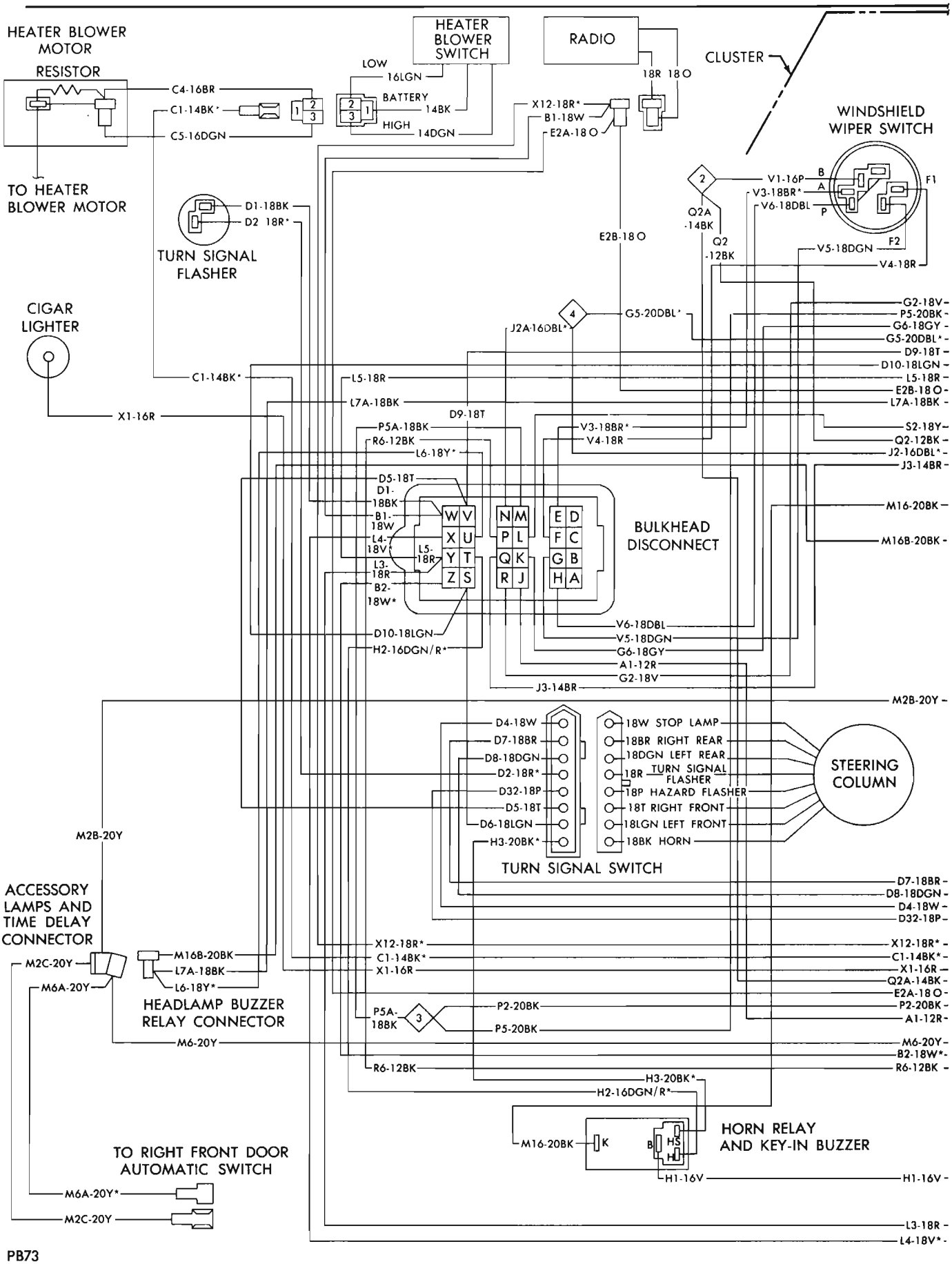


Fig. 15 - Instrument Panel Wiring - (Standard Cluster) - Valiant

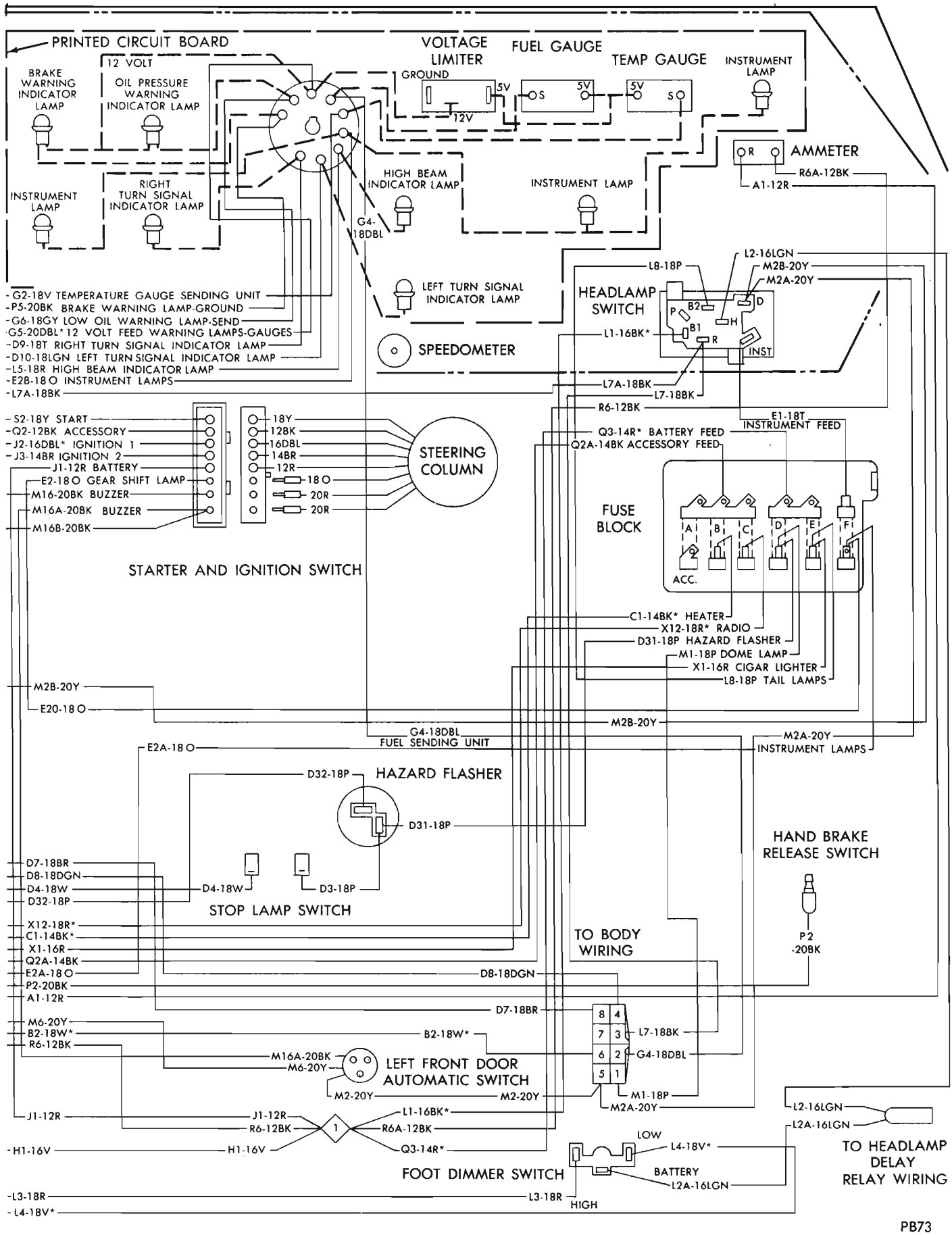


Fig. 15 - Instrument Panel Wiring - (Standard Cluster) - Valiant

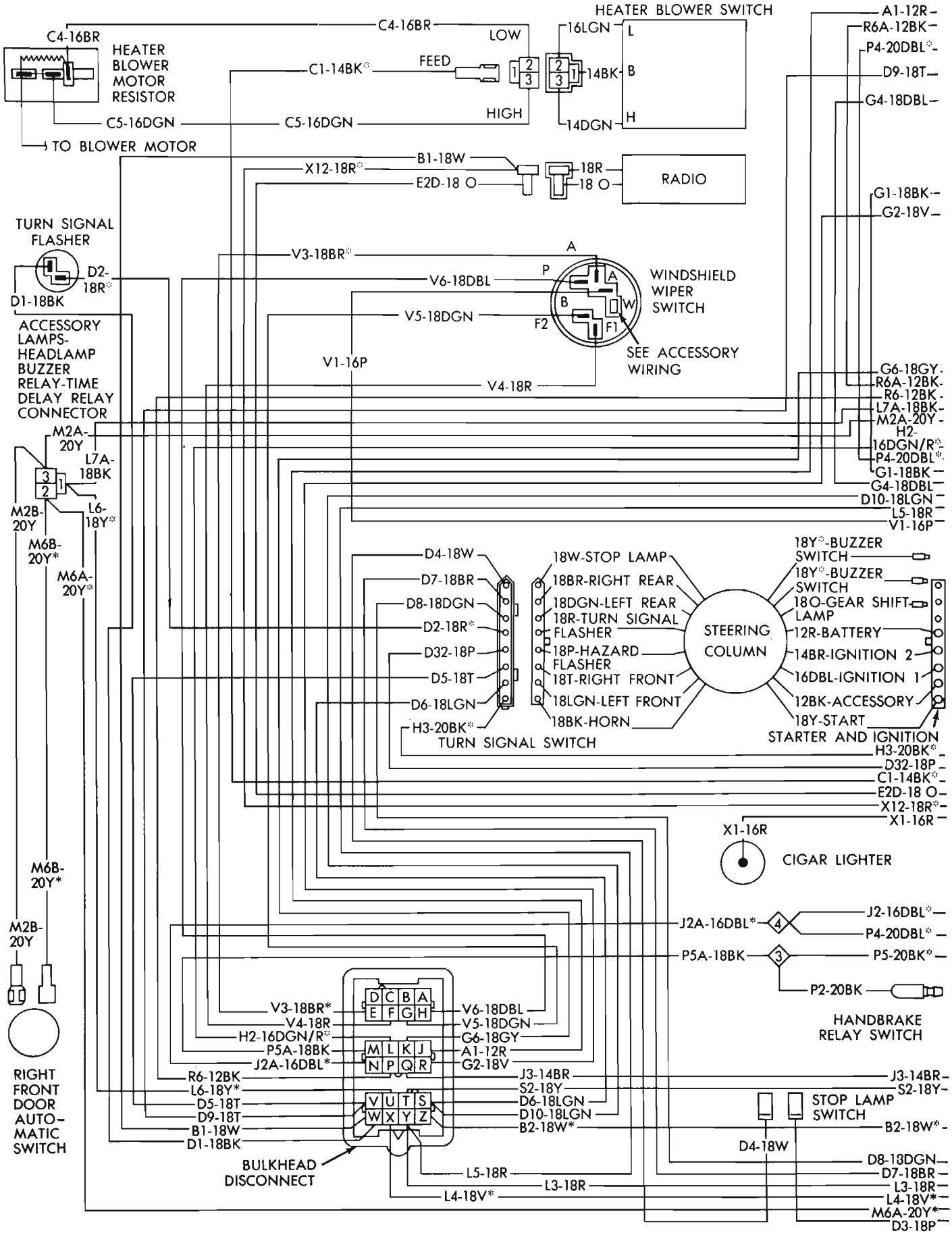


Fig. 16 - Instrument Panel Wiring - (Rallye Cluster) - Valiant

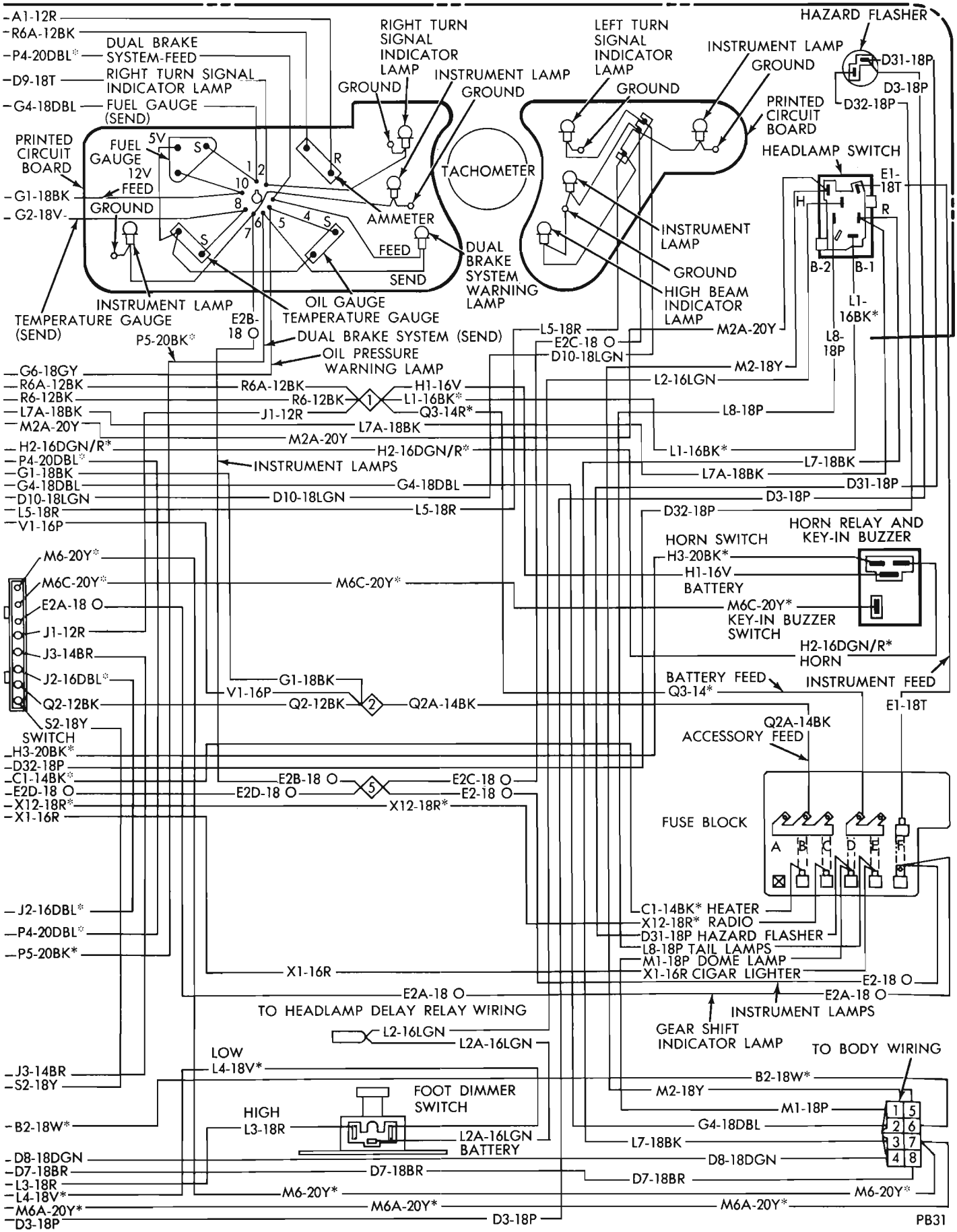


Fig. 16 - Instrument Panel Wiring - (Rallye Cluster) - Valiant

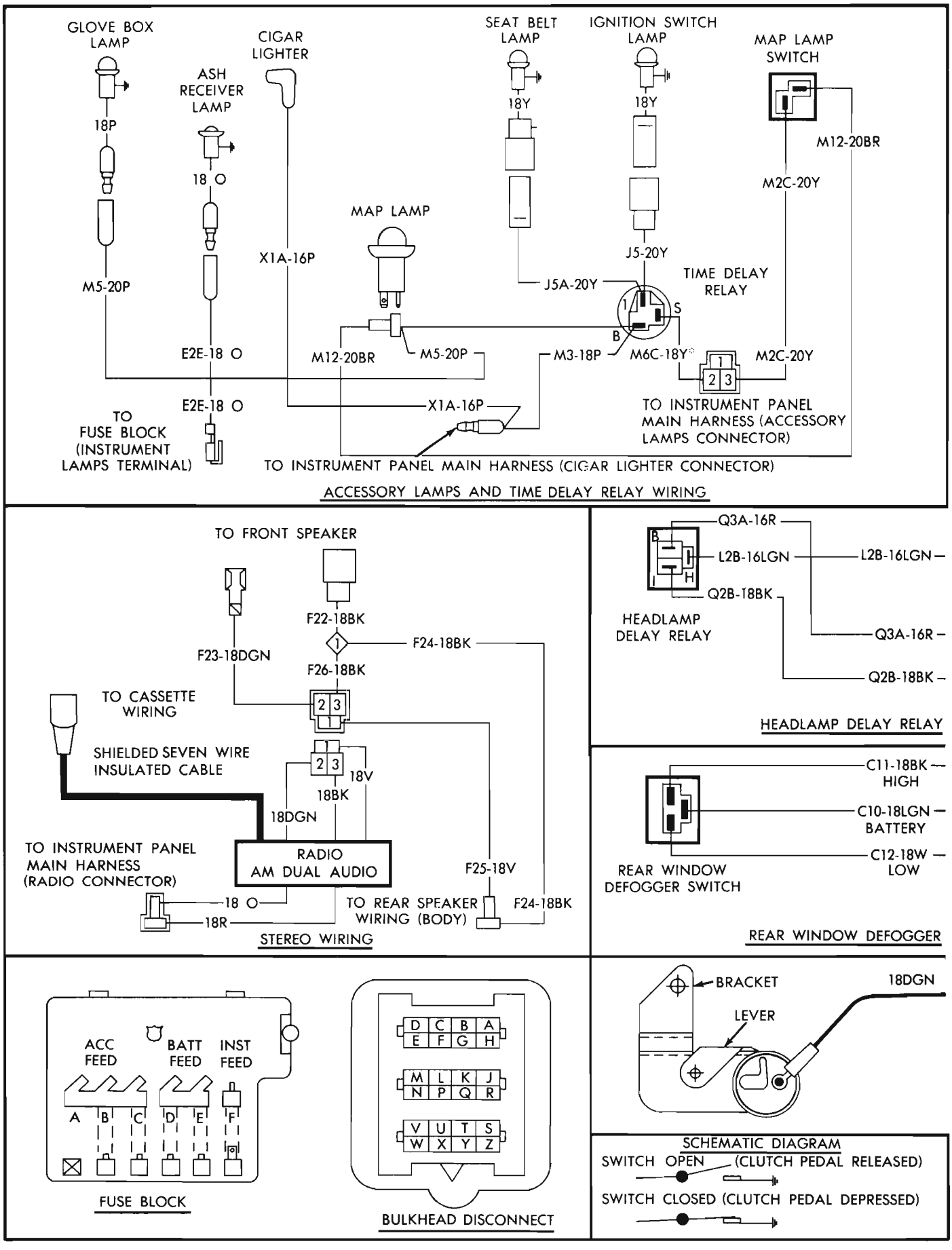


Fig. 17 - Instrument Panel Accessory Wiring - Valiant

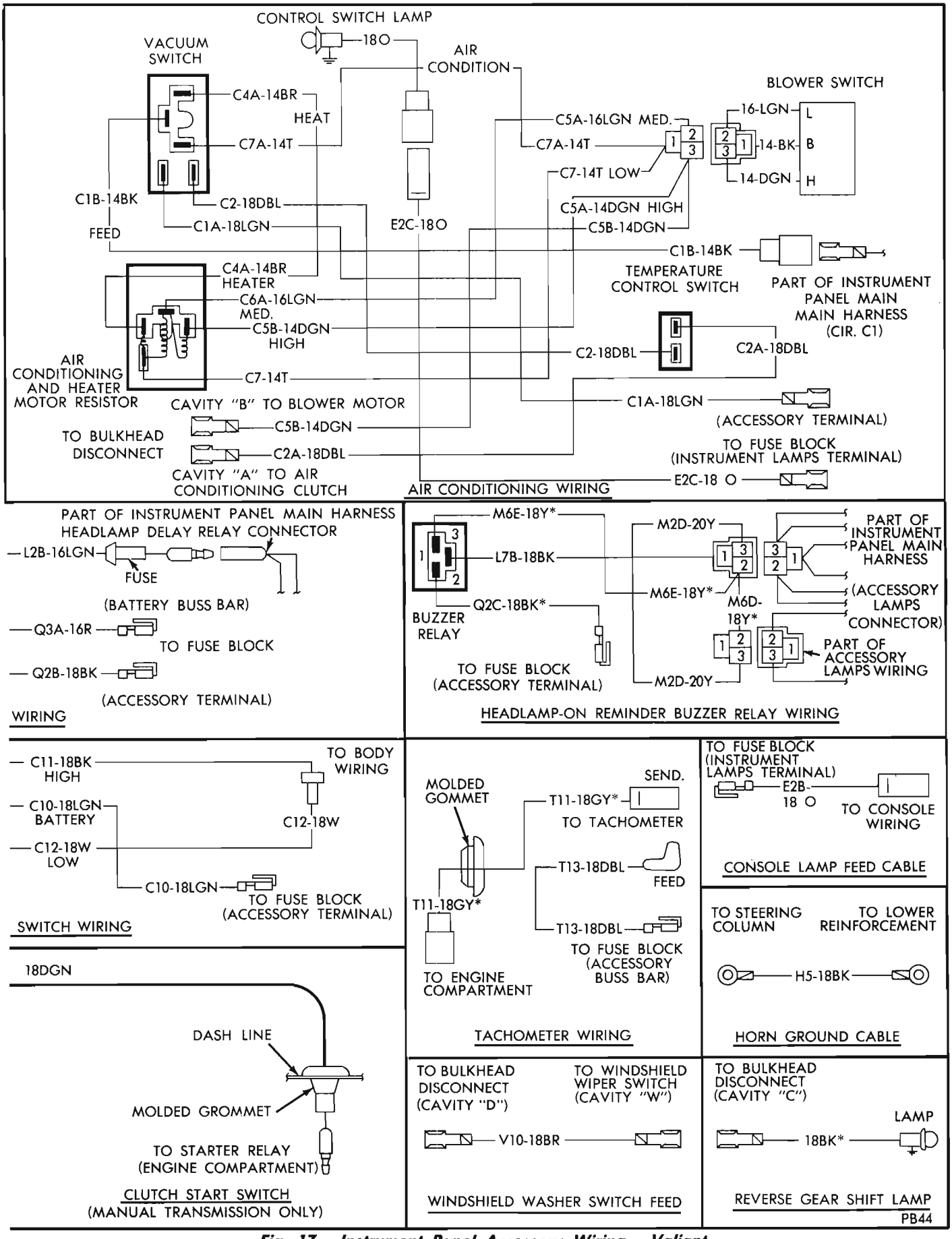


Fig. 17 - Instrument Panel Accessory Wiring - Valiant

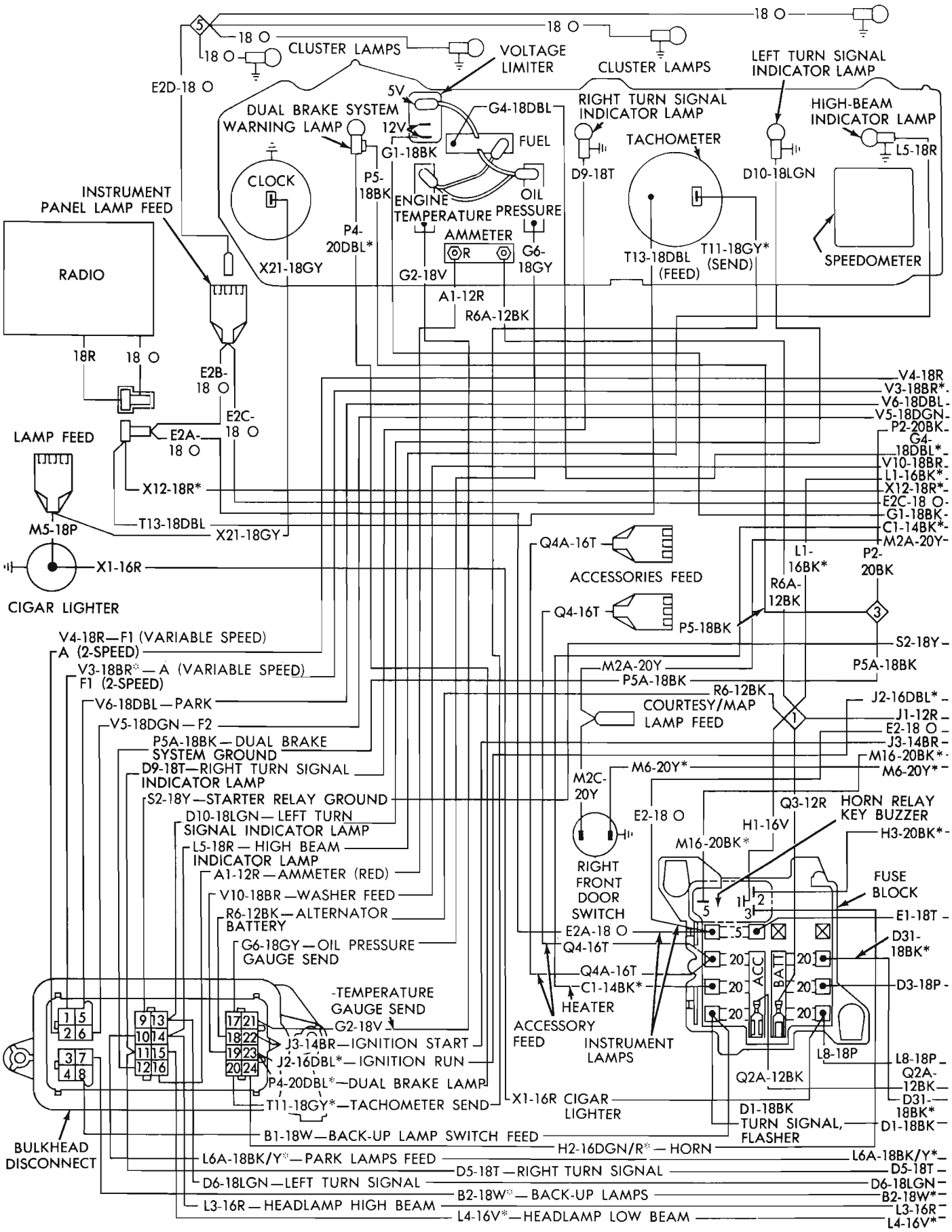


Fig. 18 - Instrument Panel Wiring - (Rallye Cluster) - Barracuda

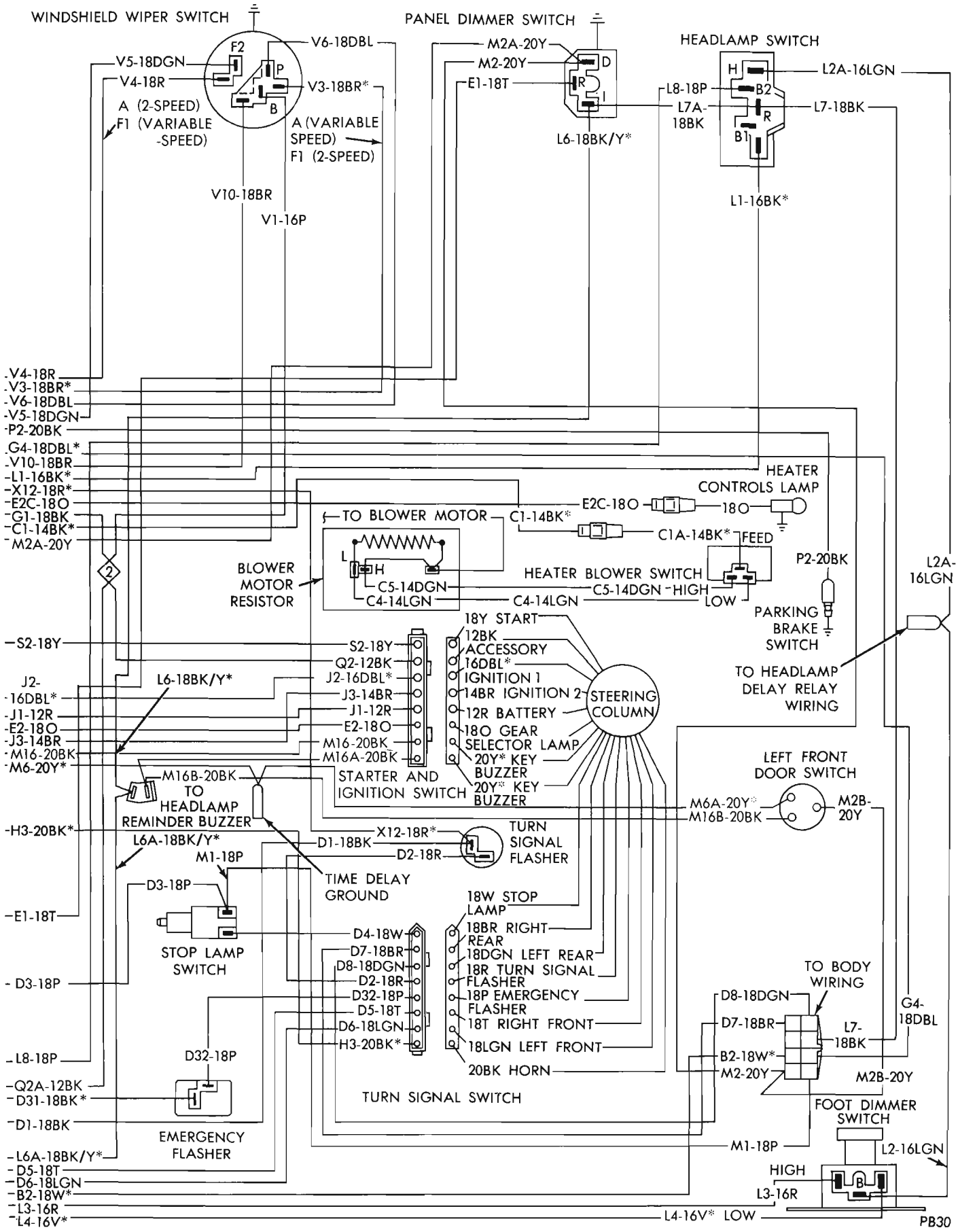


Fig. 18 - Instrument Panel Wiring - (Rallye Cluster) - Barracuda

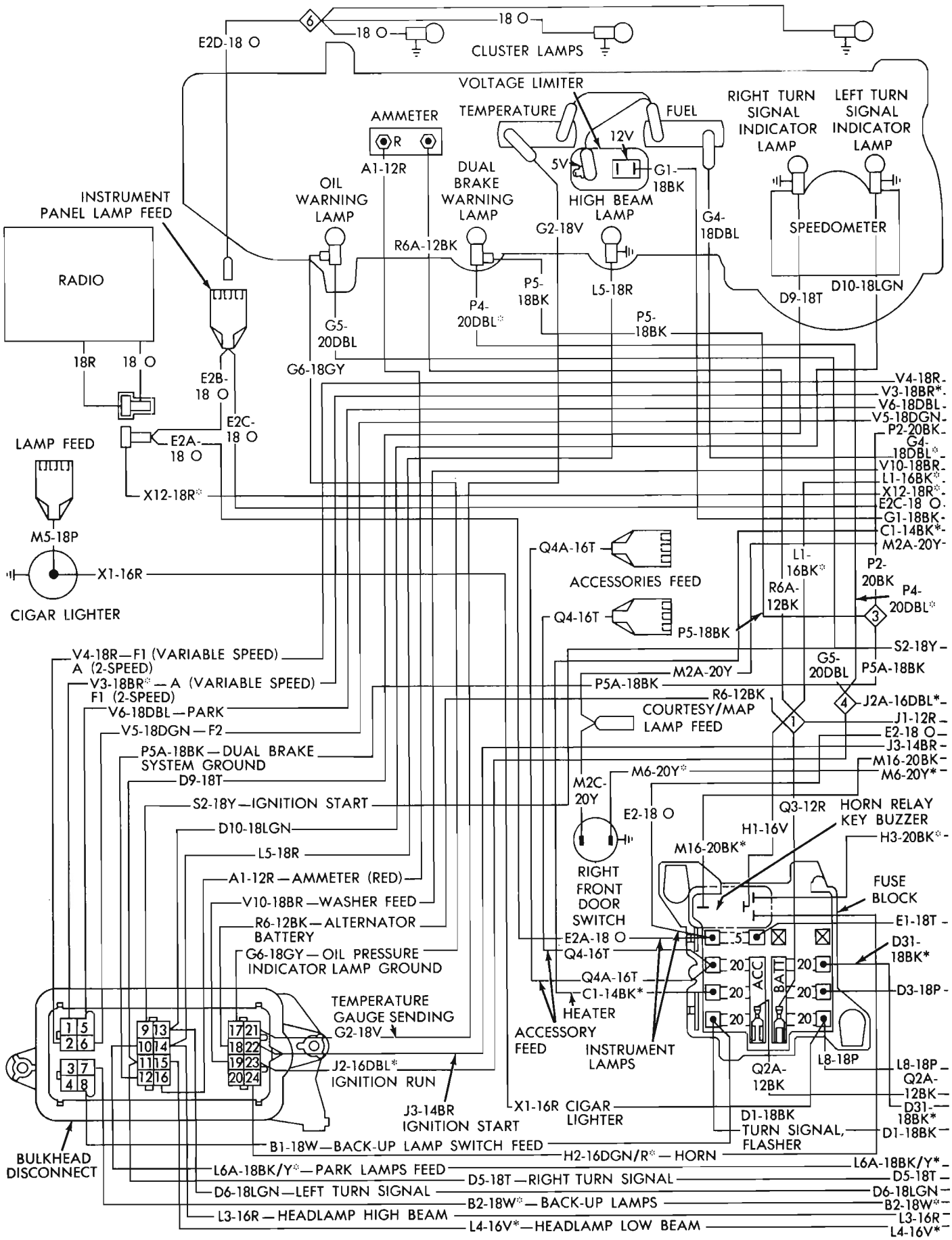


Fig. 19 - Instrument Panel Wiring - (Standard Cluster) - Barracuda

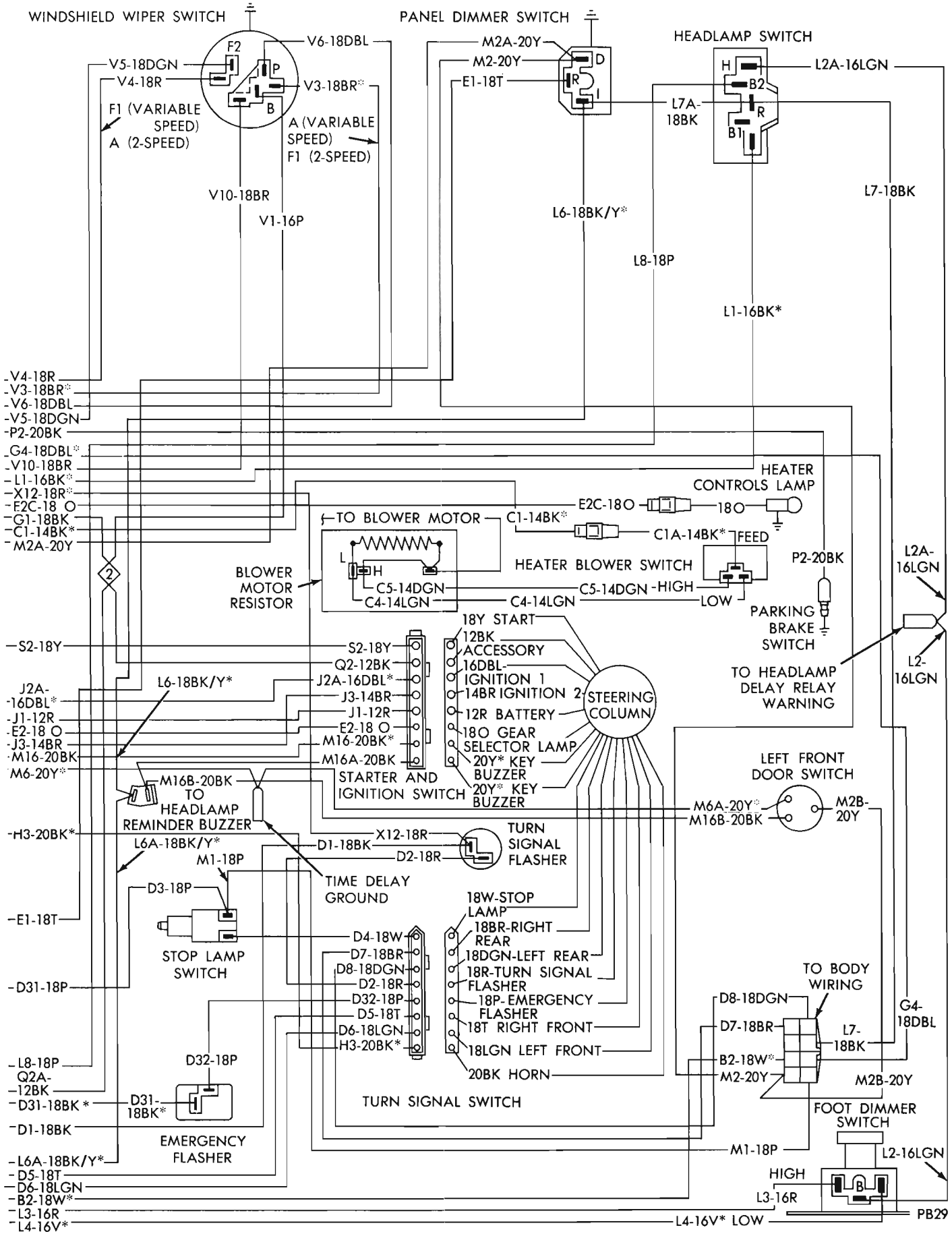


Fig. 19 - Instrument Panel Wiring - (Standard Cluster) - Barracuda

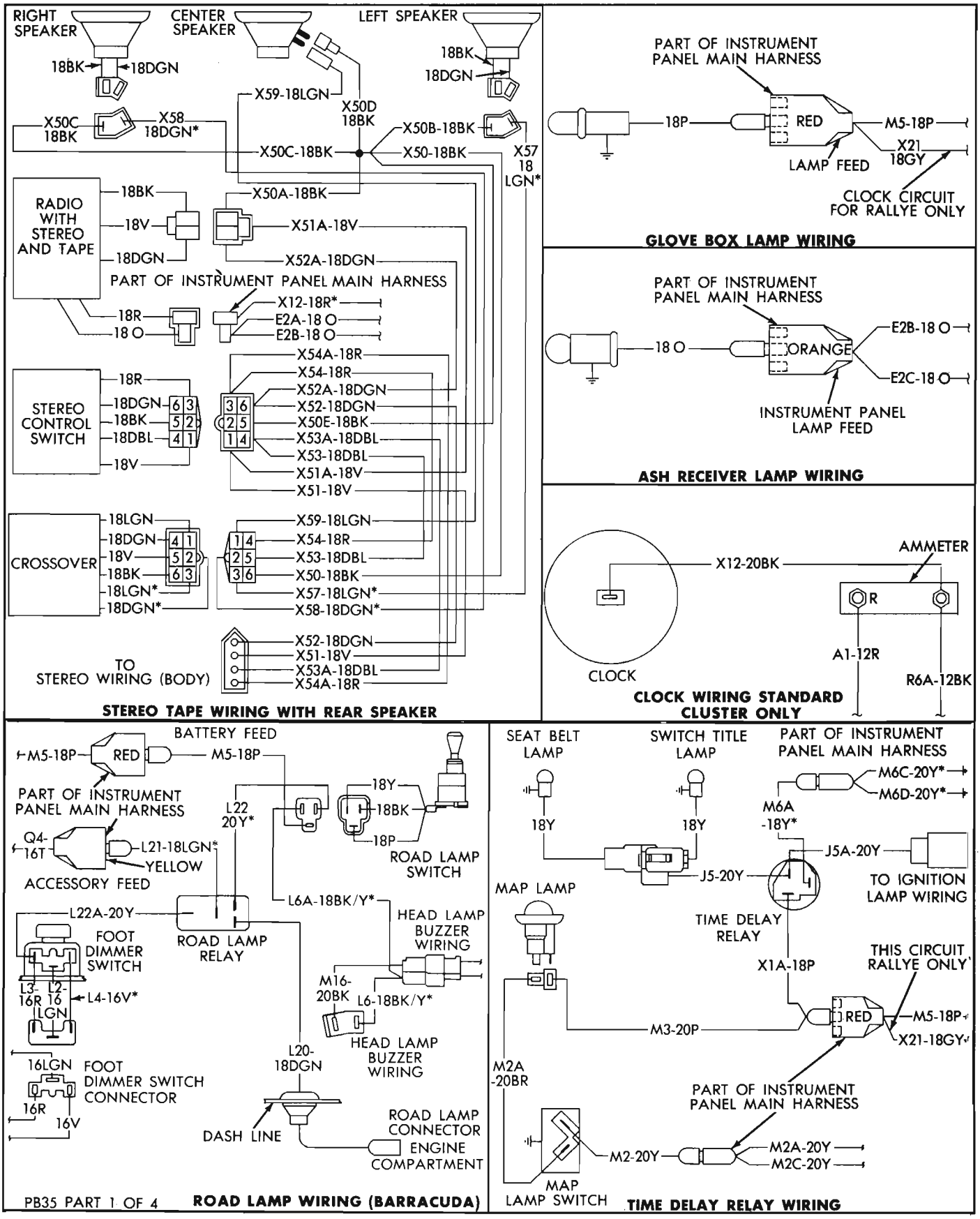


Fig. 20 - Instrument Panel Accessory Wiring - Barracuda

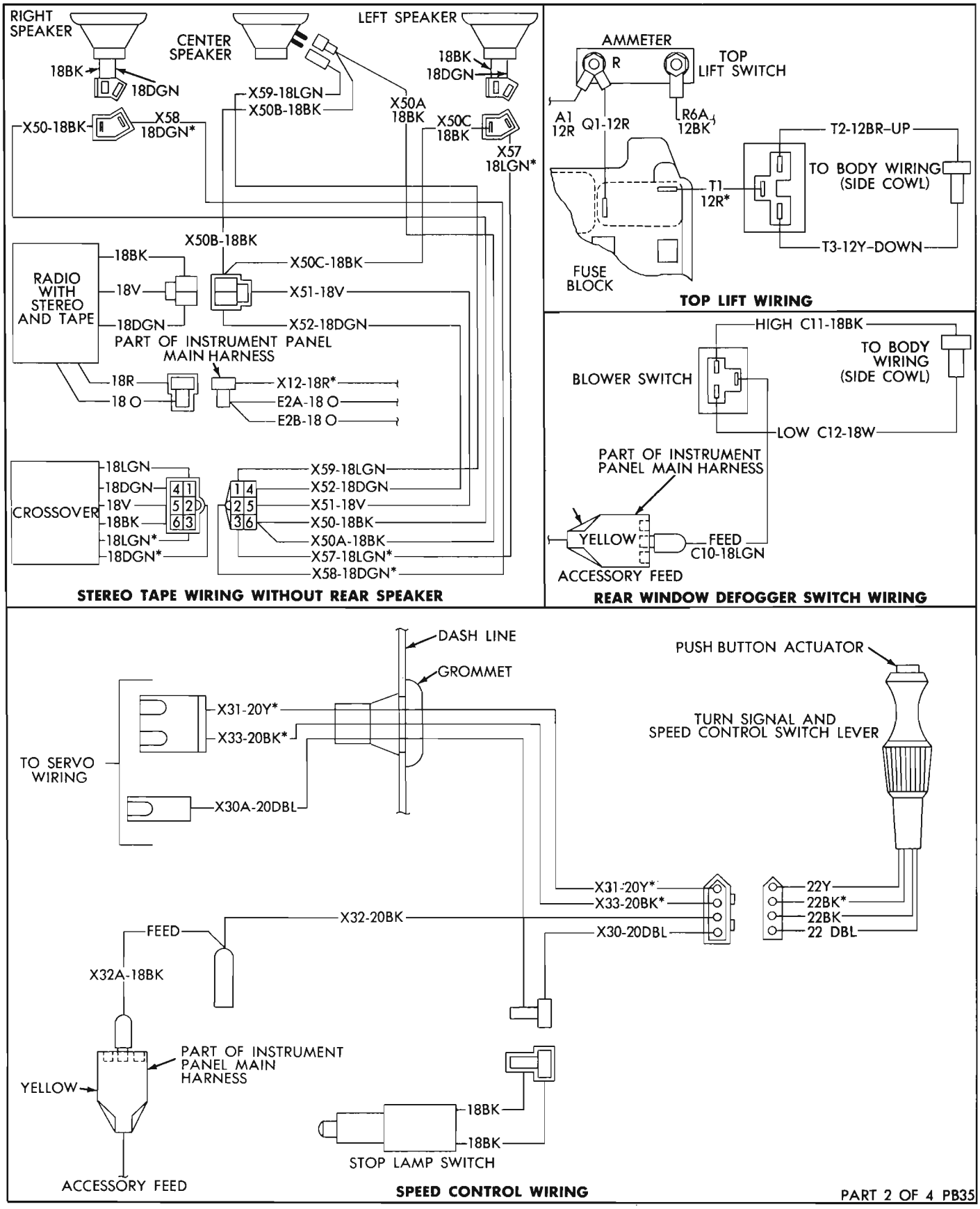


Fig. 20 - Instrument Panel Accessory Wiring - Barracuda

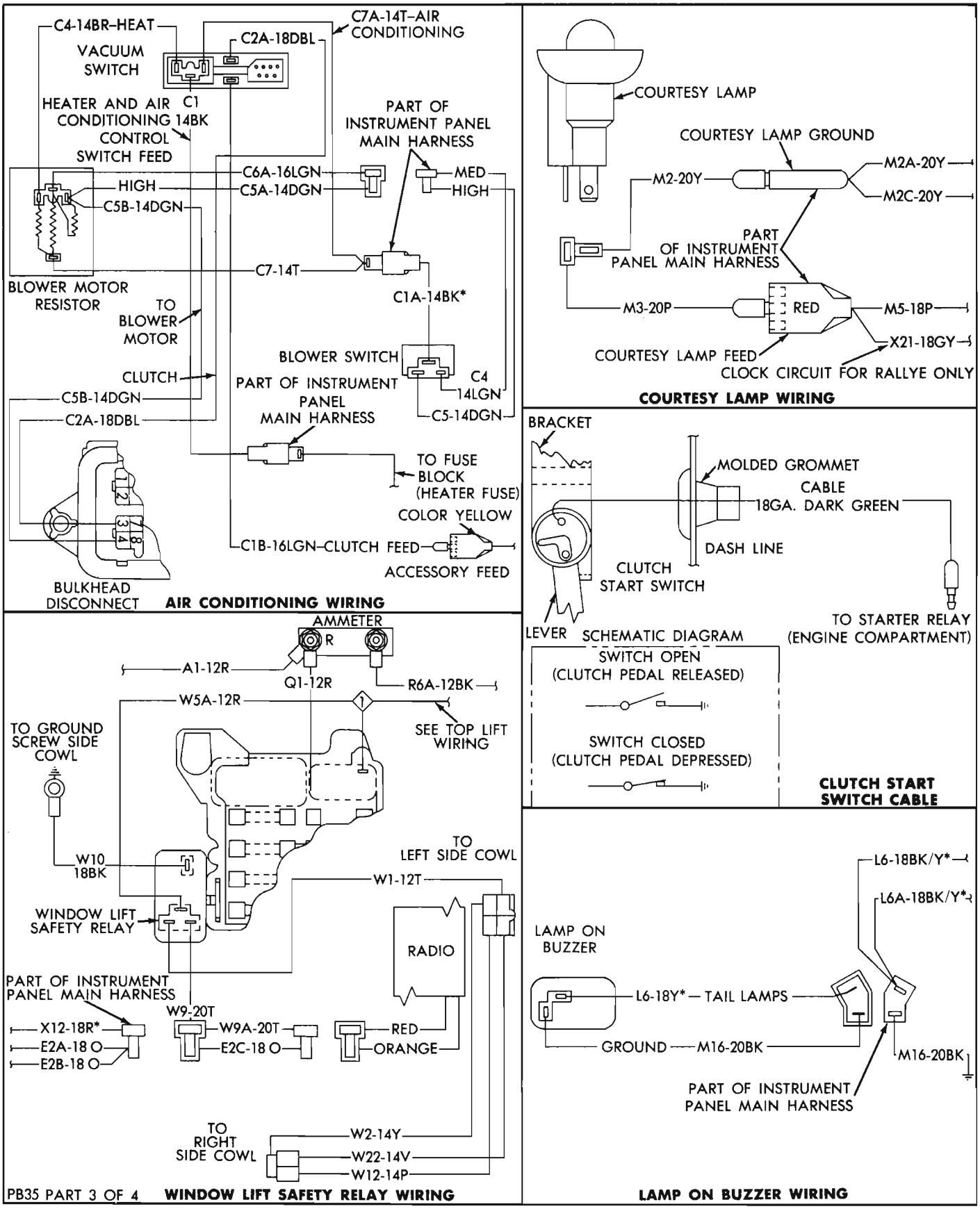


Fig. 20 - Instrument Panel Accessory Wiring - Barracuda

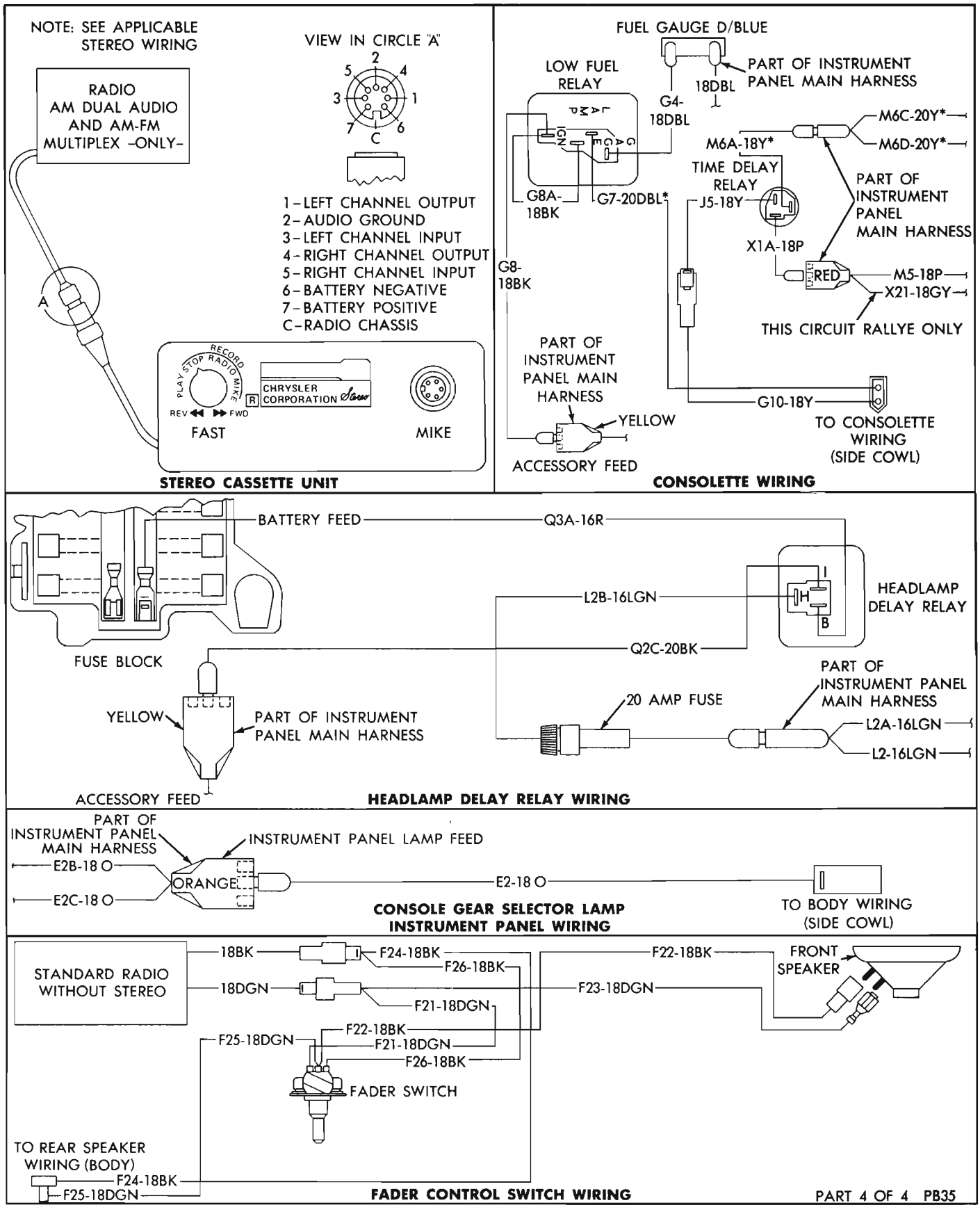


Fig. 20 - Instrument Panel Accessory Wiring - Barracuda

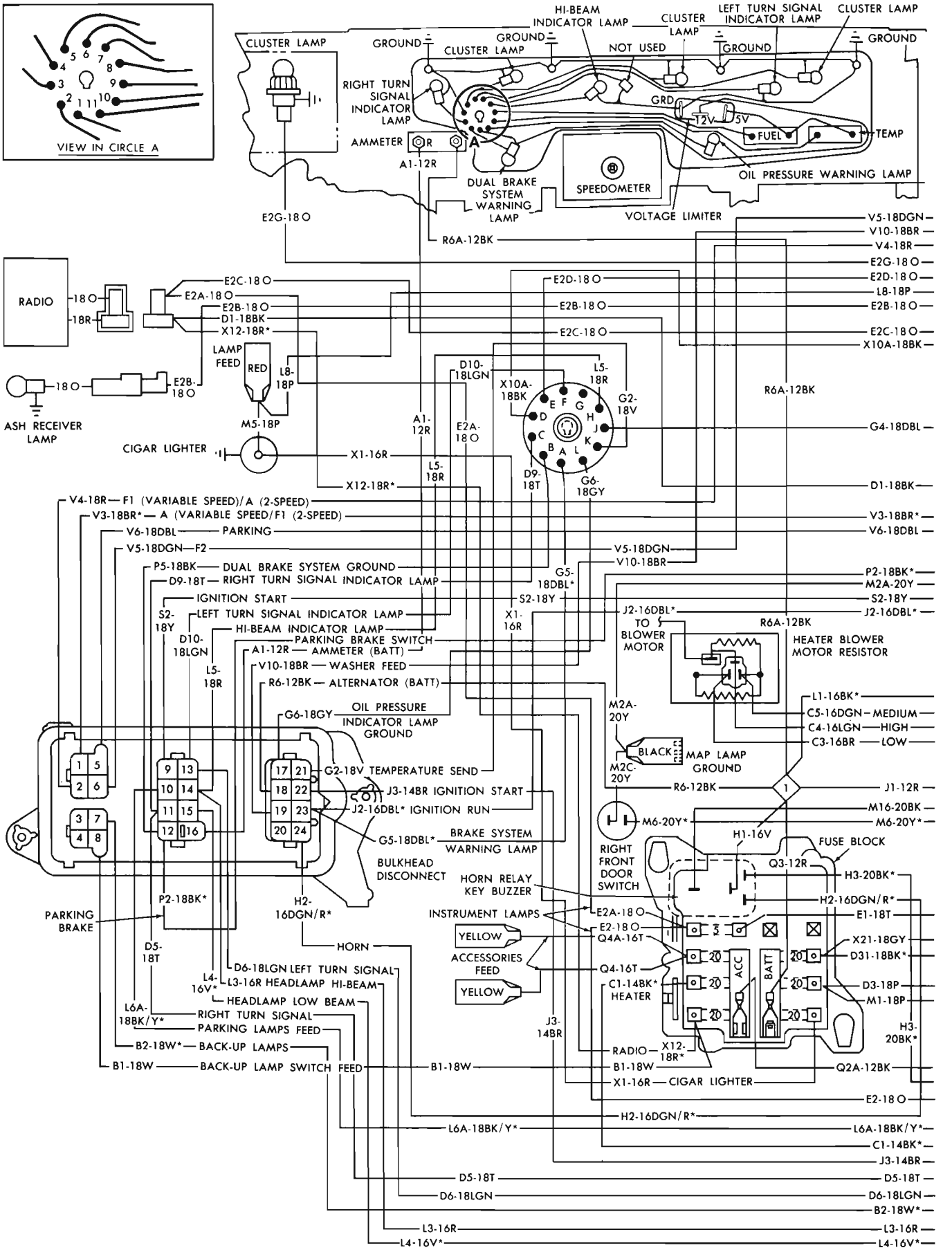


Fig. 21 - Instrument Panel Wiring - (Standard Cluster) - Satellite

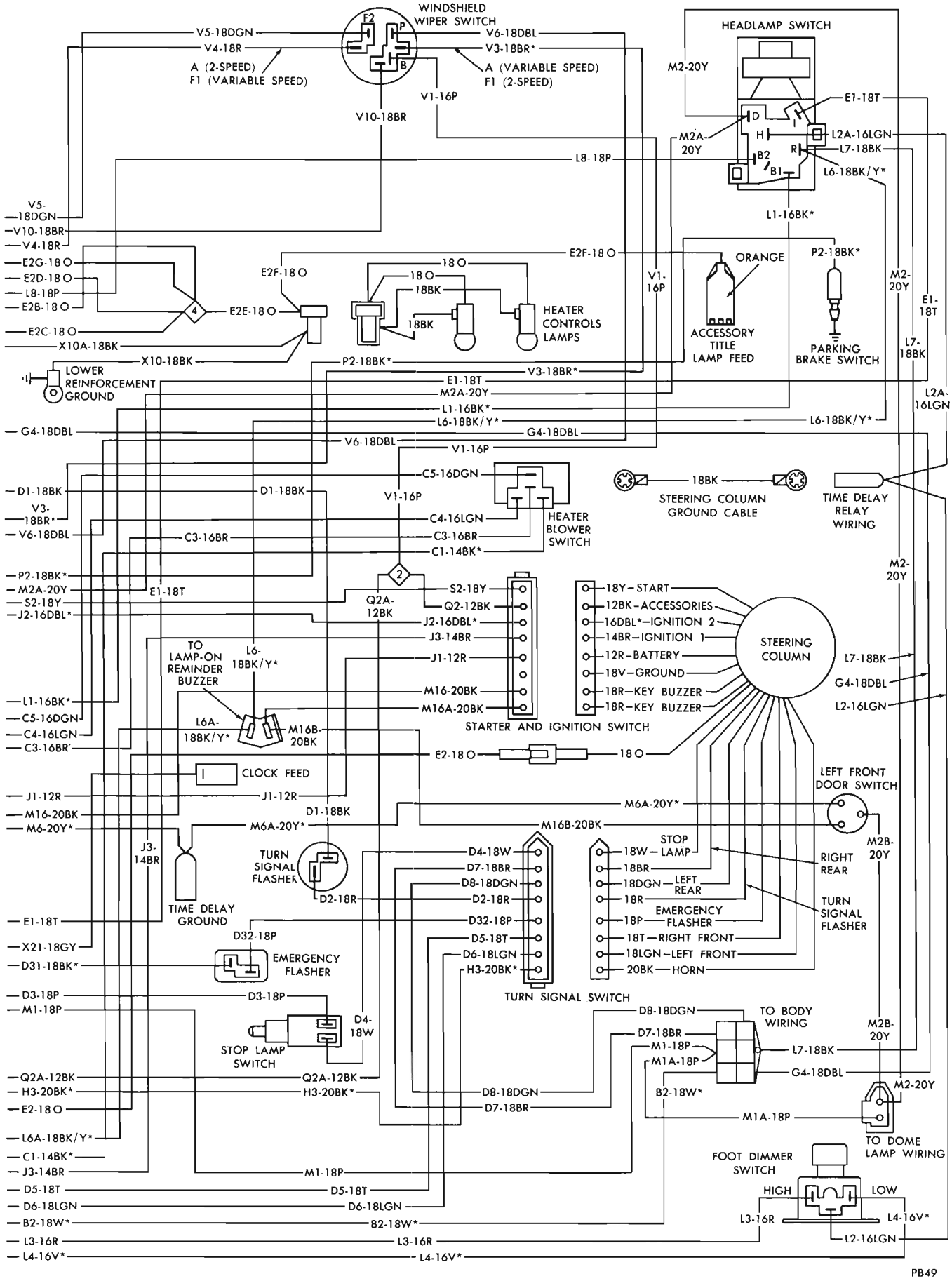


Fig. 21 - Instrument Panel Wiring - (Standard Cluster) - Satellite

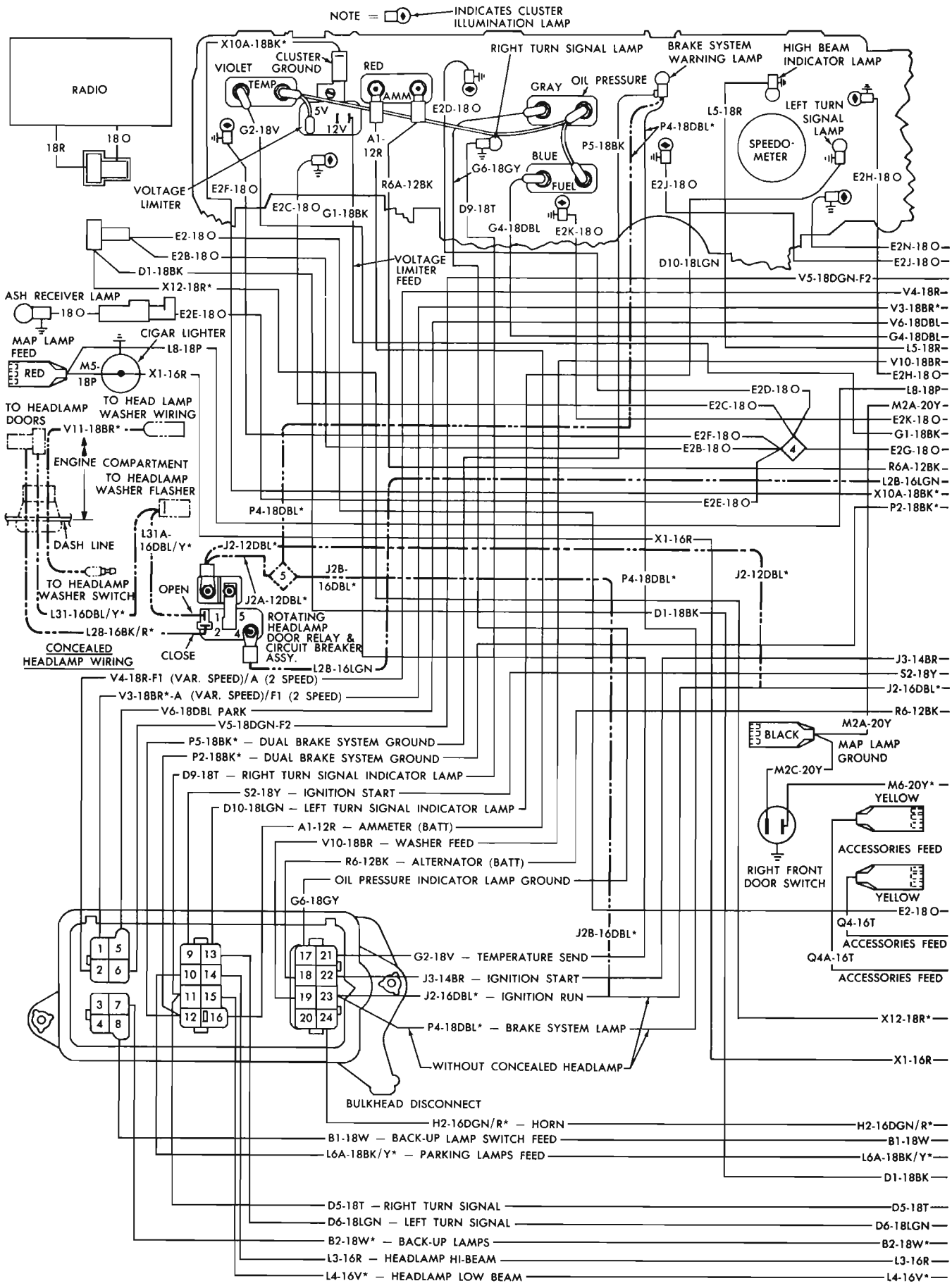


Fig. 22 - Instrument Panel Wiring - (Rallye Cluster) - Satellite

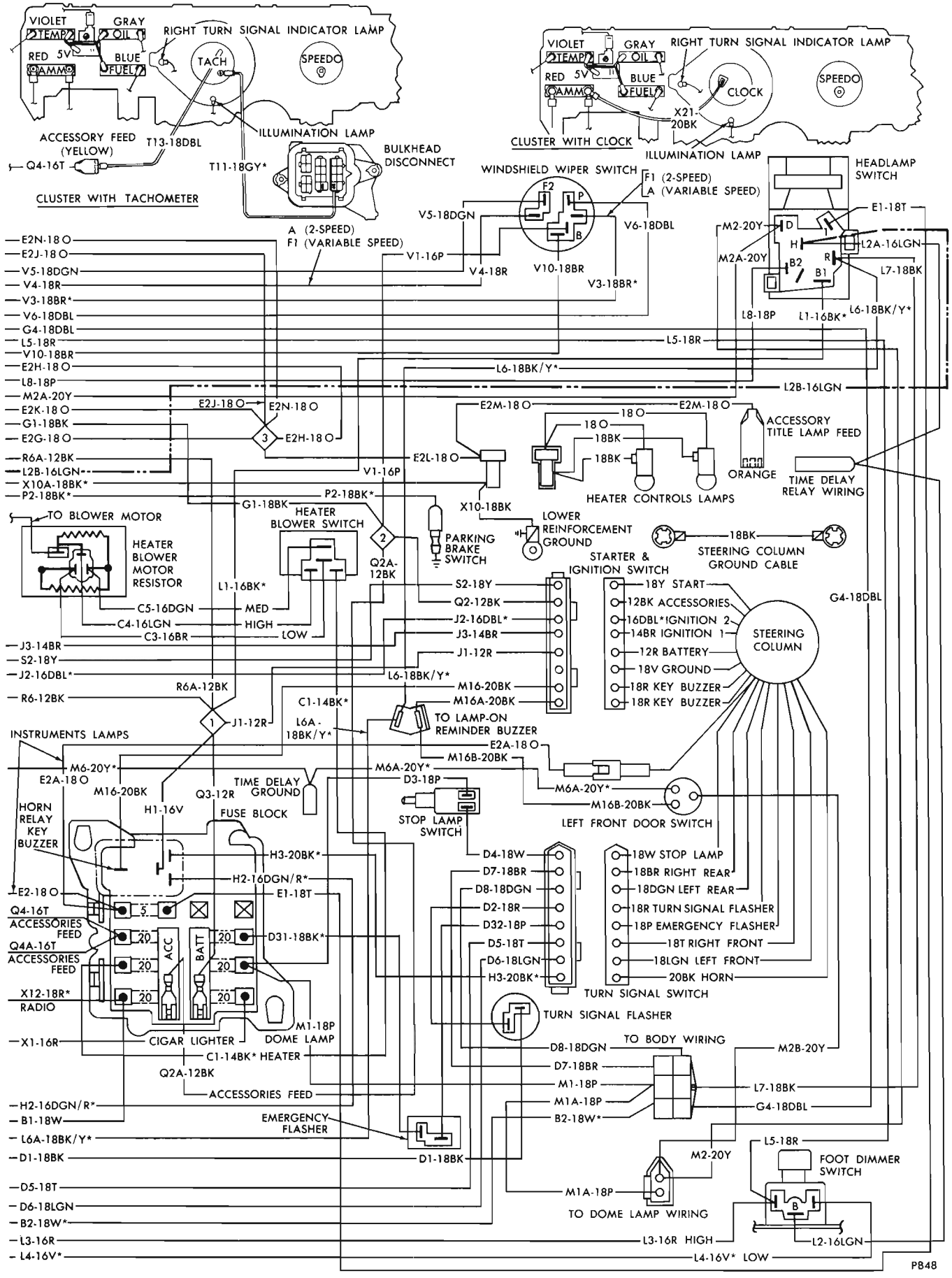


Fig. 22 - Instrument Panel Wiring - (Rallye Cluster) - Satellite

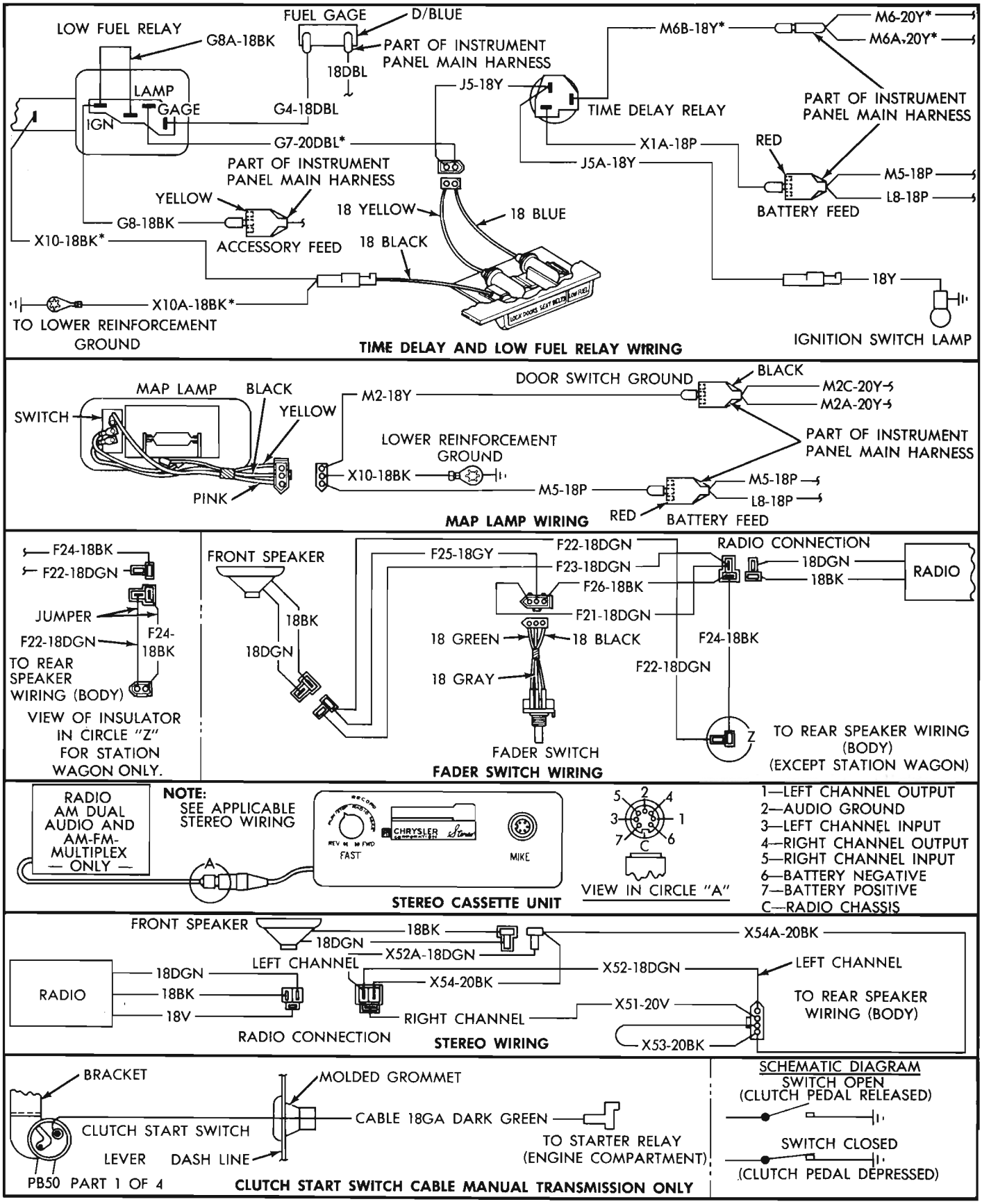


Fig. 23 - Instrument Panel Accessory Wiring - Satellite

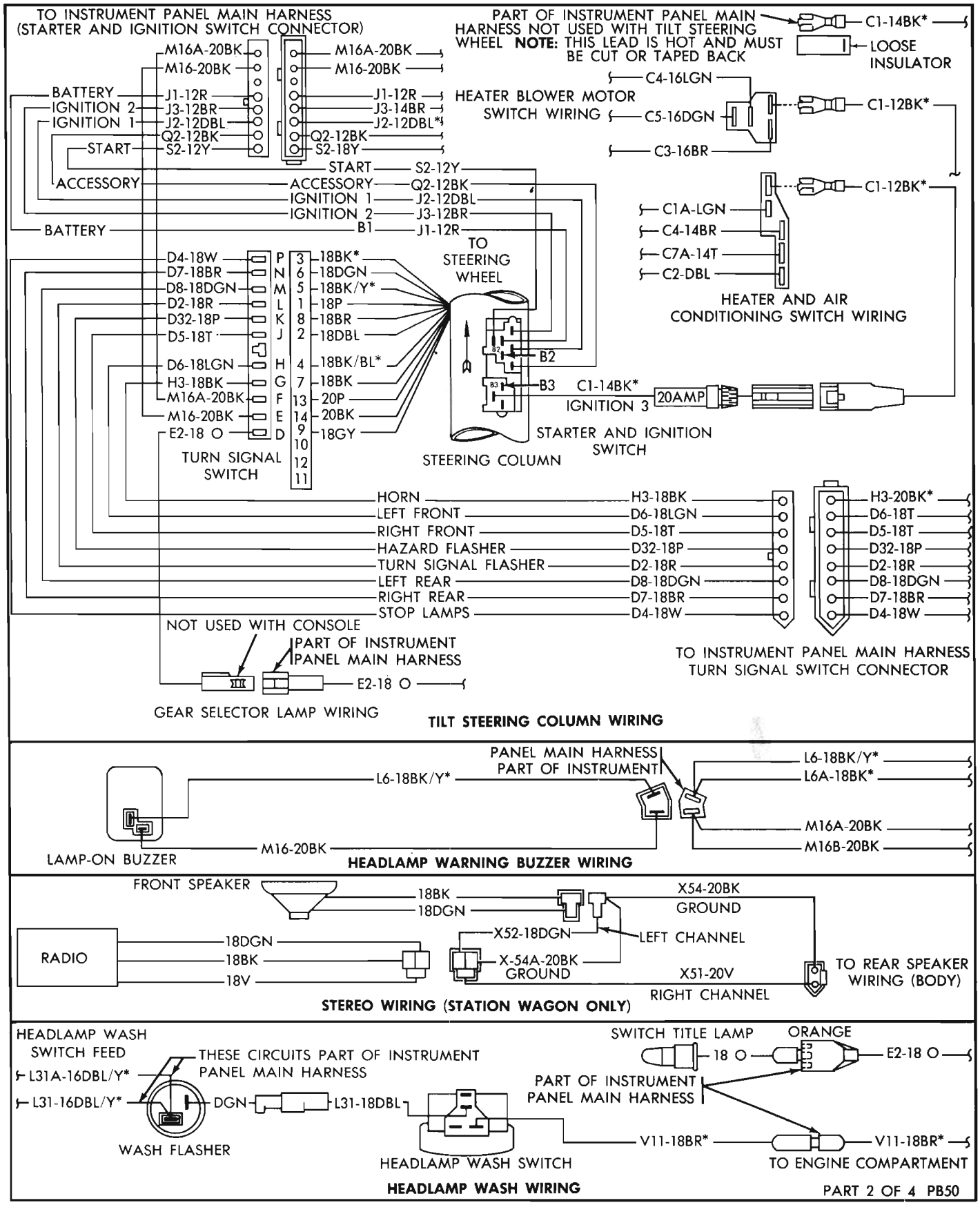


Fig. 23 - Instrument Panel Accessory Wiring - Satellite

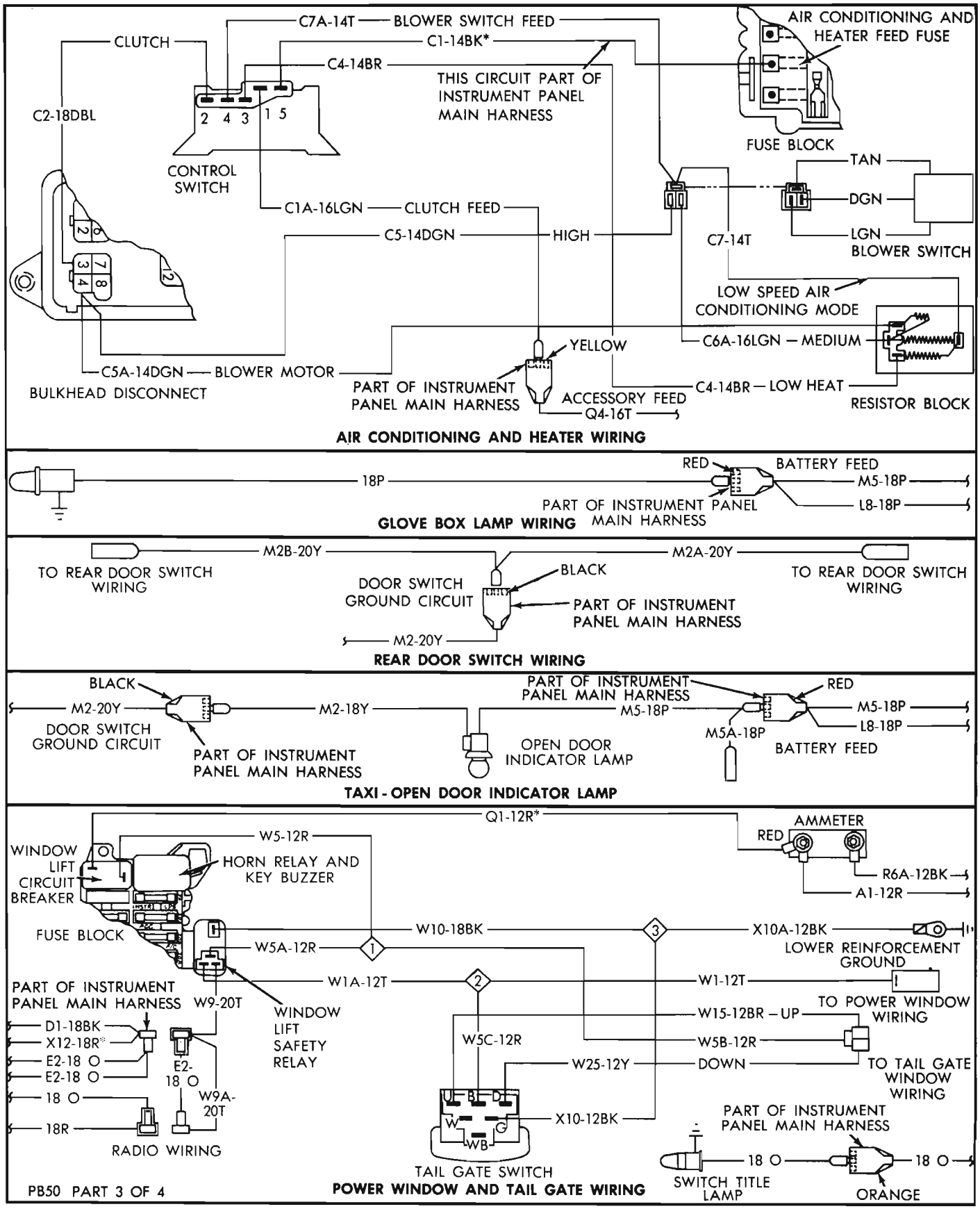


Fig. 23 - Instrument Panel Accessory Wiring - Satellite

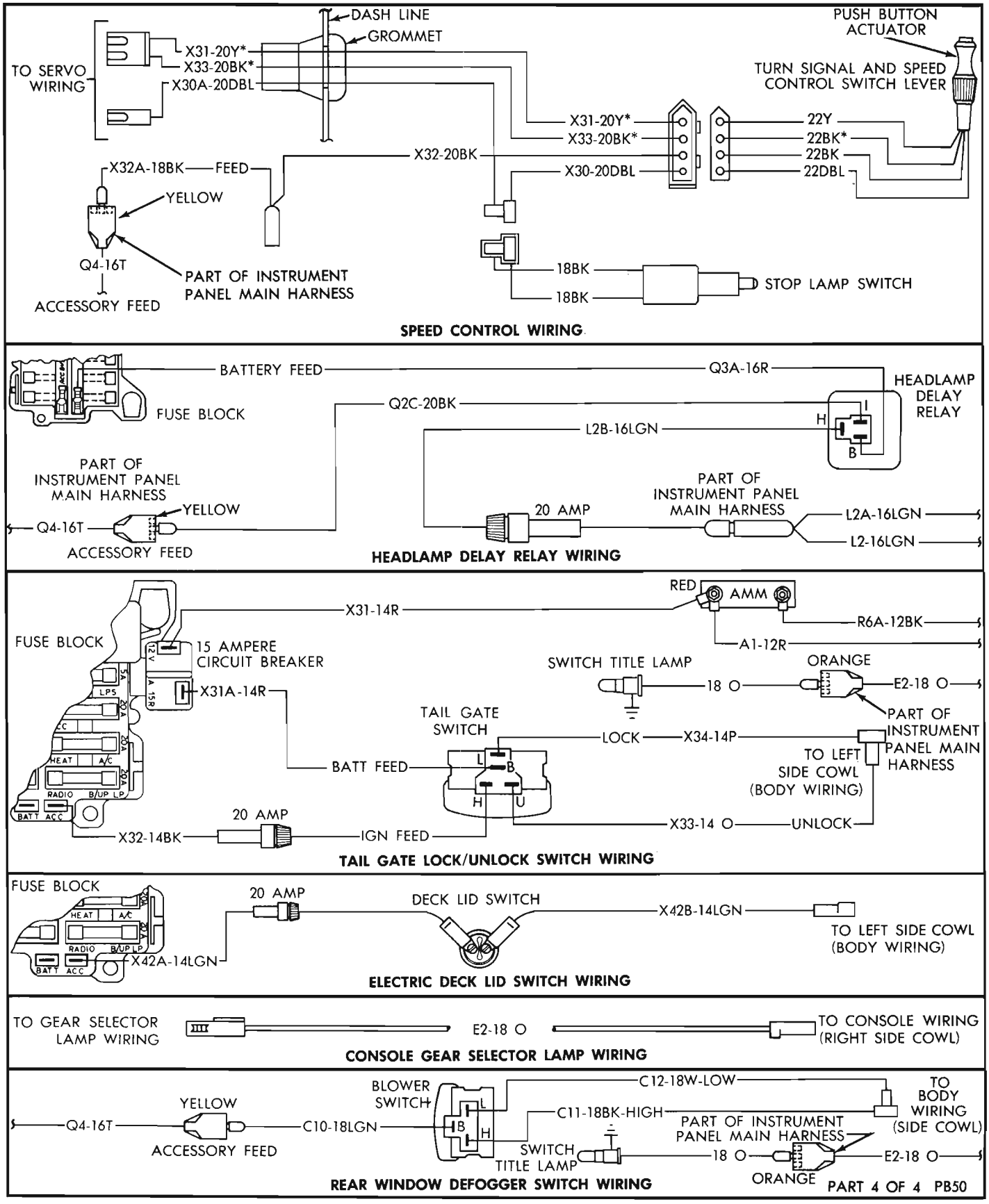


Fig. 23 - Instrument Panel Accessory Wiring - Satellite

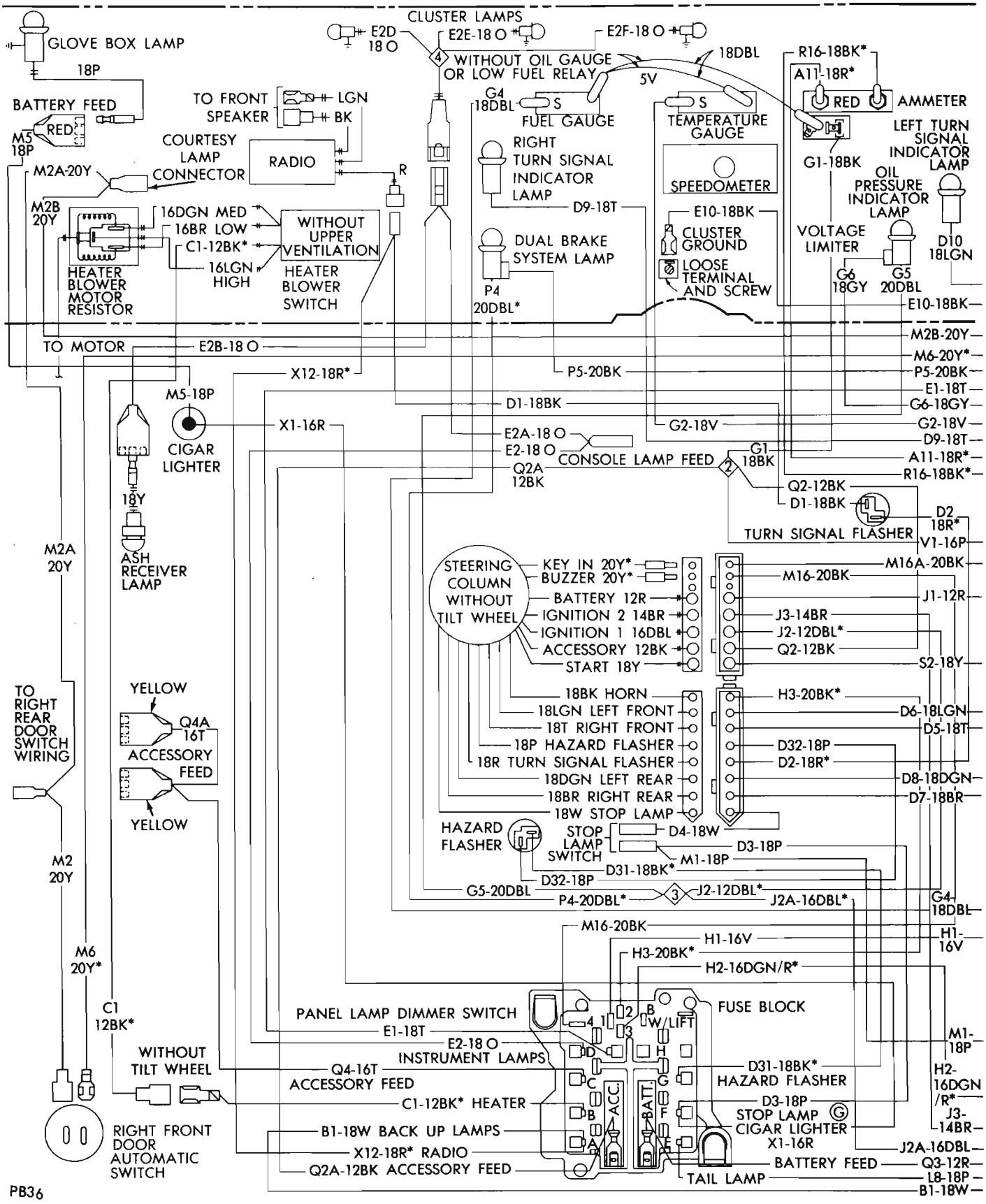


Fig. 24 - Instrument Panel Wiring - Fury

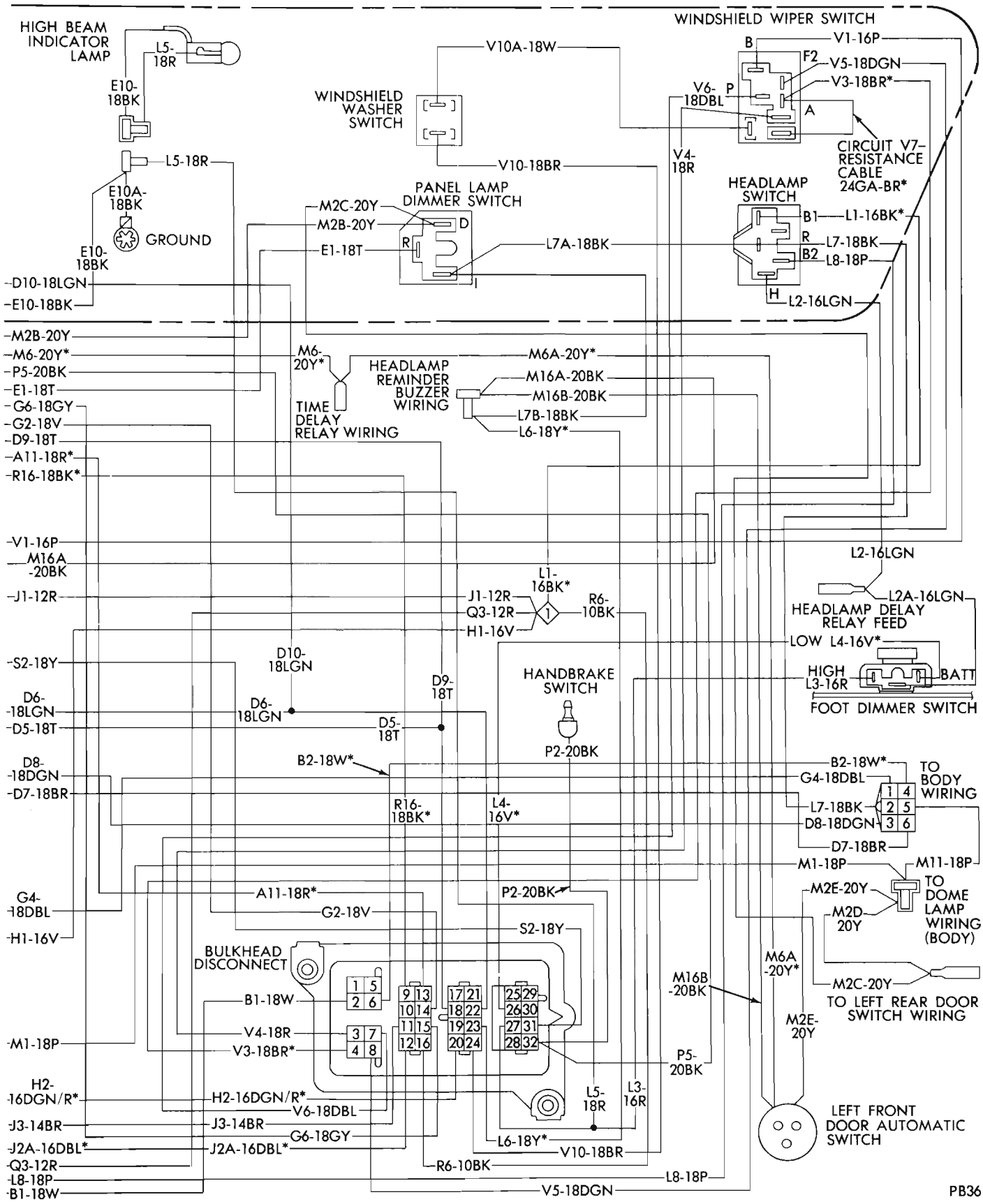


Fig. 24 - Instrument Panel Wiring - Fury

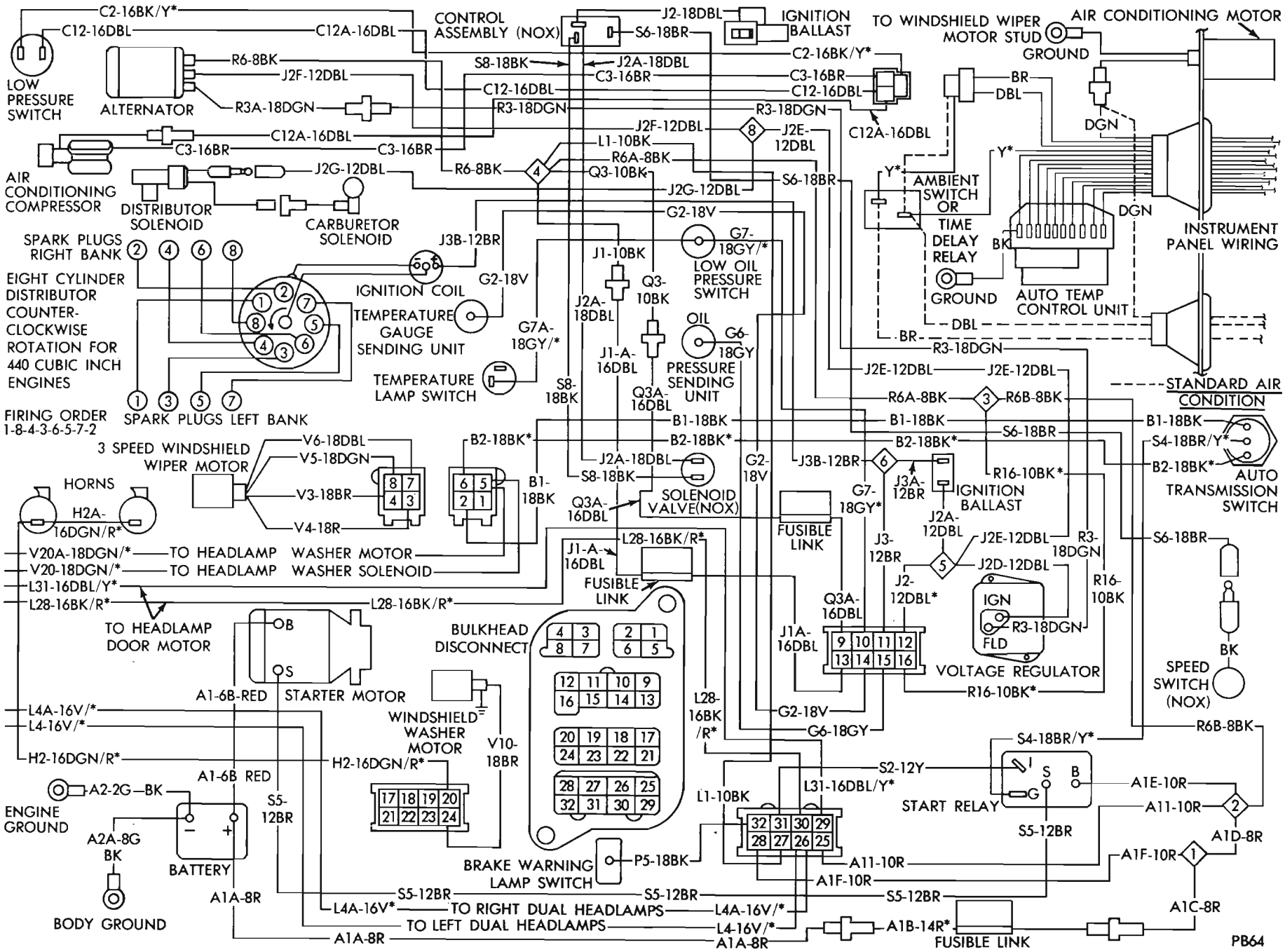


Fig.25 - Engine Wiring - Imperial

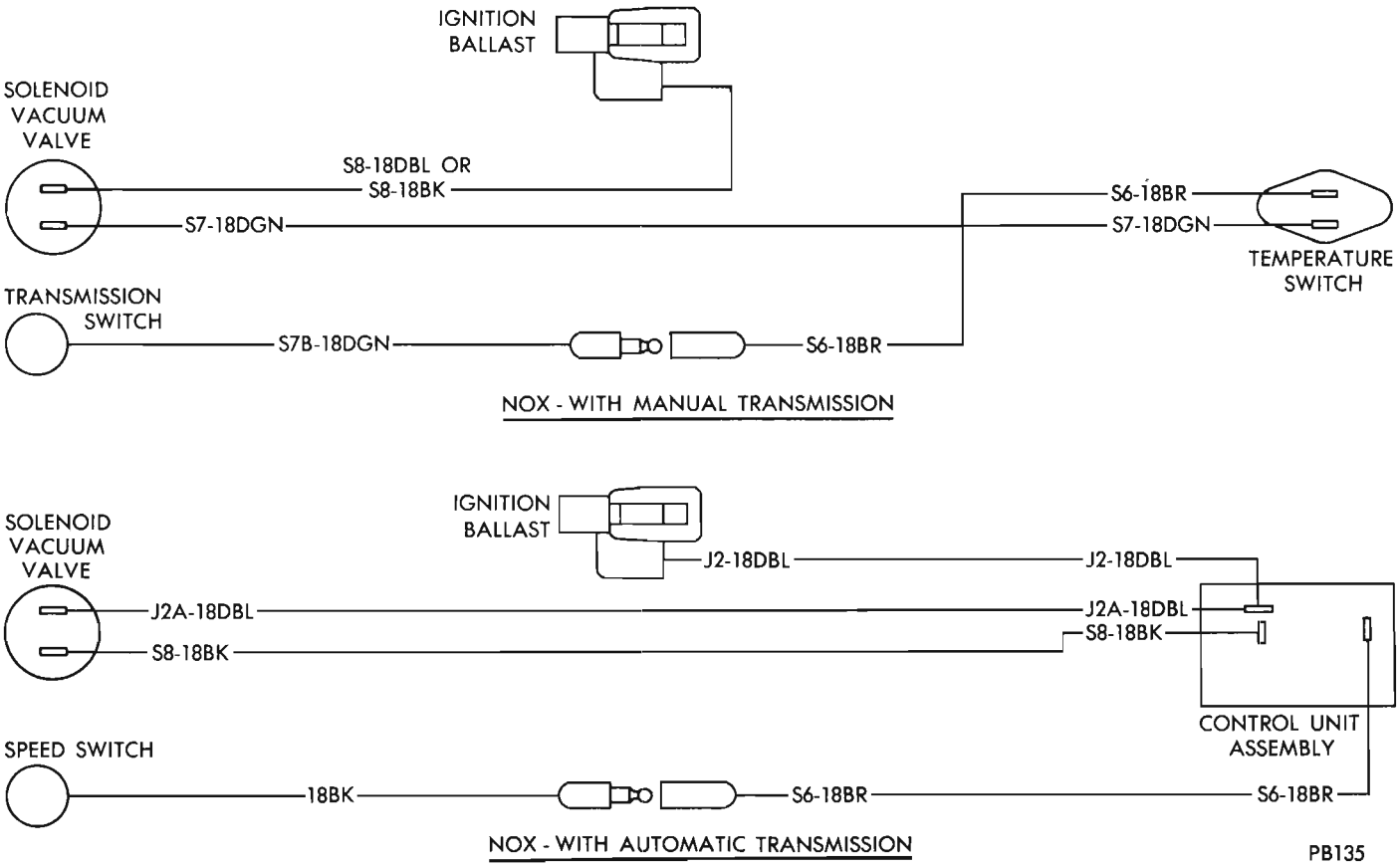


Fig. 26 - NOx System Wiring

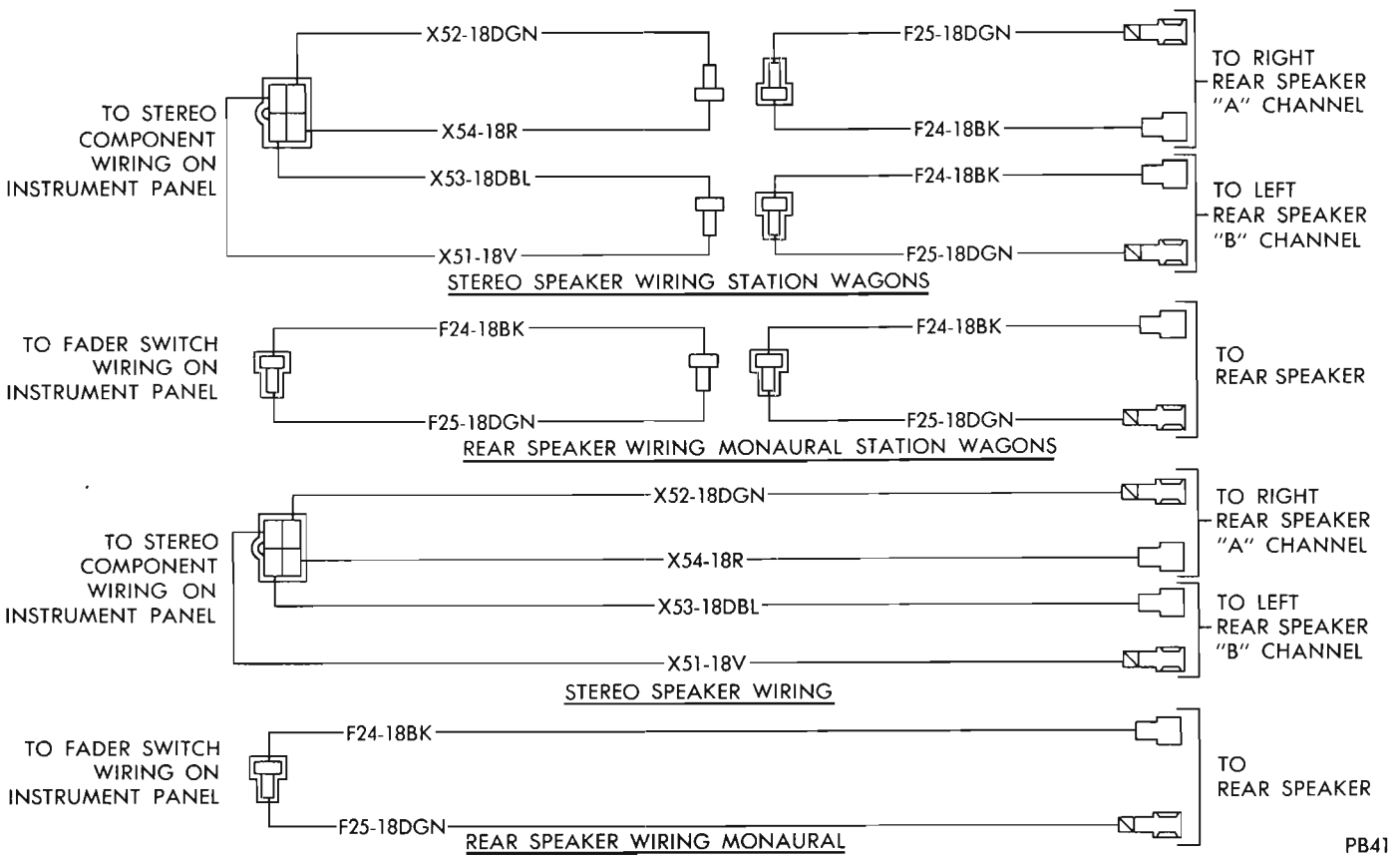


Fig. 27 - Radio Rear Speaker Wiring - Fury, Chrysler and Imperial

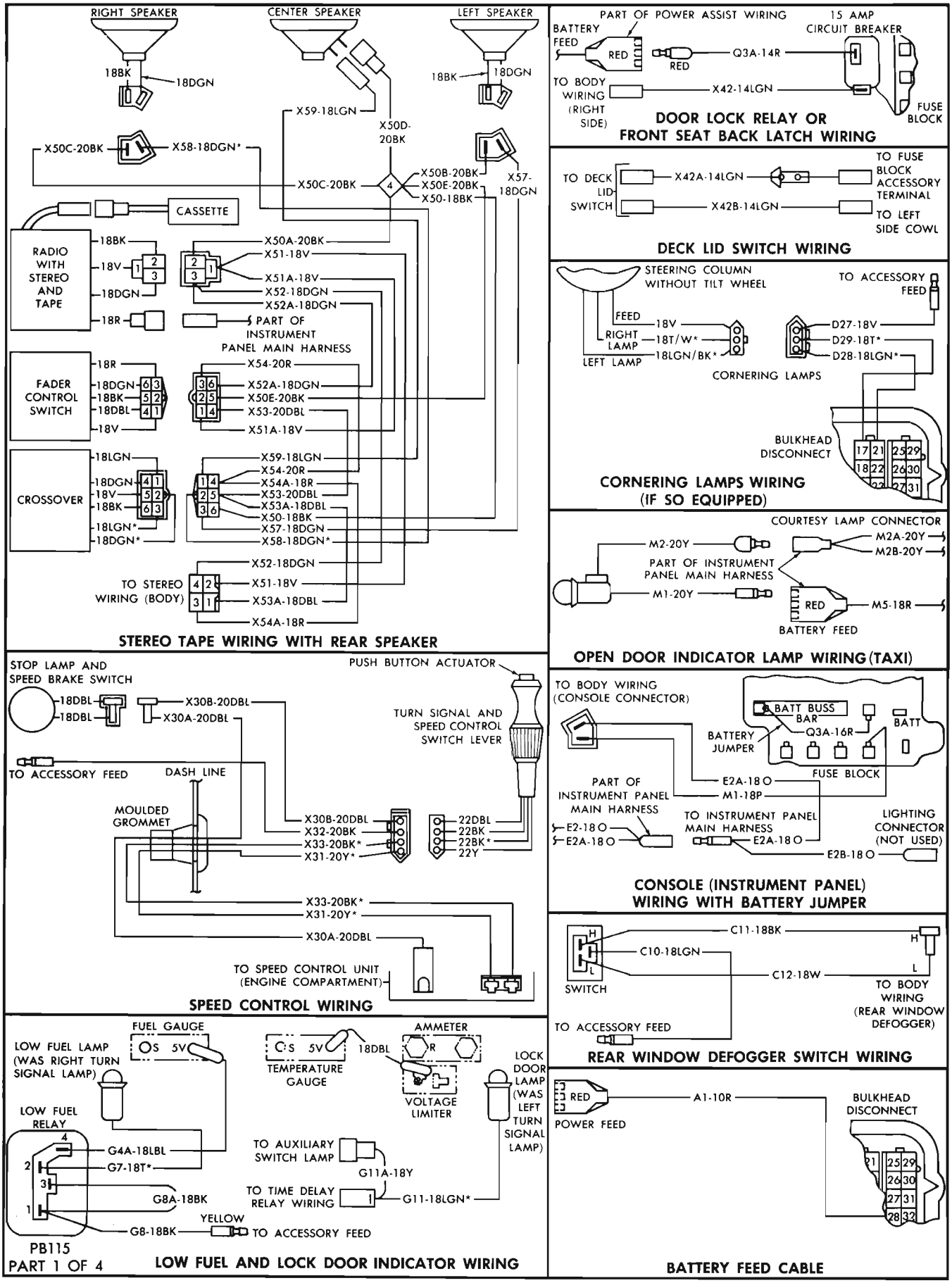


Fig. 28 - Instrument Panel Accessory Wiring - Fury

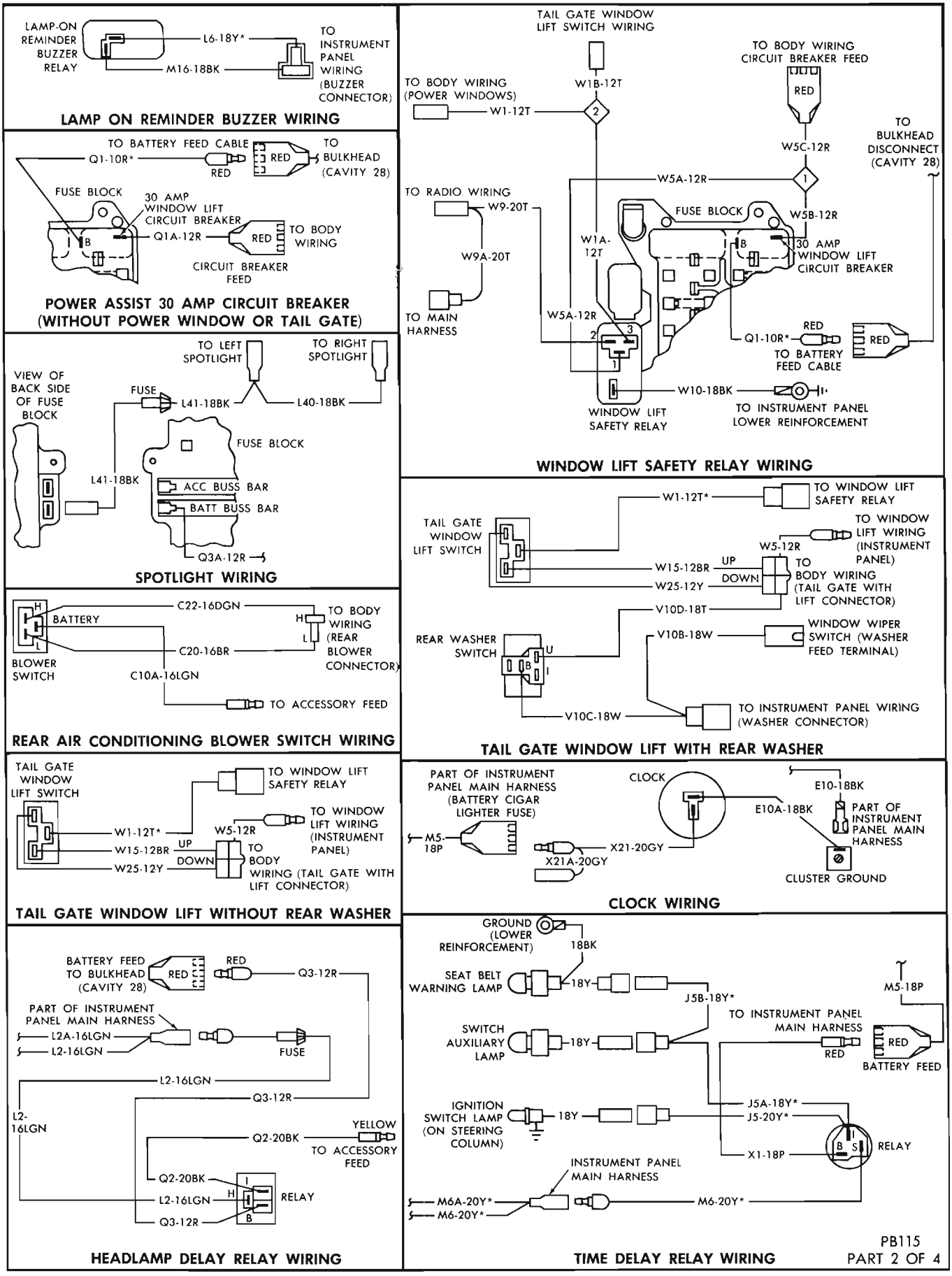


Fig. 28 - Instrument Panel Accessory Wiring - Fury

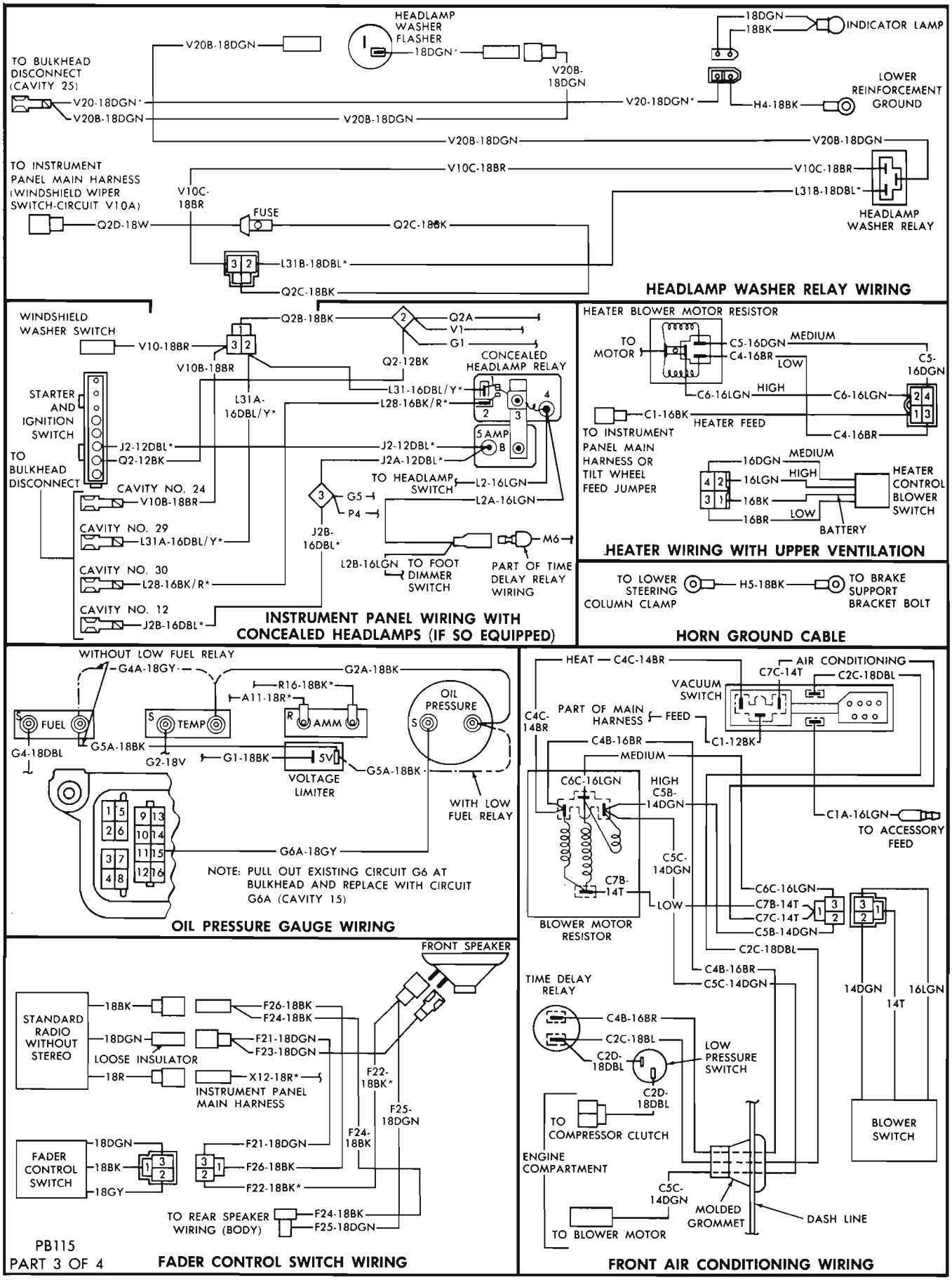


Fig. 28 - Instrument Panel Accessory Wiring - Fury

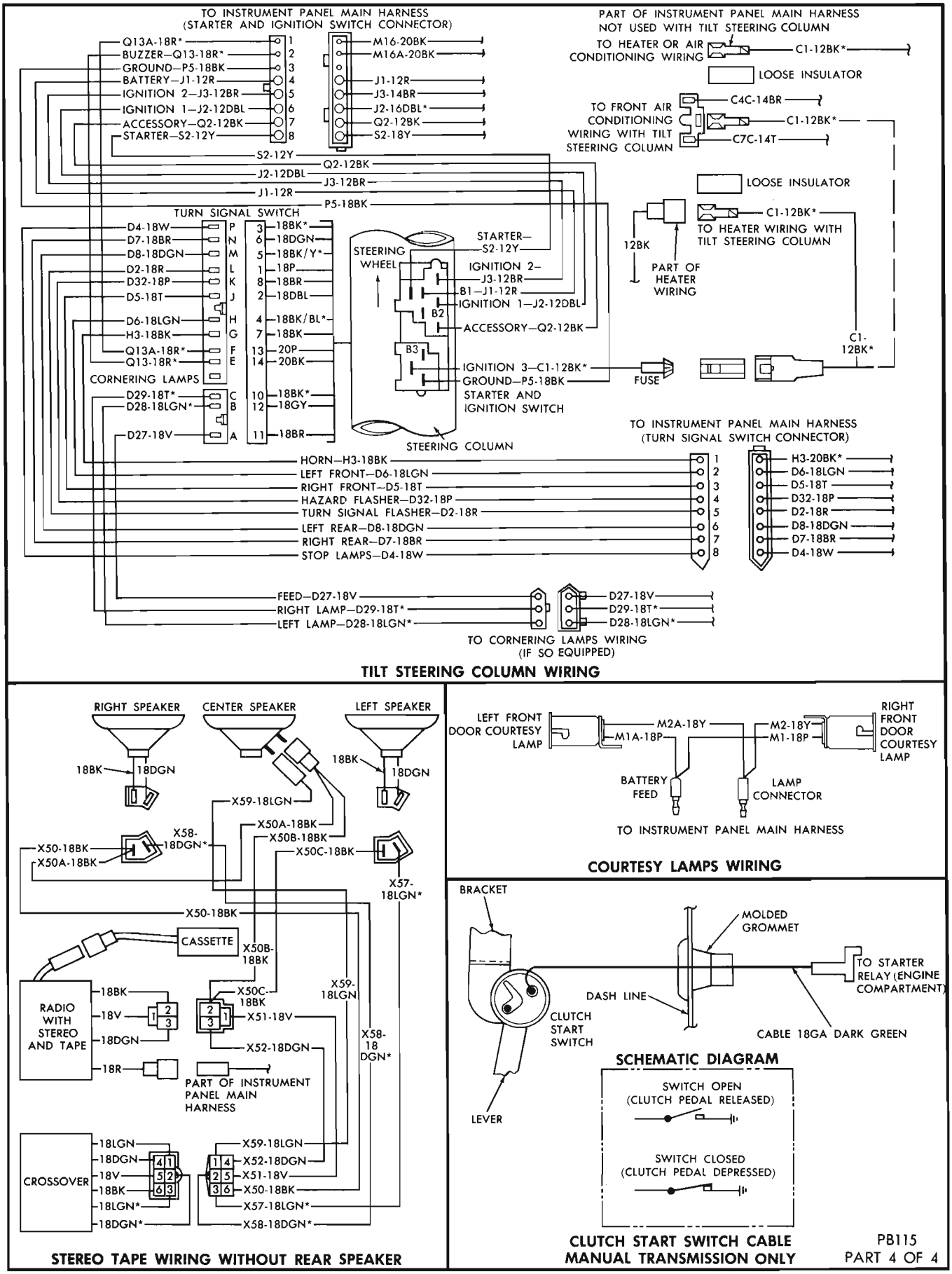


Fig. 28 - Instrument Panel Accessory Wiring - Fury

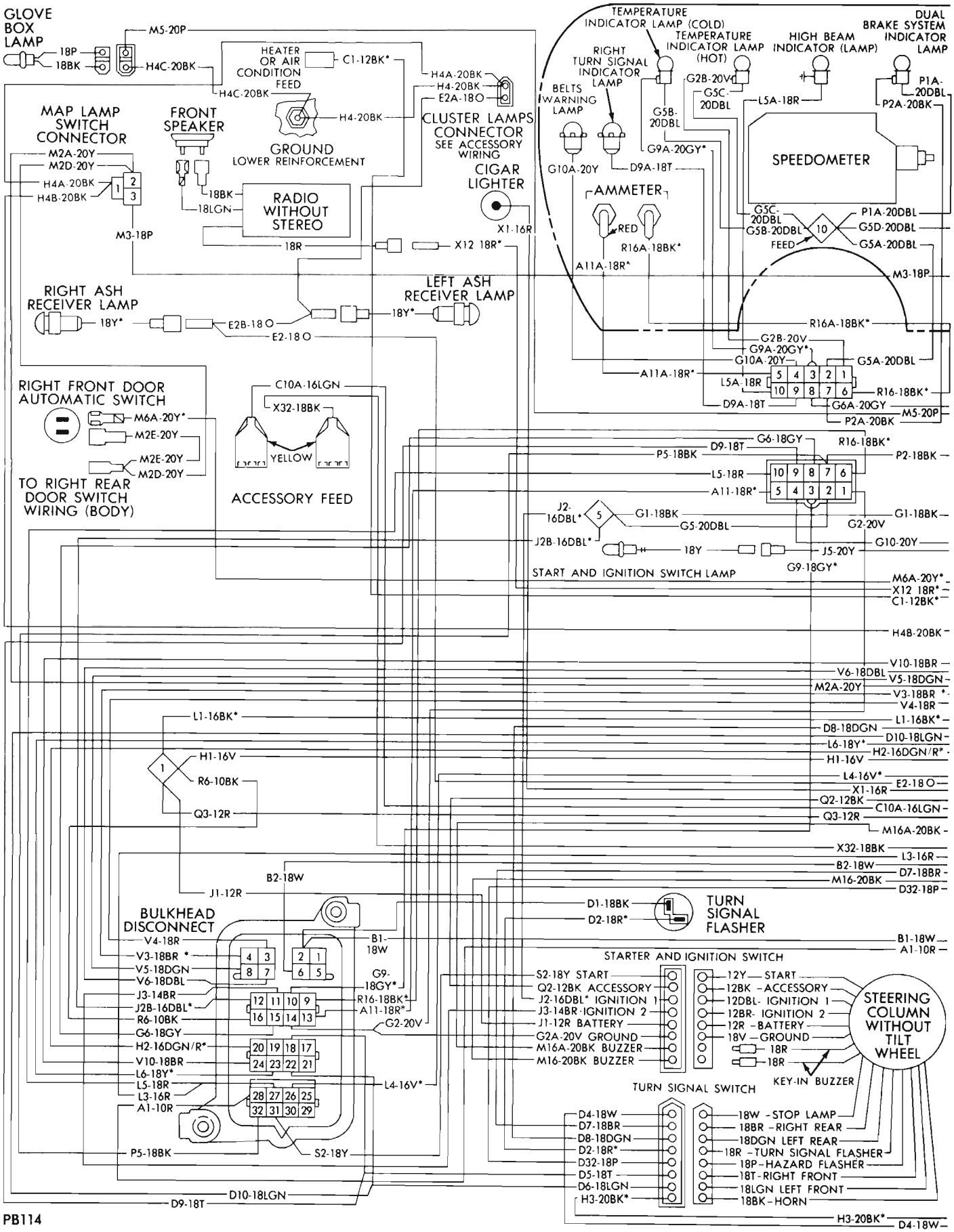


Fig. 29 - Instrument Panel Wiring - Chrysler

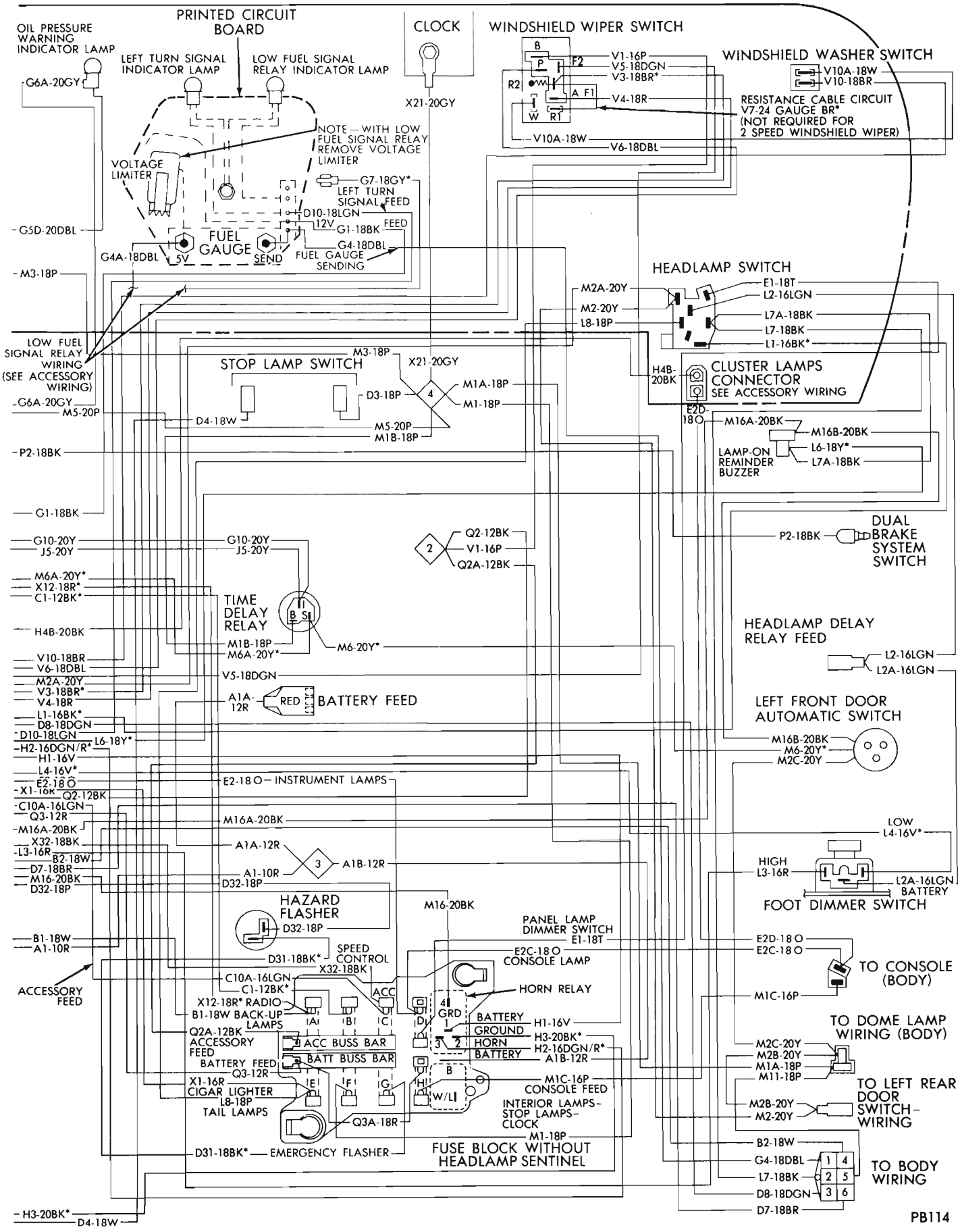


Fig. 29 - Instrument Panel Wiring - Chrysler

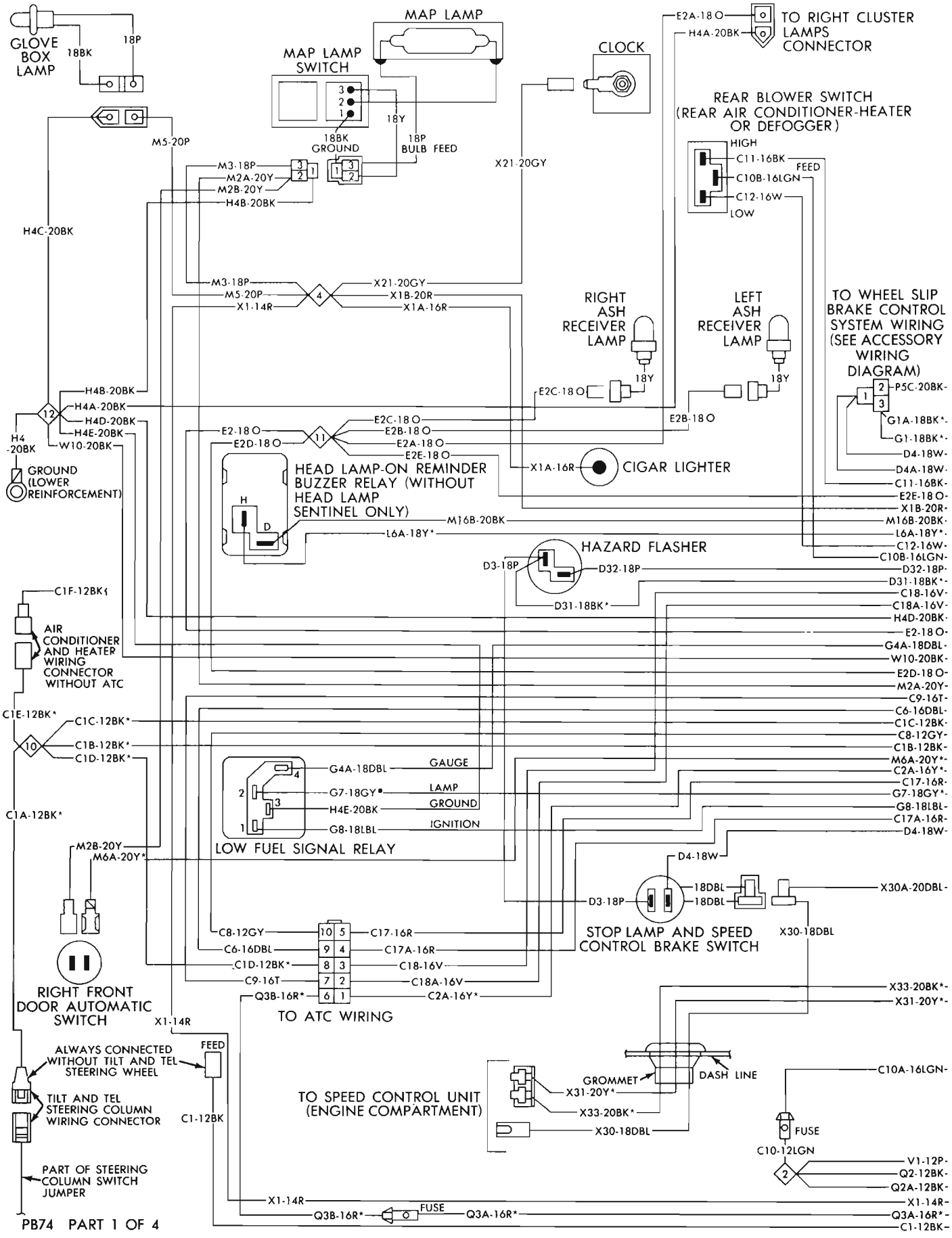


Fig. 30 - Instrument Panel Wiring - Imperial

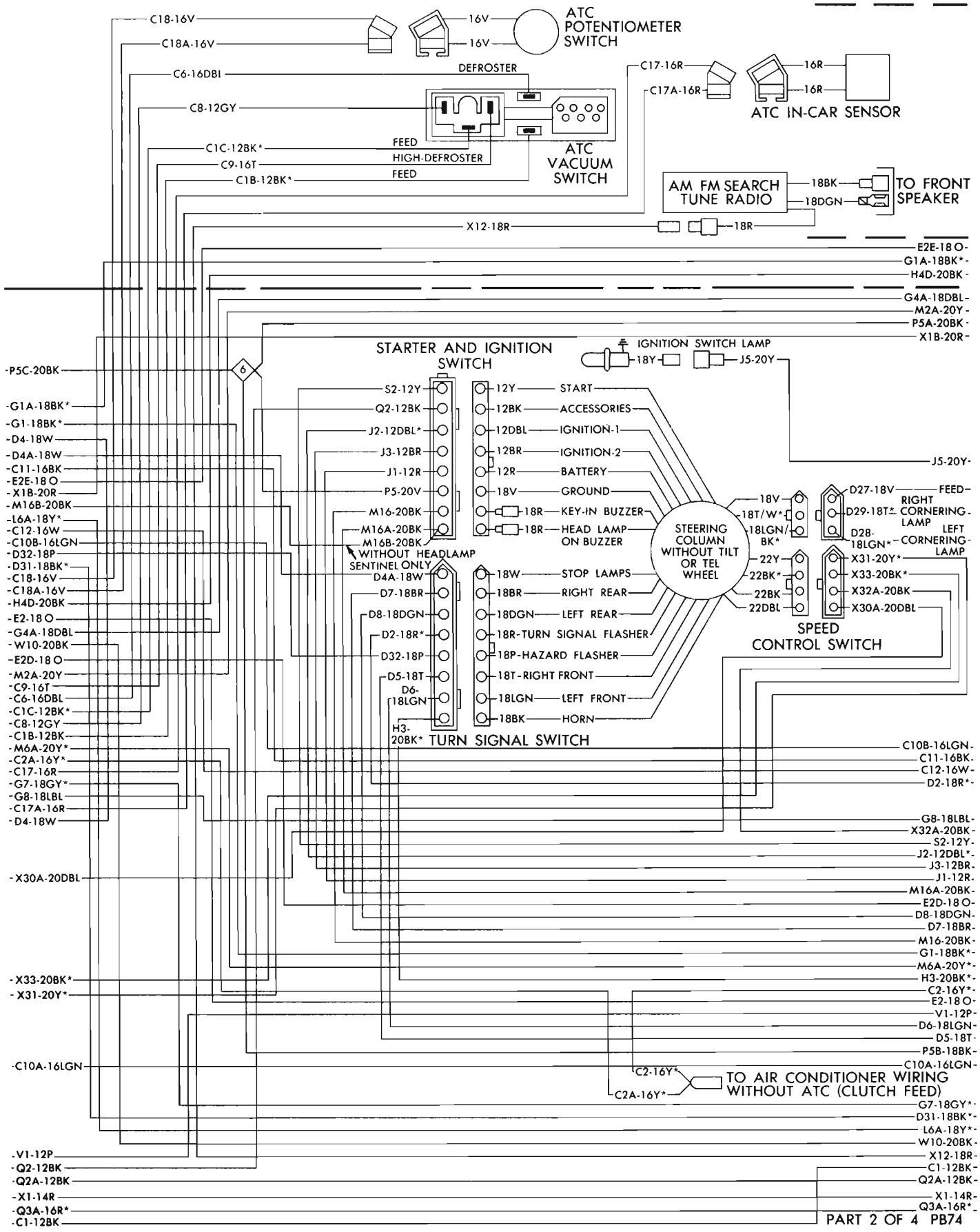


Fig. 30 - Instrument Panel Wiring - Imperial

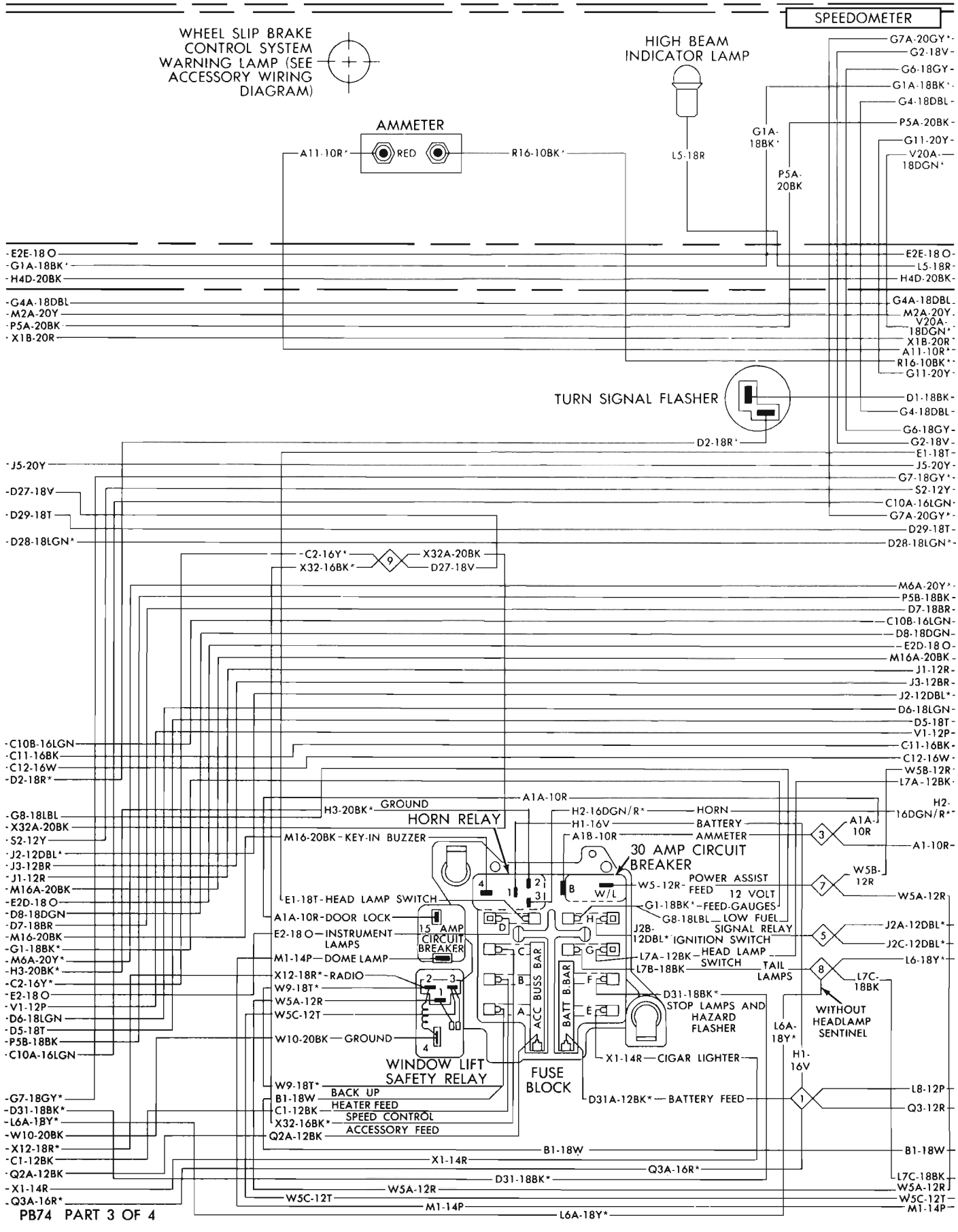


Fig. 30 - Instrument Panel Wiring - Imperial

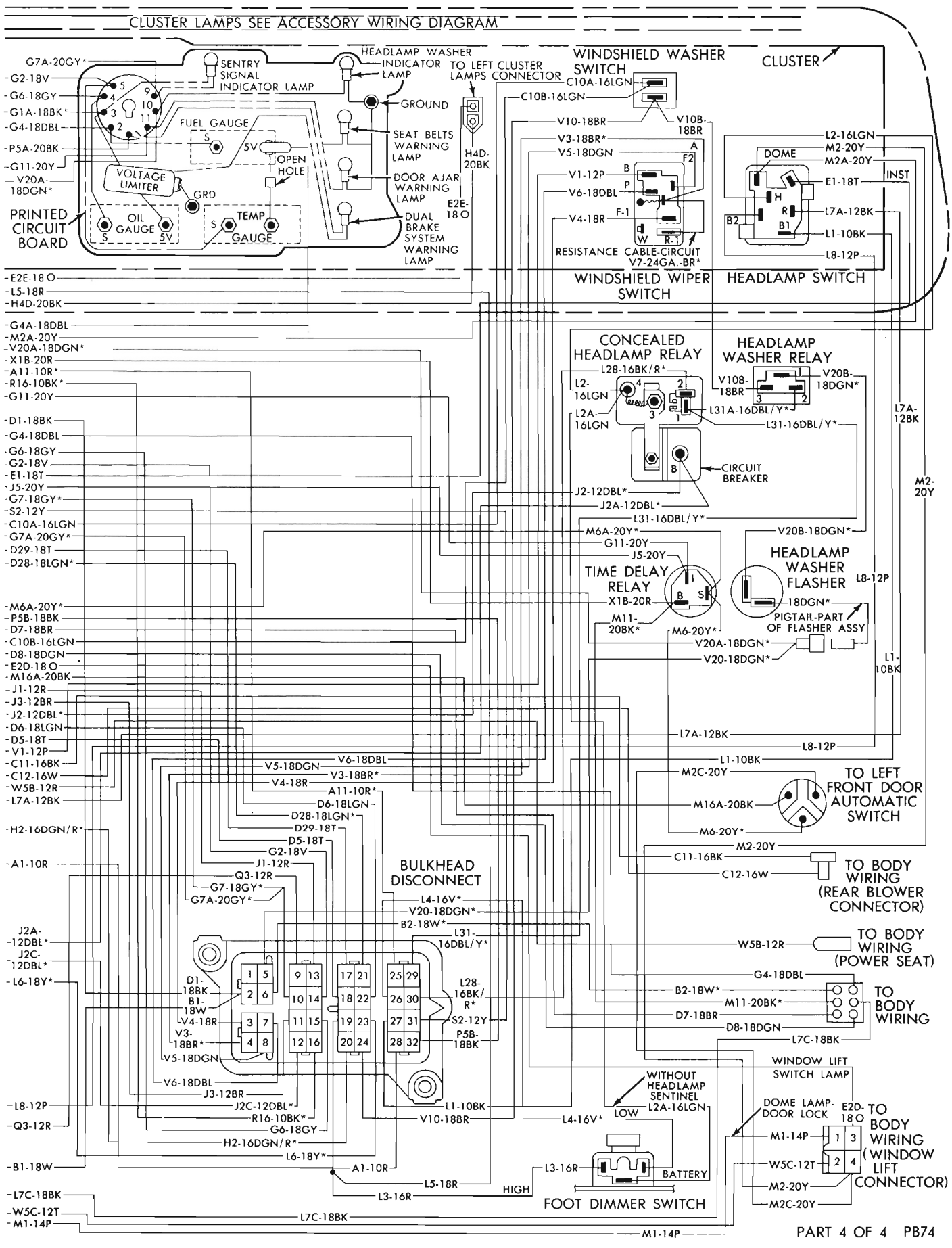


Fig. 30 - Instrument Panel Wiring - Imperial

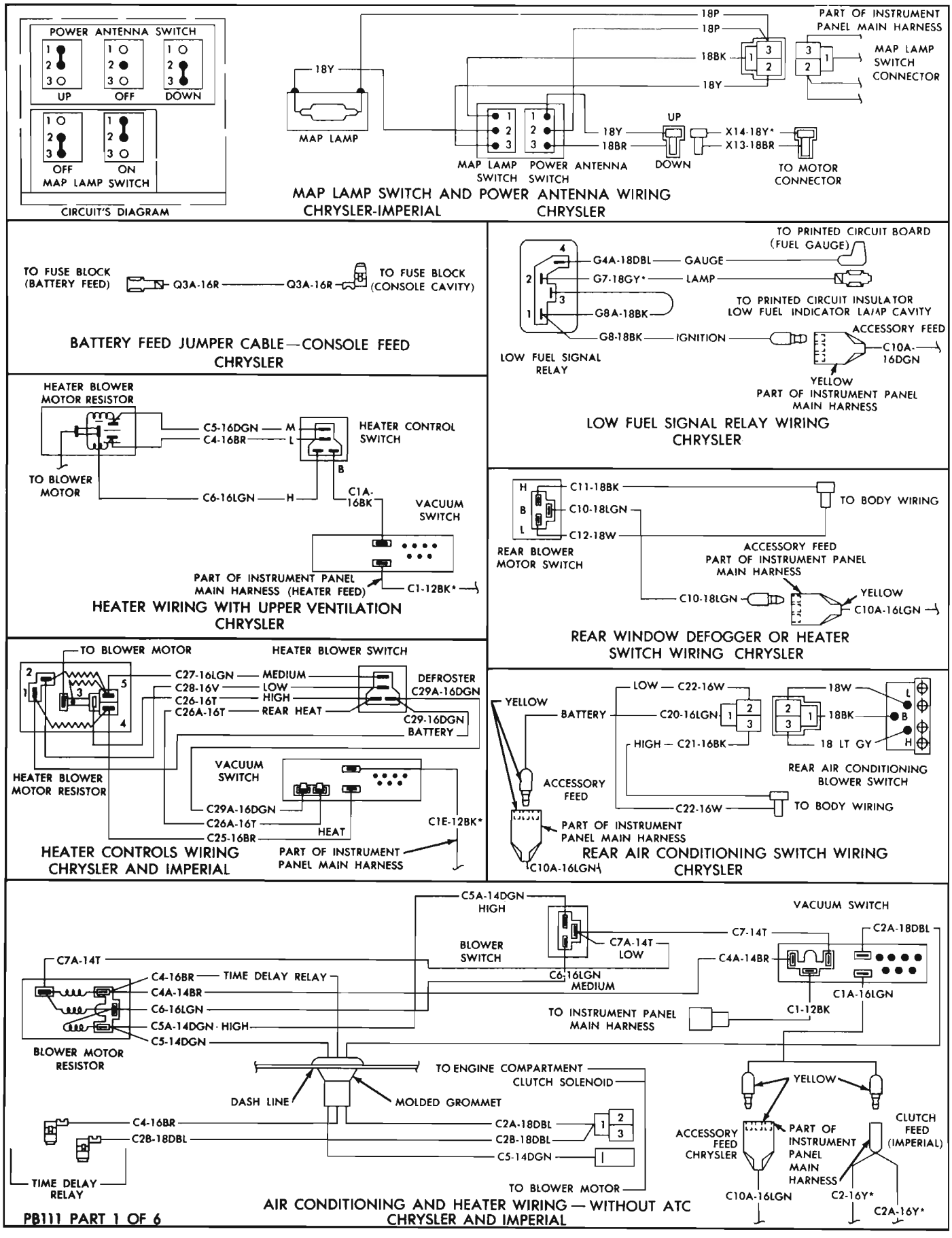


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

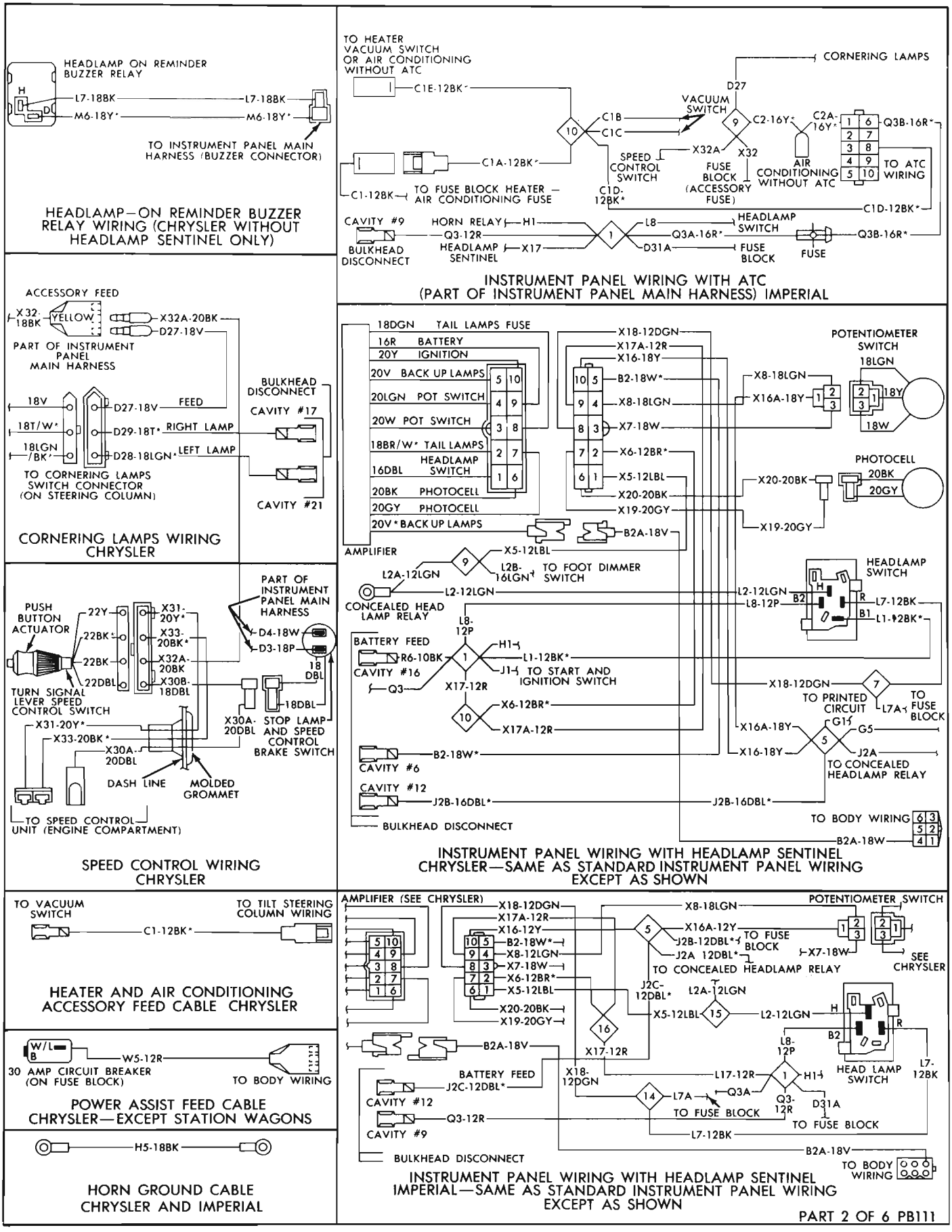


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

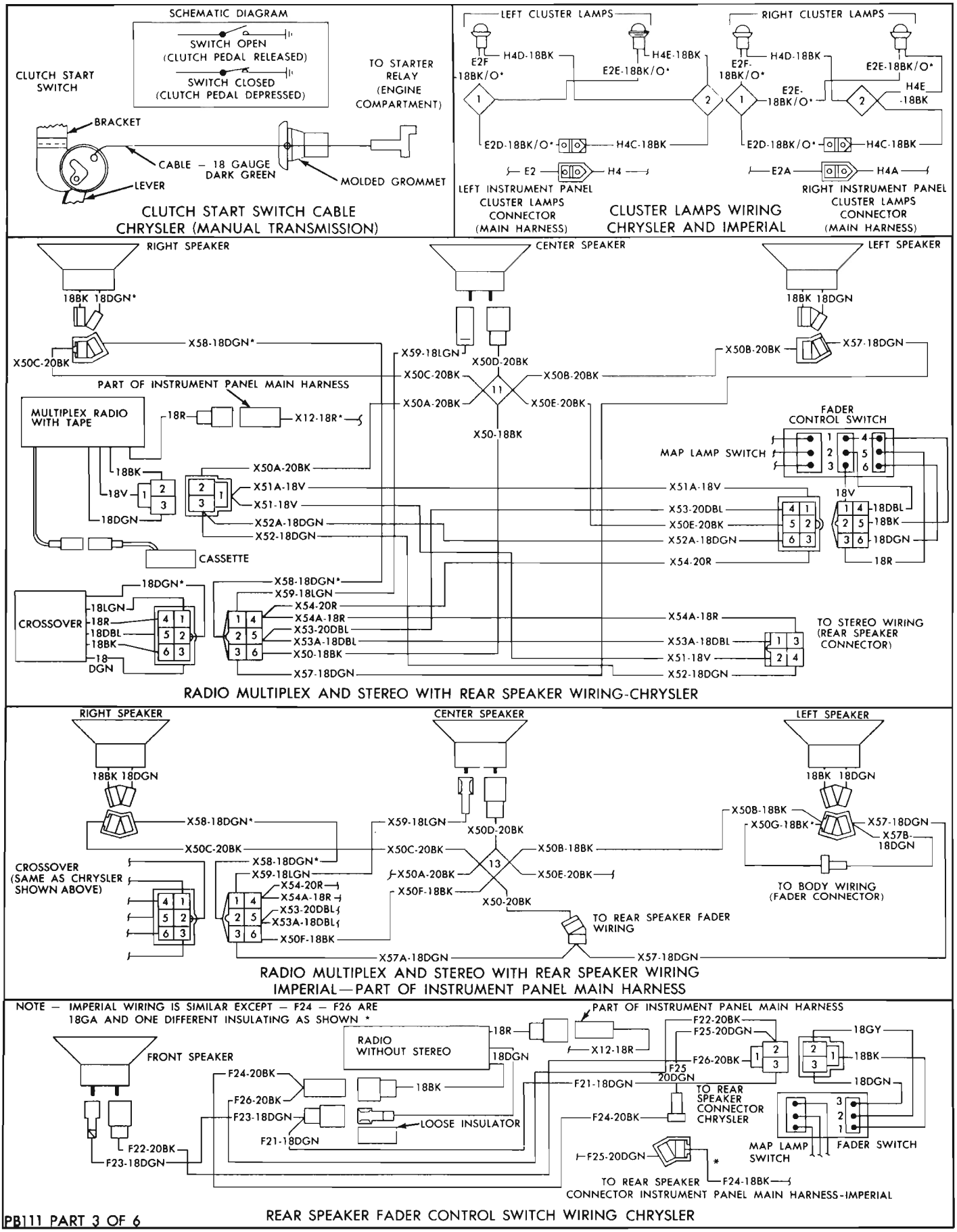


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

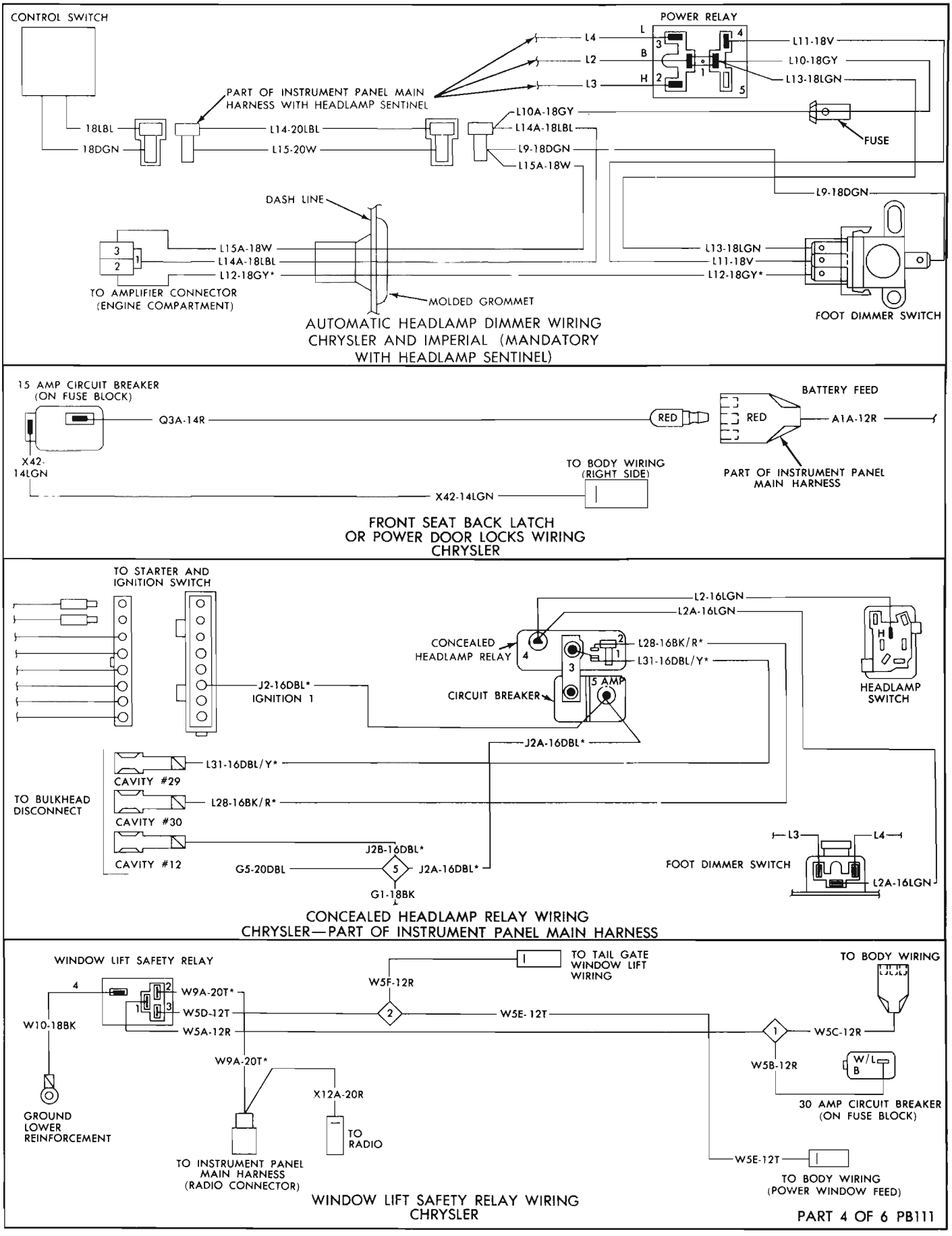


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

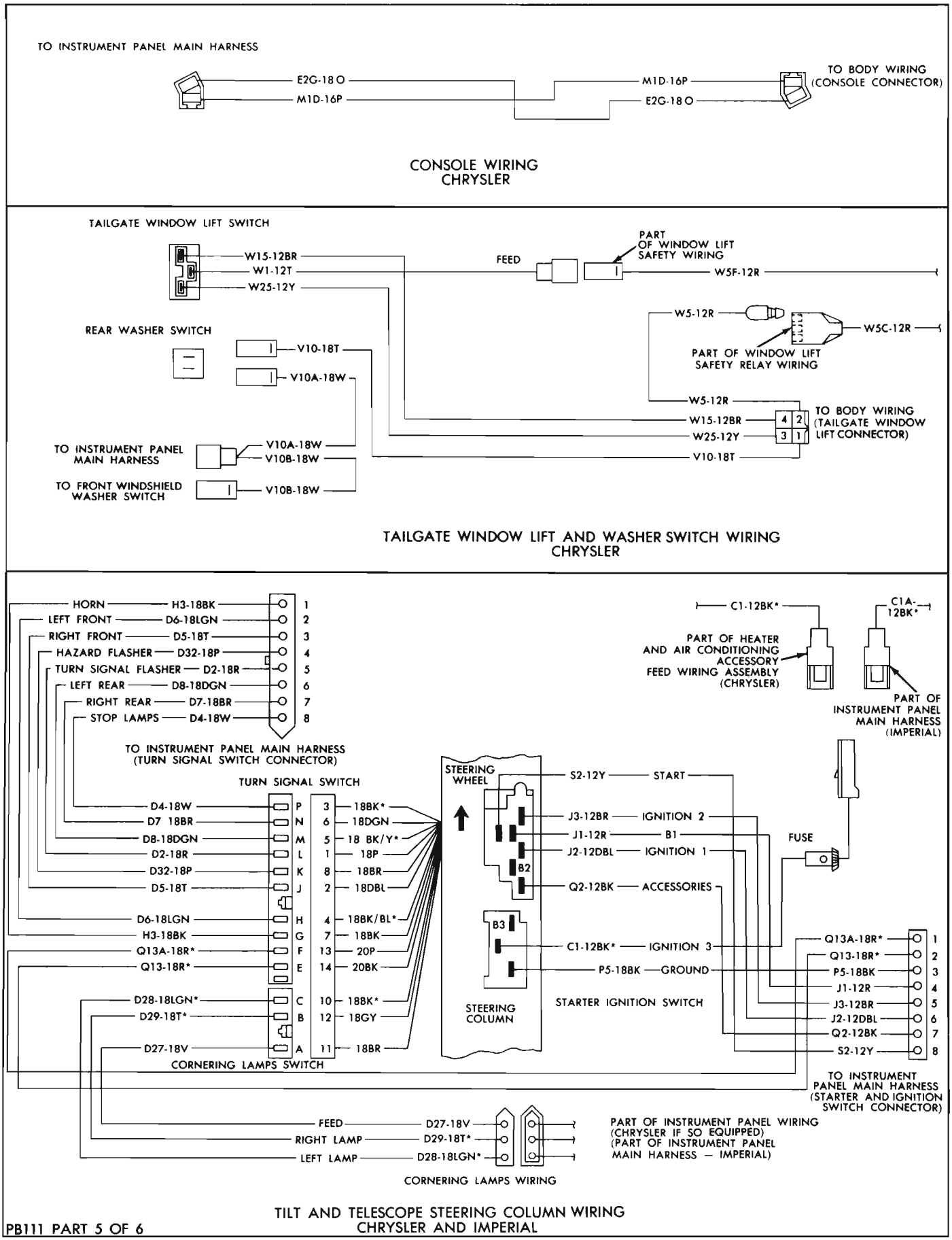


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

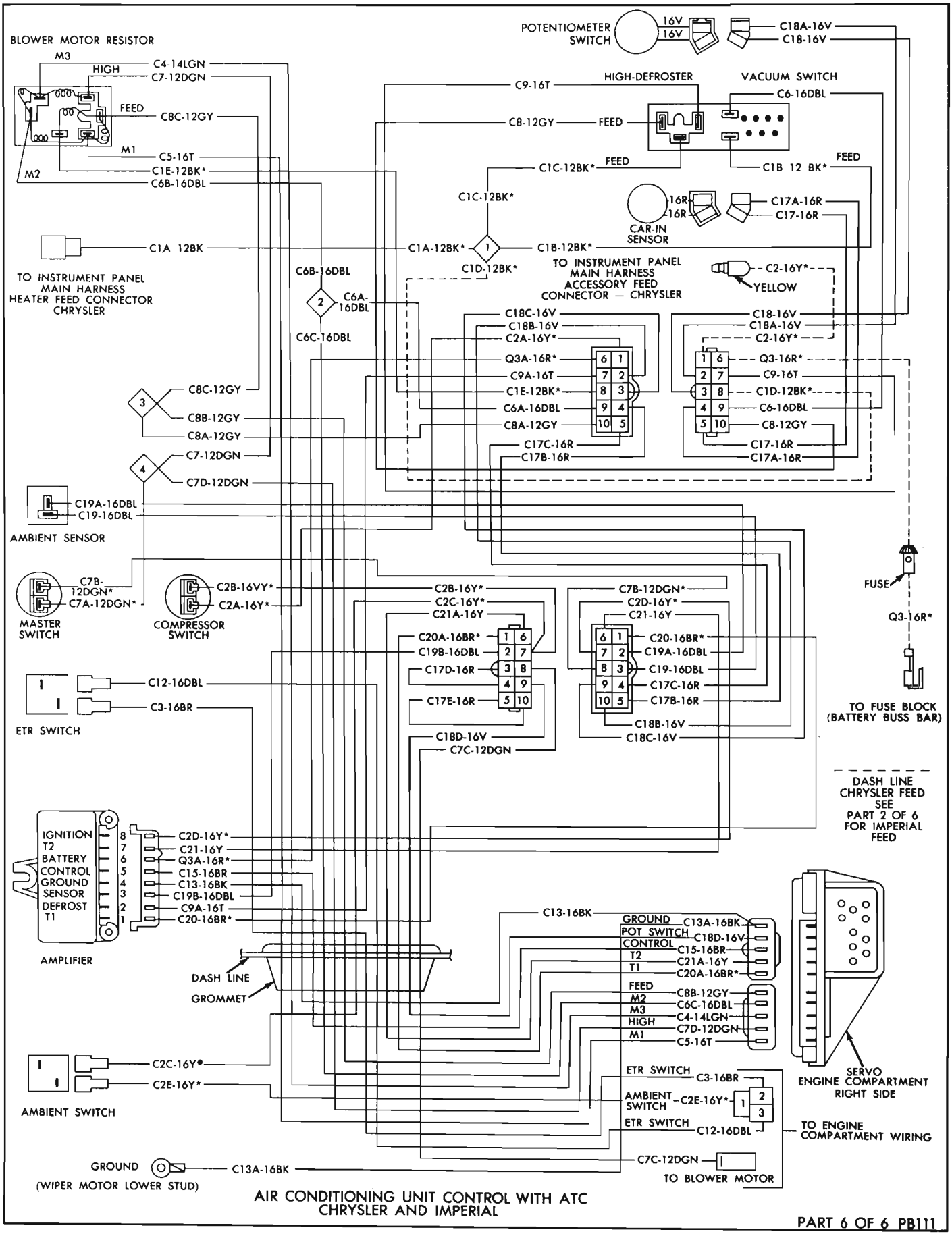
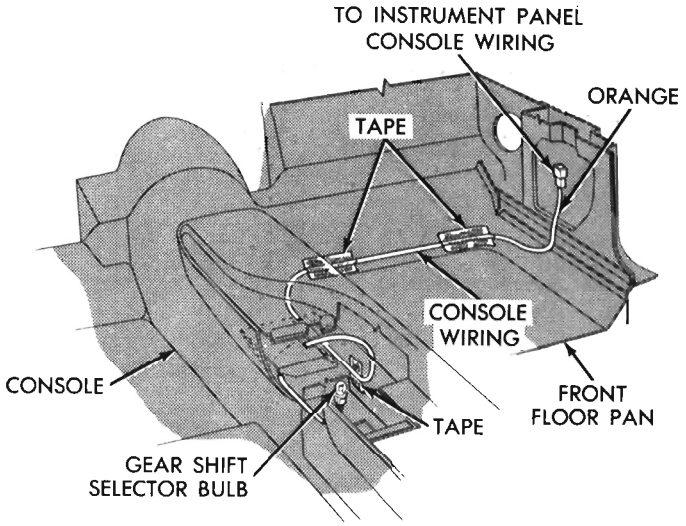


Fig. 31 - Instrument Panel Accessory Wiring - Chrysler, Imperial

WIRING ADAPTATIONS

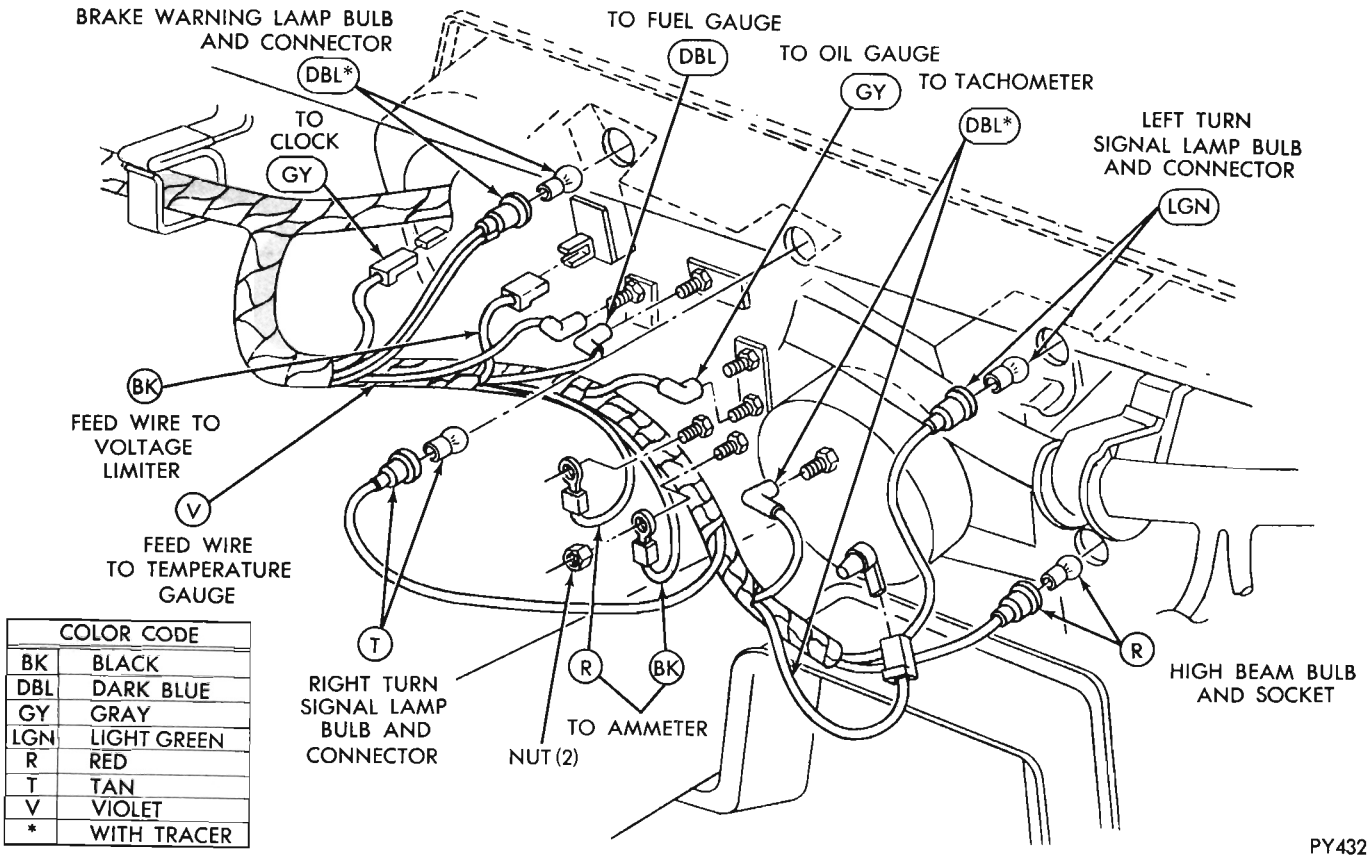
INDEX

	Page
Air Conditioner, Heater and Windshield Washer Wiring-Valiant	205
Air Conditioner, Heater Wiring-Fury	206
Cluster Wiring-Valiant	207
Cluster Wiring-Barracuda	202
Console Wiring-Barracuda	202
Console Wiring-Fury	203
Instrument Panel Wiring-Valiant	203
Instrument Panel Wiring-Barracuda	204
Instrument Panel Wiring-Fury	208
Instrument Panel Wiring-Chrysler	209
Instrument Panel Wiring-Imperial	210
Overhead Console Wiring-Barracuda	204



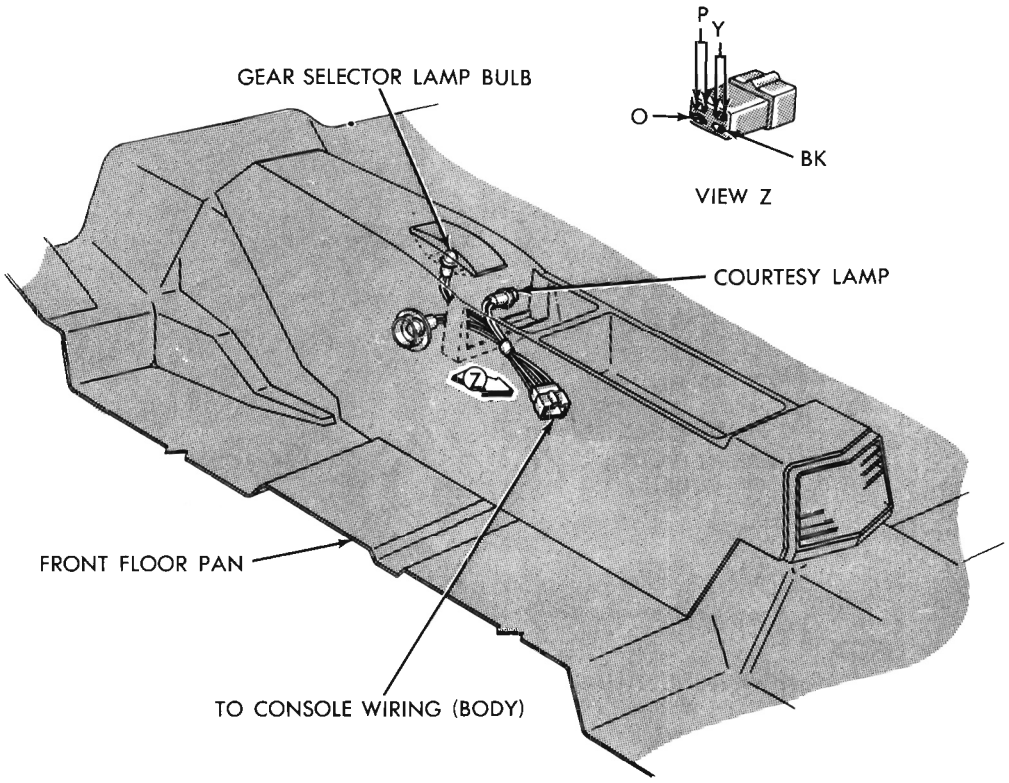
PY811

Fig. 1 - Console Wiring - Barracuda



PY432

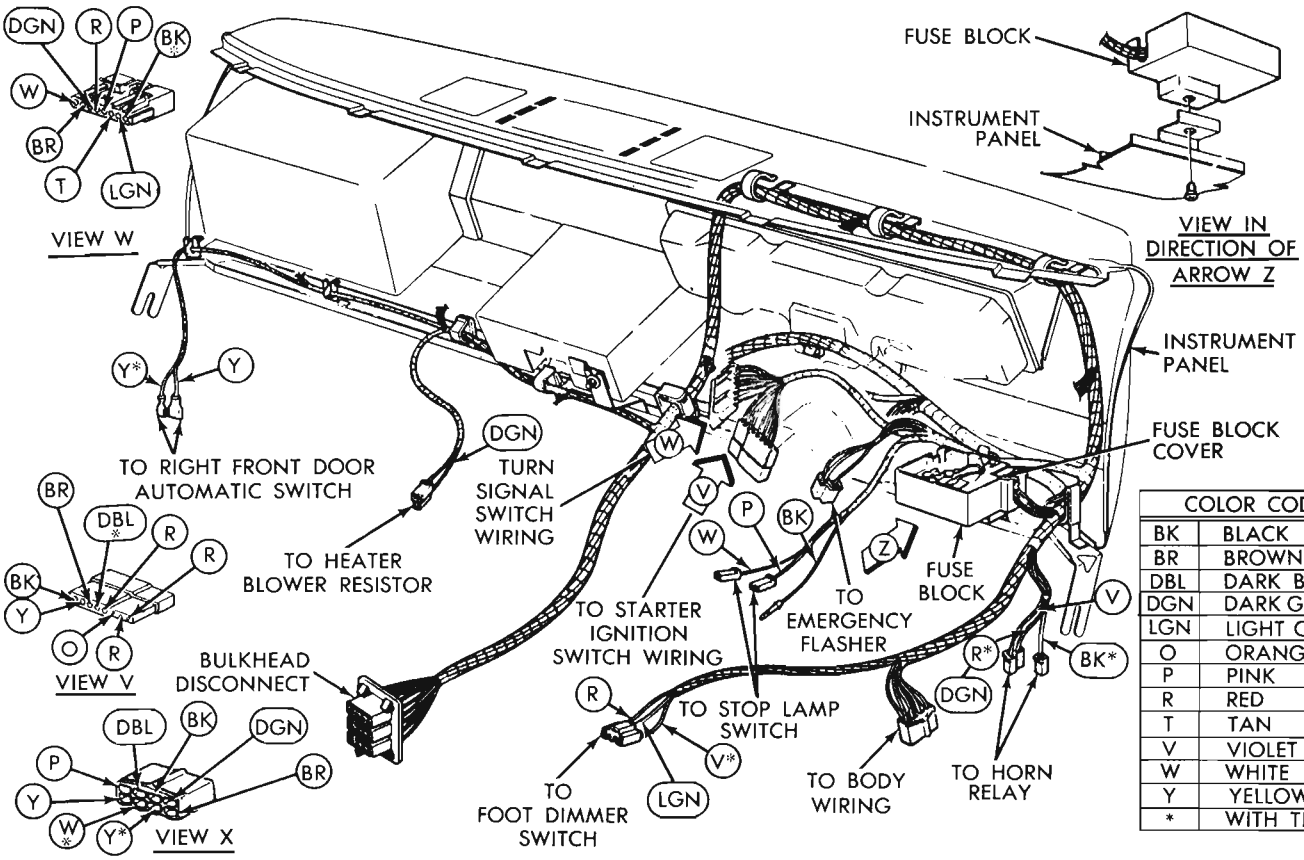
Fig. 2 - Cluster Wiring - Barracuda



COLOR CODE	
BK	BLACK
O	ORANGE
P	PINK
Y	YELLOW
*	WITH TRACER

PY715

Fig. 3 - Console Wiring - Fury



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

PY723

Fig. 4 - Instrument Panel Wiring - Valiant

COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
GY	GRAY
LBL	LIGHT BLUE
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

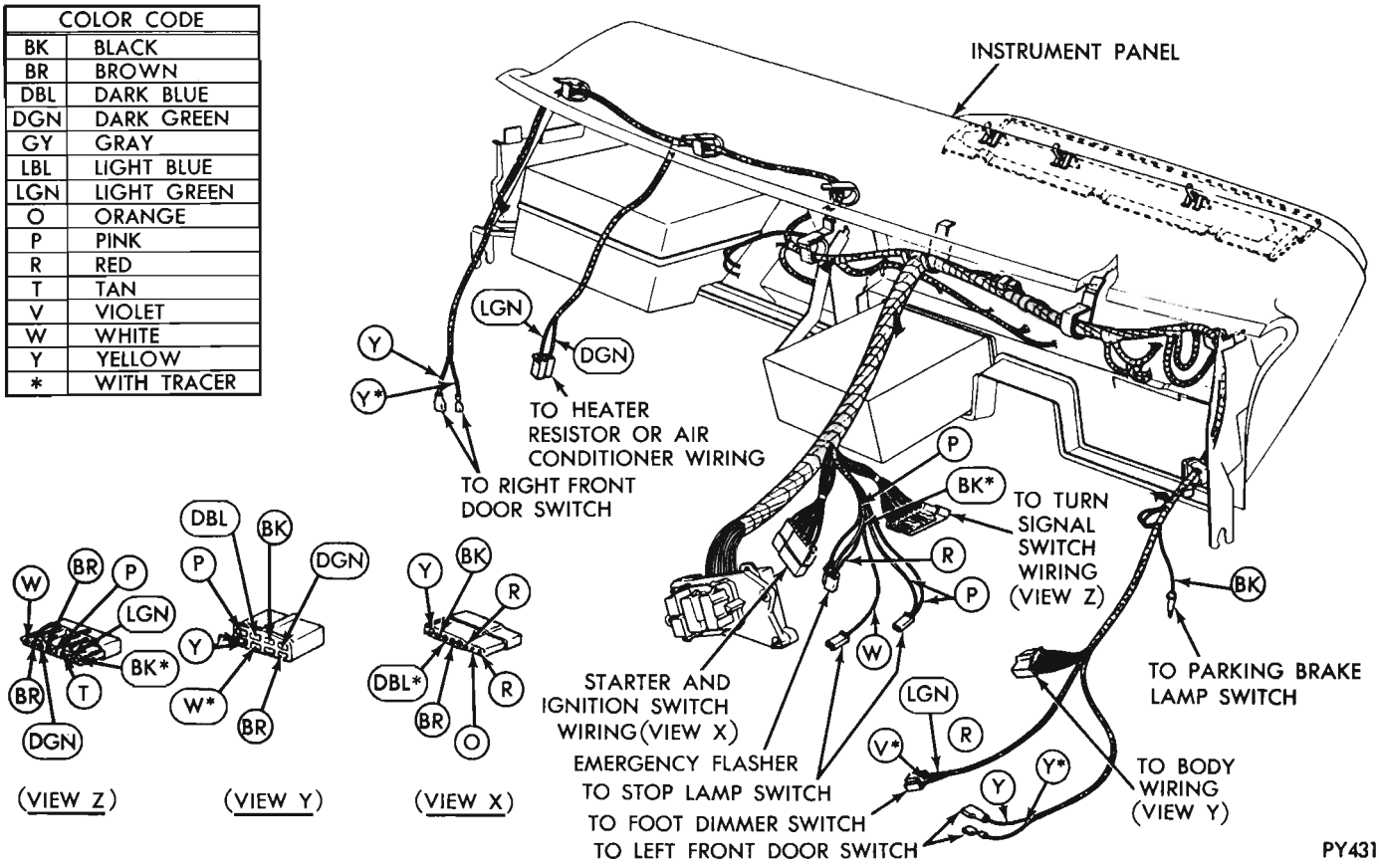


Fig. 5 - Instrument Panel Wiring - Barracuda

COLOR CODE	
BK	BLACK
DBL	DARK BLUE
GY	GRAY
R	RED
Y	YELLOW
*	WITH TRACER

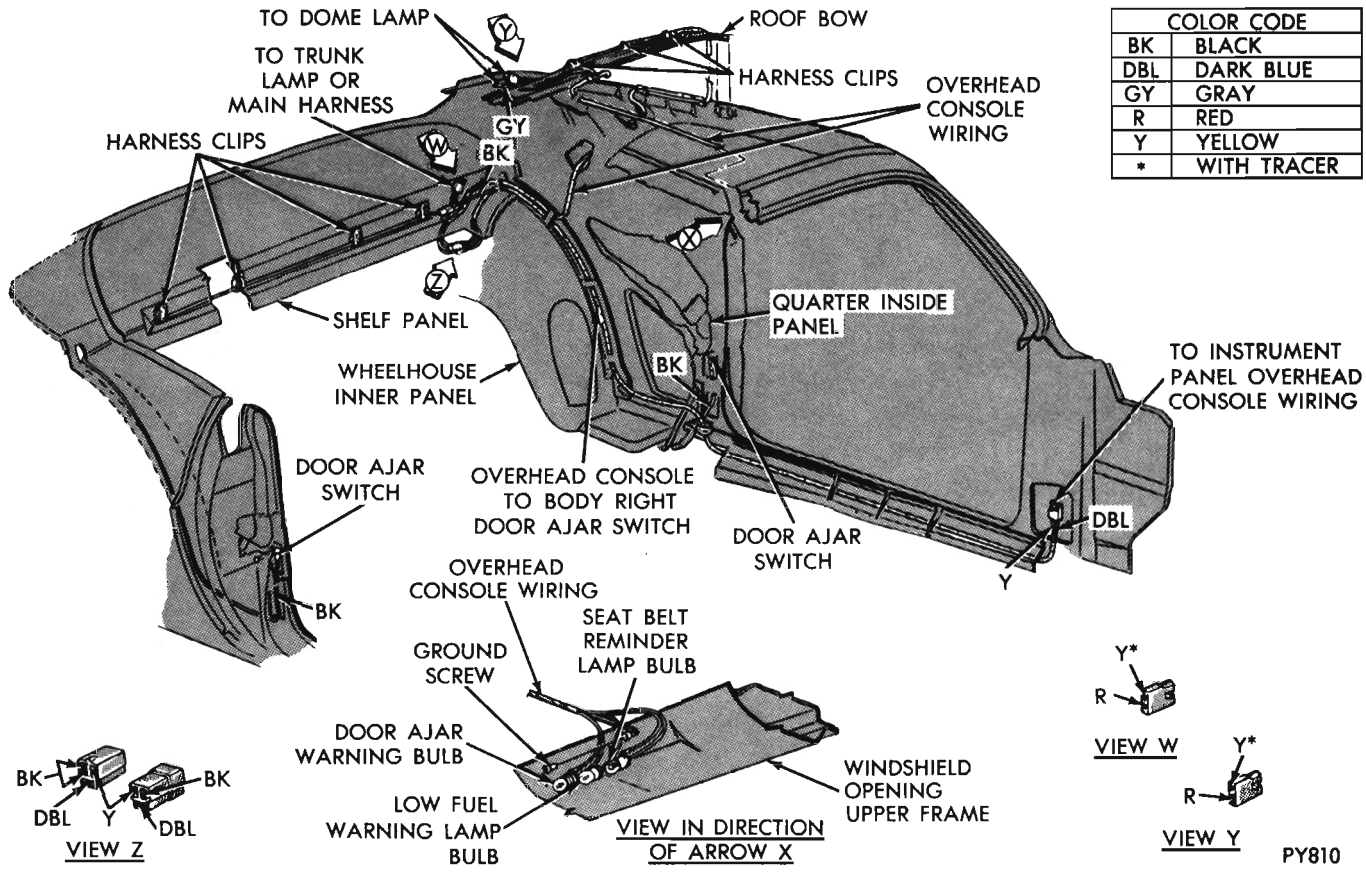
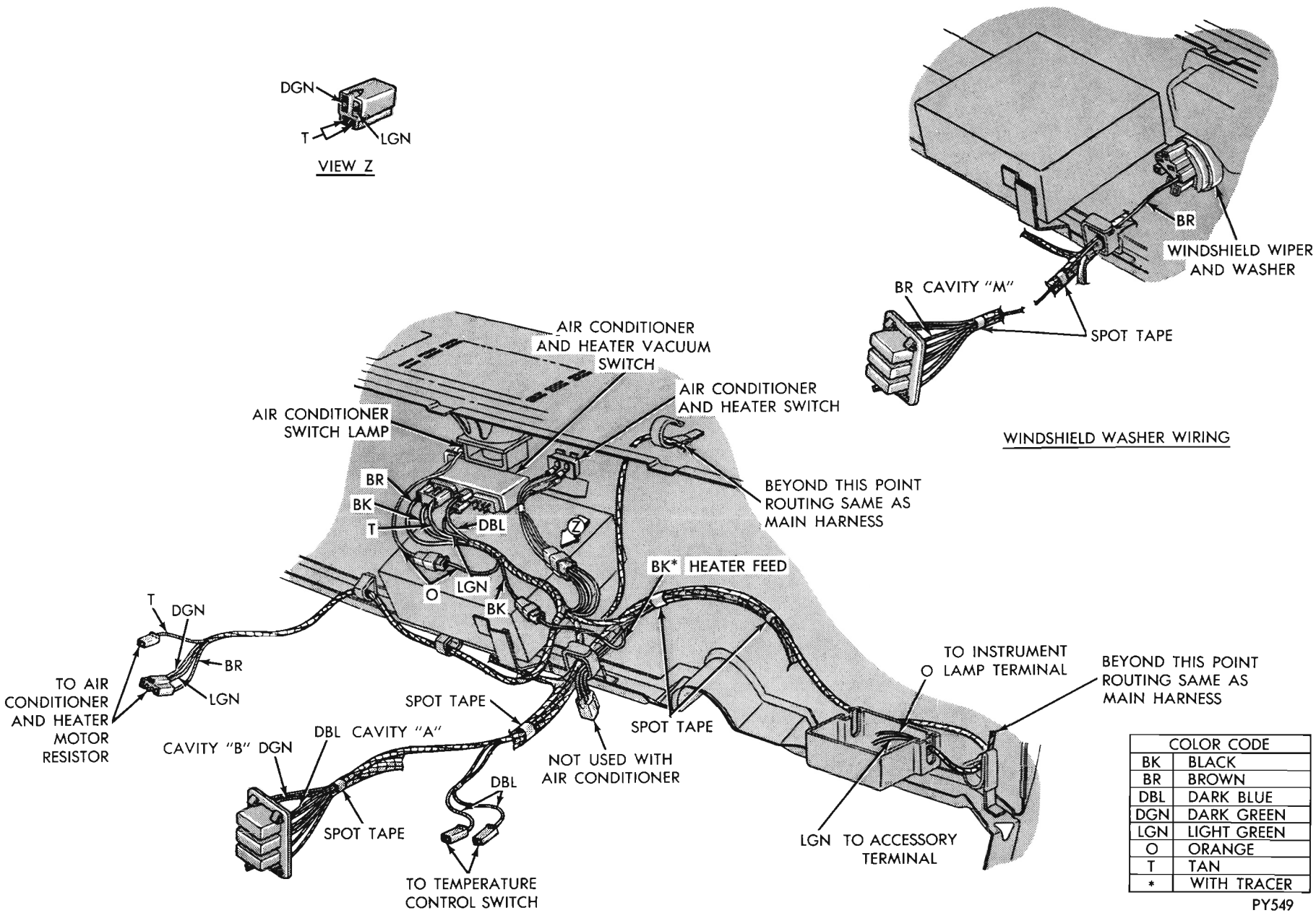


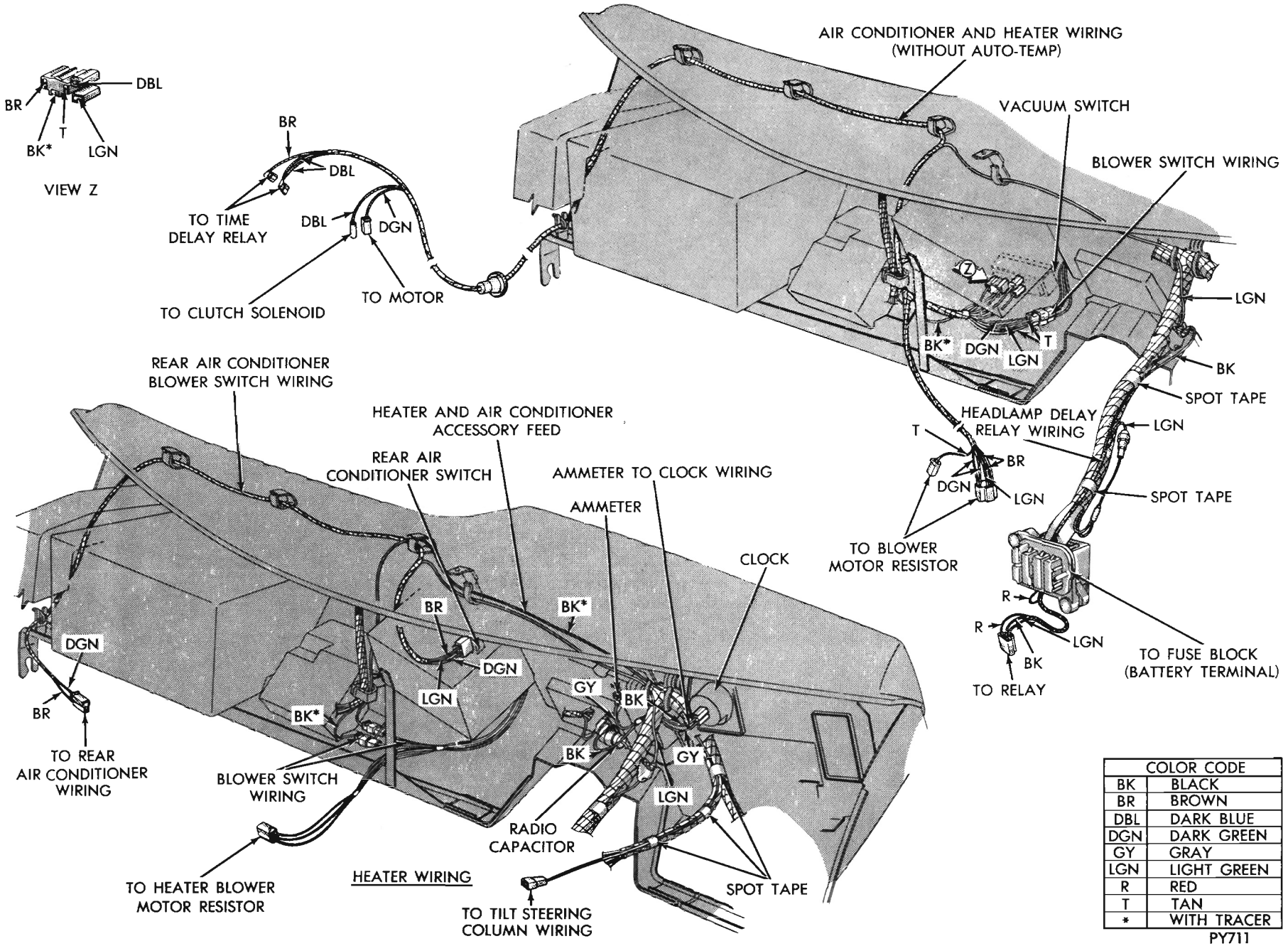
Fig. 6 - Overhead Console Wiring - Barracuda



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
LGN	LIGHT GREEN
O	ORANGE
T	TAN
*	WITH TRACER

PY549

Fig. 7 - Air Conditioner, Heater and Windshield Washer Wiring - Valiant



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
GY	GRAY
LGN	LIGHT GREEN
R	RED
T	TAN
*	WITH TRACER

PY711

Fig. 8 - Air Conditioner, Heater Wiring - Fury

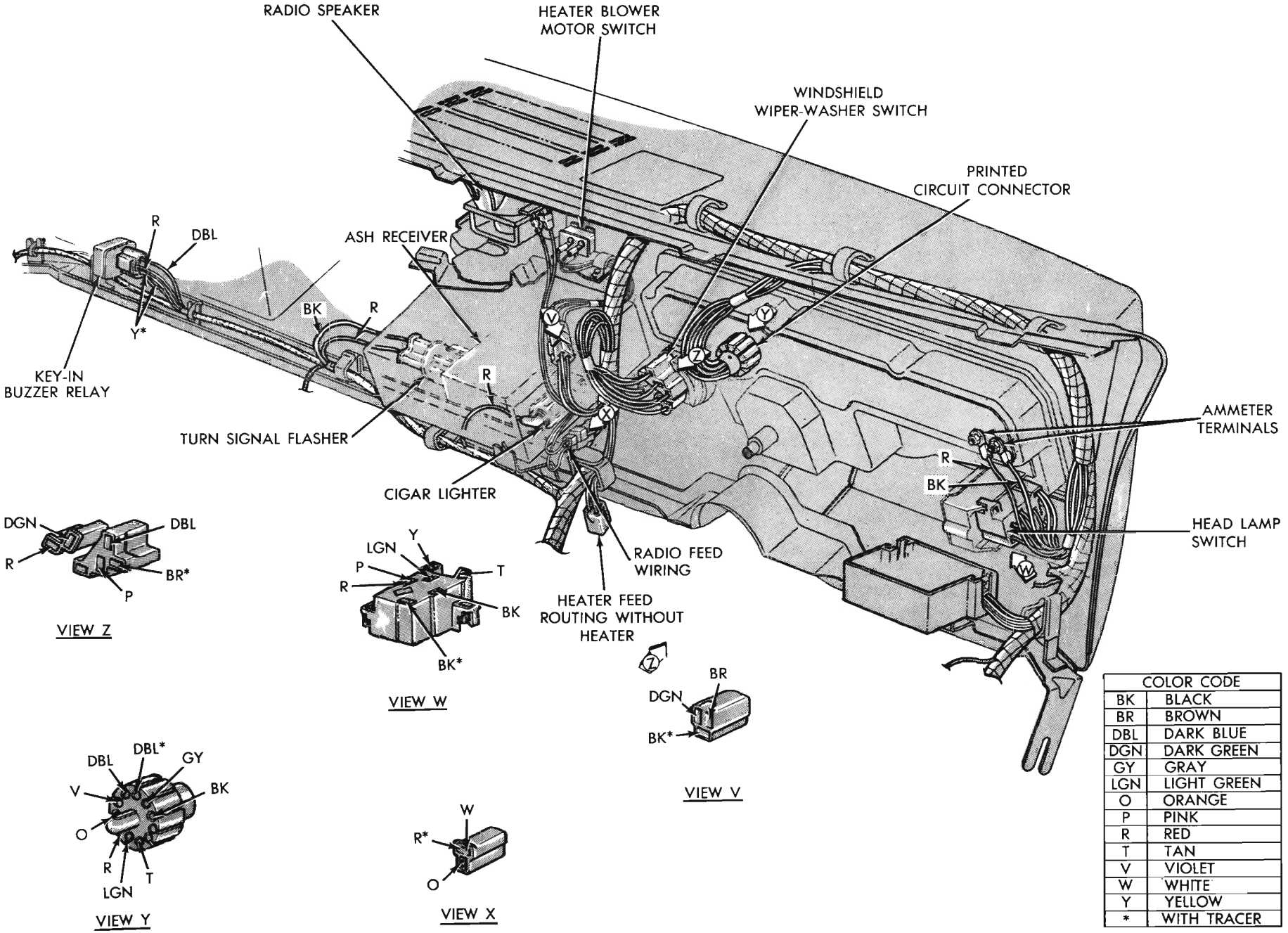
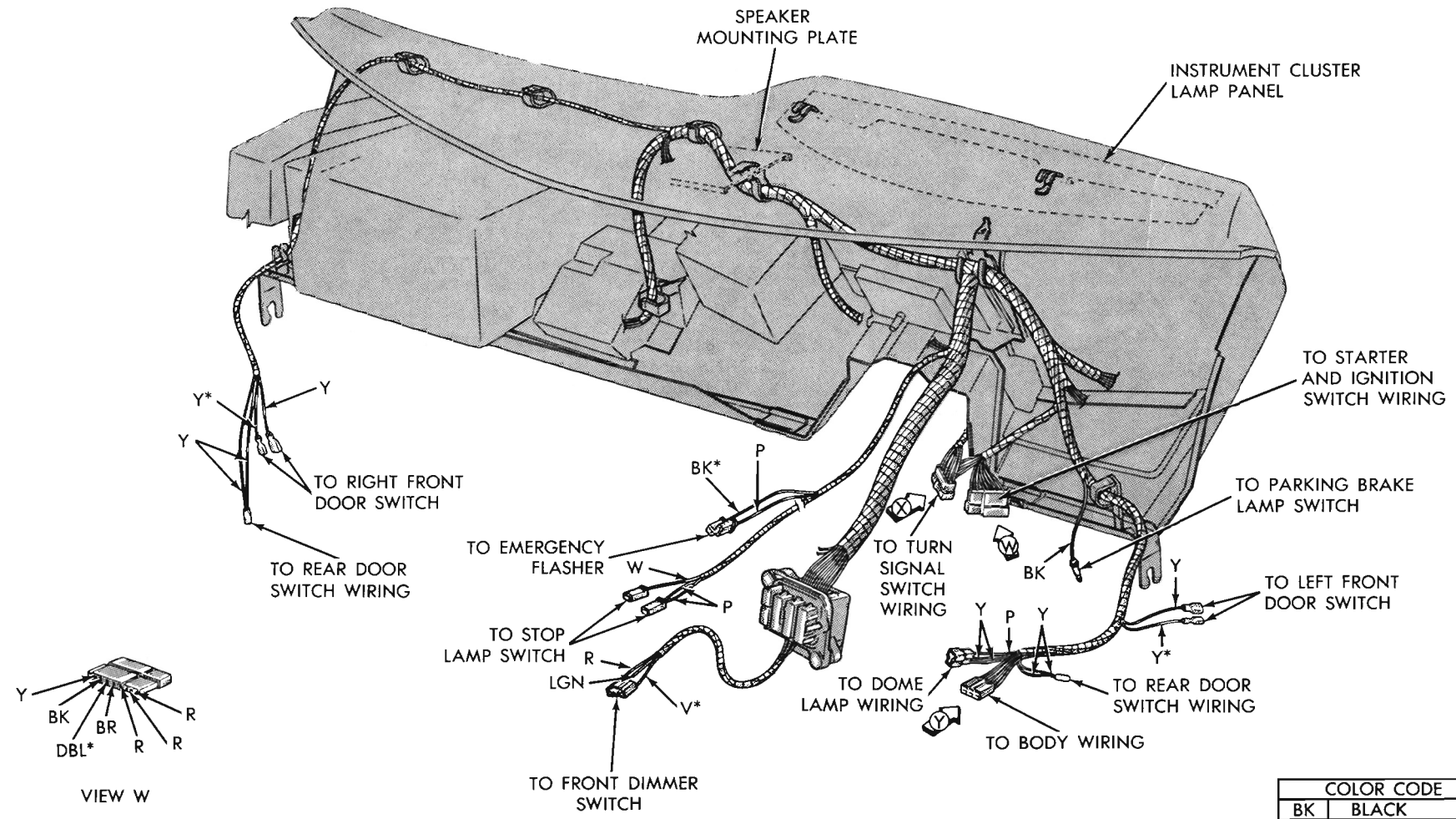


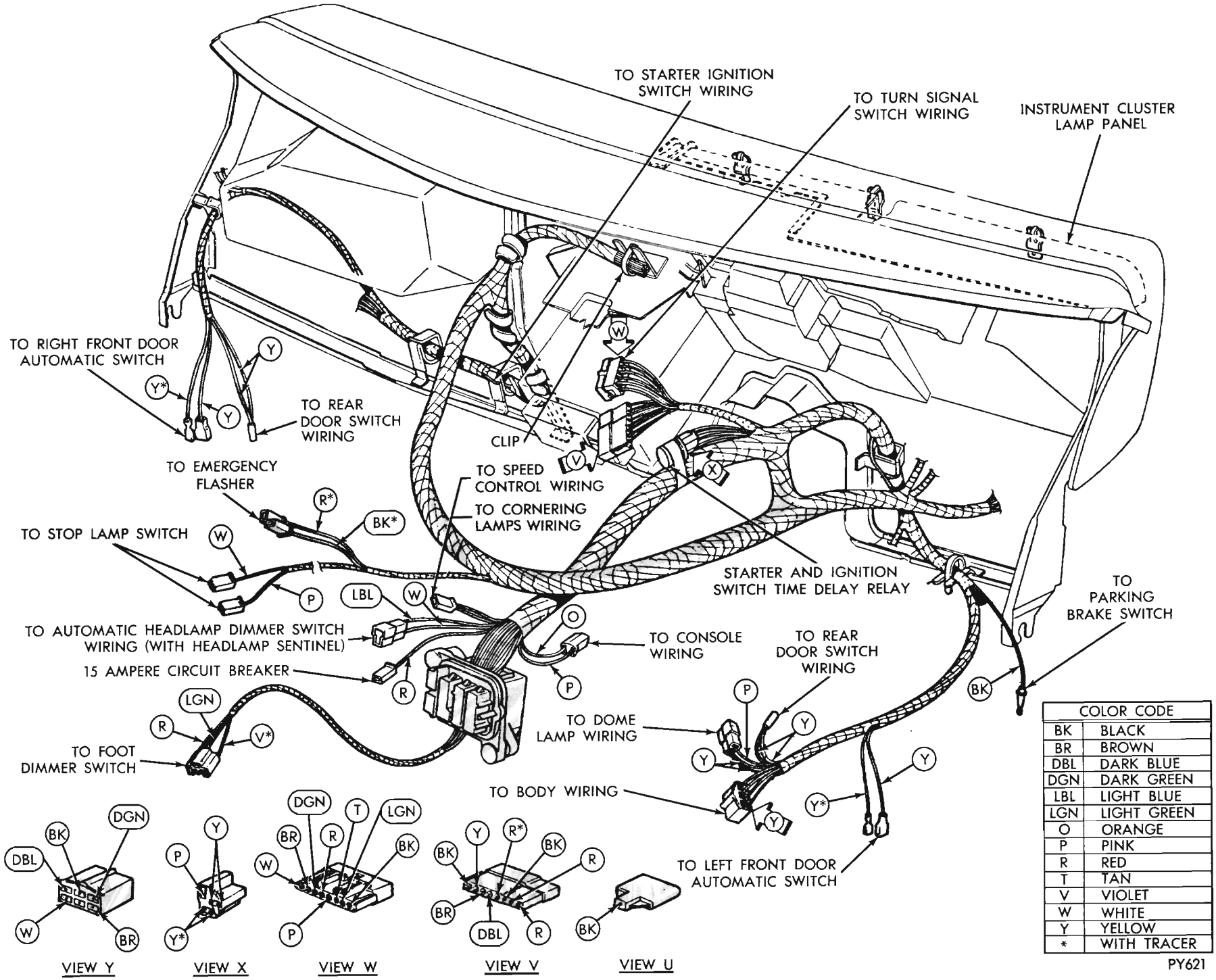
Fig. 9 - Cluster Wiring - Valiant



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
LGN	LIGHT GREEN
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

PY707

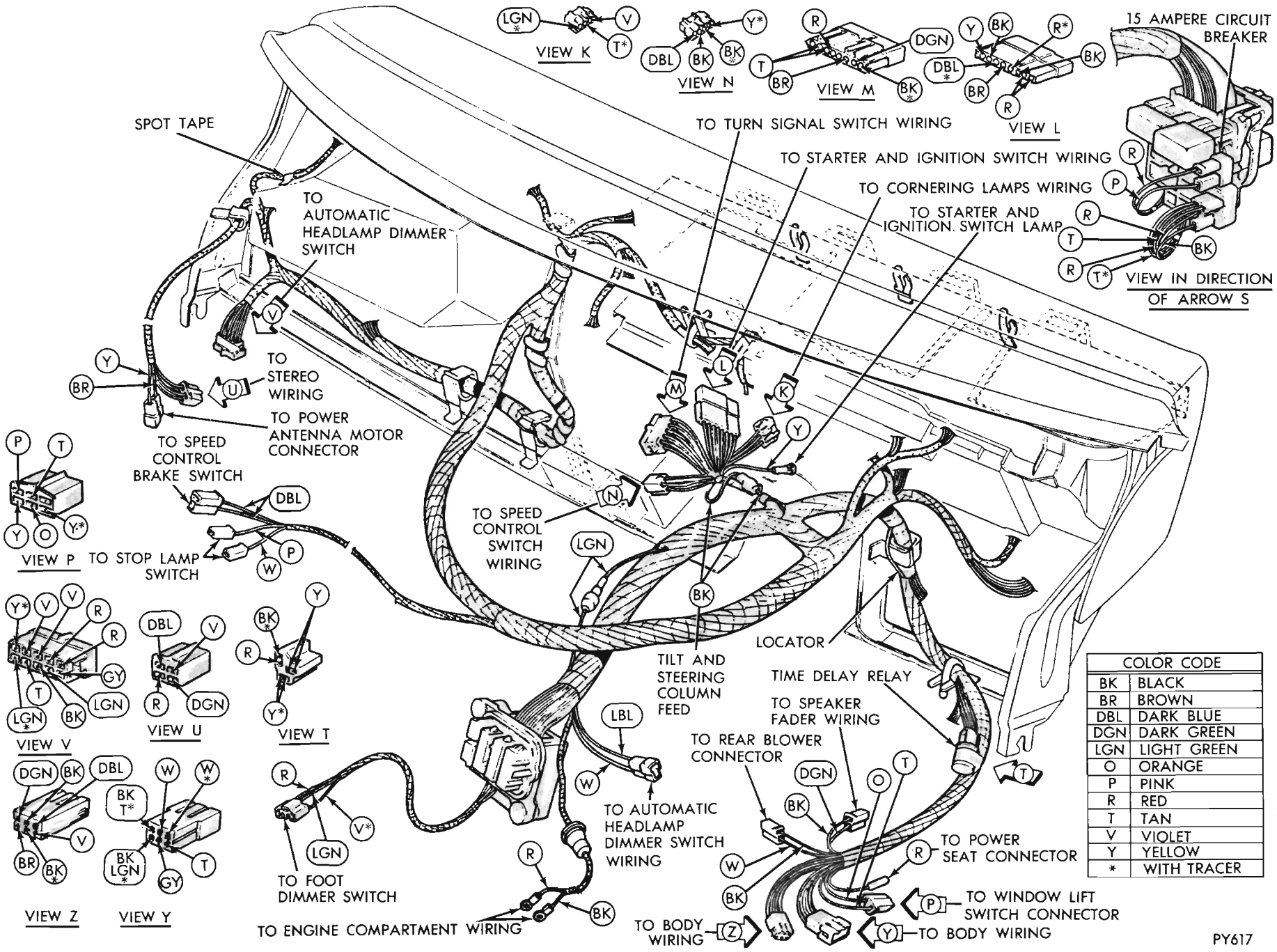
Fig. 10 - Instrument Panel Wiring - Fury



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
LBL	LIGHT BLUE
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

PY621

Fig. 11 - Instrument Panel Wiring - Chrysler



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
Y	YELLOW
*	WITH TRACER

Fig. 12 - Instrument Panel Wiring - Imperial

ENGINE

CONTENTS

	Page
CRANKCASE VENTILATION SYSTEM	92
GENERAL INFORMATION	1
SERVICE DIAGNOSIS	2
198-225 CUBIC INCH 6 CYLINDER ENGINES	5
318-340-360 CUBIC INCH V8 ENGINES	25
383-440 CUBIC INCH ENGINES	50
426 CUBIC INCH "HEMI" ENGINES	73
REPAIR OF DAMAGED OR WORN THREADS	93
SPECIFICATIONS	94
TIGHTENING REFERENCE	116

ENGINE APPLICATION

Engine Type and Displacement	Number Cylinder	Compression Ratio	Remarks
"RG" 198 Cubic Inch	6	8.4 to 1	1 BBL Carb.
"RG" 225 Cubic Inch	6	8.4 to 1	1 BBL Carb.
"LA" 318 Cubic Inch	8	8.8 to 1	2 BBL Carb. Std. Cam
"LA" 340 Cubic Inch	8	10.5 to 1	4 BBL Carb. Spec. Cam
"LA" 340 Cubic Inch	8	10.5 to 1	3-2 BBL Carb. Spec. Cam
"LA" 360 Cubic Inch	8	8.8 to 1	2 BBL Carb. Std. Cam
"LB" 383 Cubic Inch	8	8.7 to 1	2 BBL Carb. Std. Cam
"LB" 383 Cubic Inch	8	8.7 to 1	4 BBL Carb. Spec. Cam
"RB" 440 Cubic Inch	8	9.0 to 1	4 BBL Carb. Std. Cam
"RB" 440 Cubic Inch	8	9.7 to 1	4 BBL Carb. Spec. Cam
"RB" 440 Cubic Inch	8	10.5 to 1	3-2 BBL Carbs. Spec. Cam
"Hemi" 426 Cubic Inch	8	10.25 to 1	2-4 BBL Carbs. Spec. Cam

GENERAL INFORMATION

Six Cylinder Engine

The 6 cylinder engine, (Fig. 1) is inclined toward the right at an angle of 30 degrees from the vertical in the engine compartment. This design permits a lower hood line and allows space in the engine compartment for the long intake manifold branches. The engine has in-line overhead valves and wedge shaped combustion chambers and a nominal compression ratio of 8.4:1.

The lubrication system consists of an externally mounted rotor type pump on the lower right side of the cylinder block. A full flow screw on throw away type oil filter is mounted on the rear of the oil pump body. Oil is forced by the oil pump to a series of oil passages in the engine (Fig. 49).

The semi-series flow cooling system contains an aluminum water pump body with a pressed in ball bearing and seal assembly and steel stamped impeller. The water pump housing is integral with the cylinder block.

V8 Engines

The V8 engines are all the valve-in-head type with hydraulic tappets. Engines vary in compression ratio, piston displacement, camshafts, valve springs, carburetors, intake manifolds and exhaust systems. The three-two barrel and four barrel carburetor equipped engines with a compression ratio of 9.7 or higher use premium fuel.

The 426 hemi-head engine (Fig. 2) has twin four-barrel carburetors, nonsilenced low-restriction air cleaner, low-restriction intake manifold and exhaust headers, hydraulic tappets.

Engine oiling system consists of a rotor type oil pump and a full flow oil filter. On the 318, 340 and 360 cubic inch engines, the pump is mounted internally. On the 383,426 and 440 cubic inch engines, the pump is mounted externally. Oil is forced by the oil pump to a series of oil passages in the engine.

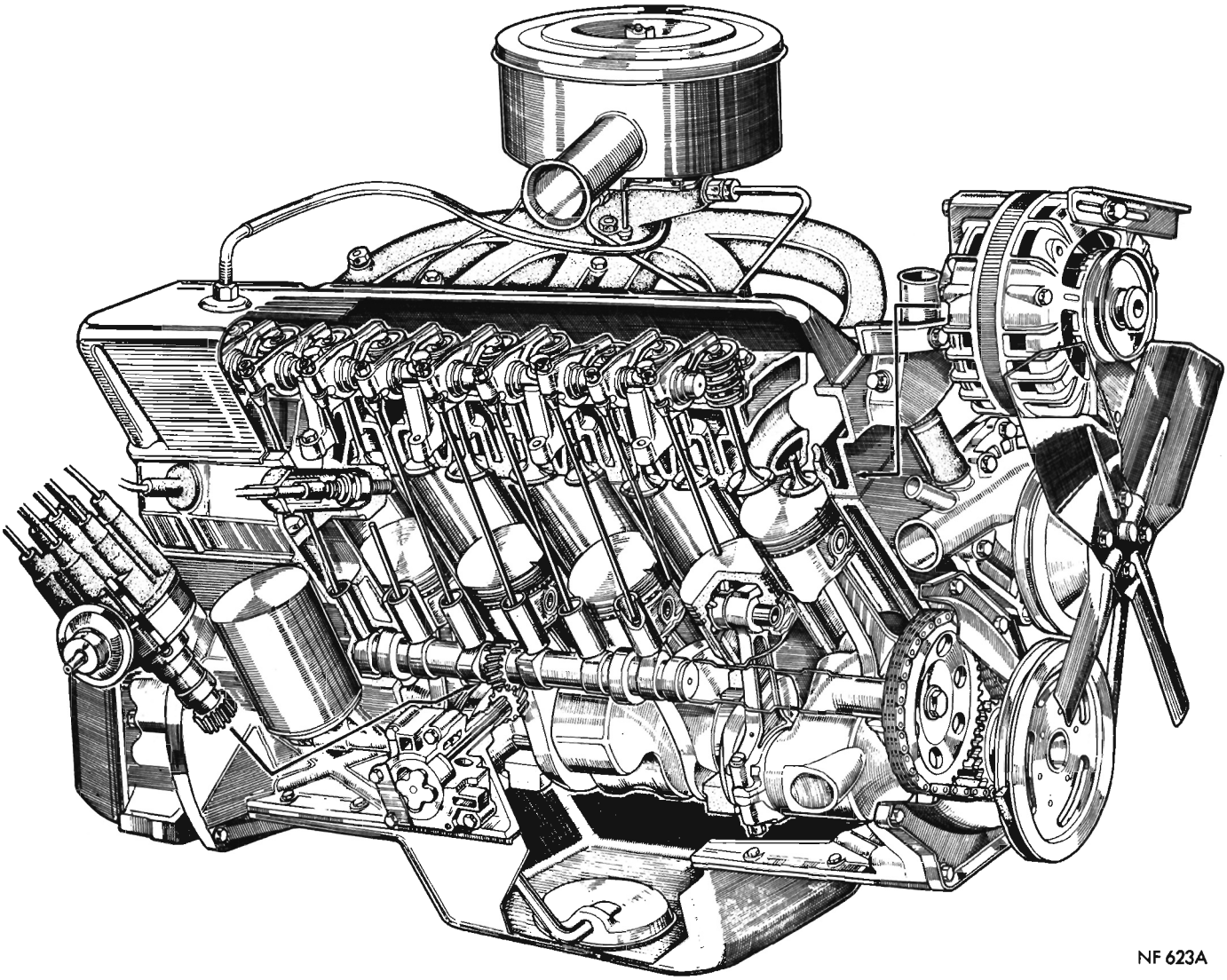
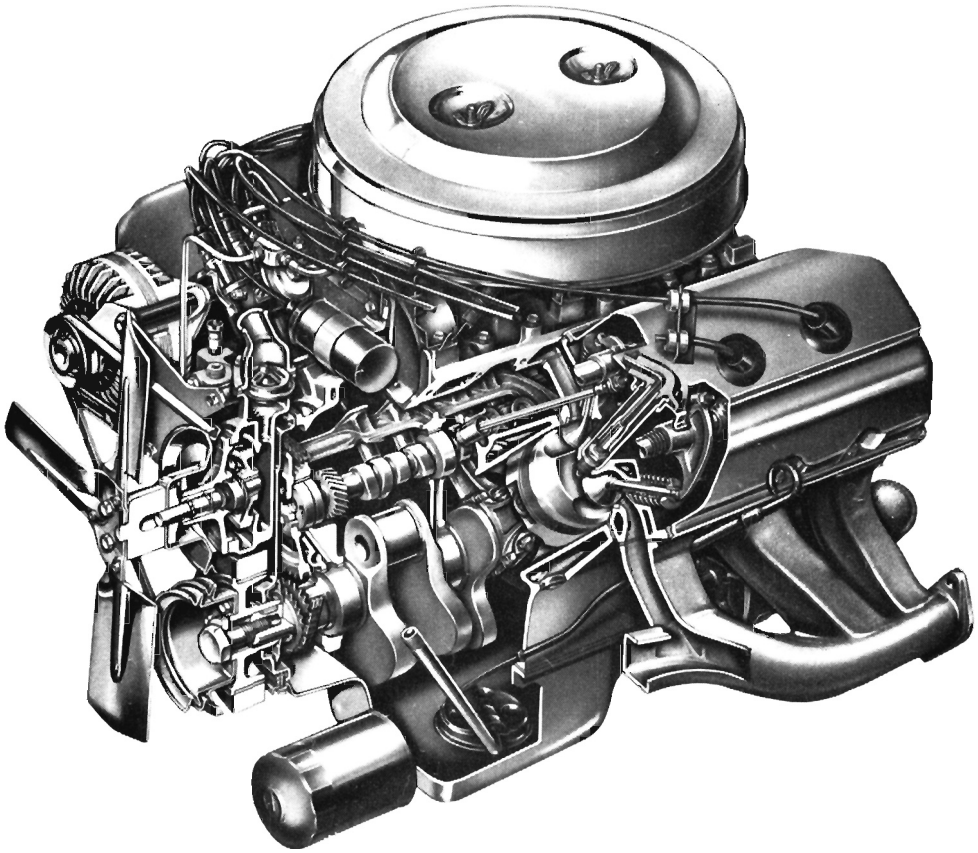


Fig. 1 Six Cylinder Engine Cutaway View

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
ENGINE WILL NOT START	(a) Weak battery.	(a) Test battery specific gravity. Recharge or replace as necessary.
	(b) Corroded or loose battery connections.	(b) Clean and tighten battery connections. Apply a coat of petroleum to terminals.
	(c) Faulty starter.	(c) Refer to "Starting Motor".*
	(d) Moisture on ignition wires and distributor cap.	(d) Wipe wires and cap clean and dry.
	(e) Faulty ignition cables.	(e) Replace any cracked or shorted cables.
	(f) Faulty coil or condenser.	(f) Test and replace if necessary.*
	(g) Dirty or corroded distributor contacts.	(g) Clean or replace as necessary.
	(h) Incorrect spark plug gap.	(h) Set gap at .035 in.
	(i) Incorrect ignition timing.	(i) Refer to "Ignition Timing."*
	(j) Dirt or water in fuel line or carburetor.	(j) Clean lines and carburetor.**
	(k) Carburetor flooded.	(k) Adjust float level—check seats.**



NN1033

Fig. 2 426 Hemi Engine Cutaway View

	(l) Incorrect carburetor float setting.	(l) Adjust float level—check seats.**
	(m) Faulty fuel pump.	(m) Install new fuel pump.**
	(n) Carburetor percolating. No fuel in the carburetor.	(n) Measure float level. Adjust bowl vent.** Inspect operation of manifold control valve.
ENGINE STALLS	(a) Idle speed set too low.	(a) Adjust carburetor.**
	(b) Incorrect choke adjustment.	(b) Adjust choke.**
	(c) Idle mixture too lean or too rich.	(c) Adjust carburetor.**
	(d) Incorrect carburetor float setting.	(d) Adjust float setting.**
	(e) Leak in intake manifold.	(e) Inspect intake manifold gasket and replace if necessary.**
	(f) Dirty, burned or incorrectly gapped distributor contacts.	(f) Replace contacts and adjust.*
	(g) Worn or burned distributor rotor.	(g) Install new rotor.
	(h) Incorrect ignition wiring.	(h) Install correct wiring.
	(i) Faculty coil or condenser.	(i) Test and replace if necessary.*
	(j) Incorrect tappet lash.	(j) Adjust to specifications.
ENGINE LOSS OF POWER	(a) Incorrect ignition timing.	(a) Refer to "Ignition Timing."*
	(b) Worn or burned distributor rotor.	(b) Install new rotor.
	(c) Worn distributor shaft or cam.	(c) Remove and repair distributor.*
	(d) Dirty or incorrectly gapped spark plugs.	(d) Clean plugs and set gap at .035 in.
	(e) Dirt or water in fuel line, carburetor or filter.	(e) Clean lines, carburetor and replace filter.**
	(f) Incorrect carburetor float setting.	(f) Adjust float level.**
	(g) Faulty fuel pump.	(g) Install new pump.
	(h) Incorrect valve timing.	(h) Refer to "Checking Valve Timing."***

Condition	Possible Cause	Correction
	(i) Blown cylinder head gasket.	(i) Install new head gasket.***
	(j) Low compression.	(j) Test compression of each cylinder.***
	(k) Burned, warped or pitted valves.	(k) Install new valves.***
	(l) Plugged or restricted exhaust system.	(l) Install new parts as necessary.
	(m) Faulty ignition cables.	(m) Replace any cracked or shorted cables.
	(n) Fauty coil or condenser.	(n) Test and replace as necessary.*
ENGINE MISSES ON ACCELERATION	(a) Dirty, burned, or incorrectly gapped distributor contacts.	(a) Replace contacts and adjust.*
	(b) Dirty, or gap too wide in spark plugs.	(b) Clean spark plugs and set gap at .035 in.
	(c) Incorrect ignition timing.	(c) Refer to "Ignition Timing."*
	(d) Dirt in carburetor.	(d) Clean carburetor.**
	(e) Acceleration pump in carburetor.	(e) Install new pump.**
	(f) Burned, warped or pitted valves.	(f) Install new valves.***
	(g) Faulty coil or condenser.	(g) Test and replace if necessary.*
ENGINE MISSES AT HIGH SPEED	(a) Dirty or incorrectly gapped distributor contacts.	(a) Clean or replace as necessary.*
	(b) Dirty or gap set too wide in spark plug.	(b) Clean spark plugs and set gap at .035 in.
	(c) Worn distributor shaft or cam.	(c) Remove and repair distributor.*
	(d) Worn or burned distributor rotor.	(d) Install new rotor.
	(e) Fautly coil or condenser.	(e) Test and replace if necessary.*
	(f) Incorrect ignition timing.	(f) Refer to "Ignition Timing."*
	(g) Dirty jets in carburetor.	(g) Clean jets.**
	(h) Dirt or water in fuel line, carburetor or filter.	(h) Clean lines, carburetor and replace filter.**
NOISY VALVES	(a) High or low oil level in crankcase.	(a) Check for correct oil level.***
	(b) Thin or diluted oil.	(b) Change oil.***
	(c) Low oil pressure.	(c) Check engine oil level.**
	(d) Dirt in tappets.	(d) Clean tappets.**
	(e) Bent push rods.	(e) Install new push rods.***
	(f) Worn rocker arms.	(f) Inspect oil supply to rockers.***
	(g) Worn tappets.	(g) Install new tappets.***
	(h) Worn valve guides.	(h) Ream and install new valves with O/S Stems.***
	(i) Excessive run-out of valve seats or valve faces.	(i) Grind valve seats and valves.***
	(j) Incorrect tappet lash.	(j) Adjust to specifications.
CONNECTING ROD NOISE	(a) Insufficent oil supply.	(a) Check engine oil level.***
	(b) Low oil pressure.	(b) Check engine oil level. Inspect oil pump relief valve and spring.***
	(c) Thin or diluted oil.	(c) Change oil to correct viscosity.
	(d) Excessive bearing clearance.	(d) Measure bearings for correct clearance.***
	(e) Connecting rod journals out-of-round.	(e) Replace crankshaft or regrind journals.***
	(f) Misaligned connecting rods.	(f) Replace bent connecting rods.***
MAIN BEARING NOISE	(a) Insufficient oil supply.	(a) Check engine oil level.***
	(b) Low oil pressure.	(b) Check engine oil level. Inspect oil pump relief valve and spring.***
	(c) Thin or diluted oil.	(c) Change oil to correct viscosity.
	(d) Excessive bearing clearance.	(d) Measure bearings for correct clearances.***
	(e) Excessive end play.	(e) Check No. 3 main bearing for wear on flanges.***
	(f) Crankshaft journal out-of-round worn.	(f) Replace crankshaft or regrind journals.
	(g) Loose flywheel or torque converter.	(g) Tighten to correct torque.

Condition	Possible Cause	Correction
OIL PUMPING AT RINGS	(a) Worn, scuffed, or broken rings.	(a) Hone cylinder bores and install new rings.***
	(b) Carbon in oil ring slot.	(b) Install new rings.***
	(c) Rings fitted too tight in grooves.	(c) Remove the rings. Check grooves. If groove is not proper width, replace piston.***
OIL PRESSURE DROP	(a) Low oil level.	(a) Check engine oil level.
	(b) Faulty oil pressure sending unit.	(b) Install new sending unit.
	(c) Clogged oil filter.	(c) Install new oil filter.
	(d) Worn parts in oil pump.	(d) Replace worn parts or pump.
	(e) Thin or diluted oil.	(e) Change oil to correct viscosity.
	(f) Excessive bearing clearance.	(f) Measure bearings for correct clearance.***
	(g) Oil pump relief valve stuck.	(g) Remove valve and inspect, clean, and reinstall.
	(h) Oil pump suction tube loose, bent or cracked.	(h) Remove oil pan and install new tube if necessary.

* Refer to the "Electrical and Instruments" Group 8 for service procedures.
** Refer to the "Fuel System" Group 14 for service procedures.
*** Refer to the "Engine" Group 9 for service procedures.

SIX CYLINDER ENGINES

INDEX

	Page
Camshaft	15
Camshaft Bearings	15
Connecting Rods	19
Crankshaft Identification	19
Crankshaft Main Bearings	20
Crankshaft Main Journals	20
Crankcase Ventilation System	92
Cylinder Block	16
Cylinder Head	8
Engine Assembly	6
Installing Piston and Connecting Rod Assembly	19
Measuring Connecting Rod Bearing Clearance	19
Measuring Main Bearing Clearance	20
Oil Filter	25
Oil Pan	23
Oil Pump	23
Pistons, Pins and Rings	17
Rear Main Bearing Oil Seal	21
Repair of Damaged or Worn Threads	93
Rocker Arms and Shaft Assembly	7
Specifications	94
Timing Chain Cover, Oil Seal and Chain	12
Tune-Up	5
Valves and Valve Springs	10
Valve Timing	12

SERVICE PROCEDURES

TUNE-UP

(1) Test battery specific gravity, add water if necessary, clean and tighten battery connections.

(2) Test cranking voltage. See "Starting Motor Cranking Voltage" Electrical Group 8.

(3) Tighten intake and exhaust manifold bolts to 15 foot-pounds.

(4) Perform cylinder compression test. Compression should not be less than 100 pounds and not vary more than 25 pounds. The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine in good condition may exhibit higher pressures. Many conditions which are difficult to control cause variations in compression readings. An engine should not be disassembled to determine the cause of low compression unless some other malfunction is present.

(5) Clean or replace spark plugs as necessary and adjust gap to .035 inch. Tighten to 30 foot-pounds.

(6) Test resistance of spark plug cables. Refer to "Ignition System Secondary Circuit Inspection" Electrical Section.

(7) Inspect the breaker plate contacts, primary wire and vacuum advance operation. Test coil output voltage, primary and secondary resistance. Test Condenser. Replace parts as necessary. Refer to Ignition System and make necessary adjustment.

(8) Reset ignition timing with vacuum advance line disconnected. Ignition timing should be set to compensate for altitudes and/or gasoline grades.

(9) Set carburetor idle mixture adjustment. Adjust throttle stop screw to specifications. Perform a combustion analysis.

(10) Test fuel pump for pressure and vacuum. Refer to "Fuel System" Group 14, Specifications.

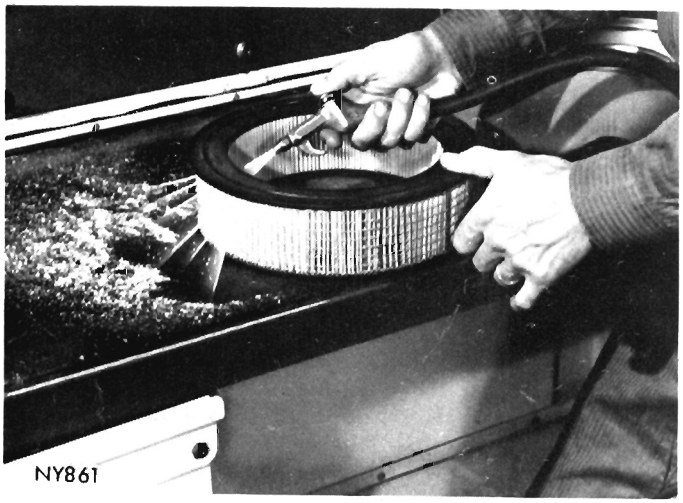


Fig. 3 Cleaning Filter Element

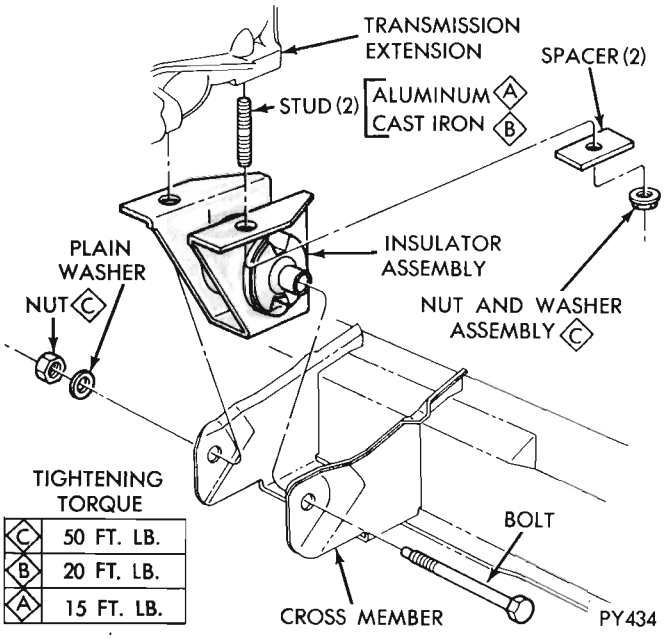


Fig. 5 Engine Rear Support - Barracuda, Satellite, Fury

(11) Inspect manifold heat control valve in exhaust manifold for proper operation and apply Manifold Heat Control Valve Solvent Part Number 3419129 or equivalent to bushing and shaft.

(12) Every 6 months remove filter element and blow out dirt gently with an air hose. Direct air from inside out, and keep nozzle 2 inches away from element to avoid damaging. Clean metal housing and install element. Every two years, install a new factory recommended filter element or equivalent. Service unit more frequently when driving under severe conditions, such as in dusty areas (Fig. 3).

(13) Inspect crankcase ventilation system as outlined on page 92.

(14) Inspect and adjust accessory belt drives referring to "Cooling System," Group 7 for proper adjustments.

(15) Road test vehicle as a final test.

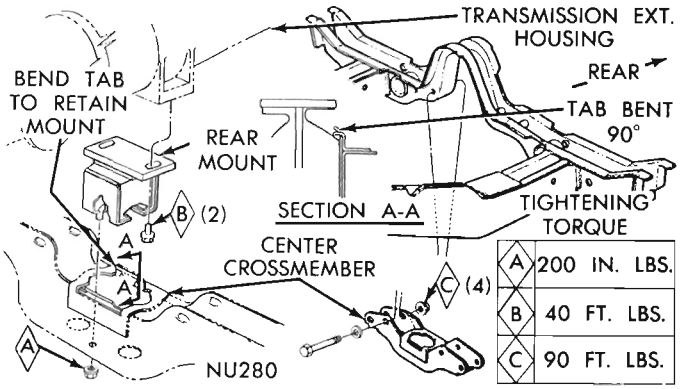


Fig. 4 Engine Rear Support - Valiant

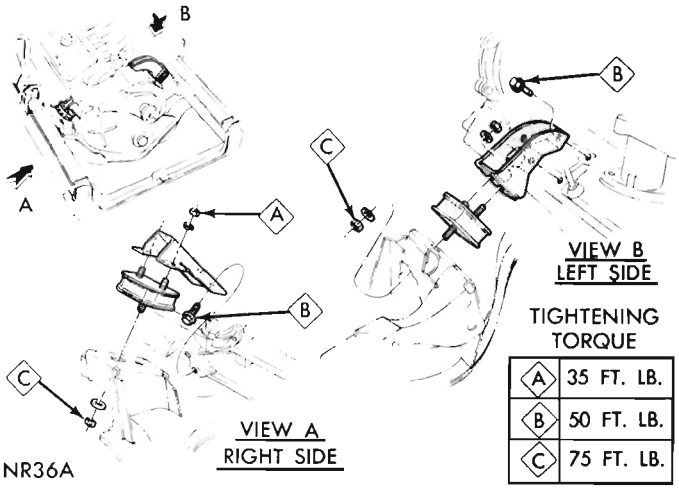


Fig. 6 Front Engine Mounts - Valiant

ENGINE ASSEMBLY

Removal

(1) Scribe hood hinge outlines on hood and remove hood.

(2) Drain cooling system and remove battery and carburetor air cleaner.

(3) Remove radiator and heater hoses and remove radiator.

(4) Remove closed ventilation system and evaporative control system from cylinder head cover.

(5) Disconnect fuel lines, carburetor linkage and wiring to engine.

(6) Disconnect exhaust pipe at manifold.

(7) Raise vehicle on a hoist.

(8) Drain converter housing and transmission. Remove oil cooler lines, filler tube and shift cable.

(9) Remove clutch torque shaft, brake cable and rods.

(10) Remove speedometer cable and gear shift

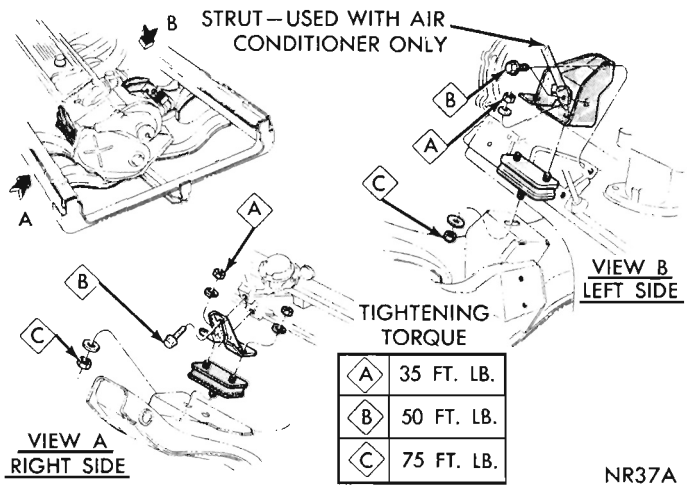


Fig. 7 Front Engine Mounts - Barracuda, Satellite

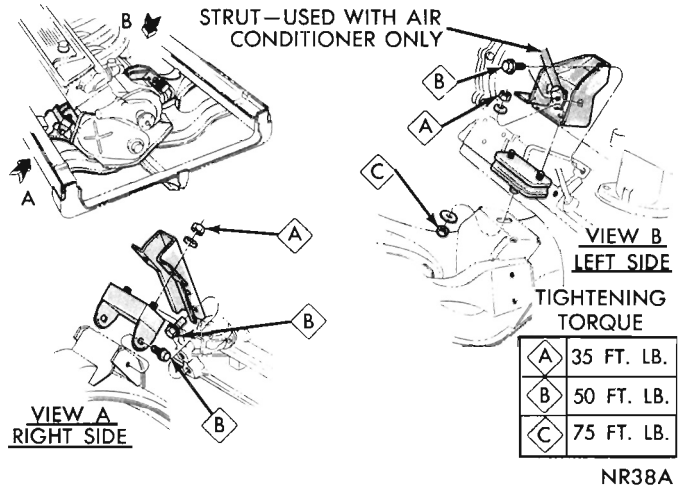


Fig. 8 Front Engine Mounts - Fury

rods.

(11) Disconnect propeller shaft and tie-up out of way.

(12) Install engine support fixture Tool C-3487A and leg C-3806 to support rear of engine.

(13) Remove engine rear support crossmember (Figs. 4 or 5).

(14) Remove transmission bolts from clutch housing.

(15) Remove transmission.

(16) Lower vehicle.

(17) Install engine lifting fixture to cylinder head and attach a chain hoist to fixture eyebolt.

(18) Remove engine support fixture.

(19) Remove front engine mount bolts (Figs. 6, 7 or 8).

(20) Lift engine from engine compartment and install in engine repair stand.

Installation

(1) Install engine lifting fixture and attach a chain hoist to fixture eyebolt.

(2) Lower engine into engine compartment until front of engine is positioned on front engine mounts.

(3) Install front engine mount bolts. **Do not tighten.**

(4) Install engine support fixture Tool C-3487A and leg C-3806.

(5) Remove chain hoist and engine lifting fixture.

(6) Raise vehicle on a hoist.

(7) Position rear of engine and install transmission.

(8) Install engine rear support crossmember, remove engine support fixture.

(9) Connect propeller shaft at transmission.

(10) Install speedometer cable and gear shift rods.

(11) Install clutch torque shaft, brake cables and rods.

(12) Install cooler lines, and transmission filler tube.

(13) Lower vehicle.

(14) Tighten front engine mount bolts to specified torque.

(15) Connect exhaust pipe at the manifold using a new gasket.

(16) Connect fuel lines, carburetor linkage and wiring to engine.

(17) Install closed ventilation system and evaporative control system on cylinder head cover.

(18) Install hood using scribe marks for proper alignment.

(19) Close all drain cocks and fill cooling system.

(20) Fill engine crankcase and transmission. Refer to "Lubrication" Group O, for quantities and lubricants to use. Inspect entire system for leaks and correct.

(21) Start engine and run until normal temperature is reached.

(22) Inspect timing (with vacuum advance line removed), adjust carburetor and transmission linkage as necessary. Connect vacuum line and road test vehicle.

ROCKER ARMS AND SHAFT ASSEMBLY

Stamped steel rocker arms are arranged on a single rocker arm shaft. Hardened steel spacers are used between the pairs of rocker arms. The rocker shaft is held in place by bolts and stamped steel retainers attached to the seven brackets on the cylinder head.

Removal

(1) Remove closed ventilation system.

(2) Remove evaporative control system.

(3) Remove cylinder head cover and gasket.

(4) Remove rocker shaft bolts and retainers.

(5) Remove rocker arms and shaft assembly.

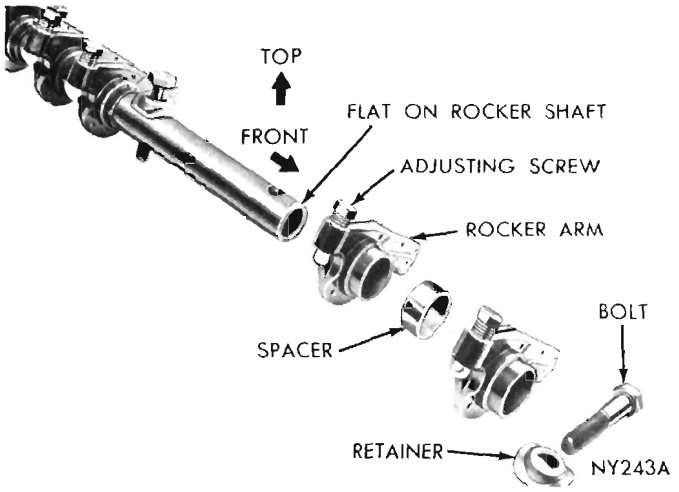


Fig. 9 Rocker Shaft Assembly

Installation

(1) Rocker arms and shaft assembly must be installed (Fig. 9) so the flat on the end of rocker shaft is on top and point toward front of engine. This is necessary to provide proper lubrication to rocker assemblies.

(2) Install rocker shaft retainers between rocker arms so they seat on rocker shaft and not on the extended bushing of rocker arm.

Be sure to install long retainer in center position only.

(3) Install rocker shaft bolts. Install long bolt at the rear of the engine. Tighten all bolts to 25 foot-pounds.

(4) Operate engine until normal operating temperature is reached (approximately 185 degrees F., water temperature).

(5) Allow engine to idle at 550 rpm at this 185 degrees F. temperature for five minutes.

(6) Adjust tappets, **Hot;** intake .010 inch, exhaust .020 inch.

(7) Inspect cylinder head cover for distortion. Straighten if necessary.

(8) Place new cylinder head cover gasket in position and install the cylinder head cover. Tighten nuts to 40 inch-pounds.

(9) Install closed ventilation system and evaporative control system.

CYLINDER HEAD

The chrome alloy cast iron cylinder head (Fig. 10) is held in place by 14 bolts. Spark plugs are located at the wide edge of the combustion chambers and aluminum spark plug tubes serve as spark plug gaskets.

Removal

(1) Drain cooling system.

(2) Remove carburetor air cleaner and fuel line.

(3) Disconnect accelerator linkage.

(4) Remove vacuum control tube at carburetor and distributor.

(5) Disconnect spark plug wires by pulling

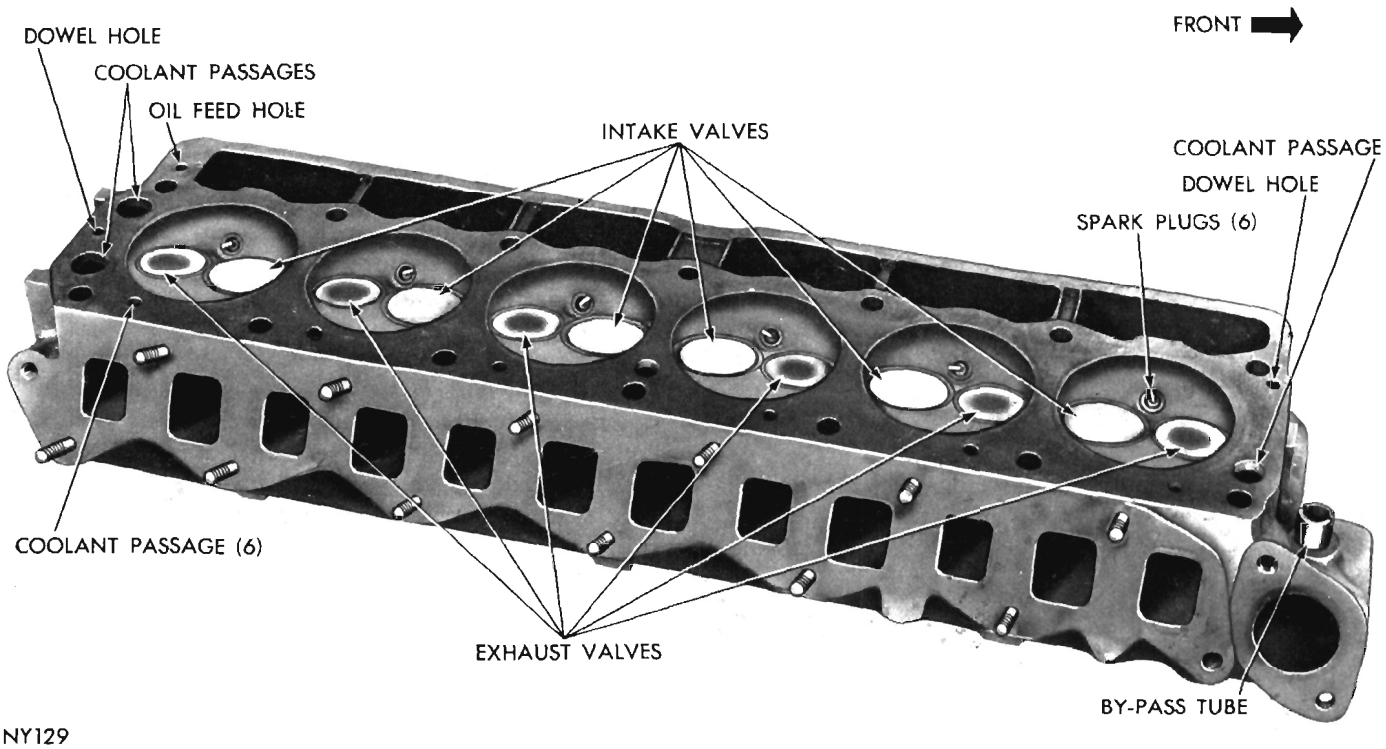


Fig. 10 Cylinder Head

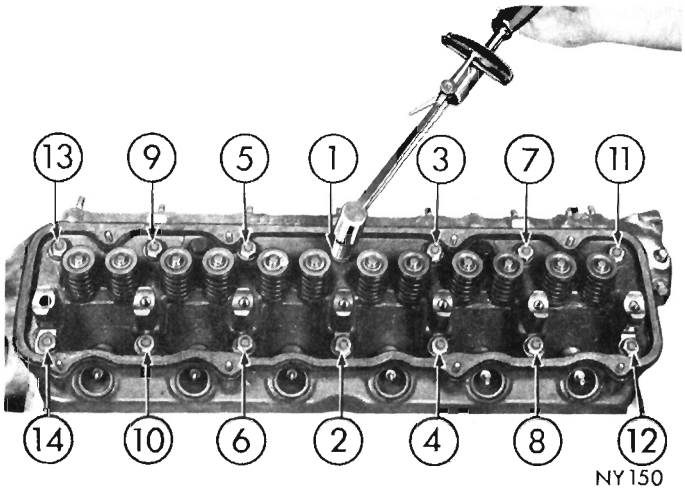


Fig. 11 Cylinder Head Tightening Sequence

straight out in line with the plug.

(6) Disconnect heater hose and clamp holding by-pass hose.

(7) Disconnect heat indicator sending unit wire.

(8) Disconnect exhaust pipe at exhaust manifold flange.

(9) Remove intake and exhaust manifold and carburetor as an assembly.

(10) Remove closed ventilation system, evaporative control system and cylinder head cover.

(11) Remove rocker arms and shaft assembly.

(12) Remove push rods and identify to insure installation in original location.

(13) Remove 14 head bolts and remove cylinder head.

(14) Place cylinder head in holding fixture Tool C-3626 and remove spark plugs and tubes.

Installation

(1) Clean all gasket surfaces of cylinder block and cylinder head and install spark plugs.

(2) Inspect all surfaces with a straightedge if there is any reason to suspect leakage. If out of flatness exceeds .00075 times the span length in any direction; either replace head or lightly machine the head gasket surface. As an example, if a 12 inch span is .004 in. out of flat, allowable is 12 x .00075 = .009 in.

The cylinder head surface finish should be 70-180 micro-inches.

(3) Coat new gasket lightly with Chrysler Sealer, Part Number 1057794 or equivalent. Install gasket and cylinder head.

(4) Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 50 foot-pounds in sequence (Fig. 11). Repeat the procedure, retightening all cylinder head bolts to 65 foot-pounds.

(5) Install rocker arms and shaft assembly with "FLAT" on end of rocker shaft "ON TOP" and

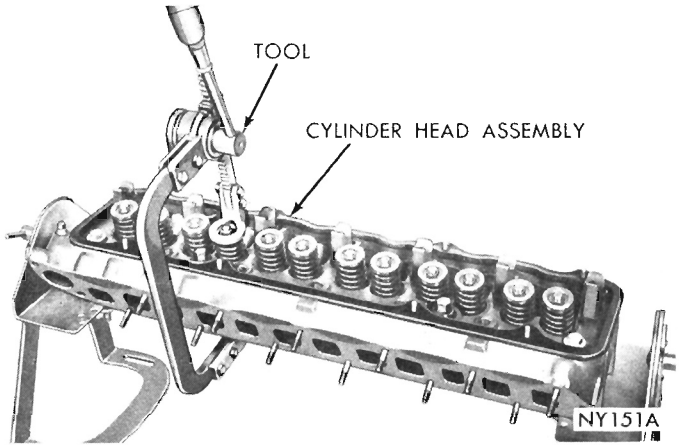


Fig. 12 Compressing Valve Spring

pointing toward front of engine, (Fig. 9) to provide proper lubrication to rocker assemblies. **Install rocker shaft retainers between rocker arms to the seat on rocker shaft and not on extended bushing on rocker arm.** Be sure to install long retainer in center position only. Install rocker shaft bolts (long bolt at rear of engine) and tighten to 25 foot-pounds.

(6) Loosen the 3 bolts holding intake manifold to exhaust manifold. This is required to maintain proper alignment.

(7) Install intake and exhaust manifold and carburetor assembly to the cylinder head with cup side of the conical washers against manifolds. Tighten nuts to 10 foot-pounds.

(8) Tighten 3 bolts holding intake manifold to exhaust manifold to 15 foot-pounds.

Sequence: Tighten inner bolt first, then the outer two bolts.

(9) Connect heater hose and by-pass hose clamp.

(10) Connect heat indicator sending unit wire, accelerator linkage and spark plug cables.

(11) Install vacuum control tube at carburetor and distributor.

(12) Connect exhaust pipe to exhaust manifold flange.

(13) Install fuel line and carburetor air cleaner.

(14) Fill cooling system.

(15) Operate engine until normal operating temperature is reached (approximately 185 degrees F. water temperature).

(16) Allow engine to idle at 550 rpm at this 185 degrees F. temperature for five minutes.

(17) Adjust tappets, **HOT;** intake .010 inch, exhaust .020 inch.

(18) Place new cylinder head cover gasket in position and install the cylinder head cover. Tighten nuts to 40 inch-pounds.

(19) Install closed ventilation system and evaporative control system.

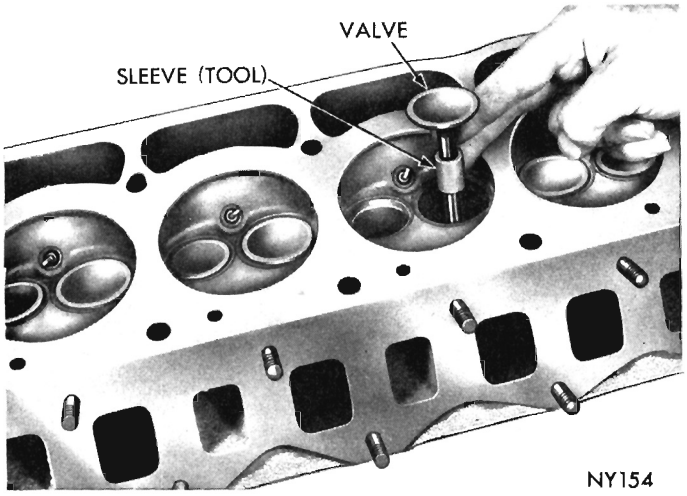


Fig. 13 Installing Valve and Tool C-3973

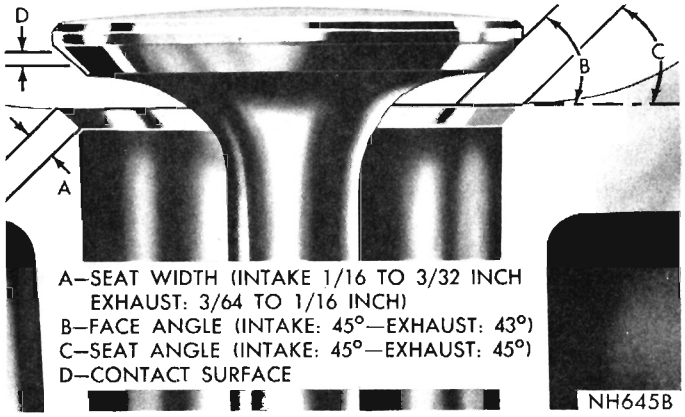


Fig. 15 Valve Face and Seat Angle

VALVES AND SPRINGS

Valves are arranged in line in the cylinder head and operate in guides that are integral with the cylinder heads.

Removal

(1) With cylinder head removed, compress valve springs, using Tool C-3422A (Fig. 12).

(2) Remove valve retaining locks valve spring retainers, valve stem cup seals and valve springs.

Remove any burrs from valve stem lock grooves to prevent damage to the valve guide when valves are removed. Identify valves to insure installation in original location.

Valve Inspection

(1) Clean valves thoroughly and discard burned, warped and cracked valves.

(2) Measure valve stems for wear. The intake valve stem diameter (new valve) should measure .372 to .373 inch and exhaust valve stem diameter (new valve) should measure .371 to .372 inch. If wear exceeds .002 inch, replace the valve.

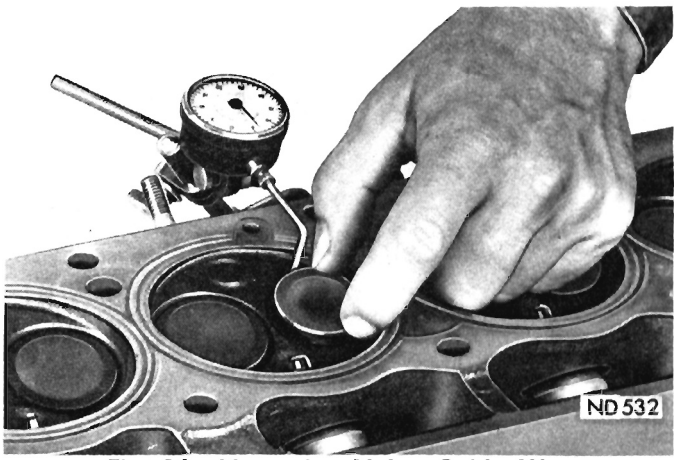


Fig. 14 Measuring Valve Guide Wear

(3) Remove carbon and varnish deposits from inside of valve guides, with a reliable guide cleaner.

(4) Measure valve stem guide clearance as follows:

(a) install sleeve Tool C-3973 over valve stem and install valve (Fig. 13). The special sleeve places the valve at the correct height for measuring with a dial indicator.

(b) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle to the valve stem being measured (Fig. 14).

(c) Move valve to and from the indicator. The total dial indicator reading should not exceed .017 inch. Ream guides for valves with oversize stems if dial indicator reading is excessive or if stems are scuffed or scored.

(5) Service valves with oversize stems are available in .005, .015 and .030 inch oversize. Reamers to accommodate the oversize valve stem are as follows:

Reamer Tool Number	Reamer Oversize	Valve Guide Size
C-3433	.005 in.	.379-.380 in.
C-3430	.015 in.	.389-.390 in.
C-3427	.030 in.	.404-.405 in.

(6) Slowly turn reamer by hand and clean guide thouroughly before installing a new valve. **Do not attempt to ream valve guides form standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so valve guides may be reamed true in relation to the valve seat.**

Refacing Valves and Valve Seats

(1) The intake and exhaust valve seats and the intake valve face have a 45 degree angle. The exhaust valve face has a 43 degree angle. The valve face and valve seat angles, are shown in Figure 15.

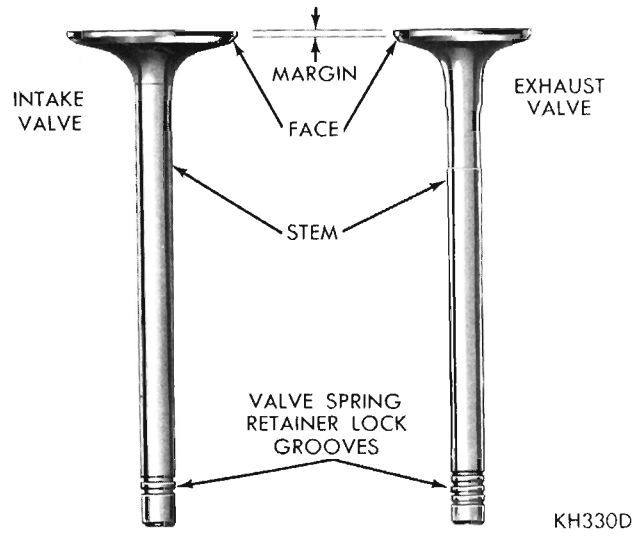


Fig. 16 Intake and Exhaust Valves

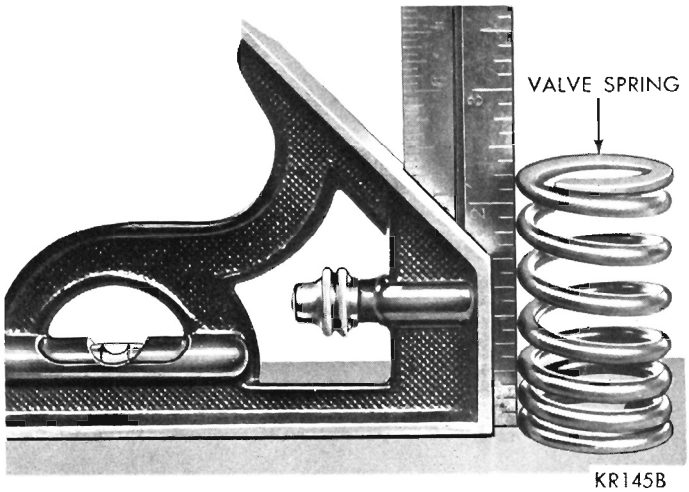


Fig. 18 Inspecting Valve Spring Squareness

(2) Inspect the remaining margin after the valves are refaced (Fig. 16). Valves with less than 3/64 inch margin should be replaced.

(3) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(4) Measure the concentricity of the valve seat using dial indicator No. 13725. Total runout should not exceed .002 inch (total indicator reading).

(5) Inspect valve seat with Prussian blue to determine where valve contacts the seat. To do this, coat valve seat **lightly** with Prussian Blue than set the valve in place. Rotate the valve with pressure. If the blue is transferred to the center of the valve face, contact is satisfactory. If the blue is transferred to the top edge of valve face, lower the valve seat with a 30 degree stone. If the blue

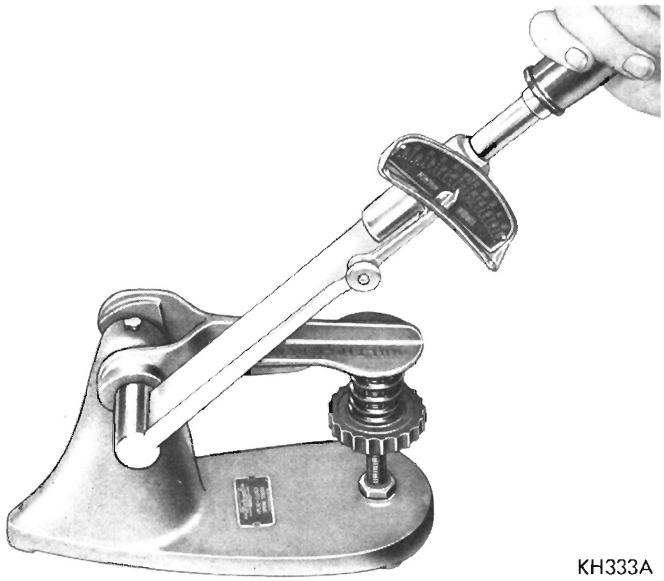


Fig. 17 Testing Valve Spring

is transferred to the bottom edge of valve face raise the valve seat with a 60 degree stone.

(6) When the seat is properly positioned the width of intake seats should be 1/16 to 3/32 inch. The width of exhaust seats should be 3/64 to 1/16 inch.

Testing Valve Springs (Fig. 17)

(1) Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested. As an example, the compressed length of the spring to be tested is 1-5/16 inches. Turn table of Tool C-647 until the surface is in line with the 1-5/16 inch mark on the threaded stud and the zero mark to the front. Place spring over the stud on table and lift the compressing lever to set the tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at the test length. Fractional measurements are indicated on the table for finer adjustments. Refer to specifications to obtain specified height and allowable tensions. Discard the springs that do not meet specifications.

(2) Inspect each valve spring for squareness with a steel square and surface plate, test springs from both ends, (Fig. 18).

If the spring is more than 1/16 inch out of square, install a new spring.

Installation

(1) Coat valve stems with lubrication oil and insert them in cylinder head.

(2) If valves or seats are reground, test valve stem height with Tool C-3746. If valve is too long, grind off the tip until length is within limits.

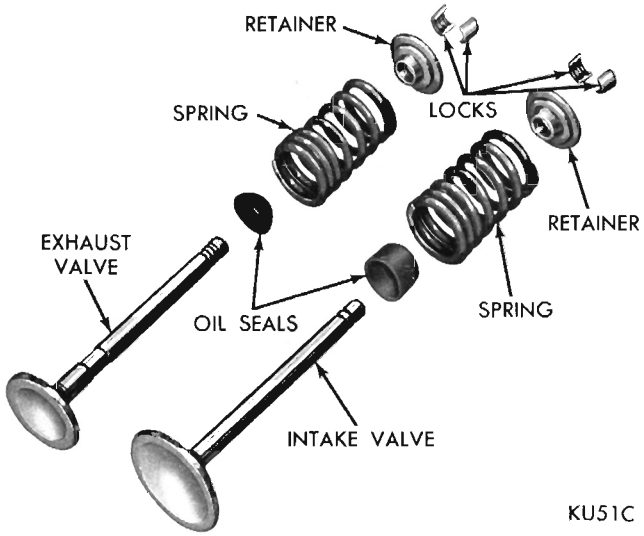


Fig. 19 Valve Assembly

(3) Install new cup seals on all valve stems (long seal on intake valve and short seal on exhaust valve) and over valve guides (Figs. 19 and 20) .—Install valve springs and retainers.

(4) Compress valve springs with Tool C-3422A, install locks and release the tool. **If valves and/or seats are reground, measure the installed height of springs. Make sure measurement is taken from the bottom of the spring seat in the cylinder head to the bottom surface of the spring retainer. (If spacers are installed, measure from the top of spacer). If height is greater than 1-11/16 inches, install a 1/16 inch spacer in the head counterbore to bring the spring height back to normal 1-5/8 inches to 1-11/16 inches.**

VALVE TIMING

(1) Rotate crankshaft until No. 6 exhaust valve is closing and No. 6 intake valve is opening. Install a dial indicator so that indicator pointer contacts valve spring retainer on No. 1 intake valve parallel to the axis of the valve stem.

(2) Turn No. 1 intake adjusting screw in one complete turn to remove the lash. Adjust dial indicator to zero. Rotate crankshaft clockwise (normal running direction) until valve has lifted .029 inch. The timing of the crankshaft pulley should now read from 12 degrees before top dead center to dead center. Readjust lash.

(3) If reading is not within specified limits:

(a) Inspect sprocket index marks.

(b) Inspect timing chain for wear.

(c) Inspect accuracy of "DC" mark on timing indicator.

TIMING CHAIN COVER, OIL SEAL AND CHAIN

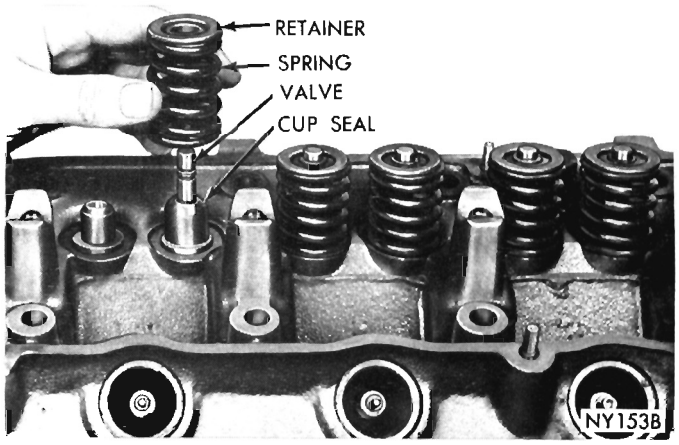


Fig. 20 Installing Valves and Cup Seals

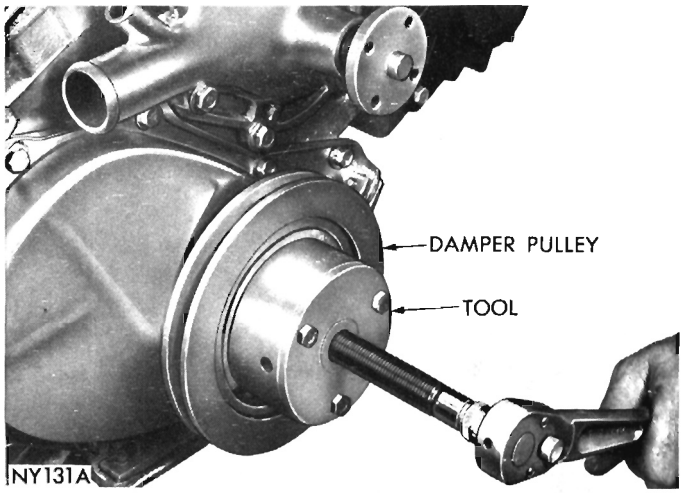


Fig. 21 Removing Vibration Damper Assembly

Cover Removal

(1) Drain cooling system.

(2) Remove radiator and fan.

(3) Install Tool C-3732A and pull vibration damper assembly off end of crankshaft (Fig. 21).

(4) Loosen oil pans bolts to allow clearance and remove chain case cover and gasket.

It is normal to find particles of neoprene collected between seal retainer and crankshaft oil slinger after seal has been in operation.

(5) Slide crankshaft oil slinger off end of crankshaft.

Measuring Timing Chain for Stretch

(1) Place a scale next to the timing chain so that any movement of the chain may be measured.

(2) Place a torque wrench and socket over the camshaft sprocket lock bolt and apply torque in the direction of crankshaft rotation to take up slack; 30 foot-pounds (cylinder head installed) or 15 foot-pounds (cylinder head removed). **With tor-**

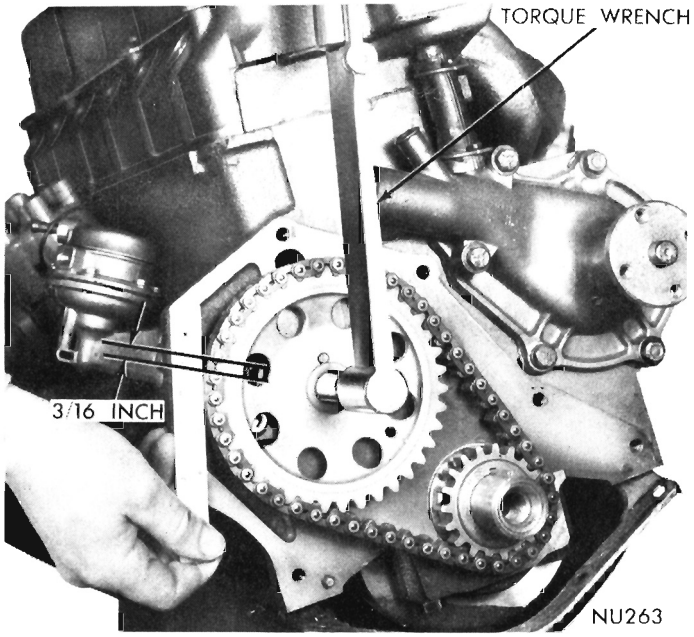


Fig. 22 Measuring Chain Stretch

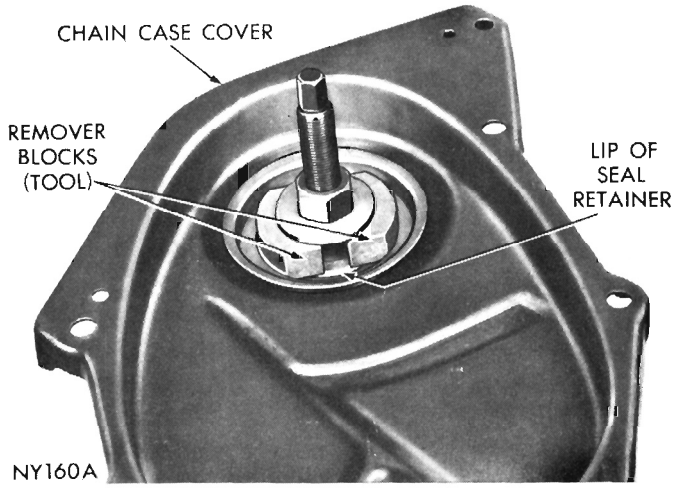


Fig. 24 Remover Blocks Expanded to Puller Position

que applied to the camshaft sprocket bolt, crankshaft should not be permitted to move. It may be necessary to block the crankshaft to prevent rotation.

(3) Holding a scale with dimensional reading even with the edge of a chain link, apply torque in the reverse direction 30 foot-pounds (cylinder head installed) or 15 foot-pounds (cylinder head removed) and note the amount of chain movement (Fig. 22).

(4) If chain movement exceeds 3/16 inch, install a new timing chain.

(5) If chain is satisfactory, slide the crankshaft oil slinger over the shaft and up against sprocket (flange away from spocket).

(6) If chain is not satisfactory, remove camshaft sprocket attaching bolt and remove timing chain

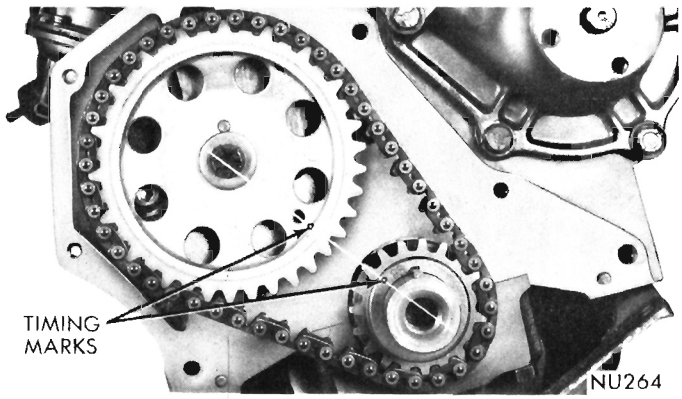


Fig. 23 Alignment of Timing Marks

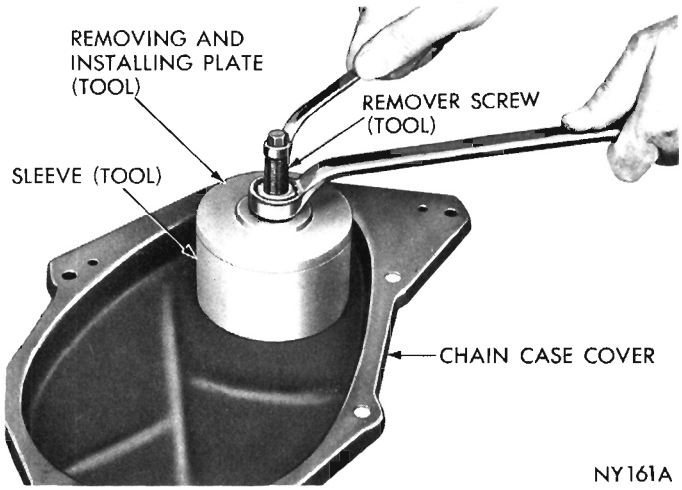


Fig. 25 Removing Oil Seal

with camshaft sprocket.

(7) Turn crankshaft to line up the centerline of camshaft and crankshaft with the timing mark on crankshaft sprocket.

(8) Install camshaft sprocket and timing chain.

(9) Line up timing marks on the sprockets with the centerline of crankshaft and camshaft (Fig. 23)

(10) Tighten camshaft sprocket lock bolt to 35 foot-pounds. Slide the crankshaft oil slinger over the shaft and up against sprocket (flange away from sprocket).

Oil Seal Replacement (Cover Removed)

(1) Position remover screw of Tool C-3506 through case cover, the inside of case cover up. Position remover blocks directly opposite each other, and force angular lip between the neoprene and flange of seal retainer.

(2) Place washer and nut on the remover screw. Tighten nut forcing the blocks into the gap to a point of distorting the seal retainer lip (Fig. 24). **Remover is only positioned at this point.**

(3) Place sleeve over the retainer and install the removing and installing plate into the sleeve.

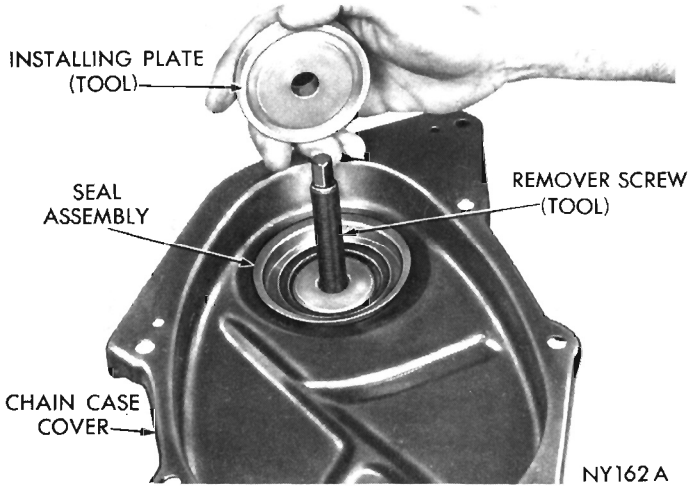


Fig. 26 Positioning Installer Plate

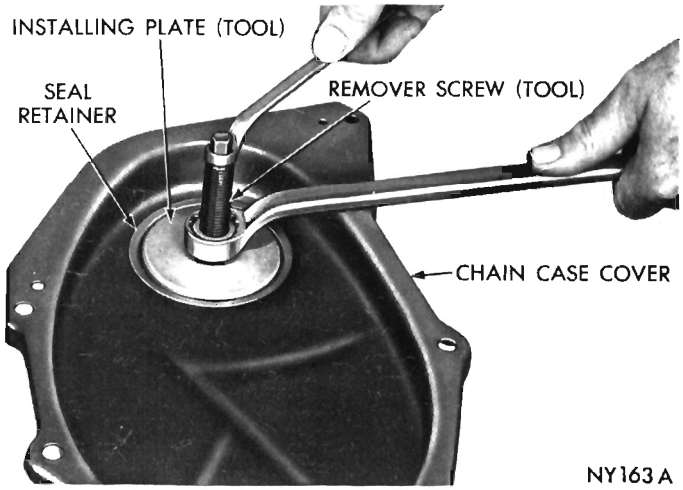


Fig. 27 Installing New Seal



Fig. 28 Inspecting Seal for Proper Seating

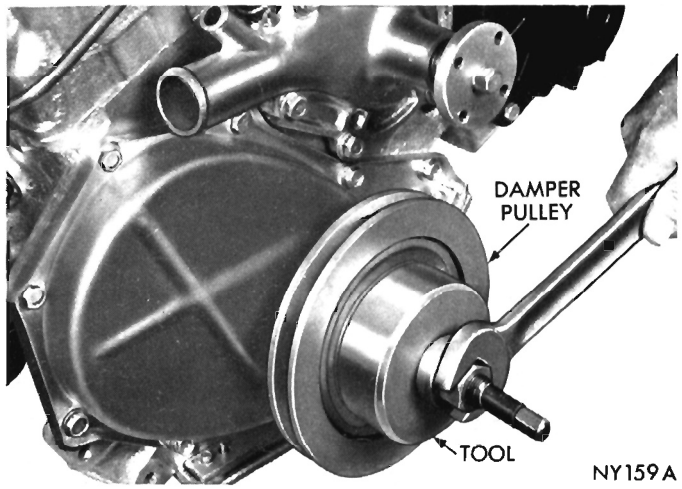


Fig. 29 Installing Vibration Damper Assembly

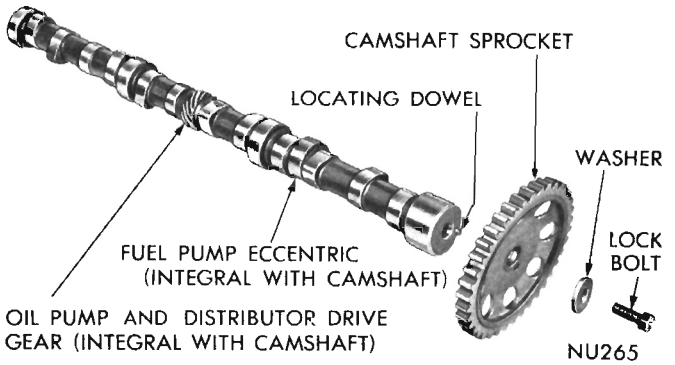


Fig. 30 Camshaft and Sprocket Assembly

(4) Place flat washer and nut on remover screw. Hold center screw and tighten lock nut to remove seal (Fig. 25).

(5) Insert remover screw through the removing and installing plate so the thin shoulder will be facing up.

(6) Insert the remover screw with the plate through the seal opening (inside of chain case cover facing up).

(7) Place the seal in cover opening, with neoprene down. Place seal installing plate into the new seal, with the protective recess toward lip of seal retainer (Fig. 26).

(8) Install flat washer and nut on the remover screw; hold screw and tighten nut (Fig. 27).

(9) Seal is properly installed when the neoprene is tight against face of cover. Try to insert a .0015 inch feeler gauge between the neoprene and cover (Fig. 28) if the seal is installed properly, the feeler gauge cannot be inserted. **Do not over compress neoprene.**

Cover Installation

(1) Be sure mating surfaces of chain case cover and cylinder block are clean and free from burrs.

(2) Using a new gasket, slide chain case cover over locating dowels and tighten bolts to 15 foot-pounds. Be sure all oil pan gaskets are in place and tighten oil pan bolts to 200

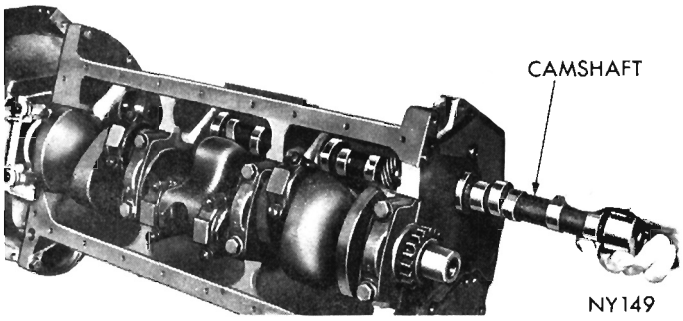


Fig. 31 Installing Camshaft

inch-pounds.

(3) Place damper pulley assembly hub key in the slot in crankshaft, lubricate seal lip with Lubriplate and slide hub on the crankshaft.

(4) Place installing tool, part of puller set Tool C-3732A in position and press damper pulley assembly on the crankshaft (Fig. 29).

CAMSHAFT

The camshaft has an integral oil pump and distributor drive gear and fuel pump eccentric (Fig. 30).

Rearward camshaft thrust is taken by the rear face of the aluminum camshaft sprocket hub, bearing directly on the front of the cylinder block, eliminating the need for a thrust plate.

The helical oil pump distributor drive gear and camshaft lobe taper both tend to produce only a rearward thrust.

Removal

(1) Remove tappets, using Tool C-4129.

(2) Remove timing sprockets, distributor and oil pump.

(3) Remove fuel pump.

(4) Install a long bolt into the front of camshaft to facilitate removal of the camshaft; remove camshaft, being careful not to damage cam bearings with the cam lobes.

Installation

(1) Lubricate camshaft lobes and camshaft bearing journals and insert the camshaft in cylinder block (Fig. 31).

When replacing camshaft, all of the tappet faces must be inspected for crown with a straight edge. If any negative crown (dish) is observed, tappet must be replaced. The tappet must have a definite crown.

Installation of Distributor

Before installing the distributor, time the engine as follows:

The distributor rotates clockwise.

(1) Rotate crankshaft until the mark on inner edge of crankshaft pulley is in line with the "O" (TDC) mark on the timing chain case cover. No. 1 cyl. compression stroke (both valves closed).

(2) With distributor "O" rings in position, hold the distributor over mounting pad.

(3) Turn the rotor to point forward, corresponding to 4 o'clock.

(4) Install distributor so that with distributor fully seated on the engine, the gear has spiraled to bring the rotor to a 5 o'clock position.

(5) Turn the housing until the ignition contacts are separating and rotor is under No. 1 cap tower.

(6) Install hold down bolt and connect the primary wire.

(7) Adjust timing to specifications, using a timing light, then re-connect the vacuum line.

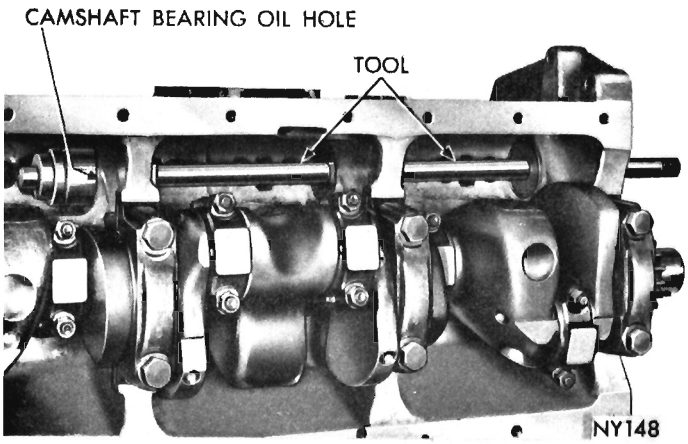


Fig. 32 - Removing Camshaft Bearings (Tool C-3132A)

CAMSHAFT BEARINGS (Engine Removed from Vehicle)

Removal

(1) With camshaft removed, drive out rear cam bearing welch plug.

(2) Install proper size adapters and horse shoe washers (part of Tool C-3132A) at the back of each bearing shell and drive out all bearing shells.

Installation

(1) Install new camshaft bearings with Tool C-3132A by sliding the new camshaft bearing shell over the proper adapter.

(2) Position bearing in tool. Install horseshoe lock and drive the bearing shell into place, (Fig. 32). **The camshaft bearing oil hole or holes must be in exact alignment with drilled oil passage or passages from the main bearing.**

(3) Install remaining shells in like manner. **Install NO. 1 camshaft bearing 3/32 inch inward from the front face of the cylinder block.**

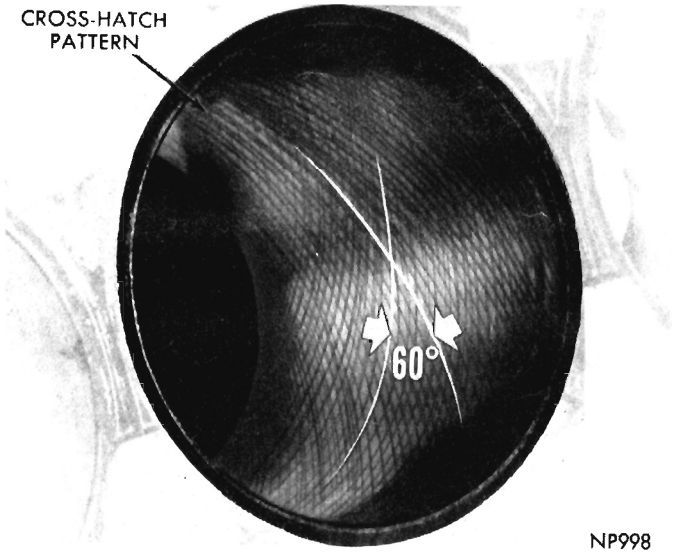


Fig. 33 Cross Hatch Pattern

(4) Apply sealer to a new welch plug and install at rear of camshaft. **Be sure this plug does not leak.**

CYLINDER BLOCK

Piston Removal

(1) Remove the top ridge of cylinder bores using Tool C-3012 before removing pistons from cylinder block. **Keep tops of the pistons covered during this operation.**

(2) Pistons and connecting rods must be removed from top of cylinder block. Rotate crankshaft so that each connecting rod is centered in the cylinder bore.

(3) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them if necessary.

(4) Remove connecting rod cap. Install connecting rod bolt guide set on connecting rod bolts. Push each piston and rod assembly out of cylinder bore. **Be careful not to nick crankshaft journals.**

(5) Install bearing caps on mating rods.

Cleaning and Inspection

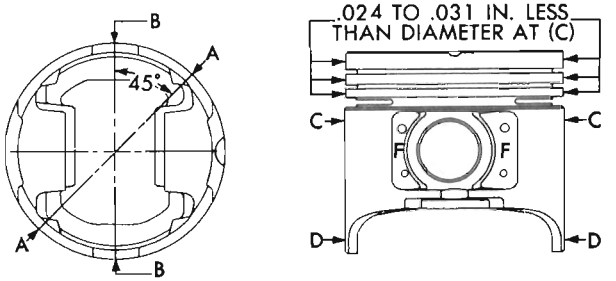
(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are installed, coat edges or plug and core hole with Number 105779 Sealer or equivalent. Drive the core plug in so that the rim lies at least 1/64 in. below the lead-in chamfer.

(3) Examine block for cracks or fractures.

Cylinder Bore Inspection

The cylinder walls should be tested for out-of-round and taper with Tool C-119. If the cylinder bores show more than .005 in. out-of-round, or a taper of more than .010 in. or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed, and new oversize pistons and rings fitted. Whatever type of boring equipment is used, boring and honing operation should be closely coordinated with the fitting of pistons and rings in order that specified clearance may be maintained.



THE ELLIPTICAL SHAPE OF THE PISTON SKIRT SHOULD BE .008 TO .010 IN. LESS AT DIAMETER (A) THAN ACROSS THE THRUST FACES AT DIAMETER (B). MEASUREMENT IS MADE 1/8 IN. BELOW LOWER RING GROOVE

DIAMETERS AT (C) AND (D) CAN BE EQUAL OR DIAMETER AT (D) CAN BE .0015 IN. GREATER THAN (C)

NY221B

Fig. 34 Piston Measurements

Honing Cylinder Bores

Before honing, stuff plenty of clean rags under the bores, over the crankshaft to keep abrasive materials from entering crankcase area.

(1) Used carefully, the cylinder bore resizing hone Tool C-823, equipped with 220 grit stones, is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, Tool C-3501, equipped with 280 grit stones (C-3501-3810). If the cylinder bore is straight and round 20-60 strokes depending on the bore condition will be sufficient to provide a satisfactory surface. Inspect cylinder walls after 20 strokes. Use honing oil C-3501-3880 or a light honing oil available from a major oil distributor.

Do not use engine or transmission oil, mineral spirits or kerosene.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 60 degrees, the cross hatch angle is most satisfactory for proper seating of the rings. (See Fig. 33).

(4) After honing, it is necessary that the block be cleaned again to remove all traces of abrasives. **CAUTION: Be sure all abrasives are removed from engine parts after honing. It is recommend-**

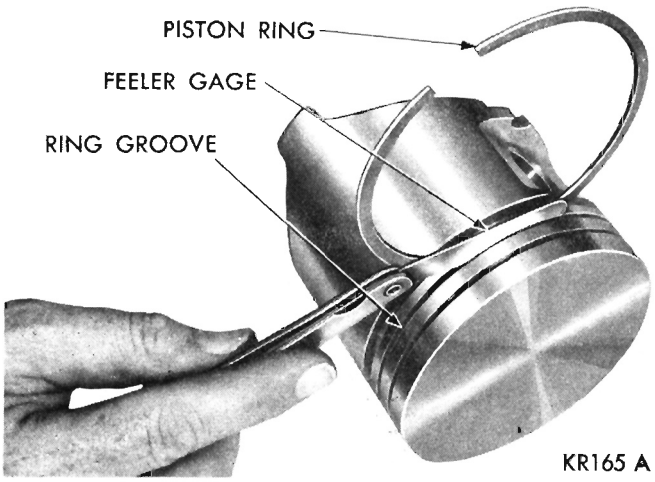


Fig. 35 Measuring Piston Ring Side Clearance

ed that a solution of soap and water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil bores after cleaning to prevent rusting.

PISTONS, PINS AND RINGS

The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the thrust face. This allows for expansion under normal operating conditions. The expansion forces the pin bosses away from each other, and the piston assumes a more round shape. Inspect pistons for taper and elliptical shape before they are fitted into cylinder bores. (See Fig. 34).

Finished Pistons

All pistons are machined to the same weight in grams, regardless of oversize to maintain piston balance. For cylinder bores which have been honed or rebored, all service pistons include pins and are available in standard and the following oversizes: .005, .020, .040 inch.

Fitting Pistons

The piston and cylinder wall must be clean and dry. Specified clearance between the piston and cylinder wall is .0005 to .0015 inch.

(1) Pistons and cylinder bores should be measured at normal room temperature, 70 degrees F.

(2) Measure piston diameter at the top of skirt 90 degrees to piston pin axis.

(3) Measure cylinder bores halfway down cylinder bore and transverse to engine crankshaft center line.

Fitting Rings

(1) Measure piston ring gap about two inches from the bottom of the cylinder bore in which it is to be fitted. (An inverted piston can be used to push rings down to insure positioning rings squarely in cylinder bore).

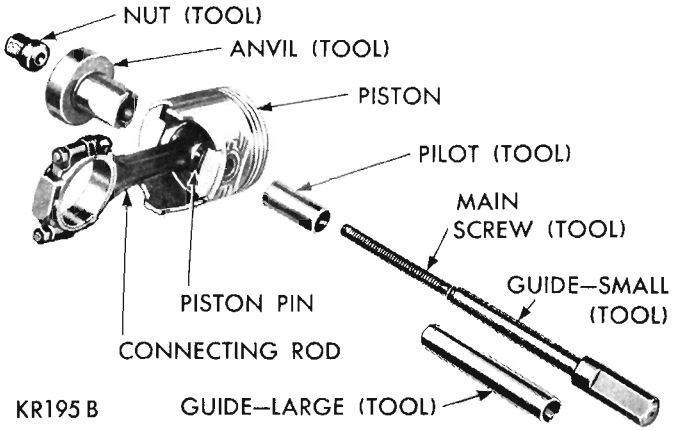


Fig. 36 Tool Arrangement for Removing Piston Pin

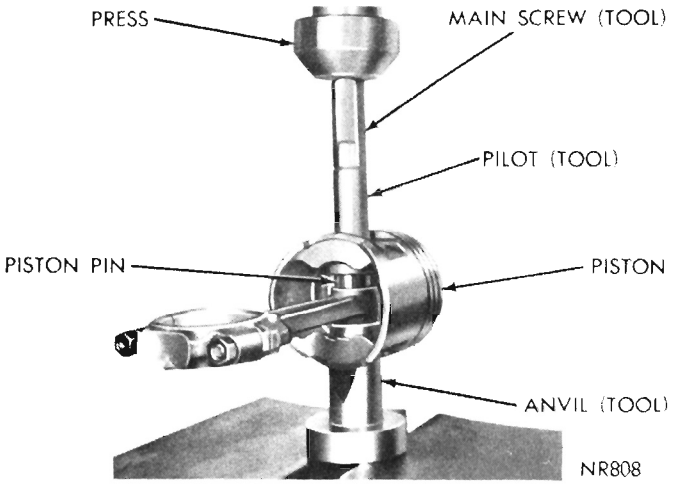


Fig. 37 Removing Piston Pin

(2) Insert feeler stock in the gap. Ring gap should be .010 to .047 inch for compression rings and .015 to .062 inch for oil ring steel rails in standard size bores. Maximum gap in .005 inch o/s bores should be .060 inch for compression rings and .070 inch for oil ring steel rails.

(3) Measure side clearance between piston ring and ring land, (Fig. 35).

Clearance should be .0015 to .004 inch for top compression ring and intermediate ring.

(4) Starting with oil ring expander, place expander ring in lower ring groove and install oil control ring using instructions in package. Steel rail service oil ring should be free in groove, but should not exceed .005 inch side clearance.

(5) Install compression rings in middle and top grooves, using ring installer, Tool C-3805. Be sure the mark "TOP" on each compression ring is to the top of piston.

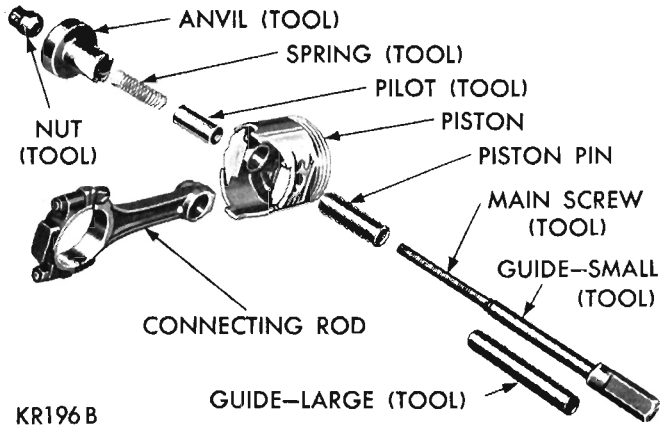


Fig. 38 Tool Arrangement for Installing Piston Pin

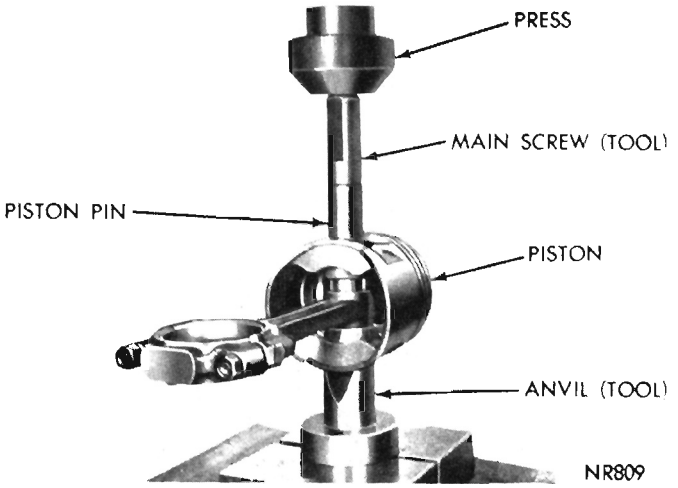


Fig. 40 Installing Piston Pin

Piston Pin Removal

(1) Arrange Tool C-3724 parts for removal of piston pin (Fig. 36).

(2) Install pilot on main screw.

(3) Install screw through piston pin.

(4) Install anvil over threaded end of main screw with small end of anvil against piston boss. **Be sure spring is removed from anvil.**

(5) Install nut loosely on main screw and place assembly on the press (Fig. 37). Press piston pin out of connecting rod.

When the pin falls free from connecting rod, stop the press to prevent damage to bottom of the anvil.

(6) Remove tool from piston.

Installation

(1) Measure piston pin fit in the piston. It should be a sliding fit in piston at 70 degrees F. Piston pins are supplied in standard sizes only.

(2) Lubricate piston pin holes in piston and connecting rod.

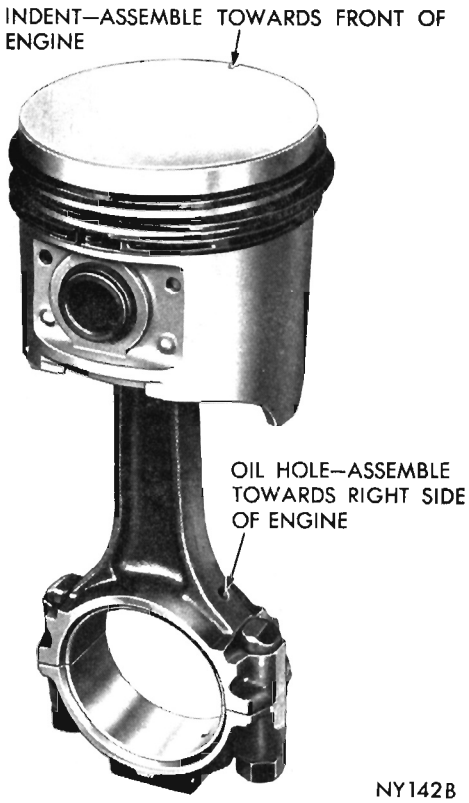


Fig. 39 Connecting Rod Oil Hole

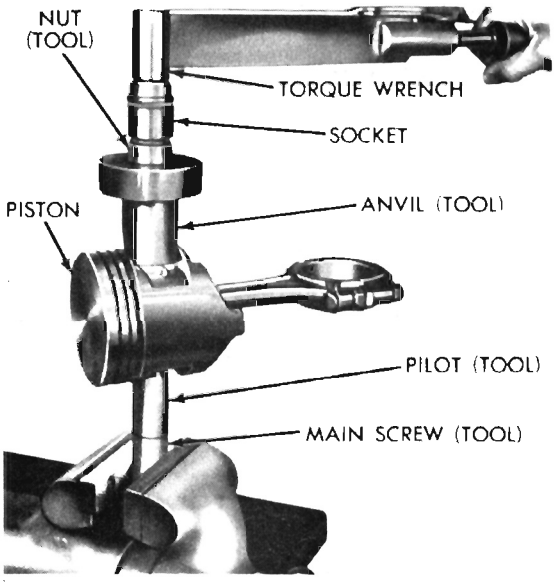


Fig. 41 Testing Fit of Piston Pin in Connecting Rod

(3) Arrange tool parts for installation of piston pin (Fig. 38).

(4) Install spring inside the pilot and install spring and pilot in the anvil.

(5) Install piston pin over main screw.

(6) Place piston, with "Notch Front" up, over the pilot so that pilot extends through piston pin holes.

(7) Position connecting rod over the pilot which

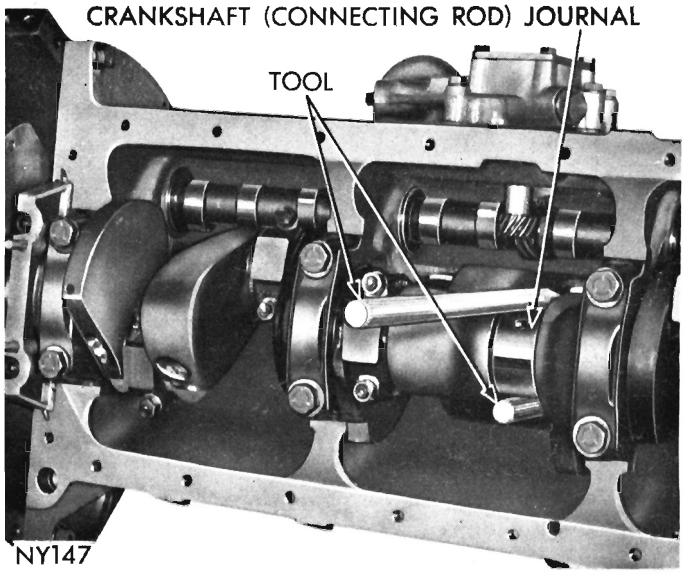


Fig. 42 Removing and Installing Connecting Rod

extends through piston hole. **The oil hole in connecting rod must point toward the direction shown in Figure 39.**

(8) Install main screw and piston pin in piston (Fig. 40).

(9) Install nut on main screw to hold assembly together. Place assembly on a press (Fig. 40).

(10) Press piston pin in the piston until pin bottoms on pilot, properly positioning pin in connecting rod.

(11) Remove tool and arrange tool parts and piston assembly in the same manner, as shown in Figure 36 for measuring pin fit.

(12) Place assembly in a vise (Fig. 41).

(13) Attach torque wrench to nut and test torque up to 15 foot-pounds. If connecting rod moves downward on the piston pin, reject this connecting rod and piston pin combination. Install a new connecting rod and repeat the installation and testing procedure.

If the connecting rod does not move under 15 foot-pounds, piston and connecting rod interference is satisfactory.

(14) Remove tool.

CRANKSHAFT IDENTIFICATION

A Maltese Cross stamped on the engine numbering pad on right side of block, on top boss directly behind coil indicates that engine is equipped with a crankshaft which has one or more connecting rods and/or main bearing journals finished .001 inch undersize. The position of the undersize journal or journals is stamped on the center counterweight of crankshaft.

A Maltese Cross with an X indicates that all connecting rods and/or all main bearing journals are .010 inch undersize.

Connecting rod journals will be identified by the letter "R" and main bearing journals by the letter "M". For example "M-1" indicates that No. 1 main bearing is .001 inch undersize.

CONNECTING RODS

Installing Connecting Rod Bearings

(1) Install connecting rod bearings so small formed tang fits into machined groove in connecting rod.

(2) The limits of taper or out-of-round on any crankshaft journal should be held to .001 inch. Bearings are available in standard .001, .002, .003, .010 and .012 inch undersize.

(3) Install bearings in pairs. **Do not use a new bearing with an old bearing. Do not file rods or bearing caps.**

MEASURING CONNECTING ROD BEARING CLEARANCE

Shim Stock Method

(1) Smooth the edges of a 1/2 x 3/4 inch piece of brass shim stock, .001 inch thickness.

(2) Oil and place between the bearing and connecting rod journal.

(3) Install bearing cap and tighten to 45 foot-pounds.

(4) Turn connecting rod 1/4 turn in each direction. A slight drag should be felt which indicates clearance is satisfactory. Correct clearance is from .0005 to .002 inch.

(5) Side play should be from .006 to .012 inch.

INSTALLING PISTON AND CONNECTING ROD ASSEMBLY

(1) Compression ring gaps should be located on the left side of the engine and staggered about 60 degrees apart. Neither gap should line up with oil ring rail gaps.

(2) Rotate oil ring expander so that ends are at right side of engine. Rotate steel rails so that gaps are approximately opposite and positioned above piston pin holes.

(3) Immerse piston head and rings in clean engine oil. Slide the ring compressor, Tool C-385, over the piston and tighten with special wrench (part of Tool C-385). **Position of rings must not change during this operation.**

(4) The notch on top of piston must point toward front of engine so that squirt hole in connecting rod is toward right side of engine.

(5) Install connecting rod bolt protectors on rod bolts, the long protector should be installed on squirt hole side of connecting rod. **Rotate crankshaft so that connecting rod journal is on the**

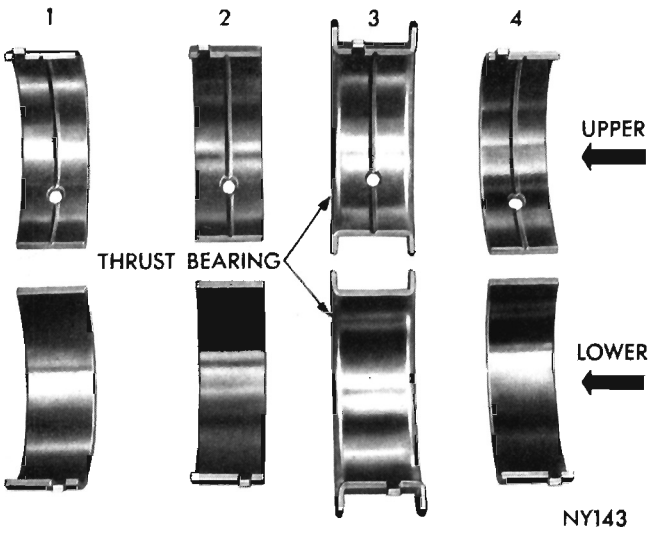


Fig. 43 Main Bearing Identification

center of cylinder bore.

(6) Insert rod and piston into cylinder bore and guide rod over the crankshaft journal (Fig. 42). Be careful not to nick connecting rod jounals.

(7) Tap piston down in cylinder bore, using handle of a hammer. At the same time, guide connecting rod into position on crankshaft journal.

(8) Install rod caps, tighten nuts to 45 foot-pounds.

CRANKSHAFT MAIN JOURNALS

Crankshaft journals should be inspected for excessive wear, taper and scoring. Limits of taper or out-of-round on any crankshaft journal should be held to .001 inch. Journal grinding should not exceed .012 inch under the standard journal diameter. Do not grind thrust faces of No. 3 main bearing. Do not nick connecting rod or main bearing journal fillets. After regrinding, remove rough edges from crankshaft oil holes and clean out all oil passages.

CRANKSHAFT MAIN BEARINGS

The NOs. 1, 2 and 4 lower main bearings are interchangeable (Fig. 43). The NOs. 2 and 4 upper main bearings are interchangeable.

The NO. 1 upper main bearing **is not interchangeable and is chamfered** on the tab side for timing chain oiling and can be identified by a red marking on the edge of the bearing. Upper main bearings are grooved and lower main bearings are plain and are not **interchangeable.** The NO. 3 upper and lower main bearings are flanged to carry the crankshaft thrust loads and are **not interchangeable** with any other main bearings in the engine. **Bearings that are not badly worn, scored or pitted should be reinstalled in the same bearing bore.**

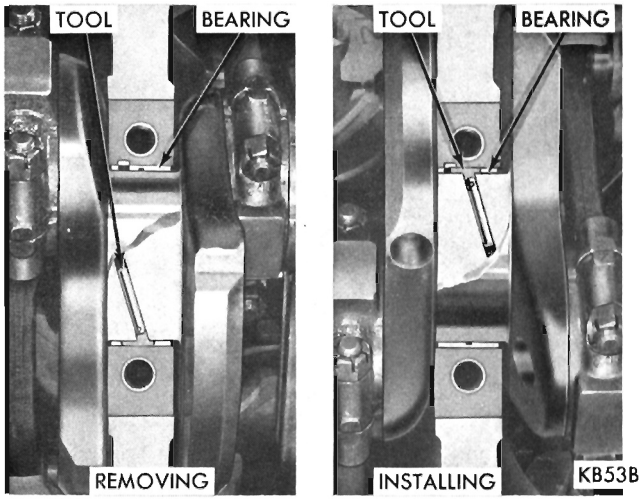


Fig. 44 Removing or Installing Upper Main Bearing

The bearing caps are not interchangeable and the numbers should be marked at removal to insure correct assembly. Bearings are available in standard and the following undersizes, .001, .002, .003, .010 and .012 inch. Never install an undersize bearing that will reduce the clearance below specifications.

Removal

(1) Remove oil pan and inspect the bearing cap identifying numbers.

(2) Remove bearing caps one at a time. Remove upper half of bearing by inserting Tool C-3059 (Fig. 44) in the oil hole of crankshaft.

(3) Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

Installation

Only one main bearing should be selectively fitted while all other main bearing caps are properly tightened.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

(1) Start bearing in place, and insert Tool C-3059 into oil hole of crankshaft (Fig. 44).

(2) Slowly rotate crankshaft counter-clockwise sliding the bearing into position. Remove Tool C-3059.

MEASURING MAIN BEARING CLEARANCE

Shim Stock Method

(1) Smooth edges of a 1/2 x 3/4 inch piece of brass shim stock, .001 inch thickness.

(2) Install bearing in center main bearing cap, **bearing tang in groove in cap,** lubricate bearing and position shim stock across the bearing, install cap, tighten bolts to 85 foot-pounds.

(3) If a slight drag is felt as crankshaft is turned

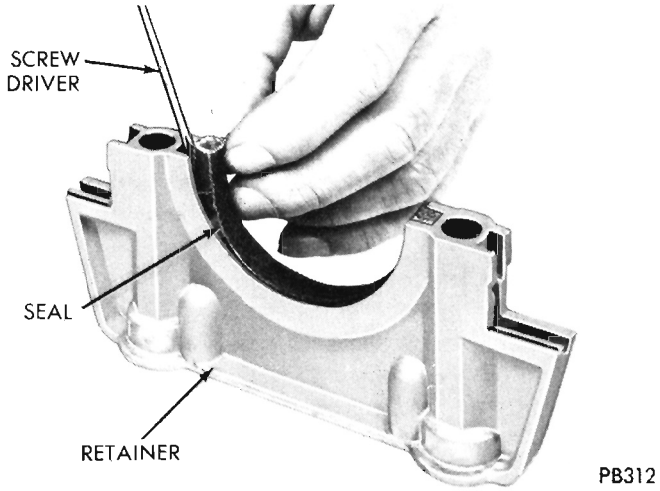


Fig. 45 Removing Lower Oil Seal from Retainer

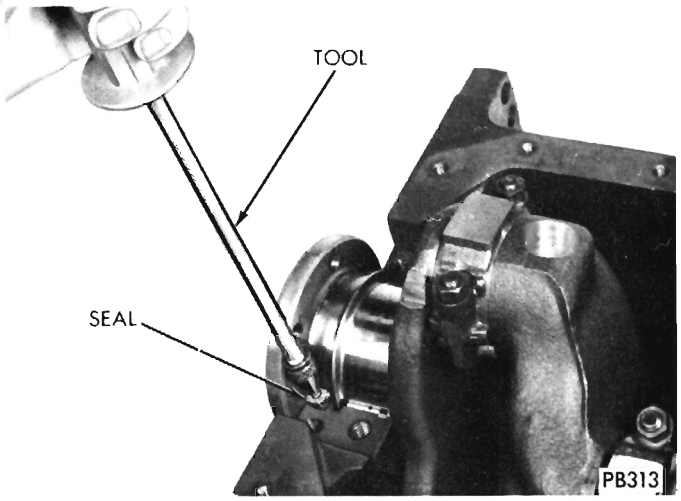


Fig. 46 Removing Upper Oil Seal with Tool C-4148

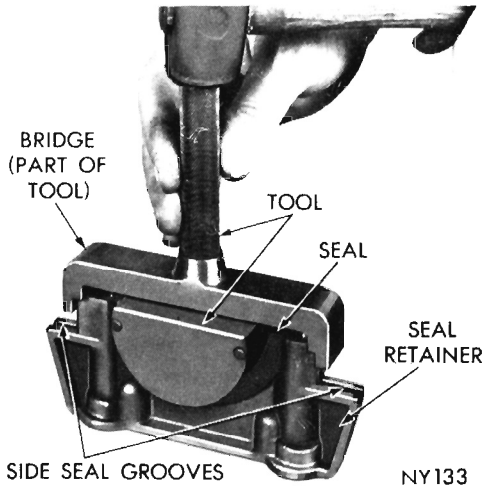


Fig. 47 Installing Rear Main Bearing Oil Seal

(moved no more than 1/4 turn in either direction), clearance is .002 inch or less and is considered satisfactory.

If, however, no drag is felt, the bearing is too large or crankshaft cannot be rotated, bearing is too small and should be replaced with the correct size.

(4) Measure crankshaft end play .002 to .007 inch. If end play is less than .002 inch or more than .007 inch, install a new number 3 main bearing.

(5) Fit remaining bearings in same manner.

It is permissable to use one .001 inch undersize bearing shell with one standard bearing shell or one .002 inch undersize bearing shell with one .001 inch undersize shell. **Always use the smaller diameter bearing half as the upper. Never use an upper bearing half more than .001 inch smaller than the lower bearing half and never use a new bearing half with a used bearing half.**

REAR MAIN BEARING OIL SEALS

Service seals are of split rubber type composition. The seals make it possible to replace the upper rear seal without removing the crankshaft. **The seal must be used as an upper and lower set and cannot be combined with the rope seal.**

(1) With oil pan removed, remove rear seal retainer and rear main bearing cap.

(2) Remove lower rope oil seal by prying from the side with a small screw driver (Fig. 45).

(3) Remove upper rope seal by turning in Tool C-4148 into the end of the seal, being careful not to damage the crankshaft (Fig. 46). Pull the seal out with the tool while rotating the crankshaft.

CAUTION: Always wipe crankshaft surface clean, then oil lightly before installing a new seal.

(4) Oil seal lip lightly with engine oil.

(5) Hold seal (with paint stripe to the rear) tightly against crankshaft with thumb to make sure that the sharp edge of the groove, in the block does not shave or nick the back of the seal, install seal in the block groove. Rotate the crankshaft, if necessary, while sliding seal into groove. **Care must be exercised not to damage the sealing lip.**

(6) Install other half of the seal into the lower seal retainer with paint stripe to rear.

(7) Install rear main bearing cap, tighten to 85 foot-pounds.

(8) Install lower seal retainer, tighten to 30 foot-pounds. **Do not use sealer or cement on seal ends or lip.**

REAR MAIN BEARING OIL SEAL

(Crankshaft Removed)

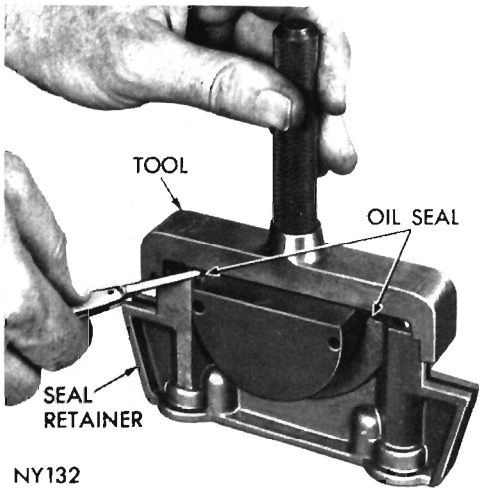


Fig. 48 Trimming Rear Main Bearing Oil Seal

Upper Seal

(1) Install a new oil seal in the cylinder block so that both ends protrude.

(2) Tap seal down into position, using Tool C-3743 (with bridge removed) until the tool is seated in the line bearing bore.

(3) Hold tool in this position and cut off the portion of the seal that extends above the block on both sides.

Lower Seal

(1) Install a new seal in seal retainer so that ends protrude (Fig. 47).

(2) Install the bridge on the tool and tap seal down into position until tool is seated.

(3) Trim off portion of seal that protrudes above cap (Fig. 48).

(4) Install two side seals in grooves in seal retainer.

(5) When installing seal retainer, tighten screws to 30 foot-pounds.

ENGINE OILING SYSTEM

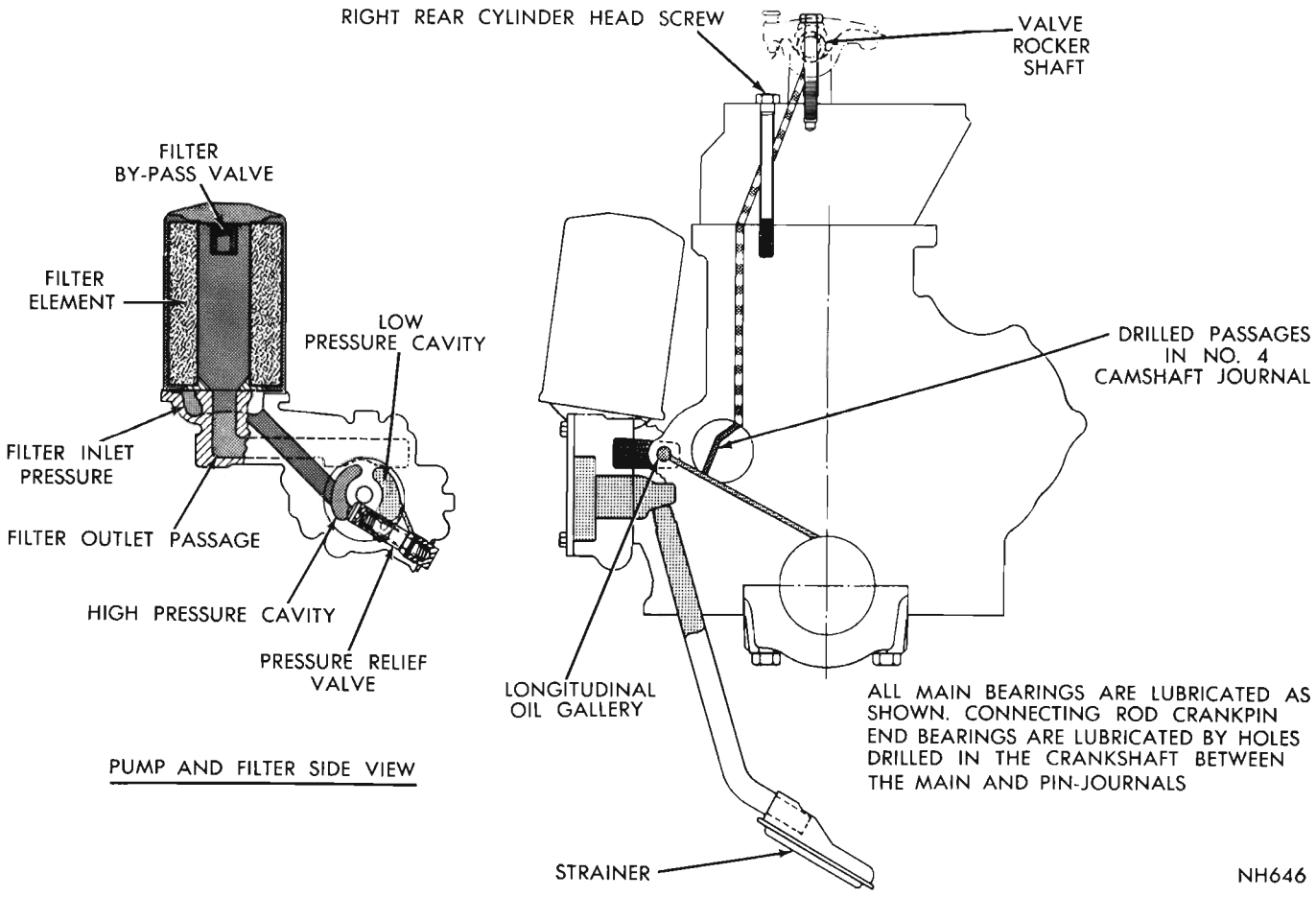


Fig. 49 Engine Oiling System

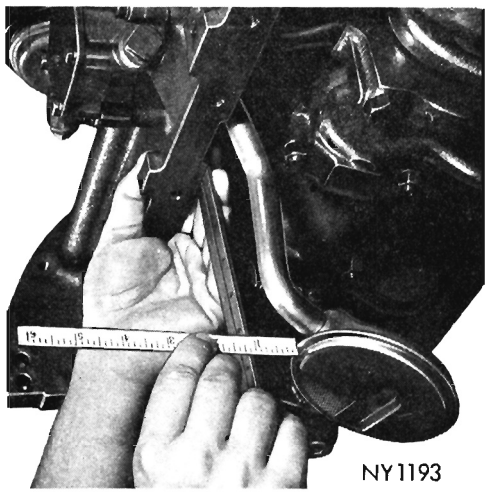


Fig. 50 Positioning Oil Pick-up Tube and Screen

OIL PAN

Removal 198 or 225 Cubic Inch Engine

(Valiant)

(1) Drain radiator, disconnect battery, upper and lower hoses, remove oil dipstick.

(2) Remove shroud attaching screws, separate shroud from radiator, position shroud rearward on engine if so equipped.

(3) Raise vechicle on hoist and drain oil pan.

(4) Remove center link from steering arm and idler arm ball joints, see "Front Suspension."

(5) Support front of-engine with a jack stand placed under the right front corner of engine oil pan. **(Do not support the engine at the crankshaft pulley or vibration damper).**

(6) Remove front engine mount bolts. Raise engine approximately 1-1/2 to 2 inches.

(7) Remove oil pan attaching screws, rotate engine crankshaft to clear counterweights and remove oil pan.

225 Cubic Inch Engine

(Barracuda, Satellite, Fury)

(1) Remove oil dipstick, disconnect negative ground cable. Raise vehicle on hoist and drain oil pan.

(2) Remove center link from steering arm and idler arm ball joints, see "Front Suspension."

(3) Disconnect exhaust pipe from manifold and tie out of way.

(4) Remove oil pan attaching bolts, rotate engine crankshaft to clear counterweights and remove oil pan.

Cleaning and Inspection

Clean oil pan in solvent and wipe dry with a clean cloth. Scrape all gasket material from mounting surface of pan and block.

Inspect oil drain plug and plug hole for stripped or damaged threads and repair as necessary. Install a new drain plug gasket. Tighten to 20 foot-pounds.

Inspect oil pan mounting flange for bends or distortion. Straighten flange if necessary.

Clean oil screen and pipe thoroughly in clean solvent. Inspect condition of screen.

Install oil screen and pipe. Turn pipe in until it begins to tighten in the crankcase, continue tightening until screen is positioned (Fig. 50). Hold a steel rule against flat surface inside the case and measure from edge of rule to edge of oil screen. Measurement should be 1-1/8 inches with screen properly positioned.

Screen must be an interference with bottom of oil pan.

Installation

198 or 225 Cubic Inch Engine (Valiant)

(1) Using a new pan gasket set, install oil pan and tighten screws to 200 inch-pounds.

(2) Lower engine to its original position, install front engine mount bolts. Tighten to specifications.

(3) Connect steering and idler arm ball joints to center link. Tighten retainer nuts to 40 foot-pounds and secure with cotter pins.

(4) Install upper and lower radiator hoses. Install fan shroud, if so equipped.

(5) Refill radiator, install battery cables.

(6) Lower vehicle install oil dipstick and fill crankcase to recommended level with proper grade of motor oil.

225 Cubic Inch Engine

(Barracuda, Satellite, Fury)

(1) Using a new oil pan gasket set, install the oil pan and tighten bolts to 200 inch-pounds.

(2) Connect steering and idler arm ball joints to center link. Tighten retaining nuts to 40 foot-pounds and secure with cotter pins. Install dust shield.

(3) Install exhaust pipe to manifold, use a new gasket. Tighten to 30 foot-pounds.

(4) Lower vehicle install oil dipstick and fill crankcase to recommended level with proper grade of motor oil. Connect negative ground cable at battery.

OIL PUMP

Removal

(1) Drain radiator, disconnect upper and lower hoses. Remove fan shroud, if so equipped.

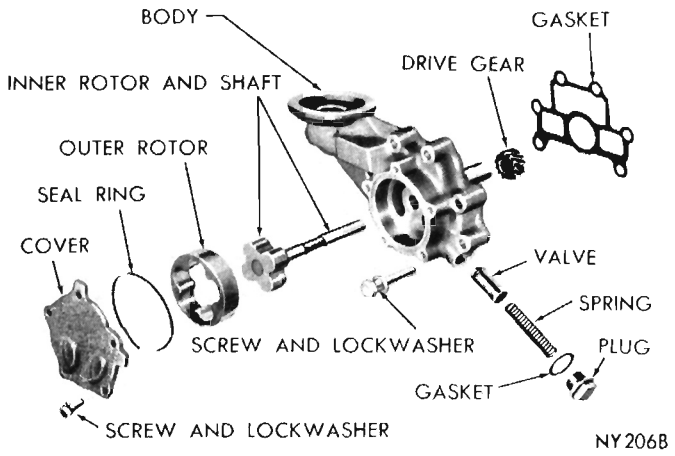


Fig. 51 Oil Pump Disassembled View

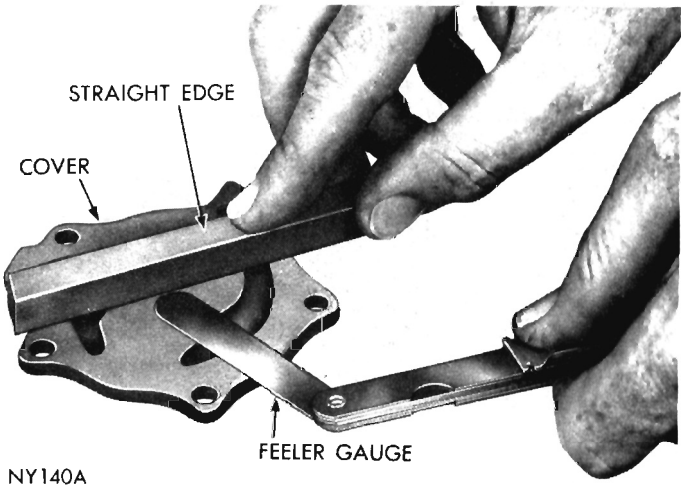


Fig. 52 Measuring Oil Pump Cover Flatness

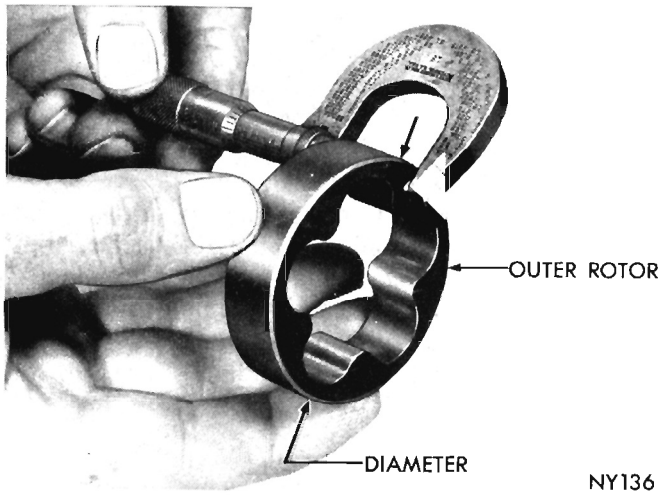


Fig. 53 Measuring Outer Rotor Thickness

(2) Raise vehicle on hoist, support front of engine with a jack stand placed under the right front corner of engine oil pan. **(Do not support the engine at the crankshaft pulley or vibration damper.)** Remove front engine mount bolts.

(3) Raise engine approximately 1-1/2 to 2 inches.

(4) Remove oil filter, oil pump attaching bolts and remove pump assembly.

Installation

(1) Using new "O" rings, install oil pump and tighten to 200 inch-pounds.

(2) Lower engine to its original position, install front engine mount bolts.

(3) Connect upper and lower radiator hoses. Install fan shroud, if so equipped.

(4) Install oil filter.

(5) Refill radiator.

Disassembly (Fig. 51)

(1) Remove pump cover and seal ring.

(2) Press off drive gear. Support gear to keep the load off of aluminum body.

(3) Remove pump rotor and shaft and lift out outer pump rotor.

(4) Remove oil pressure relief valve plug and lift out spring and plunger.

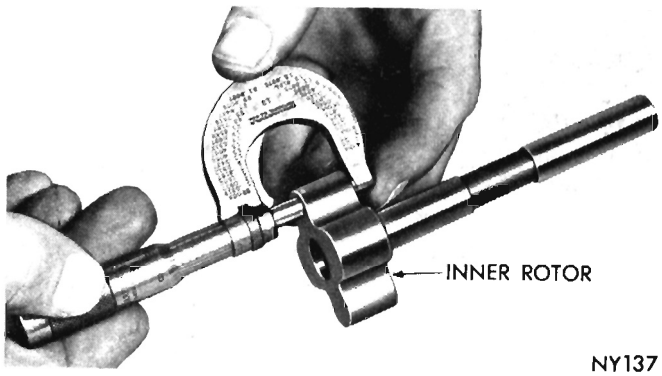


Fig. 54 Measuring Inner Rotor Thickness

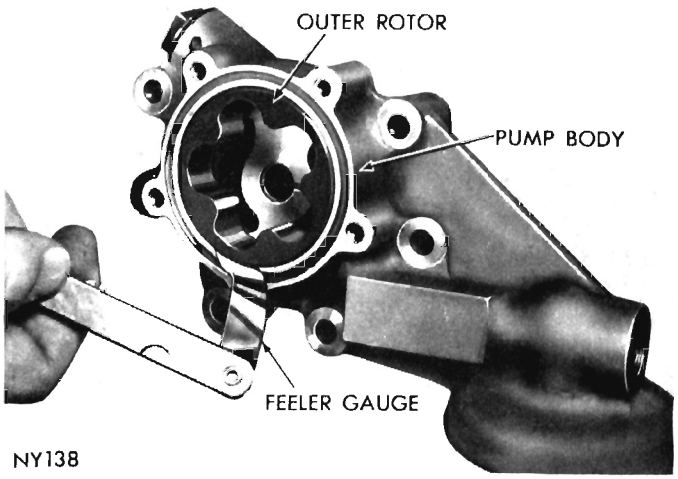


Fig. 55 Measuring Outer Rotor Clearance

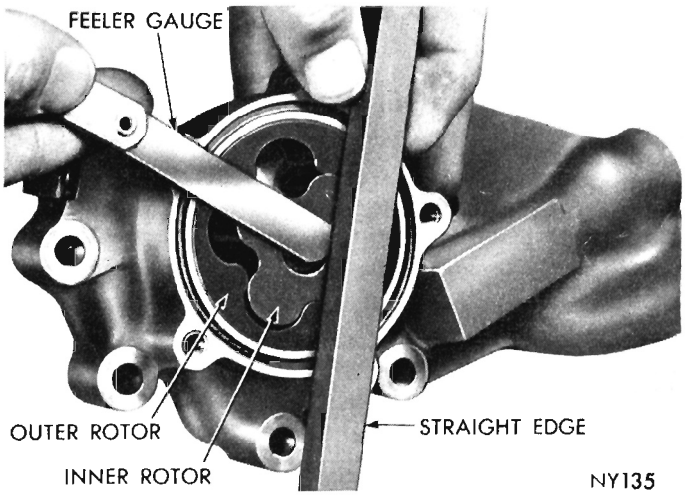


Fig. 56 Measuring Clearance Over Rotors

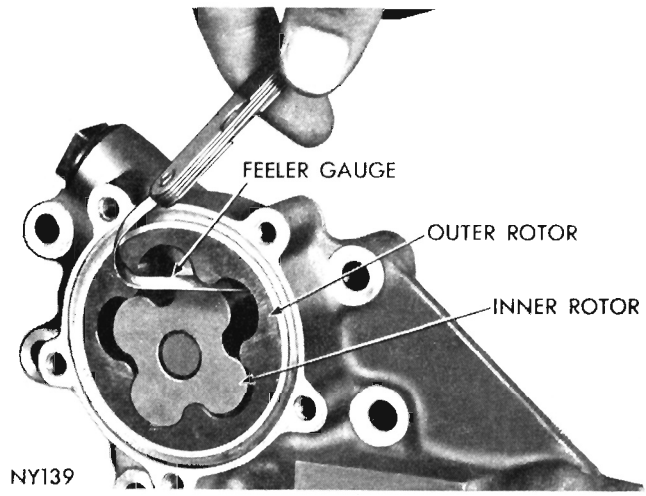


Fig. 57 Measuring Clearance Between Rotors

Inspection and Repair

(1) Clean all parts thoroughly. Mating face of oil pump cover should be smooth. Replace cover if it is scratched or grooved.

(2) Lay a straightedge across the oil pump cover surface (Fig. 52). If a .0015 inch feeler gauge can be inserted between cover and straightedge, cover should be replaced.

(3) If outer rotor length measures less than .649 inch (Fig. 53), and the diameter less than 2.469 inches, replace outer rotor.

(4) If inner rotor length measures less than .649 inch (Fig. 54), replace inner rotor.

(5) Install outer rotor into pump body, pressing to one side with fingers and measure clearance between outer rotor and pump body (Fig. 55). If measurement is more than .014 inch, replace oil pump body.

(6) Install inner rotor into pump body and place a straightedge across face between bolt holes (Fig. 56). If a feeler gauge of more than .004 inch can be inserted between the rotors and straightedge, replace pump body.

(7) If clearance between inner rotor and outer rotor (Fig. 57) is more than .010 inch, replace inner and outer rotors.

(8) Inspect oil pump relief valve plunger for scoring for free operation in its bore. Small scores may be removed with 400 grit wet or dry paper.

(9) For 198-225 cubic inch engines the relief valve spring has a free length of 2-9/32 to 2-19/64 inch and should test 14.85 to 15.85 lbs. when compressed to 1/19-32 inch. Discard spring that fails to meet specifications.

(10) If oil pressure is low, inspect for worn bearings, or look for other causes of possible loss of oil pressure.

Assembly

(1) Assemble pump, using new parts as required.

(2) Install new oil seal rings between cover and body. Tighten cover bolts to 95 inch-pounds.

(3) Install the oil pump on engine. Tighten attaching bolts to 200 inch-pounds.

OIL FILTER

The oil filter should be replaced to coincide with every second oil change.

(1) Using Tool C-4065, unscrew filter from base of oil pump and discard.

(2) Wipe base clean.

(3) Screw new filter on the base until gasket on filter contacts base.

(4) To obtain an effective seal, tighten filter by **hand** the additional number of turns **indicated on the replacement filter.** Start engine and inspect for leaks.

318-340-360 CUBIC INCH ENGINES

INDEX

	Page
Camshaft	37
Camshaft Bearings	38
Connecting Rods	43
Crankshaft Identification	43
Crankshaft Main Bearings	45
Crankshaft Main Journals	45
Crankcase Ventilation System	92
Cylinder Block	39

Cylinder Heads 29
Distributor Drive Shaft Bushing 38
Engine Assembly 28
Engine Mounts 27
Hydraulic Tappets 33
Installing Piston and Connecting Rod Assembly 44
Measuring Connecting Rod Bearing Clearance 44
Measuring Main Bearing Clearance 45
Oil Filter 25
Oil Pan 46
Oil Pump 48
Pistons, Pins, and Rings 41
Rear Main Bearing Oil Seal 46
Repair of Damaged or Worn Threads 93
Rocker Arms and Shaft Assembly 28
Specifications 94
Tappet Adjustment 340 Cubic Inch 33
Timing Chain Cover, Oil Seal and Chain 35
Tune-Up 26
Valves and Valve Springs 30
Valve Timing 35

SERVICE PROCEDURES

TUNE-UP

(1) Test battery specific gravity, add water if necessary, clean and tighten battery connections.

(2) Test cranking voltage. See "Starting Motor Cranking Voltage" Electrical Section of this manual.

(3) Tighten the intake manifold bolts to specifications.

(4) Perform cylinder compression test. Compression should not be less than 100 pounds for 318 or 360 Cubic Inch Engine or 110 pounds for 340 Cubic Inch Engine and not vary more than 40 pounds. The recommended compression pressures are to be only as a guide to diagnosing engine problems. An engine in good condition may exhibit higher pressures. Many conditions which are difficult to control cause variations in compression readings. An engine should not be disassembled to determine the cause of low compression unless some other malfunction is present.

(5) Clean or replace spark plug as necessary and adjust gap to .035 inch. Tighten to 30 foot-pounds using new gaskets.

(6) Test resistance of spark plug cables. Refer to "Ignition System Secondary Circuit Inspection" Electrical Section.

(7) Inspect the breaker plate contacts, primary wire and vacuum advance operation. Test coil output voltage, primary and secondary resistance. Test Condenser. Replace parts as necessary. Refer to Ignition System and make necessary adjustments.

(8) Reset ignition timing and vacuum advance line disconnected. Ignition timing should be set to compensate for altitudes and/or gasoline grades.

(9) Set carburetor idle mixture adjustment. Adjust throttle stop screw to specifications. Perform a combustion analysis.

(10) Test fuel pump for pressure and vacuum. Refer to "Fuel System" Group 14, Specifications.

(11) Inspect manifold heat control valve in the right exhaust manifold for proper operation and apply Manifold Heat Control Valve Solvent Part Number 3419129 or equivalent to the bushing and shaft.

(12) Every 6 months, remove air cleaner filter element and blow out dirt gently with air hose.

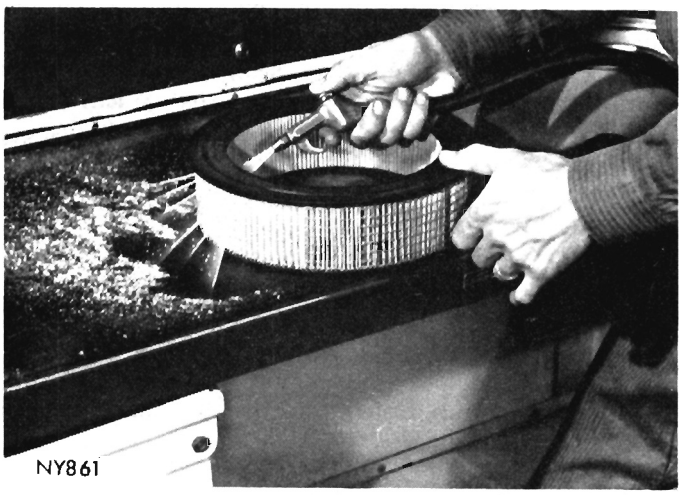


Fig. 1 Cleaning Filter Element

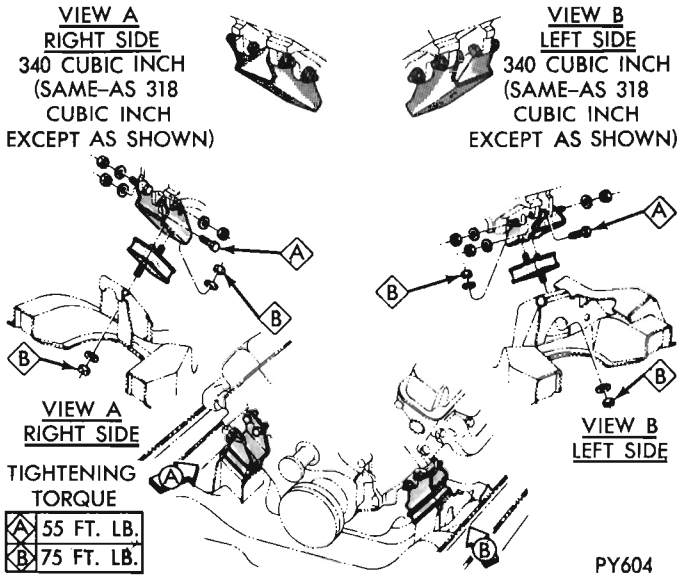


Fig. 2 Front Engine Mounts 318-340 Cubic Inch - Valiant

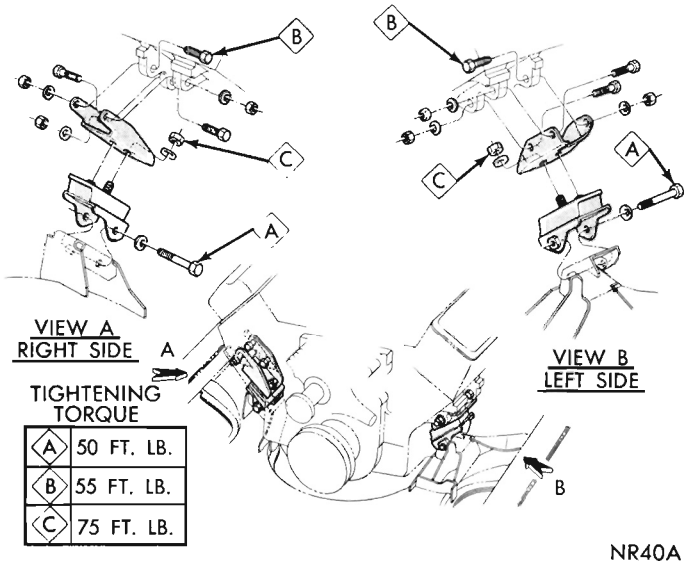


Fig. 3 Front Engine Mounts 318 Cubic Inch - Barracuda, Satellite, Fury

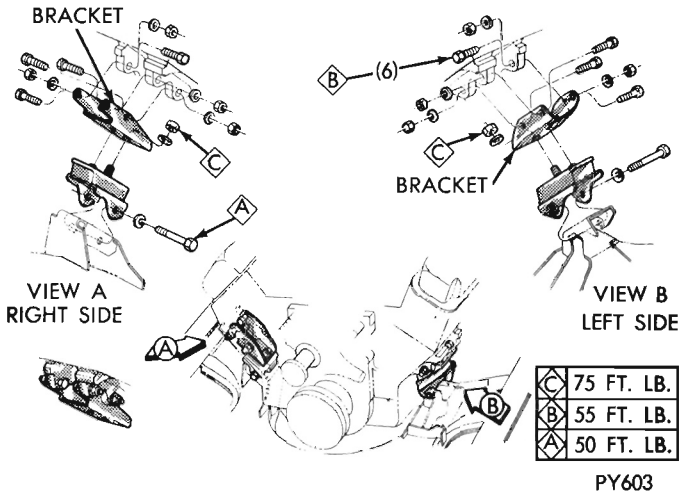


Fig. 4 Front Engine Mounts 340 Cubic Inch - Barracuda, Satellite, 360 Cubic Inch - Fury

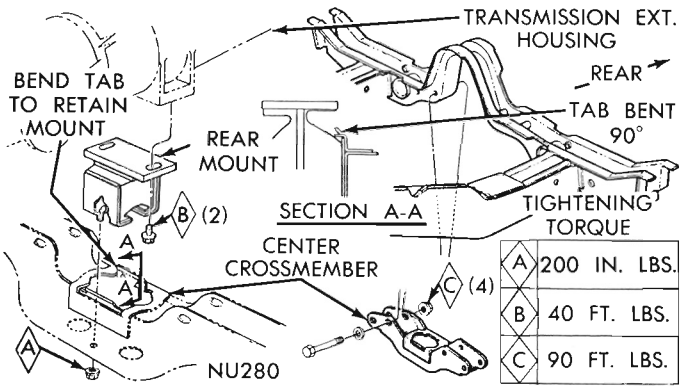


Fig. 5 Engine Rear Support - Valiant

Direct air from inside out, and keep nozzle 2 inches away for element to avoid damaging. Clean metal housing and replace element (Fig. 1). Every two years, install a new factory recommended filter element or equivalent. Service unit more frequently when driving under severe conditions, such as in dusty areas.

(13) Inspect crankcase ventilation system as outlined on page 92.

(14) Inspect and adjust accessory belt drives referring to "Cooling System," Group 7, for proper adjustments.

(15) Road test vehicle as a final test.

FRONT ENGINE MOUNTS (Figs. 2,3 and 4)

Removal

(1) Raise hood and position fan to clear radiator hose and radiator top tank.

(2) Disconnect throttle linkage at transmission and at carburetor.

(3) Remove torque nuts from insulator studs.

(4) Raise engine just enough to remove front engine mount assembly.

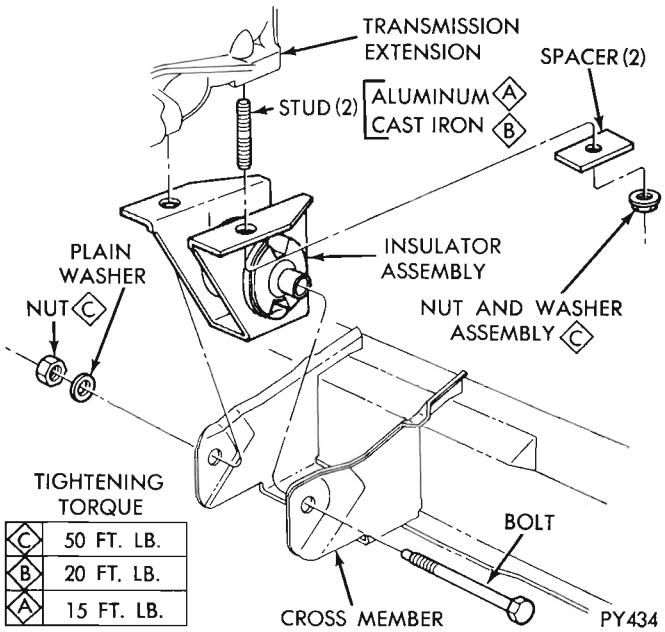


Fig. 6 Engine Rear Support - Barracuda, Satellite, Fury

Installation

(1) Install insulator to engine bracket and tighten as specified.

(2) Lower engine and install washers and prevailing torque nuts to insulator studs; tighten nuts as specified.

(3) Connect throttle at transmission and carburetor.

REAR ENGINE MOUNTS (Figs. 5 and 6)

Removal

(1) Raise vehicle on hoist.
(2) Install transmission jack.
(3) Remove rear engine crossmember from frame and remove rear mount.

Installation

(1) Install rear engine mount to crossmember and tighten nut as specified.
(2) Install rear crossmember to frame and tighten bolts as specified.
(3) Remove transmission jack.
(4) Install rear engine mount to transmission bolts and tighten as specified.
(5) Lower vehicle.

ENGINE ASSEMBLY

Removal

(1) Scribe outline of hinge brackets on the hood to assure proper adjustment when installing. Remove hood.
(2) Drain cooling system and remove battery.
(3) Remove all hoses, fan shroud (if so equipped), oil cooler lines and radiator.
(4) Disconnect fuel lines, linkage and wires attached to engine, remove air cleaner and carburetor.
(5) Attach engine lifting fixture to carburetor flange studs on intake manifold.
(6) Raise vehicle on a hoist and install engine support fixture Tool C-3487A on the chassis to support rear of engine.
(7) Drain transmission and torque converter.
(8) Disconnect exhaust pipes at the manifolds, propeller shaft, wires, linkage, speedometer cable, and oil cooler lines at transmission.
(9) Remove engine rear support crossmember and remove transmission from vehicle.
(10) Lower vehicle and attach a crane or other suitable lifting tool to fixture eyebolt.
(11) Remove engine front mounts. Raise engine with lifting tool and work engine out of chassis.
(12) Place engine in repair stand C-3167 and adapter C-3662 for disassembly using transmission mounting bolts.

Installation

(1) Attaching engine lifting fixture to carburetor flange studs on intake manifold.
(2) Attach a crane or other suitable lifting tool to fixture eyebolt.
(3) Remove engine from repair stand and lower engine carefully until engine is positioned in the chassis with front engine mounts in place.
(4) Install engine support fixture Tool C-3487A on chassis to support rear of engine. Remove the crane or lifting tool.
(5) Raise vehicle on a hoist, install the transmission, engine rear support crossmember, tighten front engine mounts, remove the engine support fixture, Tool C-3487A.
(6) Connect propeller shaft, wires, linkage, speedometer cable, oil cooler lines at transmission, connect exhaust pipes to manifolds. Install transmission filler tube.
(7) Lower vehicle and remove engine lifting fixture from engine. Install carburetor and fuel lines.
(8) Install radiator, fan shroud, hoses, oil cooler lines and connect all wires and linkage.
(9) Install hood using scribe marks for proper alignment.
(10) Close all drain cocks and fill cooling system, install battery.
(11) Fill engine crankcase and transmission. Refer to "Lubrication" Group O, for quantities and lubricants to use. Inspect entire system for leaks and correct as necessary.

WHENEVER A HIGH PERFORMANCE ENGINE IS REBUILT AND/OR NEW PISTONS INSTALLED, ONE PINT OF SPERM OIL ADDITIVE, CHRYSLER PART NO. 3549586 OR EQUIVALENT SHOULD BE ADDED TO THE ENGINE OIL TO AID BREAK-IN. THIS OIL MIXTURE SHOULD BE RETAINED UNTIL THE NEXT REGULARLY SCHEDULED OIL CHANGE. REFER TO "LUBRICATION", Group "O" for subsequent use of this additive in high performance engines.

(12) Start engine and run until normal operating temperature is reached.
(13) Test timing (with vacuum advance line removed) and adjust carburetor and transmission linkage as necessary. Connect vacuum lines, install air cleaner and road test the vehicle.

ROCKER ARMS AND SHAFT ASSEMBLY

Removal

(1) Disconnect spark plug wires by pulling on the boot straight out in line with plug.
(2) Disconnect closed ventilation system and evaporative control system from cylinder head cover.
(3) Remove cylinder head cover and gasket.
(4) Remove five rocker shaft bolts and retainers.
(5) Remove rocker arms and shaft assembly.

Installation

(1) Install rocker arm and shaft assemblies with "NOTCH" on end of rocker shaft pointing to centerline of engine and toward front of engine on the left bank and to the rear on right bank, making sure to install the long stamped steel retainers in the number two and four positions, tighten to 210 inch-pounds.
(2) 340 Cubic Inch 3-2 Barrel Carburetor only, adjust tappets. See "Tappet Adjustment Procedure."
(3) Clean cylinder head cover gasket surface. In-

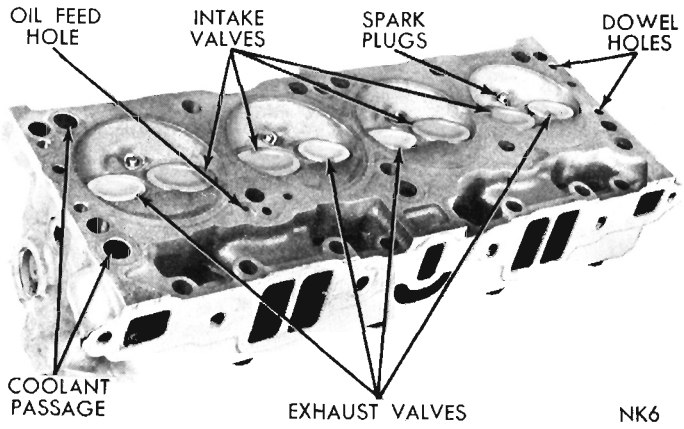


Fig. 7 Cylinder Head Assembly

spect cover for distortion and straighten if necessary.

(4) Clean head rail if necessary. Install cylinder head cover and tighten to 40 inch-pounds.

(5) Install closed crankcase ventilation system and evaporative control system.

CYLINDER HEADS

The chrome alloy cast iron cylinder heads shown in Figure 7 are held in place by 10 bolts. The spark plugs are located in peak of the wedge between the valves.

Removal

(1) Drain cooling system and disconnect battery ground cable.

(2) Remove alternator, carburetor air cleaner and fuel line.

(3) Disconnect accelerator linkage.

(4) Remove vacuum control hose between carburetor and distributor.

(5) Remove distributor cap and wires.

(6) Disconnect coil wires, heat indicator sending unit wire, heater hoses and by-pass hose.

(7) Remove closed ventilation system, evaporative control system and cylinder head covers.

(8) Remove intake manifold, ignition coil and carburetor as an assembly.

(9) Remove exhaust manifolds.

(10) Remove rocker arm and shaft assemblies. Remove push rods and ***identify to insure installation in original location.***

(11) Remove the 10 head bolts from each cylinder head and remove cylinder heads.

(12) Place cylinder heads in holding fixture Tool C-3626. Remove spark plugs.

Installation

(1) Clean all gasket surfaces of cylinder block and cylinder heads.

(2) Inspect all surfaces with a straightedge if

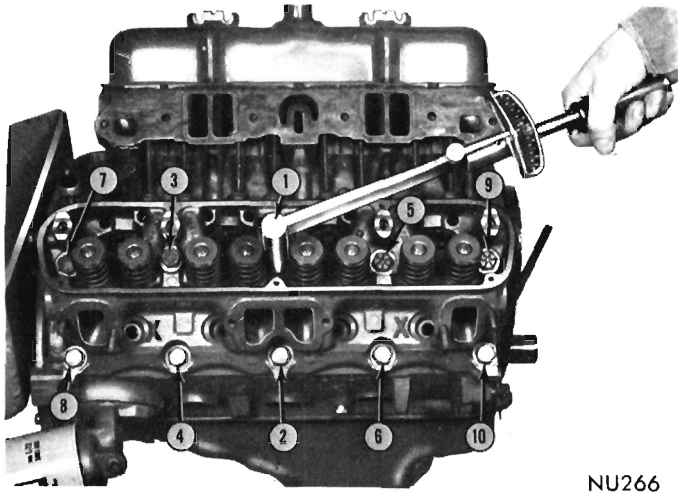


Fig. 8 Cylinder Head Tightening Sequence

there is any reason to suspect leakage. If out of flatness exceeds .00075 times the span length in any direction; either replace head or lightly machine the head gasket surface. As an example, if a 12 inch span is .004 in. out of flat, allowable is 12 x .00075 = .009 in. Head is OK.

The cylinder head surface finish should be 70-180 micro-inches.

(3) Coat new gaskets lightly with number 1057794 Sealer and install on cylinder block.

(4) Remove cylinder heads from holding fixtures Tool C-3626 and place heads on engine.

(5) Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 50 foot-pounds in sequence, as shown in Figure 8. Repeat procedure, retighten all cylinder head bolts to 95 foot-pounds **on all engines.**

(6) Inspect push rods and replace worn or bent rods.

(7) Install push rods, rocker arm and shaft assemblies with the **"NOTCH"** on the end of rockershaft pointing to centerline of engine and toward front of engine on the left bank and to the rear on right bank, making sure to install the long stamped steel retainers in the number two and four positions, tighten to 210 inch-pounds.

(8) Cut the three inch strip of sealer material into four equal parts and install under cylinder head gasket lock tabs. **Do not use sealer or cement.**

(9) Position rubber seals over rails at front and rear of cylinder block. Center hole in seals must engage dowel pins and end holes locked in tangs of head gasket.

(10) Coat intake manifold side gaskets lightly with number 1057794 sealer or equivalent. Install gaskets with the bead down.

(11) Carefully lower intake manifold into position on the cylinder block and cylinder heads. After intake manifold is in place, **inspect to make sure**

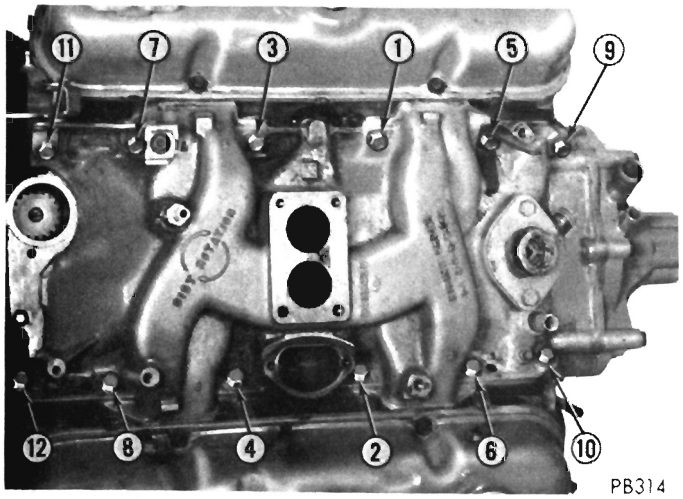


Fig. 9 - Intake Manifold Tightening Sequence

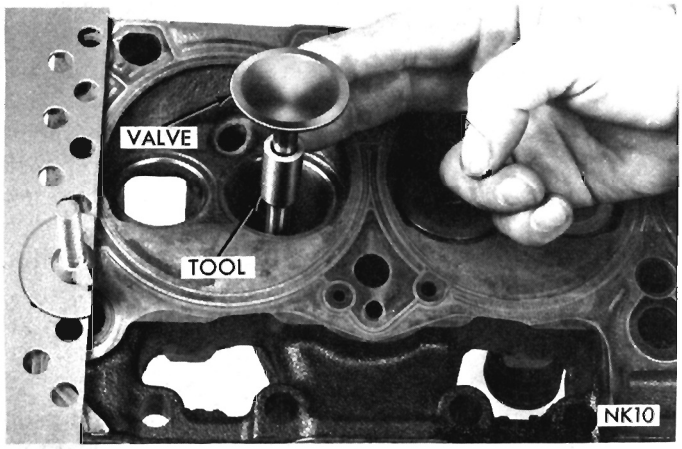


Fig. 11 Installing Valve and Tool C-3973

seals are in place.

(12) Install the twelve attaching cap screws "Finger Tight." Tighten cap screws one through four to 25 foot-pounds and tighten remaining cap screws to 25 foot-pounds, in the tightening sequence shown in Figure 9, then retighten cap screws one through four to 35 foot-pounds and follow by retightening the remaining cap screws to 35 foot-pounds in sequence shown.

(10) Install exhaust manifolds with new gaskets, Valiant and Barracuda the extended shield is used on left side, tighten to 30 foot-pounds.

(11) Adjust spark plugs to .035 inch gap and install the plugs tightening to 30 foot-pounds.

(12) Install coil wires, heat indicator sending unit wire, heater hoses and by-pass hose.

(13) Install vacuum control hose between carburetor and distributor.

(14) Install accelerator linkage and adjust as necessary.

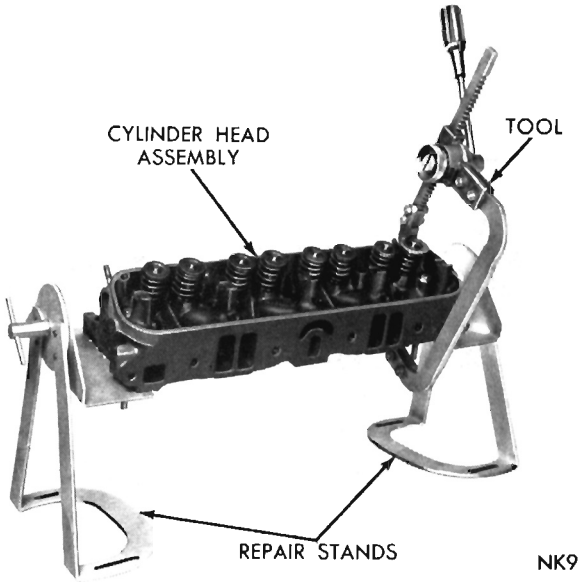


Fig. 10 Compressing Valve Spring

(15) Install distributor cap and wires.

(16) Install fuel line, alternator and drive belt. Tighten alternator mounting bolt to 30 foot-pounds and and adjusting strap bolt to 200 inch-pounds. See Cooling Section on adjusting belt tension.

(17) Place new cylinder head cover gaskets in position and install cylinder head covers. Tighten to 40 inch-pounds.

(18) Install closed crankcase ventilation system and evaporative control system.

(19) Fill cooling system and install battery ground cable.

VALVES AND VALVE SPRINGS

The valves are arranged in line in the cylinder heads and inclined 18 degrees. The rocker shaft support and the valve guides are cast integral with the heads.

REMOVAL

(1) With cylinder head removed, compress valve springs using Tool C-3422A, as shown in Fig. 10.

(2) Remove valve retaining locks, valve spring retainers, valve stem cup seals and valve springs.

(3) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guide.** Identify valves to insure installation in original location.

Valve Inspection

(1) Clean valves thoroughly and discard burned, warped and cracked valves.

(2) Measure valve stems for wear. New stem diameters should measure:

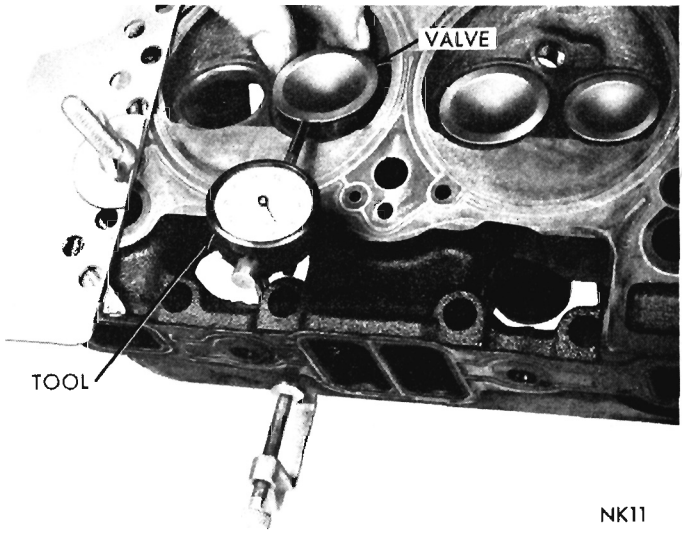


Fig. 12 Measuring Valve Guide Wear

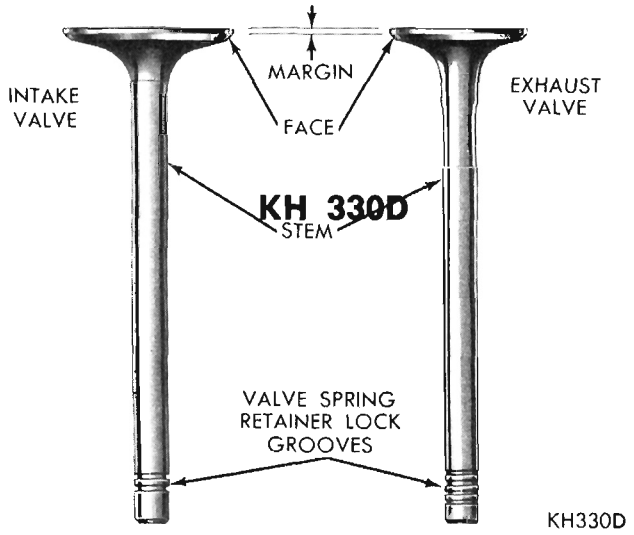


Fig. 14 Intake and Exhaust Valves

	318 or 360	340
Intake	.372" to .373"	.3715" to .3725"
Exhaust	.371" to .372"	.3705" to .3715"

If wear exceeds .002 inch, replace valve.

(3) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(4) Measure valve stem guide clearance as follows:

(a) Install sleeve Tool C-3973 over valve stem (Fig. 11) and install valve. The special sleeve places the valve at the correct height for checking with a dial indicator.

(b) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 12).

(c) Move valve to and from the indicator. The total dial indicator reading should not exceed .017 inch. Ream the guides for valves with oversize stems if dial indicator reading is excessive or if the stems are scuffed or scored.

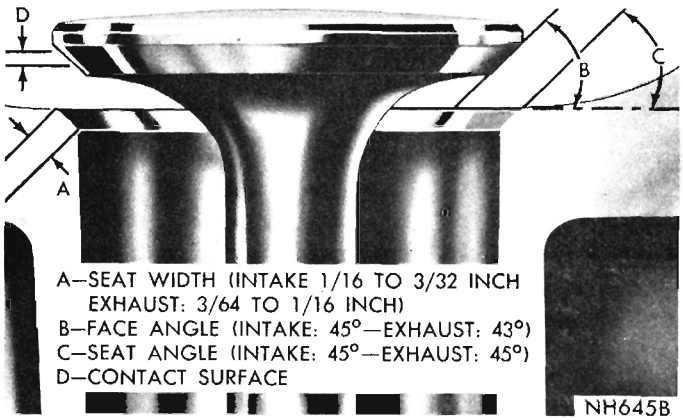


Fig. 13 Valve Face and Seat Angle

(5) Service valves with oversize stems are available in .005, .015 and .030 inch oversize. Reamers to accommodate the oversize valve stem are as follows:

Reamer Tool Number	Reamer Oversize	Size Valve Guide
C-3433	.005 in.	.379-.380 in.
C-3430	.015 in.	.389-.390 in.
C-3427	.030 in.	.404-.405 in.

(6) Slowly turn reamer by hand and clean guide thoroughly before installing new valve. **Do not attempt to ream the valve guides from standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so the valve guides may be reamed true in relation to the valve seat.**

Refacing Valves and Valve Seats

(1) The intake and exhaust valve seats and intake valve face have a 45 degree angle. The exhaust valve face has a 43 degree angle. The valve face and valve seat angles are shown in Figure 13.

(2) Inspect the remaining margin after the valves are refaced (Fig. 14). Valves with less than 3/64 inch margin should be discarded.

(3) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(4) Measure the concentricity of valve seat using dial indicator No. 13725. Total runout should not exceed .002 inch (total indicator reading).

(5) Check the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat lightly with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, lower valve seat with a 30 degrees stone. If the blue is transferred to bottom edge of valve face raise

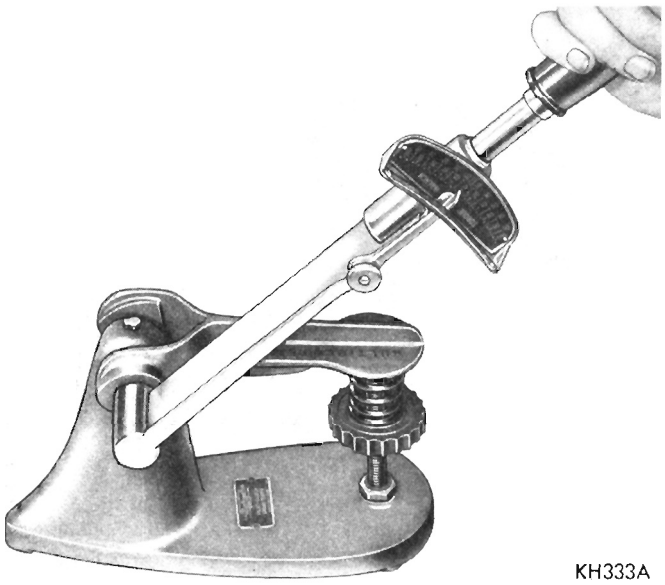


Fig. 15 Testing Valve Spring

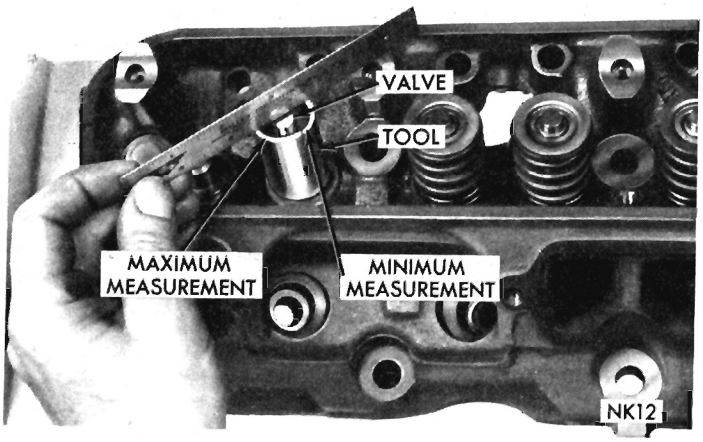


Fig. 17 Measuring Valve Stem Length

valve seat with a 60 degrees stone.

(6) When seat is properly positioned the width of intake seats should be 1/16 to 3/32 inch. The width of the exhaust seats should be 3/64 to 1/16 inch.

Testing Valve Springs (Fig. 15)

(1) Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested. As an example the compression length of the spring to be tested is 1-5/16 inches. Turn table of Tool C-647 until surface is in line with the 1-5/16 inch mark on the threaded stud and the zero mark to the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on

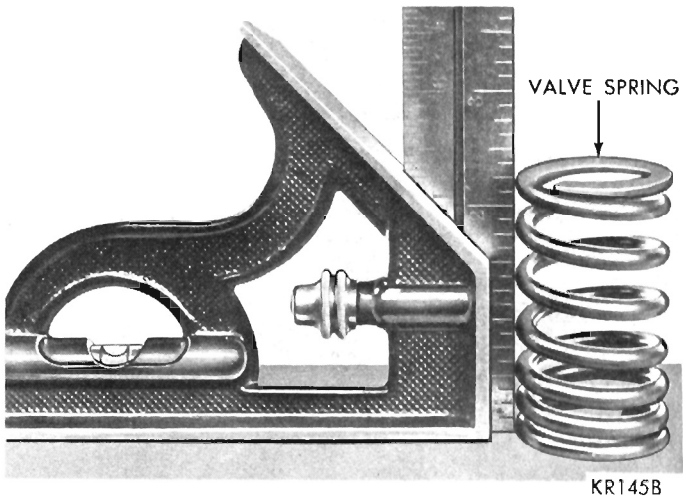


Fig. 16 Inspecting Valve Spring Squareness

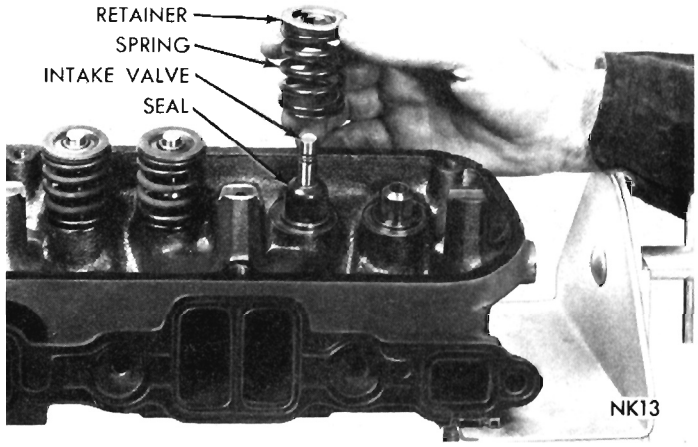


Fig. 18 Installing Valve, Cup Seals, Spring and Retainer

the table for finer adjustments. Refer to specifications to obtain specified height and allowable tensions. Discard the springs that do not meet specifications.

(2) Inspect each valve spring for squareness with a steel square and surface plate, test springs from both ends (Fig. 16).

If the spring is more than 1/16 inch out of square, install a new spring.

Installation

(1) Coat valve stems with lubrication oil and insert them in cylinder head.

(2) If valves or seats are reground, check valve stem height with Tool C-3968 (Fig. 17). If valve is too long, grind off the tip until length is within limits.

(3) Install new cup seals on all valve stems and over valve guides (Fig. 18). Install valve springs and retainers.

(4) Compress valve springs with Tool C-3422A, install locks and release tool. **If valves and/or seats are reground, measure the installed height of springs, make sure measurement is taken**

from bottom of spring seat in cylinder head to the bottom surface of spring retainer (if spacers are installed, measure from the top of spacer). If height is greater than 1-11/16 inches, install a 1/16 inch spacer in head counterbore to bring spring height back to normal 1-5/8 inches to 1-11/16 inches.

TAPPET ADJUSTMENT

The 340 cu in. 3-2 barrel carburetor engine only is equipped with adjustable rockers and special hydraulic tappets with limited plunger travel and a heavy duty snap ring for more reliability in high operation.

To adjust tappets, position crankshaft as indicated in the following procedure and adjust only the tappets indicated in the chart.

Set the rocker adjusting screw so that there is no clearance (zero lash) in the system. Then turn the screw into the rocker 1 1/2 turns. Torque the lock nut to 25 ft. lbs.

When adjusting tappets on the 340 cu. in. engine (cold setting) it is very important that the setting be made with each tappet at the lowest point of the camshaft; that is on the base circle.

The procedure used on standard engines cannot be used because of the overlap and duration with the special camshaft. The following procedure will assure proper position of the camshaft when making the adjustment. An indicating light may be used in the ignition primary circuit to more clearly define the various positions of the camshaft:

	Intake	Exhaust
A. Adjust iginition timing to TDC, chalk mark TDC and 180° opposite TDC on the front crankshaft damper.		
B. Set crankshaft so No. 1 cylinder is at TDC (Compression stroke, points opening).	Adjust 2 and 7	4 and 8
C. Rotate crankshaft 180° in normal running direction until points open for No. 4 cylinder	Adjust 1 and 8	3 and 6
D. Rotate crankshaft an additional 180° until points open for No. 6 cylinder.	Adjust 3 and 4	5 and 7
E. Rotate crankshaft an additional 180° until points open for No. 7 cylinder.	Adjust 5 and 6	1 and 2
F. Reset ignition timing to operating specifications and install valve covers.		

HYDRAULIC TAPPETS

Preliminary to Checking the Hydraulic Tappets

Before disassembling any part of the engine to correct tappet noise, read the oil pressure at the gauge (Install a reliable gauge at pressure sending unit if vehicle has no oil pressure gauge.) and check the oil level in the oil pan. The pressure should be between 45 and 65 pounds at 1000 R.P.M.

The oil level in the pan should never be above the "full" mark on dipstick, or below the "add oil" mark. Either of these two conditions could be responsible for noisy tappets.

Oil Level Too High

If oil level is above the "full" mark on dipstick, it is possible for the connecting rods to dip into the oil while engine is running and create foam. Foam in oil pan would be fed to the hydraulic tappets by oil pump causing them to lose length and allow valves to seat noisily.

Oil Level Too Low

Low oil level may allow pump to take in air which when fed to the tappets, causes them to lose length and allows valves to seat nosily. Any leaks on intake side of pump through which air can be drawn will create the same tappet action. When tappet noise is due to aeration, it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, engine should be operated at fast idle for sufficient time to allow all of the air inside of the tappets to be bled out.

Tappet Noise Diagnosis

(1) To determine source of tappet noise, operate engine at idle with cylinder head covers removed.

(2) Feel each valve spring or rocker arm to detect noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

(3) Valve tappet noise ranges from light noise to a heavy click. A light noise is usually caused by

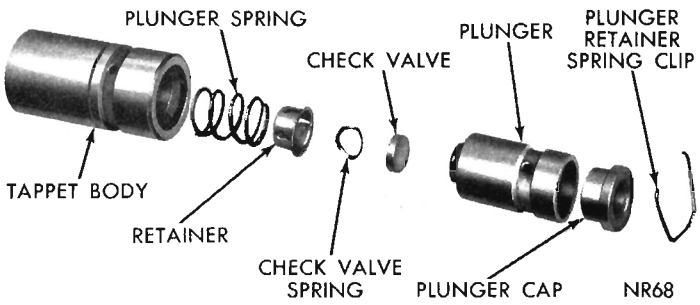


Fig. 19 Hydraulic Tappet Assembly (Disassembled View)

excessive leakdown around the unit plunger which will necessitate replacing the tappet, or by the plunger partially sticking in the tappet body cylinder. A heavy click is caused either by a tappet check valve not seating, or by foreign particles becoming wedged between the plunger and the tappet body, causing the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, tappet assembly should be removed for inspection and cleaning.

Tappet Removal

(1) The tappets can be removed without removing cylinder heads by following this recommended procedure: Remove cylinder head covers.

(2) Remove rocker arms and shaft assembly.

(3) Remove push rods and **identify to insure installation in original location.**

(4) Slide Tool C-4129 through opening in cylinder head and seat tool firmly in the head of tappet.

(5) Pull tappet out of bore with a twisting motion. If all tappets are to be removed, **identify tappets to insure installation in original location. CAUTION: The plunger and tappet bodies are not interchangeable. The plunger and valve must always be fitted to the original body. It is advisable to work on one tappet at a time to avoid mixing of parts. Mixed parts are not compatible. Do not disassemble a tappet on a dirty work bench.**

Disassembly (Fig. 19)

(1) Pry out plunger retainer spring clip.

(2) Clean varnish deposits from inside of tappet body above plunger cap.

(3) Invert tappet body and remove plunger cap, plunger, flat check valve, check valve spring, check valve retainer and plunger spring.

Cleaning and Assembly

(1) Clean all tappet parts in a solvent that will remove all varnish and carbon.

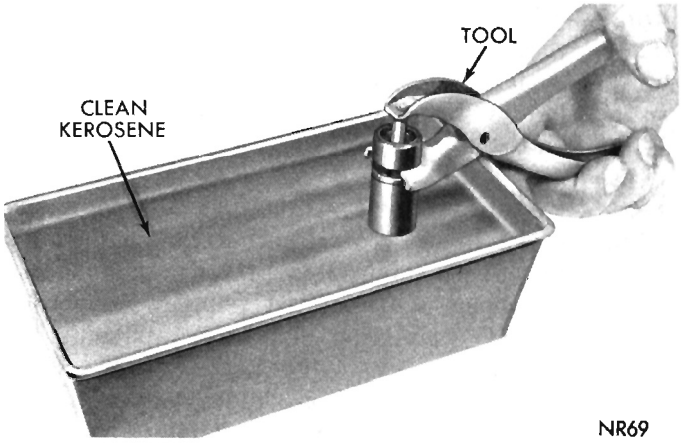


Fig. 20 Testing Tappet Using Tool C-3160

(2) Replace tappets that are unfit for further service with new assemblies.

(3) If plunger shows signs of scoring or wear and valve is pitted, or if valve seat on end of plunger indicates any condition that would prevent valve from seating, install a new tappet assembly.

(4) Assemble tappets (Fig. 19).

Testing

(1) Fill a pan with clean kerosene.

(2) Remove cap from plunger and plunger from tappet body.

(3) Fill tappet body with kerosene and install plunger.

(4) Unseat check valve with a brass rod to permit complete installation of plunger. Replace cap.

(5) Hold tappet in an upright position and insert lower jaw of pliers, Tool C-3160, in the groove of tappet body (Fig. 20).

(6) Engage jaw of pliers with top of tappet plunger. Test leakdown by compressing the pliers. If plunger collapses almost instantly as pressure is applied, disassemble tappet, clean and test again (Fig. 20).

(7) If tappet still does not operate satisfactorily after cleaning, install a new tappet assembly.

If the tappet or bore in cylinder block is scored, scuffed, or shows signs of sticking, ream the bore to next oversize.

Installation

(1) Lubricate tappets.

(2) Install tappets and push rods in their original positions.

(3) Install rocker arm and shaft assembly.

(4) Start and operate engine. Warm up to normal operating temperature.

CAUTION: To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic tappets have filled with oil and have become quiet.

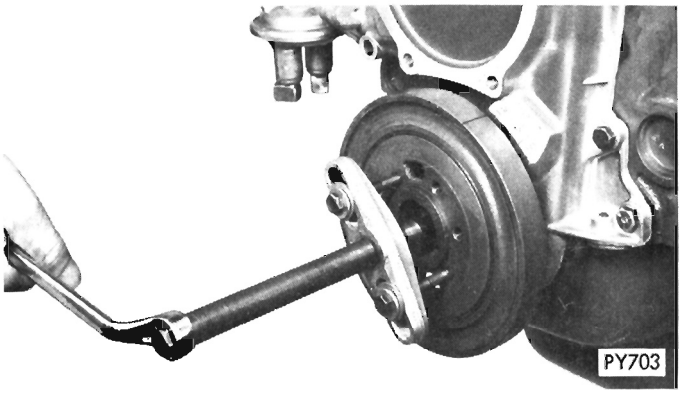


Fig. 21 - Removing Vibration Damper Assembly 318 Cubic Inch Shown (Typical)

VALVE TIMING

(1) Turn crankshaft until the NO. 6 exhaust valve is closing and NO. 6 intake valve is opening.

(2) Insert a 1/4 inch spacer between rocker arm pad and stem tip of No. 1 intake valve. Allow spring load to bleed tappet down giving in effect a solid tappet.

(3) Install a dial indicator so plunger contacts valve spring retainer as nearly perpendicular as possible. Zero the indicator.

(4) Rotate crankshaft clockwise (normal running direction) until the valve has lifted .010 inch for 318 cubic inch engines, .030 inch for 340 cubic inch engine or .020 inch for 360 cubic inch engine.

CAUTION: Do not turn crankshaft any further clockwise as valve spring might bottom and result in serious damage.

The timing of the crankshaft pulley should now read from 10 degrees before top dead center to 2 degrees after top dead center. Remove spacer.

(5) If reading is not within specified limits:

(a) Check sprocket index marks.

(b) Inspect timing chain for wear.

(c) Check accuracy of DC mark on timing indicator.

TIMING CHAIN COVER, OIL SEAL AND CHAIN

Cover Removal

(1) Drain cooling system and remove radiator, fan belt and water pump assembly.

(2) Remove pulley from vibration damper and bolt and washer securing vibration damper on crankshaft.

(3) Install Tool C-3688 and pull vibration damper from end of crankshaft (Fig. 21).

(4) Remove fuel lines and fuel pump.

(5) Loosen oil pan bolts and remove the front bolt at each side.

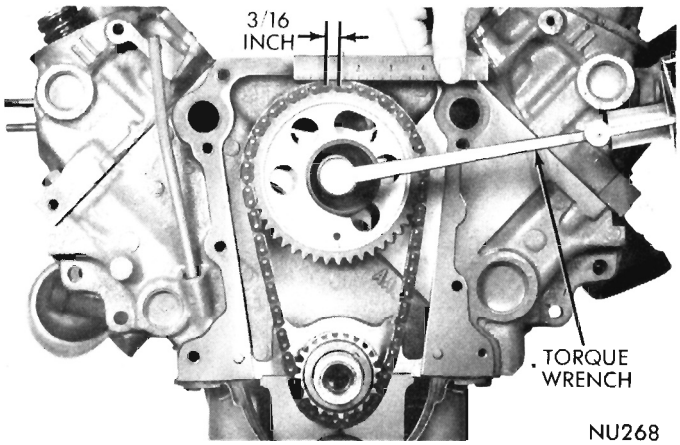


Fig. 22 - Measuring Timing Chain Stretch

(6) Remove chain case cover and gasket using extreme caution to avoid damaging oil pan gasket.

It is normal to find particles of neoprene collected between the crankshaft seal retainer and crankshaft oil slinger.

(7) Slide crankshaft oil slinger from end of crankshaft.

Measuring Timing Chain for Stretch

(1) Place a scale next to timing chain so that any movement of chain may be measured.

(2) Place a torque wrench and socket over camshaft sprocket attaching bolt and apply torque in direction of crankshaft rotation to take up slack; 30 foot-pounds (with cylinder head installed) or 15 foot-pounds (cylinder heads removed). **With a torque applied to the camshaft sprocket bolt, crankshaft should not be permitted to move. It may be necessary to block crankshaft to prevent rotation.**

(3) Holding a scale with dimensional reading even with edge of a chain link, apply torque in the reverse direction 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed) and note amount of chain movement (Fig. 22).

(4) Install a new timing chain, if its movement exceeds 3/16 inch.

(5) If chain is satisfactory, slide the crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

(6) If chain is not satisfactory, remove camshaft sprocket attaching cup washer, fuel pump eccentric and remove timing chain with crankshaft and camshaft sprockets.

When installing timing chain, use Tool C-3509 to prevent camshaft from contacting the welch plug in the rear of engine block. Remove distributor and oil pump-distributor drive gear. Locate tool against rear side of cam gear and at-

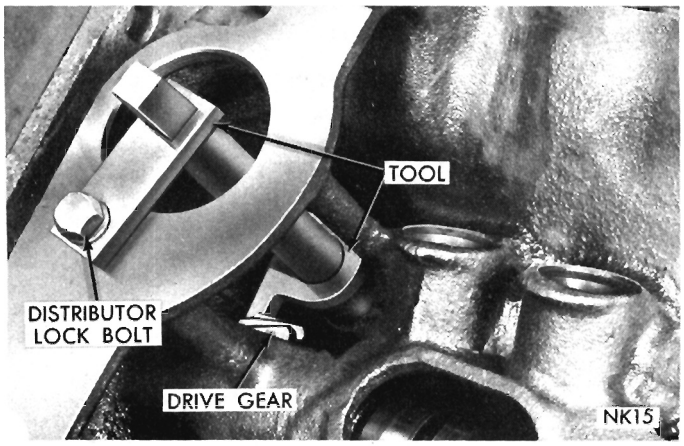


Fig. 23 - Camshaft Holding Tool C-3509

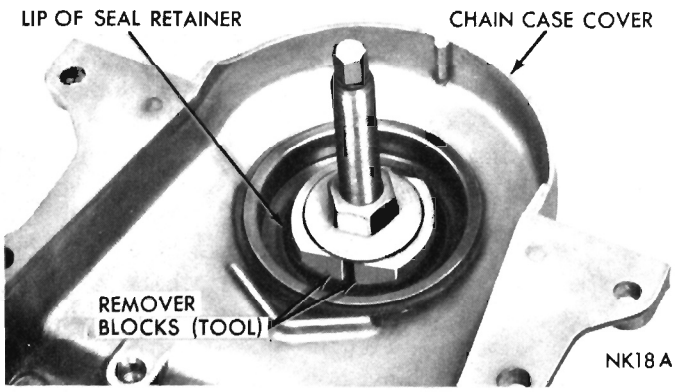


Fig. 25 - Remover Blocks Expanded to Puller Position

tach tool with distributor retainer plate bolt (Fig. 23).

(7) Place both camshaft sprocket and crankshaft sprocket on the bench with timing marks on exact imaginary center line through both camshaft and crankshaft bores.

(8) Place timing chain around both sprockets.

(9) Turn crankshaft and camshaft to line up with keyway location in crankshaft sprocket and in camshaft sprocket.

(10) Lift sprockets and chain (keep sprockets tight against the chain in position as described).

(11) Slide both sprockets evenly over their respective shafts and use a straight edge to check alignment of timing marks (Fig. 24).

(12) Install the fuel pump eccentric, cup washer, and camshaft bolt. Tighten bolt to 35 foot-pounds.

(13) Check camshaft for .002 to .006 inch end play with a new thrust plate and up to .010 inch end play with a used thrust plate. If not within these limits install a new thrust plate.

(14) If within limits, slide the crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

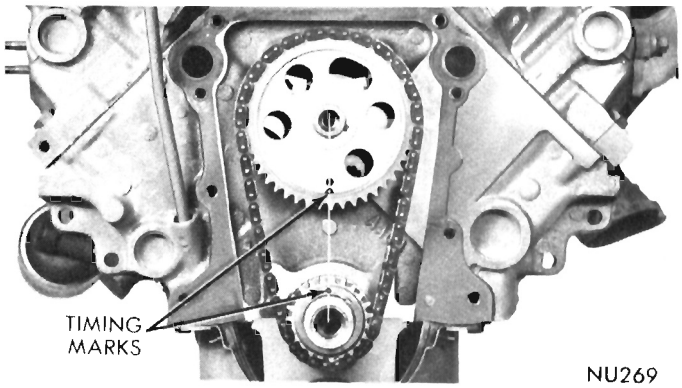


Fig. 24 - Alignment of Timing Marks

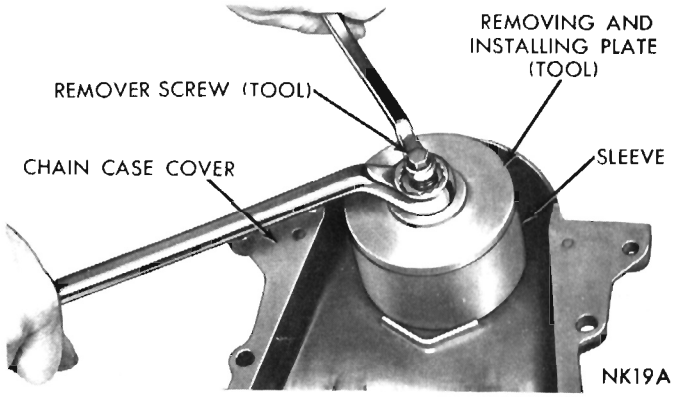


Fig. 26 Removing Oil Seal

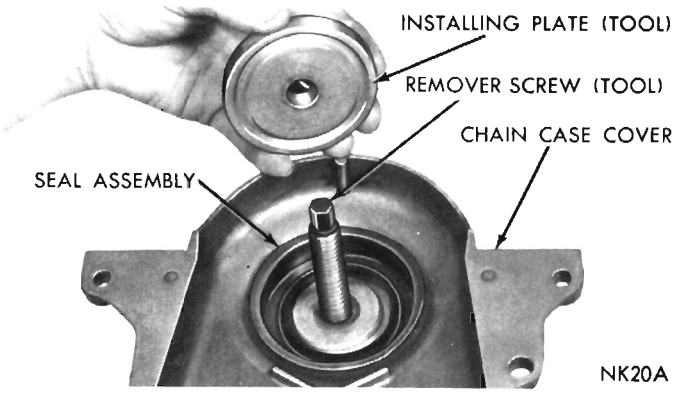


Fig. 27 Positioning Installer Plate

Oil Seal Replacement (Cover Removed)

(1) Position remover screw of Tool C-3506 through case cover with inside of case cover up. Position puller blocks directly opposite each other, and force the angular lip between the neoprene and flange of the seal retainer.

(2) Place washer and nut on remover screw. Tighten nut, forcing the blocks into the gap to a point of distorting the seal retainer lip, (Fig. 25). This is important, **remover is only positioned at this point.**

(3) Place sleeve over the retainer and place re-

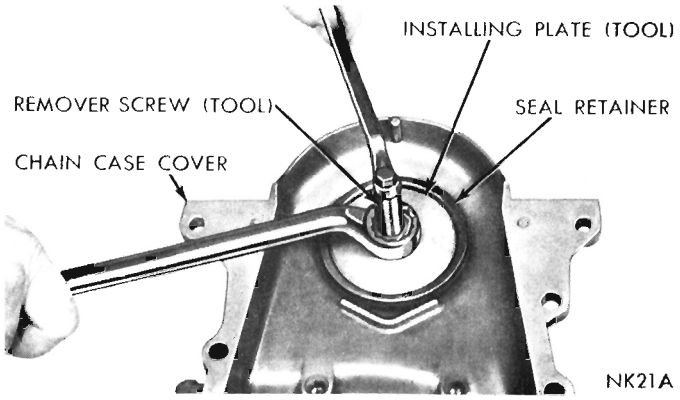


Fig. 28 Installing New Seal

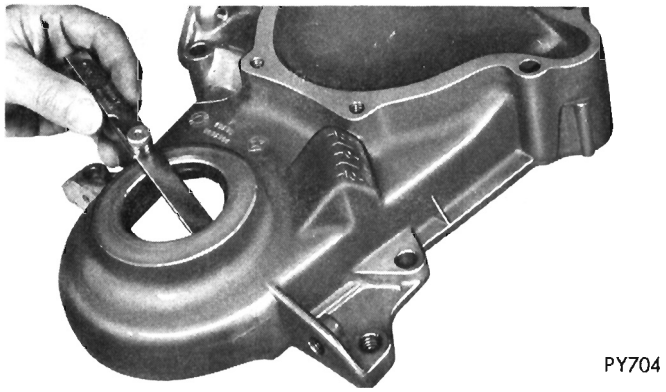


Fig. 29 Inspecting Seal for Proper Seating

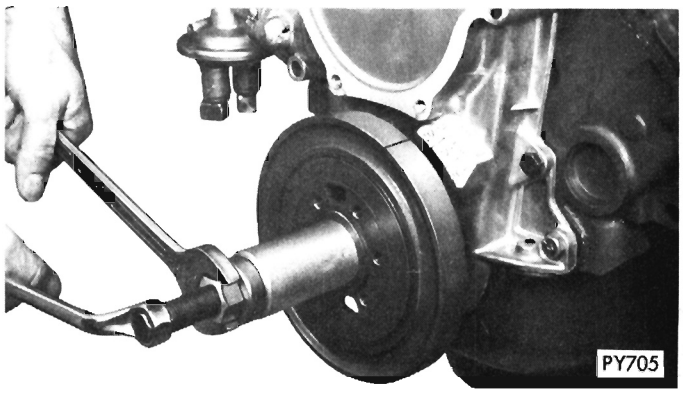


Fig. 30 Installing Vibration Damper Assembly

moving and installing plate into sleeve.

(4) Place flat washer and nut remover screw. Hold tool center screw and tighten tool lock nut to remove seal (Fig. 26).

(5) Insert remover screw through removing and installing plate so that the thin shoulder will be facing up.

(6) Insert remover screw with plate through the seal opening (inside of chain case cover facing up)

(7) Place seal in the cover opening, with neoprene down. Place the seal installing plate into the new seal, with protective recess toward lip of seal retainer (Fig. 27).

(8) Install flat washer and nut on remover screw, hold screw and tighten the nut (Fig. 28).

(9) Seal is properly installed when neoprene is tight against face of cover. Try to insert a .0015 feeler gauge between neoprene and cover (Fig. 29). If the seal is installed properly, the feeler gauge cannot be inserted. **Do not over compress neoprene.**

Cover Installation

(1) Be sure mating surfaces of chain case cover and cylinder block are clean and free from burrs.

(2) Using a new gasket carefully install chain case cover to avoid damaging oil pan gasket. Tighten chain case cover capscrews to 30 foot-pounds first than tighten oil pan capscrews to 200 inch-pounds.

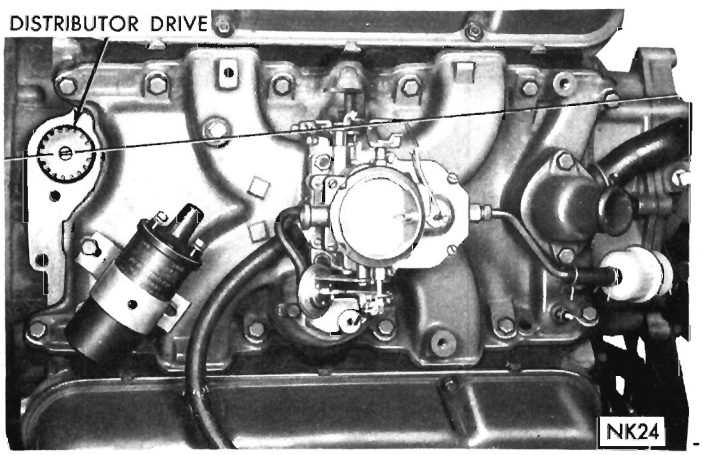


Fig. 31 Positioning of Distributor Drive Gear

(3) Lubricate seal lip with lubriplate, position damper hub slot on key in crankshaft, and slide hub on crankshaft.

(4) Place installing tool, part of Puller set Tool C-3688 in position and press damper hub on crankshaft (Fig. 30).

(5) Slide pulley over the shaft and attach with bolts and lockwashers. Tighten the bolts to 15 foot-pounds.

(6) Install damper hub retainer washer and bolt.

(7) Install fuel pump and fuel lines.

(8) Install water pump and housing assembly using new gaskets. Tighten bolts to 30 foot-pounds.

(9) Install radiator, fan and belt, hoses and close drains.

(10) Fill cooling system.

(11) With timing indicator on "O" install distributor drive gear with slot pointing to the first intake manifold bolt on left side of engine (Fig. 31).

CAMSHAFT

(Engine Removed from Vehicle)

The camshaft has an integral oil pump and dis-

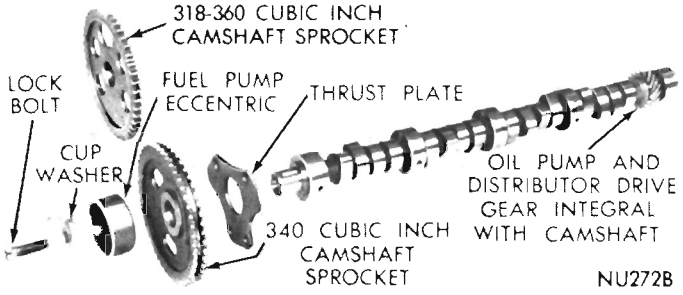


Fig. 32 Camshaft and Sprocket Assembly (Disassembled View)

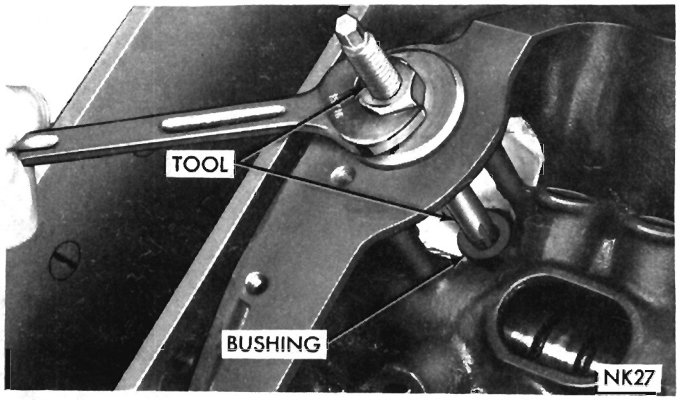


Fig. 34 Removing Distributor Drive Shaft Bushing

tributor drive gear and a bolt on fuel pump eccentric, as shown in (Fig. 32). With engine in repair stand C-3167 and adapter C-3662. Remove intake manifold, cylinder head covers, timing case cover and timing chain.

(1) Remove rocker arm and shaft assemblies.

(2) Remove push rods and tappets; identify so each part will be replaced in its original location.

(3) Remove distributor and lift out the oil pump and distributor drive shaft.

(4) Remove camshaft thrust plate and carefully withdraw the camshaft being careful not to damage cam bearings with the cam lobes.

Installation

(1) Lubricate camshaft lobes and camshaft bearing journals and insert the camshaft to within 2 inches of its final position in cylinder block.

(2) Install Tool C-3509 with tongue back of distributor drive gear, (Fig. 23).

3) Hold tool in position with distributor lock plate screw. This tool will restrict camshaft from being pushed in too far and prevent knocking out the welch plug in rear of cylinder block. **Tool should remain installed until the camshaft and crankshaft sprockets and timing chain have been installed.**

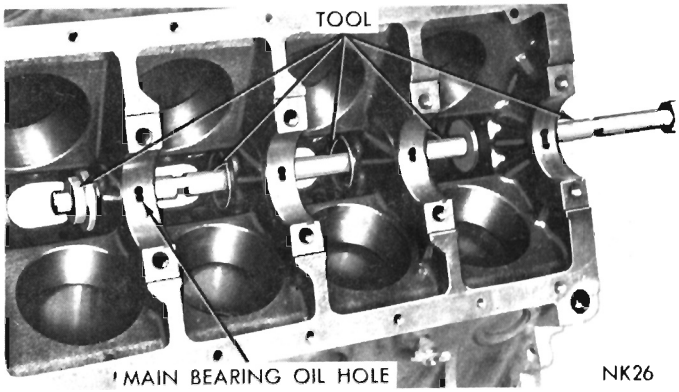


Fig. 33 Removing Camshaft Bearings

Whenver the camshaft is replaced, all of the tappet faces must be inspected for crown with a straightedge. If any negative crown (dish) is observed, tappet must be replaced.

CAMSHAFT BEARINGS

(Engine Removed from Vehicle)

Removal

(1) With engine completely disassembled, drive out rear cam bearing welch plug.

(2) Install proper size adapters and horse shoe washers (part of Tool C-3132A) at back of each bearing shell to be removed and drive out bearing shells, (Fig. 33).

Installation

(1) Install new camshaft bearings with Tool C-3132A by sliding the new camshaft bearing shell over proper adapter.

(2) Position rear bearing in the tool. Install horse shoe lock and by reversing removal procedure, carefully drive bearing shell into place.

(3) Install remaining bearings in the same manner.

Bearings must be carefully aligned to bring oil holes into full register with oil passages from the main bearings. Also, Number two bearing must index with the oil passage to the left cylinder head and Number four bearing must index with the oil passage to the right cylinder head. If the camshaft bearing shell oil holes are not in exact alignment, remove and reinstall them correctly. Install a new core hole plug at the rear of camshaft. **Be sure this plug does not leak.**

DISTRIBUTOR DRIVE SHAFT BUSHING

Removal

(1) Insert Tool C-3052 into old bushing and thread down until a tight fit is obtained, (Fig. 34)

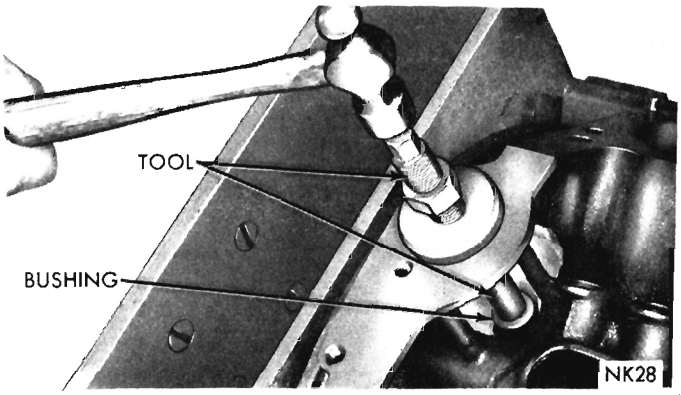


Fig. 35 Installing Distributor Drive Shaft Bushing

(2) Hold puller screw and tighten puller nut until bushing is removed.

Installation

(1) Slide new bushing over burnishing end of Tool C-3053 and insert the tool and bushing into the bore.

(2) Drive bushing and tool into position, using a hammer (Fig. 35).

(3) As the burnisher is pulled through the bushing by tightening the puller nut, the bushing is expanded tight in block and burnished to correct size, (Fig. 36).

DO NOT REAM THIS BUSHING.

Distributor Timing

Before installing the distributor and oil pump drive shaft, time engine as follows:

(1) Rotate crankshaft until No. 1 cylinder is at top dead center on the firing stroke.

(2) When in this position, the straight line on vibration damper should be under ("O") on the timing indicator.

(3) Coat shaft and drive gear with engine oil. Install the shaft so that after gear spirals into place, it will index with the oil pump shaft, so slot in top of drive gear will point to the first intake manifold bolt on left side of engine as shown in (Fig. 31).

Installation of Distributor

(1) Hold the distributor over the mounting pad on cylinder block with vacuum chamber pointing toward right of engine.

(2) Turn rotor until it points forward and to approximate location of No. 1 tower terminal in distributor cap.

(3) Place distributor gasket in position.

(4) Lower the distributor and engage the shaft in the slot of distributor drive shaft gear.

(5) Turn distributor clockwise until breaker contacts are just separating and install hold down clamp.

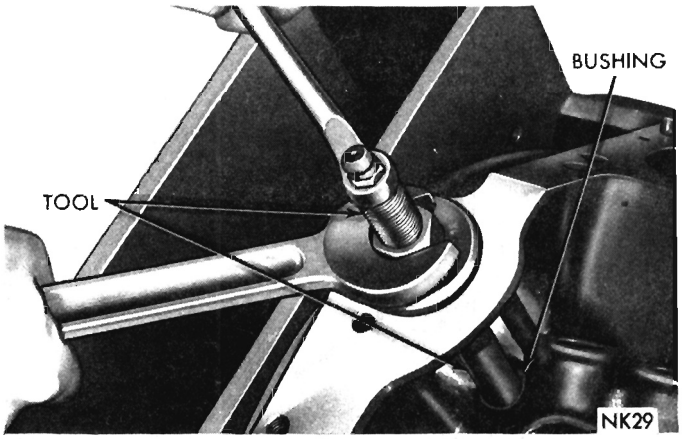


Fig. 36 Burnishing Distributor Drive Shaft Bushing

CYLINDER BLOCK

Piston Removal

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**

(2) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them if necessary.

(3) Remove connecting rod cap. Install connecting rod bolt guide set on connecting rod bolts. Push each piston and rod assembly out of cylinder bore. **Be careful not to nick crankshaft journals.**

(4) After removal, install bearing cap on the mating rod.

Cleaning and Inspection

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are installed, coat edges of plug and core hole with Number 1057794 Sealer or equivalent. Drive the core plug in so that the rim lies at least 1/64 in. below the lead-in chamfer.

(3) Examine block for cracks or fractures.

Cylinder Bore Inspection

The cylinder walls should be checked for out-of-round and taper with Tool C-119. If the cylinder bores show more than .005 in. out-of-round, or a taper of more than .010 in., or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed, and new pis-

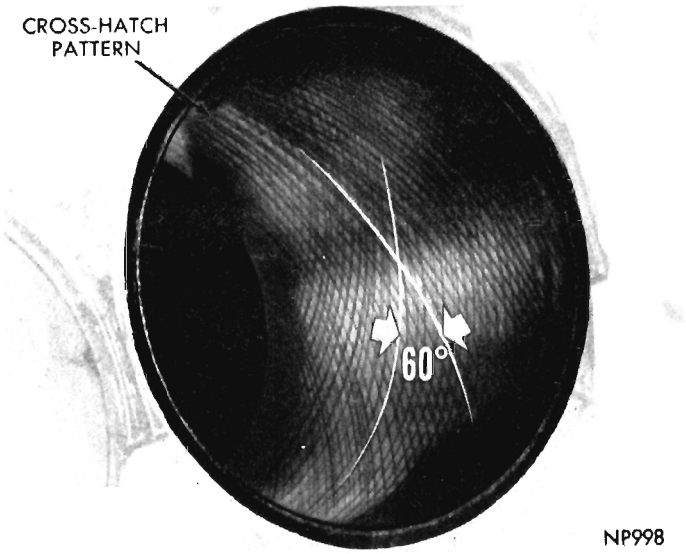


Fig. 37 Cross Hatch Pattern

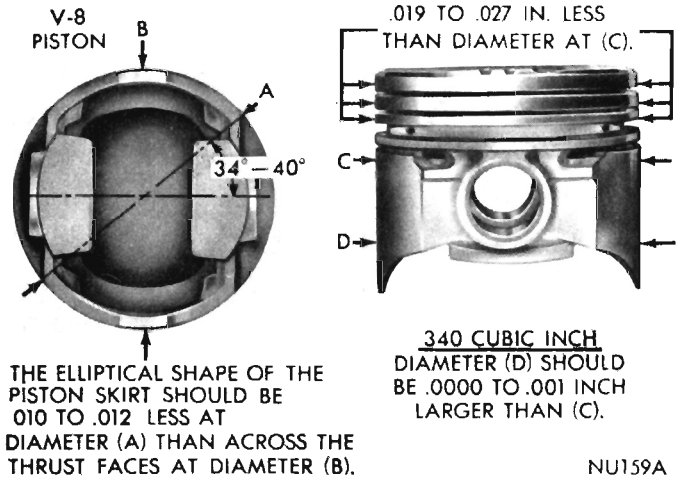


Fig. 39 340 Cubic Inch Piston Measurements

tons and rings fitted. Whatever type of boring equipment is used, boring and honing operation should be closely coordinated with the fitting of pistons and rings in order that specified clearances may be maintained.

