PONTIAC
Service Craftsman News

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1956 NEW MODEL INFORMATION

CONTENTS OF THIS ISSUE

NOTE: This issue of the Service Craftsman News should be used as a supplement to the 1955 Shop Manual. Only those features or procedures which are different from 1955 are covered. All other information in the 1955 Shop Manual applies to the 1956 models.

A complete 1956 Shop Manual is now being prepared and will be distributed as soon as available.

1956 NEW MODEL INFORMATION

New styling features, new colors, new interiors, new body styles, more powerful engine, new Synchro-Mesh and Hydra-Matic transmissions, new dual exhaust system, new power steering, new air conditioning, new power seat, new signal seeking radio, new optional electric windshield wipers are among the highlight features of Pontiac for 1956.

While continuing basic 1956 body and sheet metal, appearance has been changed considerably by the use of a new grille and bright metal parts. Addition of insulating material under the hood of the 870 and Star Chief models, and in the body of all Star Chief models, helps reduce interior noise.

GENERAL INFORMATION

The same series numbers and model names are used as in 1955. A new body style has been added to both the Star Chief and the 860 and 870 lines. The new body style is a four door Catalina style and will be called the "Four Door Catalina". It is available in the 860 series (Body No. 2739) 870 series (Body No. 2739D) and Star Chief series (Body No. 2839SD).

General body specifications remain the same except for overall length which has been increased 2.4" for all models.

The four-barrel carburetor is standard equipment on the Star Chief models and optional on the Chieftain models. Dual exhaust is optional on all models except the 860 three seat station wagon. The new Strato-Flight Hydra-Matic transmission is available on Star Chief models while the D-56 Hydra-Matic (similar to 1955) is available on 860 and 870 models.

Engine car serial numbers of the 1956 models will be exactly the same as in 1955 except that "56" will be used in place of "55". For example: P756H to designate a 1956 27 series Hydra-Matic.

PAINT INFORMATION

The following are the colors, symbols and DuPont stock numbers of 1956 Pontiac body paints.

Symbol	Color	"Duco" Stock No.
A	Raven Black	44
B	Chesapeake Blue	2230
C	Olympic Blue	2228
D	Amethyst	2232-H
E	Phantom Gray	2235
F	Grenada Gold	2236
G	Bolero Red (No. 2)	2234-H
H	Hialeah Green	2225
J	Vista Blue	1869
K	Nimbus Gray	2226
L	Glendale Green	2231-H
M	Tarragon Green	824
N	Sandalwood Tan	2229
P	Sun Beige	2227
Q	Catalina Blue	2237-H
R	Camellia	2233

Two tone combinations will be designated by using two symbols. Lower body color symbol will be shown first and upper body color second.

EXAMPLE: KA for Nimbus Grey lower and Raven Black upper.

BODY AND FRAME

In addition to new interior trim, the front seat has been moved rearward 3/4", lowered slightly and tilted 1° further to the rear to increase front seat leg and head room. The locations of the cigarette lighter and ash tray have been switched so that the ash tray is now on the right and the lighter on the left.

Two extra body to frame brackets have been added to the outside of the frame to provide the extra rigidity required for the Catalina sedans. The frame for the 860 four door station wagon has more arch at the kick-up over the rear wheels and has an additional body bolt bracket on each side at the top of the kick-up. These changes were made to accommodate the new seating arrangement.

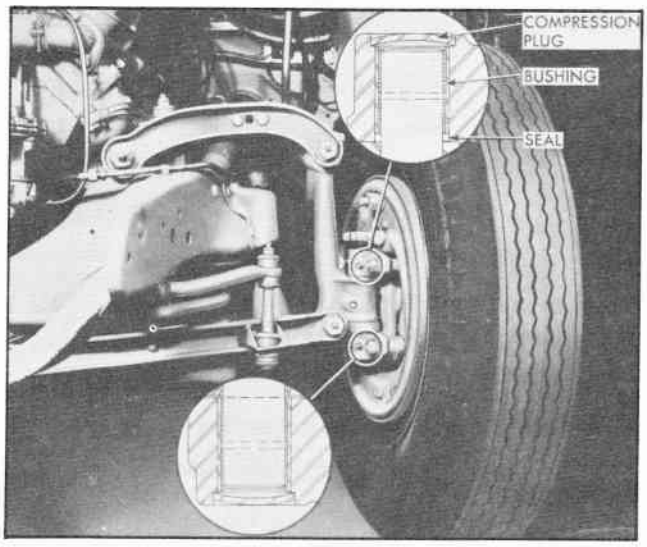


Fig. 1 Press Fitted King Pin Bushings and Seal

FRONT SUSPENSION

GENERAL DESCRIPTION

PRESS FITTED KING PIN BUSHINGS

The steering knuckle for 1956 Pontiac has press fitted king pin bushings and an "O" ring seal Fig. 1. The bushings are steel backed bronze with an oil

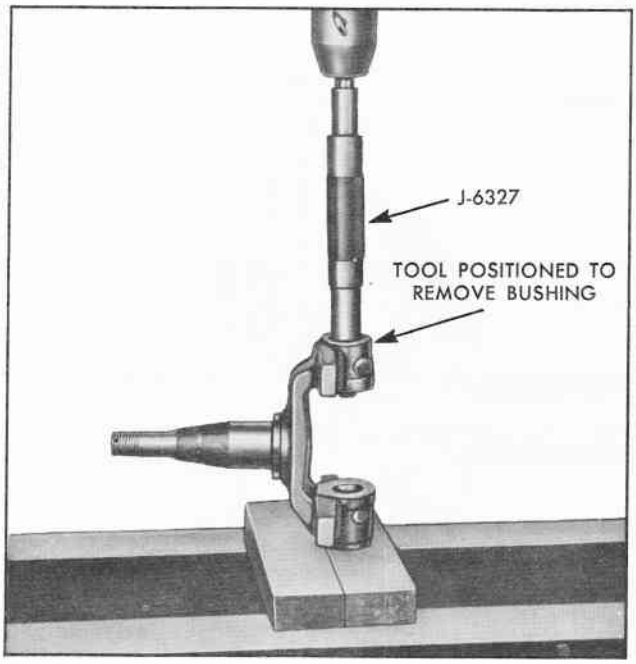


Fig. 2 Using Tool J-6327 to Remove Bushing

groove in the inner circumference. The "O" ring seal is located next to the upper steering knuckle bushing and assures retention of lubricant to the king pin bearing surfaces at all times. Caution should be taken not to over lubricate the steering knuckle bushings as the "O" ring seal is tightly fitted between steering knuckle support and steering knuckle. This close fit will not permit any excess lubricant to pass between knuckle support and knuckle. Care should be taken when using lubricating gun not to build up excess pressure as this condition could blow out the upper or lower compression plugs.

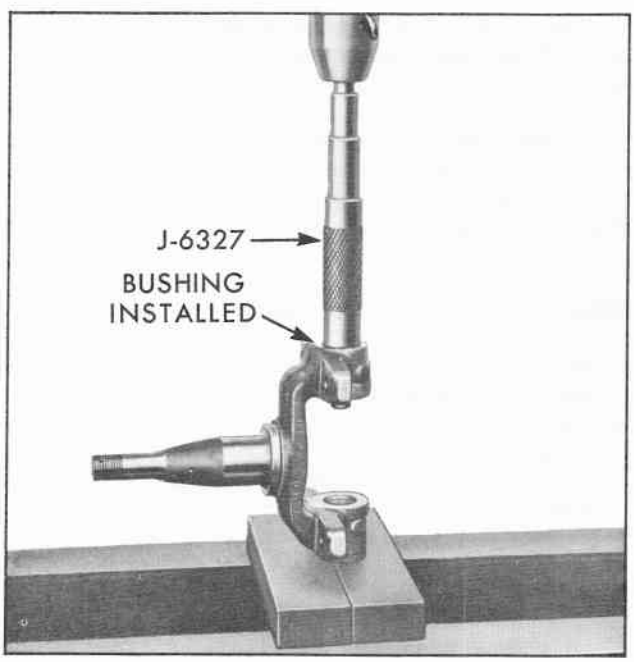


Fig. 3 Using Tool J-6327 to Install Bushing

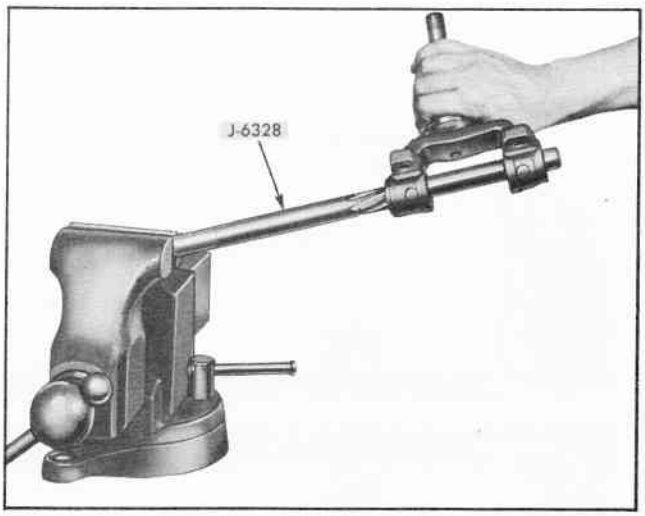


Fig. 4 Reaming King Pin Bushings

REMOVING STEERING KNUCKLE BUSHINGS

Use same procedure outlined in the 1955 Shop Manual with the following exceptions. Use tool J-6330 for cleaning up recesses in steering knuckle where metal was upset over expansion plug. Press out bushing using Bushing Remover and Replacer J-6327 (Fig. 2).

INSTALLING NEW STEERING KNUCKLE BUSHINGS

Align lubrication hole in bushing with similar hole in steering knuckle. Press new bushing into place using same tool but using opposite end of Bushing Remover and Replacer J-6327 (Fig. 3). This end of tool must be used since the thin wall of bushing will distort when pressed into steering knuckle unless supported by shank of tool.

REAMING STEERING KNUCKLE BUSHINGS

With reamer J-6328 in vise, line ream bushings to size (Fig. 4).

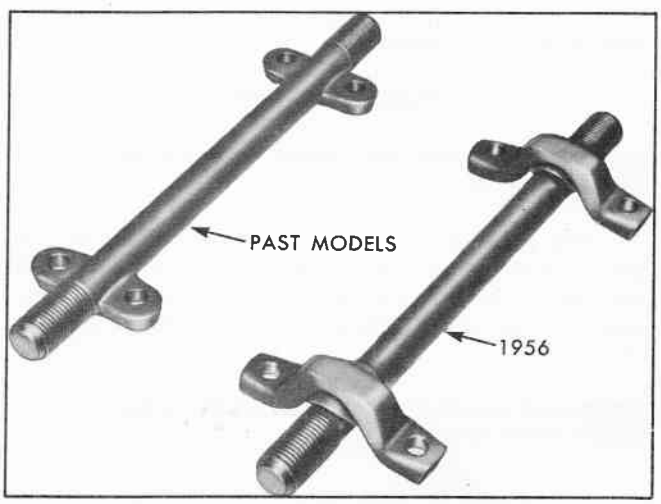


Fig. 5 Lower Control Arm Shaft Assembly

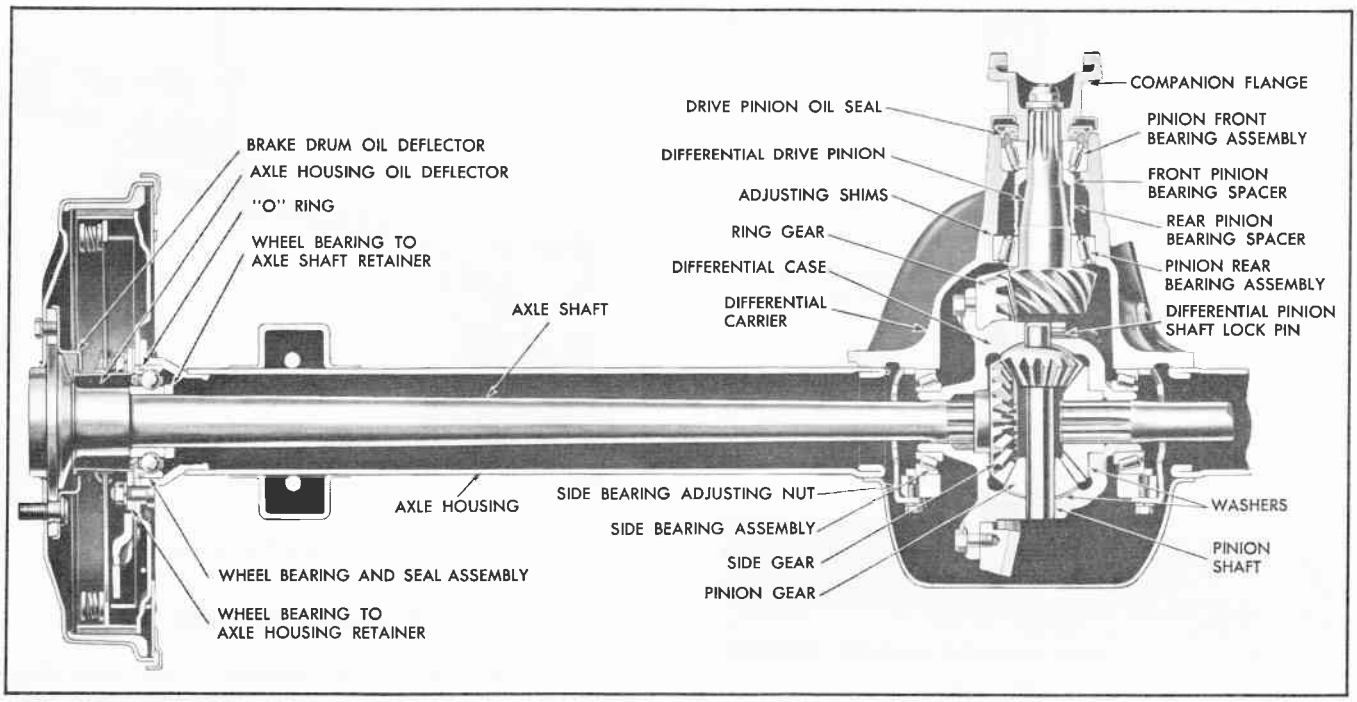


Fig. 6 Differential and Axle Housing Cross Section

LOWER CONTROL ARM AND SHAFTS

The lower control arm inner shafts are three piece construction type consisting of shaft and two flanges (Fig. 5). The flanges are welded to the shaft instead of being integral with the shaft as in the past. To remove and replace shafts follow procedure outlined in the 1955 Shop Manual. The 1956 shaft is not interchangeable with prior models because the bolt holes are spread farther apart than the previous shafts.

SPRINGS AND SHOCK ABSORBERS

The 1956 rear springs have full length liners between the top four leaves. The effect of the liners is to reduce friction in the rear springs. This improvement together with modified valving in both front and rear shock absorbers provides a softer ride in the 1956 models.

REAR SUSPENSION

RETAINING DIFFERENTIAL PINION GEAR CROSS SHAFT TO CASE

The 1956 differential is the same as used in 1955 except that the pinion gear cross shaft is retained to the case by means of a roll pin. The roll pin is driven half way into the shaft leaving half retained in the case (Fig. 6).

REMOVING DIFFERENTIAL PINION GEAR CROSS SHAFT FROM CASE

Use a quarter inch rod or punch and drive roll pin into shaft until flush. Use drift or punch of soft material and drive shaft from case.

INSTALLING DIFFERENTIAL PINION CROSS SHAFT INTO CASE

Align hole in pinion shaft with similar hole in case. Drive pinion shaft into case with pinion gears assembled. With hole in pinion shaft indexed with hole in case, drive new roll pin into case flush with boss.

UNIVERSAL JOINTS AND PROPELLER SHAFT

The universal joints are larger in diameter and longer to provide greater bearing surface. The bearings are retained by snap rings. The propeller shaft is shortened to accommodate design requirements but retains its sturdy construction as was used in 1955. A "U" bolt type clamp and locking plate is used to attach the universal joint to the companion flange (Fig. 7). Tighten "U" bolt nuts to 14 to 17 lb. ft. torque.

REAR WHEEL BEARINGS AND SEALS

A new rear axle shaft wheel bearing and seal assembly along with a rubber "O" ring replaces the bearing and separate seal assembly used heretofore. The rubber "O" ring fits into a groove in the outer diameter of the bearing race and seals between the bearing and axle housing. The new bearing assembly is lubricated by oil from the axle housing.

REMOVING BEARING AND SEAL ASSEMBLY

Use same procedure used in the 1955 Shop Manual for removing axle shaft and bearing assembly. After

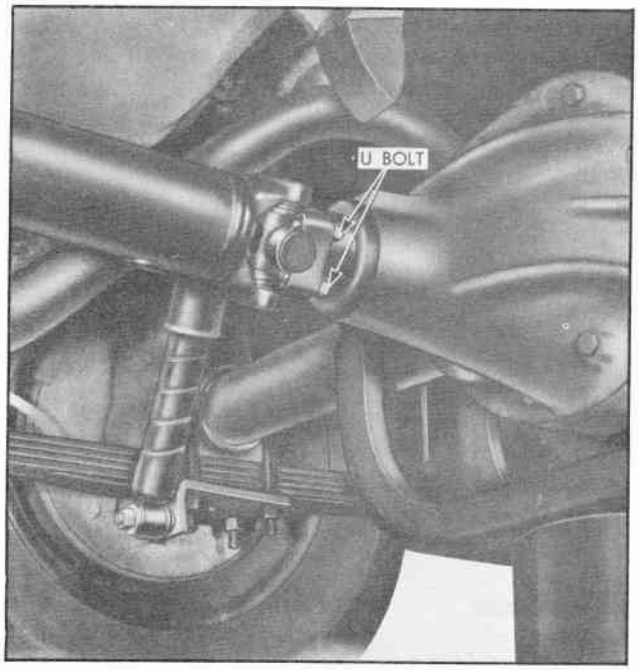


Fig. 7 Universal Joint and Propeller Shaft

bearing is removed from axle shaft, use offset screw driver or similar tool and lift oil seal assembly from axle shaft bearing.

REPLACING AXLE SHAFT WHEEL BEARING SEAL

Lubricate seal assembly and start into bearing making sure that seal has started evenly all around. Install lip side of seal toward the bearing. Press oil seal assembly flush with end of bearing.

INSTALLATION OF AXLE SHAFT AND BEARING

Lubricate rubber "O" ring and place into groove of outer bearing race. Slide axle shaft into housing being careful not to damage rubber "O" ring.

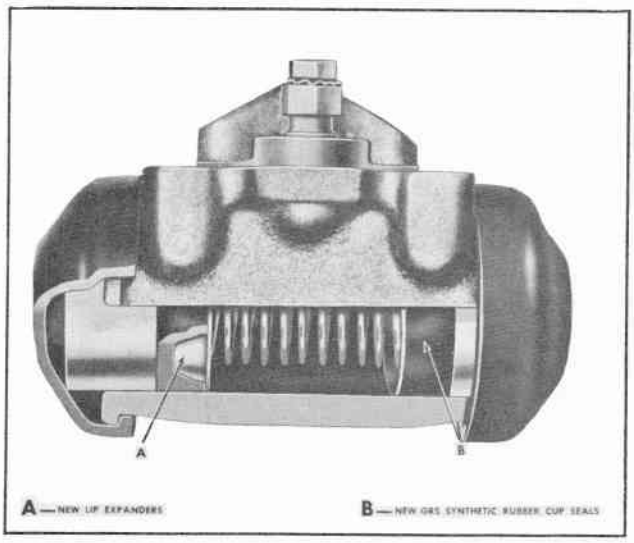


Fig. 8 Cross Section of Wheel Cylinder

BRAKES

An improved Delco Super 11 brake fluid is being used in 1956. This fluid has better high temperature characteristics, improved volatility and evaporation control, and improved lubricating qualities.