Honing Cylinder Bores

Before honing, stuff plenty of clean rags under the bores, over the crankshaft to keep abrasive materials from entering crankcase area.

(1) Used carefully, the cylinder bore resizing hone C-823 equipped with 220 grit stones, is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, Tool C-3501, equipped with 280 grit stones (C-3501-3810) if the

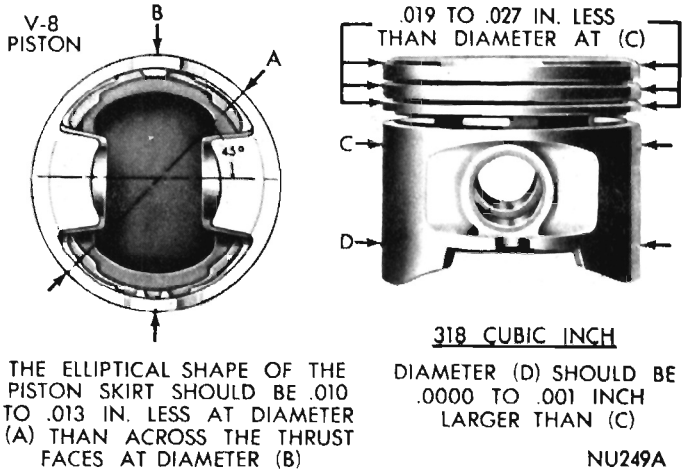


Fig. 38 318 Cubic Inch Piston Measurement

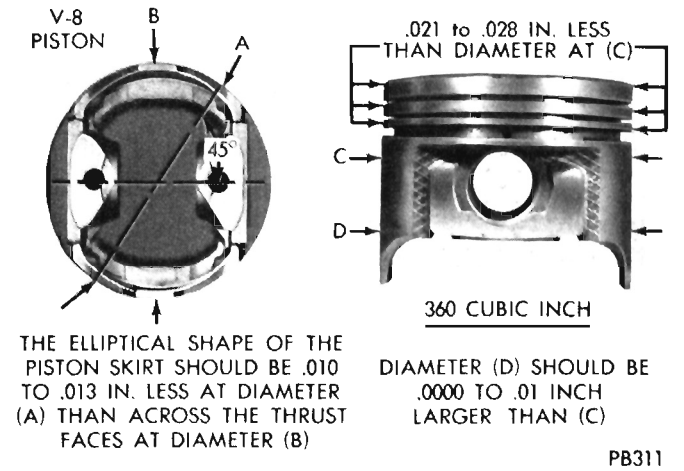


Fig. 40 360 Cubic Inch Piston Measurements

cylinder bore is straight and round. 20-60 strokes depending on the bore condition will be sufficient to provide a satisfactory surface. Inspect cylinder walls after each 20 strokes. Use honing oil C-3501-3880 or a light honing oil available from major oil distributors. **Do not use engine or transmission oil, mineral spirits or kerosene.**

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 37).

(4) After honing, it is necessary that the block be cleaned again to remove all traces of abrasives. **CAUTION: Be sure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.**

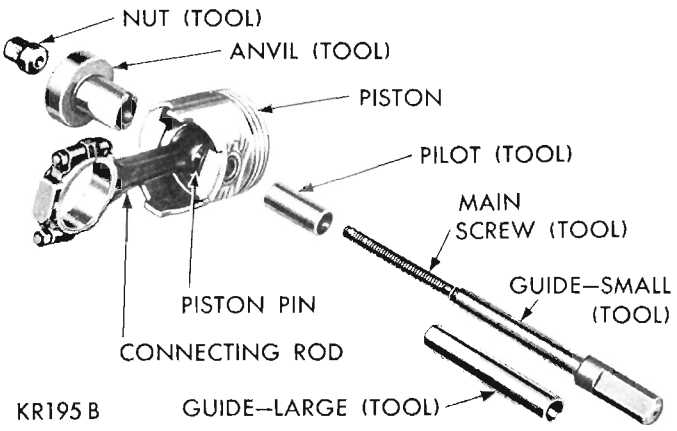


Fig. 41 Tool Arrangement for Removing Piston Pin

PISTONS, PINS AND RINGS

The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the thrust face. This allows for expansion under normal operating conditions. Under operating temperatures, expansion forces the pin bosses away from each other, thus, causing the piston to assume a more nearly round shape. It is important that pistons be checked for taper and elliptical shape before they are fitted into the cylinder bore (Figs. 38, 39 and 40).

Finished Pistons

All pistons are machined to the same weight in grams, regardless of oversize to maintain piston balance. For cylinder bores which have been honed or rebored new pistons are supplied with properly fitted pins, available in standard and the following oversizes: .005, .020, .040 inch.

Fitting Pistons

Piston and cylinder wall must be clean and dry. Specified clearance between the piston and the cylinder wall is .0005 to .0015 inch.

Piston diameter should be measured at the top of skirt 90 degrees to piston pin axis. Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line.

Pistons and cylinder bores should be measured at normal room temperature, 70 degrees F.

Piston Pins

On 318, 340 cubic inch engines, the piston pin is full floating and is retained by piston pin lock rings.

On 360 cubic inch engines, the piston pin rotates in piston only, and is retained by the press interference fit of the piston pin to the small end of connecting rod.

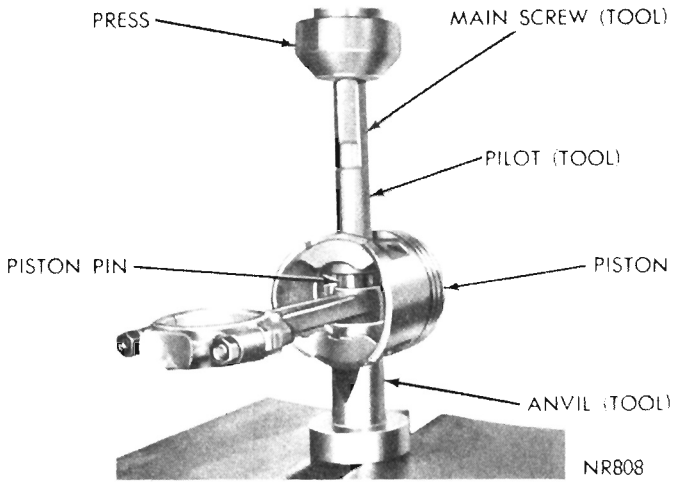


Fig. 42 Removing Piston Pin

318,340 Cubic Inch Only

(1) With new piston and new pins at room temperature, 70 degrees F., pin should be a light thumb push fit in the piston and connecting rod. Replacement is necessary if there is excessive clearance between the pin and the piston. Ream piston and connecting rod to next oversize.

Install piston pin lock rings with the beveled edge away from the piston pin, using Tool C-3915 (340 cubic inch engine).

(2) Assemble piston and rods for the left hand cylinder bank (1-3-5-7) with piston boss marked "Front" and indent on piston head on the same side as the larger chamfer on large end of connecting rod. Assemble pistons and rods to be used in the right cylinder bank (2-4-6-8) with "Front" and indent opposite

Piston Pin Removal 360 Cubic Inch Only

(1) Arrange Tool C-4158 parts for removal of piston pin, (Fig. 41).

(2) Install pilot on main screw.

(3) Install main screw through piston pin.

(4) Install anvil over threaded end of main screw with small end of anvil against piston boss. **Be sure spring is removed from anvil.**

(5) Install nut loosely on main screw and place assembly on a press, (Fig. 42).

(6) Press piston pin out of connecting rod.

When pin falls free from connecting rod, stop press to prevent damage to bottom of anvil.

(7) Remove tool from piston.

Installation

(1) Test piston fit in the piston. It should be a sliding fit in the piston at 70 degrees F. Piston pins are supplied in standard sizes only.

(2) Lubricate piston pin holes in the piston and connecting rod.

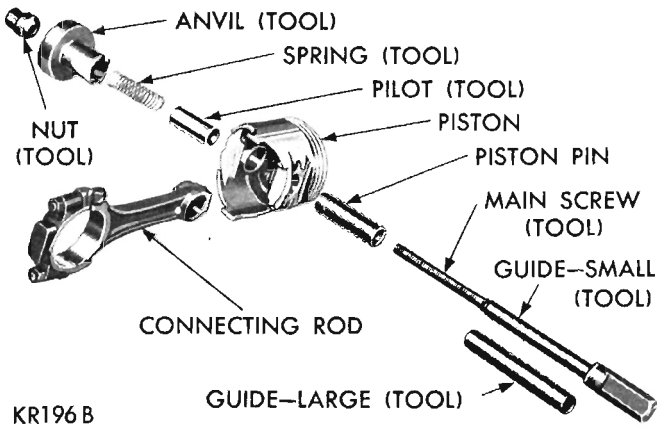


Fig. 43 Tool Arrangement for Installing Piston Pin

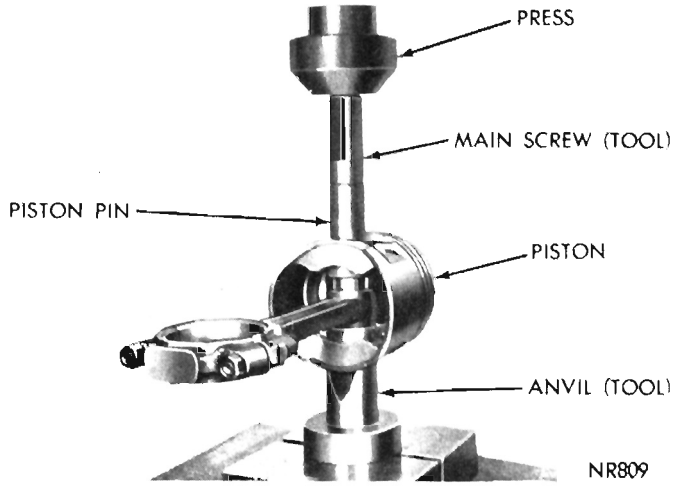


Fig. 44 Installing Piston Pin

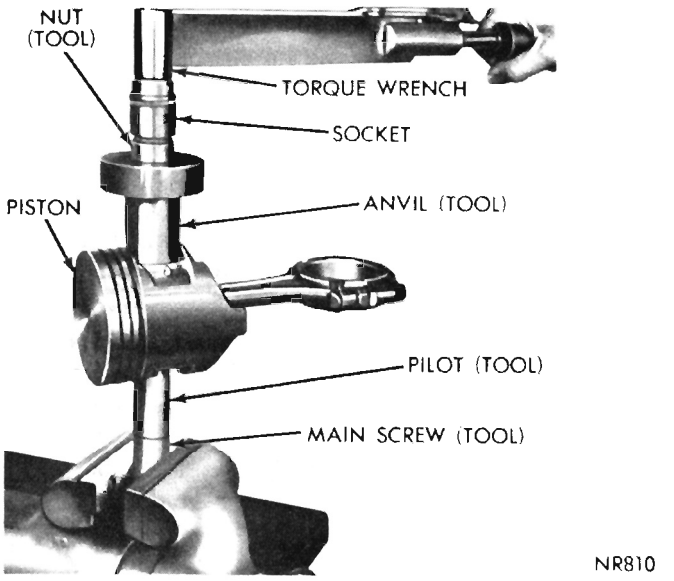


Fig. 45 Testing Fit of Piston Pin Connecting Rod

(3) Arrange Tool C-4158 parts for installation of piston pin (Fig. 43).

(4) Install spring inside the pilot and install spring and pilot in the anvil. Install piston pin over main screw.

(5) Place piston, with "front" up, over the pilot so pilot extends through piston pin hole.

(6) Position connecting rod over the pilot which extends through piston pin hole.

Assemble rods to pistons of the right cylinder bank (2, 4, 6, and 8) with indent on piston head opposite to the larger chamfer on the large bore end of connecting rod. Assemble rods to pistons of the left cylinder bank (1, 3, 5, and 7) with indent on piston head on the same side as the large chamfer on the large bore end of the connecting rod.

(7) Install main screw and piston pin in piston, (Fig. 43).

(8) Install nut on puller screw to hold assembly together. Place assembly on a press (Fig. 44).

(9) Press piston pin in until piston pin "bottoms" on the pilot. This will position pin in connecting rod.

(10) Remove tool and arrange tool parts and piston assembly in same manner (Fig. 41).

(11) Place assembly in a vise (Fig. 45).

(12) Attach torque wrench to nut and tighten up to 15 foot-pounds. If the connecting rod moves downward on piston pin, reject this connecting rod and piston pin combination. Obtain a connecting rod with proper small end bore diameter and repeat the installation and tightening procedure.

(13) If connecting rod does not move under 15 foot-pounds, piston pin and connecting rod interference is satisfactory, remove tool.

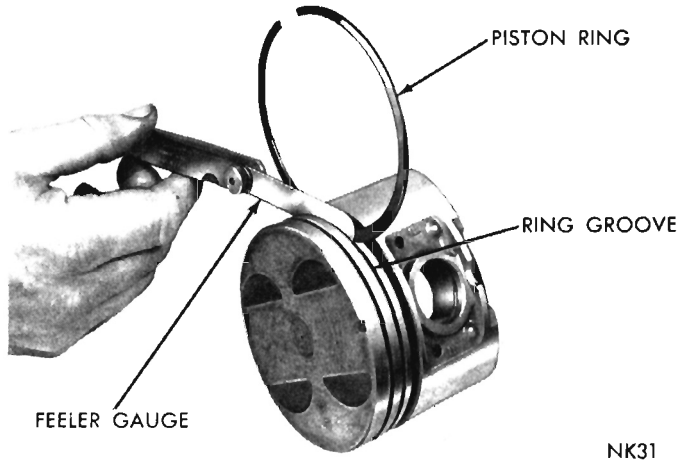


Fig. 46 Measuring Piston Ring Clearance

Fitting Rings

(1) Measure piston ring gap about two inches from bottom of cylinder bore in which it is to be fitted (An inverted piston can be used to push the rings down to insure positioning rings squarely in the cylinder bore before measuring).

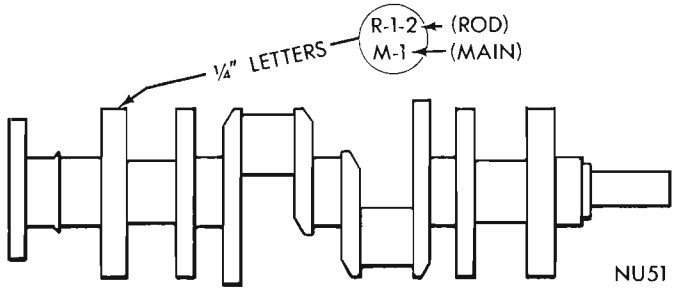


Fig. 47 Showing Location of Internal Marking of No. 8 Counterweight

(2) Insert feeler stock in the gap. The ring gap should be between .010 and .020 inch for compression rings and .015 to .062 inch for oil ring steel rails in standard size bores (for new service rings). Maximum gap in .005 inch O/S bores should be .060 inch for compression rings and .070 inch for oil ring steel rails.

(3) Measure side clearance between piston ring and ring land (Fig. 46). Clearance should be .0015 to .003 inch for the top compression ring and the intermediate ring. Steel rail service oil ring should be free in groove, but should not exceed .005 inch side clearance.

(4) On 318 or 360 Cubic Inch Engine, the keys on the spacer expander must be inserted into the hole in the oil ring groove over the piston pin front boss.

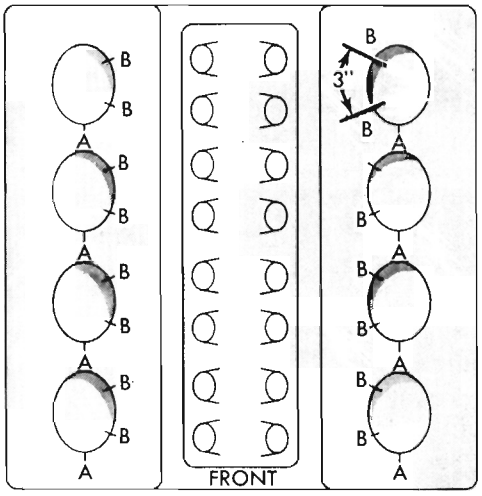
On 340 Cubic Inch Engine, install the spacer keys into one of the drain holes on the outboard side of the engine.

(5) Install compression rings in middle and top grooves use ring installer Tool C-3586 for 318 cubic inch engine, Tool C-3672 for 340 cubic inch engine, Tool C-3562 for 360 cubic inch engine. Be sure the mark "Top" on each compression ring is to the top of piston when ring is installed.

CRANKSHAFT IDENTIFICATION

A crankshaft which has one or more connecting rod or main bearing journals undersize will be steel stamped on the milled flat on the #8 crankshaft counterweight (Fig. 47).

Undersize Journal	Identification Stamp
.001 inch	R1-R2-R3 or R4
.010 inch	RX
.001 inch	M1-M2-M3-M4 or M5
.010 inch	MX



IF YOU HAVE FOLLOWED THE INSTRUCTIONS, THE RING WILL BE IN THIS POSITION ON THE PISTON.

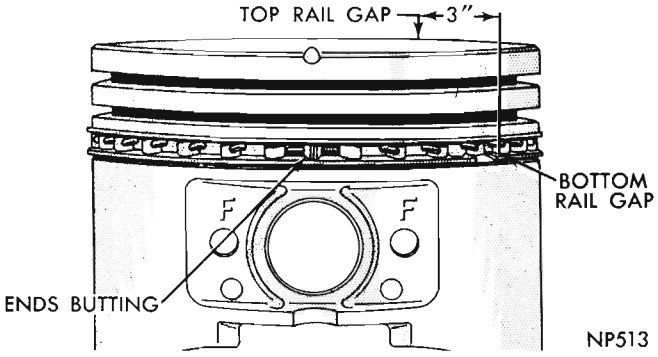


Fig. 48 Proper Oil Ring Installation

A crankshaft which has .010 inch undersize journals will have all rod journals; all main journals or both.

CONNECTING RODS

Installation of Connecting Rod Bearings

Fit all rods on one bank until completed. Do not alternate from one bank to another, because when the rods are assembled to pistons correctly, they are not interchangeable from one bank to another.

The bearing caps are not interchangeable and should be marked at removal to insure correct assembly.

Each bearing cap has a small "V" groove across the parting face. When installing the lower bearing shell, make certain that the "V" groove in the shell is in line with the "V" groove in the cap. This provides lubrication of the cylinder wall in the opposite bank.

The bearing shells must be installed so that the tangs are in the machined grooves in the rods and caps.

Limits of taper or out-of-round on any crankshaft journals should be held to .001 inch. Bearings are available in .001, .002, .003, .010 and .012 inch undersize. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

MEASURING CONNECTING ROD BEARING CLEARANCE

Shim Stock Method

(1) (a) **On 318 or 360 Cubic Inch Engine,** place an oiled .001 inch brass shim stock (1/2 inch wide and 3/4 inch long between the bearing and connecting rod journal.

(b) **On 340 Cubic Inch Engine** with tri-metal bearings, use an oiled .002 inch brass shim stock (1/2 inch wide and 3/4 inch long) between the bearing and connecting rod journal.

(2) Install bearing cap and tighten to 45 foot-pounds.

(3) Turn crankshaft 1/4 turn in each direction. A slight drag should be felt which indicates clearance is satisfactory. **318 or 360 Cubic Inch Engine** correct clearance is from .0005 to .002 inch; **340 Cubic Inch Engine** with tri-metal bearings correct clearance is from .001 to .002 inch.

(4) Side play should be from .009 to .017 inch (two rods).

INSTALLING PISTON AND CONNECTING ROD ASSEMBLY

(1) Before installing pistons, and connecting rod assemblies into the bore, be sure that compression ring gaps are staggered so that neither is in line with oil ring rail gap.

(2) Before installing the ring compressor, make sure the oil ring expander ends are butted and the rail gaps located as shown in Figure 48.

(3) Immerse the piston head and rings in clean engine oil, slide the ring compressor, Tool C-385, over the piston and tighten with the special wrench (part of Tool C-385). **Be sure position of rings does not change during this operation.**

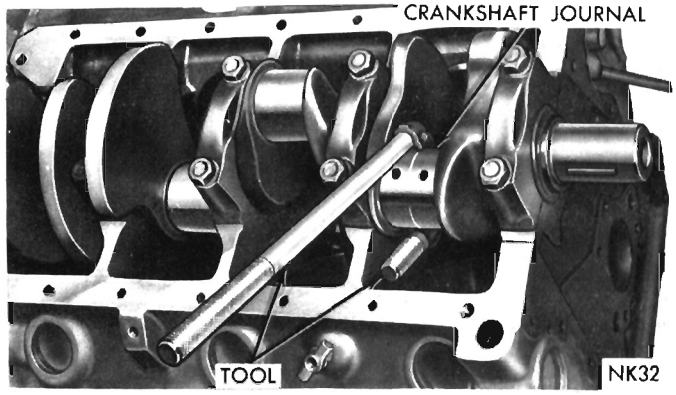


Fig. 49 Removing or Installing Connecting Rod

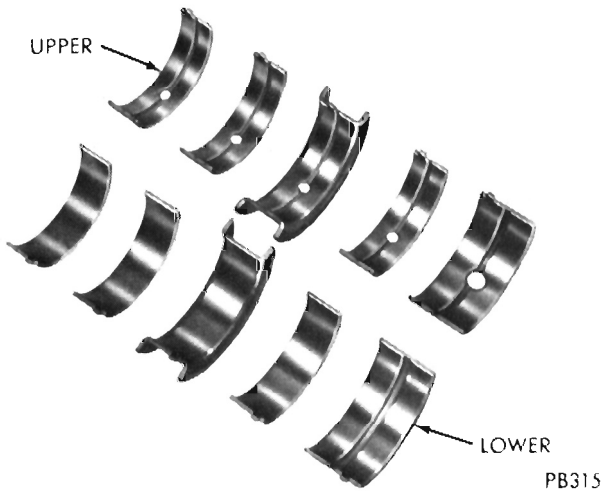


Fig. 50 Main Bearing Identification

(4) Install connecting rod bolt protectors on rod bolts, the long protector should be installed on the numbered side of the connecting rod.

(5) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal (Fig. 49).

(6) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on crankshaft journal.

(7) The notch or groove on top of piston must be pointing toward front of engine and the larger chamfer of the connecting rod bore must be installed toward crankshaft journal fillet.

(8) Install rod caps, tighten nuts to 45 foot-pounds.

WHENEVER A HIGH PERFORMANCE ENGINE IS REBUILT AND/OR NEW PISTONS INSTALLED, ONE PINT OF SPERM OIL ADDITIVE, CHRYSLER PART NO. 3549586 OR EQUIVALENT SHOULD BE ADDED TO THE ENGINE OIL TO AID BREAK-IN. THIS OIL MIXTURE SHOULD BE RETAINED UNTIL THE NEXT REGULARLY SCHEDULED OIL CHANGE. REFER TO "LUBRICATION", GROUP "O" FOR

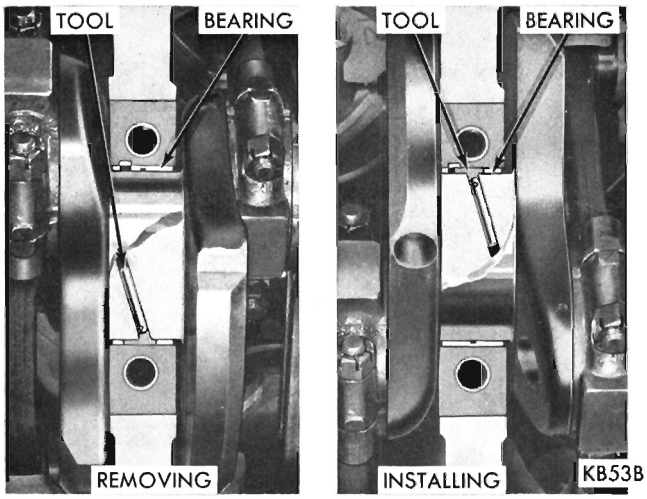


Fig. 51 Removing or Installing Upper Main Bearing

SUBSEQUENT USE OF THIS ADDITIVE IN HIGH PERFORMANCE ENGINES.

CRANKSHAFT MAIN JOURNALS

The crankshaft journals should be checked for excessive wear, taper and scoring. Limits of taper or out-of-round on any crankshaft journals should be held to .001 inch. Journal grinding should not exceed .012 inch under the standard journal diameter. Do NOT grind thrust faces of Number 3 main bearing. Do NOT nick crank pin or main bearing fillets. After regrinding, remove rough edges from crankshaft oil holes and clean out all oil passages.

CRANKSHAFT MAIN BEARINGS

Bearing caps are not interchangeable and should be marked at removal to insure correct assembly. Upper and lower bearing halves are NOT interchangeable. Lower main bearing halves of 1,2 and 4 are interchangeable. Upper main bearing halves of 1,2 and 4 are interchangeable.

Upper and lower Number 3 bearing halves are flanged to carry the crankshaft thrust loads and are NOT interchangeable with any other bearing halves in the engine (Fig. 50). Bearing shells are available in standard and the following undersizes: .001, .002, .003, .010 and .012 inch. Never install an undersize bearing shell that will reduce clearance below specifications.

Removal

(1) Remove oil pan and identify bearing caps before removal.

(2) Remove bearing caps one at a time. Remove upper half of bearing by inserting Tool C-3059 (Fig. 51) into the oil hole of crankshaft.

(3) Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

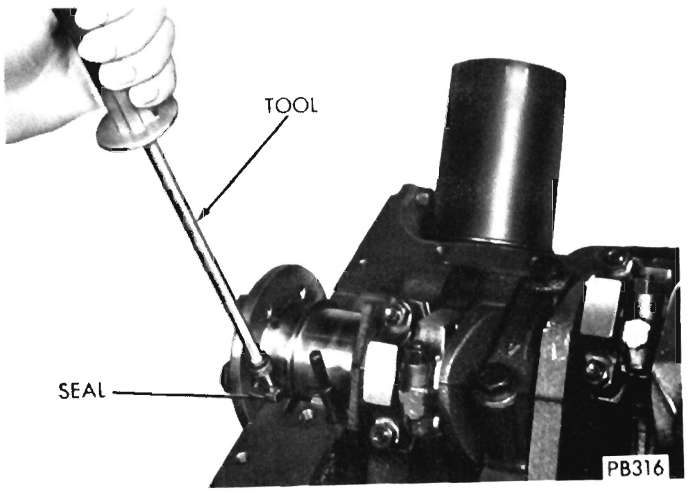


Fig. 52 - Removing Upper Oil Seal with Tool C-4148

Installation

Only one main bearing should be selectively fitted while all other main bearing caps are properly tightened.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

(1) Start bearing in place, and insert Tool C-3059. into oil hole of crankshaft (Fig. 51).

(2) Slowly rotate crankshaft counter-clockwise sliding the bearing into position. Remove Tool C-3059.

MEASURING MAIN BEARING CLEARANCE

Shim Stock Method

(1) Smooth edges of a 1/2 x 3/4 inch piece of brass shim stock,.001 inch thickness.

(2) Install bearing in center main bearing cap, **bearing tang in groove in cap**, lubricate bearing and bolts position shim stock across the bearing, install cap, tighten bolts to 85 foot-pounds.

(3) If a slight drag is felt as crankshaft is turned (moved no more than 1/4 turn in either direction), clearance is .001 inch or less and is considered satisfactory.

If, however, no drag is felt, the bearing is too large or crankshaft cannot be rotated, bearing is too small and should be replaced with the correct size.

(4) Measure crankshaft end play .002 to .007 inch. If end play is less than .002 inch or more than .007 inch, install a new number 3 main bearing.

(5) Fit remaining bearings in same manner.

It is permissable to use one .001 inch undersize bearing shell with one standard bearing shell or one .002 inch undersize bearing shell with one .001 inch undersize shell. **Always use the smaller**

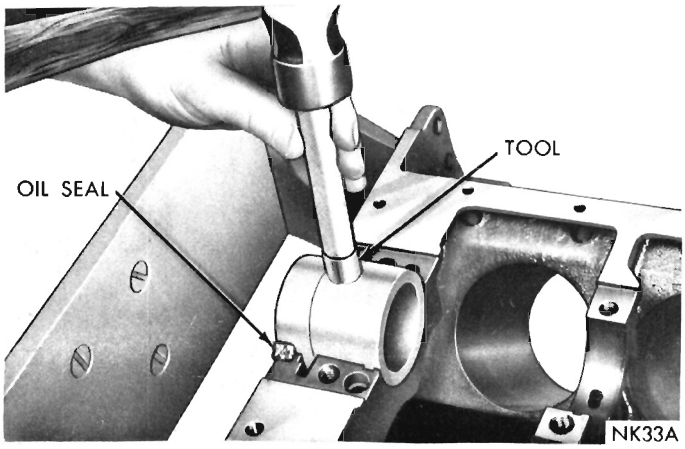


Fig. 53 - Installing Rear Main Upper Oil Seal

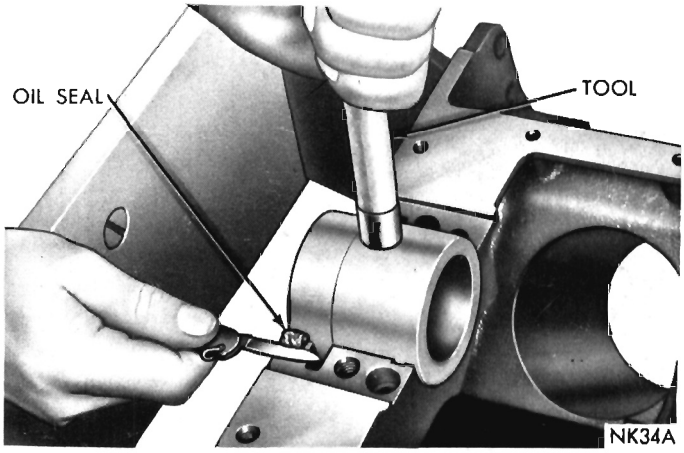


Fig. 54 - Trimming Rear Main Upper Oil Seal

diameter bearing half as the upper. Never use an upper bearing half more than .001 inch smaller than the lower bearing half and never use a new bearing half with a used bearing half.

REAR MAIN BEARING OIL SEALS

Service seals are of split rubber type composition. The seals make it possible to replace the upper rear seal without removing the crankshaft. **The seal must be used as an upper and lower set and cannot be combined with the rope seal.**

(1) With the oil pan and oil pump removed, remove the rear main bearing cap.

(2) Remove lower rope oil seal by prying from the side with a small screw driver.

(3) Remove upper rope oil seal by turning in Tool C-4148 into the end of the seal, being careful not to damage the crankshaft (Fig. 52). Pull the seal out with the tool while rotating the crankshaft.

CAUTION: Always wipe crankshaft surface clean, then oil lightly before installing a new seal.

(4) Oil seal lip lightly with engine oil.

(5) Hold seal (with paint stripe to the rear) tightly against crankshaft with thumb to make sure that the sharp edge of the groove in the block does not shave or nick the back of the seal, install seal in the block groove. Rotate the crankshaft, if necessary, while sliding seal into groove. **Care must be exercised not to damage the sealing lip.**

(6) Install other half of the seal into the rear main bearing cap, with paint stripe to the rear.

(7) Install rear main bearing cap, tighten to 85 foot-pounds. **Do not use sealer or cement on seal ends or lip.**

REAR MAIN BEARING OIL SEAL

(Crankshaft Removed)

Upper Seal

(1) Install a new rear bearing oil seal in the cylinder block so that both ends protrude.

(2) Using Tool C-3511 tap seal down into position until tool is seated in bearing bore, (Fig. 53).

(3) Hold tool in this position and cut off the portion of seal that extends above the block on both sides, (Fig. 54).

Lower Seal

(1) Install a new seal in bearing cap so that ends protrude.

(2) Using Tool C-3511 tap the seal down into position until tool is seated in bearing bore.

(3) Hold tool in this position and cut off the portion of seal that extends above the cap on both sides.

ENGINE OILING SYSTEM (Fig. 55)

OIL PAN

Removal

(1) Disconnect negative (ground) cable from the battery, and remove dipstick.

(2) Raise vehicle on a hoist, drain the oil. Remove engine to torque converter left housing strut.

(3) Remove steering and idle arm ball joints from steering linkage center link.

(4) Remove exhaust pipes from exhaust manifolds and leave hang without disconnecting from the muffler on single exhaust system.

(5) Remove the oil pan bolts and oil pan.

Installation

(1) Inspect alignment of oil strainer. Bottom of

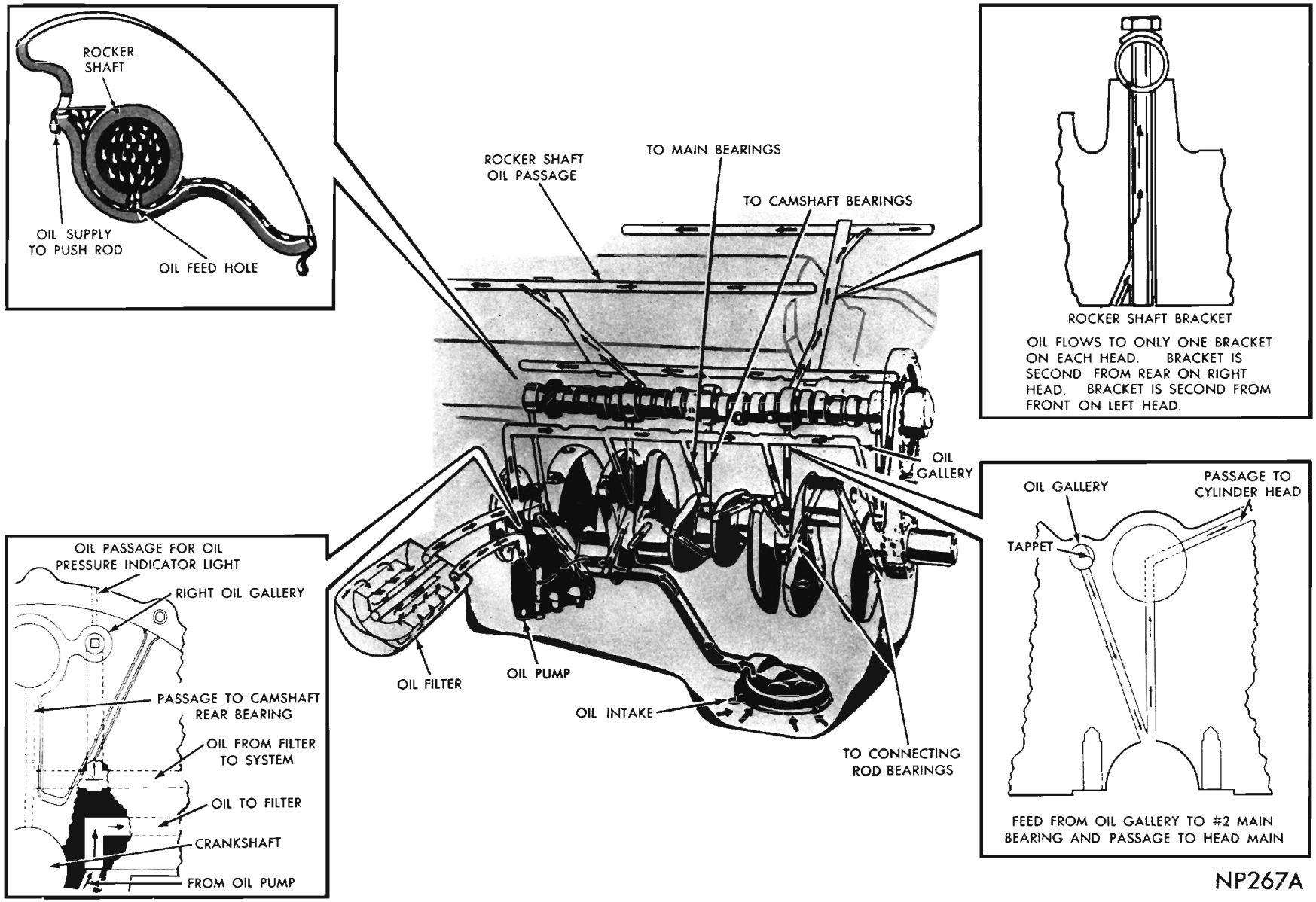


Fig. 55 - Engine Oiling System

strainer must be parallel with the machined surface of the cylinder block. Bottom of strainer must touch bottom of oil pan.

(2) Clean oil pan gasket surface. Inspect pan rail for distortion and straighten if necessary.

(3) Using a new pan gasket set, install oil pan, tighten screws to 200 inch-pounds. **Be sure notches on side gaskets are installed as shown in figure 56 on 360 cubic inch engines.**

(4) Install engine to converter housing strut. Connect exhaust pipes to manifolds (if removed).

(5) Connect steering and idler arm ball joints to steering center link.

(6) Lower vehicle, install dipstick, fill with proper grade and quantity of motor oil, connect battery ground.

OIL PUMP

It is necessary to remove the oil pan, and remove the oil pump from rear main bearing cap to service the oil pump.

Disassembly

(1) To remove the relief valve, proceed as follows:

(a) Remove cotter pin, drill a 1/8 inch hole into the relief valve cap and insert a self-threading sheet metal screw into cap.

(b) Clamp screw into a vise and while supporting oil pump, remove cap by tapping pump body using a soft hammer. Discard cap and remove spring and relief valve (Fig. 57).

(2) Remove oil pump cover bolts and lockwashers, and lift off cover.

(3) Discard oil seal ring.

(4) Remove pump rotor and shaft, and lift out outer rotor.

(5) Wash all parts in a suitable solvent and inspect carefully for damage or wear (Fig. 58).

Inspection

(1) The mating face of the oil pump cover should be smooth. If cover is excessively scratched or grooved, it should be replaced.

(2) Check for excessive cover to rotor wear by laying a straightedge across cover surface. If a .0015 inch feeler gauge can be inserted between the cover and straightedge, discard cover and install a new one (Fig. 59).

(3) Measure diameter and thickness of outer rotor. If outer rotor measures less than .825 inch (Fig. 60) and the diameter is less than 2.469 inches, install a new outer rotor.

(4) Measure thickness of inner rotor.

(5) If inner rotor measures less than .825 inch, a new inner rotor should be installed (Fig. 61).

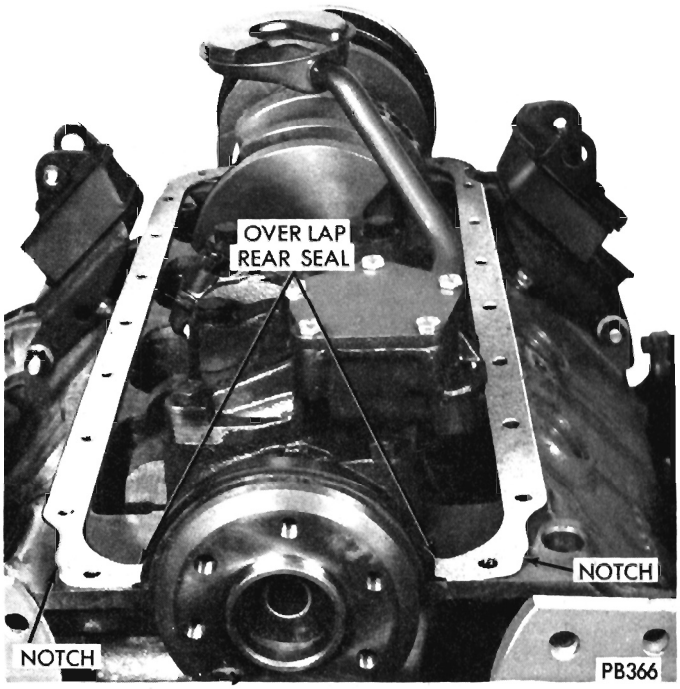


Fig. 56 - Pan Side Gaskets and Rear Seal Installation

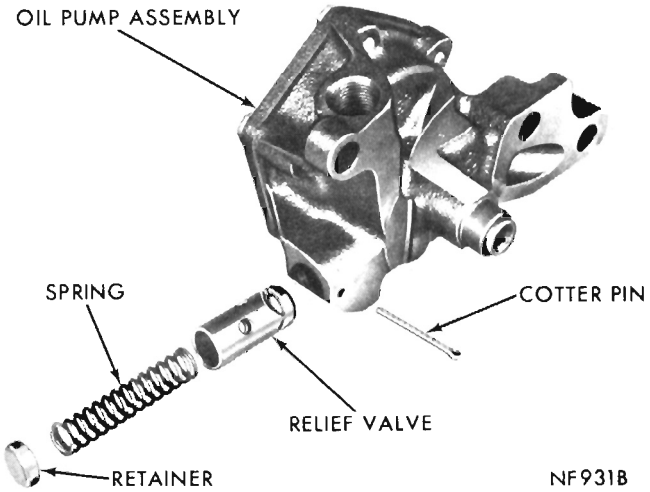


Fig. 57 - Relief Valve Spring and Retainer Removed

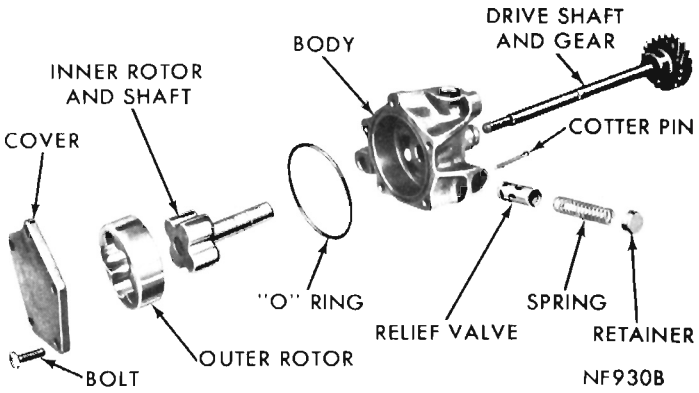


Fig. 58 - Oil Pump Assembly (Disassembled View)

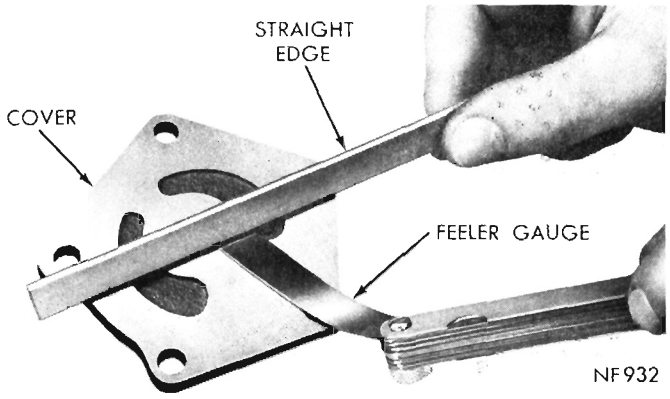


Fig. 59 - Measuring Oil Pump Cover Flatness

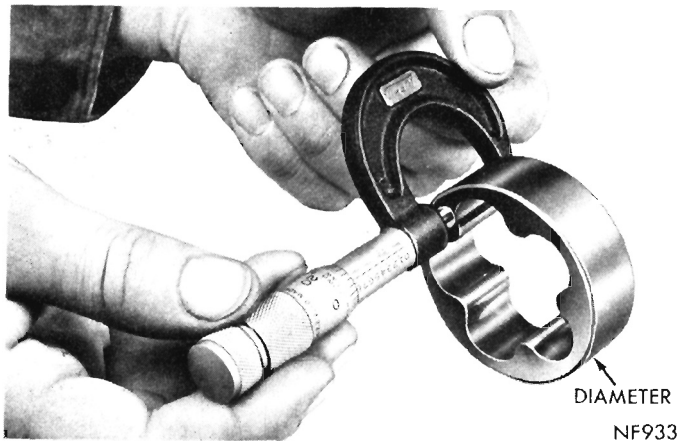


Fig. 60 - Measuring Outer Rotor Thickness

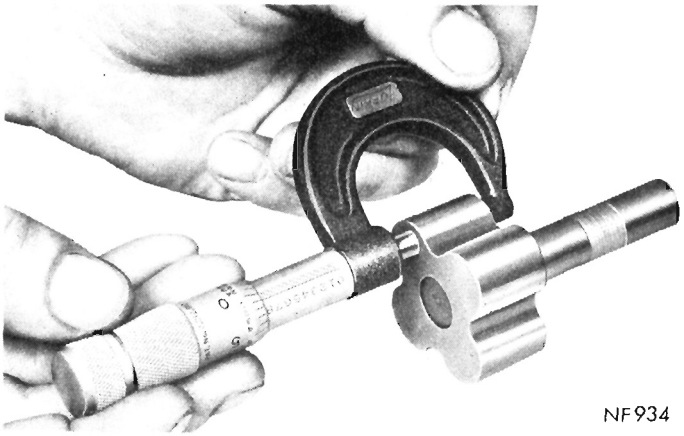


Fig. 61 - Measuring Inter Rotor Thickness

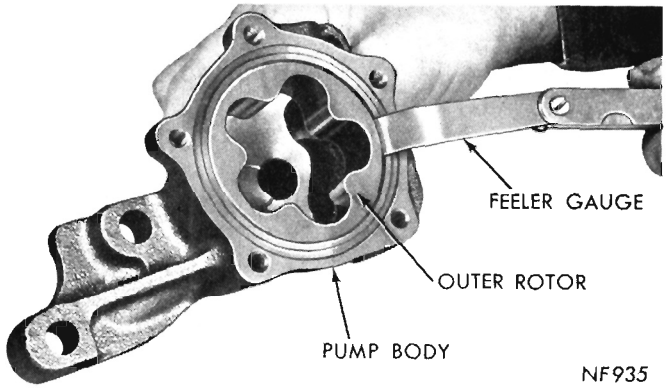


Fig. 62 - Measuring Outer Rotor Clearance

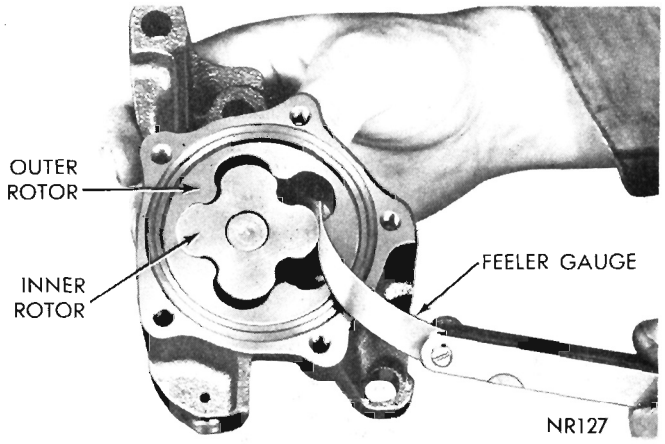


Fig. 63 - Measuring Clearance Between Rotors

(6) Slide outer rotor into pump body, press to one side with fingers and measure clearance between outer rotor and pump body (Fig. 62). If measurement is more than .014 inch, replace oil pump body.

(7) Install inner rotor and shaft into pump body. If clearance between inner and outer rotors (Fig. 63) is more than .010 inch, replace inner and outer rotors.

(8) Place a straightedge across the face (between the bolt holes). If a feeler gauge of more than .004 inch can be inserted between rotors and straightedge, replace pump body (Fig. 64).

(9) Inspect oil pump relief valve plunger for scoring and for free operation in its bore. Small scores may be removed with 400 grit wet or dry paper.

(10) The relief valve spring has a free length of 2-1/32 to 2-3/64 inch and should test 16.2 to 17.2 lbs. when compressed to 1-11/32 inch. Discard springs that fails to meet specifications.

(11) Install the relief valve, spring a new retainer cap. (Spring seats inside retainer cap). Press retainer in housing so that top of retainer cap is within the relief valve bore diameter as shown in Figure 65. Install cotter pin.

(12) If oil pressure is low, inspect for worn bearings, or look for other causes of possible loss of oil pressure.

Assembly

(1) When assembling oil pump, be sure to use a new oil seal ring between cover and body.

(2) Tighten cover bolts to 95 inch-pounds.

(3) Prime oil pump.

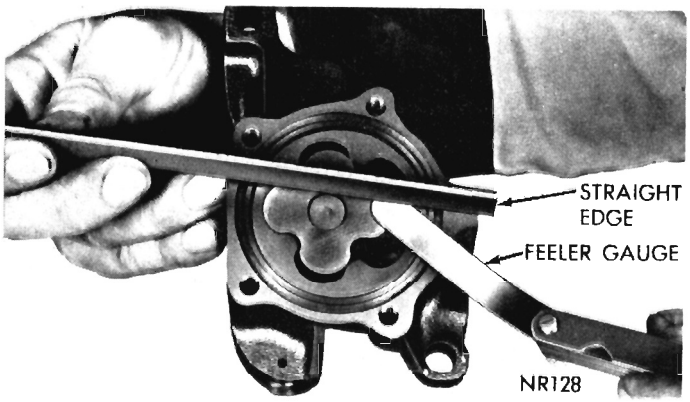


Fig. 64 - Measuring Clearance Over Rotors

(4) Install oil pump and strainer to rear main bearing cap. Tighten bolts to 35 foot-pounds.

Servicing the Oil Pressure Relief Valve

It is necessary to remove the oil pan, and remove oil pump from rear main bearing cap to service the pressure relief valve.

To remove the relief valve, proceed as follows:

(1) Remove cotter pin, drill a 1/8 inch hole in the relief valve cap and insert a self-threading sheet metal screw into cap.

(2) Clamp screw into a vise and while supporting oil pump, remove cap by tapping pump body using a soft hammer. Discard cap.

(3) Remove spring and plunger.

(4) Clean parts thoroughly. Inspect oil pump relief valve for scoring and free operation in its bore. Small scores may be removed with 400 grit wet or dry paper providing extreme care is used not to round off the sharp edge portion of the valve.

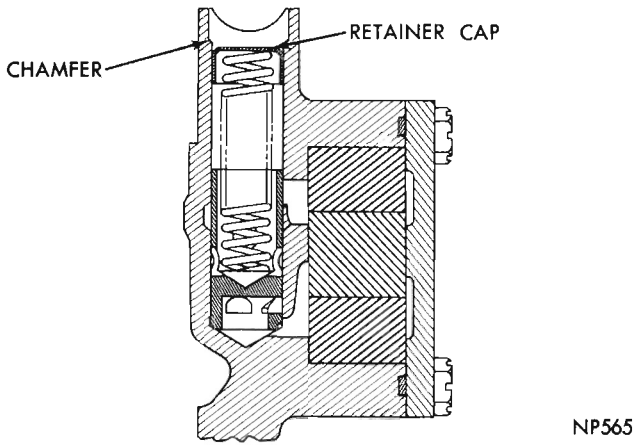


Fig. 65 - Proper Retainer Cap Installation

(5) The relief valve spring has a free length of 2-1/32 to 2-3/64 inch and should test 16.2 to 17.2 lbs. when compressed to 1-11/32 inch. Discard spring that fails to meet specifications.

(6) Install the relief valve, spring a new retainer cap. (Spring seats inside retainer cap). Press retainer in housing so that top of retainer cap is within the relief valve bore diameter as shown in Figure 65. Install cotter pin.

383-440 CUBIC INCH ENGINES

INDEX

	Page
Camshaft	62
Camshaft Bearings	62
Connecting Rods	67
Crankcase Ventilation System	92
Crankshaft Identification	67
Crankshaft Main Bearings	68
Crankshaft Main Journals	68
Cylinder Block	63
Cylinder Heads	53
Distributor Drive Shaft Bushing	63
Engine Assembly	52
Engine Mounts	51
Engine Oiling System	70
Hydraulic Tappets	57
Installing Piston and Connecting Rod Assembly	67
Measuring Connecting Rod Bearing Clearance	67
Measuring Main Bearing Clearance	69
Oil Filter	73
Oil Pan	70
Oil Pump	71
Pistons, Pins and Rings	64
Repair of Damaged or Worn Threads	93
Rear Main Bearing Oil Seal	69
Rocker Arms and Shaft Assembly	53
Specifications	94
Timing Chain Cover, Oil Seal and Chain	59
Tune-Up	50
Valves and Valve Springs	54
Valve Timing	59

SERVICE PROCEDURES

TUNE-UP

(1) Test battery specific gravity, add water if necessary, clean and tighten battery connections.

(2) Test cranking voltage. See "Starting Motor Cranking Voltage" Electrical Section of this manual.

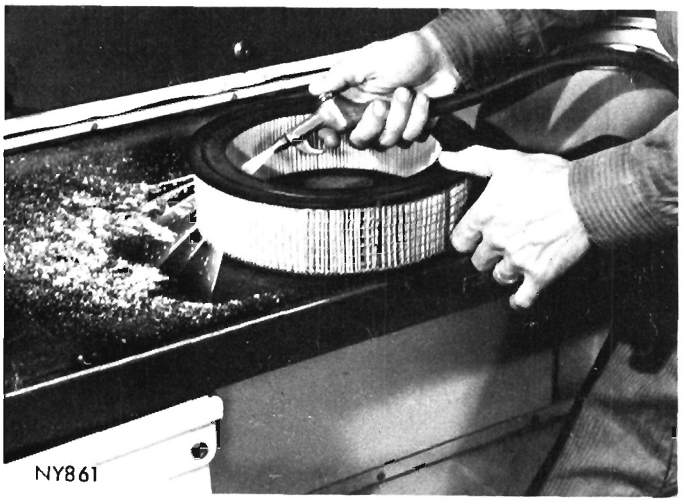


Fig. 1 - Cleaning Filter Element

(3) Tighten the intake manifold bolts to 50 foot pounds.

(4) Perform cylinder compression test. Compression should not be less than 100 pounds for 383 Cubic Inch Engine with two barrel carburetor and not vary more than 40 pounds. 110 pounds for 383, 440 Cubic Inch Engine with four or six barrel carburetor and should not vary more than 40 pounds. The recommended pressures are to be used only as a guide to diagnosing engine problems. An engine in good condition may exhibit higher pressures. Many conditions which are difficult to control cause variations in compression readings. An engine should not be disassembled to determine the cause of low compression unless some other malfunction is present.

(5) Clean or replace spark plugs as necessary and adjust gap to .035 inch. Tighten to 30 foot-pounds using new gaskets.

(6) Test resistance of spark plug cables. Refer to "Ignition System Secondary Circuit Inspection" Electrical Section.

(7) Inspect the breaker plate contacts, primary wire and vacuum advance operation. Test coil output voltage, primary and secondary resistance. Test Condenser. Replace parts as necessary. Refer to Ignition System and make necessary adjustments.

(8) Reset the ignition timing with the vacuum advance line disconnected. The ignition timing should be set to compensate for altitudes and/or gasoline grades.

(9) Set carburetor idle mixture adjustment. Adjust throttle stop screw to specifications. Perform a combustion analysis.

(10) Test the fuel pump for pressure and vacuum. Refer to "Fuel System" Group 14, Specifications.

(11) Inspect the manifold heat control valve in the right exhaust manifold for proper operation and apply Manifold Heat Control Valve Solvent Number 3419129 or equivalent to the bushing and shafts.

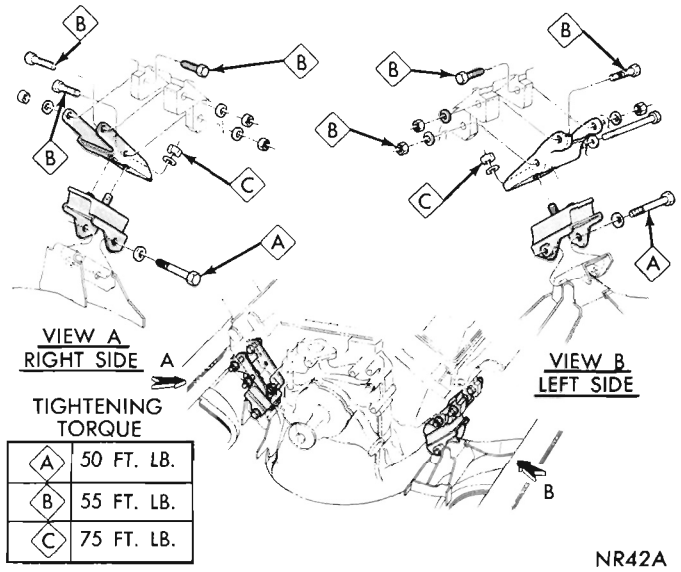


Fig. 2 - Front Engine Mounts - Barracuda, Satellite, Fury, Chrysler, Imperial

(12) Every 6 months, remove filter element and blow out dirt gently with air hose. Direct air from inside out, and keep nozzle 2 inches away from element to avoid damaging (Fig. 1). Clean the metal housing and replace the element. Every two years install a new factory recommended filter element or equivalent. Service the unit more frequently when driving under severe conditions, such as in dusty areas.

(13) Inspect crankcase ventilation system as outlined on page 92.

(14) Inspect and adjust the accessory belt drive referring to "Cooling System" Group 7 for proper adjustments.

(15) Road test vehicle as a final check.

FRONT ENGINE MOUNTS (Fig 2)

Removal

(1) Raise hood and position fan to clear raditor hose and radiator top tank.

(2) Disconnect throttle linkage at transmission and at carburetor.

(3) Remove torque nuts from insulator studs.

(4) Raise engine just enough to remove front engine mount assembly.

Installation

(1) Install insulator to engine bracket and tighten to specified torque.

(2) Lower the engine and install washers and prevailing torque nuts to insulator studs; tighten nuts to specified torque.

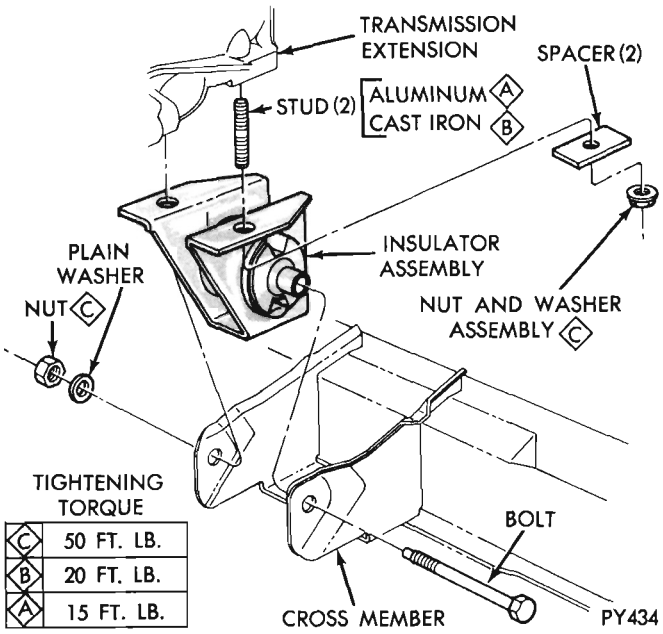


Fig. 3 - Engine Rear Support - Barracuda Satellite, Fury, Chrysler, Imperial

(3) Connect throttle at transmission and carburetor.

REAR ENGINE MOUNTS (Fig. 3)

Removal

(1) Raise vehicle on hoist.
(2) Install transmission jack.
(3) Remove rear engine crossmember from frame and remove rear mount.

Installation

(1) Install rear engine mount to crossmember and tighten nut to specified torque.
(2) Install rear crossmember to frame and tighten bolts to specified torque.

ENGINE ASSEMBLY

Removal

(1) Scribe the outline of hinge brackets on hood to assure proper adjustments when installing.
(2) Remove hood.
(3) Drain cooling system and remove battery.
(4) Remove all hoses, fan shroud, disconnect oil cooler lines and remove radiator.
(5) Disconnect fuel lines and wires attached to engine units. Remove air cleaner and carburetor.
(6) Attach engine lifting fixture to carburetor flange studs on intake manifold.
(7) Raise vehicle on a hoist and install engine support fixture Tool C-3487A to support rear of engine.

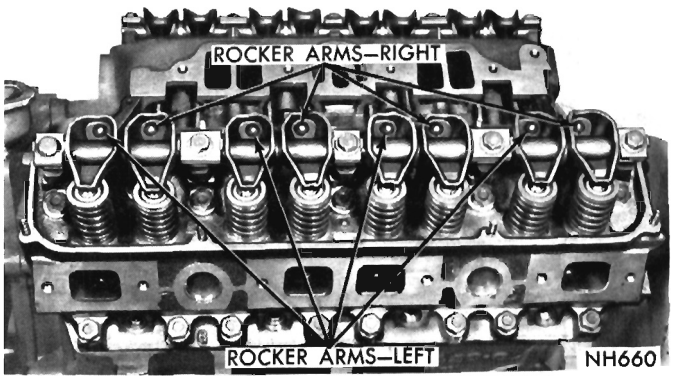


Fig. 4- Rocker Arm Assemblies Installed

(8) Drain transmission and torque converter.
(9) Disconnect exhaust pipes at manifolds, propeller shaft, wires, linkage, cable, and oil cooler lines at the transmission.
(10) Remove engine rear support crossmember and remove transmission from vehicle.
(11) Lower vehicle and attach chain hoist to fixture eyebolt.
(12) Remove engine front mounting bolts. Raise engine with a chain hoist and work engine out of chassis.
(13) Place engine in repair stand Tool C-3167 and adapter C-3662 for disassembly, using transmission mounting bolts.

Installation

(1) Attach engine lifting fixture to carburetor flange studs on intake manifold.
(2) Attach chain hoist to fixture eyebolt.
(3) Remove engine from repair stand and lower engine carefully until engine is positioned in vehicle.
(4) Install engine support fixture Tool C-3487A and adjust to support rear of engine.
(5) Remove chain hoist from fixture eyebolt.
(6) Raise vehicle on hoist, install and tighten engine front support mounting bolts.
(7) Install transmission and engine rear support crossmember.
(8) Lower engine into position and install engine rear support crossmember bolts. Remove engine support fixture Tool C-3487A.
(9) Connect propeller shaft, wires, linkage, cable, oil cooler lines at the transmission, connect exhaust pipes to manifold using new gaskets. Install transmission filler tube.
(10) Lower vehicle and install radiator, fan shroud, hoses, oil cooler lines and connect all wires and linkage.
(11) Remove engine lifting fixture from intake manifold and install carburetor and fuel lines. Connect throttle linkage.
(12) Install hood, using scribe marks for proper alignment.

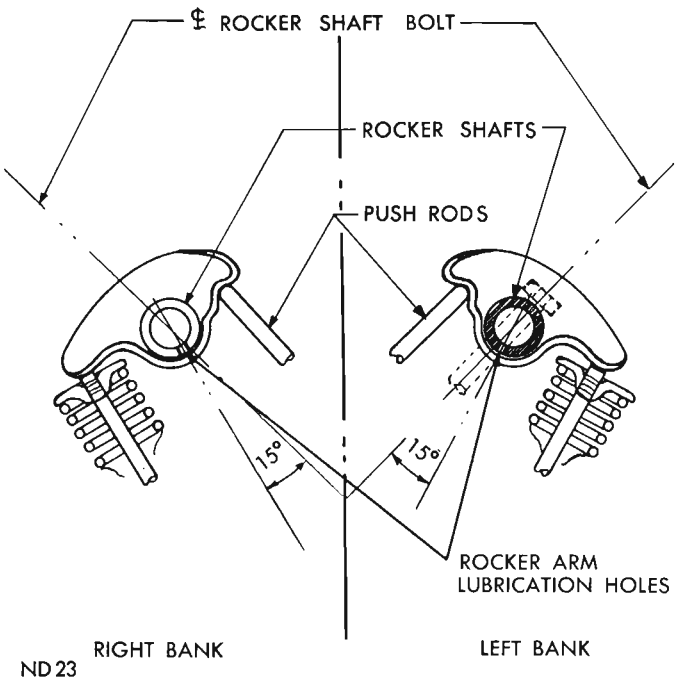


Fig. 5 - Rocker Arm Lubrication Holes

(13) Close all drain cocks and fill cooling system.

(14) Fill engine crankcase and transmission. Refer to "Lubrication" Group O for quantities and lubricants to use and check entire system for leaks and correct as necessary.

(15) Start engine and run engine until normal operating temperature is reached.

(16) Inspect ignition timing and adjust carburetor as necessary.

(17) Adjust accelerator and transmission linkages. Road test vehicle.

ROCKER ARMS AND SHAFT ASSEMBLY

The rocker arms are of stamped steel and are arranged on one rocker arm shaft, per cylinder head. The push rod angularity tends to force the pairs of rocker arms toward each other where oilite spacers carry the side thrust at each rocker arm. The rocker shaft is held in place by bolts and stamped steel retainers attached to the five brackets on the cylinder head.

Removal

(1) Remove cylinder head cover and gasket.

(2) Remove rocker shaft bolts and retainers and remove rocker arms and shaft assembly.

(3) If rocker arm assemblies have been disassembled for cleaning, inspection, or replacement, refer to Figure 4 for proper reassembly.

Installation

(1) Install rocker arms and shaft assembly making sure to install the long stamped steel retainers in the number two and four positions.

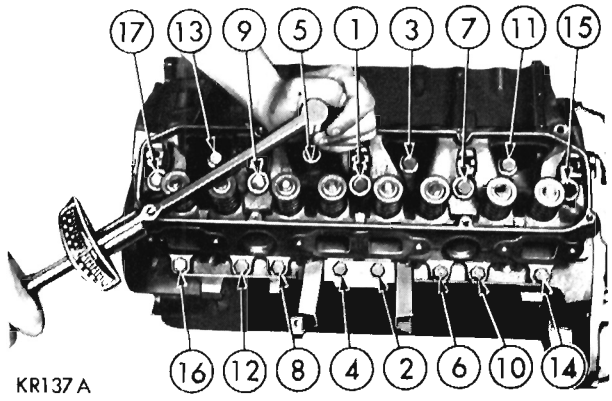


Fig. 6 - Cylinder Head Tightening Sequence

(2) Install rocker shafts so that 3/16 inch diameter rocker arm lubrication holes point downward into the rocker arm, so that the 15 degree angle of these holes point outward towards the valve end of the rocker arms, (Fig. 5). This is necessary to provide proper lubrication to the rocker assemblies.

The 15 Degree angle of the rocker arm lubrication holes is determined from the center line of the bolt holes through the shaft which are used to attach the shaft assembly to the cylinder head.

(3) Tighten rocker shaft bolts to 25 foot-pounds.

(4) Clean cylinder head cover gasket surface. Inspect cover for distortion and straighten if necessary.

(5) Clean cylinder head rails. Place new cylinder head cover gasket in position and install cylinder head covers. Tighten to 40 inch-pounds.

(6) Install closed crankcase ventilation system and evaporative control system.

CYLINDER HEADS

The chrome alloy cast iron cylinder heads are held in place by 17 bolts. The spark plugs enter the cylinder head horizontally and are located at the wedge of the combustion chambers.

Removal

(1) Drain cooling system.

(2) Remove alternator, carburetor, air cleaner and fuel line.

(3) Disconnect accelerator linkage.

(4) Remove closed ventilation system and evaporative control system.

(5) Remove vacuum control tube at carburetor and distributor.

(6) Disconnect distributor cap, coil wires and heater hose.

(7) Disconnect heat indicator sending unit wire.

(8) Remove spark plugs.

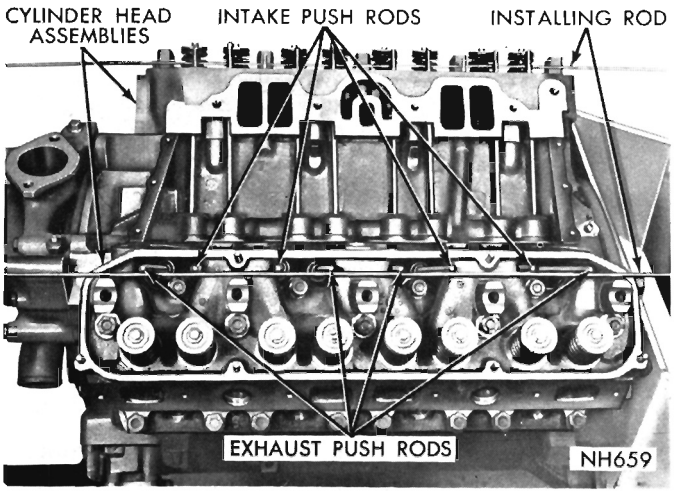


Fig. 7 - Push Rods Installed

(9) Remove intake manifold, ignition coil and carburetor as an assembly.

(10) Remove tappet chamber cover.

(11) Remove cylinder head covers and gaskets.

(12) Remove exhaust manifolds.

(13) Remove rocker arm and shaft assemblies. Remove push rods and **identify to insure installation in original location.**

(14) Remove the 17 head bolts from each cylinder head and remove cylinder heads.

(15) Place cylinder head in holding fixture Tool C-3626.

Installation

(1) Clean gasket surfaces of the cylinder block and cylinder head. Remove all burrs from edges of cylinder heads.

(2) Inspect all surfaces with a straightedge if there is any reason to suspect leakage. If out of flatness exceeds .00075 times the span length in any direction; either replace head or lightly machine the head gasket surface. As an example, if a 12 inch span is .004 inches out of flat, allowable is 12 x .00075 = .009 inches. Head is OK.

The cylinder head surface finish should be 70-180 micro-inches.

(3) Coat new gaskets lightly with a suitable sealer, Chrysler Number 1057794 or equivalent. Install gaskets and cylinder heads.

(4) Install cylinder head bolts. Starting at top center, tighten all cylinder head bolts to 40 foot-pounds in sequence (Fig. 6).

Repeat the procedure, tightening all head bolts to 70 foot-pounds.

(5) Inspect push rods and replace any worn or bent rods.

(6) Install push rods in the tappets maintaining alignment, using rod, (Fig. 7).

(7) Install rocker arm and shaft assembly starting each push rod into its respective rocker arm socket making sure to install the long stamped steel retainers in the number two and four positions, **tighten bolts to 25 foot-pounds.**

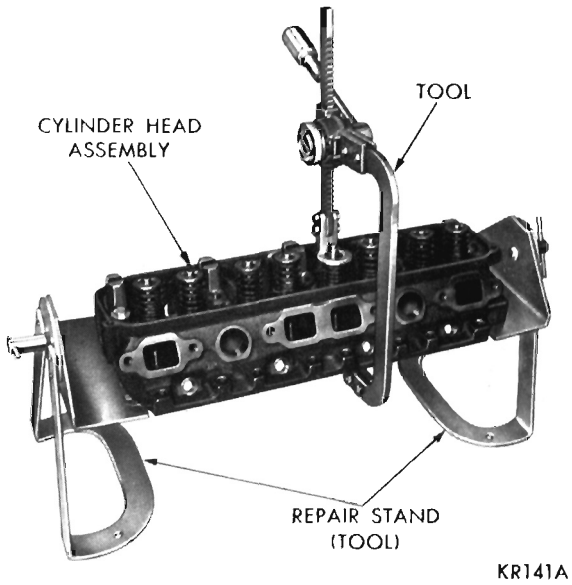


Fig. 8 - Compressing Valve Spring

(8) Place new cylinder head gasket in position and install cylinder head covers. Tighten nuts to 40 inch-pounds.

(9) Install exhaust manifolds and tighten nuts to 30 foot-pounds.

(10) Adjust spark plugs to .035 inch gap and install plugs, tighten plugs to 30 foot-pounds.

(11) Install a new tappet chamber cover and tighten end bolts to 9 foot-pounds.

(12) Install intake manifold, carburetor and ignition coil as an assembly and tighten manifold bolts to 40 foot-pounds.

(13) Install distributor cap. Connect the coil wire, heat indicator sending unit wire, accelerator linkage, spark plug cables and insulators.

(14) Install vacuum hose at carburetor and distributor.

(15) Install closed ventilation system and evaporative control system.

(16) Install alternator and drive belts. Tighten alternator adjusting strap bolt to 200 inch-pounds, and alternator mounting bolt to 30 foot-pounds.

(17) Install fuel line and carburetor air cleaner.

(18) Fill cooling system. Adjust belt tensions as outlined in "Cooling System" Group 7.

VALVES AND VALVE SPRINGS

Valves are arranged in-line in the cylinder heads and inclined 30 degrees outward from vertical. The intake and exhaust valves operate in guides that are cast integral with the heads.

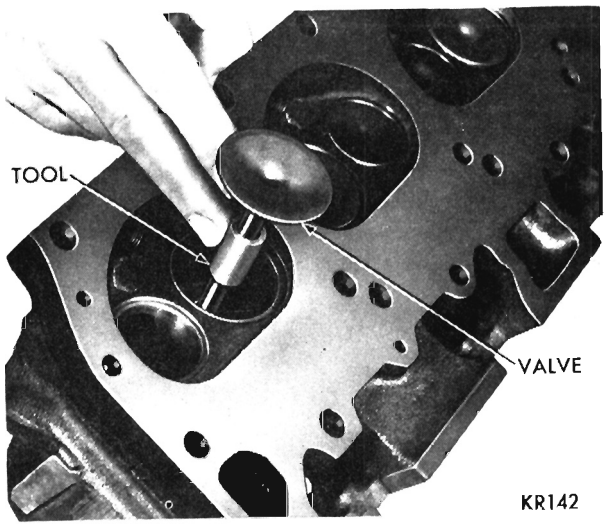


Fig. 9 - Installing Valve and Tool C-3973

Removal

(1) With cylinder head removed, compress valve springs, using Tool C-3422A, (Fig. 8).

(2) Remove valve retaining locks, valve spring retainers, valve stem cup seals and valve springs.

(3) Before removing valves, remove any burrs from valve stem lock grooves to prevent damage to the valve guide. **Identify valves to insure installation in original location.**

Valve Inspection

(1) Clean valves thoroughly, and discard any burned, warped, or cracked valves.

(2) Measure valve stems for wear. Refer to specifications for proper size. If wear exceeds .002 inch, replace the valve.

(3) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(4) Measure valve stem guide clearance as follows: Install sleeve Tool C-3973 over valve stem (Fig. 9) and install valve.

(5) The special sleeve places the valve at the correct height for measuring with a dial indicator.

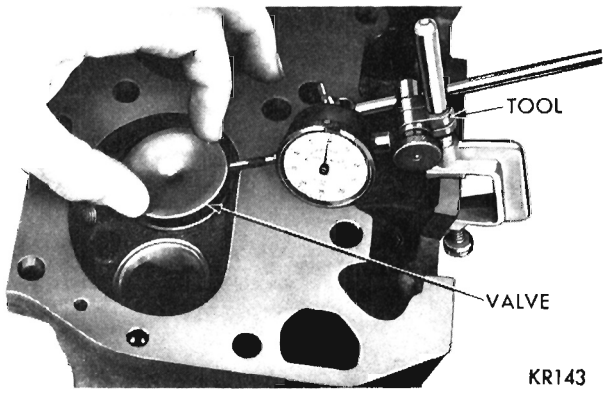


Fig. 10 - Measuring Valve Guide Wear

Attach dial indicator Tool C-3339 to the cylinder head and set it at a right angle to the valve stem being measured (Fig. 10).

(6) Move valve to and from the indicator. Total dial indicator reading should not exceed .017 inch. If the dial indicator reading is excessive or if the stems are scored or worn excessively, ream the guides for new valves with oversize stems.

(7) Service valves with oversize stems are available in .005, .015 and .030 inch oversize. the oversize valve stem are as follows:

Reamer Tool Number	Reamer Oversize	Valve Guide Size
C-3433	.005 in.	.379-.380 in.
C-3430	.015 in.	.389-.390 in.
C-3427	.030 in.	.404-.405 in.

(8) Slowly turn reamer by hand and clean guide thoroughly before installing new valve. **Do not attempt to ream the valve guides from standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so the valve guides may be reamed true in relation to the valve seat.**

Refacing Valves and Valve Seats

The intake and exhaust valve faces have a 45 degree angle. Always inspect the remaining valve margin after the valves are refaced (Fig. 11). Valves with less than 3/64 inch margin should be discarded.

(1) The angle of both the valve and seat should be identical. When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete valve seat surface must be obtained.

(2) Inspect valve seat with Prussian blue to determine where valve contacts seat. To do this, coat valve seat lightly with Prussian blue, then set valve in place. Rotate valve with light pressure. If the blue is transferred to the center of the valve face, the contact is satisfactory. If the blue is transferred to the top edge of the valve face, lower the valve seat with a 30 degree stone. If the blue is transferred to the bottom edge of the valve face raise the valve seat with a 60 degree stone.

(3) When the seat is properly positioned the width of the intake seats should be 1/16 to 3/32 inch. The width of the exhaust seats should be 3/64 to 1/16 inch.

(4) Measure the concentricity of the valve seat using dial indicator No. 13725. The total runout should not exceed .003 inch (total indicator reading).

(5) When valves and seats are reground, the position of the valve in the cylinder head is changed, shortening the operating length of the hydraulic tappet. This means that the plunger is operating

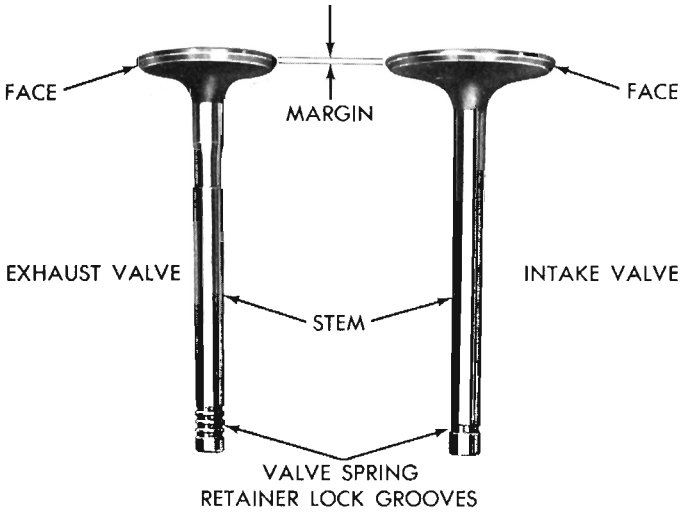


Fig. 11 - Intake and Exhaust Valves

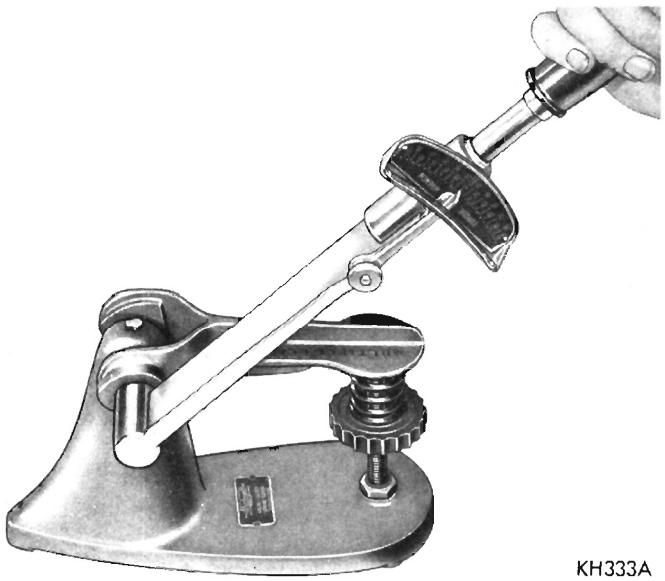


Fig. 13 - Testing Valve Spring

closer to its "bottomed" position, and less clearance is available for thermal expansion of the valve mechanism during high speed driving.

(6) The design of the valve mechanism includes a safety factor to allow for a limited amount of wear, and the refacing of the valves and seats.

(7) To insure that limits have not been exceeded, the dimension from valve spring seat in the head to the valve tip should be measured with gauge, Tool C-3648 (Fig. 12).

(8) The end of the cylindrical gauge and the bottom of slotted area represent the maximum and minimum allowable extension of the valve stem tip beyond the spring seat.

(9) If the tip exceeds the maximum, grind stem

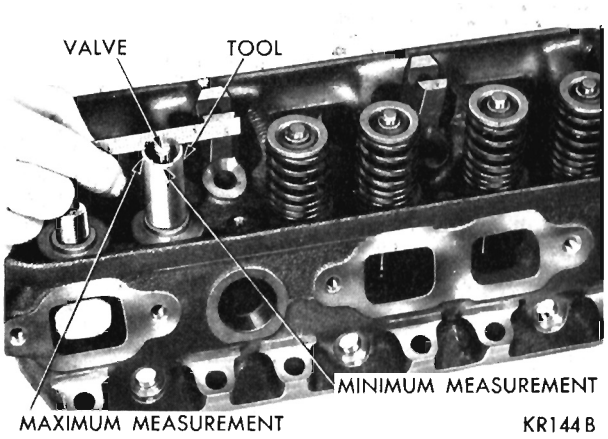


Fig. 12 - Measuring Valve Stem Length

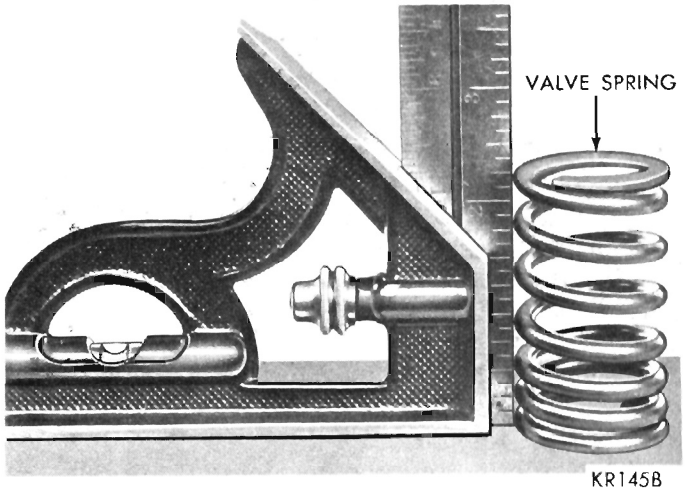


Fig. 14 - Inspecting Valve Spring Squareness

tip to within gauge limits. Clean tappets if tip grinding is required.

Testing the Valve Springs (Fig. 13).

(1) Whenever valves are removed for inspection, reconditioning or replacement, the valve springs should be tested. As an example, the compressed length of the spring to be tested is 1-15/32 inches. Turn the table of Tool C-647 until the surface is in line with the 1-15/32 inch mark on the threaded stud and the zero mark to the front. Place the spring over the stud on the table and lift the compressing lever to set the tone device. Pull on the torque wrench until a ping is heard. Take the reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at the test length. Fractional measurements are indicated on the table for finer adjustments. Refer to specifications to obtain specified height and allowable tension. Discard the springs that do not meet specifications.

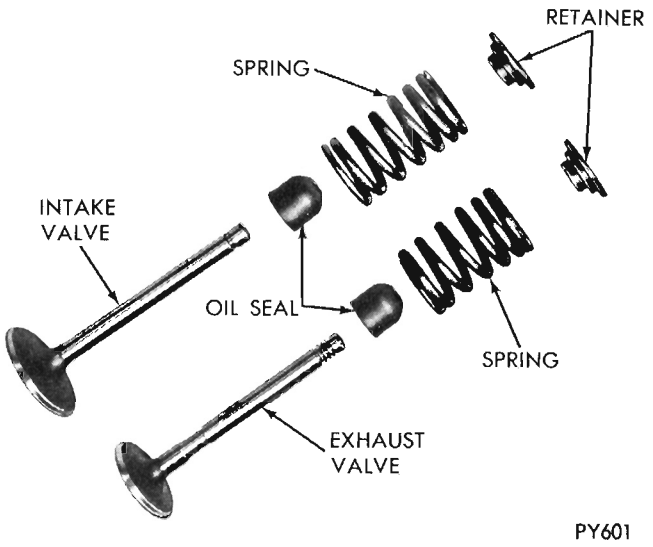


Fig. 15 - Valve Assembly (Disassembled View)

(2) Inspect each valve spring for squareness at both ends with a steel square and surface plate (Fig. 14).

(3) If the spring is more than 1/16 inch out of square, install a new spring.

Installation

(1) Coat valve stems with lubricating oil and insert them in position in cylinder head.

(2) Install new cup seals on the intake and exhaust valve stems and over valve guides (Fig. 15 and 16) and install valve springs and retainers.

(3) Compress valve springs with Tool C-3422A. Install locks and release tool.

If valves and/or seats are reground, measure installed height of the springs. Make sure measurement is taken from the bottom of spring seat in cylinder head to bottom surface of spring retainer. If the height is greater than 1-57/64 inches, install a 1/16 inch spacer in the head counterbore to bring the spring height back to normal 1-53/64 to 1-57/64 inch. (If spacers are installed, measure from the top of the spacer.)

HYDRAULIC TAPPETS

Preliminary to Checking the Hydraulic Tappets

(1) Before disassembling any part of the engine to correct tappet noise, read the oil pressure at the gauge (Install a reliable gauge at pressure sending unit if vehicle has no oil pressure gauge.) and check the oil level in the oil pan. The pressure should be between 45 and 65 pounds at 1000 R.P.M.

(2) The oil level in the pan should never be above the "full" mark on dipstick, or below the "add oil" mark. Either of these two conditions could be responsible for noisy tappets.

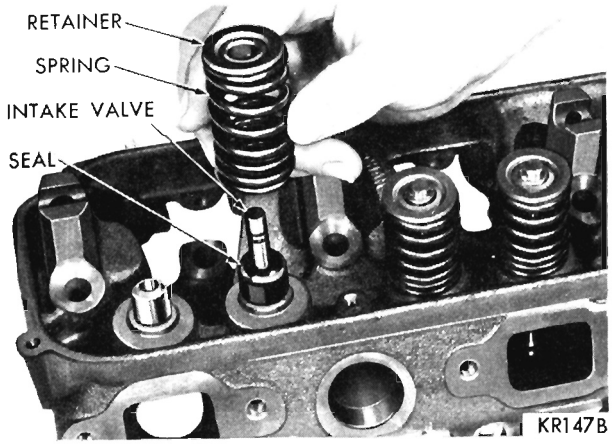


Fig. 16 - Installing Valve, Spring, Cup Seal and Retainer

Oil Level Too High

If oil level is above the "full" mark on dipstick, it is possible for the connecting rods to dip into the oil while engine is running and create foam. Foam in oil pan would be fed to the hydraulic tappets by the oil pump causing them to lose length and allow valves to seat noisily.

Oil Level Too Low

Low oil level may allow oil pump to take in air which, when fed to the tappets, causes them to lose length and allows valves to seat noisily. Any leaks on intake side of pump through which air can be drawn will create the same tappet action. When tappet noise is due to aeration, it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, engine should be operated at fast idle for sufficient time to allow all of the air inside of the tappets to be bled out.

Tappet Noise Diagnosis

(1) To determine source of tappet noise, operate engine at idle with cylinder head covers removed.

(2) Feel each valve spring or rocker arm to detect noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

(3) Valve tappet noise ranges from light noise to a heavy click. A light noise is usually caused by excessive leakdown around the unit plunger which

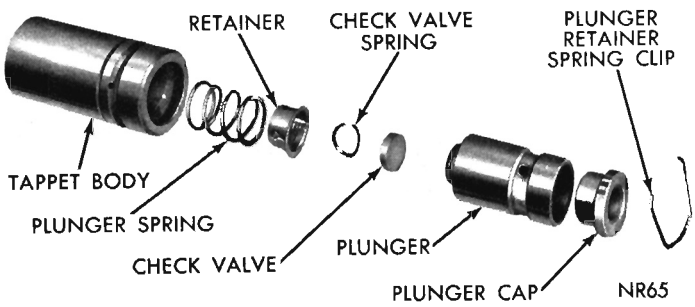


Fig. 17 - Hydraulic Tappet Assembly (Disassembled View)

will necessitate replacing the tappet, or by the plunger partially sticking in the tappet body cylinder. A heavy click is caused either by a tappet check valve not seating, or by foreign particles becoming wedged between the plunger and the tappet body, causing the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, tappet assembly should be removed for inspection and cleaning.

Tappet Removal

(1) The tappet can be removed without removing intake manifold or cylinder heads by following this recommended procedure: Remove cylinder head covers.

(2) Remove rocker arms and shaft assembly.

(3) Remove push rods and **identify to insure installation in original location.**

(4) Slide Tool C-4129 through push rod opening in cylinder head and seat tool firmly in the head of tappet.

(5) Pull tappet out of bore with a twisting motion. If all tappets are to be removed, **identify tappets to insure installation in original location.**

A diamond shaped marking stamped on the engine numbering pad indicates that some tappet bodies are .008 inch oversize.

CAUTION: The plunger and tappet bodies are not interchangeable. The plunger and valve must always be fitted to the original body. It is advisable to work on one tappet at a time to avoid mixing of parts. Mixed parts are not compatible. Do not disassemble a tappet on a dirty work bench.

Disassembly (Fig. 17)

(1) Pry out plunger retainer spring clip.

(2) Clean varnish deposits from inside of tappet body above plunger cap.

(3) Invert tappet body and remove plunger cap, plunger, flat check valve, check valve spring, check valve retainer and plunger spring.

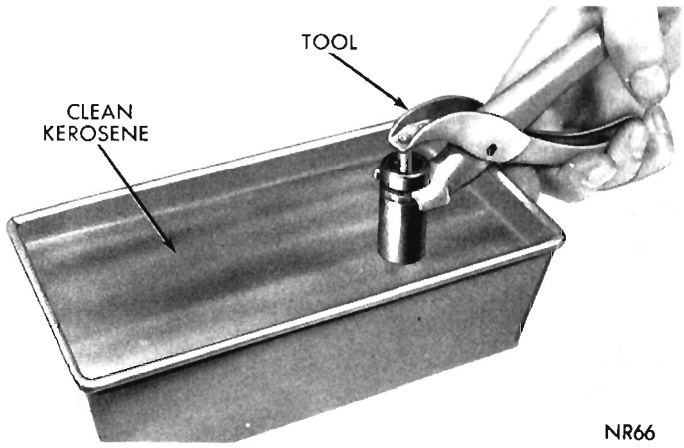


Fig. 18 - Testing Tappet Using Tool C-3160

Cleaning and Assembly

(1) Clean all tappet parts in a solvent that will remove all varnish and carbon.

(2) Replace tappets that are unfit for further service with new assemblies.

(3) If plunger shows signs of scoring or wear and valve is pitted, or if valve seat on end of plunger indicates any condition that would prevent valve from seating, install a new tappet assembly.

(4) Assemble tappets (Fig. 17).

Testing

(1) Fill a pan with clean kerosene.

(2) Remove cap from plunger and plunger from tappet body.

(3) Fill tappet body with kerosene and install plunger.

(4) Unseat check valve with a brass rod to permit complete installation of plunger. Replace cap.

(5) Hold tappet in an upright position and insert lower jaw of pliers, Tool C-3160, in the groove of tappet body (Fig. 18).

(6) Engage jaw of pliers with top of tappet plunger. Test leakdown by compressing the pliers. If plunger collapses almost instantly as pressure is applied, dissassemble tappet, clean and test again (Fig. 18).

(7) If tappet still does not operate satisfactorily after cleaning, install a new tappet assembly.

If the tappet or bore in cylinder block is scored, scuffed, or shows signs of sticking, ream the bore to next oversize.

Installation

(1) Lubricate tappets.

(2) Install tappets and push rods in their original positions.

(3) Install rocker arm and shaft assembly.

(4) Start and operate engine. Warm up to normal operating temperature.

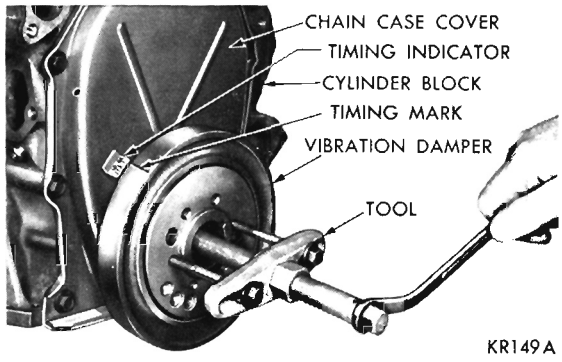


Fig. 19 - Removing Vibration Damper Assembly

CAUTION:To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic tappets have filled with oil and have become quiet.

VALVE TIMING

(All Models)

(1) Turn crankshaft until NO. 6 exhaust valve is closing and NO. 6 intake valve is opening.

(2) Insert a 1/4 inch spacer between rocker arm pad and stem tip of NO. 1 intake valve (second valve on the left bank).

(3) Install a dial indicator so plunger contacts valve spring retainer as nearly perpendicular as possible.

(4) Allow spring load to bleed tappet down giving in effect a solid tappet. Zero the indicator.

(5) Turn the crankshaft clockwise (normal running direction) until intake valve has lifted.025 inch with 260-268 degree camshaft and .033 inch with 268-284 degree camshaft. See specifications for engine application. The timing on the timing indicator, located on the chain case cover, should read from 10 degrees BTDC to 2 degrees ATDC. If the reading is not within specified limits: Inspect timing sprocket index marks, inspect timing chain for wear, and determine accuracy of the DC mark on timing indicator. Turn crankshaft counterclockwise until valve is closed and remove the indicator and spacer.

CAUTION: Do not turn crankshaft any further clockwise, as the valve spring might bottom and result in serious damage.

TIMING CHAIN COVER, OIL SEAL AND CHAIN

Cover Removal

(1) Drain cooling system and remove radiator and water pump assembly.

(2) Remove crankshaft vibration damper attaching bolt.

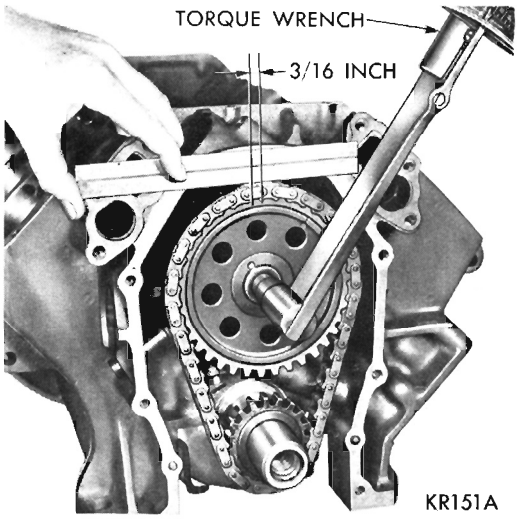


Fig. 20 - Measuring Timing Chain Stretch

(3) Remove two of the pulley bolts, install Tool C-3688, and pull damper assembly off end of crankshaft (Fig. 19).

(4) Remove chain cover and gasket.**It is normal to find particles of neoprene collected between seal retainer and crankshaft oil slinger after seal has been in operation.**

(5) Slide crankshaft oil slinger off end of crankshaft.

Measuring Timing Chain for Stretch

(1) Place a scale next to the timing chain so any movement of the chain may be measured.

(2) Place a torque wrench and socket over camshaft sprocket attaching bolt and apply torque in the direction of crankshaft rotation to take up slack; 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed) . **With torque applied to the camshaft sprocket bolt, crankshaft should not be permitted to move. It may be necessary to block crankshaft to prevent rotation.**

(3) Holding a scale with dimensional reading even with edge of a chain link, apply torque in the reverse direction 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed), and note amount of chain movement (Fig. 20).

(4) Install a new timing chain, if its movement exceeds 3/16 inch.

(5) If chain is satisfactory, slide crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

(6) If chain is not satisfactory, remove camshaft sprocket attaching bolt and remove timing chain with crankshaft and camshaft sprockets.

When installing timing chain, use Tool C-3509 to prevent camshaft from contacting the welch

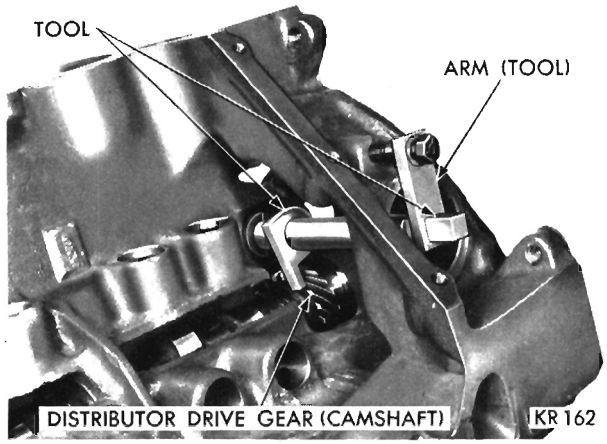


Fig. 21 - Camshaft Holding Tool C-3509

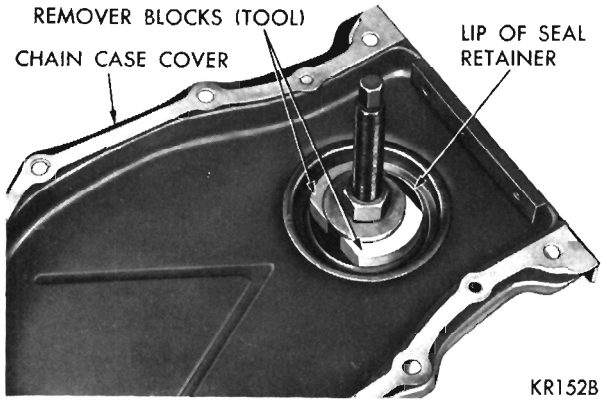


Fig. 23 - Remover Blocks Expanded to Puller Position

plug in the rear of engine block. Remove distributor and oil pump-distributor drive gear. Locate tool against rear side of cam gear and attach tool with distributor retainer plate bolt (Fig. 21).

(7) Place camshaft sprocket and crankshaft sprocket on the bench with timing marks on exact imaginary center line through both camshaft and crankshaft sprocket bores.

(8) Place timing chain around both sprockets.

(9) Turn crankshaft and camshaft to line up with keyway location on crankshaft sprocket and dowel hole in camshaft sprocket.

(10) Lift sprockets and chain (keep sprockets tight against chain in position as described).

(11) Slide both sprockets evenly over their respective shafts.

(12) Use a straight edge to measure alignment of timing marks (Fig. 22).

(13) Install washer and camshaft sprocket bolt, tighten to 35 foot-pounds. Check to be sure that rear face of aluminum camshaft sprocket is flush with end of camshaft. Slide the crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

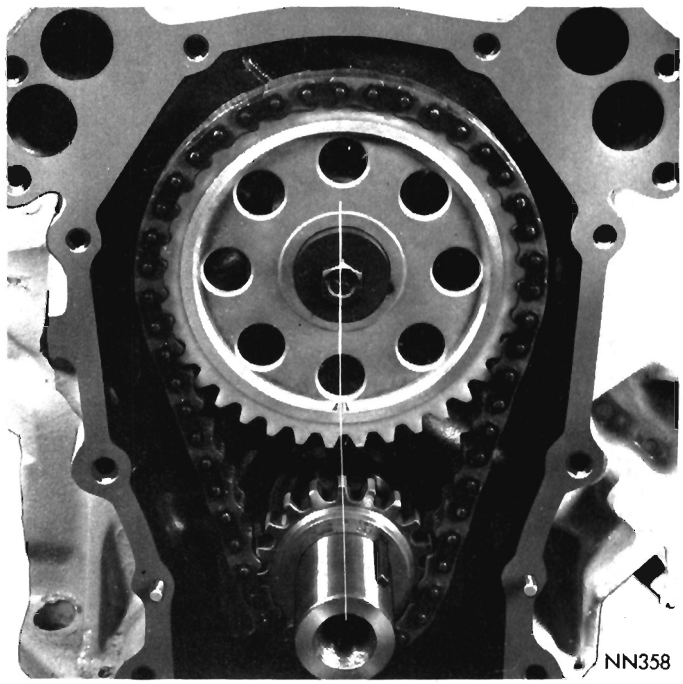


Fig. 22 - Alignment of Timing Marks

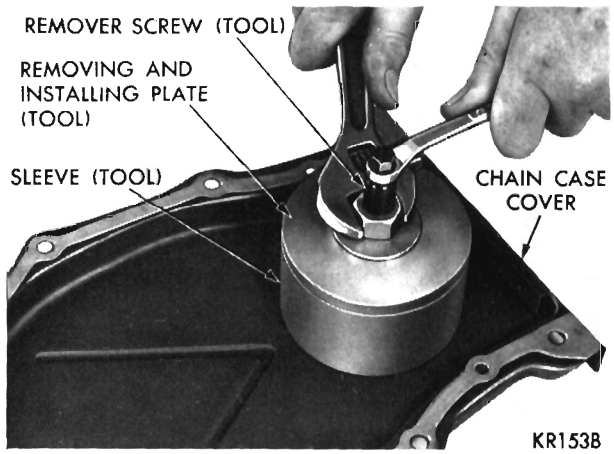


Fig. 24 - Removing Oil Seal

Oil Seal Replacement (Cover Removed)

(1) Position remover screw of Tool C-3506 through case cover, inside of case cover up. Position remover blocks directly opposite each other, and force the angular lip between the neoprene and flange of seal retainer.

(2) Place washer and nut on remover screw. Tighten nut, forcing the blocks into the gap to a point of distorting the seal retainer lip (Fig. 23). This is important,**remover is only positioned at this point.**

(3) Place sleeve over retainer and place removing and installing plate into the sleeve.

(4) Place flat washer and nut on the remover screw. Hold center screw and tighten remover nut to remove the seal (Fig. 24).

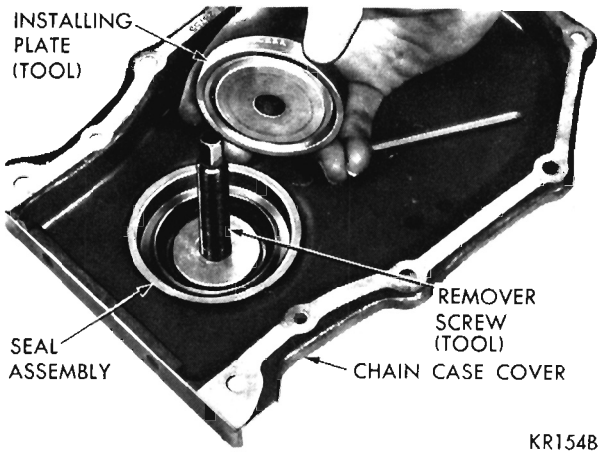


Fig. 25 - Positioning Installer Plate

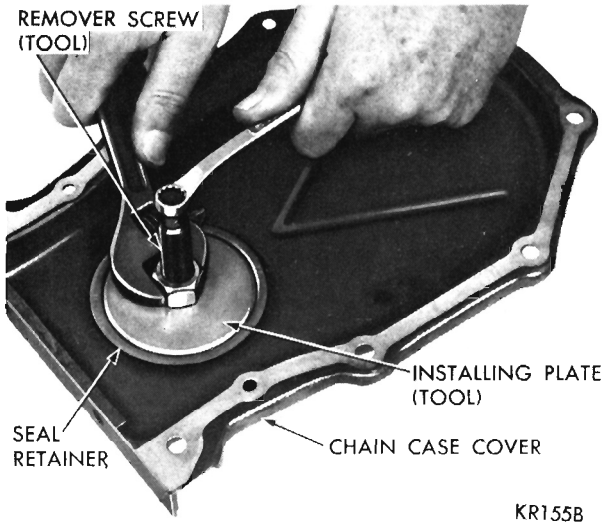


Fig. 26 - Installing New Seal

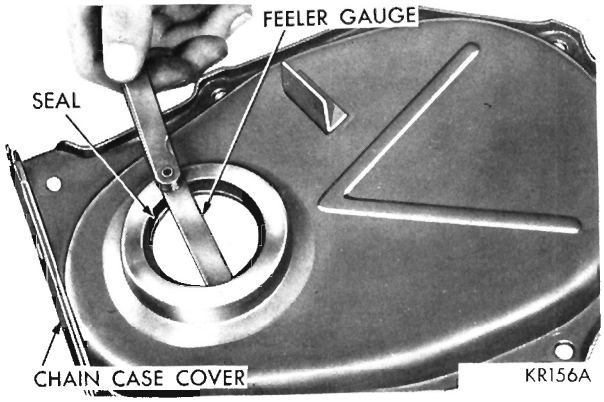


Fig. 27 - Inspecting Seal for Proper Seating

(5) Insert remover screw through the removing and installing plate so thin shoulder will be facing up.

(6) Insert remover screw with the plate through seal opening (inside of chain case cover facing up).

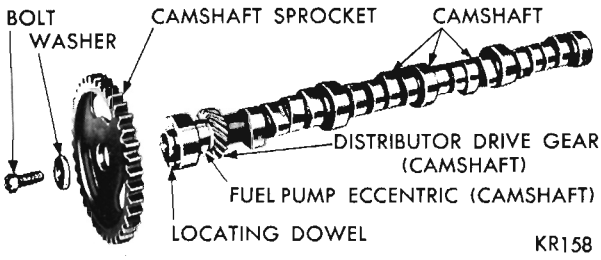


Fig. 29 - Camshaft and Sprocket Assembly (Disassembled View)

(7) Place seal in cover opening, with neoprene down. Place seal installing plate into the new seal, with protective recess toward lip of seal retainer (Fig. 25). **The lip of the neoprene seal must be toward source of oil.**

(8) Install flat washer and nut on remover screw, hold screw and tighten nut (Fig. 26).

(9) The seal is properly installed when the neoprene is tight against face of cover. Try to insert a .0015 inch feeler gauge between the neoprene and the cover (Fig. 27). If the seal is installed properly, feeler gauge cannot be inserted. **Do not over compress neoprene.**

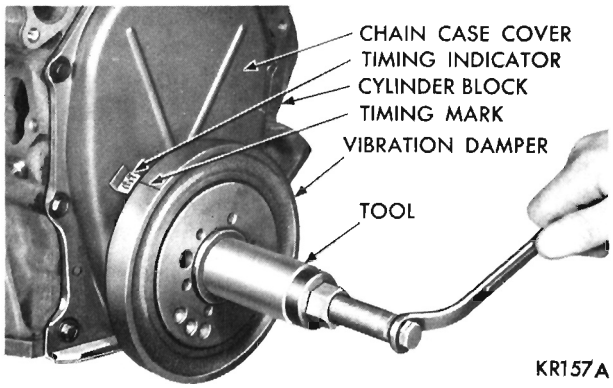


Fig. 28 - Installing Vibration Damper Assembly

Cover Installation

(1) Be sure mating surfaces of chain case cover and cylinder block are clean and free from burrs.

(2) Using a new gasket slide chain case cover over locating dowels. Install and tighten bolts to 15 foot-pounds.

(3) Lubricate seal lip with lubriplate, place damper hub slot on key in crankshaft, and slide vibration damper on crankshaft.

(4) Place installing tool, part of Tool C-3688 in position and press damper on the crankshaft (Fig. 28).

(5) Install damper retainer washer and bolt. Tighten to 135 foot-pounds.

(6) Slide belt pulley over shaft and attach with bolts and lockwashers. Tighten bolts to 200 inch-pounds.

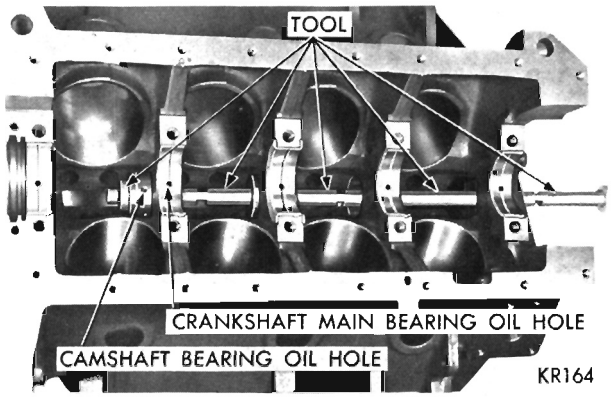


Fig. 30 - Removing Camshaft Bearing

CAMSHAFT

The camshaft has an integral oil pump and distributor drive gear and fuel pump eccentric (Fig. 29).

The rearward camshaft thrust is taken by the rear face of the aluminum camshaft sprocket hub, bearing directly on the front of cylinder block, eliminating need for a thrust plate. The helix of the oil pump and distributor drive gear and camshaft lobe taper both tend to provide a rearward thrust.

Removal

(1) With tappets and the timing chain and sprockets removed, remove distributor and lift out oil pump and distributor drive shaft.

(2) Remove fuel pump to allow fuel pump push rod to drop away from cam eccentric.

(3) Remove camshaft, being careful not to damage camshaft bearings with cam lobes.

Installation

(1) Lubricate camshaft lobes and camshaft bearing journals and insert camshaft to within 2 inches of its final position in cylinder block.

(2) Modify Tool C-3509 by grinding off index lug holding the upper arm on the tool and rotate arm 180 degrees.

(3) Install Tool C-3509 in place of distributor drive gear and shaft, as shown in Figure 21.

(4) Hold tool in position with distributor lock plate screw. This tool will restrict camshaft from being pushed in too far and prevent knocking out the welch plug in the rear of cylinder block.

The tool should remain installed until camshaft and crankshaft sprockets and timing chain have been installed.

Whenever camshaft is replaced, all of tappet faces must be inspected for crown with a straight edge. If any contact surface is dished or worn, tappet must be replaced.

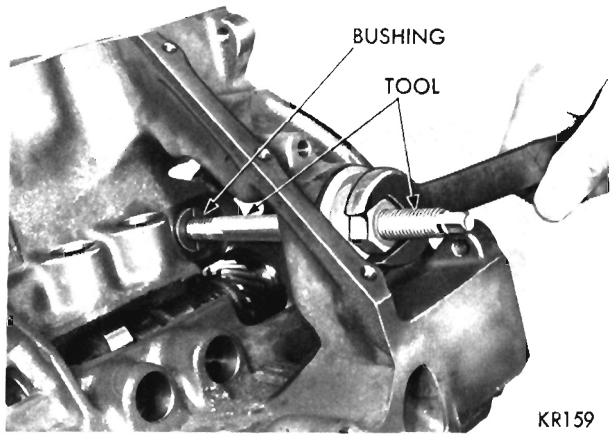


Fig. 31 - Removing Distributor Drive Shaft Bushing

CAMSHAFT BEARINGS

(Engine Removed From Vehicle)

Removal

(1) With engine completely disassembled, drive out camshaft rear bearing welch plug.

(2) Install proper size adapters and horse shoe washers (part of Tool C-3132A) at the back of each bearing to be removed and drive out bearings (Fig. 30).

Installation

(1) Install new camshaft bearings with Tool C-3132A. Place new camshaft bearing over proper adapter.

(2) Position bearing in the tool. Install the horse shoe lock and by reversing removal procedure, carefully drive bearing into place.

(3) Install remaining bearings in like manner.

Install the NO. 1 camshaft bearing 1/32 inward from the front face of cylinder block.

The oil holes in camshaft bearings and the cylinder block must be in exact register to insure proper lubrication (Fig. 30).

The camshaft bearing index can be inspected after installation by inserting a pencil flashlight in the bearing. The camshaft bearing oil hole should be perfectly aligned with the drilled oil passage from the main bearing. Other oil holes in the camshaft bearings should be visible by looking down on the left bank oil hole above and between NO. 6 and NO. 8 cylinders to NO. 4 camshaft bearing and on the right bank above and between NO. 5 and 7 cylinders to NO. 4 camshaft bearings. If camshaft bearing oil holes are not in exact register, remove and reinstall them correctly. Install a new welch plug at rear of camshaft.**Be sure this plug does not leak.**

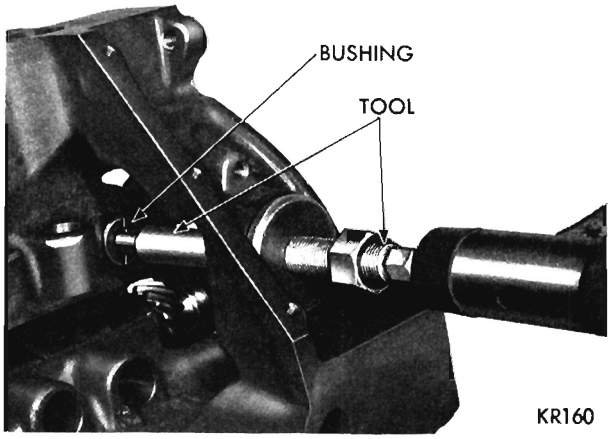


Fig. 32 - Installing Distributor Drive Shaft Bushing

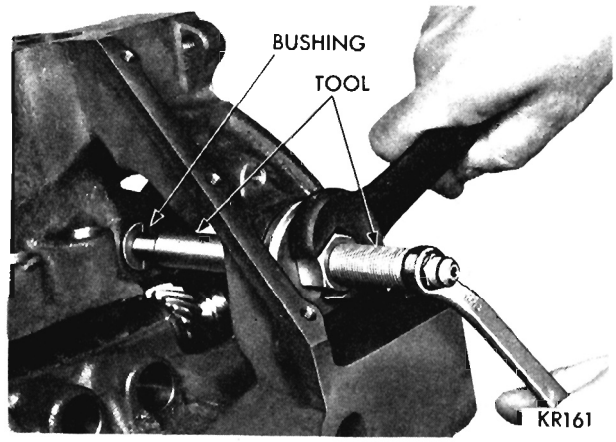


Fig. 33 - Burnishing Distributor Drive Shaft Bushing

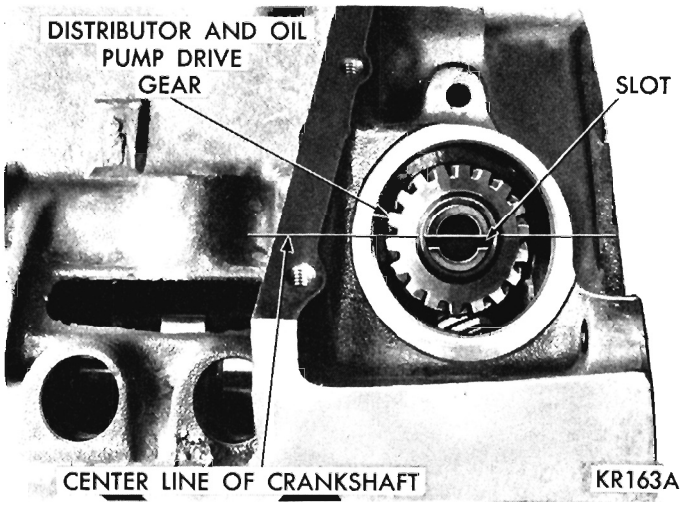


Fig. 34 - Distributor Drive Gear Installed

DISTRIBUTOR DRIVE SHAFT BUSHING

Removal

(1) Insert Tool C-3052 into the old bushing and thread down until a tight fit is obtained (Fig. 31).

(2) Hold remover screw and tighten nut until bushing is removed.

Installation

(1) Slide a new bushing over burnishing end of Tool C-3053 and insert tool bushing into the bore.

(2) Drive bushing and tool into position, using a hammer (Fig. 32).

(3) As the burnisher is pulled through the bushing by tightening remover nut, the bushing is expanded tight in the block and burnished to correct size (Fig. 33). DO NOT REAM THIS BUSHING.

Distributor Timing

Before installing distributor and oil pump drive shaft, time the engine as follows:

(1) Rotate crankshaft until NO. 1 cylinder is at top dead center on the firing stroke.

(2) When in this position, the straight line on the vibration damper should be under "O" on timing indicator.

(3) Coat shaft and drive gear with engine oil. Install the shaft so that after gear spirals into place, it will index with the oil pump shaft, so slot in top of drive gear will be parallel with center line of crankshaft (Fig. 34).

Installation of Distributor

(1) Hold distributor over mounting pad on cylinder block with vacuum chamber pointing toward center of engine.

(2) Turn rotor until it points forward and to approximate location of No. 1 tower terminal in the distributor cap.

(3) Place distributor gasket in position.

(4) Lower the distributor and engage the shaft in the slot of distributor drive shaft gear.

(5) Turn distributor clockwise until breaker contacts are just separating, install and tighten hold down clamp.

CYLINDER BLOCK

The cylinder block is of the deep block design which eliminates the need for a torque converter housing adapter plate. Its sides extend three inches below the crankshaft center line.

Piston Removal

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.**

The pistons and connecting rods must be removed from the top of the cylinder block. When removing piston and connecting rod assemblies from the engine, rotate the crankshaft so each

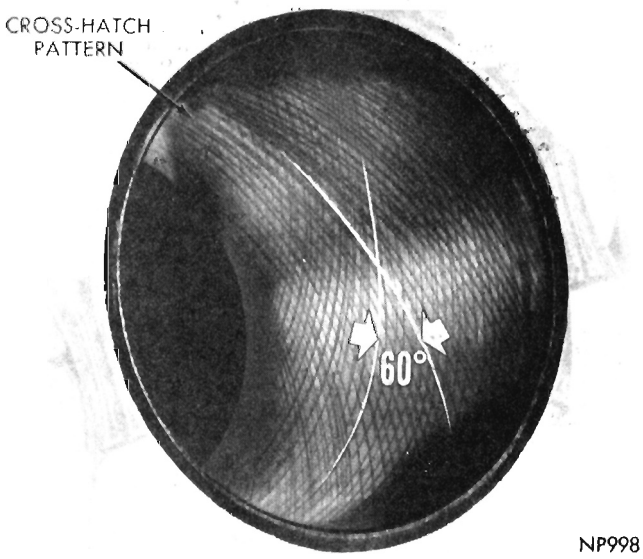


Fig. 35 - Cross Hatch Pattern

connecting rod is centered in cylinder bore.

(2) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them if necessary.

(3) Remove connecting rod cap. Install connecting rod bolt guide set on connecting rod bolts. Push each piston and rod assembly out of cylinder bore.**Be careful not to nick crankshaft journals.**

(4) Install bearing caps on mating rods.

Cleaning and Inspection

(1) Clean cylinder block thoroughly and inspect all core hole plugs for evidence of leaking.

(2) If new core plugs are installed, coat edges of plug and core hole with Number 1057794 Sealer or equivalent. Drive the core plug in so that the rim lies at least 1/64 inch below the lead-in chamfer.

(3) Examine block for cracks or fractures.

Cylinder Bore Inspection

The cylinder walls should be measured for out-of-round and taper with Tool C-119. If the cylinder bores show more than .005 inches out-of-round, or a taper of more than .010 inches or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed, and new pistons and rings fitted. Whatever type of boring equipment is used, boring and honing operation should be closely coordinated with the fitting of pistons and rings in order that specified clearance may be maintained.

Honing Cylinder Bores

Before honing, stuff plenty of clean rags under the bores, over the crankshaft to keep the abrasive materials from entering the crankcase area.

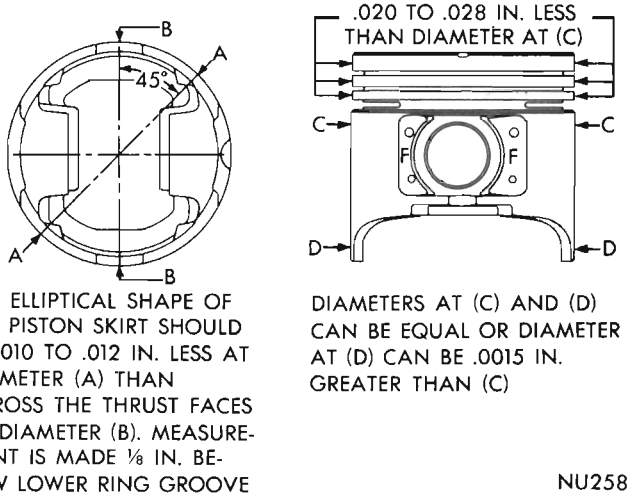


Fig. 36 - Piston Measurements

(1) Used carefully, the cylinder bore resizing hone C-823 equipped with 220 grit stones and 390 extensions necessary with 383 and 440 cubic inch engines is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-ground as well as removing light scuffing, scoring or scratches. Usually, a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, Tool C-3501, equipped with 280 grit stones (3501-3810) if the cylinder bore is straight and round. 20 to 60 strokes depending on the bore condition will be sufficient to provide a satisfactory surface. Inspect cylinder walls after each 20 strokes. Using honing oil C-3501-3880 or a light honing oil available from major oil distributors.**Do not use engine or transmission oil, mineral oil or kerosene.**

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 60 degrees, cross hatch angle is most satisfactory for proper seating of rings (See Fig. 35).

(4) After honing, it is necessary that the block be cleaned again to remove all traces of abrasives. Wash cylinder block and crankshaft thoroughly.

CAUTION: Be sure all abrasives are removed from the engine parts after honing. It is recommended that a solution of soap and water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and the cloth remains clean. Oil bores after cleaning to prevent rusting.

PISTONS, PINS AND RINGS

Pistons

The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the

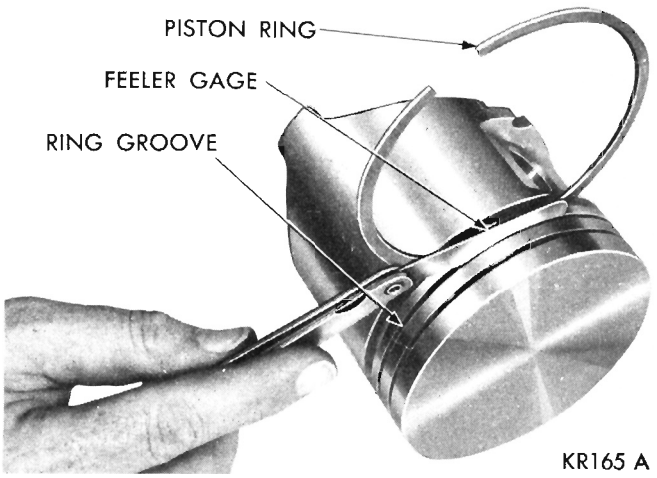


Fig. 37 - Measuring Piston Ring Clearance

thrust face. This allows for expansion under normal operating conditions. Under operating temperatures, expansion forces the pin bosses away from each other, thus causing the piston to assume a more nearly round shape. It is important that old or new pistons be measured for taper and elliptical shape before they are fitted into the cylinder bore (See Fig. 36).

Finished Pistons

All pistons are machined to the same weight in grams, regardless of oversize so piston balance can be maintained. For cylinder bores which have been honed or rebored, pistons are available in standard and the following oversizes: .005, .020, and .040 inch.

Fitting Pistons

Piston and cylinder wall must be clean and dry. Specified clearance between the piston and the cylinder wall is .0003 to .0013 inch.

Piston diameter should be measured at the top of skirt 90 degrees to piston pin axis. Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line.

Pistons and cylinder bores should be measured at normal room temperature, 70 degrees F.

All service pistons include pins, and are available in standard and the following oversizes: .005, .020 and .040 inch.

Fitting Rings

(1) Measure piston ring gap about two inches from bottom of cylinder bore in which it is to be fitted. (An inverted piston can be used to push rings down to insure positioning rings squarely in cylinder bore before measuring.)

(2) Insert feeler stock in the gap. Ring gap should be between .013 to .052 inch for the compression rings and .015 to .062 inch for the oil ring steel rails in standard size bores. Maximum gap on .005 inch O/S bores should be .060 inch for compression rings and .070 inch for the oil ring steel rails.

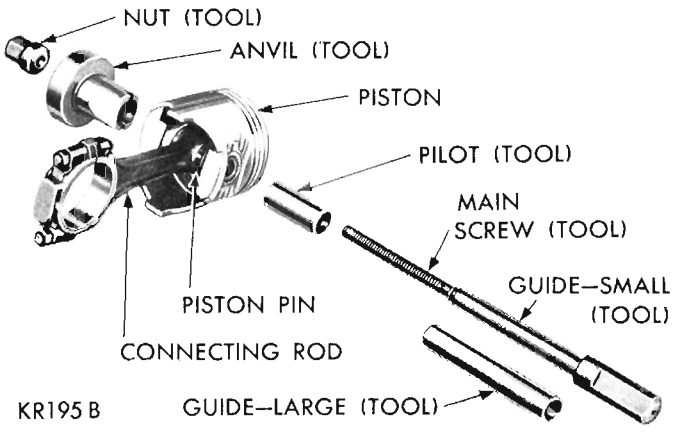


Fig. 38 - Tool Arrangement for Removing Piston Pin

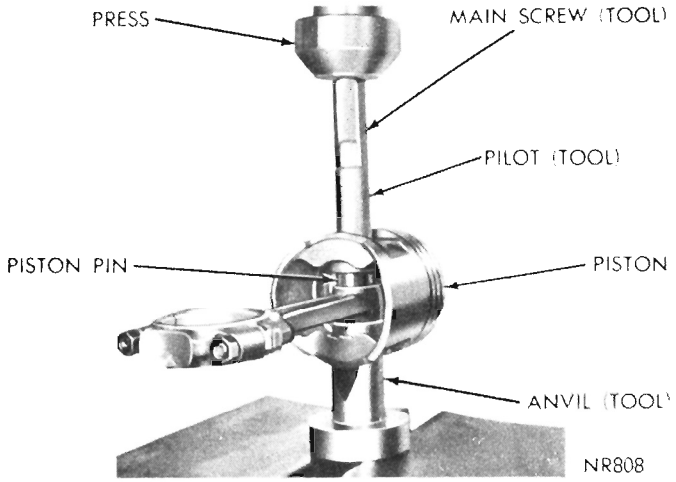


Fig. 39 - Removing Piston Pin

(3) Measure side clearance between piston ring and ring groove (Fig. 37). Clearance should be .0015 to .003 inches for the top compression ring and intermediate ring. Steel rail service oil ring should be free in groove, but should not exceed .005 inch side clearance.

(4) Install the three piece oil ring in lower ring groove using instructions in ring package.

(5) Install compression rings in middle and top groove as shown in instruction sheet. Be sure the mark "top" on each compression ring faces top of piston.

(6) For the two top rings use ring installer Tool C-3673 for 383 cubic inch engines and Tool C-4001 for the 440 cubic inch engines.

Piston Pin Removal

(1) Arrange Tool C-3684 parts, **using pilot**

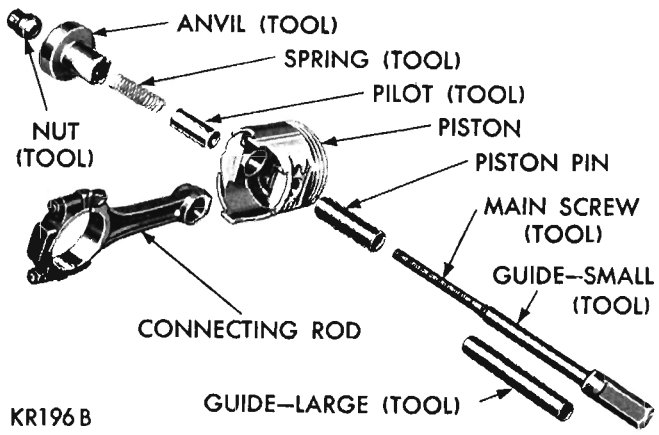


Fig. 40 - Tool Arrangement for Installing Piston Pin

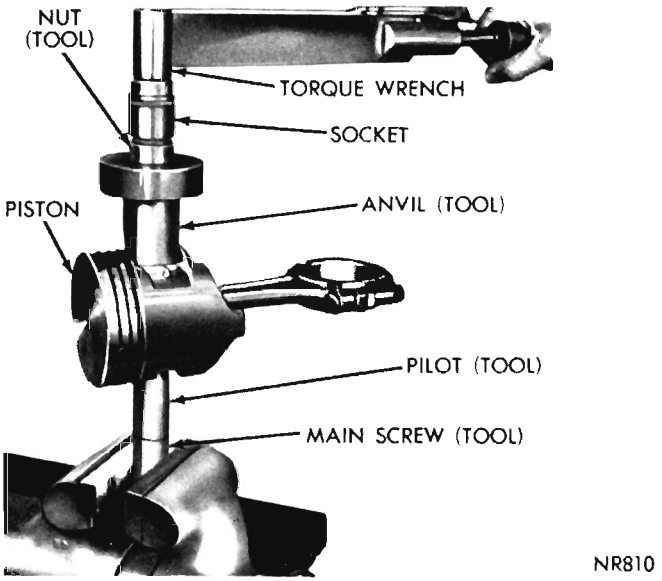


Fig. 42 - Testing Fit of Piston Pin in Connecting Rod

SP-3022 for all 383 and Std. 440 cubic inch engines or pilot SP-5517 for 440 cubic inch hi-performance engines only, for removal of piston pin (Fig. 38).

(2) Install pilot on main screw.

(3) Install main screw through piston pin.

(4) Install anvil over threaded end of main screw with small end of anvil against piston boss.**Be sure spring is removed from anvil.**

(5) Install nut loosely on main screw and place assembly on a press, (Fig. 39).

(6) Press piston pin out of connecting rod.

When pin falls free from connecting rod, stop press to prevent damage to bottom of anvil.

(7) Remove tool from piston.

Installation

(1) Test piston pin fit in the piston. It should be a sliding fit in the piston at 70 degrees F. Piston pins are supplied in standard sizes only.

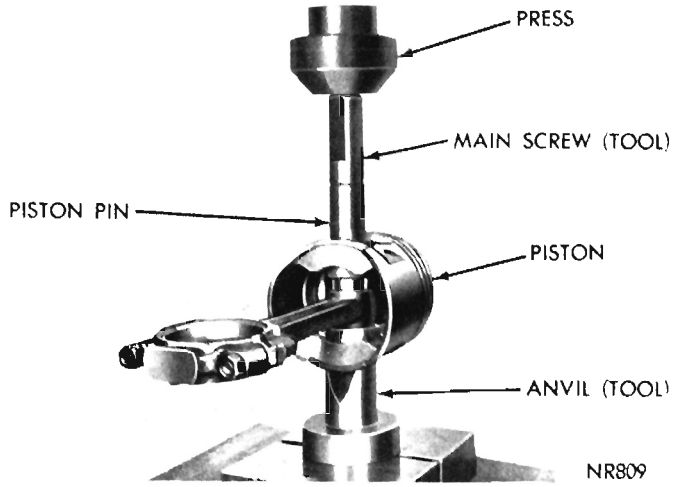


Fig. 41 - Installing Piston Pin

(2) Lubricate piston pin holes in the piston and connecting rod.

(3) Arrange Tool C-3684 parts, **using pilot SP-3022 for all 383 and Std. 440 cubic inch engines or pilot SP-5517 for 440 cubic inch hi-performance engines only,** for installation of piston pin (Fig. 40).

(4) Install spring inside the pilot and install spring and pilot in the anvil. Install piston pin over main screw.

(5) Place piston, with "front" up, over the pilot so pilot extends through piston pin hole.

(6) Position connecting rod over the pilot which extends through piston pin hole.

Assemble rods to pistons of the right cylinder bank (2,4,6, and 8,) with indent on piston head opposite to the larger chamfer on the large bore end of connecting rod. Assemble rods to pistons of the left cylinder bank (1,3,5, and 7) with indent on piston head on the same side as the large chamfer on the large bore end of the connecting rod.

(7) Install main screw and piston pin in piston, (Fig. 40).

(8) Install nut on puller screw to hold assembly together. Place assembly on a press (Fig. 41).

(9) Press piston pin in until piston pin "bottoms" on the pilot. This will position pin in connecting rod.

(10) Remove tool and arrange tool parts and piston assembly in same manner (Fig. 38).

(11) Place assembly in a vise (Fig. 42).

(12) Attach torque wrench to nut and tighten up to 15 foot-pounds. If the connecting rod moves downward on piston pin, reject this connecting rod and piston pin combination. Obtain a connecting rod with proper small end bore diameter and repeat the installation and tightening procedure.

(13) If connecting rod does not move under 15 foot-pounds, piston pin and connecting rod inter-

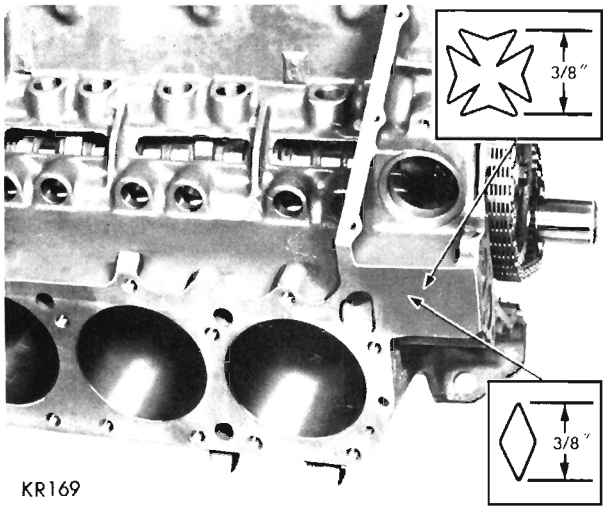


Fig. 43 - Showing Location of External Engine Numbering Pad

ference is satisfactory, remove tool.

CRANKSHAFT IDENTIFICATION

IMPORTANT: A Maltese Cross stamped on the engine numbering pad (Fig. 43) indicates that engine is equipped with a crankshaft which has one or more connecting rods and/or main bearings journal finished .001 inch undersize. The position of the undersize journal or journals is stamped on a machine surface of the NO. 3 counterweight (Fig. 44). A Maltese Cross with an X indicates.010 inch undersize journals.

The connecting rod journals are identified by the letter "R" and main bearing journals by the letter "M". For example "M-1" indicates that NO. 1 main bearing is .001 inch undersize.

CONNECTING RODS

Installation of Connecting Rod Bearings

Fit all rods on one bank until complete. Do not alternate from one bank to another, because when rods are assembled to the pistons correctly, they are not interchangeable from one bank to another.

Each bearing cap has a small "V" groove across parting face. When installing the lower bearing shell, make certain "V" groove in shell is in line with "V" groove in cap. This allows lubrication of the cylinder wall. The bearings should always be installed so that the samll formed tang fits into the machined grooves of the rods. The end clearance should be from .009 to .017 inch (two rods).

Limits of taper or out-of-round on any crankshaft journals should be held to a maximum of .001 inch. Bearings are available in .001, .002, .003, .010 and .012 inch undersize.

Install the bearings in pars. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.

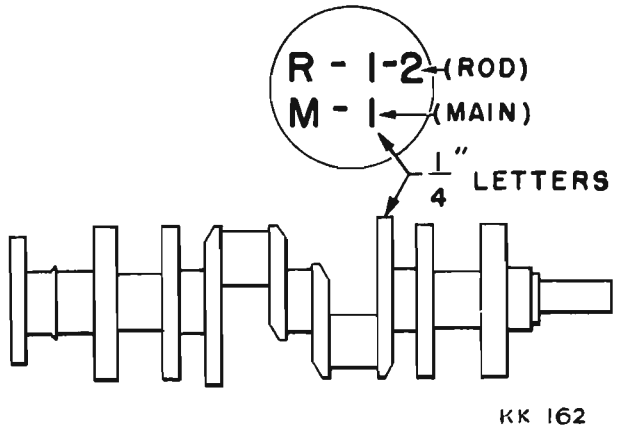


Fig. 44 - Showing Location of Internal Marking of Counterweight

MEASURING CONNECTING ROD BEARING CLEARANCE

Shim Stock Method

(1) (a) 383 engine with 2-barrel carburetor, place an oiled .001 inch brass shim stock (1/2 inch wide and 3/4 inch long) between the bearing and connecting rod journal.

(b) 383 engine with 4-barrel carburetor and 440 with tri-metal bearings, use an oiled .002 inch brass shim stock (1/2 inch wide and 3/4 inch long) between the bearing and connecting rod journal.

(2) Install bearing cap and tighten to 45 foot-pounds.

(3) Turn crankshaft 1/4 turn in each direction. A slight drag should be felt which indicates clearance is satisfactory. 383 engine with 2-barrel carburetor, correct clearance is from .0005 to .002 inch; 383 with 4-barrel carburetor and 440 with tri-metal bearings correct clearance is from .001 to .002 inch.

(4) Side play should be from .009 to .017 inch (two rods).

INSTALLING PISTON AND CONNECTING ROD ASSEMBLY

(1) Before installing pistons, rods, and rod assemblies in the bore, be sure that the compression ring gaps are staggered so that neither are in line with oil ring rail gaps.

(2) The oil ring expander ends should be positioned toward the outside of the "V" of the engine. The oil ring rail gaps should be positioned opposite each other and above the piston pin holes.

(3) Immerse piston head and rings in clean en-

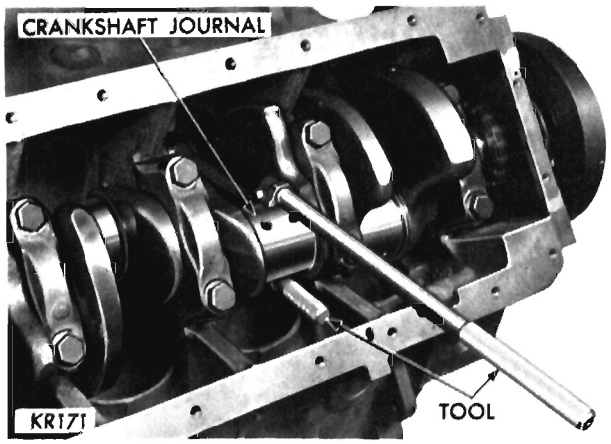


Fig. 45 - Installing Connecting Rod

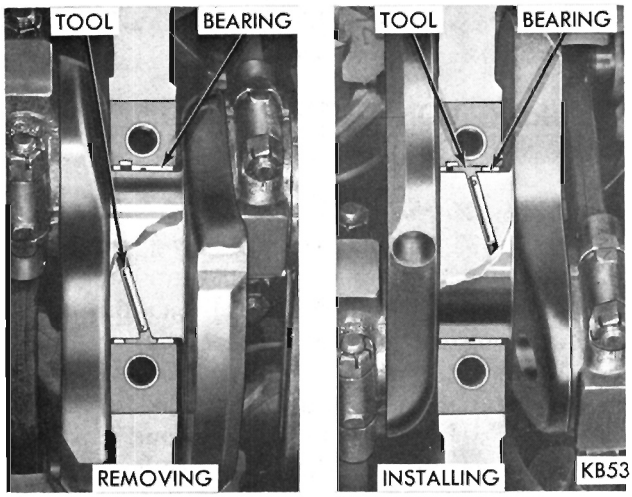


Fig. 47 - Removing or Installing Upper Main Bearing

gine oil, slide ring compressor, Tool C-385, over the piston and tighten with special wrench (part of Tool C-385).

Be sure position of rings does not change during this operation.

(4) Install connecting rod bolt protectors on rod bolts, the long protector should be installed on the numbered side of the connecting rod.

(5) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal (Fig. 45).

(6) Tap piston down in cylinder bore, using handle of a hammer. At the same time, guide connecting rod into position on crankpin journal.

(7) The notch or groove on top of piston must be pointing toward front of engine and larger chamfer of connecting rod bore must be installed toward crank pin journal fillet.

(8) Install rod caps, tighten nuts to 45 foot-pounds.

WHENEVER A HIGH PERFORMANCE ENGINE IS REBUILT AND/OR NEW PISTONS INSTALLED,

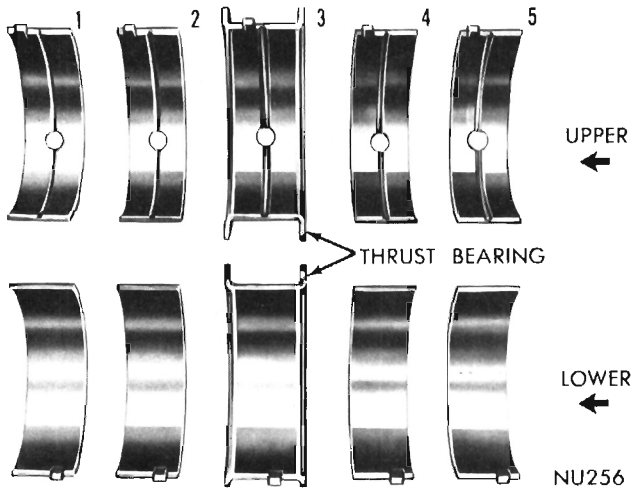


Fig. 46 - Main Bearing Identification

ONE PINT OF SPERM OIL ADDITIVE, CHRYSLER PART NO. 3549586 OR EQUIVALENT SHOULD BE ADDED TO THE ENGINE OIL TO AID BREAK-IN. THIS OIL MIXTURE SHOULD BE RETAINED UNTIL THE NEXT REGULARLY SCHEDULED OIL CHANGE. REFER TO "LUBRICATION", GROUP "O" FOR SUBSEQUENT USE OF THIS ADDITIVE IN HIGH PERFORMANCE ENGINES.

CRANKSHAFT MAIN JOURNALS

Crankshaft main bearing journals should be inspected for excessive wear, taper and scoring. Journal grinding should not exceed .012 inch under the standard journal diameter. **DO NOT** grind the thrust faces of the NO. 3 bearing. Do not nick crankpin or main bearing fillets. After regrinding, remove rough edges from crankshaft oil holes and clean out all oil passages.

CRANKSHAFT MAIN BEARINGS

New lower main bearings halves Numbers 1,2,4 5 are interchangeable (Fig. 46). New upper main bearing halves Upper and lower bearing halves are not interchangeable because upper bearing is grooved and lower bearing is not.

The NO. 1 upper main bearing **IS NOT INTERCHANGEABLE AND IS CHAMFERED** on the tab side for timing chain oiling and can be identified by a red marking on edge of bearing.

Upper and lower NO. 3 bearings are flanged to carry the crankshaft thrust loads and are **not interchangeable with any other bearings in the engine.**

Bearings that are not badly worn or pitted must be reinstalled in the same position.

Bearing caps are not interchangeable and should be marked at removal to insure correct assembly. Bearings are available in standard and the following undersizes: .001, .002, .003, .010, .011 and .012 inch. Do not install an undersize bearing that

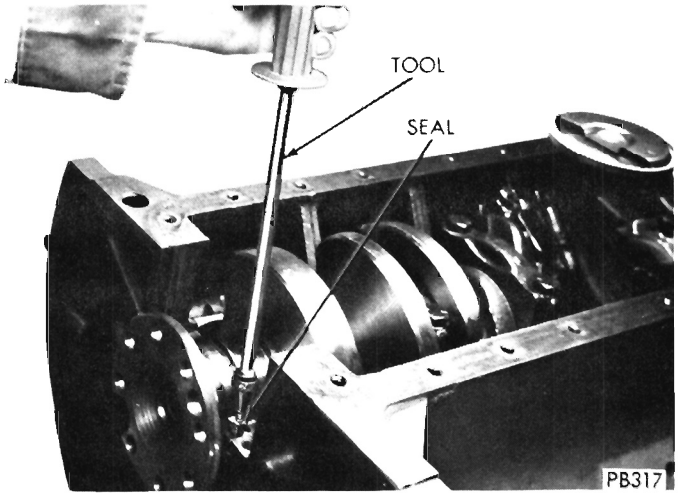


Fig. 48 - Removing Upper Oil Seal with Tool C-4148

will reduce clearance below specifications.

Removal

(1) Remove oil pan and identify bearing caps before removal.

(2) Remove bearing caps one at a time. Remove upper half of bearing by inserting Tool C-3059 (Fig. 47) into oil hole of crankshaft.

(3) Slowly rotate crankshaft clockwise, forcing out upper half of bearing.

Installation

Only one main bearing should be selectively fitted while all other main bearing caps are properly torqued.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

(1) Start bearing in place, and insert Tool C-3059 into oil hole of crankshaft (Fig. 47).

(2) Slowly rotate crankshaft counter-clockwise sliding the bearing into position. Remove Tool C-3059.

MEASURING MAIN BEARING CLEARANCE

Shim Stock Method

(1) Smooth edges of a 1/2 x 3/4 inch piece of brass shim stock, .001 inch thickness.

(2) Install bearing in center main bearing cap, bearing tang in groove in cap, lubricate bearing and position shim stock across the bearing, install cap, tighten bolts to 85 foot-pounds.

(3) If a slight drag is felt as crankshaft is turned (moved no more than 1/4 turn in either direction), clearance is .001 inch or less and is considered satisfactory.

If, however, no drag is felt, the bearing is too large or crankshaft cannot be rotated, bearing is too small and should be replaced with the correct size.

(4) Measure crankshaft end play .002 to .007 inch. If end play is less than .002 inch or more than .007 inch, install a new number 3 main bearing.

(5) Fit remaining bearings in same manner.

It is permissable to use one .001 inch undersize bearing shell with one standard bearing shell or one .002 inch undersize bearing shell with one .001 inch undersize shell. **Always use the smaller diameter bearing half as the upper. Never use an upper bearing half more than .001 inch smaller than the lower bearing half and never use a new bearing half with a used bearing half.**

REAR MAIN BEARING OIL SEALS

Service seals are of split rubber type composition. The seals make it possible to replace the upper rear seal without removing the crankshaft. The seal must be used as an upper and lower set and cannot be combined with the rope seal.

(1) With oil pan removed, remove rear seal retainer and rear main bearing cap.

(2) Remove lower rope oil seal by prying from the side with a small screwdriver.

(3) Remove upper rope seal by turning in Tool C-4148 into the end of the seal, being careful not to damage the crankshaft (Fig. 48). Pull the seal out with the tool while rotating the crankshaft.

CAUTION: Always wipe crankshaft surface clean, then oil lightly before installing a new seal.

(4) Oil seal lip lightly with engine oil.

(5) Hold seal (with paint stripe to the rear) tightly against crankshaft with thumb to make sure that the sharp edge of the groove, in the block does not shave or nick the back of the seal, install seal in the block groove. Rotate the crankshaft, if necessary, while sliding seal into groove. **Care must be exercised not to damage the sealing lip.**

(6) Install other half of the seal into the lower seal retainer with paint stripe to rear.

(7) Install rear main bearing cap, tighten to 85 foot-pounds. **Do not use sealer or cement on seal ends or lip.**

Side Seals Installation

Perform the following operations as rapidly as possible. These side seals are made from a material that expands quickly when oiled.

(1) Apply mineral spirits or diesel fuel to the side seals.

(2) Install seals immediately in the seal retainer grooves.

(3) Install seal retainer and tighten screws to 25 foot-pounds.

Failure to pre-oil the seals will result in an oil leak.

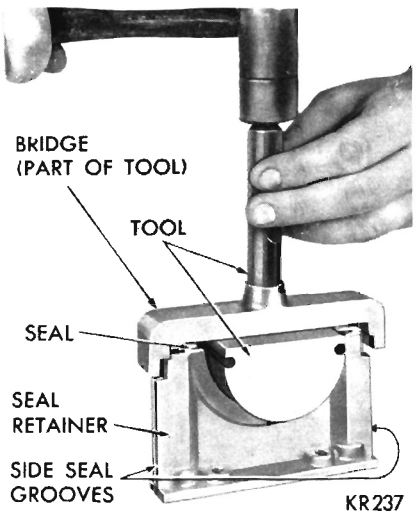


Fig. 49 - Installing Rear Main Bearing Lower oil Seal

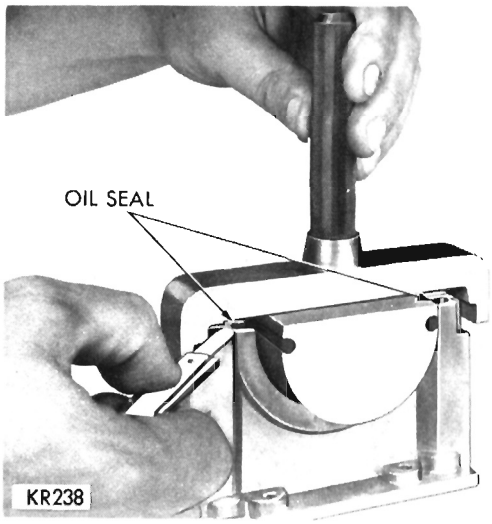


Fig. 50 - Trimming Rear Main Bearing Lower Oil Seal

REAR MAIN BEARING OIL SEAL

(Crankshaft Removed)

Upper Rear Main Seal Installation

(1) Install a new rear main bearing oil seal in cylinder block so that both ends protrude.

(2) Tap seal down into position, using Tool C-3625 for 383 Cubic Inch Engines or Tool C-3743 for 440 Cubic Inch Engines, with bridge removed until tool is seated in bearing bore.

(3) Hold the tool in this position and cut off portion of seal that extends above the block on both sides.

Lower Rear Main Seal Installation

(1) Install a new seal in seal retainer so ends protrude (Fig. 49).

(2) Install bridge on tool and tap the seal down into position with Tool C-3625 for 383 Cubic Inch Engines or Tool C-3743 for 440 Cubic Inch Engines until tool is seated.

(3) Trim off that portion of the seal that protrudes above the cap (Fig. 50).

Side Seals Installation

Perform the following operations as rapidly as possible. These side seals are made from a material that expands quickly when oiled.

(1) Apply mineral spirits or diesel fuel to the side seals.

(2) Install seals immediately in the seal retainer grooves.

(3) Install seal retainer and tighten screws to 25 foot-pounds.

Failure to pre-oil the seals will result in an oil leak.

ENGINE OILING SYSTEM (Fig. 51)

OIL PAN

Removal

(1) Disconnect battery cable and remove dipstick.

(2) Raise vehicle on a hoist and disconnect steering linkage from idler arm and steering arm.

(3) Disconnect exhaust pipe branches from right and left manifolds.

(4) Remove clamp attaching exhaust pipe to extension and remove exhaust pipe.

(5) Drain cranckcase oil.

(6) Remove converter dust shield.

(7) Remove oil pan bolts. Turn flywheel until counterweight and connecting rods at front end of crankshaft are at their highest position to provide clearance, and lower the pan. Turn pan counterclockwise to clear oil screen and suction pipe as it is lowered.

Installation

(1) Inspect alignment of oil strainer. The bottom of the strainer must be on a horizontal plane with machined surface of cylinder block. The bottom of the strainer must touch the bottom of oil pan.

(2) Clean oil pan gasket surface. Inspect pan rail for distortion and straighten if necessary.

(3) Install oil pan.

(4) Install converter dust shield.

(5) Connect exhaust pipe branches to the manifolds and to the exhaust extension.

(6) Connect steering linkage at idler arm and at

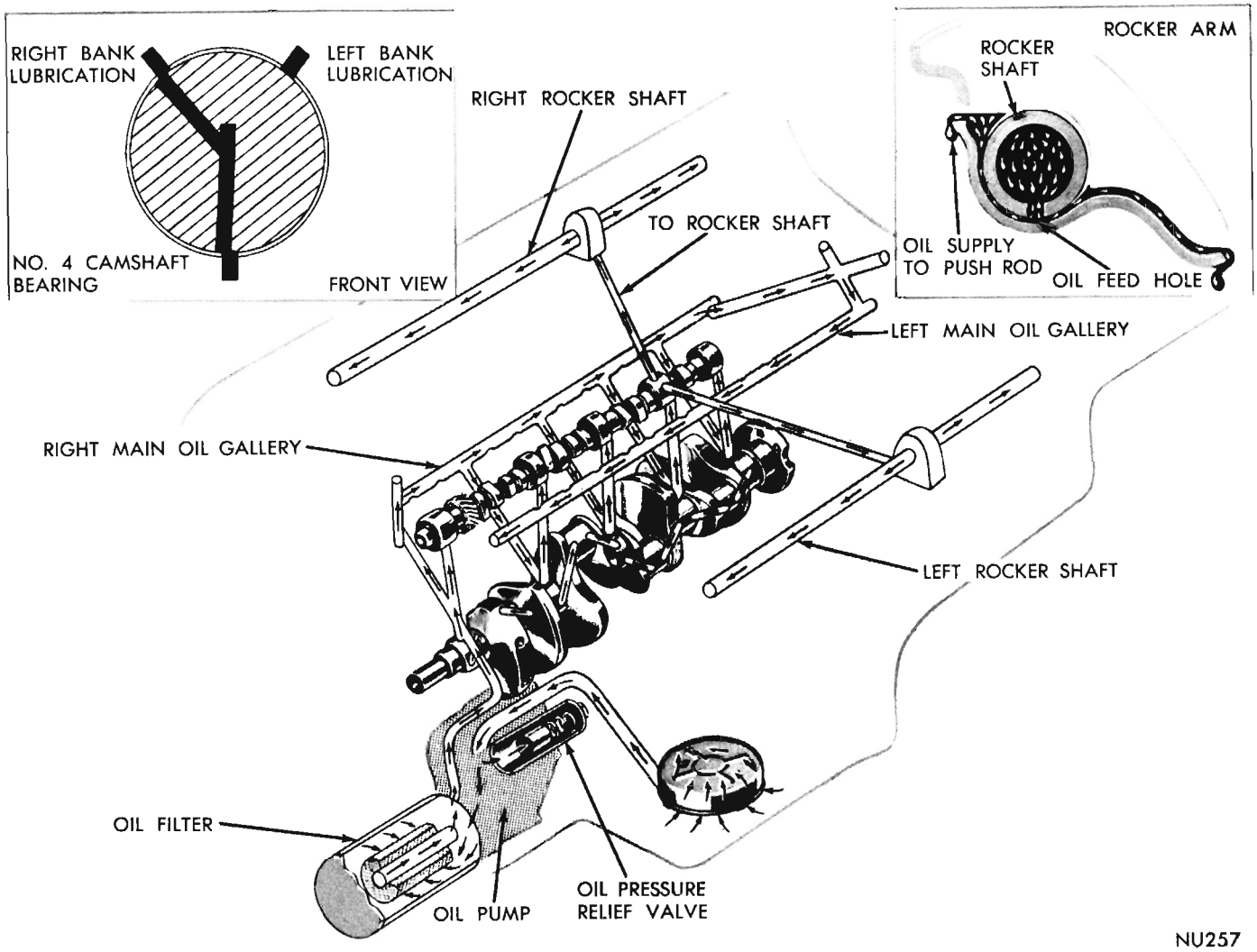


Fig. 51 - Engine Oiling System

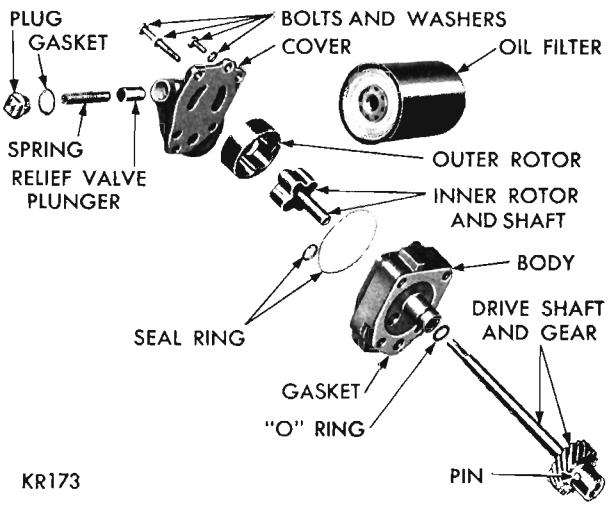


Fig. 52 - Oil Pump and Filter Assembly (Disassembled View)

pitman arm.

(7) Connect battery cable, install dipstick.

(8) Install drain plug and refill crankcase with the proper grade and quantity of oil.

OIL PUMP

Removal

Remove oil pump attaching bolts and remove pump and filter assembly from bottom side of engine.

Disassembly

(1) Remove filter base and oil seal ring.

(2) Remove pump rotor and shaft and lift out outer pump rotor.

(3) Remove the oil pressure relief valve plug and lift out the spring and relief valve plunger (Fig. 52).

Inspection and Assembly

(1) Clean all parts thoroughly. The mating face of filter base (oil pump cover) should be smooth. Replace filter base if it is scratched or grooved.

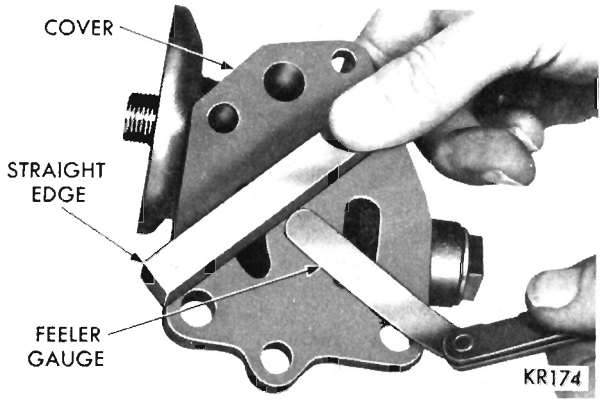


Fig. 53 - Measuring Oil Pump Cover Flatness



Fig. 55 - Measuring Inner Rotor Thickness

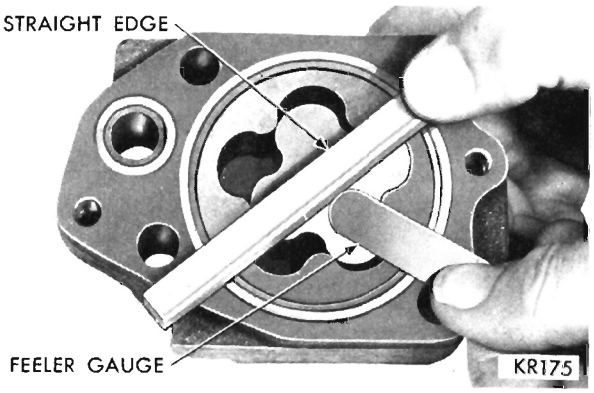


Fig. 57 - Measuring Clearance Over Rotors

(2) Lay a straightedge across oil pump filter base surface (Fig. 53). If a .0015 inch feeler gauge can be inserted between the base and straightedge, filter base should be replaced.

(3) If outer rotor length measure less than .943 inch (Fig. 54) and diameter less than 2.469 inches, replace outer rotor.

(4) If inner rotor length measures less than .942 inch (Fig. 55) a new inner rotor should be installed.

(5) Install outer rotor into pump body, press to one side with fingers and measure clearance between outer rotor and pump body (Fig. 56). If

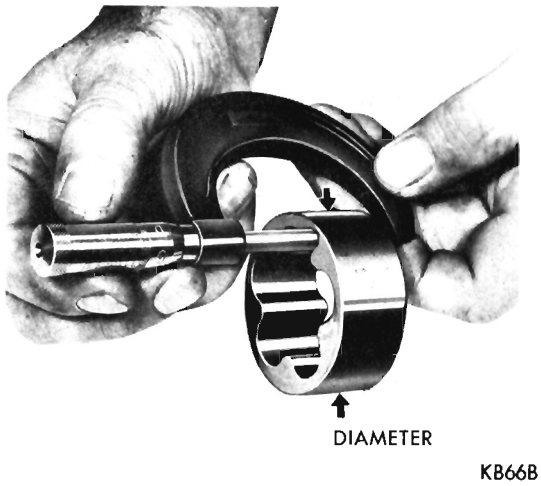


Fig. 54 - Measuring Outer Rotor Thickness

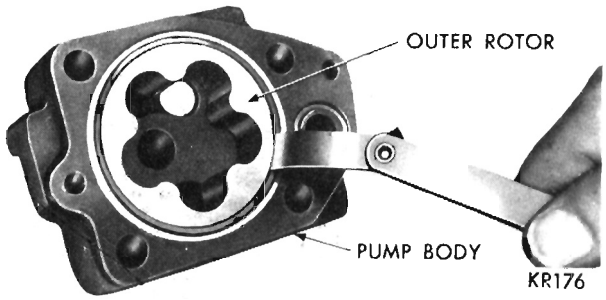


Fig. 56 - Measuring Outer Rotor Clearance

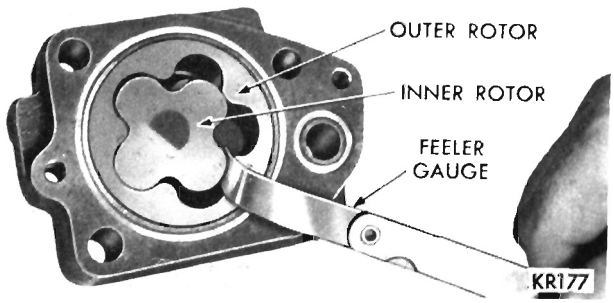


Fig. 58 - Measuring Clearance Between Rotors

measurement is more than .014 inch, replace oil pump body.

(6) Install inner rotor into pump body and place a straightedge across the face between bolt holes (Fig. 57). If a feeler gauge of more than .004 inch can be inserted between the rotors and straightedge, replace pump body.

(7) If the tip clearance between inner and outer rotor (Fig. 58) is more than .010 inch, replace inner and outer rotor.

Servicing Oil Pressure Relief Valve

Inspect oil pump relief valve plunger for scoring and free operation in its bore. Small scores may be removed with 400 grit wet or dry paper pro-



NN359

Fig. 59 - Removing Oil Filter

viding extreme care is used not to round off the sharp edge portion of the valve.

The relief valve spring has a free length of 2-9/32 to 2-19/64 inch and should test 14.85 to 15.85 lbs. when compressed to 1-19/32 inch. Discard spring that fails to meet specifications.

If the oil pressure is low, inspect for worn bearings, or look for other causes of possible loss of oil pressure. **When assembling the oil pump, be sure to use new oil seal rings between filter base and pump body.**

Installation

(1) Install a new "O" ring seal on the pilot of oil pump before attaching oil pump to cylinder block.

(2) Install oil pump on engine, using a new gasket on engine and tighten attaching bolts to 30 foot-pounds. Install oil filter element.

OIL FILTER REPLACEMENT

The "spin on" oil filter should be replaced preferably to coincide with every second oil change.

Removal

Use care so as not to damage transmission oil cooler lines.

(1) Using Tool C-4065 unscrew the filter from the base on bottom side of engine and discard (Fig. 59).

(2) Wipe base clean.

Installation

(1) Install the "spin on" oil filter by hand, finger tight. Do not use tool.

(2) To obtain an effective seal, tighten filters by hand the additional number of turns indicated on the replacement filter. Start engine and inspect for leaks.

426 CUBIC INCH HEMI ENGINE

INDEX

	Page
Camshaft	84
Camshaft Bearings	84
Connecting Rods	87
Crankcase Ventilation System	92
Crankshaft Identification	87
Crankshaft Main Bearings	88
Crankshaft Main Journals	88
Cylinder Block	85
Cylinder Heads	75
Distributor Drive Shaft Bushing	84
Engine Assembly	75
Engine Mounts	74
Engine Oiling System	90
Installing Piston and Connecting Rod Assembly	88
Measuring Connecting Rod Bearing Clearance	87
Measuring Main Bearing Clearance	89
Oil Filter	92
Oil Pan	90
Oil Pump	90
Pistons, Pins and Rings	86
Repair of Damaged or Worn Threads	93
Rear Main Bearing Oil Seal	89
Specifications	94
Tappet Adjustment	79
Timing Chain, Cover, Oil Seal and Chain	81
Tune-Up	73
Valves and Valve Springs	78
Valve Timing	81

SERVICE PROCEDURES

TUNE-UP

(1) Test, battery specific gravity, add water if necessary, clean and tighten battery connections.

(2) Test cranking voltage. See "Starting Motor Cranking Voltage" Electrical Section of this manual.

(3) Tighten the intake manifold bolts to specifications.

(4) Perform cylinder compression test. Compression should not be less than 110 pounds and not vary more than 40 pounds. The recommended

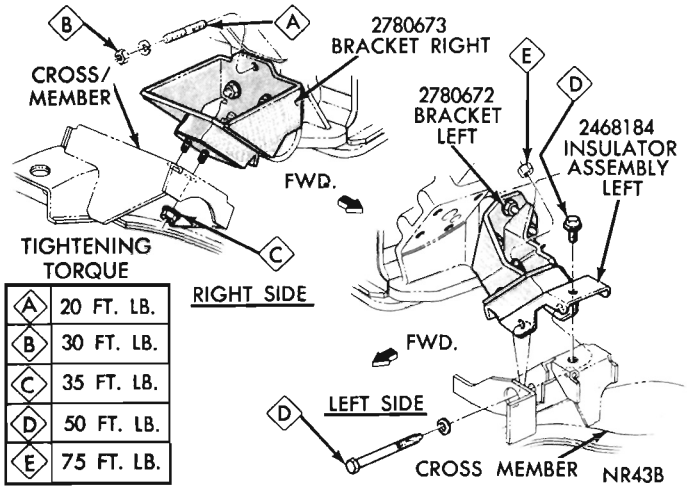


Fig. 1 - Front Engine Mounts

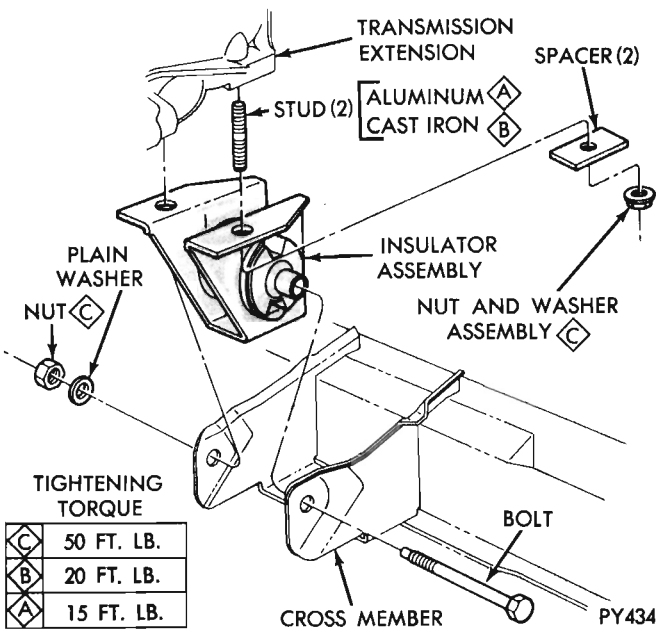


Fig. 2 - Engine Rear Support

compression pressures are to be used only as a guide to diagnosing engine problems. An engine in good condition may exhibit higher pressures. Many conditions which are difficult to control cause variations in compression readings. An engine should not be disassembled to determine the cause of low compression unless some other malfunction is present.

(5) Clean or replace spark plugs as necessary and adjust gap to .035 inch. Tighten to 30 foot-pounds. Aluminum spark plug tubes serve as spark plug gaskets.

(6) Test resistance of spark plug cables. Refer to "Ignition System Secondary Circuit Inspection" Electrical Section.

(7) Inspect the breaker plate contacts, primary wire and vacuum advance operation. Test coil output voltage, primary and secondary resistance. Test Condenser. Replace parts as necessary. Refer to Ignition System and make necessary adjustments.

(8) Reset the ignition timing with the vacuum advance line disconnected. The ignition timing should be set to compensate for altitudes and/or gasoline grades.

(9) Set carburetor idle mixture adjustment. Adjust engine RPM to specifications. Perform a combustion analysis.

(10) Test the fuel pump for pressure and vacuum. Refer to "Fuel System " Group 14, Specifications.

(11) Inspect the manifold heat control valve in the right exhaust manifold for proper operation and apply Manifold Heat Control Valve Solvent Number 3419129 or equivalent to the bushing and shafts.

(12) Every oil change, remove filter element and blow out dirt gently with air hose. Direct air from inside out, and keep nozzle 2 inches away from element to avoid damaging. Clean the metal housing and replace the element. Every year install a new factory recommended filter. element. Service the unit more frequently when driving under severe conditions, such as in dusty areas.

(13) Inspect crankcase ventilation system as outlined on page 92.

(14) Inspect and adjust the accessory belt drives referring to "Cooling System" Group 7 for proper adjustments.

(15) Road test vehicle as a final check.

FRONT ENGINE MOUNTS

Removal

(1) Disconnect throttle linkage from bellcrank at rear of engine.

(2) Position fan to clear radiator top tank and hoses.

(3) Remove engine mount to frame bolts; on the right side disconnect flexible line and fitting from fuel pump and move line to side; on left side remove splash shield.

(4) Raise engine and remove engine mounts with brackets. Remove insulators from brackets.

Installation

(1) Install insulators to brackets loosely.

(2) Install engine mounts to engine, lower engine, into position and install engine mount to frame bolts. Tighten to specified torque (Fig. 1).

(3) On right side install fitting and flexible line to fuel pump; on left side install splash shield.

(4) Install throttle linkage to bellcrank.

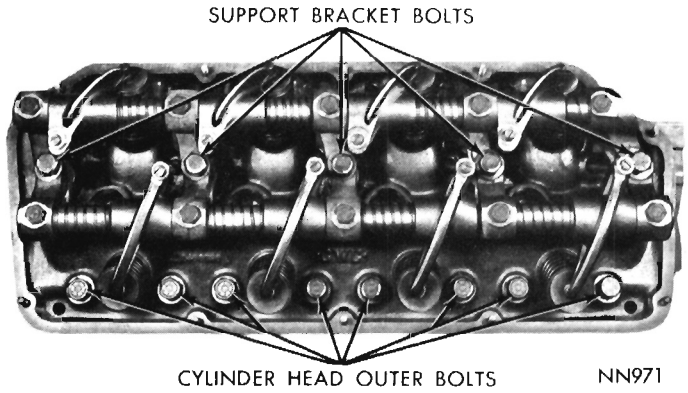


Fig. 3 - Cylinder Head Attaching Bolts

REAR ENGINE MOUNTS

Removal

(1) Raise vehicle on hoist.
(2) Install transmission jack to support rear of engine.
(3) Remove extension housing mounting bolts, crossmember attaching bolts and remove crossmember.
(4) Remove insulator from crossmember.

Installation

(1) Install insulator to crossmember.
(2) Install crossmember, tightening attaching bolts to specified torque.
(3) Install extension housing mounting bolts tightening to specified torque (Fig. 2).
(4) Remove transmission jack and lower vehicle.

ENGINE ASSEMBLY

Removal

(1) Scribe hood hinge outlines on hood and remove hood.
(2) Drain cooling system, remove battery and air cleaner.
(3) Disconnect radiator hoses, heater hoses and cooler lines if so equipped. Remove radiator and shroud.
(4) Disconnect fuel line, throttle cable, electrical connections to alternator, coil, temperature and oil pressure sending units.
(5) Raise vehicle on a hoist and remove transmission as outlined in Group 21 of this manual. Remove clutch torque shaft if so equipped.
(6) Remove attaching bolts and stud nuts from front engine mount insulators.
(7) Disconnect exhaust pipes from manifolds and tie out of the way. Lower vehicle.
(8) Install lifting straps to engine, attach front strap to front of left cylinder head and rear strap to rear of right cylinder head.

Caution: Do not use intake manifold to remove engine assembly.

Remove carburetors to prevent damage.

(9) Attach hydro-crane lifting hooks to lifting straps, remove engine assembly from chassis and install engine in a repair stand.

Installation

(1) Attach hydro-crane lifting hooks to lifting straps and remove engine from repair stand.
(2) Lower engine into chassis until the front engine mounts line up with "K" member support. Install attaching bolts and stud nuts, do not tighten at this time.
(3) Install engine support fixture C-3487A, engaging the hooks in holes in frame side members. Be sure support ends are up against the underside of the oil pan flange.
(4) Remove hydro-crane lifting hooks. Raise vehicle on a hoist.
(5) Install transmission as outlined in Group 21 of this service manual.
(6) Install clutch torque shaft, linkage and adjust clutch pedal to 1 inch free play if so equipped.
(7) Install exhaust pipes to manifolds. Torque front engine mounts to specifications. Lower vehicle.
(8) Connect electrical connections to alternator, coil, temperature and oil pressure sending units, fuel line.
(9) Install carburetors, linkage, throttle cable and adjust.
(10) Install radiator, connect heater hoses, cooler lines and fill cooling system.
(11) Install hood using scribe marks for proper alignment.
(12) Install battery, fill crankcase to capacity.

WHENEVER A HIGH PERFORMANCE ENGINE IS REBUILT AND/OR NEW PISTONS INSTALLED, ONE PINT OF SPERM OIL ADDITIVE, CHRYSLER PART NO. 3549586 OR EQUIVALENT SHOULD BE ADDED TO THE ENGINE OIL TO AID BREAK-IN. THIS OIL MIXTURE SHOULD BE RETAINED UNTIL THE NEXT REGULARLY SCHEDULED OIL CHANGE. REFER TO "LUBRICATION", GROUP "O" FOR SUBSEQUENT USE OF THIS ADDITIVE IN HIGH PERFORMANCE ENGINES.

(13) Start engine, adjust engine idle and timing to specifications, install air cleaner and road test vehicle.

CYLINDER HEADS

Each chrome alloy cast iron cylinder head is held in place by 13 bolts (Fig. 3) and 4 studs, nuts and washers (Fig. 4). The stud nuts are tightened from inside of the tappet chamber. Aluminum spark plug tubes (shown in cross section in Figure 5) serve as spark plug gaskets. The

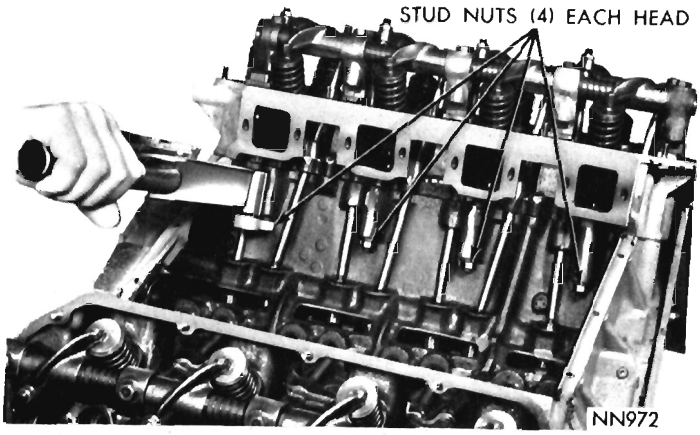


Fig. 4 - Removing or Installing Cylinder Head Stud Nuts

tubes project through the cylinder head cover and are sealed against oil leaks.

Cylinder Head Cover Removal

(1) Drain cooling system and disconnect battery ground cable at battery.

(2) Remove air cleaner, distributor cap with spark plug cable and coil secondary cable as an assembly.

(3) Grasp secondary cables at spark plug covers and pull covers straight out.

(4) Remove spark plugs.

(5) On left ban, disconnect brake lines at master cylinder, remove cotter pin and clevis pin from linkage in back of power brake.

(6) Remove the 4 nuts attaching booster to mounting bracket and remove power brake and master cylinder assembly.

(7) Remove cylinder head covers and gaskets.

Rocker Arms and Shafts Removal

(1) With cylinder head cover removed, remove the five bolts, (3/4 inch hexagon) that attach the rocker arm support brackets to the cylinder head and block (Fig. 3).

(2) Remove rocker arm assemblies.

(3) Remove push rods and **identify to insure installation in original location.**

Cylinder Head Removal

(1) With cylinder head cover and rocker arm assemblies removed, remove alternator, disconnect accelerator cable and transmission throttle rod from upper bellcrank.

(2) Disconnect fuel line at tee fitting.

(3) Disconnect intake manifold heat tubes located at rear of manifold.

(4) Remove the intake manifold attaching screws. (There are three locating dowels at each end of manifold.)

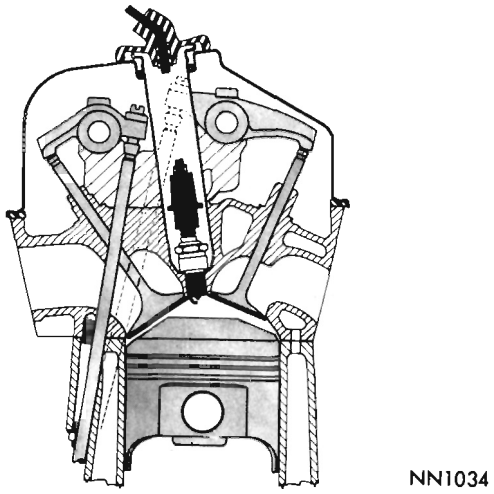


Fig. 5 - Hemi - 426 Engine Combustion Chamber Cross Section

(5) Remove intake manifold with ignition coil, both carburetors, fuel lines, fuel filters, throttle linkage and upper bellcrank as an assembly.

(6) Disconnect exhaust headers from cylinder heads and tie out of way.

(7) Remove the lower **eight** cylinder head bolts (Fig. 3).

(8) Remove the **four** stud nuts, (9/16 inch hexagon) from cylinder head studs inside of tappet chamber (Fig. 4).

(9) Remove cylinder heads and place in holding fixture tool C-3626. **To protect studs do not set cylinder head down on studs at any time.**

Cylinder Head Installation

(1) Clean gasket surfaces of cylinder block, cylinder head and remove all burrs from edges of cylinder head.

(2) Inspect all surfaces with a straightedge if there is any reason to suspect leakage. If out of flatness exceeds .00075 times the span length in any direction; either replace head or lightly machine the head gasket surface. As an example, if a 12 inch span is .004 inches out of flat, allowable is 12 x .00075 = .009 inches. Head is OK.

The cylinder head surface finish should be 70-180 micro-inches.

If the cylinder head studs were removed or come loose, the studs will have to be coated with Chrysler Sealer Part Number 1057794 or equivalent and torqued to 20 ft.-lbs.

(3) Coat new gasket lightly with Chrysler Sealer Part Number 1057794 or equivalent. With the raised bead toward cylinder block, install gasket and cylinder head.

(4) Install the cylinder head stud nuts inside of tappet chamber and the eight short outer cylinder head bolts. **Do not tighten at this time.**

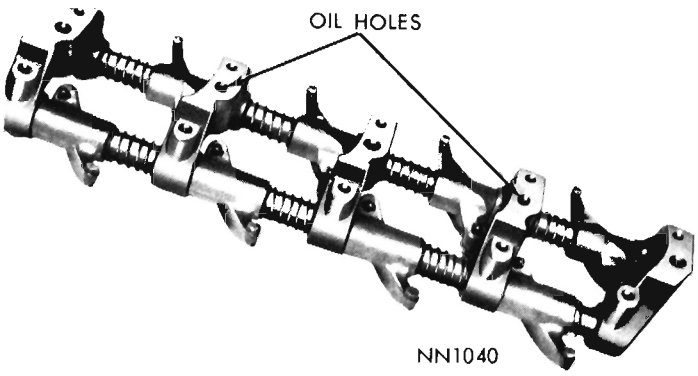


Fig. 6 - Rocker Shafts Assembly (Bottom View)

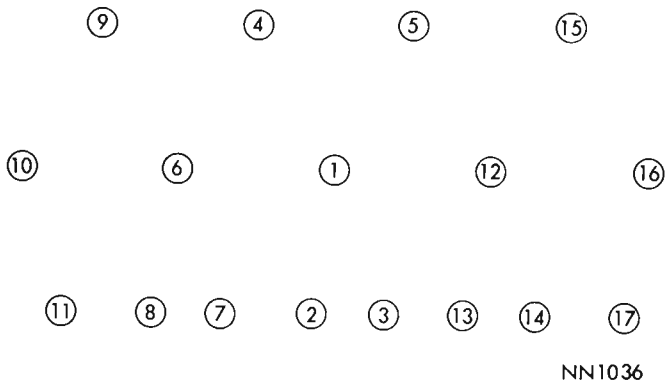


Fig. 7 - Cylinder Head Tightening Sequence

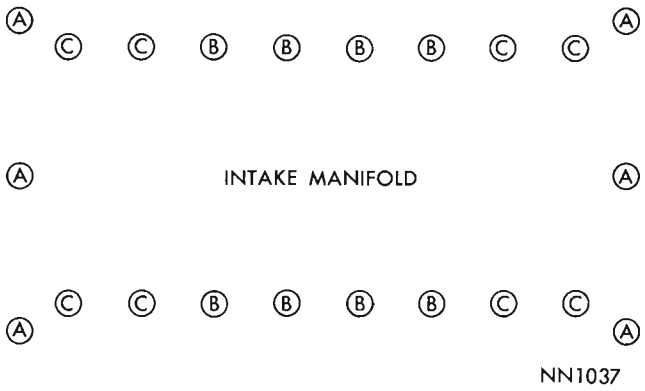


Fig. 8 - Intake Manifold Tightening Sequence

Rocker Arms and Shaft Installation

(1) Install push rods through push rod holes in head. The short rods in upper holes (intake) and long rods in lower holes (exhaust).

If the rocker arm assembly had been disassembled for cleaning, inspection or replacement, refer to Figure 6 for proper reassembly noting oil holes in number two and four brackets.

(2) Position the rocker shaft support brackets on the cylinder head and install the **five long** cylinder head bolts into rocker shaft support brackets and cylinder head, lining up all push rods to their respective rocker arms.

(3) Starting at the center, tighten all head bolts and stud nuts to 50 foot-pounds in sequence shown in Figure 7 then repeat the procedure, tightening to 75 foot-pounds in the same sequence.

(4) Adjust tappets. See "Tappet Adjustment Procedure."

(5) Install exhaust headers with new gaskets and tighten to 35 foot-pounds.

(6) Clean cylinder head cover gasket surface. Inspect cover for distortion and straighten if necessary.

(7) Place new cylinder head cover gaskets in position and install cylinder head covers. Tighten nuts to 40 inch-pounds.

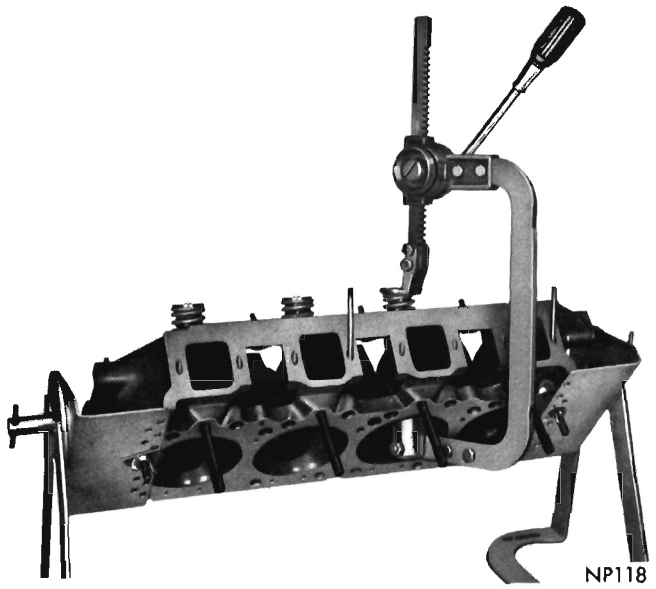


Fig. 9 - Compressing Valve Spring

(8) Adjust spark plug gaps to .035 inch. Slide spark plug tube seals over tubes. With a six inch extension on a spark plug socket insert spark plug, slide spark plug tube over assembly, insert assembly in cover and cylinder head, being careful not to drop plug as this would change gap setting. Tighten spark plugs to 30 foot-pounds.

(9) Install new intake manifold gaskets and intake manifold; make sure end gaskets are positioned over locating dowels marked "A" in Figure 8. Tighten screws marked "B" to 72 inch-pounds, and screws marked "C" to 48 inch-pounds. Repeat the tightening procedure in the sequence shown until all screws maintain their specified torque.

(10) Connect fuel line, choke, intake manifold heat tubes, transmission throttle rod to upper bell crank, accelerator cable and adjust as necessary.

(11) Install crankcase ventilation hose, distributor cap with spark plug cables, and coil wire and cable.

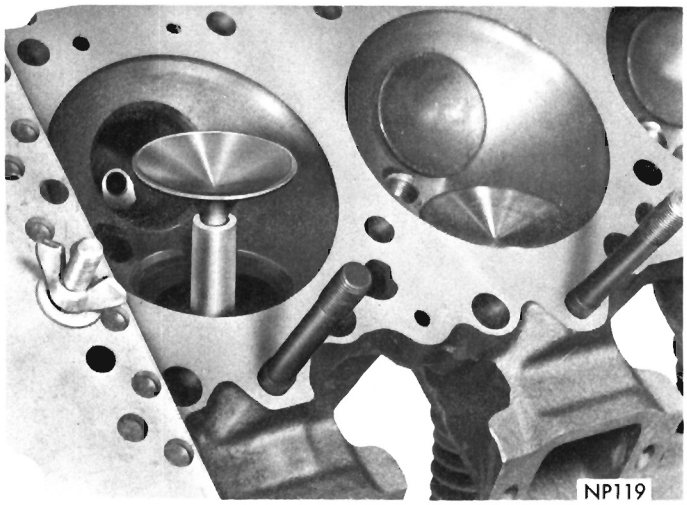


Fig. 10 - Installing Valve and Tool C-3973

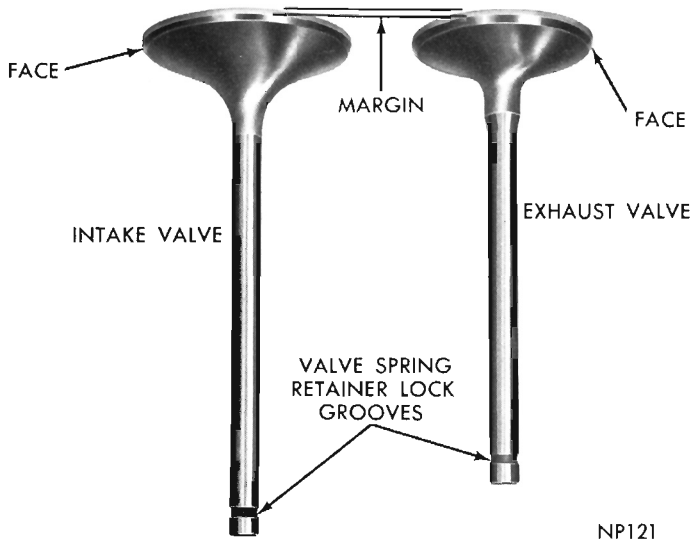


Fig. 12 - Intake and Exhaust Valves

(12) Install alternator, battery ground cable and heater hoses if removed.

(13) Connect power brake booster, if so equipped and bleed brakes.

(14) Fill the cooling system. Start engine and check for leaks.

(15) Adjust ignition timing and carburetors to specifications. Road test vehicle.

VALVES AND VALVE SPRINGS

The valves are a lateral arrangement which provides the maximum amount of space and permits direct and unrestricted intake and exhaust porting. Valve guides are integral with the heads.

Removal

(1) With cylinder head removed, compress valve springs with Tool C-3422A (Fig. 9).

(2) Remove valve retaining locks, valve spring retainers, valve stem cup seals (intake valves only) and valve springs. **Remove any burrs from the valve stem lock grooves to prevent damage to the valve guide when valves are removed. Identify valves, to insure installation in original location.**

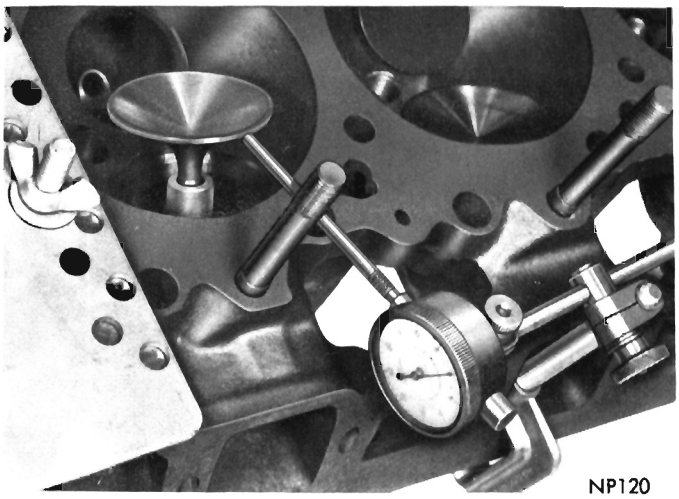


Fig. 11 - Measuring Valve Guide Wear

Valve Inspection

(1) Clean valves thoroughly and discard burned, warped or cracked valves.

(2) Measure valve stems for wear. New intake valve stem diameter should measure .3085 to .3095 inch and exhaust valve stem diameter should measure .3075 to .3085 inch. If wear exceeds .002 inch, replace valve.

(3) Remove carbon and varnish deposits from inside of valve guides with a reliable valve guide cleaner.

(4) Measure valve stem guide clearance as follows:

(a) Install sleeve Tool C-3973 over valve stem (Fig. 10) and install valve. The special sleeve places the valve at the correct height for checking with a dial indicator.

(b) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle to the valve stem being measured (Fig. 11).

(c) Move valve to and from the indicator. The total dial indicator should not exceed .017 inch. Ream guides for valves with oversize stems if dial indicator reading is excessive or if the valve stems are scuffed or scored.

(d) Service valves with oversize stems are available in .005, .015 and .030 inch oversize.

(e) Slowly turn reamer by hand and clean guide thoroughly before installing a new valve.**Do not attempt to ream the valve guides from standard directly to .030 inch. Use step procedure of .005, .015 and .030 inch so the valve guides may be reamed true in relation to the valve seat.**

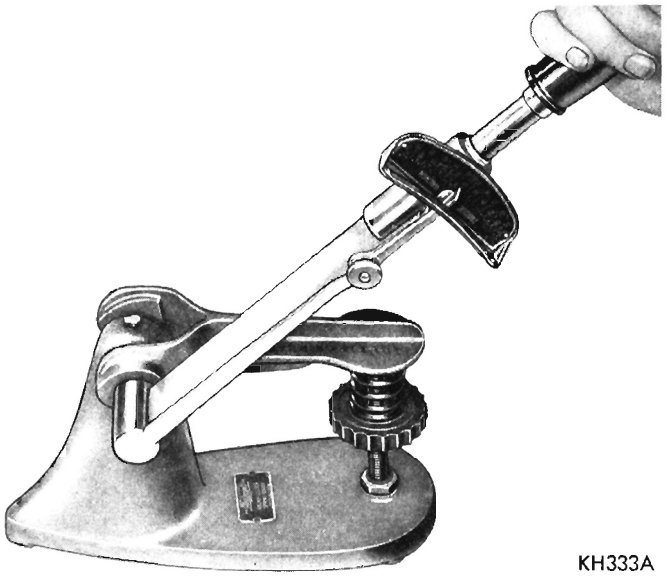


Fig. 13 - Testing Valve Spring

Refacing Valves and Valve Seats

(1) The intake and exhaust valve seats and valve faces have a 45 degree angle.

(2) Inspect the remaining margin after the valves are refaced (Fig. 12). Valves with less than 3/64 inch margin should be discarded.

(3) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(4) Measure the concentricity of valve seat using dial indicator No. 13725. Total runout should not exceed .002 inch (total indicator reading).

(5) Inspect valve seat with Prussian Blue to determine where the valve contacts the seat. To do this, coat valve seat **lightly** with Prussian Blue then set the valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of the valve face, contact is satisfactory. If the blue is transferred to the top edge of valve face, lower the valve seat with a 30 degree stone. If the blue is transferred to the bottom edge of valve face, raise the valve seat with a 60 degree stone.

(6) When the seat is properly positioned, the width of intake seats should be 1/16 to 3/32 inch. The width of exhaust seats should be 3/64 to 1/16 inch.

Testing Valve Springs (Fig. 13)

(1) Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested. As an example, the compressed length to be tested is 1-1/2 inches. Turn table of Tool C-647 until surface is in line with the 1-1/2 inch mark on the threaded stud and the zero mark to the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. The valve spring (with surge damper removed) should test 110 to 120 pounds when compressed to 1-55/64 inches (valve closed), and 300 to 320 at 1-3/8 inches (valve open). Discard springs that do not meet these specifications.

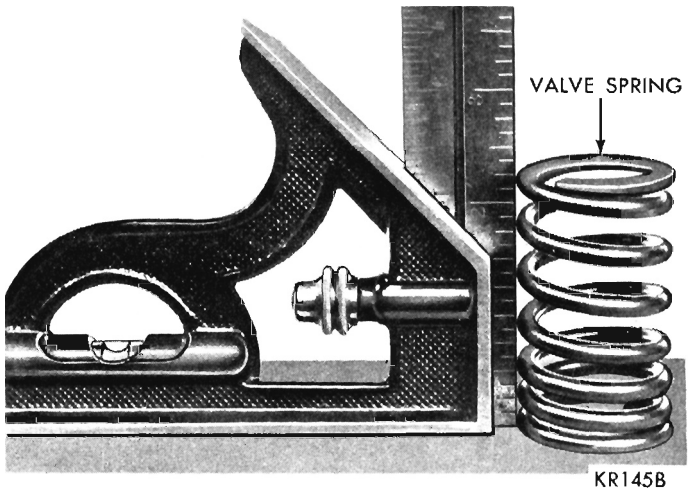


Fig. 14 - Inspecting Valve Spring Squareness

(2) Inspect each valve spring for squareness with a steel square and surface plate, test springs from both ends (Fig. 14). If the spring is more than 1/16 inch out of square, install a new spring.

Installation

(1) Coat valve stems with lubrication oil and insert them in cylinder head.

(2) Install new seals on intake valve stems and over valve guides. Install valve springs and retainers.

(3) Compress valve springs with Tool C-3422A, install locks and release tool.**If valves and/or seats are reground, measure the installed height of springs.Make sure measurement is taken from bottom of spring retainer** (if spacers are installed, measure from the top of spacer). **If height is greater than 1-59/64 inch, install a 1/16 inch spacer in head counterbore to bring spring height back to the normal 1-53/64 to 1-57/46 inches.**

TAPPET ADJUSTMENT

The 426 cu. in. engine is equipped with adjustable rockers and special hydraulic tappets with limited plunger travel and a heavy duty snap ring for more reliability in high speed operation.

To adjust tappets, position crankshaft as indicat-

ed in the following procedure and adjust only the tappets indicated in the chart.

Set the rocker adjusting screw so that there is no clearance (zero lash) in the system. Then turn the screw into the rocker 1-1/2 turns.Torque the lock nut to 25 ft. lbs.

When adjusting tappets on the 426 cu. in. engine (cold setting) it is very important that the setting be made with each tappet at the lowest point of the camshaft; that is on the base circle.

The procedure used on standard engines cannot be used because of the overlap and duration with the special camshaft. The following procedure will assure proper position of the camshaft when making the adjustment. An indicating light may be used in the ignition primary circuit to more clearly define the various positions of the camshaft :

	Intake	Exhaust
A. Adjust ignition timing to TDC, chalk mark TDC and 180° opposite TDC on the front crankshaft damper.		
B. Set crankshaft so No. 1 cylinder is at TDC (Compression stroke, points opening).		
Adjust	2 and 7	4 and 8
C. Rotate crankshaft 180° in normal running direction until points open for No. 4 cylinder.		
Adjust	1 and 8	3 and 6
D. Rotate crankshaft an additional 180° until points open for No. 6 cylinder.		
Adjust	3 and 4	5 and 7
E. Rotate crankshaft an additional 180° until points open for No. 7 cylinder.		
Adjust	5 and 6	1 and 2
F. Reset ignition timing to operating specifications and install valve covers.		

HYDRAULIC TAPPETS

Preliminary to Checking the Hydraulic Tappets

(1) Before disassembling any part of the engine to correct tappet noise, read the oil pressure at the gauge (Install a reliable gauge at pressure sending unit if vehicle has no oil pressure gauge) and check the oil level in the oil pan. The pressure should be between 45 and 65 pounds at 2000 R.P.M.

(2) The oil level in the pan should never be above the "full" mark on dipstick, or below the "add oil" mark. Either of these two conditions could be responsible for noisy tappets.

Oil Level Too High

If oil level is above the "full" mark on dipstick, it is possible for the connecting rods to dip into the oil while engine is running and create foam. Foam in oil pan would be fed to the hydraulic tappets by the oil pump causing them to lose length and allow valves to seat noisily.

Oil Level Too Low

Low oil level may allow oil pump to take in air which, when fed to the tappets, causes them to lose length and allows valves to seat noisily. Any leaks on intake side of pump through which air can be drawn will create the same tappet action. When tappet noise is due to aeration it may be intermittent or constant, and usually more than one tappet will be noisy. When oil level and leaks have been corrected, engine should be operated at fast idle for sufficient time to allow all of the air inside of the tappets to be bled out.

Tappet Noise Diagnosis

(1) To determine source of tappet noise, operate engine at idle with cylinder head covers removed.

(2) Feel each valve spring or rocker arm to detect noisy tappet. The noisy tappet will cause the affected spring and/or rocker arm to vibrate or feel rough in operation.

Worn valve guides or cocked springs are sometimes mistaken for noisy tappets. If such is the case, noise may be dampened by applying side thrust on the valve spring. If noise is not appreciably reduced, it can be assumed the noise is in the tappet. Inspect the rocker arm push rod sockets and push rod ends for wear.

(3) Valve tappet noise ranges from light noise to a heavy click. A light noise is usually caused by excessive leakdown around the unit plunger which will necessitate replacing the tappet, or by the plunger partially sticking in the tappet body cylinder. A heavy click is caused either by a tappet check valve not seating, or by foreign particles becoming wedged between the plunger and the tappet body, causing the plunger to stick in the down position. This heavy click will be accompanied by excessive clearance between the valve stem and rocker arm as valve closes. In either case, tappet assembly should be removed for inspection and cleaning.

Tappet Removal

(1) The tappet can be removed by removing the intake manifold by following this recommended procedure: Remove cylinder head covers.

(2) Remove rocker arms and shaft assembly.

(3) Remove push rods and **identify to insure installation in original location.**

(4) Remove intake manifold.

(5) Pull tappet out of bore with a twisting motion. If all tappets are to be removed, **identify tappets to insure installation in original location.**

A diamond shaped marking stamped on the

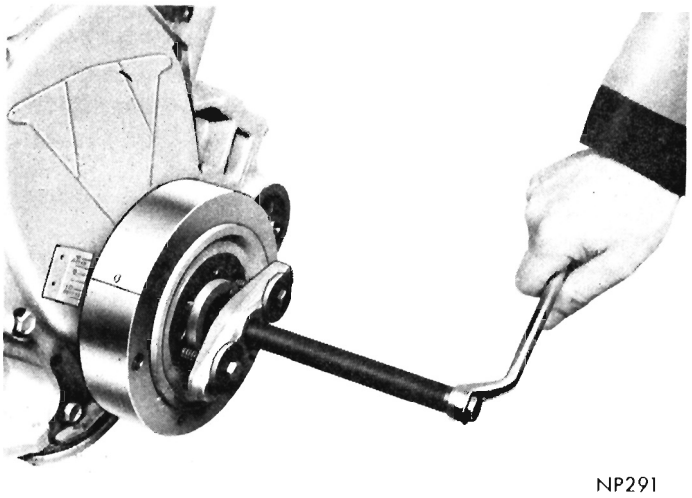


Fig. 15 - Removing Vibration Damper Assembly

engine numbering pad indicates that some tappet bodies are .008 inch oversize.

Disassembly

The tappets in the 426 Hemi engine are a special design with limited plunger travel and a special heavy duty snap ring. The snap ring is designed to remain in place at high engine speeds.

These tappets are not to be disassembled for cleaning.

If the tappet or bore in cylinder block is scored, scuffed or shows signs of sticking, ream the bore to next oversize.

Installation

(1) Lubricate tappets.

(2) Install tappets and push rods in their original positions.

(3) Install rocker arm and shaft assembly.

(4) Install intake manifold.

(5) Start and operate engine. Warm up to normal operating temperature.

CAUTION: To prevent damage to valve mechanism, engine must not be run above fast idle until all hydraulic tappets have filled with oil and have become quiet.

VALVE TIMING

(1) Turn crankshaft until NO. 6 exhaust valve is opening.

(2) Insert a 1/4 inch spacer between rocker arm pad and stem tip of NO. 1 intake valve. (First valve on top rocker shaft on right bank as viewed from front of engine).

(3) Install a dial indicator so plunger contacts valve spring retainer as nearly perpendicular as possible.

(4) Allow spring load to bleed tappet down giving in effect a solid tappet. Zero the indicator.

(5) Rotate crankshaft clockwise (normal running direction) until valve has lifted .094 inch.

CAUTION: Do not turn crankshaft any further clockwise, as the valve spring might bottom and result in serious damage.

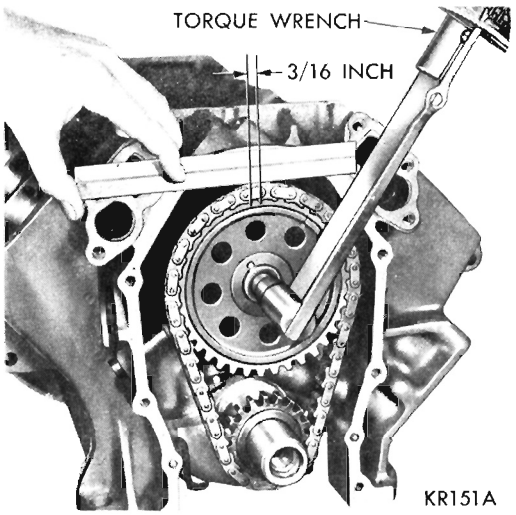


Fig. 16 - Measuring Timing Chain Stretch (Typical)

The timing of the crankshaft pulley should now read from 10 degrees before top dead center to 2 degrees after top dead center.

(6) If reading is not within specified limits:

(a) Check accuracy of DC mark on crankshaft pulley.

(b) Check sprocket index marks.

(c) Inspect timing chain for wear.

(7) Turn crankshaft counterclockwise until valve is closed and remove the indicator and spacer.

TIMING CHAIN COVER, OIL SEAL AND CHAIN

Cover Removal

(1) Drain cooling system and remove radiator, fan belt and water pump housing. Remove power steering pump and tie out of the way, if so equipped.

(2) Remove pulley from vibration damper, bolt and washer securing vibration damper on crankshaft.

(3) Install Tool C-3688, and pull damper assembly off end of crankshaft (Fig. 15).

(4) Remove the two front pan bolts.

(5) Remove chain case cover and gasket using extreme caution to avoid damaging oil pan gasket. **It is normal to find particles of neoprene collected between the crankshaft seal retainer and crankshaft oil slinger.**

(6) Slide crankshaft oil slinger from end of crankshaft.

Measuring Timing Chain for Stretch

(1) Place a scale next to the timing chain so any movement of the chain may be measured.

(2) Place a torque wrench and socket over camshaft sprocket attaching bolt and apply torque in the direction of crankshaft rotation to take up slack; 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed).

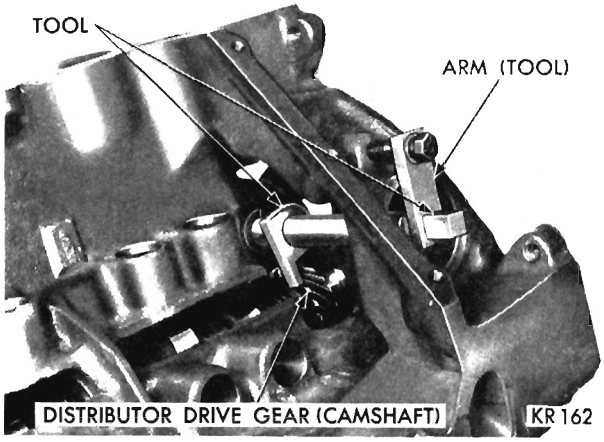


Fig. 17 - Camshaft Holding Tool C-3509

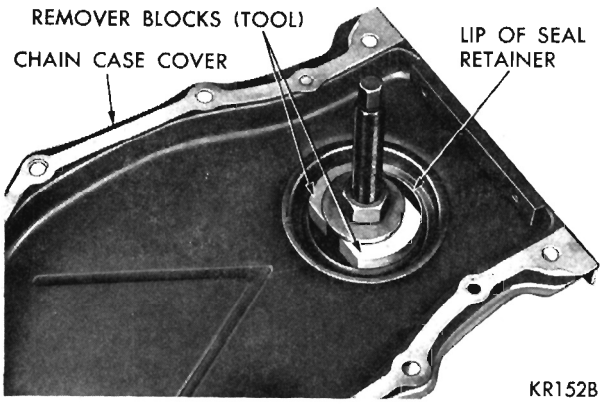


Fig. 19 - Remover Blocks Expanded to Puller Position

With torque applied to the camshaft sprocket bolt, crankshaft should not be permitted to move. It may be necessary to block crankshaft to prevent rotation.

(3) Holding a scale with° dimensional reading even with edge of a chain link, apply torque in the reverse direction 30 foot-pounds (with cylinder heads installed) or 15 foot-pounds (cylinder heads removed), and note amount of chain movement (Fig. 16).

(4) Install a new timing chain, if its movement exceeds 3/16 inch.

(5) If chain is satisfactory, slide crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

(6) If chain is not satisfactory, remove camshaft sprocket attaching bolts and remove timing chain with crankshaft and camshaft sprockets.

When installing timing chain, use Tool C-3509 to prevent camshaft from contacting the welch plug in the rear of engine block. Remove distributor and oil pump-distributor drive gear. Locate tool against rear side of cam gear and attach tool with distributor retatiner plate bolt (Fig. 17).

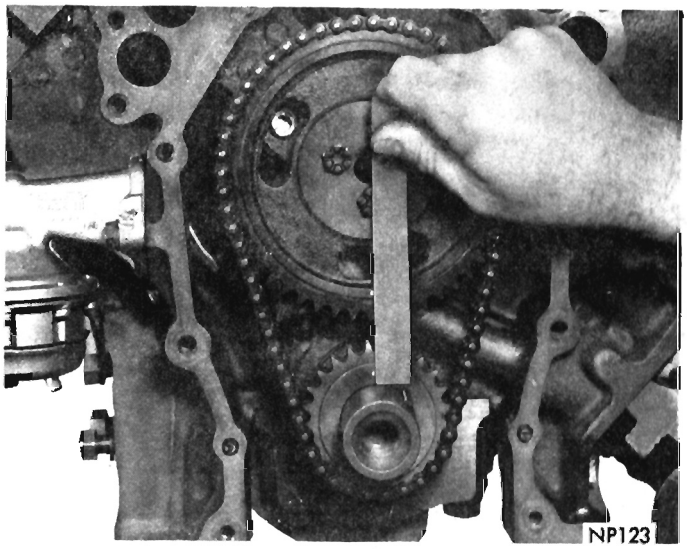


Fig. 18 - Alignment of Timing Marks

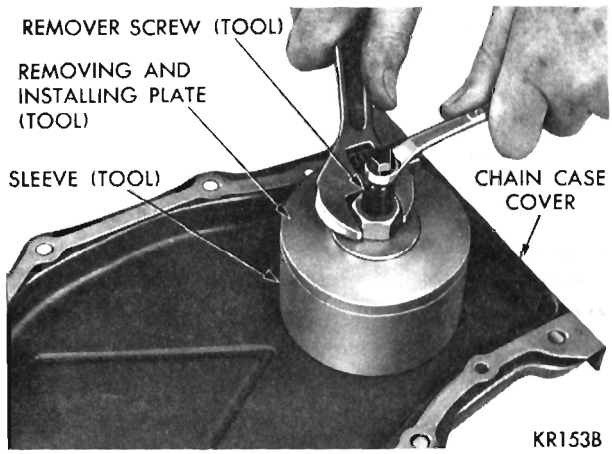


Fig. 20 - Removing Oil Seal

(7) Place camshaft sprocket and crankshaft sprocket on the bench with timing marks on exact imaginary center line through both camshaft and crankshaft sprocket bores.

(8) Place timing chain around both sprockets.

(9) Turn crankshaft and camshaft to line up with keyway location on crankshaft sprocket and dowel holes in camshaft sprocket.

(10) Lift sprockets and chain (keep sprockets tight against chain in position as described).

(11) Slide both sprockets evenly over their respective shafts.

(12) Use a straight edge to measure alignment of timing marks (Fig. 18).

(13) Install camshaft sprocket bolts and tighten to 40 foot-pounds. Slide the crankshaft oil slinger over shaft and up against sprocket (flange away from sprocket).

Oil Seal Replacement (Cover Removed)

(1) Position remover screw of Tool C-3506 through case cover, inside of case cover up. Position remover blocks directly opposite each other,

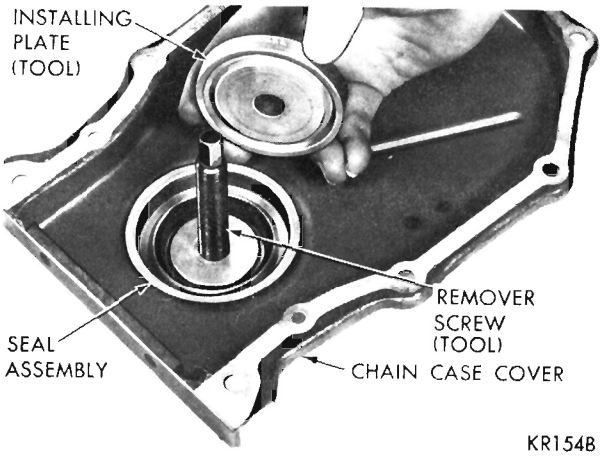


Fig. 21 - Positioning Installer Plate

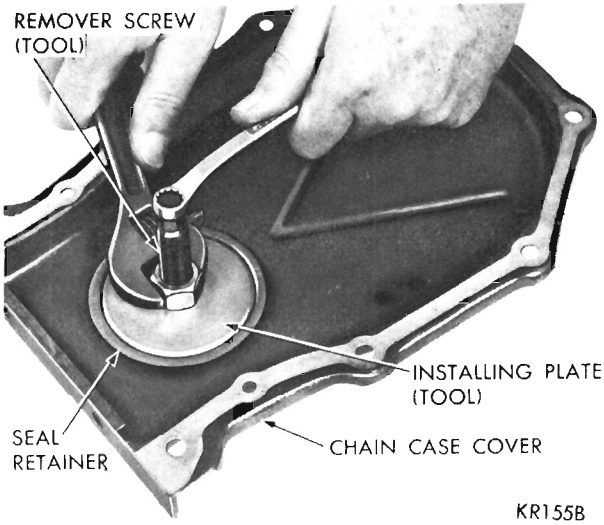


Fig. 22 - Installing New Seal

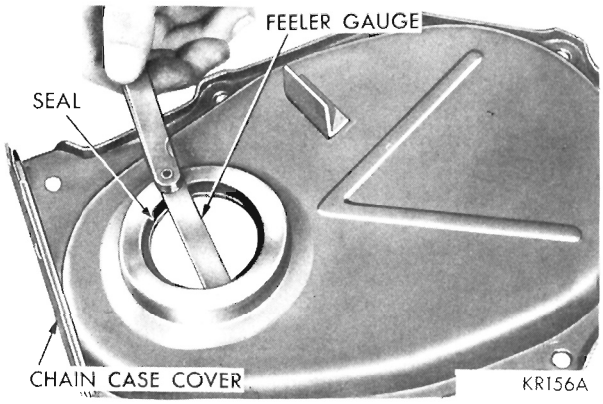


Fig. 23 - Inspecting Seal for Proper Seating

and force the angular lip between the neoprene and flange of seal retainer.

(2) Place washer and nut on remover screw. Tighten nut, forcing the blocks into the gap to a point of distorting the seal retainer lip (Fig. 19). This is important, **remover is only positioned at this point.**

(3) Place sleeve over retainer and place removing and installing plate into the sleeve.

(4) Place flat washer and nut on the remover screw. Hold center screw and tighten remover nut to remove the seal (fig. 20).

(5) Insert remover screw through the removing and installing plate so thin shoulder will be facing up.

(6) Insert remover screw with the plate through seal opening (inside of chain case cover facing up)

(7) Place seal in cover opening, with neoprene down. Place seal installing plate into the new seal, with protective recess toward lip of seal retainer (Fig. 21). **The lip of the neoprene seal must be toward source of oil.**

(8) Install flat washer and nut on remover screw, hold screw and tighten nut (Fig. 22).

(9) The seal is properly installed when the neoprene is tight against face of cover. Try to insert a .0015 inch feeler gauge between the neoprene and the cover (Fig. 23). If the seal is installed properly, feeler gauge cannot be inserted. **Do not over compress neoprene.**

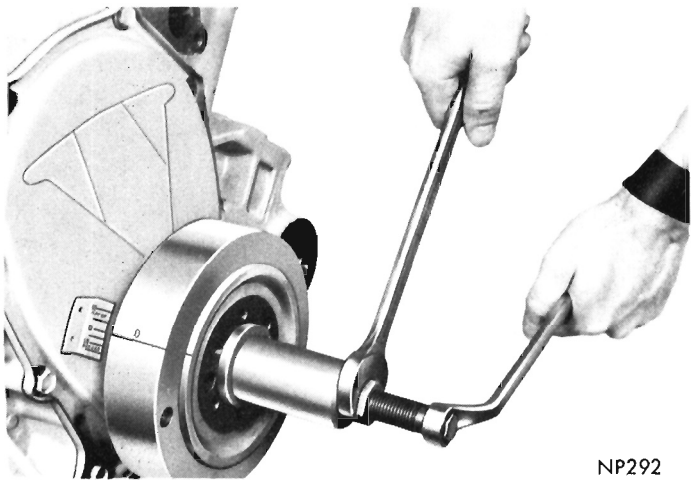


Fig. 24 - Installing Vibration Damper Assembly

Cover Installation

(1) Be sure mating surfaces of chain case cover and cylinder block are clean and free from burrs.

(2) Using a new gasket slide chain case cover over locating dowels. Install and tighten bolts 15 foot-pounds.

(3) Lubricate seal lip with lubriplate, place damper hub slot on key in crankshaft, and slide vibration damper on crankshaft.

(4) Place installing tool part of Tool C-3688 in position and press damper on the crankshaft (Fig. 24).

(5) Install damper retainer washer and bolt. Tighten to 135 foot-pounds.

(6) Slide belt pulley over shaft and attach with bolts and lockwashers. Tighten bolts to 200 inch-pounds.

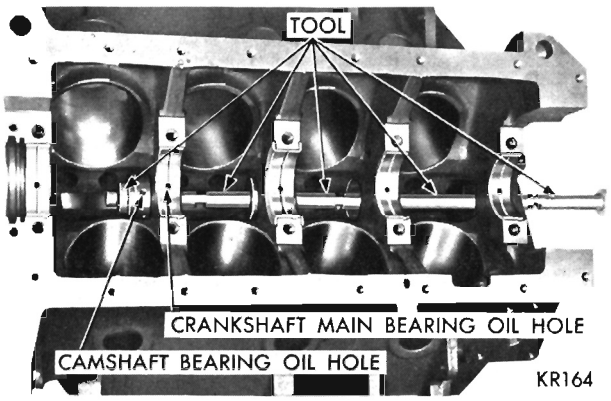


Fig. 25 - Removing Camshaft Bearing

CAMSHAFT

The camshaft has an integral oil pump and distributor drive gear and fuel pump eccentric.

The rearward camshaft thrust is taken by the rear face of the cast iron camshaft sprocket hub, bearing directly on the front of cylinder block, eliminating need for a thrust plate. The helix of the oil pump and distributor drive gear and camshaft lobe taper both tend to provide a rearward thrust.

Removal

(1) With tappets and the timing chain and sprockets removed, remove distributor and lift out oil pump and distributor drive shaft.

(2) Remove fuel pump to allow fuel pump push rod to drop away from cam eccentric.

(3) Remove camshaft, being careful not to damage camshaft bearings with the cam lobes.

Installation

(1) Lubricate camshaft lobes and camshaft bearing journals and insert camshaft to within 2 inches of its final position in cylinder block.

(2) Modify Tool C-3509 by grinding off index lug holding the upper arm on the tool and rotate arm 180 degrees.

(3) Install Tool C-3509 in place of distributor drive gear and shaft, as shown in Figure 17.

(4) Hold tool in position with distributor lock plate screw. This tool will restrict camshaft from being pushed in too far and prevent knocking out the welch plug in the rear of cylinder block.

The tool should remain installed until camshaft and crankshaft sprockets and timing chain have been installed.

Whenever camshaft is replaced, all of tappet faces must be inspected for crown with a straight edge. If any contact surface is dished or worn, tappet must be replaced.

CAMSHAFT BEARINGS

(Engine Removed From Vehicle)

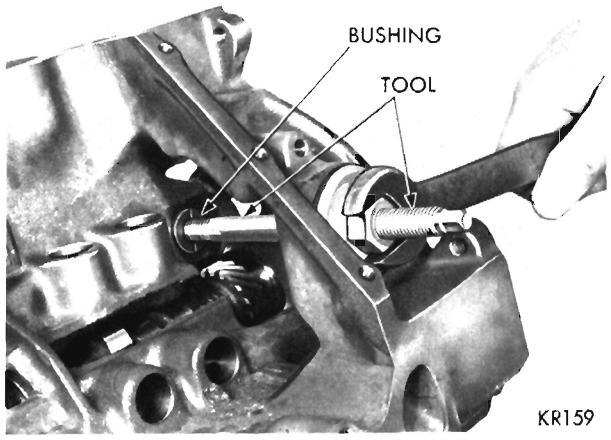


Fig. 26 - Removing Distributor Drive Shaft Bushing

Removal

(1) With engine completely disassembled, drive out camshaft rear bearing welch plug.

(2) Install proper size adapters and horse shoe washers (part of Tool C-3132A) at the back of each bearing to be removed and drive out bearings (Fig. 25).

Installation

(1) Install new camshaft bearings with Tool C-3132A. Place new camshaft bearing over proper adapter.

(2) Position bearing in the tool. Install the horse shoe lock and by reversing removal procedure, carefully drive bearing into place (Fig. 25).

(3) Install remaining bearings in like manner.

Install the No. 1 camshaft bearing 1/32 inch inward from the front face of cylinder block.

The oil holes in camshaft bearings and the cylinder block must be in exact register to insure proper lubrication.

The camshaft bearing index can be inspected after installation by inserting a pencil flashlight in the bearing. The camshaft bearing oil hole should be perfectly aligned with the drilled oil passage from the main bearing. Other oil holes in the camshaft bearings should be visible by looking down on the left bank oil hole above and between No. 6 and No. 8 cylinders to No. 4 camshaft bearing and on the right bank above and between No. 5 and 7 cylinders to No. 4 camshaft bearings. If camshaft bearing oil holes are not in exact register, remove and reinstall them correctly. Install a new welch plug at rear of camshaft. **Be sure this plug does not leak.**

DISTRIBUTOR DRIVE SHAFT BUSHING

Removal

(1) Insert Tool C-3052 into the old bushing and

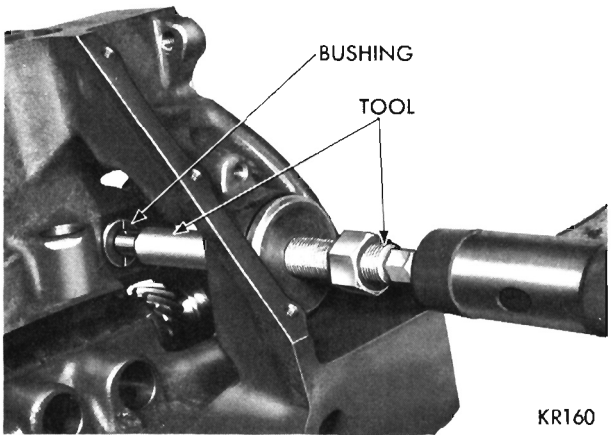


Fig. 27 - Installing Distributor Drive Shaft Bushing

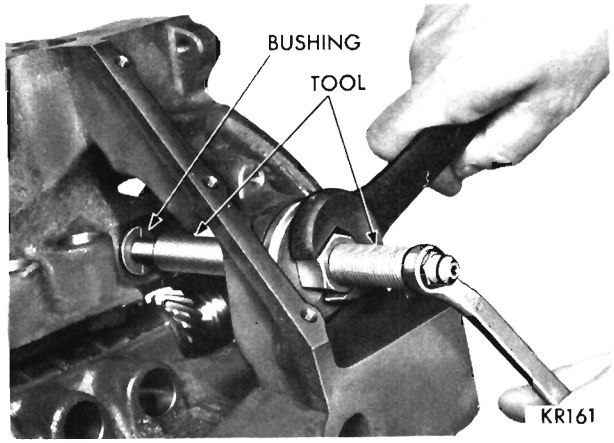


Fig. 28 - Burnishing Distributor Drive Shaft Bushing

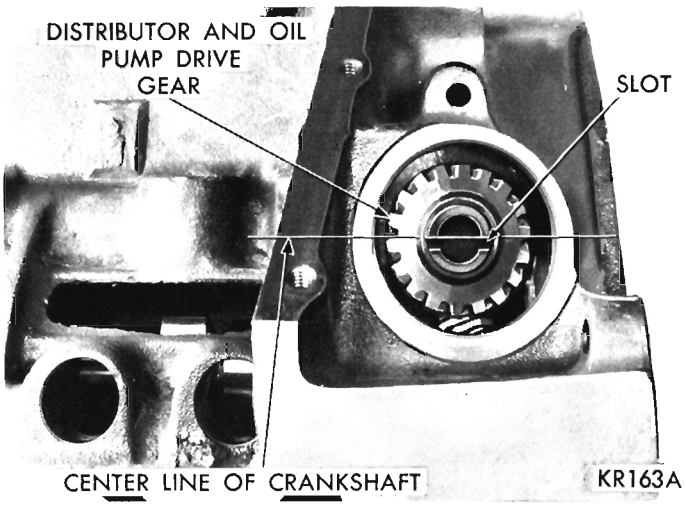


Fig. 29 - Distributor Drive Gear Installed

thread down until tight fit is obtained (Fig. 26).

(2) Hold remover screw and tighten nut until bushing is removed.

Installation

(1) Slide a new bushing over burnishing end of Tool C-3053 and insert tool bushing into the bore.

(2) Drive bushing and tool into position, using a hammer (Fig. 27).

(3) As the burnisher is pulled through the bushing by tightening remover nut, the bushing is expanded tight in the block and burnished to correct size (Fig. 28). **DO NOT REAM THIS BUSHING.**

Distributor Timing

Before installing distributor and oil pump drive shaft, time the engine as follows:

(1) Rotate crankshaft until No. 1 cylinder is at top dead center on the firing stroke.

(2) When in this position, the straight line on the vibration damper should be under "O" on timing indicator.

(3) Coat shaft and drive gear with engine oil. Install the shaft so that after gear spirals into place, it will index with the oil pump shaft, so slot in top of drive gear will be parallel with center line of crankshaft (Fig. 29).

Installation of Distributor

(1) Hold distributor over mounting pad on cylinder block with vacuum chamber pointing toward center of engine.

(2) Turn rotor until it points forward and to approximate location of No. 1 tower terminal in the distributor cap.

(3) Place distributor gasket in position.

(4) Lower the distributor and engage the shaft in the slot of distributor drive shaft gear.

(5) Turn distributor clockwise until breaker contacts are just separating, install and tighten hold down clamp.

CYLINDER BLOCK

The cylinder block is of the deep block design which eliminates the need for a torque converter housing adapter plate. The cylinder block reinforced in the vicinity of the main bearing web. Number 2,3 and 4 main bearing caps receive added support from a pair of horizontal tie-bolts which anchor the bearing caps to the sides of the cylinder block. The sides extend three inches below the crankshaft center line.

Piston Removal

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation.**

The pistons and connecting rods must be removed from the top of the cylinder block. When removing piston and connecting rod assemblies from the engine, rotate the crankshaft so each

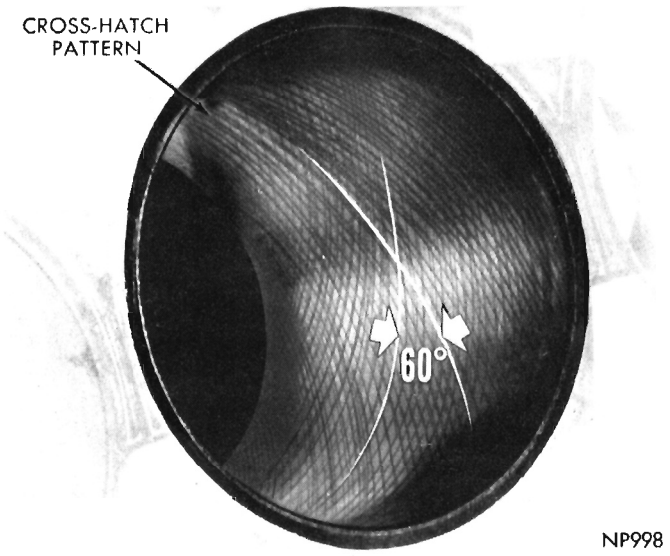


Fig. 30 - Cross Hatch Pattern

connecting rod is centered in cylinder bore.

(2) Inspect connecting rods and connecting rod caps for cylinder indentification. Identify them if necessary. Remove connecting rod cap.

(3) Install suitable connecting rod guides on rod bolts and push each piston and rod assembly out of cylinder bore. (Connecting rod guides to cover the complete threaded area can be made from copper or aluminum tubing and the inside threaded with a 7/16 inch - 20 tap.)

(4) After removal, install the corresponding bearing cap on the rod.

Cleaning and Inspection

(1) Clean cylinder block thoroughly and inspect all core hole plugs for evidence of leaking.

(2) If new core plugs are installed, coat edges of plug and core hole with Number 1057794 Sealer or equivalent. Drive the core plug in so that the rim lies at least 1/64 inch below the lead-in chamfer.

(3) Examine block for cracks or fractures.

Cylinder Bore Inspection

The cylinder walls should be measured for out-of-round and taper with Tool C-119. If the cylinder bores show more than .005 inch out-of-round, or a taper of more than .010 inch or if the cylinder walls are badly scuffed or scored, the cylinder block should be rebored and honed, and new pistons and rings fitted. Whatever type of boring equipment is used, boring and honing operation should be closely coordinated with the fitting of pistons and rings in order that specified clearance may be maintained.

Honing Cylinder Bores

Before honing, stuff plenty of clean rags under the bores, over the crankshaft to keep the abrasive materials from entering the crankscase area.

(1) Used carefully, the cylinder bore resizing hone C-823 equipped with 220 grit stones and 390 extensions necessary with the 426 cubic inch engine is the best tool for this job. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually, a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, Tool C-3501, equipped with 280 grit stones (3501-3810) if the cylinder bore is straight and round. 20 to 60 strokes depending on the bore condition will be sufficient to provide a satisfactory surface. Inspect cylinder walls after each 20 strokes. Use honing oil C-3501-3880 or a light honing oil available from major oil distributors. **Do not use engine or transmission oil, mineral oil or kerosene.**

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 60 degrees, cross hatch angle is most satisfactory for proper seating of rings (see Fig. 30).

(4) After honing, it is necessary that the block be cleaned again to remove all traces of abrasives. Wash cylinder block and crankshaft thoroughly.

CAUTION: Be sure all abrasives are removed from the engine parts after honing. It is recommended that a solution of soap and water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and the cloth remains clean. Oil bores after cleaning to prevent rusting.

PISTONS, PINS AND RINGS

Pistons

The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the thrust face. This allows for expansion under normal operating conditions. Under operating temperatures, expansion forces the pin bosses away from each other, thus causing the piston to assume a more nearly round shape. It is important that old or new pistons be measured for taper and elliptical shape before they are fitted into the cylinder bore.

Finished Pistons

All pistons are machined to the same weight in grams, regardless of oversize so piston balance can be maintained. For cylinder bores which have been honed or rebored, pistons are available in standard and the following oversizes: .005, .020, and .040 inch.

Fitting Pistons

Piston and cylinder wall must be clean and dry. Specified clearance between the piston and the cylinder wall is .0025 to .0035 inch.

Piston diameter should be measured at the top of skirt 90 degrees to piston pin axis. Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line.

Pistons and cylinder bores should be measured at normal room temperature, 70 degrees F.

All service pistons include pins, and are available in standard and the following oversizes: .005, .020 and .040 inch.

Fitting Rings

(1) Measure piston ring gap about two inches from bottom of cylinder bore in which it is to be fitted. (An inverted piston can be used to push rings down to insure positioning rings squarely in cylinder wall before measuring.)

(2) Insert feeler stock in the gap. Ring gap should be between .013 to .025 inch for the compression rings and .015 to .062 inch for the oil ring steel rails in standard size bores. Maximum gap on .005 inch O/S bores should be .060 inch for compression rings and .070 inch for the oil ring steel rails.

(3) Measure side clearance between piston ring and ring groove. Clearance should be .0015 to .003 inches for the top compression ring and intermediate ring. Steel rail service oil ring should be free in groove, but should not exceed .005 inch side clearance.

(4) Install the three piece oil ring in lower ring groove using instructions in ring package.

(5) Install compression rings in middle and top groove as shown on instruction sheet. Be sure the mark "top" on each compression ring faces top of piston.

(6) For the two top rings use ring installer Tool C-3673.

Piston Pins

(1) The piston pin should be a tight thumb press fit in connecting rod and piston at normal room temperature, 70 degree F. If proper fit cannot be obtained with standard pins, hone or ream piston and connecting rod, and install oversize piston pin. Piston pins are supplied in standard and the following oversizes: .003 and .008 inch.

(2) Position the left cylinder bank (1-3-5-7) pistons so the arrow indicating front is to the left of the operator and the connecting rod insert locating tang or number is facing the operator. Install piston pin and lock rings with the bevel edge away from the piston pin, using Tool C-3915.

(3) Assemble the right cylinder bank (2-4-6-8) so the arrow is to the right of the operator with the connecting rod insert locating tang or number is facing the operator. Install piston pin and lock rings with the bevel edge away from the piston pin using Tool C-3915.

CRANKSHAFT IDENTIFICATION

IMPORTANT: A Maltese Cross stamped on the engine numbering pad indicates that engine is equipped with a crankshaft which has one or more connecting rods and/or main bearing journal finished .001 inch undersize. The position of the undersize journal or journals is stamped on a machine surface of the No. 3 counterweight. A Maltese Cross with an X indicates .010 inch undersize journals.

The connecting rod journals are identified by the letter "R" and main bearing journals by the letter "M". For example "M-1" indicates that No. 1 main bearing is .001 inch undersize.

CONNECTING RODS

Installation of Connecting Rod Bearings

Fit all rods on one bank until complete. Do not alternate from one bank to another, because when rods are assembled to the pistons correctly, they are not interchangeable from one bank to another.

The bearings should always be installed so that the small formed tang fits into the machined grooves of the rods. The end clearance should be from .009 to .017 inch (two rods).

Limits of taper or out-of-round on any crankshaft journals should be held to a maximum of .0005 inch. Bearings are available in .001, .002, .003, .010, .011 and .012 inch undersize.

Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.

MEASURING CONNECTING ROD BEARING CLEARANCE

Shim Stock Method

(1) Place an oiled .002 inch brass shim stock (1/2 inch wide and 3/4 inch long) between the bearing and connecting rod journal.

(2) Install bearing cap and tighten to 75 foot-pounds.

(3) Turn connecting rod 1/4 turn in each direction. A slight drag should be felt which indicates clearance is satisfactory. Correct clearance is from .0015 to .0025 inch.

(4) Side play should be from .009 to .017 inch.

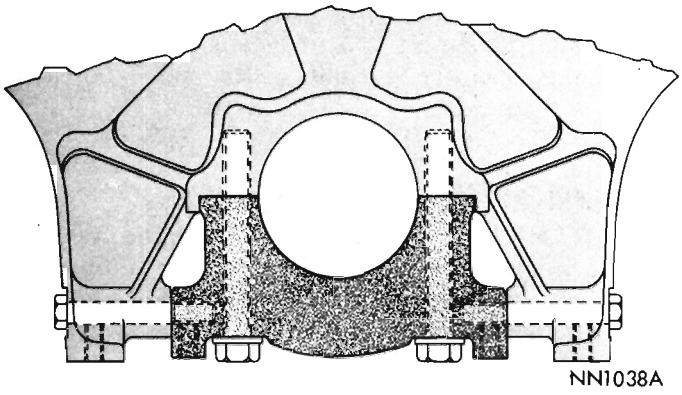


Fig. 31 - Main Bearing Cap with Horizontal Tie-Bolts

INSTALLING PISTON AND CONNECTING ROD ASSEMBLY

(1) Before installing pistons, rods, and rod assemblies in the bore, be sure that the compression ring gaps are staggered so that neither are in line with oil ring rail gaps.

(2) The oil ring expander ends should be positioned toward the outside of the "V" of the engine. The oil ring rail gaps should be positioned opposite each other and above the piston pin holes.

(3) Immerse piston head and rings in clean engine oil, slide ring compressor, Tool C-385, over the piston and tighten with special wrench (part of Tool C-385).

(4) Be sure the position of rings does not change during this operation. Screw connecting rod bolt protectors on rod bolts.

Rotate crankshaft so connecting rod journal is on center of cylinder bore.

(5) Insert rod and piston into cylinder bore. Guide the rod over crankshaft journal.

(6) Tap piston down in cylinder bore, using handle of a hammer. At the same time, guide connecting rod into position on crankpin journal.

(7) The arrow on top of piston must be pointing toward front of engine and the number or the connecting rod insert locating tang must face outboard.

(8) Install rod caps, tighten nuts to 75 foot-pounds.

WHENEVER A HIGH PERFORMANCE ENGINE IS REBUILT AND/OR NEW PISTONS INSTALLED, ONE PINT OF SPERM OIL ADDITIVE, CHRYSLER PART NO. 3549586 OR EQUIVALENT SHOULD BE ADDED TO THE ENGINE OIL TO AID BREAK-IN. THIS OIL MIXTURE SHOULD BE RETAINED UNTIL THE NEXT REGULARLY SCHEDULED OIL CHANGE. REFER TO "LUBRICATION", GROUP "O" FOR SUBSEQUENT USE OF THIS ADDITIVE IN HIGH PERFORMANCE ENGINES.

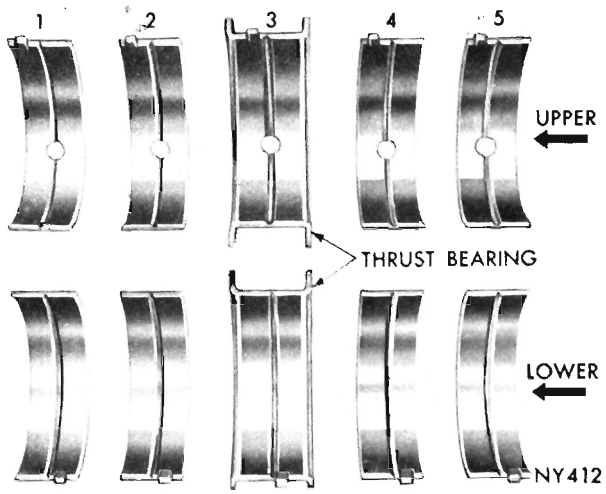


Fig. 32 - Main Bearing Identification

CRANKSHAFT MAIN JOURNALS

Crankshaft main bearing journals should be inspected for excessive wear, taper and scoring. Journal grinding should not exceed .012 inch under the standard journal diameter. **DO NOT** grind the thrust faces of the No. 3 main bearing. Do not nick crankpin or main bearing fillets. After regrinding, remove rough edges from crankshaft oil holes and clean out all oil passages.

CRANKSHAFT MAIN BEARINGS

The number 2,3 and 4 main bearing caps have two horizontal tie-bolts which anchor the bear caps to the sides of the block (Fig. 31).

New lower main bearings halves Number 1,2,4,5, are interchangeable (Fig. 32). New upper main bearing halves Number 2,4 and 5 are also interchangeable. Upper and lower bearing halves are not interchangeable because upper bearing has a oil hole and lower does not. Upper and lower bearings are grooved.

The No. 1 upper main bearing **IS NOT INTERCHANGEABLE AND IS CHAMFERED** on the tab side for timing chain oiling and can be identified by a red marking on edge of bearing.

Upper and lower No. 3 bearings are flanged to carry the crankshaft thrust loads and are **not interchangeable** with any other bearings in the engine.

Bearings that are not badly worn or pitted must be reinstalled in the same position.

Bearing caps are not interchangeable and should be marked at removal to insure correct assembly. Bearings are available in standard and the following undersizes: .001, .002, .003, .010, .011 and .012 inch. Do not install an undersize bearing that will reduce clearance below specifications.

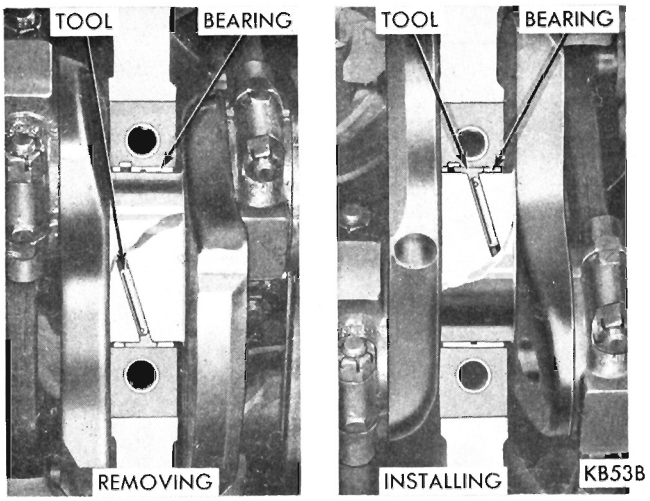


Fig. 33 - Removing or Installing Upper Main Bearing

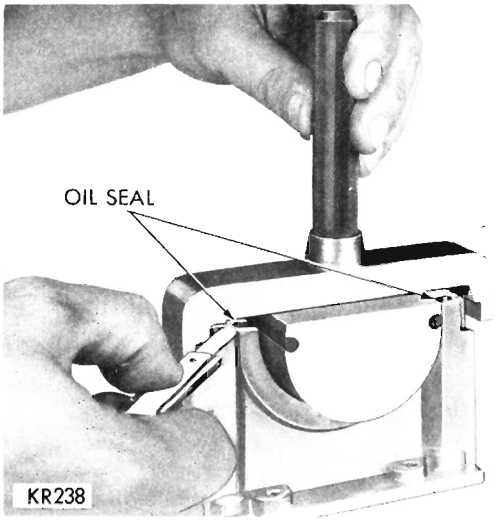


Fig. 35 - Trimming Rear Main Bearing Lower Oil Seal

Removal

(1) Remove oil pan and identify bearing caps before removal.

(2) Remove bearing caps one at a time. Remove upper half of bearing by inserting Tool C-3059 (Fig. 33) into oil hole of crankshaft.

(3) Slowly rotate crankshaft clockwise, forcing out upper half of bearing.

Installation

Only one main bearing should be selectively fitted while all other main bearing caps are properly torqued.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

(1) Start bearing in place, and insert Tool C-3059 into oil hole of crankshaft (Fig. 33).

(2) Slowly rotate crankshaft counter-clockwise sliding the bearing into position. Remove Tool C-3059.

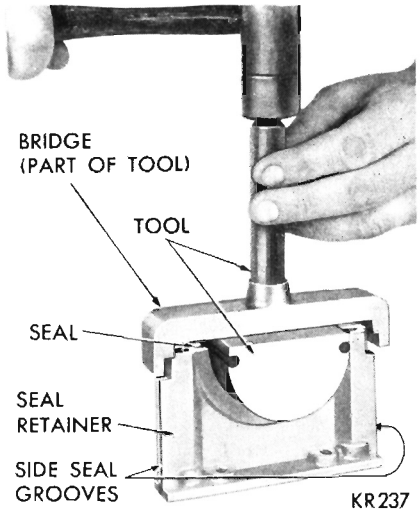


Fig. 34 - Installing Rear Main Bearing Lower Oil Seal

MEASURING MAIN BEARING CLEARANCE

Shim Stock Method

(1) Smooth edges of a 1/2 x 3/4 inch piece of brass shim stock, .002 inch thickness.

(2) Install bearing in center main bearing cap, bearing tang in groove in cap, lubricate bearing and position shim stock across the bearing, install cap and horizontal tie bolts. Tighten cap bolts to 100 foot-pounds, then horizontal tie bolts to 45 foot-pounds.

(3) If a slight drag is felt as crankshaft is turned (moved no more than 1/4 turn in either direction) , clearance is .002 inch or less and is considered satisfactory.

If, however, no drag is felt, the bearing is too large or crankshft cannot be rotated, bearing is too small and should be replaced with the correct size.

(4) Measure crankshaft end play .002 to .007 inch. If end play is less than .002 inch or more than .007 inch, install a new number 3 main bearing.

(5) Fit remaining bearings in same manner.

It is permissable to use one .001 inch undersize bearing shell with one standard bearing shell or one .002 inch undersize bearing shell with one .001 inch undersize shell. **Always use the smaller diameter bearing half as the upper. Never use an upper bearing half more than .001 inch smaller than the lower bearing half and never use a new bearing half with a used bearing half.**

REAR MAIN BEARING OIL SEAL

(Crankshaft Removed)

Upper Rear Main Seal Installation

(1) Install a new rear main bearing oil seal in cylinder block so that both ends protrude.

(2) Tap seal down into position, using Tool C-3743 with bridge removed until tool is seated in bearing bore.

(3) Hold the tool in this position and cut off portion of seal that extends above the block on both sides.

Lower Rear Main Seal Installation

(1) Install a new seal in seal retainer so ends protrude (Fig. 34).

(2) Install bridge on tool and tap the seal down into position with Tool C-3743 until tool is seated.

(3) Trim off that portion of the seal that protrudes above the cap (Fig. 35).

Side Seals Installation

Perform the following operations as rapidly as possible. These side seals are made from a material that expands quickly when oiled.

(1) Apply mineral spirits or diesel fuel to the side seals.

(2) Install seals immediately in the seal retainer grooves.

(3) Install seal retainer and tighten screws to 25 foot-pounds.

Failure to pre-oil the seals will result in an oil leak.

ENGINE OILING SYSTEM

OIL PAN

Removal

(1) Disconnect battery cable and remove dipstick.

(2) Raise vehicle on a hoist and disconnect steering linkage from idler arm and steering arm.

(3) Drain crankcase oil.

(4) Remove converter dust shield.

(5) Remove oil pan bolts. Turn flywheel until counterweight and connecting rods at front end of crankshaft are at their highest position to provide clearance, and lower the pan. Turn pan counterclockwise to clear oil screen and suction pipe as it is lowered.

Installation

(1) Inspect alignment of oil strainer. The bottom of the strainer must be on a horizontal plane with machined surface of cylinder block. The bottom of the strainer must touch the bottom of oil pan.

(2) Clean oil pan gasket surface. Inspect pan rails for distortion and straighten if necessary.

(3) Install oil pan.

(4) Install converter dust shield.

(5) Connect steering linkage at idler arm and at pitman arm.

(6) Connect battery cable.

(7) Install drain plug and refill crankcase with the proper grade and quantity of oil.

OIL PUMP

Removal

Remove oil pump attaching bolts and remove pump and filter assembly from bottom side of engine.

Disassembly

(1) Remove filter base and oil seal ring.

(2) Remove pump rotor and shaft and lift out outer pump rotor.

(3) Remove the oil pressure relief valve plug and

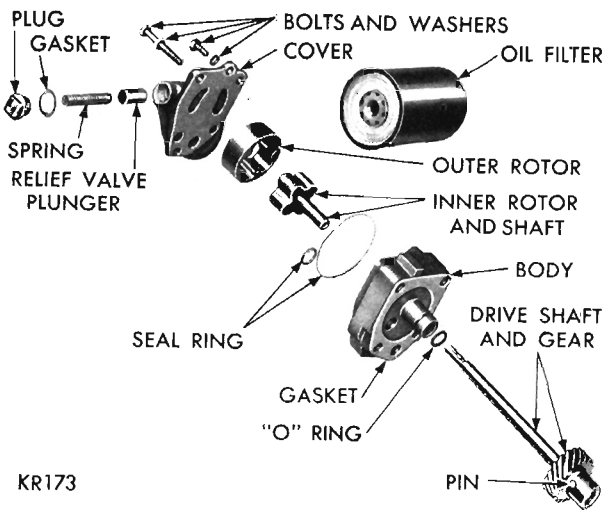


Fig. 36 - Oil Pump and Filter Assembly (Disassembled View)

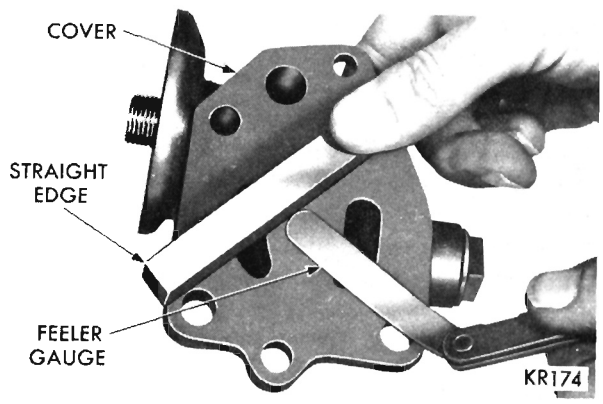


Fig. 37 - Measuring Oil Pump Cover Flatness

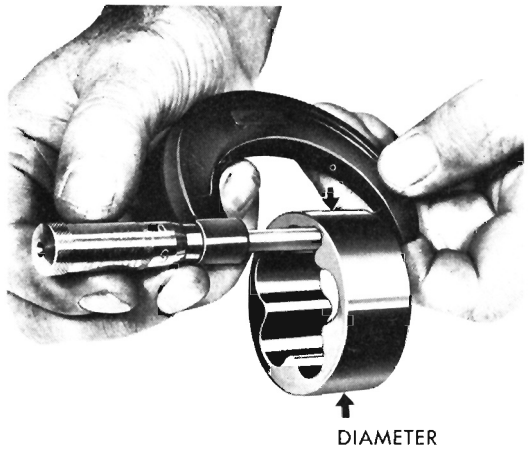


Fig. 38 - Measuring Outer Rotor Thickness

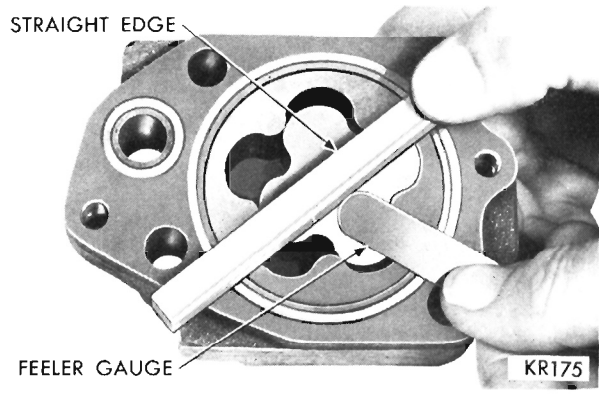


Fig. 41 - Measuring Clearance Over Rotors

lift out the spring and relief valve plunger (Fig. 36).

Inspection and Assembly

(1) Clean all parts thoroughly. The mating face of filter base (oil pump cover) should be smooth. Replace filter base if it is scratched or grooved.

(2) Lay a straightedge across oil pump filter base surface (Fig. 37). If a .0015 inch feeler gauge can be inserted between the base and straightedge, filter base should be replaced.

(3) If outer rotor length measures less than .943 inch (Fig. 38) and diameter less than 2.469 inches, replace outer rotor.

(4) If inner rotor length measures less than .942 inch (Fig. 39), a new inner rotor should be installed.

(5) Install outer rotor into pump body, pressing to one side with fingers and measure clearance between outer rotor and pump body (Fig. 40). If measurement is more than .014 inch, replace oil pump body.

(6) Install inner rotor pump body and place a straightedge across the face between bolt holes



Fig. 39 - Measuring Inner Rotor Thickness

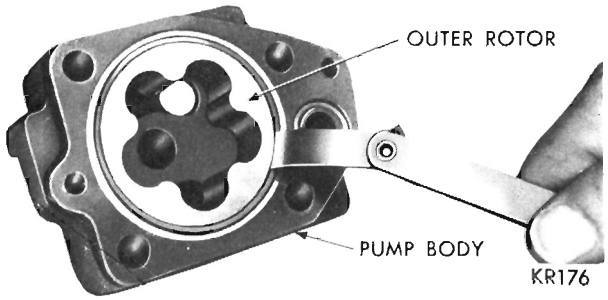


Fig. 40 - Measuring Outer Rotor Clearance

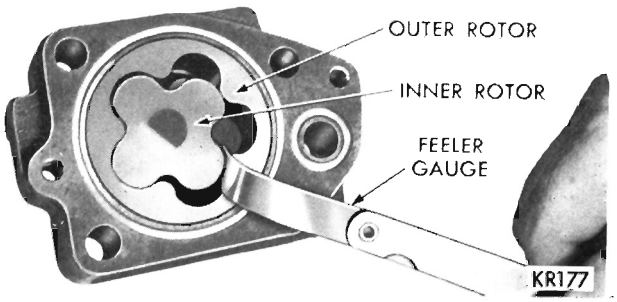


Fig. 42 - Measuring Clearance Between Rotors

(Fig. 41). If a feeler gauge of more than .004 inch can be inserted between the rotors and straightedge, replace pump body.

(7) If the tip clearance between inner and outer rotors (Fig. 42) is more than .010 inch, replace inner and outer rotor.

Servicing Oil Pressure Relief Valve

Inspect oil pump relief valve plunger for scoring and free operation in its bore. Small scores may be removed with 400 grit wet or dry paper.

The relief valve spring has a free length of 2-9/32 to 2-19/64 inch and should test 22.3 to 23.3 lbs. when compressed to 1-19/32 inch. Discard spring that fails to meet specifications.

If the oil pressure is low, inspect for worn bearings, or look for other causes of possible loss of oil pressure. **When assembling the oil pump, be sure to use new oil seal rings between filter**



Fig. 43 - Removing Oil Filter

base and pump body.

Installation

(1) Install a new "O" ring seal on the pilot of oil pump before attaching oil pump to cylinder block.

(2) Install oil pump on engine, using a new gasket on engine and tighten attaching bolts to 30 foot-pounds. Install oil filter element.

OIL FILTER REPLACEMENT

The "spin on " oil filter should be replaced preferable to concide with every second oil change.

Removal

Use care so as not to damage transmission oil cooler lines.

(1) Using Tool C-4065 unscrew the filter from the base on bottom side of engine and discard (Fig. 43).

(2) Wipe base clean.

Installation

(1) Install the "spin on" oil filter by hand, finger tight. Do not use tool.

(2) To obtain an effective seal, tighten filters by hand the additional number of turns indicated on the replacement filter. Start engine and inspect for leaks.

CRANKCASE VENTILATION SYSTEM

A fully closed crankcase ventilation system is installed on all vehicles. The fully closed ventilation system operates by air drawn into the crankcase from the air cleaner and through the crankcase inlet air cleaner by means of a hose (Fig. 1). Air is circulated through the engine and drawn out of the cylinder head cover by manifold vacuum into the combustion chambers and dispelled with the exhaust gases.

The system consists of a ventilation valve installed in the outlet vent of the cylinder head cover, and a hose. The hose is connected between the outlet vent and the lower part of the carburetor body. The function of the valve is to regulate the flow of crankcase ventilation at various throttle positions and will operate effectively as long as normal maintenance is applied.

The valve and hose are subject to fouling with sludge and carbon formation due to the nature of the material carried by the ventilation system.

A plugged vent system may in turn cause excessive engine crankcase sludge formation and may also cause rough or erratic engine idle or excessive oil leakage. The ventilation system should be cleaned every six months and valve replaced every year in average service and more frequently if the vehicle is used extensively for short trips—driving

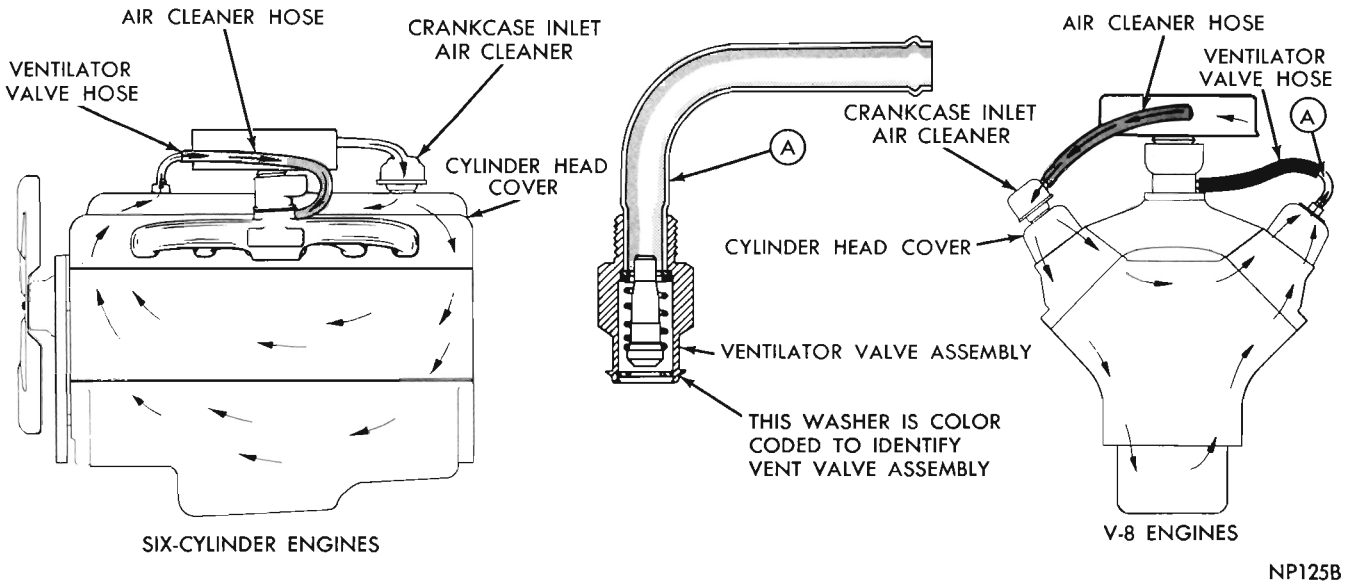


Fig. 1 - Fully Closed Ventilation System (Typical)

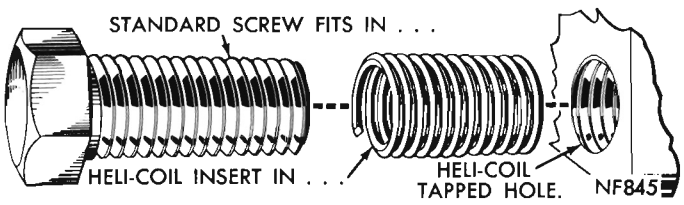


Fig. 2 - Heli-Coil Installation

less than 10 miles —with frequent idling, such as city traffic.

See the "Lubrication and Maintenance" section, Group O of this manual for proper service procedures.

REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads can be repaired by the use of Heli-Coils. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, and installing a Heli-Coil Insert into the tapped hole. This brings the hole back to its orignal thread size (See Fig. 2).

The following chart lists the threaded hole sizes which are used in the engine block and the necessary tools and inserts for the repair of damaged or worn thread. Heli-Coil tools and inserts are readily available from automotive parts jobbers.

Heli-Coil Insert			Drill	Tap	Inserting Tool	Extracting Tool
Thread Size	Part No.	Insert Length	Size	Part No.	Part No.	Part No.
1/2-20	1185-4	3/8"	17/64(.266)	4 CPB	528-4N	1227-6
5/16-18	1185-5	15/32"	Q(.332)	5 CPB	528-5N	1227-6
3/8-16	1185-6	9/16"	X(.397)	6 CPB	528-6N	1227-6
7/16-14	1185-7	21/32"	29/64(.453)	7 CPB	528-7N	1227-16
1/2-13	1185-8	3/4"	33/64(.516)	8 CPB	528-8N	1227-16

SPECIFICATIONS

SIX CYLINDER ENGINE

198-225 Cubic Inch Engines	
Type	In-Line OHV
Number of Cylinders	6
Bore	3.40"
Stroke—198 Cubic Inch	3.640"
225 Cubic Inch	4.125"
Piston Displacement	198-225 cu. in.
Compression Ratio—198 Cubic Inch	8.40 to 1
225 Cubic Inch	8.40 to 1
Minimum Compression Pressure with Engine Warm, Spark Plugs Removed, Wide-Open Throttel	100 psi
Maximum Variation Between Cylinders (any one engine)	25 psi
Firing Order	1-5-3-6-2-4
Basic Timing—198 Cubic Inch	2-1/2° BTC±2-1/2°
225 Cubic Inch	
With Distributor 2875822, 2875826	TDC ± 2-1/2°
3438440, 3438442	2-1/2°BTC±2-1/2°

CRANKSHAFT	
Type	Fully Counter-Balanced
Bearings	Steel-Backed Babbitt
Main Bearing Journal Diameter	2.7495" to 2.7505"
Connecting Rod Journal Diameter	2.1865" to 2.1875"
Maximum Out-of-Round Permissible	.001"
Number Main Bearings	4
Clearance Desired	.0005" to .002"
Maximum Clearance Allowance Before Reconditioning	.0025"
End Play	.002" to .007"
Thrust Taken by	No. 3 Main Bearing
Finish at Rear Seal Surface	Diagonal Knurling
Interchangeability of Bearings	Upper Nos. 2, 4 Lower Nos. 1,2,4

MAIN BEARINGS (service)	
All available in Standard and the following Undersizes	.001, .002, .003, .010, .012"

CONNECTING RODS AND BEARINGS	
Type	Drop Forged "I" Beam
Length (Center to Center)	198—7.003" to 7.007" 225—6.697" to 6.701"
Weight (Less Bearing Shells)	198—27 oz. 225—26.8 oz.
Bearings	Steel-Backed Babbitt
Diameter and Length	2.1870" to 1.015"
Clearance Desired	.0005 to .002"
Maximum Allowable before Reconditioning	.0025"
Side Clearance	.006" to .012"
Bearings for Service	Standard .001, .002 .003, .010, .012" U.S.
Piston Pin Bore Diameter	.8995 to .9000"

CAMSHAFT	
Drive	Chain
Bearings	Steel-Backed Babbitt
Number	4
Thrust Taken by	Cylinder Block
Clearance	.001" to .003"
Maximum Allowable Before Reconditioning	.005"
CAMSHAFT BEARING JOURNALS	
Diameter	
No. 1	1.998" to 1.999"
No. 2	1.982" to 1.983"
No. 3	1.967" to .1968"
No. 4	1.951" to 1.952"
CAMSHAFT BEARINGS	
Diameter (after reaming)	
No. 1	2.000" to 2.001"
No. 2	1.984" to 1.985"
No. 3	1.969" to 1.970"
No. 4	1.953" to 1.954"
TIMING CHAIN	
Number of Links	50
Pitch	50"
Width	.88'
TAPPETS	
Type	Mechanical
Clearance in Block	.0012" to .00025"
Body Diameter	.9040" to .9045"
Clearance Between Valve Stem and Rocker Arm Pad (Engine Hot)	.010" Intake .020" Exhaust
PISTONS	
Type	Horizontal Slot w/Steel Struts
Material	Aluminum Alloy Tin Coated
Land Clearance (diametrical)	.024" to .031"
Clearance at Top of Skirt	.0005" to .0015"
Weight (std. through .040 oversize)	465 gms.
Piston Length (overall)	3.51"
Ring Groove Depth	
No. 1	.179"
No. 2	.179"
No. 3	.181"
Pistons for Service	Std. .005, .020, .040" O.S.
PISTON PINS	
Type	Press Fit in Rod
Diameter	.9007"–.9009"
Length	2.955"–2.975"
Clearance in Piston	.00045" to .00075"
Interference in Rod	.0007" to .0012"
Piston Pins for Service	Standard Only
Direction Offset in Piston	Toward Right Side of Engine

PISTON RINGS	
Number of Rings per Piston	3
Compression	2
Oil	1
Oil Ring Type	3-piece steel rail chrome-face
Ring Width	
Compression	.0775"-.0780"
Oil–Steel rails	.025"
Ring Gap	
Compression	.010"-.020"
Oil Steel rails	.015"-.055"
Ring Side Clearance	
Compression	.0015"-.0030"
Oil–Steel rails	.0002"-.005"
Service Rings	
Ring Gap	
Compression	.010"-.047"
Oil (Steel rails)	.015"-.062"
Ring Side Clearance	
Compression	.0015"-.004"
Oil (Steel rails)	.0002"-.005"
VALVE TIMING	
Intake Opens (BTC)	16°
Closes (ATC)	48°
Exhaust Opens (BBC)	54°
Closes (ATC)	10°
Valve Overlap	26°
Intake Valve Duration	244°
Exhaust Valve Duration	244°
VALVES–Intake	
Material	Carbon Manganese Steel
Head Diameter	1.615"–1.625"
Length (to gauge dim. Line)	4.6878"–4.7028"
Stem Diameter	.372" to .373"
Stem to Guide Clearance	.001" to .003"
Maximum Allowable Before Reconditioning	.017"*
Valve Face Angle	45°
Adjustment	Rocker Arm Screw
Lift	.406"
VALVES–Exhaust	
Material	Nitrogen Treated Manganese Chromium Nickel Steel
Head Diameter	1.355"–1.365"
Length (to gauge dim. Line)	4.6878"–4.7028"
Stem Diameter	.371" to .372"
Stem to Guide Clearance	.002" to .004"
Maximum Allowable Before Reconditioning	.017"*
Valve Face Angle	43°
Adjustment	Rocker Arm Screw
Lift	.414"

*With tools C-3973 and C-339 using wobble method.

VALVE SPRINGS	
Number	12
Free Length	1.92"
Load when Compressed to (valve closed)	49–57 lbs. @ 1-11/16"
Load when Compressed to (valve open)	137/150 lbs. @ 1-5/16"
Valve Springs I.D.	1.010" to 1.030"
Valve Spring Installed Height (spring seat to retainer)	1-5/8"–1-11/16"
Use 1/16 inch spacer to reduce spring height when over specifications	
CYLINDER HEAD	
Combustion Chamber	Wedge Type
Valve Seat Run-Out (maximum)	.002"
Intake Valve Seat Angle	45°
Seat Width (finished)	.070" to .090"
Exhaust Valve Seat Angle	45°
Seat Width (finished)	.040" to .060"
Cylinder Head Gasket Compressed (thickness)	.022"
CYLINDER BLOCK	
Cylinder Bore (standard)	3.4000"
Cylinder Bore Out-of-Round (Max. allowable before reconditioning)	.005"
Cylinder Bore Taper (Max. allowable before reconditioning)	.010"
Reconditioning Working Limits (for taper and out-of-round)	.001"
Maximum Allowable Oversize Cylinder Bore	.040"
Tappet Bore Diameter	.9051"–.9059"
Distributor Lower Drive Shaft Bushing (press fit in block)	.005"–.0040"
Ream to	.4865"–.4880"
Shaft to Bushing Clearance	.007"–.0027"
ENGINE LUBRICATION	
Pump Type	Rotary, Full Pressure
Capacity (qts.)	4 U.S. or 3-1/4 Imperial**
Pump Drive	Camshaft
Operating Pressure at 1000 RPM	45 to 60 lbs.
Pressure Drop Resulting from Clogged Filter	7 to 9 lbs.
OIL-FILTER	
Type	Full Flow
Spin On	Replaceable

** When Filter Element is Replaced, Add 1 U.S. Quart or 3/4 Imperial Quart.

OIL PUMP—INSPECTION LIMITS FOR REPLACEMENT

Oil Pump Cover	.0015 inch or more
Outer Rotor Length	.649 inch or less
Outer Rotor Diameter	2.469 inch or less
Inner Rotor Length	.649 inch or less
Clearance Over Rotors—Outer	.004 inch or more
Inner	.004 inch or more
Outer Rotor Clearance	.014 inch
Tip Clearance Between Rotors	.010 inch or more

OVERSIZE AND UNDERSIZE ENGINE COMPONENT MARKINGS

Engine Displacement	Condition	Identification	Location of Identification
198 cu. in. 225 cu. in.	.001" U/S Crankshaft	Maltese Cross	Top of front pad—Right side of block
		M-2-3 etc. (indicating No. 2 & 3 main bearing journal) and/or R-1-4 etc. (indicating No. 1 & 4 connecting rod journals)	Crankshaft counterweight
	.010" U/S Crankshaft	Maltese Cross and X	Top of front pad—Right side of block
		M-10 (indicates .010" U/S all main journals) and/or R-10 (indicates .010" U/S all rod journals)	Crankshaft counterweight
	.020" O/S Cylinder Bores	A	Top of front pad—Right side of block
	.008" O/S Tappets	♦	Top of front pad—Right side of block

ENGINE	"318"	"340"	"360"
Type	90°V	90°V	90°V
Number of Cylinders	8	8	8
Bore	3.91"	4.040"	4.000"
Stroke	3.31"	3.31"	3.58"
Piston Displacement	318 cu. in.	340 cu. in.	360 cu. in.
Compression Ratio	8.8 to 1	10.5 to 1	8.80 to 1
Minimum Compression Pressure with Engine Warm, Spark Plugs Removed, Wide-Open Throttle	100 psi	110 psi	100 psi
Maximum Variation between Cylinders (any one engine)	40 psi	40 psi	40 psi
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Basic Timing	TDC ± 2½°	5 BTC ± 2½° - 4BBL 2½ BTC ± 2½° - 6BBL	2½ BTC ± 2½°
CYLINDER NUMBERING (front to rear)			
Left Bank	1-3-5-7	1-3-5-7	1-3-5-7
Right Bank	2-4-6-8	2-4-6-8	2-4-6-8
CYLINDER BLOCK			
Cylinder Bore (standard)	3.910"-3.912"	4.040"-4.0420"	4.000"-4.002"
Cylinder Bore Out-of-Round (Max. allowable before reconditioning)	.005"	.005"	.005"
Cylinder Bore Taper (Max. allowable before reconditioning)	.010"	.010"	.010"
Reconditioning Working Limits (for taper and out-of-round)	.001"	.001"	.001"
Maximum Allowable Oversize (cylinder bore)	.040"	.040"	.040"
Tappet Bore Diameter	.9051"-.9059	.9051"-.9059"	.9051"-.9059"
Distributor Lower Drive Shaft Bushings (press fit in block)	.0005"-.0040"	.0005"-.0040"	.0005"-.0040"
Ream to	.4865"-.4880"	.4865"-.4880"	.4865"-.4880"
Shaft to Bushing Clearance	.0007"-.0027"	.0007"-.0027"	.0007"-.0027"
PISTONS			
Type Material	Autothermic Alloy Tin Coated	Autothermic Alloy Tin Coated	Autothermic Alloy Tin Coated
Land Clearance (diametrical)	.019"-.027"	.019"-.027"	.021"-.028"
Clearance at Top of Skirt	.0005"-.0015"	.0005"-.0015"	.0005"-.0015"
Weight (Std. through .040" oversize)	592 gms.	719 gms.	584 gms.

ENGINE	"318"	"340"	"360"
Piston Length (overall)	3.47"	3.545"	3.19"
Ring Groove Depth			
No. 1	.205"	.210"	.210"
No. 2	.205"	.210"	.210"
No. 3	.194"	.198"	.199"
Pistons for Service	Std. .005", .020", .040" Oversize	Std. .005", .020", .040" Oversize	Std. .005", .020" .040" Oversize
PISTONS PINS			
Type	Full Floating	Full Floating	Press Fit in Rod
Diameter	.9841" - .9843"	.9841"-.9843"	.9841"-.9843"
Length	2.990"-3.000"	2.990"-3.000"	2.990"-3.000"
Clearance in Piston (Light Thumb Push @ 70°F.)	.0000"-.0005"	.0000"-.0005"	.0045"-.0075"
End Play	.004"-.026"	.004"-.026"	.004"-.026"
Clearance in Rod	.0000"-.0005"	.0000"-.0005"	.0007"-.0012" Inerference
Pins for Service	Std. .003", .008" Oversize	Std. .003", .008" Oversize	Standard Only
PISTON RINGS			
Number of Rings per Piston	3	3	3
Compression	2	2	2
Oil	1	1	1
Oil Ring Type	3-piece steel rail chrome-face	3-piece steel rail chrome-face	3-piece steel rail chrome-face
Ring Width			
Compression	.0775"-.0780"	.0775"-.0780"	.0775"-.0780"
Oil—Steel rails	.025"	.025"	.025"
Ring Gap			
Compression	.010"-.020"	.010"-.020"	.010"-.020"
Oil—Steel rails	.015"-.055"	.015"-.055"	.015"-.055"
Ring Side Clearance			
Compression	.0015"-.0030"	.0015"-.0030"	.0015"-.0030"
Oil—Steel rails	.0002"-.005"	.0002"-.005"	.0002"-.005"
Service Rings			
Ring Gap			
Compression	.010"-.020"	.010"-.020"	.010"-.020"
Oil (Steel rails)	.015"-.062"	.015"-.062"	.015"-.062"
Ring Side Clearance			
Compression	.0015"-.004"	.0015"-.004"	.0015"-.004"
Oil (Steel rails)	.0002"-.005"	.0002"-.005"	.0002"-.005"

ENGINE	"318"	"340"	"360"
CONNECTING RODS			
Length (Center to Center)	6.123"	6.123"	6.123"
Weight (less bearing shells)	726 gms.	758 gms.	758 gms.
Side Clearance (two rods)	.006"-.014"	.006"-.014"	.006"-.014"
Piston Pin Bore Diameter	1.037"-1.039"	1.037"-1.039"	1.037"-1.039"
CONNECTING ROD BUSHING			
Type	Steel Backed Bronze	Steel Backed Bronze	None
CONNECTING ROD BEARINGS (Type)	Steel Backed Grid Type	Tri-Metal Steel Backed	Steel Backed Grid Type
Diameter and Width	2.126" x .842"	2.126" x .842"	2.126" x .842"
Clearance desired	.0005"-.0020"	.0005"-.0020"	.0005"-.0020"
Maximum Allowable	.0025"	.003"	.0025"
Bearings for Service	Std., .001", .002" .003", .010", .012"	.003", .010", .012" .003", .010", .012"	.003", .010", .012" .003", .010", .012"
CRANKSHAFT			
Type	Fully Counter-Balanced	Fully Counter-Balanced	Fully External-Balanced
Bearings	Steel Backed Babbitt	Steel Backed Aluminum #1, 2, 3 & 4 Steel Backed Babbitt #5	Steel Backed Babbitt
Thrust Taken By	No. 3 Main Bearing	No. 3 Main Bearing	No. 3 Main Bearing
End Play	.002"-.007"	.002"-.007"	.002"-.007"
Maximum Allowable	.010"	.010"	.010"
Diametral Clearance Desired	.0005"-.0020"	.0005"-.0020"	.0005"-.0020"
Diametral Clearance Allowed	.0025"	.0025"	.0025"
Finish at Rear Oil Seal Surface	Diagonal Knurling	Diagonal Knurling	Diagonal Knurling
MAIN BEARING JOURNALS			
Diameter	2.4995"-2.5005"	2.4995"-2.5005"	2.8095"-2.8105"
Maximum Allowable Out-of-Round and/or Taper	.001"	.001"	.001"
Bearings for Service Available in Standard and the following undersizes	.001", .002", .003", .010", .012"	.001", .002", .003", .010", .012"	.001", .002", .003", .010", .012"
CONNECTING ROD JOURNALS			
Diameter	2.124"-2.125"	2.124"-2.125"	2.124"-2.125"
Maximum Allowable Out-of-Round and/or Taper	.001"	.001"	.001"
CAMSHAFT			
Drive	Silent Chain	Roller Chain	Silent Chain
Bearings	Steel Backed Babbitt	Steel Backed Babbitt	Steel Backed Babbitt
Number	5	5	5

ENGINE		"318"	"340"	"360"
Diametral Clearance		.001"-.003"	.001"-.003"	.001"-.003"
Maximum Allowable before Reconditioning		.005"	.005"	.005"
Thrust Taken By		Thrust Plate	Thrust Plate	Thrust Plate
End Play		.002"-.006"	.002"-.006"	.002"-.006"
Maximum Allowable		.010"	.010"	.010"
CAMSHAFT JOURNALS				
Diameter	No.1	1.998"-1.999"	1.998"-1.999"	1.998"-1.999"
	No. 2	1.982"-1.983"	1.982"-1.983"	1.982"-1.983"
	No. 3	1.967"-1.968"	1.967"-1.968"	1.967"-1.968"
	No. 4	1.951"-1.952"	1.951"-1.952"	1.931"-1.952"
	No. 5	1.5605"-1.5615"	1.5605"-1.5615"	1.5605"-1.5615"
CAMSHAFT BEARINGS				
Diameter	No. 1	2.000"-2.001"	2.000"-2.001"	2.000"-2.001"
	No. 2	1.984"-1.985"	1.984"-1.985"	1.984"-1.985"
	No. 3	1.969"-.1-970"	1.969"-1.970"	1.969"-1.970"
	No. 4	1.953"-.1.954"	1.953"-1.954"	1.953"-1.954"
	No. 5	1.5625"-1.5635"	1.5625"-1.5635"	1.5625"-1.5635"
VALVE TIMING				
			4BBL 6BBL	
Intake Opens(BTC)		10^{o}	22^{o} 22^{o}	16^{o}
Intake Closes(ABC)		50^{o}	66^{o} 66^{o}	56^{o}
Exhaust Opens (BBC)		52^{o}	74^{o} 74^{o}	60^{o}
Exhaust Closes (ATC)		16^{o}	22^{o} 22^{o}	16^{o}
Valve Overlap		26^{o}	44^{o} 44^{o}	32^{o}
Intake Valve Duration		240^{o}	268^{o} 268^{o}	252^{o}
Exhaust Valve Duration		248^{o}	276^{o} 276^{o}	256^{o}
TIMING CHAIN				
Number of Links		68	68	68
Pitch		.375"	–	.375"
Width		.625"	.860"	.625"
TAPPETS				
Type		Hydraulic	Hydraulic	Hydraulic
Body Diameter		.9035"-.9040"	.9035"-.9040"	.9035"-.9040"
Clearance in Block		.0011"-.0024"	.--11"-.0024"	.0011"-.0024"
Service Tappets Available		Std., .001", .008", .030"	Std., .001", .008", .030"	Std., .001", .008", .030"
Dry Lash		.060"-.210"	.060"-.210"	.060"-.150"

ENGINE	"318"	"340"	"360"
CYLINDER HEAD			
Valve Seat Run-Out (Maximum)	.002"	.002"	.002"
Intake Valve Seat Angle	45°	45°	45°
Seat Width (finish)	.060"-.095"	.060"-.085"	.060"-.085"
Exhaust Valve Seat Angle	45°	45°	45°
Seat Width (finish)	.040"-.060"	.040"-.060"	.040"-.060"
Cylinder Head Gasket (Thickness compressed)	.038"	,038"	.048"
VALVE GUIDES			
Type	Cast in Head	Cast in Head	Cast in Head
Guide Bore Diameter	.374"-.375" Std.	.374"-.375" Std.	.374"-.375" Std.
VALVES–(INTAKE)			
Head Diameter	1.780"	2.02"	1.88"
Length (to center of valve face)	4.90"	4.90"	4.90"
Stem Diameter (Standard)	.372"-.373"	.3715"-.3725"	.372"-.373"
Stem to Guide Clearance	.001"-.003"	.0015"-.0035"	.001"-.003"
Maximum Allowable	.017"*	.017"*	.017"*
Face Angle	45°	45°	45°
Valve for Service (Oversize Stem. Diam.)	Std., .005", .015", .030"	Std., .005", .015", .030."	Std., .005", .015", .030"
Lift (Zero Lash)	.373"	.429"	.410"
VALVES–(EXHAUST)			
Head Diameter	1.500"	1.60"	1.60"
Length to (center of Valve face)	4.90"	4.90"	4.90"
Stem Diameter (Standard)	.371"-.372"	.3705"-.3715"	.371"-.372"
Stem to Guide Clearance	.002"-.004"	.0025"-.0045"	.002"-.004"
Maximum Allowable	.017"*	.017"*	.017"*
Face Angle	43°	43°	43°
Valve for Service (Oversize Stem Diam.)	Std., .005", .030"	Std., .005", .030"	Std., .005", .030"
Lift (Zero Lash)	.399"	.444"	.412"
VALVE SPRINGS			
Number	16	16	16
Free Length	2.00"	1.94"	2.00"
Load when Compressed to (valve closed with surge damper removed)	78-88 lbs. @ 1-11/16"	80-90 lbs. @ 1-11/16"	78-88 lbs. @ 1-11/16"
Load when Compressed to (valve open with surge damper removed)	170-184 lbs. @ 1-5/16"	231-245 lbs. @ 1-5/16"	170-184 lbs. @ 1-5/16"
Valve Springs I.D.	1.010"-1.030"	1.070"-1.090"	1.010"-1.030"
Maximum Allowable Out of Plumb	1/16"	.080"	1/16"
Valve Spring Installed Height (spring seat to retainer)	1-5/8"-1-11/16"	1-5/8"-1-11/16"	1-5/8"-1-11/16"
Use 1/16" Spacer to Reduce Spring Height when Over Specifications			

*With tools C-3973 & C-3339 using wobble method.

ENGINE	"318"	"340"	"360"
ENGINE LUBRICATION			
Pump Type	Rotary Full Pressure	Rotary Full Pressure	Rotary Full Pressure
Capacity (qts.) U.S.	4**	4**	4**
Capacity (qts.) Imperial	3-1/4 **	3-1/4 **	3-1/4 **
Pump Drive	Camshaft	Camshaft	Camshaft
Minimum Pump Pressure @ 500 R.P.M.	20 PSI	20 PSI	20 PSI
Operating Pressure at 1000 R.P.M.	45-65 lbs.	45-65 lbs.	45-65 lbs.
Pressure Drop Resulting from Clogged Filter	7-9 lbs.	7-9 lbs.	7-9 lbs.
Oil Filter Type	Full Flow	Full Flow	Full Flow

**When Filter Element is Replaced Add 1 U.S. Quart or 3/4 Imperial Quart.

OIL PUMP—INSPECTION LIMITS FOR REPLACEMENT

	318, 340 and 360 Cu. In. Engines
Oil Pump Cover	.0015 inch or more
Outer Rotor Length	.825 Inch or less
Outer Rotor Diameter	2.469 inch or less
Inner Rotor Length	.825 inch or less
Clearance Over Rotors—Outer	.004 inch or more
Inner	.004 inch or more
Outer Rotor Clearance	.014 inch or more
Tip Clearance Between Rotors	.010 inch or more

OVERSIZE AND UNDERSIZE ENGINE COMPONENT MARKINGS

Displacement	Condition	Identification	Location of Identification
318 Cu. in. 340 Cu. in. 360 Cu. in.	.001" U/S Crankshaft	R or M M-2-3 etc. (Indicating No. 2 & 3 main bearing journal) and/or R-1-4 etc. (Indicating No. 1 & 4 connecting rod journal)	Milled flat on number eight crankshaft counterweight
	.010" U/S Crankshaft	RX or MX MX (Indicates .010" U/S all main journals) and/or RX (Indicating .010" U/S all rod journals)	Milled flat on number eight crankshaft counterweight
	.020" O/S Cylinder Bores	A	Following engine serial number
	.008" O/S Tappets	♦	3/8" diamond shaped stamp Top pad—Front of engine and flat ground on outside surface of each O/S tappet bore.
	.005" O/S Valve Stems	X	Milled pad adjacent to two 3/8" tapped holes on each end of cylinder head.

ENGINE	"383"	"440"
Type	90°V	90°V
Number of Cylinders	8	8
Bore	4.25"	4.320"
Stroke	3.375"	3.750"
Piston Displacement	383 cu. in.	440 cu. in.
Compression Ratio	8.7 to 1	9.0 to 1 9.7 to 1Δ 10.5 to 1ΔΔ
Minimum Compression with Engine Warm, Spark Plugs Removed, Wide-Open Throttle	100 psi* 110 psi**	110 psi
Maximum Variation Between Cylinders (any one engine)	40 psi	40 psi
Firing Order	1-8-4-3-6-5-7-2	1-8-4-3-6-5-7-2
Basic Timing .....Manual	TDC±2-1/2°	—
Automatic	2.5° BTC±2-1/2°	5°BTC±2-1/2°
Manual Hi. Perf.	—	TDC±2-1/2°
Automatic Hi. Perf.	—	2.5° BTC±2-1/2°
All 3-2 BBL.	—	5° BTC±2-1/2°

ENGINE	"383"	"440"
CYLINDER NUMBERING (front to rear)		
Left Bank	1-3-5-7	1-3-5-7
Right Bank	2-4-6-8	2-4-6-8
CYLINDER BLOCK		
Cylinder Bore (Standard)	4.2495"-4.2515"	4.320-4.322"
Cylinder Bore Out-of-Round (Max. allowable before reconditioning)	.005"	.005"
Cylinder Bore Taper (Max. allowable before reconditioning)	.010"	.010"
Reconditioning Working Limits (for taper and out-of-round)	.001"	.001"
Maximum Allowable Oversize (cylinder bore)	.040"	.040"
Tappet Bore Diameter	.9050"-.9058"	.9050"-.9058"
Distributor Lower Drive Shaft Bushing (press fit in block)	.0005"-.0040"	.0005"-.0040"
Ream to	.4865"-.4880"	.4865"-4880"
Shaft to Bushing Clearance	.007"-.0027"	.0007"-.0027"
PISTONS		
Type Material	Autothermic W/Steel Struts	Autothermic W/Steel Struts
Land Clearance (diametrical)	.021"-.029"	.023"-.030"
Clearance at Top of Skirt	.0003"-.0013"	.0003"-.0013"
Weight (Std. through .040" oversize)	770 gms.	857.5 gms.
Piston Length (overall)	3.874"	3.650"
Ring Groove Depth		
No. 1	.220"	.220"
No. 2	.220"	.220"
No. 3	.208"	.208"
Pistons for Service	Std. .005", .020" .040" Oversize	Std. .005", .020" .040" Oversize
PISTON PINS		
Type	Press Fit in Rod	Press Fit in Rod
Diameter	1.0935"-1.0937"	1.0935"-1.0937"
Length	3.555"-3.575"	3.555"-3.575"
Clearance in Piston (Light Thumb Push @ 70°F.)	.00045"-.00075"	.00045"-.00075"
Interference in Rod	.0007"-.0012"	.0007"-.0012"
Pins for Service	Standard Only	Standard Only
PISTON RINGS		
Number of Rings per Piston	3	3
Compression	2	2
Oil	1	1
Oil Ring Type	3-piece Chrome-plated rails with Stainless steel expander-spacer	3-piece Chrome-plated rails with Stainless steel expander-spacer
Ring width		
Compression	.0775"-.0780"	.0775"-.0780"
Oil (Steel rails)	.025"	.025"
Ring Gap		
Compression	.013"-.023"	.013"-.023"
Oil (Steel rails)	.015"-.055"	.015"-.055"

* 2 BBL. Carb. Δ Hi-performance
**4BBL. Carb. ΔΔ 3-2 BBL. Carb.

ENGINE	"383"	"440"
Ring Side Clearance		
Compression	.0015"-.0030"	.0015"-.0030"
Oil (Steel rails)	.0000"-.005"	.000"-.005"
Service Rings		
Ring Gap		
Compression	.013"-.023"	.013"-.023"
Oil (Steel rails)	.015"-.062"	.015"-.062"
Ring Side Clearance		
Compression	.0015"-.004"	.0015"-.004"
Oil (Steel rails)	.0000".005"	.0000"-.005"
CONNECTING RODS		
Length (Center to Center)	6.356"-6.360"	6.766"-6.770"
Weight (less bearing shells)	812±4 gms.	846±4 gms.
Side Clearance (two rods)	.009"-.017"	.009"-.017"
Piston Pin Bore Diameter	1.0923"-1.0928"	1.0923"-1.0928"
CONNECTING ROD BUSHING		
Type	None	None
CONNECTING ROD BEARINGS (Type) . . . 2 BBL. Carb.	Steel Backed Babbitt	—
4 BBL. Carb.	Tri-metal Steel Backed	Tri-metal Steel Backed
Diameter and Width	2.376"-.927"	2.376"-.927"
Clearance desired . . . . . 2 BBL. Carb.	.005"-.002"	—
4 BBL. Carb.	.001"-.002"	.001"-.002"
Maximum Allowable	.0025"	.0025"
Bearings for Service	Std., .001", .002" .003", .010", .012"	Std., .001", .002" .003", .010", .012"
CRANKSHAFT		
Type	Fully Counter-Balanced	Fully Counter-Balanced
Bearings	Steel Backed Babbitt	Steel Backed Babbitt*
*# 3 Tin Aluminum Alloy Steel Backed Hi-Performance & 3-2 BBL All Bearings	———	Tin Aluminum Alloy Steel Backed
Thrust Taken By	No. 3 Main Bearing	No. 3 Main Bearing
End Play	.002"-.007"	.002"-.007"
Maximum Allowable	.010"	.010"
Diametral Clearance Desired	.0005"-.002"	.0005"-.002"
Diametral Clearance Allowed	.0025"	.0025"
Finish at Rear Oil Seal Surface	Diagonal Knurling	Diagonal Knurling
MAIN BEARING JOURNALS		
Diameter	2.6245"-2.6255"	2.7495"-2.7505"
Maximum Allowable Out-of-Round and/or Taper	.001"	.001"
Bearings for Service Available in Standard and the following undersizes	.001", .002", .003" .010", .011", .012"	.001", .002", .003" .010", .011", .012"
CONNECTING ROD JOURNALS		
Diameter	2.374"-2.375"	2.74"-2.375"
Maximum Allowable Out-of-Round and/or Taper	.001"	.001"
CAMSHAFT		
Drive	Chain	Chain
Bearings	Steel Backed Babbitt	Steel Backed Babbitt
Number	5	5
Diametral Clearance	.001"-.003"	.001"-.003"
Maximum Allowable before Reconditioning	.005"	.005"
Thrust Taken By	Cylinder Block	Cylinder Block

ENGINE		"383"		"440"	
CAMSHAFT JOURNALS					
Diameter	No. 1	1.998"-1.999"		1.998"-1.999"	
	No. 2	1.982"-1.983"		1.982"-1.983"	
	No. 3	1.967"-1.968"		1.967"-1.968"	
	No. 4	1.951"-1.952"		1.951"-1.952"	
	No. 5	1.748"-1.749"		1.748"-1.749"	
CAMSHAFT BEARINGS					
Diameter	No. 1	2.000"-2.001"		2.000"-2.001"	
	No. 2	1.984"-1.985"		1.984"-1.985"	
	No. 3	1.967"-1.968"		1.967"-1.968"	
	No. 4	1.951"-1.952"		1.951"-1.952"	
	No. 5	1.750"-1.751"		1.750"-1.751"	
Valve Timing		Std.	Hi. Perf.	Std.	Hi. Perf. and 3-2BBL.
Intake Opens (BTC)		18°	21°	18°	21°
Intake Closes (ABC)		62°	67°	62°	67°
Exhaust Opens (BBC)		68°	79°	68°	79°
Exhaust Closes (ATC)		20°	25°	20°	25°
Valve Overlap		38°	46°	38°	46°
Intake Valve Duration		260°	268°	260°	268°
Exhaust Valve Duration		268°	284°	268°	284°
TIMING CHAIN					
Number of Links		50		50	
Pitch		.50"		.50"	
Width		.75"		.75"	
TAPPETS					
Type		Hydraulic		Hydraulic	
Body Diameter		.9035"-.9045"		.9035"-.9045"	
Clearance in Block		.0011"-.0024"		.0011"-.0024"	
Service Tappets Available		Std., .001"., .008", .030"		Std., .001", .008", .030"	
Clearance Between Valve Stem and Rocker Arm Pad (Dry Lash)		.060"-.210"		.060"-.210"	
CYLINDER HEAD					
Valve Seat Run-Out (Maximum)		.002"		.002"	
Intake Valve Seat Angle		45°		45°	
Seat Width (finish)		.060"-.085"		.060"-.085"	
Exhaust Valve Seat Angle		45°		45°	
Seat Width (finish)		.040"-.060"		.040"-.060"	
Cylinder Head Gasket (Thickness compressed)		.021"		.021"	
VALVE GUIDES					
Type		Cast in Head		Cast in Head	
Guide Bore Diameter		.374"-.375" Std.		.374"-.375" Std.	

	383-2BBL. 440-Std.	383-Hi. Perf. 440-Hi. Perf. 440-3-2BBL.
Valves—Intake		
Head Diameter	2.08"	2.08"
Length to (center of valve face)	4.87"	4.87"
Stem Diameter	.3723"-.3730"	.3718"-.3725"
Stem to Guide Clearance	.0010"-.0027"	.0015"-.0032"
Maximum Allowable	017"*	.017"*
Face Angle	45°	45°
Valve for Service (Oversize Stems Diameter)	Std., .005", .015", .030"	Std., .005", .015", .030"
Lift (Zero Lash)	.425"	.450"
Valves—Exhaust		
Head Diameter	1.75"	1.75"
Length to (center of valve face)	.3713"-.3720"	.3708"-.3715"
Stem Diameter		
Hot End	.3713"-3720"	.3708"-.3715"
Cold End	.3723"-.3730"	.3718"-3725"
Stem to Guide Clearance		
Hot End	.0020"-.0037"	.0025"-.0042"
Cold End	.0010"-.0027"	.0015"-.0032"
Maximum Allowable	.017"	.017"
Face Angle	45°	45°
Valve for Service (Oversize Stem Diameter)	Std., .005", .015", .030"	Std., .005", .015", .030"
Lift (Zero Lash)	.435"	.458"
Valve Springs		
Number	16	16
Free Length	2.58"	2.23"
Load When Compressed to		
Valve Closed	121-129 @ 1-55/64"	100-110 @ 1-55/64"
Valve Open	192-208 @ 1-7/16"	236-256 @ 1-23/64"
Valve Spring I.D.	1.01"-1.03"	1.07"-1.09"
Maximum Allowable Out of Plumb	.060"	.080"
Valve Spring Installed Height (spring seat to retainer)	1-53/64"-1-57/64"	1-53/64"-1-57/64"
Use 1/16" Spacer to Reduce Spring Height when Over Specifications		

*With tools C-3973 & C-3339 using wobble method.

ENGINE LUBRICATION		
Pump Type	Rotary Full Pressure	Rotary Full Pressure
Capacity (qts.)	4 U.S. or 3-1/4 Imperial***	4 U.S. or 3-1/4 Imperial***
Pump Drive	Camshaft	Camshaft
Minimum Pump Pressure @ 500 R.P.M.	20 PSI	20 PSI
Operating Pressure at 1000 R.P.M.	45-65 lbs.	45-65 lbs.
Pressure Drop Resulting from Clogged Filter	7-9 lbs.	7-9 lbs.
Oil Filter Type	Full-Flow	Full-Flow

***When filter is replaced, add 1 U.S. Quart or 3/4 of an Imperial Quart.

OIL PUMP—INSPECTION LIMITS FOR REPLACEMENT

	383 and 440 Cu. In. Engines
Oil Pump Cover	.0015 inch or more
Outer Rotor Length	.943 inch or less
Outer Rotor Diameter	2.469 inch or less
Inner Rotor Length	.942 inch or less
Clearance Over Rotors—Outer	.004 inch or more
Inner	.005 inch or more
Outer Rotor Clearance	.014 inch
Tip Clearance Between Rotors	.010 inch or more

OVERSIZE AND UNDERSIZE ENGINE COMPONENT MARKINGS

Engine Displacement	Condition	Identification	Location of Identification
383 cu. in. 440 cu. in.	.001" U/S Crankshaft	Maltese Cross	Top of front pad—Right side of block
		M-2-3 etc. (indicating No. 2 & 3 main bearing journal) and/or R-1-4 etc. (indicating No. 1 & 4 connecting rod journals)	Crankshaft counterweight
	.010" U/S Crankshaft	Maltese Cross and X M-10 (indicates .010" U/S all main journals) and/or R-10 (indicates .010" U/S all rod journals)	Top pad—Front of engine Crankshaft counterweight
	.020" O/S Cylinder Bores	A	Top pad—Front of engine
	.008" O/S Tappets	♦	Top pad—Front of engine
	.005" O/S Valve Stems	O.S.	Single bolt boss on end of the head

ENGINE	
Type	Hemispherical 90°V
Number of Cylinders	8
Bore	4.25"
Stroke	3.750"
Piston Displacement	426 Cu. In.
Compression Ratio	10.25 to 1
Minimum Compression Pressure with Engine Warm, Spark Plugs Removed, Wide-Open Throttle	110 psi
Maximum Variation Between Cylinders (any one engine)	40 psi
Firing Order	1-8-4-3-6-5-7-2
Basic Timing ..... Manual	TDC ±2-1/2°
Automatic	5° ±2-1/2°
CYLINDER NUMBERING (front to rear)	
Left Bank	1-3-5-7
Right Bank	2-4-6-8
CYLINDER BLOCK	
Cylinder Bore (standard) "A" Size	4.24975"
"B" Size	4.25025"
"C" Size	4.25075"
"D" Size	4.25125"
"E" Size	4.25175"
Cylinder Bore Out-of-Round (Max. allowable before reconditioning)	.005"
Cylinder Bore Taper (Max. allowable before reconditioning)	.010"
Reconditioning Working Limits (for taper and out-of-round)	.001"
Maximum Allowable Oversize (cylinder bore)	.040"
Tappet Bore Diameter	.9050"-.9058"
Distributor Lower Drive Shaft Bushing (press fit in block)	.0015"-.0040" (interference)
Ream to	.4860"-.4870"
Shaft to Bushing Clearance	.0007"-.0027"
PISTONS	
Type Material	Forged Aluminum (Tin Plated)
Land Clearance (diametrical)	.033"-.041"
Clearance at Top of Skirt	.0025"-.0035"
Weight (Std. through .040" oversize)	841-845 gms.
Piston Length (overall)	4.060"
Ring Groove Depth	
No. 1	.220"
No. 2	.220"
No. 3	.186"
Pistons for Service	Std., .005", .020", .040" Oversize
PISTON PINS	
Type	Floating
Diameter	1.0310"-1.0312"
Length	3.395"-3.405"
Weight	204 gms.
Clearance in Piston (Tight Thumb Push @ 70°F.)	.0001"-.0006"
End Play	.006"-.012"
Clearance in Rod	.0002"-.0007"
Pins for Service	Std. .003" .008" Oversize

PISTON RINGS	
Number of Rings per Piston	3
Compression	2
Oil	1
Oil-Ring Type	3-Piece Chrome-Plated Rails with Stainless Steel Expander-Spacer
Ring Width	
Compression	.0775"-.0780"
Oil (Steel Rails)	.025"
Ring Gap	
Compression	.013"-.025"
Oil (Steel Rails)	.015"-.055"
Ring Side Clearance	
Compression	.0015"-.0030"
Oil (Steel Rails)	.0002"-.005"
Service Rings	
Ring Gap	
Compression	.013"-.023"
Oil (Steel Rails)	.015"-.062"
Ring Side Clearance	
Compression	.0010"-.003"
Oil (Steel Rails)	.0002"-.005"
CONNECTING RODS	
Length (center to center)	6.859"-6.863"
Large End Weight	770 gms. ± 2 gms.
Small End Weight	314 gms. ± 2 gms.
Side Clearance (two rods)	.013"-.017"
Piston Pin Bushing Bore Diameter	1.0314"-1.0317"
CONNECTING ROD BUSHING	
Type	Steel Backed Bronze
CONNECTING ROD BEARINGS	
Type	Tri-Metal steel backed
Diameter and Width	2.376" x .927"
Clearance Desired	.0015"-.0025"
Maximum Allowable	.0025"
Bearings for Service	Std. .0005", .001", .002"
CRANKSHAFT	
Type	Fully Counter-Balanced
Bearings	Tri-metal Steel Backed
Thrust-Taken By	No. 3 Main Bearing
End Play	.002"-.007"
Maximum Allowable	.010"
Clearance Desired	.0015"-.0030"
Clearance Allowed	.0030"
Finish at Rear Oil Seal Surface	Diagonal Knurling
MAIN BEARING JOURNALS	
Diameter	2.7490"-2.7500"
Maximum Allowable Out-of-Round	.0003"
Maximum Allowable Taper	.0005"
Bearings for Service Available in Standard and the following undersizes	.001", .002", .003" .010", .011", .012"
CONNECTING ROD JOURNALS	
Diameter	2.3738"-2.3745"
Maximum Allowable Out-of-Round	.0003"
Maximum Allowable Taper	.0005"

CAMSHAFT	
Drive	Roller Chain
Bearings	Steel Backed Babbitt
Number	5
Clearance Desired	.001"-.003"
Maximum Allowable before reconditioning	.005"
Thrust Taken By	Cylinder Block
CAMSHAFT JOURNALS	
Diameter	
No. 1	1.998"-1.999"
No. 2	1.982"-1.983"
No. 3	1.967"-1.968"
No. 4	1.951"-1.952"
No. 5	1.748"-1.749"
CAMSHAFT BEARINGS	
Diameter	
No. 1	2.000"-2.001"
No. 2	1.984"-1.985"
No. 3	1.969"-1.970"
No. 4	1.953"-1.954"
No. 5	1.750"-1.751"
VALVE TIMING	
Intake Opens (BTC)	36°
Intake Closes (ABC)	68°
Exhaust Opens (BBC)	80°
Exhaust Closes (ATC)	24°
Valve Overlap	60°
Intake Valve Duration	284°
Exhaust Valve Duration	284°
TIMING CHAIN	
Type	Double Roller
Pitch	3/8"
Width	.860"
TAPPETS	
Type	Hydraulic
Body Diameter	.9035"-9040"
Clearance in Block	.0011"-.0024"
Service Tappets Available	Std., .001", .008", .030"
Clearance Between Valve Stem and Rocker Arm Pad (Dry Lash)	.060"-.150"
CYLINDER HEAD	
Valve Seat Runout (maximum)	.002"
Intake Valve Seat Angle	45°
Seat Width (Finish)	.060"-.080"
Exhaust Valve Seat Angle	45°
Seat Width (Finish)	.050"-.070"
Cylinder Head Gasket (thickness compressed)	.027"
Combustion Chamber Volumes (with valves and plugs)	171.7-173.7cc
VALVE GUIDES	
Type	Cast in Head
Guide Bore Diameter	.3115"-.3125" Std.
VALVES—(Intake)	
Head Diameter	2.250"
Length (to center of valve face)	5.316"-5.331"
Stem Diameter (Standard)	.3085"-3095"

Stem to Guide Clearance	.002"-.004"
Maximum Allowable	.017"*
Face Angle	45°
Valve for Service	Std., .005", .015", .030" Oversize Stem Diam.
Lift (Zero Lash)	.490"
VALVES—(Exhaust)	
Head Diameter	1.940"
Length to (center of valve face)	4.7543"-4.7693"
Stem Diameter (Standard)	.3075"-.3085"
Stem to Guide Clearance	.003"-.005"
Maximum Allowable	.017"*
Face Angle	45°
Valve for Service	Std., .005", .015", .030" Oversize Stem Diam.
Lift (Zero Lash)	.481"
VALVE SPRINGS	
Number	16
Free Length	2.15"
Load when Compressed to (valve closed less surge damper)	110-120 @ 1-55/64"
Load when Compressed to (valve open less surge damper)	300-320 @ 1-3/8"
Valve Springs I.D.	1.070"-1.090"
Maximum Allowable Out of Plumb	1/16"
Valve Spring Installed Height (spring seat to retainer)	1-53/64"-1-57/64"

Use 1/16" spacer to reduce spring height when over specifications.

ROCKER SHAFT ASSEMBLY	
Rocker Shaft Clearance in Rocker Arm	.0018"-.0026"
Rocker Shaft Clearance in Bracket	.0009"-.0026"
ENGINE LUBRICATION	
Pump Type	Rotary Full Pressure
Capacity (qts.)	6 U.S. or 5 Imperial**
Pump Drive	Camshaft
Minimum Pump Pressure @ 1000 rpm	15 psi
Operating Pressure at 2000 rpm.	45-65 lbs.
Pressure Drop Resulting from Clogged Filter	7-9 lbs.
Oil Filter Type	Full-Flow

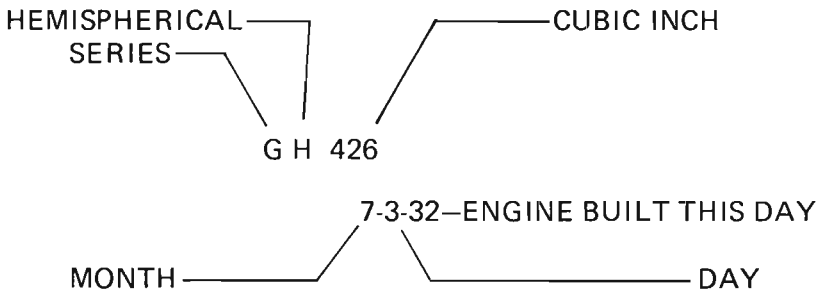
*With Tools C-3973 and C-3339 using wobble method.
**When Filter Element is Replace, Add 1 U.S. Quart or 3/4 Imperial Quart.

OIL PUMP—INSPECTION LIMITS FOR REPLACEMENT

Oil Pump Cover	.0015 inch or more
Outer Rotor Length	.943 inch or less
Outer Rotor Diameter	2.469 inch or less
Inner Rotor Length	.942 inch or less
Clearance Over Rotors—Outer	.004 inch or more
Inner	.005 inch or more
Outer Rotor Clearance	.014 inch or more
Tip Clearance Between Rotors	.010 inch or more

FOR IDENTIFICATION ENGINES WILL BE STAMPED ON CYLINDER BLOCK BOSS

EXAMPLE



OVERSIZE AND UNDERSIZE ENGINE COMPONENT MARKING

Condition	Identification	Location of Identification
.001" U/S Crankshaft	Maltese Cross M-2-3 etc. (indicating No. 2 & 3 main bearing journal) and/or R-1-4 etc. (indicating No. 1 & 4 connecting rod journals)	Top pad—Front of engine Crankshaft counterweight
.010" U/S Crankshaft	Maltese Cross and X M-10 (indicates .010" U/S all main journals) and/or R-10 (indicates .010" U/S all rod journals	Top pad—Front of engine Crankshaft counterweight
.020" O/S Cylinder Bores	A	Top pad—Front of engine
.008" O/S Tappets	♦	Top pad—Front of engine
.005" O/S Valve Stems	O.S.	Single bolt boss on end of the head

TIGHTENING REFERENCE

198 - 225 CUBIC INCH ENGINES

	Torque Foot-Pounds	Thread Size
Connecting Rod Nut	45	3/8-24
Cylinder Head Bolt	65	7/16-14
Main Bearing Cap Bolt	85	1/2-13
Spark Plug	30	14mm
Camshaft Lockbolt	35	7/16-14
Carburetor to Manifold Nut	200 in. lbs.	3/8-16
Chain Case Cover Bolt	200 in.-lbs.	5/16-18
Torque Converter Housing Bolt	30	3/8-16
Converter Brace to Aluminum Housing	40	9/16-14
Converter Brace to Engine Block	30	3/8-16
Clutch Housing Bolt	30	3/8-16
Crankshaft Rear Bearing Seal Retainer	30	3/8-16
Cylinder Head Cover Bolt	40 in. lbs.	1/4-20
Distributor Clamp Bolt	95 in. lbs.	1/4-20
Engine Front Mounting to Frame Nut	85	1/2-20
Engine Front Mounting to Block Nut	45	7/16-20
Engine Rear Mount Bolts	35	7/16-14
		3/8-24
Exhaust Manifold Nut	10	5/16-24
Exhaust Pipe Flange Nut	35	7/16-20
Exhaust Pipe Clamp Bolt	20	3/8-24
Exhaust Pipe Support Clamp Bolt	20	3/8-24
Fan Attaching Bolt	200 in.-lbs.	5/16-18
Flywheel to Crankshaft	55	7/16-20
Flex Plate to Crankshaft	55	7/16-20
Flex Plate to Converter	270 in.-lbs.	5/16-24
Flywheel Housing to Cylinder Block Bolt	50	7/16-14
Flywheel Housing Cover Bolt	7	1/4-20
Fuel Pump Attaching Bolt	30	3/8-16
Alternator Bracket Bolt	30	3/8-16
Alternator Mounting Nut	200 in.-lbs.	5/16-18
Alternator Adjusting Strap Bolt	15	5/16-18
Alternator Adjusting Strap Mounting Bolt	30	3/8-16
Intake to Exhaust Manifold Bolt	240 in.-lbs.	5/16-18
Oil Pan Drain Plug	20	1/2-20
Oil Pan Screw	200 in.-lbs.	5/16-18
Oil Pump Cover Bolt	95 in.-lbs.	1/4-20
Oil Pump Attaching Bolt	200 in.-lbs.	5/16-18
Oil Filter Attaching Stud	10	3/4-16
Oil Pressure Gauge Sending Unit	60 in.-lbs.	1/8 N.P.T.F.
Rocker Shaft Bracket Bolt	25	3/8-16
Starter Mounting Bolt	50	7/16-14
Temperature Gauge Sending Unit	180 in.-lbs.	1/4 N.P.T.F.
Water Pump to Housing Bolt	30	3/8-16

318 - 340 - 360 CUBIC INCH ENGINES

	Torque Foot-Pounds	Thread Size
Connecting Rod Nut—Plain	45	3/8-24
Cylinder Head Bolt	95	1/2-13
Main Bearing Cap	85	1/2-13
Camshaft Lockbolt	35	7/16-14
Camshaft Thrust Plate	210 in.-lbs.	5/16-18
Chain Case Cover (Cast)	35	3/8-16
Clutch Housing Bolt	30	3/8-16
Clutch Housing Vent Hole	100 in.-lbs.	1/4-20
Clutch Housing Pan Drain Plug	35	
Crankshaft Bolt (Vibration Damper)	100	3/4-16
Cylinder Head Cover	40 in.-lbs.	1/4-20
Exhaust Flange Nut 318-360	24	7/16-20
Exhaust Flange Nut 340	50	7/16-20
Flywheel to Crankshaft	55	7/16-20
Flex Plate to Crankshaft	55	7/16-20
Flex Plate to Converter	270 in.-lbs.	5/16-24
Flywheel Housing to Cylinder Block	50	
Flywheel Housing Cover	100 in.-lbs.	1/4-20
Intake Manifold	35	3/8-16
Oil Pan Drain Plug	20	1/2-20
Oil Pan Screw	200 in.-lbs.	5/16-18
Oil Pump Cover Bolt	95 in.-lbs.	1/4-20
Oil Pump Attaching Bolt	30	3/8-16
Rocker Arm Adjusting Screw Lock Nut	25	3/8-24
Rocker Shaft Retainer Bolt	200	5/16-18
Spark Plug	30	14mm
Vibration Damper Pulley Bolts	200 in.-lbs	5/16-24
Water Pump	30	3/8-16

383, 440 CUBIC INCH ENGINES

	Torque Foot-Pounds	Thread Size
Connecting Rod Nut—Plain	45	3/8-24
Cylinder Head Bolt	70	7/16-14
Main Bearing Cap Bolt	85	1/2-13
Spark Plug	30	14mm
Camshaft Lockbolt	35	7/16-14
Carburetor to Manifold Nut	200 in.-lbs.	5/16-24
Chain Case Cover Bolt	200 in.-lbs.	5/16-18
Torque Converter Housing Bolt	30	3/8-16
Clutch Housing Bolt	30	3/8-16
Crankshaft Rear Bearing Seal Retainer	25	3/8-16
Crankshaft Bolt (Vibration Damper)	135	3/4-16
Cylinder Head Cover stud and Nut	40 in.-lbs.	1/4-20
Distributor Clamp Bolt	200 in.-lbs.	5/16-18
Exhaust Manifold Nut	30	3/8-24
Exhaust Pipe Flange Nut	50	7/16-20
Exhaust Pipe Clamp Bolt	20	3/8-24
Exhaust Pipe Support Clamp Bolt	20	3/8-24
Fan Attaching Bolt	15-18	5/16-18
Flywheel to Crankshaft	55	7/16-20
Flex Plate to Crankshaft	55	7/16-20
Flex Plate to Converter	270 in.-lbs.	5/16-24
Fan Belt Idler Pulley Nut	45	7/16-20
Fan Belt Idler Pulley Bracket Bolt	30	3/8-16
Flywheel Housing to Cylinder Block Bolt	50	7/16-14
Flywheel Cover Bolt	7	1/4-20
Fuel Pump Attaching Bolt	30	3/8-16
Alternator Mounting Bolt	30	3/8-16
Alternator Adjusting Strap Bolt	200 in.-lbs.	5/16-18
Alternator Adjusting Strap Mounting Bolt	30	3/8-16
Intake Manifold Bolt	40	3/8-16
Oil Pan Drain Plug	20	1/2-20
Oil Pan Screw	200 in.-lbs.	5/16-18
Oil Pump Cover Bolt	10	5/16-18
Oil Pump Attaching Bolt	30	3/8-16
Rocker Shaft Bracket Bolt	25	3/8-16
Starter Mounting Bolt	50	7/16-14
Vibration Damper Pulley Bolts	9	1/4-20
Water Pump to Housing Bolt	30	3/8-16
Water Pump Housing to Cylinder Block Bolt	30	3/8-16
A/C Compressor to Engine Bolt	200 in.-lbs.	5/16-18

426 - HEMI ENGINE

	Torque Foot-Pounds	Thread Size
Alternator Attaching Bolt	30	3/8-16
Alternator Adjusting Strap Bolt	200 in.-lbs.	5/16-18
Alternator Bracket Bolt	30	3/8-16
Camshaft Sprocket Cap Screw (3)	40	3/8-16
Carburetor to Manifold Nut	200 in.-lbs.	5/16-24
Chain Case Cover Bolt, Upper	15-18	5/16-18
Lower	15-18	3/8-16
Connecting Rod Nut	75	7/16-20
Crankshaft Bolt (Vibration Damper)	135	3/4-16
Crankshaft Rear Bearing Seal Retainer Bolt	30	3/8-16
Cylinder Head Bolt	70-75	7/16-14
Cylinder Head Stud Nut	70-75	7/16-20
Cylinder Head Cover	40 in.-lbs.	1/4-20
Distributor Clamp Bolt	200 in.-lbs.	5/16-18
Exhaust Manifold Bolt	35	3/8-16
Exhaust Pipe Flange Nut	50	7/16-20
Fan Attaching Bolt (4)	15	5/16-18
Flywheel Cap Screw	70	7/16-20
Clutch Cover to Flywheel	30	3/8-16
Flywheel Pan Screws	200 in.-lbs.	5/16-18
Flywheel Housing to Block Bolts	30	3/8-16
	50	7/16-14
Fuel Pump Attaching Bolt	30	3/8-16
Intake Manifold	See Figure 8	1/4-20
Main Bearing Cap Bolt	100	1/2-13
Main Bearing Cap Tie Bolt	45	3/8-16
Oil Pan Screw	200 in.-lbs.	5/16-18
Oil Pan Drain Plug	20	1/2-20
Oil Pump Attaching Bolt	30	3/8-16
Oil Pump Cover Bolt	10	5/16-18
Rocker Arm Adjusting Screw Lock Nut	25	3/8-24
Rocker Shaft Bracket Bolt	30	3/8-16
Spark Plug	30	14mm
Starter Mounting Bolt	50	7/16-14
Torque Converter to Flex Plate Bolt	65	7/16-20
Water Pump to Housing Bolt	30	3/8-16
Water Pump to Cylinder Block Bolt	30	3/8-16

CLEANER AIR SYSTEM

CONTENTS

	Page
CARBURETORS AND CHOKE	5
CLEANER AIR SYSTEM	1
DISTRIBUTOR SOLENOID	5
HEATED AIR SYSTEM	1
IDLE SPEED SOLENOID	5
LOWER COMPRESSION RATIOS	5
NOx SYSTEM	7
VAPOR SAVER SYSTEM	6

CLEANER AIR SYSTEM (CAS)

The Federal government has imposed more stringent exhaust emissions requirements on all U.S. and most imported cars. These new standards require that exhaust emissions from all cars not exceed 2.2 grams of hydrocarbons and 23 grams of carbon monoxide per vehicle mile as measured during a prescribed test. This constitutes about a 33% decrease in exhaust emission levels. The new grams per mile standards take into consideration that total emission levels are a function of vehicle weight.

Several changes have been made to our engines to meet these new standards and maintain or improve vehicle driveability (Fig. 1).

HEATED AIR SYSTEM

All engines except the 340 CID, 426 Hemi and 440 CID 3-2V or engines equipped with the fresh air scoop option have a heated air intake system. This system provides a faster more efficient engine warm up with improved fuel economy and reduced exhaust emissions (Fig. 2).

The HEATED AIR SYSTEM is basically a two air flow circuit system.

(1) When the under hood air temperature is 10 degrees F or lower, the air flow will be through the stove, into a flexible connector, into the adaptor on the bottom of the snorkel and into the air cleaner.

(2) When the under hood air temperature is

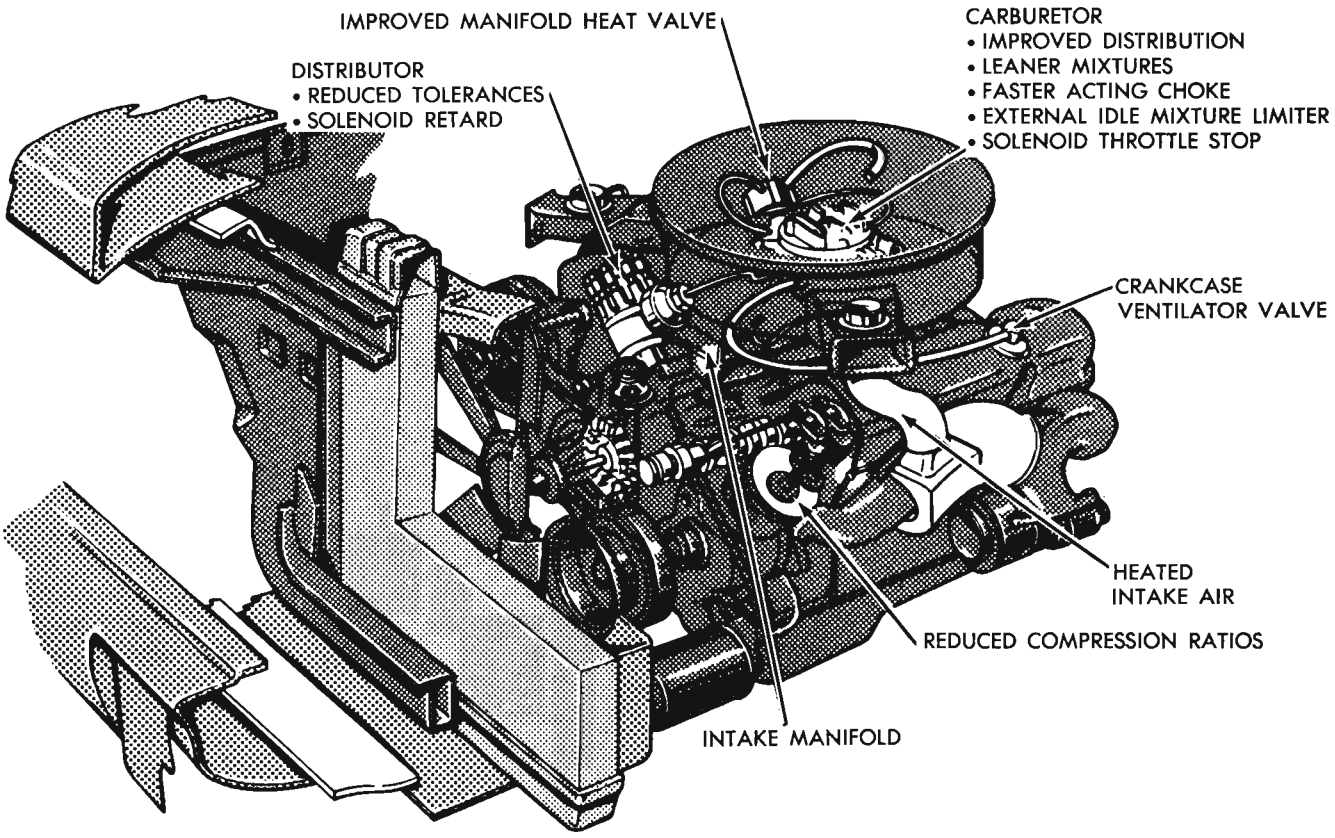


Fig. 1 - Cleaner Air System

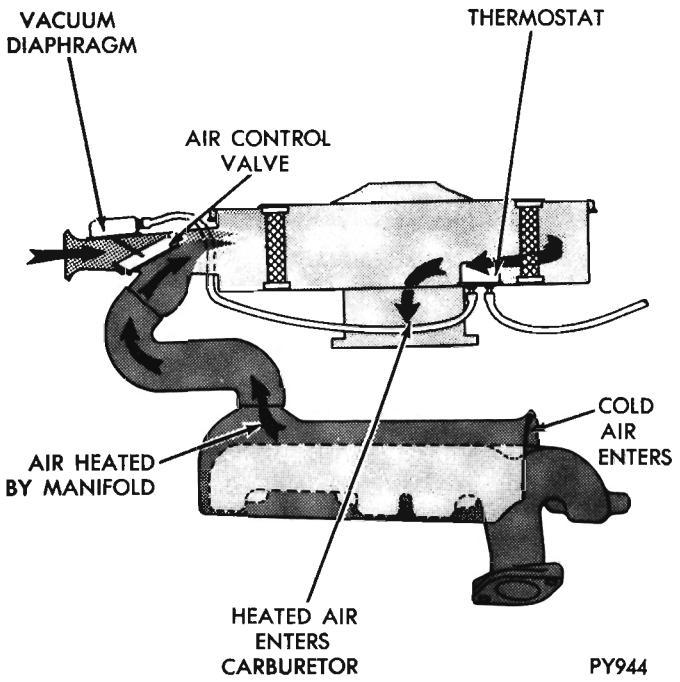


Fig. 2 Heated Inlet Air System

above 100 degrees F, the air flow will be through the snorkel into the air cleaner.

When the under hood air temperature is between approximately 10 degrees F and 100 degrees F, there will be air flow through both circuits after the engine has been started and the exhaust manifold starts to give off heat. The colder the under hood air the greater the flow of air through the stove, and the warmer the air the greater the flow through the snorkel. The quantity of air through each circuit is controlled by a heat control door in the snorkel so as to maintain a temperature of 95 degrees to 105 degrees F at the temperature sensor mounted inside the air cleaner housing.

The modulation of the induction air temperature is performed by intake manifold vacuum, a temperature sensor and a vacuum diaphragm which operates the heat control door in the snorkel.

A vacuum hose connects to a hose nipple on the base of the carburetor and leads to one side (either side) of the sensor and another hose connected to the opposite side of the sensor and leads to the vacuum diaphragm on the snorkel.

The sensor is simply a bimetalic strip attached rigidly at one end and controls a small air valve at the other end. This valve is connected into the same vacuum chamber on the bottom of the sensor that the 2 hoses connect into. When the temperature at the sensor is less than 95 degrees F the valve is closed and the intake manifold vacuum is communicated to the vacuum diaphragm which in turn lifts the heat control door and allows heated air from the exhaust manifold stove to enter the air cleaner. When the temperature at the sensor is above 105 degrees F, the valve in the sensor opens and decreases the vacuum at the vacuum diaphragm and the spring in the diaphragm housing pushes the heat control downward decreasing the heated air flow from the stove and increases the air flow through the snorkel.

The vacuum diaphragm is simply a bellows type diaphragm mounted in a housing with a spring between the diaphragm and the top of the housing and a hose nipple in the side of the housing to connect to the vacuum hose from the sensor. Permanently connected to the piston of the vacuum diaphragm is a link which hooks into the heat control door. Since the diaphragm is opposed by a spring, it requires not less than 5 in. Hg to lift the heat control door off the floor of the snorkel and not greater than 9 in. Hg to raise the door to the top of the snorkel.

With the vacuum diaphragm opposed by a spring it is obvious that temperature modulation will occur only at road load throttle positions or when the intake manifold vacuum is above the operating vacuum of the vacuum diaphragm. But should a burst of power be required, and the throttle is opened wide, the intake manifold vacuum drops and the heat control door drops to the floor of the snorkel closing off the hot air and opens the snorkel to eliminate any undue resistance to free breathing of the engine.

SERVICE PROCEDURES

HEATED AIR SYSTEM

Improper functioning of this system will affect driveability as well as affecting the vehicle exhaust emission control system and may result in failure of the vehicle to meet Federal Emission regulations.

To determine whether the system is functioning properly, the following procedure should be used:

(1) Make sure all vacuum hoses (Figs. 3 and 4), and the stove to air cleaner flexible connector are properly attached and are in good condition.

(2) With a cold engine and ambient temperature in the engine compartment of less than 100 degrees F., the heat control door (valve plate) in the snorkel should be in the **up position** or **heat on position.**

(3) With the engine warmed up and running, check the air temperature entering the snorkel or at the sensor. When the air temperature entering the outer end of snorkel is 105 degrees F. or higher the door should be in the **down** position

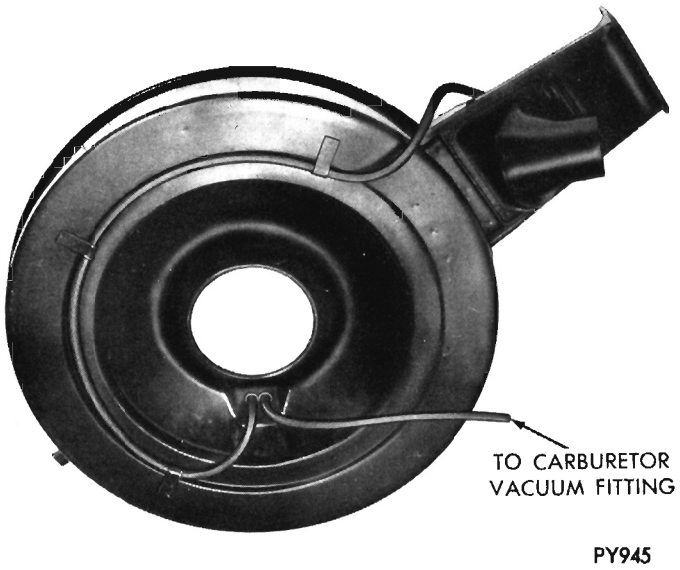


Fig. 3 - Routing of Vacuum Hoses - Single Snorkel Air Cleaner

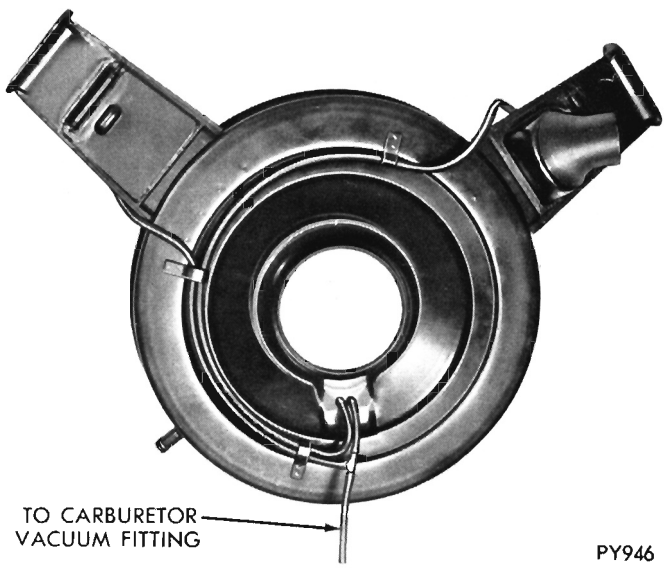


Fig. 4 - Routing of Vacuum Hoses - Dual Snorkel Air Cleaner

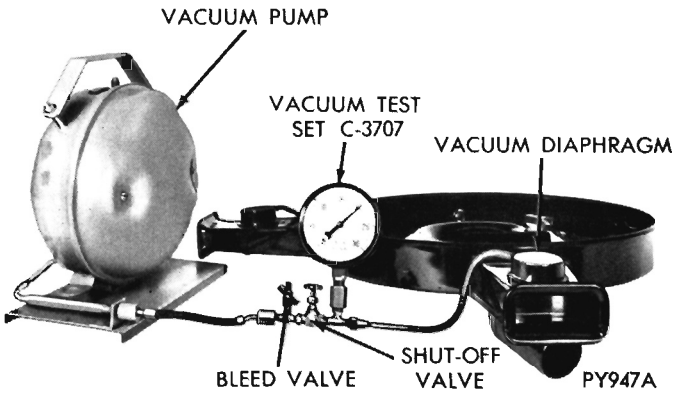


Fig. 5 - Inspecting Vacuum Diaphragm

(heat off).

(4) Remove the air cleaner from the engine and allow it to cool down to 90 to 95 degrees F. With 20 in. Hg vacuum applied to the sensor the door should be in the **up** position **(heat on** position). Should the door not rise to the heat on position, check the vacuum diaphragm for proper operation.

(5) Check the vacuum diaphragm by applying vacuum directly to the vacuum diaphragm (with Tool C-3707 and vacuum pump C-4801) with a vacuum gauge in the line and a bleed valve to control the vacuum inserted in the line between the gauge and the vacuum source. Apply 20 inches Hg to the vacuum diaphragm and stop off the line and check for diaphragm leaks (Fig. 5). The diaphragm should hold 20 in. Hg for five minutes. Next release the vacuum on the vacuum diaphragm. Then with the use of the bleed valve build the vacuum slowly and observe the door operation. The door should lift off the bottom of

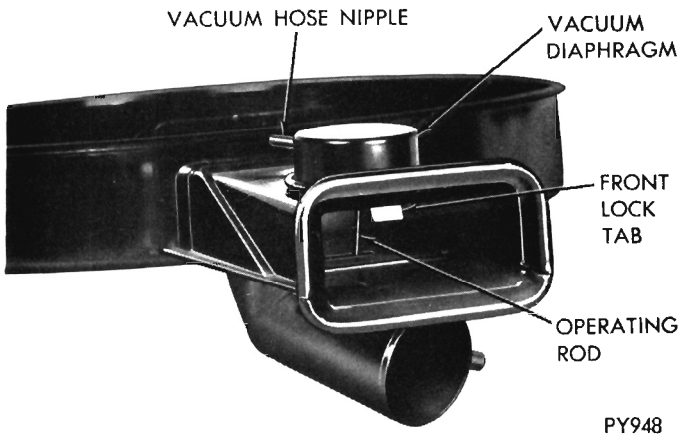


Fig. 6 - Opening Front Lock Tab

the snorkel at not less than 5 inches Hg and be in the full up position with no more than 9 inches Hg.

(6) Should the vacuum diaphragm not perform adequately, replace it and repeat the checks in steps 2 and 3.

(7) Should the vacuum diaphragm perform adequately but proper temperature is not maintained, replace the sensor and repeat the temperature checks in steps 2 and 3.

DUAL SNORKEL

The dual snorkel air cleaner performs at low temperatures and above 105 degrees F. basically like a single snorkel air cleaner with one exception:

(1) On deep throttle accelerations, both snorkels are open (when intake manifold vacuum drops below the 5 inches Hg).

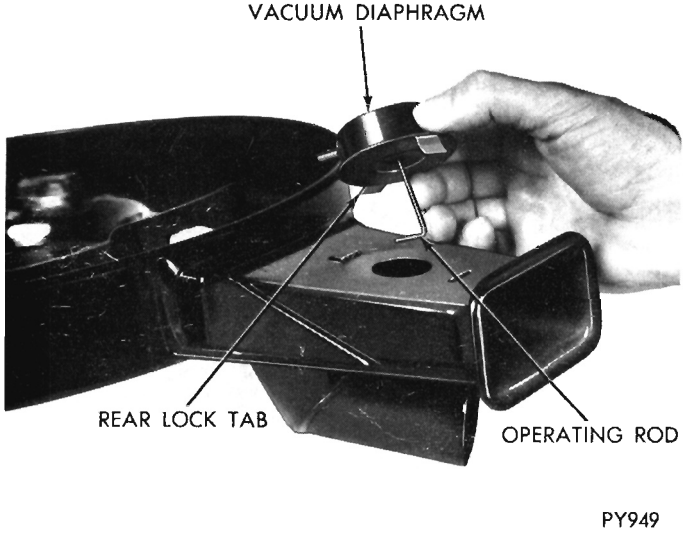


Fig. 7 - Removing or Installing Vacuum Diaphragm

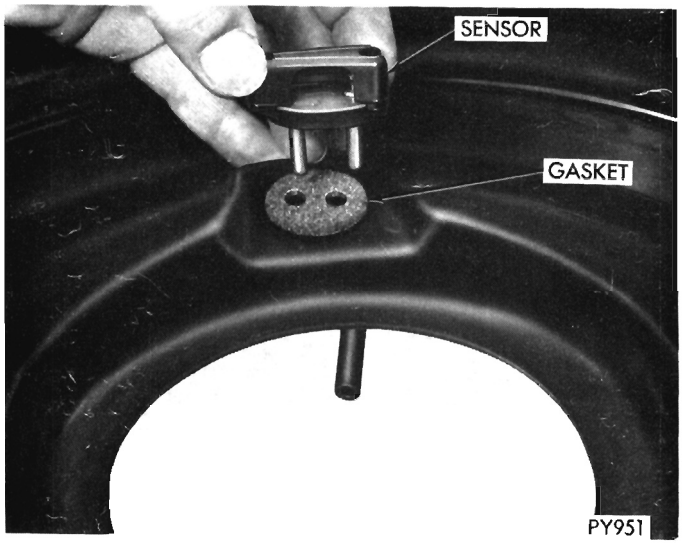


Fig. 9 - Installing Gasket and Sensor

(2) The non-heat air snorkel is connected to manifold vacuum through a **"TEE" in the vacuum hose between the carburetor and the sensor (Fig. 4).**

Check second snorkel vacuum diaphragm as one with heat connector.

VACUUM DIAPHRAGM

With air cleaner housing removed from vehicle.

(1) Bend down lock tab (Fig. 6) and carefully lift forward edge to clear lock tab, then slide forward to disengage rear lock tab, then slide to right to unhook operating rod from heat control door (Fig. 7).

(2) With the vacuum diaphragm removed, check the door for freedom of travel. When the door is raised to the up position, it should fall freely when released. If it does not, observe door to snorkel side walls for interference of foreign matter. Also check hinge pin for foreign matter. Try to release by blowing with compressed air or by releasing the interference.

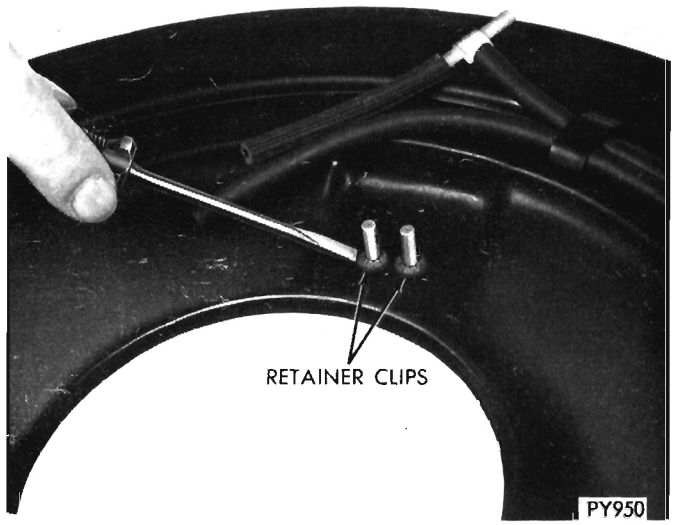


Fig. 8 - Removing Retainer Clips

Installation

(1) Insert operating rod into heat control door, then slide rearward engaging the rear lock tab, when front lock is in position press forward edge down.

(2) While holding vacuum diaphragm down, apply 9 inches of vacuum to diaphragm hose nipple, door should operate freely. If door operates freely, bend lock tab forward. While supporting snorkel and the lock tab with a piece of flat steel held securely under lock tab, flatten flush with snorkel. **Manually operating heater door could cock rod and diaphragm which would restrict operation of the heater door.**

(3) Assemble air cleaner, install on vehicle and test operation.

SENSOR

Removal

With air cleaner housing removed from vehicle.

(1) Disconnect vacuum hoses from sensor, remove retainer clips (Fig. 8), and discard (new clips are supplied with a new sensor).

(2) Remove sensor with gasket and discard.

Installation

(1) Position gasket on air cleaner housing and install sensor (Fig. 9).

(2) Supporting sensor on outer diameter, install new retainer clips securely being sure gasket is compressed to form an air seal. **Supporting sensor on plastic guard could damage bi-metal strip. No attempt should be made to adjust sensor.**

(3) Install vacuum hoses (Figs. 3 and 4).

(4) Install air cleaner and test operation. Refer

to Exhaust System, Group 11, for service procedures on Air Heaters.

CARBURETORS AND CHOKES

All carburetors have leaner mixtures and mixture distribution has been improved on all engines. All two and four barrel carburetors will have dual idle mixture screws with an external adjustment limiting device for better control of idle mixtures. Other carburetor changes include: idle fuel discharged into a bypass air slot for better atomization (383 CID 2V).

Used in conjunction with heated intake air is a new fast acting automatic choke control. This unit reacts quickly to hot exhaust gases to provide a shortened period of mixture enrichment, and hence improved fuel economy and reduced emissions. This is achieved by using a removable, thin stamped, stainless-steel cup between the thermostatic choke control unit and the exhaust passage gases in place of the thicker cast-in manifold pocket used previously. A gasket is installed between the steel cup and manifold to ensure that no exhaust leak occurs. Also a part of the heated air system is a heat insulating spacer between the intake manifold and carburetor. This is used in place of a gasket and is essential for correct operation.

IDLE SPEED SOLENOID

The high performance engines (340, 440, 440 3-2V and 426 Hemi) employ idle speeds between 800 and 1000 rpm to obtain acceptable lower emissions during idle and deceleration. In order to prevent "after running" with such high idle speeds, these engines have an electrical solenoid throttle stop which holds the throttle at the correct idle position when energized but de-energizes when the ignition is turned off, allowing the throttle blades to close more completely. Refer to "Fuel System" Group 14 for service procedures.

LOWER COMPRESSION RATIOS

The 318, 383 and 440 CID engines (except the 426 Hemi and 440 CID 3-2V) have new pistons to reduce compressions by about 0.5. The lower compression ratio reduces hydrocarbon emissions by producing a better combustion chamber shape and by leaving more heat in the exhaust to assist the after combustion reaction.

DISTRIBUTOR SOLENOID

All 383 and 440 engines (except the 440 3-2V) have a solenoid incorporated in the distributor vacuum advance mechanism to retard the ignition timing when the throttle is closed. At closed throttle, electrical contacts on the carburetor throttle stop and with idle adjusting screw in the closed position, causes the distributor solenoid to energize. This retards the ignition timing to provide reduced exhaust emissions under hot idle conditions. Cold or part throttle starting is not penalized because the distributor solenoid is not energized unless the hot idle adjusting screw is against the throttle stop contact. **Timing must be set at closed throttle to give ignition full retard.**

SERVICE PROCEDURES

IGNITION TIMING (383 Cu. In. 440 Cu. In.)

(Solenoid Distributor)

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing. The ignition timing test will indicate the timing of the spark at No. 1 cylinder at curb idle (Hot only).

Test procedures are as follows:

(1) Disconnect vacuum hose at distributor, and plug hose.

(2) Connect the secondary lead of a power timing light to No. 1 spark plug, red primary lead to positive terminal of the battery and the black primary lead to the negative battery terminal. **Do not puncture cables, boots or nipples with test probes. Always use proper adapters. Puncturing the spark plug cables with a probe will damage the cables. The probe can separate the conductor and cause high resistance. In addition breaking the rubber insulation may permit secondary current to arc to ground.**

(3) Loosen the distributor hold-down mounting screw just enough so distributor housing can be rotated in its mounting.

(4) Start the engine and set the curb idle as shown in "Specifications." (Transmission in Neutral and Engine Hot).

(5) Aim the power timing light at the timing marks on the chain case cover. If the timing light flash occurs when the timing mark on the vibration damper is located ahead of specified degree mark on the timing plate. The timing is advanced. To adjust turn distributor housing **(Not Vacuum Chamber)** Counter clockwise.

Do not use vacuum chamber as a turning handle. If the timing light flash occurs when the timing mark on the vibration damper is located past the specified degree mark on the timing plate. The timing is retarded.

To adjust turn distributor housing clockwise. **Timing may vary from the specified specification a plus or minus 2-1/2 degree and still fall with-**

in range, but if the timing is checked it should be adjusted to the specification shown on the distributor charts.

(6) To check the distributor solenoid for proper operation, disconnect the wire at the carburetor. Aim the power timing light at the timing marks on the chain case. The timing should advance above 5-1/2 degrees and the engine speed should increase.

(7) Stop the engine and tighten the distributor hold-down screw.

(8) Reconnect the wire at the carburetor throttle stop.

(9) Reconnect the vacuum hose to the distributor.

(10) Remove the timing light.

VAPOR SAVER

All Chrysler Corporation cars have an evaporation control system called "Vapor Saver" to reduce the loss of fuel from the fuel system to the atmosphere by evaporation. This is a closed system which controls fuel expansion and feeds fuel evaporation emissions from the carburetor or fuel tank. The vapors pass through vent lines to the crankcase by way of the crankcase inlet air cleaner. Since fuel vapors are two to four times heavier than air, they settle to the bottom of the crankcase. With the engine running the fuel vapors are purged from the crankcase and together with the normal crankcase vapor are drawn via the crankcase ventilation system, which is an existing part of the Cleaner Air System (CAS) into the base of the carburetor to be burnt by engine combustion.

The possible expansion of fuel in a full fuel tank, due to a rise in temperature, is provided by a 1.4 gallon over-fill limiter tank inside the main fuel tank. When the main tank is filled, the orifice controlled slow filling of the inner tank allows the main tank fuel level to drop thereby providing thermal expansion space. (Fig. 10)

The loss of any fuel or vapor out of the filler neck is prevented by the use of a filler cap which will release only under significant pressure (1/2 to 1 psi) or vacuum (1/4 to 1/2 psi). This cap is identified by the words **pressure-vacuum** and must be replaced by a similar unit if replacement is necessary, in order for the system to remain effective.

Because the fuel tank is flat on top, four vents are used, one in each corner of the tank and are

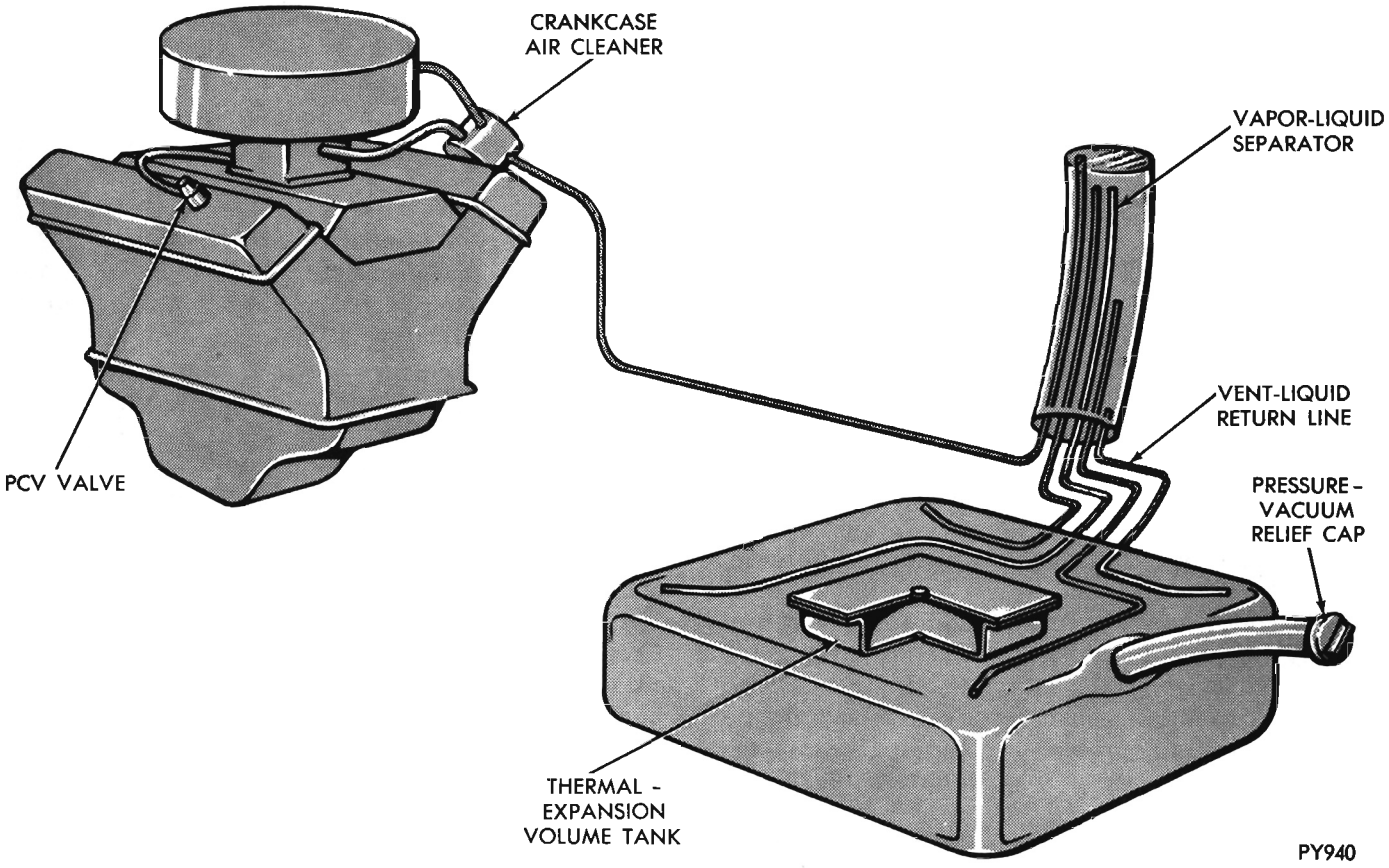


Fig. 10 - Vapor Saver System

connected to a vapor-liquid separator by rubber hoses. The vapor liquid separator is a piece of two inch steel tubing mounted at an angle inside the trunk of the vehicle (quarter panel on Station wagons) which internally holds four vent lines from the tank and a vent line which leads to the crankcase inlet air cleaner. These lines are of different heights so the tank will always be vented regardless of vehicle attitude, and fuel vapor will be transferred to the crankcase. One vent line from the tank is short to provide a drain back to the tank for any liquid fuel which may get into the separator during maneuvers or incline parking. The vent to the crankcase is at the highest point in the separator.

The Vapor Saver system also includes closed ventilation of fuel vapor from the carburetor bowl. On eight cylinder engines this is accomplished via a hose connection from the carburetor bowl to the crankcase inlet air cleaner. For six cylinder engines the hose from the carburetor bowl is connected into the crankcase via a connecting nipple on the fuel pump. This fuel pump also incorporates a bleed device which prevents build-up of pressure in the fuel supply line between the pump and the carburetor. This feature aids hot starting. In event of fuel pump replacement, it is important that the correct pump is used.

SERVICE DIAGNOSIS

The Vapor Saver system should not require any maintenance in normal service. Any loss of fuel or vapor from the fuel filler cap would indicate one or more of the following:

(1) An unsatisfactory seal between cap and filler neck.

(2) A malfunction of the Vapor Saver cap release valve. A quick check of the fuel cap may be made by placing against the mouth and blowing into the hole in the release valve housing. An immediate leak with light blowing or lack of release with hard blowing indicates a defective or incorrect unit.

(3) All lines plugged between fuel tank and vapor separator.

(4) Plugged line between the vapor separator and the crankcase air inlet filler.

NOx System

GENERAL INFORMATION

The NOx system has been added to vehicles sold in California to control nitrous oxide emissions. This is in addition to Cleaner Air System and Vapor Saver System.

The NOx system has two separate and distinct configurations. One is used on vehicles equipped with a manual transmission and the other on automatic transmission equipped vehicles. These differences are in the external parts of the system. To be equipped for installation of the NOx System the engine must first have a special camshaft designed to give increased valve overlap and a 185 degrees F coolant thermostat.

MANUAL TRANSMISSION

The NOx system for manual transmission equipped vehicles consists of the three parts shown in Fig. 11. These are the transmission switch, thermal switch and the solenoid vacuum valve.

The transmission switch is mounted on the transmission housing and is used to sense the transmission position (gear selection). It remains closed in any gear selected below high and opens

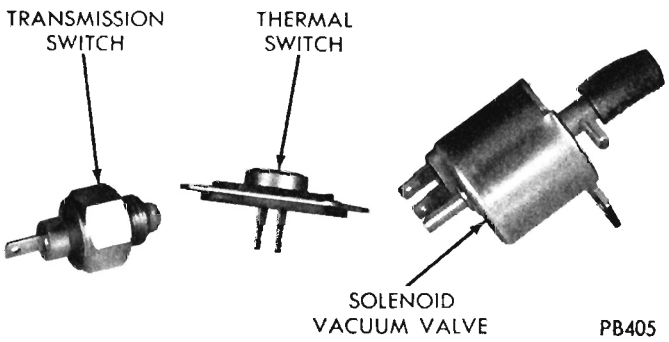


Fig. 11 - NOx System Components - Manual Transmission Installation

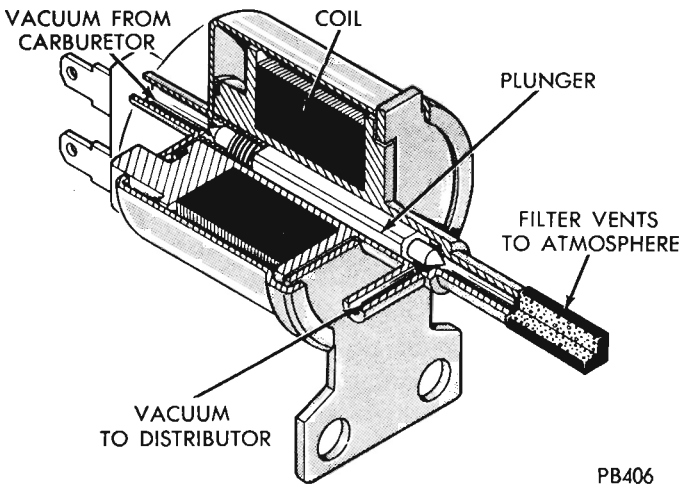


Fig. 12 - Solenoid Vacuum Valve

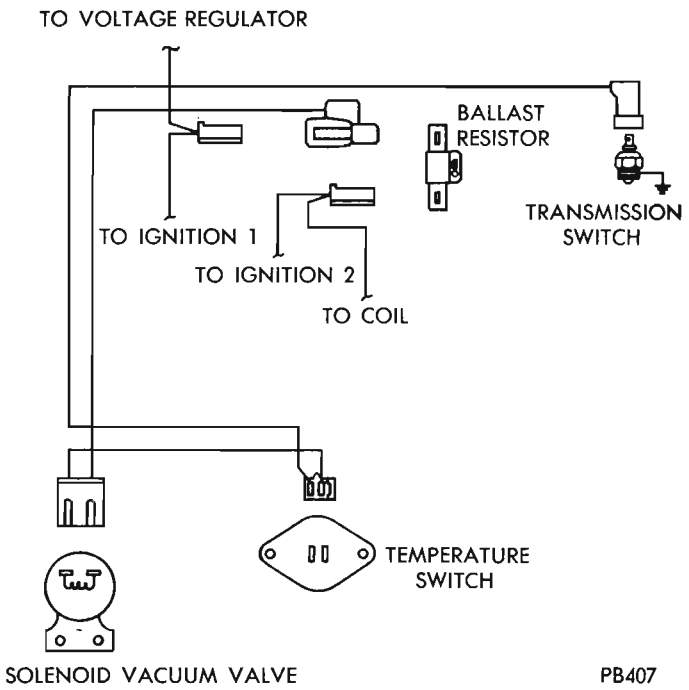


Fig. 13 - Wiring Schematic of Manual Transmission Installation

whenever the top gear is selected (either 3rd or 4th).

The thermal switch is mounted on the firewall and senses ambient temperature in the plenum chamber.

The solenoid vacuum valve, Figure 12, is a simple solenoid with the plunger used as a valve and is identical for both the manual and automatic transmission installations. It is the only part that is interchangeable. When the solenoid is de-energized, the plunger is spring loaded toward the vent, closing it and allowing normal vacuum spark advance. When the solenoid is energized the plunger is drawn to the opposite end of it's travel which shuts off the vacuum line from the carburetor and opens the vent. This prevents vacuum spark advance and allows any vacuum that may be trapped in the distributor spark advance chamber to be bled off cancelling any spark advance.

The electric schematic of the manual transmission system as shown in Fig. 13 points out the simplicity of this system. Whenever the key is "on" the system is powered from the B + terminal of the ballast resistor. Tracing out the circuit we find that it passes to the solenoid vacuum valve, through the coil and over to the thermal switch. This switch must be closed for the circuit to continue so if the temperature in the plenum is below 70 degrees (approximately) this switch will be open and the circuit will be broken leaving the NOx System inoperative. However if the temperature is above 70 degrees (approximately) the switch will be closed and the circuit will continue to the transmission switch. If the transmission is in any gear but high the switch will be closed, completing a circuit to ground. This will energize the solenoid vacuum valve which will move to shut off the vacuum line from the carburetor and vent the distributor line cancelling out the normal vacuum spark advance. When high gear is selected the circuit will be broken by opening the transmission switch. This de-energizes the solenoid vacuum valve and restores normal vacuum spark advance.

This means that if the temperature is above 70 degrees F you will not have normal vacuum spark advance in any of the lower gears but you will have it whenever high gear is selected. When the temperature drops below 70 degrees F the NOx System will be inoperative and you will always have normal vacuum spark advance regardless of the gear selected.

To test the system for operation be sure that the plenum chamber temperature is well above 70 degrees F (about 78 degrees F). Put the transmission in neutral position. Turn on the ignition switch to "run" position. Disconnect the wire from the B+ connector of the ballast resistor while holding the solenoid vacuum valve. You will feel the valve de-energize. Reconnect the wire and you will feel the solenoid energize.

Then select high gear on the transmission and you should feel no energizing of the solenoid when the wire is disconnected or connected. This indicates that the system is functioning correctly electrically.

If the system does not work normally, try the following check out procedures.

To test the solenoid vacuum valve, first remove connector on valve to expose valve blade terminals. Jumper from the piggy back connector on the ballast resistor to one of the solenoid vacuum valve blade terminals. Jumper the other blade terminal on the vacuum valve to ground. With the ignition switch in the "run" position the solenoid should energize. If it does not energize replace it.

To test the thermal switch disconnect the dual plug from the thermal switch and use a short wire to jumper the plug. Place transmission in neutral and ignition to "run". The solenoid vacuum valve should energize. If the plenum temperature is 78 degrees F and the solenoid vacuum valve does not energize when the thermal switch is connected but does energize when the plug is jumpered the thermal switch is defective and should be changed.

To test the transmission switch. Place ignition switch in "run", transmission in neutral. Remove connector from switch and jumper it to a good ground. If the valve functions when this is done

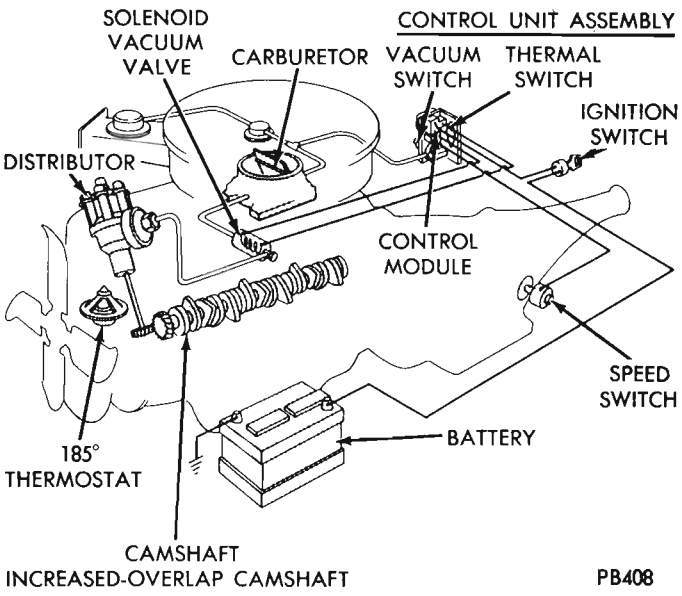


Fig. 14 - NOx System - Automatic Transmission Installation

change the transmission switch. Check switch first for proper torque in transmission housing. This should be 180 in. lbs. to insure proper grounding. If the proper torque does not relieve the problem, change the transmission switch.

AUTOMATIC TRANSMISSION

The NOx Control System for the automatic transmission installation is shown in Fig. 14. It consists of the high overlap cam and 185 degrees thermostat and addition of a Speed Switch, Control Unit Assembly and a Solenoid Vacuum Valve.

The speed switch senses vehicle speed and is mounted on the transmission housing inline with the speedometer cable. Except on Valiant/Dart Bodies in which the speed switch is mounted in mid-cable and attached to a frame member by a strap bracket which provides the ground.

The control unit assembly mounts on the fire wall against the plenum chamber. It contains three parts, the control module, the thermal switch and the vacuum switch. It senses ambient temperature and manifold vacuum.

The solenoid vacuum valve Fig. 12 is a simple solenoid with the plunger used as a valve and is identical to the one used in manual transmission installations. It is the only interchangeable part. When the solenoid is de-energized it is spring loaded toward the vent, closing it and allowing normal vacuum spark advance. When the solenoid is energized, the plunger is drawn to the opposite end of its travel which shuts off the vacuum line from the carburetor and opens the vent. This prevents vacuum spark advance and allows any vacuum that may be trapped in the distributor spark advance chamber to be bled off cancelling any

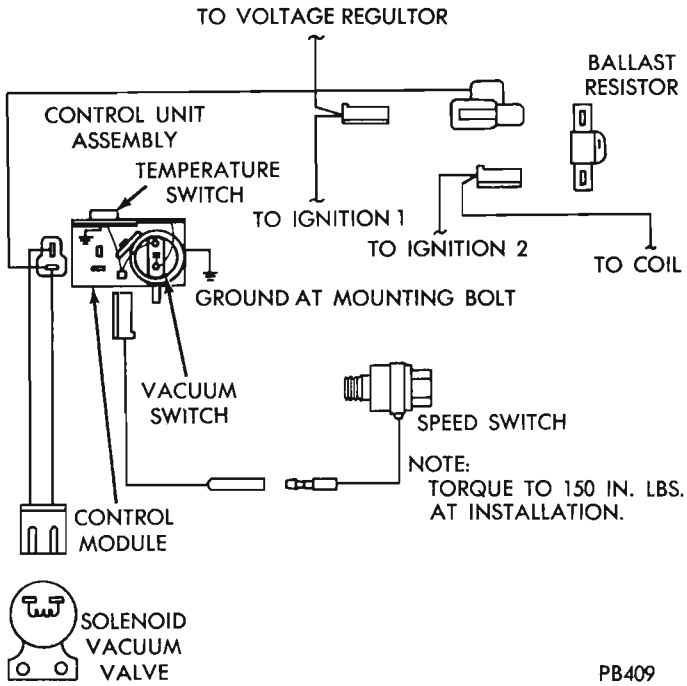


Fig. 15 - Wiring Schematic of Automatic Transmission Installation

spark advance.

A quick test of the solenoid vacuum valve can be made by turning the ignition switch to "run" then while holding the case of the solenoid vacuum valve disconnect the most convenient connector. You can feel the valve cycling when the connector is connected and disconnected.

The NOx system is designed to have one function and that is to prevent vacuum spark advance of the distributor under certain conditions. These are; (1) temperature above 70 degrees F, (2) speeds below 30 m.p.h., and (3) acceleration. At any time that all three of these conditions exist the solenoid vacuum valve will be energized venting the distributor vacuum advance chamber and shutting off the vacuum from the carburetor.

The wiring schematic in Fig. 15 shows the wiring of the external components of the NOx System as installed on automatic transmission equipped vehicles.

Due to the many variables involved no firmly fixed values can be given with regard to temperature, vacuum or speed. All values given are subject to variation from one vehicle to another but exact values are not deemed necessary to functionally check operation of the NOx System.

To functionally check the system, warm the engine to normal operating temperature. Be sure the temperature in the plenum chamber is well above 70 degrees F (78 degrees F). Using a tee fitting place a vacuum gauge between the distributor and the solenoid vacuum valve. Raise the rear wheels on a hoist to clear the floor. Disconnect and plug

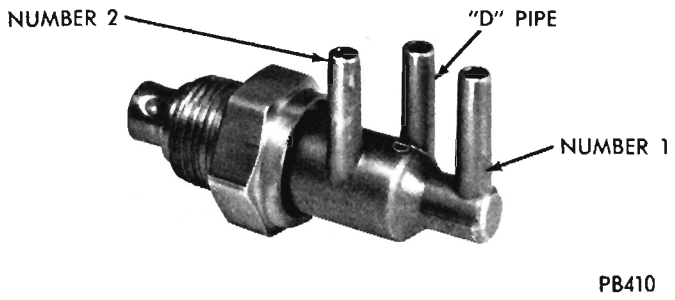


Fig. 16 - Temperature Operated Vacuum By-Pass

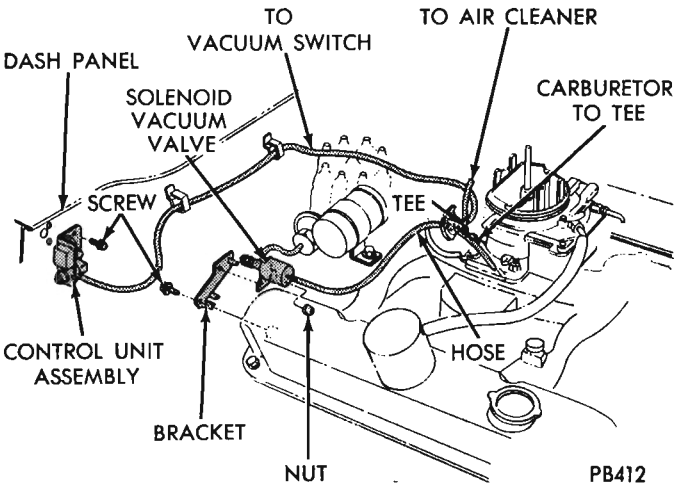


Fig. 18 - Eight Cylinder Engine with Rear Mounted Distributor (Typical)

the vacuum line at the vacuum switch on the control unit assembly. Start the engine and run at a fast idle (above 850 rpm). Vacuum gauge should read zero. Remove the electrical lead from the control unit "T" connector and the vacuum gauge should read ported vacuum spark advance. Reconnect the wire and the gauge should drop to zero. Unplug and reconnect the vacuum line to vacuum switch and disconnect the single wire lead from the control unit to the speed switch. Gauge should read ported vacuum. Place transmission in drive gear. A sharp acceleration will cause the vacuum gauge to drop to zero sharply. Limit speed to 40 mph. As the engine r.p.m. stabilizes the vacuum should be restored sharply and the gauge read ported vacuum spark advance. Reconnect speed switch lead. Disconnect and plug vacuum line at vacuum switch. Vacuum gauge should be zero. Accelerate engine to above 30 mph, vacuum gauge should indicate normal vacuum spark advance when about 30 mph is reached. Due to variations in speedometer and speed switches this is only an approximate speed reading.

If no solenoid action occurred in the foregoing procedures replace control unit assembly. Repeat tests to be sure problem was corrected.

Reconnect vacuum lines as before test and be sure all wires are securely connected.

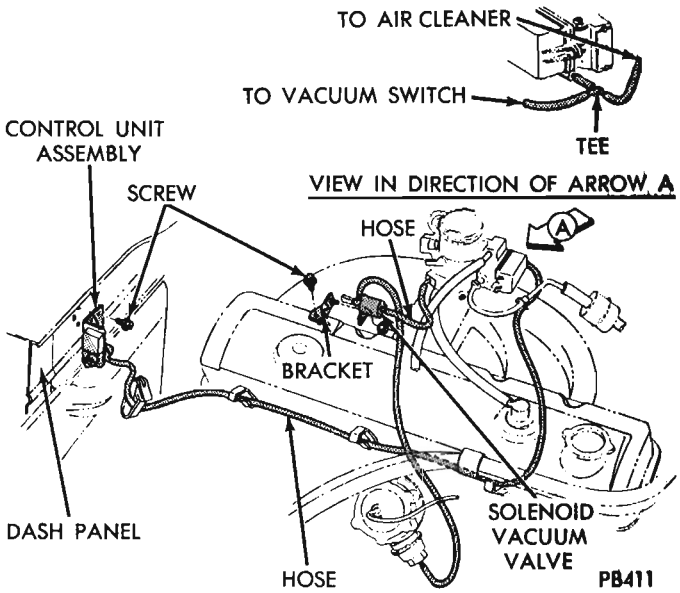


Fig. 17 - Six Cylinder Engine (Typical)

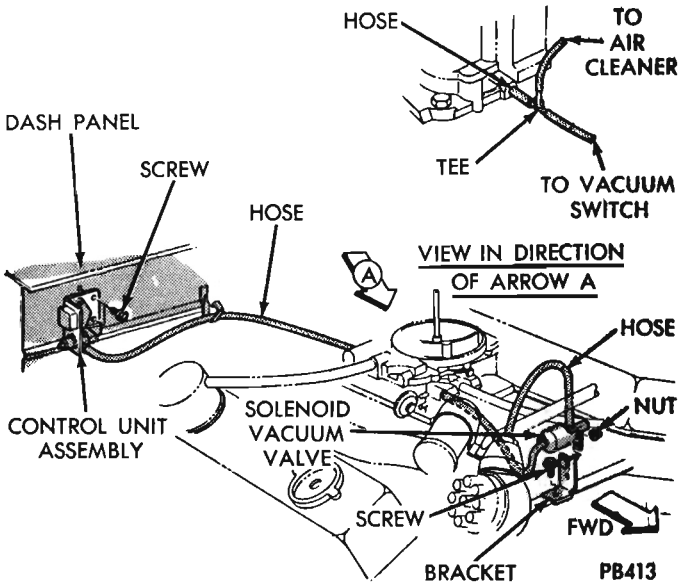


Fig. 19 - Eight Cylinder Engine with Front Mounted Distributor (Typical)

TEMPERATURE OPERATED VACUUM BY-PASS VALVE

On 383 2V without air conditioning and with Automatic Transmission a temperature operated vacuum valve has been added. This valve senses an engine overheat condition. The heat causes the valve to operate which sends manifold vacuum to the distributor for normal vacuum spark advance. This will bypass the NOx system and normal spark advance will continue until the overheat condition is corrected. As the engine cools the valve will operate to restore the NOx system to normal operation. This valve is threaded into the water jacket.

EXHAUST SYSTEM AND INTAKE MANIFOLD

CONTENTS

	Page
CARBURETOR AIR HEATER	17
EXHAUST HEADERS (426 Hemi Engine)	21
EXHAUST HEADER HEAT CONTROL VALVE (426 Hemi Engine)	24
EXHAUST MANIFOLD (318, 340, 360 Cu. In. Engines)	19
EXHAUST MANIFOLD (383, 440 Cu. In. Engines)	19
EXHAUST PIPES, MUFFLERS AND TAIL PIPES	15
GENERAL INFORMATION	1
INTAKE AND EXHAUST MANIFOLD Assembly (6-Cyl. Engines)	18
INTAKE MANIFOLD (318, 340, 360 Cu. In Engine)	18
INTAKE MANIFOLD (383, 440 Cu. In. Engines)	19
INTAKE MANIFOLD (426 Hemi Engine)	20
INTAKE MANIFOLD HEAT TUBES (426 Hemi Engine)	20
MANIFOLD HEAT CONTROL VALVE	21
6 Cylinder Engine	21
318, 340 and 360 Cubic Inch Engine	22
360-383-440 Cubic Inch Engine	23
426 Hemi Engine	24
MANIFOLD HEAT CONTROL VALVE REPLACEMENT (426 HEMI)	24
SERVICE DIAGNOSIS	15
SERVICE PROCEDURES	15
TIGHTENING REFERENCE	25

GENERAL INFORMATION

Exhaust Pipes, Mufflers and Tail Pipes

The single line exhaust systems (Figs. 1, 2, 4, 5, 6, 9, 10, 11 and 13) use mufflers made of aluminized steel and plain steel components. Dual exhaust systems (Figs. 3, 7, 8, 12, 14 and 15) use mufflers made of aluminized and stainless or chromized steel components. The Satellite equipped with the 426 Hemi has in addition to the regular muffler, an aluminized and stainless or chromized steel resonator on both sides and rear of the rear axle (Fig. 8). Barracuda models equipped with the 426 Hemi has short resonator located in front of the rear axle and mufflers to the rear of the rear axle (Fig. 14). The tail pipes on all models are made of aluminized steel.

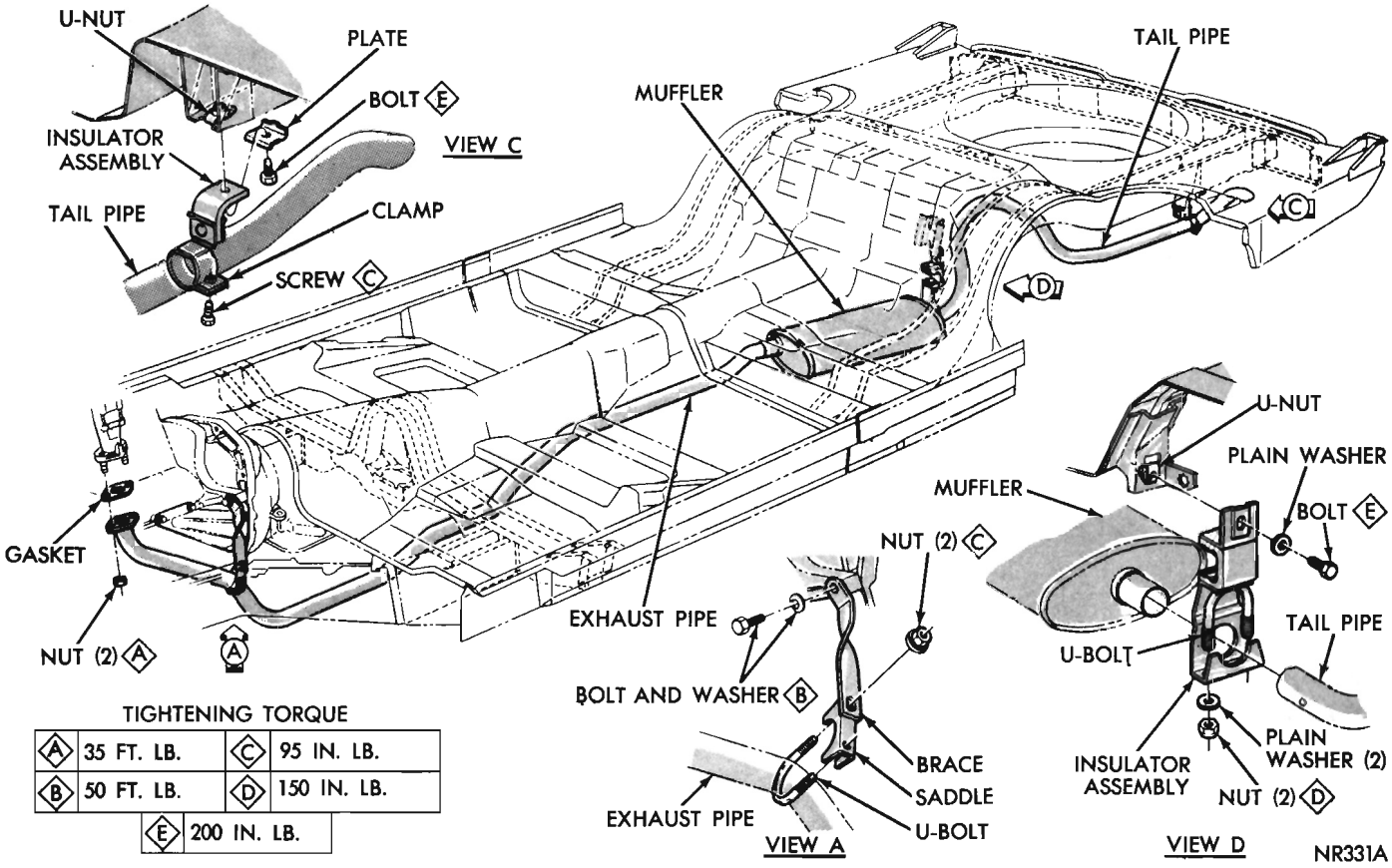
The single line exhaust systems used on models equipped with the six cylinder engine, except the Barracuda six use an integral exhaust pipe and muffler (Figs. 1, 4 and 9). Single line exhaust systems with 318 and 360 engines (Figs. 2, 5 and 10) Valiant, Satellite and Fury and 383-2V engine (Fig. 6) Satellite, a U-bolt and saddle clamping arrangement is used between the exhaust pipe and exhaust pipe extension. The Barracuda single line exhaust system used with the six cylinder as well as the single line exhaust with the 318 V-8 engine has an exhaust pipe which is one piece from engine to tail pipe support (Fig. 13). Barracuda 340-4V, 383-2V (single). 383-4V, 440-4V and 440 3-2V have a resonator as part of the exhaust pipe. All Barracuda models have the main muffler integral with the tail pipe and located at the rear of the car (Figs. 13 and 14).

(The dual exhaust system used on models equipped with the 426 Hemi engine uses an "H " type exhaust pipe arrangement (Figs. 8 and 14). The dual pipes are connected near the center by a short crossover pipe. Ball joint connections are provided at the juncture of exhaust headers and exhaust pipes to facilitate installation and alignment of the system.

The dual exhaust system used on Satellite models equipped with the 440 engines use an "H" type exhaust pipe arrangement (Figs. 8 and 14). The dual pipes are connected near the center by a short crossover pipe.

Muffler (Satellite) and resonators (Barracuda) are clamped on the "H" pipe systems with U-bolts and saddle (See Figs. 8 and 14).

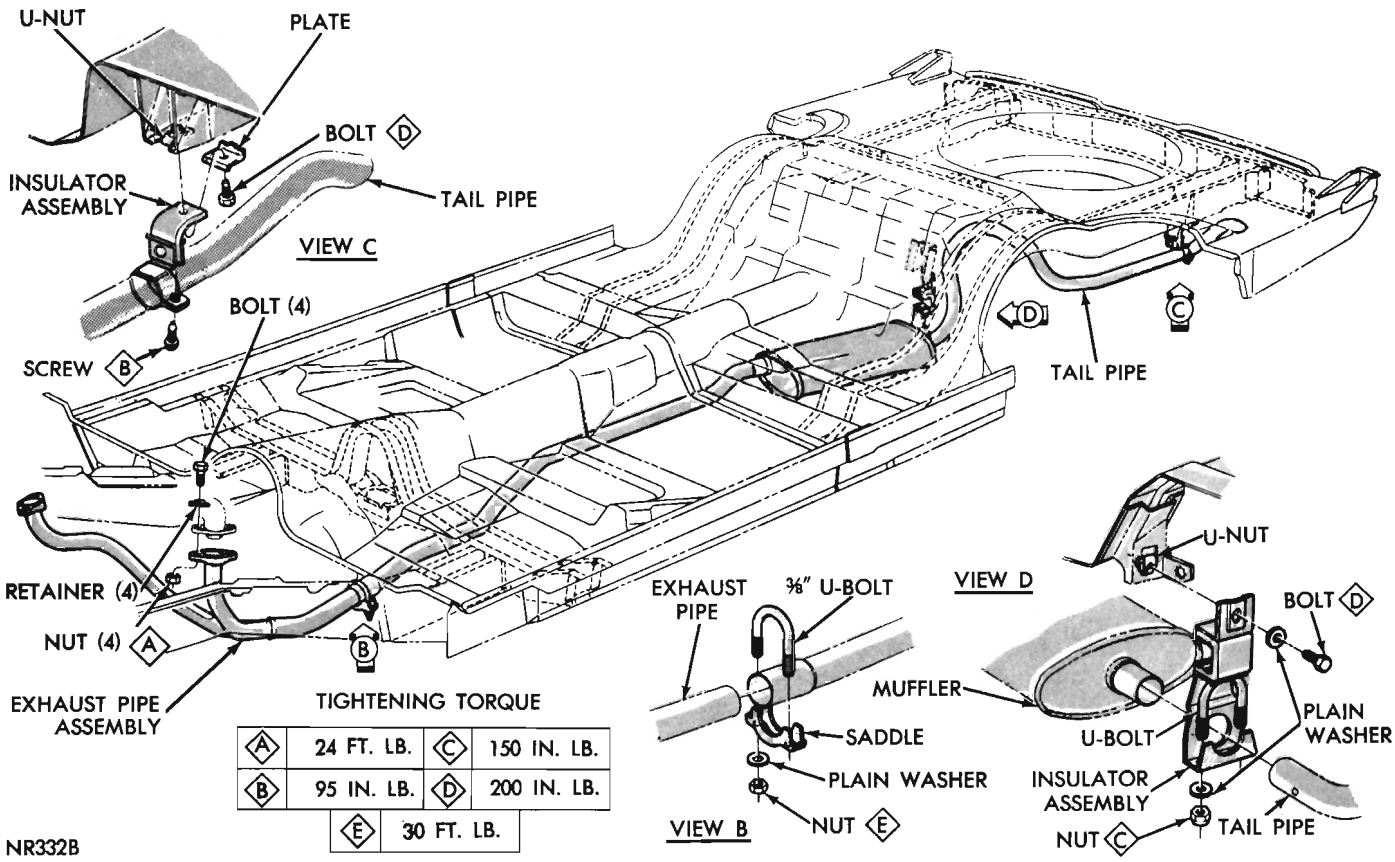
Ball joint connections are used at the juncture of the exhaust manifolds and exhaust pipes on models equipped with 318, 340, (right side only on Duster) (Fig. 3) and 360 cubic inch engines. No gaskets are used at the ball joint connections. All other V-8 except Hemi and six cylinder engines use a gasket between the exhaust manifold and pipe flanges. Ball joint connections are used between the exhaust pipes and pipe extensions on



TIGHTENING TORQUE

A	35 FT. LB.	C	95 IN. LB.
B	50 FT. LB.	D	150 IN. LB.
E	200 IN. LB.		

Fig. 1 Valiant Exhaust System (198, 225 cubic inch engines)



TIGHTENING TORQUE

A	24 FT. LB.	C	150 IN. LB.
B	95 IN. LB.	D	200 IN. LB.
E	30 FT. LB.		

Fig. 2 Valiant Exhaust System (318 cubic inch engine)

Fury, Chrysler and Imperial models **with 383 and 440 cubic inch engines** (Figs. 11 and 12) to facilitate installation and alignment of the system.

The single and dual exhaust systems on Fury, Chrysler and Imperial models (Figs. 9, 10, 11 and 12) are suspended from the shock absorber crossmember brackets at the top of the tail pipe kick-up by flexible, double loop support. A U-bolt and saddle clamping arrangement secure the tail pipe to the muffler outlet nipple. A similar support arrangement is used on the Satellite models on the right side only. The left side of dual systems is supported with a flexible "C" type support (Figs. 5, 7 and 8).

Flexible "C" type supports are used at the rear of the mufflers on all Valiant models and at the front end of the tail pipe on Barracuda models.

Tail pipes are supported at the rear with flexible "L" type hangers on all models except Barracuda with chrome extensions. Satellite 383-4V and 440 with chrome extension or Hemi and Duster 340 with chrome extension are equipped with a metal blade and rubber block type support at the end of the system.

Satellite models with the 440 cubic inch Power Pak engine or the 426 Hemi engine use chrome plated extensions clamped to the ends of their systems. (Fig. 8).

Barracuda models equipped with 340, 383-4V, 440 and 426 Hemi and also the Duster with the 340 cubic inch engines use a chrome plated extension clamped on at the end of their systems (Figs. 3, 8 and 14).

Barracuda models equipped with the 340 tri-carbuertor (Trans-Am) has special muffler supports. Special outlet pipes are clamped to the front of the mufflers and supported by bracket assemblies bolted to the inner sill. The Trans-Am models has some of the exhaust system installed at the factory prior to delivery to the dealer with the balance to be completed by the dealer (Figs. 15 and 16).

The dealer parts package and instructions are as follows:

Package contains:
(1) Right Outlet Pipe
(1) Left Outlet Pipe
(1) Right MTG Bracket with Insulator
(1) Left MTG Bracket with Insulator
(6) MTG Bracket Attaching Screws
(2) Lo-Profile U-Bolt & Saddle Assemblies
(1) Installation Instruction Sheet

INSTALLATION OF OUTLET PIPES

(1) Install outlet pipes to the muffler with the support blade through the rubber insulator block.

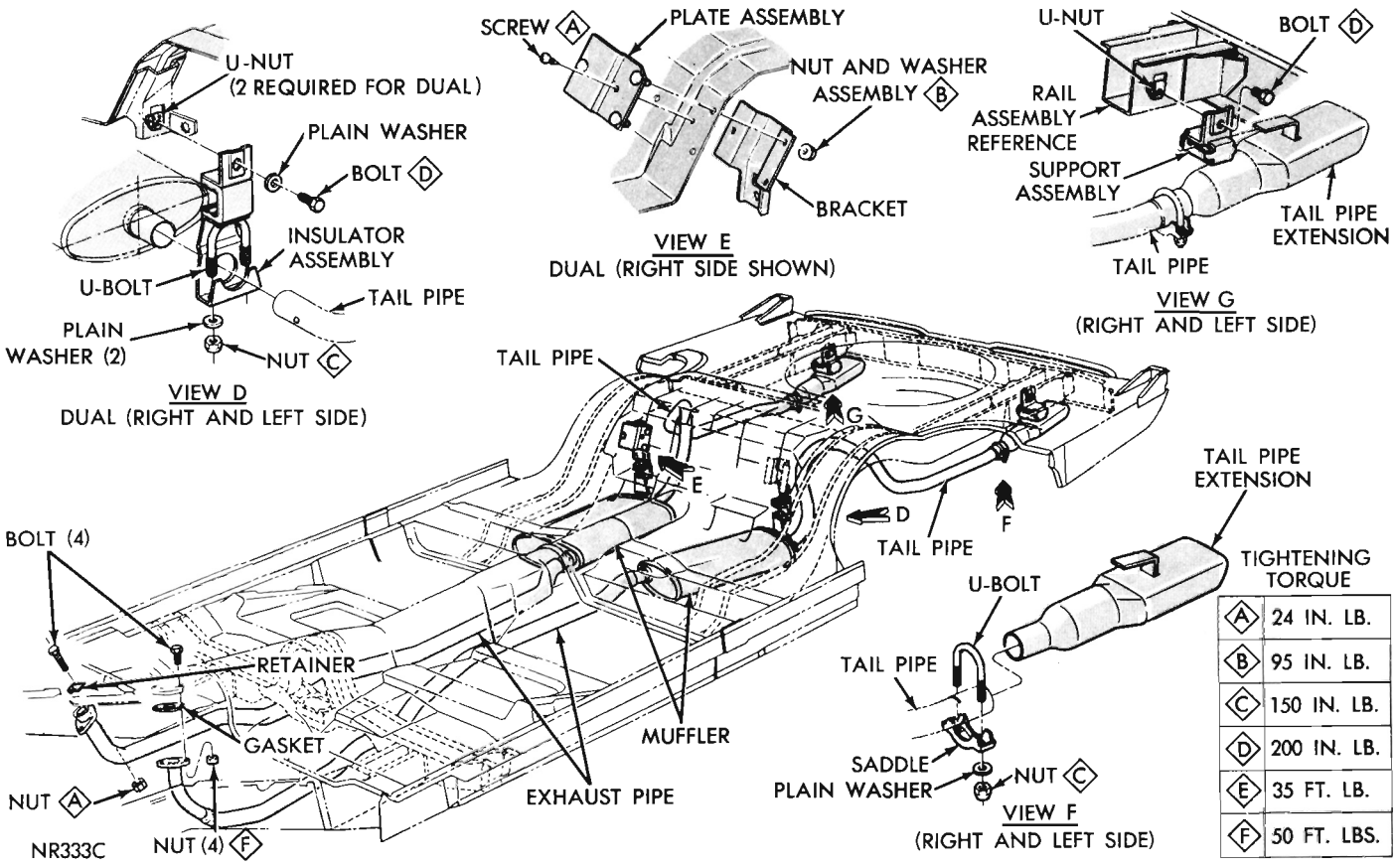


Fig. 3 Duster Exhaust System (340 cubic inch engine)

It might be necessary to loosen the muffler support clamp and exhaust pipe to muffler U-bolts. If this is required, reposition the muffler clamp using the locating finger provided and reposition the muffler using the small locating tabs provided. Tighten clamp screws & U-bolts securely.

(2) Align the outlet pipes being sure of proper pipe to muffler engagement (positioning studs are provided). Tighten U-bolts securely.

(3) After installation, check all joints to be sure there is no leakage of exhaust gases. If satisfactory remove the "Caution" decal from the windshield.

Manifold Heat Control Valve

A thermostatic heat control valve is incorporated in the left hand exhaust manifold on 6-cylinder models (Fig. 24). On all V-8 models, a similar valve is located in the right hand manifold.

On all V-8 models, except those equipped with the 426 Hemi engine, the valve directs exhaust gases to the heat chamber beneath the carburetor mounting flange in the intake manifold to help vaporize the fuel mixture during the warm-up period.

On the 426 Hemi engine, a heat tube arrangement incorporated with the exhaust header thermostatic heat control valve (Fig. 23) diverts the hot exhaust gases to a heat chamber in the intake manifold at the base of the rear carburetor during the warm-up period. These tubes are made of aluminized steel to resist corrosion,

When the valve is closed, the exhaust gases are diverted to the heat chamber through the right hand tube (Fig. 23). After circulating through the heat chamber, the gases are returned to the exhaust pipe through the left hand tube.

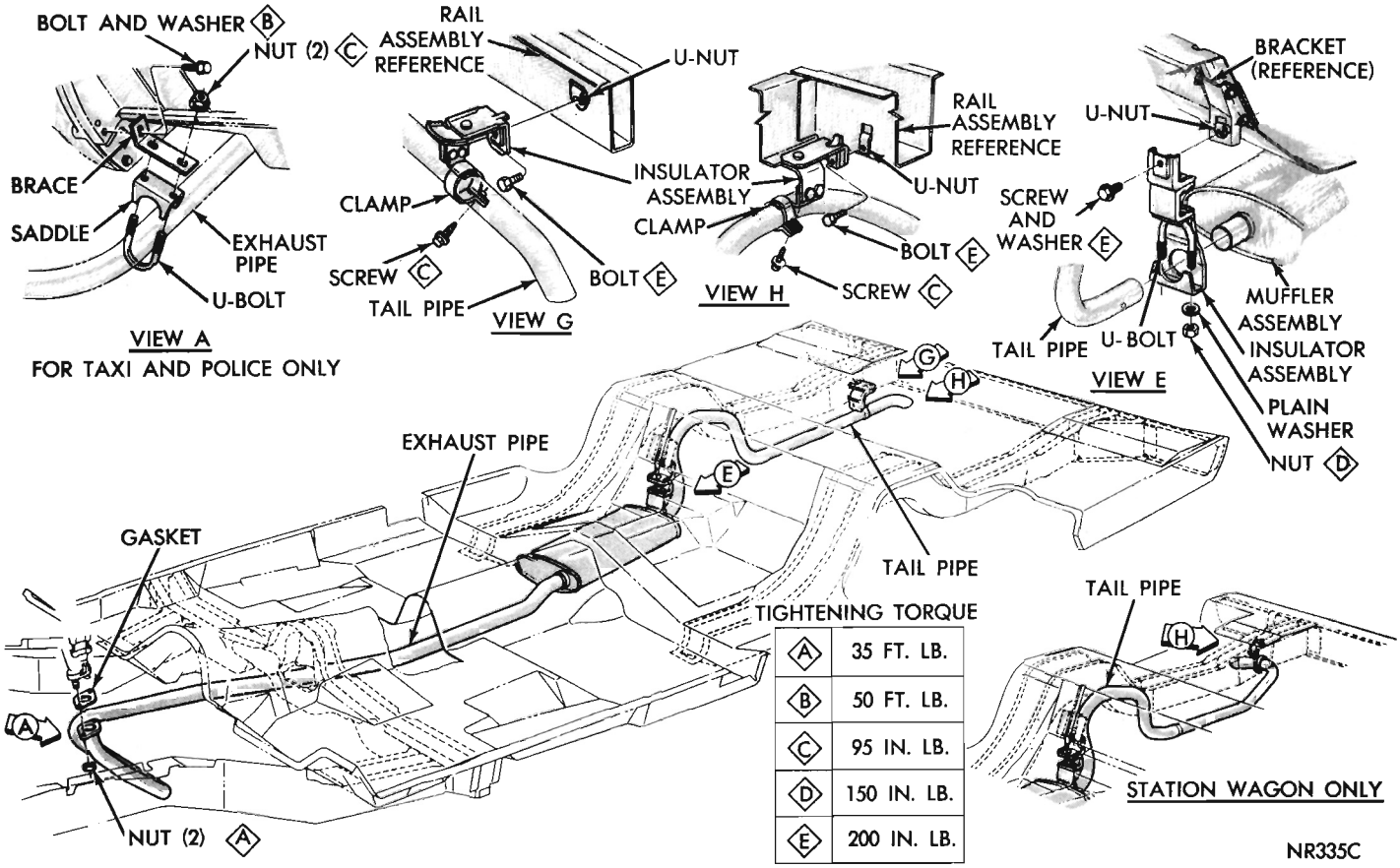


Fig. 4 Satellite Exhaust System (225 cubic inch engine)

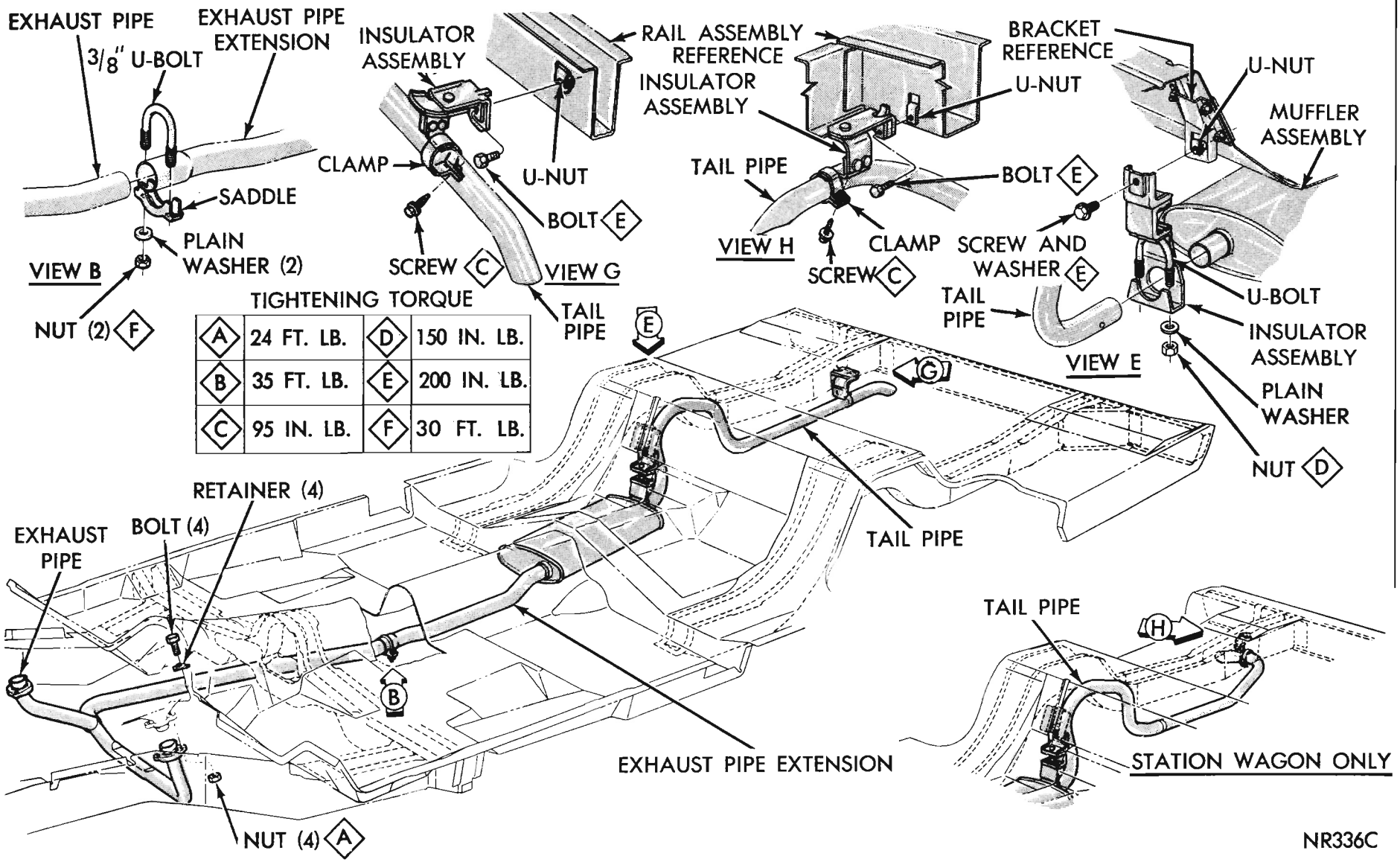


Fig. 5 Satellite Exhaust System (318 cubic inch engine)

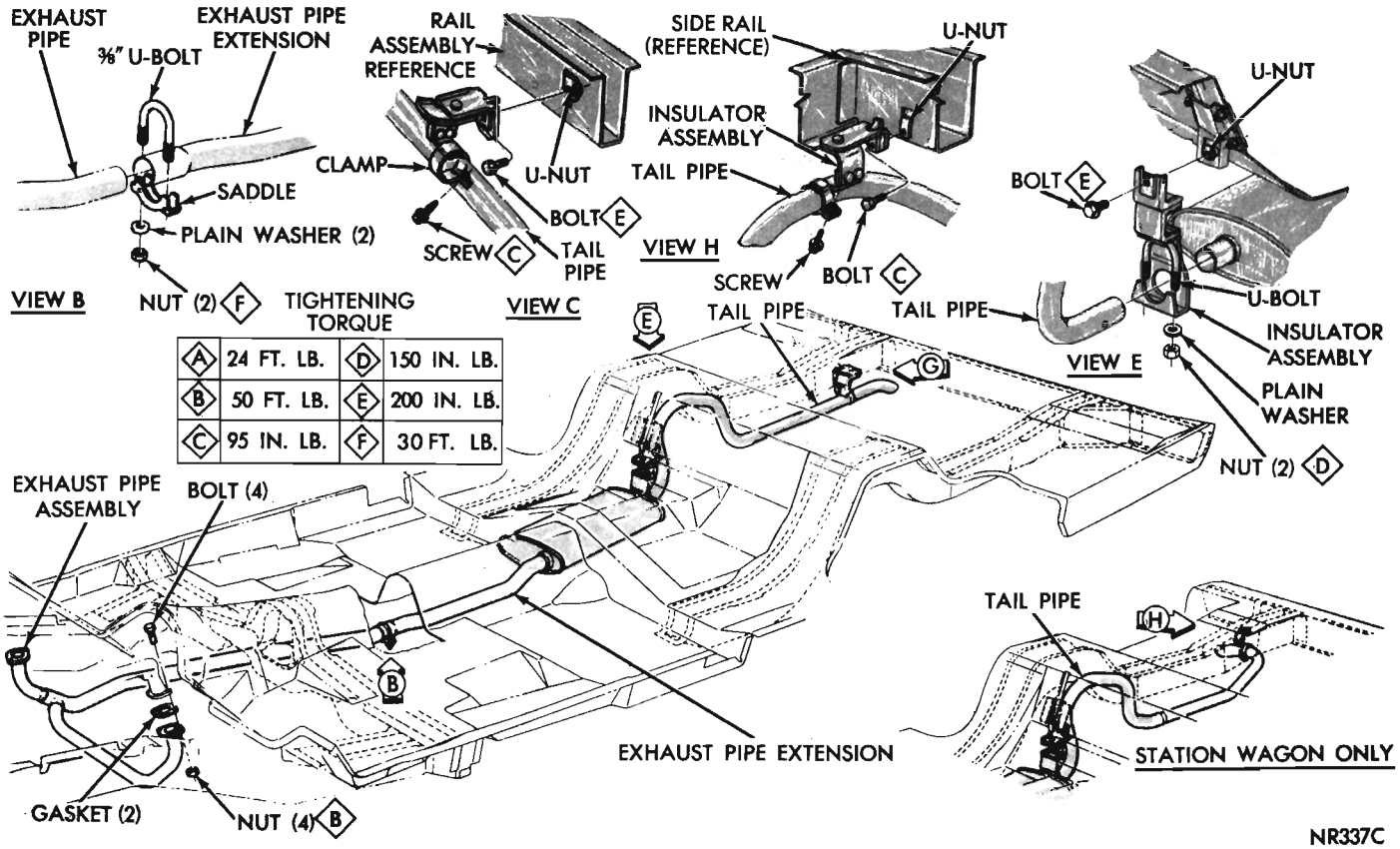


Fig. 6 Satellite Single Exhaust System (383-2V cubic inch engine)

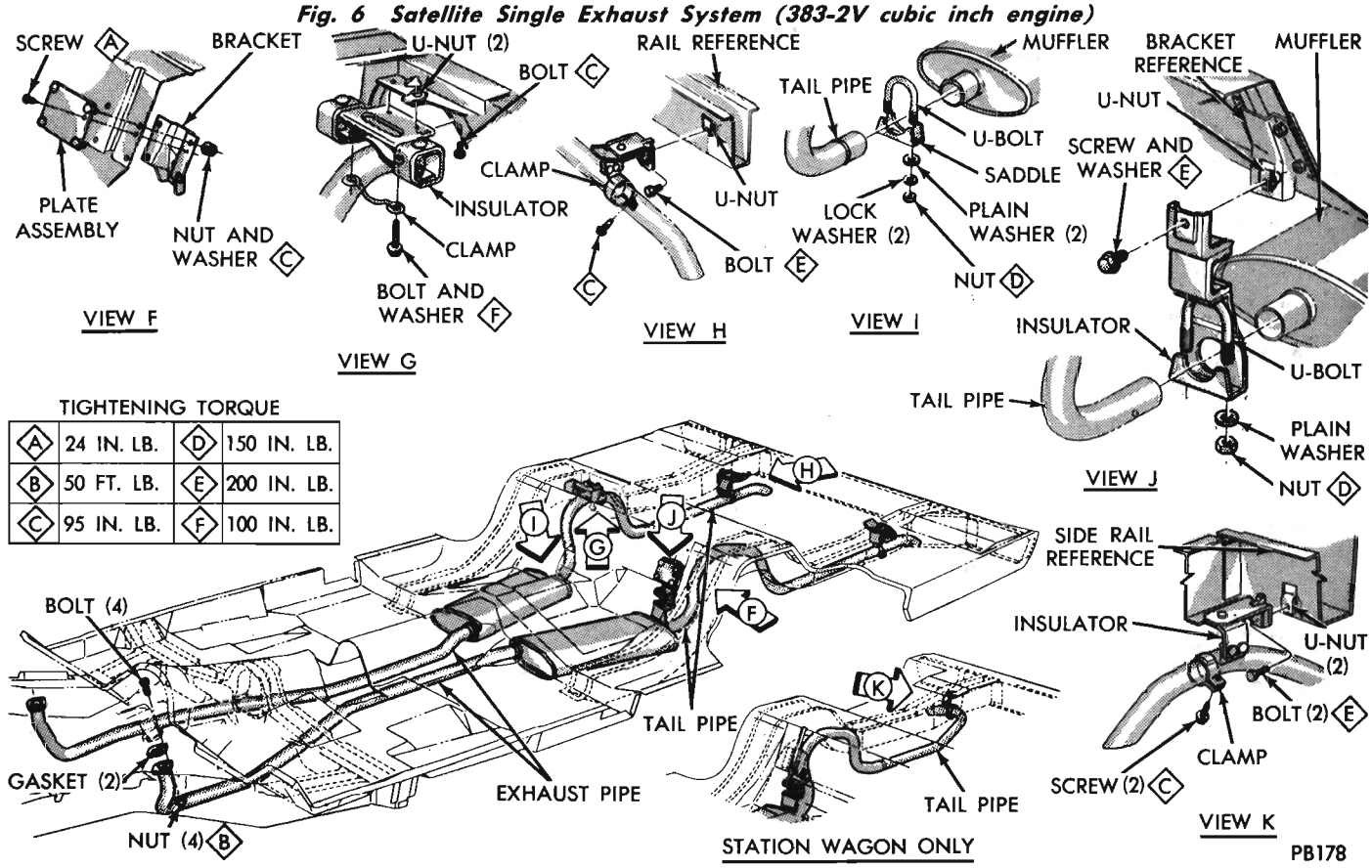
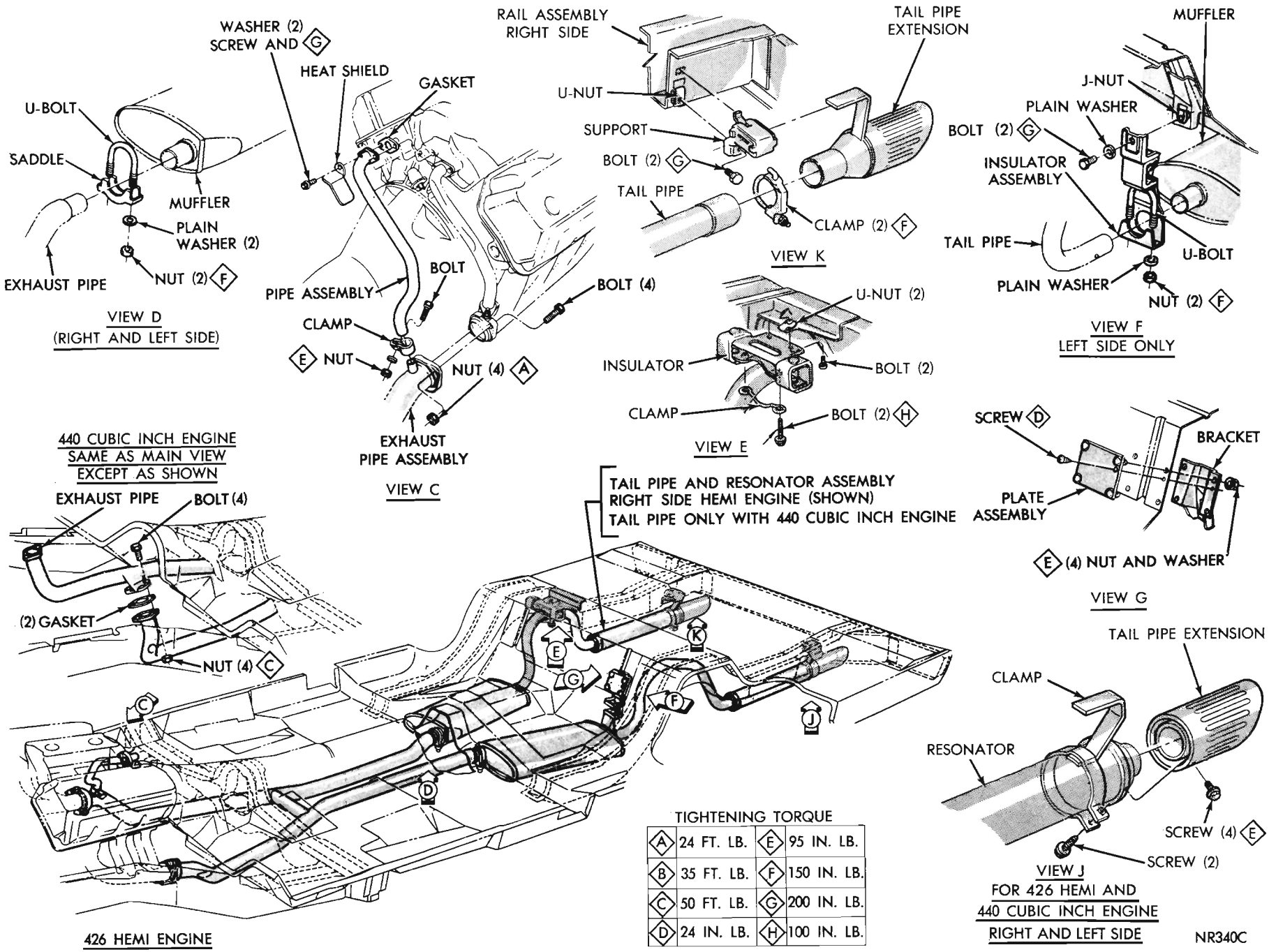


Fig. 7 Satellite Dual Exhaust System (383-4V cubic inch engine)



TIGHTENING TORQUE

A	24 FT. LB.	E	95 IN. LB.
B	35 FT. LB.	F	150 IN. LB.
C	50 FT. LB.	G	200 IN. LB.
D	24 IN. LB.	H	100 IN. LB.

Fig. 8 Satellite Dual Exhaust System (426, 440 cubic inch engines)

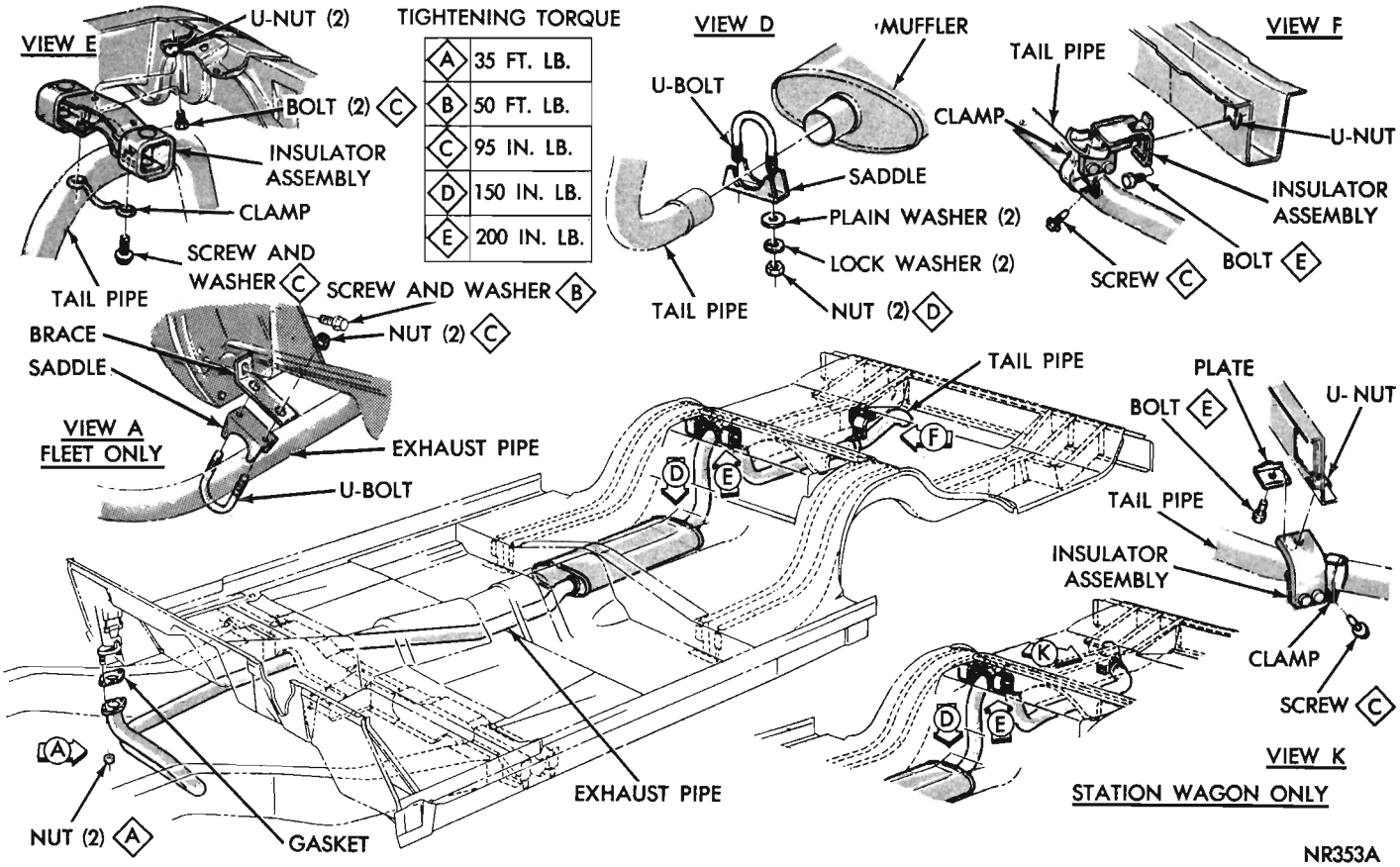


Fig. 9 Fury Exhaust System (225 cubic inch engine)

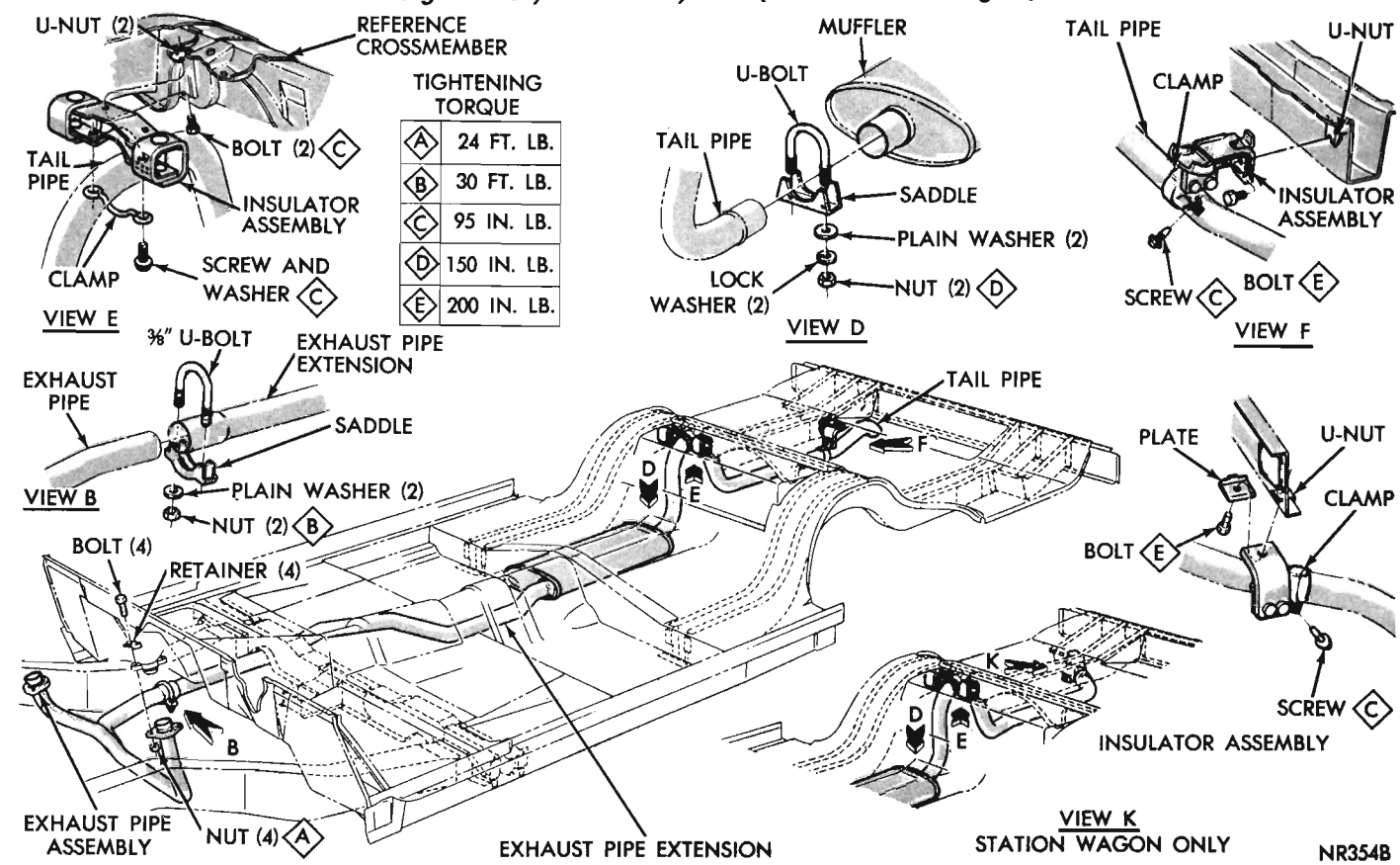


Fig. 10 Fury Exhaust System (318 and 360 cubic inch engines)

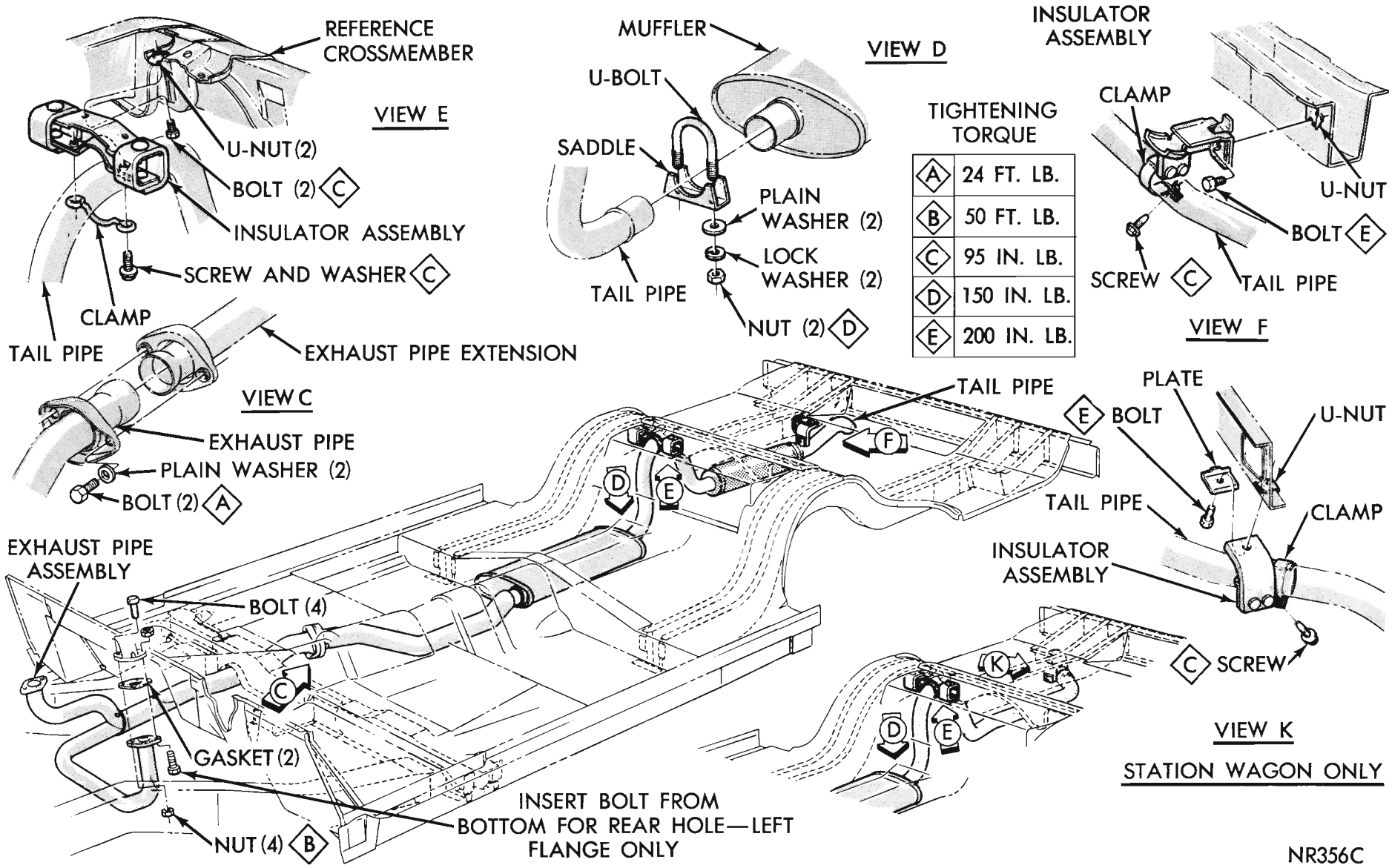


Fig. 11 Fury, Chrysler, Imperial Single Exhaust System (383-2V, 383-4V and 440 cubic inch engines)

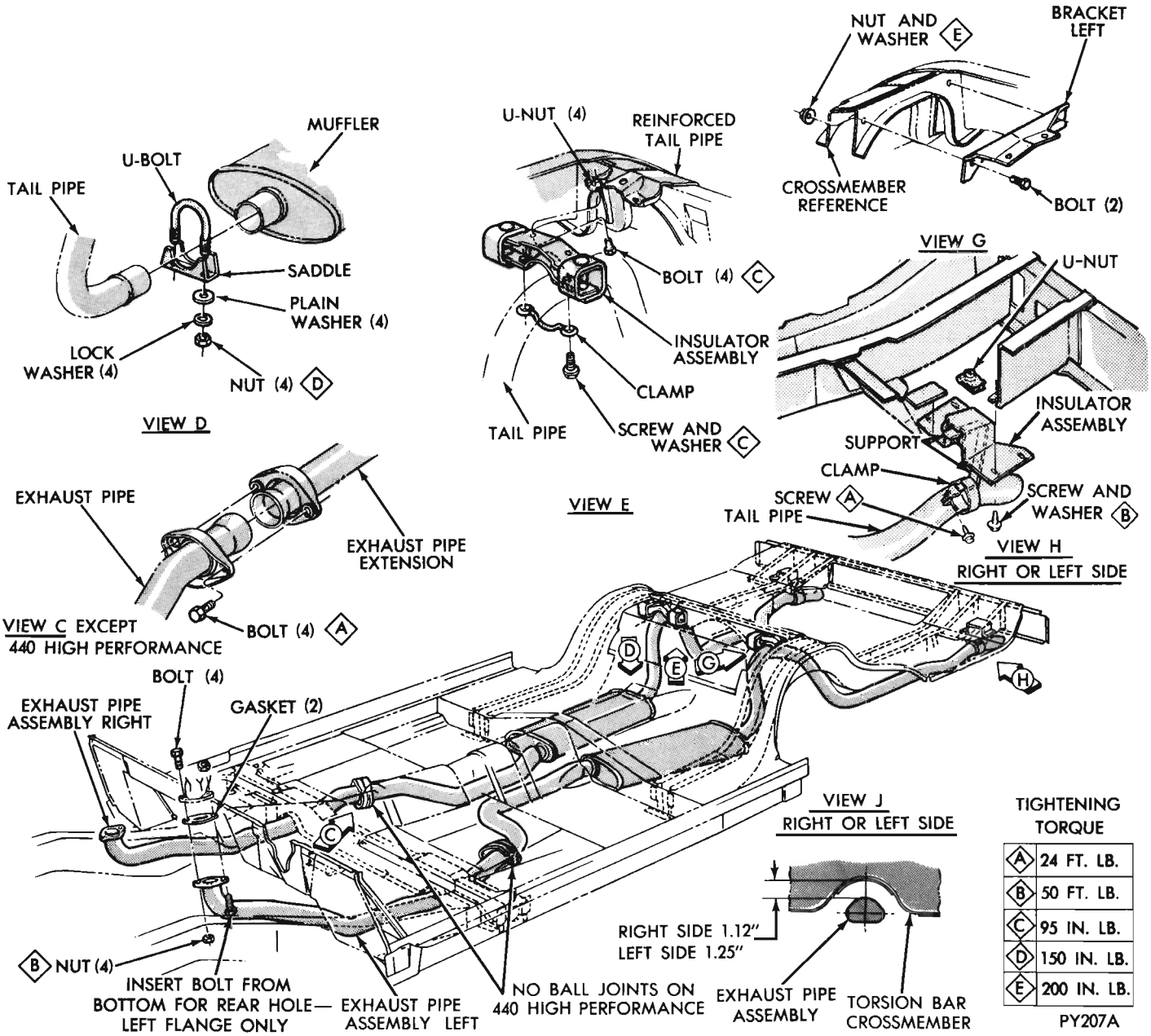
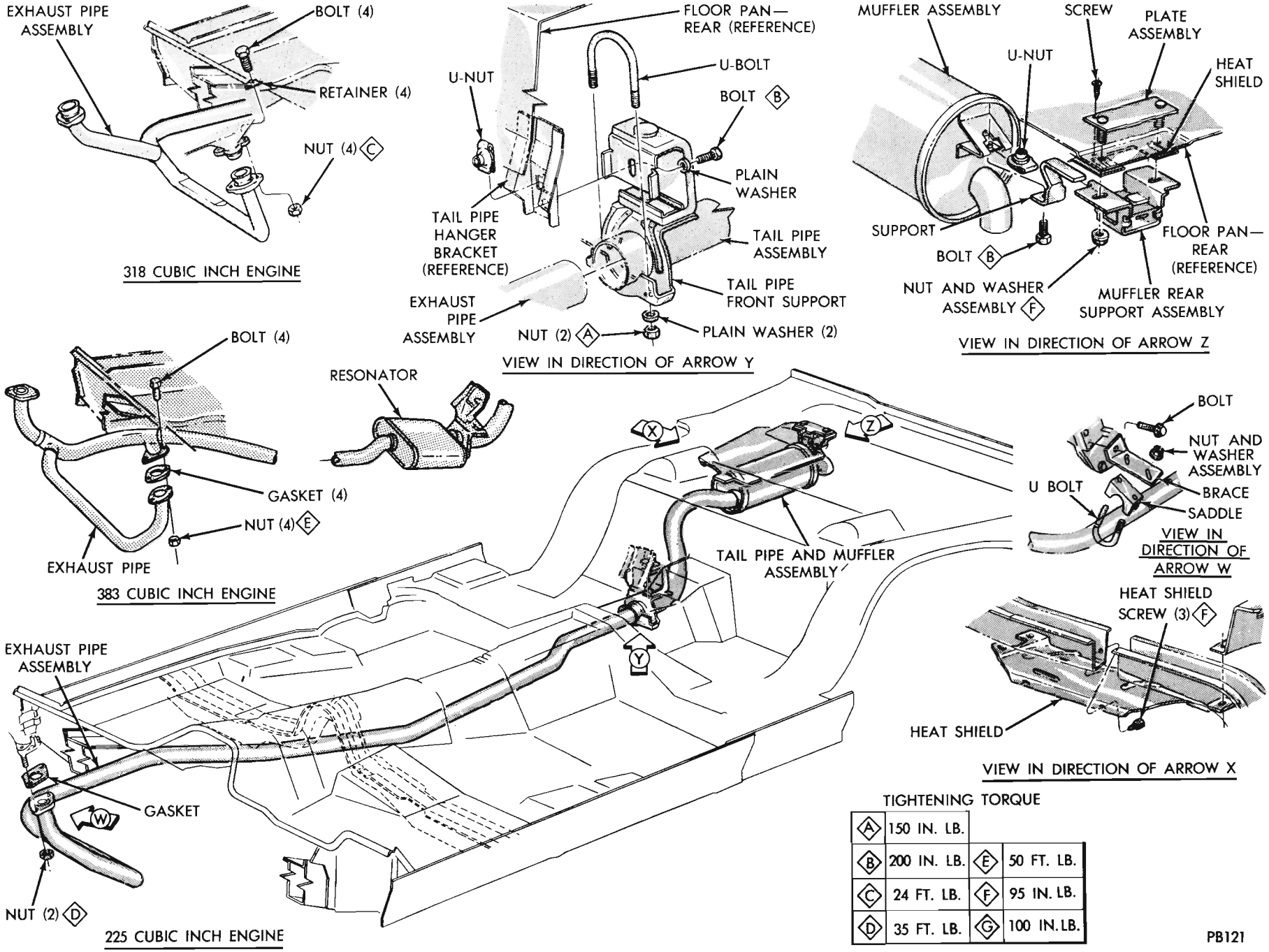


Fig. 12 Fury, Chrysler Dual Exhaust System (383-4V, 440-4V cubic inch engines) and (440-6V cubic inch engine Fury only)

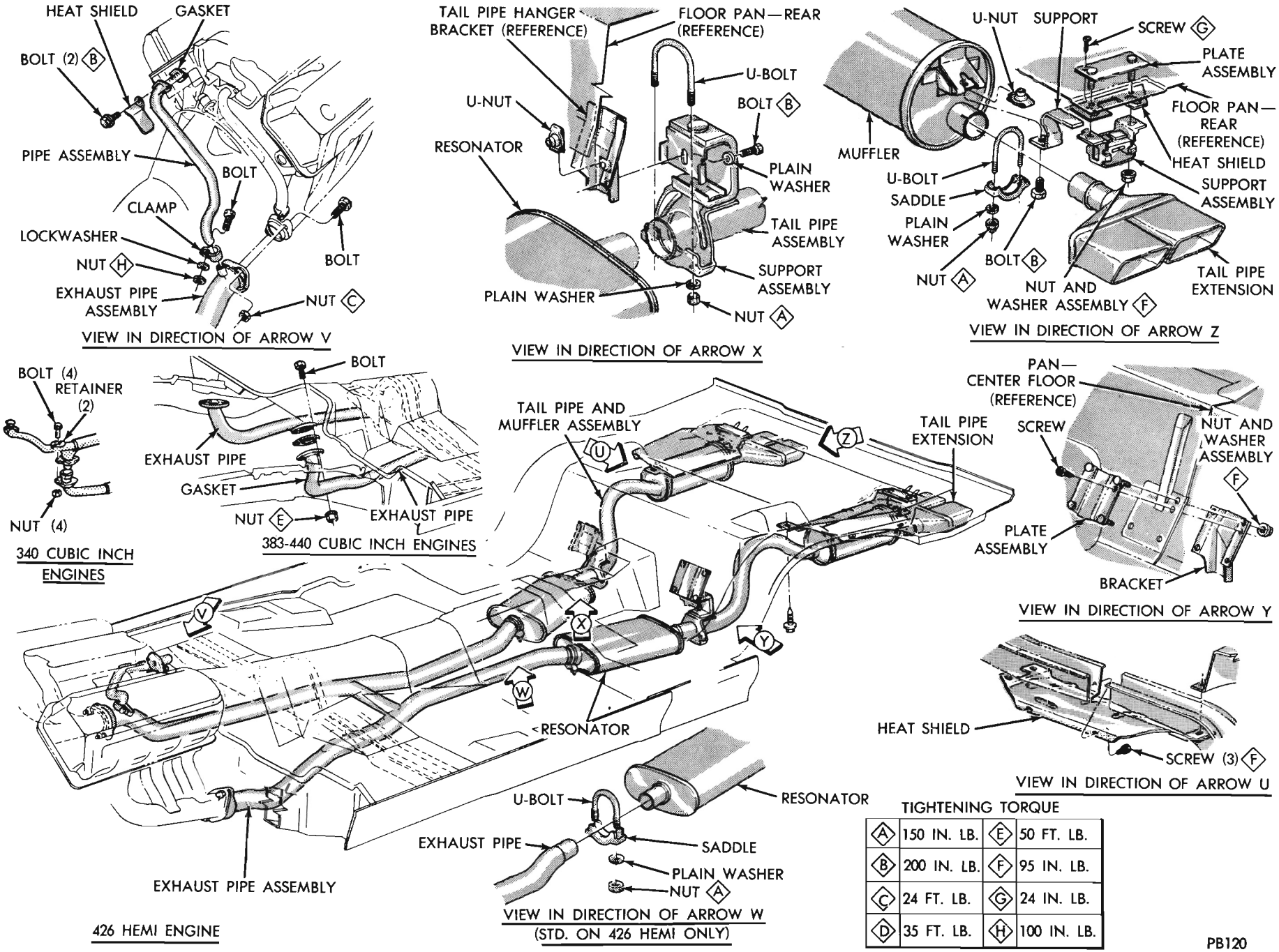


TIGHTENING TORQUE

A	150 IN. LB.		
B	200 IN. LB.	E	50 FT. LB.
C	24 FT. LB.	F	95 IN. LB.
D	35 FT. LB.	G	100 IN. LB.

PB121

Fig. 13 Barracuda Single Exhaust System (198, 225, 318 and 383-2V cubic inch engines)

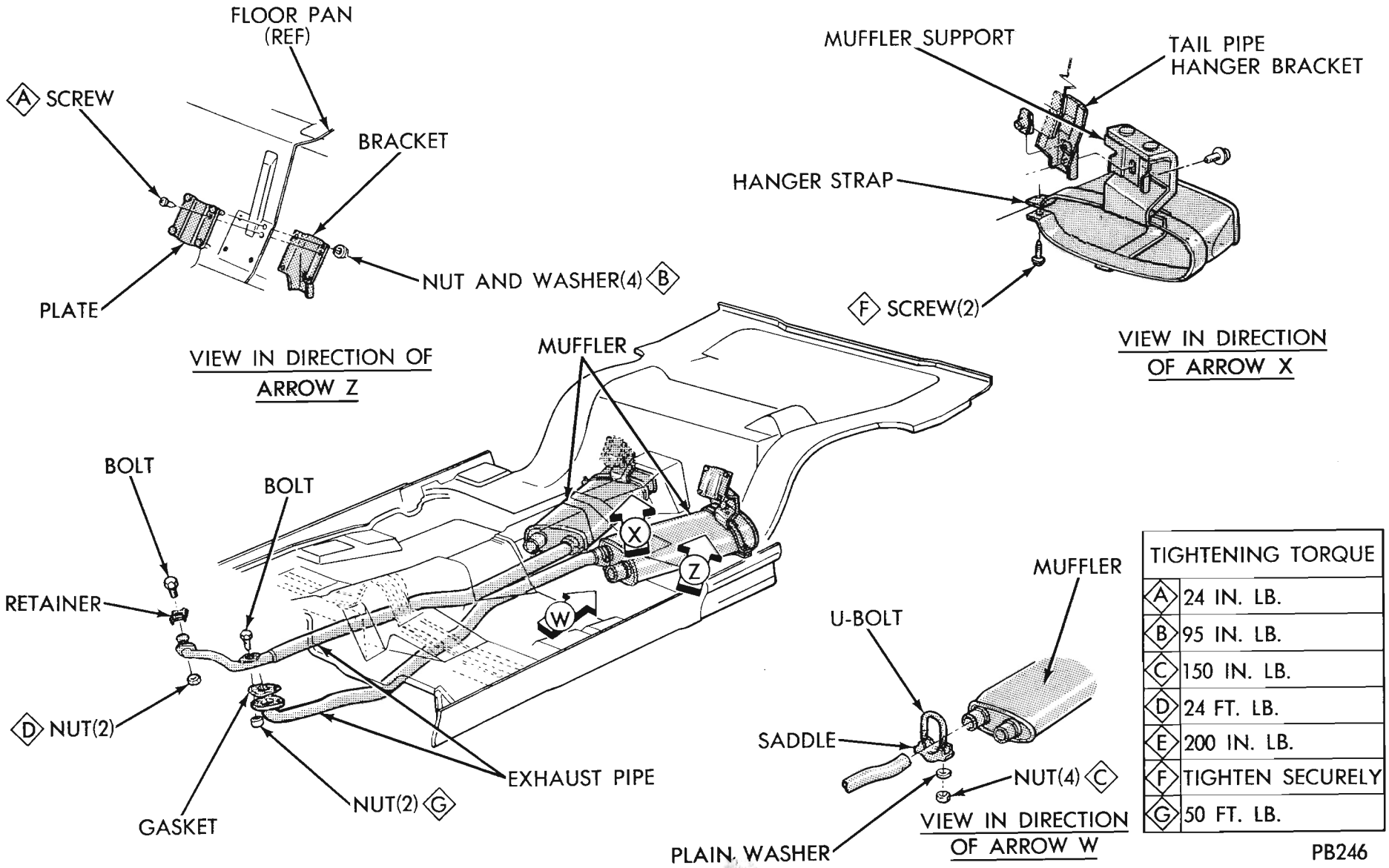


TIGHTENING TORQUE

A	150 IN. LB.	E	50 FT. LB.
B	200 IN. LB.	F	95 IN. LB.
C	24 FT. LB.	G	24 IN. LB.
D	35 FT. LB.	H	100 IN. LB.

PB120

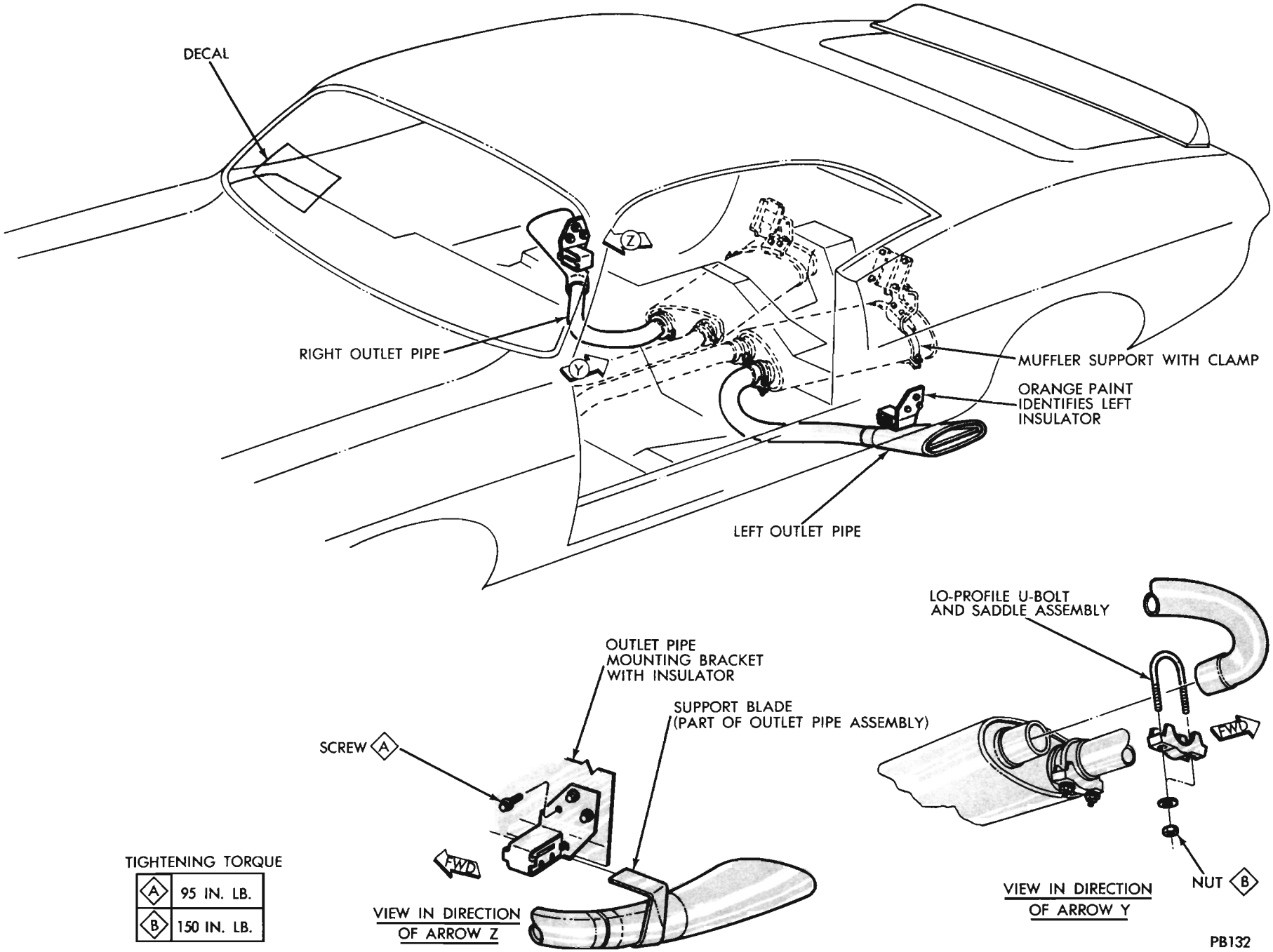
Fig. 14 - Barracuda Dual Exaust System (340, 383-4V, 440-4V, 440-6V and 426 Hemi Engines)



TIGHTENING TORQUE	
A	24 IN. LB.
B	95 IN. LB.
C	150 IN. LB.
D	24 FT. LB.
E	200 IN. LB.
F	TIGHTEN SECURELY
G	50 FT. LB.

PB246

Fig. 15 Barracuda Dual Exhaust (340 cubic inch Tri-Carb) Factory Installation



TIGHTENING TORQUE

A	95 IN. LB.
B	150 IN. LB.

Fig. 16 Barracuda (340 cubic inch Tri-Carb) (Dealer Installation)

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
EXCESSIVE EXHAUST NOISE	(a) Leaks at pipe joints.	(a) Tighten clamps at leaking joints.
	(b) Burned or blown out muffler.	(b) Replace muffler assembly.
	(c) Burned or rusted out exhaust pipe.	(c) Replace exhaust pipe.
	(d) Exhaust pipe leaking at manifold flange.	(d) On 318, 340 and 360 cu. in. engines, tighten ball joint connection attaching bolt nuts to 24 foot-pounds. On 426 Hemi engines, tighten the nuts to 24 foot-pounds. On all other engines, install a new gasket and tighten flange bolt nuts to 50 foot-pounds.
	(e) Exhaust manifold cracked or broken.	(e) Replace manifold.
	(f) Leak between manifold and cylinder head.	(f) Tighten manifold to cylinder head stud nuts or bolts to specifications.
	(g) Leaks at heat tube pipe connections.	(g) Replace gaskets as required. Tighten bolts and nuts and clamp bolt nut to specifications.
LEAKING EXHAUST GASES	(a) Leaks at pipe joints.	(a) Tighten U-bolt nuts at leaking joints to 150 inch-pounds.
	(b) Damaged or improperly installed gaskets.	(b) Replace gaskets as necessary.
	(c) Restriction in muffler or tail pipe.	(c) Remove restriction, if possible, or replace as necessary.
	(d) Loose heat tube connections.	(d) Replace gaskets as required. Tighten stud nuts or bolts to specifications.
	(e) Burned or rusted out heat tubes.	(e) Replace heat tubes as required.
ENGINE HARD TO WARM UP OR WILL NOT RETURN TO NORMAL IDLE	(a) Heat control valve frozen in the open position.	(a) Free up manifold heat control valve using a suitable solvent.
MANIFOLD HEAT CONTROL VALVE RATTLE	(a) Thermostat broken.	(a) Replace thermostat.
	(b) Broken, weak or missing anti-rattle spring.	(b) Replace spring.

SERVICE PROCEDURES

EXHAUST PIPES, MUFFLERS AND TAIL PIPES

Removal — General

(1) Raise vehicle on hoist and apply penetrating oil to all clamp bolts and nuts to loosen rust and corrosion. **If only the muffler is to be replaced, cut the extension pipe just forward of the muffler with a hack saw or cutter. It is not necessary to remove the exhaust pipe. The replacement muffler can be installed, using a U-bolt and saddle clamping arrangement at the front of the muffler.** (Barracuda replacement mufflers must be same as original equipment).

(2) Remove clamps and supports from exhaust pipe, muffler and tail pipe (Figs. 1 through 16).

(3) Disonnect exhaust pipe at exhaust manifolds and remove exhaust pipe. On models using gaskets at exhaust pipe flanges, discard gaskets and carefully clean manifold flanges of any gasket particles.

On models with the 426 Hemi engine, also remove heat tube clamp bolt, nut, clamp and heat tube from exhaust pipe connection (Figs, 8 and 14).

(4) Remove muffler and extension pipe assembly.

(5) Raise rear end of vehicle to relieve body weight from rear springs and remove tail pipe.

Removal — Barracuda

To remove the exhaust system, follow the same instructions outlined for regular models with the following additional steps:

(1) The muffler support bolt is to be removed and the support moved to allow lowering of the muffler.

(2) Cars equipped with chrome extension should have special attention to avoid paint damage to the stone deflector panel.

Removal — Satellite with Chrome Extensions

To remove the exhaust system, follow the same instructions outlined for other models with the following additional steps:

(1) On Hemi equipped cars, remove the two screws on the underside of the extension and work the extension loose (Fig. 8).

Steps 2 through 5 are for all cars except 426 Hemi

(2) At the extension, remove the U-bolt and saddle clamping arrangement (Fig. 8).

(3) Remove extension bracket support screw and nut attaching support to side rail.

(4) Slide extension and support as an assembly from tail pipe.

(5) Withdraw extension bracket from rubber block in support.

Installation (All Models with 198, 225, 318, 340, 360, 383 and 440 Cu. In. Engines)

(1) Assemble exhaust pipe, muffler and tail pipe loosely to permit proper alignment (Figs. 1 through 14).

(2) Assemble exhaust pipe to exhaust manifold. On engines without ball joint seating connections, use new flange gaskets and tighten bolt nuts to 50 foot-pounds. On Models with 318 cubic inch engines, do not tighten ball joint bolt nuts at this time.

(3) Adjust tail pipe and muffler supports to provide proper clearance with underbody and adjacent parts. **Do not fully tighten attaching bolts and screws at this time.**

(4) Tighten all slip joint U-bolt nuts to 150 inch-pounds, (except exhaust pipe to extension slip joint which must use a heavier "U" bolt (3/8 in. - 16 thread) and be tightened to 30 foot-pounds), working from rear to front.

(5) Tighten tail pipe support attaching clamp screws to 95 inch-pounds, at same time maintaining proper clearance with adjacent parts.

(6) Tighten exhaust pipe ball joint connection bolt nuts to 24 foot-pounds. Alternately tightening nuts to insure parallelism of flanges.

Installation Satellite and Barracuda

(Models with 426 Hemi Engine)

(1) Assemble exhaust pipes, mufflers (resonators Barracuda) and tail pipes loosely to permit proper alignment (Figs. 8 and 14).

(2) Assemble exhaust pipes to exhaust headers, **but do not tighten ball joint nuts at this time.**

(3) Adjust muffler and tail pipe supports to provide proper clearance with underbody and adjacent parts. **Do not fully tighten attaching bolts and nuts at this time.**

(4) Tighten front muffler (resonator in Barracuda) slip joint U-bolt nuts to 150 inch pounds.

(5) Tighten muffler and tail pipe support attaching bolts to 150 inch-pounds, at same time maintaining proper clearance with adjacent parts.

(6) Tighten tail pipe U-bolt nuts to 150 inch-pounds.

(7) Tighten exhaust pipe ball joint bolt nuts to 24 foot-pounds.

(8) Install outlet heat tube on right hand exhaust pipe connection and secure with clamp, bolt, washer and nut. Tighten nut to 95 inch-pounds.

Extention Installation - Satelitte With Chrome Extensions

Install exhaust system as prescribed for other models with following additional steps:

(1) On Hemi equipped cars work the extension on to the nipple of the resonator until the two screw holes in the resonator flange are visible. Align the extension as required and tighten the two screws to 95 inch-pounds (Fig. 8). Steps 2 through 5 are for all cars except 426 Hemi:

(2) Insert extension bracket in rubber block in support assembly.

(3) Slide extension and support as an assembly on end of tail pipe until it bottoms (Fig. 8).

(4) Assemble support assembly to side rail with screw and tighten to 200 inch-pounds.

(5) Slide "U" bolt and saddle in place on extension and tighten to 150 inch-pounds.

Extension Installation - Duster 340

Install exhaust system as prescribed for other models with the following additional steps:

(1) Insert extension bracket in rubber block in support assembly.

(2) Position "U" bolt clamp in place on extension, slide extension and support as an assembly on end of tail pipe until it bottoms (Fig. 3).

(3) Assemble support to side rail and tighten attaching bolt to 200 inch-pounds. Tighten "U" bolt clamp to 150 inch-pounds.

Extension Installation — Barracuda

Install exhaust system as prescribed for other models with the following additional steps

(1) Assemble the chrome extension loosely through the stone shield using caution so as to avoid paint damage.

(2) After the muffler is approximately located, insert the extensions into the muffler nipple (Fig 3).

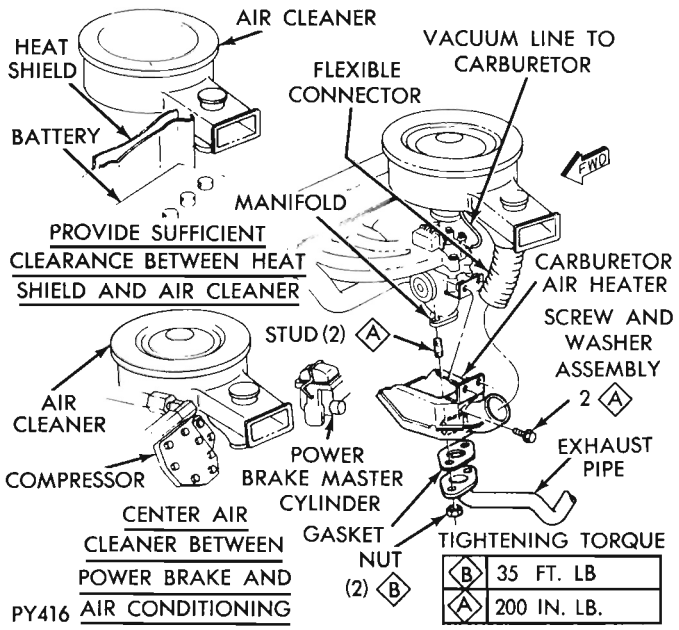


Fig. 17 Carburetor Air Heater, Six Cylinder Engines

(3) Install the U-bolt and saddle loosely over the muffler nipple.

(4) Attach the blade (which is still in Rubber Block) to the muffler support and tighten to 200 inch-pounds.

(5) Align the extensions with approximately 1/2 inch clearance all around.

(6) Secure the U-bolt with 150 inch-pounds.

CARBURETOR AIR HEATER

SIX CYLINDER ENGINES

Removal

(1) Disconnect air cleaner vacuum line from carburetor and flexible connector between air cleaner and carburetor air heater. (Fig. 17).

(2) Disconnect breather cap to air cleaner line and remove air cleaner.

(3) Disconnect exhaust pipe at exhaust manifold.

(4) Remove two screw and washer assemblies attaching carburetor air heater to manifold and remove air heater.

(5) Inspect air heater; replace if damaged.

Installation

(1) Refer to figure 17 install carburetor air heater with two screw and washer assemblies. Tighten to 200 inch-pounds.

(2) Attach exhaust pipe to manifold flange, using a new gasket. Tighten stud nuts to 35 foot-pounds.

(3) Install air cleaner and connect air cleaner to breather cap line.

(4) Install air cleaner to carburetor vacuum line

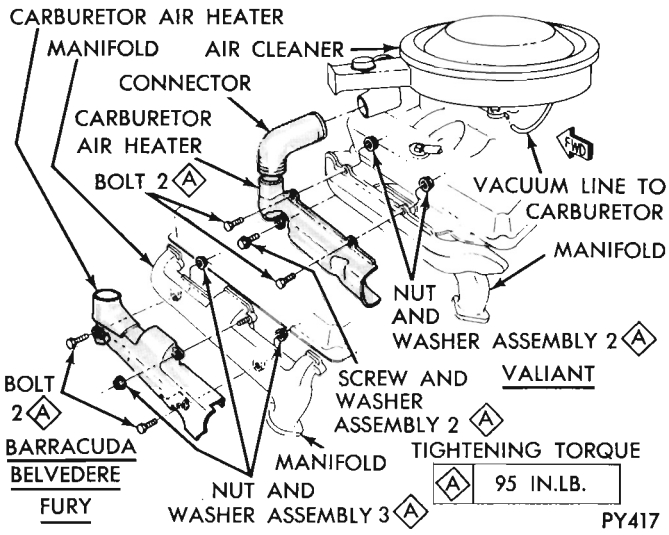


Fig. 18 Carburetor Air Heater, 318 cubic inch engines

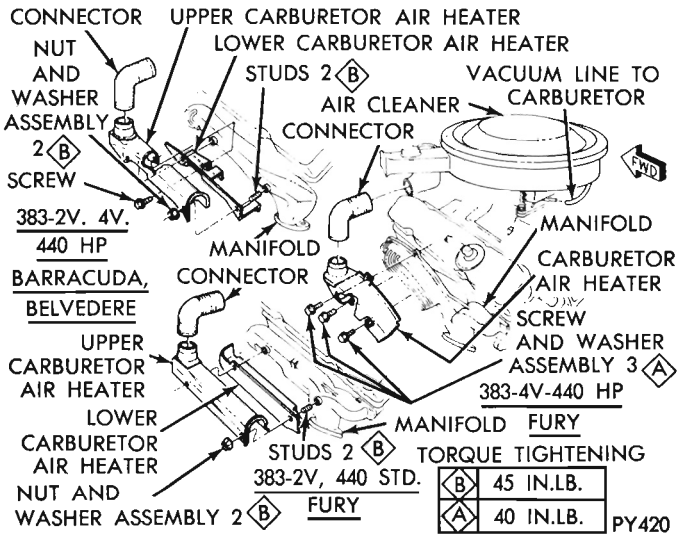


Fig. 19 Carburetor Air Heater, 383, 440 cubic inch engines

and flexible connector between air cleaner and carburetor air heater. **Position air cleaner to provide sufficient clearance between heat shield or air conditioning compressor and master brake cylinder if so equipped**(Fig. 17).

318, 340 and 360 CUBIC INCH ENGINES

Removal

(1) Disconnect air cleaner vacuum line from carburetor and flexible connector between air cleaner and carburetor air heater.

(2) Disconnect breather cap to air cleaner line and remove air cleaner.

(3) Refer to figure 18, to remove carburetor air heater and attaching screws.

(4) Inspect air heater; replace if damaged.

Installation

(1) Refer to figure 18, install carburetor air heater with attaching screws, bolts, nut, and washer assemblies. Tighten to 95 inch-pounds.

(2) Install air cleaner and connect air cleaner to breather cap line.

(3) Install air cleaner to carburetor vacuum line, flexible connector between air cleaner and carburetor air heater.

383-440 CUBIC INCH ENGINES

Removal

(1) Disconnect flexible connector between air cleaners and carburetor air heater.

(2) Refer to figure 19, remove attaching screws, nut and washer assemblies and remove carburetor air heater.

(3) Inspect air heater; replace if damaged.

Installation

(1) Refer to figure 19, install carburetor air heater with attaching screws, bolts, nut and washer assemblies. Torque to specifications.

(2) Install flexible connector between air cleaner and carburetor air heater.

INTAKE AND EXHAUST MANIFOLD ASSEMBLY (6-Cylinder Engines)

Removal

(1) Disconnect air cleaner vacuum line from carburetor and flexible connector between air cleaner and carburetor air heater.

(2) Disconnect breather cap to air cleaner line and remove air cleaner.

(3) Disconnect distributor vacuum control line, crankcase ventilator valve hose and carburetor bowl vent line if so equipped.

(4) Disconnect fuel line, automatic choke rod and throttle linkage from carburetor and remove carburetor.

(5) Disconnect exhaust pipe at exhaust manifold.

(6) Remove carburetor air heater.

(7) Remove nuts and washers attaching manifold assembly to cylinder and remove manifold.

(8) Remove three screws securing intake manifold to exhaust manifold and separate manifolds.

Cleaning and Inspection

(1) Discard gasket and clean all gasket surfaces on manifolds. Wash manifolds in solvent and dry with compressed air.

(2) Test mating surfaces of manifolds for flatness, with a straightedge. Surfaces should be flat within .008 inch.

(3) Inspect manifolds for cracks or distortion.

(4) Test operation of manifold heat control valve. If shaft is binding, apply a suitable manifold heat control valve solvent. Then, work valve back and forth until it turns freely.

Installation

(1) Install a new gasket between the two manifolds and install the three long screws securing the manifolds. **Do not tighten screws at this** time.

(2) Position manifold assembly on cylinder head, using a new gasket. Install triangular washers and nuts on upper studs and on the four lower studs opposite numbers 2 and 5 cylinders. The eight triangular washers should be positioned squarely on the machined surfaces of both intake and exhaust manifold retaining pads. These washers must be installed with **cup side against manifold. Install nuts and washers only when engine is cold.**

(3) Install steel conical washers with cup side facing manifold, one on center upper stud and two on center lower studs. Install brass washers at each end with flat side to manifold. Install nuts with flat side away from washer. Snug all nuts.

CAUTION: Do not over-tighten

(4) Tighten three intake to exhaust screws, starting with **inner screw**.

(5) Tighten all nuts to 10 foot-pounds. Install carburetor air heater.

(6) Attach exhaust pipe to maniold flange, using a new gasket and tighten stud nuts to 35 foot-pounds.

(7) Install carburetor and connect fuel line, automatic choke rod and throttle linkage.

(8) Install distributor vacuum control line and carburetor bowl vent line if so equipped.

(9) Install air cleaner and correct breather cap to air cleaner line.

(10) Install air cleaner vacuum line to carburetor and flexible connector between air cleaner and carburetor air heater.

INTAKE MANIFOLD (318, 340, 360 Cu. In. Engines)

Remove intake manifold as outlined in Group 9, "Engine".

Servicing

(1) Clean manifold in solvent and blow dry with compressed air. Inspect manifold for cracks.

(2) Inspect mating surfaces of manifold for flatness with a straightedge.

(3) Inspect exhaust crossover passages through manifold (Fig. 20). If passages are coated with hard, black carbon, they should be scraped clean and sandblasted to remove the carbon deposits.

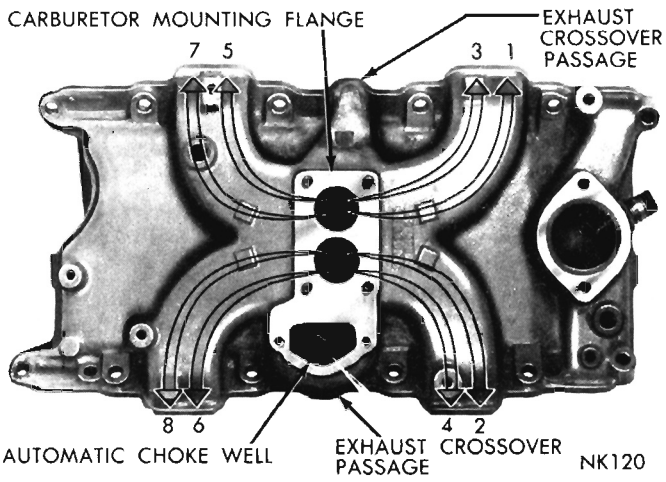


Fig. 20 Intake Manifold - 318 cubic inch engine (Typical)

(4) Install intake manifold, using new gaskets. Tighten manifold screws to 35 foot-pounds.

EXHAUST MANIFOLD (318, 340, 360 Cu. In. Engines)

Removal

(1) Remove bolts and nuts attaching exhaust pipe to manifold.

(2) Remove bolts, nuts and washers attaching manifolds to cylinder heads. Remove manifolds from cylinder heads.

Cleaning and Inspection

(1) Clean mating surfaces on cylinder heads and manifolds, wash with solvent and blow dry with compressed air. Inspect manifolds for cracks.

(2) Inspect mating surfaces of manifold for flatness with a straightedge. Gasket surfaces must be flat within .008 inch.

(3) On **right hand** manifold test manifold heat control valve for free operation. If necessary to free up, apply a suitable manifold heat control valve solvent to both ends of valve shaft. A suitable solvent is available under Part Number 2525054, Manifold Heat Control Valve Solvent or equivalent. Be sure manifold is **COOL** and solvent is allowed to soak a few minutes to dissolve deposits. Then, work valve back and forth until it turns freely.

Installation

CAUTION: If studs came out with the nuts, install new studs, applying sealer on the coarse thread ends. If this precaution is not taken, water leaks may develop at the studs.

(1) Position two outboard arms of manifolds on the two studs on cylinder heads, using new gaskets. Install conical washers and nuts on studs

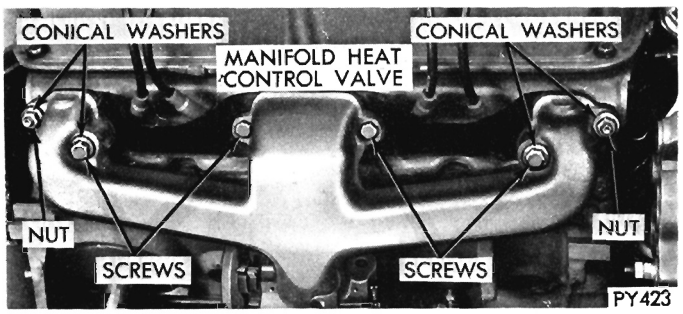


Fig. 21 Installing Exhaust Manifold 318, 440 cubic inch engines (Typical)

(Fig. 21)

(2) Install two screws and conical washers at inner ends of outboard arms of manifold. Install two screws **without** washers on center arm of manifold (Fig. 21). Tighten screws and nuts, starting at center arm and working outward, to 20 foot-pounds.

(3) Assemble exhaust pipe to manifold, and secure with bolts, nuts and washers,.**On 318 and 360 cubic inch engines** tighten nuts to 24 foot-pounds. **On 340 cubic inch engine,** tighten right side nuts to 24 foot-pounds. **On left side manifold,** attach two braces to manifold with bolts, nuts and washers. Tighten nuts to 50 foot-pounds.

INTAKE MANIFOLD (383, 440 Cu. In. Engines)

Remove Intake Manifold as outlined in Group 9, "Engine".

Servicing

(1) Clean manifold in solvent and blow dry with compressed air.

(2) Inspect exhaust crossover passages and pressure test for any leakage into intake passages.

(3) Inspect mating surfaces for flatness.

(4) Use new gaskets when installing manifold. Reinstall manifold as outlined in Group 9, "Engine".

EXHAUST MANIFOLD (383, 440 Cu. In. Engines)

Removal

(1) Remove spark plugs.

(2) Remove alternator.

(3) Disconnect exhaust pipe at exhaust manifolds.

(4) Remove stud nuts attaching exhaust mani-

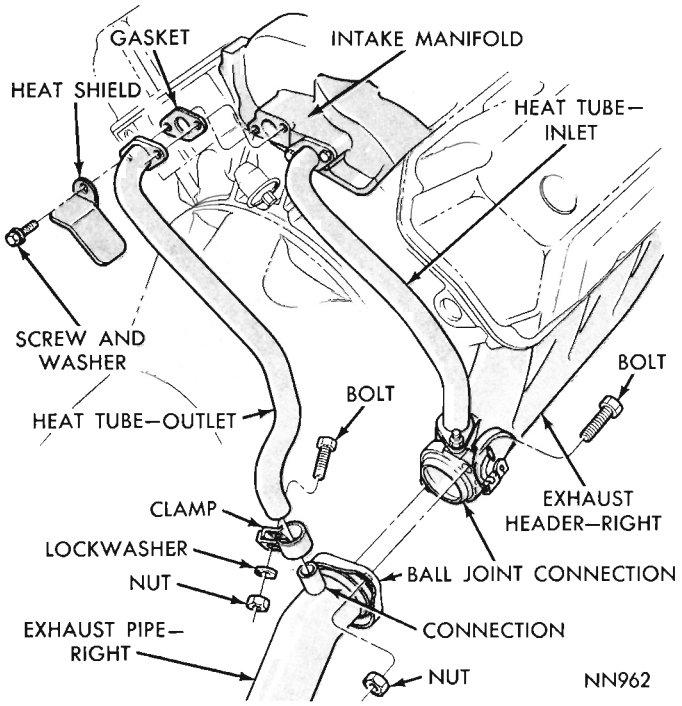


Fig. 22 Intake Manifold Heat Tube Arrangement 426 Hemi Engine

folds to cylinder heads. Slide manifolds off studs and away from cylinder heads.

Cleaning and Inspection

(1) Clean manifolds in solvent and blow dry with compressed air.

(2) Inspect manifolds for cracks and distortion.

(3) On **right hand** manifold test manifold heat control valve for free operation. If necessary to free up, apply a suitable manifold heat control valve solvent to both ends of valve shaft. A suitable solvent is available under Part Number 2525054, Manifold Heat Control Valve Solvent or equivalent. Be sure manifold is **COOL** and solvent is allowed to soak a few minutes to dissolve deposits. Then, work valve back and forth until it turns freely.

Installation

CAUTION: If studs came out with the nuts, install new studs, applying sealer on the coarse thread ends. If this precaution is not taken, water leaks may develop at the studs.

(1) Install manifolds on cylinder heads. No gaskets are required. Tighten stud nuts to 30 foot-pounds.

(2) Install exhaust pipes on exhaust manifolds, using new gaskets. Tighten nuts to 50 foot-pounds.

(3) Install alternator and adjust belt tension.

(4) Install spark plugs and tighten to 30 foot-pounds.

INTAKE MANIFOLD (426 Hemi Engine)

Remove intake manifold as outline in Group 9, "Engine".

Servicing

(1) Clean manifold in solvent and blow dry with compressed air.

(2) Inspect exhaust passages and pressure test for any leakage into intake passages.

(3) Inspect mating surfaces for parallelism.

(4) Use new gaskets when installing manifold. Reinstall manifold as outlined in Group 9, "Engine".

INTAKE MANIFOLD HEAT TUBES (426 Hemi Engine)

Removal — Inlet Tube

(1) To remove inlet tube, remove two stud nuts and washers from right hand exhaust header (Fig. 22).

(2) Remove screws attaching upper end of inlet tube to rear face of intake manifold.

(3) Remove tube and gaskets and discard gaskets.

Outlet Tube

(1) To remove outlet tube, remove nut, washer and bolt from tube clamp at exhaust pipe (Fig. 22). Remove clamp from tube.

(2) Remove two screws attaching heat shield and outlet tube to rear face of intake manifold and remove tube.

Installation — Inlet Tube

(1) Clean gasket surfaces of exhaust header and intake manifold of all old gasket particles.

(2) Place new gaskets in position and install inlet tube on exhaust header studs.

(3) Install washers and nuts on studs and tighten to 200 inch-pounds.

(4) Secure upper end of tube with screws and washers. Tighten screws to 200 inch-pounds.

Outlet Tube

(1) Install tube and clamp on exhaust pipe connection.

(2) Install new gasket and tube at upper end of outlet tube.

(3) Install heat shield and outer screw and washer on outlet tube flange. Install inner screw and washer. Tighten screws to 200 inch-pounds.

(4) Install clamp bolt, washer and nut and tighten nut to 100 inch-pounds.

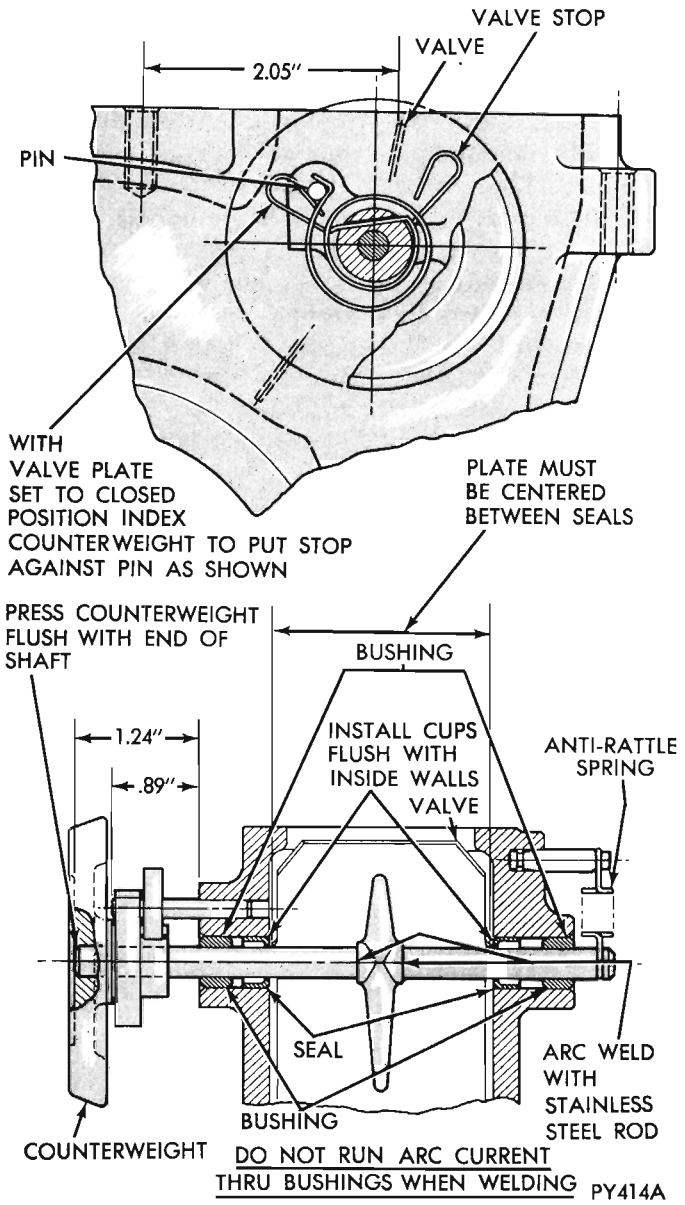


Fig. 23 Proper Manifold Heat Control Valve Installation Six Cylinder Engines

EXHAUST HEADERS (426 Hemi Engine)

Removal

(1) On **right hand** exhaust header, disconnect carburetor choke heat tube.

(2) Disconnect choke intake heat tube from lower inside surface of right hand exhaust header.

(3) Remove ball joint bolts connecting exhaust pipes to exhaust headers and separate pipes from headers.

(4) Remove screws attaching inlet heat tube to exhaust header and separate tube from header.

(5) Remove screws and washers attaching exhaust headers to cylinder heads. Remove headers and gaskets from cylinder heads.

Cleaning and Inspection

(1) Clean gasket surfaces on cylinder heads and headers, wash with solvent and blow dry with compressed air. Inspect headers for cracks.

(2) Inspect mating surfaces of headers for flatness with a straightedge. Gasket surfaces must be flat within .008 inch.

(3) On **right hand** header, test heat control valve for free operation. If necessary to free up, apply a suitable manifold heat control valve solvent to both ends of valve shaft. A suitable solvent is available under Part Number 2525054, Manifold Heat Control Valve Solvent or equivalent. Be sure header is **COOL** and solvent is allowed to soak a few minutes to dissolve deposits. Then, work valve back and forth until it turns freely.

Installation

(1) Place headers in position on cylinder heads, using new gaskets. Install conical washers and screws. Position washers with concave side toward bolting flanges. Tighten screws to 35 foot-pounds.

(2) Assemble exhaust pipes to exhaust headers. Secure ball joints with bolts and nuts. Tighten nuts to 20 foot-pounds.

(3) Assemble inlet heat tube to right hand header, using new gaskets. Tighten screws to 200 inch-pounds.

(4) Connect choke intake heat tube to lower inside surface of exhaust header.

(5) Connect choke heat tube to exhaust header.

MANIFOLD HEAT CONTROL VALVE (All Engines)

Operation of the manifold heat control valve should be inspected periodically. With engine idling, accelerate momentarily. The counterweight on six cylinder engines should respond by moving **counterclockwise** approximately 1/2 inch and to its original position. On all other engines, the counterweight should move **clockwise.** If no movement is observed, shaft is binding due to accumulation of deposits or thermostat is weak or broken.

The application of a suitable manifold heat control valve solvent, every oil change, to both ends of manifold heat control valve shaft at bushings, will keep valve working freely. A suitable solvent is available under Part Number 2525054, Manifold Heat Control Valve Solvent or equivalent. The solvent should be applied when manifold is **COOL** and allowed to soak a few minutes to dissolve deposits. Then, work valve back and forth until it turns freely.

SIX CYLINDER ENGINE

Remove intake and exhaust manifold as outlined on page 18

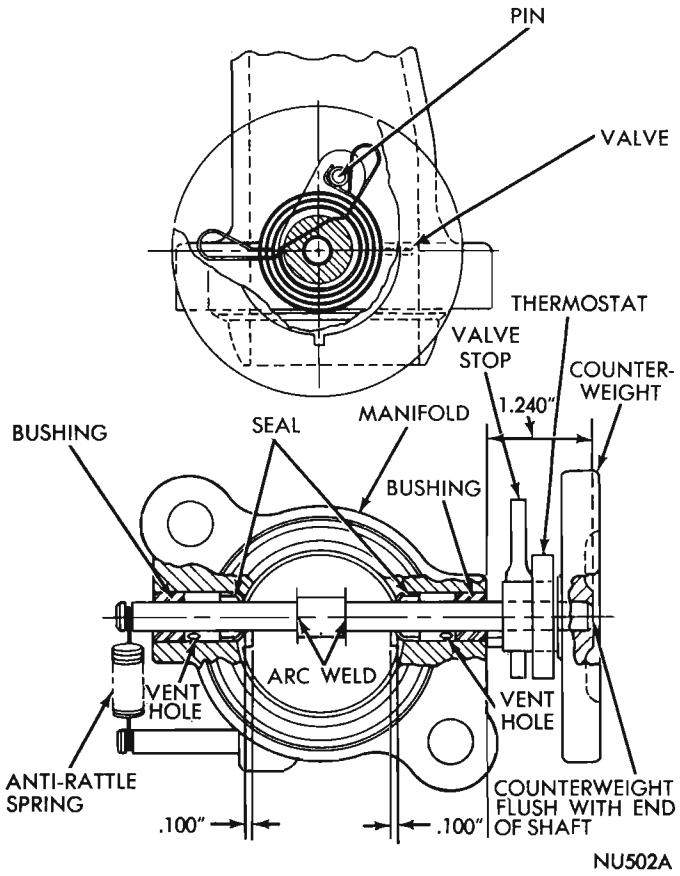


Fig. 24 Proper Manifold Heat Control Valve Installation (318, 340, and 360 cubic inch engines)

(1) Position valve plate, grind off spot welds from valve plate and shaft.

(2) Remove counterweight and shaft assembly, valve plate.

(3) Press out bushings and cup seals from manifold (Fig. 23).

(4) Inspect vent holes and clean out if necessary.

Installation

(1) **Press** in cup seals flush with inside walls (Fig. 23) with cupped ends facing outward.

(2) **Press** in bushings flush with outer edge of exhaust manifold.

(3) Line ream bushings and seals .3095 to .3110 inch diameter. Test for free fit of shaft in bushings and seals.

(4) Mark one end of shaft with a suitable dye at 1.240 inches, press counterweight on marked end of shaft until flush with end of shaft.

(5) Install thermostatic spring on counterweight with center end of tab pointing **right** and outer end or hook pointing **left**.

(6) Install valve stop on counterweight with looped ends facing away from thermostatic spring hook end.

(7) Holding thermostatic spring wrapped 215 degrees in a **clockwise** direction viewed from counterweight end, install shaft assembly in manifold and valve plate with strap facing outboard; attach hook end of thermostatic spring to stop pin (Fig. 23).

(8) With counterweight end of shaft positioned 1.240 inches (previously identified) away from manifold, valve plate centered between seals and positioned 2.05 inches from center of inside tapped hole (intake to exhaust manifold attaching screw) (Fig. 23).

(9) Arc weld valve plate to shaft with stainless steel rod. **Arc welding ground must be made at counterweight.**

(10) Test for free operation. Install anti-rattle spring.

(11) Complete assembly and installation as outlined on page

318 AND 340 CUBIC INCH ENGINES

Removal

(1) Remove exhaust pipe from manifold.

(2) Remove exhaust manifold from engine.

(3) Position valve plate, grind off spot welds from valve plate and shaft.

(4) Remove counterweight and shaft assembly, valve plate. Press out bushings and seals from manifold (Fig. 24).

(5) Inspect vent holes and clean out if necessary.

Installation

(1) **Press** in cup seals until seals extend into manifold .100 inch on each side with cupped ends facing outward (Fig. 24).

(2) **Press** in bushings flush with outer edge of exhaust manifold.

(3) Line ream bushings and seals, .3095 to .3110 inch diameter. Test for free operation of shaft in bushings and seals.

(4) Mark one end of shaft with a suitable dye at 1.240 inches, press counterweight on marked end of shaft until flush with end of shaft.

(5) Position thermostat so center end or tab is pointing **left** and hook or outer end points **down,** install thermostat on counterweight.

(6) Install valve stop on counterweight so looped ends face away from thermostatic spring hook end.

(7) Holding thermostatic spring wrapped 140 degrees in a **counterclockwise** direction viewed from counterweight end, install shaft assembly through outer bushing, seal and valve plate with center strap facing flange end of manifold; attach hook end of thermostatic spring to stop pin.

(8) With counterweight end of shaft positioned 1.240 inches (previously identified) away from manifold, valve plate centered between seals and valve plate closed (Fig. 24).

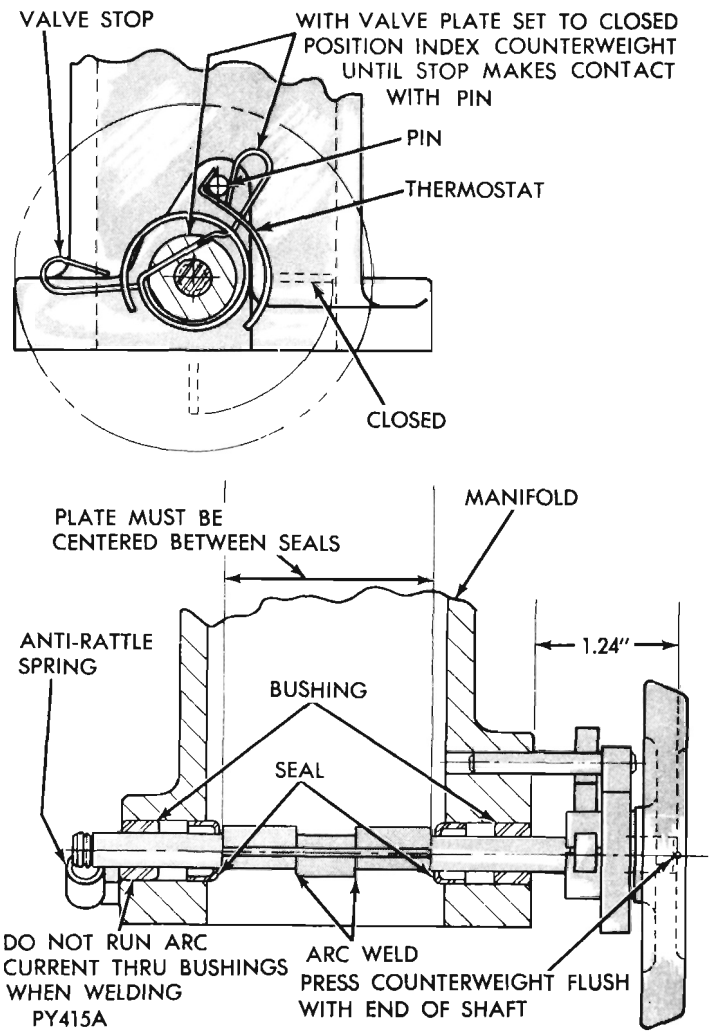


Fig. 25 Proper Manifold Heat Control Valve Installation (383, 440 cubic inch engines)

(9) Arc weld valve plate to shaft with stainless steel rod. **Arc welding ground must be made at counterweight.**

(10) Test for free operation. Install anti-rattle spring.

(11) Position new gasket on studs, install exhaust manifold and tighten to 20 foot-pounds.

(12) Install exhaust pipe to manifold (no gasket used) and tighten to 24 foot-pounds.

383-440 CUBIC INCH ENGINE

Removal

Remove exhaust manifold as outlined on page 19.

(1) Position valve plate, grind off welds from valve plate and shaft.

(2) Remove counterweight and shaft assembly, valve plate.

(3) Press out bushings and cup seals from manifold (Fig. 25)

(4) Inspect vent holes and clean out if necessary.

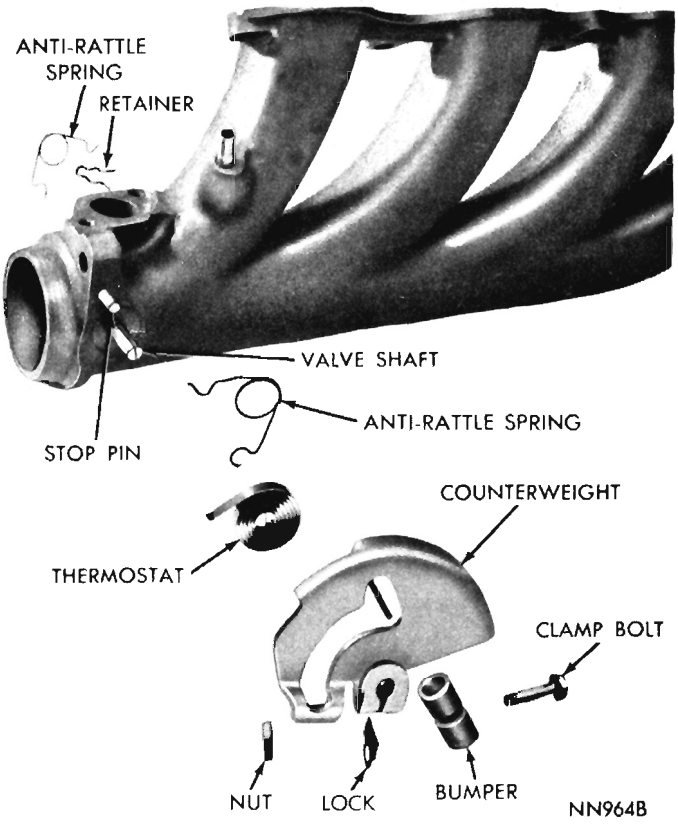


Fig. 26 Heat Control Valve Disassembled (426 Hemi Engine)

Installation

(1) **Press** in cup seals until seals extend into manifold .100 inch on each side with curved ends facing outward (Fig. 25)

(2) **Press** in bushings flush with outer edge of exhaust manifold.

(3) Line ream bushings and seals .3095 to .3110 inch diameter. Test for free fit of shaft in bushings and seals.

(4) Mark one end of shaft with a suitable dye at 1.240 inches, press counterweight on marked end of shaft until flush with end of shaft.

(5) Install thermostatic springs on counterweight with center end or tab pointing **left** and outer end or hook pointing right.

(6) Install valve stop on counterweight with looped ends facing away from thermostatic spring hook end.

(7) Holding thermostatic spring wrapped 215 degrees in a **counterclockwise** direction viewed from counterweight end, install shaft assembly in manifold and valve plate with strap facing flange end of manifold; attach hook end of thermostatic spring to stop pin (Fig. 25).

(8) With counterweight end of shaft positioned 1.240 inches (previously identified) away from manifold, valve plate centered between seals and

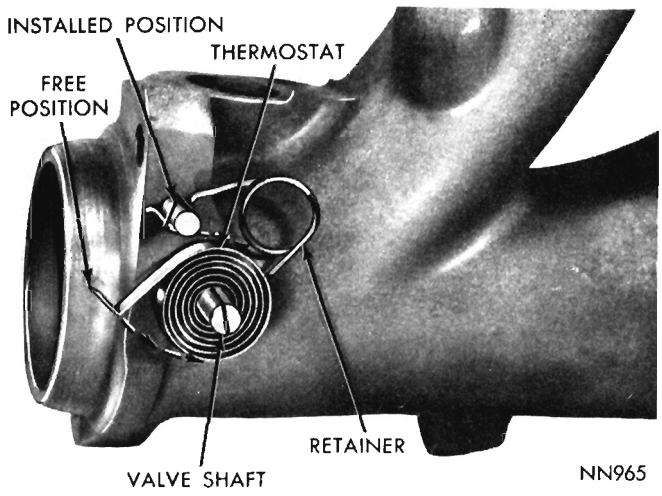


Fig. 27 Installing Thermostat (426 Hemi Engine)

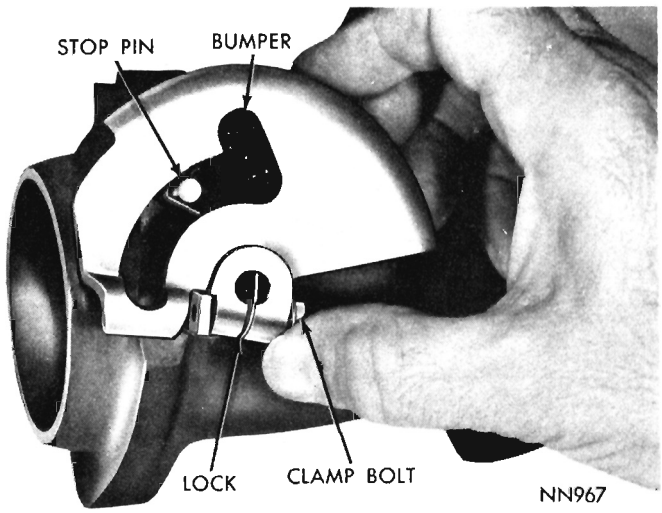


Fig. 28 Installing Counterweight (426 Hemi Engine)

valve plate closed (Fig. 25).

(9) Arc weld valve plate to shaft with stainless steel rod. **Arc welding ground must be made at counterweight.**

(10) Test for free operation. Install anti-rattle spring.

(11) Complete assembly and installation as outlined on page 23.

426 HEMI ENGINE

COUNTERWEIGHT — THERMOSTAT

Removal

(1) Remove counterweight from outer end of valve shaft by loosening clamp bolt (Fig; 26).

(2) Unhook thermostat from stop pin and slide from valve shaft slot.

(3) If fabric bumper on counterweight is worn, it may be replaced by sliding it off the tab and sliding on a new one.

Installation

(1) Be sure shaft reatiners (Fig. 26) are in place in grooves in valve shaft and stop pins. Then, turn shaft in the extreme **counterclockwise** position.

(2) Install a new thermostat in slot in shaft (Fig. 27), with outer end of thermostat in lower left hand position. Press inner end of thermostat into shaft and seat firmly.

(3) Wrap outer end of thermostat **counterclockwise** and engage under stop pin.

(4) Install counterweight on outer end of valve shaft with lock engaged in valve shaft slot and bumper on right hand side of stop pin (Fig. 28).

(5) Tighten clamp bolt to 50 inch-pounds with C-3380 Torque Wrench. Test operation of valve for freedom of movement.

MANIFOLD HEAT CONTROL VALVE REPLACEMENT (HEMI ONLY)

Removal

(1) Remove alternator.

(2) Remove exhaust pipe from manifold.

(3) Remove exhaust manifold from engine.

(4) Remove counterweight, thermostat, shaft retainers and anti-rattle spring.

(5) Grind welds off valve plate and shaft.

(6) Remove shaft and press bushings from manifold.

Installation

(1) Install new bushings in exhaust manifold.

(2) Install shaft in manifold and check for freedom of movement. If shaft fails to turn freely, it will be necessary to hone bushings to shaft size.

(3) Pull shaft out far enough to position valve plate on shaft, then slide shaft into position in both bushings.

(4) Align hole in valve plate with hole in shaft and insert a drift into both holes to maintain correct positioning of valve plate while it is being welded to shaft.

(5) Remove drift from valve plate and shaft.

(6) Install new thermostat anti-rattle spring, shaft retainers and counterweight assembly on shaft, as outlined for respective engine.

(7) Install manifold on engine assembly.

(8) Attach exhaust pipe to manifold, using a new gasket where required.

(9) Install alternator and adjust belt tension.

(10) Start engine and test operation of manifold heat control valve assembly.

TIGHTENING REFERENCE

	6-Cylinder		8-Cylinder	
	Ft. Lbs.	In. Lbs.	Ft. Lbs.	In. Lbs.
Exhaust Header Ball Joint Bolt Nut (426 Hemi Engine			24	
Exhaust Manifold Brace Bolt Nut (318 Cu. In. Engines)			30	
Exhaust Manifold to Cylinder Head Stud Nut 198, 225 Cu. In. Engines	10			
318, 340, 360 Cu. In. Engines			20	
383, 440 Cu. In. Engines			30	
Exhaust Manifold to Pipe Flange Ball Joint Bolt Nut			24	
Exhaust Pipe Flange Bolt Nut Single Exhaust	35		35	
Dual Exhaust			50	
Exhaust Pipe U-Bolt Nut		150		150
Heat Control Valve Counterweight Clamp Bolt Nut		50		50
Heat Tube Clamp Bolt Nut (426 Hemi Engine)				95
Heat Tube Screw and Stud Nut (426 Hemi Engine				200
Intake Manifold to Cylinder Head Screw	10			
318, 340, 360 Cu. In. Engine			35	
383, 440 Cu. In. Engines			40	
Intake to Exhaust Manifold Screw	15			
Rear Muffler Support Bolt and Nut				200
Rear Muffler Support to Underbody Bolt (Except Fury)		200		200
Tail Pipe Front Clamp Screws (Fury Models)		150		150
Tail Pipe Support to Underbody Bolt (Except Fury)		200		200
Tail Pipe Support to Crossmember Screws (Fury Models)		200		200
Tail Pipe U-Bolt Nuts (426 Hemi Engines)				95

FUEL SYSTEM

CONTENTS

	Page
AFB—SERIES CARBURETORS	110
AVS—SERIES CARBURETORS	83
BBD—SERIES CARBURETORS	20
BBS—SERIES CARBURETORS	7
FUEL PUMPS	120
FUEL TANKS	123
HOLLEY CARBURETOR (1920 SERIES)	14
HOLLEY CARBURETOR (2200 SERIES)	49
HOLLEY CARBURETOR (2300 SERIES)	93
HOLLEY CARBURETOR (4160 SERIES)	66
ROCHESTER CARBURETOR	26
SERVICE DIAGNOSIS	4
SPECIFICATIONS	137
THERMO-QUAD CARBURETOR	38
THROTTLE LINKAGE	133

GENERAL INFORMATION

The fuel system consists of the fuel tank, fuel pump, fuel filter, carburetor, fuel lines and vacuum lines.

The fuel tank assembly consists of the tank, filler neck cap, air vent, and a fuel gauge sending unit.

In operation, the fuel pump draws fuel from the tank and forces it to the filter and carburetor. The carburetor meters the fuel into the air stream drawn into the engine, in quantities suitable for all engine speed and load conditions.

The fuel filter is a paper element sealed, disposable type unit, located in the fuel line between the fuel pump and the carburetor. The filter unit should be replaced every 24,000 miles.

When checking parts removed from the carburetor, it is at times difficult to be sure they are satisfactory for further service. It is therefore recommended that in such case, new parts be installed.

All the carburetors referred to in the Fuel System are equipped for use with Vapor Saver System.

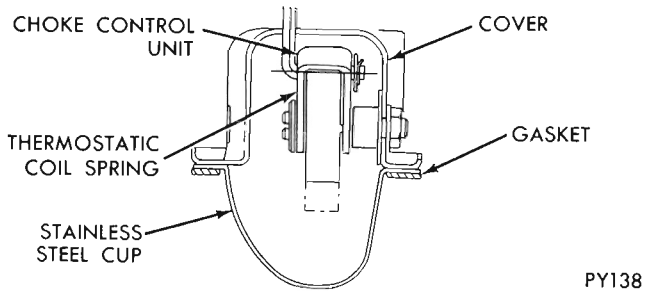


Fig. 1 - Choke Control (Open Well)

AUTOMATIC CHOKE—WELL TYPE

A new design well for the automatic choke has been incorporated in all engines except the 340, 440 cu. in. tricarb installation. This new design allows faster opening of the choke mechanism resulting in leaner fuel mixtures during the warm-up period for reduced emissions and fuel consumption. (Fig. 1).

To function properly, it is important that all parts be clean and move freely. Other than an occasional cleaning, the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and down to check for free movement in the coil housing. If unit binds, a new unit should be installed. **The well type choke is serviced as an assembly. Do not attempt to repair or change the setting, unless authorized by service literature. Changes of the choke setting materially affect summer temperature cold starting and seldom are a satisfactory correction of driveability problems, which are generally associated with carburetors or vacuum diaphragms.**

Two types of wells are in general usage. One is cast as an integral part of the manifold. The second is a stainless steel cup fastened over a port in the manifold. (Fig. 1).

The stainless steel well cups are held in place by choke retainer bolts. A steel-asbestos gasket seals the exhaust gas within the manifold. **Loosening or removing the choke retainer bolts will allow exhaust gases to escape into the engine compartment. DO NOT RUN THE ENGINE WITHOUT THE CHOKE FIRMLY BOLTED TO THE MANIFOLD. FIRE OR HEAT DAMAGE MAY OCCUR.**

When installing the steel well cup, make certain the gasket is in good condition and is in place to prevent exhaust leakage.

Do not lubricate any of the choke parts or the control unit. This causes dirt to accumulate, and would result in binding of the choke mechanism.

The choke control unit is accurately adjusted when first assembled. Under normal servicing do **NOT** change the setting or disassemble the control unit. If however, the setting has been disturbed, reset as follows: Loosen locknut and turn shaft with screwdriver until index mark on disc is in alignment with correct mark on the frame. Hold in this position with screwdriver while tightening nut, (Refer to Specifications for indexing). The Rochester choke unit, used on 318 cubic inch engines is non-adjustable.

VAPOR SAVER SYSTEM

The vapor saver system consists of the C.A.S. system plus, a special vented fuel tank, separator, fuel tank vapor tube, breather cap, enclosed bowl vent valve, a vacuum pressure relief fuel tank cap and hoses. (Fig. 2).

The function of the vapor saver system is to reduce the loss of fuel from the fuel system to the atmosphere by evaporation and reduce the unburned hydro-carbons emitted by the vehicle's engine. When fuel evaporates from the carburetor or fuel tank, it passes through vent hoses or tubes to the crankcase. With the engine running, vapors are purged from the crankcase through the crankcase ventilation system.

The fuel tank contains a one gallon overfill limiter tank. When the fuel tank is filled, the overfill limiter tank remains essentially empty, to allow for thermal expansion. Each corner of the fuel tank is vented and each of the hoses from these vents are connected to the separator. A tube from the separator leads to the breather cap. Thus evaporated fuel vapor from the fuel tank, flows through the separator, to the engine crankcase and then through the crankcase ventilation system. In addition, the carburetor fuel bowl vent valve is also included, by a tube from the vent valve to the breather cap, or fuel pump. (6 cylinder engines.) This completely seals the fuel system.

SERVICING THE CARBURETOR

Often, the carburetor is blamed for a great variety of trouble which is classed as "POOR CAR PERFORMANCE." Therefore, be definitely sure that the trouble is not located elsewhere before disassembling the carburetor.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) The carburetor must be completely disassembled except for choke and throttle valves.

(2) All parts (except plastic parts and choke diaphragm assembly) should be cleaned in a suitable solvent then inspected for damage or wear.

(3) Use air pressure only, to clean the various orifices or channels.

(4) Replace questionable parts with NEW ONES.

CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results.

The plastic parts or choke diaphragm can be damaged by solvents. Avoid placing the plastic parts or diaphragm assembly in **ANY** liquid. Clean the external surfaces with a clean cloth or a soft wire brush. Shake dirt or other foreign material from the stem (plunger) side of the diaphragm. Depressing the stem to the retracted position, will provide an additional hole for the removal of dirt. Compressed air can be used to remove loose dirt **but should not be connected to the vacuum diaphragm fitting.**

IMPORTANT: If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT." After rinsing, all trace of water must be blown from the passages with

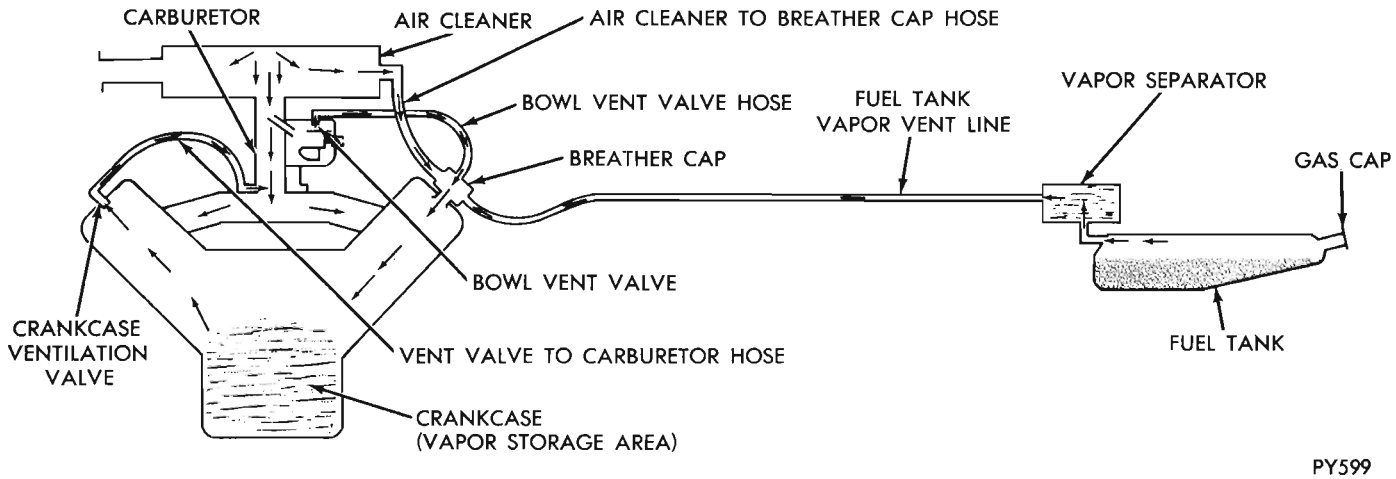


Fig. 2 - Vapor Saver System

air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains. Never clean jets with a wire, drill, or other mechanical means, because the orifices may become enlarged, making the mixture too rich for proper performance.

Idle Speed Adjustment (Curb Idle)

To make the idle speed adjustment on carburetors, secure an accurate ignition tachometer and a Sun Electric Combustion-Vacuum Unit, Model 80, Exhaust Condenser, Model EC, and Hose 669-14 or equivalent. (The above analyzer is recommended; however, other reliable makes of analyzers in good condition may be used.)

(1) Engine running at normal operating temperature, and timing checked to the specifications shown in the Electrical Group.

(2) Air Cleaner installed.

(3) Automatic transmissions in neutral position (not in park position).

(4) On air conditioned cars, turn air conditioning off.

(5) Connect ignition tachometer.

(6) Insert probe of exhaust gas analyzer in the tail pipe as far as possible (2 ft. minimum distance). On dual exhaust cars use left side tail pipe (side opposite heat valve). It is very important that the probe and connecting tubing be free of leaks to prevent erroneous readings. If a garage exhaust system is used to conduct the exhaust gases away, a plenum chamber or other means must be used to reduce vacuum of the exhaust system to 1/2 inch water or less.

(7) Connect exhaust gas analyzer, warm up and calibrate according to manufacturer's instructions.

(8) Set the idle speed to specified value for the specific engine-transmission combination as follows: **IMPORTANT: When adjusting mixture screws to obtain the air/fuel ratio specified, do not turn the mixture screw more than 1/16 turn at a time. The combustion analyzer is so sensitive that the ratio must be changed by very small increments if accurate readings are to be obtained. The meters read in air/fuel ratio so that a higher reading indicates a leaner mixture and vice versa.**

(a) Adjust each screw 1/16 turn richer (counterclockwise) and wait 10 seconds before reading the meter.

(b) If necessary, repeat step "a" until meter indicates a definite increase in richness (lower reading) This step is very important since the meter reverses its readings and indicates a richer mixture as the carburetor is leaned out if carburetor is set too lean.

(c) When it has been established that the meter is indicating a lower reading (richer mixture) when the idle mixture screws are turned in the richer direction, proceed to adjust the carburetor to give 14.2 air/fuel ratio, turning the screws counterclockwise (richer) to lower the meter reading and clockwise (leaner) to increase the meter reading. **Do not remove plastic cap in order to obtain an over-rich mixture.**

(d) If the idle speed changes as the mixture screws are turned, adjust the speed to the specified value and readjust the mixture as required so that 14.2 air/fuel ratio is obtained at the specified idle speed.

ROUGH IDLE AND LOW SPEED SURGE

Rough idle and low speed surge on vehicles (using 1-1/2 in. BBD, AVS, and Holley 4160 carburetors) may be the result of improper idle setting balance between the right and left carburetor bores. To correct this condition the following steps should be followed.

(1) Remove the plastic caps from the two idle screws in base of carburetor (1-1/2 in. BBD, and AVS) or in the sides of the primary metering block (Holley). (Fig. 1, BBD, AVS and Holley).

(2) With engine thoroughly warmed up, install an approved exhaust gas analyzer for carburetor idle speed and mixture adjustment as described under "Idle Speed Adjustment".

(3) With a screw driver, turn the two idle screws clockwise until they are both seated.

(4) Turn both idle screws 1-1/2 turns counterclockwise for 1-1/2 in. BBD carburetors and 2 to 3 turns counterclockwise for AVS carburetors as a starting point (experience may dictate more or less turns as a rough setting but both screws should be turned equally).

(5) Start engine and set specified idle speed for engines with 300 or more miles. Set 75 rpm below specifications if under 50 miles or 50 rpm below specifications if 50 to 300 miles are on engine.

(6) Observe air/fuel ratio reading of exhaust gas analyzer. Turn each screw 1/16 turn richer (counterclockwise) and note change in air/fuel meter reading. From this point on, follow instructions for idle setting until 14.2 air/fuel ratio is obtained at appropriate idle speed. It is very important that both idle screws be turned the same amount on each adjustment so that as finally set both screws will be the same number of turns from the seated position.

(7) Install plastic caps over idle screws.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
POOR IDLING	(a) Idle air bleed carbonized or of incorrect size.	(a) Disassemble carburetor. Then, use compressed air to clear idle bleed after soaking it in a suitable solvent.
	(b) Idle discharge holes plugged or gummed.	(b) Disassemble carburetor. Then, use compressed air to clear idle discharge holes after soaking main and throttle bodies in a suitable solvent.
	(c) Throttle body carbonized or worn throttle shaft.	(c) Disassemble carburetor. Check throttle valve shaft for wear. If excessive wear is apparent, replace throttle body assembly.
	(d) Damaged or worn idle mixture needle.	(d) Replace throttle body assembly.
	(e) Low grade fuel or incorrect float level.	(e) Test fuel level in carburetor. Adjust as necessary to obtain correct float level.
	(f) Loose main body to throttle body screws.	(f) Tighten main body to throttle body screws securely to prevent air leaks.
	(g) Worn or corroded needle valve and seat.	(g) Clean and inspect needle valve and seat. If found to be in questionable condition, replace assembly. Then, test fuel pump pressure. Refer to Specifications for correct fuel pump pressure.
	(h) Incorrect valve lash.	(h) Adjust valves.
	(i) Engine miss (ignition.)	(i) Check ignition system.
POOR ACCELERATION	(a) Accelerator pump piston (or plunger) leather too hard, worn, or loose on stem.	(a) Disassemble carburetor. Replace accelerator pump assembly if leather is hard, cracked or worn. Test follow-up spring for compression.
	(b) Faulty accelerator pump discharge ball.	(b) Disassemble carburetor. Use compressed air to clean discharge nozzle and channels after soaking main body in a suitable solvent. Test fuel pump capacity.
	(c) Faulty accelerator pump inlet check ball.	(c) Disassemble carburetor. Check accelerator pump inlet, check ball for poor seat or release. If part is faulty, replace.
	(d) Incorrect fuel or float level.	(d) Test fuel or float level in carburetor. Adjust as necessary to obtain correct float level.
	(e) Worn accelerator pump and throttle linkage.	(e) Disassemble carburetor. Replace worn accelerator pump and throttle linkage and measure for correct position.
	(f) Manifold heat valve sticking.	(f) Free up manifold heat control valve, using recommended solvent.
	(g) Incorrect pump setting.	(g) Reset pump.
CARBURETOR FLOODS OR LEAKS	(a) Cracked body.	(a) Disassemble carburetor. Replace cracked body. Make sure main to throttle body screws are tight.

Condition	Possible Cause	Correction
	(b) Faulty body gaskets.	(b) Disassemble carburetor. Replace defective gaskets and test for leakage. Be sure screws are tightened securely.
	(c) High float level.	(c) Test fuel level in carburetor. Make necessary adjustment to obtain correct float level.
	(d) Worn needle valve and seat.	(d) Clean and inspect needle valve and seat. If found to be in a questionable condition, replace complete assembly and test fuel pump pressure. Refer to specifications for correct fuel pump pressure.
	(e) Excessive fuel pump pressure.	(e) Test fuel pump pressure. If pressure is in excess of recommended pressure (refer to Specifications), replace fuel pump.
POOR PERFORMANCE MIXTURE TOO RICH	(a) Restricted air cleaner.	(a) Remove and clean air cleaner or replace element.
	(b) Leaking float.	(b) Disassemble carburetor. Replace leaking float. Test float level and correct as necessary, to proper level.
	(c) High float level.	(c) Adjust float level as necessary to secure proper level.
	(d) Excessive fuel pump pressure.	(d) Test fuel pump pressure. Refer to specifications for recommended pressure. If pressure is in excess of recommended pressure, replace fuel pump assembly.
	(e) Worn metering jet.	(e) Disassemble carburetor. Replace worn metering jet, using a new jet of the correct size and type.
CARBURETOR MIXTURES LEAN	(a) Air leak bypassing carburetor.	(a) Repair.

ENGINE RUNS EXCESSIVELY RICH AFTER COLD START

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
CHOKE SYSTEM RICH	(a) Choke thermostat adjustment richer than specified.	(a) Correct or replace.
	(b) Choke vacuum diaphragm inoperative or misadjusted.	(b) Correct or replace.
	(c) Choke vacuum passage blocked or leaking.	(c) Correct.
CARBURETOR RICH	(a) Incorrect gasket or gasket installation between carburetor and intake manifold.	(a) Replace or correct.

EXCESSIVE STALLS AFTER COLD START

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(a) Choke System Lean.	(a) Check items under "Poor Starting—Choke Valve Fails to Close."
	(b) Choke vacuum diaphragm adjustment lean.	(b) Adjust to specifications.
ENGINE OUTPUT LOW	(a) Fast idle speed low.	(a) Adjust to specification.
	(b) Fast idle cam position adjustment incorrect.	(b) Adjust to Specifications.

Condition	Possible Cause	Correction
	(c) Engine lubrication oil of incorrect viscosity.	(c) Recommend proper grade oil for ambient temperature.
CARBURETOR LEAN	(a) Curb idle set very lean.	(a) Adjust to Specifications.
	(b) Air leak bypassing the carburetor.	(b) Repair.

POOR COLD ENGINE STARTING

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
INCORRECT PROCEDURE	(a) (See Owners Manual.)	(a) Instruct owner.
CHOKE VALVE FAILS TO CLOSE	(a) Choke thermostat adjustment leaner than specified.	(a) Adjust.
	(b) Choke thermostat corroded such that it has cracked and distorted lean.	(b) Replace assembly.
	(c) Choke linkage, shaft or related parts corroded, bent or dirty such that the system is not entirely free to move from the open to the closed position.	(c) Repair, clean or replace.
	(d) Choke valve improperly seated.	(d) Reseat valve.
	(e) Air cleaner gasket interferes with choke valve or linkage.	(e) Reinstall gasket properly.
LOW ENGINE OUTPUT (10 degrees F or lower)	(a) Engine lubricating oil or incorrect viscosity.	(a) Recommended 5W-20.
	(b) Valve lash incorrect.	(b) Readjust.
	(c) Choke thermostat adjustment incorrect, rich.	(c) Adjust to correct setting.

ENGINE RUNS LEAN, FIRST HALF MILE

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
CHOKE LEAN	(a) Check items under (Poor Starting).	(a) See "Choke Valve Fails to Close."
	(b) Diaphragm adjustment lean.	(b) Readjust to specification.

ENGINE RUNS LEAN AFTER HALF MILE

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
ENGINE HEAT INSUFFICIENT	(a) Heat valve stuck open.	(a) Free with solvent.
	(b) Heat valve thermostat distorted.	(b) Replace thermostat.
	(c) Heat valve failed within exhaust. See engine section for proper diagnosis.	(c) Replace heat valve.
	(d) Water temperature sub-normal.	(d) Check thermostat.

BBS CARBURETOR

INDEX

	Page
Automatic Choke (well type)	1
Carburetor Adjustments	11
Accelerator Pump and Bowl Vent	11
Choke Vacuum Kick	12
Fast Idle Cam Position	12
Fast idle Speed (On Vehicle)	13
Choke Unloader (Wide Open Kick)	13
Idle Speed Adjustment	13
Checking Float Setting (On Vehicle)	13
Cleaning Carburetor Parts	2
Disassembling Carburetor	8
General Information	7
Inspection and Reassembly	9
Specifications	137

GENERAL INFORMATION

The Ball and Ball single throat carburetor models BBS-4955S and BBS-4956S are used on the 198 cu. in. engines when the vehicles are equipped with manual or automatic transmissions respectively. (Fig. 1.) Both of these carburetors are equipped with a hot idle compensator valve, which is a thermostatically operated air bleed, to relieve an overrich condition at idle. This condition is the result of excessive heat.

Since the service procedures are identical on all BBS carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

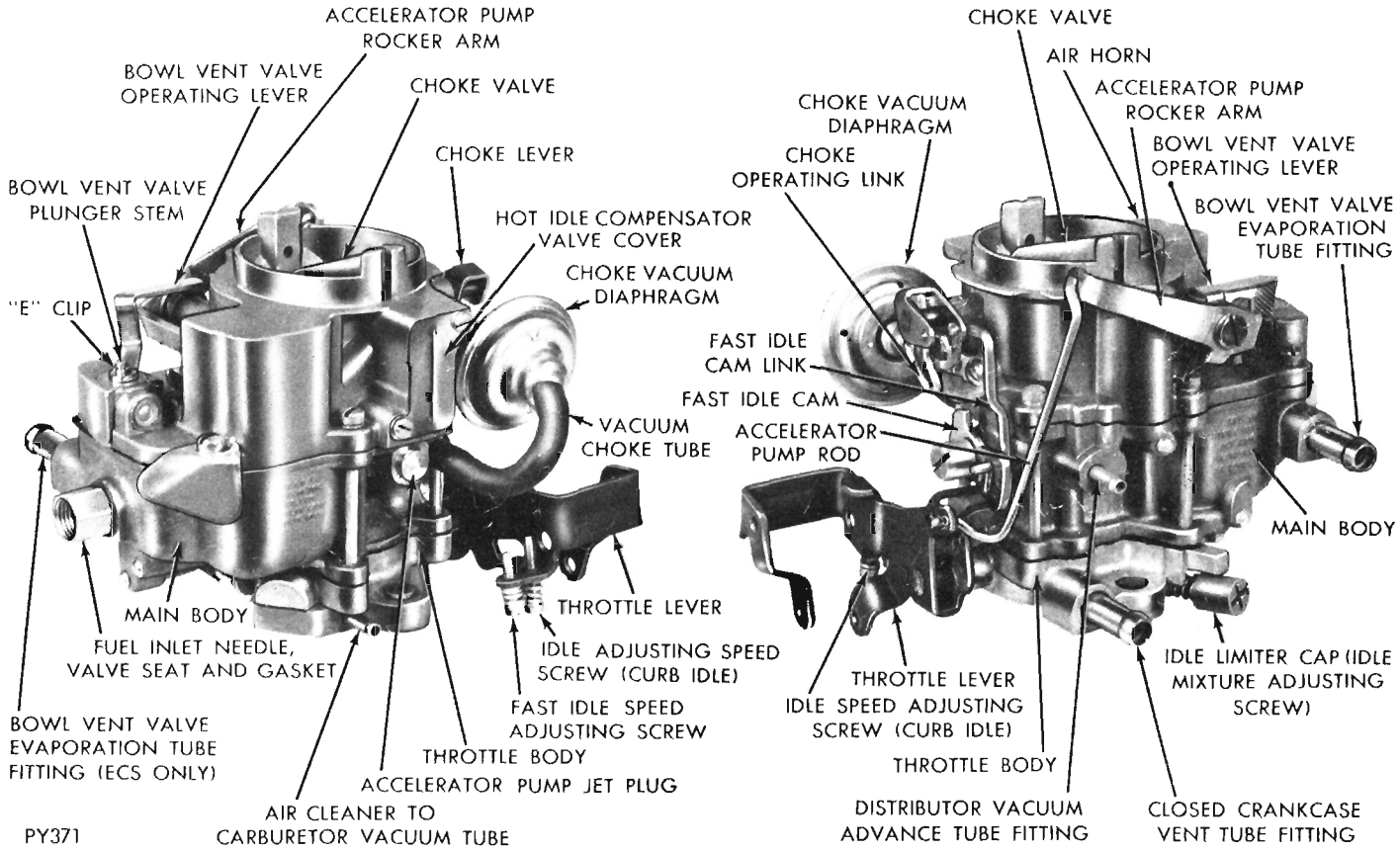


Fig. 1 - Carburetor Assembly (Ball and Ball)

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR

(1) Place carburetor assembly on repair block, Tool C-3225.

(2) Remove hairpin clip and disengage accelerator pump operating rod.

(3) Remove vacuum hose between carburetor main body and vacuum diaphragm.

(4) Remove clip from choke operating link and disengage link from diaphragm plunger (stem) and choke lever. (Fig. 1). Remove link.

(5) Remove vacuum diaphragm and bracket assembly and place to one side to be cleaned as a special item. A liquid cleaner may damage diaphragm material.

(6) Remove air horn retaining screws.

(7) Tilt air horn toward throttle lever far enough to disengage fast idle cam link from the fast idle cam, (Fig. 2). Lift air horn up and away from main body. Discard gasket. Separate bodies. Discard gasket.

(8) Remove bowl vent valve plunger to operating "E" clip. Remove accelerator pump rocker arm pivot screw (Fig. 2.) Push up on bottom of plunger and disengage from rocker arm. Remove rocker arm and bowl vent valve lever. Slide plunger, spring and seat out of air horn. If inspection shows plunger can be used again, place in a jar of clean gasoline or kerosene to prevent leather from drying out.

(9) Remove screws that attach hot idle compen-

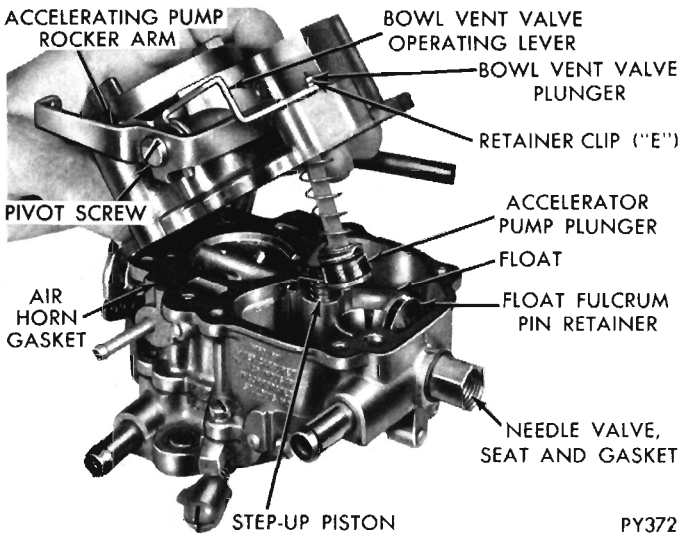


Fig. 2 - Removing or Installing Air Horn

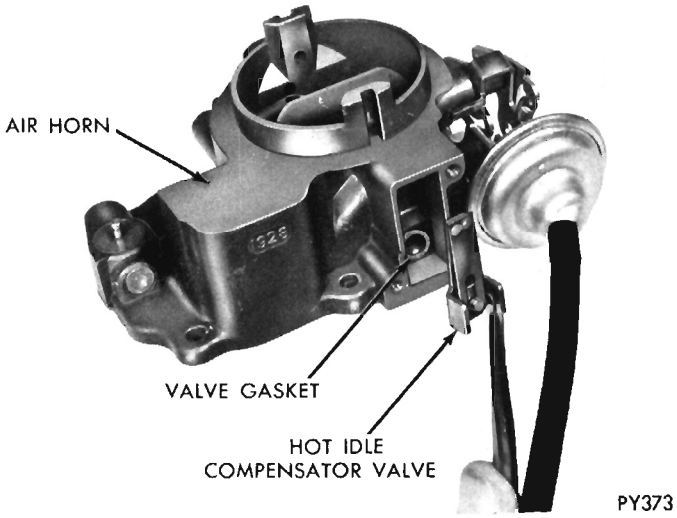


Fig. 3 - Removing or Installing Hot Idle Compensator Valve

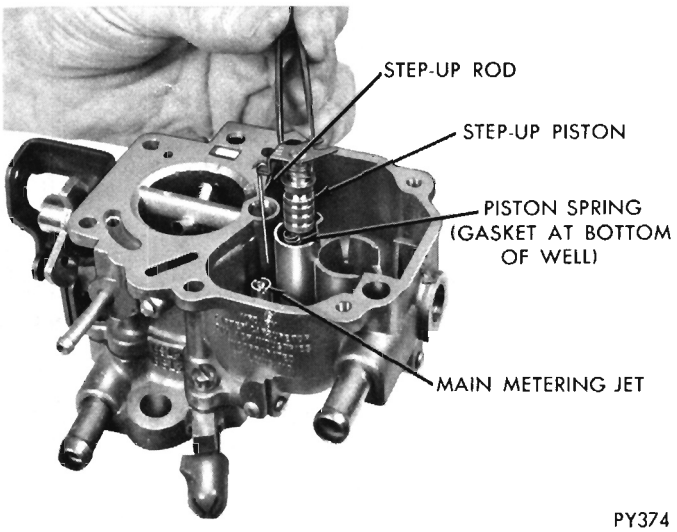


Fig. 4 - Removing or Installing Step-up Piston

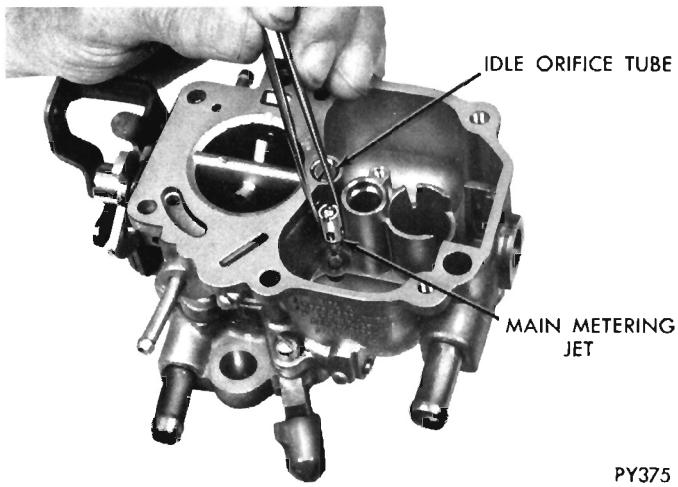


Fig. 5 - Removing or Installing Main Metering Jet

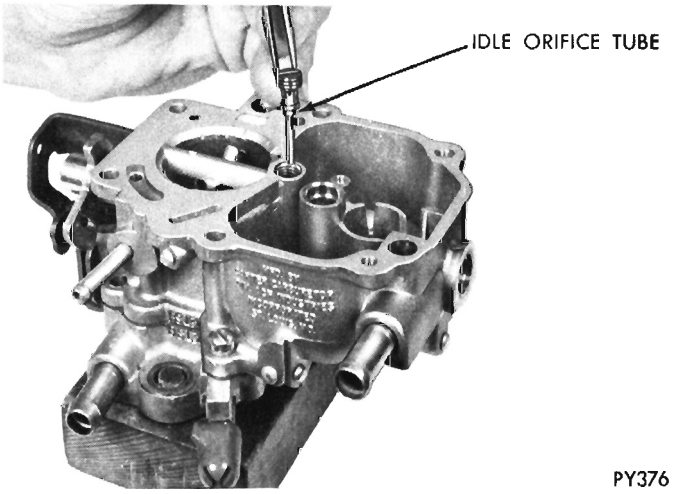


Fig. 6 - Removing or Installing Idle Orifice Tube

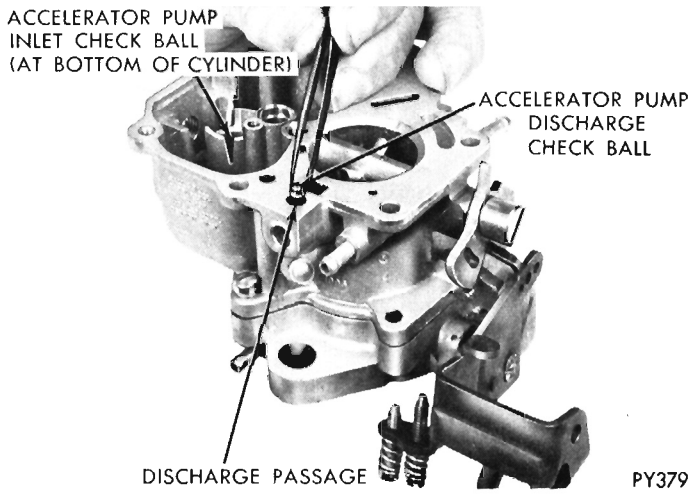


Fig. 8 - Installing Accelerator Pump Discharge and Intake Check Balls

sator valve cover to air horn. Lift off cover, then remove valve and gasket. (Fig. 3.) If so equipped.

(10) Remove fuel inlet needle valve, seat and gasket from main body. Lift out float fulcrum pin retainer, then lift out floats and fulcrum pin.

(11) Remove step-up piston retaining screw, and slide step-up piston and rod out of well, (Fig. 4). Now lift out the step-up piston spring. Remove step-up piston gasket from bottom of the well.

(12) Remove main metering jet (Fig. 5).

(13) Unscrew and remove idle orifice tube (Fig. 6).

(14) Invert carburetor and drop out accelerator pump check balls from their respective seats.

(15) Using Tool T-109-43 plug remover, remove accelerator pump jet plug. Using Tool T-109-59T, remove accelerator pump jet, (Fig. 7).

(16) Remove plastic limiter cap from idle air mixture screw. (Be sure and count number of turns to seat screw, as the same number of turns (from the seat) must be maintained at installation.)

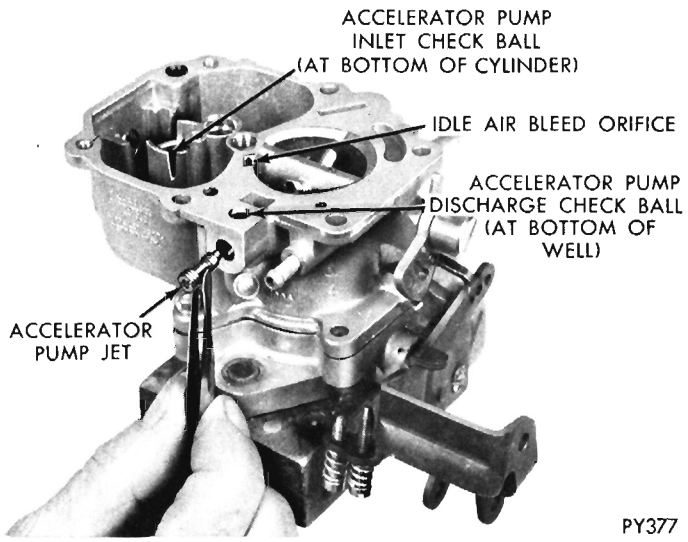


Fig. 7 - Removing or Installing Accelerator Pump Jet

Remove screw and spring from throttle body.

The carburetor now has been disassembled into three main units; air horn, main body and throttle body and the component parts of each disassembled as far as necessary for cleaning and inspection.

INSPECTION AND REASSEMBLY

Throttle Body

(1) Check throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that throttle body assembly be replaced rather than installing a new shaft in the old body.

(2) Install idle mixture screw and spring in body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) DO NOT USE A SCREW DRIVER. Turn screw lightly against its seat with the fingers. Back off number of turns counted at disassembly. Install new plastic cap (blue) with tab against stop.

Main Body

(1) Install accelerator pump discharge and intake check balls in their respective passages, (Fig. 8).

To check accelerator pump system; fuel inlet and discharge check balls, proceed as follows:

(2) Pour clean gasoline into carburetor bowl, approximately 1/2 inch deep. Remove pump plunger from jar of gasoline and slide down into pump cylinder. Raise plunger and press lightly on plunger shaft to expel air from pump passage.

(3) Using a small clean brass rod, hold discharge check ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either intake or discharge passage, (Fig. 9).

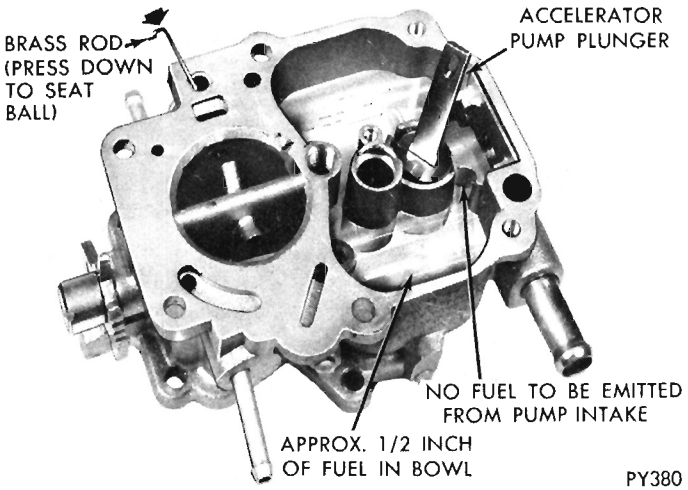


Fig. 9 - Testing Accelerator Pump Intake and Discharge Check Balls

If any fuel does emit from either passage, it indicates the presence of dirt or a damaged check ball. Clean the passage again and repeat test. If leakage is still evident, install a **NEW** check ball. The fuel inlet check ball is located at the bottom of the plunger well. Invert carburetor and remove both check balls.

(4) Install accelerator pump jet, (Fig. 7). Tighten securely, using Tool T-109-59T. Install a new plug and drive tightly in place.

(5) Install idle orifice tube, (Fig. 6). Tighten securely.

(6) Install main metering jet, (Fig. 5). Tighten securely.

(7) Before installing step-up piston, be sure step-up rod is able to move freely each side of vertical position, (Fig. 10). The step-up rod must be straight and smooth.

(8) Slide step-up piston gasket down into position in piston well, then install step-up piston spring and step-up piston and rod (Fig. 4). Install retaining screw and tighten securely. (Carefully guide step-up rod into main metering jet.) Be sure step-up piston slides freely in its cylinder. A step-up piston stuck in **UP** position will cause a rich mixture at part throttle, whereas a piston stuck in **DOWN** position will cause a lean mixture at wide open throttle and poor acceleration.

Checking Float Setting

The carburetors are equipped with a synthetic rubber tipped fuel inlet needle. The needle tip is a rubber material which is not affected by gasoline and is stable over a wide range of temperatures.

To correctly set the float height, when the carburetor is being overhauled, proceed as follows:

(1) Install floats with fulcrum pin and pin retainer in main body.

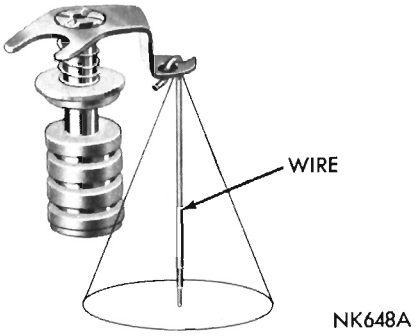


Fig. 10 - Step-up Piston Wire Free Play

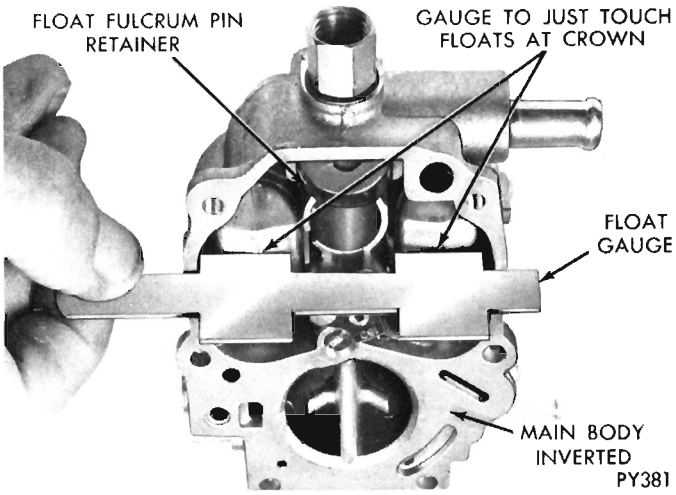


Fig. 11 - Checking Float Setting

(2) Install needle, seat and gasket in body and tighten securely.

(3) Invert main body so that weight of floats **only,** is forcing needle against seat. Hold finger against retainer to fully seat fulcrum pin.

(4) Using Tool T-109-282, or a T scale, check float, (Fig. 11). There should be 1/4 inch from surface of fuel bowl to crown of each float at center.

If an adjustment is necessary, bend the lip of float lever either in or out until correct setting has been obtained.

CAUTION: Do not attempt to change the setting without removing the float, as the synthetic rubber tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in the bowl. After being compressed, the tip is very slow to recover its original shape. Recheck as described in step 4 above.

It is very important that the float lip be perpendicular to the needle or slanted not more than 10 degrees away from the needle when the float is set correctly.

(5) Place a new gasket on throttle body and position main body making sure they are aligned.

(6) Install check balls in respective positions.

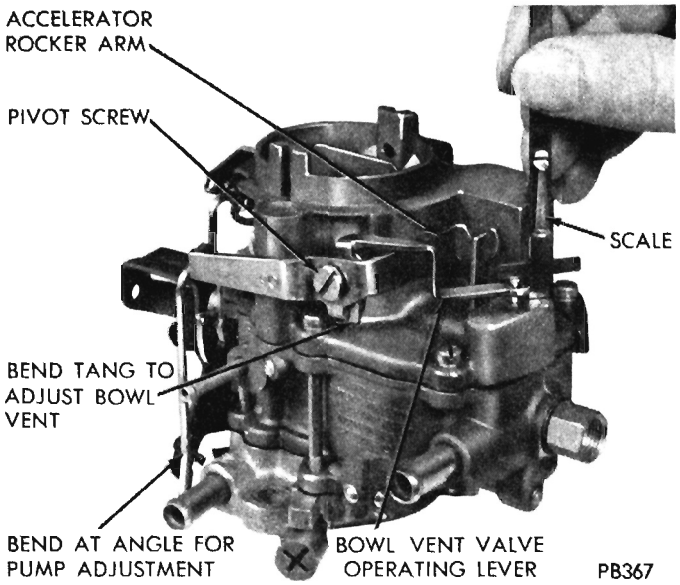


Fig. 12 - Adjusting Bowl Vent Opening

Air Horn

Check freedom of choke mechanism in the air horn. The shaft must float free to operate correctly.

(1) Assemble pump plunger, spring and spring seat and slide plunger shank up through opening in air horn.

(2) Assemble accelerator pump rocker arm and bowl vent lever, then install pivot screw. Engage pump rocker arm with pump plunger and bowl vent lever over valve stem. Insert pivot screw and tighten securely. (Fig. 2.)

(3) Install "E" clip over bowl vent valve stem to retain lever.

(4) Engage fast idle cam link with choke lever.

(5) Place a new gasket on main body, then install air horn by tilting air horn (Fig. 2), in order to engage fast idle link with fast idle cam. After engaging link, slowly lower air horn and at the same time, guide accelerator pump plunger into its well.

(6) Install the two short air horn attaching screws but do not tighten.

(7) Place a new gasket on throttle body, then lower main body and air horn down into position. Install long screws and dash pot (if so equipped). Tighten all screws securely.

(8) Install accelerator pump operating rod and secure with hairpin clip. Normal operation of accelerator pump is obtained by installing pump rod in long stroke (outer hole) of throttle arm.

Choke Vacuum Diaphragm

Inspect the vacuum diaphragm fitting to be sure that the passage is not plugged with foreign material. Leak test diaphragm to determine if it has internal leaks. To do this, depress diaphragm stem, then place a finger over fitting to seal opening. Release stem. If stem moves more than 1/16 inch in 10 (ten) seconds, leakage is excessive and the assembly must be replaced.

Install the diaphragm on the carburetor as follows:

(1) Place diaphragm on mounting surface. Install and tighten attaching screws securely.

(2) Install choke operating link in position between the diaphragm plunger (stem) and choke lever. Install clip to secure.

(3) Inspect rubber hose for cracks before placing it on correct carburetor fitting. **Do not connect vacuum hose to diaphragm fitting until after vacuum kick adjustment has been made.** (See Carburetor Adjustments.)

(4) Place hot idle compensator valve gasket in position in recess in air horn, followed by valve. (Be sure valve is positioned with legs toward outside of carburetor.) Place cover over opening and install attaching screws. Tighten securely. (Fig. 3.) If so equipped.

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor, and in the sequence listed:

Accelerator Pump and Bowl Vent Valve

On the BBS carburetor, it is necessary to check or set the accelerator pump travel before checking the bowl vent valve opening.

Accelerator Pump Travel

(1) Be sure the accelerator pump rod is in outer hole (long stroke) of throttle lever.

(2) Close throttle valve to curb idle.

(3) Using a straight edge placed on flat surface (air cleaner mounting surface), measure distance between straight edge and top of accelerator pump plunger. This measurement should be 5/16 inch.

(4) If an adjustment is necessary, bend accelerator pump rod at angle until correct pump travel has been obtained. Use Tool T109-213.

Bowl Vent Valve

This adjustment to be made **after** accelerator pump adjustment.

(1) With throttle valve at curb idle, measure distance from top of casting to top of bowl vent valve stem. This measurement should 17/64 inch (Fig. 12).

(2) If an adjustment is necessary, bend lower tang on bowl vent valve operating lever (at pivot) until correct opening has been obtained.

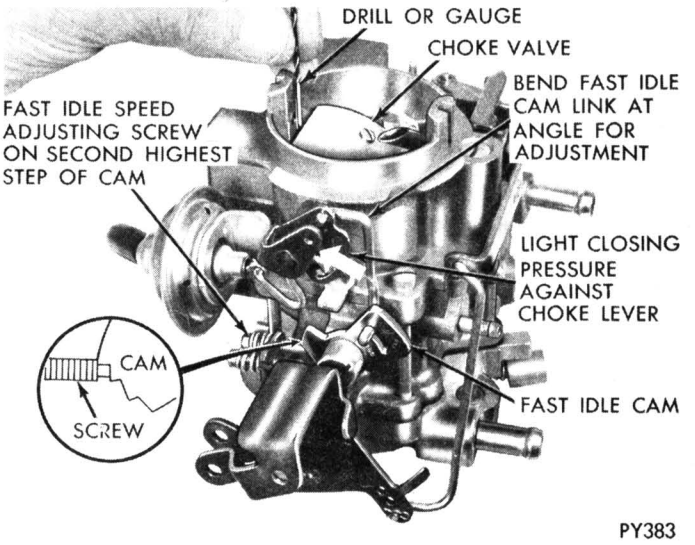


Fig. 13 - Fast Idle Cam Position Adjustment

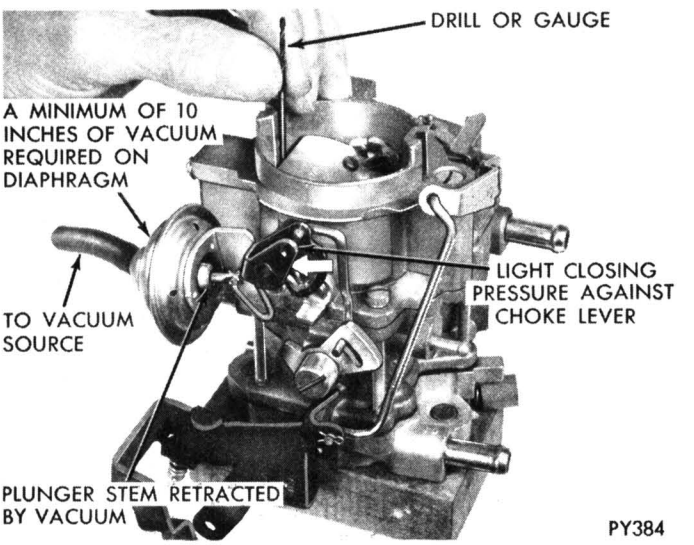


Fig. 14 - Vacuum Kick Adjustment

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (On the Vehicle) Paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each cam step occur at the proper time during engine warm-up. Adjust as follows:

(1) With fast idle speed adjusting screw contacting second highest step on fast idle cam, move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill between choke valve and wall of air horn (See Specifications at rear of Fuel System Group).

(3) If an adjustment is necessary, bend fast idle rod at upper angle, using Tool T-109-213, until correct valve opening has been obtained. (Fig. 13).

Vacuum Kick Adjustment—(This test can be made ON or OFF vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by action of the linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Use either a distributor test machine with a vacuum source, or vacuum supplied by another vehicle. Adjust as follows:

(1) If adjustment is to be made with engine running, back off fast idle speed screw until choke can be closed to the kick position with engine at curb idle. (Note number of screw turns required so that fast idle can be returned to original adjustment). If an auxiliary vacuum source is to be used, open throttle valve (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches of mercury.

(3) Insert specified drill (refer to Specifications) between choke valve and wall of air horn (Fig. 14).

Apply sufficient closing pressure on lever to which choke rod attaches to provide a minimum choke valve opening without distortion of diaphragm link. Note that the cylindrical stem of diaphragm will extend as internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle screw to its original location if disturbed as suggested in Step No. 1.

(6) Make following check. With no vacuum applied to diaphragm, the **CHOKE VALVE SHOULD MOVE FREELY** between open and closed positions. If movement is not free, examine linkage for misalignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

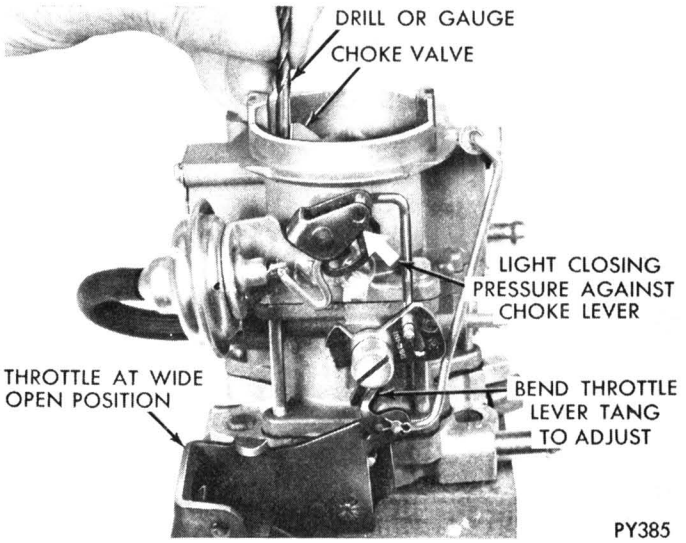


Fig. 15 - Checking Choke Unloader Setting

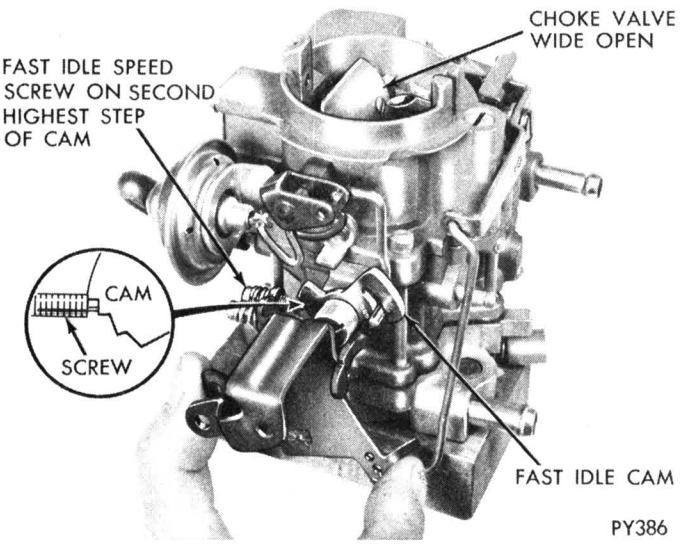


Fig. 16 - Fast Idle Speed Adjustment (On Vehicle)

Choke Unloader (Wide Open Kick)

The choke unloader is a mechanical device to partially open the choke valve at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the choke unloader as follows:

(1) Hold throttle valve in wide open position. Insert specified drill (see Specifications) between upper edge of choke valve and inner wall of air horn.

(2) With a finger lightly pressing against valve, a slight drag should be felt as drill is being withdrawn. If an adjustment is necessary, bend unloader tang on throttle lever until correct opening has been obtained. (Fig. 15.).

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in PARK or NEUTRAL position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest-speed step of fast idle cam (Fig. 16).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw in or out to secure specified speed. (See Specifications.)

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section.)

Checking the Float Setting (On the Vehicle)

(1) Remove accelerator pump operating rod.

(2) Remove two long air horn attaching screws and two short screws, then install two short screws in place of two long screws removed. This will hold main body to throttle body. Tighten screws securely.

(3) Remove remaining air horn screws, then tilt air horn far enough to disengage fast idle cam link from fast idle cam. Remove air horn and gasket.

Check float setting as follows:

(4) Seat float fulcrum pin by pressing on fulcrum pin retainer.

There should be enough fuel in the bowl to raise float so that lip bears firmly against needle. Additional fuel may be admitted by slightly depressing float. If the fuel pressure in line is insufficient to force additional fuel into the bowl, add the necessary fuel from a clean container.

CAUTION: Since the manifolds may be hot, it is dangerous to spill fuel on these surfaces. Therefore, take the necessary precautions to avoid spillage.

(5) With only pressure of buoyant float holding float lip against inlet needle, check float setting, using Tool T-109-239 or a "T" scale. There should be 1/4 inch from surface of bowl (gasket removed) to crown of floats at center.

If an adjustment is necessary, hold the float on

the bottom of the bowl, then bend the float lip toward or away from the needle. Recheck the 1/4 inch setting again, then repeat the lip bending operation as required.

CAUTION: When bending the float lip, do not allow the lip to push against the needle as the tip can be compressed sufficiently to cause a false setting which will affect correct level of the fuel in the bowl.

It is very important that the float lip be perpendicular to the needle or slanted not more than 10 degrees away from the needle when the float is correctly set.

(6) Reassemble air horn as described previously.

HOLLEY MODEL NO. 1920 CARBURETOR

INDEX

	Page
Automatic Choke (well type)	1
Carburetor Adjustments	18
Accelerator Pump and Bowl Vent	19
Choke Vacuum Kick	18
Fast Idle Cam Position	18
Fast Idle Speed (On Vehicle)	19
Idle Speed Adjustment	19
Cleaning Carburetor Parts	2
Disassembling Carburetor	15
General Information	14
Inspection and Reassembly	16
Specifications	137

GENERAL INFORMATION

The Holley single throat carburetor models R-4655A, R-4656A and Taxi application R-4659A are used on the 225 cu. in. engines when the vehicles are equipped with manual or automatic transmissions respectively. (Fig. 1.) These carburetors are equipped with a hot idle compensator valve, which is a thermostatically operated air bleed, to relieve an overrich condition at idle. This condition is the result of excessive heat and resultant overrich mixtures.

Fuel from the bowl flows into the four basic fuel metering systems, which are: the idle system,

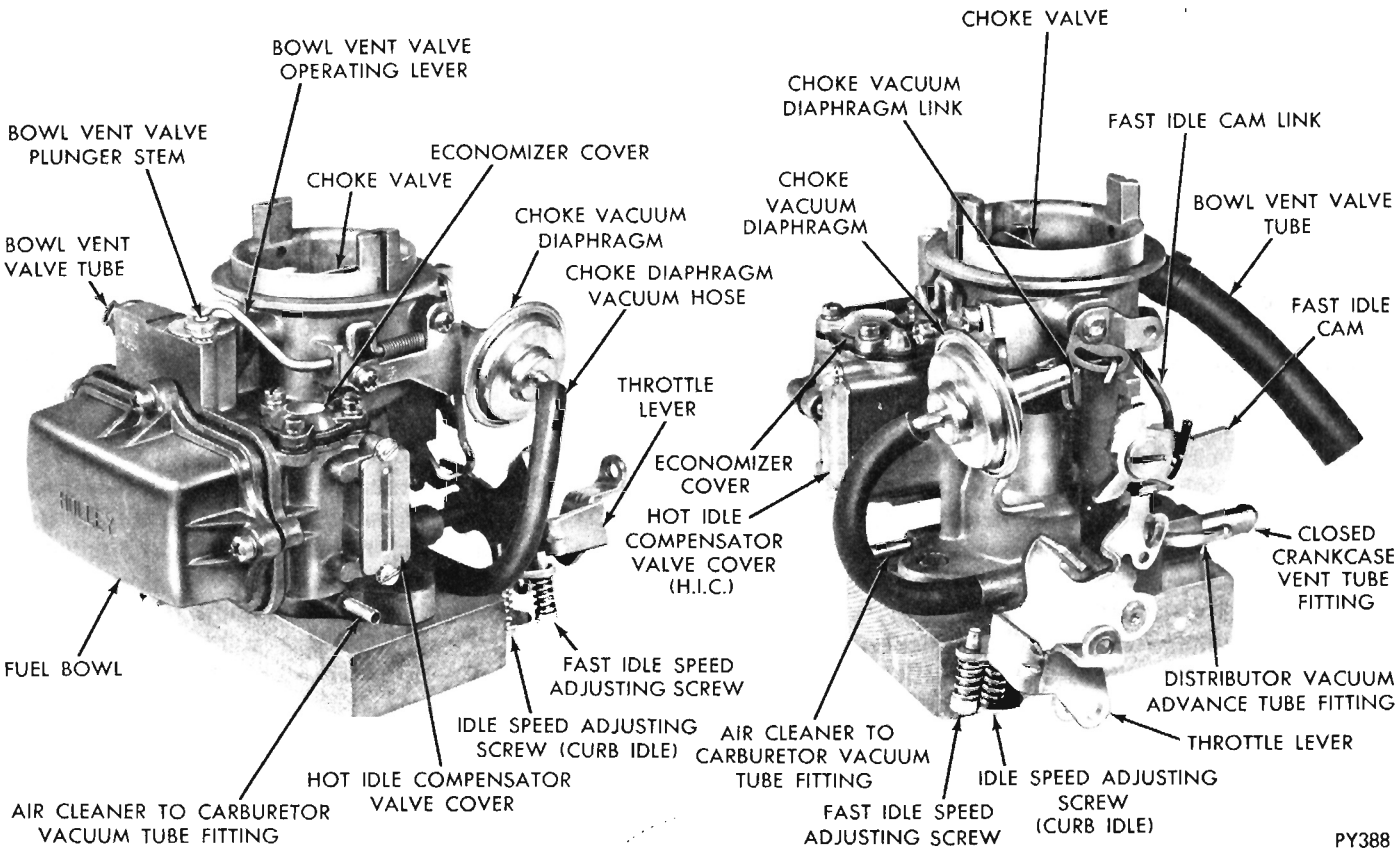


Fig. 1 - Carburetor Assembly (Holley 1920 Series)

the main metering system, the power enrichment system and the accelerating pump system.

The choke valve located in the bore of the carburetor is connected to a well-type automatic choke.

Additional fuel for acceleration is supplied by a diaphragm type, spring driven pump. The pump is operated by a lever connected by linkage to the throttle shaft.

A two stage power valve mounted in the metering block, actuated by manifold vacuum, delivers the additional fuel necessary for full power and high speed operation.

Since the service procedures are identical on all Holley carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR

(1) Place carburetor assembly on repair stand, Tool C-3866.

(2) Remove vacuum hose between carburetor throttle body fitting and vacuum diaphragm.

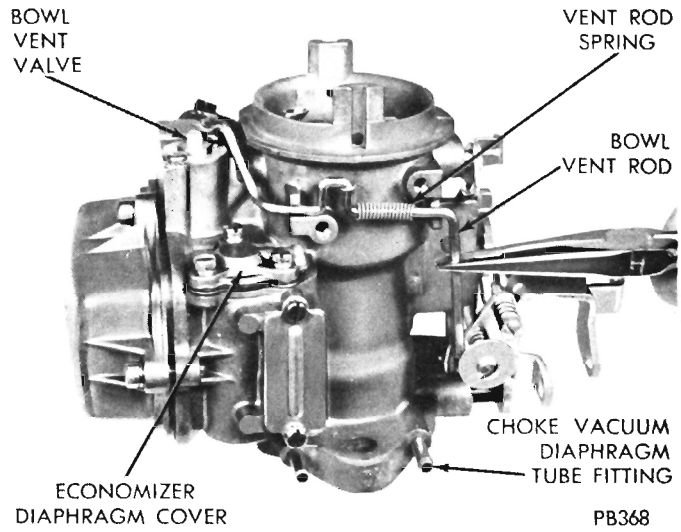


Fig. 2 - Removing or Installing Bowl Vent Rod

(3) Remove choke vacuum diaphragm, link and bracket assembly. Disengage link from slot in choke lever; place to one side to be cleaned as a

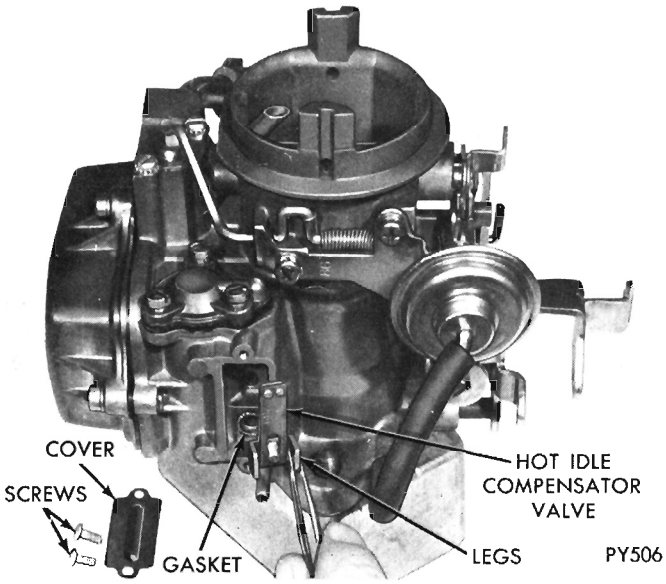


Fig. 3 - Removing or Installing Hot Idle Compensator Valve

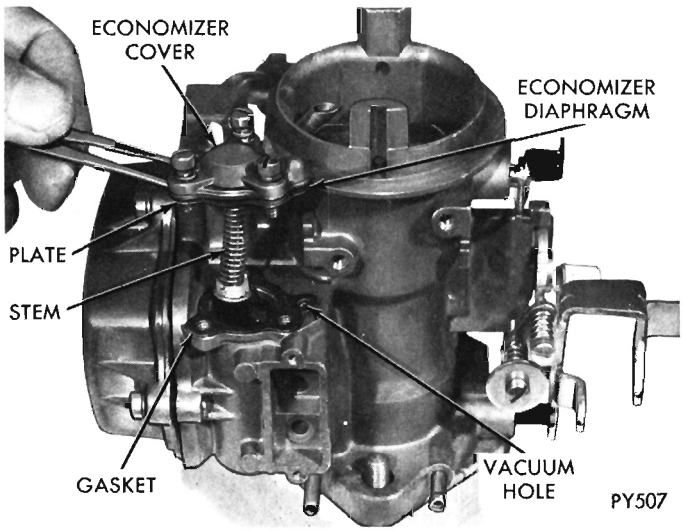


Fig. 4 - Removing or Installing Economizer

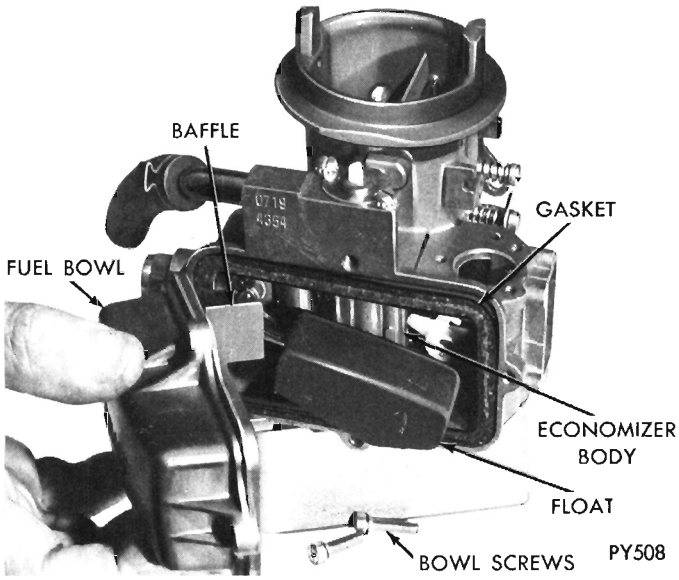


Fig. 5 - Removing or Installing Fuel Bowl

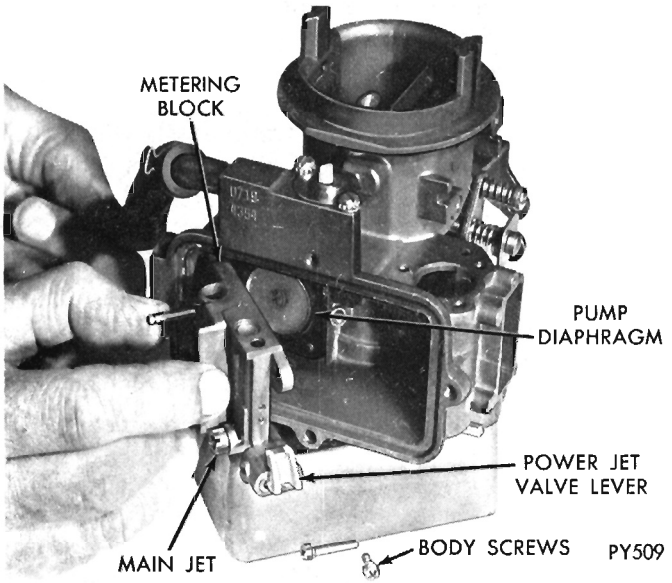


Fig. 6 - Removing or Installing Metering Block

special item. (Fig. 1). **As the vacuum diaphragm bracket is being removed, the bowl vent valve rod and spring will fall out. (Fig. 2).**

(4) Remove screws that attach hot idle compensator valve cover to air horn. Lift off cover, then remove valve and gasket. (Fig. 3.) If so equipped.

(5) Using a 5/8 in. wrench, remove fuel inlet needle valve and seat.

(6) Remove economizer retaining screws, then lift economizer cover, diaphragm and stem out of carburetor, (Fig. 4).

(7) Remove fuel bowl attaching screws, then remove fuel bowl, baffle and gasket, (Fig. 5). Slide baffle out of bowl. Discard gasket. Remove float damper spring.

(8) Using a suitable tool, remove float retaining clip, then slide float off fulcrum pin.

(9) Remove screws that attach metering block, then remove metering block (Fig. 6).

(10) Tilt pump lever on its pivot until hook on pump diaphragm stem can be released. Slide pump diaphragm and spring out of fuel bowl. (Fig. 7).

(11) Using Tool C-3748, remove main jet from metering block. (Fig. 8).

(12) Using a suitable tool, remove pump lever retaining clip. Slide lever off pivot and disengage link from throttle lever.

(13) Remove fast idle cam retaining screw, then remove cam, and at same time, disengage fast idle cam rod.

(14) Remove plastic limiter cap from idle air mixture screw. (Be sure and count number of turns to seat the screw, as the same number of turns (from the seat) must be maintained at installation.) Remove screw and spring from throttle body. Discard plastic cap.

(15) Remove fast idle and curb idle speed screws

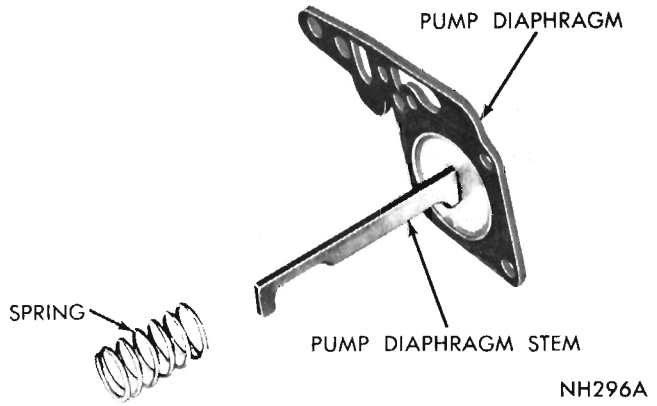


Fig. 7 - Pump Diaphragm and Spring

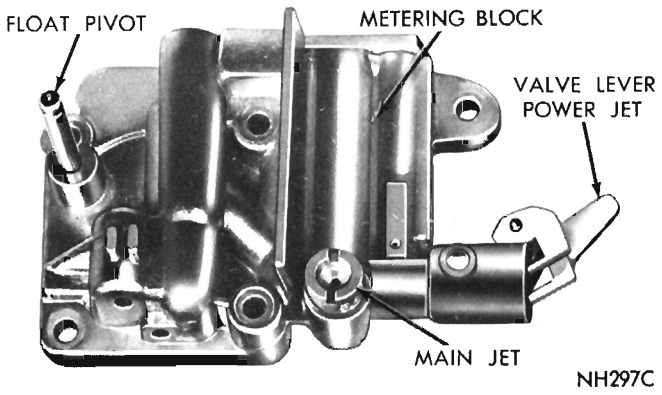


Fig. 8 - Metering Block Assembly

and spring from throttle lever.

(16) Remove screws that retain bowl vent valve cover to air horn. Remove cover, then lift out valve and spring. (If so equipped.)

The carburetor assembly now has been disassembled as far as necessary for cleaning and inspection.

INSPECTION AND REASSEMBLY

Throttle Shaft and Valve

(1) Check throttle shaft for excessive wear in body. If wear is extreme, it is recommended that carburetor assembly be replaced rather than installing a new shaft in old body.

(2) Install idle mixture screw and spring in body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) **Do not use a screwdriver.** Turn screw **lightly** against its seat with fingers. Back off number of turns counted at disassembly. Install new plastic cap (blue) with tab against stop.

Assembling Carburetor

(1) Loosen choke valve attaching screws slightly.

(2) Hold valve closed, with fingers pressing on

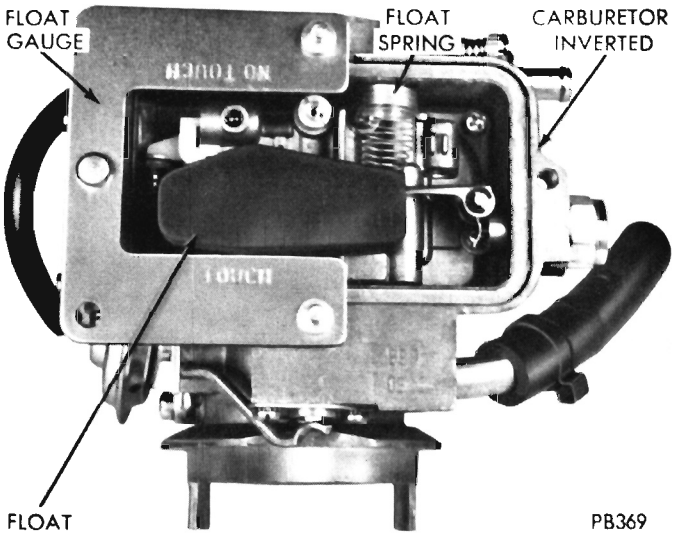


Fig. 9 - Adjusting Float Level

high side of valve. Tap valve lightly with a screwdriver to seat in air horn. Tighten attaching screws securely and stake by squeezing with pliers.

(3) Test choke valve for binding by rotating lever through extent of its full travel.

(4) Install fast idle and curb idle speed screws and springs in throttle lever.

(5) Engage pump link hook with throttle lever, then install in pump lever and secure with clip. When installing link, be sure link is in center hole of throttle lever.

(6) Slide pump spring (Fig. 7), over pump diaphragm stem. Install assembly in position in fuel bowl and at same time, engage hook on diaphragm stem with recess in pump lever.

(7) Install main jet in metering block, using Tool C-3748. (Fig. 8).

(8) Turn carburetor with bowl opening up then position metering block in carburetor, (Fig. 6). Install screws and tighten securely.

(9) Engage choke link with choke lever and fast idle cam. Place cam in position, then install retaining screw. Tighten screw securely.

(10) Slide float into position over fulcrum pin and secure with retainer clip.

(11) Install fuel inlet needle, seat and new gasket. Tighten seat securely. Install float damper spring. Check float setting as follows:

Checking Float Setting

With the carburetor inverted, slide the float gauge C-3903 into position and check the setting on the "touch" leg of the gauge, (Fig. 9). The float should just touch the gauge. Reverse the gauge and check the "No touch" leg. The float should just clear the gauge.

If an adjustment is necessary, bend the float tab (which touches the head of the fuel inlet needle) using needle nosed pliers. **Do not allow the float tab to contact the float needle head during this operation as the synthetic rubber tip of the needle can be compressed, giving a false setting. Do not touch contact area of float tab with pliers.**

Recheck float setting as described above after adjustment.

(1) Slide economizer diaphragm and stem assembly into position, making sure vacuum holes are aligned, and that stem is on power valve. (Fig. 4). Install cover and retaining screws. Tighten screws securely.

(2) Slide baffle into position in fuel bowl, place fuel bowl gasket on cover. Place fuel bowl in position, install screws and washers and tighten alternately. (Be sure gasket is sealed in recess section of main body. Tighten screws gently so as to compress only lockwashers. (Screws drawn down too tightly could distort fuel bowl and cause a leak.)

(3) Install bowl vent valve spring in air horn, followed by valve and cover. Install attaching screws and tighten securely. (If so equipped.)

Installing the Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to insure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem. Then place a finger over the vacuum fitting to seal the opening. Release the diaphragm stem. If the stem moves more than 1/16 inch in 10 seconds, the leakage is excessive and the assembly must be replaced. Install the diaphragm as follows:

(1) Slide bowl vent valve rod assembly in position on air horn. Hold rod centered in its grooves, using a finger.

(2) Engage choke link in slot in choke lever.

(3) Install vacuum diaphragm assembly on air horn, being sure vent rod is in position. Install diaphragm attaching screws and tighten securely.

(4) Inspect vacuum diaphragm fitting and remove any dirt or foreign material which could plug vacuum passage. Inspect rubber hose for cracks, before placing it on correct fitting. (Fig. 1). Do not connect vacuum hose to diaphragm fitting until after vacuum kick adjustment has been made (See Carburetor Adjustments.)

(5) Place hot idle compensator valve gasket in position in recess in air horn, followed by valve. (Be sure valve is positioned with legs toward outside of carburetor.) (Fig. 3.) Place cover over opening and install attaching screws. Tighten securely. (If so equipped.)

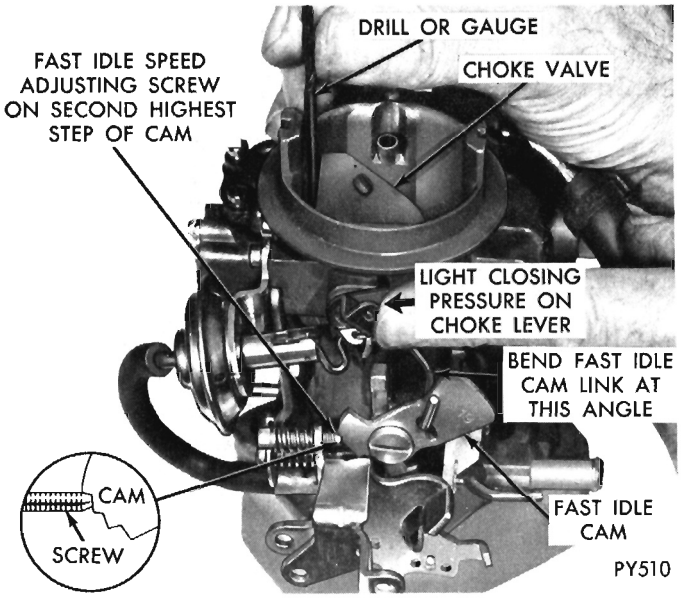


Fig. 10 - Fast Idle Cam Position Adjustment

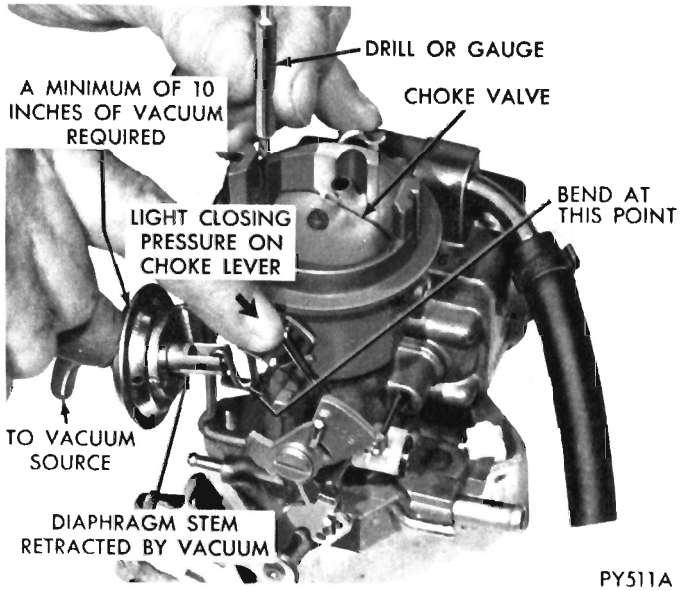


Fig. 11 - Adjusting Choke Vacuum Kick Setting

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor.

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in "Fast Idle Speed Adjustment." (On the Vehicle) Paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each cam step occur at the proper time during engine warm-up. Adjust as follows:

(1) With fast idle speed adjusting screw contacting second highest step on fast idle cam (Fig. 10), move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill between top of choke valve and wall of air horn. (See Specifications at rear of Fuel System Group.)

(3) If an adjustment is necessary, bend fast idle link at lower angle, using Tool T-109-213, until correct valve opening has been obtained. (Fig. 10).

When the correct fast idle position cam adjustment has been made, the choke unloader (wide open kick) adjustment has also been obtained. No further adjustment is required.

Vacuum Kick Adjustment—(This test can be made ON or OFF vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by action of the linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Use either a distributor test machine with a vacuum source or vacuum supplied by another vehicle. Adjust as follows:

(1) If adjustment is to be made with engine running, back off fast idle speed screw until choke can be closed to the kick position with engine at curb idle. (Note number of screw turns required so that fast idle can be returned to original adjustment). If an auxiliary vacuum source is to be used, open throttle valve (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches of mercury.

(3) Insert specified drill (refer to Specifications) between top of choke valve and wall of air horn (Fig. 11). Apply sufficient closing pressure on lever to which choke rod attaches to provide a minimum choke valve opening without distortion of diaphragm link. Note that the cylindrical stem of diaphragm will extend as internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly.

CAUTION; DO NOT APPLY TWISTING OR BEND-

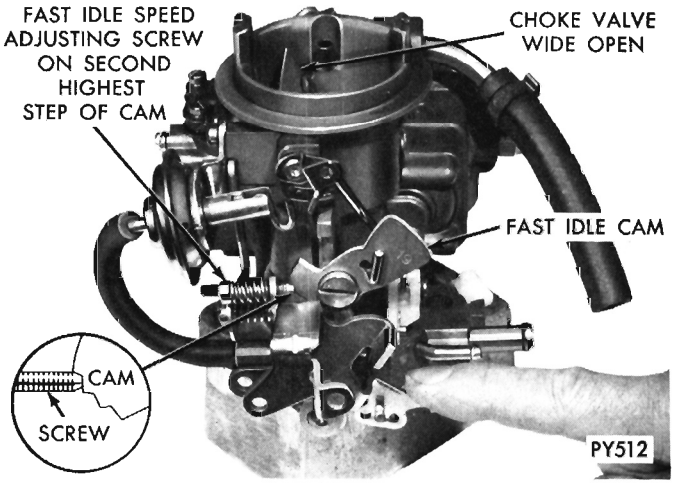


Fig. 12 - Fast Idle Speed Adjustment (On Vehicle)

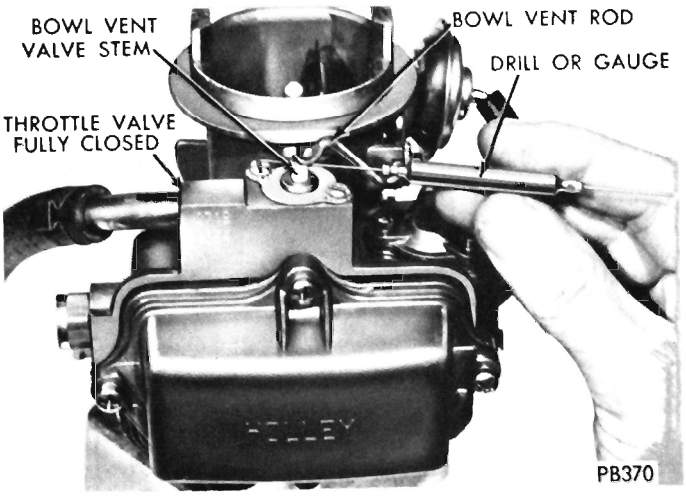


Fig. 14 - Adjusting Bowl Vent Opening

ING FORCE TO DIAPHRAGM.

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle screw to its original location if disturbed as suggested in Step No. 1.

(6) Make following check. With no vacuum applied to diaphragm, the **CHOKE VALVE SHOULD MOVE FREELY** between open and closed positions. If movement is not free, examine linkage for misalignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section).

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in PARK or NEUTRAL position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest-speed step of fast idle cam (Fig. 12).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw in or out to secure specified speed. (See Specifications.)

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Before adjusting idle and/or fast idle speeds and mixtures, make sure that the basic timing is correctly adjusted as outlined under Idle Speed Adjustment (Curb Idle).

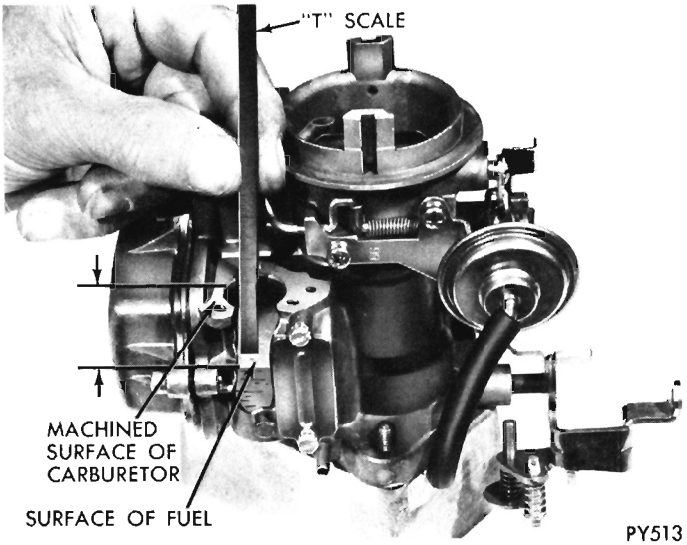


Fig. 13 - Measuring Wet Fuel Level

Checking Wet Fuel Level

With engine running and car on a level floor, the fuel level can be checked or measured through the economizer diaphragm opening. Using a 6 in. scale with a depth gauge, measure the distance from the machined surface of the opening to the exact fuel surface, (Fig. 13). The measurement should be 27/32 inch. If not, adjust float to give proper level.

Bowl Vent Adjustment

With throttle valve at curb idle speed, it should be possible to insert a 1/32 (.030) in. drill or gauge between bowl vent and the seat. (Fig. 14.)

If an adjustment is necessary, bend vent rod at horizontal portion until correct clearance has been obtained. Be sure vent rod does not bind in guide after adjusting.

BBD CARBURETORS (1-1/4 IN.)

INDEX

	Page
Automatic Choke (well type)	1
Carburetor Adjustments	24
Accelerator Pump and Bowl Vent	24
Choke Vacuum Kick	25
Fast Idle Cam Position	25
Fast Idle Speed (On Vehicle)	26
Choke Unloader (Wide Open Kick)	26
Idle Speed Adjustment	26
Dashpot Adjustment	26
Cleaning Carburetor Parts	2
Disassembling Carburetor	21
Inspection and Reassembly	22
Specifications	137

GENERAL INFORMATION

Ball and Ball dual throat 1-1/4 inch carburetor models BBD-4957S and BBD-4958S are also used on the 318 cu. in. engines when the vehicles are equipped with manual and automatic transmissions respectively. (Fig. 1.) Both of these carburetors are equipped with a hot idle compensator valve, which is a thermostatically operated air bleed, to relieve an over rich condition at idle. This condition is the result of excessive heat.

The BBD-4957S is equipped with a dash pot which retards the return of the throttle to idle position. (Manual Transmission Only).

The proper adjustment of the dash pot is very important! (See carburetor adjustments.)

Since the service procedures are identical on all BBD carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

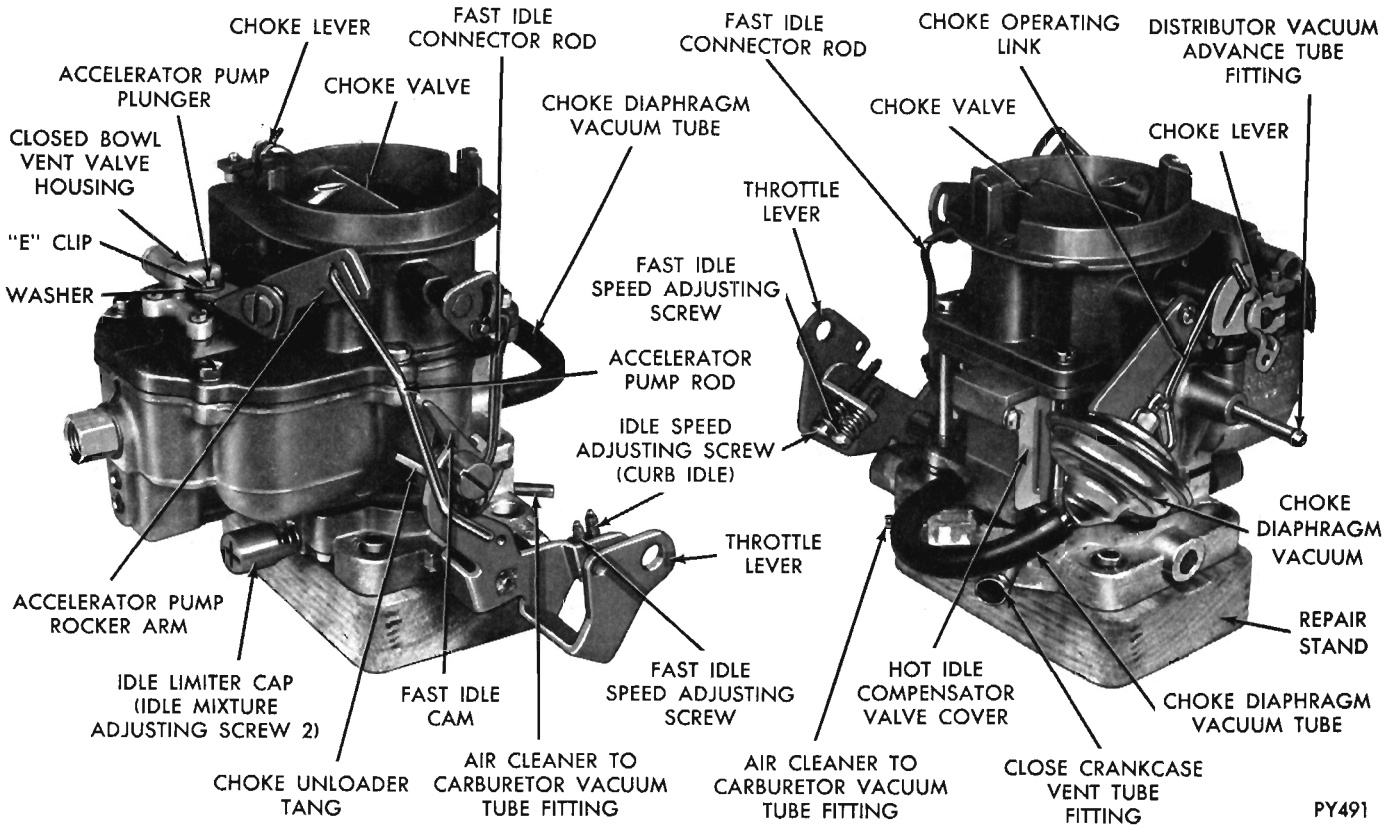


Fig. 1 - Carburetor Assembly (1-1/4 inch BBD)

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR

(1) Place carburetor assembly on repair block Tool C-3225.

(2) Remove hairpin clips and disengage accelerator pump operating rod.

(3) Remove clips and disengage fast idle connector rod from fast idle cam and choke lever.

(4) Remove vacuum hose between carburetor main body and choke vacuum diaphragm.

(5) Remove clip from choke operating link and disengage link from diaphragm plunger (stem) and choke lever.

(6) Remove choke vacuum diaphragm and bracket assembly and place to one side to be cleaned as a special item. **A liquid cleaner may damage diaphragm material.**

(7) Remove air horn retaining screws and lift air horn straight up and away from main body, (Fig. 2). Discard gasket. Remove dash pot and bracket (if so equipped).

(8) Remove "E" clip and washer from plunger stem, slide accelerator pump plunger out of air horn. Remove screws attaching bowl vent housing to air horn. Remove housing, vent valve spring and vent valve.

If the old plunger can be used again, or if a new plunger is to be installed, place plunger in a jar of clean gasoline or kerosene to prevent leather from drying out.

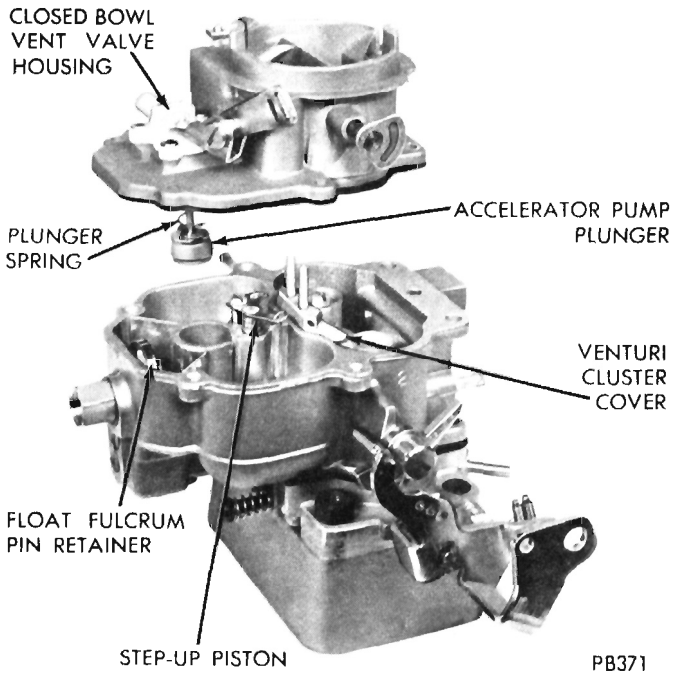


Fig. 2 - Removing or Installing Air Horn

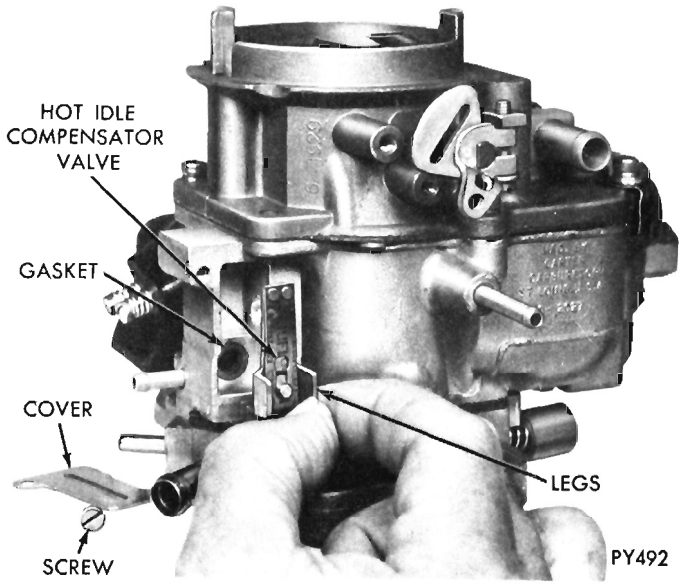


Fig. 3 - Removing or Installing Hot Idle Compensator Valve

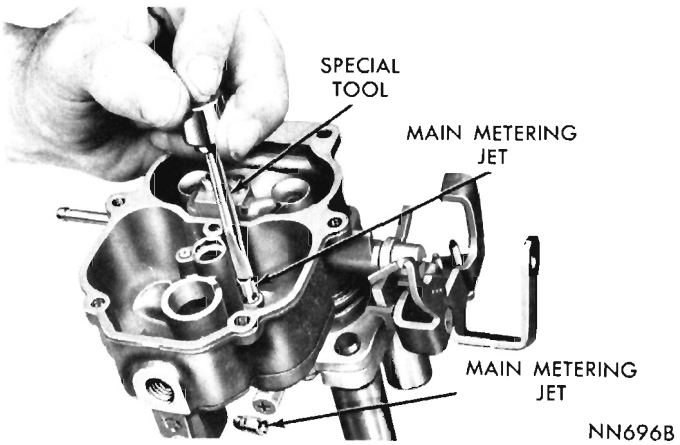


Fig. 4 - Removing or Installing Step-up Piston

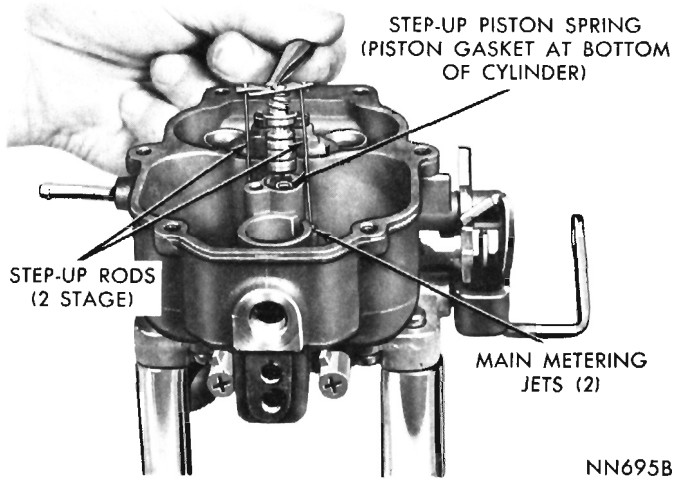


Fig. 5 - Removing or Installing Main Metering Jets

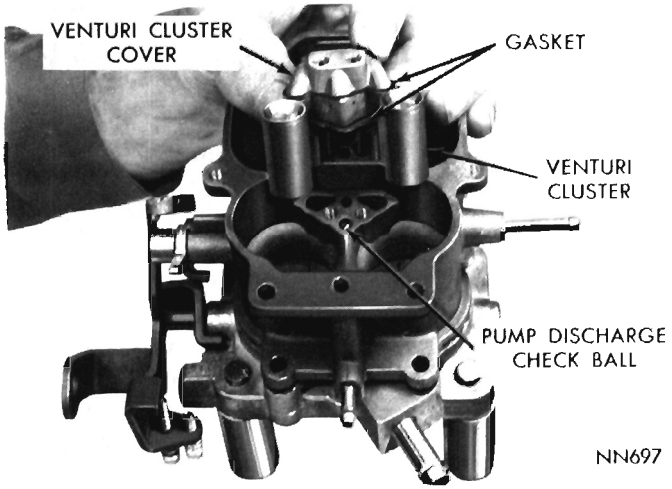


Fig. 6 - Removing or Installing Venturi Cluster

(9) Remove screws attaching hot idle compensator valve cover to main body. Remove cover, then lift out compensator valve and gasket. (Fig. 3).

(10) Remove fuel inlet needle valve, seat and gasket from main body.

(11) Lift out float fulcrum pin retainer, then lift out floats and fulcrum pin.

(12) Remove step-up piston retaining screw, and slide step-up piston and rods out of well, (Fig. 4). Now, lift out step-up piston spring. Remove step-up piston gasket from the bottom of well.

(13) Remove main metering jets, (Fig. 5)

(14) Remove venturi cluster screws, then lift venturi cluster and gaskets up and away from main body, (Fig. 6). Discard gaskets. **Do not remove the idle orifice tubes or main vent tubes from the cluster.** They can be cleaned in a solvent and dried with compressed air.

(15) Invert carburetor and drop out accelerator pump discharge and intake check balls.

(16) Remove plastic limiter cap from idle air mixture screws. (Be sure and count number of turns to seat the screw, as the same number of turns (from the seat) must be maintained at installation.) Remove screws and springs from throttle body.

(17) Remove screws that attach throttle body to main body. Separate bodies.

(18) Test freeness of choke mechanism in air horn. The choke shaft must float free to operate correctly. If choke shaft sticks in bearings, or appears to be gummed from deposits in air horn, a thorough cleaning will be required.

The carburetor now has been disassembled into three main units, namely, the air horn, main body and throttle body and the component parts of each disassembled as far as necessary for cleaning and inspection.

INSPECTION AND REASSEMBLY

Throttle Body

(1) Check throttle shaft for excessive wear in throttle body. (If wear is extreme, it is recommended that throttle body assembly be replaced rather than installing a new shaft in old body.)

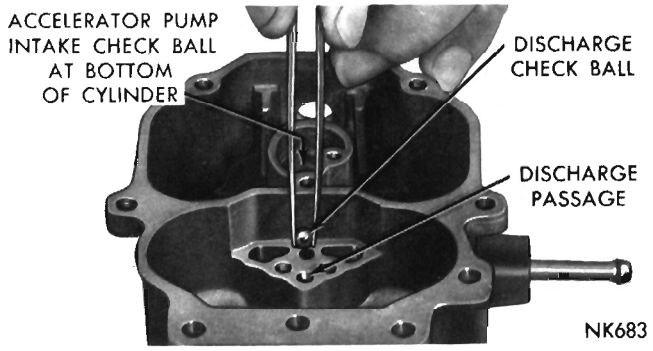


Fig. 7 - Installing Accelerator Pump Discharge Check Ball

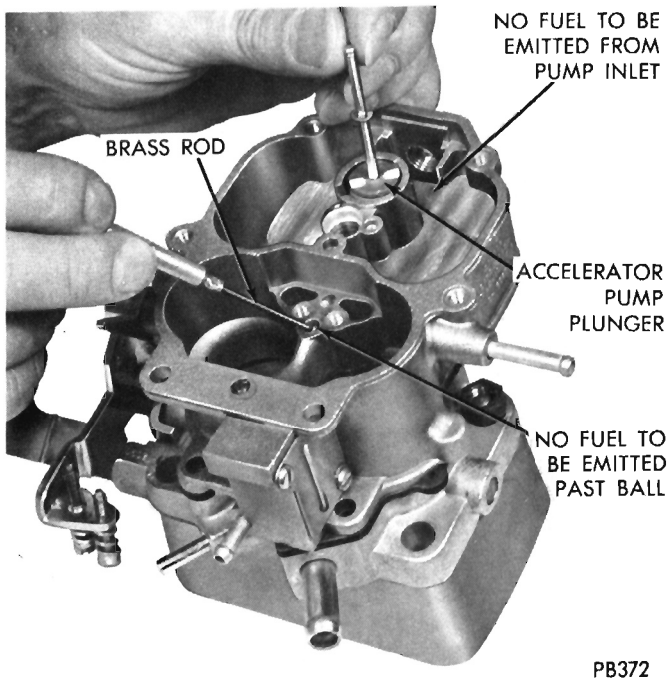


Fig. 8 - Testing Accelerator Pump Intake and Discharge Check Balls

(2) Install idle mixture screws and springs in body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control). DO NOT USE A SCREW DRIVER. Turn screws lightly against their seats with fingers. Back off number of turns counted at disassembly. Install new plastic caps (blue) with tab against stop.

Main Body

(1) Invert main body and place insulator in position, then place throttle body on main body and align. Install screws and tighten securely.

(2) Install accelerator pump discharge check ball (5/32 inch diameter) in discharge passage, (Fig. 7).

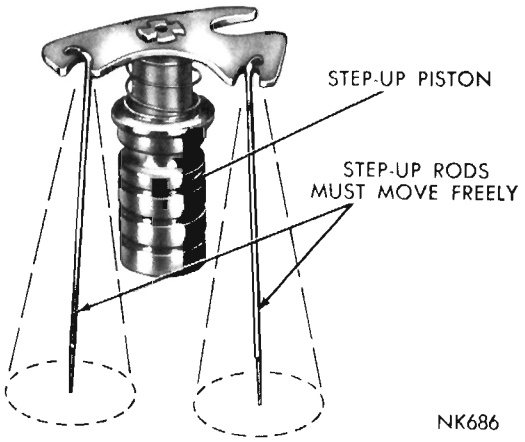


Fig. 9 - Step-up Piston and 2 Stage Rods

Drop accelerator pump intake check ball (3/16 inch diameter) into bottom of the pump cylinder.

To check the accelerator pump system; fuel inlet and discharge check balls, proceed as follows:

(3) Pour clean gasoline into carburetor bowl, approximately 1/2 inch deep. Remove pump plunger from jar of gasoline and slide down into pump cylinder. Raise plunger and press lightly on plunger shaft to expel air from pump passage.

(4) Using a small clean brass rod, hold discharge check ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either intake or discharge passage, (Fig. 8).

If any fuel does emit from either passage, it indicates the presence of dirt or a damaged check ball or seat. Clean passage again and repeat test. If leakage is still evident, install new check balls. The fuel inlet check ball is located at bottom of the plunger well. Remove fuel from bowl.

(5) Install new gaskets on venturi cluster, then install in position in main body. (Fig 6). Install cluster screws and tighten securely.

(6) Before installing step-up piston, be sure step-up rods are able to move freely each side of vertical position, (Fig. 9). The step-up rods must be straight and smooth.

(7) Slide step-up piston gasket down into position in piston well, then install step-up piston spring and step-up piston and rods. Carefully guide step-up rods into main metering jets. (Fig. 4). Install retaining screw and tighten securely.

A step-up piston stuck in the **UP** position will cause a rich mixture at part throttle, whereas a piston stuck in the **DOWN** position will cause a lean mixture at wide open throttle and poor acceleration.

(8) Install hot idle compensator valve gasket in position in recess in main body, followed by valve. (Be sure valve is positioned with legs toward outside of main body.) (Fig. 3). Place cover over opening and install attaching screws. Tighten securely.

Checking Float Setting

The carburetors are equipped with a synthetic rubber tipped fuel inlet needle. The needle tip is a rubber material which is not affected by gasoline and is stable over a wide range of temperatures. The tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding.

The use of the synthetic rubber tipped inlet needle requires that care be used in adjusting the float setting. Care should be taken to perform this accurately in order to secure the best performance and fuel economy.

To correctly set the float height, when the carburetor is being overhauled, proceed as follows:

(1) Install floats with fulcrum pin and pin retainer in main body.

(2) Install needle, seat and gasket in body and tighten securely.

(3) Invert main body (catch pump intake check ball) so that weight of floats **only,** is forcing needle against seat. Hold finger against retainer to fully seat fulcrum pin.

(4) Using Tool T-109-282 or a "T" scale, check the float, (Fig. 10). There should be 1/4 inch from surface of fuel bowl to crown of each float at center.

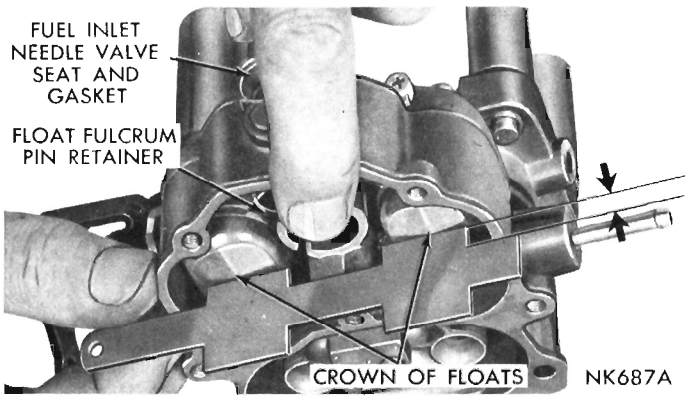


Fig. 10 - Checking Float Setting

If an adjustment is necessary, hold the floats on the bottom of the bowl and bend the float lip toward or away from the needle. Recheck the 1/4 inch setting again then repeat the lip bending operation as required. **CAUTION: When bending the float lip, do not allow the lip to push against the needle as the synthetic rubber tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in the bowl.** After being compressed, the tip is very slow to recover its original shape.

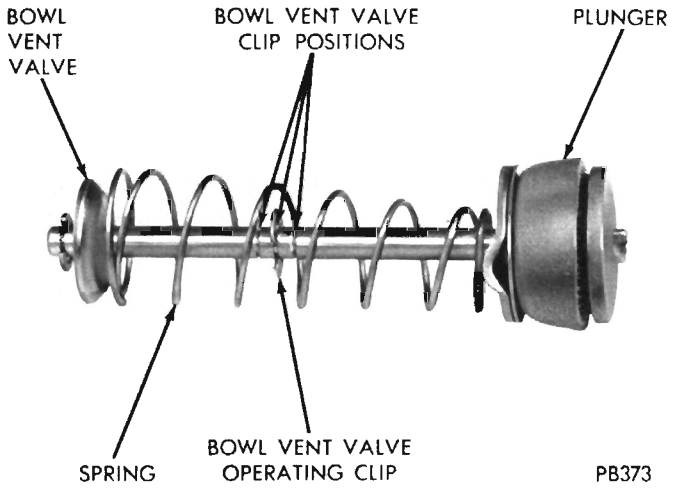


Fig. 11 - Accelerator Pump Assembly

It is very important that the float lip be perpendicular to the needle or slanted not more than ten degrees away from the needle when the float is set correctly.

Air Horn

(1) Slide pump plunger spring over plunger stem, then slide plunger up through air horn. Slide bowl vent valve down over plunger stem (with convex side down). Slide valve spring over stem, followed by valve housing. Install attaching screws and tighten securely. (Fig. 11).

(2) Place a new gasket on main body, then install air horn. (Fig. 2). Install attaching screws and tighten securely. (When installing air horn be sure leather on plunger does not fold back.) Install dash pot (if so equipped).

(3) Engage fast idle connector rod in choke lever and fast idle cam. Secure with clips.

(4) Engage accelerator pump operating rod in inside slot in rocker arm and in center hole in throttle lever. Install clips to secure.

Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to insure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the vacuum fitting to seal the opening. Release the diaphragm stem. If the stem moves more than 1/16 inch in 10 seconds, the leakage is excessive and the assembly must be replaced.

Install the diaphragm assembly on the air horn as follows:

(1) Assemble to air horn and tighten the attaching screws securely.

(2) Install choke operating link in position between diaphragm plunger (stem) and choke lever. Install clip to secure.

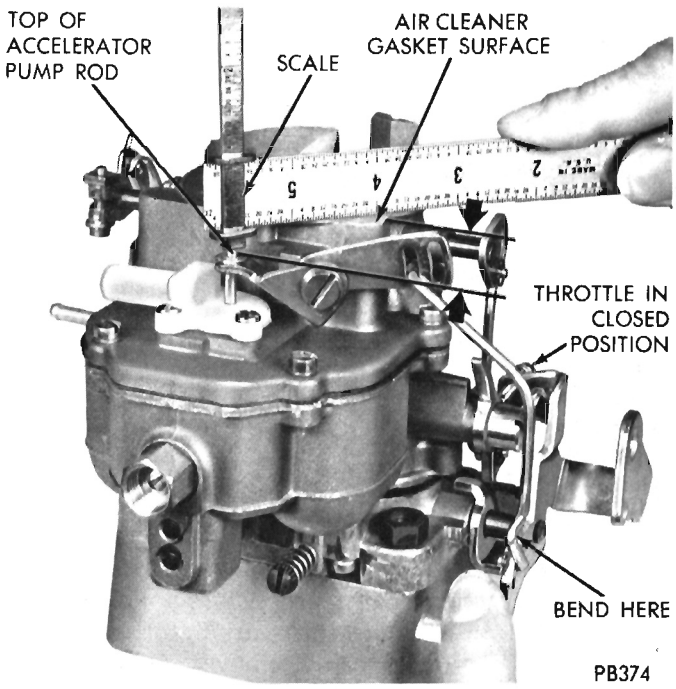


Fig. 12 - Adjusting Accelerator Pump Stroke

(3) Inspect rubber hose for cracks before placing it on correct carburetor fitting. (Fig. 1). Do not connect vacuum hose to diaphragm fitting until after vacuum kick adjustment has been made. (See Carburetor Adjustments.)

(4) Loosen choke valve attaching screws slightly. Hold valve closed, with fingers pressing on high side of valve. Tap valve lightly with a screw driver to seat in air horn. Tighten attaching screws securely and stake by squeezing with pliers.

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor, and in the sequence listed:

Accelerator Pump and Bowl Vent

(1) Back off idle speed adjusting screw to completely close throttle valves. Open choke valve so that fast idle cam allows throttle valves to seat in bores.

(2) Be sure accelerator pump operating rod is in medium stroke hole in throttle lever.

(3) Close throttle valves tightly. Measure distance from air cleaner gasket surface of air horn to top of accelerator pump rod. (Fig. 12). This measurement should be .200 inch.

(4) To adjust pump travel, bend accelerator pump operating rod, using Tool T-109-213, at lower angle, until correct pump travel has been obtained.

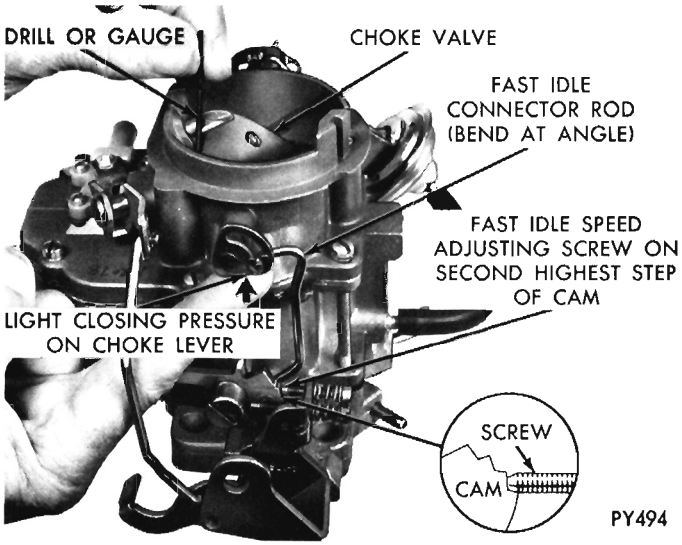


Fig. 13 - Fast Idle Cam Position Adjustment

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (On the Vehicle) Paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each cam step occur at the proper time during engine warm-up. Adjust as follows:

(1) With fast idle speed adjusting screw contacting second highest speed step on fast idle cam, move choke valve towards closed position with light pressure on choke shaft lever.

(2) Insert specified drill (see specifications) between choke valve and wall of air horn. An adjustment will be necessary if a slight drag is not obtained as drill or gauge is being removed.

(3) If an adjustment is necessary, bend fast idle connector rod at angle, using Tool T-109-213, until correct valve opening has been obtained. (Fig. 13).

Vacuum Kick Adjustment—(This test can be made ON or OFF vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by action of the linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or vehicle to be adjusted.

(1) If adjustment is to be made with engine running, disconnect fast idle linkage to allow choke to close to the kick position with engine at curb idle. If an auxiliary vacuum source is to be used, open throttle valves (engine not running)

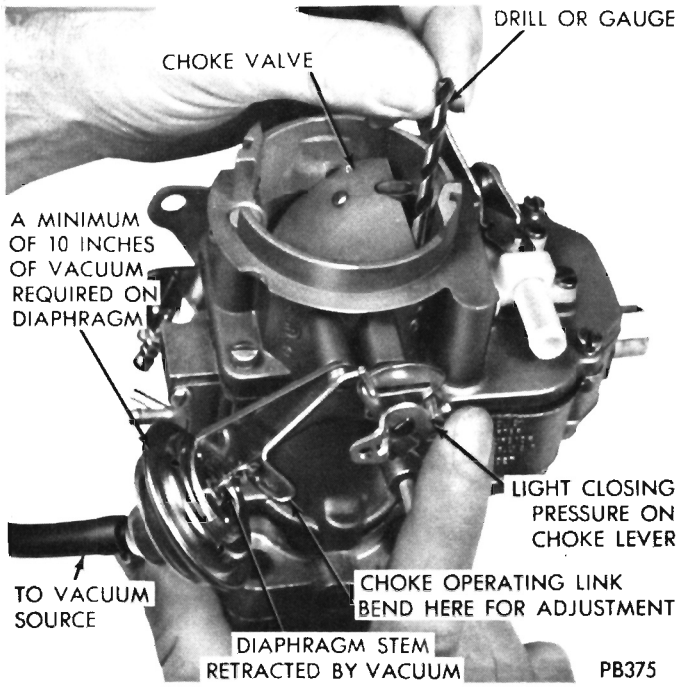


Fig. 14 - Adjusting Choke Vacuum Kick

and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches of mercury.

(3) Insert specified drill (refer to Specifications) between choke valve and wall of air horn (Fig. 14). Apply sufficient closing pressure on lever to which choke rod attaches to provide a minimum choke valve opening without distortion of diaphragm link. Note that the cylindrical stem of diaphragm will extend as internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle linkage to its original condition if disturbed as suggested in Step No. 1.

(6) Make following check. With no vacuum applied to diaphragm, the **CHOKE VALVE SHOULD MOVE FREELY** between open and closed positions. If movement is not free, examine linkage for misa-

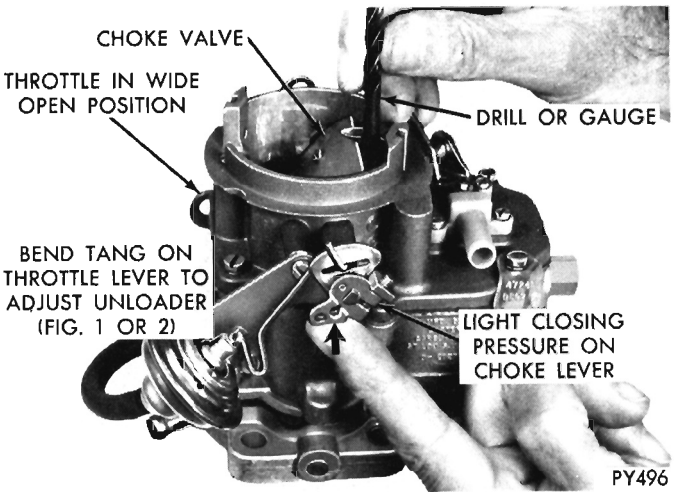


Fig. 15 - Adjusting Choke Unloader

lignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

Choke Unloader (Wide Open Kick)

The choke unloader is a mechanical device to partially open the choke valve at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the choke unloader as follows:

(1) Hold throttle valves in wide open position. Insert specified drill (see Specifications) between upper edge of choke valve and inner wall of air horn.

(2) With a finger lightly pressing against valve, a slight drag should be felt as drill is being withdrawn. If an adjustment is necessary, bend unloader tang on throttle lever until correct opening has been obtained. (Fig. 15).

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section).

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

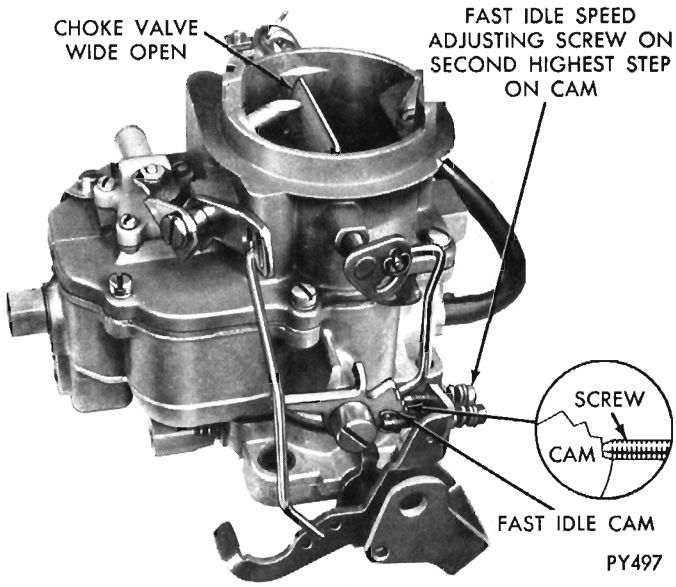


Fig. 16 - Fast Idle Speed Adjustment (On Vehicle)

(1) With engine off and transmission in PARK or NEUTRAL position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest-speed step of fast idle cam (Fig. 16).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw in or out to secure specified speed. (See Specifications.)

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Before adjusting idle and/or fast idle speeds and mixtures, make sure that the basic timing and the distributor control valve are correctly adjusted as outlined under Idle Speed Adjustment (Curb Idle).

Dashpot Setting and Adjustment Manual Transmission Only

With the curb idle speed and mixture properly set and a tachometer installed, position the throttle lever so that the actuating tab on the lever is contacting the stem of the dashpot but not depressing it. The tachometer should read 2000 rpm if the setting is correct. To adjust the setting if necessary, screw the dashpot in or out as required. When the desired setting is obtained, tighten the lock nut on the dashpot against the bracket.

To set the idle speed, refer to the Fuel System General Information Paragraph.

ROCHESTER 2GV CARBURETOR (1-1/4 IN.)

INDEX

	Page
Automatic Choke - Well Type	1
Carburetor Adjustments	36
Accelerator Pump Rod	36
Fast Idle Cam Position	36
Vacuum Kick (On or Off Vehicle)	36
Choke Unloader (Wide Open Kick)	37
Idle Speed	37
Fast Idle Speed (On Vehicle)	38

Idle Vent Valve (On Vehicle) 38
General Information 27
Disassembling Carburetor 31
Cleaning and Inspection 33
Reassembly 34
Specifications 137

GENERAL INFORMATION

The Rochester Model 2GV carburetor used on 318 cu. in. engines, equipped with automatic transmission, is of the side bowl design. (Fig. 1). It is equipped with 1-7/16 in. bores, 1-3/16 in. venturi. The carburetor float bowl is located forward of the main bores of the carburetor. The carburetor is compact in design in that all of the fuel metering is centrally located.

The Model 2GV carburetor uses a calibrated cluster design, which places in a removable assembly, the main well tubes, idle tubes, mixture passages, air bleeds, and pump jets. The cluster can easily be removed for cleaning and inspection purposes. The venturi cluster fits on a flat portion of the carburetor bowl in front of the main venturi with a gasket underneath. The idle and main well tubes are permanently installed in the cluster body by means of a precision pressed fit. Therefore, they cannot be serviced separately. The main nozzles and idle tubes are suspended in the fuel in the main well of the float bowl. This provides good insulation from possible excessive engine heat.

The main metering jets are of the fixed type. Metering calibration is accomplished through a system of calibrated air bleeds which give the correct air/fuel mixtures throughout all operational ranges.

The Model 2GV carburetor employs the use of a vacuum operated power system for extra power when needed. Power mixtures are regulated by a drop in engine manifold vacuum, regardless of the degree of throttle opening. Thereby, additional fuel can be supplied for power mixtures according to engine demands.

The carburetor is internally vented through a large cored hole which leads from beneath the carburetor air cleaner inside the air horn bore to the float bowl. The float bowl is externally vented through an idle vent valve which operates off the pump lever. During hot engine idle and "shut down" fuel vapors are vented from the float bowl through a tube which leads to the crankcase inlet air cleaner.

Plastic main well inserts are used in the carburetor main fuel wells which surround the main well

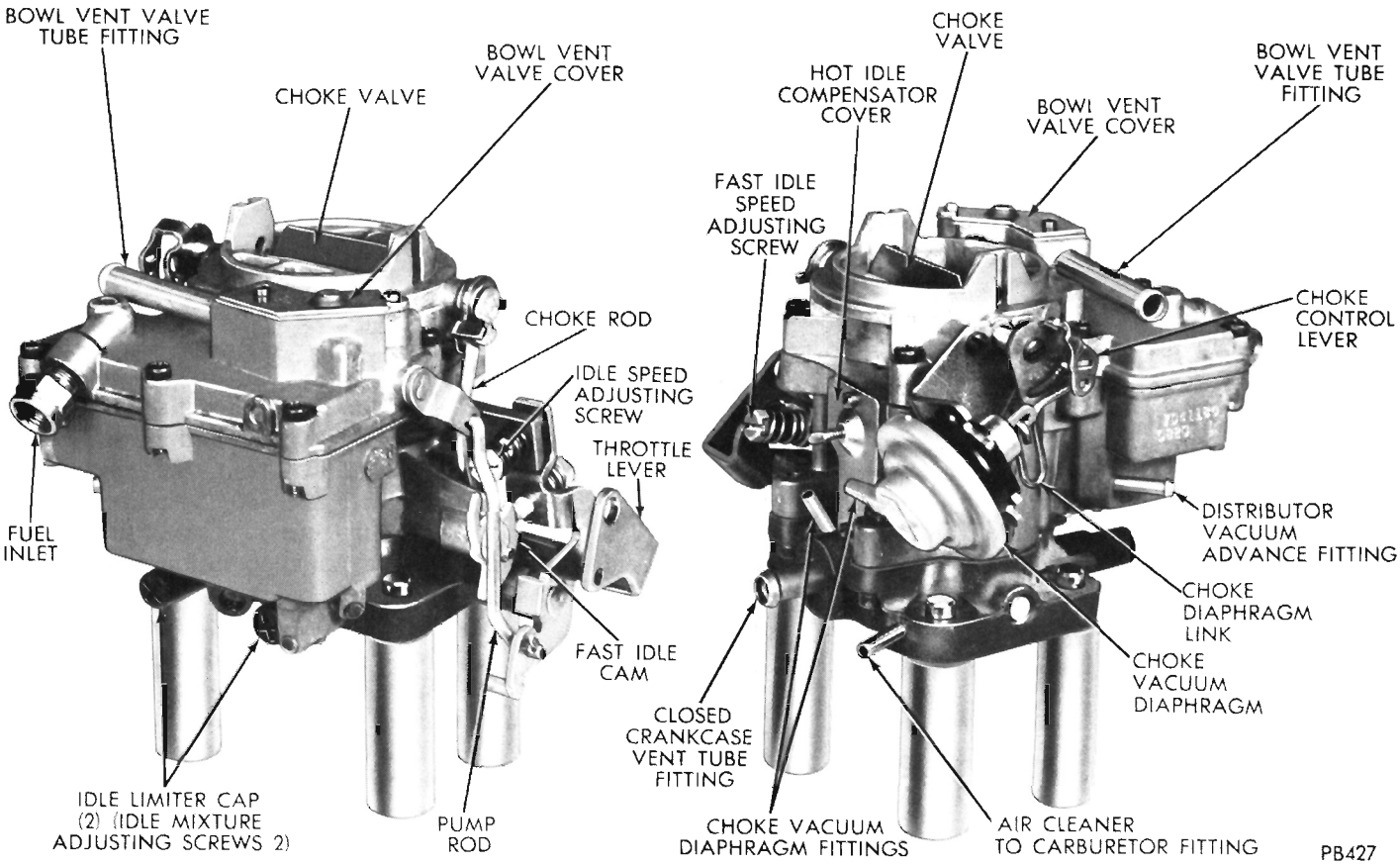


Fig. 1 - Carburetor Assembly (Rochester Model 2GV)

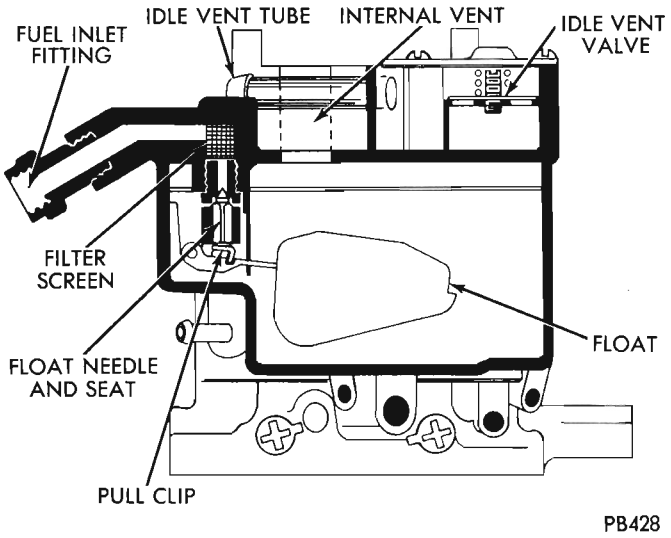


Fig. 2 - Float System

tubes. The plastic inserts insulate the main well tubes against engine heat.

Idle mixture limiters will be used on the idle mixture needles to restrict idle mixture adjustment for emission control.

Adjustments have been made as simple as possible. They consist of idle, float level, float drop, pump, idle vent, choke unloader, vacuum break, and fast idle cam.

Incorporated in the Rochester Model 2GV carburetors are six basic systems. They are float, idle, main metering, power, accelerating and choke systems: The following explanation and illustrations show how each system operates to provide efficient carburetion through all operating conditions.

Float System (Figure 2)

The float system controls the level of the fuel in the carburetor float bowl. Fuel level is very important because it must be maintained to give proper metering through all operating ranges. The float system operates as follows:

Fuel entering the carburetor must first pass through the fuel inlet screen by the inlet needle seat, then past the float needle valve, into the fuel bowl. Fuel flow continues until the fuel level raises the float to a position where it closes the float valve. As fuel is used from the carburetor bowl, the float drops, moving the float needle off its seat allowing more fuel to enter the bowl, thereby keeping the fuel level constant.

A float tang located at the rear of the float arm between the float hanger, prevents the float assembly from moving too far downward, but allows the float assembly to move down far enough for maximum fuel flow into the carburetor bowl. A float needle pull clip connecting the float arm to

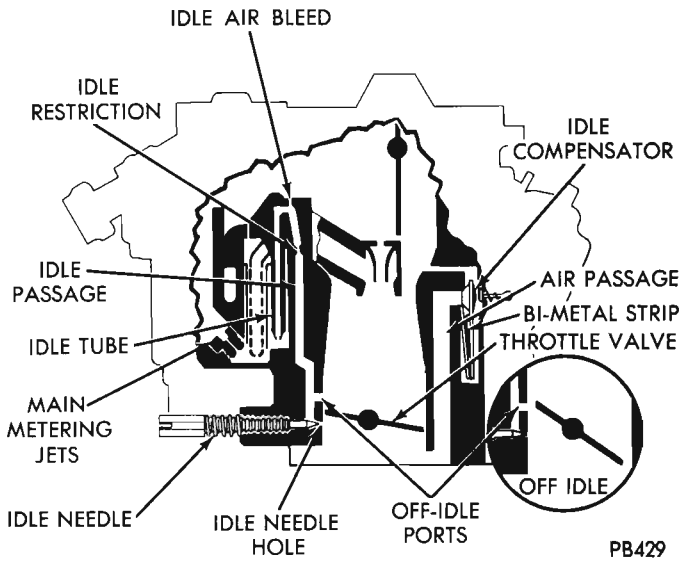


Fig. 3 - Idle System

the needle valve keeps the needle from sticking closed in the needle seat.

The fuel bowl is internally vented by a cored hole which leads from inside the air horn bore to the top of the fuel in the float bowl. The carburetor is internally balanced through the internal vent because the same pressure causing air to flow will be acting upon the top of the fuel in the float bowl, causing fuel to flow.

The idle vent valve located at the top of the float bowl is open during engine idle. The purpose of the external vent valve is to allow any vapors formed during hot engine idle or hot "soak" from being forced into the carburetor bores. The vapors are vented externally through a tube which leads to the crankcase inlet air cleaner. This helps provide good hot engine idle and starting after "hot soak" periods.

Idle System (Figure 3)

During engine idle operation, air flow through the carburetor venturi is very low and is not great enough to obtain fuel flow from the main discharge nozzles. Therefore, the idle system is used to provide the proper mixture ratios required during idle and low speed engine operation.

The idle system consists of the idle tubes, idle passages, idle air bleeds, off-idle discharge ports, and the idle mixture adjustment needles and holes.

In the idle position, the throttle valves are slightly open, allowing a small amount of air to pass between the wall of the carburetor bore and the edge of the throttle valves. Since there is not enough air flow for venturi action, the fuel is made to flow by the application of vacuum (low pressure) directly through the idle system to the fuel in the carburetor bowl.

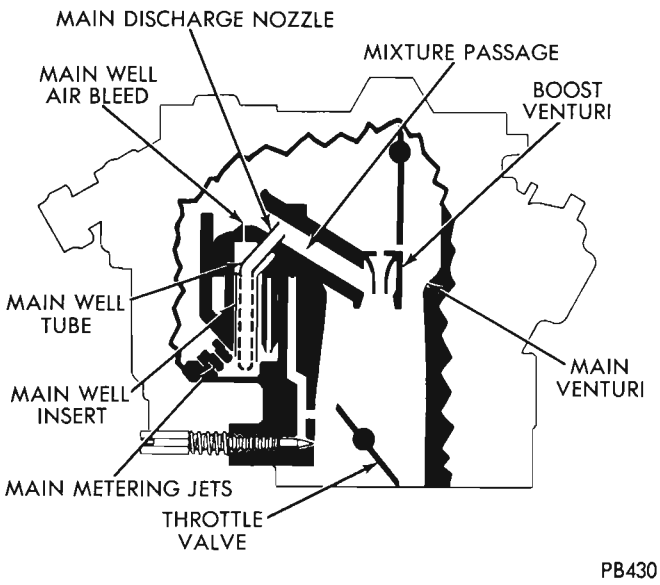


Fig. 4 - Main Metering System

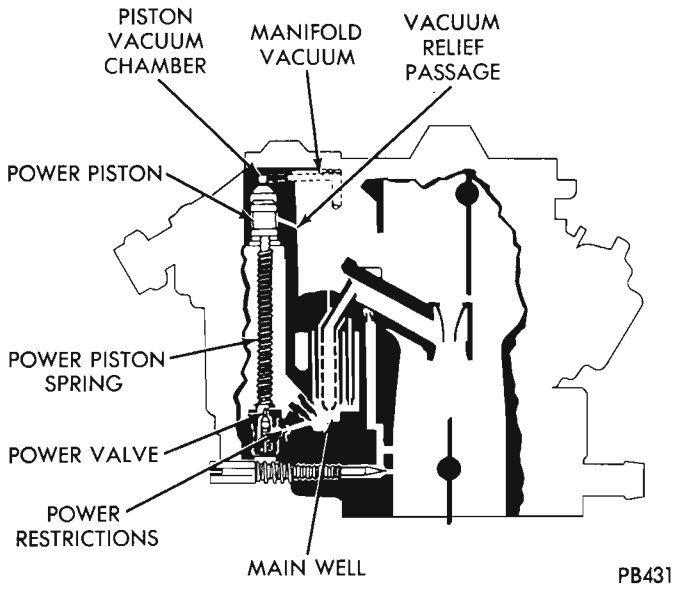


Fig. 5 - Power System

Fuel from the float bowl passes through each main metering jet into the main fuel wells where it is picked up and metered by the orifice at the lower end of the idle tubes. It then passes up the idle tubes, across channels in the cluster and is further mixed with the air through air bleed holes in the top of the cluster casting. The air/fuel mixture then passes down through calibrated restrictions and continues down past the off-idle discharge ports where it is further bled with air. The mixture then continues down to the idle mixture needle holes where it enters the carburetor bore and mixes with air passing the slightly open throttle valves. The idle mixture needles control the amount of fuel mixture which enters the carburetor bores at curb idle position of the throttle valves. As explained previously, idle mixture limiters are used to restrict the fuel mixture adjustment at idle, to stay within emission regulations.

Off-idle Operation (See inset - Figure 3)

As the throttle valve is opened further, more of the off-idle discharge port is exposed to manifold vacuum. This port supplies additional fuel mixture for off-idle engine requirements.

Hot Idle Air Compensator (See Figure 3)

The hot idle compensator is used to off-set enrichment effects which can be caused by excessive fuel vapors from fuel percolation, during extreme hot engine operation.

The compensator consists of a thermostatically controlled valve mounted at the rear of the float bowl. The valve closes off an air channel which leads from above the carburetor venturi to a point below the throttle valves.

The hot idle compensator valve is operated by a bi-metal strip which senses temperature. During extreme hot engine operation, excessive fuel vapors entering the engine manifold cause richer than normally required mixtures, resulting in rough engine idle and stalling. At a pre-determined temperature, when extra air is needed to off-set the enrichening effects of fuel vapors, engine heat causes the bi-metal strip to bend and unseat a valve which covers the air channel leading from the carburetor venturi. At this time, just enough air is added to the engine to off set the richer mixtures and maintain a smooth engine idle. When the engine cools and extra air is not needed, the bi-metal strip closes the valve and operation returns to normal temperatures.

Caution: In order to insure proper idle adjustment when the engine is hot, the valve should always be checked to make sure that it is closed when setting idle speed and mixtures. A plunger located at the rear of the carburetor in the hot idle compensator cover, can be pushed inward to check and make sure the compensator valve is closed.

Main Metering System (Figure 4)

As the throttle valves continue to open, the edge of the throttle valve is gradually moved away from the wall of the carburetor bore, reducing the vacuum so that the discharge of fuel mixture at the idle needle holes and off-idle ports gradually diminish.

With the increased throttle opening, there is increased velocity in the venturi system. This causes a drop in pressure in the large venturi which is increased many times in the small venturi. Since the low pressure (high vacuum) is now in the small venturi, fuel flows in the following manner:

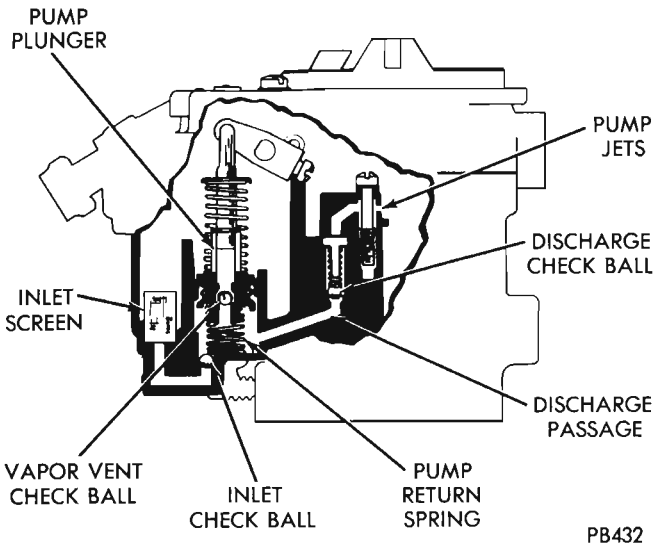


Fig. 6 - Pump System

Fuel from the float bowl passes through the calibrated main metering jets into the main fuel wells and rises in the main well tubes. The volume of the main wells is reduced with a removable plastic insert. This results in better fuel control in the off-idle and transfer range. Air entering the main well tubes and out of the discharge nozzle into the mixture channel where more air is added. The mixture then travels down through the channel to the small venturi where it is delivered to the air stream and then in to the intake manifold as a combustible mixture.

Power System (Figure 5)

To achieve the proper mixtures required when more power is desired or for extreme high speed driving, a vacuum operated power piston in the air horn and a power valve located in the bottom of the float bowl are used. Through a connecting vacuum passage from the base of the carburetor to the power piston cylinder in the air horn, the power piston is exposed to manifold vacuum at all times.

During idle and part throttle operation, the relatively high vacuum holds the power piston up against spring tension and the power valve remains closed.

Increase in engine load lowers the manifold vacuum. When it has dropped sufficiently, the power piston spring overcomes the upward vacuum pull and the power piston moves downward, opening the power valve to allow additional fuel to flow through calibrated restrictions and on into the main fuel wells.

As the engine load decreases, the resulting higher vacuum overcomes the spring tension on the power piston and raises the power piston closing

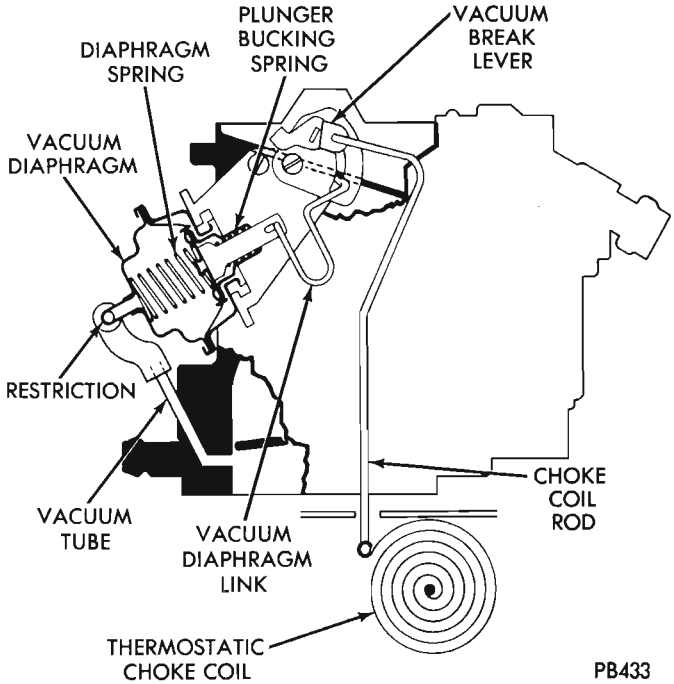


Fig. 7 - Choke System

the power valve.

A two step power valve is used. In the first position, fuel is metered by the valve itself. This is during the period when the valve is slightly open and the mixture is enrichened for light power loads. On heavy power loads the valve is fully opened to the second step and in this location the power valve allows the fuel to be metered by the power restrictions in the fuel channels located in the bottom of the fuel bowl.

It should be noted that the power piston cavity in the carburetor air horn is connected to the main air flow passage by a vacuum relief hole. The purpose of this hole is to prevent the transfer of vacuum acting on the power piston from also acting on the top of the fuel in the float bowl. Any leakage of air past the upper groove of the piston will be compensated for by this relief passage so that the carburetor metering will not be affected.

Accelerating Pump System (Figure 6)

When the throttle valve is opened rapidly, air flow and manifold vacuum change almost instantaneously, while the heavier fuel tends to lag behind causing a momentary leanness. The accelerator pump provides the fuel necessary for smooth operation on rapid acceleration.

Fuel for acceleration is supplied by a double spring loaded pump plunger. The top and bottom springs combine to move the plunger so that a smooth, sustained charge of fuel is delivered for acceleration.

Fuel is drawn into the pump well through the

inlet check ball on the intake stroke of the pump plunger (upward stroke).

Downward motion of the pump plunger seats the inlet ball check and forces the fuel through the discharge passage where it unseats the pump discharge ball and then passes on through the pump jets where it sprays into the venturi.

The check ball in the pump plunger head serves as a vapor vent from the pump well. When the pump plunger is not in operation, the check ball drops off its seat and vents any vapors which may form in the bottom of the pump well, into the float bowl area. Without this vapor vent check ball, vapor pressure in the pump well might force fuel from the pump system into the engine manifold causing hard starting and pump slugging conditions under extreme heat.

The pump discharge check ball in the accelerator pump passage prevents any pull over or discharge of fuel from the pump nozzles when the accelerator pump is inoperative.

Choke System (Figure 7)

The Model 2GV choke system consists of a choke valve located in the carburetor air horn, the vacuum diaphragm unit, fast idle cam, choke linkage and a thermostatic coil which is mounted on the engine manifold. The thermostatic coil is connected to the choke valve by a rod. The choke operation is controlled by a combination of intake manifold vacuum, the off set choke valve, and temperature.

The thermostatic coil located on the engine manifold is calibrated to hold the choke valve closed when the engine is cold. While starting the engine, air velocity against the off-set choke valve causes the valve to open slightly, against the torque of the thermostatic coil. When the engine starts manifold vacuum increases. A vacuum diaphragm unit connected by linkage to the choke valve shaft opens the choke valve a pre-determined amount against choke coil tension, so that the fuel mixture will be lean enough and the engine will run without stalling.

Included in the vacuum unit is a spring loaded plunger. The purpose of the spring loaded plunger is to off-set tension of the thermostatic choke coil and balance opening of the choke valve with tension of the choke coil. This enables further refinement of fuel mixtures after the initial engine start depending upon ambient temperatures. The choke thermostatic coil working against the bucking spring allows the choke valve to be further closed during severe cold starting to provide richer mixtures and yet allow the choke valve to open further after start in warmer temperatures to provide the engine with slightly leaner mixtures.

As the engine continues to warm up, the choke coil continues to relax its tension until the choke valve is fully opened and the engine can now run at normal fuel mixtures.

To provide correct engine speeds during warm up, a fast idle cam is used to run the engine at slightly higher speeds than idle to prevent stalling. This is accomplished by graduated steps on the fast idle cam. During engine starting, the fast idle screw is on the highest step of the cam, which holds the throttle valve open further than at normal idle. As the engine warms up and the choke valve begins to move open, the fast idle screw drops to lower steps on the cam and gradually lowers engine speed until the choke is open, at which point the engine will run near normal idle speed. The fast idle cam follows rotation of the choke valve. When the choke valve is fully open the fast idle cam drops so that the fast idle screw will clear the fast idle cam and the engine will run within the normal idle speed position.

A mechanical choke unloader is provided to allow the driver to open the choke valve mechanically during the starting period, should the engine become flooded. When the accelerator pedal is depressed a tang on the throttle lever pushes on the tail of the fast idle cam and forces the choke valve slightly open to allow extra air into the engine to lean the fuel mixtures so the engine will start.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR (Fig. 8)

Air Horn Removal

(1) Place carburetor assembly on suitable repair stand.

(2) Remove fuel inlet fitting.

(3) Remove pump rod by removing lower retaining pin and rotating rod until lug on upper end of rod passes through upper pump lever.

(4) Remove idle adjusting screw and spring from the float blowl casting.

(5) Remove fast idle cam attaching screw. Then remove fast idle cam and rod assembly by rotating upward until lug on upper end of choke rod passes through the slot in the upper choke lever and collar assembly.

(6) Remove the choke control lever from the end of choke shaft by removing retaining screw and lever. Remove control lever from vacuum diaphragm link by rotating link out of slot in lever and remove link from vacuum diaphragm plunger

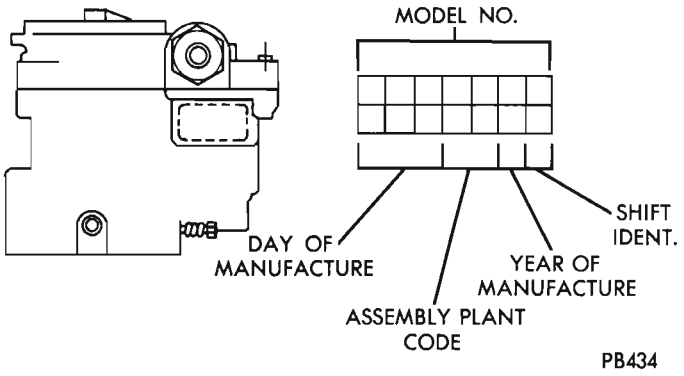


Fig. 8 - Carburetor Identification

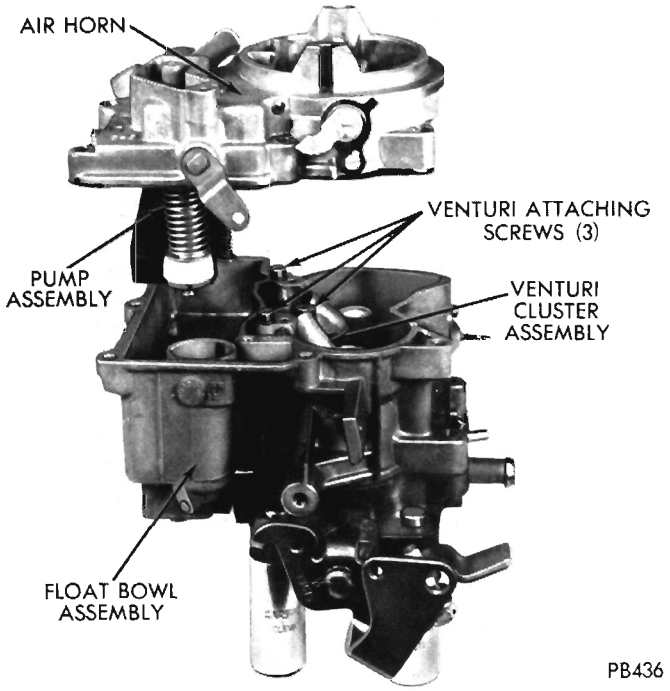


Fig. 10 - Removing or Installing Air Horn

in the same manner (Fig. 9).

(7) Remove rubber hose from the choke vacuum diaphragm and tube on throttle body. Then remove vacuum diahragm assembly from the air horn by removing two attaching screws.

(8) Remove the two idle vent valve cover retaining screws, then remove the idle vent valve cover and gasket. After the cover is removed, the vent valve closing spring can now by removed and the idle vent valve assembly from the air horn casting.

(9) Remove eight air horn to float bowl attaching screws and carefully remove air horn assembly from fuel bowl by lifting gently upward (Fig. 10).

Air Horn Disassembly

(1) Place air horn assembly inverted on clean bench. Remove the float hinge pin and lift float assembly from cover. Remove float needle from the float arm. Remove float needle seat, fibre

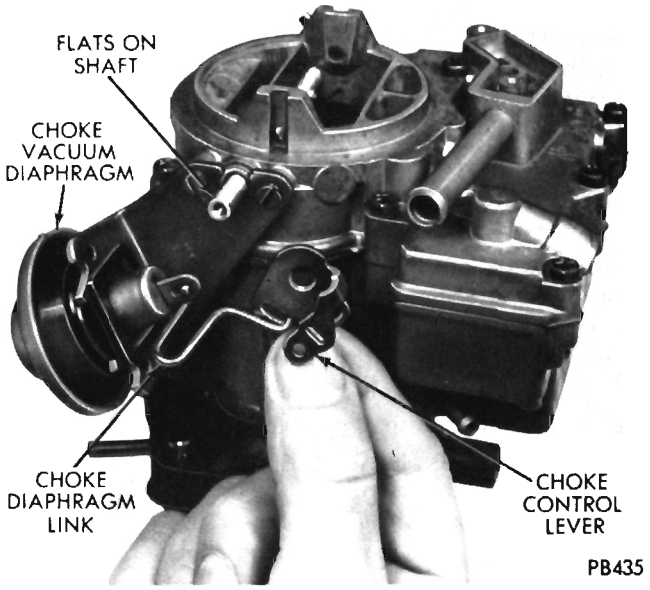


Fig. 9 - Removing or Installing Choke Control Lever

gasket and needle seat screen. Then remove the screen from projection on needle seat.

(2) Remove air horn gasket.

(3) Remove power piston by depressing shaft and allowing spring to snap repeatedly, thus forcing the power piston retaining washer from casting.

Note: If heavy staking is encountered, removing staking from around power piston retaining washer.

(4) Remove pump lever and shaft assembly by loosening set screw on inner arm and removing outer lever and shaft assembly and plastic bearing washer. The pump assembly can now be removed from the inner pump lever by rotating pump assembly and removing from hole in lever.

Note: A plastic washer is used between the outer pump lever and air horn casting on the pump shaft. This should be removed from the pump shaft and not immersed in carburetor cleaner.

Float Bowl Disassembly

(1) Remove pump plunger return spring from pump well. Remove small aluminum check ball from the bottom of pump well by inverting and shaking into hand. Remove pump inlet screen from bottom of fuel bowl.

(2) Remove main metering jets.

(3) Remove power valve assembly and fibre gasket.

(4) Remove three venturi cluster attaching screws and remove cluster and gasket. Center cluster screw has smooth shank and fibre gasket for sealing the accelerator pump fuel by-pass.

(5) Remove plastic main well inserts.

(6) Using a pair of long nosed pliers, remove pump discharge ball spring "T" shaped retainer;

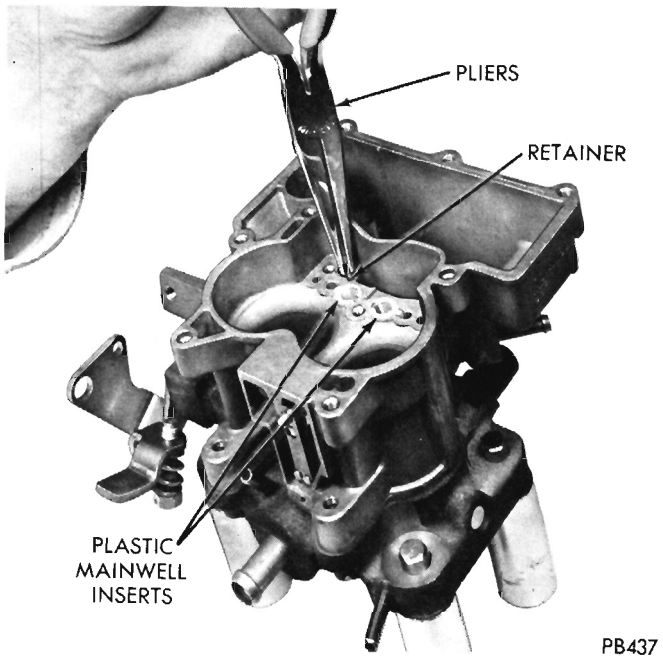


Fig. 11 - Removing Pump Discharge Ball Spring Retainer

then remove pump discharge spring and steel discharge ball (Fig. 11).

(7) Remove two hot idle compensator cover attaching screws at rear of float bowl. Then remove cover (Fig. 12).

(8) Remove two hot idle compensator attaching screws. Then remove compensator assembly.

(9) Invert carburetor and remove three throttle body to bowl attaching screws. Remove throttle body and throttle body to bowl gasket.

Throttle Body Disassembly

Note: For cleaning purposes it will be necessary to remove the idle mixture needles and springs. To do this, pry off idle mixture limiter caps and then the mixture needles can be removed from the throttle body assembly.

No further disassembly of the throttle body is needed. The throttle valves should not be removed as the idle ports are drilled in direct relation to the location of the throttle valves and shaft. Removal of the throttle valves will upset this location. The throttle body assembly is only serviced as a complete unit with throttle valves intact. New plastic idle mixture needle limiters are provided in the repair kits.

CLEANING AND INSPECTION

Dirt, gum, water or carbon contamination in or on the exterior moving parts of the carburetor are often responsible for unsatisfactory performance. For this reason, efficient carburetion depends upon careful cleaning and inspection while servicing.

(1) Thoroughly clean all carburetor castings and

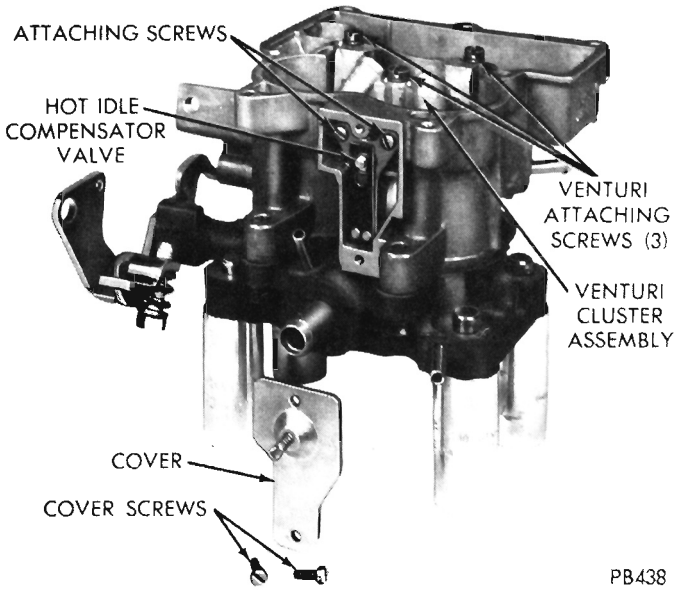


Fig. 12 - Removing or Installing Hot Idle Compensator Valve

metal parts in an approved carburetor cleaning solvent.

Caution: Pump plunger, choke diaphragm assembly or any fibre, rubber, or plastic parts should not be immersed in carburetor cleaner. Wash them in a cleaning solvent such as kerosene or gasoline.

(2) Blow out all passages in the castings with compressed air and blow off all parts until they are dry. Make sure all jets and passages are cleaned. Do not use wire or drills for cleaning fuel passages or air bleeds.

(3) Check all parts for wear. If excessive wear is noted, defective parts must be replaced. Note especially the following:

a. Check float needle and seat for wear. If wear is noted, the assembly must be replaced.

b. Check float hinge pin for wear and float for dents or distortion.

c. Check throttle and choke shaft bores for wear and out-of-round.

d. Inspect idle mixture adjusting needles for burrs or grooves. Such a condition requires replacemnt.

e. Inspect the pump plunger cup; replace if worn or hard.

f. Inspect pump well in bowl for wear or scoring.

(4) Check fuel inlet needle seat screen for dirt or lint. If dirty, replace.

(5) If for any reason, parts have become loose or damaged in the cluster assembly, it must be replaced.

(6) It is recommended that new gaskets be used whenever the carburetor is disassembled or overhauled.

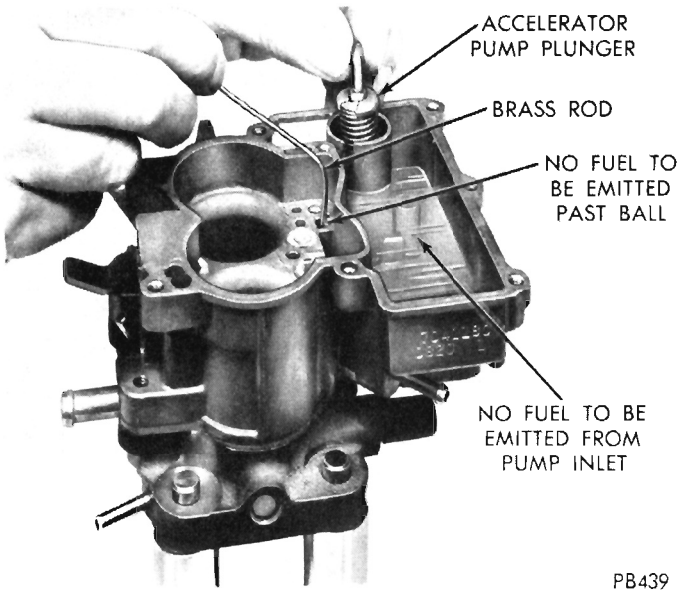


Fig. 13 - Testing Accelerator Pump Intake and Discharge Check Balls

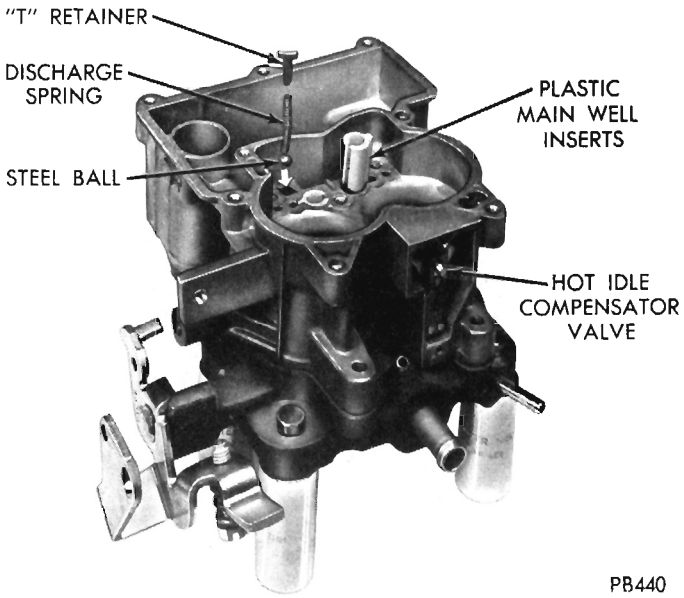


Fig. 14 - Installing Pump Discharge Steel Ball, Spring and "T" Retainer

REASSEMBLY

Throttle Body

(1.) Screw idle mixture adjusting needles and springs into the throttle body until finger tight. Back out each screw two turns as a preliminary idle adjustment.

Caution: Do not force the idle needle against its seat or damage may result.

Note: The plastic idle mixture needle limiters should be installed later after the correct idle mixture has been set on the vehicle.

(2.) Invert float bowl assembly and place the new throttle body gasket on bowl. Install throttle body on bowl using three attaching screws and lockwashers. Tighten securely.

Accelerator Pump Test

(1) Install accelerator pump discharge check steel ball (large) into discharge passage. Drop accelerator pump inlet aluminum ball (small) into bottom of pump cylinder.

(2) Pour clean gasoline into carburetor bowl, approximately 1/2 inch deep. Remove pump plunger from jar of gasoline and slide down into pump cylinder. Raise plunger and press lightly on plunger shaft to expel air from pump passage.

(3) Using a small clean brass rod, hold discharge check ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either intake or discharge passage (Fig. 13).

If any fuel does emit from either passage, it indicates the presence of dirt or a damaged check ball or seat. Clean passage again and repeat test with new check balls. Remove fuel from bowl being careful not to lose check balls.

Float Bowl Assembly

(1) Install hot idle compensator gasket into recess in bowl. Then install hot idle compensator assembly using two attaching screws. Tighten securely.

(2) Install hot idle compensator cover attaching with two screws. Tighten securely.

(3) Drop the steel pump discharge check ball into the discharge hole. Install pump discharge spring and "T" shaped retainer, staking retainer in place (Fig. 14). **Note: Top of retainer must be flush with the flat of bowl casting.**

(4) Install the two plastic main well inserts. Install the venturi cluster with gasket. Install venturi cluster screws and tighten evenly and securely. Make sure center screw is fitted with fibre gasket and special smooth shank screw is used.

(5) Install two main metering jets, power valve gasket and power valve. Tighten securely.

(6) Install small aluminum inlet check ball into pump inlet in the bottom of pump well; insert pump return spring and center in well by pressing downward with finger.

(7) Install pump inlet screen in the bottom of float bowl. Press into recess with finger.

Air Horn Assembly

(1) Install plastic washer over pump shaft and slide against outer lever. Install outer pump lever and shaft assembly into air horn with lever pointing towards choke shaft. Slide the inner pump lever over the pump shaft until seated and tighten retaining screw securely. Install the pump assem-

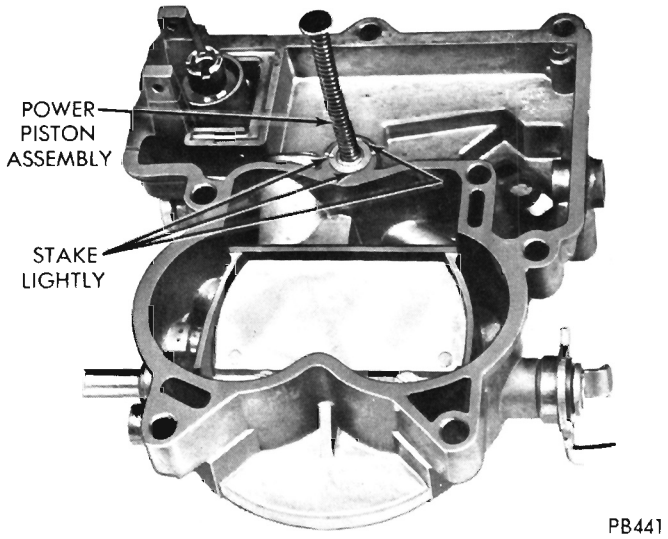


Fig. 15 - Installing Power Piston Assembly

bly into the hole in the inner pump lever. End of the pump plunger shaft should point inward towards center of air horn.

(2) Install the fuel strainer on float needle seat, then install float needle seat and gasket into air horn. Tighten needle seat securely, using a wide bladed screw driver.

(3) Install power piston into vacuum cavity. Lightly stake piston retainer washer in place. Piston should travel freely in cavity (Fig. 15).

(4) Install air horn gasket on the air horn fitting gasket over guide pin.

(5) Attach float needle to float. Carefully position float and insert float hinge pin. Drop tang on rear of float arm should point downward toward air horn casting.

Note: Make sure that the float needle pull clip is installed at the side of the float arm.

Float Level Adjustment

With air horn assembly inverted, measure the distance from the air horn gasket to the lip at toe of float, as shown. Bend the float arm at point shown as required to obtain the correct measurement. See Figure 16.

Float Drop Adjustment

With air horn assembly held upright, measure distance from gasket to lip at toe of float as shown. Bend float tang at rear next to the needle and seat to obtain the correct drop setting. See Figure 17.

Assembly of Air Horn to Float Bowl

(1) Carefully place air horn assembly on float bowl, making certain that the pump plunger is properly positioned in the pump well. Lower the cover gently, straight down, then install the eight

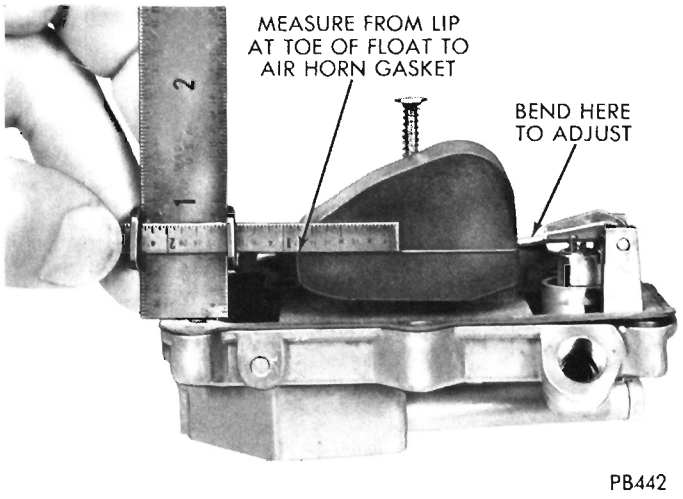


Fig. 16 - Adjusting Float Level

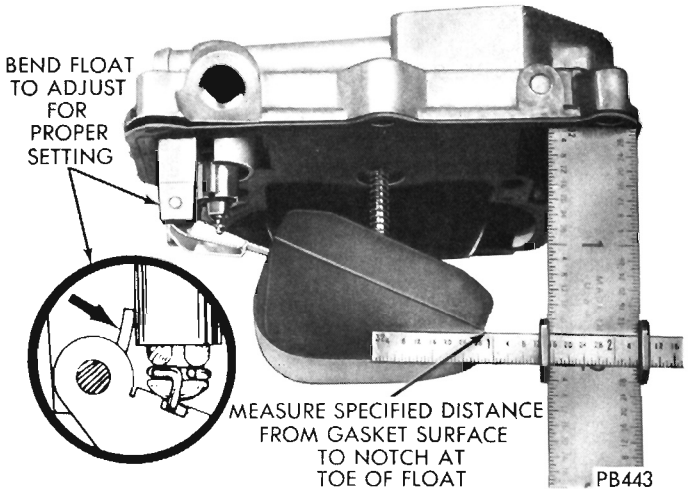


Fig. 17 - Adjusting Float Drop

air horn to float bowl attaching screws. Tighten evenly and securely.

Note: The longer air horn screw goes in top of pump housing.

(2) Install choke rod into choke lever and fast idle cam. Install fast idle cam screw and tighten securely. See Fig. 1, for proper installation.

(3) Install accelerator pump rod in the upper pump lever and in throttle lever. Install retaining pin in lower end at throttle lever.

(4) Install the idle speed screw and spring into casting on float bowl extension. Turn screw inward with throttle valve closed until the screw just contacts the tang on throttle lever, then turn 1-1/2 more turns as an initial idle adjustment.

(5) Install the rubber hose from the choke vacuum diaphragm to tube on throttle body.

(6) Install fuel inlet fitting into air horn casting, if removed. Note: The idle vent valve, closing spring, cover and attaching screws can be installed at this time. However, if the pump rod needs readjustment it will be necessary to re-check the idle vent valve setting on the vehicle.

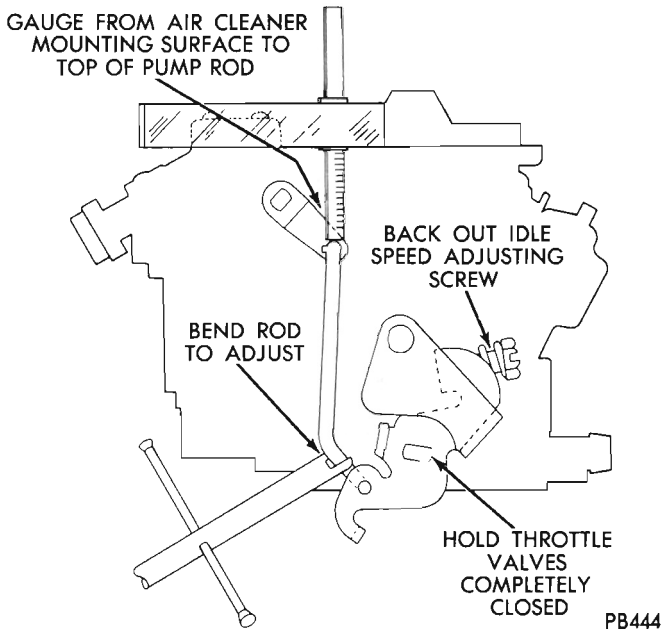


Fig. 18 - Adjusting Accelerator Pump Stroke

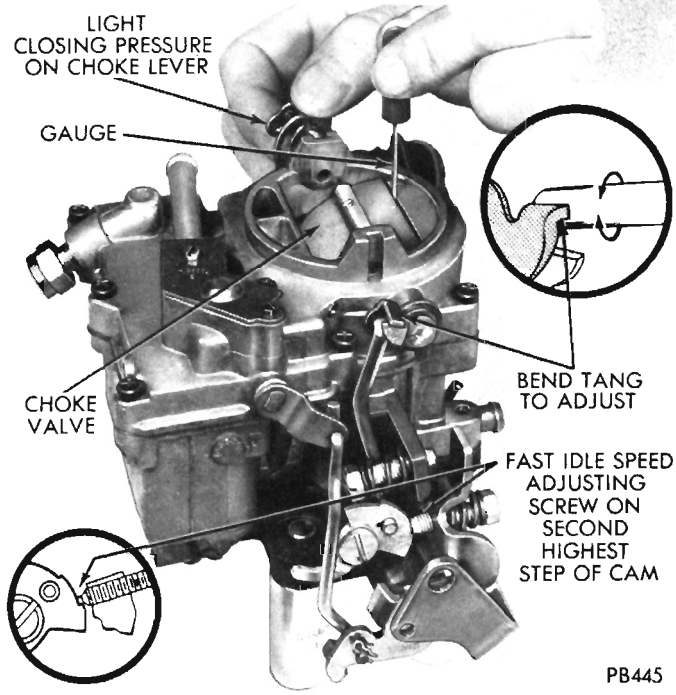


Fig. 19 - Fast Idle Cam Position Adjustment

Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to be sure that the very small restriction is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the fitting to seal the opening. Release the stem. If the stem moves more than 1/16 inch in ten (10) seconds, the leakage is excessive and the assembly must be replaced.

Install the diaphragm system on the carburetor as follows:

Fasten the vacuum diaphragm assembly onto the side of the air horn assembly using two attaching screws. Tighten screws evenly and securely. Install looped end of vacuum diaphragm plunger link into the slot in the plunger stem and install the choke control lever onto other end of diaphragm link. Then install the control lever to the end of choke shaft. Make sure the flats on thermostatic coil lever fit properly on flats on the end of the choke shaft. Install retaining screw and tighten securely.

CARBURETOR ADJUSTMENTS

All the adjustments on the carburetor, except for float adjustments, are made externally. The following adjustments can be made on or off the car, except for fast idle speed and the idle vent valve adjustment which should be checked on the vehicle.

Accelerator Pump Rod Adjustment

Back out the idle speed screw and completely close the throttle valves in the throttle bores. Place the pump gauge across the air cleaner mounting surface, Figure 18, with leg of gauge pointing downward towards the top of pump rod. With the "T" scale set to the specified dimension, the lower leg of the gauge should just touch the top of the pump rod. Bend the pump rod as required to obtain the specified setting.

Fast Idle Cam Position Adjustment

Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each step of the cam occur at the proper time during engine warm-up.

(1) With the fast idle speed adjusting screw contacting the second highest speed step on the fast idle cam, move the choke valve toward the closed position with the light pressure on the choke control lever.

(2) Insert the specified drill between the choke valve and the wall of the air horn (Fig. 19).

An adjustment will be necessary if a slight drag is not obtained as the drill is being removed.

(3) To adjust, bend the indicated tang until the correct valve opening has been obtained (Fig. 19).

Vacuum Kick Adjustment (ON or OFF the Vehicle)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by use

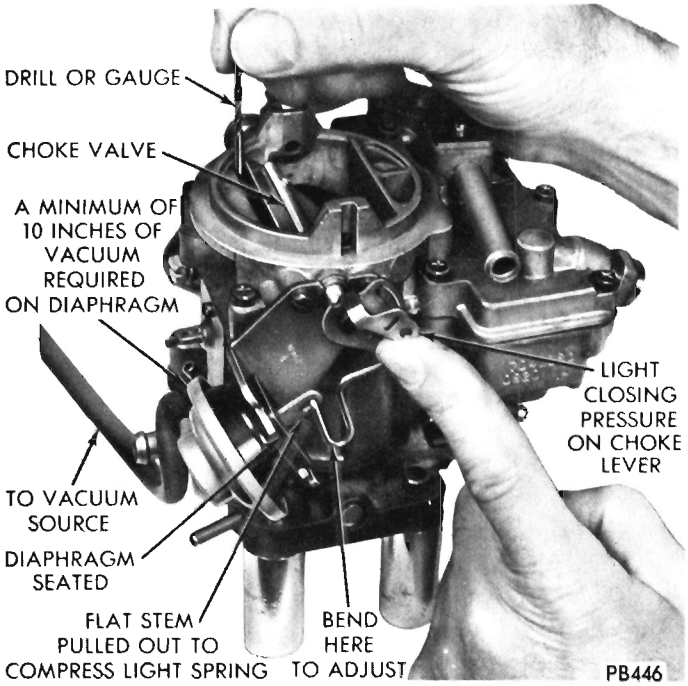


Fig. 20 - Adjusting Choke Vacuum Kick

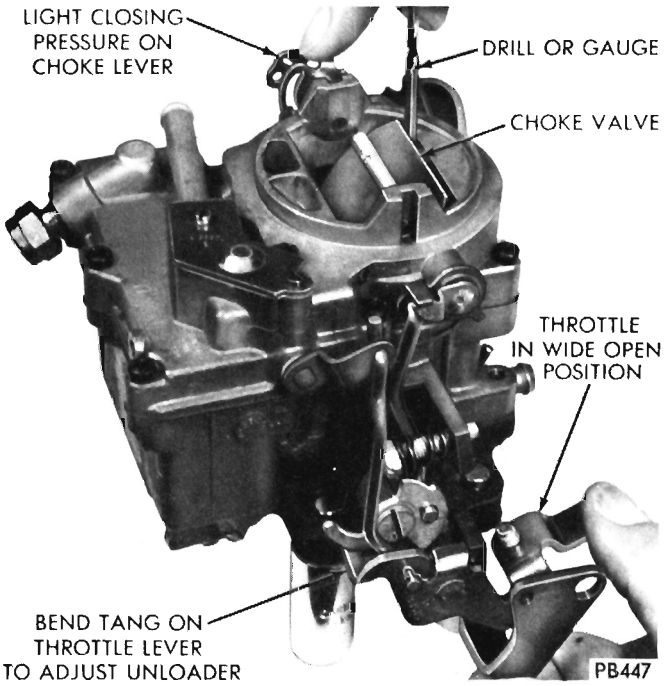


Fig. 21 - Adjusting Choke Unloader

of linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or the engine of the vehicle to be adjusted.

(1) If the adjustment is to be made with the engine running, back off the fast idle speed screw until the choke can be closed to the kick position with the engine at curb idle. (Note the number of screw turns required so that the fast idle can be returned to the original adjustment). If an auxiliary vacuum source is to be used, open the throttle valves (engine not running) and move the choke to the closed position. Release the throttle first, then release the choke.

(2) Apply a vacuum of 10 or more inches of Hg.

(3) Insert the specified drill between the choke valve and the wall of the air horn (Fig. 20). Apply sufficient closing pressure on the lever to which the choke rod attaches to provide a minimum choke valve opening without distortion of the diaphragm link. Note that the flat stem of the diaphragm will extend as an internal spring is compressed. This spring must be fully compressed for proper measurement of the vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly.

CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.

(5) Reinstall the vacuum hose on the correct fitting. Return the fast idle screw to its original condition if distrubed as suggested in Step No. 1.

(6) Make the following check. With no vacuum applied to the diaphragm, the CHOKE VALVE SHOULD MOVE FREELY between the open and closed positions. If movement is not free, examine the linkage for misalignment or interferences caused by the bending operation. Repeat the adjustment if necessary to provide proper link operation.

CHOKE UNLOADER (WIDE OPEN KICK)

The choke unloader is a mechanical device to partially open the choke at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the system as follows.

(1) Hold the throttle valves in the wide open position. Insert the specified drill between the upper edge of the choke valve and the inner wall of the air horn.

(2) With a finger lightly pressing against the choke control lever, a slight drag should be felt as the drill is being withdrawn. If an adjustment is necessary, bend the indicated tang until correct opening has been obtained (see Fig. 21).

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section).

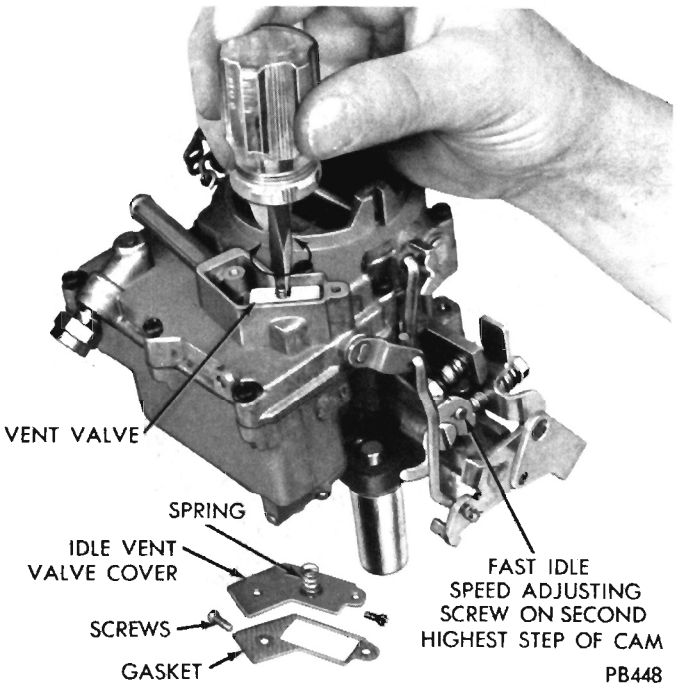


Fig. 22 - Adjusting Bowl Vent Valve

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in **PARK** or **NEUTRAL** position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest-speed step of fast idle cam (Fig. 19).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw in or out to secure specified speed. (See Specifications).

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Idle Vent Valve Adjustment (On Vehicle)

If the idle vent valve cover and closing spring are in place, remove two attaching screws, idle vent valve cover and spring.

Place the fast idle screw on the second step of the fast idle cam next to the highest step. In this position the idle vent valve should be closed (seated).

If the vent valve is just closed on the second step, rotate the fast idle cam so that the fast idle screw will be on the next lower step. At this point, the vent valve should just begin to open.

To adjust, turn the adjustment screw in the plastic valve until it just closes with the fast idle screw on the second step of the fast idle cam (Fig. 22).

CARTER THERMO-QUAD CARBURETOR

INDEX

	Page
Automatic Choke - Well Type	1
Carburetor Adjustments	44
Secondary Throttle Linkage	44
Secondary Air Valve Opening	45
Secondary Air Valve Spring Tension	45
Accelerator Pump Stroke	45
Choke Control Lever Adjustment (Off or On Vehicle)	45
Choke Diaphragm Connector Rod	46
Vacuum Kick Adjustment (Off or On Vehicle)	46
Fast Idle Cam and Linkage	47
Choke Unloader Adjustment (Wide Open Kick)	47
Secondary Throttle Lockout	48
Bowl Vent	48
Fast Idle Speed Adjustment (On Vehicle)	48
Idle Speed (Curb Idle)	
Fast Curb Idle Speed Solenoid Adjustment	48
Disassembling Carburetor	40
General Information	38
Inspection and Reassembly	41
Servicing Carburetor	2
Specifications	137

GENERAL INFORMATION

The Carter Thermo-Quad carburetor models TQ 4972S and TQ 4973S are used on the 340 cubic inch engines when the vehicles are equipped with manual or automatic transmission respectively (Fig. 1). The carburetors have a unique black main body or fuel bowl of molded phenolic resin. This acts as a very effective heat insulator. Fuel is kept cooler (approximately 20 degrees F) than in all-metal carburetor designs. Another reason for the lower operating temperatures is its metering system. It's called "suspended" design. All calibra-

tion points, with the exception of the idle adjustment screws, are in the upper aluminum casting, or air horn, and are, in effect suspended in cavities in the plastic main body.

The air horn houses the choke valve, the air valve for the secondaries and its controls and adjustments, the fuel inlet system (two floats and inlet needles and seats) the complete accelerating pump system, primary boost ventures, vacuum controlled step-up piston and rods, low and high speed fuel metering systems (primary and secondary jets, fuel discharge nozzles and all air bleeds and restrictions). (Fig. 2).

The carburetors have a hot idle compensator valve located in the throttle body. This valve is a thermostatically operated air bleed, to relieve an overrich condition at idle in case of abnormally high temperatures.

A fast curb idle speed solenoid is mounted on the intake manifold on the throttle lever side. This solenoid is used to maintain a higher idle speed when the engine is running and allows the throttle to close to a low idle speed position when the ignition key is turned off, to prevent "after running".

The Thermo-Quad carburetor has unique features which require extra caution during all adjustments. The vacuum kick diaphragm provides **two separate functions.** It still provides for vacuum kick but it also controls the secondary air valve. Becuase of the separate nature of the two functions, **two separate but interrelated adjustments** are necessary and these adjustments **must be performed in the proper sequence.**

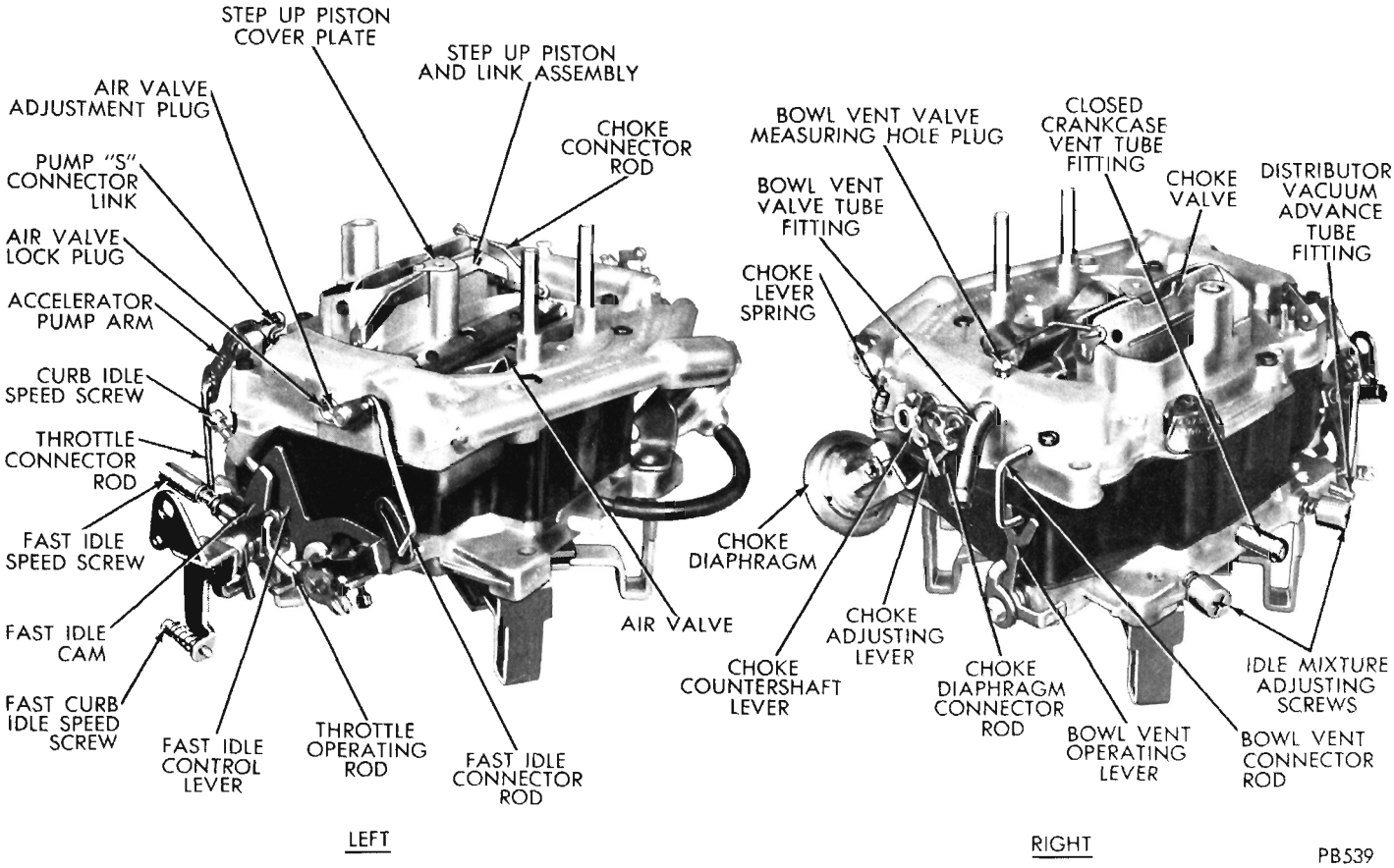


Fig. 1 - Carburetor Assembly

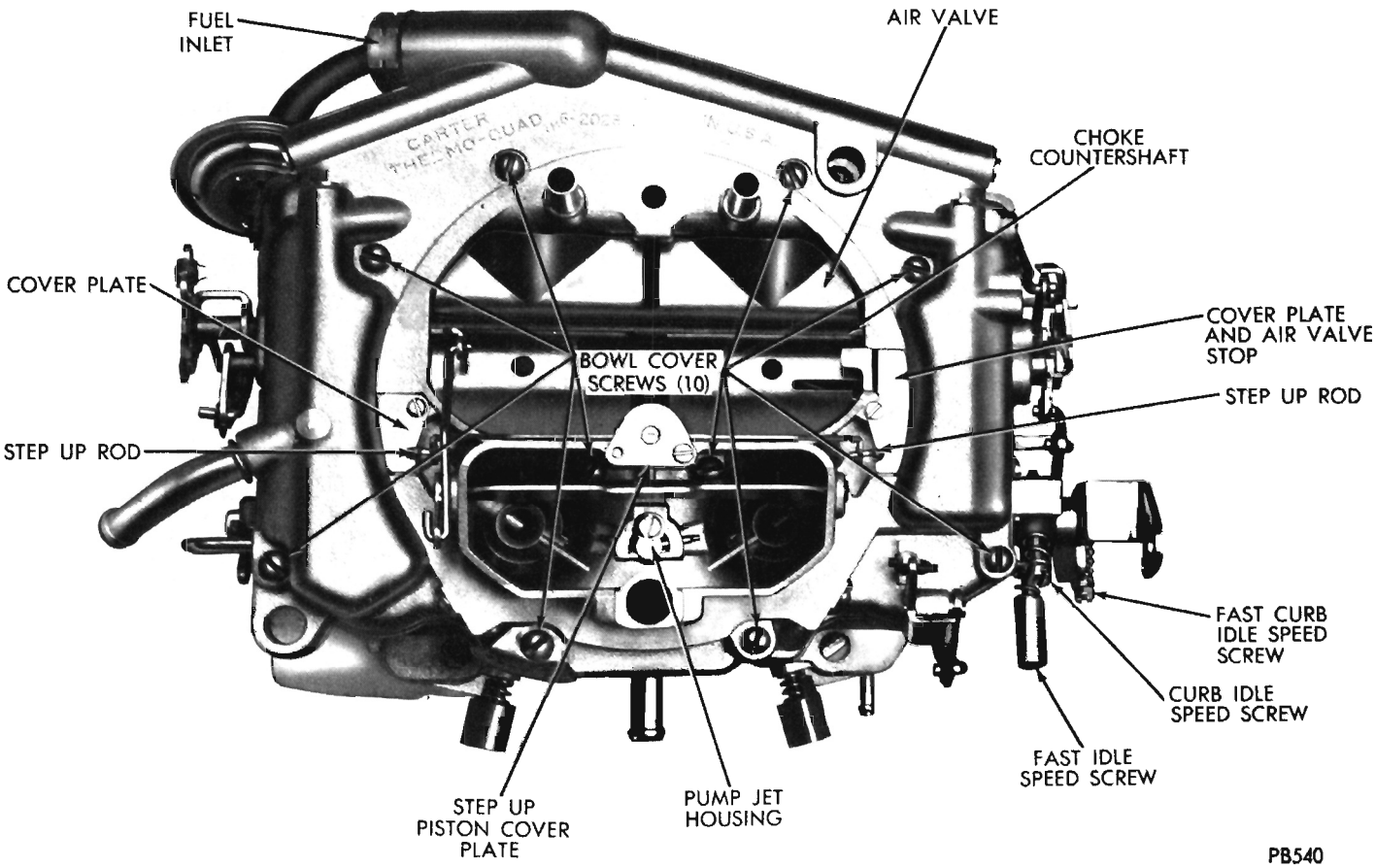


Fig. 2 - Carburetor Assembly Top View

SERVICE PROCEDURE

DIASSEMBLING CARBURETOR (Fig. 1)

(1) Place carburetor assembly on repair stand Tool C-3886. Repair stand is used to protect throttle valves from damage and to provide a suitable base for working.

(2) Remove rod retainers that holds throttle connector rod to accelerator pump arm and throttle lever, then remove rod from carburetor.

(3) Remove accelerator pump arm screw and disengage from pump rod "S" link, (leave "S" link connected to pump rod) then remove lever.

(4) Remove choke countershaft fast idle lever attaching screw while holding lever. Disengage lever from countershaft, then swing fast idle connector rod at an arc until it can be disengaged from fast idle operating lever.

(5) Remove rod retainers and washer that holds choke diaphragm connector rod to choke vacuum diaphragm and air valve lever, then remove lever.

(6) Remove rod retainer that holds choke connector rod to choke countershaft, then disengage rod and swing rod at an arc to disengage choke shaft lever assembly.

(7) Remove step up piston cover plate attaching screw and cover plate, then remove step up piston and link assembly with step up rods. Remove step up piston spring.

(8) Remove pump jet housing screw, housing with gasket. Invert carburetor and remove discharge check needle.

(9) Remove 10 bowl cover screws, two of the bowl cover screws are located between choke valve and wall of bowl cover. Remove bowl cover and invert on bench to protect floats (Fig. 2).

Disassembling Bowl Cover

(1) Remove float lever pins and lift out float assemblies. It is suggested that the float on the pump side be marked so that floats can be reinstalled in their respective positions.

(2) Remove two needle valves from their respective seats, after marking one on pump side for identification. Using a wide blade screw driver, remove needle valve seats. Be sure each needle valve is returned to its original seat at reassembly.

(3) Remove primary jets. (Large screw driver slots).

(4) Remove secondary jets. (Small screw driver slots).

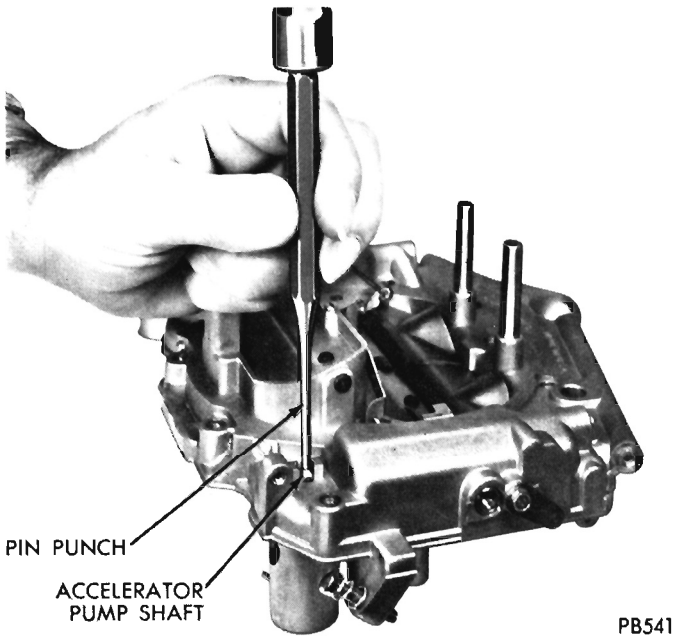


Fig. 3 - Removing Accelerator Pump

(5) Remove acceleration pump passage tube (plastic) and bowl cover gasket.

(6) Remove accelerator pump rod "S" link. To remove pump plunger assembly, use a small rod placed on upper end of plunger shaft and tap lightly with a small hammer (Fig. 3). **Use care not to damage plunger shaft hole in bowl cover. This should be done with fingers under lower portion of pump cylinder in order to catch intake check seat, disc, disc retainer, spring (light) pump plunger and plunger spring (heavy).**

(7) If inspection shows plunger can be used again, place in a jar of clean gasoline or kerosene to prevent leather from drying out.

(8) **Note position of bowl vent connector rod and arm spring** before removing retainer clip from connector rod, then remove rod from bowl vent operating arm. Remove grommet seal from operating arm.

(9) Remove fuel inlet fitting and gasket.

Throttle Body

(1) Remove choke diaphragm and bracket assembly with hose and place to one side to be cleaned as a special item. Liquid cleaners may damage diaphragm material. Note: that the carburetor vacuum fitting hides a very small vacuum passage restriction. Clean passage only with compressed air.

(2) Remove hot idle compensator valve and gasket from throttle body.

(3) Remove plastic limiter caps from idle air mixture screws. Be sure to count number of turns to seat the screws (from stop), as the same number of turns (from seat) must be maintained at installation. Remove idle mixture screws and springs.

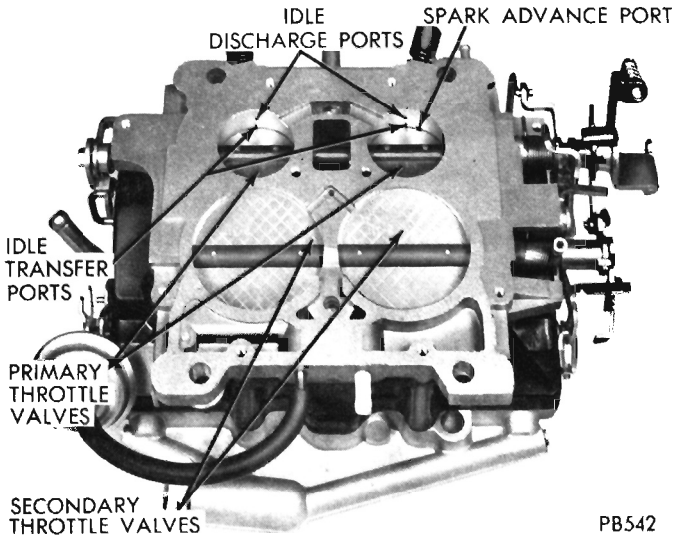


Fig. 4 - Ports in Relation to Throttle Valves

It is not advisable to remove the throttle shafts or valves unless wear or damage necessitates the installation of new parts. During the manufacture of the carburetor, the location of the idle transfer ports and the idle discharge ports to the valve is carefully established for one particular assembly. (Fig. 4).

If new throttle shafts should be installed in an old worn body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. A very slight change in the port relationship to the valves would adversely affect normal carburetor operation, between the speeds of curb idle to 30 miles per hour.

Main Body

It is not necessary to remove the baffle plate from the main body. (Do not immerse main body in cleaning solvents for a prolonged period of time). The carburetor now has been disassembled into three main units, namely, the air horn, main body and throttle body and the component parts of each disassembled as far as necessary for cleaning and inspection.

INSPECTION AND REASSEMBLY

Check for cracks, warpage, stripped screw threads, or damaged or marred mating surfaces, on all major castings. The passages in the castings should be free of restrictions. Check the float assemblies for damage or any condition that would impair these items from further service. The choke and throttle valves should be replaced if the edges have been nicked, burred or damaged, new valves may be installed. Be sure that the choke and

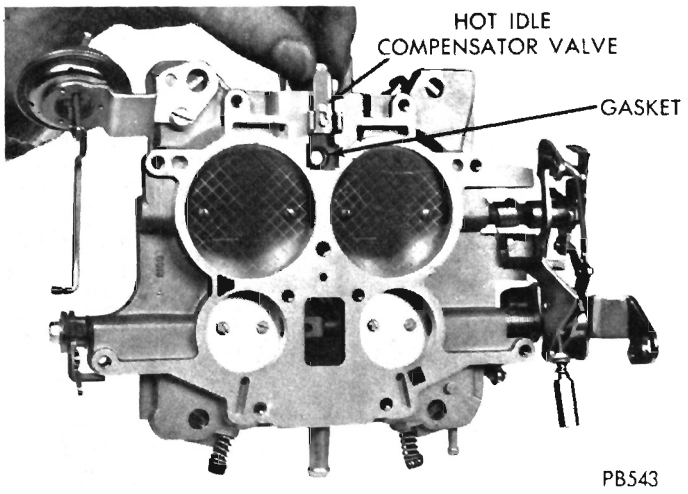


Fig. 5 - Removing or Installing Hot Idle Compensator Valve

throttle shafts are not bent or scored. Replace any broken or distorted springs. Replace all screws and lockwashers that show signs of stripped threads or distortion.

Throttle Body

If necessary to replace throttle valves, remove staking with a file. These screws are staked to prevent loosening and care is necessary to avoid breaking off in shaft.

(1) Remove screws that hold throttle valves to throttle shaft.

(2) Slide damaged throttle valves out of bores. It should be noted at this time, that the numbered side is on the bottom (or carburetor mounting flange side) and opposite the vacuum port.

(3) Slide new throttle valves in position on throttle shaft, with the valve number on the bottom (flange side) and opposite the vacuum port.

(4) Install new screws, but do not tighten. Be sure idle speed adjusting screw is backed out. Hold valves in place with fingers (fingers pressing on high side of valves).

(5) Tap valves lightly in this position, tighten screws securely. Stake screws. Be sure to support shaft when staking screws. Operate the throttle shaft, from closed to open position, it should operate smoothly without drag or sticking. Hold throttle body up to a strong light. The light visible around the outer diameter of the valves on the bores should be uniform.

(6) Install secondary throttle valves in the same manner as described previously. The numbers stamped on the valves must be toward primary bores. For adjustment (See Secondary Throttle Adjustment).

(7) Install idle mixture screws and springs in the throttle body. (The tapered portion must be straight and smooth to insure having correct idle mixture control.) **Do not use a screw drive.** Turn screws lightly agains their seats with fingers. Back off the number of turns counted at disassembly. **Do not install limiter caps at this time.**

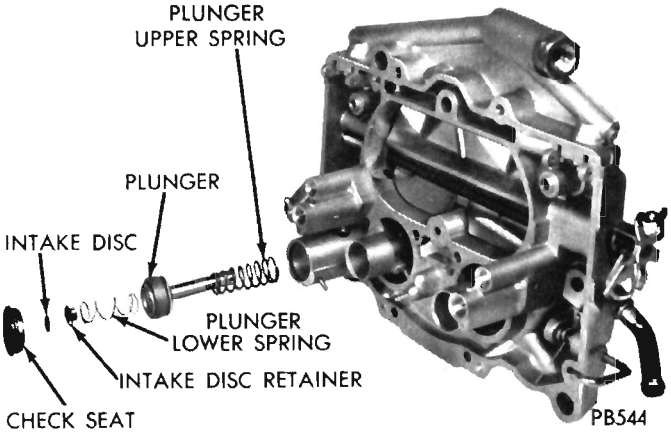


Fig. 6 - Accelerator Pump Assembly (Disassembled View)

(8) Install hot idle compensator valve gasket in recess and valve (Fig. 5).

Choke Vacuum Diaphragm (Also Air Valve Dashpot)

(1) Inspect the vacuum diaphragm fitting to be sure that the passage is not plugged with foreign material. Leak test diaphragm to determine if it has internal leaks. To do this, depress diaphragm stem, then place finger over fitting to seal opening. Release stem. If stem moves more than 1/16 inch in ten seconds, leakage is excessive and assembly must be replaced.

(2) Position diaphragm and bracket assembly on locating dowel on mounting surface. Install and tighten attaching screw.

(3) Inspect rubber hose for cracks before installing on correct carburetor fitting. (Fitting next to diaphragm bracket). **Do not connect vacuum hose to diaphragm fitting until after vacuum kick adjustment has been made.** (See Carburetor Adjustments).

(4) Install throttle body gasket and main body.

Bowl Cover

(1) Install secondary jets.

(2) Install primary jets.

(3) Position accelerator upper spring (heavy) on pump plunger with large diameter up (Fig. 6). Install spring and plunger in bore, compressing spring until rod extends through bowl cover, then install pump "S" link to retain assembly.

(4) Position intake check seat with flange down, install intake disc (red) and intake disc retainer in

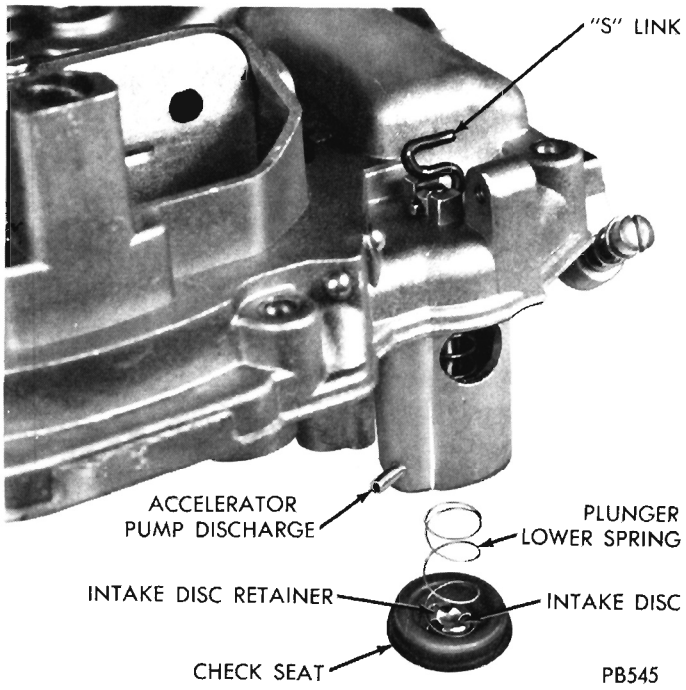


Fig. 7 - Installing Check Seat

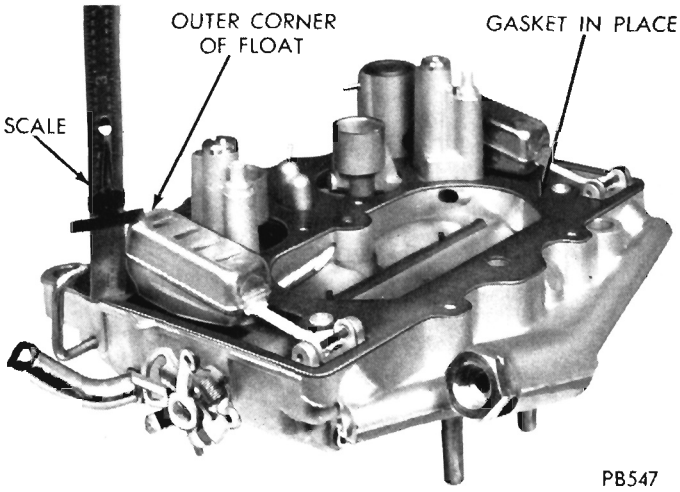


Fig. 9 - Checking Float Height

check seat. **Be sure disc is centered in retainer and seat.** Install plunger lower spring (light) in seat of disc retainer. (Fig. 6).

(5) Position accelerator pump bore over the assembly, then apply firm hand pressure to bowl cover to seat intake check seat in pump bore (Fig. 7).

(6) Install accelerator pump passage tube (plastic)

(7) Pour clean gasoline into main body, approximately 1/2 inch deep and carefully lower bowl cover down on main body. Raise plunger and press lightly on plunger shaft to expel air from pump passage.

(8) Install accelerator pump discharge check needle in discharge passage. Using a small clean rod,

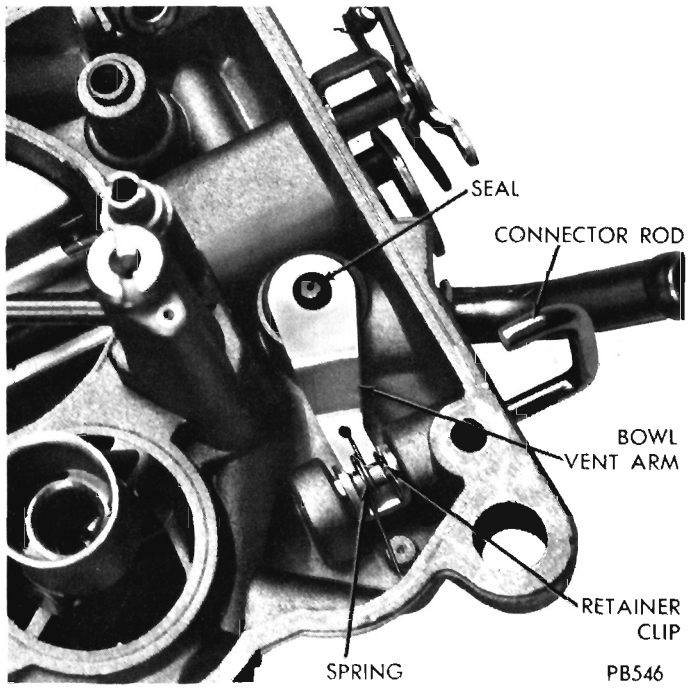


Fig. 8 - Bowl Vent Assembly Installation

hold discharge check needle firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from the discharge passage. Fuel leakage at discharge passage indicates presence of dirt or a damaged check needle. Clean again and install a new check needle. Retest for leakage.

(9) If discharge check needle leaks after above test, attempt to reseat as follows:

(a) Insert a piece of drill rod down on needle. Lightly tap drill rod with a hammer to form a new seat. Remove and discharge needle and install a new one. Retest as described previously. If service fix does not correct the condition, a new carburetor will have to be installed.

(b) Install accelerator pump jet housing, new gasket and attaching screw. Tighten securely.

(c) Test operation, a clear straight stream should emit from each jet. If streams are not identical, a new accelerator pump jet housing should be installed. After test, remove bowl cover and accelerator pump passage tube (plastic) from bowl cover. Pour gasoline from main body.

(10) Install new grommet seal on bowl vent arm, position bowl vent arm in bowl cover with bowl vent arm spring hooked in arm, then install bowl vent connector rod, being sure rod goes through loop of spring and flat end engages slot in bowl vent arm. Install retainer clip. **Bowl vent connector rod should be up when installed with bowl cover in an inverted position (Fig. 8).**

(11) Install gaskets on fuel inlet needle seats, then install in bowl cover. Tighten securely. (Be sure each needle seat and needle is reinstalled in

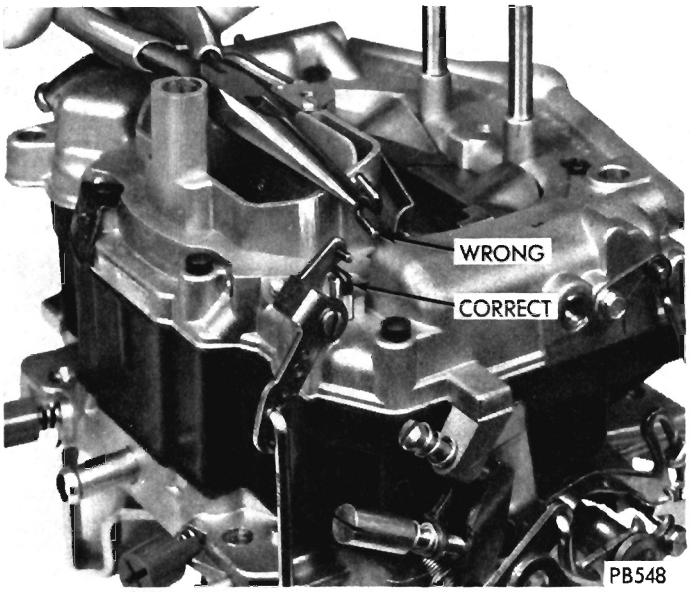


Fig. 10 - Installation Pump Rod "S" Link

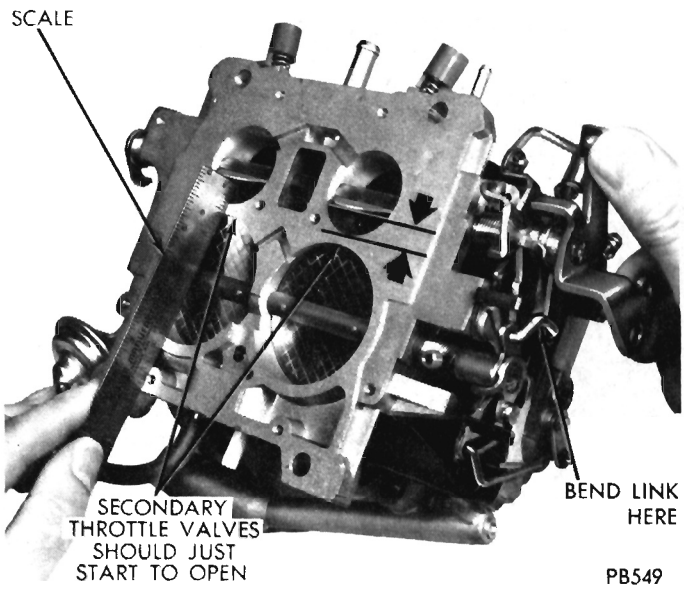


Fig. 11 - Checking Secondary Throttle Adjustment

its original position if being reused).

(12) Place a new bowl cover to main body gasket in position on bowl cover, then slide right and left floats into position in bowl cover, then install float fulcrum pins. **Be sure marked float is installed on pump side of the bowl cover.**

(13) With bowl cover inverted, gasket installed and floats resting on seated needle, the dimension of each float from bowl cover gasket to bottom side of float should be 1.00 inch. To adjust bend lever (Fig. 9). **Never allow lip of float be pressed against needle when adjusting.**

(14) Install accelerator pump passage tube (plastic).

(15) Carefully lower bowl cover down on main body, be sure bowl vent operating lever engages bowl vent connector rod. Install ten air horn screws and tighten to 50 inch-pounds, in two stages.

(16) Install fuel inlet fitting with a new gasket and tighten securely.

(17) Engage pump rod "S" link with hole in accelerator pump arm, then position arm on air horn and install pump arm screw (Fig. 10).

(18) Engage throttle connector rod with hole in throttle lever. Install other end in accelerator pump arm (center hole) and install rod retainers.

(19) Install step up piston spring in piston cylinder, followed by step up rods and piston and link assembly. Install cover plate and attaching screw. Tighten securely.

(20) Engage choke connector rod with hole in choke shaft lever, then swing rod at an arc until rod can engage choke countershaft. Install rod retainer.

(21) Engage fast idle connector rod with slot in fast idle operating lever, then swing rod at an arc until lever can engage choke countershaft (with choke valve held in open position) install lever and attaching screw. Tighten securely while holding lever.

(22) Engage choke diaphragm connector rod to air valve lever, then install washer and rod retainer. Install other end to choke vacuum diaphragm plunger and install rod retainer.

CARBURETOR ADJUSTMENTS

Many of the following adjustments should be made with carburetor on bench for ease of working and should be made in the following order:

(1) Secondary Throttle Linkage
(2) Secondary Air Valve Opening
(3) Secondary Air Valve Spring Tension
(4) Accelerator Pump Stroke
(5) Choke Control Lever Adjustment (Off or On Vehicle)
(6) Choke Diaphragm Connector Rod
(7) Vacuum Kick Adjustment (Off or On Vehicle)
(8) Fast Idle Cam and Linkage
(9) Choke Unloader Adjustment (Wide Open Kick)
(10) Secondary Throttle Lockout
(11) Bowl Vent Valve Adjustment
(12) Fast Idle Speed
(13) Fast Curb Idle Solenoid Adjustment

Secondary Throttle Linkage

To check the secondary throttle linkage adjustment, block the choke valve in the wide open position and invert the carburetor. Slowly open the primary throttle valves until it is possible to measure 11/32 inch between the lower edge of the primary valve and the bore (opposite idle

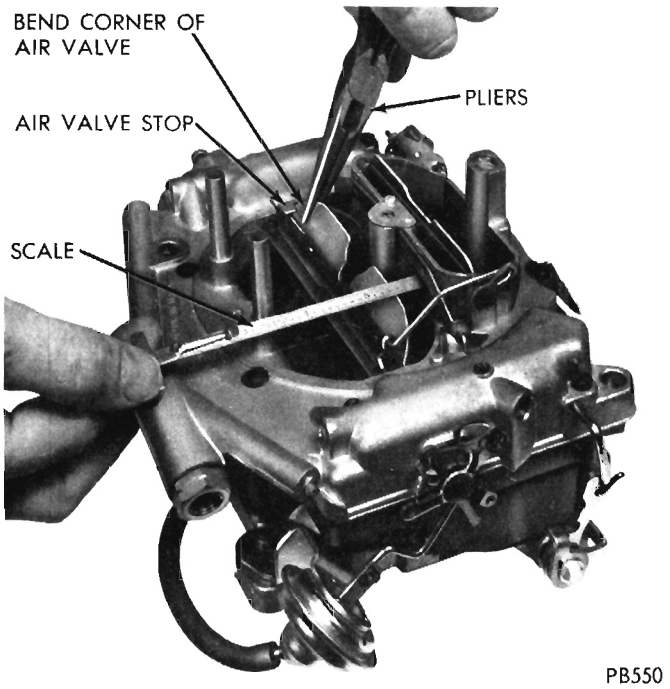


Fig. 12 - Adjusting Secondary Air Valve Opening

port, Fig. 11). At this measurement, the secondary valves should just start to open. If an adjustment is necessary, bend the secondary throttle operating rod at the angle using pliers, until correct adjustment has been obtained.

Secondary Air Valve Opening

(1) With air valve in closed position, the opening along air valve at the long side must be at its maximum and parallel with air horn gasket surface.

(2) With air valve in wide open position, the opening of the air valve at the short side and air horn should be 31/64 inch. The corner of air valve is notched for adjustment. Bend the corner with a pair of pliers to give proper opening (Fig. 12).

Secondary Air Valve Spring Tension

(1) Loosen air valve lock plug (Fig. 13), and allow air valve to position itself to wide open position.

(2) With a long screwdriver that will enter center of Tool C-4152 positioned on air valve adjustment plug, turn plug **counterclockwise** until air valve contacts stop lightly, test with finger, then an additional 1-1/4 turn.

(3) Hold adjustment plug with screwdriver, and tighten lock plug securely with Tool C-4152. Be sure adjustment does not move. Check air valve for freedom of movement.

Accelerator Pump Stroke

(1) Move choke valve to wide open position, to release fast idle cam. Back off idle speed adjusting screw (curb idle) until throttle valves are seated in bores. Be sure that throttle connector rod is installed in center hole of accelerator pump arm.

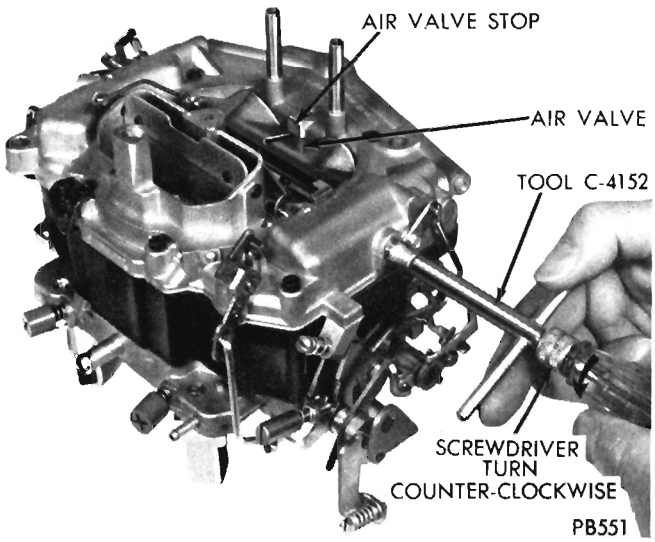


Fig. 13 - Adjusting Air Valve Spring Tension

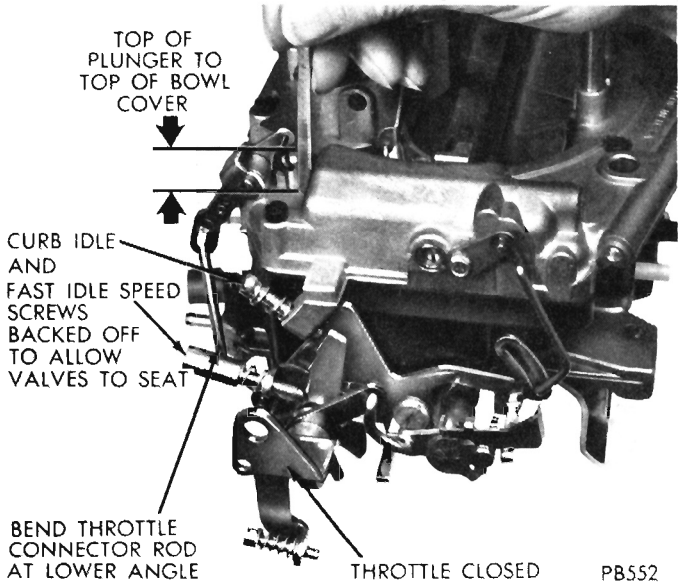


Fig. 14 - Adjusting Accelerator Pump Stroke

(2) Close throttle valve tightly. Measure the distance between top of bowl cover and end of plunger shaft (Fig. 14). This measurement should be 31/64 inch.

(3) If an adjustment is necessary, bend throttle connector rod at lower angle, until correct travel has been obtained.

Choke Control Lever Adjustment (Off or On Vehicle)

The choke control lever must be properly adjusted to provide correct choke thermostat loads and choke linkage operation. Adjust as follows:

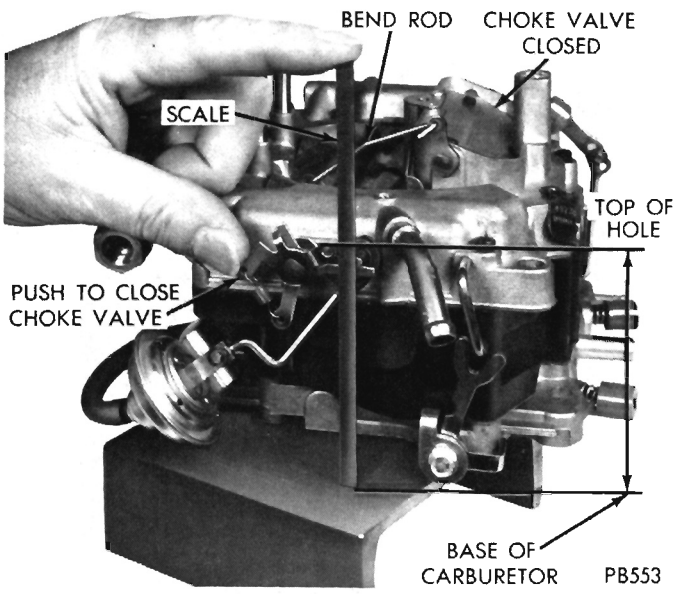


Fig. 15 - Adjusting Choke Control Lever

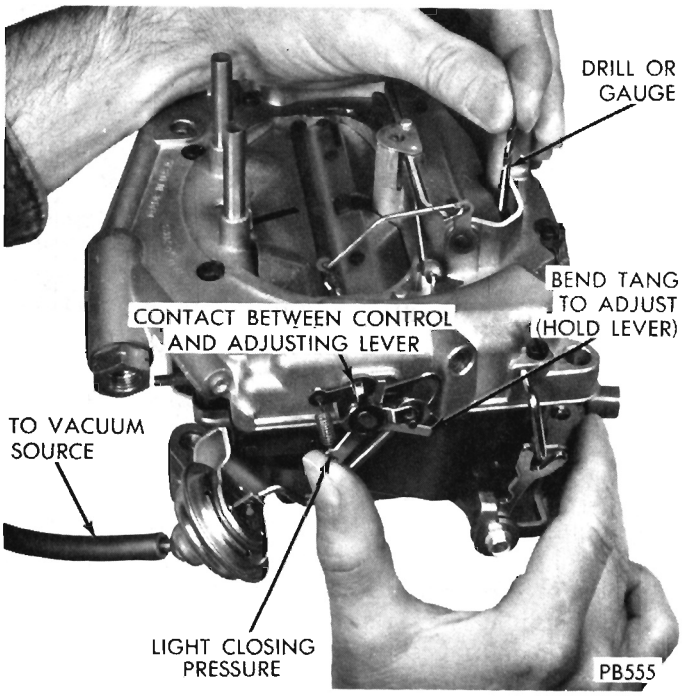


Fig. 17 - Adjusting Vacuum Kick

(1) **Off vehicle,** place carburetor on flat object with surface flush against bottom of flange and extending out under choke control lever.

(2) **On vehicle,** remove choke assembly, stainless steel cup and gasket.

(3) Close choke by pushing on choke lever with throttle partly open.

(4) Measure vertical distance from top of rod hole in control lever down to flat surface simulating carburetor bottom (off vehicle) or down to clean choke pad surface (on vehicle).

(5)**Off vehicle**, scale should read 3-27/64 inches, (Fig. 15).

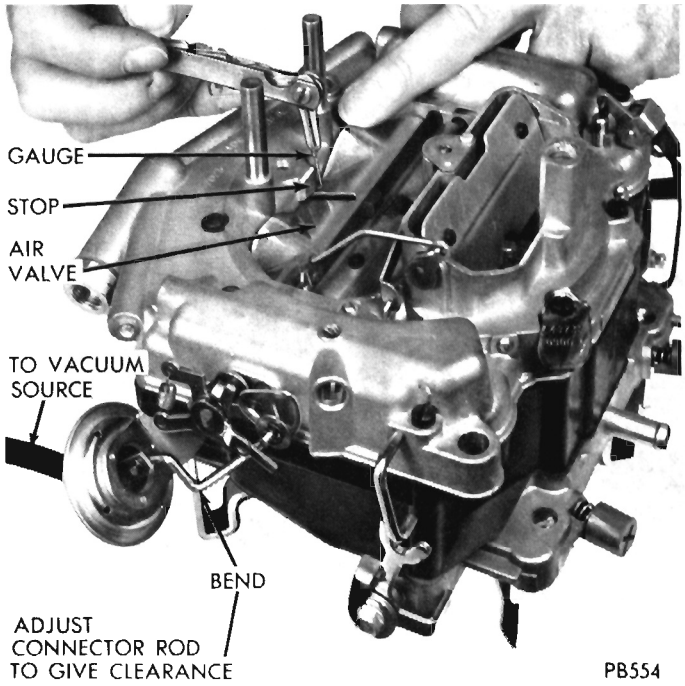


Fig. 16 - Adjusting Choke Diaphragm Connector Rod (Secondary Air Valve Control)

(6) **On vehicle,** scale should read 5-41/64 inches.

(7) Adjust by bending link connecting two choke shafts as indicated.

Choke Diaphragm Connector Rod (Secondary Air Valve Control)

The diaphragm must be energized to adjust the choke diaphragm connector rod. Use an auxiliary source like a distributor test machine. **Perform this adjustment before Vacuum Kick Adjustment.**

(1) Be sure diaphragm is securely mounted on carburetor. Apply a vacuum of 10 or more inches of HG. to diaphragm to fully depress diaphragm stem.

(2) With air valve closed, adjust connector rod to give .040 inch clearnace between air valve and stop (Fig. 16).

Vacuum Kick Adjustment (Off or On Vehicle)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by use of linkage between the choke shaft and diaphragm. The diaphragm must be energized to measure the vacuum kick. Use vehicle vacuum or an auxiliary source like a distributor test machine. **Perform this adjustment after qualification of the Choke Diaphragm Connector Rod and Choke Control Lever.**

(1) **Off vehicle,** open the throttle valves and move choke valve to closed position with control lever. Release throttle before releasing choke to

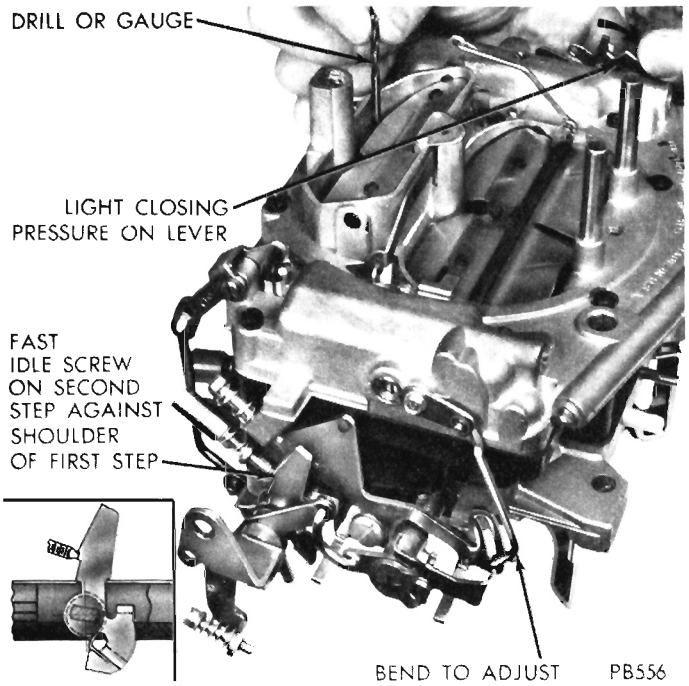


Fig. 18 - Adjusting Fast Idle Cam and Linkage

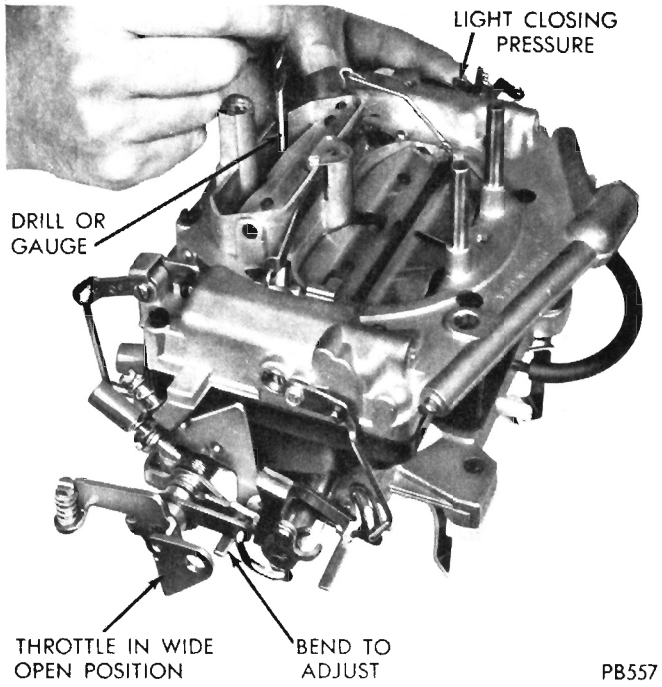


Fig. 19 - Adjusting Choke Unloader

trap fast idle cam in closed choke position.

(2) **On vehicle,** with engine running back off fast idle speed screw until choke can be closed to the kick position at curb idle. (Note number of screw turns required so that fast idle can be returned to original adjustment).

(3) **Off vehicle,** using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which could damage the diaphragm. **Be sure diaphragm is securely mounted on carburetor.** Apply a vacuum of 10 or more inches of Hg.

(4) Insert specified drill between long side (lower edge) of choke valve and the air horn wall. See Specifications (Fig. 17). Apply sufficient closing pressure on choke control lever to provide a minimum choke valve opening without distortion of choke linkage. Note that only this carburetor extends a spring connecting the control lever to an adjustment lever. This spring must be fully extended for proper measurement of vacuum kick adjustment.

(5) Adjustment will be necessary if slight drag is not obtained as drill is being removed. Bend the tang indicated in (Fig. 17), to change contact with end of diaphragm rod. **Do not adjust diaphragm rod.** Adjust tang only while applying a counter force to the adjustment lever. Counter force can be provided by a screwdriver placed in U-shaped opening between lever and shaft.

Caution: Do not load the link connecting the two choke shafts because Choke Control Lever Qualification will change.

(6) Reinstall vacuum hose on correct carburetor fitting. Return fast idle screw to its original adjustment if **on vehicle** adjustment was made.

(7) With no vacuum applied to diaphragm **Choke Valve Should Move Freely** between open and closed positions. If movement is not free, examine system for misalignment or interferences and correct. Repeat adjustment if necessary.

Fast Idle Cam and Linkage

(1) With fast idle screw on second step of cam against shoulder of first step, adjust fast idle connector rod to obtain .110 inch opening between air horn wall and edge of choke valve (long side of valve nearest lever (Fig. 18).

Choke Unloader Adjustment (Wide Open Kick)

The choke unloader is a mechanical device to partially open the choke at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust as follows:

(1) Hold throttle valves in wide open position. Insert specified drill between long side (lower edge) of choke valve and inner wall of air horn (Fig. 19). See Specifications.

(2) With finger lightly pressing against choke control lever, a slight drag should be felt as drill is being withdrawn. If necessary, adjust by bending tang on fast idle control lever until correct opening has been obtained.

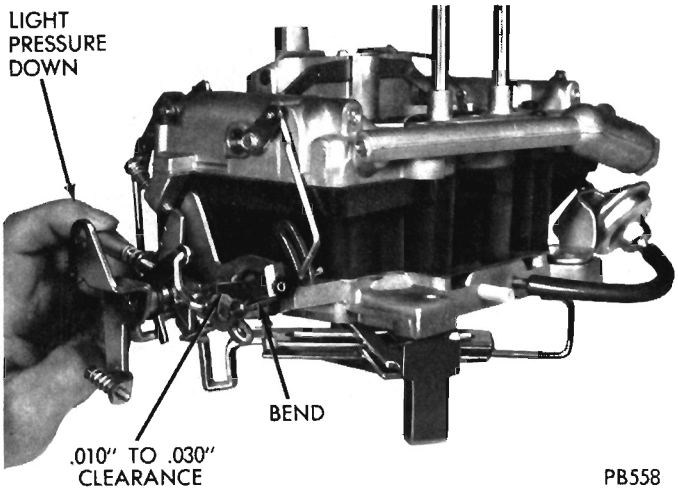


Fig. 20 - Adjusting Secondary Throttle Lockout

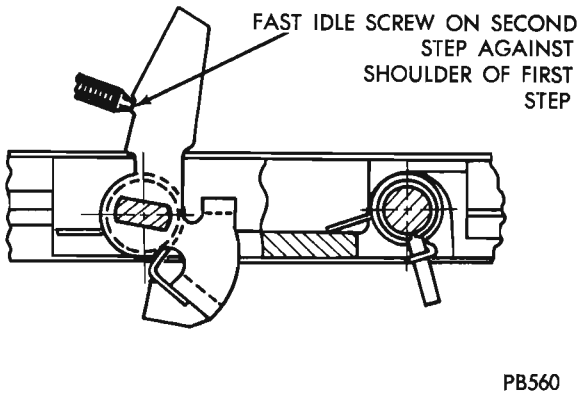


Fig. 22 - Fast Idle Speed Cam Position

Secondary Throttle Lockout

Secondary throttle operation is eliminated during the choke cycle by use of a latch triggered by the fast idle system. Adjust as follows:

(1) Move choke control lever to open choke position.

(2) Measure clearance between lockout lever and stop (Fig. 20). It should be .010 to .030 inch.

(3) Bend tang on fast idle control lever to provide proper clearance.

Bowl Vent Valve Adjustment

To check the bowl vent adjustment, proceed as follows:

(1) Using a suitable tool, remove bowl vent valve checking hole plug in bowl cover.

(2) With throttle vales at curb idle, insert a narrow ruler down through hole. Allow ruler to rest lightly on top of valve. The reading should be .850 inch from top of valve to top of bowl cover at opening (Fig. 21).

(3) If an adjustment is necessary, bend bowl vent operating lever at notch until correct valve opening has been obtained.

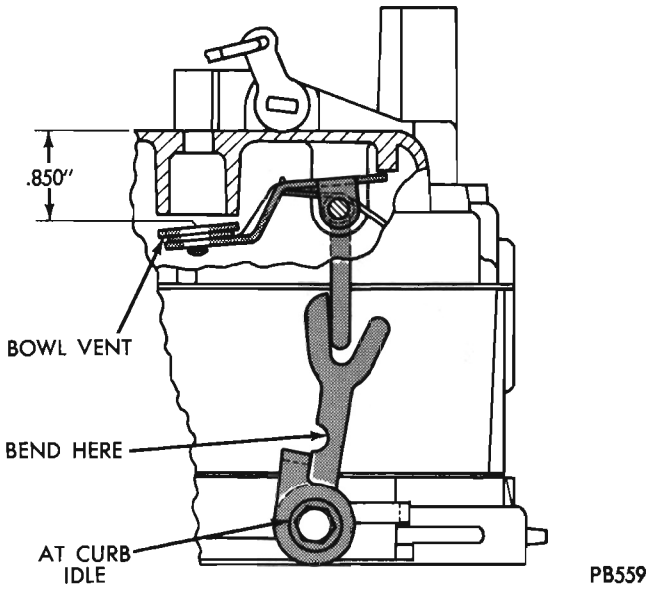


Fig. 21 - Adjusting Bowl Vent

(4) Install new plug and top lightly to seat, using a small hammer.

After adjustments have been made, reinstall carburetor on engine, using a new gasket.

It is suggested that the carburetor be filled with clean gasoline. This will help prevent dirt that is trapped in the fuel system, from being dislodged by free flow of fuel, as the carburetor is primed.

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least five miles. Connect a tachometer and set curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in **PARK** or **NEUTRAL** position open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on the second step of cam against shoulder of first step (Fig. 22).

(3) Start engine and determine stablized speed. Turn fast idle speed screw **in** or **out** to secure specified speed (refer to specifications).

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Before adjusting idle and/or fast idle speeds and mixtures, make sure that the basic timing is correctly adjusted.

Fast Curb Idle Speed Solenoid Adjustment

(1) Warm up engine to normal operating

temperature, then attach a tachometer.

(2) With engine running (with solenoid energized), turn fast curb idle adjusting screw **in** or **out** against solenoid plunger to secure specified engine rpm for manual or automatic transmission equipped vehicles (refer to specifications).

(3) After specified rpm has been obtained and with engine still running (with solenoid energized) adjust slow curb idle speed screw until end of screw **just touches** stop. Now, back off one full turn to obtain slow curb idle speed setting (refer to specifications). Test by disconnecting solenoid wire at connector (do not let lead short to engine)

Reconnect solenoid wire after test. **Solenoid will not advance throttle, it will be necessary to manually advance throttle to obtain fast curb idle.**

HOLLEY 2210 CARBURETOR

INDEX

	Page
Carburetor Adjustments	56
Accelerator Pump	58
Bowl Vent	58
Choke Unloader (Wide Open Kick)	57
Fast Idle Speed and Cam Position	56
Fast Idle Speed (On Vehicle)	58
Idle Speed	58
Vacuum Kick	56
Cleaning Carburetor Parts	53
Disassembling Carburetor	50
General Information	49
Inspection and Reassembly	53
Specifications	137

GENERAL INFORMATION

The Holley dual throat, 2210 series carburetor models R-4665A and R-4666A are used on the 360 cu. in. engines when the vehicles are equipped with manual and automatic transmissions respectively (Fig. 2). Both of these carburetors are equipped with a hot idle compensator valve which is a thermostatically operated air bleed to relieve an overrich condition at idle.

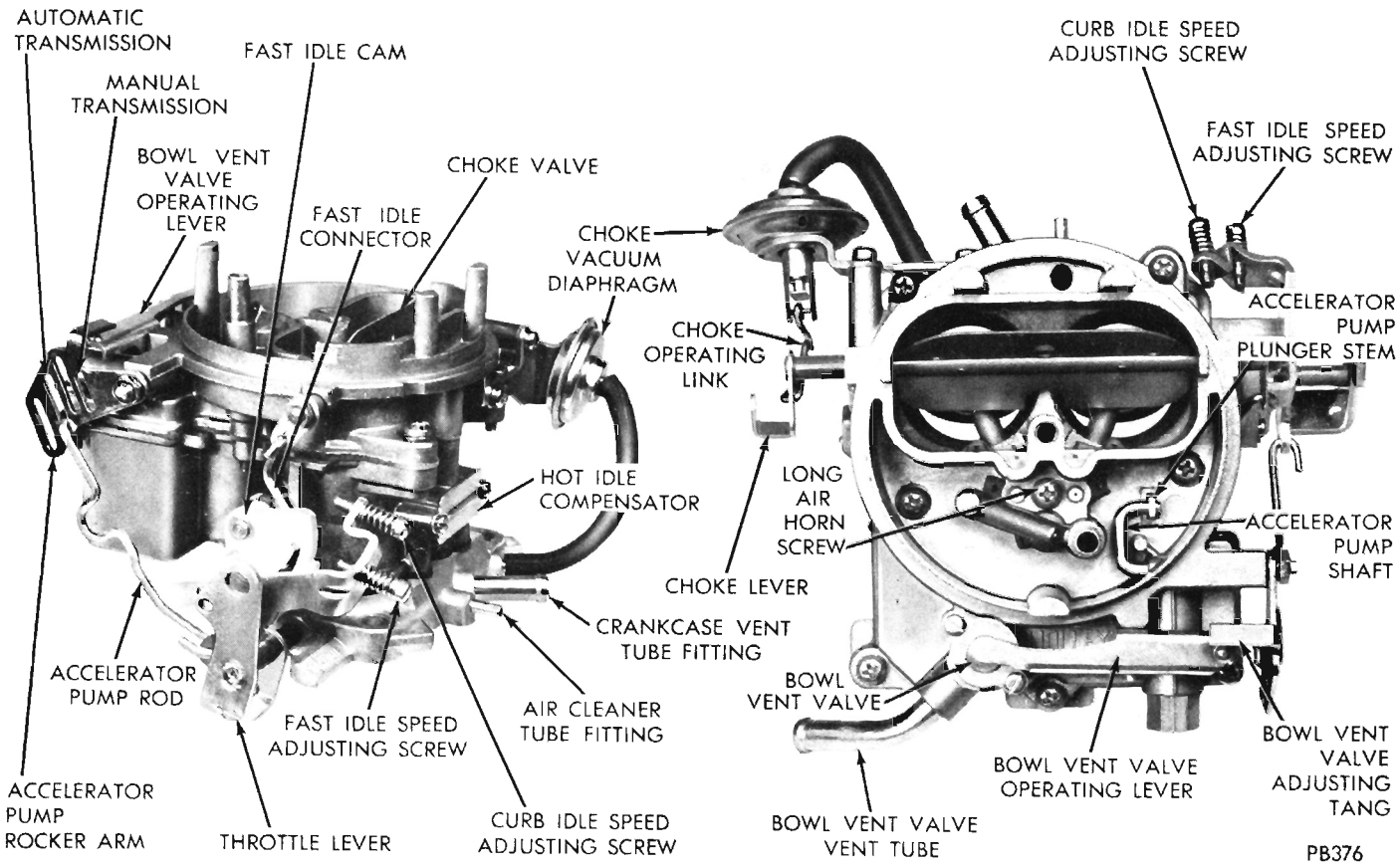


Fig. 1 - Carburetor Assembly (Holley 2210 Series)

Each throat of the carburetor has its own throttle valve and main metering systems and are supplemented by the float, accelerating, idle and power systems.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR

(1) Insert three Tool T109-287S and one Tool T109-288s elevating legs through carburetor throttle body mounting stud holes. (These tools are used to protect throttle valves from damage and to provide a suitable base for working.) (Fig. 1).

(2) Remove nut and washer attaching accelerator pump rocker arm to accelerator pump shaft. Remove arm from flats on pump shaft, then disengage accelerator pump rod from center slot in arm and from hole in throttle lever. (Fig. 2).

(3) Remove nut and washer that attaches choke lever to choke shaft. Disengage fast idle connector rod from lever and fast idle cam. (Fig. 3).

(4) Remove choke vacuum diaphragm hose from throttle body tube fitting. Remove screws that attach choke diaphragm and mounting bracket to air horn.

(5) Remove choke diaphragm and at the same

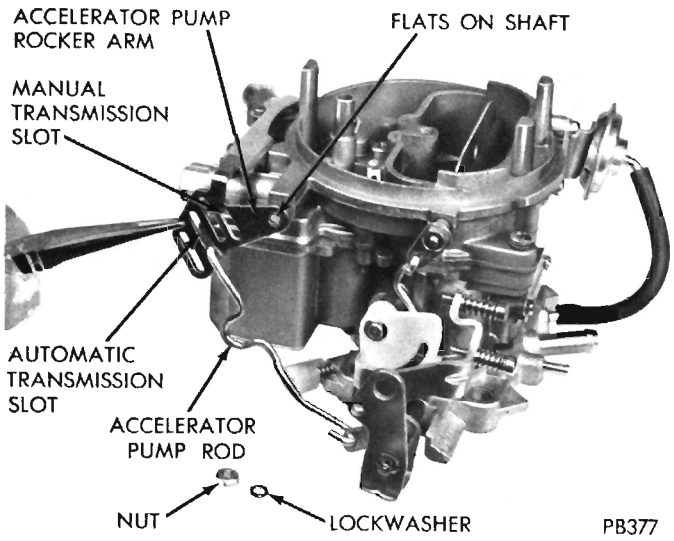


Fig. 2 - Removing or Installing Accelerator Pump Rocker Arm

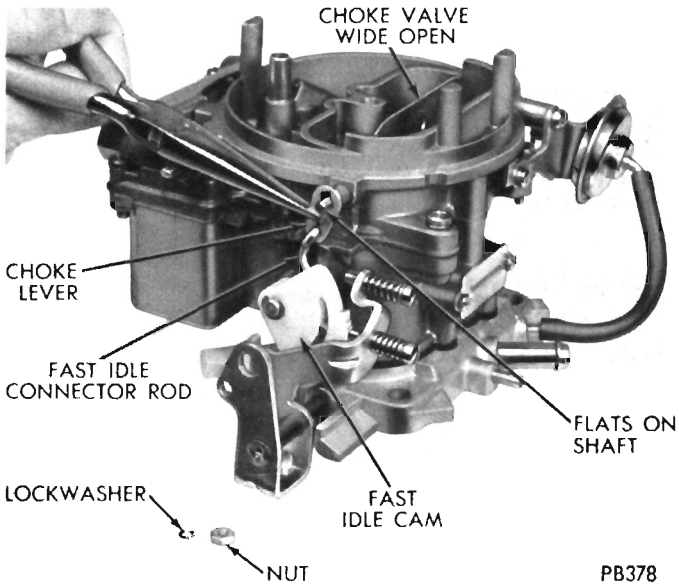


Fig. 3 - Removing or Installing Fast Idle Connector Rod

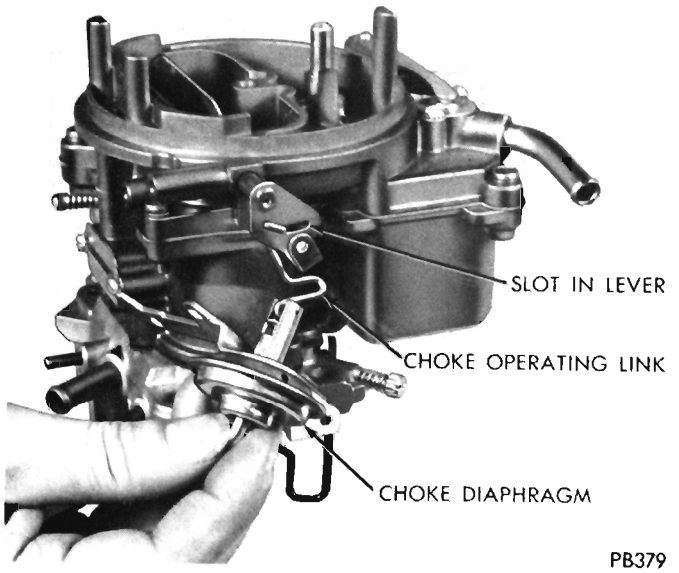


Fig. 4 - Removing or Installing Choke Diaphragm

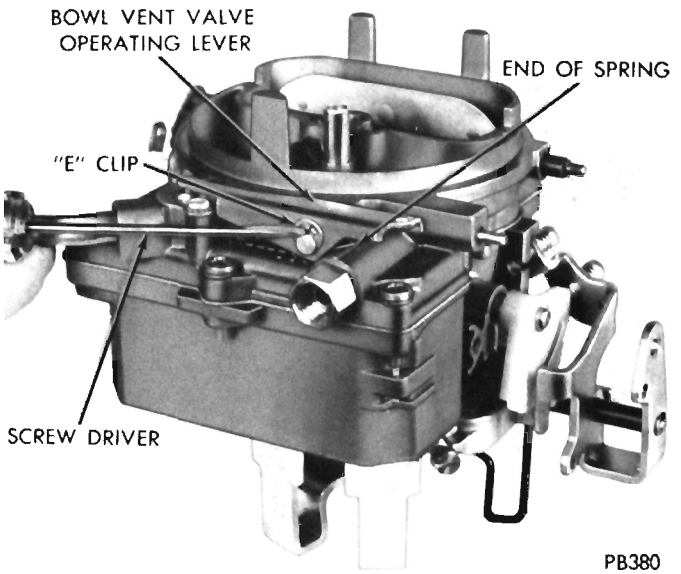


Fig. 5 - Removing Bowl Vent Valve Operating Lever "E" Clip

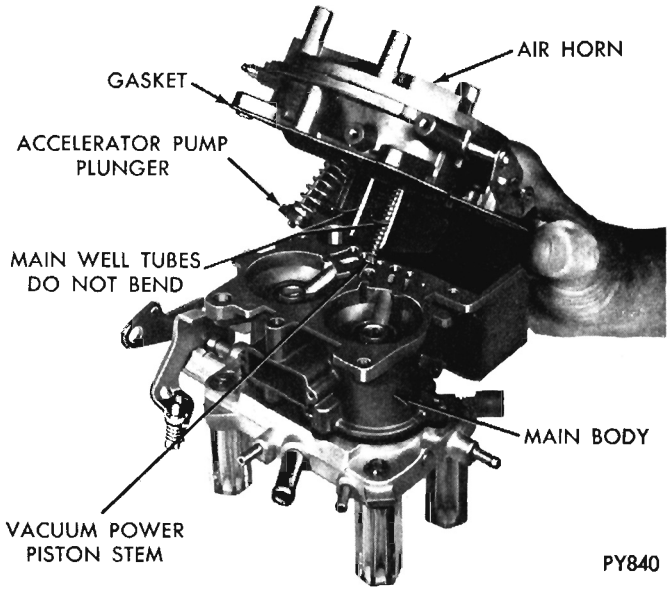


Fig. 6 - Removing or Installing Air Horn

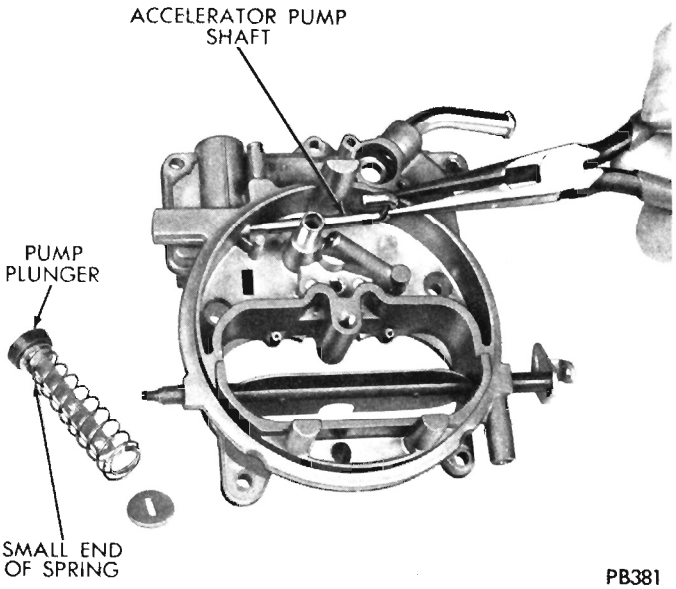


Fig. 8 - Removing or Installing Accelerator Pump Shaft

time, disengage choke operating link from slot in choke operating lever. (Fig. 4). Place choke unit to one side to be cleaned as a special item. **A liquid cleaner may damage diaphragm material.**

(6) Remove "E" clip that retains bowl vent valve operating lever on stub shaft or air horn. Slide lever off shaft, being careful not to lose lever spring. (Note position of spring). (Fig. 5).

(7) Remove eight air horn attaching screws, then lift air horn straight up and away from main body. (Long screw in center). **USE EXTREME CARE WHEN HANDLING AIR HORN SO AS NOT TO BEND OR DAMAGE MAIN WELL TUBES.** (Fig. 6).

(8) Disengage accelerator pump plunger from pump shaft by pushing **up** on bottom of plunger,

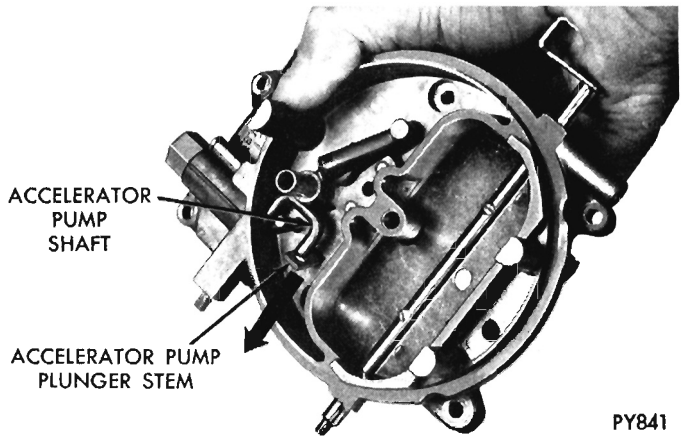


Fig. 7 - Removing or Installing Accelerator Pump Plunger

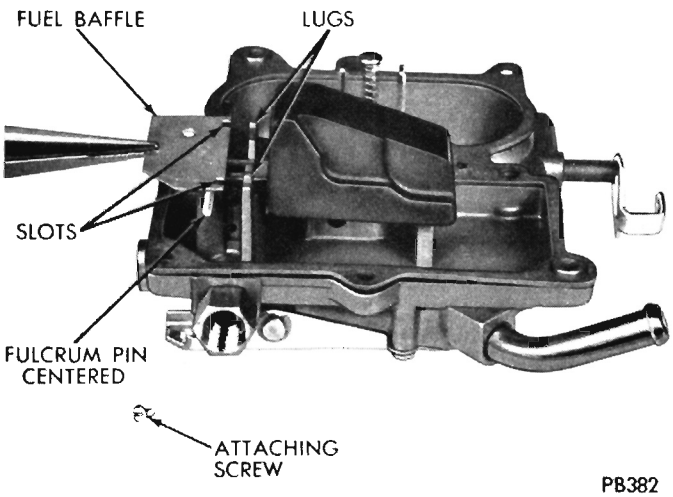


Fig. 9 - Removing or Installing Fuel Baffle

then tilting slightly toward center, then slide off pump shaft. Slide plunger stem out of air horn and remove compression spring. (Fig. 7).

(9) Slide accelerator pump shaft out of air horn (Fig. 8).

(10) Remove fuel inlet fitting and gasket from air horn.

(11) With air horn inverted, remove screw that attaches fuel baffle to air horn. (Fig. 9).

(12) Slide nylon float fulcrum pin out of air horn, then remove float. Invert air horn and drop out fuel inlet needle. Using a wide blade screw driver, remove fuel inlet needle valve seat and gasket. (Fig. 10).

(13) Remove air horn gasket and discard.

(14) Remove vacuum power piston from air horn, using tool C-4141 (Fig. 11). (This assembly is staked in position and care must be used at removal.) Remove staking using a suitable sharp tool.

(15) **WARNING: DO NOT ATTEMPT TO REMOVE MAIN WELL TUBES FROM AIR HORN.**

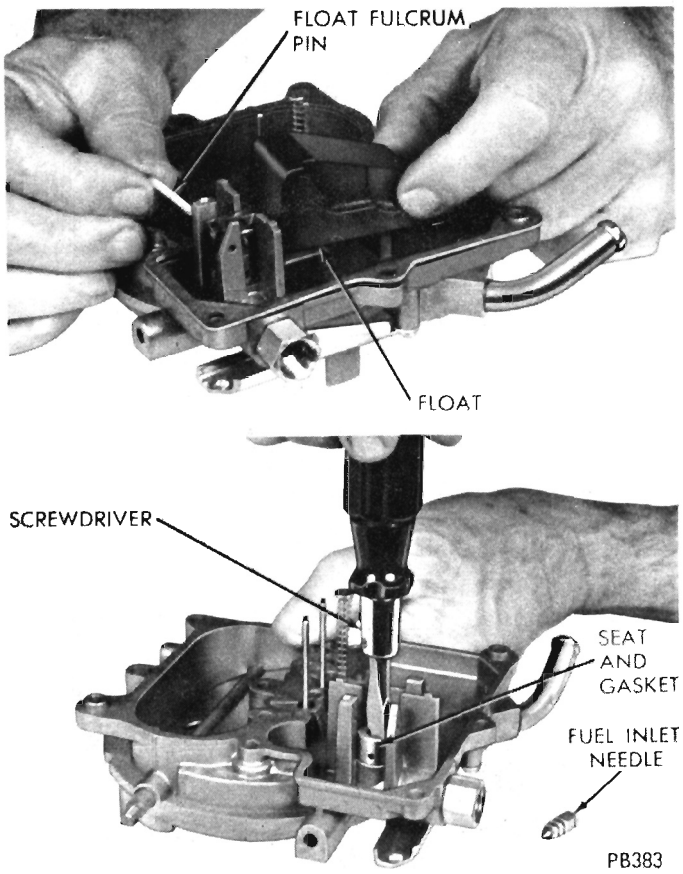


Fig. 10 - Removing or Installing Float and Needle Seat

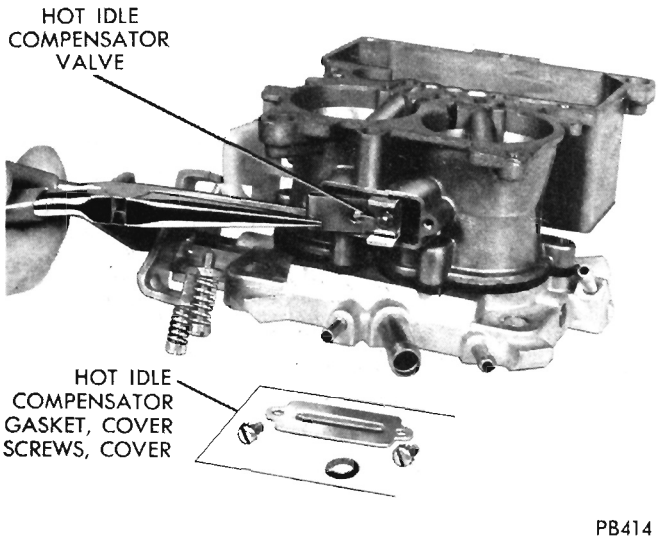


Fig. 12 - Removing or Installing Hot Idle Compensator Valve

These tubes are a press fit in air horn, and will be damaged if removed. They can be cleaned in a solvent and blown dry with compressed air. If carburetor parts are cleaned in a basket, be sure other carburetor parts are not striking these tubes.

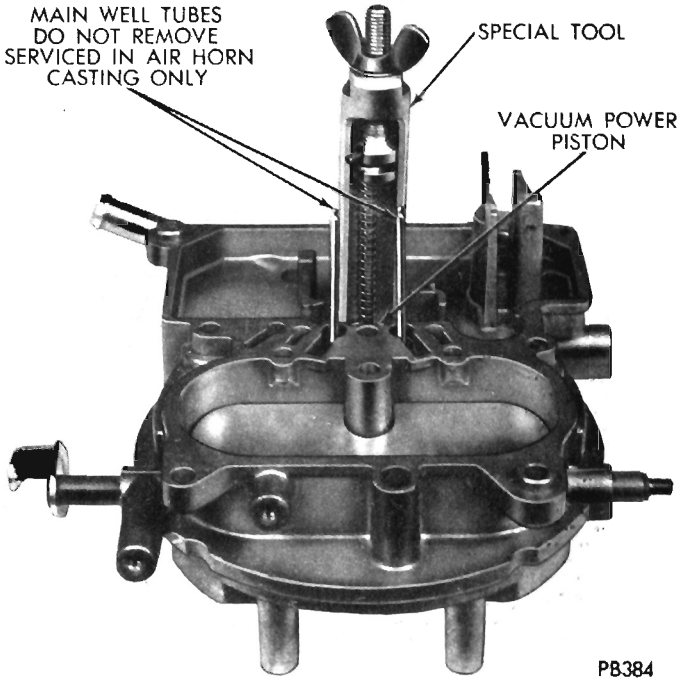


Fig. 11 - Removing Vacuum Power Piston

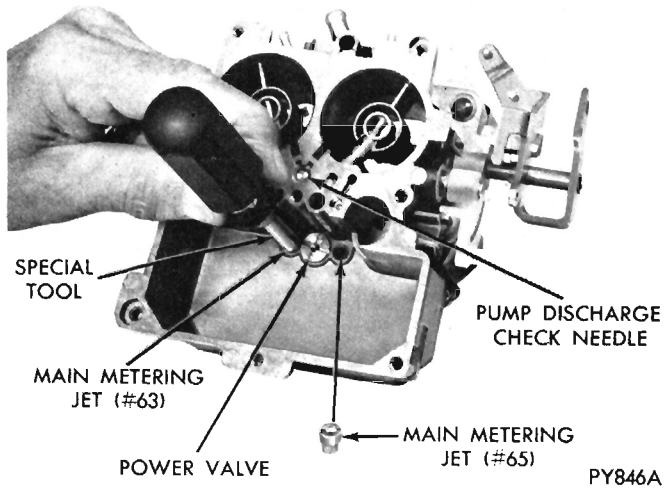


Fig. 13 - Removing or Installing Main Metering Jets

(16) Remove screws attaching bowl vent valve cover to fuel bowl. Lift off cover and remove vent valve, spring and seal. (Fig. 1). Remove seal from bottom of valve.

(17) Remove screws that attach hot idle compensator valve cover to main body. Lift off cover, then remove valve and gasket. (Fig. 12.).

(18) Using Tool TMC-36A, remove main metering jets (Fig. 13).

(19) Using Tool T109-73S, remove power valve assembly (Fig. 14).

(20) Invert main body and drop out accelerator pump discharge check needle from discharge passage.

(21) Remove fast idle cam retaining "E" clip, then slide fast idle cam off stub shaft. (Fig. 15).

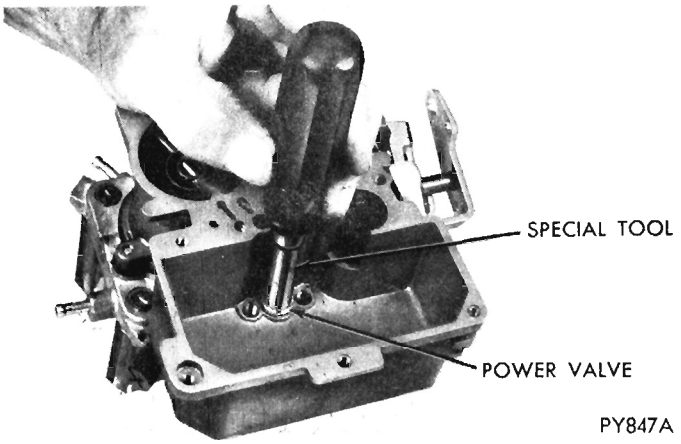


Fig. 14 - Removing or Installing Power Valve

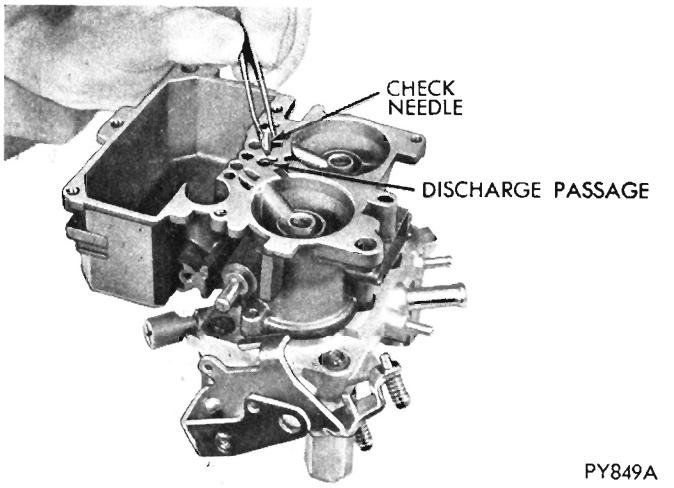


Fig. 16 - Installing Accelerator Pump Discharge Check Needle

(22) Invert main body and remove throttle body to main body attaching screws. Separate bodies and discard gasket.

(23) Turn idle limiter caps to stop. (Top on throttle side and bottom of stop on choke side). Remove idle limiter caps by prying off with suitable tool. (Be careful not to bend screws.) Be sure and count number of turns to seat the screws, as the same number of turns (from the seat) must be maintained at installation. Remove screws and springs from throttle body.

The carburetor now has been disassembled into three sub-assemblies, the air horn, main body, throttle body and the components of each disassembled as far as necessary for cleaning and inspection.

CLEANING CARBURETOR PARTS

Refer to General Information Section at front of Fuel System, for cleaning instructions.

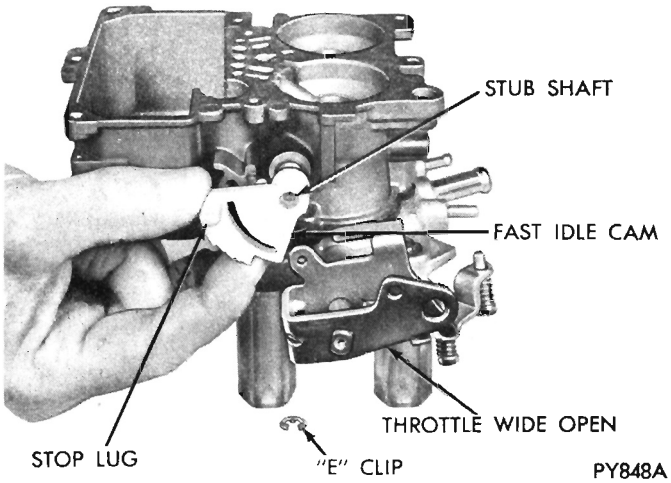


Fig. 15 - Removing or Installing Fast Idle Cam

INSPECTION AND REASSEMBLY

DO NOT clean any rubber or plastic parts in cleaning solvent because of possible damage.

Check for cracks, warpage, stripped screw threads, damaged or marred mating surfaces, on all major castings. The passages in the castings should be free of restrictions. Install new castings as required. Check float assembly for damage or any condition that would impair this item from further service. The choke and throttle valves should be replaced if the edges have been nicked or if the protective plating has been removed. Be sure that the choke and throttle shafts are not bent or scored. Replace any broken or distorted springs. Replace all screws and lockwashers that show signs of stripped threads or distortion.

Throttle Body

(1) Install idle mixture screws and springs in body. (The tappered portion must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) **DO NOT USE A SCREW DRIVER.** Turn screws lightly against their seat with fingers. Back off the number of turns (from the seat) counted at disassembly. Install new plastic caps with tab against stop. (Screws should be equal number of turns on both sides).

Main Body

(1) Invert main body and place a new gasket in position. Place throttle body on main body and align. Install attaching screws and tighten to 25 inch pounds.

(2) Install accelerator pump discharge check needle in discharge passage. (Fig. 16). Check accelerator pump, fuel inlet and discharge systems as follows:

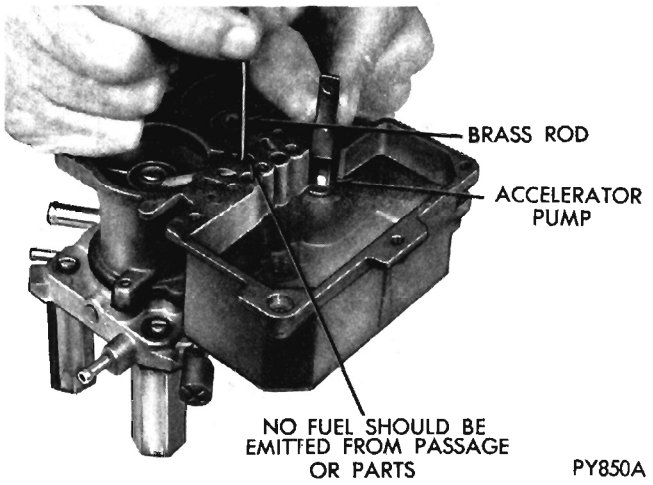


Fig. 17- Testing Accelerator Pump Discharge Check Needle

(3) Pour clean gasoline into fuel bowl, approximately 1 inch deep. Slide accelerator pump plunger into cylinder. Raise plunger and press down lightly on plunger stem to expell all air from pump passage.

(4) Using a small clean brass rod, hold discharge check needle down on its seat. Again raise plunger and press downward. No fuel should be emitted from pump discharge passage. (Fig. 17).

If any fuel does emit from discharge passage, it indicates the presence of dirt or a damaged or worn check needle, or seat. Clean the passage again and retest as above. If leakage is still evident, attempt to form a new seat as follows:

(5) With discharge check needle installed, insert a piece of drill rod down on needle. Lightly tap drill rod with a hammer to form a new seat. Remove and discard old needle and install a new one. Retest as discribed previously If service fix does not correct the condition, a new main body should be installed. Remove accelerator pump plunger, discharge check needle and fuel from main body.

(6) Install power valve, using Tool T109-73S (Fig. 14). Tighten securely.

(7) Install main metering jets, using Tool TMC-36A (Fig. 13). Tighten to 25 inch pounds.

(8) Install accelerator pump discharge check needle in pump discharge passage. (Fig 16)

(9) Install hot idle compensator valve gasket in position in recess in main body, followed by valve. (Be sure valve is positioned with legs toward outside of main body.) (Fig. 12) Place cover over opening and install attaching screws. Tighten to 15 inch pounds.

Air Horn

(1) Test freeness of choke mechanism in air horn. The choke shaft must float free to operate

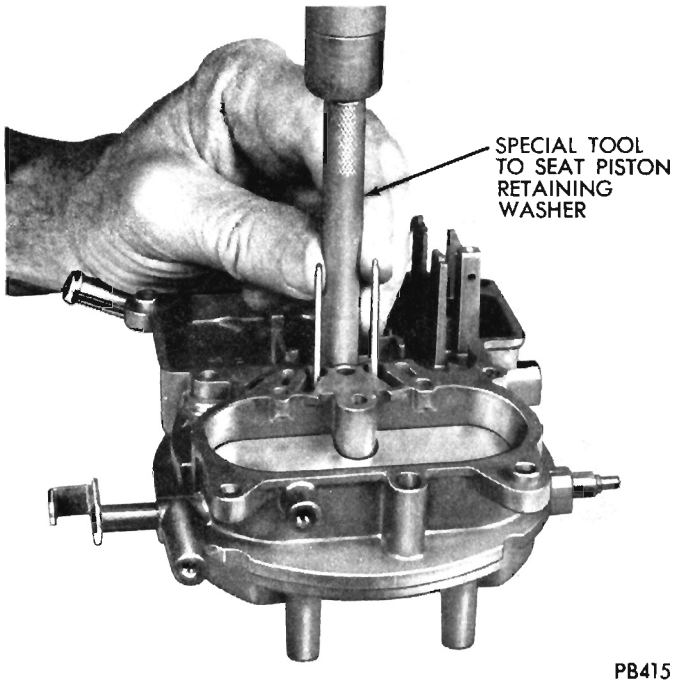


Fig. 18 - Installing Vacuum Power Piston

correctly. If choke sticks in bearing bores, or appears to be gummed from deposits in air horn, a thorough cleaning will be required.

(2) Install vacuum power piston in its cylinder (Fig. 18). Lock in position by prick punching rim of cylinder (at least three place.) Do not over-stake. Compress piston to be sure no binding exists. If piston sticks or binds enough to hinder smooth operation, a new piston should be installed.

(3) Slide accelerator pump plunger compression spring over plunger stem, with small diameter toward plunger. Install pump shaft in air horn. (Fig. 8).

(4) As plunger is being installed in air horn, slightly tilt plunger to engage with plunger shaft.

(5) Install fuel inlet needle valve seat and gasket in air horn. Tighten securely, using a wide blade screwdriver. Install fuel inlet needle in seat. (Fig. 10).

(6) Install float in position, then slide delrin fulcrum pin through float hinge to retain float. Center fulcrum pin. (Fig. 10).

(7) Install fuel baffle on bosses with slots engaged lugs. Install attaching screw and tighten securely. (Fig. 9).

Measuring Float Setting

The carburetors are equipped with a viton tipped fuel inlet needle. The tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding. **Care should be taken to perform this operation accurately in order to secure best performance and fuel economy.**

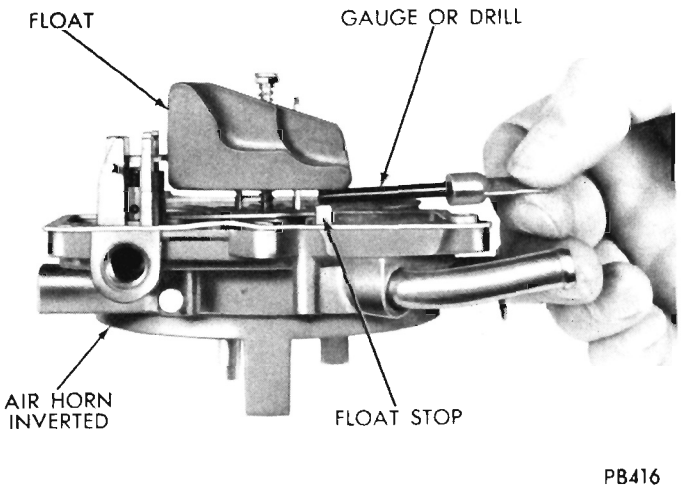


Fig. 19 - Checking Float Setting

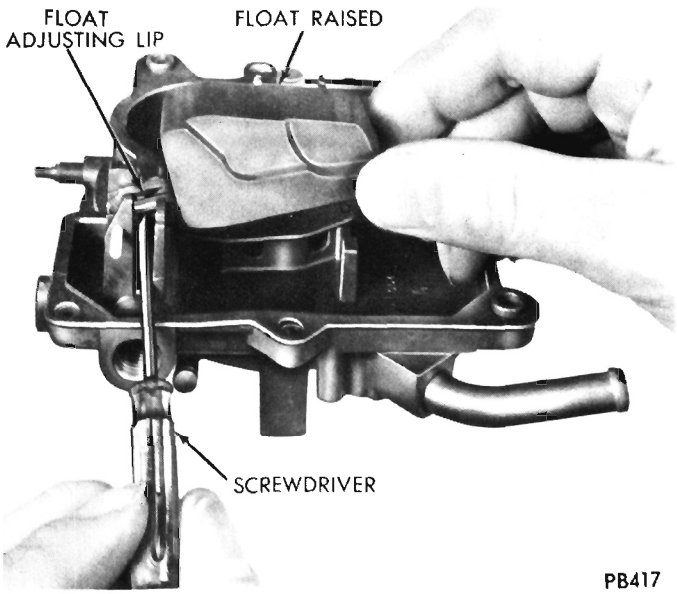


Fig. 20 - Bending Float Adjusting Lip

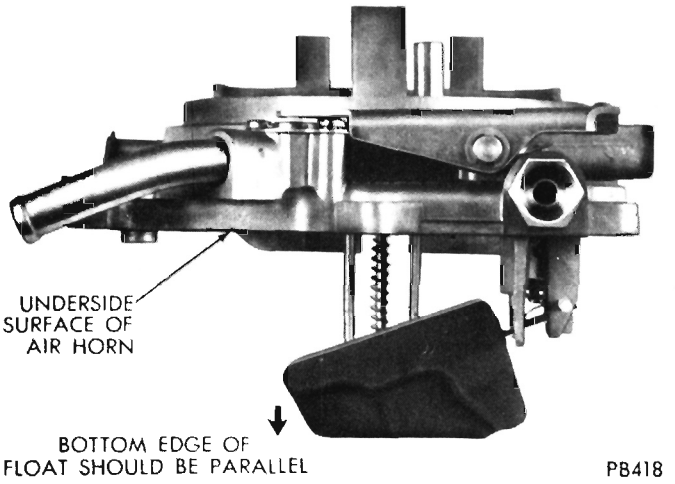


Fig. 21 - Checking Float Drop

(1) To correctly set float height when carburetor is being overhauled, proceed as follows:

(2) Invert air horn so that weight of float only is forcing needle against seat.

(3) Measure the clearance between top of float and float stop. (Fig. 19). The clearance should be .200 inch ± 1/64 (7 drill). Be sure drill or gauge is perfectly level when measuring.

If an adjustment is necessary, bend float lip toward or away from needle, using a narrow blade screwdriver (Fig. 20), until correct clearance of setting has been obtained.

(4) Check float drop, by holding air horn in an upright position. The bottom edge of float should be parallel to underside surface of air horn. (Fig. 21). If an adjustment is necessary, bend tang on float arm until parallel surfaces have been obtained.

Installing Air Horn

(1) Place a new gasket on air horn, then check

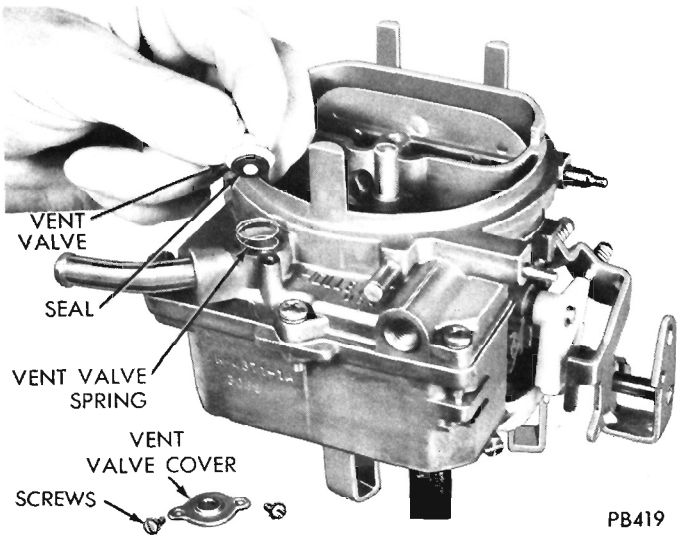


Fig. 22 - Installing Vent Valve, Seal and Cover

to be sure main well tubes are straight. Lower air horn straight down on main body; guiding accelerator pump plunger into its cylinder. **Caution: Do not cut lip on plunger on sharp edge of cylinder.** Install attaching screws (long screw in center) and tighten to 25 inch pounds (Fig. 6).

(2) Install fuel inlet tube fitting and gasket in air horn and tighten securely.

(3) Engage hooked end of accelerator pump rod in throttle lever (hook end toward outside). Engage other end of rod in center slot of pump rocker arm. (Fig. 2).

(4) Install rocker arm on accelerator pump shaft with flats in alignment. (Fig. 2). Install attaching lockwasher and nut. Tighten securely.

(5) Install seal on bottom of vent valve. Slide plastic valve and seal into cover, with valve

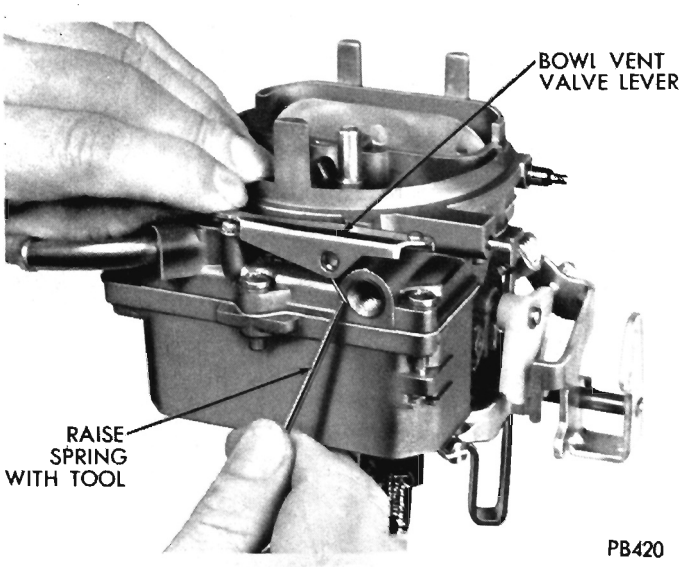


Fig. 23 - Installing Bowl Vent Valve Lever and Spring

recess, mating with shoulder on underside of cover.

(6) Install bowl vent valve spring in position in opening in bowl, then install valve and cover over spring. Install attaching screws and tighten securely (Fig. 22).

(7) Install bowl vent valve lever on air horn, by first inserting spring into position in arm, with end of spring pointing toward fuel inlet fitting. (Fig. 23). Slide assembly over stub shaft on air horn. Align spring and arm with stub shaft and end of spring over raised portion of fuel inlet fitting. Install "E" slip to secure. Vent valve should be in closed position.

(8) Install fast idle cam on air horn stub shaft, with steps toward fast idle adjusting screw. Install "E" clip to secure. (Fig. 15).

(9) To install fast idle connector rod, engage plain end in slot of fast idle cam (from inside). Engage other end of rod in choke lever. With choke valve wide open, slide lever over choke shaft; (aligning flats) and pointing directly to fast idle cam stub shaft. (Fig. 3). Install attaching lockwasher and nut. Tighten securely.

Choke Vacuum Diaphragm

Inspect the diaphram vacuum fitting to be sure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the fitting to seal the opening. Release the stem. If the stem moves more than 1/16 inch in 10 (ten) seconds, the leakage is excessive and the assembly must be replaced.

Install choke diaphragm assembly on the air horn as follows:

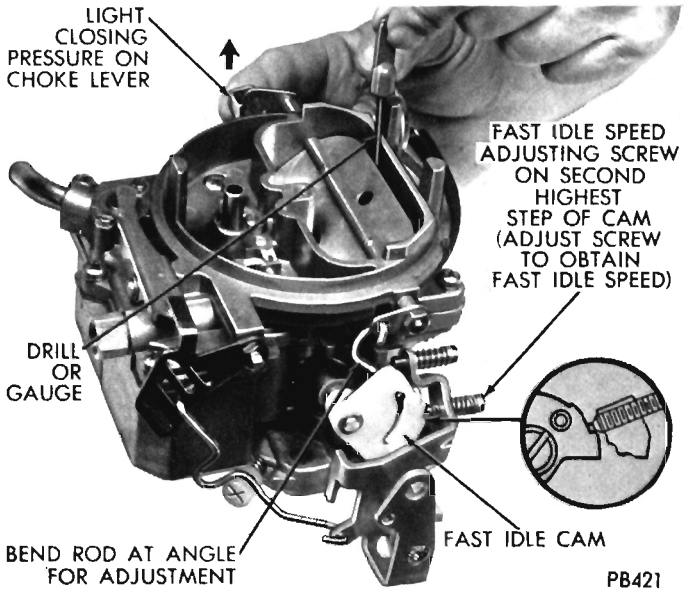


Fig. 24 - Fast Idle Cam Position Adjustment

(1) Engage free end of choke operating link in slot of choke lever.

(2) Install choke diaphragm and mounting bracket on air horn. Install attaching screws and tighten securely.

(3) Inspect rubber hose for cracks before placing it on correct carburetor fitting, (Fig 1) after vacuum kick adjustment has been made.

CARBURETOR ADJUSTMENTS

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (on Vehicle) paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each step of the cam occur at the proper time during engine warm-up.

(1) With fast idle speed adjusting screw contacting second highest speed step on the fast idle cam, move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill (see Specifications) between top of choke valve and wall of air horn. (Fig. 24) An adjustment will be necessary if a slight drag is not obtained as drill shank is being removed.

(3) If an adjustment is necessary, bend fast idle connector rod at angle, using Tool T109-213, until correct valve opening has been obtained.

Vacuum Kick Adjustment—(This test can be made On or Off vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It posi-

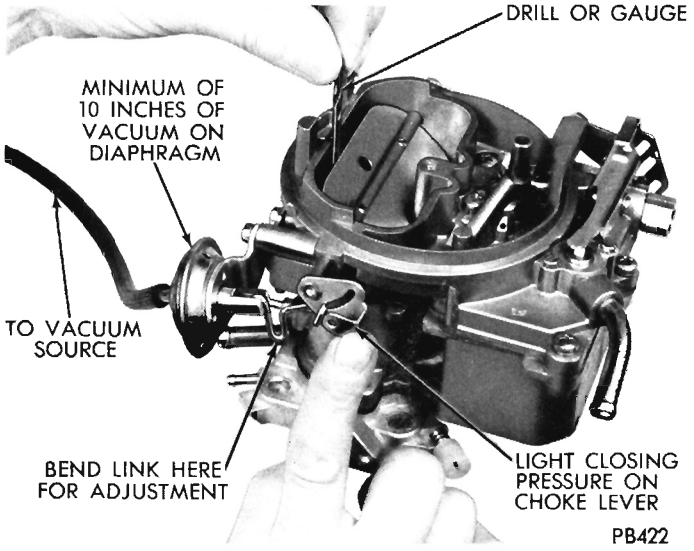


Fig. 25 - Adjusting Vacuum Kick

tions the choke valve within the air horn by action of the linkage betwen the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum with a kick adjustment. Use either a distributor test machine with a vacuum source, or vacuum supplied by another vehicle.

(1) If adjustment is to be made with engine running, disconnect fast idle linkage to allow choke to close to the kick position with engine at curb idle. If an auxiliary vacuum source is to be used, open throttle valves (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply, with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which can damage the system. Apply a vacuum of 10 or more inches of mercury.

(3) Insert specified drill (refer to Specifications) between top of choke valve and wall of air horn (Fig. 25). Apply sufficient closing pressure on lever to which choke rod attaches to provide a minimum choke valve opening, without distortion of diaphragm link. Note that the cylindrical stem of diaphragm will extend as internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly.

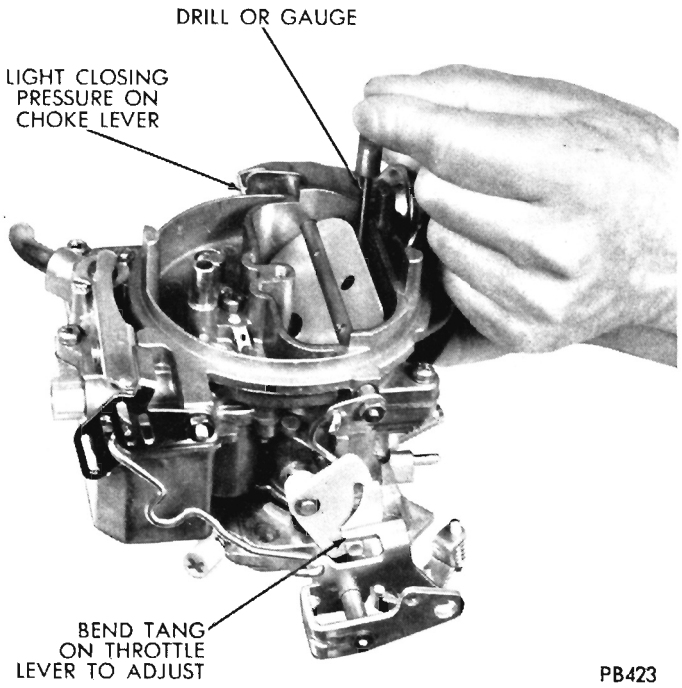


Fig. 26 - Choke Unloader Adjustment (Wide Open Kick)

CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle linkage to its original condition if disturbed as suggested in Step No. 1.

(6) Make following check. With no vacuum applied to diaphragm, the **choke valve should move freely** between open and closed positions. If movement is not free, examine linkage for misalignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

Choke Unloader (Wide Open Kick)

The choke unloader is a mechanical device to partially open the choke valve at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have flooded or stalled by excessive choke enrichment can be cleaned by use of the unloader. Adjust the choke unloader as follows:

(1) Hold throttle valves in wide open position. Insert specified drill (see Specifications) between upper edge of choke valve and inner wall of air horn. (Fig. 26)

(2) With a finger slightly pressing against shaft lever, a slight drag should be felt as drill is being withdrawn. If an adjustment is necessary, bend unloader tang on throttle lever until correct opening has been obtained. (Fig. 26) Use Tool T109-213.

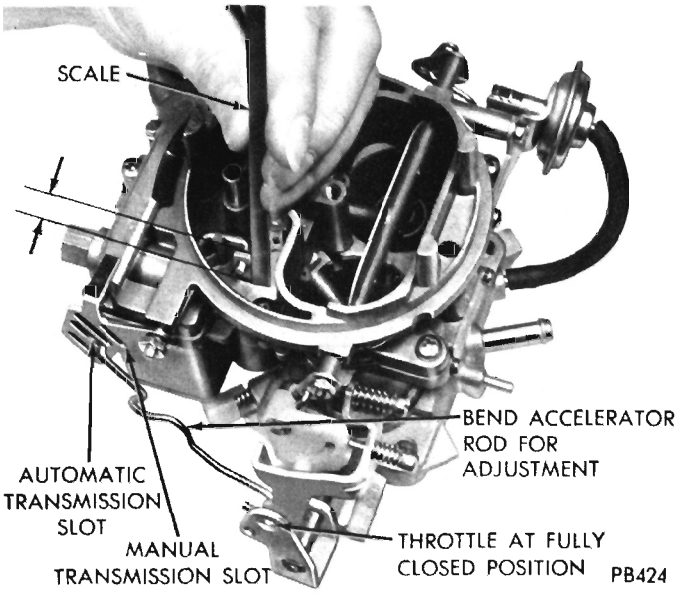


Fig. 27 - Accelerator Pump Adjustment

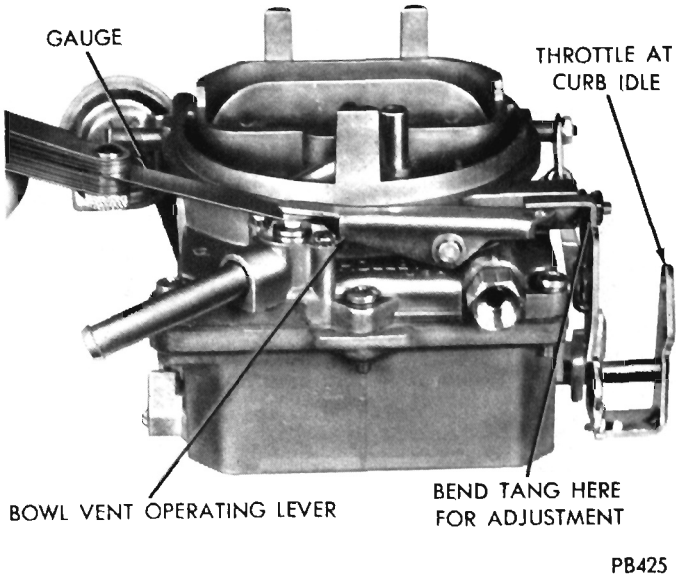


Fig. 28 - Adjusting Bowl Vent

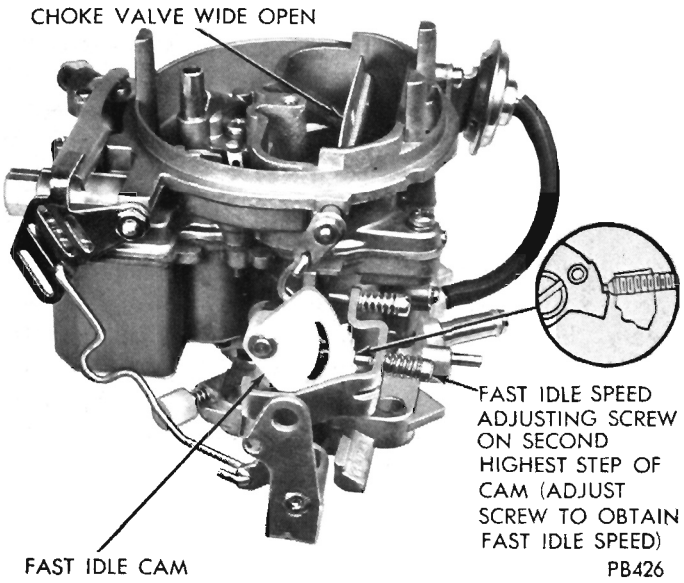


Fig. 29 - Fast Idle Speed Adjustment (On Vehicle)

Accelerator Pump

(1) Back off curb idle speed adjusting screw. Open choke valve so that fast idle cam allows throttle valves to be completely seated in bores. Be sure that pump connector rod is installed in correct slot of accelerator pump rocker arm. (First slot (next to attaching screw) for manual transmission).

(2) Close throttle valves tightly. Measure the distance bewtween top of air horn and end of plunger shaft, (Fig. 27) See specifications.

(3) To adjust pump travel, bend pump operating rod, using Tool T-109-213, at loop of rod, until correct setting has been obtained.

Checking Bowl Vent Valve Clearance

To check the bowl vent valve clearance adjustment, proceed as follows:

(1) With the throttle valves at curb idle, it should be possible to insert a .015 inch gauge between the bowl vent valve plunger stem and operating rod (Fig. 28).

(2) If an adjustment is necessary, bend the tang on pump lever to change arc of contact with throttle lever, using Tool T-109-213, until correct clearance has been obtained.

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section).

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction stalls, after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With the engine off and transmission in **PARK** or **NEUTRAL** position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest speed step of fast idle cam (Fig. 29).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw **in** or **out** to secure specified speed. (See Specifications).

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to pro-

vide correct throttle closing torque.

To set idle speed on vehicles, refer to Fuel System General Information Paragraph.

BBD SERIES CARBURETORS (1-1/2 IN.)

INDEX

	Page
Automatic Choke (well type)	1
Carburetor Adjustments	63
Accelerator Pump and Bowl Vent	63
Choke Vacuum Kick	63
Fast Idle Cam Position	63
Fast Idle Speed (On Vehicle)	65
Choke Unloader (Wide Open Kick)	64
Idle Speed Adjustment	65
Cleaning Carburetor Parts	2
Disassembling Carburetor	60
Inspection and Reassembly	61
Specifications	137

GENERAL INFORMATION

The Ball and Ball dual throat 1-1/2 inch carburetor models BBD-4961S and BBD-4962S are used on the 383 cu. in. engines when the vehicles are equipped with manual and automatic transmissions respectively (Fig. 1). Both of these carburetors are equipped with a hot idle compensator valve which is a thermostatically operated air bleed to relieve an overrich condition at idle. This condition is the result of excessive heat. These two carburetors are also equipped with a distributor ground switch, which retards the distributor when the carburetor is at curb idle, for better emission control.

Since the service procedures are identical on all BBD carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

The Ball and Ball carburetor is of the dual downdraft type. Each throat has its own throttle valve and main metering systems and are supplemented by the float, accelerating, idle and power systems.

On each BBD series carburetor, the model num-

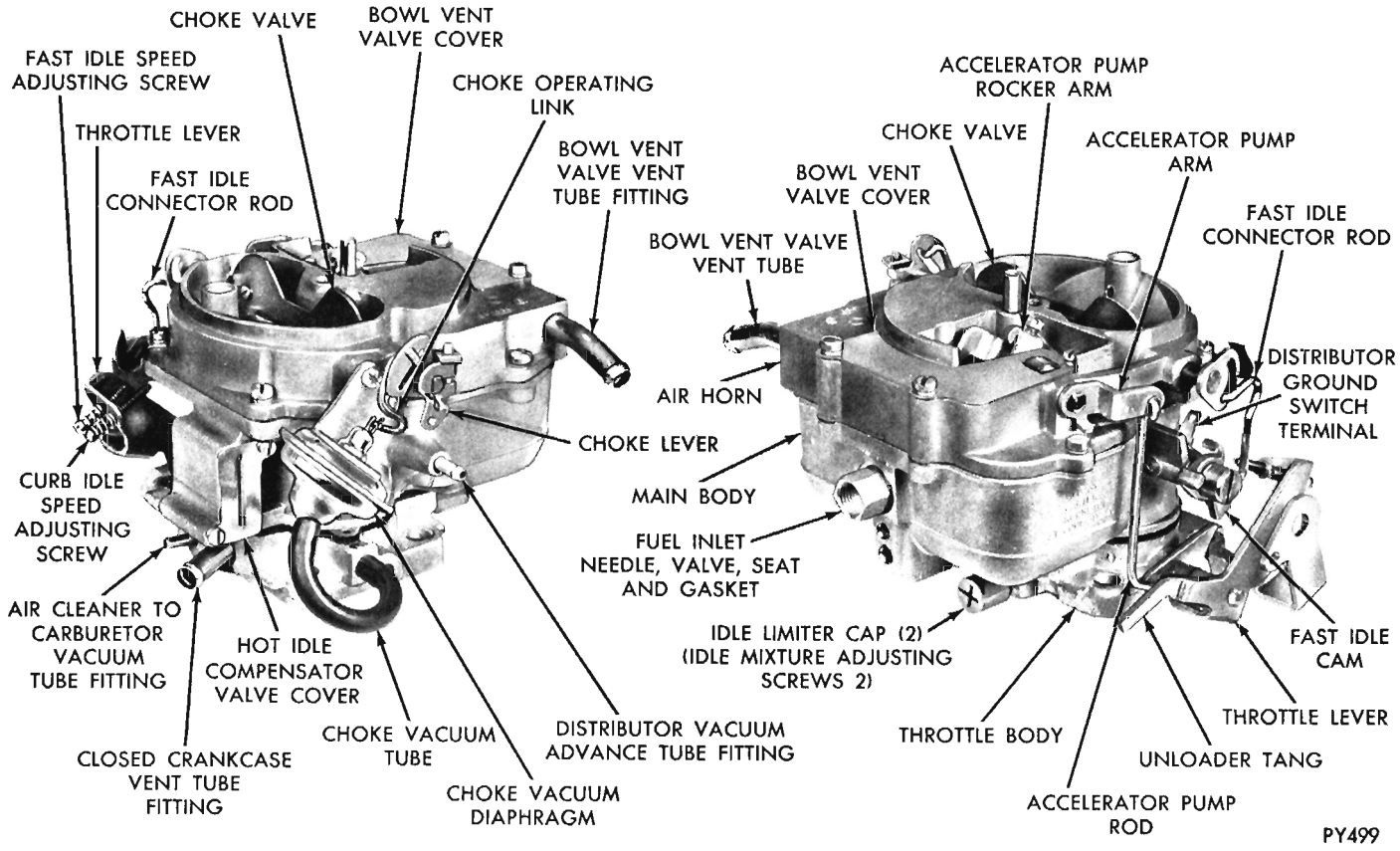


Fig. 1 - Carburetor Assembly (1-1/2 inch BBD)

ber is stamped on metal tag attached to air horn. Do not remove or destroy this tag, as it is the only means provided for carburetor model identification. Before attempting to repair or overhaul carburetor, refer to model number and secure a repair kit for number indicated on tag.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR

(1) Insert three Tool T109-287S and one Tool T-109-288S elevating legs through carburetor throttle body stud holes. These tools are used to protect throttle valves from damage and to provide a suitable base for working.)

(2) Remove hairpin clips and disengage fast idle connector rod from fast idle cam and choke lever.

(3) Remove hairpin clip and disengage accelerator rod from throttle lever and pump rocker arm.

(4) Remove vacuum hose between carburetor throttle body fitting and vacuum diaphragm.

(5) Remove clip from choke operating link and disengage link from diaphragm plunger and choke lever (Fig. 1).

(6) Remove vacuum diaphragm and bracket assembly and place to one side, to be cleaned as a special item. **A liquid cleaner may damage the diaphragm material.**

(7) Remove screws that attach hot idle compensator valve cover to main body. Remove cover and lift out hot idle compensator valve and gasket. (Fig. 2).

(8) Remove air horn retaining screws and lift air horn straight up and away from main body. Discard gasket (2 screws recessed).

(9) Disengage accelerator pump plunger from accelerator pump arm by pushing up on bottom of plunger and sliding plunger shaft off hook. Slide plunger out of air horn and remove compression spring and seat. Remove bowl vent valve cover.

If old plunger can be used again or if a new plunger is to be installed, place plunger in a jar of clean gasoline or kerosene to prevent leather from drying out.

(10) Remove fuel inlet needle valve, seat and gasket from main body.

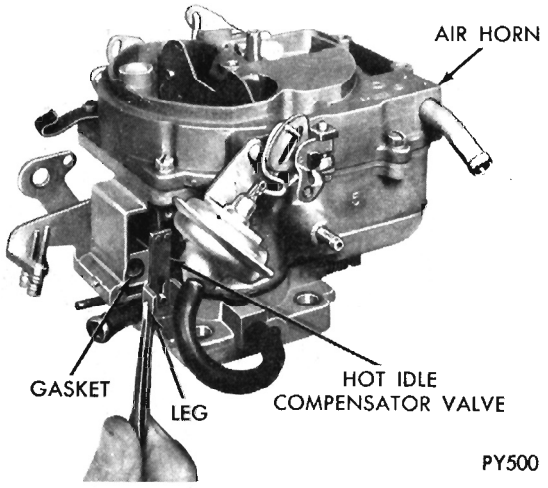


Fig. 2 - Removing or Installing Hot Idle Compensator Valve

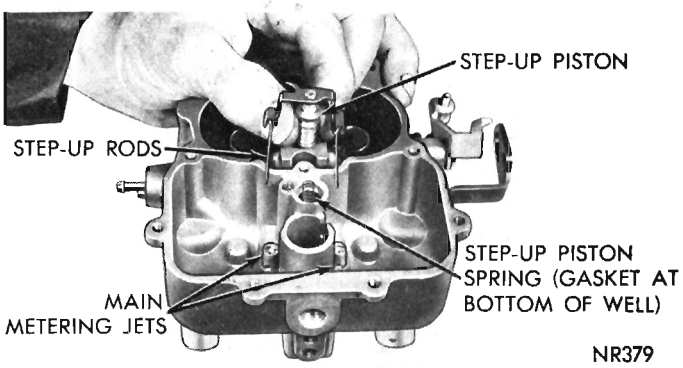


Fig. 3 - Removing or Installing Step-up Piston

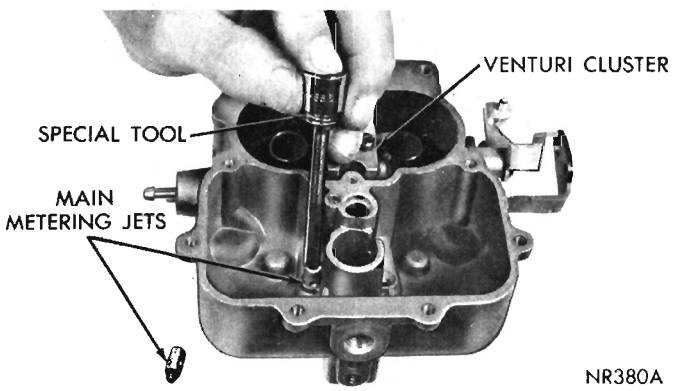


Fig. 4 - Removing or Installing Main Metering Jets

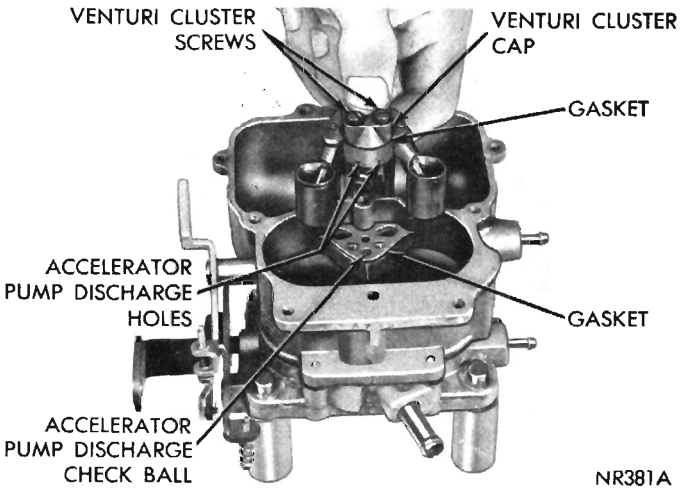


Fig. 5 - Removing or Installing Venturi Cluster

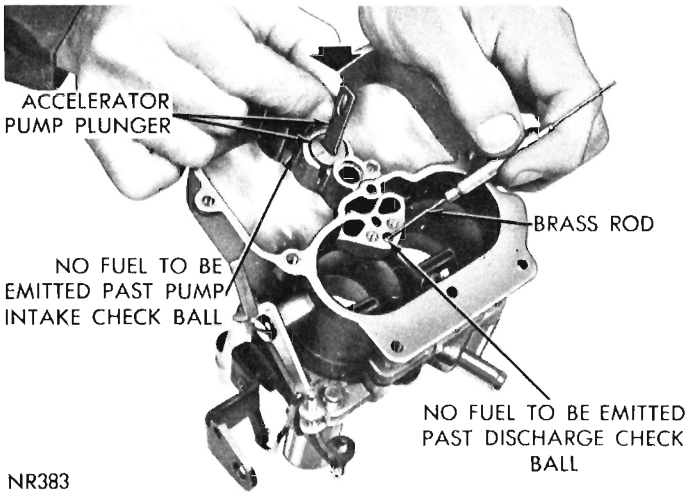


Fig. 6 - Testing Accelerator Pump Intake and Discharge Check Balls

(11) Lift out float fulcrum pin retainer, and lift out floats and fulcrum pin.

(12) Remove step-up piston and retaining screw and slide step-up piston and rods out of well, (Fig 3). Lift out step-up piston spring. Remoe step-up piston gasket from bottom of well.

(13) Remove main metering jets (Fig. 4).

(14) Remove venturi cluster screws, then lift venturi cluster and gaskets up and away from main body, (Fig. 5). Discard gaskets. **Do not remove idle orifice tubes or main vent tubes from cluster**. They can be cleaned in a solvent and dried with compressed air.

(15) Invert carburetor and drop out accelerator pump discharge check ball and intake check ball. (The intake check ball is the largest.)

(16) Remove screws that attach throttle body to main body. Separate the bodies and discard gasket.

(17) Remove plastic limiter caps from idle air mixture screws. (Be sure and count number of turns to seat the screws, as the same number of turns (from the seat) must be maintained at installation.) Remove screws and springs from throttle body.

The carburetor now has been disassembled into three sub-assemblies, the air horn, main body and throttle body and the components of each disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shaft or valves from the throttle body, unless wear or damage necessitates the installation of new parts.

There is about .005 inch clearance between the throttle shaft and the throttle shaft bores in the throttle body. Any clearance over .010 inch, a new throttle shaft and/or throttle body should be installed.

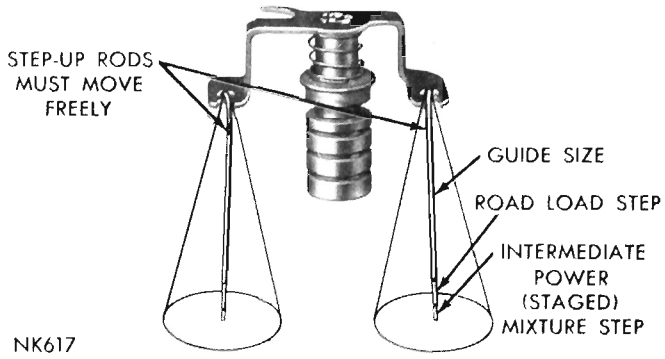


Fig. 7 - Step-up Rods Free Play

INSPECTION AND ASSEMBLY

Throttle Body

(1) Inspect the throttle shaft and throttle body for excessive wear. If either or both are worn to the point where the carburetor operation will be affected, replace as required.

(2) Install idle mixture screws and springs in body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) **DO NOT USE A SCREWDRIVER**. Turn screws lightly against their seats with fingers. Back off the number of turns counted at disassembly. Install new plastic caps bith tab against stop.

Main Body

(1) Invert main body and place a new gasket in position and place throttle body on main body and align. Install screws and tighten securely.

(2) Install accelerator pump discharge check ball in discharge passage and check accelerator pump system; fuel inlet and discharge check balls as follows:

(3) Pour clean gasoline into carburetor bowl, approximately 1/2 inch deep. Remove pump plunger from jar of gasoline, flex leather several times, then slide down into pump cylinder. Raise plunger and press lightly on plunger shaft to expel all air from pump passage.

(4) Using a small clean brass rod, hold discharge check ball down firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either intake or discharge passage, (Fig. 6).

If any fuel does emit from either passage, it indicates the presence of dirt or a damaged check ball seat. Check the passage again and repeat test. If leakage is still evident, install a new check ball. The fuel inlet check ball is located at the bottom of the plunger well.

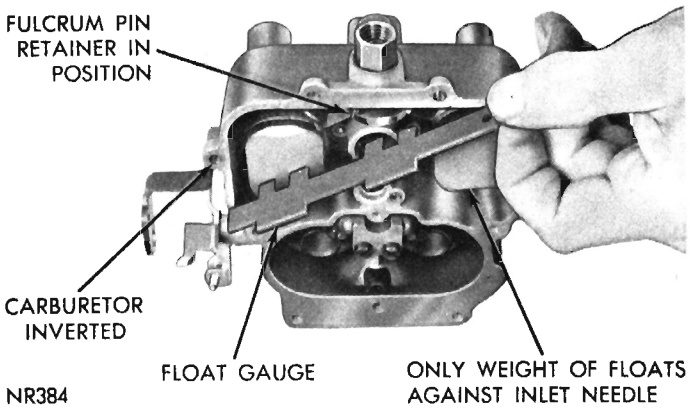


Fig. 8 - Checking Float Setting

(5) Install new gaskets on venturi cluster, and install in position in main body. Install cluster screws and tighten securely. Test pump discharge by pressing pump plunger down. Two fine streams of fuel should be forced from cluster. If either stream is restricted or diverted, remove cluster and reclean. After test pour fuel from the bowl and remove pump plunger. (Fig. 5).

(6) Install main metering jets. Tighten securely. (Fig. 4).

(7) Before installing step-up piston, be sure step-up rods are able to move freely, each side of the vertical position, (Fig. 7). The step-up rods must be straight, smooth and free to move forward and backward from vertical.

(8) Slide step-up piston gasket down into position in piston well, then install the step-up piston spring, step-up piston and rods. Carefully guide step-up rods into main metering jets (Fig. 3). Install retaining screw and tighten securely. Check piston for free operation in well.

A step-up piston stuck in the **Up** position will cause a rich mixture at part throttle, whereas a piston stuck in the **Down** position will cause a lean mixture at wide open throttle and poor acceleration.

Measuring Float Setting

The carburetors are equipped with a rubber-tipped fuel inlet needle. The rubber tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding. Care should be taken to perform this operation accurately in order to secure the best performance and fuel economy.

(1) To correctly set float height when carburetor is being overhauled, install floats with fulcrum pin and pin retainer in main body.

(2) Install rubber-tipped needle, seat and gasket in body and tighten securely.

(3) Invert main body so that weight of float only is forcing needle against seat. Hold finger aginst retainer to fully seat fulcrum pin.

(4) Using Tool T-109-280 or a "T" scale, measure float, (Fig. 8). There should be 5/16 inch from surface of fuel bowl to crown of each float at center.

If an adjustment is necessary, hold the floats on bottom of the bowl and bend float lip toward or away from needle. Recheck the 5/16 inch setting again and repeat the lip bending operation as required.

CAUTION: When bending the float lip, do not allow the lip to push against the needle as the synthetic rubber tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in the bowl.

After being compressed, the tip is very slow to recover its original shape.

CAUTION: It is very important that the float lip be perpendicular to the needle or slanted not more than ten degrees away from the needle when the float height is correct.

Air Horn

(1) Test freeness of choke mechanism in air horn. The choke shaft must float free to operate correctly. If choke shaft sticks in bearing areas, or appears to be gummed from deposits in air horn, a thorough cleaning will be required.

(2) Remove accelerator pump plunger from gasoline, slide compression spring and spring seat over shaft. Install assembly in air horn and engage with accelerator pump arm.

(3) Place a new gasket on main body, and install air horn. Install attaching screws and tighten securely. (When installing air horn, be sure leather on plunger does not wrinkle or fold back.)

(4) Engage accelerator pump rod with pump rocker arm and install loose end in outer hole of throttle lever. Install hairpin clip to secure (Fig. 1).

(5) Engage fast idle connector rod (loop at top) in fast idle cam and in slotted choke lever. Install retaining clips to secure.

(6) Install hot idle compensator valve gasket in position in recess in main body, followed by valve. (Be sure valve is positioned with legs toward outside of main body.) (Fig. 2) Place cover over opening and install attaching screws. Tighten securely.

Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to be sure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the fitting to seal the opening. Release the stem. If the stem moves more than 1/16 inch in ten (10) seconds, the leakage is excessive and the assembly

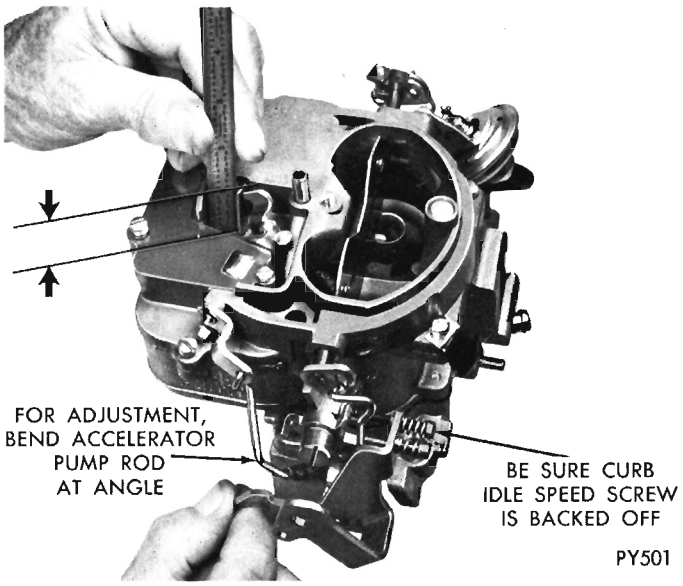


Fig. 9 - Adjusting Accelerator Pump Stroke

must be replaced.

Install the diaphragm assembly on the air horn as follows:

(1) Assembly diaphragm to air horn and tighten attaching screws securely.

(2) Install choke operating link in position between diaphragm plunger (stem) and choke lever. Install clip to secure.

(3) Inspect rubber hose for cracks before placing it on correct carburetor fitting. (Fig. 1). Do not connect vacuum hose to diaphragm fitting until after vacuum kick adjustment has been made. (See Carburetor Adjustments.)

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments are made on a reconditioned carburetor and in the sequence listed:

Accelerator Pump

(1) Open choke valve so that fast idle cam allows throttle valves to close (curb idle). Be sure that pump connector rod is installed in outer hole of throttle lever.

(2) Close throttle valves tightly. Measure the distance between top of air horn and end of plunger shaft, (Fig. 9). This measurement should be 1.00 inch.

(3) To adjust pump travel, bend pump operating rod using Tool T-109-213, at lower angle of rod, until correct setting has been obtained.

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (On the Vehicle) Paragraph. However, the Fast Idle Cam Position Adjustment

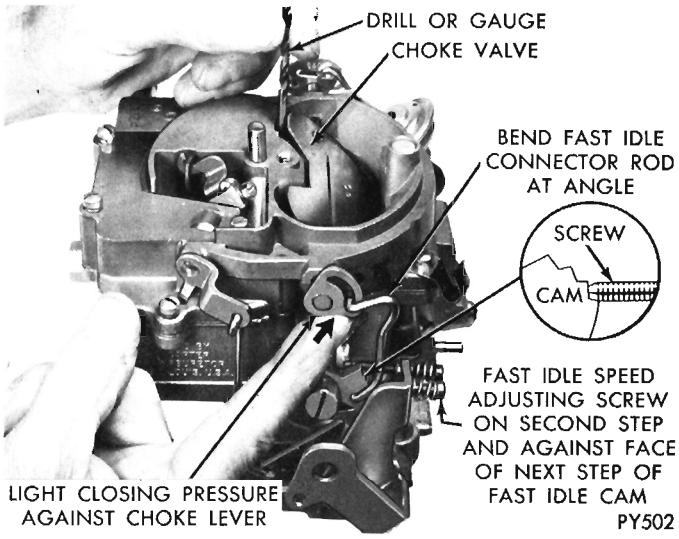


Fig. 10 - Fast Idle Cam Position Adjustment

can be made on the bench. This adjustment is important to assure that the speeds of each step of the cam occur at the proper time during engine warm-up.

(1) With fast idle speed adjusting screw contacting second highest speed step on fast idle cam, move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill (see specifications) between choke valve and wall of air horn. An adjustment will be necessary if a slight drag is not obtained as drill is being removed.

(3) If an adjustment is necessary, bend fast idle connector rod at lower angle, using Tool T-109-213, until correct valve opening has been obtained. (Fig. 10).

Vacuum Kick Adjustment—(This test can be made ON or OFF vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by action of the linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or vehicle to be adjusted.

(1) If adjustment is to be made with engine running, disconnect fast idle linkage to allow choke to close to the kick position with engine at curb idle. If an auxiliary vacuum source is to be used, open throttle valves (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum suuply with a small length of tube to act as a fitting. Removal of hose

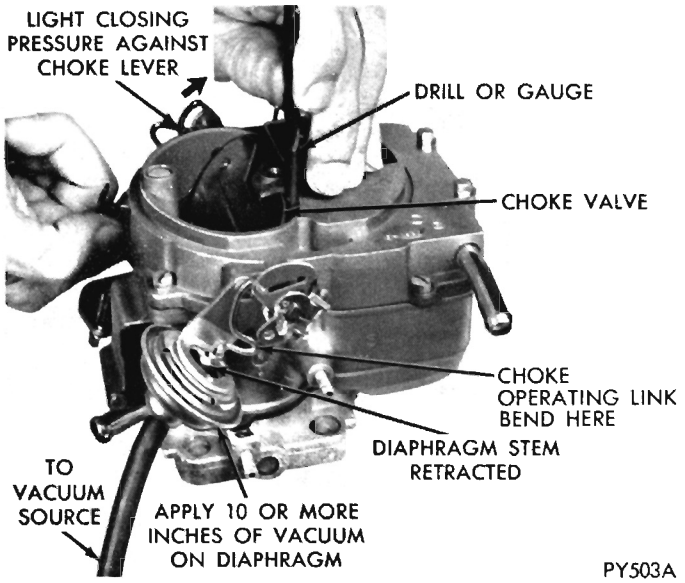


Fig. 11 - Adjusting Choke Vacuum Kick

from diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches of mercury.

(3) Insert specified drill (refer to Specifications) between choke valve and wall of air horn (Fig. 11). Apply sufficient closing pressure on lever to which choke rod attaches to provide a minimum choke valve opening without distortion of diaphragm link. Note that the cylindrical stem of diaphragm will extend as internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle linkage to its original condition if disturbed as suggested in Step No. 1.

(6) Make following check. With no vacuum applied to diaphragm, the **CHOKE VALVE SHOULD MOVE FREELY** between open and closed positions. If movement is not free, examine linkage for misalignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

Choke Unloader (Wide Open Kick)

The choke unloader is a mechanical device to partially open the choke valve at wide open throttle. It is used to eliminate choke enrichment

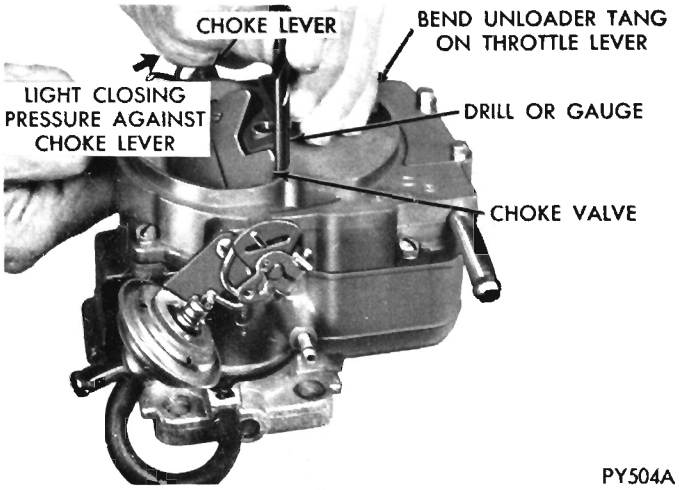


Fig. 12 - Adjusting Choke Unloader

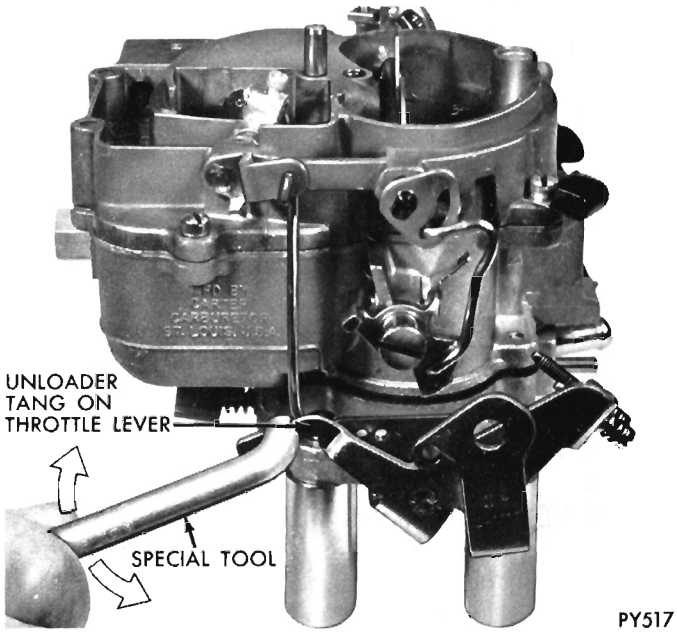


Fig. 13 - Bending Choke Unloader Tang

during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the choke unloader as follows:

(1) Hold throttle valves in wide open position. Insert specified drill (see Specifications) between upper edge of choke valve and inner wall of air horn. (Fig. 12).

(2) With a finger lightly pressing against shaft lever, a slight drag should be felt as drill is being withdrawn. If an adjustment is necessary, bend unloader tang on throttle lever until correct opening has been obtainted. (Fig. 13). Use Tool T109-214.

Bowl Vent Adjustment

(1) Open choke valve so that fast idle cam al-

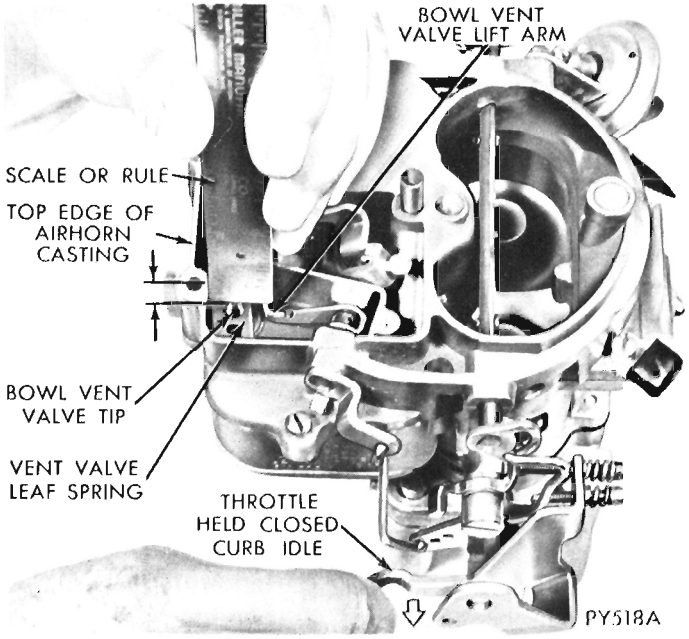


Fig. 14 - Measuring Bowl Vent Valve Opening

lows valves to close, (curb idle).

(2) Be sure that pump operating rod is in long stroke hole in throttle lever. Remove bowl vent valve cover if not previously done.

(3) Close throttle valves tightly. Using a narrow ruler, measure the distance from top of bowl vent valve (rubber tip) to top of air horn casting. (Fig. 14). This measurement should be 5/32 inch.

(4) If an adjustment is necessary, bend bowl vent lift arm, using a suitable tool, until correct opening has been obtained. **(WARNING: DO NOT BEND BOWL VENT VALVE LEAF SPRING DURING BENDING OPERATION OR IMPROPER VENT VALVE OPERATION WILL RESULT.) Install bowl vent valve cover and secure with attaching screws.**

Idle Speed Adjustment (Curb Idle)

(Refer to General Information at Front of Section).

Measuring Float Setting (On Vehicle)

(1) Remove hairpin clip and disengage accelerator pump rod from throttle lever and pump rocker arm. Disconnect automatic choke rod by unsnapping clip.

(2) Remove air horn attaching screws and lift air horn straight up and away from main body. Remove gasket.

(3) Set float fulcrum pin by pressing a finger against fulcrum pin retainer.

There should be enough fuel in the bowl to raise floats so that the lip bears firmly against needle. Additional fuel may be admitted by slightly depressing float. If fuel pressure in the line is insufficient to force additional fuel into bowl, add necessary fuel from a clean container.

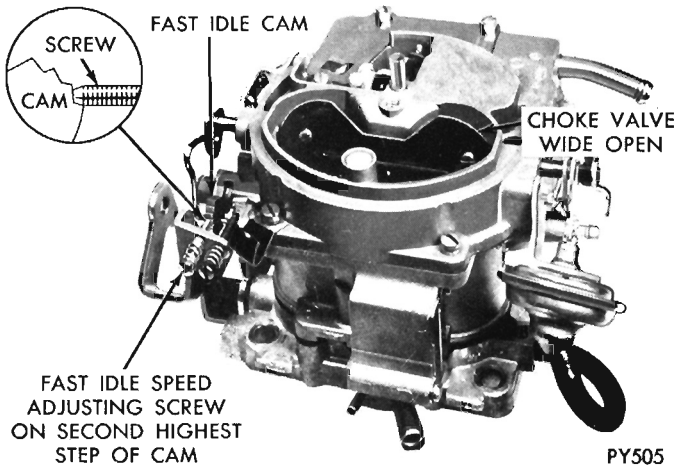


Fig. 15 - Fast Idle Speed Adjustment (On Vehicle)

WARNING: Since the manifold may be hot, it is dangerous to spill fuel onto these surfaces. Take the necessary precautions to avoid spillage.

(4) With only pressure from buoyant float holding lip against inlet needle, check float setting, using Tool T-109-280, or a "T" scale. There should be 5/16 inch from surface of bowl (gasket removed) to crown of floats at center.

If an adjustment is necessary, hold floats on the bottom of the bowl, then bend the float lip toward or away from the needle. Recheck the 5/16 inch setting again, then repeat the lip bending operation as required. **When bending the float lip, do not allow the lip to push against the needle as the rubber tip can be compressed sufficiently to cause a false setting.**

(5) After float has been correctly set, reassemble the air horn.

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in PARK or NEUTRAL position, open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on second highest-speed step of fast idle cam (Fig. 15).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw in or out to secure specified speed. (See Specifications.)

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed

screw on cam after each speed adjustment to provide correct throttle closing torque.

To set the idle speed on vehicles, refer to Fuel System General Information Paragraph.

HOLLEY 4160 CARBURETOR

INDEX

	Page
Automatic Choke-Well Type	1
Carburetor Adjustments	80
Adjusting the Floats	78
Checking Bowl Vent Valve Clearance	80
Checking Pump Lever Clearance	80
Checking Wet Fuel Level	83
Choke Unloader (Wide Open Kick)	81
Fast Idle Cam Position	81
Fast Idle Speed (On or Off Vehicle)	81
Idle Speed (Curb Idle)	83
Idle Speed Solenoid Adjustment (Fast curb Idle)	83
Secondary Throttle	82
Vacuum Kick (On or Off Vehicle)	82
Disassembling the Carburetor	73
Cleaning Carburetor Parts	76
General Information	66
Inspection and Reassembly	76
Servicing Carburetor	2
Specifications	137

GENERAL INFORMATION

383 Cubic Inch Engine

The Holley four barrel carburetor models R-6191A and R-4668A are used on the 383 cubic inch engines when the vehicles are equipped with manual or automatic transmissions respectively. These two carburetors are used with a **Heated Air Intake System**.