In conjunction with the new fluid, new improved wheel cylinder cups are being used. A special GRS synthetic rubber that is highly resistant to heat deterioration has been developed for the 1956 brake system. Expanders are used with the new cups to insure against leakage by positively holding the cups against the cylinder walls (Fig. 8).

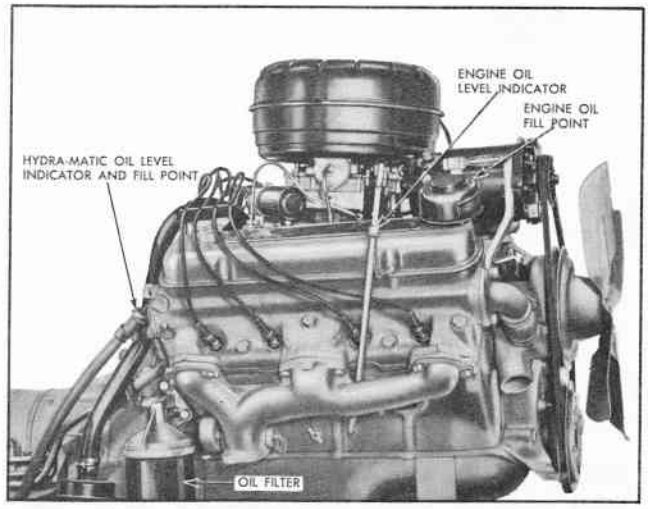


Fig. 9 Pontiac Strato-Streak V-8 Engine

ENGINE

Horsepower has been increased in the 1956 Pontiac engine by increased carburetor venturi size, intake manifold with larger header and runner area, high lift camshaft, higher compression ratio, and larger bore diameter.

Piston displacement is 316.6 cu. in. provided by 3-15/16 in. bore and 3-1/4 in. stroke. Two compression ratios are available. An 8.9:1 compression ratio that requires the use of premium fuel is standard on Synchro-Mesh and Hydra-Matic models. A 7.9:1 compression ratio engine for use with standard fuel is optional on Synchro-Mesh equipped Chieftain model only.

Engines used in Star Chief models are equipped with a new four-barrel carburetor as standard equipment (Fig. 9). Engines used in Chieftain models are equipped with a new two-barrel carburetor. The four-barrel carburetors are available as optional equipment on Chieftain models.

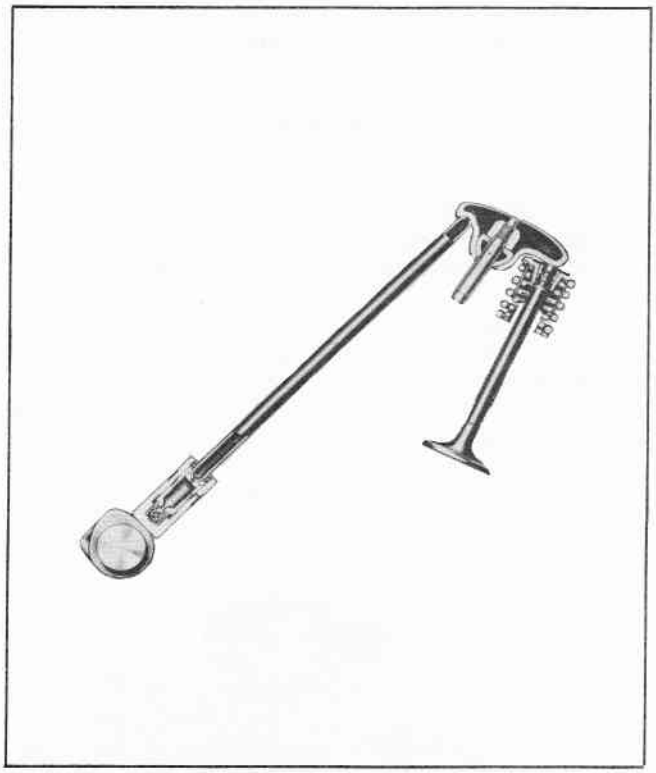


Fig. 10 Fixed Setting Rocker Arm Valve Train

VALVE TRAIN

A new valve train is used and requires no adjustment (Fig. 10). This was accomplished by moving the valve lifter oil supply hole upward to insure ample oil reserve (Fig. 11), along with new design of the valve rocker arm ball retaining nut, and rocker arm mounting stud.

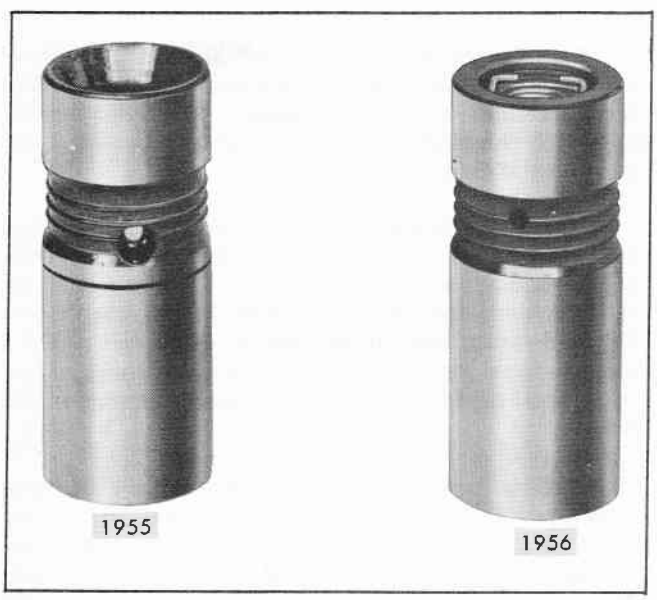


Fig. 11 Valve Lifters

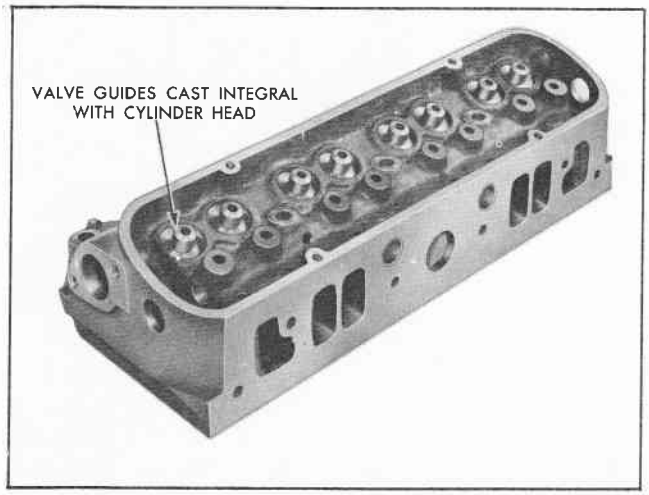


Fig. 12 Cylinder Head with Integral Valve Guides

VALVE GUIDES

Valve guides are cast integral with cylinder head and are tapered as in the past (Fig. 12). Some cylinder heads might be equipped with one or more 1955 removable type valve guides. These valve guides are installed in production if the integral valve guides are reamed oversize in the machining operation. The durability and function of these guides is the same as the integral type. When removing and replacing the replacable guides use same procedure outlined in the 1955 Shop Manual.

CAMSHAFT

A new high lift camshaft is used with the Hydra-Matic transmission. The camshaft opens the intake valve 27° before top dead center and closes the exhaust valve 31° after top dead center (Fig. 13). The

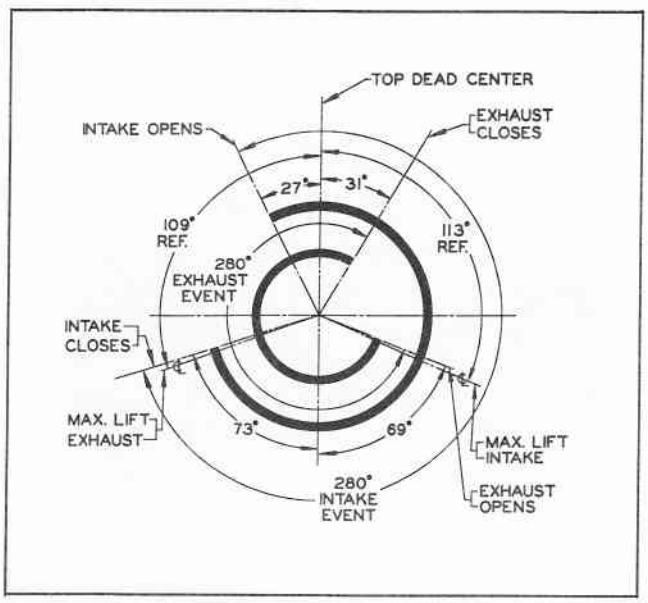


Fig. 13 Valve Timing Diagram

camshaft now used with the Synchro-Mesh transmission was used in 1955 engines. This camshaft opens the intake valve 22° before top dead center and closes the exhaust valve 27° after top dead center.

VALVES

The intake and exhaust valve heads are aluminum treated to increase valve life. Valves with oversize stems are available in .001 and .003 oversize.

CYLINDER BLOCK

The cylinder block has been made more rigid to ensure utmost durability with the greater horsepower and torque. This was accomplished by adding more metal at the three intermediate bearing bulkheads.

CRANKSHAFT

Crankshaft design was modified to meet new balancing requirements of the larger displacement engine. A new cast steel crankshaft is also being used and is interchangeable with the forged crankshaft. The forged crankshaft can be identified by the machined surface of counterweights, and the cast steel crankshaft can be identified by the cast surface of counterweights. The groove and oil hole has been eliminated from the lower main bearing shell (except rear) to provide maximum durability.

PISTON ASSEMBLY

Piston pins are longer, piston rings, and pistons are larger to conform with the new bore size. The oil ring expander is of double hump type. More uniform ring pressure is provided and the number of points at which the expander contacts the ring is doubled.

PUSH ROD COVER

The push rod cover ventilator outlet pipe flange is integral with the push rod cover and replaces the spot welded type used in 1955.

HARMONIC BALANCER

The harmonic balancer has been redesigned using a one piece crankshaft pulley instead of the two piece steel with cast hub used heretofore (Fig. 14).

INTAKE MANIFOLD

The intake manifold with larger header and runner area was designed to meet requirements of the larger engine.

EXHAUST MANIFOLD

The exhaust manifold, heat control valve, exhaust pipe, muffler and tail pipe have been enlarged to accommodate the greater displacement of the engine.

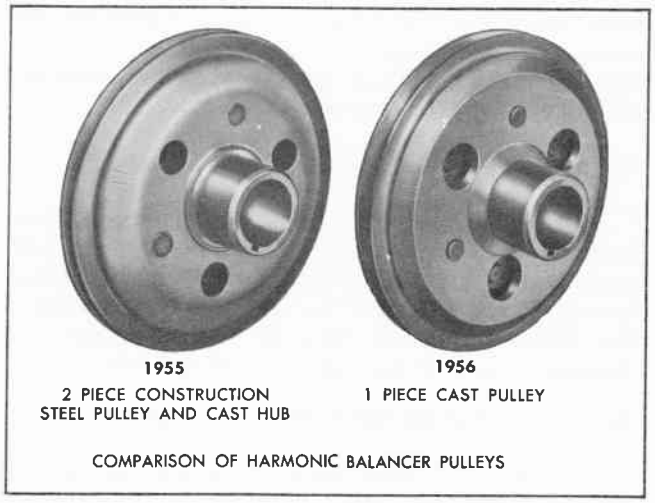


Fig. 14 Harmonic Balancer

DUAL EXHAUST

A new dual exhaust system is available for all 1956 models, with exception of the four door 860 station wagon as an extra cost option. With dual exhaust, the crossover pipe is eliminated and a separate exhaust pipe, muffler, and tail pipe are added for the left bank of cylinders. NOTE: With engine cold, the manifold heat valve is closed and all exhaust passes out the left exhaust system. This will be especially noticeable on days when exhaust omitted from the tail pipe vaporizes.

SERVICE OPERATIONS

VALVE GUIDE SERVICE

If necessary to service a valve guide to accommodate either the .001 or .003 oversize valve stem, use Valve Guide Reamer J-5715 for .001 oversize

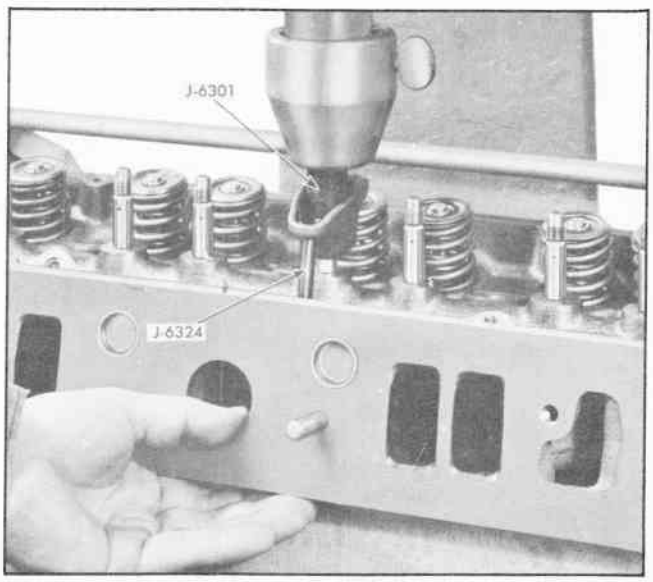


Fig. 15 Rocker Arm Stud Installation

valve stem and Valve Guide Reamer J-6341 for .003 oversize valve stem. If replacement of removable type valve guide is found necessary, use the procedure outlined in the 1955 Shop Manual.

VALVE LIFTER LEAKDOWN RATE TEST

All published information on testing leakdown rate for 1955 applies for 1956, except that the indicator travel is measured between the second line from bottom (marked "start") to the .125" line instead of the .094" line. The time for this travel has been changed from 9-30 seconds to 12-40 seconds.

INSTALLATION OF ROCKER ARM STUD

To install a new rocker arm stud in the 1956 cylinder head use new Rocker Arm Stud Installer J-6301 and new Valve Train Gauge J-6324 (Fig. 15). Follow the procedure that is outlined in the 1955 Shop Manual.

ASSEMBLY OF ROCKER ARM TO STUD

When the valve rocker arm ball retaining nut is tightened to 15 lb. ft. torque, proper location of rocker arm, with respect to the push rod and valve lifter is automatically assured. The need for adjusting rocker arm position as in 1955 is thereby eliminated. Due to the redesign of the rocker arm ball retaining nut and rocker arm mounting stud, the following new tools will be used for compressing valve spring. Thread sleeve J-6384-2 on stud, place compressor J-6384-1 over sleeve, compress spring by using nut J-6384-3 while holding valve up with valve holder J-5961-2.

INSTALLING MAIN BEARINGS

When replacing main bearing shells, be sure to place the shell with the groove and oil feed hole in block. The shell which does not have the groove and oil hole goes in the cap.

SPECIFICATIONS

Bore and Stroke	3.94" x 3.25"
Piston Displacement	316.6 cu. in.
Taxable Horsepower	49.6
Compression Ratio - Standard	8.9:1
Optional Compression Ratio for S.M. Trans.	7.9:1

Horsepower and Torque	S.M. Trans.	H.M. Trans.
Brake Horsepower 4-Barrel Carb.	216 @ 4800 RPM	227 @ 4800 RPM
Torque 4-Barrel Carb.	315 @ 2800 RPM	312 @ 3000 RPM
Brake Horsepower 2-Barrel Carb.	192 @ 4400 RPM	205 @ 4600 RPM
Torque 2-Barrel Carb.	297 @ 2400 RPM	294 @ 2600 RPM

Compression Pressure at Cranking Speed. (8.9:1 Compression Ratio)	145-155 @ 160-170 RPM
Compression Pressure at Cranking Speed. (7.9:1 Compression Ratio)	120-130 @ 160-170 RPM

Crankshaft

Material	Dropped Forged Steel or Cast Arma Steel

Camshaft

Material	Alloy Cast Iron Cyanide Hardened

Piston and Cylinders

Cylinder Out of Round and Taper When New	.001
Piston Clearance in Cylinder	.0007 to .0017

SPECIFICATIONS - Continued

Piston Pins

Fit in Pistons	.0000 to .0004 Loose With Piston and Pin at 70°F
Fit in Rod	.0001 to .0006
Length	3.13

Valves

Material

Intake	G.M. 8440 Steel
Fit of Stem Guides (New)	.0002-.0008 in Small End of Tapered Holes in Guide

Valve Timing Hydra-Matic Transmission

Intake Opens	27° BUDC
Intake Closes	73° ALDC
Exhaust Opens	69° BLDC
Exhaust Closes	31° AUDC

Valve Lifter

Leak Down Rate	12-40 Seconds With 50# Load
Plunger Travel (For Gauging Purposes)	.125 (1/8 in.)

OTHER SPECIFICATIONS ARE THE SAME AS IN THE 1955 SHOP MANUAL

ENGINE COOLING AND LUBRICATION

COOLING SYSTEM

The 160° thermostat is being used in all models. Cars with air conditioning will have a 13 lb. pressure cap in conjunction with the 160° thermostat. Cooling system capacity is the same for standard cars as it was in 1955. Due to the use of the oil cooler with the Strato-Flight Hydra-Matic the capacity of models so equipped is increased approximately 3/4 qt. The new radiator used with Air Conditioning has substantially the same coolant capacity as the standard radiator.

OIL FILTER

The mileage interval at which the filter element should be replaced has been lengthened to 15,000 miles instead of 10,000 miles as in 1955.

1956 CARBURETION

The 1956 carburetor line closely approximates the 1955. Minor changes have been made in the calibration to correspond to the changes in engine displacement and output.

In 1956 only Rochester carburetors will be used in the two-barrel series. One model is used for both the P-56 and D-56 Hydra-Matic transmissions and one for the Synchro-Mesh transmission. One model Carter 4-Barrel carburetor will be used with the P-56 and D-56 Hydra-Matic equipped cars. A resume of all carburetor changes follows:

ROCHESTER 2GC

Part No. 7008695 Hydra-Matic
Tag No. 8695 Color - Brass

Part No. 7008696 Synchro-Mesh
Tag No. 8696 - Color - Black

The principles of operation, assembly and disassembly procedures, and cleaning and inspection procedures are exactly the same as the 1955 model carburetor. Adjustments and sequence of adjustment are the same as in 1955 with the exception of the Fast Idle Cam Index Adjustment described in the 1955 Shop Manual on page 6B-44. In 1956 a 1/16" drill is used in place of tool J-5920 to establish the clearance between the upper edge of the choke valve and the inner side of the air horn as shown in Figure 6B-82 of the 1955 Shop Manual.