The Holley four barrel carburetor models R-6193A and R-4735A are used on the 383 cubic inch engines when the vehicles are equipped with manual or automatic transmissions respectively. These two carburetors are used with a **Fresh Air Intake System**.

The R-6191A and R-6193A carburetors are equipped with an idle speed solenoid which is used to maintain a higher idle speed when the engine is running and allows the throttle to close to a low idle speed throttle position when the ignition key is turned off, to prevent "after running".

The solenoid plunger has a distributor ground switch, activated by the fast curb idle speed screw, which retards the distributor for better emission control. (Fig. 1).

The R-4668A and R-4735A carburetors have a distributor ground switch, retained by the curb idle adjusting screw, activated by the throttle lever at curb idle, which retards the distributor for better emission control. (Fig. 2).

All of the above carburetors have a hot idle compensator valve. This valve is a thermostatically operated air bleed, to relieve an overrich condition at idle in case of abnormal temperature.

Since the service procedures are identical on all Holley four barrel carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

The Holley 4160 Series Carburetor (Figs. 1, 2 and 3) can be considered as two dual downdraft carburetors mounted side by side, each having its own fuel bowl and float system. The two fuel bowls insure a constant supply of fuel for all the fuel metering systems. Fuel from the bowls flow into the primary and the secondary metering bodies where the fuel is mixed with air for all phases of engine operation. This type of metering provides for adequate diagnosis and easier servicing.

The two primary bores have one choke valve, connected to a well type automatic choke. Each bore has its own venturi, booster venturi, main fuel discharge nozzle and throttle valve.

Additional fuel for acceleration is supplied by a diaphragm type, mechanically operated pump which is located on the primary fuel bowl. The pump is actuated from a cam on the primary throttle. An override spring on the pump operating lever prolongs the discharge of fuel for smoother acceleration.

A power valve, mounted on the primary metering body, which is actuated by manifold vacuum, delivers the additional fuel necessary for full power and high speed operation.

The larger volume of fuel, in two separate bowls exposed to the cooling air stream, is an effective means of reducing percolation and hard starting when the engine is hot. An external vent on the primary bowl, vents the primary fuel bowl when the throttle is closed.

The primary and/or secondary bowls can be quickly removed to adjust the fuel level or change the fuel inlet valve without removing the carburetor from the engine.

Primary Fuel Inlet System

All fuel first enters the primary fuel bowl which supplies the four basic metering systems with the required amount of fuel (Fig. 4).

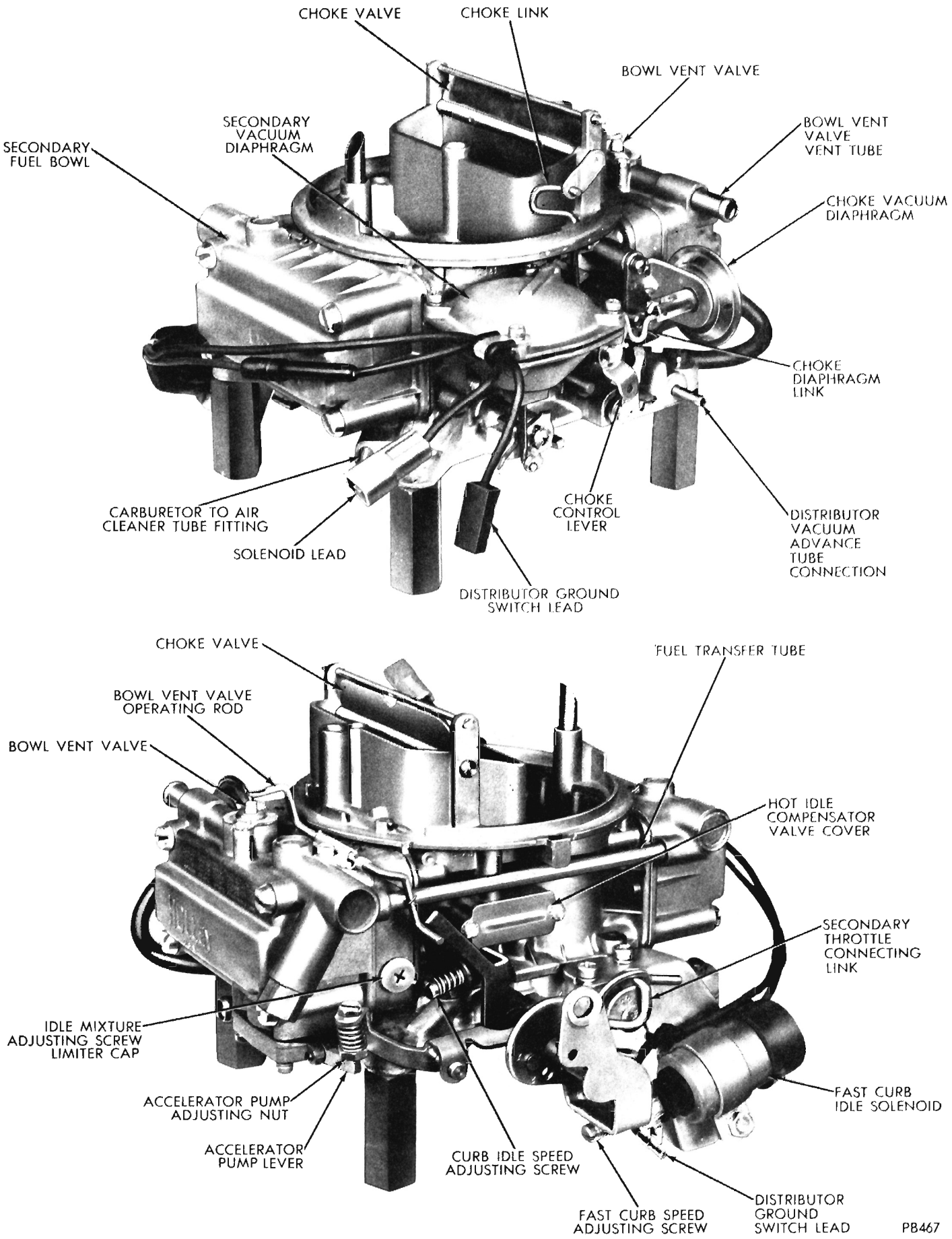


Fig. 1 - Carburetor Assembly (Manual Transmission)

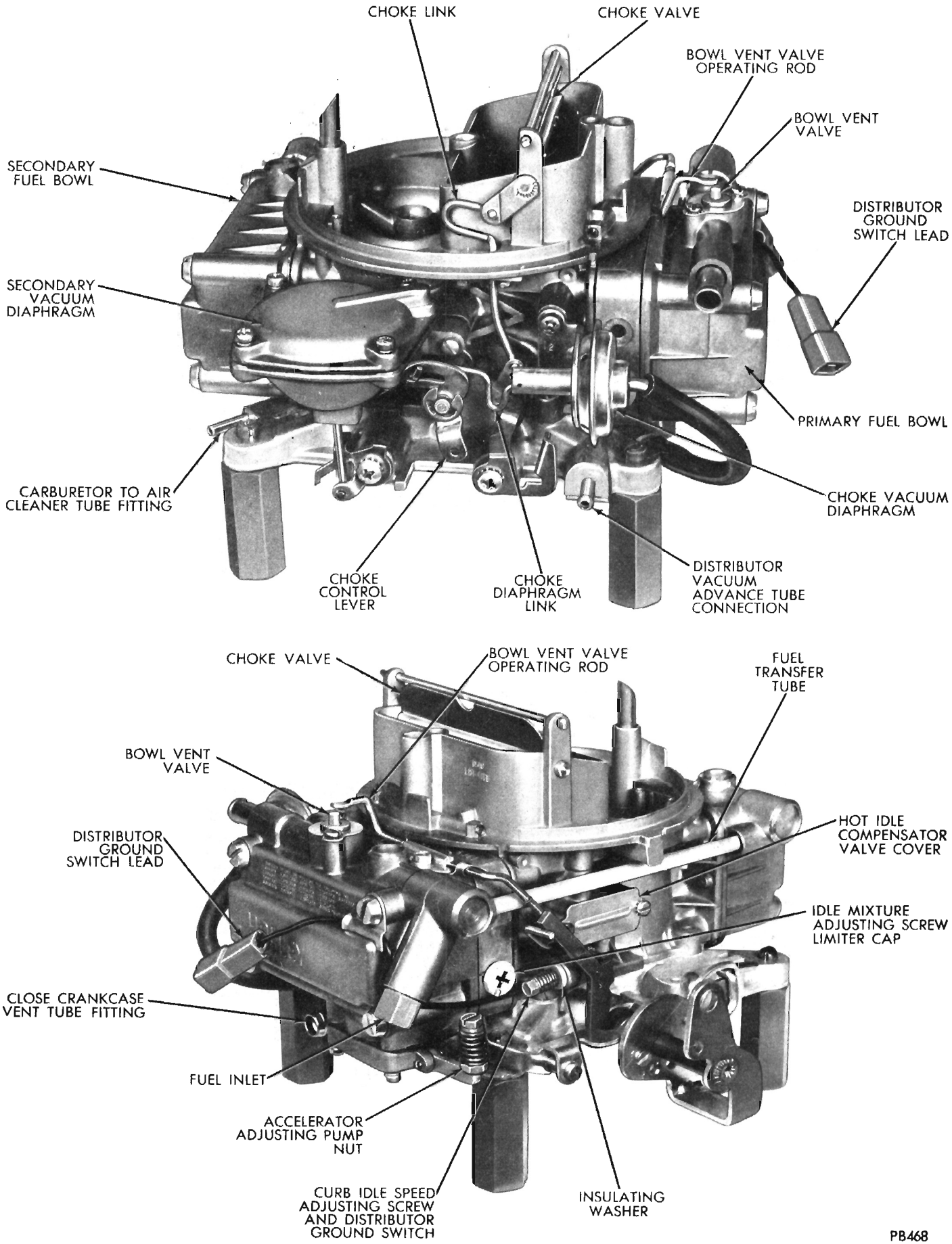


Fig. 2 - Carburetor Assembly (Automatic Transmission)

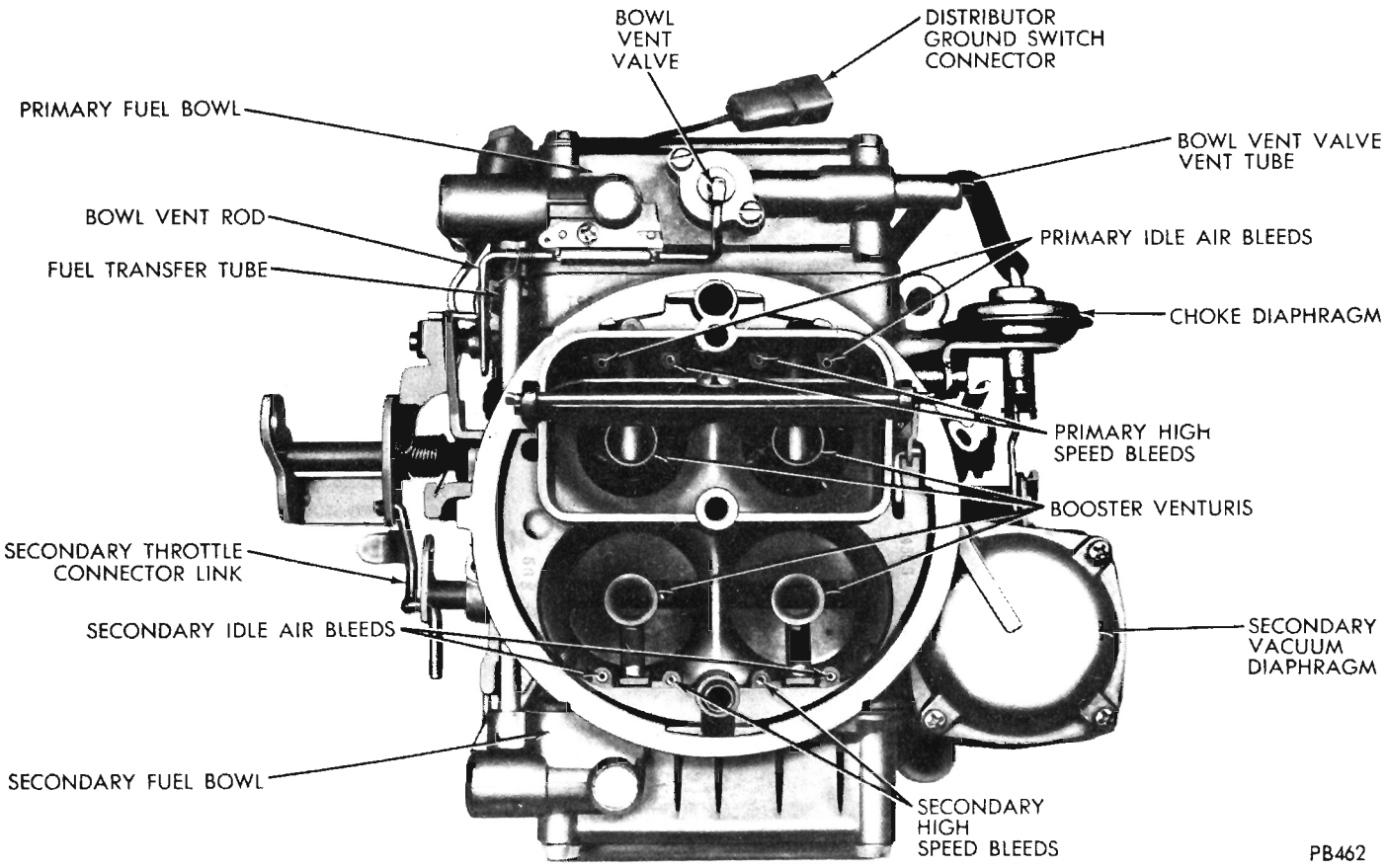


Fig. 3 - Carburetor Assembly (Top View)

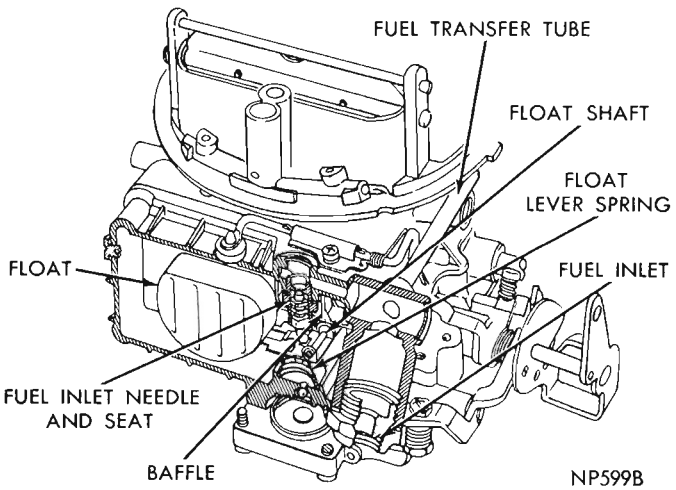


Fig. 4 - Primary Fuel Inlet System (Typical)

The fuel enters the fuel bowl through a fuel inlet fitting and into the fuel inlet valve. The amount of fuel entering the fuel bowl is determined by the space between the top of the movable needle and its seat and also by the pressure from the fuel pump.

The fuel inlet system must constantly maintain the specified level of fuel as the basic fuel metering systems are calibrated to deliver the proper mixture only when the fuel is at this level.

A float spring is incorporated under the float to keep the float in a stable position.

The float chamber is vented internally by the vent tube at all times. At curb idle or when the engine is stopped, the chamber is also vented by the external vent on top of the primary fuel bowl. This external vent provides a release of excess fuel vapors from the bowl.

Idle System (Fig. 5)

At idle and low speeds, the air flow through the carburetor is not sufficiently strong enough to draw fuel through the primary venturi for the main metering system. Intake manifold vacuum is high because of the greater restriction to the air flow by the nearly closed throttle valves. This high manifold vacuum is used to provide the pressure differential which operates the idle system.

The carburetor utilizes two idle systems, one for each primary barrel. Since the two passages function identically, only one side will be considered in this explanation (Fig. 5).

At idle, the near atmospheric pressure in the float chamber causes the fuel to flow through the idle system to the greatly reduced pressure area below throttle plate.

Fuel flows from the float chamber, through the main metering jet and into the idle tube. The fuel flows up the idle tube and into the idle down channel where it is mixed with air coming in

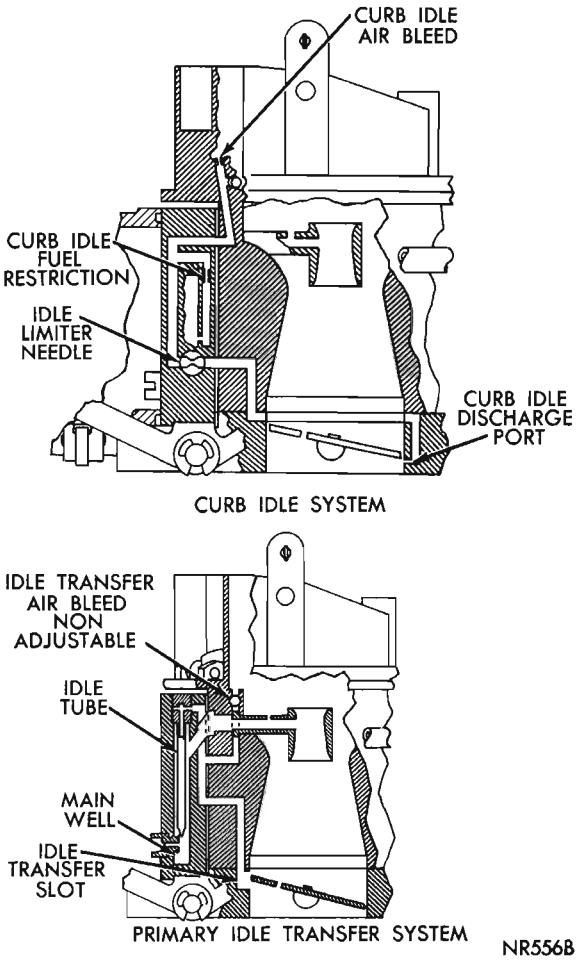


Fig. 5 - Idle System.

from the primary idle air bleed. Part of this air-fuel mixture then goes into the main body to be discharged through the idle transfer slot, and the remainder of air-fuel mixture is metered by the idle mixture screw to the curb idle discharge ports in the primary and secondary bores of the throttle body below the throttle blades. The idle mixture screws are located in the sides, of the primary metering block, and are limited with white plastic limiter caps installed at the factory. These limiter caps incorporate a stop which allows the mixture screws to be rotated about 270 degrees from the leanest to the richest positions. The limiter caps are slotted so that all adjustments can be made with a screwdriver. An acceptable idle quality should be obtainable within the rotational limits of the limiter caps. (If for any reason it is necessary to remove the limiter caps, two screwdrivers should be employed at points 180 degrees apart on the limiter cap to pry the limiter cap off the mixture screw. This minimizes the danger of damaging the mixture screw. Once removed, the original limiter cap must be discarded, as any attempt to reinstall them may result in damaging the idle mixture screws).

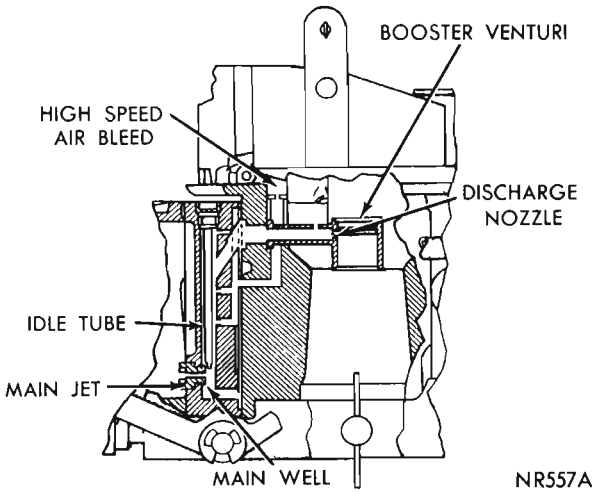


Fig. 6 - Main Metering System

As the throttle valve is opened still wider and engine speed increases, the air flow through the carburetor is also increased. This creates an increased vacuum in the venturi to bring the main metering system into operation. The flow from the idle transfer system tapers off as the main metering systems begin discharging fuel. The two systems are engineered to provide smooth gradual transition from idle to cruising speeds.

Main Metering System

As the engine is running the intake stroke of each piston draws the air through the carburetor venturi and booster venturi. The air, passing through the restriction of the venturi, creates a low pressure commonly called a vacuum. The strength of this low pressure is determined primarily by the velocity of the air flowing through the venturi. This, in turn, is regulated by the speed and power output of the engine. The difference, between the pressure in the booster venturi and the normal air pressure in the float chamber, causes fuel to flow through the main metering system (Fig. 6).

At cruising speed, the fuel flows from the float chamber through the main jet, which measures or meters the fuel flow, into the bottom of the main well. The fuel moves up the main well past the main well air bleed hole in the side of the well. Filtered air, enters through the high speed air bleed in the main body and then into the main metering body by interconnecting passages. This mixture of fuel and air, being lighter than raw fuel, responds faster to any change in venturi vacuum and vaporizes more readily when discharged into the air stream of the venturi. The mixture of fuel and air moves up the main well and passes into the short horizontal passage leading to the main body, then through the horizontal channel of the discharge nozzle. This fuel is discharged into

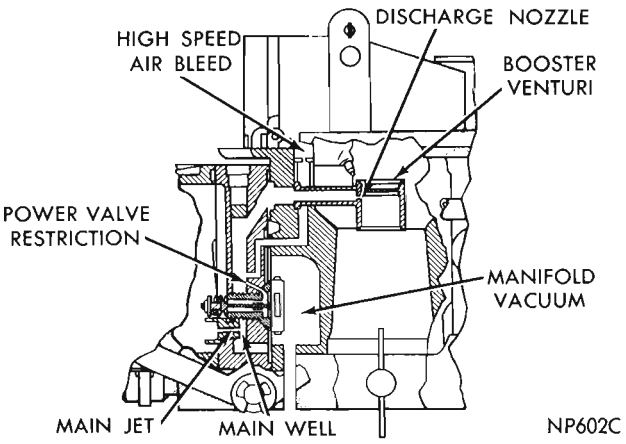


Fig. 7 - Power Enrichment System

the booster venturi and then in the air stream of the carburetor venturi.

The throttle valve controls the amount of fuel-air mixture admitted to the intake manifold, regulating the speed and power output of the engine in accordance with accelerator pedal movement.

Power Enrichment System

During high power operation, the carburetor must provide a mixture richer than is needed when the engine is running at cruising speed under no great power requirements. The added fuel for power operation is supplied by the power enrichment system (Fig. 7).

This system is controlled by manifold vacuum which gives an accurate indication of the power demands placed upon the engine. Manifold vacuum is strongest at idle and decreases as the load on the engine increases. As the load on the engine is increased, the throttle valve must be opened wider to maintain a given speed. Manifold vacuum is thus reduced because the opened throttle valve offers less restriction to air entering the intake manifold.

A vacuum passage in the throttle body transmits manifold vacuum to the power valve chamber in the main body. The power valve which is located in the main metering body is effected by this manifold vacuum. The manifold vacuum, acting on the diaphragm at idle or normal load conditions, is strong enough to hold the diaphragm closed, and overcomes the tension of the power valve spring. When high power demands place a greater load on the engine and manifold vacuum drops below a predetermined point, the power valve spring overcomes the reduced vacuum opening the power valve. Fuel flows from the float chamber, through the valve and out the small holes in the side of the valve through the diagonal restrictions in the main metering body and then into the main well. In the main well, the fuel joins the

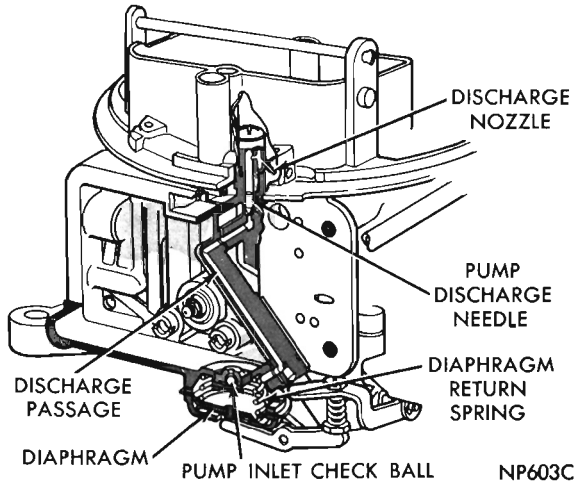


Fig. 8 - Accelerating Pump System

fuel flow in the main metering system, enriching the mixture.

As engine power demands are reduced, manifold vacuum increases. The increased vacuum acts on the diaphragm, overcoming the tension of the power valve spring. This closes the power valve and shuts off the added supply of fuel which is no longer required.

Accelerating Pump System

Upon acceleration, the air flow through the carburetor responds almost immediately to the increased throttle opening.

Therefore during the brief interval before the fuel, which is heavier than air, can gain speed and maintain the desired balance of fuel and air, the accelerating pump supplies fuel until the other systems can once again provide the proper mixture (Fig. 8).

The accelerating pump is located in the bottom of the primary fuel bowl. The pump begins to function when the pump operating lever is actuated by throttle movement. When the throttle is opened, the pump linkage, actuated by a cam on the primary throttle shaft, forces the pump diaphragm up. As the diaphragm moves up, the pressure forces the pump inlet check ball on its seat preventing fuel from flowing back into the float chamber. The fuel flows from the short passage in the fuel bowl into the long diagonal passage in the primary metering body. The fuel passes into the main body and then in the pump discharge chamber. The pressure of the fuel causes the discharge needle valve to raise and fuel is discharged into the venturi.

As the throttle is moved toward the closed position, the linkage returns to its original position and the diaphragm spring forces the diaphragm down. As the diaphragm returns to its original position the pump inlet check ball is moved off

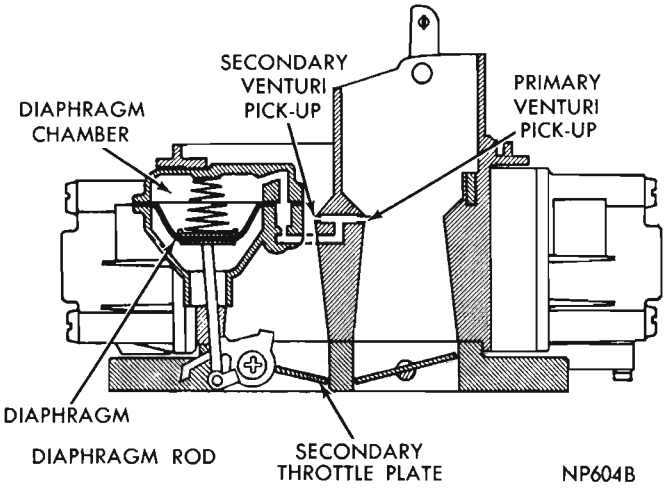


Fig. 9 - Secondary Throttle Operation System

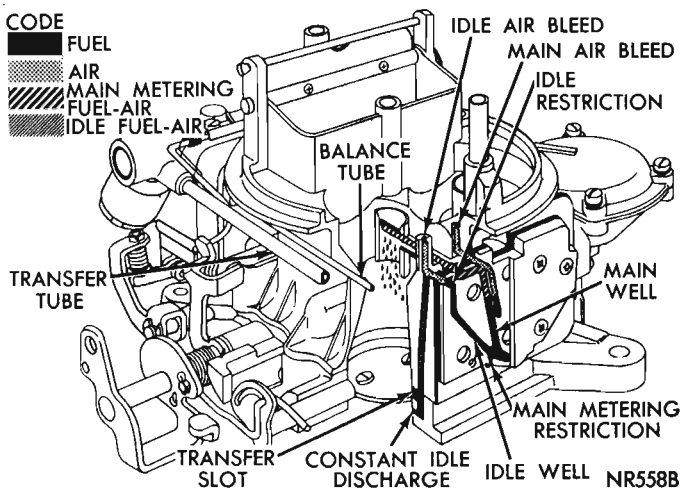


Fig. 10 - Secondary Fuel Metering System

its seat and the diaphragm chamber is filled with fuel from the float bowl.

Secondary Throttle Operating System

At lower speeds, the secondary throttle valves remain nearly closed, allowing the engine to maintain satisfactory fuel air velocities and distribution. When engine speed increases to a point where additional breathing capacity is needed, the vacuum controlled secondary throttle valves open automatically.

Vacuum taken from one of the primary barrels and one of the secondary barrels acts upon a diaphragm which controls the secondary throttle valves. At high speeds when engine requirements approach the capacity of the two primary bores, the increased primary venturi vacuum moves the diaphragm, compressing the diaphragm spring. The diaphragm, acting through the diaphragm link and lever, will commence to open the secondary throttle valves (Fig. 9).

The position of the secondary throttle valves depends on the strength of the vacuum. This in turn, is determined by the air-flow through the bores to the engine. As the air-flow increases, a greater secondary throttle valve opening will result and the secondary barrels will supply a greater portion of the engine's requirements. As top speed is reached, the secondary throttle valves will approach wide open.

As the secondary throttle valves begin to open, a vacuum is created in the secondary barrels, first at the throttle valves and then, as air flow increases, at the throat of the secondary venturi. This vacuum assists the secondary metering system to operate.

When engine speed is reduced, venturi vacuum in the bores become weaker. As the vacuum acting on the diaphragm is lessened, the load on the diaphragm spring will commence closing the secondary valves. The diaphragm spring is assisted by the design of the secondary valves. Each secondary valve is slightly offset. When the valves are closing, the combined force of manifold vacuum and the air stream has greater effect on the larger, upstream area of the valves forcing the valves to a closed position. The secondary valves are retained in the closed position when the primary valves are fully closed by the secondary throttle connecting rod. This rod, which is fastened to the primary throttle lever, rides in a slot in the secondary throttle lever.

Secondary Fuel Metering Systems

The secondary system is supplied with fuel from the secondary fuel bowl, which receives its fuel through a connecting tube, from the primary fuel inlet.

The secondary fuel bowl is equipped with a fuel inlet assembly which regulates the flow of fuel into the bowl, the same as the primary fuel bowl. The secondary fuel inlet system must maintain a specified level of fuel as the two secondary fuel systems are calibrated to deliver the proper mixture only when the fuel is at this level.

As the valves begin to open the fuel flows through the secondary metering restrictions into the idle well and is discharged through the secondary idle transfer slot (Fig. 10).

When the secondary throttle valves are opened further the pressure differential causes the secondary main metering system to begin functioning.

Automatic Choke

The automatic choke supplies enriched fuel-air mixture for starting and operating a cold engine (Fig. 11). Most of the fuel from the carburetor of a cold engine is liquid. This fuel in liquid form burns slowly and incompletely. Power loss and stalls result. The choke valve supplies the extra

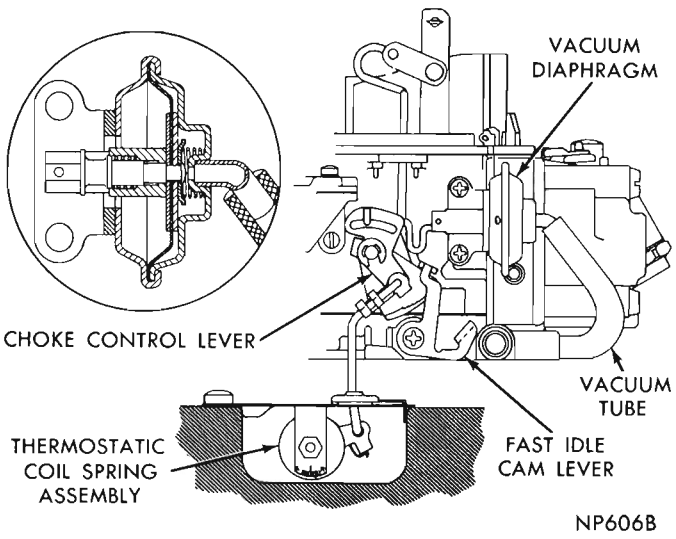


Fig. 11 - Automatic Choke System

fuel by restricting air flow during cranking and warm-up. Vacuum created by the restriction causes this fuel flow from both the main metering and idle systems.

The thermostat spring of a cold engine pushes the choke valve toward the closed position. When the engine is started, manifold vacuum acts on both the choke valve and a vacuum diaphragm attached to the carburetor body. This vacuum acts to oppose the thermostat spring and partially opens the choke valve to prevent stalls from richness. The choke shaft does not pass through the center of a choke valve. Instead, it is offset to expose a large area at one side to manifold vacuum. During idle or low temperature cranking, manifold vacuum is not sufficiently strong to open the choke valve. But air impact against the valve causes partial opening. These two factors, vacuum and air impact allow ample air to run the engine. Continued running of the engine develops heat and causes the thermostat assembly to move to the open choke position.

During the warm-up period, air flow past the partially open offset choke valve acts to open the valve. Just as in the start cycle, vacuum and air impact combine to control the choke valve. The engine required less choking at high speeds. The offset choke valve, vacuum diaphragm and thermostat spring are engineered to provide satisfactory choking for most conditions of engine speed, output and temperature.

Fast Idle

The choke control lever at the carburetor actuates a fast idle cam during choking. A cam has a series of steps designed to increase carburetor air flow to maintain satisfactory cold engine speed levels. The proper cam step is moved into position as the choke rod is moved from closed to open conditions. Each step permits a slower idle rpm as engine temperature rises and choking is reduced.

Spark Advance

The distributor utilizes changes in air pressure within the carburetor to control spark timing to satisfy all engine speed and load conditions.

In order to obtain a vacuum to operate the spark advance as dictated by the engine speed and load conditions, a port is located in the throttle bore just above the full closed position of the throttle valves, as the throttle is opened, this port is subject to manifold vacuum, which varies with changes in engine load. This port in the throttle body leads to an outlet on the side of the throttle body which connects to a single flexible tube to the distributor.

SERVICE PROCEDURES

Servicing Carburetor

Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and the installation of new parts, where required, will return the carburetor to its originally designed performance.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) All parts should be carefully cleaned in a suitable solvent, then inspected for damage or wear.

(2) Use air pressure only to clear the various orifices and channels.

(3) Replace questionable parts with New Ones. When checking parts removed from the carburetor, it is at times rather difficult to be sure they are satisfactory for further service. It is, therefore, recommended that in such cases, New Parts be installed.

(4) Always use a complete repair kit when overhauling the carburetor. Using the code number stamped on the air-horn, adjacent to the fuel inlet, refer to the parts catalog and order the correct repair kit for the carburetor being worked on.

DISASSEMBLING CARBURETOR

To disassemble the carburetor for cleaning or overhaul, proceed as follows:

(1) Install four elevating legs, Tool T109-287S in mounting flange holes in throttle body, or use Carburetor Stand C-3886. (These tools are used to protect the throttle valves from damage and to

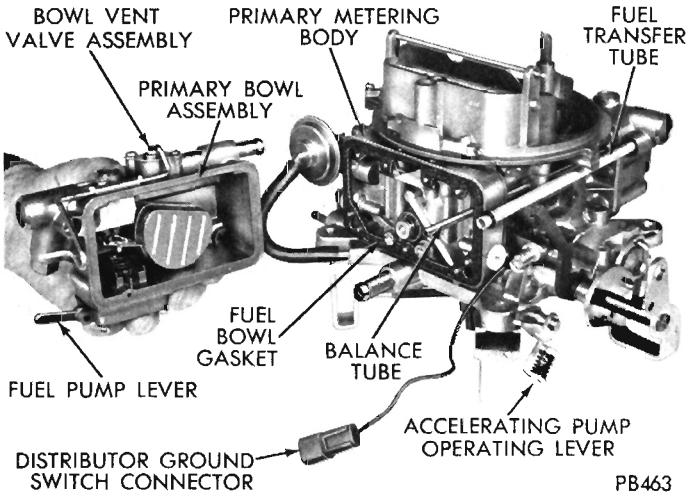


Fig. 12 - Removing or Installing Primary Fuel Bowl

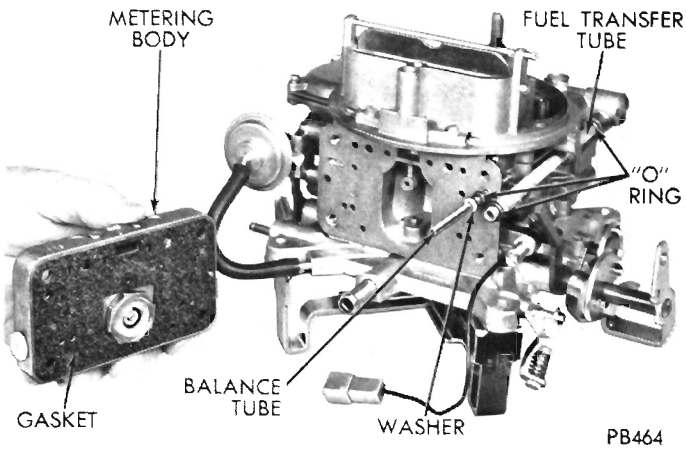


Fig. 13 - Removing or Installing Primary Metering Body and Plate

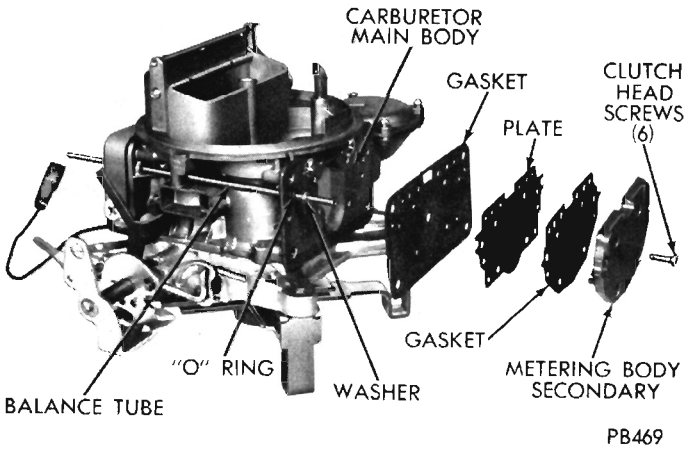


Fig. 14 - Secondary Metering Body, Plate and Gaskets

provide a suitable base for working).

(2) Remove primary fuel bowl assembly by sliding straight off balance tube (Fig. 12).

(3) Remove primary metering body by sliding straight off balance tube (Fig. 13). Remove plate to body gasket.

(4) Remove accelerating pump operating lever "E" clip and slide lever assembly off stub shaft. Remove adjusting nut, spring and screw.

(5) Remove fuel transfer tube and "O" rings (Fig. 13).

(6) Remove secondary fuel bowl assembly.

(7) Using a clutch head screwdriver (Tool CL-13) remove clutch head screws, carefully work secondary metering body, plate and gaskets off balance tube (Fig. 14).

(8) Remove balance tube, washers and "O" rings by sliding out of main body (either end).

(9) Disconnect choke diaphragm hose from throttle body fitting, then remove diaphragm assembly, at the same time disengaging link from fast idle cam lever.

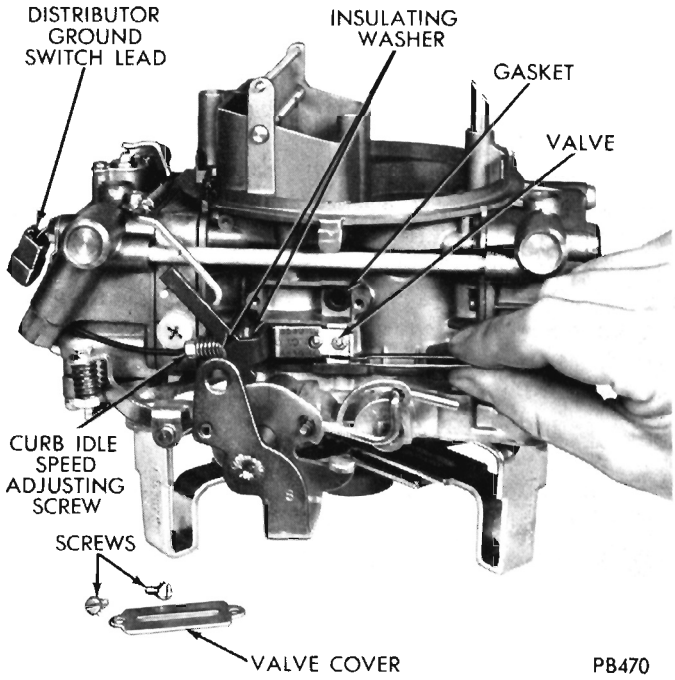


Fig. 15 - Removing or Installing Hot Idle Compensator Valve

(10) Remove "E" clup that retains fast idle cam lever and cam. Slide lever and cam off stub shaft, and at the same time, disengage choke rod from cam lever. (Note position of fast idle cam to cam lever.)

(11) Remove secondary diaphragm attaching screws and remove diaphragm assembly. Disengage diaphragm stem from secondary stop lever. Remove gasket.

(12) Remove pump discharge nozzle retaining screw, then lift out discharge nozzle. Remove gasket from nozzle (top and bottom).

(13) Remove screws that attach hot idle compensator valve cover to main body. Lift off cover, then remove valve and gasket. (Fig. 15).

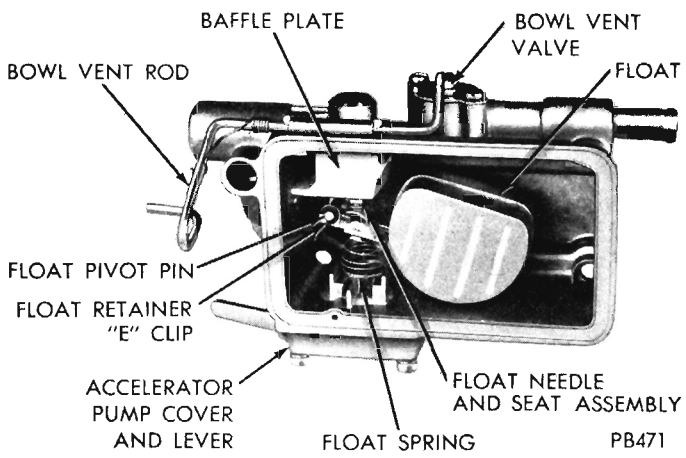


Fig. 16 - Primary Fuel Bowl Assembly

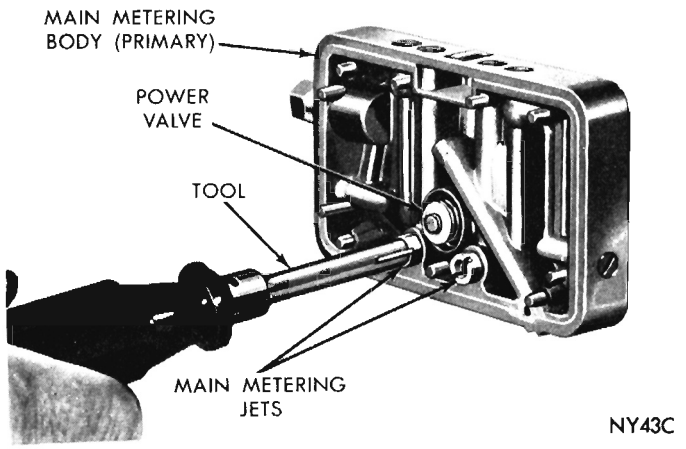


Fig. 18 - Removing or Installing Main Metering Jets

(14) Remove curb idle speed screw and spring. Then remove insulating washer from between lead terminal and stop. Remove distributor ground switch lead. Using a thin blade screw driver, remove insulator bushing from boss on body. (Fig. 15).

(15) Invert carburetor and drop out pump discharge jet needle from discharge passage.

(16) With carburetor inverted, remove screws that attach the throttle body to main body (Fig. 15). Remove throttle body and discard gasket.

Disassembling Fuel Bowls (Primary and Secondary)

Primary

(1) Remove operating rod assembly. (Fig. 16).

(2) Remove float retainer "E" clip, then slide float and spring out of float chamber. (As float is being removed, the fuel inlet needle may drop out of seat assembly.) Remove float baffle.

(3) Remove fuel inlet needle valve seat. Discard the gasket.

(4) Remove screws attaching accelerator pump cover. Remove cover, then carefully remove diaphragm and spring.

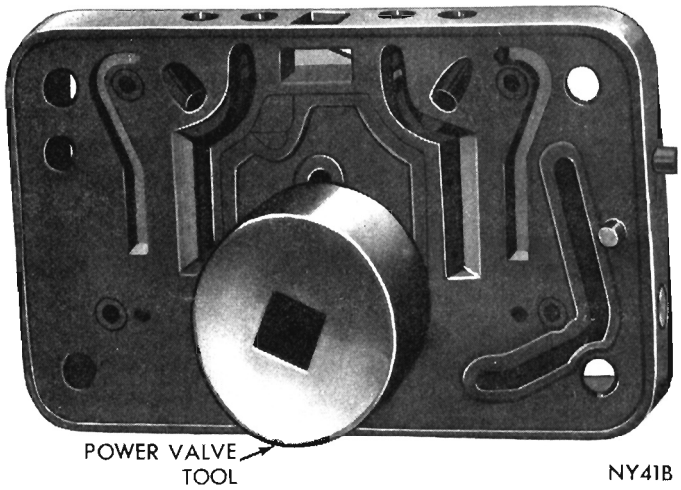


Fig. 17 - Removing or Installing Power Valve

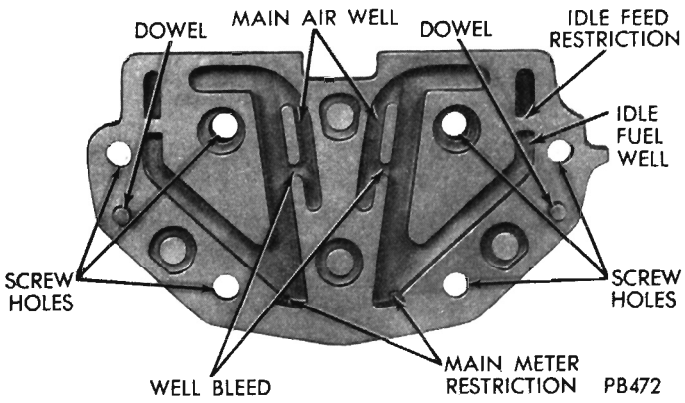


Fig. 19 - Secondary Metering Body

(5) Remove fuel inlet fitting and discard gasket.

(6) Remove screws attaching bowl vent valve cover to fuel bowl. Lift off cover and remove vent valve, spring and seal. Remove seal from bottom of valve.

Secondary

(1) Remove float retainer "E" clip, then slide float and spring out of float chamber. (As float is being removed, the fuel inlet needle may drop out of seat assembly.) Remove float baffle.

(2) Remove fuel inlet needle valve seat. Discard gasket.

It should be noted that the Primary and Secondary fuel bowl baffles are of a different design and should be installed in the correct bowl at reassembly.

Disassembling Main Metering Body

Primary

(1) Using Tool C-3747, remove power valve assembly from primary metering body (Fig. 17).

(2) Using Tool C-3748, remove main metering jets. (Fig. 18).

(3) Turn idle limiter caps to stops. Remove caps by prying off ends of screws, using a suitable tool. (Be careful not to bend screws.) Be sure and count number of turns to seat the screws, as the same number of turns (from the seat) must be maintained at installation. Remove screws and gaskets from metering body.

Secondary

No disassembly required, but it is very important that the well bleed parts, main metering restrictions and idle feed restrictions are clean (Fig. 19).

Disassembling Secondary Diaphragm

(1) Remove the diaphragm cover screws and separate diaphragm cover from housing.

(2) Remove diaphragm return spring from cover, then slide diaphragm out of housing.

Disassembling Throttle Body

CAUTION: In normal routine cleaning and overhaul of the carburetor, do not remove the throttle valves unless they are nicked or damaged. If necessary to remove, proceed as follows:

(1) Remove screws that hold throttle valves to throttle shafts. **These screws are staked to prevent loosening and care is necessary to avoid breaking off in shaft. Remove staking with a file.**

(2) Slide damaged throttle valves out of bores. It should be noted at this time, that the secondary throttle valves are thicker than the primary valves. **Do not install secondary valves in primary bores or visa versa as the relationship of the primary valves to the idle transfer port and spark advance control ports is carefully established for one particular assembly.**

CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents, (such as Metalclene) which may be used with satisfactory results.

The choke diaphragm can be damaged by solvents. Avoid placing the diaphragm assembly in ANY liquid. Clean the external surfaces with a clean cloth or soft wire brush. Shake dirt or other foreign material from the stem side of the diaphragm. Depressing the diaphragm stem to the retracted position, will provide an additional hole for the removal of dirt. Compressed air can be used to remove loose dirt, **but should not be connected to the vacuum inlet fitting.**

IMPORTANT: If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT". After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean gasoline or kerosene to be certain no trace of moisture remains. Never clean jets with a wire, drill or other mechanical means because the orifices may become enlarged, making the fuel mixture too rich for proper performance.

DO NOT clean any rubber diaphragms or plastic parts in cleaning solvent because of possible damage.

INSPECTION AND REASSEMBLY.

Throttle Body

If the throttle valves were removed because of damage, install new valves as follows:

(1) Slide new primary throttle valves in position on throttle shaft, with the valve number on the bottom (flange side) and toward idle transfer and spark advance control ports.

(2) Install new attaching screws but do not tighten.

(3) Hold valves in place with fingers. (Fingers pressing on high side of valves.)

(4) Tap valves lightly with screwdriver in this position to center in bores. Tighten securely. Operate the throttle shafts. From closed to open position, they must operate smoothly without drag or sticking. Hold throttle body up to a strong light. The light which is visible around the outer diameter of the valves and the bores should be uniform.

(5) Install secondary throttle valves in the same manner as described previously. The numbers stamped on the valves must be away from the idle transfer port. For adjustment (See Secondary Throttle Adjustment).

Assembling Main Metering Body (Primary)

(1) Install idle mixture screws in metering body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) **DO NOT USE A SCREW DRIVER.** Turn screws lightly against their seats with fingers. Back off the number of turns counted at disassembly. Install new plastic caps with tabs against stop.

(2) Slide a new gasket over power valve and install, using Tool C-3747. Tighten securely (Fig. 17).

(3) Install main metering jets (Fig. 18), using Tool C-3748. Tighten securely.

Assembling Fuel Bowls Primary

(1) Install accelerator pump spring in position in fuel bowl, followed by diaphragm and pump

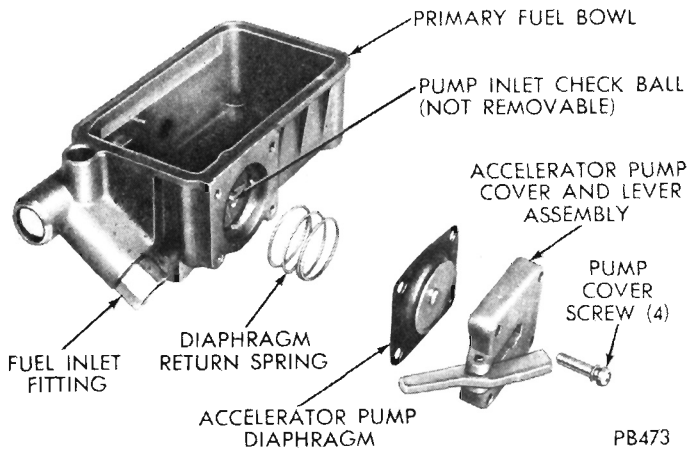


Fig. 20 - Accelerating Pump (Disassembled View)

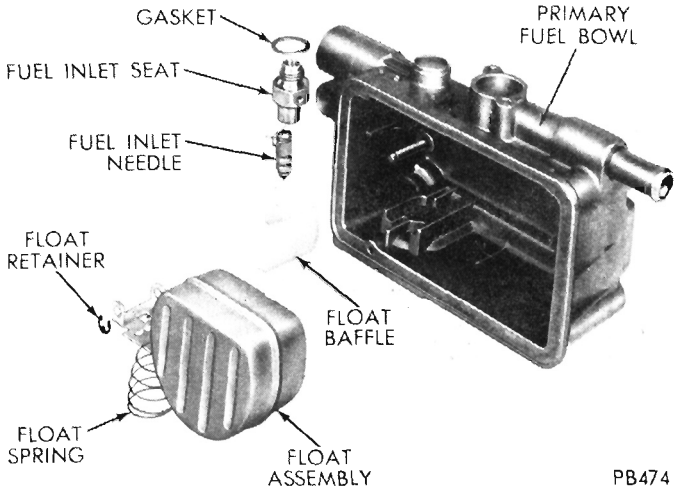


Fig. 21 - Float, Needle and Baffle (Disassembled View)

cover. (When installing diaphragm, be sure contact button is toward pump lever in cover.) (Fig. 20).

(2) Place cover over diaphragm (with lever on fuel inlet fitting side) (Fig. 20). Install attaching screws and tighten securely.

(3) Install new gasket on fuel inlet needle seat (Fig. 21) then install in fuel bowl. Tighten securely. Slide fuel inlet needle into seat.

(4) Install float baffle in position, then slide float hinge over pivot and secure with "E" clip. Install float spring.

(5) Install new gasket over fuel inlet fitting, then install fitting in primary fuel bowl. Tighten securely.

(6) Install seal on bottom of vent valve. Slide plastic valve and seal into cover, with valve recess, mating with shoulder on underside of cover.

(7) Install bowl vent valve spring in position in opening in bowl, then install valve and cover over

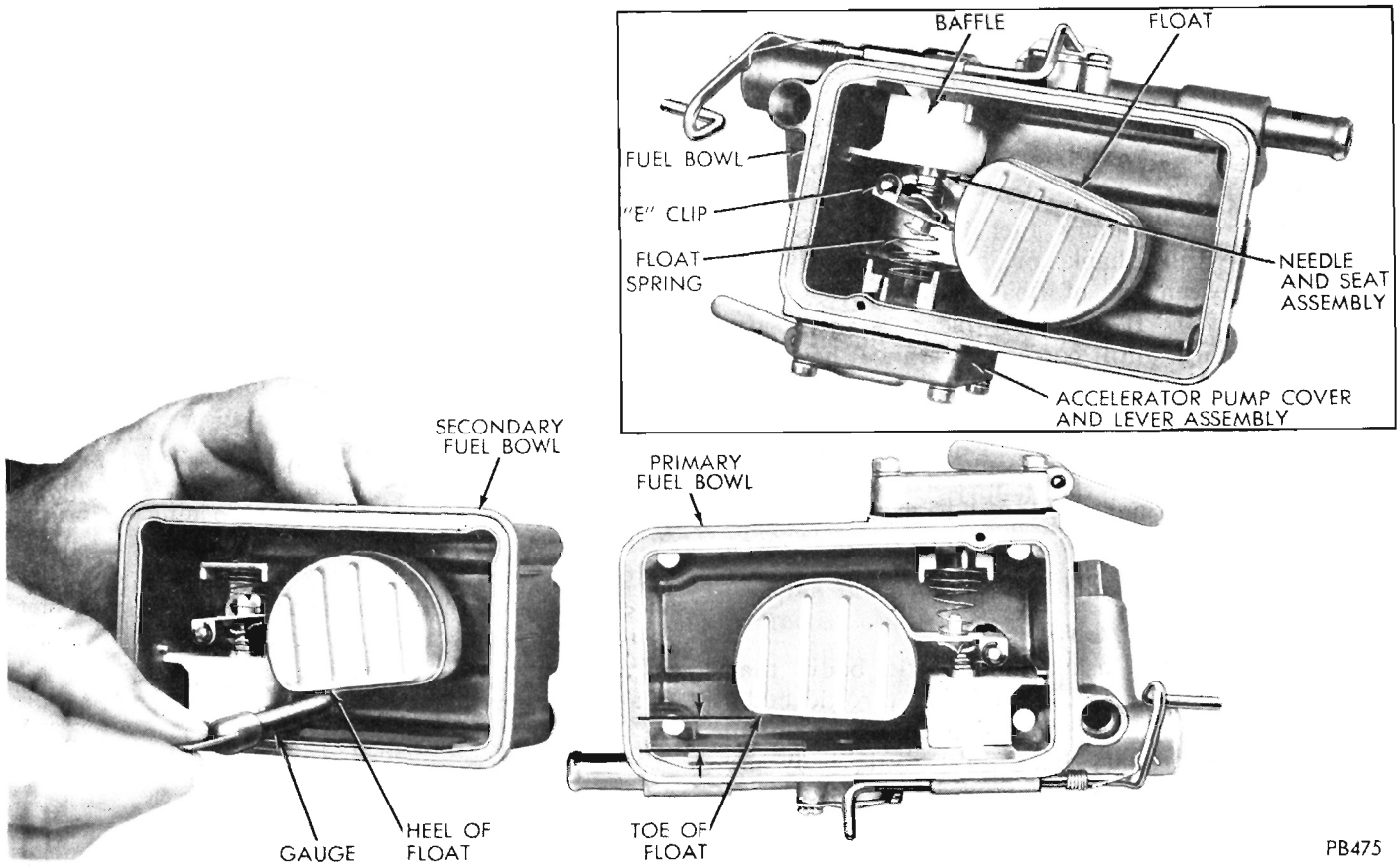


Fig. 22 - Checking Float Setting (Primary and Secondary)

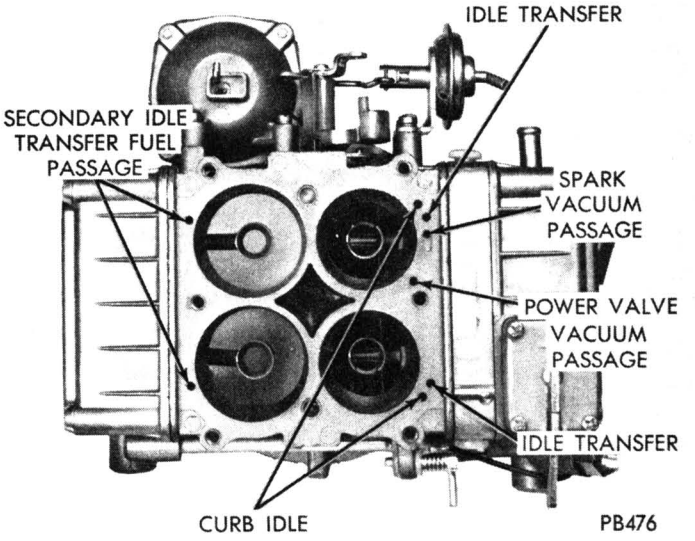


Fig. 23 - Main Body Identification (Bottom View)

spring. Install attaching screws and tighten securely.

(8) Install bowl vent operating rod, clamp and spring in position on bowl. Install attaching screw and tighten securely.

Secondary

(1) Install new gasket on fuel inlet needle seat (Fig. 21), then install in fuel bowl. Tighten securely. Slide fuel inlet needle into seat.

(2) Install float baffle in position, then slide float hinge over pivot and secure with "E" clip. Install float spring.

Adjusting Floats

(1) Invert the primary fuel bowl and using a 15/64 inch drill shank or gauge, measure the clearance between toe of float and surface of fuel bowl. (Fig. 22). If an adjustment is necessary, bend float tang until correct clearance has been obtained.

(2) Invert the secondary fuel bowl and using a 17/64 inch drill shank or gauge, measure the clearance between heel of float and surface of fuel bowl (Fig. 22). If an adjustment is necessary, bend float tang until correct clearance has been obtained.

Assembling Main Body

(1) Place a new gasket on throttle body, then lower main body (Fig. 23) down on throttle body, aligning roll pin guides with openings in main body. Be sure primary bores of throttle body are on the same side as primary venturi.

(2) Holding assembly together, invert assembly and install attaching screws. Tighten securely.

(3) Install balance tube into main body and install new "O" rings and washers at each end. Be

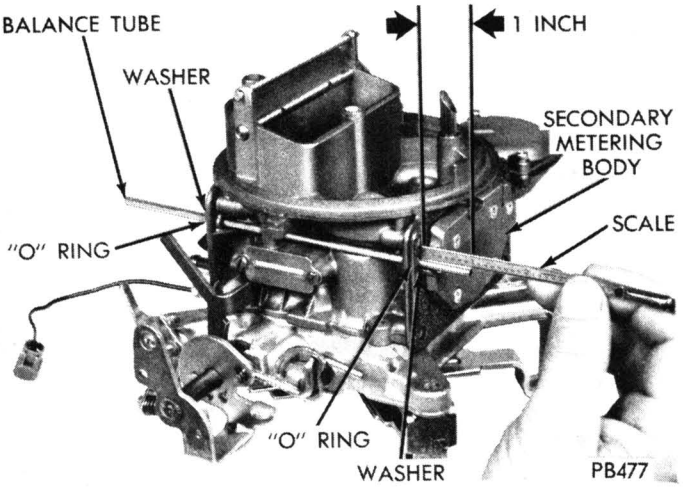


Fig. 24 - Positioning Balance Tube

sure "O" rings are seated in recesses, followed by washers.

(4) Install a new secondary metering body to main body gasket (Fig. 14) followed by metering body plate, plate gasket and body. Install clutch head screws and tighten securely. (Be sure the main metering restriction ports are at the bottom).

(5) Position balance tube so that only 1 inch extends beyond the secondary metering body (Fig. 24). (Use a 6 inch ruler for this measurement.)

(6) Place a new gasket over primary metering body aligning pin. (Rear) Carefully slide metering body over balance tube and down into position against main body.

(7) Slide a new gasket over metering body alignment studs and carefully position against body.

(8) Carefully install primary fuel bowl over balance tube and down against metering body. Slide new gaskets over the long fuel bowl mounting screws, then install in position through fuel bowl. Tighten securely. If new gaskets are not used, a fuel leak will develop.

(Be sure and install distributor ground switch lead and lead clamp on long screw adjacent to fuel inlet.)

(9) Slide a new "O" ring on each end of fuel tube, then install fuel tube into opening in primary fuel bowl. Press in on tube end until seated.

(10) Carefully slide secondary fuel bowl over balance tube and fuel tube and seat against gasket. Install secondary fuel bowl attaching screws after installing new gaskets. Tighten securely.

(11) Install accelerating pump discharge needle in the discharge passage in the center of primary venturi.

To test needle for sealing, pour clean gasoline into primary fuel bowl through vent valve opening. Push down on accelerator pump arm to expel air from the pump passages. Using a small clean brass rod, hold the discharge check needle

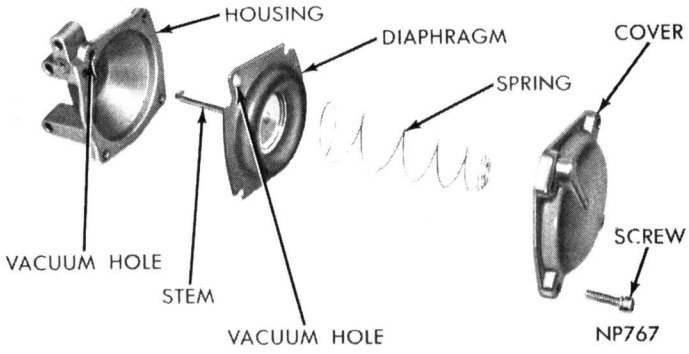


Fig. 25 - Secondary Throttle Diaphragm (Disassembled View)

firmly on its seat. Again press down on pump arm. No fuel should be emitted from the discharge passage. Fuel leakage at the discharge needle indicates the presence of dirt or a damaged check needle. Clean again and install a new needle. Retest for leakage.

If fuel continues to leak past discharge check needle, attempt to reseat as follows:

With the discharge check needle installed, insert a piece of drill rod down on the needle. Lightly tap the drill rod with a hammer to form a new seat. Remove and discard old needle and install a new one. Retest as described previously. If the serivce fix does not correct the condition, a new carburetor will have to be installed.

(12) Install pump discharge nozzle gasket, nozzle and mounting screw and gasket. Tighten screw securely. Test nozzle operation. Press pump lever down. The two streams from the nozzle should be identical and should strike the two venturi in the same spot.

(13) Slide the bowl vent valve shaft down between fuel tube and carburetor body. Hold in position, then install clamp, after engaging stub end of spring in clamp. Install retaining screw and tighten securely.

(14) Loosen choke valve attaching screws slightly.

(15) Tap lightly on choke valve to center valve in air horn. Holding choke valve with the fingers, tighten attaching screws securely. Stake by squeezing with pliers.

(16) Engage fast idle cam with fast idle cam lever, then slide assembly onto stub shaft positioning fast idle cam behind fast idle cam lever. At the same time engage fast idle cam lever with choke rod. Install "E" clip to secure.

Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to be sure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the fitting to seal the opening. Release the stem. If the stem moves more than 1/16 inch in ten (10) seconds, the leakage is excessive and the assembly must be replaced.

Install the diaphragm assembly on the carburetor as follows:

(1) Engage choke link in slot in choke lever.

(2) Place the diaphragm on the mounting surface. Install and tighten the attaching screws securely.

(3) Inspect the rubber hose for cracks before placing it on the correct carburetor fitting. Do not connect the vacuum hose to the diaphragm fitting until after the vacuum kick adjustment has been made.

(4) Install hot idle compensator valve gasket in position in recesss in main body, followed by valve. (Be sure valve is positioned with legs toward outside of main body.) (Fig. 15). Place cover over opening and install attaching screws. Tighten securely. (If so equippped.)

(5) Slide a new distributor ground switch insulated bushing into stop on main body, with the notch aligned with raised portion of boss. Force into position against stop.

(6) Place insulating washer over tangs on lead wire terminal, then install curb idle speed screw with spring through terminal and washer.

(7) Turn screw into boss, at the same time, keep insulating washer aligned.

Assembling Secondary Diaphragm

(1) Slide diaphragm into housing (Fig. 25).

(2) Position diaphragm so that the vacuum hole in housing is aligned with vacuum hole in diaphragm.

(3) Install diaphragm return spring with coiled end snapped over button in cover.

(4) Support diaphragm stem in order to keep diaphragm flat as spring and cover are installed.

(5) Align vacuum port in cover with port in housing then carefully lower cover. Install attaching screws and tighten securely.

(6) Check diaphragm by pressing **in** on stem and placing finger over port. Diaphragm should stay in retracted position.

(7) Install a new gasket in vacuum passage recess in diaphragm housing, then install secondary diaphragm on main body of carburetor and at the same time engage stem with secondary stop lever. Install screws and tighten securely.

(8) Install pump lever on stub shaft and secure with "E" clip. Slide spring and locknut between fuel pump lever and pump operating lever. Open throttle valve and install adjusting screw. Tighten 2 or 3 threads to hold. The correct setting of the adjusting screw will be covered under adjustments.

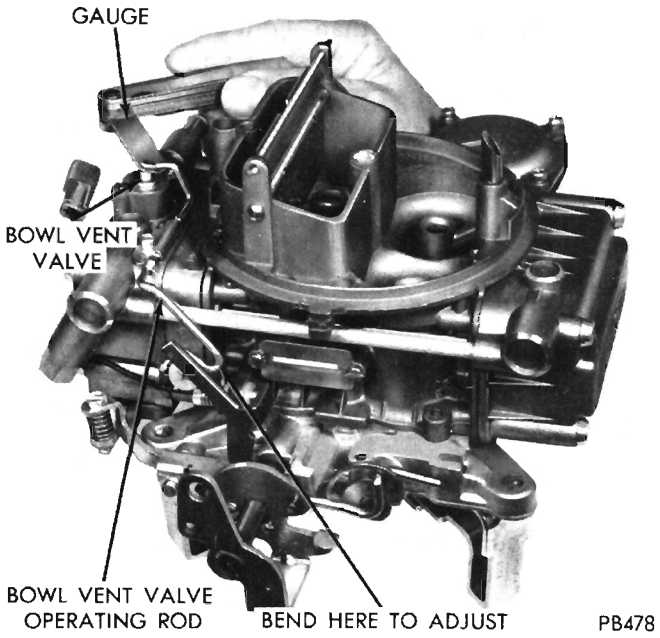


Fig. 26 - Adjusting Bowl Vent Clearance

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor:

Qualifying the Choke Control Lever
Choke Unloader Adjustment (wide open kick)
Fast Idle Cam Position Adjustment
Vacuum Kick Adjustment (On or off vehicle)
Fast Idle Speed Adjustment (On the vehicle)
Checking the Bowl Vent Valve Clearance.
Checking the Pump Lever Clearance
Idle Speed Adjustment (Curb idle)
Adjusting the Float
Secondary Throttle Adjustment
Idle Mixture Adjustment
Checking Wet Fuel Level

Checking Bowl Vent Valve Clearance

To check the bowl vent valve clearance adjustment, proceed as follows:

(1) With the throttle valves at curb idle, it should be possible to insert a .015 in. gauge between bowl vent valve plunger stem and operating rod, (Fig. 26).

(2) If an adjustment is necessary, bend rod to change arc of contact with throttle lever, using Tool T109-213, until correct clearance has been obtained.

Checking Accelerator Pump Lever Clearance

To check accelerator pump lever clearance (Fig. 27), proceed as follows:

(1) With throttle valves wide open, and the pump lever held down, it should be possible to insert a .015 inch gauge between adjusting nut and lever.

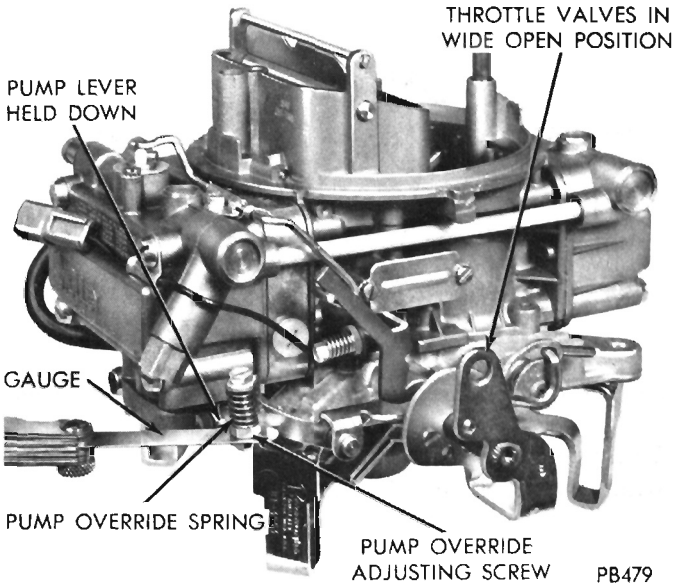


Fig. 27 - Checking Accelerator Pump Lever Clearance

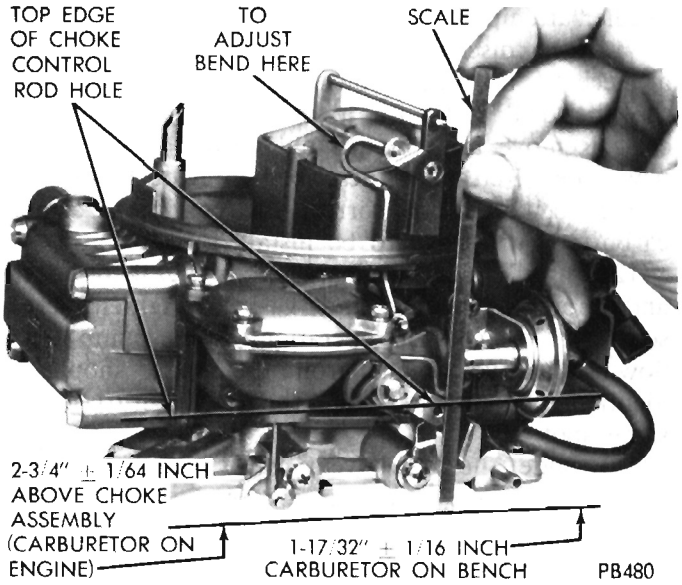


Fig. 28 - Qualifying Choke Control Lever

(2) If an adjustment is necessary, adjust pump override screw until correct clearance has been obtained.

(3) There must be no free movement of pump leverage when throttle is at curb idle.

Qualifying Choke Control Lever

Adjustment of the choke control lever is necessary to provide correct relationship between choke valve, thermostatic coil spring and the fast idle cam. It should be checked and adjusted (if necessary) after carburetor assembly or as preparation of the choke system linkage before making the Vacuum Kick, Cam Position or Unloader Adjustment. These three adjustments must and

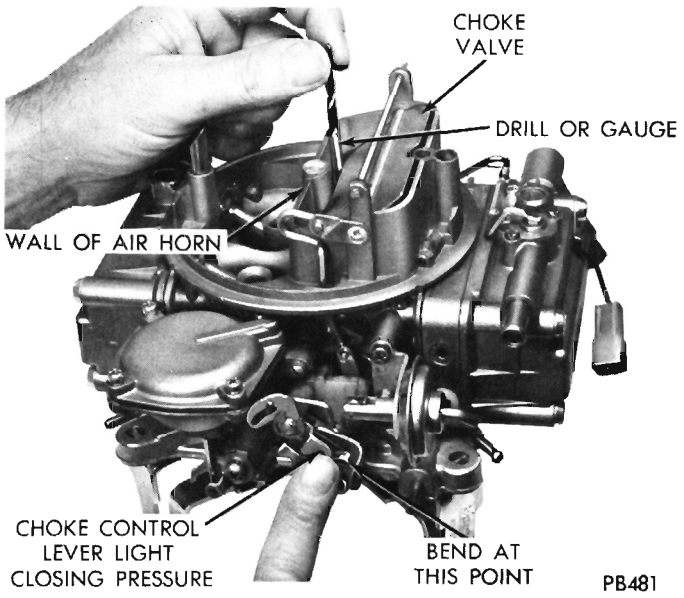


Fig. 29 - Choke Unloader Adjustment (Wide Open Kick)

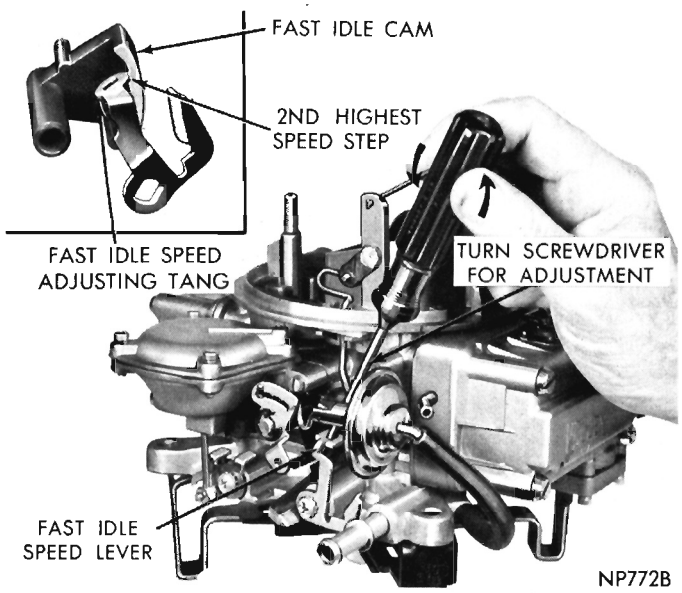


Fig. 30 - Fast Idle Speed Adjustment (On Vehicle)

should be made after qualification of the choke control lever.

(1) Open the throttle to mid-position.

(2) Close the choke valve by slight pressure on choke control lever.

(3) The top of choke rod hole in control lever should be 2-3/4 ± 1/64 inch above choke assembly (carburetor on engine) or 1-17/32±1/16 inch above carburetor base (Carburetor on bench) (Fig. 28).

(4) Adjust if necessary by bending choke shaft rod at point indicated.

CAUTION: Improper bending will cause binding of rod. Test for free movement between open and closed choke positions and rebend if necessary to eliminate any interferences.

Choke Unloader Adjustment (wide open kick)

The choke unloader is a mechanical device to partially open the choke at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the system as follows.

(1) Qualify the choke control lever, if necessary. (See Qualifying Choke Control Lever Paragraph).

(2) Hold the throttle valves in the wide open position. Insert the specified drill between the lower edge of the choke valve and the inner wall of the air horn (see specifications).

(3) With a finger lightly pressing against the choke control lever, a slight drag should be felt as the drill is being withdrawn. If an adjustment is necessary, bend the indicated tang until correct opening has been obtained (Fig. 29).

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare the engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With the engine off and the transmission in the PARK or NEUTRAL position, open the throttle slightly.

(2) Close choke valve until fast idle screw tang can be positioned on the second highest-speed step of the fast idle cam (Fig. 30).

(3) Start the engine and determine the stabilized speed. Bend the fast idle tang by use of a screwdriver placed in the tang slot to secure the specified speed.*

CAUTION: Bend only in a direction perpendicular to the contact surface of the cam. Movement in any other direction changes the CAM POSITION ADJUSTMENT described earlier.

(4) Stopping the engine between adjustments is not necessary. However, reposition the fast idle tang on the cam after each speed adjustment to provide correct throttle closing torque.

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle as described in the Fast Idle Speed Adjustment (on the vehicle) paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each step of the cam occur at the proper time during engine warm-up.

*See specifications.

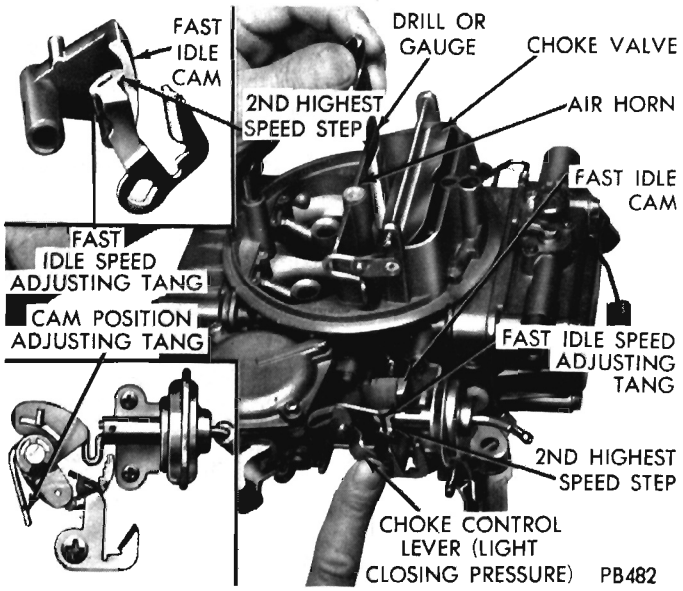


Fig. 31 - Fast Idle Cam Position Adjustment

(1) Qualify the choke control lever, if necessary. (See Qualifying the Choke Control Lever Paragraph).

(2) With fast idle speed adjusting tang contacting second highest speed step on fast idle cam, move choke valve toward the closed position with light pressure on choke control lever.

(3) Insert specified drill between the choke valve and wall of the air horn (see specifications).

An adjustment will be necessary if a slight drag is not obtained as the drill is being removed.

(4) To adjust, bend the indicated tang (Fig. 31) until the correct choke valve opening has been obtained.

Vacuum Kick Adjustment (ON or OFF Vehicle)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by use of linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or vehicle to be adjusted.

(1) If the adjustment is to be made with the engine running, position the fast idle tang (Fig. 31) (Cam position adjustment) to allow choke closure to kick position. If auxiliary vacuum source is to be used, open throttle valves, (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect the vacuum hose from the carburetor and connect it to the hose from the vacuum supply

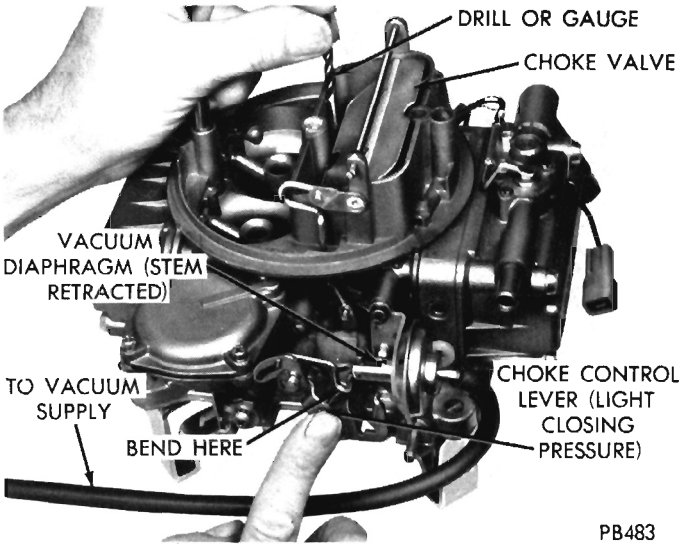


Fig. 32 - Vacuum Kick Adjustment

with a small length of tube to act as a fitting. Removal of the hose from the diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches of hose.

(3) Insert the specified drill (see specifications) between the choke valve and the wall of the air horn. (Fig. 32). Apply sufficient closing pressure on the lever to which the choke rod attaches to provide a minimum choke valve opening without distortion of the diaphragm link. Note that the cylindrical stem of the diaphragm will extend as an internal spring is compressed. This spring must be fully compressed for proper measurement of the vacuum kick adjustment.

(4) An adjustment will be necessary if a slight drag is not obtained as the drill is being removed. Shorten or lengthen the diaphragm link to obtain the correct choke opening. Length changes should be made by carefully opening or closing the bend provided in the diaphragm link. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall the vacuum hose on the correct carburetor fitting.

(6) Make the following check. With no vacuum applied to the diaphragm, the CHOKE VALVE SHOULD MOVE FREELY between the open and closed positions. If movement is not free, examine the linkage for misalignment or interferences caused by the bending operation. Repeat the adjustment if necessary to provide proper link operation.

Secondary Throttle Adjustment

This adjustment no longer required as valves are pre-adjusted and need no further adjustment.

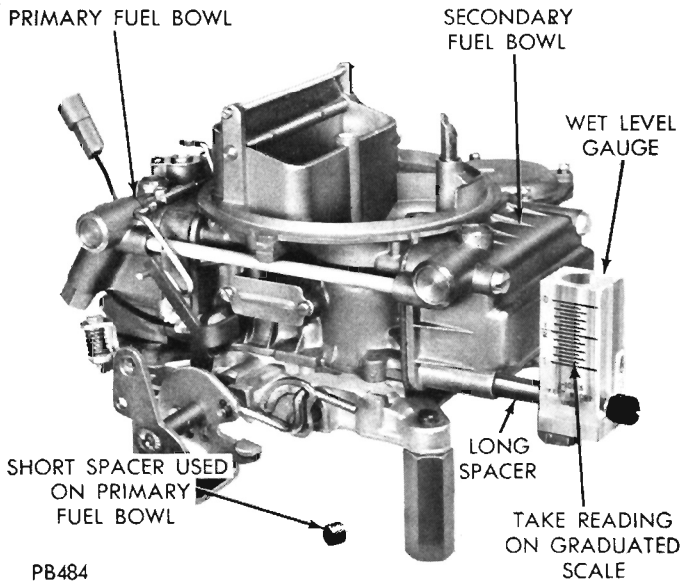


Fig. 33 - Checking Wet Fuel Level (On Vehicle)

Idle Speed Adjustment (Curb Idle)

Refer to General Information at front of Group.

Idle Speed Solenoid Adjustment (Fast Curb Idle)

To set idle speed solenoid for correct engine r.p.m. proceed as follows:

(1) Warm up engine to normal operating temperature, then attach a tachometer.

(2) With engine running, turn idle speed solenoid adjusting screw **in** or **out** to obtain 900 r.p.m. on standard transmission equipped vehicles.

(3) After specified r.p.m. has been obtained and with engine still running (with solenoid energized), adjust curb idle speed screw until end of screw **just touches** stop on carburetor throttle lever. Now, back off one full turn to obtain slow curb idle speed setting. (Approximately 600 to 650 r.p.m.).

Checking Wet Fuel Level (On Vehicle)

Before checking wet fuel level, check the fuel pump pressure to be certain 5 pound reading is obtained.

To check wet fuel level, remove lower bolt furthest from fuel supply (Primary and Secondary) and install C-4051 wet fuel level gauge (Fig. 23). As screw is being removed, fuel will be lost. Start or crank engine and allow fuel bowls to fill. The reading on level gauge should be 9/16 for Primary and 13/16 inch for Secondary, with 5 pounds fuel pump pressure.*

If an adjustment is necessary remove fuel bowl and bend tang on float until correct specifications are obtained.

*Fuel level will vary 1/32 inch for every pround of fuel pump pressure under or over specifications.
*See Specifications.

AVS CARBURETOR

INDEX

	Page
Automatic Choke (well type)	1
Carburetor Adjustments	89
Accelerator Pump and Bowl Vent	90
Air Valve Secondary	91
Bowl Vent Valve	91
Choke Unloader (Wide Open Kick)	90
Choke Vacuum Kick	89
Fast Idle Cam Position	89
Fast Idle Speed (On Vehicle)	92
Idle Speed	92
Secondary Throttle Lever	90
Secondary Throttle Lockout	91
Cleaning Carburetor Parts	2
Closed Crankcase Vent System (Group 9—Engine)	
Disassembling Carburetor	85
General Information	83
Inspection and Reassembly	86
Specifications	137

GENERAL INFORMATION

The Carter four barrel carburetor models AVS-6125S, AVS-4966S are used on 383 and standard 440 cubic inch engines when the vehicles are equipped with automatic transmissions respectively. The carburetors have a hot idle compensator valve. This valve is a thermostatically operated air bleed, to relieve an overrich condition at idle case of abnormal temperature.

The carburetors have a distributor ground switch, retained by the curb idle adjusting screw activated by the throttle lever at curb idle, which retards the distributor for better emission control.

The Carter four barrel models AVS-4967S, AVS-4968S are used on Hi-Performance 440 cubic inch engines when the vehicles are equipped with manual or automatic transmissions respectively.

These two carburetors have a fast curb idle speed solenoid mounted on the carburetor opposite the throttle lever side (Fig. 1). This solenoid is used to maintain a higher idle speed when the

engine is running and allows the throttle to close to a low idle speed position when the ignition key is turned off, to prevent "after running."

These two carburetors are also equipped with a hot idle compensator valve.

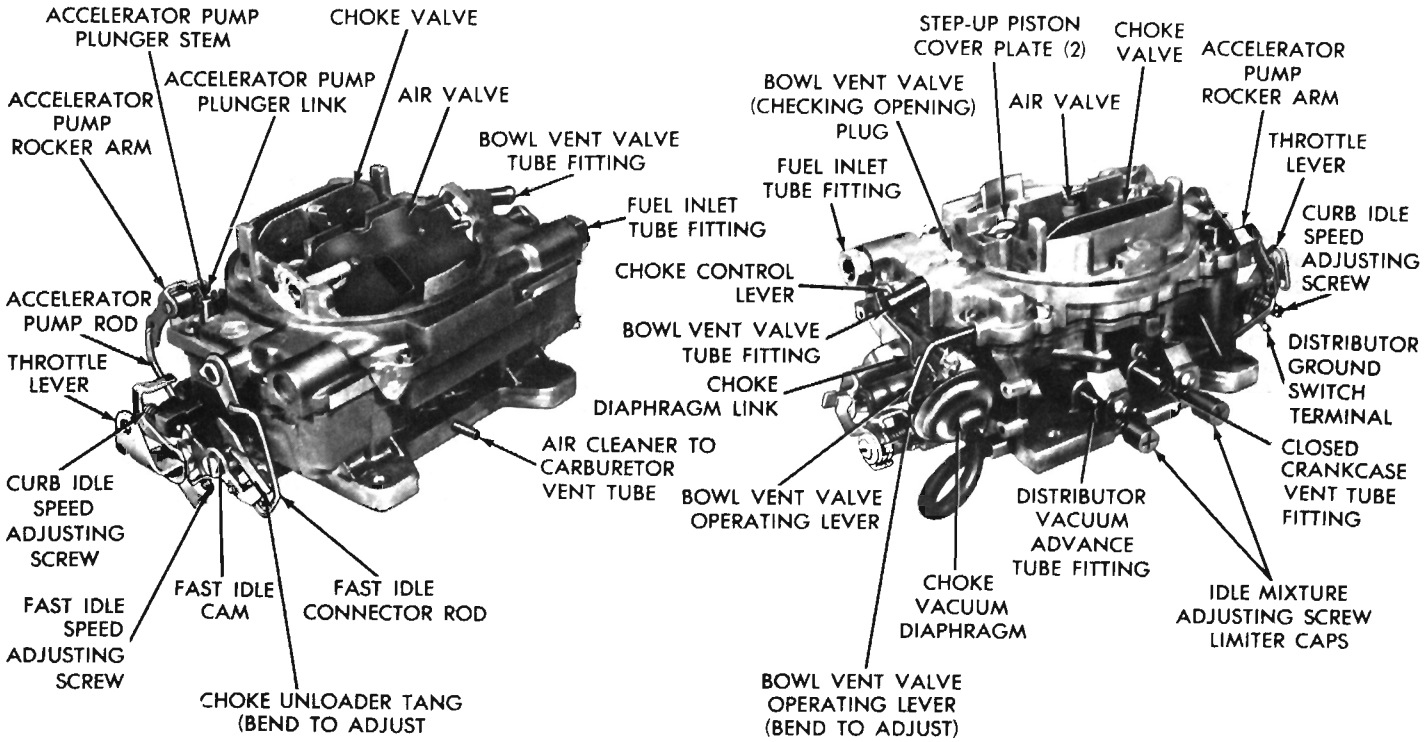
These two carburetors are also equipped with a distributor ground switch on the solenoid plunger, activated by the fast curb idle adjusting screw, to retard the distributor when the carburetor is at fast curb idle for better emission control.

Since the service procedures are identical on all Carter AVS carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

The throttle valves of the secondary half of the carburetor are mechanically connected to the primary valves and open with the primary after an approximate 60 degrees lag; and continue to open until both primary and secondary throttle valves reach the wide open position simultaneously. As engine speed increases, the forces exerted by the velocity of intake air down through the venturis of the carburetor increases and tends to overcome the air valve spring attached to the air valve, permitting the air valve to position its self according to engine requirements.

The AVS (air valve secondary) carburetor contains many features, some of which are the locations for the step-up rods and pistons. The step-up rods, pistons and springs are accessible for service without removing the air horn or the carburetor from the engine. The primary venturi assemblies are replaceable and contain many of the calibration points for both the high and low speed system. One fuel bowl feeds both the primary and secondary nozzles on the right side while the other fuel bowl takes care of the primary and secondary nozzles on the left side. This provides improved performance in cornering, quick stops and acceleration.

All the major castings of the carburetor are aluminum, with the throttle body cast integral with the main body. This allows an overall height reduction in the carburetor. The section containing the accelerator pump is termed the primary side of the carburetor. The rear section is the secondary. The five conventional systems used in previous four barrel carburetors are also used in this unit. The five conventional systems are, two float systems, two low speed systems, (primary side only) two high speed systems, one accelerator pump system and one automatic choke control system.



PB561

Fig. 1 - Carburetor Assembly

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR (Fig. 1)

(1) Place carburetor assembly on repair stand Tool C-3886 or T-109-287S elevating legs. These tools are used to protect throttle valves from damage and to provide a suitable base for working.

(2) Remove hairpin clip that attaches fast idle connector rod to fast idle cam. Disengage rod from cam then swing rod at an arc until it can be disengaged from choke operaing lever.

(3) Remove hairpin clip that holds throttle connector rod in center hole of accelerator pump arm. Disengage rod from arm and throttle lever, then remove from carburetor.

(4) Remove screws attaching step-up piston and rod cover plates. Hold cover down with a finger to prevent piston and rods from flying out. Lift off plates and slide step-up pistons and rods out of air horn.

Remove step-up piston springs.

(5) Remove vacuum hose between carburetor throttle body and vacuum diaphragm.

(6) Remove clip from choke operating link and disengage link from diaphragm plunger (stem) and choke lever. (Fig. 1).

(7) Remove vacuum diaphragm and bracket assembly and place to one side to be cleaned as a special item. A liquid cleaner may damage diaphragm material.

(8) Remove screws that attach idle solenoid bracket and solenoid to air horn and main body. Remove solenoid assembly from carburetor. (If so equipped.)

(9) Remove eight screws that attach air horn to main body. Lift air horn straight up and away from main body. When removing air horn, use care so as not to bend or damage floats. Remove accelerator pump, plunger lower spring from pump cylinder.

(10) Remove hot idle compensator and gasket.

Disassembling Air Horn

Place air horn in an inverted position on bench (to protect the floats) then proceed to disassemble as follows:

(1) Using a suitable tool, remove float fulcrum pins, (left and right) then lift float up and out of bosses on air horn. It is suggested that the float on the pump side be marked so that floats can be reinstalled in their respective positions.

(2) Remove two needle valves from their respective seats, after marking one on pump side for identification. Using a wide blade screw driver, remove needle valve seats. Be sure each needle valve is returned to its original seat at reassembly.

(3) Remove shoulder screw and spring holding accelerator pump rocker arm to air horn. Remove arm and disengage pump link from pump stem. Slide accelerator pump plunger and spring out of air horn. Remove gasket.

(4) Place accelerator pump plunger in a jar of clean gasoline or kerosene, to prevent leather from drying out.

(5) Remove fuel inlet fitting and filter screen from air horn.

(6) Test freeness of choke mechanism in air horn. The choke shaft must float free to operate correctly. If choke shaft sticks in bearing area, or appears to be gummed from deposits in air horn, a thorough cleaning will be required.

Main Body Disassembly

(1) Remove screws that attach accelerator pump

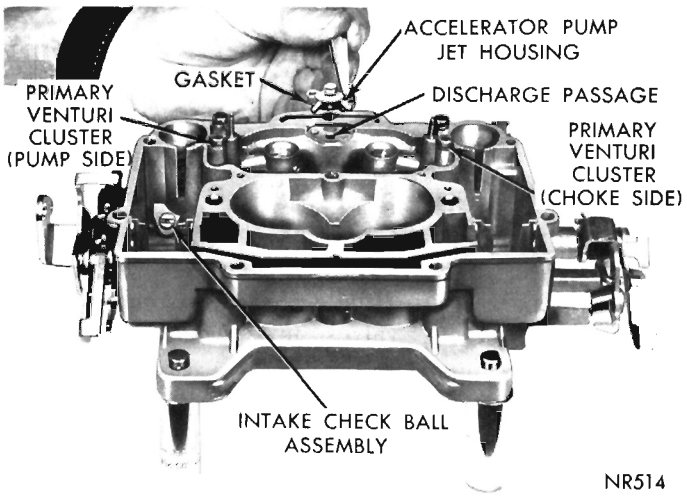


Fig. 2 - Removing or Installing Accelerator Jet Housing

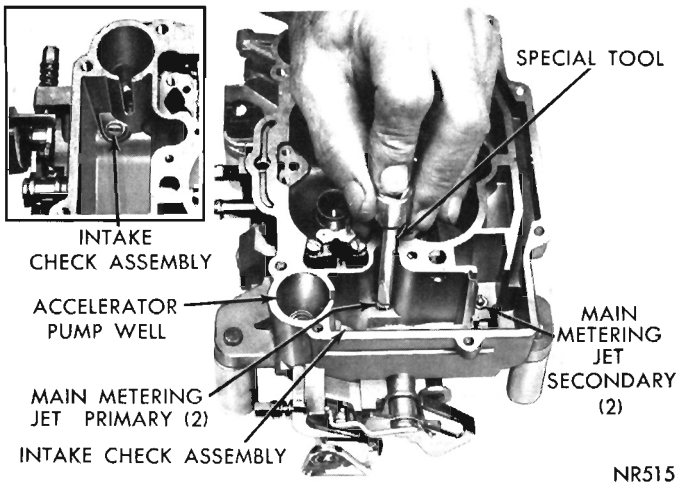


Fig. 3 - Removing or Installing Main Metering Jets

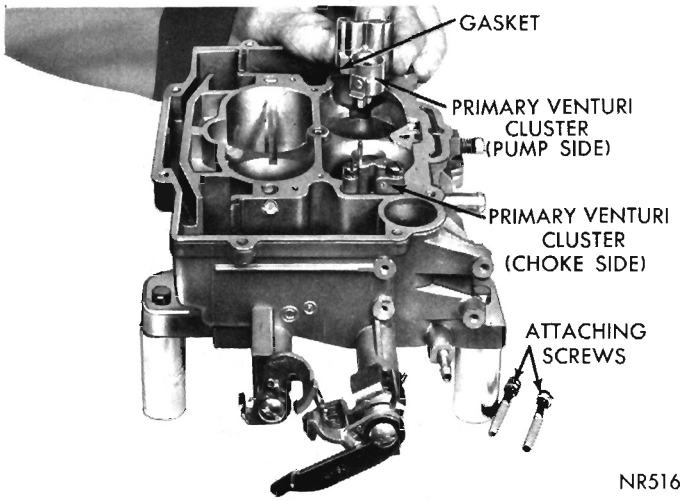


Fig. 4 - Removing or Installing Primary Venturi Cluster

jet housing to main body. Lift out jet housing and gasket (Fig. 2). Discard gasket. Now, invert main body and drop out discharge check needle from discharge passage.

(2) Using Tool T-109-58, remove main metering jets (primary side), (Fig. 3). **The primary and secondary main metering jets are not interchangeable. It is very important that these jets be installed in their respective locations in the main body at reassembly.**

(3) Again using Tool T-109-58, remove main metering jets (secondary side), (Fig. 3).

(4) Remove screws that attach primary venturi (choke and pump side) to main body. Lift venturi straight up and away from main body, (Fig. 4). Discard gaskets. **The venturi assemblies are not interchangeable, side for side and must be reinstalled in their original locations at reassembly.**

(5) Using Tool T-109-59, screw driver bit, remove accelerator pump intake check valve located inside fuel bowl, adjacent to accelerator pump cylinder.

(6) Remove plastic limiter caps from idle air mixture screws. (Be sure and count number of turns to seat the screws (from stop), as the same number of turns (from seat) must be maintained at installation.) Remove screws and springs from throttle body.

The carburetor now has been disassembled into two units, namely air horn and the main and throttle body casting. The component parts of each have been disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shafts or valves unless wear or damage necessitates the installation of new parts. During the manufacture of the carburetor, the location of the idle transfer ports and the idle discharge ports to the valve is carefully established for one particular

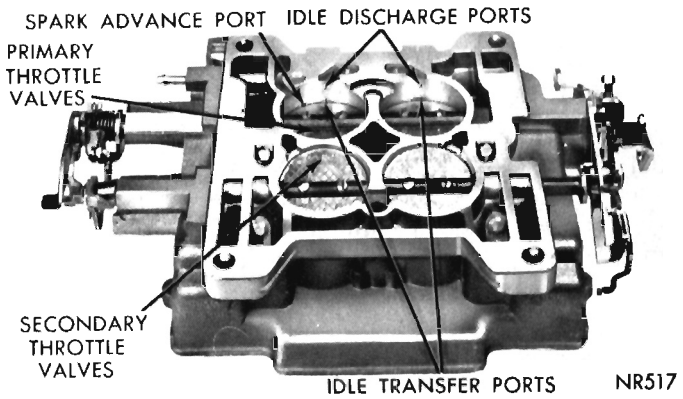


Fig. 5 - Ports in Relation to Throttle Valves

assembly, (Fig. 5). The valves are milled to give proper port relation.

If new throttle shafts should be installed in an old worn body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. A very slight change in the port relationship to the valves would adversely affect normal carubretor operation, between the speeds of 15 and 30 miles per hour.

It is recommended that if the throttle shafts are excessively worn, that a new carburetor be installed. However, if the throttle valves have become nicked, burred or damaged, new valves may be installed, providing the following instructions are carefully followed. **The screws that attach the throttle valves are staked on the opposite side and care should be used in removal so as not to break the screws in the throttle shaft. Remove the staked portion of the screws with a file.**

Remove the screws that attach the primary throttle valves to the throttle shaft and slide valve (or valves) out of bores.

Remove the screws that attach the secondary throttle valves to the throttle shaft and slide valve (or valves) out of bores.

The primary valves and secondary valves are not interchangeable and should be kept separate in order that each may be returned to its respective bore.

INSPECTION AND REASSEMBLY

(1) Slide primary throttle valve (or valves) into their respective bores, install new screws, but do not tighten. Be sure idle speed adjusting screw is backed out. Hold valves in place with fingers. (Fingers pressing on high side of valves.)

(2) Tap valves lightly in this position, tighten screws securely. Stake screws by squeezing with pliers.

(3) Install idle mixture screws and springs in throttle body. (The tapered portion must be straight and smooth. If tapered portion is grooved

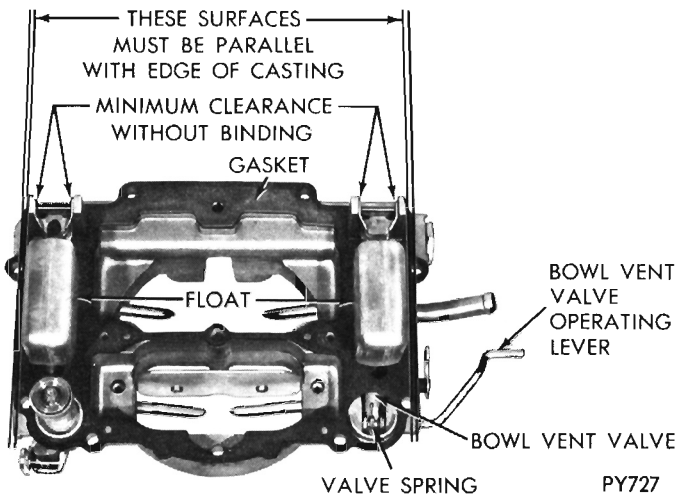


Fig. 6 - Checking Float Alignment

or ridge, a new idle mixture screw should be installed to insure having correct idle mixture control.) **DO NOT USE A SCREW DRIVER.** Turn screws lightly against their seats with fingers. Back off the number of turns counted at disassembly. Install new plastic caps with tab against stops. Turn counterclockwise (Richer) and clockwise (Leaner).

(4) **Be sure all the metering holes and vent tubes are clean, in the primary venturi.** Place new primary venturi gaskets in position, then install the primary venturi (pump and choke side) by lowering straight down on gaskets (Fig. 4). Install attaching screws and tighten securely.

(5) Install primary and secondary main metering jets, using Tool T-109-58. (Fig. 3). Tighten jets securely.

(6) Install accelerator pump intake check ball using Tool T-109-59.

(7) Install hot idle compensator and gasket. Tighten screws securely.

Accelerator Pump Test

(1) Pour clean gasoline into carburetor bowl (approximately 1/2 inch deep). Remove accelerator pump plunger from jar of gasoline. Flex leather several times, then slide into pump cylinder.

(2) Install accelerator pump discharge check needle in discharge passage. Raise pump plunger and press lightly on plunger shaft to expel air from pump passages. Using a small clean brass rod, hold discharge check needle firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either the intake or discharge passage.

(3) If fuel does emit from intake passage, remove intake check ball and reclean the passage. Fuel leakage at discharge check needle indicates presence of dirt or a damaged check needle. Clean again and then install a new check needle. Retest for leakage.

(4) If either intake check assembly or discharge check needle leaks after above test and service fix, attempt to reseat as follows:

Intake Check Ball

Remove the intake check assembly from the throttle body. Install a new check assembly, then retest as described previously (Fig. 3).

Discharge Check Needle

(1) With discharge check needle installed, insert a piece of drill rod down on needle. Lightly tap drill rod with a hammer to form a new seat. Remove and discard old needle and install a new one. Retest as described previously. If service fix does not correct the condition, a new carburetor will have to be installed.

(2) Install accelerator pump, jet housing and gasket. Tighten screws securely.

(3) Press down on accelerator pump plunger shaft, and as plunger is being depressed, a clear straight stream should emit from each jet. If streams are not identical, (if either one is diverted or restricted) a new accelerator pump jet housing should be installed. After test, pour gasoline from carburetor bowl and remove pump plunger.

Assembling Air Horn

(1) Slide fuel inlet screen into fuel line fitting, then install in air horn. Tighten securely.

(2) Check to see if leather on accelerator pump plunger is hard, cracked or worn. If any sign of wear or deterioration is evident, install a new plunger assembly. Install pump link.

(3) Place pump arm in position over boss of air horn and engage pump link. Install screw through arm and boss. Be sure shoulder of screw enters arm. Tighten securely. Check for proper operation.

The carburetors are equipped with synthetic rubber tipped fuel inlet needles. The needle tip is a rubber material which is not affected by gasoline and is stable over a wide range of temperatures. The tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding.

The use of new inlet needles require that care be used when making float adjustments. Avoid applying any pressure on the floats which might compress the tip of the fuel inlet needles. **The tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in the bowl.**

(4) Place a new air horn to main body gasket in position on air horn, then install float needle valve seats. (Be sure each needle seat and needle is reinstalled in its original position.)

(5) Slide right and left floats into position in air

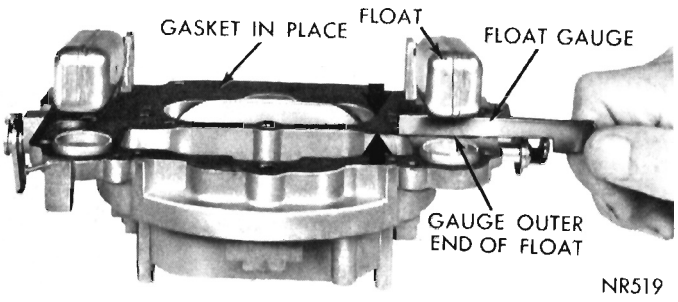


Fig. 7 - Checking Float Height

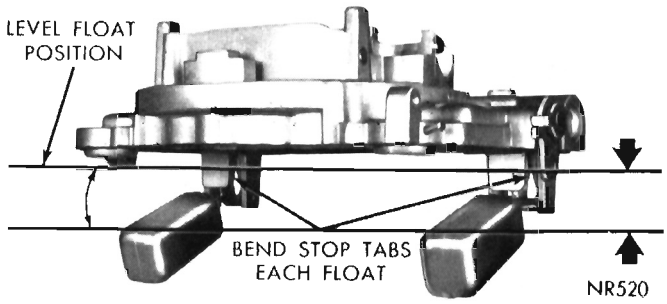


Fig. 8 - Checking Float Drop

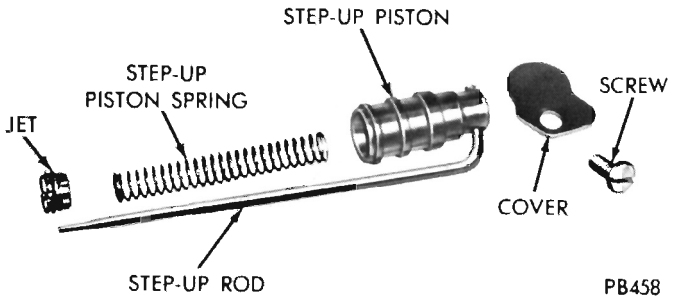


Fig. 9 - Step-Up Piston, Rod and Jet

horn, then install float fulcrum pins. **(Be sure marked float is installed on pump side of the air horn.) See disassembly procedures.**

(6) After floats have been installed, check float alignment, level and drop settings as follows:

Float Alignment Setting

(1) Sight down side of each float shell to determine if side of the float is parallel to outer cage of air horn casting (Fig. 6).

(2) If sides of float are not in alignment with edge of casting, bend float lever by applying pressure to end of float shell with thumb. **To avoid damage to the float, apply only enough pressure to bend the float lever.**

(3) After aligning floats, remove as much clearance as possible between arms of float lever and lugs of air horn. To do this, bend float lever. The arms of float lever should be as parallel as possible to inner surfaces of lugs of casting.

Float Level Setting

(1) With air horn inverted, air horn gasket in place and float needle seated, slide float gauge (refer to specifications for carburetor being worked on) between top of the float (at outer end) and air horn gasket, (Fig. 7). Float should just touch gauge (T-109-107).

(2) Check other float in same manner. If an adjustment is necessary, bend float arm using Tool T-109-22, until correct clearance has been obtained. After bending arm, recheck the float alignment.

Float Drop Setting

Float drop is the distance the floats move from the inverted air horn (float level setting position) to the airhorn in upright position.

(1) With air horn inverted (upside down) place air horn in upright position and measure the distance floats move from inverted to upright position. This measurement should be 1/2 inch. (Fig. 8). Air horn gasket installed. If an adjustment is necessary, bend stop tabs on float levers until correct drop setting has been obtained. Bend tab toward needle seat to lessen drop, or away from seat to increase drop.

(2) After floats have been checked and adjusted, continue to assemble carburetor as follows:

(3) Place accelerator pump plunger lower spring in pump cylinder, then lower air horn carefully down on main body. Care must be taken to center small brass main bleed tubes so that they will pass through holes in air horn without being damaged. **Be sure the fuel baffles on the air horn, slide down in front, (bowl side) of the float chamber baffles, or the air horn will not index correctly with the main body and can cause the floats to hang up. Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not observed.** Place fast curb idle solenoid in position on carburetor. Install attaching screws and tighten securely. (If so equipped.)

(4) Install air horn attaching screws and tighten securely.

The change from low speed, best fuel economy, road load mixtures to richer wide open throttle full power mixtures is now accomplished in two steps. This has made it possible to secure best low speed fuel economy without sacrificing performance in the intermediate speed range. To do this, there is a step-up piston, new metering rods with two diameters, and primary metering jets, (Fig. 9).

(5) Slide step-up piston spring into piston cylinders, followed by step-up pistons and step-up rods. Install cover plates and attaching screws while holding step-up pistons down in position. Tighten screws securely.

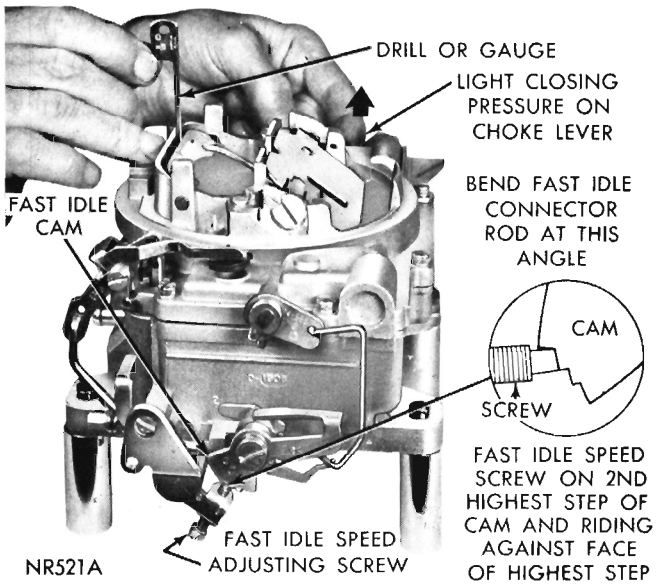


Fig. 10 - Fast Idle Cam Position Adjustment

(6) Check fit of choke valve in air horn. The valve should be evenly spaced on all sides. Loosen screws and reposition if necessary.

(7) Engage throttle connector rod with hole in throttle lever. Install other end in accelerator pump rocker arm, (center hole) and install hairpin clip to secure.

(8) Engage upper end of fast idle connector rod in slot of choke operating lever. Swing rod in an arc and engage with fast idle cam. Secure with hairpin clip.

Installing Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to be sure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the vacuum fitting to seal the opening. Release the diaphragm stem. If the stem moves more than 1/16 inch in ten (10) seconds, the leakage is excessive and the assembly must be replaced. Install the diaphragm assembly on the carburetor as follows:

(1) Assemble to carburetor and tighten attaching screws securely.

(2) Install choke operating link in position between diaphragm plunger (stem) and choke lever. Install clip to secure. Secure choke lever end with spring clip.

(3) Inspect rubber hose for cracks, before placing it on correct carburetor fitting. (Fig. 1). **Do not connect the vacuum hose to the diaphragm fitting until after the vacuum kick adjustment has been made. (See Carburetor Adjustments.)**

CARBURETOR ADJUSTMENTS

The following adjustments should be made with the carburetor on the bench for ease of working, and, should be made in the following order:

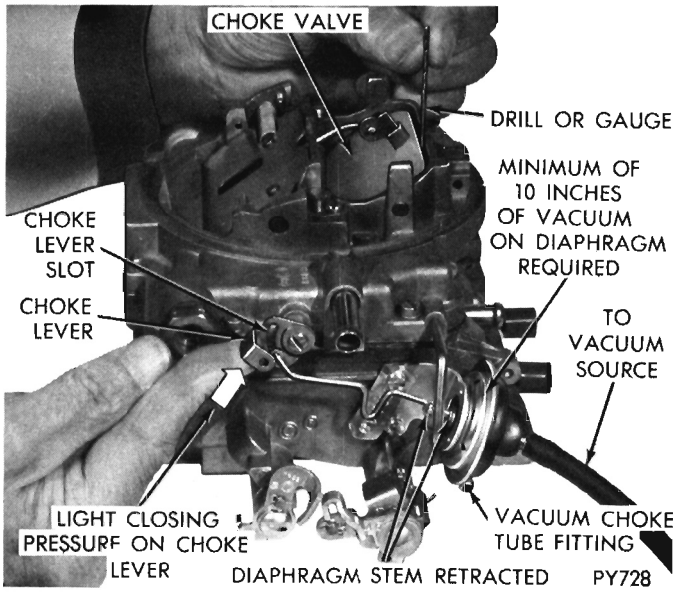


Fig. 11 - Checking Choke Vacuum Kick Setting

Fast Idle Speed Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (On Vehicle Paragraph.) However, the Fast Idle Cam Position Adjustment can be made on the bench.

This adjustment is important to assure that the speeds of each cam step occur at the proper time during engine warm-up. Adjust as follows:

(1) With fast idle speed adjusting screw contacting second highest speed step on fast idle cam, move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill (refer to Specifications), between choke valve and wall of air horn (Fig. 10). An adjustment will be necessary if a slight drag is not obtained as the drill is being removed.

(3) To adjust, bend fast idle connector rod at angle, using Tool T-109-213 until correct valve opening has been obtained. (Fig. 10).

Vacuum Kick Adjustment—(This test can be made ON or OFF vehicle.)

The choke diaphragm adjustment controls the fuel delivery while the engine is running. It positions the choke valve within the airhorn by use of the linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or vehicle to be adjusted.

(1) If adjustment is to be made with engine running, disconnect fast idle linkage to allow choke to close to kick position with engine at

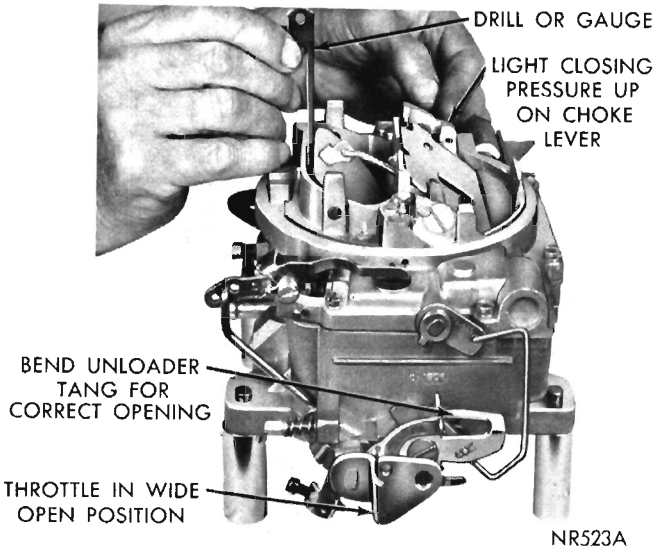


Fig. 12 - Checking Choke Unloader (Wide Open Kick)

curb idle. If an auxiliary vacuum source is to be used, open throttle valves (engine not running) and move choke valve to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect vacuum hose from carburetor and connect it to hose from vacuum supply with a small length of tube to act as a fitting. Removal of hose from diaphragm may require forces which damage the system. Apply a vacuum of 10 or more inches.

(3) Insert specified drill (refer to Specifications) between choke valve and wall of air horn. (Fig. 11). Apply sufficient closing pressure on **lever** to which choke rod attaches to provide a minimum choke valve opening without distortion of diaphragm link. Note that on most units, a cylinderical stem extends as an internal spring is compressed. This spring must be fully compressed for proper measurement of vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall vacuum hose on correct carburetor fitting. Return fast idle linkage to its original condition if disturbed as suggested in step no. 1.

(6) Make following check. With no vacuum applied to diaphragm, **CHOKE VALVE SHOULD MOVE FREELY** between open and closed positions. If movement is not free, examine linkage for misalignment or interferences caused by bending operation. Repeat adjustment if necessary to provide proper link operation.

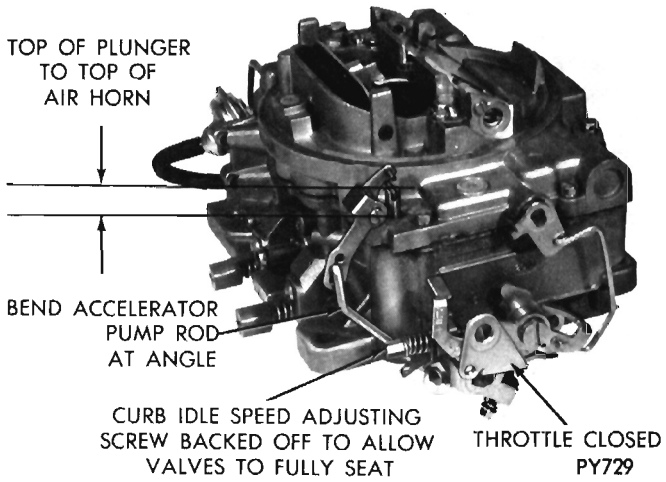


Fig. 13 - Checking Accelerator Pump Adjustment

Choke Unloader Adjustment

The choke unloader is a mechanical device to partially open the choke at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the system as follows:

(1) Hold throttle valves in wide open position. Insert specified drill (refer to Specifications), between upper edge of choke valve and inner wall of air horn. (Fig. 12).

(2) With a finger lightly pressing against choke lever, a slight drag should be felt as drill is being withdrawn. If an adjustment is necessary, bend unloader tang on fast idle cam, using Tool T-109-22, until correct opening has been obtained. (Fig. 12).

Accelerator Pump Adjustment

Move the choke valve to wide open position, to release the fast idle cam. Back off the idle speed adjusting screw (curb idle) until the throttle valves are seated in the bores.

Measure the distance from the top of the air horn to the top of the plunger shaft, using a "T" scale, (Fig. 13). This distance should be 7/16 inch. If an adjustment is necessary, bend the throttle connector rod at the lower angle, using Tool T-109-213, until correct travel has been obtained.

Secondary Throttle Lever Adjustment

To check the secondary throttle lever adjustment, block the choke valve in the wide open position and invert the carburetor. Slowly open the prima-

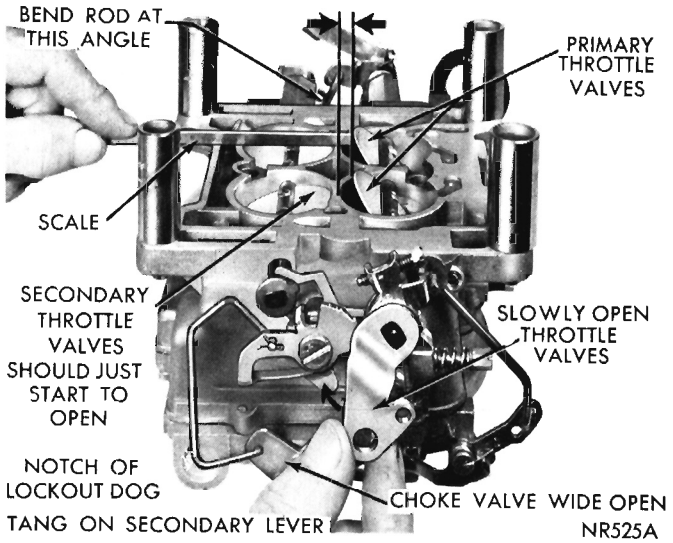


Fig. 14 - Checking Secondary Throttle Adjustment

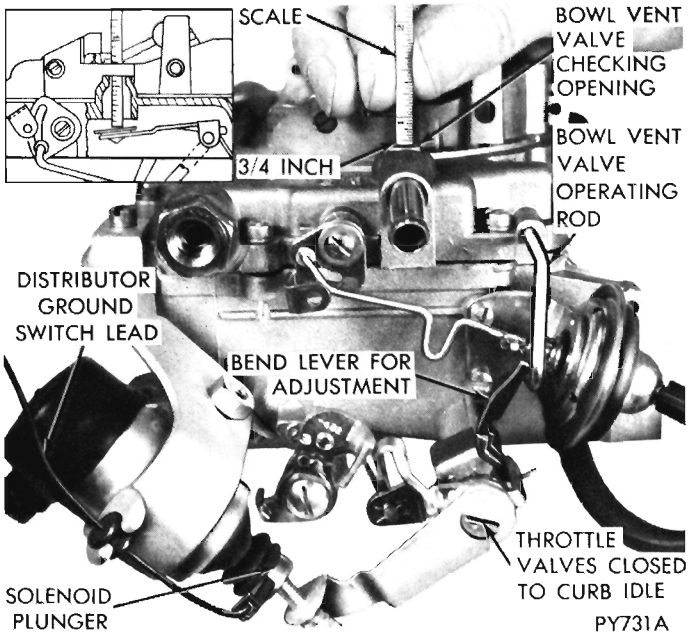


Fig. 16 - Bowl Vent Valve Adjustment

ry throttle valves until it is possible to measure 21/64 inch between the lower edge of the primary valve and the bore (opposite idle port) (Fig. 14). At this measurement, the secondary valves should just start to open. If an adjustment is necessary, bend the secondary throttle operating rod at the angle, using Tool T-109-213, until correct adjustment has been obtained.

With primary and secondary throttle valves in tightly closed position, it should be possible to insert Tool T-109-29 (.020 in.) wire gauge, between positive closing shoes on the secondary throttle levers, (Fig. 15). If an adjustment is necessary, bend the shoe on the secondary throttle lever, using Tool T-109-22, until correct clearance has been obtained.

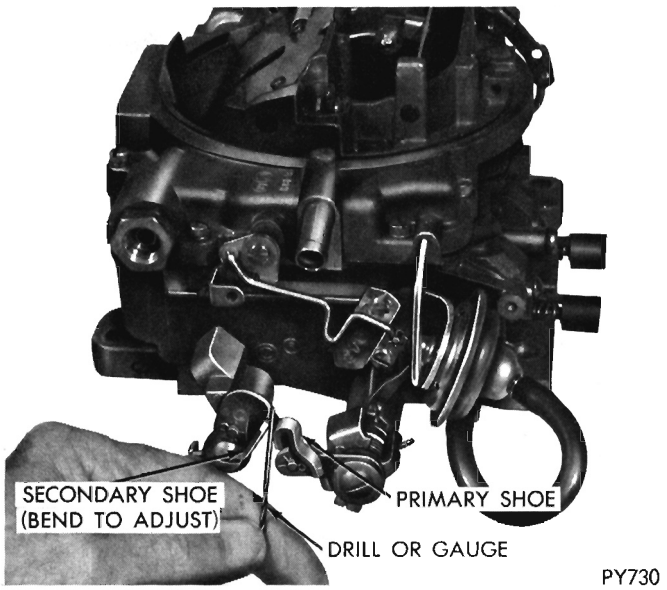


Fig. 15 - Checking Clearance Between Closing Shoes

Secondary Throttle Lock Out Adjustment

Crack the throttle valves, then manually open and close the choke valve. The tang on the secondary throttle lever should freely engage in the notch of the lockout dog. (Fig. 14).

If an adjustment is necessary, bend the tang on the secondary throttle lever, until engagement has been made. Use Tool T-109-22 for this operation.

After adjustments have been made, reinstall carburetor on engine, using a new gasket.

It is suggested that the carburetor be filled with clean gasoline. This will help prevent dirt that is trapped in the fuel system, from being dislodged by the free flow of fuel, as the carburetor is primed.

Bowl Vent Adjustment

To check the bowl vent valve adjustment, proceed as follows:

(1) Using Tool T109-43, remove bowl vent valve checking hole plug in air horn.

(2) With throttle valves at closed curb idle position, insert a narrow ruler down through hole. Allow ruler to rest lightly on top of valve. The reading should be 3/4 inch from top of valve to top of air horn casting at opening. (Fig. 16).

(3) If an adjustment is necessary, bend bowl vent valve operating lever, until correct valve opening has been obtained.

(4) Install new plug and rap lightly to seat, using a hammer.

Secondary Air Valve Adjustment

(1) Loosen lock screw (Fig. 17) and allow air valve to position itself at wide open position.

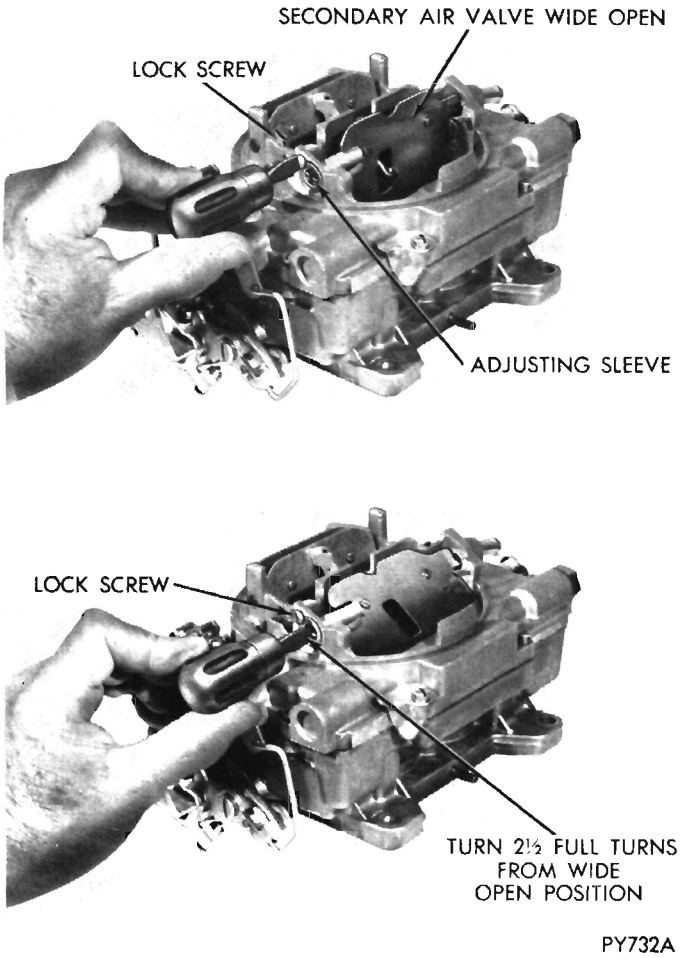


Fig. 17 - Secondary Air Valve Adjustment

(2) From wide open position, (spring barely moving valve), turn slotted sleeve 2-1/2 **full turns** counter clockwise, (Fig. 17).

(3) Hold in this position with finger, then tighten lock screw securely. Check valve for freedom of movement.

Idle Speed Adjustment—(Curb Idle)

Refer to General Information at Front of Group.

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a tachometer and set curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in **PARK** or **NEUTRAL** position open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on the second highest speed step of fast idle cam. (Fig. 18).

(3) Start engine and determine stabilized speed.

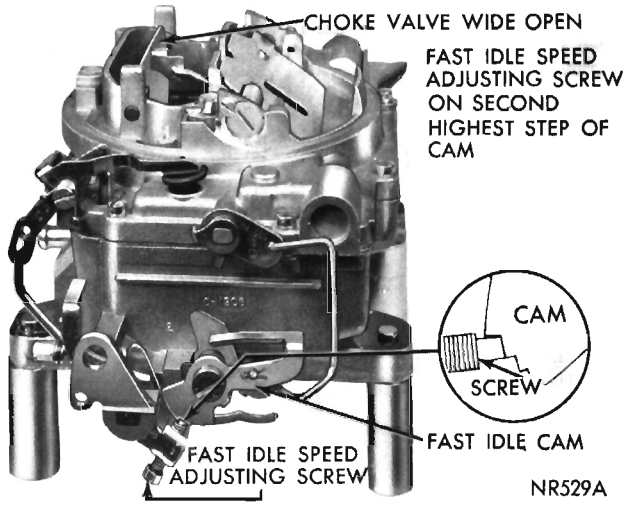


Fig. 18 - Fast Idle Speed Adjustment (On Vehicle)

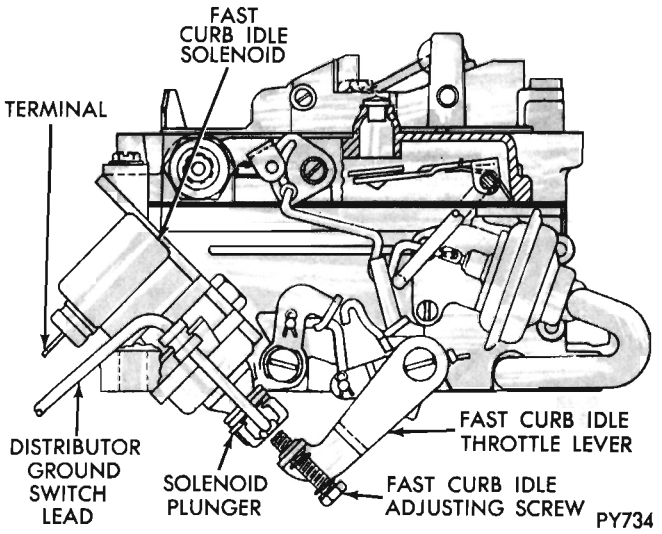


Fig. 19 - Idle Speed Solenoid Adjustment (Fast Curb Idle)

Turn fast idle speed screw **in** or **out** to secure specified speed. (Refer to Specifications).

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Before adjusting idle and/or fast idle speeds and mixtures, make sure that the basic timing and the distributor control valve are correctly adjusted as outlined under Idle Speed Adjustment (Curb Idle).

Idle Speed Solenoid Adjustment (If so equipped)

To set idle speed solenoid for correct engine r.p.m. proceed as follows:

(1) Warm up engine to normal operating temperature, then attach a tachometer.

(2) With engine running, turn idle speed solenoid adjusting screw **in** or **out** to obtain 900 r.p.m. for

manual transmission equipped vehicles and 900 r.p.m. for automatic transmission equipped vehicles. (Fig. 19).

(3) After specified r.p.m. has been obtained and with engine still running (with energized solenoid), adjust curb idle speed screw until end of screw **just touches** stop on carburetor throttle body. Now, back off 1 full turn to obtain slow curb idle speed setting. (Approximately 650 to 700 r.p.m.)

HOLLEY 2300 CARBURETORS

(TRI-CARB)

INDEX

	Page
Assembling Carburetor (Center Unit)	102
Assembling Carburetor (Outboard)	107
Carburetor Adjustments	104
Accelerator Pump Lever Clearance	104
Bowl Vent Valve Clearance	104
Choke Unloader (Wide Open Kick)	105
Fast Idle Cam Position	105
Fast Idle Speed (On Vehicle)	106
Idle Speed (Curb Idle)	107
Outboard Carburetor Throttle Rod	106
Qualifying Choke Control Lever	104
Vacuum Kick	106
Cleaning Carburetor Parts	101
Disassembling Carburetor (Center Unit)	98
Disassembling Carburetor (Outboard)	107
General Information	93
Specifications	137

GENERAL INFORMATION

340 Cubic Inch Engines

Three two barrel Holley 2300 and 2300C Series carburetors are mounted on an aluminum intake manifold and are used on the 340 cubic inch engine. R-4791A and R-4792A are used when the vehicle is equipped with Standard or Automatic Transmissions respectively. The two Outboard Carburetors Models R-4789A and R-4790A are used with either Standard or Automatic Transmission. (Refer to Specifications.)

440 Cubic Inch Engines

Three two barrel Holley 2300 and 2300C Series carburetors are mounted on a cast iron intake manifold and are used on the 440 cubic inch engine. R-4669A and R-4670A are used when the vehicle is equipped with Standard or Automatic Transmissions respectively. The two Outboard Carburetors Models R-4671A and R-4672A are used with either Standard or Automatic Transmission. (Refer to Specifications.) (Fig. 1).

The two outboard carburetors contain all the usual systems except choke, power enrichment, accelerating pump, idle, and spark advance. Each carburetor is equipped with a throttle control vacuum diaphragm (Fig. 1). The two outboard carburetors are connected to the center carburetor's slotted throttle lever by two adjustable connector rods. The slotted throttle lever of the center carburetor allows the throttle valves to open on the outboard carburetors as vacuum requires and close mechanically with the controlling center carburetor (Fig. 1).

The center (or controlling carburetor) provides for easier servicing and adjusting (Fig. 1). Each barrel has its own venturi, idle system, main metering system, booster venturi and throttle valve. The carburetor is equipped with a diaphragm type cam operated, accelerating pump, located on the bottom of the fuel bowl. The pump functions when the pump lever is activated by a cam on the throttle lever. An override spring on the pump lever adjusting screw, allows a prolonged discharge of fuel for smooth acceleration.

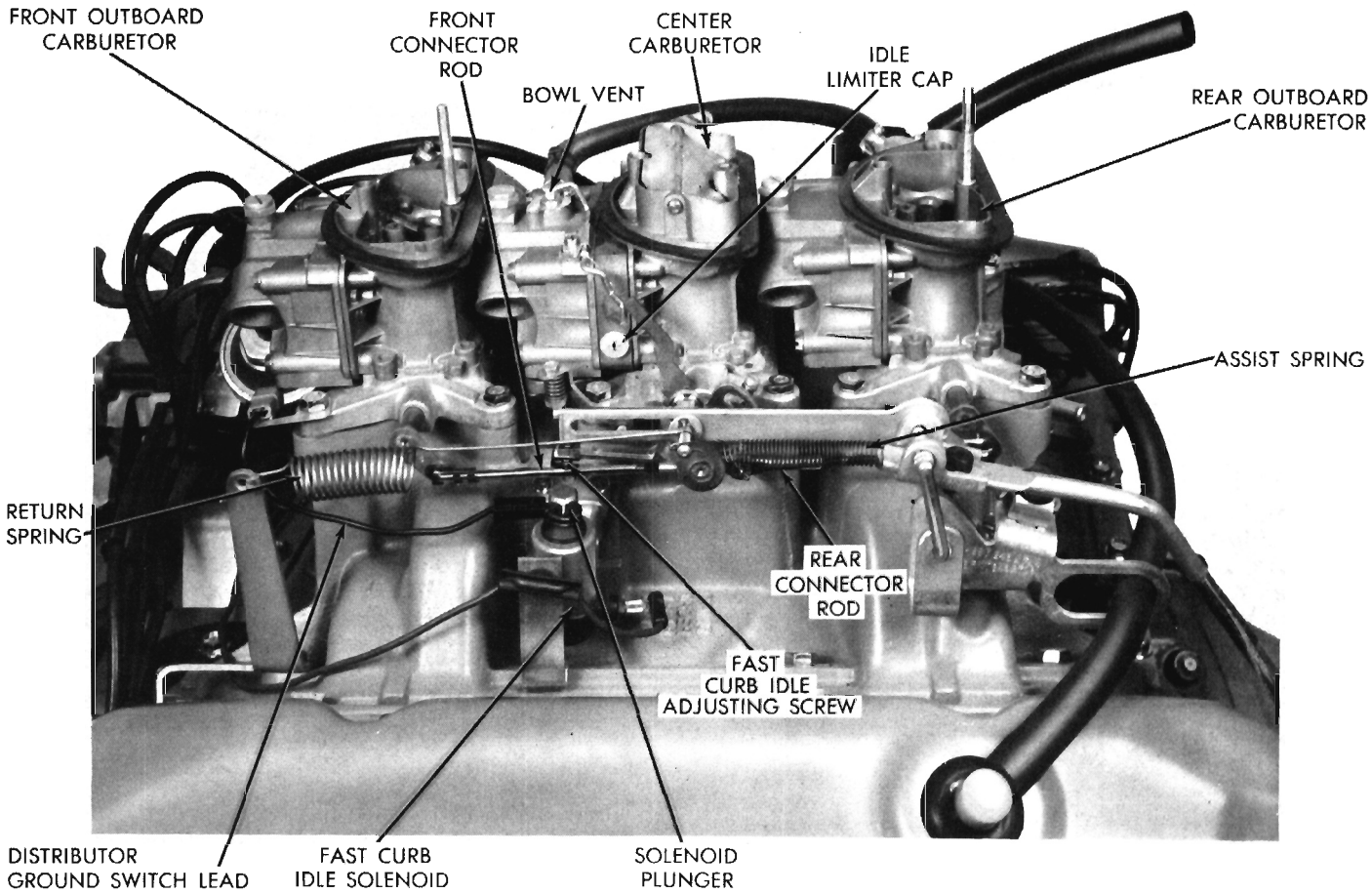
The supply of fuel necessary for high speed or full power operation, is delivered by a fully automatic power enrichment system. Manifold vacuum on the power valve diaphragm actuates the power enrichment system.

The choke used only on the center carburetors (only) is the well type with a thermostatic coil spring. The well is located in the intake manifold and over the exhaust crossover passage. Heat generated in the well acts on the thermostatic coil spring so that as the engine warms up, the choke valve moves toward the open position.

There are four major sub-assemblies of the center carburetors and they are: the main body assembly, the fuel bowl, the metering body assembly and the throttle body.

Operation (R-4669A, R-4677A, R-4791A and R-4792A)

The carburetor uses the four basic systems required for efficient carburetion. These four systems are: The idle system which provides a rich mixture for smooth idle and low speed performance;



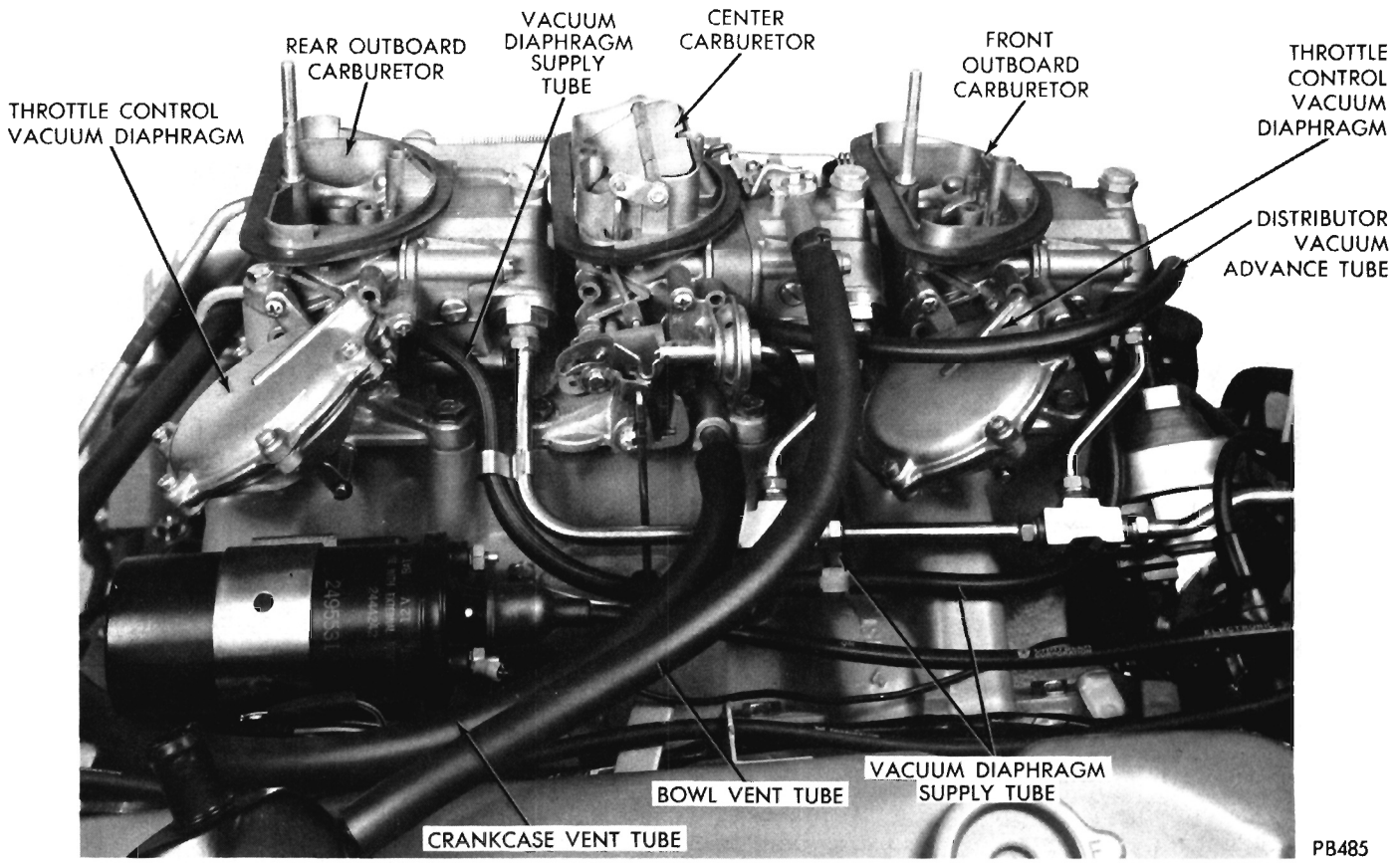


Fig. 1 - Tri-Carburetor Installation

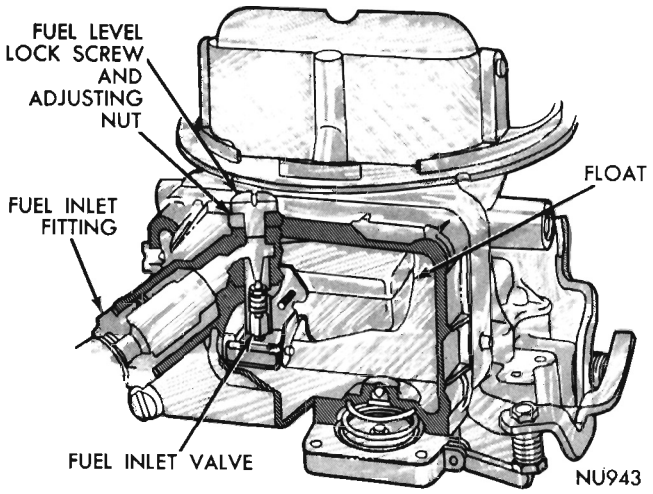


Fig. 2 - Fuel Inlet System

The accelerating pump system which provides additional fuel during acceleration; The main metering system which provides an economical mixture for normal cruising conditions; and the power enrichment system which provides a richer mixture when high power output is desired.

Supplementing the four systems are: The fuel inlet system which constantly supplies fuel to each basic system; and the choke system which temporarily enriches the fuel mixture to aid in starting and running a cold engine. The pressure drop (vacuum) within the carburetor provides the force for proper discharge of fuel for the various engine speed and load conditions.

Fuel Inlet System

All fuel first enters the fuel bowl (Fig. 2) which stores fuel for the four basic metering systems. The fuel enters the fuel bowl through the fuel inlet valve or needle and seat assembly. The amount of fuel entering the fuel bowl is determined by the space between the movable needle and its seat and also by the pressure from the fuel pump.

Movement of the needle in relation to the seat is controlled by the float and hinge assembly which rises and falls with the fuel level. As the fuel level drops, the float drops, opening the needle valve to allow fuel to enter the float chamber. When the fuel reaches a specified level, the float moves the needle valve to a position where it restricts the flow of fuel, admitting only enough to replace that being used. Any slight change in the fuel level causes a corresponding movement of the float, opening or closing the fuel inlet needle valve to immediately restore or hold the proper fuel level. The fuel inlet system must constantly maintain the specified level of fuel as the basic fuel metering systems are calibrated to deliver the proper mixture only when the fuel is at this level.

A float spring is incorporated under the float to assist in minimizing float vibration. The float chamber is vented internally by the vent tube at all times.

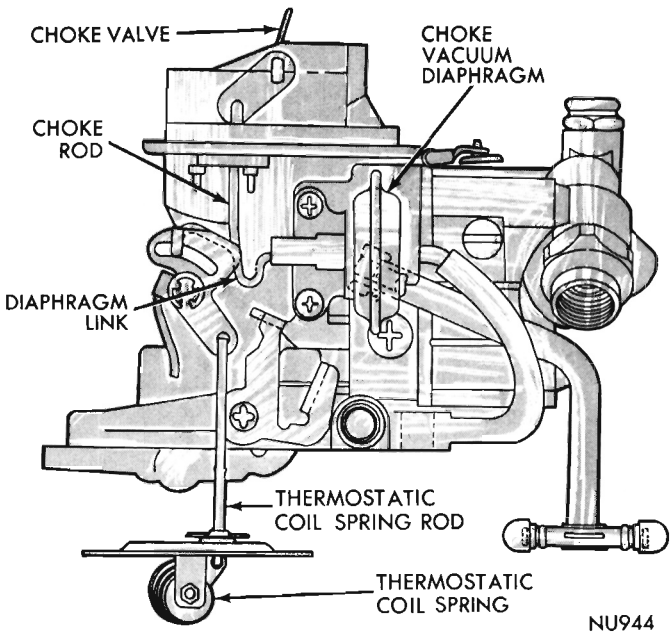


Fig. 3 - Choke System

Choke System

The choke permits a richer fuel-air mixture required for starting and operating a cold engine. Most of the vaporized fuel condenses to a liquid upon contact with the cold surfaces of intake manifold. In this liquid form it burns too slowly and incompletely in the cylinders and will cause stalling and loss of power. The choke valve is normally closed during the cranking period and partially open during warm up, confining manifold vacuum below the choke valve. This greater vacuum causes both main metering system and idle system to discharge fuel into the manifold (Fig. 3)

Accelerating Pump System

As the throttle opening is increased, the air flow through the carburetor responds almost immediately. The fuel, however, is heavier than air and there is a brief interval before the fuel flow responds. It is during this interval that the accelerating pump operates, supplying fuel until the other metering systems can provide the proper mixture.

The accelerating pump (Fig. 4) is located in the bottom of the fuel bowl. The pump begins to function when the pump operating lever is actuated by throttle movement. When the throttle is opened the pump linkage, actuated by a cam on the throttle shaft lever, forces the pump diaphragm up. As the diaphragm moves up, the pres-

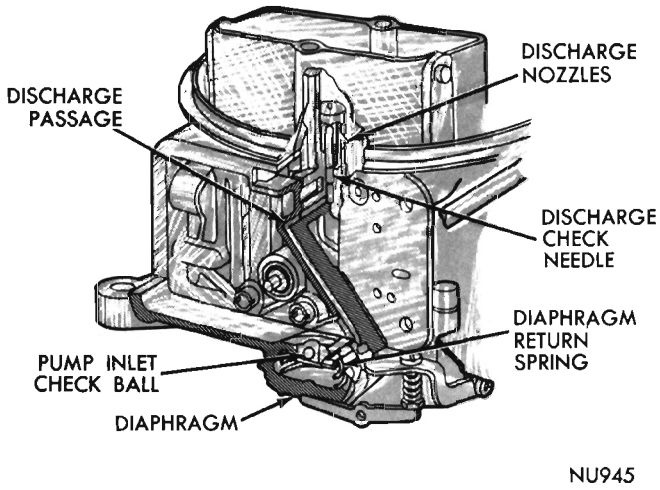


Fig. 4 - Accelerating Pump System

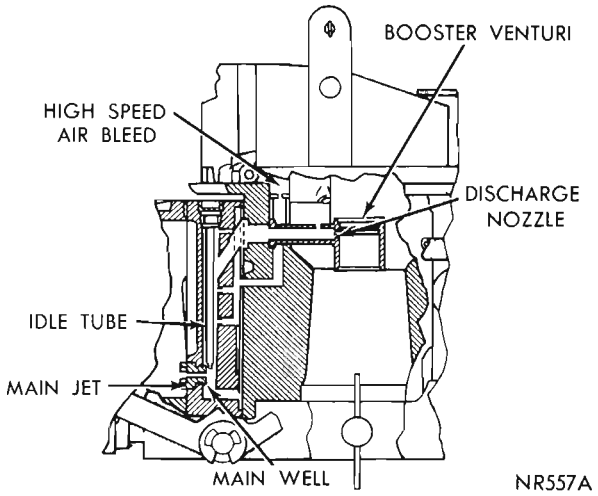
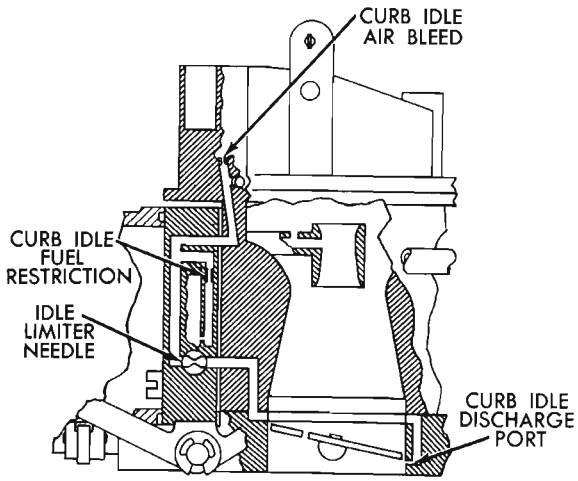


Fig. 5 - Main Metering System



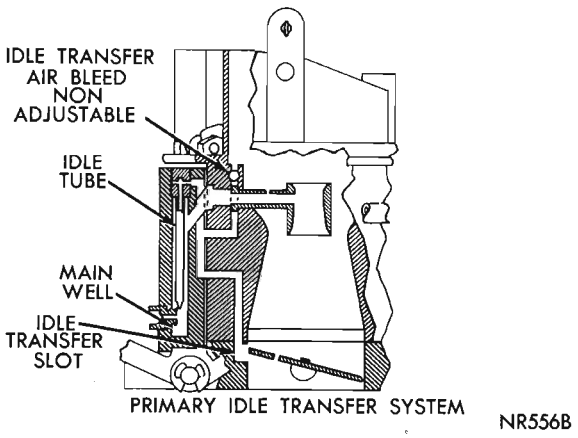


Fig. 6 - Idle System

sure forces the pump inlet check ball on its seat preventing fuel from flowing back into the float chamber. The fuel flows from the short horizontal passage in the fuel bowl into the long diagonal passage in the metering body. The fuel passes into the main body and then in the pump discharge chamber. The pressure of the fuel causes the discharge needle to raise and fuel is discharged into the venturi.

As the throttle is moved toward the closed position, the linkage returns to its original position and the diaphragm spring forces the diaphragm down. As the diaphragm returns to its original position the pump inlet check ball is moved off its seat and the diaphragm chamber is filled with fuel from the bowl.

Main Metering System

When the engine is running, it draws air through the carburetor venturi and booster venturi. The air passing through the throat of a venturi, creates a low pressure called a vacuum. The strength of this low pressure is determined primarily by the velocity of the air flowing through throat of the venturi. This, in turn, is regulated by the speed and power output of the engine. The difference, between the pressure in the booster venturi and the normal air pressure in the float chamber, causes fuel to flow through the main metering system (Fig. 5).

At cruising speed, the fuel flows from the float chamber through the main jet, which measures or meters the fuel flow, into the bottom of the main well. The fuel moves up the main well past the main well air bleed hole in the side of the well. Filtered air, enters through the air bleed in the main body and then into the main metering body by interconnecting passages. This mixture of fuel and air, being lighter than raw fuel, responds faster to any change in venturi vacuum and vaporizes more readily when discharged into the air stream of the venturi. The mixture of fuel and air moves up the main metering passage and passes into the short horizontal passage leading to the main body, then through the horizontal channel of the discharge nozzle.

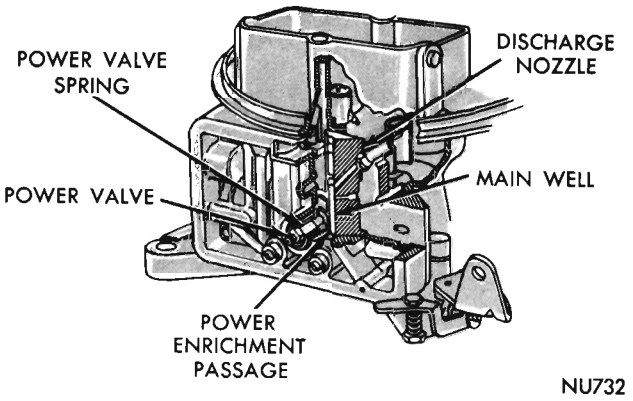


Fig. 7 - Power Enrichment System

Idle System

At idle and low speeds, the air flow through the carburetor is not sufficiently strong enough to draw fuel through the venturi for the main metering system. Intake manifold vacuum is high because of the greater restriction to the air flow by the nearly closed throttle valves. This high manifold vacuum is used to provide the pressure differential to operate the idle system (Fig. 6).

The carburetor utilizes two identical idle systems, one for each bore. Since, the two passages function identically, only one side will be considered in this explanation.

Fuel flows from the float chamber, through the main metering jet and into the idle tube. The fuel flows up the idle tube and into the idle down channel where it is mixed with air coming in from the primary idle air bleed. Part of this air-fuel mixture then goes into the main body to be discharged through the idle transfer slot, and the remainder of air-fuel mixture is metered by the idle mixture screw to the curb idle discharge ports.

The idle mixture screws are located in the sides of the primary metering block, and are limited with white plastic limiter caps installed at the factory. These limiter caps incorporate a stop which allows the mixture screws to be rotated about 270 degrees from the leanest to the richest positions. The limiter caps are slotted so that all adjustments can be made with a screwdriver. An acceptable idle quality should be obtainable within the rotational limits of the limiter caps. (If for any reason it is necessary to remove the limiter caps, two screwdrivers should be employed at points 180 degrees apart on the limiter cap to pry the limiter cap off the mixture screw. This minimizes the danger of damaging the mixture screw. Once removed, the original limiter cap must be discarded, as any attempt to reinstall them may result in damaging the idle mixture screws).

As the throttle valve is opened wider and engine speed increases, the air flow through the carburetor is also increased. This creates an increased vacuum in the venturi to bring the main metering system into operation. The flow from the idle system tapers off as the main metering system begins discharging fuel. The two systems are engineered to provide smooth gradual transition from idle to cruising speeds.

This fuel is discharged into the booster venturi and then in the air stream of the carburetor venturi.

The throttle valve controls the amount of fuel-air mixture admitted to the intake manifold, regulating the speed and power output of the engine in accordance with accelerator pedal movement.

Power Enrichment System

During high speed (or low manifold vacuum) the carburetor must provide a mixture richer than is needed when the engine is running at cruising speed under no great power requirements. The added fuel for power operation is supplied by the power enrichment system (Fig. 7).

This system is controlled by manifold vacuum which gives an accurate indication of the power demands placed upon the engine. Manifold vacuum is strongest at idle and decreases as the load on the engine increases. As the load on the engine is increased, the throttle valve must be opened wider to maintain a given speed. Manifold vacuum is thus reduced because the opened throttle valve offers less restriction to air entering the intake manifold.

A vacuum passage in the throttle body transmits manifold vacuum to the power valve chamber in the main body. The power valve which is located in the main metering body is affected by this manifold vacuum. The manifold vacuum, acting on the diaphragm at idle or normal load conditions, is strong enough to hold the diaphragm closed, and overcomes the tension of the power valve spring. When high power demands, place a greater load on the engine and manifold vacuum drops below a predetermined point, the power valve spring overcomes the reduced vacuum opening the power valve. Fuel flows from the float chamber, through the valve and out the small holes in the side of the valve through the diagonal restrictions in the main metering body and then into the main well. Here the fuel joins the fuel flow in the main metering system, enriching the mixture.

As engine power demands are reduced, manifold vacuum increases. The increased vacuum acts on the diaphragm, overcoming the tension of the power valve spring. This closes the power valve and shuts off the added supply of fuel which is no longer required.

Spark Advance

The carburetor is teamed with the distributor to effect spark timing that will satisfy all engine speed and load conditions.

The spark must be advanced as the engine speed is increased since a definite time is required for the fuel-air mixture to burn and reach its maximum pressure at the right time for highest efficiency of the engine cycle. Because the fuel-air mixture induced into the intake manifold at light loads is not as dense as that during high load operation, it burns more slowly, hence the spark under these conditions must also be advanced.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR (Center Unit)

To disassemble the carburetor (Fig. 8) for cleaning or overhaul, proceed as follows:

(1) Install four elevating legs Tool T109-287S in mounting flange holes in throttle body, or use Carburetor stand C-3886. (These tools are used to protect the throttle valves from damage and to provide a suitable base for working.)

(2) Remove screws and seal washers that attach fuel bowl and metering body to main body. Remove fuel bowl (Fig. 9). Discard screw seal washers.

(3) Remove metering body, then discard gaskets (Fig. 10).

(4) Remove screw and washer that retains choke unloader lever to throttle shaft. Slide lever off flats on end of shaft (Fig. 11).

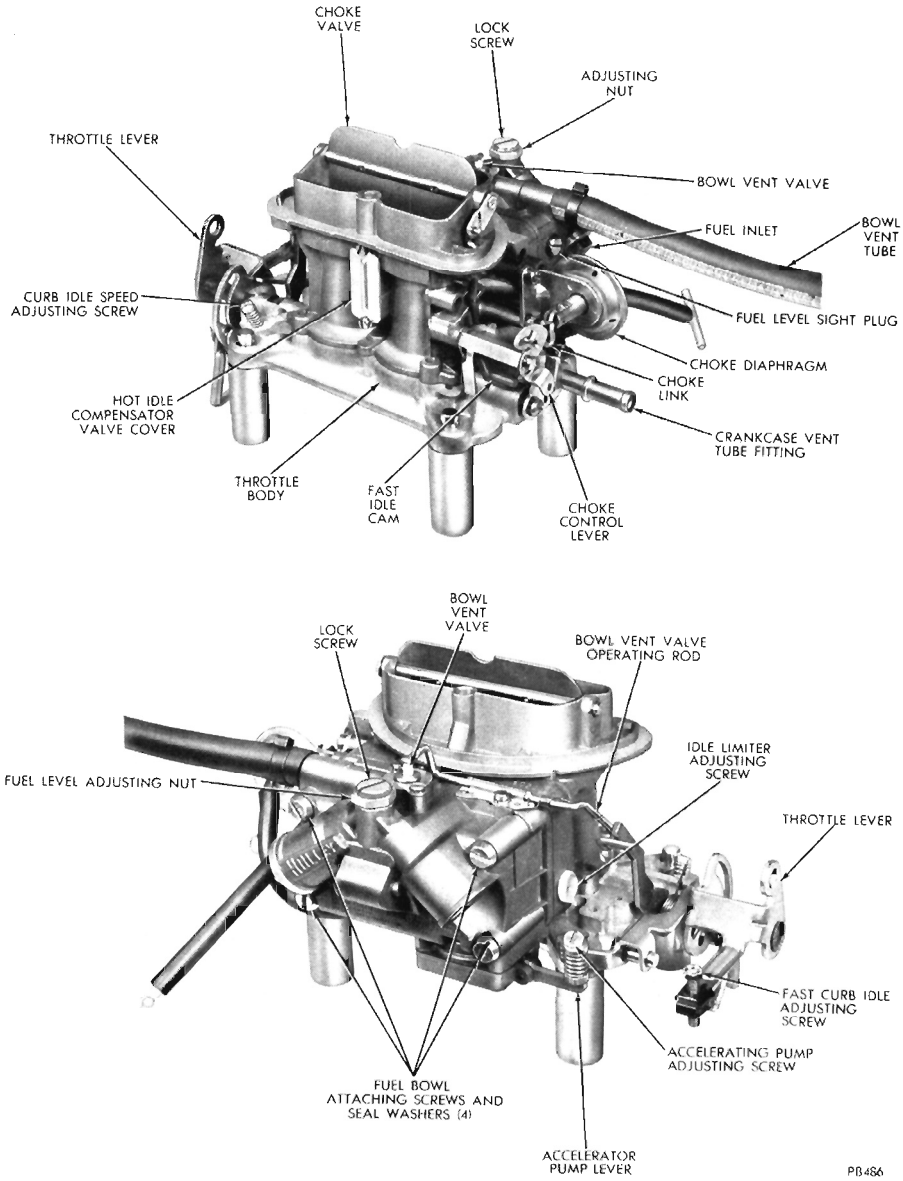


Fig. 8 - Carburetor Assembly (Center Unit)

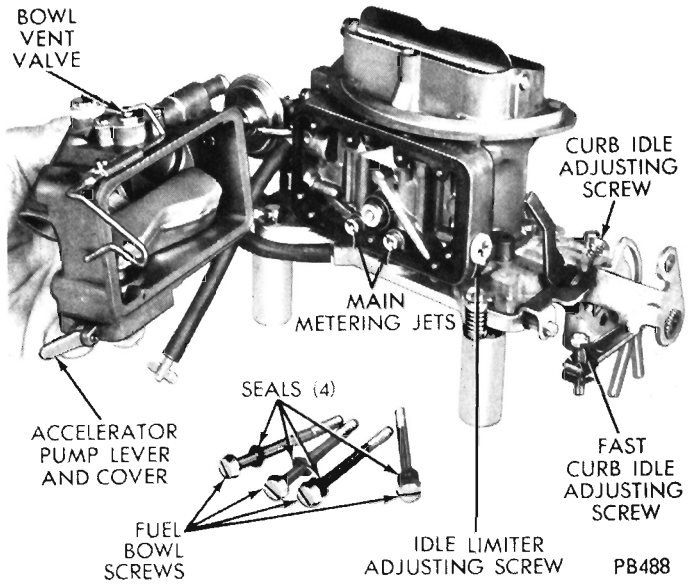


Fig. 9 - Removing or Installing Fuel Bowl

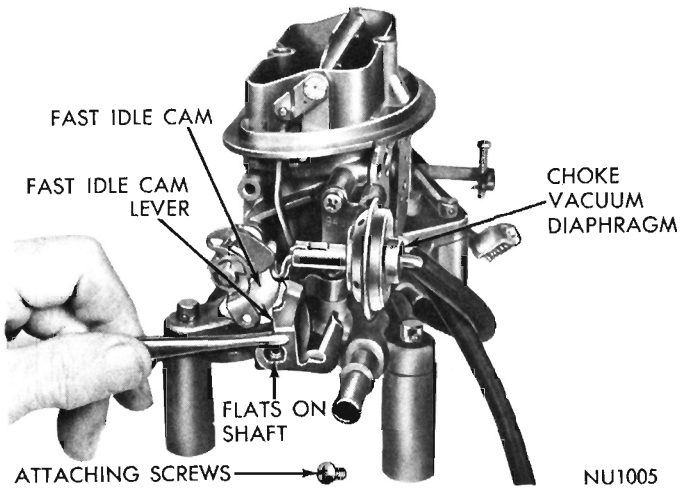


Fig. 11 - Removing or Installing Fast Idle Cam Lever

(5) Disconnect choke diaphragm hose from throttle body fitting. Remove choke diaphragm attaching screws, then remove choke diaphragm after disengaging link from choke control lever.

(6) Remove "E" clip that retains choke control lever and cam. Slide lever and cam off stub shaft, and at the same time, disengage choke rod from bottom hole of lever (Fig. 12). (Note position of fast idle cam in choke control lever).

(7) Remove accelerator pump discharge nozzle retaining screw, then lift out discharge nozzle (Fig. 13). Remove nozzle and retaining screw gaskets and discard. Remove vacuum diaphragm hose. (To outboard carburetors.)

(8) Invert main body and drop out accelerator pump check needle from discharge passage (Fig. 14).

(9) With carburetor inverted, remove five screws that attach throttle body to main body (Fig. 15).

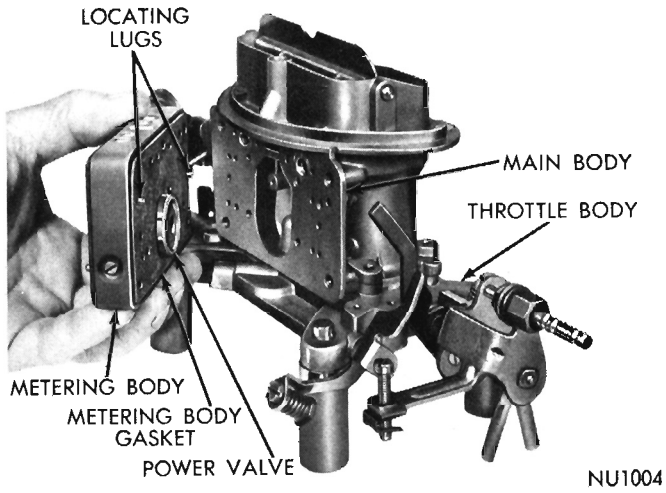


Fig. 10 - Removing or Installing Metering Body

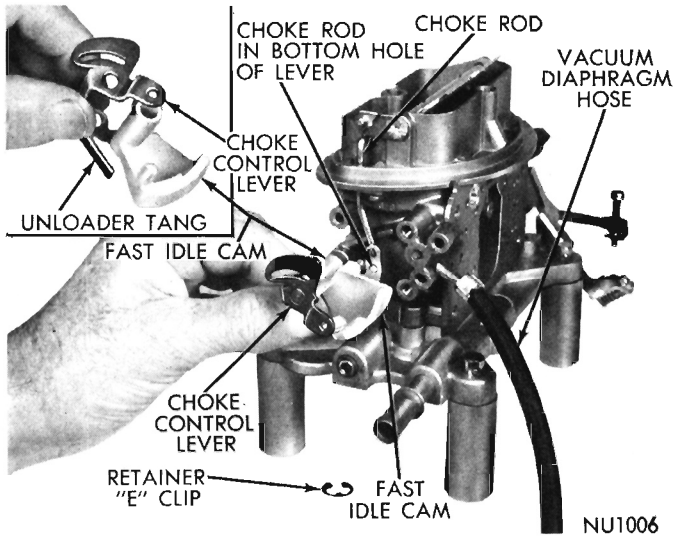


Fig. 12 - Removing or Installing Choke Control Lever and Fast Idle Cam

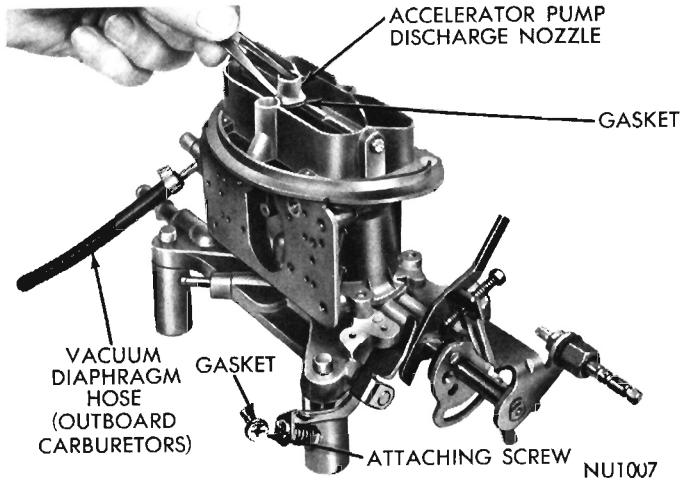


Fig. 13 - Removing or Installing Pump Discharge Nozzle

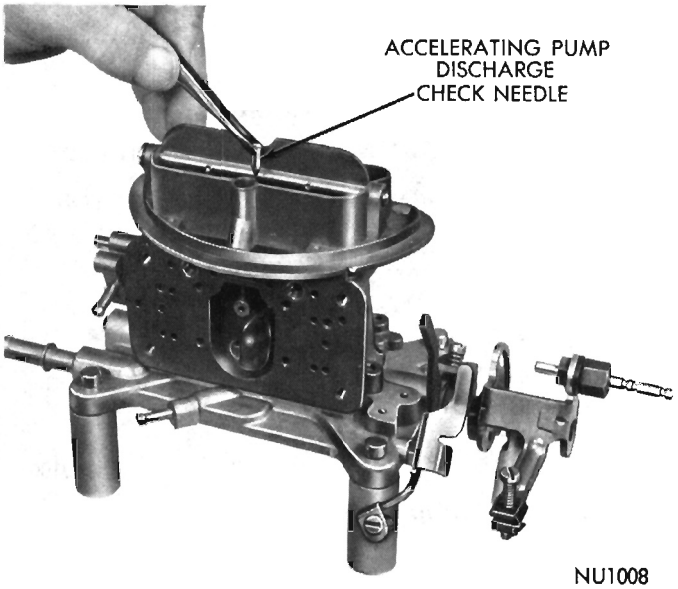


Fig. 14 - Removing or Installing Pump Discharge Check Needle

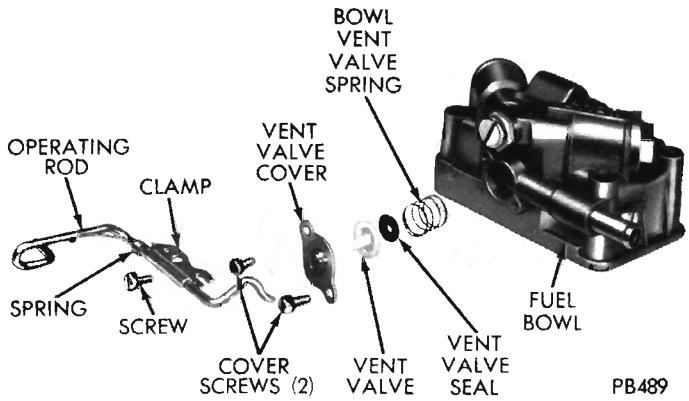


Fig. 16 - Removing or Installing Bowl Vent Valve

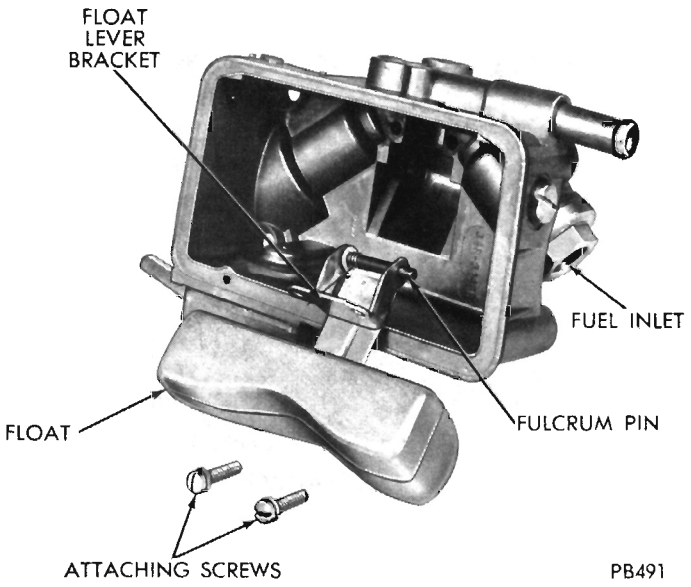


Fig. 18 - Removing or Installing Float Assembly

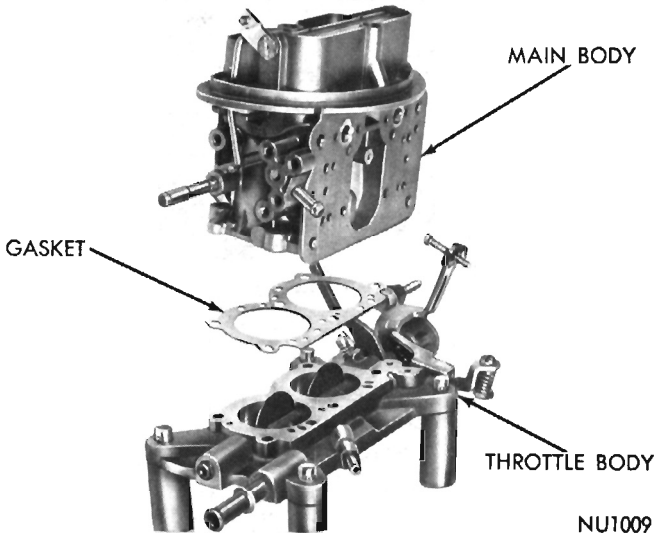


Fig. 15 - Removing or Installing Main Body

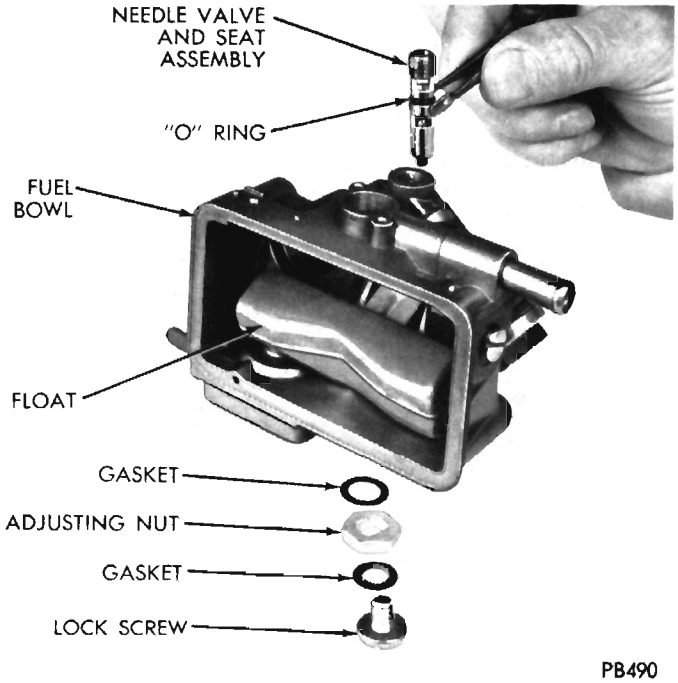


Fig. 17 - Removing or Installing Fuel Inlet Needle and Seat

Remove throttle body and discard gasket.

Disassembling Fuel Bowl

(1) Remove screw that retains bowl vent valve, plate, spring and rod to fuel bowl (Fig. 16). Remove bowl vent valve assembly.

(2) Remove fuel level adjusting nut lock screw, then remove adjusting nut. Slide needle valve and seat out of fuel bowl (Fig. 17). Discard needle seat "O" ring.

(3) Remove screws that attach float lever bracket to fuel bowl. Remove float, spring and fulcrum pin from fuel bowl (Fig. 18).

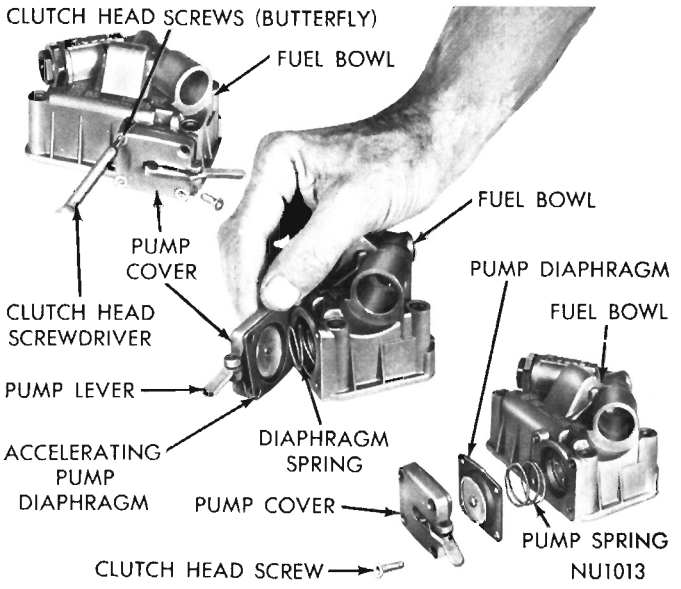


Fig. 19 - Removing or Installing Accelerating Pump

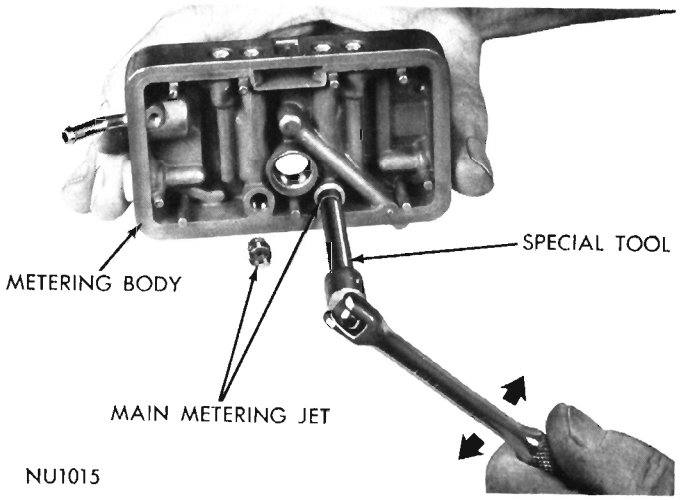


Fig. 21 - Removing or Installing Main Metering Jets

(4) Remove sight plug and gasket from bowl. Discard gasket.

(5) Using special clutch head screwdriver Tool CL-13, remove screws that attach accelerating pump cover. Remove cover, then carefully remove diaphragm and return spring (Fig. 19).

(6) Remove fuel inlet fitting and discard gasket.

Disassembling Main Metering Body

(1) Using Tool C-3747, remove power valve assembly from metering body (Fig. 20).

(2) Using Tool C-3748, remove main metering jets (Fig. 21).

(3) Using a suitable tool, pry plastic limiter caps off the two idle air mixture screws. Remove screws and gaskets. (Be sure and count the number of turns to seat screws, as the same number of turns from the seat must be maintained at

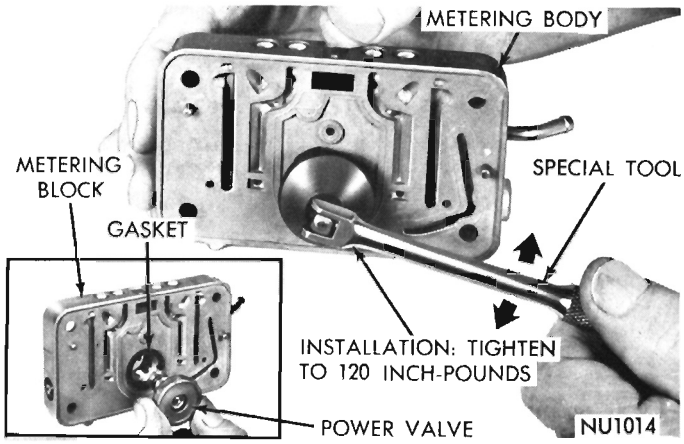


Fig. 20 - Removing or Installing Power Valve

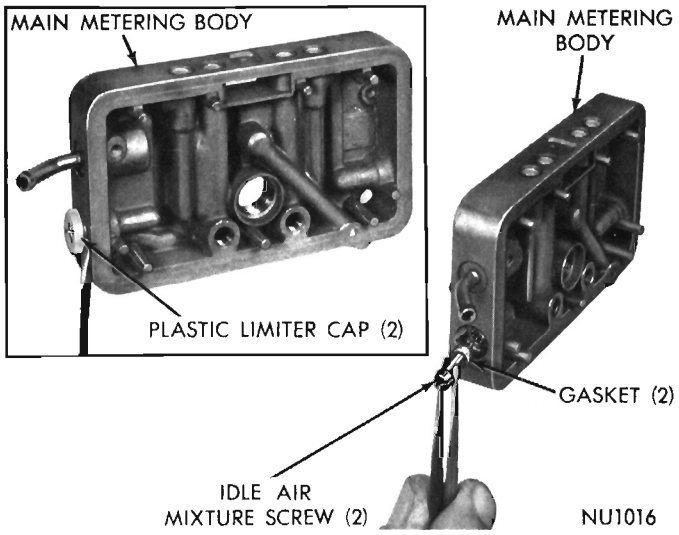


Fig. 22 - Removing Idle Air Mixture Screws and Gaskets

installation) (Fig. 22).

Disassembling Throttle Body

Caution: In normal routine cleaning and overhaul of the carburetor, do not remove throttle valves unless they are nicked or damaged. If necessary to remove, proceed as follows:

(1) Remove screws that hold throttle valves to throttle shaft. These screws are staked to prevent loosening and care is necessary to avoid breaking off in shaft. Remove staking with a file.

(2) Slide damaged throttle valves out of bores. It should be noted at this time, that the numbered side is on the bottom (or carburetor mounting flange side) and opposite the vacuum port.

CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents,

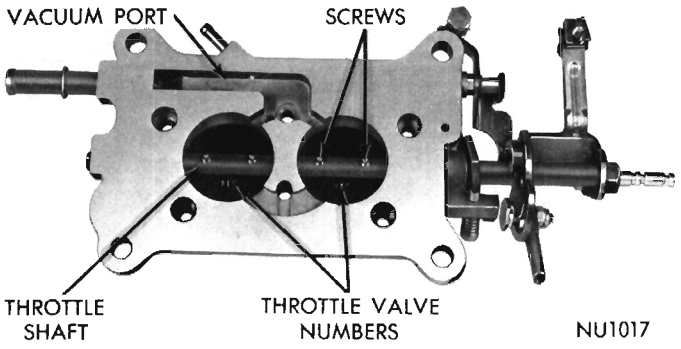


Fig. 23 - Throttle Valves Installed

(such as Metalclene) which may be used with satisfactory results.

The choke diaphragm can be damaged by solvents. Avoid placing the diaphragm assembly in ANY liquid. Clean the external surfaces with a clean cloth or soft wire brush. Shake dirt or other foreign material from the stem side of the diaphragm. Depressing the diaphragm stem to retracted position, will provide an additional hole for the removal of dirt. Compressed air can be used to remove loose dirt, **but should not be connected to the vacuum inlet fitting.**

IMPORTANT: If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT". After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean gasoline or kerosene to be certain no trace of moisture remains. Never clean jets with a wire, drill, or other mechanical means because the orifices may become enlarged, making the fuel mixture too rich for proper performance.

DO NOT clean any rubber diaphragms in cleaning solvent because of possible damage.

Check for cracks, warpage, stripped screw threads, or damaged or marred mating surfaces, on all major castings. The passages in the castings should be free of restrictions. Install new castings as required. Check the float assembly for damage or any condition that would impair this item from further service. The choke and throttle valves should be replaced if the edges have been nicked or if the protective plating has been removed. Be sure that the choke and throttle shafts are not bent or scored. Replace any broken or distorted springs. Replace all screws and lockwashers that show signs of stripped threads or distortion.

ASSEMBLING CARBURETOR (Center Unit)

Throttle Body

If the throttle valves were removed because of damage, install new valves as follows:

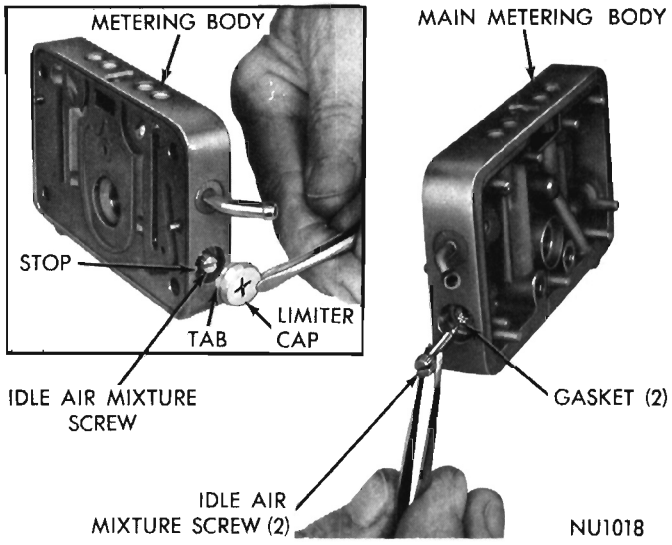


Fig. 24 - Installing Idle Air Mixture Screws and Gaskets

(1) Slide new valves into position on throttle shaft, with the valve number on the bottom or mounting flange side, and away from vacuum port (Fig. 23).

(2) Install new valve screws but do not tighten.

(3) Hold valves in place with fingers. (Fingers pressing on high side of valves.)

(4) Tap valves lightly with a screwdriver to center in bores. Now, tighten valve attaching screws securely. Operate the throttle shaft. From closed to open position, they must operate smoothly without drag or sticking. Hold throttle body up to a strong light. The light which is visible around outer diameter of valves in bores should be uniform. Stake screws, using a pair of pliers.

Assembly Main Metering Body

(1) Install main metering jets in metering body, using Tool C-3747. Tighten securely (Fig. 21).

(2) Slide a new gasket over power valve and install in body. Using Tool C-3748, tighten to 120 inch pounds (Fig. 20).

(3) Press a new gasket in each of the idle air mixture ports, then thread idle air mixture screws through gasket and into body, using a small screwdriver. Lightly seat screws, then back off number of turns (from seat) counted at disassembly.

Before installing screws, be sure that the tapered portion is straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control (Fig. 24).

(4) Install **new** plastic caps over idle screws, with tabs on caps against stops in bore (Fig. 24).

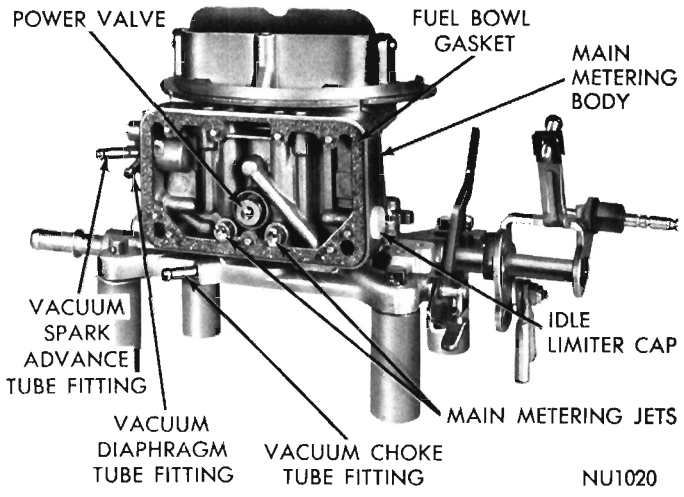


Fig. 25 - Metering Body Installed

Reassembling Fuel Bowl

(1) Place a new gasket over fuel inlet fitting, then install fitting in fuel bowl. Tighten securely.

(2) Install accelerator pump spring in position in fuel bowl, followed by diaphragm and pump cover. (When installing diaphragm, be sure contact button rivet head is toward pump lever in cover (Fig. 19). Install clutch head screws and tighten securely, using Tool CL-13.

(3) Install sight plug and new gasket in bowl.

(4) Slide float and hinge bracket in position in bowl, with fulcrum pin seated in slot. Install attaching screws and tighten securely (Fig. 18).

(5) Coat a new "O" ring with vasoline and slide over fuel inlet needle seat and down into position. Install needle and seat in fuel bowl (Fig. 17).

(6) Using a new gasket, install fuel level adjusting nut over threaded end of needle seat, with flats aligned. Place a new gasket over lockscrew and install in needle seat and over adjusting nut.

(7) Invert main body and install new main to throttle body gasket. Place throttle body in position on gasket. Install attaching screws and tighten securely.

(8) Install bowl vent valve on fuel bowl. Install attaching screw and tighten securely. (Be sure spring short loop enters hold in plate from underneath and long end hooked under rod (Fig. 16).

(9) Engage fast idle cam with choke and control lever. Be sure cam steps are toward lever side (Fig. 12). Slide cam and lever over pivot pin and at the same time engage choke rod in bottom hole of lever. Secure with "E" clip.

(10) Slide fast idle cam lever over flats on throttle shaft. (Be sure lever is installed in such manner so that tab rides on cam steps (Fig. 11).

(11) Engage choke link in slot on choke control lever, then place choke diaphragm on main body. Install attaching screws and tighten securely.

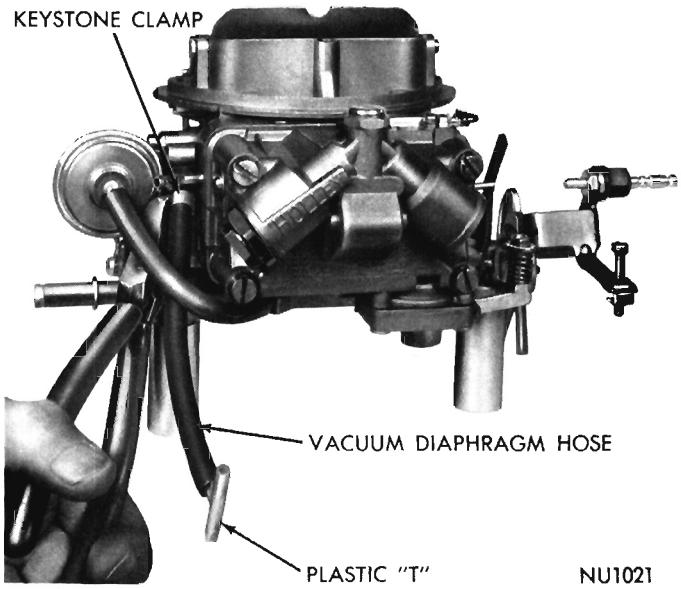


Fig. 26 - Installing Vacuum Diaphragm Hose

(12) Install new gaskets on front and rear of metering body, then install in position on main body with jets toward outside (Fig. 25).

(13) Slide new seal washers over fuel bowl mounting screws. Install screws through fuel bowl and metering body. (Be sure all gaskets are aligned, then tighten screws to 50 inch pounds). Make sure accelerator pump lever is under adjusting screw of accelerating pump operating lever.

(14) Install new clamp over vacuum diaphragm hose (with tee for outboard carburetors), then slide hose over tube fitting (Fig. 26). Position clamps properly.

Choke Vacuum Diaphragm

Inspect the diaphragm vacuum fitting to be sure that the passage is not plugged with foreign material. Leak check the diaphragm to determine if it has internal leaks. To do this, first depress the diaphragm stem, then place a finger over the fitting to seal the opening. Release the stem. If the stem moves more than 1/16 inch in ten (10) seconds, the leakage is excessive and the assembly must be replaced.

Install the diaphragm assembly on the carburetor as follows:

(1) Engage choke link in slot in choke lever.

(2) Place the diaphragm on the mounting surface. Install and tighten the attaching screws securely.

(3) Inspect the rubber hose for cracks before placing it on the correct carburetor fitting. Do not connect the vacuum hose to the diaphragm fitting until after the vacuum kick adjustment has been made.

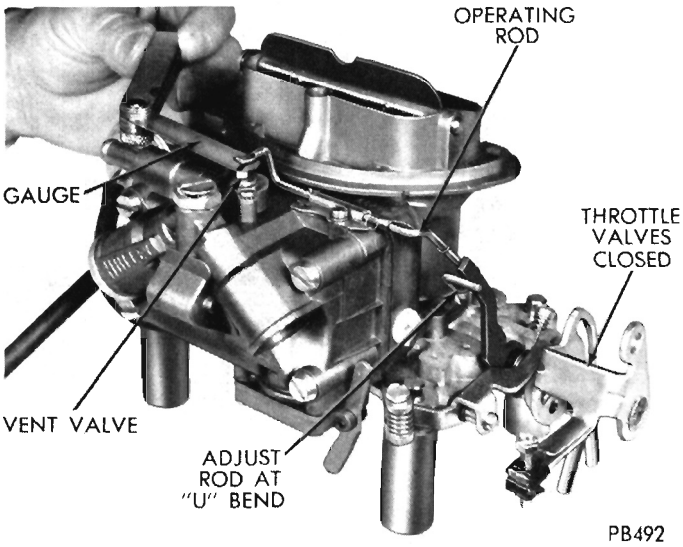


Fig. 27 - Adjusting Bowl Vent Valve Clearance

CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor:

Qualifying the Choke Control Lever
Fast Idle Cam Position Adjustment
Choke Unloader Adjustment (wide open kick)
Vacuum Kick Adjustment (on or off vehicle)
Fast Idle Speed Adjustment (on the vehicle)
Checking the Bowl Vent Valve Clearance
Checking the Pump Lever Clearance
Outboard Carburetor Throttle Rod Adjustment
Idle Speed Adjustment (curb Idle)
Idle Speed Solenoid Adjustment (Fast Curb Idle)
Checking Wet Fuel Level

Checking the Bowl Vent Valve Clearance

To check the bowl vent valve clearance (Fig. 27) proceed as follows:

(1) With throttle valves at fast curb idle, it should be possible to insert .015 inch gauge between the bowl vent valve and the bowl vent rod with the fast curb idle speed properly set.

(2) If an adjustment is necessary, bend rod to change arc of contact with throttle lever, using Tool T109-213 until correct clearance has been obtained.

Checking Acclerator Pump Lever Clearance

To check accelerator pump lever clearance (Fig. 28), proceed as follows:

(1) With throttle valves wide open, and the pump lever held down, it should be possible to insert a .015 inch (min.) .0625 (max.) gauge between adjusting nut and lever.

(2) If an adjustment is necessary, adjust pump over-ride screw until correct clearance has been obtained.

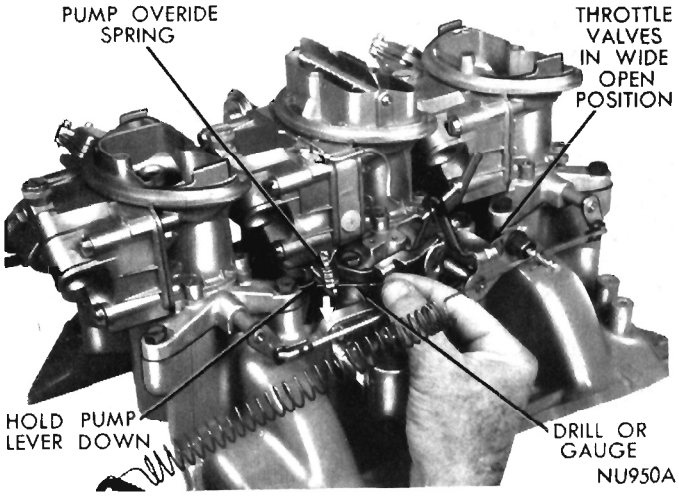


Fig. 28 - Adjusting Accelerator Pump Lever Clearance

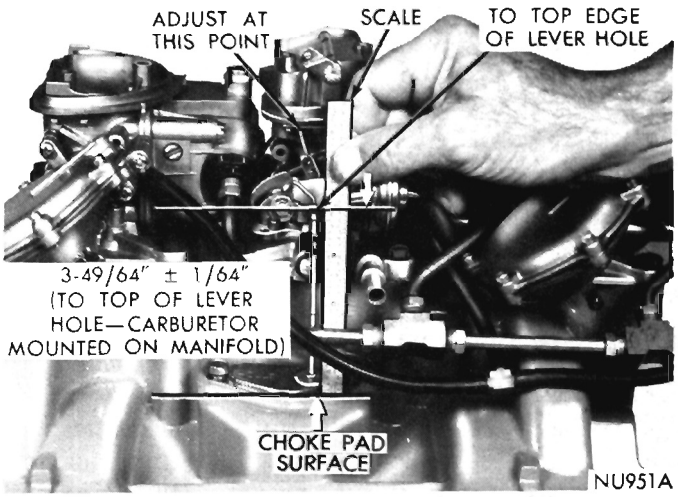


Fig. 29 - Qualifying Choke Control Lever

(3) There must be no free movement of pump leverage when throttle is at curb idle.

Qualifying Choke Control Lever

Adjustment of the choke control lever is necessary to provide correct relationship between choke valve, thermostatic coil spring and the fast idle cam. It should be checked and adjusted (if necessary) after carburetor assembly or as preparation of the choke system linkage before making the Vacuum Kick, Cam Position or Unloader adjustment. These three adjustments must and should be made after qualification of the choke control lever.

(1) Open the throttle to mid-position.

(2) Close the choke valve by slight pressure on choke control lever.

(3) The top of choke rod hole in control lever should be 3-49/64 ± 1/64 inch above choke pad (carburetor on engine) or 1-23/32 ± 1/64 inch above carburetor base (carburetor on bench) (Fig. 29).

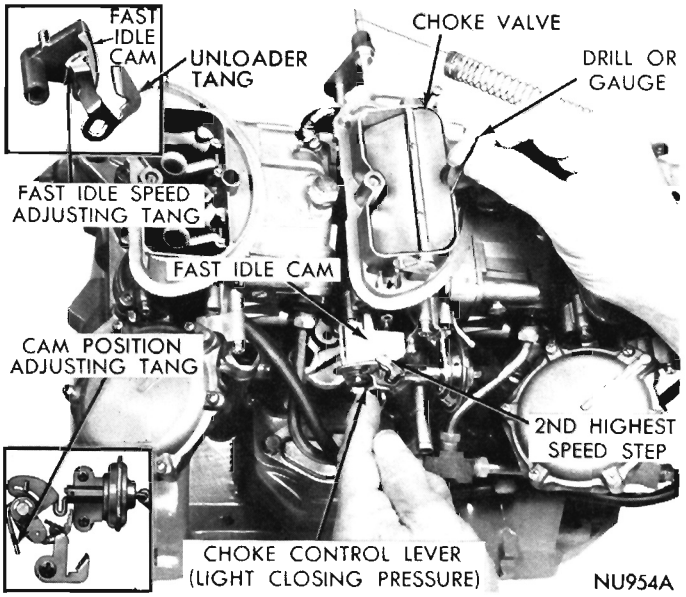


Fig. 30 - Fast Idle Cam Position Adjustment

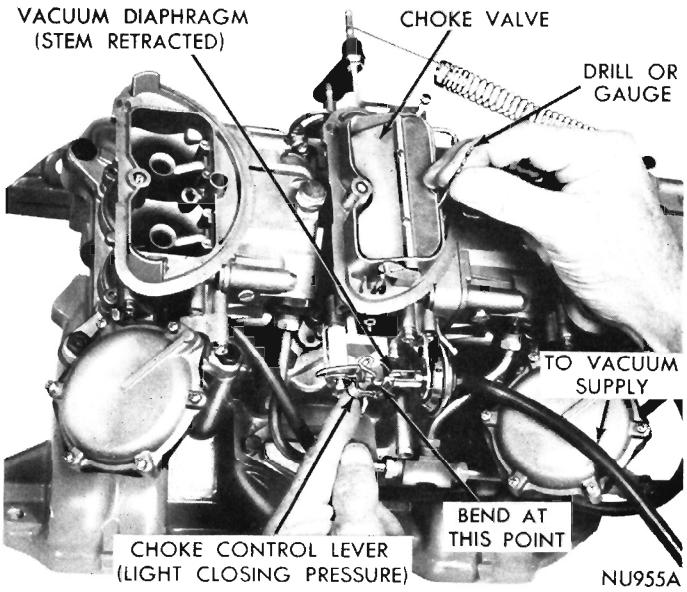


Fig. 32 - Vacuum Kick Adjustment

(4) Adjust if necessary by bending choke shaft rod at point indicated.

CAUTION: Improper bending will cause binding of rod. Test for free movement between open and closed choke positions and rebend if necessary to eliminate any interferences.

Fast Idle Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle as described in the Fast Idle Speed Adjustment (on the vehicle) paragraph. However, the Fast Idle Cam Position Adjustment can be made on the bench. This adjustment is important to assure that the speeds of each step of the cam occur at the proper time during engine warm-up.

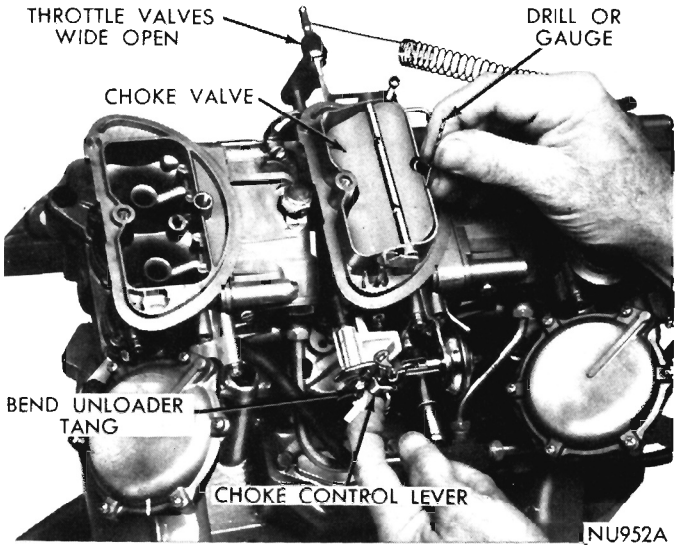


Fig. 31 - Choke Unloader Adjustment (Wide Open Kick)

(1) Qualify the choke control lever, if necessary. (See Qualifying the Choke Control Lever Paragraph).

(2) With fast idle speed adjusting tang contacting second highest speed step on fast idle cam, move choke valve toward the closed position with light pressure on choke control lever (Fig. 30).

(3) Insert specified drill between the choke valve and wall of the air horn (See specifications).

An adjustment will be necessary if a slight drag is not obtained as the drill is being removed.

(4) To adjust, bend the indicated tang (Fig. 30) until the correct choke valve opening has been obtained.

Choke Unloader Adjustment (wide open kick)

The choke unloader is a mechanical device to partially open the choke at wide open throttle. It is used to eliminate choke enrichment during cranking of an engine. Engines which have been flooded or stalled by excessive choke enrichment can be cleared by use of the unloader. Adjust the system as follows:

(1) Qualify the choke control lever, if necessary. (See Qualifying Choke Control Lever Paragraph).

(2) Hold the throttle valves in the wide open position. Insert the specified drill between the upper edge of the choke valve and the inner wall of the air horn (see specifications).

(3) With a finger lightly pressing against the choke control lever, a slight drag should be felt as the drill is being withdrawn. If an adjustment is necessary, bend the indicated tang until correct opening has been obtained (Fig. 31).

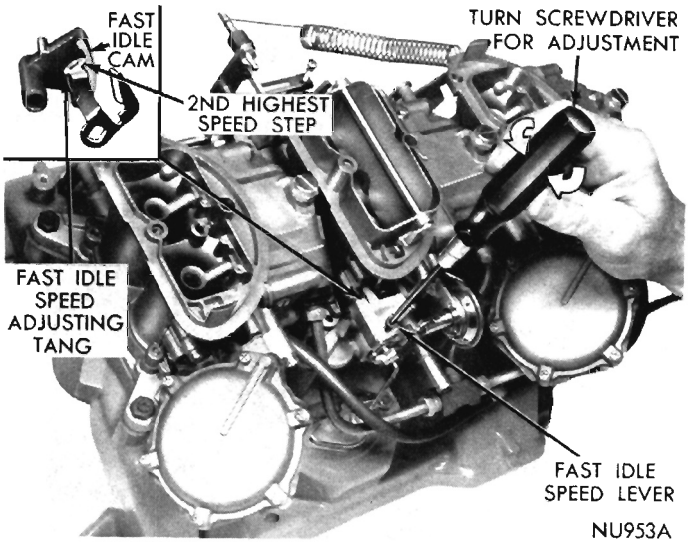


Fig. 33 - Fast Idle Speed Adjustment (On Vehicle)

Vacuum Kick Adjustment (ON or OFF Vehicle)

The choke diaphragm adjustments controls the fuel delivery while the engine is running. It positions the choke valve within the air horn by use of linkage between the choke shaft and the diaphragm. The diaphragm must be energized to measure the vacuum kick adjustment. Vacuum can be supplied by a distributor test machine, another vehicle or vehicle to be adjusted.

(1) If the adjustment is to be made with the engine running, position the fast idle tang (Fig. 32) (Cam position adjustment) to allow choke closure to kick position. If auxiliary vacuum source is to be used, open throttle valves, (engine not running) and move choke to closed position. Release throttle first, then release choke.

(2) When using an auxiliary vacuum source, disconnect the vacuum hose from the carburetor and connect it to the hose from the vacuum supply with a small length of tube to act as a fitting. Removal of the hose from the diaphragm may require forces which could damage diaphragm. Apply a vacuum of 10 or more inches.

(3) Insert the specified drill (see specifications) between the choke valve and the wall of the air horn (Fig. 32). Apply sufficient closing pressure on the lever to which the choke rod attaches to provide a minimum choke valve opening without distortion of the diaphragm link. Note that the cylindrical stem of the diaphragm will extend as an internal spring is compressed. This spring must be fully compressed for proper measurement of the vacuum kick adjustment.

(4) Adjustment is necessary if slight drag is not obtained when removing the drill. Shorten or lengthen diaphragm link to obtain correct choke valve opening. Length changes should be made by carefully opening or closing the U-bend provided in the link. Improper bending causes contact between the U-section and the diaphragm assembly. **CAUTION: DO NOT APPLY TWISTING OR BENDING FORCE TO DIAPHRAGM.**

(5) Reinstall the vacuum hose on the correct carburetor fitting.

(6) Make the following check. With no vacuum applied to the diaphragm, the **CHOKE VALVE SHOULD MOVE FREELY** between the open and closed positions. If movement is not free, examine the linkage for misalignment or interferences caused by the bending operation. Repeat the adjustment if necessary to provide proper link operation.

Fast Idle Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after the vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare the engine by driving at least 5 miles. Connect a tachometer and set the curb idle speed and mixture, then proceed as follows:

(1) With the engine off and the transmission in the PARK or NEUTRAL position, open the throttle slightly.

(2) Close choke valve until fast idle screw tang can be positioned on the second highest-speed step of the fast idle cam (Fig. 33).

(3) Start the engine and determine the stabilized speed. Bend the fast idle tang by use of a screwdriver placed in the tang slot to secure the specified speed. **CAUTION: Bend only in a direction perpendicular to the contact surface of the cam. Movement in any other direction changes the CAM POSITION ADJUSTMENT. Bend only when tang is clear of cam.**

(4) Stopping the engine between adjustments is not necessary. However, reposition the fast idle tang on the cam after each speed adjustment to provide correct throttle closing torque.

Outboard Carburetor Throttle Rod Adjustment

To synchronize the outboard throttle valves with the center, or control carburetor, proceed as follows:

(1) Remove air cleaner (if not previously done), then remove outboard throttle connector rod clips and disengage front and rear rods from throttle levers (Fig. 30).

(2) If this adjustment is to be done on vehicle, be sure ignition switch is **OFF**. (This de-energizes fast curb idle solenoid so that clearance is obtained between plunger and fast curb idle adjusting screw.)

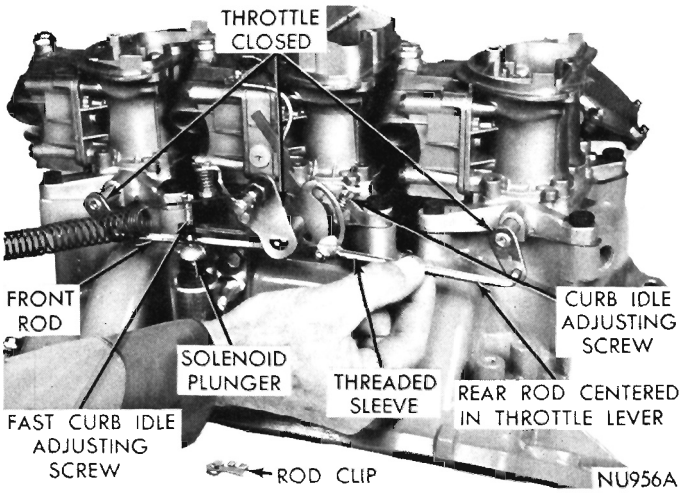


Fig. 34 - Outboard Carburetor Throttle Rod Adjustment

(3) Close throttle valves on the two outboard carburetors and the center carburetor. Hold in closed position.

(4) Shorten or lengthen the front and rear connector rods by turning rod **in** or **out** in threaded sleeve, until rod end can enter hole in throttle lever evenly (Fig. 34).

(5) Install throttle connector rod in lever and secure with clip.

Idle Speed Adjustment (Curb Idle)

Refer to General Information at front of Group.

Idle Speed Solenoid Adjustment (Fast Curb Idle)

To set the idle speed solenoid for correct engine r.p.m., proceed as follows:

(1) Warm up engine to normal operating temperature, then attach a tachometer.

(2) With engine running, turn idle speed solenoid adjusting screw **in** or **out** to obtain 900 r.p.m. for both manual and automatic transmissions equipped vehicles.

(3) After specified r.p.m. has been obtained and with engine still running (to energize solenoid), adjust curb idle speed screw until end of screw **just touches** stop on carburetor throttle body. Now, back off 1 full turn to obtain the slow curb idle speed setting. (Approximately 650 to 700 r.p.m.)

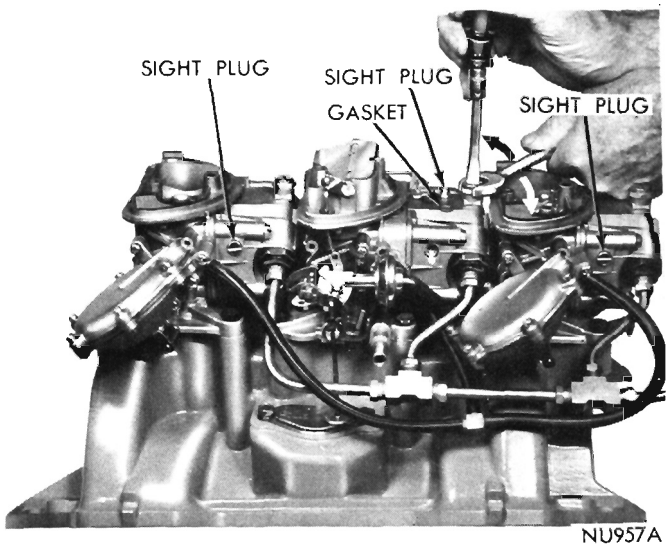


Fig. 35 - Adjusting Fuel Level (On Vehicle)

Checking Wet Fuel Level (On Vehicle)

Before checking wet fuel level, check the fuel pump pressure to be certain 5 pound reading is obtained.

(1) To check fuel level in bowl, start engine and then remove sight plug from fuel bowl (Fig. 35).

(2) Using a wrench and screwdriver, turn adjusting nut either **up** or **down** until fuel just dribbles out of sight hole (Fig. 35).

(3) Reinstall sight plug and gasket and tighten securely. Check other fuel bowls in the same manner.

CAUTION: It is suggested that a suitable precaution be taken by placing a shop towel or a container under the bowl, to catch any fuel that might be liberated due to a high or improper previous setting.

DISASSEMBLING AND ASSEMBLING CARBURETOR (OUTBOARD—Front or Rear)

The disassembly and assembly procedure covering the two outboard carburetors are similar to the center or control carburetor. In as much as the outboard carburetors are not equipped with automatic choke, power enrichment, accelerating pump, idle or spark advance, the servicing of these two carburetors are relatively simple. (Fig. 36).

The following disassembly and assembly procedures will be covered by pictures, step by step, with no text reference. Should written instructions be required, refer to disassembly and assembly procedures as written for the center unit.

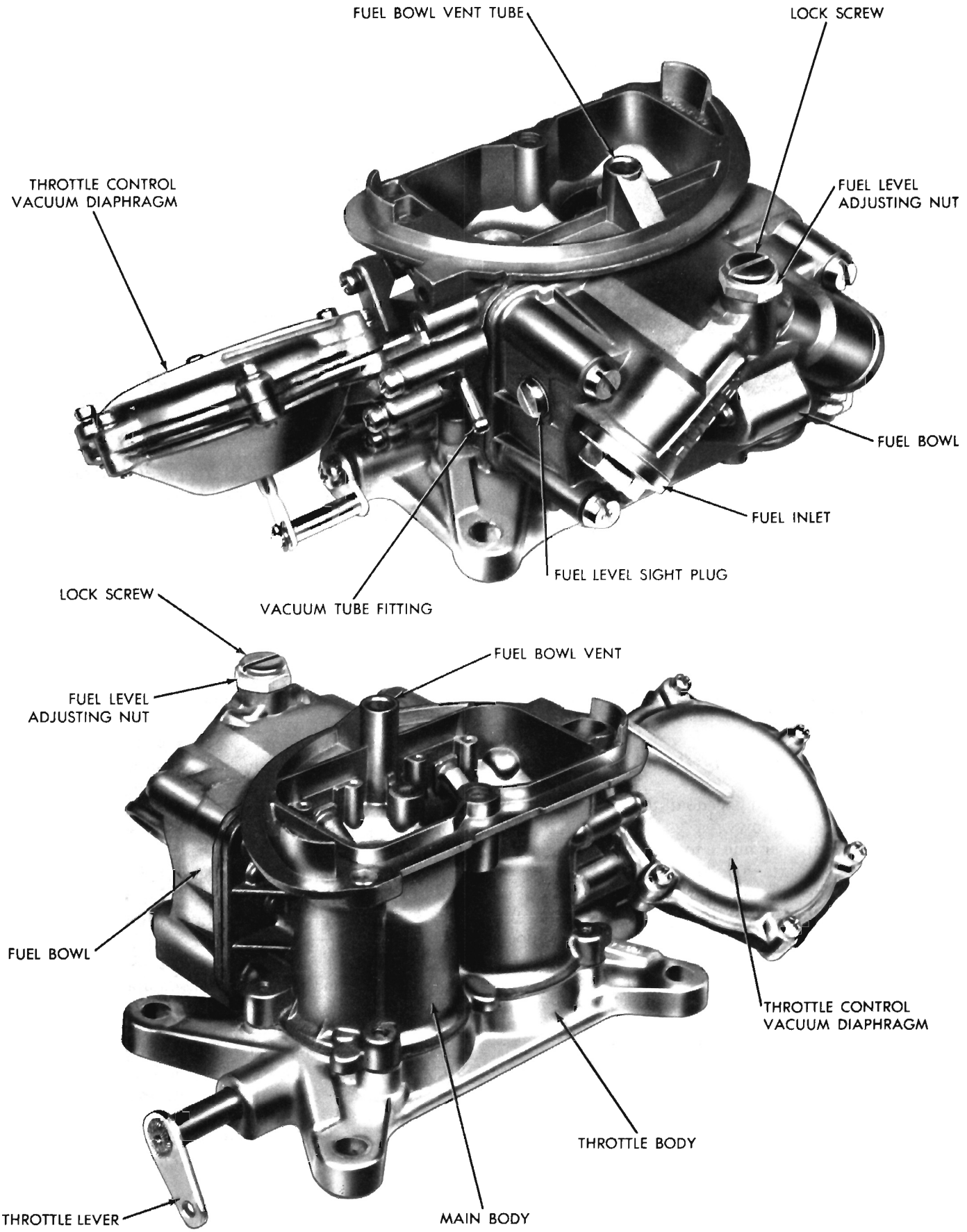


Fig. 36 - Carburetor Assembly (Outboard Front or Rear)

PB487

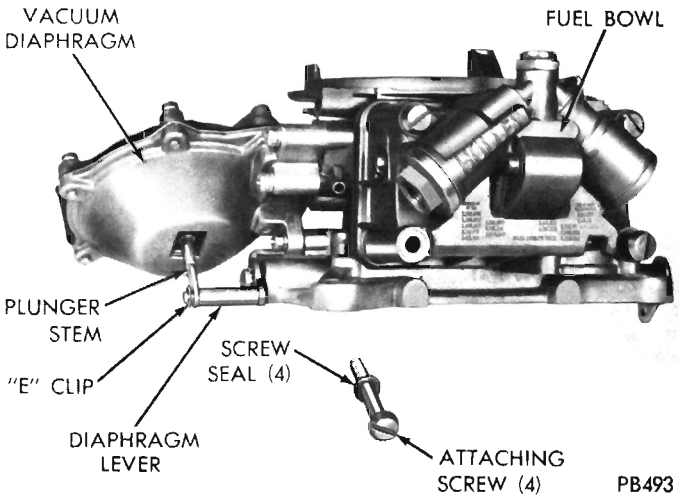


Fig. 37 - Removing or Installing Fuel Bowl Screws

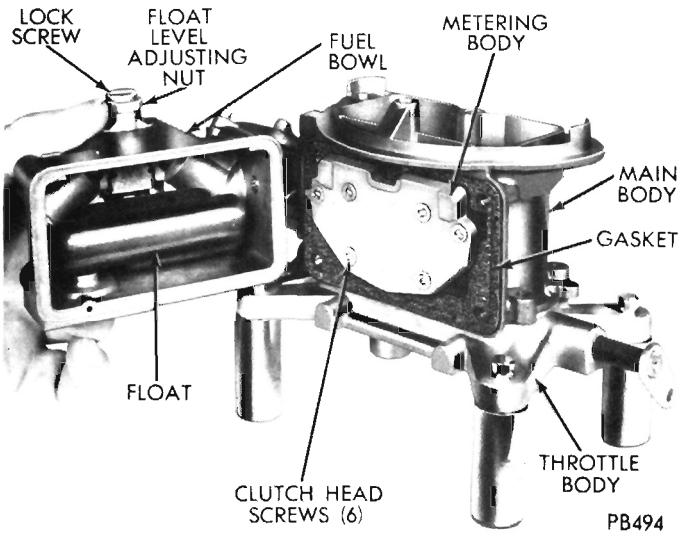


Fig. 38 - Removing or Installing Fuel Bowl

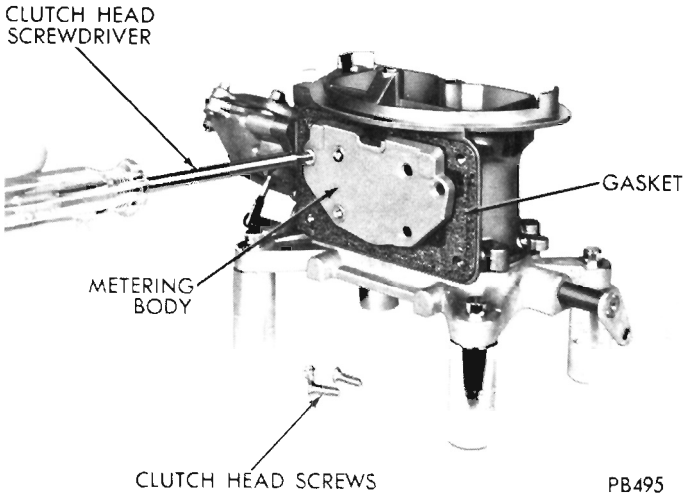


Fig. 39 - Removing or Installing Metering Body Screws

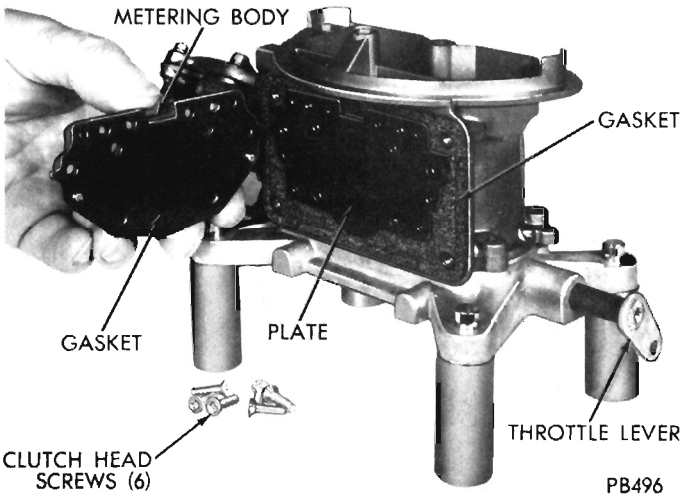


Fig. 40 - Removing or Installing Metering Body Plate and Gaskets



Fig. 41 - Metering Body

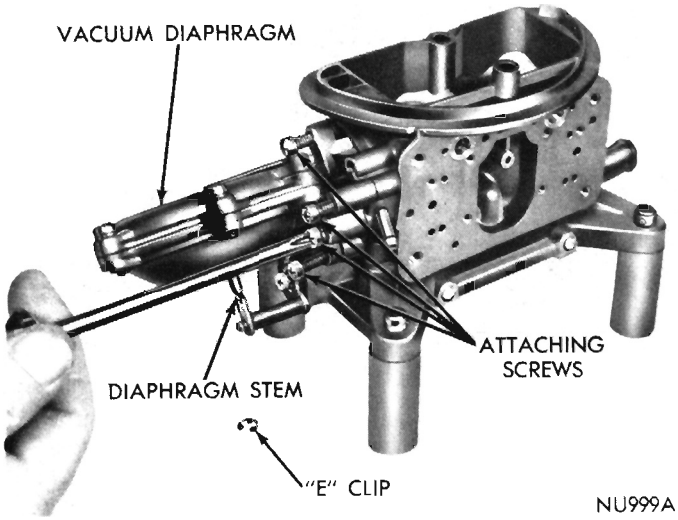


Fig. 42 - Removing or Installing Diaphragm Mounting Screws

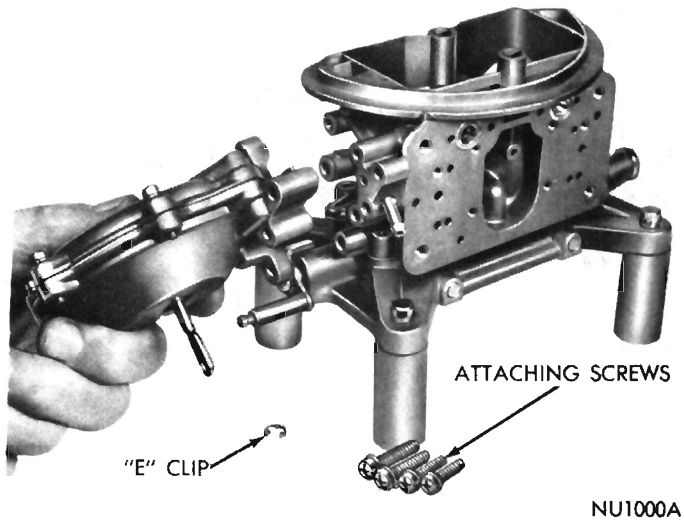


Fig. 43 - Removing or Installing Vacuum Diaphragm

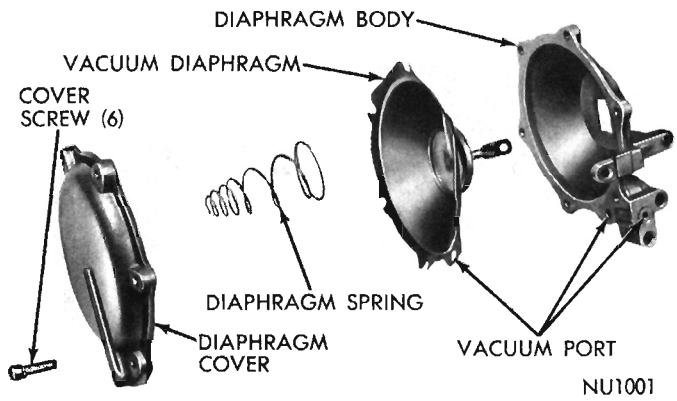


Fig. 44 - Vacuum Diaphragm (Disassembled View)

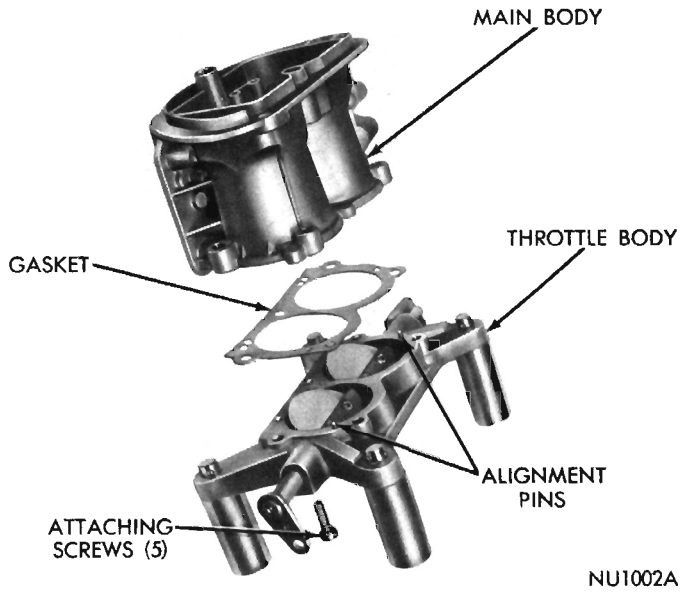


Fig. 45 - Removing or Installing Main Body

AFB CARTER CARBURETOR

INDEX

	Page
Carburetor Adjustments	117
Accelerator Pump	117
Bowl Vent Valve	119
Fast Idle Speed Cam Position	117
Fast Idle Speed (On Vehicle)	118
Idle Speed	119
Secondary Throttle Lever	118
Secondary Throttle Lockout	118
Cleaning Carburetor Parts	2
Disassembling Carburetor	112
General Information	111
Inspection and Reassembly	115
Specifications	137

GENERAL INFORMATION

The twin four barrel carburetors (Fig. 1) are used on the 426 cu. in. Hemi engine. Carburetor Models AFB-4971S (front) are used on the 426 cu. in. engine (Street Hemi), when the vehicles are equipped with the manual or automatic transmissions.

Carburetor Models AFB-4969S (rear) and AFB-4970S (rear) are used on the 426 cu. in. engine (Street Hemi), when the vehicles are equipped with the manual or automatic transmissions respectively.

The rear carburetors are equipped with a hot idle compensator valve. (Fig. 2.) This valve is a thermostatically operated air bleed, to relieve an overrich condition at idle. This condition is the result of excessive heat and resultant overrich mixtures.

These carburetors also work in conjunction with an idle speed solenoid, which is used to maintain a higher idle speed when the vehicle is running and allows the throttle to close to a low idle speed throttle position when the ignition key is turned off, to prevent "after running".

The idle solenoid is mounted between the two carburetors, on a bracket held by the carburetor mounting studs and nuts. (Fig. 21).

Since the service procedures are identical on all Carter AFB carburetors, the illustrations showing the various disassembly procedures will not always show any one specific carburetor.

The throttle valves of the secondary half of the carburetor are mechanically connected to the primary valves and open with the primary after an approximate 60 degrees lag; and continue to open until both primary and secondary throttle valves reach the wide open position simultaneously. As engine speed increases, the forces exerted by the

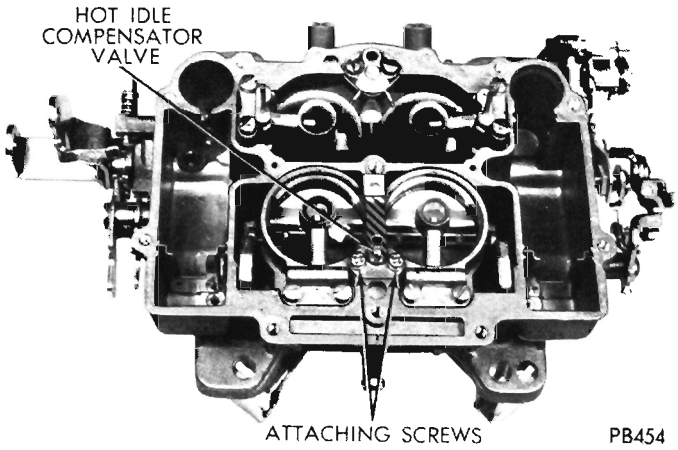


Fig. 2 - Hot Idle Compensator Valve

LEFT HAND VIEW

RIGHT HAND VIEW

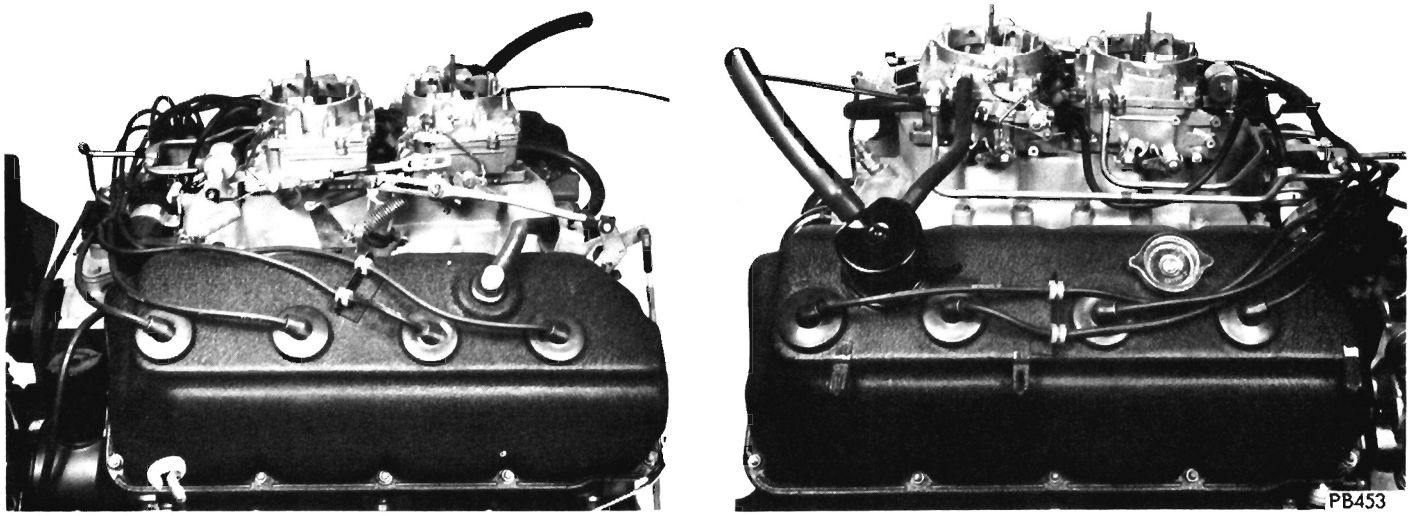


Fig. 1 - Twin Four Barrel Carburetor Assemblies

velocity of intake air down through the venturis of the carburetor increases and tends to overcome the counterweight attached to the velocity shaft, permitting the offset velocity valves to position themselves according to engine requirements.

The AFB (aluminum four barrel) carburetor contains many features, some of which are the locations for the step-up rods and pistons. The step-up rods, pistons and springs are accessible for service without removing the air horn or the carburetor from the engine. The venturi assemblies (primary and secondary) are replaceable and contain many of the calibration points for both the high and low speed system. One fuel bowl feeds both the primary and secondary nozzles on the right side while the other fuel bowl takes care of the primary and secondary nozzles on the left side. This provides improved performance in cornering, quick stops and acceleration.

All the major castings of the carburetor are aluminum, with the throttle body cast integral with the main body. This allows an overall height reduction in the carburetor. The section containing the accelerator pump is termed the primary side of the carburetor. The rear section is the secondary. The five conventional systems used in previous four barrel carburetors are also used in this unit. The five conventional systems are, two float systems, two low speed systems (primary side only on front carburetors only) two high speed systems, one accelerator pump system per carburetor and one hand choke control system on the rear carburetor.

The carburetors are equipped with a pair of velocity valves, which control the secondary valve operation.

SERVICE PROCEDURES

DISASSEMBLING CARBURETOR (Fig. 3)

(1) Place carburetor assembly on repair stand Tool C-3886. These tools are used to protect throttle valves from damage and to provide a suitable base for working.

(2) Remove hairpin clip that attaches fast idle connector rod to choke lever. Disengage rod from lever, then swing rod at an arc until it can be disengaged from fast idle cam.

(3) Remove retainer that holds throttle connector rod in center hole of accelerator pump arm. Remove hairpin clip that attaches lower end of rod in primary throttle shaft lever. Disengage rod

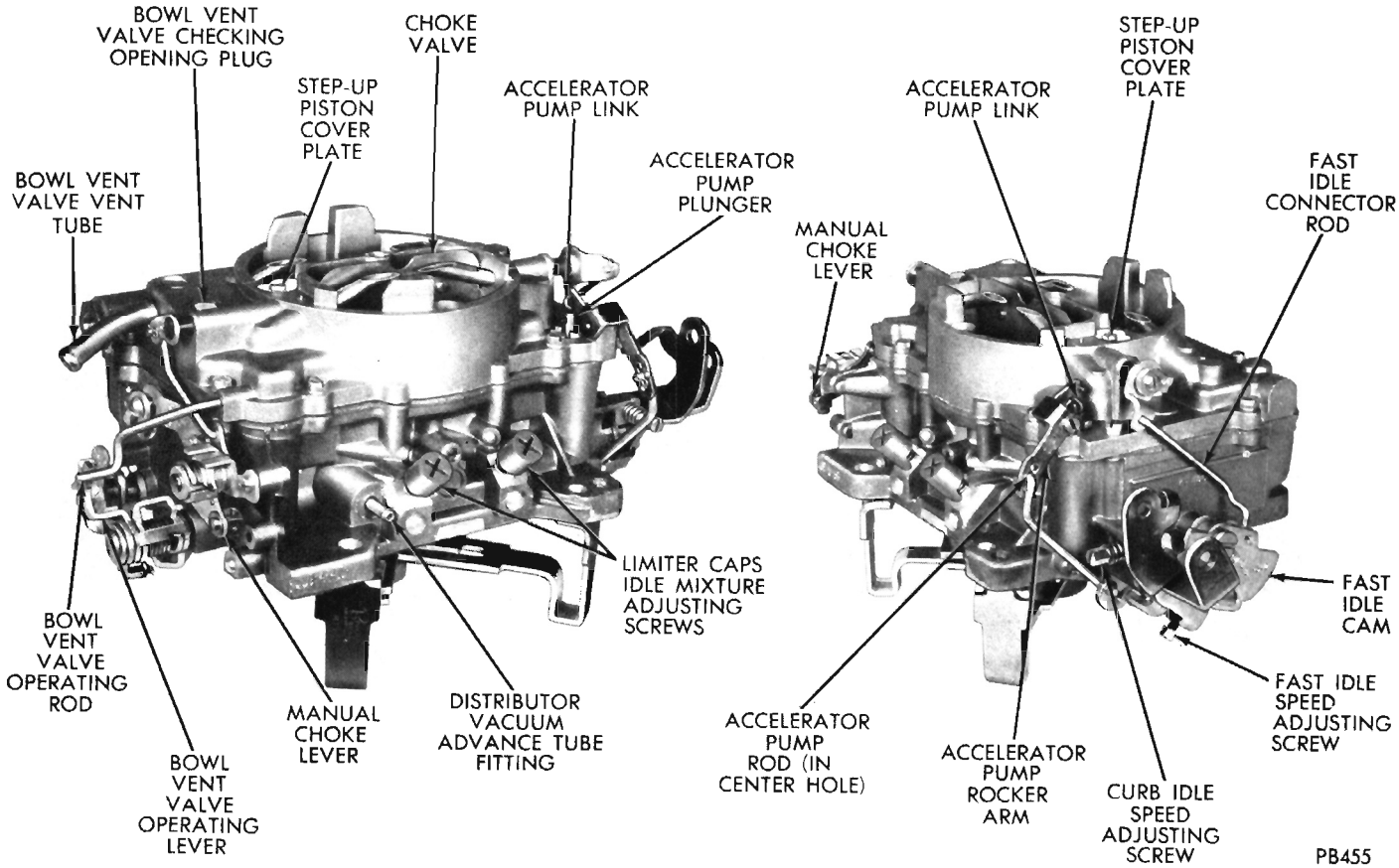


Fig. 3 - Carburetor Assembly

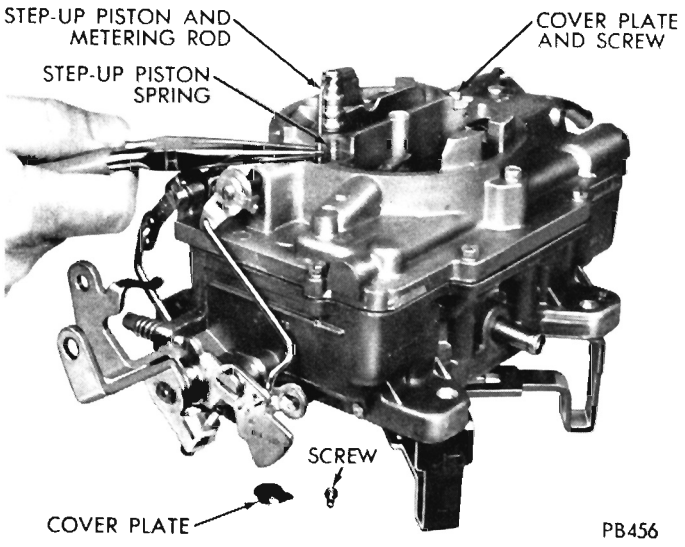


Fig. 4 - Removing or Installing Step-Up Pistons and Rods

from arm and lever, then remove from carburetor.

(4) Remove screws attaching step-up piston and rod cover plates. Hold cover down with a finger to prevent piston and rods from flying out. Lift off plates and slide step-up pistons and rods out of air horn, (Fig. 4). Remove step-up piston springs. Step-up rods are not interchangeable.

(5) Remove ten screws that attach air horn to main body. (1 screw in hole in air horn.) Lift air horn straight up and away from main body. When removing air horn, use care so as not to bend or damage floats. Remove accelerator pump, plunger, lower spring from pump cylinder.

Disassembling the Air Horn

Place air horn in an inverted position on bench (to protect the floats) then proceed to disassemble as follows:

(1) Using a suitable Tool, remove float fulcrum pins, (left and right) then lift float up and out of bosses on air horn. It is suggested that the float on the pump side be marked so that floats can be reinstalled in their respective positions.

(2) Remove two needle valves from their respective seats, after marking one on pump side for identification. Using a wide blade screw driver, remove needle valve seats. Be sure each needle valve is returned to its original seat at reassembly.

(3) Remove spring clip that holds throttle connector rod in center hole of pump arm. Remove pump arm pivot screw and lift off pump arm, at same time, disengage link from arm and pump stem. Slide accelerator pump plunger and spring out of air horn. Remove gasket.

(4) Place accelerator pump plunger in a jar of clean gasoline or kerosene, to prevent leather from drying out.

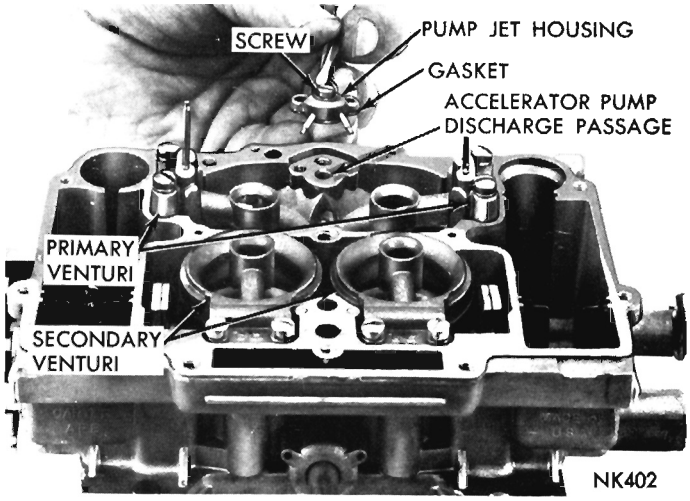


Fig. 5 - Removing or Installing Accelerator Pump Jet Housings

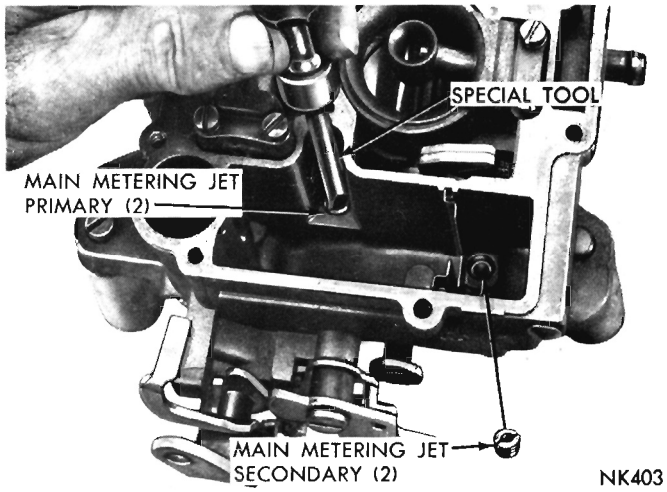


Fig. 6 - Removing or Installing Main Metering Jets

(5) Remove fuel inlet fitting and filter screen from air horn.

Main Body Disassembly

(1) Remove screws that attach accelerator pump jet housing to main body. Lift out jet housing and gasket (Fig. 5). Discard gasket. Now, invert main body and drop out discharge check needle from discharge passage.

(2) Using Tool T-109-58, remove main metering jets (primary side), (Fig. 6). **The primary and secondary main metering jets are not interchangeable. It is very important that these jets be installed in their respective locations in the main body at reassembly.**

(3) Again using Tool T-109-58, remove main metering jets (secondary side), (Fig. 6).

(4) Remove screws that attach primary venturi (choke and pump side) to main body. Lift venturi straight up and away from main body, (Fig. 7). Discard gaskets. **The venturi assemblies are not**

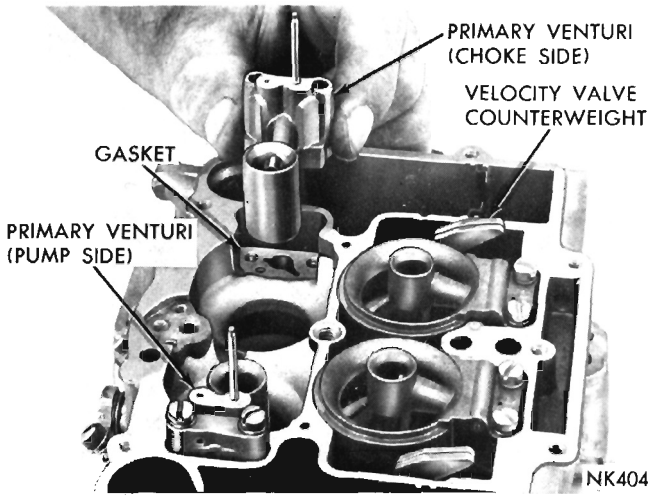


Fig. 7 - Removing or Installing Primary Venturi Cluster

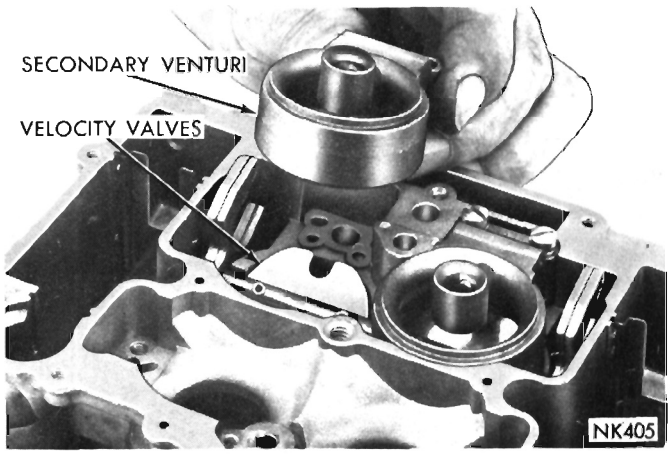


Fig. 8 - Removing or Installing Secondary Venturi Cluster

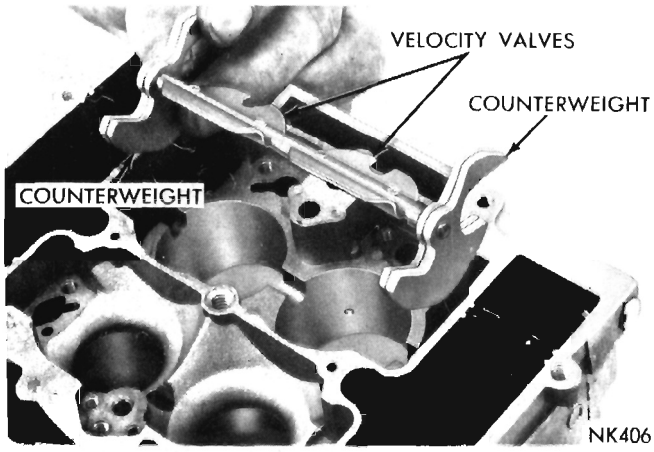


Fig. 9 - Removing or Installing Velocity Valves

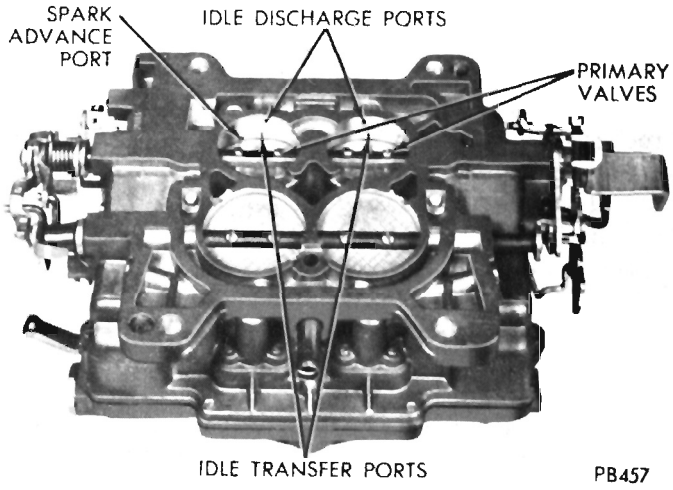


Fig. 10 - Ports in Relation to Throttle Valves

interchangeable, side for side and must be reinstalled in their original locations at reassembly.

(5) Remove screws that attach secondary venturi (choke and pump side) to main body. Lift secondary venturi assemblies straight up and away from body, (Fig. 8). Remove velocity valves (Fig. 9).

(6) Using Tool T-109-59, screw driver bit, remove accelerator pump intake check valve located inside fuel bowl, adjacent to accelerator pump cylinder.

(7) Remove screws that attach hot idle compensator valve to main body boss. Remove valve and gasket.

(8) Remove plastic limiter caps from idle air mixture screws. (Be sure and count number of turns to seat the screws (from stop), as the same number of turns (from seat) must be maintained at installation.) Remove screws and springs from throttle body.

The carburetor now has been disassembled into two units, namely air horn and the main and throttle body casting. The component parts of each have been disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shafts or valves unless wear or damage necessitates the installation of new parts. During the manufacture of the carburetor, the location of the idle transfer ports and the idle discharge ports to the valve is carefully established for one particular assembly, (Fig. 10).

If new throttle shafts should be installed in an old worn body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. A very slight change in the port relationship to the valves would adversely affect normal carburetor operation, between the speeds of 15 and 30 miles per hour.

It is recommended that if the throttle shafts are excessively worn, that a new carburetor be installed. However, if the throttle valves have become nicked, burred or damaged, new valves may be installed, providing the following instructions are carefully followed. **The screws that attach the**

throttle valves are staked on the opposite side and care should be used in removal so as not to break the screws in the throttle shaft. Remove the staked portion of the screws with a file.

Remove the screws that attach the primary throttle valves to the throttle shaft and slide valve (or valves) out of bores.

Remove the screws that attach the secondary throttle valves to the throttle shaft and slide valve (or valves) out of bores.

The primary valves and secondary valves are not interchangeable and should be kept separate in order that each may be returned to its respective bore.

INSPECTION AND REASSEMBLY

(1) Slide primary throttle valve (or valves) into their respective bores, install new screws, but do not tighten. Be sure idle speed adjusting screw is backed out. Hold valves in place with fingers. (Fingers pressing on high side of valves.)

(2) Tap valves lightly in this position, tighten screws securely. Stake screws by squeezing with pliers.

(3) Install idle mixture screws and springs in throttle body. (The tapered portion must be straight and smooth. If tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control.) **DO NOT USE A SCREW DRIVER.** Turn screws lightly against their seats with fingers. Back off the number of turns counted at disassembly. Install new plastic caps with tab against stops. This screw has a left hand thread. Turn counterclockwise (Richer) and clockwise (Leaner).

Install velocity valves in position in body.

(4) Place new secondary venturi gaskets in position, then install secondary venturi (pump and choke side) by lowering straight down on gaskets. Install attaching screws and tighten securely. **Be sure all the metering holes and vent tubes are clean, in both the primary and secondary venturi.**

(5) Place new primary venturi gaskets in position, then install the primary venturi (pump and choke side) by lowering straight down on gaskets. (Fig. 7). Install attaching screws and tighten securely.

(6) Install primary and secondary main metering jets, using Tool T-109-58. (Fig. 6). Tighten jets securely.

(7) Install accelerator pump intake check ball using Tool T-109-59.

Accelerator Pump Test

(1) Pour clean gasoline into carburetor bowl (approximately 1/2 inch deep). Remove accelerator pump plunger from jar of gasoline. Flex leather several times, then slide into pump cylinder.

(2) Install accelerator pump discharge check needle in discharge passage. Raise pump plunger and press lightly on plunger shaft to expel air from pump passages. Using a small clean brass rod, hold discharge check needle firmly on its seat. Again raise plunger and press downward. No fuel should be emitted from either the intake or discharge passage.

(3) If fuel does emit from intake passage, remove intake check ball and reclean the passage. Fuel leakage at discharge check needle indicates presence of dirt or a damaged check needle. Clean again and then install a new check needle. Retest for leakage.

(4) If either intake check assembly or discharge check needle leaks after above test and service fix, attempt to reseat as follows:

Intake Check Ball

Remove the intake check assembly from the throttle body. Install a new check assembly, then retest as described previously.

Discharge Check Needle

(1) With discharge check needle installed, insert a piece of drill rod down on needle. Lightly tap drill rod with a hammer to form a new seat. Remove and discard old needle and install a new one. Retest as described previously. If service fix does not correct the condition, a new carburetor will have to be installed.

(2) Install accelerator pump discharge check needle, jet housing and gasket. Install housing and attaching screws. Tighten screws securely.

(3) Press down on accelerator pump plunger shaft, and as plunger is being depressed, a clear straight stream should emit from each jet. If streams are not identical, (if either one is diverted or restricted) a new accelerator pump jet housing should be installed. After test, pour gasoline from carburetor bowl and remove pump plunger.

Assembling Air Horn

(1) Slide fuel inlet screen into fuel line fitting, then install in air horn. Tighten securely.

(2) Check to see if leather on accelerator pump plunger is hard, cracked or worn. If any sign of wear or deterioration is evident, install a new plunger assembly.

(3) Slide the accelerator plunger into air horn, then install the accelerator pump link. When reassembling, make sure the large diameter of pivot screw enters hole in pump arm and that shoulder on screw has not pinched pump arm.

The carburetors are equipped with synthetic rub-

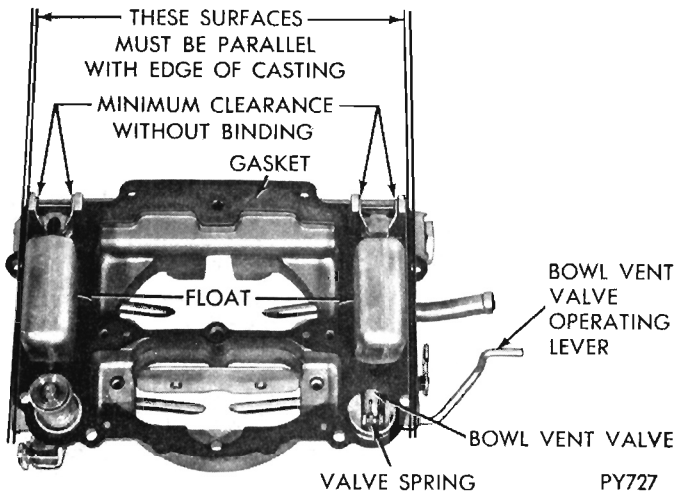


Fig. 11 - Checking Float Alignment

ber tipped fuel inlet needles. The needle tip is a rubber material which is not affected by gasoline and is stable over a wide range of temperatures. The tip is flexible enough to make a good seal on the needle seat, and to give increased resistance to flooding.

The use of new inlet needles require that care be used when making float adjustments. Avoid applying any pressure on the floats which might compress the tip of the fuel inlet needles. **The tip can be compressed sufficiently to cause a false setting which will affect correct level of fuel in the bowl.**

(4) Place a new air horn to main body gasket in position on air horn, then install float needle valve seats. (Be sure each needle seat and needle is reinstalled in its original position.)

(5) Slide right and left floats into position in air horn, then install float fulcrum pins. **(Be sure marked float is installed on pump side of the air horn.) See disassembly procedures.**

(6) After floats have been installed, check float alignment, level and drop settings as follows:

Float Alignment Setting

(1) Sight down side of each float shell to determine if side of the float is parallel to outer cage of air horn casting, (Fig. 11).

(2) If sides of float are not in alignment with edge of casting, bend float lever by applying pressure to end of float shell with thumb. **To avoid damage to the float, apply only enough pressure to bend the float lever.**

(3) After aligning floats, remove as much clearance as possible between arms of float lever and lugs of air horn. To do this, bend float lever. The arms of float lever should be as parallel as possible to inner surfaces of lugs of casting.

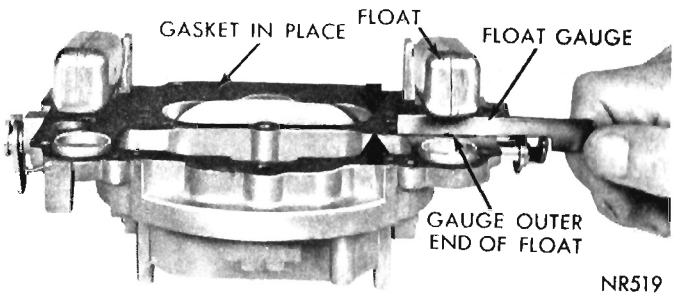


Fig. 12 - Checking Float Height

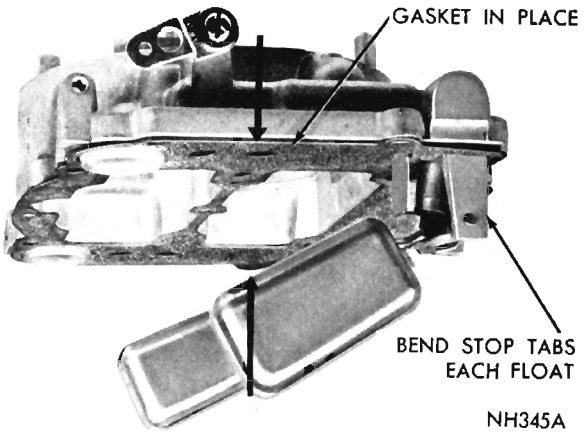


Fig. 13 - Checking Float Drop

Float Level Setting

(1) With air horn inverted, air horn gasket in place and float needle seated, slide float gauge (refer to specifications for carburetor being worked on) between top of the float (at outer end) and air horn gasket, (Fig. 12). Float should just touch gauge (T-109-106).

(2) Check other float in same manner. If an adjustment is necessary, bend float arm using Tool T-109-22, until correct clearance has been obtained. After bending arm, recheck the float alignment.

Float Drop Setting

(1) Holding air horn in an upright position, measure distance from the top of floats (outer end) to the air horn gasket, (Fig. 13). This measurement should be 3/4 inch. If an adjustment is necessary, bend stop tabs on float levers until correct drop setting has been obtained. Bend tab toward needle seat to lessen drop, or away from seat to increase drop.

(2) After floats have been checked and adjusted, continue to assemble carburetor as follows:

(3) Place accelerator pump plunger lower spring in pump cylinder, then lower air horn carefully down on main body. Care must be taken to center small brass main bleed tubes so that they will

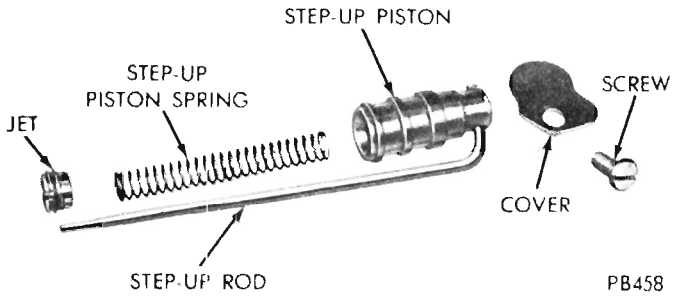


Fig. 14 - Step-up Piston, Rod and Jet

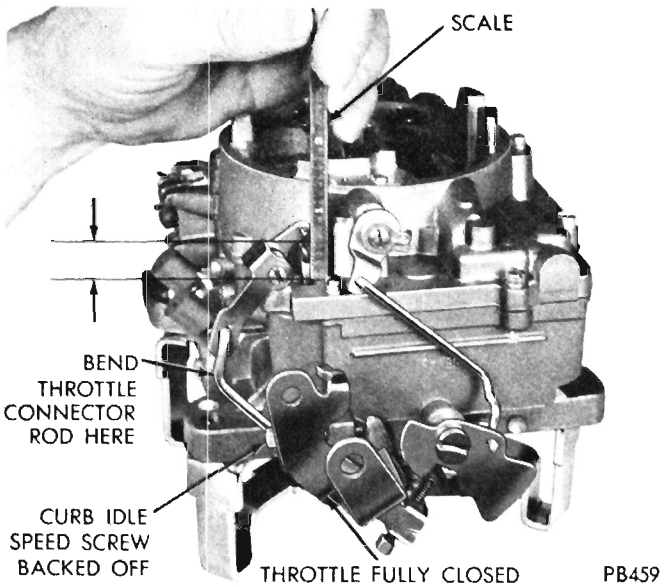


Fig. 16 - Adjusting Accelerator Pump

pass through holes in air horn without being damaged. **Be sure the fuel baffles on the air horn, slide down in front, (bowl side) of the float chamber baffles, or the air horn will not index correctly with the main body and can cause the floats to hang up. Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not observed. Install dashpot (if so equipped.)**

(4) Install 10 air horn attaching screws and tighten securely. (The two long screws should be installed in holes that are located at air cleaner mounting surface. The 1 inch screw at front and 1-1/2 inch at rear.)

(5) Slide step-up piston spring into piston cylinders, followed by step-up pistons and step-up rods. Install cover plates and attaching screws while holding step-up pistons down in position. Tighten screws securely. (Fig. 14).

(6) Engage throttle connector rod with primary throttle shaft lever, then install hairpin clip. Install clevis clip to rod and pump arm.

(7) Engage lower end of fast idle connector rod with fast idle cam, then swing in an arc to lock

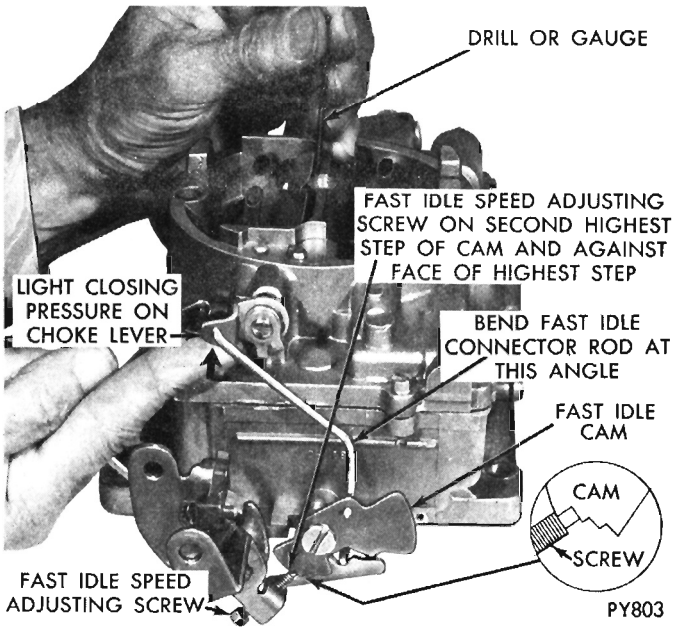


Fig. 15 - Fast Idle Cam Position Adjustment

in cam. Slide other end of rod into choke shaft lever and secure with hairpin clip.

CARBURETOR ADJUSTMENTS (AFB-4969S and AFB-4970S Carburetors Only)

The following adjustments should be made with the carburetor on the bench for ease of working, and, should be made in the following order:

Fast Idle Speed Cam Position Adjustment

The fast idle engine speed adjustment should be made on the vehicle, as described in the Fast Idle Speed Adjustment (On the Vehicle Paragraph.) However, the Fast Idle Cam Position Adjustment can be made on the bench.

This adjustment is important to assure that the speeds of each cam step occur at the proper time during engine warm-up. Adjust as follows:

(1) With fast idle speed adjusting screw contacting second highest speed step on fast idle cam, move choke valve toward closed position with light pressure on choke shaft lever.

(2) Insert specified drill (refer to Specifications), between choke valve and wall of air horn (Fig. 15). An adjustment will be necessary if a slight drag is not obtained as the drill is being removed.

(3) To adjust, bend fast idle connector rod at angle, using Tool T-109-213 until correct valve opening has been obtained (Fig. 15).

Accelerator Pump Adjustment

Move the choke valve to wide open position, to release the fast idle cam. Back off the idle speed adjustment screw (curb idle) until the throttle valves are seated in the bores.

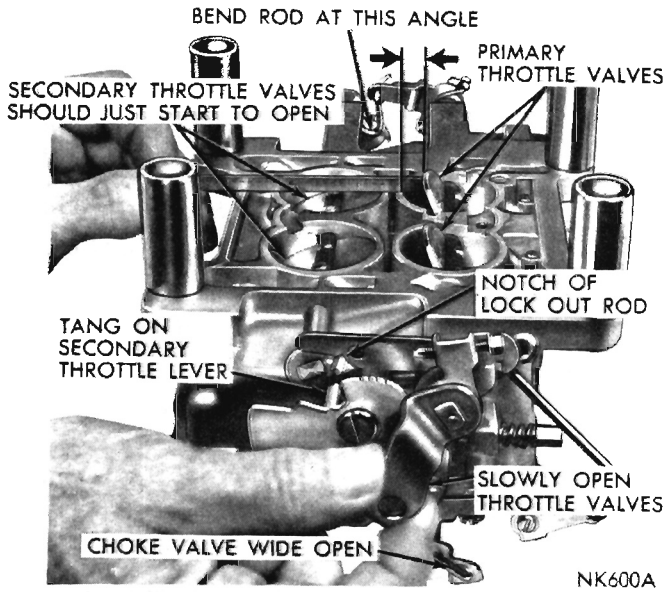


Fig. 17 - Checking Secondary Throttle Adjustment

Measure the distance from the top of the air horn to the top of the plunger shaft, using a "T" scale, (Fig. 16). This distance should be 31/64 inch.

If an adjustment is necessary, bend the throttle connector rod at the lower angle, using Tool T-109-213, until correct travel has been obtained.

Secondary Throttle Lever Adjustment

To check the secondary throttle lever adjustment, block the choke valve in the wide open position and invert the carburetor. Slowly open the primary throttle valves until it is possible to measure 17/64 inch between the lower edge of the primary valve and the bore (opposite idle port) (Fig. 17). At this measurement, the secondary valves should just start to open. If an adjustment is necessary, bend the secondary throttle operating rod at the angle, using Tool T-109-213, until correct adjustment has been obtained.

With primary and secondary throttle valves in tightly closed position, it should be possible to insert Tool T-109-29 (.020 in.) wire gauge, between positive closing shoes on the secondary throttle levers, (Fig. 18).

If an adjustment is necessary, bend the shoe on the secondary throttle lever, using Tool T-109-22, until correct clearance has been obtained.

Secondary Throttle Lock Out Adjustment

Crack the throttle valves, then manually open and close the choke valve. The tang on the secondary throttle lever should freely engage in the notch of the lockout dog (Fig. 17).

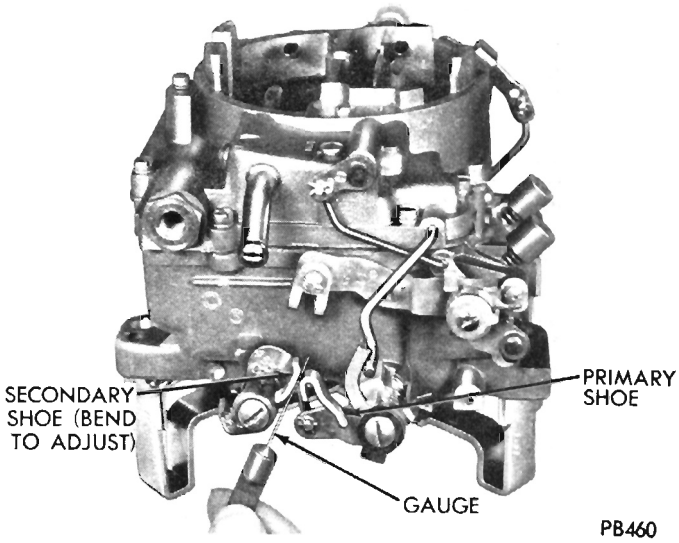


Fig. 18 - Checking Clearance Between Closing Shoes

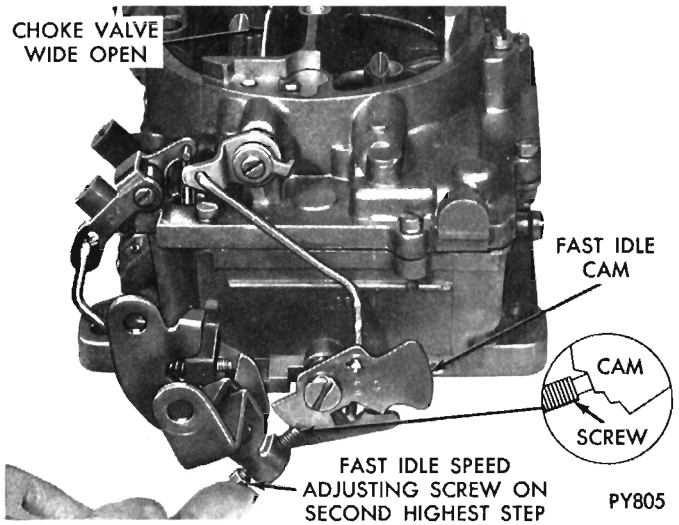


Fig. 19 - Fast Idle Speed Adjustment (On Vehicle)

If an adjustment is necessary, bend the tang on the secondary throttle lever, until engagement has been made. Use Tool T-109-22 for this operation.

After adjustments have been made, reinstall carburetor on engine, using a new gasket.

It is suggested that the carburetor be filled with clean gasoline. This will help prevent dirt that is trapped in the fuel system, from being dislodged by the free flow of fuel, as the carburetor is primed.

Fast Idle Speed Adjustment (On Vehicle)

Fast idle engine speed is used to overcome cold engine friction, stalls after cold starts and stalls because of carburetor icing. Set this adjustment after vehicle odometer indicates over 500 miles to insure a normal engine friction level. Prepare engine by driving at least 5 miles. Connect a ta-

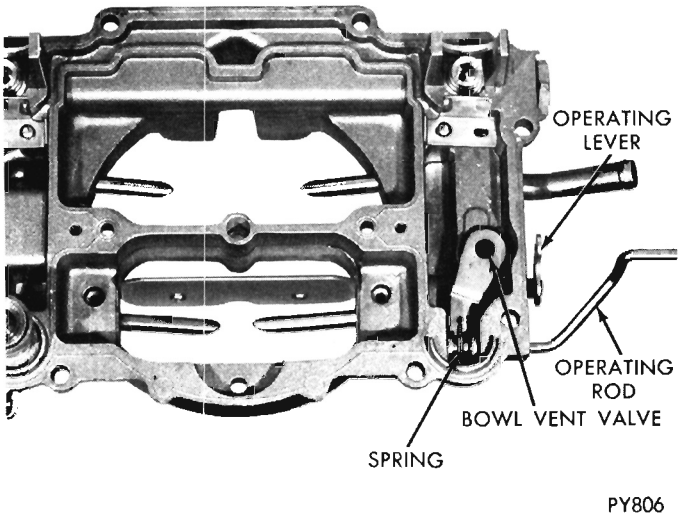


Fig. 20 - Bowl Vent Valve Assembly

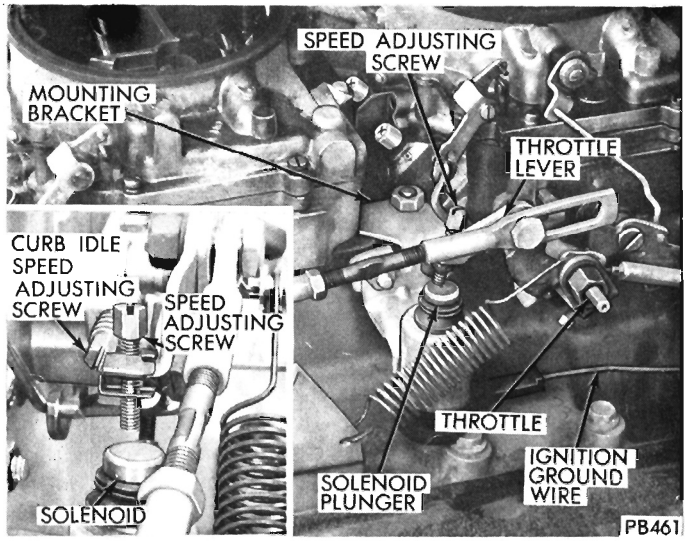


Fig. 21 - Idle Speed Solenoid Adjustment

chometer and set curb idle speed and mixture, then proceed as follows:

(1) With engine off and transmission in **PARK** or **NEUTRAL** position open throttle slightly.

(2) Close choke valve until fast idle screw can be positioned on the second highest speed step of fast idle cam (Fig. 19).

(3) Start engine and determine stabilized speed. Turn fast idle speed screw **in** or **out** to secure specified speed. (Refer to Specifications).

(4) Stopping engine between adjustments is not necessary. However, reposition fast idle speed screw on cam after each speed adjustment to provide correct throttle closing torque.

Before adjusting idle and/or fast idle speeds and mixtures, make sure that the basic timing and the distributor control valve are correctly adjusted as outlined under Idle Speed Adjustment (Curb Idle).

Bowl Vent Valve Adjustment (Fig. 20)

To check the bowl vent valve adjustment, proceed as follows:

(1) Using Tool T109-43, remove bowl vent valve checking hole plug in air horn (Fig. 3).

(2) With throttle valves at closed curb idle position, insert a narrow ruler down through hole. Allow ruler to rest lightly on top of valve. The reading should be 3/4 inch from top of valve to top of air horn casting at opening.

(3) If an adjustment is necessary, bend bowl vent valve operating lever, until correct valve opening has been obtained.

(4) Install new plug and rap lightly to seat, using a hammer.

Idle Speed and Mixture Adjustment—AFB-4969S and AFB-4970S Rear Carburetors, AFB-4971S Front Carburetor

Connect a tachometer and warm-up the engine to normal operating temperature. Be sure the choke is fully off and that the engine is at curb idle, (transmission in Neutral). Proceed as follows:

(1) Turn the idle mixture screws from 1 to 2 turns open.

(2) Set the idle screws 2 turns open and adjust the idle speed to 950 rpm. (Manual or Automatic Transmissions).

Adjust the idle mixture screws on each carburetor for maximum rpm. Repeat on each carburetor.

Before attaching the rod at each carburetor, check the transmission to throttle linkage adjustments, so that the idle position is not disturbed.

Accurate carburetor synchronization or balance is extremely important and when performed should be rechecked and rebalanced in the outside ambient temperature after a five mile or more road test. This readjustment will prevent rough engine idle performance and possible engine stalling when the vehicle is returned to the owner.

Idle Speed Solenoid Adjustment

To set idle speed solenoid for correct engine r.p.m. proceed as follows:

(1) Warm up engine to normal operating temperature, then attach a tachometer.

(2) With engine running, turn idle speed solenoid adjusting screw **in** or **out** to obtain 950 r.p.m. on automatic transmission equipped vehicles and 950 r.p.m. on standard transmission equipped vehicles. (Fig. 21).

(3) After specified r.p.m. has been obtained and with engine still running (to energize solenoid), adjust curb idle speed screw until end of screw **just touches** stop on carburetor throttle body. Now, back off 1 full turn to obtain slow curb idle speed setting. (Approximately 650 to 700 r.p.m.)

FUEL PUMP

INDEX

	Page
Fuel Vapor Separator	123
General Information	120
Service Diagnosis	121
Specifications	137
Testing Fuel Pump (On Vehicle)	122

GENERAL INFORMATION

Fuel pump Model MS-4844S (Fig. 1), is used exclusively on the 198/225 cubic inch 6 cylinder engine. Model MS-4587SA (Fig. 2) is used on the 318, 340 and the 360 cu. in. engines.

Model MS-4589SA (Fig. 3) and Model RD-267A, (Fig. 4) (optional) is used on the 383 and 440 cubic inch engine. Model MA-4024S is used on the 426 cu. in. engine (Fig. 5). Model MS-4845S is used on the 440 cu. in. H.P. engine (Fig. 3).

The fuel pumps are driven by an eccentric cam that is cast on the camshaft in the 198-225, 383

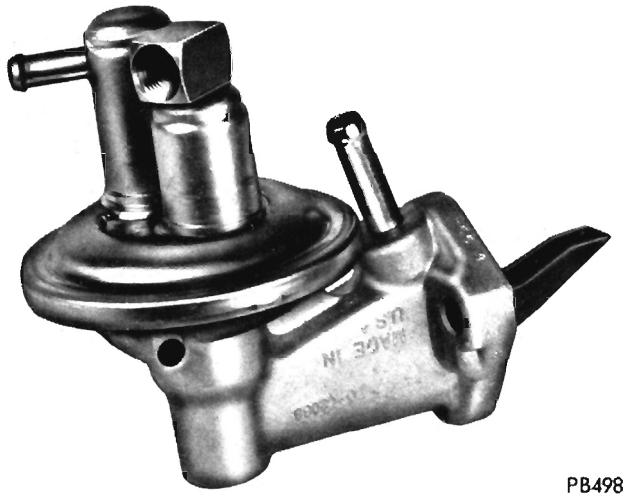


Fig. 1 - Fuel Pump Assembly (6 Cylinder Engines)

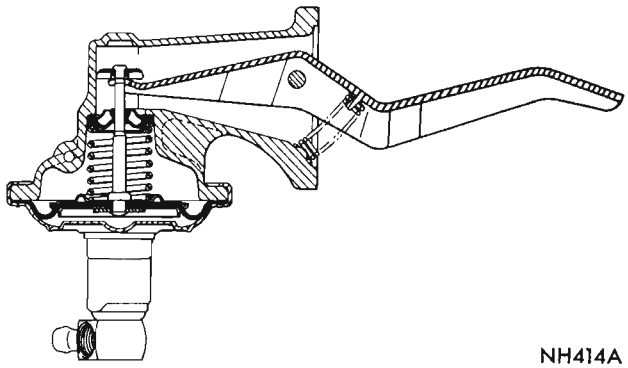


Fig. 2 - Fuel Pump Assembly (318, 340 and 360 Cu. In. Engines)

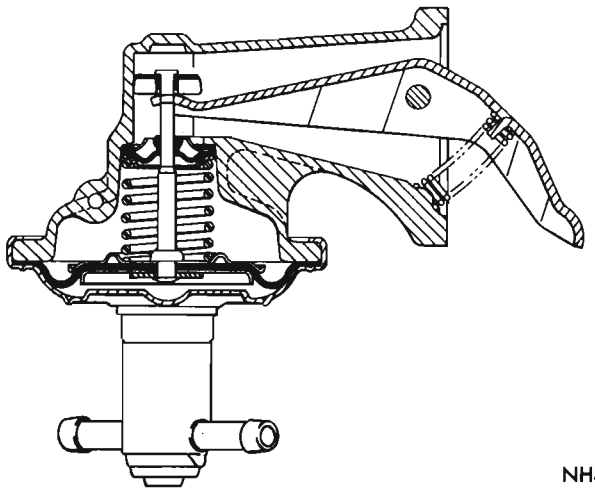


Fig. 3 - Fuel Pump Assembly (383 and 440 Cu. In. Engines)

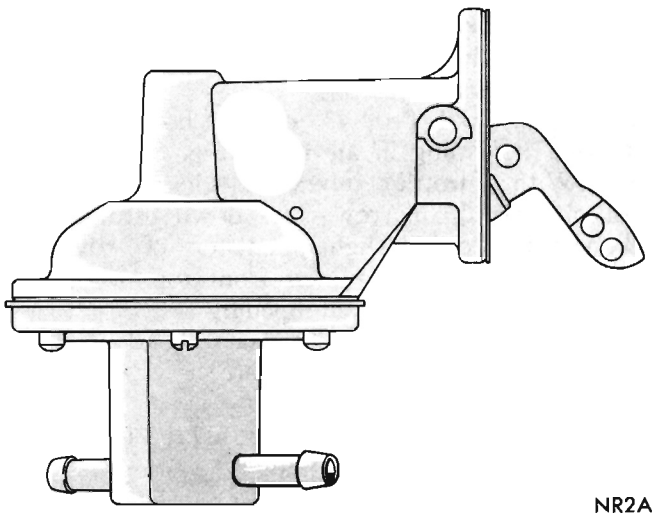


Fig. 4 - Fuel Pump Assembly (RD-267A) 383 AND 440 Cu. In. Engines

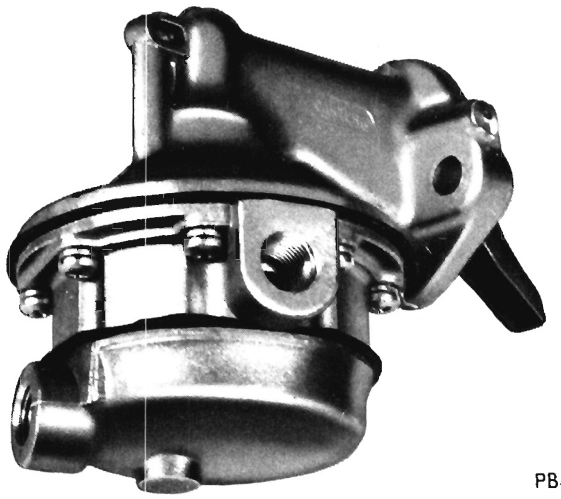

PB499

Fig. 5 - Fuel Pump Assembly (426 Cu. In. Engines)

and 426, 440 cubic inch engines, or by a pressed steel eccentric cam mounted on the gear end of the camshaft in the 318, 340 and 360 cubic inch engines.

As the camshaft rotates, the eccentric cam presses down on the pump rocker arm. (On the 383, 426 and 440 cubic inch engine, a push rod operates between the camshaft and the fuel pump rocker arm.) This action lifts the pull rod and diaphragm upwards against the fuel pump main spring, thus creating a vacuum in the valve housing and opens the inlet valve and fuel is drawn into the valve housing chamber. On the return stroke the main spring forces the diaphragm to the **down** position, which closes the inlet valve and expels the fuel in the valve housing chamber through the outlet valve, to the fuel filter and the carburetor.

The fuel filter should be changed every 24,000 miles, to insure having an unrestricted flow of fuel at all times. **Do not attempt to clean.**

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
FUEL PUMP LEAKS—FUEL	(a) Worn, ruptured or torn diaphragm.	(a) Install new pump.
	(b) Loose diaphragm mounting plates.	(b) Install new pump.
	(c) Loose inlet or outlet line fittings.	(c) Tighten line fittings.
FUEL PUMP LEAKS—OIL	(a) Cracked or deteriorated pull rod oil seal.	(a) Install new pump.
	(b) Loose rocker arm pivot pin.	(b) Install new pump.
	(c) Loose pump mounting bolts.	(c) Tighten mounting bolts securely.
	(d) Defective pump to block gasket.	(d) Install new gasket.
INSUFFICIENT FUEL DELIVERY	(a) Vent in tank restricted. (This will also cause collapsed fuel tank.)	(a) Unplug vent and inspect tank for leaks.
	(b) Leaks in fuel line or fittings.	(b) Tighten line fittings.
	(c) Dirt or restriction in fuel tank.	(c) Install new fuel filter and clean out tank.
	(d) Worn, ruptured, or torn diaphragm.	(d) Install new pump.
	(e) Frozen gas lines.	(e) Thaw lines and drain tank.
	(f) Improperly seating valves.	(f) Install new fuel pump.
	(g) Push rod worn (383,426,440)	(g) Replace push rod.
	(h) Vapor lock.	(h) Install heat shield where lines or pump are near exhaust.
	(i) Low pressure.	(i) Install new fuel pump.
	(j) Incorrect fuel pump.	(j) Install correct fuel pump.
	(k) Restricted fuel filter.	(k) Install new filter.
FUEL PUMP NOISE	(a) Loose mounting bolts.	(a) Tighten mounting bolts.
	(b) Scored or worn rocker arm.	(b) Install new fuel pump.
	(c) Weak or broken rocker arm spring.	(c) Install new spring.
	(d) Stiff inlet hose	(d) Install 3 in. longer hose

SERVICE PROCEDURES

TESTING FUEL PUMP (On Vehicle)

If the fuel pump fails to supply fuel properly to the carburetor, the following tests should be made before removing the fuel pump from the vehicle.

Pressure Test

(1) Insert a "T" fitting in fuel line at carburetor, (Fig. 6).

(2) Connect a 6 inch piece of hose between "T" fitting and gauge C-3411. (The hose should not exceed 6 inches. A longer hose may collect fuel and additional weight of fuel would be added to pressure of pump and result in an inaccurate reading.)

(3) Vent pump for a few seconds (this relieves air trapped in fuel chamber). If this is not done, pump will not operate at full capacity and low pressure reading will result.

(4) Connect a tachometer, then start engine and run at idle. The reading should be as shown in specifications (depending on pump) and remain constant or return to zero very, very slowly when engine is stopped. An instant drop to zero indicates a leaky outlet valve. If pressure is too low a weak diaphragm main spring, or improper assembly of diaphragm may be the cause. If pressure is too high, main spring is too strong.

Vacuum Test

The vacuum test should be made with the fuel line disconnected from the carburetor. (This will allow the pump to operate at full capacity, which it must do to prime a dry carburetor.) The minimum reading should be at least 10 inches of vacuum at idle, with the fuel line disconnected at the carburetor.

Volume Test

The fuel pump should supply 1 quart of fuel in 1 minute or less at idle.

Inlet Valve Test

To test the inlet valve, connect a vacuum gauge on the inlet fitting while the line is disconnected.

(1) Start engine or turn over with starting motor.

(2) There should be a noticeable vacuum present, not alternated by blowback.

(3) If blowback is present, inlet valve is not seating properly and a new pump should be installed.

If fuel pump does not perform to above test

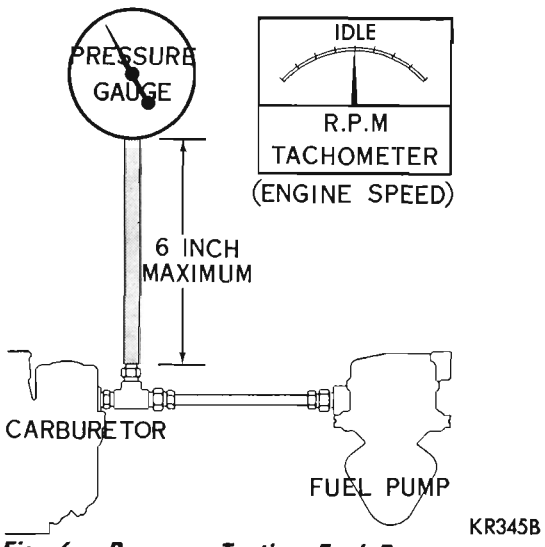


Fig. 6 - Pressure Testing Fuel Pump

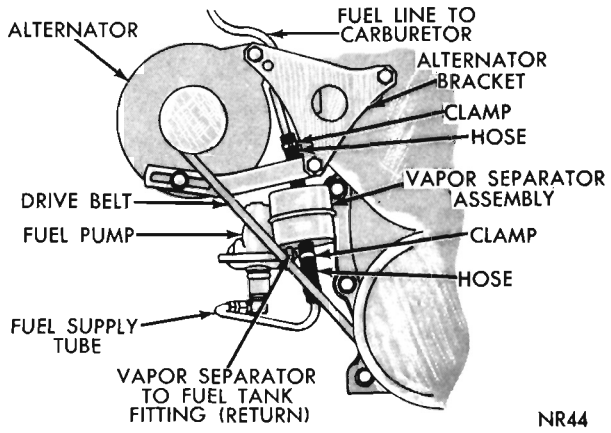


Fig. 7 - Fuel Vapor Separator (440 Cu. In. Engines)

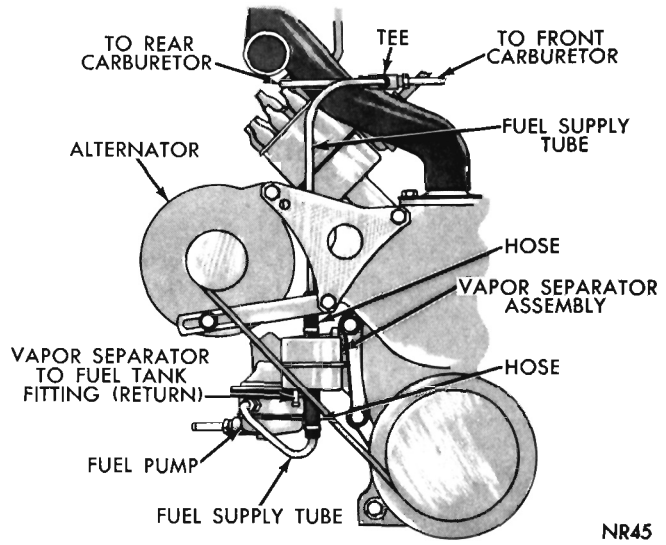


Fig. 8 - Fuel Vapor Separator (426 Cu. In. Engines)

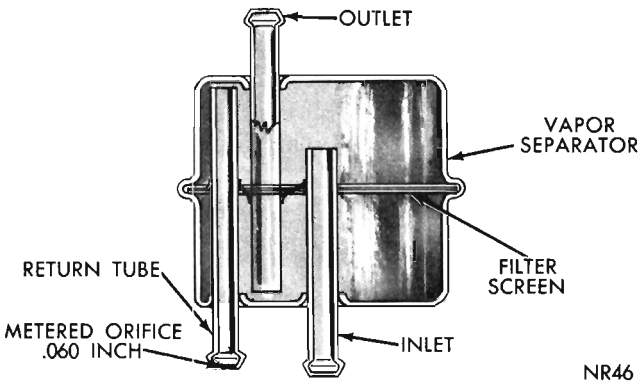


Fig. 9 - Fuel Vapor Separator (Sectional View)

requirements, fuel pump should be removed from the vehicle.

FUEL VAPOR SEPARATOR

The fuel vapor separator (Figs. 7, 8 and 9), is used on the 440 cu. in. High Performance engine and the 426 Hemi engine to prevent vapor lock.

The vapor separator is located between the fuel pump and carburetor, depending on model (Figs. 7 or 8) on the right side (front) of the engine. The separator is serviced as an assembly only and consists of a sealed can, a filter screen, an inlet and outlet fitting and a metered orifice outlet fitting for the return line to the fuel tank (Fig. 9).

Fuel is drawn from the fuel tank by the fuel pump, through the supply line, into the pump and thence to the vapor separator unit, until the unit is filled with fuel. The outlet tube picks up fuel from the bottom of the separator unit and flows into the carburetor for distribution to the engine. Any fuel vapor (caused by excessive heat) that has gathered in the indrawn fuel rises to the top of the separator unit and is forced out of the metered fitting into the return line to the tank for condensation to liquid fuel.

As previously mentioned, the vapor separator unit is serviced only as an assembly. Check to see if the unit is installed correctly (with the **inlet** fitting and **return** fitting at the bottom, and the **outlet** fitting at the top.

To check the unit for a restricted or plugged screen, disconnect fuel line at carburetor, then with a container placed under end of line, turn engine over with starting motor. Check the quantity of fuel pumped through the unit. This should be 1 quart of fuel in 1 minute, at idle.

If vapor lock is evident, remove the return hose and check to see if the metered oridice is open. If clogged, bend a paper clip and insert through restricted orifice to clear. If necessary, use air pressure to clear return line to fuel tank, after removing filler cap.

FUEL TANK VAPOR SAVER SYSTEM

INDEX

	Page
General Information	123
Installing Fuel Tank	131
Installing Fuel Tank (Station Wagon)	133
Removing Fuel Tank	131
Removing Fuel Tank (Station Wagon)	132

GENERAL INFORMATION

All Chrysler Corporation Vehicles are equipped with a Vapor Saver System to reduce the loss of fuel from the fuel system to the atmosphere by evaporation. This is a closed system which controls fuel expansion and feeds fuel evaporation emissions from the carburetor or fuel tank. The vapors pass through vent lines to the crankcase by way of the crankcase inlet air cleaner. Since fuel vapors are two to four times heavier than air, they settle to the bottom of the crankcase. With the engine running the fuel vapors are purged from the crankcase and together with the normal crankcase vapor are drawn via the crankcase ventilation system, which is an existing part of the Cleaner Air System (CAS) into the base of the carburetor to be burnt by engine combustion.

The possible expansion of fuel in a full fuel tank, due to a rise in temperature, is provided by a 1.4 gallon over-fill limiter tank inside the main fuel tank when the main tank is filled. The orifice controlled slow filling of the inner tank allows the main tank fuel level to drop there by providing thermal expansion space (Fig. I).

The loss of any fuel or vapor out of the filler neck is prevented by the use of a filler cap which will release only under significant pressure (1/2 to 1 psi) or vacuum (1/4 to 1/2 psi). This cap is identified by the words **pressure-vacuum** and must be replaced by a similar unit if replacement is necessary, in order for the system to remain effective (Fig. 1).

Because the fuel tank is flat on top, four vents are used, one in each corner of the tank and are connected to a vapor-liquid separator by rubber

hoses. The vapor-liquid separator is a piece of two inch steel tubing mounted at an angle inside the trunk of the vehicle (quarter panel), which internally holds four vent lines from the tank and a vent line which leads to the crankcase inlet air cleaner. These lines are of different heights so the tank will always be vented regardless of vehicle attitude and fuel vapor will be transferred to the crankcase. One vent line from the tank is short to provide a drain back to the tank for any liquid fuel which may get into the separator during maneuvers or incline parking. The vent to the crankcase is at the highest point in the separator.

The vapor saver system also includes closed ventilation of fuel vapor from the carburetor bowl. On eight cylinder engines this is accomplished via a hose connection from the carburetor bowl to the crankcase inlet air cleaner. For six cylinder engines the hose from the carburetor bowl is connected into the crankcase via a connecting nipple on the fuel pump. This fuel pump also incorporates a bleed device which prevents buildup of pressure in the fuel supply line between the pump and the carburetor. This feature aids hot starting.

In event of fuel pump replacement, it is important that the correct pump is used.

The fuel tank on all models except Station Wagon Models is located at the rear of the body under the trunk compartment floor (Figs. 2, 3, 4 and 6).

In Station Wagon Models, the fuel tank is mounted in the left rear quarter panel beyond the wheel house (Figs. 5 and 7).

	Capacity Gallons		Filler Location
	U.S.	Imp.	
Valiant	17	14¼	Left Quarter
Barracuda	18	15	Rear Right Quarter
Belvedere	21	17½	Rear (Except Wagons) Left Quarter (Wagons Only)
Fury			
Chrysler	23	19¼	Rear (Except Wagons) Left Quarter (Wagons Only)
Imperial	23	19¼	Rear

The fuel tank is fitted with a gauge unit, including the suction pipe, (Fig. 8). The filter on the end of the suction pipe is a replaceable unit and prevents the entry of water or foreign material. When installing a gauge unit, be sure the filter is pushed down on the pipe until seated.

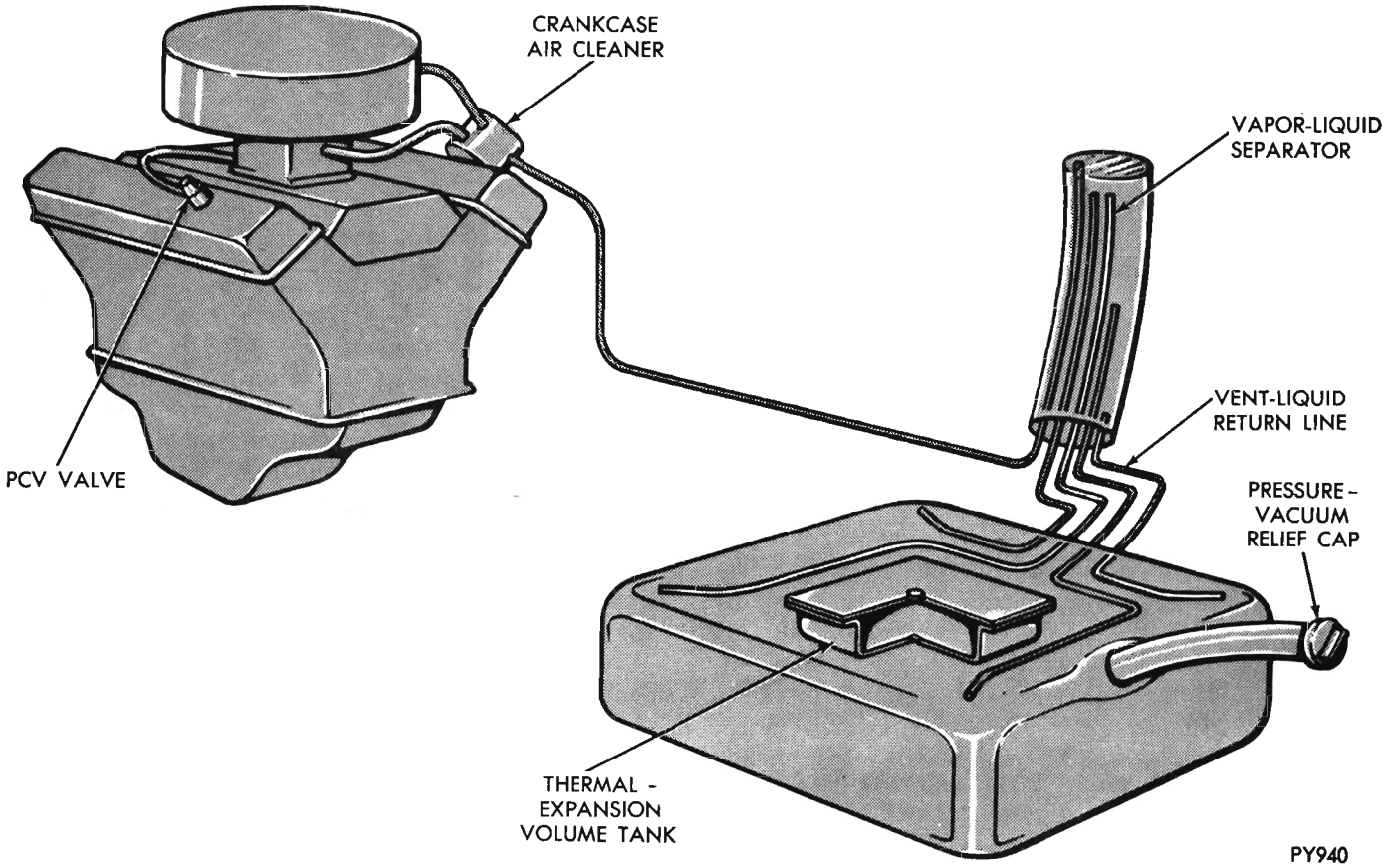


Fig. 1 - Vapor Saver System

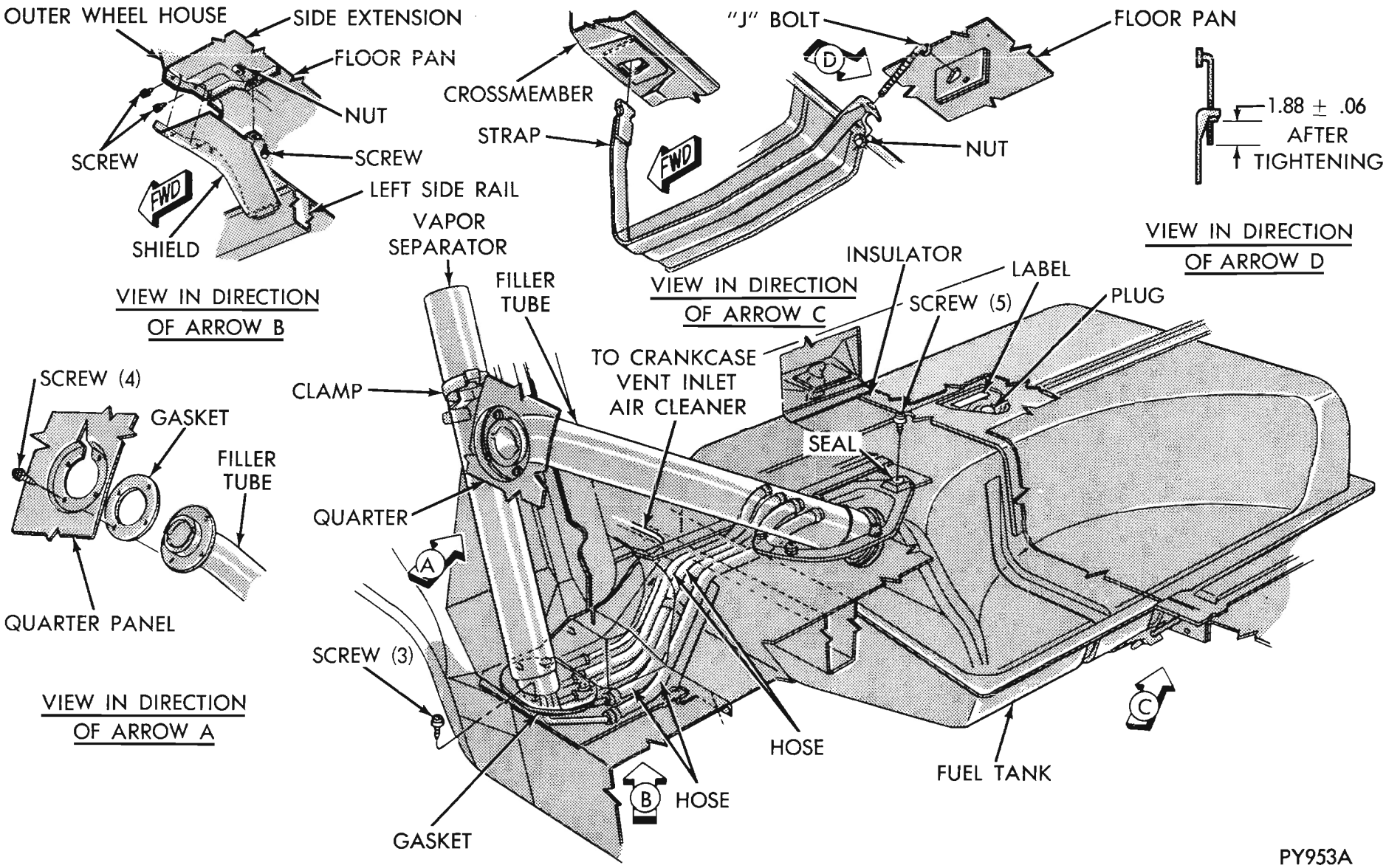


Fig. 2 - Fuel Tank Assembly (Valiant)

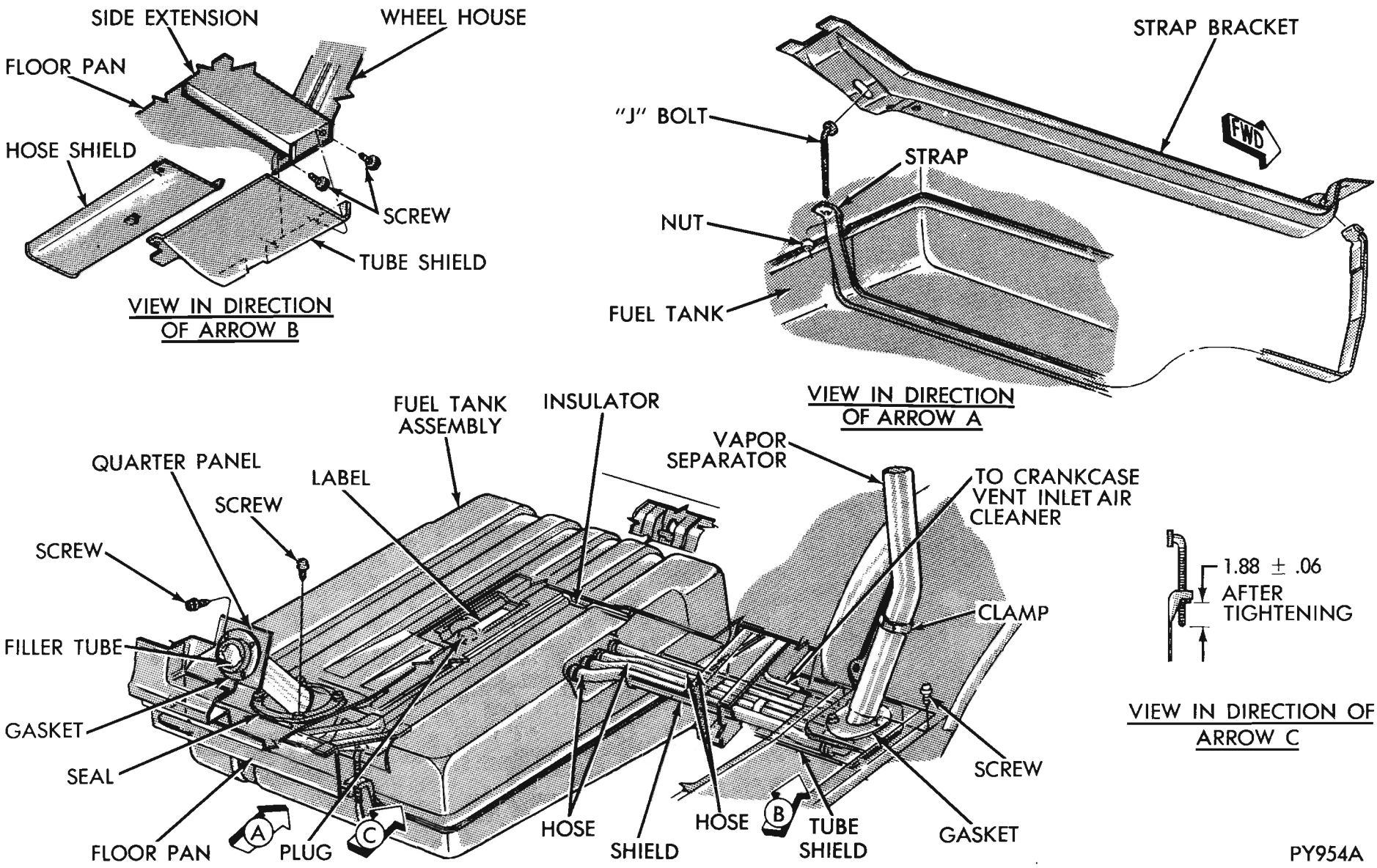


Fig. 3 - Fuel Tank Assembly (Barracuda)

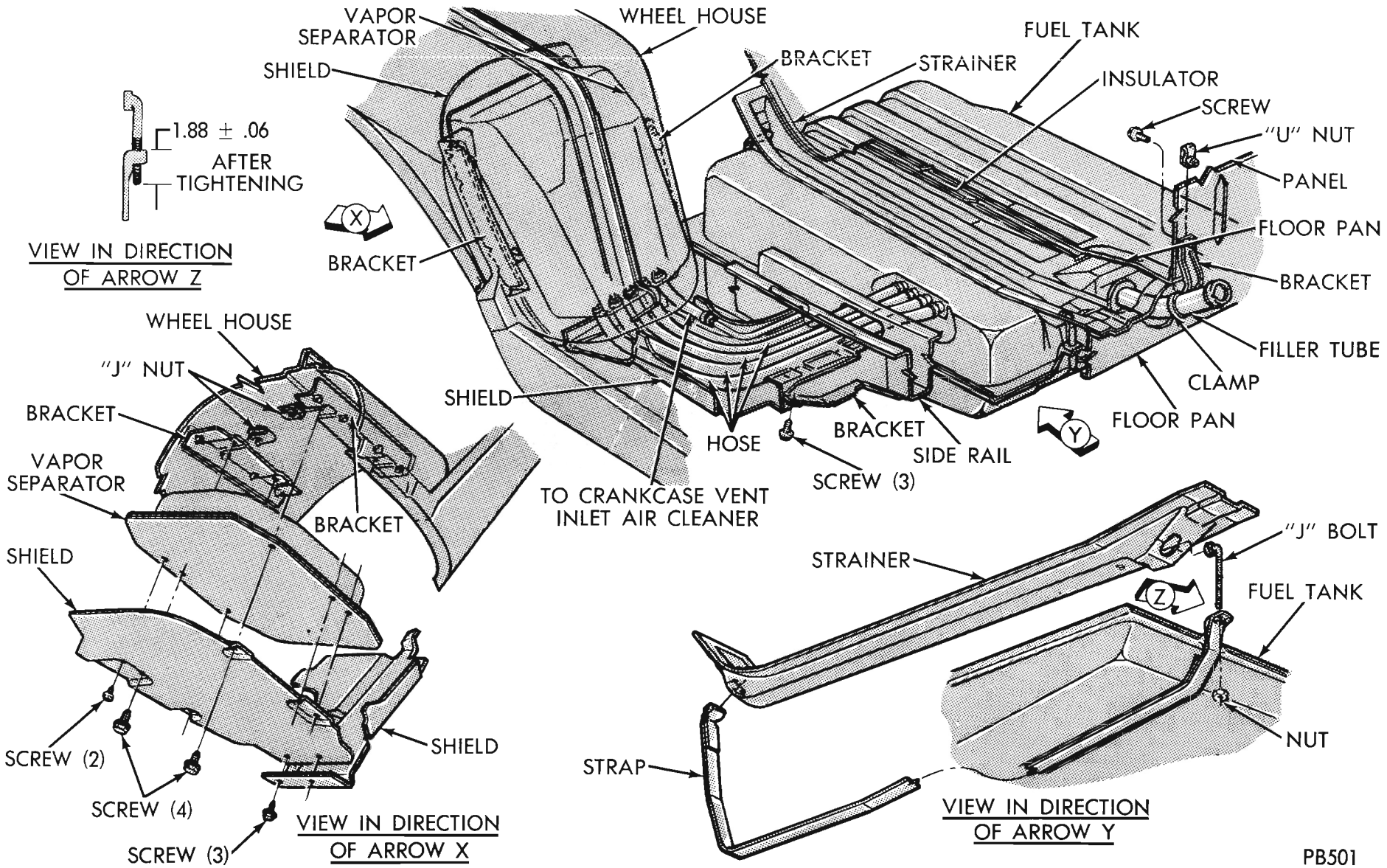


Fig. 4 - Fuel Tank Assembly (Satellite, Except Station Wagons)

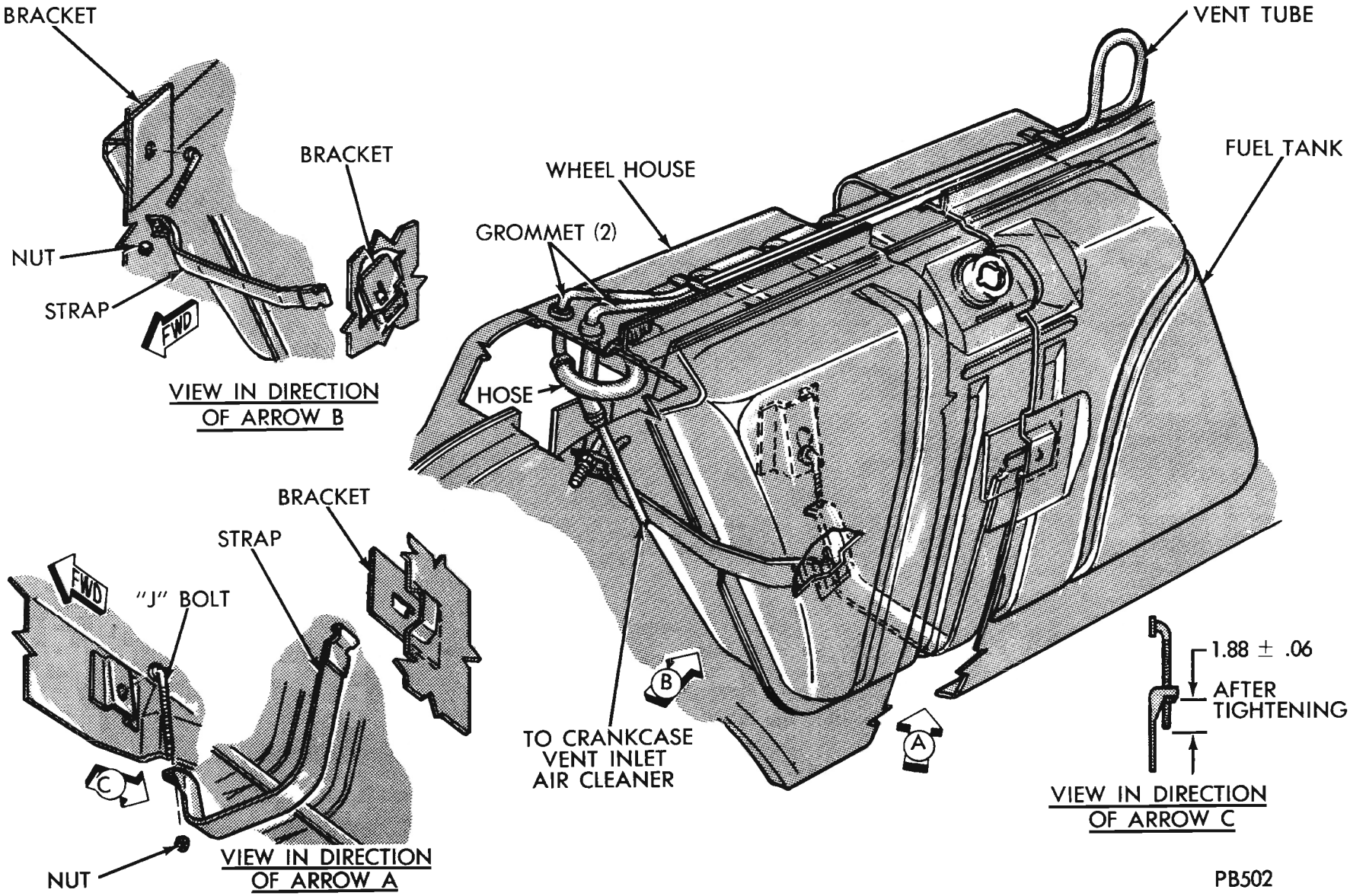


Fig. 5 - Fuel Tank Assembly (Satellite Station Wagons only)

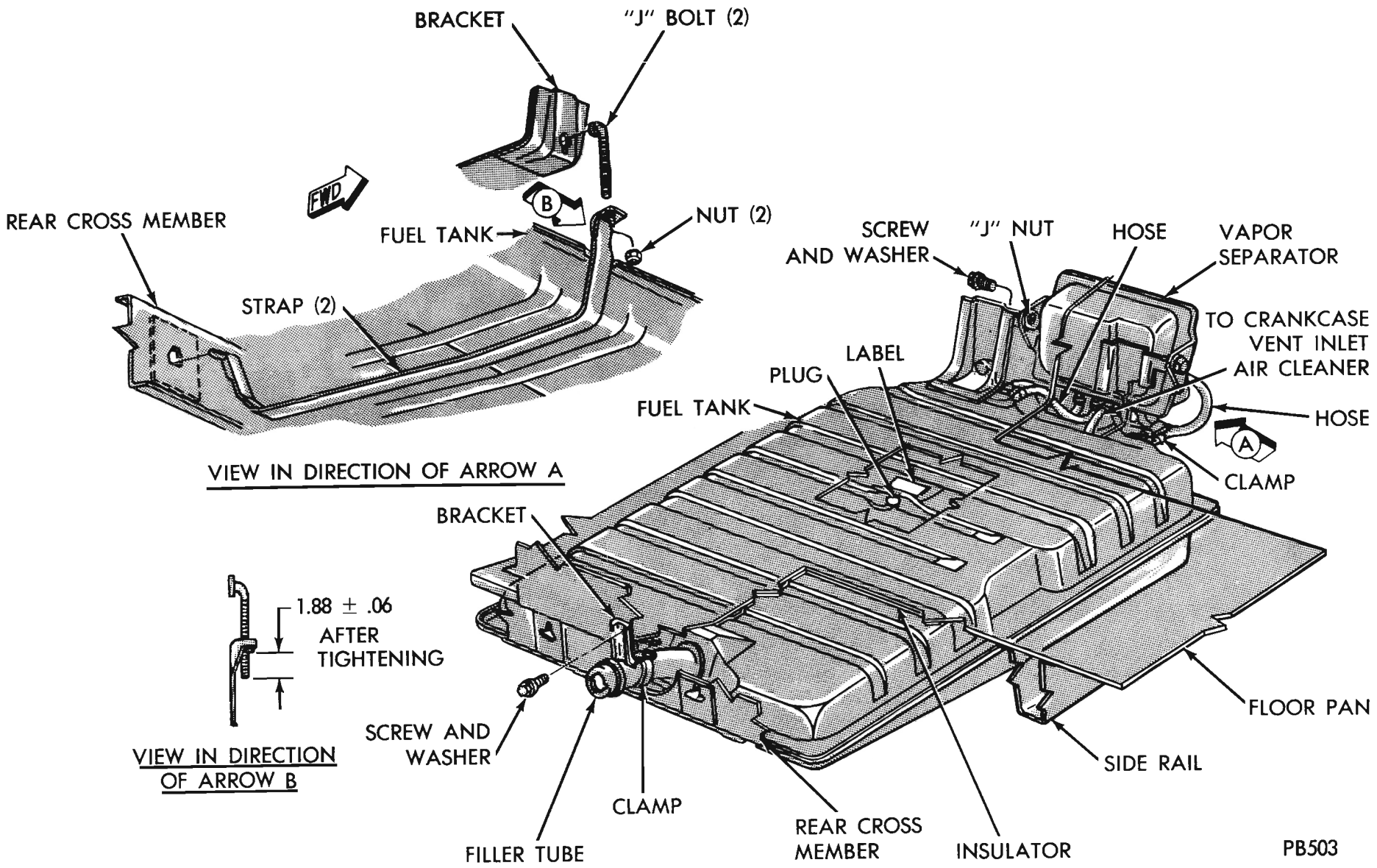


Fig. 6 - Fuel Tank Assembly (Fury, Chrysler and Imperial Except Station Wagons)

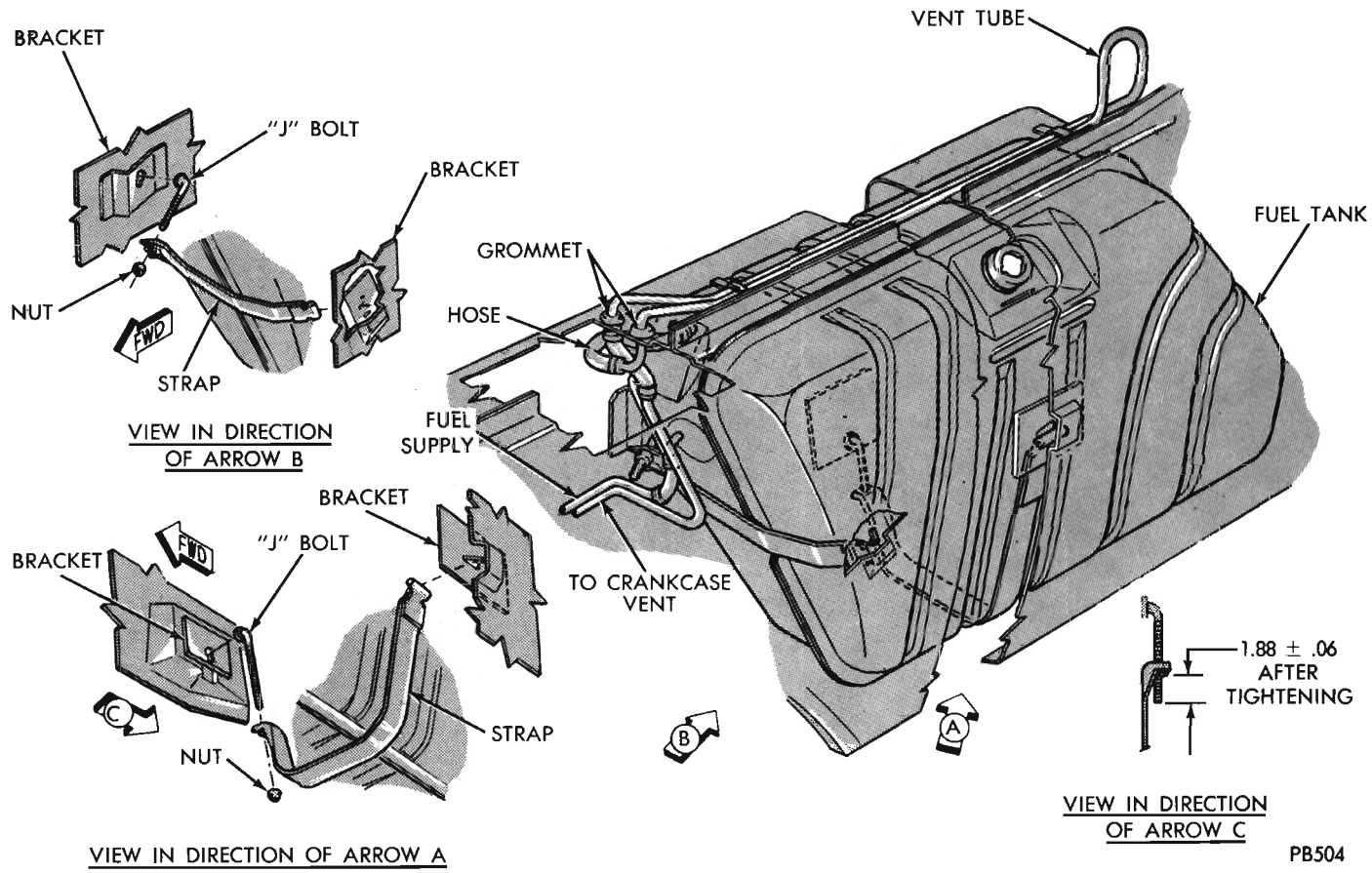


Fig. 7 - Fuel Tank Assembly (Fury, Chrysler Station Wagons Only)

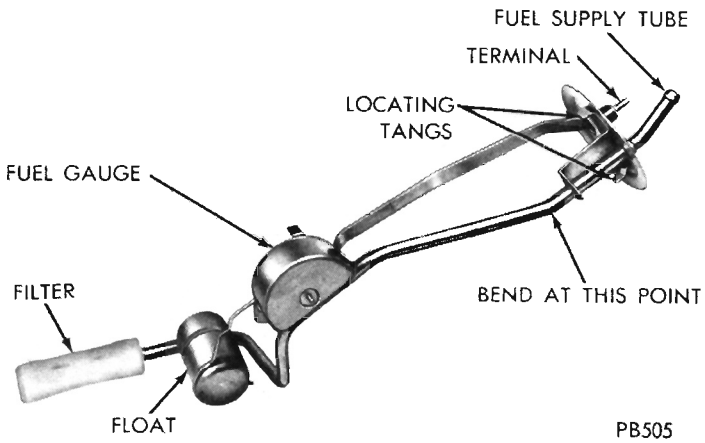


Fig. 8 - Fuel Gauge (Tank Unit)

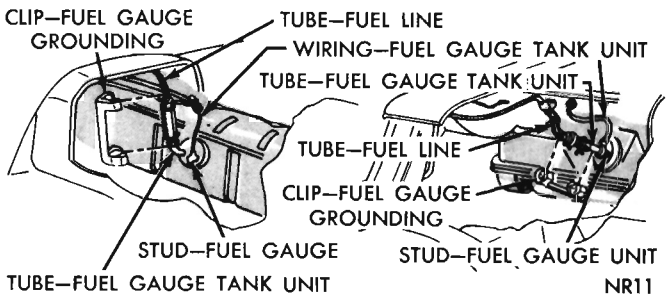


Fig. 9 - Fuel Tank Ground Strap

SERVICE DIAGNOSIS

The Vapor Saver System should not require any maintenance in normal service. Any loss of fuel or vapor from the fuel filler cap would indicate one or more of the following:

(1) An unsatisfactory seal between cap and filler neck.

(2) A malfunction of filler cap release valve. A quick check of the filler fuel cap may be made by placing against the mouth and blowing into the hole in the release valve housing. An immediate leak with light blowing or lack of release with hard blowing indicates a defective or incorrect unit.

(3) All Vapor Saver lines plugged between fuel tank and vapor separator.

(4) Plugged Vapor Saver lines between the vapor separator and the crankcase air inlet filter.

SERVICE PROCEDURES

REMOVING FUEL TANK—VALIANT-BARRACUDA-(Figs. 2 or 3)

(1) Drain fuel tank dry by disconnecting fuel line at pump and then connect a siphon tube. Collect drained fuel in a suitable container. Disconnect fuel line ground strap and wire lead to gauge unit.(Front center near top of tank) (Fig. 9).

(2) On models equipped with dual exhaust it will be necessary to lower the tail pipe or rear muffler to remove the heat shield and/or vapor separator hoses.

(3) Remove three screws that attach heat shield to floor pan.

(1) Remove four clamps and hoses from vapor separator.

(5) Remove four screws that hold filler tube and gasket to body panel.

(6) Remove screws and washers that attach filler tube seal to floor pan.

(7) Grasp filler tube with both hands, twist tube, and at the same time, force downward into tank, until end of tube clears quarter panel. Remove gasket. (If tube is frozen in tank, use a rubber lubricant around joint and work into grommet, after sliding dust shield out of way.)

(7) Twist (or rotate) filler tube approximately 180 degrees, then work tube carefully out of tank and dust shield seal. Remove tube from inside of trunk compartment.

(8) Remove nut that holds tank retaining strap to "J" bolt. Allow strap to drop or hang, then lower tank and remove from under car.

(9) Remove tank gauge unit, using spanner wrench C-3582. Slide gauge assembly out of fuel tank. Discard gasket.

(10) If necessary check operation of the fuel gauge, as described in the Electrical Section of the Manual.

INSTALLING FUEL TANK—VALIANT-BARRACUDA

Before installing the fuel gauge, check the condition of the filter on the end of the suction tube. If the filter is plugged, install a new filter.

(1) Install a new rubber grommet in tank. Insert a new gasket in fuel gauge opening recess then slide gauge into tank. Align the positioning tangs on gauge with those in tank. Install lockring, then tighten securely, using Tool C-3582. (If tank insulator was torn or damaged during removal of tank, be sure and install a new insulator at reassembly.)

(2) Locate insulation pad on top of tank. Slide tank under car and up in position, carefully working vapor separator hoses through frame opening. Hold in position, then raise retaining straps and thread onto "J" bolts. Install nut, and tighten. (Not over 50 inch-pounds.)

(3) Lubricate rubber grommet using a suitable rubber lubricant, then slide filler tube down through dust seal and into tank, far enough to clear quarter panel. Twist (or rotate) filler tube 180 degrees and align with opening in body panel. Install a new gasket over end of tube, then slowly withdraw tube from tank and into position against body panel. Align attaching screw holes; install screws and tighten securely. Slide vent tube through seal.

(4) If dust seal was distrubed during removal operation, realign and tighten attaching screws securely.

(5) Install new clamps over vent hoses and install on vapor separator fittings. Tighten hose clamps securely.

(6) On models with dual exhaust, install tail pipe or rear muffler.

(7) Install heat shield with attaching screws.

(8) Reconnect fuel supply line, ground strap and wire lead to gauge (Fig. 9).

(9) Refill tank and check for leaks.

REMOVING FUEL TANK—BELVEDERE (FIG. 4)

(1) Drain fuel tank by disconnecting fuel line at pump and connect a siphon tube. Collect drained furl in a safety can. Disconnect fuel ground strap, fuel line and wire lead to gauge unit. (Front center near top of tank (Fig. 9).

(2) On models equipped with dual exhaust it will be necessary to lower the tail pipe to remove the heat shield and/or vapor separator hoses.

(3) Remove three screws that attach heat shield

to floor pan.

(4) Remove four clamps and hoses from fuel tank.

(5) Remove clamp and bracket from filler tube.

(6) Grasp filler tube with both hands, twist tube and at the same time, work tube carefully out of tank.

(7) Remove nuts that hold tank retaining straps to "J" bolt. Allow straps to drop, then lower front end of tank and slide out from under vehicle.

(8) Remove tank gauge unit using spanner wrench C-3582. Slide gauge assembly out of fuel tank. Discard gasket.

(9) Inspect rubber grommet around filler tube. If cracked or deteriorated, install a new grommet at reassembly.

INSTALLING FUEL TANK—BELVEDERE

Before installing the fuel gauge, check the condition of the filter on the end of the suction tube. If the filter is plugged, install a new filter.

(1) Insert a new gasket in fuel gauge opening recess then slide gauge into tank. Align the positioning tangs on gauge with those in tank. Install lockring, then tighten securely using Tool C-3582.

(2) Install a new filler tube rubber grommet in tank.

(3) Locate insulation pad on top of tank. (If tank insulator was torn or damaged during removal of tank, install a new insulator). Slide tank under vehicle and up in position. Hold in position, then raise retaining straps and thread into "J" bolts. Install nuts and tighten. (Not over 50 inch-pounds).

(4) Lubricate rubber grommet using a suitable rubber lubricant, then slide filler tube into tank, far enough to clear panel opening. Install clamp and bracket.

(5) Install new clamps over vapor separator hoses and install on fuel tank. Tighten hose clamps securely.

(6) On models with dual exhaust, install tail pipe.

(7) Install heat shield with attaching screws.

(8) Reconnect fuel supply line, ground strap and wire lead to gauge unit (Fig. 9).

(9) Refill tank and check for leaks.

REMOVING THE FUEL TANK (Except Station Wagon)

CAUTION: Be sure the ignition switch is turned off before disconnecting or connecting the gauge wire.

Removal

(1) Drain tank into a safety can, then disconnect fuel line and wire lead to gauge unit.

(2) Remove keystone keystone clamps and vent hoses from vapor separator (Fig. 6).

(3) Remove screw that attaches filler tube bracket to rear crossmember.

(4) Remove nuts that hold ends of fuel tank hold down straps to frame. Lower front end of tank far enough to disengage filler tube from rear panel and slide out from under vehicle.

(5) Remove tank gauge unit, using spanner wrench Tool C-3582 (Fig. 8). Check rubber grommet around filler tube. If cracked or deteriorated, install a new grommet at reassembly.

Installation

Before installing the tank gauge unit, check the condition of the filter on the end of suction tube. If the filter is plugged, install a new filter.

(1) Position fuel tank gauge unit in tank, using a new gasket. Tighten securely, using Tool C-3582. (If tank insulator was torn or damaged during removal of tank, be sure and install a new insulator at reassembly.) Install vent hoses on tank, (if removed.)

(2) Slide fuel tank under vehicle. Raise tank far enough to engage filler spout with opening in rear panel, and locator embossments on floor pan.

(3) Push tank toward rear to fully engage filler spout in opening.

(4) Hold fuel tank in this position, and place hold down straps in position, feeding attaching studs through holes in end of straps. Install nuts but do not tighten.

(5) Install new keystone clamps over vent hoses and install on vapor separator fittings. Using keystone clamp pliers, tighten hose clamps securely. (Fig. 6).

(6) Guide button head of studs into slots in frame and down into position. Tighten hold down strap attaching nuts securely. (40 in-lbs.).

(7) Install filler tube mounting screw and tighten securely.

(8) Connect lead wire to tank gauge unit, reconnect fuel line and ground strap (Fig. 9).

(9) Refill tank and check for leaks.

FUEL TANK (Station Wagon) (Figs. 5 & 7)

Removal

CAUTION: Be sure the Ignition Switch is turned OFF before disconnecting or connecting the gauge wire.

(1) Remove filler cap and syphon fuel into safety can.

(2) Raise vehicle on hoist and remove fender skirt (if so equipped).

(3) Remove left rear tire and wheel.

(4) Remove screws that attach stone shield to wheel house. Slide shield down and away from

vehicle.

(5) Disconnect fuel line, ground strap and gauge wire. Disconnect vent tube.

(6) Place stands under frame at rear to support vehicle as hoist is lowered.

(7) Remove rear shock absorbers lower attaching nuts, then slide off lower pivot.

(8) Remove left rear brake drum.

(9) Remove left rear spring hanger attaching bolts to frame.

(10) Lower hoist and allow rear axle to fall away from vehicle far enough so as not to stretch brake hose.

(11) Remove fuel tank support strap nuts from eyebolts.

(12) Slide fuel tank forward and tilt leading edge down. Work fuel tank out from under rear quarter panel.

(13) Loosen tank gauge unit, using spanner wrench Tool C-3582. Slide unit up and out of tank.

Installation

(1) Position fuel tank gauge unit in tank, using a new gasket. Tighten securely, using Tool C-3582.

(2) Work fuel tank up into position in quarter panel. Move rearward until filler tube is centered in opening in quarter panel. Place straps in position and install nuts. Tighten to 40 inch-pounds. Bottom strap should be tightened first.

(3) Install fuel line and connect ground strap (Fig. 9), and fuel gauge wire. Install new clamps on vent tube, then install tube on tank fitting. Tighten clamps securely.

(4) Raise hoist far enough to engage spring hanger with frame.

(5) Position left rear spring hanger at frame and install attaching bolts. Tighten to 30 foot pounds.

(6) Slide shock absorbers over pivots and secure with nuts. Tighten to 50 foot pounds.

(7) Install brake drum on axle flange.

(8) Slide stone shield up into position. Install attaching screws and tighten securely.

(9) Install wheel and tire and tighten wheel nut to 65 foot pounds in sequence.

(10) Raise hoist and remove car stands.

(11) Install fender skirt (if so equipped) and lower vehicle to floor.

(12) Refill fuel tank and check for leaks.

(13) For testing fuel gauge (tank unit) refer to Electrical Group 8 "Gauges".

THROTTLE LINKAGE ADJUSTMENT

Automatic Transmission

For adjustment of throttle linkage, refer to Transmission Section of this Manual.

Manual Transmission (Fig. 1) (6 Cylinder Engines)

(1) Apply a thin film of multi-purpose grease on accelerator shaft where it turns in bracket, antirattle spring where it contacts shaft, ball end and pocket at rear end of throttle cable.

(2) Disconnect choke at carburetor or block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Loosen cable clamp nut (1), adjust position of cable housing ferrule (2) in the clamp so that all slack is removed from cable with carburetor at curb idle. To remove slack from cable, move ferrule (2) in the clamp in direction **away** from carburetor lever.

(4) Back off ferrule (2) 1/4 inch to provide 1/4 inch cable slack at idle. Tighten cable clamp nut to 45 inch-pounds.

(5) Connect choke rod or remove blocking fixture.

Manual Transmission (Fig. 2) (V-8 Engines Except Hemi)

(1) Apply a thin film of multi-purpose grease on accelerator shaft where it turns in bracket, ball end and pocket at rear end of throttle cable.

(2) Disconnect choke at carburetor or block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Loosen cable clamp nut (1), adjust position of cable housing ferrule (2) in the clamp so that all slack is removed from cable with carburetor at curb idle. To remove slack from cable, move ferrule (2) in the clamp in direction **away** from carburetor lever.

(4) Back off ferrule (2) 1/4 in. This provides 1/4 in. cable slack at idle. Tighten cable clamp nut (1) to 45 inch-pounds.

(5) Connect choke rod or remove blocking fixture.

Manual Transmission (Fig. 3) (With Hemi Engine)

(1) Apply a thin film of multi-purpose grease on accelerator shaft (5) where it turns in bracket, ball end and pocket (21) at rear end of throttle cable.

(2) Block choke valve in full open position.

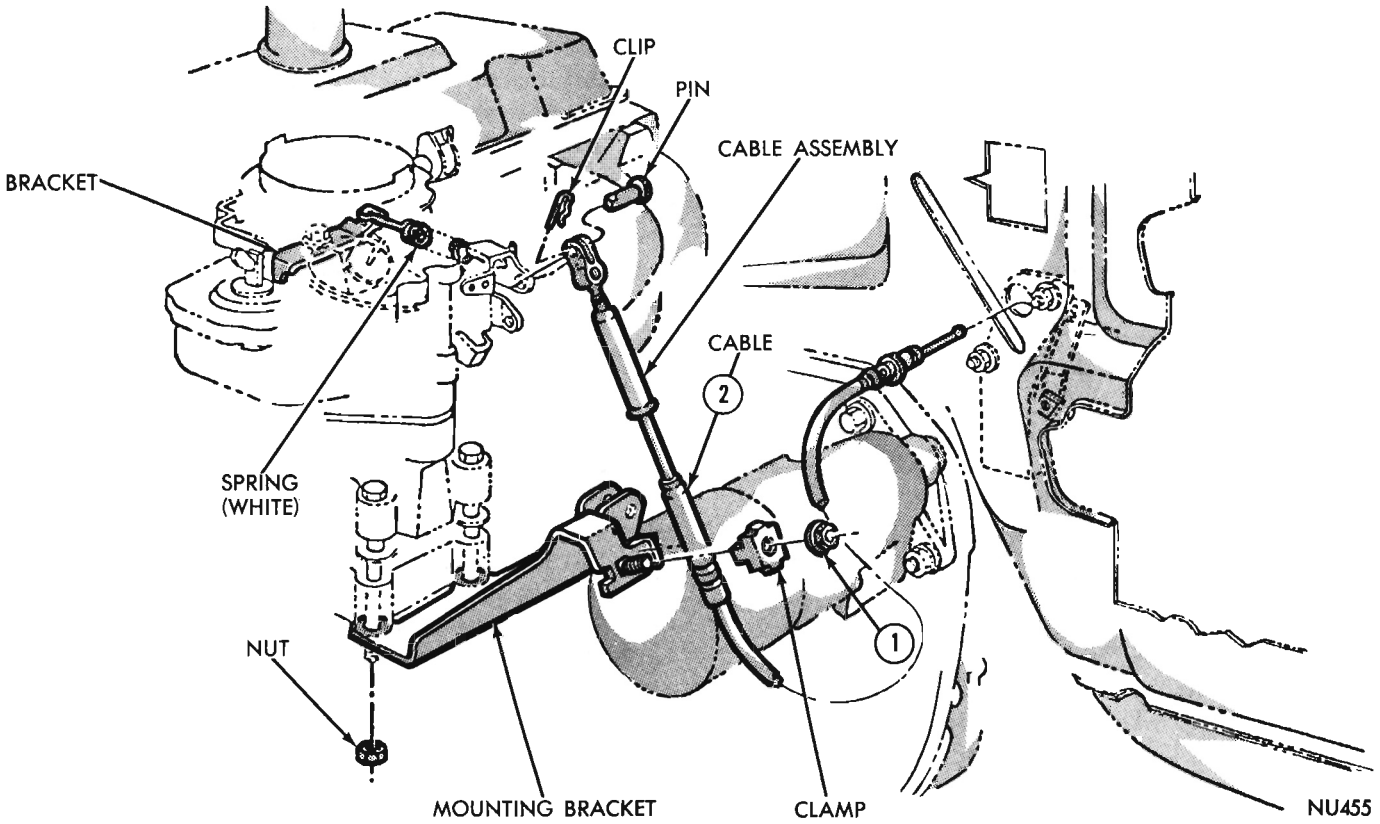


Fig. 1 - Throttle Linkage Adjustment (6 Cylinder Engines)

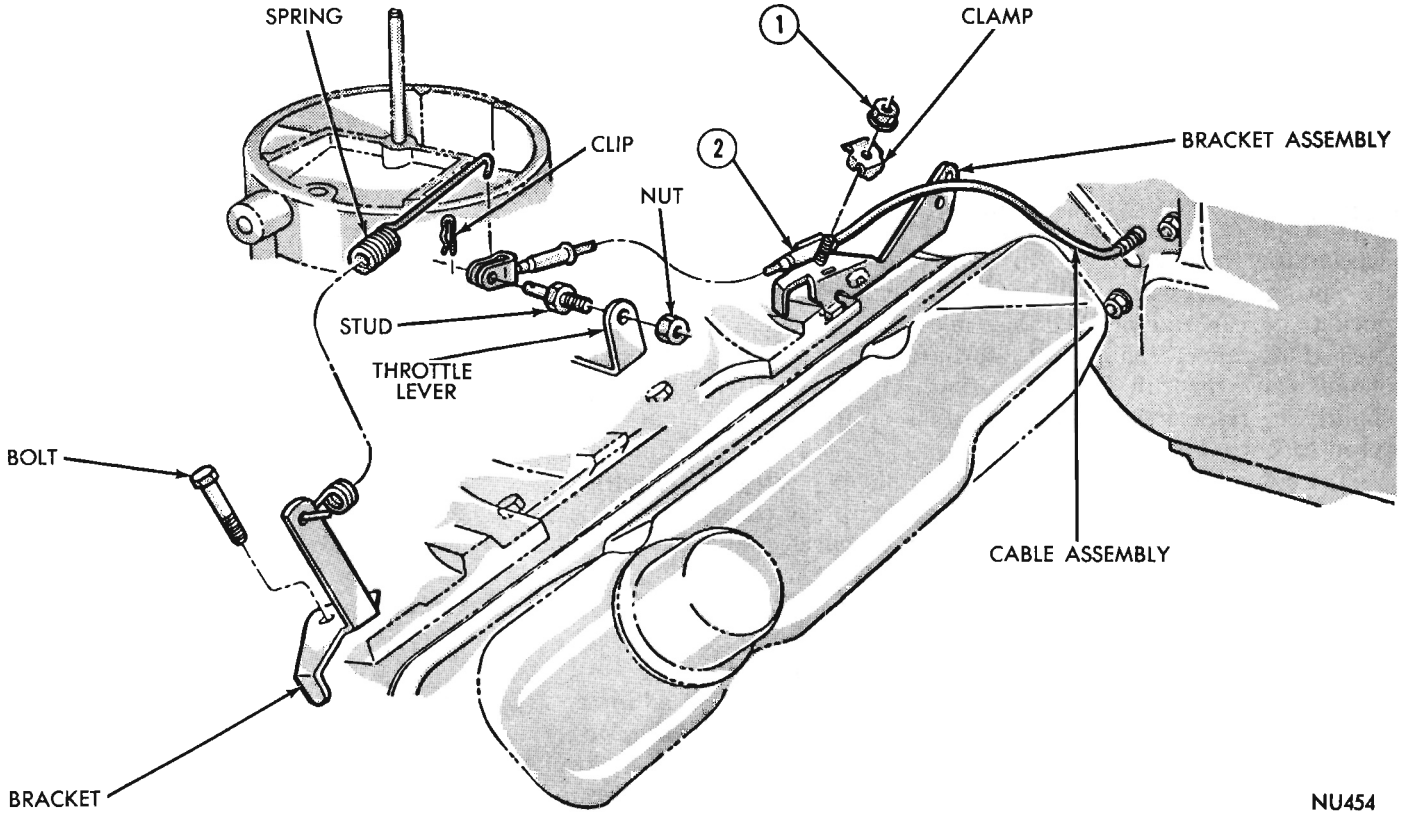


Fig. 2 - Throttle Linkage Adjustment (V-8 Engines)

Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Loosen cable clamp nut (12), adjust position of cable housing ferrule (13) in the clamp (14) so that all slack is removed from cable with rear carburetor at curb idle. To remove slack from cable, move ferrule (13) in the clamp (14) in direction **away** from carburetor lever.

(4) Back off ferrule (13) 1/4 in. This provides 1/4 in. cable free play. Tighten clamp nut (12) to 45 inch-pounds.

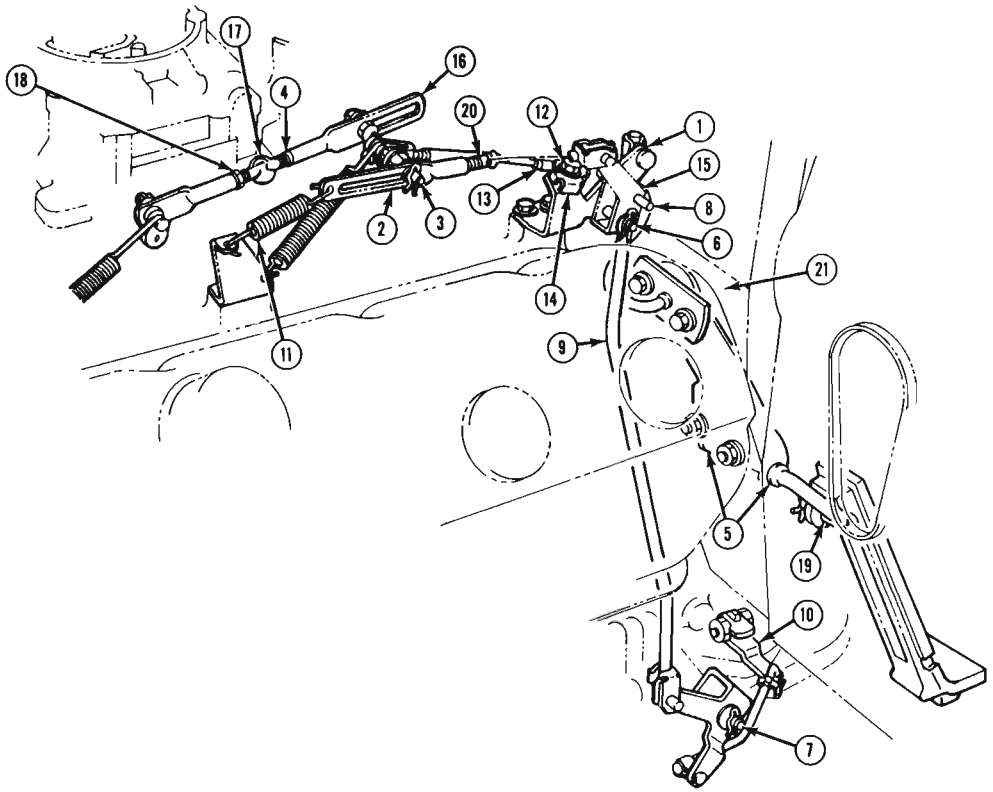
(5) Attach carburetor rod (4) assembly between the carburetors with slotted rod end (16) attached to outboard side of inboard lever on rear carburetor. With rear carburetor at wide open throttle, adjust length of connector rod (4) so that front carburetor is also at wide open throttle. To lengthen this rod (4), turn adjusting stud (17) clockwise as viewed from front of engine. Tighten lock nut (18).

(6) Remove choke valve blocking fixture.

CARBURETOR AIR SYSTEM

The carburetor air system (Fig. 1) is available on Plymouth Road Runner, GTX is the "Air Grabber"—a vacuum-operated air scoop in the hood ducted directly to the air cleaner. This system is standard with the "hemi" engine and optional on the high-performance 383 and 440 CID engines. The driver can open or close the air scoop when the engine is running. It closes automatically when the engine is shut off.

Methods of attachment of the Carburetor Air System will be found in the Body Section.



NN974A

Fig. 3 - Throttle Linkage Adjustment (426 Hemi Engines)

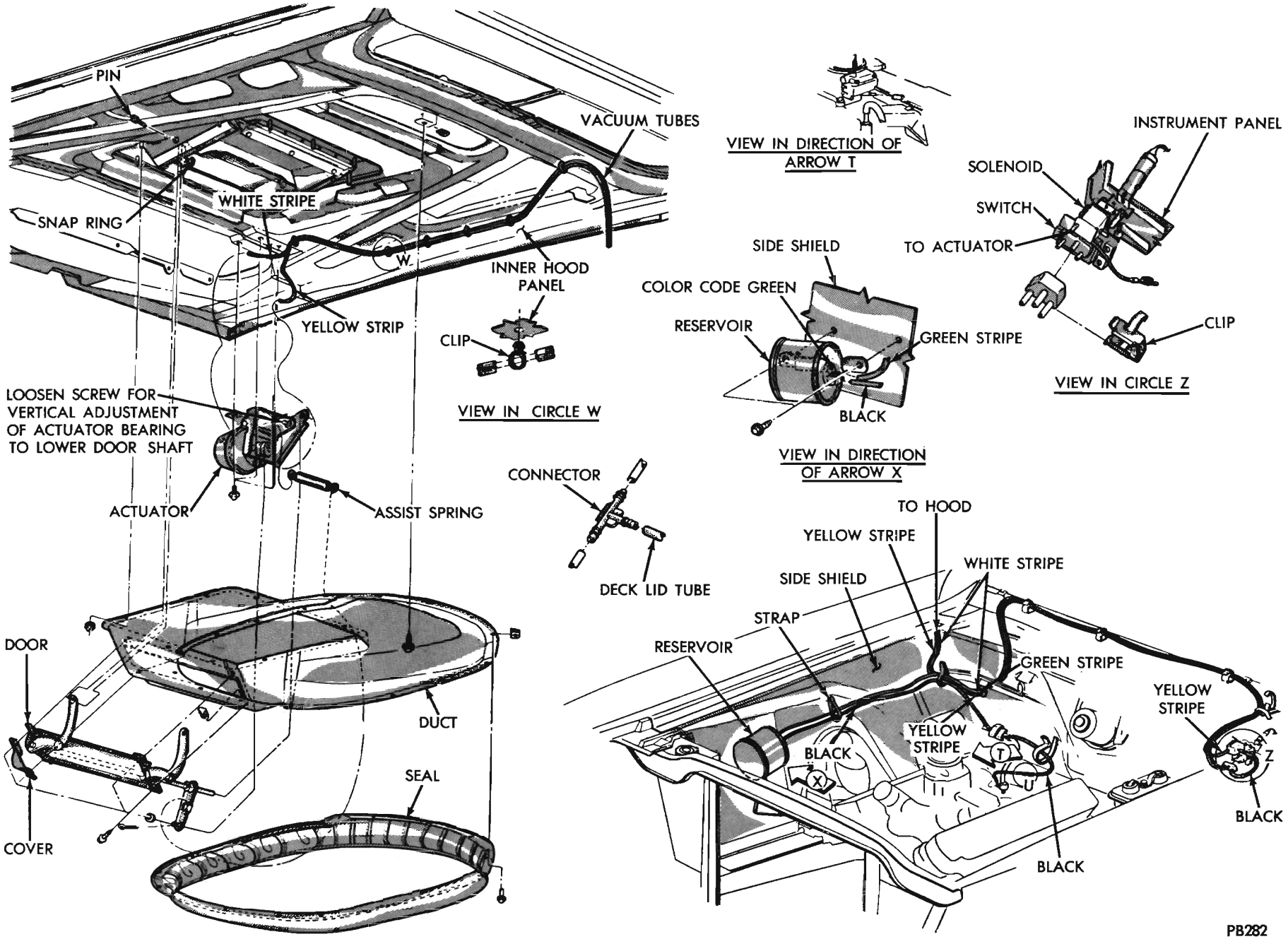


Fig. 1 - Carburetor Air System

SPECIFICATIONS
BALL AND BALL SINGLE THROAT CARBURETOR

	Manual Trans.	Auto. Trans.
Model	BBS-4955S	BBS-4956S
Engine Displacement (Cu. In.)	198	198
Bore	1-11/16"	1-11/16"
Venturi	1-11/32"	1-11/32"
Main Metering Jet		
Standard	No. 120-429S	No. 120-429S
Step-Up Wire (Standard)	75-1842	75-1881
Diameter	.038" x .034"	.042" x .039"
ADJUSTMENTS		
Float Setting	1/4"	1/4"
Choke Unloader	3/16"	3/16"
Fast Idle Cam Position	No. 48	No. 48
Vacuum Kick (drill size)	No. 35	No. 35
Bowl Vent Valve Setting (from top of valve stem to casting)	17/64"	17/64"
Idle Speed R.P.M. (curb idle)	800	800
Fast Idle Speed (r.p.m.)	1900	1800
CHOKE		
Type	Well	
Setting	2 Notches Rich	

HOLLEY 1920 SERIES SINGLE THROAT CARBURETOR

	Taxi		
Model			
Manual Trans.	R-4659A	R-4655A	–
Automatic Trans.	R-4659A	–	R-4656A
Engine Displacement (Cu. In.)	225	225	225
Bore	1-9/16"	1-11/16"	1-11/16"
Venturi	1-1/4"	1-5/16"	1-5/16"
Main Metering Jet			
Standard	49	56	55
One Step Lean	48	55	54
Two Steps Lean	47	54	53
ADJUSTMENTS			
Flost Setting		Use Gauge	
Float Level Height (Wet)	27/32"	27/32"	27/32"
Vacuum Kick (Drill Size)	No. 39	No. 39	No. 39
Cam Position Adjustment (Drill Size)	No. 52	No. 52	No. 52
Choke Unloader (See Fast Idle Cam Pos. Adj.)	9/32"	9/32"	9/32"
Bowl Vent Valve	1/32"	1/32"	1/32"
Idle Speed (Curb Idle rpm)	750	750	750
Fast Idle Speed (Engine Hot and Screw on 2nd Highest Step of Cam rpm)			
Manual Trans.	1800	1600	–
Automatic Trans.	1800	–	1900
CHOKE			
Type		Well	
Control		Thermostatic Coil Spring	
Setting		2 Notches Rich	

BALL AND BALL 1-1/4 INCH BBD CARBURETOR

Type	Ball and Ball Dual Downdraft	
Engine Displacement (cu. in.)	318	318
Manual Transmission	BBD-4957S	—
Automatic Transmission	—	BBD-4958S
Bore	1-7/16"	1-7/16"
Venturi	1-3/16"	1-3/16"
Main Metering Jets		
Standard	120-309S	120-309S
One Step Lean	120-299S	120-299S
Two Steps Lean	120-300S	120-300S
Step-Up Wire (Standard)	75-1849	75-1549
Diameters (2 stage)	.031" x .026"	.032" x .027"
ADJUSTMENTS		
Float Setting (at center of floats)	1/4"	1/4"
Accelerator Pump Setting (throttle closed)	.200"	.200"
Choke Unloader	1/4"	1/4"
Idle Speed R.P.M. (curb idle)	750	700
Vacuum Kick Adjustment (Drill Size)	No. 20	No. 20
Fast Idle Cam Position (Drill Size)	No. 41	No. 41
Fast Idle Speed R.P.M.	1600*	1900*
CHOKE		
Type	Well	
Control	Thermostatic Coil Spring	
Setting	On Index	

*After Approx. 500 Miles (if necessary)

ROCHESTER MODEL 2GV CARBURETOR

Type	2 Barrel Downdraft
Engine Displacement (cu. in.)	318
Automatic Transmission	
Bore	1-7/16"
Venturi	1-3/16"
Main Metering Jet	
Standard	53C
ADJUSTMENTS	
Float Setting	21/32"
Float Drop	1-3/4"
Vacuum Kick (Drill Size)	No. 41
Fast Idle Cam Position (Drill Size)	No. 55
Choke Unloader (Drill Size)	No. 29
Accelerator Pump Rod	1-5/64"
Idle Speed RPM (Curb Idle)	700
Fast Idle Speed RPM	1800*

CHOKE	
Type	Well
Control	Thermostatic Coil Spring

NOTE: Idle vent should just close with fast idle screw on second step of fast idle cam.

*After Approx. 500 Miles (If Necessary)

CARTER THERMO-QUAD CARBURETOR

Type	4 Barrel Downdraft	
Model	TQ4972S	TQ4973S
Transmission Type	Manual	Automatic
Engine Displacement (Cu. In.)	340	340
Throttle Bore		
Primary	1-3/8"	1-3/8"
Secondary	2-1/4"	2-1/4"
Main Venturi		
Primary	1-1/16"	1-1/16"
Secondary	2-1/4"	2-1/4"
Step-Up Rod (2 Stage)		
Standard	16-655	16-655
Adjustments		
Float Setting	1"	1"
Secondary Throttle Linkage	11/32"	11/32"
Secondary Air Valve Opening	31/64"	31/64"
Secondary Air Valve Spring Tension (from Contact)	1-1/4" turn	1-1/4" turn
Accelerator Pump Stroke (top of plunger to top of bowl cover)	31/64"	31/64"
Choke Control Lever Adjustment		
Off vehicle	3-27/64"	3-27/64"
On vehicle	5-41/64"	5-41/64"
Choke Diaphragm Connector Rod (clearance between air valve and stop)	.040"	.040"
Vacuum Kick	.110" or # 35 drill	.110" or #35 drill
Fast Idle Cam and Linkage	.110" or # 35 drill	.110" or #35 drill
Choke Unloader (Wide Open Kick)	.190" or # 11 drill	.190" or #11 drill
Secondary Throttle Lockout	.010" to .030"	.010" to .030"
Bowl Vent Valve (at curb idle)	.850"	.850"
Fast Idle Speed (rpm)	1800	1800
Fast Curb Idle Speed (solenoid adjustment)	900	900
Choke		
Type	Well	
Control	Coil Spring	
Setting	2 Notches Rich	

HOLLEY 2210 SERIES 2-BARREL CARBURETOR

Type	Dual Downdraft	
Engine Displacement (cu. in.)	360	360
Manual Transmission	R-4665A	–
Automatic Transmission	–	R-4666A
Bore	1-9/16"	1-9/16"
Venturi	1-7/16"	1-7/16"

Main Metering Jet		
Standard	No. 63	No. 62
One Step Lean	No. 62	No. 61
Two Steps Lean	No. 61	No. 60
ADJUSTMENTS		
Accelerator Pump Setting	9/16" (1/4" Travel)	9/16" (1/4" Travel)
Float Setting	No. 15 drill (.200")	No. 15 drill (.200 ")
Vacuum Kick Adjustment	No. 28 drill (.140")	No. 30 drill (.130")
Fast Idle Cam Position Adjustment	No. 35 drill (.110")	No. 35 drill (.110")
Bowl Vent Valve (at curb idle)	.015"	.015"
Choke Unloader	11/64"	11/64"
Idle Speed RPM (Curb Idle)	750	700
Fast Idle Speed RPM	1800*	1800*
CHOKE		
Type	Well	
Control	Thermostatic Coil Spring	
Setting	2 Notches Rich	

*After Appro. 500 Miles (If necessary)

BALL AND BALL 1 1/2 INCH BBD CARBURETOR

Type	Ball and Ball Dual Downdraft	
Engine Displacement (cu. in.)	383	383
Manual Transmission	BBD-4961S	—
Automatic Transmission	—	BBD-4962S
Bore	1-9/16"	1-9/16"
Venturi	1-5/16"	1-5/16"
Main Metering Jet		
Standard	120-437S	120-437S
Step-Up Wire (Standard)	75-1843	75-1881
Diameter (2 Stage)	.040" x .036"	.042" x .039"
ADJUSTMENTS		
Accelerator Pump Setting	1.00"	1.00"
Float Setting (at Center of Floats)	5/16"	5/16"
Vacuum Kick Adjustment	No. 20	No. 28
Fast Idle Cam Position Adjustment	No. 20	No. 20
Bowl Vent Valve (at curb idle)	3/16"	3/16"
Choke Unloader	1/4"	1/4"
Idle Speed RPM (Curb Idle)	750	700
Fast Idle Speed RPM	1900*	1700*
CHOKE		
Type	Well	
Control	Thermostatic Coil Spring	
Setting	2 Notches Rich	

*After Approx. 500 Miles (If Necessary)

HOLLEY MODEL 4160 SERIES 4-BARREL CARBURETOR

	HEATED AIR		FRESH AIR	
Model	R-6191A	R-4668A	R-6193A	R-4735A
Engine Displacement (cu. in.)	383	383	383	383
Transmission Type	Manual	Automatic	Manual	Automatic
Throttle Bore				
Primary	1-9/16"	1-9/16"	1-9/16"	1-9/16"
Secondary	1-3/4"	1-3/4"	1-3/4"	1-3/4"
Main Venturi				
Primary	1-1/4"	1-1/4"	1-1/4"	1-1/4"
Secondary	1-9/16"	1-9/16"	1-9/16"	1-9/16"

Main Metering Jet				
Standard	64	64	64	64
1 Size Lean	63	63	63	63
2 Size Lean (5,000-10,000 ft.)	62	62	62	62
Adjustments				
Curb Idle Speed	900	800	900	800
Fast Idle Speed (No. 2 Step)	1800*	1700*	1800*	1700*
Bowl Vent Valve	.015"	.015"	.015"	.015"
Unloader Adjustemnt (wide open throttle)	No. 25 Drill	No. 25 Drill	No. 25 Drill	No. 25 Drill
Vacuum Kick Adjustment	No. 18 Drill	No. 46 Drill	No. 46 Drill	No. 18 Drill
Fast Idle Cam Position	No. 53 Drill	No. 53 Drill	No. 53 Drill	No. 53 Drill
Float Setting (Dry)				
Primary	15/64"	15/64"	15/64"	15/64"
Secondary	17/64"	17/64"	17/64"	17/64"
Float Setting (Wet)				
Primary	9/16"	9/16"	9/16"	9/16"
Secondary	13/16"	13/16"	13/16"	13/16"
Accelerator Pump				
Override Adjustment (wide open throttle)	.015 Min.	.015 Min.	.015 Min.	.015 Min.
Power Valve (stamped)	65	.65	65	65
Choke				
Type	Well		Well	
Control	Coil Spring		Coil Spring	
Setting	2 Notches Rich		2 Notches Rich	

*After Approx. 500 Miles (If Necessary)

CARTER AVS SERIES CARBURETORS

Type	Carter 4 Barrel Downdraft			
Model	AVS-6125S	AVS-4966S	AVS-4967S	AVS-4968S
Transmission Type	Automatic	Automatic	Manual	Automatic
Engine Displacement (Cu. In.)	383	440	440	440
THROTTLE BORE				
Primary	1-7/16"	1-7/16"	1-11/16"	1-11/16"
Secondary	1-11/16"	1-11/16"	1-11/16"	1-11/16"
MAIN VENTURI				
Primary	1-3/16"	1-3/16"	1-7/16"	1-7/16"
MAIN JET				
Primary	.089"	.089"	.101"	.101"
Secondary	.089"	.095"	.095"	.095"
STEP-UP ROD (2 Stage)				
Standard	16-546	16-575	16-617	16-575
ADJUSTMENTS				
Accelerator Pump (top of plunger to air horn)	7/16"	7/16"	7/16"	7/16"
Fast Idle Cam Position (drill size)	No. 50	No. 50	No. 50	No. 50
Choke Unloader	1/4"	1/4"	1/4"	1/4"
Vacuum Kick (drill size)	No. 44	No. 44	No. 44	No. 44
Bowl Vent Valve Setting	3/4"	3/4"	3/4"	3/4"
Fast Idle Speed (r.p.m.)	1700*	1800*	2100*	1800*
Idle Speed (r.p.m.)	800	750	900	900
Secondary Throttle Lever Adj.	23/64"	23/64"	23/64"	23/64"
Secondary Throttle Lockout Adj.	.020"	.020"	.020"	.020"
Float Setting	7/32"	7/32"	7/32"	7/32"

Float Drop	1/2"	1/2"	1/2"	1/2"
Air Valve Spring Tension—(from Vertical-Turns)	2-1/2	2-1/2	2-1/2	2-1/2
CHOKE				
Type		Well		
Control		Coil Spring		
Setting		Two Notches Rich		

*After Approx. 500 Miles (If Necessary)

HOLLEY 2300 SERIES CARBURETORS

	Outboard Front	Center		Outboard Rear
Type	Holley Dual Downdraft			
Engine Displacement (cu. in.)	340	340	340	340
Manual Transmission	R-4789A	R-4791A	—	R-4790A
Automatic Transmission	R-4789A	—	R-4792A	R-4790A
Bore	1-3/4"	1-1/2"	1-1/2"	1-3/4"
Main Venturi	1-9/16"	1-3/16"	1-3/16"	1-9/16"
Main Metering Jet				
Standard	—	63	63	—
1 Size Lean	—	62	62	—
2 Size Lean (5,000-10,000 ft.)	—	61	61	—
Adjustments				
Curb Idle Speed	—	950	1000	—
Fast Idle Speed (No. 2 Step)	—	2600*	2800*	—
Bowl Vent Valve	—	No. 38	No. 38	—
Unloader Adjustment (wide open throttle)	—	5/32"	5/32"	—
Vacuum Kick Adjustment	—	No. 28	No. 39	—
Fast Idle Cam Position	—	No. 53	No. 53	—
Float Setting (Dry)	Center float in bowl with fuel bowl inverted.			
Accelerator Pump Override				
Adjustment (wide open throttle)	—	.015" min.	.015" min.	—
Fuel Level (Wet)	With bowl sight plugs removed, fuel level should be at bottom edge of sight plug hole but not over-flowing. Note that floats are externally adjustable.			
Choke				
Type	None	Well		None
Control	None	Coil Spring		None
Setting	None	On Index		None

	Outboard Front	Center		Outboard Rear
Type	Holley Dual Downdraft			
Engine Displacement (cu. in.)	440	440	440	440
Manual Transmission	R-4671A	R-4669A	—	R-4672A
Automatic Transmission	R-4671A	—	R-4670A	R-4672A
Bore	1-3/4"	1-2/2"	1-1/2"	1-3/4"
Main Venturi	1-9/16"	1-3/16"	1-3/16"	1-9/16"
Main Metering Jet				
Standard	—	63	63	—
1 Size Lean	—	62	62	—
2 Size Lean(5,000-10,000 ft.)	—	61	61	—
Adjustments				
Curb Idle Speed	—	900	900	—
Fast Idle Speed (No. 2 Step)	—	1800*	1800*	—
Bowl Vent Valve	—	No. 38	No. 38	—

Unloader Adjustment (wide open throttle)	—	5/32"	5/32"	—
Vacuum Kick Adjustment	—	No. 28	No. 50	—
Fast Idle Cam Position	—	No. 53	No. 53	—
Float Setting (Dry)	Center float in bowl with fuel bowl inverted.			
Accelerator Pump Override Adjustment (wide open throttle)	—	.015" min.	.015" min.	—
Fuel Level (Wet)	With bowl sight plugs removed, fuel level should be at bottom edge of sight plug hole but not over-flowing. Note that floats are externally adjustable.			
Choke				
Type	None	Well		None
Control	None	Coil Spring		None
Setting	None	2-Notches Rich		None

*After approx. 500 miles (if necessary)

CARTER AFB SERIES CARBURETORS

Type	Carter 4 Barrel Downdraft		
	Front	Rear	Rear
Model	AFB-4971S	AFB-4969S	AFB-4970S
Transmission Type	Manual—Automatic	Manual	Automatic
Engine Displacement (Cu. In)	426 Hemi.	426 Hemi.	426 Hemi.
THROTTLE BORE			
Primary	1-7/16"	1-7/16"	1-7/16"
Secondary	1-11/16"	1-11/16"	1-11/16"
MAIN VENTURI			
Primary	1-3/16"	1-3/16"	1-3/16"
Secondary	1-9/16"	1-9/16"	1-9/16"
MAIN JET			
Primary	.089"	.089" L .089" R	.089" L .089 R
Secondary	.089"	.092" L .077" R	.092" L .077" R
STEP-UP ROD (2 stage)			
Standard	16-28X	16-543L 16-544R	16-543L 16-544R
ADJUSTMENTS			
Accelerator Pump (top of plunger to air horn)	31/64"	31/64"	31/64"
Fast Idle Cam Position (drill size)	—	No. 50	No. 50
Bowl Vent Valve Setting (at curb idle)	—	3/4"	3/4"
Fast Idle Speed (r.p.m.)	—	2300*	2300*
Idle Speed (r.p.m.)	950	950	950
Secondary Throttle Lever Adj.	17/64"	17/64"	17/64"
Secondary Throttle Lockout Adj.	.020"	.020"	.020"
Float Setting	7/32"	7/32"	7/32"
Float Drop	3/4"	3/4"	3/4"
Idle Mixture Screw (turns open)	—	1-2	1-2
CHOKE			
Type	—	Manual	Manual
Control	—	Cable	Cable

*After Approx. 500 Miles (If Necessary)

FUEL PUMP SPECIFICATIONS

Fuel Pump	6 198 Cu. In. 225 Cu. In.	V-8 318 Cu. In. 340 Cu. In. 360 Cu. In.	V-8 383 Cu. In. 440 Cu. In.	V-8 426 Cu. In. Hemi	V-8 383 Cu. In. 440 Cu. In.	V-8 440 Cu. In. H.P.
Make	Carter	Carter	Carter	Carter	Airtex	Carter
Model	MS-4844S	MS-4587SA	MS-4589SA	MS-4024S	RD-267A	MS-4845S
Type	Diaphragm	Diaphragm	Diaphragm	Diaphragm	Diaphragm	Diaphragm
Number of Valves	2	2	2	3	2	2
Driven by	Camshaft	Camshaft	Camshaft	Camshaft	Camshaft	Camshaft
Pump Pressure (pounds)	3-1/2 to 5	5 to 7	3-1/2 to 5	7 to 8-1/2	3-1/2 to 5	6 to 7-1/2

PROPELLER SHAFT AND UNIVERSAL JOINTS

CONTENTS

	Page
CONSTANT VELOCITY UNIVERSAL JOINT.	7
CROSS AND ROLLER UNIVERSAL JOINTS.	6
GENERAL INFORMATION	1
PROPELLER SHAFT ANGULARITY	3
SERVICE DIAGNOSIS	3
SPECIFICATIONS	12
TIGHTENING REFERENCE	16

GENERAL INFORMATION

The propeller shaft and universal joint applications on the Valiant, Barracuda, Plymouth and Chrysler vehicles incorporate an internally splined yoke at the front universal joint. The sliding splined yoke slides fore and aft on the transmission output shaft to compensate for the movement of the rear axle. A bellows type rubber seal on the transmission extension, with a nylon ring which fits over the sliding yoke is used to exclude road splash and other foreign material (Fig. 1).

The universal joints and sliding spline yoke are permanently lubricated. The joints should be inspected every time the vehicle is serviced, for external seal leakage (Figs 2 and 3). The joints need not be disassembled or relubricated unless seal leakage is evident. If the cross and roller universal joints are repacked with the recommended lubricant, see "Lubrication", Group O of this manual.

Two types of propeller shafts are used on the Valiant, Barracuda, Satellite and Fury models, dependent upon engine, transmission and axle ratio combinations. Certain applications will require the usage of propeller shafts having solid tubes in some models.

The other propeller shafts will incorporate an internal vibration absorber inside the shaft in the location of the front universal joint. Servicing of both propeller shafts is the same in all respects. (Fig. 2).

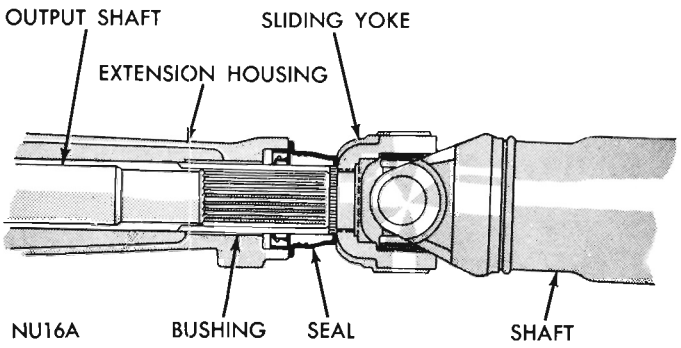


Fig. 1 Front Universal Joint Sliding Yoke

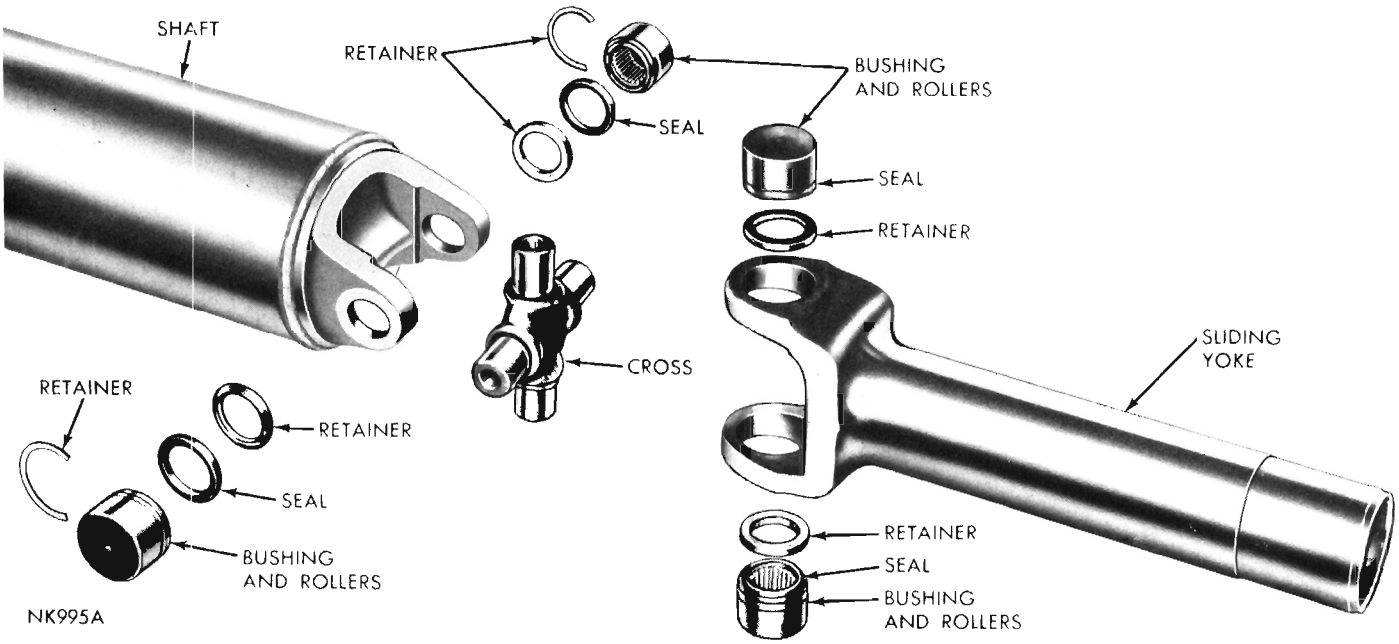


Fig. 2 - Cross and Roller Universal Joint - Front

All Chrysler models except the Imperial also use a propeller shaft which incorporates an internal vibration absorber inside the shaft in the location of the front universal joint. The servicing of the propeller shaft and universal joints are the same in all respects.

A single one piece propeller shaft will be used on the Imperial models, with a constant velocity universal joint at each end.

Both constant velocity universal joints incorporate a centering ball and socket arrangement, in which the centering balls are located between the yokes of each joint to maintain the relative position of the two joints. The centering balls cause

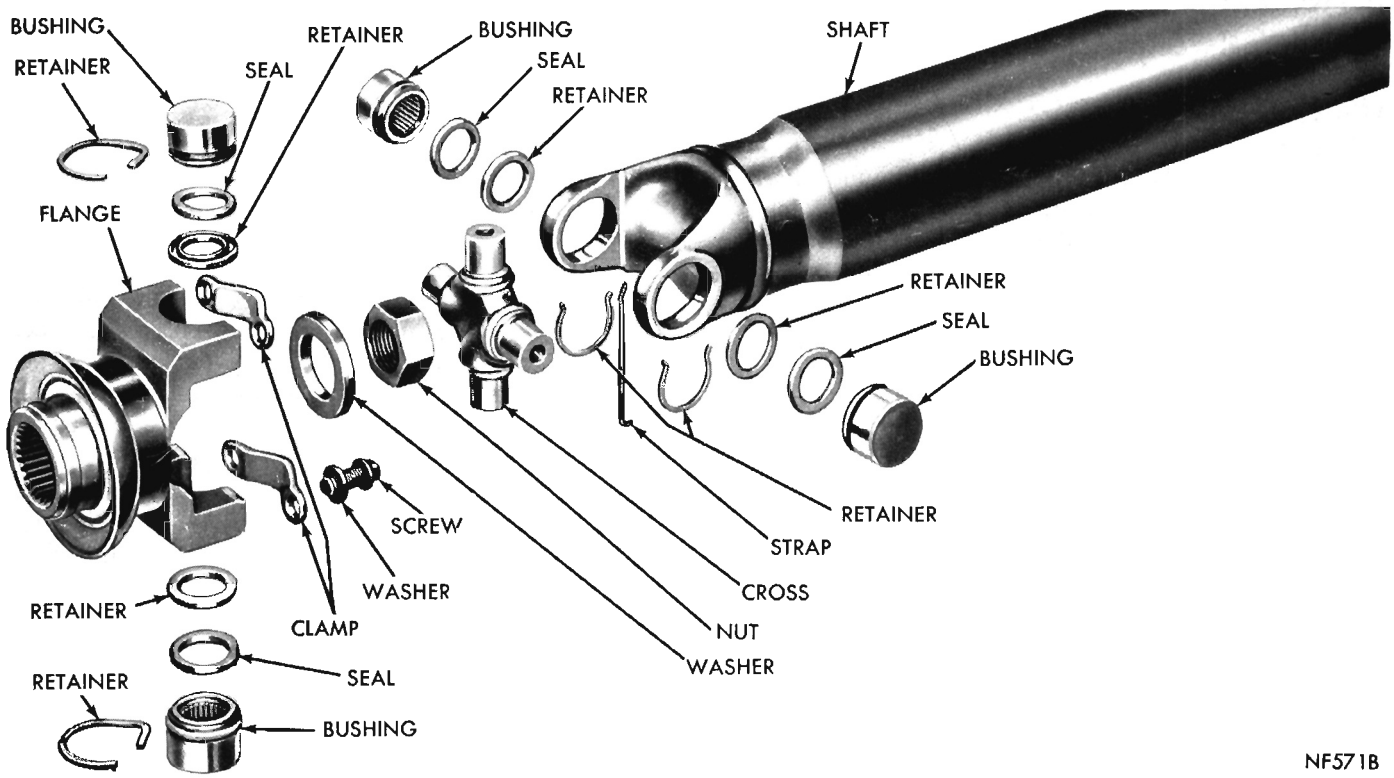


Fig. 3 - Cross and Roller Universal Joint - Rear

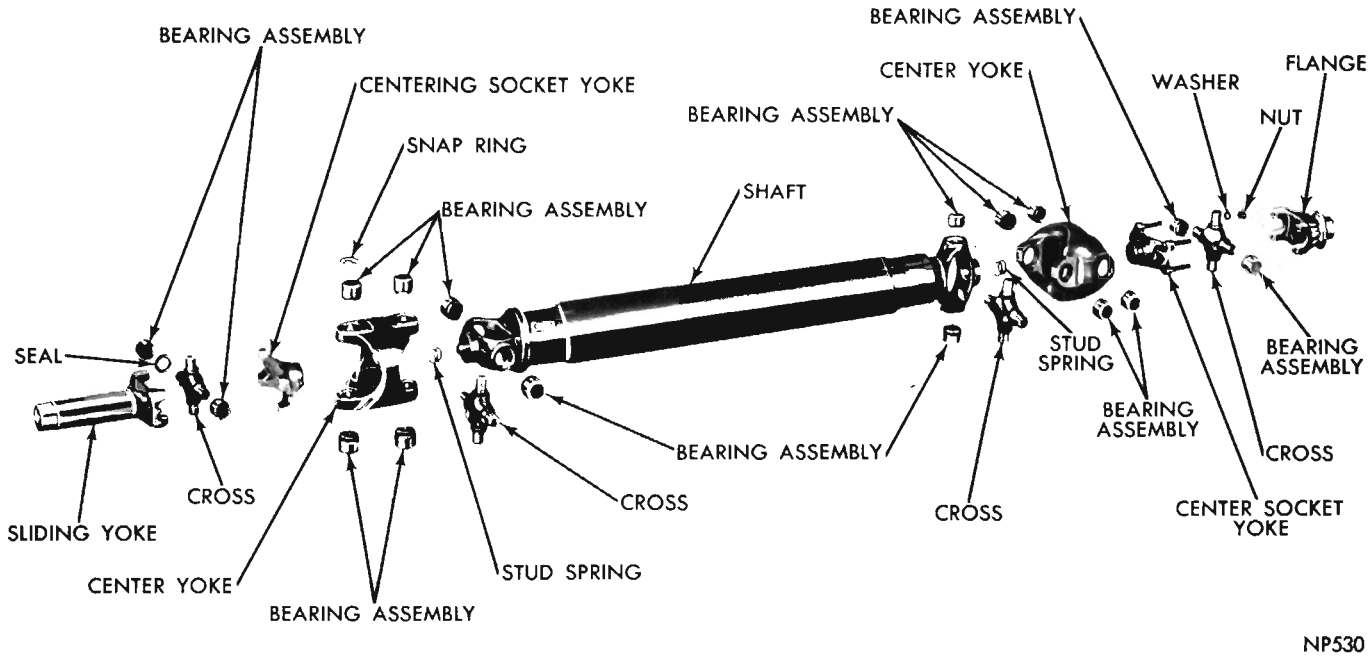


Fig. 4 Propeller Shaft and Constant Velocity Universal Joints (Imperial)

each of the two joints to operate through exactly one half of the complete angle between the two joints (Fig. 4).

The constant velocity universal joints and centering ball and sockets are permanently lubricated and should not be disturbed unless external leakage is evident. See "Constant Velocity Universal Joint" for servicing instructions.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
PROPELLER SHAFT VIBRATION	(a) Undercoating or other foreign matter on shaft.	(a) Clean exterior of shaft and wash with solvent.
	(b) Loose universal joint flange bolts.	(b) Tighten bolt nuts to specific torque.
	(c) Loose or bent universal joint flange or high runout.	(c) Install new flange. Tighten to specifications.
	(d) Improper drive line angularity.	(d) Correct angularity. See "Propeller Shaft Angularity."
	(e) Rear spring center bolt not in seat.	(e) Loosen spring U-bolts, reseat center bolt and tighten U-bolts to specified torque.
	(f) Worn universal joint bearings or missing rollers.	(f) Recondition universal joint.
	(g) Propeller shaft damaged (bent tube) or out of balance.	(g) Install new propeller shaft.
	(h) Broken rear spring.	(h) Replace rear spring.
	(i) Excessive runout or unbalance condition.	(i) Reindex propeller shaft 180 degrees, reride and correct as necessary.
UNIVERSAL JOINT NOISE	(a) Propeller shaft flange bolts nuts loose.	(a) Tighten nuts to specified torque.
	(b) Lack of lubrication	(b) Recondition universal joint.

SERVICE PROCEDURES

PROPELLER SHAFT ANGULARITY

The increased emphasis on the need for a quiet, smooth operating drive line in all cars require that the universal joint angles be maintained within acceptable tolerances. Propeller shaft and rear axle housing angularity may be measured by using the Propeller Shaft Angularity Tool C-3976A (Fig. 5). This tool makes it possible to check the angularity at the engine and differential and carrier.

All joint angle measurements on the vehicle should be made with the car supported by the tires if possible; such as, on an alignment pit or a platform hoist. A two post hoist may be used where other means are not available. The vehicle should be approximately level when taking angle measurements with any heavy items removed from the luggage compartment or passenger compartment. The fuel tank should be full or the equivalent

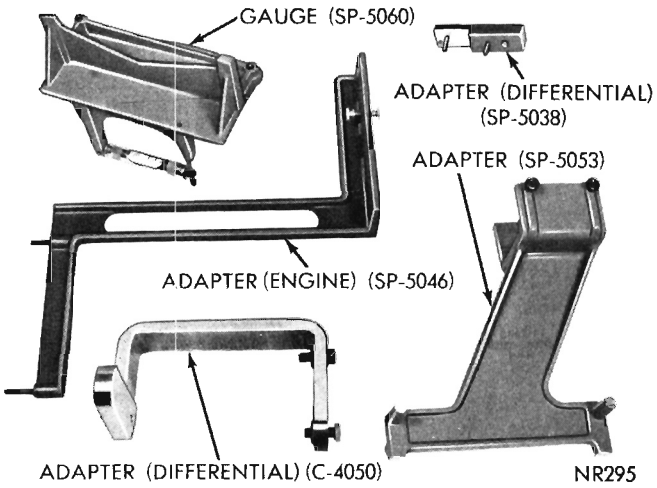


Fig. 5 Propeller Shaft Angularity Tool C-3976A

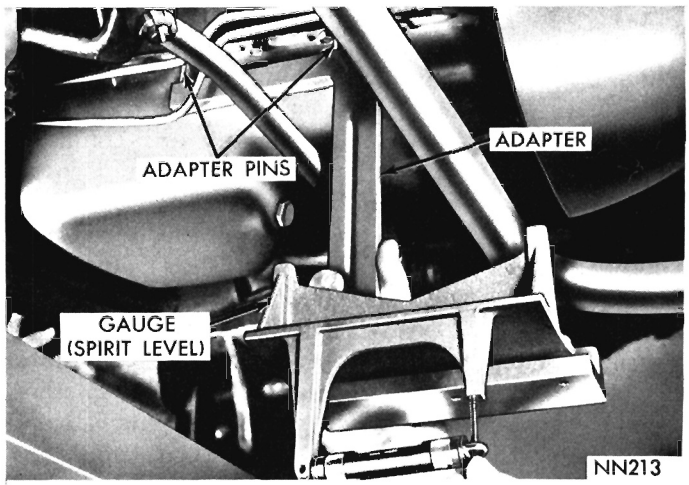


Fig. 6 Adjusting Gauge on Engine (Front Joint Angle Reference)

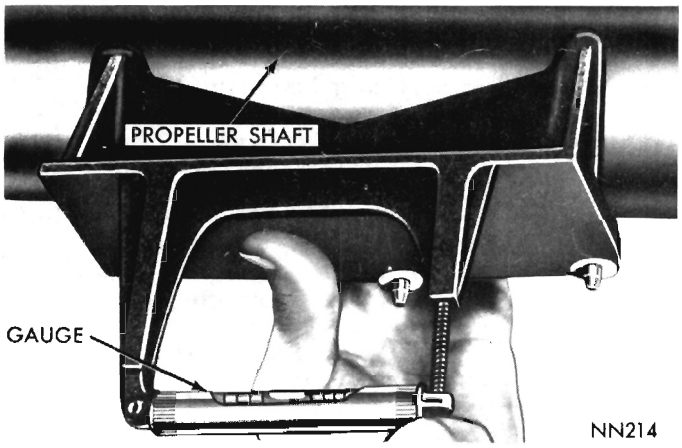


Fig. 7 Measuring Front Universal Joint Angle

weight simulated.

When using a twin post hoist, the vehicle must be supported by the lower control arms and rear axle housing. **DO NOT USE A FRAME CONTACT HOIST WHEN MEASURING PROPELLER SHAFT ANGULARITY.**

FRONT UNIVERSAL JOINT ANGLE

(1) Attach engine adapter SP-5046 to gauge SP-5060.

(2) Positon guage on left side of engine so that adapter pins contact flat surface of engine oil pan flange adjacent to vertical wall of the oil pan (Fig. 6). The gauge must be held vertical as shown with arrow on gauge SP-5060 pointing toward the front of car.

(3) Adjust position of bubble in spirit level in accordance with the listing for appropriate car model as shown in Chart (Figs 18 or 19)

(4) Remove engine adapter SP-5046 and gauge SP-5060 from flange adjacent to the vertical wall of oil pan and separate the gauge from engine adapter.

(5) With gauge SP-5060 adjusted for the correct engine angle reference, position gauge SP-5060 squarely and firmly along underside of the propeller shaft (Fig. 7). Make sure Veeway is in alignment and that both adapter pins are contacting propeller shaft. Be sure arrow on gauge is pointing toward the front of car.

(6) Observe position of bubble in spirit level and compare the position with that shown on Chart (Figs 18 or 19) for front joint angle. A normal joint angle will cause bubble to position itself within the acceptable range. If bubble is found to be slightly forward of the acceptable tolerance range, this means that the angle is actually smaller than that specified and does not need correcting. If bubble in spirit level is found to be rearward of the acceptable range, the angle is too large, and must be corrected. To reduce front universal joint angle, install a flat shim between the transmission extension housing and rear engine mount (Fig. 8). Flat shims 1/8 inch in thickness are required to move the bubble in spirit level one graduation.

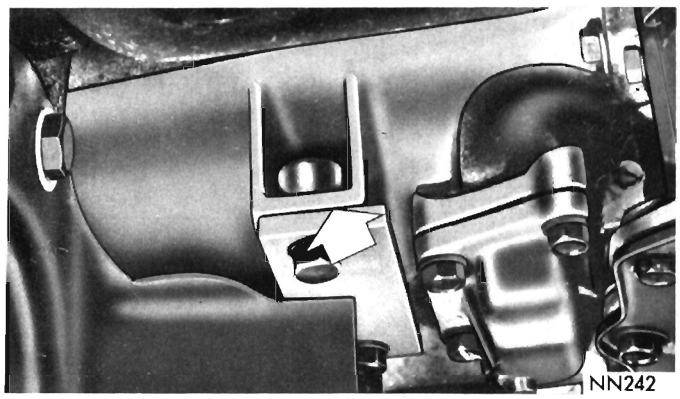


Fig. 8 Shim Location (Front Universal Joint Angle Correction)

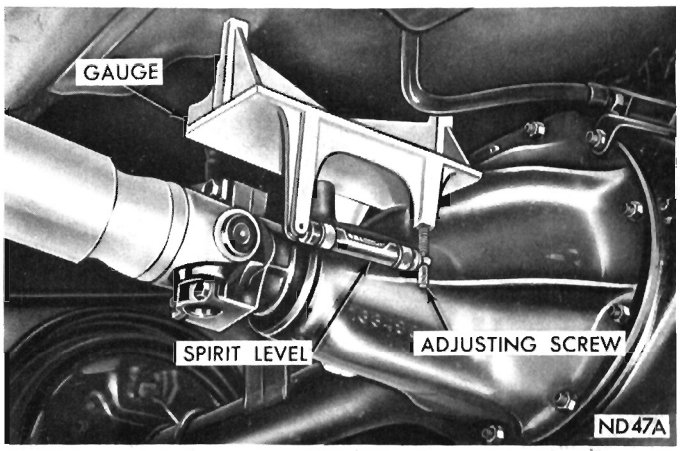


Fig. 9 Adjusting Gauge on Differential (Rear Joint Angle Reference)

(7) To install shim, loosen bolts in rear mount to transmission extension housing.

(8) Raise transmission sufficiently using a floor stand and block of wood beneath transmission oil pan.

(9) Install 1/8 in. shim, lower transmission, remove floor stand and tighten bolts in rear mount to transmission extension housing to specifications.

(10) Recheck front joint angle, starting with step (1) of "Procedure."

CAUTION: If a great amount of shimming is required at the transmission extension rear mount, make sure extension housing and propeller shaft will not make contact with floor pan or make interference with seat belt mounting bolts.

REAR UNIVERSAL JOINT ANGLE

(1) Remove pinion bumper plate from differential and carrier housing and position gauge SP-5060

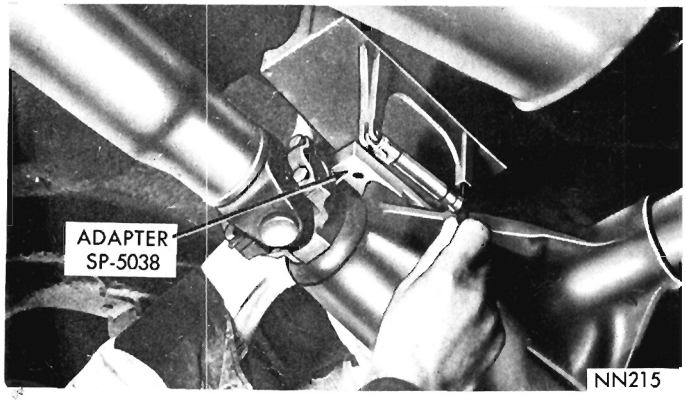


Fig. 10 Adjusting Gauge on Differential (Models with 7-1/4 in. Axle) (Rear Joint Angle Reference)

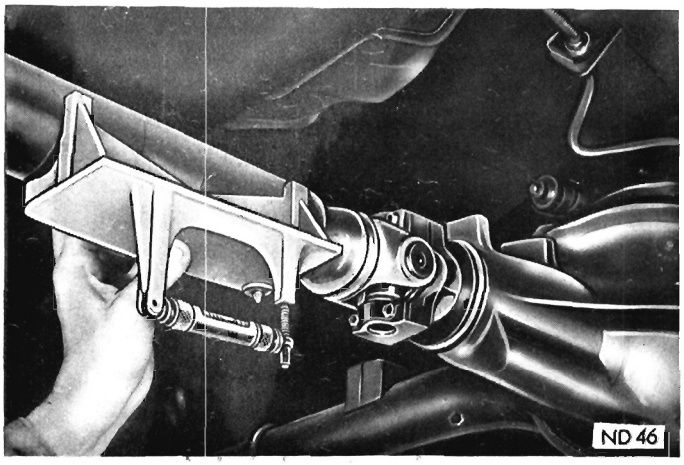


Fig. 12 Measuring Rear Universal Joint Angle

on the machined pads with locating pin in rear bolt hole (Fig. 9). The arrow on gauge should point toward the front of car. On models equipped with 7-1/4 in. axle place propeller shaft alignment gauge adapter SP-5038 between the gauge and machined pads of the carrier (Fig. 10). On models equipped with 9-3/4 in. axle, position adapter C-4050 on machined pad of axle and install gauge (Fig. 11). The arrow on gauge should point toward front of car.

(2) Adjust position of bubble in spirit level in accordance with the listing for appropriate car model as shown in Chart (Fig. 18 or 19).

(3) Remove gauge SP-5060 from differential and carrier assembly and position it squarely and firmly along underside of propeller shaft (Fig. 12). Make sure Veeway is in alignment and that both adapter pins are contacting shaft. Be sure arrow on gauge is pointing toward the front of car.

(4) Observe position of bubble in spirit level and compare the position with that shown on Chart (Figs 18 or 19 for rear joint angle. A normal joint angle will cause the bubble to position itself within the acceptable range.

(5) If bubble in spirit level is found outside the

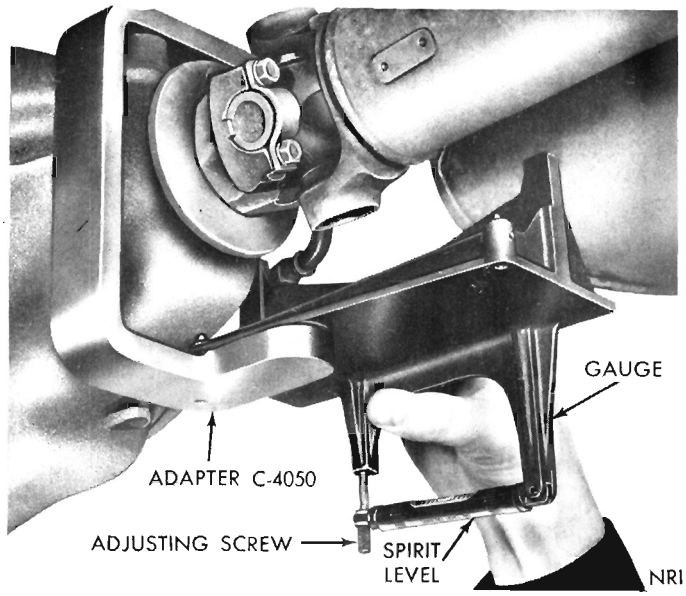


Fig. 11 Adjusting Gauge on Differential (Models with 9-3/4 in. Axle) (Rear Joint Angle Reference)

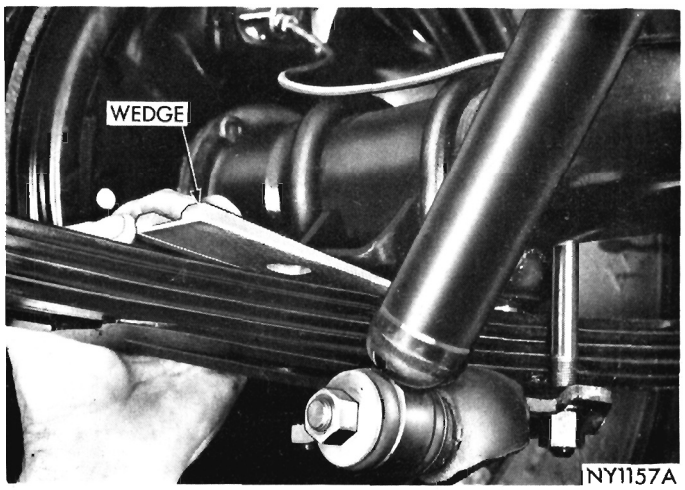


Fig 13 Tapered Wedge Location (Rear Universal Joint Angle Correction)

acceptable range indicated on Chart (Figs 18 or 19), you will have to install a wedge type shim between both rear springs and the axle housing spring pads to bring position of bubble within the acceptable range.

To make sure shims are installed properly, remember this rule. If bubble is too far forward, insert shim with thick end toward front of car. If bubble is too far to rear, the nose of differential is too high, so thick end of shim goes toward rear of car (Fig. 13). A 1 degree shim will move bubble in spirit level about 3 graduations foward or rearward, depending on which way the thick end is installed.

Presently, there are a number of makes of wedge type shims available commercially. Always make sure shims you use are made of steel and are the

same width as the springs on the car. Chrysler Parts Division has made available steel shims in varying angles of 1/2 degrees, 1 degree, 2 degree, and 3 degree making it possible with these conbinations to set the rear universal joint angle within 1/2 degrees of a perfect angle.

(6) To install shims, loosen spring "U" bolt nuts and install shims between rear springs and axle housing spring pads.

(7) Tighten spring "U" bolt nuts to proper specifications.

(8) Recheck rear universal joint angle after installation of wedge type shim, to make sure position of bubble in spirit level is within the acceptable range.

(9) Reinstall rebound bumper and plate assembly on differential carrier, tighten screws to 200 inch-pounds.

CAUTION: Under no circumstances should a shim pack be used that is over 1/4 inch thick at the center if that much shimming is required, look for a possible broken rear spring, mislocated spring seat, etc.

PROPELLER SHAFT

Removal—Rear Joint

To maintain proper drive line balance when installing, make scribe marks on the propeller shaft,universal joint and pinion flange before removal.

(1) Remove both rear universal joint roller and bushing assembly clamps from rear axle drive pinion flange (Fig. 3). **Do not disturb the retaining strap used to hold bushing assemblies on universal joint cross, if so equipped.**

CAUTION: Do not allow propeller shaft to drop or hang loose from either joint during removal. Wire up or otherwise support the loose end of shaft to prevent damage to joint.

Before removing propeller shaft with sliding yoke from Transmission, the vehicle front end should be lowered slightly to prevent the loss of Transmission Fluid.

Front Joint

(1) Slide propeller shaft with the front yoke from the tramsmission output shaft (Fig. 2). Be careful not to damage splines on output shaft or yoke. Examine sliding yoke seal for evidence of leakage. If no leakage is evident, do not disturb the seal. If necessary to replace the seal, see Transmission Group, 21.

CAUTION: It is important to protect the machined surface of the sliding yoke from damage after propeller shaft has been removed.

Installation—Front Joint

(1) Before installing propeller shaft, wipe sliding yoke clean and inspect machine surface for scratches, nicks, burrs and correct as necessary.

(2) Engage the yoke splines on end of output shaft, being careful not to burr the splines(Fig. 2).

Rear Joint

Install rear universal joint of propeller shaft in the same position as removed by matching scribe marks.

(1) Install rear universal joint cross and roller bushings in the seats of drive pinion flange. Install bushing clamps and attaching screws (Fig. 3). Tighten clamp screws to 170 inch-pounds on all models.

CROSS AND ROLLER UNIVERSAL JOINT

Disassembly

(1) Before disassembling universal joint, mark yoke, cross and bushings to facilitate resassembly if inspection discloses parts are serviceable.

(2) Remove four bushing retainers from universal joint cross assembly. Using a socket approximately the same diameter as bushing, press one bushing and roller assembly out of yoke by pressing opposite bushing in.

(3) Press out remaining bushing and roller assembly by pressing on end of cross.

(4) Remove cross assembly from yoke, Do not remove seal retainers from cross assembly. The cross and retainers are serviced as an assembly.

Cleaning and Inspection

(1) Clean all parts in a suitable solvent and dry with compressed air. Examine bearing surfaces of cross. They should be smooth and free from ripples and pits. If bearing surfaces or seal retainers are damaged, replace cross assembly.

(2) Examine rollers in bushings. Rollers that have operated on a worn cross should be replaced. Rollers should have a uniformly good appearance and roll freely inside bushings.

Assembly

(1) Lubricate bushing and roller assemblies with Multi-Purpose Grease NLGI Grade 2 EP or Multi Mileage Lubricant part number 2525035 or equivalent. Also, fill reservoirs in the ends of the cross.

(2) Place cross in propeller shaft yoke, observing identification marks made at disassembly. Install bushing and roller assemblies in yoke, matching identifying marks.

(3) Press both bushing assemblies into yoke while guiding cross into bushings. Correctly posi-

tion bushings so retainers can be installed.

(4) Position remaining two bushing assemblies on cross. Install retainer strap to hold bushings on cross during installation of shaft on drive pinion flange. Lightly tap outer ends of bushings while rotating cross to be sure cross and bushings operate freely.

CONSTANT VELOCITY UNIVERSAL JOINT

IMPERIAL MODELS

PROPELLER SHAFT ANGULARITY

Due to the constant velocity universal joints being able to operate through greater angels, thus eliminating most driveline disturbances, resulting from excess angularity, it will not be necessary to check and adjust the propeller shaft angularity on Imperial models.

Removal

To maintain proper dirve line balance when installing, make scribe marks on the propeller shaft, universal joint, and pinion flange before removal.

(1) Loosen and remove nuts and lockwashers attaching rear constant velocity universal joint to rear axle pinion flange (Fig. 14)

Before removing propeller shaft with sliding yoke from Transmission, the vehicle front end should be lowered slightly to prevent the loss of Transmission Fluid.

(2) Slide propeller shaft as far forward as possible until studs clear pinion flange and remove propeller shaft as an assembly toward rear of vehicle. **If interference between rear universal joint studs and pinion flange is encountered, it will therefore be necessary to disconnect the front universal joint from sliding yoke to remove propeller shaft. When rein-stalling install in same manner as propeller shaft was removed.**

CAUTION: Under no circumstances should propeller shaft be allowed to drop or hang by either universal joint during removal, as this can damage the centering ball arrangement. Tie up or otherwise support propeller shaft to prevent damage to universal joints.

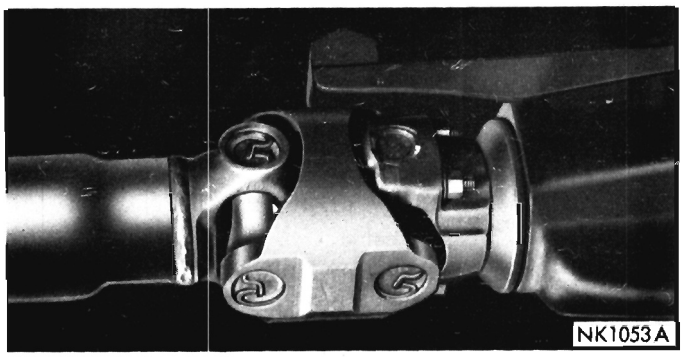


Fig. 14 Rear Constant Velocity Universal Joint

Installation

Install rear universal joint of propeller shaft in the same position as removed by matching scribe marks.

(1) Before installing propeller shaft, wipe sliding yoke clean and inspect machined surface for scratches, nicks and burrs, correct as necessary.

(2) Engage sliding yoke on transmission output shaft splines being careful not to burr splines.

(3) Slide propeller shaft as far forward as possible and engage rear constant velocity universal joint studs into position through holes of rear axle pinion flange. Install lockwashers, nuts and tighten 300 inch-pounds. **Before disassembling joint, mark all parts for easy identification at reassembly.**

Disassembly

(1) Remove four screws and lockwashers which attach spline yoke to constant velocity joint and remove spline yoke (Fig. 4). Slide the two loose bearings from centering socket yoke.

(2) Remove snap rings securing the two bearings in front bores of center yoke.

CAUTION: If joints are heavily coated with rust or corrosion, apply penetrating oil in bearing bores before attempting to press out the bearings.