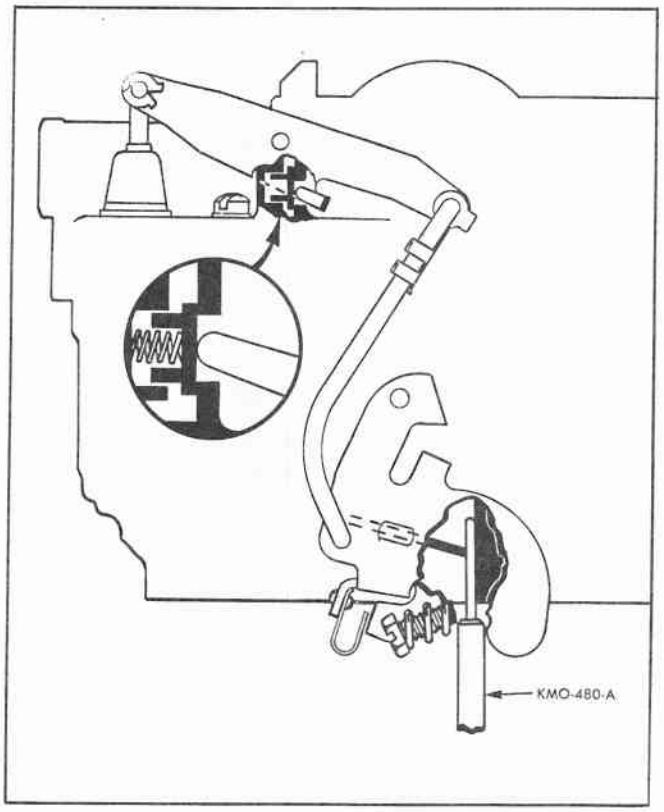


Fig. 16 Idle Vent Valve and Linkage

ADJUSTMENT SPECIFICATIONS - ROCHESTER 2GC CARBURETORS

Tag No. 8695 (Hydra-Matic) and Tag No. 8696 (Synchro-Mesh)
All Adjustment Specifications the same as 1955 Except:

Fast Idle Cam Index . . . . . 1/16" Drill (.0625) top edge of choke valve to inner wall of air horn. Bend tang.

ROCHESTER 4GC

In 1956 the following changes have been made: The idle adjusting screw and stop has been removed. The Idle Vent Valve Assembly and Auxiliary Throttle Valve Assembly have been added to the carburetor.

Part No. 7008697 Hydra-Matic
Tag No. 8697 - Color - Brass
Part No. 7007900 Synchro-Mesh
Tag No. 7900 - Color - Black

PRINCIPLES OF OPERATION

The operating principles of all carburetor circuits are the same as in 1955 with two exceptions.

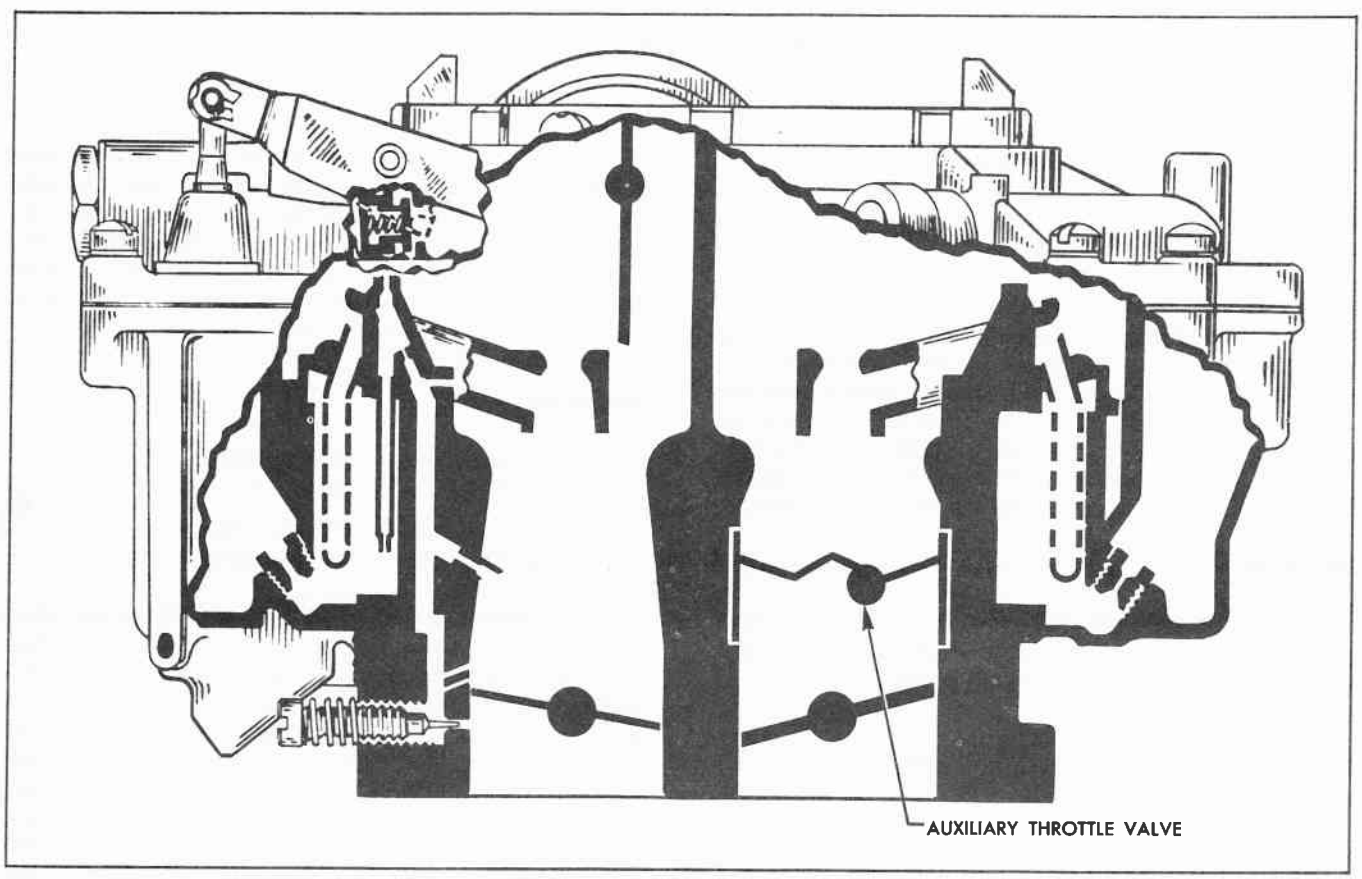


Fig. 17 Auxiliary Throttle Valves - Closed Position

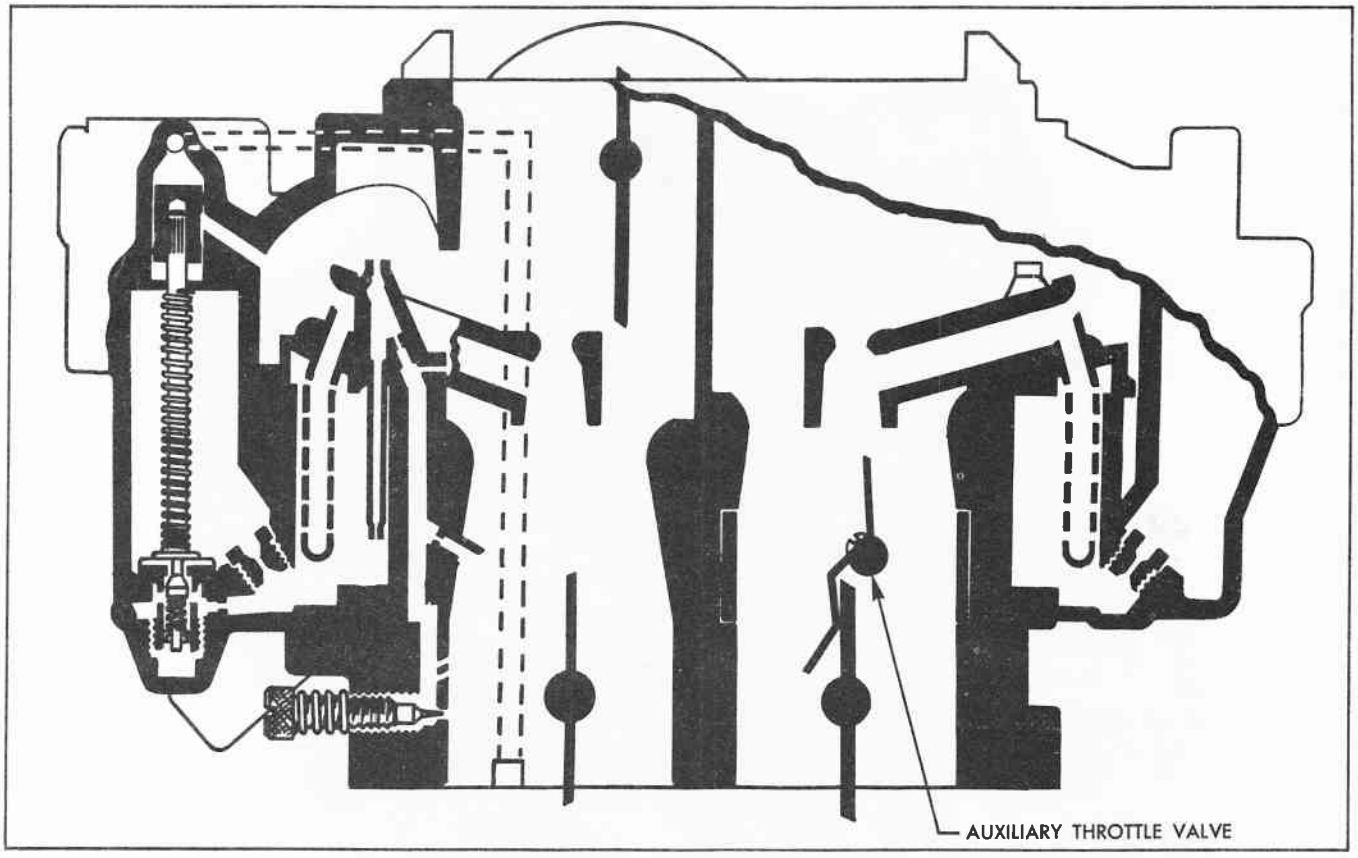


Fig. 18 Auxiliary Throttle Valves - Open Position

To improve the venting of the carburetor bowl, an idle vent valve and spring assembly has been added to the bowl cover and air horn assembly (Fig. 16). The idle vent valve is actuated by a tang that is part of the accelerator pump actuating lever. With the throttle valves in their idle position, the idle vent valve is held open against its spring. When the throttle valves are opened the pump actuating lever tang no longer contacts the idle vent valve and the spring forces the valve to shut. The function of the idle vent valve assembly is to improve idle when the engine is warm by venting fumes outside the carburetor rather than into the air cleaner area. It should be noted that this external venting may result in noticeable fumes on idle or when the vehicle is being operated in extreme turns with the throttle valves closed.

To improve low speed wide open throttle operation a pair of spring loaded, air velocity operated, auxiliary throttle valves are located in the secondary bores above the regular throttle valves (Fig. 17). When the throttle valves are moved to their wide open position and engine speed is low there is insufficient air flow thru the secondary bores to force the spring loaded auxiliary valves to open. This will concentrate all air flow thru the primary throttle bores with better metering of fuel and air. In this condition the carburetor is functioning as a 2-Barrel carburetor. As the engine speed increases, the force of the air acting on the auxiliary valves increases to the point where the auxiliary valves are forced to open (Fig. 18). The calibration of the auxiliary valve spring tension is such that valve opening occurs when greatest metering efficiency is possible. With the addition of the auxiliary throttle valves, low speed power operation is improved with a smoother transition from low to high speed occurring.

DISASSEMBLY AND ASSEMBLY PROCEDURE

The disassembly and assembly procedures of the 1956 4GC carburetors are the same as 1955 except

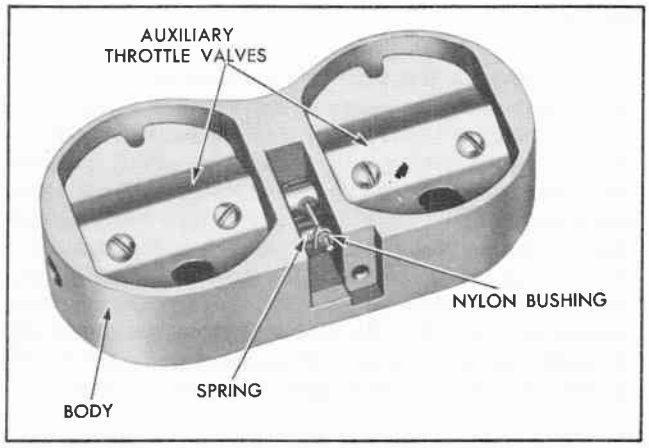


Fig. 19 Auxiliary Throttle Valve Assembly

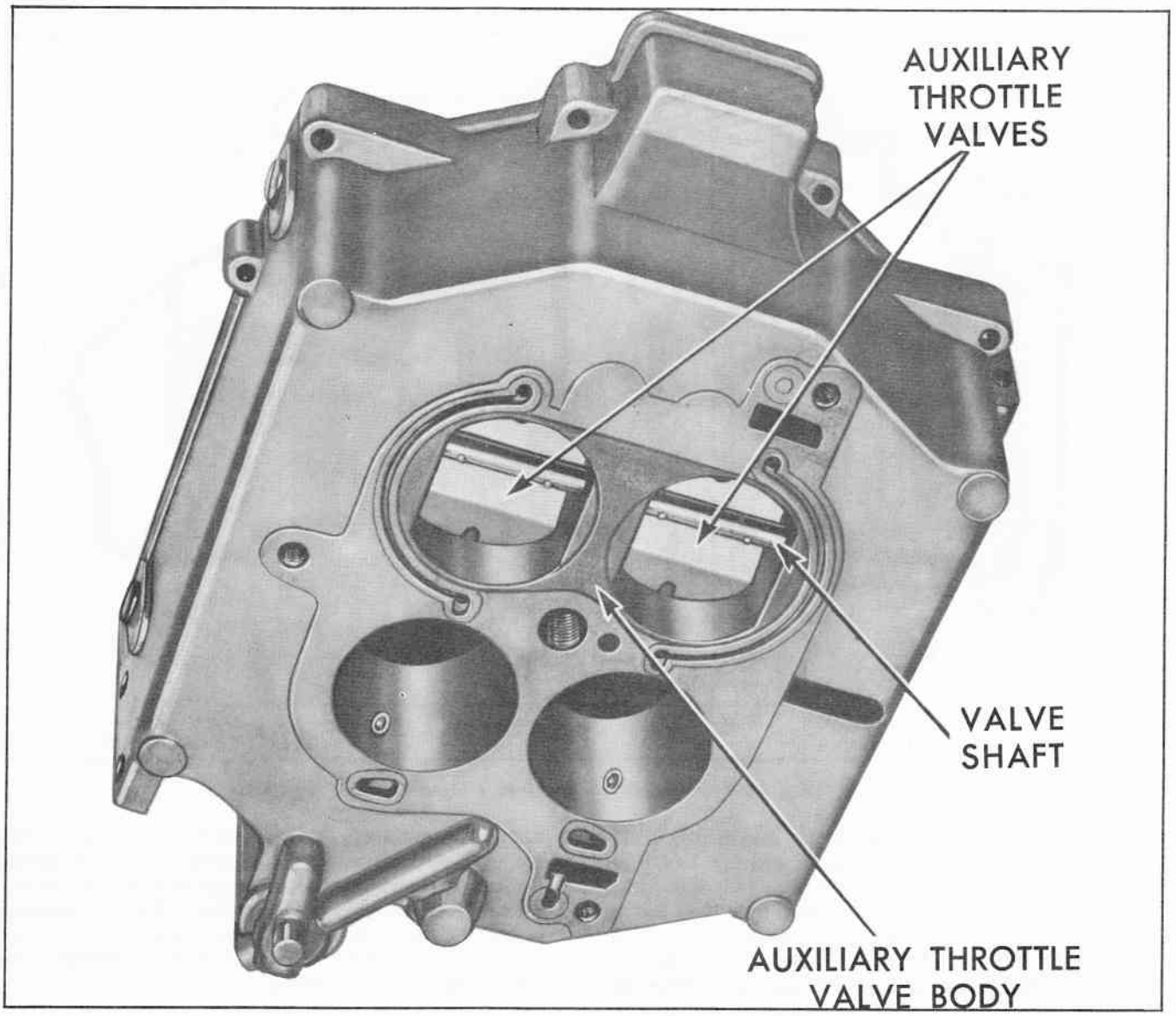


Fig. 20 Auxiliary Throttle Valves Installed

for the addition of the auxiliary throttle valve assembly. NOTE: Since the idle vent valve assembly need not be removed from the bowl cover and air horn assembly for cleaning, such removal is not described herein.

To remove the auxiliary throttle valve assembly it is necessary to remove the throttle flange from the carburetor body. With the carburetor body inverted the assembly will usually be easily removed by lifting upward. If the assembly is tight within the carburetor body, hold the carburetor body upright and tap the auxiliary throttle valve casting at its ends with a long punch from above. NOTE: Do not attempt any further disassembly of the auxiliary throttle valve assembly (Fig. 19). The spring tension is exactly calibrated and any change will completely upset the operation of the secondary side of the carburetor.

The replacement of the auxiliary throttle valve assembly is accomplished by inserting the assembly into its bore within the carburetor body making certain that it does not project out from carburetor body. NOTE: The auxiliary throttle valve assembly is correctly installed when the auxiliary throttle valve shaft is visible with the carburetor body inverted (Fig. 20).

CLEANING AND INSPECTION PROCEDURE

The cleaning and inspection procedures used on the 1955 4GC carburetor apply in 1956. The two new units in the 1956 carburetor, the idle vent valve assembly and auxiliary throttle valve assembly, require the following cleaning and inspection. Since the idle vent valve assembly is cleaned with the bowl cover, no further cleaning of the valve is required. Test for free movement of the valve within its bore.

The auxiliary throttle valve assembly incorporates a nylon bushing on the spring actuating lever.

Therefore, the assembly should be cleaned using only WARM WATER and a brush. Do not use carburetor solvents. Inspect the assembly for wear or broken parts. Since the unit is serviced as an assembly no repair is possible.

ADJUSTMENTS

All carburetor adjustments and the adjustment sequence are the same as 1955 with the following exception.

The idle speed screw and stop assembly has been removed from the 1956 carburetor. Idle speed is now set by the idle adjusting screw acting against the fast idle cam. This change eliminates the fast idle adjustment on and off the car.

Off the car adjustment of the idle vent valve is as follows: Insert .054" wire gauge KMO 480-A between lower edge of either primary throttle valve and the inner wall of its bore opposite the idle adjusting screw (Fig. 16). The idle vent valve should be fully closed with the operating tang just contacting the face of the valve. Bend tang as necessary to adjust. This is the last adjustment made on the carburetor.

Diagnosis - Diagnosis of the 1956 carburetor should be done exactly as 1955 with the exception of the effect of the idle vent valve assembly. In the event of engine loading make certain that the idle vent valve is operating and adjusted to specification.

ADJUSTMENT SPECIFICATIONS - ROCHESTER 4GC CARBURETORS

Tag No. 8697 (Hydra-Matic) and Tag No. 7900 (Synchro-Mesh)

All Adjustment Specifications the same as 1955 Except:

Idle Vent Valve - With vent valve closed and operating tang against face of valve there should be .054" (KMO 480-A) clearance between lower edge of primary throttle valve and inner wall of bore opposite idle adjusting screw.

ENGINE IDLE RPM

NOTE: All adjustments are made with the engine at operating temperatures, transmission in neutral and with the distributor vacuum line disconnected.

P-56 Hydra-Matic Transmission -- 450-470 RPM

D-56 Hydra-Matic Transmission -- 450-470 RPM

Synchro-Mesh Transmission -- 450-470 RPM

Air Conditioned equipped cars will be adjusted in Neutral with Air Conditioning off to 510-530 RPM

CARTER CARBURETOR

Carter four-barrel carburetors are completely recalibrated to correspond to the changes in engine displacement and output. The chief difference over 1955, however, is the use of auxiliary throttle valve in the secondary side. These valves are controlled by air velocity so that they will not open unless the extra air flow is needed.

The auxiliary throttle valves are closed by a counterweight located outside the carburetor body. Operation of the valves can be checked by moving the counterweight.

The auxiliary valves can be removed after removing the throttle flange.

ADJUSTMENTS

No adjustments are required on the auxiliary throttle valves and all other adjustments are the same as in 1955.

SYNCRO-MESH TRANSMISSION

The Synchro-Mesh transmission for 1956 (Fig. 21) has been redesigned to accommodate the increased horsepower and torque of the 1956 Pontiac engine. Following are complete disassembly and assembly instructions.

DISASSEMBLY OF TRANSMISSION

1. Thoroughly clean all dirt from exterior of transmission to avoid getting dirt into bearings when transmission is opened.
2. Remove transmission cover and gasket.
3. Remove speedometer driven gear, then remove rear bearing retainer, gasket, and shifter lever spring yoke support from transmission case.
4. Place transmission in second gear and pull mainshaft back until rear bearing is clear of case. NOTE: If fit between bearing and transmission case is tight, it may be necessary to tap second speed gear as shown in Fig. 22.
5. Disengage shifter yoke from synchronizer and lift front end of main shaft enough to remove synchronizer from shaft as shown in Fig. 23.

NOTE: The counterbored end of synchronizer clutch gear must face second speed gear when replaced.

6. Remove snap ring holding second speed gear to main shaft (Fig. 24).

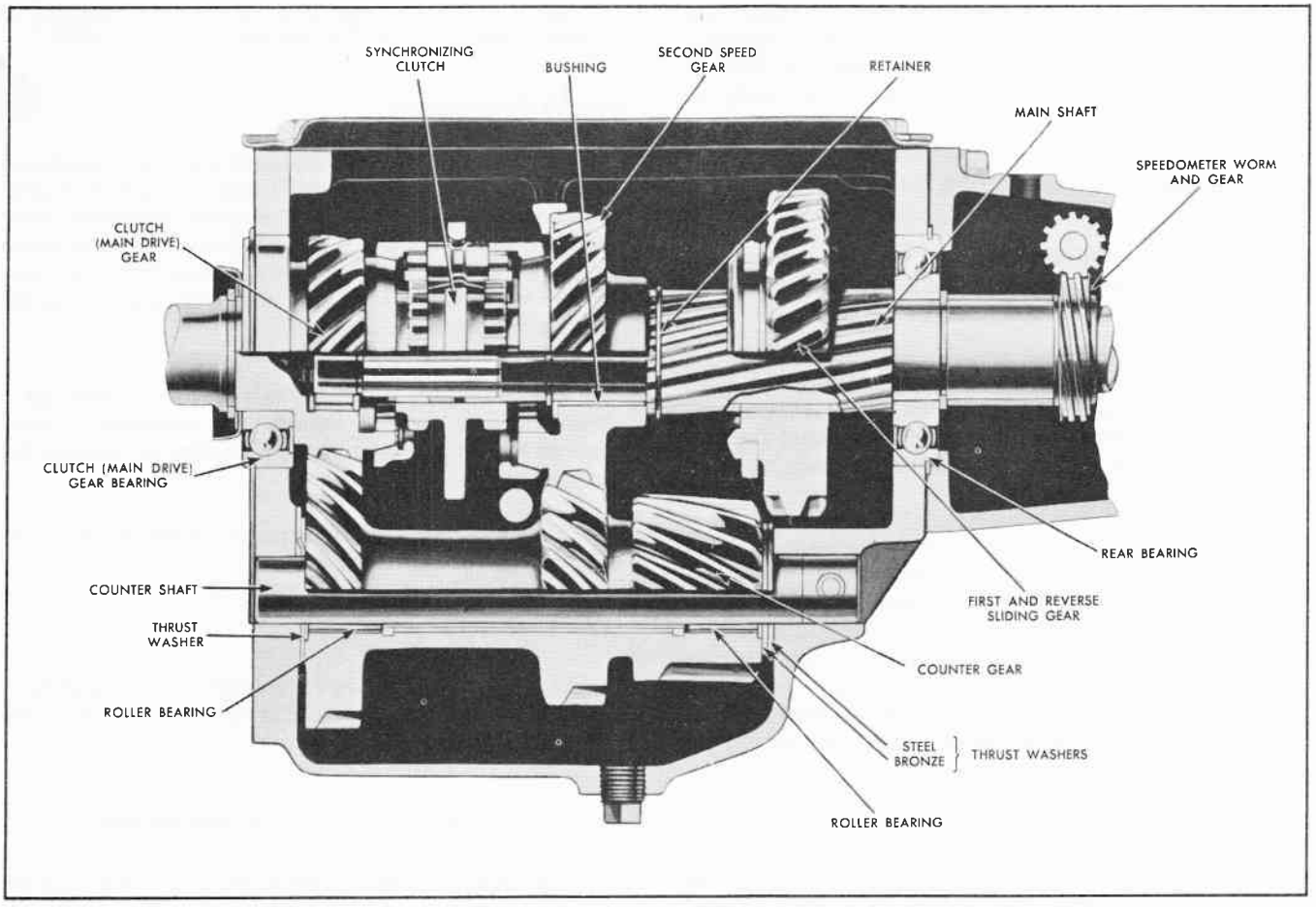


Fig. 21 Synchro-Mesh Transmission Cross Section

Fig. 22 Freeing Transmission Rear Bearing from Case

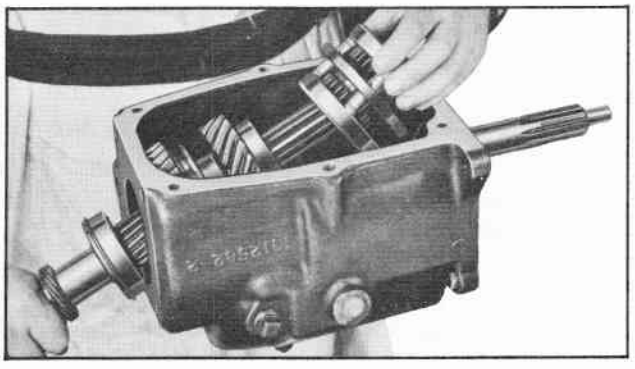


Fig. 23 Removing Synchronizer from Main Shaft

7. Slide second speed gear and thrust washer off end of main shaft. Note wire spacer ring installed in bottom of snap ring groove.
8. Remove snap ring holding low and reverse gear to main shaft.
9. Slide low and reverse gear off mainshaft by pulling shaft out through rear of transmission case.
10. Place transmission levers in neutral and remove set screws holding shifter yokes and shifter levers to their respective shafts (Fig. 25).

NOTE: Each shifter shaft is in neutral when the

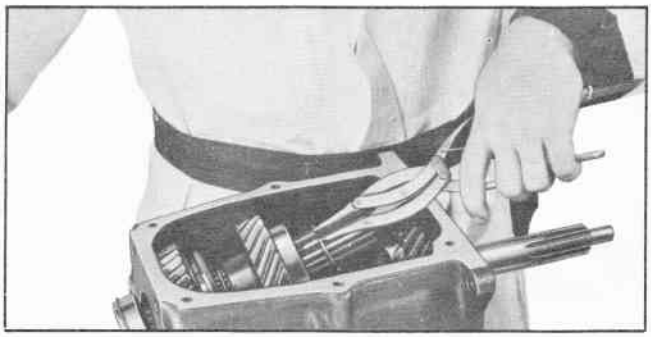


Fig. 24 Removing Second Speed Gear Snap Ring

notch for the shifter lever is directly above the selector shaft.

11. Push second and third shifter shaft out through front of transmission case, taking care to prevent poppet ball and spring from flying out (See Fig. 25). Remove shifter yoke, ball and spring.
12. Pull selector shaft to left and remove interlock retainer from groove in right end of selector shaft and using a soft hammer drive the shaft out through right side of transmission case (See Fig. 26). The welch plug in right side of case will be driven out by the shaft. Do not allow shifter levers and interlock to drop into case. CAUTION: When replacing selector shaft, be sure to install from left side of case toward right in order to avoid damaging oil seal.
13. Taking care to prevent poppet ball and spring from flying out, push low and reverse shifter shaft out through rear of transmission case (See Fig. 25). Remove shifter yoke, poppet ball, spring, and low and reverse interlock pin.
14. Using punch drive counter gear shaft lock pin into the shaft, then drive shaft out through rear of transmission case using Bearing Loader Tool J-1001-A and a soft hammer (Fig. 29). Make sure

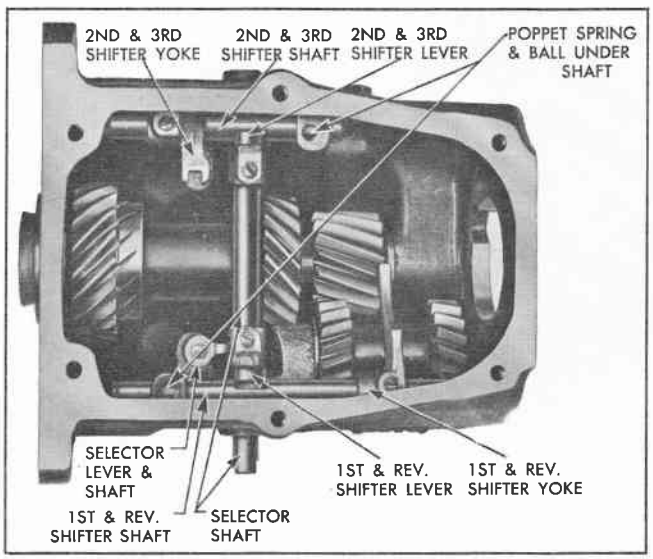


Fig. 25 Transmission Shift Mechanism

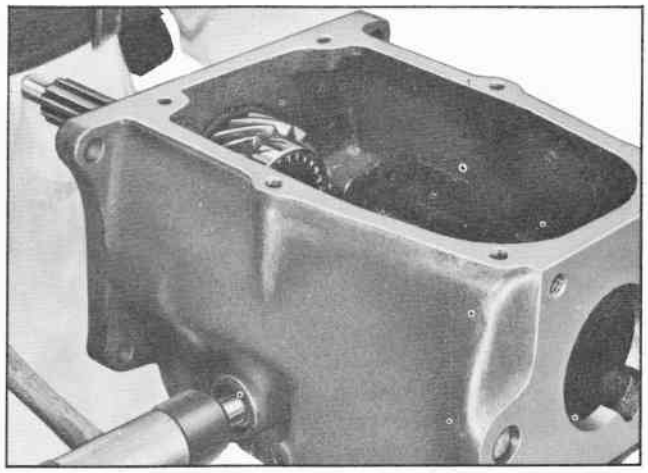


Fig. 26 Removing Selector Shaft

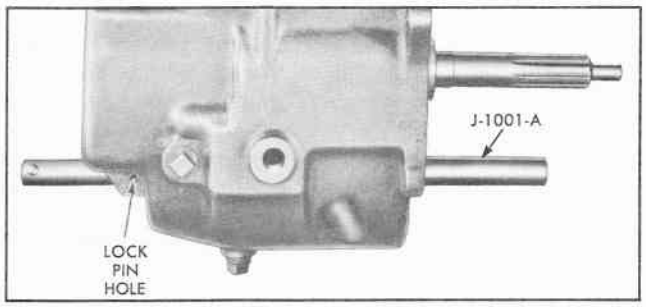


Fig. 27 Driving Counter Gear Shaft Out of Transmission

follows the shaft closely so that counter gear bearings and thrust washers will be held in place. Allow counter gear assembly to rest on bottom of case. Drive lock pin out of shaft.

15. Remove snap ring from main drive gear bearing and tap drive gear bearing assembly toward rear of transmission case to remove (See Fig. 28).
16. Carefully raise counter gear out of case so that bearing loader, bearings, and bearing retainer washer do not fall out. Remove all thrust washers.

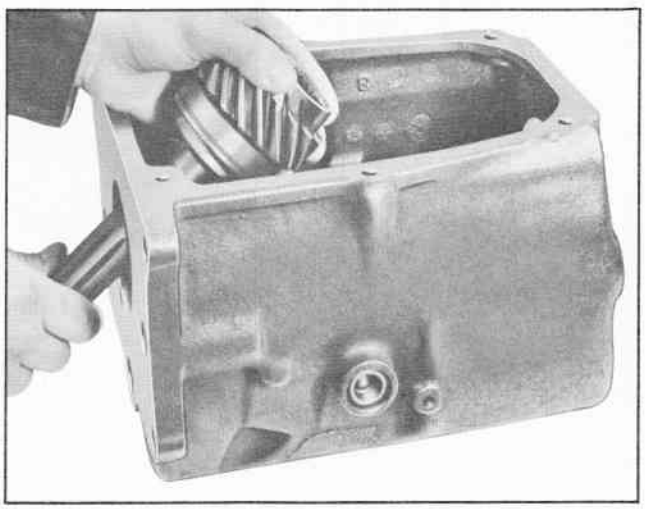


Fig. 28 Removing Main Drive Gear

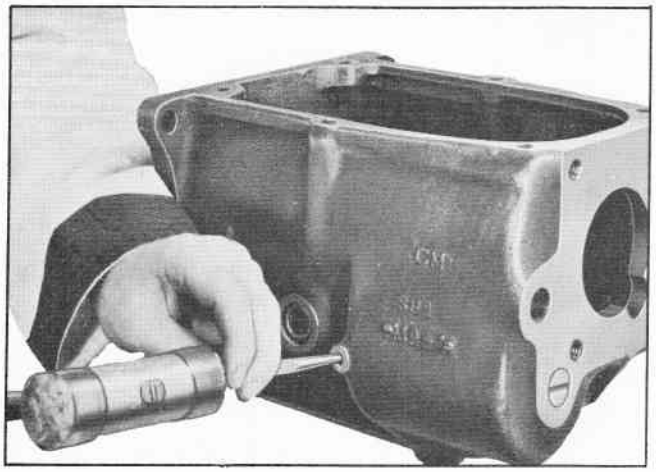


Fig. 29 Driving Reverse Idler Gear Shaft Lock Pin Into Shaft

Note that a bronze and a steel washer are used at the rear (with bronze washer next to the gear) and a large bronze washer, only, is used at the front.

17. Remove transmission inner selector lever and shaft, spring washer, flat washer, and oil seal from transmission case.
18. Drive reverse idler gear shaft lock pin into shaft and drive shaft out of rear of case (Fig. 29). Drive lock pin out of shaft. NOTE: Slot on end of shaft is for aid in locating drive pin hole on installation.
19. Remove reverse idler gear and thrust washers.

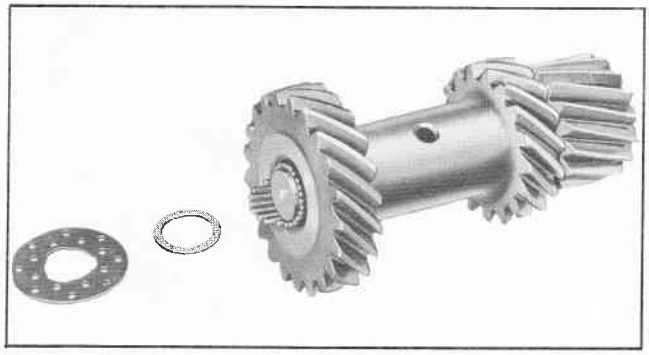


Fig. 30 Counter Shaft Assembly

SERVICING COUNTER SHAFT ASSEMBLY (FIG. 30)

1. If it is necessary to service bearings, spacer tube or retainer washers always place tool J-1001-A in the cluster gear to hold needle bearings in place on reassembly.
2. Assemble bearing spacer tube and bearing inner retainer washers over tool J-1001-A.
3. Assemble a sufficient number of bearings under end of tool so it is evenly spaced in bore of gear.
4. Finish assembling a total of 26 bearings at each end of gear.
5. Install outer bearing retainer washers and thrust washers. Largest diameter thrust washer goes at front, smaller washer goes to rear
6. Leave Tool J-1001-A in place until gear is assembled into transmission case.

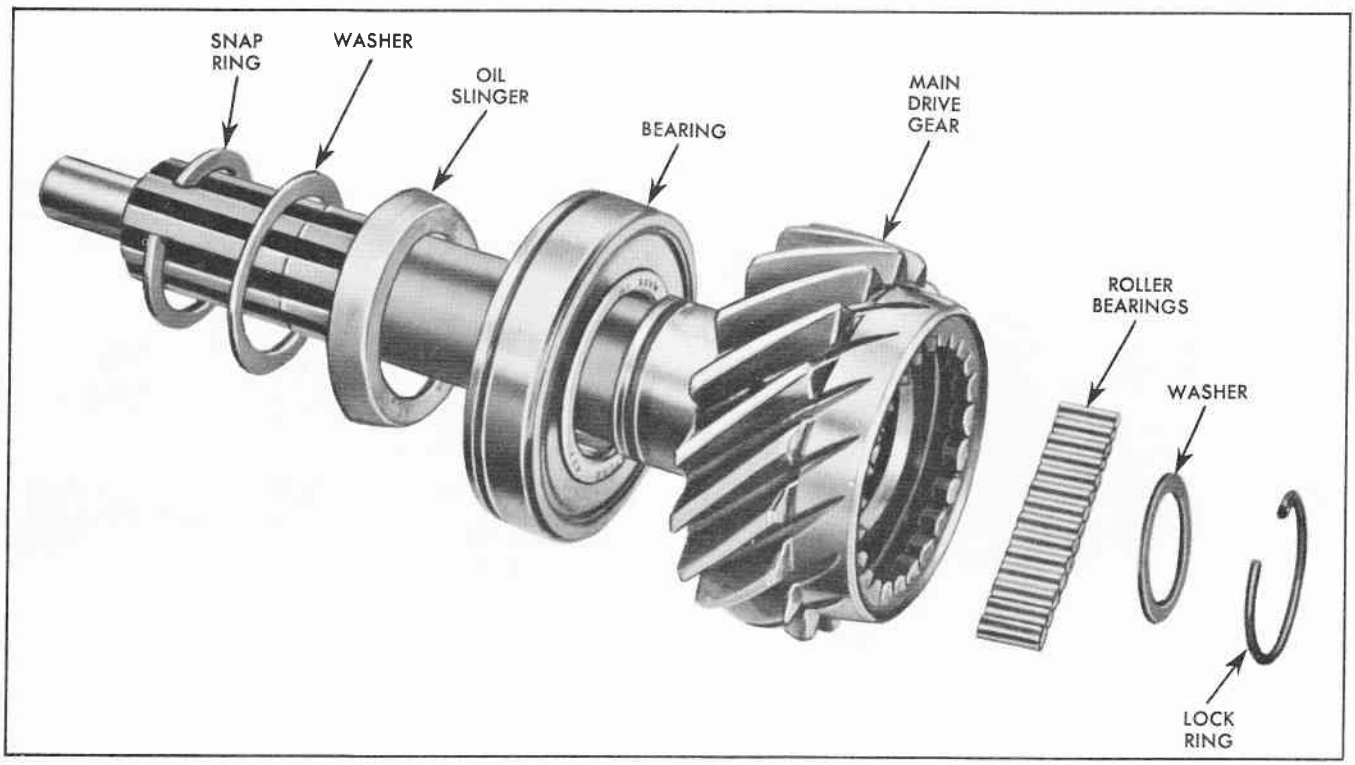


Fig. 31 Main Drive Gear and Front Bearing Assembly

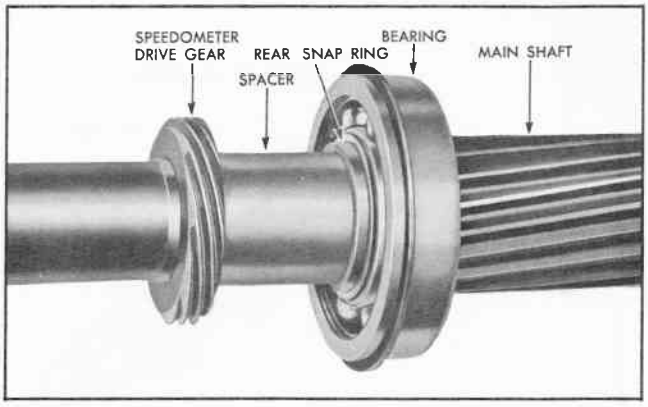


Fig. 32 Transmission Mainshaft Assembly

SERVICING MAIN DRIVE GEAR (FIG. 31)

1. Remove snap ring, washer, and oil slinger holding main drive gear bearing to gear.
2. Remove bearing by jarring shaft on block of wood.
3. Remove wire lock ring, washer and 14 roller bearings from counterbore in gear. To replace, reverse sequence of removal operations.