(3) Press bearing assemblies from yokes in fol-

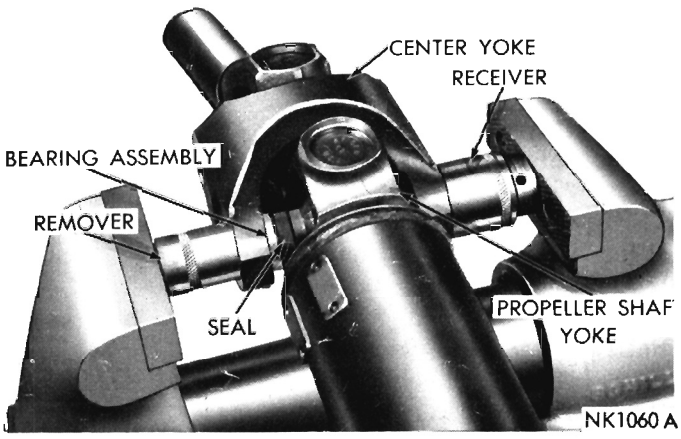


Fig. 15 Pressing Bearing from Center Yoke

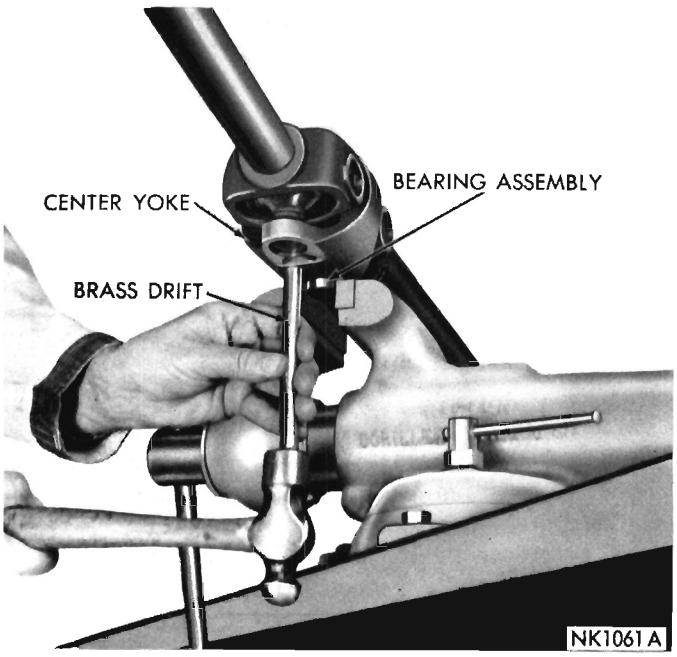


Fig. 16 Removing Bearing from Center Yoke

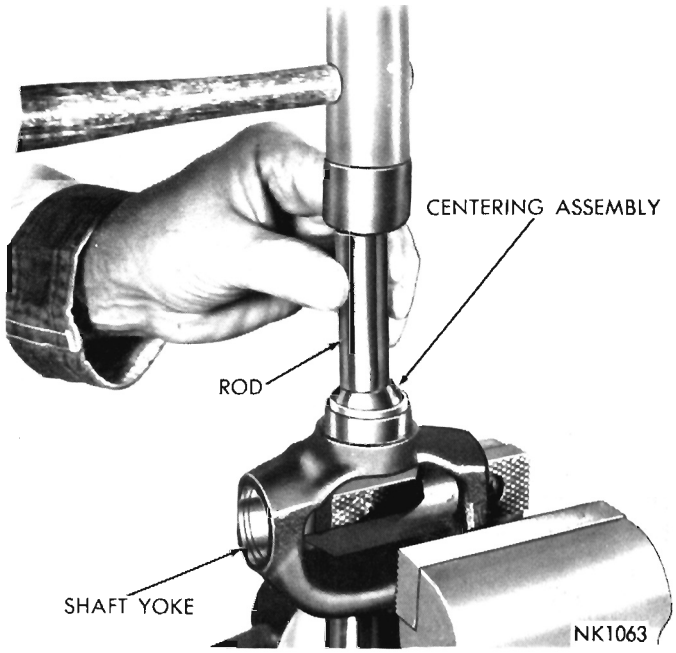


Fig. 17 Removing Centering Ball and Socket Assembly

lowing manner. Use a short length of round bar stock 3/4 inch in diameter, or a 3/4 inch socket as a remover. As a receiver on the opposite bearing, use a short length of pipe or a socket with an inside diameter of not less that 1-1/16 inch. Clamp the joint with remover and receiver in vice (Fig. 15) and press one of the rear yoke bearings approximately 3/8 inch out of yoke.

(4) Securely clamp the exposed bearing in vise and drive yoke from bearing, using a brass drift (Fig. 16). Apply only light blows on drift.

(5) Using same procedure, press exposed end of cross to force bearing on opposite end approximately 3/8 inch out of yoke. Remove bearing from yoke, using brass drift as previously described.

(6) With propeller shaft firmly held in vise, press in on cross and centering socket yoke and remove cross and socket yoke assembly from center yoke.

(7) Remove remaining four bearings from rear bores of center yoke and propeller shaft yoke in manner described in steps 3, 4, and 5.

(8) Remove cross from propeller shaft yoke. Remove spring from centering stud (Fig. 4).

CAUTION: Be careful to avoid damaging cross seals and center stud yoke slinger.

Centering Socket Yoke Assembly

(1) Carefully pry centering ball seal assembly from socket yoke.

(2) Remove seal and bearing rollers from centering ball assembly.

(3) Fill cavity behind centering ball and inside the ball with Multi-Purpose Grease, NLGI grade 2 EP. Multi-Mileage Lubricant Part Number 2525035 is suitable for this application.

(4) Insert a rod, slightly smaller than inside diameter of centering ball, into ball and strike it sharply with a hammer (Fig. 17), The force applied by initial hammer blow will force the ball and retainer assembly from yoke.

Cleaning and Inspection

(1) Clean all parts in a suitable solvent and blow dry.

(2) Carefully examine all parts for excessive wear or damage. Discard parts that are not serviceable. Examine bearing races for grooves and ridges. Rollers that have been operating in damaged races should not be reused. Examine seals on cross assemblies for damage. Seals are not serviced separetely. They are included in the cross assembly. Replace with parts contained in replacement packages. **All parts in the package should be used.** If propeller shaft is damaged,replace the shaft assembly to be assured of a balanced assembly.

Assembly

(1) Position the centering assembly in yoke with large diameter hole up and press it firmly to its seat.

(2) Apply a film of Multi-Purpose Grease, NLGI grade 2 EP. Multi Mileage Lubricant Part Number 2525035 is suitable for this application, on the inside surface of centering ball. Install rollers (34 required). Install centering stud seal in ball.

(3) Install centering ball seal assembly on yoke and press firmly in place.

(4) Coat the inside surfaces of bearing races with Multi-Purpose Grease, NLGI grade 2 EP. Multi-Mileage Lubricant Part Number 2525035 is suitable for this application, and install rollers (32 are required). Also, pack reservoirs in ends of cross with same lubricant.

(5) Place the cross in shaft yoke. Insert one bearing assembly in bearing bore of shaft yoke. Using bar stock or socket used as a remover when diassembling joint, press bearing into bore, at the same time guiding cross into bearing. Press bearing into yoke approximately 3/16 inch or far enough to install snap ring. Install snap ring. Reverse the position of yoke and install bearing and snap ring in opposite bore in same manner.

(6) Install the two bearings in rear bores of center yoke and on cross, as previously described. Install two snap rings.

(7) Install centering stud spring on centering stud, large end first. Apply a film of Multi-Purpose Grease NLGI grade 2 EP. Multi-Mileage Lubricant Part Number 2525035 is suitable for this application, on stud.

(8) Install two slip spline yoke bearing assemblies on cross and assemble in bearing bores of centering yoke.

(9) Install centering yoke and cross as an assembly in center yoke, guiding centering ball on stud.

(10) Apply slight pressure on cross to align cross in front bores of center yoke. Insert one bearing in yoke and guide the end of cross into bearing.

(11) Press bearing into bore and install snap ring.

(12) Install remaining bearing in center yoke. Install snap ring.

(13) Install slip spline yoke on the constant velocity joints with screws and lockwashers and tighten to 300 inch-pounds.

ANGULARITY MEASUREMENT AND CORRECTION CHART

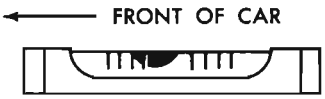
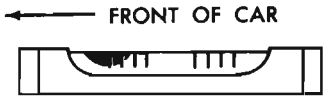
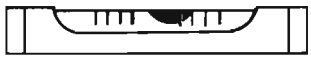
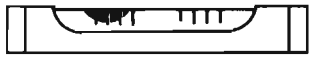
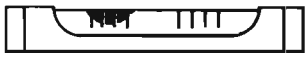
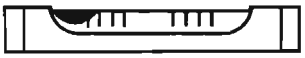
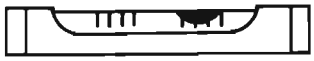
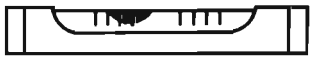
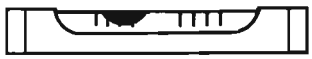
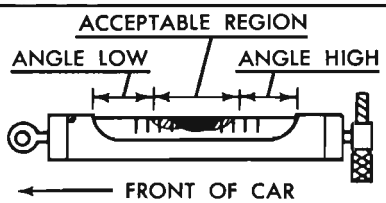
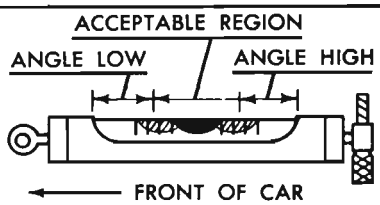
UNIVERSAL JOINT		
CAR TYPE AND WHEELBASE	FRONT JOINT ANGLE ADJUST POSITION OF BUBBLE WITH GAUGE AT ENGINE OIL PAN FLANGE	REAR JOINT ANGLE ADJUST POSITION OF BUBBLE WITH GAUGE ON DIFFERENTIAL CARRIER
VALIANT 108" W.B. 7¼" AXLE		
VALIANT 108" W.B. 8¾" AXLE		
BARRACUDA ALL MODELS		
PLYMOUTH 117" W.B. EXCEPT 2 DR. SEDAN & H.T.		
PLYMOUTH 117" W.B. 2 DR. SEDAN / H.T.		
PLYMOUTH 117" W.B. 426 OR 440 C.I. ENG. AUTOMATIC TRANS.		
PLYMOUTH 117" W.B. 426 OR 440 C.I. ENG. 9¾" AXLE		
PLYMOUTH STATION WAGON 117" W.B.		
PLYMOUTH 119" W.B. EXCEPT STATION WAGON		
PLYMOUTH 121" W.B. STATION WAGON		
FINAL READING ON PROPELLER SHAFT (ALL MODELS)		
CORRECTION PROCEDURE PY265A	ADD SHIMS AT ENGINE REAR MOUNT (⅛" FOR EACH GAUGE DIVISION) TO REDUCE FRONT JOINT ANGLE. CORRECT LOW ANGLES ONLY IF FLOOR PAN INTERFERENCE IS ENCOUNTERED.	ADD SHIMS AT REAR AXLE HOUSING SPRING SEATS. 1° WEDGE SHIM MOVES BUBBLE 3 TO 4 GAUGE DIVISIONS. TO REDUCE ANGLE, INSTALL THICK END OF WEDGE TO FRONT OF CAR.

Fig. 18 Universal Joint Angularity Reference Chart

ANGULARITY MEASUREMENT AND CORRECTION CHART

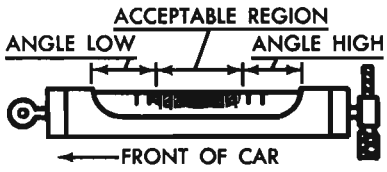
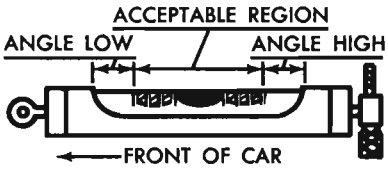
UNIVERSAL JOINT	FRONT JOINT ANGLE	REAR JOINT ANGLE
CAR TYPE AND WHEELBASE	ADJUST POSITION OF BUBBLE WITH GAUGE AT ENGINE OIL PAN FLANGE.	ADJUST POSITION OF BUBBLE WITH GAUGE ON DIFFERENTIAL CARRIER.
CHRYSLER 124" W.B. EXCEPT STATION WAGON		
CHRYSLER 122" W.B. STATION WAGON		
FINAL READING ON PROPELLER SHAFT (ALL MODELS)		
CORRECTION PROCEDURE	ADD SHIMS AT ENGINE REAR MOUNT (1/8" FOR EACH GAUGE DIVISION) TO REDUCE FRONT JOINT ANGLE. CORRECT LOW ANGLES ONLY IF FLOOR PAN INTERFERENCE IS ENCOUNTERED.	ADD SHIMS AT REAR AXLE HOUSING SPRING SEATS. 1° WEDGE SHIM MOVES BUBBLE 3 TO 4 GAUGE DIVISIONS. TO REDUCE ANGLE, INSTALL THICK END OF WEDGE TO FRONT OF CAR. PY269A

Fig. 19 Universal Joint Angularity Reference Chart

CHRYSLER

Model Application

PROPELLER SHAFT	*Length-Inches	Diameter-Inches	
Type ..... Tubular			
AXLE RATIO	2.76	2.94	3.23
MANUAL TRANSMISSION 3-SPEED (A-230)			
383 CI Engine 2BBL—Except Station Wagon 57.86			3.25(IVA)
AUTOMATIC TRANSMISSION (A-727)			
383 CI Engine 2BBL—Except Station Wagon 57.86	3.25(IVA)		3.25(IVA)
383 CI Engine 4BBL—Except Station Wagon 57.61	3.25(IVA)		3.25(IVA)
383,440 CI Engine Station Wagon 55.68	3.25(IVA)		3.25(IVA)
440 CI Engine—Except Station Wagon 57.61	3.25(IVA)		3.25(IVA)

UNIVERSAL JOINTS	
Type--Front	Sliding Spline Cross and Roller
Rear	Cross and Roller

From Centerline of front yoke bearing bores to Centerline of rear bearing bores.
(IVA) Interval Vibration Absorber at front joint of propeller shaft.

IMPERIAL

AUTOMATIC TRANSMISSION (A-727)	
440 CI Engine—All models 52.57	3.25(CV)

UNIVERSAL JOINTS	
Type—Front	Constant Velocity
Rear	Constant Velocity

(CV)Constant Velocity universal joints.

SPECIFICATIONS

VALIANT

SPECIFICATIONS

Model Application

	*Length-Inches	Diameter-Inches
PROPELLER SHAFT		
Type	Tubular	
MANUAL TRANSMISSION 3-SPEED		
198, 225 CI Engine 7-1/4" Axle	51.43	
198, 225 CI Engine 8-3/4" Axle	49.27	
318, 340 CI Engine 8-3/4" Axle	49.27	
AUTOMATIC TRANSMISSION		
198, 225 CI Engine 7-1/4" Axle	51.43	
198, 225 CI Engine 8-3/4" Axle	49.27	
318 CI Engine 7-1/4" Axle	51.43	
318 CI Engine 8-3/4" Axle	49.27	
340 CI Engine 8-3/4" Axle	44.99	

AXLE RATIO	2.76	3.23	3.55	3.91
MANUAL TRANSMISSION 3-SPEED				
198 CI Engine 7-1/4" Axle	—	3.00(IVA)	3.00(IVA)	2.75
225 CI Engine 7-1/4" Axle	—	3.00(IVA)	2.75	2.75
318 CI Engine 7-1/4" Axle	—		2.75	
198, 225 CI Engine 8-3/4" Axle	—	2.75	—	—
318, 340 CI Engine 8-3/4" Axle	—	2.75	2.75	2.75
AUTOMATIC TRANSMISSION				
198, 225, 318 CI Engine 7-1/4" Axle	2.75	—	—	—
198, 225 CI Engine 7-1/4" Axle	—	3.00(IVA)	3.00(IVA)	3.00(IVA)
198, 225 CI Engine 8-3/4" Axle	—	2.75	—	—
318 CI Engine 8-3/4" Axle	—	2.75	2.75	2.75
340 CI Engine 8-3/4" Axle	—	3.00	3.00	3.00

UNIVERSAL JOINTS	
Type—Front	Sliding Spline Cross and Roller
Rear	Cross and Roller

*From Centerline of front yoke bearing bores to centerline of rear bearing bores.
(IVA) Internal Vibration Absorber at front point of propeller shaft.

Model Application

PROPELLER SHAFT	*Length-Inches	Diameter-Inches					
Type	Tubular						
MANUAL TRANSMISSION 3-SPEED							
225 CI Engine 7-1/4" Axle	46.06						
318 CI Engine 8-3/4" Axle	43.60						
340, 383 CI Engine W/4BBL 8-3/4" Axle	43.60						
MANUAL TRANSMISSION 4-SPEED							
225 CI Engine 7-1/4" Axle	46.06						
340, 383 CI Engine W/4BBL 8-3/4" Axle	43.60						
426, 440 CI Engine 9-3/4" Axle	42.60						
AUTOMATIC TRANSMISSION							
225, 318 CI Engine 7-1/4" Axle	49.89						
318 CI Engine 8-3/4" Axle	47.95						
383 CI Engine W/2BBL 8-3/4" Axle	43.60						
340, 383 CI Engine W/4BBL 8-3/4" Axle	43.60						
426, 440 CI Engine 8-3/4" Axle	43.60						
426, 440 CI Engine 9-3/4" Axle	42.60						
AXLE RATIO		2.76	3.23	3.54	3.55	3.91	4.10
MANUAL TRANSMISSION 3-SPEED							
225 CI Engine 7-1/4" Axle		–	3.25(IVA)	–	–	–	–
318 CI Engine 8-3/4" Axle		3.25(IVA)	3.25(IVA)	–	–	–	–
383 CI Engine W/4BBl 8-3/4" Axle		–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–
MANUAL TRANSMISSION 4-SPEED							
225 CI Engine 7-1/4" Axle		–	3.25(IVA)	–	–	–	–
340, 383 CI Engine W/4BBL 8-3/4" Axle		–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–
426, 440 CI Engine 9-3/4" Axle		–	–	3.25(IVA)	–	–	3.25(IVA)
AUTOMATIC TRANSMISSION							
225, 318 CI Engine 7-1/4" Axle		3.25(IVA)	3.25(IVA)	–	–	–	–
318 CI Engine 8-3/4" Axle		–	3.25(IVA)	–	–	–	–
383 CI Engine W/2BBL 8-3/4" Axle		3.25(IVA)	3.25(IVA)	–	–	–	–
340, 383 CI Engine W/4BBl 8-3/4" Axle		3.25(IVA)	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–
425, 440 CI Engine 8-3/4" Axle		–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–
426, 440 CI Engine 9-3/4" Axle		–	–	–	–	–	3.25(IVA)
UNIVERSAL JOINTS							
Type–Front		Sliding Spline Cross and Roller					
Rear		Cross and Roller					

*From centerline of front yoke bearing bores to centerline of rear bearing bores.
(IVA) Internal Vibration Absorber at front joint of propeller shaft.

SATELLITE

Model Application

PROPELLER SHAFT *Length-Inches / Diameter-Inches											
Type . . . . . Tubular											
AXLE RATIO	2.45	2.71	2.76	2.93	2.94	3.23	3.54	3.55	3.91	4.10	3.21
MANUAL TRANSMISSION 3-SPEED											
225 CI Engine–											
7-1/4" Axle A903 Hardtop 57.10	–	–	–	–	–	3.00(IVA)	–	–	–	–	–
7-1/4" Axle A-903 Sedan 59.60	–	–	–	–	–	3.00(IVA)	–	–	–	–	–
8-1/4" Axle A-903 Hardtop 54.86	–	–	–	–	–	–	–	3.25(IVA)	–	–	–
8-1/4" Axle A-903 Hardtop 54.92	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
8-1/4" Axle A-903 Sedan 57.36	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	–	–	–
8-1/4" Axle A-230 Hardtop 50.80	–	–	–	–	–	–	–	3.00(IVA)	–	–	3.00(IVA)
8-1/4" Axle A-230 Hardtop 50.68											
318 CI Engine–											
8-1/4" Axle A-230 Hardtop 50.80	–	–	–	–	3.00 (IVA)	–	–	3.25(IVA)	–	–	–
. . . . . 50.68	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
8-1/4" Axle A-230 Sedan 53.30	–	–	–	–	3.00(IVA)	3.00(IVA)	–	–	–	–	–
. . . . . 53.24	–	–	–	–	–	–	–	3.25(IVA)	–	–	–
8-3/4" Axle A-230 Wagon 53.24	–	–	–	–	–	3.24(IVA)	–	3.25(IVA)	–	–	–
. . . . . 53.30	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
383 CI Engine W/4BBL											
8-3/4" Axle A-230 Sedan & Wagon . . 53.18	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–	–
MANUAL TRANSMISSION 4-SPEED											
8-3/4" Axle A-833 Hardtop 50.68	–	–	–	–	–	3.24(IVA)	–	3.25(IVA)	3.25(IVA)	–	–
8-3/4" Axle A-833 Sedan & Wagon . . 53.18	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–	–
426, 440 CT Engine–											
9-3/4" Axle A833 Hardtop 49.50	–	–	–	–	–	–	3.25(IVA)	–	–	3.25(IVA)	–
AUTOMATIC TRANSMISSION											
225 CI Engine–											
7-1/4" Axle A-904 Hardtop 57.10	–	–	–	–	–	3.00(IVA)	–	–	–	–	–
7-1/4" Axle A-904 Sedan 59.60	–	–	–	–	–	3.00(IVA)	–	–	–	–	–
8-3/4" Axle A-904 Hardtop 54.92	–	–	–	–	3.00(IVA)	–	–	3.00(IVA)	–	–	–
8-3/4" Axle A-904 Sedan & Wagon . . 57.42	–	3.00(IVA)	–	–	3.00(IVA)	3.25(IVA)	–	–	–	–	–
Wagon 57.36	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
8-3/4" Axle A-727 Hardtop 50.80	–	–	–	–	3.00(IVA)	–	–	3.00(IVA)	–	–	–
Hardtop 50.68	–	–	–	–	–	3.25(IVA)	–	3.00(IVA)	–	–	–
8-3/4" Axle A-727 Sedan & Wagon . . 53.30	–	–	–	–	3.00(IVA)	–	–	3.00(IVA)	–	–	3.00(IVA)
Sedan & Wagon 53.24	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	–	–	–
318 CI Engine–											
8-3/4" Axle A-727 Hardtop 50.80	–	–	–	–	3.00(IVA)	–	–	3.00(IVA)	–	–	–
Hardtop 50.68	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
8-3/4" Axle A-727 Sedan & Wagon . . 53.30	–	3.00(IVA)	–	–	–	3.25(IVA)	–	3.25(IVA)	–	–	–
Sedan & Wagon 53.24	–	–	3.25(IVA)	–	–	–	–	–	–	–	–
8-3/4" Axle A-904 Hardtop 54.92	–	3.00(IVA)	–	–	3.00(IVA)	–	–	–	–	–	–
Hardtop 54.86	–	–	–	–	–	–	–	3.25(IVA)	–	–	3.25(IVA)
8-3/4" Axle A-904 Sedan & Wagon . . 57.42	–	3.00(IVA)	–	–	3.00(IVA)	–	–	–	–	–	–
Sedan & Wagon 57.36	–	–	–	–	3.00(IVA)	–	–	–	–	–	3.25(IVA)
383 CI Engine W/2BBL–											
8-3/4" Axle A-727 Hardtop 50.80	3.00(IVA)	–	–	–	3.00(IVA)	–	–	–	–	–	–
Hardtop 50.68	–	–	–	–	–	3.25(IVA)	–	–	–	–	–
8-3/4" Axle A-727 Sedan & Wagon . . 53.30	3.00(IVA)	–	3.25(IVA)	–	3.00(IVA)	3.25(IVA)	–	–	–	–	–
383 CI Engine W/4BBL–											
8-3/4" Axle A-727 Hardtop 50.68	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–	–
8-3/4" Axle A-727 Sedan & Wagon . . 53.18	–	–	3.25(IVA)	–	–	3.25(IVA)	–	3.25(IVA)	3.25(IVA)	–	–
426, 440 CI Engine–											
8-3/4" Axle A-727 Hardtop 50.68	–	–	–	–	–	3.25(IVA)	–	3.25(IVA)	–	–	–
426, 440 CI Engine–											
9-3/4" Axle A-727 Hardtop 49.50	–	–	–	–	–	–	3.25(IVA)	–	–	3.25(IVA)	–

UNIVERSAL JOINTS	
Type–Front	Sliding Spline Cross and Roller
–Rear	Cross and Roller

*From centerline of front yoke bearing bores to centerline of rear bearing bores. (IVA) Internal Vibration Absorber at front joint of propeller shaft.

Model Application

PROPELLER SHAFT	* Length-Inches	Diameter-Inches					
Type	Tubular						
AXLE RATIO		2.71	2.76	2.94	3.21	3.23	3.55
MANUAL TRANSMISSION 3-SPEED							
225 CI Engine—8-1/4" Axle A-230 Sedan	54.05	—	—	—	—	—	3.00
318 CI Engine—8-1/4" Axle A-230 Sedan	54.05	—	—	—	3.00	3.00	3.00
318 CI Engine—8-3/4" Axle A-230 Wagon	55.81	—	—	—	—	3.25(IVA)	3.25(IVA)
360 CI Engine—8-1/4 Axle A-230 Sedan	54.13	—	—	—	—	3.25	—
360 CI Engine—8-3/4 Axle A-230 Wagon	55.81	—	—	—	—	3.25	3.25
383 CI Engine W/2BBL 8-3/4" Axle A-230 Sedan	54.13	—	—	—	—	3.25(IVA)	—
383 CI Engine W/2BBL 8-3/4" Axle A-230 Wagon	55.18	—	—	—	—	3.25(IVA)	
AUTOMATIC TRANSMISSION							
225 CI Engine—8-1/4" & 8-3/4" Axle A904 Sedan	58.12	—	—	2.75	2.75	2.75	2.75
225 CI Engine—8-3/4" Axle A-727 Sedan	54.13	—	—	3.25(IVA)	3.25(IVA)	3.25(IVA)	3.25(IVA)
318 CI Engine—8-3/4" Axle A-998 Sedan	58.17	3.25(IVA)	3.25(IVA)	—	—	3.25(IVA)	3.25(IVA)
318 CI Engine—8-3/4" Axle A-727 Sedan	54.13	3.25(IVA)	3.25(IVA)	3.25(IVA)	3.25(IVA)	3.25(IVA)	3.25(IVA)
318 CI Engine—8-3/4" Axle A-998 Wagon	60.16	—	—	3.25(IVA)	—	3.25(IVA)	—
318 CI Engine—8-3/4" Axle A-727 Wagon	55.81	—	—	3.25(IVA)	—	3.25(IVA)	—
360 CI Engine 8-3/4" Axle A-727 Sedan	54.13	3.25(IVA)	3.25(IVA)	—	—	3.25(IVA)	—
360 CI Engine 8-3/4" Axle A-727 Wagon	55.81	—	3.25(IVA)	—	—	3.25(IVA)	—
383 CI Engine W/2BBL 8-3/4" Axle A-727 Sedan	54.13	—	3.25(IVA)	—	—	3.25(IVA)	—
383 CI Engine W/2BBL 8-3/4" Axle A-727 Wagon	56.17	—	3.25(IVA)	—	—	3.25(IVA)	—
383, 440 CI Engine—8-3/4" Axle A-727 Sedan	53.64	—	3.25(IVA)	—	—	3.25(IVA)	—
383, 440 CI Engine—8-3/4" Axle A-727 Wagon	55.68	—	3.25(IVA)	—	—	3.25(IVA)	—
UNIVERSAL JOINTS							
Type—Front		Sliding Spline Cross and Roller					
Rear		Cross and Roller					

*From centerline of front yoke bearing bores to centerline of rear bearing bores.
(IVA) Internal Vibration Absorber at front joint of propeller shaft.

TIGHTENING REFERENCE

	Pounds Foot	Pounds Inch
Pinion Flange Clamp Screw (7-1/4", 8-1/4", 8-3/4" Axles)		170
Pinion Flange Clamp Screw (9-3/4" Axle)		170
Rear Spring "U" Bolt Nut (7-1/4" Axle)	40	
Rear Spring "U" Bolt Nut (8-1/4", 8-3/4", 9-3/4" Axles)	45	
Pinion Bumper Plate Screw (7-1/4" Axle)		150
Pinion Bumper Plate Screw (8-1/4", 8-3/4", 9-3/4" Axles)		200

SHOCK ABSORBERS AND REAR SPRINGS

CONTENTS

	Page		Page
REAR SPRINGS	4	SPECIFICATIONS	7
SHOCK ABSORBERS	2	TIGHTENING REFERENCE	7

GENERAL INFORMATION

The rear springs are of the semi-elliptical type and are designed to have little or no camber under very light loads. When the load on the rear suspension is increased, a small amount of reverse spring camber is normal. A relatively flat rear spring gives better lateral stability and reduces side sway which contributes to a well controlled ride and superior handling and stability characteristics.

Rubber bushings inserted into the "eye" of each end of the main leaf are the means by which the springs are attached to the mounting brackets bolted to the body at the front and to spring shackles at the rear. The rubber bushings serve as isolators and reduce noise being transmitted to the body.

On Imperial models the mounting of the rear axle assembly to the spring is the same as the previous years model. All Fury and Chrysler models will use the same mounting as the Imperial. The spring is sandwiched between two rubber isolators which are contained by two channel type retainers. The bottom retainer contains the lower shock absorber stud. The rubber isolators reduce the amount of axle and road noise transmitted to the body.

Heavy duty rear springs offered as part of the heavy duty suspension option have a higher rate for greater stability under loaded conditions. (Trailer Towing.) They are part of a complete, engineered option which inculdes heavy-duty torsion bars, and heavy-duty shock absorbers, a sway bar is included on some heavy-duty packages and is optional on others.

Zinc interleaves are used between the leaves of all springs to reduce corrosion and improve spring life.

The double acting shock absorbers do not help support the load, but are a means used to control ride motion. The shock absorbers are matched to the particular suspension of the vehicle. It is not usually necessary to replace shock absorbers in pairs. Their action does NOT change with use. Replace a shock absorber only if it is broken or leaking badly (not just damp) or has lost resistance in one or both directions, due to internal damage. Slight fluid seepage during cold weather operations, resulting in a damp appearance, is normal and does not affect the performance or life of the shock absorber. Resistance in the rebound direction is usually greater than in the jounce direction. Be sure to use the same replacement part as the original equipment.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
SPRINGS SAG OR BOTTOM	(a) Springs sagged or taken a set.	(a) Replace the spring.
	(b) Broken, bent or weak spring leaves.	(b) Replace the spring.
SPRING NOISE	(a) Loose "U" bolts.	(a) Tighten "U" bolt nuts to specifications.
	(b) Loose or worn eye bushings.	(b) Replace the bushings and tighten the shackle bolt nuts to specifications.
	(c) Worn or missing interliners.	(c) Install new interliners.
SPRING BREAKAGE	(a) Loose "U" bolts.	(a) Replace spring. Inspect "U" bolts for damage. Tighten "U" bolt nuts to specifications.
	(b) Shock absorber inoperative.	(b) Replace the spring and the shock absorber.
SHOCK ABSORBER NOISY	(a) Loose bolt or stud.	(a) Tighten to specifications.
	(b) Undercoating on shock absorber reservoir.	(b) Clean undercoating off shock absorber.
	(c) Bushing excessively worn.	(c) Replace bushing.
	(d) Air trapped in system.	(d) Purge shock absorber.
SHOCK ABSORBER DRIPPING OIL	(a) Worn seal.	(a) Replace shock absorber.
	(b) Damaged crimp or reservoir.	(b) Replace shock absorber.

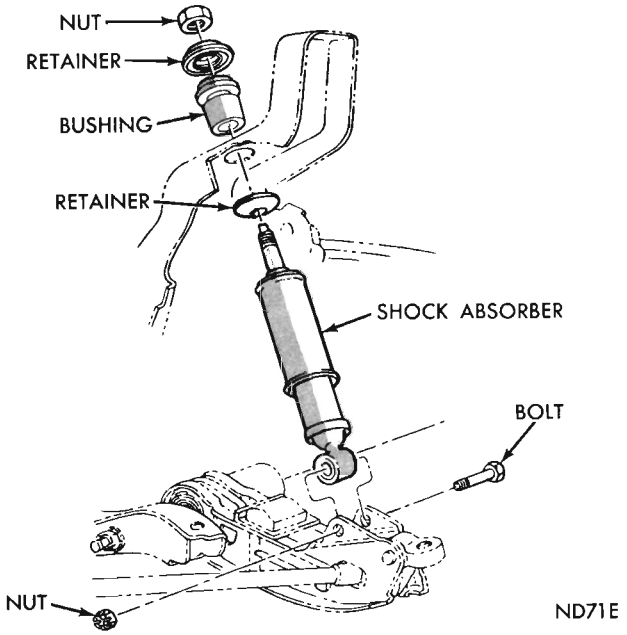


Fig. 1 - Front Shock Absorber (Valiant)

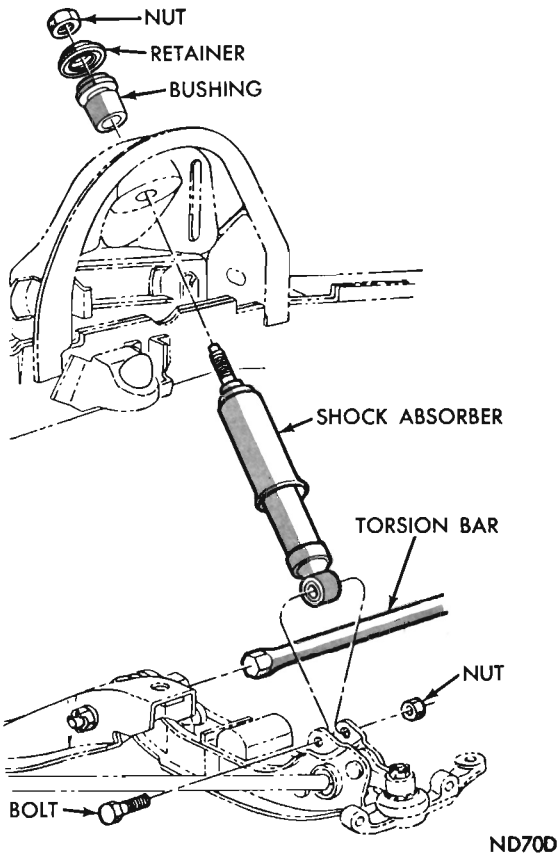


Fig. 2 - Front Shock Absorber (Satellite-Barracuda)

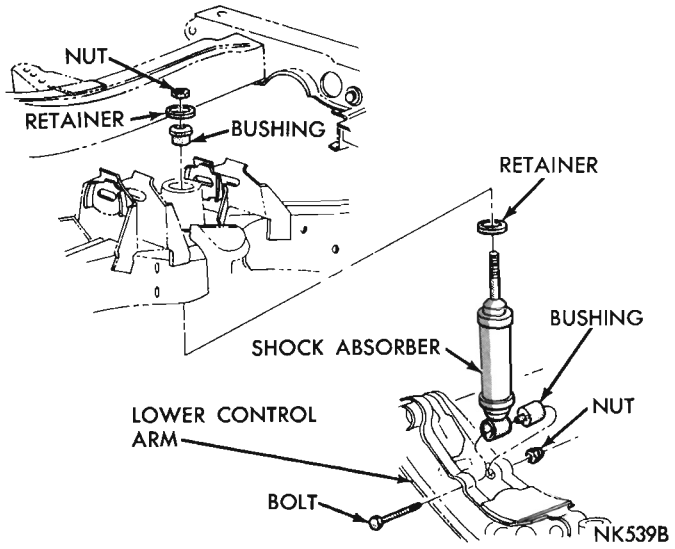


Fig. 3 - Front Shock Absorber (Fury-Chrysler)

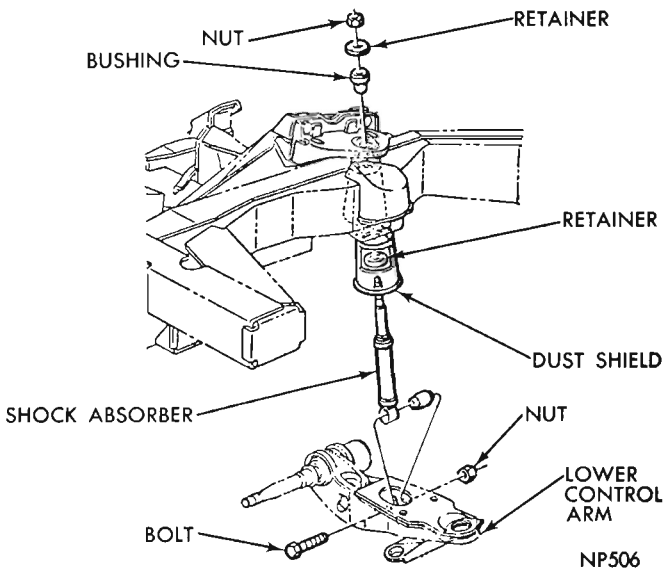


Fig. 4 - Front Shock Absorber (Imperial)

SERVICE PROCEDURES

SHOCK ABSORBERS

Front — Removal (Figs. 1, 2, 3 and 4)

On Imperial models to remove the front shock absorbers you may find it necessary and also more convenient to remove the tire and wheel assembly and perform the removal from under the fender.

(1) Loosen and remove nut and retainer from upper end of shock absorber piston rod.

(2) Raise car so wheels are clear of floor and loosen and remove lower attachement bolt nut. Remove this bolt from lower shock absorber eye and lower control arm mounting bracket.

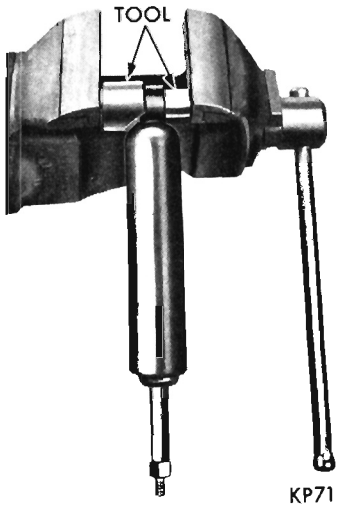


Fig. 5 Removing or Installing Shock Absorber Bushing

(3) Compress shock absorber by pushing upward and remove from vehicle by pulling down and out of upper shock absorber mounting bushing. (On Imperial models you may find it necessary to remove the upper control arm bumper to obtain enough clearance to remove shock absorber and dust shield).

(4) Check appearance of upper shock absorber mounting bushing and if it appears worn, damaged, or deteriorated, remove bushing by first pressing out inner sleeve with a suitable tool then prying out or cutting out the rubber bushing. (This bushing will take some set after it has been in service and should be replaced once it has been removed.)

(5) If lower bushing requires replacement, remove it from shock absorber using Tool C-3553 by pressing on the outer sleeve of bushing (Fig. 5)

Pressing on inner sleeve of lower bushing will not remove outer sleeve from the shock absorber. **New shock absorbers are furnished with the lower bushing installed; however, bushings are furnished separately for service installation.** Test and expel air from shock absorber before installation.

Testing and Expelling Air

(1) With shock absorber removed, extend fully in an upright position.

(2) Inspect for evidence of fluid running from the upper end of reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit. A slight amount of seepage is not unusual and does not affect performance.)

(3) Test for low fluid level or air trapped in cylinder, by holding shock absorber in its normal vertical position and alternately extending and compressing unit. There should be no lost motion in either direction.

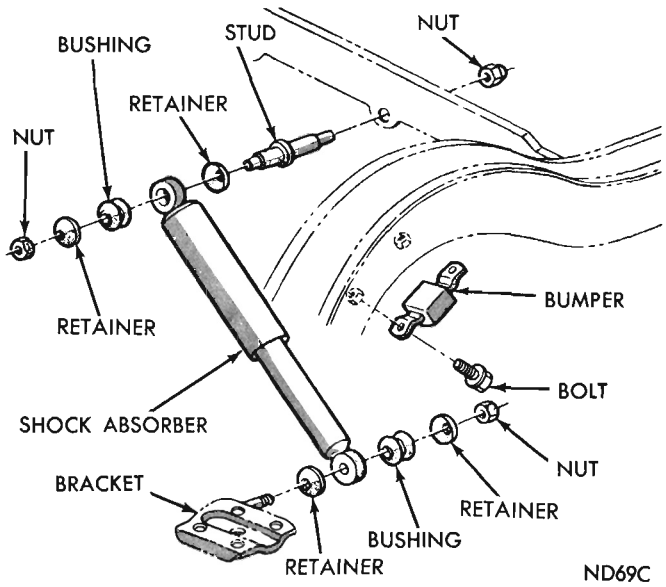


Fig. 6 - Rear Shock Absorber (Valiant)

(4) Should lost motion be evident hold shock absorber in its normal vertical position and fully extend it.

(5) Invert unit and slowly compress it. **Do not extend unit while inverted.**

(6) Repeat steps 4 and 5 several times to expel any air trapped in cylinder.

(7) Should lost motion persist, replace shock absorber. Repeat operation 4 and 5 prior to installation of a new shock absorber. (New shock absorbers may have a greater resistance than an old one due to friction of new seal.)

Installation

(1) To install upper rubber bushing, remove inner steel sleeve and immerse bushing in water (Do not use oil) and with a twisting motion, start bushing into hole of upper mounting bracket, then tap into position with a hammer. Reinstall steel inner sleeve in bushing.

(2) Install lower mounting bushing in eye of shock absorber using Tool C-3553 (Fig. 5).

(3) Test and expel air from shock absorber, then compress to its shortest length. Position retainer on upper rod of shock absorber, insert rod through upper bushing, install upper retainer and nut then tighten to 25 foot-pounds.

On Imperial models position retainer on upper rod of shock absorber followed by dust shield. Insert rod through upper bushing and install upper retainer and nut and tighten to 25 foot-pounds.

In each case, install all retainers with the concave side in contact with the rubber.

(4) Position and align lower eye of shock absor-

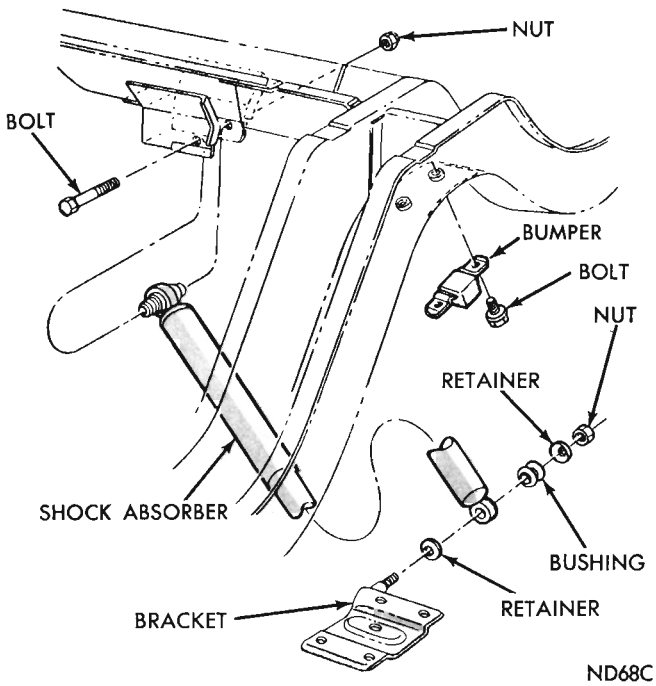


Fig. 7 - Rear Shock Absorber (Barracuda-Satellite)

ber with that of lower control arm mounting holes. Install bolt (from rear side only on Valiant) and nut and tighten to 50 foot-pounds with the full weight of vehicle on the wheels.

Rear-Removal (Figs. 6, 7 and 8)

(1) Raise vehicle on hoist to a comfortable working position.

(2) Using floor stands under axle assembly, raise axle to relieve load on shock absorber.

(3) Loosen and remove nut and retainer attaching shock absorbers to spring plate mounting stud and remove shock absorber from stud.

On Chrysler and Imperial models, loosen and remove nut and retainer attaching shock absorber to spring seat isolator retainer and remove shock absorber from stud.

(4) Loosen and remove nut and bolt from upper shock absorber mounting, and remove shock absorber. (On Barracuda models it is necessary to remove rubber plug in luggage compartment to gain access to upper mounting bolt nut, in order to remove). (Other models remove nut and washer and remove shock absorber).

(5) Inspect appearance of shock absorber mounting bushings and if they appear damaged or deteriorated, remove and replace.

(6) Test and expel air from shock absorber before installation, see "Testing and Expelling Air" procedure.

Installation

(1) Position and align upper eye of shock absor-

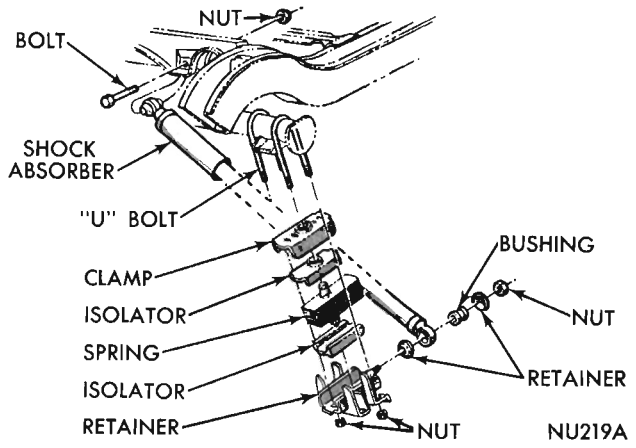


Fig. 8 - Rear Shock Absorber (Fury-Chrysler-Imperial)

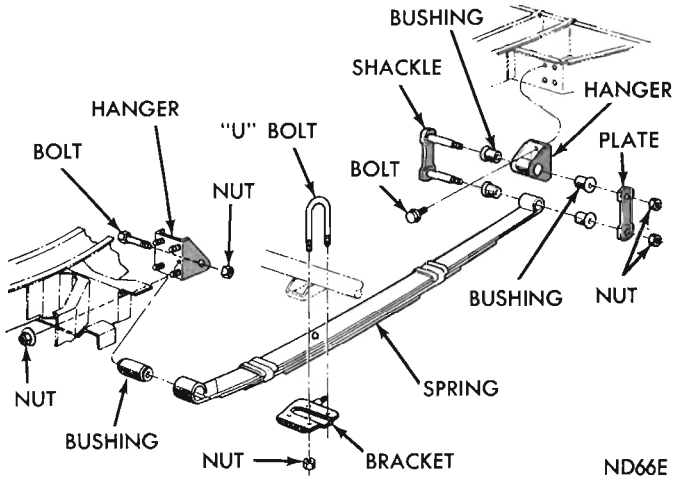


Fig. 9 - Rear Spring (Valiant)

ber with mounting holes in crossmember and install bolt and nut. Do not fully tighten. On Valiant models position washer on shock absorber mounting stud and install shock absorber on stud followed by remaining cupped washer and nut.

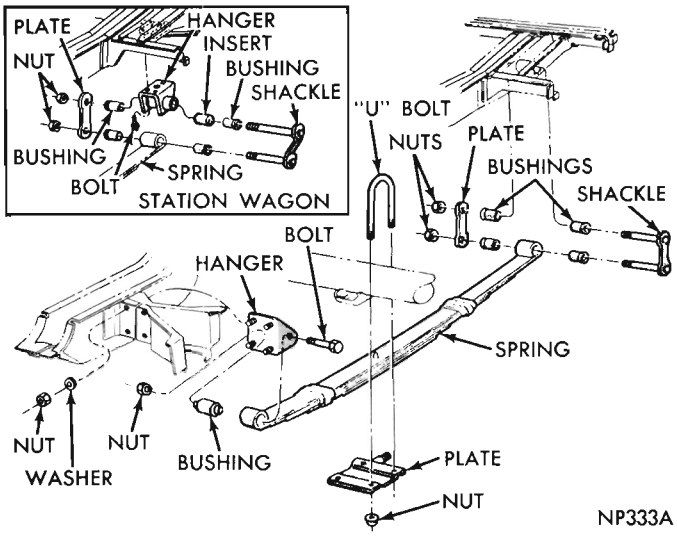
(2) Position washer on shock absorber mounting stud and install shock absorber on stud followed by remaining cupped washer and nut. DO NOT fully tighten.

(3) **Lower vehicle until full weight of vehicle is on the wheels.** Tighten upper nut 70 foot-pounds, (Vailant 50 foot-pounds). Tighten lower nut 50 foot-pounds. (On Barracuda models reinstall rubber plug in floor pan of luggage compartment).

REAR SPRINGS

Measuring Spring Height (Figs. 9, 10 and 11).

When measuring rear spring heights, vehicle should be placed on a level floor, have correct front suspension height on both sides, correct tire pressures, no passenger or luggage compartment



Fig; 10 - Rear Spring (Barracuda-Satellite)

load and a full tank of fuel.

(1) Jounce car several times (front bumper first). Release bumpers at same point in each cycle.

(2) Measure shortest distance from highest point on underside of rear axle bumper strap (at rear of bumper) to top of axle housing.

(3) Measure both right and left sides.

If these measurements vary by more than 3/4 inch (side to side), it is an indication that one of the rear springs may need replacing.

It is normal for rear springs to show some reverse arch, even with no load, so appearance alone should not be reason for spring replacement.

REPLACEMENT

Removal

(1) Raise vehicle on hoist to a comfortable working position.

(2) Using floor stands under axle assembly, raise axle assembly to relieve weight on rear spring.

(3) Disconnect rear shock absorber at spring plate lower mounting stud. Lower axle assembly, permitting rear springs to hang free. (On some Barracuda models disconnect rear sway bar links).

(4) Loosen and remove "U" bolt nuts and remove "U" bolts and spring plate.

(5) Loosen and remove the nuts holding front spring hanger to body mounting bracket.

(6) Loosen and remove rear spring hanger bolts and let spring drop far enough to pull front spring hanger bolts out of body mounting bracket holes. (Barracuda models, loosen and remove rear shackle nuts, plate and remove shackle, which will let spring be easily removed).

(7) Loosen and remove front pivot bolt from front spring hanger.

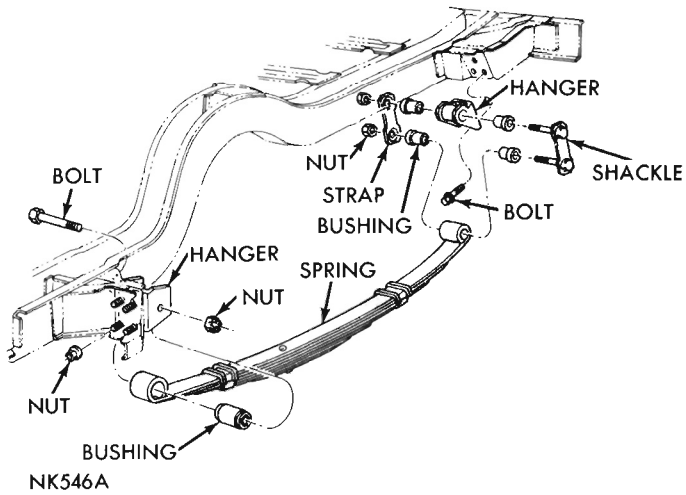


Fig. 11 - Rear Spring (Fury-Chrysler-Imperial)

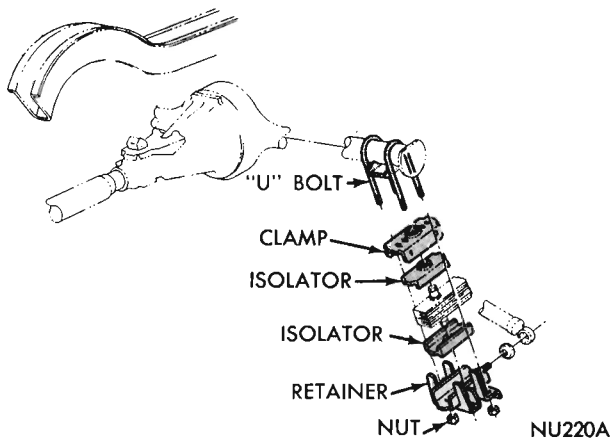


Fig. 12 - Rear Spring Isolator (Fury-Chrysler-Imperial)

(8) Loosen and remove shackle nuts and remove shackle from rear spring.

Installation

Inspect rear spring front pivot bolt bushing and if necessary, replace bushing, see "Pivot Bushing Replacement" procedure.

(1) Assemble shackle and bushings in rear of spring and rear spring hanger. **(Do not lubricate rubber bushings.)** Start shackle bolt nut.**Do not tighten.** Barracuda models position bushings into spring eye followed by lower shackle bolt and raise spring into position. Insert upper bushings into hanger and install shackle bolt. Install plate and nuts. **Do not tighten.**

(2) Assemble front spring hanger to front spring eye and install pivot bolt and nut. **Do not tighten.**

(3) Position rear spring hanger to body bracket and install bolts and tighten bolts to 30 foot-pounds.

(4) Raise the spring and start the spring hanger bolts in mounting bracket holes (light leverage such as mechanics shoulder under spring might be

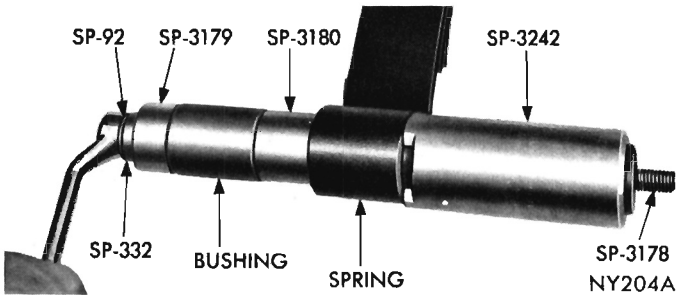


Fig. 13-Pivot Bushing Replacement

necessary to position spring hanger studs in mounting bracket holes). Install nuts and tighten to 30 foot-pounds.

(5) Lower axle assembly into correct position with axle centered over spring center bolt.

(6) Position the lower spring plate, (upper isolator over center bolt followed by upper clamp, bottom isolator and retainer Fury - Chrysler - Imperial - Fig. 12) install "U" bolts and nuts. Tighten to 40 foot - pounds (Valiant - Satellite - Barracuda with 7-1/4 inch axle) and 45 foot - pounds on models having other axles.

(7) Install shock absorber on stud and tighten nut 50 foot-pounds. (Connect sway bar link if applicable).

(8) Lower vehicle to floor and with full weight of vehicle on the wheels, tighten pivot bolts and/or nuts 85 foot-pounds on (Valiant), and 125 foot-pounds on all other models. Tighten shackle nuts 30 foot-pounds on (Valiant), and 40 foot-pounds on all other models.

(9) It is recommended that after a rear spring has been replaced, that the vehicle be driven and the front suspension heights be remeasured and corrected if necessary.

Pivot Bushing Replacement

The removal of old bushings and installation of new bushings is performed in one operation, using Tool C-3709, or Tool C-3729 (Valiant models) (Fig. 13).

(1) Raise vehicle on hoist to a comfortable working position.

(2) Using floor stands under axle assembly, raise axle assembly to relieve weight on rear spring.

(3) Disconnect rear shock absorber at spring plate lower mounting stud. Lower axle assembly, permitting rear springs to hang free.

(4) To replace front pivot bushing, remove rear spring front hanger from body bracket. Remove pivot bolt and hanger from spring.

(5) Place new bushings on Tool C-3709 or Tool C-3729 (Valiant models) (Fig. 13). Arrange tool in spring eye, then press out old bushing while pressing new bushing in one operation.

(6) Assemble front hanger to spring but do not tighten pivot bolt nut until full weight of vehicle is on wheels.

(7) Attach spring hanger to body bracket and tighten mounting bolts to 30 foot-pounds.

(8) To replace rear spring shackle bushings remove rear spring hanger from body bracket. Remove shackle, then slide bushings out of spring and hanger.

(9) Insert new bushings in spring and hanger then assemble shackle and hanger on spring. Start shackle bolt nuts.

(10) Attach hanger to body bracket and tighten mounting bolt to 30 foot-pounds.

(11) Lower vehicle to floor and with full weight of vehicle on the wheels, tighten pivot bolt and/or nuts 85 foot-pounds on (Valiant), and 125 foot-pounds on all other models. Tighten shackle nuts 30 foot-pounds (Valiant), 40 foot-pounds on all other models.

(12) Reinstall shock absorber on spring plate stud and tighten to 50 foot-pounds.

Spring Interliner Replacement

Removal

(1) Raise vehicle on hoist to a comfortable working position.

(2) Using floor stands under axle assembly, raise axle assembly to relieve weight on rear spring.

(3) Disconnect rear shock absorber at spring plate lower mounting stud. Lower axle assembly, permitting rear springs to hang free.

(4) Remove spring alignment clips and discard. (On Fury, Chrysler and Imperial models, retain clips for re-installation).

(5) Using a tapered pry bar or screwdriver, separate spring leaves and remove interliners.

(6) Keeping spring leaves separated, clean mating area of both spring leaves throughly. **If rust or corrosion is evident, wrap fine sandpaper around a flat file or putty knife and sand until area is smooth and clean.**

Installation

(1) With spring leaves still separated, insert new interliner with retaining buttons in alignment with locating holes.

(2) Press retaining buttons into retainer holes and remove pry bar or screwdriver from spring leaves.

(3) Repeat above procedure for balance of interliners. **(Do not lubricate interliners.)**

(4) Install new alignment clips (On Fury, Chrysler and Imperial models, reinstall old clips).

(5) Reinstall shock absorber on spring plate stud and install washer and nut, tighten to 50 foot-pounds.

(6) Lower vehicle onto its wheels.

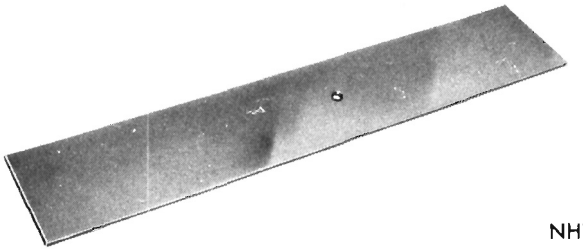


Fig. 14 - Zinc Interleaf

Zinc Interleaf

To remove or install zinc interleaves (Fig. 14) between spring leaves, it will be necessary to remove center bolt and disassemble spring leaves. Tighten spring center bolt nut 10 foot-pounds.

SPECIFICATIONS

REAR SPRINGS	Valiant	Barracuda	Satellite	Fury	Newport	300	New Yorker	Imperial
Type			Semi-Elliptical					
NUMBER OF LEAVES								
Standard					5	6	6	7
(198 CI Engine)	5							
(225 CI Engine)	5	4-1/2	4-1/2					
(318 CI Engine)	5	4-1/2	4-1/2	4				
(340 CI Engine)	6			4				
(360 CI Engine)				4				
(383 CI Engine)	6	4-1/2	4-1/2	4				
(426 Hemi or 440 CI Engine)*		5-1/2	6,5-2/2	7				
Heavy Duty	6	4-1/2	4-1/2	7	7	7	7	7
Station Wagon (Standard)			4-1/2	7	7			
Heavy Duty			5-1/2	7	7			6-1/2
Taxi			4-1/2	7				
Police			6	6-1/2				
LENGTH (Inches)	55	57	58	62	62	62	62	62
WIDTH (Inches)	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2	2-1/2
MOUNTING								
Front			Rubber Bushing					
Rear			Shackle Rubber Bushing					
SHOCK ABSORBERS								
Type			Double Acting					
Mounting			Rubber Bushing					

* Models equipped with 426 Hemi or 440 CI (Satellite Only) High Performance Engine use 6 full spring leaves on left side and 5 leaves plus two 1/2 leaves forward of axle on right side. Chrysler 300 and New Yorker have 7 leaves.

TIGHTENING REFERENCE

	Foot Pounds
REAR SPRINGS	
Center Bolt Nut	10
Front Hanger Nut	30
Pivot Bolt or Nut (Except Valiant)	125
Valiant	85
Rear Hanger Bolt	30
Shackle Nut(Except Valiant)	40
Valiant	30
"U" Bolt Nut (Except 7-1/4" Axle)	45
(7-1/4" Axle)	40

	Foot Pounds
SHOCK ABSORBERS	
Front	
Lower Bolt Nut	50
Upper Shaft Nut	25
Rear	
Lower Stud Nut	50
Upper Bolt Nut (Except Valiant)	70
Upper Stud Nut-Valiant	50
SWAY BAR—(Barracuda)	
Shaft Bracket Retaining Screw	200
Link Nut	100

STEERING

CONTENTS

	Page		Page
MANUAL GEAR	1	PUMPS	22
POWER GEAR	8	STEERING COLUMNS	36

MANUAL STEERING GEAR

INDEX

	Page		Page
Adjustments	2	Gear Removal	3
General Information	1	Cross Shaft Oil Seal	7
Service Diagnosis	1	Gear Installation	3
Gear Reconditioning	4	Specifications	60
		Tightening Reference	62

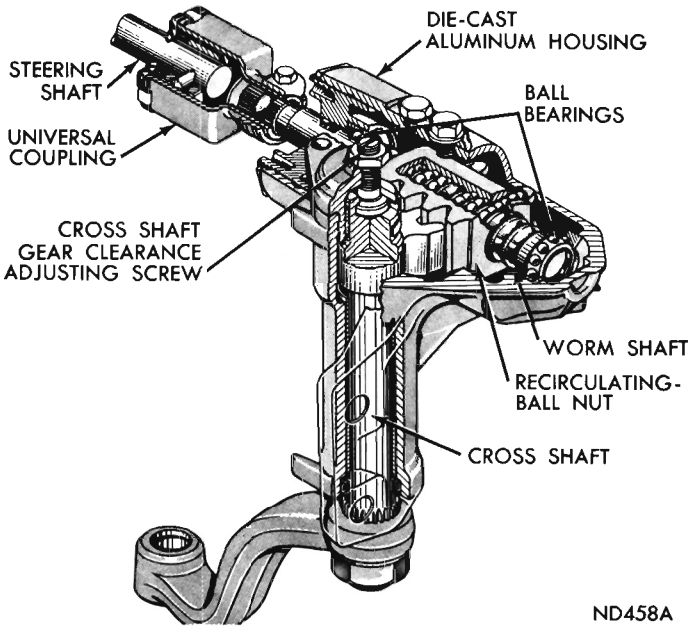


Fig. 1 - Steering Gear Cross Section

GENERAL INFORMATION

The manual steering gear (Fig. 1) is designed to provide easy steering with minimum friction in the steering gear. A ball nut travels up or down on the wormshaft, riding on recirculating balls acting as a screw thread.

The wormshaft and ball nut assembly is supprot-ed in the gear housing by an adjustable ball thrust type upper and lower bearing. The lower bearing cup is pressed into the gear housing, and the upper bearing cup is pressed into the worm-shaft bearing adjuster.

The cross shaft is integral with the sector gear. The sector gear meshes with the rackteeth on the re-circulating ball nut. Adjustment at this point is controlled by the cross shaft adjusting screw which extends through the housing cover.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARD STEERING	(a) Low or uneven tire pressure.	(a) Inflate tires to recommended pressures.
	(b) Insufficient lubricant in the steering gear housing or in steering linkage.	(b) Lubricate as necessary.
	(c) Steering gear shaft adjusted too tight.	(c) Adjust according to instructions.
	(d) Front wheels out of line.	(d) Align the wheels. See "Front Suspension."

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
PULL TO ONE SIDE (Tendency of the Vehicle to veer in one direction only)	(a) Incorrect tire pressure.	(a) Inflate tires to recommended pressures.
	(b) Wheel bearings improperly adjusted.	(b) See "Front Wheel Bearing Adjustment."
	(c) Dragging brakes.	(c) Inspect for weak, or broken brake shoe spring, binding pedal.
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment Group."
	(e) Incorrect toe-in.	(e) See "Front Wheel Alignment Group."
	(f) Grease, dirt, oil or brake fluid in brake linings.	(f) Inspect, replace and adjust as necessary.
	(g) Front and rear wheels out of alignment.	(g) Align the front wheels. See "Front Suspension Group"
	(h) Broken or sagging rear springs.	(h) Replace rear springs.
	(i) Bent suspension parts.	(i) Replace parts necessary.
WHEEL TRAMP (Excessive Vertical Motion of Wheels)	(a) Incorrect tire pressure.	(a) Inflate tires to recommended pressures.
	(b) Improper balance of wheels, tires and brake drums.	(b) Lubricate as necessary.
	(c) Loose tie rod ends or steering connections.	(c) Inspect and repair as necessary.
	(d) Worn or inoperative shock absorbers.	(d) Replace shock absorbers as necessary.
EXCESSIVE PLAY OR LOOSENESS IN THE STEERING WHEEL	(a) Steering gearshaft adjusted too loose or badly worn.	(a) Replace worn parts and adjust according to instructions.
	(b) Steering linkage loose or worn	(b) Replace worn parts. See "Front Wheel Alignment."
	(c) Front wheel bearings improperly adjusted.	(c) Adjust according to instructions.
	(d) Steering arm loose on steering gear shaft.	(d) Inspect for damage to gear shaft and steering arm, replace parts as necessary.
	(e) Steering gear housing attaching bolts loose.	(e) Tighten attaching bolts according to tigntening reference.
	(f) Steering arms loose at steering knuckles.	(f) Tighten according to tightening reference.
	(g) Worn ball joints.	(g) Replace ball joints as necessary. See "Front Suspension."
	(h) Steering gear adjustment too loose.	(h) Adjust worm bearing pre-load according to instructions.

SERVICE PROCEDURES

Adjustments

Two adjustments are provided in the steering gear (Fig. 2). The worm bearing pre-load adjustment, and the ball nut rack sector gear mesh adjustment.

Before the correct adjustment can be made at the ball nut rack and the sector gear, it must be determined that the worm bearing pre-load is properly adjusted.

The worm bearing pre-load adjustment is controlled by the worm thrust bearing adjuster which threads into the housing at the upper end of the wormshaft.

Worm Bearing Pre-Load

(1) Disconnect steering gear arm from cross shaft with Tool C-3646 (Fig. 3).

(2) Remove horn button or horn ring.

(3) Loosen cross shaft adjusting screw lock nut, and back out adjusting screw approximately two turns. This will relieve any friction load which

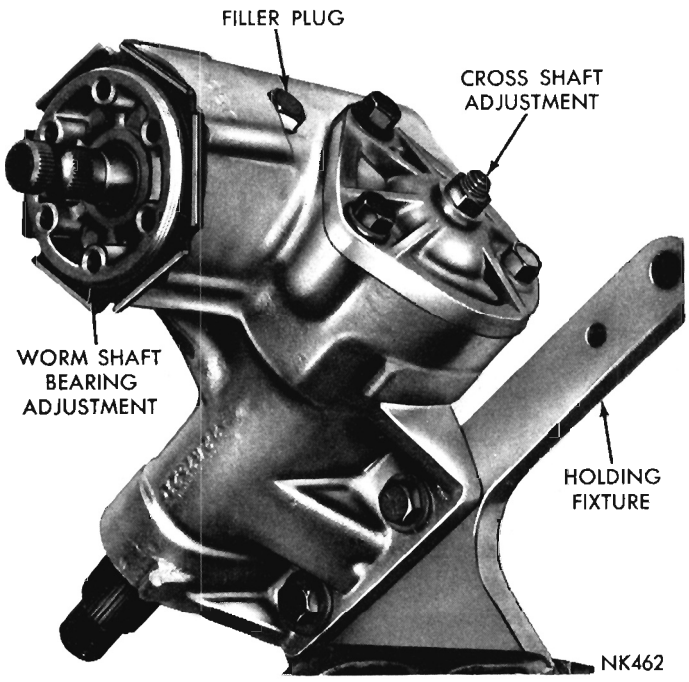


Fig. 2 - Gear Adjustment Locations

may be present at the closely meshed ball nut rack and sector gear teeth.

(4) Turn steering wheel two complete turns from straight ahead position, and place torque wrench Tool C-3380 on steering shaft nut.

(5) Rotate steering shaft at least one turn toward straight ahead position, while testing rotating torque with torque wrench.

The torque required to keep wheel moving should be between 1-1/2 and 4-1/2 inch-pounds. If reading is not within these limits, adjustment can be made, in or out of the vehicle as follows:

(a) Loosen adjuster lock nut.

(b) Use adjuster wrench from Tool C-3884 set and turn adjuster clockwise to increase pre-load, or counterclockwise to decrease pre-load,

(c) While holding adjuster from turning, tighten lock nut securely, then retest worm bearing pre-load.

Ball Nut Rack and Sector Mesh

The cross shaft adjusting screw, located in housing cover, raises or lowers shaft to provide proper mesh load between tapered teeth of sector gear and tapered teeth of ball nut. **This adjustment can be accurately made only after proper worm bearing preload has been established.**

(1) Turn steering wheel gently from one stop to the other, carefully counting number of turns. Turn steering wheel back exactly half way, to center position.

(2) Turn cross shaft adjusting screw clockwise to take out all lash between ball nut rack and sector gear teeth, then tighten adjusting screw lock nut to 35 foot-pounds.

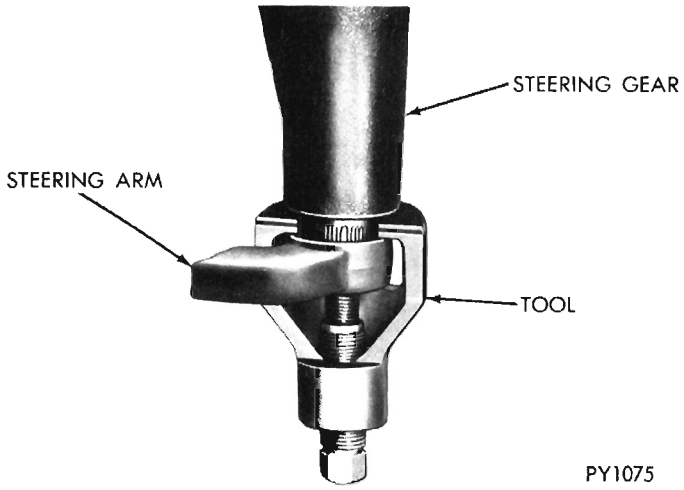


Fig. 3 - Removing Steering Gear Arm

(3) Turn steering wheel about 1/4 turn away from center of "high spot" position. Then, using torque wrench Tool C-3380, at steering wheel nut, measure torque required to rotate steering wheel through high spot at center position. The reading should be between 8 and 11 inch-pounds. This represents the total of worm shaft bearing pre-load and ball nut rack and sector gear mesh load. Readjust cross shaft adjustment screw if necessary, to obtain proper torque reading.

(4) After adjustments have been completed, place front wheels in a straight ahead position, and with steering gear and steering - wheel centered, install steering arm on cross shaft.

(5) Tighten steering arm retaining nut to 180 foot-pounds.

Gear Removal

To avoid damage to the energy absorbing steering column, it is recommended that the steering column be completely detached from floor and instrument panel before steering gear is removed. See Steering Column Section of this manual for proper removal, alighment and installation procedure.

(1) Remove steering column.

(2) From under vehicle, remove steering arm retaining nut and lock washer. Remove steering arm with Tool C-3646 (Fig. 3).

(3) Remove gear to frame retaining bolts and remove gear.

Installation

(1) Position gear on frame and install gear to frame retaining bolts and lock washers. Tighten to specifications.

(2) Rotate worm shaft by hand and center cross shaft to mid point of its travel. Align master serration on cross shaft with splines in steering arm.

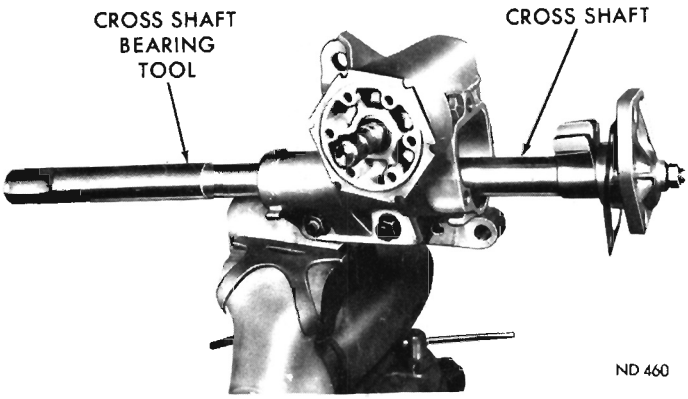


Fig. 4 - Removing Cross Shaft

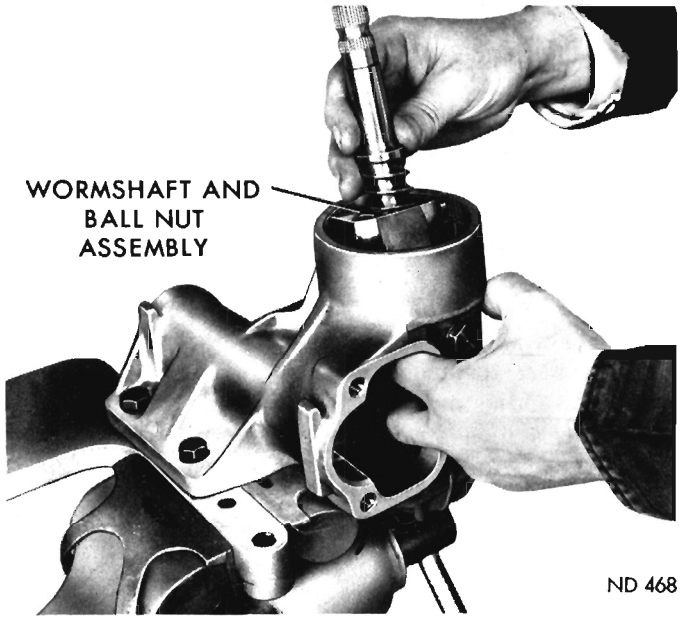


Fig. 6 - Removing Worm Shaft and Ball Nut Assembly

Install steering arm with lock washer and nut. Tighten to specifications.

(3) Align and install steering column as outlined. (See "Steering Columns").

Worm Shaft Replacement

The master serration on the steering gear worm shaft spline, used for centering the steering shaft coupling, is machined after the steering gear is completely assembled.

If it should become necessary to replace a steering gear worm shaft, it will be necessary to file a master serration on the spline of the worm shaft, since the replacement part does not have a master serration machined in the spline.

To file a master serration on a worm shaft spline, the steering gear must be completely assembled and the worm shaft centered in its travel, then with the steering gear in its normal upright

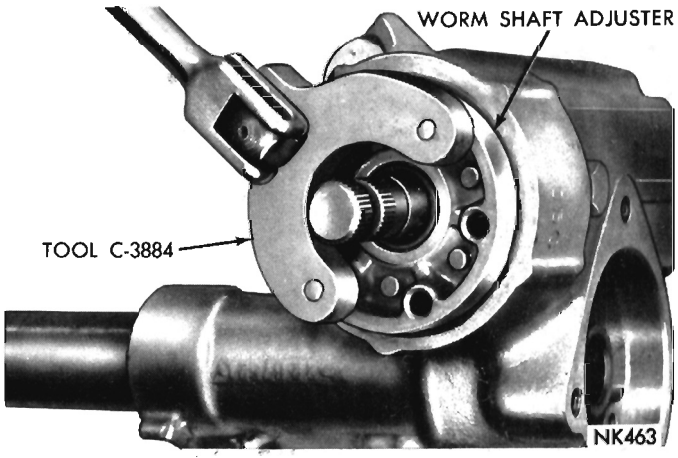


Fig. 5 - Removing Worm Shaft Adjuster

position remove one tooth of the spline, at the 12 o'clock position, with a suitable file.

Gear Reconditioning

Thoroughly clean entire outside surface of steering gear before disassembly to avoid contaminating wormshaft and ball ball nut assembly with dirt or grit.

(1) Attach steering gear to holding fixture, Tool C-3323 and install holding fixture in a vise (Fig. 2).

(2) Loosen cross shaft adjusting screw lock nut, and back out screw about two turns to relieve load caused by close mesh between ball nut rack and sector gear teeth. **Remove cross shaft seal as outlined in "Cross Shaft Oil Seal Replacement."**

(3) Position steering wormshaft in straightahead position.

(4) Remove bolts from cross shaft cover and slowly remove cross shaft while sliding arbor tool into housing. Use Tool C-3875 for 1-1/8 inch diameter cross shaft and Tool C-3786 for 1-1/4 inch diameter cross shaft, (Fig. 4)

(5) Remove lock nut from cross shaft adjusting screw and remove screw from cover by turning screw clockwise.

(6) Slide adjustment screw and shim out of slot in end of cross shaft.

(7) Loosen wormshaft bearing adjuster lock nut with a soft drift and remove lock nut. Hold wormshaft from turning while unscrewing adjuster, using tool wrench from Tool Set C-3884 (Fig. 5).

(8) Slide wormshaft adjuster off shaft.

CAUTION: The adjuster must be handled carefully to avoid damage to aluminum threads.

Be careful that the ball nut does not run down to either end of the wormshaft as the ball guide ends can be damaged if the ball nut is allowed to rotate until stopped at the end of the worm.

(9) Carefully remove worm and ball nut assem-

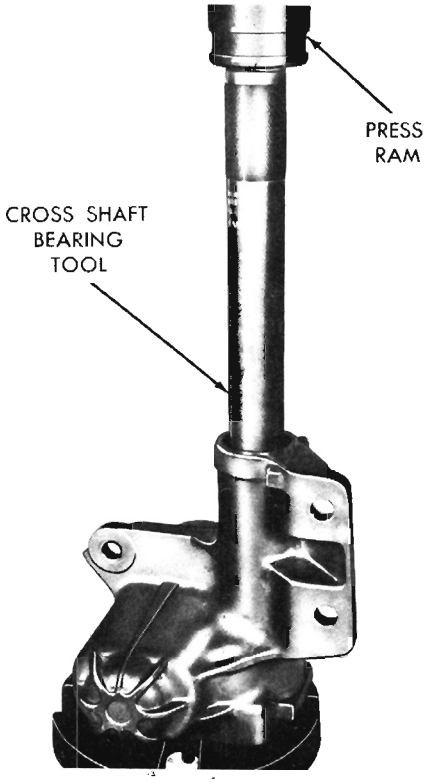


Fig. 7 - Removing Cross Shaft Inner and Outer Bearings

bly (Fig. 6).

The ball nut and wormshaft are serviced as an assembly only, and are not to be disassembled. Do not remove or disturb ball return guides. **Place ball nut and wormshaft assembly in a clean place.**

(10) Remove cross shaft needle bearing (if so equipped) by placing steering gear housing in an arbor press; insert Tool C-3875 (1-1/8 inch shaft), or Tool C-3786 (1-1/4 inch shaft), with adapter ring in lower end of housing (Fig. 7) and press both bearings through housing. For Tool -C-3786 no adapter ring is required.

CAUTION: The adapter ring must be used with remover and installer arbor Tool C-3875 otherwise bearings will be crushed.

Housings equipped with cross shaft bushings are serviced as an assembly only. The cross shaft cover assembly, including a needle bearing or bushing, is serviced as an assembly.

(11) Remove wormshaft oil seal from wormshaft bearing adjuster, by inserting a blunt punch behind seal and tap alternately on each side of seal until seal is driven out of adjuster.

(12) Remove wormshaft upper bearing cup in same manner. However, this must be done carefully to avoid cocking the bearing cup and distorting adjuster counterbore.

(13) Remove lower cup if replacement is necessary by positioning locking head jaws of remover

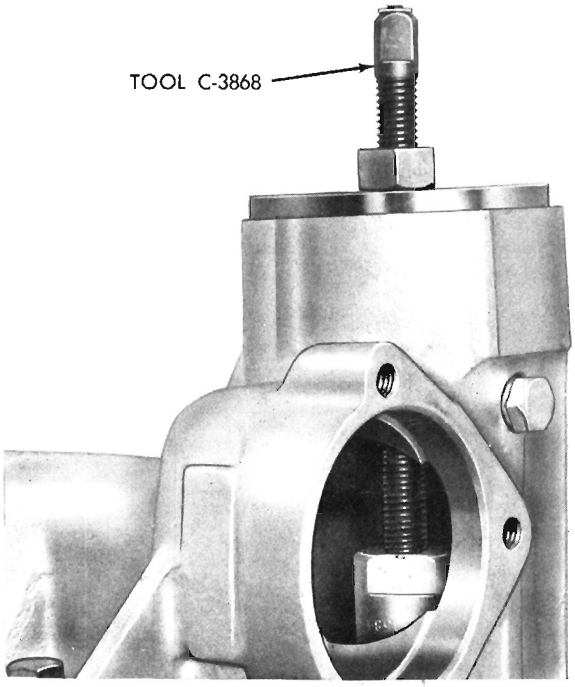


Fig. 8 - Removing Lower Bearing Cup

Tool C-3868 (Fig. 8) behind the bearing cup and expanding remover head by pressing down on center plunger of tool. Withdraw bearing cup by turning remover screw nut in clockwise direction while holding center screw.

(14) Wash all parts in clean solvent and blow dry with compressed air.

(15) Test operation of ball nut assembly on wormshaft. If ball nut does not travel smoothly and freely on wormshaft and there is roughness or binding, assembly must be replaced.

(16) Extreme care is necessary when handling aluminum worm bearing adjuster to avoid damaging threads. It is equally important to avoid damaging mating threads in gear housing. The wormshaft adjuster must **never** be screwed into housing without lubrication, or when threads are dirty or damaged. These precautions **must** be taken to avoid "picking up" threads and ruining the housing and/or wormshaft bearing adjuster.

(17) Inspect cross shaft for wear and check fit of shaft in housing bearings. Inspect fit of shaft pilot in cover bearing. Make sure the wormshaft has not been bent or otherwise damaged.

(18) Cross shaft and wormshaft oil seals should be replaced when unit is reconditioned.

(19) Install cross shaft outer needle bearing by placing bearing on end of Tool C-3875 for 1-1/8 inch diameter cross shaft or Tool C-3786 with adapter ring, for 1-1/4 inch shaft Press bearing into housing to 7/16 inch below end of bore for 1-1/8 inch shaft and 1/2 inch below for 1-1/4 inch shaft to to provide space for oil seal.

CAUTION: The adapter ring must be used with

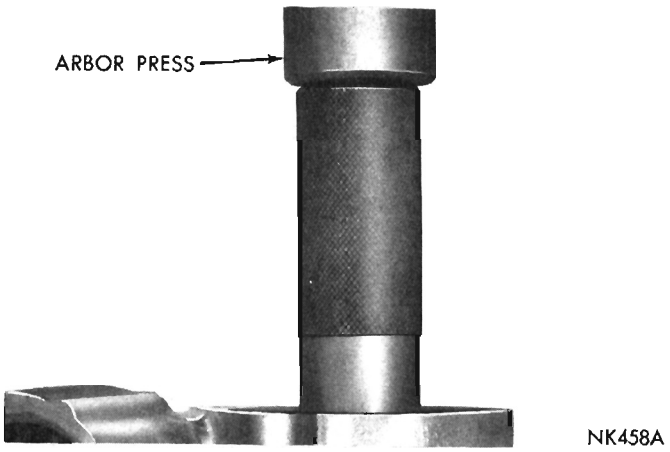


Fig. 9 - Installing Inner Bearing

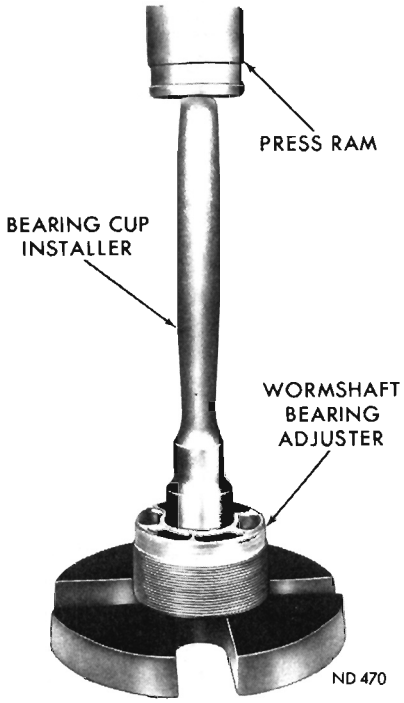


Fig 11 - Installing Worm Shaft Upper Bearing Cup

remover and installer arbor Tool C-3875 and Tool C-3786 otherwise bearings will be crushed.

(20) Install inner needle bearing by placing bearing on Tool C-3875 with adapter ring or Tool C-3786 (Fig. 9). Press bearing into inside end of housing bore flush with inside end of bore surface.

(21) To install wormshaft bearing cups, position cups in housing and bearing adjuster nut. Then press them in place with Tool C-3865 (Figs. 10 and 11).

(22) Install wormshaft oil seal by positioning seal in wormshaft adjuster with seal metal retainer **UP.** Drive seal into place with a suitable sleeve so it is slightly below end of bore in adjuster.

(23) Apply a coating of steering gear lubricant to all moving parts during assembly, also palce

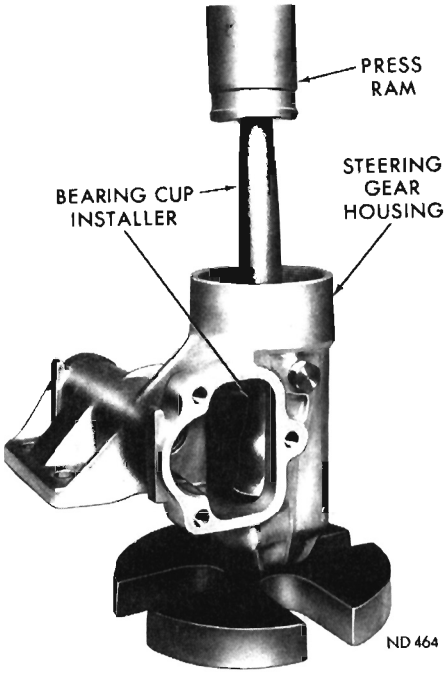


Fig. 10 - Installing Worm Shaft Lower Bearing Cup

lubricant on and around oil seal lips.

(24) Clamp holding fixture and housing in a vise with bearing adjuster opening upward.

(25) Place a thrust bearing in lower cup in housing.

(26) Hold ball nut from turning (Fig. 6), and insert wormshaft and ball nut assembly into housing with end of worm resting in thrust bearing.

(27) Place upper thrust bearing on wormshaft. Thoroughly lubricate threads on adjuster and threads on housing.

(28) Place a protective sleeve of plastic tape over wormshaft splines so splines do not damage seal. Slide adjuster assembly over shaft.

(29) Thread adjuster into steering housing, and with Tool wrench C-3884 and splined nut set, tighten adjuster to 50 foot-pounds while rotating wormshaft. This is done to effectively seat bearings.

(30) Loosen adjuster so no bearing pre-load exists. Then, using torque wrench Tool C-3380, adjust wormshaft bearing pre-load from 1-1/8 to 4-1/2 inch-pounds.

(31) After adjusting preload, tighten bearing adjuster lock nut, and retest to be sure preload remains between 1-1/8 and 4-1/2 inch-pounds.

(32) Before installing cross shaft, pack wormshaft cavities in housing above and below the ball nut with steering gear lubricant. Use steering gear lubricant whenever possible, but if not available, a good grade of multi-purpose, lubricant may be used. Do not use gear oil. When gear is properly packed with steering gear lubricant it will contain eleven fluid ounces of lubricant, and level of lubri-

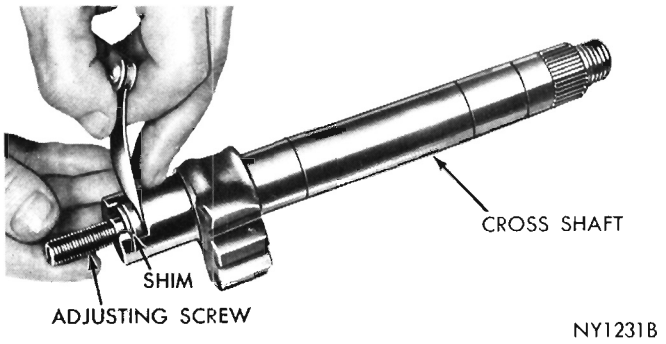


Fig. 12 - Measuring Cross Shaft Adjusting Screw End Clearance.

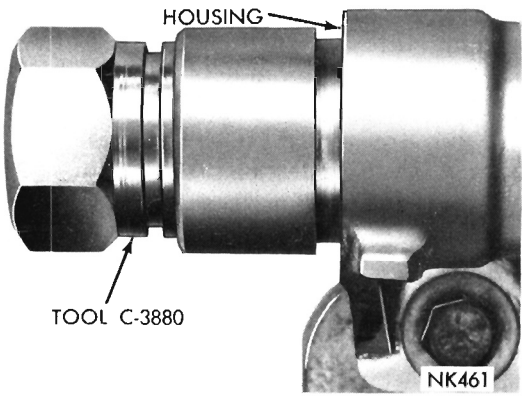


Fig. 14 - Installing Cross Shaft Oil Seal

cant will be at top of worm.

(33) Slide cross shaft adjusting screw and shim into slot in end of shaft.

(34) Test end clearance (Fig. 12). The screw must be free to turn with zero to .004 inch end play. Three different thickness shims are available to obtain specified clearance.

(35) Start cross shaft and adjuster screw into bearing in housing cover. Then, using a screw driver through hole in cover, turn screw counterclockwise to pull shaft into cover.

(36) Install adjusting screw lock nut, but do not tighten at this time.

(37) Rotate wormshaft to centralize ball nut.

(38) Place new cover gasket on housing cover.

(39) Carefully install cross shaft and cover assembly into steering gear housing (Fig. 4). **Coat the cross shaft and sector teeth with steering gear lubricant before installing cross shaft in housing.**

(40) Make certain some lash exists between cross shaft sector teeth and ball nut rack then install and tighten the cover bolts to 25 foot-pounds.

(41) Position cross shaft seal on cross shaft with lip of seal facing gear housing. Place installing adapter SP-3828 from Tool C-3880 against seal with **short step** toward seal (Fig. 14). Position nut from Tool C-3880 on cross shaft and turn it

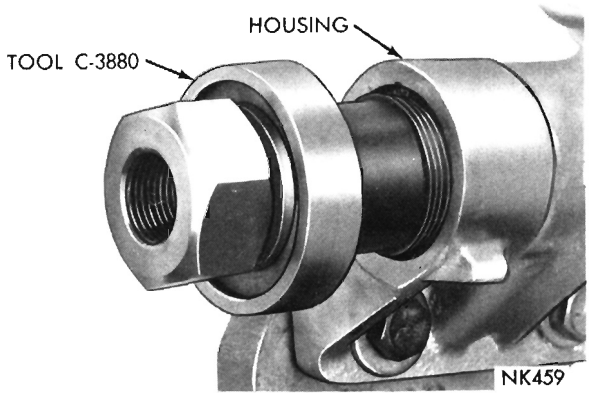


Fig. 13 - Removing Cross Shaft Oil Seal

down against adapter, pressing seal into housing until step on adapter contacts end of housing. Remove tool.

(42) Turn worm shaft about 1/4 turn away from center of "high-spot" position. Using torque wrench C-3380 and 3/4 inch socket on worm shaft spline, check torque required to rotate shaft through high spot at center position. The reading should be between 8 and 11 inch pounds. Readjust cross shaft adjusting screw as necessary to obtain proper torque reading. Tighten lock nut to 35 foot-pounds and recheck cross shaft torque.

Cross shaft Oil Seal Replacement

The cross shaft oil seal may be replaced by the following procedure either on the bench, or without removing steering gear from vehicle.

CAUTION: When replacing oil seal in vehicle, clean the exposed portion of cross shaft to help prolong oil seal life.

(1) Remove steering gear arm retaining nut and lock washer. Remove arm with Tool C-3646 (Fig. 3).

Use Tool C-3880 to service cross shaft seal. The tool consists of adapter SP-3056; half rings SP-1932 and nut SP-3610.

(2) Slide threaded adapter over end of cross shaft and install nut portion of tool on shaft. (Fig. 13).

Maintain pressure on adapter with tool nut while screwing adapter into seal until it grips oil seal firmly. Place two half rings and retainer over both portions of tool. Turn tool nut counterclockwise to withdraw seal from housing.

(3) Place seal onto splines on cross shaft with lip of seal facing gear housing.

(4) Place installing adapter SP-3052 from Tool C-3880 against seal. Press seal in until a gap of 1/4 inch exists between adapter and housings (Fig. 14).

(5) Place nut down from Tool Set C-3880 on cross shaft, and turn it down against adapter, pressing seal into housing until step on adapter

contacts end of housing.

(6) Remove tool, install steering arm, lock washer and retaining nut and tighten nut to 175 foot-pounds.

POWER—STEERING GEAR

INDEX

	Page
General Information	8
Service Diagnosis	10
Service in Vehicle	12
Cross Shaft Adjustment	12
Cross Shaft Oil Seal Replace	15
Valve Body Recondition	12
Service Out of Vehicle	15
Tests and Adjustments	21
Gear Reconditioning	15
Gear Installation	22
Gear Removal	15
Worm Shaft Oil Seal Replace	15
Specifications	60
Tightening Reference	62

GENERAL INFORMATION

The power steering gear consists of a gear housing containing a cross shaft with sector gear, a power piston with gear teeth broached into the side of the piston which is in constant mesh with the cross shaft sector, and a wormshaft connecting the steering wheel to the power piston through a pot type coupling. The wormshaft is geared to the piston through recirculating ball contact. The steering valve mounted on top of the steering gear, directs the flow of fluid in the system.

Fluid is supplied to the steering gear, by an engine driven constant displacement type pump through a pressure hose. Oil is returned to the pump reservoir from the steering gear through a return hose. (Figs. 1 and 2).

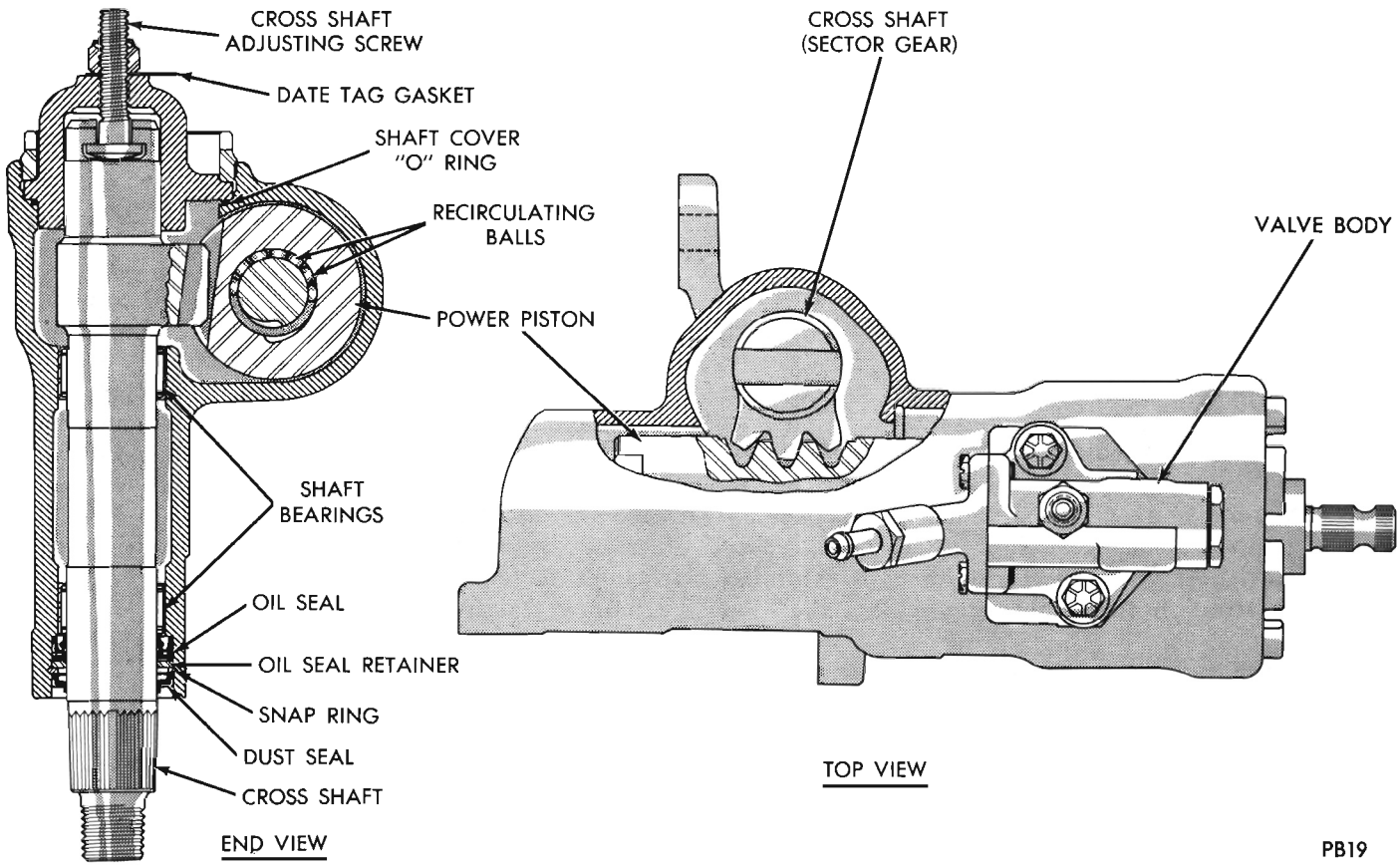


Fig. 1 - Cross Shaft Seal Alignment

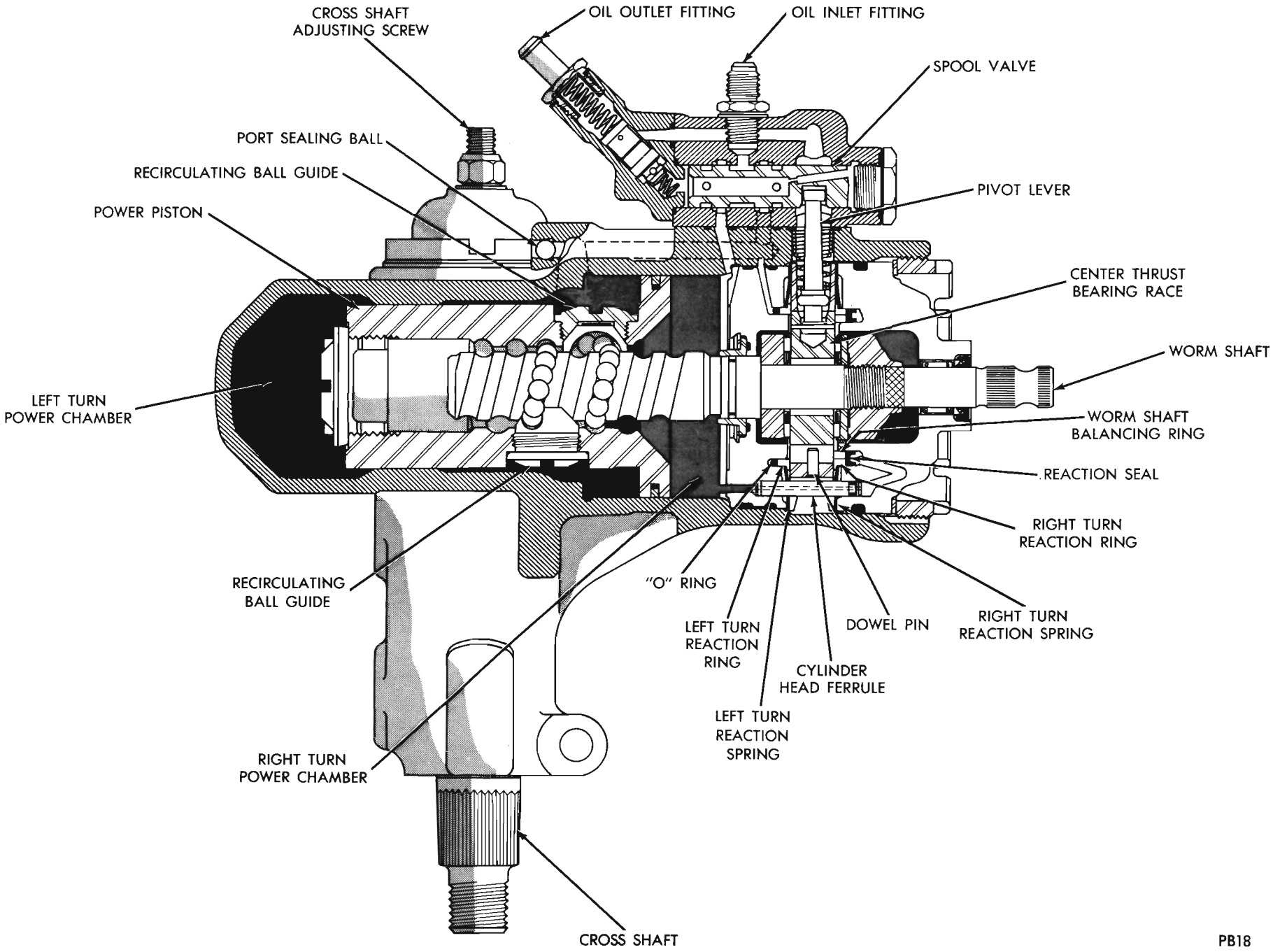


Fig. 2 - Power Steering Gear

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARD STEERING	(a) Tires not properly inflated.	(a) Inflate tires to recommended pressures.
	(b) Low oil level in pump reservoir (usually accompanied by pump noise).	(b) See "Fluid Level," Power Steering Pump.
	(c) Loose pump belt.	(c) See "Group 7—Cooling."
	(d) Improper caster and camber.	(d) See "Front Wheel Alignment" Front Suspension Group 2.
	(e) Power steering output low.	(e) Pressure test pump.
	(f) Steering linkage binding.	(f) Repair and lubricate as necessary.
	(g) Steering gear malfunctions.	(g) Adjust or repair as follows:
	1. Cross shaft adjustment too tight.	1. See "Cross Shaft Adjustment."
	2. Faulty or damaged valve lever.	2. Repair as necessary.
	3. External leakage.	3. Inspect for leakage at the lower cross shaft oil seal; the cross shaft cover "O" ring.
	4. Excessive internal leakage.	4. Recondition steering gear.
POOR RECOVERY FROM TURNS	(a) Tires not properly inflated.	(a) Inflate tires to recommended pressures.
	(b) Steering linkage binding.	(b) Repair and lubricate as necessary.
	(c) Improper wheel alignment.	(c) See "Front Wheel Alignment," Front Suspension Group 2.
	(d) Damaged steering tube bearing.	(d) Remove jacket tube and replace bearings.
	(e) Steering wheel column jacket and steering nut improplerly aligned.	(e) See "Gear Installation."
	(f) Steering gear malfunctions.	(f) Adjust or repair as follows:
	1. Improper cross shaft adjustment.	1. See "Cross Shaft Adjustment."
	2. Column support spanner nut loose.	2. Repair as necessary.
	3. Damaged valve lever.	3. Repair as necessary.
	4. Improper worm thrust bearing adjustment.	4. Recondition steering gear.
	5. Worn or damaged cylinder head worm seal ring or faulty worm piston ring.	5. Recondition steering gear.
	6. Burrs or nicks in the reaction ring grooves in the cylinder head or column support.	6. Repair as necessary.
	7. Dirt or chips in the steering gear unit.	7. Recondition steering gear.
	8. Rough worm in the piston assembly.	8. Recondition steering gear.
	9. Valve binding.	9. Replace valve assembly.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
CAR LEADS TO EITHER SIDE	(a) Tires not properly inflated.	(a) Inflate tires to recommended pressures; See "Wheels and Tires".
	(b) Improper wheel alignment.	(b) See "Front Suspension, Front Wheel Alignment." Group 2
	(c) Valve body out of adjustment.	(c) If vehicle leads to the left, move the steering valve housing up on the steering housing. If vehicle leads to the right, move the steering valve housing down on the steering housing.
	(d) Valve lever damaged.	(d) Repair as necessary.
	(e) Column support spanner nut loose.	(e) Repair as necessary.
	(f) Coupling not centered.	(f) Center coupling, Refer to "Gear Installation."
	(g) Internal leakage in the steering gear valve body.	(g) Replace the steering gear valve body assembly.
TEMPORARY INCREASES IN EFFORT WHEN TURNING STEERING WHEEL TO THE RIGHT OR LEFT	(a) Oil level low in pump reservoir.	(a) See -"Fluid Level."
	(b) Loose Pump Belts.	(b) See "Group 7-Cooling."
	(c) Oil on pump belts	(c) Replace the belt and adjust.
	(d) Binding steering linkage.	(d) Lubricate and repair as necessary.
	(e) Engine idle too slow.	(e) See "Fuel Specifications." Group 14
	(f) Air in the system.	(f) Work the steering wheel from right to left until the air is expelled.
	(g) Power steering pump output low.	(g) See Diagnosis "Hard Steering" correction (e).
	(h) Gear malfunction.	(h) Adjust and repair as outlined under "Hard Steering"condition and correction (g).
NOISES	(a) Buzzing noise in neutral and stops when the steering wheel is turned.	(a) Noisy pump, make pressure test and repair as necessary. Damaged hydraulic lines or interference of the hoses with components attached to the fender shield. Air in system; work steering wheel from right to left until the air is expelled.
	(b) Chucking noise. Cause as follows:	(b) Correct as follows:
	1. Improper cross shaft adjustment.	1. See "Cross Shaft Adjustment.
	2. Improper worm shaft thrust bearing adjustment.	2. Recondition steering gear."

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	3. Coupling loose on the worm shaft.	3. Inspect worm shaft splines for wear. Inspect coupling bolt for tightness, if loose, replace bolt and inspect worm shaft and coupling.
	4. Worm worm and piston assembly.	4. Replace worm and piston assembly.
	(c) Metallic clatter or hissing noise.	(c) Replace back pressure valve cushion.
	(d) Knocking condition at the bracket stop when the engine is running.	(d) Rubber stop worn or missing from pump bracket.
	(e) Loose pump belt.	(e) See Group 7 Cooling.
EXCESSIVE STEERING WHEEL FREE-PLAY	(a) Improper cross shaft adjustment.	(a) See "Cross Shaft Adjustment"
	(b) Column support spanner nut loose.	(b) Repair as necessary.
	(c) Improper worm thrust bearing adjustment.	(c) Repair as necessary.
	(d) Coupling loose on the worm shaft.	(d) Inspect wormshaft splines for wear.
	(e) Excessive worm-piston side play.	(e) Replace worm-piston assembly.
LACK OF ASSIST (One Direction)	(a) Oil leaking past worm shaft oil seal ring.	(a) Recondition steering gear.
	(b) Broken or worn ring on worm piston.	(b) Recondition steering gear.
	(c) Piston end plug loose.	(c) Replace the worm and piston assembly.
	(d) Reaction seal missing.	(d) Remove the steering gear and repair as necessary.
LACK OF ASSIST (Both Directions)	(a) Pump belt slipping.	(a) See Group 7.
	(b) Pump output low.	(b) Pressure test pump.
	(c) Broken or worn ring on worm piston.	(c) Recondition steering gear.
	(d) Piston end plug loose.	(d) Replace the worm and piston assembly.

SERVICE PROCEDURES

SERVICE IN VEHICLE

Cross Shaft Adjustment

(1) Disconnect center link from steering gear arm

(2) Start engine and run at idle speed.

(3) Turn steering wheel gently from one stop to the other, counting number of turns. Then turn wheel back exactly half way, to center position.

(4) Loosen adjusting screw until backlash is evident in steering gear arm. Feel backlash by holding end of steering gear arm between thumb and forefinger with a light grip. Tighten adjusting screw until backlash just disappears.

Continue to tighten to 3/8 to 1/2 turn from this position and tighten lock nut to 28 foot-pounds to maintain this setting.

Valve Body Recondition

(1) Disconnect high pressure and return hoses at the valve body and tie the ends above the reservoir fluid level.

(2) Remove two screws attaching valve body to main gear housing.

(3) Lift valve body upward to disengage from valve lever (Fig. 8).

(4) Remove the two screws attaching control

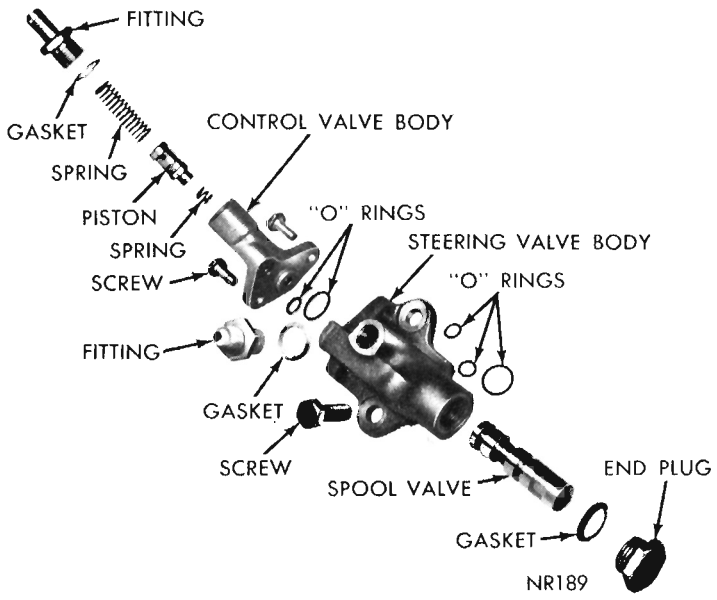


Fig. 3 - Valve Body (Disassembled View)

valve body to steering valve body and separate two bodies (Fig. 3).

(5) Remove outlet fitting, washer, spring, valve piston and cushion spring.

(6) Carefully shake out spool valve and inspect for nicks, burrs and scores. Do not remove valve body end plug unless inspecton indicates a leak at gasket. **If spool valve or valve body is damaged, replace valve and body assembly.**

Small burrs and nicks may be removed with crocus cloth if extreme care is used not to round off sharp edges of valve. The sharp edge is vitally important to operation of this valve.

(7) Clean valve bodies and valve piston thoroughly in clean solvent. Blow out all pasages with compressed air. Lubricate pistons and bores with power steering fluid.

(19) Turn steering wheel from stop to stop several times to expel air from system. Refill reservoir as required.

CAUTION: Do not turn hard against ends of travel. This will generate high pressure and may blow out the "O" rings since the valve body screws have not been finally tightened.

(20) With steering wheel in straight ahead center position, start and stop the engine several times, tapping the valve body up or down as required until there is no movement of the steering wheel when the engine is started or stopped.

(21) The valve is now centered. Tighten the two screws attaching valve body to housing to 200 inch-pounds.

Cross Shaft Oil Seal Replacement

The cross shaft oil seal may be replaced without removing the steering gear from the vehicle (Fig.

(8) Install steering spool valve in valve body so valve lever hole is aligned with lever opening in valve body. Valve must be perfectly free in valve body without sticking or binding (Fig. 3).

(9) Install a new gasket on end plug (if removed). Tighten plug to 25 foot-pounds.

(10) Install piston cushion spring in control valve body being sure it seats in counterbore at bottom of housing. Lubricate piston and insert nose end of pistion into body bore. Test for smooth operation. Be sure cushion spring is not cocked.

(11) Install spring on top of piston, and install copper washer and fittings. Tighten to 20 foot-pounds.

(12) Position two new "O" rings on control valve body and attach to steering valve body. Tighten the two attaching screws to 95 inch-pounds.

(13) If pressure inlet fitting has been removed, tighten fitting to 30 foot-pounds.

(14) Align lever hole in valve spool with lever opening in valve body.

(15) Install on gear housing making sure the valve lever enters hole in valve spool and key section on bottom of valve body nests with the keyway in housing.

CAUTION: These parts should go together with relative ease. Use of force may damage the lever. If they do not go together easily, lift off valve assembly, realign valve spool hole with lever opening in valve body and install valve body.

(16) Install two screws and tighten to 7 foot-pounds to prohibit leakage during valve centering operation.

(17) Connect high pressure and return hoses to valve body.

(18) Start engine. If unit is self-steering tap the valve up or down to correct.

Note: Tools designated in the following procedure are used on models which have 1-1/4 inch diameter cross shaft. The same procedure may be followed for models which have a 1-1/8 inch cross shaft, using Tool C-3880 with appropriate adapters.

CAUTION: When replacing oil seal in vehicle, clean the exposed portion of cross shaft to help prolong oil seal life.

(1) Remove steering arm nut.

(2) Disconnect steering gear arm from sector shaft with Tool C-3646 (Fig. 4).

(3) Slide threaded adapter SP-3056 of Tool C-3350-A. over end of cross shaft and thread tool nut on cross shaft. Maintain pressure on threaded adapter with tool nut while screwing adapter far enough to engage metal portion of grease retainer. Place the two half rings SP-1932, and Tool retainer ring over both portions of the Tool (Fig. 5).

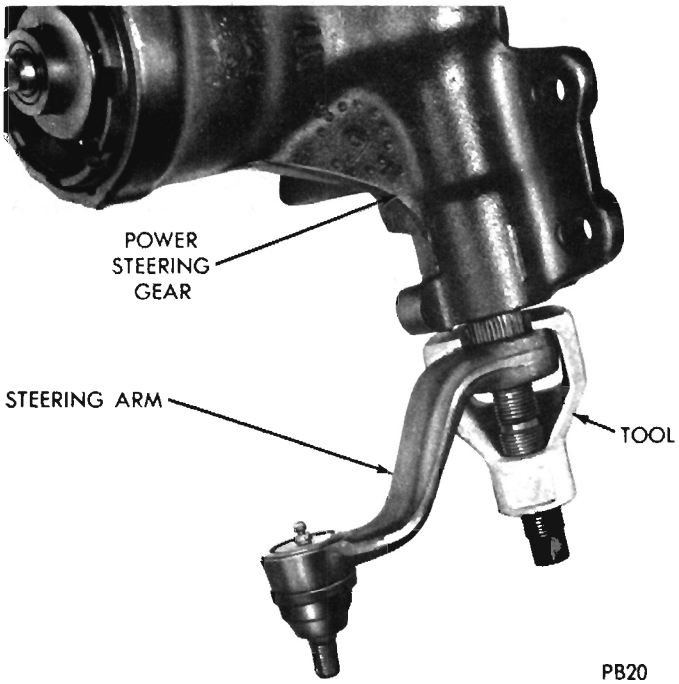


Fig. 4 - Removing Steering Gear Arm

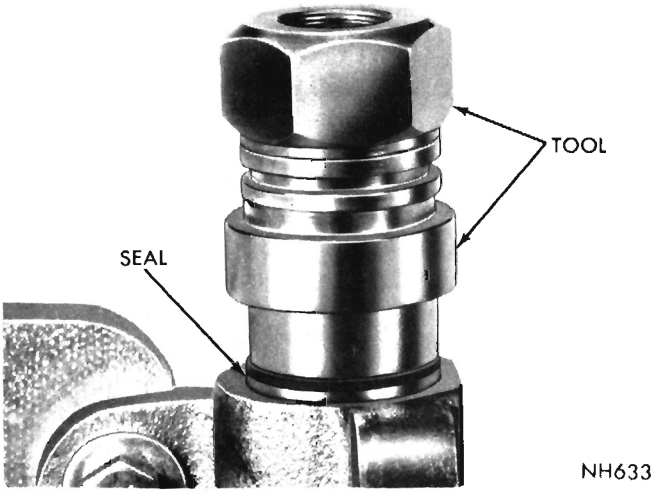


Fig. 6 - Installing Cross Shaft Inner Oil Seal

Turn the tool nut counter-clockwise to withdraw grease reatiner from housing.

(4) Remove oil seal snap ring with snap ring pliers and remove seal back-up washer.

(5) Use Tool C-3350-A in same manner as outlined in step (3) to remove inner seal.

(6) Place new oil seal on flat surface, lip down, lubricate inside diameter with power steering fluid and insert seal protector sleeve SP-1601.

(7) Position seal with protector over cross shaft with lip of seal toward housing.

(8) Place tool adapter SP-5148 with long step of adapter against new seal (Fig. 6). Install tool nut on cross shaft and tighten tool nut until shoulder of tool adapter contacts gear housing.

(9) Remove tool nut, adapter and protector. Install seal back-up washer and oil seal snap ring

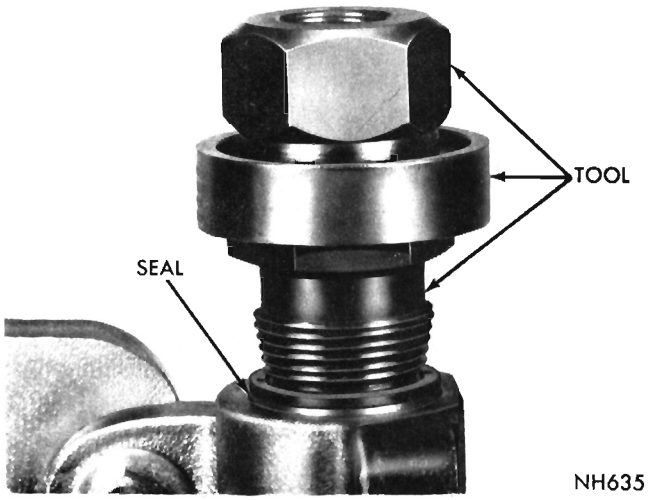


Fig. 5 - Removing Gear Shaft Oil Seal

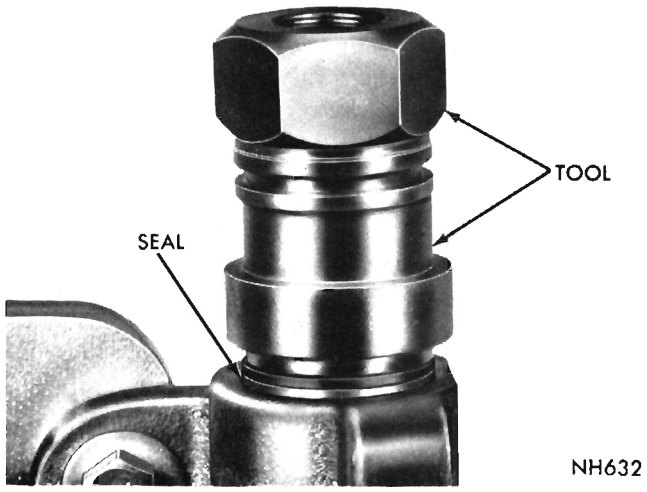


Fig. 7 - Installing Cross Shaft Grease Retainer

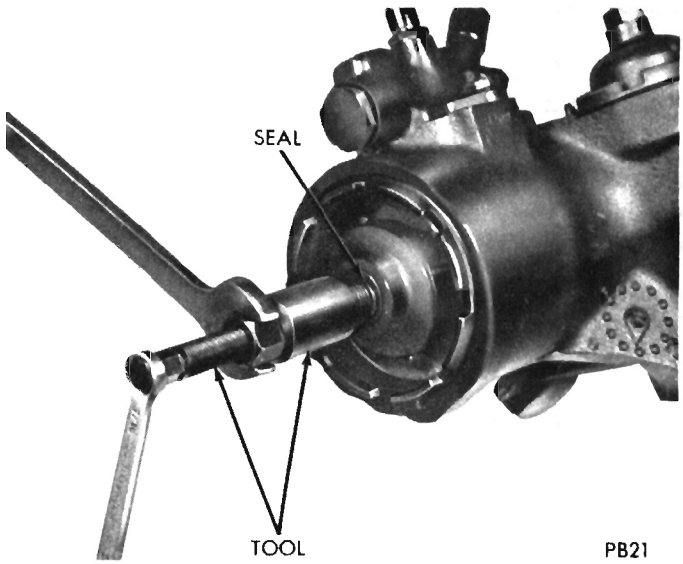


Fig. 8 - Removing Worm Shaft Oil Seal

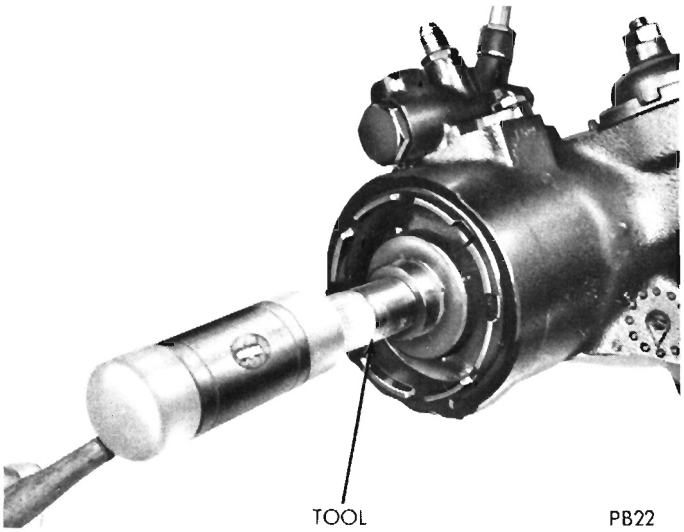


Fig. 9 - Installing Worm Shaft Oil Seal

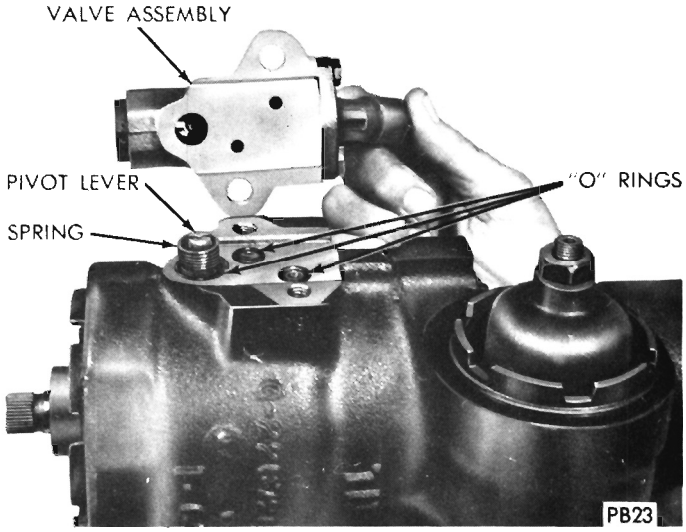


Fig. 10 - Removing Valve Body Assembly

with sharp edge out.

(10) Position grease retainer in housing bore. Place tool adapter SP 5148 with short step of lip against seal (Fig. 7). Install tool nut on cross shaft and tighten until shoulder of tool adapter contacts gear housing.

(11) Place steering gear and front wheels in straight ahead position and install steering gear arm and nut.

(12) Tighten steering gear arm nut to 180 foot-pounds.

Worm Shaft Oil Seal Replacement

The worm shaft oil seal may be replaced without removing gear from vehicle. Remove steering column as outlined under "Steering Columns" and remove oil seal with Tool C-3638 (Fig. 8). Drive new oil seal in place (lip of seal toward housing) with Tool C-3650 (Fig. 9). Install and align steering column as described in "Steering Columns".

SERVICE OUT OF VEHICLE

Cross Shaft Cover Seal Replacement

(1) Remove steering gear from vehicle. See "Gear Removal".

(2) Clamp gear in vise and clean cross shaft area thoroughly before removing cover to prevent dirt from entering gear when shaft cover is removed.

(3) Remove lock nut and aluminum date tag gasket from cross shaft adjusting screw.

(4) Remove cover spanner nut with tool C-3988.

(5) While holding cover, turn adjusting screw clockwise until the screw becomes disengaged from the cover. The adjusting screw will now slide out of the "T" slot in the end of the shaft.

(6) Remove and discard cover "O" ring from inside housing.

(7) Lubricate new "O" ring with power steering fluid and place it in housing.

(8) Place the head of the adjusting screw in the "T" slot in the end of the cross shaft and place cover over the adjusting screw. Insert an Allen wrench through the threaded hole in the cover and turn screw counter clockwise to thread shaft completely into the cover.

(9) Install shaft cover spanner nut and tighten to 150 foot-pounds.

(10) Install new aluminum date tag gasket and lock nut, "see cross shaft adjustment". Tighten lock nut to 28 foot pounds. Install gear in vehicle, see "Gear Installation".

Gear Removal

To avoid damage to the energy absorbing steering column, it is recommended that the steering column be completely detached from floor and insturment panel before steering gear is removed. See Steering Column Section of this Manual for proper removal, alignment and installation procedure.

(1) Remove steering column.

(2) Disconnect power steering pressure and return hoses at centering valve on gear. Tie free ends of hoses above pump level to avoid loss of fluid.

(3) From under vehicle, remove steering arm retaining nut and lock washer. Remove steering arm with tool C-3646.

(4) Remove three gear to frame retaining bolts (use 1/2 inch twelve point socket) remove gear.

Gear Reconditioning

Clean the gear assembly thoroughly in a suitable solvent and clamp in vise.

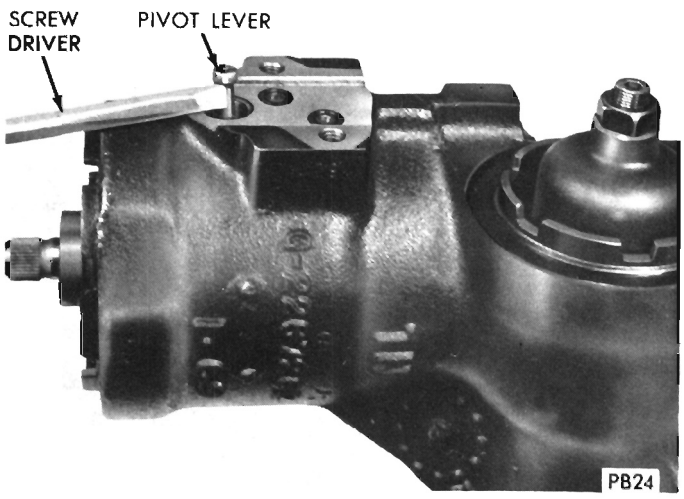


Fig. 11 - Removing Pivot Lever

(1) Drain steering gear through the pressure and return connections by turning steering wormshaft from one extreme of travel to the other.

(2) Remove valve body attaching screws, and remove valve body and three "O" rings (Fig. 10).

(3) Remove pivot lever and spring. Pry under spherical head with a screw driver (Fig. 11).

CAUTION: Use care not to collapse slotted end of the valve lever as this will destroy the bearing tolerances of the spherical head.

(4) Remove cross shaft grease retainer and oil seal as outlined in "Cross Shaft Oil Seal Replacement."

(5) Loosen cross shaft adjusting screw locknut and remove cross shaft cover spanner nut with Tool C-3988.

(6) Rotate wormshaft to position cross shaft sector teeth at center of piston travel. Loosen steering power train retaining nut with Tool C-3989.

(7) Place Tool C-3786 on threaded end of cross shaft and slide tool into housing until both tool and shaft are engaged with bearings.

(8) Turn wormshaft to full left turn position to compress power train parts. Remove power train retaining nut with Tool C-3989. Remove housing head tang washer.

(9) While holding power train firmly compressed, pry on piston teeth with a screw driver using gear shaft as a fulcrum and remove complete power train (Fig. 12).

It is important that cylinder head, center race and spacer assembly and housing head be maintained in close contact with each other. This will eliminate the possiblity of reaction rings becoming disengaged from their grooves in both cylinder head and housing head. It will prohibit center spacer from becoming separated from center race and becoming "cocked" in housing which may make it impossible to remove power train without damaging the spacer, the housing, or both.

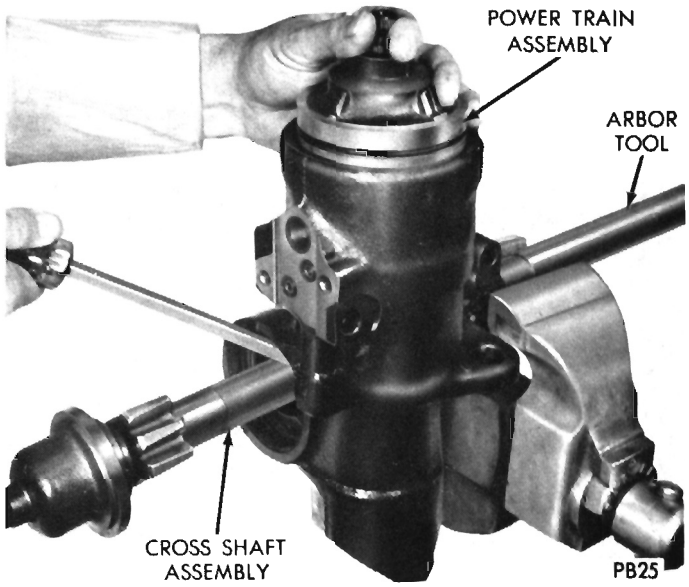


Fig. 12 - Removing Power Train

(10) Place power train vertically in a vise equipped with soft jaws to avoid damaging piston assembly. See Fig. 13 for parts identification.

(11) Raise housing head until wormshaft oil seal just clears top of wormshaft and position arbor tool C-3929 on top of wormshaft and into oil seal. With arbor in position pull up on housing head until arbor is positioned in bearing. Remove housing head and arbor.

CAUTION: If the wormshaft oil seal is to be replaced, perform the operation with the housing head assembled in the steering gear housing.

(12) Remove large "O" ring from groove in housing head.

(13) Remove reaction seal from groove in face of housing head with air pressure directed into ferrule chamber (Fig. 14).

(14) Inspect all grooves for burrs. Make sure passage from ferrule chamber to upper reaction chamber is unobstructed.

(15) Remove reaction spring, reaction ring, worm balancing ring and spacer.

(16) Hold wormshaft from turning, then turn nut with sufficient force to release staked portions from knurled section and remove nut. **Wire brush the knurled sections to remove the chips, then blow out the nut and wormshaft to remove any metal particles.**

(17) Remove upper thrust bearing race (thin) and upper thrust bearing.

(18) Remove center bearing race.

(19) Remove lower thrust bearing and lower thrust bearing race (thick).

(20) Remove lower reaction ring and reaction spring.

(21) Remove cylinder head assembly.

(22) Remove two "O" rings in two outer grooves in cylinder head.

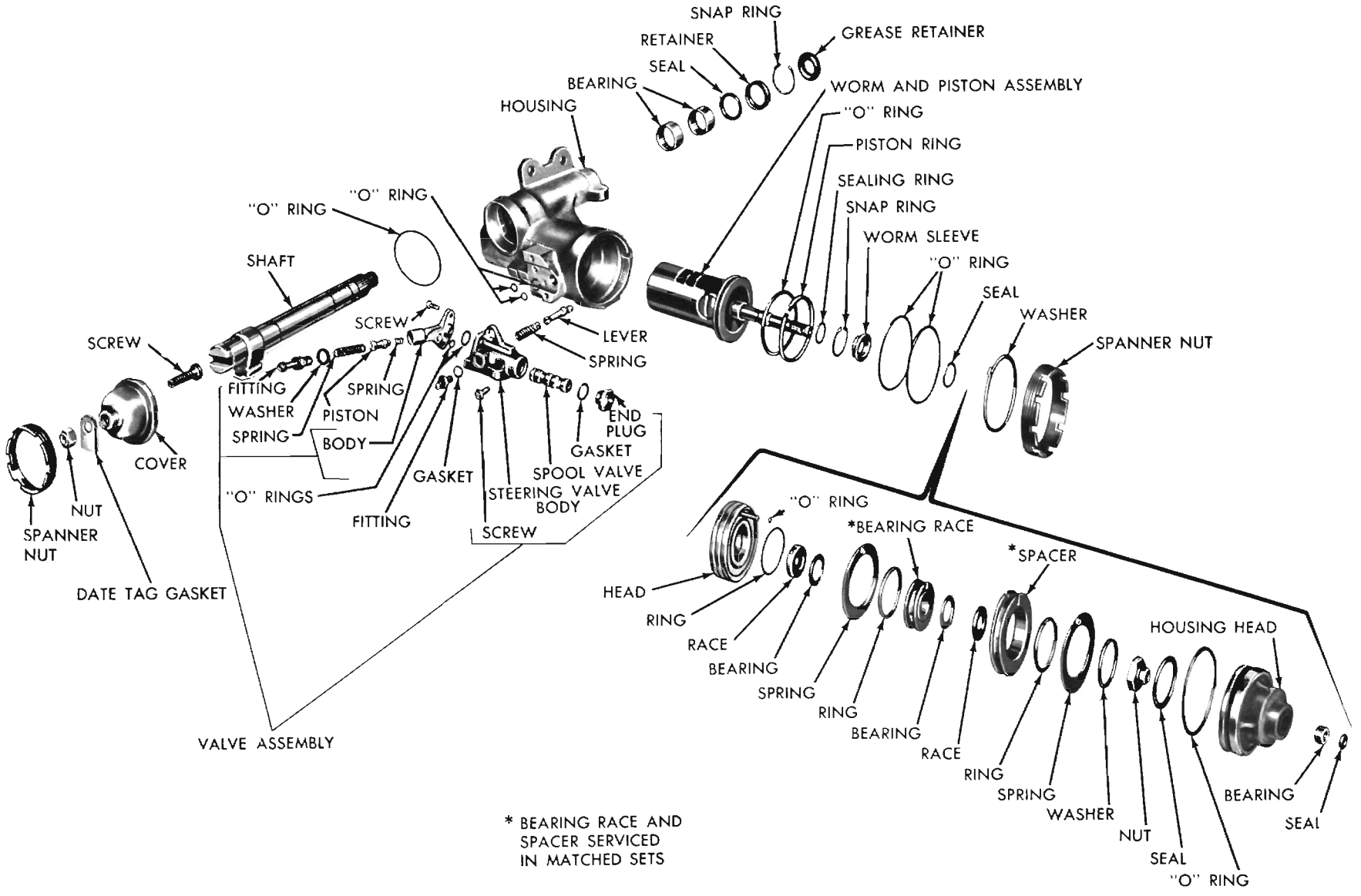


Fig. 13 - Steering Gear Disassembled View

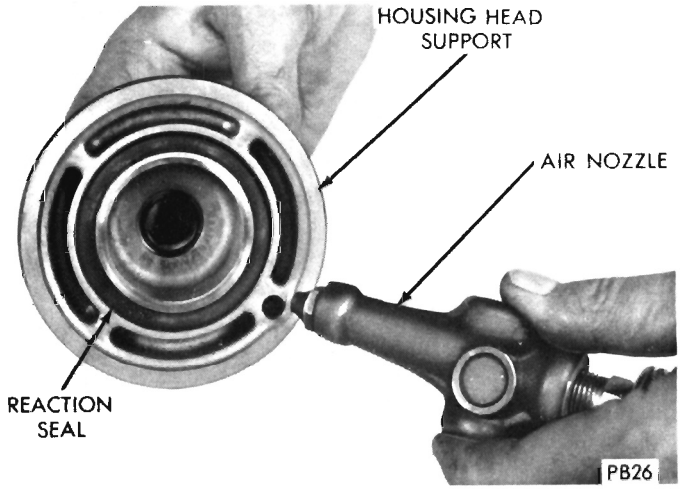


Fig. 14 - Removing Reaction Seal from Worm Shaft Support

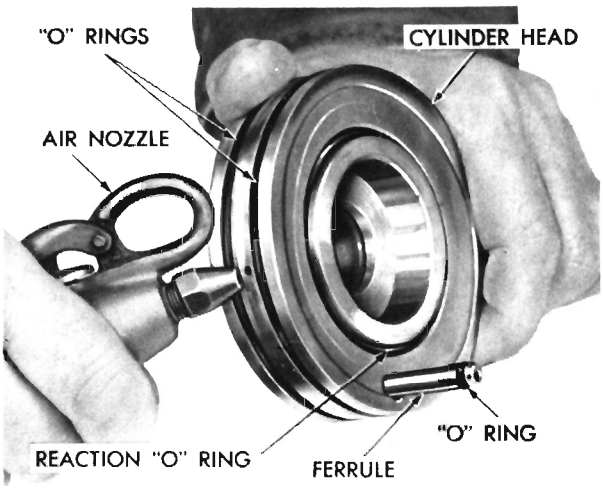


Fig. 15 - Removing Reaction Seal From Cylinder Head

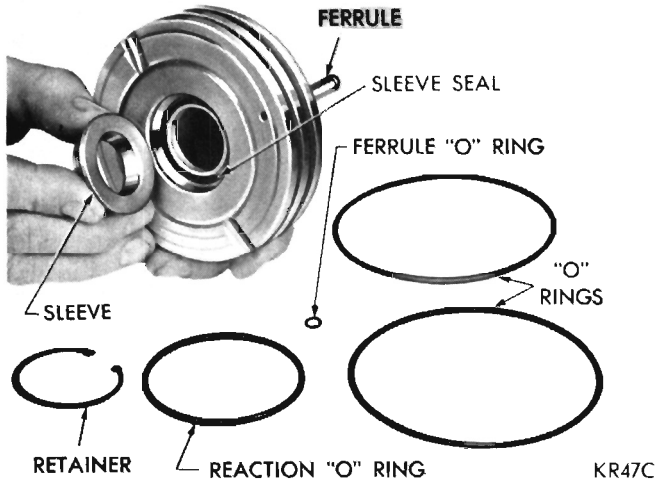


Fig. 16 - Removing Cylinder Head Oil Seal

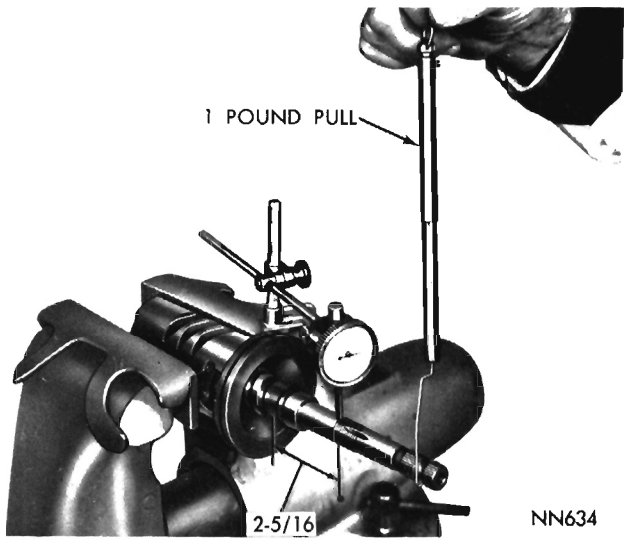


Fig. 17 - Checking Worm Shaft Side Play

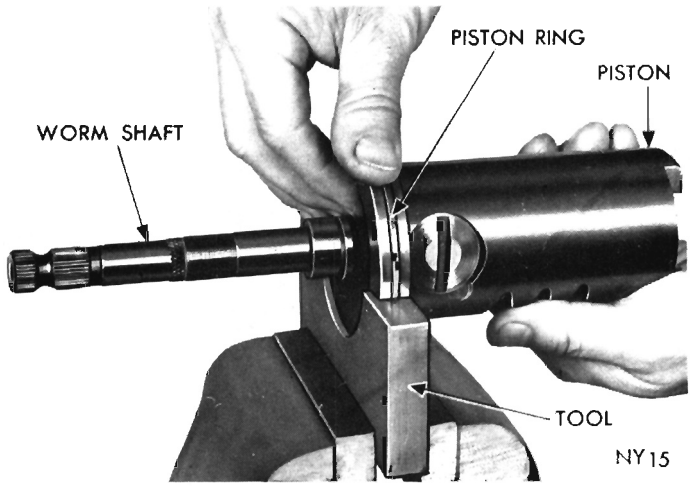


Fig. 18 - Installing Piston Ring

(23) Remove reaction "O" ring from groove in face of cylinder head with air pressure directed into oil hole located between two "O" ring grooves (Fig. 15).

(24) Remove snap ring, sleeve and rectangular oil seal ring from cylinder head counterbore (Fig. 16).

(25) Test operation of wormshaft. The torque required to rotate wormshaft throughout its travel in or out of piston must not exceed 2 inch-pounds with a 15 pound side load. The worm should run in and out of piston under its own weight. **The worm and piston is serviced as a complete assembly and should not be disassembled.**

(26) Test for excessive side play with the piston held firmly in a vise with the rack teeth up, and the worm in its approximate center of travel. The vertical side play measured at a point 2-5/16 inches from the piston flange should not exceed .008 inch when the end of the worm is lifted with a force of 1 pound (Fig. 17).

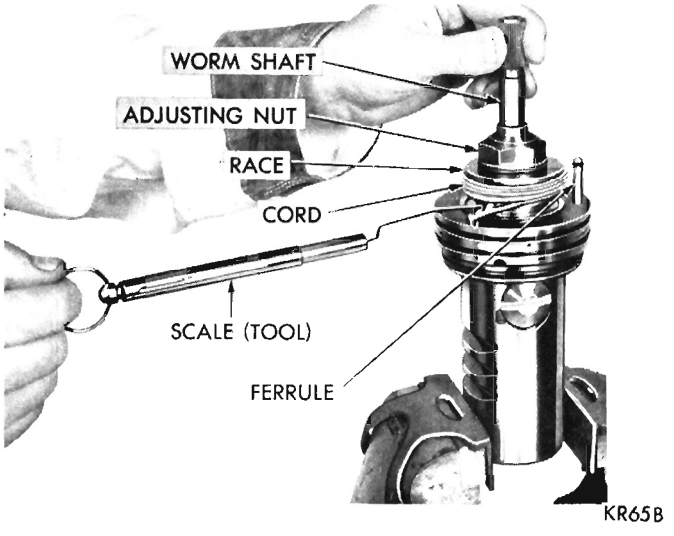


Fig. 19 - Checking Center Bearing Preload

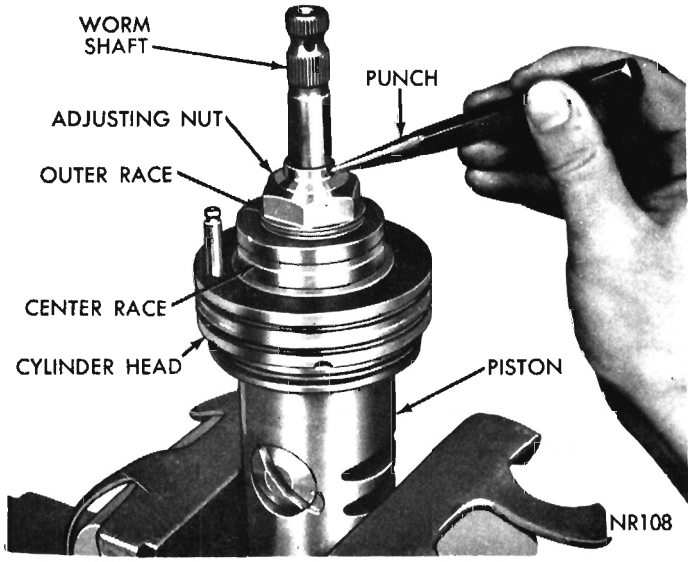


Fig. 20 - Staking Worm Shaft Bearing Adjusting Nut

(27) Inspect condition of rubber sealing ring located under cast iron ring and replace if necessary. Install cast iron piston ring as follows:

(a) Slide a new piston ring into place in piston groove, then place piston and ring assembly in Tool C-3676 with lower part of piston and ring resting on land of tool (Fig. 18).

(b) Press down on piston to seat ring in piston groove, forcing open ends of ring out for ease of locking the ring.

(28) Place piston assembly in a vertical position (wormshaft up) in a vise equipped with soft jaws.

(29) Inspect cylinder head ferrule oil passage for obsturctions and the lands for burrs, then lubricate the two large "O" rings and install them in the cylinder head grooves (Fig. 13).

(30) Install worm sleeve seal, sleeve and snap ring (if removed). Make sure snap ring is seated in groove.

(31) Install lower reaction seal (O-ring) in cylinder head groove.

(32) Slide cylinder head assembly (ferrule up) on wormshaft. Check wormshaft seal ring making sure gap is closed to avoid damaging the ring as the cylinder head moves against piston flange.

(33) Lubricate with power steering fluid, and install parts in the following order:

(a) Lower thrust bearing race (thick).

(b) Lower thrust bearing

(c) Lower reaction spring (with the small hole over the ferrule).

(d) Lower reaction ring (flange up so ring protrudes through reaction spring and contacts the reaction "O" ring in the cylinder head).

(e) Center bearing race.

(f) Upper thrust bearing.

(g) Upper thrust bearing race (thin).

(h) Start wormshaft thrust bearing adjusting nut (do not tighten).

(34) Turn wormshaft clockwise one-half turn. Hold wormshaft in this postion with splined nut, Tool C-3637 and socket wrench, and hold in this positon thru items 35 and 36, then tighten to 50 foot-pounds to prestretch wormshaft threads.

(35) Loosen adjusting nut. Place several rounds of cord around center bearing race. Make a loop in one end of cord and hook loop of a distributor breaker arm spring scale Tool MTU-36 in cord loop. Pulling cord will cause bearing race to rotate. Retighten worm bearing adjusting nut while pulling on cord with scale. When adjusting nut is tightened properly, reading on the scale should be 16 to 24 ounces (20 ounces prefered while the race is turning). (Fig. 19)

(36) Stake upper part of wormshaft adjusting nut into knurled area of shaft.

(a) Hold a 1/4 inch flat end punch on center line of wormshaft end at a slight angle to nut flange (Fig. 20).

(b) Strike punch a sharp blow with a hammer and test preload. **If adjusting nut moved during staking operation, it can be corrected by striking the nut a glancing blow in the direction required to regain proper preload.**

(c) After retesting for proper preload, stake the nut at three more locations 90 degrees apart around upper part of the nut.

(d) To test total staking, apply 20 foot-pounds of torque in each direction. If nut does not move, staking operation is satisfactory. **Retest wormshaft preload to determine that adjustment remains constant after nut is securely locked.**

(37) Position spacer assembly over center race, engaging dowel pin of spacer in slot of race, and slot of spacer entered over cylinder head ferrule. **This will align the valve pivot lever hole in the**

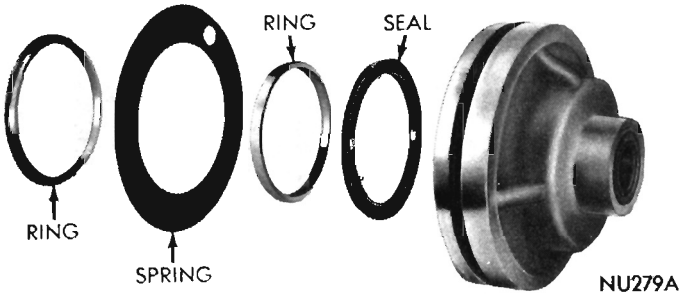


Fig. 21 - Reaction Seal Ring In Housing Head

center bearing race with the valve pivot lever in the center bearing race with the valve pivot lever hole in center bearing spacer assembly. The small "O" ring for the ferrule groove should not be installed until after upper reaction spring and spacer have been installed.

(38) Install upper rection ring on center race and spacer with flange down against spacer.

(39) Install upper reacton spring over reaction ring with cylinder head ferrule through hole in reaction spring.

(40) Install worm balancing ring (without flange) inside upper reaction ring.

(41) Lubricate ferrule "O" ring and install in groove on cylinder head ferrule.

(42) If oil seal was removed from housing head, install a new seal with Tool C-3650 (Fig. 7). See "Wormshaft Oil Seal Replacement." With lip of seal toward bearing, drive seal until tool bottoms on the support.

(43) Lubricate and install reaction seal in groove in face of housing head with flat side of seal out (Figs. 21 and 22). Install "O" ring in groove on housing head.

(44) Slide housing head and arbor, Tool C-3929 over the wormshaft carefully engaging cylinder head ferrule and "O" ring and making sure reaction rings enter circular groove in housing head. The power train is now ready for installation in housing.

(45) It is generally not necessary to remove sector shaft cover. However, this may be easily accomplished by removing the adjusting screw. While holding the cover, turn adjusting screw clockwise until the shaft becomes disengaged from cover. The adjusting screw will now slide out of the "T" slot in end of shaft.

Gear Shaft Assembly

(46) To remove gear shaft needle bearings from housing, remove grease retainer, oil seal snap ring with pliers and remove remove seal back-up washer.

(47) Insert Tool C-3875 or C-3786 in steering housing; place housing in a press and press out bearings and oil seal.

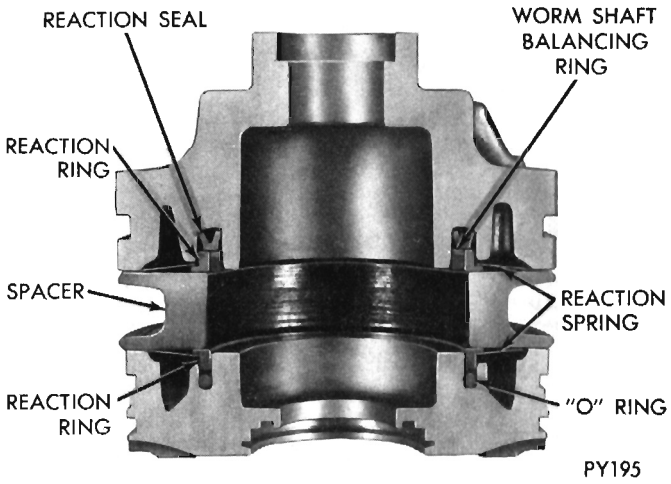


Fig. 22 - Reaction Rings Installed (Cut Away View)

(48) To install gear shaft lower needle bearing, place bearing on end of Tool C-3875 or C-3786. Press bearing into steering gear housing 1/32 inch below end of bearing bore to provide space for oil seal, back-up washer and snap ring and cross shaft grease retainer. See "Cross Shaft Oil Seal Replacement."

CAUTION: The arbor adapter ring must be used with C-3875 Remover and Installer Arbor, otherwise the bearing may be crushed.

(49) To install upper needle bearing, place bearing on end of Tool C-3875 or C-3786. Press bearing into housing flush with end surface of bore.

(50) Insert gear shaft and adjusting screw into cover and using an Allen wrench through the threaded hole in cover, turn screw counterclockwise to pull shaft completely into the cover. Install adjusting screw lock nut, but do not tighten at this time.

(51) Lubricate cross shaft cover "O" ring with wheel bearing grease and install on shelf of gear housing.

(52) Lubricate power train bore of the housing with power steering fluid, and carefully install power train assembly. To keep reaction rings from coming out of their grooves keep worm turned fully counterclockwise. The piston teeth must be facing to the right and the valve lever hole in center race and spacer must be in the "up" position.

CAUTION: Make sure the cylinder head is bottomed on the housing shoulder (Fig. 1).

(53) Align valve lever hole in center bearing race and spacer with valve lever hole in gear housing.

(54) Install valve pivot lever (double bearing end first) (Fig. 25) into center race and spacer through hole in steering housing so that slots in valve lever are parallel to wormshaft in order to engage the antirotation pin in center race. Lightly tap on end of lever with wooden end of hammer handle,

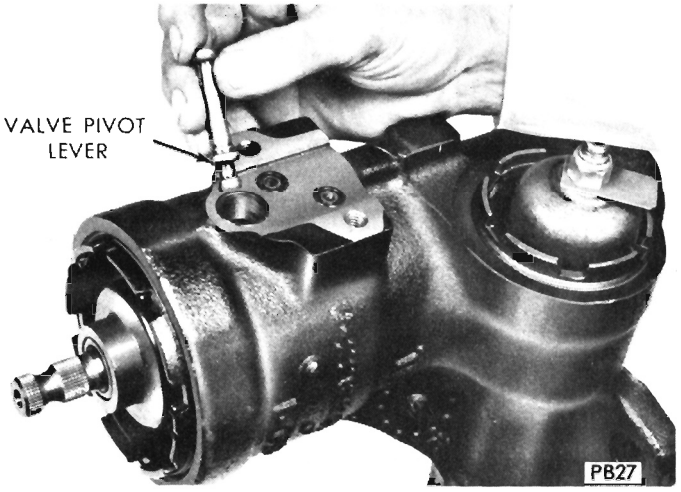


Fig. 23 - Installing Valve Pivot Lever

or handle of plastic screw driver, to seat lower pivot point in center race.

(55) Center lever in hole in housing by turning housing head by tapping on a reinforcing rib with hammer and drift.

(56) Install housing head tang washer to index with groove in housing. Install spanner nut and tighten to 125 to 200 foot-pounds with tool C-3989. Be sure that the lever stays centered in the hole in the housing.

Turn wormshaft until the piston bottoms in both directions and observe the action of the lever. It must be in the center of the hole and snap back to its center position when the worm torque is relieved.

(57) Install valve pivot lever spring small end first.

(58) Set the power piston at the center of travel and install gear shaft and cover assembly so that sector teeth index with piston rack teeth. Make sure cover O-ring is properly installed on shelf in housing.

(59) Install cover spanner nut and tighten to 110 to 200 foot-pounds with Tool C-3988.

(60) Install valve body on housing making sure valve pivot lever enters hole in valve spool (Fig. 23). Be sure "O" ring seals are in place. Tighten valve mounting screws to 7 foot-pounds.

(61) Install new gear shaft seal followed by seal back-up washer and snap ring and a new grease retainer as outlined under "Gear Shaft Oil Seal Replacement."

Tests and Adjustments

(1) Remove oil reservoir cover and fill reservoir with Power Steering Fluid, Part No. 2084329 or equivalent, to the level mark. Do Not use Automatic transmission fluid.

(2) Connect test hoses with proper adapters to hydraulic pump on vehicle with pressure gauge

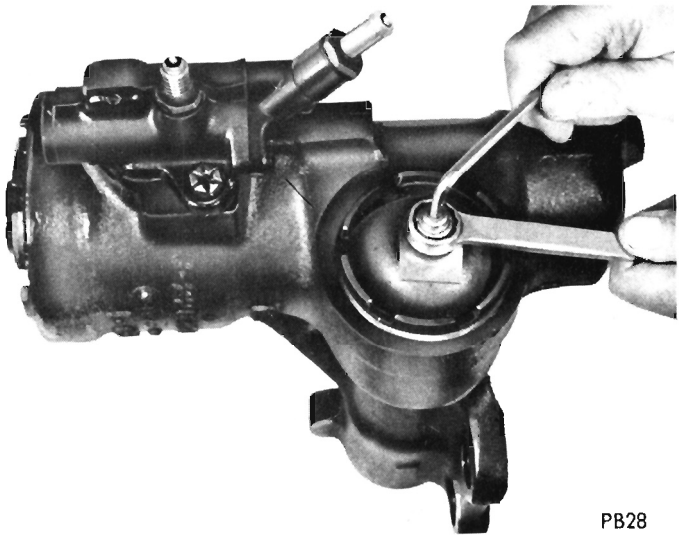


Fig. 24 - Adjusting Steering Gear Mesh

C-3309D installed between pump and steering gear.

(3) Start the engine.

(4) Center valve until unit is not self-steering. Tap on the head of valve body attaching screws to move valve body up on steering housing, and tap on end plug to move valve body down on housing. Expel all air from the unit by turning wormshaft back and forth through the travel several times.

(5) Refill reservoirs before proceeding with following tests and adjustments on the bench.

(A) With steering gear on center, tighten gear shaft adjusting screw until backlash in steering gear arm just disappears. See "Cross Shaft Adjustment."

If power train has been removed, tighten 1-1/4 turns from this position and while holding adjusting screw in this position, tighten lock nut (Fig. 24). **This is a temporary adjustment to bring piston rack and sector teeth in full alignment.**

(B) Operate unit through full travel several times to align piston rack and sector teeth.

(C) With gear on center, readjust sector shaft backlash. This will require loosening adjusting screw until backlash is evident. Then retighten adjusting screw until backlash just disappears. Continue to tighten for 3/8 to 1/2 turn from this position and tighten lock nut to 28 foot-pounds to maintain setting.

(D) Starting from a point at least one full turn of the wormshaft either side of center, torque at sector shaft required to turn unit through center at 2 rpm in each direction shall not exceed 20 foot-pounds or vary more than 5 foot-pounds from left to right.

(E) Adjust torque to be equal in both directions by readjusting the valve.

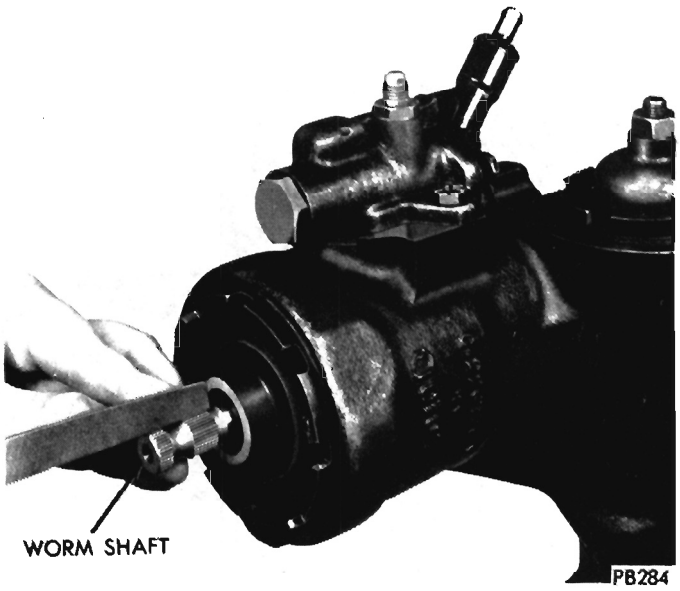


Fig. 25 - filing master serration in replacement worm shaft.

Tighten valve body adjusting screw to 200 inch-pounds.

(F) With gear at or near full turn in either direction, attempt to return unit to center by applying torque wrench at steering gear shaft. Hold wormshaft until cross shaft torque builds up to 50 foot-pounds. Release wormshaft and maintain a constant steady pull at 2 rpm on the gear shaft. If cross shaft torque does not drop to 20 foot-pounds maximum as the unit passes through center, check for too much interior drag; binding spool valve, or tight cross shaft adjustment.

(6) With unit under power, but with no load, torque required to rotate wormshaft through an included angle of 180 degrees (90 degrees eighter side of center) at 6 rpm (or one revolution every ten seconds) shall be 6-10 inch-pounds. Disconnect test equipment and install unit in vehicle.

Worm Shaft Replacement

The master serration on the steering gear worm shaft spline, used for centering the steering shaft coupling, is machined after the steering gear is completely assembled.

If it should become necessary to replace a steering gear worm shaft, it will be necessary to file a master serration on the spline of the worm shaft, since the replacement part does not have a master serration machined in the spline.

To file a master serration on a worm shaft spline, the steering gear must be completely assembled and the worm shaft centered in its travel, then with the steering gear in its normal upright position remove one tooth of the spline, at the 12 o'clock postion,with a suitable file. (Fig. 25)

Gear Installation

(1) Position gear on frame and install three gear to frame retaining bolts and lock washers. Tighten to specifications.

(2) Rotate worm shaft by hand and center cross shaft to mid point of its travel. Align master serration on cross shaft with splines in steering arm. Install steering arm with lock washer and nut. Tighten to specifications.

(3) From engine compartment, connect pressure and return hoses to centering valve on gear.

(4) Align and install steering column as outlined. (See "Steering Columns").

(5) Fill power steering pump with power steering fluid Part No. 2084329 or equivalent.

(6) Start engine and turn steering wheel several times from stop to stop to bleed the system of air. Stop engine check oil level and correct if necessary.

Hose Installation

When either hose is reinstalled or replaced, it is essential that the sponge sleeve hose protector be installed as follows:

(1) Avoid sharp bends in a large section of hose (about 10 inch diameter is recommended).

(2) Hose must remain at least 1 inch away from all pulleys, battery case and brake lines and 2 inches away from exhaust manifold.

(3) Sponge sleeves must be installed where hose contacts composition or metal.

(4) Tighten pump end hose fitting to 24 foot-pounds and gear end fitting to 160 inch-pounds.

POWER STEERING PUMPS

INDEX

	Page
General Information	23
.94 Model	25
Flow Control Valve	35
1.06 Model	35
.94 Model	35
Service Diagnosis	24
1.06 Model	25
Service Procedures	25
Pump Removal	26
Inspection	28
Pump Installation	26
.94 Model	26

Oil Seal Replacement 27
1.06 Model 31
.94 Model 27
Specifications 60
Tightening References 62
Reconditioning 27

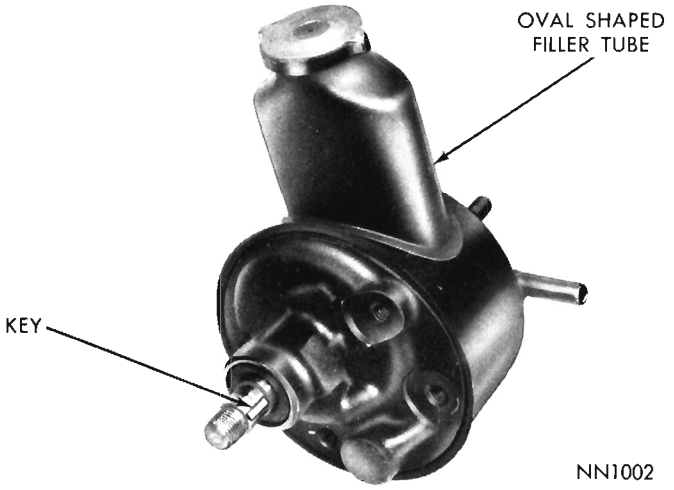


Fig. 1 .94 Pump

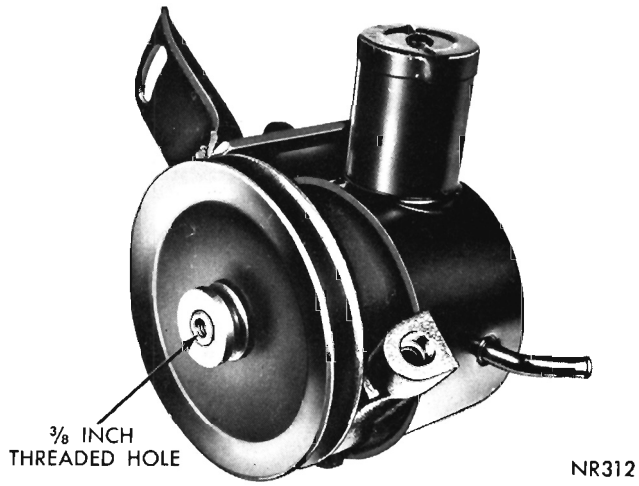


Fig. 2 1.06 Pump

GENERAL INFORMATION

Hydraulic pressure is provided for the power steering gear in the vehicle by one of two belt driven power steering pumps. The .94 model or the 1.06 model.

The .94 pump can be identified by the long oval shape of the filler neck and a drive pulley secured to the drive shaft with a large nut (Fig. 1). Rectangular pumping vanes carried by a shaft driven rotor, move the fluid from the intake to the pressure cavities of the cam ring. As the rotor begins to rotate, centrifugal force throws the vanes against the inside surface of the cam ring to pick up residual oil which is forced into the high pressure area. As more oil is picked up by the vanes, oil is forced into the cavities of the thrust plate, through two cross-over holes in the cam ring and pressure plate which empty into the high pressure area between the pressure plate and the housing end plate.

Filling the high pressure area causes oil to flow under the vanes in the slots of the rotor forcing the vanes to follow the inside oval surface of the cam ring. As the vanes rotate to the small area of the cam ring, oil is forced out from between the vanes.

The 1.06 pump can be identified by a 3/8 inch threaded hole in the pulley end of the drive shaft (Fig. 2). The operation of the 1.06 pump is similar to the vane type pump but differs in appearance and design

The rotor is star shaped and upon rotation, propells 12 steel rollers against the inside surface of the cam ring. As the rollers follow the eccentric pattern of the cam ring, oil is drawn into the inlet ports and exhausted through the discharge ports as the rollers are forced into vee shaped cavities of the rotor.

A flow control valve permits a regulated amount of oil to return to the intake side of the pump when excess output is generated during high speed operation. This reduces the power requirements to drive the pump and minimizes temperature build-up.

The 1.06 pump incorporates a two-stage flow control valve. High pressure oil passes through two orifices in a metering insert. (The metering insert is located in an oil passage sealed with a 1/8 inch pipe plug.) At low speed, approximately 2.7 gpm is passed to the gear. As speed increases and the valve moves, excess oil is by-passed to inlet and the valve acts to block flow through one orifice. This drops flow to the gear to approximately 1.6 gpm at high speeds. Two-stage flow control provides high flow at low speed for improved steering, while reducing the flow at high speed to reduce the power steering system oil temperatures.

Oil coolers are used on some vehicles equipped with high performance engines and special axle ratios that require high engine revolutions. **Coolers are not required on standard equipment vehicles.**

When steering conditions exceed maximum pressure requirements, such as turning the wheels against the stops, the pressure built up in the steering gear also exerts pressure on the spring end of the flow control valve. This end of the valve houses the pressure relief valve on both the .94 and 1.06 models. High pressure lifts the relief

valve ball from its seat and allows oil to flow through a trigger orifice located in the outlet fitting of the .94 pump and in the front land of the flow control valve of the 1.06 pump. This reduces pressure on the spring end of the valve which then opens and allows the oil to return to the intake side of the pump. This action limits maximum pressure output of the pump to a safe level.

Under normal operating conditions, the pressure requirements of the pump are below maximum, causing the pressure relief ball and the flow control valve to remain closed.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
INTERMITTANT OR NO ASSIST	(a) Loose belt.	(a) Tighten belt.
	(b) Low fluid level.	(b) Inspect and correct fluid level.
	(c) Low pump efficiency.	(c) Service as necessary.
	*(d) Pump seizure.	(d) Replace pump.
	(e) Flow control bore plug ring not in place.	(e) Replace snap ring. Inspect groove for depth.
	(f) Flow control valve sticking.	(f) Service flow control valve as necessary.
	(g) Wrong pressure-relief valve setting.	(g) Replace flow control valve—.94 pump. Replace pump partial assembly.— 1.06 pump.
	(h) Damaged "O" ring on flow control bore plug.	(h) Replace "O" ring.
	(i) Loose plug in end of flow control valve.	(i) Tighten plug. See "Tightening Reference".
	(j) Distorted pressure plate.	(j) Replace pressure plate—.94 pump
	*(k) Cam ring badly worn.	(k) Replace cam ring—.94 pump.
	(l) Vanes improperly installed.	(l) Install vanes properly—.94 pump.
	(m) Plugged metering orifice(s) or trigger orifice.	(m) Disassemble pump and clean.
	(n) Damaged or leaky pressure relief valve seat (plug) or ball.	(n) Replace seat and ball—1.06 pump; replace flow control valve—.94 pump.
	(o) Damaged housing bore "O" rings(s) or pressure plate "O" ring.	(o) Replace "O" rings.
	*(p) Scored pressure plate, thrust plate, cam, rotor or rollers.	(p) Replace rotating group package—1.06 pump.
NOISY PUMP	(a) Low fluid level.	(a) Inspect and correct fluid level.
	(b) Belt noise.	(b) Inspect for pulley alignment, paint or grease on pulley and correct.
	(c) Belt loose (causing pump rattling noise).	(c) Adjust belt. See "Cooling System" Group 7—1.06 pump.
	(d) Foreign material blocking pump housing oil inlet hole.	(d) Remove reservoir, visually check inlet oil hole and service as necessary.
	(e) Vanes improperly installed.	(e) Install properly or replace if necessary—.94 pump.
	(f) Vanes sticking in rotor.	(f) Recondition pump and correct cause—.94 pump.
	(g) Faulty flow control valve.	(g) Replace flow control valve—.94 pump.
	*(h) Pressure plate, thrust plate or rotor scored.	(h) Replace badly scored part or lap in if lightly scored—.94 pump.
	*(i) Pressure plate, thrust plate, cam, rotor or rollers scored.	(i) Replace rotating group package—1.06 pump.
	(j) Pump hose interference with sheet metal or brake lines.	(j) Reroute hoses.
	(k) Pulley loose.	(k) Retorque pulley retaining nut—.94 pump.
PUMP VIBRATION	(a) Pump hose interference with sheet metal or brake lines.	(a) Reroute hoses.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(b) Faulty or loose belt.	(b) Replace or adjust belt as necessary. See "Cooling System," Group 7.
	(c) Pulley loose or out of round.	(c) Replace pulley.
	(d) Crankshaft pulley loose or damaged.	(d) Replace crankshaft pulley.
PUMP LEAKS	(a) Cap or filler neck leaks.	(a) Correct fluid level. (Fluid Level Too High).
	(b) Reservoir solder joints leak.	(b) Resolder and replace reservoir as necessary.
	(c) Reservoir "O" ring leaking.	(c) Inspect sealing area of reservoir. Replace "O" ring or reservoir as necessary.
	(d) Shaft seal leaking.	(d) Replace seal.
	(e) Loose rear bracket bolts.	(e) Tighten bolts. See "Tightening Reference".
	(f) Loose or faulty pressure hose ferrule.	(f) Tighten fitting to 24 foot-pounds, 1.06 pump—20 foot-pounds, .94 pump, or replace as necessary.
	(g) Damaged pressure hose "O" ring.	(g) Replace "O" ring—1.06 pump.
	(h) Housing ball plug leaking.	(h) Replace pump partial assembly.— 1.06 pump.
	(j) Rear bolt holes stripped or casting cracked.	(i) Repair, if possible, or replace pump.
		*Clean and flush high pressure and return hoses. Recondition gear valve body (see "Power Steering Gear").

SERVICE PROCEDURES

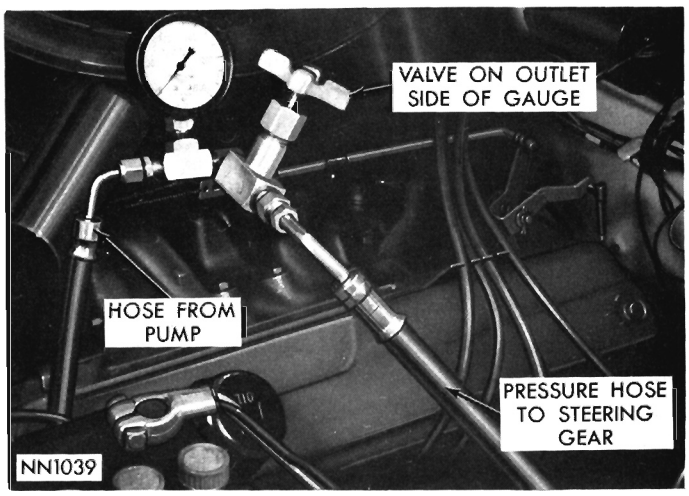


Fig. 3 Pressure Test

Checking Fluid Level

1.06 Model

(1) Start engine, turn steering wheel from stop to stop several times to expel air from system, then shut off engine.

(2) Wipe reservoir filler cap free of dirt, remove cap and visually inspect oil level in reservoir.

Engine at room temperature—Oil should just cover filler neck reservoir joint (1-3/4 inches to 2 inches from top of filler neck).

Engine Hot—Oil level should be one-half way up in filler neck.

.94 Model

The oil level in the .94 pump should be checked **only** after pump has reached normal operating temperature. A dip stick, built into the reservoir cap, indicates "FULL" or ADD". Fluid level should be at the "FULL" mark when hot.

Replenish the fluid, if necessary, in all pumps with **Power Steering Fluid, Part No. 2084329 or equivalent.**

Caution- Do not use automatic transmission fluid.

Pressure Test—All Models

(1) Inspect fluid level in reservoir. Fill to correct level indicated on dip stick if necessary.

(2) Measure belt tension and correct if necessary. See "Cooling System" Group 7.

(3) Disconnect the high pressure hose at the steering gear and connect the free end of the hose to the guage side of C-3309D. Connect a second pressure hose from the valve side of C-3309D to the steering gear. The valve must be installed on the outlet side of the gauge (Fig. 3).

(4) Insert thermometer in fluid reservoir, start

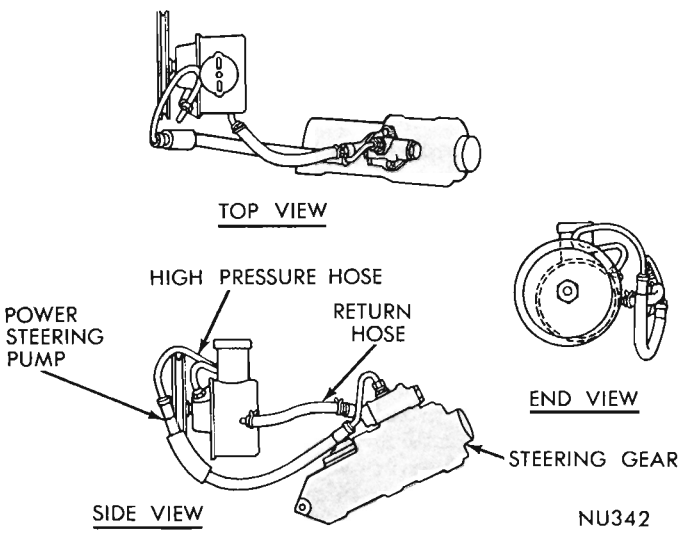


Fig. 4 - Hose Routing - 1.06 Pump 8 Cylinder Engines

engine and warm up fluid to a temperature between 150 and 170 degrees Fahrenheit.

Turning the wheels from stop to stop will aid in warming the fluid. Do not hold wheels against stop for extended period as undue internal pump overheating will result.

(5) With engine idling at 600 RPM, and guage valve open, note pressure while turning steering wheel from one extreme position to the other. Turn the wheels all the way to one stop or the other momentarily and note the maximum pressure. A pressure of at least the minimum pressure shown for the particular pump in "Specifications" should be read.

(6) If pressure is under the specified rating, the steering system is not functioning properly. To determine which unit is faulty, momentarily close the pressure gauge valve and note maximum pressure registered on gauge. If the pressure reads less than the maximum pressure shown for the particular pump in "Specifications" the pump is faulty and should be reconditioned. Should pressure read low in step 5 but not in step 6, the steering gear is faulty.

When removing test equipment, be sure to reinstall hoses in original position to avoid interference with engine or sheet metal.

Pump Removal—All Models

(1) Loosen pump mounting and locking bolts and remove belt.

(2) Disconnect both hoses at pump.

(3) Remove mounting and locking bolts and remove pump and bracket.

Pump Installation—All Models

(1) Position pump on engine and install mounting and locking bolts.

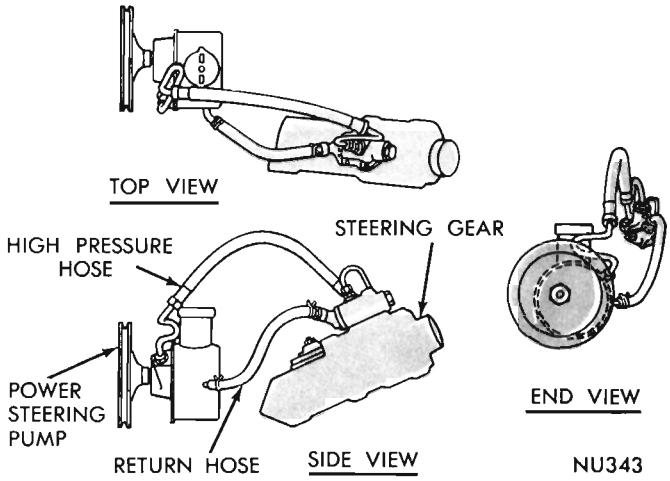


Fig. 5 Hose Routing 1.06 Pump 6 Cylinder Engines

(2) Install drive belt and adjust. See "Cooling System—Group 7". Tighten mounting bolts to 30 foot-pounds.

(3) Connect pressure and return hoses. (Use new pressure hose "O" ring—1.06 pump only). See "Hose Installation".

(4) Fill pump reservoir to top of filler neck with Power Steering Fluid, Part No. 2084329 or equivalent.

(5) Start engine and turn steering wheel several times from stop to stop to bleed the system. Stop engine, check oil level and correct if necessary. See "Checking Fluid Level".

Hose Installation—All Models

When either hose is reinstalled or replaced, the following points are essential:

(1) Route hoses in same position they were in before removal.

(2) Route hoses smoothly, avoiding sharp bends and kinking.

(3) When properly installed, the pressure hose tube ends should rest against the outside of the pump reservoir neck on one end, and the outside of the gear valve body on the other end. (Fig. 4 and 5).

NOTE: The pressure hose tube end is not designed to rest against the gear valve body on the 426 Cu. inch (Hemi) Engine. The gear fitting for the pressure hose on these models is a right angle fitting.

(4) Tighten pump end hose fitting to 24 foot-pounds and gear end fitting to 160 inch-pounds.

(5) Hoses must remain at least one inch away from all pulleys, battery case and brake lines, and two inches away from exhaust manifold.

(6) When used, protective sponge sleeves must be properly positioned to prevent hose contact with other components in engine compartment.

(7) After hoses are installed, check for leaks

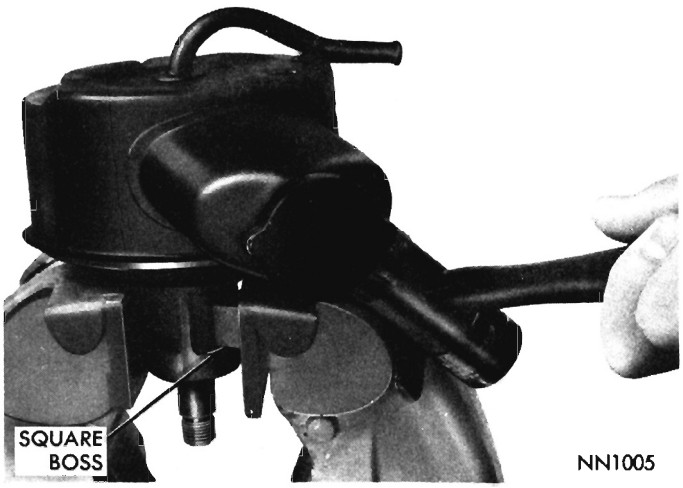


Fig. 6 - Removing Reservoir

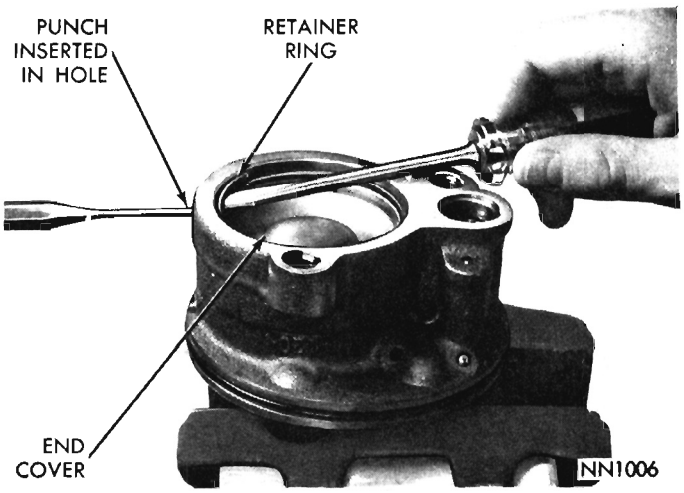


Fig. 7 - Removing End Cover Retainer Ring

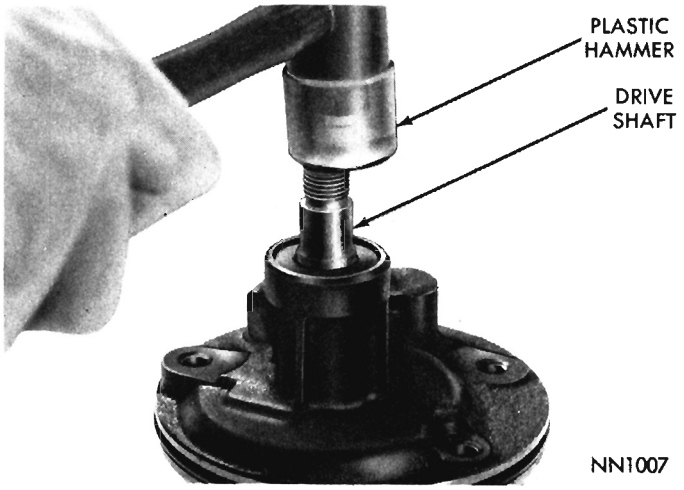


Fig. 8 - Removing Drive Shaft Assembly

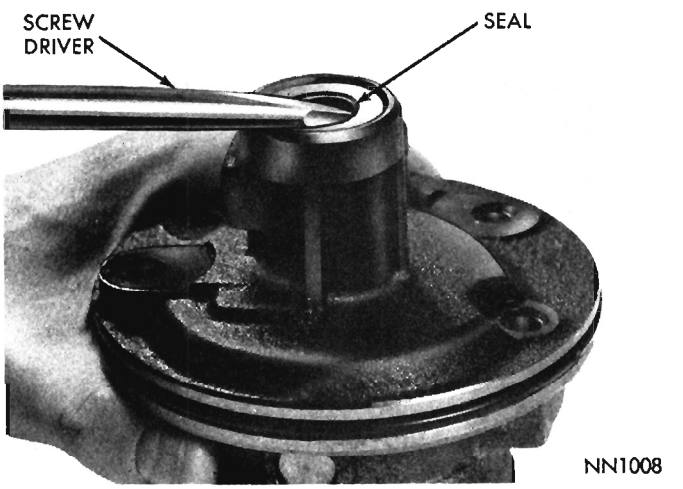


Fig. 9 - Oil Seal Removal

while system is being bled. See "Pump Installation".

.94 MODEL PUMP

Oil Seal Replacement

To service the drive shaft oil seal, it is necessary to remove the pump from the vehicle, disassemble and reassemble the pump as outlined in "Reconditioning".

RECONDITIONING

Disassembly

(1) Remove pulley retaining nut before loosening power steering pump belts. Remove pump from engine as an assembly.

(2) Tap pulley off shaft with plastic hammer.

(3) Remove brackets from pump, drain reservoir and clean exterior of pump with solvent.

(4) Remove key from drive shaft.

(5) Using soft protective jaws, clamp pump (shaft down) in vise between square boss and shaft housing (Fig. 6).

(6) Remove two mounting studs and pressure hose fitting. Gently tap reservoir filler tube back and forth with plastic hammer to loosen. Work reservoir off pump body (Fig. 6). Discard "O" rings from reservoir, two mounting studs and pressure fitting.

(7) Using a punch, tap end cover retainer ring around till one end of ring lines up with hole in pump body. Insert punch in hole far enough to disengage ring from groove in pump bore and pry ring out of pump body (Fig. 7).

(8) Tap end cover with plastic hammer to jar it loose. Spring under cover should push cover up.

(9) Remove pump body from vise, place in inverted position on flat surface and tap end of drive shaft with plastic hammer to loosen pressure plate, rotor and thrust plate assembly from body. Lift pump body off of rotor assembly. Flow control valve and spring should slide out of bore also (Fig. 8).

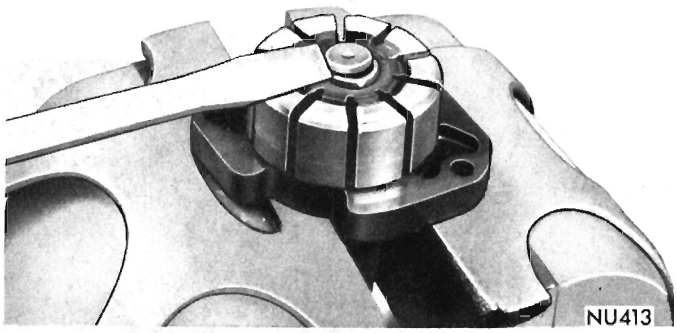


Fig. 10 - Removing Full Diameter Lock Ring.

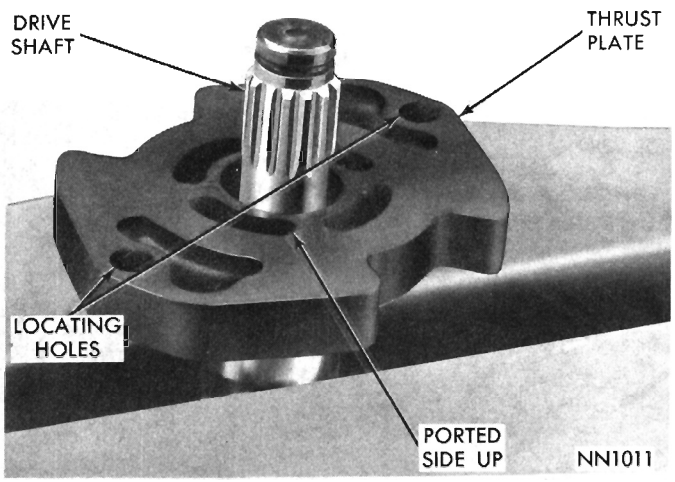


Fig. 12 - Installing Thrust Plate

(10) Remove and discard end plate and pressure plate "O" rings.

(11) Place pump body on flat surface and pry drive shaft oil seal out with a screw driver (Fig. 9).

(12) Inspect seal bore in housing for burrs, nicks or score marks that would allow oil to bypass outer seal surface.

(13) If necessary to disassemble flow control valve for cleaning, see "Flow Control Valve Disassembly".

(14) After lifting pressure plate and cam ring from rotor, remove ten vanes from slots in rotor.

(15) Clamp drive shaft in soft jawed vise, with rotor and thrust plate facing up.

(16) Remove rotor lock ring, pry ring off drive shaft using a screw driver (Fig. 10). Exercise care to avoid nicking the rotor end face. Discard ring.

(17) Slide rotor and thrust plate off of shaft and remove shaft from vise.

Inspection

(1) Wash all parts in clean solvent, blow out all passages with compressed air and air dry cleaned parts.

(2) Inspect drive shaft for excessive wear and seal area for nicks or scoring. Replace if necessary.

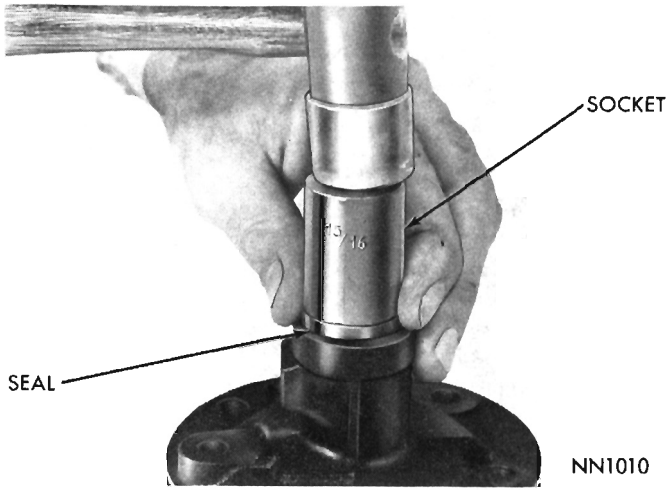


Fig. 11 - Oil Seal Installation

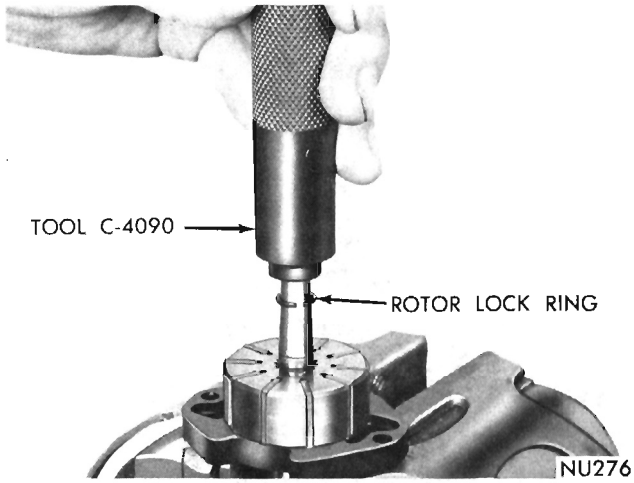


Fig. 13 - Installing Rotor Lock Ring

(3) Inspect fit of vanes in rotor. Vanes must slide freely in slots of rotor without binding. Excessively loose vanes require replacement of rotor and/or vanes. Binding can be relieved by cleaning or removal of burrs with a thin fine file.

(4) Inspect flat surfaces of pressure and thrust plates for wear or scoring. Light scoring can be removed by lapping on a flat surface. Remove all lapping compound thoroughly before reassembly.

(5) Inspect inner surface of cam ring for heavy scuff or chatter marks. Replace if necessary. Light score or scuff marks can be removed by polishing with a small, flat oil stone.

(6) Inspect end cover for nicks or burrs on surface contacting "O" ring and remove with a fine stone.

(7) Inspect pump body drive shaft bushing for excessive wear. Replace pump body and bushing as an assembly if badly worn or scored.

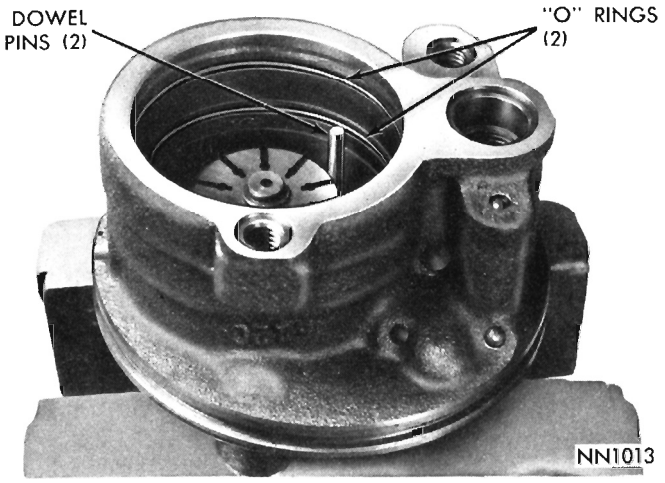


Fig. 14 - Rotor and Thrust Plate Installed

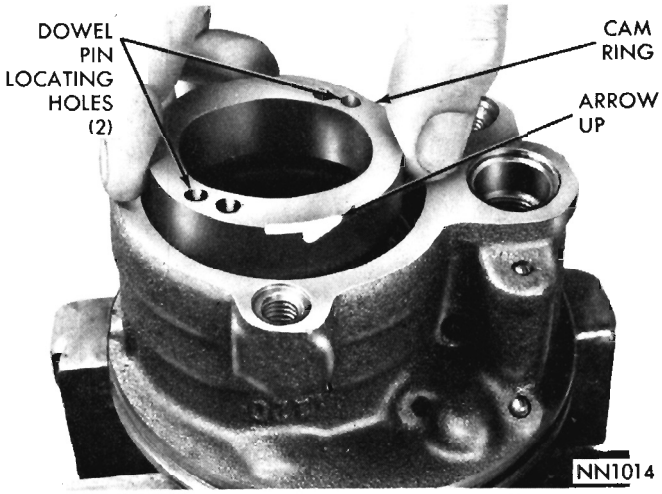


Fig. 15 - Installing Cam Ring

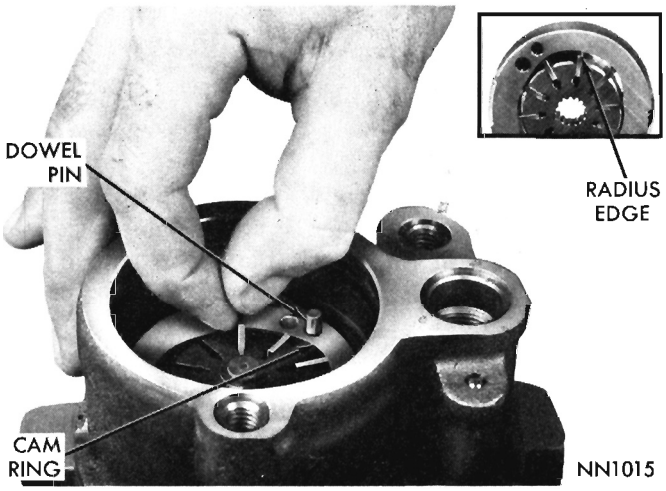


Fig. 16 - Installing Rotor Vanes

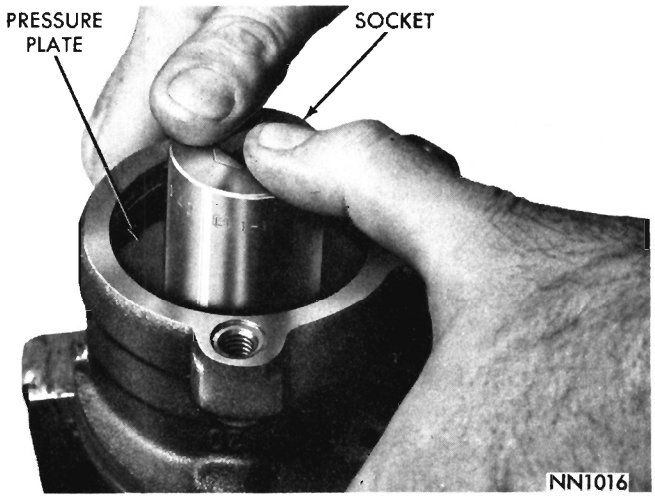


Fig. 17 - Seating Pressure Plate

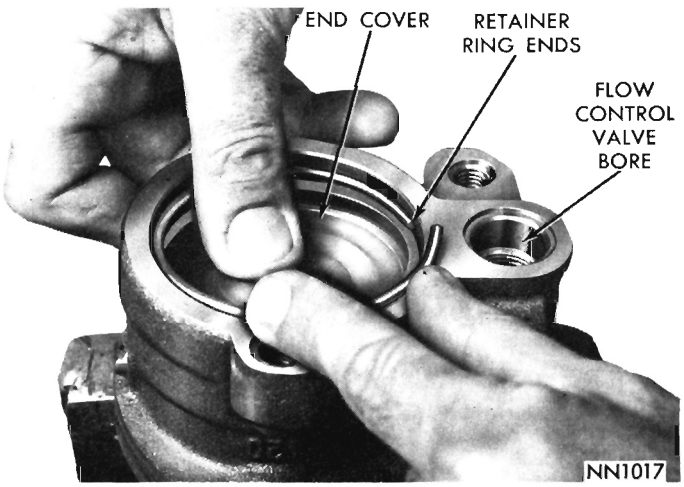


Fig. 18 - Installing End Cover Plate and Retainer Ring

Assembly

(1) Place pump body on flat surface and drive new drive shaft seal into bore with a 7/8 or 15/16 inch socket till seal bottoms on shoulder (Fig. 11).

CAUTION: Excessive force will distort the seal.

(2) Lubricate seal with power steering fluid and clamp pump body in vise, (shaft end down).

(3) Install end cover and pressure plate "O" rings in grooves in pump cavity. These rings are the same size. Lubricate with power steering fluid.

(4) With drive shaft clamped splined end up in soft jawed vise, install thrust plate on drive shaft (smooth, ported side up) (Fig. 12).

(5) Slide rotor over splines with the counterbore of rotor facing **down**. Install rotor lock ring making sure ring is seated in groove (Fig. 13).

(6) Install two dowel pins in holes in pump cavity. Carefully insert drive shaft, rotor and thrust plate assembly in pump cavity indexing locating holes with dowel pins (Fig. 14).

(7) Slide cam ring over rotor on dowel pins with arrow on ring facing "UP" (Fig. 15).

(8) Install ten vanes in rotor slots with radius

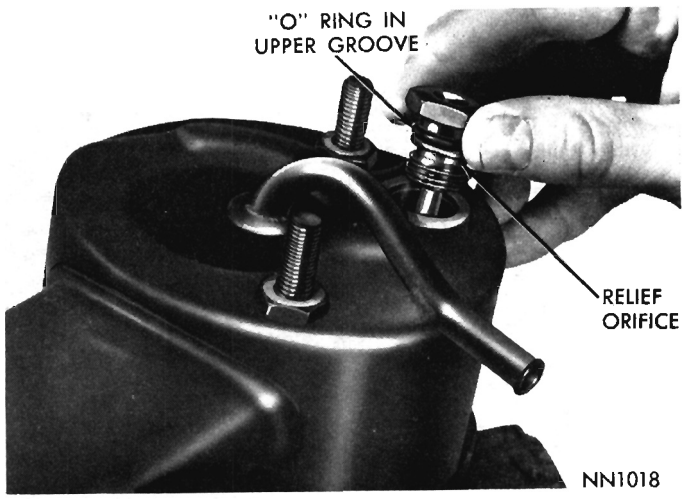


Fig. 19 - Installing Pressure Hose Fitting

edge facing out towards cam ring inner surface (Fig. 16).

CAUTION: Vanes installed with flat edge out will result in noisy pump operation.

(9) Position pressure plate on dowel pins. Place a 1-1/4 inch socket in groove of pressure plate and seat entire assembly on "O" ring in pump cavity by pressing down on socket with both thumbs (Fig. 17).

(10) Place spring in groove in pressure plate and position end cover lip edge UP over spring.

(11) Press end cover down below retaining ring groove with thumb and install ring making sure it is seated in groove (Fig. 18).

This operation can be performed in an arbor press if available. Care should be exerted to prevent cocking the end cover in the bore or distorting the assembly.

(12) Using a punch, tap retainer ring ends around in the groove until opening is opposite flow control valve bore. This is important for maximum retention of the retainer ring (Fig. 18).

(13) Replace reservoir "O" ring seal, two mounting stud "O" ring seals and flow control valve "O" ring seal on pump body, lubricate with power steering fluid and carefully position reservoir on pump body. Visually align the mounting stud holes till studs can be started in threads.

(14) Using a plastic hammer, tap reservoir down on pump and insert flow control valve spring and valve (Hexigon plug down)

(15) Replace "O" ring on pressure hose fitting and lubricate with power steering fluid (Fig. 19).

CAUTION: Be sure "O" ring is installed on upper groove. It is possible to install "O" ring in lower groove. This would restrict relief outlet orifice.

(16) Install pressure hose fitting and tighten mounting studs. Tighten pressure hose fitting to 20 foot-pounds and rear mounting studs 25-35 foot-pounds.

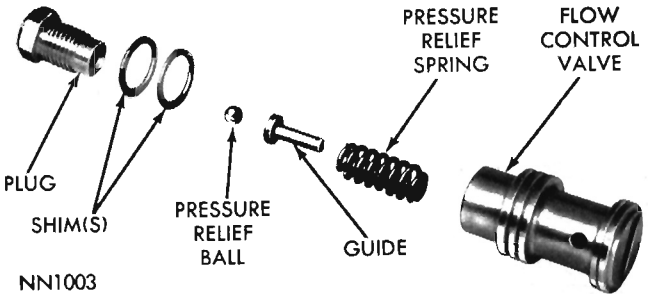


Fig. 20 - Flow Control Valve (.94 Pump)

(17) Remove pump assembly from vise and install mounting brackets and drive shaft key.

(18) Install pulley on shaft and secure with retaining nut. **Tighten nut to 45-55 foot-pounds.**

(19) Install pump assembly on engine and refill reservoir. Start engine, inspect for leaks, and recheck fluid level.

FLOW CONTROL VALVE

.94 Model

The flow control valve is serviced as an assembly. Nicks or burrs that might cause the valve to stick in the bore may be removed by rubbing valve over flat surface covered by crocus cloth. Care should be taken to prevent rounding the sharp edges of the lands.

The valve may be disassembled for cleaning if dirt has caused pump failure. It is important that if the valve is disassembled for cleaning purposes, the entire pump should be disassembled and cleaned.

Disassembly

(1) Remove pressure hose fitting from pump reservoir. Discard "O" ring on fitting.

(2) Withdraw valve with a magnet. If valve is stuck in bore, it may be necessary to push in on valve against spring pressure. Release pressure exerted against valve abruptly and allow valve to spring out of bore.

(3) Clamp land end of valve in a soft jawed vise and remove hex head plug and shim(s). Note number of shims on plug. Same number of shims should be installed on assembly of valve.

(4) Remove valve from vise and remove pressure relief ball, guide and spring.

Assembly

(1) Insert spring, guide and pressure relief ball in end of flow control valve (Fig. 20).

(2) Install hex head plug using the same number of shims as were removed. **Altering shim thickness will change relief pressure.**

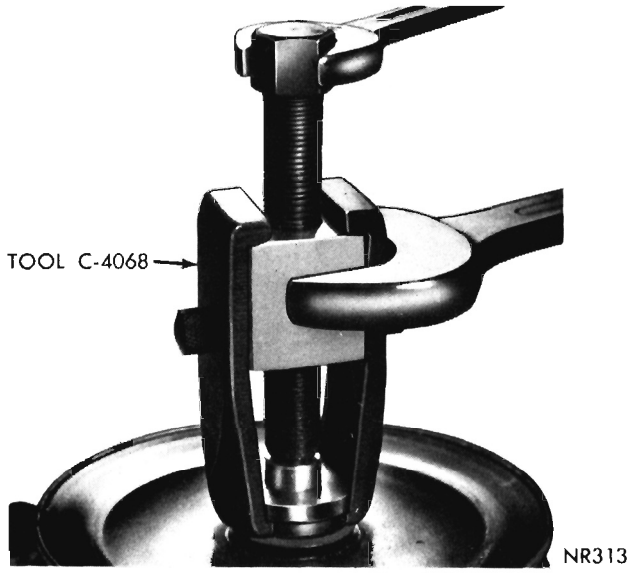


Fig. 21 - Removing Drive Pulley (1.06 Pump)

(3) Install hex head plug and tighten to 50 inch-pounds.

(4) Insert flow valve spring and valve in bore. Install new "O" ring on pressure hose fitting and lubricate with power steering fluid.

(5) Thread fitting into pump body and tighten to 20 foot-pounds.

PUMP MODEL 1.06

Oil Seal Replacement

(1) Remove pump from engine. Drain reservoir and clean exterior before servicing.

(2) Clamp pump in vise securely at mounting bracket.

(3) Remove pulley with Tool C-4068 (Fig. 21).

(4) Position seal remover adapter SP-5323A over end of drive shaft with large opening toward pump.

(5) Place seal remover Tool C-4062 over shaft, through adapter and screw tapered thread well into metal portion of seal. Tighten large drive nut and remove seal. (Fig. 22).

(6) Inspect seal bore in housing for burrs, nicks, or score marks that would allow oil to by-pass outer seal surface.

(7) Inspect shaft for scratches or burrs, if any, remove with crocus cloth. Lubricate new seal and install with lip toward pump. Use Tool C-4061 to drive seal flush with housing (Fig. 23).

(8) Install drive pulley. See "Pulley Installation", (Figs. 33 and 34).

(9) With installer shaft clamped securely in vice, tighten drive nut against thrust bearing and press pulley onto shaft.

CAUTION: Do not attempt to press pulley on to shaft without the use of special tool as serious damage will result to interior of pump.

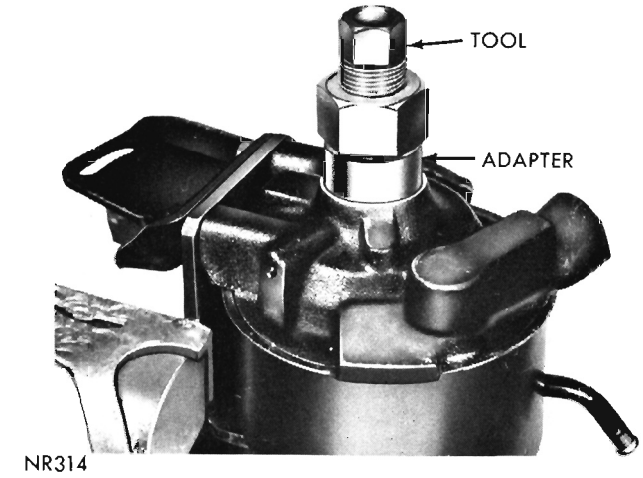


Fig. 22 - Removing Shaft Seal

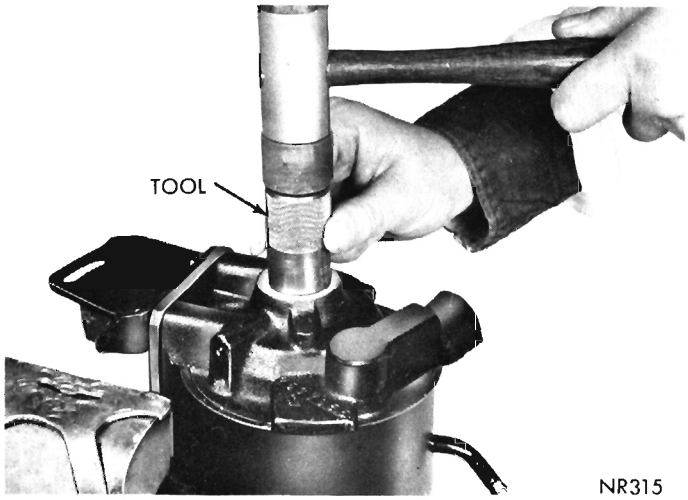


Fig. 23 - Installing Shaft Seal

A small amount of drive shaft end play will be observed when pulley is installed flush with end of shaft. This movement is necessary and will be minimized by a thin cushion of oil between the rotor and end plates when pump is in operation.

(10) Install pump and adjust belt as outlined under "Cooling" Group 7.

RECONDITIONING.

Disassembly (Fig. 24)

(1) Remove pump from engine. Drain reservoir and clean exterior before servicing.

(2) Clamp pump securely in vise at mounting bracket.

(3) Remove pulley with Tool C-4068 (Fig. 21).

(4) Remove oil seal as described in "Oil Seal Replacement" section.

(5) Remove pump from vise and remove three mounting bracket bolts, remove bracket.

(6) Remove reservoir and place pump in vise with shaft down (use vise with soft protective

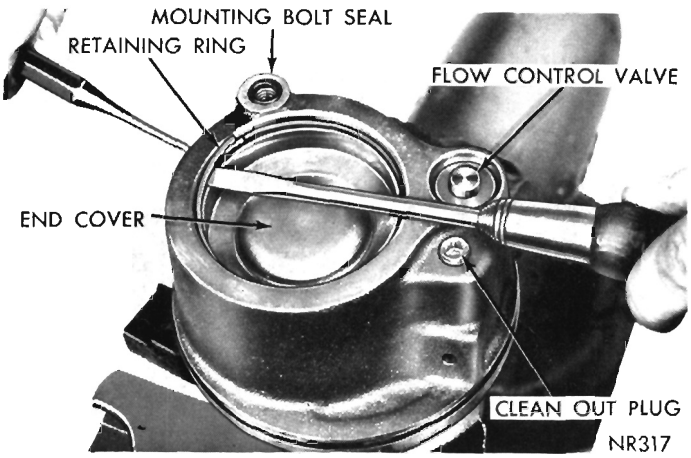


Fig. 25 - Removing End Cover Retaining Ring

jaws). Discard mounting bolt and reservoir "O" rings.

(7) Using a punch, tap end cover retaining ring around until one end of ring lines up with hole in pump body. Insert punch in hole far enough to disengage ring from groove in pump bore. Remove ring from body (Fig. 25).

(8) Tap end cover with plastic hammer to jar it loose. Spring under cover should push cover up.

(9) Remove pump body from vise, place in inverted position on clean flat surface and tap end of drive shaft to loosen rotating group. Lift pump body off rotating group.

(10) Remove and discard brass seal plate and fibre gasket. (Some pumps may be assembled with brass plates only). The fibre gasket may be found stuck to housing floor; it can easily be lifted or pulled away. Insure that all portions of gasket are removed and that housing floor is not scratched or damaged.

(11) Discard pressure plate and end cover "O" rings.

(12) Remove snap ring, bore plug, flow control valve and spring from housing. Discard "O" ring.

(13) If necessary to disassemble flow control valve for cleaning, see"flow Control Valve Disassembly".

Inspection

(1) Remove clean out plug with allen wrench (Fig. 25).

(2) Wash all parts in clean solvent, blow out all passages with compressed air and air dry all cleaned parts.

(3) Inspect drive shaft for excessive wear and seal area for nicks or scoring. Replace if necessary.

(4) Inspect end plates, rollers, rotor and cam ring for nicks, burrs, or scratches. If any of the

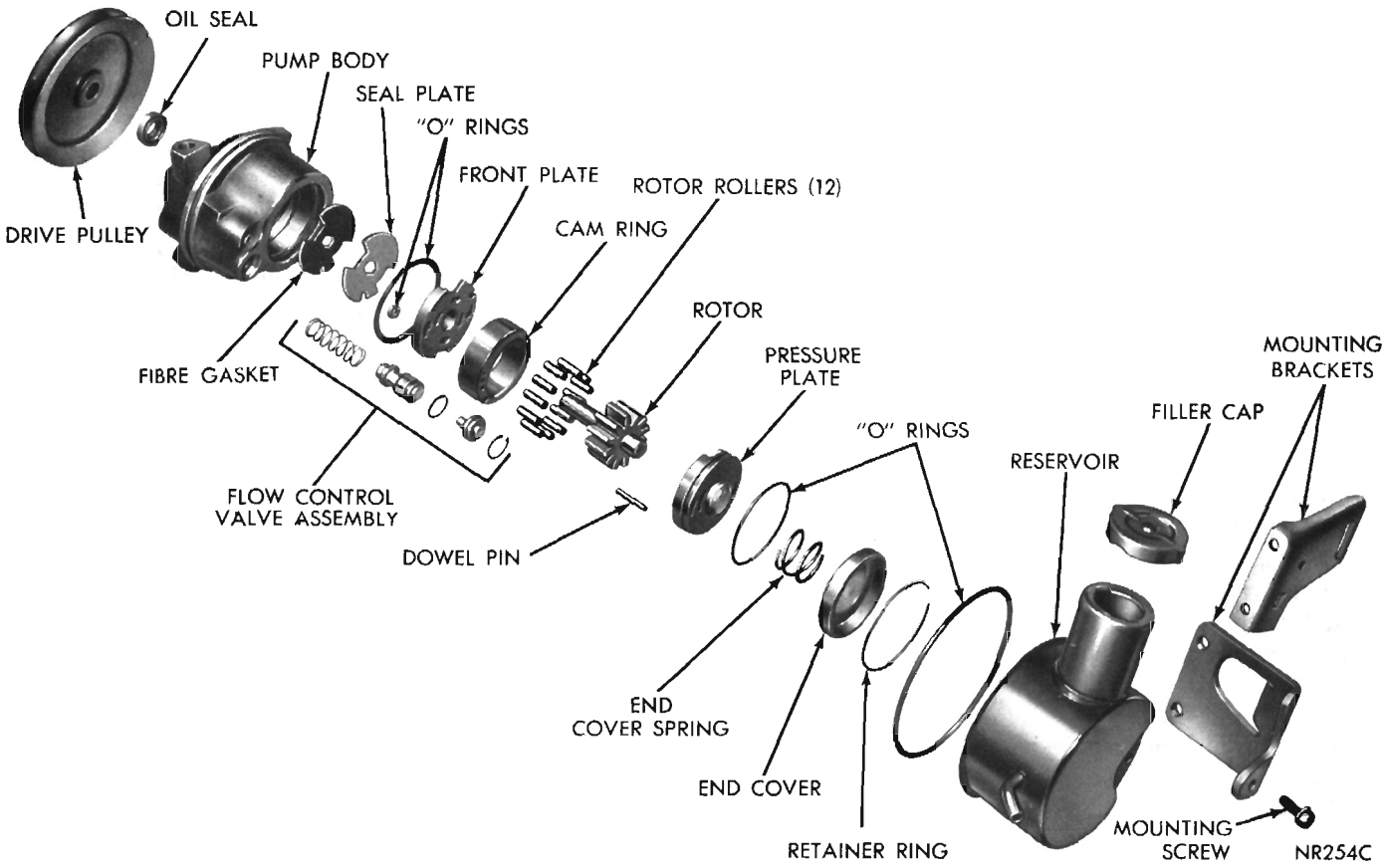


Fig. 24 - 1.06 Pump Disassembled View

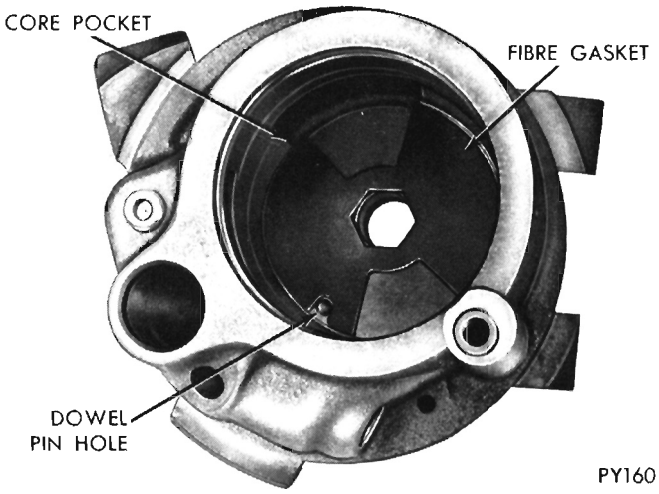


Fig. 26 - Fibre Gasket Installed

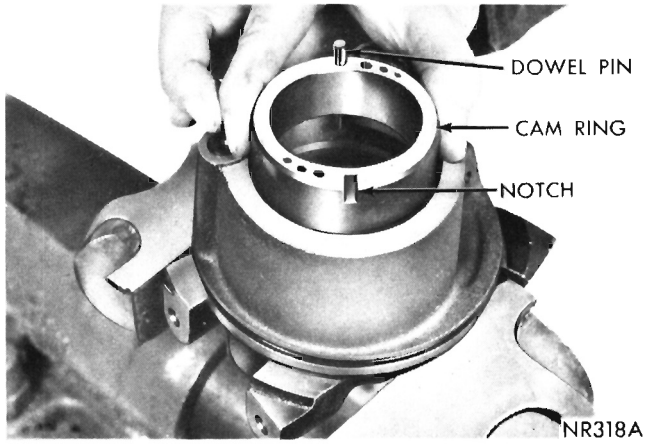


Fig. 27 - Installing Cam Ring

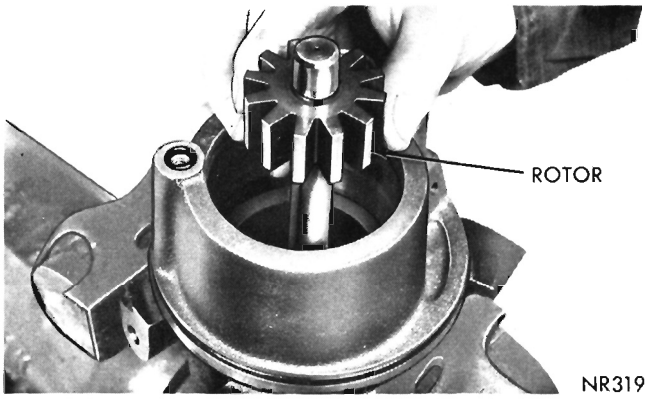


Fig. 28 - Installing Rotor

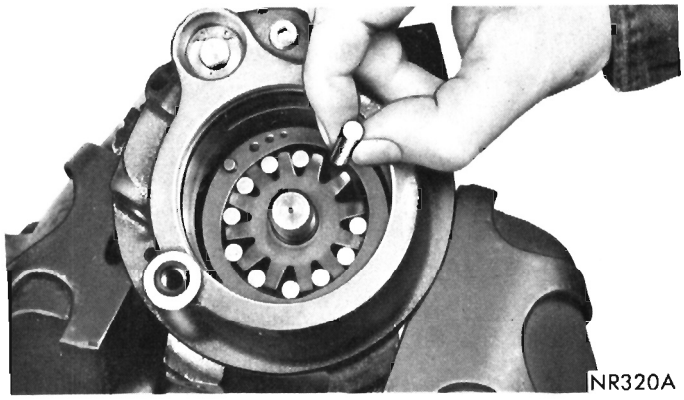


Fig. 29 - Installing Rollers in Rotor

components are damaged to a degree that the efficiency of the pump is affected it is recommended that all the interior parts be replaced.

(5) Inspect pump body drive shaft bushing for excessive wear. Replace pump with pump partial assembly if badly worn or scored. Pump partial assembly includes the entire pump with the exception of the reservoir, filler cap, mounting brackets, and drive pulley.

Assembly

(1) Install 1/8 inch pipe clean out plug. Tighten to 80 inch-pounds.

(2) Place pump body on flat surface and drive new shaft seal into bore with Tool C-4061.

(3) Install new end cover, "O" ring in groove in pump bore. Lubricate with power steering fluid.

(4) Lubricate new large pump body to reservoir "O" ring and install on pump body.

(5) Install new fibre gasket and brass seal plate to bottom of housing floor (fibre gasket on floor and brass seal plate on top of fibre). Note: **Pumps originally built with brass seal plate only, must be serviced with both brass seal plate and fibre gasket. Align index notches in plate and gasket with dowel pin hole in housing; cut-out sections of gasket and plate should be in line with core pockets on side of housing bore (Fig. 26).**

Caution: Pump will not operate properly if either gasket or seal plate are improperly installed.

(6) Carefully install front plate in pump bore. Chamfered edge first. Align index notch in plate with dowel pin hole in housing.

CAUTION: Use extreme care in aligning dowel pin. Pump can be completely assembled with dowel pin improperly positioned in end plates and not in indexing hole in housing.

(7) Place dowel pin in cam ring and position cam ring inside pump bore. Notch on cam ring must be up or away from pulley end of pump (Fig. 27). If cam ring has two notches, one machined and one cast, install with machined notch up. Machined notch has sharp corners and cast notch rounded corners.

If end of dowel pin in cam ring is more than 3/16 inch above surface of installed cam ring, it is not seated in index hole in housing.

(8) Install rotor and shaft in cam ring and carefully place 12 rollers in cavities of rotor (Figs. 28 and 29).

Lubricate rotor, rollers, and cam I.D. with power

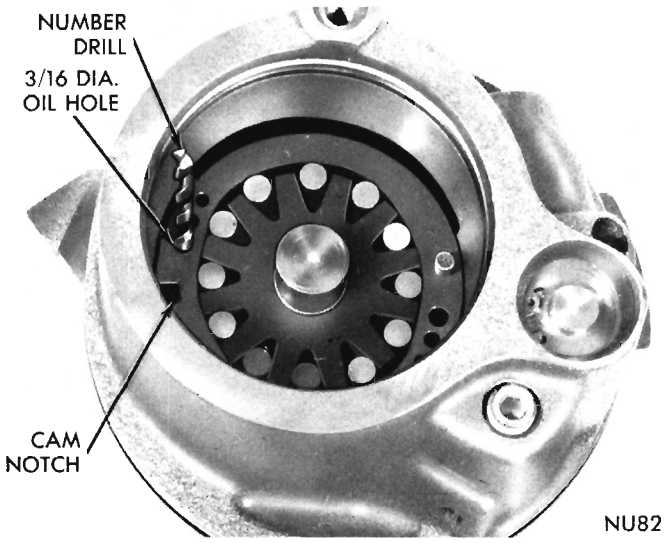


Fig. 30 - Aligning Oil Holes

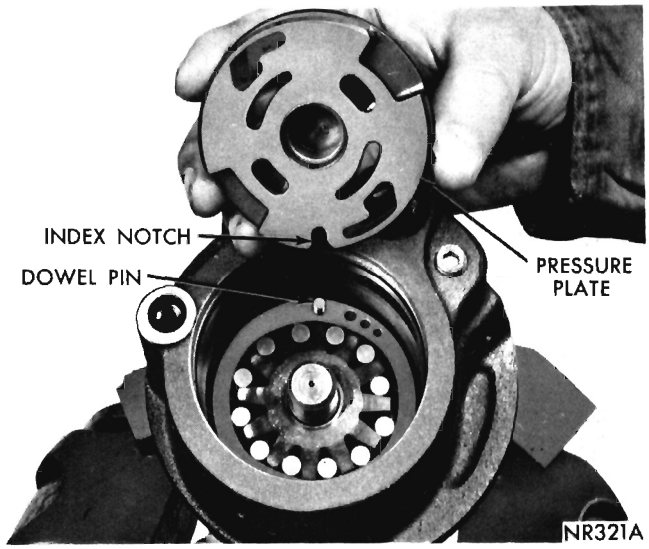


Fig. 31 - Installing Pressure Plate

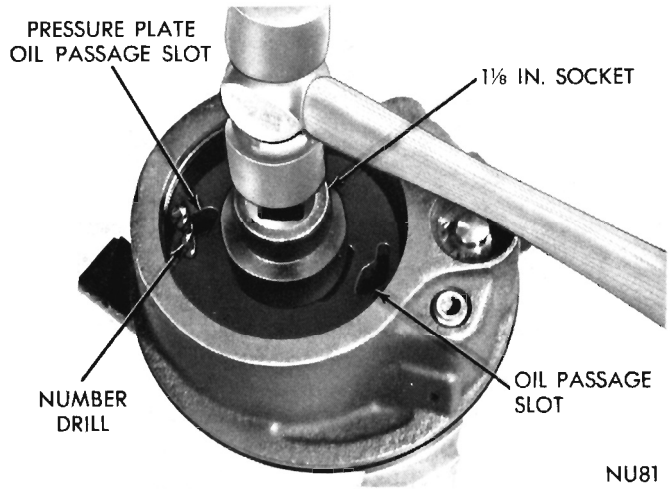


Fig. 32 - Seating Pressure Plate

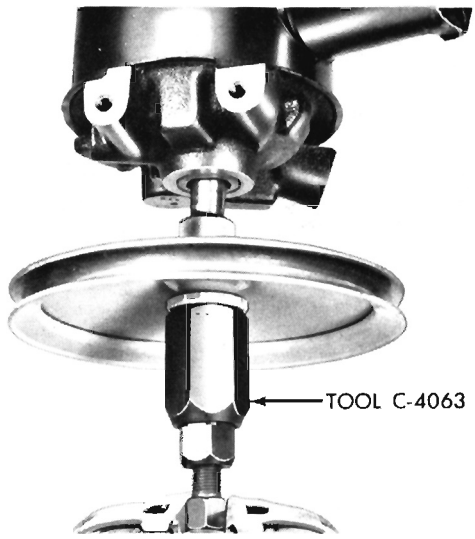


Fig. 33 - Pulley Installation 6 Cylinder Engines

steering fluid.

(9) Before installing pressure plate, rotate shaft by hand to make sure rollers are all seated parallel with pump shaft.

(10) To insure proper alignment of pressure plate to dowel pin, insert the largest possible number drill into the large 3/16 inch diameter oil hole in the cam ring, next to the cam notch. Select from a number 13 through 16 drill, clean thoroughly, and bottom on housing floor (Fig. 30).

(11) Install new "O" ring on pressure plate, lubricate with power steering fluid and carefully position in pump bore. Before seating plate in pump bore, align index notch in plate with dowel pin and oil passage slot in plate with number drill. Seat plate on cam ring using a clean 1-1/8 inch socket and plastic hammer (Figs. 31 and 32). Remove drill. Inspect pressure plate at both oil passage slots to insure that plate is squarely seated on cam ring end face.

(12) Place large coil spring over raised portion of installed pressure plate.

(13) Position end cover, lip edge UP, over spring. Press end cover down below retaining ring groove with thumb and install ring making sure it is seated in groove. Light tapping on the end cover may be necessary to insure that the end cover chamfer is squarely seated againt snap ring.

(14) Replace reservoir mounting bolt seal.

(15) Lubricate flow control valve with power steering fluid and insert valve spring and valve into bore (spring first then hex plug end of valve). Install new "O" ring on bore plug, lubricate with power steering fluid and carefully install into bore. Install snap ring, with sharp edge UP.

CAUTION: Do not depress the bore plug more than 1/16 inch beyond snap ring groove.

(16) Place reservoir on pump body and visually

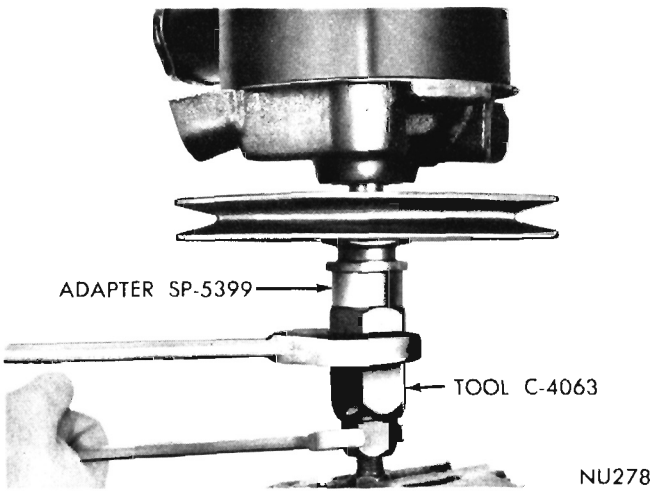


Fig. 34 - Pulley Installation 8 Cylinder Engines

align mounting bolt hole. Tap reservoir down on pump with plastic hammer.

(17) Remove pump from vise and install mounting brackets with three mounting bolts, tighten to 18 foot-pounds.

(18) Install drive pulley. See "Pulley Installation" (Figs. 33 and 34).

Power steering pump drive pulleys installed on six cylinder engines are not pressed flush with the end of the pump shaft. With drive pulley placed on end of shaft, securely thread installed Tool C-4063, **without** adapter, into 3/8 inch threaded hole in end of shaft. (Fig. 33).

Pumps installed on eight cylinder engines have drive pulleys pressed flush with the end of the pump shaft. With drive pulley placed on end of shaft, securely thread installer Tool C-4063, **with** adapter SP-5399, into 3/8 inch threaded hole in end of shaft (Fig. 34).

(19) With installer shaft clamped securely in vice, tighten drive nut against thrust bearing and press pulley onto shaft.

CAUTION: Do not attempt to press pulley on to shaft without the use of special tool as serious damage will result to interior of pump.

A small amount of drive shaft end play will be observed when pulley is installed. This movement is necessary and will be minimized by a thin cushion of oil between the rotor and end plates when pump is in operation.

(20) Install pump assembly on engine, connect hoses (using new pressure hose "O" ring), and tighten drive belt see "Cooling System". Group 7. Fill reservior with power steering fluid, test and inspect for leaks.

FLOW CONTROL VALVE

1.06 MODEL

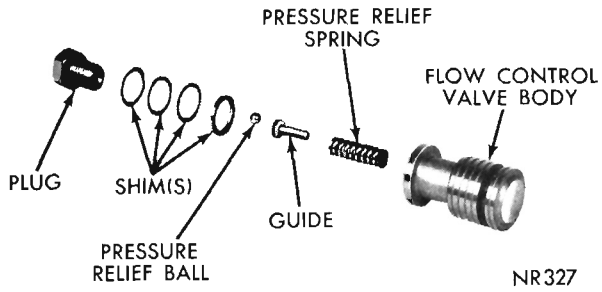


Fig. 35 Flow Control Valve Disassembled View

Disassembly

(1) Remove pump from engine and reservoir from pump.

(2) Remove snap ring and plug from flow bore. Discard "O" ring from plug.

(3) Depress control valve against spring pressure and allow to spring back. The valve should pop out of bore far enough to be lifted out. Light tapping on rear face of pump body may be necessary to remove a stuck valve.

If dirt or foreign particles are found on valve or within valve bore, entire pump should be disassembled, cleaned and rebult. The high pressure and return hoses must also be flushed and the steering gear valve body reconditioned see "Power Steering Gear". If valve bore is badly scored, replace pump body and flow control valve.

(4) Remove nicks or burrs that might cause the valve to stick by rubbing valve over a flat surface covered with crocus cloth.

(5) Clamp land of valve in a soft jawed vise and remove hex head ball seat and shim(s). Note number and guage of shims on ball seat. Same number and guage of shims must be installed on assembly of valve. **Altering shim thickness will change relief pressure.**(Fig. 35).

(6) Remove valve from vise and remove pressure relief ball, guide and spring.

(7) Clean all parts thoroughly. **Dirt Particles On Ball or Ball Seat Will Cause Improper Pump Operation.**

Assembly

(1) Insert spring, guide and pressure relief ball in end of flow control valve (Fig. 35).

(2) Install hex head ball seat using the same number and thickness shims as were removed. Tighten to 50 inch-pounds.

(3) Lubricate valve with power steering fluid and insert flow valve spring and valve in bore. Install new "O" ring on bore plug, lubricate with power steering fluid and carefully install into bore.

CAUTION: Do not depress the bore plug more than 1/16 inch beyond snap ring groove.

(4) Install snap ring.

(5) Install reservoir on pump.

STANDARD STEERING COLUMN

INDEX

	Page
Disassembly	39
Floor Shift Column	48
Inspection	42
Installation	47
Reassembly	42
Removal	38

GENERAL INFORMATION

The steering column under head-on collision conditions is designed to telescope at a controlled rate. The telescoping action reduces the likelihood of the steering wheel being driven rearward toward the driver. If the driver is thrown forward into the wheel, the column can telescope further at the same controlled rate, thereby reducing force of the impact.

The column assembly (Fig. 1 or 2) has four principal components:

1. A column jacket with a mesh section designed to shorten in "accordion" fashion.
2. A two-piece telescoping transmission gearshift tube interconnected by plastic inserts and shear pins.
3. A two-piece telescoping steering shaft with upper and lower sections connected by plastic friction collars and shear pins.
4. A mounting bracket connecting steering column to the instrument panel, which allows the column to slide forward but blocks its rearward movement toward the driver.

The center section of the column jacket has diamond-shaped perforations and is formed with accordion pleats. These pleats allow it to compress like a bellows from impact forces.

The gearshift tube is made up of two sections designed to telescope together. These sections are interconnected and held together by injections of plastic that form the interconnecting inserts and shear pins. Under impact, the pins shear first, followed by a gradual paring away of the inserts by

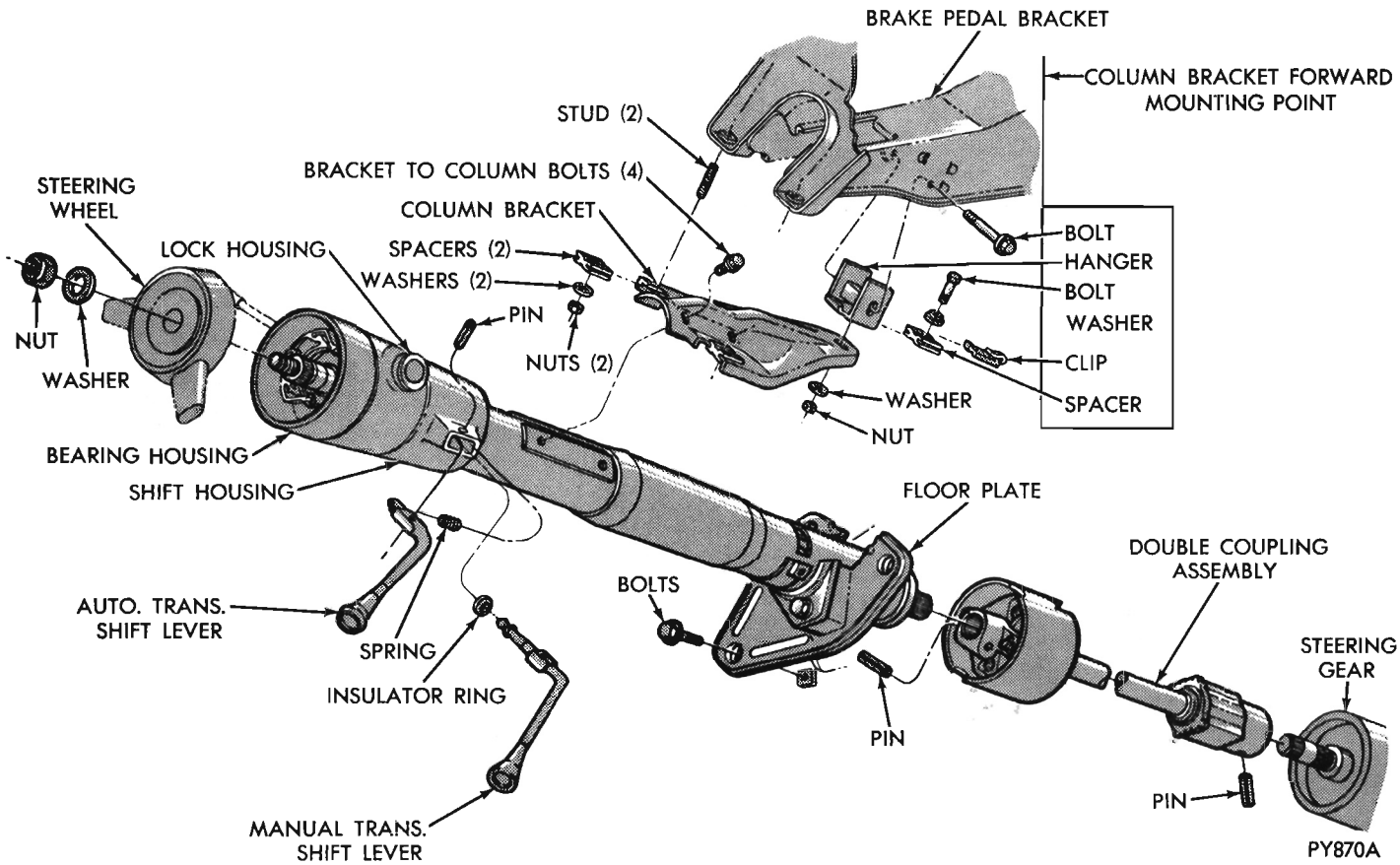


Fig. 1 Column Installation (Fury - Chrysler)

the knife-like edge in the adjoining tube section.

The steering shaft is a two-piece assembly. The upper piece is solid and has a double-flatted lower section. The lower piece is hollow and formed to fit over the double-flatted section of the upper piece. The purpose of the flatted section is to provide continued steering action even though completely telescoped. Plastic is injected through two small holes in the hollow piece into a pair of annular grooves on the solid portion of the shaft. The four small holes filled with plastic form the shear pins. Upon impact, the shear pins break off and the shaft gradually telescopes against a resistance provided by the plastic collars in the annular grooves.

The mounting bracket is designed to restrain the column from being shifted toward the driver during impact. It incorporates three "break-away capsules" that allow the mounting bracket to slip off the attaching points, permitting the steering column to compress or yield in a forward direction under a severe impact from the driver side.

When the column is installed in a car it is no more susceptible to damage through ordinary usage than previous columns; however, when it is removed, special care must be take in handling this assembly. When the column is removed from the car such actions as a sharp blow on the end of the steering shaft or shift levers, leaning on the column assembly, or dropping of the assembly could shear or loosen the plastic shear joints that maintain column rigidity. It is, therefore, suggested that the removal and installation, and the disassembly and reassembly procedures be carefully followed when servicing this assembly.

IMPORTANT: Bumping, jolting and hammering on the steering shaft and gearshift tube must be avoided during all servicing operations. If the shear pins are broken, the controlled rate of the impact-absorbing features will be destroyed making these parts unfit for further use. The Special Tools required and their usage are covered in the following service procedures.

The **Barracuda** column (Fig. 3) has a telescoping steering shaft, but all other components are conventional. A corrugated cylinder is added between steering wheel and steering column for energy absorption on impact.

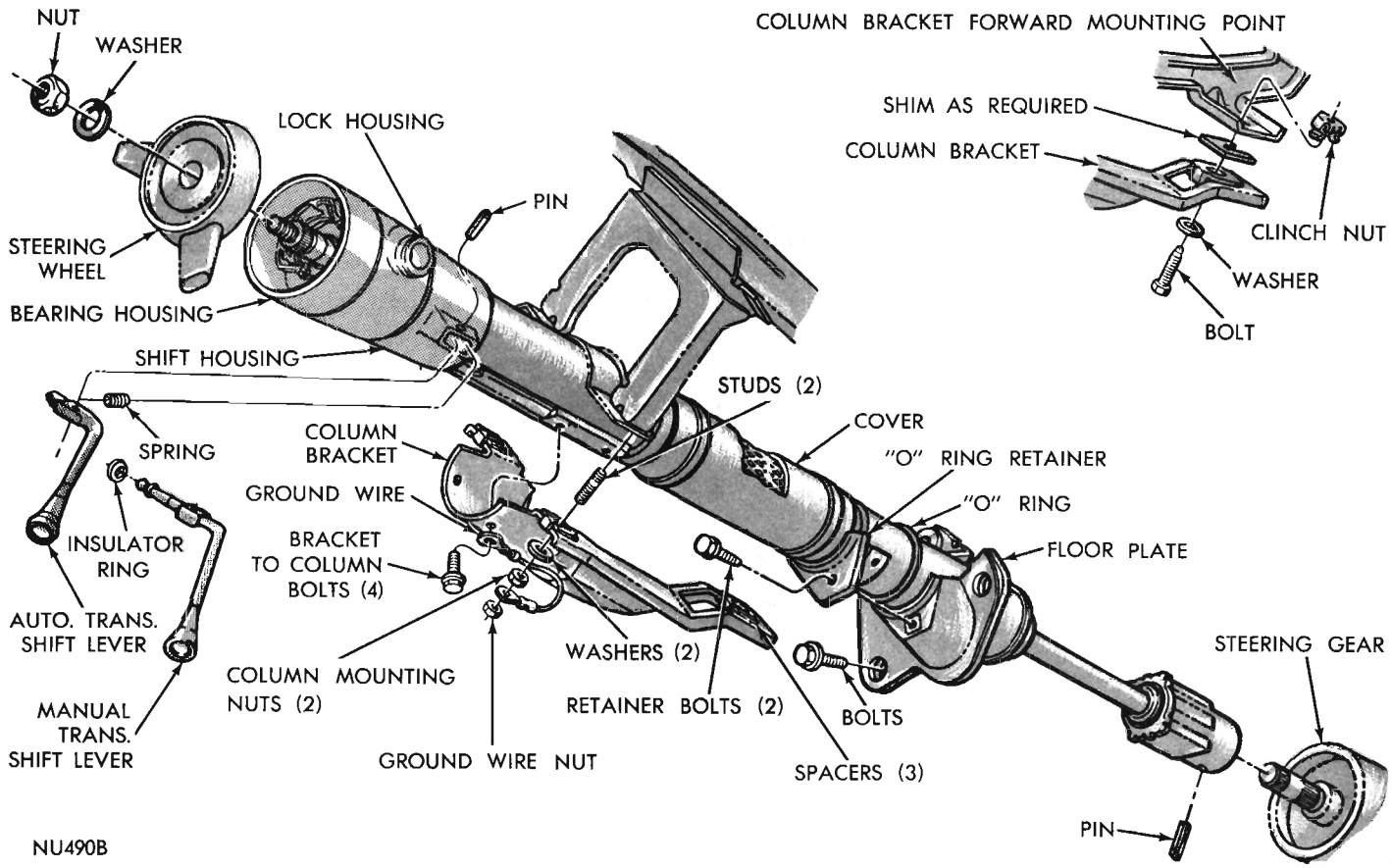


Fig. 2 Column Installation (Valiant and Satellite)

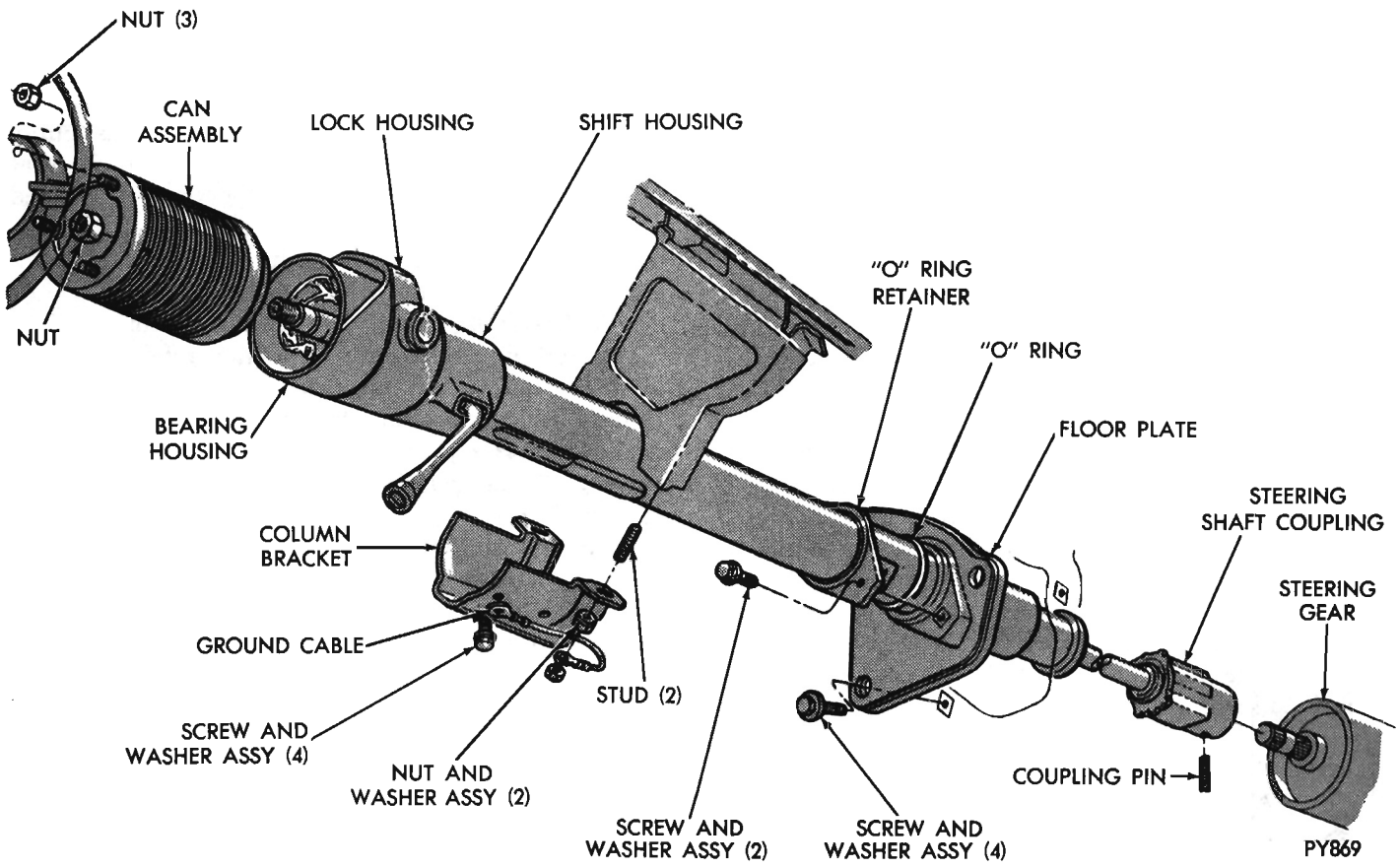


Fig. 3 Column Installation (Barracuda)

SERVICE PROCEDURES

COLUMN

Removal (Figs. 1, 2 or 3)

(1) Disconnect negative (ground) cable from battery.

(2) Disconnect linkage from lower end of steering column.

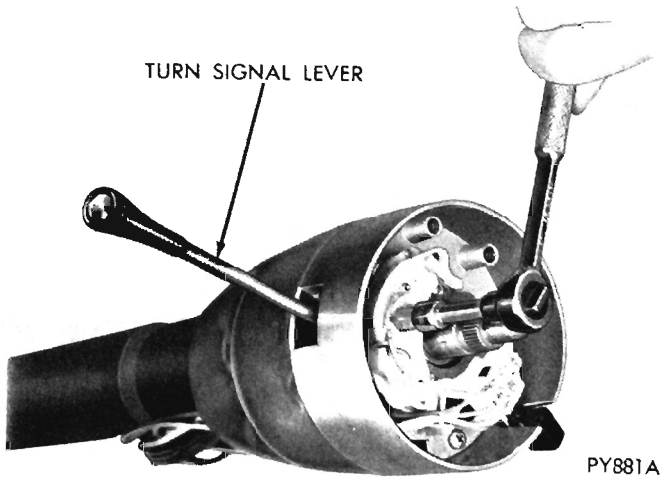


Fig. 4 Turn Signal Lever

(3) Remove steering shaft lower coupling to wormshaft roll pin.

(4) Disconnect wiring connectors at steering column jacket.

(5) Remove horn ring ornament assembly.

(6) Disconnect wire at horn switch. Remove three screws attaching horn ring and switch to steering wheel, then remove horn ring and switch.

(7) Remove steering wheel retaining nut and washer. Remove steering wheel with Tool C-3428B. **Do not bump or hammer on steering shaft to remove wheel.**

Barracuda models: remove three nuts fastening steering wheel to corruglated cylinder, remove nut and washer from steering shaft and install Tool C-3428B to pull cylinder from shaft splines.

(8) Remove turn signal lever (Fig. 4).

(9) Remove floor plate to floor pan attaching screws. Remove finish plate from under instrument panel to expose steering column bracket.

Chrysler-Fury: disconnect automatic shift indicator pointer from shift tube bracket.

(10) Remove nuts or bolts attaching steering column bracket to instrument panel support. If so

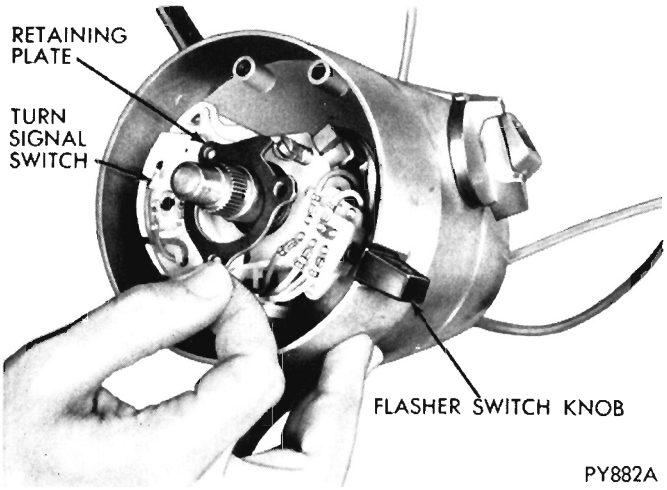


Fig. 5 - Retainer and Turn Signal Switch

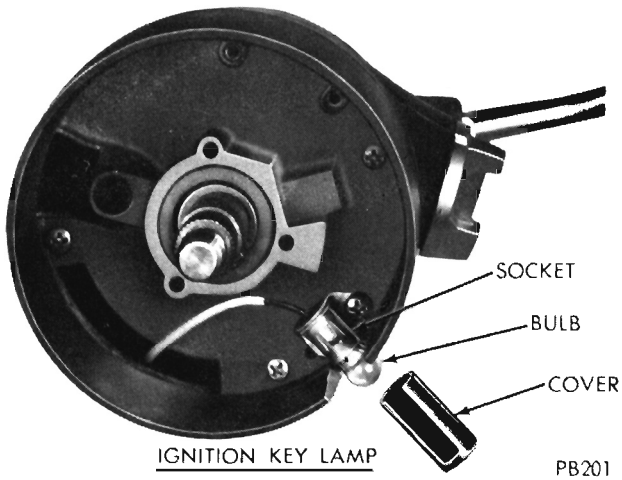


Fig. 6 - Ignition Key Lamp

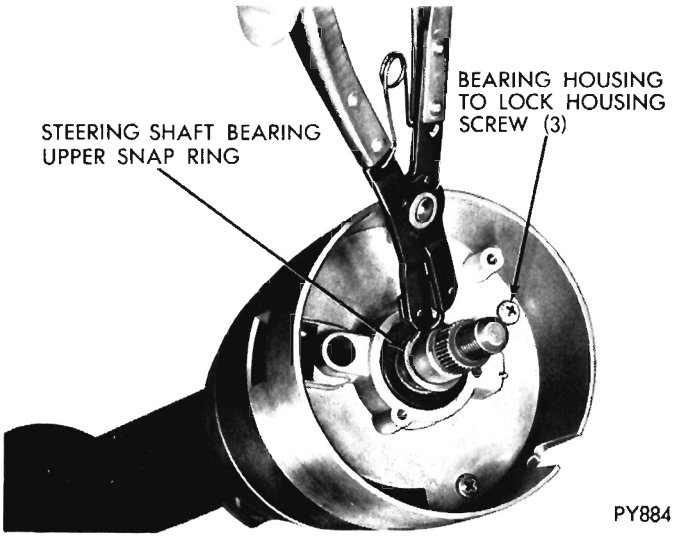


Fig. 7 - Steering Shaft Bearing Upper Snap Ring

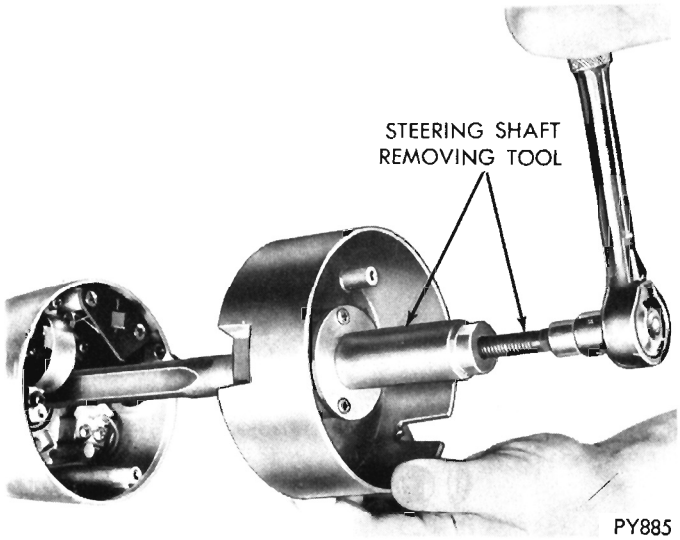


Fig. 8 - Pressing Shaft Out of Bearing

equipped, save shim pack from between bracket forward leg and support for reuse during installation.

(11) Carefully pry lower coupling from steering gear wormshaft, then remove column assembly out through passenger compartment being careful not to damage paint or trim.

Disassembly

(1) Remove four bolts attaching bracket assembly to column jacket.

(2) Remove two screws and lift off wiring trough.

(3) Attach Column Holding Fixture C-4132 to column jacket and clamp the assembly in a vise.

(4) To remove shift lever, use masking tape to protect paint and a deep socket to back up the housing then drive the retaining roll pin out with a punch.

(5) Remove turn signal switch and upper bearing retainer screws. Remove retainer and lift switch upward out of the way (Fig. 5).

(6) Remove retaining screw and lift the ignition key lamp assembly out of the way (Fig. 6).

(7) Remove snap ring from upper end of steering shaft (Fig. 7).

Steering Shaft

(1) Remove three screws which hold bearing housing to lock housing.

CAUTION: These screws must be removed before steering shaft removal.

(2) Install steering shaft remover C-4044 and press shaft out of bearing and remove bearing housing from shaft (Fig. 8).

(3) Remove bearing lower snap ring from shaft.

(4) Pry sleeve off steering shaft lock plate hub to expose pin.

(5) Install Tool C-4113 on steering shaft lock plate hub to press pin out of shaft. **DO NOT**

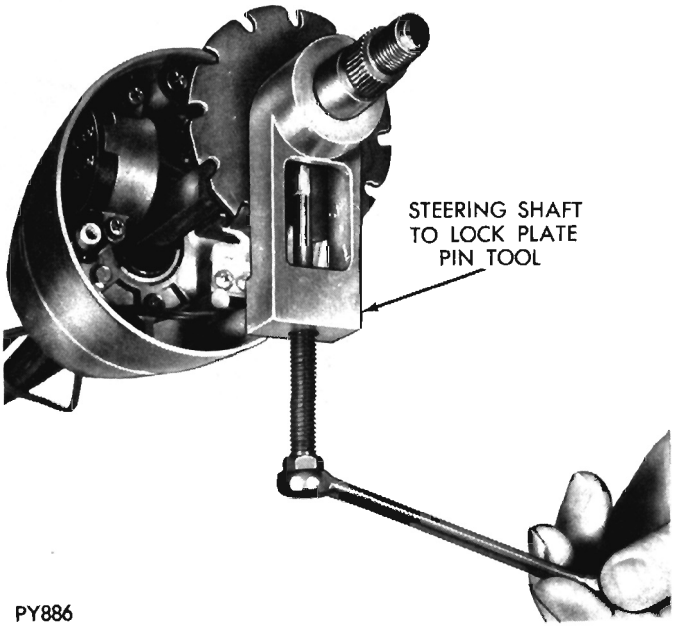


Fig. 9 - Lock Plate Pin - Removal or Installation

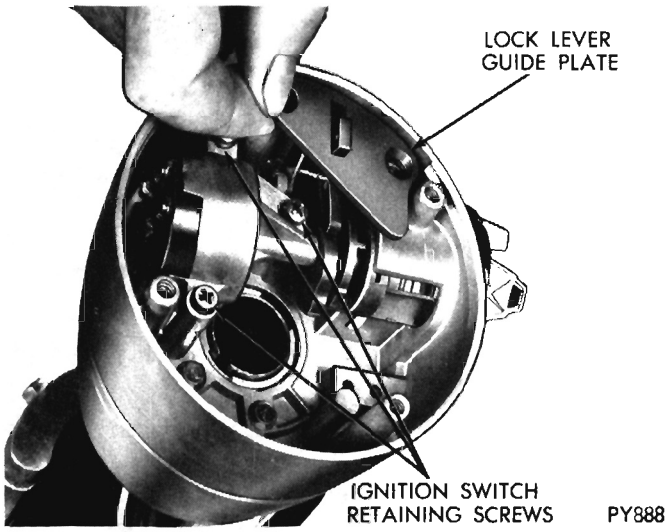


Fig. 11 - Lock Lever Guide Plate

HAMMER (Fig. 9).

(6) Remove tool and lock plate from shaft.

(7) Remove shaft through lower end of column.

Lock Housing

(1) If equipped with shift indicator dial remove pointer attached to shift housing with one screw.

(2) Remove two screws and lift out buzzer switch (Fig. 10).

(3) Remove two retaining screws and the lock lever guide plate which will expose the lock cylinder release hole (Fig. 11).

(4) **Place cylinder in "lock" position and remove key.** Insert a small diameter screwdriver or similar tool into lock cylinder release hole and push in to release spring loaded lock retainer. At the same time pull lock cylinder out of housing bore (Fig. 12).

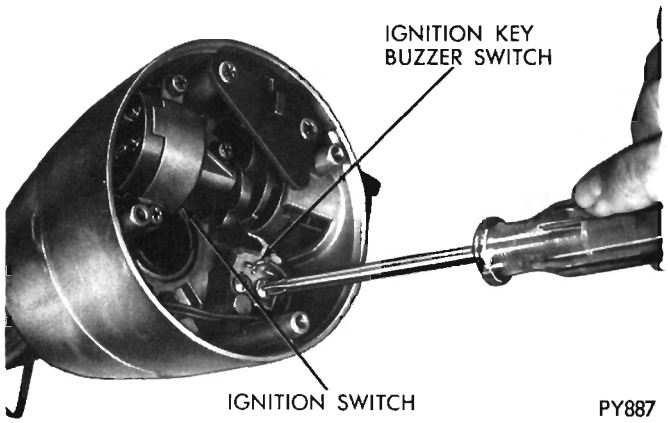


Fig. 10 - Ignition Key Buzzer Switch

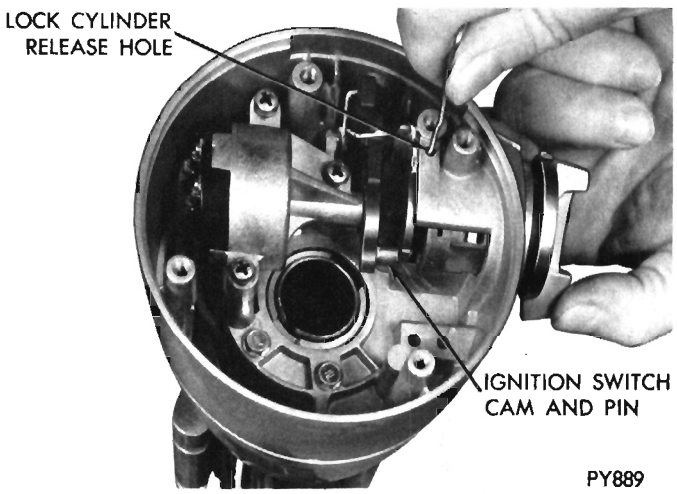


Fig. 12 - Removing Lock Cylinder

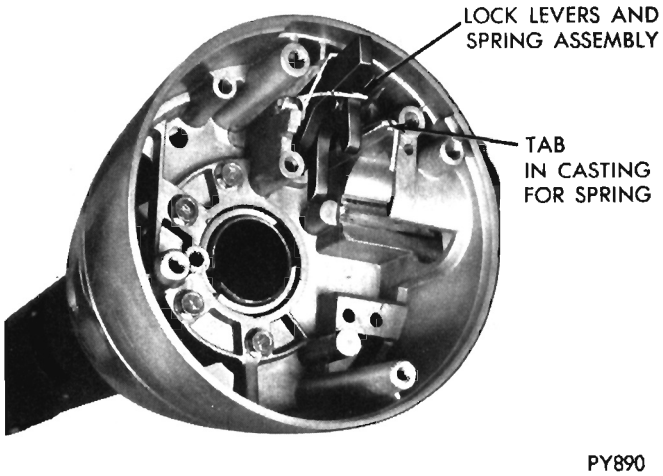


Fig. 13 Lock Levers and Spring Assembly Installed in Housing

(5) Remove the three retaining screws and the

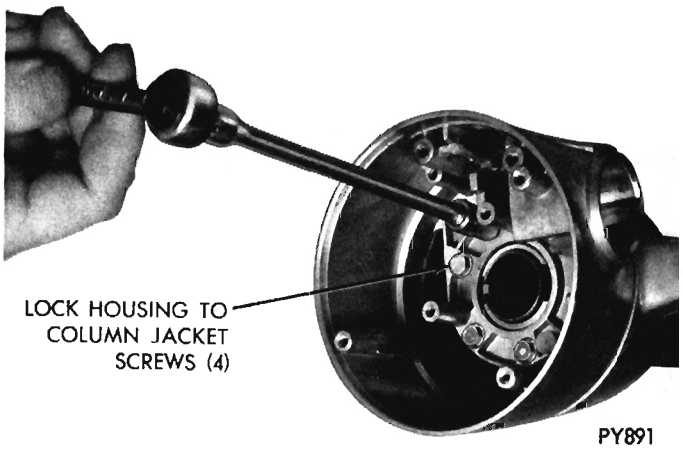


Fig. 14 Lock Housing to Column Jacket, Retaining Screws

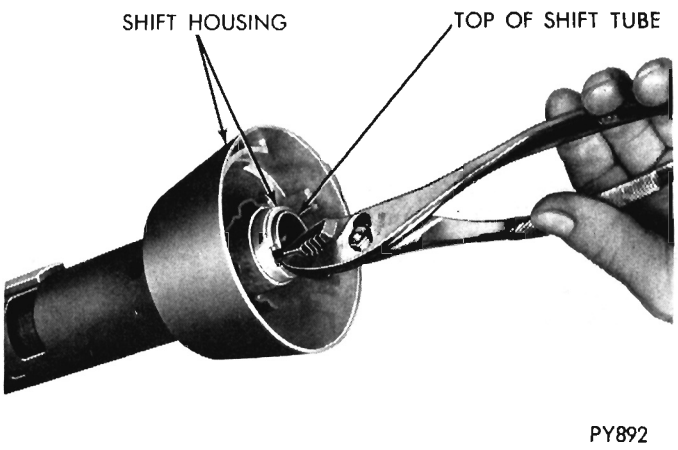


Fig. 15 Bending Shift Tube Tabs

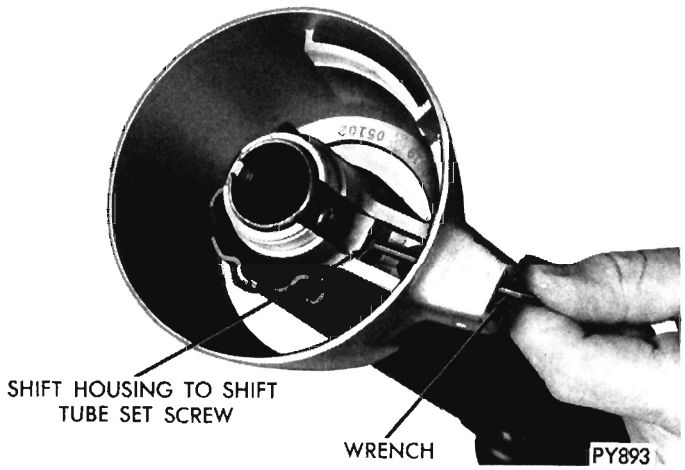


Fig. 16 Shift Tube Set Screw

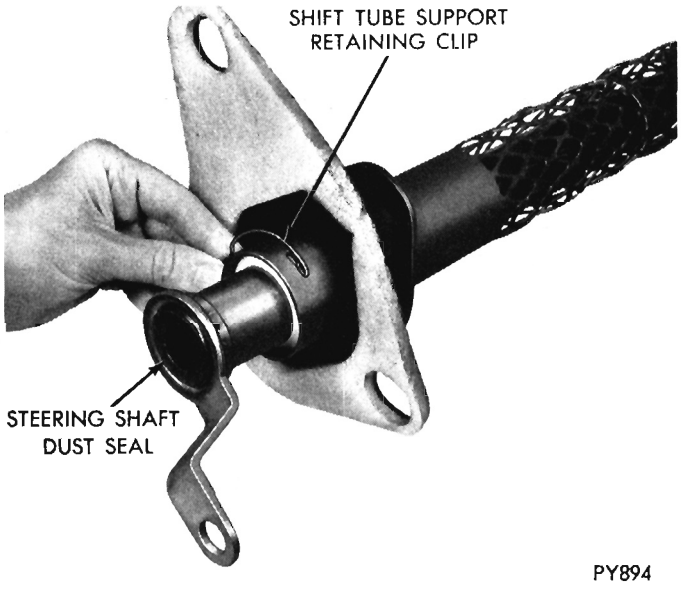


Fig. 17 Shift Tube Support Retaining Clip

ignition switch assembly (Fig. 12).

(6) Grasp lock lever and spring assembly and pull straight out of housing (Fig. 13).

(7) Remove four lock housing to column jacket hex head retaining screws and remove housing from jacket (Fig. 14).

Shift Tube (Figs. 15, 16, 17 & 18)

(1) To remove shift tube from column shift automatic or **Fury and Chrysler** floor shift models, first straighten the tabs at top of shift tube which are bent outward against shift housing casting. If so equipped, remove shift indicatior bracket from shift tube. Remove shift tube support retaining clip from slots at bottom of jacket. Loosen shift tube set screw in shift housing and remove parts from jacket.

(2) To remove shift tube from column shift manual models., remove the three bearing support screws at lower end of jacket and the two adjustable bushing screws from cam slots in jacket. Pull the tube and lever assembly out of jacket lower end (Figs. 19 and 20).

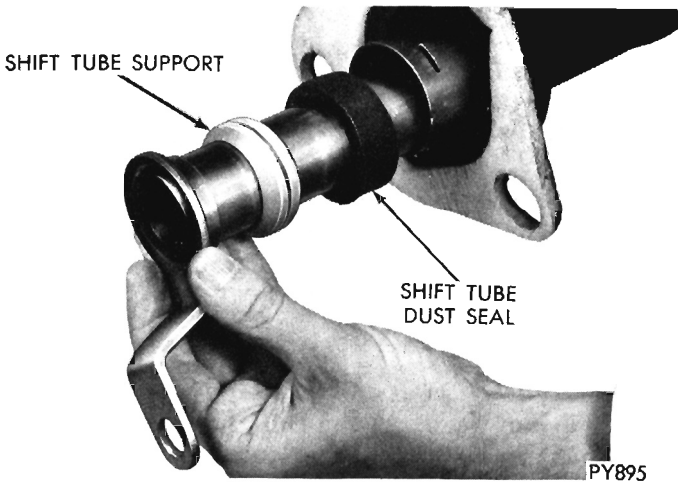


Fig. 18 Shift Tube Assembly-Removal or Installation

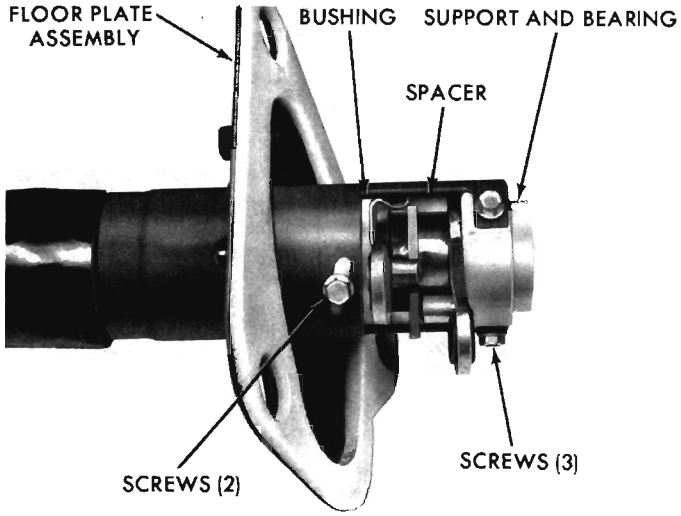


Fig. 19 Shift Tube & Levers Assembled

Steering Shaft Coupling (Fig. 21)

(1) Pry cover tangs out from coupling body and pull seal and cover from body.

(2) Drive the small short dowel pin at edge of coupling body, down into coupling and discard.

(3) Pull body off the shaft and shoe assembly.

(4) Separate and clean all parts.

Inspection

After cleaning, inspect all parts for wear or damage. Note condition of shift lever gate and inner end of shift lever. Inspect turn signal switch for distortion, broken or damaged parts. Inspect wiring insulation for worn or bare spots.

Inspect steering shaft bearing for smooth operation, and lubricate with Multi-Purpose Chassis Lubricant or similar lubricant. If bearing has any signs of roughness or wear, it should be replaced.

Reassembly (Fig. 22 or 23)

The grease recommended for use during reassembly procedures procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035. Apply a thin coating to all friction surfaces.

(1) Install column holding tool C-4132 and clamp column in a vise with both ends of column accessible.

(2) Install the O-ring retainer, O-ring and floor plate on lower end of column jacket. **This must be done before installing shift tube.**

Column Shift Automatics and Fury Floor Shift Models

(3) Coat spring washer with grease and install on lower hub of gearshift housing so that the center of the curved washer surface bears against the

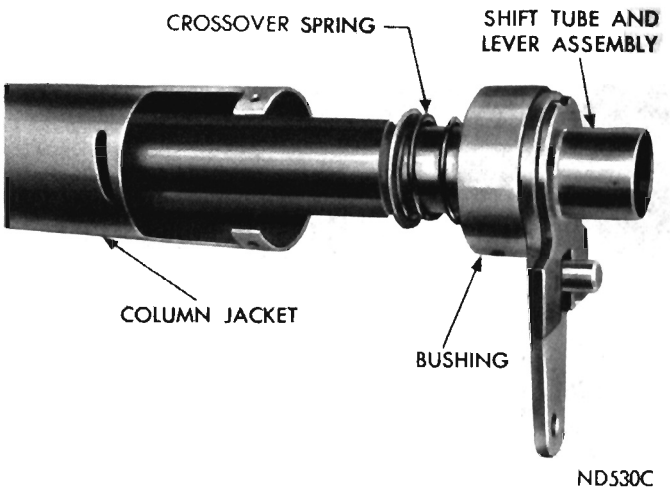


Fig. 20 Shift Tube Assembly-Removal or Installation

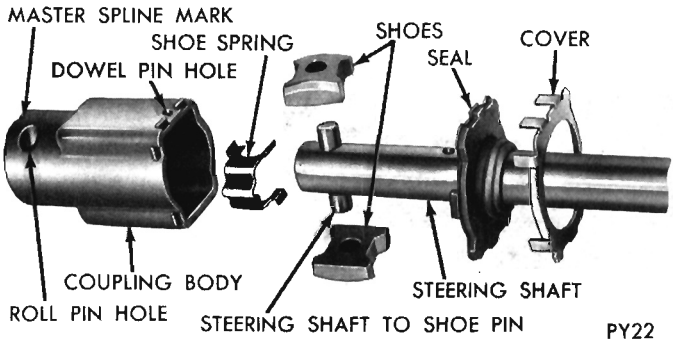


Fig. 21 Steering Shaft "Pot" Coupling Disassembled

housing hub. Position the housing and washer on the column jacket (Fig. 22 or 23).

(a) With dust seal and shift tube support installed on shift tube, slide the assembly into jacket. Guide key on upper end of tube into slot in gearshift housing. Hold firmly together and tighten lock screw in shift housing (Fig. 16).

(b) Bend corners of shift tube slot out against shift housing casting (Fig. 15).

(c) Insert wire retainer in slots in lower end of jacket and into groove in shift tube support (Fig.17).

(4) **Column Shift Automatics only** Position the shift lever and crossover load spring in the gearshift housing and tap in the pivot pin (Fig. 24).

Install the shift lever gate on the lock housing (Fig. 25).

If so equipped, feed gear selector dial lamp wire through hole behind the transmission dial on the lock housing and route wire down through the space between the housing and jacket and insert wire terminal into ignition switch connector. Secure lamp assembly to rear of transmission dial with 2 screws (Fig. 26). Secure gear selector dial lens assembly to gear selector dial with 2 screws.

CHRYSLER & FURY: place gearshift lever in neutral position and attach pointer mounting bracket to shift tube with two new plastic rivets (Fig. 27).

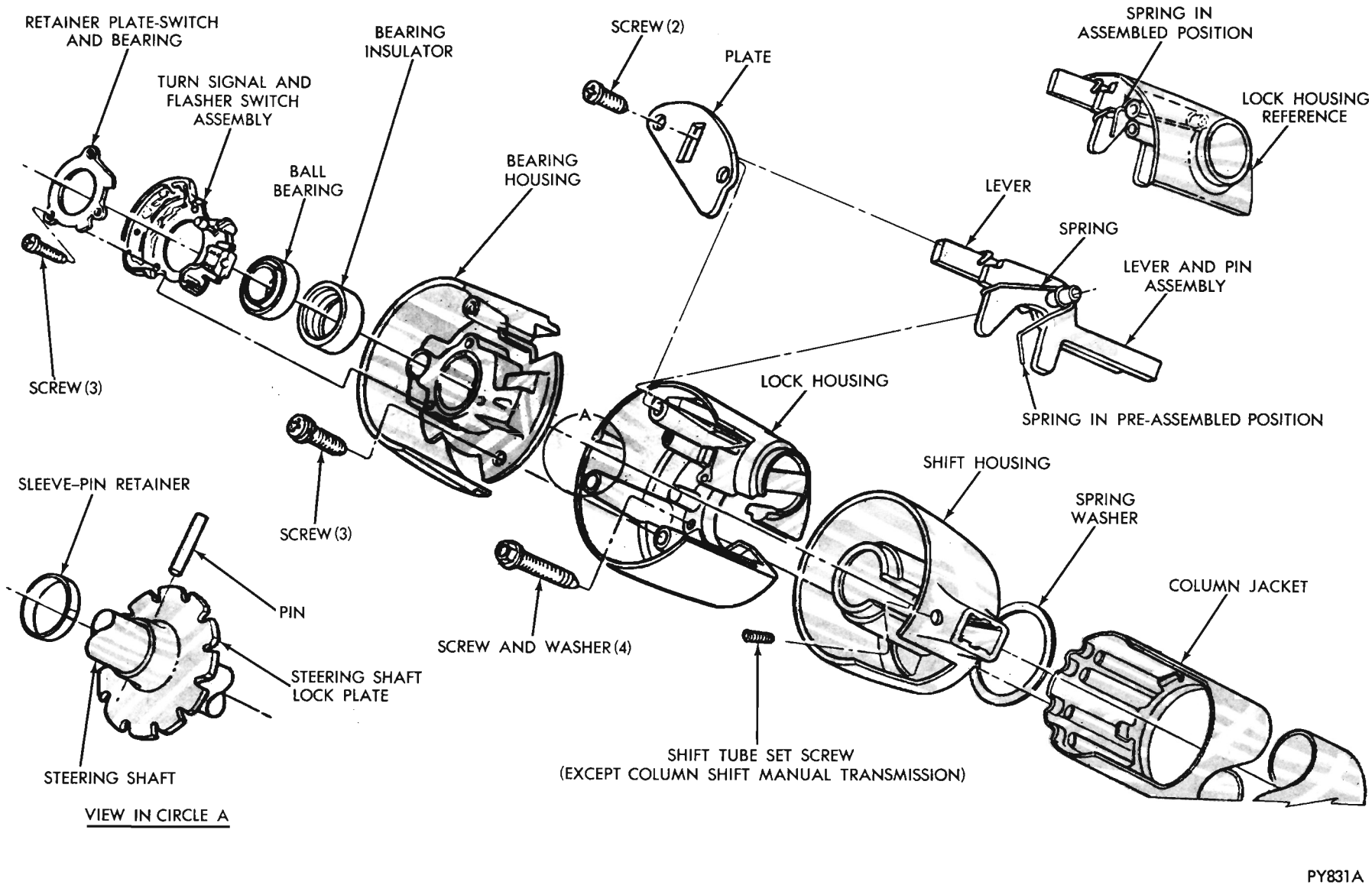


Fig. 22 Steering Column Upper End Disassembled (Without Transmission Dial)

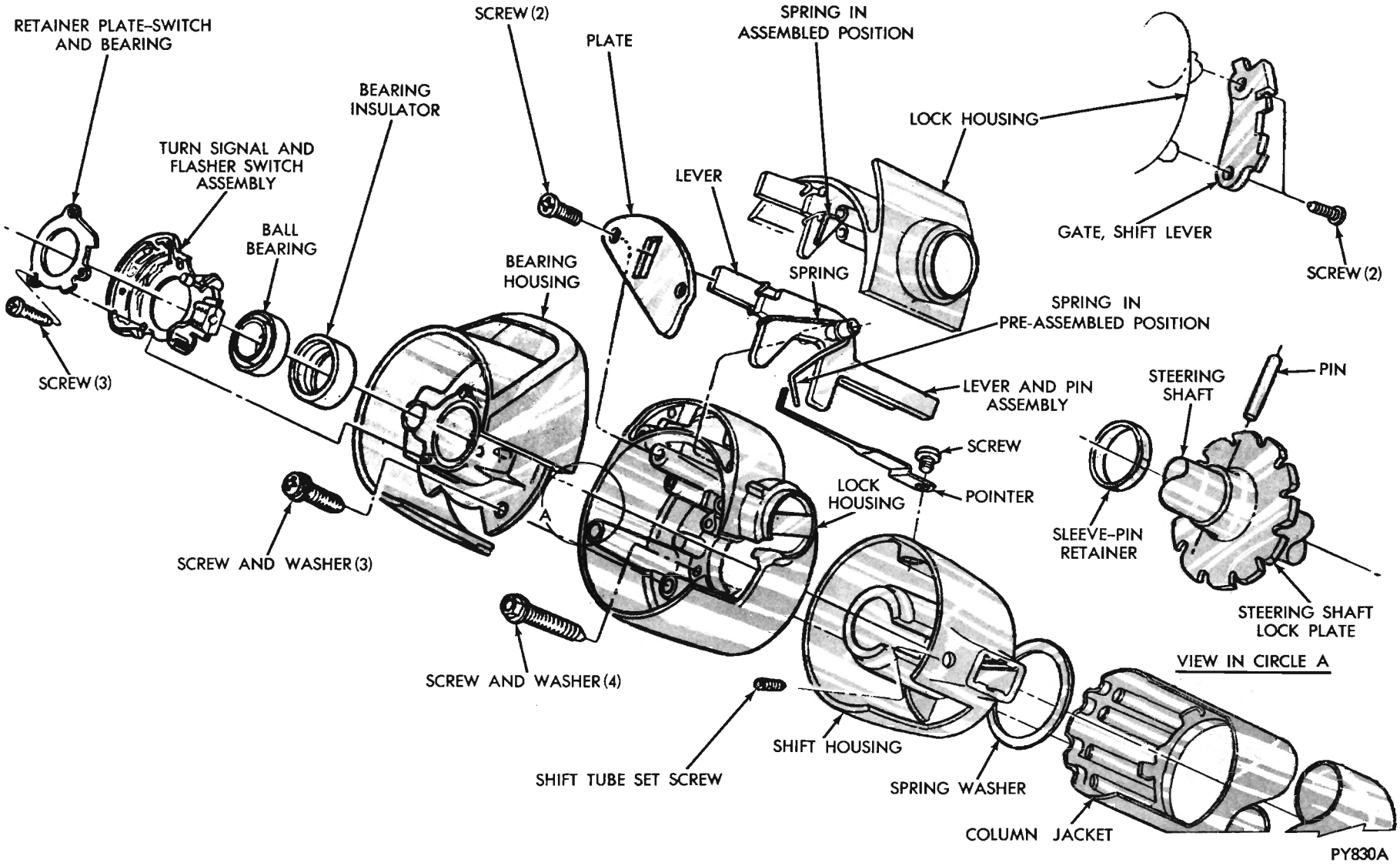


Fig. 23 Steering Column Upper End Disassembled (With Transmission Dial)

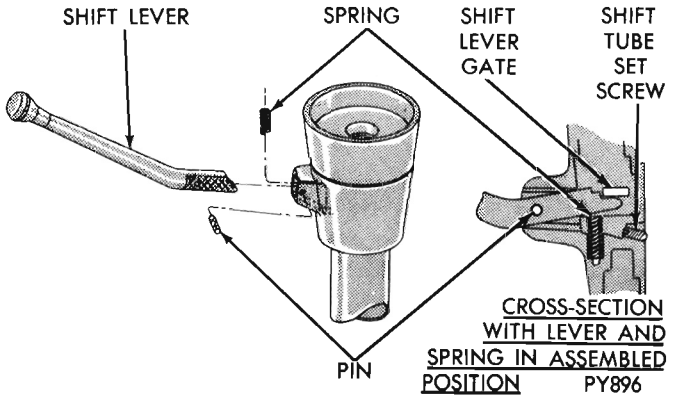


Fig. 24 Shift Lever Installation - Automatic

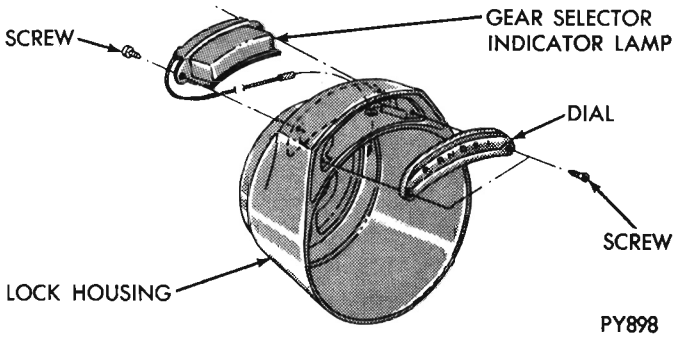


Fig. 26 Gear Selector Dial Lamp

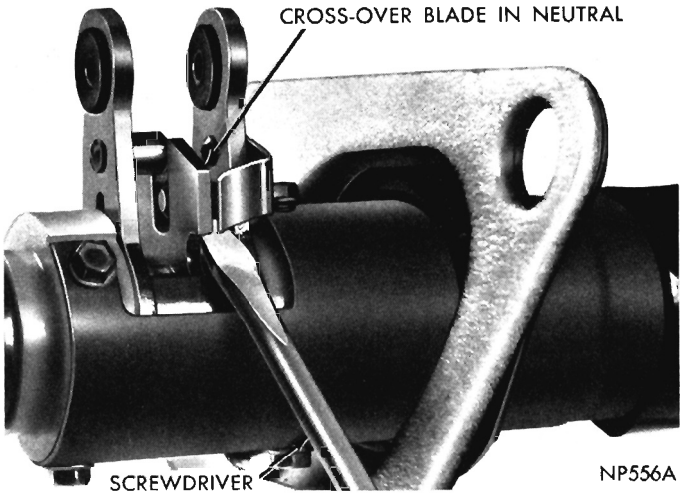


Fig. 28 Holding Cross-Over Blade In Neutral Position

(5) Seat the lock housing on top of the jacket, indexing the key in the housing with the slot in the jacket. Insert all four screws and tighten them alternately in steps to insure proper seating of the housing on the jacket. Tighten to 80 inch-pounds (Fig. 14).

(6) **Column Shift Manual Transmission Only**

(a) Turn bushing on shift tube (Fig. 20) so the holes in bushing are aligned with adjustment slots in column jacket. Slide shift tube and lever assembly through jacket and into gearshift housing. Start the bushing retainer screws through slots in jacket but do not tighten.

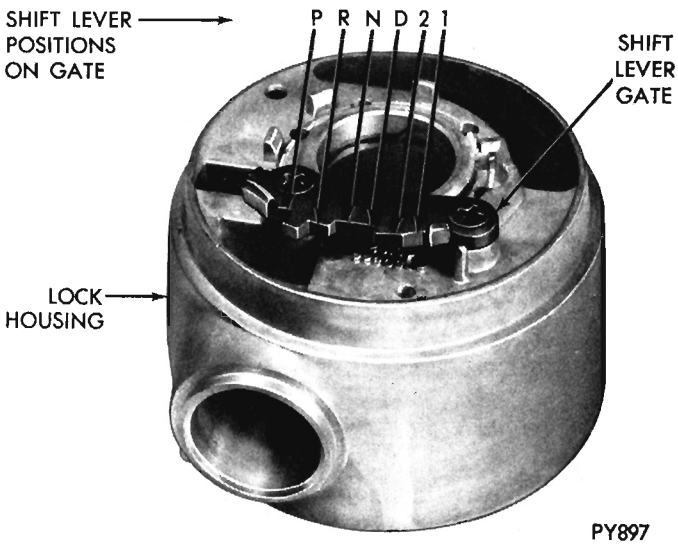


Fig. 25 Lock Housing and Shift Gate

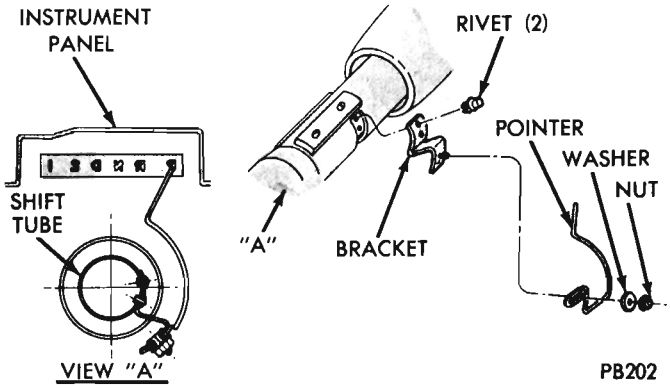


Fig. 27 Gear Selector Pointer Bracket

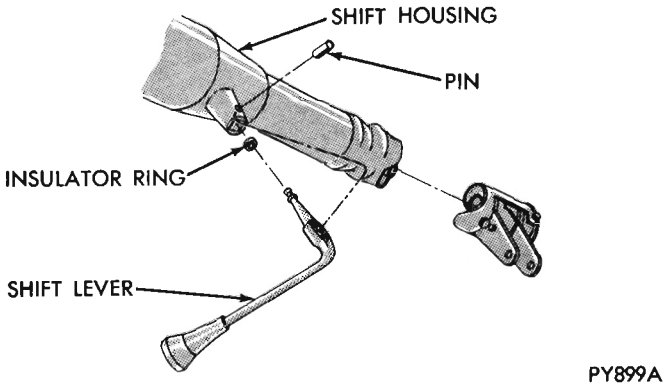


Fig. 29 Install Shift Lever-Manual

(b) Install rubber spacer on lower end of shift tube and metal spacer over crossover blade so it rests against the 2nd and direct shift lever.

(c) Install low and reverse lever, then install support and bearing assembly. Install and tighten the three retaining screws to 60 inch-pounds.

(d) Rotate bushing (Fig. 19) with screws so all play at shift levers and spacer is eliminated, but

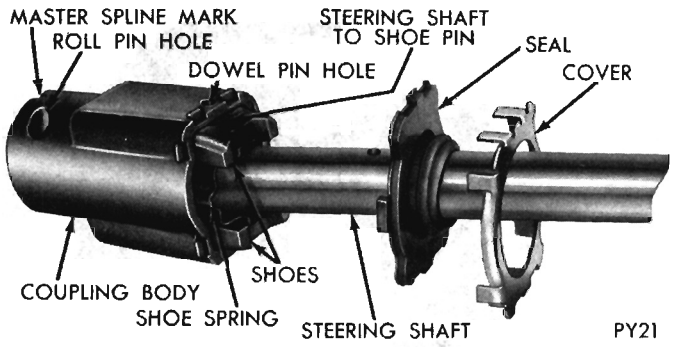


Fig. 31 Assembling Steering Shaft Coupling

no binding occurs. With bushing in this position tighten the two bushing to jacket screws to 60 inch-pounds.

(e) Place a screwdriver blade between 2nd and direct shift lever and crossover blade, so it will be held in neutral position half-way between the two shift levers (Fig. 28).

(f) Position gearshift lever in housing so ball end with insulator ring engages hole in shift tube key. Align and install retaining roll pin (Fig. 29).

(7) Grease and assemble the two lock levers, lock lever spring, and pin (Fig. 30).

(8) Install the resulting assembly in the lock housing. Seat the pin firmly into the bottom of the slots. Make sure that the lock lever spring leg is firmly in place in lock casting notch (Fig. 13).

(9) Install the lock lever guide plate and retaining screws (Fig. 11).

(10) Position ignition switch to center detent (OFF) position. Feed wires down through the space between housing and jacket. Position switch in housing and tighten three mounting screws (Fig. 12).

(11) Feed buzzer switch wires behind wiring post and down through space between housing and jacket. Position switch in housing and tighten two mounting screws (Fig. 10).

(12) **To install ignition lock, turn key to "LOCK" position and remove key.** This will cause buzzer operating lever to retract in cylinder. Now insert cylinder into housing far enough to contact switch actuator. Insert key, press inward and rotate cylinder. When parts align, the cylinder will move inward and a spring loaded retainer will snap into place, locking the cylinder into the housing.

Steering Shaft Coupling Assembly (Fig. 31)

(1) Fill coupling body with grease to approximately 1/2 inch from top.

(2) Place cover and seal on shaft.

(3) Press shoe pin into steering shaft so that it projects an equal distance on each side of shaft.

(4) Place spring on side of shaft, straddling the shoe pin.

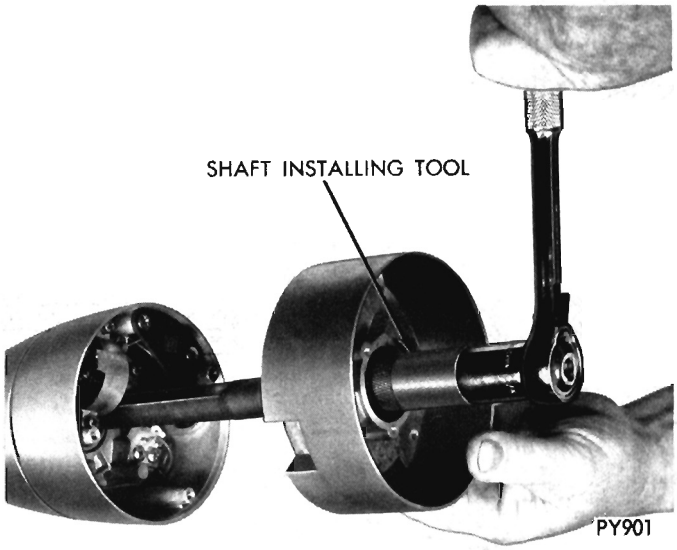


Fig. 32 Pulling Shaft Into Bearing

(5) Place shoes on pin ends with flat side toward spring, engaging tangs.

(6) Squeeze shoes together, compressing spring, and push assembly into coupling body (Fig. 31) with gage hole in shaft aligned with master spline in coupling.

(7) Drive in a new dowel pin flush to outer surface of coupling body.

(8) Position seal and cover on body and crimp cover tangs over the projections on body securely.

Steering Shaft Installation

(1) Insert the steering shaft assembly into the column and shift tube assembly.

(2) Install the lock plate on the steering shaft and press the pin into place. **DO NOT HAMMER** use tool C-4113 (Fig. 9). Make sure pin is centered.

(3) Install steering column shaft lock plate sleeve over shaft lock plate pin and against lock plate.

(4) Install the bearing lower snap ring on the steering shaft.

Bearing Housing Assembly (Fig. 22 or 23)

(1) Place rubber insulator with ground staple, over column upper bearing and install assembly into bearing housing bore. Use a soap solution or rubber lubricant to ease installation.

(2) Install the turn signal switch in the bearing housing, feeding the wires through the opening in the housing. Feed the ignition key lamp assembly wires through the opening in the housing at this time.

(3) Install the retaining plate over the switch and tighten 3 screws to 27 in-lbs. (Fig. 5).

(4) Install the turn signal lever or turn signal/speed control lever on the turn signal switch. If

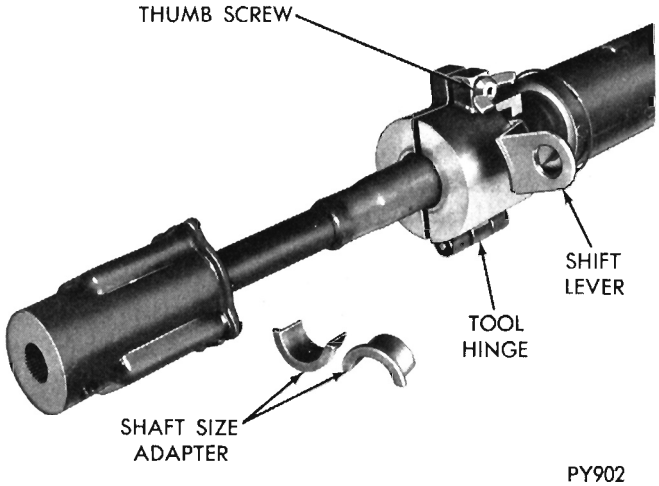


Fig. 33 Shaft Centering Tool

speed control, feed the wires through the opening provided in the bearing housing (Fig. 4).

(5) Position the bearing housing assembly on the column jacket assembly, feeding the wires through the space between the lower housings and the jacket.

(6) When installing this housing, the steering shaft must be drawn, not pushed, through the bearing, using the bearing inner race as a reaction member, or damage to the shaft plastic shear pins, lock housing components, or bearing could result. **Do Not Drive The Shaft Into The Bearing.**

(7) Install on steering shaft. Tool C-3879, with washer and steering wheel nut (Fig. 32). Turn nut to pull shaft through bearing. Remove tool and install upper snap ring on shaft.

(8) Install and tighten to 35 in. lbs. the 3 bearing housing to lock housing screws.

(9) Install the ignition key lamp assembly in the bearing housing.

(10) On column shift automatic only, position pointer under transmission dial and tighten attaching screw to shift housing (Fig. 23) **except Fury and Chrysler** models.

(11) Install the wiring trough in place over the wires, being careful to not pinch wires between trough and jacket.

Installation (Fig. 1, 2 or 3)

(1) Tool C-4134 or C-4157 must be used to hold the steering shaft in the center of the shift tube while installing and aligning the column in the vehicle.

(This centering operation is not necessary on columns which have a lower bearing for the steering shaft.)

(a) Remove thumbscrew and open tool C-4134 to straddle shift tube lever and steering shaft (Fig. 33).

(b) Close tool and tighten thumbscrew.

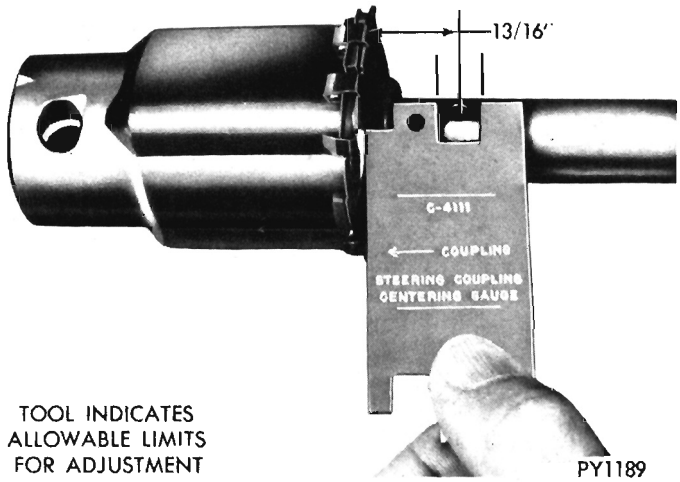


Fig. 34 - Adjusting Steering Shaft in Coupling

(c) If hole in tool is too large to grip steering shaft, add the split insert to adapt tool to smaller shaft diameter.

(d) On floor shift columns with no shift tube, place tool C-4157 over steering shaft and slide up into lower end of jacket to keep shaft centered while column is installed.

(2) Position bracket assembly on steering column (Fig. 1), install ground wire and tighten the four **short** retaining screws to 120 inch-pounds. Plastic capsules should be pre-assembled in bracket slots, **except Barracuda.** Insert column assembly through floor pan opening, being careful not to damage paint or trim.

(3) With front wheels in straight ahead position and master splines on wormshaft and coupling aligned, engage coupling with wormshaft and install the roll pin. **CAUTION: Do not apply end loads to steering shaft.**

(4) Hold column assembly with bracket slots on mounting studs. Install but **do not tighten** the two upper bracket nuts.

(5) **Center steering shaft coupling at midpoint of its travel.** This is accomplished by moving column and slotted bracket assembly on the mounting studs so dimension between top of coupling and center of gauge hole is 13/16 inch (Fig. 34). Tighten the two upper bracket nuts to 110 inch-pounds. Attach electrical ground wire to one of the rear mounting studs.

(6) Position floor plate over floor pan opening, centering it around the column, then install and tighten retaining bolts. Slide "O" ring down the jacket and into recess in floor plate, position retaining plate over "O" ring and secure with the two bolts. **Do not pry to align plates and attaching bolts or column misalignment will occur.**

(7) **Valiant and Satellite** place shim pack between column bracket forward leg and forward mounting point. **Maximum shim pack thickness error must not exceed .060 inch before tighten-**

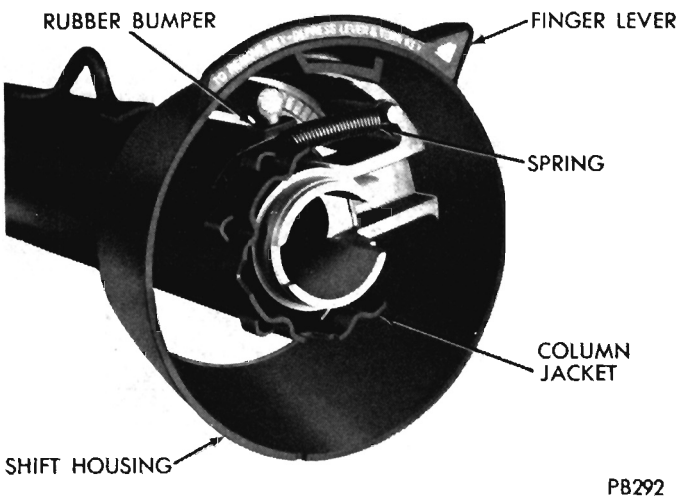


Fig. 35 Floor Shift Column (Except Fury and Chrysler)

ing the bolt. Add shims, if necessary, then tighten bolt to 110 inch-pounds.

Steps 8 and 9 apply to Fury and Chrysler

(8) Loosen bolt attaching the forward adjustable hanger to the brake pedal bracket. Attach column bracket forward leg to the hanger and tighten to 110 inch-pounds. **Then tighten the hanger to brake pedal bracket bolt to 200 inch-pounds.**

(9) Connect gearshift indicator pointer (Fig. 27) to operating bracket on shift tube in its approximate original location. Slowly move gearshift lever from "1" (low) to "P" (park) pausing briefly at each selector position. The indicator pointer must align with each selector position. If necessary, loosen the bolt and readjust to align pointer correctly.

(10) Attach finish plate to bottom of instrument panel.

(11) Place steering wheel **(or corrugated cylinder on Barracuda)** on steering shaft with master spines aligned. Install retaining nut and washer, tighten nut to 28 foot-pounds. **Do not drive wheel on shaft, draw wheel down with retaining nut.** Install **Barracuda** steering wheel to corrugated cylinder, tightening the three nuts to 150 inch-pounds.

(12) Install horn switch parts previously removed from steering wheel. Connect horn switch wire.

(13) Connect wiring connectors at steering column jacket. Connect battery ground cable, test operation of lights and horns.

(14) Connect and adjust gearshift linkage, refer to "Transmission Group".

Floor Shift Column

The Steering Column used on Valiant, Barracuda, and Satellite models with a floor mounted gearshift is basically the same as previously described Standard Columns and Service procedures are indentical except as below described.

After Lock Housing is removed (Fig. 14 and 16) it will be seen there is no shift tube or set screw in this shift housing. Also there is no spring washer between the shift housing and column jacket as shown in (Fig. 22).

Instead this shift housing has a spring attached between it and the column jacket which keeps the housing rotated counterclockwise against a rubber bumper (Fig. 35).

This spring and rubber bumper are easily removed or replaced with the fingers.

STEERING COLUMN (TILT-WHEEL)

INDEX

	Page
Disassembly	48
Inspection	52
Reassembly	53

GENERAL INFORMATION

This optional steering column has an impact absorbing design similar to the other columns described in this section. The installation is the same, therefore only the disassembly and reassembly of the column will be detailed here.

SERVICE PROCEDURES

COLUMN

Removal (See Standard Columns)

Disassembly (Fig. 1)

(1) Remove four bolts attaching bracket assembly to column jacket.

(2) Unsnap and remove the wiring protector from column jacket.

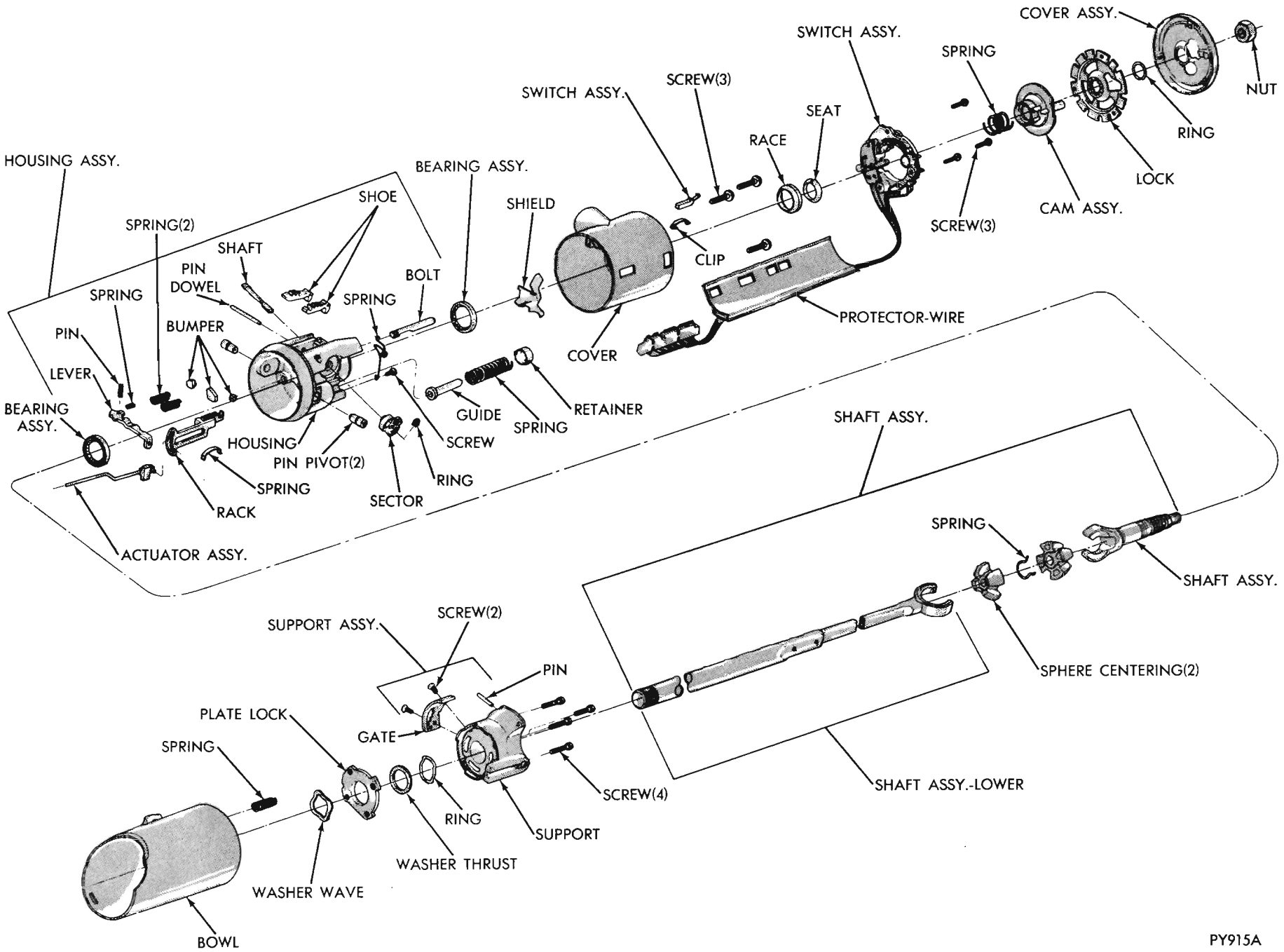


Fig. 1 - Tilt Column Upper End - Dissassembled

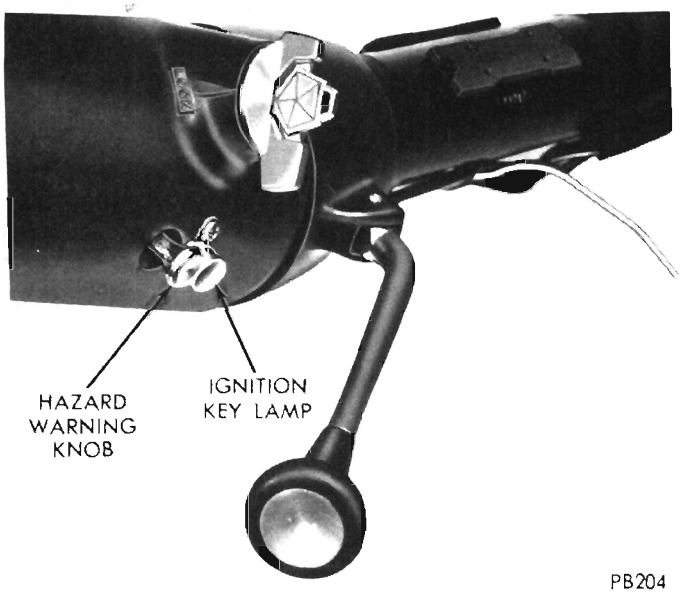


Fig. 2 Ignition Key Lamp and Hazard Warning Switch

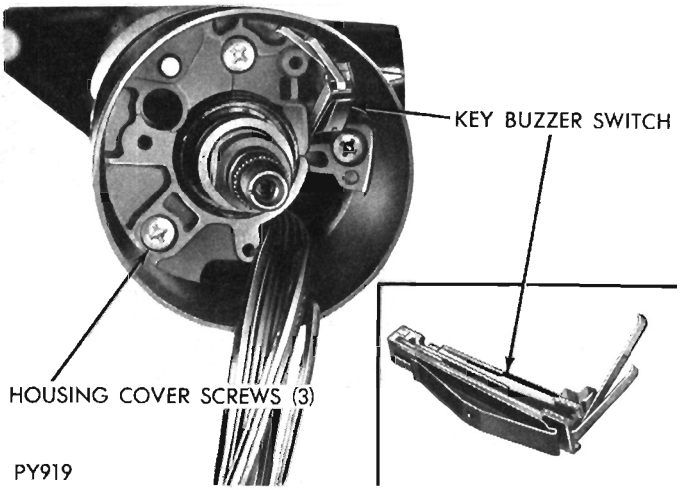


Fig. 4 - Key Buzzer Switch

(3) Attach column Holding Fixture C-4132 to jacket pads and clamp the assembly in a vise.

(4) Remove three screws and remove shaft lock cover.

(5) Remove tilt lever and turn signal lever. (If equipped with "Speed Control" see Accessories Group 1). Push hazard warning knob in and unscrew to remove. Remove ignition key lamp assembly. (Fig. 2)

(6) To remove lock plate from steering shaft, use tool C-4156 to depress plate, then pry exposed lock ring from shaft (Fig 3) and discard it. Now remove tool, lock plate, cancelling cam and spring.

(7) Remove three turn signal switch attaching screws, place shift bowl in low (1) position, and remove switch and wiring (Fig. 1).

(8) The buzzer switch can be pulled straight out of the housing. A flat spring wedges the switch toward the lock cylinder (Fig. 4). (This may be done without the removal of the lock cylinder.) If the lock cylinder is in the housing, it must be in the "ON" position.

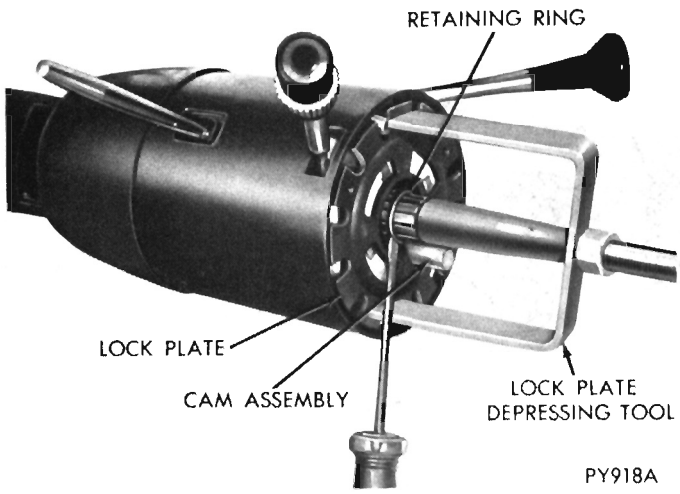


Fig. 3 - Removing Lock Plate Retaining Ring.

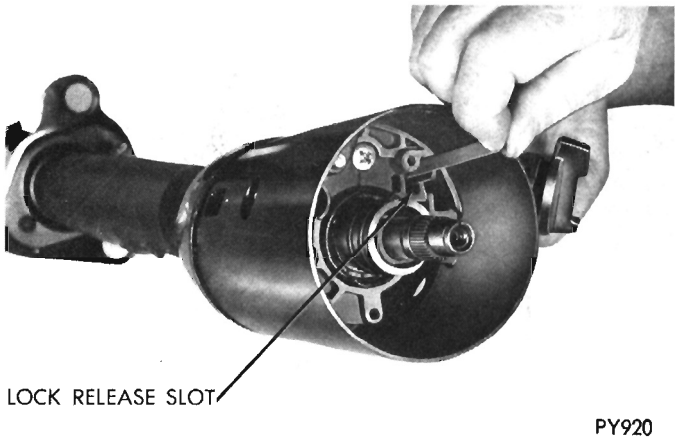


Fig. 5 - Removing Lock Cylinder

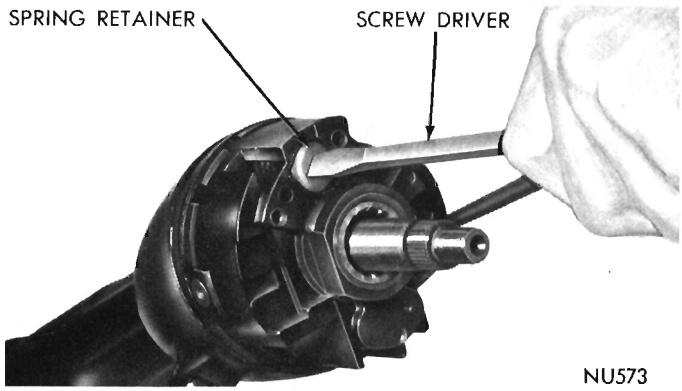


Fig. 6 - Tilt Spring Retainer

(9) The lock cylinder may be removed in any position from "ACCESSORY" to "ON". However, the "LOCK" position is recommended because of its positive location.

Insert a thin tool (small screw driver or shim

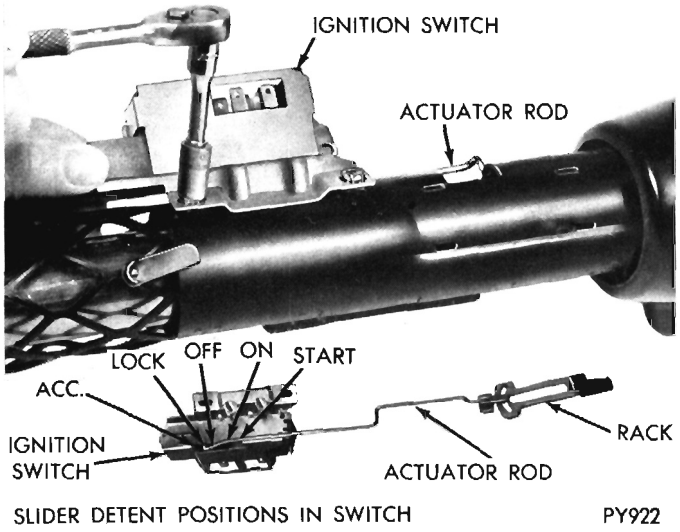


Fig. 7 - Ignition Switch

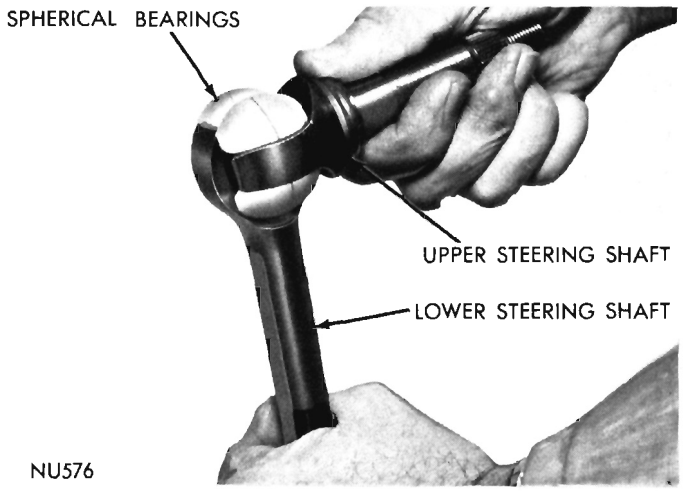


Fig. 9 - Assembling or Disassembling Steering Shaft Centering Spheres

stock) into the slot next to the switch mounting screw boss (right-hand slot) and depress spring latch at bottom of slot, which releases lock. Remove lock (Fig. 5).

(10) Remove three housing cover screws and remove housing cover (Fig. 4).

(11) Install tilt release lever and place column in full "UP" position. Remove tilt spring retainer using screw driver blade that just fits into slot opening. Insert screw driver in slot, press in approximately 3/16 inch turn approximately 1/8 turn counterclockwise until ears align with grooves in housing and remove spring and guide (Fig. 6).

(12) Push upper steering shaft in sufficiently to remove steering shaft inner race seat and inner race.

(13) With ignition switch in "LOCK" position, remove the ignition switch mounting screws and ignition switch (Fig.7).

(14) Place Pivot Pin Remover C-4016 over pivot

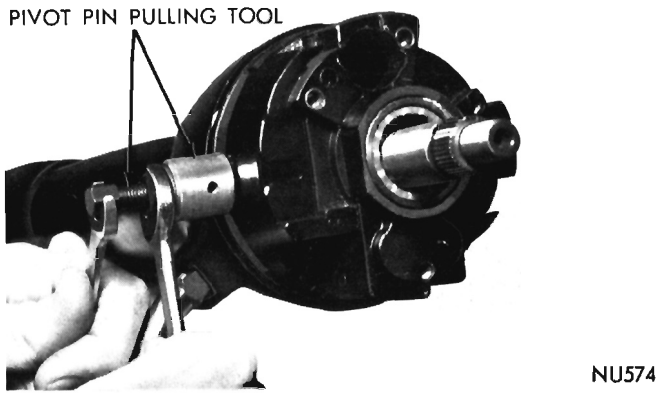


Fig. 8 - Pivot Pin Removing Tool

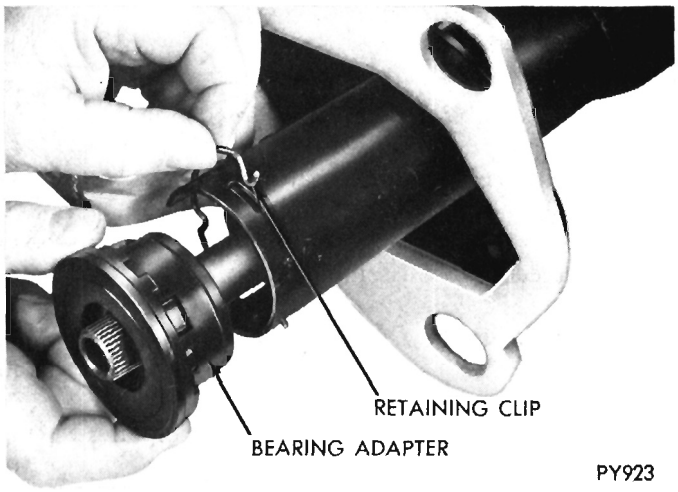


Fig. 10 - Shaft Lower Bearing Adapter

pin and thread small portion of screw firmly into the pin. Hold screw from turning with one wrench, turn nut clockwise with a second wrench to withdraw pivot pin from the support (Fig. 8). Remove opposite pivot pin in same manner.

(15) Use tilt release lever to disengage lock shoes. Remove bearing housing assembly by pulling upward to extend rack full down and moving housing assembly to the left to disengage rack from actuator. Remove actuator rod assembly.

(16) Remove coupling from lower end of steering shaft. Double coupling is retained to shaft with a roll pin. Single coupling must be disassembled (see procedure in Standard Columns).

(17) Remove steering shaft assembly from upper end.

(18) Disassemble steering shaft assembly by removing center spheres and anti-lash spring (Fig. 9)

(19) Remove four bolts securing support to lock plate and remove support from end of column jacket. If necessary, remove two attaching screws and shift gate from the support.

(20) Remove shift tube retaining ring with screw

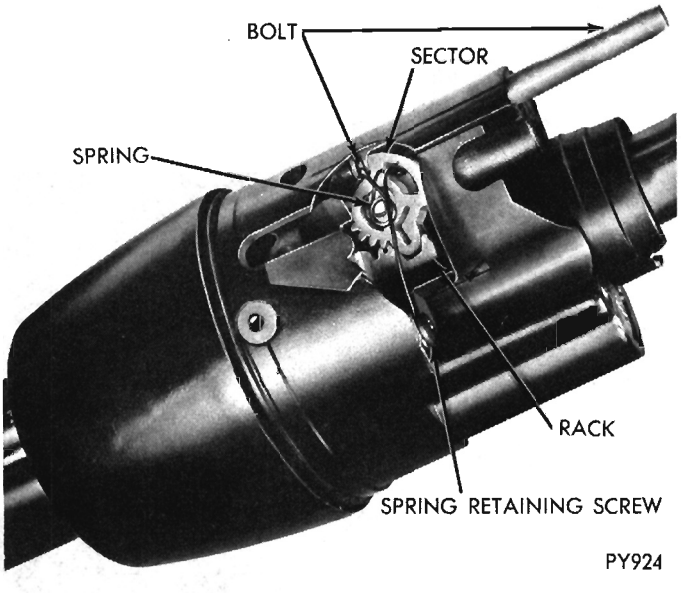


Fig. 11 - Sector and Bolt Spring

driver. Remove thrust washer.

(21) Remove clip and bearing adapter from lower end of column jacket (Fig. 10).

(22) The column jacket with shift tube and bowl are serviced as an assembled unit.

Bearing Housing Disassembly (Fig. 1)

(1) Remove tilt lever opening shield from housing.

(2) Remove lock bolt spring by removing spring retaining screw and moving spring clockwise to remove from bolt (Fig. 11).

(3) Remove snap ring from sector drive shaft. With small punch, lightly tap drive shaft from sector. Remove drive shaft, sector and bolt. Remove rack and rack spring.

(4) Remove tilt release lever pin with punch and hammer. Remove lever and release lever spring. (To relieve load on release lever, hold shoes inward and wedge block between top of shoes (over slots) and bearing housing).

(5) Remove lock shoe pin with punch and hammer. Remove lock shoes and lock shoe springs.

NOTE: With tilt lever opening on left side, shoes facing up, the four slot shoe is on the left.

(6) Remove bearings from bearing housing **only if they are to be replaced.** Remove separator and balls from bearing. Place housing on work surface. With a pointed punch against back surface of race, carefully hammer race out of housing until bearing puller can be used. Repeat for other race.

Inspection

(1) Inspect all bearings and race seats for brinelling, nicks, scratches and wear.

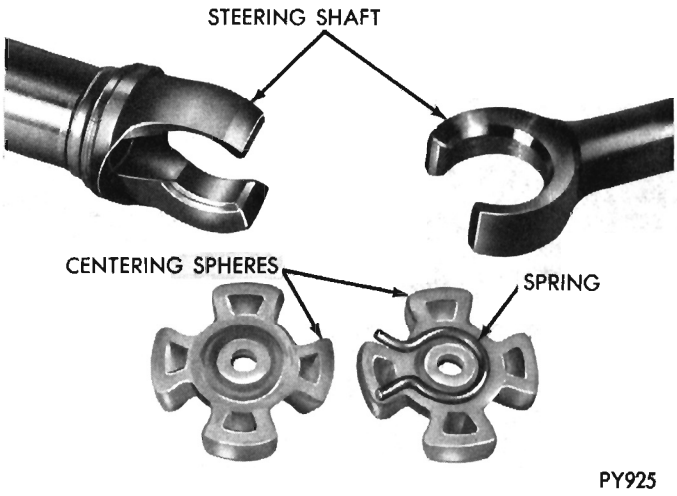


Fig. 12 - Steering Shaft - Disassembled

(2) Inspect centering sphere for nicks, damage or wear. If damage is found, check shaft couplings for nicks, burrs or rough spots.

(3) Inspect actuator housing, shift lever bowl and support for cracks or other damage.

(4) Inspect turn signal switch unit for distortion, broken or damaged parts.

(5) Inspect horn and turn signal wires for worn or bare spots.

(6) Inspect the steering shaft and gearshift tube for loose or broken plastic shear joints.

(7) Inspect steering column mesh cover, mend with electricians tape if loose or torn.

Assembly

The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

Bearing Housing Assembly (Fig. 1)

(1) Install bearings in bearing housing, if removed.

(2) Install lock shoe springs, lock shoes and shoe pin in bearing housing. Use approximately .180 rod to line up shoes for pin installation.

(3) Install spring, release lever and pin in bearing housing. (Again, relieve load on release lever as in step (4) of disassembly procedure.)

(4) Install drive shaft in housing. Lightly tap sector onto the shaft far enough to install snap ring.

(5) Install lock bolt and engage with sector cam surface.

(6) Install rack and spring. Block tooth on rack to engage block tooth on sector. Install external tilt release lever.

(7) Install bolt spring and spring retaining screw. Tighten to 35 inch-pounds (Fig. 11).

Reassembly (Fig. 1)

(1) Install thrust washer and retaining ring by pulling bowl up to compress wave washer.

(2) Install support by aligning "V" in support with "V" notch in jacket. Insert screws through support into lock plate. Tighten screws to 60 inch-pounds torque.

(3) Align lower bearing adapter notches in jacket and push in lower end of column jacket. Shift tube should pilot in adapter at this time. Install clip (Fig. 10).

(4) Install centering spheres and anti-lash spring in upper steering shaft (Fig. 12).

(5) Install lower steering shaft from same side of spheres that spring ends protrude (Fig. 9).

(6) Install steering shaft assembly in shift tube from upper end. Carefully guide shaft through shift tube and bearing.

(7) Install ignition switch actuator rod through bowl from bottom and insert in slot in support. Extend rack downward from bearing housing. Assemble bearing housing over steering shaft and engage rack over end of actuator rod.

(8) Install external tilt release lever and, holding lock shoes in disengaged position, assemble bearing housing over steering shaft until the pivot pin holes line up and install pivot pins.

(9) Place housing in full "UP" position and install guide, tilt spring and tilt spring retainer, using screw driver in retainer slot. Turn retainer clockwise to engage (Fig. 5).

(10) Install bearing inner race and seat.

(11) Install tilt lever opening shield in housing.

(12) Remove tilt release lever, install housing cover and tighten three screws to 45 inch-pounds (Fig. 3).

(13) Assemble buzzer switch to spring clip with formed end of clip under end of switch and spring bowed away from switch on side opposite contact. Push switch and spring into hole in cover to the step with the contacts toward lock cylinder bore (Fig. 3).

(14) Install signal switch wires and connector through cover, bearing housing and bowl. Push hazard warning plunger in, install switch and tighten screws to 35 inch-pounds.

(15) Install hazard warning knob and pull knob out. Install cancelling cam spring, canceling cam and shaft lock. Depress shaft lock and install retaining ring with Tool number C-4156 (Fig. 3).

(16) Install tilt release lever and signal switch lever.

(17) **To install ignition lock, turn key to "LOCK" position and remove key.** This will cause buzzer operating lever to retract in cylinder. Now insert cylinder into housing far enough to contact switch actuator. Press inward and move switch actuator rod up and down to align parts. When parts align, the cylinder will move inward and a spring loaded retainer will snap into place, locking the cylinder into the housing.

(18) Install shaft lock cover and tighten three screws to 35 inch-pounds.

(19) When replacing ignition switch, place the key cylinder in "LOCK" detent position. Place the switch in "LOCK" by the following procedure:

(a) Positon the switch as it is shown in (Fig 7)

(b) Move the slider to the extreme left (toward steering gear).

(c) Move the slider back one position to the right (toward steering wheel) to the "LOCK" position.

Fit the actuator rod into the slider hole and assemble to the column with two screws. Push the switch lightly down the column (away from the steering wheel), to take out lash in the actuator rod, and tighten mounting screws. Caution should be exercised to prevent moving the switch out of detent. Use only the correct length screws. Tighten to 35 inch-pounds.

(20) Install wire protector over wires on column jacket. Be careful not to pinch any wires.

(21) Remove column from vise and Holding Fixture from column.

(22) Position bracket assembly on steering column. Install and torque the four short retaining screws to 120 inch-pounds.

(23) Install coupling to lower end of steering shaft. Double coupling is retained to shaft with a roll pin. Single coupling must be reassembled to steering shaft (see procedure in Standard Columns)

Installation (See Standard Columns)

STEERING COLUMN (TILT-A-SCOPE)

INDEX

	Page
General Information	54
Steering Column	54
Disassembly	54
Inspection	57

Reassembly 58
Steering Wheel 59
Assembly 58
Dissassembly 54
Installation 59
Removal 59

GENERAL INFORMATION

This optional steering column has an impact absorbing design similar to the other columns described in this section. The installation is the same, therefore only the disassembly and reassembly of the column will be detailed here.

SERVICE PROCEDURES

COLUMN

Removal (See Standard Columns)

Disassembly (Fig. 1)

(1) Remove four bolts attaching bracket assembly to column jacket.

(2) Unsnap and remove the wiring protector from column jacket.

(3) Attach column Holding Fixture C-4132 to jacket pads and clamp the assembly in a vise.

(4) Remove tilt lever and turn signal lever (if equipped with "Speed Control" see Accessories Group 1). Push hazard warning knob in and unscrew to remove. Remove ignition key lamp assembly (Fig. 2)

(5) Lock telescoping shaft with a set screw and install lock plate compressing tool C-4118 (Fig. 3). Depress lock and carrier far enough to remove "C" ring. Remove tool, lock plate, carrier and spring.

(6) Remove three turn signal switch attaching screws, place shift bowl in low (1) position, and remove switch and wiring (Fig. 1).

(7) The buzzer switch can be pulled straight out of the housing. A flat spring wedges the switch toward the lock cylinder (Fit. 4). (This may be done without the removal of the lock cylinder.) If the lock cylinder is in the housing, it must be in the "ON" position.

(8) The lock cylinder may be removed in any position from "Accessory" to "ON". However, the "LOCK" position is recommended because of its positive location.

(9) Insert a thin tool (small screw driver or shim stock) into the slot next to the switch mounting screw boss (right-hand slot) and depress spring latch at bottom of slot, which releases lock. Remove lock (Fig. 5).

(10) Remove three housing cover screws and remove housing cover (Fig. 4).

(11) Install tilt release lever and place column in full "Up" position. Remove tilt spring retainer using screw driver blade that just fits into slot opening. Insert screw driver in slot, press in approximately 3/16 inch, turn approximately 1/8 turn counterclockwise until ears align with grooves in housing and remove spring and guide (Fig. 6).

(12) Remove seat and upper bearing race (Fig. 1).

(13) With ignition switch in "LOCK" position, remove two ignition switch mounting screws and ignition switch (Fig. 7).

(14) Place Pivot Pin Remover C-4016 over pivot pin and thread small portion of screw firmly into the pin. Hold screw from turning with one wrench, turn nut clockwise with a second wrench to withdraw pivot pin from the support (Fig. 8). Remove opposite pivot pin in same manner.

(15) Use tilt release lever to disengage lock shoes. Remove bearing housing assembly by pulling upward to extend rack full down and moving housing assembly to the left to disengage rack from actuator. Remove actuator rod assembly.

(16) Remove roll pin and coupling assembly from lower end of steering shaft. To disassemble coupling see Standard Columns.

(17) Remove steering shaft assembly from upper end.

(18) Disassemble steering shaft assembly by removing centering spheres and anti-lash spring (Fig. 9).

(19) Disassemble upper steering shaft, locking wedge, locking rod and up bump stop from upper yoke (Fig. 10).

(20) Remove four bolts securing support to lock plate and remove support from end of column jacket. If necessary, remove two attaching screws and shift gate from the support.

(21) Remove shift tube retaining ring with screw driver. Remove thrust washer.

(22) Remove clip and bearing adapter from lower end of column jacket (Fig. 11).

(23) The column jacket with shift tube and bowl are serviced as an assembled unit.

Bearing Housing Disassembly (Fig. 1)

(1) Remove tilt lever opening shield and turn signal lever opening shield from housing.

(2) Remove lock bolt spring by removing spring retaining screw and moving spring clockwise to remove from bolt (Fig. 12).

(3) Remove snap ring from sector drive shaft. With small punch, lightly tap drive shaft from sector. Remove drive shaft, sector and bolt. Re-

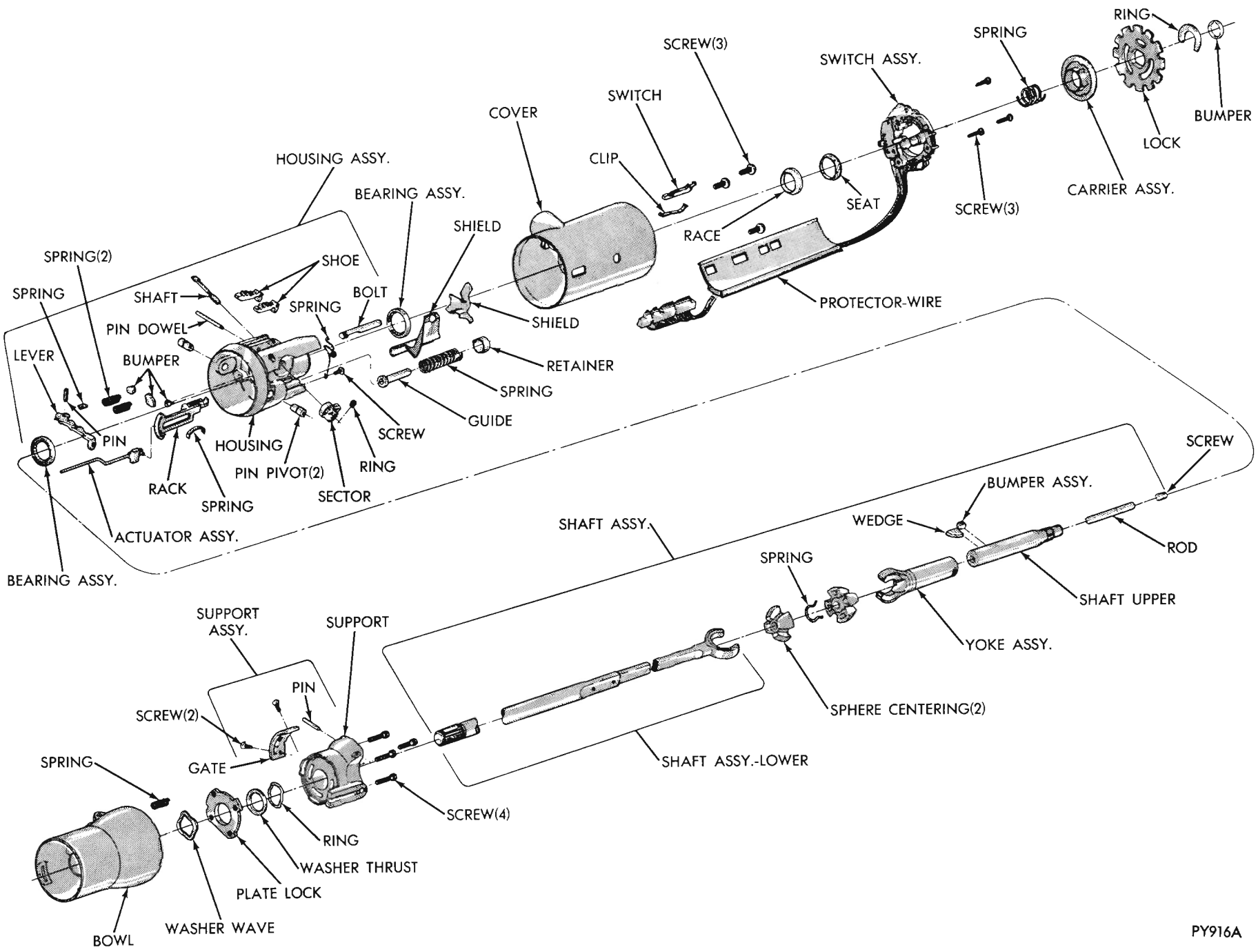


Fig. 1 - Tilt-A-Scope Column Upper End - Disassembled

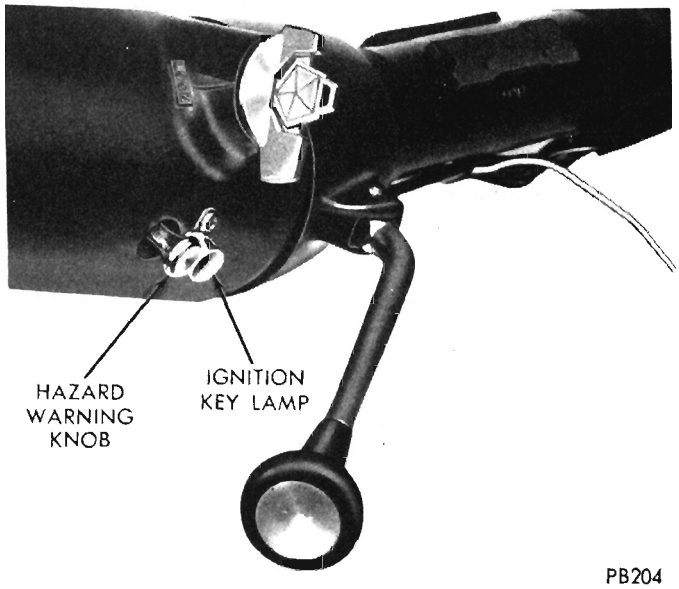


Fig. 2 Ignition Key Lamp and Hazard Warning Switch

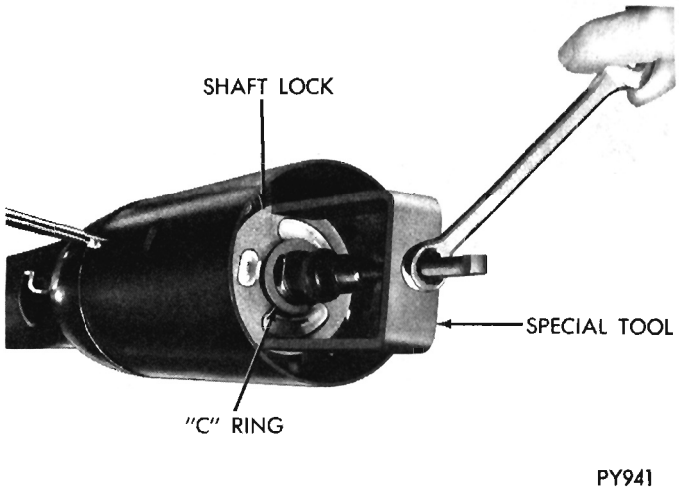


Fig. 3 - Removing or Installing Lock Plate "C" Ring

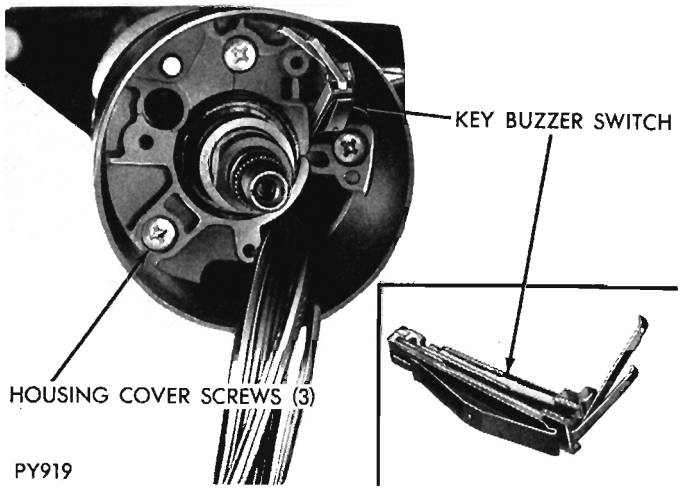


Fig. 4 - Key Buzzer Switch

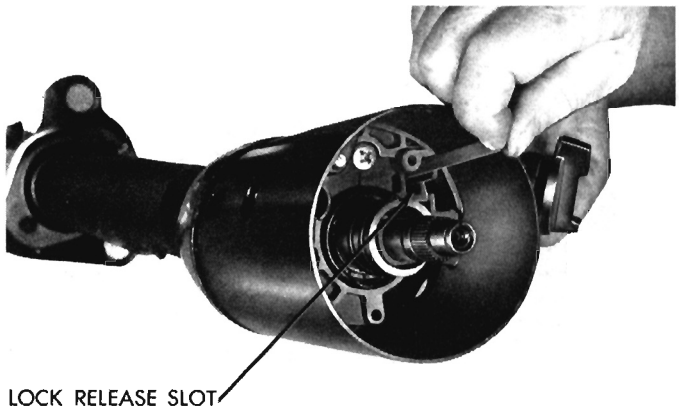


Fig. 5 - Removing Lock Cylinder

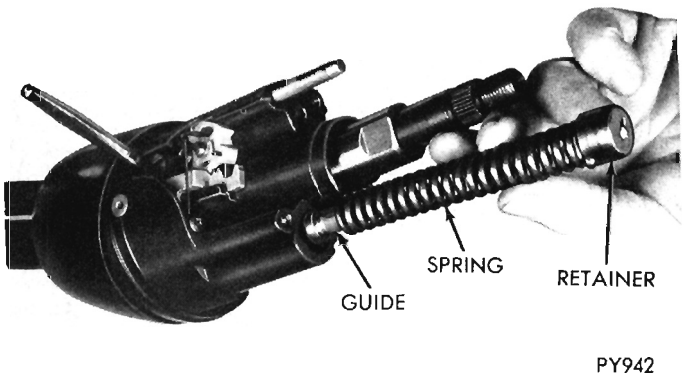


Fig. 6 - Tilt Spring, Retainer, and Guide

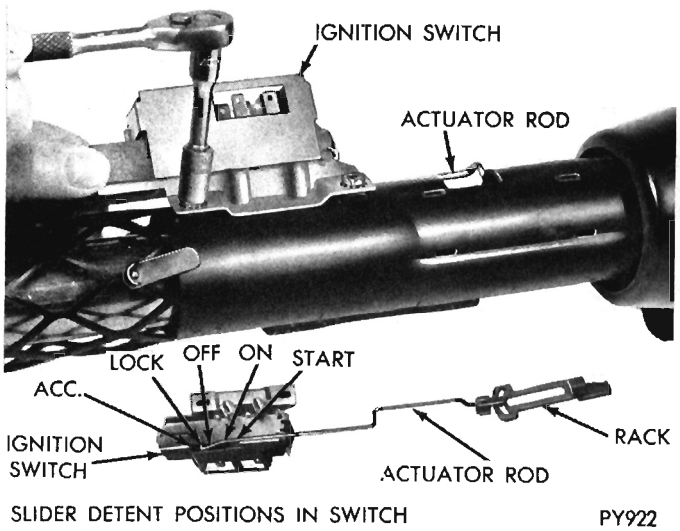


Fig. 7 - Ignition Switch

move rack and rack spring.

(4) Remove tilt release lever pin with punch and hammer. Remove lever and release lever spring. (To relieve load on release lever, hold shoes inward and wedge block between top of shoes (over slots) and bearing housing).

(5) Remove lock shoe pin with punch and

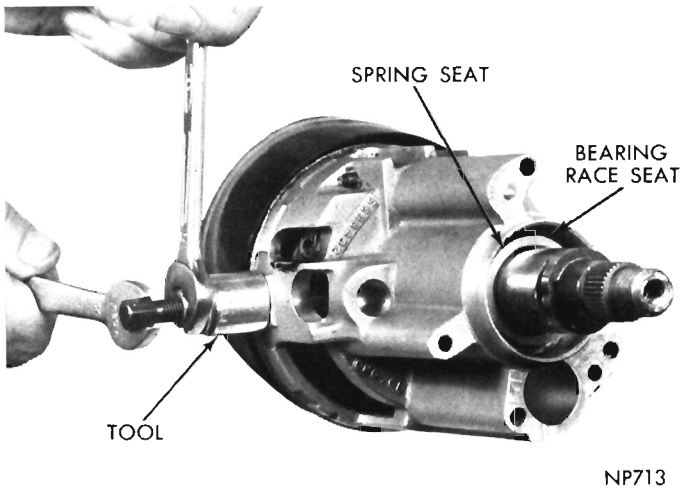


Fig. 8 - Pivot Pin Removing Tool

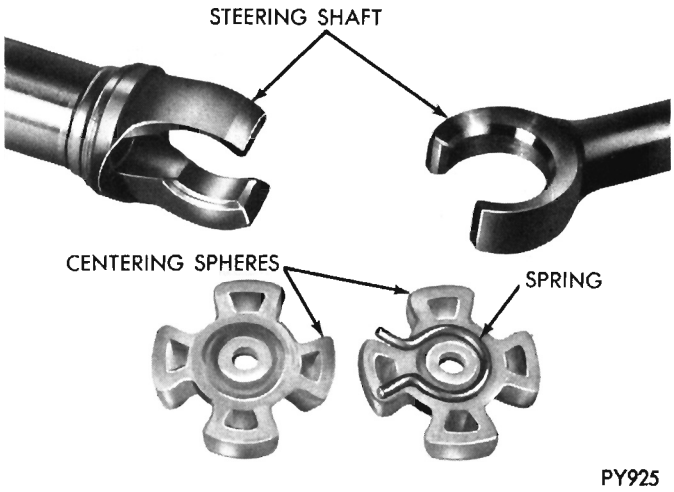


Fig. 9 - Shaft Centering Spheres - Disassembled

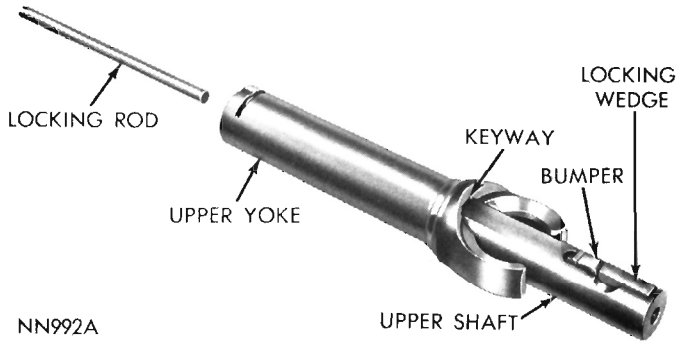


Fig. 10 - Upper Steering Shaft and Yoke - Disassembled

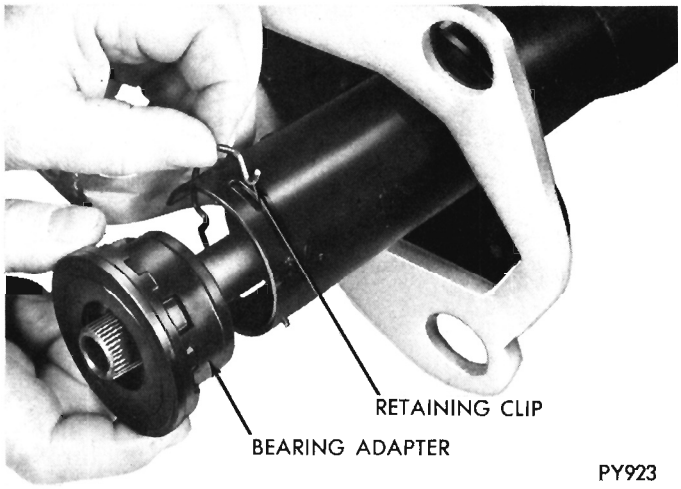


Fig. 11 - Shaft Lower Bearing Adapter

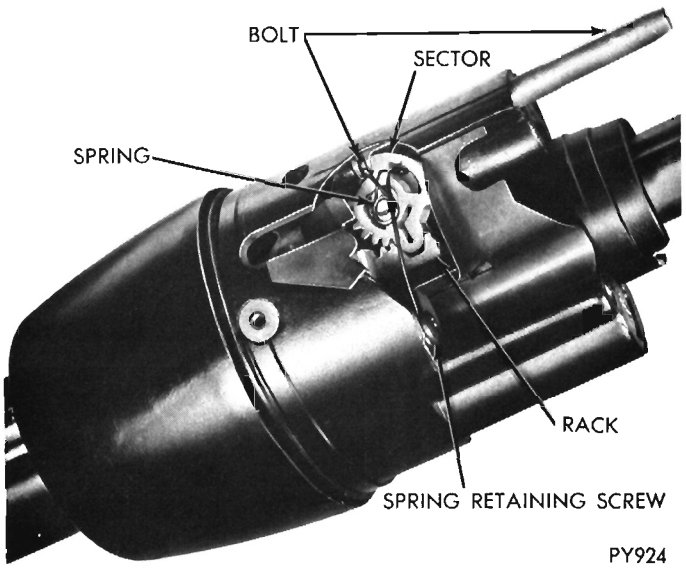


Fig. 12 - Sector and Bolt Spring

hammer. Remove lock shoes and lock shoe springs.

NOTE: With tilt lever opening on left side, shoes facing up, the four slot shoe is on the left.

(6) Remove bearings from bearing housing **only if they are to be replaced.** Remove separator and balls from bearing. Place housing on work surface. With a pointed punch against back surface of race, carefully hammer race out of housing until bearing puller can be used. Repeat for other race.

Inspection

(1) Inspect all bearings and race seats for brinelling, nicks, scratches and wear.

(2) Inspect centering sphere for nicks, damage or wear. If damage is found, check shaft couplings for nicks, burrs or rough spots.

(3) Inspect actuator housing, shift lever bowl and support for cracks or other damage.

(4) Inspect turn signal switch unit for distortion, broken or damaged parts.

(5) Inspect horn and turn signal wires for worn or bare spots.

(6) Inspect the steering shaft and gearshift tube for loose or broken plastic shear joints.

(7) Inspect steering column mesh cover, mend with electricians tape if loose or torn.

Assembly

The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

Bearing Housing Assembly (Fig. 1)

(1) Install bearings in bearing housing, if removed.

(2) Install lock shoe springs, lock shoes and shoe pin in bearing housing. Use approximately .180 rod to line up shoes for pin installation.

(3) Install spring, release lever and pin in bearing housing. (Again, relieve load on release lever as in step (4) of disassembly procedure.)

(4) Install drive shaft in housing. Lightly tap sector onto the shaft far enough to install snap ring.

(5) Install lock bolt and engage with sector cam surface.

(6) Install rack and spring. Block tooth on rack to engage block tooth on sector. Install external tilt release lever.

(7) Install bolt spring and spring retaining screw. Tighten to 35 inch-pounds (Fig. 12).

Reassembly (Fig. 1)

(1) Install thrust washer and retaining ring by pulling bowl up to compress wave washer.

(2) Install support by aligning "V" in support with "V" notch in jacket. Insert screws through support into lock plate. Tighten screws to 60 inch-pounds torque.

(3) Align lower bearing adapter notches in jacket and push in lower end of column jacket. Shift tube should pilot in adapter at this time. Install clip (Fig. 11).

(4) Install centering spheres and anti-lash spring in upper steering yoke. Install lower steering shaft from same side of spheres that spring ends protrude (Fig. 9). Install upper steering shaft, locking wedge, locking rod and up bump stop in yoke (Fig. 10).

(5) Install steering shaft assembly in shift tube from upper end. Carefully guide shaft through shift tube and bearing.

(6) Install ignition switch actuator rod through bowl from bottom and insert in slot in support. Extend rack downward from bearing housing. Assemble bearing housing over steering shaft and engage rack over end of actuator rod.

(7) Install external tilt release lever and, holding lock shoes in disengaged position, assemble bearing housing over steering shaft until the pivot pin holes line up.

(8) Install pivot pins.

(9) Place housing in full "UP" position and install guide, tilt spring and tilt spring retainer, using screw driver in retainer slot. Turn retainer clockwise to engage (Fig. 6).

(10) Install tilt lever opening shield and turn signal lever opening shield in housing.

(11) Remove tilt release lever, install housing cover and tighten three screws to 45 inch-pounds (Fig. 4).

(12) Assemble buzzer switch to spring clip with formed end of clip under end of switch and spring bowed away from switch on side opposite contact. Push switch and spring into hole in cover to the step with the contacts toward lock cylinder bore (Fig. 4).

(13) Install signal switch wires and connector through cover, bearing housing and bowl. Install switch and tighten screws to 35 inch-pounds.

(14) Install over the upper steering yoke the upper bearing race, followed by the seat, spring, carrier assembly and lock plate (Fig. 1). Lock the telescoping shaft with a set screw and install lock plate compressing Tool C-4118. Depress lock plate and carrier just far enough to install "C" ring on yoke (Fig. 3). Remove tool and set screw from shaft.

(15) Install tilt release lever and turn signal switch lever.

(16) **To install ignition lock, turn key to "LOCK" position and remove key.** This will cause buzzer operating lever to retract in cylinder. Now insert cylinder into housing far enough to contact switch actuator. Press inward and move switch actuator rod up and down to align parts. When parts align the cylinder will move inward and a spring loaded retainer will snap into place, locking the cylinder into the housing.

(17) When replacing ignition switch, place the key cylinder in "LOCK" detent position. Place the switch in "LOCK" by the following procedure:

(a) Position the switch as it is shown in (Fig. 7).

(b) Move the slider to the extreme left (toward steering gear).

(c) Move slider back one position to the right (toward steering wheel) to the "LOCK" position.

(18) Fit the actuator rod into the slider hole and assemble to the column with two screws. Push the switch lightly down the column (away from the steering wheel), to take out lash in the actuator rod, and tighten mounting screws. Caution should be exercised to prevent moving the switch out of detent. Use only the correct length screws. Tighten to 35 inch-pounds.

(19) Install wire protector over wires on column jacket. Be careful not to pinch any wires.

(20) Remove column from vise and Holding Fixture from column. Position bracket assembly on steering column. Install and torque the four short retaining screws to 120 inch-pounds.

(21) Align master splines and install coupling assembly on steering shaft. Then drive in the retaining roll pin.

Installation (See Standard Columns)

See Brakes, Group 5, for installation of Imperial parking brake vacuum valve.

Steering Wheel (Figs. 13 and 14)

Removal

(1) Remove 2 retaining nuts from underside of horn ring and lift off pad.

(2) Move lever to unlock position then remove 3 locking lever retaining screws then remove screw and flange assembly with locking lever.

(3) Remove 4 horn ring retaining screws and bushings then lift off horn ring and spring.

(4) Scribe an alignment mark on steering wheel hub in line with mark on end of steering shaft to aid in reassembly.

(5) Remove steering wheel retaining nut and washer. Remove steering wheel with Tool C-3428B. **Do not bump or hammer on steering shaft to remove wheel.**

Disassembly

Figure 14 shows a disassembled view of the tilting and telescoping steering wheel.

(1) Remove 2 spring clips and remove horn contact and spring assembly.

(2) Remove 3 screws and lift off cover.

Assembly

(1) Place cover on bottom of steering wheel and fasten with 3 screws.

(2) Position horn contact assembly studs through steering wheel and fasten with 2 spring clips. Wire connectors to be in 6 o'clock position.

(3) Place spring and horn ring on steering wheel and attach with 4 bushings and screws.

(4) Attach horn wires to horn contact terminals.

Installation

(1) Install steering wheel with scribed mark on hub aligned with mark on end of steering shaft. Install and tighten retaining nut to 28 foot-pounds.

(2) With steering wheel in normal position place locking lever on steering shaft and tighten screw and flange assembly to 45 inch-pounds to lock telescoping action.

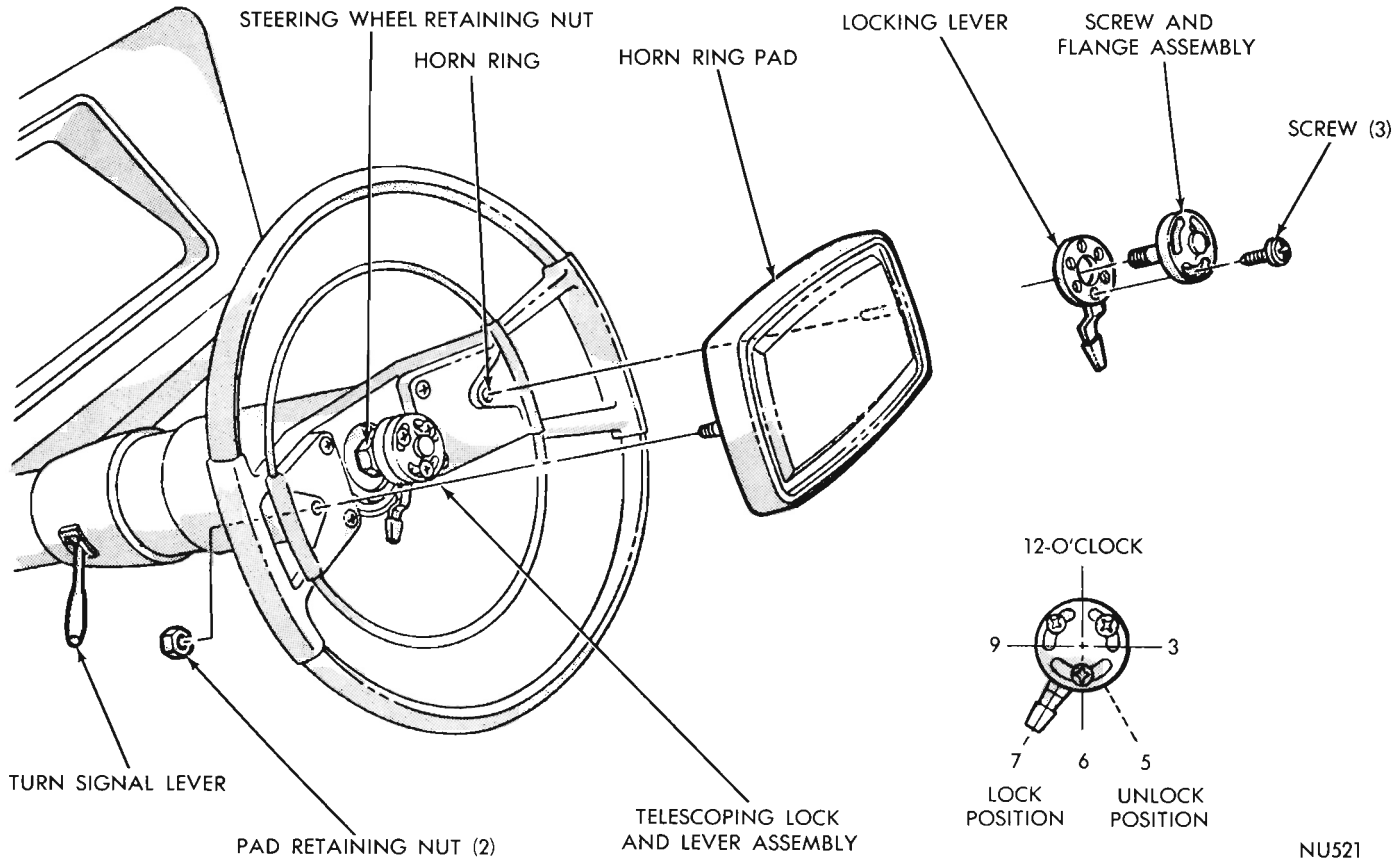


Fig. 13 - Telescoping Steering Wheel - Locking Mechanism

(3) Attach locking lever finger tight to flange with 3 screws (Fig. 13).

(4) Position lever in lock (7 o'clock) position and tighten screws to 24 inch-pounds.

(5) Check operation of telescoping mechanism as follows:

Rotate locking lever counterclockwise to 5 o'clock position. The wheel should be entirely free to telescope.

Rotate locking lever clockwise making certain it secures wheel in any telescoped position.

(6) Place pad on horn ring and tighten two nuts to 35 inch-pounds.

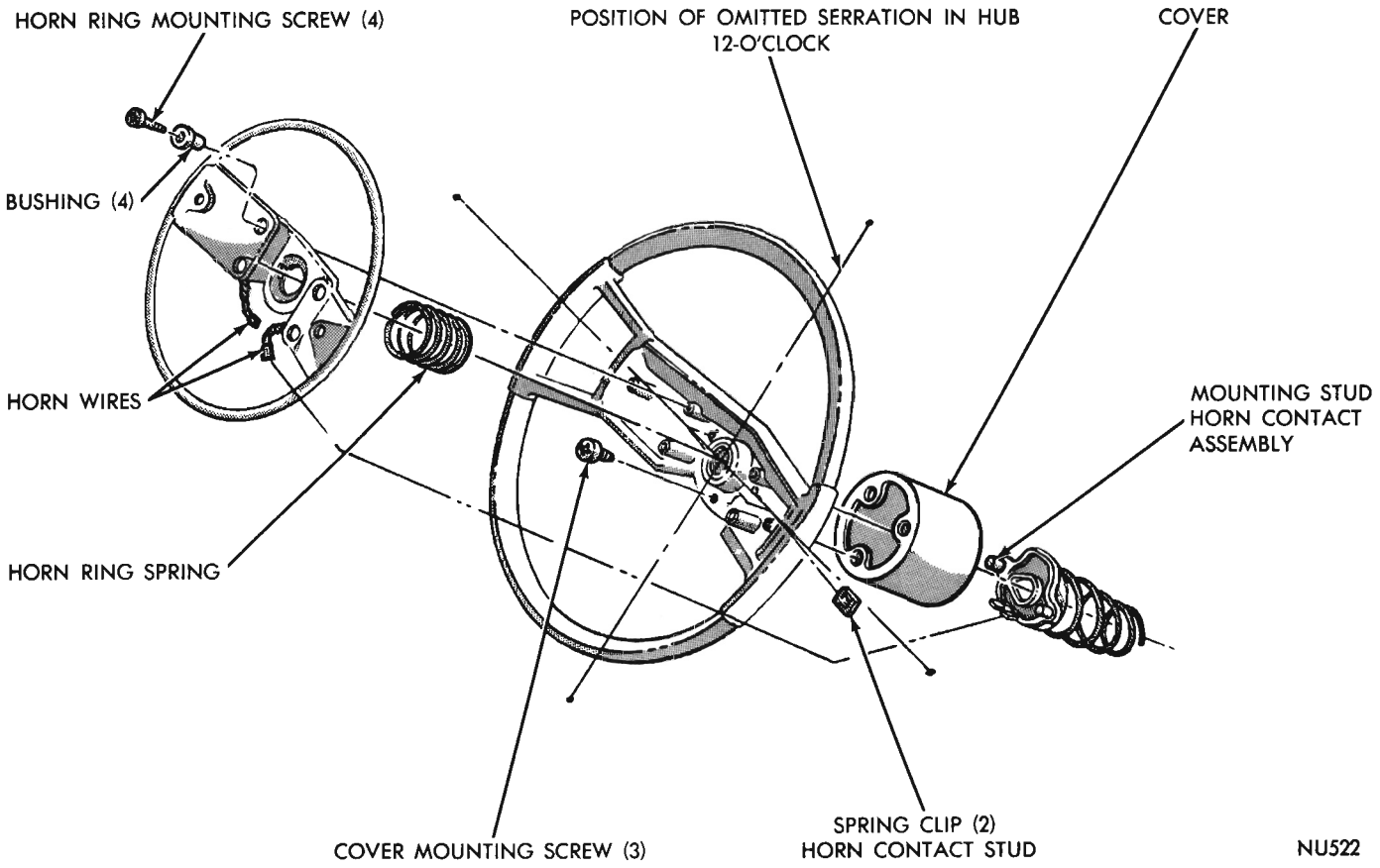


Fig. 14 - Telescoping Steering Wheel - Disassembled

SPECIFICATIONS

MANUAL STEERING

Type	Recirculation Ball Nut
Ratio	24 to 1
Cross Shaft Bearings	3-Needle Bearings
Valiant 6 Cyl.	Bronze Bushings
Worm Shaft Bearings	2-Caged Ball Bearings
Cross Shaft Adjusting Screw End Play	.000-.004 Inch
Worm Bearing Pre-Load	1 to 4 in. lbs. to keep Wheel Moving
Sector Mesh Adjustment Pre-Load Torque - Includes worm bearing Pre-Load	8 to 11 in. lbs. Pull through high spot

POWER STEERING GEAR

Type	Constant Control Full Time Power
Ratio	15.7 to 1
Wheel Turns-Stop to Stop	3-1/2
Cross Shaft Bearings	2 Needle Bearings and 1 Direct Bearing on Gray Iron Cover
Worm Shaft Thrust Bearing Pre-Load	16-24 Ozs.
Cross Shaft Adjustment	Tighten Adjusting Screw 3/8 to 1/2 turn past Zero Back Lash (Center of High Spot)
Fluid Capacity of Hydraulic System	4 Pints
Type of Fluid	Power Steering Fluid Part No. 2084329 or equivalent Do not use Automatic Transmission Fluid

PUMPS

Type	Constant Displacement - .94 Cu. In. per revolution Constant Displacement - 1.06 Cu. In. per revolution
Maximum Pressure	
Valiant	
1.06 pump (All Engines)	750 to 850 PSI
Barracuda	
1.06 pump (198 or 225 CID Engine)	750 to 850 PSI
1.06 pump (318, 340 or 426 CID Engine)	950 to 1050 PSI
.94 pump (318, 340, 383, or 440 CID Engine)	975 to 1075 PSI
Satellite	
1.06 pump (318, 383 or 426 HEMI CID Engine)	950 to 1050 PSI
.94 pump (318, 383 and 440 CID Engine)	975 to 1075 PSI
1.06 pump (225 CID Engine)	750 to 850 PSI
Fury	
.94 pump (318, 383, or 440 CID Engine)	1100 to 1200 PSI
1.06 pump (318 CID Engine)	950 to 1050 PSI
1.06 pump (225 CID Engine)	1000 to 1300 PSI
1.06 pump (383 or 440 CID Engine)	1100 to 1300 PSI
Chrysler	
1.06 pump (383 or 440 CID Engine)	1100 to 1300 PSI
.94 pump (383 CID Engine only)	1100 to 1200 PSI
Imperial	
1.06 pump	1200 to 1300 PSI
Pump Output	
.94 pump	2.1 to 2.6 gpm
1.06 pump	
High level	2.5 to 3.0 gpm
Low level	1.4 to 1.8 gpm
Type of Fluid	Power Steering Fluid - Part No. 2084329 or equivalent — Do not use Automatic Transmission Fluid

TIGHTENING REFERENCE

MANUAL STEERING

	Foot Pounds
Cross Shaft Adjusting Screw Lock Nut	35
Cross Shaft Cover Bolt	25
Gear Assembly to Frame Bolt	
Valiant, Barracuda and Satellite	80
Fury, Chrysler & Imperial Models	100
Steering Arm Nut	175
Steering Wheel Nut	28

POWER STEERING

	Foot Pounds
Gear Housing to Frame Bolt	
Valiant, Barracuda and Satellite	80
Fury, Chrysler & Imperial Models	100
Cross Shaft Adjusting Screw Lock Nut	28
Cross Shaft Cover Nut	150
High Pressure Hose Fitting	30
Steering Arm Nut	175
Housing Head Spanner Nut	150
Valve Body Attaching Bolts	8
Valve Body End Plug	50
Steering Wheel Nut	28

PUMPS

Location	Foot Pounds
High Pressure Hose Fitting	
Gear End	
All Models	13
Pump End	
All Models	24
Bracket Bolts	
.94 pump	35
1.06 pump	18
Flow Control Valve Plug	
.94 pump	4
1.06 pump	7
Pulley Retaining Nut (.94 pump)	50
Bracket Mounting Bolts	30
1.06 pump	
1/8 inch pipe clean out plug	7

TRANSMISSIONS

CONTENTS

	Page
MANUAL TRANSMISSIONS—3 SPEED	
(A-903) 6 Cyl. only	36
(A-230) All Synchronized	1
MANUAL TRANSMISSION—4 SPEED	
(A-833) All Synchronized	20
SPECIFICATIONS	133
TORQUEFLITE TRANSMISSIONS	50

MANUAL TRANSMISSION—THREE SPEED(A-230)

INDEX

	Page
General Information	1
Service Diagnosis	2
Service in Vehicle	
Extension Housing Yoke Seal	15
Gearshift Linkage Adjustment	16
Speedometer Pinion Gear	15
Service Out of Vehicle	
Assembling Transmission	9
Cleaning and Inspection	6
Disassembling Transmission	3
Extension Housing Bushing Replacement	12
Transmission Installation	13
Transmission Removal	2
Specifications	133
Tightening Reference	136

GENERAL INFORMATION

The A-230 three speed transmission (Fig. 1) has two synchronizer units, providing clash free shifting in all forward gears.

A pad has been provided on the right side of the transmission (Fig. 2) for identification numbers.

Sample Number PP 230 3262 2220

The first two letters identify the manufacturing plant. The next three numbers are the transmission model number. The following four numbers are a date of manufacture code. The last four numbers are a sequence number.

The main drive pinion (input shaft) is supported by a ball bearing in the transmission case and an olite bushing pressed in the end of the crankshaft.

The mainshaft (output shaft) front end is supported by roller bearings in the end of the main drive pinion and a ball bearing retainer in the front of the extension housing. The output end of the mainshaft is splined to the sliding universal joint yoke, which is supported by a bushing in the extension housing.

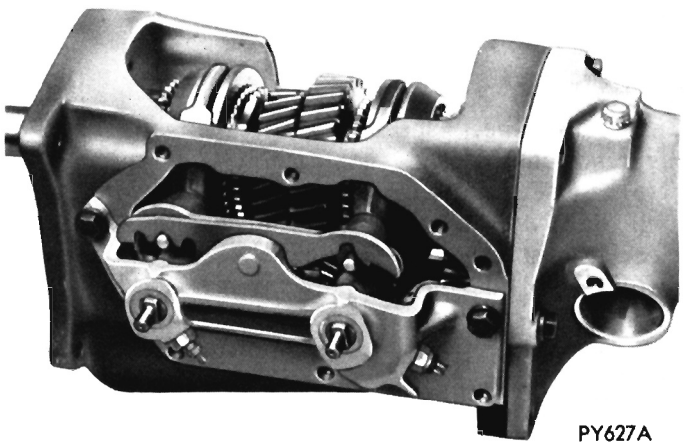


Fig. 1 - A-230 Transmission Cutaway

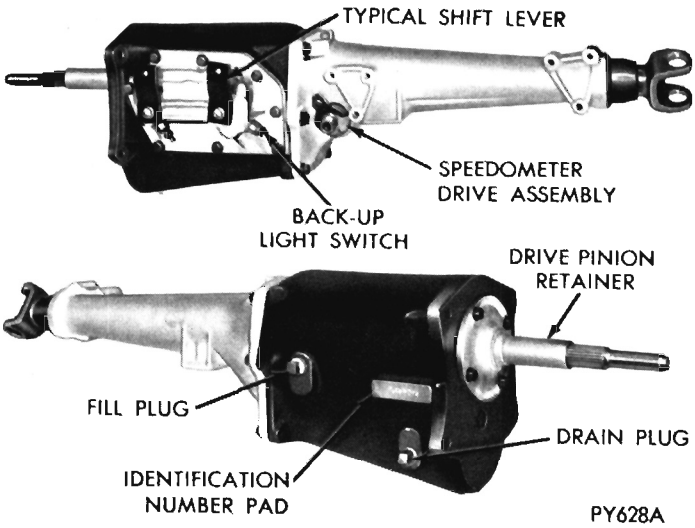


Fig. 2 - A-230 Transmission - Left and Right Sides

The countershaft gear is supported by a double row of needle type roller bearings at each end and the thrust is taken on thrustwashers between the ends of the gear and the transmission case. The alignment of the needle type roller bearings within the gear is maintained by six thrust washers (one being used between the rows of roller bearings and one at each end).

The reverse idler gear is also supported on needle type roller bearings.

The gearshifting is manually operated through shift control rods to the transmission. Any forward gear may be engaged while the vehicle is in motion through the use of synchronizing clutches.

The transmission may be used as an aid to deceleration by downshifting in sequence without double clutching or gear clashing, due to the fact that all forward speeds are synchronized. The service procedures covering the A-230 transmission used on all vehicles so equipped is identical to the following service procedures except where noted.

IMPORTANT Some internal transmission parts are different from standard on vehicles with high performance engines. These "special" parts are listed in applicable Parts Catalog; therefore, be sure they are used when replacement is necessary.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARD SHIFTING	(a) Incorrect clutch adjustment.	(a) Refer to Clutch Group for corrections.
	(b) Improper linkage adjustment.	(b) Perform linkage adjustment as outlined in "Gearshift Linkage Adjustments."
	(c) Synchronizer clutch sleeve damaged.	(c- d-e) Causes noted can only be corrected by disassembling transmission and replacing damaged or worn parts.
	(d) Synchronizer spring improperly installed.	
	(e) Broken or worn synchronizer stop rings.	
TRANSMISSION SLIPS OUT OF GEAR	(a) Linkage interference.	(a) Inspect and remove all linkage interferences.
	(b) Gearshift rods out of adjustment.	(b) Adjust gearshift rods as outlined in "Gearshift Linkage Adjustments."
	(c) Synchronizer clutch teeth worn.	(c) Disassemble transmission and replace parts as necessary.
	(d) Clutch housing bore or face out of alignment.	(d) Refer to Clutch Group for correction procedure.
TRANSMISSION NOISES	(a) Excessive end play in countershaft gear.	(a) Replace thrust washers.
	(b) Loose synchronizer hub spline fit on mainshaft.	(b) Inspect mainshaft and synchronizer hub and replace parts as necessary.
	(c) Damaged, broken or excessively worn gear teeth.	(c) Replace worn gears.
	(d) Rough or pitted bearing races or balls.	(d) Replace worn bearing.

SERVICE PROCEDURES

TRANSMISSION REMOVAL

(1) Remove shift rods from transmission levers.

(2) Drain fluid from transmission.

(3) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(4) Disconnect speedometer cable and back-up light switch leads.

(5) Some models have exhaust systems which will have to be partially removed for clearance. See Exhaust Systems, Group 11.

(6) Install engine support fixture C-3487A, engaging the hooks in holes in frame side member. Be sure support ends are up against underside of oil pan flange.

(7) Raise engine slightly with support fixture. Disconnect extension housing from removable cen-

ter crossmember.

(8) Support transmission with a suitable jack and remove center crossmember.

(9) Remove transmission to clutch housing bolts. Slide transmission toward rear until drive pinion shaft clears clutch disc, before lowering transmission.

(10) Lower transmission and remove from under vehicle. Thoroughly clean exterior of unit.

LEGEND FOR FIGURE 3

1. Gear, First
2. Ring
3. Spring
4. Sleeve
5. Struts (3)
6. Spring
7. Snap Ring
8. Bushing
9. Gear, Reverse
10. Bearing
11. Snap Ring
12. Snap Ring
13. Retainer
14. Gasket
15. Extension
16. Bushing
17. Seal
18. Yoke
19. Snap Ring
20. Ring
21. Spring
22. Sleeve
23. Struts (3)
24. Spring
25. Ring
26. Gear, Second
27. Shaft, Output
28. Washer
29. Roller
30. Washer
31. Roller
32. Washer
33. Countershaft
34. Washer
35. Roller
36. Washer
37. Roller
38. Washer
39. Retainer
40. Gasket
41. Seal
42. Snap Ring
43. Snap Ring
44. Bearing
45. Pinion, Drive
46. Roller
47. Snap Ring
48. Case
49. Plug, Drain
50. Fork
51. Lever
52. Housing
53. Lever
54. Nut, Locking
55. Switch
56. Lever
57. Bolt
58. Gasket
59. Lever, Interlock
60. Lever
61. Fork
62. Spring
63. Snap Ring
64. Washer
65. Gear, Countershaft
66. Washer
67. Roller
68. Gear, Idler
69. Washer
70. Shaft
71. Key
72. Washer
73. Plug, Filler
74. Gear, Clutch
75. Gear, Clutch
76. Key
77. Gasket
78. Seals (2)
79. Exhaust Emission Switch

DISASSEMBLING TRANSMISSION (Fig. 3)

Gearshift Housing and Mechanism

(1) Shift transmission to second gear for shift fork clearance.

(2) Remove housing retaining bolts and lift shift mechanism from case (Fig. 4).

(3) If shaft seals need replacement, or interlock levers are cracked, proceed as follows. Pull shift forks out of shafts.

(4) Remove nuts attaching operating levers to the shafts. Disengage levers from flats on shafts and remove.

(5) Remove burrs from shafts before removal from housing to avoid scoring the bores or damaging the lip seals, which would cause leakage after reassembly.

(6) Push gearshift lever shafts through housing bores and remove.

(7) Remove seals from housing.

Drive Pinion Retainer and Extension Housing

(1) Remove bolts holding drive pinion bearing retainer to front of transmission case.

(2) Slide retainer and gasket forward off the drive pinion. Pry pinion oil seal from bearing retainer. To avoid leakage around the new seal, do not nick or scratch the bore in which the seal is pressed, or the surface on which seal bottoms.

(3) Tap drive pinion forward carefully with a brass drift, as far as possible to provide maximum disassembly clearance for mainshaft removal (Fig. 5).

(4) Rotate cut away part of second gear next to countershaft gear for mainshaft removal clearance (Fig. 6).

(5) Also shift 2nd-3rd synchronizer sleeve forward for clearance.

(6) Remove bolt and retainer securing speedometer pinion adapter in extension housing (Fig. 2). Carefully work adapter and pinion out of extension housing.

(7) Remove bolts that attach extension housing to rear of transmission case.

(8) Tap with plastic hammer to break gasket seal and carefully guide housing off rear of mainshaft.

Idler Gear and Mainshaft (Fig. 7)

(1) Insert arbor tool C-464 in case to push reverse idler shaft and key out of case (Fig. 7).

(2) Remove idler gear with arbor in place to retain rollers.

(3) Remove both thrust washers (Fig. 8)

(4) Grasp mainshaft assembly and remove through rear of case (Fig. 8).

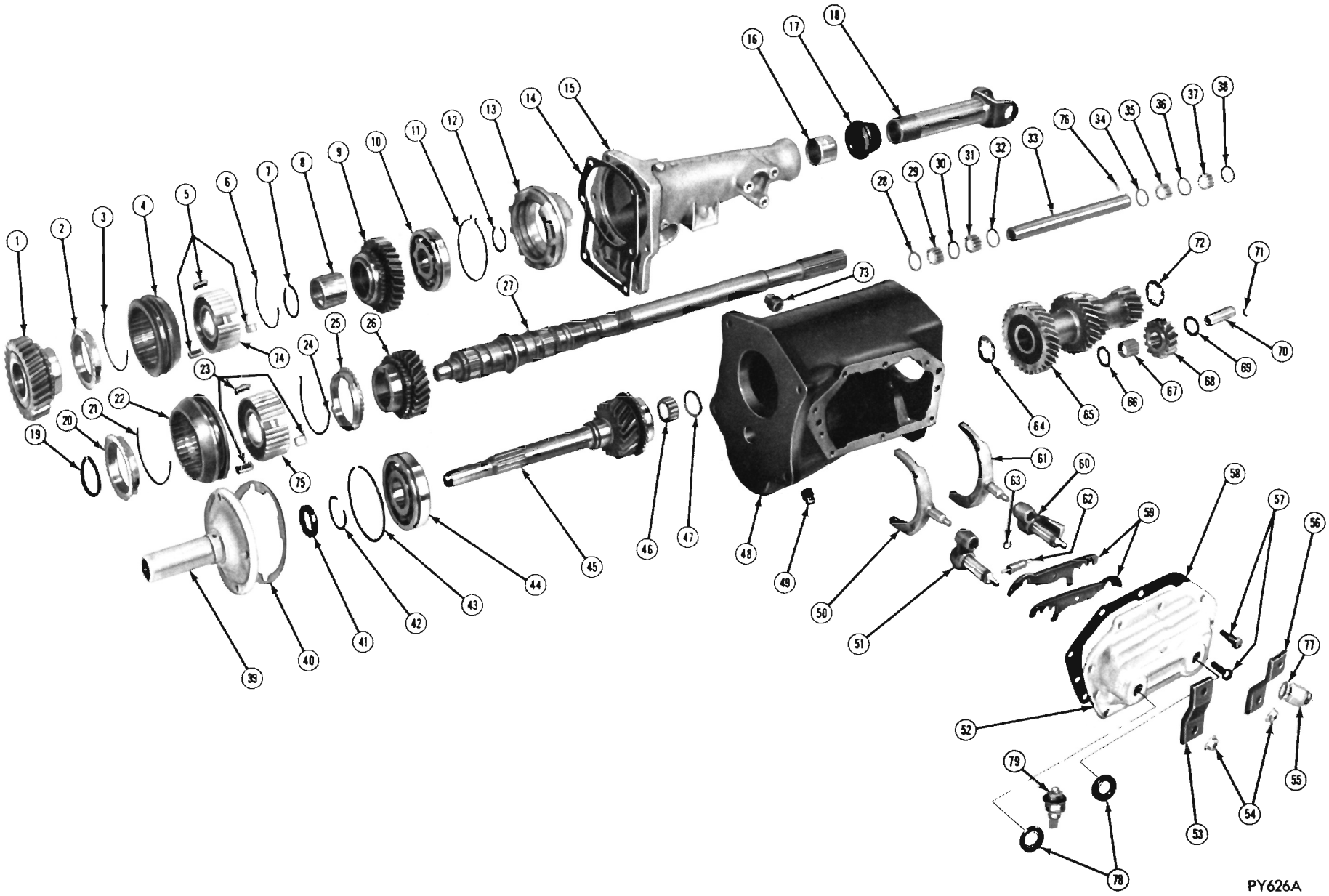


Fig. 3 - A-230 Transmission - Disassembled

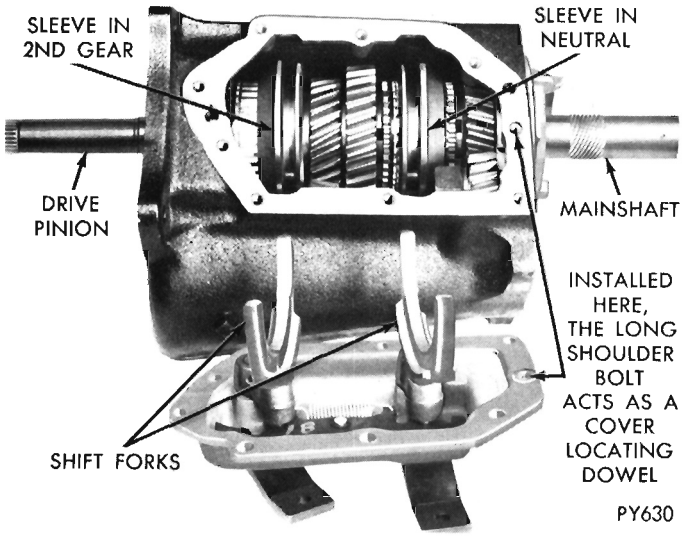


Fig. 4 - A-230 With Shift Mechanism Assy., Pinion Bearing Retainer, and Extension Housing - Removed

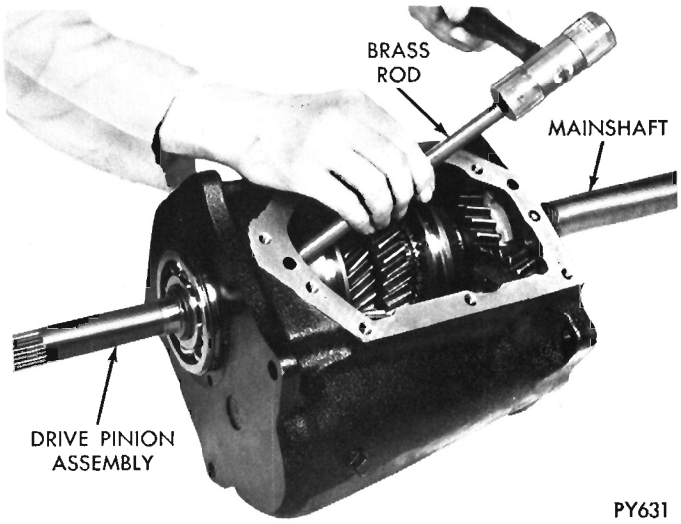


Fig. 5 - Tap Drive Pinion Forward for Mainshaft Pilot Clearance

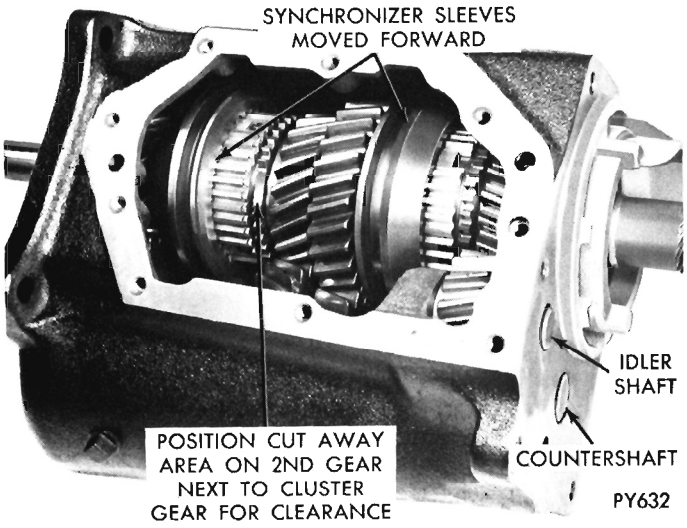


Fig. 6 - Position 2nd Gear and Shift Sleeves For Clearance

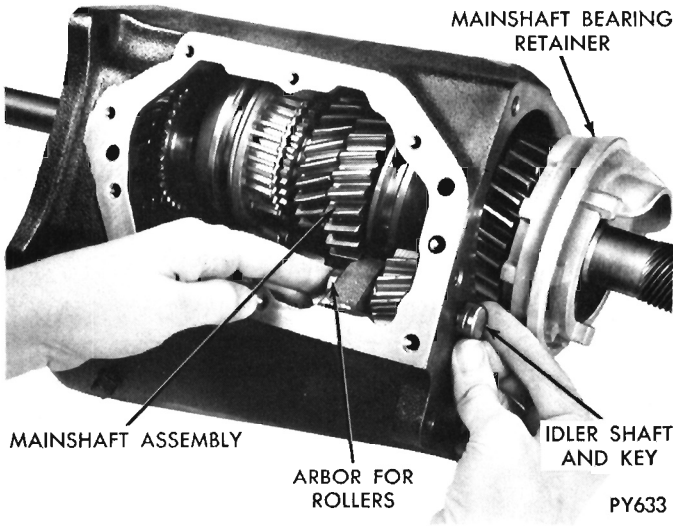


Fig. 7 - Reverse Idler Gear - Removal or Installation

Countershaft Gear and Drive Pinion

(1) Using a mallet and arbor tool C-4112 tap countershaft rearward and remove key. Continue to drive countershaft out of case, maintaining contact between shaft and arbor so that washers will not drop between them (Fig. 9).

(2) Lower countershaft gear to bottom of case to permit removal of main drive pinion.

(3) Remove snap ring from pinion bearing outer race (Fig. 10).

(4) Using a plastic hammer, drive the pinion into case and remove through rear (Fig. 11).

(5) If bearing is to be replaced, remove snap ring and press bearing off the pinion gear shaft (Fig. 12).

(6) Lift countershaft gear and arbor assembly out through rear of case (Fig. 13).

Mainshaft Disassembly

(1) Remove the snap ring from front end of mainshaft which retains the 2nd-3rd synchronizer clutch gear (Fig. 14).

(2) Slide the 2nd-3rd synchronizer assembly off end of mainshaft along with the 2nd gear stop ring (Fig. 15).

If synchronizer is to be disassembled, mark all parts so that they will be reassembled in the same position. Do not interchange the first-reverse assembly with the second-third assembly.

(3) Remove 2nd gear from mainshaft (Fig. 16).

(4) Spread snap ring in mainshaft bearing retainer to disengage it from bearing groove and slide

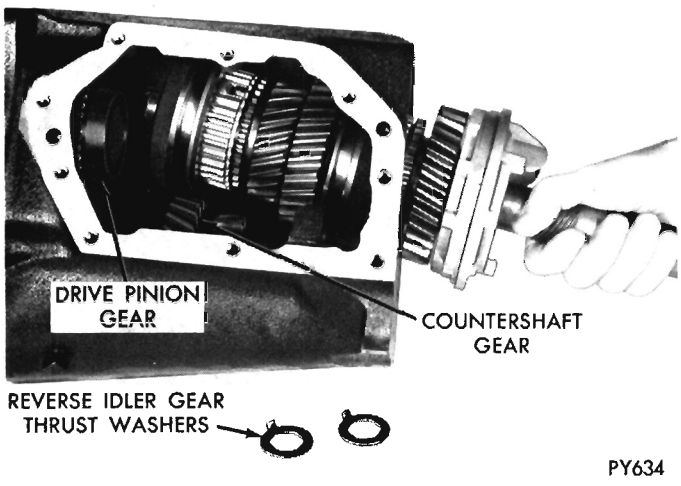


Fig. 8 - Mainshaft Assembly - Removal or Installation

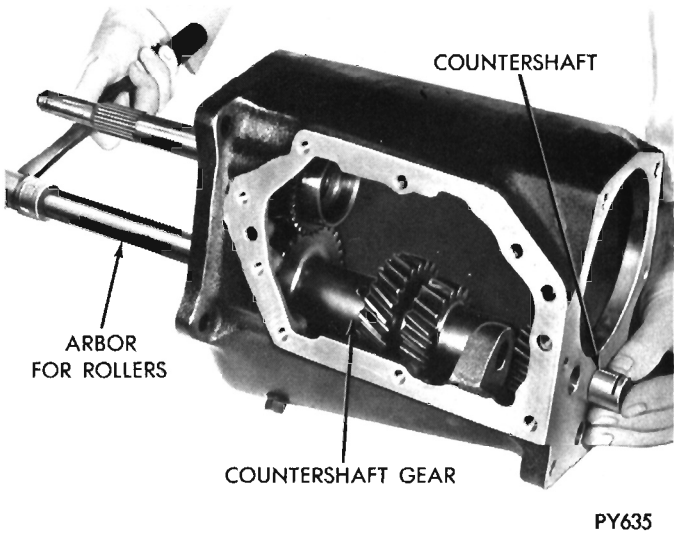


Fig. 9 - Countershaft Removal

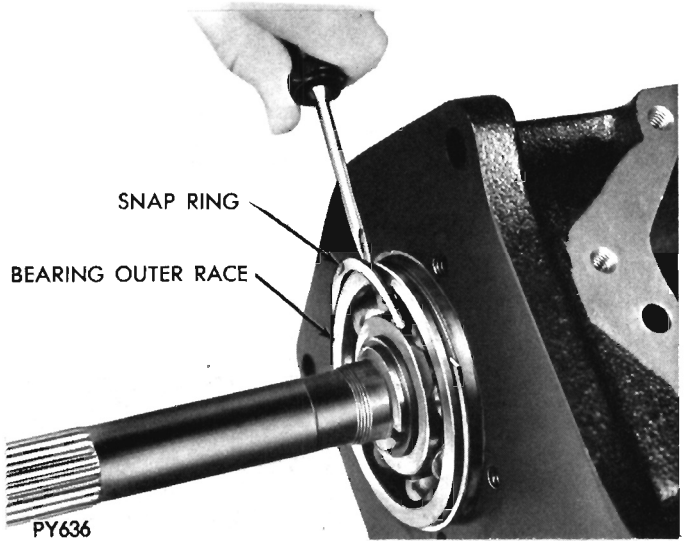


Fig. 10 - Snap Ring on Pinion Gear Bearing - Removal

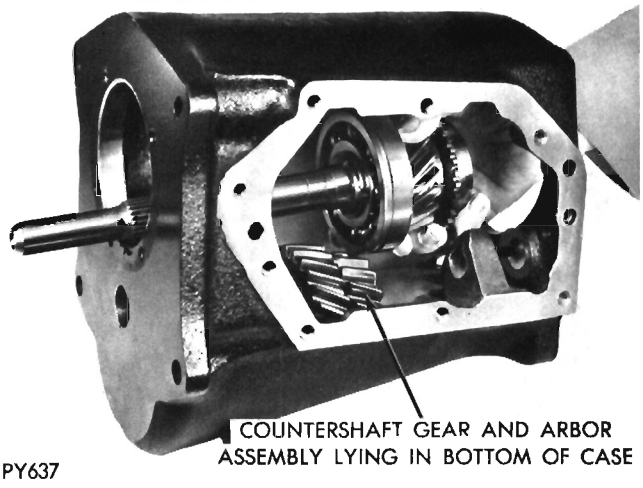


Fig. 11 - Drive Pinion and Bearing Assembly - Removal or Installation

retainer off the bearing race (Fig. 17).

(5) Remove snap ring securing bearing to mainshaft (Fig. 18).

(6) Set up parts in arbor press to force bearing off mainshaft. By supporting front side of reverse gear it can push the bearing off shaft as pressure is applied to shaft (Fig. 19). When bearing clears shaft, don't let parts drop through.

(7) Remove from press and remove from end of shaft, the mainshaft bearing and reverse gear (Fig. 20).

(8) Remove from mainshaft the snap ring which retains the 1st-Reverse synchronizer clutch gear (Fig. 21).

(9) Slide 1st-Reverse synchronizer assembly off splines and remove from mainshaft (Fig. 22).

(10) Remove 1st gear and its stop ring from mainshaft (Fig. 23).

CLEANING AND INSPECTION

Clean transmission case thoroughly, using a suitable solvent, dry with compressed air. Inspect case for cracks, stripped threads in various bolt holes and machined mating surfaces for burrs, nicks or any condition that would render the case unfit for further service. The front mating surface should be smooth; if any burrs are present, dress them off with a fine mill file. If threads are stipped, install Helicoil inserts.

Ball Bearings

Wash ball bearings, using a clean solvent and blow dry with compressed air.

CAUTION: Do not spin bearings with air pressure; turn slowly by hand. Spinning unlubricated bearings may cause damage to races and balls.

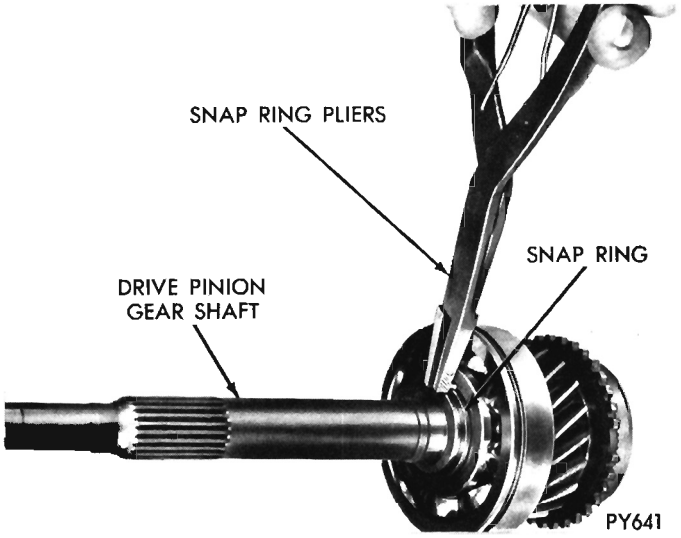


Fig. 12 - Snap Ring, Pinion Shaft to Bearing - Removal or Installation

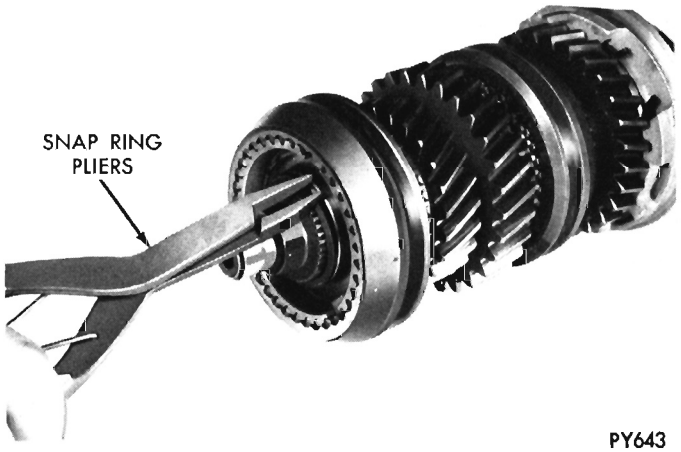


Fig. 14 - Snap Ring -2nd - 3rd Synchronizer Clutch Gear to Mainshaft - Removal or Installation

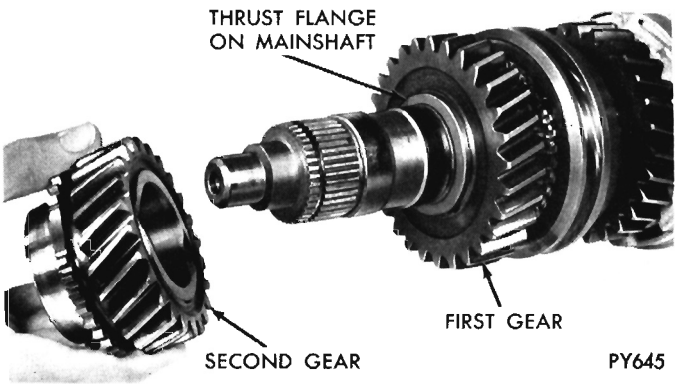


Fig. 16 -2nd Gear - Removal or Installation

Be sure ball bearings are clean, then lubricate them with light grade engine oil. Inspect bearings

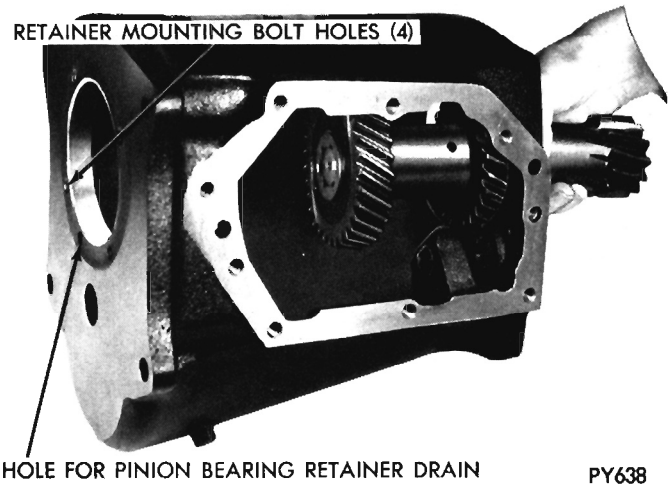


Fig. 13 - Countershaft Gear and Arbor Assembly - Removal or Installation

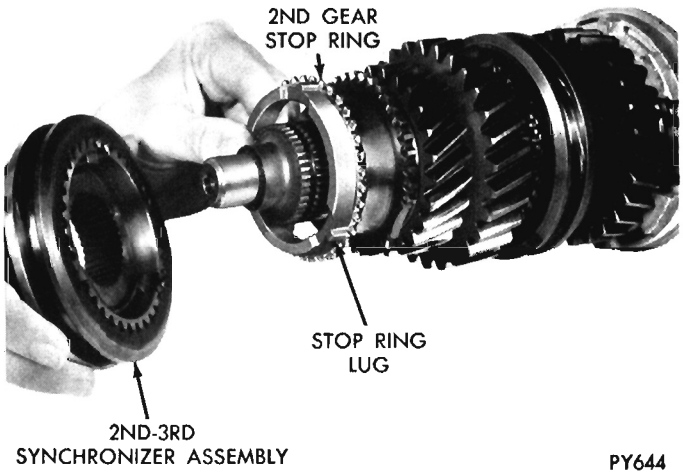


Fig. 15 -2nd - 3rd Synchronizer Assembly and Stop Ring - Removal or Installation

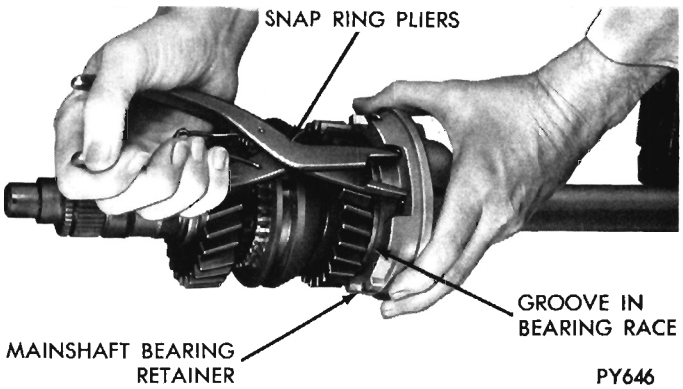


Fig. 17 - Snap Ring Spread, to Remove or Install Retainer on Mainshaft Bearing

for pitting. This can best be determined by slowly turning outer race by hand. Measure fit of bearings on their respective shafts.

Needle Type Bearing Rollers and Spacers

Inspect all bearing rollers for flat spots or brineling. Inspect all bearing roller spacers for signs of wear of galling. Inspect roller contact surfaces of gear and shaft. Install new parts as required.

Gears

Inspect gear splines on synchronizer clutch gears

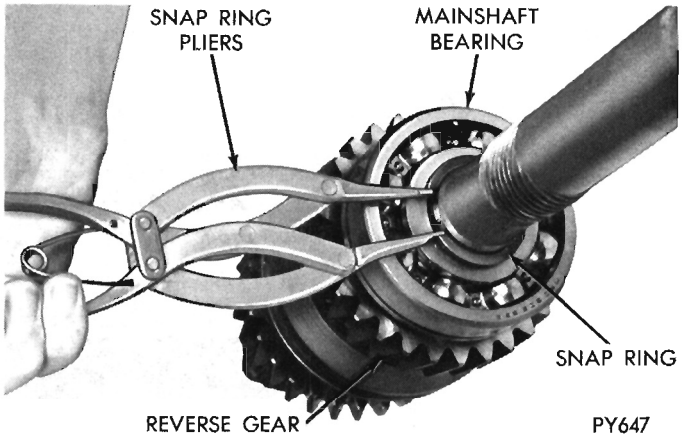


Fig. 18 - Snap Ring - Mainshaft Bearing To Shaft - Removal or Installation

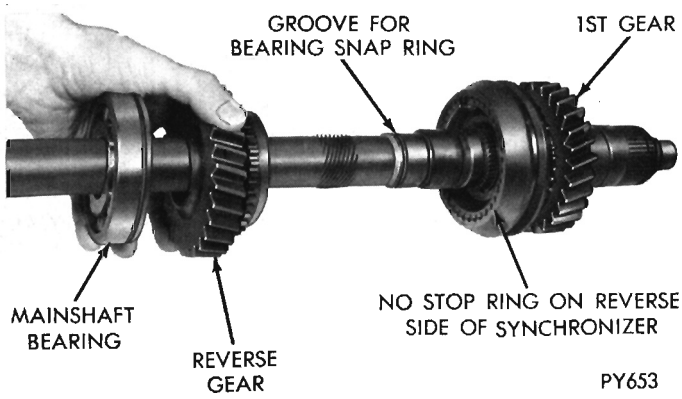


Fig. 20 - Reverse Gear and Mainshaft Bearing - Removal or Installation.

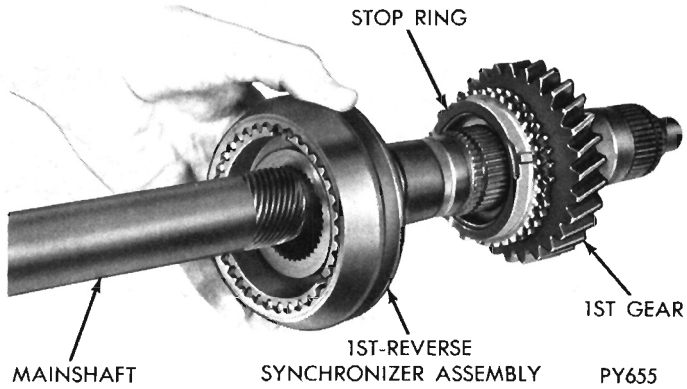


Fig. 22 - 1st Reverse Synchronizer Assembly - Removal or Installation

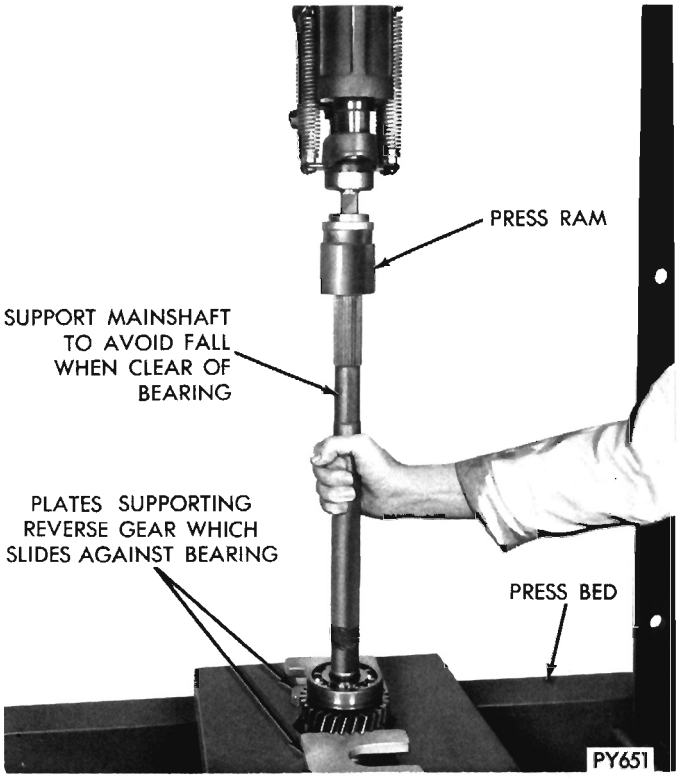


Fig. 19 - Using Press to Remove Mainshaft Bearing

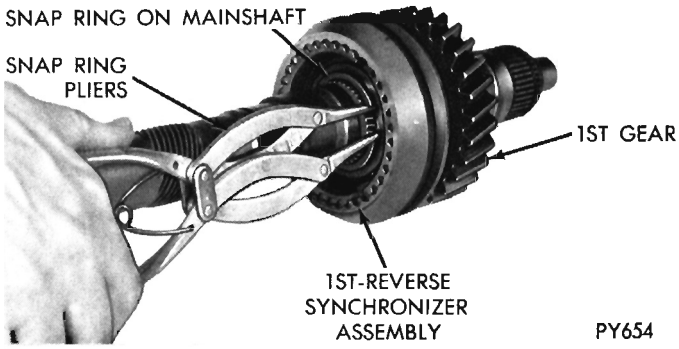


Fig. 21 - Snap Ring - 1st - Reverse Synchronizer Clutch Gear - Removal or Installation

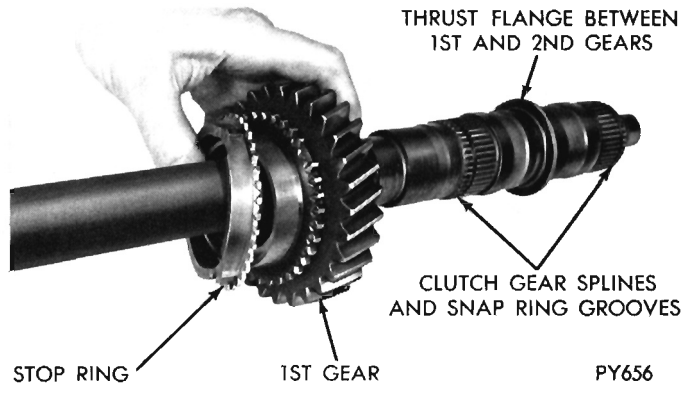


Fig. 23 - 1st Gear and Stop Ring - Removal or Installation

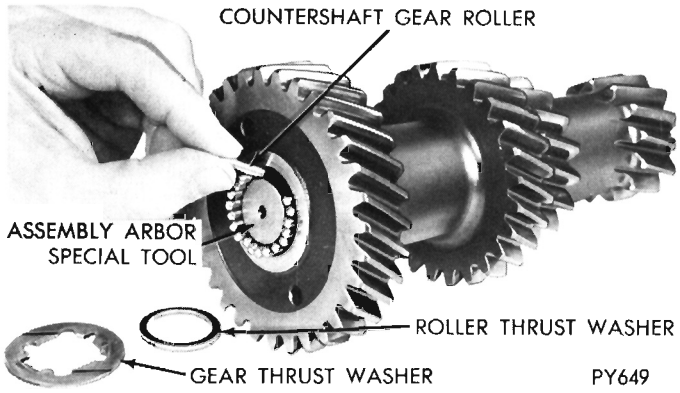


Fig. 24 - Countershaft Gear - Roller Bearing Assembly



Fig. 26 - Countershaft - Installation

and stop rings. If there is evidence of chipping or excessively worn teeth, install new parts at reassembly. Be sure clutch sleeve slides easily on the clutch gear. Inspect countershaft gear and all gear teeth for chipped or broken teeth, or signs of excessive wear. Small nicks or burrs must be stoned off.