CAUTION: Press on inner race of bearing when installing using tool J-6133-A.

SERVICING MAIN SHAFT (FIG. 32)

1. Press off speedometer drive gear as shown in Fig. 33.
2. Remove spacer from mainshaft and remove rear bearing snap ring using tool J-1041 (Fig. 34).
3. Press off rear bearing in same manner as speedometer drive gear.
4. To assemble new bearing to shaft press on inner race of bearing using tool J-6133-A as shown in Fig. 35. Bearing should be against shoulder on shaft.

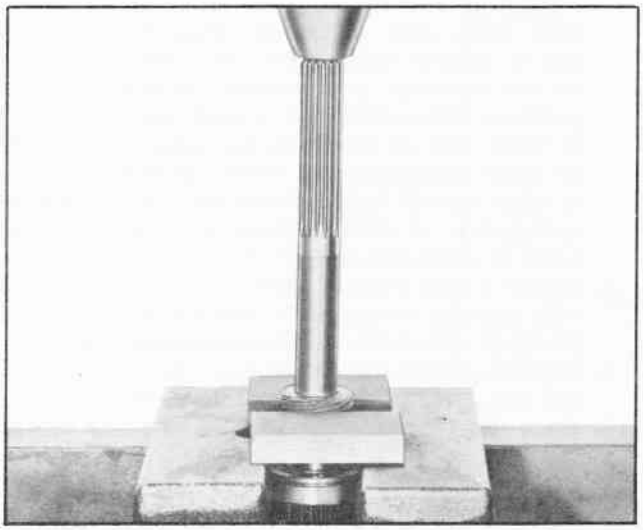


Fig. 33 Pressing Speedometer Drive Gear Off Main Shaft

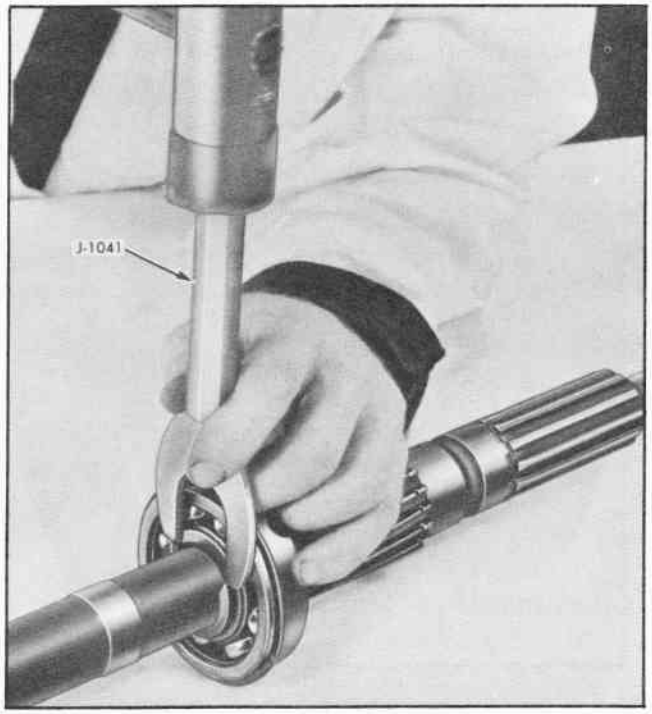


Fig. 34 Removing Rear Bearing Snap Ring

5. Install snap ring and speedometer gear spacer on shaft.
6. Press speedometer drive gear on shaft against spacer using tool J-6133-A.

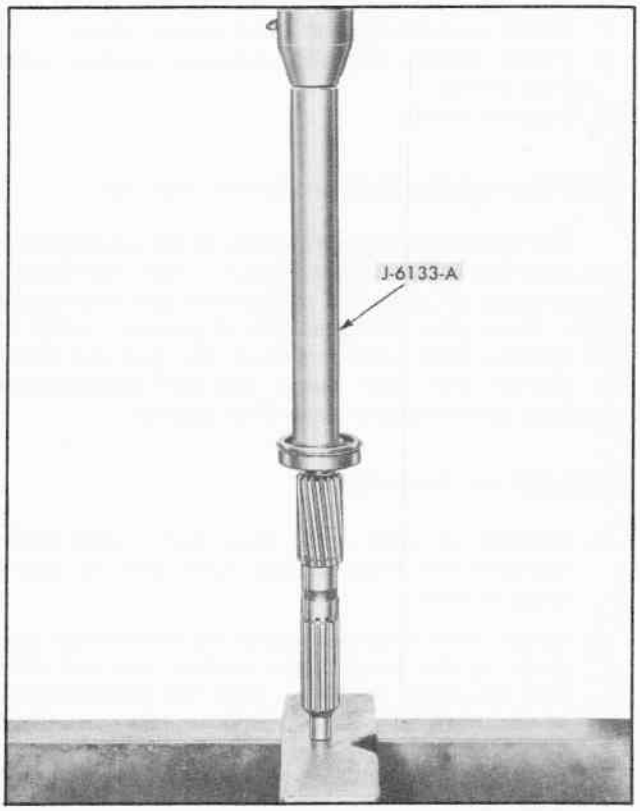


Fig. 35 Pressing Rear Bearing on Shaft

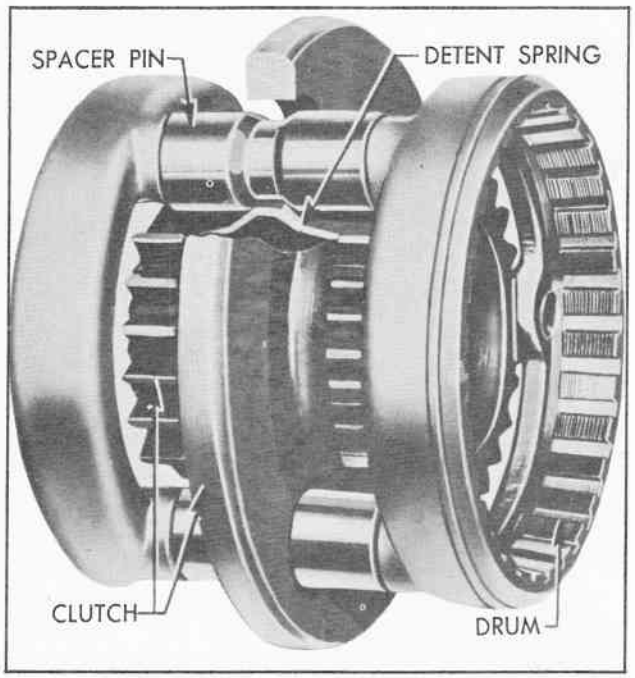


Fig. 36 Snychronizing Clutch Assembly

SERVICING REAR BEARING RETAINER SEAL

1. Remove shield from rear bearing retainer.
2. Remove seal from rear bearing retainer.
3. Coat outer diameter of new seal with Permatex #3.
4. Line up new seal over bore in housing and tap lightly on outer edge to start seal in place.
5. Finish driving seal into retainer housing, using Tool J-1354.
6. Replace shield.

SERVICING SYNCHRONIZING CLUTCH (FIG. 36)

The synchronizing springs are serviced separately and may be replaced, if necessary. Push synchronizing coupling off center of springs and pry each spring loose from gear and push out of groove. After the old springs have been removed, the new one should be placed over the clutch and the synchronizing coupling pulled up into place over springs.

ASSEMBLY OF TRANSMISSION

1. Position reverse idler gear and bronze thrust washers into transmission case with oil hole to front of case.
2. Install idler gear shaft until the front of the shaft picks up the front thrust washer and just starts into the inner support. Coat the protruding end of the shaft with Permatex #3 or other non-hardening sealer and complete installation of shaft making sure that lock pin hole in shaft lines up with hole in case. NOTE: Slot in end of idler shaft is used to line up shaft and hole.

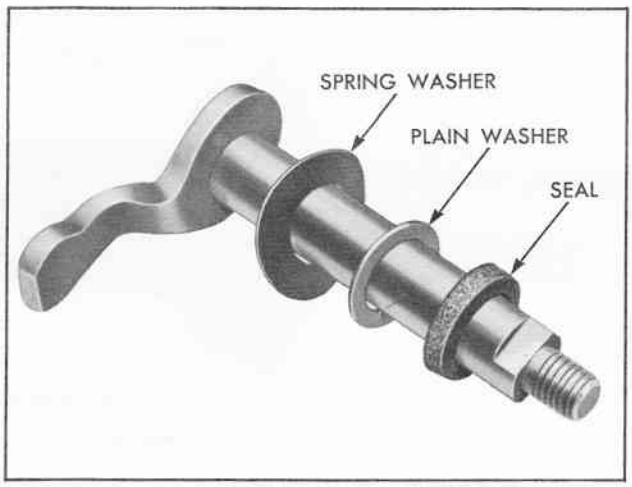


Fig. 37 Inner Selector Lever Shaft Assembly

3. Install a new lock pin coated with sealing compound to prevent leaks. Drive lock 1" below surface of boss on case.
4. Place spring washer, flat washer, and oil seal on selector lever shaft in order named, with crowned side of spring washer against flat washer (See Fig. 37). Apply lubriplate to shaft and assemble into transmission case. Then install outer selector lever.
5. Lay counter gear with bearings, Bearing Loader J-1001-A, retainer washers, and thrust washers into bottom of transmission case. Note that a small diameter bronze washer and a steel washer are used at the rear of the gear. A larger bronze washer, only, is used at the front.
6. Install main drive gear into front wall of transmission case and replace snap ring on bearing.
7. Mesh the teeth of the counter gear with teeth on main drive gear and reverse idler gear. Drive counter gear shaft into place with lock pin hole to rear from rear of transmission, being careful that it closely follows Bearing Loader J-1001-A so that bearings and washers are held in proper position. When front end of shaft just enters bore in front wall of transmission apply Permatex #3 or other non-hardening sealer to protruding end of shaft and to bore in front wall, then complete installation of shaft making sure that lock pin holes in shaft and case are in line.
8. Install a new counter gear shaft lock pin coated with sealing compound to prevent leaks. Drive pin flush with surface of transmission case.
9. Replace poppet ball and spring, interlock pin, and low and reverse shifter shaft with yoke.
10. Place low and reverse shifter shaft in neutral position.

NOTE: The shifter shaft is in neutral position when the notch for the shifter lever is directly above the selector shaft bore in transmission case.

11. Install a new welch plug, coated with sealing compound, in right side of transmission case.
12. Raise low and reverse interlock pin into groove in shifter shaft, then from left side of transmission case install selector shaft. Place low and reverse and second and high shifter levers on shaft, making sure selector lever engages notch in bottom of shifter lever. Install second and high interlock on shaft.
13. Install a new second and high interlock retainer on selector shaft.
14. Replace poppet ball and spring, yoke, and second and high shifter shaft over the second and high interlock.
15. Insert mainshaft assembly through bore in rear of transmission case, slide low and reverse gear onto shaft and replace snap ring holding gear to shaft.
16. Install second speed gear on mainshaft.
17. Install wire spacer ring in mainshaft snap ring groove if removed. Install thrust washer and snap ring on mainshaft. NOTE: One spline on mainshaft is machined the entire length of the second speed gear bearing surface for lubrication purposes. Do not install thrust washer key in this spline. The key indexes only in the spline 180° from the lubrication spline. This spline is machined past the snap ring groove to allow thrust washer to clear groove.
18. Install synchronizer with counterbored end of clutch gear next to second speed gear, engage second and high shifter yoke with synchronizer and low and reverse yoke with low and reverse gear. Finish installing mainshaft assembly.
19. Replace set screws securing shifter levers and yokes to their respective shafts. J-2895 Shifter Fork Lock Screw Remover can be used to tighten screws.
20. Use new gasket and install rear bearing retainer to transmission case, sealing cap screws with sealing compound. (Install shifter lever spring yoke support under lower left cap screw.)
21. Install new top cover gasket and replace cover and spring clip.
22. Before installing transmission add 3/4 pt. lubricant in rear bearing retainer and 2-1/2 pts. to transmission case (Extreme Pressure Lubricant or Multi-Purpose Gear Lubricant SAE 80 or 90).
23. Install speedometer driven gear.

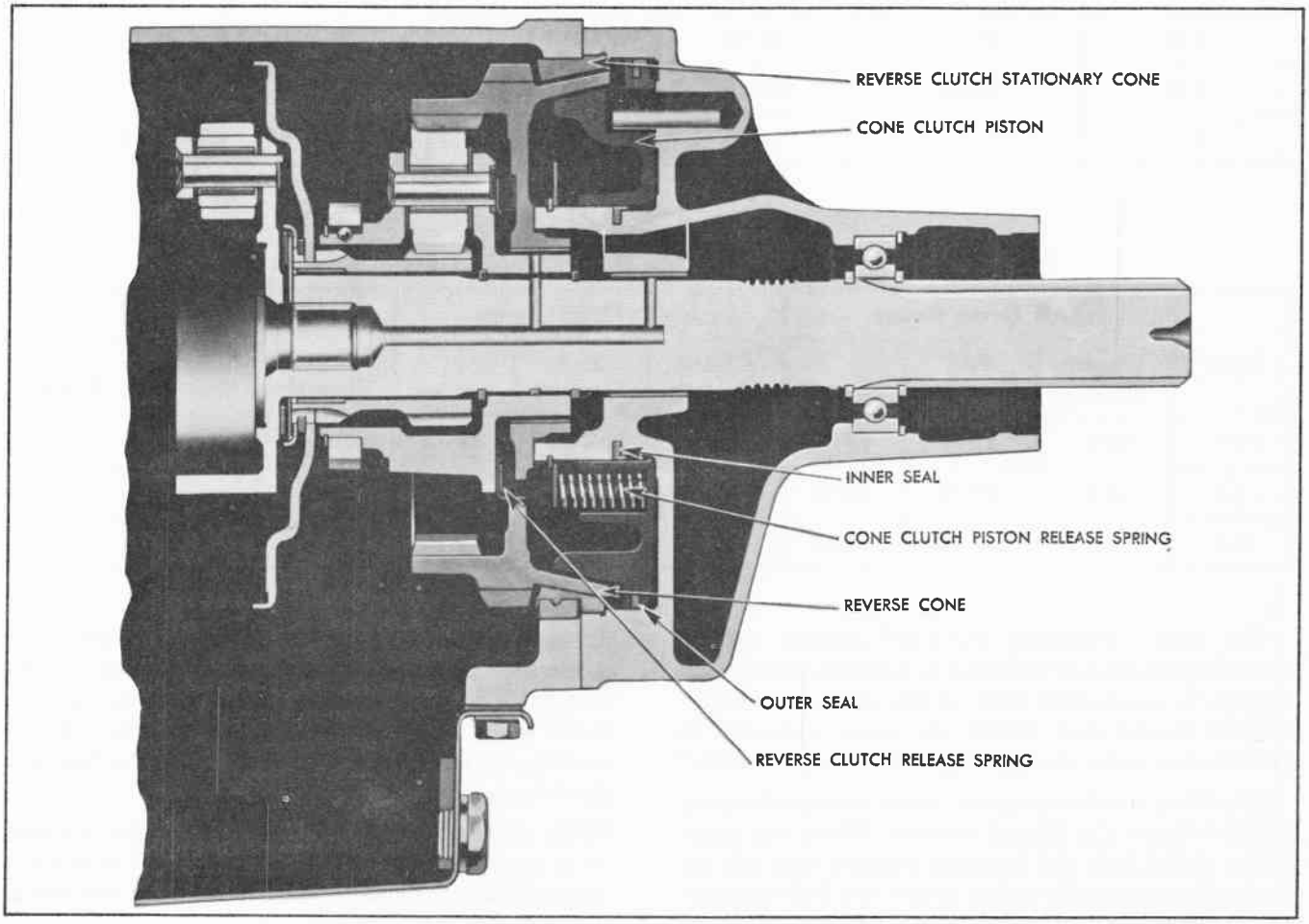


Fig. 38 Cross Section of Reverse Unit and Rear Bearing Retainer

D-56 HYDRA-MATIC TRANSMISSION

The 1956 D series Hydra-Matic transmission will be used only on the 27 series cars. The new Strato-Flight (P-56) Hydra-Matic transmission will be used on the 28 series. Information on the Strato-Flight transmission is contained in the 1956 Preliminary Hydra-Matic Manual. The D series transmission is essentially the same as the 1955 Hydra-Matic transmission except for the following:

Hydraulic and mechanical refinements have been made to compensate for increased engine horsepower and torque. The valve body is changed by the modification of 3-4 shift valve and the 3-4 regulator plug. This change raises the full throttle 3-4 upshift from about 70 MPH to about 73 MPH, and the maximum speed at which a forced 4-3 downshift can be made from 66 to 70. The front servo has been modified by the increase in the size of the compensator piston. This will give the front servo better timing and holding characteristics when the servo is applied.

The rear multiple disc clutch pack has been increased from seven drive and driven discs to eight drive and eight driven discs. The increase in clutch pack requires the use of a new rear drum and rear clutch annular piston.

The rear bearing retainer (Fig. 38) has been altered by an increase in the length of the inner hub. By extending the hub and finishing the hub face, the

SHIFT SPEED CHART

UPSHIFTS

Shift	Left Drive Range		Right Drive Range		Lo Range
	Minimum Throttle	Full Throttle	Minimum Throttle	Full Throttle	Full Throttle
1-2	7-10	20-23	7-10	20-23	19-23
2-3	12-15	36-40	12-15	36-40	—
3-4	21-25	70-75	71-76*	73-78	—
2-4	—	—	—	—	41-45

DOWNSHIFTS

Shift	Left Drive Range			Right Drive Range			Lo Range		
	Closed Throttle	Full Throttle	Forced	Closed Throttle	Full Throttle	Forced	Closed Throttle	Full Throttle	Forced
4-3	20-17	31-17	70-31	72-67	78-73	78-73	59-54	—	—
3-2	13-10	13-10	26-13	13-10	13-10	26-13	53-48	—	—
2-1	8-6	13-10	13-10	8-6	13-10	13-10	—	—	11-0

The term "Minimum Throttle" denotes a fixed throttle opening only sufficient to provide acceleration enough to accomplish each of the shifts. The transmission should shift within the limits indicated in the columns under the heading "Minimum Throttle."

The three conditions under which downshifts occur are as follows: (1) Closed throttle: When the accelerator pedal is in the released position and the car is coasting, gradually losing speed. (2) Full throttle: When the accelerator pedal is fully depressed but not through the detent position. (3) Forced: When the accelerator pedal is fully depressed through the detent. NOTE: When driving in the left drive range in fourth speed at about 31 MPH or less, partially depressing the accelerator pedal will cause the fourth to third downshift.

*With the transmission in the drive right position, it is possible to obtain a 3-4 upshift in this speed range if the accelerator pedal is suddenly released to the full closed position.

reverse internal gear thrust washer is no longer required. This thrust washer has been removed.

The transmission output shaft has been increased in diameter and four pinions are used in the rear planet carrier. Increasing the diameter of the output shaft eliminates the shoulder that formerly located the rear bearing on the output shaft. In place of the shoulder, a snap ring is now used in front of the bearing.

To remove the output shaft from the bearing retainer, it is necessary to first remove the rear bearing retainer seal. Remove the outer (rear) snap ring using KMO-410 Snap Ring Pliers. Remove the rear bearing to retainer snap ring using J-5172 Snap Ring Pliers or needle nose pliers. Drive the output shaft into the retainer until the end of the shaft is flush with the end of the retainer. Holding the output shaft back, bump the end of the retainer on a wood bench or block until the rear bearing drops free. With the bearing removed and the output shaft returned to operating position, remove the inner (front) snap ring using J-5172 Snap Ring Pliers. CAUTION: Be very careful not to drop snap ring during removal. If it falls in the undercut part of the shaft, it is very difficult to remove.

The retainer may now be removed from the shaft as in the past. To reassemble, reverse disassembly procedure. If the bearing is a tight fit on the shaft, drive it on with Bearing Installer J-6133-A.

All other service procedures described in the 1955 Hydra-Matic Shop Manual can be used with the 1956 transmission.

DIAGNOSIS

The 1955 diagnosis procedure will apply in 1956 except as concerns transmission shift points. See 1956 Shift Speed Chart on previous page.

FUEL TANK AND EXHAUST SYSTEM

FUEL TANK FILTER

The fuel filter formerly mounted near the inlet side of the carburetor has been replaced by a new fuel tank outlet filter (Fig. 39). The new double wrap plastic filter offers a larger filtering area and does not require cleaning. The mesh is sufficiently fine to prevent passage of water and assures that the articles that pass through are too small to interfere with valve operation in the fuel pump or to unseat the carburetor float needle valve. The construction of the fuel tank is basically the same as in previous models except that the outlet pipe to tank anchor has been removed and a depression is provided in the bottom of the fuel tank. The depression in conjunction with the outlet pipe assembly, insures that the outlet tube and filter are in proper position with respect to the tank bottom. Station wagons, as in 1955, have special fuel tanks. A new design is used on three seat models to meet new requirements resulting from seating changes.

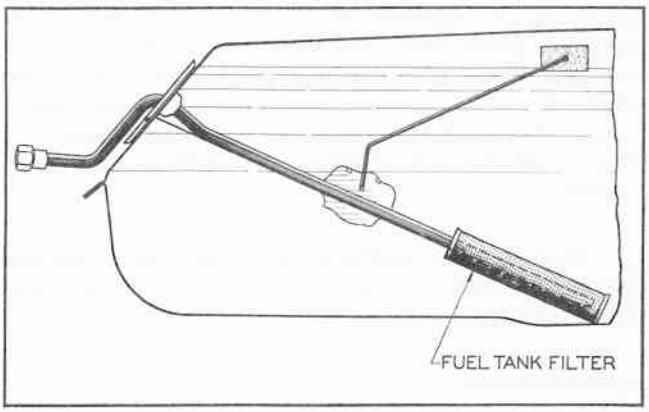


Fig. 39 Fuel Tank Filter

EXHAUST SYSTEM

The major units comprising the muffling system on all 1956 model Pontiacs have been changed from 1955. The exhaust pipe, crossover pipe, and tail pipe diameter are increased one quarter inch for free engine breathing with the increased displacement engine. The change in valve timing necessitated a redesign of the tuning chambers of the muffler to provide maximum muffling performance. As in 1955, the muffler is oval shaped, operates on the reverse flow principle, uses multiple pipes, and is double-jacketed to minimize noise and heat radiation. Mounting of the system has been revised to meet installation and durability requirements.

A new dual exhaust system is available for all 1956 models with exception of the four-door 860 station wagon. The dual exhaust system has direct exhaust from the left and right bank exhaust manifolds, thereby eliminating the crossover pipe (Fig. 40). The dual exhaust system also improves engine performance because of back pressure reduction. The dual

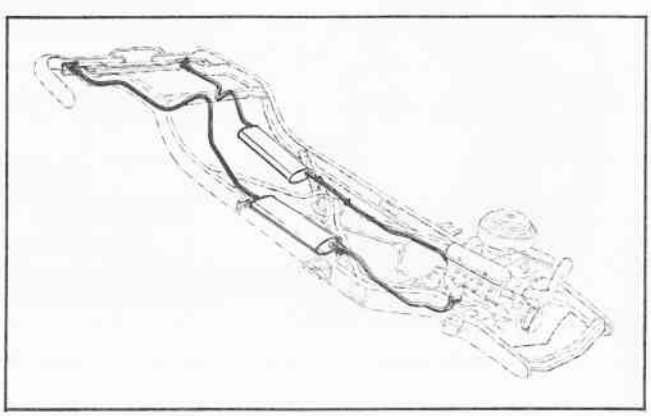


Fig. 40 Dual Exhaust System

mufflers are basically the same construction as the single muffler type; therefore, the capacity to pass exhaust gases with the heat control valve open has doubled. The mufflers and pipes are not interchangeable with each other or interchangeable with the standard single muffler type that is used on all models.

Dual exhaust mufflers have zinc coated internal parts to resist corrosion which is more severe with dual mufflers.

SPECIFICATIONS

Fuel Tank Capacity (All Except Station Wagons)	20 Gal.
Station Wagons (Except Three Seat)	17 Gal.
Station Wagon Three Seat	16 Gal.

GENERAL DESCRIPTION OF IN-LINE POWER STEERING

Pontiac's power steering gear for 1956 is a completely new unit, operating on hydraulic principle similar to that used heretofore. The gear is now of in-line type and incorporates innovations which importantly improve its performance, durability and serviceability. Drivers will particularly appreciate the fact that maximum parking effort has been reduced 34 per cent while desirable road feel has been retained.

The steering shaft, worm, and ball nut, power rack-piston and power cylinder are all in-line (Fig. 41). The valve assembly is mounted on top of gear housing, which has eliminated external lines and hoses with exception of pressure and return hoses between the pump and valve.

The mechanical element of this steering gear is similar to that used in the standard gear, and consists of recirculating ball nut in which a number of steel balls act as a highly efficient rolling thread between the steering worm and ball nut. The ball nut is assembled as a rigid part of the rack piston assembly that is geared to the sector on the pitman shaft.

Housing of the in-line gear is treated with Lubrite to provide an extremely durable bearing surface between the piston and housing.

Over-all steering ratio of the new power steering unit is approximately 22.5:1 as compared to the 24:1 ratio used in 1955. This reduces the amount of steering wheel turn necessary to obtain a desired amount of front wheel steer.

This unit is so designed that it requires only approximately five pounds effort on the steering wheel for parking, the most difficult of turning conditions, a 34 per cent decrease over that formerly required.

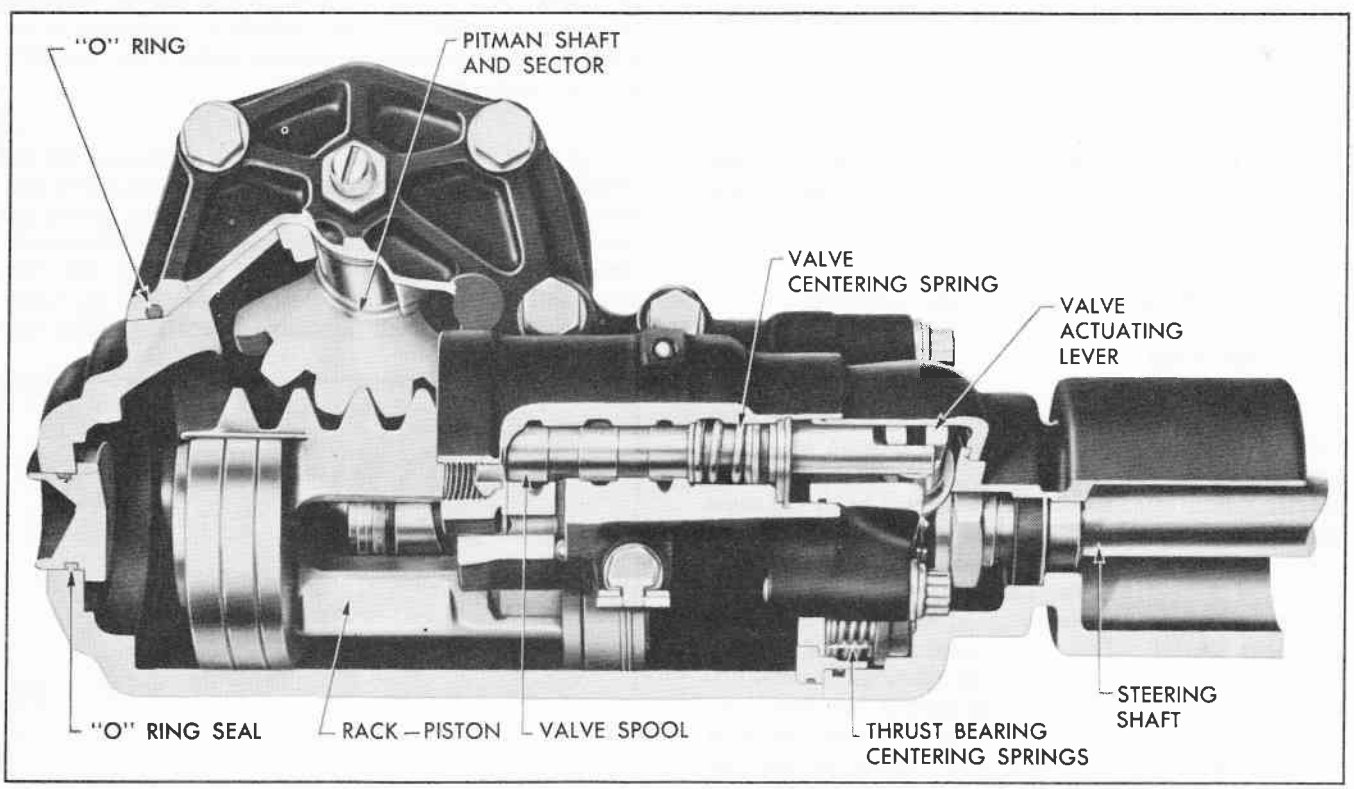


Fig. 41 Power Steering Sectional View

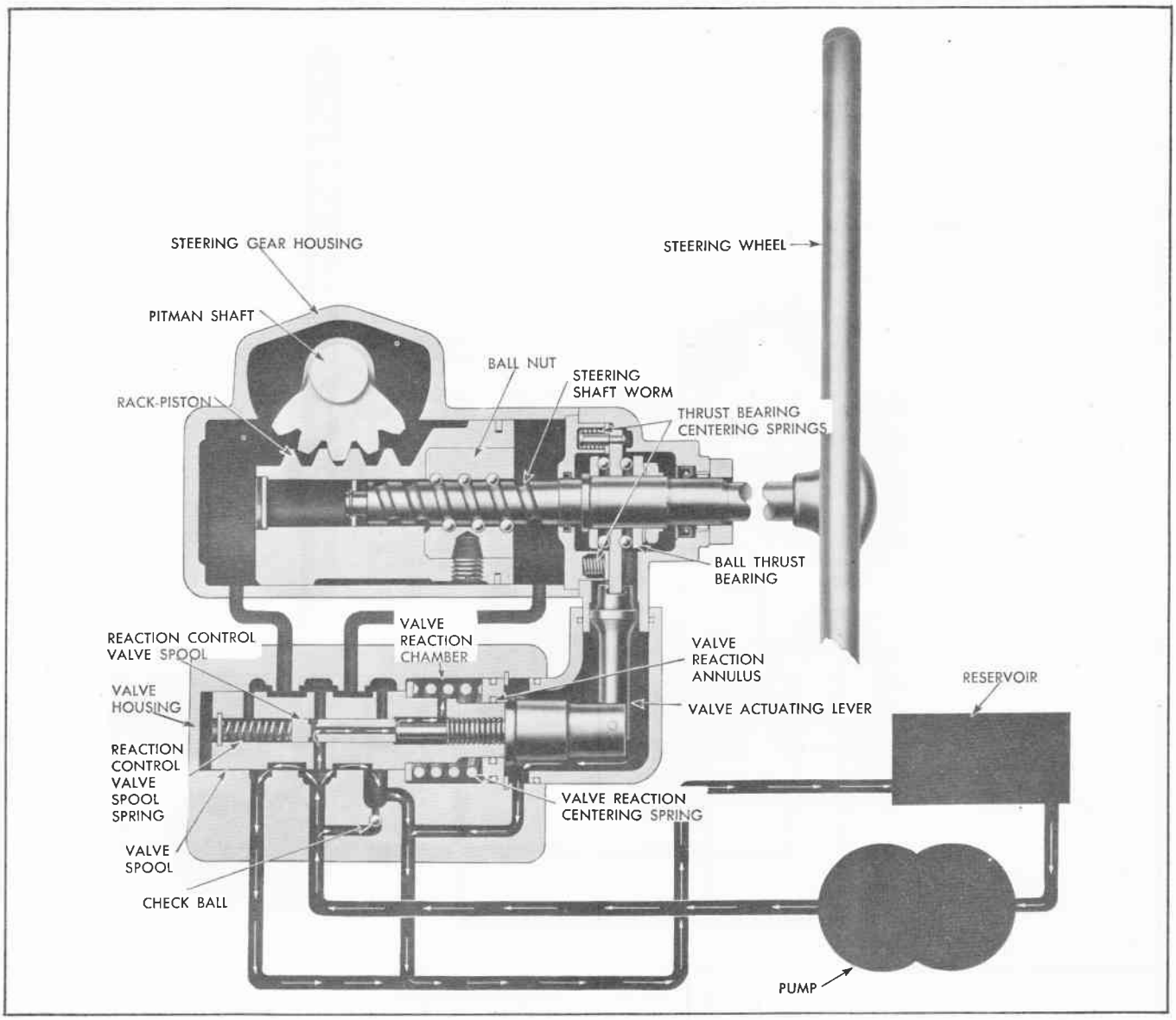


Fig. 42 Oil Flow - Straight Ahead Position

DESCRIPTION OF OPERATION OF POWER STEERING

Function of the entire system in the straight-ahead and right turn positions, respectively, are shown schematically in Figs. 42 and 43. The valve assembly is purposely enlarged to facilitate the explanation of its function. This valve is an open center three way type. The valve spool is held in the neutral position by means of a valve reaction centering spring located in the valve reaction chamber, plus the thrust bearing centering springs and hydraulic pressure.

A second spool called the reaction control valve spool, is located in the center of the valve spool. The reaction spool establishes the maximum pressure that may build up in the reaction chamber to hydraulically center the valve spool. Limiting the pressure in this manner decreases steering wheel effort when parking.

A check ball is provided to allow oil to circulate in the system without over-flowing the reservoir in case of pump failure.

OIL FLOW IN STRAIGHT-AHEAD POSITION

In neutral or straight-ahead position (Fig. 42) the oil flows from the pump, through the open-center valve spool and back to the pump reservoir without circulating in the power cylinder in which the rack-piston is located. Since all passages are open, flow resistance is low in the neutral position, and since the valve remains in this position at all times except when steering in turns, the power required to operate the pump is at the minimum.

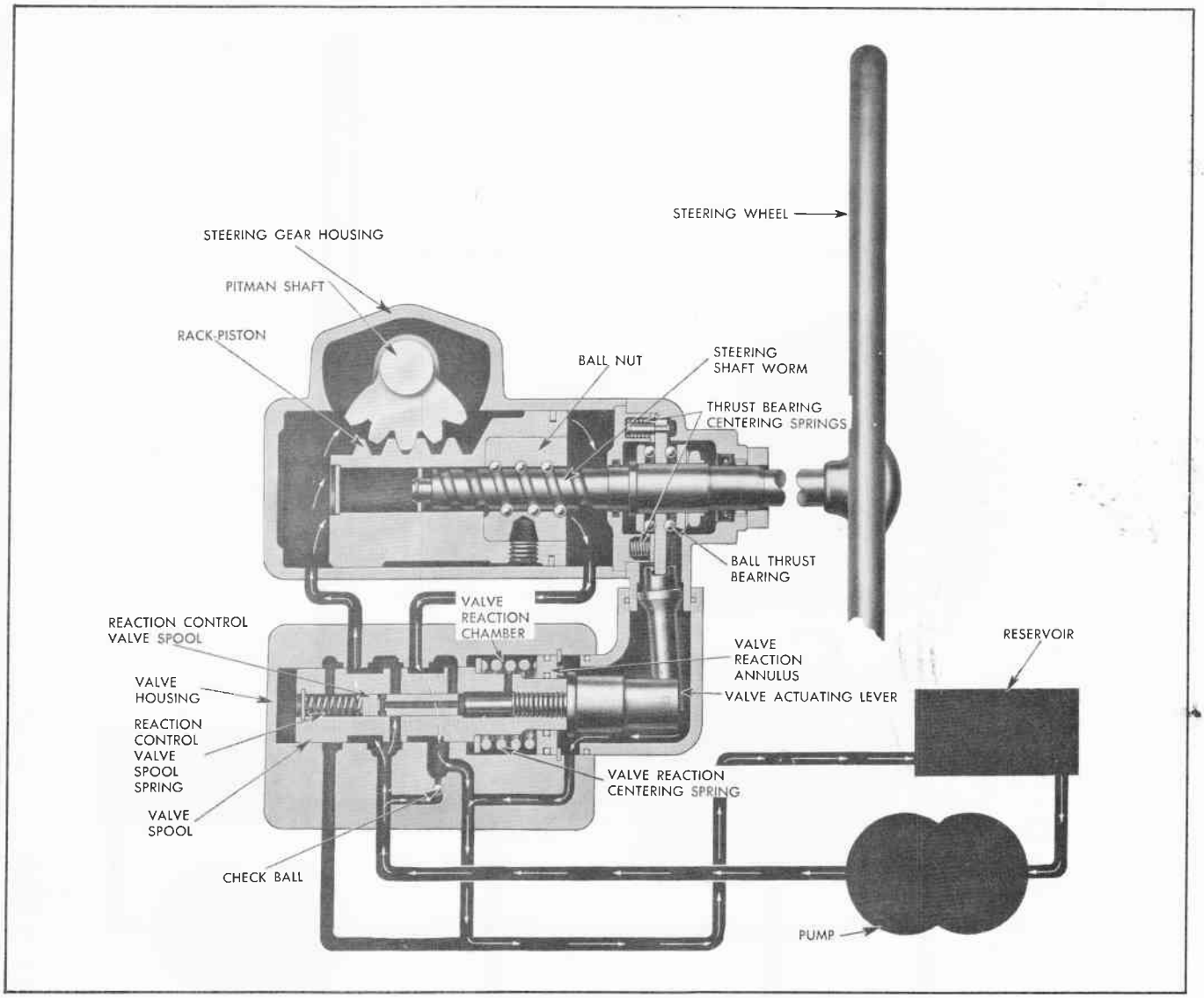


Fig. 43 Oil Flow - Right Turn Position

The power cylinder is full of oil at all times, although in the straight-ahead position the pressure on both sides of the rack-piston is equal and very low. This oil acts as a cushion that absorbs road shocks so that they are not transferred to the steering wheel, thus giving safer and more effortless driving. In addition, this oil lubricates all internal components of the gear, making it unnecessary to lubricate the gear at any time.

OIL FLOW DURING TURNS

For the purpose of explanation, only right turn will be described (Fig. 43). Oil flow and reactions are similar during a left turn except that oil and mechanical movements are in the opposite direction. When the steering wheel is turned to the right, the steering shaft worm tends to screw into the ball nut since the resistance of the wheels on the road tends to prevent the ball nut from moving. Therefore, as the driver applies right turn effort to the steering wheel, the worm is allowed to move downward an imperceptible amount. As the worm moves downward, it also moves the ball thrust bearing downward, which in turn causes the valve actuating lever to move the valve spool upward.