Inspect teeth on main drive pinion. If excessively worn, broken or chipped, a new pinion should be installed. If the seal contact area on drive pinion shaft is pitted, rusted or scratched, a new pinion is recommended for best seal life.

Synchronizer Stop Rings

Inspect stop rings for cracks and wear. If rings are cracked or show signs of extreme wear on threaded bore, install new rings at reassembly. Test new rings for good fit on gear cones with minimum wobble.

Mainshaft

Inspect mainshaft gear and bearing mating surfaces. If gear contact surfaces show signs of galling or are excessively worn, a new mainshaft

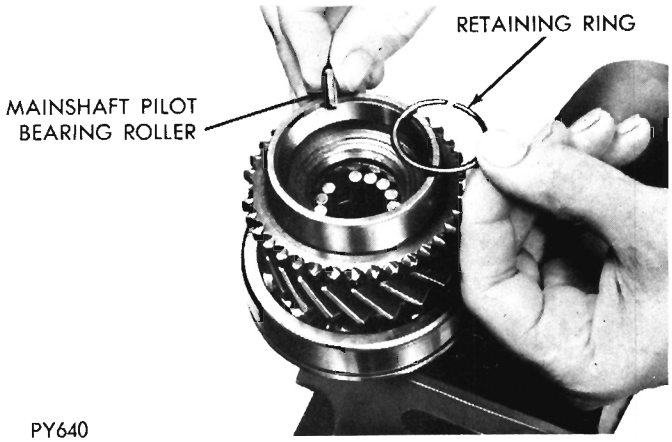


Fig. 25 - Installing Rollers in Drive Pinion Gear

should be installed.

Inspect snap ring grooves for burred edges. If rough or burred, remove condition using a fine file or crocus cloth. Inspect synchronizer clutch gear splines on shaft for burrs.

ASSEMBLING TRANSMISSION

Countershaft Gear

(1) Slide assembly arbor, Tool C-4112, into countershaft gear.

(2) Slide one roller thrust washer over arbor and into gear, followed by 22 Greased Rollers (Fig. 24).

(3) Repeat Step 2, adding one roller thrust washer on end.

(4) Repeat Steps 2 and 3 at other end of countershaft gear. (Total of 88 Rollers and 6 thrust washers).

(5) Place greased front thrust washer on arbor against gear with tangs forward.

(6) Coat rear thrust washer with heavy grease and stick it in place in the transmission case, with tangs rearward.

(7) Carefully place countershaft gear assembly in position in bottom of transmission case (Fig. 13). **Do not finish installation with countershaft and key until drive pinion is installed.**

Pinion Gear

(1) Press new bearing on pinion with snap ring groove forward. Install snap ring on shaft (Fig. 12).

(2) Install 15 rollers and retaining ring in gear (Fig. 25).

(3) Install drive pinion and bearing assembly into case (Fig. 11).

(4) Now finish installation of countershaft gear assembly by positioning it and the thrust washers so that the countershaft can be tapped into position (Fig. 26). **Be careful to keep the arbor in**

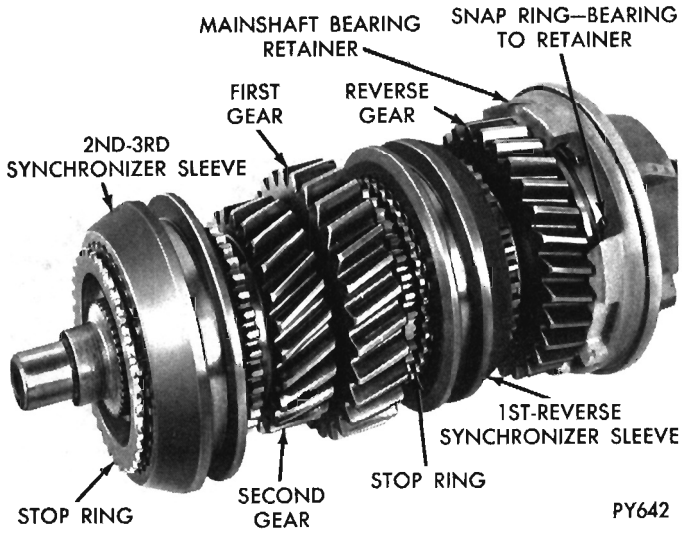


Fig. 27 - Mainshaft Assembled

contact with the countershaft to avoid parts dropping out of position and blocking the installation. Install key in countershaft as installation is finished.

(5) Carefully tap drive pinion forward to provide maximum clearance for mainshaft installation (Fig. 5).

Mainshaft (Fig. 27)

Sub assemble the synchronizer parts **(aligning marks made during disassembly)** in the order shown in Figs. 28, 29 and 30) as follows:

(1) Place a stop ring flat on the bench followed by the clutch gear and sleeve.

(2) Drop the struts in their slots and snap in a strut spring placing the tang inside one strut.

(3) Turn the assembly over on the stop ring and install second strut spring with tang in a different strut.

Note when replacing parts that the pointing angle on synchronizer sleeve and stop ring splines is 105 degrees except floor shift 2nd-3rd synchronizer, which is 115 degrees.

(4) Slide 1st gear and stop ring over rear end of mainshaft and against flange which separates 1st and 2nd gears (Fig. 23).

(5) Slide 1st-Reverse synchronizer assembly over mainshaft, indexing the hub slots to 1st gear stop ring lugs (Fig. 22).

(6) Install clutch gear snap ring on mainshaft (Fig. 21).

(7) Slide reverse gear and mainshaft bearing in place and take to press, to force bearing on shaft (Fig. 20).

(8) Support inner race of bearing and press shaft through to shoulder (Fig. 31).

Be sure snap ring groove on outer race is forward.

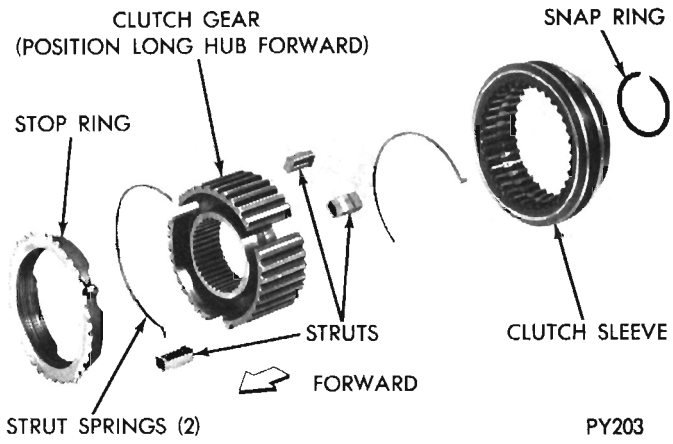


Fig. 28 - 1st - Reverse Synchronizer - Disassembled

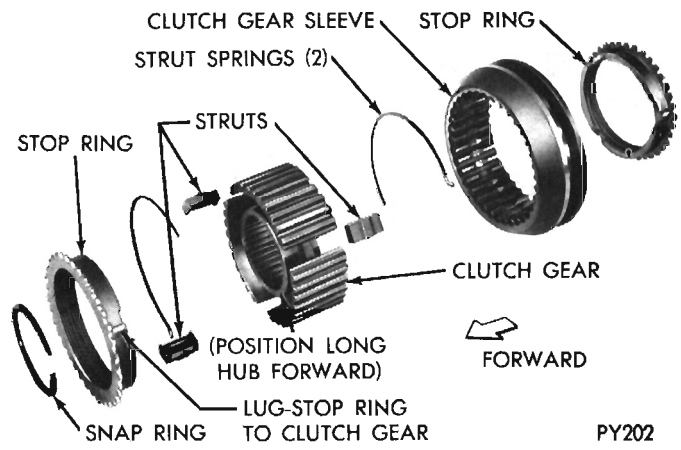


Fig. 29 - 2nd - 3rd Synchronizer - Disassembled

(9) Install bearing retaining snap ring on mainshaft (Fig. 18).

(10) Spread snap ring in mainshaft bearing retainer groove and slide it over the bearing. Be sure snap ring seats in bearing groove (Fig. 17).

(11) Place second gear over front of mainshaft with thrust surface against flange (Fig. 16).

(12) Install properly indexed stop ring and 2nd-3rd synchronizer assembly against second gear (Fig. 15).

(13) Install 2nd-3rd clutch gear snap ring on shaft (Fig. 14).

(14) Move 2nd-3rd synchronizer sleeve forward as far as practical (limited by need to retain struts in place) and install front stop ring (coated with grease to hold it in position) inside sleeve with lugs indexed to struts.

(15) Rotate cut out on second gear so it is toward countershaft gear for clearance (Fig. 6).

(16) Now slowly insert mainshaft assembly into case (Fig. 8) tilting it as required to clear cluster gears and finally entering the pilot rollers in the drive pinion gear.

If everything is in proper position the bearing

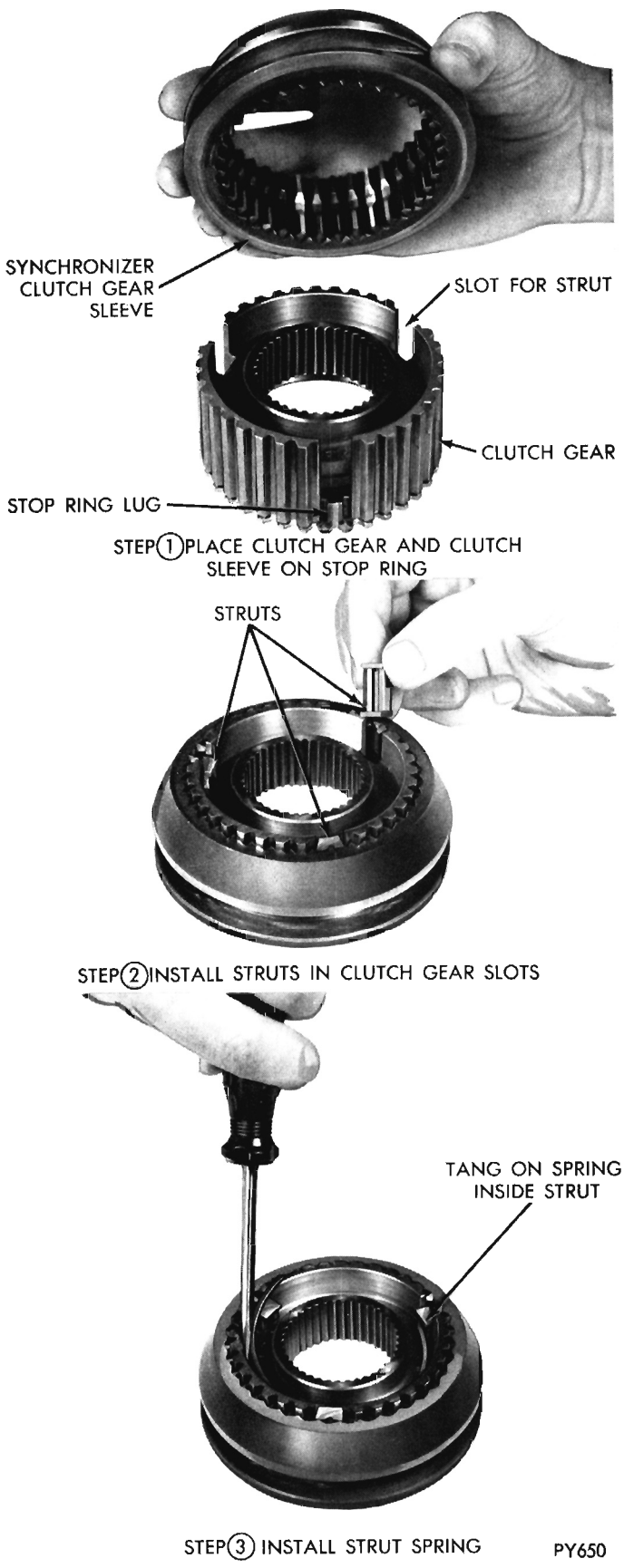


Fig. 30 - Assembling Synchronizer Parts

retainer will bottom to the case without force. If not, check to see if a strut, pinion roller, or stop ring is out of position.

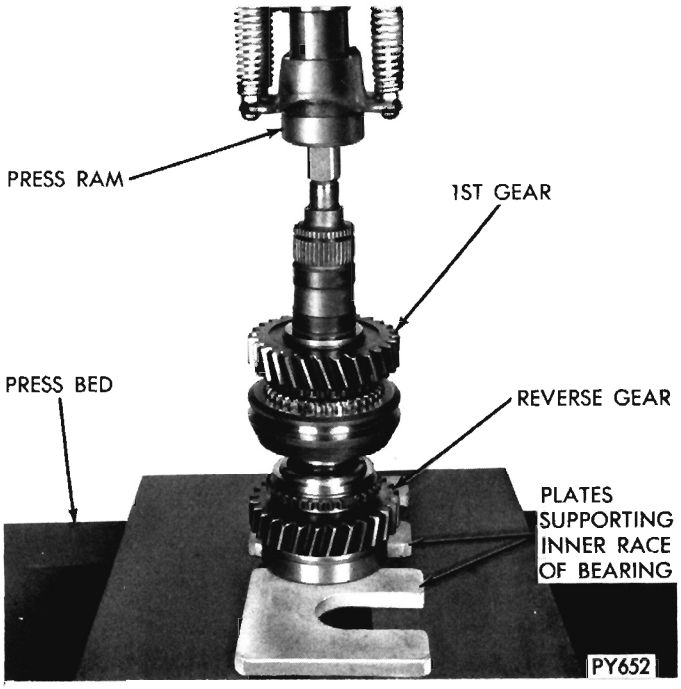


Fig. 31. - Using Press to Install Mainshaft Bearing

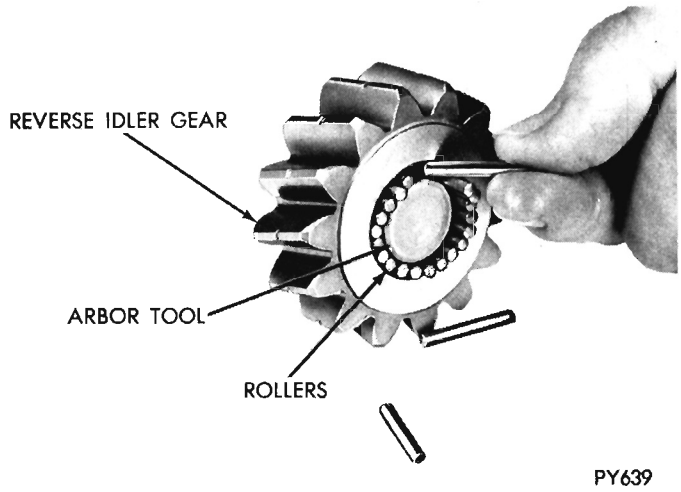


Fig. 32 - Reverse Idler Gear - Roller and Arbor Assembly

Reverse Idler Gear

(1) Place assembly arbor, Tool C-464 into idler gear along with 22 greased rollers (Fig. 32).

(2) Position reverse idler thrust washers in case with grease to retain them.

(3) Now position reverse idler gear with arbor and rollers in the case (Fig. 7) while installing idler shaft and key.

(4) Install extension housing and gasket now, to hold mainshaft and bearing retainer in place (Fig. 33). First, replace bushing and seal, if necessary.

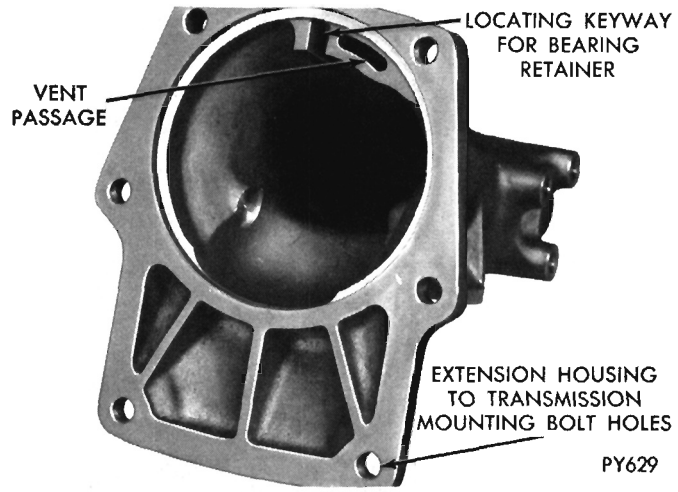


Fig. 33 - Extension Housing - Front View

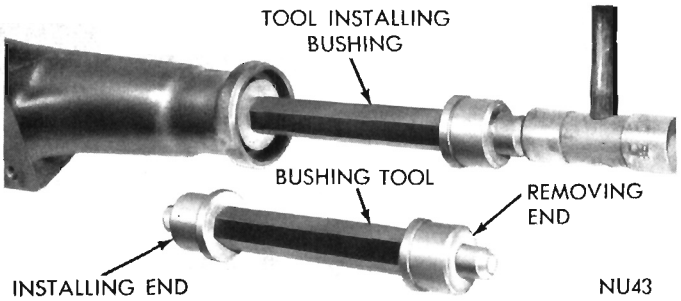


Fig. 35 - Replacing Bushing in Extension Housing

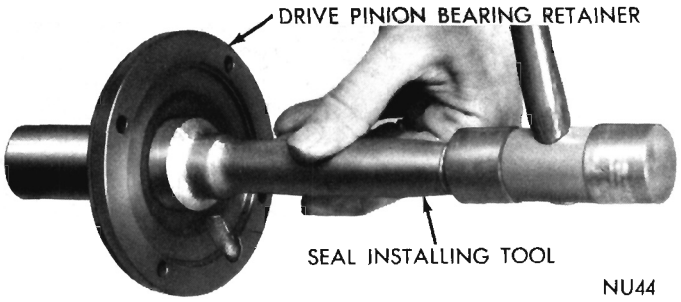


Fig. 37 - Installing Seal in Drive Pinion Bearing Retainer

Extension Housing Bushing Replacement

(1) Remove extension housing yoke seal (Fig. 34) with Tool C-3985.

(2) Drive the bushing out of housing (Fig. 35) with Tool C-3974.

(3) Slide a new bushing on installing end of Tool C-3974. Align oil hole in bushing with oil slot in housing, then drive bushing into place (Fig. 35).

(4) To install a new seal, position seal in opening of extension housing and drive it into housing with Tool C-3972 (Fig. 36).

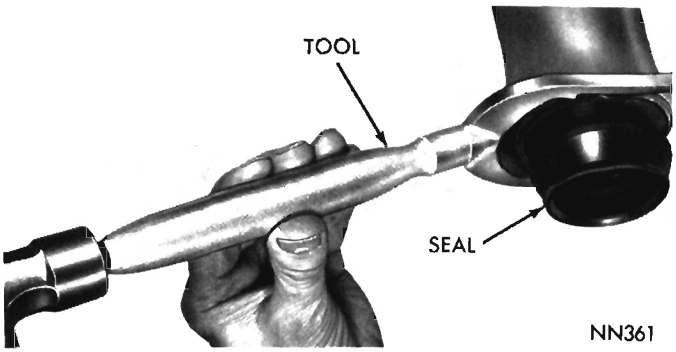


Fig. 34 - Removing Extension Housing Seal

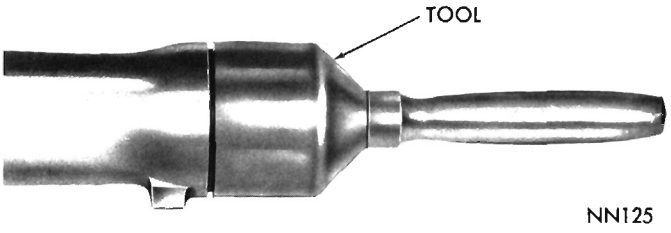


Fig. 36 - Installing Extension Housing Seal

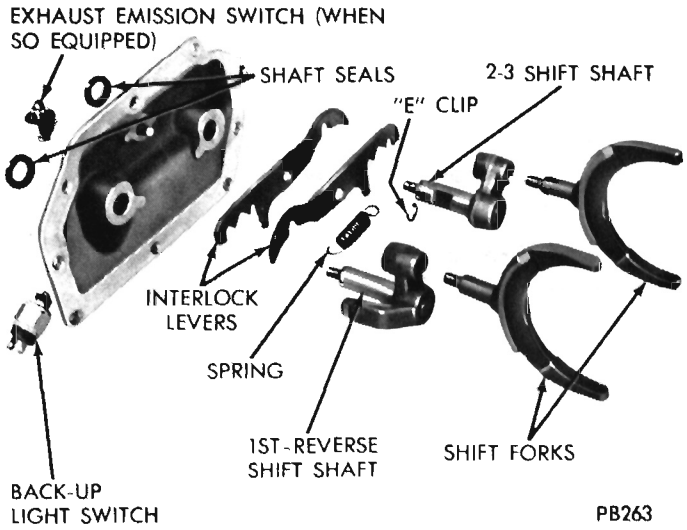


Fig. 38 - Gearshift Mechanism and Housing - Disassembled

Drive Pinion Bearing Retainer

(1) Install the outer snap ring on the drive pinion bearing and tap the assembly back until the snap ring contacts case.

(2) Using Tool C-3789 (Fig. 37), install a new oil seal in retainer bore.

(3) Position main drive pinion bearing retainer and gasket on front of case.

(4) Coat threads with sealing compound, then install attaching bolts and tighten to 30 foot-pounds (Fig. 2).

Gearshift Mechanism and Housing (Fig. 38)

(1) If removed, place the two interlock levers on the pivot pin and secure with "E" clip on Pivot pin.

(2) With pliers install the spring on interlock lever hangers.

(3) Place new shift lever shaft seals in the cover bores. Drive seals into cover until they bottom using tool C-3766.

(4) Coat lever shaft ends with grease and carefully install in cover bores and through seals.

(5) Rotate each shift shaft fork bore, to neutral position (straight up) and install shift forks through bores and under both interlock levers.

Install Gearshift Mechanism

(1) Position the 2nd-3rd Synchronizer sleeve in transmission to rear in (in 2nd gear). Position the 1st-reverse synchronizer sleeve to middle of travel (in neutral) (Fig. 4). Place the shift forks in the gearshift mechanism in the same positions.

(2) Install gasket and gearshift mechanism on transmission using special shoulder bolts. One bolt has an extra long shoulder which enters the transmission case acting as a locating dowel pin. This hole is at center rear of case (Fig. 4). Tighten bolts evenly to 15 foot-pounds.

(3) Install speedometer drive pinion gear and adapter being sure range number, stamped on outside of adapter, representing number of teeth on gear, is in 6 "O" clock position.

Exhaust Emission Control System Switch

Some models have a switch mounted in the shift cover, adjacent to the 2-3 shift lever for the Emission Control System. It is actuated by a flat on the 2-3 lever shaft when in third gear (Fig. 38).

In those vehicles not equipped with the Emission System, a plug is installed in the switch mounting hole in the shift cover. Torque for either is 15 foot-pounds.

(See Group 9A "Cleaner Air System" for details of system.)

TRANSMISSION INSTALLATION

Place a small amount of Multi-Purpose lubricant around inner end of pinion shaft pilot bushing in flywheel and on pinion bearing retainer pilot, for clutch release sleeve. **Do not lubricate end of pinion shaft, clutch disc splines or clutch release levers.**

(1) With transmission on a suitable jack, slide assembly under vehicle.

(2) Raise transmission until drive pinion is centered in clutch housing bore.

(3) Roll transmission slowly forward until pinion shaft enters clutch disc. With transmisssion in gear, turn output shaft until splines are aligned, then push transmission forward until seated against clutch housing. **Do not allow transmission to "hang" after pinion has entered the clutch disc.**

(4) Install transmission attaching bolts and tight-

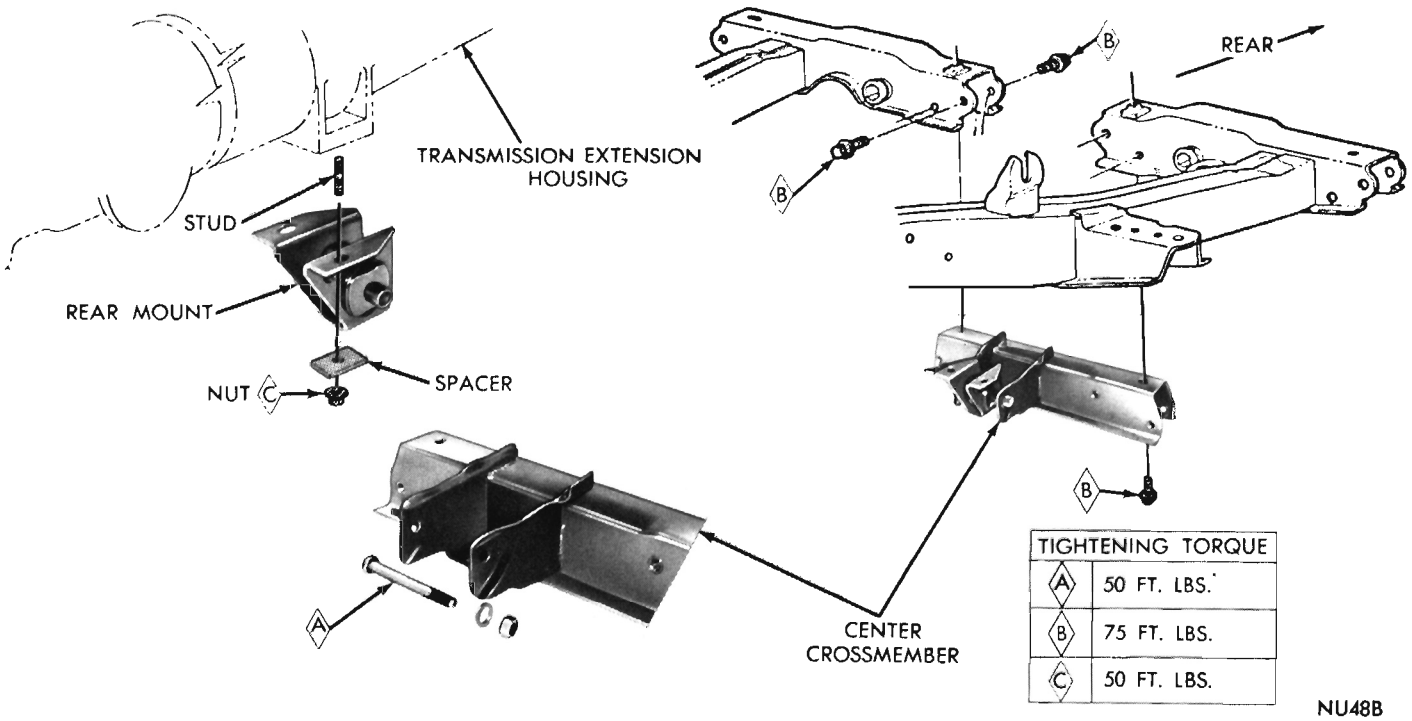


Fig. 39 - Center Crossmember and Rear Engine Mount (Fury)

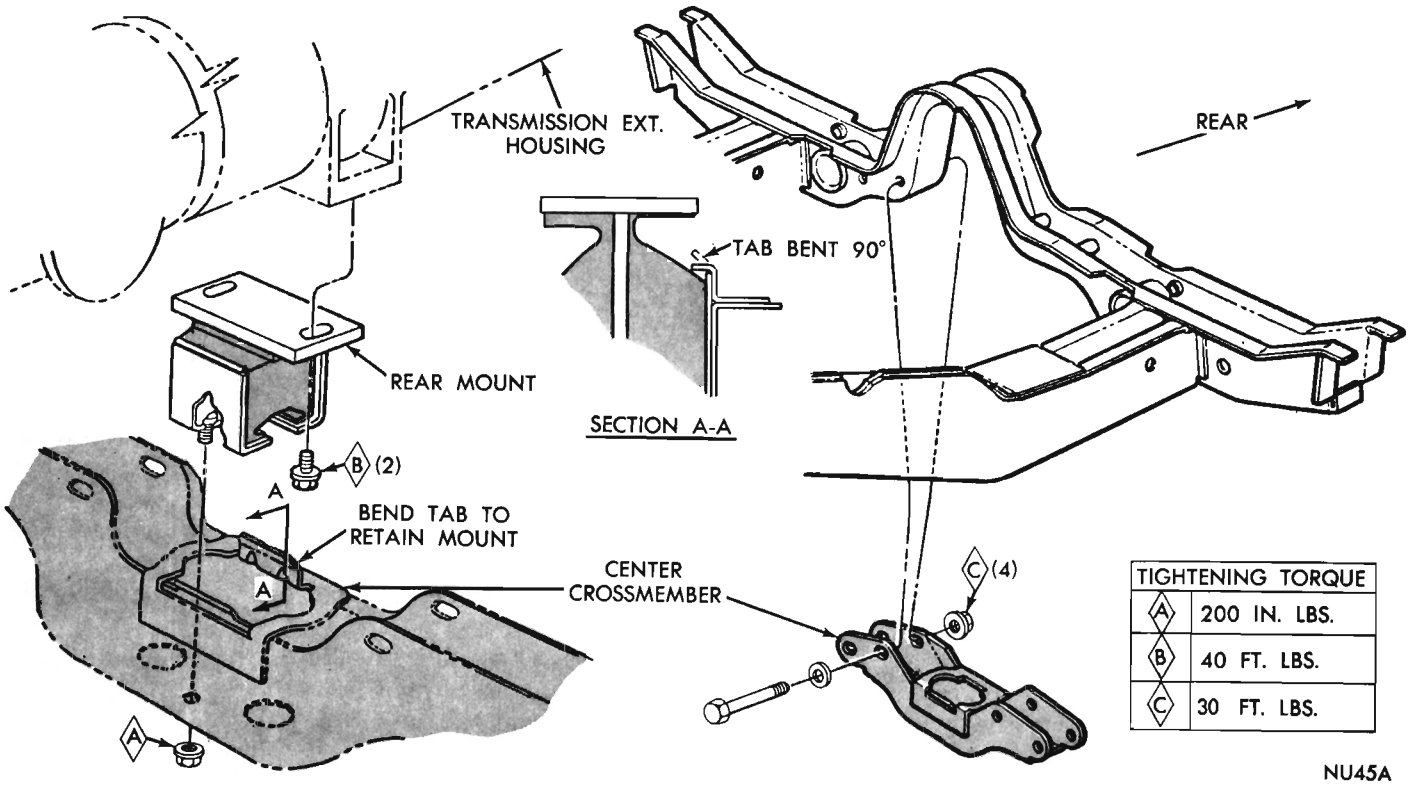


Fig. 40 - Center Crossmember and Rear Engine Mount (Valiant)

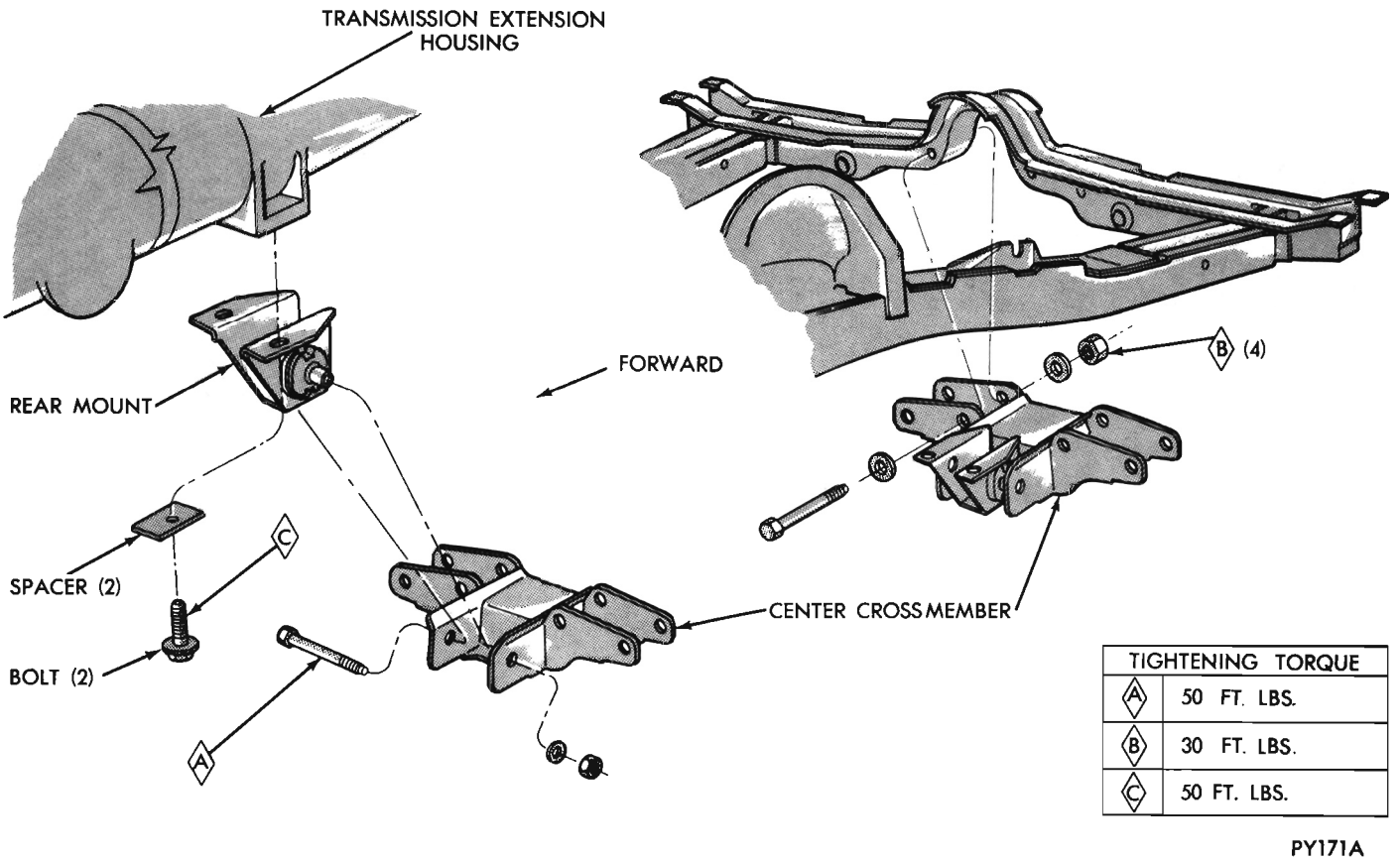


Fig. 41 - Center Crossmember and Rear Engine Mount (Barracuda and Satellite)

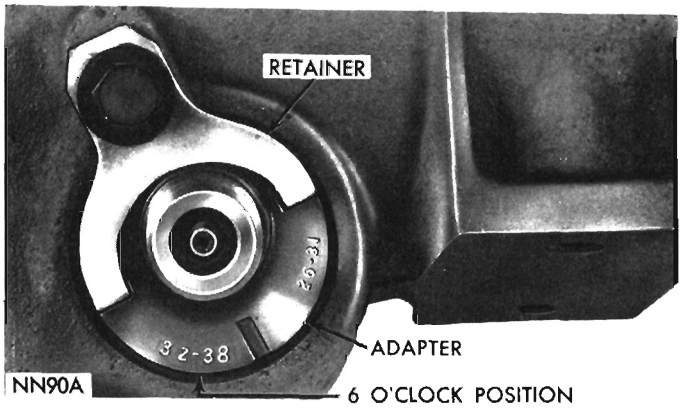


Fig. 42 - Speedometer Pinion and Adapter - Installed in Extension Housing

en to 50 foot-pounds. Remove the jack.

(5) Using a pointed drift, align crossmember bolt holes, then install attaching bolts. Tighten to specifications (Figs. 39, 40, or 41).

(6) Remove engine support fixture and disengage hooks from holes in the frame side rails. Install extension housing to rear engine mount bolts and tighten to 40 foot-pounds. On all except **Valiant** models the engine mount to center crossmember bolt and nut, loose assembled to this point, should now be torqued to 50 foot-pounds.

(7) Referring to "Gearshift Linkage Adjustment", connect shift control rods to transmission levers and connect speedometer cable.

(8) Carefully guide front universal joint yoke into extension housing and onto mainshaft splines. Connect propeller shaft to rear axle pinion yoke aligning the marks made at removal.

(9) Reconnect exhaust pipes (if removed). Tighten bolts securely.

(10) Fill transmission. See Lubrication Group "O" for detailed recommendations.

(11) Road test vehicle to make sure transmission shifts smoothly and operates quietly.

SPEEDOMETER PINION GEAR

Removal and Installation

Rear axle gear ratio and tire size determines pinion gear size requirements. Refer to "Speedometer Pinion Gear Chart" in Specifications for pinion usage.

(1) Place drain pan under adapter or drain transmission.

(2) Remove bolt and retainer securing speedometer pinion adapter to extension housing (Fig. 42).

(3) With cable housing connected, carefully work adapter and pinion out of extension housing.

(4) If transmission fluid is found in cable housing, replace seal in the adapter (Fig. 43).

(5) Start seal and retainer ring in adapter, then push them into adapter with Tool C-4004 until tool bottoms (Fig. 44).

(6) Note number of gear teeth and install speedometer pinion gear into adapter (Fig. 43).

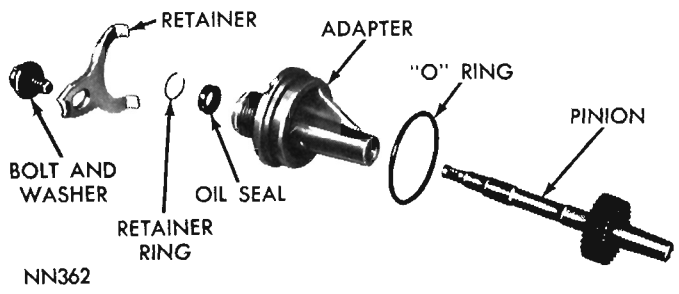


Fig. 43 - Speedometer Pinion and Adapter - Disassembled

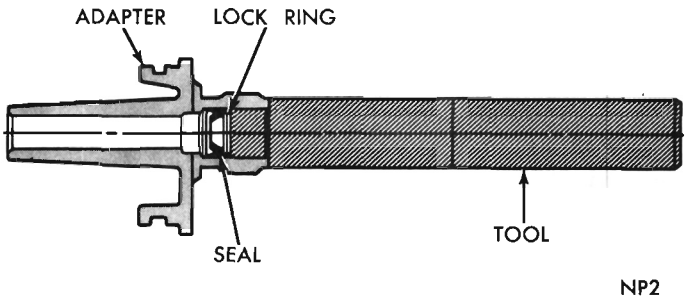


Fig. 44 - Installing Speedometer Pinion Seal in Adapter

CAUTION: Before installing pinion and adapter assembly, make sure adapter flange and its mating area on extension housing are perfectly clean and lubricated. Dirt or sand will cause mis-alignment resulting in speedometer pinion gear damage.

(7) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed (Fig. 42).

(8) Install retainer and bolt, with retainer tangs in adapter positioning slots. Tap adapter firmly into extension housing and tighten retainer bolt to 100 inch-pounds.

(9) Fill transmission to level of fill plug (Refer to Lubrication Group "O").

EXTENSION HOUSING YOKE SEAL

Replacement

(1) Place drain pan under yoke seal.

(2) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(3) Remove extension housing yoke seal (Fig. 34) with Tool C-3985.

(4) To install a new seal, position seal in opening of extension housing and drive it into housing with Tool C-3972 (Fig. 36).

(5) Carefully guide front universal joint yoke into extension housing and on mainshaft splines. Connect propeller shaft to rear axle pinion shaft yoke aligning the marks made at removal. Tighten clamp screws to 15 foot-pounds.

(6) Fill transmission to level of fill plug (Refer to Lubrication Group "O").

GEARSHIFT LINKAGE ADJUSTMENT

A-230 Column Shift

(1) Remove both shift rod swivels from transmission shift levers (Figs. 45, 46 or 47).

(2) Make sure transmission shift levers are in neutral (middle detent) position.

(3) Move shift lever to line up locating slots in bottom of steering column shift housing and bearing housing. Install suitable tool in slot and lock ignition switch.

(4) Place screwdriver or suitable tool between crossover blade and 2nd-3rd lever at steering column so that both lever pins are engaged by crossover blade (Fig. 48).

(5) Set 1st-Reverse lever on transmission to reverse position (rotate clockwise).

(6) Adjust 1st-Reverse rod swivel by loosening clamp bolt and sliding swivel along rod so it will enter 1st-reverse lever at transmission. Install washers and clip. Tighten swivel bolt to 100 inch-pounds.

(7) Remove gearshift housing locating tool, unlock ignition switch and shift column lever to neutral position.

(8) Adjust 2nd-3rd rod swivel by loosening clamp bolt and sliding swivel along rod so it will enter 2nd-3rd lever at transmission. Install washers and clip. Tighten swivel bolt to 100 inch-pounds.

(9) Remove tool from cross-over blade at steering column and shift through all gears to check adjustment and cross-over smoothness.

10) Check for proper operation of steering column lock in reverse and other gear positions. With proper linkage adjustment, column should lock in reverse position only.

Three Speed Floor Shift Mechanism (Figs. 49, 50 or 51)

Removal

(1) Disconnect negative (ground) cable from battery.

(2) Loosen lock nut and unscrew shift knob.

(3) To remove console, if so equipped, see proce-

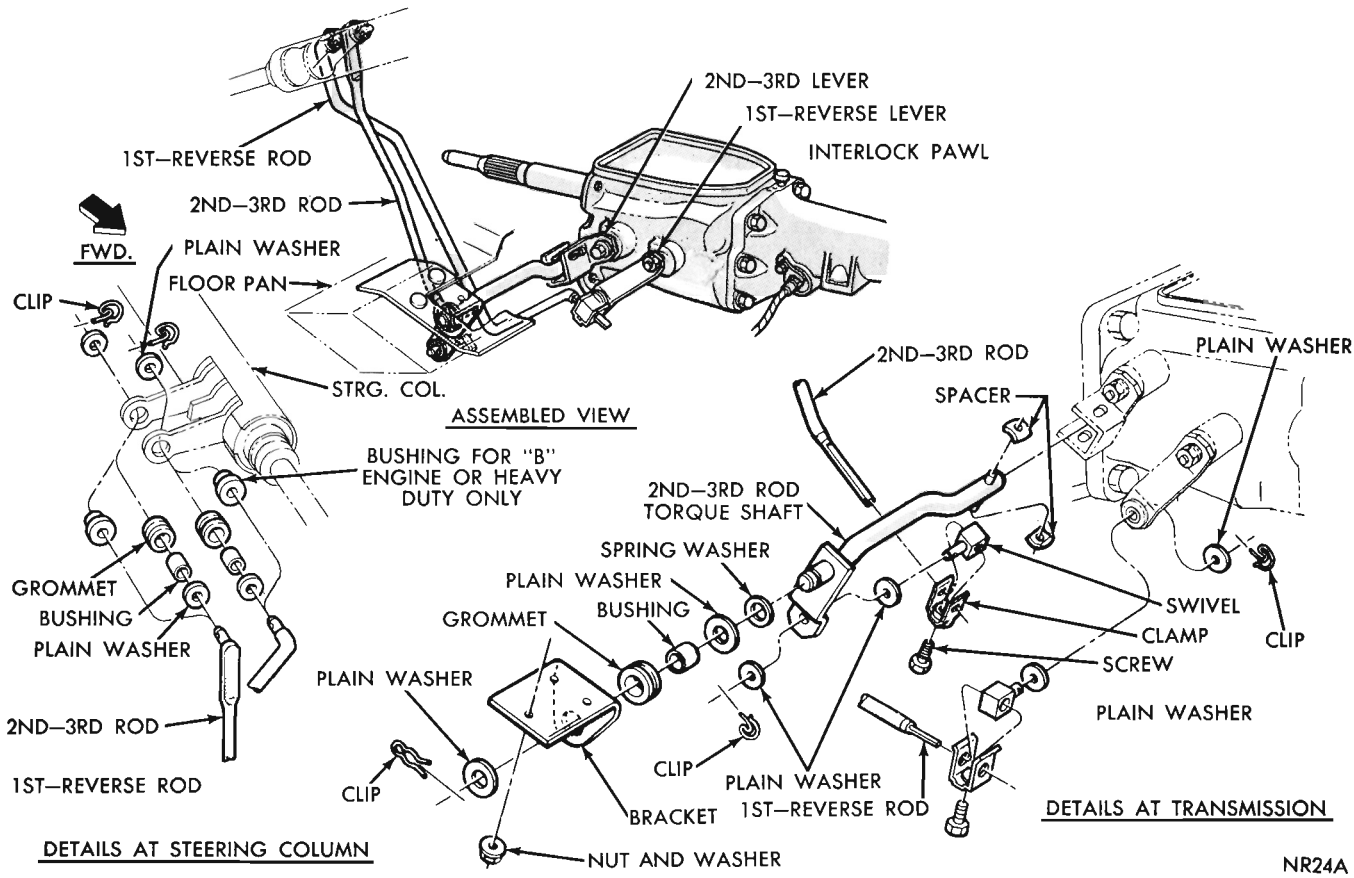


Fig. 45 - Column Gearshift Linkage (Fury)

dure in "Body" Book.

(4) Remove retaining screws from floor pan boot and retainer and slide up and off shift lever.

(5) Remove shift lever attaching screws and remove lever.

(6) Remove retaining clips, washers and shift rods from shift mechanism levers under floor pan.

(7) Remove bolts securing shift mechanism to transmission extension housing mounting plate and remove the unit.

Installation and Adjustment (Figs. 49, 50 or 51)

(1) Position shift mechanism on transmission extension housing mounting plate and secure with the three mounting bolts. (If equipped with lower boot, place boot on mechanism first and insert long mounting bolt through unit and boot before attaching to mounting plate).

(2) Fabricate a lever alignment tool from 1/16 inch thick sheet metal to dimensions shown in figures 49, 50 or 51.

(3) Insert lever alignment tool into slots in levers and mechanism frame to hold levers in nuetral crossover position.

(4) Place transmission levers in neutral (middle detent) position and adjust shift rod swivels so rods will install freely to levers.

(5) Secure rods with proper washers and clips and remove alignment tool. (If so equipped, work flange portion of lower boot up above floor pan opening).

(6) Attach shift lever to mechanism with three mounting screws, grommets and spacers.

(7) Slide boot and retainer over shift lever and fasten to floor with four screws each.

(8) To install console, if so equipped, see procedure in "Body" Book.

(9) Install shift knob and its lock nut on shift lever.

(10) Reconnect battery ground cable and test shifting action for smoothness.

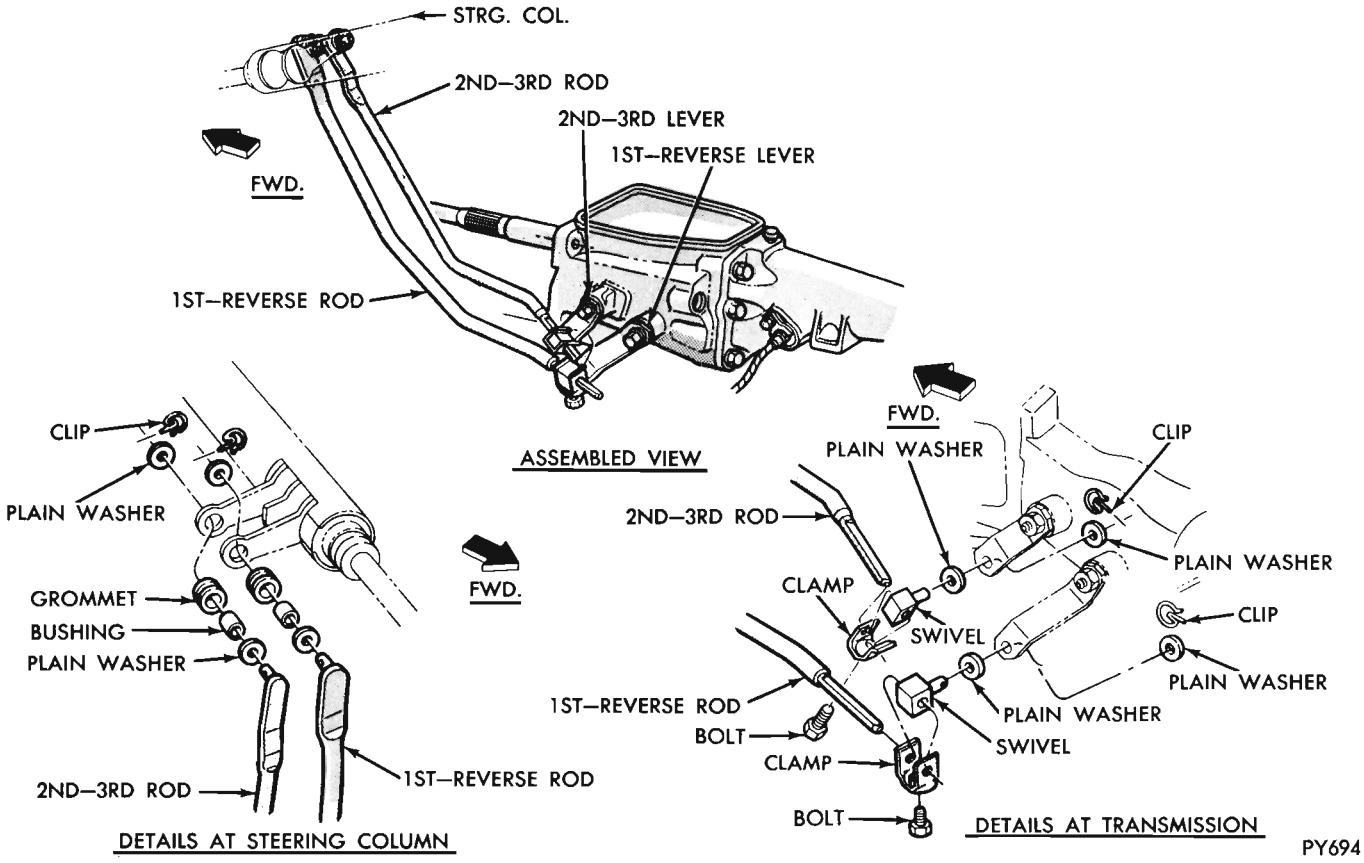


Fig. 46 - Column Shift (A-230) (Valiant)

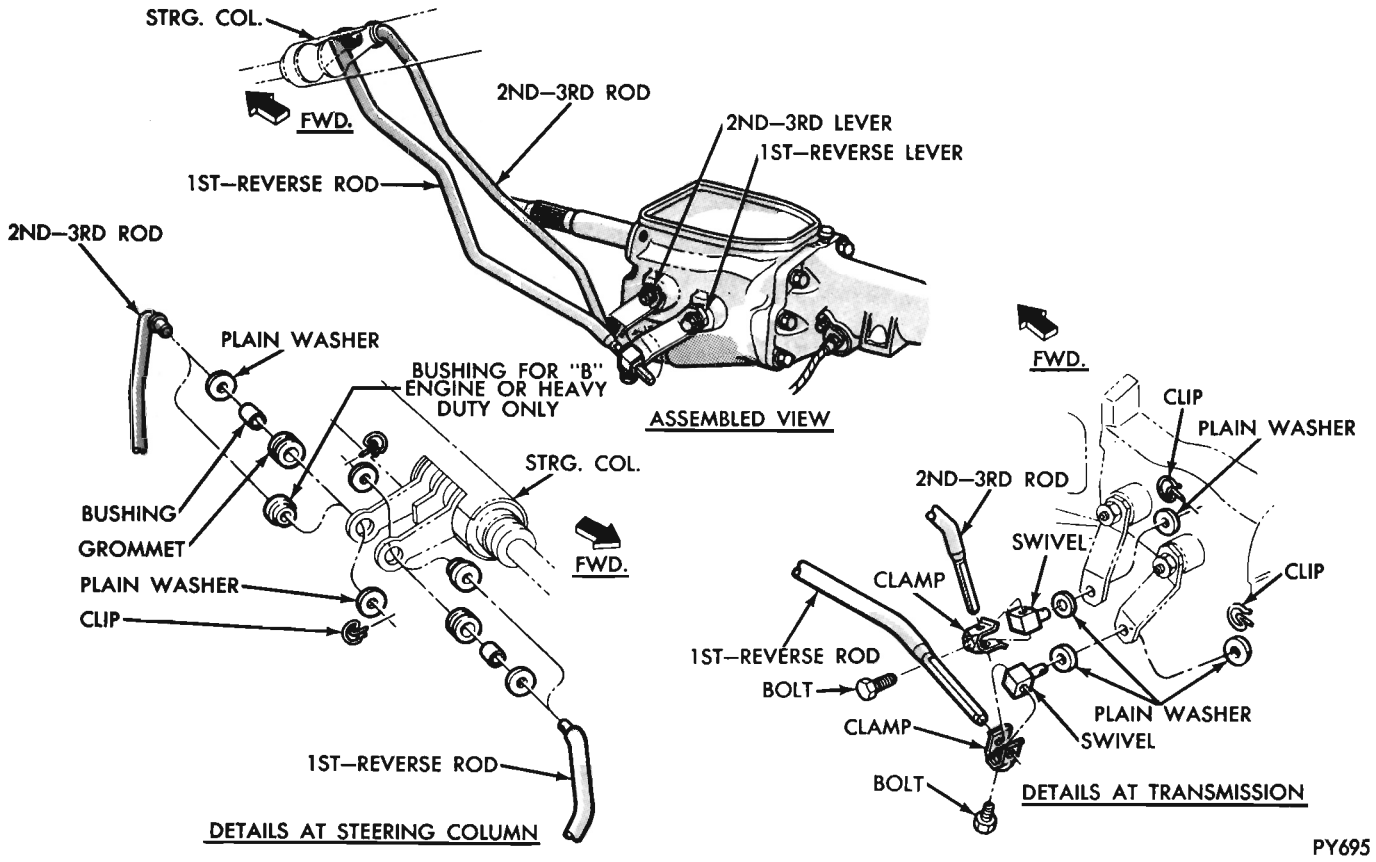


Fig. 47 - Column Shift (A-230) (Satellite)

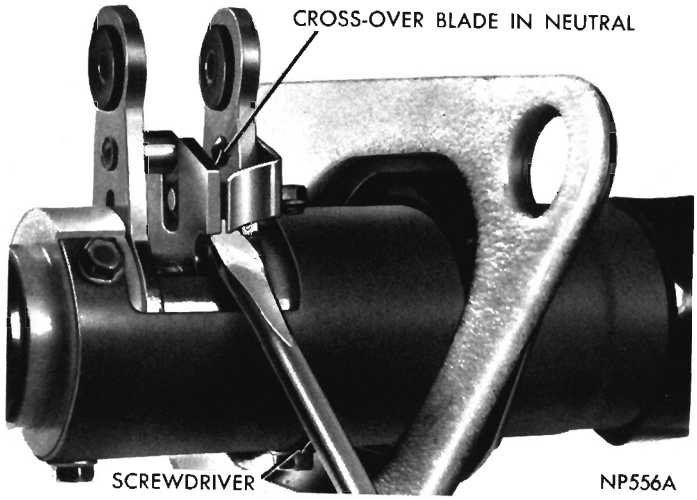


Fig. 48 - Holding Crossover Blade in Neutral Position

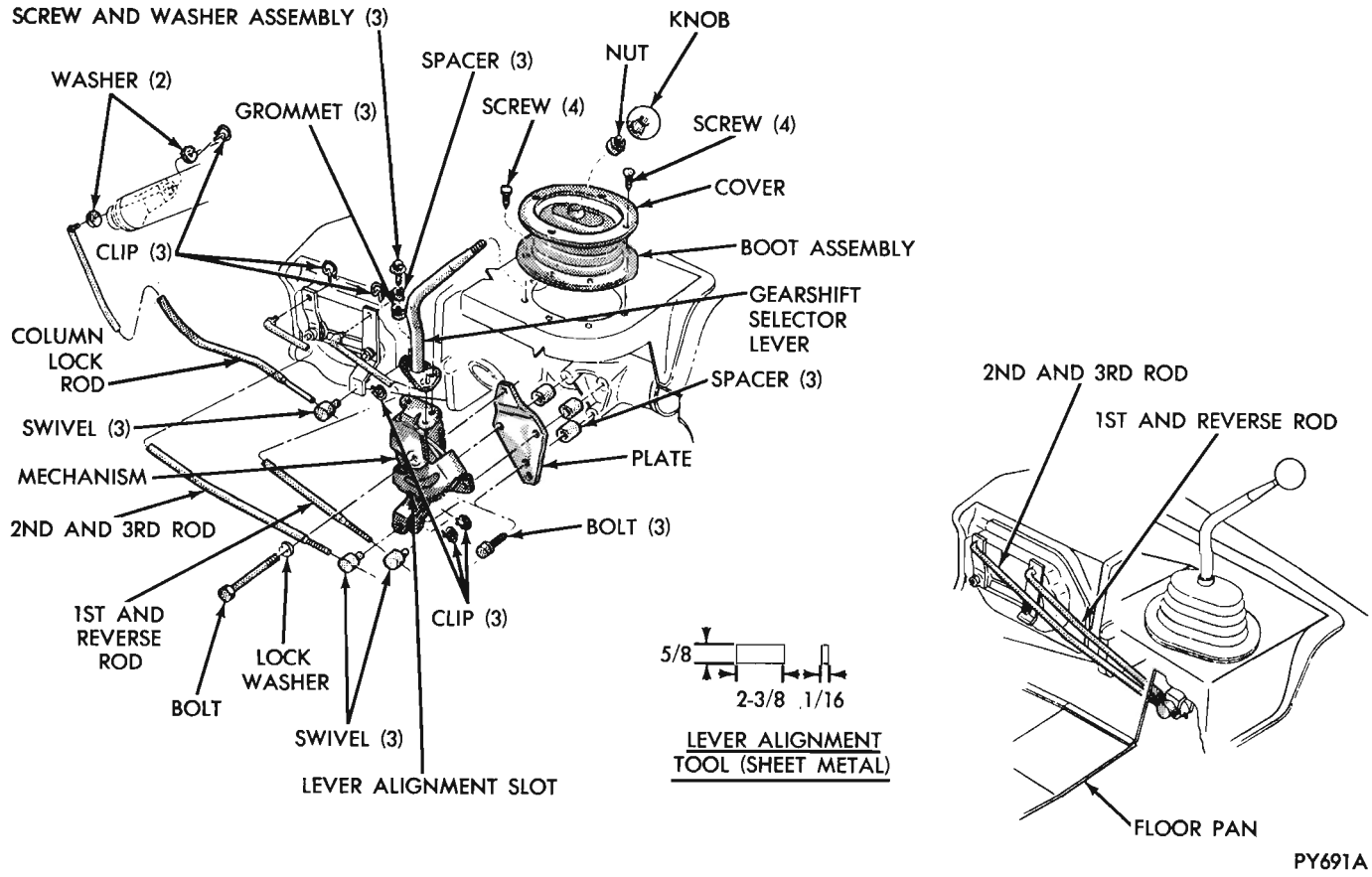


Fig. 49 - Floor Shift - 3 Speed (Valiant)

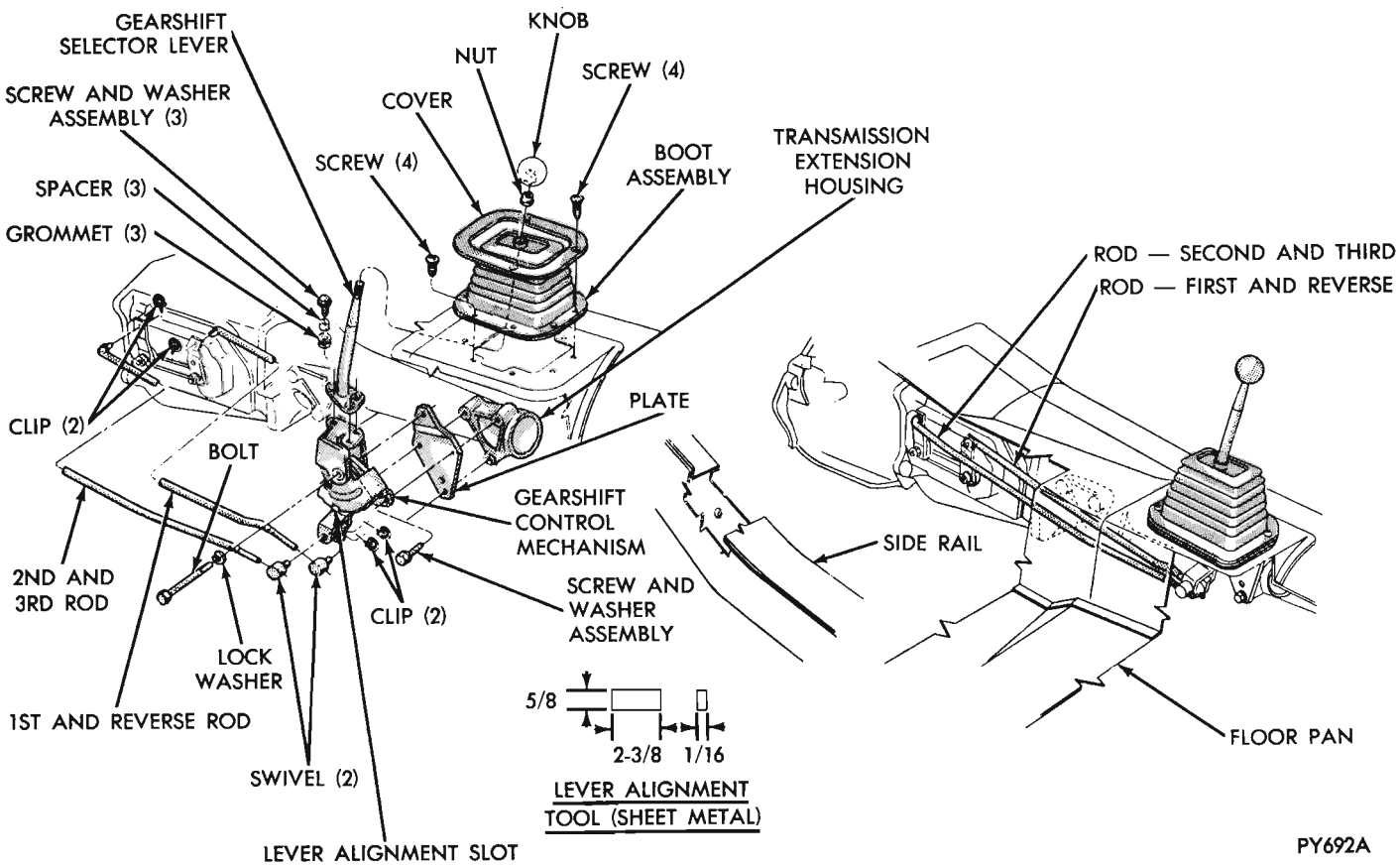


Fig. 50 - Floor Shift - 3 Speed (Barracuda)

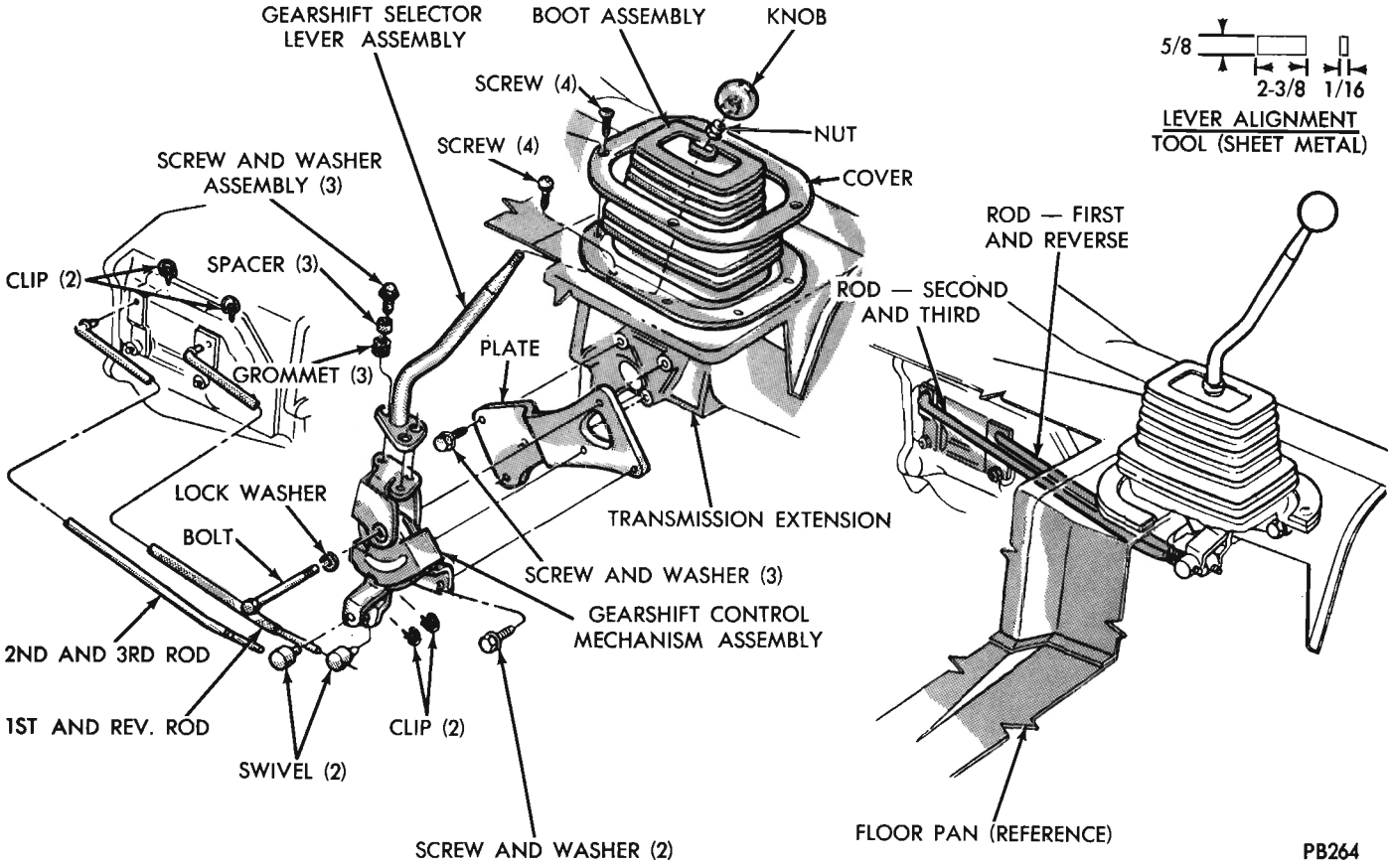


Fig. 51 - Floor Shift - 3 Speed (Satellite)

MANUAL TRANSMISSION—FOUR SPEED (A-833)

INDEX

	Page
Cleaning and Inspection	32
General Information	20
Service Diagnosis	21
Service In Vehicle	22
Extension Housing Yoke Seal	24
Four Speed Gearshift	22
Gearshift Linkage Adjustment	22
Speedometer Pinion Gear	22
Service Out of Vehicle	25
Assembling Transmission	32
Disassembling Transmission	27
Extension Housing Bushing Replacement	33
Transmission Installation	36
Transmission Removal	25
Specifications	133
Tightening Reference	136

GENERAL INFORMATION

The A-833 four speed transmission (Fig. 1) is available as special equipment for many models.

A pad has been provided (Fig. 2) on right side of transmission for identification numbers.

SAMPLE NUMBER: PP 833 1861 0250.

The first two letters identify the manufacturing plant. The next three numbers are the transmission model number. The following four numbers are a date of manufacture code. The last four numbers are a sequence number.

The main drive pinion and input shaft is supported by a ball bearing in the transmission case and an olite bushing pressed in the end of the crankshaft.

The mainshaft front end is supported by roller bearings in the end of the main drive pinion and a ball bearing in the front of the extension housing. The output end of the mainshaft is splined to the sliding universal joint yoke, which is supported by a bushing in the extension housing.

The countershaft gear is supported by a double

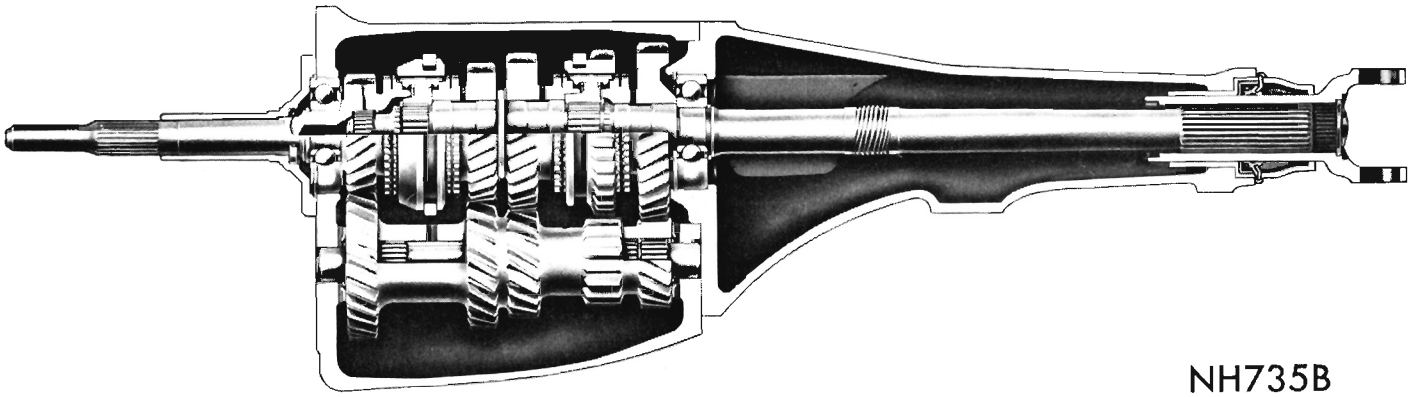


Fig. 1 - A-833 Four Speed Transmission

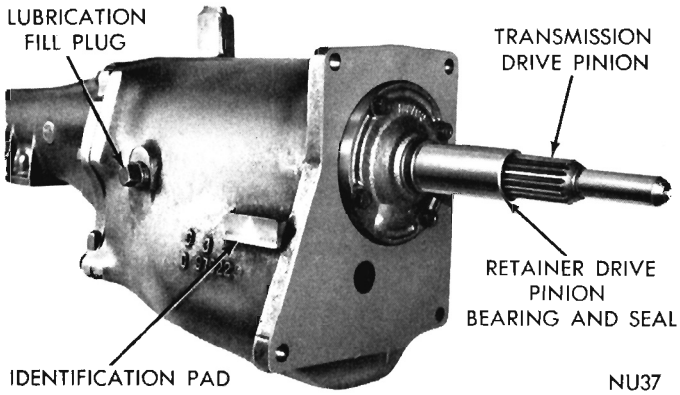


Fig. 2 - Four Speed Transmission Identification Pad

row of needle type roller bearings at each end and the thrust is taken on thrust washers between the ends of the gear and the transmission case. The alignment of the needle type roller bearings within the gear is maintained by a tubular spacer in the center and four thrust washers (one being used between the rows of roller bearings and one at each end).

The reverse idler gear is supported on a bronze bushing, pressed into the gear.

The gearshifting is manually operated through shift control rods to the transmission. Any forward gear may be engaged while the vehicle is in motion through the use of synchronizing clutches.

The transmission may be used as an aid to deceleration by downshifting in sequence without double clutching or gear clashing, due to the fact that all forward speeds are synchronized. The service procedures covering the four-speed transmission used on all vehicles so equipped is identical to the following service procedures except where noted.

IMPORTANT: Some internal transmission parts are different from standard on vehicles with high performance engines. These "special" parts are listed in applicable Parts Catalog; therefore, be sure they are used when replacement is necessary.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARD SHIFTING	(a) Incorrect clutch adjustment.	(a) Refer to Clutch Group for corrections.
	(b) Improper cross-over adjustment.	(b) Perform cross-over adjustment as outlined in "Gearshift Linkage Adjustments."
	(c) Synchronizer clutch sleeve damaged	(c- d-e) Causes noted can only be corrected by disassembling transmission and replacing damaged or worn parts.
	(d) Synchronizer spring improperly installed.	
	(e) Broken or worn synchronizer stop rings.	
TRANSMISSION SLIPS OUT OF GEAR	(a) Linkage interference.	(a) Inspect and remove all linkage interferences.
	(b) Gearshift rods out of adjustment.	(b) Adjust gearshift rods as outlined in "Gearshift Linkage Adjustments."
	(c) Second or direct speed gear synchronizer clutch teeth worn.	(c) Diassemble transmission and replace parts as necessary.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(d) Clutch housing bore or face out of alignment.	(d) Refer to Clutch Group for correction procedures.
TRANSMISSION NOISES	(a) Excessive end play in countershaft gear.	(a) Replace thrust washers.
	(b) Loose synchronizer hub spline fit on mainshaft.	(b) Inspect mainshaft and synchronizer hub and replace parts as necessary.
	(c) Damaged, broken or excessively worn gear teeth.	(c) Replace worn gears.
	(d) Rough or pitted bearing races or balls.	(d) Replace worn bearing.

SERVICE PROCEDURES

SERVICE IN VEHICLE

FOUR SPEED GEARSHIFT

Removal (Figs. 3, 4, 5 and 6)

(1) Disconnect negative (ground) cable from battery.

(2) Remove console and wiring if so equipped. (See Body Book).

(3) Remove retaining screws from floor pan boot and slide up and off shift lever.

(4) Remove attaching bolts and shift lever from shift control mechanism.

(5) Remove retaining clips, washers and control rods from shift unit levers.

(6) Remove two bolts and washers which secure shift unit to mounting plate on extension housing and remove unit.

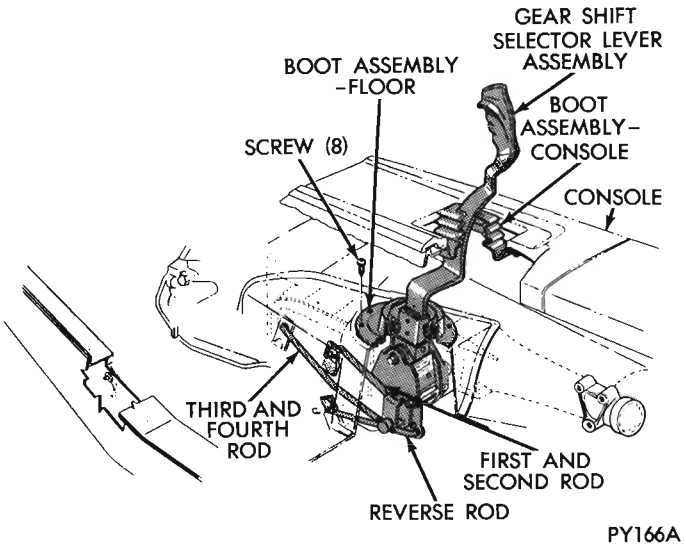


Fig. 3 - Gearshift Mechanism - Assembled (Satellite)

Installation (Figs. 3, 4, 5 and 6)

(1) Fasten unit to extension housing mounting plate with two bolts and lock washers and tighten to 30 foot-pounds.

(2) Install shift rods, washers and clips.

(3) See next paragraph for adjustment procedure.

(4) Fasten shift lever to shift mechanism with two bolts.

(5) Slide boot down over lever and fasten to floor pan.

(6) Install console and connect wiring if so equipped (See Body Book). Reconnect battery cable.

GEARSHIFT LINKAGE ADJUSTMENT

(1) Install floor shift lever aligning Tool C-3951 (Fig. 7) to hold the levers in neutral-crossover position.

(2) With all rods removed from transmission shift levers, place levers in neutral detent positions.

(3) Rotate threaded shift rods to make length exactly right to enter transmission levers. Start with 1-2 shift rod (it may be necessary to pull clip at shifter end to rotate this rod).

(4) Replace washers and clips.

(5) Remove aligning tool and test shifting action.

SPEEDOMETER PINION GEAR

Removal and Installation

Rear axle gear ratio and tire size determines pinion gear size requirements. Refer to "Speedometer Pinion Gear Chart" in Specifications for pinion usage.

(1) Place drain pan under adapter.

(2) Remove bolt and retainer securing speedometer pinion adapter to extension housing (Fig. 8).

(3) With cable housing connected, carefully work adapter and pinion out of extension housing.

(4) If transmission fluid is found in cable

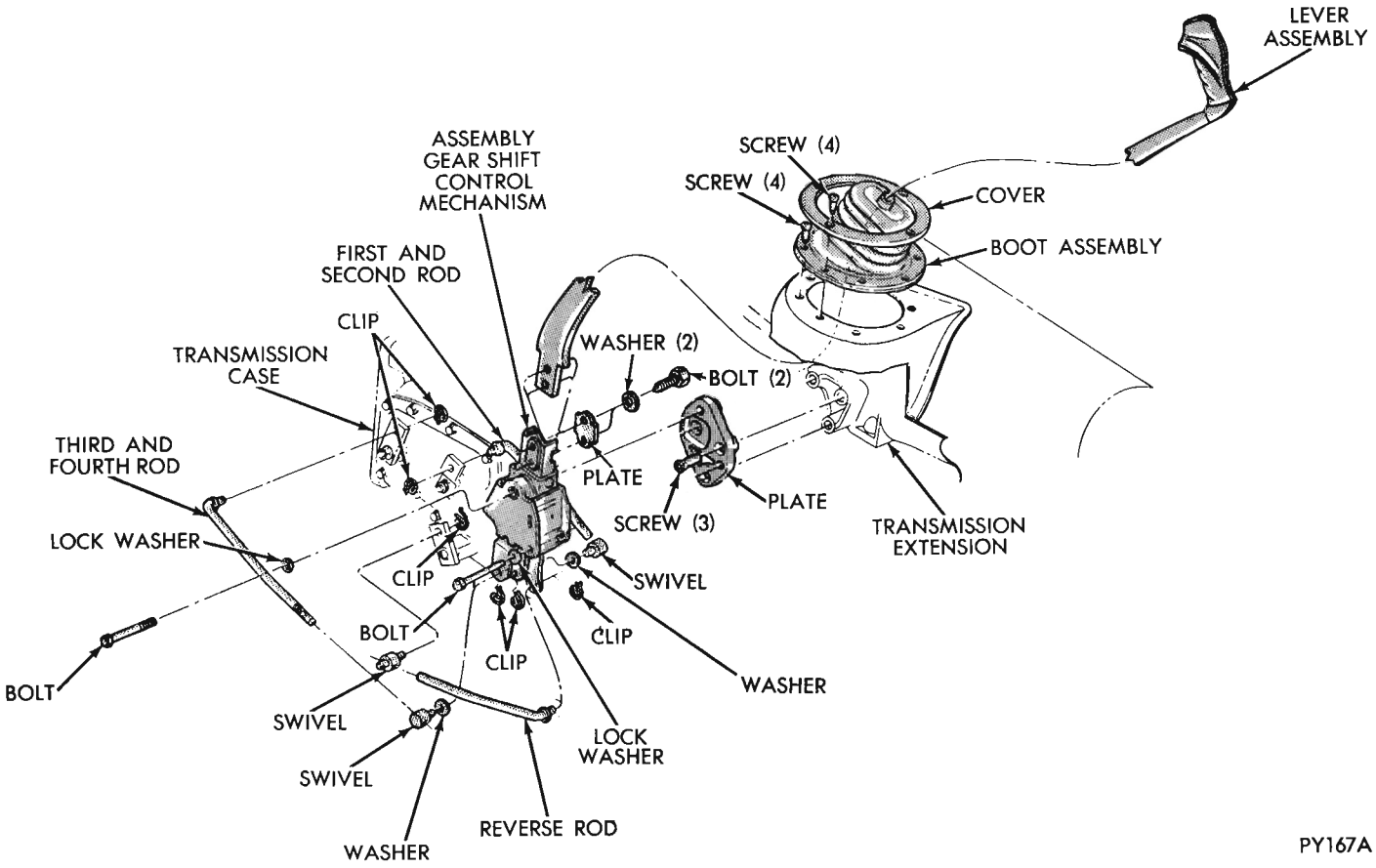


Fig. 4 - Gearshift Mechanism - Disassembled (Satellite) (Typical for Valiant)

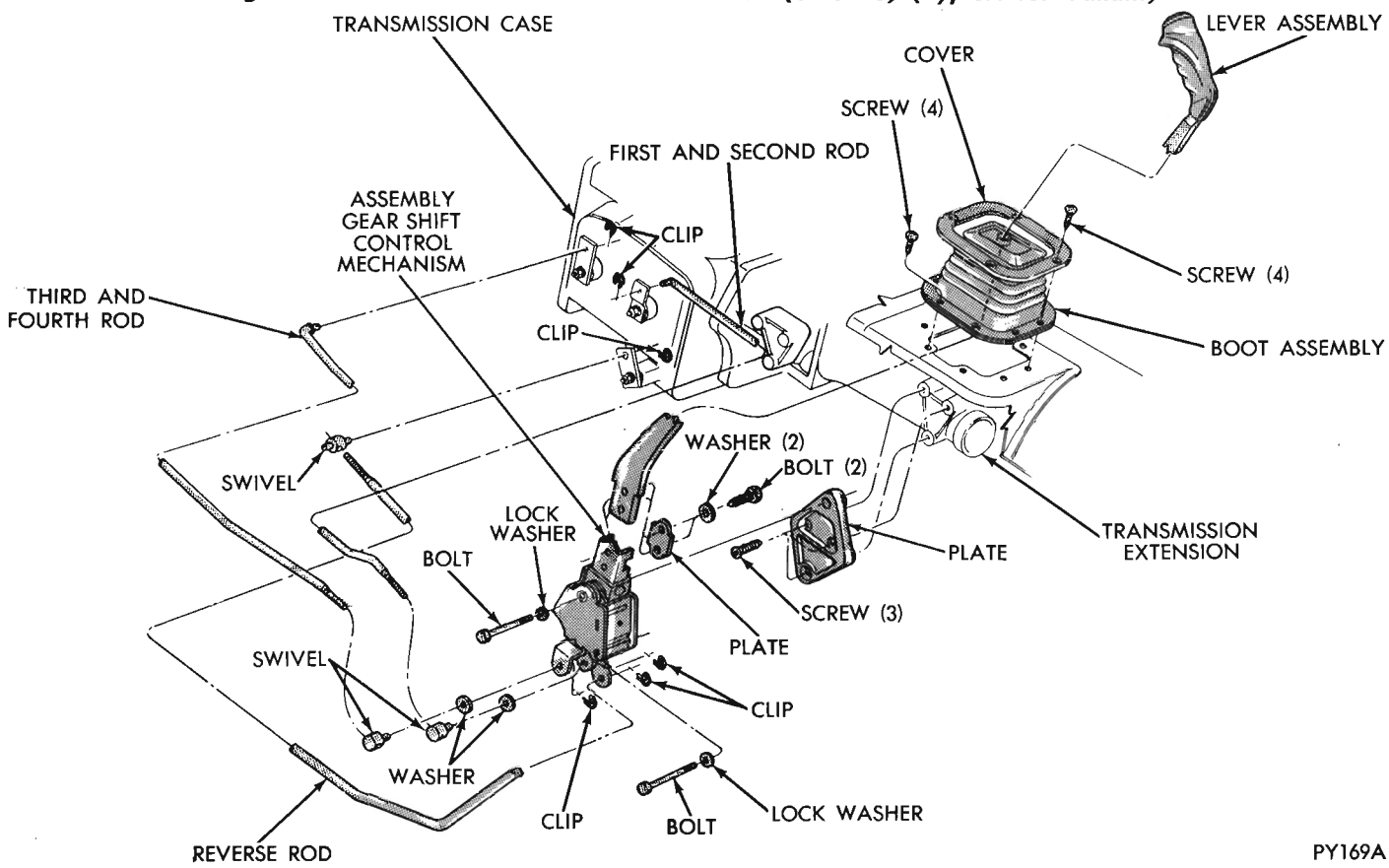


Fig. 5 - Gearshift Mechanism - Disassembled (Barracuda)

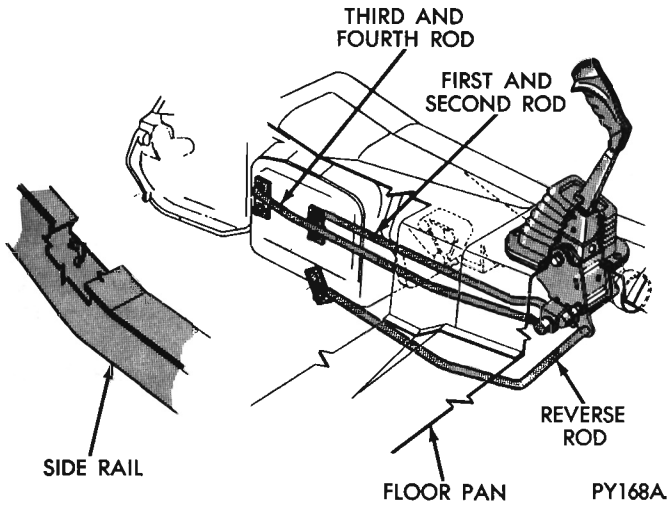


Fig. 6 - Gearshift Mechanism - Assembled (Barracuda)

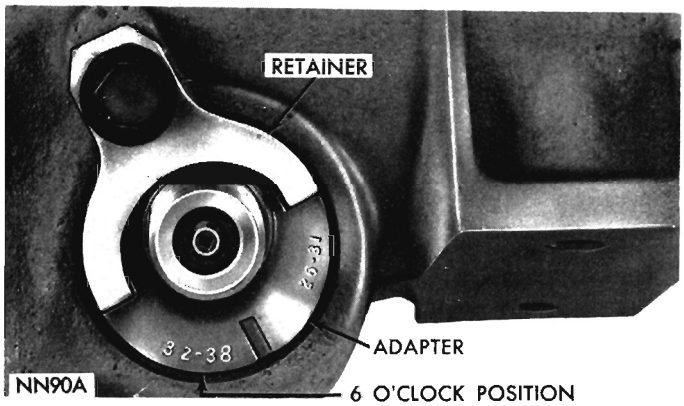


Fig. 8 - Speedometer Pinion and Adapter - Installed.

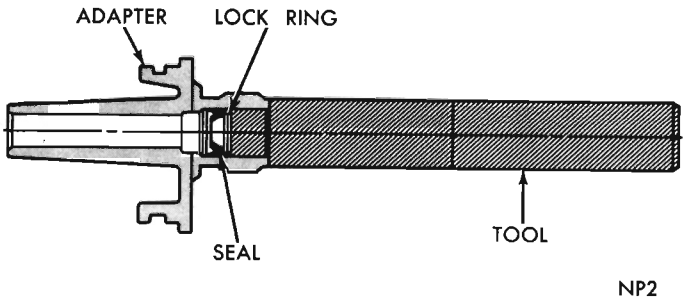


Fig. 10 - Installing Speedometer Pinion Seal

housing, replace seal in the adapter (Fig. 9). Start seal and retainer ring in adapter, then push them into adapter with Tool C-4004 until tool bottoms (Fig. 10).

(5) Note number of gear teeth and install speedometer pinion gear into adapter (Fig. 9).

CAUTION: Before installing pinion and adapter assembly, make sure adapter flange and its mating area on extension housing are perfectly clean. Dirt or sand will cause mis-alignment resulting in speedometer pinion gear damage.

(6) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed (Fig. 8).

(7) Install retainer and bolt, with retainer tangs in adapter positioning slots. Tap adapter firmly into extension housing and tighten retainer bolt to 100 inch-pounds.

(8) Fill transmission to level of fill plug (Refer to Lubrication Group "O").

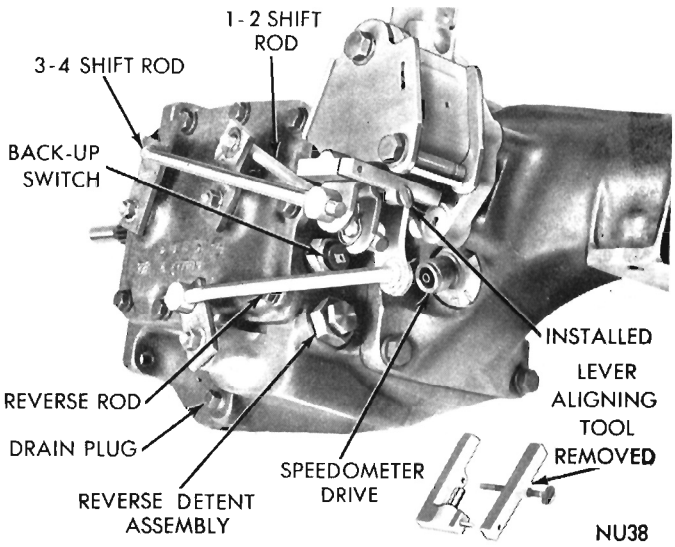


Fig. 7 - Gearshift Linkage Adjustment

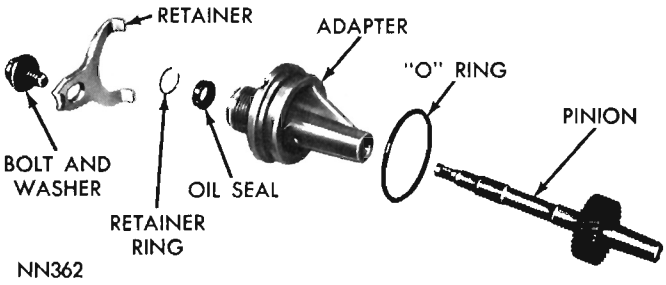


Fig. 9 - Speedometer Pinion and Adapter - Disassembled

EXTENSION HOUSING YOKE SEAL

Replacement

(1) Place drain pan under yoke seal.

(2) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmis-

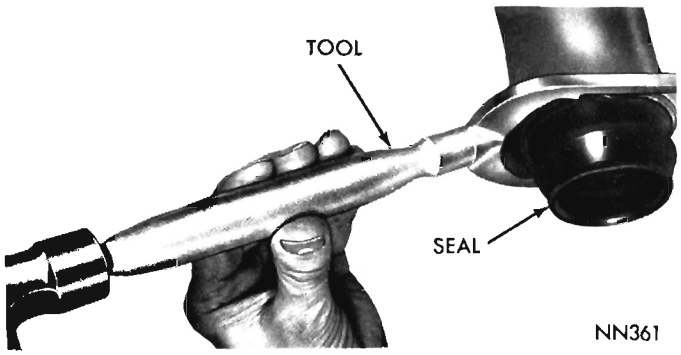


Fig. 11 - Removing Extension Housing Yoke Seal

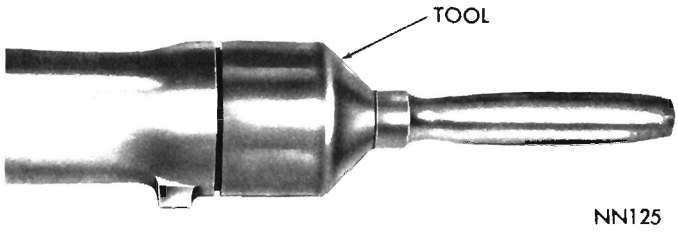


Fig. 12 - Installing Extension Housing Yoke Seal

sion extension housing.

CAUTION Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(3) Remove extension housing yoke seal (Fig. 11) with Tool C-3985.

(4) To install a new seal, position seal in opening of extension housing and drive it into housing with Tool C-3972 (Fig. 12).

(5) Carefully guide front universal joint yoke into extension housing and on the mainshaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

(6) Fill transmission to level of fill plug. (Refer to Lubrication Group "O").

SERVICE OUT OF VEHICLE

TRANSMISSION REMOVAL

(1) Remove console and 4-speed gearshift components, refer to "Four Speed Gearshift."

(2) Drain fluid from transmission.

(3) Disconnect propeller shaft at rear universal joint marking parts to reinstall in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(4) Disconnect speedometer cable and back-up light switch leads.

(5) Some models have exhaust systems which

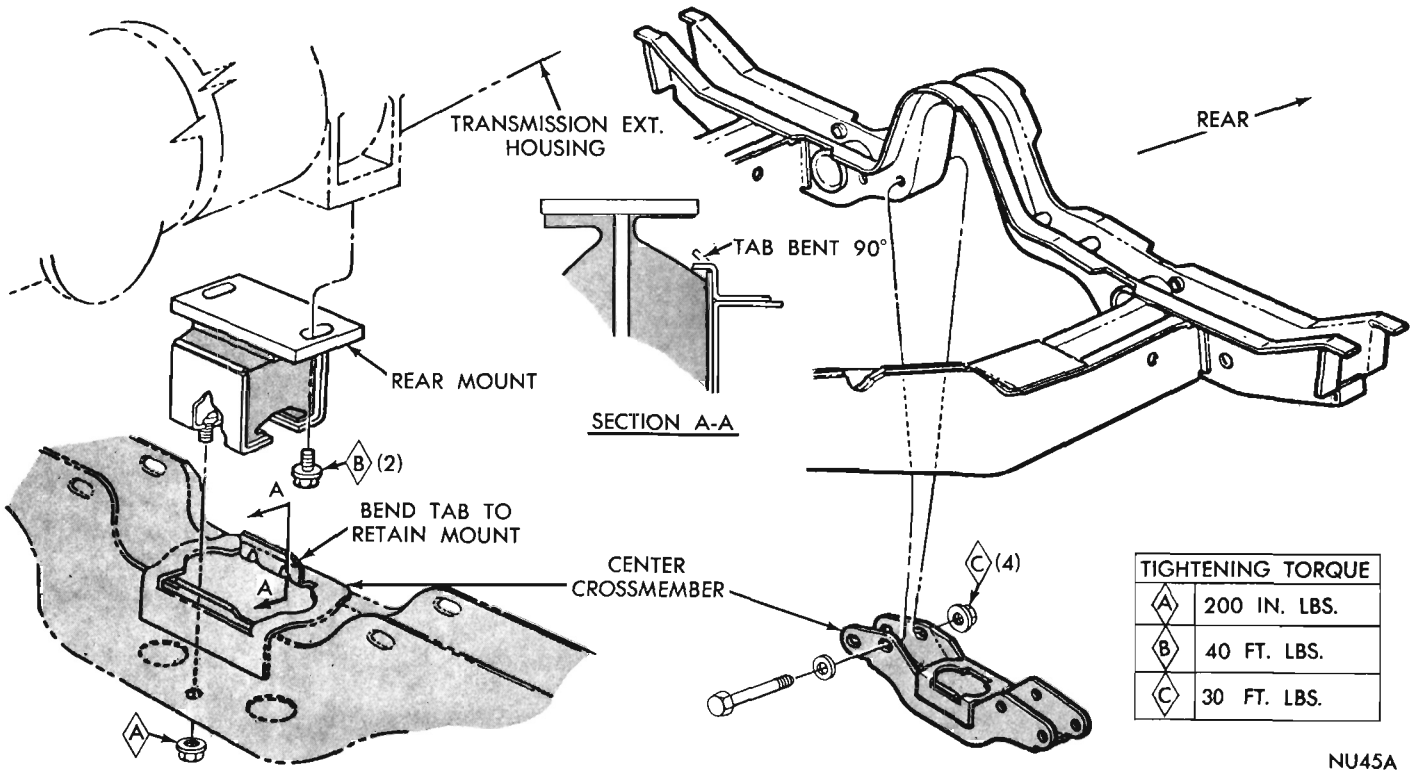


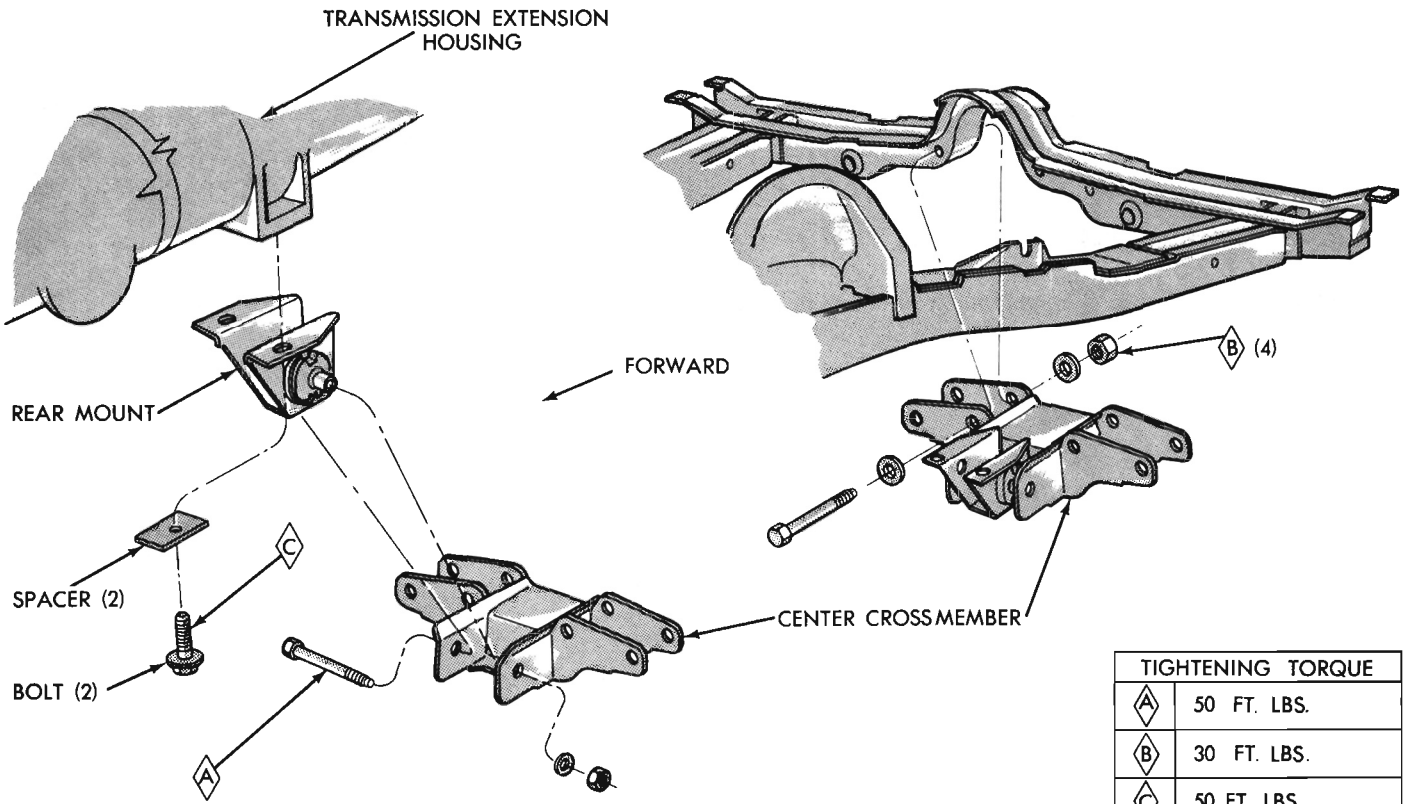
Fig. 13 - Center Crossmember and Rear Engine Mount (Valiant)

will have to be partially removed for clearance. See Exhaust Systems, Group 11.

(6) Install engine support fixture C-3487A, engaging the hooks in the holes in frame side member. Be sure support ends are up against underside of oil pan flange.

(7) Raise engine slightly with support fixture. Disconnect extension housing from removable center crossmember (Figs. 13 or 14).

(8) Support transmission with a suitable jack and



TIGHTENING TORQUE	
(A)	50 FT. LBS.
(B)	30 FT. LBS.
(C)	50 FT. LBS.

Fig. 14 - Center Crossmember and Rear Engine Mount (Barracuda and Satellite)

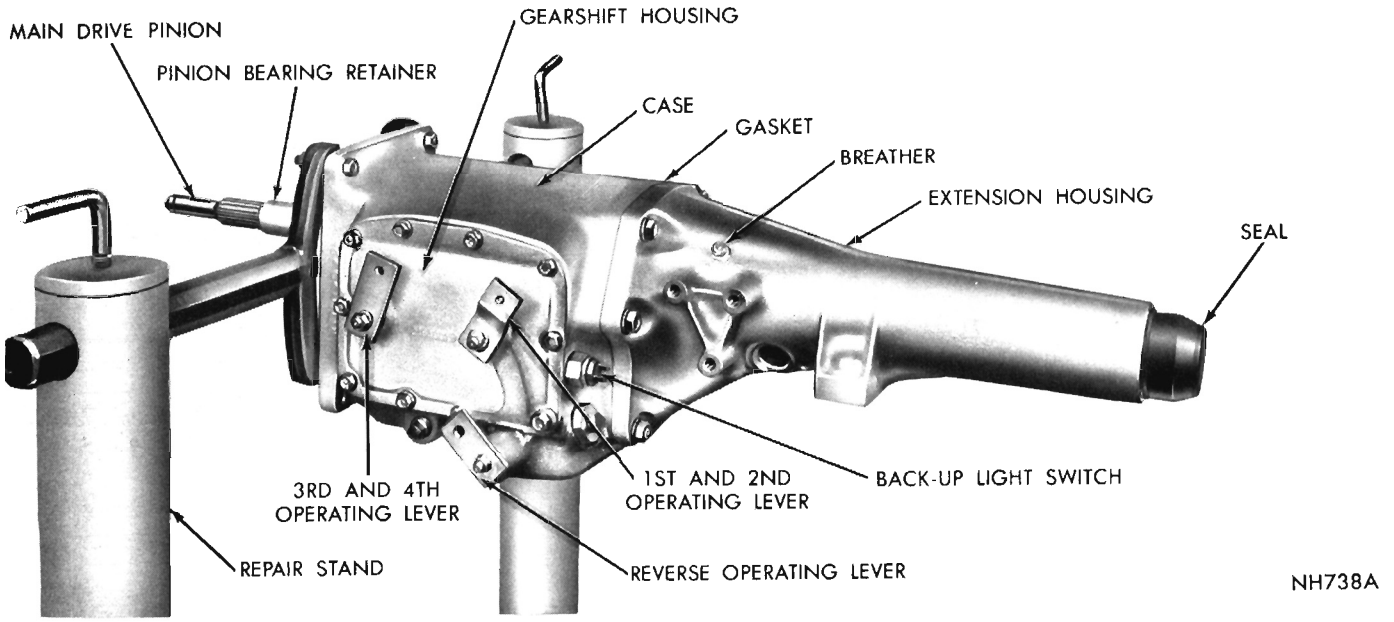


Fig. 15 - A-833 Transmission in Repair Stand

LEGEND FOR FIGURE 16

1. Bearing Retainer
2. Bearing Retainer Gasket
3. Bearing Retainer Oil Seal
4. Snap Ring, Bearing (Inner)
5. Snap Ring, Bearing (Outer)
6. Pinion Bearing
7. Transmission Case
8. Filler Plug
9. Gear, 2nd Speed
10. Stop Ring
11. Shift Strut Springs
12. Clutch Gear
13. Shift Struts (3)
14. Shift Strut Spring
15. Snap Ring
16. 1st and 2nd Clutch Sleeve Gear
17. Stop Ring
18. 1st Speed Gear
19. Bearing Retainer Ring
20. Rear Bearing
21. Snap Ring
24. Baffle
25. Gasket, Case to Extension Housing
26. Lockwasher
27. Bolt
28. Extension Housing
29. Mainshaft Yoke Bushing
30. Oil Seal
31. Main Drive Pinion
33. Needle Bearing Rollers
34. Snap Ring
35. Stop Ring
36. Snap Ring
37. Shift Strut Spring
38. Clutch Gear
39. Shift Strut Spring
40. Clutch Sleeve
41. Stop Ring
42. 3rd Speed Gear
43. Mainshaft (Output)
44. Shift Struts (3)
45. Woodruff Key
46. Countershaft
47. Thrustwasher, Gear (1)
48. Thrustwasher, Needle Roller Bearing
49. Needle Bearing Rollers
50. Bearing Spacer
51. Countershaft Gear (Cluster)
52. Needle Bearing Rollers
53. Thrustwasher, Needle Roller Bearing
54. Thrustwasher, Gear (1)
55. Backup Light Switch
56. Backup Light Switch Gasket
57. Plug
58. Retainer, Reverse Detent Ball Spring
59. Gasket
60. Spring, Reverse Detent Ball
61. Ball, Reverse Detent
62. Woodruff Key
63. Reverse Idler Gear Shaft
64. Bushing, Reverse Idler Gear
65. Gear, Reverse Idler
66. Fork, Reverse Shifter
67. Reverse Lever
68. Oil Seal, Reverse Lever Shaft
69. Reverse Operating Lever
70. Flatwasher
71. Lockwasher
72. Nut
73. Gearshift Control Housing
74. 1st and 2nd Operating Lever
75. Flatwasher
76. Lockwasher Lever
77. Nut, Lever
78. Lockwasher, Lever
79. Flatwasher, Lever
80. 3rd and 4th Operating Lever
81. Switch
82. Gasket
83. Interlock Lever (2)
84. "E" Ring
85. Spring
86. Oil Seal (2)
87. 3rd and 4th Lever
88. 1st and 2nd Lever
89. 3rd and 4th Speed Fork
90. 1st and 2nd Speed Fork
91. Drain Plug
92. Gasket, Shift Control Housing

remove center crossmember.

(9) Remove transmission to clutch housing bolts. Slide transmission toward rear until drive pinion shaft clears clutch disc, before lowering transmission.

(10) Lower transmission and remove from under vehicle. Thoroughly clean exterior of unit, preferably by steam. Mount transmission in repair stand (Fig. 15).

Gearshift Housing and Mechanism

(1) Remove reverse shift lever from shaft. Remove bolts that attach gearshift housing to transmission case (Fig. 17).

(2) With levers in neutral detent position, pull housing out and away from the case. (The first and second, third and fourth shift fork may remain in engagement with synchronizer sleeves.) Work forks out of sleeves and remove from the case. **The following three steps need only be done, if oil leakage is visible around gearshift lever shafts, or the interlock levers are cracked.**

(3) Remove nuts, lockwashers and flatwashers that attach first and second, third and fourth speed shift operating levers to the shafts. Disengage levers from flats on shafts and remove.

CAUTION: Make sure shafts are free of burrs before removal otherwise the bores may be scored resulting in leakage after reassembly.

(4) Pull gearshift lever shafts out of housing.

(5) Remove "E" Ring from interlock lever pivot pin and remove interlock levers and spring from housing.

Extension Housing and Mainshaft

(1) Remove bolt and retainer securing speedometer pinion adapter in extension housing (Fig. 8). Carefully work adapter and pinion out of extension housing.

(2) Remove bolts that attach extension housing to transmission case.

(3) Slide third and fourth synchronizer sleeve slightly forward, slide reverse idler gear to center of its shaft, then using a soft hammer, tap on extension housing (in a rearward direction). Slide housing and mainshaft assembly out and away from the case (Fig. 18).

(4) Refer to (Fig. 19) for location of various gears, synchronizer sleeves and clutches before disassembling mainshaft.

(5) Remove snap ring (Fig. 20), that retains 3rd and 4th synchronizer clutch gear and sleeve, slide 3rd and 4th synchronizer assembly off end of mainshaft.

(6) Slide 3rd speed gear and stop ring off mainshaft. (Do not separate 3rd and 4th speed synchronizer clutch gear, sleeve, shift struts or springs unless inspection reveals a replacement part is required).

(7) Using a long nose pliers, compress snap ring that retains mainshaft ball bearing in extension housing (Fig. 21).

(8) Holding snap ring compressed, pull mainshaft assembly and bearing out of extension housing (Fig. 22).

Heavy duty model (Fig. 23) has snap ring in outer race of bearing. Use snap ring pliers to expand and hold this ring while removing mainshaft and bearing from extension housing.

(9) Remove snap ring that retains mainshaft bearing on the shaft (Fig. 24).

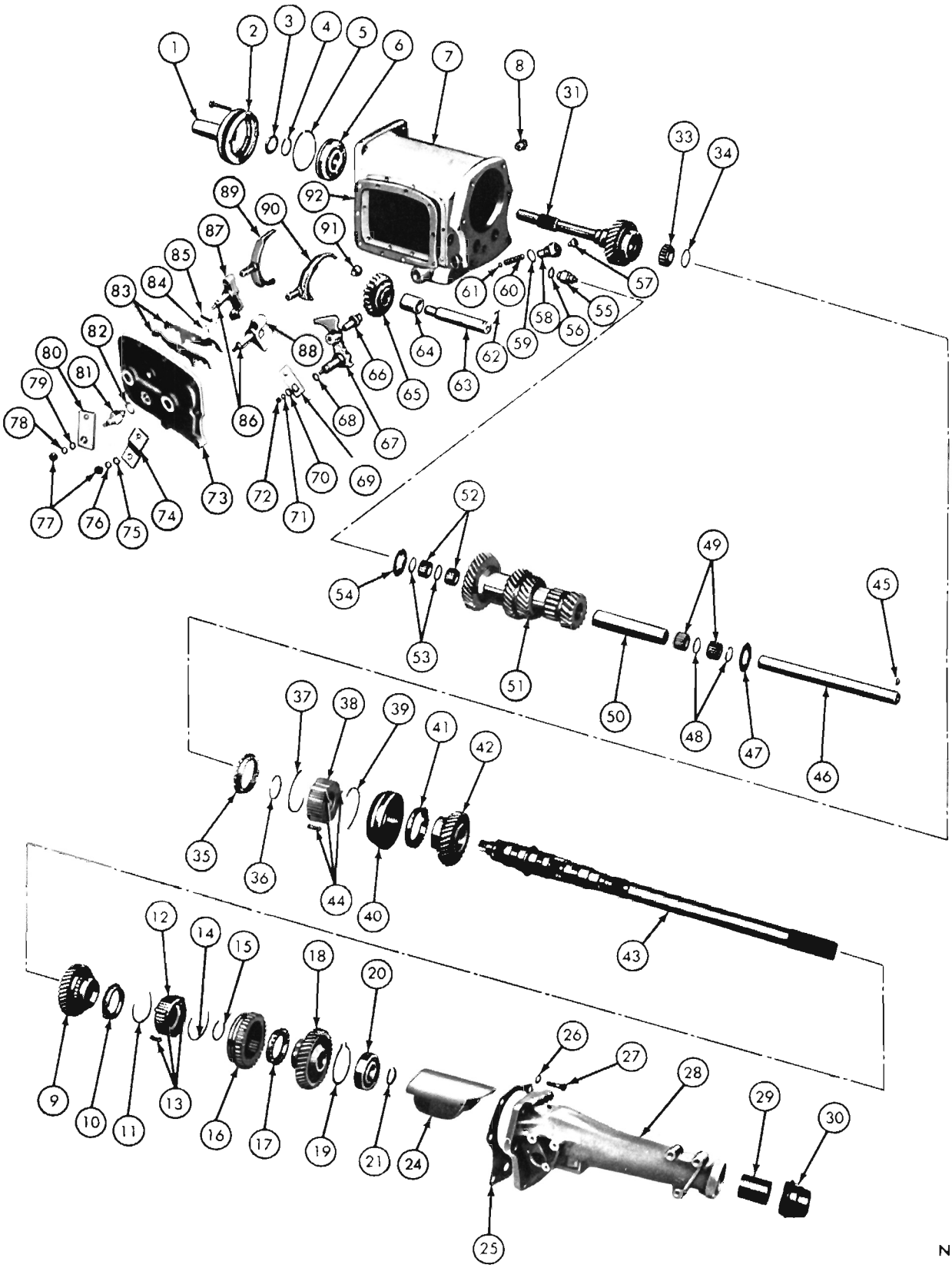


Fig. 16 - A-833 Transmission Disassembled

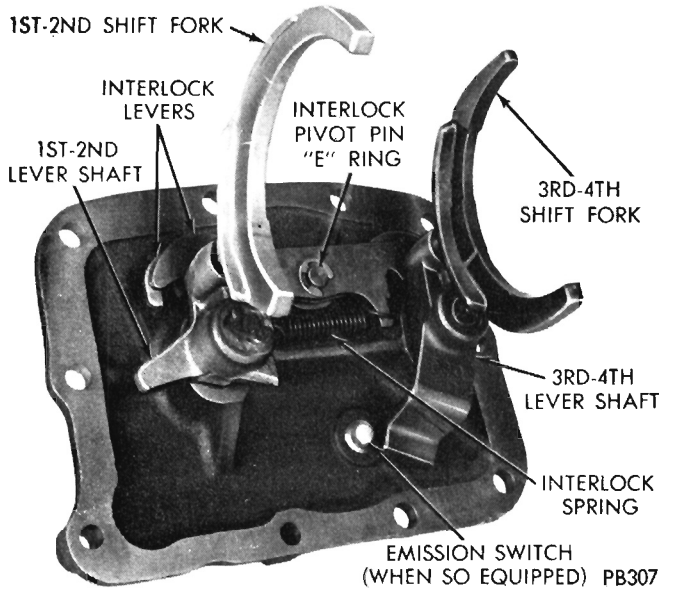


Fig. 17 - Shift Housing Assembly

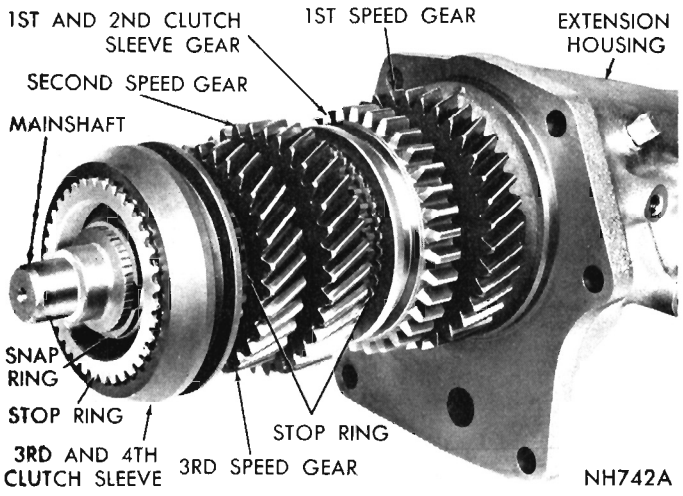


Fig. 19 - Mainshaft Gear Identification

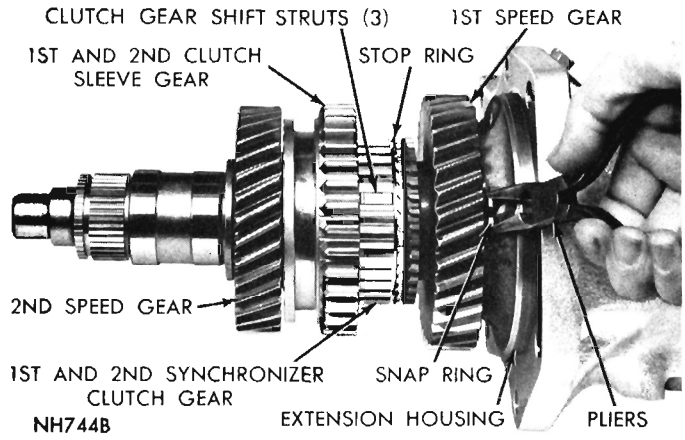


Fig. 21 - Removing or Installing Mainshaft Bearing Snap Ring - Front

Remove bearing from mainshaft by inserting steel plates on front side of 1st speed gear, then press

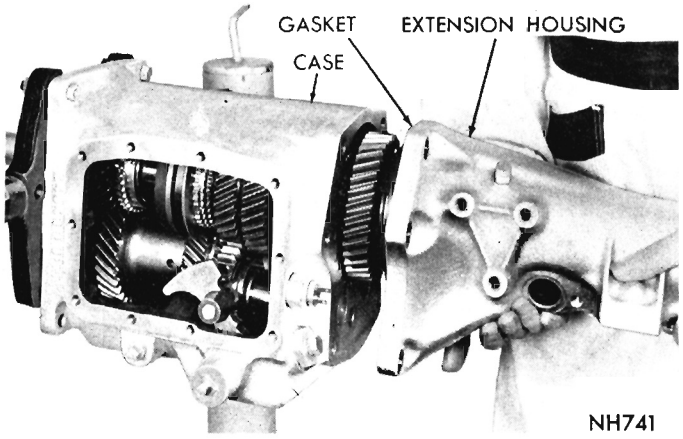


Fig. 18 - Removing or Installing Extension Housing and Mainshaft Assembly

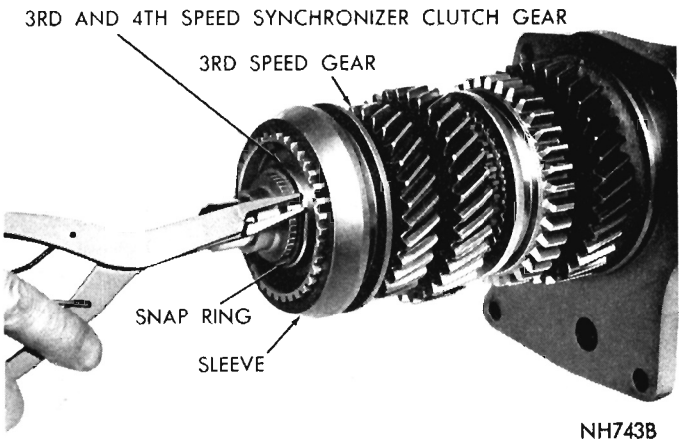


Fig. 20 - Disassembling Mainshaft

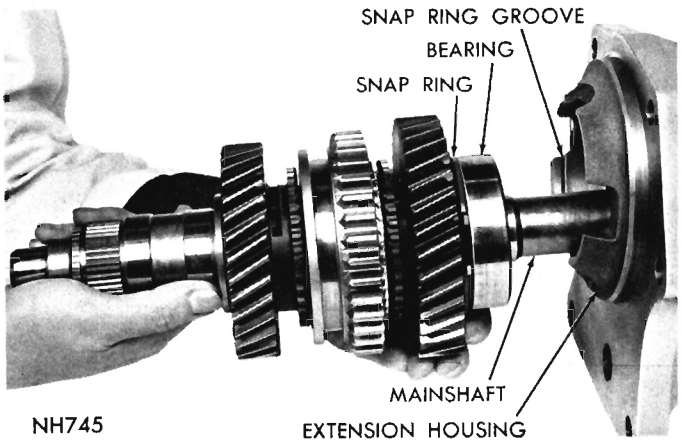


Fig. 22 - Removing or Installing Mainshaft

or drive mainshaft through bearing. (Be careful not to damage gear teeth.)

(10) Remove bearing, bearing retainer ring, 1st speed gear, and first speed stop ring from the shaft.

(11) Remove snap ring that retains 1st and 2nd clutch sleeve gear and clutch to mainshaft (Fig.

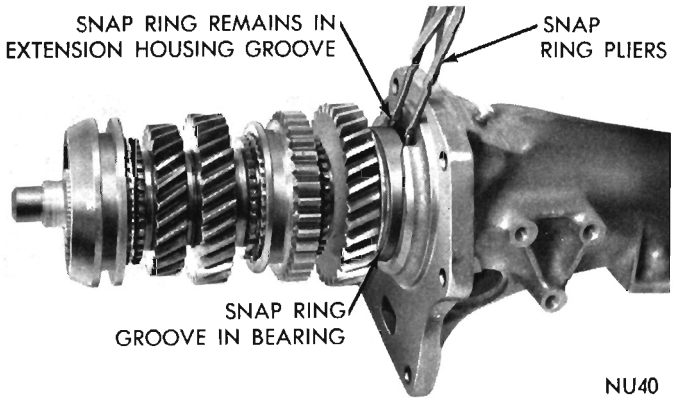


Fig. 23 - Removing or Installing Mainshaft (Heavy Duty Model)

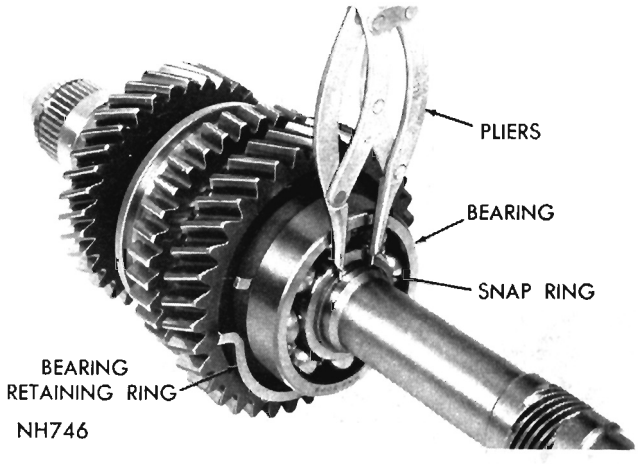


Fig. 24 - Removing or Installing Mainshaft Bearing Snap Ring - Rear

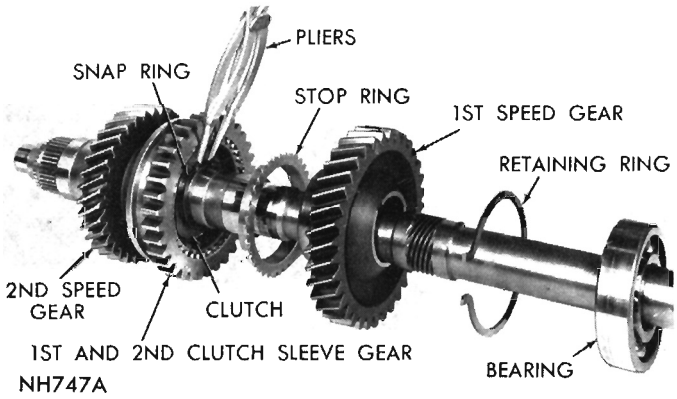


Fig. 25 - Removing or Installing Clutch Gear Snap Ring

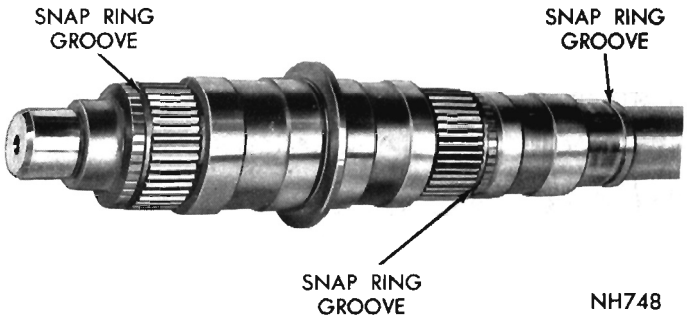


Fig. 26 - Mainshaft Bearing Surfaces

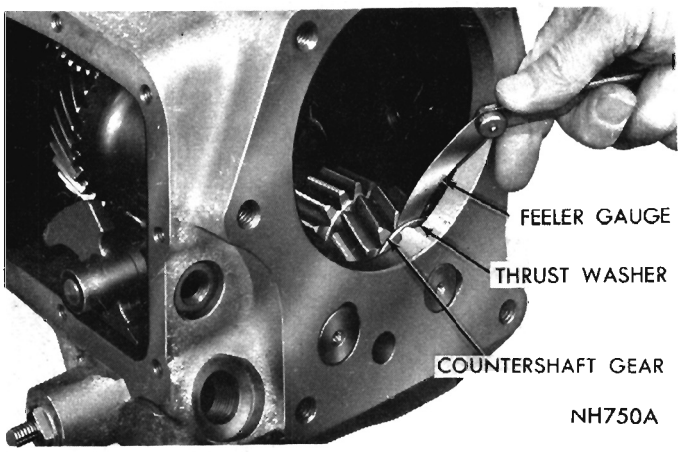


Fig. 27 - Measuring Countershaft Gear End Play

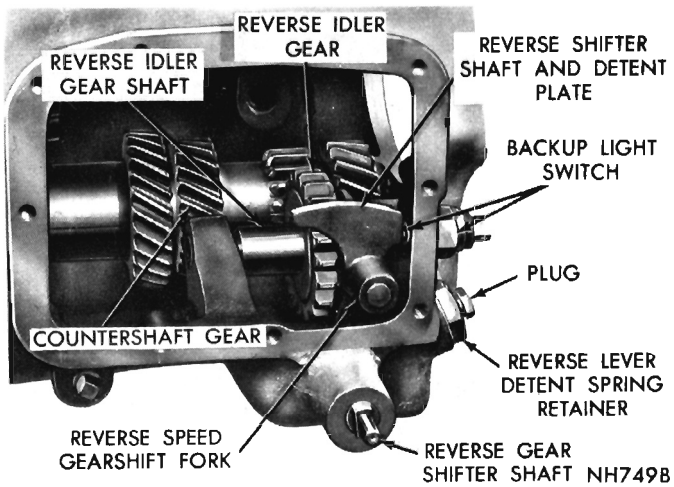


Fig. 28 - Gear, Shaft and Lever Identification

25).

(12) Slide 1st and 2nd clutch sleeve gear and clutch from mainshaft. (Do not separate clutch sleeve gear and clutch, unless inspection reveals a replacement part is required.) Remove 2nd speed gear.

(13) (Fig. 26) shows various mainshaft bearing surfaces for the gears. Inspect these surfaces for signs of wear, scoring, or any condition that would not allow shaft to be used at reassembly.

(14) Using a feeler gauge, measure end play of countershaft gear, by inserting gauge between thrust washer and gear (Fig. 27). This measurement should be .015 to .029 inch. If measurement is greater than that specified, new thrust washers must be installed at reassembly.

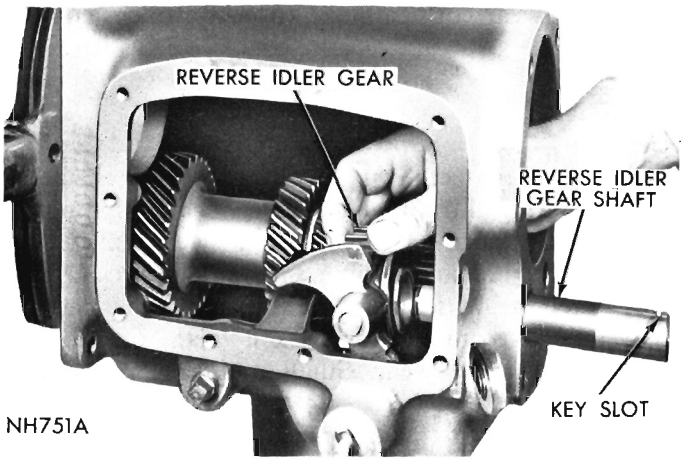


Fig. 29 - Removing or Installing Reverse Idler Gear

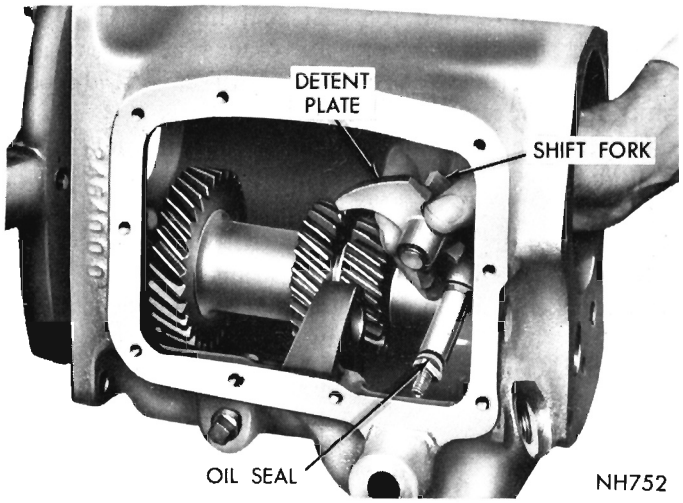


Fig. 31 - Removing or Installing Reverse Shift Fork and Lever

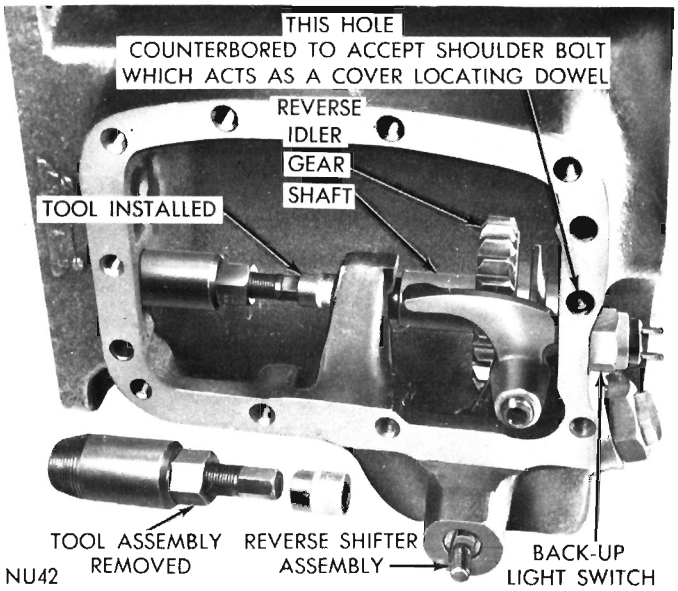


Fig. 30 - Removing Reverse Idler Gear Shaft (A-833)

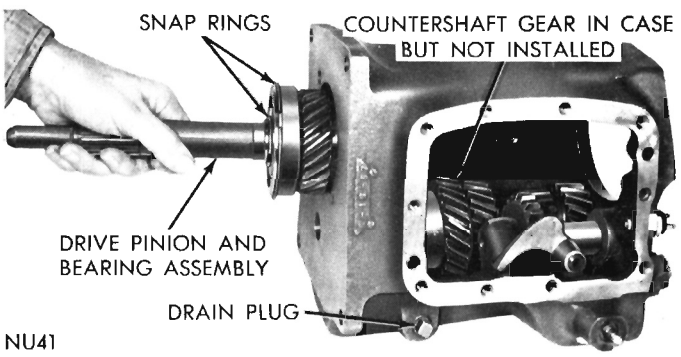


Fig. 32 - Removing or Installing Drive Pinion Assembly (Heavy Duty)

Reverse Gear, Lever and Fork

(1) Remove reverse gearshift lever detent spring retainer, gasket, plug and detent ball spring from rear of the case (Fig. 28).

(2) The reverse idler gear shaft is a very tight fit in the case (Fig. 29).

(3) To remove, place a 7/16 socket (1/4 or 3/8 inch drive) on end of C-3638 Power Steering "Worm Shaft Seal Remover" or C-3642 "Pump Shaft Seal Remover" (Fig. 30).

(4) Place tool in case with socket against end of shaft and other end of tool against the case. Turn screw counterclockwise to press shaft out of the case. Remove woodruff key from shaft. In some cases, a 7/16 deep socket and/or a 3 in. extension may be required to press shaft completely out of the case.

The following step need only be done if oil leakage is visible around reverse gearshift lever shaft.

(5) **Remove any burrs from shaft so as not to damage the case bore,** then carefully push reverse gearshift lever shaft inward and remove it from case (Fig. 31). Retrieve detent ball from bottom of case. Remove shift fork from shaft and detent plate.

Drive Pinion and Countershaft Gear

(1) Using countershaft arbor C-3938, and a plastic hammer, drive countershaft out of case, allowing countershaft gear to be lowered to bottom of case. **(This will permit removal of main drive pinion.)**

(2) Remove drive pinion bearing retainer attaching bolts, then slide retainer and gasket from pinion shaft (Fig. 2). Pry pinion oil seal from bearing retainer. To avoid leakage around the new seal, do not nick or scratch the bore in which the seal is pressed, or the surface on which seal bottoms.

(3) Remove snap ring from outer race of pinion bearing and, using a soft hammer, tap the pinion and bearing assembly into the case to remove it through rear of case. Heavy duty models have a

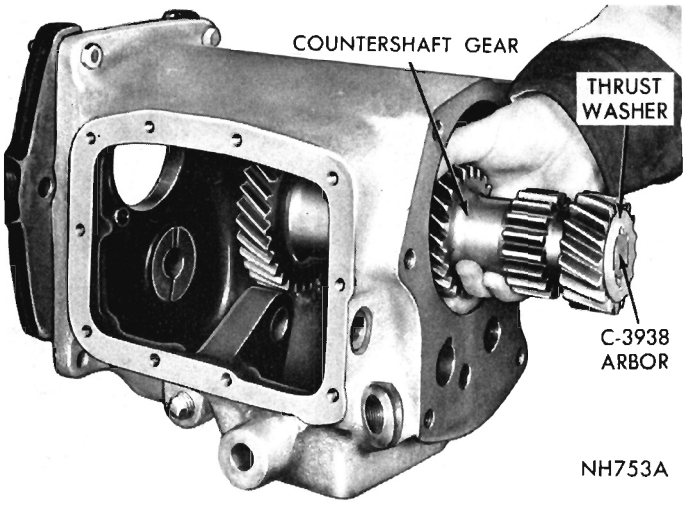


Fig. 33 - Removing or Installing Countershaft Gear and Arbor

bearing larger than the gear diameter and the assembly can be removed through front of case (Fig. 32).

(4) Remove pinion bearing inner snap ring. Using an arbor press, remove bearing from pinion.

(5) Remove snap ring and 16 bearing rollers from cavity in drive pinion.

(6) Remove countershaft gear from bottom of case (Fig. 33).

(7) Remove arbor and 76 needle type bearings, thrust washers and spacer, from center of countershaft gear.

CLEANING AND INSPECTION

Clean transmission case thoroughly, using a suitable solvent, dry with compressed air. Inspect case for cracks, stripped threads in various bolt holes and machined mating surfaces for burrs, nicks or any condition that would render the case unfit for further service. The front mating surface should be smooth; if any burrs are present, dress them off with a fine mill file. If threads are stripped, install Helicoil inserts.

Ball Bearings

Wash ball bearings, using a clean solvent and blow dry with compressed air.

CAUTION: Do not spin bearings with air pressure; turn slowly by hand. Spinning unlubricated bearings may cause damage to races and balls.

Be sure ball bearings are clean, then lubricate them with light grade engine oil. Inspect bearings for roughness. This can best be determined by slowly turning outer race by hand. Measure fit of bearings on their respective shafts.

Needle Type Bearing Rollers and Spacers

Inspect all bearing rollers for flat spots or brinelling. Inspect all bearing roller spacers for signs of wear or galling. Inspect roller contact surfaces of gear and shaft. Install new parts as required.

Gears

Inspect gear teeth on synchronizer clutch gears and stop rings. If there is evidence of chipping or excessively worn teeth, install new parts at reassembly. Be sure clutch sleeve slides easily on the clutch gear. Inspect countershaft gear and all gear teeth for chipped or broken teeth, or showing signs of excessive wear. Small nicks or burrs must be stoned off.

Inspect teeth on main drive pinion. If excessively worn, broken or chipped, a new pinion should be installed. If the oil seal contact area on drive pinion shaft is pitted, rusted or scratched, a new pinion is recommended for best seal life.

Inspect interlock levers for cracks at detent and clearance notches at each end of levers. Inspect shift forks for wear on pads and shafts.

Inspect the fork shaft bore in the shift levers for galling.

Synchronizer Stop Rings

Inspect stop rings for cracks and wear. If rings are cracked or show signs of extreme wear on threaded bore, install new rings at reassembly. Test new rings for good fit on gear cones with minimum wobble.

Mainshaft

Inspect mainshaft gear and bearing mating surfaces. If gear contact surfaces show signs of galling or are excessively worn, a new mainshaft should be installed.

Inspect snap ring grooves for burred edges. If rough or burred, remove condition using a fine file or crocus cloth. Inspect synchronizer clutch gear splines on shaft for burrs.

ASSEMBLING TRANSMISSION

The Grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease, NLGI grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

Countershaft Gear and Drive Pinion

(1) Using heavy grease, coat inside bore of gear at each end, then install roller bearing spacer. Insert arbor Tool C-3938, into gear and through spacer. Center spacer and arbor.

(2) Coat needle type roller bearings with heavy grease, then at each end of gear, install 19 rollers, followed by a spacer ring and 19 more roller bearings and 1 spacer ring (Fig. 16).

(3) If countershaft gear end play exceeded .029

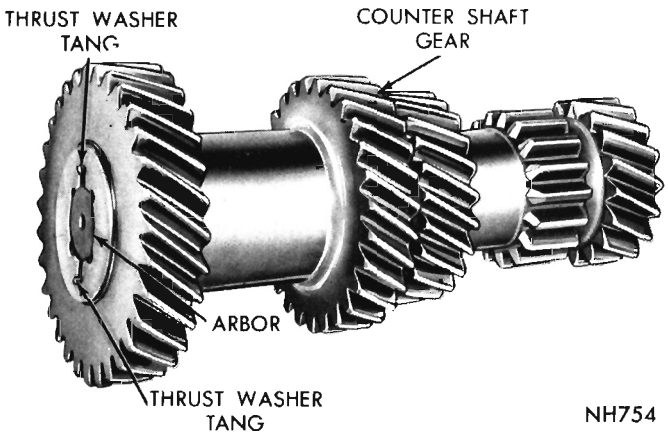


Fig. 34 - Countershaft Gear and Arbor Assembly

in. when measured during disassembly (Fig. 27), install new thrust washers. Coat thrust washers with heavy grease and install them over arbor with tang side toward the case boss (Fig. 34).

(4) Install countershaft gear assembly into the case (Fig. 33). Allow gear assembly to rest on bottom of case. (Be sure thrust washers stay in position.)

(5) Press main drive pinion bearing on pinion shaft. Be sure outer snap ring groove is toward front (Fig. 35). Seat bearing fully against shoulder on gear.

(6) Install a new inner snap ring on shaft to retain bearing. Be sure snap ring is seated. This snap ring is a select fit for minimum end play (Fig. 32).

(7) Place pinion shaft in a vise (with soft jaws), then install 16 bearing rollers in cavity of shaft. Coat bearing rollers with heavy grease, then install bearing retaining snap ring in its groove.

(8) Install drive pinion and bearing through rear of case and position in front bore. Tap lightly into place, using a plastic hammer. Install outer snap ring in bearing groove. **Heavy duty model** (Fig. 32) because of larger bearing can be installed through front of case.

(9) Start countershaft in its bore at rear of case. Raise countershaft gear until teeth mesh with main drive pinion gear. (Be sure thrust washers remain in position on ends of arbor and tangs aligned with slots in the case.)

(10) Align countershaft arbor with bores in case, then drive countershaft into the gear. Install the woodruff key. Continue to drive shaft into case until end of shaft is flush with rear face of the case. Remove arbor Tool C-3938.

(11) Using Tool C-3789 or C-3801 for heavy duty model (Fig. 36), install a new oil seal in retainer bore.

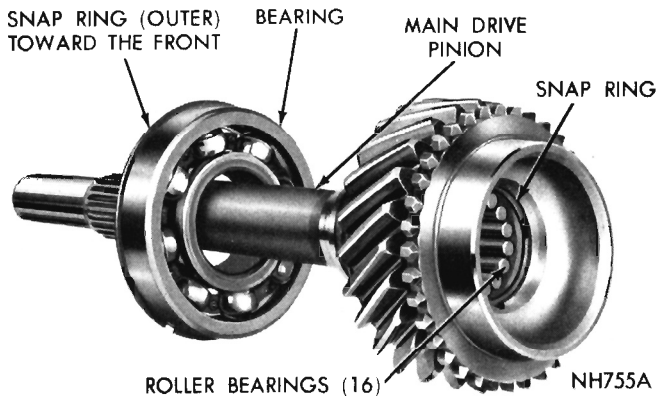


Fig. 35 - Main Drive Pinion and Bearing Assembly

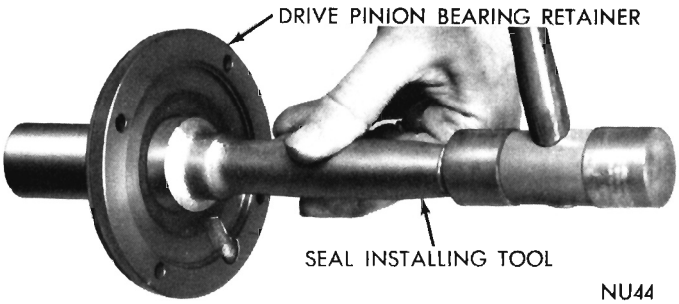


Fig. 36 - Replacing Seal in Drive Pinion Bearing Retainer

Reverse Gear, Lever and Fork

The following step need only be done if the reverse shaft was removed because of oil leak.

(1) Install a new oil seal "O" ring on reverse gearshift lever shaft. Coat lever shaft with Multipurpose grease, then carefully install lever shaft into bore in the case (Fig. 31). Install reverse fork in the lever.

(2) Install reverse detent spring retainer and gasket. Torque to 50 foot-pounds. Insert ball and spring. Install plug and gasket. Torque to 24 foot-pounds.

(3) Place reverse idler gearshaft in position in end of case, and drive it in far enough to position reverse idler gear on protruding end of shaft with shift slot toward rear (Fig. 29). At same time, engage slot with reverse shift fork.

(4) With reverse idler gear correctly positioned, drive reverse gear shaft into case far enough to install woodruff key. Drive in shaft, flush with end of case (Fig. 29).

(5) Install back-up light switch and gasket. Torque to 15 foot-pounds.

Extension Housing Bushing Replacement

(1) Remove extension housing yoke seal (Fig. 11) with Tool C-3985.

(2) Drive the bushing out of housing (Fig. 37) with Tool C-3974.

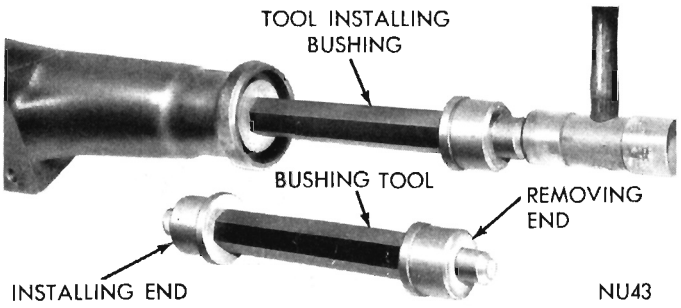


Fig. 37 - Replacing Bushing in Extension Housing

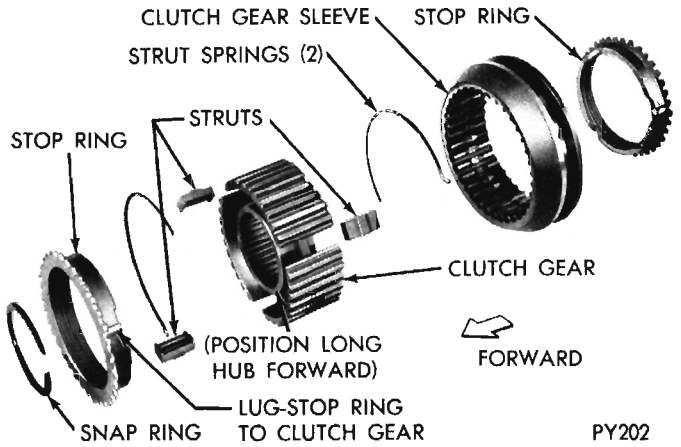


Fig. 39 - 3rd - 4th Synchronizer - Disassembled

(3) Slide a new bushing on installing end of Tool C-3974. Align oil hole in bushing with oil slot in housing, then drive bushing into place (Fig. 37).

(4) To install a new seal, position seal in opening of extension housing and drive it into housing with Tool C-3972 (Fig. 12).

MAINSHAFT

(1) Sub assembly the synchronizer parts in the order shown in (Figs. 38 and 39) as follows: Place a stop ring flat on the bench followed by the clutch gear and sleeve. Drop the struts in their slots and snap in a strut spring placing the tang inside one strut. Turn the assembly over on the stop ring and install second strut spring tang in a different strut.

(2) Slide second speed gear over mainshaft (synchronizer cone toward rear) and down against shoulder on shaft (Fig. 25).

(3) Slide first and second synchronizer assembly (including stop ring with lugs indexed in hub slots, Fig. 38) over mainshaft, down against second gear cone and secure with a new snap ring (Fig. 25). Slide next stop ring over shaft and index lugs into clutch hub slots.

(4) Slide first speed gear (synchronizer cone toward clutch sleeve gear just installed) over mainshaft into position against clutch sleeve gear.

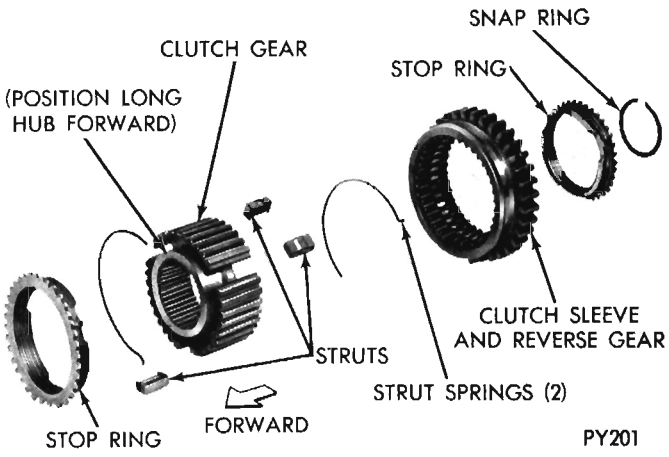


Fig. 38 - 1st - 2nd Synchronizer - Disassembled

(5) Install mainshaft bearing retaining ring, followed by mainshaft rear bearing. Using an arbor and a suitable tool, drive or press bearing down into position. Install a new snap ring on shaft to secure bearing (Fig. 24). This snap ring is a select fit for minimum end play.

(6) Install partially assembled mainshaft into extension housing far enough to engage bearing retaining ring in slot in extension housing (Fig. 22). Now compress ring wih pliers so that mainshaft ball bearing can move in to bottom against its thrust shoulder in extension housing. Release ring and seat it all around its groove in extension housing (Fig. 21).

Heavy duty model (Fig. 23). Install mainshaft assembly into extension housing until bearing touches snap ring in housing groove. Then expand ring with pliers so that mainshaft ball bearing can slide in against shoulder in extension housing. Release snap ring and see that it seats in bearing groove.

(7) Slide third speed gear over mainshaft (with synchronizer cone toward front) followed by third gear stop ring (Fig. 20).

(8) Install third and fourth speed synchronizer clutch gear assembly (including sleeve, shift struts and springs) on mainshaft (shift fork slot toward rear) against third speed gear (Fig. 20). Be sure to index rear stop ring with clutch gear shift struts.

(9) Install retaining snap ring (Fig. 20). Then, using heavy grease, position front stop ring over clutch gear, again indexing ring lugs with shift struts.

CAUTION: It is very important that indexing of all stop rings and positioning of gears and clutches on mainshaft be correct, or mating of extension housing to the case will not be possible without damage.

(10) Coat a new extension housing to case gasket with grease (both sides) then place in position

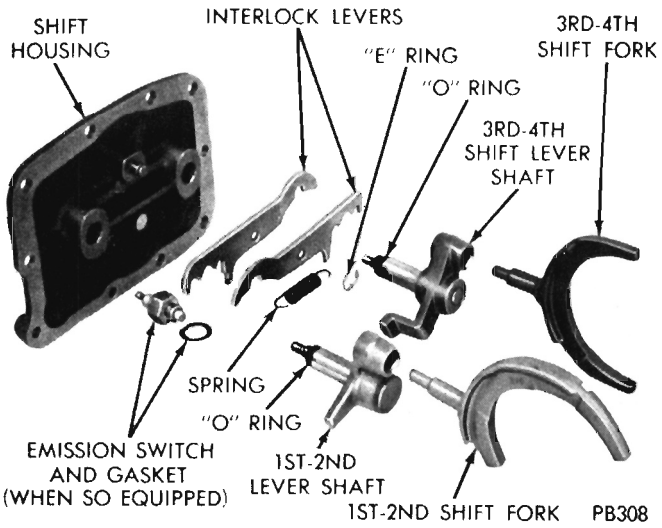


Fig. 40 Shift Housing - Disassembled

on the case.

(11) To provide clearance so that assembly will be possible, slide reverse idler gear to center of its shaft and move the 3rd and 4th synchronizer sleeve as far forward as practical (do not lose struts).

(12) Move drive pinion as far forward as possible to give maximum clearance for mainshaft pilot end.

(13) Now slowly insert mainshaft assembly into case (Fig. 18) tilting it as required to clear idler and cluster gears and finally entering the pilot rollers in the drive pinion gear.

(14) Place 3rd and 4th synchronizer sleeve in neutral position.

(15) If everything is in proper position the extension housing will bottom to the case gasket without force. If not, check to see if a strut, pinion roller, or stop ring is out of position.

(16) Install extension housing bolts and tighten to 50 foot-pounds.

(17) Install main drive pinion bearing retainer and gasket. Coat threads with sealing compound, then install attaching bolts and tighten to 30 foot-pounds (Fig. 2).

Gearshift Housing and Mechanism (Fig. 40).

(1) Install interlock levers on pivot pin and fasten with "E" Ring. Use pliers to install spring on interlock lever hangers.

(2) Grease and install new "O" ring oil seals on both shift shafts. Grease housing bores and push each shaft into its proper bore.

(3) Install operating levers and tighten retaining nuts to 18 foot-pounds.

(4) Rotate each shift shaft fork bore to neutral position (straight up) and install the 3-4 shift fork in it's bore and under both interlock levers.

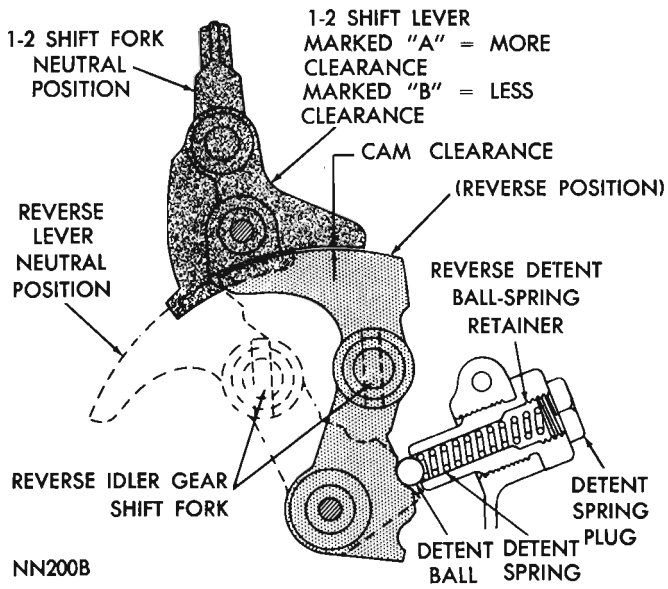


Fig. 41 - Reverse Interlock

(5) In the transmission, position both synchronizer sleeves in neutral. Place the 1-2 shift fork in groove of 1-2 synchronizer sleeve.

(6) Lay transmission on it's right side and position gasket using grease to retain it.

(7) As the shift housing is lowered in place, guide the 3-4 shift fork into it's synchronizer groove, then lead the shaft of the 1-2 shift fork into it's bore in the 1-2 shift lever.

To finish the installation a screwdriver must be used to raise the interlock lever against it's spring tension to allow the 1-2 shift fork shaft to slip under the levers. The shift housing will now seat against the case gasket.

(8) Install housing retaining bolts finger tight and shift through all gears to insure proper operation.

(9) Eight of the shift housing retaining bolts are shoulder bolts for accurately locating the mechanism on the transmission. One bolt shoulder is longer and acts as a dowel, passing through the cover and into the transmission case at center of rear flange (Fig. 30). Two bolts are standard, located at lower rear of cover. Tighten all bolts evenly to 15 foot-pounds.

(10) The reverse shift lever and 1-2 shift lever have cam surfaces which mate in reverse position (Fig. 41) to lock the 1-2 lever, fork and synchronizer in neutral position.

Test for correct action by placing transmission in reverse. Then, while turning input shaft, move 1-2 lever in each direction. If input shaft locks or becomes harder to turn, the synchronizer is partly engaging caused by too much cam clearance. Select new 1-2 shift lever, size "A" or "B" as required (Fig. 41). If too little cam clearance exists it will be difficult or impossible to shift to reverse.

(11) Grease reverse shaft and install operating lever and nut. Tighten to 18 foot-pounds (Fig. 15)

(12) Install speedometer drive pinion gear and adapter being sure range number, representing number of teeth on gear, is in 6 o'clock position (Fig. 8).

EXHAUST EMISSION CONTROL SYSTEM SWITCH

Some models have a switch mounted in the shift housing below the 3-4 shift lever for the Emission Control System.

It is actuated by a cam on the 3-4 lever when in fourth gear, similar to the Back-Up Light Switch System (Fig. 40).

In those vehicles not equipped with the Emission System, a plug is installed in the switch mounting hole in the shift housing. Torque for either is 15 foot-pounds.

(See Group 9A "Cleaner Air System" for details of system.)

TRANSMISSION INSTALLATION

Place a small amount of Multi-Purpose lubricant around inner end of pinion shaft pilot bushing in flywheel and on pinion bearing retainer release bearing sleeve area. **Do not lubricate end of pinion shaft, clutch disc splines or clutch release levers.**

(1) With transmission on a suitable jack, slide assembly under vehicle.

(2) Raise transmission until drive pinion is centered in clutch housing bore.

(3) Roll transmission slowly forward until pinion shaft enters clutch disc. With transmission in gear, turn output shaft until splines are aligned, then push transmission forward until seated against clutch housing. **Do not allow transmission to "hang" after pinion has entered the clutch disc.**

(4) Install transmission to clutch housing bolts and tighten to 50 foot-pounds. Remove the jack.

(5) Using a pointed drift, align crossmember bolt holes, then install attaching bolts. Tighten to 30 foot-pounds (Fig. 13 or 14).

(6) Remove engine support fixture and disengage hooks from holes in the frame side rails. Install extension housing to rear engine mount bolts and tighten to 40 foot-pounds. On (Fig. 14) type, the engine mount to center crossmember bolt and nut, loose assembled to this point, should now be torqued to 50 foot-pounds.

(7) Fasten shift unit to extension housing mounting plate with two bolts and lock washers and tighten to 30 foot-pounds. Referring to "Gearshift Linkage Adjustment" connect shift control rods to transmission levers and connect speedometer cable.

(8) Carefully guide front universal joint yoke into extension housing and onto mainshaft splines. Connect propeller shaft to rear axle pinion yoke aligning marks made at removal.

(9) Reconnect exhaust pipes (if removed).

(10) Fill transmission with "DEXRON" type Automatic Transmission Fluid except California where Multi-Purpose Gear Oil SAE 140 is used.

(11) Lower vehicle, install gearshift lever and console, refer to "Four Speed Gearshift."

(12) Road test vehicle to make sure transmission shifts smoothly and operates quietly.

MANUAL TRANSMISSION—3 SPEED (A-903)

INDEX

	Page
Cleaning and Inspection	46
General Information	36
Service Diagnosis	37
Service In Vehicle	39
Extension Housing and Bushing	42
Extension Housing Yoke Seal	42
Gearshift Interlock	40
Gearshift Linkage Adjustment	39
Speedometer Pinion Gear	40
Service Out of Vehicle	43
Assembling Transmission	47
Disassembling Transmission	43
Transmission Installation	49
Transmission Removal	43
Specifications	133
Tightening Reference	136

GENERAL INFORMATION

The A-903 transmission (Fig. 1, 2, and 3) is used on Valiant and Belvedere/Satellite models with 198 or 225 cu. in. 6 cylinder engines.

A pad has been provided on the right side of the transmission (Fig. 2) for identification numbers.

Sample Number: PP903 3262 2220

The first two letters identify the manufacturing plant. The next three numbers are the transmission model number. The following four numbers are a date of manufacture code. The last four numbers are a sequence number.

This transmission has the following gear ratios: First—2.95 to 1; Second—1.83 to 1; Third or

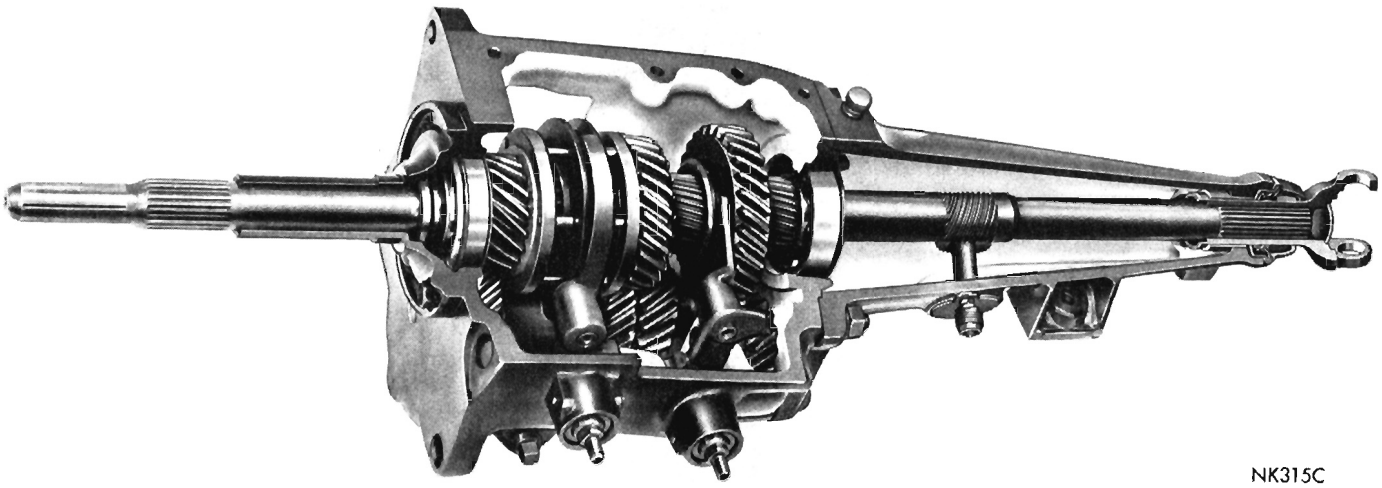


Fig. 1 - A-903 Three Speed Transmission Cutaway

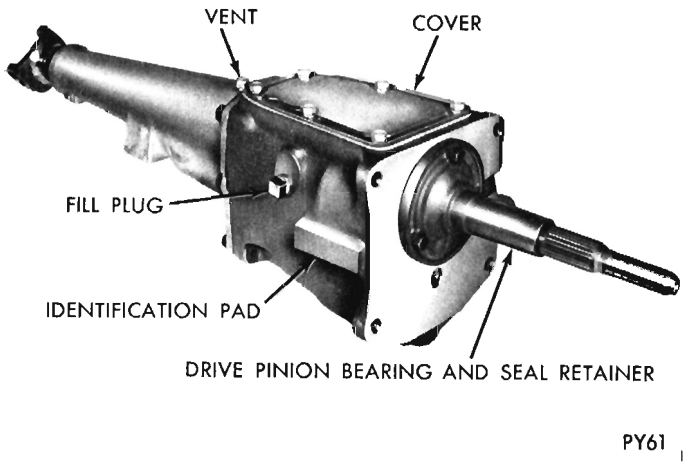


Fig. 2 - A-903 Transmission - Right Side

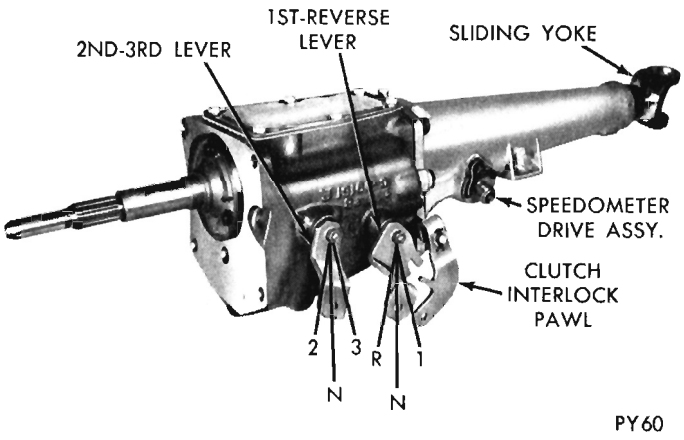


Fig. 3 - A-903 Transmission - Left Side

High—1 to 1; Reverse—3.80 to 1.

A synchronizing clutch is provided between second and third gears to prevent gear clash. The countershaft gear is in constant mesh and is supported by roller bearings at each end. The reverse idler gear is also supported on needle type roller bearings.

The mainshaft front end is piloted in roller bearings in the end of the main drive pinion, and is supported by a ball bearing in the rear of the case. The rear end of the mainshaft is supported by the sliding yoke and bushing in the extension housing. The speedometer drive gear is integral with the mainshaft.

The main drive pinion (input shaft) is supported by a ball bearing in the transmission case and an olite bushing pressed in the end of the crankshaft.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARD SHIFTING	(a) Incorrect clutch adjustment.	(a) Refer to Clutch Group for corrections.
	(b) Improper cross-over adjustment.	(b) Perform cross-over adjustment as outlined in "Gearshift Linkage Adjustments."
	(c) Synchronizer clutch sleeve damaged.	(c- d-e) Causes noted can only be corrected by disassembling transmission and replacing damaged or worn parts.
	(d) Synchronizer spring improperly installed.	

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(e) Broken or worn synchronizer stop rings.	
TRANSMISSION SLIPS OUT OF GEAR	(a) Linkage interference.	(a) Inspect and remove all linkage interferences.
	(b) Gearshift rods out of adjustment.	(b) Adjust gearshift rods as outlined in "Gearshift Linkage Adjustments."
	(c) Second or direct speed gear synchronizer clutch teeth worn.	(c) Disassemble transmission and replace parts as necessary.
	(d) Clutch housing bore or face out of alignment.	(d) Refer to Clutch Group for correction procedures.
TRANSMISSION NOISES	(a) Excessive end play in countershaft gear.	(a) Replace thrust washers.
	(b) Loose synchronizer hub spline fit on mainshaft.	(b) Inspect mainshaft and synchronizer hub and replace parts as necessary.
	(c) Loose spline fit on low speed sliding gear to mainshaft spline.	(c) Inspect low speed sliding gear and mainshaft. Replace parts as necessary.
	(d) Damaged, broken or excessively worn gear teeth.	(d) Replace worn gears.
	(e) Drive pinion bearing worn.	(e) Replace worn bearing.

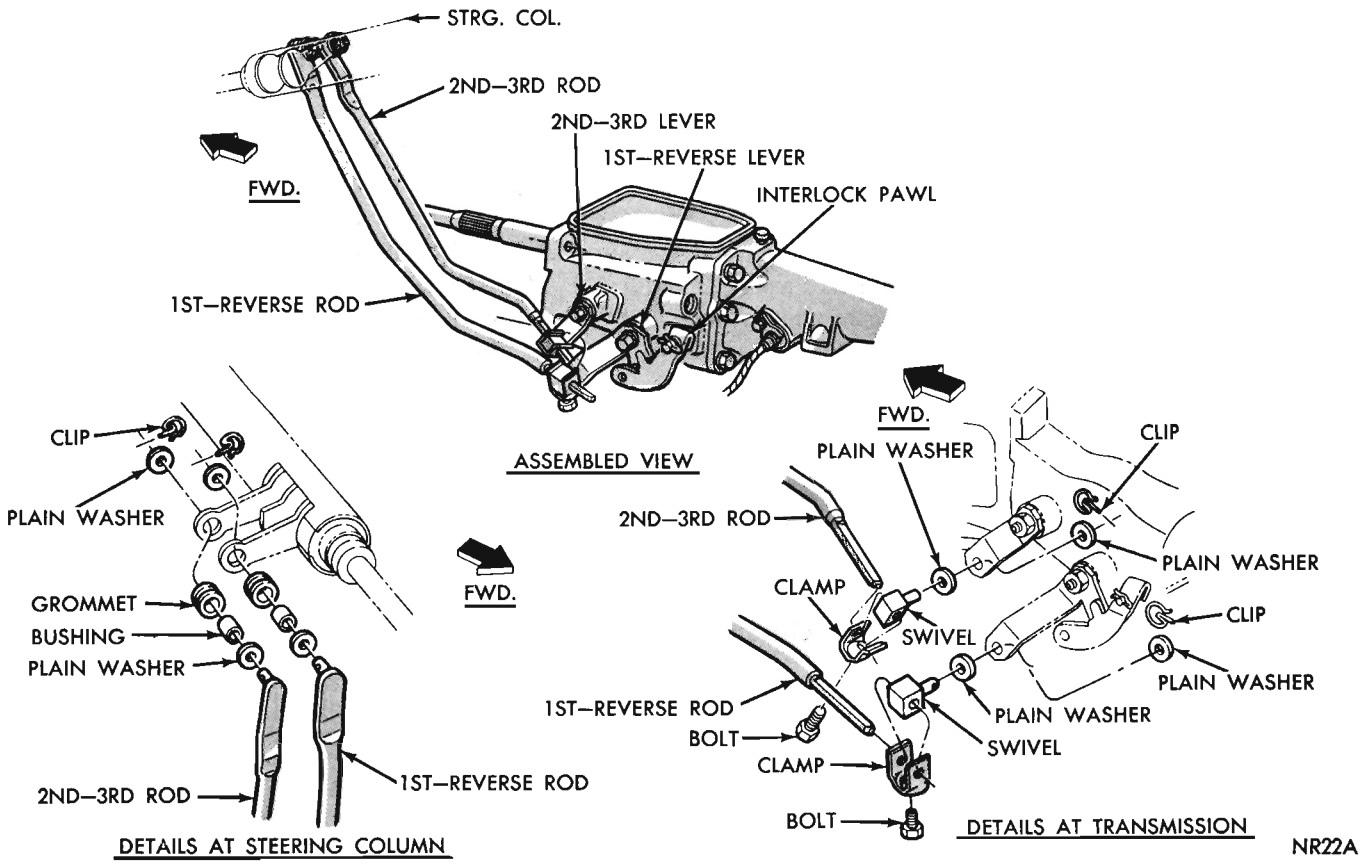


Fig. 4 - Column Gearshift Linkage (Valiant)

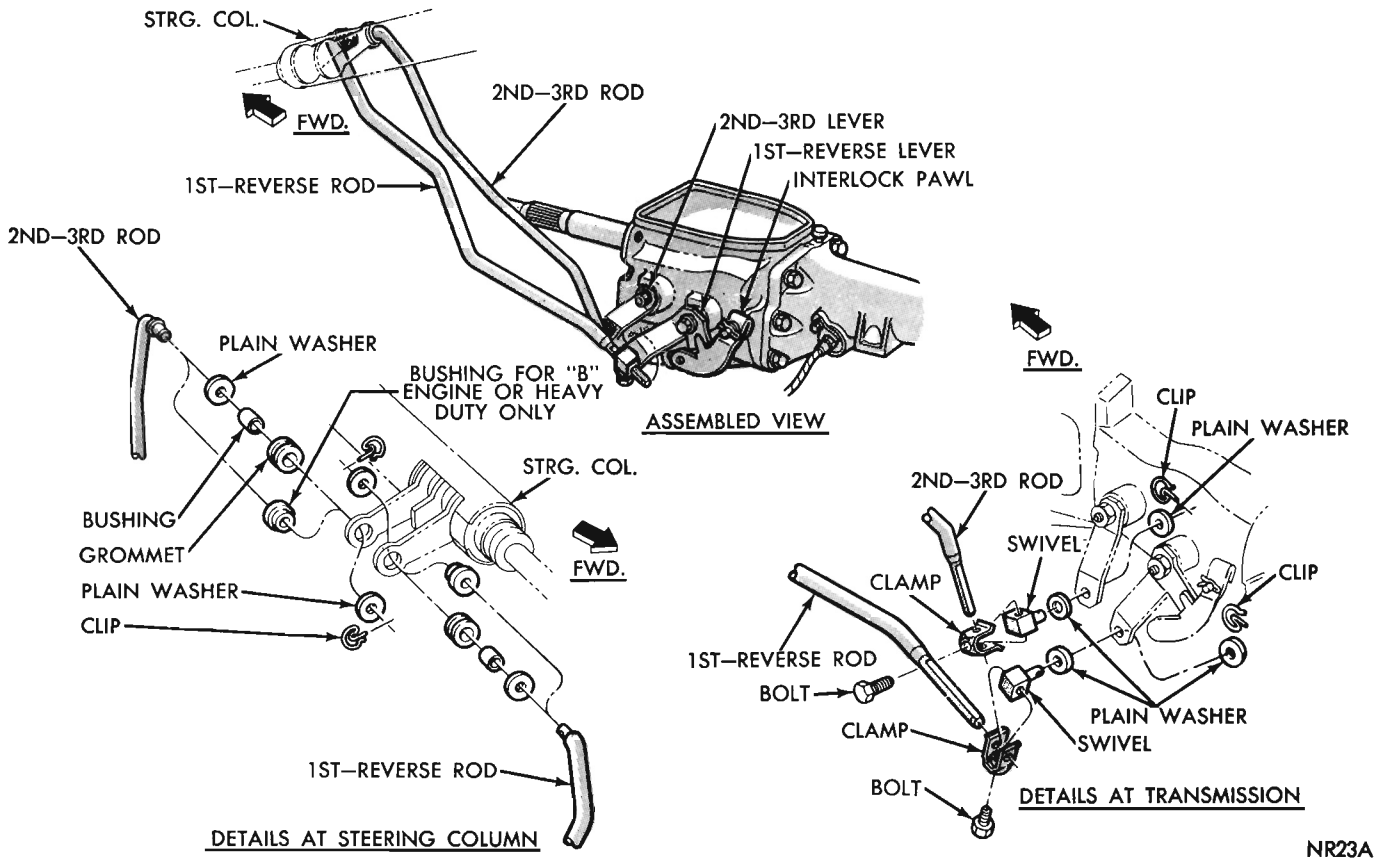


Fig. 5 - Column Gearshift Linkage (Satellite)

SERVICE PROCEDURES
SERVICE IN VEHICLE
GEARSHIFT LINKAGE ADJUSTMENT

A-903 Column Shift

(1) Remove both shift rod swivels from transmission shift levers (Fig. 4 or 5).

(2) Make sure transmission shift levers are in neutral (middle detent) position (Fig. 3).

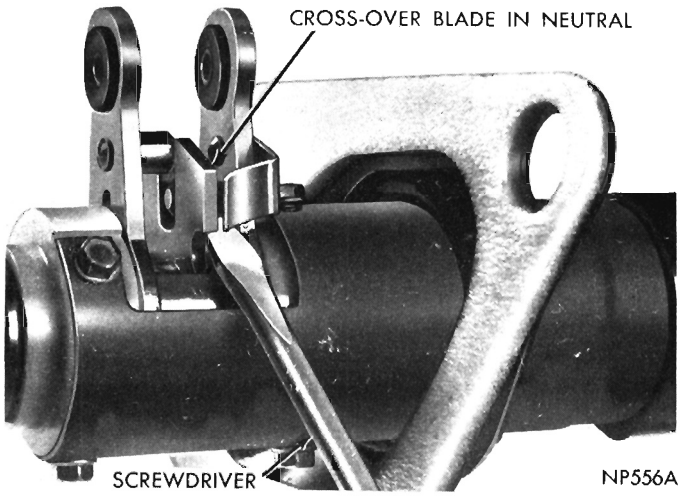


Fig. 6 Holding Cross-over Blade in Neutral Position

(3) Move shift lever to line up locating slots in bottom of steering column shift housing and bearing housing. Install suitable tool in slot and lock ignition switch.

(4) Place screwdriver or suitable tool between cross-over blade and 2nd-3rd lever at steering column so that both lever pins are engaged by cross-over blade (Fig. 6).

(5) Set 1st-Reverse lever on transmission to reverse position (Fig. 3).

(6) Adjust 1st-reverse rod swivel by loosening clamp bolt and sliding swivel along rod so it will enter 1st-reverse lever at transmission. Install washers and clip. Tighten swivel bolt to 100 inch-pounds.

(7) Remove gearshift housing locating tool, unlock ignition switch and shift column lever to neutral position.

(8) Adjust 2nd-3rd rod swivel by loosening clamp bolt and sliding swivel along rod so it will enter 2nd-3rd lever at transmission. Install washers and clip. Tighten swivel bolt to 100 inch-pounds.

(9) Remove tool from cross-over blade at steering column and shift through all gears to check adjustment and cross-over smoothness.

(10) Check for proper operation of steering column lock in reverse. With proper linkage adjustment, column should lock in reverse position only.

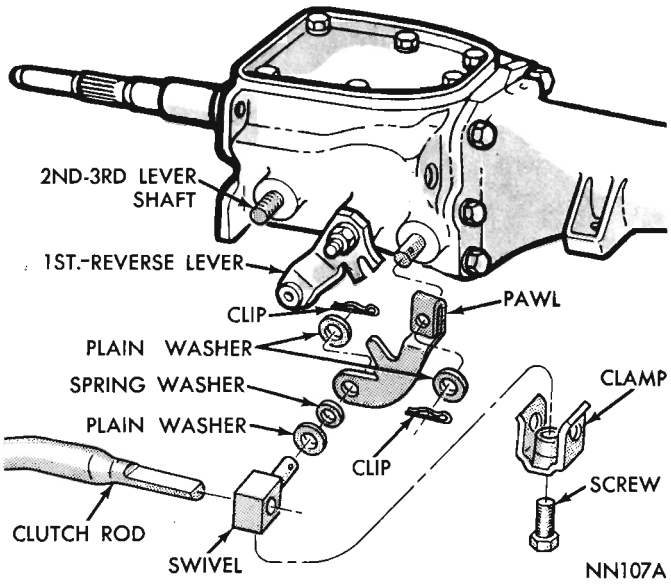


Fig. 7 - Gearshift Interlock

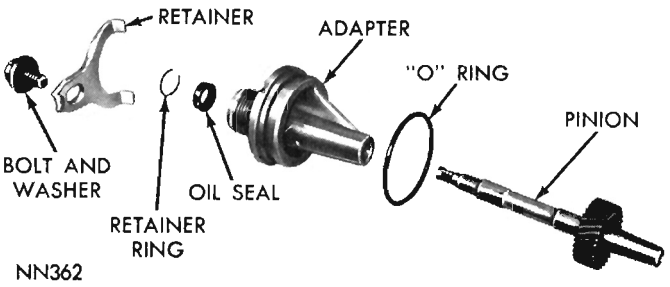


Fig. 9 - Speedometer Pinion and Adaptor - Disassembled

Gearshift Interlock (Fig. 7)

(1) Disconnect clutch rod swivel from interlock pawl.

(2) Adjust clutch pedal free play as specified in clutch section.

(3) When first-reverse lever on transmission is in neutral (middle detent) position, the interlock pawl will enter the slot in first-reverse lever.

(4) Loosen swivel clamp bolt and slide swivel on rod to enter pawl. Install washers and clip. Hold interlock pawl forward and tighten swivel clamp bolt to 100 inch-pounds. Clutch pedal has to be in full returned position during this adjustment.

CAUTION: Do not pull clutch rod rearward to engage swivel in the pawl.

(5) Shift transmission in normal manner from neutral to first, and from neutral to reverse (disengage clutch while shifting and engage clutch when in gear). Clutch action should be normal.

(6) Disengage clutch and shift halfway to first or reverse. Clutch should now be held down by interlock to prevent clutch engagement.

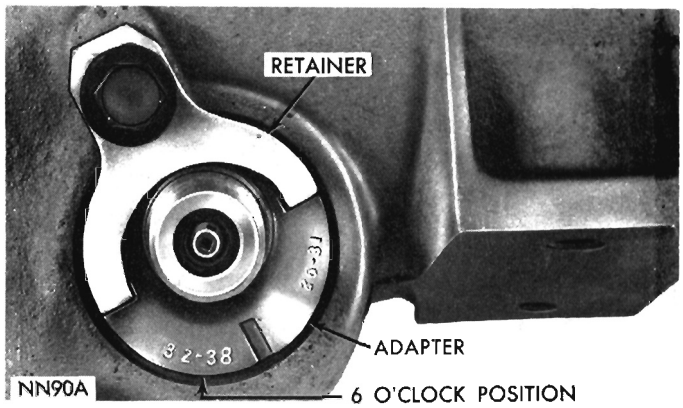


Fig. 8 - Speedometer Pinion and Adaptor Installed

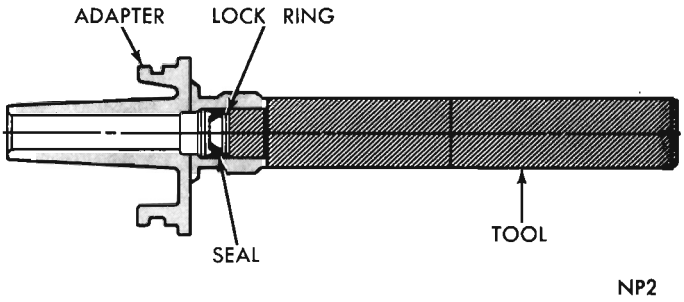


Fig. 10 - Installing Speedometer Pinion Seal

SPEEDOMETER PINION GEAR

Removal and Installation

Rear axle gear ratio and tire size determines pinion gear size requirements. Refer to "Speedometer Pinion Chart" in Specifications for pinion usage.

(1) Place drain pan under adapter to drain transmission.

(2) Remove bolt and retainer securing speedometer pinion adapter in extension housing (Fig. 8).

(3) With cable housing connected, carefully work adapter and pinion out of extension housing.

(4) If transmission fluid is found in cable housing, replace seal in the adapter (Fig. 9).

(5) Start seal and retainer ring in adapter, then push them into adapter with Tool C-4004 until tool bottoms (Fig. 10).

(6) Note number of gear teeth and install speedometer pinion gear into adapter (Fig. 9).

CAUTION: Before installing pinion and adapter assembly, make sure adapter flange and its mating area on extension housing are perfectly clean and lubricated. Dirt or sand will cause mis-alignment resulting in speedometer pinion gear damage.

(7) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed (Fig. 8).

(8) Install retainer and bolt, with retainer tangs

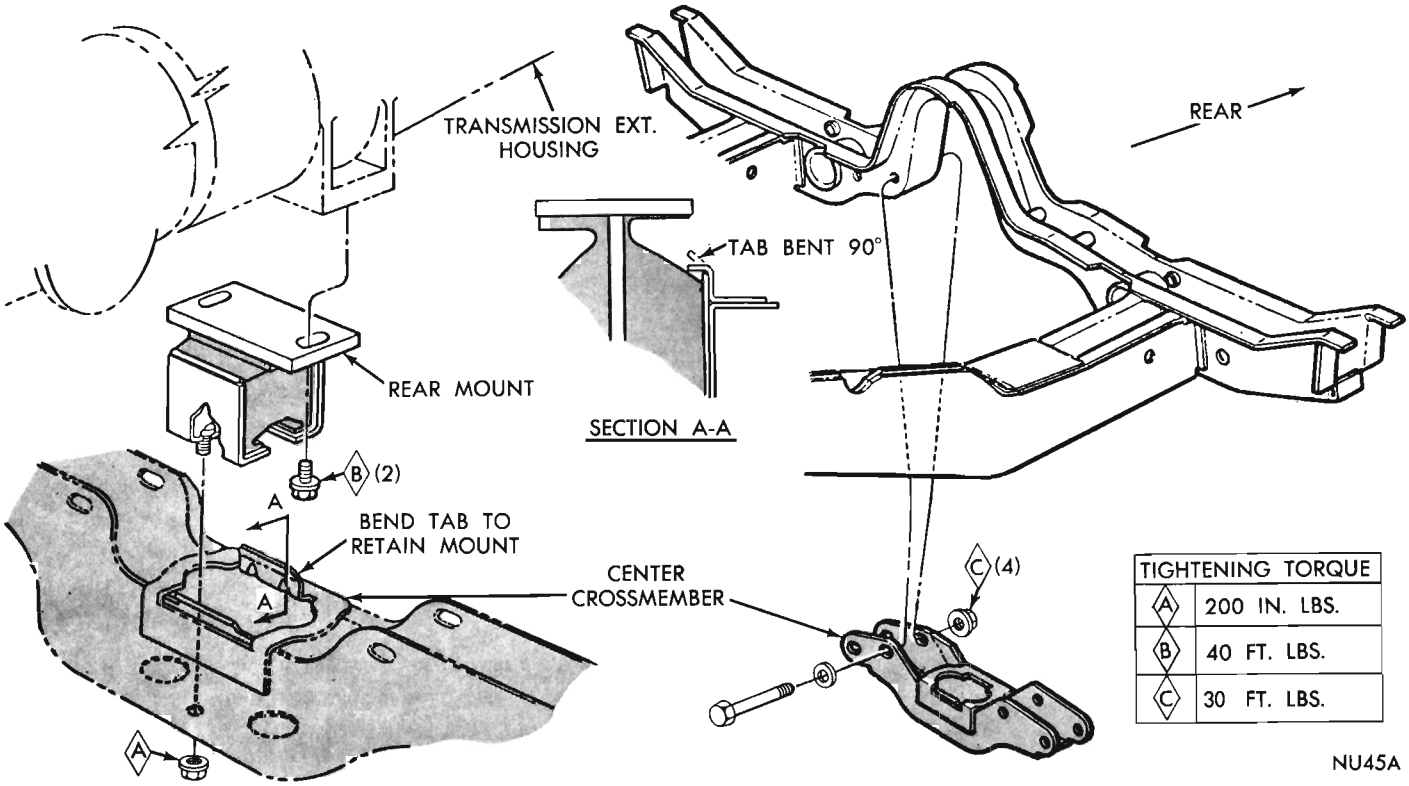


Fig. 11 - Center Crossmember and Rear Engine Mount (Valiant)

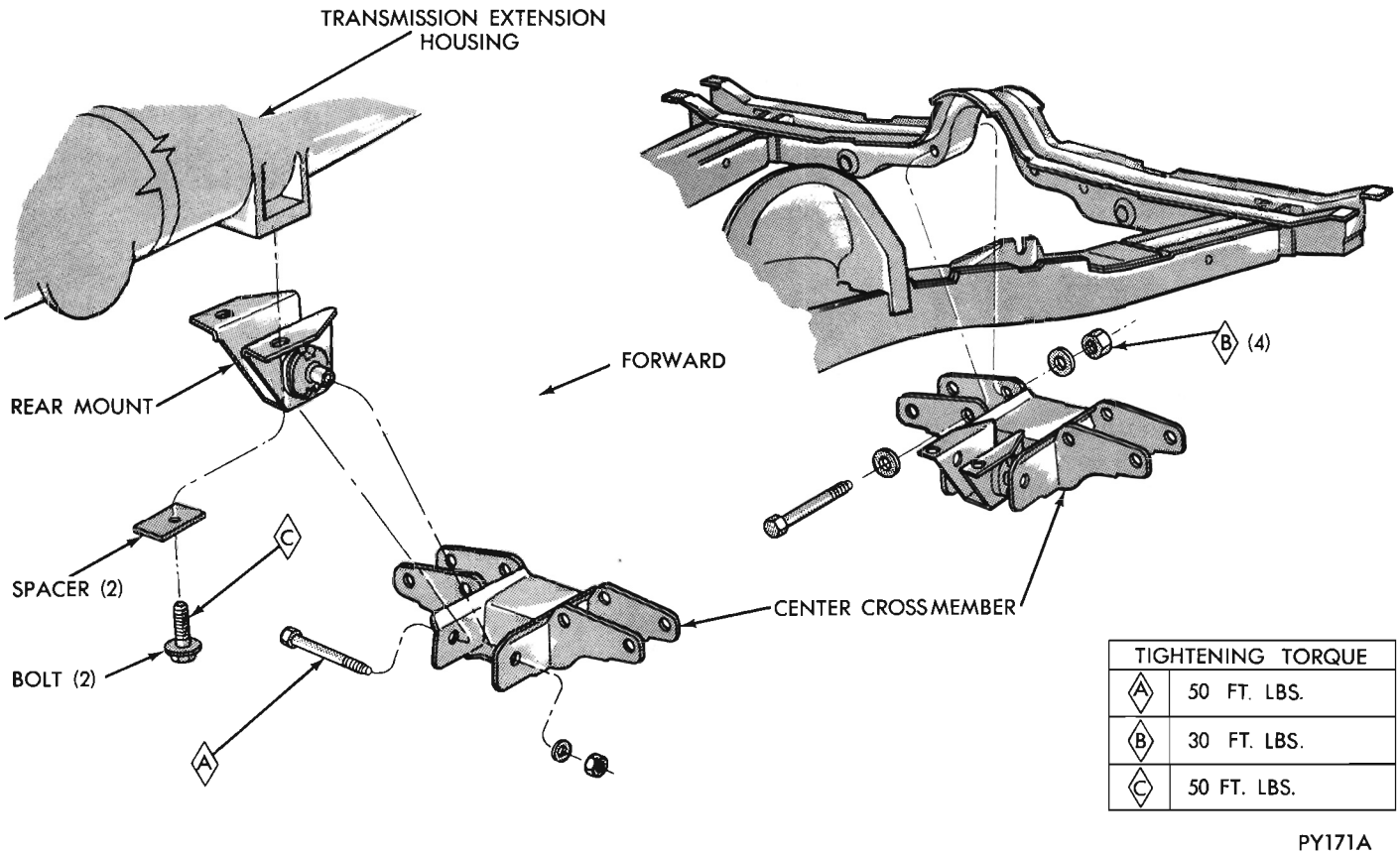


Fig. 12 - Center Crossmember and Rear Engine Mount (Satellite)

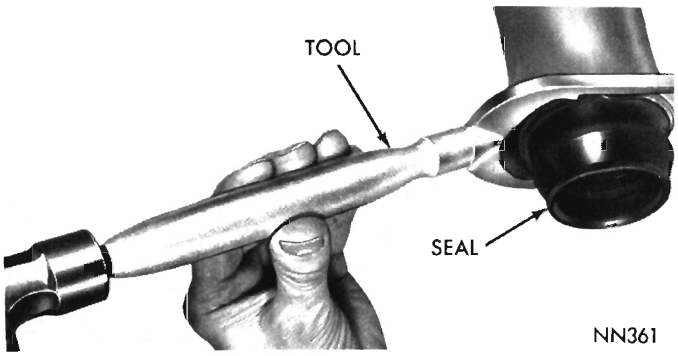


Fig. 13 - Removing Extension Housing Yoke Seal

in adapter positioning slots. Tap adapter firmly into extension housing and tighten retainer bolt to 100 inch-pounds.

(9) Fill transmission to level of fill plug (Fig. 2).

EXTENSION HOUSING AND BUSHING

Removal

(1) Drain transmission fluid by removing speedometer adapter.

(2) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(3) Remove bolts securing extension housing to crossmember. Raise transmission slightly with service jack and remove center crossmember (Fig. 11 or 12).

(4) Remove extension housing to transmission bolts and slide extension housing off the mainshaft.

Bushing Replacement

(1) Remove extension housing yoke seal (Fig. 13) with Tool C-3994.

(2) Drive the bushing out of housing (Fig. 14) with Tool C-3996.

(3) Slide a new bushing on installing end of Tool C-3996. Align oil hole in bushing with oil slot in housing, then drive bushing into place (Fig. 14).

(4) Drive a new oil seal into housing with Tool C-3995 (Fig. 15).

Installation

(1) Slide extension housing, with a new gasket, over mainshaft and down against the case. Install and tighten attaching bolts to 50 foot-pounds.

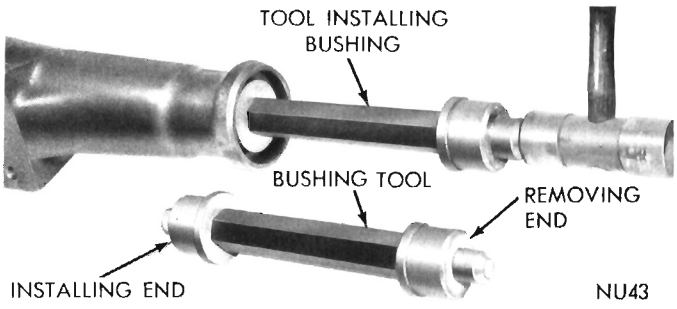


Fig. 14 - Replace Bushing in Extension Housing

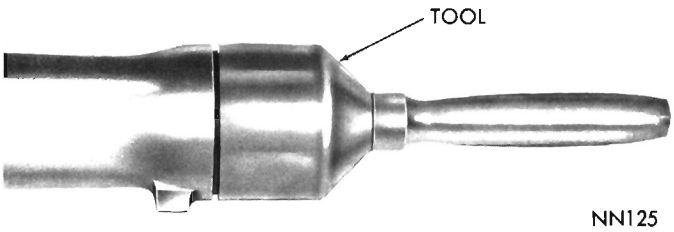


Fig. 15 - Installing Extension Housing Yoke Seal

(2) Install center crossmember and tighten retaining bolts to 30 foot-pounds. Lower transmission, install extension housing to rear engine mount bolts and tighten to 40 foot-pounds.

(3) Install the speedmometer pinion and adapter.

(4) Carefully guide front universal joint yoke into extension housing and onto mainshaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion yoke.

(5) Fill transmission to level of fill plug (Fig. 2).

EXTENSION HOUSING YOKE SEAL

Replacement

(1) Place drain pan under seal.

(2) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(3) Remove extension housing yoke seal (Fig. 13) with Tool C-3994.

(4) To install a new seal, position seal in opening of extension housing and drive it into housing with Tool C-3995 (Fig. 15).

(5) Carefully guide front universal joint yoke into extension housing and on the mainshaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

(6) Fill transmission to level of fill plug (Fig. 2).

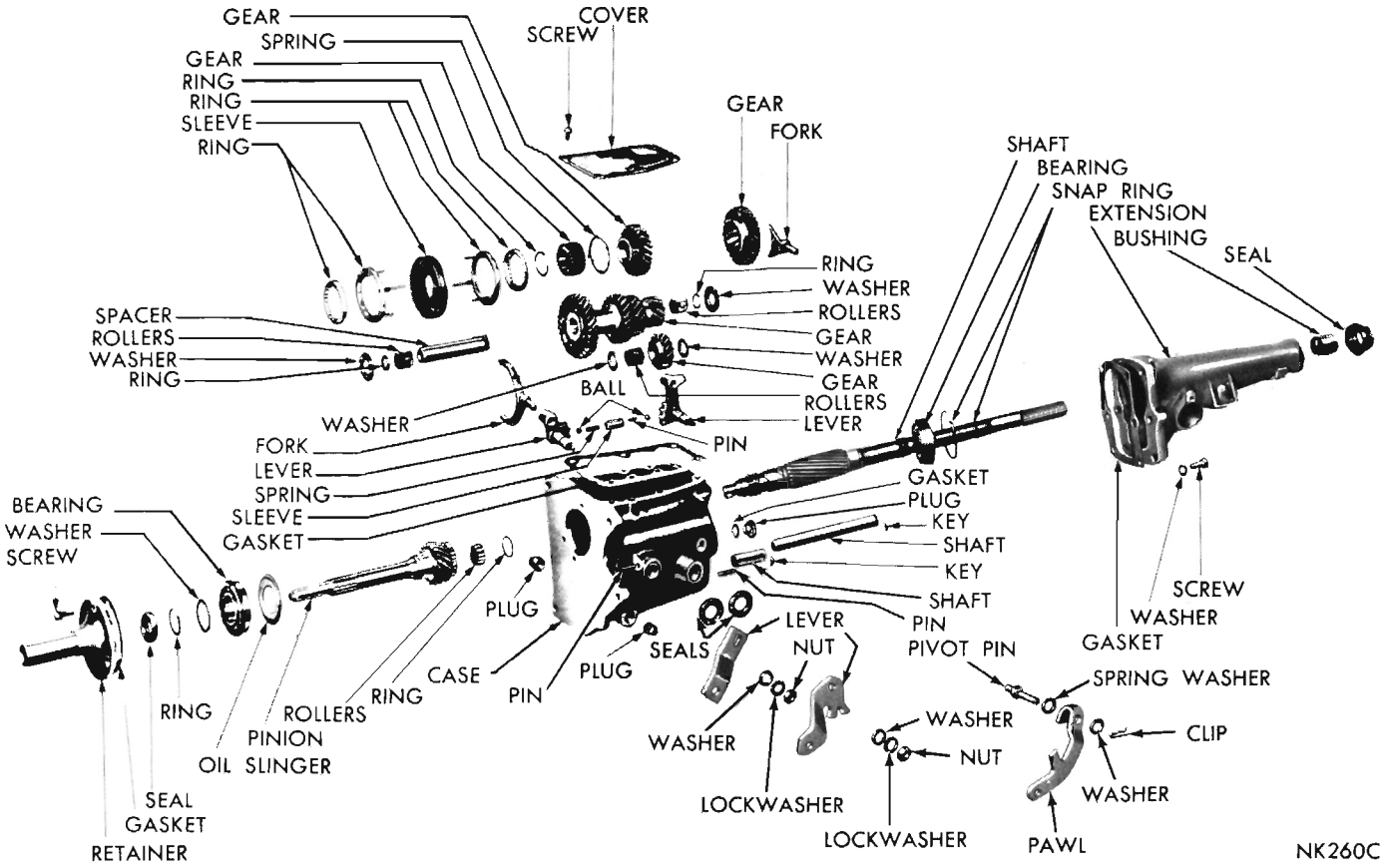


Fig. 16 - A-903 Transmission Disassembled

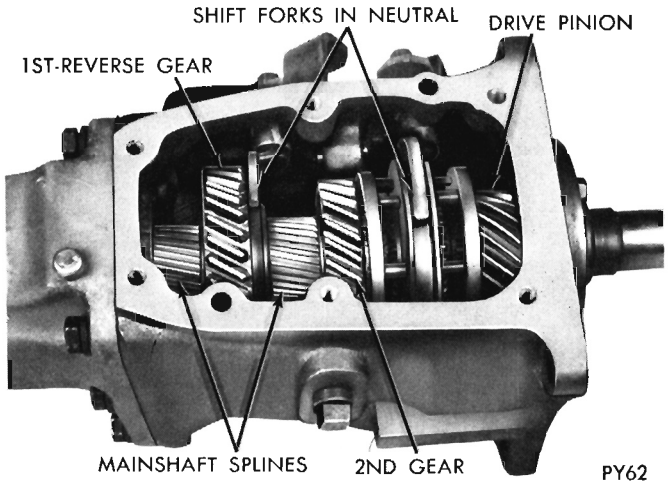


Fig. 17 - A-903 Transmission - Cover Removed

SERVICE OUT OF VEHICLE

TRANSMISSION REMOVAL

(1) Drain lubricant from the transmission by removing speedometer adapter.

(2) Disconnect propeller shaft at rear universal joint. Mark both parts to reassemble in same position. Carefully pull shaft yoke out of transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(3) Disconnect speedometer cable, back-up light switch leads, gearshift and interlock control rods.

(4) Install engine support fixture C-3487-A, mounting hooks firmly into holes in the side frame members with support ends up against underside of oil pan flange. Use Adapter Leg C-3806 on 6-cyl. engines.

(5) Raise engine slightly with support fixture. Disconnect transmission extension housing from removable center crossmember. (Fig. 11 or 12).

(6) Support transmission with a suitable jack and remove center crossmember. Remove bolts that attach transmission to clutch housing.

(7) Slide transmission rearward until pinion shaft clears clutch disc before lowering transmission. (This precaution will avoid damaging the clutch disc.)

(8) Lower transmission and remove from under vehicle. Clean outside of transmission.

DISASSEMBLING TRANSMISSION (Fig. 16)

(1) Remove bolts that attach cover to the case. Remove cover and gasket (Fig. 17).

(2) Using a pair of feeler gauges, measure synchronizer float. The measurement of the "float" should be taken before any further disassembly of transmission.

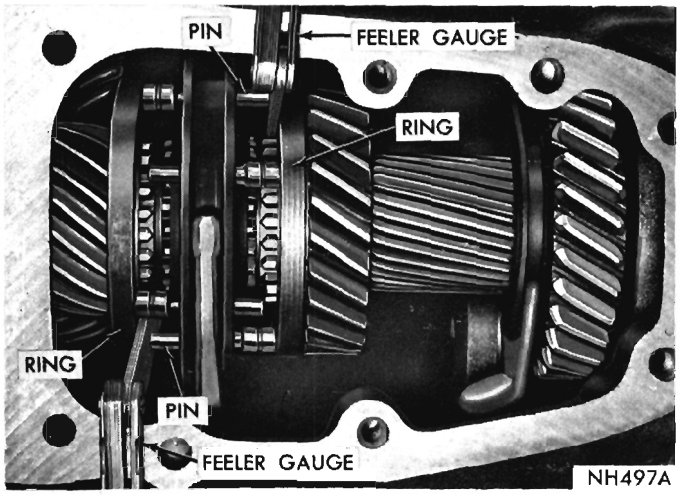


Fig. 18 - Measuring Synchronizer "Float"

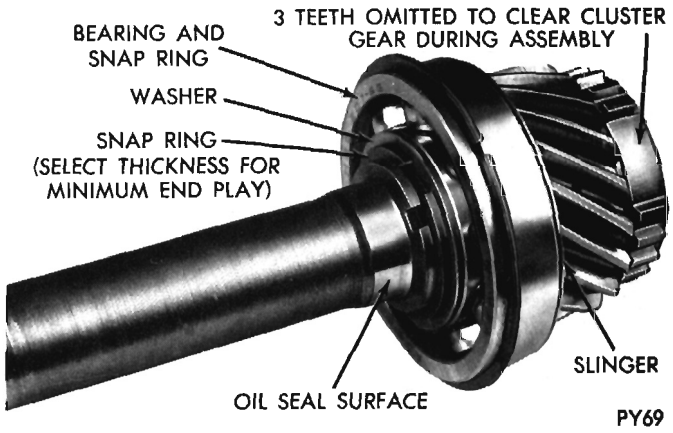


Fig. 19 - Drive Pinion Assembly

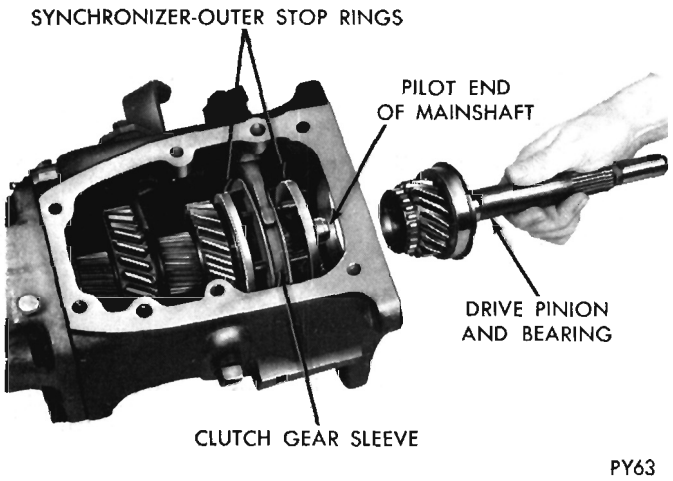


Fig. 20 - Removing or Installing Drive Pinion

(3) The synchorinizer "float" should be .060 to .117 inch, when measured between synchronizer outer ring pin and opposite synchronizer outer ring (Fig. 18).

This measurement must be made on two pins, 180 degrees apart with equal gap on both ends for "float" determination.

(4) There should be a snug fit between pins and feeler gauges, similar to that obtained when measuring with a micrometer.

Extension Housing

(1) Remove bolt and retainer securing speedometer pinion adapter in extension housing (Fig. 8). Carefully work adapter and pinion out of extension housing.

(2) Remove bolts which attach extension housing to transmission case. Slide extension housing off mainshaft.

Drive Pinion

(1) Remove bolts that attach drive pinion bearing retainer to case, then slide retainer off the pinion. Pry seal out of retainer, using a suitable tool To avoid leakage around the new seal, do not nick or scratch the bore in which the seal is pressed, or the surface on which seal bottoms.

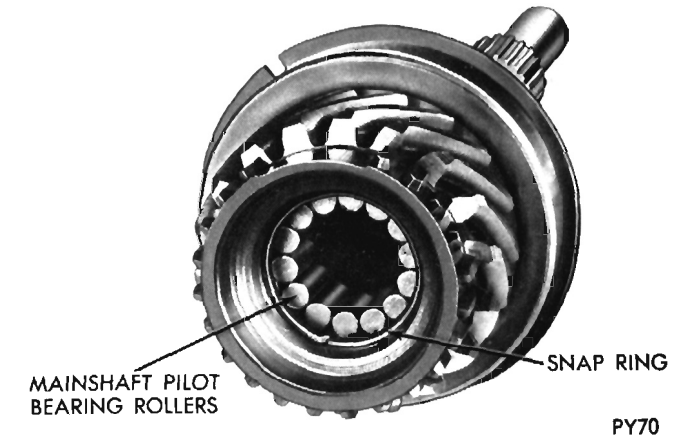


Fig. 21 - Mainshaft Pilot Bearing in End of Drive Pinion

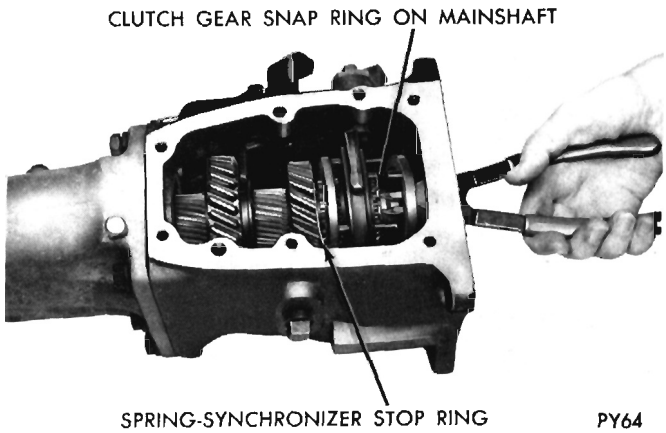


Fig. 22 - Removing or Installing Clutch Gear Snap Ring

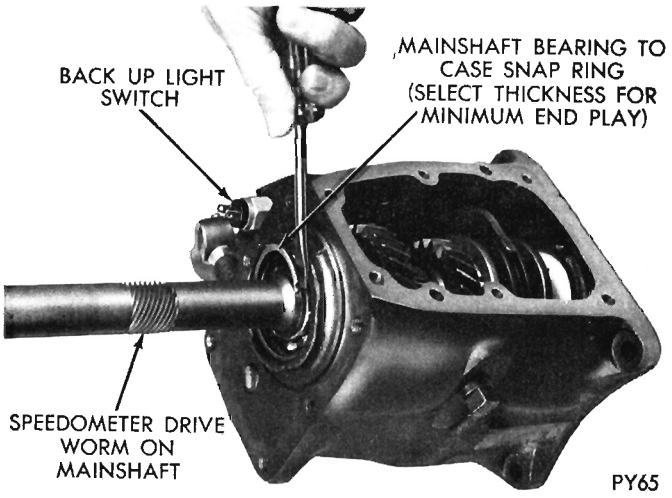


Fig. 23 - Removing Mainshaft to Case Snap Ring

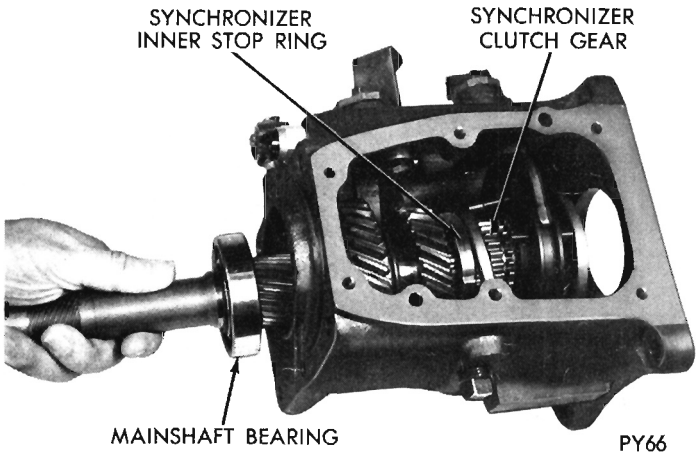


Fig. 24 - Removing Mainshaft from Case and Gear

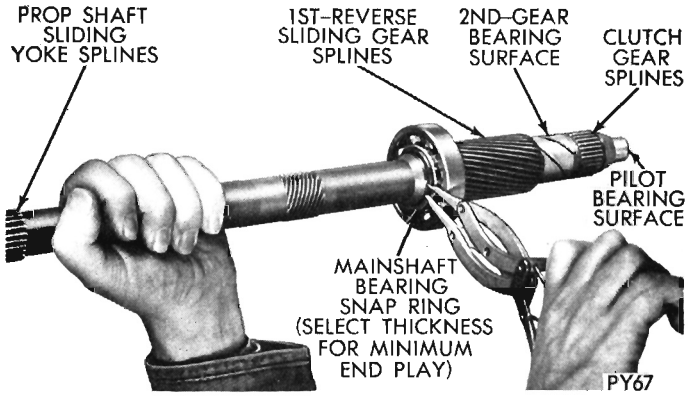


Fig. 25 - Mainshaft and Bearing Assembly

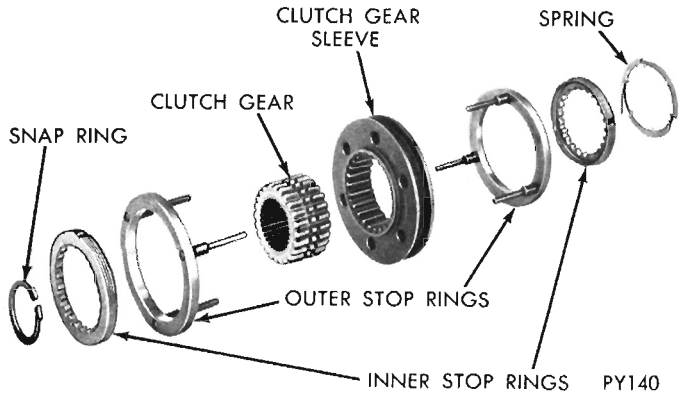


Fig. 26 - A-903 Synchronizer - Disassembled

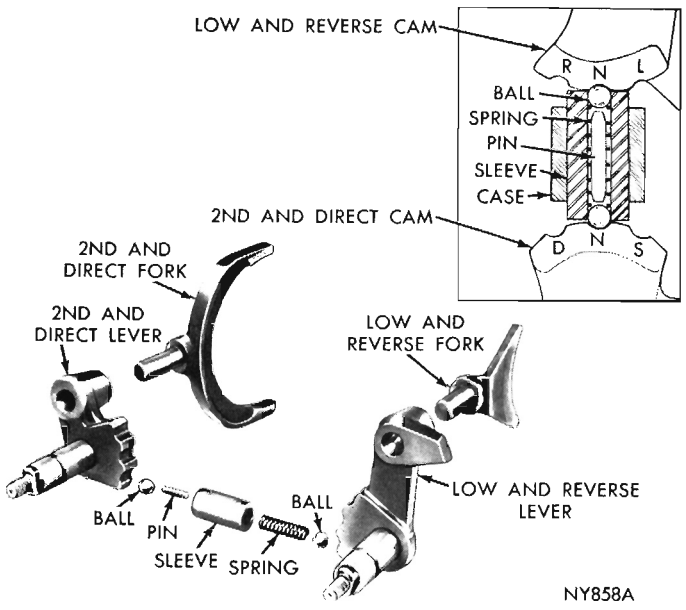


Fig. 27 - A-903 Shift Forks and Levers

(2) Rotate drive pinion so that the omitted clutch tooth area (Fig. 19) is next to countershaft gear for removal clearance.

(3) Grasp pinion shaft and pull assembly out of case slightly, then slide synchronizer front inner stop ring from the short splines on pinion as assembly is being removed from the case (Fig. 20).

(4) Remove snap ring (Fig. 19), which locks bearing on pinion shaft. Remove pinion bearing washer, then carefully press pinion shaft out of bearing, using an arbor press. Remove oil slinger.

(5) Remove snap ring and bearing rollers from cavity in end of drive pinion (Fig. 21).

Mainshaft

(1) Remove clutch gear retaining snap ring from mainshaft (Fig. 22).

(2) Remove mainshaft bearing retaining snap ring from case (Fig. 23).

(3) Slide mainshaft and bearing rearward out of case while steadying gears as they drop free (Fig. 24).

(4) Remove selective snap ring from shaft (Fig. 25) and press bearing off the mainshaft.

(5) Now remove the synchronizer parts (Fig. 26) second gear, first-reverse gear, and shift forks from the case.

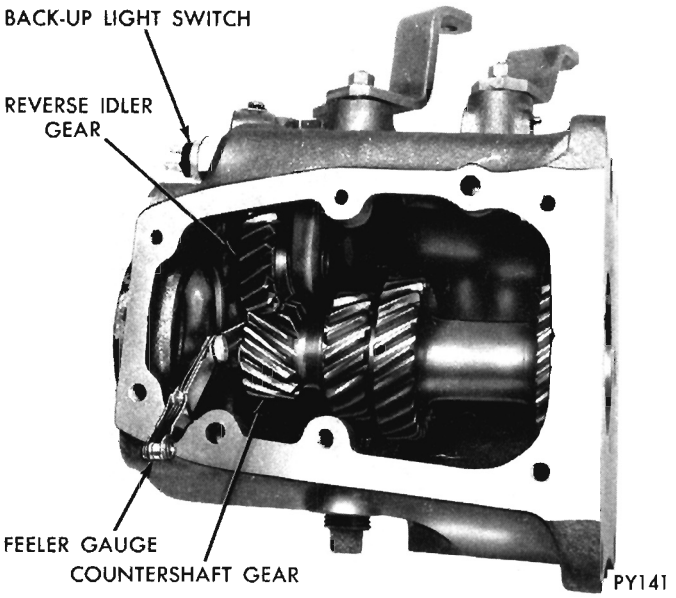


Fig. 28 - Checking Countershaft Gear End Play

Gearshift Mechanism

(This operation need only be done if the seals are leaking.)

(1) Remove operating levers from their respective shafts.

(2) Drive out tapered retaining pin from either of the two lever shafts, then withdraw lever shaft from inside transmission. (The detent balls are spring loaded; as shaft is being withdrawn, the ball will drop to bottom of the case.)

(3) Remove interlock sleeve, spring, pin and both balls from the case (Fig. 27).

(4) Drive out remaining tapered pin, then slide lever shaft out of transmission.

(5) Using a suitable drift, drive out lever shaft oil seals.

Countershaft Gear

(1) Using a feeler gauge, measure end play of countershaft gear (Fig. 28). The end play should be from .005 inch to .022 inch. (This measurement will determine if new thrust washers are to be installed at reassembly.)

(2) Using countershaft bearing arbor, Tool C-578 for A-903 transmission, and a plastic hammer, drive countershaft toward rear of case until small key can be removed from countershaft.

(3) Drive countershaft remaining way out of case, keeping arbor tight against end of countershaft to prevent loss of bearing rollers.

(4) Remove countershaft gear and thrust washers from the case.

(5) Remove bearing rollers, washers and center spacer from countershaft gear.

Reverse Idler Gear

(1) Using a suitable drift, drive reverse idler gear shaft towards rear and out of the case. Remove woodruff key from end of shaft.

(2) Lift reverse idler gear and thrust washers out of the case. Remove bearing rollers from gear.

CLEANING AND INSPECTION

Clean transmission case throoughly, using a suitable solvent, dry with compressed air. Inspect case for cracks, stripped threads in various bolt holes and machined mating surfaces for burrs, nicks or any condition that would render case unfit for further service. The front mating surface should be smooth; if any burrs are present, dress them off with a fine mill file. If threads are stripped, install Helicoil inserts.

Ball Bearings

Wash ball bearings, using a clean solvent and blow dry with compressed air.

CAUTION: Do not spin bearings with air pressure; turn slowly by hand. Spinning unlubricated bearings may cause damage to races and balls.

Be sure ball bearings are clean, then lubricate them with light grade engine oil. Inspect bearings for roughness. This can best be determined by slowly turning outer race by hand. Measure fit of bearings on their respective shafts.

Needle Type Bearing Rollers and Spacers

Inspect all bearing rollers for flat spots or brinnelling. Inspect all bearing roller spacers for signs of wear or galling. Inspect roller contact surfaces of gear and shaft. Install new parts as required.

Gears

Inspect gear teeth on synchronizer clutch gears and stop rings. If there is evidence of chipping or excessively worn teeth, install new parts at reassembly. Be sure clutch sleeve slides easily on the clutch gear. Inspect countershaft gear and all other gears for chipped or broken teeth, and signs of excessive wear. Small nicks or burrs must be stoned off.

Inspect teeth on main drive pinion. If excessivley worn, broken or chipped, a new pinion should be installed. If the oil seal contact area on drive pinion shaft is pitted, rusted or scratched, a new pinion is recommended for best seal life.

Test interlock sleeve and pin for free movement in bore of shift housing. Examine detent balls for signs of brinelling. If lever detents show signs of excessive wear to extent of not locking in gear, install a new part. Inspect shift forks for wear on

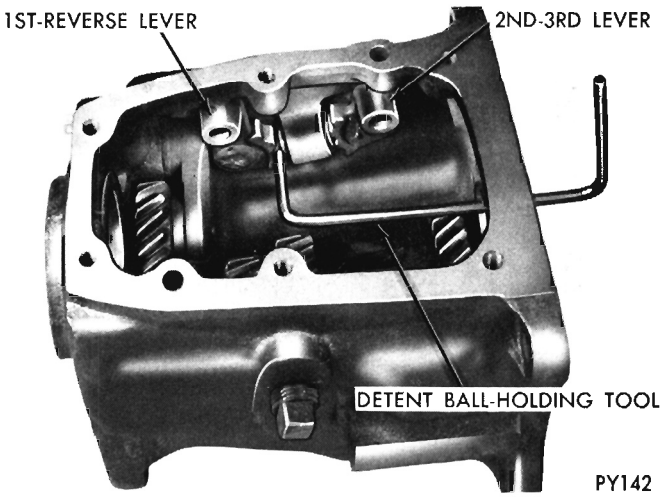


Fig. 29 - Install Shift Levers and Detent Balls

the shafts and pads.

Synchronizer Stop Rings

Inspect gear teeth and threads on synchronizer inner stop rings for broken teeth or worn threads. Inspect pins on synchronizer outer stop ring assembly for being straight and attached securely. Replace parts as required.

Mainshaft

Inspect mainshaft gear and bearing mating surfaces. If gear contact surfaces show signs of galling or are excessively worn, a new mainshaft should be installed (Fig. 25).

Inspect snap ring grooves for burred edges. If rough or burred, remove condition using a fine file or crocus cloth. Inspect synchronizer clutch gear splines on shaft for burrs.

ASSEMBLING TRANSMISSION (Fig. 16)

The grease recommended for use during reassembly procedures is Automotive Multi-Purpose Grease NLGI Grade 2 E.P. or Multi-Mileage Lubricant, Part Number 2525035.

Countershaft Gear

(1) Slide countershaft gear bearing roller spacer over arbor Tool C-578 for A-903 transmission. Coat bore of gear with lubricant and slide tool and spacer in gear bore.

(2) Lubricate bearing rollers with heavy grease and install 22 rollers in each end of gear in area around arbor. Coat with heavy grease and install bearing spacer rings in each end of gear.

(3) **If countershaft gear end play was found to exceed .022 inches during disassembly, install new thrust washers.** Coat with heavy grease and install thrust washer at each end of countershaft gear and over arbor. Install gear and arbor in the case making sure tabs on thrust washers slide into grooves in the case.

(4) Using countershaft and a soft hammer, drive arbor forward out of countershaft gear and through bore in front of the case. Before driving countershaft all way into case, be sure keyway is positioned in line with key recess in rear of case. Insert shaft key and continue to drive countershaft forward in case until key is bottomed in recess.

Reverse Idler Gear

(1) Position arbor Tool C-464 in reverse idler gear and using heavy grease, install 22 roller bearings in gear.

(2) Place front and rear thrust washers at each end of reverse idler gear, and position assembly in transmission case with chamfered end of gear teeth toward front (Fig. 28).

(3) Insert reverse idler shaft into bore at rear of case with keyway to rear, pushing arbor toward front of transmission.

(4) With keyway aligned with recess in case, drive shaft forward, inserting key before keyway is obscured. Continue driving shaft forward until key seats in recess.

Gearshift Mechanism (Fig. 27)

(1) Place new shift lever shaft seals in their bores in the case. Using Tool C-3766, drive seals into case, until tool bottoms.

(2) Install seal protector, Tool C-3767 on end of low and reverse lever shaft, then slide shaft into rear boss of case and through the seal. Lock in position with tapered pin. Turn lever until center detent is in line with interlock bore.

(3) Slide interlock sleeve in its bore in case followed by one of the interlock balls. Install interlock spring and pin.

(4) Place remaining interlock ball on top of interlock spring, using Tool C-3765 (Fig. 29). (A good method of installing second ball is to stick ball in the tool recess with grease, then use tool to position ball on the detent spring.)

(5) Install seal protector Tool C-3767, on second and third lever shaft. Depress interlock ball, using Tool C-3765 and at same time install second and third lever shaft, with center detent aligned with detent ball. Remove the tool. Secure lever shaft with remaining tapered pin.

(6) Install operating levers and tighten retaining nuts to 18 foot-pounds.

MAINSHAFT

(1) Press bearing on mainshaft then select and install snap ring for minimum end play (Fig. 25).

(2) Move shift lever to reverse position then position the 1st-reverse gear and shift fork in the case (Fig. 17 and 31).

Note that both shift forks are offset toward

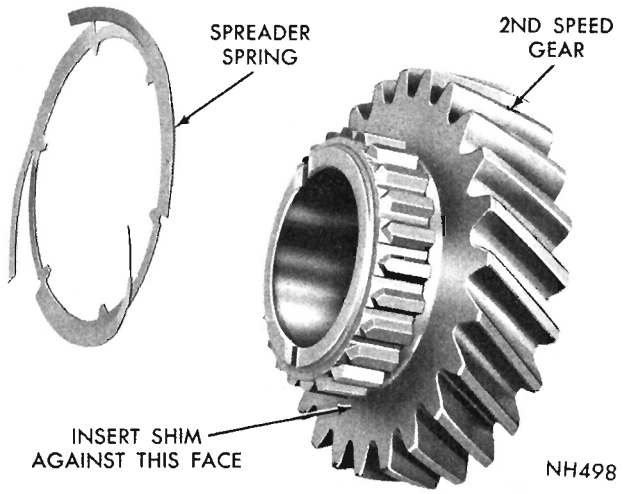


Fig. 30 - Synchronizer Shim Location

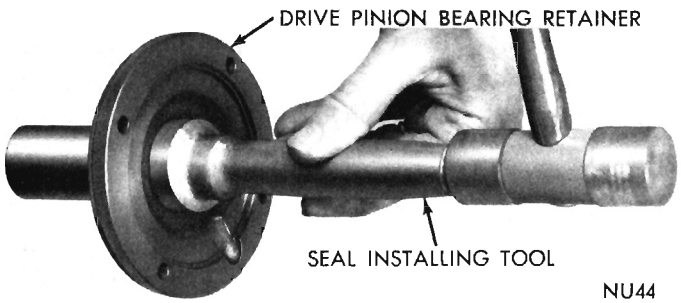


Fig. 32 - Drive Pinion Seal Replacement

rear of transmission (Fig. 27).

(3) Arrange all the synchronizer parts (Fig. 26) with second gear (Fig. 30) and shift fork, so they may be held in one hand as a package.

(4) Position this gearset in case and enter shift fork into its lever (Fig. 17 and 31).

(5) Carefully work mainshaft through gears and synchronizer parts until bearing bottoms in rear of case (Fig. 31).

(6) Install synchronizer clutch gear snap ring (Fig. 22) on mainshaft.

(7) Select and install mainshaft bearing snap ring (Fig. 23) in case.

(8) In cases where synchronizer "float" measurement is above .117 inch, synchronizer shims should be installed to reduce "float" to .117 inch or less. Install shim on shoulder of second speed gear, before spreader spring is installed (Fig. 30).

If synchronizer "float" is below .060 inch, an equal amount of material should be removed from ends of all six synchronizer pins until synchronizer "float" is above .060 inch.

Drive Pinion

(1) Slide oil slinger over pinion shaft and down against gear (Fig. 19).

(2) Slide bearing over pinion shaft (snap ring groove away from gear end), then seat on shaft,

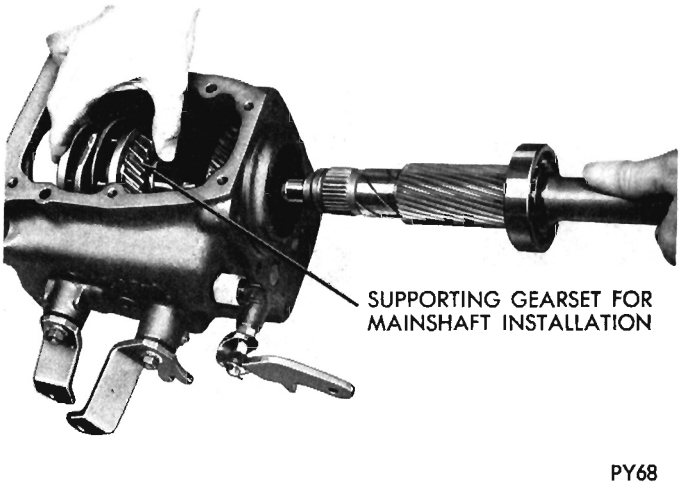


Fig. 31 - Installing Mainshaft into Gears and Case

using an arbor press.

(3) Install keyed washer between bearing and retaining snap ring groove.

(4) Secure bearing and washer with selected thickness snap ring. Four snap rings are available to eliminate end play. Be sure snap ring is properly seated. If large snap ring around bearing was removed, install at this time.

(5) Place pinion shaft in a vise (with soft jaws), then install 14 bearing rollers in cavity of shaft (Fig. 21). Coat bearing rollers with heavy grease, then install bearing retaining ring in its groove.

(6) Rotate drive pinion so that the omitted clutch tooth area is next to countershaft gear for assembly clearance (Fig. 19). Guide drive pinion through front of case and engage inner stop ring with clutch teeth, then seat pinion bearing. The pinion shaft bearing is fully seated when snap ring is in full contact with the case.

(7) Install a new seal in pinion bearing retainer, using Tool C-3789 (Fig. 32).

(8) Position retainer assembly and new gasket on the case. Use thread sealing compound on bolts then install and tighten to 30 foot-pounds.

Extension Housing

(1) Slide extension housing and a new gasket over mainshaft while guiding shaft through bushing and oil seal. Install and tighten attaching bolts to 50 foot-pounds. **Use sealing compound on bolt used in one hole tapped through transmission case.**

(2) Install transmission gasket and cover, install and tighten cover bolts to 12 foot-pounds.

(3) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed.

(4) Install and tighten back-up light switch to 15 foot-pounds.

EXHAUST EMISSION CONTROL SYSTEM SWITCH

Some models have a switch mounted above the 2-3 shift lever for the Emission Control System. It is actuated by a cam on the 2-3 lever when in third gear, similar to the Back-Up Light Switch System (Fig. 33).

In those vehicles not equipped with the Emission System, a plug is installed in the switch mounting hole in the transmission case. Torque for either is 15 foot-pounds.

(See group 9A "Cleaner Air System" for details of system.)

TRANSMISSION INSTALLATION

Place a small amount of Multi-Purpose Grease around inner end of pinion shaft pilot bushing in crankshaft and on pinion bearing retainer release bearing sleeve area. **Do not lubricate end of the pinion shaft, clutch disc splines or clutch release levers.**

(1) Place transmission on a suitable jack and slide assembly under vehicle.

(2) Raise transmission until drive pinion shaft is centered in clutch housing bore.

(3) Roll transmission slowly forward until pinion shaft enters clutch disc. With transmission in gear, turn output shaft until splines are aligned, then push transmission forward until seated against clutch housing. **Do not allow transmission to "hang" after pinion has entered the clutch disc.**

(4) Install transmission attaching bolts and tighten to 50 foot-pounds. Remove the jack.

(5) Using a pointed drift, align crossmember bolt holes, then install attaching bolts. Tighten to 30 foot-pounds (Fig. 11 or 12).

(6) Remove engine support fixture and disengage hooks from holes in frame side rails. Install extension housing to rear engine mount bolts and tighten to 40 foot-pounds. On the (Fig. 12) type, the engine mount to center crossmember bolt and nut, loose assembled to this point, should now be torqued to 50 foot-pounds.

(7) Reconnect speedometer cable, gearshift rods and back-up light switch wires. Refer to "Gearshift Linkage Adjustment" and "Gearshift Interlock," in this section.

(8) Carefully guide front universal joint yoke into extension housing and onto mainshaft splines. Connect propeller shaft to rear axle pinion yoke aligning the marks made during removal. Tighten clamp screws to 15 foot-pounds.

(9) Fill transmission to level of fill plug (Refer to Lubrication Group "O").

(10) Road test vehicle, making sure transmission shifts smoothly and operates quietly.

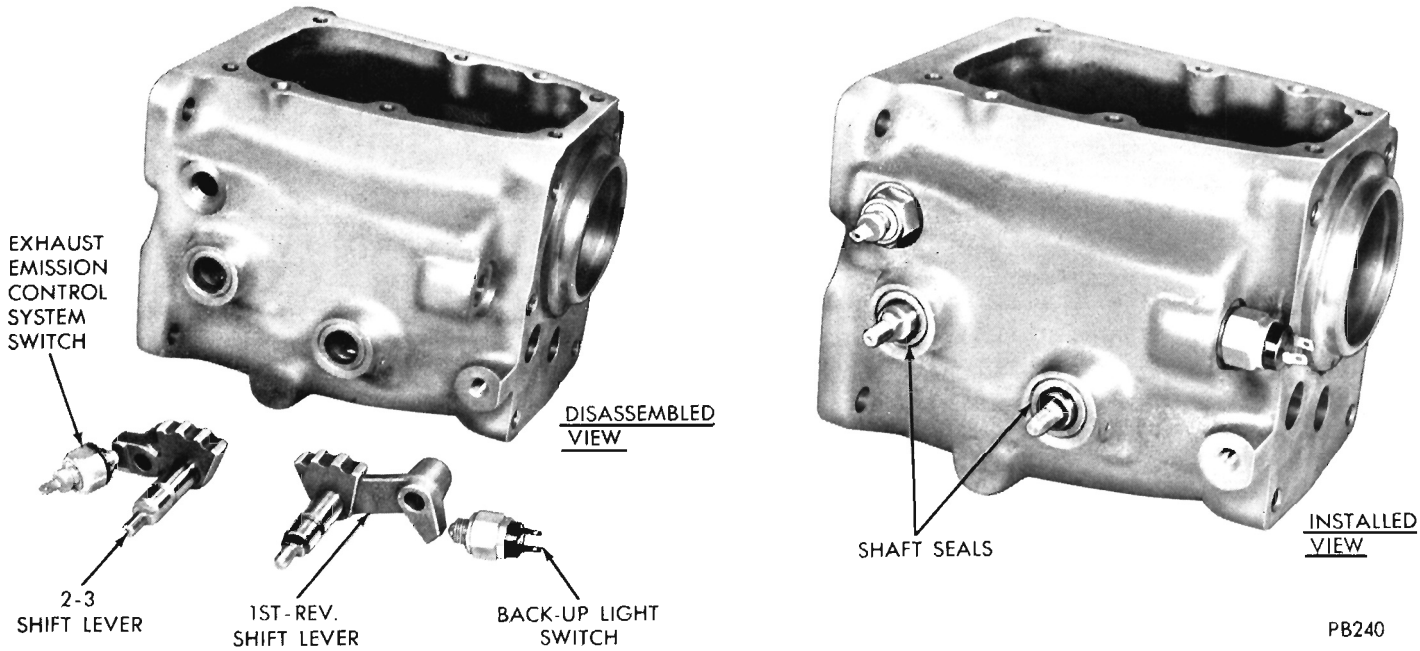


Fig. 33 Exhaust Emission Control System Switch Installation

TORQUEFLITE TRANSMISSIONS
(A-904 and A-727)
INDEX

	Page
General Information	50
Hydraulic Control System	70
Operating Instructions	71
Service Diagnosis	71
Service in Vehicle	79
Air Pressure Tests	89
Aluminum Thread Repair	79
Band Adjustments	83
Console Gearshift	81
Extension Housing and Output Shaft Bearing	91
Extension Housing Yoke Seal	91
Gearshift Linkage Adjustment	80
Governor	92
Hydraulic Control Pressure Adjustments	88
Hydraulic Control Pressure Tests	88
Lubrication	79
Neutral Starting Switch	83
Parking Lock Components	93
Speedometer Pinion	90
Throttle Rod Adjustment	84
Valve Body and Accumulator Piston	93
Service Out of Vehicle	94
Assembly—Sub-Assembly Installation	124
Disassembly—Sub-Assembly Removal	97
Installation—Transmission, Converter and Drive Plate	127
Fluid Leakage	130
Recondition Sub-Assemblies	99
Accumulator Piston and Spring	106
Extension Housing Bushing and Oil Seal	106
Front Clutch—A-904	111
Front Clutch—A-727	113
Governor and Support	107
Kickdown Servo and Band	123
Low-Reverse Servo and Band	124
Oil Pump and Reaction Shaft Support—A-904	107
Oil Pump and Reaction Shaft Support—A-727	109
Overrunning Clutch	121
Parking Lock Sprag	106
Planetary Gear Train—A-904	118
Planetary Gear Train—A-727	120
Rear Clutch—A-904	116
Rear Clutch—A-727	117
Valve Body Assembly	104
Removal—Transmission and Converter	94
Pump Oil Seal	97
Starter Ring Gear	95
Torque Converter Flushing	96
Specifications	133
Tightening Reference	136

GENERAL INFORMATION

The TorqueFlite Transmission model identification marking shown in the following application chart, is cast in raised letters about 3/8 inch high on the lower left side of the bell housing. Transmission usage is determined by the type of engine with which it is installed.

The A-727-RG is available for heavy duty police and taxi service with the 6 Cylinder, 225 Cu. In. engine.

Because of the similarity in design and in servicing the transmissions, the procedures have been combined in this Manual. Where variations in procedures occur, application is indicated.

CAUTION: Transmission operation requirements are different for each vehicle and engine combination and some internal parts will be different to provide for this. Therefore, when replacing parts, refer to the seven digit part number stamped on left side of the transmission oil pan flange (Fig. 1 or 2).

The transmission combines a torque converter and a fully-automatic 3-speed gear system. The converter housing and transmission case are an integral aluminum casting. The transmission consists of two multiple disc clutches, an over-running clutch, two servos and bands, and two planetary gear sets to provide three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell which is splined to the sun gear and to the front clutch retainer. The hydraulic system consists of an oil pump, and a single valve body which contains all of the valves except the governor valve.

Venting of the transmission is accomplished by a drilled passage through the upper part of the oil pump housing.

The torque converter is attached to the crankshaft through a flexible driving plate. Cooling of the converter is accomplished by circulating the transmission fluid through an oil-to-water type cooler, located in the radiator lower tank. The torque converter assembly is a sealed unit which cannot be disassembled.

The transmission fluid is filtered by an internal "Dacron Type" filter attached to the lower side of

TRANSMISSION APPLICATION CHART

Engine Type	Displacement Cubic Inch	Identification Marking
6 Cyl.	198-225	A-904-G
8 Cyl.	318	A-904-LA
6 Cyl.	225	A-727-RG
8 Cyl.	318-340-360	A-727-A
8 Cyl.	383-426-440	A-727-B

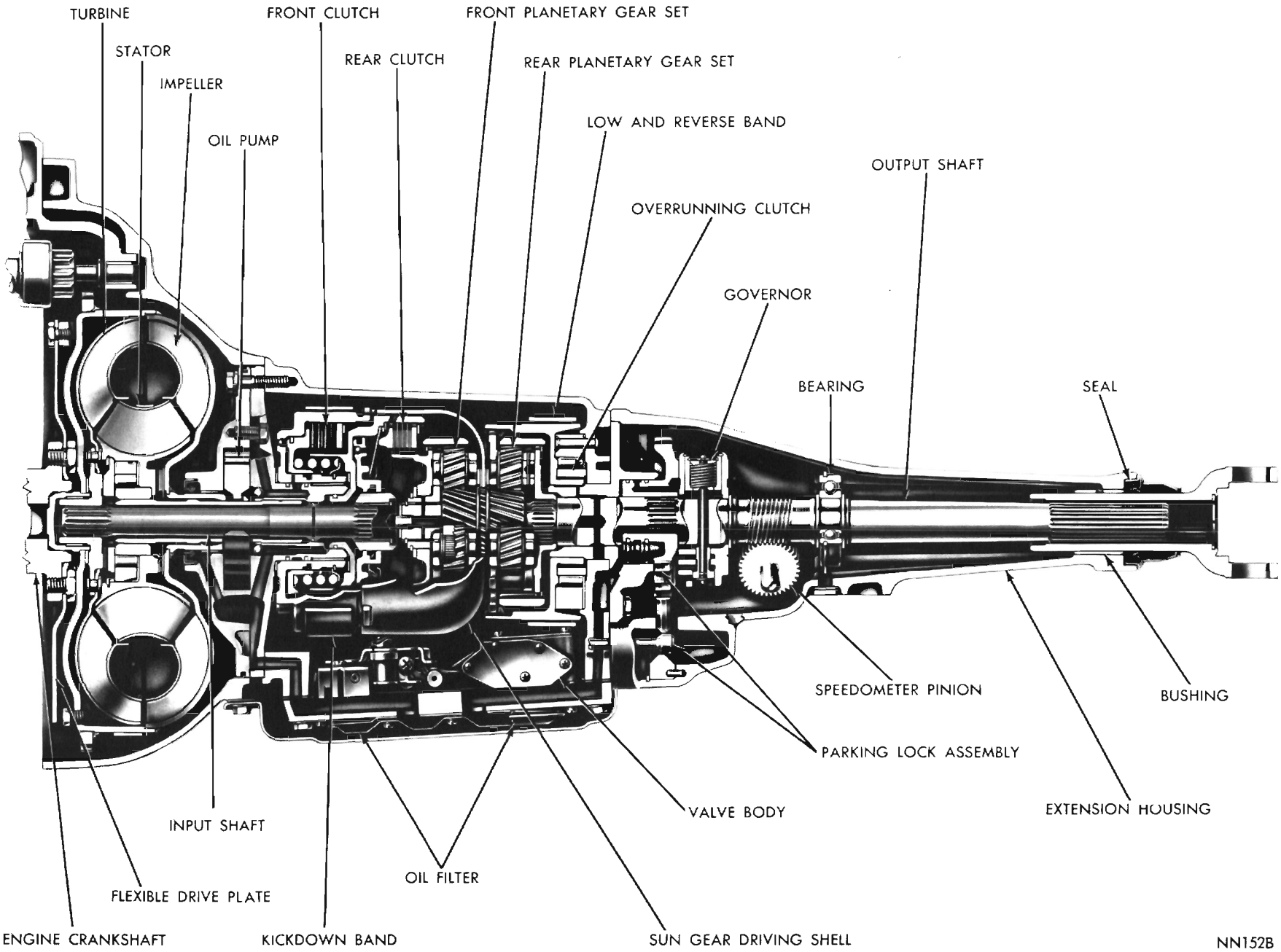


Fig. 1 - TorqueFlite Transmission and Torque Converter (A-904)

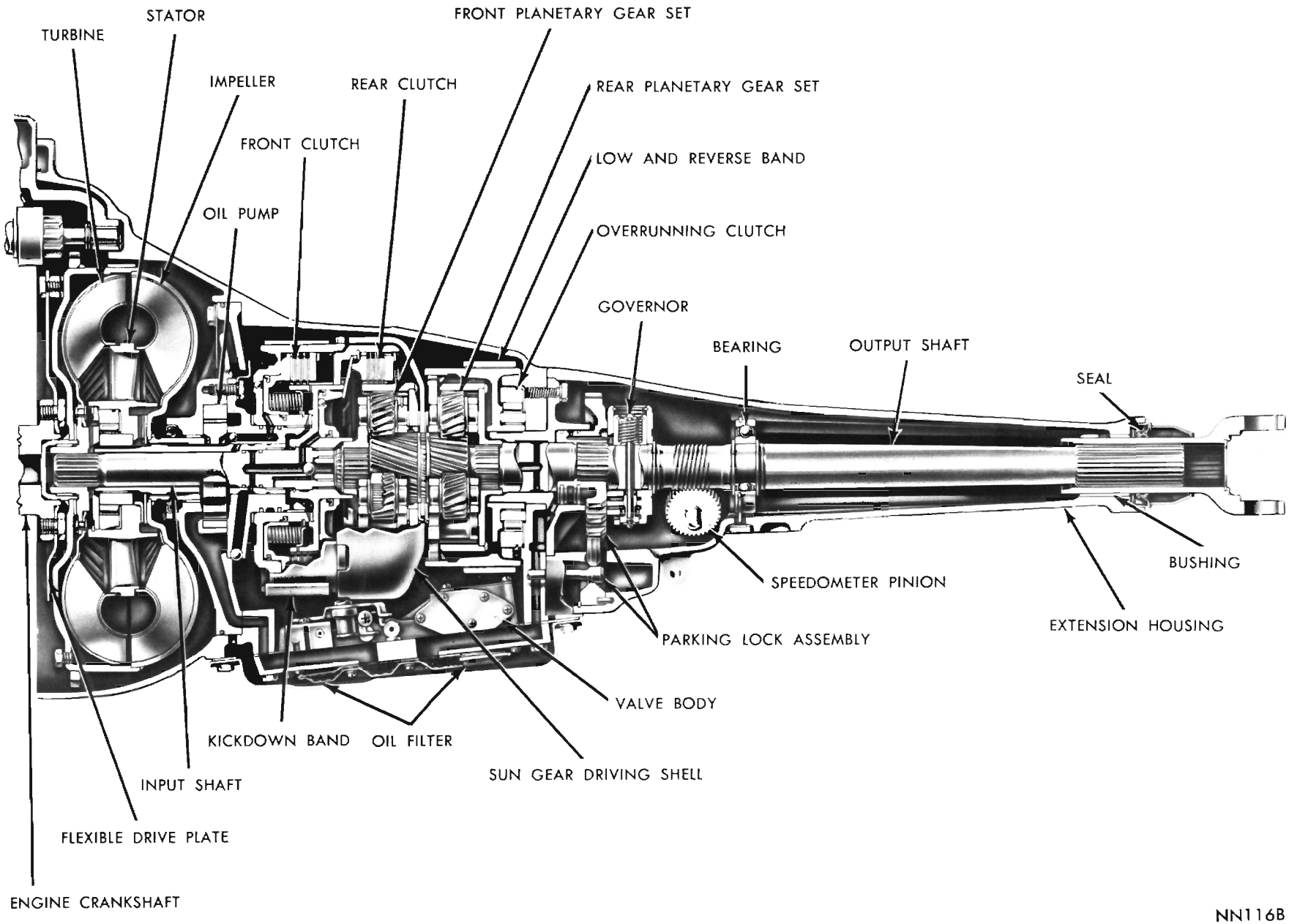
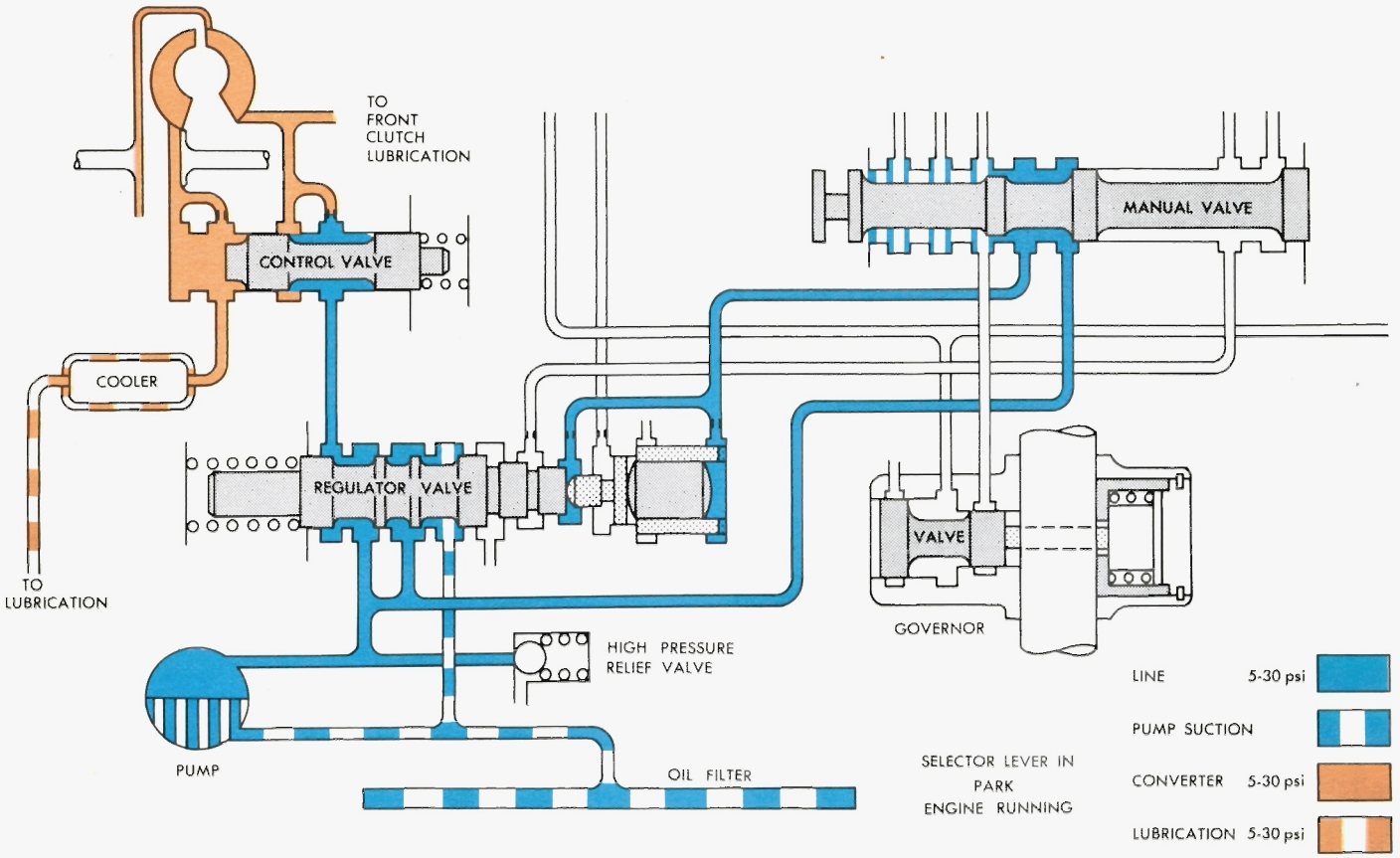
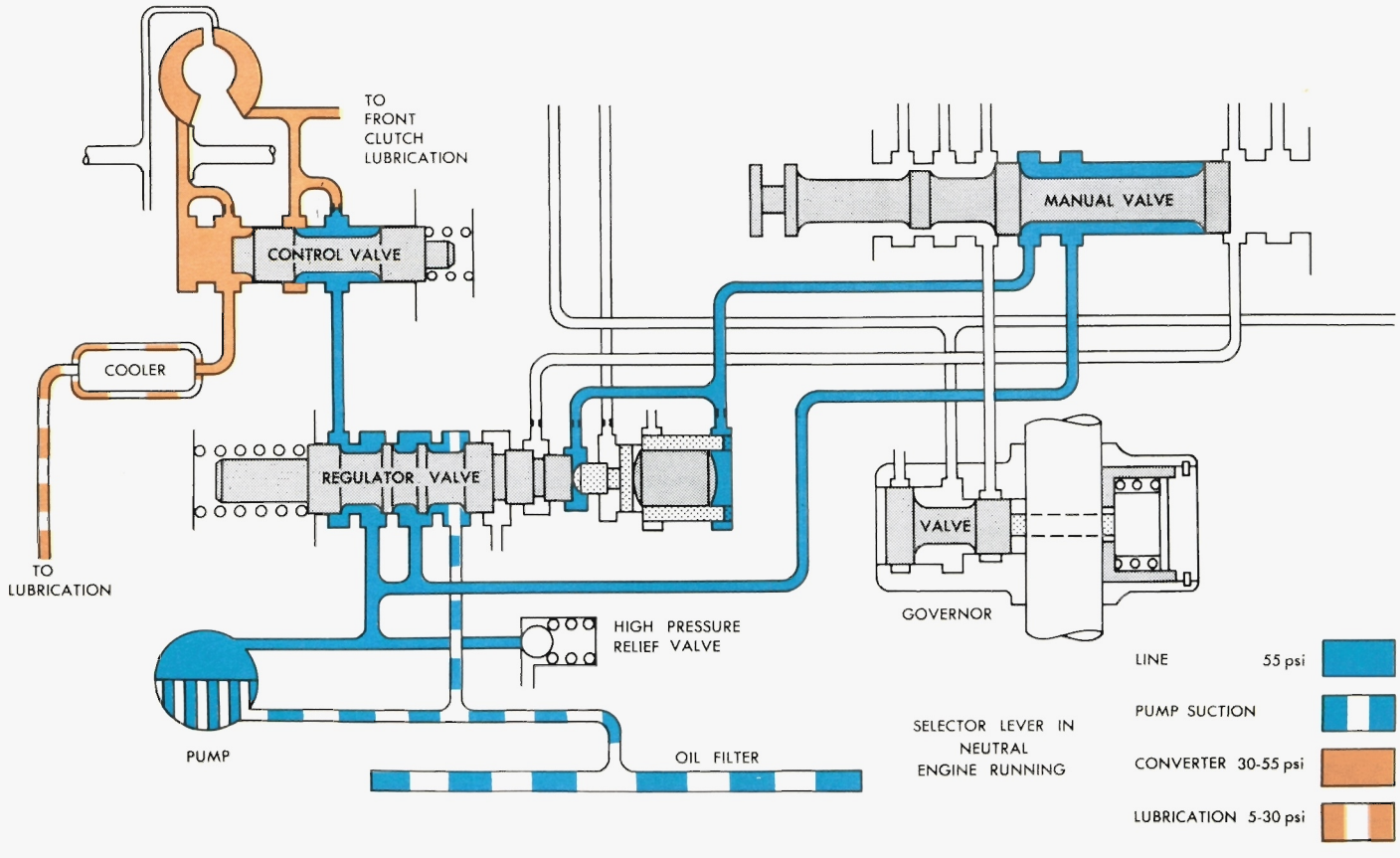
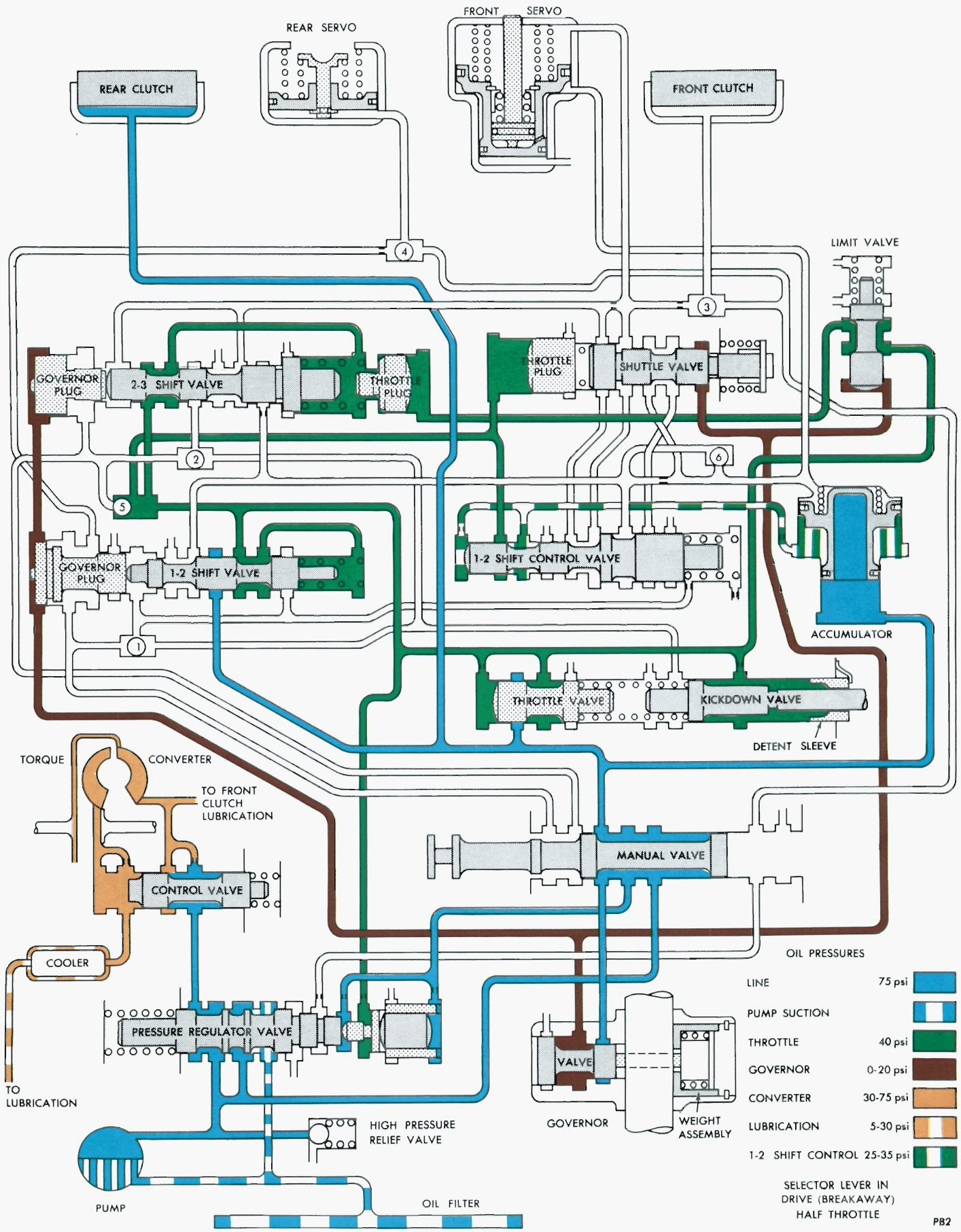


Fig. 2 - TorqueFlite Transmission and Torque Converter (A-727)

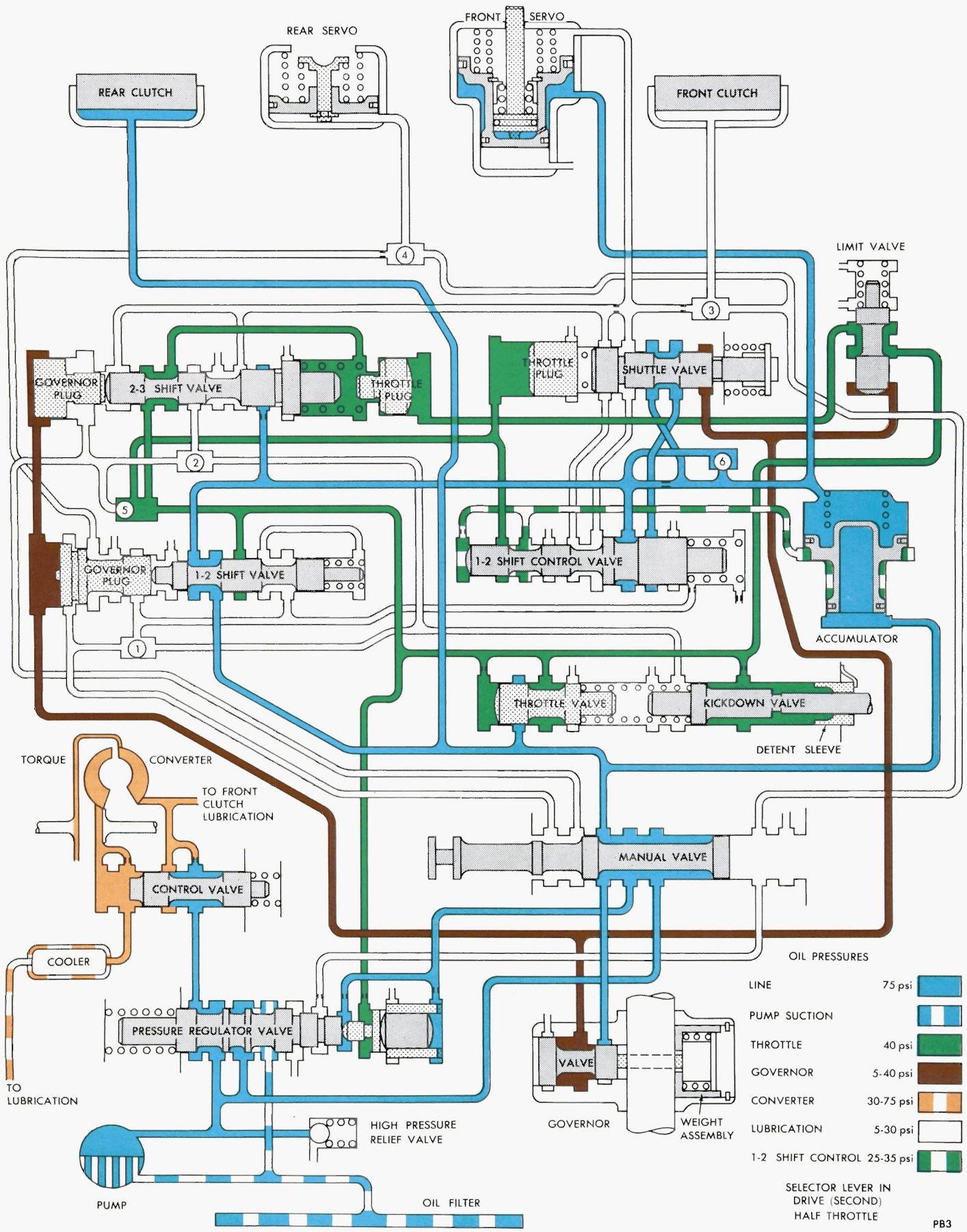




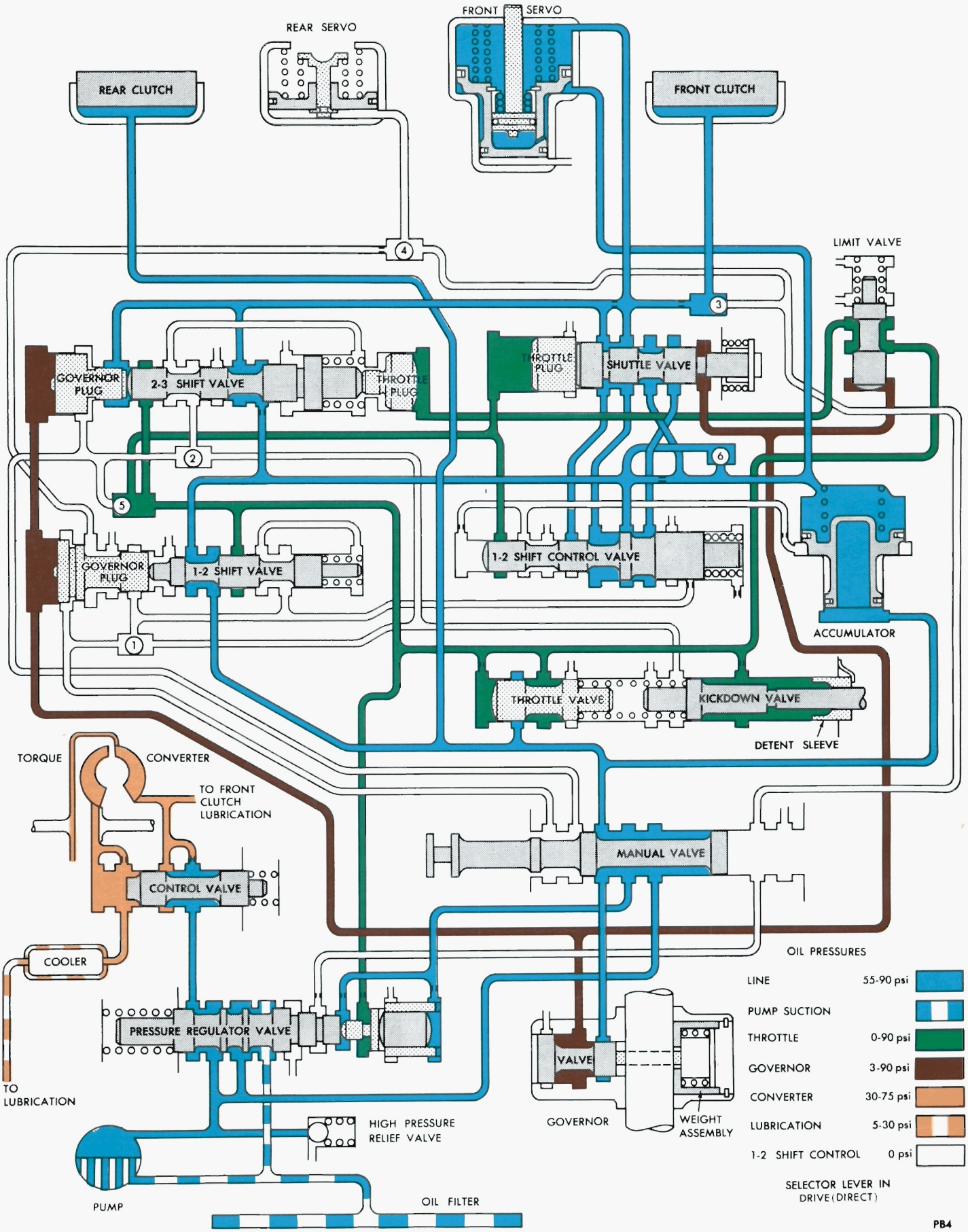
Park and Neutral (6 and 8 cylinder)



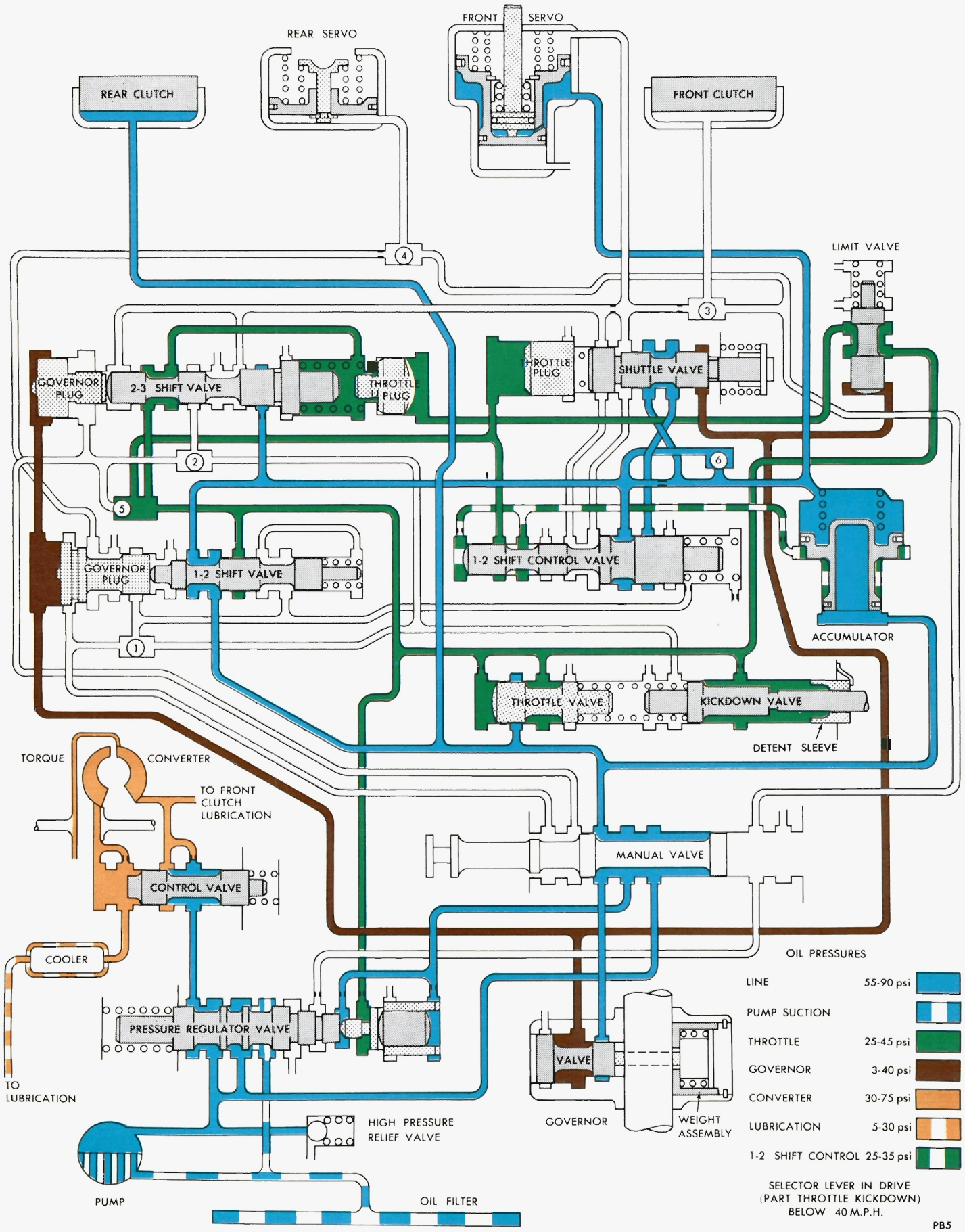
Drive Breakaway (8 Cylinder)



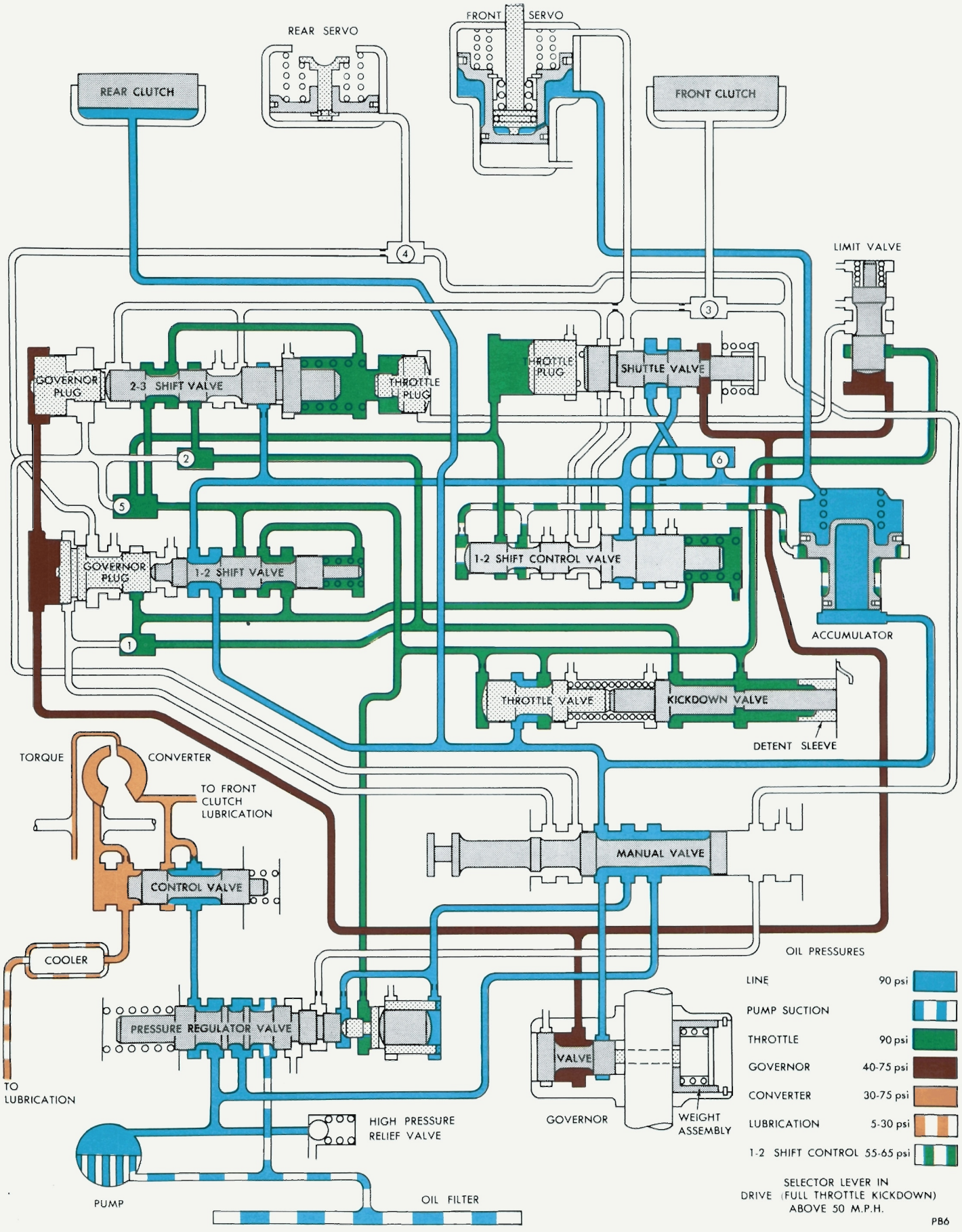
Drive-Second (8 Cylinder)



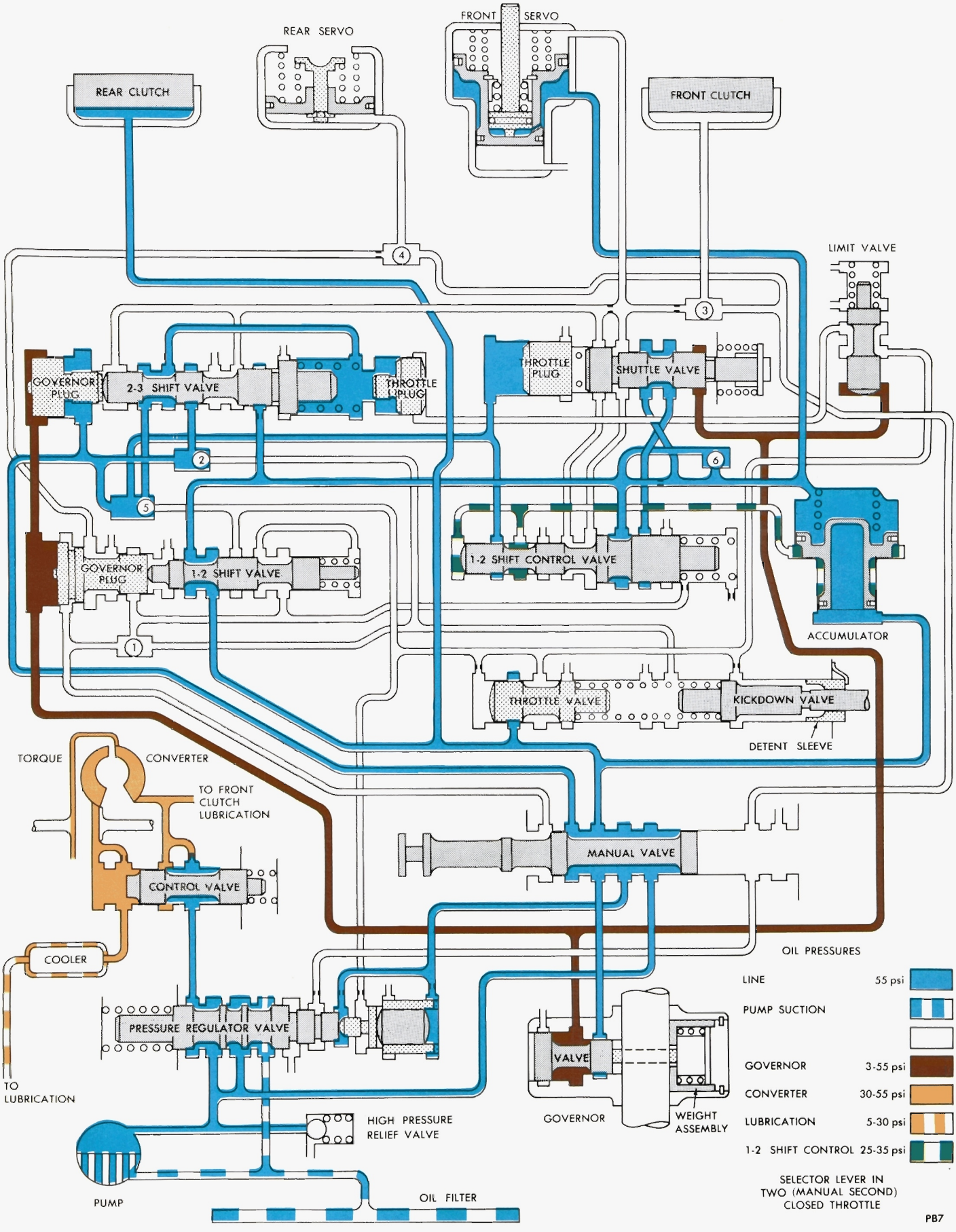
Drive-Direct (8 Cylinder)



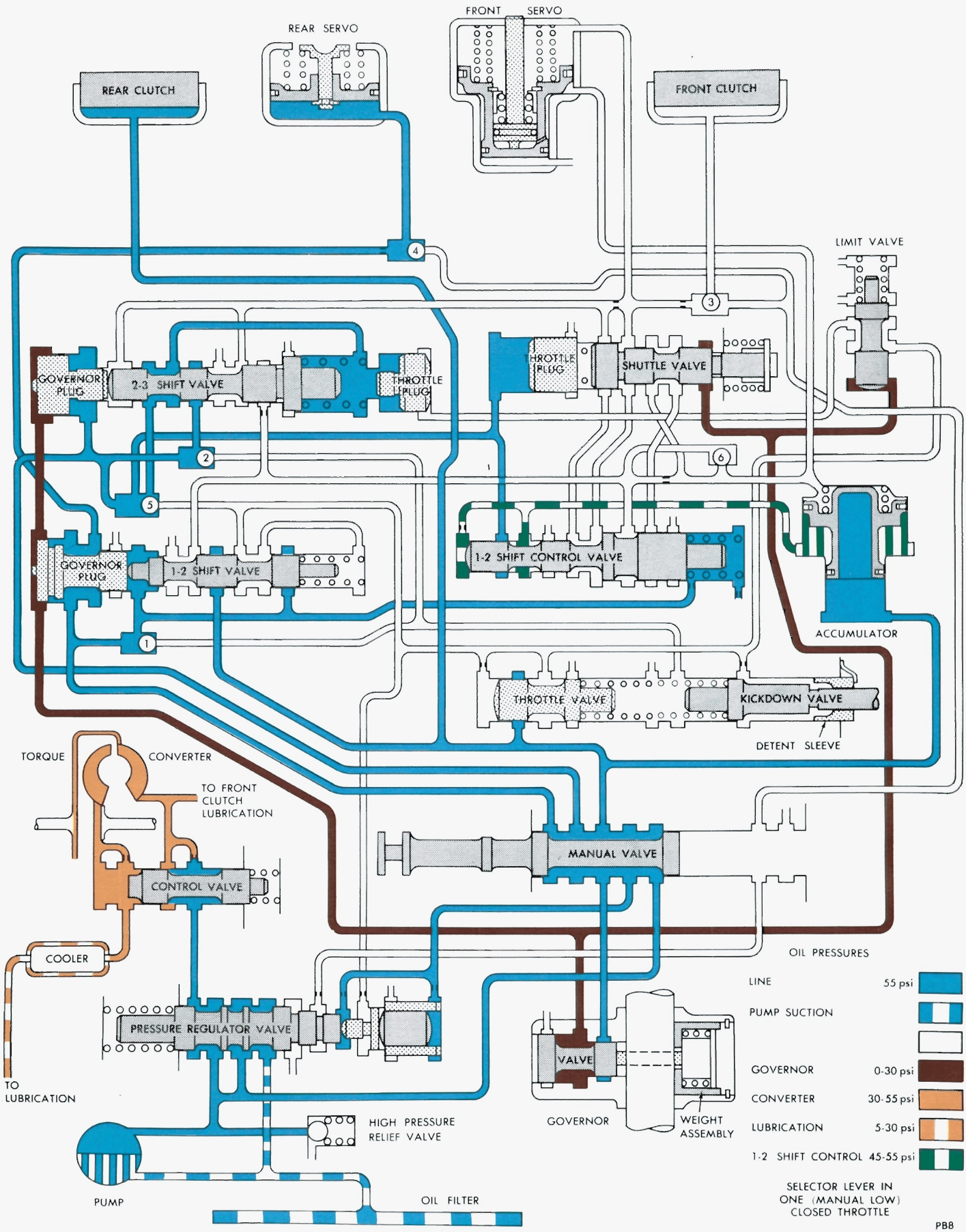
Drive-Part Throttle Kickdown (8 Cylinder)



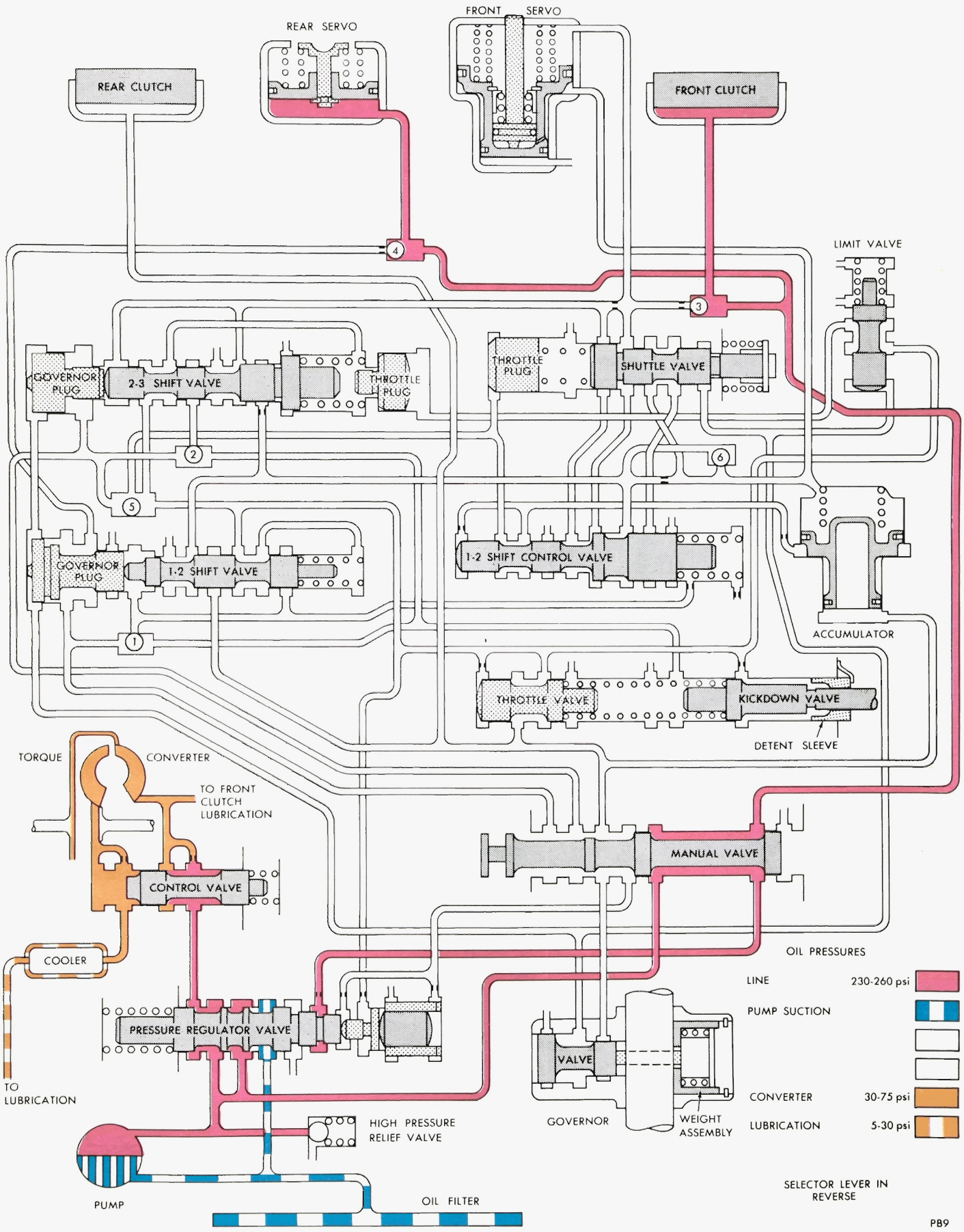
Drive-Full Throttle Kickdown (8 Cylinder)



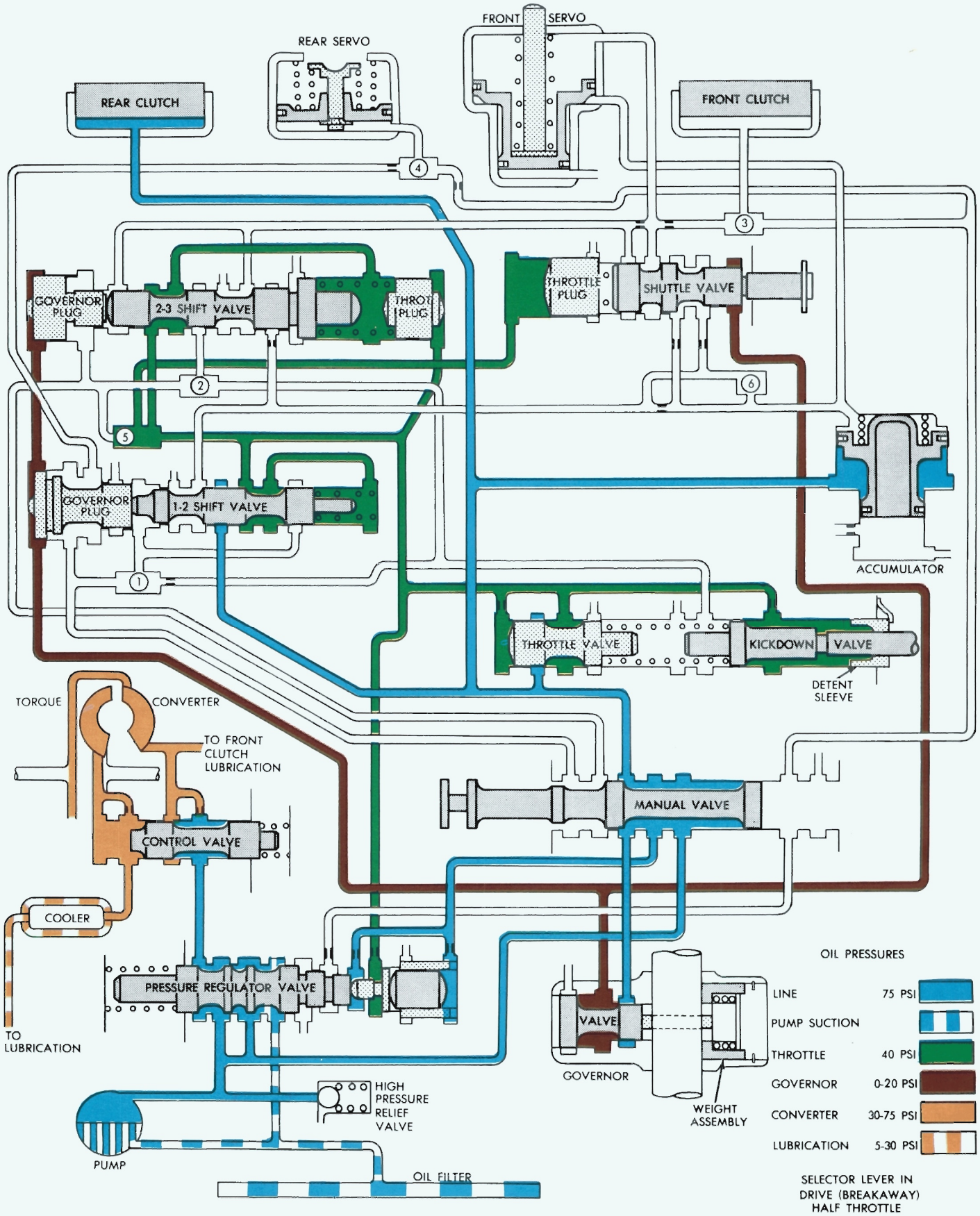
Selector Lever - Two (8 Cylinder)



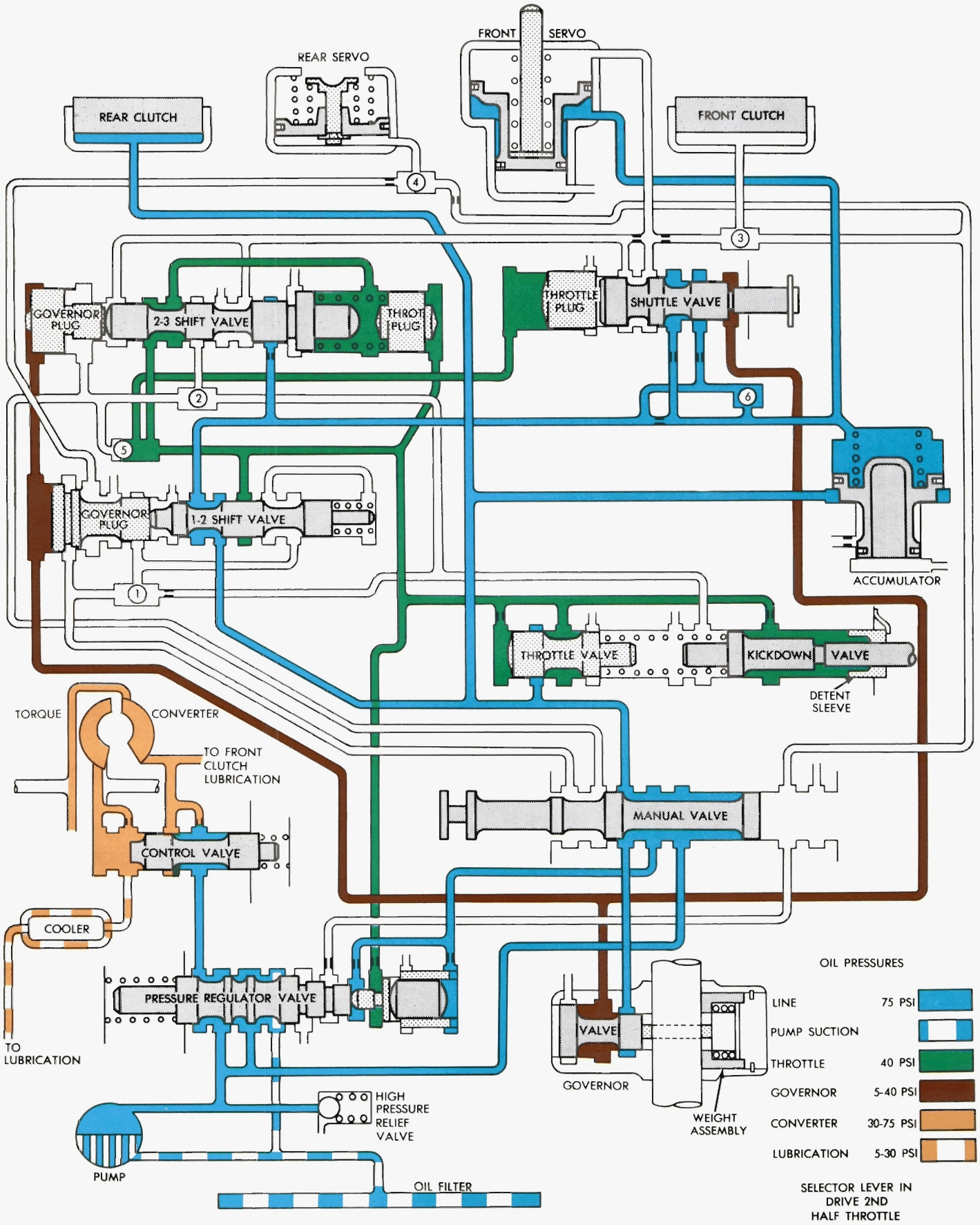
Selector Lever - One (8 Cylinder)



Reverse (8 Cylinder)

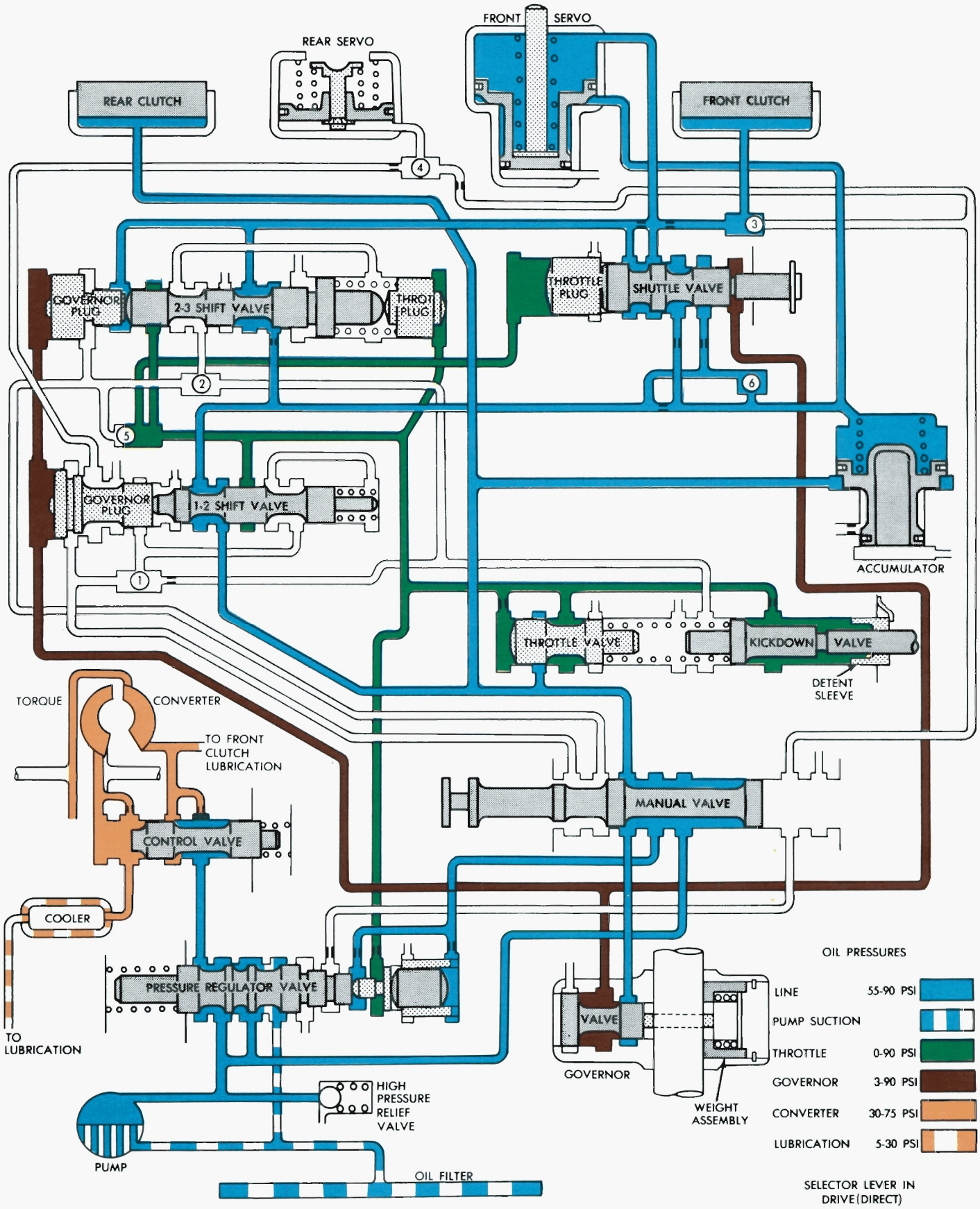


Drive - Breakaway (6 Cylinder)

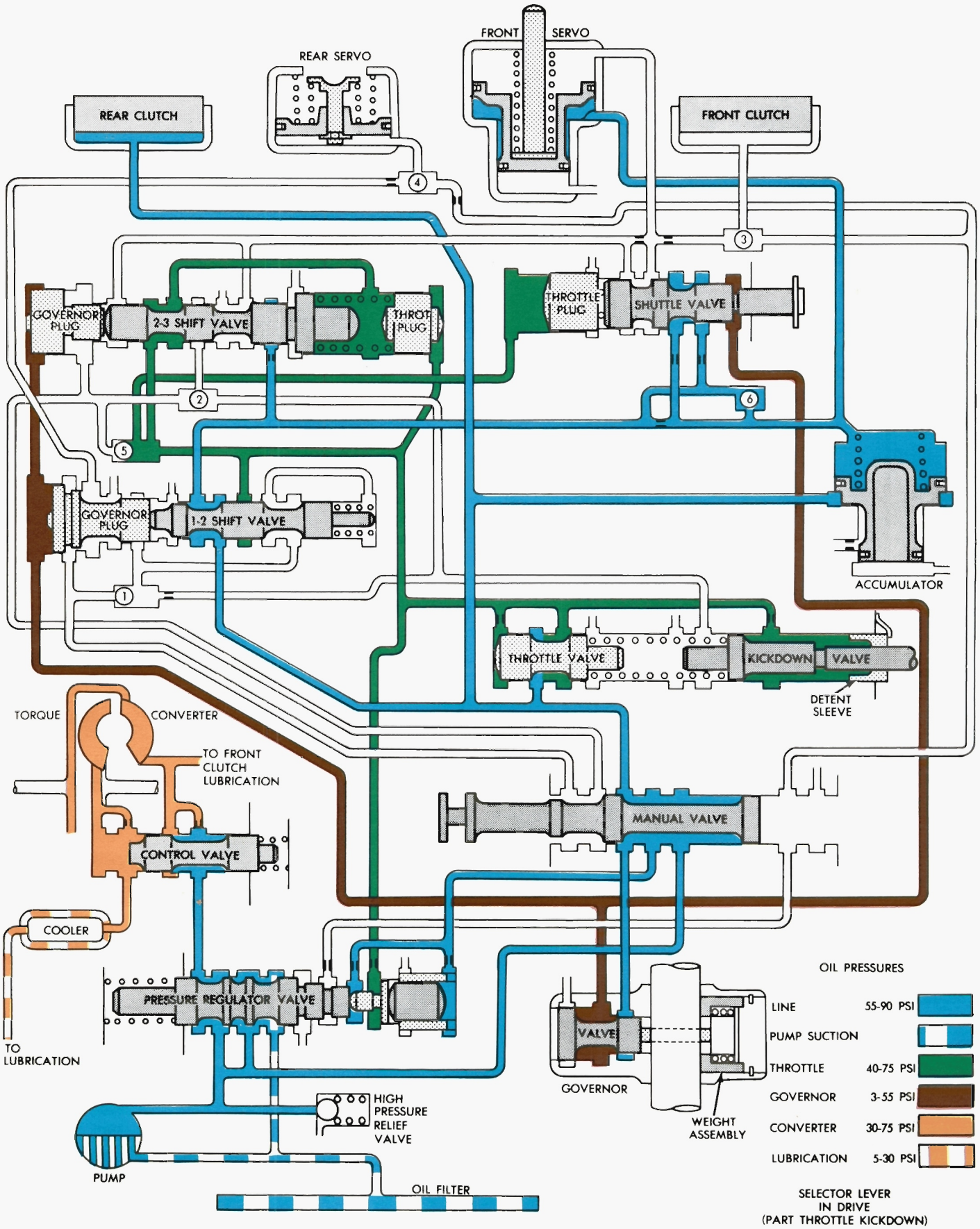


PB11

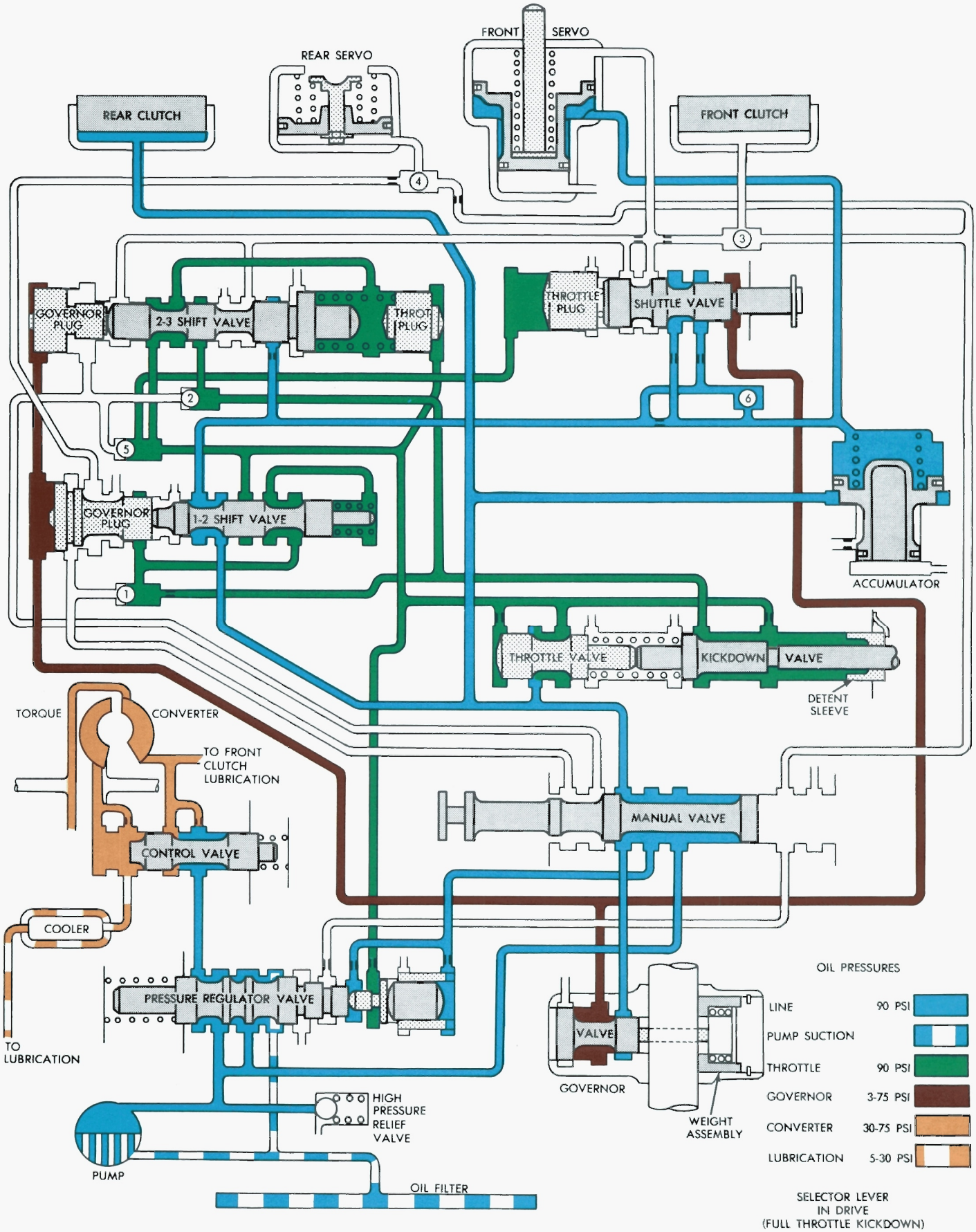
Drive - Second (6 Cylinder)



Drive - Direct (6 Cylinder)

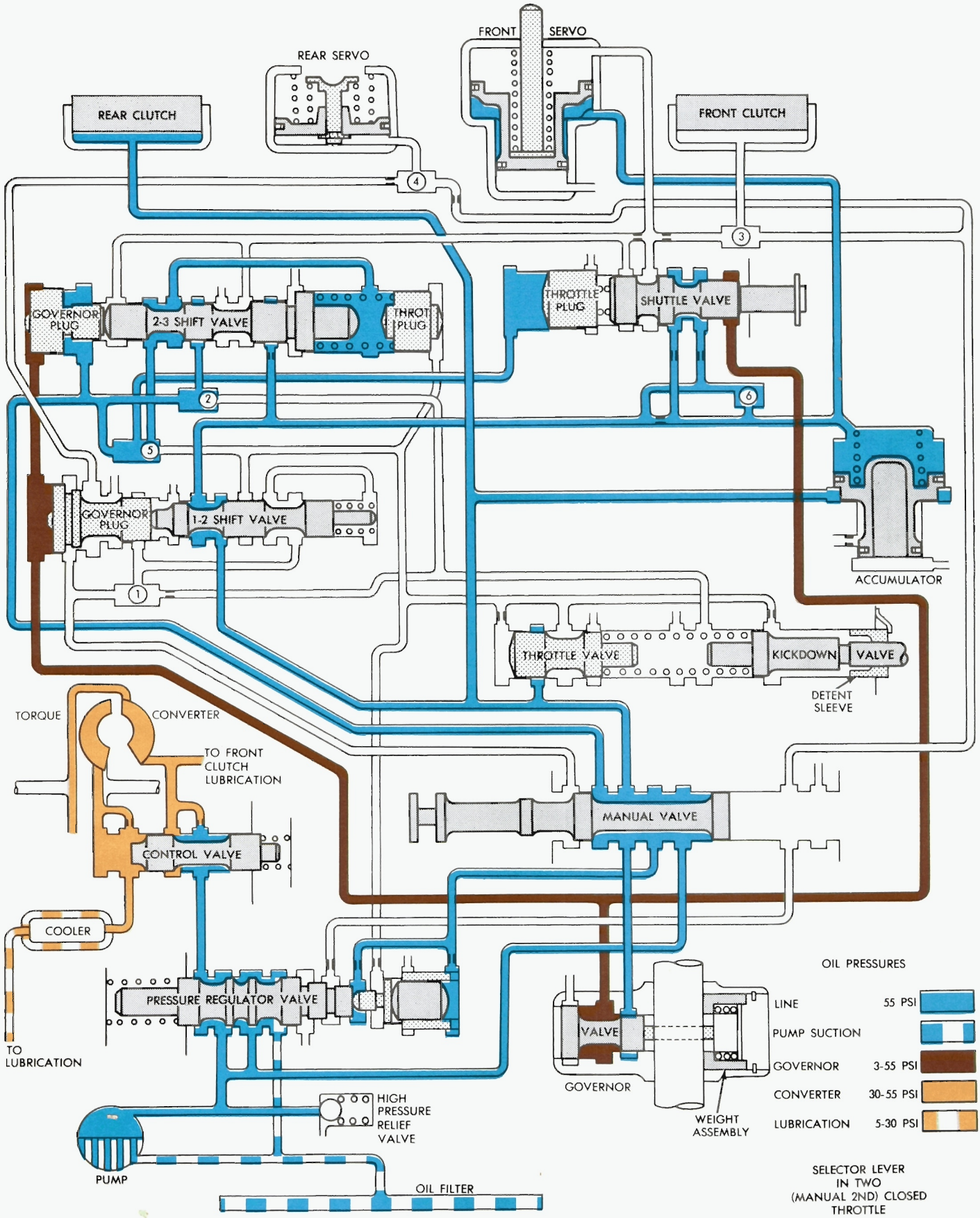


Drive - Part Throttle Kickdown (6 Cylinder)



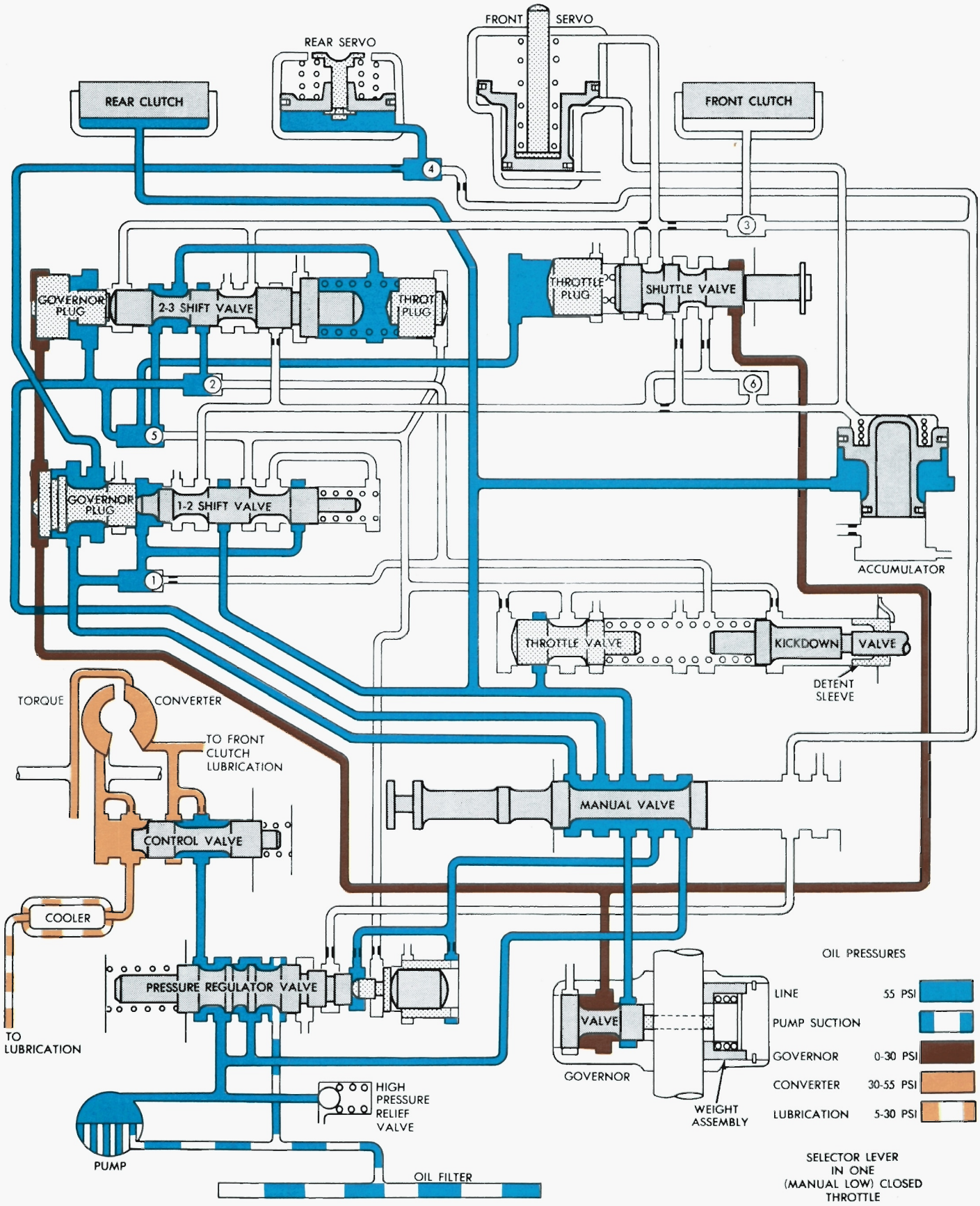
PB14

Drive-Full Throttle Kickdown (6 Cylinder)



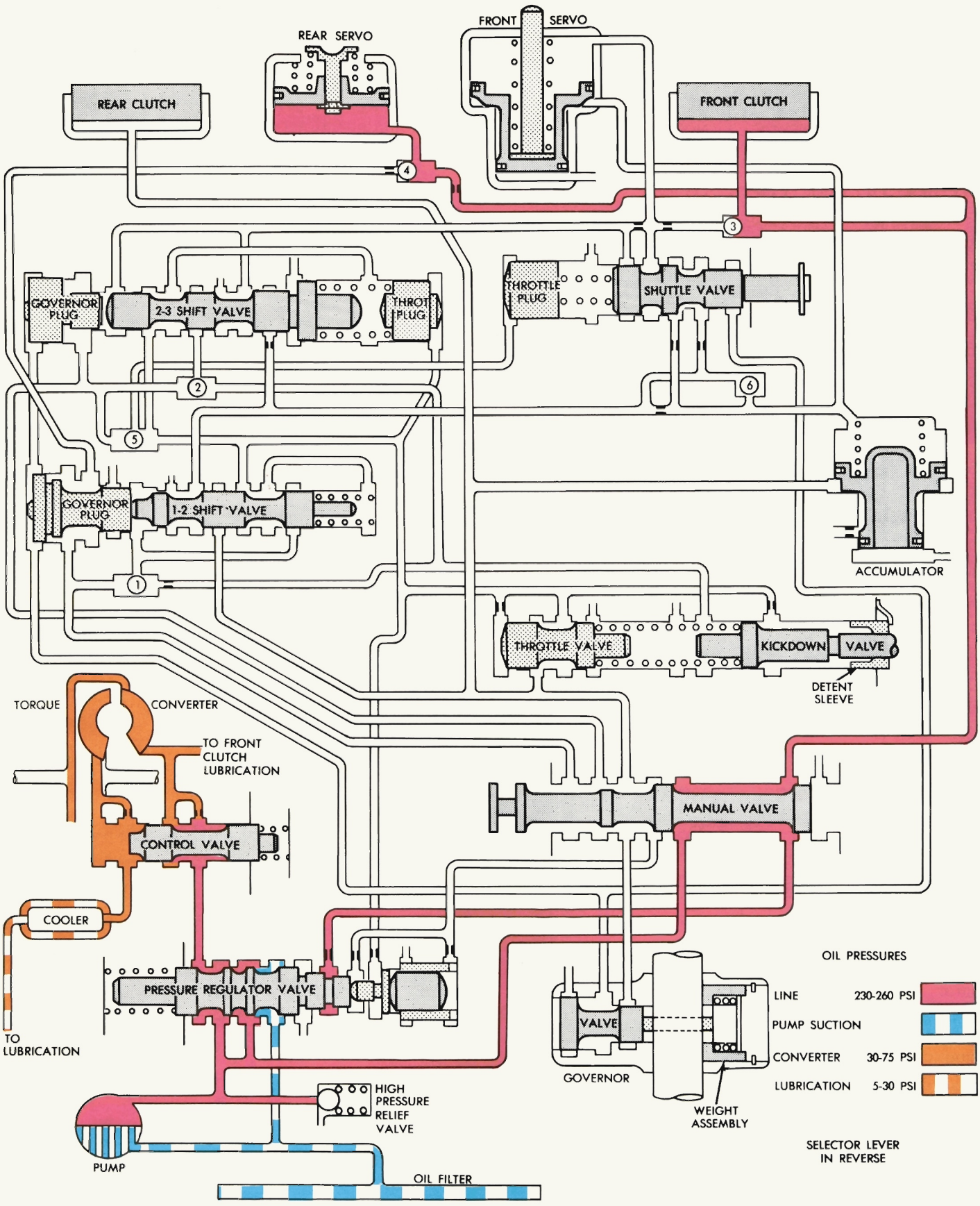
PB15

Selector Lever - Two (6 Cylinder)



PB16

Selector Lever - One (6 cylinder)



PB17

Reverse (6 Cylinder)

the valve body assembly.

Engine torque is transmitted to the torque converter then, through the input shaft to the multiple discs clutches in the transmission. The power flow depends on the application of the clutches and bands. Refer to "Clutch Engagement and Band Application Chart."

HYDRAULIC CONTROL SYSTEM

The hydraulic control circuits on pages 53 through 69 show the position of the various valves with color coded passages to indicate those under hydraulic pressure for all operations of the transmission.

The hydraulic control system makes the transmission fully automatic, and has four important functions to perform. In a general way, the components of any automatic control system may be grouped into the following basic groups:

The pressure supply system, the pressure regulating valves, the flow control valves, and the clutches and band servos.

Taking each of these basic groups or systems in turn, the control system may be described as follows:

Pressure Supply System

The pressure supply system consits of an oil pump driven by the engine through the torque converter. The single front pump furnishes pressure for all the hydraulic and lubrication requirements.

CLUTCH ENGAGEMENT AND BAND APPLICATION CHART

Lever Position Drive-Ratio	Front Clutch	Rear Clutch	Front (Kickdown) Band	Rear (Low-Rev) Band	Overrunning Clutch
N-NEUTRAL	DISENGAGED	DISENGAGED	RELEASED	RELEASED	NO MOVEMENT
D-DRIVE (Breakaway) 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	RELEASED	HOLDS
(Second) 1.45 to 1	DISENGAGED	ENGAGED	APPLIED	RELEASED	OVER RUNS
(Direct)	ENGAGED	ENGAGED	RELEASED	RELEASED	OVER RUNS
KICKDOWN (To Second) 1.45 to 1	DISENGAGED	ENGAGED	APPLIED	RELEASED	OVER RUNS
(To Low) (2.45 to 1)	DISENGAGED	ENGAGED	RELEASED	RELEASED	HOLDS
2-SECOND 1.45 to 1	DISENGAGED	ENGAGED	APPLIED	RELEASED	OVER RUNS
1-LOW 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	APPLIED	PARTIAL HOLD
R-REVERSE	ENGAGED	DISENGAGED	RELEASED	APPLIED	NO MOVEMENT

Pressure Regulating Valves

The pressure regulating valves consist of a regulator valve which controls line pressure at a value dependent on throttle opening.

The torque converter control valve maintains torque converter operating pressure and transmission lubricating pressure.

The governor valve transmits regulated pressure to the transmission (in conjunction with throttle pressure) to control upshift and downshift speeds.

The throttle valve transmits regulated pressure to the transmission (in conjunction with governor pressure) to control upshift and downshift speeds.

Flow Control Valves

The manual valve obtains the different transmission drive ranges as selected by the vehicle operator.

The 1-2 shift valve automatically shifts the transmission from low to second or from second to low depending on the vehicle operation.

The 2-3 shift valve automatically shifts the transmission from second to direct or from direct to second depending on the vehicle operation.

The kickdown valve makes possible a forced downshift from direct to second-second to breakaway or direct to breakaway (depending on vehicle speed) by depressing the accelerator pedal past the detent "feel" near wide open throttle.

The throttle pressure plug at the end of the 2-3 shift valve, provides a 3-2 downshift with varying throttle openings depending upon vehicle speed.

A-727 and A-904-LA only The 1-2 shift control

valve transmits 1-2 shift control pressure to the transmission accumulator piston to control the kickdown band capacity on 1-2 upshifts and 3-2 downshifts. The limit valve determines the maximum speed at which a 3-2 part throttle kickdown can be made.

The shuttle valve has two separate functions and performs each independently of the other. The first is that of providing fast release of the kickdown band, and smooth front clutch engagement when the driver makes a "lift-foot" upshift from second to direct. The second function of the shuttle valve is to regulate the application of the kickdown servo and band when making direct to second kickdowns.

Clutches, Band Servos and Accumulator

The front and rear clutch pistons, and both servo pistons are moved hydraulically to engage the clutches and apply the bands. The pistons are released by spring tension when hydraulic pressure is released. On the 2-3 upshift, the kickdown servo piston is released by spring tension and hydraulic pressure.

The accumulator controls the hydraulic pressure on the apply side of the kickdown servo during the 1-2 shift; thereby, cushioning the kickdown band application at any throttle position.

OPERATING INSTRUCTIONS

The transmission will automatically upshift and downshift at approximately the speeds shown in the "Automatic Shift Speed Chart." **All shift speeds given in the "Chart" may vary somewhat due to production tolerances and rear axle ratios. The quality of the shifts is very important. All shifts should be smooth and positive with no noticeable engine runaway. See "Specifications" for chart.**

Gearshift and Parking Lock Controls

The transmission is controlled by a "lever type" gearshift incorporated within the steering column. The control has six selector lever positions: P (park), R (reverse), N (neutral), D (drive), 2 (second) and 1 (low). Some vehicles are equipped with a "lever type" console gearshift which has the same selector lever positions. The parking lock is applied by moving the selector lever past a gate to the P position.

CAUTION: Never apply the parking lock until the vehicle has stopped; otherwise, a severe ratcheting noise will occur.

Starting the Engine

The engine will start with the selector lever in either the P (park) or N (neutral) positions.

(1) As a safety precaution when starting in the N (neutral) position, apply the parking or foot brake.

(2) Depress the accelerator pedal one-third of travel to insure proper choke operation.

(3) Turn the ignition key all the way to the right to START position. When the engine starts, release the key and it will return to the ON position. **The Torque-Flite transmission will not permit starting the engine by pushing or towing.**

Mountain Driving

When driving in the mountains with either heavy loads or when pulling trailers, the 2 (second) or 1 (low) position should be selected on upgrades which require heavy throttle for 1/2 mile or more. This reduces possibility of overheating the transmission and converter under these conditions.

Towing Vehicle

Transmission Inoperative: Tow the vehicle with a rear end pickup or remove the propeller shaft.

Transmission Operating Properly: The vehicle may be towed safely in N (neutral) with rear wheels on the ground at a speed not to exceed 30 mph. **If the vehicle is to be towed for extended distances, it should be done with a rear end pickup or the propeller shaft removed.** Because the transmission receives lubrication only when the engine is running, **it is good practice to always tow a disabled vehicle with a rear end pickup** or remove the propeller shaft.

The transmission should not be removed nor disassembled until a careful diagnosis is made, the definite cause determined and all possible external corrections performed. In diagnosing any abnormal shift condition, always make the hydraulic pressure tests before disassembly or replacement of parts.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HARSH ENGAGEMENT IN D, 1, 2 AND R	(a) Engine idle speed too high.	(a) Adjust engine idle speed to specifications. Re-adjust throttle linkage.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(b) Inspect fluid level, then perform hydraulic pressure tests and adjust to specifications.	(b) Hydraulic pressures too high or low.
	(c) Low-reverse band out of adjustment.	(c) Adjust low-reverse band.
	(d) Valve body malfunction or leakage.	(d) Perform pressure tests to determine cause and correct as required.
	(e) Accumulator sticking, broken rings or spring.	(e) Inspect accumulator for sticking, broken rings or spring. Repair as required.
	(f) Low-reverse servo, band or linkage malfunction.	(f) Inspect servo for damaged seals, binding linkage or faulty band lining. Repair as required.
	(g) Worn or faulty front and/or rear clutch.	(g) Disassemble and inspect clutch. Repair or replace as required.
DELAYED ENGAGEMENT IN D, 1, 2 AND R	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Incorrect gearshift control linkage adjustment.	(b) Adjust control linkage.
	(c) Hydraulic pressures too high or low.	(c) Perform hydraulic pressure tests and adjust to specifications.
	(d) Oil filter clogged.	(d) Replace oil filter.
	(e) Valve body malfunction or leakage.	(e) Perform pressure tests to determine cause and correct as required.
	(f) Accumulator sticking, broken rings or spring.	(f) Inspect accumulator for sticking, broken rings or spring. Repair as required.
	(g) Clutches or servos sticking or not operating.	(g) Remove valve body assembly and perform air pressure tests. Repair as required.
	(h) Faulty oil pump.	(h) Perform hydraulic pressure tests. Adjust and repair as required.
	(i) Worn or faulty front and/or rear clutch.	(i) Disassemble and inspect clutch. Repair or replace as required.
	(j) Worn or broken input shaft and/or reaction shaft support seal rings.	(j) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
	(k) Aerated fluid.	(k) Inspect for air leakage into pump suction passages.
	(l) Engine idle speed too low.	(l) Adjust idle speed to specifications and readjust transmission throttle rod.
RUNAWAY OR HARSH UPSHIFT AND 3-2 KICKDOWN	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Incorrect throttle linkage adjustment.	(b) Adjust throttle linkage.
	(c) Hydraulic pressures too high or low.	(c) Perform hydraulic pressure tests and adjust to specifications.
	(d) Kickdown band out of adjustment.	(d) Adjust kickdown band.
	(e) Valve body malfunction or leakage.	(e) Perform pressure tests to determine cause and correct as required.
	(f) Governor malfunction.	(f) Inspect governor and repair as required.
	(g) Accumulator sticking, broken rings or spring.	(g) Inspect accumulator for sticking, broken rings or spring. Repair as required.
	(h) Clutches or servos sticking or not operating.	(h) Remove valve body assembly and perform air pressure tests. Repair as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(i) Kickdown servo, band or linkage malfunction.	(i) Inspect servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.
	(j) Worn or faulty front clutch.	(j) Disassemble and inspect clutch. Repair or replace as required.
	(k) Worn or broken input shaft and/or reaction shaft support seal rings.	(k) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
NO UPSHIFT	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Incorrect throttle linkage adjustment.	(b) Adjust throttle linkage.
	(c) Kickdown band out of adjustment.	(c) Adjust kickdown band.
	(d) Hydraulic pressures too high or low.	(d) Perform hydraulic pressure tests and adjust to specifications.
	(e) Governor sticking or leaking.	(e) Remove and clean governor. Replace parts if necessary.
	(f) Valve body malfunction or leakage.	(f) Perform pressure tests to determine cause and correct as required.
	(g) Clutches or servos sticking or not operating.	(g) Remove valve body assembly and perform air pressure tests. Repair as required.
	(h) Faulty oil pump.	(h) Perform hydraulic pressure tests, adjust or repair as required.
	(i) Kickdown servo, band or linkage malfunction.	(i) Inspect servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.
	(j) Worn or faulty front clutch.	(j) Disassemble and inspect clutch. Repair or replace as required.
	(k) Worn or broken input shaft and/or reaction shaft support seal rings.	(k) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
NO KICKDOWN OR NORMAL DOWNSHIFT	(a) Incorrect throttle linkage adjustment.	(a) Adjust throttle linkage.
	(b) Incorrect gearshift control linkage adjustment.	(b) Adjust control linkage.
	(c) Kickdown band out of adjustment.	(c) Adjust kickdown band.
	(d) Hydraulic pressures too high or low.	(d) Perform hydraulic pressure tests and adjust to specifications.
	(e) Governor sticking or leaking.	(e) Remove and clean governor. Replace parts if necessary.
	(f) Valve body malfunction or leakage.	(f) Perform pressure tests to determine cause and correct as required.
	(g) Clutches or servos sticking or not operating.	(g) Remove valve body assembly and perform air pressure tests. Repair as required.
	(h) Kickdown servo, band or linkage malfunction.	(h) Inspect servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.
	(i) Overrunning clutch not holding.	(i) Disassemble transmission and repair overrunning clutch as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
SHIFTS ERRATIC	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Inspect for air leakage into pump suction passages.	(b) Aerated fluid.
	(c) Incorrect throttle linkage adjustment.	(c) Adjust throttle linkage.
	(d) Incorrect gearshift control linkage adjustment.	(d) Adjust control linkage.
	(e) Hydraulic pressures too high or low.	(e) Perform hydraulic pressure tests and adjust to specifications.
	(f) Governor sticking or leaking.	(f) Remove and clean governor. Replace parts if necessary.
	(g) Oil filter clogged.	(g) Replace oil filter.
	(h) Valve body malfunction or leakage.	(h) Perform pressure tests to determine cause and correct as required.
	(i) Clutches or servos sticking or not operating.	(i) Remove valve body assembly and perform air pressure tests. Repair as required.
	(j) Faulty oil pump.	(j) Perform hydraulic pressure tests, adjust or repair as required.
	(k) Worn or broken input shaft and/or reaction shaft support seal rings.	(k) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
SLIPS IN FORWARD DRIVE POSITIONS	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Aerated fluid.	(b) Inspect for air leakage into pump suction passages.
	(c) Incorrect throttle linkage adjustment.	(c) Adjust throttle linkage.
	(d) Incorrect gearshift control linkage adjustment.	(d) Adjust control linkage.
	(e) Hydraulic pressures too low.	(e) Perform hydraulic pressure tests and adjust to specifications.
	(f) Valve body malfunction or leakage.	(f) Perform pressure tests to determine cause and correct as required.
	(g) Accumulator sticking, broken rings or spring.	(g) Inspect accumulator for sticking, broken rings or spring. Repair as required.
	(h) Clutches or servos sticking or not operating.	(h) Remove valve body assembly and perform air pressure tests. Repair as required.
	(i) Worn or faulty front and/or rear clutch.	(i) Disassemble and inspect clutch. Repair or replace as required.
	(j) Overrunning clutch not holding.	(j) Disassemble transmission and repair overrunning clutch as required.
	(k) Worn or broken input shaft and/or reaction shaft support seal rings.	(k) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
	(l) Engine idle speed too low.	(l) Adjust idle speed to specifications and readjust transmission throttle rod.
SLIPS IN REVERSE ONLY	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Aerated fluid.	(b) Inspect for air leakage into pump suction passages.
	(c) Incorrect gearshift control linkage adjustment.	(c) Adjust control linkage.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(d) Hydraulic pressures too high or low.	(d) Perform hydraulic pressure tests and adjust to specifications.
	(e) Low-reverse band out of adjustment.	(e) Adjust low-reverse band.
	(f) Valve body malfunction or leakage.	(f) Perform pressure tests to determine cause and correct as required.
	(g) Front clutch or rear servo, sticking or not operating.	(g) Remove valve body assembly and perform air pressure tests. Repair as required.
	(h) Low-reverse servo, band or linkage malfunction.	(h) Inspect servo for damaged seals, binding linkage or faulty band lining. Repair as required.
	(i) Faulty oil pump.	(i) Perform hydraulic pressure tests, adjust or repair as required.
	(j) Engine idle speed too low.	(j) Adjust idle speed to specifications and readjust transmission throttle rod.
SLIPS IN ALL POSITIONS	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Hydraulic pressures too low.	(b) Perform hydraulic pressure tests and adjust to specifications.
	(c) Valve body malfunction or leakage.	(c) Perform pressure tests to determine cause and correct as required.
	(d) Faulty oil pump.	(d) Perform hydraulic pressure tests, adjust or replace as required.
	(e) Clutches or servos sticking or not operating.	(e) Remove valve body assembly and perform air pressure tests. Repair as required.
	(f) Engine idle speed too low.	(f) Adjust idle speed to specifications and readjust transmission throttle rod.
	(g) Worn or broken input shaft and/or reaction shaft support seal rings.	(g) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
NO DRIVE IN ANY POSITION	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Hydraulic pressures too low.	(b) Perform hydraulic pressure tests and adjust to specifications.
	(c) Oil filter clogged.	(c) Replace oil filter.
	(d) Valve body malfunction or leakage.	(d) Perform pressure tests to determine cause and correct as required.
	(e) Faulty oil pump.	(e) Perform hydraulic pressure tests, adjust or repair as required.
	(f) Clutches or servos sticking or not operating.	(f) Remove valve body assembly and perform air pressure tests. Repair as required.
NO DRIVE IN FORWARD DRIVE POSITIONS	(a) Hydraulic pressures too low.	(a) Perform hydraulic pressure tests and adjust to specifications.
	(b) Valve body malfunction or leakage.	(b) Perform pressure tests to determine cause and correct as required.
	(c) Clutches or servos, sticking or not operating.	(c) Remove valve body assembly and perform air pressure tests. Repair as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(d) Disassemble and inspect clutch. Repair or replace as required.	(d) Worn or faulty rear clutch.
	(e) Overrunning clutch not holding	(e) Disassemble transmission and repair overrunning clutch as required.
	(f) Worn or broken input shaft and/or reaction shaft support seal rings.	(f) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace parts as required.
NO DRIVE IN REVERSE	(a) Incorrect gearshift control linkage adjustment.	(a) Adjust control linkage.
	(b) Hydraulic pressures too low.	(b) Perform hydraulic pressure tests and adjust to specifications.
	(c) Low-reverse band out of adjustment.	(c) Adjust low-reverse band.
	(d) Valve body malfunction or leakage.	(d) Perform pressure tests to determine cause and correct as required.
	(e) Front clutch or rear servo, sticking or not operating.	(e) Remove valve body assembly and perform air pressure tests. Repair as required.
	(f) Low-reverse servo, band or linkage malfunction.	(f) Inspect servo for damaged seals, binding linkage or faulty band lining. Repair as required.
	(g) Worn or faulty front clutch.	(g) Disassemble and inspect clutch. Repair or replace as required.
DRIVES IN NEUTRAL	(a) Incorrect gearshift control linkage adjustment.	(a) Adjust control linkage.
	(b) Valve body malfunction or leakage.	(b) Perform pressure tests to determine cause and correct as required.
	(c) Rear clutch dragging.	(c) Inspect clutch and repair as required.
DRAGS OR LOCKS	(a) Kickdown band out of adjustment.	(a) Adjust kickdown band.
	(b) Low-reverse band out of adjustment.	(b) Adjust low-reverse band.
	(c) Kickdown and/or low-reverse servo, band, linkage malfunction.	(c) Inspect servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.
	(d) Front and/or rear clutch faulty.	(d) Disassemble and inspect clutch. Repair or replace as required.
	(e) Planetary gear sets broken or seized.	(e) Inspect condition of planetary gear sets and replace as required.
	(f) Overrunning clutch worn, broken or seized.	(f) Inspect condition of overrunning clutch and replace parts as required.
GRATING, SCRAPING GROWLING NOISE	(a) Kickdown band out of adjustment.	(a) Adjust kickdown band.
	(b) Low-reverse band out of adjustment.	(b) Adjust low-reverse band.
	(c) Output shaft bearing and/or bushing damaged.	(c) Remove extension housing and replace bearing and/or bushing.
	(d) Governor support binding or broken seal rings.	(d) Inspect condition of governor support and repair as required.
	(e) Oil pump scored or binding.	(e) Inspect condition of pump and repair as required.
	(f) Front and/or rear clutch faulty.	(f) Disassemble and inspect clutch. Repair or replace as required.
	(g) Planetary gear sets broken or seized.	(g) Inspect condition of planetary gear sets and replace as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(h) Overrunning clutch worn, broken or seized.	(h) Inspect condition of overrunning clutch and replace parts as required.
BUZZING NOISE	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Pump sucking air.	(b) Inspect pump for nicks or burrs on mating surfaces, porous casting, and/or excessive rotor clearance. Replace parts as required.
	(c) Valve body malfunction.	(c) Remove and recondition valve body assembly.
	(d) Overrunning clutch inner race damaged.	(d) Inspect and repair clutch as required.
HARD TO FILL, OIL BLOWS OUT FILLER TUBE	(a) High fluid level.	(a) Drain fluid to correct level.
	(b) Breather clogged.	(b) Inspect and clean breather vent opening in oil pump housing.
	(c) Oil filter clogged.	(c) Replace oil filter.
	(d) Aerated fluid.	(d) Inspect for air leakage into pump suction passage.
OIL LEAKAGE	(a) Speedometer Adaptor	(a) Replace rubber "O" ring seal. Inspect for bore porosity.
	(b) Speedometer Drive Pinion Seal	(b) Replace rubber seal.
	(c) Oil Pan Gasket	(c) Can often be stopped by tightening the attaching bolts to proper torque (150 in-lbs.). If necessary, replace gasket. Inspect oil pan gasket mounting face for flatness. CAUTION: **Do not overtorque pan bolts.**
	(d) Fluid Filler Tube	(d) Replace "O" ring seal. Inspect for tube damage, and bore porosity.
	(e) Fluid Lines and Fittings	(e) If leakage cannot be stopped by tightening a fitting, replace the defective part.
	(f) Manual Control Lever	(f) Replace either or both the manual lever or throttle lever shaft seal.
	(g) Pipe Plugs	(g) Torque to specified torque. If leak persists, replace plug.
	(h) Rear Extension Seal	(h) Check for O.D. Bore damage and replace seal.
	(i) Rear Bearing Access Plate	(i) Replace gasket.
	(j) Extension Bolts	(j) Replace bolt.
	(k) Extension Gasket	(k) Replace gasket and check for sealing surface damage on case and extension.
	(l) Kickdown Band Adjusting Scew	(l) Apply sealer.
	(m) Neutral Switch	(m) Replace switch and/or gasket.
	(n) Fluid Leakage in Converter Housing Area	(n) See section on Fluid Leakage.
TRANSMISSION OVERHEATS	(a) Low fluid level.	(a) Refill to correct level with "Dexron" type Automatic Transmission Fluid.
	(b) Kickdown band adjustment too tight.	(b) Adjust kickdown band.
	(c) Low-reverse band adjustment too tight.	(c) Adjust low-reverse band.
	(d) Faulty cooling system.	(d) Inspect transmission cooling system, clean and repair as required.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
	(e) Cracked or restricted oil cooler line or fitting.	(e) Inspect, repair or replace as required.
	(f) Faulty oil pump.	(f) Inspect pump for incorrect clearance, repair as required.
	(g) Insufficient clutch plate clearance in front and/or rear clutches.	(g) Measure clutch plate clearance and correct with proper size snap ring.
STARTER WILL NOT ENERGIZE IN NEUTRAL OR PARK	(a) Incorrect gearshift control linkage adjustment.	(a) Adjust control linkage.
	(b) Faulty neutral starting switch.	(b) Test operation of switch with a test lamp. Replace if required.
	(c) Broken lead to neutral switch.	(c) Inspect lead and test with a test lamp. Repair broken lead.

STALL TEST

WARNING: During test let no one stand in front of vehicle.

The stall test consists of determining the engine speed obtained at full throttle in D position. This test checks the torque converter stator clutch operation, and the holding ability of the transmission clutches. The transmission oil level should be checked and the engine brought to normal operating temperature before stall operation. **Both the parking and service brakes must be fully applied and front wheels blocked while making this test.**

Do not hold the throttle open any longer than is necessary to obtain a maximum engine speed reading, **and never longer than five seconds at a time.** If more than one stall check is required, operate the engine at approximately 1,000 rpm in neutral for 20 seconds to cool the transmission fluid between runs. If engine speed exceeds the maximum limits shown, release the accelerator immediately since transmission clutch slippage is indicated.

STALL SPEED ABOVE SPECIFICATION

If stall speed exceeds the maximum specified in chart by more than 200 rpm, transmission clutch slippage is indicated. Follow the transmission oil pressure and air pressure checks outlined in the Service in Vehicle section to determine the cause of slippage.

STALL SPEED BELOW SPECIFICATION

Low stall speeds **with a properly tuned engine** indicate torque converter stator clutch problems. A road test will be necessary to identify the exact problem.

If stall speeds are 250-350 rpm below specification, and the vehicle operates properly at highway speeds, but has poor through-gear aceleration, the stator overrunning clutch is slipping.

If stall speed and acceleration are normal, but abnormally high throttle opening is required to maintain highway speeds, the stator clutch has seized.

Both of these stator defects require replacement of the torque converter.

NOISE

A whining or siren-like noise due to fluid flow is normal during stall operation with some converters; however, loud metallic noises from loose parts or interference within the assembly indicate a defective torque converter. To confirm that the noise originates within the converter, operate the vehicle at light throttle in D and N on a hoist and listen under the transmission bell housing.

STALL SPEED SPECIFICATION CHART

Engine Model Cu. In.	Transmission Type	Engine Speed (RPM)
198	A904-G	1550-1850
225	A904-G	1750-2050
225	A727-RG	1350-1650
318	A904-LA	2000-2300
318	A727-A	1650-1950
340-4 BBL.	A727-A	2150-2450
360-2 BBL.	A727-A	2150-2450
383-2 BBL.	A727-B	1800-2100
383-4 BBL.	A727-B	2300-2650
440-4 BBL.	A727-B	2000-2350
426-2-4 BBL.	A727-B	2500-2850

SERVICE PROCEDURES

HELI-COIL CHART

Heli-Coil Insert			Drill	Tap	Inserting Tool	Extracting Tool
Thread Size	Part No.	Insert Length	Size	Part No.	Part No.	Part No.
10-24	1185-3	.285"	13/64" (.203")	3 CPB	528-3N	1227-6
1/4-20	1185-4	3/8"	17/64" (.265")	4 CPB	528-4N	1227-6
5/16-18	1185-5	15/32"	Q (.332")	5 CPB	528-5N	1227-6
3/8-16	1185-6	9/16"	X (.397")	6 CPB	528-6N	1227-6
7/16-14	1185-7	21/32"	29/32" (.453")	7 CPB	528-7N	1227-16

SERVICE IN VEHICLE

Various transmission components can be removed for repairs without removing the transmission from the vehicle. The removal, reconditioning and installation procedures for these components are covered here.

ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils. Essentially, this repair consists of drilling out the worn or damaged threads, tapping the hole with a special Heli-Coil Tap, and installing a Heli-Coil insert into the tapped hole. This brings the hole back to its original thread size.

The chart lists the threaded hole sizes which are used in the aluminum case and valve body, and the necessary tools and inserts for the repair of damaged or worn threads. Heli-Coil tools and inserts are readily available from most automotive parts jobbers. **Some thread drag may occur in screwing a bolt into the installed Heli-Coil insert. Therefore, a torque reading should be taken of the thread drag with an inch-pound torque wrench and added to the specified bolt torque, so that all bolts securing a particular part will be tightened to the same torque.**

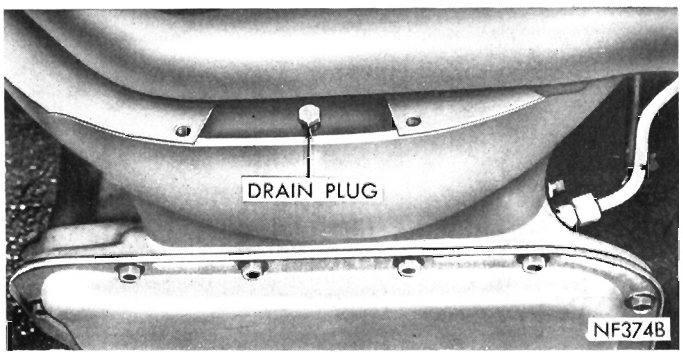


Fig. 3 - Converter Drain Plug

LUBRICATION

FLUID AND FILTER CHANGES

Automatic transmission fluid and filter should be changed, and the bands adjusted as follows:

Type Service	Required Service
Normal Usage (Pass. Cars)	No service required
Severe Usage (Defined Below)	Every 24,000 miles

(1) More than 50% operation in heavy city traffic during hot weather (above 90 F.).

(2) Police, Taxi, Limousine, Commercial Type Operation, Trailer Tow.

(3) Vehicles powered with 426 Hemi, or 340 and 440 cubic inch engines with 3 2-barrel carburetors.

NOTES:

(1) When the factory fill fluid is changed as recommended above, only fluids of the type labeled "DEXRON" Automatic Transmission Fluid should be used. A band adjustment and filter change should be made at the time of the oil change.

(2) If the transmission is disassembled for any reason, the fluid and filter should be changed, and the bands adjusted.

Fluid Level

Inspect fluid level every six months with engine and transmission at normal operating temperature. Refer to "Lubrication and Maintenance," Group



Fig. 4 - Dipstick Markings

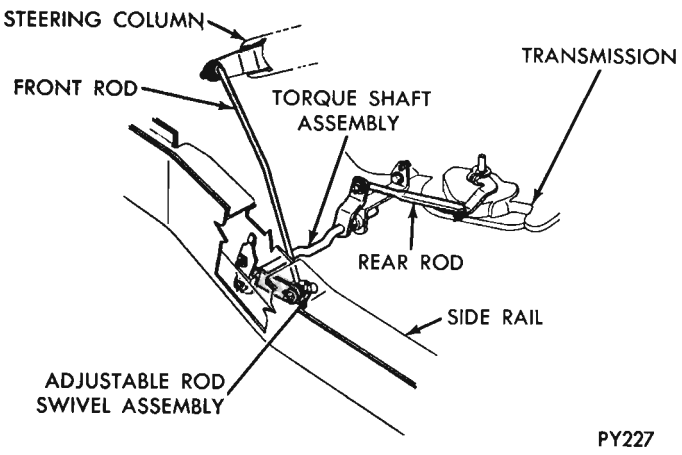


Fig. 6 - Column Gearshift Linkage (Barracuda and Satellite)

O. The transmission should not be idled in gear for long periods.

Drain and Refill

(1) Raise vehicle on a hoist. Place a drain container with a large opening, under transmission oil pan.

(2) Loosen pan bolts at one corner, tap the pan to break it loose allowing fluid to drain, then remove the oil pan.

(3) Remove access plate from in front of converter, remove drain plug allowing fluid to drain (Fig. 3). Install and tighten converter drain plug to 110 inch-pounds and install the access plate.

(4) If necessary, adjust the reverse band.

(5) Install a new filter on bottom of the valve body, and tighten retaining screws to 35 inch-pounds.

(6) Clean the oil pan, and reinstall using a new gasket. Tighten oil pan bolts to 150 inch-pounds.

(7) Pour six quarts of "DEXRON" type Auto-

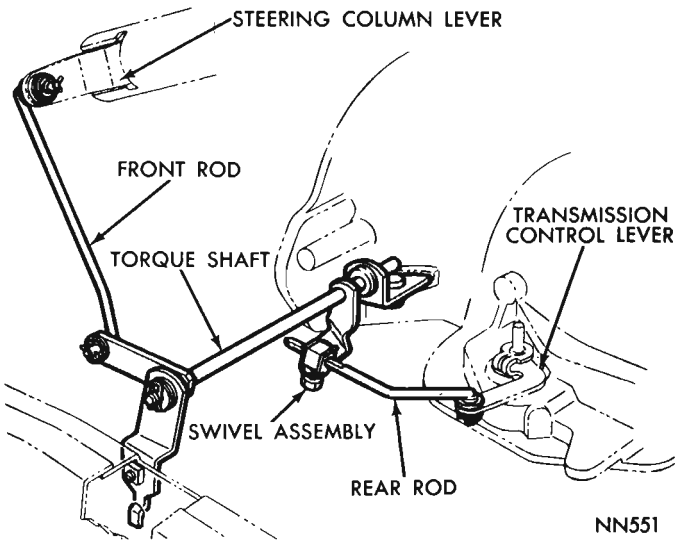


Fig. 5 - Column Gearshift Linkage (Valiant)

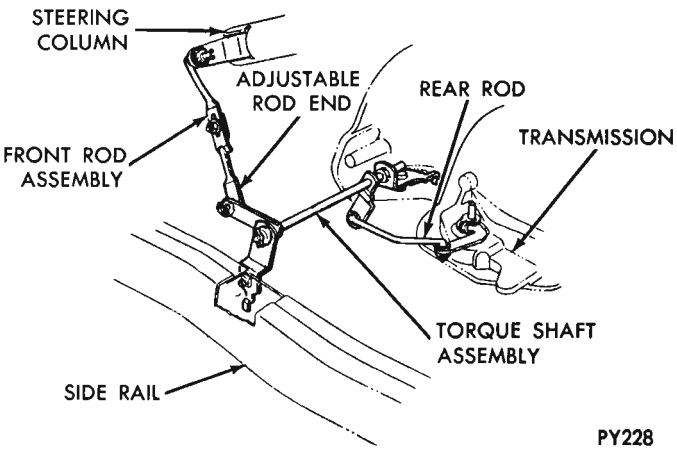


Fig. 7 - Column Gearshift Linkage (Fury and Chrysler)

matic Transmission Fluid through the filler tube.

(8) Start engine and allow to idle for at least two minutes. Then, with parking brake on, move selector lever momentarily to each position, ending in the **neutral** position.

(9) Add sufficient fluid to bring level to the **"ADD ONE PINT"** mark.

Recheck fluid level after transmission is at normal operating temperature. The level should be between the **"FULL"** mark and **"ADD ONE PINT"** mark (Fig. 4).

CAUTION: To prevent dirt from entering transmission, make certain that dip stick cap is fully seated onto the filler tube.

GEARSHIFT LINKAGE ADJUSTMENT (Column Shift) (Figs. 5, 6 or 7)

(1) Assemble all linkage parts leaving adjustable rod end free.

(2) Place gearshift selector lever in PARK posi-

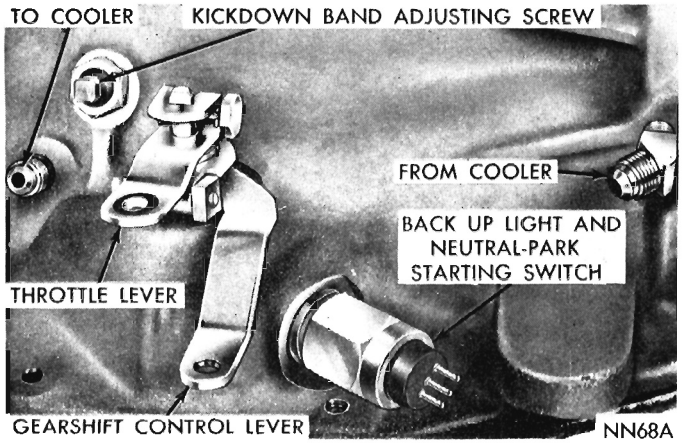


Fig. 8 - External Controls and Adjustments

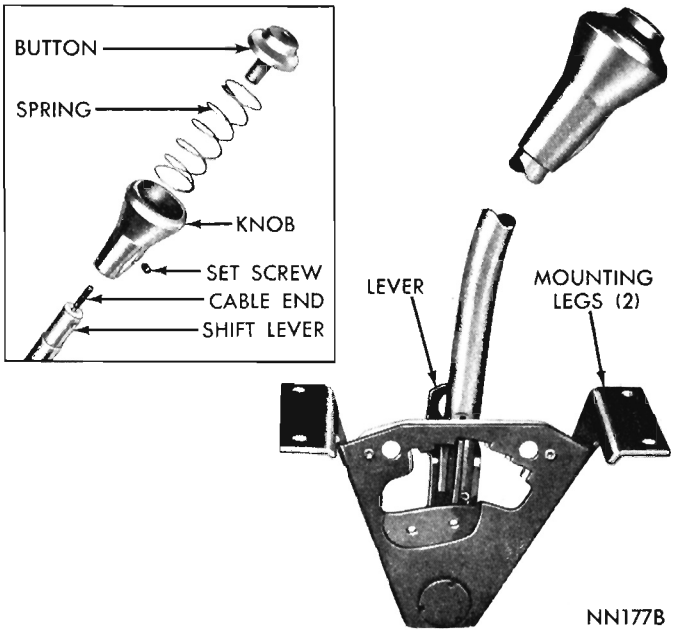


Fig. 9 - Console Gearshift Unit

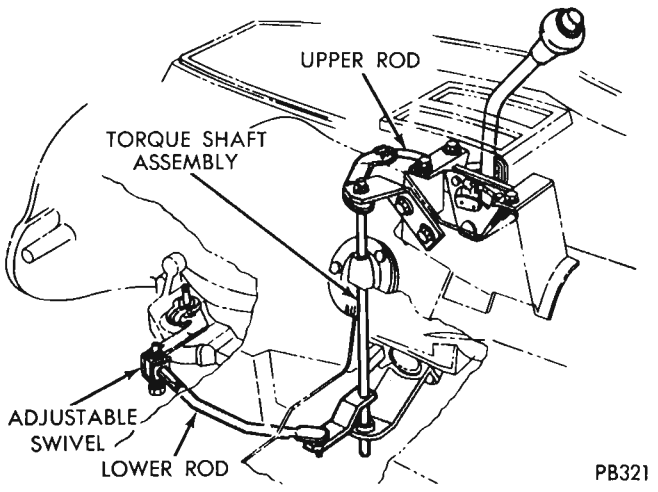


Fig. 10 - Console Gearshift Linkage (Valiant)

tion and lock steering column with ignition key.

(3) Move shift control lever on transmission all the way to rear (in PARK detent)(Fig. 8).

(4) Set adjustable rod to proper length and install with no load in either direction on linkage.

(5) Tighten adjustment lock to 220 inch-pounds on Fury and Chrysler or 125 inch-pounds on all other models.

(6) Check Adjustment as follows:

(a) Shift effort must be free and detents feel crisp. All gate stops must be positive.

(b) Detent position must be close enough to gate stops in neutral and drive to assure that hand lever will not remain out of detent position when placed against gate and then released.

(c) Key start must occur only when shift lever is in park or neutral positions.

LINKAGE ADJUSTMENT (Console Shift)

(Figs. 9, 10, 11 and 12)

(1) Assemble all linkage parts leaving adjustable rod ends free. Step (2) applies to Fury and Chrysler only.

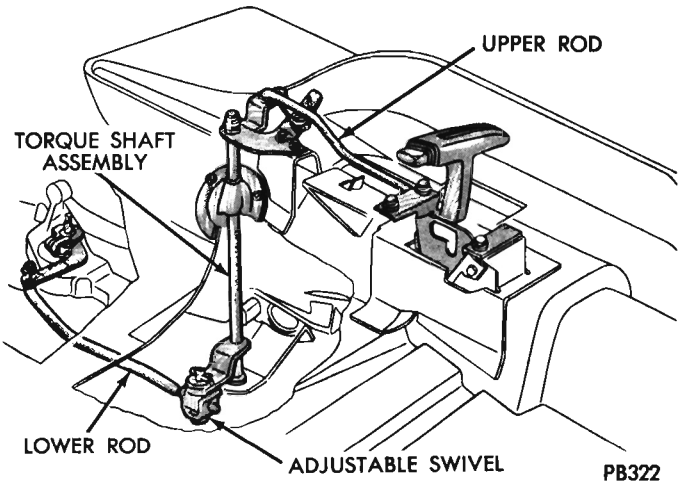


Fig. 11 - Console Gearshift Linkage (Barracuda and Satellite)

(2) At steering column upper end, line up locating slots in bottom of shift housing and bearing housing. Install suitable tool to hold this alignment and lock column with ignition key.

(3) Place console lever in PARK and move shift control lever on transmission all the way to the rear (in PARK detent).

(4) Set adjustable rods to proper length with no load applied in either direction on linkage.

(5) Check Adjustment as follows:

(a) Shift effort must be free and detents feel crisp. All gate stops must be positive.

(b) Detent position must be close enough to gate stops in neutral and drive to assure that hand lever will not remain out of detent position

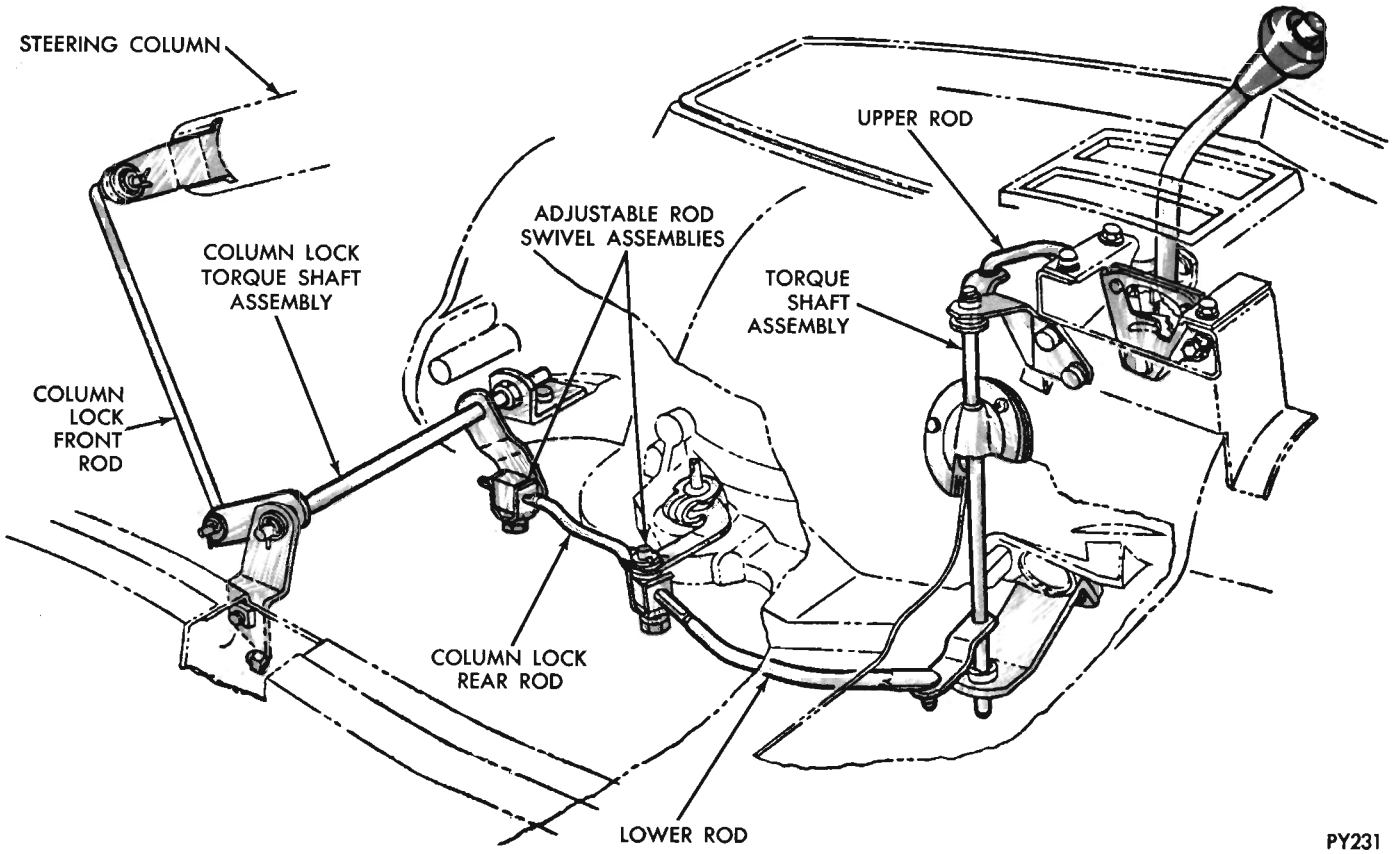


Fig. 12 - Console Gearshift Linkage (Fury and Chrysler)

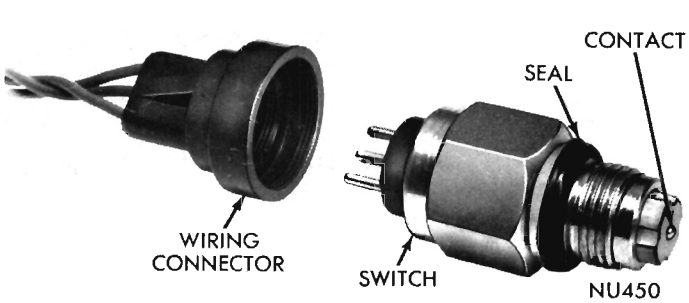


Fig. 13 - Neutral-Park Starting Switch and Back-Up Light Switch

when placed against gate and then released.

(c) Key start must occur only when shift lever is in park or neutral positions.

(6) If console removal is required, disconnect battery ground cable. Remove set screw and shift knob or handle. Proceed as outlined in Body Book.

(7) After console is in place, install shift knob as follows: with gearshift lever in NEUTRAL, thread button, spring and knob assembly on the cable end until dimension from top of button to top of knob is 13/32 in. (Fig. 9). Secure knob with set

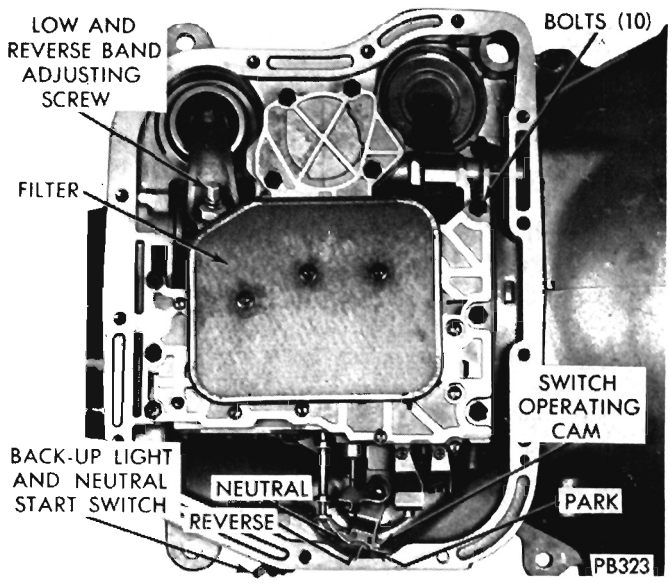


Fig. 14 - Bottom View of Transmission (Pan Removed)

screw. The "T" type handle requires no adjustment and is retained to lever with a screw (Fig. 11).

(8) Connect battery ground cable.

BACK-UP LIGHT AND NEUTRAL STARTING SWITCH (Figs. 13 and 14)

Replacement and Test

The **Neutral Starting Switch** is the center terminal of the 3 terminal switch. It provides ground for the starter solenoid circuit through the selector lever in only **Park** and **Neutral** positions.

(1) To test switch, remove wiring connector from switch and test for continuity between center pin of switch and transmission case. Continuity should exist only when transmission is in **Park** or **Neutral**.

(2) Check gearshift linkage adjustment before replacing a switch which tests bad.

(3) Unscrew switch from transmission case allowing fluid to drain into a container. Move selector lever to **Park** and then to **Neutral** positions, and inspect to see that the switch operating lever fingers are centered in switch opening in the case.

(4) Screw switch and new seal into transmission case and tighten to 24 foot-pounds. Retest switch with the test lamp.

(5) Add fluid to transmission to bring up to proper level.

(6) The **Back-Up Light Switch Circuit** is through the two outside terminals of the 3 terminal switch.

(7) To test switch, remove wiring connector from switch and test for continuity between the two outside pins.

(8) Continuity should exist only with transmission in **Reverse** position.

(9) No continuity should exist from either pin to the case.

BAND ADJUSTMENTS

Kickdown Band

The kickdown band adjusting screw is located on left side of the transmission case (Fig. 8).

(1) Loosen lock nut and back off approximately five turns. Test adjusting screw for free turning in the transmission case.

(2) Using wrench, Tool C-3380 with adapter C-3705, tighten band adjusting screw 47 to 50 inch-pounds. If adapter C-3705 is not used, tighten adjusting screw to 72 inch-pounds which is the true torque.

(3) **A-904:** Back off adjusting screw 2 turns (198, 225, and 318 cu. in. engines). Hold adjusting screw in this position and tighten lock nut to 29 foot-pounds.

A-727: Back off adjusting screw 2-1/2 turns (1-1/2 turns for 426 or 440-6, and 2 turns for 440 dual exhaust engine. Hold adjusting screw in this position and tighten lock nut to 29 foot-pounds.

Low and Reverse Band

(1) Raise vehicle, drain transmission fluid from

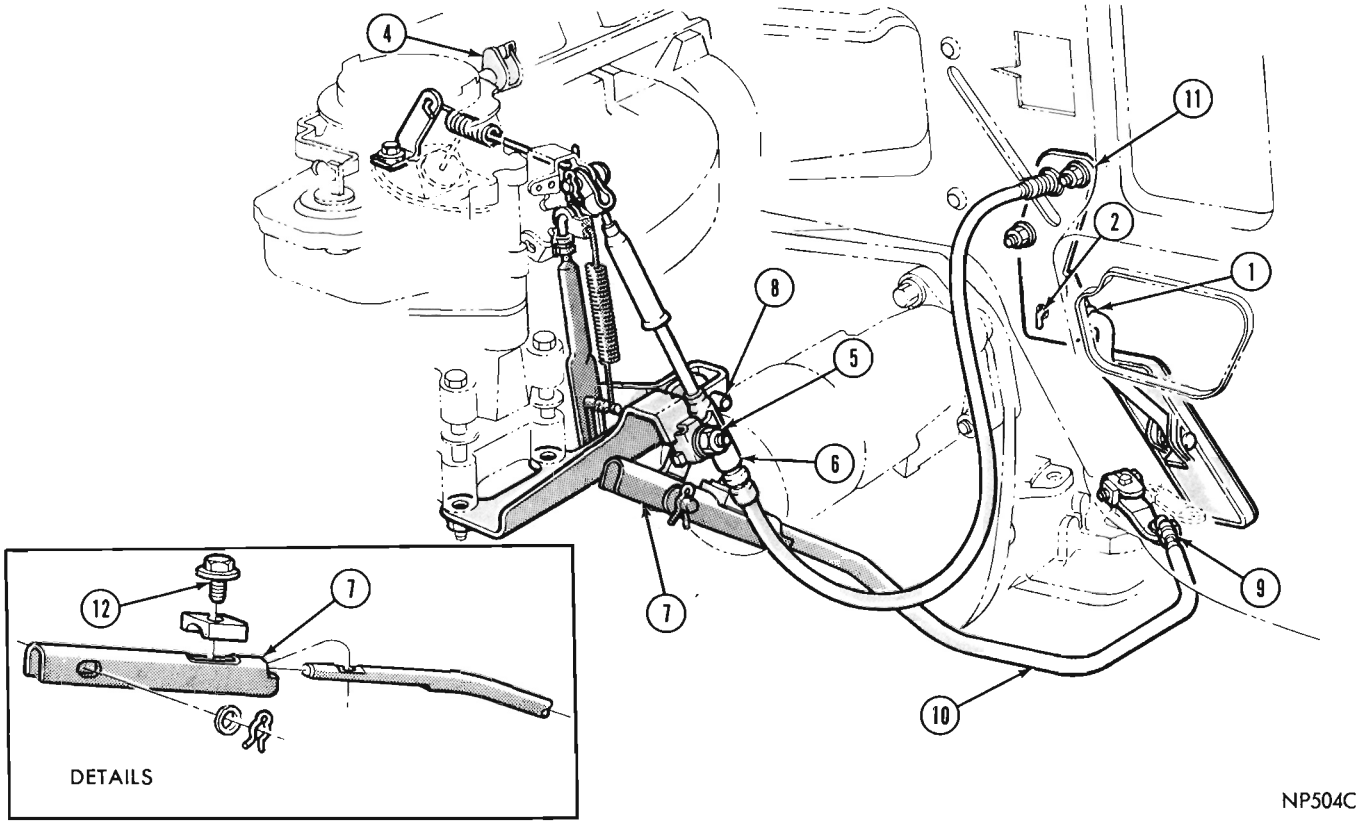


Fig. 15 - Throttle Rod Adjustment (6 Cylinder Models)

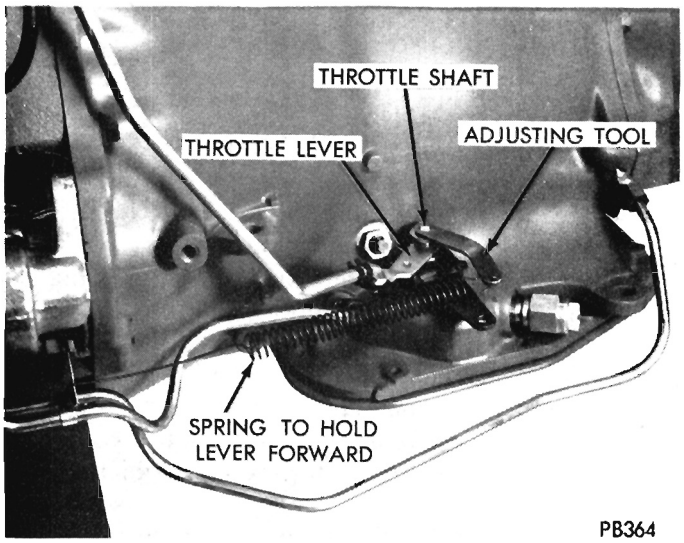


Fig. 16 - Transmission Throttle Lever Holding Tool

loosened oil pan and remove the oil pan.

(2) Loosen adjusting screw lock nut and back off nut approximately five turns (Fig. 14). Test adjusting screw for free turning in the lever.

(3) Using wrench, Tool C-3380 with adapter C-3705, tighten band adjusting screw 47 to 50 inch-pounds. If adapter C-3705 is not used, tighten adjusting screw to 72 inch-pounds which is the true torque.

(4) **A-904:** Back off adjusting screw 3-1/4 turns (4 turns for 318 cu. in. engine). Hold adjusting screw in this position and tighten lock nut to 35 foot-pounds.

A-727: Back off adjusting screw 2 turns. Hold adjusting screw in this position and tighten lock nut to 35 foot-pounds.

(5) Reinstall oil pan using a new gasket. Tighten oil pan bolts to 150 inch-pounds.

(6) Fill transmission with "DEXRON" type Automatic Transmission Fluid.

THROTTLE ROD ADJUSTMENT

With engine at operating temperature and carburetor off fast idle cam, adjust idle speed of engine using a tachometer. Refer to "Fuel System" Group 14, for idle speed Specifications and carburetor linkage adjustment.

Transmission Throttle Linkage Adjustment - 6 Cylinder Models (Fig. 15)

(1) Follow detailed instructions in Lubrication Section for linkage lubrication of all models.

(2) Disconnect choke (4) at carburetor or block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Use Special Tool Assembly (with spring) C-4160 to hold the transmission throttle lever for-

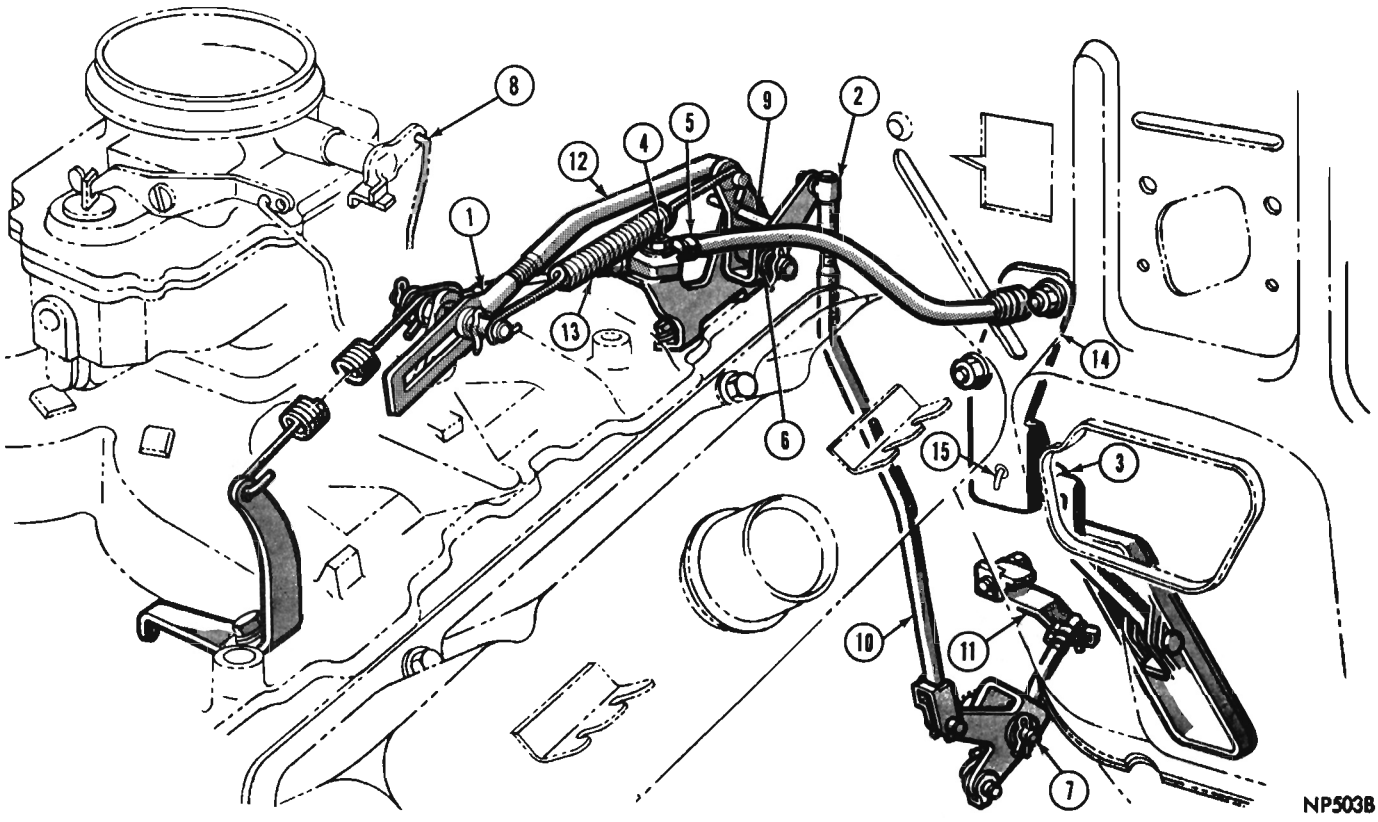


Fig. 17 - Throttle Rod Adjustment (8 Cylinder Models with 3 Section Throttle Rod)

ward against its stop while adjusting linkage, making sure that no other force is exerted against the lower end of the rod. It may be necessary to loosen the throttle lever, move it downward, and retighten to allow installation of the tool on the throttle shaft. Attach spring to hole in tool and hook spring to front end of the transmission case. See Figure 16.

It is important that the transmission lever remain firmly against the stop during the next step to insure a correct adjustment.

If a tool is not available, an assistant can hold the transmission throttle lever forward against its stop while the adjustment is made.

(4) To make transmission rod length adjustment, loosen the slotted link lock bolt (12). Pull forward on the slotted adjuster link (7) so that it contacts carburetor lever pin and all backlash is removed.

(5) Tighten transmission rod adjustment lock bolt (12) to 100 in. lbs.

(6) Remove Tool Assembly (with spring) at transmission throttle lever. To check transmission linkage freedom of operation, move slotted adjustor link (7) to the full rearward position, then allow it to return slowly, making sure it returns to the full forward position.

(7) Connect choke rod (4) or remove blocking fixture.

Transmission Throttle Linkage Adjustment - 8 Cylinder Model with Three Section Throttle Rod (Fig. 17)

(1) Follow detailed instructions in Lubrication Section for linkage lubrication of all models.

(2) Disconnect choke (8) at carburetor or block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Use Special Tool Assembly (with spring) C-4160 to hold the transmission throttle lever forward against its stop while adjusting linkage, making sure that no other force is exerted against the lower end of the rod. It may be necessary to loosen the throttle lever, move it downward, and retighten to allow installation of the tool on the throttle shaft. Attach spring to hole in tool and hook spring to front end of the transmission case. See Figure 16. (On engines with solenoid idle stops, the solenoid plunger must also be in its fully extended position.)

It is important that the transmission lever remain firmly against the stop during the next steps to insure a correct adjustment.

If a tool is not available, an assistant can hold the transmission throttle lever forward against its stop while the adjustment is made.

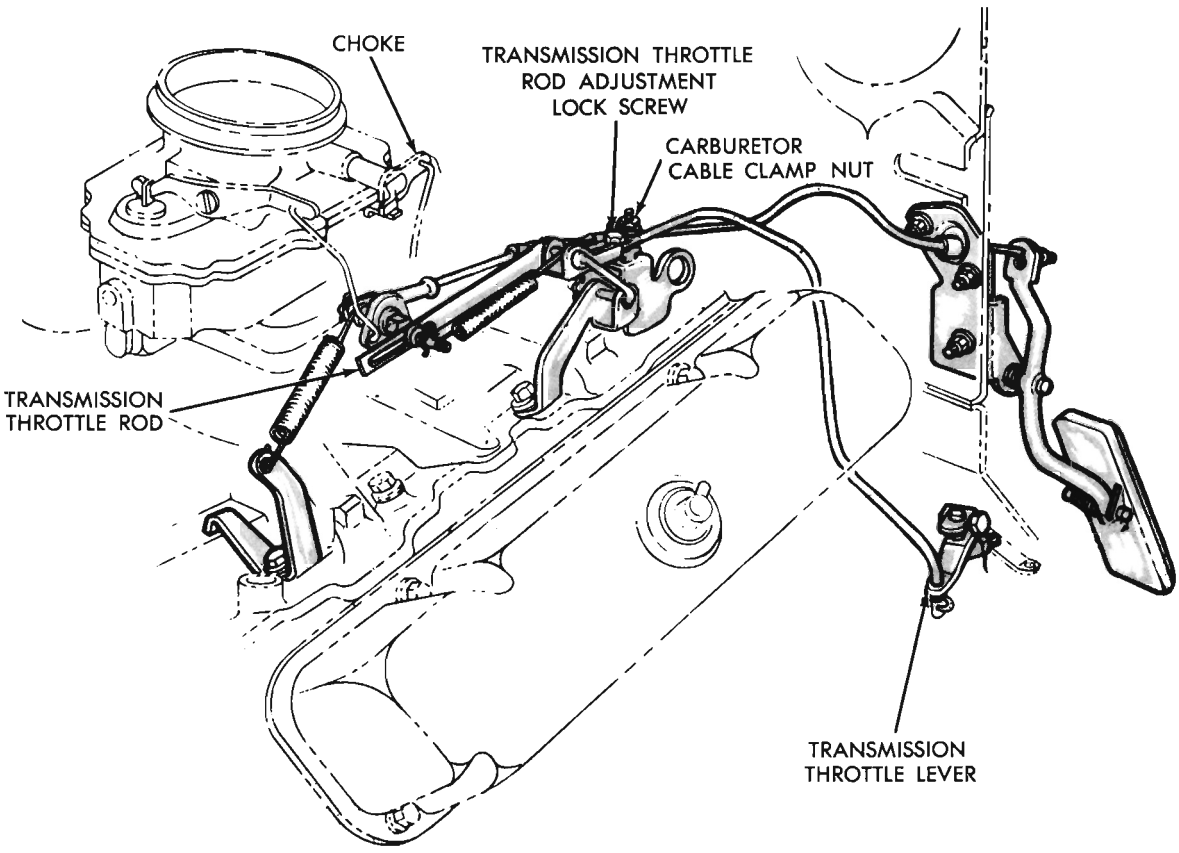


Fig. 18 - Throttle Rod Adjustment (8 Cylinder Models with Single Section Throttle Rod)

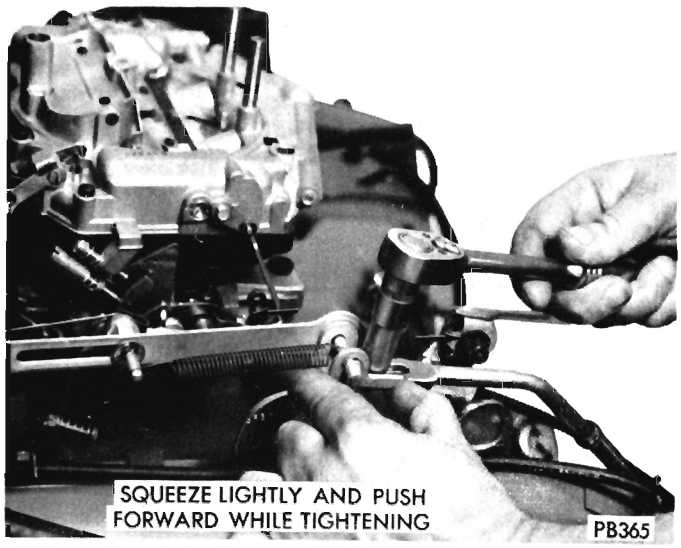


Fig. 19 - Tightening Adjuster on Single Section Throttle Rod

(4) With a 3/16 in. diameter rod (9) placed in the holes provided in the upper bellcrank (6) and lever, adjust length of intermediate transmission rod (10) by means of threaded adjustment (2) at upper end. The ball socket (2) must line up with the ball end with a slight downward effort on rod.

(5) Assemble ball socket (2) to ball end and remove 3/16 in. rod (9) from upper bellcrank and lever.

(6) Disconnect return spring (13), clip and washer, then adjust length of carburetor rod (12) by pushing rearward on rod with a slight effort (to remove all backlash) and turning the threaded adjustment (1). The rear end of slot should contact carburetor lever pin (no backlash) without exerting any forward force on pin when slotted adjuster link (1) is in its normal operating position.

(7) Assemble slotted adjustment (1) to carburetor lever pin and install washer and retainer clip. Assemble transmission linkage return spring (13) in place.

(8) Remove Tool Assembly (with spring) at transmission throttle lever. Check freedom of operation by moving the slotted link at the carburetor to full rearward position, then allow it to return slowly, making sure it returns to the full forward position.

(9) Connect choke rod (8) or remove blocking fixture.

Transmission Throttle Linkage Adjustment 8 Cylinder Models with Single Section Throttle Rod (Fig. 18)

(1) Follow detailed instructions in Lubrication Section for linkage lubrication of all models.

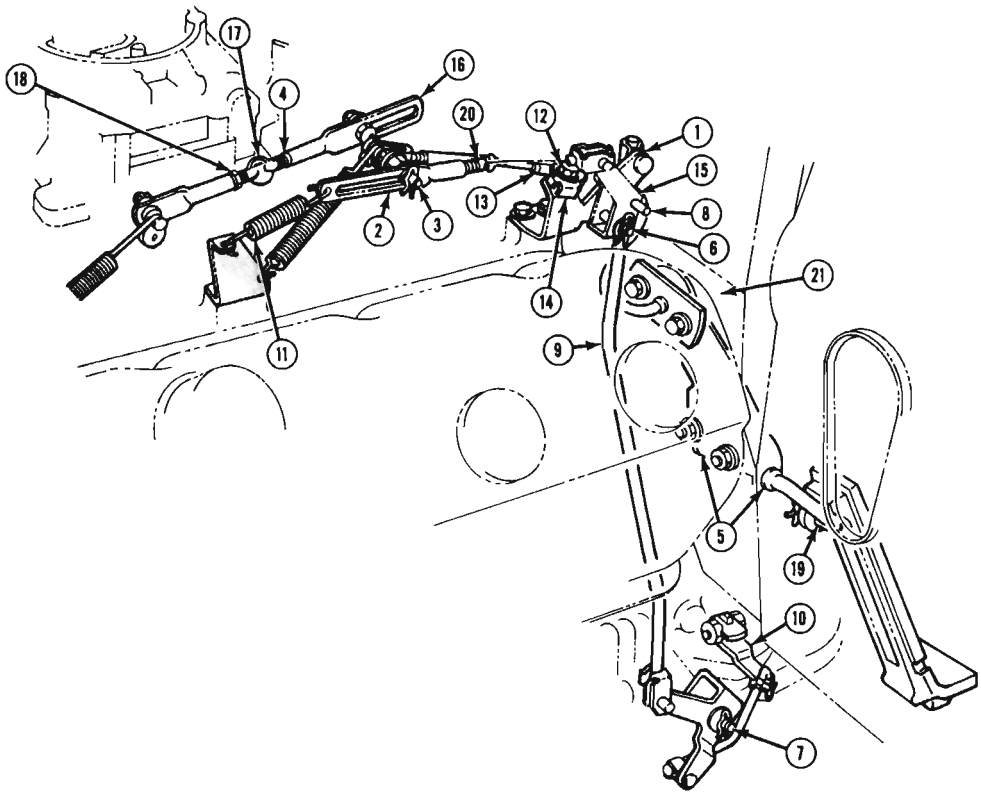


Fig. 20 - Throttle Rod Adjustment (With 426 Cu. In. Engine)

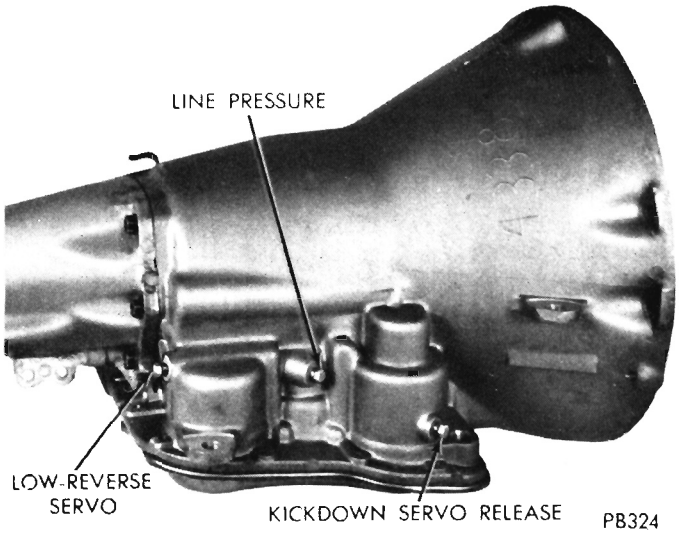


Fig. 21 - Pressure Test Locations (Right Side of Case)

(2) Disconnect choke at carburetor or block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Loosen the transmission throttle rod adjustment lock screw.

(4) Use Special Tool Assembly (with spring) C-4160 to hold the transmission lever forward against its stop while adjusting linkage, making sure that no other force is exerted against the lower end of the rod. It may be necessary to loosen the throttle lever, move it downward, and retighten to allow installation of the tool on the throttle shaft. Attach spring to hole in tool and hook spring to front end of the transmission case. See Figure 16. (On engines with solenoid idle stops, the solenoid plunger must also be in its fully extended position.)

It is important that the transmission lever remain firmly against the stop during the next step to insure a correct adjustment.

If a tool is not available, an assistant can hold the transmission throttle lever forward against its stop while the adjustment is made.

(5) Adjust the transmission rod at the carburetor by pushing forward on the retainer and rearward on the rod (opposite directions) with a slight force to remove all backlash. See Fig. 19. Tighten transmission rod adjustment locking screw. Tool must be in place at the transmission lever, and all backlash removed while locking screw is being tightened.

NOTE: The rear edge of link slot must be against the carburetor lever pin during this adjustment.

(6) Remove Tool Assembly (with spring) at transmission throttle lever. Check linkage freedom of operation by moving the slotted link at the carburetor to full rearward position, then allow it to return slowly, making sure it returns to the full forward position.

(7) Connect choke or remove blocking fixture.

Models With 426 Cu. In. Eng. (Fig. 20)

(1) Follow detailed instructions in Lubrication Section for linkage lubrication of all models.

(2) Block choke valve in full open position. Open throttle slightly to release fast idle cam, then return carburetor to curb idle.

(3) Use Special Tool Assembly (with spring) C-4160 to hold the transmission throttle lever forward against its stop while adjusting linkage, making sure that no other force is exerted against the lower end of the rod. It may be necessary to loosen the throttle lever, move it downward, and retighten to allow installation of the tool on the throttle shaft. Attach spring to hole in tool and hook spring to front end of the transmission case. See Figure 16. (On engines with solenoid idle stops, the solenoid plunger must also be in its fully extended position.)

It is important that the transmission lever remain firmly against the stop during the next steps to insure a correct adjustment.

If a tool is not available, an assistant can hold the transmission throttle lever forward against its stop while the adjustment is made.

(4) With a 3/16 in. diameter rod (8) placed in the holes provided in upper bellcrank and lever (15), adjust length of intermediate transmission rod (9) by means of threaded adjustment at upper end. The ball socket must line up with the ball end with a slight downward effort on rod.

(5) Assemble ball socket to ball end and remove 3/16 in. rod (8) from upper bellcrank and lever (15).

(6) Disconnect return spring (11), adjust length of rod (20) by pushing rearward on rod with a slight effort and turning threaded adjuster link (2). The rear end of slot should contact carburetor lever stud without exerting any forward force on the stud when slotted adjuster link is in its normal operating position.

(7) Assemble slotted adjuster link (2) to carburetor lever stud and install washer and retainer pin. Assemble transmission linkage return spring (11) in place.

(8) Remove Tool Assembly (with spring) at transmission throttle lever. Check freedom of operation by moving the slotted link at the carburetor to full rearward position, then allow it to return slowly, making sure it returns to the full forward position.

(9) Remove choke valve blocking fixture.

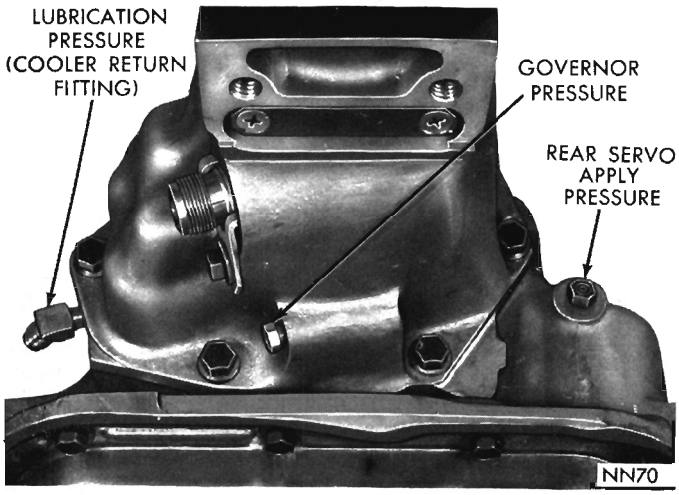


Fig. 22 - Pressure Test Locations (Rear End of Case)

HYDRAULIC CONTROL PRESSURE TESTS

Line Pressure and Front Servo Release Pressure

Line pressure and front servo release pressure tests must be made in D (drive) position with rear wheels free to turn. The transmission fluid must be at operating temperature (150 to 200 degrees F.).

(1) Install an engine tachometer, raise vehicle on a hoist and position tachometer so it can be read under the vehicle.

(2) Connect two 0-100 psi pressure gauges, Tool C-3292 to pressure take-off-points at side of accumulator and at front servo release (Fig. 21).

(3) With control in D (drive) position, speed up engine slightly until transmission shifts into direct. (Front servo release will be pressurized in direct.) Reduce engine speed slowly to 1,000 rpm. Line pressure at this time (1,000 rpm) must be 54-60 psi, and front servo release pressure must not be more than 3 psi below the line pressure.

(4) Disconnect throttle linkage from transmission throttle lever and move throttle lever gradually to the full throttle position. Line pressure must rise to a maximum of 90-96 psi just before or at kickdown into low gear. Front servo release pressure must follow line pressure up to kickdown point and should not be more than 3 psi below line pressure.

If pressure is not 54-60 psi at 1,000 rpm, see "Hydraulic Control Pressure Adjustments."

If front servo release pressures are less than pressures specified and line pressures are within limits, there is excessive leakage in the front clutch and/or front servo circuits. **Always inspect external transmission throttle lever for looseness on the valve body shaft when making the pressure tests.**

Lubrication Pressures

The lubrication pressure test should be made at same time that line pressure and front servo release pressure are tested.

(1) Install a "tee" fitting between cooler return line fitting and fitting hole in transmission case at rear left side of the transmission (Fig. 22). Connect a 0-100 psi pressure gauge, Tool C-3292 to the "tee" fitting.

(2) At 1,000 engine rpm, with throttle closed and transmission in direct, lubrication pressure should be 5-15 psi. Lubrication pressure will be approximately doubled as the throttle is opened to maximum line pressure.

Rear Servo Apply Pressure

(1) Connect a 0-300 psi pressure gauge, Tool C-3293 to apply pressure take-off point at rear servo (Fig. 22).

(2) With transmission control in R (reverse) position and engine speed set at 1600 rpm, reverse servo apply pressure should be 230 to 300 psi.

Governor Pressure

(1) Connect a 0-100 psi pressure gauge, Tool C-3292 to governor pressure take-off point, located at lower left side of extension near the mounting flange (Fig. 22).

(2) Governor pressures should fall within the limits given in the "Governor Pressure Chart" in specifications.

If governor pressures are incorrect at the given vehicle speeds, the governor valve and/or weights are probably sticking. **The governor pressure should respond smoothly to changes in mph and should return to 0 to 1-1/2 psi when vehicle is stopped. High pressure at stand still (above 2 psi) will prevent the transmission from downshifting.**

THROTTLE PRESSURE

No provisions are made to test the throttle pressure. Incorrect throttle pressure should only be suspected if part throttle up-shift speeds are either delayed or occur too early in relation to vehicle speeds. Engine runaway on either up shifts or down shifts can also be an indicator of incorrect (low) throttle pressure setting.

CAUTION: In no case should throttle pressure be adjusted until the transmission throttle linkage adjustment has been verified to be correct.

HYDRAULIC CONTROL PRESSURE ADJUSTMENTS

Line Pressure

An incorrect throttle pressure setting will cause

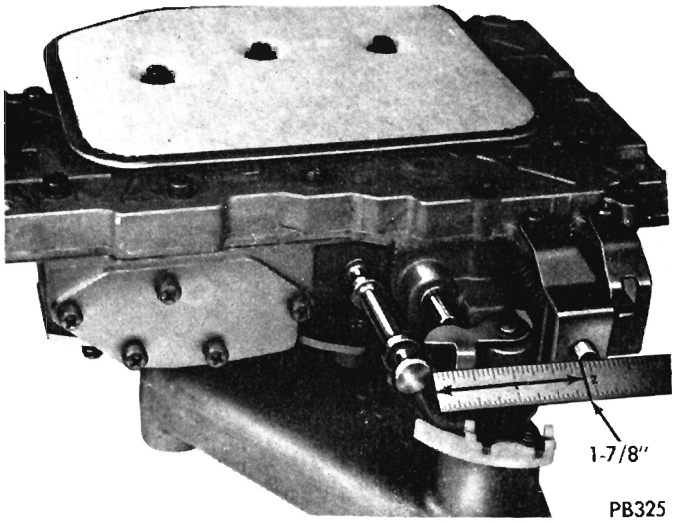


Fig. 23 - Measuring Spring Retainer Locations

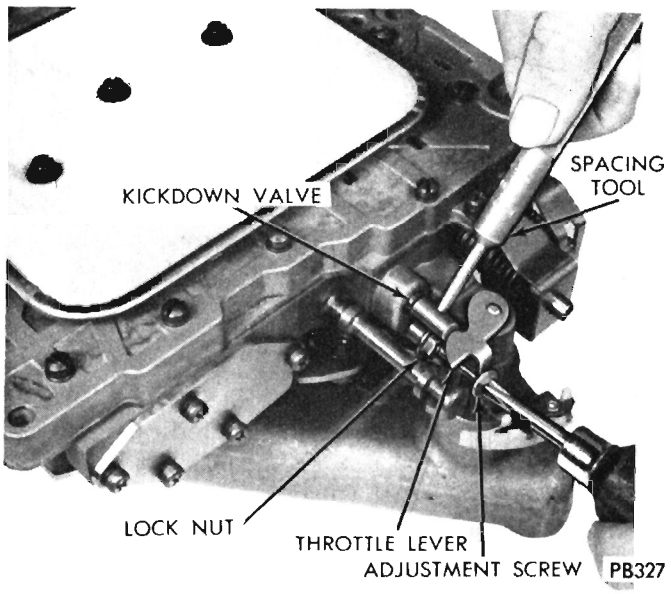


Fig. 25 - Throttle Pressure Adjustment

incorrect line pressure readings even though line pressure adjustment is correct. Always inspect and correct throttle pressure adjustment before adjusting the line pressure. **Before adjusting line pressure, measure distance between manual valve (valve in 1-low position) and line pressure adjusting screw (Fig. 23).**

This measurement must be 1-7/8 inches; correct by loosening spring retainer screws and repositioning the spring retainer. The regulator valve may cock and hang up in its bore if spring retainer is out of position.

If line pressure is not correct, it will be necessary to remove valve body assembly to perform the adjustment.

The approximate adjustment is 1-5/16 inches, measured from valve body to inner edge of adjusting nut (Fig. 24). However, due to manufacturing tolerances, the adjustment can be varied to obtain specified line pressure.

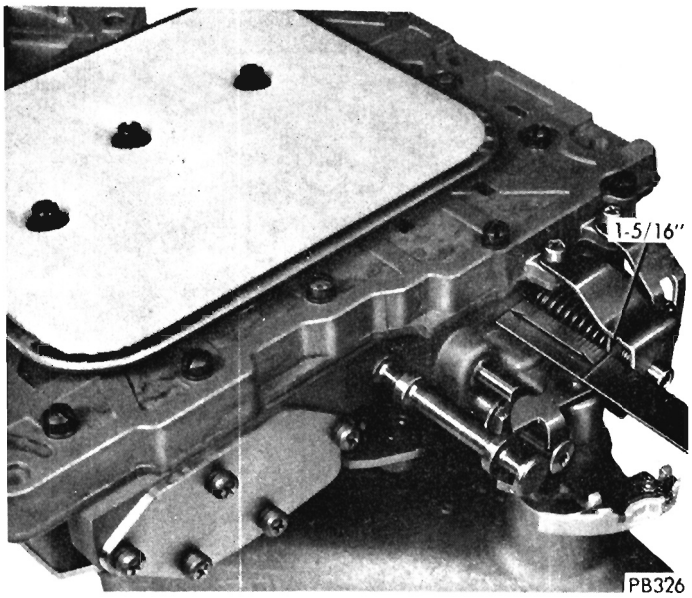


Fig. 24 - Line Pressure Adjustment

The adjusting screw may be turned with an Allen wrench. One complete turn of adjusting screw changes closed throttle line pressure approximately 1-2/3 psi. Turning adjusting screw counter-clockwise increases pressure, and clockwise decreases pressure.

Throttle Pressure

Throttle pressures cannot be tested accurately; therefore, the adjustment should be measured if a malfunction is evident.

(1) Remove valve body assembly from transmission to perform adjustment.

(2) Loosen throttle lever stop screw lock nut and back off approximately five turns (Fig. 25).

(3) Insert gauge pin of Tool C-3763 between the throttle lever cam and kickdown valve.

(4) By pushing in on tool, compress kickdown valve against its spring so throttle valve is completely bottomed inside the valve body.

(5) As force is being exerted to compress spring, tighten throttle lever stop screw finger tight against throttle lever tang with throttle lever cam touching tool and the throttle valve bottomed. **Be sure adjustment is made with spring fully compressed and valve bottomed in the valve body.**

(6) Remove tool and tighten stop screw lock nut securely.

AIR PRESSURE TESTS

A **"NO DRIVE"** condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands and servos can be located through a series

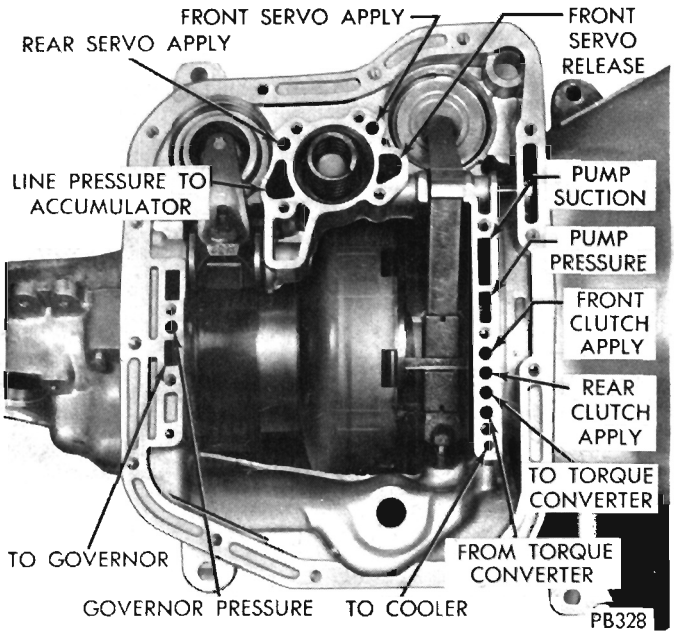


Fig. 26 - Air Pressure Tests

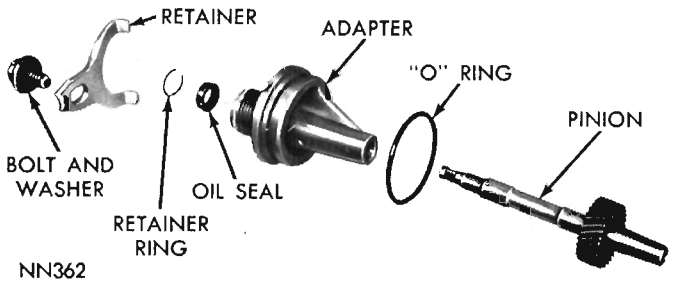


Fig. 28 - Speedometer Drive - Disassembled

of tests by substituting air pressure for fluid pressure (Fig. 26).

The front and rear clutches, kickdown servo, and low-reverse servo may be tested by applying air pressure to their respective passages after the valve body assembly has been removed. To make air pressure tests, proceed as follows:

CAUTION: Compressed air supply must be free of all dirt or moisture. Use a pressure of 30 to 100 psi.

Front Clutch

Apply air pressure to front clutch "apply" passage and listen for a dull "thud" which indicates that front clutch is operating. Hold air pressure on for a few seconds and inspect system for excessive oil leaks.

Rear Clutch

Apply air pressure to rear clutch "apply" passage and listen for a dull "thud" which indicates that rear clutch is operating. Also inspect for excessive oil leaks. **If a dull "thud" cannot be heard in the clutches, place finger tips on clutch housing and again apply air pressure. Movement of piston can be felt as the clutch is applied.**

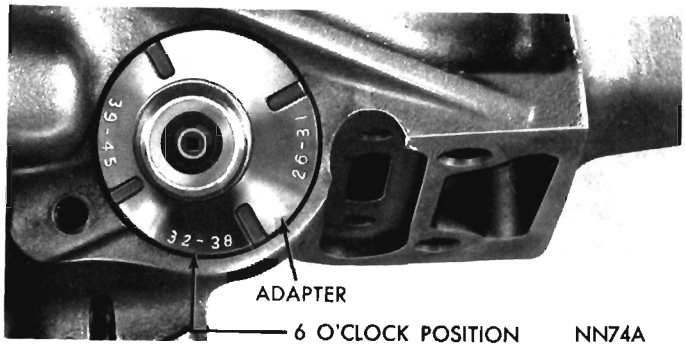


Fig. 27 - Speedometer Pinion and Adapter Installed (Retainer Removed for View)

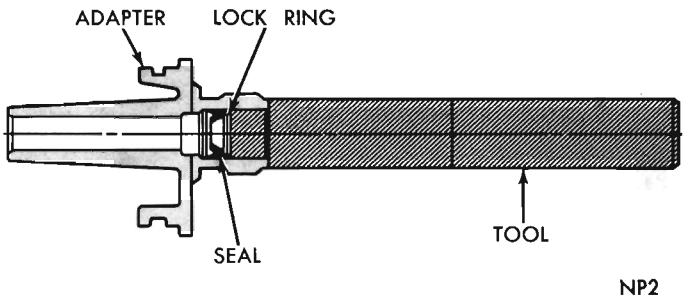


Fig. 29 - Installing Speedometer Pinion Seal

Kickdown Servo (Front)

Direct air pressure into front servo "apply" passage. Operation of servo is indicated by a tightening of front band. Spring tension on servo piston should release the band.

Low and Reverse Servo (Rear)

Direct air pressure into rear servo "apply" passage. Operation of servo is indicated by a tightening of rear band. Spring tension on servo piston should release the band.

If clutches and servos operate properly, no upshift or erratic shift conditions indicate that malfunctions exist in the valve body.

Governor

Governor operating failures can generally be diagnosed by a road test or hydraulic pressure test. Refer to "Hydraulic Control Pressure Tests."

SPEEDOMETER PINION

Removal and Installation

Rear axle gear ratio and tire size determines pinion gear size requirements. Refer to "Speedometer Pinion Chart" in Specifications for pinion usage.

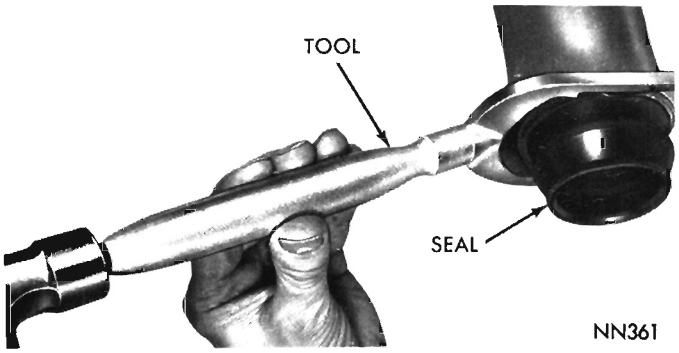


Fig. 30 - Removing Extension Housing Yoke Seal

(1) Remove bolt and retainer securing speedometer pinion adapter in the extension housing (Fig. 27).

(2) With cable housing connected, carefully work adapter and pinion out of the extension housing.

(3) If transmission fluid is found in cable housing, replace seal in the adapter (Fig. 28).

Start seal and retainer ring in the adapter, then push them into adapter with Tool C-4004 until tool bottoms (Fig. 29).

CAUTION: Before installing pinion and adapter assembly make sure adapter flange and its mating area on extension housing are perfectly clean. Dirt or sand will cause mis-alignment resulting in speedometer pinion gear noise.

(4) Note number of gear teeth and install speedometer pinion gear into adapter (Fig. 28).

(5) Rotate the speedometer pinion gear and adapter assembly so that the number on the adapter, corresponding to the number of teeth on the gear, is in the 6 o'clock position as the assembly is installed (Fig. 27).

(6) Install retainer and bolt, with retainer tangs in adapter positioning slots. Tap adapter firmly into the extension housing and tighten retainer bolt to 100 inch-pounds.

EXTENSION HOUSING YOKE SEAL

Replacement

(1) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft yoke out of the transmission extension housing.

CAUTION: Be careful not to scratch or nick ground surface on sliding spline yoke during removal and installation of the shaft assembly.

(2) Remove the extension housing yoke seal (Fig. 30) with Tool C-3994 or C-3985.

(3) To install a new seal, position seal in opening of extension housing and drive it into the housing with Tool C-3995 or C-3972 (Fig. 31).

(4) Carefully guide front universal joint yoke into extension housing and on the mainshaft splines.

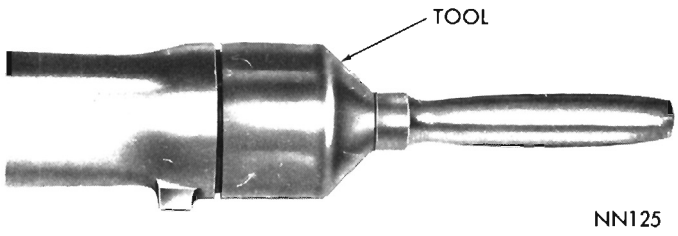


Fig. 31 - Installing Extension Housing Yoke Seal

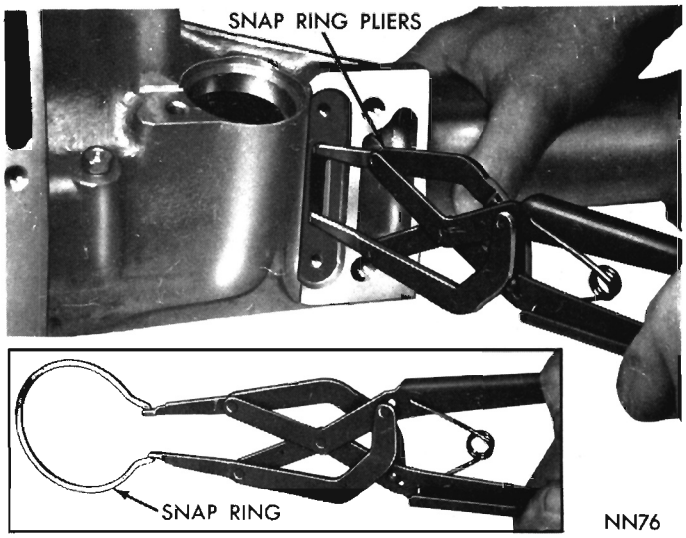


Fig. 32 - Removing or Installing Extension Housing

Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

EXTENSION HOUSING AND OUTPUT SHAFT BEARING

Removal

(1) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(2) Remove speedometer pinion and adapter assembly (Fig. 27). Drain approximately two quarts of fluid from the transmission.

(3) Remove bolts securing extension housing to the crossmember. Raise transmission slightly with service jack Tool C-3203A, then remove center crossmember and support assembly.

(4) Remove extension housing to transmission bolts.

Console Shift: Remove two bolts securing gearshift torque shaft lower bracket to extension housing. Swing bracket out of way for extension housing removal.