As the spool moves, the relationship between the grooves in the spool and the grooves in the valve housing are changed with respect to each other. As a consequence, the lower spool groove is no longer as fully open to return, but is opened wider to the pressure side of the pump. The upper spool groove is opened more fully to return, but less fully to the pressure side of the pump. This causes the oil to flow into the lower half of pressure cylinder and forces the rack-piston upward, which in turn applies turning effort to the pitman shaft.

Oil in the upper end of the cylinder is simultaneously forced out through the valve and back to the pump reservoir. The higher the resistance to

turning between the road and the front wheels, the more the valve spool is displaced and the higher the oil pressure will be on the lower end of the rack-piston. Fig. 43 shows the displacement that would occur when the maximum power is required.

Since the amount of valve action and, consequently, the amount of hydraulic pressure built in the cylinder is dependent upon the resistance to turning, the driver is assured of the proper amount of smooth, hydraulic assistance at all times.

PERIODIC SERVICE RECOMMENDATIONS

Since the steering gear is lubricated by the hydraulic oil used to operate the unit, it is only necessary to periodically check the fluid in the pump.

ADJUSTMENT ON CAR

Before making adjustments to the power steering gear to correct conditions such as, shimmy, hard or loose steering, road shock, wander or weave, a check should be made of front end alignment, shock absorbers, wheel balance, or for tight front wheel bearings, loose steering rod ends or loose pitman arm.

There is only one adjustment of the power steering gear that can be made on the car.

PITMAN SHAFT END PLAY ADJUSTMENT

1. Disconnect steering connecting rod from pitman arm ball by removing rod end cotter key and plug.
2. Loosen pitman shaft lash adjusting screw locking nut using Tool J-6354 and adjust screw so that the pull on the steering wheel rim, using spring scale J-5178, has a total load between 1-1/4 to 1-3/4 lbs. Readings are to be taken on rim of steering wheel as the wheel is rotated through an arc not exceeding 3" at rim with gear on center.
3. While holding screw with offset screw driver tighten lock nut to 25 to 30 lb. ft. torque. Recheck, pull through center after lock nut has been tightened.

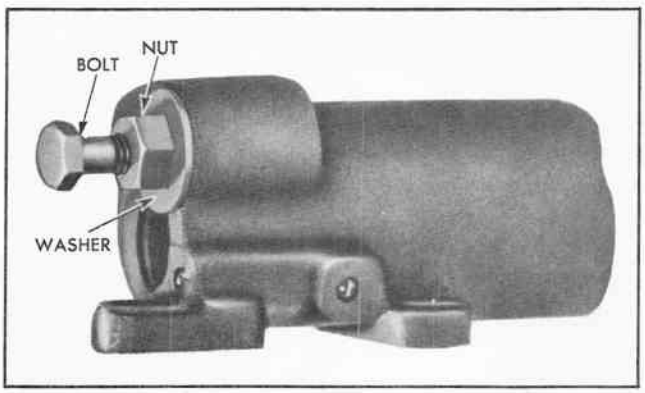


Fig. 44 Removing Connectors

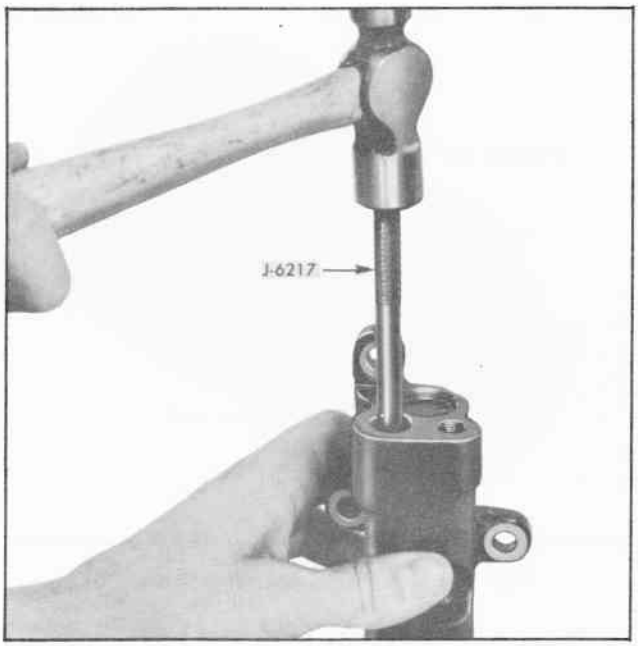


Fig. 45 Replacing Connectors

4. Reassemble connecting rod to pitman arm, by screwing in end plug until tight, and backing off to nearest cotter pin alignment hole and insert cotter pin.

REPAIRS

REPLACEMENT OF VALVE BODY CONNECTORS

1. Tap threads in holes of large and small connectors using 5/16-18 tap in the large connector and a 12-24 tap in the small connector.
2. Remove connectors by using bolt threaded into tapped holes with washer and nut as an extractor and discard (Fig. 44).
3. Blow out valve body thoroughly to remove any tapping chips.

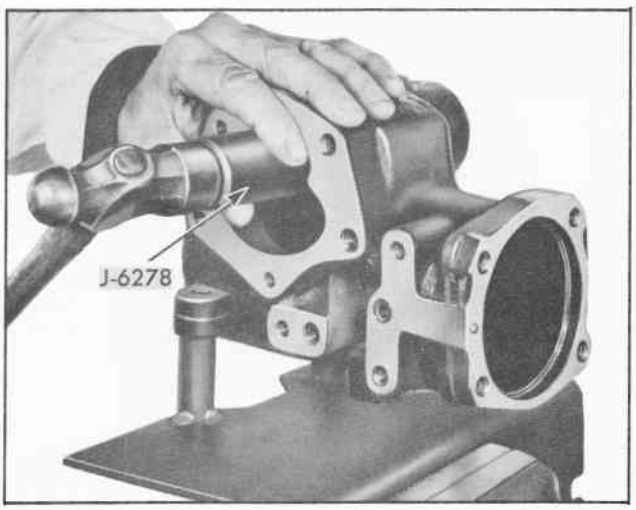


Fig. 46 Removing or Replacing Pitman Shaft Bushing

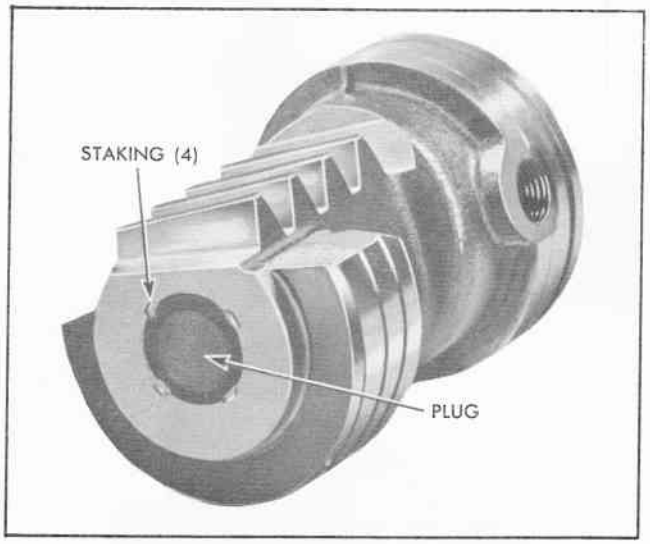


Fig. 47 Rack Piston End Plug Staked

4. Replace connectors by using tool J-6217 and drive in place (Fig. 45).

REPLACEMENT OF PITMAN SHAFT BUSHINGS

1. With steering gear housing supported in Holding Fixture J-5205, drive pitman shaft bushing from housing using Tool J-6278 (Fig. 46).
2. Drive new pitman shaft bushing into position using tool J-6278. NOTE: Bushing is diamond bored and requires no further reaming.

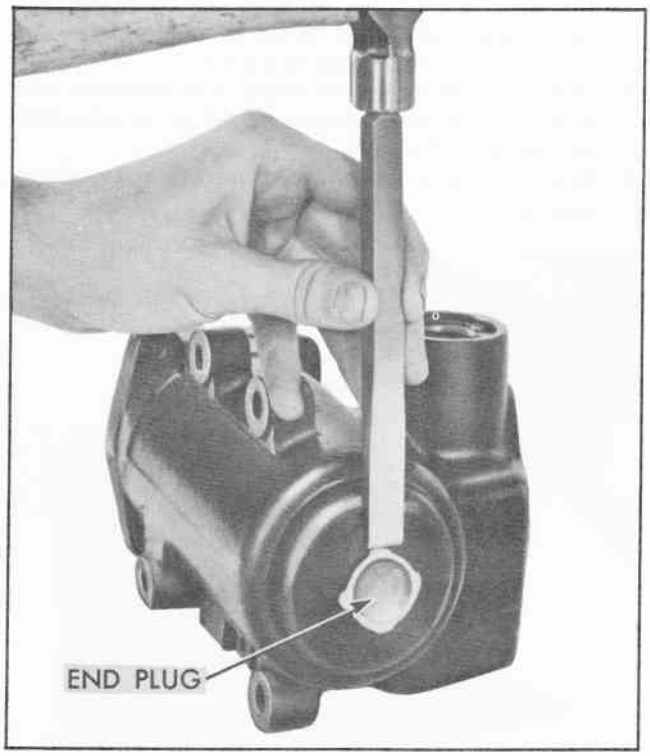


Fig. 48 Removing Housing End Plug Staked Portions

Fig. 49 Housing End Plug Staked

REPLACEMENT OF RACK-PISTON END PLUG

1. Remove end plug by driving out from inside of rack-piston using a drift of soft material. NOTE: Care must be taken not to damage inside diameter of rack-piston bore.
2. To replace rack-piston end plug, press plug in flush with end of rack-piston and stake four places evenly (Fig. 47).

REPLACEMENT OF HOUSING END PLUG

1. To remove end plug, push up or cut off the staked portions and drive out of housing, using a drift of soft material (Fig. 48). NOTE: Care should be

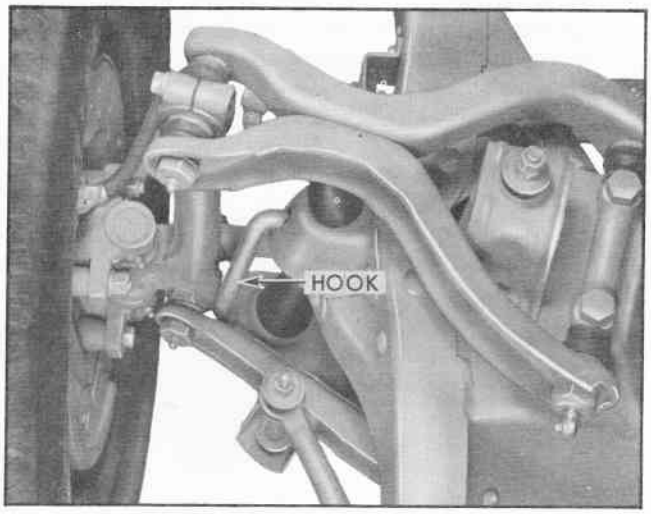


Fig. 50 Hold Down Hook J-5571 Installed

taken to not score the sealing diameter in the housing.
2. Lubricate seal and install on new end plug. Install end plug in housing from inside and drive so that shoulder on plug seats in housing, using drift of soft material.
3. Stake plug lip in four equal spaces, so that plug shoulder is held tightly against housing (Fig. 49).

REMOVAL OF POWER STEERING GEAR FROM CAR

NOTE: If car is equipped with power brakes, refer to page 5-20 in the 1955 Shop Manual for removal of power brake unit.

1. Hook front suspension in five passenger load position using tool J-5571 front suspension hold down hook (Fig. 50).
2. Remove steering wheel using puller J-3044.
3. Remove direction signal switch handle and gearshift lever.
4. Remove steering column to instrument panel bracket cap.
5. Slide rubber grommet up steering column jacket. Roll back floor mat and remove pedal plates from floor.
6. Remove neutralizer and back-up light switch on Hydra-Matic equipped cars.
7. Disconnect gearshift and selector rods.
8. Disconnect direction signal wires.
9. Disconnect power steering oil lines at gear and secure lines so ends are higher than reservoir to prevent fluid leaking. Install plastic plugs or tape to cover gear and line openings and prevent entry of dirt.
10. Protect all finished surfaces on steering column with masking tape.
11. Raise car on hoist.
12. Remove starter motor.
13. Remove pitman arm.
14. Remove left side tie rod end and drop steering linkage.
15. Remove engine left side apron.
16. Remove brake pedal hairpin spring retainer and slide pedal to right as far as it will go.
17. If car is on a twin post hoist it will be necessary to place stands under both front frame ends and lower front post approximately three feet to allow steering assembly to clear hoist.
18. Push steering connecting linkage down and toward rear of car, remove steering assembly to frame attaching bolts, removing front upper bolt last, and lower assembly between lower control arm and steering connecting linkage. NOTE: Check amount of shims and do not lose shims that are between steering gear housing and frame.
19. Thoroughly clean exterior of steering gear.
20. Steering gear oil can be drained into a container by turning control valve down and turning the worm through steering range several times.

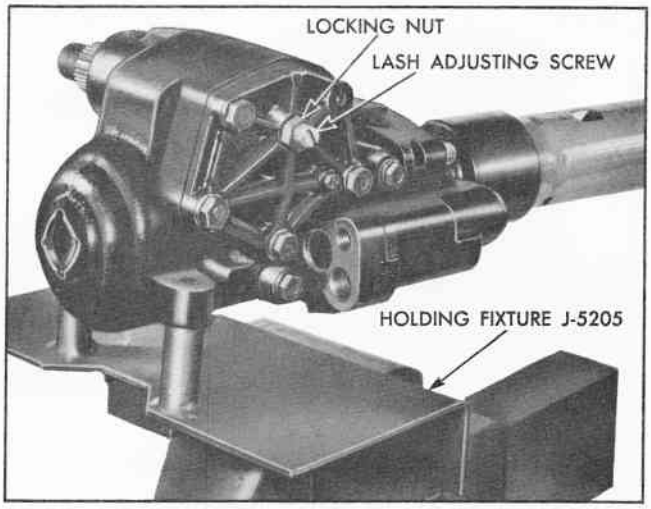


Fig. 51 Steering Gear Mounted on Tool J-5205

POWER STEERING GEAR— OVERHAUL AND ADJUST

GENERAL INFORMATION ON SERVICING THE POWER STEERING GEAR

Disassembly and reassembly of the unit and the subassemblies must be made on a clean work bench preferably while the assembly is in a holding fixture. As in repairing any hydraulically operated unit, cleanliness is of the utmost importance. Therefore, the bench, tools, and parts must be kept clean at all times.

Before disassembly of the unit, thoroughly clean the exterior of the unit with a suitable solvent and drain as much of the hydraulic oil as possible.

Assist the draining by placing the unit with the control valve down and turning the worm through its entire range two or three turns.

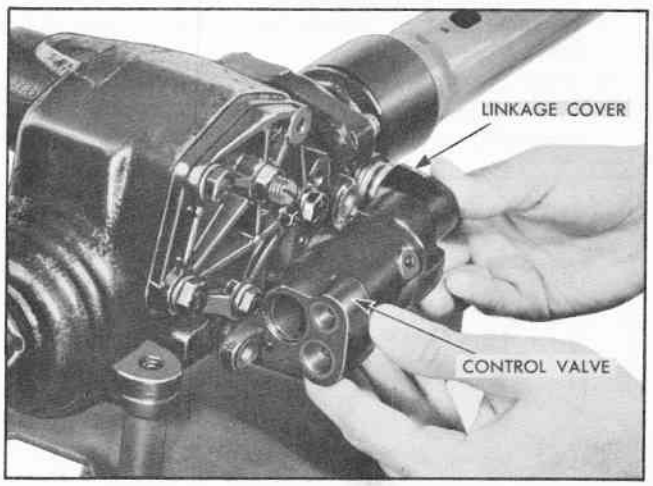


Fig. 52 Removing Control Valve and Linkage Cover

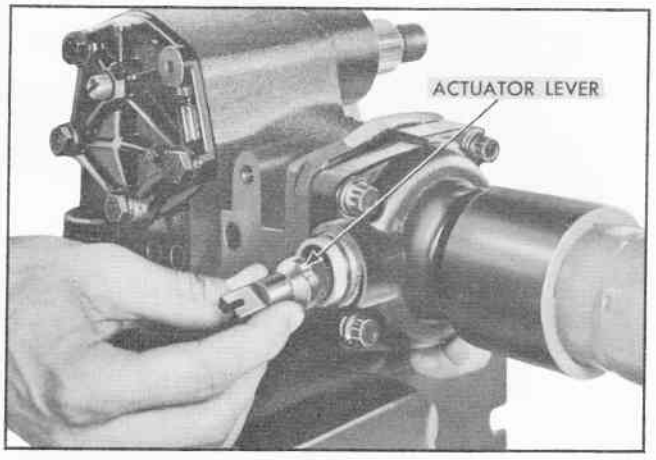


Fig. 53 Removing Actuator Lever

DISASSEMBLY OF POWER STEERING GEAR

REMOVAL OF CONTROL VALVE FROM STEERING GEAR

1. Mount unit on holding fixture J-5205 (Fig. 51).
2. Remove control valve retaining screws and lift control valve and linkage cover off gear housing (Fig. 52).
3. Remove linkage cover to end cover "O" ring seals.
4. Remove control valve to gear housing "O" ring seals.
5. Pull the linkage cover out of the valve body. Remove the linkage cover to control valve "O" ring seal.
6. Remove actuator lever from end cover (Fig. 53).

DISASSEMBLY OF CONTROL VALVE

1. Remove annulus retaining ring and annulus retaining washer using snap ring pliers J-4245 (Fig. 54). NOTE: Pliers can be used more effectively if spool assembly is turned to a position so that pivot of pliers can be moved into slot of link.
2. Slide spool assembly out of valve body (Fig. 55). Care should be taken to see that neither spool assembly or valve body are scratched or dropped.