IMPORTANT: In removing or installing extension housing (step 5), the gearshift lever must be in "1" (low) position. This positions parking lock control rod rearward so it can be disengaged or

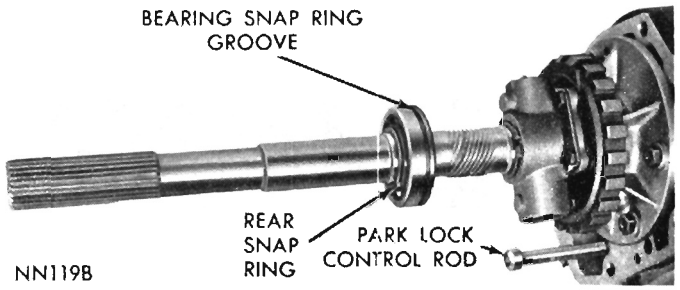


Fig. 33 - Output Shaft Bearing

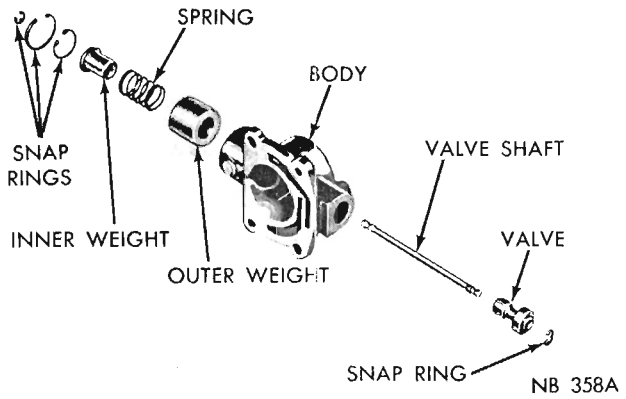


Fig. 35 - Governor Assembly

engaged with the parking lock sprag.

(5) Remove two screws, plate and gasket from bottom of extension housing mounting pad. Spread large snap ring from output shaft bearing with Tool C-3301 (Fig. 32).

With snap ring spread as far as possible, carefully tap extension housing off the output shaft bearing. Carefully pull extension housing rearward, to remove parking lock control rod knob past the parking sprag, then remove the housing.

Bearing Replacement

(1) Using heavy duty snap ring pliers C-4020, remove output shaft bearing rear snap ring and remove bearing from the shaft (Fig. 33).

(2) Install a new bearing on shaft with outer race ring groove toward front (Fig. 33), then install rear snap ring. A-727 has a snap ring in front of bearing, A-904 does not.

Installation

(1) Place a new extension housing gasket on the transmission case. Position output shaft bearing retaining snap ring in extension housing. Slide extension housing on output shaft guiding the parking lock control rod knob past the parking sprag. While spreading large snap ring in housing with Tool C-3301A (Fig. 32), carefully tap housing into place, then release the snap ring. Make sure snap ring is fully seated in bearing outer race ring groove.

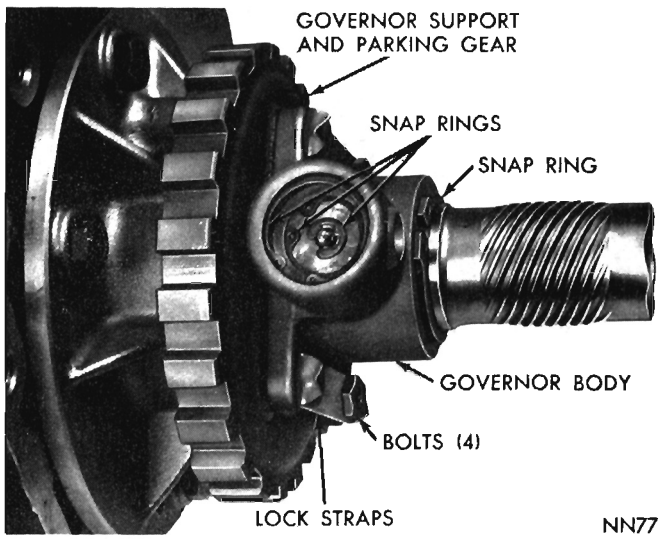


Fig. 34 - Governor Shaft and Weight Snap Rings

(2) Install and tighten extension housing bolts to 24 foot-pounds.

(3) Install gasket, plate and two screws on bottom of the extension housing mounting pad.

(4) Install center crossmember and rear mount assembly, tighten retaining bolts (Figs. 111, 112 or 113). Lower transmission, install extension housing to support bolts and tighten to 40 foot-pounds.

Console Shift: Align gearshift torque shaft lower bracket with the extension housing. Install the two retaining bolts and tighten securely.

(5) Install the speedometer pinion and adapter.

(6) Carefully guide front universal joint yoke into extension housing and on the output shaft splines. Align marks made at removal and connect propeller shaft to rear axle pinion shaft yoke.

(7) Add fluid to transmission to bring up to proper level.

GOVERNOR

Removal

(1) Remove extension housing and output shaft bearing.

(2) Carefully pry snap ring from weight end of governor valve shaft (Fig. 34). Slide valve and shaft assembly out of governor body.

(3) Remove large snap ring from weight end of governor body, lift out governor weight assembly.

(4) Remove snap ring from inside governor weight, remove inner weight and spring from the outer weight. Figure 35 shows a disassembled view of the governor assembly.

(5) Remove snap ring from behind governor body, then slide governor and support assembly off the output shaft. If necessary remove the four bolts and separate governor body from the support.

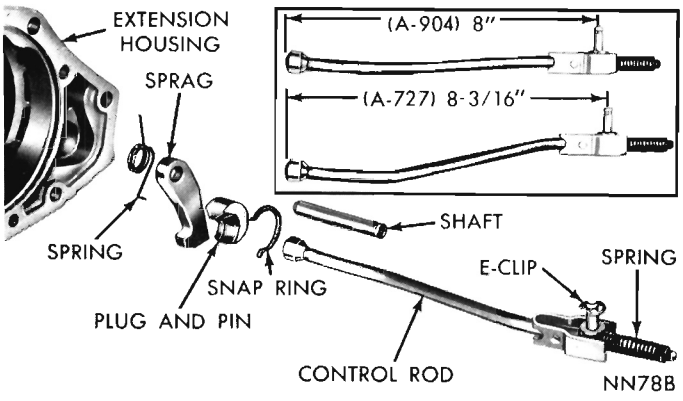


Fig. 36 - Parking Lock Components

Cleaning and Inspection

The primary cause of governor operating failure is due to a sticking governor valve or weights. Rough surfaces may be removed with crocus cloth. Thoroughly clean all parts in clean solvent and inspect for free movement before assembly.

Installation

(1) Assemble governor body to the support (if disassembled) and tighten bolts finger tight. Make sure oil passage of governor body aligns with passage in the support.

(2) Position support and governor assembly on the output shaft. Align assembly so valve shaft hole in governor body aligns with hole in the output shaft, then slide assembly into place. Install snap ring behind governor body (Fig. 34). Tighten the body to support bolts to 100 inch-pounds. Bend ends of lock straps over bolt heads.

(3) Assemble governor weights and spring, and secure with snap ring inside of large governor weight. Place weight assembly in governor body and install snap ring.

(4) Place governor valve on the valve shaft, insert assembly into the body and through governor weights. Install valve shaft retaining snap ring. Inspect valve and weight assembly for free movement after installation.

(5) Install output shaft bearing and extension housing.

PARKING LOCK COMPONENTS

Removal

(1) Remove extension housing.

(2) To replace the governor support and parking gear, refer to "Governor and Support".

(3) Slide shaft out of extension housing to remove the parking sprag and spring (Fig. 36). Remove snap ring and slide the reaction plug and pin assembly out of the housing.

(4) To replace the parking lock control rod, refer to "Valve Body—Removal and Installation."

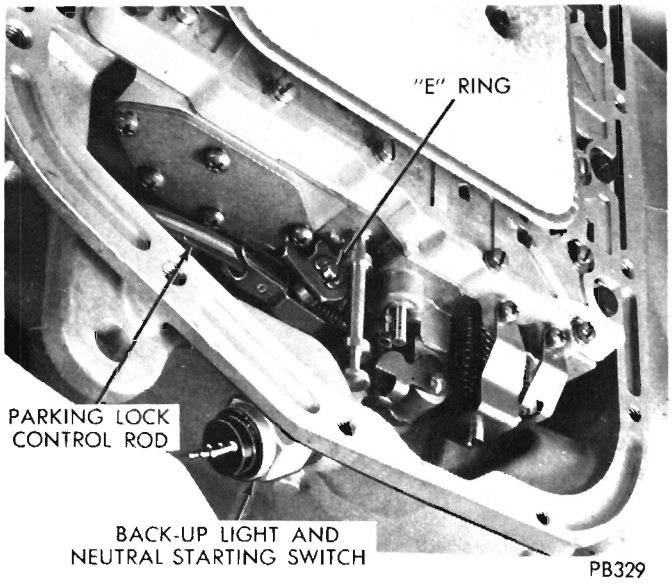


Fig. 37 - Parking Lock Control Rod Retaining E-Clip

Installation

(1) Position sprag and spring in the housing and insert the shaft (Fig. 36). Make sure square lug on sprag is toward parking gear, and spring is positioned so it moves sprag away from the gear.

(2) Install reaction plug and pin assembly in the housing and secure with snap ring.

(3) Install extension housing.

VALVE BODY ASSEMBLY AND ACCUMULATOR PISTON

Removal

(1) Raise vehicle on a hoist.

(2) Loosen oil pan bolts, tap the pan to break it loose allowing fluid to drain, then remove oil pan.

(3) Disconnect throttle and gearshift linkage from levers on the transmission. Loosen clamp bolts and remove the levers (Fig. 8).

(4) Remove E-clip (Fig. 37), securing parking lock rod to the valve body manual lever.

(5) Remove Back-Up Light and Neutral Start Switch.

(6) Place a drain pan under transmission, then remove the ten hex-head valve body to transmission case bolts. Hold valve body in position while removing the bolts.

(7) While lowering valve body down out of transmission case, disconnect parking lock rod from the lever.

To remove parking lock rod, pull it forward out of the case. If necessary, rotate propeller shaft to align parking gear and sprag to permit knob on end of control rod to pass the sprag.

(8) Withdraw accumulator piston from the trans-

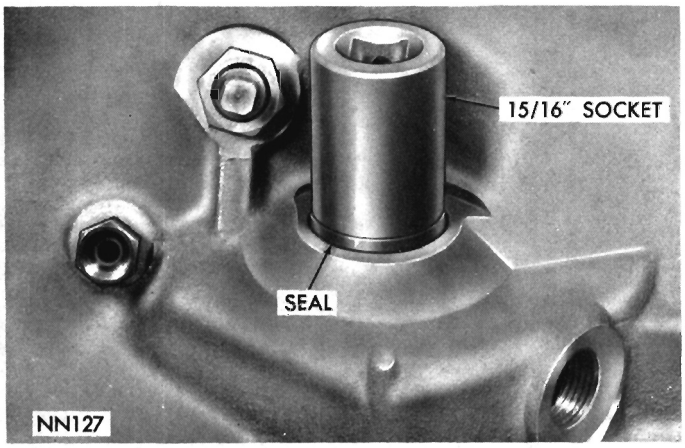


Fig. 38 - Installing Valve Body Manual Lever Shaft Oil Seal

mission case. Inspect piston for scoring, and rings for wear or breakage. Replace as required.

(9) If valve body manual lever shaft seal requires replacement, drive it out of the case with a punch.

(10) Drive a new seal into the case with a 15/16 inch socket and hammer (Fig. 38).

Servicing the valve body assembly is outlined under "Recondition Sub-Assemblies".

Installation

(1) Make sure Back-Up Light and Neutral Start Switch has been removed. If parking lock rod was removed, insert it through opening in rear of case with knob positioned against the plug and sprag. Move front end of rod toward center of transmission while exerting rearward pressure on the rod to force it past the sprag. (Rotate propeller shaft if necessary).

(2) Install accumulator piston in the transmission case.

(3) Position accumulator spring on the valve body.

(4) Place valve body manual lever in **LOW** position. Lift valve body into its approximate position, connect parking lock rod to manual lever and secure with E-clip. Position valve body in the case, install retaining bolts finger tight.

(5) With neutral starting switch installed, place manual lever in the neutral position. Shift valve body if necessary to center neutral finger over the neutral switch plunger. Snug bolts down evenly, then tighten to 100 inch-pounds.

(6) Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and re-align.

(7) Make sure throttle shaft seal is in place, then install flat washer, lever and tighten the clamp bolt. Connect throttle and gearshift linkage and adjust as required.

(8) Install oil pan, using a new gasket. Add transmission fluid to bring it up to proper level.

SERVICE OUT OF VEHICLE

TRANSMISSION AND CONVERTER REMOVAL

The transmission and converter must be removed as an assembly; otherwise, the converter drive plate, pump bushing, and oil seal will be damaged. The drive plate will not support a load; therefore, none of the weight of the transmission should be allowed to rest on the plate during removal.

(1) Connect a remote control starter switch, Tool C-763 to starter solenoid and position switch so engine can be rotated from under the vehicle.

(2) Disconnect primary wire from the ignition coil.

(3) Remove cover plate from in front of converter to provide access to the converter drain plug and mounting bolts.

(4) Rotate engine with remote control switch to bring the drain plug to "6 o'clock" position. Drain torque converter and transmission.

(5) Mark converter and drive plate to aid in reassembly. The crankshaft flange bolt circle, inner and outer circle of holes in drive plate, and four tapped holes in front face of converter all have one hole offset so these parts will be installed in original position. This maintains the balance of engine and converter.

(6) Rotate engine with remote control switch to locate two converter to drive plate bolts at "5 and 7 o'clock" positions. Remove the two bolts, rotate engine with switch and remove the other two bolts. **Do not rotate converter or drive plate by prying with a screw driver or similar tool as the drive plate might become distorted. Also, starter should never be engaged if drive plate is not attached to converter with at least one bolt or if transmission case to engine bolts have been loosened.**

(7) Disconnect negative (ground) cable from the battery.

(8) Remove the starting motor assembly.

(9) Disconnect wire from the neutral starting switch.

(10) Disconnect gearshift rod from the transmission lever. Remove the gearshift torque shaft from transmission housing and left side rail.

Console Shift: Remove two bolts securing gearshift torque shaft lower bracket to the extension housing. Swing bracket out of way for transmission removal. Disconnect gearshift rod from the transmission lever.

(11) Disconnect throttle rod from throttle lever on the transmission.

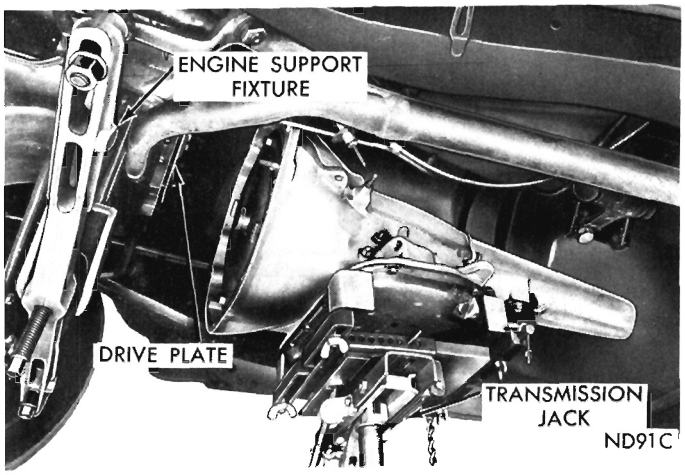


Fig. 39 - Engine Support Fixture

(12) Disconnect oil cooler lines at transmission and remove oil filler tube. Disconnect the speedometer cable.

(13) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(14) Remove rear mount to extension housing bolts.

(15) Install engine support fixture, Tool C-3487-A (6 or 8 cyl.) and raise the engine slightly (Fig. 39).

(16) Some models have exhaust systems which will have to be partially removed for clearance. See Exhaust Systems, Group 11.

(17) Remove crossmember attaching bolts and remove the crossmember.

(18) Place a transmission service jack under transmission to support the assembly.

Imperial Models: Through openings on rear side of torsion bar rear anchor crossmember, remove four large bolts securing rubber isolators to the center crossmember. Remove six additional bolts securing center crossmember, then remove crossmember from the stub frame. **Do not remove rear anchor crossmember from the torsion bars.**

(19) Attach a small "C" clamp to edge of bell housing to hold converter in place during removal of the transmission.

(20) Remove the bell housing retaining bolts. Carefully work transmission rearward off engine block dowels and disengage converter hub from end of the crankshaft.

(21) Lower transmission jack and remove transmission and converter assembly.

(22) To remove converter assembly, remove "C" clamp from edge of bell housing, then carefully slide assembly out of the transmission.

STARTER RING GEAR REPLACEMENT

The starter ring gear is mounted directly on outer diameter of the torque converter front cover.

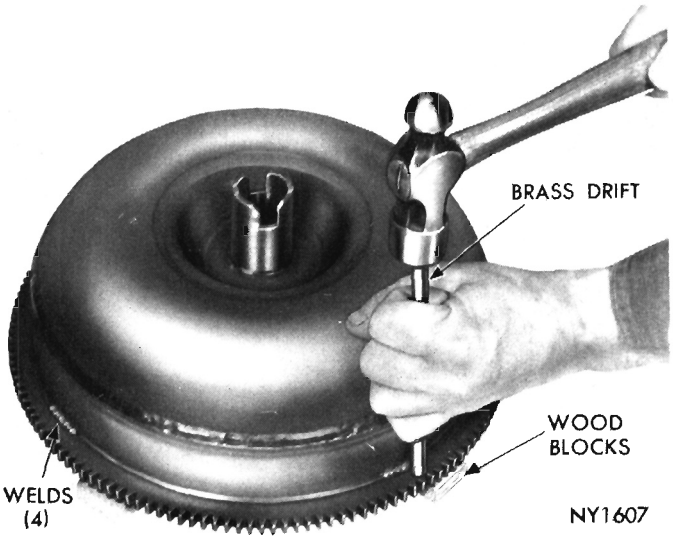


Fig. 40 - Removing Starter Ring Gear

With torque converter removed from vehicle, replacement of the gear is as follows:

Removal

(1) Cut through weld material at rear side of ring gear with a hack saw or grinding wheel (Fig. 40). Be careful not to cut or grind into front cover stamping.

(2) Scribe a heavy line on front cover next to front face of ring gear to aid in locating the new gear.

(3) Support converter with the four lug faces resting on blocks of wood. **The converter must not rest on the front cover hub during this operation.** Using a blunt chisel or drift and hammer, tap downward on ring gear near welded areas to break any remaining weld material (Fig. 40). Tap around ring gear until it comes off the converter.

(4) Smooth off weld areas on the cover with a file.

Installation

Any of the following methods may be used to heat and expand starter ring gear for installation on the converter:

Oven: Place ring gear in Oven and set temperature at 200 degrees F. Allow ring gear to remain in oven for 15 to 20 minutes.

Boiling Water: Place ring gear in a shallow container, add water, and heat for approximately eight minutes after water has come to a boil.

Steam: Place ring gear on a flat surface and direct a steam flow around gear for approximately two minutes.

Flame: Place ring gear squarely on a flat surface. Using a medium size tip, direct a slow flame evenly around inner rim of the gear. **Do not apply**

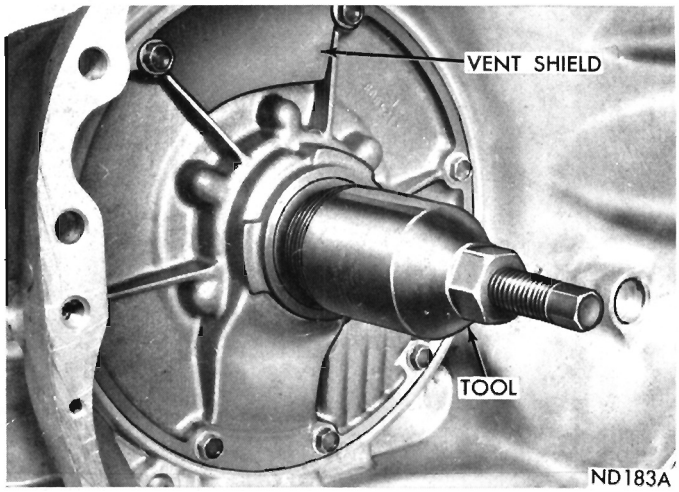


Fig. 41 - Removing Pump Oil Seal

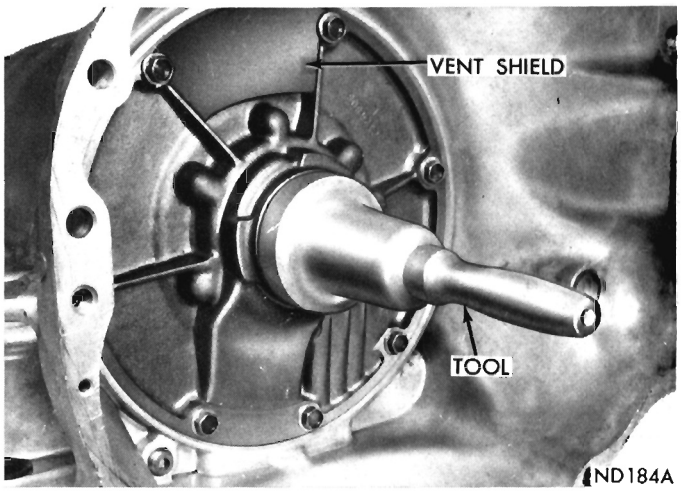


Fig. 42 - Installing Pump Oil Seal

flame to the gear teeth. Place a few drops of water on face of gear at intervals during heating process. When gear is hot enough to just boil the water, installation of gear on the torque converter can be made.

(1) After ring gear is expanded by heating, place the gear in position on converter front cover. Tap gear on the cover evenly with a plastic or rawhide mallet until face of gear is even with scribed line (made during removal) on the front cover. Make sure gear is even with scribed line around full circumference of the front cover.

(2) Reweld ring gear to torque converter front cover, being careful to place, as nearly as possible, same amount of weld material in exactly same location as was used in original weld. This is necessary in order to maintain proper balance of the unit. Place welds alternately on opposite sides of converter to minimize distortion.

(3) The following suggestions are offered as an aid in making the weld:

a. **Do not gas weld.**

b. Use a D.C. welder that is set at straight polarity or an A.C. welder if the proper electrode is available.

c. Use a 1/8 inch diameter welding rod, and a welding current of 80 to 125 amps.

d. Direct the arc at intersection of the gear and front cover from an angle of 45 degrees from rear face of the gear.

(4) Inspect gear teeth and remove all nicks where metal is raised, weld metal splatter, etc., in order to ensure quiet starter operation.

TORQUE CONVERTER FLUSHING

When a transmission failure has contaminated the fluid, the torque converter should be flushed to insure that metal particles or sludged oil are not later transferred back into the reconditioned transmission.

HAND FLUSHING

(1) Place converter in horizontal position and pour two quarts of new clean solvent or kerosene into converter through the impeller hub.

(2) Turn and shake converter so as to swirl solvent through the internal parts. **Turn the turbine and stator with transmission input and reaction shafts to dislodge foreign material.**

(3) Position converter in its normal operation position with drain plug at the lowest point. Remove drain plug and drain solvent. Rotate turbine and stator, and shake converter while draining to prevent dirt particles from settling. Tool C-3963-A is available to do this job faster and more effectively.

This tool adapts a drill motor to an input shaft to spin the turbine and includes a drawing for a simple wooden fixture to hold the converter. This fixture will hold the converter upright for the spinning and draining operations.

(4) Repeat flushing operation at least once, or as many times as required until solvent or kerosene drained out is clear.

(5) After flushing, shake and rotate converter several times with drain plug out to remove any residual solvent and dirt. **Flush any remaining solvent from converter with two quarts of new transmission fluid.** This will prevent any adverse effect the solvent may have on the transmission seals. Reinstall drain plug and tighten to 110 inch-pounds.

(6) Flush and blow out the oil cooler and its lines.

MACHINE FLUSHING

Machine cleaning is recommended; using the type which rotates the converter while pumping cleaning fluid through it. The machine automatically adds timed blasts of compressed air to the

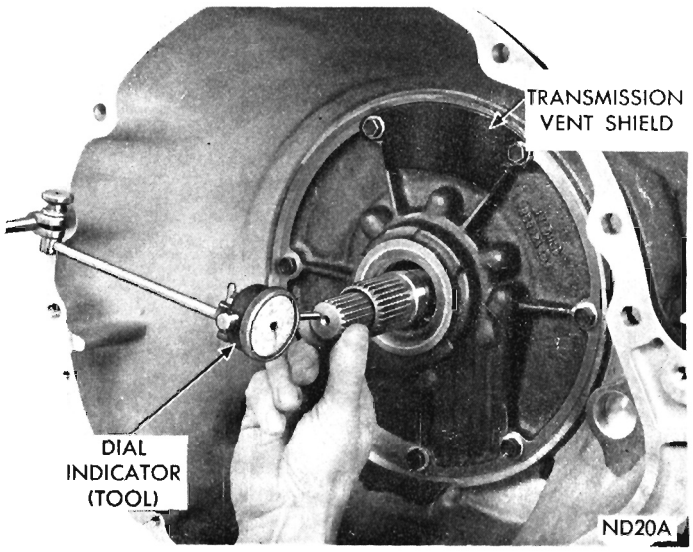


Fig. 43 - Measuring Drive Train End Play

cleaning fluid as it enters the converter, providing more thorough cleaning than the hand flushing operation.

PUMP OIL SEAL

Replacement

The pump oil seal can be replaced without removing pump and reaction shaft support assembly from the transmission case. **The vent shield shown in (Figs. 41 and 42) is not used or required on the A-904 pumps.**

(1) **A-904:** Screw seal remover Tool C-3981 into seal (Fig. 41), then tighten screw portion of tool to withdraw the seal.

A-727: Using Tool C-3861, remove seal in the same manner.

(2) **A-904:** To install a new seal, place seal in opening of the pump housing (lip side facing inward). Using Tool C-3757, drive seal into housing until tool bottoms (Fig. 42).

A-727: Using Tool C-3860, install new seal in the same manner.

DISASSEMBLY—SUB-ASSEMBLY REMOVAL

Prior to removing any transmission sub-assemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be over-emphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All mating surfaces in the transmission are accurately machined; therefore, careful handling of parts must be exercised to avoid nicks or burrs.

Drive Train End Play

Measuring drive train end play before disassembly will usually indicate when a thrust washer

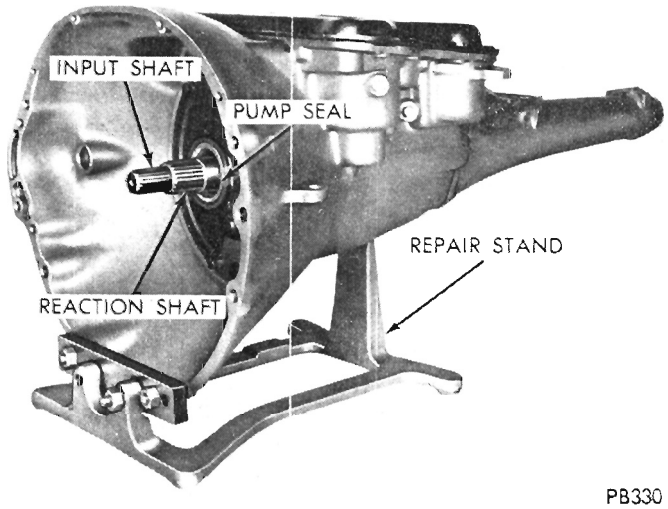


Fig. 44 - Transmission Installed in Repair Stand

change is required, (except when major parts are replaced). **The thrust washer is located between reaction shaft support and front clutch retainer on A-727 transmissions. The thrust washer is located between input and output shafts on A-904 transmissions.**

(1) Attach a dial indicator to transmission bell housing with its plunger seated against end of input shaft (Fig. 43).

Move input shaft in and out to obtain end play reading. End play specifications are .030 to .089 inch for A-904 transmissions, and .037 to .084 inch for A-727 transmissions.

(2) Record indicator reading for reference when reassembling the transmission.

Oil Pan

(1) Place transmission assembly in repair stand, Tool C-3750-A (Fig. 44).

(2) Unscrew oil pan bolts and remove oil pan and gasket.

Valve Body Assembly

(1) Loosen clamp bolts and remove throttle and gearshift levers from the transmission.

(2) Remove Back-Up Light and Neutral Start Switch.

(3) Remove the ten hex-head valve body to transmission bolts. Remove E-clip securing parking lock rod to the valve body manual lever (Fig. 37).

(4) While lifting valve body upward out of transmission case, disconnect parking lock rod from the lever.

Accumulator Piston and Spring

(1) Lift spring off accumulator piston and withdraw piston from the case. Spring will be on opposite side of piston (at small end) on 440 dual

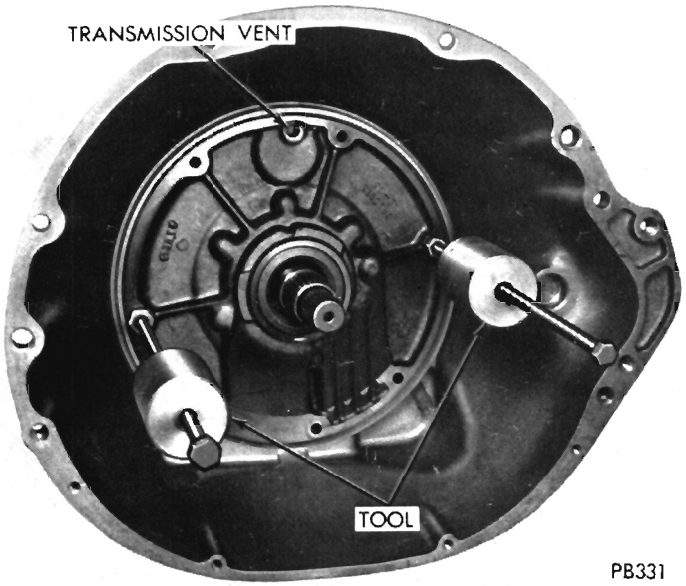


Fig. 45 - Removing Pump and Reaction Shaft Support Assembly

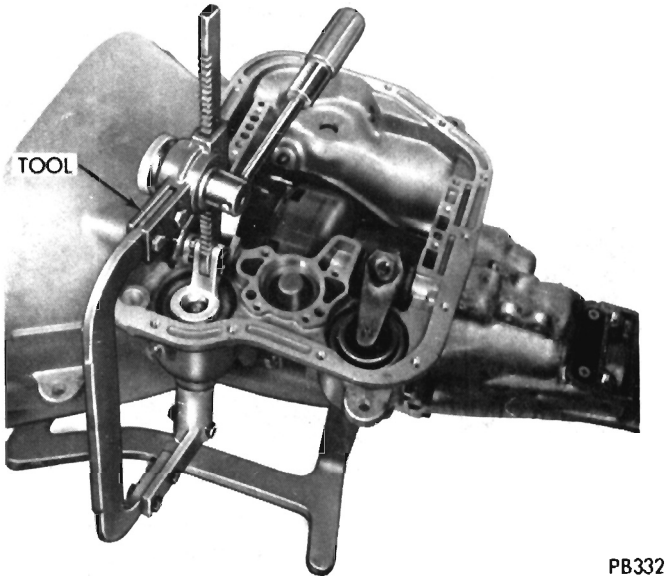


Fig. 46 - Compressing Kickdown Servo Spring

exhaust engines.

Extension Housing

Before removing extension housing, pull parking lock rod forward out of the case. Rotate output shaft if necessary to align parking gear and sprag to permit knob on end of control rod to pass the sprag.

(1) Remove speedometer pinion and adapter assembly.

(2) Remove extension housing to transmission bolts.

(3) Remove two screws, plate and gasket from bottom of extension housing mounting pad. Spread large snap ring from output shaft bearing with Tool C-3301A (Fig. 32). With snap ring spread as far as possible, carefully tap extension housing off the output shaft and bearing.

(4) Using heavy duty snap ring pliers C-4020, remove output shaft bearing rear snap ring. Remove bearing from shaft, then remove front snap ring (A-727). The A-904 has no front snap ring.

Governor and Support

(1) Carefully pry snap ring from weight end of governor valve shaft (Fig. 34). Slide valve and shaft assembly out of the governor body.

(2) Remove snap ring from behind governor body, then slide governor body and support assembly off the output shaft.

Oil Pump and Reaction Shaft Support

(1) **Tighten front band adjusting screw until band is tight on front clutch retainer.** This prevents clutch retainer from coming out with pump which might cause unnecessary damage to the clutches.

(2) Remove oil pump housing retaining bolts.

(3) Attach Tool C-3752 to pump housing flange, (Fig. 45), in threaded holes in the flange.

(4) Bump outward evenly with the two "knocker weights" to withdraw pump and reaction shaft support assembly from the case.

Front Band and Front Clutch

(1) Loosen front band adjuster, remove band strut and slide band out of the case.

(2) Slide front clutch assembly out of the case.

Input Shaft and Rear Clutch

(1) Grasp input shaft, and slide input shaft and rear clutch assembly out of the case.

CAUTION: Be careful not to lose thrust washer located between rear end of input shaft and forward end of the output shaft.

Planetary Gear Assemblies, Sun Gear and Driving Shell

(1) While supporting output shaft and driving shell, carefully slide assembly forward and out through the case.

CAUTION: Be very careful not to damage ground surfaces on output shaft during removal.

Rear Band and Low-Reverse Drum

(1) Remove low-reverse drum, then loosen rear band adjuster, remove band strut and link, then remove band from the case.

(A-904-LA Double Wrap Band): Loosen band adjusting screw then remove band and low-reverse drum.

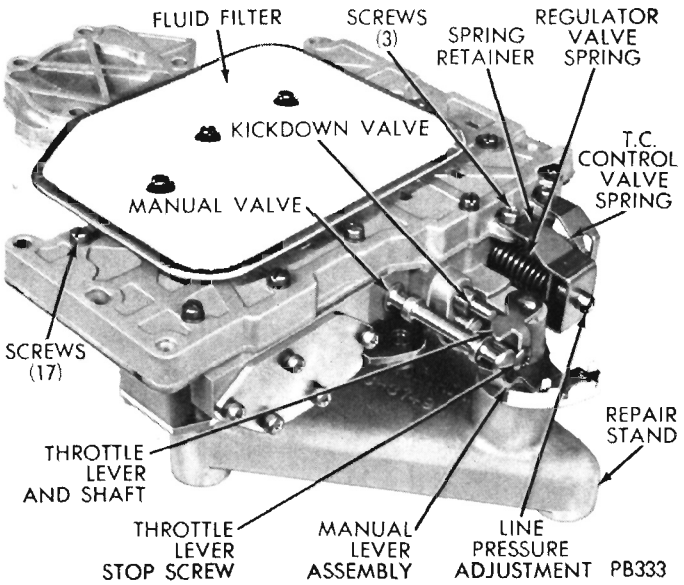


Fig 47 - Valve Body and Control Assembly

Overrunning Clutch

(1) Note position of overrunning clutch rollers and springs before disassembly to assist in reassembly.

(2) Carefully slide out clutch hub and remove rollers and springs. **If the overrunning clutch cam and/or roller spring retainer are found damaged or worn, refer to INDEX for replacement procedures.**

Kickdown Servo (Front)

(1) Compress kickdown servo spring by using engine valve spring compressor, Tool C-3422, then remove snap ring (Fig. 46).

(2) Remove rod guide, springs and piston rod from the case. Be careful not to damage piston rod or guide during removal.

(3) Withdraw piston from the transmission case. (See Fig. 99 or 100).

(4) If so equipped, disassemble "Controlled Load" Servo piston assembly by removing small snap ring from servo piston then remove washer, spring and piston rod from servo piston.

Low and Reverse Servo (Rear)

(1) Compress low and reverse servo piston spring by using engine valve spring compressor, Tool C-3422, then remove the snap ring.

(2) Remove spring retainer, spring, and servo piston and plug assembly from the case.

RECONDITION SUB-ASSEMBLIES

The following procedures cover disassembly, inspection, repair, and assembly of each sub-assembly as removed from the transmission.

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts.

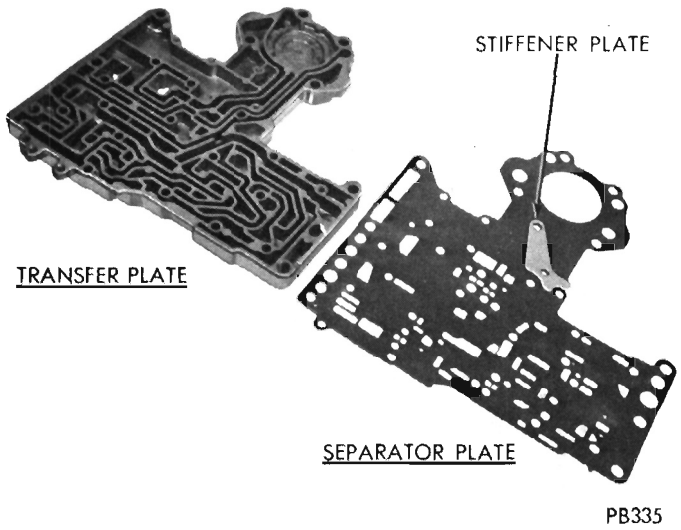


Fig. 48 - Transfer and Separator Plate (A-904)

Pre-sized service bushings are available for replacement for most all bushings in the Torque Flite transmission. The two bushings in sun gear are not serviced because of the low cost of sun gear assembly. If bushings are found worn or scored, they should be replaced as outlined in the following reconditioning procedures.

The bushing replacement tools listed by "SP" numbers are part of Tool Kit C-3887-A.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off the sharp edges. The sharp edge is vitally important to this type of valve. Sharp edges prevent dirt and foreign matter from getting between the valve and body, thus reducing possibility of sticking. When it becomes necessary to recondition transmission, and vehicle has accumulated considerable mileage, install new seal rings on parts requiring their usage. **Coat each part with "DEXRON" type Automatic Transmission Fluid during assembly.**

VALVE BODY DISASSEMBLY (A-904)

CAUTION: Never clamp any portion of valve body or transfer plate in a vise. Any slight distortion of the aluminum body or transfer plate will result in sticking valves, excessive leakage or both. When removing or installing valves or plugs, slide them in or out carefully. Do not use force.

Filter, Transfer Plate and Ball Valves

(1) Place valve body assembly on repair stand, Tool C-3749, (Fig. 47). Remove three screws from fluid filter and lift off the filter.

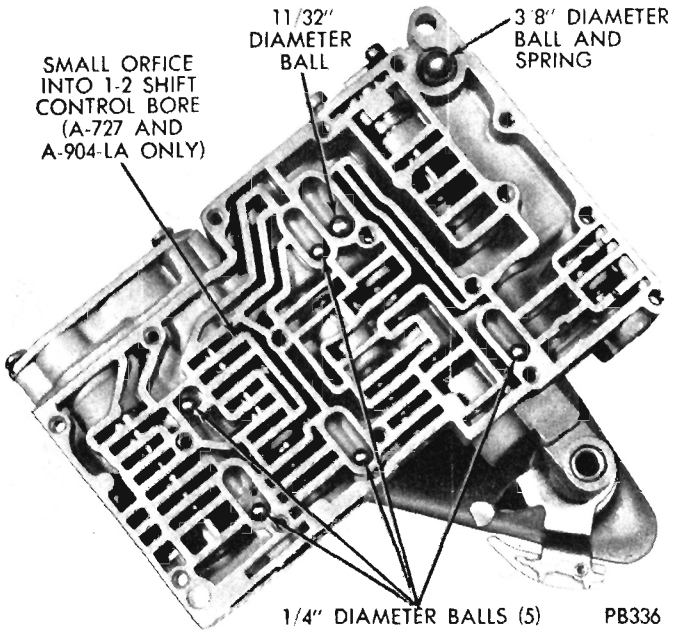


Fig. 49 - Steel Ball Locations

(2) Remove (17) transfer plate retaining screws and 2 of the spring retainer mounting screws.

(3) Lift off transfer plate and separator plate assembly. Remove (4) screws from stiffener and separator plate and separate parts for cleaning (Fig. 48).

(4) Remove the 7 balls and spring from valve body shown in (Fig. 49).

CAUTION: Tag all springs as they are removed for reassembly identification.

Shuttle Valve and Governor Plugs

(1) Turn valve body over (Fig. 50) and remove shuttle valve cover plate.

(2) Remove governor plug end plate (Fig. 51) and slide out the shuttle valve throttle plug and spring, the 1-2 shift valve governor plug and the 2-3 shift valve governor plug.

(3) Remove shuttle valve "E" clip and slide shuttle valve out of its bore.

Pressure Regulators and Manual Control

(1) **Hold spring retainer firmly against spring force while removing last retaining screw from valve body (Fig. 52).**

(2) Remove spring retainer, line pressure adjusting screw assembly **(do not disturb setting)** and the line pressure and torque converter regulator springs.

(3) Slide torque converter and line pressure valves out of their bores.

(4) Remove E-clip and washer from throttle lever shaft (Fig. 52). Remove any burrs from shaft, then while holding manual lever detent ball and spring in their bore with Tool C-3765 or similar

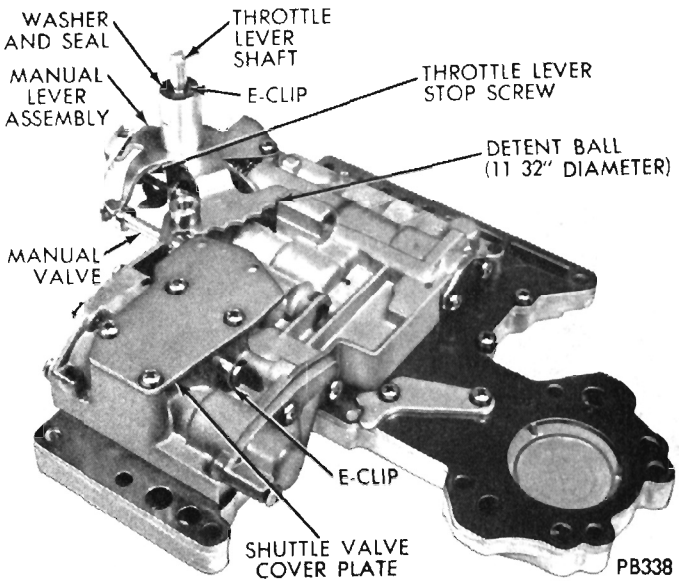


Fig. 50 - Valve Body Controls (A-904)

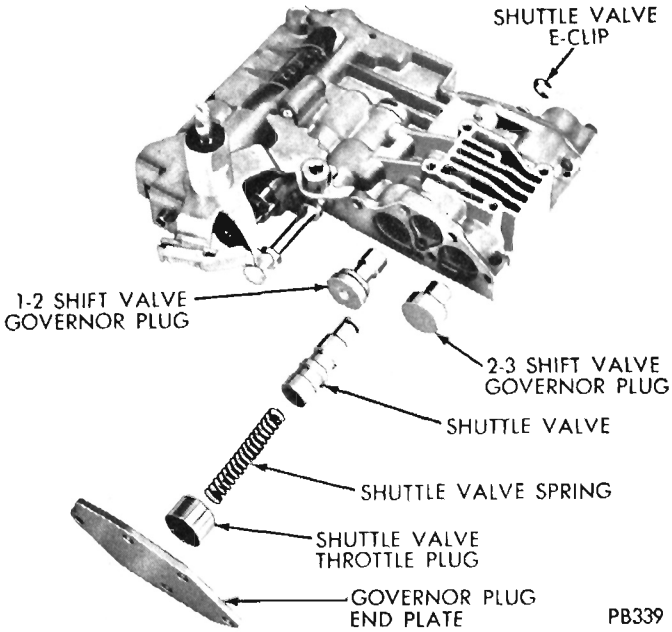


Fig. 51 - Shuttle Valve and Governor Plugs (A-904)

tool (Fig. 59), slide manual lever off the throttle shaft. Remove the detent ball and spring.

(5) Slide manual valve out of its bore.

(6) Remove throttle lever stop screw assembly from valve body and slide out the kickdown detent, kickdown valve, throttle valve spring and the throttle valve.

Shift Valves and Regulator Valve Pressure Sensing Plugs

(1) Remove the line pressure regulator valve end plate (Fig. 53) and slide out the regulator valve sleeve, line pressure plug, and throttle pressure plug.

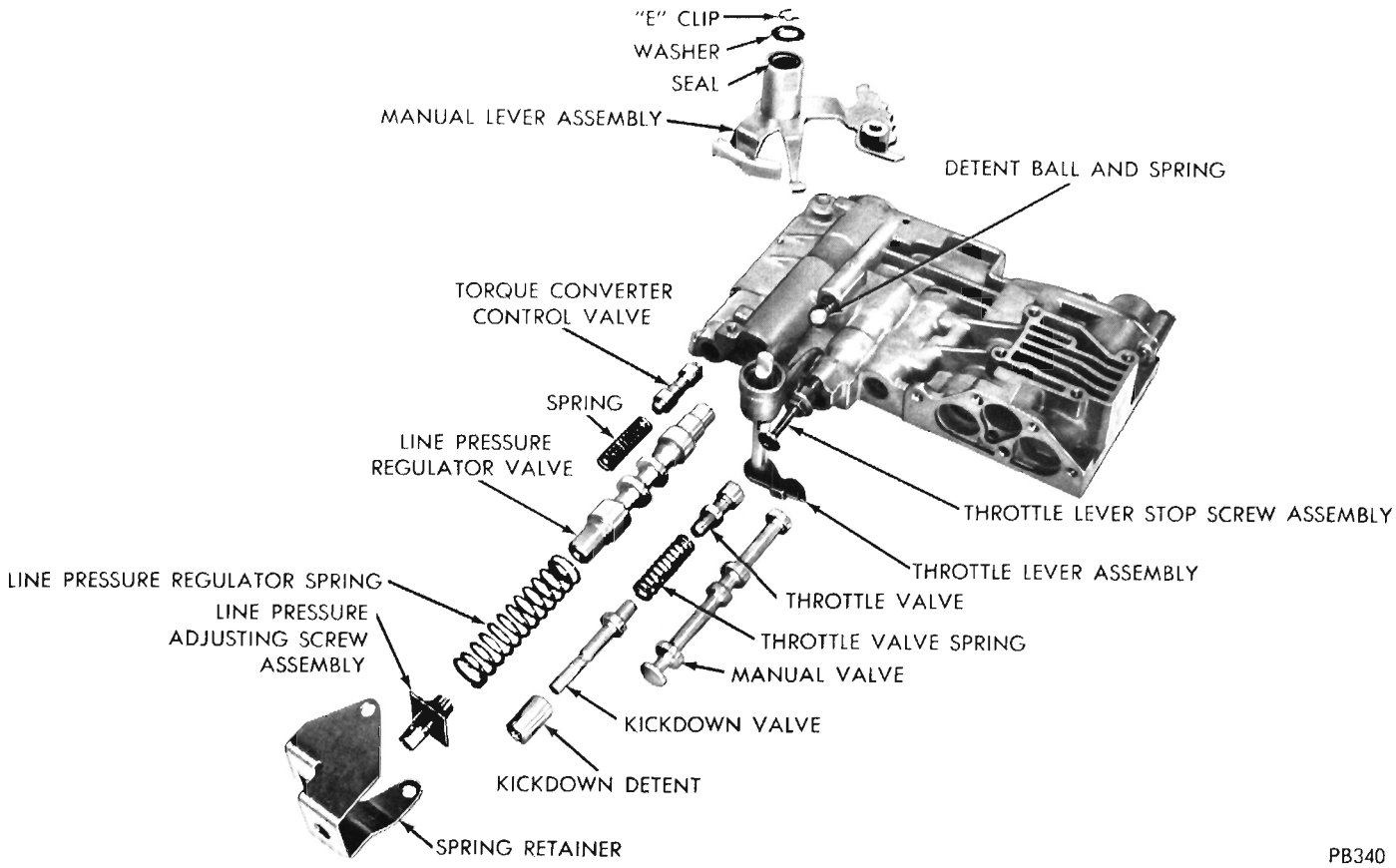


Fig. 52 - Pressure Regulators and Manual Control (A-904)

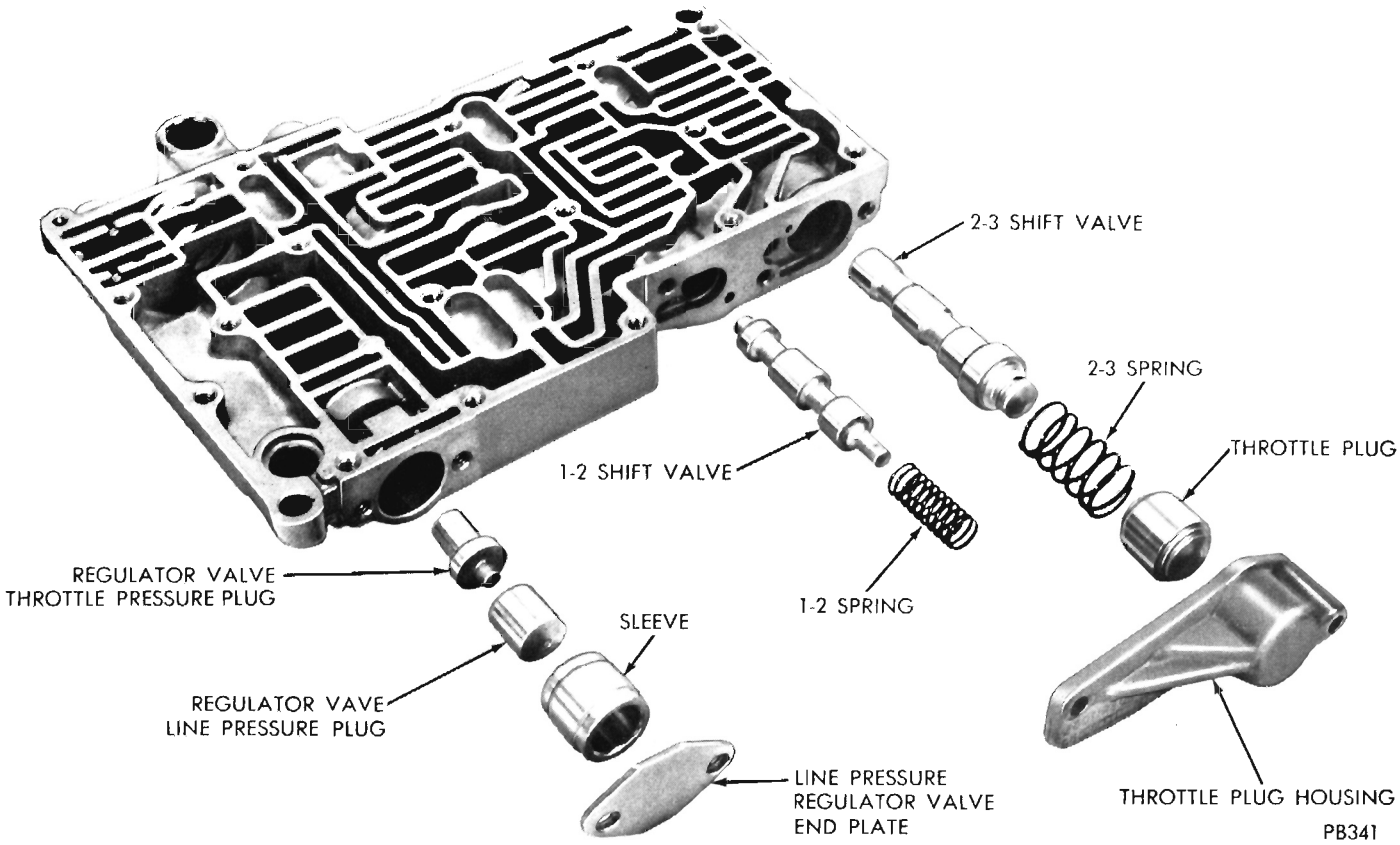


Fig. 53 - Shift Valves and Pressure Regulator Valve Plugs (A-904)

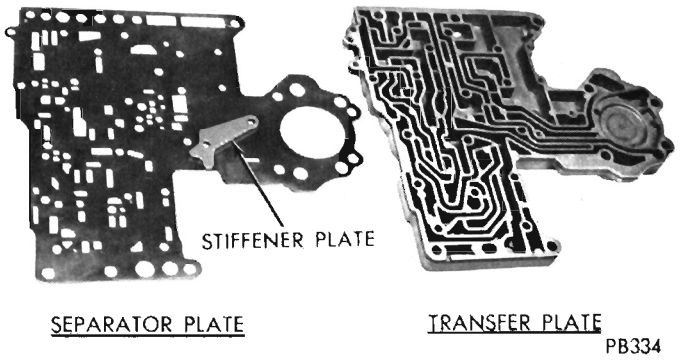


Fig. 54 - Transfer and Separator Plate (A-727 and A-904-LA)

(2) Remove throttle plug housing and slide throttle plug out of it.

(3) Remove the shift valve springs and slide both shift valves from their bores.

VALVE BODY DISASSEMBLY (A-727 and A-904-LA)

CAUTION: Never clamp any portion of valve body or transfer plate in a vise. Any slight distortion of the aluminum body or transfer plate will result in sticking valves, excessive leakage or both. When removing or installing valves or plugs, slide them in or out carefully. Do not use force.

Filter, Transfer Plate and Ball Valves

(1) Place valve body assembly on repair stand, Tool C-3749, (Fig. 47). Remove three screws from fluid filter and lift off the filter.

(2) Remove (17) transfer plate retaining screws and 2 of the spring retainer mounting screws.

(3) Lift off transfer plate and separator plate assembly. Remove (4) screws from stiffener and separator plate and separate parts for cleaning (Fig. 54).

(4) Remove the 7 balls and spring from valve body shown in (Fig. 49).

CAUTION: Tag all springs as they are removed for reassembly identification.

Shuttle Valve and Governor Plugs

(1) Turn valve body over (Fig. 55) and remove shuttle valve cover plate.

(2) Remove governor plug end plate (Fig. 56) and slide out the shuttle valve throttle plug and spring, the 1-2 shift valve governor plug and the 2-3 shift valve governor plug.

(3) Remove shuttle valve "E" clip and slide shuttle valve out of its bore. Also remove the secondary spring and guides which were retained by "E" clip.

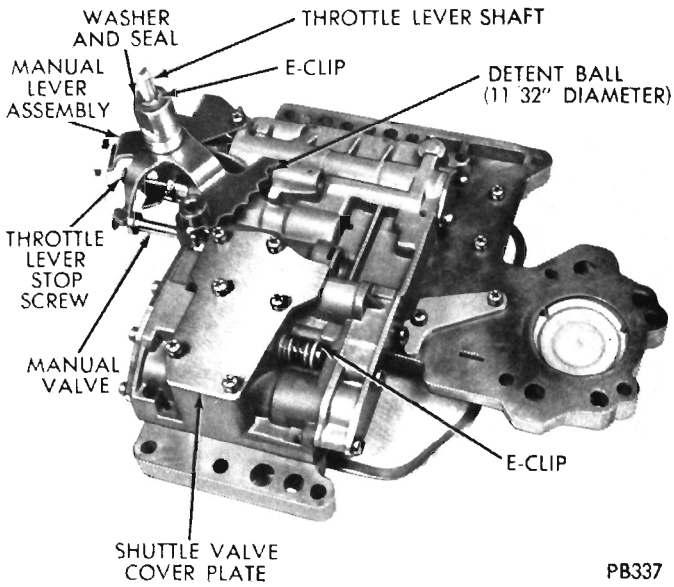


Fig. 55 - Valve Body Controls (A-727 and A-904-LA)

Pressure Regulators and Manual Control

(1) **Hold spring retainer firmly against spring force while removing last retaining screw from valve body (Fig. 57).**

(2) Remove spring retainer, line pressure adjusting screw assembly **(do not disturb setting)** and the line pressure and torque converter regulator springs.

(3) Slide torque converter and line pressure valves out of their bores.

(4) Remove E-clip and washer from throttle lever shaft (Fig. 57). Remove any burrs from shaft, then while holding manual lever detent ball and spring in their bore with Tool C-3765 or similar tool (Fig. 59), slide manual lever off the throttle shaft. Remove the detent ball and spring.

(5) Slide manual valve out of its bore.

(6) Remove throttle lever stop screw assembly from valve body and slide out the kickdown detent, kickdown valve, throttle valve spring and the throttle valve.

Shift Valves and Regulator Valve Pressure Sensing Plugs

(1) Remove the line pressure regulator valve end plate (Fig. 58) and slide out the regulator valve sleeve, line pressure plug, and throttle pressure plug.

(2) Remove end plate and downshift housing assembly if so equipped.

(3) Remove throttle plug from housing.

(4) Slide retainer from housing and remove limit valve and spring.

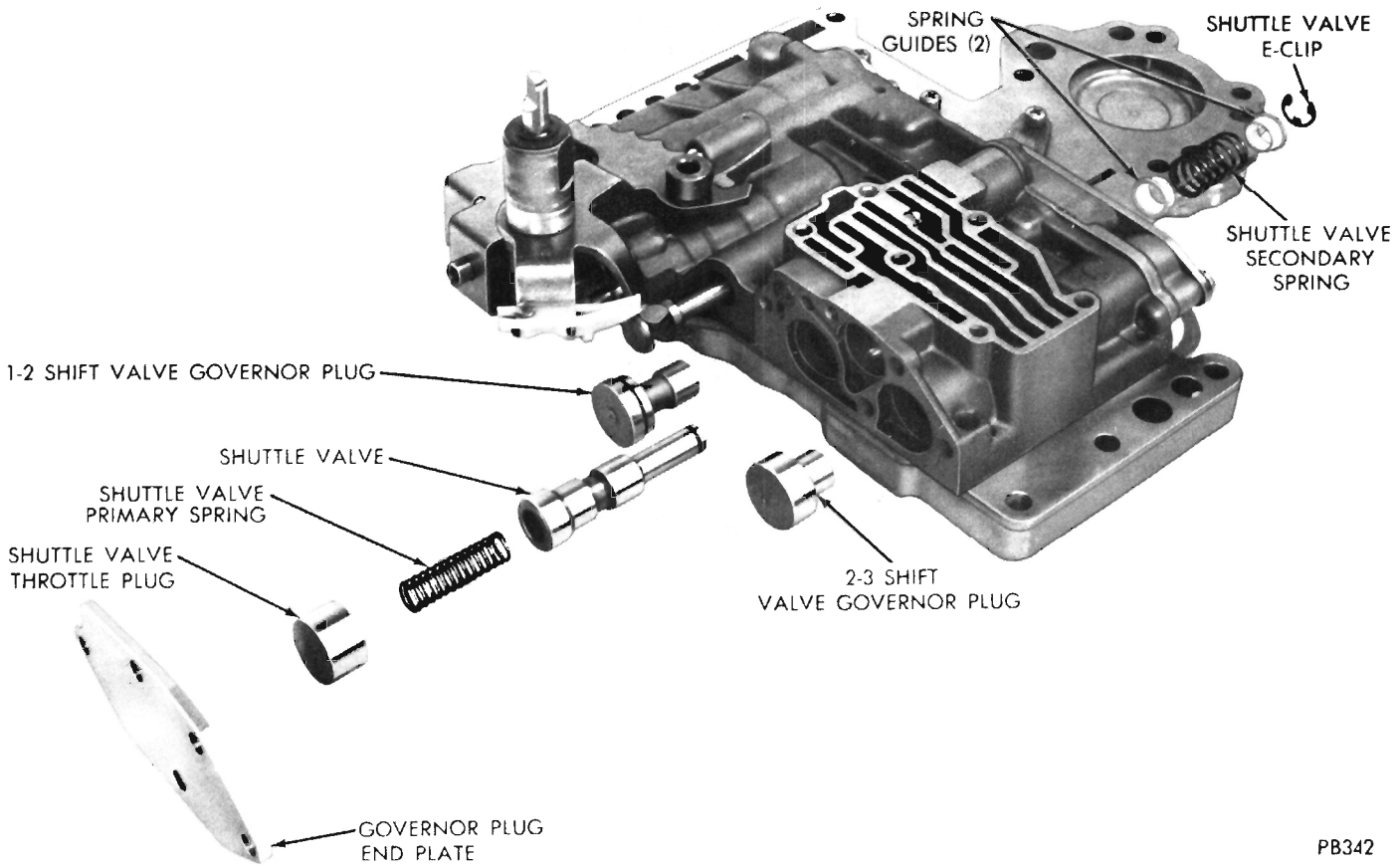


Fig. 56 - Shuttle Valve and Governor Plugs (A-727 and A-904-LA)

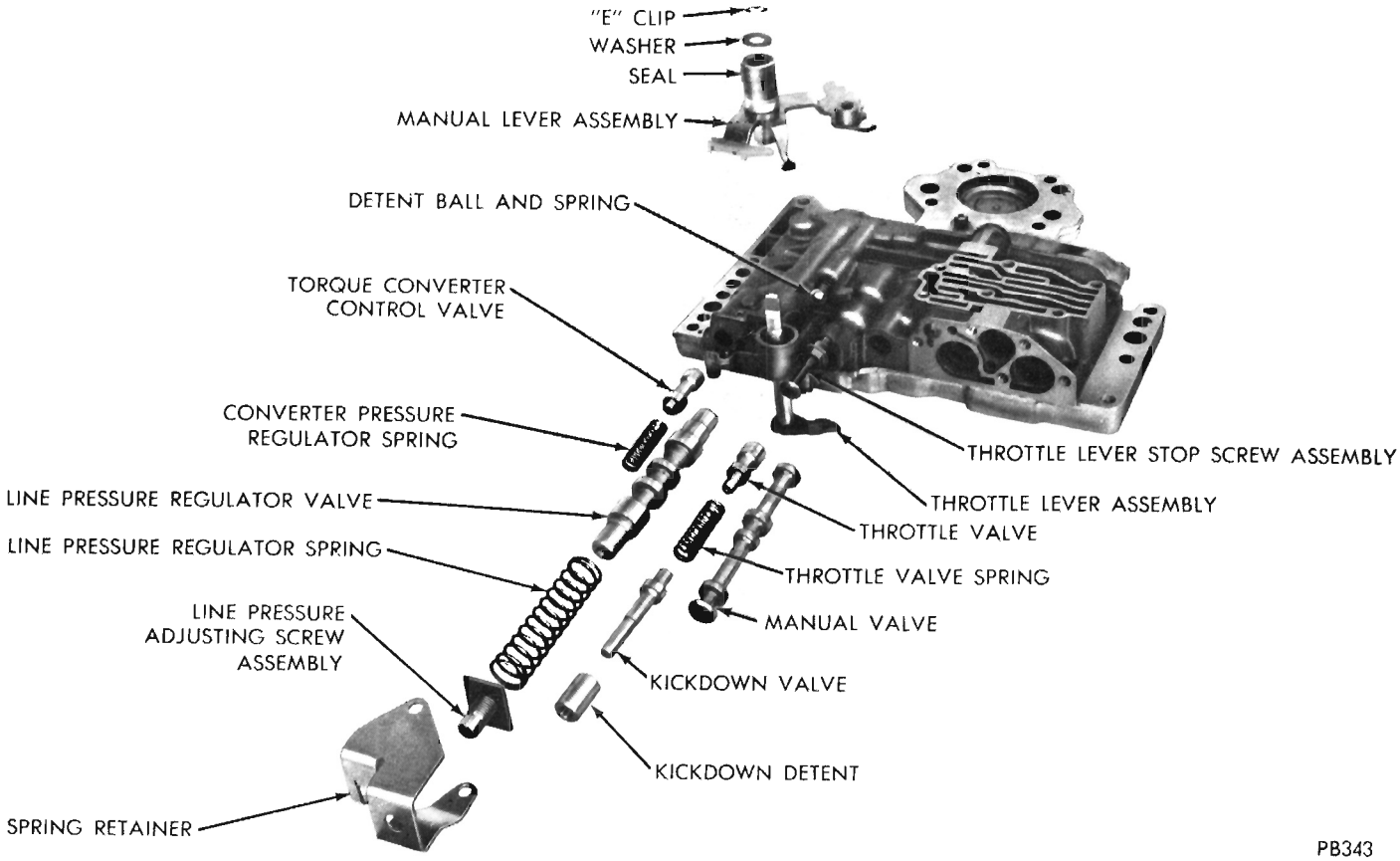


Fig. 57 - Pressure Regulators and Manual Control (A-727 and A-904-LA)

(5) Remove the three springs and shift valves from the valve body.

Cleaning and Inspection

Allow all parts to soak a few minutes in a suitable clean solvent. Wash thoroughly and blow dry with compressed air. Make sure all passages are clean and free from obstructions.

Inspect manual and throttle valve operating levers and shafts for being bent, worn or loose. If a lever is loose on its shaft, it may be **silver soldered** only, or lever and shaft assembly should be replaced. **Do not attempt to straighten bent levers.**

Inspect all mating surfaces for burrs, nicks and scratches. Minor blemishes may be removed with crocus cloth, using only a very light pressure. Using a straight edge, inspect all mating surfaces for warpage or distortion. Slight distortion may be corrected, using a surface plate. Make sure all metering holes in steel plate and valve body are open. Using a pen light, inspect bores in valve body for scores, scratches, pits and irregularities.

Make sure orfice referred to in (Fig. 49) is open by inserting a 1/32 in. dia. drill through it into the 1-2 shift control valve bore.

Inspect all valve springs for distortion and collapsed coils. Inspect all valves and plugs for burrs, nicks and scores. Small nicks and scores may be removed with crocus cloth, providing extreme care is taken not to round off sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between valve and valve body, thus reducing possibility of sticking. Inspect all valves and plugs for freedom of operation in valve body bores.

When bores, valves and plugs are clean and dry, the valves and plugs should fall freely in the bores. **The valve body bores do not change dimensionally with use. Therefore, a valve body that was functioning properly when vehicle was new, will operate correctly if it is properly and thoroughly cleaned. There is no need to replace valve body unless it is damaged in handling.**

VALVE BODY REASSEMBLY (A-904)

Shift Valves and Regulator Valve Pressure Sensing Plugs (Fig. 53)

(1) Slide shift valves and springs into proper valve body bores.

(2) Insert throttle plug into its housing and install housing on valve body. Tighten screws to 28 inch-pounds.

(3) Install throttle pressure plug, line pressure plug, and sleeve then fasten end plate to valve

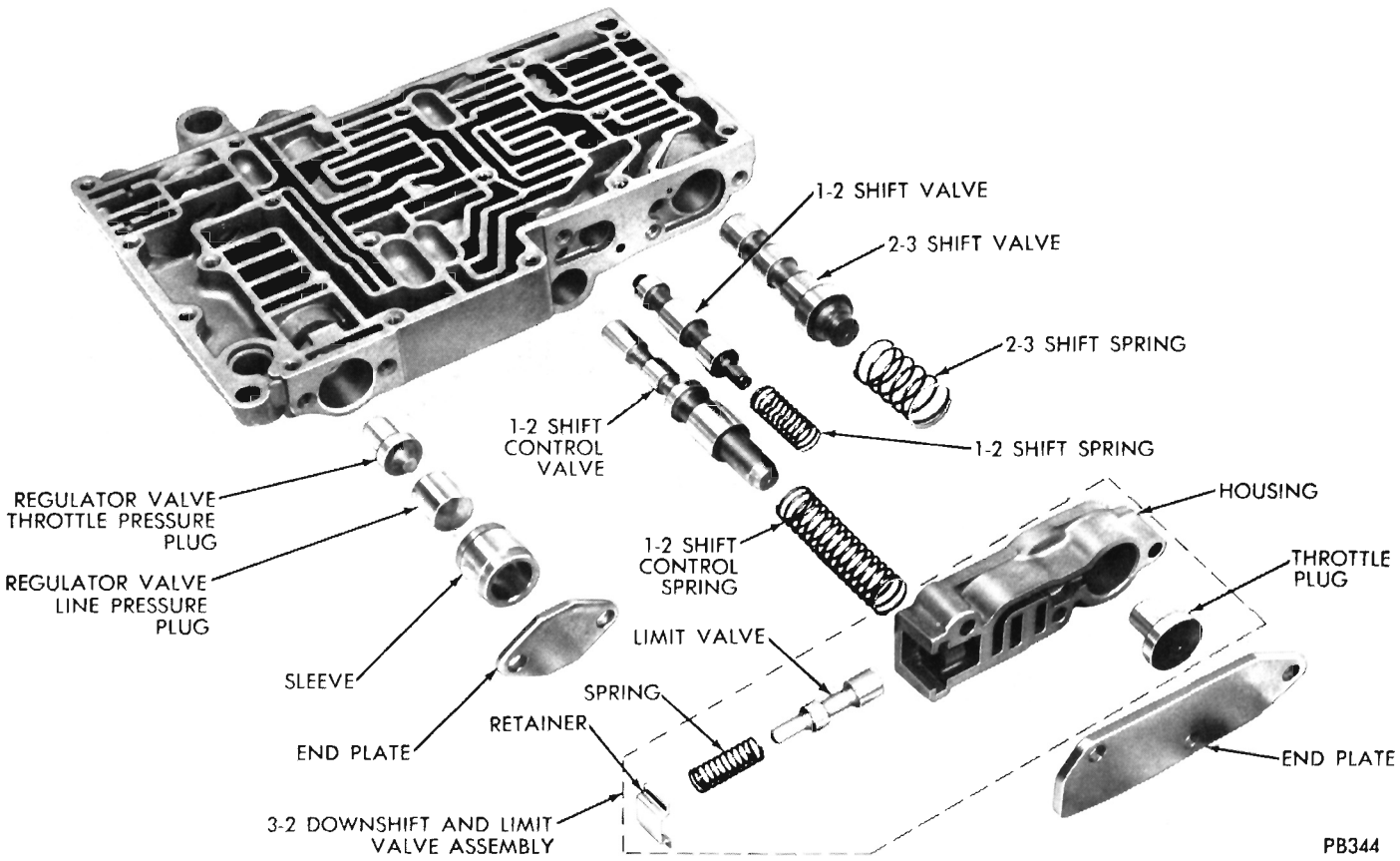


Fig. 58 - Shift Valves and Pressure Regulator Valve Plugs (A-727 and A-904-LA)

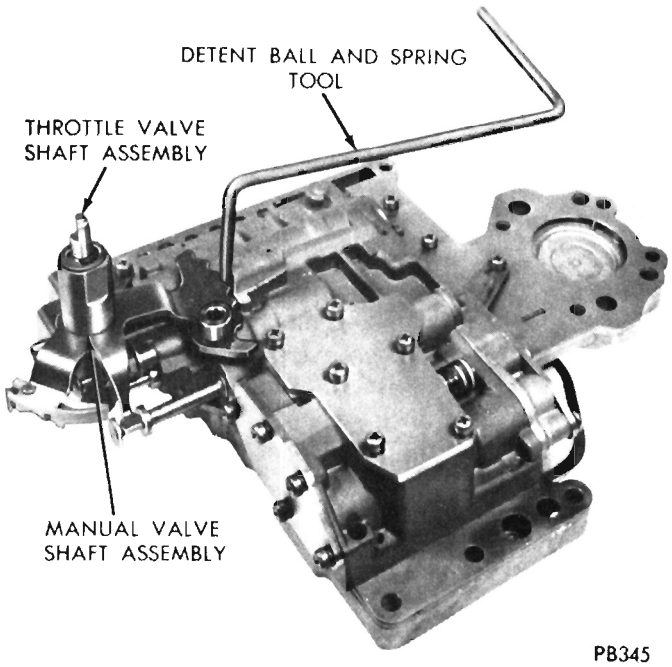


Fig. 59 - Installing Detent Ball, Spring and Control Levers

body. Torque to 28 inch-pounds.

Pressure Regulators and Manual Control (Fig. 52)

(1) Install throttle valve, throttle valve spring, kickdown valve, kickdown detent and throttle lever stop screw with lock nut (do not adjust yet).

(2) Slide manual valve into its bore.

(3) Install throttle lever and shaft on valve body (Fig. 52). Insert detent spring and ball in its bore in valve body. Depress ball and spring with Tool C-3765 (Fig. 59) or similar tool and slide manual lever over throttle shaft so that it engages manual valve and detent ball. Install seal, retaining washer and E-clip on throttle shaft.

(4) Insert torque converter control valve and spring into valve body.

(5) Insert line pressure regulator valve and spring into valve body.

(6) Install line pressure adjusting screw assembly and spring retainer on the springs and fasten with one screw for now.

Shuttle Valve and Governor Plugs (Fig. 51)

(1) Place 1-2 and 2-3 shift valve governor plugs in their respective bores.

(2) Install shuttle valve, spring and shuttle valve throttle plug.

(3) Install governor plug end plate and tighten the five retaining screws to 28 inch-pounds.

(4) Install E-clip on end of shuttle valve.

(5) Install shuttle valve cover plate and tighten the four retaining screws to 28 inch-pounds.

Ball Valves, Transfer Plate and Filter

(1) Install the spring and seven balls in the valve body as shown in (Fig. 49).

(2) Place separator plate on the transfer plate (Fig. 48). **Install stiffener plate and retaining screws exactly as shown.** Make sure all bolt holes are aligned, then tighten two transfer plate screws and two stiffener plate screws to 28 inch-pounds.

(3) Place transfer plate assembly on valve body. Be careful to align the spring loaded ball as the 17 shorter screws are installed (3 longer screws are for oil filter).

(4) Starting at the center and working outward, tighten screws to 35 inch-pounds.

(5) Install oil filter and tighten to 35 inch-pounds.

(6) Check spring engagement with tang and adjusting nut and install remaining spring retainer screws. Check alignment (Fig. 23), and tighten to 28 inch-pounds.

(7) After valve body has been serviced and completely assembled, adjust throttle and line pressures (Fig. 24 and 25). However, if pressures were satisfactory prior to disassembly, use original settings.

VALVE BODY REASSEMBLY (A-727 AND A-904-LA)

Shift Valves and Regulator Valve Pressure Sensing Plugs (Fig. 58)

(1) Slide shift valves and springs into proper valve body bores.

(2) If so equipped, sub-assemble the downshift housing as follows:

(a) Insert limit valve and spring into housing.

(b) Slide spring retainer into groove in housing.

(c) Insert throttle plug in housing bore. Position assembly against the shift valve springs.

(3) Install end plate and tighten screws to 28 inch-pounds.

(4) Install throttle pressure plug, line pressure plug, and sleeve then fasten end plate to valve body. Torque to 28 inch-pounds.

Pressure Regulators and Manual Control (Fig. 57)

(1) Install throttle valve, throttle valve spring, kickdown valve, kickdown detent and throttle lever stop screw with lock nut (do not adjust yet).

(2) Slide manual valve into its bore.

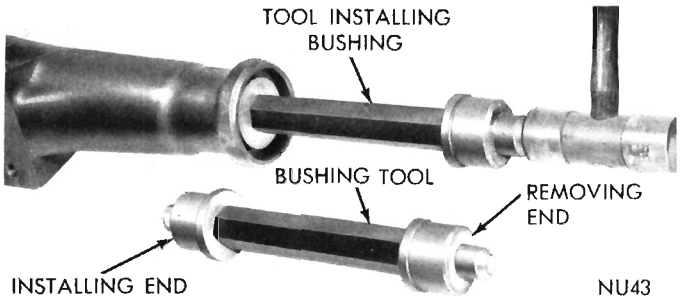


Fig. 60 - Replacing Extension Housing Bushing

(3) Install throttle lever and shaft on valve body (Fig. 57). Insert detent spring and ball in its bore in valve body. Depress ball and spring with Tool C-3765 (Fig. 59) or similar tool and slide manual lever over throttle shaft so that it engages manual valve and detent ball. Install seal, retaining washer and E-clip on throttle shaft.

(4) Insert torque converter control valve and spring into valve body.

(5) Insert line pressure regulator valve and spring into valve body.

(6) Install line pressure adjusting screw assembly and spring retainer on the springs and fasten with one screw for now.

Shuttle Valve and Governor Plugs (Fig. 56)

(1) Place 1-2 and 2-3 shift valve governor plugs in their respective bores.

(2) Install shuttle valve and hold it in bore with index finger while installing on the other end of it the secondary spring with guides and retaining "E" clip.

(3) Install primary shuttle valve spring and throttle plug.

(4) Install governor plug end plate and tighten the five retaining screws to 28 inch-pounds.

(5) Install shuttle valve cover plate and tighten the six retaining screws to 28 inch-pounds.

Ball Valves, Transfer Plate and Filter

(1) Install the spring and seven balls in the valve body as shown in (Fig. 49).

(2) Place separator plate on the transfer plate (Fig. 54). **Install stiffener plate and retaining screws exactly as shown.** Make sure all bolt holes are aligned, then tighten two transfer plate screws and two stiffener plate screws to 28 inch-pounds.

(3) Place transfer plate assembly on valve body. Be careful to align the spring loaded ball as the 17 shorter screws are installed (3 longer screws are for oil filter).

(4) Starting at the center and working outward, tighten screws to 35 inch-pounds.

(5) Install oil filter and tighten to 35 inch-pounds.

(6) Check spring engagement with tang and adjusting nut and install remaining spring retainer screws. Check alignment (Fig. 23), and tighten to 28 inch-pounds.

(7) After valve body has been serviced and completely assembled, adjust throttle and line pressures (Fig. 24 and 25). However, if pressures were satisfactory prior to disassembly, use original settings.

ACCUMULATOR PISTON AND SPRING

Inspection

Inspect seal rings for wear and make sure they turn freely in piston grooves. It is not necessary to remove rings unless conditions warrant. Inspect piston for nicks, burrs, scores and wear. Inspect piston bore in the case for scores or other damage. Inspect piston spring for distortion. Replace parts as required.

EXTENSION HOUSING BUSHING AND OIL SEAL

Replacement

(1) Remove the extension housing yoke seal (Fig. 29) with Tool C-3994 or C-3985.

(2) **A-904:** Press or drive out bushing with Tool C-3996 (Fig. 60).

A-727: Remove bushing in the same manner with Tool C-3974.

(3) **A-904:** Slide a new bushing on installing end of Tool C-3996. Align oil hole in bushing with oil slot in the housing, then press or drive bushing into place (Fig. 60).

A-727: Using Tool C-3974, install a new bushing in same manner.

(4) **A904:** Drive a new oil seal into housing with Tool C-3995 (Fig. 31).

A-727: Using Tool C-3972, install a new oil seal in same manner.

PARKING LOCK SPRAG

Disassembly

(1) Slide shaft out of extension housing to remove parking sprag and spring (Fig. 36). Remove snap ring and slide reaction plug and pin assembly out of the housing.

Inspection

Inspect sprag shaft for scores and free movement in the housing and sprag. Inspect sprag and control rod springs for distortion and tension. Inspect square lug on sprag for broken edges, also lugs on parking gear for damage. Inspect knob on end of control rod for nicks, burrs and free turning.

To replace parking gear, refer to "Governor and Support—Disassembly and Assembly."

Assembly

(1) Install reaction plug and pin assembly in the housing and secure with snap ring (Fig. 36).

(2) Position sprag and spring in housing and insert the shaft. Make sure square lug on sprag is toward parking gear, and spring is positioned so it moves sprag away from the gear.

GOVERNOR AND SUPPORT

Disassembly

(1) Remove large snap ring from weight end of governor body, lift out weight assembly.

(2) Remove snap ring from inside governor weight, remove inner weight and spring from outer weight.

(3) If lugs on support gear are damaged, remove four bolts and separate support from governor body.

Cleaning and Inspection

Figure 35 shows a disassembled view of the governor assembly.

Inspect all parts for burrs and wear. Inspect inner weight for free movement in outer weight, and outer weight for free movement in governor body. Inspect valve for free movement in governor body. The weights and valve should fall freely in the bores when clean and dry. Rough surfaces may be removed with crocus cloth.

Inspect governor weight spring for distortion. Inspect lugs on support gear for broken edges or other damage. Thoroughly clean all governor parts in clean solvent and test for free movement before assembly.

Assembly

(1) If support was separated from governor body, assemble and tighten bolts finger tight.

(2) Assemble governor weights and spring, and secure with snap ring inside of large governor weight. Place weight assembly in governor body and install snap ring.

OIL PUMP AND REACTION SHAFT SUPPORT—A-904

Disassembly

Figure 61 shows the oil pump and reaction shaft support disassembled.

(1) Remove bolts from rear side of reaction shaft support and lift support off the pump.

(2) Remove rubber seal ring from pump body flange.

(3) Drive out oil seal with a blunt punch.

Inspection

Inspect interlocking seal rings (Fig. 61) on reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Inspect front clutch piston retainer to reaction shaft support thrust washer for wear. Washer thickness should be .043 to .045 inch, replace if necessary. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect pump rotors for scoring or pitting. With rotors cleaned and installed in pump body, place a straight edge across face of rotors and pump body. Use a feeler gauge to measure clearance between straight edge and face of rotors. Clearance limits are from .0015 to .003 inch. Also, measure rotor tip clearance between inner and outer rotor teeth. Clearance limits are from .005 to .010 inch. Clearance between outer rotor and its bore in oil pump body should be .004 to .008 inch.

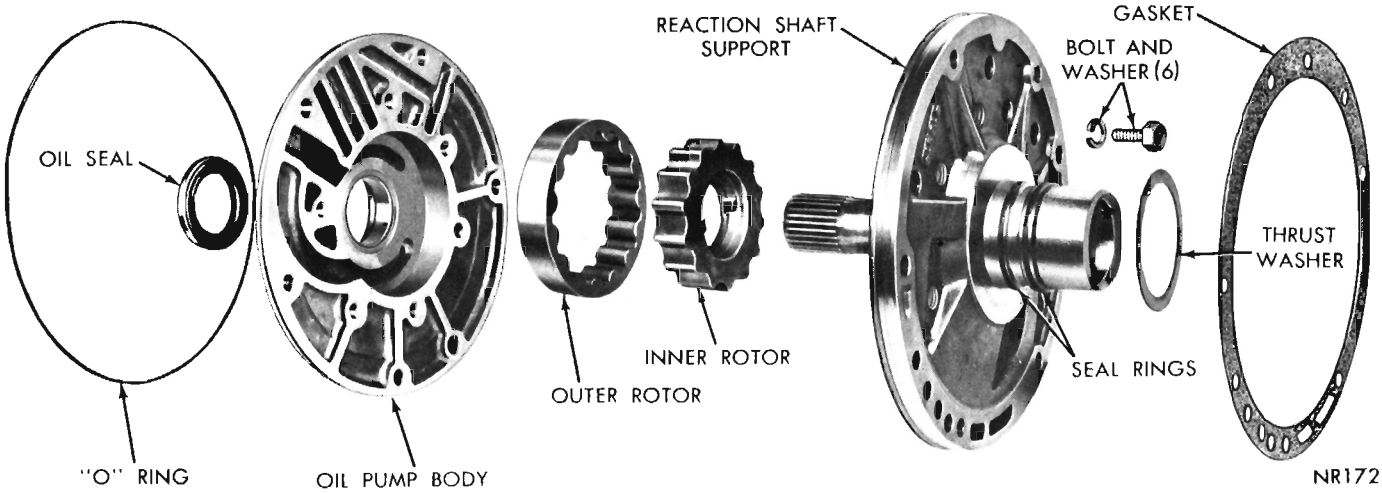


Fig. 61 - Oil Pump and Reaction Shaft Support Disassembled (A-904)

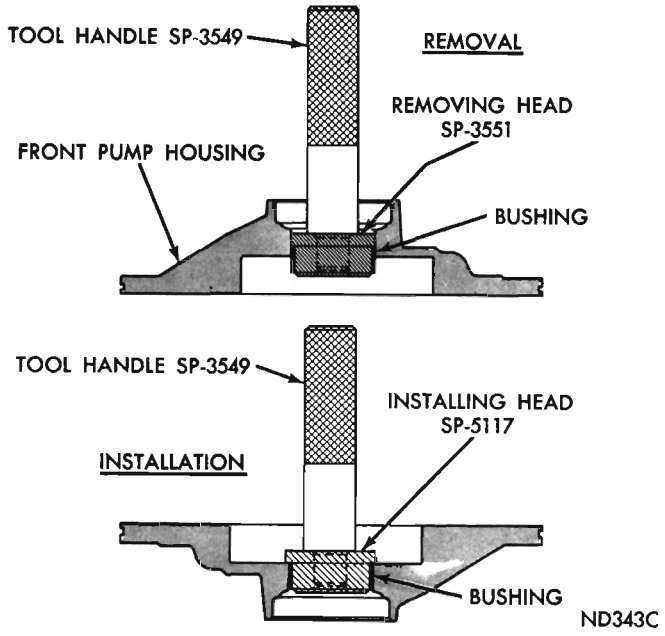


Fig. 62 - Replacing Pump Bushing (A-904)

Pump Bushing Replacement—A-904

(1) Place pump housing (seal face down) on a smooth firm surface.

(2) Place removing head, Tool SP-3551 in bushing and install handle, Tool SP-3549 in the removing head (Fig. 62).

(3) Drive bushing straight down and out of pump housing bore. Be careful not to cock tool in the bore.

(4) Position new bushing on installing head, Tool SP-5117.

(5) With pump housing on a smooth clean surface, start bushing and installing head in the bushing bore. Install handle, Tool SP-3549 in the installing head (Fig. 62).

(6) Drive bushing into housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

(7) Stake bushing in place by using a blunt punch or similar tool (Fig. 63). A gentle tap at each stake slot location will suffice.

(8) Using a narrow-bladed knife or similar tool, remove high points or burrs around staked area (Fig. 63). Do not use a file or similar tool that will remove more metal than is necessary.

Reaction Shaft Bushing Replacement—A-904

In case of a reaction shaft bushing failure, always inspect the support for wear from the input shaft seal ring lands. If worn or grooved, replace support assembly.

(1) Assemble remover Tool SP-5324, cup Tool SP-3633, and hex nut Tool SP-1191 (Fig. 64).

CAUTION: Do not clamp any part of reaction shaft or support in a vise.

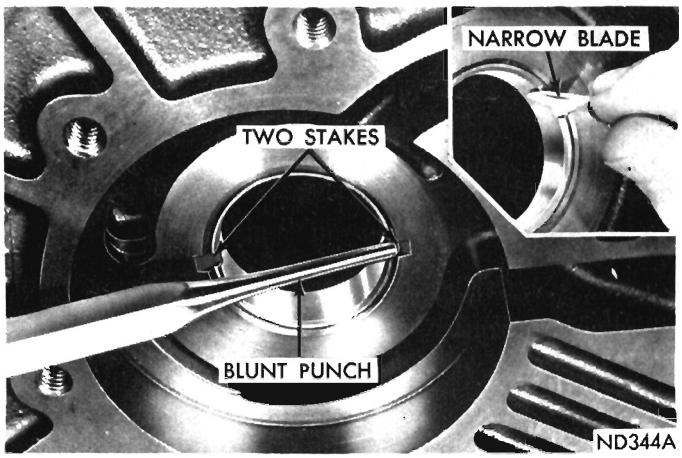


Fig. 63 - Staking Pump Bushing (A-904)

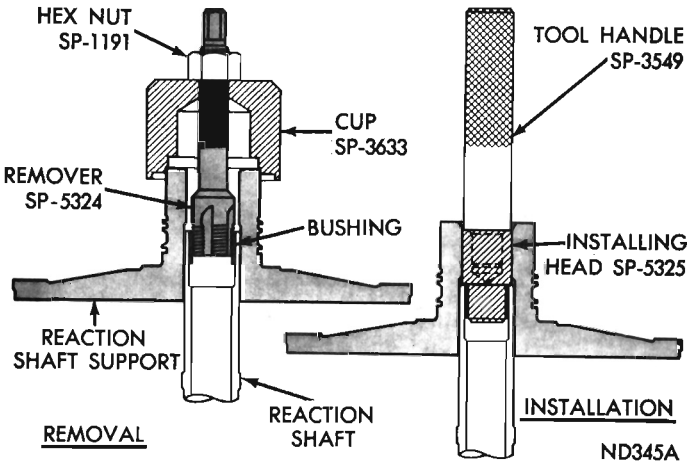


Fig. 64 - Replacing Reaction Shaft Bushing (A-904)

(2) With cup held firmly against reastion shaft, thread remover into bushing as far as possible by hand.

(3) Using a wrench, screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

(4) Turn hex nut down against cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.

(5) Lightly grip bushing in a vise or with pliers and back tool out of the bushing. Be careful not to damage threads on bushing remover.

(6) Slide a new bushing on installing head Tool SP-5325, and start them in the bore of reaction shaft (Fig. 64).

(7) Support reaction shaft upright on a clean smooth surface and install handle Tool SP-3549 in installing head. Drive bushing into the shaft until tool bottoms.

(8) Thoroughly clean reaction shaft support assembly before installation.

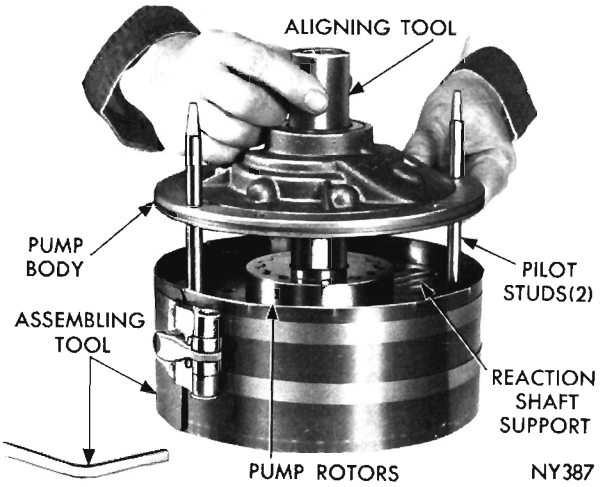


Fig. 65 - Assembling Pump and Reaction Shaft Support (A-904)

Assembly

(1) Place reaction shaft support in assembling Tool C-3759, with hub of support and tool resting on a smooth **flat** surface bench (Fig. 65). Screw two pilot studs, Tool C-3283 into threaded holes of reaction shaft support flange.

(2) Assemble and place rotors in center of the support (Fig. 65).

(3) Lower pump body over the pilot studs, insert Tool C-3756 through pump body and engage pump inner rotor. Rotate the rotors with tool to enter rotors in pump body, then with pump body firm against reaction shaft support, tighten clamping tool securely.

(4) Invert pump and reaction shaft support assembly with clamping tool intact. Install support to pump body bolts and tighten to 160 inch-pounds. Remove clamping tool, pilot studs and rotor alignment tool.

(5) Place a new oil seal in opening of pump housing (lip of seal facing inward). Using Tool C-3757, drive seal into housing until tool bottoms.

OIL PUMP AND REACTION SHAFT SUPPORT—A-727

Disassembly

Figure 66 shows the oil pump and reaction shaft support disassembled.

(1) Remove bolts from rear side of reaction shaft support, and lift support off the pump.

(2) Remove rubber seal ring from pump body flange.

(3) Drive out oil seal with a blunt punch.

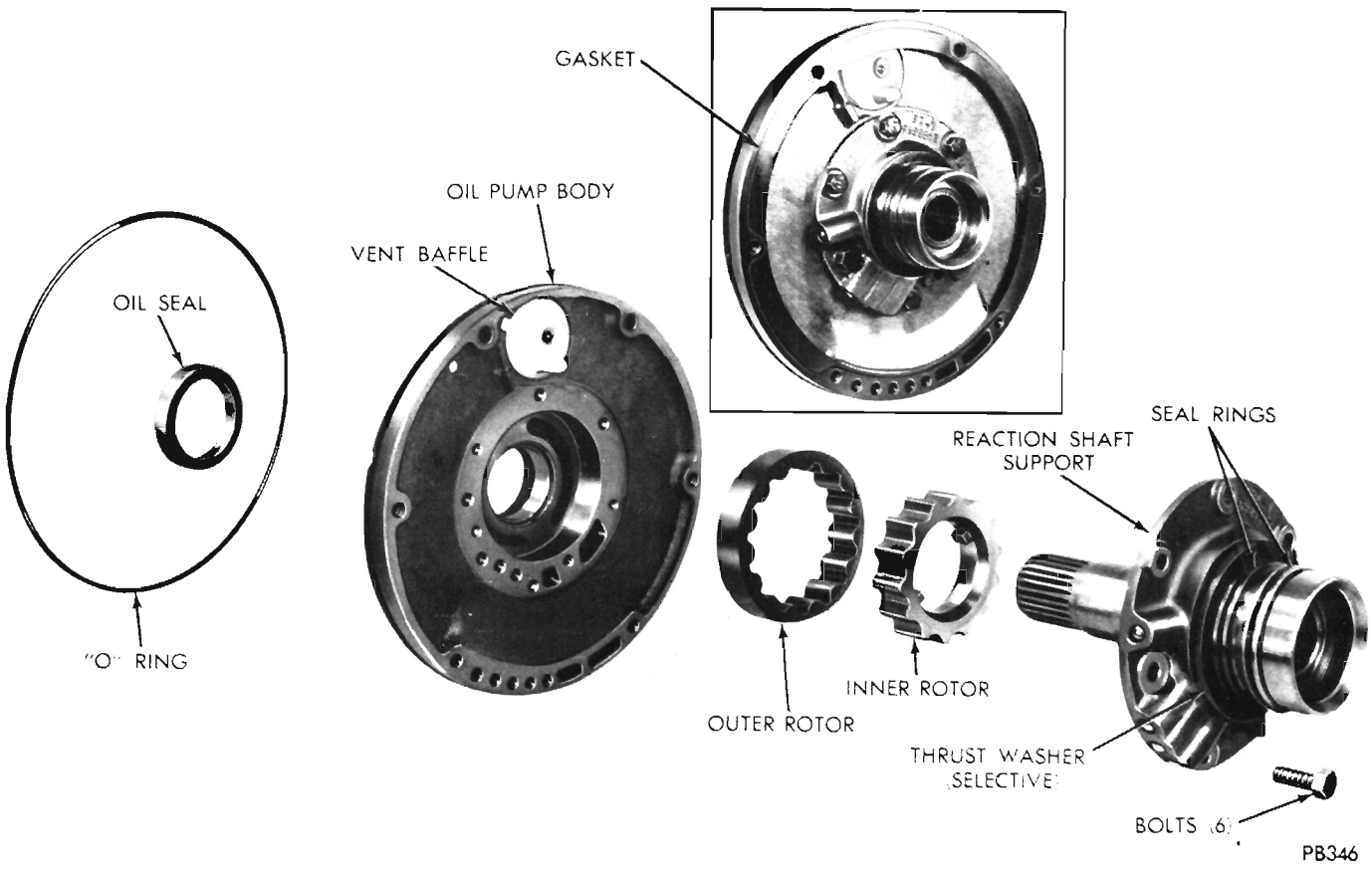


Fig. 66 - Oil Pump and Reaction Shaft Support (A-727)

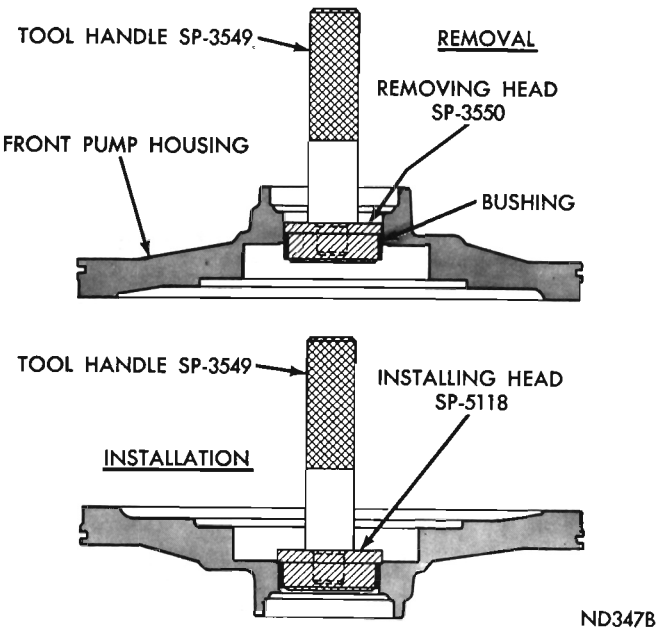


Fig. 67 - Replacing Pump Bushing (A-727)

Inspection

Inspect interlocking seal rings (Fig. 66) on reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect pump rotors for scoring or pitting. With rotors cleaned and installed in pump body, place a straight edge across face of rotors and pump body. Use a feeler gauge to measure clearance between straight edge and face of rotors. Clearance limits are from .0015 to .003 inch. Also, measure rotor tip clearance between inner and outer teeth. Clearance limits are from .005 to .010 inch. Clearance between outer rotor and its bore in oil pump body should be .004 to .008 inch.

Pump Bushing Replacement—A-727

(1) Place pump housing on a clean smooth surface with rotor cavity down.

(2) Place removing head Tool SP-3550 in the bushing, and install handle Tool SP-3549 in the removing head (Fig. 67).

(3) Drive bushing straight down and out of the bore. Be careful not to cock tool in the bore.

(4) Position a new bushing on installing head Tool SP-5118.

(5) With pump housing on a smooth clean surface (hub end down), start bushing and installing head in the bushing bore. Install handle Tool SP-3549 in installing head (Fig. 67).

(6) Drive bushing into housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

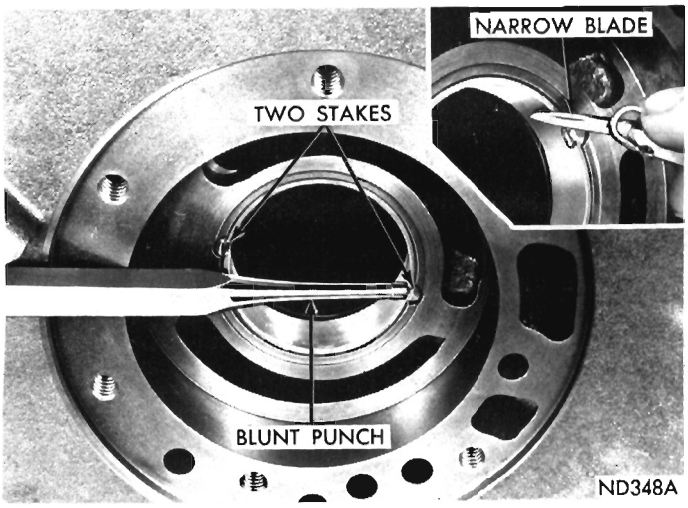


Fig. 68 - Staking Pump Bushing (A-727)

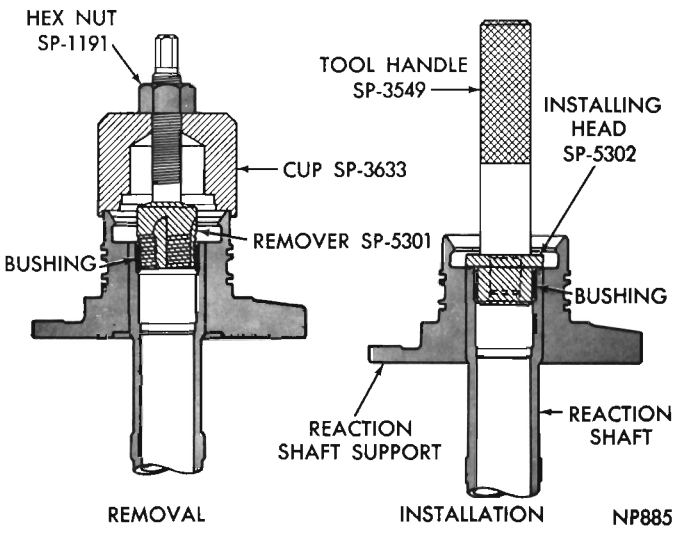


Fig. 69 - Replacing Reaction Shaft Bushing (A-727)

(7) Stake the bushing in place by using a blunt punch or similar tool (Fig. 68). A gentle tap at each stake slot location will suffice.

(8) Using a narrow-bladed knife or similar tool, remove high points or burrs around staked area (Fig. 68). Do not use a file or similar tool that will remove more metal than is necessary.

(9) Thoroughly clean pump housing before installation.

Reaction Shaft Bushing Replacement—A-727

(1) Assemble remover Tool SP-5301,cup Tool SP-3633, and hex nut Tool SP-1191 (Fig. 69).

CAUTION: Do not clamp any part of reaction shaft or support in a vise.

(2) With cup held firmly against reaction shaft, thread remover into bushing as far as possible by hand.

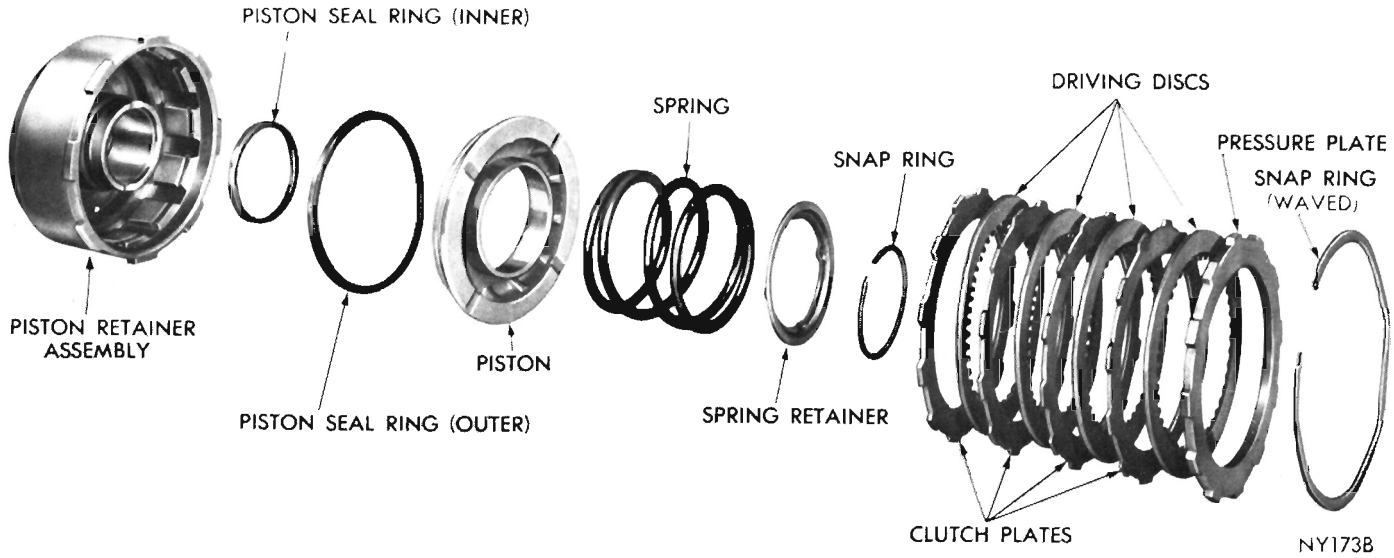


Fig. 70 - Front Clutch Disassembled (A-904)

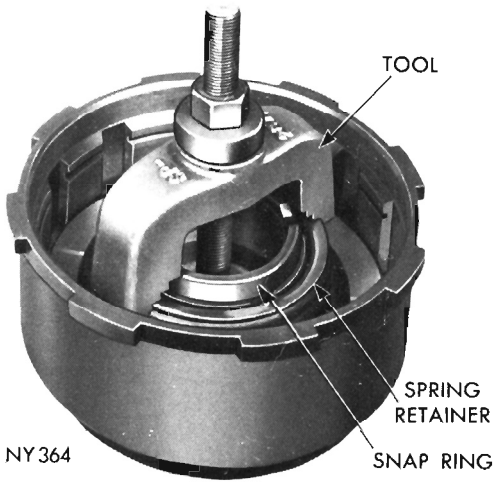


Fig. 71 - Removing or Installing Front Clutch Spring Retainer Snap Ring (A-904)

(3) Use a wrench to screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

(4) Turn hex nut down against the cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.

(5) Lightly grip bushing in a vise or with pliers and back tool out of the bushing. Be careful not to damage threads on bushing remover.

(6) Slide a new bushing (chamfered end first) on installing head Tool SP-5302, and start them in the bore of reaction shaft (Fig. 69).

(7) Support reaction shaft upright on a clean smooth surface and install handle Tool SP-3549 in installing head. Drive bushing into shaft until tool bottoms.

(8) Thoroughly clean reaction shaft support assembly before installation.

Assembly

(1) Assemble pump rotors and "O" ring in the pump housing (Fig. 66).

(2) Install reaction shaft support. Install retaining bolts and tighten to 160 inch-pounds.

(3) Place a new oil seal in opening of pump housing (lip of seal facing inward) using Tool C-3860 drive seal into housing until tool bottoms.

FRONT CLUTCH—A-904

Disassembly

Figure 70 shows a disassembled view of the front clutch assembly.

(1) Remove large waved snap ring that secures pressure plate in the clutch piston retainer. Lift pressure plate and clutch plates out of the retainer.

(2) Install compressor, Tool C-3575 over piston spring retainer (Fig. 71). Compress spring and remove snap ring, then slowly release tool until spring retainer is free of the hub. Remove tool, retainer and spring.

(3) Invert clutch retainer assembly and bump it on a wood block to remove the piston. Remove seal rings from the piston and clutch retainer hub.

Inspection

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scor-

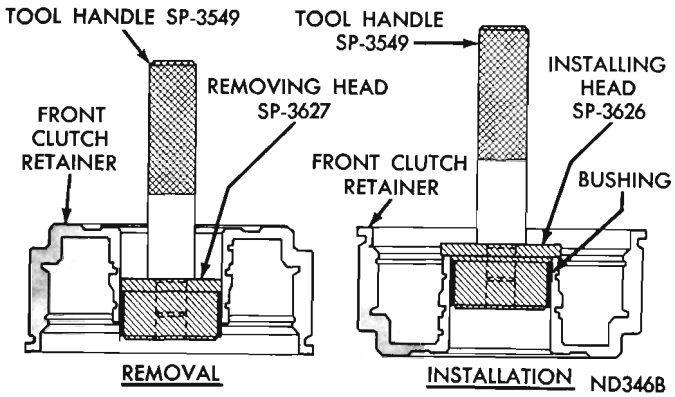


Fig. 72 - Replacing Front Clutch Retainer Bushing (A-904)

ing or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in grooves. Inspect band contacting surface on clutch retainer for scores, **the contact surface should be protected from damage during disassembly and handling.** Note ball check in clutch retainer, make sure ball moves freely. Inspect piston seal ring surfaces in clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene rings. Inspect clutch retainer inner bore surface for wear from reaction shaft support seal rings. Inspect clutch retainer bushing for wear or scores.

Inspect inside bore of piston for score marks, if light, remove with crocus cloth. Inspect seal ring grooves for nicks and burrs. Inspect neoprene seal rings for deterioration, wear, and hardness. Inspect piston spring, retainer and snap ring for distortion.



Fig. 73 - Measuring Front Clutch Plate Clearance

Front Clutch Retainer Bushing Replacement A-904

(1) Lay clutch retainer (open end down) on a clean smooth surface and place removing head Tool SP-3627 in the bushing (Fig. 72). Install handle Tool SP-3549 in removing head.

(2) Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.

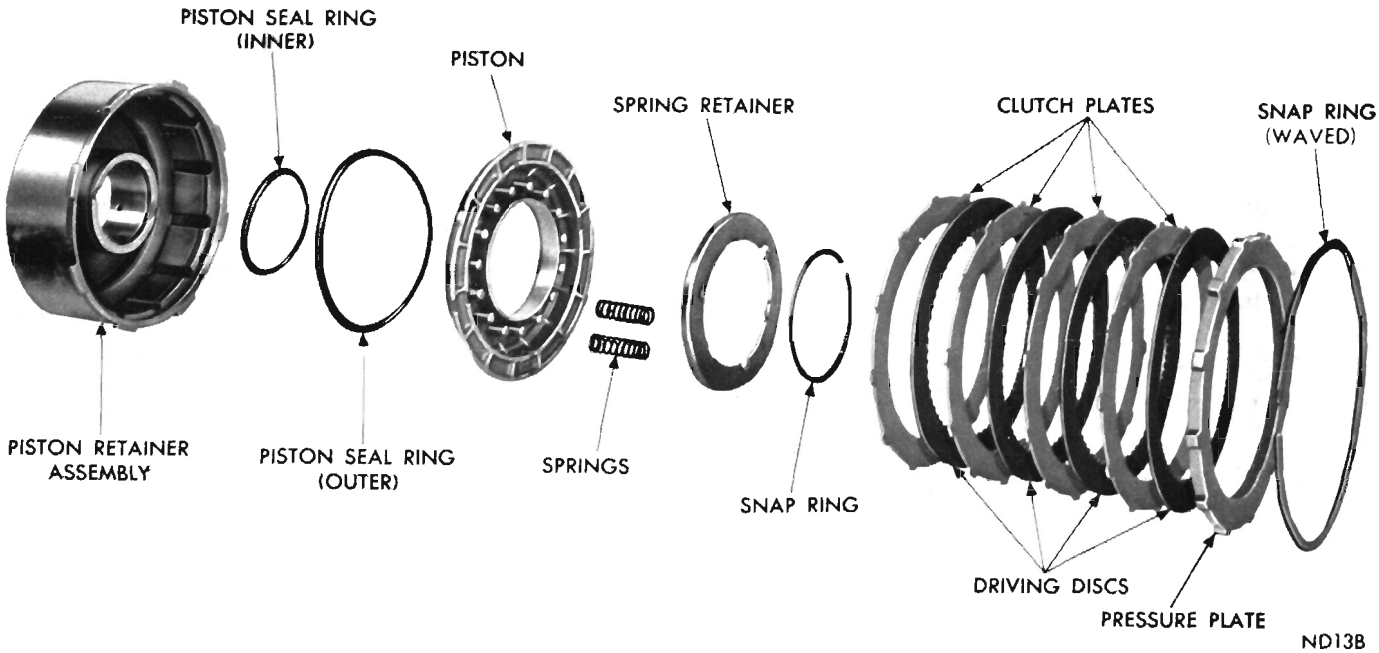


Fig. 74 - Front Clutch Disassembled (A-727)

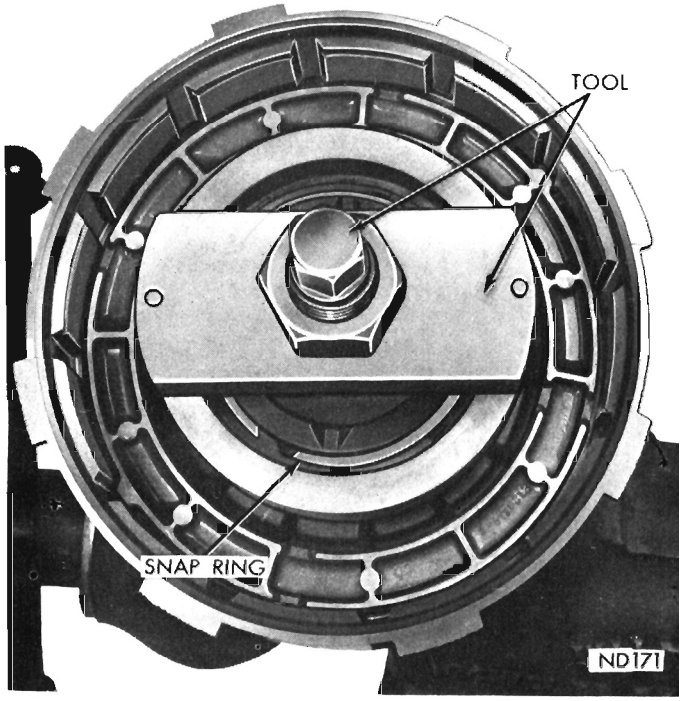


Fig. 75 - Removing or Installing Front Clutch Spring Retainer Snap Ring (A-727)

(3) Lay clutch retainer (open end up) on a clean smooth surface. Slide a new bushing on installing head Tool SP-3626, and start them in clutch retainer bore (Fig. 72).

(4) Install handle Tool SP-3549 in installing head. Drive bushing into clutch retainer until tool bottoms.

(5) Thoroughly clean clutch retainer before assembly and installation.

Assembly

(1) Lubricate and install inner seal ring on hub of clutch retainer. Make sure lip of seal faces down and is properly seated in the groove (Fig. 70).

(2) Lubricate and install outer seal ring on clutch piston, with lip of seal toward bottom of clutch retainer. Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of retainer.

(3) Place spring on piston hub and position spring retainer and snap ring on the spring. Compress spring with Tool C-3575 (Fig. 71), and seat snap ring in hub groove. Remove compressor tool.

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate until all plates are installed. Install pressure plate and waved snap ring. Make sure snap ring is properly seated.

The A-904 transmission uses three plates and discs in front clutch for both six cylinder engines. Four plates and discs are used in A-904 transmissions for eight cylinder engines.

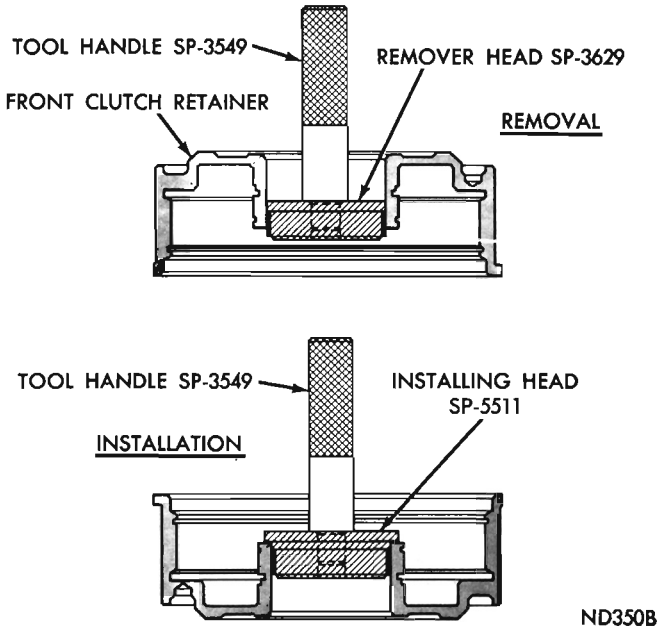


Fig. 76 - Replacing Front Clutch Retainer Bushing (A-727)

(5) With front clutch completely assembled, insert a feeler gauge between pressure plate and snap ring (Fig. 73).

Maximum clearance should be .048 to .109 inch for the four plate clutch, and .036 to .087 inch for the three plate clutch.

FRONT CLUTCH—A-727

Disassembly

Figure 74 shows a disassembled view of the front clutch assembly.

(1) Remove large waved snap ring that secures pressure plate in clutch piston retainer. Lift pressure plate and clutch plates out of the retainer. Snap ring in 5 disc clutch is not waved.

(2) Install compressor, Tool C-3863 over piston spring retainer, (Fig. 75). Compress springs and remove snap ring, then slowly release tool until spring retainer is free of hub. Remove tool, retainer and springs.

(3) Invert clutch retainer assembly and bump it on a wood block to remove piston. Remove seals from piston and clutch retainer hub.

Inspection

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Disc should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

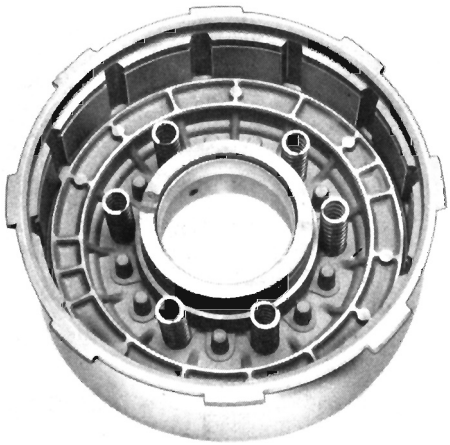


Fig. 77 - Front Clutch Spring Location (6 Springs)

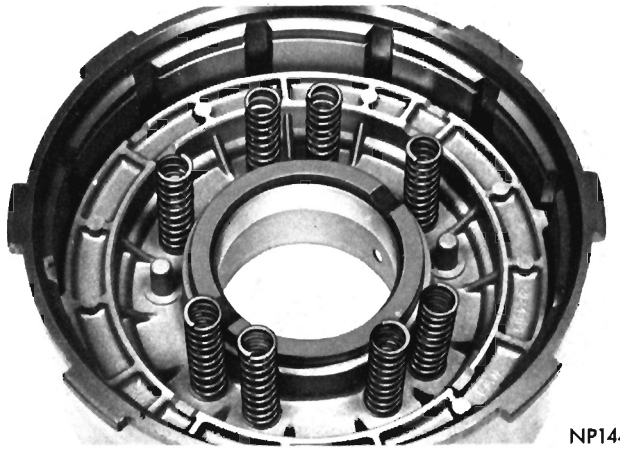


Fig. 78 - Front Clutch Spring Location (8 Springs)



Fig. 79 - Front Clutch Spring Location (9 Springs)

Inspect steel plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in the grooves. Inspect band contacting surface on clutch retainer for scores. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal surfaces in clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene rings. Inspect clutch retainer bushing for wear or scores.

Inspect inside bore of piston for score marks, if light, remove with crocus cloth. Inspect seal grooves for nicks and burrs. Inspect neoprene seals for deterioration, wear, and hardness. Inspect piston springs, retainer and snap ring for distortion.

Front Clutch Retainer Bushing Replacement A-727

(1) Lay clutch retainer (open end down) on a clean smooth surface and place removing head Tool SP-3629 in the bushing. Install handle Tool SP-3549 in removing head (Fig. 76).

(2) Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.

(3) Lay clutch retainer (open end up) on a clean smooth surface. Slide a new bushing on installing head Tool SP-5511, and start them in clutch retainer bore.

(4) Install handle Tool SP-3549 in the installer (Fig. 76). Drive bushing into clutch retainer until tool bottoms.

(5) Thoroughly clean clutch retainer before assembly and installation.

Assembly

(1) Lubricate and install inner seal on hub of clutch retainer. Make sure lip of seal faces down and is properly seated in the groove.

(2) Install outer seal on the clutch piston, with lip of seal toward bottom of clutch retainer. Apply a coating of wax type lubricant or Door Ease to outer edge of seals for easier installation of piston assembly. Place piston assembly in retainer and carefully seat piston in bottom of retainer.

FRONT CLUTCH CHART A-727

Engine Cu. In.	No. of Clutch Discs.	Plate Clearance	No. of Piston Springs
225	3	.035 to .088	13
318	3	.035 to .088	9
340-4BBL	3	.035 to .088	9
340-6BBL	4	.047 to .110	9
360	3	.035 to .088	9
383-2BBL	3	.035 to .088	9
383-4BBL	4	.047 to .110	9
440	4	.047 to .110	9
440 (Hi Perf.)	4	.047 to .110	9
426	5	.033 to .075	12
440 3-2BBL	5	.033 to .075	12

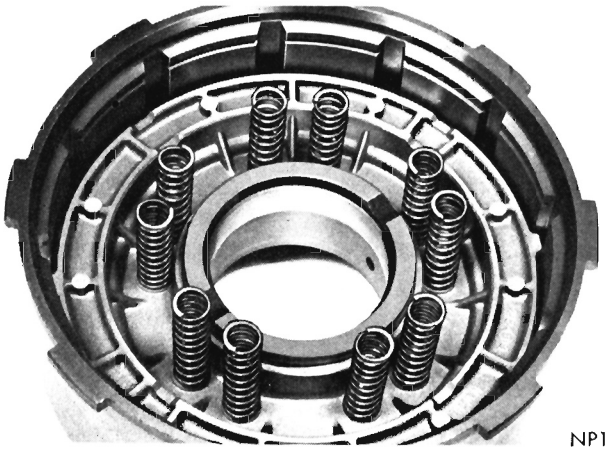


Fig. 80 - Front Clutch Spring Location (10 Springs)

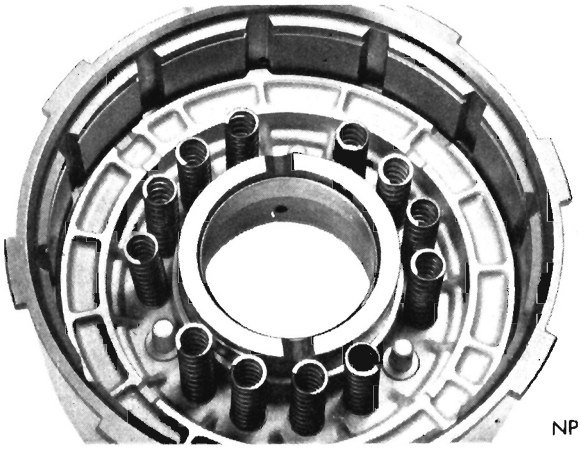


Fig. 81 - Front Clutch Spring Location (12 Springs)

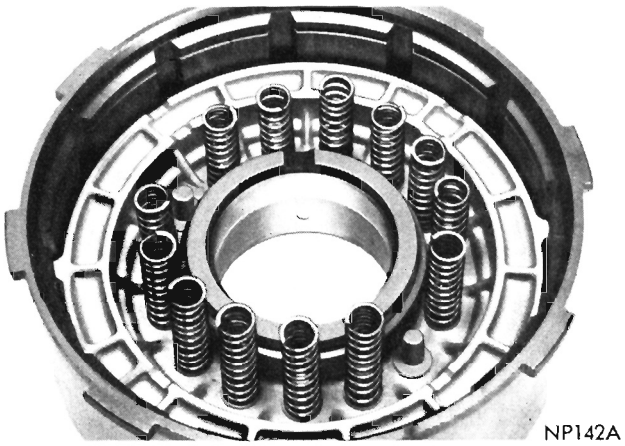


Fig. 82 - Front Clutch Spring Location (13 Springs)

(3) Refer to "Front Clutch Chart" and install springs on piston exactly as shown (Fig. 77 through 82).

Position spring retainer and snap ring over the springs. Compress springs with Tool C-3863 (Fig. 75), and seat snap ring in hub groove. Remove compressor tool.

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate (disc) until the number given in the chart is installed. Install pressure plate and snap ring. Make sure snap ring is properly seated.

(5) With front clutch completely assembled, push downward on pressure plate and insert a feeler gauge between pressure plate and snap ring (Fig. 73). The maximum clearance should be within limits given in the chart.

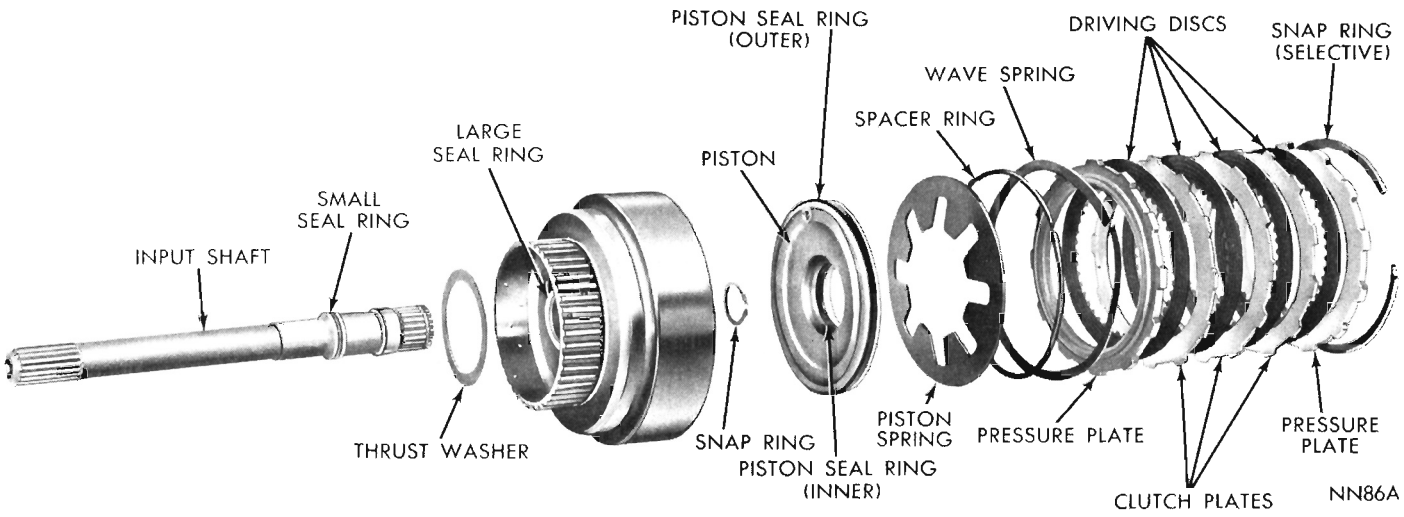


Fig. 83 - Rear Clutch Disassembled (A-904)

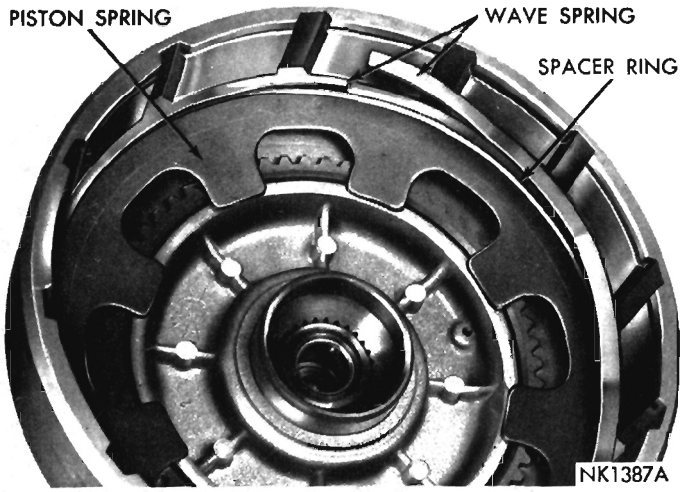


Fig. 84 - Installing Rear Clutch Spring, Spacer Ring and Wave Spring

REAR CLUTCH—A-904

Disassembly

Figure 83 shows a disassembled view of the rear clutch assembly.

(1) Remove large selective snap ring that secures pressure plate in clutch piston retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Carefully pry one end of wave spring out of its groove in clutch retainer, then remove wave spring, spacer ring and clutch piston spring.

(3) Invert clutch piston retainer assembly and bump it on a wood block to remove piston. Remove seals from piston.

(4) If necessary, remove snap ring and press input shaft from piston retainer.

Inspection

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surface for burning, scoring or damaged driving lugs. Replace if necessary. Inspect plates and discs for flatness, they must not be warped or cone-shaped.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in the grooves. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal ring surfaces in clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of the neoprene rings. Inspect neoprene seal rings for deterioration, wear and hardness. Inspect piston spring, wave spring, and spacer for distortion or breakage.

Inspect interlocking seal rings (Fig. 83) on input shaft and piston retainer for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect rear clutch to front clutch thrust washer for wear. Washer thickness should be .043 to .045 inch, replace if necessary.

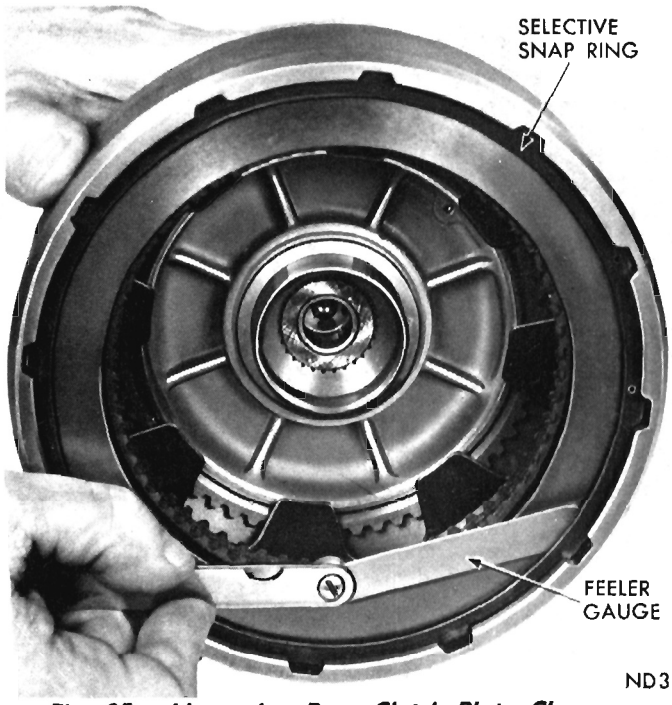


Fig. 85 - Measuring Rear Clutch Plate Clearance

Assembly

(1) If removed, press input shaft into piston retainer and install snap ring.

(2) Lubricate and install inner and outer seal rings on clutch piston. Make sure lip of seals face toward head of clutch retainer, and are properly seated in piston grooves (Fig. 83).

(3) Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of retainer.

(4) Place clutch piston spring and spacer ring on top of piston in clutch retainer, make sure spring and spacer ring are positioned in the retainer recess. Start one end of wave spring in retainer groove (Fig. 84), then progressively push or tap spring into place making sure it is fully seated in the groove.

(5) Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.

(6) Lubricate all clutch plates, install one lined plate followed by a steel plate until all plates are installed. Install outer pressure plate and selective snap ring. **The A-904 transmission uses two plates and three discs in rear clutch for both six cylinder engines. Three plates and four discs are used in the A-904 transmissions for eight cylinder engines.**

(7) Measure rear clutch plate clearance by hav-

ing an assistant press down firmly on outer pressure plate, then insert a feeler gauge between the plate and snap ring (Fig. 85).

The clearance should be between .032 to .056 inch for 8 cylinder or .026 to .055 inch for 6 cylinder. If not, install a snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. **Rear clutch plate clearance is very important in obtaining proper clutch operation. Clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060, .076 and .098 inch thickness.**

REAR CLUTCH—A-727

Disassembly

Figure 86 shows a disassembled view of the rear clutch assembly.

(1) Remove large selective snap ring that secures pressure plate in clutch retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Carefully pry one end of wave spring out of its groove in clutch retainer, then remove wave spring, spacer ring and clutch piston spring.

(3) Invert clutch piston retainer assembly and bump it on a wood block to remove piston. Remove seals from the piston.

(4) If necessary, remove snap ring and press input shaft from clutch piston retainer.

Inspection

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces, plates must travel freely in the grooves. Note ball check in the piston, make sure ball moves freely. Inspect seal surfaces in clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene seals. Inspect neoprene seals for deterioration, wear, and hardness. Inspect piston spring, wave spring, and spacer for distortion or breakage.

Inspect interlocking seal rings (Fig. 86) on input shaft for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect bushing in input shaft for wear or scores. Inspect rear clutch to front clutch thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary.

Input Shaft Bushing Replacement (A-727 only)

(1) Clamp input shaft in a vise with soft jaws, being careful not to clamp on seal ring lands or

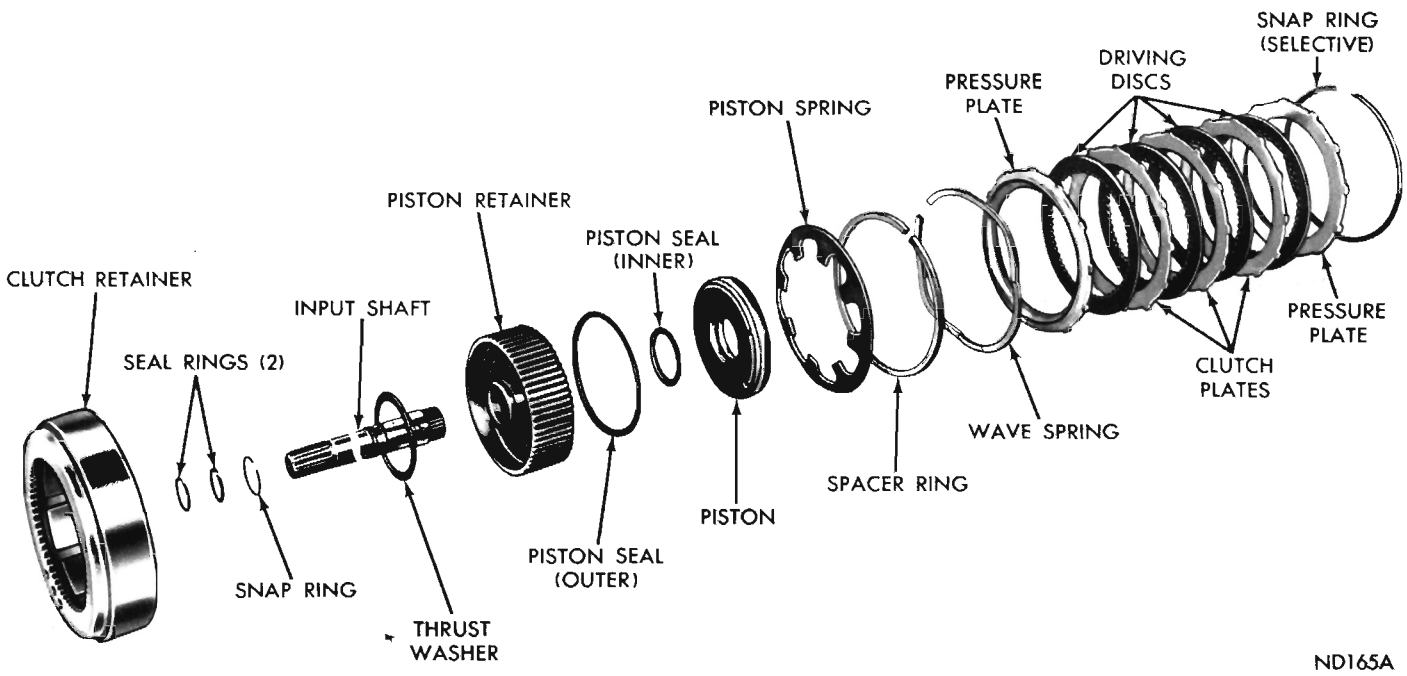


Fig. 86 - Rear Clutch Disassembled (A-727)

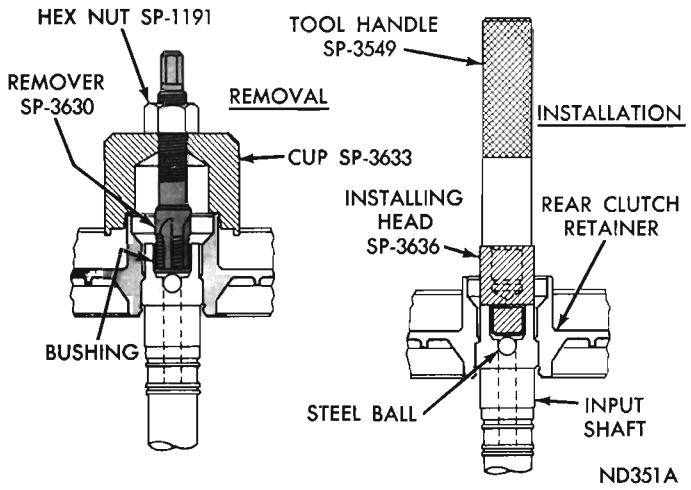


Fig. 87 - Replacing Input Shaft Bushing (A-727)

bearing journals.

(2) Assemble remover Tool SP-3630, cup Tool SP-3633, and hex nut Tool SP-1191 (Fig. 87).

(3) With cup held firmly against clutch piston retainer, thread remover into bushing as far as possible by hand.

(4) Using a wrench, screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

(5) Turn hex nut down against cup to pull bushing from input shaft.

(6) Thoroughly clean input shaft to remove chips made by remover threads. Make certain small lubrication hole next to ball in end of shaft is not plugged with chips. Be sure no chips are lodged next to the steel ball.

(7) Slide a new bushing on installing head Tool SP-3636 and start them in the bore of input shaft.

(8) Stand input shaft upright on a clean smooth surface and install handle Tool SP-3549 in the installing head (Fig. 87). Drive bushing into shaft until tool bottoms.

(9) Thoroughly clean input shaft and clutch piston retainer before assembly and installation.

Assembly

(1) If removed, press input shaft into clutch piston retainer and install snap ring.

(2) Lubricate and install inner and outer seal rings on clutch piston. Make sure lip of seals face toward head of clutch retainer, and are properly seated in piston grooves (Fig. 86).

(3) Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of the retainer.

(4) Position clutch retainer over piston retainer splines and support the assembly so clutch retainer remains in place.

(5) Place clutch piston spring and spacer ring on top of piston in clutch retainer, make sure spring

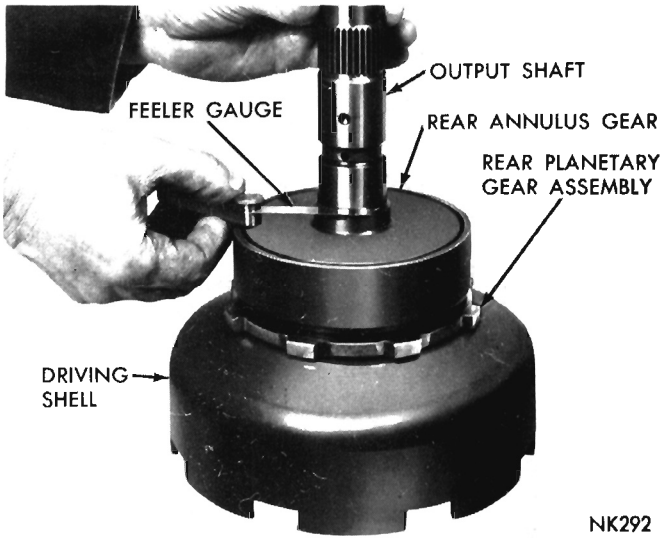


Fig. 88 - Measuring End Play of Planetary Gear Assemblies

and spacer ring are positioned in the retainer recess. Start one end of wave spring in retainer groove (Fig. 84), then progressively push or tap spring into place making sure it is fully seated in the groove.

(6) Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.

(7) Lubricate all clutch plates, install one lined plate followed by a steel plate until all plates are installed. Install outer pressure plate and selective snap ring.

(8) Measure rear clutch plate clearance by having an assistant press downward firmly on outer pressure plate, then insert a feeler gauge between the plate and snap ring (Fig. 85). The clearance should be between .025 to .045 inch. If not, install a snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. **Rear clutch plate clearance is very important in obtaining proper clutch operation. The clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060, .074, .088 and .106 inch thickness.**

PLANETARY GEAR TRAIN A-904

End Play

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. With assembly in an upright position, push rear annulus gear support downward on the output shaft. Insert a feeler gauge between rear annulus gear support hub and shoulder on output shaft. (Fig. 88). **The clearance should be .006 to .033 inch.** If clearance exceeds specifications, replace thrust washers and/or necessary parts.

Disassembly

(1) Remove selective thrust washer from forward end of output shaft (Fig. 89).

(2) Remove selective snap ring from forward end of output shaft, then slide front planetary assembly off the shaft.

(3) Remove snap ring and thrust washer from forward hub of front planetary gear assembly, slide front annulus gear and support off planetary gear set (Fig. 89). Remove thrust washer from rear side of planetary gear set. If necessary, remove snap ring from front of annulus gear to separate support from annulus gear.

(4) Slide sun gear, driving shell and rear planetary assembly off the output shaft.

(5) Lift sun gear and driving shell off rear planetary assembly. Remove snap ring and steel washer from sun gear (rear side of driving shell). Slide sun gear out of driving shell, and remove snap ring and steel washer from opposite end of sun gear if necessary.

(6) Remove thrust washer from forward side of rear planetary assembly and remove planetary gear set and thrust plate from rear annulus gear. If necessary, remove snap ring from rear of annulus gear to separate support from annulus gear.

Inspection

Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp edged stone. Make sure all oil passages in shaft are open and clean.

Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth, and for broken pinion shaft lock pins. Inspect annulus gear and driving gear teeth for damage. Replace distorted lock rings.

Assembly

Refer to Figure 89 for parts reference.

(1) Place rear annulus gear support in annulus gear and install snap ring. Install rear annulus gear on the output shaft. Apply a thin coat of grease on thrust plate, place it on the shaft and in the annulus gear making sure teeth are over the shaft splines.

(2) Position rear planetary gear assembly in rear annulus gear and place thrust washer on front side of planetary gear assembly.

(3) Insert output shaft in rear opening of rear annulus gear. Carefully work shaft through annulus gear support and planetary gear assembly. Make sure shaft splines are fully engaged in splines of annulus gear support.

(4) Install steel washer and snap ring on one end of sun gear. Insert sun gear through front side of driving shell, install rear steel washer and snap ring.

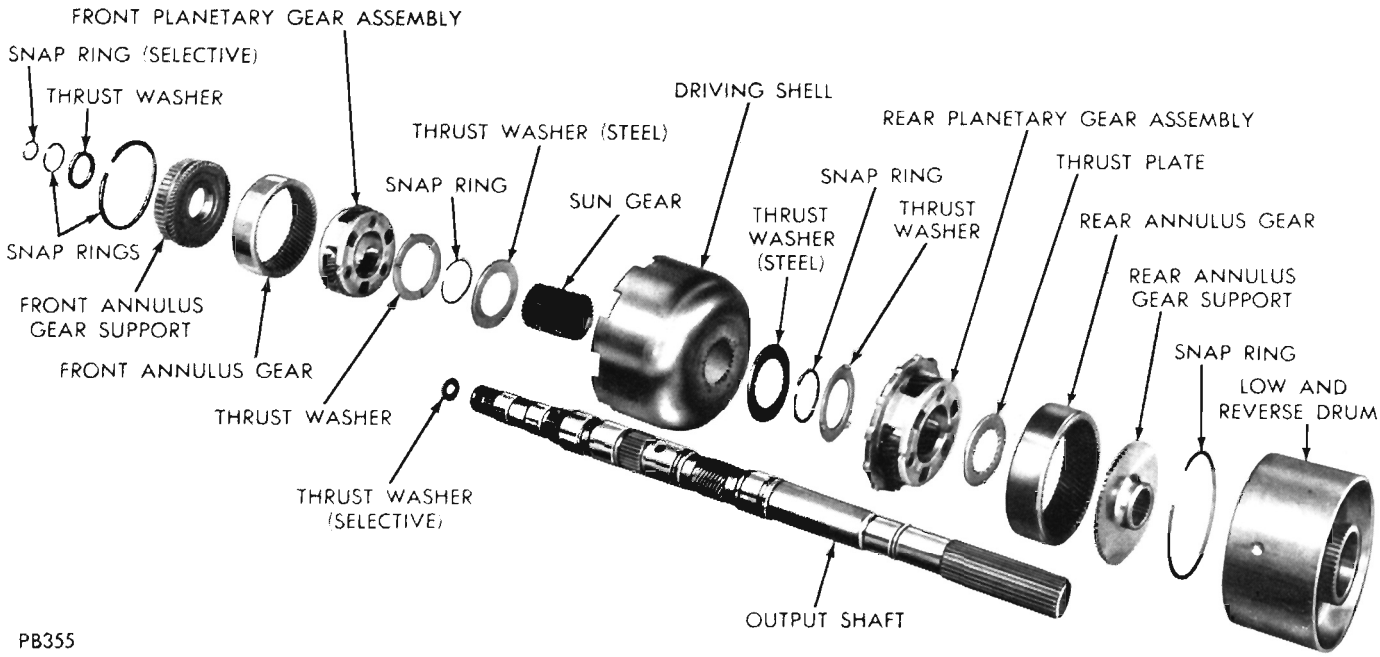


Fig. 89 - Planetary Gear Train and Output Shaft Disassembled (A-904)

(5) Carefully slide driving shell and sun gear assembly on the output shaft, engaging sun gear teeth with rear planetary pinion teeth.
(6) Place front annulus gear support in the annulus gear and install snap ring.
(7) Position front planetary gear assembly in front annulus gear, place thrust washer over planetary gear assembly hub and install snap ring. Position thrust washer on rear side of planetary gear assembly.
(8) Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with sun gear teeth.
(9) With all components properly positioned, install selective snap ring on front end of output shaft. Remeasure end play of the assembly. **The clearance can be adjusted by the use of various thickness snap rings. Snap rings are available in .040, .048 and .059 inch thickness.**

PLANETARY GEAR TRAIN—A-727

End Play

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. With assembly in an upright position, push rear annulus gear support downward on output shaft. Insert a feeler gauge between rear annulus gear support hub and shoulder on output shaft (Fig. 88). **The clearance should be .010 to .037 inch.** If clearance exceeds specifications, replace thrust washers and/or necessary parts.

Disassembly

(1) Remove thrust washer from forward end of output shaft (Fig. 90).
(2) Remove selective snap ring from forward end of output shaft, then slide front planetary assembly off the shaft.
(3) Slide front annulus gear off planetary gear set (Fig. 90). Remove thrust washer from rear side of planetary gear set.
(4) Slide sun gear, driving shell and rear planetary assembly off output shaft.
(5) Lift sun gear and driving shell off rear planetary gear assembly. Remove thrust washer from inside the driving shell. Remove snap ring and steel washer from sun gear (rear side of driving shell) and slide sun gear out of the shell. Remove front snap ring from sun gear if necessary. Note that front end of sun gear is longer than rear.
(6) Remove thrust washer from forward side of rear planetary gear assembly, remove planetary gear set and thrust plate from rear annulus gear.

Inspection

Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp edged stone. Make sure all oil passages in shaft are open and clean.
Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth and for broken pinion shaft lock pins. Inspect annulus gear and driving gear teeth for

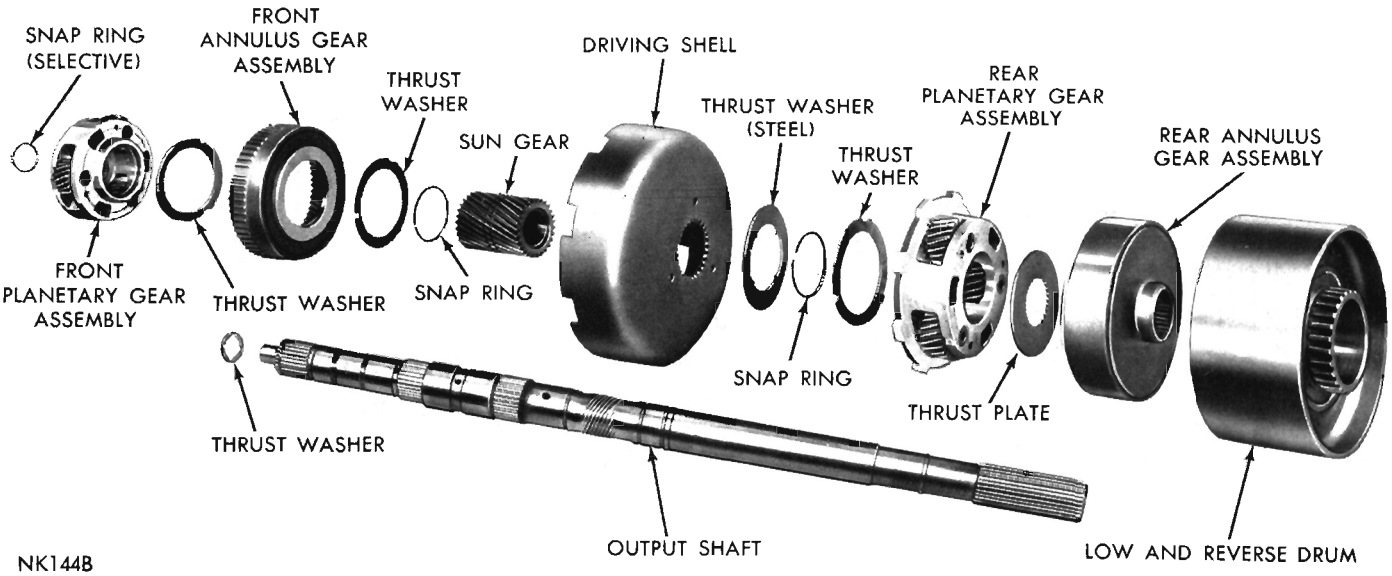


Fig. 90 - Planetary Gear Train and Output Shaft Disassembled (A-727)

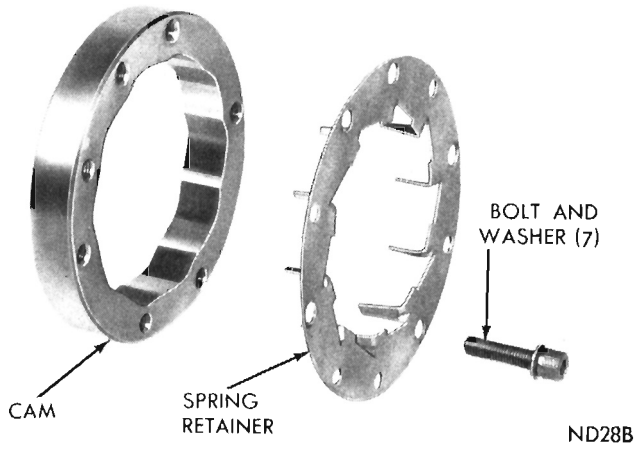


Fig. 91 - Overrunning Clutch Service Replacement Cam (A-904)

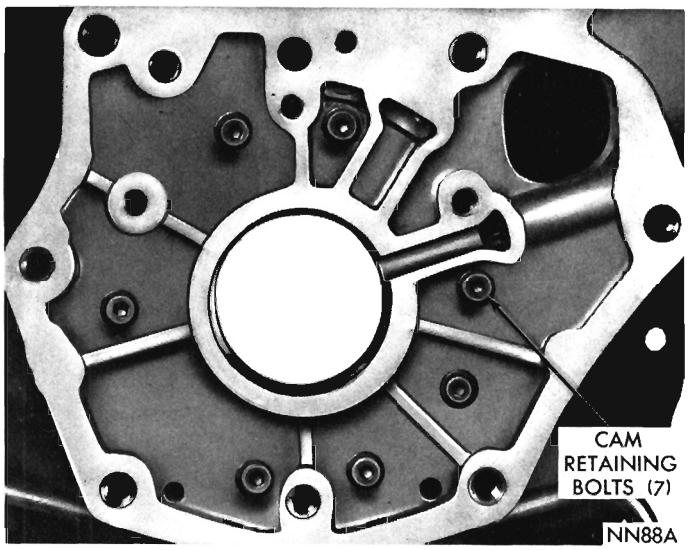


Fig. 93 - Cam Retaining Bolts Installed (A-904)

damage. Replace distorted lock rings.

Assembly

Refer to Figure 90 for parts identification.

(1) Install rear annulus gear on the output shaft. Apply a thin coat of grease on thrust plate, place it on the shaft and in the annulus gear making sure teeth are over the shaft splines.

(2) Position rear planetary gear assembly in the rear annulus gear. Place thrust washer on front side of planetary gear assembly.

(3) Install snap ring in front groove of sun gear (long end of gear). Insert sun gear through front side of driving shell, install rear steel washer and snap ring.

(4) Carefully slide driving shell and sun gear assembly on output shaft, engaging sun gear teeth with rear planetary pinion teeth. Place thrust washer inside the front driving shell.

(5) Place thrust washer on rear hub of front planetary gear set, then slide assembly into front annulus gear.

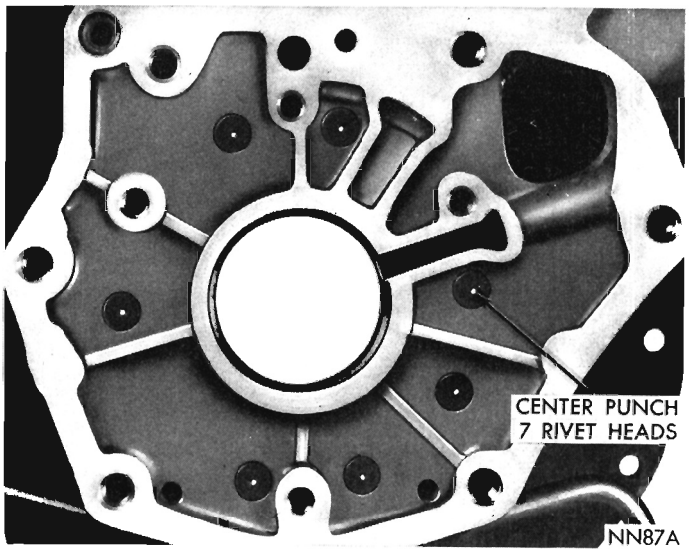


Fig. 92 - Center Punch Rivet Heads (A-904)

(6) Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with the sun gear teeth.

(7) With all components properly positioned, install selective snap ring on front end of output shaft. Remeasure end play of the assembly. **The clearance can be adjusted by the use of various thickness snap rings. Snap rings are available in .048, .055 and .062 inch thickness.**

OVERRUNNING CLUTCH

Inspection

Inspect clutch rollers for smooth round surfaces, they must be free of flat spots and chipped edges. Inspect roller contacting surfaces in the cam and race for brinelling. Inspect roller springs for distortion, wear or other damage.

A-727: Inspect cam set screw for tightness. If loose, tighten and restake the case around screw.

Overrunning Clutch Cam Replacement—A-904

If overrunning clutch cam or spring retainer are found damaged, they can be replaced with a service replacement cam, spring retainer, and retaining bolts (Fig. 91).

The service parts are retained in the case with bolts instead of rivets. To install, proceed as follows:

(1) Remove four bolts securing output shaft support to rear of the transmission case. Drive support rearward out of the case with a wood block and hammer.

(2) Center punch the rivets **exactly** in center of each rivet head (Fig. 92).

(3) Drill through each rivet head with a 3/8

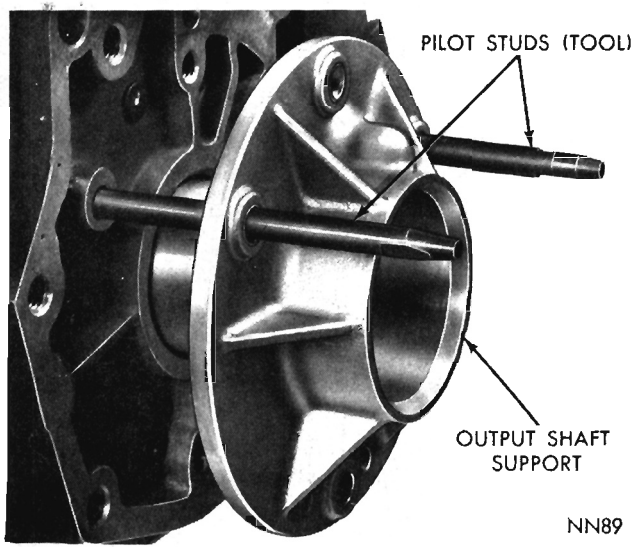


Fig. 94 - Installing Output Shaft Support (A-904)

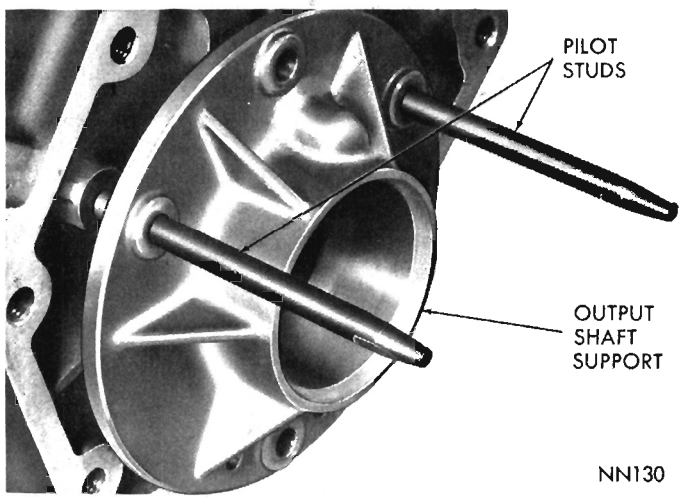


Fig. 96 - Installing Output Shaft Support (A-727)

inch drill. **Be careful not to drill into the transmission case.** Chip off rivet heads with a small chisel, then drive rivets and cam from the case with a blunt punch of proper size.

(4) Carefully enlarge rivet holes in the case with a 17/64 inch drill. Remove all chips and foreign matter from the case, make sure cam area is free of chips and burrs.

(5) To install, position cam and roller spring retainer in the case. Align cam bolt holes with holes in the case, then thread all seven retaining bolt and washer assemblies into cam a few turns. The cone washers must be installed so inner diameter is coned toward the bolt head (Fig. 93).

(6) Tap cam firmly into the case if necessary. Draw retaining bolts down evenly, then tighten to 100 inch-pounds.

(7) Screw two pilot studs, Tool C-3288-B into the case (Fig. 94). Chill the support with ice (preferably dry ice). Quickly position support over

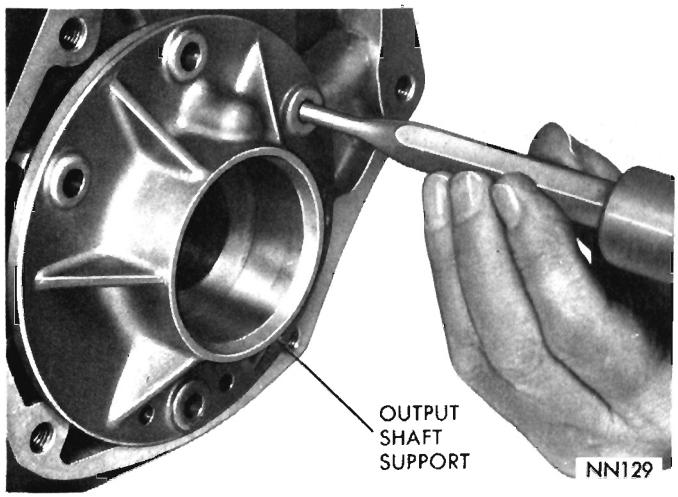


Fig. 95 - Removing Overrunning Clutch Cam (A-727)

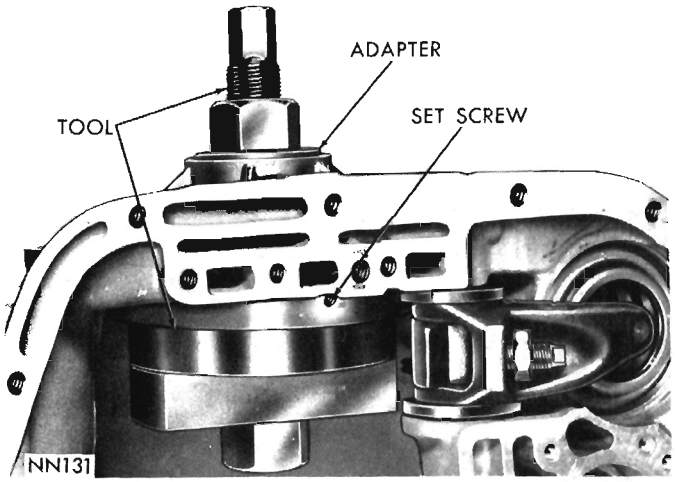


Fig. 97 - Installing Overrunning Clutch Cam (A-727)

the pilot studs, and drive it firmly into the case with a wood block and hammer.

Overrunning Clutch Cam Replacement—A-727

If overrunning clutch cam and/or roller spring retainer are found damaged, replace cam and spring retainer in the following manner:

(1) Remove set screw from the case below clutch cam.

(2) Remove four bolts securing output shaft support to rear of transmission case. Insert a punch through bolt holes and drive cam from the case (Fig. 95). Alternate punch from one bolt hole to another so cam will be driven evenly from the case.

IMPORTANT: The output shaft support must be in the case to install the overrunning clutch cam. If the support requires replacement, drive it rearward out of the case with a wood block and hammer. To install, screw two C-3288-B pilot studs into the case (Fig. 96). Chill the support with ice (preferably dry ice). Quickly posi-

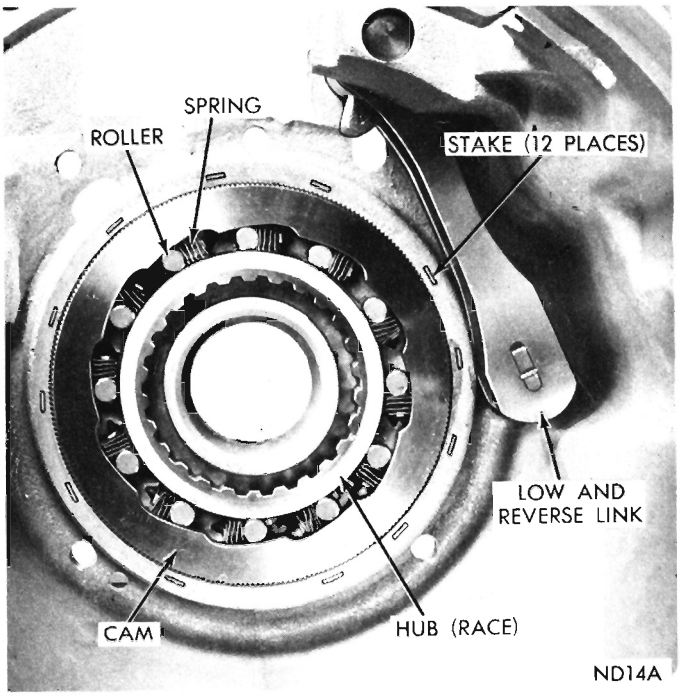


Fig. 98 - Overrunning Clutch, Low and Reverse Band Link

tion support over the pilot studs, and drive it firmly into the case with a wood block and hammer.

(3) Clean all burrs and chips from cam area in the case.

(4) Place spring retainer on the cam, making sure retainer lugs snap firmly into notches on the cam.

(5) Position cam in the case with cam serrations aligned with those in the case. Tap cam **evenly** into the case as far as possible with a soft mallet.

(6) Install Tool C-3863 and Adapter SP-5124 as shown in Figure 97, tighten nut on tool to seat cam into the case. Make sure cam is firmly bottomed, then install cam retaining set screw. Stake the case around set screw to prevent it coming loose.

(7) Remove cam installing tool. Install and tighten support retaining screws to 140 inch-pounds. Stake the case around cam in twelve places with a blunt chisel (Fig. 98).

KICKDOWN SERVO AND BAND

Inspection

See (Fig. 99 or 100) and Kickdown servo chart for parts reference.

Inspect piston and guide seal rings for wear, and make sure they turn freely in the grooves. It is not necessary to remove seal rings unless conditions warrant. Inspect piston for nicks, burrs, scores and wear. Inspect piston bore in the case for scores or other damage. Inspect fit of guide

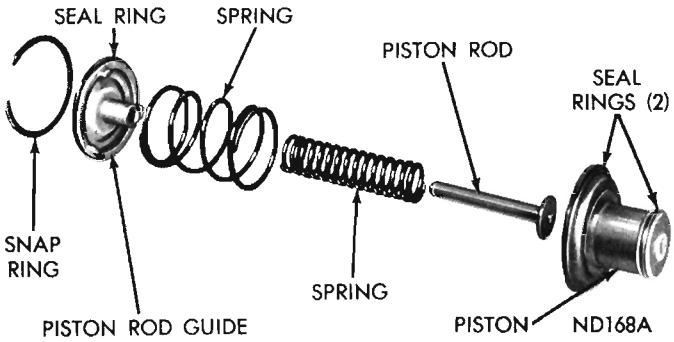


Fig. 99 - Kickdown Servo

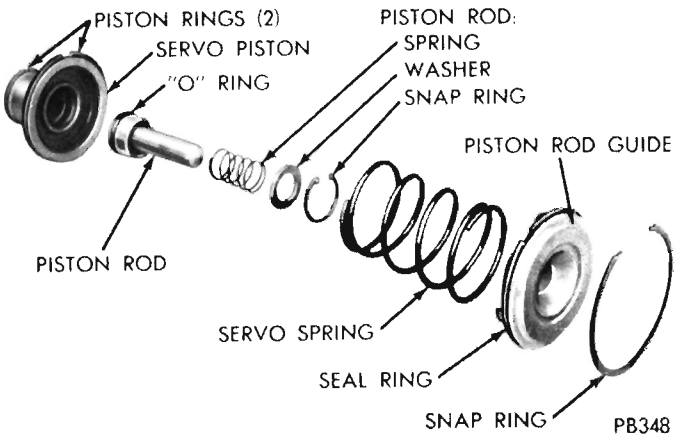


Fig. 100 - Kickdown Servo (Controlled Load)

on piston rod. Inspect piston spring for distortion.

If equipped with controlled load servo piston, inspect bore in piston and "O" ring on piston rod.

Inspect band lining for wear and bond of lining to the band. Inspect lining for black burn marks, glazing, non-uniform wear pattern and flaking. If

KICKDOWN SERVO CHART

Engine	Kickdown Springs Outer	Inner	Controlled Load Servo Piston
A-727			
225	Yes	No	Yes
318	Yes	No	Yes
340	Yes	No	Yes
360	Yes	No	Yes
383	Yes	No	Yes
383 (Hi-Perf)	Yes	No	Yes
440	Yes	No	Yes
440 (Hi-Perf)	Yes	Yes	No
426	No	Yes	No
440 3-2 BBL	No	Yes	No
A-904			
198, 225	No	Yes	No
318	Yes	Yes	No

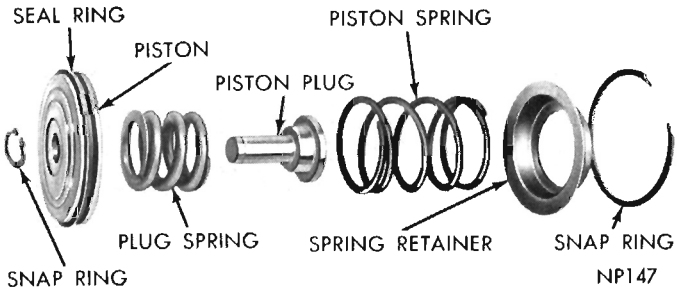


Fig. 101 - Low and Reverse Servo

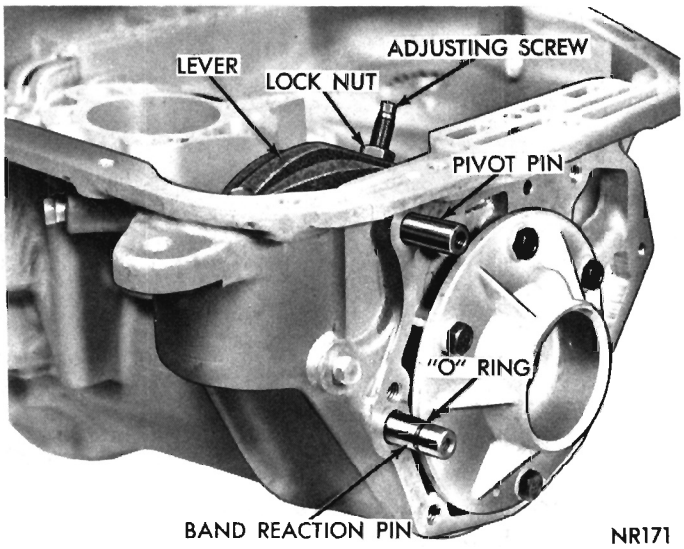


Fig. 103 - Double Wrap Band Linkage - Installed (A-904-LA Transmission Only)

lining is worn so grooves are not visible at ends or any portion of the bands, replace the band. Inspect band for distortion or cracked ends.

LOW—REVERSE SERVO AND BAND

Disassembly

(1) Remove snap ring from piston and remove the piston plug and spring (Fig. 101).

Inspection

Inspect seal for deterioration, wear and hardness. Inspect piston and piston plug for nicks, burrs, scores and wear; piston plug must operate freely in the piston. Inspect piston bore in the case for scores or other damage. Inspect springs for distortion.

Inspect band lining for wear and bond of lining to the band. If lining is worn so grooves are not visible at ends or any portion of the band, replace the band. Inspect band for distortion or cracked ends.

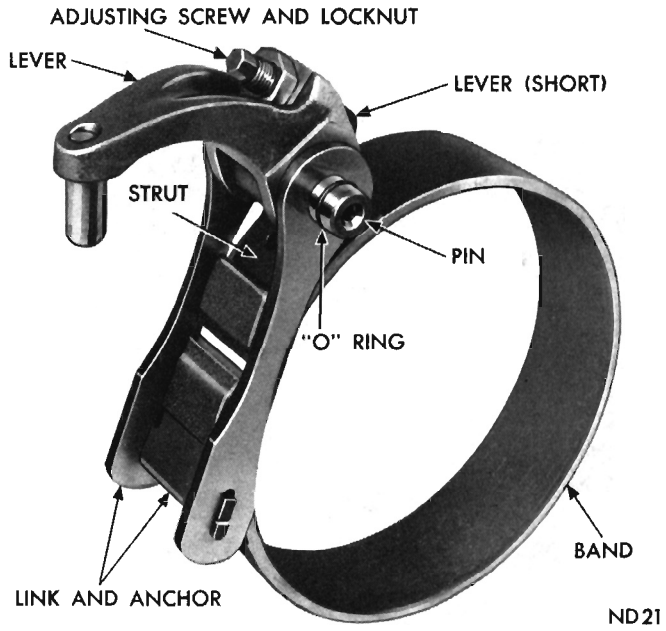


Fig. 102 - Low-Reverse Band and Linkage

Assembly

(1) Lubricate and insert piston plug and spring in the piston, and secure with snap ring.

ASSEMBLY—SUB-ASSEMBLY INSTALLATION

The assembly procedures given here include installation of sub-assemblies in the transmission case and adjusting drive train end play. Do not use force to assemble mating parts. If parts do not assemble freely investigate the cause, and correct the trouble before proceeding with assembly procedures. Always use new gaskets during assembly operations.

IMPORTANT: Use only "Dexron" type Automatic Transmission Fluid to lubricate transmission parts during assembly.

Overrunning Clutch

(1) With transmission case in an upright position, insert clutch hub inside the cam. Install overrunning clutch rollers and springs exactly as shown in Figure 98.

Low Reverse Servo and Band

(1) Carefully work servo piston assembly into the case with a twisting motion. Place spring, retainer and snap ring over the piston (Fig. 101).

(2) Compress low and reverse servo piston spring by using engine valve spring compressor Tool C-3422, then install snap ring.

(3) Position rear band in the case, install short strut, then connect long link and anchor to the band (Fig. 102). Screw in band adjuster just enough to hold strut in place.

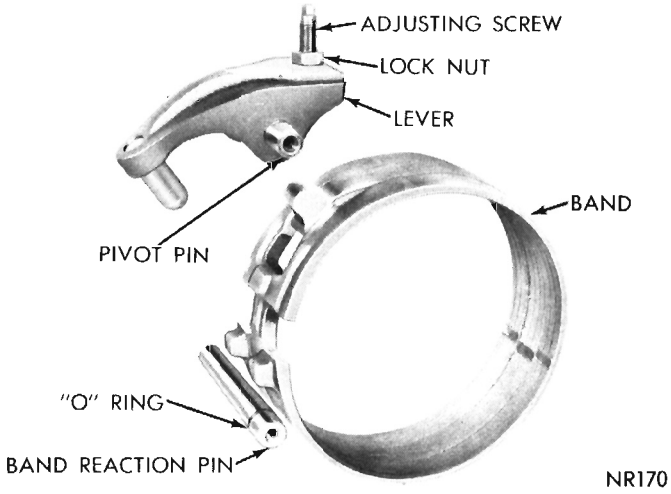


Fig. 104 - Double Wrap Band and Linkage - Disassembled (A-904-LA Transmission Only)

Install low-reverse drum.

A-727: Be sure long link and anchor assembly is installed, as shown in Figure 98 to provide running clearance for the low and reverse drum.

Low-Reverse Band A-904-LA (318 Cu. In. Engine Only)

This transmission has a double-wrap band supported at two points by a band reaction pin in the case and acted upon at one point by the servo lever adjusting screw (Fig. 103 and 104).

(1) Push band reaction pin (with new "O" ring) into case flush with gasket surface (Fig. 103).

(2) Place band into case resting two lugs against band reaction pin (Fig. 104).

(3) Install low-reverse drum into overrunning clutch and band.

(4) Install operating lever with pivot pin flush in case and adjusting screw touching center lug on band (Fig. 104).

Kickdown Servo (Figs. 99 or 100)

(1) If equipped with controlled load servo piston, sub-assemble it as follows (Fig. 100):

(a) Grease "O" ring and install on piston rod.

(b) Install piston rod into servo piston.

(c) Install spring, flat washer and snap ring to complete the sub-assembly.

(2) Carefully push servo piston into the case bore. Install piston rod, springs and guide (see chart).

(3) Compress kickdown servo springs by using engine valve spring compressor Tool C-3422, then install snap ring.

Planetary Gear Assemblies, Sun Gear, and Driving Shell

(1) While supporting assembly in the case, insert output shaft through rear support. Carefully work

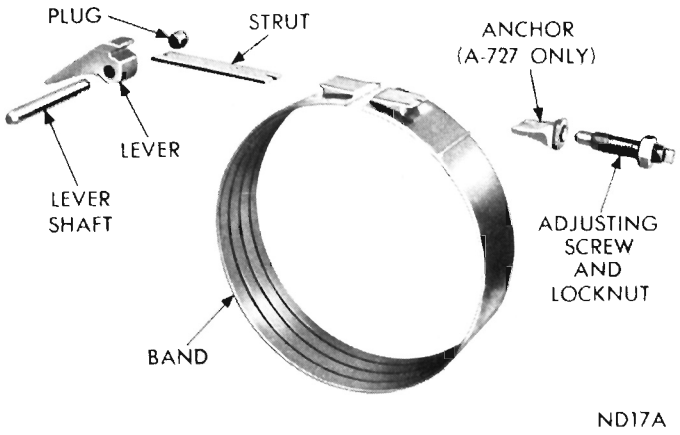


Fig. 105 - Kickdown Band and Linkage

assembly rearward engaging rear planetary carrier lugs into low-reverse drum slots.

CAUTION: Be very careful not to damage ground surfaces on output shaft during installation.

Front and Rear Clutch Assemblies

The front and rear clutches, front band, oil pump and reaction shaft support are more easily installed with transmission in an upright position.

One method to support transmission, is outlined in Steps 1 and 2.

(1) Cut a 3-1/2 inch diameter hole in a bench, in the end of a small oil drum or a large wooden box strong enough to support transmission. Cut or file notches at edge of the 3-1/2 inch hole so output shaft support will fit and lay flat in the hole.

(2) Carefully insert output shaft into hole to support the transmission upright, with its weight resting on flange of the output shaft support.

(3) **A-904**: Apply a coat of grease to selective thrust washer (Fig. 89) and install washer on front end of the output shaft. If drive train end play was not within specifications (.030 to .089 inch), when tested before disassembly, replace thrust washer with one of proper thickness.

The following selective washers are available for A-904 transmissions.

Thickness	Color
.052-.054 inch	Natural
.068-.070 inch	Red
.083-.085 inch	Black

A-727: Apply a coat of grease on the input to output shaft thrust washer (Fig. 90), and install washer on front end of the output shaft.

(4) Align front clutch plate inner splines, and place assembly in position on the rear clutch. Make sure front clutch plate splines are fully engaged on rear clutch splines.

(5) Align rear clutch plate inner splines, grasp input shaft and lower the two clutch assemblies into the transmission case.

(6) Carefully work clutch assemblies in a circular motion to engage rear clutch splines over splines of front annulus gear. Make sure front clutch drive lugs are fully engaged in slots in the driving shell.

Front Band

Figure 105 shows a disassembled view of the kickdown band assembly.

(1) Slide band over front clutch assembly.

(2) Install band strut, screw in adjuster just enough to hold strut and anchor in place.

Oil Pump and Reaction Shaft Support

If difficulty was encountered in removing pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat lamp, heat the case in area of pump for a few minutes prior to installing pump and reaction shaft support assembly.

A-904: Install thrust washer on reaction shaft support hub (Fig. 61).

A-727: If drive train end play was not within specifications (.037 - .084 inch) when measured before disassembly, replace thrust washer on reaction shaft support hub with one of proper thickness (Fig. 66).

The following selective thrust washers are available for A-727 transmissions.

Thickness	Color
.061-.063 inch	Green
.084-.086 inch	Red
.102-.104 inch	Yellow

(1) Screw two pilot studs, Tool C-3288B in pump opening in the case (Fig. 106). Install a new gasket over the pilot studs.

(2) Place a new rubber seal ring in the groove on outer flange of pump housing. Make sure seal ring is not twisted. Coat seal ring with grease for easy installation.

(3) Install pump assembly in the case; tap it lightly with a soft mallet, if necessary. Place deflector over vent opening and install four pump body bolts. (The A-904 does not use a deflector over vent opening.) Remove pilot studs, install remaining bolts and snug down evenly.

Rotate input and output shafts to see if any binding exists, then tighten bolts to 175 inch-pounds. Check shafts again for free rotation.

Governor and Support

(1) Position support and governor body assembly on the output shaft. Align assembly so governor valve shaft hole in governor body aligns with hole in output shaft, then slide assembly into place. Install snap ring behind the governor body (Fig. 34). Tighten body to support bolts to 100 inch-pounds. Bend ends of lock straps against bolt heads.

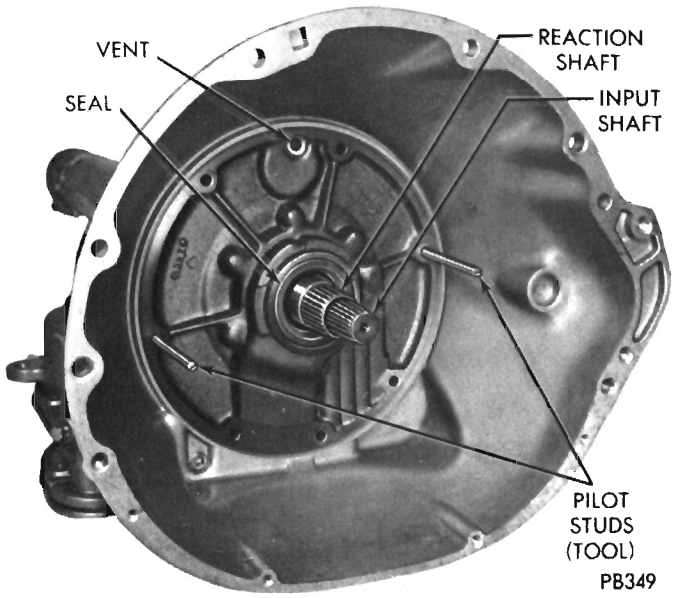


Fig. 106 - Installing Pump and Reaction Shaft Support Assembly

(2) Place governor valve on valve shaft, insert assembly into body and through governor weights. Install valve shaft retaining snap ring.

Output Shaft Bearing and Extension Housing

(1) Install a snap ring in the front groove (A-727 only) on output shaft. Install bearing on shaft with its outer race ring groove toward front (Fig. 33). Press or tap bearing tight against front snap ring, then install rear snap ring.

(2) Place a new extension housing gasket on the transmission case. Position output shaft bearing retaining snap ring in the extension housing. Spread snap ring as far as possible (Fig. 32), then carefully tap extension housing into place. **Make sure snap ring is fully seated in the bearing groove.**

(3) Install and tighten extension housing bolts to 24 foot-pounds.

(4) Install gasket, plate and two screws on bottom of extension housing mounting pad.

(5) Install speedometer pinion and adapter assembly.

IMPORTANT: Measure drive train end play as described under Disassembly Sub-Assembly Removal. Correct if necessary.

Valve Body Assembly and Accumulator Piston

(1) Clean mating surfaces and inspect for burrs on both the transmission case and valve body steel

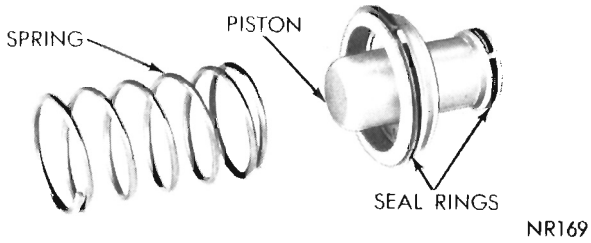


Fig. 107 - Accumulator Piston and Spring

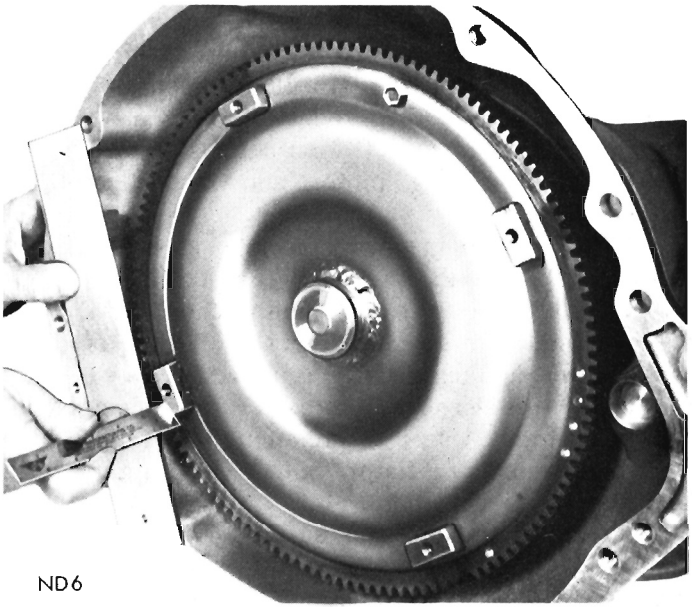


Fig. 109 - Measuring Converter for Full Engagement in Transmission

plate.

(2) Install accumulator piston in transmission case and place piston spring on the accumulator piston (Fig. 107). Install spring first and then piston, when equipped with dual exhaust 440 cu. in. 4 BBL. engine. No accumulator spring is used when equipped with 440-6 BBL. or 426 cu. in. engines. Make sure Back-Up Light and Neutral Start Switch has been removed.

(3) Insert parking lock rod through opening in rear of case with the knob positioned against the reaction plug and sprag. Move front end of rod toward center of transmission while exerting rearward pressure on rod to force it past the sprag (rotate output shaft if necessary).

(4) Place valve body manual lever in **LOW** position. Place valve body in its approximate position in the case, connect parking lock rod to manual lever and secure with E-clip. Align valve body in the case, install retaining bolts finger tight.

(5) With neutral starting switch installed, place manual valve in the neutral position. Shift valve body if necessary to center neutral finger over the neutral switch plunger. Snug bolts down evenly,

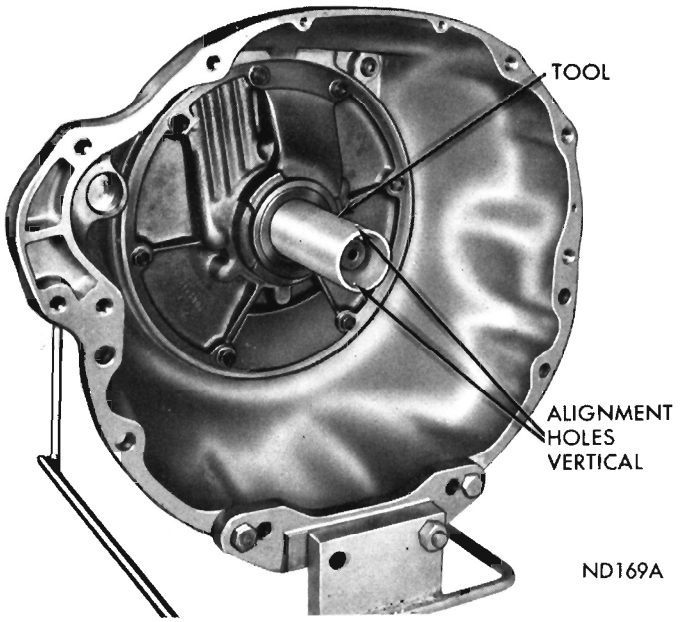


Fig. 108 - Aligning Pump Rotors

then tighten to 100 inch-pounds.

(6) Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and re-align.

(7) Install flat washer and throttle lever, then tighten lever clamp bolt.

(8) Adjust kickdown and low-reverse bands.

(9) Install oil pan, using a new gasket. Tighten pan bolts to 150 inch-pounds.

TRANSMISSION, CONVERTER AND DRIVE PLATE INSTALLATION

The transmission and converter must be installed as an assembly; otherwise, the converter drive plate, pump bushing, and oil seal will be damaged. The drive plate will not support a load; therefore, none of the weight of transmission should be allowed to rest on the plate during installation.

(1) Rotate pump rotors with Tool C-3756 (A-904) or Tool C-3881 (A-727) until the two small holes in handle are vertical (Fig. 108).

(2) Carefully slide converter assembly over input shaft and reaction shaft. Make sure converter impeller shaft slots are also vertical and fully engage pump inner rotor lugs.

Test for full engagement by placing a straight edge on face of the case (Fig. 109). The surface of converter front cover lug should be at least 1/2 inch to rear of straight edge when converter is pushed all way into the transmission.

(3) Attach a small "C" clamp to edge of converter housing to hold converter in place during transmission installation.

(4) Inspect converter drive plate for distortion or cracks and replace if necessary. Torque drive plate

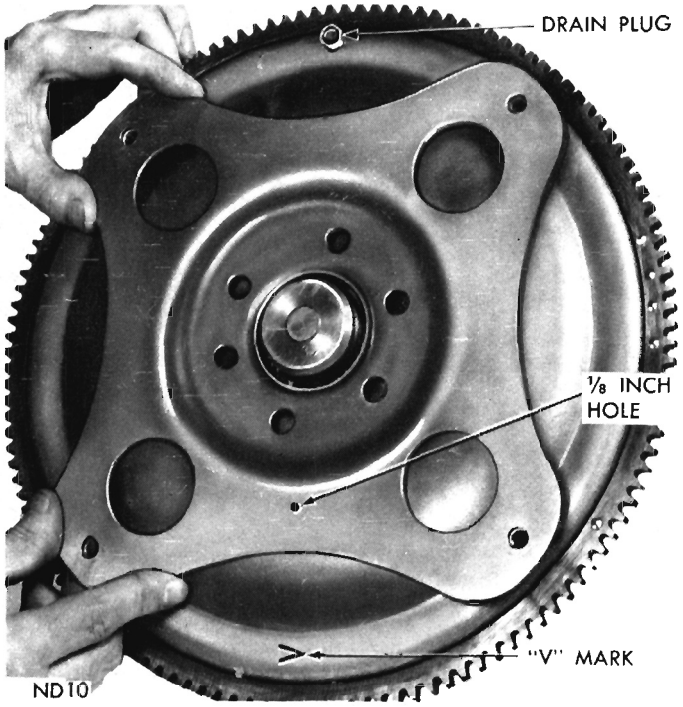


Fig. 110 - Converter and Drive Plate Marking

to crankshaft bolts to 55 foot pounds. **When Drive Plate replacement has been necessary, make sure both transmission dowel pins are in engine block and they are protruding far enough to hold transmission in alignment.**

(5) Coat converter hub hole in crankshaft with wheel bearing grease. Place transmission and converter assembly on a service jack and position assembly under vehicle for installation. Raise or tilt as necessary until transmission is aligned with engine.

(6) Rotate converter so mark on converter (made during removal) will align with mark on drive plate. The offset holes in plate are located next to 1/8 inch hole in the inner circle of plate. A stamped V mark identifies the offset hole in converter front cover (Fig. 110). Carefully work transmission assembly forward over engine block dowels with converter hub entering the crankshaft opening.

(7) After transmission is in position, install bell housing bolts and tighten to 28 foot-pounds.

(8) Install and tighten the two lower drive plate to converter bolts to 270 inch-pounds.

(9) Install starting motor and connect battery ground cable.

(10) Rotate engine with remote control switch and install the other two drive plate to converter bolts. Tighten bolts to 270 inch-pounds.

(11) Install crossmember (Fig. 111, 112 or 113) and tighten attaching bolts as noted.

Imperial Models: Position center crossmember in the stub frame. Start all retaining bolts including the four rubber isolator bolts, then tighten all bolts to 75 foot-pounds.

(12) Lower transmission so extension housing is aligned and rests on rear mount. Install bolts and tighten to 40 foot-pounds. On all except Valiant,

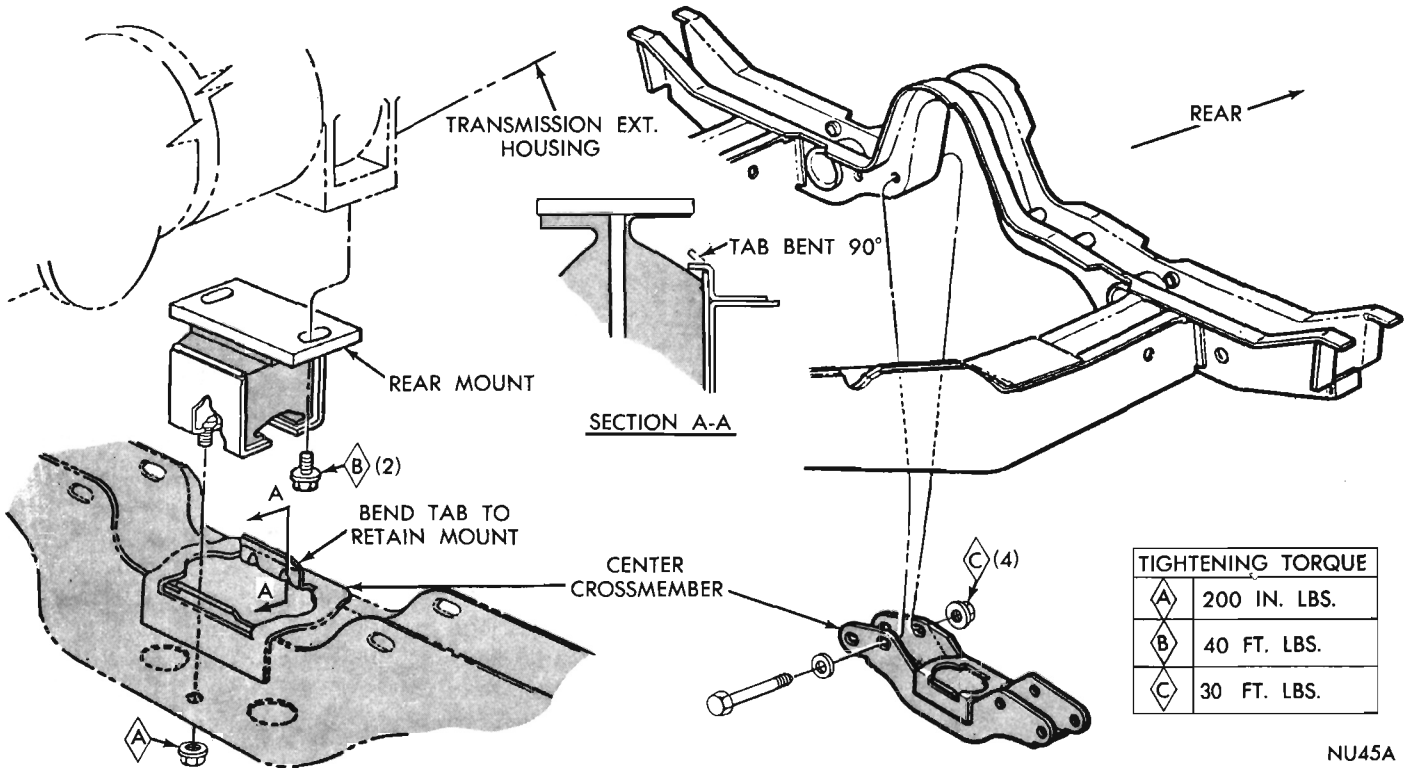


Fig. 111 - Center Crossmember and Rear Engine Mount (Valiant)

the rear mount to center crossmember bolt and nut, loose assembled to this point, should now be torqued to 50 foot-pounds.

(13) Install gearshift torque shaft and connect

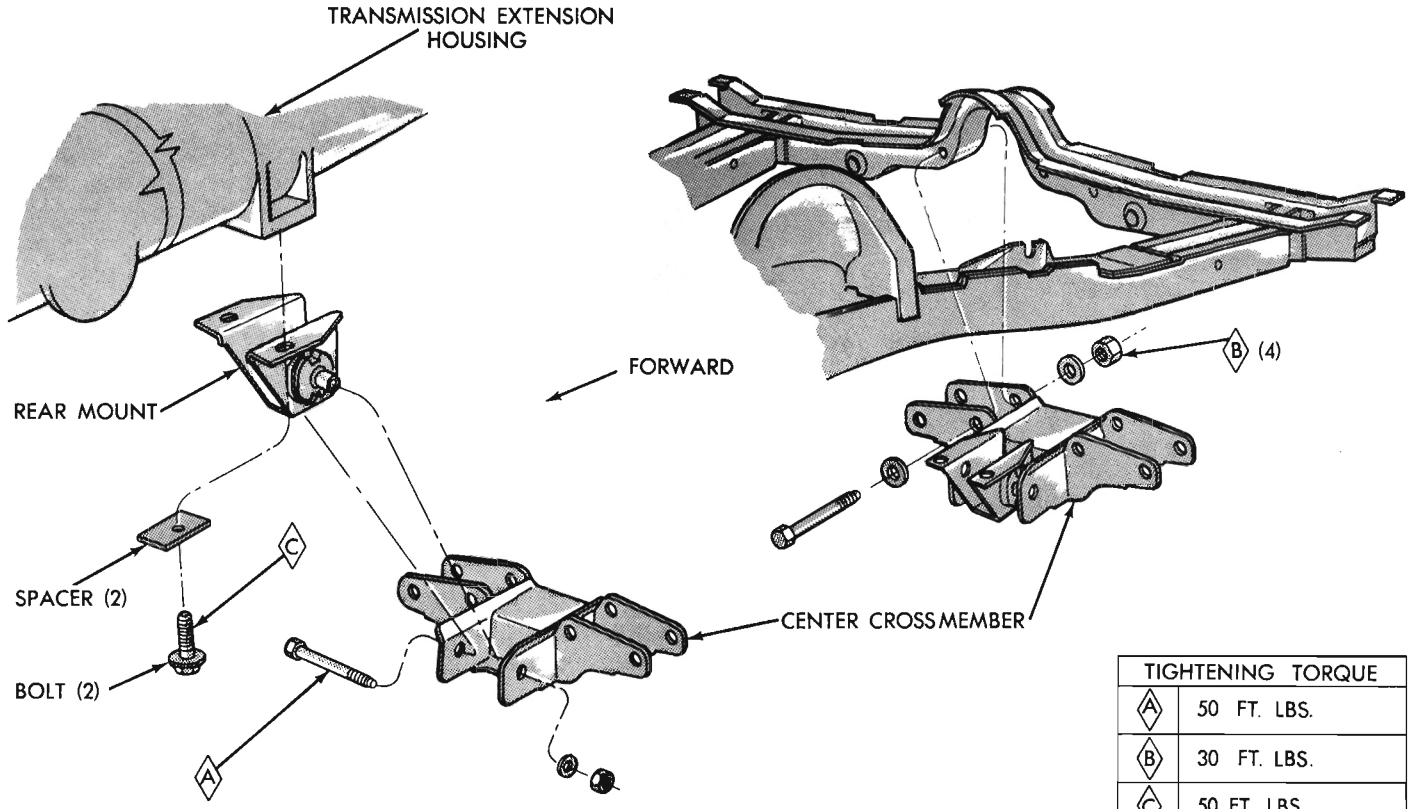


Fig. 112 - Center Crossmember and Rear Engine Mount (Barracuda and Satellite)

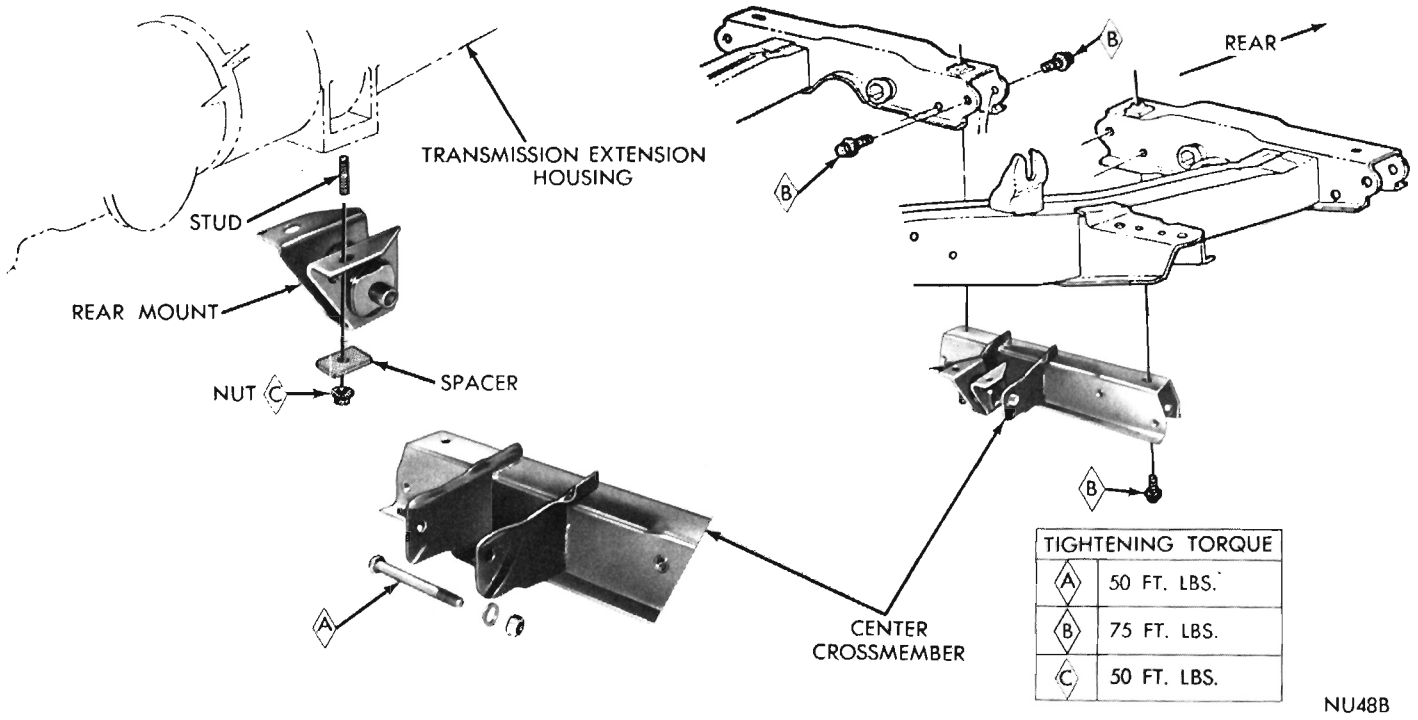


Fig. 113 - Center Crossmember and Rear Engine Mount (Fury and Chrysler)

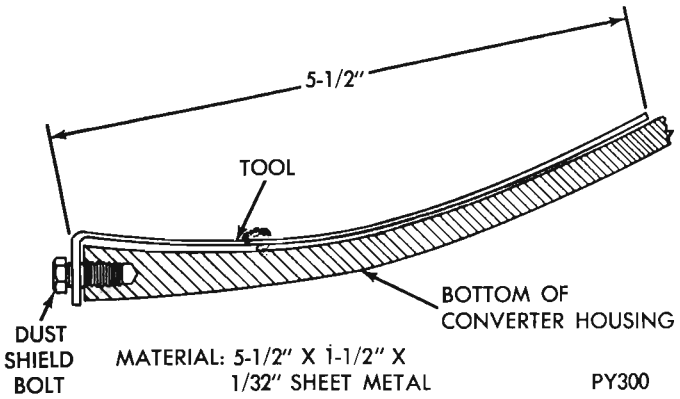


Fig. 114 - Leak Locating Test Probe Tool

gearshift rod to the transmission lever.

Console Shift: Align gearshift torque shaft lower bracket on the extension housing. Install the two retaining bolts and tighten securely. Connect gearshift rod to the transmission lever.

(14) Carefully guide sliding yoke into extension housing and on the output shaft splines. Align marks made at removal then connect propeller shaft to rear axle pinion shaft yoke.

(15) Connect oil cooler lines to the transmission and install oil filler tube. Connect the speedometer cable.

(16) Connect throttle rod to the transmission throttle lever.

(17) Connect wire to the Back-up light and neutral starting switch.

(18) Install cover plate in front of the converter assembly.

(19) Install the transmission case to cylinder block brace. **The converter cover plate must be between case and brace. The oil line bracket is attached in front of the brace. Tighten bolts holding brace to the case before attaching brace to the cylinder block.**

(20) Refill transmission with "Dexron" Type Automatic Transmission Fluid.

(21) Adjust throttle and gearshift linkage.

FLUID LEAKAGE—TRANSMISSION CONVERTER HOUSING AREA

(1) **Check for Source of Leakage.**

Since fluid leakage at or around the converter area may originate from an engine oil leak, the area should be examined closely. Factory fill fluid is dyed red and, therefore, can be distinguished from engine oil.

(2) Prior to removing the transmission, perform the following checks:

When leakage is determined to originate from the transmission, check fluid level and torque converter drain plug torque prior to removal of the transmission and torque converter.

High oil level can result in oil leakage out the

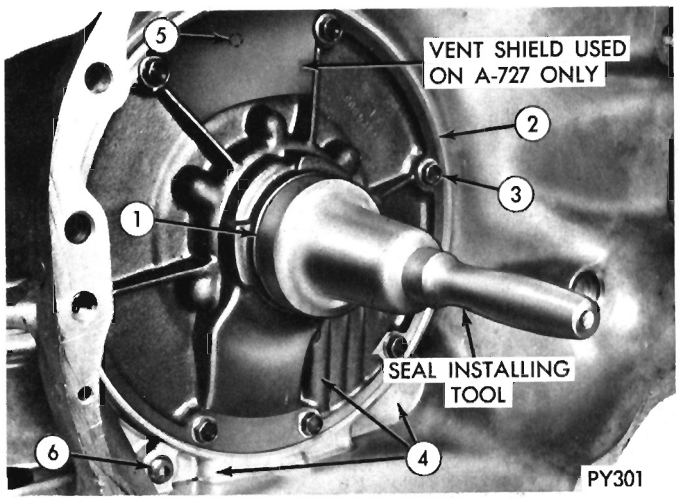


Fig. 115 - Transmission Converter Area

vent located at the top of the front pump housing. If the fluid level is high, adjust to proper level.

Oil leakage can also occur at the torque converter drain plug. Torque the drain plug to 110 inch-pounds.

After performing these two operations, re-check for leakage. If a leak persists, perform the following operation on the car to determine whether it is the **converter or transmission** that is leaking.

LEAKAGE TEST PROBE

(1) Remove converter housing dust shield.

(2) Position vehicle with front lower than back so that accumulated fluid in converter housing will drain out. Wipe bottom inside of converter housing as dry as possible. A solvent spray followed by compressed air drying is preferable.

(3) Fabricate and fasten test probe (Fig. 114) securely to convenient dust shield bolt hole. Make certain converter is cleared by test probe. Tool must be clean and dry.

(4) Run engine at approximately 2,500 rpm with transmission in neutral, for about 2 minutes. Transmission must be at operating temperature.

(5) Stop engine and carefully remove tool.

(6) If upper surface of test probe is dry, there is no converter leak. A path of fluid across probe indicates a converter leak. Oil leaking under the probe is coming from the transmission converter area (Fig. 115).

(7) Remove transmission and torque converter assembly from vehicle for further investigation. The fluid should be drained from the transmission and converter. Re-install converter drain plug and oil pan (with new gasket) at specified torque.

Possible sources of transmission converter area fluid leakage shown in (Fig. 115) are:

(1) Converter Hub Seal

(a) Seal lip cut, check converter hub finish.

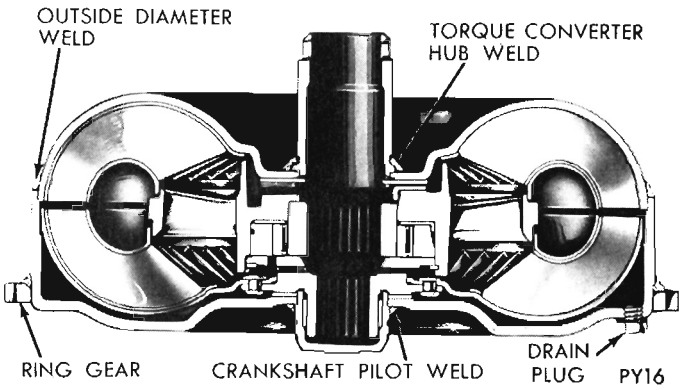


Fig. 116 - Torque Converter Cross Section

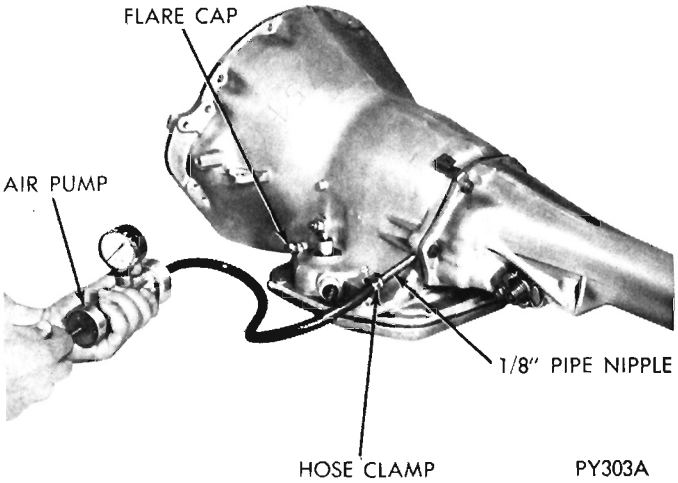


Fig. 118 - Pressurizing Transmission

(b) Bushing moved and/or worn.

(c) Oil return hole in front pump housing plugged or omitted.

(d) Seal worn out (high mileage cars).

(2) Fluid leakage at the outside diameter from pump housing "O" ring seal.

(3) Fluid leakage at the front pump to case bolts.

(4) Fluid leakage due to case or front pump housing porosity.

(5) Oil leakage out the vent.

(6) Kickdown lever shaft access plug.

Converter Leakage (Fig. 116)

Possible sources of converter leakage are:

(a) Torque converter weld leaks at the outside diameter (peripheral) weld.

(b) Front pump hub weld.

(c) Crankshaft pilot weld.

(d) Fluid leakage from the converter drain plug. These leaks appear at the outside diameter of the converter on the engine side.

AIR PRESSURE TEST OF TRANSMISSION

Fabricate equipment needed for test as shown in (Figs. 119 through 123).

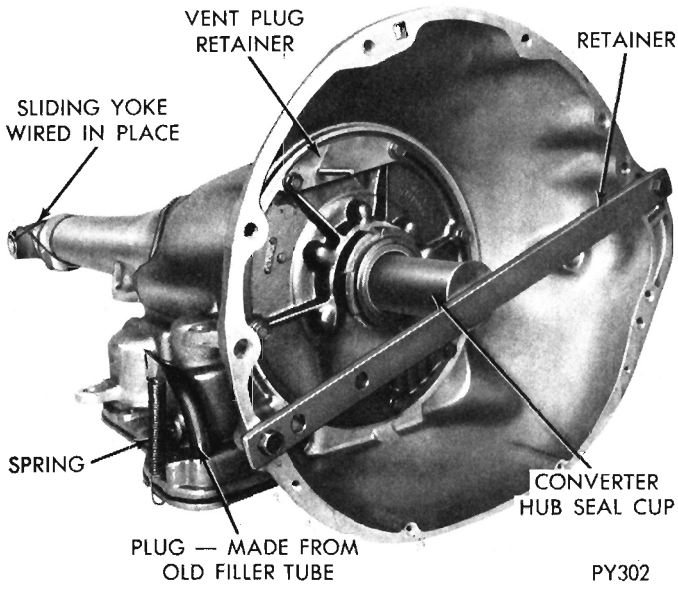


Fig. 117 - Transmission Prepared for Test

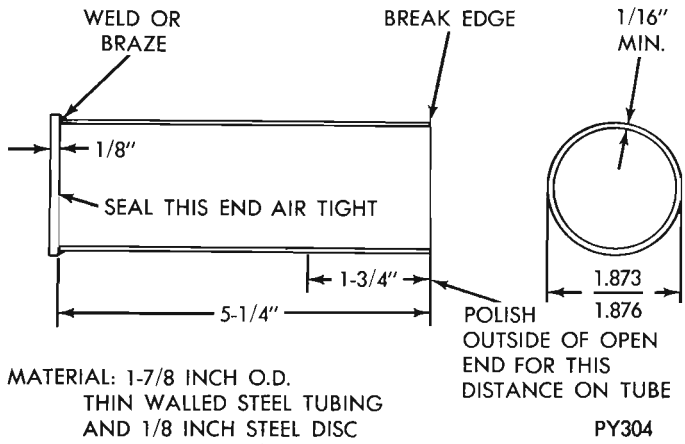


Fig. 119 - A-727 - Converter Hub Seal Cup

The transmission should be prepared for pressure test as follows after removal of the torque converter:

(1) Install filler tube bore plug, propeller shaft yoke (tie in with cord or wire), flared tube fitting cap (on front cooler line fitting), and pipe nipple (in case at rear cooler line fitting) (Fig. 117 and 118).

(2) Remove necessary front pump housing bolts, and vent shield (in A-727 transmission). Install vent plug (rubber stopper), and vent plug retainer preferably using longer bolts than those removed.

(3) With rotary motion, install converter hub seal cup over input shaft, and through the converter hub seal until the cup bottoms against the pump rotor lugs. Secure with cup retainer strap (Fig. 117), using converter housing to engine block retaining bolts.

(4) Attach and clamp hose from nozzle of Tool

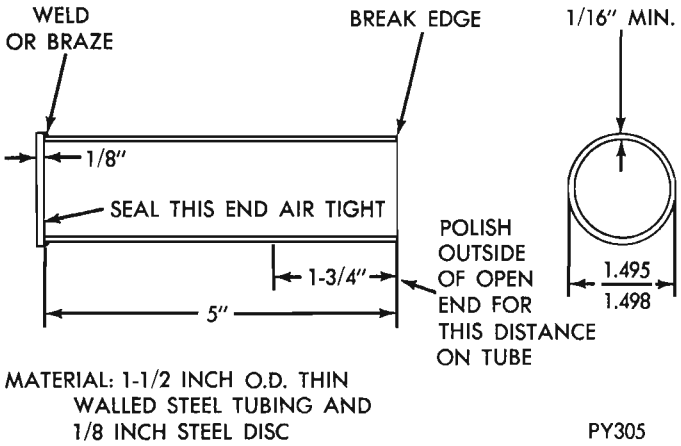


Fig. 120 - A-904 - Converter Hub Seal Cup

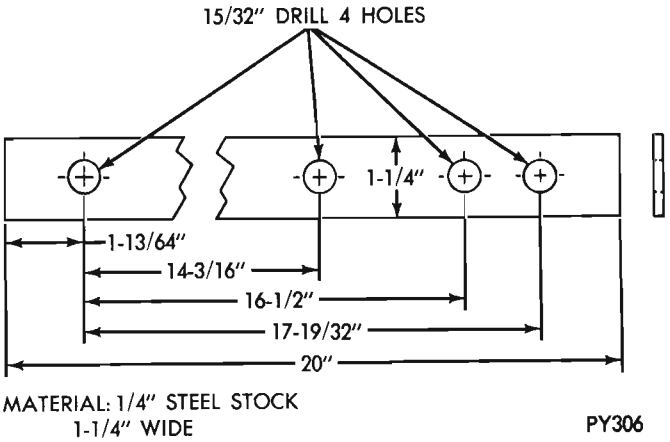


Fig. 121 - Hub Seal Cup Retaining Strap

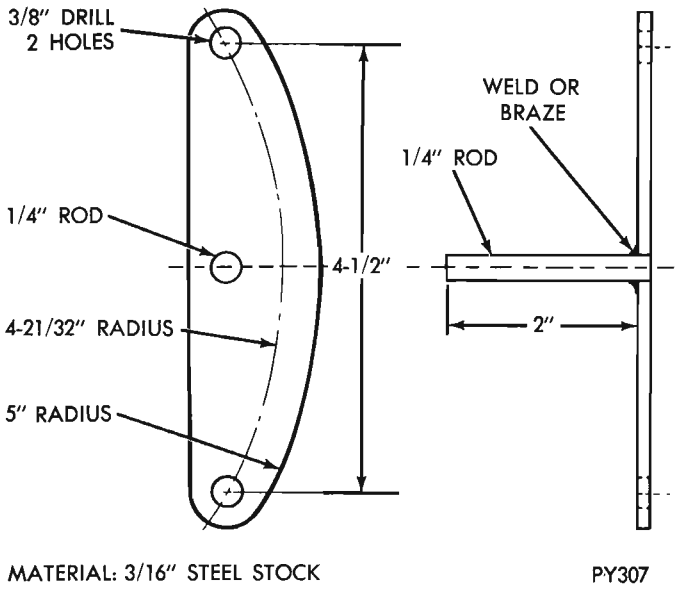


Fig. 122 - A-727 - Vent Plug Retainer

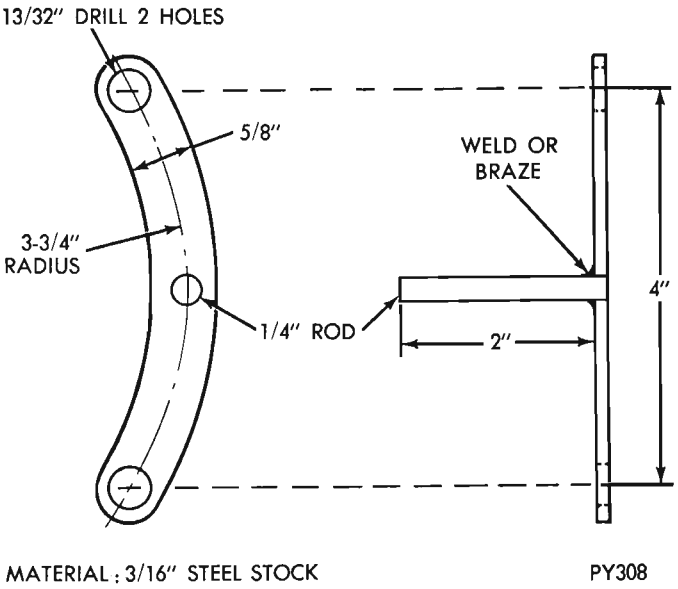


Fig. 123 - A-904 - Vent Plug Retainer

C-4080 to pipe nipple, which is in the rear cooler line fitting position in case (Fig. 118).

(5) Pressurize the transmission using Tool C-4080 until the pressure gage reads 8 psi. Position transmission so that pump housing and case front may be covered with soapy solution or water. Leaks are sometimes caused by porosity in the case or pump housing.

CAUTION: Do not, under any circumstances, pressurize a transmission to more than 10 psi.

If a leak source is located, that part and all associated seals and gaskets should be replaced with new parts.

TORQUE CONVERTER PRESSURE TEST

If fluid leakage has occurred in the bell housing area, the torque converter can be leak checked as follows after removal from the transmission:

(1) Drain all oil from the converter. If flushing is required, flush before checking for leakage.

(2) Install tool C-4102 and tighten.

(3) Apply a maximum of 100 psi air pressure to the converter.

(4) Submerge the converter in a tank of water and observe the hub, ring gear, and seam welds for bubbles. Five to ten minutes may be required for bubbles to develop from small leaks.

If no bubbles are observed, it can be assumed that the welds are not leaking. If leakage occurs, the converter should be replaced.

SPECIFICATIONS
3-SPEED TRANSMISSION
(A-903 6 CYL. ONLY)

Engine Displacement (Cu. In.)	198-225
Gear Ratio	
First	2.95
Second	1.83
Third	1.00
Reverse	3.80
Downshift Speed Limits	
3rd to 2nd	40 to 10 mph
2nd to 1st	Zero mph
Lubricant	U.S. Pints IMP Pints
Capacity	6-1/2 5-1/2
Type	"DEXRON" Type Automatic Transmission Fluid
Gear Type	Helical
Tolerances	
Second Speed Gear End Play	.002" to .016"
Countershaft Gear End Play	.005" to .022"
Clutch Housing Face Squareness	.006" Max
Clutch Housing Bore Run-Out	.008" Max.
Synchronizer Float	.060" to .117"

3-SPEED TRANSMISSION
(A-230 ALL SYNCHRONIZED)

Engine Displacement (Cu. In.)	198-225 318	340 383
Gear Ratio		
First	3.08	2.55
Second	1.70	1.49
Third	1.00	1.00
Reverse	2.90	3.34
Downshift Speed Limits		
3rd to 2nd	45 to 15 mph	
2nd to 1st	25 to 0 mph	
Lubricant	U.S. Pints	IMP. Pints
Capacity–All Except Fury	4-3/4	4
Fury	5	4-1/4
Type	"DEXRON" Type Automatic Transmission Fluid	
Gear Type	Helical	
Tolerances		
Clutch Housing Face Squareness	.006 Max.	
Clutch Housing Bore Run-Out	.008 Max.	

4-SPEED TRANSMISSION (A-833)

	Standard	Heavy Duty
Gear Ratio		
First	2.47:1	2.44:1
Second	1.77:1	1.77:1
Third	1.34:1	1.34:1
Fourth	1.00:1	1.00:1
Reverse	2.40:1	2.36:1
Gear Type	Helical (Except Reverse)	
Tolerances		
Countershaft Gear End Play	.015" to .029"	
Clutch Housing Face Squareness	.006" Max.	
Clutch Housing Bore Run-Out	.008" Max.	
Lubricant—Capacity and Type	U.S. Pints	IMP. Pints
Valiant	7	5-3/4
Barracuda, Satellite	7-1/2	6-1/4
California--Multi-Purpose Gear Oil	S.A.E. 140	
Standard Fill	"DEXRON" Type Automatic Transmission Fluid	
Downshift Speed Limits		
4th to 3rd	50 to 25 mph	
3rd to 2nd	25 to 15 mph	
2nd to 1st	15 to Zero mph	

TORQUEFLITE TRANSMISSIONS

Transmission Models	A-904		A-727	
TYPE	Automatic Three Speed with Torque Converter			
TORQUE CONVERTER DIAMETER (Std.)	10-3/4 inches		11-3/4 inches	
(High Stall Speed)			10-3/4 inches	
	U.S. Measure	Imperial Measure	U.S. Measure	Imperial Measure
OIL CAPACITY—TRANSMISSION AND TORQUE CONVERTER (Std.)	17 Pts.	14 Pts.	19 Pts.	16 Pts.
(High Stall Speed)			16-1/2 Pts.	13-1/2 Pts.
Use "DEXRON" Type Automatic Transmission Fluid				
COOLING METHOD	Water-Heat Exchanger			
LUBRICATION	Pump (Rotor Type)			
GEAR RATIOS	First	Second	Third	Reverse
	2.45 to 1	1.45 to 1	1 to 1	2.20 to 1
PUMP CLEARANCES				
Outer Rotor to Case Bore		.004" to .008"		
Outer to Inner Tip		.005" to .010"		
End Clearance—Rotors		.0015" to .003"		
GEAR TRAIN END PLAY	.006" to .033"		.010" to .037"	
INPUT SHAFT END PLAY	.030 to .089"		.037" to .084"	

	A-904	A-727
SNAP RINGS		
Front and Rear Clutches		
Rear Snap Ring (Selective)	.060 to .062"	.060 to .062"
	.068 to .070"	.074 to .076"
	.076 to .078"	.088 to .090"
Output Shaft (Forward End)	.040 to .044"	.048 to .052"
	.048 to .052"	.055 to .059"
	.059 to .065"	.062 to .066"
CLUTCH PLATE CLEARANCE		
Front Clutch	3 Disc .036 to .087	3 Disc .035 to .088
	4 Disc .048 to .109	4 Disc .047 to .110
		5 Disc .033 to .075
Rear Clutch	3 Disc .026 to .055	4 Disc .025 to .045
	4 Disc .032 to .056	

CLUTCHES—Engine Cu. In.	198	225	318	225	318	340	360	383-2	383-4	440	440-6 426
Number of Front Clutch Plates	3	3	4	3	3	3	3	3	4	4	5
Number of Front Clutch Discs	3	3	4	3	3	3	3	3	4	4	5
Number of Rear Clutch Plates	2	2	3	3	3	3	3	3	3	3	3
Number of Rear Clutch Discs	3	3	4	4	4	4	4	4	4	4	4
BAND ADJUSTMENTS											
Kickdown (Front) Turns*	2	2	2	2½	2½	2½	2½	2½	2½	2½[1]	1½
Low-Reverse (Internal) Turns*	3¼	3¼	4	2	2	2	2	2	2	2	2

*Backed off from 72 inch-pounds.

[1] 440 Dual Exhaust, 2 Turns

THRUST WASHERS		A-904		A-727
Reaction Shaft Support to Front Clutch Retainer	#1	.061 to .063	#1	Selective
		—		.061 to .063" Natural
		—		.084 to .086" Red
				.102 to .104" Yellow
Front Clutch to Rear Clutch	#2	.061 to .063"	#2	.061 to .063"
Input Shaft to Output Shaft	#3	Selective	#3	.062 to .064"
		.052 to .054" Natural		—
		.068 to .070" Red		—
		.083 to .085" Black		—
Front Annulus Support To Front Carrier	#4	.121 to .125"	#4	.060 to .062"
Front Carrier to Driving Shell Thrust Plate	#5	.060 to .062"		—
Front Annulus Support to Driving Shell			#5	.060 to .062"
Driving Shell Thrust Plate	#6	.034 to .036"	#6	.034 to .036"
	#7	.034 to .036"		—
Rear Carrier to Driving Shell	#8	.060 to .062"	#7	.060 to .062"
Rear Annulus Thrust Plate	#9	.034 to .036" (New in "G" Series)	#8	.034 to .036"

AUTOMATIC SHIFT SPEEDS AND GOVERNOR PRESSURE CHART (APPROXIMATE MILES PER HOUR)

Model *	V	V	R	B	P	PC	PC	Y
Engine Cu. In.	198	225	318	340	360	383	383-4 & 440 Hi. Perf.	440
Axle Ratio	2.76	2.76	2.71	3.23	2.71	2.76	3.23	2.94
Tire Size	6.95X14	6.95X14	G78X14	F70X14	G78X15	H78X15	H78X15	L84X15
Throttle Closed								
1-2 Upshift	10-14	10-14	10-15	8-12	10-15	10-15	9-13	10-15
2-3 Upshift	14-19	14-19	17-23	14-19	17-23	17-23	15-20	17-23
3-1 Downshift	8-12	8-12	9-13	7-10	9-13	9-13	7-11	9-12
Throttle Wide Open								
1-2 Upshift	28-41	28-41	32-50	33-44	35-50	35-51	36-47	35-49
2-3 Upshift	71-82	71-82	78-91	65-73	77-89	79-90	70-80	77-88
Kickdown Limit								
3-2 WOT Downshift	59-74	59-74	66-83	56-67	65-81	67-82	60-72	65-80
3-2 Part Throttle Downshift	45-65	45-65	29-50	31-44	32-51	32-51	34-48	32-50
3-1 WOT Downshift	26-30	26-30	27-40	25-37	27-41	28-42	27-40	27-41
Governor Pressure								
15 psi	19-20	19-20	20-22	17-18	20-22	21-22	18-19	20-22
50 psi	49-55	49-55	56-64	49-53	54-63	55-64	53-58	54-62
75 psi	72-79	72-79	80-88	66-71	78-86	80-87	71-77	78-85

* V=Valiant R=Satellite B=Barracuda P=Fury C=Chrysler Y=Imperial

TIGHTENING REFERENCE

Torqueflite A-904 and A-727	Pounds Foot	Pounds Inch
Cooler Line Fitting		110
Cooler Line Nut		85
Converter Drain Plug		110
Converter Drive Plate to Crankshaft Bolt	55	
Converter Drive Plate to Torque Converter Bolt		270
Extension Housing to Transmission Case Bolt	24	
Extension Housing to Insulator Mounting Bolt	40	
Governor Body to Support Bolt		100
Kickdown Band Adjusting Screw Lock Nut	29	
Kickdown Lever Shaft Plug		150
Neutral Starter Switch	24	
Oil Filler Tube Bracket Bolt		150
Oil Pan Bolt		150
Oil Pump Housing to Transmission Case Bolt		175
Output Shaft Support Bolt		150
Overrunning Clutch Cam Set Screw		40
Pressure Test Take-Off Plug		75
Reaction Shaft Support to Oil Pump Bolt		160
Reverse Band Adjusting Screw Lock Nut	35	
Speedometer Drive Clamp Screw		100
Transmission to Engine Bolt	28	
Valve Body Screw		35
Valve Body to Transmission Case Bolt		100

Manual A-903, A-230 3-Speed	Foot Pounds
Back Up Light Switch	15
Extension Housing Bolts	50
Extension Housing to Cross Member Bolts	40
Emission Switch or Plug	15
Drive Pinion Bearing Retainer Bolts	30
Gearshift Operating Lever Nuts	18
Transmission to Clutch Housing Bolts	50
Transmission Cover Retaining Bolts	12
Transmission Drain Plug	25

Manual A-833 4-Speed	Foot Pounds
Back Up Light Switch	15
Drive Pinion Bearing, Retainer Bolts	30
Extension Housing to Case Bolts	50
Emission Switch or Plug	15
Gearshift Housing Bolts	15
Reverse Detent Spring Retainer	50
Reverse Detent Spring Retainer Plug	24
Shift Lever Nuts	18
Transmission Drain Plug	25
Transmission to Clutch Housing Bolts	50

SPEEDOMETER PINION GEAR CHART
ALL CAR LINES-ALL TRANSMISSIONS
NUMBER OF TEETH ON PINION GEAR LISTED UNDER EACH AXLE

Tire Size	2.45:1	2.71:1	2.76:1	2.93:1	2.94:1	3.21:1	3.23:1	3.54:1	3.55:1	3.91:1	4.10:1
B78 x 14	27	29	30	32	32	35	35	38	38	42	44
C78 x 14	26	29	29	31	31	34	34	37	37	41	43
D78 x 14	26	28	29	31	31	33	34	37	37	41	43
E 78 x 14	25	28	28	30	30	33	33	36	36	40	42
F78 X 14	25	27	28	30	30	32	33	36	36	39	41
G78 x 14	24	27	27	29	29	32	32	35	35	39	40
H78 x 14	24	26	27	28	28	31	31	34	34	37	39
F78 x 15	24	27	27	29	29	31	32	35	35	38	40
G78 x 15	24	26	27	28	28	31	31	34	34	38	39
H78 x 15		26	26	28	28	30	30	33	33	37	38
J78 x 15		25	26	27	27	30	30	33	33	36	38
L84 x 15		25	25	27	27	29	29	32	32	35	37
E70 x 14	26	28	29	31	31	34	34	37	37	41	43
F70 x 14	25	28	28	30	30	33	33	36	36	40	42
G70 x 14	25	27	28	30	30	32	33	36	36	39	41
H70 x 15		26	27	28	28	31	31	34	34	37	39
E60 X 15	25	28	29	30	30	33	33	37	37	40	42
F60 x 15	25	28	28	30	30	33	33	36	36	40	42
G60 x 15	25	27	28	30	30	32	32	36	36	39	41
6.45 x 14	26	29	29	31	31	34	34	37	38	41	43
6.95 x 14	25	28	29	30	30	33	33	37	37	40	42
7.35 x 14	25	28	28	30	30	33	33	36	36	40	42
7.75 x 14		27	28	29	29	32	32	35	35	39	41
8.25 x 14	24	27	27	29	29	32	32	35	35	38	40
8.55 x 14	24	26	26	28	28	31	31	34	34	37	39
7.75 x 15		27	28	29	29	32	32	35	35	39	41
8.25 x 15	24	26	27	28	29	31	31	34	34	38	40
8.55 x 15		26	26	28	28	31	31	34	34	37	39
8.90 x 15			24	25	25	28	28	30	30	33	35
9.00 x 15		24	25	26	26	29	29	32	32	35	37
9.15 x 15		25	26	27	27	30	30	33	33	36	38

Note: Pinions with less than 26 teeth require a different adapter than the one used for all other pinions.

WHEELS—BEARINGS—TIRES

CONTENTS

	Page
BEARINGS (FRONT WHEEL)	7
Removal (Without Disc Brakes)	7
Removal (With Disc Brakes)	7
Cleaning and Inspection	7
Lubrication	7
Installation (Without Disc Brakes)	7
Installation (With Disc Brakes)	8
Bearing Adjustment	8
GENERAL INFORMATION	1
SERVICE PROCEDURES	2
SPECIFICATIONS	9
TIGHTENING REFERENCE	11
TIRES	2
Care of Tires—Cleaning	2
Collapsible Spare Tire	3
Inflation of Tires	2
Radial Ply Tires	3
Rotation of Tires	3
Repairing Tire Leaks	4
Tire Noise Complaints	4
Tire Wear Patterns	5
Tire Tread Wear Indicators	4
Wide Tread 70 and 60 Series Tires	3
WHEELS	6
Tire—Wheel Balance	6
Tire and Wheel Runout	6
Wheel Covers	7

GENERAL INFORMATION

The original equipment Load Range B (4) ply rating bias belted factory installed tires on your vehicle are designed and tested to meet all normal operating requirements. These tires are superior tires for the vehicle and provide the best overall performance for normal operation; furthermore, the

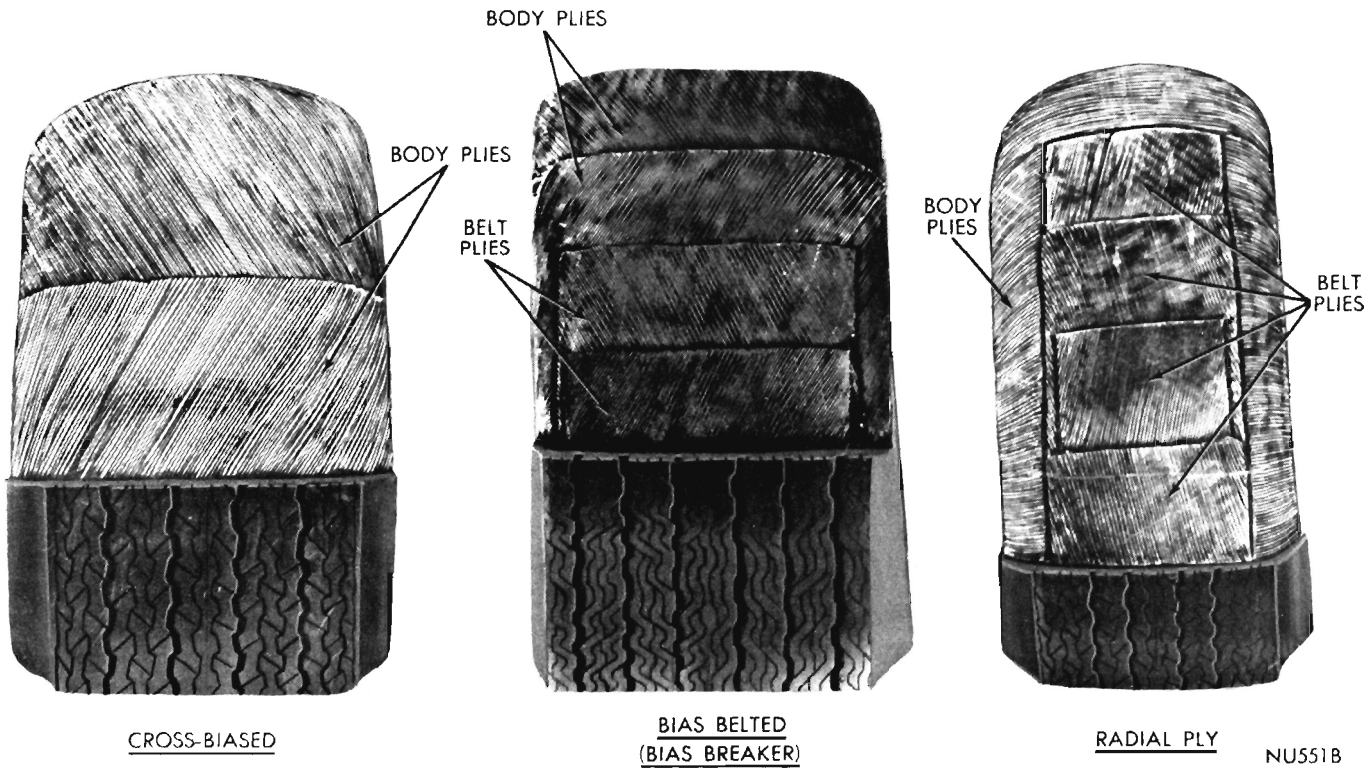


Fig. 1-Tire Cord Angles

ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance and tread life.

The bias belted (bias breaker) represents a complete departure in tire design. This type of tire construction has the body plies, or layers of cords, running at a bias or criss-crossed angle to the circumference (Fig. 1). In addition, a rugged two-ply circumferencial belt is added directly under the tread.

The advantages of bias belted tires which are most important to the owner are: Superior ride and handling, improved tread life, improved traction and skid resistance and improved high speed durability because of cooler operating temperatures.

Tire wear and vehicle stability are affected greatly by tire size, tire pressures, wheel rim size, distribution of load within the vehicle, wheel alignment, road surface conditions, and driver operating habits.

Tires used at low speeds, in cool climates, and with light loads will have longer life than tires used for high speed driving in hot climates with heavy loads. Abrasive road surfaces will accelerate tire wear.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe or careless drivers. Rapid acceleration and deceleration, severe application of brakes, high speed driving, taking turns at excessive speeds, striking curbs and other obstacles are just a few of the driving habits which will shorten the life of any tire.

To obtain maximum vehicle stability and tire life the vehicle should be equipped with the recommended supsension application including the proper tire size and the recommended full rated load should not be exceeded. See Minimum Tire Size and Vehicle Load Chart in this section.

SERVICE PROCEDURES

TIRES

Care of Tires—Cleaning

Some white side wall tires have a colored protective coating that should be removed from the tires before delivery of the car. This protective coating is not as flexible as rubber and will crack. This may introduce sidewall checking if not removed. In no case should the tires be driven more than 50 miles before this coating is removed.

To remove this coating, wet the tire surface thoroughly with warm water and allow it to soak for one minute. Using a soft bristle brush or sponge, wash the protective coating from the tire. This coating may also be removed by steam cleaning. DO NOT USE GASOLINE OR OTHER SOLVENTS. DO NOT USE A WIRE BRUSH.

After the car is in service, ordinary road dirt that collects on white side wall tires may be cleaned with soap or a non-abrasive cleaner and (if necessary) a soft bristle brush. Under no circumstances should gasoline, kerosene, or any cleaning fluid containing a solvent derived from oil be used to clean white sidewall tires. Mineral oil in any form is detrimental to rubber, and a cleaner with an oil base solvent will discolor or injure any tires.

Inflation of Tires

Tire inflation pressure is one of the most important elements of tire care. Inflation pressures recommended for all vehicle models have been carefully selected to provide a proper balance between ride handling, and tire life. See Tire Inflation Pressure placard located on the latching pillar of the driver's door.

The tire pressure differentials, front to rear, (higher rear) as shown on some placards, are recommended to insure optimum directional stability.

Tire pressures should be checked at least once a month and should be checked and adjusted before any long trips. **Check and adjust tire pressures with the tires cold if possible.** It is normal for tire air pressure to increase (2-6 psi) due to temperature increases caused by tire flexing. **Under no circumstances should inflation pressure of warm tires be reduced.**

When it is not possible to check tire air pressure cold, assume a (2-6 psi) increase over cold pressures. **It may be recognized that this method is not as accurate as checking pressures when the tires are cold. Always check tire pressure with an accurate gauge.**

Higher inflation pressures than shown on the chart can cause deterioration in ride quality, less resistance to various types of impact bruises, rapid wear at the center of tire treads and poor steering returnability.

Lower tire pressures than those recommended on the chart can result in greater gasoline consumption, rapid wear toward the edges of tire tread, less resistance to rim bruises and various types of ply and tread separation, cord fatigue or breakage and increased steering effort.

Tire valve caps (or valve extensions) should always be reinstalled on the valve and tightened fin-

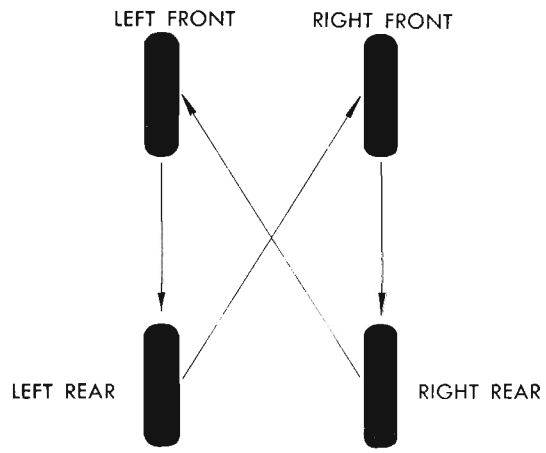


Fig. 2-Tire Roation Diagram 4 Tires. NP158

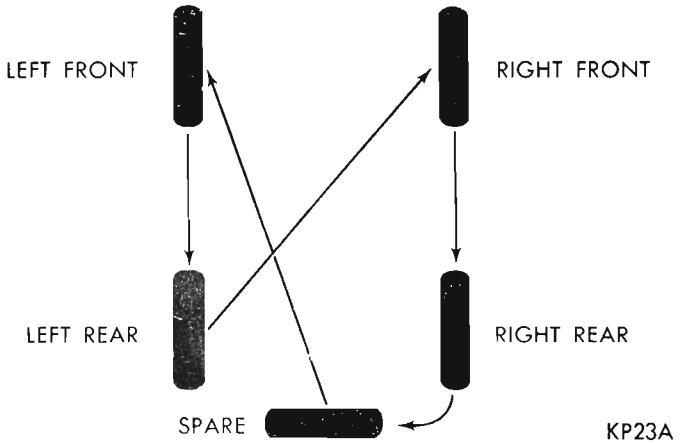


Fig. 3-Tire Rotation Diagram 5 Tires

ger tight. They assist in retaining air and also keep foreign material out of the valve.

Tire Rotation

Under normal operating conditions it is recommended that all tires, especially the wide tread 70 and 60 series and bias belted type, should be rotated **no later** than every second oil change and should be in correct balance to obtain the most uniform tread wear. Tire inspection at every oil change is recommended and if irregular tread wear is evident, rotation of tires is suggested at that time. Be sure to always adjust tire pressures properly after rotation, especially on station wagons. If vehicle is equipped with styled wheels or a collapsible spare tire, follow the 4 tire rotation illustration. Proper tire rotation at the recommended intervals reduces the possibility of tire noise and equalizes tire wear. Figures 2 and 3 are the recommended sequence for the rotation of tires. Under conditions of severe service (trailer towing) they should be rotated more frequently.

CAUTION: Trans-Am vehicles are equipped with E60-15 tires front and G60-15 tires rear. These tires may be re-positioned by switching from side to side of the appropriate axle. Under no circumstances should these tires be changed from front to rear or rear to front.

Uneven tire wear is frequently the cause of tire induced noises which are attributed to rear axle gears, bearings etc. Unnecessary work is often performed on other chassis components in an effort to correct tire noises.

Radial Ply Tires

Your vehicle is designed for bias belted or cross bias tires of the sizes indicated. The use of radial tires is not recommended because of their harsh ride at low speeds and possible unfamiliar stability characteristics. Should these radial tires be desired the maximum allowable size should be selected. **Radial ply tires must be used in sets of five (5), and under no circumstances should they be used on the front only.**

If snow tires are installed on the rear wheels bias belted or cross bias tires must be mounted on the front wheels. Not doing this will result in oversteer and could possibly cause spins on wet or icy roads. The safest policy is never intermix radial ply tires with bias belted or cross bias tires.

Wide Tread 70 and 60 Series Tires

The use of 70 and 60 Series wide tread bias belted or cross bias (again radial not recommended) tires is acceptable on your vehicle if the size is listed in the specification charts. The use of oversize tires of this construction (that are not listed in the specification charts) may cause interference with vehicle components under extremes of suspension and steering travel and may cause tire damage. For maximum satisfaction these tires should be used only in sets of five and under no circumstances should they be used on the front only. If snow tires are used they must also be of the same wide tread—low profile 70 or 60 Series design.

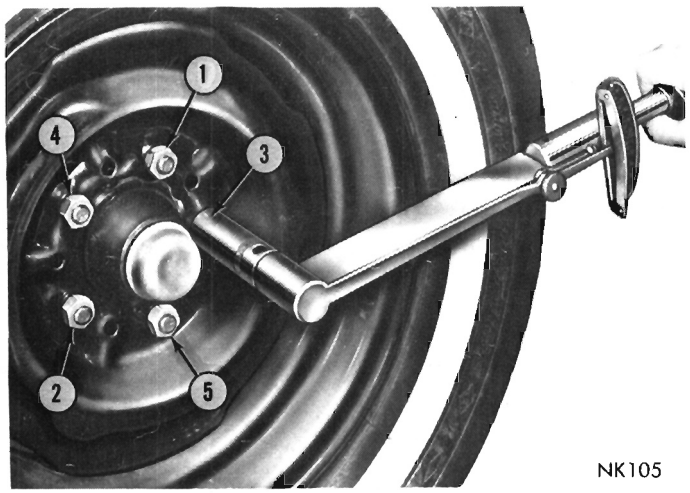
Collapsible Spare Tire

The collapsible spare tire has an approximate tread life of 2000 miles and its continued use other than for emergency purposes is not recommended. The original tire should be repaired and reinstalled at the first opportunity.

Inflation Procedure

The collapsible tire may be inflated in about two minutes, using the inflator stowed with the tire in the luggage compartment, or with any convenient source of compressed air.

Caution: Inflator contains fluorocarbon gas and



NK105

Fig. 4-Wheel Stud Nut Tightening Sequence

CO2 under pressure. Keep out of reach of children. Do not expose to heat or store in temperature above 165 degrees F. Avoid contact with gas or metal parts of inflator during use to prevent possible frost bite.

If outside temperature is below zero, inflator should be warmed on defroster outlet for about 10 minutes to provide more rapid tire inflation. Heater should be on "Defrost" position and fan on "High".

(1) Remove the tire from storage location and place flat on the ground with valve stem up.

(2) Remove valve cap from tire valve stem and make sure valve core is screwed in tight using valve cap.

(3) Remove plastic cap from inflator.

(4) Place inflator outlet over valve stem and push onto stem until sound of gas entering tire can be heard.

(5) Hold inflator in position for one minute after sound stops and tire is completely inflated.

(6) Replace valve cap.

It is recommended that the collapsible spare tire pressure be checked and adjusted to 32 PSI as soon as possible after installation.

To stow collapsible spare tire, remove air by removing tire valve stem core with valve cap. Flatten tire and replace core and cap. Stow tire in proper luggage compartment location.

NOTE

The inflator for the collapsible spare tire is good for one inflation only. A new inflator must be purchased from your local dealer after every inflation.

REPAIRING LEAKS

Leaks between the tire and wheel require the removal of the tire. Leaks in the tire can often be repaired without removing the tire. Always follow the equipment manufacturers recommendations.

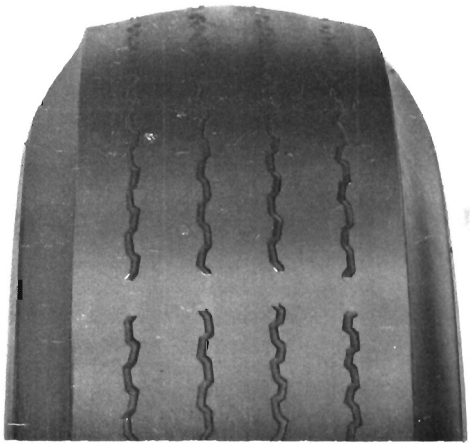

NR243

Fig. 5-Tire Tread Wear Indicator

Tools used for dismounting and mounting tires must be smooth, free from sharp edges or burrs which could damage the tire or wheel rim.

The tire must be **completely** deflated before the tire beads are removed from the seats. Before mounting the tire on the wheel, make sure all rust scale is removed from the wheel rim. A mild soap solution applied to both tire bead surfaces will aid in installation. Either a commercial type bead expander or a rope tourniquet can be used to seat the tire beads.

When installing wheels on the vehicle, progressively tighten wheel nuts in sequence shown in (Fig. 4) to proper torque specifications, 55 foot-pounds for Valiant, and 65 foot-pounds all other models.

NOTE: All wheel stud nuts and studs have right hand threads.

Tire Tread Wear Indicators

Your potential driving, cornering and braking traction decreases as your tires wear. Furthermore, as the tread depth is decreased the tires have less resistance to road hazards and are more likely to hydroplane on wet pavement. Tread wear indicators have been provided to assist you in determining when your tires are worn so as to require replacement. These indicators are molded into the bottom of the tread grooves and will appear as approximately 1/2 inch wide bands when this tread depth has been reduced to 1/16 inch (Fig. 5). Tire replacement due to tread wear is necessary when these indicators appear in two or more adjacent grooves or a localized worn spot eliminates all the tread.

Tire Noise or Vibration Complaints

To determine whether tires are causing the noise or vibration, drive the car over a smooth portion of highway at different speeds and note the effect of acceleration and deceleration on noise level.

Axle and exhaust noise change in intensity as speed varies, while tire noise will usually remain constant. If after road testing the vehicle it was determined that tires may be causing the noise, balance all tires and inflate to 50 psi. Drive the car over the same route at the same speeds as before to determine whether the disturbance has changed. If the disturbance is changed or eliminated by overinflating the tires, continue the road test by lowering the pressure one tire at a time to normal. When the disturbance returns, the last tire deflated will usually be the offender. Tire thump (sometimes referred to as "tramp") usually occurs in the speed range of 20-40 MPH and can usually be located this way. If you have a "thumper", replace the tire.

Tire roughness can be caused by a single tire with two or more "thump" spots in it, or by two or more thumping tires at speeds of 40-70 MPH. To isolate the cause of this condition, you may have to substitute the spare for each of the four tires, with all tires inflated to normal pressure. Tire roughness is recognized as a low-frequency rumble or vibration and is very similar to driveline vibration. Positive separation of the two disturbances can only be accomplished by using a known set of good tires or by towing the vehicle with the propeller shaft removed. To correct tire roughness, replace the offending tires.

Tire Wear Patterns

An inspection of the tires, together with information as to locality of vehicle operation will usually indicate abnormal wear due to operating conditions or mechanical faults, which should be corrected. Various types of abnormal tire wear with their causes and corrective actions are shown in (Fig. 6).

Underinflation

For the maximum results in stability and handling, ride quality and tire life, tire inflation pressures should not be allowed to go below the recommended inflation pressures. Underinflation results in much faster wear of the shoulders than the center of tread.

Overinflation

By maintaining specified tire inflation pressure, even wear will take place over the entire tread surface. Overinflation results in faster wear at the center of the tread.

Cracked Treads

This is the result of alternate under and over inflation, exceeding the recommended full rated load, high temperature and high speed driving.

Excessive Camber Wear

Excessive wheel camber, either positive or negative causes the tire to run at an angle to the road. One side of the tread wears more than the other. For best corrective results, have the front wheel camber adjusted to specifications.

Toe-in or Toe-out Tread Wear

Excessive toe-in or toe-out causes wear on the edges of the front tires. An excessive amount of either toe-in or toe-out actually drags the tire instead of letting the tire roll true. This wear condition will usually produce a tapered or feathered edge on the outside ribs. Have the toe-in or toe-out adjusted to specifications to correct.

CONDITION	RAPID WEAR AT SHOULDERS	RAPID WEAR AT CENTER	CRACKED TREADS	WEAR ON ONE SIDE	FEATHERED EDGE	BALD SPOTS
CAUSE	UNDER INFLATION	OVER INFLATION	UNDER-INFLATION OR EXCESSIVE SPEED	EXCESSIVE CAMBER	INCORRECT TOE	WHEEL UNBALANCED
CORRECTION	ADJUST PRESSURE TO SPECIFICATIONS WHEN TIRES ARE COOL			ADJUST CAMBER TO SPECIFICATIONS	ADJUST FOR TOE-IN 1/8 INCH	DYNAMIC OR STATIC BALANCE WHEELS

NN2

Fig. 6-Tire Wear Patterns

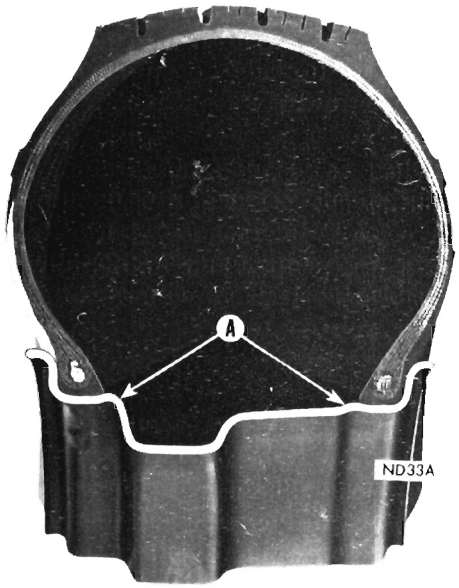


Fig. 7-Safety Type Rim

Bald Spot, Cupped or Scalloped Tire Tread Wear

Cupping, scalloping and bald spotting of tires is associated with wear on a car driven mostly at highway speeds without the recommended tire rotation and with unbalance conditions. Regardless of the cause of cupped wear on either front tire, no alignment or balance job can prevent future excessive wear of the spots. Once a front tire acquires flat or cupped spots additional wear will continue at a rapid rate. To correct this condition, tire rotation and wheel balance are necessary. A cupped tire will partially true itself up on a rear wheel.

WHEELS

All models use steel drop center wheels. The safety rim wheel (Fig. 7) has raised sections between the rim flanges and the rim well. Initial inflation of the tire forces the bead over these raised sections. Tire-wheel separation under extreme hard cornering is prevented by air pressure and these safety humps. Furthermore, in case of a tire failure, the raised sections help hold the tire in position on the wheel until the car can be brought to a safe stop.

TIRE-WHEEL BALANCE

The need for tire and wheel assembly balancing is indicated by heavy vibration of the steering wheel when driving at speeds above 40 miles an hour.

Static (still) balance is equal distribution of the weight of the wheel and tire around the spindle, so that the assembly has no tendency to rotate by itself. An assembly that has a heavy spot is statically out of balance and can produce a bouncing motion.

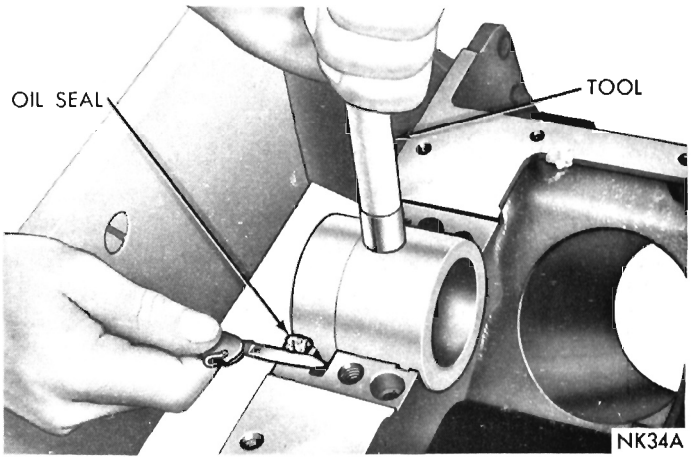


Fig. 8-Runout Checking Area

Correction for static unbalance is made by first finding the location of the heavy spot, then adding sufficient weight to counterbalance it (follow the equipment manufacturers recommendations). Half the balance weight should be added to the inside of the wheel and the other half to the outside to prevent excessive dynamic unbalance.

A wheel and tire, to be in dynamic balance, must first be in static balance and also be in balance from inside to outside. A wheel not in dynamic balance can produce wobble or shimmy.

TIRE AND WHEEL RUNOUT

Wheels and tires may be measured for both radial and lateral runout. Radial runout (eccentricity) is the difference between the high and low points on the tread of the tire; lateral runout is the "wobble" of the wheel and/or tire.

Prior to measuring the wheel or tire for runout, the accuracy of the drum at the mounting bolts should be determined. The car should be driven a short distance and immediately lifted off the ground before the measurement is made so that "flat-spotting" of the tire (from being parked) does not affect the runout measurement.

(1) Attach dial indicator C-3339 to a firm base so it will be held steady while taking the runout readings.

(2) Place plunger of dial indicator against one of the center ribs of the tire tread and rotate the assembly slowly to measure radial runout. This measurement should not exceed .080 inch.

(3) To measure lateral runout, position the dial indicator against the side of the tire. This measurement should not exceed .105 inch.

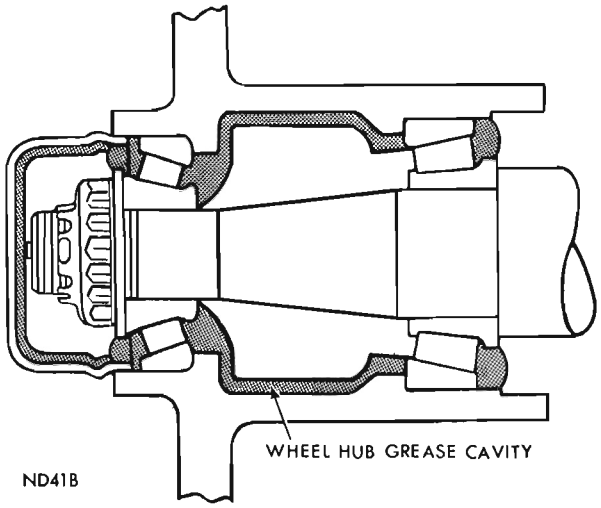


Fig. 9-Wheel Hub Grease Cavity

Rotating the tire on the wheel may reduce runout or it may be necessary to take dial indicator measurements of the wheel itself in order to determine which unit has the excessive runout. Measure runout at the protected areas"A" and "B" (Fig. 8), where the tire bead pilots. The radial runout, "A" should not exceed .035 inch. The lateral runout "B", should not exceed .045 inch. **Under no circumstances should point indicated by "C" be used for measuring wheel runout as this metal has been sheared in the manufacturing process and is not an even surface.**

WHEEL COVERS

To avoid damaging the wheel covers during removal and installation, care should be used to be sure the forces are applied to the correct area of the covers. To install the wheel covers, insert the tire valve through the cover valve stem hole and seat this portion of the cover **completely**. Apply force 180 degrees from the valve stem hole to complete the installation. When removing the wheel covers, pry completely loose 180 degrees from the valve stem hole first. Continue prying toward the valve stem hole until covers are loose. **Do not remove the wheel cover at the valve stem hole.** The covers are structurally stronger at the outer circumference to withstand the force required for removal and installation. Use a rubber end mallet when installing the covers. **CAUTION: On Trans-Am vehicles equipped with hub caps and trim rings, remove trim ring before removing hub cap or damage to trim ring will result.**

BEARINGS

FRONT WHEEL BEARING LUBRICATION

Front wheel bearing lubricant should be changed at the recommended intervals or at the time of normal brake reline. Lubricant should not be added to that already in the bearings.

Removal (without Disc Brakes)

(1) Raise vehicle so front wheels are free of the floor.
(2) Remove wheel cover, grease cap, cotter pin, nut lock and bearing adjusting nut.
(3) Remove thrust washer and outer bearing cone.
(4) Slide wheel, hub and drum assembly off the spindle.
(5) Drive out inner oil seal and remove bearing cone.

Removal (with Disc Brakes)

(1) Raise vehicle so front wheels are free of floor.
(2) Remove wheel cover and loosen and remove wheel nuts and remove wheel and tire assembly.
(3) Remove grease cap, cotter pin, nut lock and bearing adjusting nut.
(4) Remove bolts that attach disc brake caliper assembly to steering knuckle.
(5) Slowly slide caliper assembly up and away from brake disc and support caliper assembly on steering knuckle arm. **CAUTION: Do not leave caliper assembly hang by brake hose, as possible brake hose damage may result.**
(6) Remove thrust washer and outer bearing cone.
(7) Slide wheel hub and disc assembly off the spindle.
(8) Drive out inner seal and remove bearing cone.

Cleaning and Inspection

(1) Clean the hub and drum assembly and the bearings in kerosene, mineral spirits or other similar cleaning fluids. **Do not dry the bearings by air spinning.**
(2) Examine bearing cups for pitting, brinnel marks or other imperfections. If cups are damaged, remove them from the hub with a soft steel drift positioned in the slots in the hub.
(3) Bearing cup areas in the hub should be smooth without scored or raised metal which could keep the cups from seating against shoulders in hub.
(4) The bearing cones and rollers should have smooth, unbroken surfaces without brinnel marks.
The ends of the rollers and both cone flanges should also be smooth and free from chipping or other damage.

Installation (without Disc Brakes)

(1) If the bearing cups were removed, start the new cups into hub evenly, driving them flush with

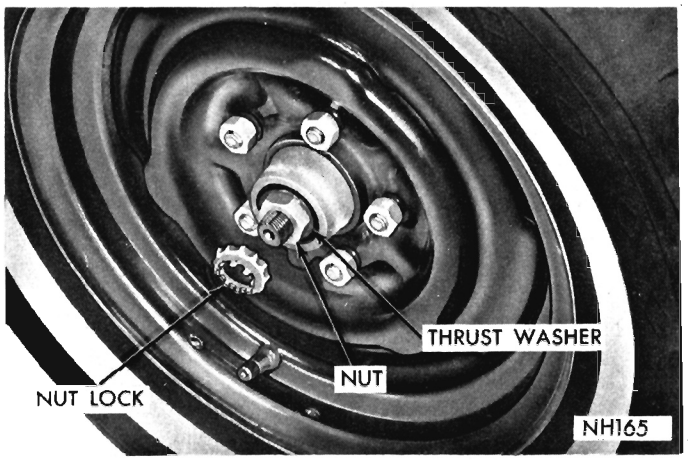


Fig. 10-Front Wheel Bearing Adjustment

hub using a soft steel block and hammer. Seat cups against shoulders of hub, using a soft steel drift and hammer.

(2) Fill hub grease cavity (Fig. 9) with recommended wheel bearing lubricant. Lubricant should be even with inner diameter of bearing cups.

(3) Force lubricant between bearing cone rollers or repack using a suitable bearing packer.

(4) Install inner cone and a new seal, with lip of seal facing inward. Using Tool C-3893, position seal flush with end of hub. The seal flange may be damaged if tool is not used.

(5) Clean the spindle and apply a light coating of wheel bearing lubricant over the polished surfaces.

(6) Install wheel tire and drum assembly on spindle.

(7) Install outer bearing cone, thrust washer and adjusting nut.

Installation (with Disc Brakes)

(1) If bearing cups were removed, start new cup into hub evenly, driving them flush with hub using a soft steel block and hammer. Seat cups against shoulders of hub, using a soft steel drift and hammer.

(2) Fill hub grease cavity (Fig. 9) with recommended bearing lubricant, see Lubrication Group 0. Lubricant should be even with inner diameter of bearing cups.

(3) Force lubricant between bearing cone rollers or repack using a suitable bearing packer.

(4) Install inner cone and a new seal with lip of seal facing inward. Using Tool C-3893, position seal flush with end of hub. The seal flange may be damaged if tool is not used.

(5) Clean the spindle and apply a light coating of wheel bearing lubricant over the polished surfaces.

(6) Install hub and braking disc assembly on spindle and install outer bearing cone, thrust washer and adjusting nut.

(7) Slowly slide caliper assembly down on brake disc assembly and position correctly.

(8) Install caliper assembly over disc and align mounting holes. Install mounting bolts and tighten to 45 to 60 foot-pounds.

(9) Install tire and wheel and tighten wheel nut to specifications.

Adjustment

(1) Tighten wheel bearing adjusting nut to 90 inch-pounds while rotating wheel.

(2) Position nut lock (Fig. 10) on nut with one pair of slots in line with cotter pin hole.

(3) Back off adjusting nut lock assembly one slot and install cotter pin. **The resulting adjustment should be zero (no preload) to .003 inch end play.**

(4) Clean the grease cap, coat inside with wheel bearing lubricant (do not fill) and install.

(5) Install wheel covers and lower vehicle to floor.

SPECIFICATIONS

Only tires of the sizes shown may be used on your vehicle, subject to the restrictions listed. Tires are shown in the order of increasing size. Do not install tires smaller than the minimum size shown on the tire inflation placard located on the vehicle.

VALIANT

Tire Size	Wheel Size	Restrictions
6.45-14	4-1/2J	
6.95-14	4-1/2J	
D78-14 *	4-1/2J or 5-1/2J	
E70-14 *	5-1/2J	H. D. Susp. with sway bar required

Vehicle Maximum Capacity—
Sedans: Front Seat—3 passengers; Rear Seat—3 passengers; Luggage—200 lbs.; Total—1100 lbs.
Coupe: Front Seat—3 passengers; Rear Seat—2 passengers; Luggage—200 lbs.; Total 950 lbs.
NOTE: Reduce by one front seat passenger (150 lbs. total) where equipped with bucket seats without center seat.

Optional Reduced Vehicle Loading for Improved Ride.
Sedan: Front Seat—2 passengers; Second Seat—3 passengers; Luggage—0; Total—750 lbs.
Coupe: Front Seat—2 passengers; Rear Seat—1 passenger; Luggage—0; Total—450 lbs.

BARRACUDA

D78-14	5J, 5-1/2JJ	
E78-14	5J, 5-1/2JJ, 6JJ**	
F78-14*	5J, 5-1/2JJ, 6JJ**	
F70-14*	5-1/2JJ, 6JJ**	H.D. susp. with sway bar required
E60-15*	7JJ**	H.D. susp. w/sway bar & restricted susp. travel required.
F60-15*	7JJ**	Hemi engine models only
E60-15 Front G60-15* Rear	7JJ**	Trans-Am models only

Vehicle Maximum Capacity—
Sedans, Hardtops and Convertible (Bench Seat): Front Seat—3 passengers; Rear Seat—2 passengers; Luggage—200 lbs.; Total—950 lbs. Bucket Seat: Front Seat—2 passengers; Second Seat—2 passengers; Luggage—200 lbs.; Total—800 lbs.

Optional: Reduced Vehicle Loading For Improved Ride. Front Seat—2 passengers; Second Seat—1 passenger; Luggage—0; Total—450 lbs.

*Chain Clearance

Tire snow chains are not recommended for use with some tire sizes, as indicated on the Tire Size Chart by the symbol*, because of possible fender interferences. In an emergency, chains may be used on these tires if the vehicle is moderately loaded and driven cautiously.

**6JJ & 7JJ rims require 11" drum or disc brakes

SPECIFICATIONS

Only tires of the sizes shown may be used on your vehicle, subject to the restrictions listed. Tires are shown in the order of increasing size. Do not install tires smaller than the minimum size shown on the tire inflation placard located on the vehicle.

SATELLITE

Tire Size	Wheel Size	Restrictions
E78-14	5J, 5-1/2JJ, 6JJ**	
F78-14	5J, 5-1/2JJ, 6JJ**	
F70-14	5-1/2JJ, 6JJ**	
G78-14	5-1/2JJ, 6JJ**	
G70-14	6JJ**	H.D. susp. w/sway bar required
G60-15*	7JJ**	XH.D. susp. w/sway bar & restricted susp. travel required, do not use on four door sedans
H78-14*	5-1/2JJ, 6JJ**	

Vehicle Maximum Capacity—
Sedans, Hardtops: Front Seat—3 passengers; Rear Seat—3 passengers; Luggage—200 lbs.; Total—1100 lbs.
Station Wagons: Front Seat—3 passengers; Second Seat—3 passengers; Third Seat or Luggage—2 passengers or 300 lbs.; Total 1200 lbs.
NOTE: Reduce by one front seat passenger (150 lbs. total) where equipped with bucket seats, without center seat.

Optional Reduced Vehicle Loading For Improved Ride—Sedans, Hardtops; Front Seat—2 passengers; Rear Seat—3 passengers; Luggage—0; Total—750 lbs.

FURY

F78-15	5J, 5-1/2JJ	
G78-15	5-1/2JJ, 6JJ	
H78-15*	5-1/2JJ, 6JJ	
H70-15*	6JJ	H.D. susp. required
J78-15*	6JJ, 6-1/2JJ***	Station Wagon has ample chain clearance
L84-15*	6-1/2JJ***	Station Wagons only

Vehicle Maximum Capacity—
Sedans, Hardtops; Front Seat—3 passengers; Rear seat—3 passengers; Luggage 200 Lbs.; Total 1100 Lbs.
Town and Country Wagons; Front seat—3 passengers; Rear seat—3 passengers; Third seat—2 passengers or 300 Lbs. luggage; Total 1200 Lbs.

Optional Reduced Vehicle Loading for Improved Ride—Sedans, Hardtops; Front seat—2 passengers; Second seat—3 passengers; Luggage 0; Total 750 Lbs.

*Chain Clearance
Tire snow chains are not recommended for use with some tire sizes, as indicated on the Tire Size Chart by the symbol*, because of possible fender interferences. In an emergency, chains may be used on these tires if the vehicle is moderately loaded and driven cautiously.

**6JJ & 7JJ rims require 11" drum or disc brakes

***6-1/2JJ Station Wagons only

SPECIFICATIONS

Only tires of the sizes shown may be used on your vehicle, subject to the restrictions listed. Tires are shown in the order of increasing size. Do not install tires smaller than the minimum size shown on the tire inflation placard located on the vehicle.

CHRYSLER

Tire Size	Wheel Size	Restrictions
H78-15	5-1/2JJ, 6JJ	
J78-15*	6JJ	
L84-15*	6JJ, 6-1/2JJ**	

IMPERIAL

L184-15	6JJ	

Vehicle Maximum Capacity—
Sedans, Hardtops; Front Seat—3 passengers; Rear Seat—3 passengers; Luggage 200 Lbs.; Total 1100 Lbs.
Town and Country Wagons; Front Seat—3 passengers; Rear Seat—3 passengers; Third Seat—2 passengers or 300 Lbs. luggage; Total 1200 Lbs.

Optional Reduced Vehicle Loading for Improved Ride—Sedans, Hardtops. Front Seat—2 passengers; Second Seat—3 passengers; Luggage 0; Total 750 Lbs.

* Chain Clearance

Tire Snow chains are not recommended for use with some tire sizes, as indicated on the Tire Size Chart by the symbol*, because of possible fender interferences. In an emergency, chains may be used on these tires if the vehicle is moderately loaded and driven cautiously.

**6-1/2JJ Station Wagons only

TIGHTENING REFERENCE

	Valiant	Barracuda-Satellite-Fury Chrysler	Imperial
Wheel Bearing Nut Torque (Wheel Spinning)	70 in-lbs	90 in-lbs	90 in-lbs
Wheel Nut Torque	55 ft-lbs	65 ft-lbs	65 ft-lbs
WHEELS			
Type	Steel Disc		
Rim	Drop Center—Safety Wheel		
No. of Wheel Nuts	5	5	5
Stud Size	7/16"-20	1/2"-20	1/2"-20
Stud Hole Circle	4"	4-1/2"	5"

All wheel stud nuts and studs have right hand thread.

TRAILER TOWING TIRE SIZE AND INFLATION PRESSURE

MODEL	TIRE SIZE	INFLATION PRESSURE-COLD FRONT	REAR	RIM WIDTH
Valiant—225-318 Engines	D78-14	30	30	5-1/2JJ
Valiant—340 Engine	E70-14	30	30	5-1/2JJ
Barracuda—Grand Coupe	F78-14	28	32	6 JJ
'Cuda	F70-14	28	32	6 JJ
Satellite	G78-14	28	28	6 JJ
Roadrunner	G70-14	28	28	6 JJ
Satellite Station Wagons	H78-14	22	32	6 JJ
Fury	H78-15	28	28	6 JJ
Chrysler	J78-15	28	28	6 JJ
Fury—Chrysler Station Wagons	L84-15	22	32	6 JJ
Imperial	L84-15	28	28	6 JJ

1. Cold inflation pressures must not exceed 32 pounds per square inch (PSI) for load range B (4 ply rating) and 40 psi for load range D (8 ply rating) tires. These tire pressures may increase as much as 6 psi when hot. Do not reduce this normal pressure buildup. Cold tire inflation is defined as the pressure after the vehicle has been inoperative for at least three hours and driven less than one mile.

2. All tires must be inflated 4 psi more than specified in the chart but not to exceed pressures indicated above in note No. 1 for sustained speeds above 75 mph. Sustained speeds above 75 mph are not recommended when the 4 psi pressure adjustment would require pressures greater than the allowed maximum indicated on the tire sidewall.

Load Range D (eight ply rating) tires inflated an additional 6 psi, but not to exceed 40 psi, are required for these instances where maximum vehicle capacity is carried above 75 mph and maximum allowable load range B (4 ply rating) tire pressures would be exceeded.

We strongly discourage excessive speed, however, if the vehicle must be driven at sustained speeds over 90 mps special high speed tires inflated to maximum vehicle capacity pressures are required.

3. The use of tires smaller than the specified minimum or larger than the specified maximum could constitute a safety hazard.

4. Cargo loads, particularly in station wagon models, should be distributed as far forward as possible.

5. Vehicles with luggage racks do not have a maximum vehicle capacity greater than indicated in chart.

6. Vehicles with trailer towing packages do not have increased maximum capacity. The allowable passenger and cargo load must be decreased an amount equal to the trailer tongue load on the trailer hitch.

7. Because of vehicle limitations, oversize, 70 Series or load range D (8 ply rating) tires do not provide increased vehicle capacity. They do, however, provide an extra margin of tire service (tread life, etc.). Do not exceed the maximum tire size stated in chart.

8. Snow tires should not be operated at sustained speeds over 70 mph. These tires should be operated at maximum vehicle capacity pressures under all load conditions.

9. All tires and especially the wide tread 70 Series, bias breaker and radial types must be rotated no later than every second oil change and should be in correct balance to obtain the most uniform tread wear. Tire rotation at shorter intervals is recommended if irregular tread wear develops.

HEATERS AND AIR CONDITIONING

CONTENTS

	Page
HEATERS	1
AIR CONDITIONING	21
AUTO-TEMP (CHRYSLER AND IMPERIAL)	85

HEATERS

INDEX

	Page
General Information	1
Service Diagnosis (All Models)	1
Service Procedure	2
VALIANT	
Control Cable Adjustment	2
Heater Removal and Installation	2
Disassembly and Assembly	4
Blower Motor Removal and Installation	5
BARRACUDA	
Control Cable Adjustment	5
Heater Removal and Installation	5
Disassembly and Assembly	5
Blower Motor Removal and Installation	7
SATELLITE	
Control Cable Adjustment	7
Heater Removal and Installation	9
Disassembly and Assembly	9
Blower Motor Removal and Installation	9
FURY	
Control Cable Adjustment	10
Heater Removal and Installation	10
Blower Motor Removal and Installation	13
CHRYSLER AND IMPERIAL	
General Information	13
Service Procedure	13
Control Cable Adjustment	15
Heater Removal and Installation	15
Heater Core Removal and Installation	17
Blower Motor	17
Rear Seat Heater Removal and Installation.	
UPPER LEVEL VENTILATION (STRATO VENT)	
Satellite Fury and Chrysler Models	18

GENERAL INFORMATION

All Plymouth models use a "Blend Air" type heater. Outside air enters the heater through the cowl grille and passes through a plenum chamber to the heater core. A temperature control door in the heater housing directs the air either through or past the heater core. The amount of "blend" is determined by the setting of the temperature lever on the instrument panel. Direction of the "blended air" is controlled by the "Heat-Defrost" lever on the instrument panel.

The blower switch determines the speed of the blower motor and the velocity of the air flow from the heater outlets.

On Valiant models, outside air ducts, for warm weather use, are located under each end of the instrument panel. By opening the doors on these ducts, outside air bypasses the heater and is rammed into the vehicle.

On all other Plymouth models, the ventilator doors are controlled by knobs mounted on the instrument panel. Make sure these doors are closed during heater operation.

NOTE: The size of the heater inlet hose from the engine has been reduced to a 1/2 in. I.D. on all engines to simplify plumbing connections. The return hose to the engine will remain at 5/8 in. I.D.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
INSUFFICIENT HEAT	(a) Carpet obstructing outlet.	(a) Reposition carpet to clear outlet.
	(b) Radiator hoses leaking.	(b) Correct leak. Replace hoses if necessary and bleed system of air.
	(c) Obstructed heater hose.	(c) Replace heater hoses.

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(d) Temperature door not closed or leaking.	(d) Adjust temperature control cable. See "Cable Adjustments."
	(e) Shut-off or defroster door improperly adjusted.	(e) Adjust the Heater-Defroster Control Cable. See "Cable Adjustments."
	(f) Engine thermostat open.	(f) Replace thermostat. See Group 7, "Cooling System".
	(g) Coolant too low.	(g) Fill the radiator to recommended level.
	(h) Kinked hose.	(h) Reroute to eliminate restriction.
TOO MUCH HEAT	(a) Disengaged cable on temperature door.	(a) Connect or replace cable.
	(b) Thermostat stuck in closed position.	(b) Replace thermostat. See Group 7, "Cooling System".
BLOWER MOTOR NOT OPERATING	(a) Blown fuse.	(a) Check for excessive resistance in circuit and replace fuse.
	(b) Faulty electrical connection.	(b) Tighten all electrical connections.
	(c) Faulty blower switch.	(c) Replace switch.
	(d) Faulty motor.	(d) Replace motor.
	(e) Faulty resistor.	(e) Replace resistor.

SERVICE PROCEDURE

VALIANT MODELS

Control Cable Adjustment

To adjust heater control cables, the adjustment must be correct at the instrument panel control assembly first. It is necessary to remove the control assembly from the instrument panel to make these adjustments. See "Heater Controls" in "Instrument Panels," Group 8.

(1) Disconnect only the temperature (blend air) door cable at the heater.

(2) With the control assembly removed from the instrument panel, position the temperature cable on the control bottom cable mounting bracket so the cable housing is flush with edge of the bracket. Install new clip.

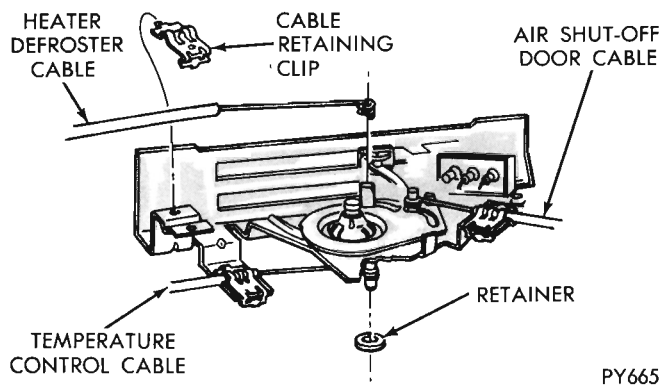


Fig. 1 Heater Control Cable Adjustment

(3) With the TEMPERATURE lever at the extreme left "COOL" position, connect the cable at the heater unit blend air door (right side door) while holding the door crank in the extreme clockwise position.

(4) With the top control lever in the center on "HEAT" position, place core wire loop of the heater defroster cable (right cable) onto the control cable pin which is to the right of center (Fig. 1). With moderate force, pull the cable housing away from the control and install a new cable clip. Make sure that the plastic control pin is not cocked while installing the cable. The cable housing should be adjusted so that only a very light tension is put on the plastic control pin.

(5) Repeat step (4) with the left side cable from the air shut off door, attaching it to the control cable pin just to the left of center.

HEATER

Removal

To service the heater core or blower motor, it is necessary to remove the heater assembly from the vehicle.

(1) Disconnect battery ground cable and drain radiator.

(2) Disconnect heater hoses from heater and remove heater hoses at dash panel seal and retainer plate.

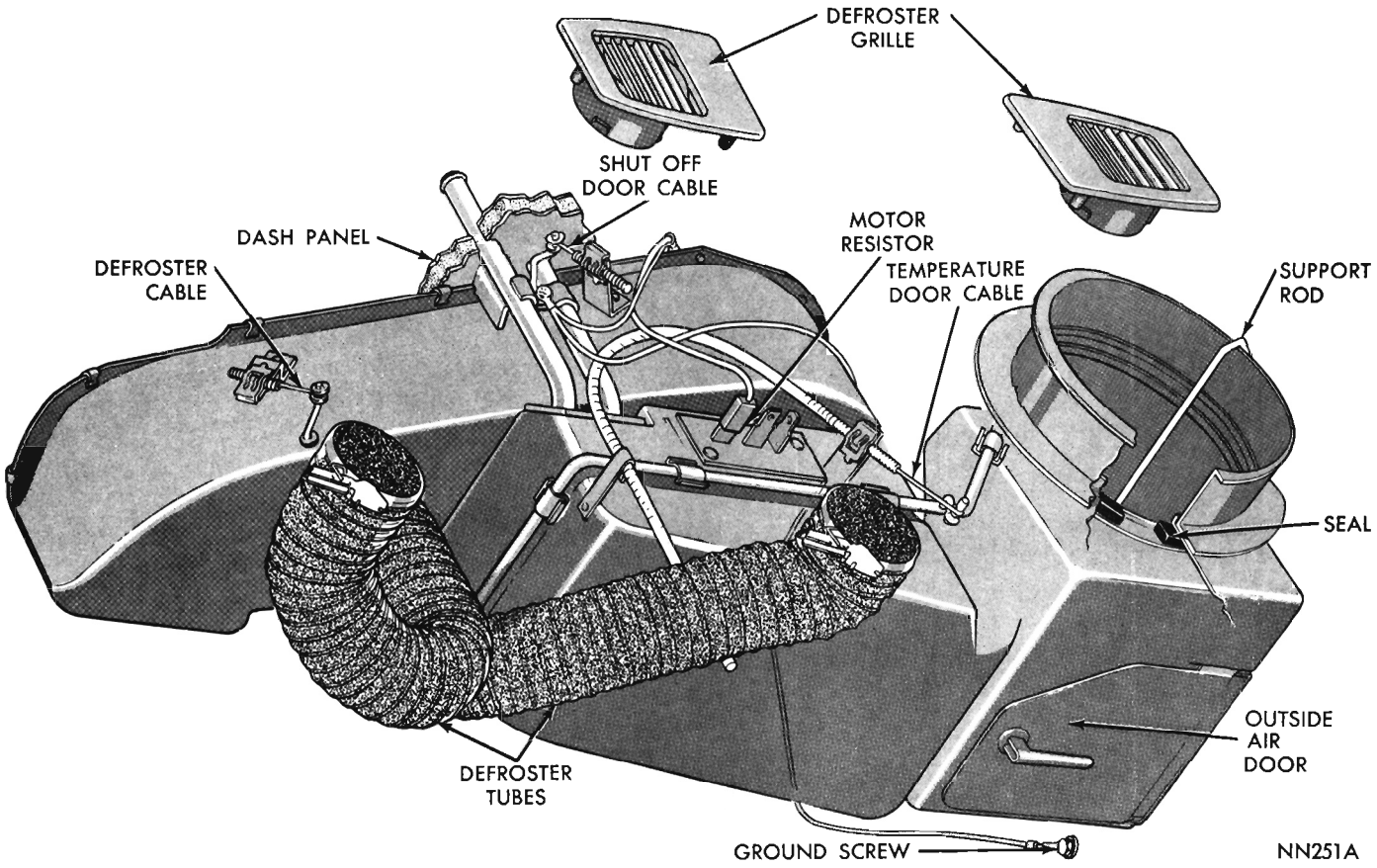


Fig. 2 Heater Assembly - Valiant

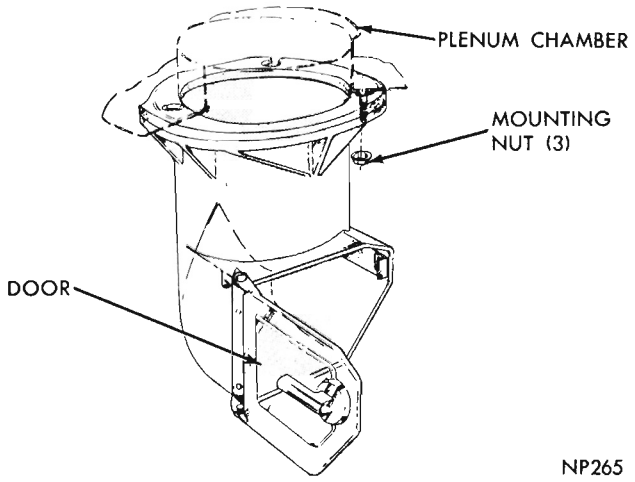


Fig. 3 - Outside Air Duct - Driver's Side

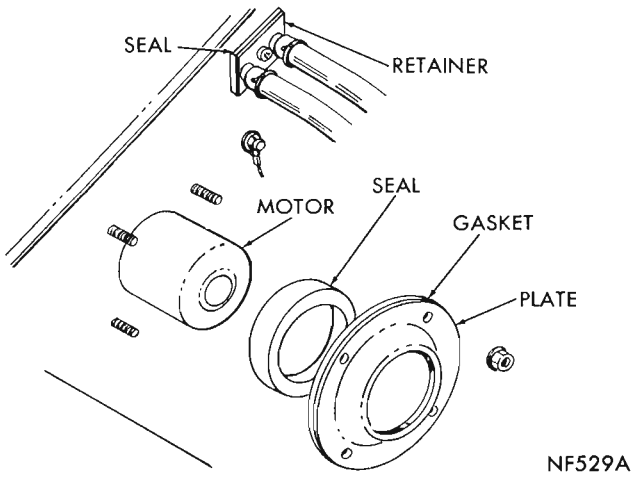


Fig. 4 - Heater Mounting.

(3) Disconnect wires from blower motor resistor (Fig. 2).

(4) Remove heater motor seal retainer plate and seal from dash panel.

(5) Disconnect heater and defroster control cables from heater assembly (Fig. 2).

(6) Remove defroster tubes from heater assembly.

(7) Disconnect heater housing support rod from air duct (Fig. 3).

(8) Remove heater assembly.

Installation

(1) Position heater assembly on dash panel by sliding four mounting studs into their respective holes in dash panel. (Fig.4)

(2) Connect and adjust heater-defroster cable and temperature control cables to their respective control arms.

(3) In engine compartment side, install heater to dash panel seal, seal retainer and mounting nuts.

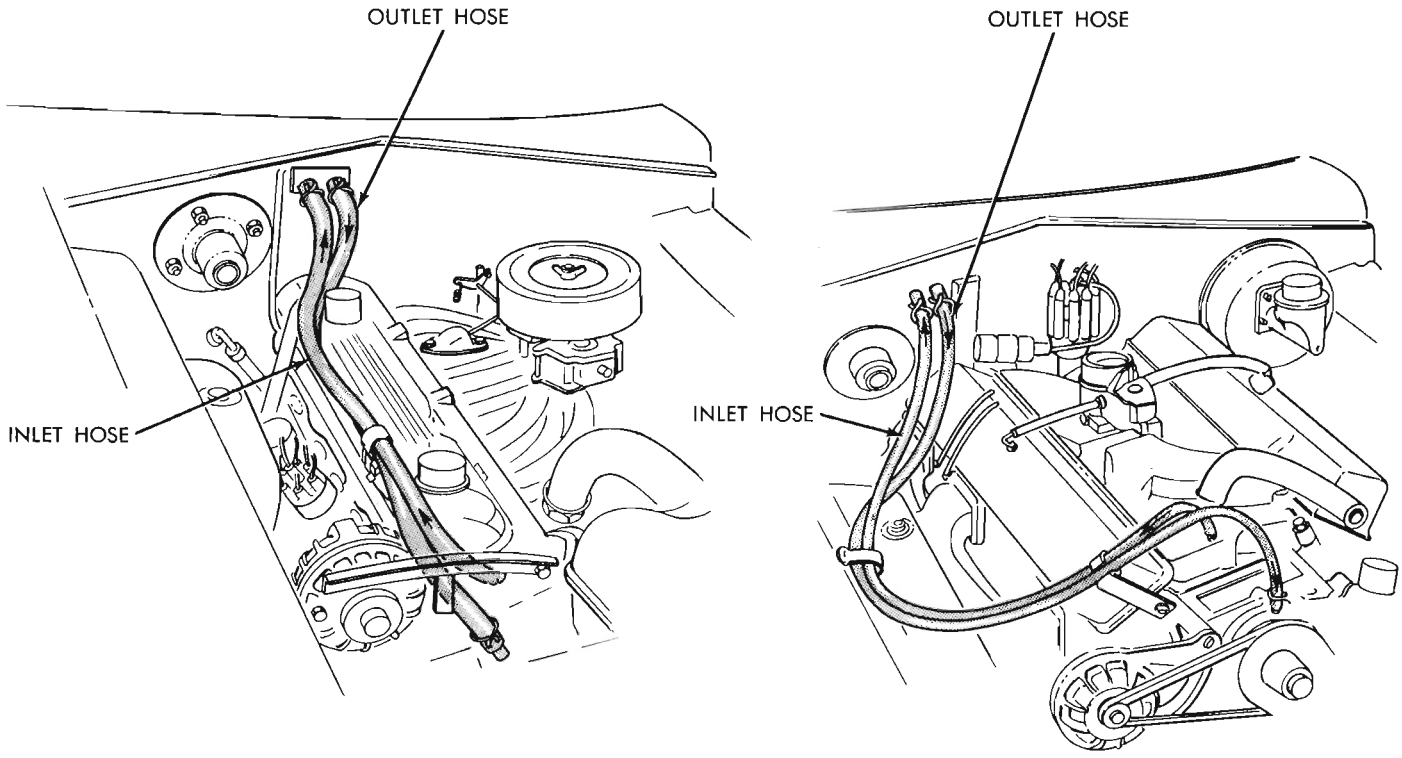
(4) Position seal and seal retainer over heater tubes and install attaching screws.
(5) Connect heater hoses to heaters (Fig. 5).
(6) On passenger compartment side, connect heater support rod to heater housing.
(7) Connect wire to heater motor resistor.
(8) Connect defroster tubes to heater.
(9) Fill cooling system, start engine and operate until normal engine operating temperature is obtained.
(10) Test operation of heater assembly.

Disassembly

(1) Remove heater as outlined in "Heater Removal."
Remove seal from around heater motor mounting studs.
(2) Remove spring clips holding spacers and heater motor to heater housing.
(3) Remove fan from heater motor.
(4) Remove mounting support plate from heater motor.
(5) Remove heater motor resistor assembly from heater housing (Fig. 2).
(6) Remove air door seal from either inner or outer heater housing half only.
(7) Remove retainer clips attaching heater housing halves together.
(8) Separate heater housing halves.
(9) Remove screw attaching seal retainer and seal around heater core tubes.
(10) Remove heater core tube support clamp.
(11) Remove screws attaching heater core to heater housing and remove core.
(12) Remove seal retainer and seal from heater core.

Assembly

(1) Position heater core in heater housing.
(2) Slide seal retainer and seal over heater core tubes and up against housing. Install attaching screw.
(3) Install heater core to housing screws.
(4) Position support clamp over heater core tubes and install attaching screw.
(5) Install support plate on heater motor.
(6) Install fan on heater motor. Turn fan to make certain it does not hit motor support plate.
(7) Position heater motor and support plate over mounting studs on heater housing.
(8) Install spacers and retainers on heater motor mounting studs.
(9) Position both housing halves together and install retainer spring clips. Add sealer between two halves before reassembly.
(10) Install heater motor resistor assembly.



198 AND 225 CUBIC INCH ENGINES — 273, 318, AND 340 CUBIC INCH ENGINES — PB68

Fig. 5 - Heater Hose Routing (Valiant)

(11) Position and cement seal around outside air door opening.
(12) Position heater housing to dash panel seal around heater housing mounting studs.
(13) Install heater as outlined in "Heater Installation."

BLOWER MOTOR

Removal and Installation

The entire heater assembly must be removed from the vehicle to service the blower motor. See "Disassembly and Assembly" procedure.

SERVICE PROCEDURE BARRACUDA MODELS

Control Cable Adjustment

To adjust the temperature control cable, remove the cable retaining clip from the cable at the temperature control door. Place the temperature control lever in the minimum heat "LOW" position. Rotate the temperature control door crank to the extreme clockwise position and reinstall the cable retaining clip. Be sure the instument panel control lever remains in the "LOW" position during the adjustment (Fig. 1).

The "Heat-Defrost" cable is adjusted at the instrument panel control end only. Place the control lever in the "OFF" position, loosen the cable retaining screw in the elongated hole in the flag attached to the cable.

Move cable housing **towards** instrument panel control to **shorten** travel of cable at housing. Move cable housing **away** from instrument panel control to **lengthen** travel of cable at housing. Tighten retaining screw.

Air Vent Control Cable

Push the air vent control knob in (leave about 1/8 inch between knob and panel). Remove the control cable clip from the door control crank arm bracket. Rotate the crank arm of the door firmly to the closed position (left side counterclockwise; the right side clockwise) and reinstall the cable to the crank arm bracket (Fig. 1).

Heater Disassembly

(1) Remove heater assembly from vehicle as outlined in "Heater Removal".
(2) Remove nine spring clips and four screws that hold the front cover to the assembly housing.
(3) Cut sponge rubber plenum to housing air seal in two places where the front cover separates cover from housing.
(4) Remove one core tube retaining screw from behind housing between core tubes.
(5) Remove two sponge rubber gaskets from core tubes and remove heater core from housing.
(6) Disconnect blower motor lead from blower motor resistor.
(7) Remove six sheet metal screws and six retaining clips holding blower motor mounting plate to housing.

Separate mounting plate and blower motor assembly from housing.

Assembly

Inspect all gaskets and sealing compound for areas that might allow air to escape from housings and replace as necessary.
(1) Position blower motor mounting plate on back of housing and install six sheet metal screws and clips. From opening in front of housing rotate blower motor by hand and inspect for alignment.
(2) Connect blower motor lead to resistor. Inspect ground lead for good connection.
(3) Place heater core in position and install core tube retaining screw from back of housing between core tubes.
(4) Position front cover on housing and install mounting screws and clips, check all doors for alignment.
(5) Place sponge rubber gaskets on core tubes.
(6) Seal plenum air seal cuts with a good grade rubber cement and install assembly in vehicle as outlined in "Heater Installation".

HEATER

Removal

(1) Disconnect battery ground cable.
(2) Drain coolant from radiator.
(3) Disconnect heater hoses from core tubes at dash panel. Plug core tubes to prevent spilling coolant on interior of car (Fig. 2).
(4) Remove three mounting nuts from studs around blower motor.
(5) Unplug antenna from radio and place wire to one side.
(6) Remove screw from housing to plenum support rod on right side of housing above air opening.
(7) Disconnect three air door cables (Fig. 1).
(8) Disconnect wires from blower motor resistor.
(9) Tip unit down and out from under instrument panel.

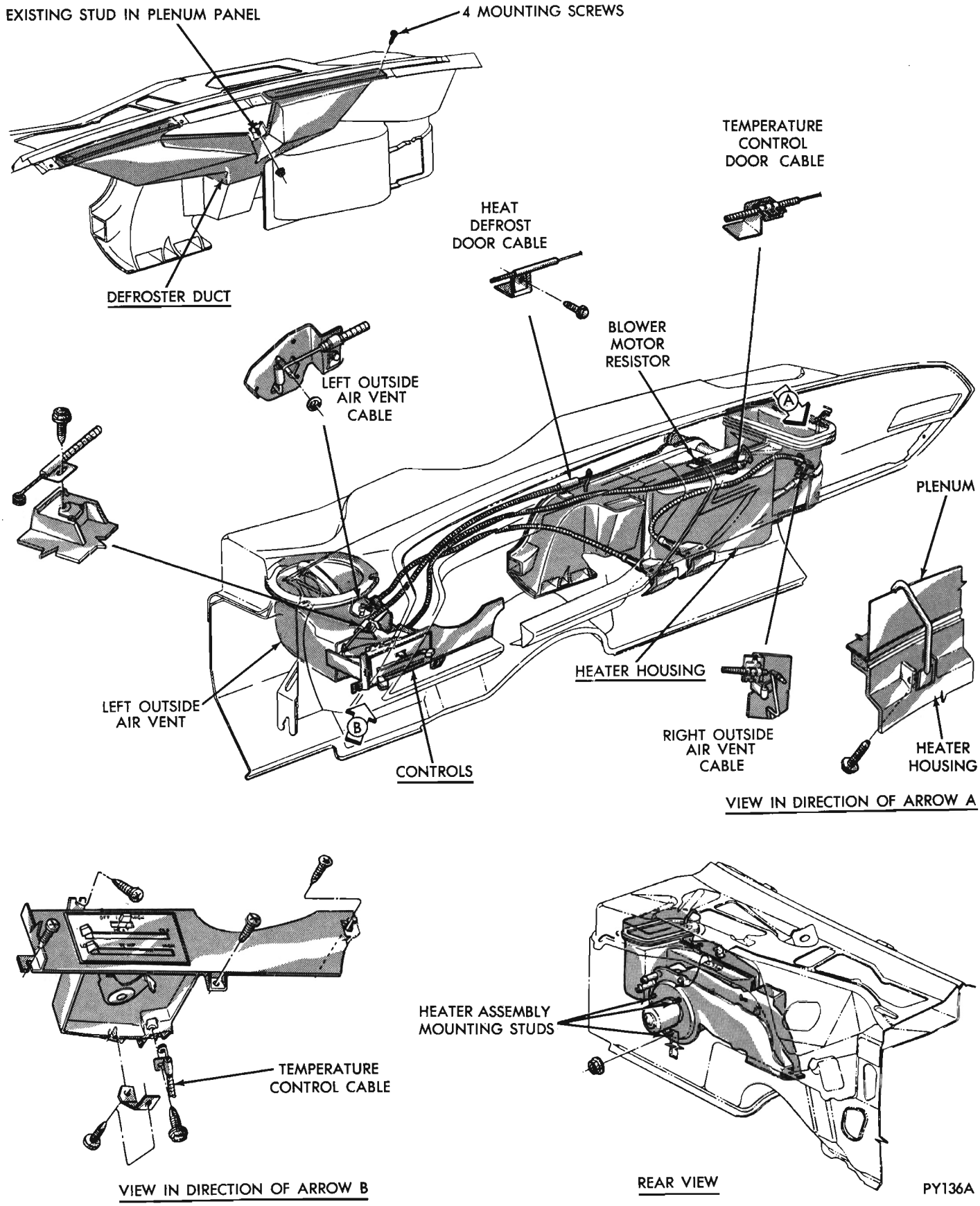


Fig. 1 Heater Assembly - Barracuda Models

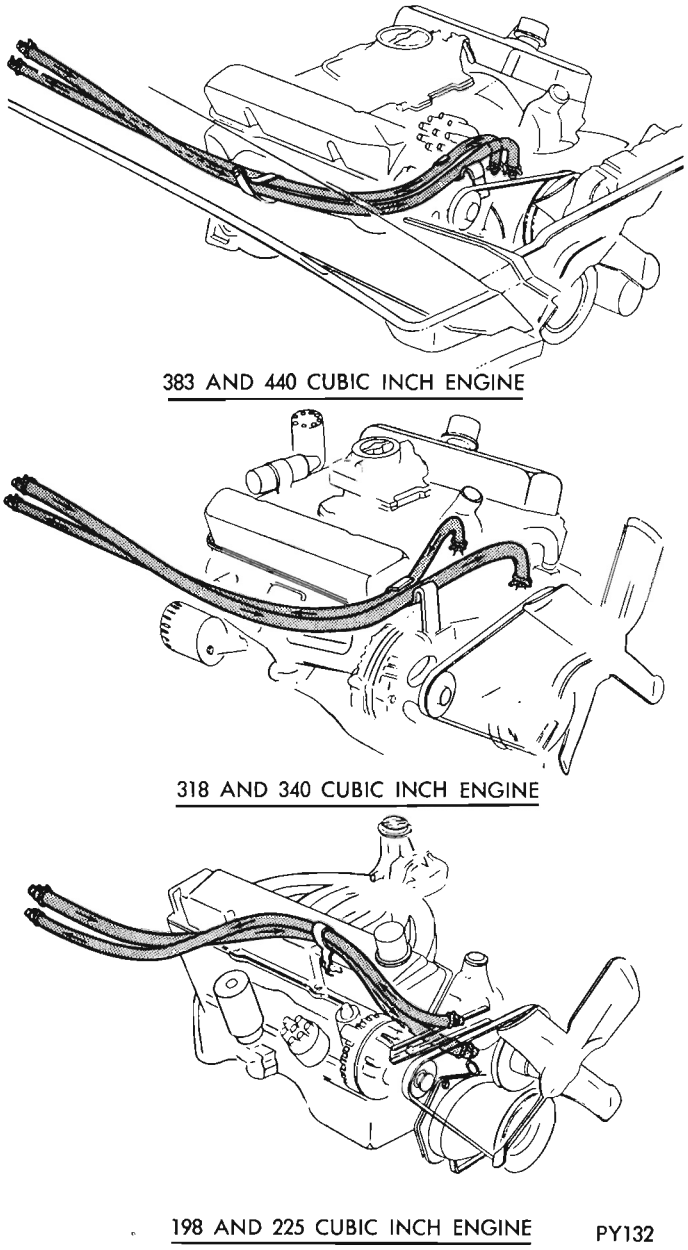


Fig. 2 - Heater Hose Routing Barracuda Models.

Installation

(1) Place unit on front floor of vehicle.
(2) Connect wires to blower motor resistor.
(3) Connect bowden cables to air door cranks. (Cable housings flush with edge of bracket).
(4) Unhook plenum support rod from opening in plenum chamber, position it in housing with hook toward rear of vehicle. Install retaining screw but do not tighten.
(5) Position unit against dash panel. Be sure heater core tubes and mounting studs are in their respective holes before applying pressure to front of housing. Hook housing to plenum support rod in position.
(6) Plug antenna into receptacle in bottom of radio.
(7) Place air seal and flange over blower motor.
(8) Install nuts on mounting studs and tighten securely, then tighten plenum support rod retaining screw (Fig. 1).
(9) Remove plugs from core tubes and connect hoses (Fig. 2).
(10) Connect battery cables, fill radiator, bleed air from system inspect for leaks and test operation of heater.

BLOWER MOTOR

Removal

The entire heater assembly must be removed from the vehicle to service the blower motor.
(1) Disconnect blower motor lead from resistor block and ground wire from mounting plate.
(2) Remove six sheet metal screws and six retaining clips holding blower motor mounting plate to housing. Separate mounting plate and blower motor assembly from housing.
(3) Remove blower wheel from motor shaft.
(4) Remove two retaining nuts and separate motor from mounting plate.

Installation

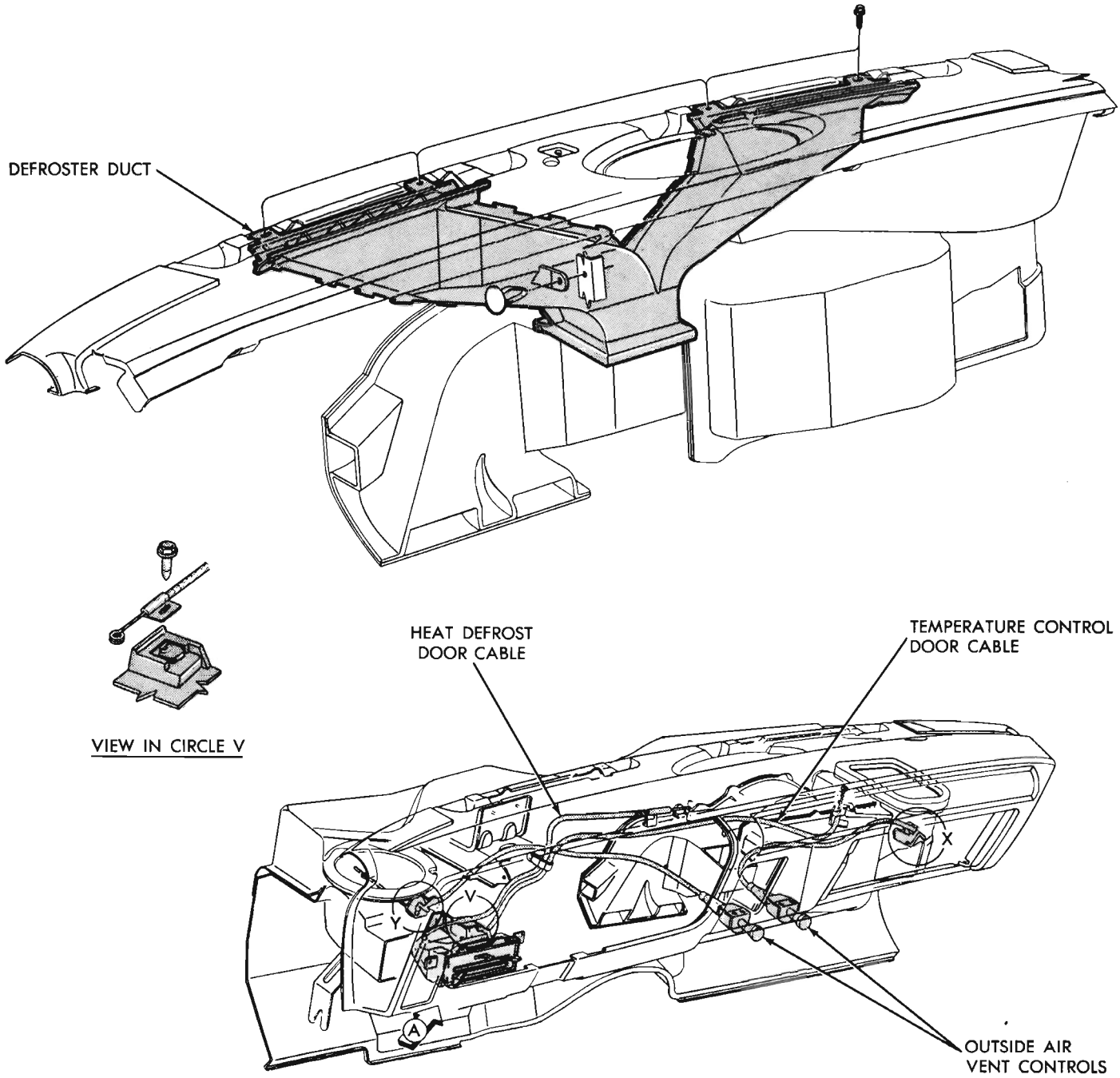
(1) Position blower motor to mounting plate and secure with two retaining nuts.
(2) Install blower wheel, rotate by hand and inspect for alignment.
(3) Place mounting plate to back of housing and install six mounting screws and six retaining cups.
(4) Connect lead wire to resistor block.
(5) Connect ground wire to mounting plate tighten securely.

SERVICE PROCEDURE

SATELLITE MODELS

Control Cable Adjustment

To adjust the temperature control cable, remove the cable retaining clip from the cable at the temperature control door. Place the temperature control lever in the minimum heat "LOW" position. Rotate the temperature control door crank to the extreme clockwise position and reinstall the cable to the retaining clip. Be sure the instrument panel control lever remains in the "LOW" position during the adjustment (Fig. 1).



VIEW IN CIRCLE V

VIEW IN CIRCLE Y

VIEW IN CIRCLE X

VIEW IN DIRECTION OF ARROW A

PB255

Fig. 1 Heater Assembly - Satellite Models.

The "Heat-Defrost" cable is adjusted at the instrument panel control end only. Place the control lever in the "OFF" position, loosen the cable retaining screw in the elongated hole in the flag attached to the cable. Move cable housing **towards** instrument panel control to **shorten** travel of cable at housing. Move cable housing **away** from instrument panel control to **lengthen** travel of cable at housing. Tighten retaining screw.

Air Vent Control Cable

Push the air control knob in (leave about 1/8 in. between knob and panel). Remove the control cable clip from the door control crank arm bracket. Rotate the crank arm of the door firmly to the closed position (left side counterclockwise; the right side clockwise) and reinstall the cable to the crank arm bracket (Fig. 1).

Heater Disassembly

(1) Remove heater assembly from vehicle as outlined in "Heater Removal".
(2) Remove screws that hold the front cover to the assembly housing.
(3) Cut sponge rubber plenum to housing air seal in two places where the front cover separates cover from housing.
(4) Remove one core tube retaining screw from behind housing between core tubes.
(5) Remove two sponge rubber gaskets from core tubes and remove heater core from housing.
(6) Disconnect blower motor lead from blower motor resistor.
(7) Remove six sheet metal screws and six retaining clips holding blower motor mounting plate to housing. Separate mounting plate and blower motor assembly from housing.

Assembly

Inspect all gaskets and sealing compound for areas that might allow air to escape from housings and replace as necessary.
(1) Position blower motor mounting plate on back of housing and install six sheet metal screws and clips. From opening in front of housing rotate blower motor by hand and inspect for alignment.
(2) Connect blower motor lead to resistor. Inspect ground lead for good connection.
(3) Place heater core in position and install core tube retaining screw from back of housing between core tubes.
(4) Position front cover on housing and install mounting screws, check all doors for alignment.
(5) Place sponge rubber gaskets on core tubes.
(6) Seal plenum air seal cuts with a good grade rubber cement and install assembly in vehicle as outlined in "Heater Installation".

HEATER

Removal

(1) Disconnect battery ground cable.
(2) Drain coolant from radiator.
(3) Disconnect heater hoses from core tubes at dash panel. Plug core tubes to prevent spilling coolant on interior of car.
(4) Remove three mounting nuts from studs around blower motor and one near center of dash panel.
(5) Unplug antenna from radio and place wire to one side.
(6) Remove screw from housing to plenum support rod on right side of housing above outside air opening.
(7) Disconnect three air door cables (Fig. 1).
(8) Disconnect wires from blower motor resistor.
(9) Tip unit down and out from under instrument panel.

Installation

(1) Place unit on front floor of vehicle.
(2) Connect wires to blower motor resistor.
(3) Connect bowden cables to air door cranks.
(4) Unhook plenum support rod from opening in plenum chamber, position it in housing with hook toward rear of vehicle. Install retaining screw but do not tighten.
(5) Position unit against dash panel. Be sure blower motor cooling tube seal is glued to heater housing and core tubes and mounting studs are in their respective holes before applying pressure to front of housing. Hook housing to plenum support rod in position. Tighten retaining screw securely.
(6) Plug antenna into receptacle in bottom of radio.
(7) Install nuts on mounting studs and tighten securely. (Fig. 1).
(8) Remove plugs from core tubes and connect hoses. See (Fig. 2) under "Barracuda Service Procedure" for heater hose connections.
(9) Connect battery cables, fill radiator, bleed air from system inspect for leaks and test operation of heater.

BLOWER MOTOR

Removal

The entire heater assembly must be removed from the vehicle to service the blower motor.
(1) Disconnect blower motor lead from resistor block and ground wire from mounting plate.
(2) Remove six sheet metal screws and six retaining clips holding blower motor mounting plate to housing. Separate mounting plate and blower motor assembly from housing.

(3) Remove blower wheel from motor shaft.
(4) Remove two retaining nuts and separate motor from mounting plate.

Installation

(1) Position blower motor to mounting place and secure with two retaining nuts.
(2) Install blower wheel, rotate by hand and inspect for alignment.
(3) Place mounting plate to back of housing and install six mounting screws and six retaining clips.
(4) Connect lead wire to resistor block.
(5) Connect ground wire to mounting plate tighten securely.

SERVICE PROCEDURE

FURY MODELS

Control Cable Adjustment

(1) Disconnect the three cables at heater assembly.
(2) With control assembly removed from instrument panel, position the three control cables so the cable housing is flush with edge of the cable mounting bracket (Fig. 1). Install cable mounting clips.
(3) Install control assembly on instrument panel.
(4) Place top control lever in center or "Heat" position and connect heater-defroster cable (left cable) to heat-defrost door (extreme left door) of heater assembly while holding crank in extreme counter clockwise position.
(5) Connect air shut-off cable (right cable) to air shut-off door of heater assembly (on the front surface of the heater), while holding crank in extreme clockwise position.
(6) Place temperature control lever in extreme left, "Cool" position. Connect cable to right door of heater assembly while holding crank of door in extreme counterclockwise position.

Air Vent Control Cable

(1) Push the air vent control knob in (leave about 1/8 inch between the knob and panel).
(2) Remove the kick pad at the air outlet.
(3) Remove the control cable clip from the vent door cable bracket.
(4) Rotate and hold the vent door firmly closed and attach cable clip.
(5) Reinstall kick pad.

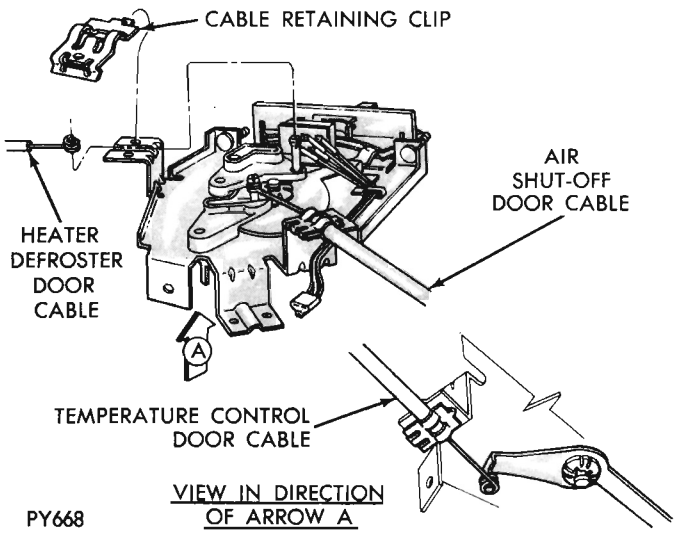


Fig. 1 Heater Control Cable Adjustment

Passenger Side Housing

Removal

(1) Disconnect battery negative cable and drain radiator.
(2) In engine compartment disconnect heater hoses at dash panel. Plug hose fittings on heater to prevent any coolant from spilling on inside of vehicle as heater assembly is removed.
(3) Slide front seat back to allow room to remove unit from vehicle and unplug antenna lead from side of radio.
(4) Remove vacuum hoses from trunk lock if so equipped.
(5) Disconnect electrical connectors from blower motor resistor block on face of housing. (Fig. 2)
(6) Remove control cables from defroster door crank and heat shut off door crank.
(7) Remove bottom retaining nut from support bracket and swing bracket up out of the way.
(8) In engine compartment remove four retaining nuts from studs on engine side housing.
(9) Remove locating bolt from bottom center of passenger side housing.
(10) Roll or tip housing out from under instrument panel.
(11) Remove temperature control cable retaining clip and cable from heat shut off door crank.

Installation

NOTE: Before pressing housing to dash panel, be sure housing to panel seal is not misaligned or damaged.
(1) Position housing on front floor of vehicle under instrument panel and place temperature control cable in bracket. Place end of cable housing

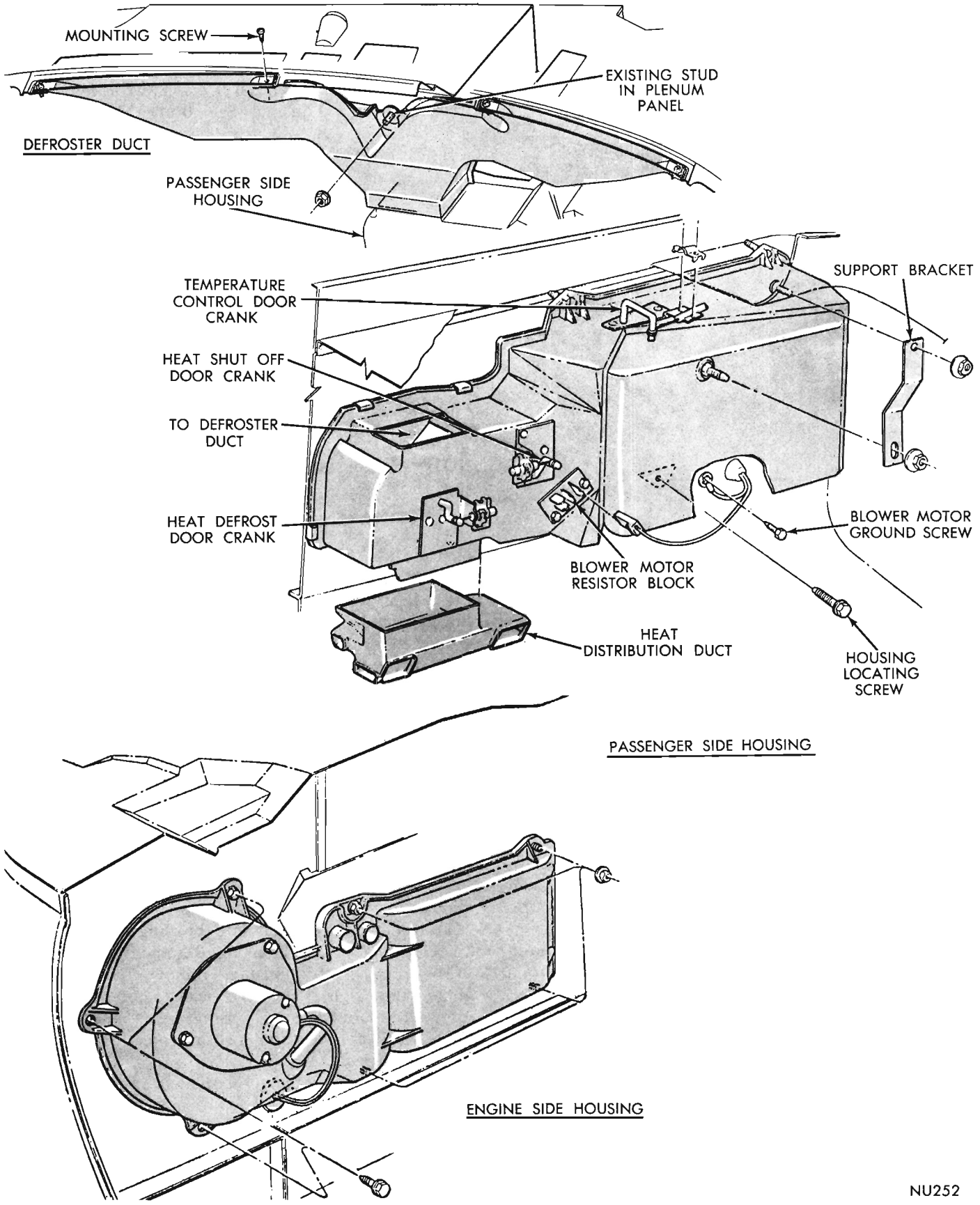


Fig. 2 - Heater Assembly - Fury

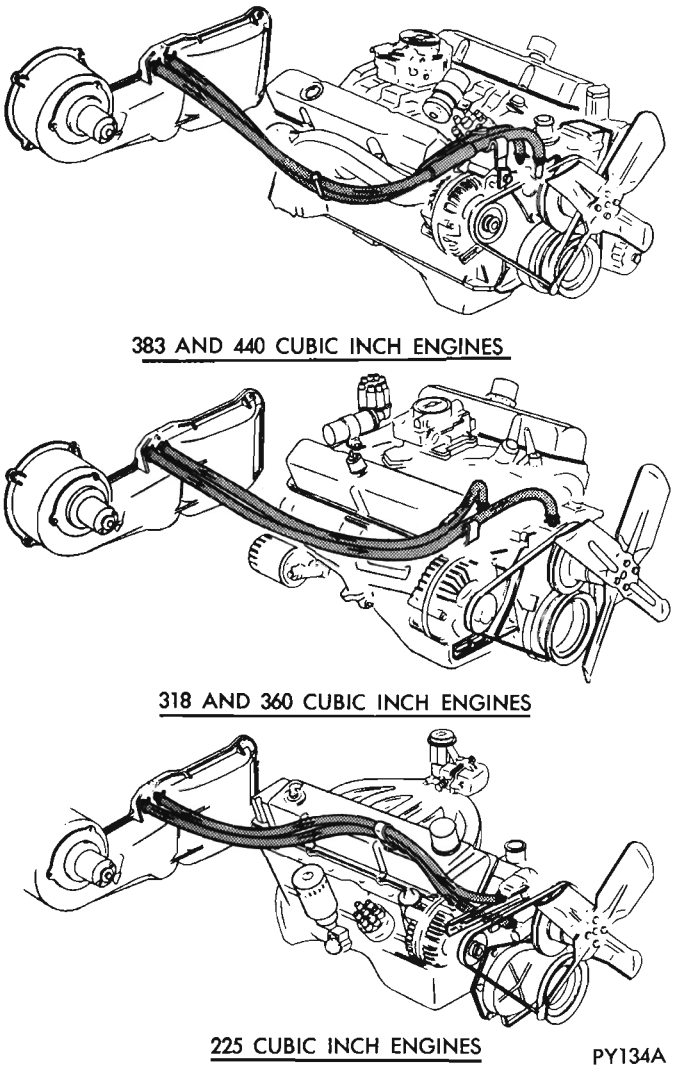


Fig. 3 Heater Hose Routing - Fury

flush with end of bracket and install retaining clip.

(2) Tip housing up under instrument panel and press mounting studs through dash panel.

(3) While holding housing in position, install locating screw. Then swing mounting bracket down onto stud on face of housing and install mounting nut.

(4) In engine compartment install four retaining nuts and tighten securely. (24 inch pounds)

(5) Connect electrical connectors to resistor block and connect control cables to defroster door crank and heat shut off door crank.

(6) Plug antenna lead into radio and connect vacuum trunk lock hoses if so equipped.

(7) From engine compartment, remove plugs from core tubes and connect hoses to heater (Fig. 3).

(8) Fill cooling system and connect battery negative cable.

(9) Start engine, operate heater and bleed air from system.

Engine Side Housing

Removal

NOTE: The right inner fender shield must be removed from vehicle to service heater blower motor or engine side housing. See Body Manual "Unit 3" for detailed illustrations of fender shield removal.

(1) Drain radiator and disconnect battery ground cable.

(2) Disconnect heater hoses at core tubes.

(3) Remove inner fender shield. (See note).

(4) From under instrument panel, disconnect blower motor feed and ground wires. Push wires and rubber grommet through dash panel into engine compartment.

(5) From engine compartment remove four retaining nuts and three screws from outer edge of housing and remove housing.

Installation

NOTE: Before pressing housing to dash panel, be sure housing to panel seal is not misaligned or damaged.

(1) Position housing on four studs on dash panel.Install four retaining nuts and three screws. Tighten securely.

(2) Push blower motor feed and ground wires through hole in dash panel and secure rubber grommet.

(3) From under instrument panel connect feed and ground wires.

(4) Install inner fender shield, connect heater hoses to core tubes (Fig. 3).

(5) Fill cooling system and connect battery negative cable.

(6) Start engine, operate heater and bleed air from system.

HEATER CORE

Removal

(1) Remove passenger side housing from vehicle. (See Passenger Side Housing Removal).

(2) From inside housing, remove two retaining nuts from right side of heater core and four screws from outside of housing.

(3) Remove core tube locating metal screw from top of housing.

(4) Carefully pull heater core out of housing.

Installation

NOTE: Examine core to housing seal for damage or misalignment before seating heater core in housing.

(1) Position core on studs in housing and install two retaining nuts.

(2) Install four core retaining screws from outside of housing and one core tube locating screw in top left of housing. Tighten all nuts and screws securely.

(3) Install housing under instrument panel. (See Passenger Side Housing Installation).

BLOWER MOTOR

The blower motor is mounted to the engine side housing under the right front fender between the inner fender shield and the fender. The inner fender shield must be removed to service either the blower motor or engine side housing. See Body Manual for detailed illustrations.

SERVICE PROCEDURES

CHRYSLER AND IMPERIAL

GENERAL INFORMATION

Chrysler models use a "Blend Air" type heater (Fig. 1). Outside air enters the heater through the cowl grille and passes through a plenum chamber to the heater core. A temperature control door in the heater plenum chamber directs the air either through or past the heater core. The amount of "blend" is controlled by the setting of the temperature lever on the instrument panel. Direction of the "blended air" is controlled by the "Heat-Defrost" push buttons on the instrument panel.

Two doors, inside the heater assembly, are controlled by the "Heat" and "Defrost" buttons. When the "Heat" button is pressed the heater defroster door is closed and the heater shut-off door by the action of the vacuum actuator, is opened. When the "Defrost" button is pressed the heater shut-off door remains open and the heater defroster door, by the action of the vacuum actuator, is opened to route the heated air up to the windshield. The "Fan Switch" determines the speed of the heater blower motor.

The "Hi-Heat" button will automatically put the heater in a high blower speed condition regardless of the position of the fan switch.

Heating the Vehicle (Front Unit Only)

For best heating results, the windows of the vehicle should be closed. When the green temperature indicator light goes "out", move the temperature control lever to the "warm" position. Push the "Heat" button and move the fan switch to "high." The temperature condition inside the vehicle can then be controlled using the "Fan Switch" and the "Temperature Control Lever."

Summer Ventilation

Two air inlets are provided to allow outside air to be brought inside the vehicle in warm weather independent of the heater. The control knobs for the inlets are located on the lower edge of the instrument panel on both sides of the steering column. **Be sure the air inlets are shut during cold weather.**

Rear Seat Heater

A recirculating hot water rear seat heater mounted in the right side of the luggage compartment, is offered as optional equipment in all except station wagon models. A variable speed electric blower draws inside air through a duct mounted in the shelf panel behind the rear seat back and forces it through the heater core. From the heater core, warm air can be deflected either to the rear floor through ducts mounted under the rear seat cushion or through a defroster duct which is also mounted in the shelf panel.

The heater core is supplied with warm engine coolant from the front heater hoses by means of "tee" connections. A vacuum actuated valve controls the supply of coolant routed through steel tubing, under the right side of the floor pan, to the heater core.

Controls consist of two toggle type switches mounted in the instrument panel. The right hand switch controls the heater blower motor speed. The other switch controls a vacuum actuated damper which directs the flow of air either to the defroster— defogger or floor heater ducts. This switch also controls coolant flow at the valve in the engine compartment.

Heating the Vehicle (With Rear Unit)

When the green temperature control indicator light goes "out" move the left hand toggle switch to either the defroster position or the heat position. The right hand switch controls the blower speed.

Defogging the Rear Windows

To defog the rear glass, place the left hand switch in the "Air" position. This will close the vacuum actuated water valve and cool air will flow to the rear glass. The blower switch will control the volume of air.

For summer operation, the heater control switch should be kept in the "Air" position. This shuts off the coolant supply to the heater core and

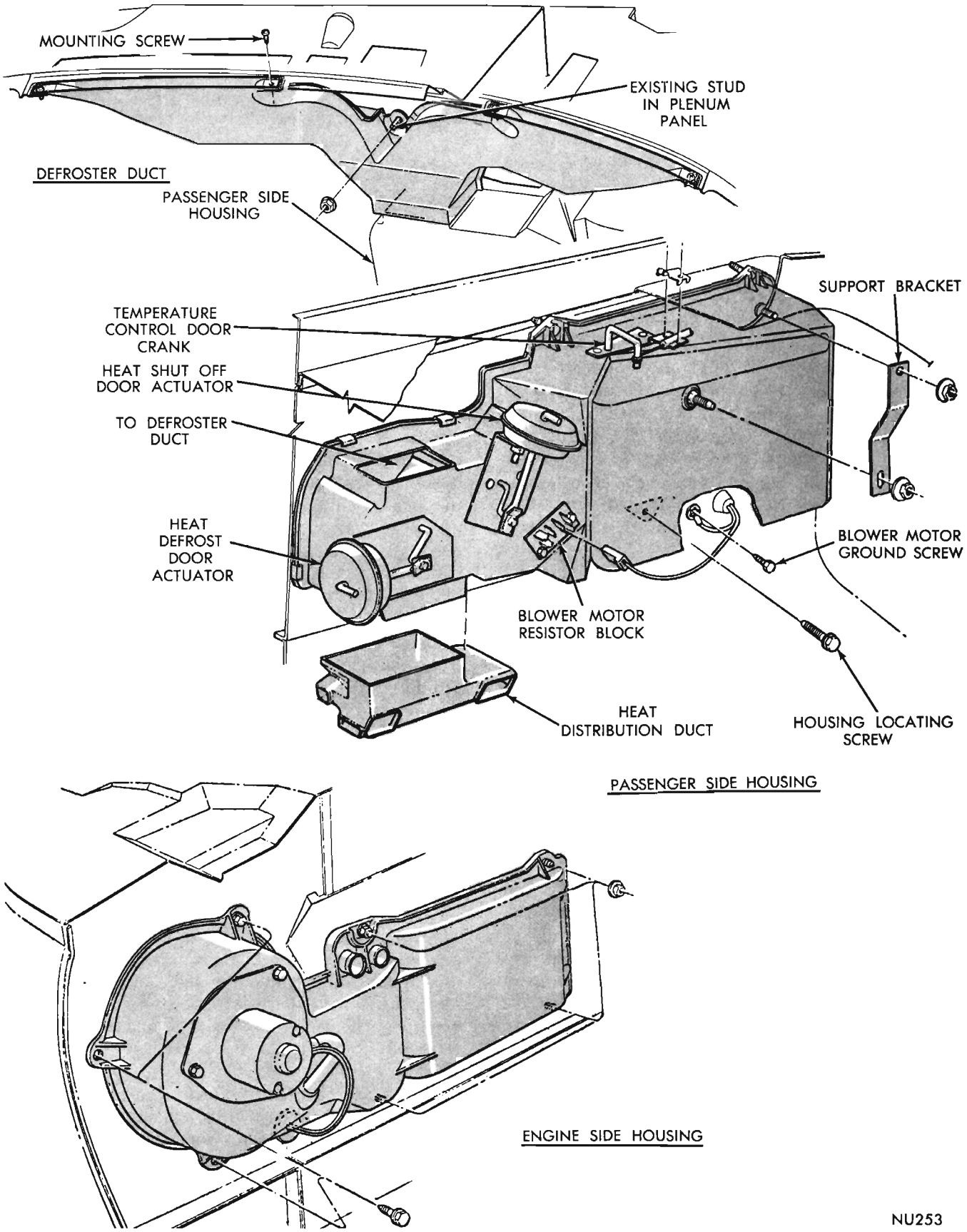


Fig. 1 - Heater Assembly - Chrysler and Imperial

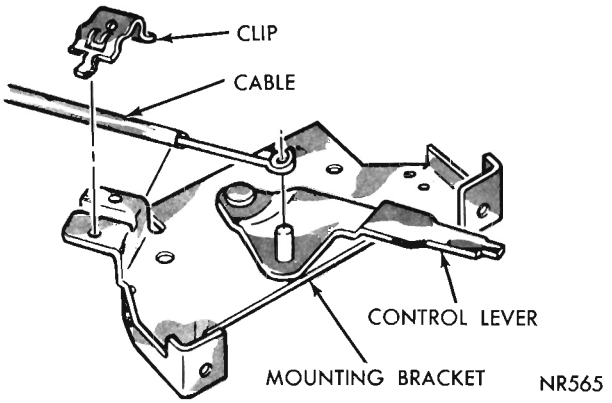


Fig. 2 - Heater Control Cable Adjustment

stops the natural flow of warm air through the heater ducts. With the control in the "Heat" or "Defrost" position, the coolant valve is open and coolant flows through the heater unit.

CONTROL CABLE ADJUSTMENT

(1) Disconnect battery ground cable.

(2) Remove ash receiver and housing (Chrysler only.)

(3) Remove vacuum control switch, temperature control bracket and lower assembly through ash receiver housing opening.

(4) Remove glove box to provide access to the heater temperature door.

(5) Disconnect temperature control cable at heater.

(6) At heater control assembly, position cable housing to edge of cable bracket (Fig. 2) and install clip.

(7) Install temperature control bracket and secure vacuum control switch in place on temperature control bracket.

(8) Place temperature control arm in extreme left position and connect cable to temperature control door crank on heater assembly while holding door in extreme right position. Install clip.

(9) Install ash receiver and housing assembly.

(10) Connect battery ground cable and test operation of heater controls. **For Heater Control and Switch removal, see "Switches in Instrument Panels"— Group 8.**

Air Vent Control Cable Adjustment

(1) Push the air vent control knob in (leave about 1/8 inch between the knob and panel).

(2) Remove the kick pad at the air vent outlet.

(3) Remove the control cable clip from the vent door cable bracket.

(4) Rotate and hold the vent door firmly closed and attach cable clip.

(5) Reinstall kick pad.

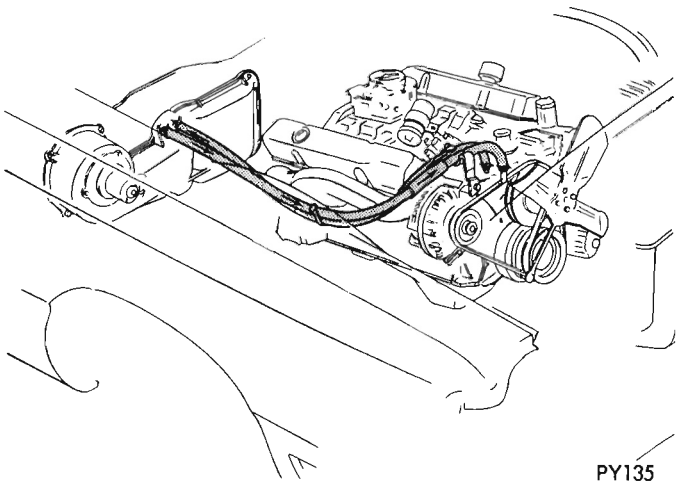


Fig. 3 Heater Hose Routing

HEATER REMOVAL

Passenger Side Housing

(1) Disconnect battery negative cable and drain radiator.

(2) In engine compartment disconnect heater hoses at dash panel. Plug hose fittings on heater to prevent any coolant from spilling on inside of vehicle as heater assembly is removed.

(3) Slide front seat back to allow room to remove unit from vehicle and unplug antenna lead from side of radio.

(4) Remove vacuum hoses from trunk lock if so equipped.

(5) Disconnect electrical connectors from blower motor resistor block on face of housing.

(6) Remove two vacuum hoses from defroster actuator and two vacuum hoses from heater shut off door actuator.

(7) Remove bottom retaining nut from support bracket and swing bracket up out of the way.

(8) In engine compartment remove four retaining nuts from studs on engine side housing.

(9) Remove locating bolt from bottom center of passenger side housing.

(10) Roll or tip housing out from under instrument panel.

(11) Remove temperature control cable retaining clip and cable from heat shut off door crank.

Installation

NOTE: Before pressing housing to dash panel, be sure housing to panel seal is not misaligned or damaged.

(1) Position housing on front floor of vehicle under instrument panel and place temperature control cable in bracket. Place end of cable housing flush with end of bracket and install retaining clip.

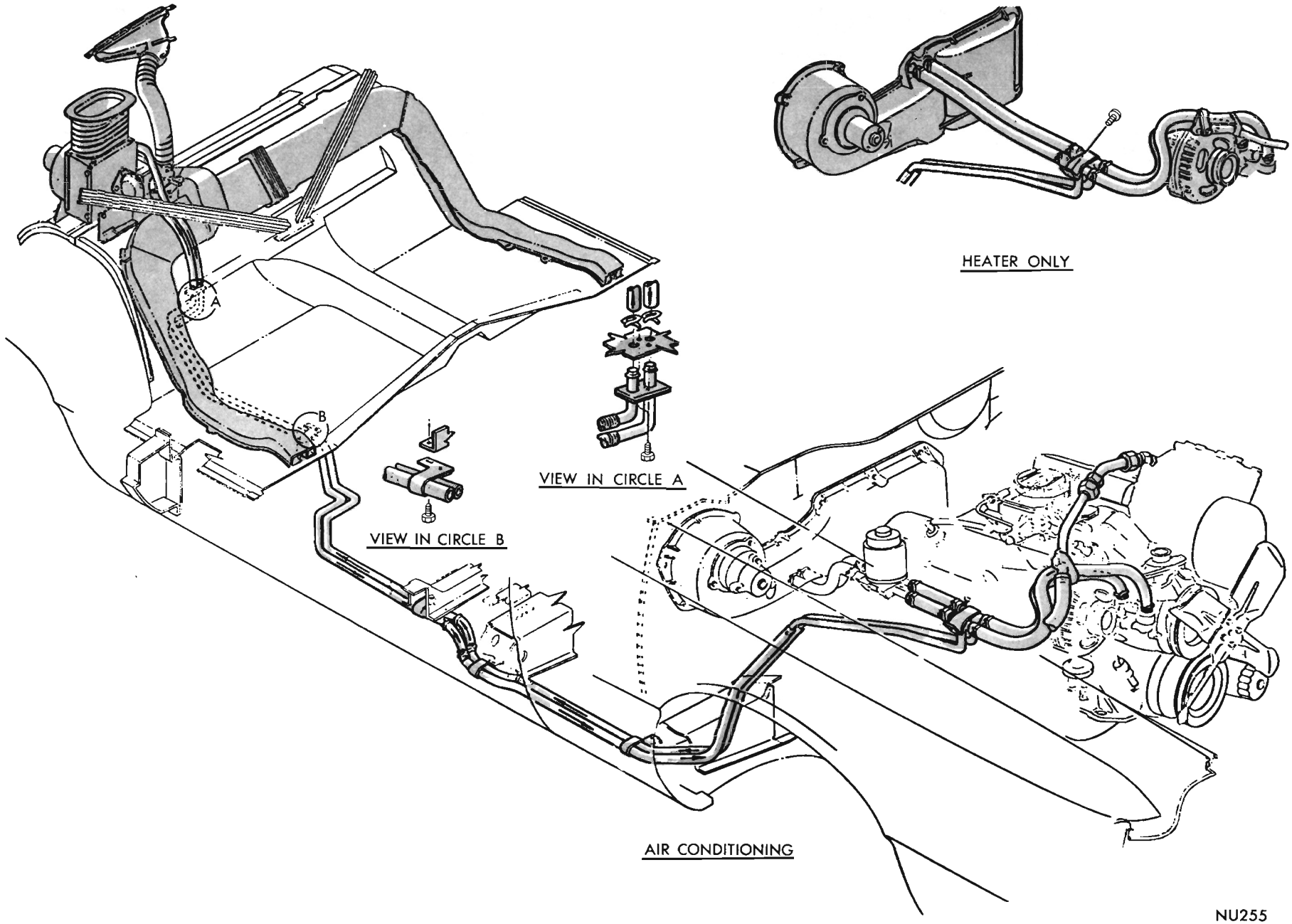


Fig. 4 - Rear Seat Heater Hose Connections

(2) Tip housing up under instrument panel and press mounting studs through dash panel.
(3) While holding housing in position, install locating screw. Then swing mounting bracket down onto stud on face of housing and install mounting nut.
(4) In engine compartment install four retaining nuts and tighten securely. (24 inch-pounds).
(5) Connect electrical connectors to resistor block and vacuum hoses to actuators (white hose to rod side of actuator).
(6) Plug antenna lead into radio and connect vacuum trunk lock hoses if so equipped.
(7) From engine compartment, remove plugs from core tubes and connect hoses to heater (Fig. 3).
(8) Fill cooling system and connect battery negative cable.
(9) Start engine, operate heater and bleed air from system.

HEATER CORE

Removal

(1) Remove passenger side housing from vehicle. (See Passenger Side Housing Removal).
(2) From inside housing, remove two retaining nuts from right side of heater core and four screws from outside of housing.
(3) Remove core tube locating metal screw from top of housing.
(4) Carefully pull heater core out of housing.

Installation

NOTE: Examine core to housing seal for damage or misalignment before seating heater core in housing.
(1) Position core on studs in housing and install two retaining nuts.
(2) Install four core retaining screws from outside of housing and one core tube locating screw in top left of housing. Tighten all nuts and screws securely. (24 inch-pounds).
(3) Install housing under instrument panel. (See Passenger Side Housing Installation).

BLOWER MOTOR

The blower motor is mounted to the engine side housing under the right front fender between the inner fender shield and the fender. The inner fender shield must be removed to service either the blower motor or engine side housing. See Body Manual for detailed illustrations.

Heater Door Service

For service of the heater regulator door, defrost-

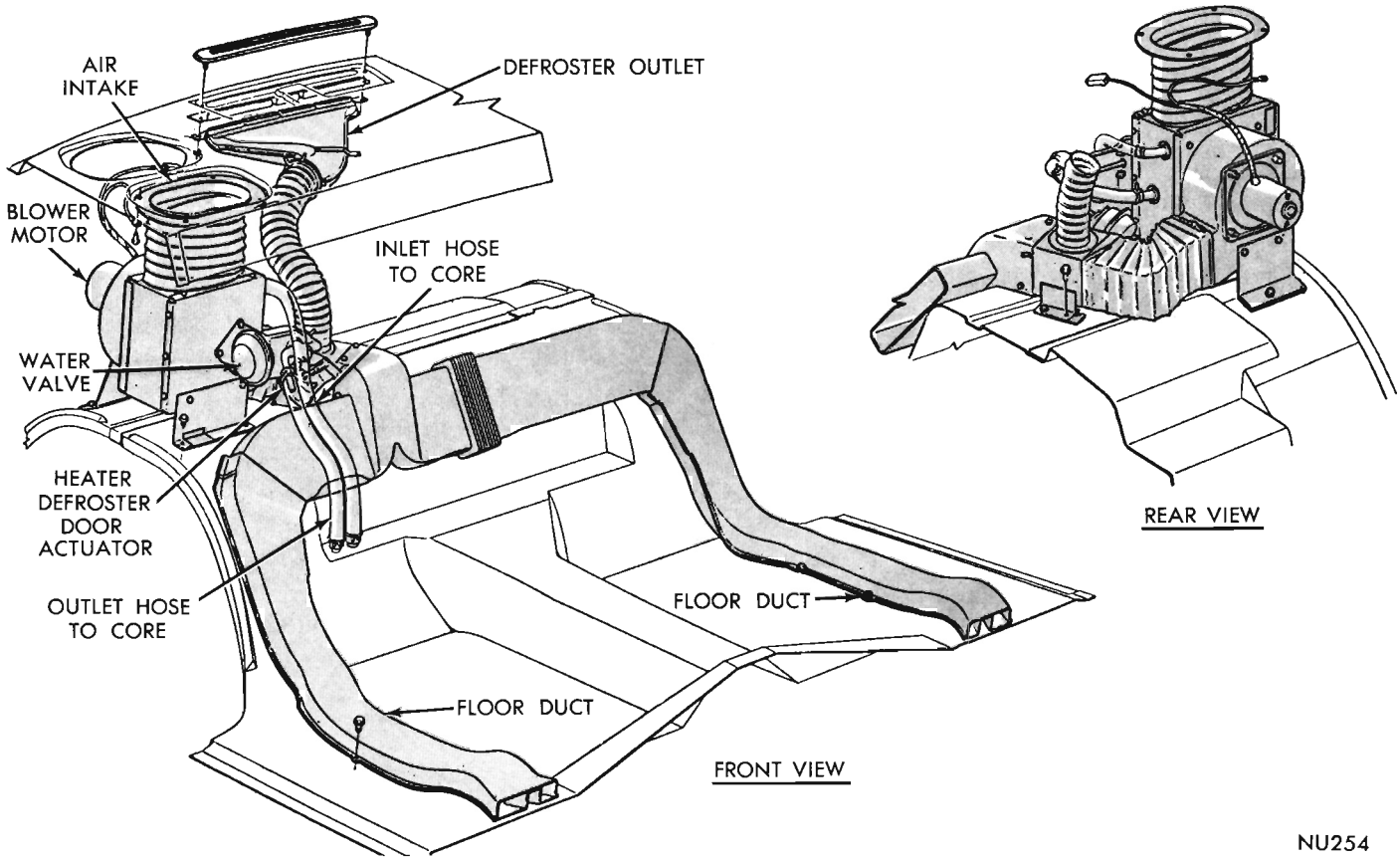


Fig. 5 - Rear Seat Heater Installation

er door or outside air door the heater must be removed from the vehicle and disassembled. Refer to "Heater Removal and Installation."

Blower Motor Resistor Replacement

(1) From under instrument panel disconnect wiring at resistor.
(2) Remove two screws that mount resistor to heater and remove resistor.
(3) Position new or repaired resistor into opening in heater assembly and install the mounting screws.
(4) Connect wiring to resistor.

REAR SEAT HEATER

Removal

(1) From under the car, remove two heater hose clamps at the junction of the front and rear tube assembly and drain system (Fig. 4).
(2) Remove rear seat cushion and back seat.
(3) From inside car, remove two heater hose clamps and hoses from the heater.
(4) Remove spare tire from luggage compartment.
(5) Disconnect motor feed wire, outside air intake hose and flexible blower discharge duct.
(6) Remove the four metal screws from mounting brackets and remove heater to the bench for servicing (Fig. 5).

Installation

(1) Position heater assembly in luggage compartment and install the four mounting screws in mounting bracket.
Be sure to install motor ground wire terminal to the mounting screw under blower motor.
(2) Install blower discharge duct and air intake hose.
(3) Inside car, install two heater hoses and clamps to heater.
(4) Install spare tire.
(5) Install two heater hoses at junction of tube assemblies.
(6) Fill cooling system, start engine, bleed heater system of air and check for leaks.
(7) Install seat back and rear seat cushion and heat shield.
CAUTION: Carefully align the seat cushion to mate with floor mounted air ducts before locking seat in place. Misalignment will crush air ducts.

HEATER CORE

Removal

(1) Remove heater from vehicle as outlined in "Heater Removal."
(2) Remove the 11 metal screws from end plate and remove plate.
(3) Remove the four screws retaining heater core to heater body and remove the core.

Installation

(1) Position heater core in heater body and install the four retaining screws.
(2) Install end plate and 11 metal screws.
(3) Install heater as outlined in "Heater Installation."

Blower Motor Rear Unit

The heater blower motor can be replaced without removing heater from vehicle as follows:
(1) Remove spare tire from luggage compartment.
(2) Disconnect motor feed wire and ground wire from end mounting bracket screw.
(3) Remove the four motor mounting plate nuts and remove motor assembly from the heater.
(4) Loosen set screw mounting fan to shaft and slide fan from shaft.
(5) Remove the two nuts from plate and separate motor from plate.

Installation

(1) Install back plate on end of motor and secure with the two nuts.
(2) Install fan on the motor shaft. Adjust for clearance of fan and heater chamber.
(3) Install motor assembly in heater and the four mounting nuts.
(4) Connect motor feed wire and install ground wire terminal under end mounting bracket screw.
(5) Install spare tire in luggage compartment.

Floor Air Ducts

Replacement of the floor air ducts is accomplished by removing the seat back and seat cushion. The ducts are fastened to the floor pan with sheet metal screws. (Fig. 4).
CAUTION: When installing the seat cushion, carefully align the cushion with the floor air ducts before locking in place. Misalignment will crush the air ducts.

UPPER LEVEL VENTILATION

(Strato Vent)

Upper Level Ventilation is offered as optional equipment on Satellite, Fury and Chrysler Models, this convenience consists of components added to a modified heater housing assembly which allows outside air to be forced into the passenger compartment, by the blower fan, through directional outlets in the center of the instrument panel (Figs. 1 and 2).

In addition to the heater housing assembly the "Upper Level Ventilation" package consists of:-

(1) A special control with a fourth "Vent" position.

(2) Two directional air outlets located in the center of the instrument panel.

(3) An air transfer duct installed behind the instrument panel between the heater housing and the back of the directional air outlets.

(4) A vacuum harness which is routed through the control "Vent Position", to activate two vacuum actuators at the same time, one shuts off the water valve to the heater core and the other positions an air door to direct outside air into the passenger compartment. "Ram Air" cannot be utilized through the Upper Level Vent outlets do to the configuration of the housing and ducts.

Upper Level Ventilation does not replace the two lower cable operated cowl vents, but is to be used in addition to these lower vents for best results.

Fast Cool Down

(1) Place the mode lever in the "Vent" position. On Chrysler Models, push the push button marked "Vent".

(2) Place the blower switch on "Hi".

(3) Open both cowl vents.

(4) Place the temperature control lever in the full "Heat" position this will position air doors to allow fast cool down of the heater housing and ducts. Leave the temperature control lever in the "Heat" position during ventilation.

NOTE: When the temperature control lever is placed in the "Heat" position and the mode lever is in the "Vent" position, no coolant is circulating through the heater core since the water valve is shut off at this time.

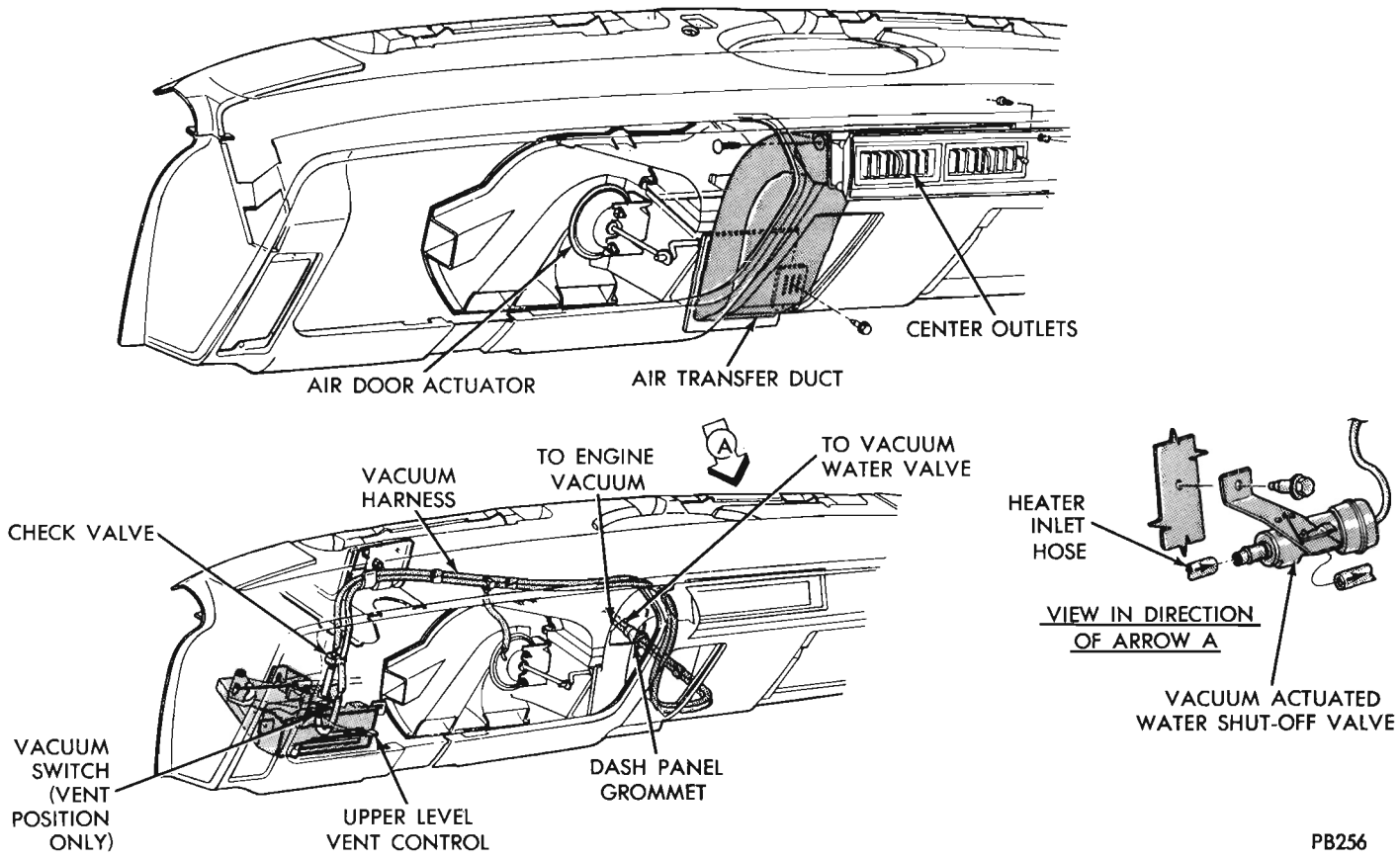


Fig. 1 Upper Level Ventilation-Satellite Models.

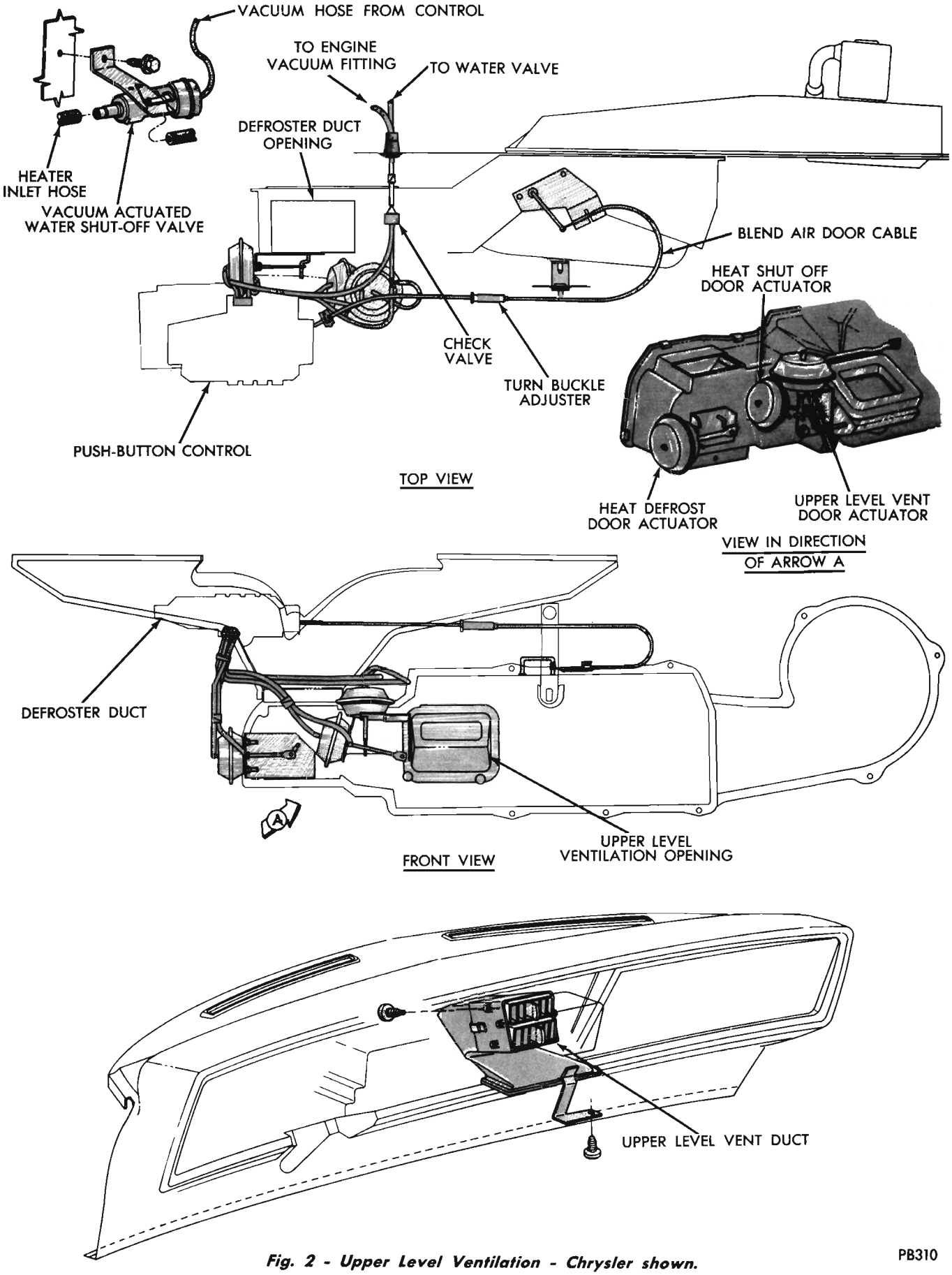


Fig. 2 - Upper Level Ventilation - Chrysler shown.

PB310

AIR CONDITIONING

INDEX

	Page
Auto-Temp (Chrysler and Imperial)	85
Complete System Discharge and Recharge	35
Evaporator—Heater Assembly	
Valiant	50
Barracuda	60
Satellite	60
Chrysler, Imperial and Plymouth (Fury Models)	73
Gauge Set Manifold Installation	22
Operating Instructions For Owners	21
Service Procedures	40
Servicing The Compressor	43
Test Procedures	24

OPERATING INSTRUCTIONS FOR OWNERS (ALL MODELS)

Off-Season Operation

During the off-cooling season, suggest to the owners that they operate the air-conditioning system for at least five minutes once a week with the "Max.-A/C" button depressed and the temperature control lever in the warm position. This will cause the air conditioner compressor to pump oil to the compressor seal, preventing the seal from drying out and causing loss of refrigerant.

AntiFreeze Required for Summer Operation

Air conditioned cars must be protected with a permanent type antifreeze during summer to —15 degrees F. or lower to prevent the heater core from freezing. However, this protection does not provide sufficient corrosion inhibitors for the engine cooling system.

Summer protection to —15 degrees F. will provide adequate inhibitors for protection of engine cooling system against corrosion. **Do not use the same antifreeze for more than one year.**

Fast Cool Down

If the car has been parked in the hot sun, open the windows and drive the car for several minutes to expel the warm air, and at the same time:

(1) Slide the temperature control lever to the "Off" position.

(2) Push the "Max.-A/C" button in.

(3) Move the fan switch to "High".

(4) Adjust the four cooling outlet vanes to direct cooled air to the desired area.

(5) Close windows.

Normal Cooling (Cooling with Outside Air)

When the desired amount of cooling is obtained with the "Max.-A/C" button, you can continue cooling with outside air for added comfort by pushing the "A/C" button and adjusting the fan switch to change fan blower speed. If less cooling is desired, move the fan switch lever to "Low" speed and readjust the cooling outlets for indirect cooling. For warmer air, move the temperature control lever to the desired temperature.

Cooling for Special Conditions

The air conditioner provides maximum dehumidified air at the most comfortable weather conditions above 50 degrees F.

During rainy or muggy weather, operate the system as usual, using the temperature control lever to clear the windows and provide interior comfort.

If the outside air is extremely humid or too warm for cooling with outside air as previously described, push the "Max.-A/C" button.

This method is also recommended when driving through areas which are extremely dusty or have objectionable odors.

Operation in Traffic

In extremely slow traffic, additional cooling may be required.

When pulling a trailer, driving through heavy traffic at 10 to 15 mph. or when pulling up steep hills additional engine cooling may be required. If any or all of these situations are encountered, put the transmission in a lower gear. At stop lights and other stops put transmission in Neutral and increase engine speed.

Radiator Cap

Air conditioned vehicles must be equipped with a radiator cap having a holding pressure of 15 to 16 psi. Replace the radiator cap that does not test within these specifications.

Condenser

Inspect the condenser for obstruction for foreign matter. Clean if necessary.

Any obstruction to the free flow of air across the condenser will decrease heat dissipation from the condenser, decrease the efficiency of the condenser and, in turn, decrease the evaporator's

efficiency. These conditions result in increasing the discharge pressure and horsepower load on the engine. The use of a bug screen is not recommended as it, too, will decrease the free flow of air.

Inspect the condenser for bent or damaged fins. The bent fins on the condenser deflect air flow across the bent portions, decreasing the condenser area.

Bug Screens (All Models)

Bug screens should not be installed on vehicles equipped with air conditioner. A bug screen installed in front of the condenser will reduce air flow and effect air conditioner performance. Under severe heat conditions a bug screen may cause the engine to over-heat.

THE GAUGE SET MANIFOLD INSTALLATION (ALL MODELS)

The Gauge Set Manifold is an indispensable test and diagnosis instrument. The gauge set manifold Tool C-3740 has two compound suction gauges and one discharge pressure gauge. Two accurately calibrated suction pressure gauges are required for the evaporator pressure regulator valve test. (Fig. 1 and 2). **The hoses are shown in the test illustrations for quick reference to distinguish the various adaptations.**

Evaporator Suction Gauge—at the left side of the manifold set is calibrated to register 0 to 30 inches of vacuum and 0 to 150 psi. This gauge is connected to the suction service port of the compressor. On Valiant installations this gauge is connected to the compressor inlet service port. A special service port adapter, supplied with the gauge set, provides the means of connecting the gauge set manifold hose to the service port. When the adapter is installed at the port and tightened, the stem of the valve in the service port is depressed, opening the service port valve.

Discharge Pressure Gauge—at the center of the manifold set is calibrated to register 0 to 300 psi. For all tests this gauge is connected to the discharge service port of the compressor. A service port adapter is used to make this connection. The needle valve, located below the discharge pressure gauge, is used to damp out gauge needle oscillations so that accurate readings can be obtained.

Compressor Inlet Gauge—is mounted at the right side of the manifold set. This mounting is for convenience only. There are no passages between this gauge and the gauge manifold. The compressor inlet gauge is calibrated to register 0 to 30 in. of vacuum and 0 to 150 psi. This gauge

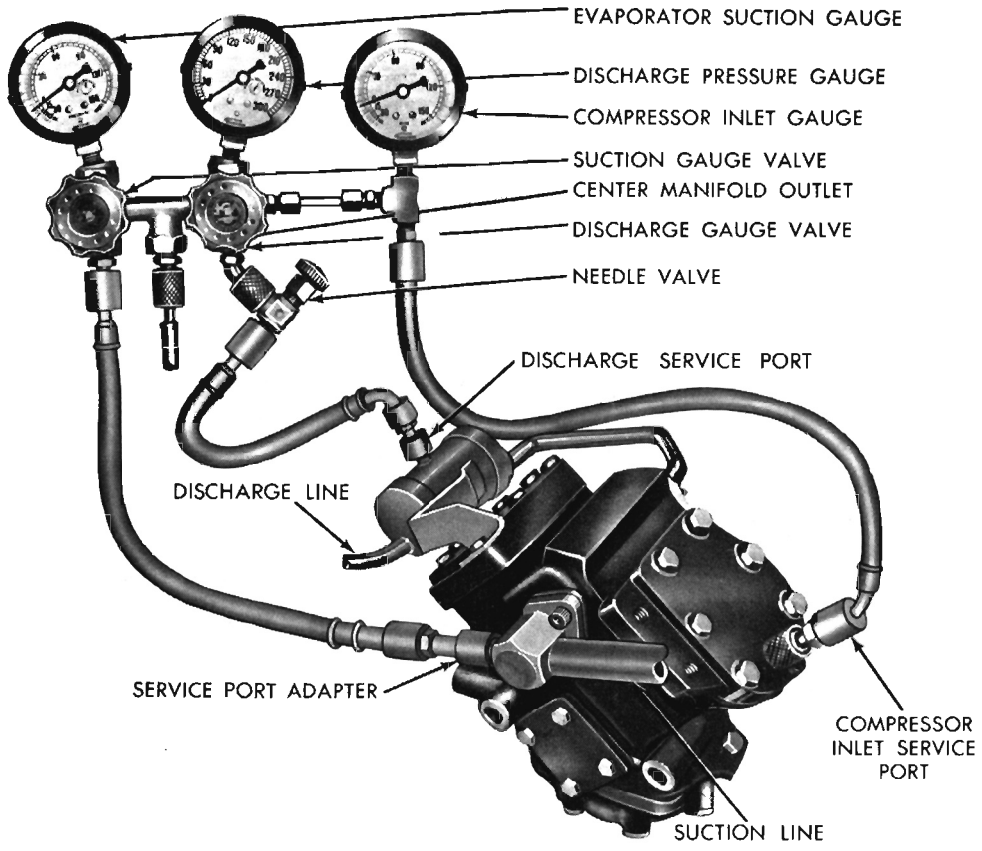


Fig. 1 - Gauge Set Manifold Connections-(All Models except Valiant)

and the evaporator suction gauge must be accurately calibrated so that the needles of both gauges are exactly at 0 before making tests. The compressor inlet gauge is connected to the compressor inlet service port by a special service port adapter.

This gauge is used, when checking the EPR Valve. Not used on Valiant installations (Fig. 2) which do not use an EPR valve.

Center Manifold Outlet—provides the necessary connection for a long service hose used when discharging the system, using a vacuum pump to "pull a vacuum" before charging the system, and for connecting the supply of refrigerant when charging the system.

Manifold Gauge Valves—should be closed when connecting the gauge set manifold to the service ports of the compressor. The suction gauge valve at the left is opened to provide a passage between the suction gauge and the center manifold outlet. The discharge gauge valve at the right is opened to provide a passage between the discharge pressure gauge and the center manifold outlet.

Detailed instructions for proper use of the gauge set manifold are contained in the test covering each test and service operation employing these gauges.

SAFETY PRECAUTIONS

The refrigerant used in all air-conditioning installation is Refrigerant 12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of **21.7 degrees F. below zero,** at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable and nonexplosive. It is nonpoisonous except when it is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling Refrigerant 12.

CAUTION: Wear safety goggles when servicing the refrigeration system.

Refrigerant 12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes.

Always wear safety goggles when servicing the refrigeration part of the air-conditioning system. Keep a bottle of sterile mineral oil and a weak solution of boric acid handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil

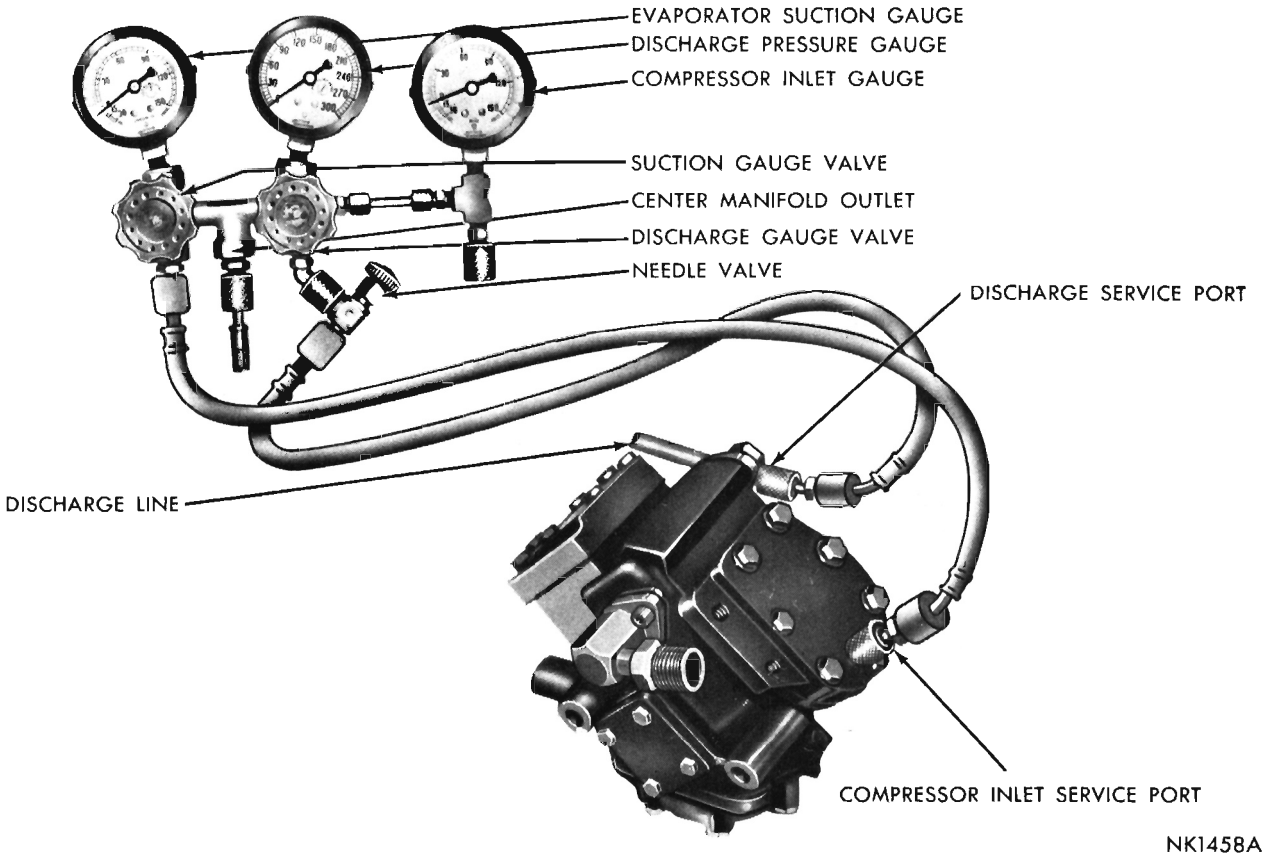


Fig. 2 - Gauge Set Manifold Connections-(Valiant)

to wash them out. Refrigerant 12 is rapidly absorbed by the oil. Next, wash the eyes with the weak solution of boric acid. Call your doctor immediately even though irritation has ceased after first aid treatment.

CAUTION: Do not heat refrigerant 12 above 125 degrees F.

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 125 degrees F. is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

CAUTION: Keep Refrigerant 12 containers upright when charging the system.

When metering Refrigerant 12 into the refrigeration system, **keep the supply tank or cans in an upright position.** If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

CAUTION: Always work in a well-ventilated room.

Always maintain good ventilation in the working area. Always discharge the refrigerant into the service bay exhaust system or outside the building. Large quantities of refrigerant vapor in a small, poorly ventilated room can displace the air and cause suffocation.

Although Refrigerant 12 vapor is normally non-poisonous, it can be changed into a very poisonous gas if allowed to come in contact with an open flame. Do not discharge large quantities of refrigerant in an area having an open flame. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

CAUTION: Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces. Avoid splashing refrigerant on any surface. Refrigerant in combination with moisture is very corrosive and can cause great damage to all metal surfaces.

TEST PROCEDURES

INDEX

	Page
Correcting Low Refrigerant Level	28
Expansion Valve and EPR Valve Test	33
Front Unit Performance Test	30
Over-All Performance Test	30
Receiver drier	36
Refrigerant Level	24
Roof Unit Performance Test	33
Test System Pressure	24
Testing System For Leaks	27

TEST 1

TEST SYSTEM PRESSURE

(Engine not Running)

Install the gauge set manifold. See "Gauge Set Manifold Installation" for identification of test hose connections at service ports. After tightening service port adapters, make sure that the needle valve located below the discharge pressure gauge is open. Purge air from the gauge hoses (Figs. 1 and 2) as follows:

(1) Open suction gauge valve momentarily, then close it.

(2) Open discharge gauge valve momentarily, then close it.

(3) Loosen compressor inlet suction hose connection at the manifold momentarily, then tighten it. **Step three not necessary with "Valiant" installations.**

If vehicle has been parked and the air conditioning system not operating, gauge pressure should be normal for temperature of the system. Refer to the Temperature-Pressure Relationship Chart.

If no pressure is indicated on the gauges it means that the system is empty, due to a leak. It will be necessary to evacuate, **check compressor oil level,** charge with a sweep-test charge, locate and correct the leak, purge the test charge, replace the drier, vacuum the system and charge the system with the proper amount of Refrigerant 12.

If pressures are normal, proceed with the next test and adjustment.

TEST 2

REFRIGERANT LEVEL

The system must be operated at high blower speed, with vehicle doors and windows open, if the system is a dual system, both units must be operated simultaneously at high blower speed when this test is made, and when adding to the charge.

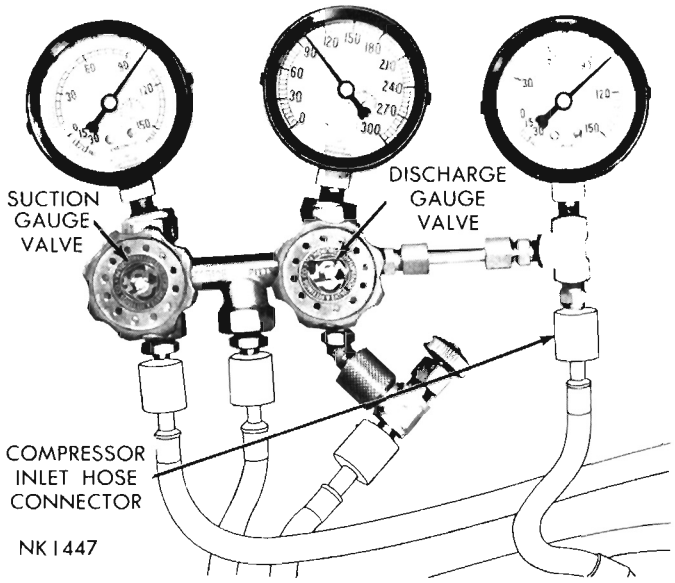


Fig. 1 - Purge Gauge Hoses (All Models except Valiant)

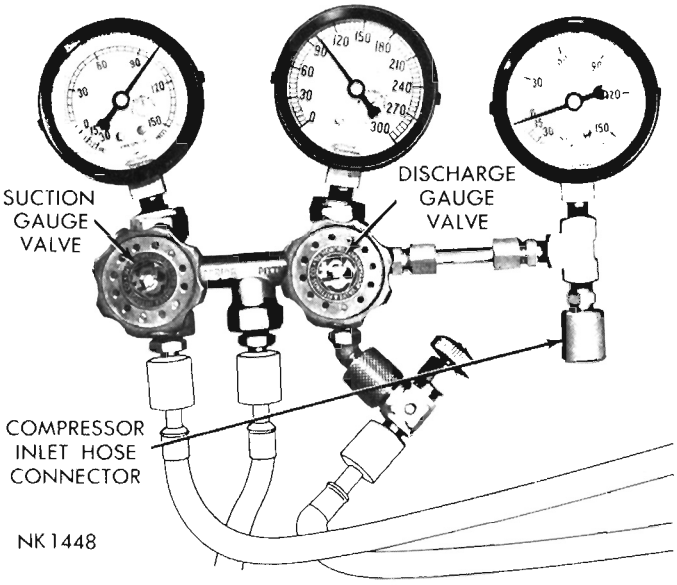


Fig. 2 - Purge Gauge Hoses (Valiant)

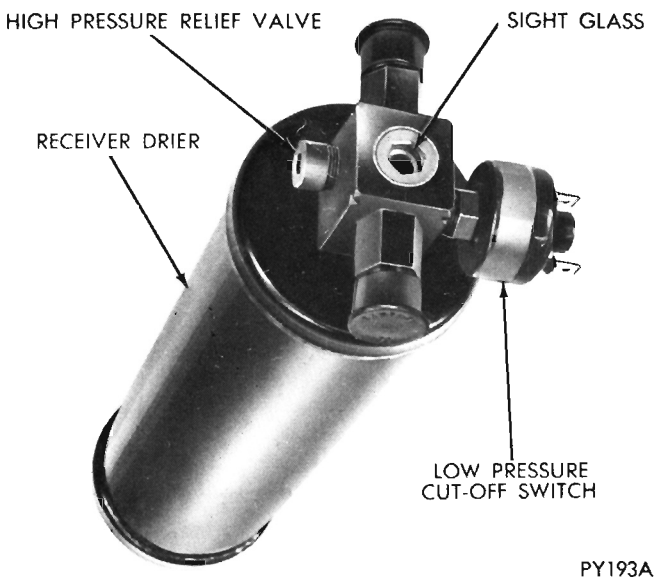


Fig. 3 - Receiver Drier (All Models)

The sight glass is an integral part of the receiver-strainer-drier. The outlet line (liquid) from the condenser must be attached to the connection marked IN. The word IN is stamped on the top face of the inlet connection (Fig. 3). If the receiver-strainer-drier is reversed and the lines are connected wrong, the system must be purged, the lines reversed and the system recharged.

Block the air flow across the condenser to raise the discharge pressure to 225 to 250 psi, and check the sight glass for foam. There should be no foam. If sight glass is clear, remove the air restriction from the condenser and allow the discharge pressure to return to normal.

If the foam shows in the sight glass when the discharge pressure is 225 to 250 psi, it indicates the system is low on refrigerant. The proper amount of refrigerant required to complete a full charge may be added to the system as follows: Maintaining the discharge pressure at 225 to 250 psi, add refrigerant gas through the suction side of the system until foam is cleared from sight glass, then add exactly one-half (1/2) pound of refrigerant.

SIGHT GLASS

Periodic inspection of the sight glass is considered a practical method of determining the amount of refrigerant in the system. One of the following conditions may exist:

(1) **Full Charge** - The sight glass is clear; no foaming.

(2) **Low in Charge** - Some bubbles or foaming.

(3) **No Charge** - The sight glass is clear; no foaming; no temperature differential between compressor inlet or outlet.

In extremely high ambients, (110 degrees F.), occasional foam or bubbles may appear when system is fully charged. Some foaming is also normal with an outside ambient temperature of 70 degrees F or below.

Low-Presure Cut-Off Switch

The Low Pressure Cut-Off switch, which is located on the receiver drier, is wired in series with the compressor magnetic clutch. It cuts off the electrical power supply to the clutch when liquid refrigerant pressure drops to the control point of the switch. (Fig. 3).

The switch is a sealed, factory calibrated unit.

TEMPERATURE-PRESSURE RELATIONSHIP CHART

(FOR REFRIGERANT 12)

Temp. F.	Press. PSI	Temp. F.	Press. PSI	Temp. F.	Press. PSI	Temp. F.	Press. PSI	Temp. F.	Press. PSI
0	9.2	35	32.6	60	57.7	85	91.8	110	136.4
2	10.2	36	33.4	61	58.9	86	93.3	111	138.4
4	11.2	37	34.3	62	60.1	87	94.7	112	140.5
6	12.0	38	35.2	63	61.3	88	96.5	113	142.6
8	13.5	39	36.1	64	62.5	89	98.2	114	114.7
10	14.6	40	37.0	65	63.8	90	99.8	115	146.8
12	15.8	41	37.9	66	65.0	91	101.5	116	148.9
14	17.1	42	38.9	67	66.3	92	103.1	117	151.1
16	18.4	43	39.8	68	67.6	93	104.8	118	153.2
18	19.7	44	40.7	69	68.9	94	106.5	119	155.4
20	21.0	45	41.7	70	70.2	95	108.3	120	157.7
21	21.7	46	42.7	71	71.5	96	110.0	121	159.9
22	22.4	47	43.6	72	72.9	97	111.7	112	161.2
23	23.2	48	44.7	73	74.2	98	113.5	123	164.4
24	23.9	49	45.7	74	75.6	99	115.3	124	166.7
25	24.6	50	46.7	75	77.0	100	117.2	125	169.1
26	25.4	51	47.7	76	78.4	101	119.0	126	171.4
27	26.1	52	48.8	77	79.8	102	120.9	127	173.8
28	26.9	53	49.9	78	81.3	103	122.7	128	176.2
29	27.7	54	51.0	79	82.7	104	124.6	129	178.6
30	28.5	55	52.5	80	84.2	105	126.6	130	181.0
31	29.3	56	52.2	81	85.7	106	128.5	131	183.5
32	30.1	57	54.3	82	87.2	107	130.4	132	185.9
33	30.9	58	55.4	83	88.7	108	132.4	133	188.5
34	31.7	59	56.6	84	90.2	109	134.4	134	191.0

No attempt shall be made to adjust or otherwise repair it. If it is found to be defective it must be replaced.

Switch Test (Engine not running)

(1) Remove the two wires from the low pressure cut-out switch and connect them together.

(2) Press the A/C button.

(3) Momentarily turn the ignition switch on (**do not crank the engine**), listen for the compressor clutch engaging.

(4) If the clutch does not engage, the clutch, wiring or fuse may be defective. Check the clutch circuit and clutch.

(5) If the clutch engages, connect the manifold gauge set and read the discharge pressure. At any pressure of 40 psi and above, the switch must actuate the clutch.

(6) Reconnect the wires to the switch and perform step number 3.

If the clutch does not engage, discharge the system, replace the switch, check compressor oil level, and recharge the system.

NOTE: Check compressor oil level before charging the system in accordance with instructions under "Oil Level—Compressor". If the pressure is below 40 psi the system may be low of charge. In this case it is mandatory to follow the procedure described below:

(1) Add partial charge until the pressure gauge reads 40 psi.

(2) Perform step number 3 (wires connected to switch). If the clutch engages, the switch is satisfactory; if it does not, it must be replaced. In either case the following steps must be performed:

(a) Check the system for leaks and repair as necessary.

(b) Discharge the system. **Check the compressor oil level.** Replace the switch if it was found defective and recharge the system.

NOTE: Whenever the system is inactivated by the low pressure cut-off switch due to the loss

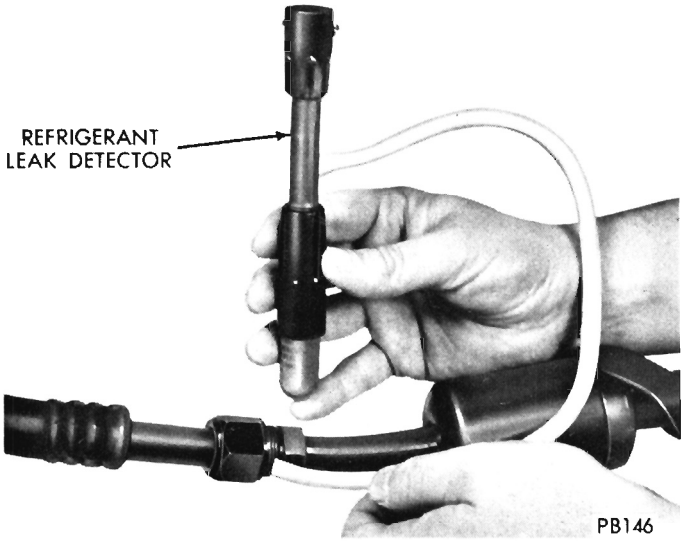


Fig. 4 - Refrigerant Leak Detector

of refrigerant, refrigerant oil may also have been lost. Therefore, to prevent damage to the compressor due to operation without sufficient lubrication, the leak must be repaired and the compressor oil level checked before final charge of the system in accordance with instruction under "Oil Level—Compressor".

High Pressure Relief Valve

The High Pressure Relief Valve is located on the receiver drier opposite the low pressure cut-off switch. Its function is to prevent damage to the air conditioning system in the event that excessive pressure develops due to condenser air flow being restricted by, for example, leaves, newspaper, or an overcharge of refrigerant.

NOTE: The high pressure relief valve differs from the fusible plug in that it vents only the small amount of refrigerant necessary to reduce system pressure and then reseats itself. The majority of the refrigerant is conserved in the system. The valve is calibrated to vent at a pressure of 475 to 550 psi. therefore, the fact that the valve vented refrigerant, does not mean the valve is defective. The valve is part of the receiver drier assembly and must not be removed nor otherwise disturbed.

On new receiver drier assemblies, a mylar disc is applied to the venting port of the valve. The disc is primarily intended for protection of the valve during the painting operation of the bottle. A missing or damaged disc does not indicate failure. If the mylar disc has loosened or come off, it is a recommended practice to apply a drop or two of refrigerant oil into the valve mechanism through the venting holes periodically, this will prevent salt, dirt or moisture from entering the valve.

TEST 3

TESTING THE SYSTEM FOR LEAKS

The Leak Detector Torch Tool C-3569A is a butane gas-burning torch used to locate a leak in any part of the refrigeration system. Refrigerant gas drawn into the sampling or "snifter" hose will cause the flame to change color in proportion to the size of the leak. A very small leak will produce a flame varying from yellowish-green to bright green. A large leak will produce a brilliant blue flame.

CAUTION: Do not use the lighted detector in any place where explosive gases, dust or vapors are present. Do not breathe the fumes that are produced by the burning of refrigerant gas. Large concentrations of refrigerant in the presence of a live flame become dangerously toxic.

If the flame remains bright yellow when the tester is removed from possible leak point, insufficient air is being drawn in through the sampling tube, or the copper reaction wire is dirty.

(1) Assemble leak detector as shown (Fig. 4) be sure detector is seated tightly over torch gasket.

(2) Holding torch upright screw-in butane charger (clockwise) until punctured. (Do not use force)

(3) Screw-out butane charger (counterclockwise) about 1/4 turn.

(4) Point torch away from body - then light escaping gas with match. Always keep torch in upright position.

(5) Adjust flame by turning cartridge in or out as required.

(6) Allow 30 seconds to heat copper reaction wire.

CAUTION: Never remove butane charger while torch is lighted or in the presence of any open flame.

(7) Examine all tube connectors and other possible leak points by moving the end of the sampling hose from point to point. Always keep torch in upright position. Since Refrigerant 12 is heavier than air, it is good practice to place the open end of the sampling hose directly below the point being tested. Be careful not to pinch the sampling tube since this will shut off the air supply to the flame and cause a color change.

(8) Watch for a change in the color of the flame. Small leaks will produce a green color and large leaks a bright blue color. If leaks are observed at tube fittings, tighten the connection, using the proper flare wrenches, and retest.

(9) To extinguish tester, blow out flame. Close off torch by turning butane charger clockwise (screw-in) without using force. Escaping gas will stop in a few seconds.

Remove Sweep-Test Charge

If the system is free of leaks; or after correcting a leak, and if no air conditioning components have been removed, add the necessary refrigerant as described under TEST 4 "Correcting Low Refrigerant Level." If any parts of the refrigerant system were disconnected, remove the sweep test charge. Close the refrigerant manifold valve so that any refrigerant remaining in the container is sealed. Remove the long test hose from the refrigerant manifold. Insert the free end of this test hose into an exhaust system outlet. Open the right-hand gauge set manifold valve a fraction of a turn to let the sweep-test charge escape slowly. Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand gauge valve to allow any refrigerant trapped in the suction side of the system to escape.

TEST 4

CORRECTING LOW REFRIGERANT LEVEL

Since the refrigeration system is completely sealed, refrigerant level will not be low unless there is a leak in the system or refrigerant has been allowed to escape by depressing one of the service port valves. For detailed instructions on the proper procedure for checking refrigerant level, refer to "Refrigerant Level" TEST 2.

Before adding refrigerant where cause of low level is not known, the system should be tested for leaks. Assuming no leaks are present, or that leaks have been corrected without discharging the system, proceed with partial charge.

Install and connect gauge set manifold. (Figs. 5 and 6).

(1) Close both of the gauge set manifold valves. Open the gauge set manifold needle valve.

(2) Connect the suction gauge test hose to the suction service port of the compressor.

On **"Valiant"** installations, install the suction gauge test hose to the compressor inlet service port.

On all models connect the discharge gauge test hose to the discharge service port of compressor.

(3) Connect one end of long test hose to center manifold outlet, other end to refrigerant dispensing manifold.

(4) Close two of the dispensing manifold valves and open remaining dispensing manifold valve. Remove protective cap from opened valve.

(5) Screw a can of Refrigerant 12 to the opened manifold valve. Be sure gasket is in place and in good condition. Tighten refrigerant can and manifold locking nut to insure a good seal. Do not over-tighten since 6 to 8 foot-pounds is sufficient if gasket is in good condition.

(6) Turn manifold valve (above the refrigerant

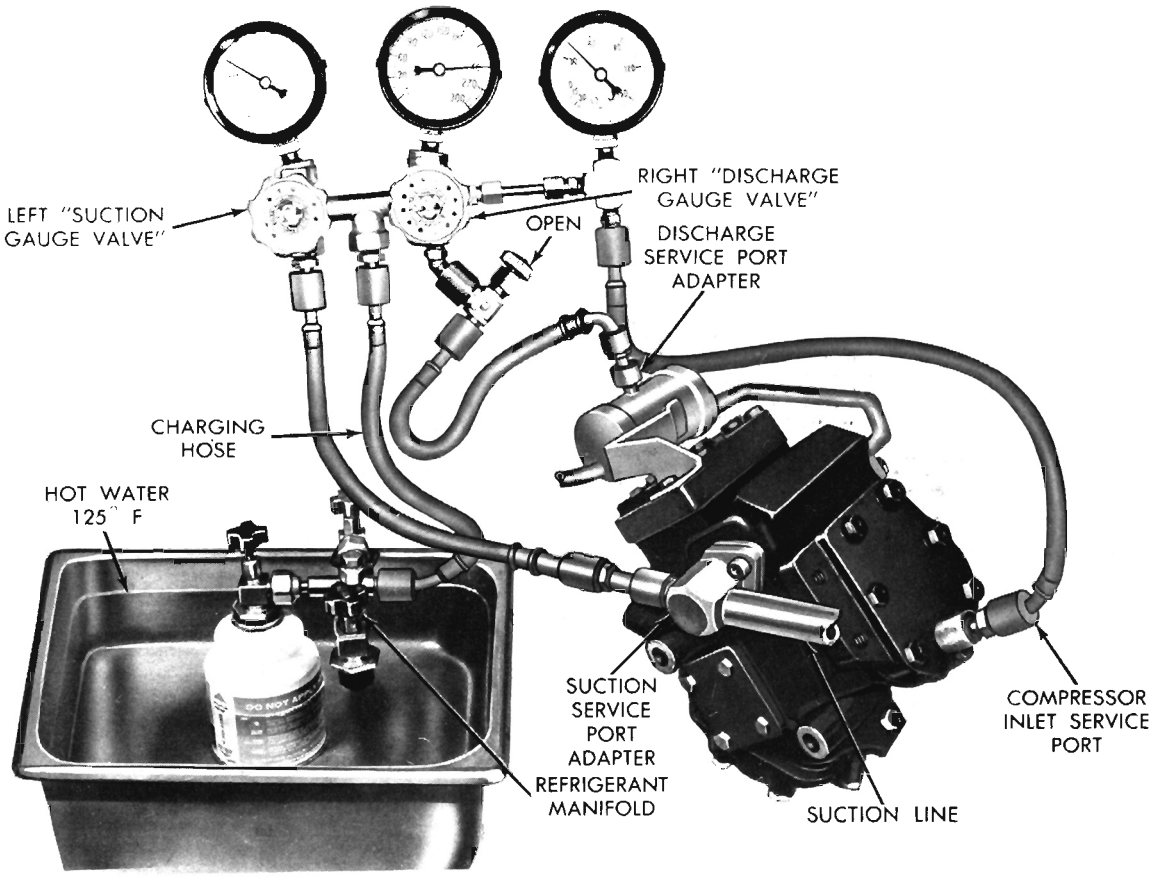


Fig. 5 - Adding Partial Charge (All Models except Valiant)

can) completely clockwise to puncture the can. This closes the valve and seals the refrigerant in the can.

(7) Place the refrigerant in a large pan of water heated to 125 degrees F. Place pan of water containing the refrigerant can on an accurate scale so the amount of refrigerant added can be weighed. Open the refrigerant manifold valve.

(8) Purge all air from test hoses. Air in the system will be trapped in the condenser causing abnormally high discharge pressures and interfering with condensing of the refrigerant.

(9) Loosen both test hoses at the gauge set manifold. Tighten the hoses as soon as the air is purged.

(10) Loosen charging hose connection at gauge set manifold. This will purge air from the charging hose. Tighten connection as soon as air is purged.

(11) With vehicle windows open and hood up, operate engine as shown in following chart:

	Engine	Engine R.P.M.
All Models except Valiant	6 Cyl.	1600
	8 Cyl.	1300
Valiant	6 Cyl.	1250
	8 Cyl.	1000

(12) Push in "A/C" button, fan switch on high. On dual installation both blowers must be on high speed during charging operation.

(13) If necessary, block the condenser to maintain a discharge pressure of 225 to 250 psi. The system must be charged through the evaporator suction service port as follows:

(a) Slowly open the suction service gauge valve. Meter flow of refrigerant by adjusting the suction service gauge valve so that pressure registered at the suction service gauge does not exceed 50 psi. **Keep refrigerant container upright.**

(b) Add refrigerant gas until there is no foam visible at the sight glass. As soon as all foam clears, note the weight registered on the refrigerant scale.

(c) Watch the refrigerant weighing scale and add **exactly 1/2** pound more refrigerant to the system. Close the suction gauge valve. **Too much refrigerant in the system can cause abnormally high discharge pressures. Care must be used so that exactly 1/2 pound of refrigerant is added after foam clears in the sight glass.**

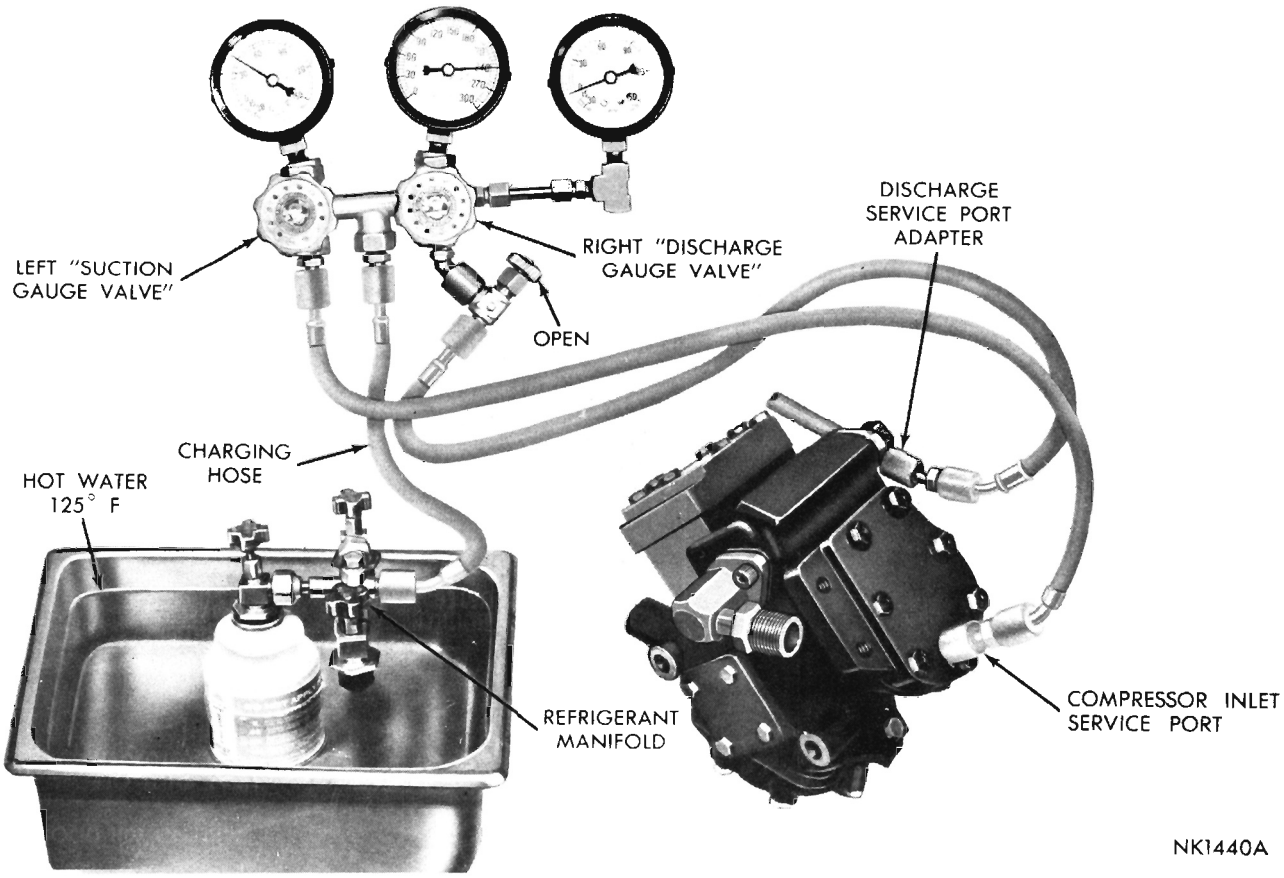


Fig. 6 - Adding Partial Refrigerant Charge (Valiant)

(d) Close dispensing manifold valve. Remove test hoses and adapters from the service ports of compressor, and install protective caps at service ports.

TEST 5

OVER-ALL PERFORMANCE TEST

Humidity (the amount of moisture in the air) has an important bearing on the temperature of the air delivered to the vehicle's interior. This is true of all air-conditioned systems whether in the home, office or vehicle. It is important to understand the effect humidity has on the performance of the system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature and the temperature of the moisture carried in the air. Condensing the moisture in the air transfers a great deal of heat energy into the evaporator fins and tubing. This reduces the amount of heat the evaporator can absorb from the air. In other words, high humidity greatly reduces the evaporator's ability to lower the temperature of the air delivered to the vehicle interior.

Evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds materially to the comfort of the passengers. However, an owner may expect too much from his air-conditioning system on humid days. A performance test is the best way to determine whether or not the system is performing up to standard. This test also provides valuable clues to the possible cause of trouble.

The preliminary inspections in TESTS 1 thru 4, outlined previously, should be made before the "Over-All Performance Test." Install gauge set manifold. **Air temperature in test room must be 75 degrees F. minimum for this test.**

FRONT UNIT PERFORMANCE TEST

Start the engine, open the windows, temperature control lever must be in the off position.

Push in "A/C" button, fan switch on high. Open all grille outlets. **When testing the front unit of a dual system, leave roof unit blower turned off.**

Adjust engine RPM as outlined in TEST 4.

Arrange gauge set manifold hoses and tachometer leads to allow hood to be lowered, then close hood.

Place motor-driven psychrometer Tool C-3704 at cowl inlet opening. Distilled water should be used with this meter to prevent drying out and hardening the wet sock.

Place thermometer Tool C-3623 fully into right outlet grille opening. The left outlet should be fully extended and directed towards rear of vehicle.

Operate the air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important steps in making the over-all performance test is that the engine must be operated at the RPM as indicated on the above chart for approximately five minutes to allow all the under-hood components of the system to reach their operating temperature.

Partially close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the pointer. Do not close the needle valve completely since this would prevent the discharge pressure gauge from registering pressure.

This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound pressure is for **test purposes only.** To increase pressure restrict the air flow across the condenser using cardboard or paper. To decrease pressure, increase air flow across condenser with external floor fans.

Observe and record both the "Inlet Dry Bulb

SINGLE UNIT

INLET AIR WET BULB TEMPERATURE

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
40	41	42	43	44	45	46	47	48	49	50	50	51	51	52	52	53	53	54	54	55	56	57	58	59	60	61	62	64	66	68	69	70	71	72	73

DISCHARGE AIR DRY BULB TEMPERATURE

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 100°F NK1341A

Fig. 7 - Performance Temperature Chart-Single Unit Valiant

Temperature" as registered on the psychometer.

Observe and record "Discharge Air Temperature" registered by thermometer at right hand grille outlet.

From the appropriate "Performance Temperature Chart," for vehicle and type installation being tested (Figs. 7 thru 13), determine the maximum allowable discharge air temperature for the prevailing "Dry" and "Wet" bulb temperatures recorded.

If the vehicle's discharge air temperature is at or below the temperature given on the Performance Chart, the air-conditioning is delivering its cooling capacity. However, to assure trouble-free operation, continue with the "Evaporator Pressure Regulator

SINGLE UNIT

INLET AIR WET BULB TEMPERATURE

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
47	48	49	50	51	52	53	54	55	56	57	57	58	58	59	59	60	60	61	61	62	63	64	65	66	67	68	69	70	73	75	76	77	78	79	80

DISCHARGE AIR DRY BULB TEMPERATURE

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND100° F

PB260

Fig. 8 - Performance Temperature Chart-Single Unit Satellite and Barracuda

FRONT UNIT OF DUAL

INLET AIR WET BULB TEMPERATURE

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
43	44	45	46	47	48	49	50	51	52	52	52	53	53	54	54	55	55	55	56	56	57	58	59	60	61	61	62	64	66	68	69	70	71	72	73

DISCHARGE AIR DRY BULB TEMPERATURE

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F

NK1343A

Fig. 9 - Performance Temperature Chart-Front Unit Only Chrysler, Imperial, and Fury Models

ROOF UNIT OF DUAL

INLET AIR WET BULB TEMPERATURE

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
52	53	54	55	56	57	58	59	60	61	61	61	62	62	63	63	64	64	64	65	66	67	68	69	70	71	71	72	74	76	78	79	79	80	80	81

DISCHARGE AIR DRY BULB TEMPERATURE

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F

NK1344A

Fig. 10 - Performance Temperature Chart-Roof Unit of Dual Chrysler and Fury Models

Test 6".

If discharge air temperature at the outlet grilles is above the maximum allowable on Performance Chart, perform the "Evaporator Pressure Regulator and Expansion Valve Test" until proper performance is obtained.

FRONT UNIT ONLY
INLET WET BULB TEMPERATURE VERSUS DISCHARGE DRY BULB TEMPERATURE

INLET AIR WET BULB TEMPERATURE																																	
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
41	42	43	44	45	46	48	49	50	51	51	51	52	52	54	54	55	55	55	56	56	58	59	60	61	62	62	64	66	68	70	71	72	73	74	75
DISCHARGE AIR DRY BULB TEMPERATURE																																	

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F NP655

Fig. 11 - Performance Temperature Chart-Front Unit Only-Imperial

FRONT UNIT OF DUAL
INLET WET BULB TEMPERATURE VERSUS DISCHARGE DRY BULB TEMPERATURE

INLET AIR WET BULB TEMPERATURE																																	
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
43	44	45	46	47	48	50	51	52	53	53	53	54	54	56	56	57	57	57	58	58	60	61	62	63	64	64	66	68	70	72	73	74	75	76	77
DISCHARGE AIR DRY BULB TEMPERATURE																																	

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F NP653

Fig. 12 - Performance Temperature Chart-Front Unit of Dual-Imperial

TRUNK UNIT OF DUAL
INLET WET BULB TEMPERATURE VERSUS DISCHARGE DRY BULB TEMPERATURE

INLET AIR WET BULB TEMPERATURE																																	
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
42	43	44	45	46	47	49	50	51	52	52	52	53	53	55	55	56	56	56	57	57	59	60	61	62	63	63	65	67	69	71	72	73	74	75	76
DISCHARGE AIR DRY BULB TEMPERATURE																																	

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F NP654

Fig. 13 - Performance Temperature Chart-Trunk Unit of Dual-Imperial

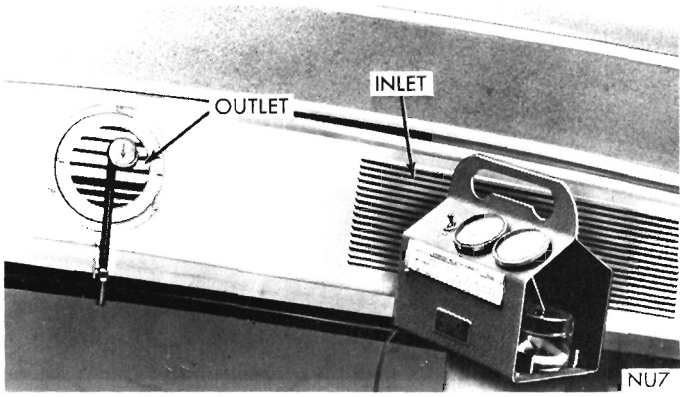


Fig. 14 - Roof Unit performance Test

ROOF UNIT PERFORMANCE TEST

The method used to test the roof unit of a dual installation is essentially the same as for a front unit. The front unit should be tested before testing the roof unit. Turn the front unit off by pushing the "OFF" button. Connect a jumper from the positive terminal of the battery to the compressor so that the refrigeration part of the entire system can be operated without air-flow through the front unit.

Open the windows, adjust engine speed to 1600 rpm for 6 cylinder engines and 1300 rpm for 8 cylinder engines and close the hood. Turn roof unit blower motor switch to "high" speed position. Place motor-driven psychrometer Tool C-3704 near roof unit air outlet grille and a thermometer Tool C-3623 in right-hand air outlet grille (Fig 14).

Operate the air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important factors in making the over-all performance test is that the engine must be operated at 1600 rpm for 6 cylinder engines and 1300 rpm for 8 cylinder engines for a sufficient time to build up to operating temperatures and allow all the under-hood components of the system to be subjected to the under-hood operating temperatures for a period of time.

Partially close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the discharge gauge point. Do not close the needle valve completely since this would prevent discharge pressure gauge from registering discharge pressure.

Read the discharge pressure on the gauge. This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound-pressure is for test purposes only. These pressures change according to the ambient temperature, humidity and the efficiency of the entire system.

Take necessary steps to bring and maintain the discharge pressure within these limits.

To increase the discharge pressure, restrict the air flow across the condenser using cardboard or paper. In high ambient temperatures and high humidity areas, it may be necessary to put an electric fan in front of the condenser to keep the pressure down to these limits.

Observe and record the "Inlet Dry Bulb Temperature" and "Inlet Wet Bulb Temperature" as registered on the psychrometer.

Observe and record "Discharge Air Temperature" registered by the thermometer at right-hand grille outlet.

From the appropriate Roof Unit Performance Temperature Chart for vehicle and type installation being tested (Figs.7 thru 13), determine the maximum allowable discharge air temperature for the prevailing "Dry" and "Wet" bulb temperatures. If the discharge air temperature is at or below the temperature given on the Performance Chart, the roof unit is delivering its rated cooling capacity.

If the discharge air temperature at the outlet grilles is above the maximum allowance on the "Performance Chart," perform the Evaporator Pressure Regulator and Expansion Valve Test," until proper performance is obtained.

TEST 6

EXPANSION VALVE AND EPR VALVE TEST (In Car)

Test must be made at room ambient temperature of 75 degrees F., under hood temperature 86 degrees F. minimum.

After performing tests 1 through 5 conduct the Expansion Valve and EPR (Evaporator Pressure Regulator Valve) Test as follows:

(a) Close the windows and operate the engine at the rpm shown below. Set air conditioning controls for "Max A/C", high blower and temperature control lever to full reheat position.

Set RPM's at:

800 for all 8 cylinder engines.

900 for 6 cylinder engines.

(b) Operate the system for at least five minutes in order to obtain partial stabilization and sufficient reheat to load the system. Pressure at the discharge service port should reach 140-210 psi. If the head pressure of 140-210 psi cannot be obtained, check the pressure drop across the EPR valve as described in paragraph (D) and replace if necessary. If EPR valve is satisfactory (open), proceed with steps (C), (E) and (F).

(c) Remove the expansion valve thermo bulb from its internal well in the suction line (Fig. 15) and hold it in your hand for several minutes until the suction pressure stabilizes. The evaporator suc-

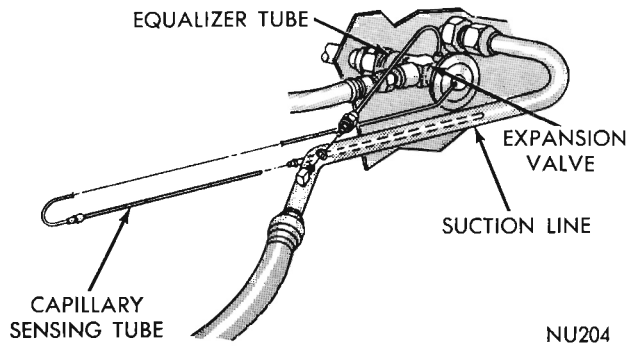


Fig. 15 - Expansion Valve Details (Typical)

tion pressure should read a minimum or 40 psi. Any expansion valve which does not produce this reading is faulty and should be replaced.

(d) The EPR valve should now be wide open, and the pressure drop across it should be no greater than 1-4 psi. The pressure drop can be established by the difference between evaporator and compressor inlet pressures. If the pressure drop is greater than 1-4 psi, the EPR valve is faulty, and should be replaced.

(e) Remove the expansion valve thermo bulb from its internal well and immerse it 5 inches into a container 32 degrees F. ice and water (Fig. 16).

The evaporator suction pressure should now read 21-25 psi. If the evaporator suction pressure does not pull down to 25 psi, then either the compressor or the expansion valve is faulty. In order to determine which is the bad component, raise the engine speed to 1750 RPM. If the evaporator suction pressure now reduces to 21-25 psi range, the expansion valve is operating satisfactorily, but the compressor is faulty.

(f) Immerse the expansion valve in 32 degrees F ice water. If the evaporator suction pressure reads 21 to 25 psi, the compressor inlet pressure should be 17 psi or less. If the compressor inlet pressure is higher than 17 psi, the EPR valve should be replaced.

EXPANSION VALVE TEST DUAL UNIT

The expansion valves for the front and rear units of a dual unit installation will have to be tested separately as follows:

(a) Close car doors and windows and operate the engine at 800 rpm. Set air conditioning controls at "Max A/C", high blower and temperature control lever to full reheat position.

(b) Operate the system for a few minutes to obtain partial stabilization and sufficient reheat to load the evaporator. The pressure at the discharge service port should read between 140 and 210 psi.

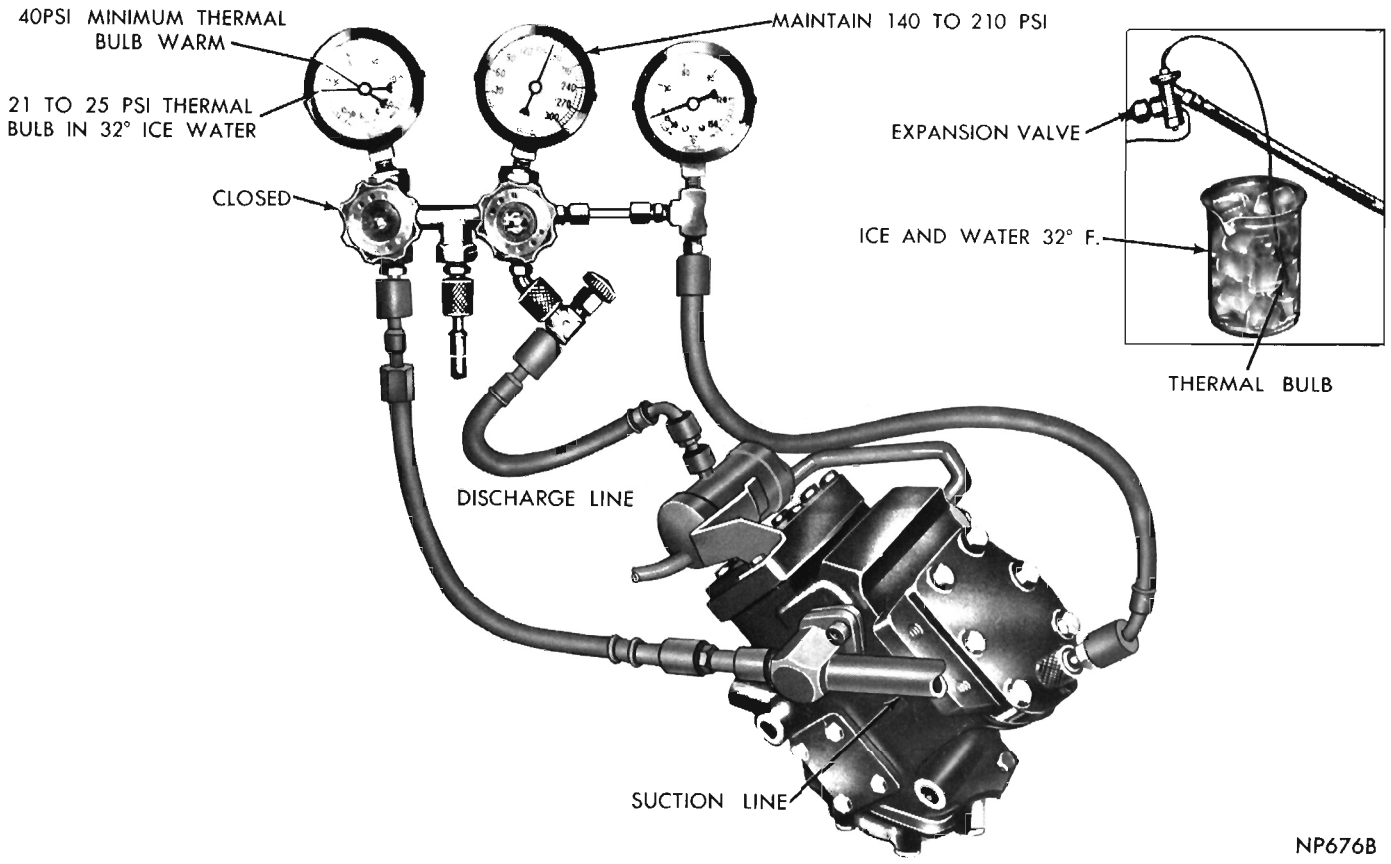


Fig. 16 - Expansion Valve and EPR Valve Test

before starting the test, (expansion valve thermo bulb in well).

(c) Place the sensing element thermo bulb of the rear unit expansion valve in a salt and ice water brine which is at a temperature of 18 degrees F., or lower and place the expansion valve thermo bulb of the front unit in a container of 32 degrees F., ice water. The evaporator suction pressure should read 21 to 28 psi. The compressor inlet pressure should be 22 psi or less. If the compressor inlet pressure is higher than 22 psi, the EPR valve should be replaced. If the evaporator suction pressure is greater than 28 psi, the EPR valve cannot be checked until after the expansion valve passes the test. Read Step (g) and continue with the test, Step. (d).

(d) Remove the front unit thermo bulb from the ice water and hold the bulb in your hand for several minutes until the suction pressure stabilizes. The evaporator suction pressure should read a minimum of 40 psi. Any expansion valve which does not produce this reading is defective and should be replaced. With the evaporator suction pressure reading a minimum of 40 psi under the conditions in step (d) above, the compressor inlet pressure should read 1 to 4 psi less. If the compressor inlet pressure is more than 4 psi less than the evaporator suction pressure, the EPR valve is defective and should be replaced.

(e) Then, place the front unit expansion valve thermo bulb in the 18 degree F., ice water and brine solution and place the rear unit thermo bulb in the 32 degree F., ice water solution. The evaporator suction pressure should read 17 to 25 psi.

(f) Remove the rear unit expansion valve thermo bulb from the ice water solution and hold the bulb in your hand for several minutes until the suction pressure stabilizes. The evaporator suction pressure should read a minimum of 35 psi. Any expansion valve which does not produce this reading is defective and should be replaced.

(g) If the evaporator suction pressure was greater than 28 psi. (step (c) and 25 psi. (step (e), one or possibly both of the expansion valves are stuck open. The expansion valve that produced the least evaporator suction pressure change when its thermo bulb was moved from in the 32 degree F., ice water to in the hand location, is stuck open and should be replaced. After replacing the defective expansion valve, charge the system and repeat the testing of the other expansion valve.

If the expansion valve passes Tests (a) through (g), then the compressor valve plate should be removed and the gaskets and valves inspected. Replace gaskets and any damaged valve plate assemblies. **Make sure that all of the old gasket material is removed from the valve plates, cylinder head and crankcase before rebuilding the compressor.**

COMPLETE SYSTEM DISCHARGE AND RECHARGE

INDEX

	Page
Charging the System	37
Discharge the System	36
Evacuate the System	37
Refrigerant Service	35
Removing Sweep-Test Charge	36
Replace Receiver Drier	36
Sweep-Test Charge	36
Testing the System for Leaks	27

REFRIGERANT SERVICE

Use only Refrigerant 12 in the air-conditioning system. Refrigerant 12 is available in bulk tanks or in sealed 15 ounce cans. The use of canned refrigerant is preferred by most technicians because it provides a very quick and simple means of adding refrigerant or charging the system completely. Refer to the Refrigerant Charge Chart.

REFRIGERANT CHARGE

	Single	Dual*
All Models except Valiant	3-1/4 lbs.	4-1/4 lbs.
Valiant	2-3/4 lbs.	

* Not used on Barracuda or Satellite Models

An accurate scale must be used to insure charging with the proper amount of refrigerant.

Since the use of canned refrigerant is preferred universally, only that method is described.

Before the system can be opened for replacement of lines or components, the system must be completely discharged. Whenever the system has been opened, it must be swept with a partial charge, and the entire system tested for leaks. Compressor oil level should be checked and adjusted, if necessary. See "Oil Level". The drier should be replaced and the system evacuated using a vacuum pump to remove all air and moisture. The system

should be charged with the proper amount of refrigerant. Detailed instruction for performing these operations follow.

DISCHARGE THE SYSTEM

(1)Be sure the valves of the gauge manifold set are closed before attaching the gauge set manifold (suction test hose to the suction service port and discharge test hose to the discharge service port). Attach the long test hose to the center connection of the gauge set manifold. Lead the other end of this hose into an exhaust ventilation system outlet or to the outside of the building.

(2) Open the gauge set manifold needle valve and close both of the gauge set manifold gauge valves.

(3) With the vehicle windows open and hood up, operate the engine as shown in the following chart:

	Engine	Engine R.P.M.
All Models except Valiant	6 Cyl.	1600
	8 Cyl.	1300
Valiant	6 Cyl.	1250
	8 Cyl.	1000

(4) Push in "A/C" button, fan switch on high. On dual installation both blowers must be on high speed during the charging operation.

"Valiant installation—push in the "A/C" button and fan switch on high.

(5) Allow the system to operate at full capacity for at least 15 minutes at the rpm shown in the chart. This will cause most of the compressor oil in the system to return to the compressor crankcase.

(6) Push the "Off" button. Shut off the engine. Open the discharge right-hand gauge valve a small amount. This will allow the refrigerant vapor to discharge **slowly.**

CAUTION: Do not allow the system to discharge rapidly since this would sweep some of the refrigerant oil out of the compressor.

(7) Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand valve to release any vapor trapped at the suction side of the system.

SWEEP-TEST CHARGE

The purpose of the sweep-test charge is to pressurize the system so that a leak test can be made. The sweep-test charge also serves the purpose of drying the system or sweeping out trapped moisture. Repairs and component replacement must be completed before charging with the sweep-test charge.

(1) Close both gauge set manifold valves and open the gauge set manifold needle valve.

(2) Attach the free end of the long hose used for discharging to the refrigerant dispensing manifold.

(3) Attach a single can of Refrigerant 12 to the dispensing manifold. Place the refrigerant in 125 degree water. For detailed instructions on attaching refrigerant can for charging, see "Charging the System" in this section.

(4) With vehicle windows open and hood up, proceed with test as follows:

(5) Start engine and adjust R.P.M. as indicated in chart under "Discharge The System".

(6) Push in "A/C" button, fan switch on high. On dual installation both blowers must be on high speed during the charging operation.

(7) Slowly open the left-hand gauge set manifold valve to meter the refrigerant into the system. When the full can of refrigerant has been metered into the system, close the gauge set manifold valves and the refrigerant manifold valve.

If the system has been opened for repair or replacement, a complete leak test must be made to make sure the system is sealed. Also, if the system has accidentally lost its charge it will be necessary to perform a leak test while the sweep-test charge is in the system. Stop the engine and disconnect the test hoses and adapters from the compressor service ports.

REMOVE SWEEP-TEST CHARGE

If the system is free of leaks, or after correcting a leak, and if no air-conditioning components have been removed, add the necessary refrigerant as described under "Correcting the Low Refrigerant Level." If any parts of the refrigerant system were disconnected remove the sweep-test charge. Close the refrigerant manifold valve so that any refrigerant remaining in the container is sealed. Remove the long test hose from the refrigerant manifold. Insert the free end of this test hose into an exhaust system outlet. Open the right-hand gauge set manifold valve a fraction of a turn to let the sweep-test charge escape slowly. Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand gauge valve to allow any refrigerant trapped in the suction side of the system to escape.

REPLACE THE RECEIVER-DRIER

The system must be discharged and swept with a test charge before replacing the receiver-drier.

To remove the receiver-drier, simply unscrew it at the fittings and disconnect Low Pressure Cut-off wires. When installing a new receiver-drier, use new "O" rings. Tighten the new unit to 40

foot-pounds. **Do Not** overtighten as this might damage the "O" rings. Connect Low Pressure Cut-Off Wires.

CAUTION: Replacement receiver-drier units must be sealed while in storage. The drier used in these units is so hungry for moisture that it can saturate quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick re-assembly to avoid keeping the system open any longer than necessary.

EVACUATE THE SYSTEM

Whenever the system has been opened to atmosphere, it is absolutely essential that the system be swept with refrigerant and evacuated or "vacuumed" to remove all the air and the moisture. If any appreciable amount of air remains in the system when it is charged, the trapped air will concentrate near the top of the condenser and cause abnormally high discharge pressure. Air in the system will reduce the condenser's ability to condense the refrigerant gas and supply adequate liquid refrigerant to the evaporator. To evacuate the system, proceed as follows:

(1) Connect gauge set manifold to compressor and long test hose from gauge set manifold center connection to vacuum pump, Tool C-3652, as shown in Figures 1 and 2.

(2) Open both gauge set manifold valves, and the needle valve.

(3) Start the vacuum pump and operate until the evaporator-suction gauge registers at least 26 inches of vacuum. If system is tight and pump in good condition, vacuum will go as low as 28 inches.

(4) Allow vacuum pump to operate with the suction gauge registering 26 to 28 inches of vacuum for a minimum of five minutes.

(5) Close both gauge set manifold valves, turn off vacuum pump and remove test hose from vacuum pump. Leave gauge set manifold connected to compressor. Charge system with proper amount of Refrigerant 12. **Failure to pull at least 26 inches of vacuum indicates a leak in the refrigeration system or a defective vacuum pump. Locate and correct the trouble before recharging the system.**

CHARGING THE SYSTEM (Figs. 3 and 4)

An accurate scale must be used to insure charging with the proper amount of refrigerant.

The special refrigerant dispensing manifold permits charging three full cans of refrigerant at one time.

Keep the refrigerant manifold valves capped

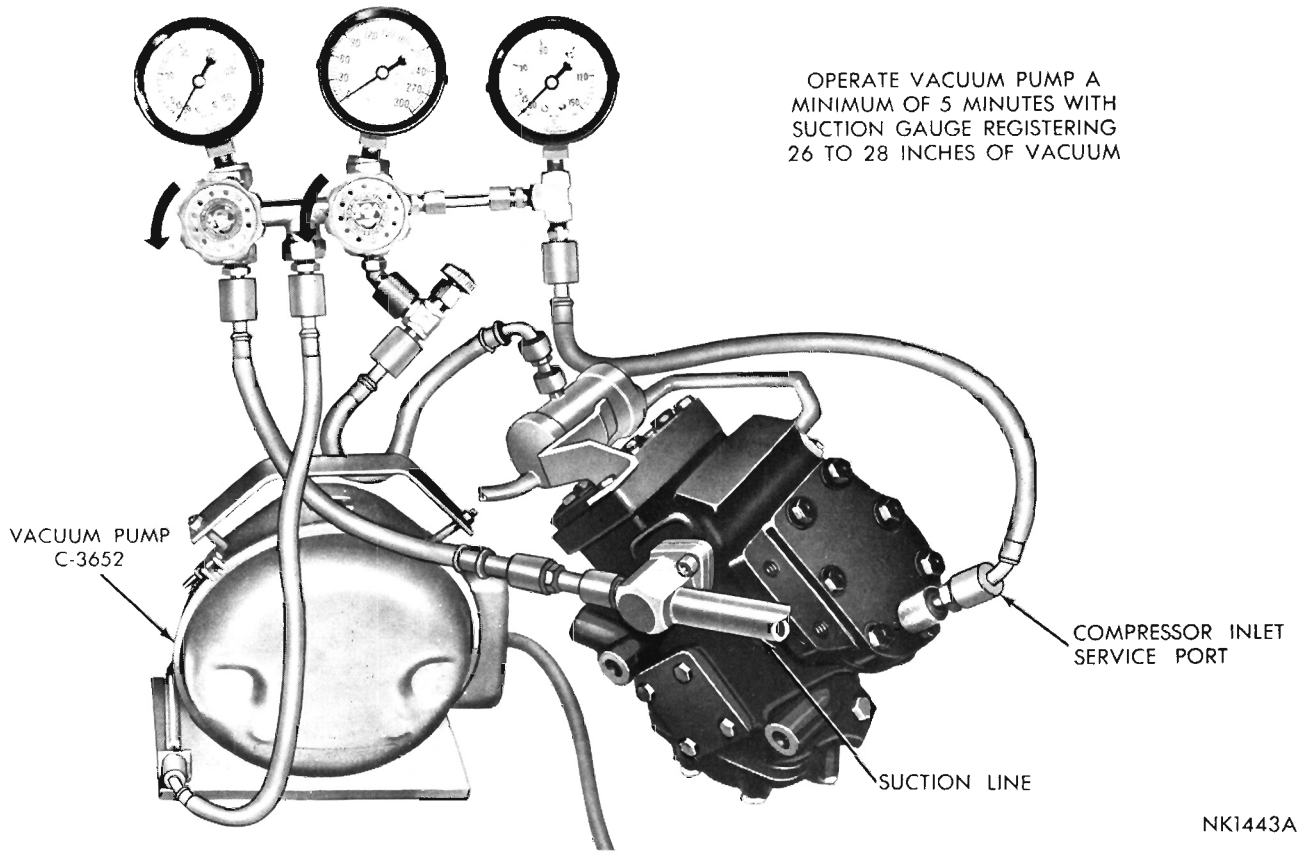


Fig. 1 - Evacuating the System - All Models Except Valiant

when not in use. Keep a supply of extra refrigerant-can-to-refrigerant-manifold gaskets on hand so that gaskets can be replaced periodically. This will insure a good seal without excessive tightening of the can or the manifold nuts.

(1) Attach center hose from gauge set manifold to refrigerant dispensing manifold. Turn refrigerant manifold valves completely counterclockwise so they are fully open. Remove protective caps from refrigerant manifold.

(2) Screw refrigerant cans into manifold. Be sure manifold-to-can gasket is in place and in good condition. Tighten can and manifold nuts to 6 to 8 foot-pounds.

(3) Turn three refrigerant manifold valves completely clockwise to puncture the cans and close the manifold valves.

(4) Turn refrigerant manifold valves counterclockwise to open them.

(5) Momentarily loosen the charging hose at the gauge set manifold to allow the refrigerant gas to purge air out of the charging hose.

(6) Place the three cans of refrigerant into a pan containing hot water at a temperature of 125 degrees F.

(7) Start engine and adjust speed as outlined under "Discharge the System".

(a) Charge the system through the suction side of the system by slowly opening the left-hand gauge set manifold valve. Adjust valve as necessary so charging pressure does not exceed 50 psi. Maintain the temperature of the water in the pan by adding warm water as necessary.

(b) When all three cans of refrigerant are completely empty, close gauge set manifold valves and refrigerant manifold valves.

(c) If more than three cans of refrigerant are necessary to complete charge repeat steps two through six.

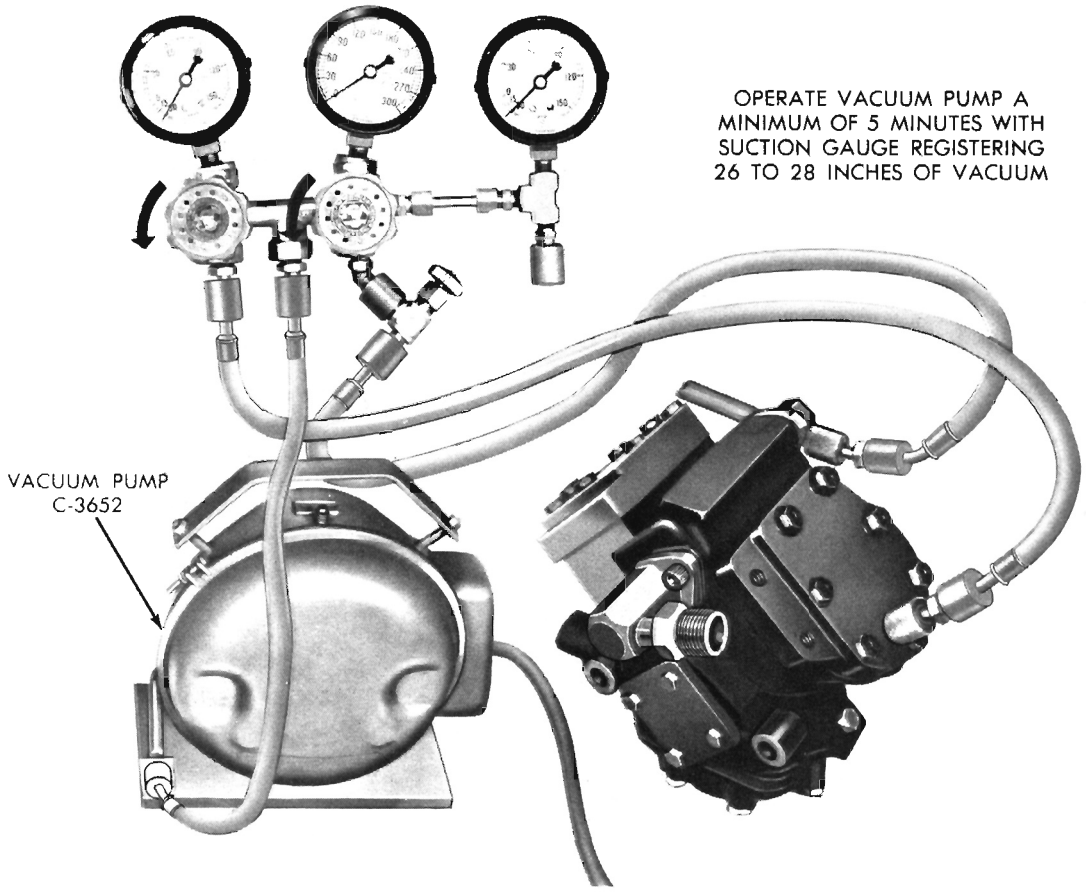


Fig. 2 - Evacuating the System - Valiant

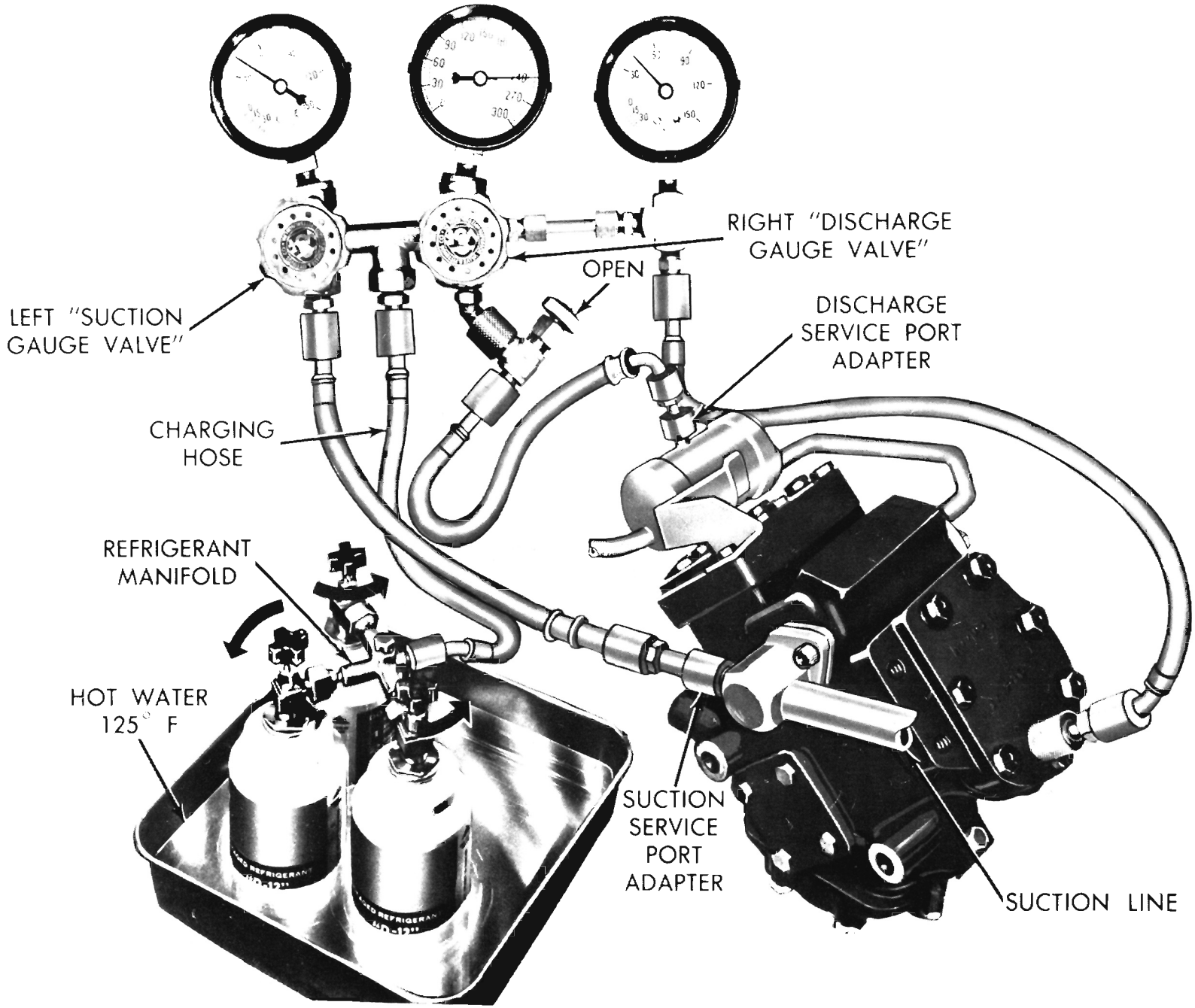


Fig. 3 - Complete Charging of the System - All Models Except Valiant

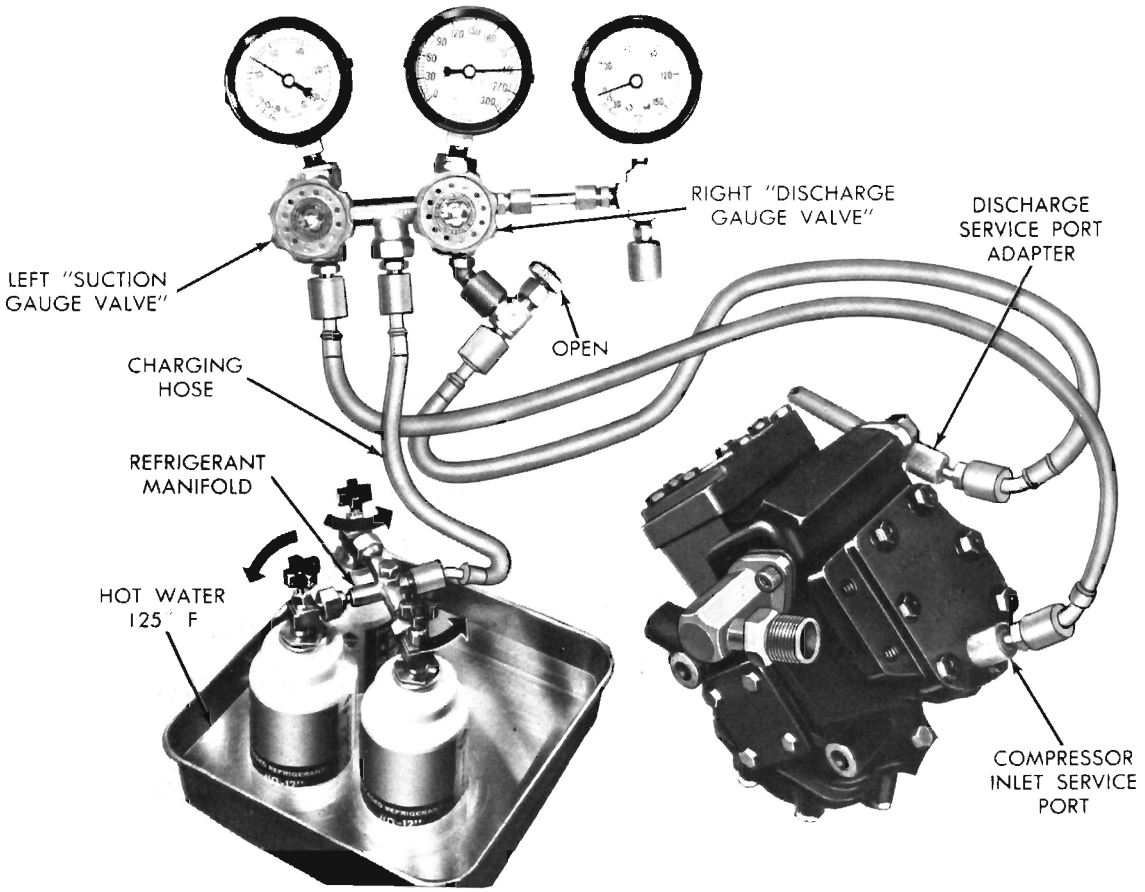


Fig. 4 - Complete Charging of the System - Valiant

SERVICE PROCEDURES

INDEX

	Page
Anti-Freeze Recommendations	41
Compressor Drive Belt Adjustment	41
Handling Tubing and Fittings	40
Radiator Pressure Cap	42
Vacuum Control System Adjustments and Tests	42

HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed.

The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly. Use a suitable tube bender when bending the refrigerant lines to avoid kinking. **Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.**

A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 3 inches from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

"O" rings and fittings must be in good condition. The slightest burr or foreign material may cause a leak. "O" rings and fittings must be coated with refrigerant oil to allow the connec-

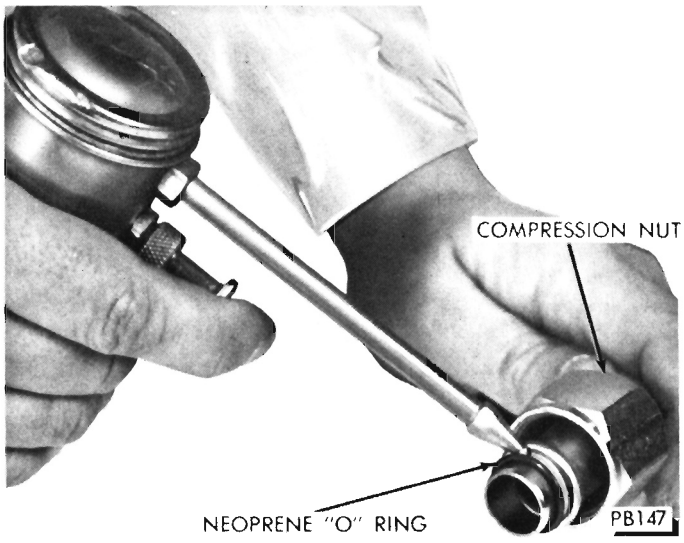


Fig. 1 - Lubricate with Refrigerant Oil - Typical

tions to seat squarely and to be tightened evenly to the proper torque. Fittings which are not oiled with refrigerant oil are almost sure to leak (Fig. 1).

The use of proper wrenches when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings. Always use two wrenches when loosening or tightening tube fittings to prevent distorting of lines and components.

The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure-moisture-free Refrigerant 12 and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause operational troubles or even serious damage if present in more than minute quantities.

When it is necessary to open the refrigeration system, have everything you will need to service the system ready so that the system will not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used.

All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses should be kept clean and dry.

The special refrigeration oil supplied for the system is as clean and dry as it is possible to make it. **Only refrigeration oil** should be used in the system or on the fittings and lines. The oil container should be kept tightly capped until it is ready for use, and then tightly capped after use to prevent entrance of dirt and moisture. Refrigerant oil will quickly absorb any moisture with which it comes in contact.

COMPRESSOR DRIVE BELT ADJUSTMENT

Satisfactory performance of the air-conditioning system is dependent upon drive belt condition and tension. If the proper tensions are not maintained, belt slippage will greatly reduce air-conditioning performance and drive belt life. To avoid such adverse effects, the following service procedure should be followed:

(1) Any belt that has operated for a minimum of a half-hour is considered to be a "used" belt. Adjust air-conditioning drive belts at the time of new-car preparation. See Chart, "Accessory Belt Drives."

(2) Measure drive belt tension at regular service intervals using torque method, and adjust as needed.

(3) On all new-belt installations, new-belt tension specifications should be used when the belt is first installed to obtain proper tension. Thereafter, these replacement belts should be serviced according to the above procedure. Always replace belts in pairs if so equipped, otherwise the old belt will have insufficient tension and the load will be primarily on the new belt. See Chart, "Accessory Belt Drives," "Group 7 Cooling."

ANTIFREEZE RECOMMENDATIONS

The Air-Conditioning System requires the engine's cooling system to be protected to —15 degrees F. with a permanent type antifreeze for summer operation. This is to prevent freezing of the coolant in the heater core.

However, this protection does not provide sufficient corrosion inhibitors for the engine cooling system. Summer protection to —15 degrees F. will provide adequate inhibitors for protection of engine cooling system against corrosion.

In the springtime, after winter's operation with the cooling system protected with permanent-type antifreeze for the temperatures of the area, it is suggested the system be drained and flushed out with water. When draining, flushing and refilling, have the temperature control lever in the extreme hot position so the heater core is drained, flushed and refilled. Install a gallon of permanent type antifreeze in the system, and add enough water to fill the system.

Do not re-use the old antifreeze. The permanent type antifreeze does not lose its antifreeze qualities during the winter season operation, but the chemical inhibitors for rust and corrosion prevention are weakened and finally exhausted by extended use. Do not add new inhibitor to used antifreeze in hope or revitalizing the used antifreeze.

The chemical inhibitors come in various chemical compositions, some are compatible, some neutralize each other, and some form violent reactions to

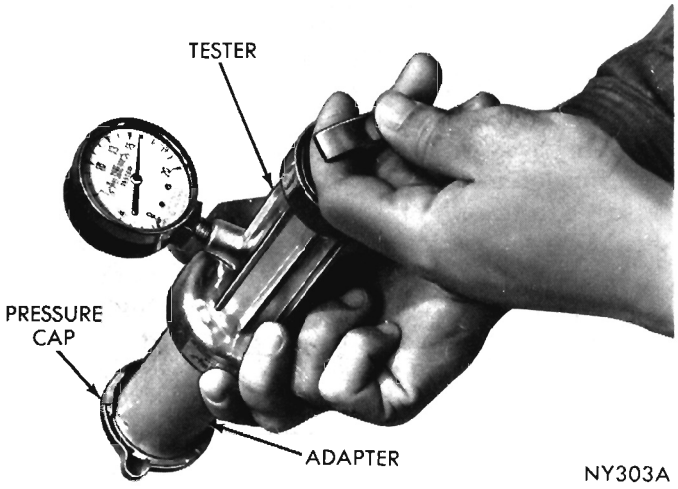


Fig. 2 - Radiator Cap Tester

each other causing foaming and other undesirable reactions. Play it safe and use new permanent-type antifreeze.

RADIATOR PRESSURE CAP

All air conditioned vehicles must be equipped with a 15 to 16 psi radiator cap.

A radiator pressure cap testing below these specifications will permit loss of coolant during a hard pull on a hot day, or in slow moving traffic, or when the engine is stopped on a hot day.

Test the radiator pressure cap, using Tool C-4080 (Fig. 2). Before assembling adapter and radiator pressure cap to the pump, dip radiator cap and both ends of adapter into clean water to assure a tight seal.

Hold the assembled tester in a vertical position with the radiator cap downward, (Fig. 2). Stroke the tester pump plunger until the gauge indicates the pressure cap is relieving pressure. It must relieve at a pressure between 14 to 17 psi. If within these specifications, reinstall on the radiator. **These test specifications are for caps tested at average altitudes. In high altitudes, the test specifications are lowered about one (1) psi for each 2,000 feet above sea level.**

If the radiator cap does not test within these specifications, replace it with a cap that does.

VACUUM CONTROL SYSTEM ADJUSTMENTS AND TESTS

The test of the push-button operation determines whether or not the vacuum and electrical circuits are properly connected and the controls are functioning properly. However, it is possible that a vacuum control system that operates perfectly at the high vacuum provided at engine idle speed may not function properly at high engine speeds. Before starting this test, stop engine and make certain the vacuum source hose at engine intake

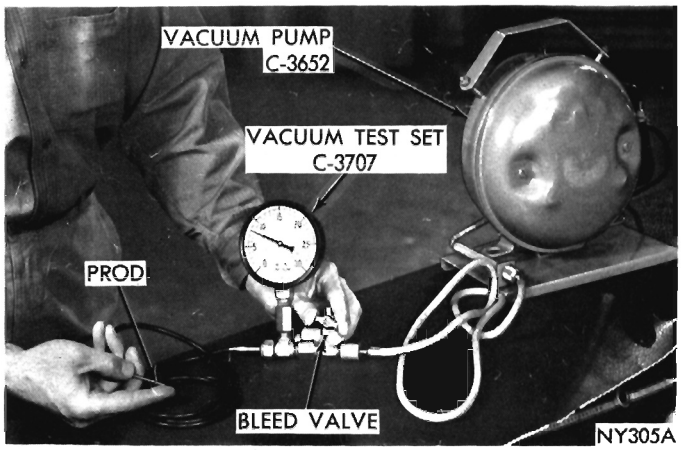


Fig. 3 - Adjust Vacuum Test Bleed Valve

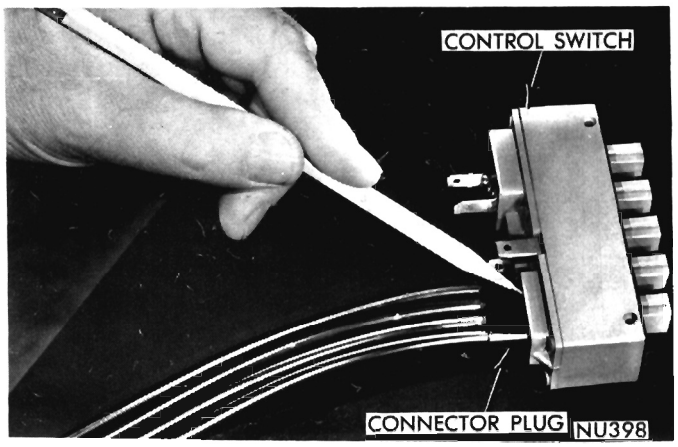


Fig. 4 - Push Button Vacuum Test

manifold is tight on its connector.

Start vacuum pump (Tool C-3652) and connect to the vacuum test set (Tool C-3707). Adjust bleed valve on test set to obtain exactly 8 inches of vacuum with a finger blocking the prod on end of test hose (Fig. 3).

It is essential that the bleed valve be adjusted so the vacuum gauge pointer will return to exactly 8 inches when the prod is covered by a finger. Otherwise a false reading will be obtained when the control circuit is tested.

CAUTION: Alternately release and reblock the hose prod several times. Make sure the bleed valve is adjusted so the vacuum gauge pointer returns to exactly 8 inches of vacuum when the prod is covered with a finger.

Disconnect engine vacuum source hose at engine intake manifold and insert vacuum tester hose prod into source hose leading to control switch. Place vacuum gauge on the cowl so it can be observed from the driver's position as push buttons are operated.

Start the test by pushing the "HEAT" button. Vacuum tester gauge needle will drop until the

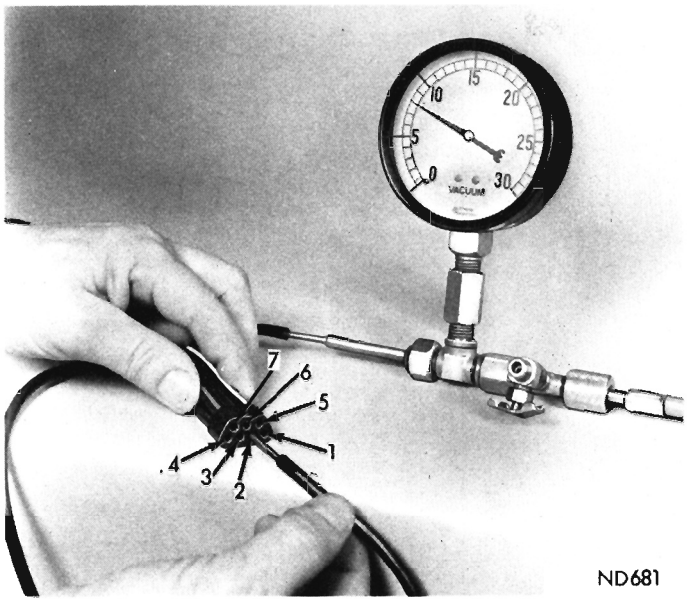


Fig. 5 - Vacuum Tube Assembly Test

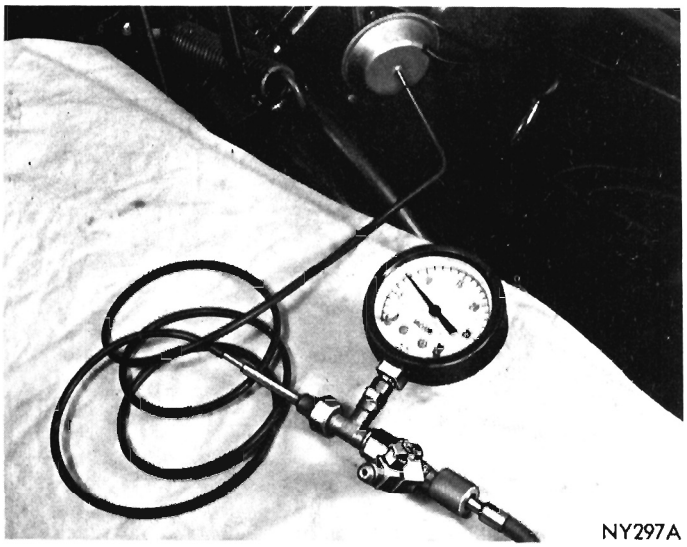


Fig. 6 - Vacuum Actuator Test

actuator has operated, and then will return to 8 inches. Note how much the vacuum drops below 8 inches. Continue to push buttons; "Off," "Max. A/C" "A/C", "Defrost" and "Heat" allowing time for actuators to operate after each button is pushed, and note the vacuum drop below 8 inches after each operation. The maximum allowable vacuum drop below 8 inches after each operation is 3/4 inch.

If the vacuum drop is more than 3/4 inch, first recheck the tester for reading exactly 8 inches. If correct, inspect the fit of the 7-hole hose connector plug on the control switch (Fig. 4). This plug must be positioned all the way on the 7 prods on the control switch.

CAUTION: Do not use lubricant on the switch prods or in the holes in the plug, as lubricant will ruin the vacuum valve in the switch. If it is impossible to properly position the connector plug all the way on the switch prods, put a drop or two of clean water in the holes of the connector plug. This will allow the plug to slide completely on the switch prods.

If vacuum drop is now within limits, proceed with the over-all performance test. If vacuum drop is still in excess of 3/4 inch, remove connector plug from the switch. Insert the vacuum test prod alternately in each of the connector holes except the source hose connector hole (Fig. 5).

Note amount of vacuum drop **below** 8 inches after each actuator has operated. If vacuum test gauge comes back to 8 inches at each of the 6 holes, the hoses and actuators are not leaking. The control switch is faulty and must be replaced. If excessive vacuum drop shows up at one or more holes in connector block, isolate faulty hose or actuator.

Inspect hose connections to the actuator involved. Then test whether actuator or hose is at fault; use the test hose on the actuator involved (Fig. 6).

A leak in a hose may be detected with leak tester by running the fingers along the hose and watching vacuum gauge reading. A faulty spot may be cut out and the hose spliced, using 1/8 inch 00 copper tubing.

A vacuum drop in excess of 3/4 inch below the 8 inches needed in this test would not interfere with the engine operation, other than perhaps to cause a rough idle. It could, however, interfere with the proper operation of the air-conditioning and heating controls at high speeds and during acceleration.

SERVICING THE COMPRESSOR

INDEX

	Page		Page
Compressor	45	Magnetic Clutch	44

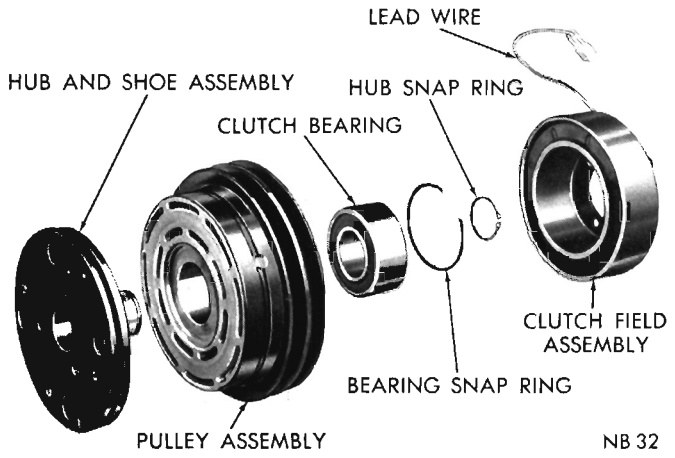


Fig. 1 - Warner Clutch

The compressor is equipped with an electro-magnetic clutch that is built-in the drive pulley assembly. (Fig. 1).

An electro-magnetic field coil is mounted on the compressor and electrical connections made directly to the coil lead. The electromagnet does not rotate with the drive pulley, therefore, collector rings and brushes are eliminated.

Testing Electromagnet Current Draw

To test the coil for a short or open circuit, connect an ammeter (0-10 ampere scale) in series with a fully charged 12 volt battery and the field coil lead. The current draw at 12 volts and 68 degrees temperature should be as follows:

2.7 to 3.3 amperes for Warner (Copper Wire).

4.0 to 4.6 amperes for Warner (Aluminum Wire).

Note: Housings on Aluminum coils bear the letter "AL".

Removal (All)

(1) Loosen and remove the belts. Disconnect clutch field lead wire at the connector.

(2) Remove the special locking bolt and the washer from the compressor crankshaft at the front center of the clutch.

(3) Insert a 5/8 in.-11 x 2-1/2 in. cap screw into the threaded portion of the hub assembly.

(4) Support clutch with one hand, then tighten cap screw until clutch is removed.

(5) Remove the three hexagon head screws attaching the clutch field assembly to the compressor and lift off the assembly.

Installation(All)

(1) Install clutch field coil assembly on the base of compressor bearing housing. Make sure coil assembly is positioned so lead wire points to left of compressor as viewed from the front. Install the three mounting screws and tighten to 17 inch-pounds.

(2) Insert woodruff key in the crankshaft.

(3) Insert clutch assembly on crankshaft.

(4) Install washer and a new self-locking bolt. Hold clutch from turning with a spanner wrench inserted in the holes of front bumper plate. Tighten to 20 foot-pounds.

(5) Connect field lead wire.

(6) Install belts and tighten to the specified tension.

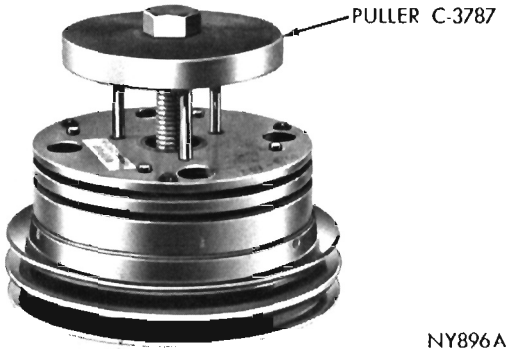


Fig. 2 - Remove Hub and Shoe Assembly

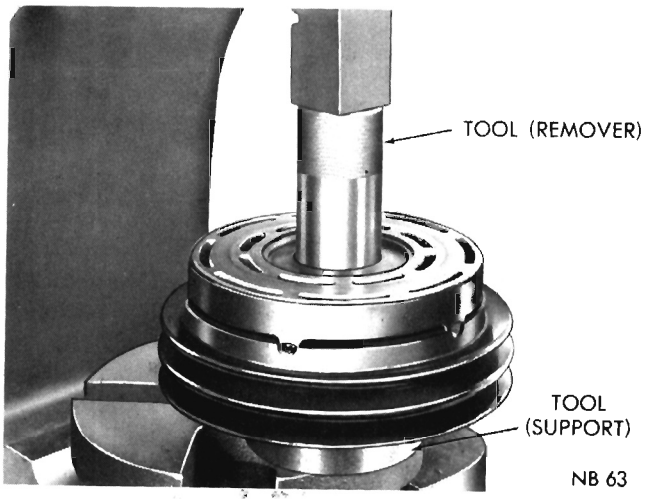


Fig. 3 - Removing Bearing From the Pulley Assembly

Disassembly

(1) Remove the small snap ring from the drive hub.

(2) Install drive hub puller Tool C-3787 aligning the three pins of the Tool in the three holes in the hub and shoe assembly. Compressors mounted on eight cylinder engines will be equipped with clutches with four holes in them, in this case use puller tool C-4154. Tighten the hex head bolt down until the drive hub is removed from the bearing (Fig. 2).

(3) Remove bearing snap ring from pulley.

(4) Place pulley assembly on an arbor press, with pulley side down, and bearing hub centered

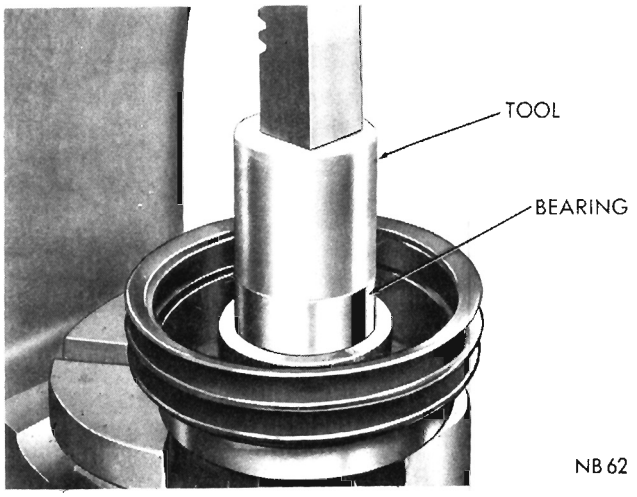


Fig. 4 - Installing a New Bearing in the Pulley Assembly (Typical)

on Tool C-3825. Install Tool SP-3496 on inner race of bearing and press the bearing from the pulley assembly (Fig. 3).

A new bearing must be installed every time the magnetic clutch is disassembled.

Assembly

(1) Install pulley assembly with pulley side up on an arbor press and insert a **new** bearing into the bore. Install Tool C-3807 against the bearing and press into position (Fig. 4).

(2) Install pulley assembly with pulley side facing down on Tool C-3807.

(3) Start drive hub into the inner bearing race, and press hub into position with an arbor press.

(4) Install bearing snap ring and hub snap ring.

CAUTION: The pulley assembly and hub assembly are mated parts. They are burnished at the factory before shipment. No attempt should be made to replace either unit separately as this may reduce the initial torque of the clutch.

COMPRESSOR

The compressor is a two-cylinder, reciprocating-type designed specifically for the Chrysler Air-Conditioning System. Service parts are available so that the compressor can be repaired in the field.(Fig. 5)

Some parts are serviced individually and some are serviced in packages which include two or

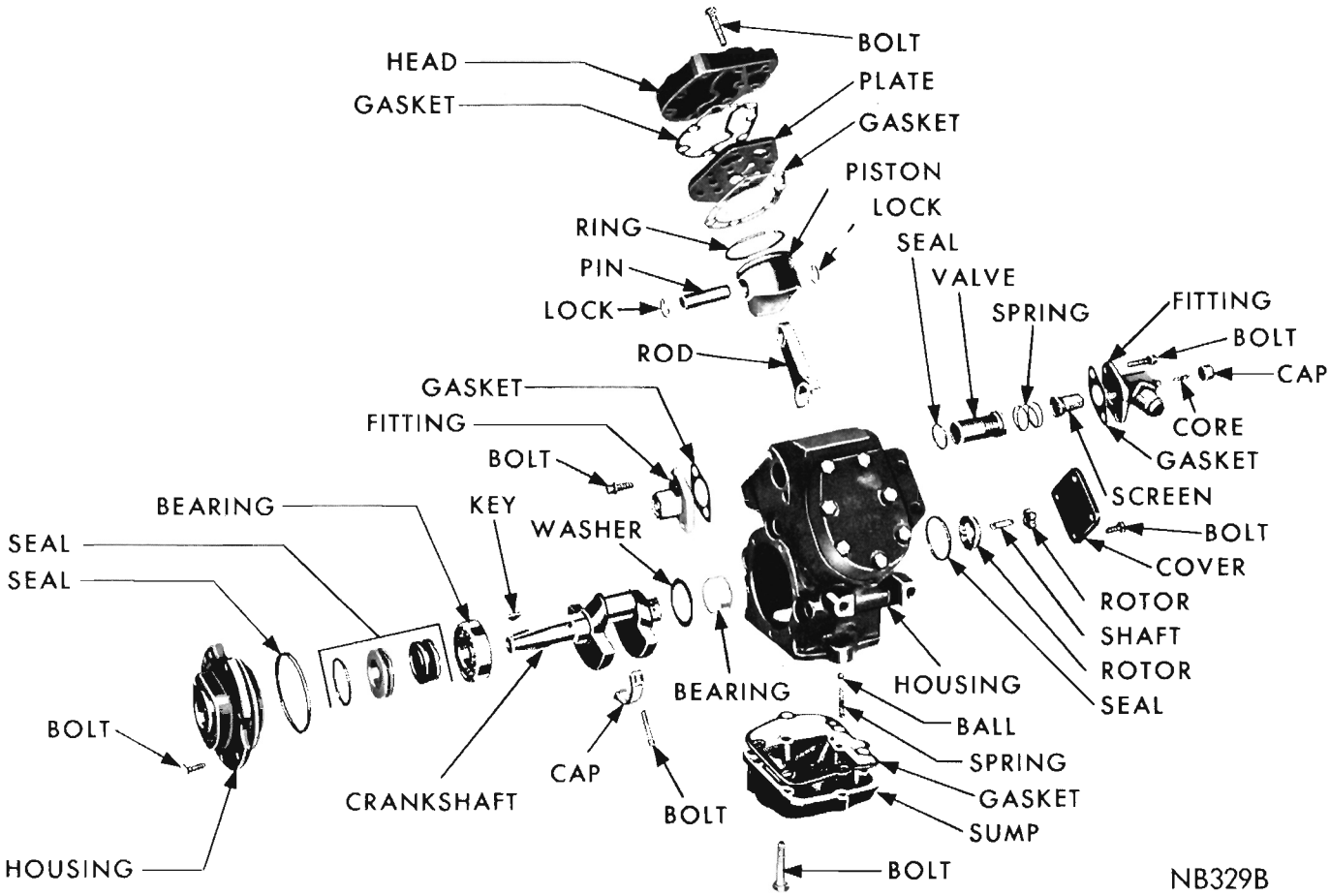


Fig. 5 - Compressor Disassembled

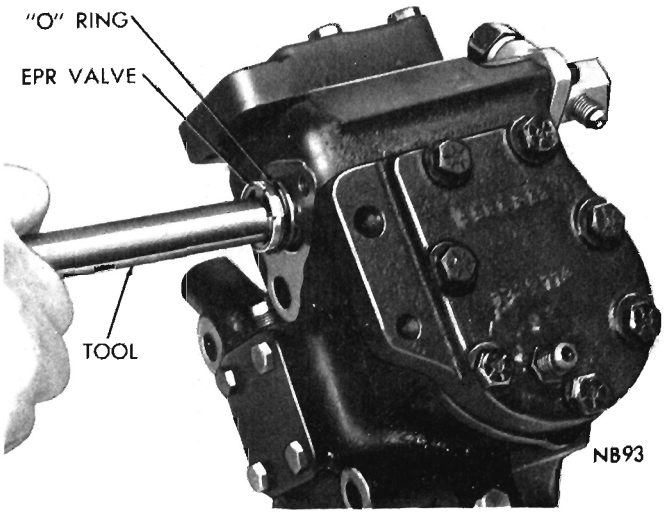


Fig. 6 - Removing the EPR Valve

more service parts. Refer to the parts book for this information.

CAUTION: The refrigerant oil used in the compressor is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in the system when the refrigerant is discharged for testing or unit replacement. If the compressor is to be removed for repair or replacement, measure the refrigerant oil level in the compressor before the compressor is removed from the vehicle so that the same oil level can be established when the new or repaired compressor is installed on the vehicle.

Too much refrigerant oil in the system can cause abnormal operating pressures and reduce the performance of the entire system.

Complete disassembly and assembly of the compressor must be performed with the compressor removed from the vehicle. On some models however, the valve plate and crankshaft gas seal assemblies can be repaired with compressor installed on vehicle.

CAUTION: The system must be completely discharged before attempting to perform any disassembly or repair service to the compressor. Before bleeding system down, cover clutch with a cloth to prevent contamination of clutch pole faces.

Before disassembling the compressor, clean exterior surfaces thoroughly.

Cleanliness is extremely important. The work area must be clean and free of air-borne dust and dirt. All parts must be thoroughly cleaned and blown dry before reassembly.

Do not use air to dry the crankshaft front main bearing Wash bearing in **clean** mineral spirits and shake out all excess cleaning fluid. Saturate bearing with **clean refrigerant oil** and assemble immediately. Any dirt in the front main bearing assembly will cause noisy operation and possible damage to bearing.

CAUTION: Before reassembly of any unit, all contact surfaces must be liberally coated with clean refrigerant oil. Refrigerant oil must be kept in a sealed container until ready for use to prevent entrance of moisture and dirt. Never use engine oil as a substitute for refrigerant oil.

EPR Valve(Evaporator Pressure Regulator)

Removal(System Discharged)

(1) Remove the two "EPR" Valve suction line fitting bolts, the fitting which also contains the compressor suction screen, spring, and the gasket.

(2) Remove the "EPR" Valve and "O" ring from the compressor using Tool C-3822 by rotating the valve counterclockwise slightly (Fig. 6).

CAUTION: Do not handle the "EPR" Valve more than necessary. The valve should be inspected externally and wiped clean with a lint-free cloth. Place the valve in a plastic bag until ready to be installed.

Installation

(1) Install new "O" ring on the "EPR" Valve.

(2) Lubricate "O" ring with refrigerant oil and install "EPR" Valve in the compressor with Tool C-3822 while rotating the valve counterclockwise.

(3) Install compressor suction screen in the "EPR" Valve suction line fitting.

(4) Install suction line fitting gasket, spring, fitting, and tighten the attaching bolts to 8 to 14 foot-pounds.

(5) Recharge System.

Compressor

Removal

(1) Discharge the system.

(2) Measure and record the refrigerant oil level so that the oil level of a replacement or repaired compressor can be adjusted to the **exact level in the compressor removed from the vehicle.** See "Oil Level."

(3) Disconnect suction line from suction muffler and the discharge line from the muffler fitting.

CAUTION: Plug or cap all the lines as soon as they are disconnected to keep the moisture out of the system.

(4) Disconnect the magnetic clutch-to-control-unit wire.

(5) Loosen and remove compressor pulley belts.

(6) Remove the compressor-to-bracket attaching bolts, and remove compressor.

Installation

(1) Install the compressor to the bracket, and tighten the attaching bolts.

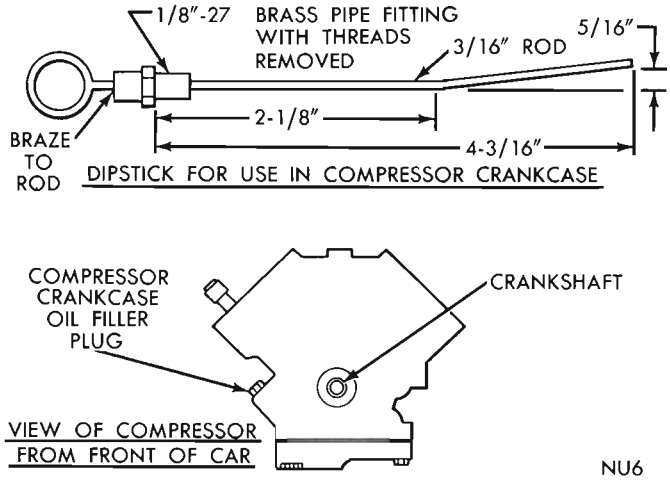


Fig. 7 - Compressor Dip Stick Chart

(2) Install compressor pulley belts.

(3) Connect magnetic clutch-to-control-unit wire.

(4) Remove the caps or plugs and connect the suction line to the suction muffler and connect discharge line to the muffler fitting.

CAUTION: When replacing the compressor assembly, the crankshaft should be rotated by hand at least two complete revolutions to clear oil accumulation from the compressor head before the clutch is energized to avoid damaging the compressor reed valves.

Oil Level—Compressor

When a new compressor is installed at the factory, the compressor contains 10 to 11 ounces of a special wax-free refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system. Consequently, once the system has been in operation, the amount of oil left in the compressor will always be less than the original charge of 10 to 12 ounces. **The compressor oil level should be checked as a matter of routine, whenever the refrigerant has been released from the system.**

(1) Operate the system for 15 minutes at 1000 engine rpm for eight cylinder engines and 1100 engine rpm for six cylinder engines. These engine settings will provide a compressor speed of approximately 1200 rpm.

(2) Open car windows and keep engine hood raised.

(3) Press the "A/C" button and turn blower switch to high. **On completion of the above operations, shut the air conditioning off, without changing any of the described settings.**

After the system has been bled down, wait ten minutes for refrigerant to boil off and then measure the oil in the compressor by inserting a dipstick (made up as shown in Figure 7) through the crankcase oil filler hole. Measure the height on the dipstick and determine the amount of oil in the unit.

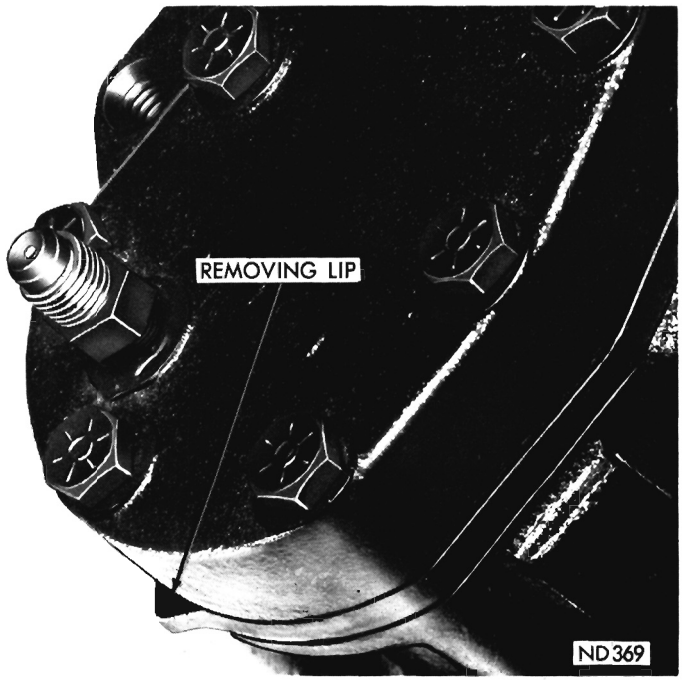


Fig. 8 - Valve Plate and Head Removing Lip

Engine	Dipstick Reading Inches@ 6 ounces Minimum	Inches@ 8 ounces Maximum
All 6 Cylinder engines.	1-5/8"	2-1/8"
All 8 Cylinder engines	1-5/8"	2-3/8"
Compressor Set Vertically on Bench	1-5/8"	2-3/8"

Dipstick reading should be at least six ounces and not more than eight ounces.

If the sump contains less than six ounces of oil, add fresh clean refrigerant oil to bring the level to the minimum shown in the table above. **Remove any oil in excess of eight ounces.**

Cylinder Head and Valve Plate Assembly

Removal

Remove the cylinder head bolts, head and valve plate assembly. If plate does not separate from head, tap the removing lip on the valve plate lightly with a plastic hammer (Fig. 8). Do not pry apart.

Inspection

After removal of head, plate and gaskets, exa-

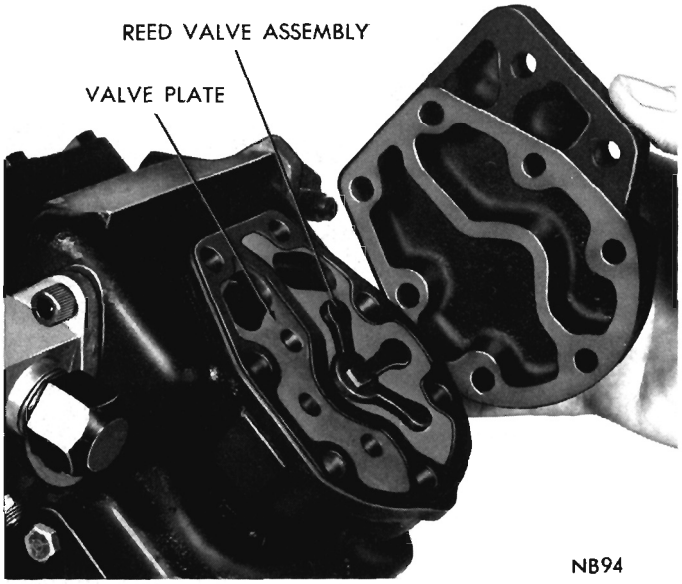


Fig. 9 - Valve Plate - Installed Position

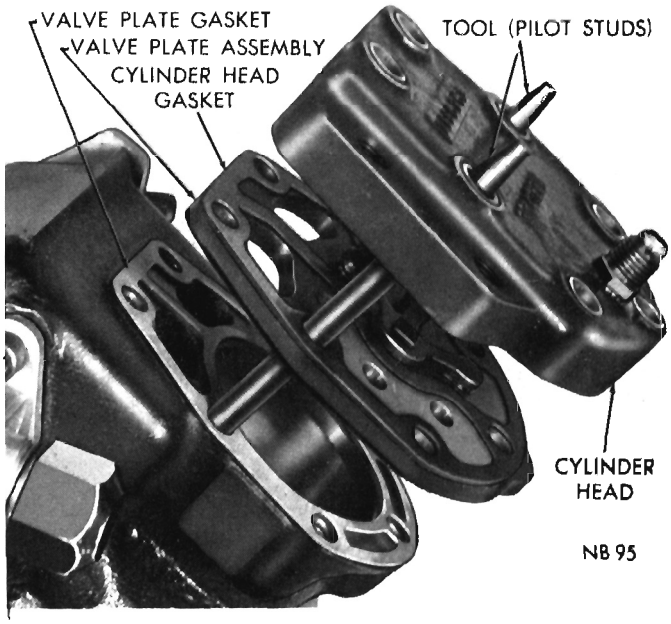


Fig 10 - Installing Valve Plate and Cylinder Head

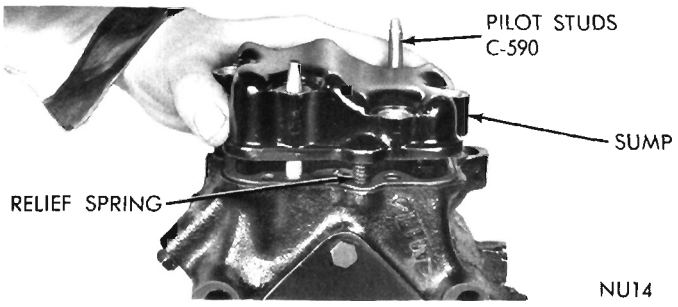


Fig. 11 - Installing Compressor Sump

mine the valves. If valves are broken and the damage extends to cylinder bores, examine bores to see if they can be repaired by removing light scoring, scuffing or scratches with a crocus cloth. After conditioning cylinder bores, clean surfaces of cylinder block, valve plate and head thoroughly with mineral spirits.

Use care to remove all shreds of old gasket from plate, block and head surfaces. Clean attaching stud holes in the block. If valve plate or cylinder head is damaged, replace, using a complete compressor valve replacement package.

CAUTION: Do not touch or pry the reed valves.

Installation

(1) The valve plate and the cylinder head must be assembled with the reed assembly (Fig. 9).

(2) Using the pilot studs as a guide, install the valve plate gasket, valve plate, cylinder head gasket and cylinder head (Fig. 10).

(3) Install the attaching bolts. Tighten each bolt alternately and evenly to 18 to 24 foot-pounds (name plate bolts) and 20 to 26 foot-pounds on the remaining bolts.

Piston and Connecting Rod

Removal

(1) Drain oil from compressor.

(2) Remove sump attaching bolts.

(3) Separate the sump from the case by tapping with a plastic hammer being careful not to distort the oil pressure relief spring.

(4) Remove oil relief spring and (rubber) ball from crankcase.

(5) Remove cylinder heads and valve plates. **Before removing the pistons, rods or rod caps, mark all parts to insure reassembly in the original position.**

(6) Remove rod caps; remove piston and rod assembly from cylinder.

Inspection

Inspect piston and rings for score marks. Inspect rod bearing for pits and for chipping. Replace parts if damaged.

Installation

(1) Remove bearing cap and install piston in bore. Use piston ring compressor to prevent ring damage.

(2) Install bearing caps, and tighten screws 50 to 60 inch-pounds. Be sure each cap is installed in its original position.

(3) Install valve plates and cylinder heads.

(4) Turn compressor upside down. Install pilot studs, gasket, oil pressure relief ball and spring.

(5) Install the sump over pilot studs (Fig. 11) making sure the oil pressure relief spring depresses uniformly as the sump is lowered on the case.

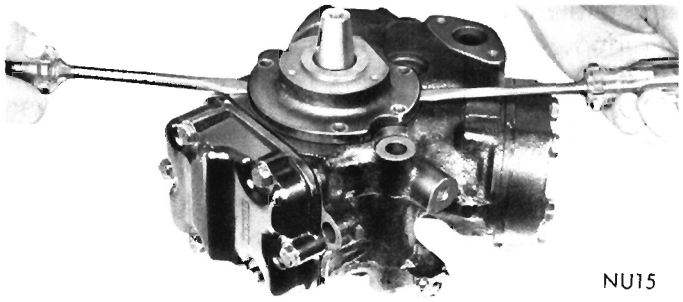


Fig. 12 - Removing Crankshaft Bearing Housing

(6) Tighten sump bolts finger tight to prevent spring misalignment, then tighten 14 to 20 foot-pounds.

(7) Refill with new refrigerant oil after the compressor is installed on vehicle. Do not re-use the oil that was previously drained.

Crankshaft Bearing Housing and Gas Seal

Replacement (System Discharged)

The gas seal may be replaced with the compressor installed in the vehicle or with the compressor removed and placed on a workbench.

Special care should be taken when installing the new seal in a compressor mounted on the engine, that the carbon ring does not fall out of its housing. Adequate lubrication of the rotating seal assembly prior to installation on the compressor shaft, will prevent the carbon ring from falling out of place.

If the compressor has been removed from the vehicle, it should be placed on its back, to facilitate seal replacement.

The crankshaft gas seal replacement package consists of the crankshaft gas seal assembly and crankshaft bearing housing seal seat plate.

Removal

(1) Loosen belt, remove clutch, coil and drive key.

(2) Remove crankshaft bearing housing seal bolts.

(3) Remove bearing housing from crankshaft, using two screwdrivers inserted in the slots provided, to pry the housing from the case (Fig. 12).

(4) Remove bearing housing oil seal.

(5) Remove gas seal seat plate from the bearing housing. This is part of the gas seal replacement package and must be replaced when the gas seal assembly is replaced.

(6) Clean the front bearing housing thoroughly.

Installation

(1) Immerse the new seal seat in clean refrigerant oil and install in the bearing housing with the smooth (micro finish) side up. Use a sleeve with the minimum inside diameter of 1-3/8 in. to avoid damaging the micro finish sealing surface of the face plate. Tap the sleeve lightly until the seal seat is fully seated in the housing.

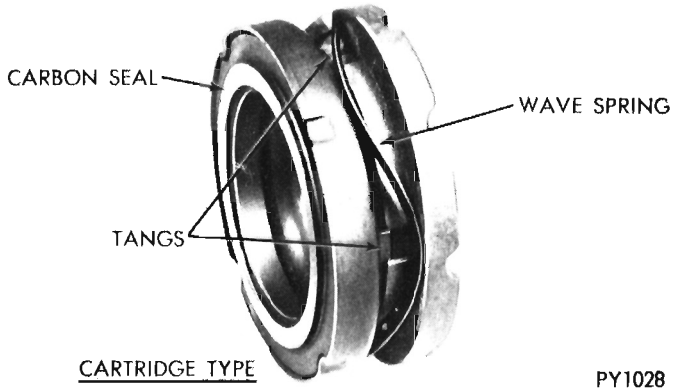


Fig. 13 - Gas Seal Identification

(2) Before installing the cartridge-type assembly, inspect the assembly to make sure that the tangs of the carbon seal are indexed in the slots of the mating, steel part (Fig. 13).

(3) Immerse the seal assembly in clean refrigerant oil, carbon ring up.

(4) Hold the seal assembly firmly at the outside edge, at the same time preventing the ring from coming out of position. Do not touch the sealing face of the carbon seal.

(5) When the seal bottoms against the crankshaft bearing, inspect the indexing tangs of the carbon ring again.

(6) Oil the bearing housing oil seal and install. (Make certain that the seal is evenly stretched into position.)

(7) Wipe the seal seat clean with a lint-free cloth, and re-oil with refrigerant oil.

(8) Install the bearing housing, taking care to ensure that the "nose" of the crankshaft does not touch the seal seat in the bearing housing.

(9) Insert 5, 1/4 x 20 screws and pull bearing housing squarely into position. This must be done 1/2 turn at a time per screw so that the ball bearing outer race will not be jammed by the bearing housing.

(10) Replace drive key in shaft.

(11) Assemble clutch to compressor and turn crankshaft by turning clutch armature. No more than 10 inch-pounds of torque should be required to turn crankshaft. If shaft is tight, remove clutch and loosen the bearing housing screws until shaft loosens up. Again, slowly tighten screws.

(12) Check the oil level which should meet the requirements of the oil check.

(13) Install clutch package on compressor, applying 20 ft-lbs. torque to tighten the clutch center mounting bolt. Install and tighten belts. Evacuate system and recharge.

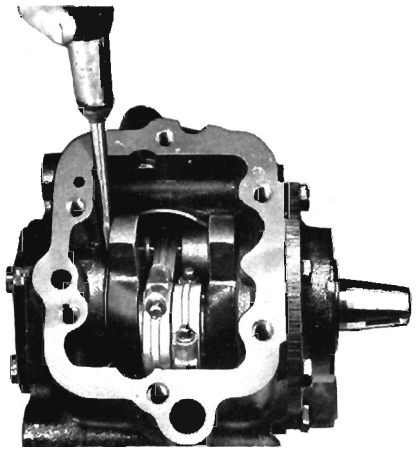

NY893B

Fig. 14 - Measuring Crankshaft Axial Movement

Crankshaft and Ball Bearings

Removal

(1) Remove cylinder heads and valve plates.
(2) Remove pistons and connecting rods.
(3) Remove crankshaft bearing housing and gas seal. **The pistons and rods must be completely removed before the crankshaft removal.**
(4) Remove crankshaft and thrust washer from crankcase.
(5) To remove the crankshaft ball bearing, use a small arbor press. Make sure bearing is properly supported before pressing bearing from shaft.

Inspection

Clean and inspect all the parts. Replace questionable parts as required. If the crankshaft ball bearing is in good condition and clean, protect it against entry of dirt and re-use it. If bearing is serviceable but dirty, or there is evidence of dirt, clean it carefully with mineral spirits and shake dry. Saturate bearing with clean refrigerant oil and assemble immediately. If a new bearing is to be installed, leave it wrapped in its protective package until ready for installing. **Do not wash a new bearing assembly before installation. Do Not spin bearing with air.**

Installation

(1) Press crankshaft ball bearing on crankshaft using a sleeve which bears on inner race **only.**
(2) Install crankshaft, making sure the thrust washer is on the rear bearing journal before placing crankshaft in the crankcase.
(3) Rotate crankshaft to engage the oil pump shaft in the crankshaft slot.
(4) Install new gas seal and crankshaft bearing housing. Use a suitable tool to assure free axial movement.(Fig. 14)
(5) Install pistons and connecting rods.
(6) After pistons and connecting rods are installed, turn the crankshaft to check freeness. Shaft should turn without binding.
(7) Install oil sump, valve plates and cylinder heads, using new gaskets.

Oil Pump

Removal

To remove oil pump, it is not necessary to drain the refrigerant oil from the crankcase.
(1) Remove oil pump cover plate and oil seal.
(2) Remove drive shaft and rotors.

Installation

(1) Install oil pump drive shaft by rotating the shaft until tang end engages in the crankshaft slot.
(2) Install inner rotor on the drive shaft, engaging the drive.
(3) Install outer rotor, and rotate it until it will slide forward over inner rotor cams. Turn compressor crankshaft with the oil pump in this position to determine that rotors do not bind.
(4) Install oil pump cover plate and oil seal.
(5) Tighten bolts 8 to 14 foot-pounds.

VALIANT

EVAPORATOR HEATER ASSEMBLY

INDEX

	Page
Blower Motor Removal and Installation	60
Electrical Controls and Circuits	53
Evaporator Removal and Installation	57
Expansion Valve Removal and Installation	54
General Information	51
Heater Core Removal and Installation	55
Inspection and Test Procedures	24
Operation of all Controls	53
Vacuum Controls and Circuits	52

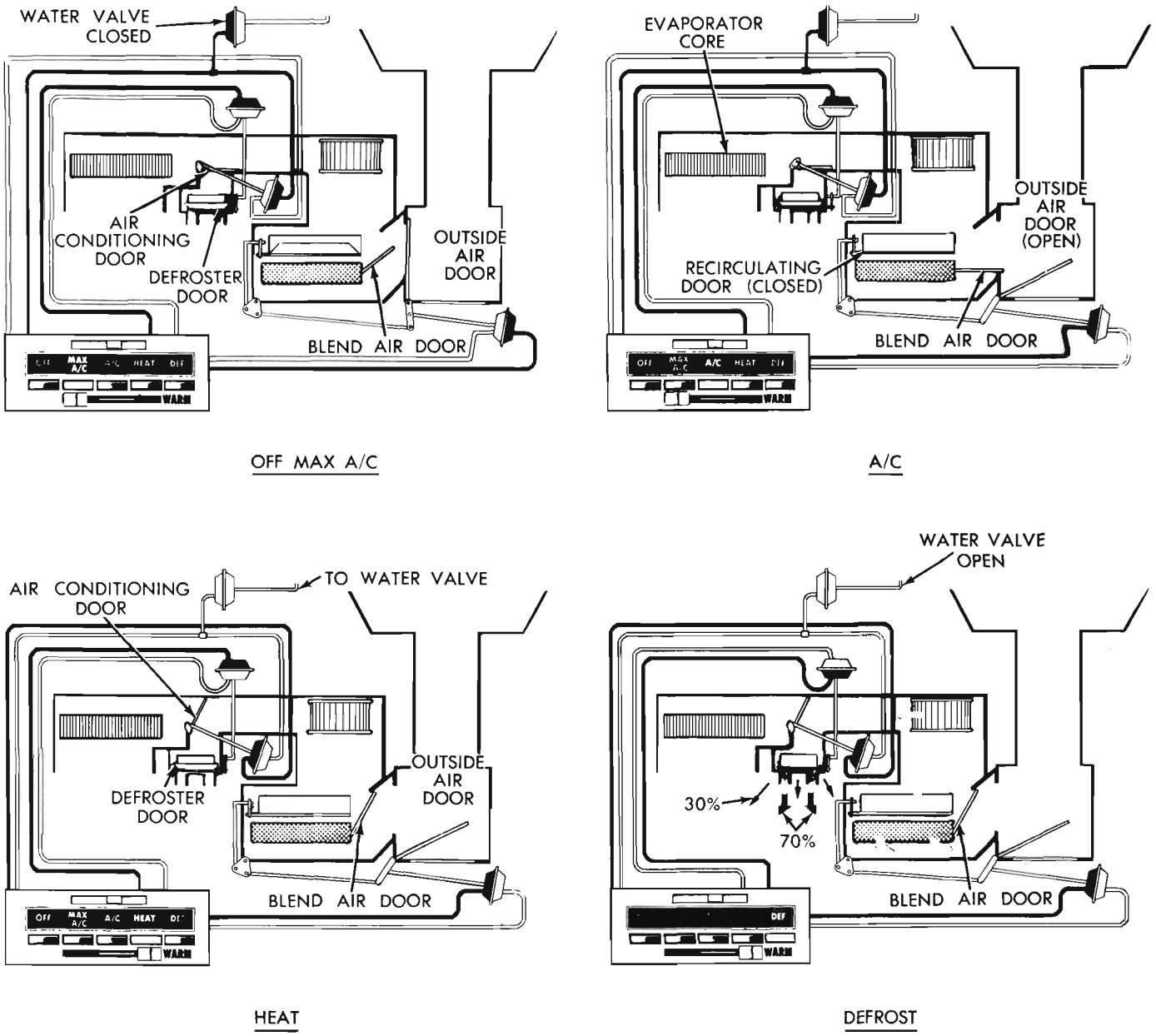
GENERAL INFORMATION

The combination heater-air conditioner used on Valiant Models controls and directs airflow by opening and closing a series of doors. The blend air door, which controls the temperature of the heater output, is opened and closed by a bowden cable from the temperature control slide lever in the instrument panel. All the other doors, and the heater water flow valve are operated by vacuum actuators. A single blower serves both heater and air conditioner. In fact, all of the components in the blower motor circuit are common to the heater and air conditioner. Controls and cooling air outlets are integral with the instrument panel.

Three cooling air outlets are contained in one unit secured to the lower edge of the instrument panel. Each outlet can be adjusted independently to direct air up, down, or to either side. Two fixed openings in the distribution duct installed under the instrument panel direct cooling air to the floor.

Controls for the system consists of five push buttons, a temperature control slide lever and a fan blower switch.

Push Buttons—Control the source and route of



PB257

Fig. 1 - Vacuum Circuits—Heater and Air Conditioning

circulating air. "Off" (turns off the entire system); "Max. A/C" (maximum air conditioning): "A/C" (air conditioning with outside air); "Heat" (for heater use only); "Def" (windshield defrosting).

Temperature Control Slide Lever—Maintains any desired temperature by sliding the lever right or left when operating **either the heater or air conditioner** and controls the automatic cycling of the refrigeration system.

Fan Switch—Permits selection of "Low," "Medium" or "High" blower speed. "Low" (far left), "Medium" (center) and "High" (far right) used when operating either the heater or air conditioner.

Air Directional Outlets—Located on the lower edge of the instrument panel. These are manually adjusted and can be shut off, turned up, down, or to either side to deflect cool air to suit requirements of driver and passengers.

VACUUM CONTROLS AND CIRCUITS

When testing or adjusting the doors in the distribution system, it is necessary to know the correct position of each door for each push-button position. In the illustrations which follow; air flow is indicated, also which vacuum actuator hoses are activated for each push-button position. (Fig. 1)

Warm Weather Ventilation—Two "ventilation" doors are provided, one below each end of the instrument panel. These doors can be opened manually for outside air ventilation during warm weather. **Before using the air conditioner be sure both ventilation doors are closed and latched.**

MAX A/C

With the "MAX A/C" button pushed in, all of the doors and the water valve are in the same position they are in when the "OFF" button is pushed. The "MAX A/C" push button merely closes the electrical circuits to the blower motor resistor block and the evaporator temperature control switch. The temperature control switch regulates the air-conditioning outlet air temperature, by engaging and disengaging the compressor clutch.

A/C

The "A/C" button re-routes air inlet door vacuum to the rod side of the actuator. This opens the outside air door and operates the linkage to close the recirculating door. The recirculating door and the outside-air door always operate simultaneously. Any time one of them is open, the other is always closed. All the other doors remain in the same position as for MAX A/C operation.

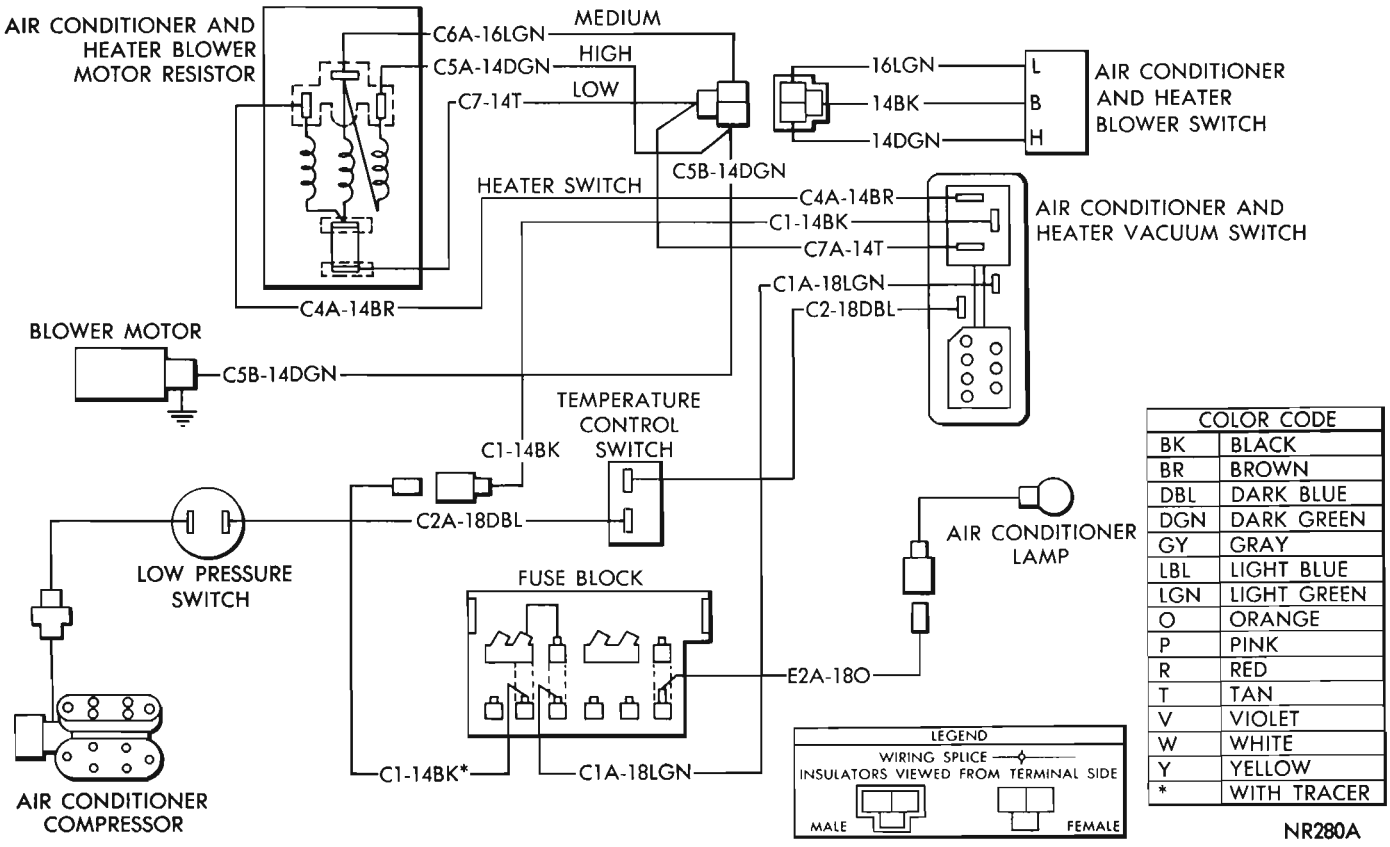


Fig. 2 - Electrical Control Circuit (Valiant)

HEAT

With the "HEAT" button in and the temperature control lever all the way to the right, the outside-air door is opened to the cowl ventilation inlet. At the same time, the outside-air door actuator closes the recirculating door. The blend air door is held closed by a bowden cable from the temperature control slide lever so all the airflow from the cowl passes through the heater core and into the blower.

Vacuum is applied to the rod side of the air-conditioning door actuator, closing off the passage to the evaporator core, and opening the passage to the heater-defroster manifold. Since the heater-defroster door is raised, the full flow of heated air goes through the heater outlets, except for a small amount that bleeds off through the defroster outlets.

DEFROST

When the defroster button is pushed, all conditions are the same as for heater operation, except that vacuum is now applied to the rod side of the defroster door actuator. The door moves away from the defroster outlets and partially closes off the heater outlets. The heater outlets are left open far enough to allow about 30 percent of the blower output to bleed off. The other 70 percent is defroster air. The full range of temperature control is available during defroster operation, as are all three blower motor speeds.

ELECTRICAL CONTROLS AND CIRCUITS

The system is controlled by the following switches:

(a) Push button switch (air conditioner and heater vacuum switch).

(b) Fan switch (air conditioner and heater blower switch).

(c) Temperature control switch (temperature control slide lever).

The electrical control circuit is protected by a 20 ampere fuse in the fuse block. The compressor clutch circuit is energized when either the Max A/C or the A/C push buttons are depressed. (Fig. 2)

Blower Motor (Fan Switch)

The power feed line from the push-button switch to the blower switch is energized only when the ignition is on and any push button, other than "Off," is depressed.

The fan switch is controlled by moving the control lever from left "Low" to right "High."

Temperature Control Switch

The temperature control switch controls the temperature of the evaporator by automatically cycling the compressor clutch. As the clutch is cycled on and off, the temperature of the evaporator is held at the setting of the temperature control lever.

OPERATION OF ALL CONTROLS

Operating controls must be tested in the following sequence.

(1) Inspect, test, and adjust compressor drive belt.

(2) Start engine and adjust engine speed to 1600 rpm for 6 cylinder and 1300 rpm for 8 cylinder engines. Use a reliable tachometer.

(3) Move temperature control lever to "Off" position and push the "A/C" button.

(4) The outside air door should be open to outside air. Open vehicle windows.

(5) Test the blower operation at all three speed positions. If the blower does not operate correctly, refer to "Electrical Controls and Circuit." Leave the blower switch in the "High" (Hi) position.

(6) The compressor should be running and the air conditioning system in operation.

Push Button Operation

Reduce engine speed to normal idle. Vacuum will be high and vacuum actuators should operate quickly.

If actuator operation is slow, check the source hose connection at engine manifold.

Push each button to test over-all operation of the electrical and vacuum controls.

The "Push Button Control Chart" summarizes the actions that should take place when each button is pushed. See "Chart." Also, refer to "Vacuum Circuits."

If all the controls operate in the proper sequence but the action of the dampers and doors is slow or incomplete, inspect for mechanical misalignment, binding or improper linkage adjustment.

Water Valve Test

A vacuum actuated water shut-off valve is mounted in the engine compartment and is connected in series with the heater hose circuit. This valve (spring loaded) is in the open position until vacuum is applied to actuator. Vacuum is applied only when the engine is running and the "Off" "Max A/C" or A/C push buttons are depressed.

To test the valve, start the engine, remove the radiator cap to minimize pressure in the vehicle's cooling system.

With the "MAX A/C" or "A/C" button pushed in, test water valve by momentarily disconnecting heater outlet hose. A slight spillage of water when

PUSH BUTTON CONTROL CHART

Button	Off	Max. A/C	A/C	Heat	Defrost
Outside Air Door	Closed	Closed	Open	Open	Open
Recirculating Door	Open	Open	Closed	Closed	Closed
Inlet Door	Open	Open	Open	Closed	Closed
Water Valve	Closed	Closed	Closed	Open	Open
Defroster Doors	Closed	Closed	Closed	Closed with Air Bleed	Open
Heater Door	Open	Open	Open	Open	Closed with Air Bleed
Blower Speed	Off	Hi.-Med. Low	Hi.-Med. Low	Hi-Med. Low	Hi-Med. Low
Compressor Clutch	Off	On	On	Off	Off

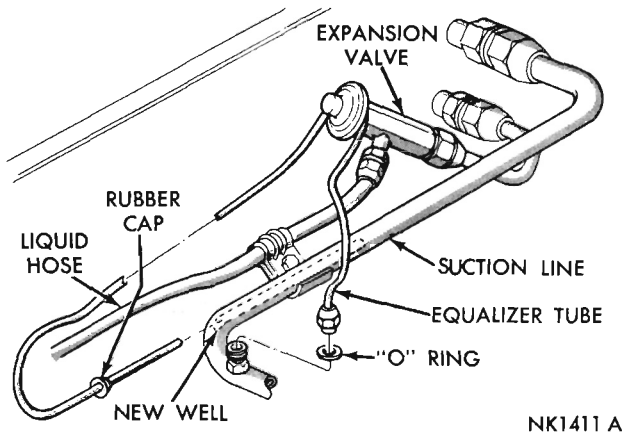


Fig. 3 - Expansion Valve Details

the hose is removed is normal. A continuous flow of water indicates that the valve is not closing properly or the vacuum hoses are not properly connected.

If the shut-off valve does not close completely, replace the valve.

EXPANSION VALVE "Valiant"

Removal

The system must be completely discharged before opening any of the refrigerant lines.

(1) Remove equalizer tube from evaporator suction line fitting (Fig. 3).

(2) Disconnect expansion valve from elbow assembly and liquid line. Use two wrenches to loosen each of these connections.

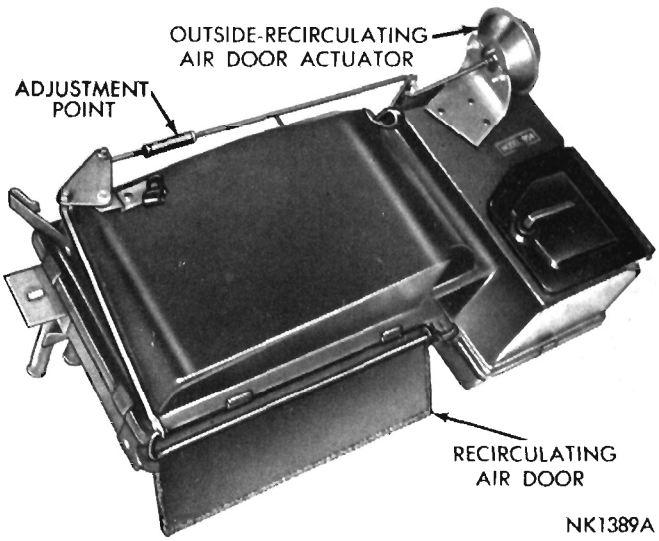


Fig. 4 - Recirculating Air Door Linkage

(3) Carefully pull out capillary sensing tube from well located in suction line. Remove rubber seal from capillary sensing tube. Inspect inlet screen.

Installation

(1) With new "O" rings and clean refrigerant oil on all fittings, install the expansion valve to the liquid line and elbow assembly using two wrenches to prevent rotation and twisting of the lines.

(2) Connect equalizer tube to the fitting on the evaporator suction line.

(3) With a rubber seal on the capillary sensing

tube, carefully install the tube in the well located in the suction line as far as it will go (approximately five inch depth).

(4) After expansion valve is installed, it must be completely tested. Then the system must be tested for leaks and recharged.

Recirculating Door Linkage

To adjust the recirculation door, remove the glove box, push the "Max A/C" (Maximum Air Conditioning) button in. Vacuum will then be applied to the top of the outside air recirculation actuator closing the outside air door, opening the recirculating door (Fig. 4).

The top connecting rod has a turnbuckle nut and lock nut. The length of the rod can be adjusted by using two 7/16 inch open-end wrenches. The recirculating door should be adjusted to give the **maximum** possible opening when the fresh air door is completely closed. Push in the "A/C" (Air Conditioning) button and inspect to see that the recirculating door has moved to its fully closed position. Install the glove box.

CONTROL CABLE (Turnbuckle)

A turnbuckle has been incorporated in the air conditioning temperature control cable. This turnbuckle is used to adjust the length of the cable housing without removing it from the instrument panel control or the blend air door crank. (Fig. 5)

Adjustment

If the blend air door does not fully open or close, the control cable housing may be shortened or lengthened by rotating the turnbuckle (remove glove box to adjust). Replacement cable will be of standard type.

Installation

The cable operated blend air door is equipped with a self adjusting control cable. No adjustment is necessary after the initial installation.

(1) Place the temperature control lever, on the instrument panel, in the center position.

(2) Position self adjusting clip on cam lever pin and place cam lever on water valve, in full heat position. Snap cable housing into retaining clip and cable into self adjusting clip.

(3) Move the temperature control lever on instrument panel to the full heat position to adjust the control.

HEATER CORE

The heater core is located behind a separate cover forward of the instrument panel. The core is held in position in its cover by four sheet metal

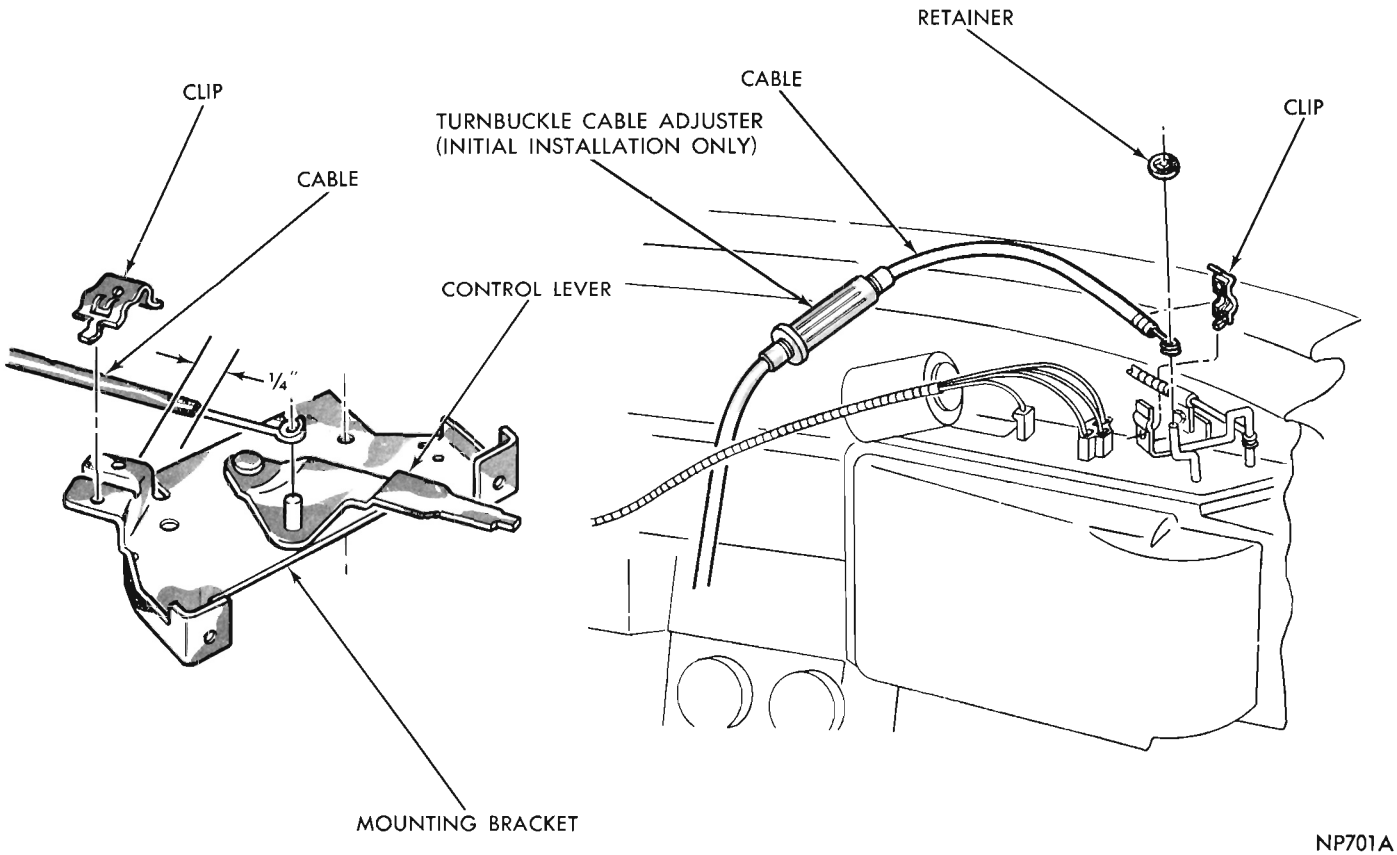


Fig. 5 - Temperature Control Cable Adjustment (Valiant)

attaching screws. The core and cover are removed and installed as an assembly.

Removal

(1) Disconnect battery and remove air cleaner.
(2) Drain cooling system and remove heater hoses from the core.
(3) Remove air outlet assembly, glove box assembly and right defroster tubing.
(4) Disconnect electrical wires from resistor block, vacuum hoses from the outside air-recirculating actuator, the temperature control cable, evaporator temperature control switch control cable and heater core ground wire.
(5) Remove the screw securing the heater assembly to the evaporator assembly (Fig. 6 and 7).
(6) Disconnect heater housing support rod from the outside air duct.
(7) Remove heater assembly.
(8) Remove outside air-recirculating door actuator.
(9) Remove operating link between bellcrank and recirculating door.
(10) Remove the outside air inlet seal from either front or rear heater housing half only.
(11) Remove the retainer clips attaching the heater housing halves together and separate the heater housing halves.
(12) Remove the screws attaching the heater core to heater housing and remove the core.

Installation

(1) Place a small bead of sealer in heater housing flange.
(2) Install heater core in the heater housing and secure the four attaching screws.
(3) Cement the weatherseal on the inner lip of heater core flange (Fig. 8).
(4) Place a small bead of sealer on heater housing cover.
(5) Position both housing halves together and install the eleven retainer spring clips. Remove any excess sealer.
(6) Cement air inlet seal into position.
(7) Install operating link between bellcrank and recirculating door. Adjust if necessary. With recirculating door closed, outside air door should be fully open.
(8) Install outside air recirculating actuator.
(9) Position heater assembly in the vehicle and proceed as follows:
(a) Install temperature control cable on outer operating arm in full heat position with end of cable housing 1/4 inch beyond edge of retainer clip.
(b) Install the evaporator temperature control

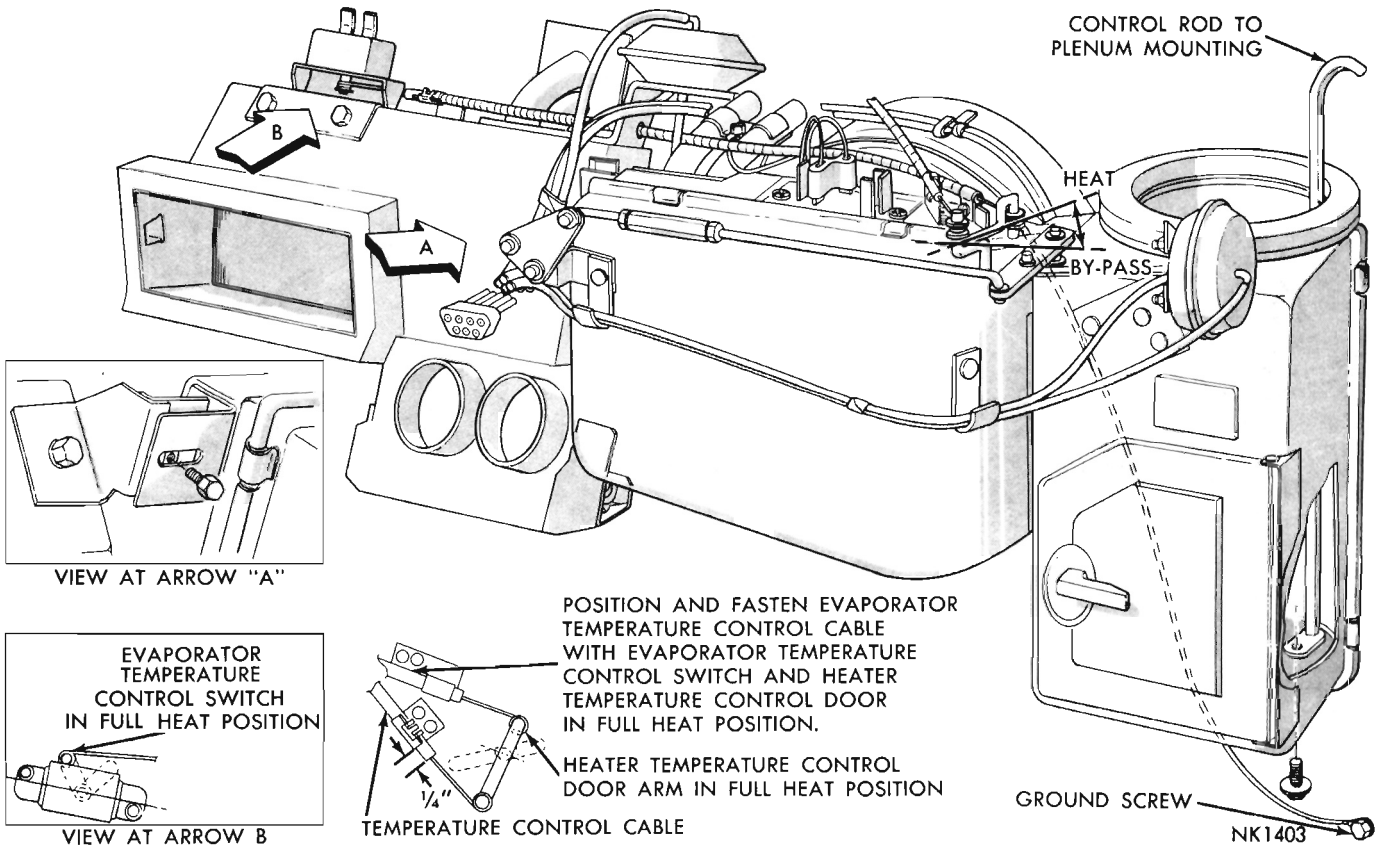


Fig. 6 - Heater and Evaporator Assembly - Passenger Side - Typical

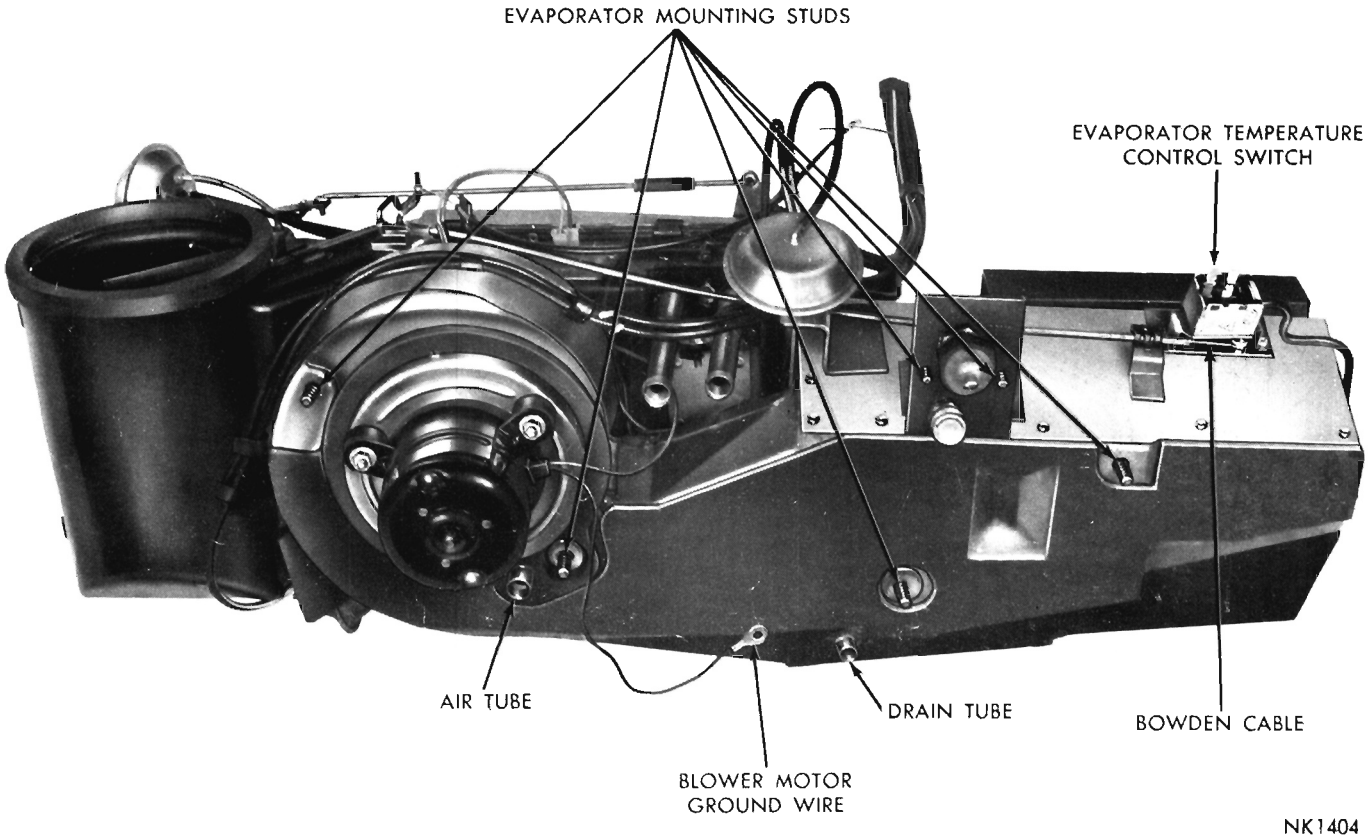


Fig. 7 - Heater and Evaporator Assembly - Engine Side - Typical

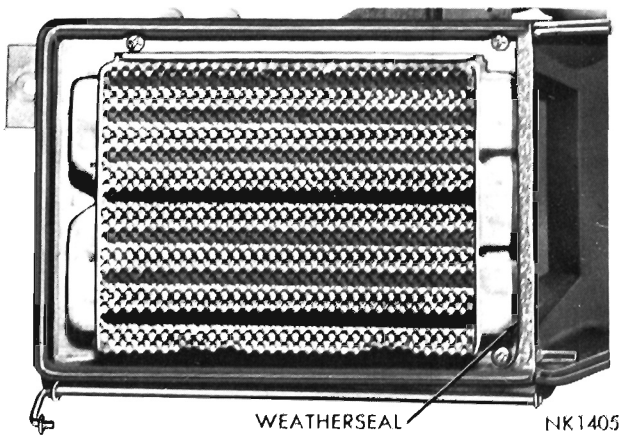


Fig. 8 - Weatherseal Positioned

switch cable on the inner operating arm in full heat position with the end of the cable housing 1/4 inch beyond the edge of the cable clip.

(10) Position heater assembly on dash panel and secure heater support rod to the outside air duct and the screw to the evaporator assembly.

(11) Install electrical wires to resistor block, vacuum hoses to outside air-recirculating actuator (red stripe to rod side) and heater core ground wire.

(12) Install right defroster tubing, glove box assembly and air outlet assembly.

(13) Install heater hoses, (Figs. 9 and 10), fill cooling system, connect battery terminal and install air cleaner.

(14) Start engine, operate until normal engine operating temperature is obtained and test operation of heater assembly.

EVAPORATOR

The evaporator assembly includes the evaporator core, the evaporator housing with the evaporator inlet and defroster doors. To remove the evaporator assembly, it is necessary to remove the heater assembly, See "Heater Removal." The system must be completely discharged before opening any of the refrigerant lines.

Removal

(1) Disconnect elbow assembly and suction lines from evaporator. Use two wrenches to loosen each of these connections. Cap all the refrigerant openings to prevent entrance of dirt and moisture.

(2) Disconnect blower motor wires and air tube.

(3) Disconnect actuator hoses.

(4) Remove mounting stud nuts and remove evaporator assembly with blower motor as a single unit (Fig. 11).

(5) Remove defroster actuator, evaporator temp-

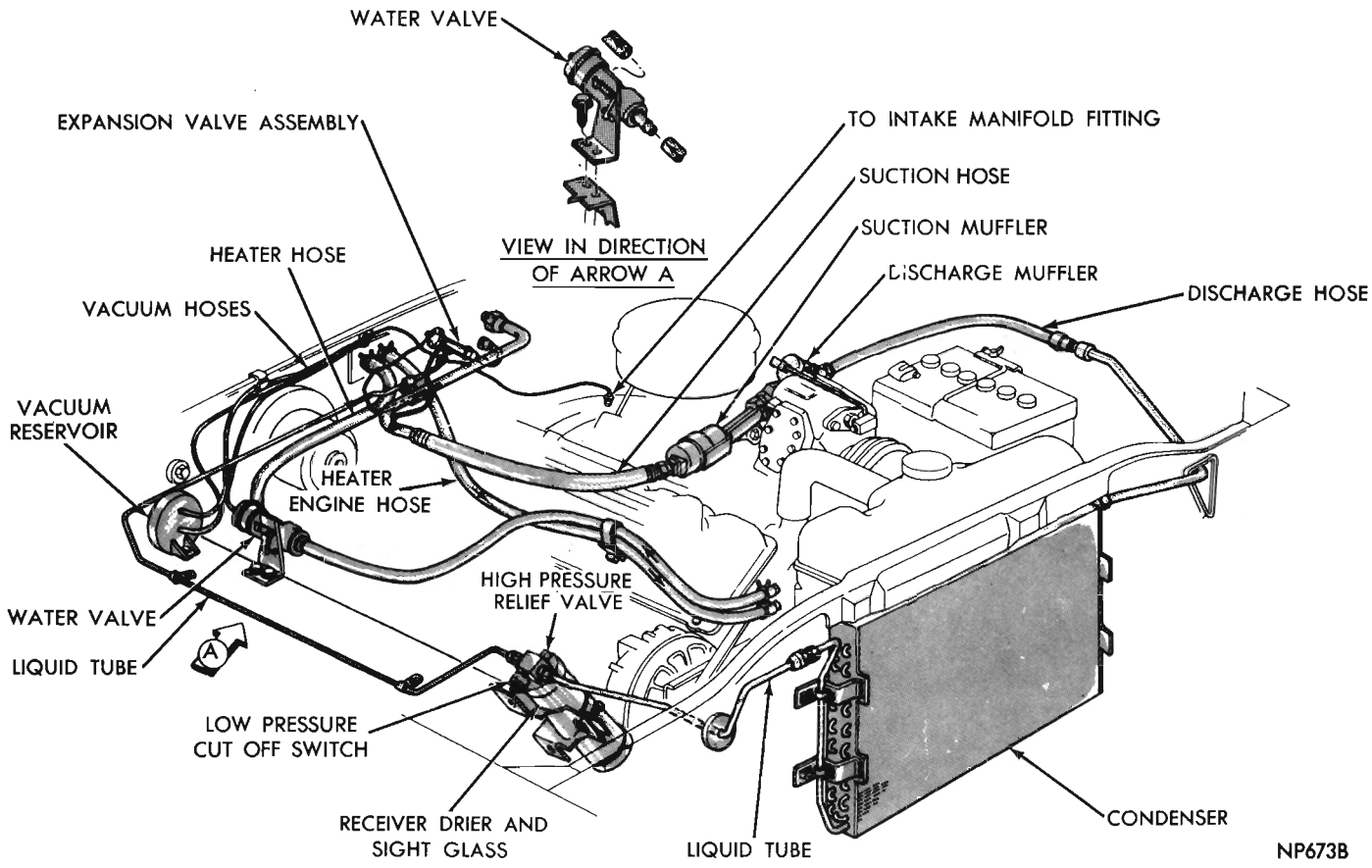


Fig. 9 - Air Conditioning and Heater Plumbing (Valiant) 198 and 225 Cu. In. Engine

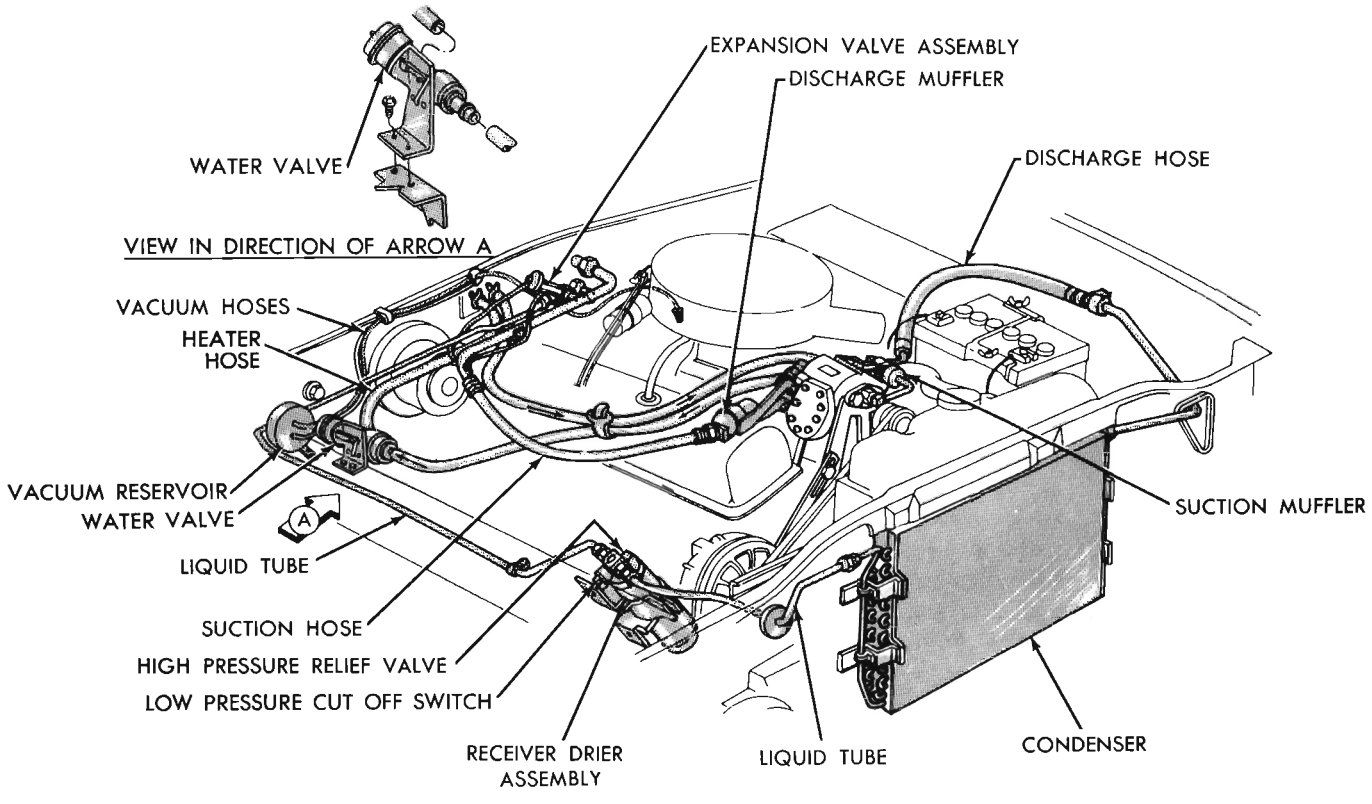


Fig. 10 - Air Conditioning and Heater Plumbing (Valiant) 318 and 340 Cu. In. Engine

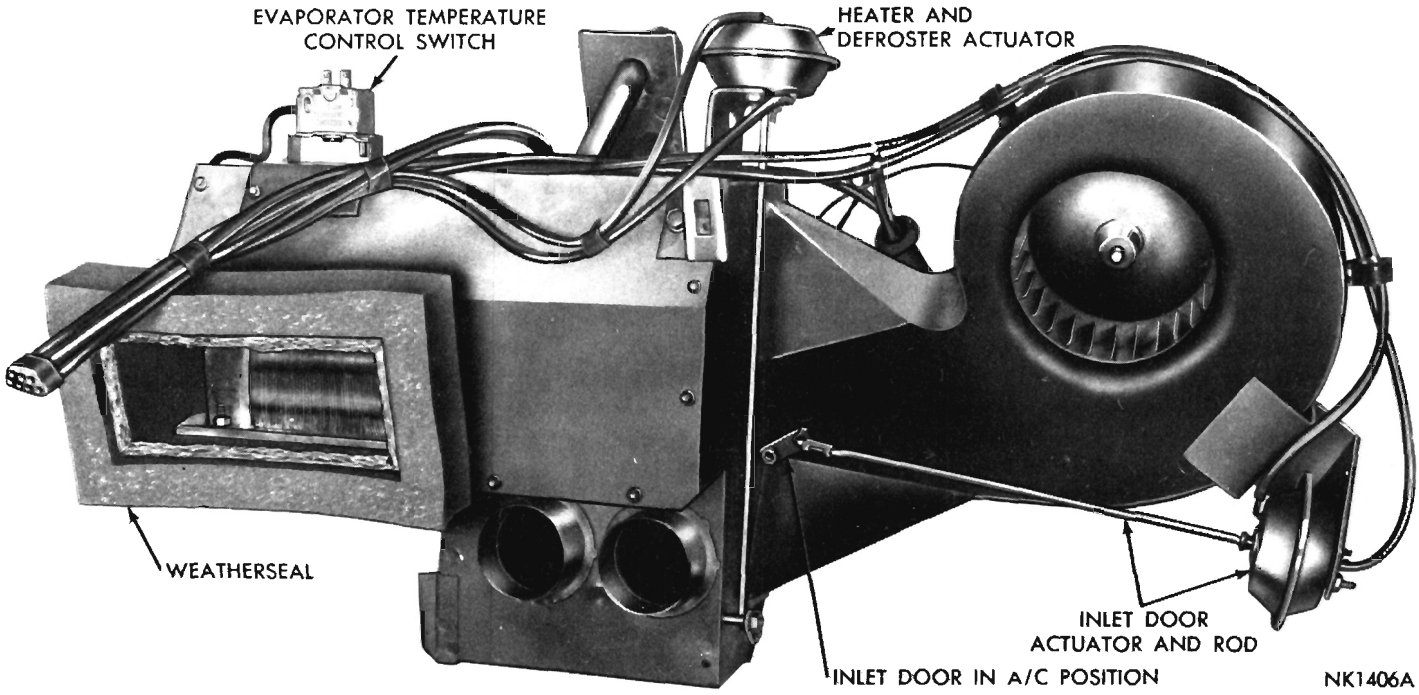


Fig. 11 - Evaporator Assembly Removed - Typical

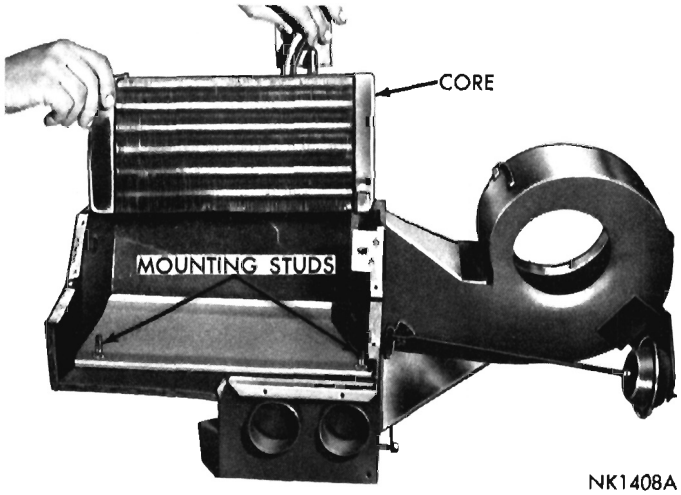


Fig. 12 - Removing Evaporator Core - Typical

erature control switch, and carefully withdraw the capillary sensing tube.

(6) Remove the weatherseal around the air outlet opening, and remove cover screws and cover.

(7) Remove the attaching stud nuts and remove evaporator from case (Fig. 12).

Installation

(1) Position evaporator in the case and secure with attaching stud nuts.

(2) Place a small bead of sealer on case flange, install case cover and secure the attaching screws. Remove any excess sealer.

(3) Carefully install capillary sensing tube

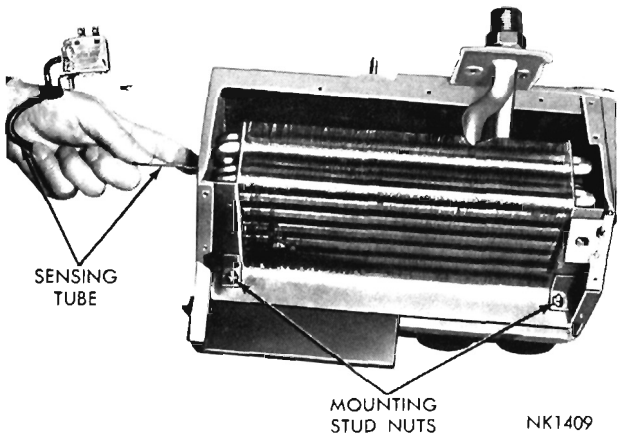


Fig. 13 - Installing Capillary Sensing Tube

through the case into the evaporator **to the full depth.** Position evaporator temperature control switch and secure with attaching screws (Fig. 13).

(4) Install defroster actuator and cement and weatherseal around air outlet opening.

(5) Position evaporator assembly on the dash panel and install the stud nuts that attach the assembly to dash panel.

(6) Install blower motor wires and air tube suction line. Use two wrenches to prevent rotation.

(7) Use new "O" rings with clean refrigerant oil on all connections, install the inlet elbow assembly use two wrenches to avoid twisting the lines.

(8) Install actuator hoses (hose with red stripe to rod side).

(9) Install heater as described in "Heater Installation."

(10) After the evaporator and heater assemblies are installed in the vehicle, it will be necessary to sweep the system, test for leaks and charge the system with the proper amount of refrigerant. It is recommended that the operation of all controls be tested and an overall performance test be made after the repair or replacement of the evaporator assembly.

BLOWER MOTOR

All service to the blower motor is made from the engine compartment side.

Removal

(1) Disconnect feed wire at connector and ground wire. Remove air tube.

(2) Remove the three sheet metal screws located on the outer surface of mounting plate.

(3) Remove mounting plate, blower motor and fan as an assembly.

Installation

If the blower was removed from the mounting plate, be sure the mounting grommets are installed at the attaching bolts. Be sure the blower wheel is free and does not rub.

(1) Install blower motor assembly to the evaporator case with air tube opening to the bottom. Secure with the three sheet metal screws.

(2) Install air tube, motor ground wire and connect the feed wire.

(3) Test operation of blower motor.

BARRACUDA AND SATELLITE EVAPORATOR HEATER ASSEMBLY

INDEX

	Page
Electrical Controls and Circuits	66
Evaporator Removal and Installation	69
Expansion Valve Removal and Installation	68
General Information	60
Heater Core Removal and Installation	69
Inspection and Test Procdures	24
Operation of all Controls	67
Vacuum Controls and Circuits	64

GENERAL INFORMATION

The air conditioner assembly installed on Barracuda and Satellite models is a combination air conditioning and heating unit which is installed inside the passenger compartment under the instrument panel (Figs. 1 and 2)

The controls and cooling air outlets are integral with the instrument panel. This system operates on the reheat principle.

In this reheat air conditioner unit all the air entering the system passes through the evaporator coil. Then either through or around the heater core. All output air temperatures are controlled by a single slide lever in the instrument panel, which operates the heater water flow control valve. The blower motor is turned on in any of the positions except "Off".

The Barracuda and Satellite air conditioning housing assemblies are similar in design, therefore, for all practical purposes, the service diagnosis and procedures that follow may be used for either assembly with the exception of the controls and temperature control valves.

Satellite models are equipped with a vacuum actuated water valve which is controlled by a vacuum regulator operated by the temperature control lever. A second slide lever selector located just above the temperature control lever can be placed in any one of six positions; OFF, MAX A/C, A/C, VENT, HEAT or DEFROST. All position provide the same vacuum circuits as Barracuda push button except the VENT position.

Upper Level Ventilation (Strato-Vent)

(Satellite Models Only)

When the selector lever is placed in the VENT position, the vacuum circuit remains the same as in the A/C position but the compressor clutch electrical circuit is opened preventing the compressor from operating. The blower motor is then used to force unheated outside air into the passenger compartment through the A/C outlets in the instrument panel.

Controls

In addition to the six position slide lever selector (Satellite models) and the five push buttons (Barracuda models), the A/C heater controls consist of:

Temperature Control Slide Lever—Maintains any desired temperature by sliding the lever right or left when operating either the heater or air conditioner.

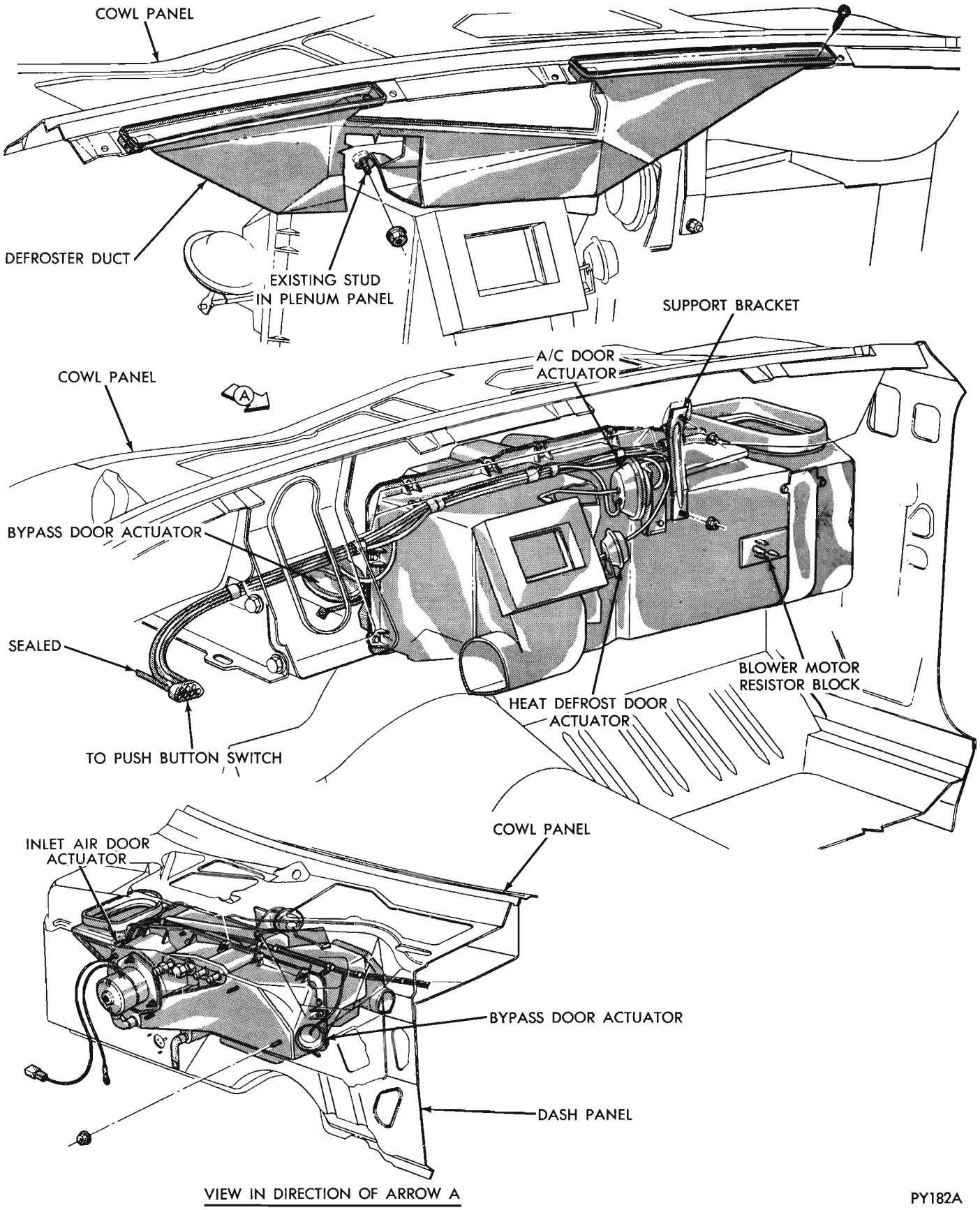


Fig. 1 - Evaporator Heater Assembly - Barracuda Installation

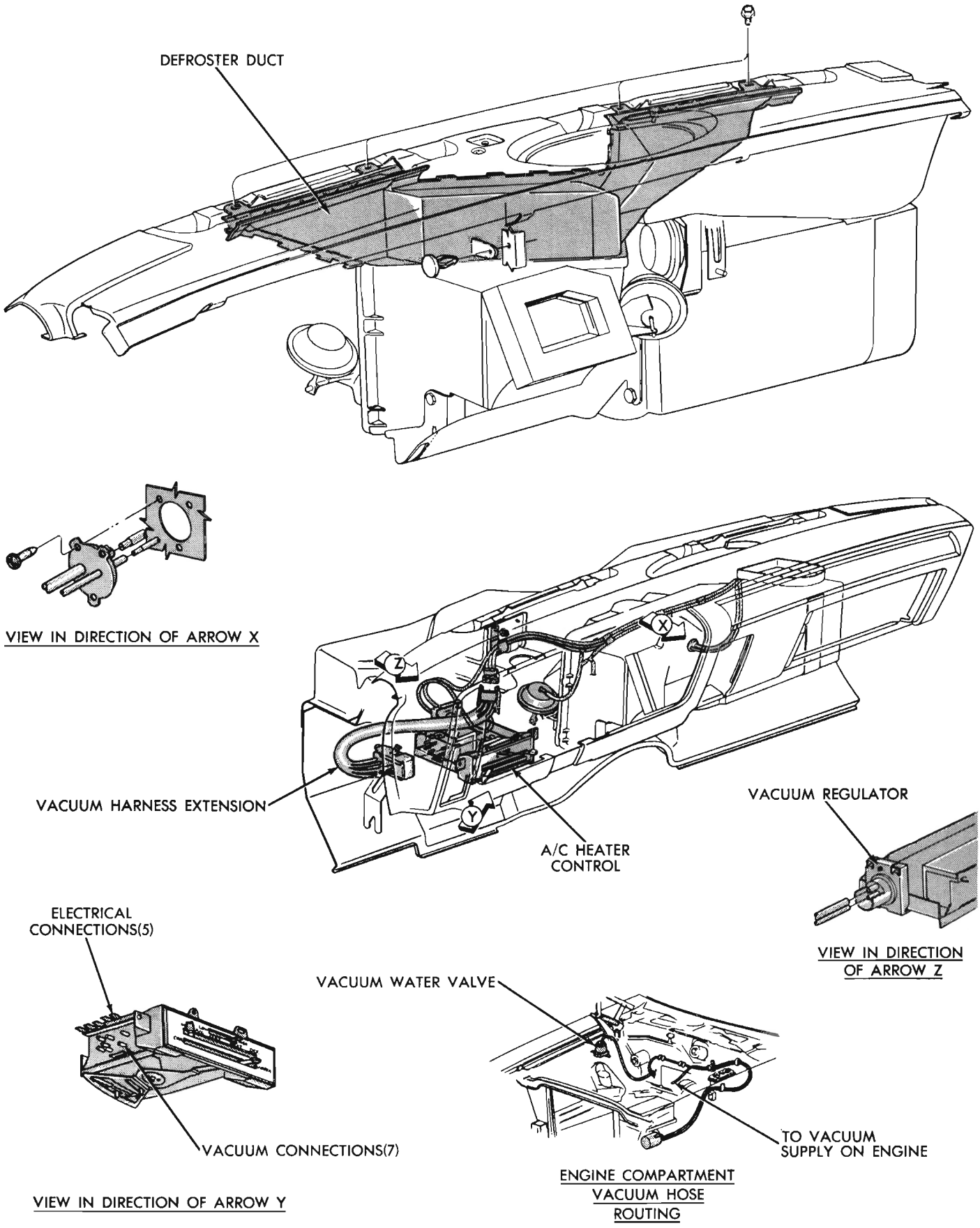


Fig. 2 - Evaporator Heater Assembly - Satellite Installation

Fan Switch—Permits selection of low, medium or high blower speeds—used when operating either the heater or air conditioner.

Air Directional Vanes—One at each end, and two in the center of the instrument panel. These are adjusted manually to direct cool air to suit the requirements of the driver and passengers. (Figs. 3 and 4)

The center outlets can be rotated to direct air

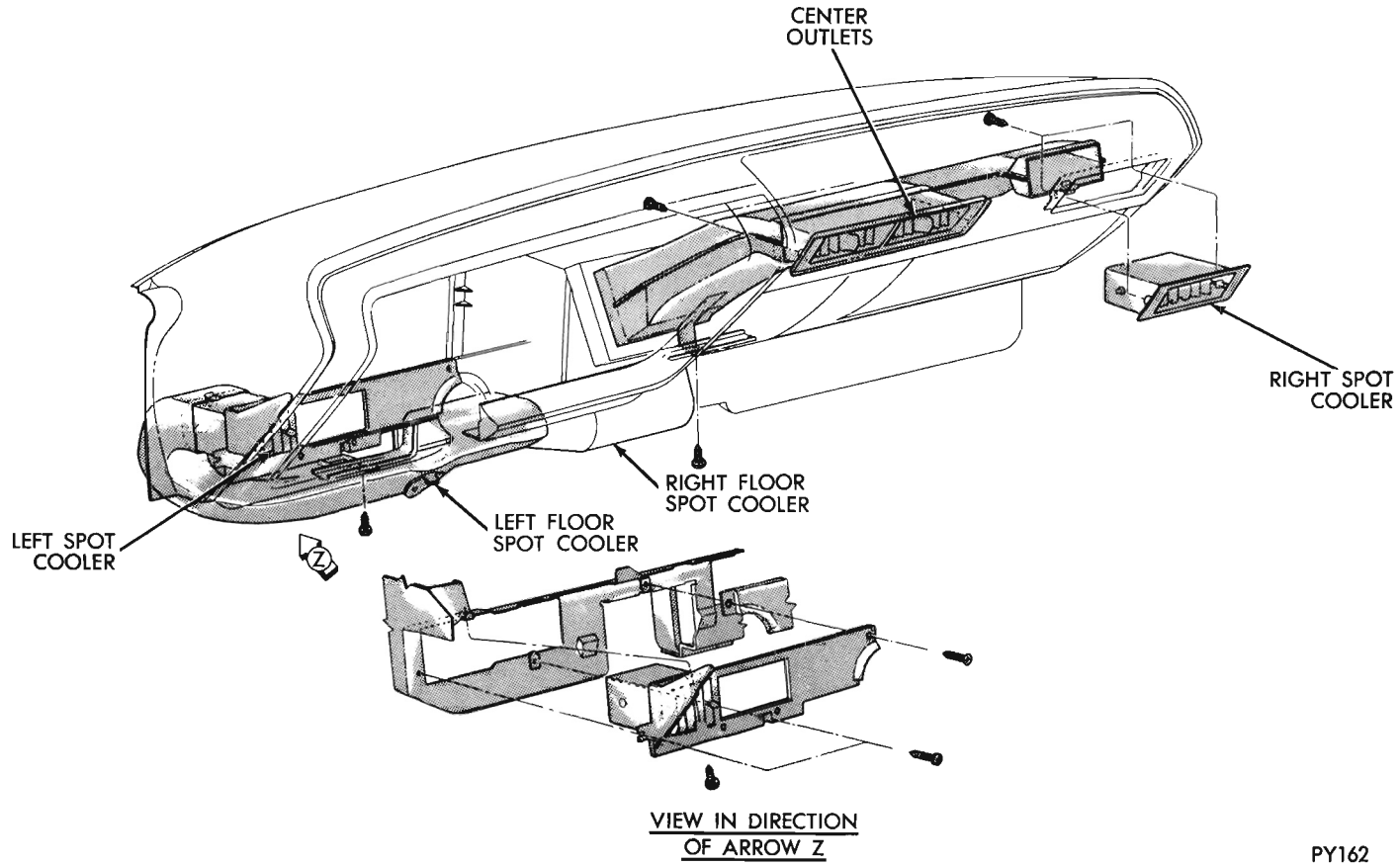


Fig. 3 - Air Conditioning Ducts - Barracuda Installation

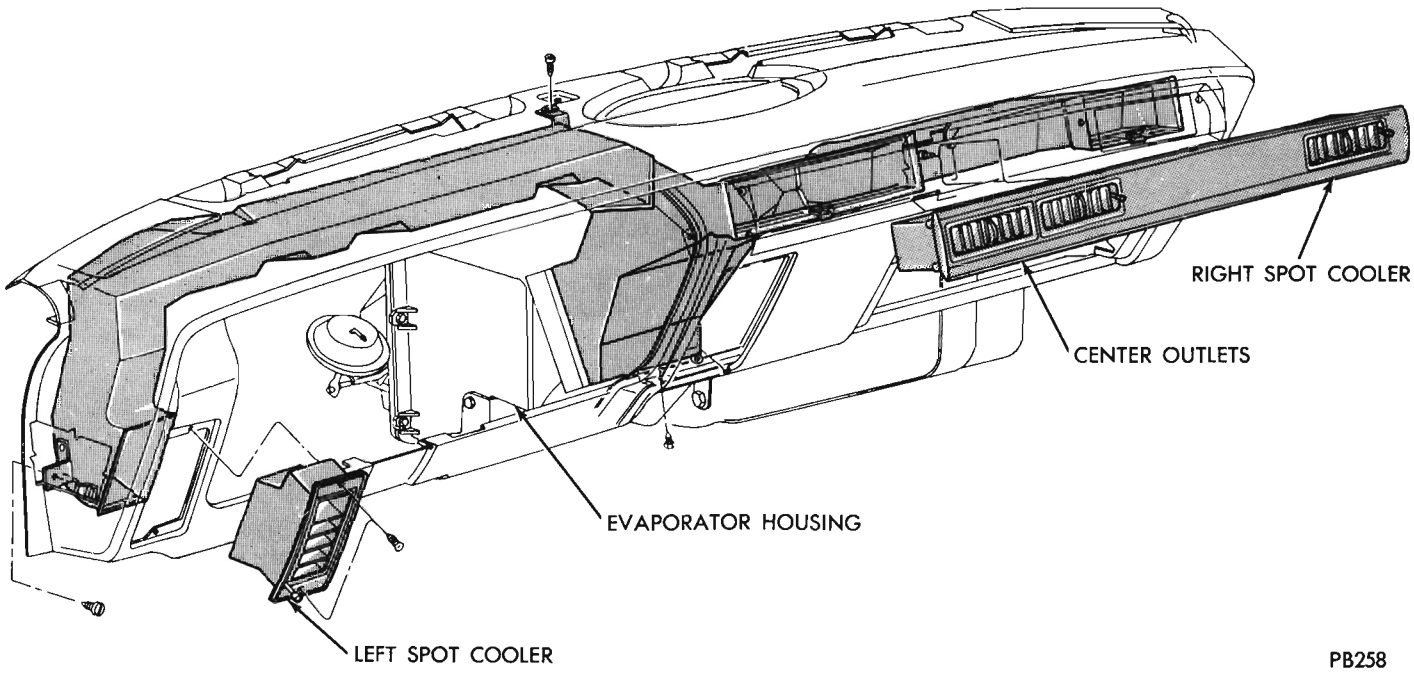


Fig. 4 - Air Conditioning Ducts - Satellite Installations

up or down; adjustable vanes direct air to either side or shut off the air.

The outlets at each end of the instrument panel are also adjustable or can be shut-off by a damper operated by a push pull shaft with the exception of the right outlet on Satellite models which use the vane shut-off feature.

VACUUM CONTROLS AND CIRCUITS

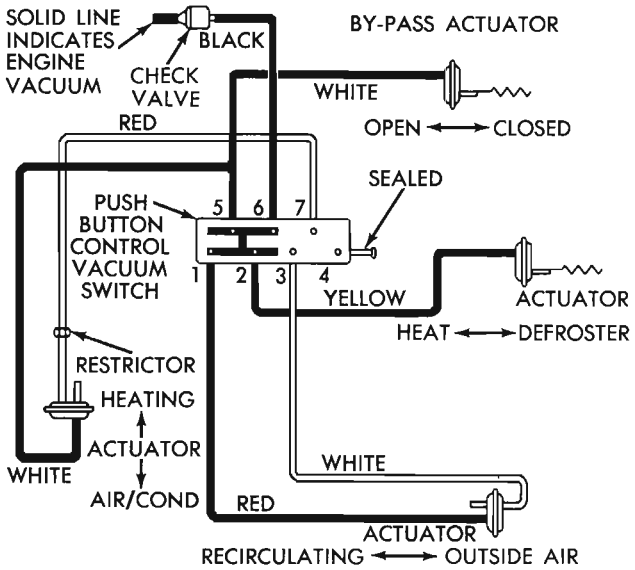
When testing or adjusting the doors in the distribution system, it is necessary to know the correct position of each door for each control position. It is also necessary to know which vacuum hoses are activated for each control position. In the following illustrations air flow is indicated as the vacuum actuator hoses are activated. (Figs. 5 and 6)

OFF

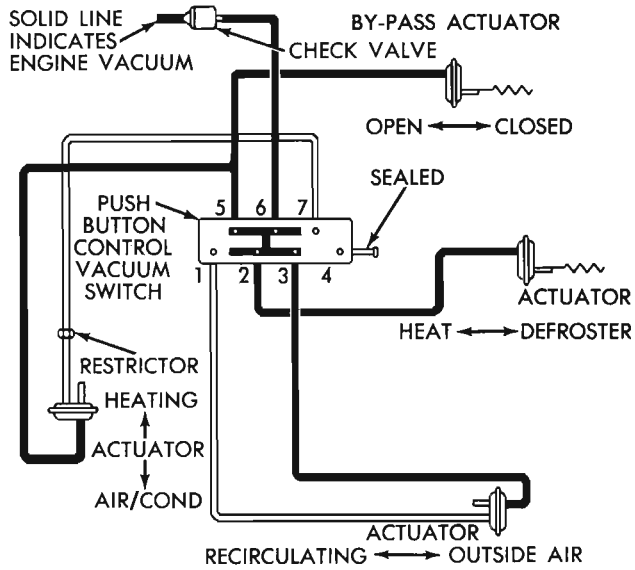
Vacuum application and door positions are the same as MAX A/C position.

MAX A/C

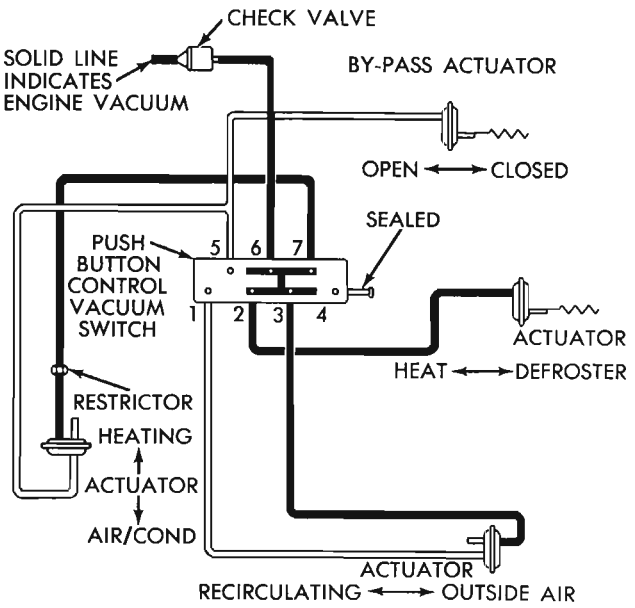
The MAX A/C position turns on the blower motor and engages the compressor clutch. The vacuum application is as indicated. The air door is closed to outside air—open to recirculating air.



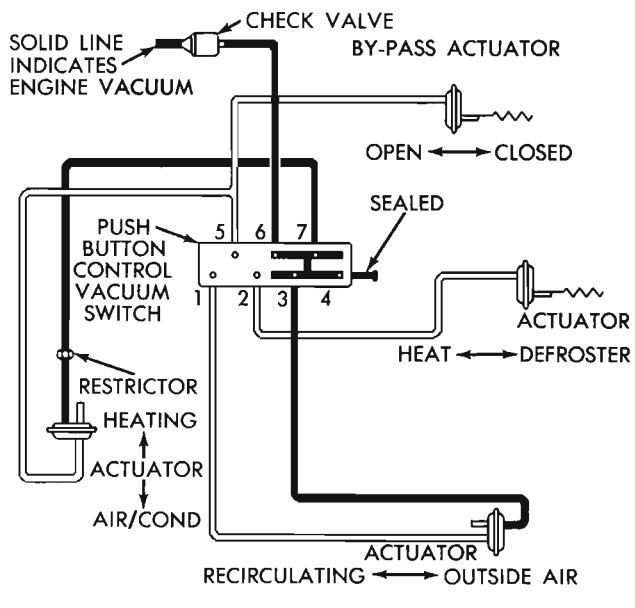
OFF, MAX A/C



A/C



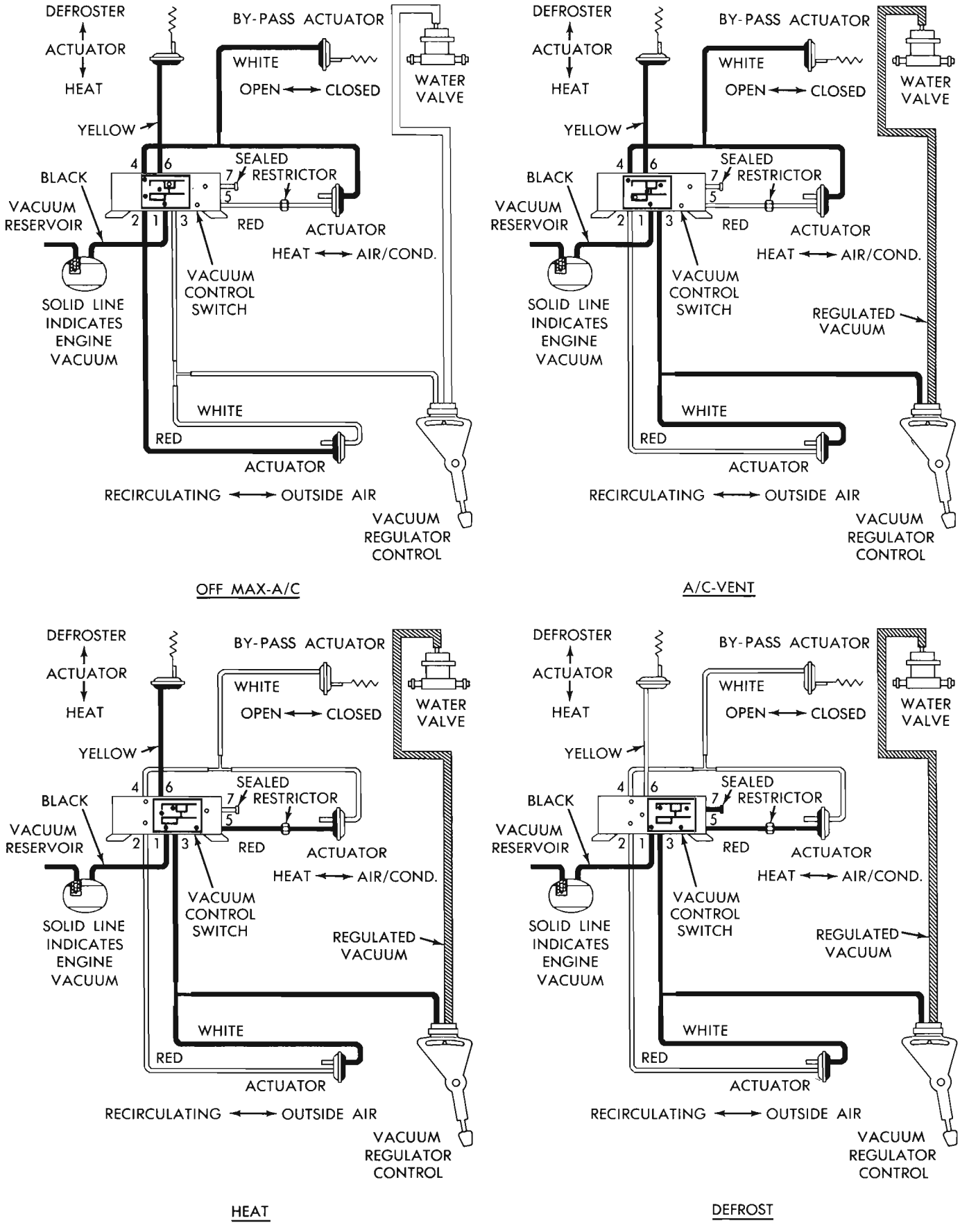
HEAT



DEFROST

PY165A

Fig. 5 - Vacuum Circuits Air Conditioning - Heating - Barracuda Models



PB67

Fig. 6 - Vacuum Circuits - Air Conditioning - Heating - Satellite Models

The A/C door is open to A/C outlets and closed to heat. The heat defrost door is closed and the heater core by-pass door will be fully open.

A/C

When the car has been cooled to the desired temperature and the control is in the A/C position; the vacuum application at the outside-recirculating air door actuator is transferred to opposite the rod side. This moves the door away from the outside-air inlet and closes the recirculating inlet. All other vacuum applications and door positions are the same as for the MAX A/C position.

VENT

(Satellite Models Only)

When the selector is placed in the VENT position, the vacuum circuit remains the same as in the A/C position, but the compressor clutch electrical circuit is opened preventing the compressor from operating. The blower motor is then used to force unheated air into the passenger compartment through the A/C outlets in the instrument panel.

HEAT

The inlet air door pivots away from the outside-air inlet and closes off the recirculating inlet, supplying outside air to the blower, which forces it through the evaporator coils and the heater core. The amount of heat added to the air by the heater core depends on the setting of the water flow control valve lever.

DEFROST

When the heater section is operating on Defrost, there will be a small amount of heat bleed through the heater outlets. Vacuum application will be as indicated. The recirculating air door will be open to outside air and the Defroster door will be open.

ELECTRICAL CONTROLS AND CIRCUITS

There are two electrical switches in the control bezel, one controls the compressor clutch circuit, and the other is a three position blower motor switch. The compressor on-off switch is built-in to the vacuum switch and is energized when the mode control is placed in the MAX A/C or A/C position. This circuit is protected by a 20 ampere fuse in the fuse block (Fig. 7).

Blower Motor (Fan Switch)

The power feed line from the push-button switch to the blower switch is energized only when the

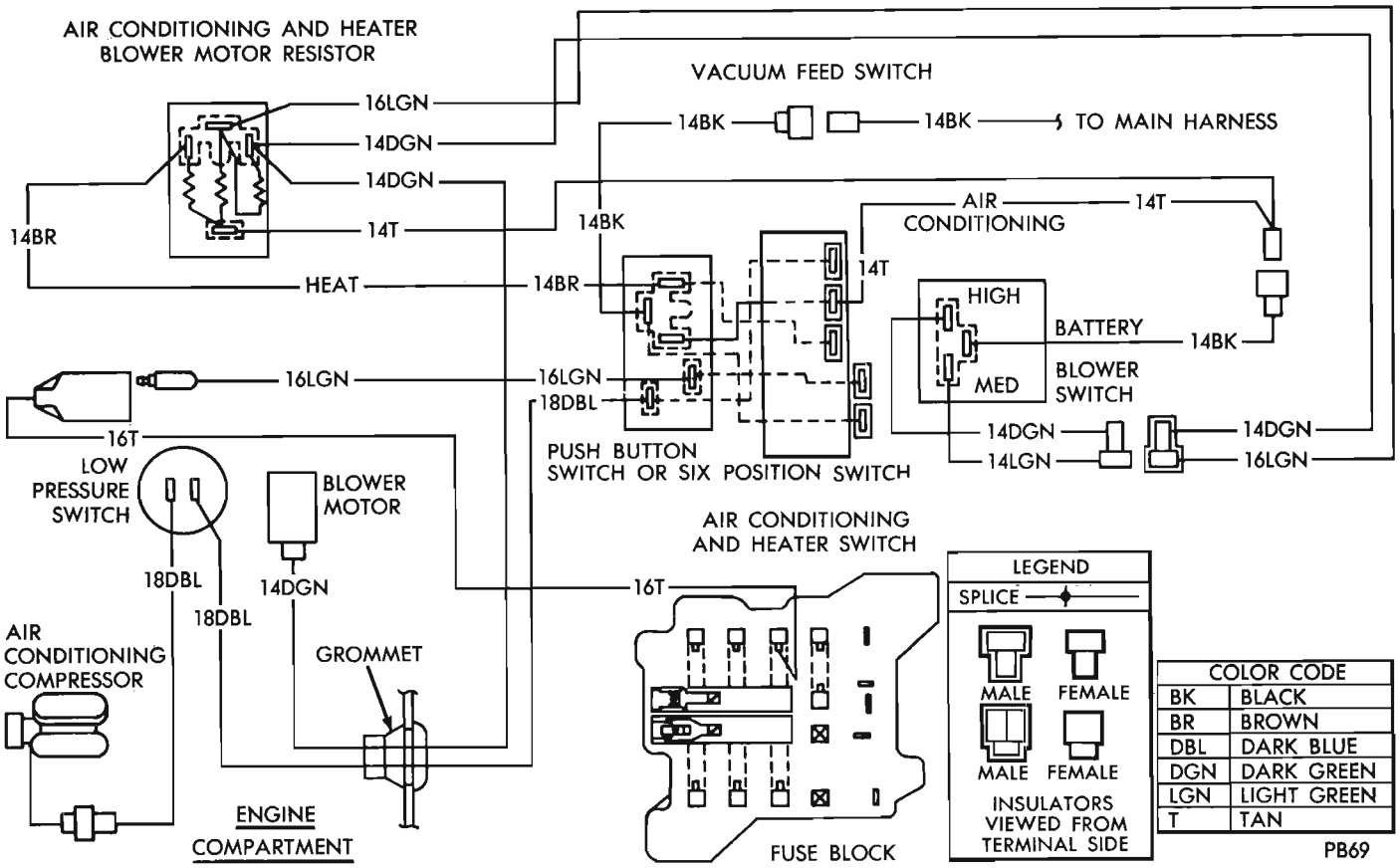


Fig. 7 - Electrical Control Circuit-Barracuda and Satellite

ignition is on and any push button, other than "Off," is depressed.

The switch is controlled by moving the switch lever from left (low) to right (high).

OPERATION OF ALL CONTROLS

Operating controls must be tested in the following sequence.

(1) Inspect and adjust compressor drive belt.

(2) Open vehicle windows.

(3) Move temperature control slide lever to "Off" position.

(4) Start engine and adjust engine speed to 1600 rpm for 6 cylinder engines and 1300 rpm for 8 cylinder engines. Use a reliable tachometer.

(5) Place system in Max A/C position.

(6) The inlet air door should be closed to outside air.

(7) Test the blower operation at all three speed positions. If the blower does not operate correctly, refer to "Electrical Controls Circuit." Leave the blower switch in the "Low" position.

(8) The compressor clutch should be engaged, the compressor operating, and the air conditioning system in operation. If the clutch does not engage, test the circuit as outlined under "Electrical Controls and Circuits."

Push Button or Selector Lever Operation.

Reduce the engine speed to normal idle. With the engine operating at idle speed, the vacuum will be high and the vacuum actuators should operate quickly.

If the actuator operation is slow, check the source hose connection at the engine manifold.

Push each button to test the over-all operation of the electrical and vacuum controls.

The "Push Button Control Chart" summarizes the actions that should take place in each position pushed. See "Chart." Also refer to "Vacuum controls and circuits."

CONTROL CHART

Control Position	Off	Max. A/C	A/C	Heat	Defrost
Inlet Air Door (Open to)	Inside	Inside	Outside	Outside	Outside
Air Conditioning Door	Open	Open	Open	Closed	Closed
By-pass Door	Open	Open	Open	Closed	Closed
Heater Door	Closed	Closed	Closed	Open	Closed with Air-Bleed
Defroster Doors	Closed	Closed	Closed	Closed with Air-Bleed	Open
Blower Speed	Off	Hi.-Med Low	Hi.-Med. Low	Hi.-Med. Low	Hi.-Med. Low
Compressor Clutch	Off	On	A/C On Vent Off	Off	Off

If all the controls operate in the proper sequence but the action of the dampers and doors is slow or incomplete, inspect for mechanical misalignment, or binding.

TEMPERATURE CONTROL CABLE

(Barracuda Models)

Installation

The cable operated temperature control valve is equipped with a self adjusting control cable. No adjustment is necessary after the initial installation.

(1) Place the temperature control lever, on the instrument panel, in the center position.

(2) Position self adjusting clip on cam lever pin and place cam lever on water valve, in full heat position. Snap cable housing into retaining clip and cable into self adjusting clip. (Fig.8).

(3) Move the temperature control lever on instrument panel to the full heat position to adjust the control.

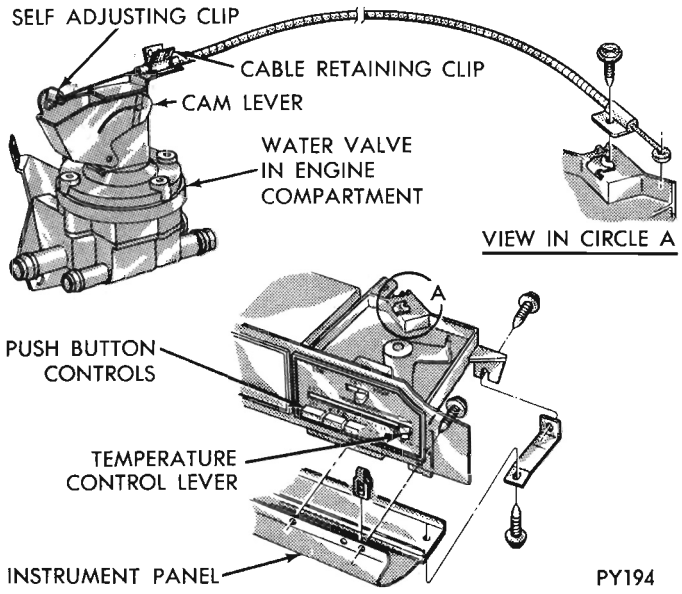


Fig. 8 - Water Temperature Control Valve - Barracuda

Vacuum Actuated Water Valve (Satellite Models)

The water temperature control valve is operated by engine vacuum which is modulated by a regulator on the back of the temperature control lever.

When the control lever is in the off position, 0 to 1 inch of vacuum will be present at the water valve and no water will flow through the heater core.

With the control lever placed in the center position, vacuum at the water valve should read 8 inches 1/2 inch and a moderate amount of water will flow through the heater core.

Movement of the control lever to the extreme right (Heat) position allows 14-1/2 inches to 16 inches of vacuum through the regulator and full water flow through the heater core.

Vacuum Reservoir Tank

A vacuum reservoir tank is used to maintain sufficient vacuum in the system in cases where source vacuum is lost momentarily. The tank has a check valve at the inlet port which closes when the vacuum drops off.

Operation of the tank and check valve can be tested in the following manner:

(1) Connect a 0-29 inch Hg. vacuum gauge to outlet port of tank.

(2) Start engine and allow to run at idle speed.

(3) Vacuum at gauge should build up to within 2 inches of engine vacuum in less than one minute.

(4) Shut engine off, and observe gauge.

(a) If vacuum does not drop off, the check valve and tank are operating satisfactorily.

(b) If vacuum drops off, there is a leak and tank assembly should be replaced.

REHEAT COOLING CONTROL

The air-conditioning refrigeration system operates at full capacity constantly when the "Max A/C" or "A/C" position (Full capacity meaning maximum refrigeration according to the existing ambient temperature and humidity.) If the discharge air from the air conditioning outlets is too cold the air temperature may be increased by reheating the air after it has passed through the evaporator coil. The amount of reheating is determined by the temperature control slide lever which controls the water flow to the heater core. Any desired air temperature can be obtained from the A/C outlets by adjusting the temperature control slide lever.

This unit has a heater core by-pass door which allows a portion of the cool air to pass under the heater core, then mix with the hotter air being discharged at the bottom of the heater core to give a more even discharge air temperature at the air conditioning outlets. The heater core by-pass door is open during air conditioning operation and closed during heater or defroster operation.

Condensation Drain Tubes

Condensation which accumulates on the bottom of the evaporator housing is expelled through a single molded rubber drain tube into the engine compartment. This tube must be kept open to prevent condensation from collecting in the bottom of the housing.

Restrictor

A plastic restrictor is installed in the vacuum hose leading to the A/C door actuator. This restrictor provides some delay in the opening of the A/C door after the "HEAT" or "DEFROST" button is depressed. This delay gives the blower time to expel condensation from the evaporator housing through the A/C outlets before it can be blown onto the windshield.

Should it become necessary to replace the vacuum hose leading to the A/C door actuator, the correct restrictor should be used.

EXPANSION VALVE

Removal

The system must be completely discharged before opening any of the refrigerant lines.

(1) Disconnect equalizer from suction line fitting.

(2) Disconnect expansion valve from liquid line and evaporator. Use two wrenches to loosen each of these connections.

(3) Carefully pull out capillary sensing tube from suction line well.

(4) Remove rubber seal from the capillary sens-

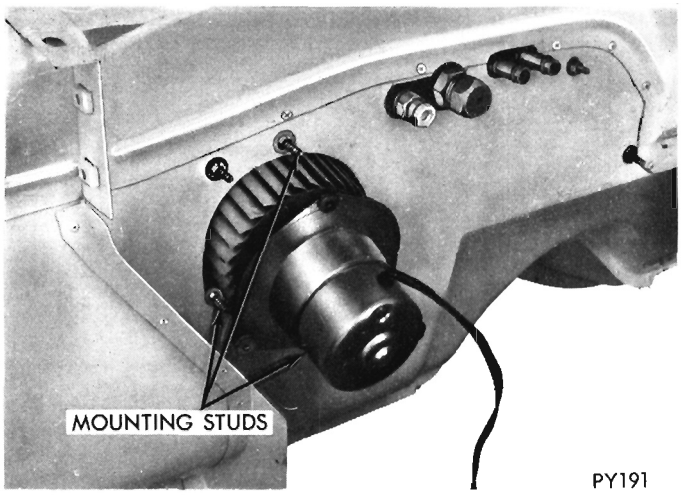


Fig. 9 - Blower Motor Removal

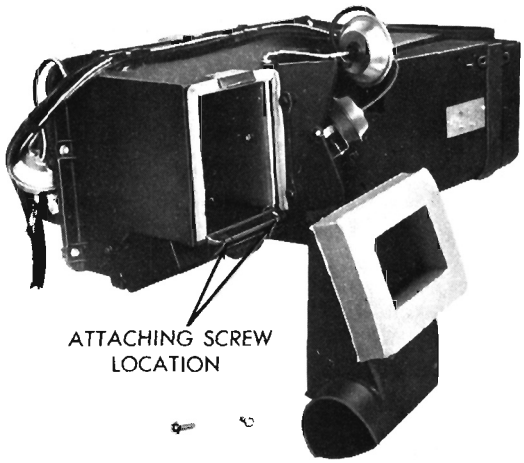


Fig. 10 - Air Distribution Housing Removal

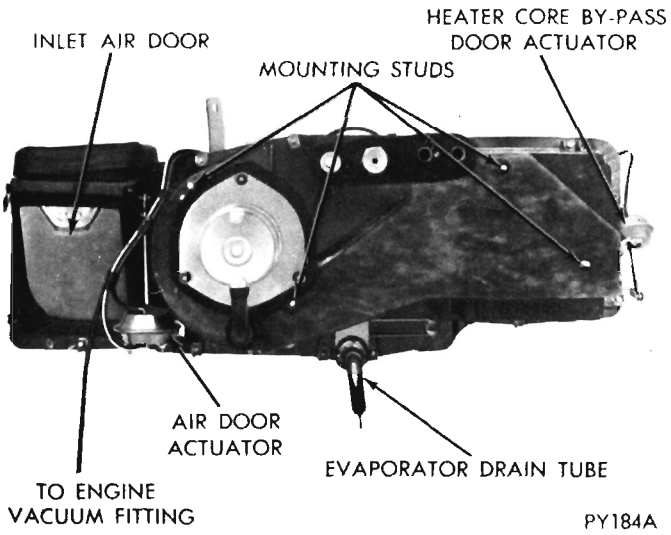


Fig. 11 - Heater Evaporator Assembly (Rear View)

ing tube. Inspect condition of inlet screen.

Installation

(1) With new "O" rings and clean refrigerant oil on all fittings, connect expansion valve to liquid line and evaporator assembly using two wrenches to prevent rotation and twisting of the lines.

(2) Connect equalizer tube to the fitting on suction line.

(3) With a rubber seal on the capillary sensing tube, carefully insert the tube in the suction line well as far as it will go (approximately five inches).

(4) After the expansion valve is installed the system must be tested for leaks and recharged.

EVAPORATOR HEATER ASSEMBLY

Removal

(1) Remove air cleaner from carburetor.

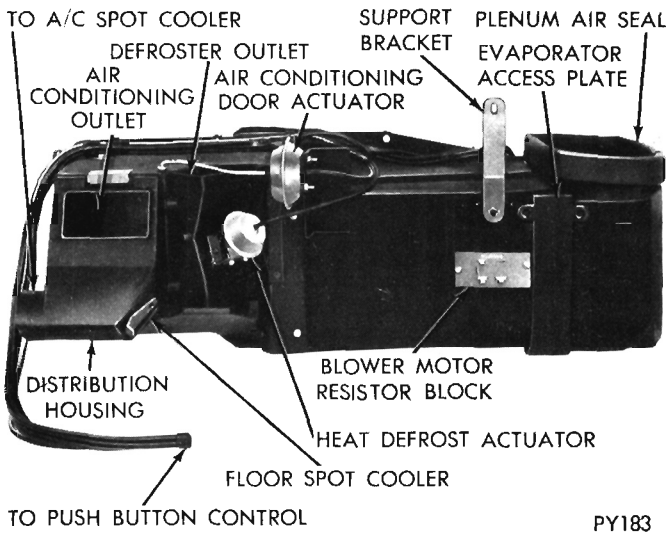


Fig. 12 - Heater Evaporator Assembly (Front View)

(2) Disconnect battery negative cable.

(3) Drain cooling system and disconnect heater hoses at dash panel. Plug core tubes to prevent spilling coolant on interior of car.

(4) Slowly discharge refrigerant from system.

(5) Disconnect refrigerant lines at dash panel using two wrenches. Leave expansion valve attached to line. Cap all refrigerant openings.

(6) Disconnect blower motor wires and remove blower motor cooling tube and blower motor.(Fig.9).

(7) Remove glove box.

(8) Remove appearance shield from lower edge of instrument panel.

(9) Remove left spot cooler duct and air distribution duct.(Fig.10).

(10) Disconnect wires from blower motor resistor, and antenna wire from bottom of radio.

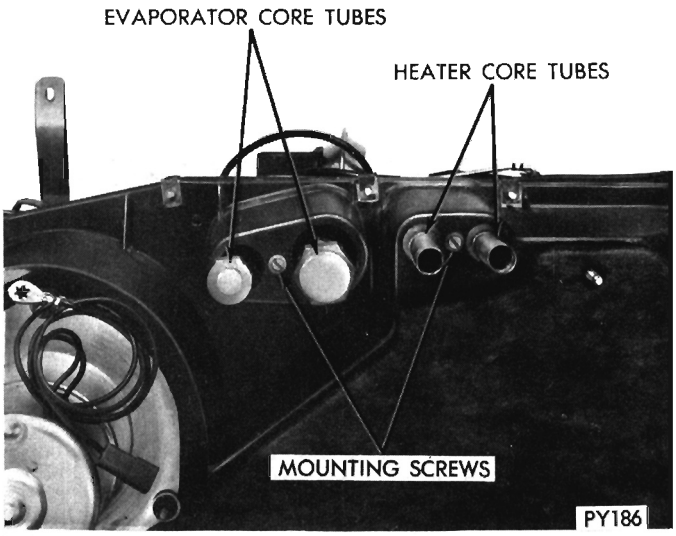


Fig. 13 - Core Tube Mounting Screw Location

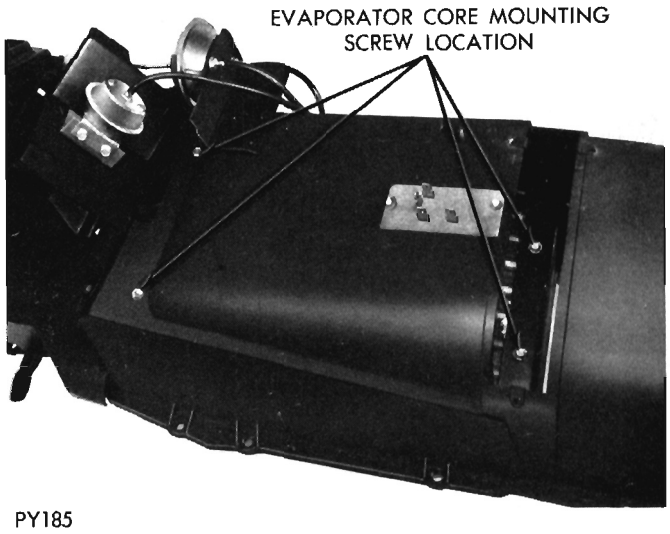


Fig. 14 - Evaporator Core Removal

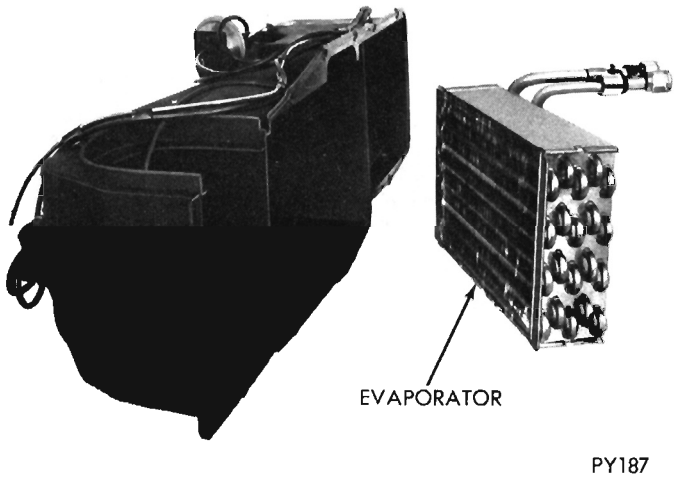


Fig. 15 - Evaporator Core Removed

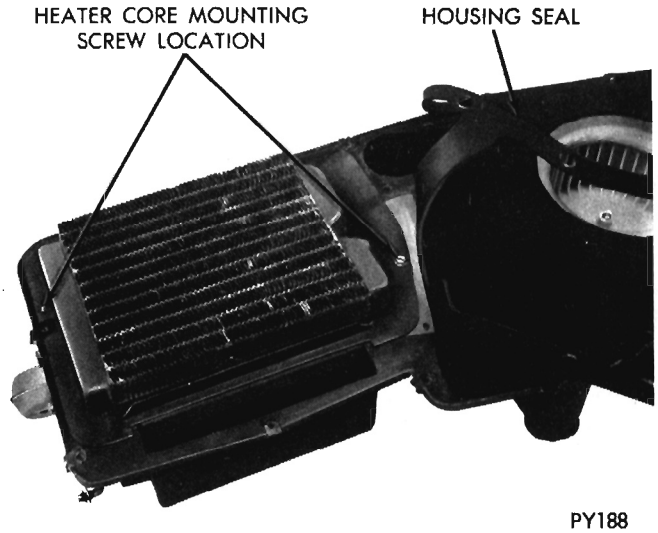


Fig. 16 - Housing Seal Partially Removed

(11) Remove radio, see "Radio Removal" Group 8.

(12) Disconnect vacuum harness from back of control switch.

(13) Remove water valve cable from bracket on left end of housing.

(14) Remove nuts from housing mounting studs in engine compartment.(Fig.1 and 11.)

(15) Remove rubber drain tube.

(16) Remove support bracket from housing to plenum panel.

(17) Remove unit from under instrument panel.

Disassembly

(1) Carefully remove plenum air seal.(Fig.12).

(2) Disconnect vacuum hose from inlet air door actuator and by-pass door actuator.

(3) Remove air seal from heater and evaporator core tubes.

(4) Remove 18 screws holding front and rear covers together and one screw from between evaporator core tubes. (Fig.13). Separate housings.

(5) Remove three screws from evaporator core access plate, remove plate, this will provide access to two evaporator core mounting screws. (Fig. 14).

(6) Remove four screws holding evaporator core to front cover and remove core. (Fig. 15).

(7) To remove the heater core, carefully lift left half of the housing seal from the rear cover as shown in Fig. 16. Do not remove the entire seal as the lower portion is a water seal.

(8) Remove two core retaining screws from mounting plates and one from between core tubes in back of rear cover. Lift heater core out of housing. (Fig. 17).

Assembly

(1) Place heat door in up position before placing

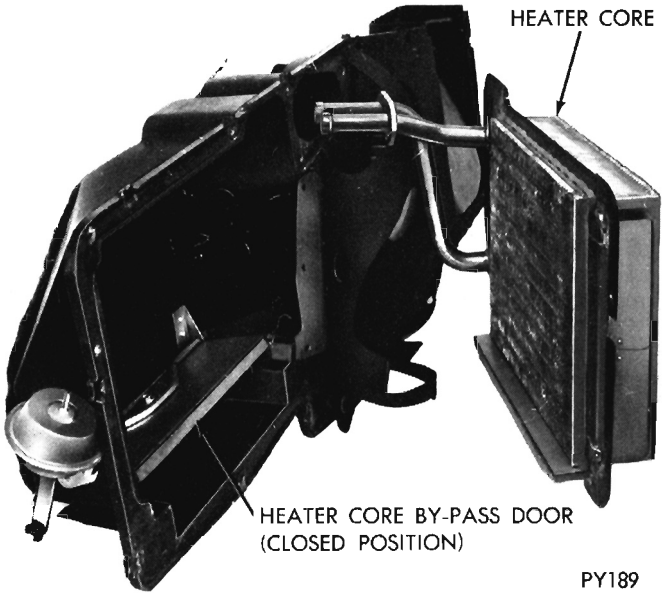


Fig. 17 - Heater Core Removed

heater core in rear cover.

(2) With heater core in position, install sheet metal retaining screws.

(3) Apply rubber cement to under side of raised portion of housing seal and carefully return it to its original position over the heater core.

(4) Install evaporator core in front cover and secure with four sheet metal screws. (Fig. 18).

(5) Assemble front cover to rear cover, be sure cover seal is properly seated. Install 18 sheet metal screws around perimeter of cover and one screw between evaporator core tubes from back of rear cover.

(6) Install air seal over heater and evaporator core tubes.

(7) Connect all vacuum hoses to respective actuators. (Hose with red tracer to rod side of actuator).

(8) Place evaporator core access cover plate on front of housing and secure with three sheet metal screws.

(9) Apply rubber cement to plenum air seal and install.

Installation

(1) Position housing up under instrument panel.

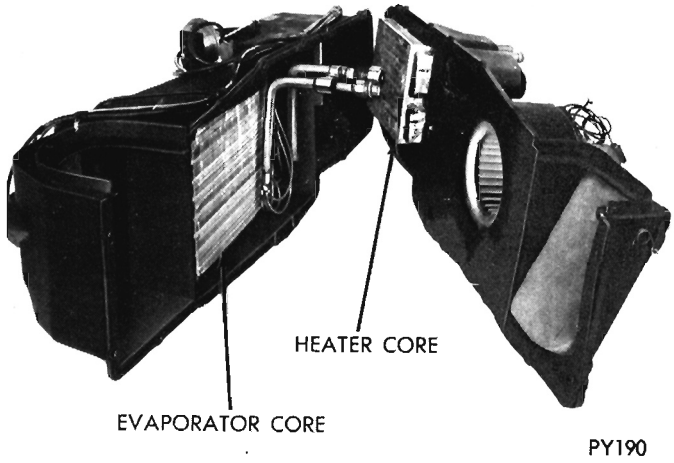


Fig. 18 - Evaporator and Heater Core Installed

(2) Loosely connect housing to plenum support bracket.

(3) From engine compartment, install four retaining nuts on housing mounting studs tighten to 24 inch pounds then tighten the plenum support bracket securely.

(4) Connect vacuum harness to back of control switch. Place the water valve control cable in its retaining bracket.

(5) Install radio, See "Radio Installation" Group 8.

(6) Connect all wiring to blower motor resistor and plug antenna lead into bottom of radio.

(7) Install center outlet air distribution housing and left spot cooler duct.

(8) Install appearance shield to bottom of instrument panel.

(9) Install glove box.

(10) Install blower motor and connect wiring.

(11) Connect blower motor cooling tube and install evaporator drain tube.

(12) Connect refrigerant lines to evaporator core tubes. Examine "O" Rings lubricate fittings and "O" ring freely with refrigerant oil. Use two wrenches to avoid twisting tubes. (Fig. 19).

(13) Connect heater hoses to core tubes. Fill cooling system.

(14) Evacuate system. Sweep test. Examine for leaks.

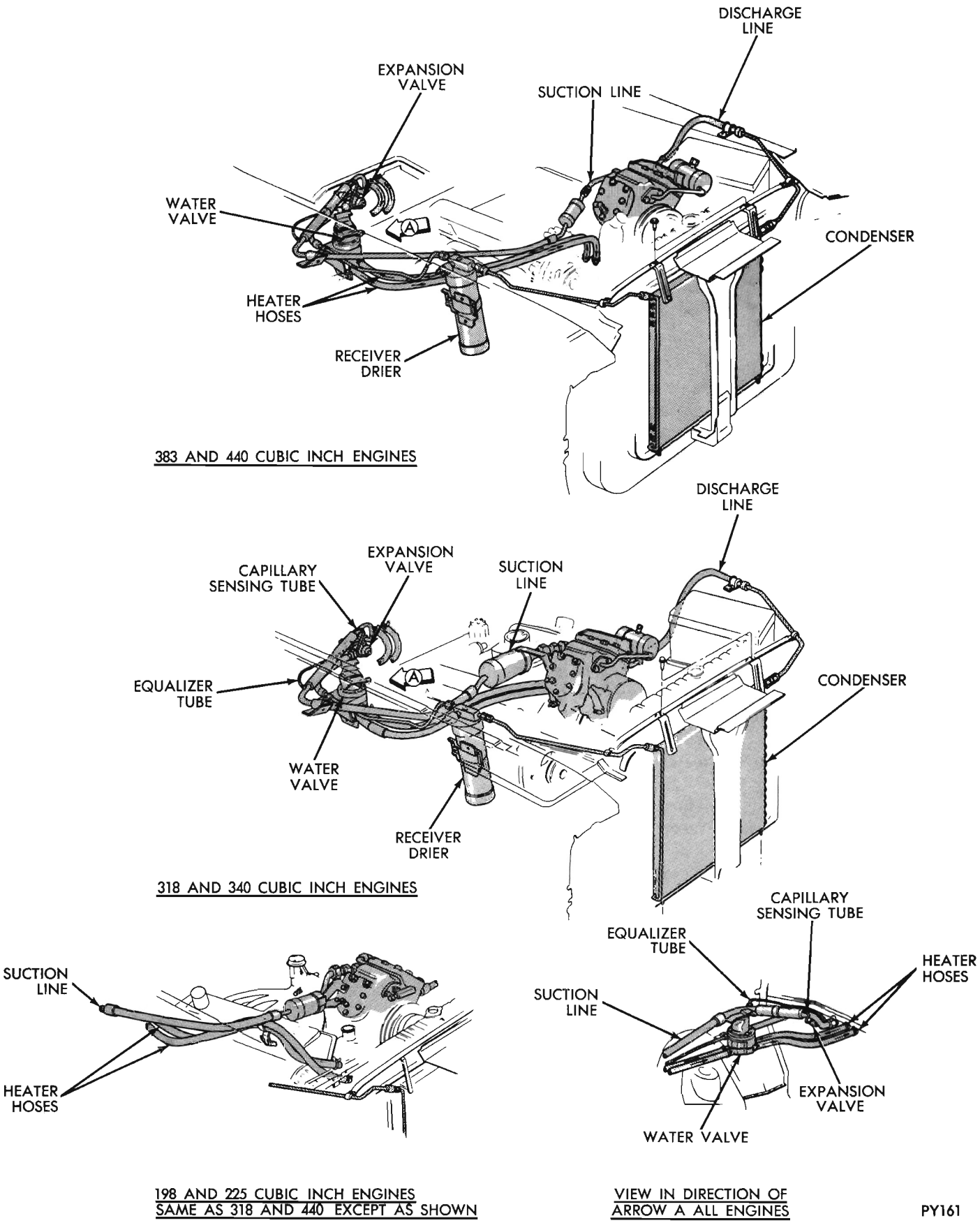


Fig. 19 - Air Conditioning and Heater Plumbing

PLYMOUTH

(Fury Models)

CHRYSLER IMPERIAL

EVAPORATOR HEATER ASSEMBLY

INDEX

	Page
Blower Motor Removal and Installation	82
Electrical Controls and Circuits	75
Evaporator Removal and Installation	82
Expansion Valve Removal and Installation	79
General Information	73
Heater Core Removal and Installation	80
Inspection and Test Procedures	24
Linkage Adjustment	80
Operation of all Controls	77
Vacuum Controls and Circuits	75

GENERAL INFORMATION

Imperial—Installations

Three air conditioner options are available. The first option (Front Unit) (Fig. 1), is a combination air conditioning and heating unit contained in two housings separated by the dash panel.

The evaporator and heater core are inside the housing installed under the instrument panel. This housing is called the "Passenger Side Housing". The blower motor and time delay relay are installed on the housing attached to the engine side of the dash panel. This housing is called the "Engine Side Housing". The controls and cooling air outlets are integral with the instrument panel. This system functions on the reheat principle.

In the "reheat" air conditioner unit all the air entering the system passes through both the evaporator coil and the heater core, regardless of whether the heater, defroster or air conditioning is in use. All output air temperatures are controlled by a single slide lever in the instrument panel, which operates the heater water flow control valve through a vacuum regulator. Airflow is controlled and directed through the unit by a series of doors operated by vacuum actuators and mechanical linkages. The blower is turned on by any of four push buttons.

The second option is the Automatic Temperature Control System (Auto-Temp) which automatically controls the heating and air conditioning operation of the vehicle to maintain a selected interior temperature.

The third option is a dual installation consisting of the combination front unit and a rear unit. The rear unit evaporator assembly is mounted in the luggage compartment. This deluxe installation insures equal distribution of conditioned air to rear seat as well as front-seat passengers.

The dash-mounted front unit is the basic factory installed option. The rear unit, mounted in the luggage compartment is not available as a single unit without the front unit. Since the rear unit option operates automatically in conjunction with the front unit, only the front unit will be described in detail.

Trunk Unit Control (Imperial)

The trunk unit evaporator is dependent upon the controls used to operate the front unit. The evaporator of a trunk unit of a dual installation will cool only when the MAX A/C or the A/C push button of the front unit control is depressed to energize the magnetic compressor clutch.

The blower circuit of the trunk unit is entirely independent of the front unit.

Chrysler—Installations

The first and second options, Standard A/C and Auto-Temp, described under "Imperial installation" are also available on Chrysler models.

The third option (Station Wagons Only), includes the first or second option plus a roof mounted evaporator assembly.

The roof mounted unit operates automatically in conjunction with the front unit and is not available as a single unit without the front unit.

Controls for the front system (Standard A/C) consists of five push buttons, a temperature control slide lever and a three-position toggle-type fan blower switch.

Control for the roof mounted system consists of a rotary two speed switch.

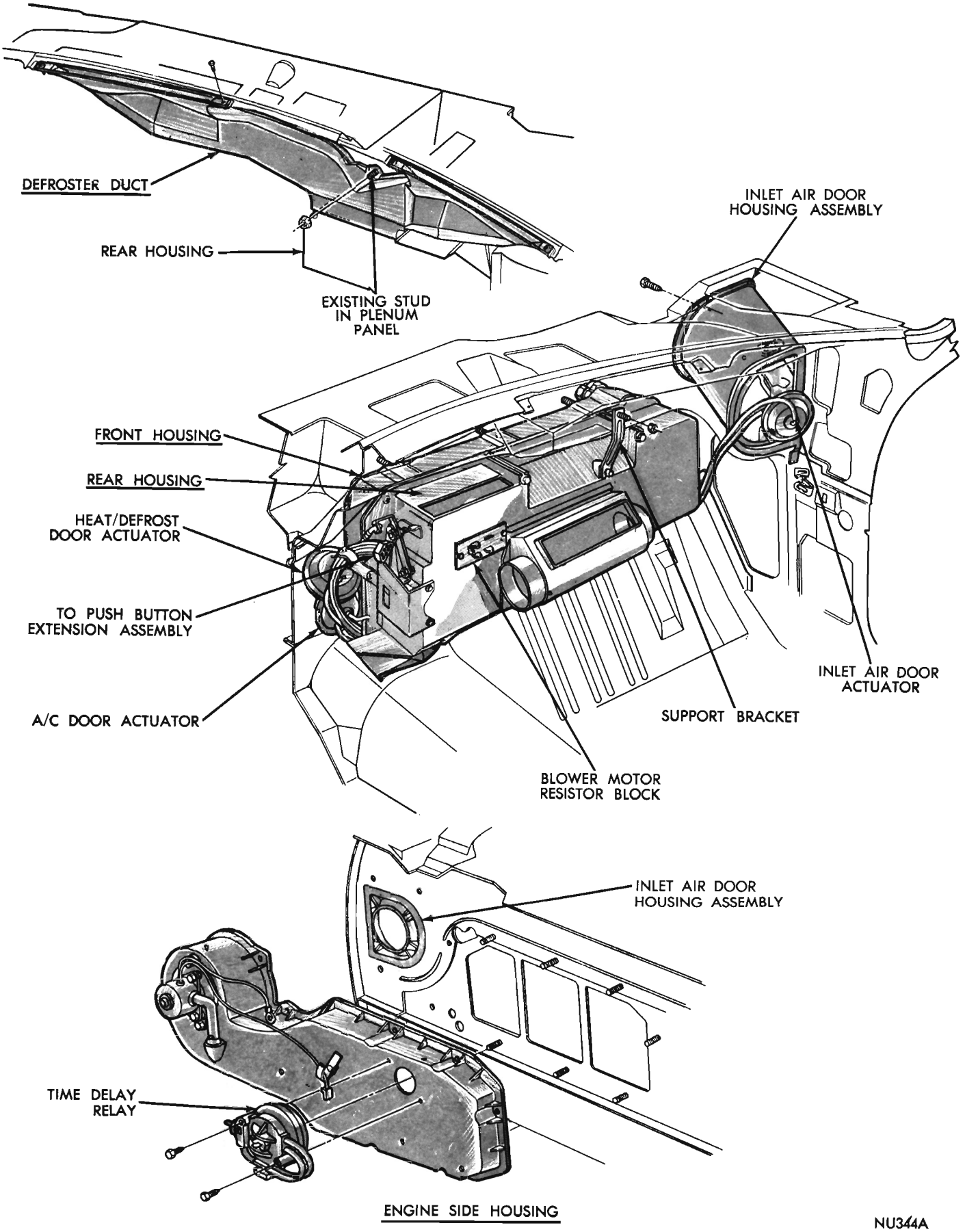


Fig. 1 - Air Conditioner - Heater Assembly (Plymouth, Chrysler and Imperial)

Plymouth—Installations

Two air conditioning options are available on Plymouth models. The first option is the front unit (Standard A/C) as described under "Imperial Installation", the second option is the combination front unit and roof mounted unit (station wagon only) as outlined under Chrysler Installation.

Push Buttons—Control the source and route of circulating air. "Off" (turns off system); "MAX A/C" (maximum air conditioning); "A/C" (air conditioning with outside air); "HEAT" (for heater use only); "DEF" (windshield defroster).

Temperature Control Slide Lever—Maintains any desired temperature by sliding the lever right or left when operating either the heater or air conditioner.

Fan Switch—Permits selection of low, medium or high blower speeds. "LOW" (far left); "MEDIUM" (Center) and "HI" (far right) used when operating either the heater or air conditioner.

Air Directional Outlets—One at each end, and two in the center of the instrument panel. These are adjusted manually to direct cool air to suit the requirements of the driver and passengers.

The center outlets are units that can be shut off or rotated to direct air up or down; adjustable vanes direct air to either side. (Fig. 2).

The air outlets at each end of the instrument panel are also adjustable or can be shut-off by a knob controled damper, with the exception of the Plymouth, it has the vane shut-off feature.

VACUUM CONTROLS AND CIRCUITS

When testing or adjusting the doors in the distribution system, it is necessary to know the correct position of each door for each push-button position. It is also necessary to know which vacuum hoses are activated for each push-button position. In the following illustrations air flow is indicated as the vacuum actuator hoses are activated for each push-button position (Figs. 3).

ELECTRICAL CONTROLS AND CIRCUITS

There are two switches, a push button switch (air conditioner and heater vacuum switch), and a fan switch (air conditioner and heater blower switch).

Push Button Control

The power feed circuit is shown in Figure 4. A 20 ampere fuse in the fuse block protects the circuit.

The compressor clutch circuit is energized when either the "Max. A/C" or the "A/C" push buttons are depressed. The "OFF" button turns off the system.

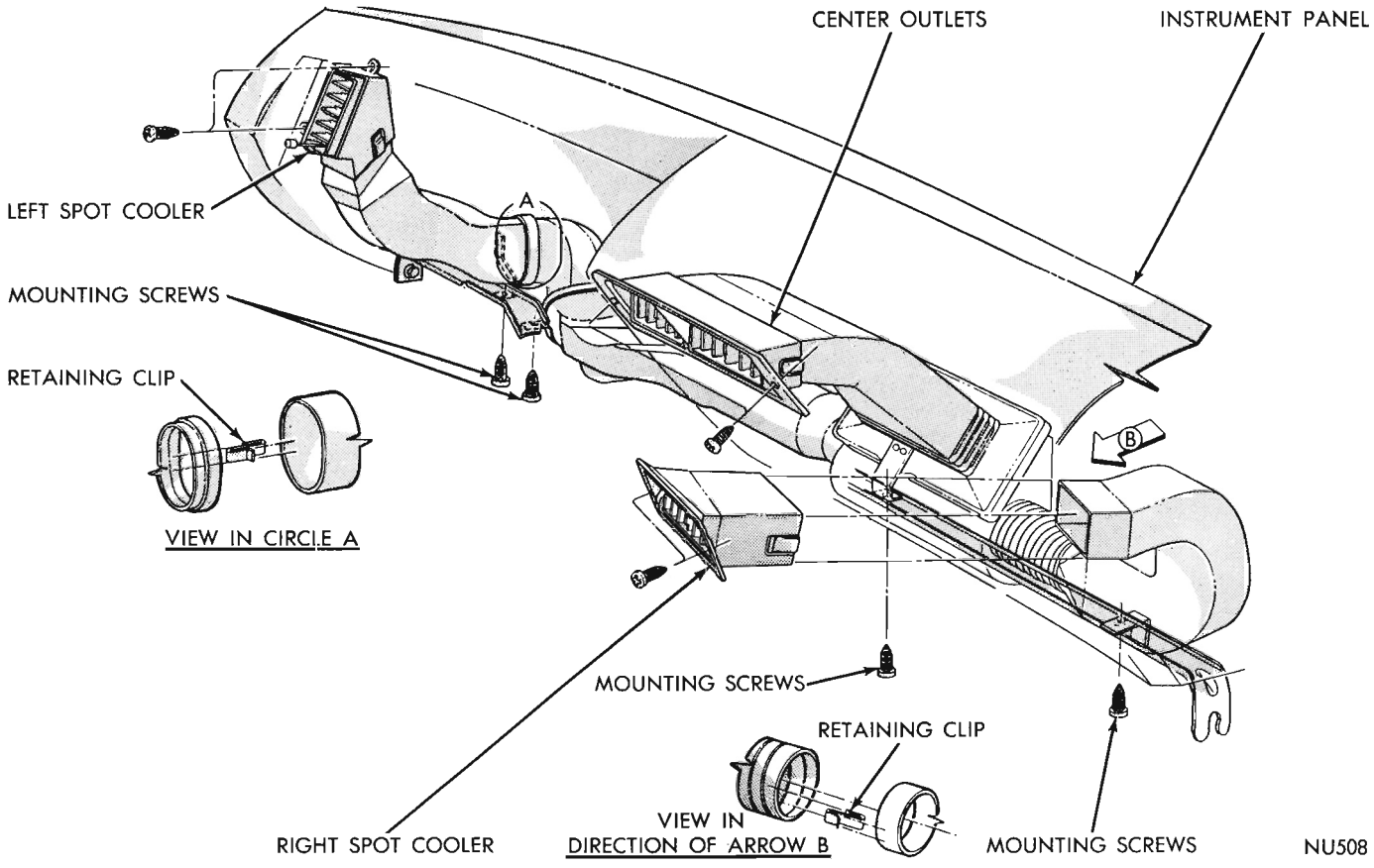


Fig. 2 - Air Conditioning Ducts

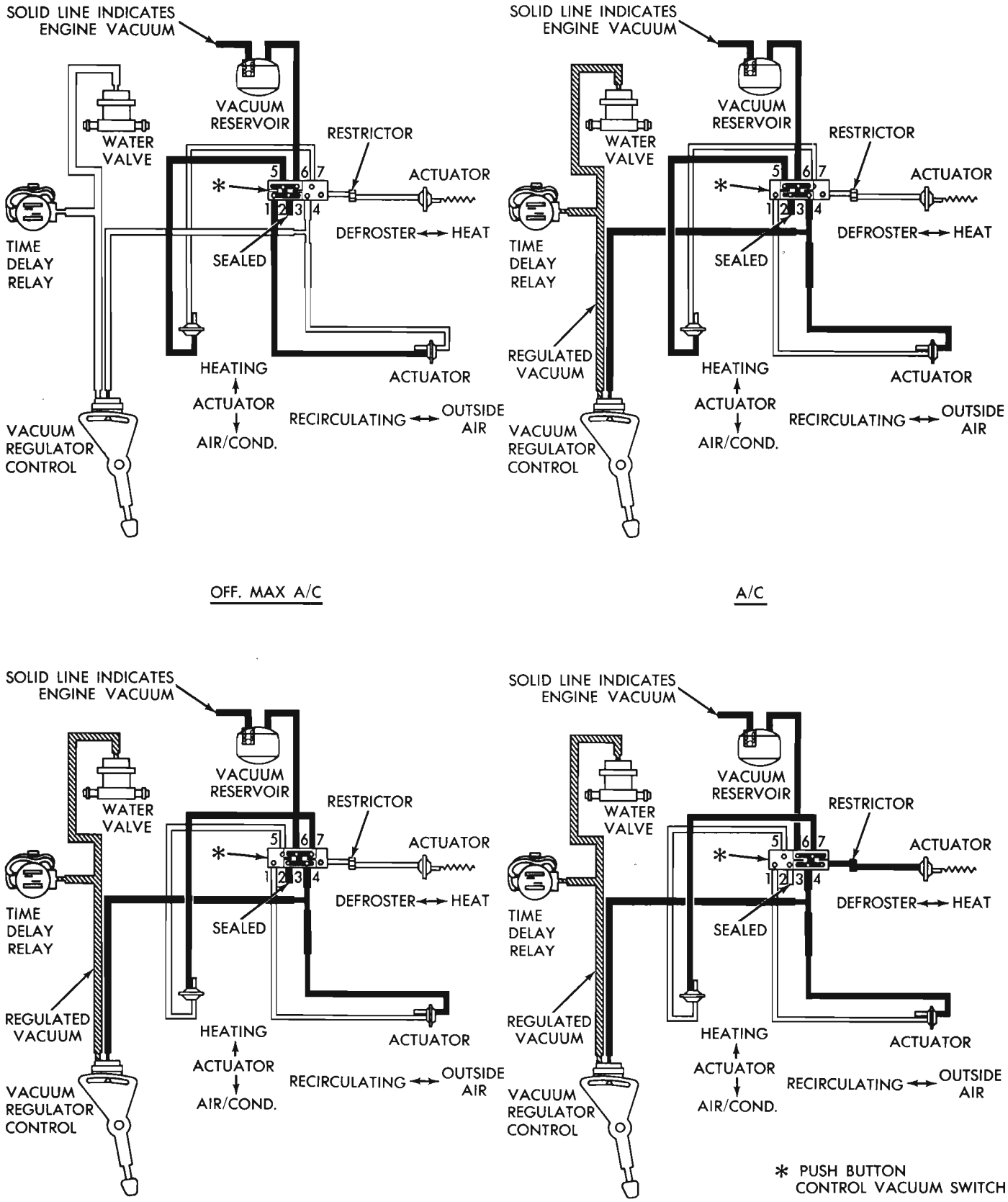


Fig. 3 - Vacuum Circuits - Air Conditioning and Heating (Plymouth, Chrysler and Imperial)

OPERATION OF CONTROLS

Operating controls must be tested in the following sequence.

(1) Inspect and adjust compressor drive belt.

(2) Open vehicle windows.

(3) Move temperature control slide lever to "Off" position.

(4) Start engine and adjust engine speed to 1130 rpm. Use a reliable tachometer.

(5) Push the "A/C," button in.

(6) The inlet air door should be open to outside air.

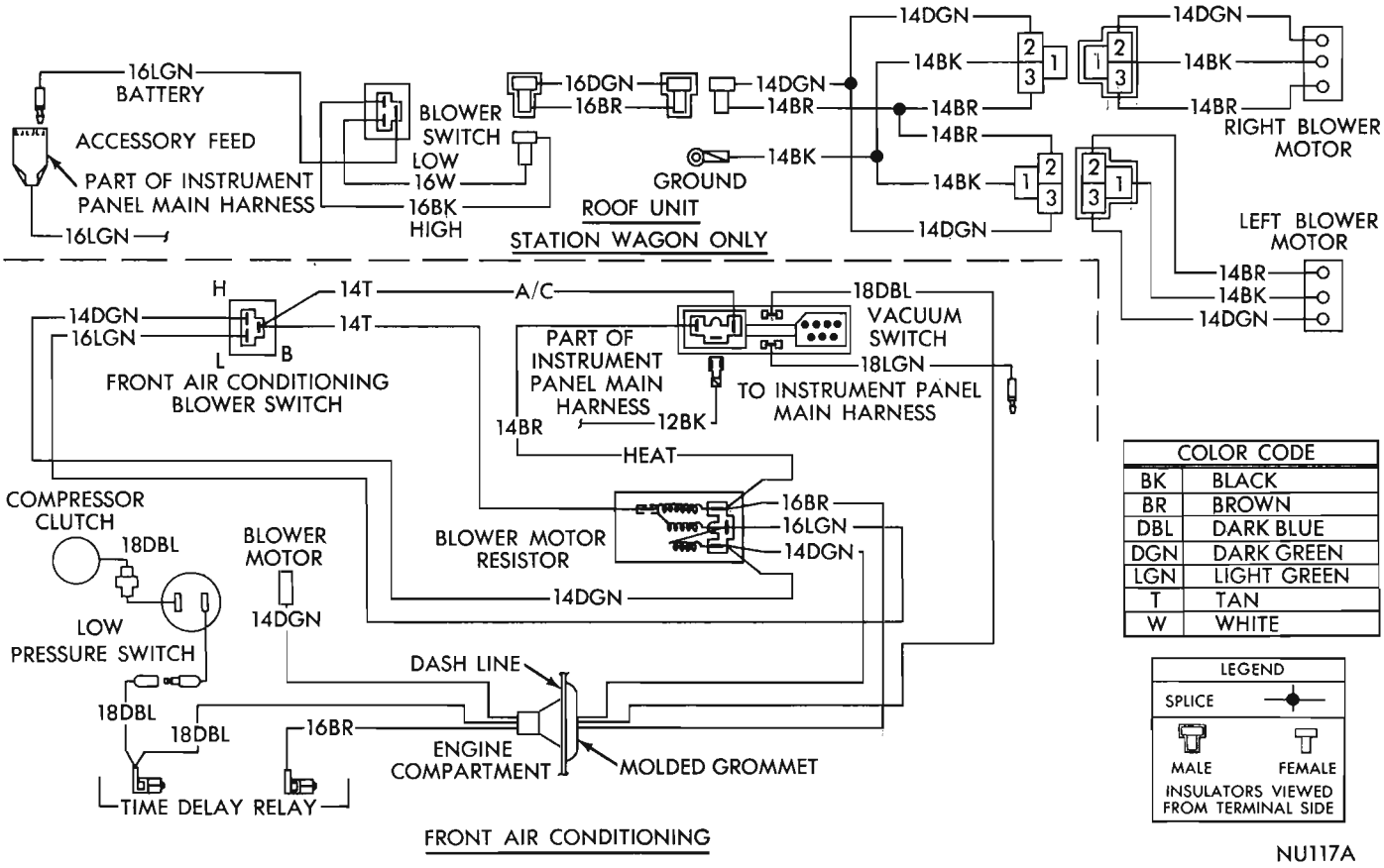


Fig. 4 - Electrical Control Circuits - Plymouth and Chrysler

PUSH BUTTON CONTROL CHART

Button	Off	Max. A/C	A/C	Heat	Defrost
Inlet air door (Open to)	Inside	Inside	Outside	Outside	Outside
Air Conditioning Door	Open	Open	Open	Closed	Closed
Heater Door	Closed	Closed	Closed	Open	Closed with Air Bleed
Defroster Doors	Closed	Closed	Closed	Closed with Air Bleed	Open
Blower Speed	Off	Hi-Med. Low	Hi-Med. Low	Hi-Med. Low	Hi-Med. Low
Compressor Clutch	Off	On	On	*Off	*Off

*Compressor may be on in Heat and Defrost position (See Time Delay Relay)

(7) Test the blower operation at all three speed positions. If the blower does not operate correctly, refer to "Electrical Controls and Circuits." Leave the blower switch in the "Low" position.

(8) The compressor clutch should be engaged, the compressor operating, and the air conditioning system in operation. If the clutch does not engage, test the circuit as outlined under "Electrical Controls and Circuits."

Push Button Operation

Reduce the engine speed to normal idle. With the engine operating at idle speed, the vacuum will be high and the vacuum actuators should operate quickly.

If the actuator operation is slow, check the source hose connection at the engine manifold.

Push each button to test the over-all operation of the electrical and vacuum controls.

The "Push Button Control Chart" summarizes the actions that should take place when each button is pushed. See "Chart." Also refer to "Vacuum Controls and Circuits."

If all the controls operate in the proper sequence but the action of the dampers and doors is slow or incomplete, inspect for mechanical misalignment, binding or improper linkage adjustment.

Vacuum Actuated Water Valve

The water temperature control valve is operated by engine vacuum which is modulated by a regulator on the back of the temperature control lever (Fig. 5).

When the control lever is in the off position, 0 to 1 inch of vacuum will be present at the water valve and no water will flow through the heater core.

With the control lever placed in the center position, vacuum at the water valve should read 8 inches + or — 1/2 inch and a moderate amount of water will flow through the heater core.

Movement of the control lever to the extreme right (Heat) position allows 14-1/2 inches to 16 inches of vacuum through the regulator and full water flow through the heater core.

Vacuum Reservoir Tank

A vacuum reservoir tank is used to maintain sufficient vacuum in the system in cases where source vacuum is lost momentarily. The tank has a check valve at the inlet port which closes when the vacuum drops off.

Operation of the tank and check valve can be tested in the following manner:

(1) Connect a 0-29 inch Hg. vacuum gauge to outlet port of tank.

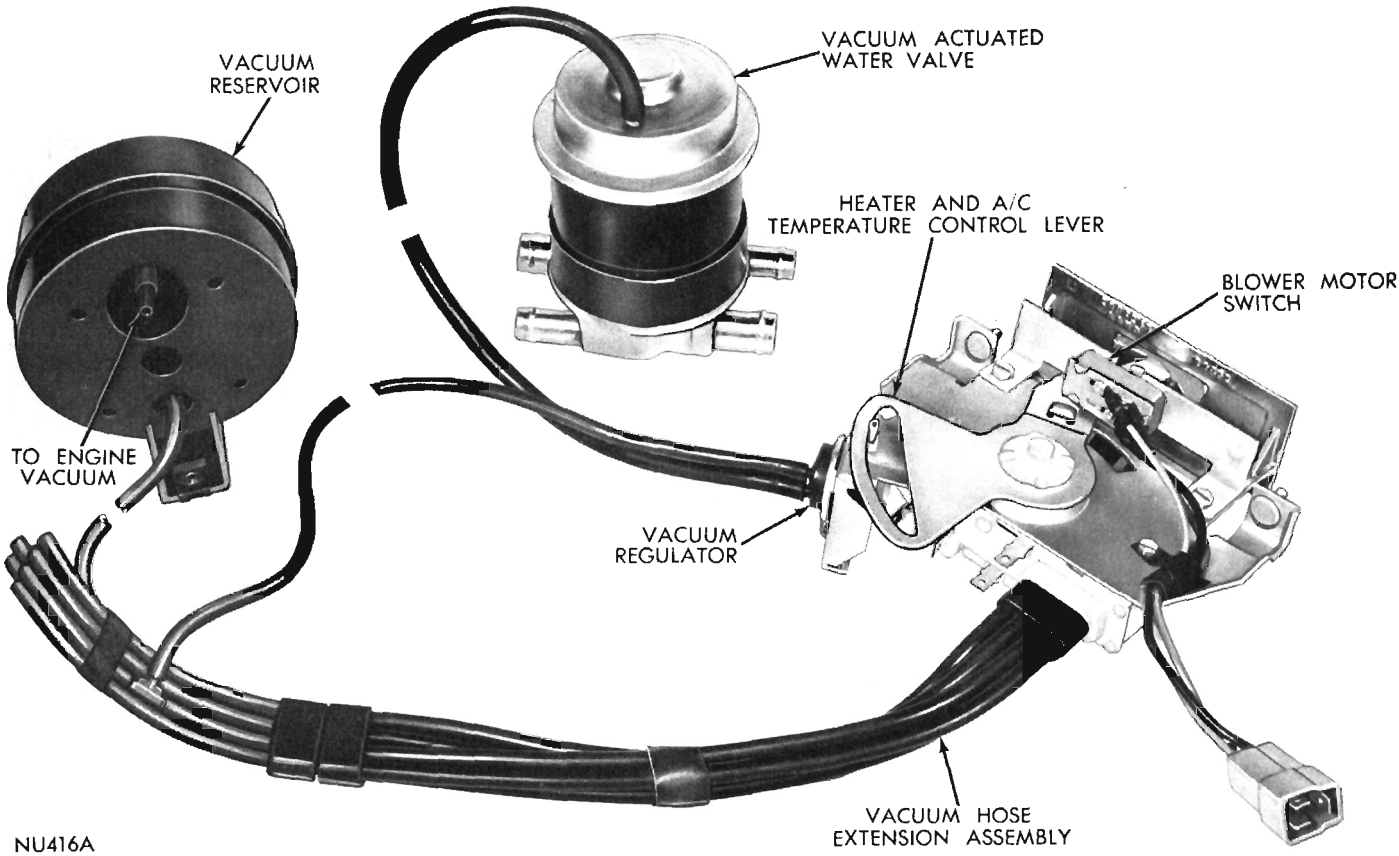


Fig. 5 - Vacuum Controls - Plymouth

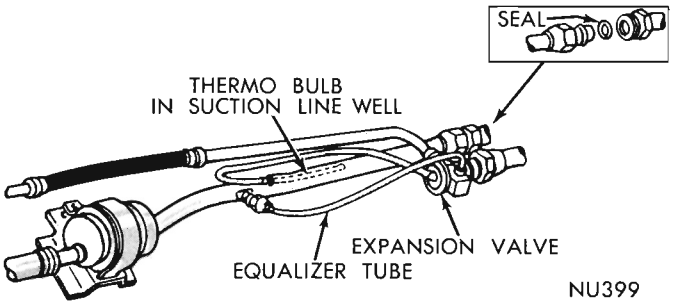


Fig. 6 - Expansion Valve Details - Typical

(2) Start engine and allow to run at idle speed.

(3) Vacuum at gauge should build up to within 2 inches of engine vacuum in less than one minute.

(4) Shut engine off, and observe gauge.

(a) If vacuum does not drop off, the check valve and tank are operating satisfactorily.

(b) If vacuum drops off, there is a leak and tank assembly should be replaced.

Time Delay Relay

A vacuum actuated time delay relay is located on the face of the engine side housing in the engine compartment. The purpose of this relay is to reduce the interior windshield condensation to an acceptable level.

The time delay relay allows the compressor to operate for a period of time after the system has been put into either "Defrost" or "Heat" modes. This time period will vary somewhat depending on temperature control lever position. If the temperature lever is in the full "Heat" position, the compressor will operate for two to ten minutes as on previous modes. If the temperature control lever is in the extreme "Cool" or "Off" position, the compressor will run continuously, except in below freezing weather.

The relay will reset if the system is shut off for two minutes or more.

Restrictor

The time delay system includes, in addition to the time delay relay, a plastic restriction in the vacuum hose leading to the heater door actuator. This restrictor provides some delay in the opening of the defroster door after the "HEAT" or "DEFROST" button is depressed. This delay gives the blower time to expel condensation from the evaporator housing through the heater outlets before it can be blown onto the windshield.

Should it become necessary to replace the vacuum hose leading to the heater door actuators, the correct restrictor should be used.

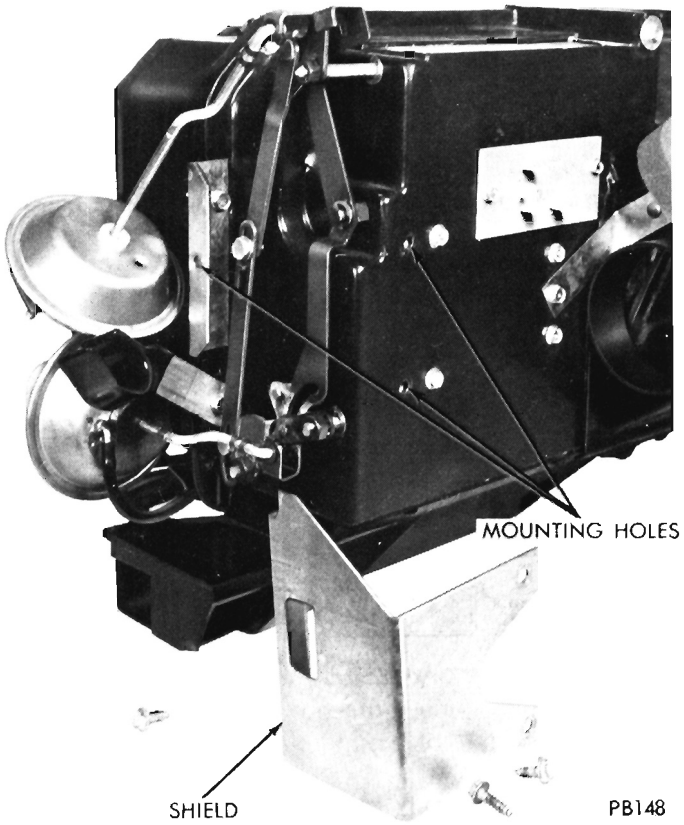


Fig. 7 - Linkage Shield Removed

EXPANSION VALVE

Removal

The system must be completely discharged before opening any of the refrigerant lines.

(1) Disconnect equalizer from suction line fitting (Fig. 6).

(2) Disconnect expansion valve from liquid line and evaporator. Use two wrenches to loosen each of these connections.

(3) Carefully pull out capillary sensing tube from suction line well.

(4) Remove rubber seal from the capillary sensing tube. Inspect condition of inlet screen.

Installation

(1) With new "O" rings and clean refrigerant oil on all fittings, connect expansion valve to liquid line and evaporator assembly using two wrenches to prevent rotation and twisting of the lines.

(2) Connect equalizer tube to the fitting on suction line.

(3) With a rubber seal on the capillary sensing tube, carefully insert the tube in the suction line well as far as it will go (approximately five inches).

(4) After expansion valve is installed, it must be completely tested and the system must be tested for leaks and recharged. **Do Not permit capillary**

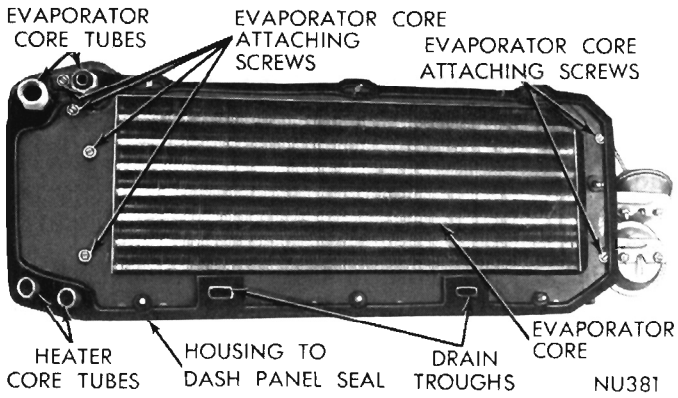


Fig. 12 - Evaporator - Back Side of Front Cover

(8) Install steering column cover and left spot cooler duct. Install glove box assembly.

(9) Connect heater hoses and fill cooling system. For summer operation as well as winter operation, be sure the system is protected with the proper type and amount of anti-freeze.

(10) Install air cleaner and connect battery ground cable.

(11) Start engine, operate until normal engine operating temperature is obtained and test operation of heater.

BLOWER MOTOR

The blower motor is mounted to the engine side housing under the right front fender between the inner fender shield and the fender. The inner fender shield must be removed to service the blower motor, inlet housing (Fig. 10), or engine side housing.

EVAPORATOR

Removal

The refrigerant system must be completely discharged before opening any of the refrigerant lines.

To remove the evaporator, the entire unit housing must be removed from under the instrument panel.

(1) Disconnect negative battery cable, drain cooling system, remove air cleaner and disconnect heater hoses. Plug both core tubes to prevent spilling coolant when unit is removed (Fig. 11).

(2) Disconnect suction line and expansion valve from evaporator tubes. Use two wrenches to loosen each of these connections. **Cap all refrigerant openings to prevent the entrance of dirt or moisture.**

(3) Remove steering column cover and remove left spot cooler duct.

(4) Remove glove box and remove center spot cooler, air distribution housing and right spot cooler duct.

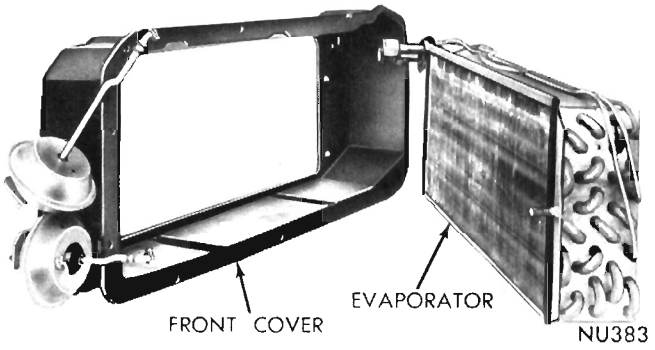


Fig. 13 - Evaporator Removed From Front Cover

(5) From glove box opening, disconnect wires at resistor block and vacuum hoses from recirculating housing actuator.

(6) Unplug antenna wire from radio and place wire out of the way.

(7) From engine compartment remove seven retaining nuts surrounding engine side housing.

(8) Through glove box opening remove retaining nut from housing end of support bracket and swing bracket up out of the way.

(9) Carefully roll housing out from under instrument panel.

(10) Place unit on bench, disconnect actuator rods, remove heat distribution duct, and separate front cover from evaporator housing by removing eleven screws surrounding the housings.

(11) From the tube side of the evaporator housing, remove six screws and carefully lift out the evaporator (Figs. 12 and 13).

Installation

(1) Position evaporator core in housing, align holes and install six mounting screws.

(2) Place heater core and front cover on evaporator core and secure the two covers with eleven screws.

(3) Install heat distribution duct to bottom of housings.

(4) Connect actuator rods and adjust linkage if necessary.

(5) Position unit under instrument panel and place support bracket over existing stud on face of housing. Install retaining nut.

(6) From engine compartment, install seven retaining nuts to studs surrounding engine side housing.

(7) From glove box opening, connect wire to resistor block and vacuum hoses to air inlet housing actuator.

(8) Install center air distribution housing, center spot cooler and right spot cooler duct. Plug antenna wire into radio and replace glove box.

(10) Connect vacuum hoses to actuator on left side of housing.

(11) Install steering column cover.
(12) Install left spot cooler duct.
(13) Connect suction line and expansion valve. Use two wrenches to tighten fittings (Figs. 14, 15 and 16).
(14) Connect heater hoses, fill cooling system and inspect for leaks.
(15) Install air cleaner and connect battery cable.

After the evaporator and heater assembly is installed in the vehicle, it will be necessary to sweep the system, test for leaks and charge the system with the proper amount of refrigerant. It is recommended that the operation of all controls be tested and an overall performance test be made after the repair or replacement of the evaporator assembly.

REAR UNIT (Imperial)

Removal

(1) Discharge the refrigerant from the system.
(2) Remove the rear seat, backrest and insulation blanket to assist in removal of the trunk unit components.
(3) Release the four clamps on the flexible ducts and remove the ducts from the evaporator.
(4) Disconnect electrical connections and drains.
(5) Disconnect the suction and discharge lines. Cap all refrigerant lines to prevent dirt and moisture from entering the system.
(6) Remove the mounting bracket to flange bolts (six) and remove the evaporator assembly from the luggage compartment. (Fig. 17).

Installation

(1) Position the evaporator assembly in the luggage compartment and install the mounting bracket to flange bolts. The blower motor ground is connected to the left front bolt.
(2) Install the electrical connection and drains.
(3) Use new "O" rings with clean refrigerant oil on connections. Install the suction and discharge lines using two wrenches to prevent rotation and twisting of the lines.
(4) Install the flexible ducts and secure the clamps.
(5) After the evaporator assembly is installed in the vehicle, it will be necessary to sweep the system. Test for leaks, and charge with the proper amount of refrigerant. **An over-all Performance Test should be made after repair or replacement of the evaporator assembly.**
(6) Install the insulation blanket, back rest and back seat.

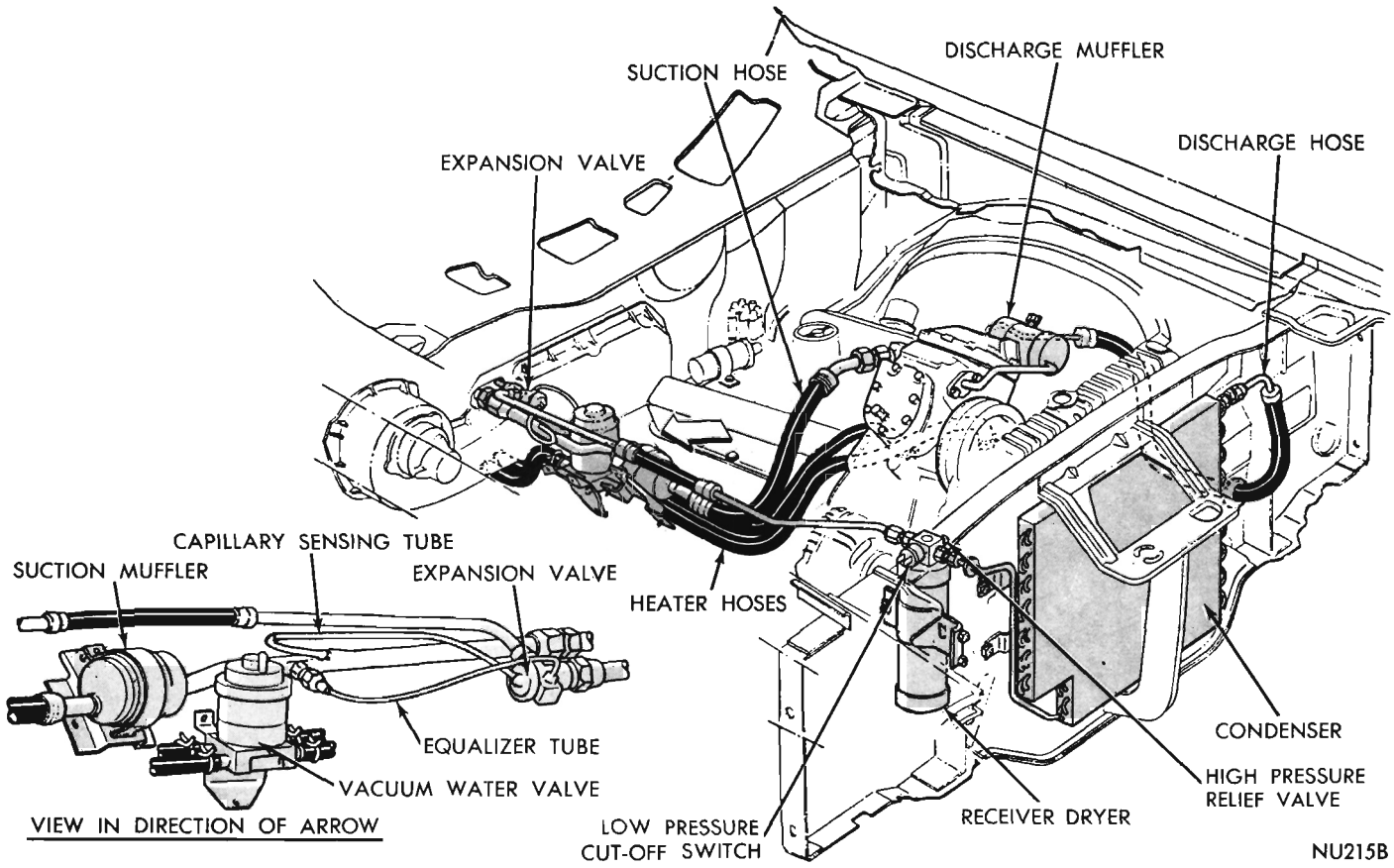


Fig. 14 - Air Conditioning and Heater Plumbing (318 and 360 Cu. In. Engine) Plymouth

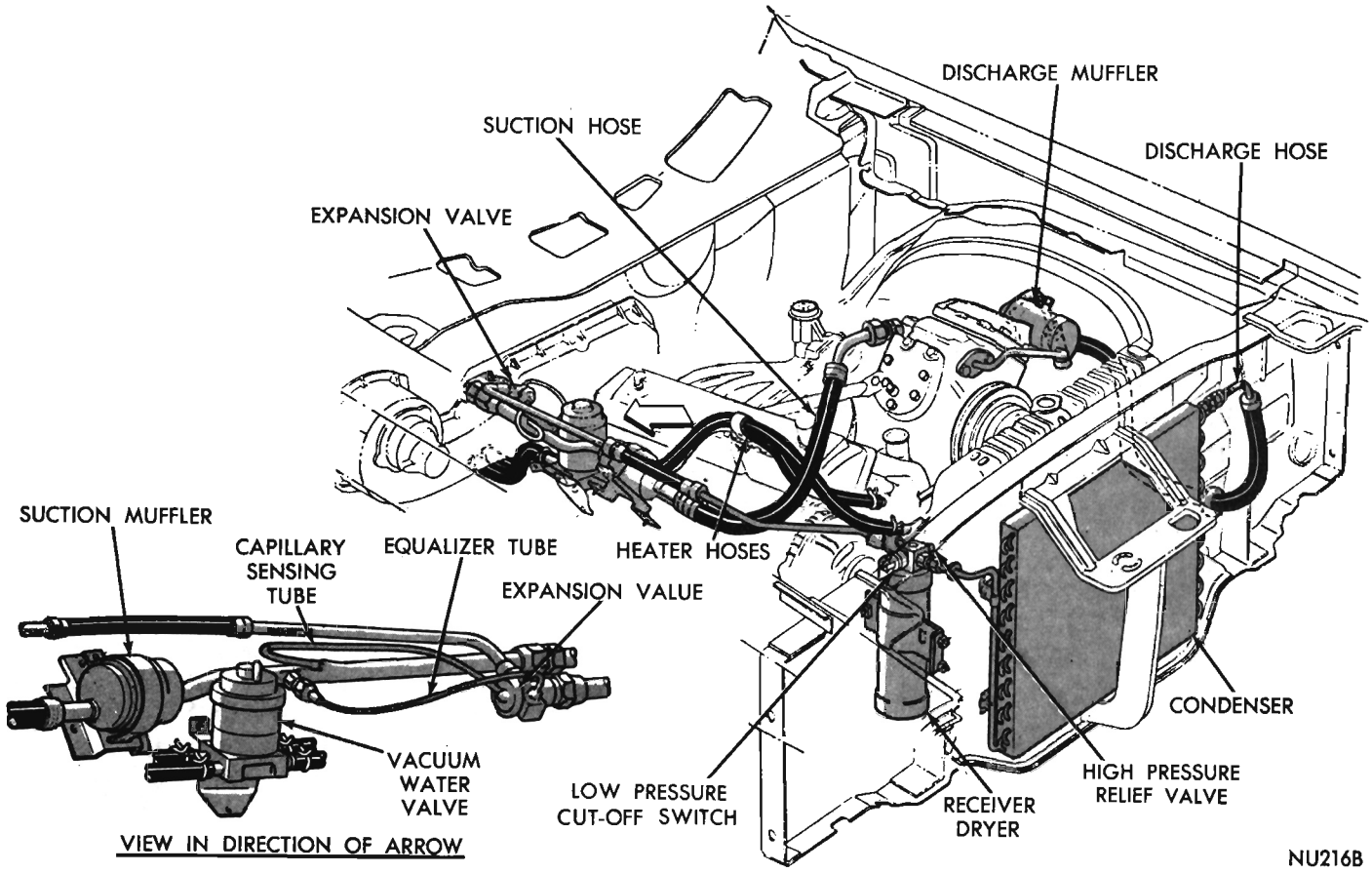


Fig. 15 - Air Conditioning and Heater Plumbing (225 Cu. In. Engine) - Plymouth

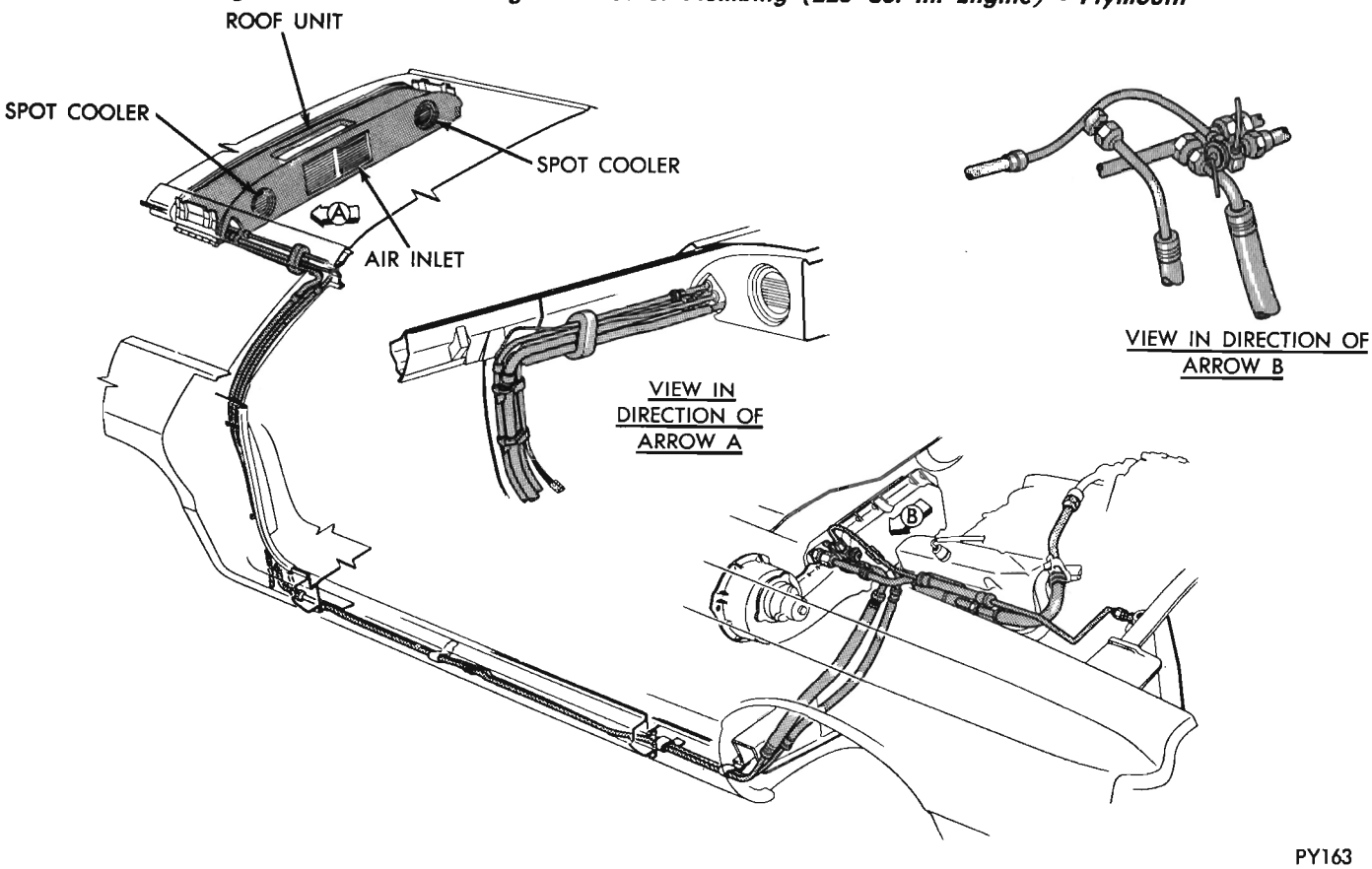


Fig. 16 - Roof Unit Air Conditioning Plumbing (Station Wagon Only) - Plymouth and Chrysler

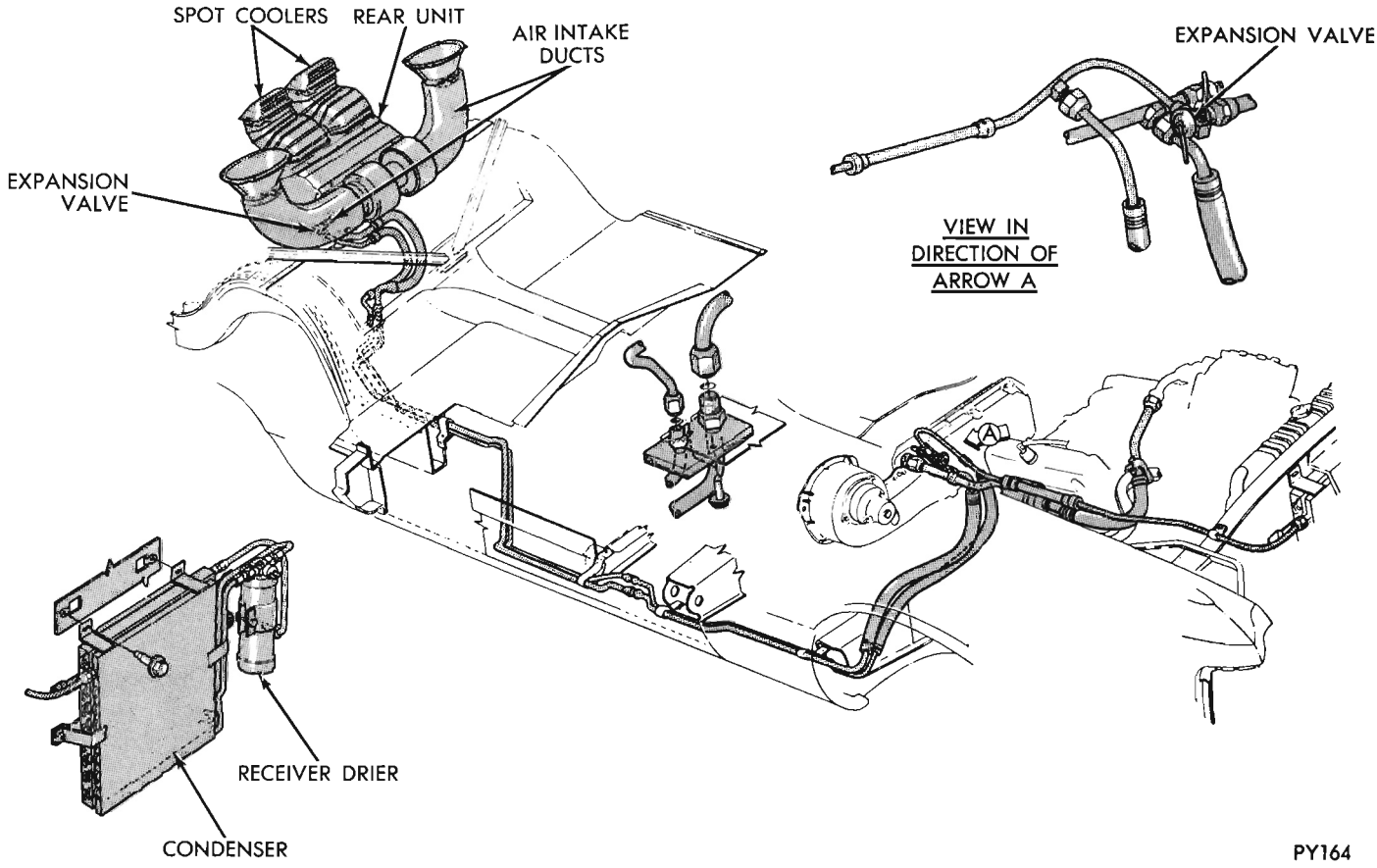


Fig. 17 - Rear Unit Air Conditioning Plumbing - Imperial Only

AUTO TEMP II
CHRYSLER AND IMPERIAL

INDEX

	Page
General Information	85
Major Components	88
Operating Controls	85
Performance Tests	112
Push Button Control Chart	99
Service Diagnosis	90
Service Procedures and Component Tests	96
System Test Procedure	96
Tester Connections	96
Vacuum Circuits	106
Wiring Diagram	101

GENERAL INFORMATION

The Auto-Temp II System automatically controls the heating and air conditioning operation of the vehicle to maintain a selected comfort level. In cold weather, the system provides heat. In warm weather the system provides cool dehumidified air.

The unit will heat or cool according to interior temperature, ambient temperature and control setting; in varying degrees of either heating or cooling without any action on the part of the operator other than dialing a desired comfort setting and setting the system on "Lo Auto", "Hi Auto" or "Def."

The basic air conditioning package is the same as that used for the standard heater-air conditioning system (Fig. 1). The controls have been changed and various sensors and components have been utilized to compose the "Auto-Temp II" system.

OPERATING CONTROLS

The Automatic Temperature Controls are located in the center of the instrument panel and consist of a thumbwheel selector and a push-button switch.

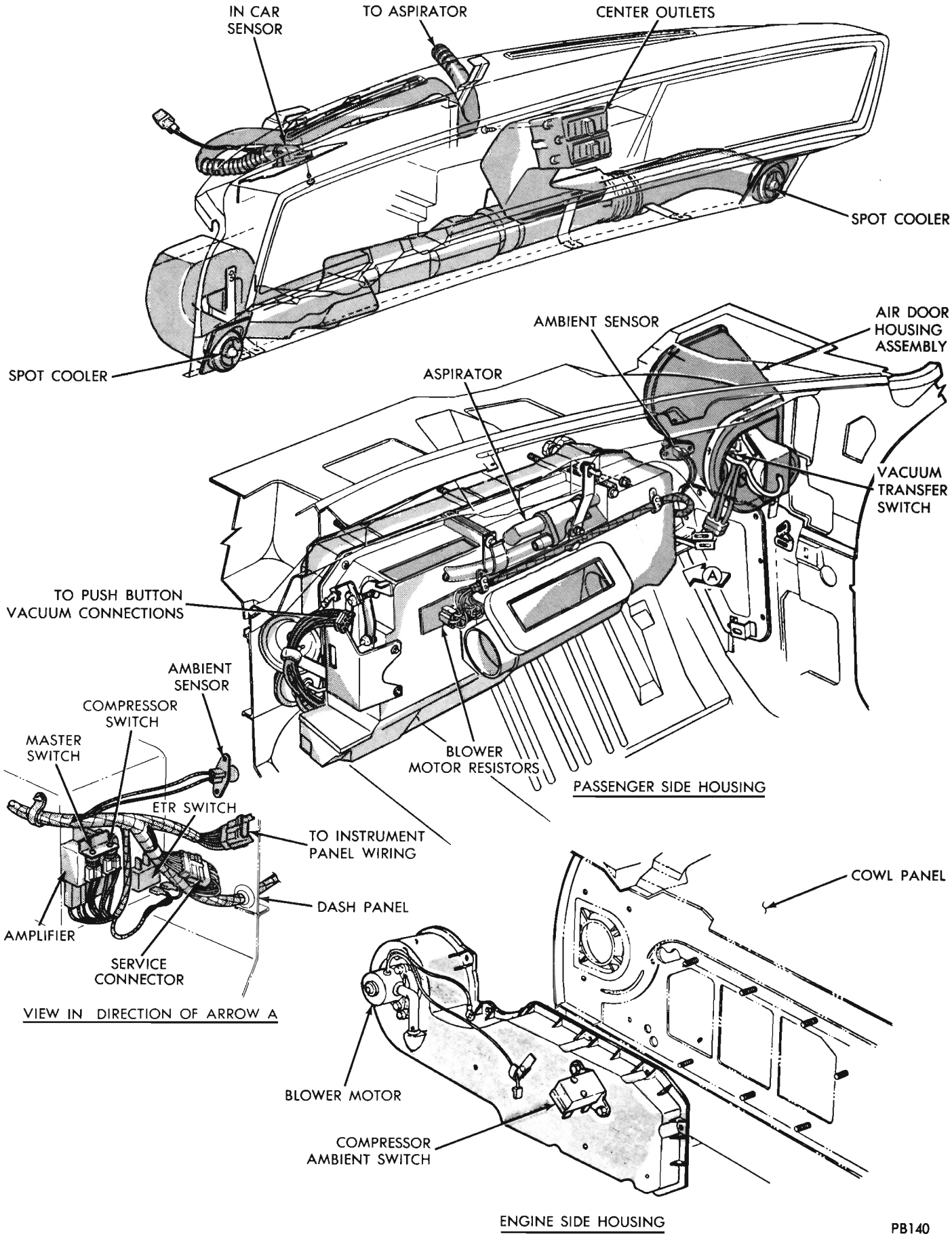


Fig. 1 - Auto-Temp II Housing Assemblies

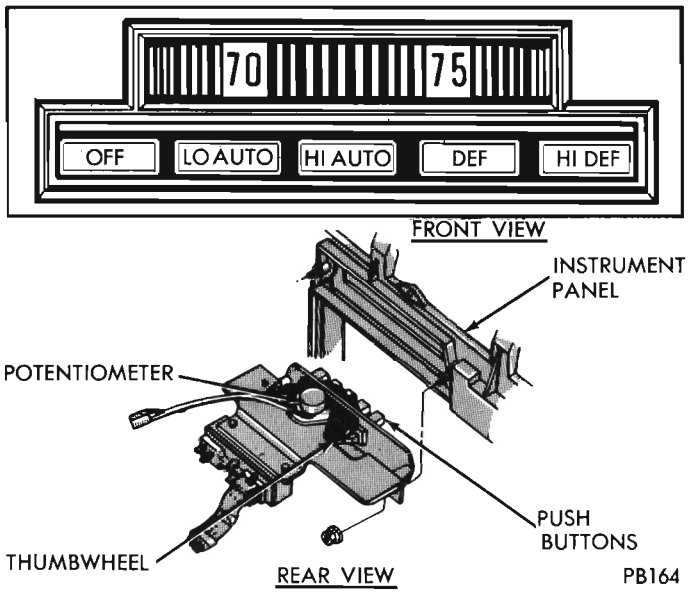


Fig. 2 - Push Button Control

Thumbwheel Selector

Thumbwheel selector operates similar to a home thermostat. The thumbwheel has 5 numbers, 65-70-75-80-85, to allow the operator to select a desired comfort level. (Fig. 2)

Pushbutton Switch

Off—System will not operate (servo will be automatically positioned in M1-A/C (Park), the blower will not operate and the outside air door will be closed).

Lo-Auto—Blower will automatically remain off and the outside air door will remain closed (if heating is required) until water temperature reaches 125 degrees F.—temperature controlled discharge air will then come out of the heater slots (with normal defrost bleed) or the air conditioning outlets as required by the system. There are five blower speeds available on the air conditioning mode of operation and four available on the heat mode (the maximum blower speed on air conditioning is higher than the maximum blower speed on heat).

Hi-Auto—Same as "Lo-Auto," except the blower will operate at the higher blower speeds only. There are three blower speeds available on the air conditioning mode and two available on the heat mode of operation (again the maximum blower on air conditioning is higher than the maximum blower on heat and all the speeds are higher in the "Hi-Auto" position than in the "Lo-Auto" position). **This position is available to allow the operator to select the higher blower speeds that**

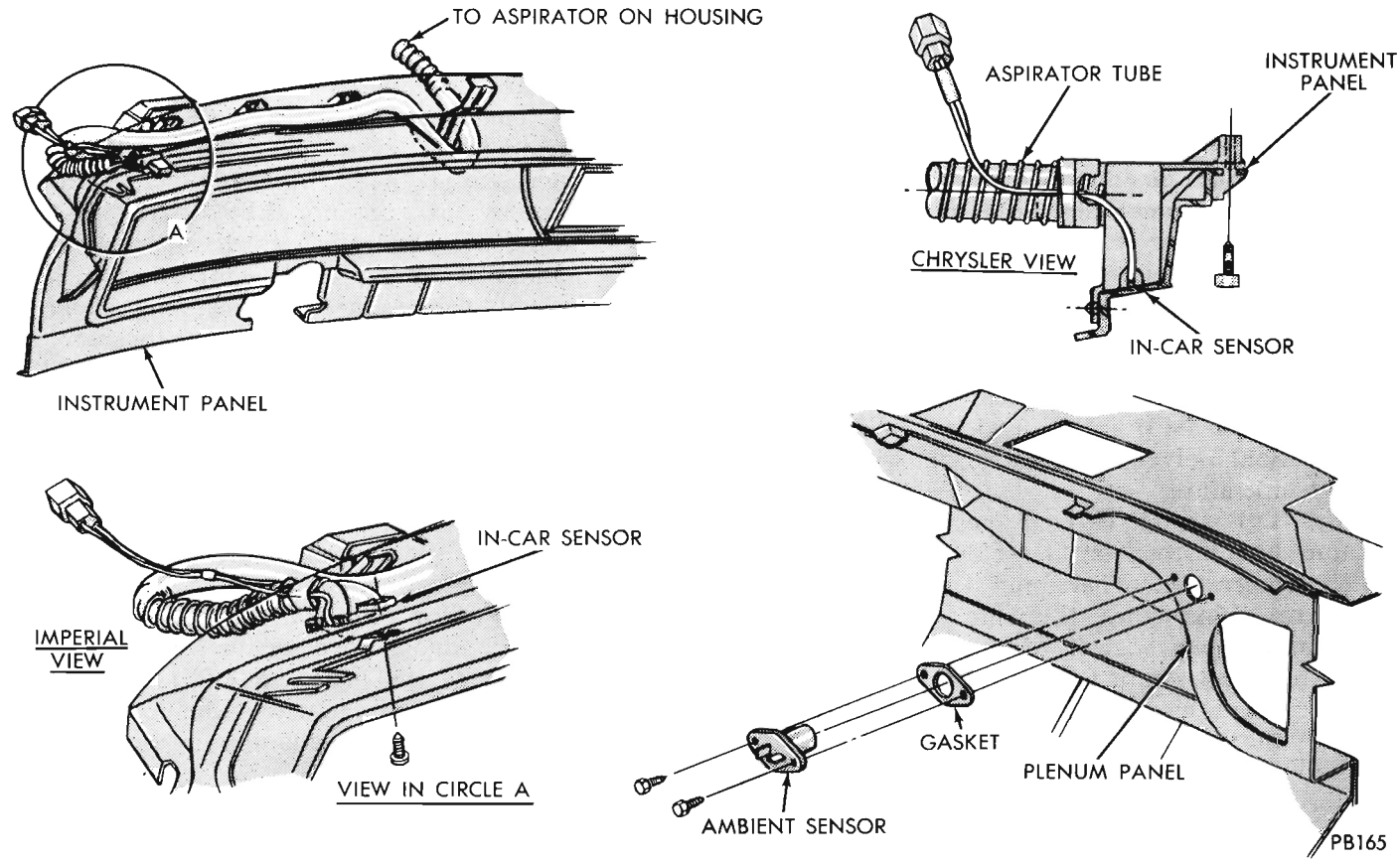


Fig. 3 - Sensor Installation

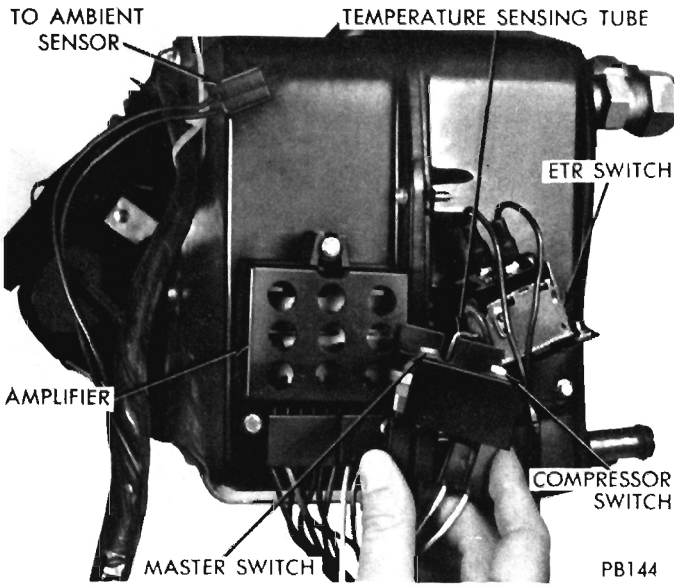


Fig. 4 - Amplifier and ETR Switch Location

are required to:

(1) Maintain comfort during city traffic operation where air distribution may be inadequate.

(2) Satisfy the rear seat passengers under extreme conditions.

(3) Provide adequate smoke removal under extreme conditions.

Def—Blower will come on immediately, air will come out of defroster outlets (with normal heat bleed)—system will then control the same as "Hi-Auto" the blower will operate at the two higher speeds. **Since the system controls in the "Def" position, it is possible to have maximum air conditioned air deposited on the windshield (and at the same time obtaining the higher blower speed that is available on the air conditioning mode of operation). However, it is not probable that the system would be operated in the "Def" position while requiring full cooling on the car interior.**

Hi-Def—Same as "Def" except blower will operate on highest (M3) speed (used on the heat mode of operation) only and discharge air will be maximum temperature.

Both "Def" and "Hi-Def" positions override a vacuum circuit to start the blower, regardless of water temperature. Therefore, if the operator returns to either the "Lo-Auto" or "Hi-Auto" position, the blower will remain on, even though the water temperature is still below 125 degrees F. However, the blower may be turned off by depressing the "Off" button.

In all of the positions except "Off," the compressor will operate if the ambient temperature is above 32 degrees F.

MAJOR COMPONENTS

In-Car Sensor

This sensor is located behind a grille in the instrument panel. It senses car interior temperature and automatically signals the amplifier to compensate for any variation from the selected comfort setting. (Fig. 3)

Ambient Sensor

The ambient sensor is located in the plenum panel behind the glove box. (Fig. 3) This sensor senses the outside temperature and sends an electrical signal to the amplifier.

Temperature Control Dial (Thumbwheel)

This control is located above the push buttons in the control head. It allows the operator to select any interior comfort setting from 65 to 85. Movement of the thumbwheel controls a resistance potentiometer which is a part of the assembly. The potentiometer will create a resistance to signal the amplifier so that it will control at the selected comfort setting.

Evaporator Temperature Regulator Switch (Anti-Frost Control System)

This switch is located on the right end of the passenger side housing. It has a sensing capillary routed through the evaporator coil fins. This control allows the evaporator to maintain a minimum air temperature without freezing. The Anti-Frost constrol system consists of a second unit, the evaporator temperature regulator valve (ETR). This valve is located at the compressor suction fitting (same place as the regulator EPR valve). It consists of a electrical solenoid which is actuated by the evaporator temperature regulator switch which senses coil fin temperature. When the solenoid is energized the valve closes and stops the flow of refrigerant to the compressor.

Master On-Off Switch

This switch is located on the right end of the passenger side housing and is color coded green. It is vacuum operated and turns on the blower when 8 inches of vacuum is applied.

Compressor Switch (Vacuum)

This switch is color coded yellow and is located just to the left of the master on-off switch. It is vacuum operated and actuates the compressor clutch when 2 inches of vacuum is applied (if the ambient switch is closed).

Amplifier

The amplifier is located on the right end of the

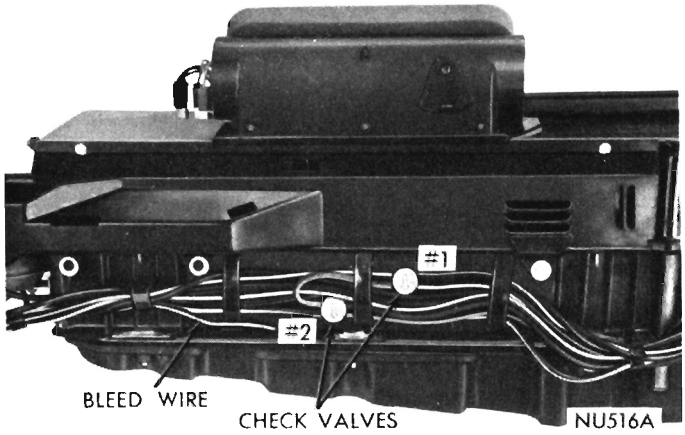


Fig. 5 - Check Valves (Bottom View of Housing)

evaporator assembly. (Fig. 4) It converts the signals from the in-car sensor, ambient sensor, and temperature control dial into a single signal to the servo assembly. The amplifier signal positions the servo and the feedback potentiometer which creates a return signal. This return signal shuts the amplifier off until it is needed again.

The amplifier also uses a battery voltage signal, to "park" the system (position it in M1-A/C,) **wherever the pushbutton**, and/or the ignition is "off".

Check Valves

The check valves are located in the vacuum harness on the bottom of the evaporator assembly. For identification, they are referred to as Number 1 and Number 2 check valves, with Number 1 being closest to the dash panel grommet. (Fig. 5)

Servo Assembly

The servo assembly's internal components are positioned by a signal from the amplifier through a small electric motor and gear train assembly. The electric (servo) motor rotates a rotary vacuum switch to open and close vacuum ports, and a wiper arm moves over a printed circuit board to change the blower speeds. (Fig. 6)

The water valve is also integrated into this unit. It is positioned automatically by the gear train, which is directly connected to it and controls the flow poppet.

The servo assembly is mounted on the right wheel housing in the engine compartment.

Cold Engine Lockout Switch

The cold engine lockout switch is mounted on the servo assembly. This switch prevents the blower motor from starting, when heat is required, until the engine coolant temperature is above 125 degrees F, and the "Lo-Auto" or "Hi-Auto" pushbuttons are engaged. This is accomplished by pre-

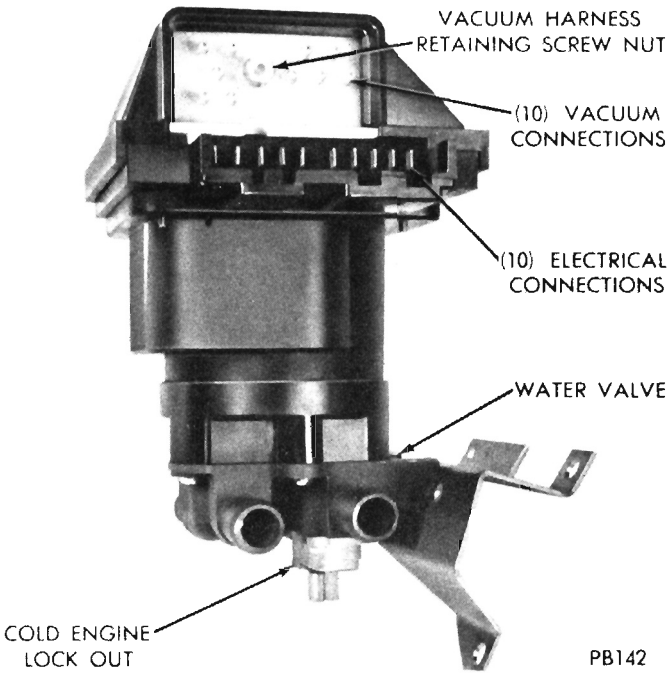


Fig. 6 - Servo Assembly

venting vacuum from reaching the master switch.

This component plus its gasket is a separate serviceable assembly.

Ambient Switch

This switch is located on the face of the engine side housing. It has a sensing capillary protruding into the housing.

The compressor switch completes the electrical circuit to the clutch if the ambient (outside) temperature is above 32 degrees F. Due to its location, the switch will become heated periodically during the winter by brief shut downs of the Auto-Temp system or the engine. On re-starts, the compressor will operate briefly and allow the seals of the compressor to be lubricated.

Vacuum Transfer Switch

This switch is located in the outside/recirculating air door housing. The switch positions the door in one of three positions: OFF, 20% Outside Air or 100% Outside Air. The three positions are accomplished by use of the spring loaded vacuum actuator and the transfer switch.

Aspirator

The aspirator is located on top of the evaporator assembly. It is a tube-shaped device connected to the evaporator in such a manner that air flowing through the evaporator creates a slight vacuum in the aspirator. The vacuum in the aspirator will pull air over the In-car sensor. The sensor then senses representative interior air temperature.

Vacuum Reservoir

The vacuum reservoir is mounted in the engine compartment. It is used to maintain sufficient vacuum in the vacuum circuit during periods when manifold vacuum is reduced. The reservoir has a check valve at the inlet port which closes when vacuum supply drops off.

Blower Motor

The blower motor is mounted on the engine side housing under the right-front fender. It runs automatically when any button is pushed other than "Off" and the coolant temperature is above 125 degrees F.

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
SYSTEM OPERATES ONLY ON MAXIMUM COOLING AND HI-BLOWER	(a) A short circuit in the ambient or in-car sensor.	(a) Inspect wiring, repair short or replace sensor.
	(b) A short circuit in the temperature control dial potentiometer.	(b) Test wiring, replace potentiometer if necessary.
	(c) Defective amplifier.	(c) Test amplifier, replace if necessary.
	(d) Defective servo.	(d) Test servo and replace, if necessary.
SYSTEM OPERATES ON AIR CONDITIONING MODE AT ALL TIMES WITH CONTROLLED AIR TEMPERATURE.	(a) Damper linkage binding from improper adjustment.	(a) Re-adjust linkage.
	(b) Vacuum not supplied to rod side of mode actuator.	(b) Check vacuum line connection (plugged or disconnected at actuator fitting. Check for pinched vacuum line).
SYSTEM OPERATES ONLY ON MAXIMUM HEATING AND M3	(a) An open circuit in the ambient or in-car sensor.	(a) Test wiring or replace sensor.
	(b) An open circuit in the temperature control dial potentiometer.	(b) Test wiring, repair or replace potentiometer.
	(c) Defective servo assembly.	(c) Test servo assembly, replace if necessary.
SYSTEM CONTROLS IN HEAT MODE FOR MOST AMBIENT TEMPERATURES	(a) Partially open ambient sensor.	(a) Check at service connector with ohmmeter. Replace if necessary.
SYSTEM OPERATES ON HEAT MODE AT ALL TIMES	(a) Damper linkage binding from misadjustment.	(a) Readjust properly.
	(b) Vacuum not supplied to pot side of mode actuator.	(b) Inspect vacuum line connection (plugged or not connected at actuator fitting. Check for pinched vacuum line).
	(c) Partially open Ambient sensor.	(c) Check at service connector with ohmmeter. Replace if necessary.
SYSTEM PUTS OUT ONLY HOT AIR IN ALL MODES AT ALL TIMES.	(a) Defective servo assembly.	(a) Replace if necessary.
SYSTEM PUTS OUT ONLY COLD AIR IN ALL MODES AT ALL TIMES.	(a) Defective servo assembly.	(a) Replace if necessary.
	(b) Kinked water hose.	(b) Inspect hoses.
BLOWER AND COMPRESSOR WILL NOT OPERATE, AND SYSTEM WILL NOT GO INTO SELECTED MODE.	(a) A failed (open) circuit.	(a) Replace if necessary.
	(b) A vacuum leak at engine fitting source or reservoir tank in engine compartment.	(b) Check vacuum connections.

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(c) A loose connection between harness and push button switch.	(c) Connect properly.
	(d) A defective (leaking) vacuum harness connector at push button switch.	(d) Replace harness.
	(e) A defective (leaking) push button switch.	(e) Replace switch.
	(f) Vacuum hose leak in vacuum circuit.	(f) Inspect all connections, repair if possible, replace if necessary.
	(g) Crossed vacuum lines at vacuum reservoir.	(g) Inpect lines.
	(h) Pinched vacuum line in vacuum circuit.	(h) Inspect lines.
	(i) Defective (leaking) actuator.	(i) Replace.
BLOWER WILL NOT OPERATE IN ANY MODE.	(a) Blower motor wiring disconnected.	(a) Connect properly.
	(b) Defective blower motor.	(b) Check by connecting directly to battery. Replace, if necessary.
	(c) A/C-heater fuse blown.	(c) Inspect wiring, repair and replace fuse.
	(d) Vacuum operated master on-off switch defective.	(d) Test and replace if necessary.
	(e) Leak in vacuum circuit.	(e) Inspect for leaks and correct.
	(f) Resistor block burned out.	(f) Replace.
	(g) Pinched vacuum line to master switch.	(g) Inspect lines.
	(h) Blower motor not grounded.	(h) Ground properly.
COMPRESSOR WILL NOT OPERATE AT ANY TIME	(a) Clutch wire disconnected.	(a) Connect.
	(b) Vacuum operated compressor switch, defective.	(b) Test and replace if necessary.
	(c) Compressor ambient switch defective.	(c) Test and replace if necessary.
	(d) Ambient is below 32 degrees F.	(d) Instruct owner that compressor operates only at ambients above 32 degrees F.
	(e) Pinched vacuum line to compressor switch.	(e) Inspect lines.
	(f) Low pressure cut-off switch defective.	(f) Test and replace if necessary.
	(g) System pressure below low pressure cut-off switch limits.	(g) Test system for leaks and repair.
	(h) Accessory fuse blown.	(h) Inspect wiring and replace fuse.
AIR CONDITIONING AND HEAT MODES REVERSED (HOT AIR FROM CONDITIONING OUTLETS AND COLD AIR FROM HEAT OUTLETS).	(a) Air conditioning and heat mode actuator vacuum hoses reversed.	(a) Route properly (white to pot side, red to shaft side).
AIR COMING OUT OF AIR CONDITIONING OUTLETS WHEN SYSTEM IS IN THE DEFROST OR HI-DEFROST POSITION.	(a) Vacuum hoses to pot side of mode actuator and pot side of defrost actuator reversed.	(a) Route properly.
	(b) Air conditioning and heat and defroster mode actuator vacuum hoses interchanged and reversed on actuators.	(b) Route properly.
MOST OF THE AIR COMING OUT OF DEFROSTERS WHEN SYSTEM SHOULD BE ON HEAT MODE.	(a) Vacuum hoses to shaft side of mode actuator and pot side of defrost actuator reversed.	(a) Route properly. (Red to shaft side, white to pot side).

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(b) Air conditioning door binding on air distribution duct.	(b) Reinstall properly.
	(c) Linkage (Door misaligned).	(c) Adjust.
AIR COMES OUT OF THE DEFROSTERS WHEN THE SYSTEM SHOULD BE IN HEAT MODE, AND AIR COMES OUT OF HEATER OUTLETS WHEN SYSTEM SHOULD BE IN AIR CONDITIONING.	(a) All vacuum lines to mode and defrost actuators completely crossed.	(a) Route properly.
	(b) Linkage misadjustment.	(b) Readjust.
AIR COMES OUT OF ALL OUTLETS WHEN THE SYSTEM SHOULD BE IN DEFROST OR AIR CONDITIONING. AIR COMES OUT THE AIR CONDITIONING OUTLETS WHEN THE SYSTEM SHOULD BE IN HEAT MODE.	(a) All vacuum lines to mode and defrost actuators completely crossed.	(a) Route properly.
	(b) Linkage misadjustment.	(b) Readjust.
SYSTEM WILL NOT CHANGE MODE IN AUTO OR HI-AUTO (EVEN WITH TESTER OPERATING CONTROL UNIT).	(a) Doors binding or linkage bent or misadjusted.	(a) Repair or adjust linkage.
	(b) Vacuum hose off.	(b) Connect.
	(c) Pinched hose to actuator.	(c) Repair.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION-CYCLING OF TEMPERATURE AND POSSIBLY BLOWER SPEED.	(a) Defective servo assembly.	(a) Test servo assembly, replace if necessary.
	(b) Aspirator not operating properly (pinched or disconnected tube).	(b) Test aspirator and tube. Repair or replace if necessary.
	(c) Defective engine thermostat.	(c) Replace.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION-TEMPERATURE SLOWLY DRIFTS UP AND DOWN.	(a) Aspirator not operating properly (pinched or disconnected tube).	(a) Test aspirator and tube. Repair or replace if necessary.
	(b) Frayed or bare sections in sensor leads.	(b) Inspect sensor leads. Repair or replace.
	(c) Defective amplifier.	(c) Test and replace if necessary.
	(d) Defective radiator pressure cap.	(d) Test and replace cap if necessary.
	(e) Defective engine thermostat.	(e) Replace.
BLOWER DOES NOT SHUT OFF WHEN"OFF" BUTTON IS PUSHED.	(a) Check valve 2 failed closed or installed backwards.	(a) Check routing and replace if necessary.
	(b) Defective pushbutton switch.	(b) Test switch and replace if necessary.
	(c) Pinched vacuum hose.	(c) Repair.
BLOWER DOES NOT COME ON IN "DEFROST" OR "HI-DEFROST" WHEN THE ENGINE IS COLD.	(a) Check valve 1 failed closed or installed backwards.	(a) Test and replace if necessary.
BLOWER SPEED CHANGES WITH CHANGES IN CAR VOLTAGE (CAR IS ACCELERATED OR ACCESSORIES ARE TURNED ON OR OFF).	(a) Defective amplifier.	(a) Test amplifier and replace if necessary.

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
SYSTEM COMES ON IN AIR CONDITIONING MODE AND M2 BLOWER IN HOT WEATHER WHEN HI BLOWER AIR CONDITIONING IS REQUIRED.	(a) No defect.	(a) Instruct owner that system is designed to start in M2 A/C and drive to Hi A/C (if required) in hot weather.
AIR COMING OUT OF DEFROSTER WHEN SYSTEM SHOULD BE THE AIR CONDITIONING MODE.	(a) Air conditioning/heat and heat-defroster mode actuator hoses interchanged and reversed on actuators.	(a) Route properly.
	(b) Defrost button may be depressed.	(b) Instruct owner on proper operation of unit.
INSUFFICIENT AIR-FLOW	(a) Air distribution ducts disconnected from air conditioning outlets or distribution center.	(a) Connect properly.
	(b) Failing blower motor.	(b) Test by connecting directly to battery.
	(c) Defective resistor block.	(c) Replace.
	(d) Freeze-up condition.	(d) Check ETR switch, ETR valve, and Expansion valve; replace if necessary.
BLOWER SPEEDS ALWAYS TOO GREAT ON LO-AUTO	(a) Resistor block, faulty (resistors shorted.)	(a) Repair or replace.
	(b) Connections at resistor block loose or disconnected.	(b) Connect.
BLOWER SPEEDS ALWAYS TOO GREAT ON HI-AUTO	(a) Lower speeds not provided for Hi-Auto.	(a) Instruct owner on operation of unit.
SYSTEM BLOWS COLD AIR AT THE START DURING COLD WEATHER OPERATION	(a) Cold engine lockout switch faulty.	(a) Test and replace if necessary.
	(b) Blower master switch inoperative in closed position.	(b) Test and replace if necessary.
	(c) Vacuum bleed plugged.	(c) Inspect and repair if necessary.
	(d) Check valve 2 failed open or reversed.	(d) Check connections, test and replace if necessary.
INSUFFICIENT HEAT WHEN MAXIMUM HEATING IS REQUIRED	(a) Defective Servo assembly.	(a) Replace if necessary.
	(b) Heater core, faulty or (plugged).	(b) Replace or clean.
	(c) Defective engine thermostat.	(c) Replace.
ERRATIC TEMPERATURE CONTROL	(a) Heater hoses reversed at core inlet and outlet tubes.	(a) Route properly.
	(b) Air in heater core.	(b) Press Hi-Defrost to open water valve fully and run engine at approximately 1500 rpm for about three minutes.
	(c) Radiator water level low.	(c) Fill as required.
	(d) Defective radiator cap.	(d) Replace.
	(e) Loose vacuum or electrical connection at control unit assembly.	(e) Inspect connections.
	(e) Defective engine thermostat.	(f) Replace.
	(g) Faulty servo assembly.	(g) Test and replace if necessary.
	(h) Intermittent sensor or temperature control potentiometer.	(h) Test and replace if necessary.
INSUFFICIENT COOLING WHEN MAXIMUM COOLING IS REQUIRED.	(a) ETR valve stuck closed.	(a) Check by energizing solenoid directly from battery.

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(b) Refrigeration system low on refrigerant.	(b) Test for leaks, repair, and add charge according to procedure.
	(c) ETR switch cut-in setting too high.	(c) Test according to procedure.
	(d) Expansion valve defective.	(d) Test according to procedure.
	(e) Clutch not running (pinched vacuum line to compressor switch, wires not connected or high resistance compressor switch).	(e) Inspect vacuum lines and electrical connections, check for high resistance by replacing switch with a jumper wire, replace switch if necessary.
	(f) Fresh air door stuck in 100% fresh air position (broken return spring or defective vacuum transfer switch.)	(f) Inspect spring, test vacuum transfer switch, replace if necessary.
	(g) Faulty clutch.	(g) Test by energizing clutch directly from battery.
DISCHARGE AIR TOO COLD AT TIMES	(a) ETR valve or switch leads disconnected.	(a) Connect.
	(b) ETR valve failed (open).	(b) Check by energizing solenoid directly from battery, replace if necessary.
	(c) ETR switch failed (capillary broken).	(c) Replace.
	(d) ETR switch capillary not properly installed.	(d) Install properly.
AFTER APPROXIMATELY ONE HOUR OF SUSTAINED DRIVING AIRFLOW DROPS OFF TO PRACTICALLY NONE, WHILE BLOWER CAN BE HEARD OPERATING AT A HIGH SPEED.	(a) Evaporator coil freeze-up, same causes as in "Discharge Air Too Cold At Times."	(a) Same as in "Discharge Air Too Cold At Times".
	(b) ETR switch setting too low.	(b) Check out according to Auto-Temp component test procedures.
AIR COMES OUT OF AIR CONDITIONING OUTLETS OR HEAT OUTLETS WHILE DRIVING IN THE "OFF" POSITION.	(a) Fresh/Recirculating door in Fresh Air position (vacuum hoses on Fresh Air door actuator reversed).	(a) Route properly.
	(b) Blower master switch (failed in closed position).	(b) Test and replace if necessary.
	(c) Fresh air door not sealing properly.	(c) Check for binding door or damaged seals. Repair.
	(d) Check valve 2 reversed or failed closed.	(d) Check connections, test and replace if necessary.
OBJECTIONABLE ODORS BEING DISCHARGED THROUGH THE AIR CONDITIONING OR HEAT OUTLETS	(a) Fresh/Recirculating door in recirculating air position (vacuum hoses on Fresh Air door actuator reversed).	(a) Route properly.
SYSTEM QUITS ON ACCELERATION	(a) Defective vacuum-reservoir tank check valve.	(a) Test and replace if necessary.
	(b) Vacuum leak.	(b) Inspect all connections, repair if possible, replace if necessary.
	(c) Check valve 1 reversed or failed open.	(c) Check connections, test and replace if necessary.
SYSTEM WILL NOT GO TO MAXIMUM HEAT ON HI-DEFROST	(a) Defrost override circuit in amplifier.	(a) Check amplifier for proper performance.
	(b) Hi-Defrost feed from push button switch to amplifier not connected at switch.	(b) Connect.

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(c) Push button actuated Hi-Defrost feed switch in control head, faulty.	(c) Replace push button switch.
	(d) Defective servo.	(d) Check servo and replace if necessary.
SYSTEM SHUTS OFF WHEN HI-DEFROST BUTTON IS PUSHED AND GOES TO HI-DEFROST WHEN THE OFF BUTTON IS PUSHED	(a) Push button switch reversed (push button extensions incorrectly installed).	(a) Visually inspect switch (vacuum ports and electrical terminals are located left and right side of switch respectively, as viewed by passenger if switch is properly installed). Remove and reassemble if necessary.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION - SYSTEM LEVELED OUT	(a) Control dial potentiometer out of calibration.	(a) Test and recalibrate if possible, replace if necessary.
	(b) Amplifier out of calibration.	(b) Test and replace if necessary.
	(c) Air conditioning outlets not directed properly.	(c) Instruct owner on positioning of outlets and/or on moving control dial slightly to attain his comfort level.
	(d) Aspirator not operating properly (pinched or disconnected tube).	(d) Test aspirator and tube. Repair or replace if necessary.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION - ERRATIC CHANGES OF TEMPERATURE AND POSSIBLY BLOWER SPEED	(a) Loose electrical connection at sensors, amplifier or servo assembly.	(a) Inspect connections.
	(b) Defective amplifier.	(b) Test amplifier, replace if necessary.
	(c) Defective Servo Assembly.	(c) Replace if necessary.
BLOWER SPEEDS NOT IN SEQUENCE	(a) Wiring harness error at servo, or resistor block.	(a) Inspect harness against circuit diagram and repair or replace.
SYSTEM WILL NOT PARK (CENTER)	(a) Defective amplifier.	(a) Test and replace, if necessary.
	(b) Defective servo.	(b) Test and replace, if necessary.
	(c) Blown in-line fuse.	(c) Check and replace, if necessary.
	(d) System battery feed disconnected.	(d) Check and connect to fuse block battery terminal, if disconnected.
	(e) System battery feed connected to fuse block accessory terminal.	(e) Check and connect to fuse block battery terminal, if disconnected.
SYSTEM COMES ON IN M1-A/C AND REMAINS THERE	(a) Partially connected main harness connector.	(a) Connect.
	(b) Accessory fuse.	(b) Replace.
	(c) Defective compressor switch.	(c) Test and replace.
	(d) Vacuum hose (yellow) to compressor switch off.	(d) Connect.
	(e) Vacuum hose to compressor switch pinched.	(e) Repair.
SYSTEM COMES ON IN A/C MODE DURING COLD WEATHER	(a) No defect.	(a) Instruct operator this is correct when engine coolant is above 125 degrees F. and to close his A/C outlets in cold weather.
SYSTEM NOISE AFTER ENGINE IS SHUT DOWN	(a) No defect.	(a) Instruct operator that it is operating correctly as system is "parking".

SERVICE PROCEDURES AND COMPONENT TESTS

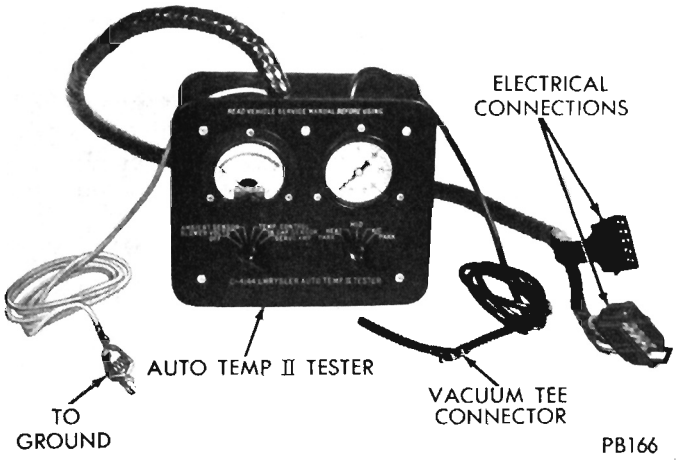


Fig. 7 - Auto-Temp II Tester C-4144

Satisfactory performance of the Auto-temp system is dependent upon proper operation and adjustment of all operating controls, as well as proper functioning of all system components. The inspection, tests and adjustments should be used to locate the cause of a malfunction. The inspections and tests in this manual have been arranged in a logical sequence that has proved to be the surest route to accurate diagnosis. It is recommended that they be followed and performed in the order in which they are presented. However, all steps are not necessary for all problems.

Auto-Temp II Tester

The Auto-Temp II Tester C-4144 is a device that substitutes weather conditions into the Auto-Temp System, and puts the system through all of its paces, from high blower air conditioning to M3 blower heat, regardless of what the weather is.

When the tester is connected into the system, the ambient sensor, temperature control dial, and in car sensor are bypassed by the tester. The bypass circuit substitutes electrical signals, and feeds them into the amplifier assembly.

The tester vacuum gauge will indicate the vacuum being supplied to the master switch. Note: This vacuum reading indicates when; the outside air door changes from zero to 20% to 100% outside air and back to zero again and when mode shift occurs by a slight dip and recovery in the vacuum reading.

The voltmeter indicates changes in the blower motor speeds and also tests the sensors and the temperature control dial, and the amplifier and servo assembly.

The tester must be in the "off" position when not testing components. (Fig. 7)

Note: The Auto-Temp system is designed to change modes slowly, approximately 60 seconds from Maximum A/C Mode to full Heat Mode. Allow time for the system to stabilize before taking readings.

TESTER CONNECTIONS

With the use of the Auto-Temp II Tester C-4144 a thorough operational check can be performed on the system and components.

NOTE: The Auto-Temp II Tester C-4144, is colored blue and cannot be used to test any previous Auto-Temp systems nor can any other tester be used to test this system.

Connect the tester in the following manner:

(1) Disconnect the Electrical Service Connector. The Service Connector is located inside the passenger compartment next to the dash panel grommet.

NOTE: This connector is connected at all times except during system tests. (Fig. 8)

(2) Connect tester in series with system harness.

(3) Attach tester white lead to a good body ground.

(4) Tee in tester vacuum hose at the green master switch hose.

Before performing any tests, the thumbwheel control on the instrument panel must be set at 75 and must remain at this setting throughout all tests.

SYSTEM TEST PROCEDURE

Start engine with system in the Off position and thermometer in right center outlet. Set voltmeter on "Blower Volts" and the mode knob to "A/C". Adjust engine rpm to 1000. Observe the following:

No reading on voltmeter. Push the Hi-Auto Button. **Observe the following:**

(1) Compressor should be running and system should be in the air conditioning mode driving to Hi blower A/C and outside air door open to 20% outside air. (Above 32 degrees Ambient).

SERVICE DIAGNOSIS (CONTINUED)

Condition	Possible Cause	Correction
	(c) Push button actuated Hi-Defrost feed switch in control head, faulty.	(c) Replace push button switch.
	(d) Defective servo.	(d) Check servo and replace if necessary.
SYSTEM SHUTS OFF WHEN HI-DEFROST BUTTON IS PUSHED AND GOES TO HI-DEFROST WHEN THE OFF BUTTON IS PUSHED	(a) Push button switch reversed (push button extensions incorrectly installed).	(a) Visually inspect switch (vacuum ports and electrical terminals are located left and right side of switch respectively, as viewed by passenger if switch is properly installed). Remove and reassemble if necessary.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION - SYSTEM LEVELED OUT	(a) Control dial potentiometer out of calibration.	(a) Test and recalibrate if possible, replace if necessary.
	(b) Amplifier out of calibration.	(b) Test and replace if necessary.
	(c) Air conditioning outlets not directed properly.	(c) Instruct owner on positioning of outlets and/or on moving control dial slightly to attain his comfort level.
	(d) Aspirator not operating properly (pinched or disconnected tube).	(d) Test aspirator and tube. Repair or replace if necessary.
SYSTEM DOES NOT ACHIEVE A COMFORTABLE CONDITION - ERRATIC CHANGES OF TEMPERATURE AND POSSIBLY BLOWER SPEED	(a) Loose electrical connection at sensors, amplifier or servo assembly.	(a) Inspect connections.
	(b) Defective amplifier.	(b) Test amplifier, replace if necessary.
	(c) Defective Servo Assembly.	(c) Replace if necessary.
BLOWER SPEEDS NOT IN SEQUENCE	(a) Wiring harness error at servo, or resistor block.	(a) Inspect harness against circuit diagram and repair or replace.
SYSTEM WILL NOT PARK (CENTER)	(a) Defective amplifier.	(a) Test and replace, if necessary.
	(b) Defective servo.	(b) Test and replace, if necessary.
	(c) Blown in-line fuse.	(c) Check and replace, if necessary.
	(d) System battery feed disconnected.	(d) Check and connect to fuse block battery terminal, if disconnected.
	(e) System battery feed connected to fuse block accessory terminal.	(e) Check and connect to fuse block battery terminal, if disconnected.
SYSTEM COMES ON IN M1-A/C AND REMAINS THERE	(a) Partially connected main harness connector.	(a) Connect.
	(b) Accessory fuse.	(b) Replace.
	(c) Defective compressor switch.	(c) Test and replace.
	(d) Vacuum hose (yellow) to compressor switch off.	(d) Connect.
	(e) Vacuum hose to compressor switch pinched.	(e) Repair.
SYSTEM COMES ON IN A/C MODE DURING COLD WEATHER	(a) No defect.	(a) Instruct operator this is correct when engine coolant is above 125 degrees F. and to close his A/C outlets in cold weather.
SYSTEM NOISE AFTER ENGINE IS SHUT DOWN	(a) No defect.	(a) Instruct operator that it is operating correctly as system is "parking".

SERVICE PROCEDURES AND COMPONENT TESTS

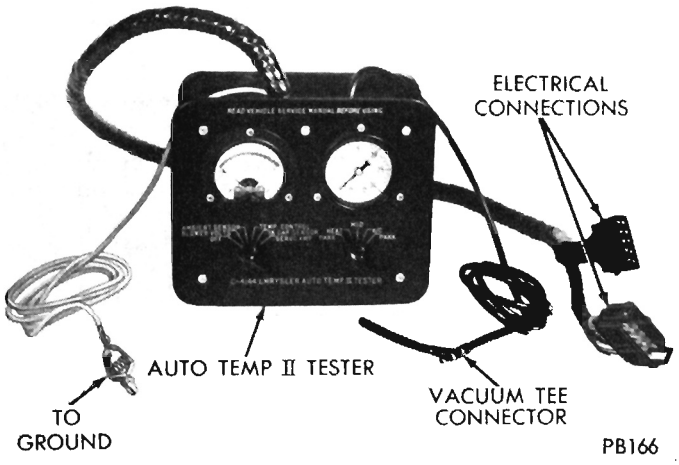


Fig. 7 - Auto-Temp II Tester C-4144

Satisfactory performance of the Auto-temp system is dependent upon proper operation and adjustment of all operating controls, as well as proper functioning of all system components. The inspection, tests and adjustments should be used to locate the cause of a malfunction. The inspections and tests in this manual have been arranged in a logical sequence that has proved to be the surest route to accurate diagnosis. It is recommended that they be followed and performed in the order in which they are presented. However, all steps are not necessary for all problems.

Auto-Temp II Tester

The Auto-Temp II Tester C-4144 is a device that substitutes weather conditions into the Auto-Temp System, and puts the system through all of its paces, from high blower air conditioning to M3 blower heat, regardless of what the weather is.

When the tester is connected into the system, the ambient sensor, temperature control dial, and in car sensor are bypassed by the tester. The bypass circuit substitutes electrical signals, and feeds them into the amplifier assembly.

The tester vacuum gauge will indicate the vacuum being supplied to the master switch. Note: This vacuum reading indicates when; the outside air door changes from zero to 20% to 100% outside air and back to zero again and when mode shift occurs by a slight dip and recovery in the vacuum reading.

The voltmeter indicates changes in the blower motor speeds and also tests the sensors and the temperature control dial, and the amplifier and servo assembly.

The tester must be in the "off" position when not testing components. (Fig. 7)

Note: The Auto-Temp system is designed to change modes slowly, approximately 60 seconds from Maximum A/C Mode to full Heat Mode. Allow time for the system to stabilize before taking readings.

TESTER CONNECTIONS

With the use of the Auto-Temp II Tester C-4144 a thorough operational check can be performed on the system and components.

NOTE: The Auto-Temp II Tester C-4144, is colored blue and cannot be used to test any previous Auto-Temp systems nor can any other tester be used to test this system.

Connect the tester in the following manner:

(1) Disconnect the Electrical Service Connector. The Service Connector is located inside the passenger compartment next to the dash panel grommet.

NOTE: This connector is connected at all times except during system tests. (Fig. 8)

(2) Connect tester in series with system harness.

(3) Attach tester white lead to a good body ground.

(4) Tee in tester vacuum hose at the green master switch hose.

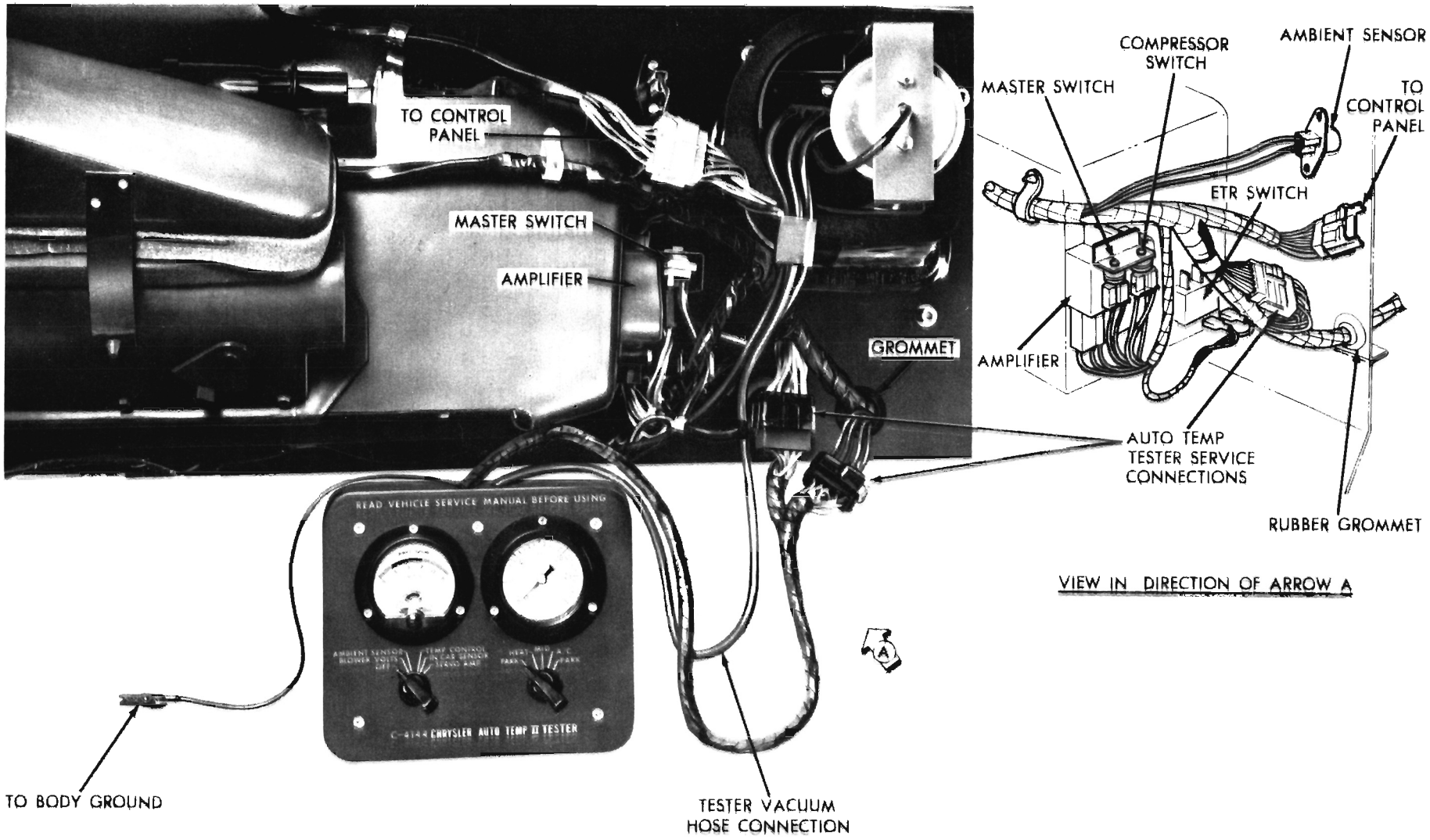
Before performing any tests, the thumbwheel control on the instrument panel must be set at 75 and must remain at this setting throughout all tests.

SYSTEM TEST PROCEDURE

Start engine with system in the Off position and thermometer in right center outlet. Set voltmeter on "Blower Volts" and the mode knob to "A/C". Adjust engine rpm to 1000. Observe the following:

No reading on voltmeter. Push the Hi-Auto Button. **Observe the following:**

(1) Compressor should be running and system should be in the air conditioning mode driving to Hi blower A/C and outside air door open to 20% outside air. (Above 32 degrees Ambient).



PB141

Fig. 8 - Auto-Temp II Tester C-4144 Connections

(2) Blower should be running.
(3) Blower speed should be high. Voltmeter should read approximately the same as supply voltage at the voltage regulator.
(4) Discharge air should be coming out of air conditioning (upper) outlets and should be dropping towards 40 degrees F.
If all the mentioned steps occurred as stated, the system is operating properly in this position.

Lo-Auto

Proceed as follows: Push thc LO-AUTO button. Blower voltage is reduced.
Rotate the "Mode Knob" to "Heat" and the following should be observed taking place in the order shown:
(1) Blower speed drops one step.
(2) The air door goes from 20% to 100% outside air, no change in discharge air temperature.
(3) Blower speed decreases a second step, a slight increase in discharge air temperature (approximately 10 degrees F).
(4) Blower speed decreases a third step, an additional rise in discharge air temperature.
(5) Blower speed decreases a fourth step, an additional rise in air temperature.
(6) System goes from A/C mode to Heat mode.
(7) After the switch to Heat mode, the blower speed increases one step, an additional rise in discharge air temperature.
(8) Blower speed increases a second step, an additional rise in discharge air temperature.
(9) Blower speed increases a third step, discharge air temperature is at its maximum (approximately 140 degrees F).

Hi-Auto

Adjust the mode knob to "A/C". System changes from heat mode to A/C and drives to "Hi" blower.
Push Hi-Auto button and observe the following:
An increase in air velocity. Note voltage increase on voltmeter, there was no change of vacuum and little or no temperature change.

Defrost

Push defrost button and observe the following:
(1) Majority of air is coming out of defroster outlets and there is bleed air coming out of heater slots. No air should be coming out of A/C outlets.
(2) The air temperature should have remained essentially the same as in LO-AUTO.
(3) Blower speed increases.

Hi-Defrost

Push Hi-Defrost button and observe the following:
(1) Blower speeds reduce in steps.
(2) The air temperature at defroster outlets is rising to maximum heat.
(3) Blower speed increases in steps to M3 blower.
(4) The mode knob on tester is no longer effective (except for "Park".)

Sensor Tests

With engine running at idle RPM, rotate voltmeter knob from off to the "ambient sensor" position. Observe the voltmeter, if the indicator is in the red area to the left, the sensor is "shorted", if indicator is in the red area to the right, the sensor is "open", in either case the sensor is faulty or disconnected and must be replaced or connected. The above procedure also applies to the temperature control (set at 75), and in-car sensor.
Caution: Do not allow the voltmeter dial to remain in any of the sensor positions for more than 30 seconds, as voltage is being applied to the sensors and they may be damaged.

Sequence Test

The sequence test is simply a thorough operational check, putting the system through all of its paces from air conditioning with high blower, to heating with M3 blower. This test checks the mode door changes, and the blower speed to changes for when then should occur.
To perform this test, set the voltmeter knob at the "Blower Volts" position and set the mode knob in the "Park" position.
As the "mode" knob is rotated to the various positions the system will perform the switching operations shown in the "Auto Temp Sequence Chart".
The sequence test is performed with the engine warm and the engine speed set at 1100 RPM.

Park Test

This test is a check of where the system positions when the ignition and/or the pushbutton switches are turned "Off".
(a) With the engine running set the voltmeter knob at "Blower Volts", and the mode knob at "Heat". (The system will stabilize in full heat and

AUTO-TEMP SEQUENCE CHART

Push Button Position	Tester Controls Voltmeter	Mode Switch	Outside Air Door Position	AC Door Position	Heat Door Position	Defrost Door Position	Blower Motor Speed
OFF	Blower Volts	A/C	0%	Open	Closed	Closed	Off
LO-AUTO	Blower Volts	Park	0%	Open	Closed	Closed	On
		A/C	100%	Open	Closed	Closed	M1
			100%	Open	Closed	Closed	M1 to M2
			100%	Open	Closed	Closed	M2 to M2
			20%	Open	Closed	Closed	M2 to Hi
		A/C	20%	Open	Closed	Closed	Hi
		Heat	20%	Open	Closed	Closed	Hi
			20%	Open	Closed	Closed	Hi to M3
			100%	Open	Closed	Closed	M3
			100%	Open	Closed	Closed	M3 to M2
			100%	Open	Closed	Closed	M2 to M1
			100%	Open	Closed	Closed	M1 to Lo
			100%	Closed	Open	Bleed	Lo
			100%	Closed	Open	Bleed	Lo to M1
			100%	Closed	Open	Bleed	M1 to M2
			100%	Closed	Open	Bleed	M2 to M3
		Heat	100%	Closed	Open	Bleed	M3
		A/C	100%	Closed	Open	Bleed	M3 to M2
			100%	Closed	Open	Bleed	M2 to M1
			100%	Closed	Open	Bleed	M1 to Lo
			100%	Closed	Open	Bleed	Lo
			100%	Open	Closed	Closed	Lo to M1
			100%	Open	Closed	Closed	M1 to M2
			100%	Open	Closed	Closed	M2 to M3
			20%	Open	Closed	Closed	M3 to Hi
		A/C	20%	Open	Closed	Closed	Hi
HI-AUTO	Blower Volts	A/C	20%	Open	Closed	Closed	Hi
		Heat	20%	Open	Closed	Closed	Hi
			20%	Open	Closed	Closed	Hi to M3
			100%	Open	Closed	Closed	M3
			100%	Open	Closed	Closed	M3 to M2
			100%	Closed	Open	Bleed	M2
			100%	Closed	Open	Bleed	M2 to M3
		Heat	100%	Closed	Open	Bleed	M3
		A/C	100%	Closed	Open	Bleed	M3 to M2
			100%	Open	Closed	Closed	M2 to M3
			20%	Open	Closed	Closed	M3 to Hi
		A/C	20%	Open	Closed	Closed	Hi
DEFROST		A/C	20%	Open	Closed	Closed	Hi
		Heat	20%	Closed	Bleed	Open	Hi
			20%	Closed	Bleed	Open	Hi to M3
			100%	Closed	Bleed	Open	M3
			100%	Closed	Bleed	Open	M3 to M2
			100%	Closed	Bleed	Open	M2
			100%	Closed	Bleed	Open	M2 to M3
		Heat	100%	Closed	Bleed	Open	M3
		A/C	100%	Closed	Bleed	Open	M3 to M2
			100%	Closed	Bleed	Open	M2 to M3
			20%	Closed	Bleed	Open	M3 to Hi
		A/C	20%	Closed	Bleed	Open	Hi
HI-DEFROST	Blower Volts	Heat	100%	Closed	Bleed	Open	M3

Blower Motor Speeds
Hi–
M3–One speed down from Hi
M2–One speed down from M3
M1–One speed down from M2
Lo–One speed down from M1

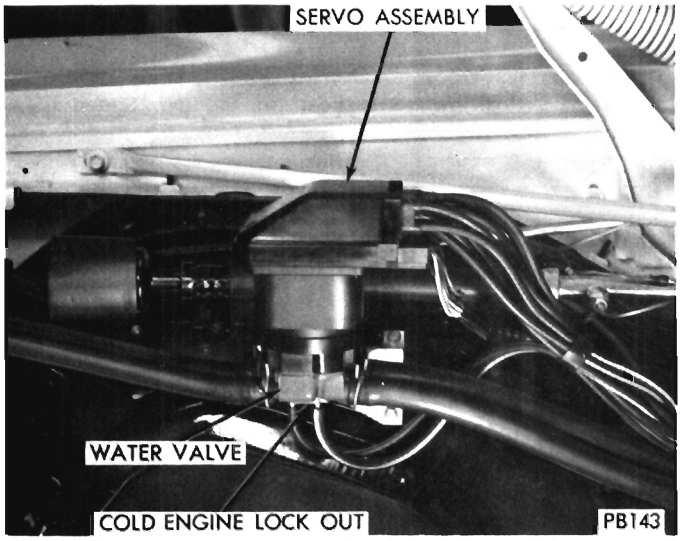


Fig. 9 Servo Assembly Installation

M3 blower.) Now change the mode knob to "Park". The blower speed (Voltmeter readings) will drop in steps to low blower and the mode will change to A/C, the blower will then increase to M1-A/C and stop.

(b) Now change the mode knob to "A/C" (the blower speeds will go in steps to Hi blower). Change the mode knob to "Park", and the system will return to M1-A/C and stop.

(c) Set the voltmeter knob to "Servo-Amp" and the mode knob to "Heat". Depress the "Off" button on the pushbutton switch. The volt-meter will show a reading approximately 5 volts for a short period of time (until park is reached) and then the reading will go to zero.

(d) Turn the voltmeter knob to "Blower Volts" and set the mode knob to "A/C", and depress the push button switch "Lo-Auto" button. The system should come on at M1-A/C and then increase in steps to "Hi" blower A/C.

(e) Set the voltmeter knob to "Servo-Amp." and turn the ignition "Off". The results should be the same as step (c).

Servo Assembly-Amplifier Test

The Servo assembly is located on the right fender side shield in the engine compartment. (Fig. 9) The amplifier is located on the right end of the evaporator package in the passenger compartment.

The amplifier takes the electrical signals from the sensors and the temperature control, and positions the servo assembly with an electrical signal to give the required amount of cooling and/or heating. This electrical voltage signal from the amplifier to the servo assembly is fed through the tester and read directly on the voltmeter (when the voltmeter switch is at "Servo-Amp"). The following table gives the approximate voltages that should be read for the various driving and stabilized conditions. The voltmeter switch must be in the "Servo-Amp" position and the engine must be running at 1100 RPM.

Servo Amplifier Test

Mode Switch Position	Driving Voltage	Stablized Voltage
Park	–	0 v.
Park to A/C	3.5 to 4.5 v.	–
A/C	–	3 v. to 4 v.
A/C to Heat	3.5 to 4.5 v.	–
Heat	–	3 v. to 4 v.
Heat to Park	4 to 6 v.	–
Park	–	0 v.
Park to Heat	3.5 to 4.5 v.	–
Heat	–	3 v. to 4 v.
Heat to A/C	3.5 to 4.5 v.	–
A/C	–	3 v. to 4 v.
A/C to Park	4 to 6 v.	–
Park	–	0 v.

Note: Voltages are approximate values.

If no driving voltage is observed when changing from one position of the mode knob to another the amplifier is defective or disconnected and must be replaced or connected. When there is voltage the servo should change position. **If the servo does not change** to all of the positions (this is indicated when there is no change in airflow, temperature of the air, or mode shift), then the servo assembly is defective or disconnected and must be replaced or connected.

When the voltage is observed and the changes of mode and blower speed occur the system is switching properly.

VACUUM TRANSFER SWITCH

This three port vacuum transfer switch and a spring loaded vacuum actuator, combine to give the outside/recirculating air door 3 positions (Off or 0% outside air, 20% outside air, and 100% outside air).

(1) Push the system off button and start engine. Observe the following through the glove box opening:

(a) Outside Air Door is on 0% outside air.

(b) Switch Plunger is retracted and touching lever.

(2) Push the "Lo-Auto" button and set the mode knob to "Park". Observe the following:

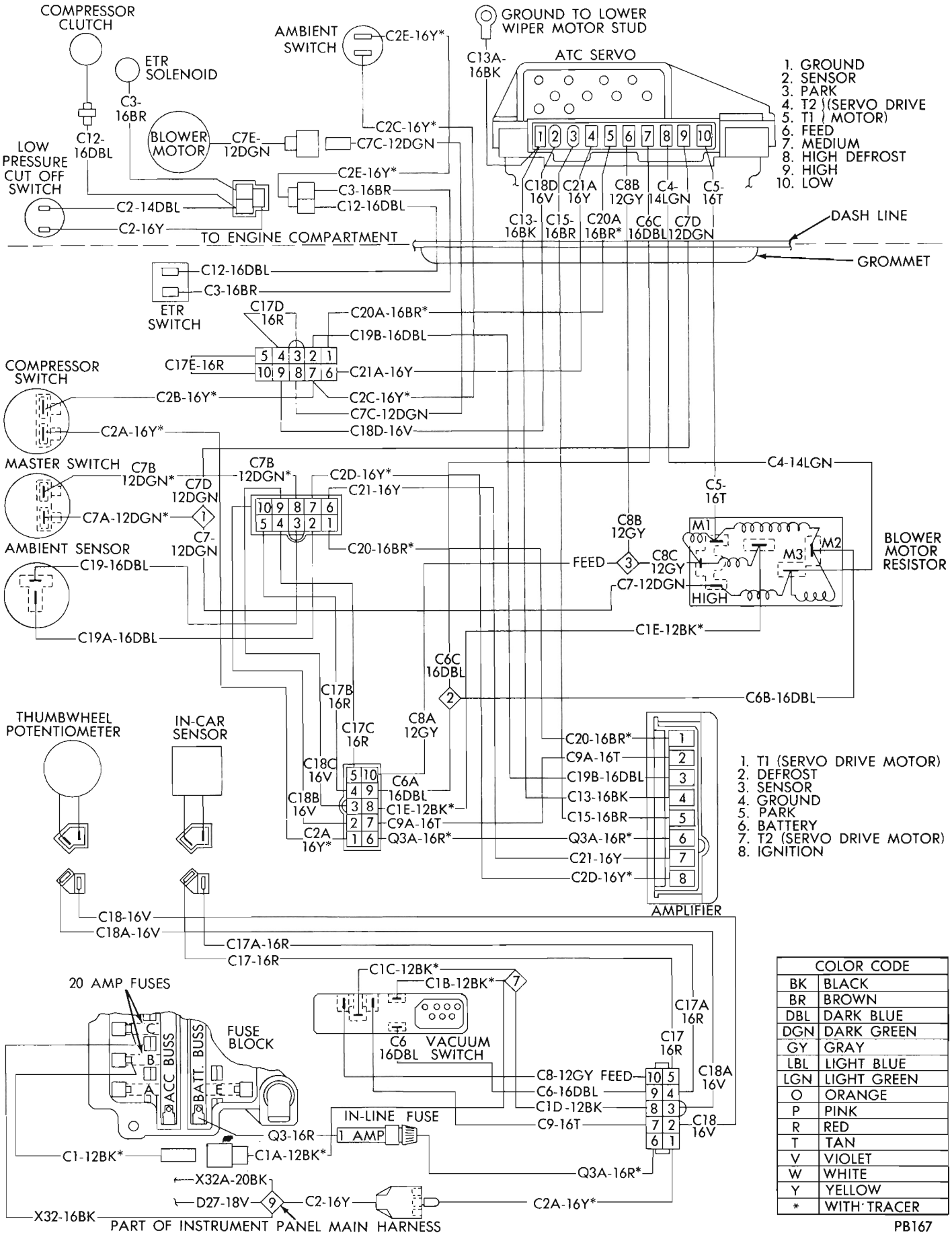
(a) Outside Air Door is in 100% outside air.

(b) Switch plunger has moved out and is not contacting the lever.

(3) Remain in "Lo-Auto" and set the mode knob to "A/C". Observe the following:

(a) Outside Air Door changes to 20% outside air.

(b) Switch plunger is part way out and is in contact with the lever.



COLOR CODE	
BK	BLACK
BR	BROWN
DBL	DARK BLUE
DGN	DARK GREEN
GY	GRAY
LBL	LIGHT BLUE
LGN	LIGHT GREEN
O	ORANGE
P	PINK
R	RED
T	TAN
V	VIOLET
W	WHITE
Y	YELLOW
*	WITH TRACER

PB167

Fig. 10 - Wiring Diagram

If all of the above occurred as stated, the switch is operating properly. If they did not, proceed as follows:

(1) Push the system "Off" button, leave engine running.

(2) Remove 3 port vacuum plug from transfer switch and connect a vacuum source to the middle port of the switch. Do the following:

(a) Depress plunger all the way in and check for presence of vacuum at the right port (one closest to lever) and absence of vacuum at the left port.

(b) Release plunger and check for absence of vacuum at the right port and presence of vacuum at the left port.

If the above did not occur as stated, the transfer switch is faulty and should be replaced.

Wiring Diagram

The system has two 20-ampere fuses and a one 1-ampere fuse. The blower motor circuit is protected by the fuse in the fuse block marked "A/C Heat." (Fig..10)

The clutch circuit and amplifier is protected by a second fuse in the fuse block marked "Access". In this circuit, the compressor switch closes when control vacuum reaches two inches. The ambient switch opens when outside temperature is below 32 degrees F. The ETR switch closes when the evaporator temperature goes lower than about 38 degrees F.

The battery circuit, which feeds the amplifier, is protected by the one ampere fuse (in-line) red wire. This circuit "Parks" the system. The servo assembly and amplifier are grounded by a black lead to the windshield wiper motor stud. The master switch closes when vacuum to the switch reaches eight inches.

When the "Lo-Auto" button is pushed, current is fed to the limit resistor before it is sent to the servo assembly.

When the "Hi-Auto" button is pushed, current bypasses the limit resistor. This means that all the blower speeds are higher (but fewer) in "Hi-Auto" than in "Lo-Auto". When the "Defrost" button is pressed, the current also bypasses the limit resistor and higher (but fewer) blower speeds are achieved. With the Hi-Def button engaged, current is fed directly to the amplifier, overriding both sensors and the temperature control potentiometer. The system is driven to full heat and the highest (M3 same voltage as defrost) blower speed.

BLOWER MASTER ON-OFF SWITCH

The master switch is vacuum operated and turns on the blower. A magnet mounted inside the switch holds the electrical contacts open. When sufficient vacuum is applied an internal diaphragm with attached electrical contact is pulled away from the magnet and the electrical circuit is completed.

This switch can be checked by applying 8 ± 1 inch Hg. vacuum to it with an external vacuum source and checking for electrical continuity, and by removing the vacuum source and checking to see that it opens at less than 5 inches Hg. vacuum. The resistance of this switch can be checked by measuring the voltage of the motor when the system is in Hi-Blower air conditioning. If the motor voltage is low, and it can be corrected by replacing the master switch with a jumper, the switch should be replaced.

COMPRESSOR VACUUM SWITCH

This switch is vacuum operated and turns on the compressor (if the ambient switch is closed). It is identical to the blower master switch except that it closes at 2 ± 1 inch Hg. vacuum and completes the electrical circuit to the compressor clutch. The switch is actuated immediately in any push-button position except Off.

The performance of the switch can be checked by applying 2 ± 1 inch Hg. vacuum with an external vacuum source and checking for electrical continuity then removing the vacuum source and checking to see that it opens. The resistance of the switch can be checked by measuring the voltage at the clutch any time the compressor should be running. If the clutch voltage is low, and can be corrected by replacing the switch with a jumper, the switch should be replaced.

AMBIENT SWITCH

The compressor ambient switch completes the electrical circuit to the clutch, ETR switch, and ETR solenoid if the ambient temperature is above 32 degrees F. The operation of the compressor down to 32 degrees F. provides a smooth transition for incoming air, and adds to comfort by also dehumidifying in cool, damp weather.

Due to its location, the switch will become heated periodically during the winter season by brief shutdowns of the engine. On restart, the compressor will operate for brief period and, thereby, allows the shaft seal to be lubricated automatically.

The ambient switch can be checked by removing it and checking for continuity at room temperature, about 75 degrees, and for being open at temperatures slightly below 32 degrees F.

ANTI-FROST CONTROLS

This control system consists of 2 parts: ETR Valve Solenoid and ETR Switch.

The anti-frost control is a device which allows the evaporator to maintain a minimum air temperature, without allowing the moisture on the fins to freeze, down to ambient temperatures of approximately 32 degrees F. This ETR (evaporator

Standard A/C cars would not prevent coil freeze-up at the lower ambient temperatures at which the compressor is required to operate. The ETR consists of the electrical solenoid which is actuated by the temperature switch which senses coil fin temperature.

The ETR solenoid can be checked simply by energizing it directly off the battery and listening for its closing.

The ETR switch can be tested for operation as follows:

(1) Set thumbwheel potentiometer below 65.

(2) Connect a test light in series with the ETR switch feed wire at the compressor.

(3) Connect a three gauge manifold, Tool C-3740 (Fig. 11), with suction and discharge valves closed.

(4) Start engine and set at 1000 RPM. Close all car doors and windows and press Auto button.

(5) Allow engine to run about 5 minutes and compare gauge readings with switching action of ETR switch.

Test Light	Evaporator Suction Gauge	Discharge Pressure Gauge	Compressor Inlet Gauge
OFF	25	180	24
ON	30	150	0 or Below

Discharge pressure may vary, but a 25 to 30 pound pressure differential will show during switching action of the ETR switch.

ETR SOLENOID VALVE

The ETR valve is a precision part, with extremely small operating clearances. The presence of foreign material between the two sleeves can cause the valve to stick. It is, therefore, imperative that every effort be made to protect the valve from contaminents.

Replacement

(1) Discharge system as outlined inA/C section of this manual.

(2) Disconnect 12 volt D.C. lead from the ETR terminal gasket at the suction fitting.

(3) Remove the 2 bolts holding the suction fitting to the compressor, and remove the fitting.

(4) Remove the terminal gasket from the compressor, and discard.

(5) Scrape off any gasket particles remaining on the crankcase and suction fitting, working from the center outwards, thereby reducing the possibility of contaminating the compressor. If the system check had indicated a lack of electrical continuity,

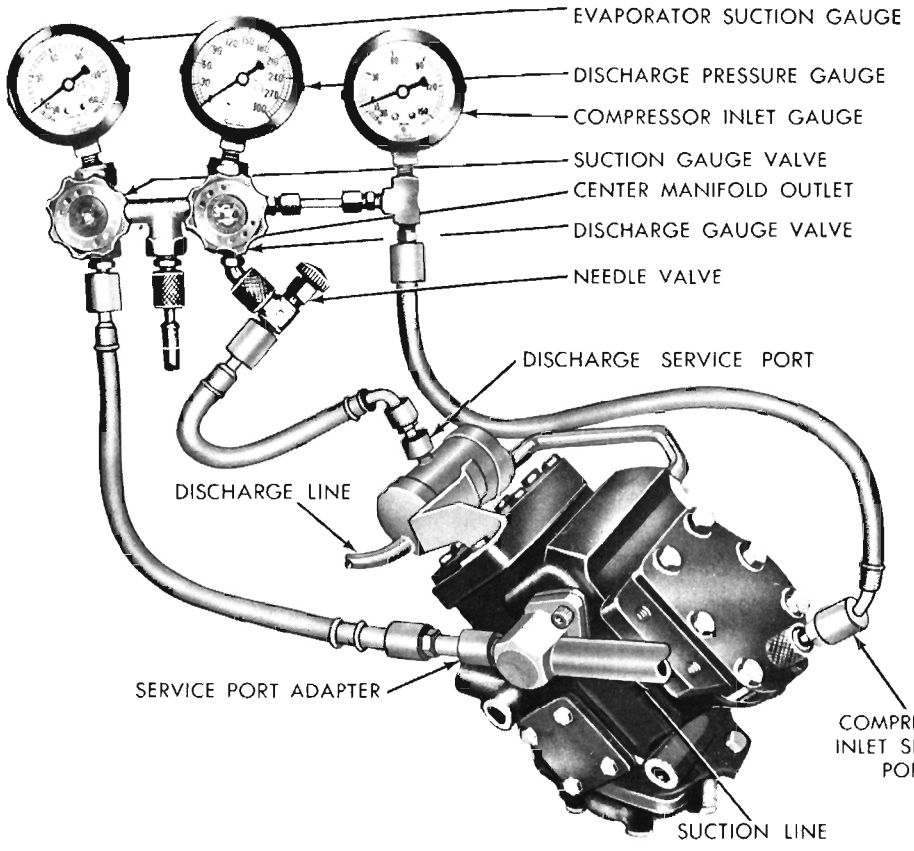


FIG. 11 Gauge Set Manifold Connections

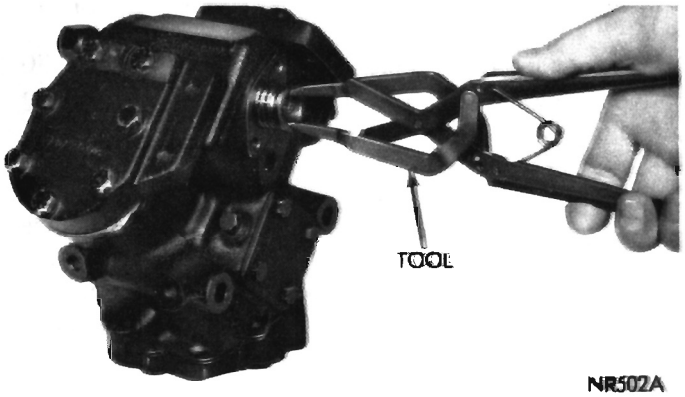


FIG. 12 Removing ETR Valve

place a short length of 1 inch diameter tubing against the rear face of the ETR valve collar, and tap lightly, to ensure good contact between the compressor and the chamfered surface of the valve collar. Check the valve for operation by applying 12 volts D.C. to the valve terminal post.

(6) Remove the valve from the compressor, using Tool C-3301A (Fig.12). Recheck the valve for operation, by connecting 12 volts D.C. to the valve terminal post. The valve should close when grounded at the bottom of the outer sleeve.

CAUTION: Do not energize the valve continuously for more than 30 seconds. If the valve is still inoperative, replace it.

(7) Inspect the suction annulus for foreign material, and ensure that the plug in the ETR oil bypass is pushed below the machined surface of the ETR cavity.

(8) Check replacement valve operation by clamping a 12 volt D.C. lead to the terminal post and gently tapping the bottom of the valve against a clean grounding surface.

(9) Using Tool C3301A, insert the replacement ETR valve as far as possible into the suction annulus. Gently tap the valve in as far as it will go, using the tool previously described.

(10) Coat both the suction fitting and compressor crankcase mating surfaces with a light coating of clean refrigerant oil.

(11) Install new terminal gasket so that the copper terminal spring slips over the terminal post of the ETR valve.

(12) Torque the suction fitting bolts to 11 foot-pounds in small equal increments, to ensure proper seating on the gasket. Check for continuity and operation by applying 12 volts D.C. to terminal.

(13) Charge the system with refrigerant-12 and check for refrigerant leaks.

Reconnect 12 volt lead from antifreeze switch to ETR valve at the terminal gasket. Check system for proper operation.

TEMPERATURE CONTROL DIAL

The control dial allows the operator to select an

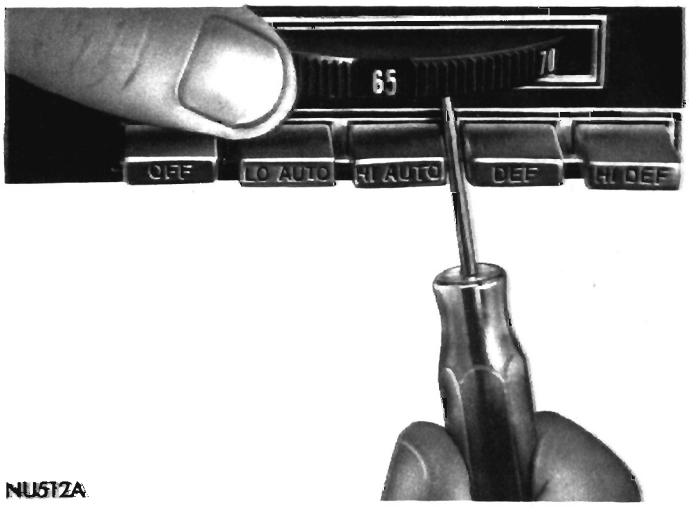


FIG. 13 Thumbwheel Calibration

interior comfort level by selecting a number from 65 to 85. Movement of the dial controls a resistance potentiometer, which is part of the dial assembly. There is a calibration between the dial numbers and the potentiometer resistance. If calibrated correctly the potentiometer will put out the proper biasing resistance signal to the control system so that it will control at the selected interior comfort level.

There are 3 basic problems which may occur with the control dial potentiometer assembly. These are listed along with the system malfunction symptom.

(1) Potentiometer could have a short circuit —System would operate on maximum A/C and high blower only.

(2) Potentiometer could have an open circuit. —System would operate on maximum heating and high blower only.

(3) Dial and potentiometer could be out of calibration —Dial must be set too high or too low to attain comfort.

Checking the above can be accomplished as follows:

(1) To check the dial potentiometer for an open or short, disconnect potentiometer leads (violet color) and connect them to an ohmmeter (Simpson model 260 series 4, volt-ohm milliammeter, or any equivalent ohmmeter can be used). Observe the following:

(a) If meter shows infinite resistance, the potentiometer is open and should be replaced.

(b) If meter shows zero resistance, the potentiometer has a short.

(c) If potentiometer is good, there should be a smooth change in resistance from approximately 200 to 1800 ohms as the dial is rotated from 65 temperature regulator) control was chosen for the Auto-Temp system because the EPR used on

to 85 If not, potentiometer should be replaced.

(2) To check the dial control calibration, set the dial to 75 at center of Bezel. The meter should read 1000 ohms. If it is out of calibration, it can be adjusted as follows:

(a) Rotate dial so that meter reads 1000 ohms.

(b) Hold potentiometer shaft as shown in (Fig. 13) and slip dial so that number 75 is on center of Bezel.

After completing work on the control dial assembly, be sure to reconnect all wiring.

IN-CAR SENSOR

The in-car sensor is located in a removable grille so that check or replacement can be accomplished. It senses car interior temperature and automatically signals the amplifier to compensate for any variation from the selected dial comfort level.

There are three basic problems which may occur with the sensor. These problems and the system malfunction symptoms are:

(1) Sensor could be open—System would operate on maximum heating and M3 blower only.

(2) Sensor could have a short—System would operate on maximum A/C and high blower only.

The above can be checked in the same manner as the control dial potentiometer.

If the sensor is defective, check connections, repair or replace as necessary. The calibration cannot be checked without extensive measuring techniques. If the sensor is suspected to be out of calibration, a new sensor may be tried, but it is considered very doubtful that this will occur.

AMBIENT SENSOR

This sensor senses the outside ambient temperature.It makes adjustments to the system that are required to maintain a constant interior comfort level due to ambient temperature changes.

There are two basic problems which may occur with this sensor, also. The problems and system malfunction symptoms are as follows:

(1) Sensor could be open—System operates in heat mode at all times.

(2) Sensor could have a short—System operates in maximum A/C and high blower only.

(3) Sensor could be partially open—System operates in heat mode all the time or most of the time.

These deficiencies are checked in the same manner as for the in-car sensor. If sensor is faulty as described, repair or replace as necessary. A calibration check of this sensor is also difficult, therefore a new sensor may be tried in the system if it is suspected.

NOTE: A failed ambient sensor may test out as good (in the green area) if it has failed partially open. A partially open ambient sensor will tend to drive the system continuously to "Heat". To check for this condition, disconnect the service connector and check the resistance across the 2 dark blue wire terminals (female insulator). The maximum resistance should be approximately 650 ohms at 65 degrees F, 550 ohms at 75 degrees F, and 450 ohms at 85 degrees F. If the resistance is constantly 1500 ohms the sensor is open, and if the resistance values are consistently higher than those above, the shunt resistor is open. In either case, the sensor is defective and must be replaced.

ASPIRATOR

The aspirator is a tube shaped device connected to the passenger side housing in such a manner that air flowing through the housing creates a slight vacuum in the aspirator. The aspirator is connected to the in-car sensor by a flexible tube. The vacuum in the aspirator tends to pull in-car air over the sensor.

Aspirator and Tube Test

With air flowing through the passenger side housing the aspirator should pull air into the in-car sensor grill. This can be checked by holding a smoking object (cigarette) next to the grille with the system on M3 blower in heat mode. If smoke is not pulled into the grille the aspirator is not working properly. The aspirator and tube must be inspected for incomplete connection or kinks.

VACUUM RESERVOIR TANK

The reservoir tank is used for the purpose of maintaining sufficient vacuum in the system in cases where source vacuum is lost momentarily. The tank has a check valve at the inlet port which closes when the vacuum supply drops off.

Operation of the tank is checked in the following manner:

(1) Connect a 0-29 inch Hg. vacuum gauge to outlet port of the tank.

(2) Start engine and allow to run at idle speed.

(3) Vacuum at gauge should build up to 16 inches or above in less than one minute.

(4) Shut engine off, and observe gauge.

(a) If vacuum does not drop off, the check valve and tank are operating satisfactorily.

(b) If vacuum drops off, there is a leak and tank assembly should be replaced.

CHECK VALVES

Check valves are used in the Auto-Temp system to prevent the venting of certain vacuum circuits, when the vacuum supply is lost or removed.

The check valve, which is an integral part of the reservoir tank, are discussed in the vacuum reservoir tank check-out procedure.There are two other check valves in the vacuum system. These two valves are a part of the vacuum harness assembly, and are located in the area where the harness routes under the passenger side housing. The valves are spaced apart on the harness, and for identification, they will be referred to in sequence

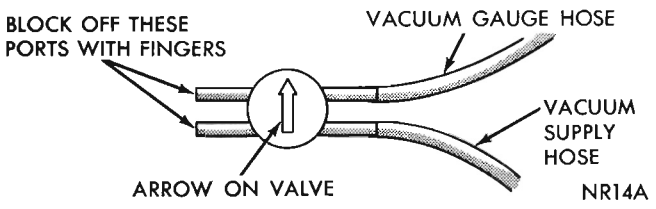


Fig. 14 Vacuum check valve test.

as numbers 1 and 2; where number 1 is the closest to the vacuum harness dash grommet.

Each check valve also serves as a "tee" connector, thereby eliminating extra connections. On the body of each valve is an arrow which points to the port or ports being checked.

Test Procedure For Check Valves

The following is presented as an aid for diagnosing check valve failures:

(1) The most probable types of failures with check valves are leakage and incorrect installation. The malfunctions created by faulty check valves are:

Check Valve Number 1 Leaking: System stays on 20% outside air and will not go to 100% outside air. Also, system shuts off when vacuum supply is lost.

Check Valve Number 1 Installed Backwards: System malfunctions the same as with a leaking valve. Also, with a cold engine the blower will not come on when the "Defrost" or "Hi-Defrost" button is pushed.

Check Valve Number 2 Leaking: Blower starts immediately and blows cold air during cold weather.

Check Valve Number 2 Installed Backwards: Blower starts immediately and blows cold air during cold weather. With the engine cold the blower will not shut off when the "Off" button is pushed.

(2) When check valve failure is suspected, the following should be done:

(a) Inspect harness to see that valves are installed correctly as in (Fig. 5).

(b) Remove any valves which are suspected to be faulty, and check as follows:

Connect a vacuum gauge and supply vacuum to valve as shown (Fig. 14).

Apply full vacuum attainable from car or from an external source. Note vacuum at gauge and remove vacuum supply hose. The reading should have remained approximately the same. If vacuum is dropping off at the gauge, the check valve is faulty. Change any valves which are found faulty and check out system to see if malfunction has been corrected. It should be noted that the most severe test on a check valve is below freezing weather. It is possible that a defective valve will not work in such weather, but work at room ambient temperatures.

CAUTION: Do not use a lubricant of any type to attempt to increase the efficiency of faulty check valves as serious damage will result to the entire vacuum system.

System Vacuum Leak Test

(1) "Tee-in" a 0 to 30 inch vacuum gauge at the master switch (green color coded) vacuum connection.

(2) With the "Lo-Auto" button depressed, place system on Heat mode by rotating tester Mode Knob to "Heat".

(3) Allow vacuum at master switch gauge to build up to at least 18 inches and stabilize.

(4) Turn engine off and observe master switch gauge vacuum decay for one minute.

If the vacuum gauge did not build up to at least 18 inches vacuum with the engine running, or if the vacuum decay rate with the engine off exceeded 5 inches per minute, the system shall fail the performance test. Check for leaks and disconnected hoses and repair if necessary.

Cold Engine Lock-Out Test

To perform this test the car **must have** a cold engine. Turn the Voltmeter Knob to "Servo-Amp", and the Mode Knob to "Park". Start the car and depress the "Lo-Auto" button. There should be no airflow or voltmeter reading at this time.

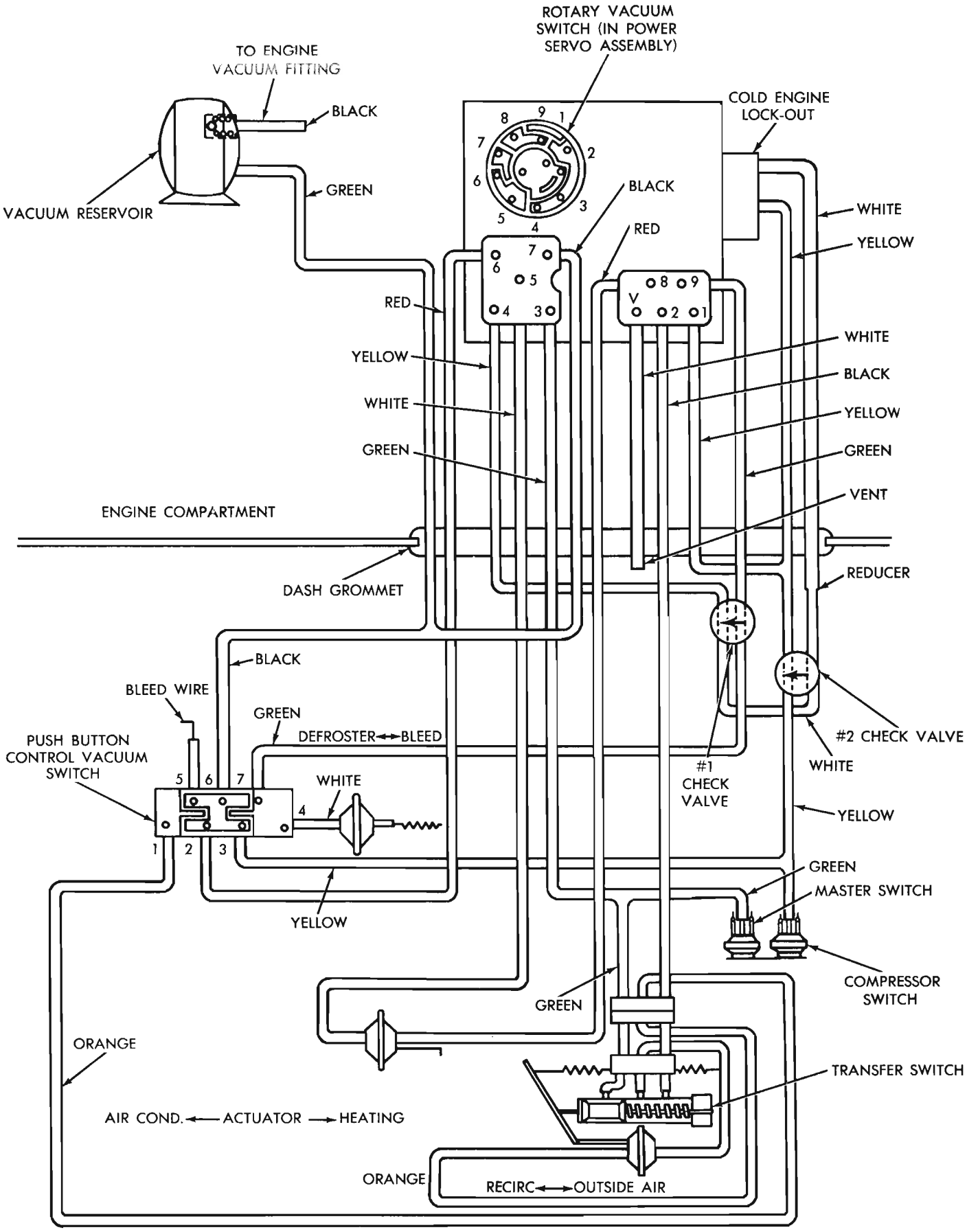
Rotate the Mode knob to "Heat". The voltmeter will show a 3 to 4.5 volt reading until full heat is reached, then it will drop approximately .5 volts. There should be no airflow out any outlets at this time.

Now switch the voltmeter knob to the "Voltage" position. There should still be no airflow and there will be no voltage reading at this position. When the engine coolant reaches a temperature of 125 degrees F., the blower will come on in M3 blower speed and the system will be in full heat. This will occur in a minimum of 3 minutes. Airflow will be out the heat (Floor) ducts with normal defroster bleed.

VACUUM CIRCUITS FOR EACH PUSH BUTTON POSITION (Figs. 15 thru 17)

When testing or adjusting the doors in the distribution system, it is necessary to know the correct position of each door for each push-button position. In the illustrations which follow; vacuum is indicated for each vacuum hose and for each push-button position.

With the use of the Service Diagnosis, Sequence Chart and Vacuum Circuit Diagrams, an accurate solution to vacuum problems should be obtained.



PB248

FIG. 15 Vacuum Hose Color Code.

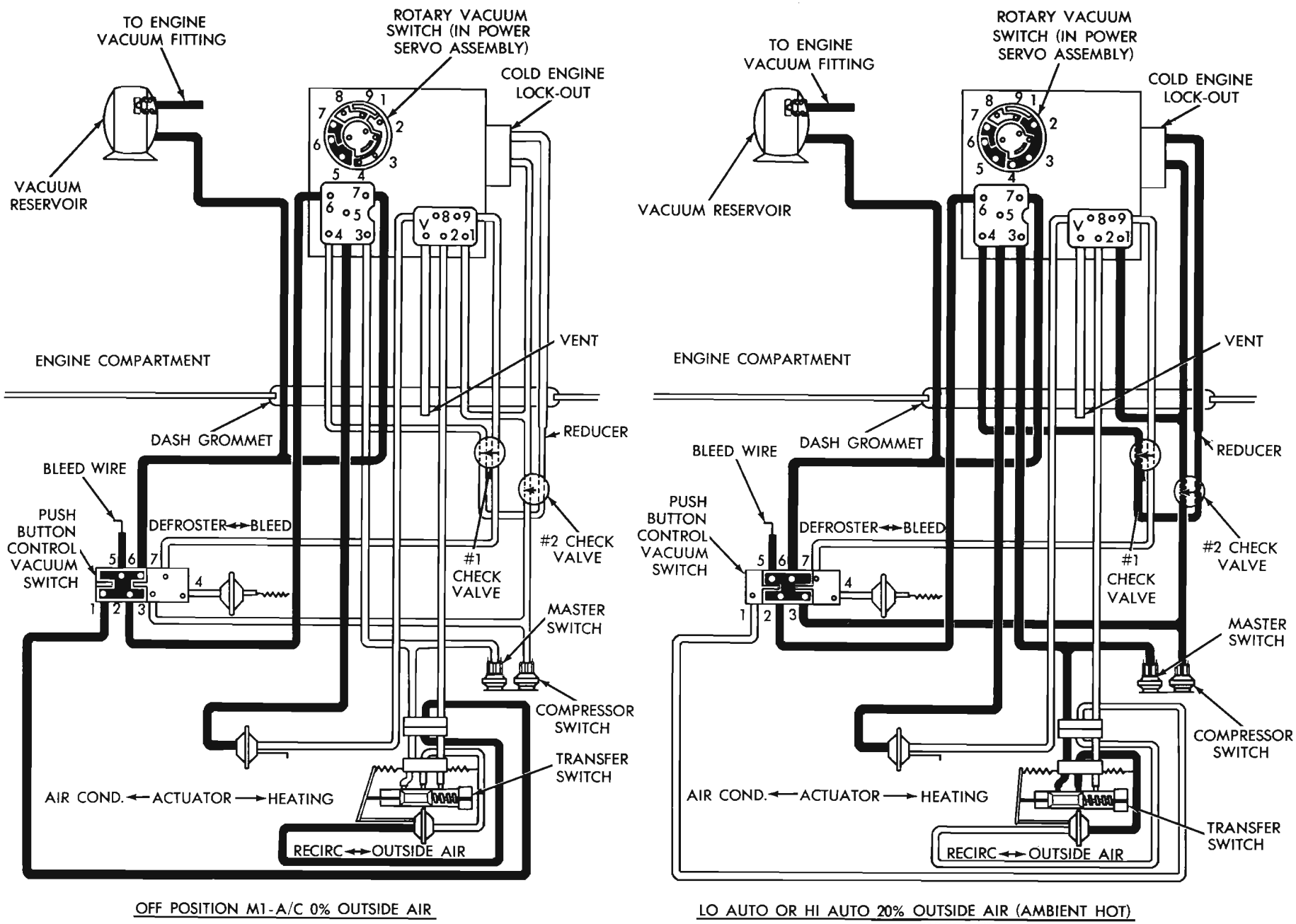
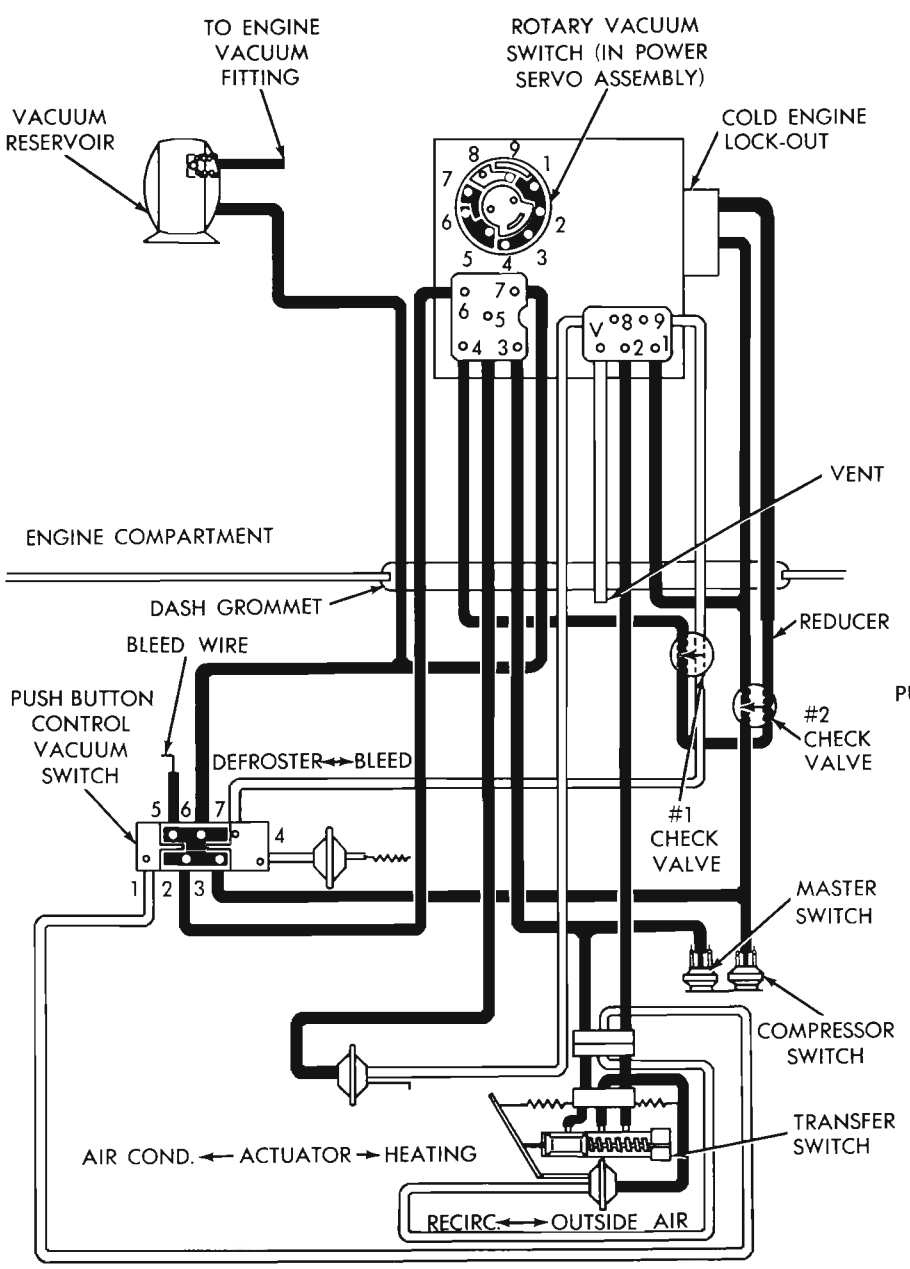
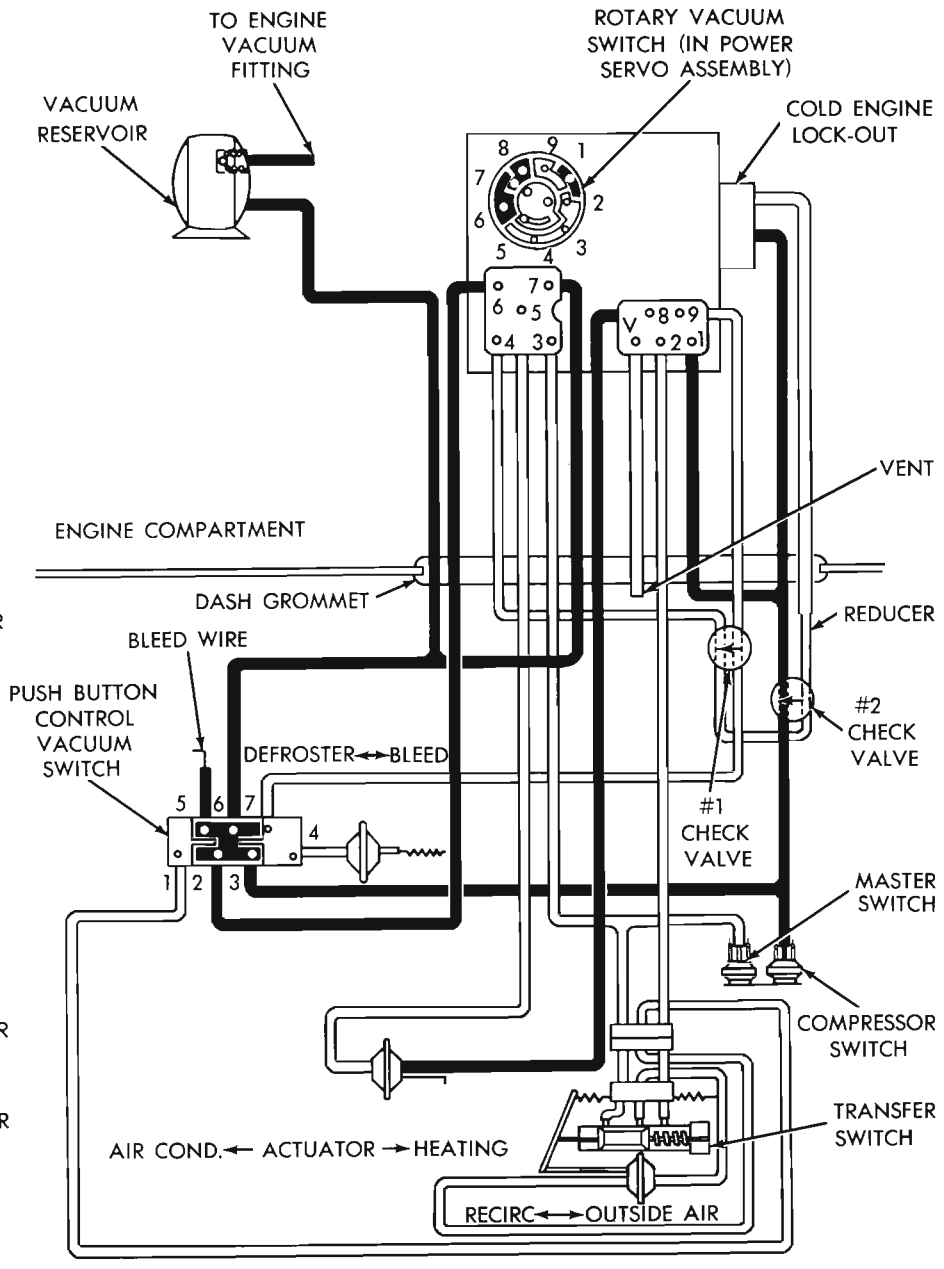


FIG. 16 Auto-Temp Vacuum Circuits



LO AUTO OR HI AUTO 100% OUTSIDE AIR (WARM AMBIENT)



LO AUTO OR HI AUTO 0% OUTSIDE AIR
ENGINE TEMPERATURE BELOW 125°F
COLD AMBIENT

PB250

FIG. 17 Auto-Temp Vacuum Circuits

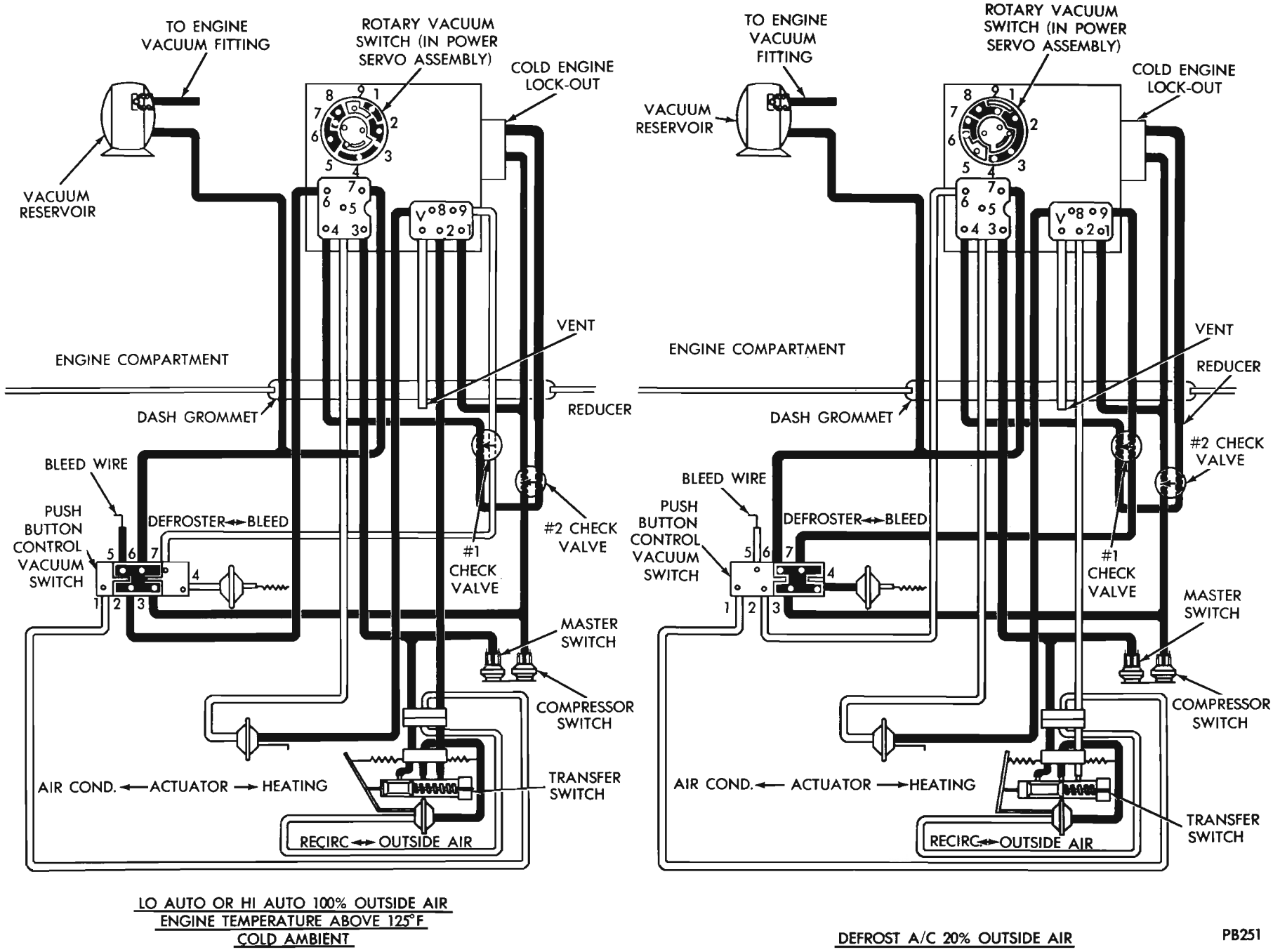


FIG. 18 Auto-Temp Vacuum Circuits

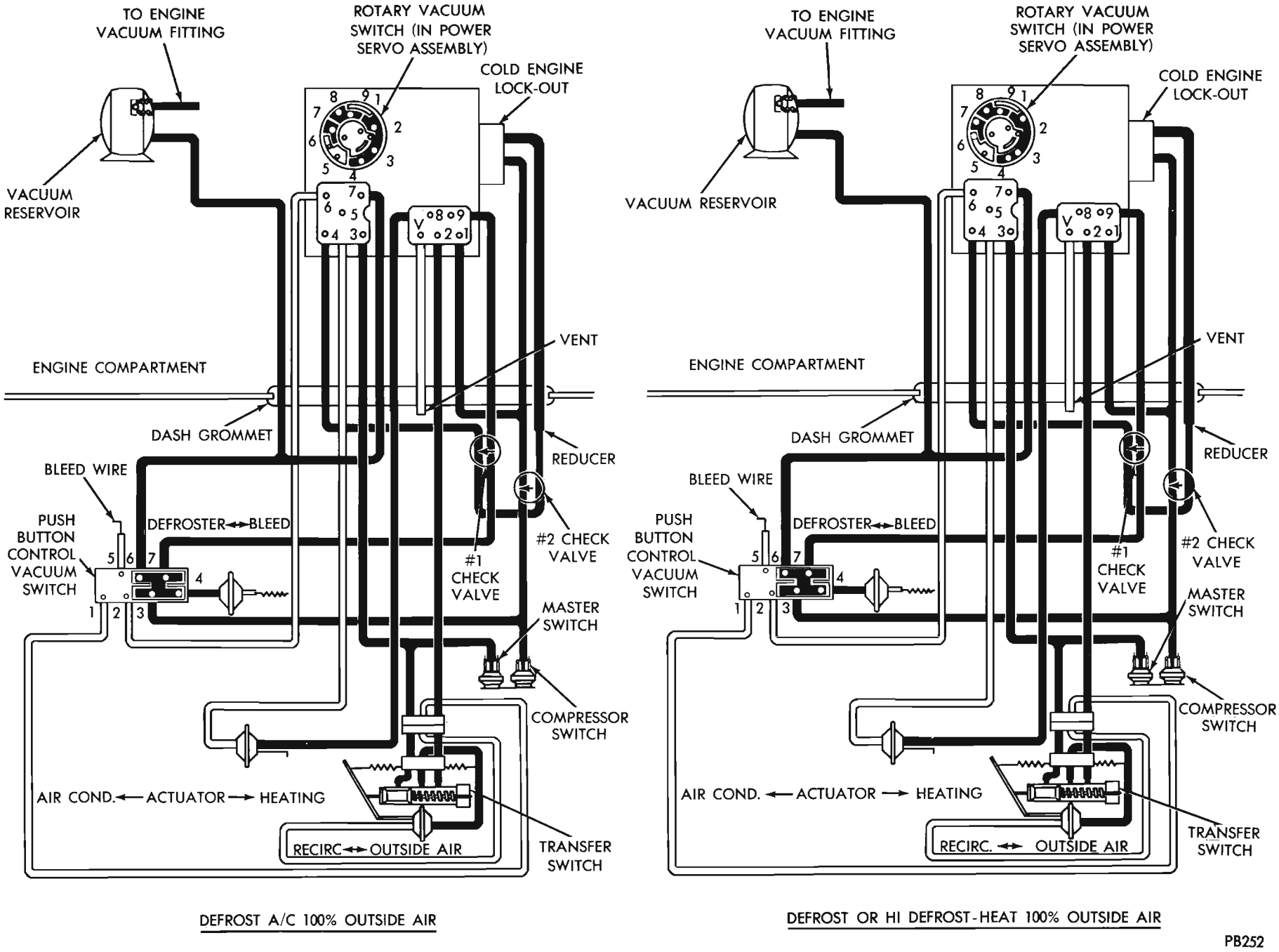


FIG. 19 Auto-Temp Vacuum Circuits

CAUTION: Do not use lubricant on switch ports or in vacuum hoses as lubricants will ruin the vacuum valve in the switch and cause check valves to fail. If it is impossible to properly position the connector plug all the way on the switch prods, put a drop or two of clean water in the holes of the connector plug. This will allow the plug to slide completely on switch prods.

PERFORMANCE TEST

Humidity (the amount of moisture in the air) has an important bearing on the temperature of the air delivered to the vehicle's interior. This is true of all air-conditioned systems whether in the home, office or vehicle. It is important to understand the effect humidity has on the performance of the system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature and the temperature of the moisture carried in the air. Condensing the moisture in the air transfers a great deal of heat energy into the evaporator fins and tubing. This reduces the amount of heat the evaporator can absorb from the air. In other words, high humidity greatly reduces the evaporator's ability to lower the temperature of the air delivered to the vehicle interior.

Evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the vehicle adds materially to the comfort of the passengers. However, an owner may expect too much from his air-conditioning system on humid days. A performance test is the best way to determine whether or not the system is performing up to standard. This test also provides valuable clues to the possible cause of trouble. Install gauge set.

Connect Auto-Temp Tester, as shown in Figure 7. Place system in A/C position. System should be in the maximum cooling position (air conditioning, 20% outside air, and Hi/blower).

Put recirculating door in the 100% outside air position. This can be done by removing the glove box and the right spot cooler duct. Remove and plug the white vacuum hose on the pot side of the air door actuator. Connect an external vacuum source to the pot side of this actuator. Replace the right spot cooler duct.

Arrange gauge set manifold hoses and tachometer leads to allow hood to be lowered, then close hood.

Place motor-driven psychrometer Tool C-3704 at cowl inlet opening. Distilled water should be used with this meter to prevent drying out and hardening the wet sock.

Place thermometer Tool C-3623 fully into the upper outlet grille opening. The lower center outlet should be fully extended and directed towards rear of vehicle.

Start the engine, open the windows, push the "Hi-Auto" button, open all grille outlets and set engine idle at 1300 R.P.M. **When testing the front unit of a dual system, leave rear unit blower turned off.**

Operate the air-conditioning system until a stabilized condition on the gauges and thermometers has been established.

One of the most important steps in making the over-all performance test is that the engine must be operated at the RPM as indicated for approximately five minutes to allow all the underhood components of the system to reach their operating temperature.

Partially close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the pointer. Do not close the needle valve completely since this would prevent the discharge pressure gauge from registering pressure.

This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound pressure is for **test purposes only.** To in-

SINGLE UNIT

INLET AIR WET BULB TEMPERATURE

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
41	42	43	44	45	46	47	48	49	50	50	50	51	51	52	52	53	53	53	54	54	55	56	57	58	59	59	60	62	64	66	67	68	69	70	71

DISCHARGE AIR DRY BULB TEMPERATURE

INLET AIR DRY BULB TEMPERATURE MUST BE BETWEEN 75° AND 110°F

NK1342A

Fig. 20 Performance Temperature Chart

crease pressure restrict the air flow across the condenser using cardboard, or paper, to decrease pressure, increase air flow across condenser with external floor fans.

Observe and record both the "Inlet Dry Bulb Temperature" and "Inlet Wet Bulb Temperature" as registered on the psychometer.

Observe and record "Discharge Air Temperature" registered by thermometer at right upper center outlet.

From the "Performance Temperature Chart," (Fig. 20), determine the maximum allowable discharge air temperature for the prevailing "Dry" and "Wet" bulb temperatures recorded. If the vehicle's discharge air temperature is at or below the temperature given on the Performance Chart, the air-conditioning is delivering its cooling capacity.

Calibration Check-out Procedure

The following procedure is to check the calibration of the 2 major system components, the servo and the amplifier. The procedure is to be used as a supplement to the standard check out procedures, not for every system check. It is a diagnosis procedure for vehicles which do not respond to the standard procedures and diagnosis chart.

Electrical Test

(1) Connect the Auto Temp II Tester C-4144 to service connector.

(2) Tester settings:

(a) Voltmeter switch (on left) - "Off"

(b) Mode knob (on right) - "Heat"

(3) Install the tachometer, start engine and set the engine speed at 1100 rpm.

(4) System controls settings:

(a) Temperature control thumbwheel - "75"

(b) Push button switch - "Lo Auto"

(5) Check the ambient sensor, temperature control and in-car sensor (see "Component Test Procedures").

(6) Set the tester voltmeter switch to "Servo-Amp".

Servo

(7) With the system "On" and in the "Heat" mode, change the tester mode knob to one of the "Park" positions.

(8) When the indicated voltage at the tester voltmeter drops to zero (0), proceed as follows:

(a) Disconnect the inboard electrical insulator (5-way) at the servo assembly.

(b) Using an ohmmeter, Simpson VOM No. 260 or equivalent, check the resistance across the 2 most inboard servo terminals number 1 and 2. See Wiring Diagram (Fig. 10). The value should be between 1250 ohms and 1500 ohms.

(c) If the resistance is within tolerance, reconnect the insulator and proceed. If the resistance is **not** within tolerances, replace the servo assembly.

(9) Set the tester mode knob to "Heat".

(10) With the system "On" and in the "Heat" mode, change the tester mode knob to the "Mid" position. (NOTE: System must be allowed to warm-up for 15 minutes before check is made).

(11) When the indicated voltage on the tester voltmeter drops to zero (0), proceed as follows:

(a) Disconnect the inboard electrical insulator (5-way), at the servo assembly.

(b) Using the ohmmeter, check the resistance across the 2 most inboard servo terminals, numbers 1 and 2, see Wiring Diagram (Fig. 10). The value should be between 1000 ohms and 1200 ohms.

(c) If the resistance is within tolerance, reconnect the insulator and proceed. If the resistance is **not** within tolerance, replace the amplifier.

Coolant Flow

(12) Insert the thermometer into one of the center A/C outlets.

(13) Set the tester mode knob to one of the "Park" positions.

(14) When the indicated voltage at the tester voltmeter drops to zero (0), proceed as follows:

(a) Clamp shut the inboard heater hose (from the servo assembly to the heater core) near the servo assembly.

(b) Remove the radiator cap to minimize pressure.

(c) Disconnect the clamped heater hose (from the servo assembly). Note: The coolant between the clamp and the servo will be lost and must be replaced.

(d) There should be no coolant flow through the servo (no more than a few drops).

(e) If there is flow, replace the servo assembly. If there is no flow, reconnect the hose, remove the clamp and proceed.

(f) At this time, the air outlet temperature should be between 38 degrees F and 45 degrees F; if not, refer to the refrigeration system check-out procedure.

(15) Change the tester mode knob to "Mid".

(16) Wait for approximately 2 minutes for the system to stabilize and check the outlet temperature. It should be 75 degrees F ± 25 degrees F. **(NOTE: Engine coolant must be up to normal operating temperatures).**

(17) Move the thermometer to the left defroster outlet.

(18) Change the tester mode knob to "Heat".

(19) Depress the "Hi-Defrost" push button.

(20) Wait approximately 2 minutes for the sys-

tem to stabilize and check the temperature. It should be 120 degrees F or more.

(21) If the requirements of either step 16 or 20 are not fulfilled, refer to the diagnosis chart for the causes and proceed according to the standard procedures. If the requirements are fulfilled, the calibration check-out is complete.

ALPHABETICAL INDEX

BRAKES

INDEX

	Page
DISC BRAKES - FIXED CALIPER	5-30
Assembling Caliper	5-38
Assembling Master Cylinder	5-58
Bleeding Disc Brake	5-40
Brake Shoe Installation	5-36
Brake Shoe Removal	5-35
Cleaning and Inspection (Master Cylinder)	5-58
Disassembling Caliper	5-37
Disassembling Master Cylinder	5-57
Disc Brake Service Precautions	5-33
General Information	5-30
Installing Brake Disc and Hub	5-39
Installing Caliper	5-39
Installing Master Cylinder	5-59
Proportioning Valve	5-41
Removing Braking Disc and Hub	5-39
Removing Caliper	5-36
Removing Master Cylinder	5-57
Routine Maintenance	5-32
Service Diagnosis	5-34
DISC BRAKES - FLOATING CALIPER	5-41
Assembling Caliper	5-50
Bleeding Disc Brake	5-56
Brake Shoe Installation	5-48
Brake Shoe Removal	5-47
Cleaning and Inspection	5-48
Checking Braking Disc for Run-out and Thickness	5-51
Disassembling Caliper	5-49
Disc Brake Service Precautions	5-46
General Information	5-43
Installing Brake Disc and Hub	5-53
Installing Caliper	5-51
Metering Valve	5-44
Proportioning Valve	5-54
Refinishing (Refacing) Braking Disc	5-53
Removing Braking Disc and Hub	5-52
Removing Caliper from Vehicle	5-49
Routine Maintenance - 30,000 Miles	5-46
Service Diagnosis	5-42
Specifications	5-64
DRUM BRAKES	5-1-6
Brake Drum Removal	5-7
Brake Shoe Removal	5-7
Brake Shoe Installation	5-11
Brake Drum Installation	5-12
Cleaning and Inspection	5-10
Grinding Recommendations	5-10
GENERAL INFORMATION	5-1
SERVICE PROCEDURES	5-3
Adjusting Service Brakes	5-3
Bleeding Brake System	5-3
Brake Hose and Tubing	5-4
Stop Lamp Switch Adjustment	5-6
Test for Fluid Contamination	5-4
Testing Application Adjusters	5-3
MASTER CYLINDER - DRUM BRAKES	5-13
Bleeding Master Cylinder	5-15
Brake Warning Switch	5-16
Cleaning and Inspection	5-14
Disassembling Master Cylinder	5-13
General Information	5-13
Installing Master Cylinder	5-15
Master Cylinder Removal	5-13
Reassembling Master Cylinder	5-15
Testing Master Cylinder	5-16
MASTER CYLINDER - DISC BRAKES	5-56
Bleeding Master Cylinder	5-59
Brake Warning Switches	5-60
Cleaning and Inspection	5-58
Disassembling Master Cylinder	5-57
General Information	5-56
Installing Master Cylinder	5-54
Master Cylinder Removal	5-57
Reassembling Master Cylinder	5-58
Testing Brake Warning Switches	5-60
Testing Master Cylinder	5-59
MASTER CYLINDER - DISC BRAKE AND HEMI ENGINE	5-56
Bleeding Master Cylinder	5-63
Brake Warning Switch	5-63
Cleaning and Inspection	5-61
Disassembling Master Cylinder	5-61
General Information	5-61
Installing Master Cylinder	5-63
Master Cylinder Removal	5-61
Reassembling Master Cylinder	5-62
Testing Brake Warning Switch	5-64
Testing Master Cylinder	5-63
PARKING BRAKES	5-19
Adjusting Parking Brake	5-20
General Information	5-19
Installing Front Parking Brake Cable	5-24
Installing Rear Parking Brake Cable	5-22
Removing Front Parking Brake Cable	5-23
Removing Rear Parking Brake Cable	5-22
Service Diagnosis	5-19
POWER BRAKES	5-24
General Information	5-24
Power Brakes	5-24
Service Diagnosis	5-25
Service Procedures	5-25
SERVICE DIAGNOSIS	5-1
Drum Brakes	5-1
Parking Brakes	5-19
Disc Brakes - Fixed Caliper	5-34
Disc Brakes - Floating Caliper	5-42
SPECIFICATIONS	5-64
WHEEL CYLINDERS	5-16
Assembling Wheel Cylinders	5-18
Disassembling Wheel Cylinders	5-17
Installing Brake Supports	5-19
Installing Wheel Cylinders	5-18
Removing Brake Supports	5-18
Removing Wheel Cylinders	5-17

CLEANER AIR SYSTEM

INDEX

	Page
CLEANER AIR SYSTEM	9A-1
NOX SYSTEM	9A-7
VAPOR SAVER SYSTEM	9A-6

CLUTCH

INDEX

	Page
CLUTCH HOUSING ALIGNMENT	6-10
CLUTCH PEDAL FREE PLAY	6-5
CLUTCH RELEASE BEARING	6-9
CLUTCH RELEASE FORK	6-9
CLUTCH SERVICING	6-6
Cleaning and Inspection	6-7
Installation	6-8
Removal	6-7
PILOT BUSHING - CRANKSHAFT TO TRANSMISSION DRIVE PINION	6-8
SERVICE DIAGNOSIS	6-4
SERVICE PROCEDURES	6-5
SPECIFICATIONS	6-12
STEAM CLEANING PRECAUTIONS	6-11
TIGHTENING REFERENCE	6-13
TORQUE SHAFT AND BEARINGS	6-10

COOLING

INDEX

	Page
ACCESSORY BELT DRIVES	7-11
CONVERSION TABLE	7-20
ENGINE WATER TEMPERATURE GAUGE	7-11
FAN	7-4
FLUID FAN DRIVE	7-4
PRESSURE TESTING COOLING SYSTEM	7-9
PRESSURE TESTING RADIATOR CAP	7-9
RADIATOR	7-6
RADIATOR HOSES	7-9
RADIATOR PRESSURE CAP	7-9
REVERSE FLUSHING COOLING SYSTEM	7-7
SERVICE DIAGNOSIS	7-1
SPECIFICATIONS	7-13
TEMPERATURE OPERATED VACUUM BY-PASS VALVE	7-9
TIGHTENING REFERENCE	7-20
THERMOSTAT	7-8
TRANSMISSION OIL COOLER	7-6
WATER PUMP	7-5

ELECTRICAL

INDEX

	Page
ALTERNATOR AND VOLTAGE REGULATOR	8-23
Assembling the Alternator	8-35
Bench Tests	8-29
Disassembling the Alternator	8-30
General Information	8-23
Output Tests	8-25
Rectifier (Diode) Testing	8-31
Regulator Testing	8-27
Replacing Slip Rings	8-33
Service Diagnosis	8-23
Specifications	8-123
Voltage Regulator	8-25
BATTERY	8-1
Adjustment of Acid Gravity	8-4
Battery Visual Inspection	8-1
Charging the Battery	8-4
High Rate Discharge Test of Battery Capacity	8-4
Specifications	8-123
Secific Gravity Test	8-1

	Page
HORNS	8-96
Adjusting	8-98
General Information	8-96
Service Diagnosis	8-97
Service Procedures	8-97
Testing	8-97
IGNITION 6-CYLINDER	8-36
Assembling the Distributor	8-42
Ballast Resistor	8-45
Distributor Advance Testing	8-44
Distributor Contact Dwell	8-39
Distributor Contact	8-43
Distributor Disassembly	8-41
Distributor Installation	8-44
Distributor Lubrication	8-44
Distributor Removal	8-40
Distributor Resistance Test	8-38
Dwell Variation	8-39
General Information	8-37
Idle R.P.M. Test	8-39
Ignition Coil	8-45
Ignition Timing	8-39
Installing and Aligning Contacts	8-43
Lubrication Distributor	8-44
Secondary Circuit Inspection	8-37
Service Diagnosis	8-37
Shaft and Bushing Wear Test	8-41
Spark Plugs	8-56
Specifications	8-123
Testing Contact Arm Spring Tension	8-43
Timing Ignition	8-39
SPECIFICATIONS	8-123
Alternator	8-124
Battery	8-123
Bulbs	8-128
Circuit Breakers	8-127
Distributors	8-131
Fuses	8-125
Starting Motor	8-124
Voltage Regulator	8-125
SPEED CONTROL	8-98
General Information	8-98
Installation	8-105
Removal	8-102
Service Diagnosis	8-100
Test and Adjustment	8-101
STARTER (DIRECT DRIVE)	8-16
Amperage Draw Test	8-16
Assembling the Starter	8-22
Brushes and Springs Replacement	8-19
Bushings - Servicing	8-22
Cleaning the Starter	8-19
Disassembling the Starter	8-18
Drive Unit - Servicing	8-22
Drive Gear Pinion Clearance - Adjusting	8-22
Field Coils - Replacement	8-21
Free Running Test	8-17
Installing the Starter	8-22
Insulated Circuit Test	8-17
Removing the Starter	8-17
Resistance Test	8-17
Service Diagnosis	8-7
Specifications	8-123
Starter Circuit Tests	8-17
Testing Armature	8-20
Testing Starting Motor (Bench test)	8-17

	Page
STARTER (REDUCTION GEAR)	8-6
Ampere Draw Test	8-8
Assembling the Starter	8-13
Brushes and Springs Replacement	8-12
Bushings Replacement	8-13
Cleaning the Starter	8-12
Disassembling the Starter	8-10
Field Coils Replacement	8-12
General Information	8-6
Ground Circuit Test	8-9
Insulated Circuit Test	8-8
IGNITION 8-CYLINDER	8-45
Assembling the Distributor	8-53
Ballast Resistor	8-56
Distributor Advance Testing	8-53
Distributor Contact Dwell	8-48
Distributor Contacts	8-54
Distributor Disassembly	8-52
Distributor Installation	8-55
Distributor Lubrication	8-54
Distributor Removal	8-50
Distributor Resistance Test	8-47
Dwell Variation	8-48
General Information	8-45
Idle R.P.M. Test	8-48
Ignition Coil	8-56
Ignition Timing	8-49
Installing and Aligning Contacts	8-54
Lubrications - Distributor	8-54
Secondary Circuit Inspection	8-46
Service Diagnosis	8-46
Shaft and Bushing Wear Test	8-52
Spark Plugs	8-56
Specifications	8-123
Testing Contact Arm Spring Tension	8-53
Timing - Ignition	8-49
INSTRUMENT PANEL	8-57
Brake System Warning Light	8-61
Buzzer System	8-80
Circuit Breakers	8-71
Fuse Block	8-70
General Information	8-57
Heater and Air Conditioning Controls	8-73
Ignition and Steering Lock	8-80
Instruments	8-68
Instrument Clusters	8-63
Light Bulb Replacement	8-61
Panel Roll Out	8-78
Printed Circuit Board Replacement	8-69
Service Diagnosis	8-58
Specifications	8-123
Speedometer Replacement	8-69
Switch Replacement	8-71
Test in Vehicle	8-59
Test Out of Vehicle	8-70
Trim Pad Replacement	8-77
RADIO	8-82
Antennas	8-88
Antenna Trimming	8-88
Fader Control	8-86
Front Speaker	8-94
Interference Elimination	8-88
Radio Replacement	8-94
Rear Speakers	8-96
Service Diagnosis	8-86
Stereo Speakers	8-95

INDEX

	Page
TURN SIGNALS AND EMERGENCY FLASHER	8-107
Emergency Flasher	8-108
General Information	8-107
Service Diagnosis	8-107
Turn Signal Switch	8-108
WINDSHIELD WIPER AND WASHERS SYSTEM	8-108
End Play Adjustment	8-111
Gear and Park Switch Replacement	8-113
General Information	8-109
Links	8-115
Lubrication	8-118
Motor Installation	8-114
Motor Removal	8-114
Motor Testing	8-112
Panel Switch Tests	8-111
Pivot Replacement	8-115
Service Diagnosis	8-118
Windshield Washers	8-118
Wiper Arm Adjustment	8-110
WIRING DIAGRAM	8-147

ENGINE

INDEX

	Page
SIX CYLINDER ENGINES	9-5
Camshaft	9-15
Camshaft Bearings	9-15
Connecting Rods	9-19
Crankshaft Identification	9-19
Crankshaft Main Bearings	9-20
Crankshaft Main Journals	9-20
Crank case Ventilation System	9-92
Cylinder Block	9-16
Cylinder Head	9-8
Engine Assembly	9-6
Installing Piston and Connecting Rod Assembly	9-19
Measuring Connecting Rod Bearing Clearance	9-19
Measuring Main Bearing Clearance	9-20
Oil Filter	9-25
Oil Pan	9-23
Oil Pump	9-23
Pistons, Pins and Rings	9-17
Rear Main Bearing Oil Seal	9-21
Repair of Damaged or Worn Threads	9-93
Rocker Arms and Shaft Assembly	9-7
Specifications	9-94
Timing Chain Cover, Oil Seal and Chain	9-12
Tune-Up	9-5
Valves and Valve Springs	9-10
Valve Timing	9-12
EIGHT CYLINDER ENGINES 318-340-360 CUBIC INCH	9-25
Camshaft	9-37
Camshaft Bearings	9-38
Connecting Rods	9-43
Crankshaft Identification	9-43
Crankshaft Main Bearings	9-45
Crankshaft Main Journals	9-45
Crank case Ventilation System	9-92
Cylinder Block	9-39
Cylinder Heads	9-29
Distributor Drive Shaft Bushing	9-38
Engine Assembly	9-28
Engine Mounts	9-27
Hydraulic Tappets	9-33
Installing Piston and Connecting Rod Assembly	9-44
Measuring Connecting Rod Bearing Clearance	9-44
Measuring Main Bearing Clearance	9-45
Oil Filter	9-25
Oil Pan	9-46
Oil Pump	9-48
Pistons, Pins and Rings	9-41
Rear Main Bearing Oil Seal	9-46
Repair of Damaged or Worn Threads	9-93
Rocker Arms and Shaft Assembly	9-28
Specifications	9-94
Tappet Adjustment 340 Cubic Inch	9-33
Timing Chain Cover, Oil Seal and Chain	9-35
Tune-Up	9-26
Valves and Valve Springs	9-30
Valve Timing	9-35
383-440 CUBIC INCH ENGINES	9-50
Camshaft	9-62
Camshaft Bearings	9-62
Connecting Rods	9-67
Crankcase Ventilation System	9-92
Crankshaft Identification	9-67
Crankshaft Main Bearings	9-68
Crankshaft Main Journals	9-68
Cylinder Block	9-63
Cylinder Heads	9-53
Distributor Drive Shaft Bushing	9-63
Engine Assembly	9-52
Engine Mounts	9-51
Engine Oiling System	9-70
Hydraulic Tappets	9-57
Installing Piston and Connecting Rod Assembly	9-67
Measuring Connecting Rod Bearing Clearance	9-67
Measuring Main Bearing Clearance	9-69
Oil Filter	9-73
Oil Pan	9-70
Oil Pump	9-71
Pistons, Pins and Rings	9-64
Repair of Damaged or Worn Threads	9-93
Rear Main Bearing Oil Seal	9-69
Rocker Arms and Shaft Assembly	9-53
Specifications	9-94

	Page
Timing Chain Cover, Oil Seal and Chain	9-59
Tune-Up	9-50
Valves and Valve Springs	9-54
Valve Timing	9-59
426 CUBIC INCH HEMI ENGINE	9-73
Camshaft	9-84
Camshaft Bearings	9-84
Connecting Rods	9-87
Crankcase Ventilation System	9-92
Crankshaft Identification	9-87
Crankshaft Main Bearings	9-88
Crankshaft Main Journals	9-88
Cylinder Block	9-85
Cylinder Heads	9-75
Distributor Drive Shaft Bushing	9-84
Engine Assembly	9-75
Engine Mounts	9-74
Engine Oiling System	9-90
Installing Piston and Connecting Rod Assembly	9-88
Measuring Connecting Rod Bearing Clearance	9-87
Measuring Main Bearing Clearance	9-89
Oil Filter	9-92
Oil Pan	9-90
Oil Pump	9-90
Pistons, Pins and Rings	9-86
Repair of Damaged or Worn Threads	9-93
Rear Main Bearing Oil Seal	9-89
Specifications	9-94
Tappet Adjustment	9-79
Timing Chain, Cover, Oil Seal and Chain	9-81
Tune-Up	9-73
Valves and Valve Springs	9-78
Valve Timing	9-81

EXHAUST SYSTEM AND INTAKE MANIFOLD

INDEX

	Page
CARBURETOR AIR HEATER	11-17
318, 340 AND 360 Cubic Inch Engines	11-17
383, 440 Cubic Inch Engines	11-18
Six Cylinder Engines	11-17
EXHAUST HEADERS (426 HEMI ENGINE)	11-21
EXHAUST MANIFOLD (318, 340, 360 CU. IN. ENGINES)	11-19
EXHAUST MANIFOLD (383 AND 440 CU. IN. ENGINES)	11-19
EXHAUST PIPES, MUFFLERS AND TAIL PIPES	11-15
GENERAL INFORMATION	11-1
INTAKE AND EXHAUST MANIFOLD (6 CYL. ENGINES)	11-18
INTAKE MANIFOLD (318, 340 AND 360 CU. IN. ENGINES)	11-18
INTAKE MANIFOLD (383 AND 440 CU. IN. ENGINES) SERVICING	11-19
INTAKE MANIFOLD (426 HEMI ENGINE) SERVICING	11-20
INTAKE MANIFOLD HEAT TUBES (426 HEMI ENGINE)	11-20
MANIFOLD HEAT CONTROL VALVE (ALL ENGINES)	11-21
318 and 340 Cubic Inch Engines	11-22
383 and 440 Cubic Inch Engines	11-23
426 Hemi Engine Counterweight Thermostat	11-24
MANIFOLD HEAT CONTROL VALVE REPLACEMENT (HEMI ONLY)	11-24
SERVICE DIAGNOSIS	11-15
SERVICE PROCEDURES	11-15
TIGHTENING REFERENCE	11-25

FRONT SUSPENSION AND STEERING LINKAGE

INDEX

	Page
LOWER BALL JOINTS	2-14
LOWER CONTROL ARM AND SHAFT	2-11
LOWER CONTROL ARM STRUT	2-14
PRE-ALIGNMENT INSPECTION (HEIGHT ADJUSTMENT)	2-4
RUBBER ISOLATED FRONT CROSS MEMBER	2-20
SPECIFICATIONS	2-20
STEERING KNUCKLES	2-7
STEERING LINKAGE	2-8
SWAY BAR	2-9
TIGHTENING REFERENCE	2-22
TORSION BAR	2-6
TORSION BAR RUBBER ISOLATOR	2-6
UPPER BALL JOINTS	2-18
UPPER CONTROL ARM	2-16
WHEEL ALIGNMENT	2-3
Camber	2-3
Caster	2-3
Steering Axis Inclination	2-3
Toe-In	2-3
Toe-Out	2-3

FUEL SYSTEM

INDEX

	Page
BBS SERIES CARBURETOR	14-7
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-11
Accelerator Pump and Bowl Vent	14-11
Choke Vacuum Kick	14-12
Fast Idle Cam Position	14-12
Fast Idle Speed (On Vehicle)	14-13
Choke Unloader (Wide Open Kick)	14-13
Idle Speed Adjustment	14-13
Checking Float Setting (On Vehicle)	14-13
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-8
General Information	14-7
Inspection and Reassembly	14-9
Specifications	14-137
HOLLEY MODEL NO. 1920	14-14
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-18
Accelerator Pump and Bowl Vent	14-19
Choke Vacuum Kick	14-18
Fast Idle Cam Position	14-18
Fast Idle Speed (On Vehicle)	14-19
Idle Speed Adjustment	14-19
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-15
General Information	14-14
Inspection and Reassembly	14-16
Specifications	14-137
ROCHESTER MODEL 2GV	14-26
Automatic Choke-Well Type	14-1
Carburetor Adjustments	14-36
Accelerator Pump Rod	14-36
Fast Idle Cam Position	14-36
Vacuum Kick (On or Off Vehicle)	14-36
Choke Unloader (Wide Open Kick)	14-37
Idle Speed	14-37
Fast Idle Speed (On Vehicle)	14-38
Idle Vent Valve (On Vehicle)	14-38
General Information	14-27
Disassembling Carburetor	14-31
Cleaning and Inspection	14-33
Reassembly	14-34
Specifications	14-137
BBD SERIES (1-1/4 IN.)	14-20
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-24
Accelerator Pump and Bowl Vent	14-24
Choke Vacuum Kick	14-25
Fast Idle Cam Position	14-25
East Idle Speed (On Vehicle)	14-26
Choke Unloader (Wide Open Kick)	14-26
Idle Speed Adjustment	14-26
Dashpot Adjustment	14-26
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-21
Inspection and Reassembly	14-22
Specifications	14-137
CARTER THERMO-QUAD	14-38
Automatic Choke-Well Type	14-1
Carburetor Adjustments	14-44
Secondary Throttle Linkage	14-44
Secondary Air Valve Opening	14-45
Secondary Air Valve Spring Tension	14-45
Accelerator Pump Stroke	14-45
Choke Control Lever Adjustment (Off or On Vehicle)	14-45
Choke Diaphragm Connector Rod	14-46
Vacuum Kick Adjustment (Off or On Vehicle)	14-46
Fast Idle Cam and Linkage	14-47
Choke Unloader Adjustment (Wide Open Kick)	14-47
Secondary Throttle Lockout	14-48
Bowl Vent	14-48
Fast Idle Speed Adjustment (On Vehicle)	14-48
Fast Curb Idle Speed Solenoid Adjustment	14-48
Disassembling Carburetor	14-40
General Information	14-38
Inspection and Reassembly	14-41
Servicing Carburetor	14-2
Specifications	14-137
HOLLEY 2210 SERIES	14-49
Carburetor Adjustments	14-56
Accelerator Pump	14-58
Bowl Vent	14-58
Choke Unloader (Wide Open Kick)	14-57
Fast Idle Speed and Cam Position	14-56
Fast Idle Speed (On Vehicle)	14-58
Idle Speed	14-58
Vacuum Kick	14-56
Cleaning Carburetor Parts	14-53
Disassembling Carburetor	14-50
General Information	14-49
Inspection and Reassembly	14-53
Specifications	14-137
BBD SERIES (1-1/2 IN.)	14-59
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-63
Accelerator Pump and Bowl Vent	14-63
Choke Vacuum Kick	14-63
Fast Idle Cam Position	14-63
Fast Idle Speed (On Vehicle)	14-65
Choke Unloader (Wide Open Kick)	14-64
Idle Speed Adjustment	14-65
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-60
Inspection and Reassembly	14-61
Specifications	14-137
HOLLEY 4160 SERIES	14-66
Automatic Choke-Well Type	14-1
Carburetor Adjustments	14-80
Adjusting the Floats	14-78
Checking Bowl Vent Valve Clearance	14-80

	Page
Checking Pump Lever Clearance	14-80
Checking Wet Fuel Level	14-83
Choke Unloader (Wide Open Kick)	14-81
Fast Idle Cam Position	14-81
Fast Idle Speed (On or Off Vehicle)	14-81
Idle Speed (Curb Idle)	14-83
Secondary Throttle	14-82
Vacuum Kick (On or Off Vehicle)	14-82
Disassembling the Carburetor	14-73
Cleaning Carburetor Parts	14-76
General Information	14-66
Inspection and Reassembly	14-76
Servicing Carburetor	14-2
Specifications	14-137
AVS SERIES CARBURETOR	14-83
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-89
Accelerator Pump and Bowl Vent	14-90
Air Valve Secondary	14-91
Bowl Vent Valve	14-91
Choke Unloader (Wide Open Kick)	14-90
Choke Vacuum Kick	14-89
Fast Idle Cam Position	14-89
Fast Idle Speed (On Vehicle)	14-92
Idle Speed	14-92
Secondary Throttle Lever	14-90
Secondary Throttle Lockout	14-91
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-85
General Information	14-83
Inspection and Reassembly	14-86
Specifications	14-137
HOLLEY 2300 SERIES (TRI-CARB)	14-93
Assembling Carburetor (Center Unit)	14-102
Assembling Carburetor (Outboard)	14-107
Carburetor Adjustments	14-104
Accelerator Pump Lever Clearance	14-104
Bowl Vent Valve Clearance	14-104
Choke Unloader (Wide Open Kick)	14-105
Fast Idle Cam Position	14-105
Fast Idle Speed (On Vehicle)	14-106
Idle Speed (Curb Idle)	14-107
Outboard Carburetor Throttle Rod	14-106
Qualifying Choke Control Lever	14-104
Vacuum Kick	14-106
Cleaning Carburetor Parts	14-101
Disassembling Carburetor (Center Unit)	14-98
Disassembling Carburetor (Outboard)	14-101
General Information	14-93
Specifications	14-137
AFB SERIES	14-110
Automatic Choke (well type)	14-1
Carburetor Adjustments	14-117
Accelerator Pump	14-117
Bowl Vent Valve	14-119
Fast Idle Speed Cam Position	14-117
Fast Idle Speed (On Vehicle)	14-118
Idle Speed	14-119
Secondary Throttle Lever	14-118
Secondary Throttle Lockout	14-118
Cleaning Carburetor Parts	14-2
Disassembling Carburetor	14-112
General Information	14-111
Inspection and Reassembly	14-115
Specifications	14-137
FUEL PUMP	14-120
Fuel Vapor Separator	14-123
General Information	14-120
Service Diagnosis	14-121
Specifications	14-137
Testing Fuel Pump (On Vehicle)	14-122
FUEL TANK	14-123
General Information	14-123
Installing Fuel Tank	14-131
Installing Fuel Tank (Station Wagon)	14-133
Removing Fuel Tank	14-131
Removing Fuel Tank (Station Wagon)	14-132

HEATERS AND AIR CONDITIONING

INDEX

	Page
AIR CONDITIONING	24-21
Auto-Temp (Chrysler and Imperial)	24-85
Complete System Discharge and Recharge	24-35
Evaporator—Heater Assembly	24-50
Valiant	24-50
Barracuda	24-60
Chrysler, Imperial and Plymouth (Fury Models)	24-73
Satellite	24-60
Gauge Set Manifold Installation	24-22
Operating Instructions For Owners	24-21
Service Procedures	24-40
Servicing The Compressor	24-43
Test Procedures	24-24
COMPLETE SYSTEM DISCHARGE AND RECHARGE	24-35
Charging the System	24-37
Discharge the System	24-36
Evacuate the System	24-37
Refrigerant Service	24-35
Removing Sweep-Test Charge	24-36
Replace Receiver Drier	24-36
Sweep-Test Charge	24-36
Testing the System for Leaks	24-27
EVAPORATOR HEATER ASSEMBLY	24-50
Barracuda and Satellite Models	24-60
Electrical Controls and Circuits	24-66
Evaporator Removal and Installation	24-69
Expansion Valve Removal and Installation	24-68
General Information	24-60
Heater Core Removal and Installation	24-69
Inspection and Test Procedures	24-24

	Page
Operation of all Controls	24-67
Vacuum Controls and Circuits	24-64
Plymouth (Fury Models) Chrysler and Imperial	24-73
Blower Motor Removal and Installation	24-82
Electrical Controls and Circuits	24-75
Evaporator Removal and Installation	24-82
Expansion Valve Removal and Installation	24-79
General Information	24-73
Heater Core Removal and Installation	24-80
Inspection and Test Procedures	24-24
Linkage Adjustment	24-80
Operation of all Controls	24-77
Vacuum Controls and Circuits	24-75
Valiant	24-50
Blower Motor Removal and Installation	24-60
Electrical Controls and Circuits	24-53
Evaporator Removal and Installation	24-57
Expansion Valve Removal and Installation	24-54
General Information	24-51
Heater Core Removal and Installation	24-55
Inspection and Test Procedures	24-24
Operation of all Controls	24-53
Vacuum Controls and Circuits	24-52
SERVICING THE COMPRESSOR	24-43
Compressor	24-45
Magnetic Clutch	24-44
SERVICE PROCEDURES	24-40
Anti-Freeze Recommendations	24-41
Compressor Drive Belt Adjustment	24-41
Handling Tubing and Fittings	24-40
Radiator Pressure Cap	24-42
Vacuum Control System Adjustments and Tests	24-42
TEST PROCEDURES	24-24
Correcting Low Refrigerant Level	24-28
Expansion Valve and EPR Valve Test	24-33
Front Unit Performance Test	24-30
Over-All Performance Test	24-30
Receiver Drier	24-36
Refrigerant Level	24-24
Roof Unit Performance Test	24-33
Test System Pressure	24-24
Testing System For Leaks	24-27
AUTO TEMP II	24-85
Chrysler and Imperial	24-85
General Information	24-85
Major Components	24-88
Operating Controls	24-85
Performance Tests	24-112
Push Button Control Chart	24-99
Service Diagnosis	24-90
Service Procedures and Component Tests	24-96
System Test Procedure	24-96
Tester Connections	24-96
Vacuum Circuits	24-106
Wiring Diagram	24-101
HEATERS	24-1
General Information	24-1
Service Diagnosis (All Models)	24-1
Service Procedure	24-2
Barracuda	24-5
Blower Motor Removal and Installation	24-7
Control Cable Adjustment	24-5
Disassembly and Assembly	24-5
Heater Removal and Installation	24-5
Chrysler and Imperial	24-13
Blower Motor Removal and Installation	24-17
Control Cable Adjustment	24-15
Disassembly and Assembly	24-17
Heater Removal and Installation	24-15
Rear Seat Heater Removal and Installation	24-18
Fury Models	24-10
Blower Motor Removal and Installation	24-13
Control Cable Adjustment	24-10
Heater Removal and Installation	24-10
Satellite	24-7
Blower Motor Removal and Installation	24-9
Control Cable Adjustment	24-7
Disassembly and Assembly	24-9
Heater Removal and Installation	24-10
UPPER LEVEL VENTILATION (STRATO-VENT)	24-18
Satellite, Fury and Chrysler Models	24-18

LUBRICATION AND MAINTENANCE

INDEX

	Page
ALTERNATOR	0-12
BATTERY	0-12
BRAKES	0-10
CAPACITIES	24-4
CARBURETOR AIR CLEANERS	24-20
CARBURETOR CHOKE VALVE SHAFT	24-1
CERTIFIED CAR CARE	0-1
CHASSIS LUBRICATION	0-7
CLASSIFICATION OF LUBRICANTS	0-2
CLUTCH LINKAGE	0-11
COOLING SYSTEM	0-12
CRANKCASE VENTILATION SYSTEM	0-16
DISTRIBUTORS	0-13
ENGINE OIL FILTERS	0-15
ENGINE OIL - SELECTION OF	0-13
ENGINE PERFORMANCE DIAGNOSIS	0-19
FREQUENCY OF OIL CHANGES	0-14
FRONT WHEEL BEARINGS	0-25
FUEL FILTERS	0-21
HEADLIGHTS	0-13
HOISTING	0-7
HYDRAULIC BRAKE SYSTEM	0-10

	Page
LUBRICATION AND MAINTENANCE GUIDE	0-2
LUBRICATION AND MAINTENANCE SCHEDULES	0-3
Normal Service	0-3
Trailer Towing and Severe Service	0-4
MANIFOLD HEAT CONTROL VALVES	0-19
MATERIALS ADDED TO ENGINE OILS	0-14
PARKING BRAKE MECHANISM	0-11
PARTS REQUIRING NO LUBRICATION	0-27
PROPELLER SHAFT AND UNIVERSAL JOINTS	0-21
REAR AXLES	0-9
SPEEDOMETER CABLE	0-26
STEERING GEAR	0-22
SUMMARY OF LUBRICATION AND MAINTENANCE SERVICES	0-1
THROTTLE LINKAGE	0-26
TIRES	0-25
TRANSMISSION (AUTOMATIC)	0-24
TRANSMISSION (MANUAL)	0-23
WINDSHIELD WIPER BLADES	0-13

PROPELLER SHAFT AND UNIVERSAL JOINTS

INDEX

	Page
CONSTANT VELOCITY UNIVERSAL JOINT	16-7
Assembly	16-8
Centering Socket Yoke Assembly	16-8
Cleaning and Inspection	16-8
Disassembly	16-7
Installation	16-7
Removal	16-7
CROSS AND ROLLER UNIVERSAL JOINTS	16-6
Assembly	16-6
Cleaning and Inspection	16-6
Disassembly	16-6
GENERAL INFORMATION	16-1
PROPELLER SHAFT	16-6
Installation, Front Joint	16-6
Installation, Rear Joint	16-6
Removal, Front Joint	16-6
Removal, Rear Joint	16-6
PROPELLER SHAFT ANGULARITY	16-3
Front Universal Joint Angle	16-4
Rear Universal Joint Angle	16-4
SERVICE DIAGNOSIS	16-3
SPECIFICATION	16-11
TIGHTENING REFERENCE	16-15

REAR AXLE

INDEX

	Page
REAR AXLE ALIGNMENT CHECKING PROCEDURE	3-5
REAR AXLE ASSEMBLY 8-1/4 IN. RING GEAR	3-15
Axle Shaft and Bearings	3-17
Differential	3-19
Differential Case	3-20
Differential Bearing Preload And Drive Gear And Pinion Backlash	3-25
Drive Pinion Depth Of Mesh	3-23
Gear Tooth Contact Pattern	3-26
Lubrication	3-28
Pinion Bearing Cup Installation	3-23
Rear Axle Assembly	3-19
Removal And Replacement Of Drive Pinion Flange And Oil Seal In Vehicle	3-27
REAR AXLE ASSEMBLY 8-3/4 IN. RING GEAR	3-28
Axle Shafts and Bearings	3-30
Axle Shaft End Play	3-33
Differential and Carrier (Removal)	3-33
Differential and Carrier (Installation)	3-44
Differential Case	3-34
Drive Gear and Pinion Backlash	3-42
Gear Tooth Contact Pattern	3-43
Lubrication	3-44
Pinion Bearing Cup Installation	3-38
Pinion Bearing Preload and Pinion Setting Using Tool C-758-D-4	3-38
Small Stem Step Pinion	3-38
Large Stem Pinion With Collapsible Spacer	3-40
Pinion Bearing Preload and Pinion Setting Without Using Tool C-758-D4	3-41
Rear Axle Housing	3-33
Removal and Replacement of Drive Pinion Flange and Oil Seal in Vehicle	3-44
REAR AXLE ASSEMBLY 9-3/4 IN. RING GEAR	3-45
Axle Shaft and Bearings	3-47
Differential (Removal)	3-50
Differential Bearing Preload and Drive Gear and Pinion Backlash	3-56
Differential (Installation)	3-52
Differential Case	3-52
Differential Noise	3-47
Drive Pinion Depth Of Mesh Setting (Using Pinion Depth Gauge Tool DD 1244)	3-53

	Page
Drive Pinion Depth Of Mesh Setting (Using Tool C-758-D4)	3-55
Gear Tooth Contact Pattern	3-57
Lubrication	3-58
Pinion Bearing Preload	3-56
Rear Axle Assembly (Removal)	3-50
Rear Axle Assembly (Installation)	3-58
REAR AXLE ASSEMBLY 7-1/4 IN. RING GEAR	3-5
Axle Shafts and Bearings	3-6
Differential	3-8
Drive Gear and Pinion Backlash	3-12
Drive Pinion Depth of Mesh	3-11
Lubrication	3-15
Pinion Bearing Cup Installation	3-11
Pinion Installation and Bearing Preload	3-11
Rear Axle Assembly	3-7
REAR AXLE ASSEMBLY SURE-GRIP DIFFERENTIAL	3-59
Installing Sure Grip Differential and Carrier Assembly	3-62
Lubrication	3-62
Sure Grip Differential Identification	3-59
Sure Grip Differential Noise	3-60
Sure Grip Differential	3-61
Testing Sure Grip Differential	3-61
REAR AXLE NOISE DIAGNOSIS	3-2
SERVICE DIAGNOSIS	3-1
SPECIFICATIONS	3-62
TIGHTENING REFERENCE	3-64

SHOCK ABSORBERS AND REAR SPRINGS

INDEX

	Page
REAR SPRINGS	17-4
SHOCK ABSORBER	17-2
SPECIFICATIONS	17-7
TIGHTENING REFERENCE	17-7

STEERING

INDEX

	Page
MANUAL STEERING GEAR	19-1
Adjustments	19-2
Cross Shaft Oil Seal	19-7
General Information	19-1
Gear Installation	19-3
Gear Reconditioning	19-4
Gear Removal	19-3
Service Diagnosis	19-1
Specifications	19-60
Tightening Reference	19-62
POWER STEERING GEAR	19-8
General Information	19-8
Service Diagnosis	19-10
Service in Vehicle	19-12
Cross Shaft Adjustment	19-12
Cross Shaft Oil Seal Replace	19-13
Valve Body Recondition	19-12
Service Out of Vehicle	19-15
Gear Installation	19-22
Gear Reconditioning	19-15
Gear Removal	19-15
Tests and Adjustments	19-21
Worm Shaft Oil Seal Replace	19-15
Specifications	19-60
Tightening Reference	19-62
POWER STEERING PUMPS	19-22
Flow Control Valve	19-35
.94 Model	19-35
1.06 Model	19-35
General Information	19-23
Inspection	19-28
.94 Model	19-28
1.06 Model	19-28
Oil Seal Replacement	19-27
.94 Model	19-27
1.06 Model	19-31
Pump Installation	19-26
Pump Removal	19-26
Reconditioning	19-27
.94 Model	19-27
1.06 Model	19-27
Service Diagnosis	19-24
Service Procedures	19-25
Specifications	19-60
Tightening References	19-62
STEERING COLUMNS	19-36
Standard Steering Column	19-36
Assembly	19-42
Disassembly	19-39
Inspection	19-42
Installation	19-47
Removal	19-38
Steering Column (Tilt-Wheel)	19-48
Assembly	19-53
Disassembly	19-48
Inspection	19-52
Steering Column (Tilt-A-Scope)	19-53
Assembly	19-58
Disassembly	19-54
Inspection	19-57

TRANSMISSION

INDEX

	Page
THREE SPEED (A-903)	21-36
Cleaning and Inspection	21-46
General Information	21-36
Service Diagnosis	21-37
Service In Vehicle	21-39
Extension Housing and Bushing	21-42
Extension Housing Yoke Seal	21-42
Gearshift Interlock	21-40
Gearshift Linkage Adjustment	21-39
Speedometer Pinion Gear	21-40
Service Out of Vehicle	21-43
Assembling Transmission	21-47
Disassembling Transmission	21-43
Transmission Installation	21-49
Transmission Removal	21-43
Specifications	14-133
Tightening Reference	21-136
THREE SPEED (A-230)	21-1
General Information	21-1
Service Diagnosis	21-2
Service in Vehicle	21-15
Extension Housing Yoke Seal	21-15
Gearshift Linkage Adjustment	21-16
Speedometer Pinion Gear	21-15
Service Out of Vehicle	21-3
Assembling Transmission	21-9
Cleaning and Inspection	21-6
Disassembling Transmission	21-3
Extension Housing Bushing Replacement	21-12
Transmission Installation	21-13
Transmission Removal	21-2
Specifications	21-133
Tightening Reference	21-136
FOUR SPEED (A-833)	21-20
Cleaning and Inspection	21-32
General Information	21-20
Service Diagnosis	21-21
Service in Vehicle	21-22
Extension Housing Yoke Seal	21-24
Four Speed Gearshift	21-22
Gearshift Linkage Adjustment	21-22
Speedometer Pinion Gear	21-22
Service Out of Vehicle	21-25
Assembling Transmission	21-32
Disassembling Transmission	21-27
Extension Housing Bushing Replacement	21-33
Transmission Installation	21-36
Transmission Removal	21-25
Specifications	21-133
Tightening Reference	21-136
TORQUEFLITE	21-50
Fluid Leakage	21-130
General Information	21-50
Hydraulic Control System	21-70
Operating Instructions	21-71
Recondition Sub-Assemblies	21-99
Accumulator Piston and Spring	21-106
Extension Housing Bushing and Oil Seal	
Front Clutch - A-904	21-111
Front Clutch - A-727	21-113
Governor and Support	21-107
Kickdown Servo and Band	21-123
Low-Reverse Servo and Band	21-124
Oil Pump and Reaction Shaft Support - A-904	21-107
Oil Pump and Reaction Shaft Support - A-727	21-109
Overrunning Clutch	21-121
Parking Lock Sprag	21-106
Planetary Gear Train - A-904	21-118
Planetary Gear Train - A-727	21-120
Rear Clutch - A-904	21-116
Rear Clutch - A-727	21-117
Valve Body Assembly	21-104
Removal - Transmission and Converter	21-94
Pump Oil Seal	21-97
Starter Ring Gear	21-95
Torque Converter Flushing	21-96
Service Diagnosis	21-71
Service In Vehicle	21-79
Air Pressure Tests	21-89
Aluminum Thread Repair	21-79
Band Adjustments	21-83
Console Gearshift	21-81
Extension Housing and Output Shaft Bearing	21-91
Extension Housing Yoke Seal	21-91
Gearshift Linkage Adjustment	21-80
Governor	21-96
Hydraulic Control Pressure Adjustments	21-88
Hydraulic Control Pressure Tests	21-88
Lubrication	21-79
Neutral Starting Switch	21-83
Parking Lock Components	21-93
Speedometer Pinion	21-90
Throttle Rod Adjustment	21-84
Valve Body and Accumulator Piston	21-93
Service Out of Vehicle	21-94
Assembly - Sub-assembly Installation	21-124
Disassembly - Sub-Assembly Removal	21-97
Installation - Transmission, Converter and Drive Plate	21-127
Specifications	21-133
Tightening Reference	21-136

WHEELS - BEARINGS - TIRES

INDEX

	Page
BEARINGS (FRONT WHEEL)	22-7
Removal (Without Disc Brakes)	22-7
Removal (With Disc Brakes)	22-7
Cleaning and Inspection	22-7
Lubrication	22-7
Installation (Without Disc Brakes)	22-7
Installation (With Disc Brakes)	22-8
Bearing Adjustment	22-8
GENERAL INFORMATION	22-1
SERVICE PROCEDURES	22-2
SPECIFICATIONS	22-9
TIGHTENING REFERENCE	22-11
TIRES	22-2
Care of Tires - Cleaning	22-2
Collapsible Spare Tire	22-3
Inflation of Tires	22-2
Radial Ply Tires	22-3
Rotation of Tires	22-3
Repairing Tire Leaks	22-4
Tire Noise Complaints	22-4
Tire Wear Patterns	22-5
Tire Tread Wear Indicators	22-4
Wide Tread 70 Series Tires	22-3
WHEELS	22-6
Tire - Wheel Balance	22-6
Tire and Wheel Runout	22-6
Wheel Covers	22-7