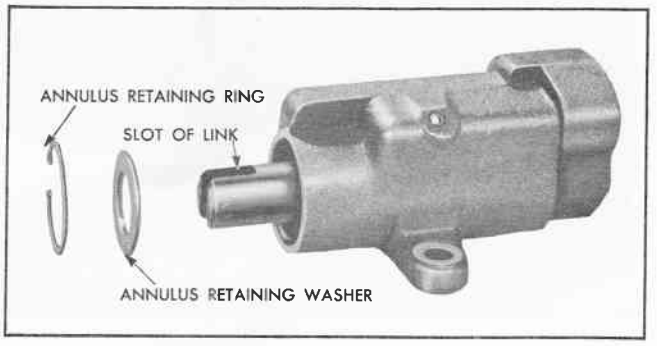


Fig. 54 Exploded View - Annulus Retaining Ring and Washer

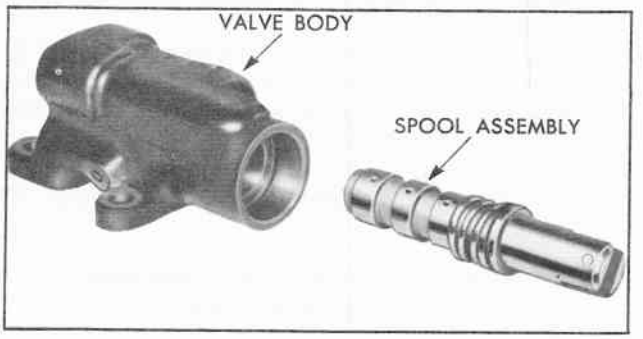


Fig. 55 Spool Assembly Removed

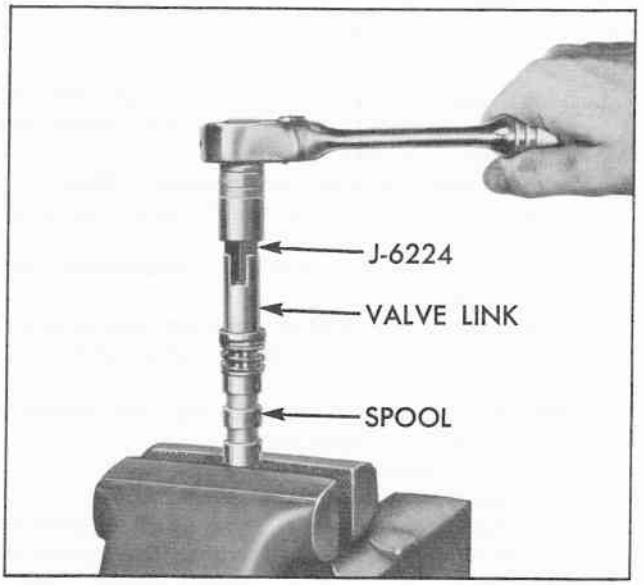


Fig. 56 Spool Assembly Clamped in Vise

3. Clamp spool assembly in a vise on small end (Fig. 56) do not clamp spool on large diameter.
4. Remove valve link, using tool J-6224. Remove annulus and seals, valve centering spring, and spring thrust washer (Fig. 57). Remove "O" ring seals from annulus.
5. Turn spool over to remove reaction control spool and spring (Fig. 58). NOTE: Caution should be taken not to drop reaction spool.

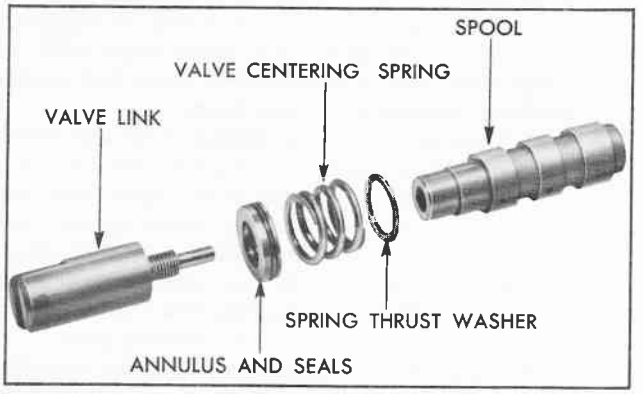


Fig. 57 Spool Assembly Partially Exploded

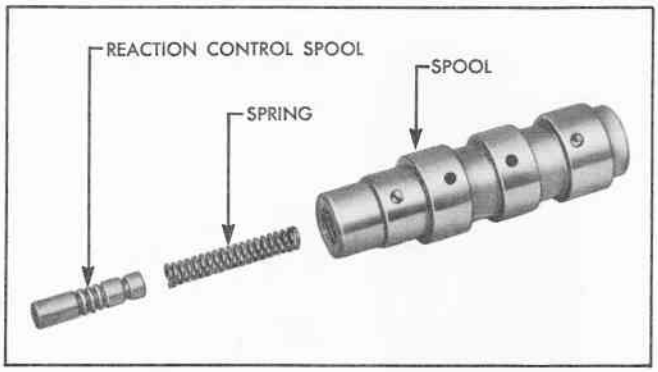


Fig. 58 Reaction Control Spool and Spring

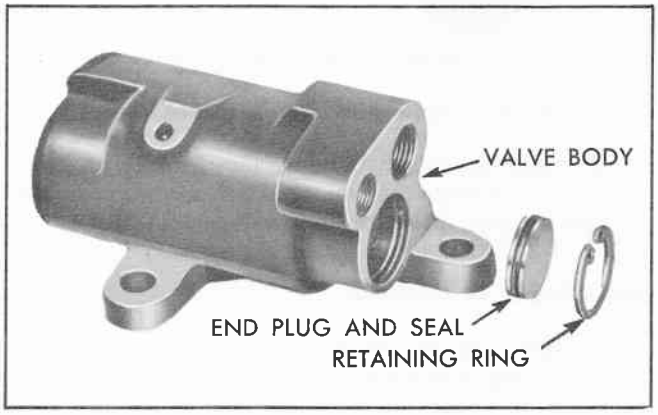


Fig. 59 Valve Body Plug and Retaining Ring

6. Remove retaining ring, end plug and seal from valve body using #1 Truarc pliers J-5403 (Fig. 59). Remove end plug seal.

REMOVAL OF PITMAN SHAFT AND RELATED PARTS

1. Remove side cover retaining screws and rotate cover one half turn.
2. Align pitman sector with opening in gear housing (Fig. 60). Tap end of pitman shaft with a soft hammer and slide shaft out of housing.

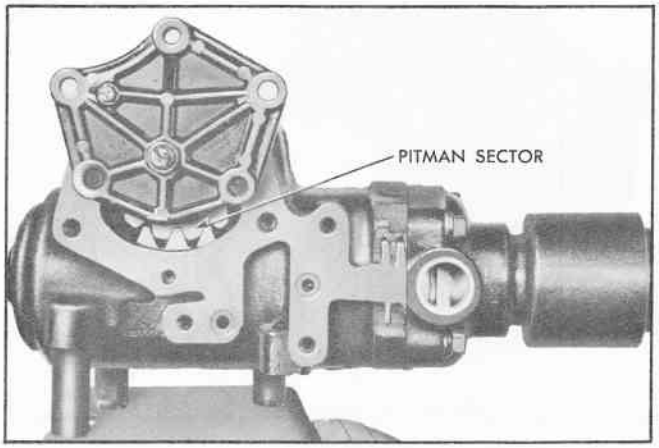


Fig. 60 Pitman Sector Alignment

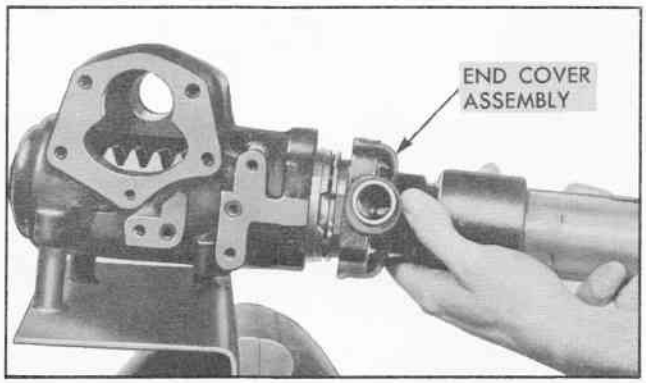


Fig. 61 Removing End Cover from Gear Housing

DISASSEMBLY OF PITMAN SHAFT AND RELATED PARTS

1. Remove "O" ring from side cover and discard.
2. Hold pitman shaft adjusting screw with a screw driver and remove adjusting screw locknut. Turn screw out of cover and remove cover. Slip adjusting screw and shim out of pitman shaft.

REMOVAL OF END COVER AND MAST JACKET ASSEMBLY

1. Remove end cover retaining screws and pull cover and housing assembly off gear housing (Fig. 61).

DISASSEMBLY OF END COVER

1. Remove end cover oil seal, back-up washer, and bearing, using tool J-6292 with slide hammer. (Fig. 62 shows part of slide hammer J-942.)

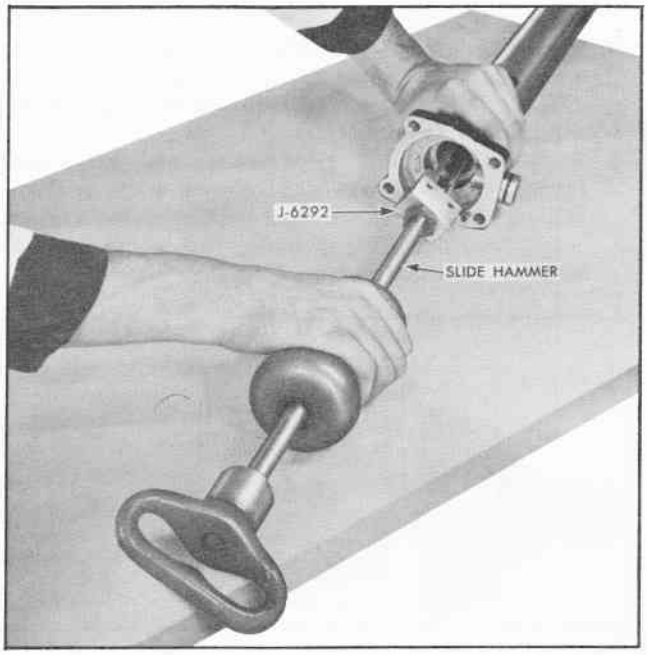


Fig. 62 Removing Bearing and Seal from End Cover

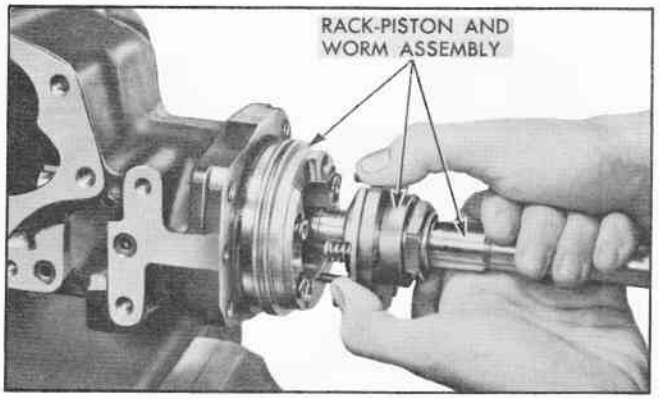


Fig. 63 Removing Rack-Piston and Worm Assembly

REMOVAL OF RACK-PISTON AND WORM ASSEMBLY FROM HOUSING

1. Pull rack-piston and worm assembly out of housing (Fig. 63).

DISASSEMBLY OF RACK-PISTON AND WORM ASSEMBLY

1. Remove piston rings from piston.
2. Remove ball nut retaining screw and slide ball nut and worm assembly out of rack-piston with ball nut retaining screw hole down to prevent ball return guides and balls from falling out and losing balls (Fig. 64).
3. Remove ball return guide caps and ball return guides. Turn nut with ball return guide holes down. Rotate worm back and forth until all balls have dropped out of nut. Catch balls in a clean pan or in a clean cloth. Remove the ball nut and adapter from worm.
4. Remove adapter seal spiral retaining ring, adapter seal washer, and adapter seal (Fig. 65). Remove adapter "O" ring seal and thrust bearing centering springs from adapter.
5. Push the retaining ring washer and worm seal toward worm groove and remove worm seal retaining ring. Remove shaft retaining ring washer, worm seal retaining washer, shaft worm seal assembly, and seal retaining washer.

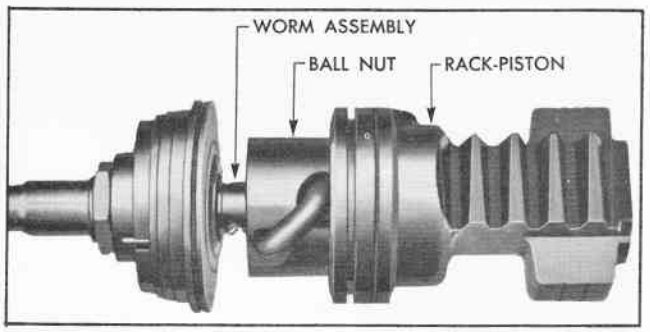


Fig. 64 Ball Nut and Worm Assembly Removed from Rack-Piston

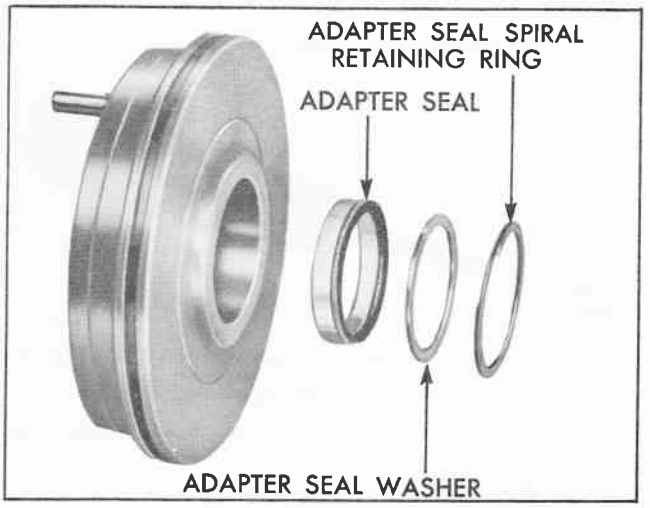


Fig. 65 Adapter Assembly - Exploded View

6. If thrust bearing is to be replaced, clean up staking on thrust bearing preload nut, remove nut and remove thrust bearing assembly.

DISASSEMBLY OF HOUSING

1. Remove pitman shaft seal retaining ring using snap ring pliers J-4245 (Fig. 66).
2. Remove washers and leather dust seal.
3. Remove oil seal. NOTE: To remove seal tap an offset screw driver in between seal and shoulder in gear housing. Then pry seal out of housing being careful not to damage seal bore.

CLEANING AND INSPECTION OF POWER STEERING GEAR PARTS

1. Wash all parts in a suitable cleaning solvent before following inspection procedure shown below.
2. Inspect "O" ring seals, if cut, damaged or distorted, seals should be replaced.

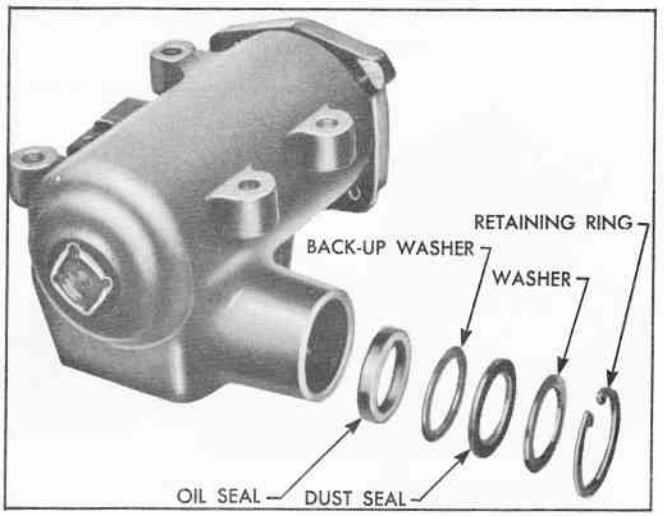


Fig. 66 Pitman Shaft Oil Seal - Exploded View

INSPECTION OF VALVE BODY AND SPOOLS

1. Inspect valve body and both spools for scores, nicks, or burred edges. If either the valve body or one of spools is damaged, a complete control valve assembly must be replaced. Valve body and spools are selective fits and, therefore, are available only as a complete assembly.
2. Inspect connectors. If badly brinelled or scored, replacement will be necessary.

INSPECTION OF PITMAN SHAFT AND RELATED PARTS

1. Inspect pitman shaft bearing surface inside cover for excessive wear or scoring. If worn or scored, replace side cover.
2. Check pitman shaft sector teeth and bearing surfaces. If worn, pitted, or scored, replace shaft.
3. Check pitman shaft bushing in housing for wear, if worn replace bushing.
4. Inspect lash adjusting screw.

INSPECTION OF END COVER

1. Inspect end cover for wear in actuator lever bore. If badly worn, replace end cover and mast jacket assembly.
2. Inspect end cover needle bearing. If needles are pitted or worn, replace bearing.

INSPECTION OF RACK-PISTON, WORM AND NUT

1. Inspect worm and ball nut grooves and all balls for wear or scoring. If either worm or ball nut needs replacing, both must be replaced as a matched assembly.
2. Inspect ball return guides, making sure that the ends where balls enter and leave guides are not damaged.
3. Inspect rack-piston teeth for pitting, wear and scoring. Inspect all bearing surfaces on rack-piston for scoring. Do not remove rack-piston end plug unless loose.
4. Inspect thrust bearing for roughness by holding worm stationary and rotating the bearing.
5. Inspect thrust bearing centering springs. If any of the springs riveted to the thrust bearing are broken, the thrust bearing assembly must be replaced. If any of the four loose springs are broken or require replacement, replace all four.
6. Test thrust bearing preload. Preload should be between 3/4 to 3 lbs. for used thrust bearing, and 1-3/4 to 3 lbs. for new thrust bearing. Measure at outer edge of center bearing through an angle of 90°. Measure bearing preload, as follows:
   a. Clamp worm in a vise using soft jaws.
   b. Fasten a cord to one of the rivets and wind it around the center race.
   c. Attach other end of cord to spring scale J-5178, then slowly pull the other end of the scale and check reading (Fig. 67).
   d. If preload is not within limits, push staked portion of thrust bearing nut up out of thread groove, being careful not to damage threads, remove nut and discard.
   e. Use a new nut and readjust as necessary to obtain proper preload.
   f. After proper preload has been obtained, stake nut being careful not to move when staking (Fig. 68).

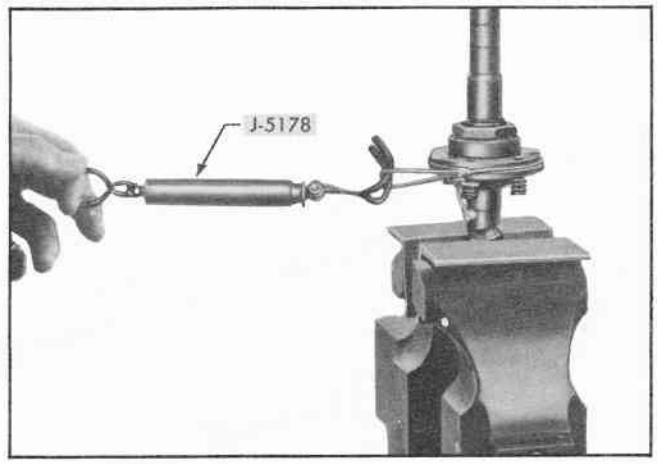


Fig. 67 Testing Thrust Bearing Preload

INSPECTION OF HOUSING

1. Inspect housing bore. If scored or worn, replace housing. Inspect housing end plug for leakage. Unless there is visual evidence of leakage, do not remove end plug.
2. Inspect pitman shaft bushing and if badly worn replace.

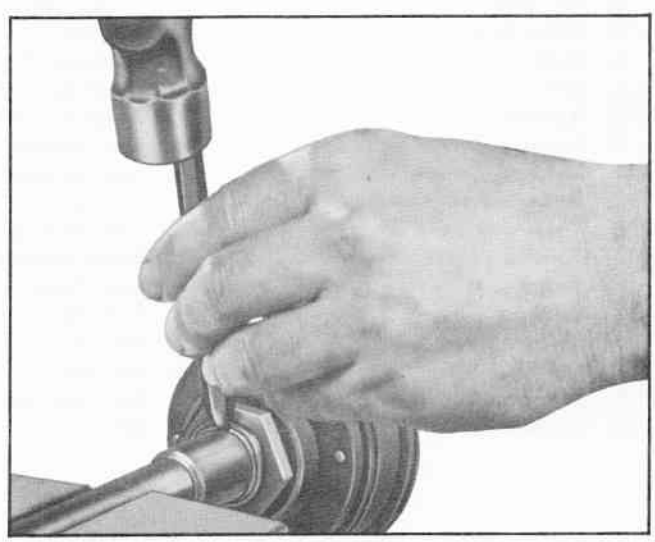
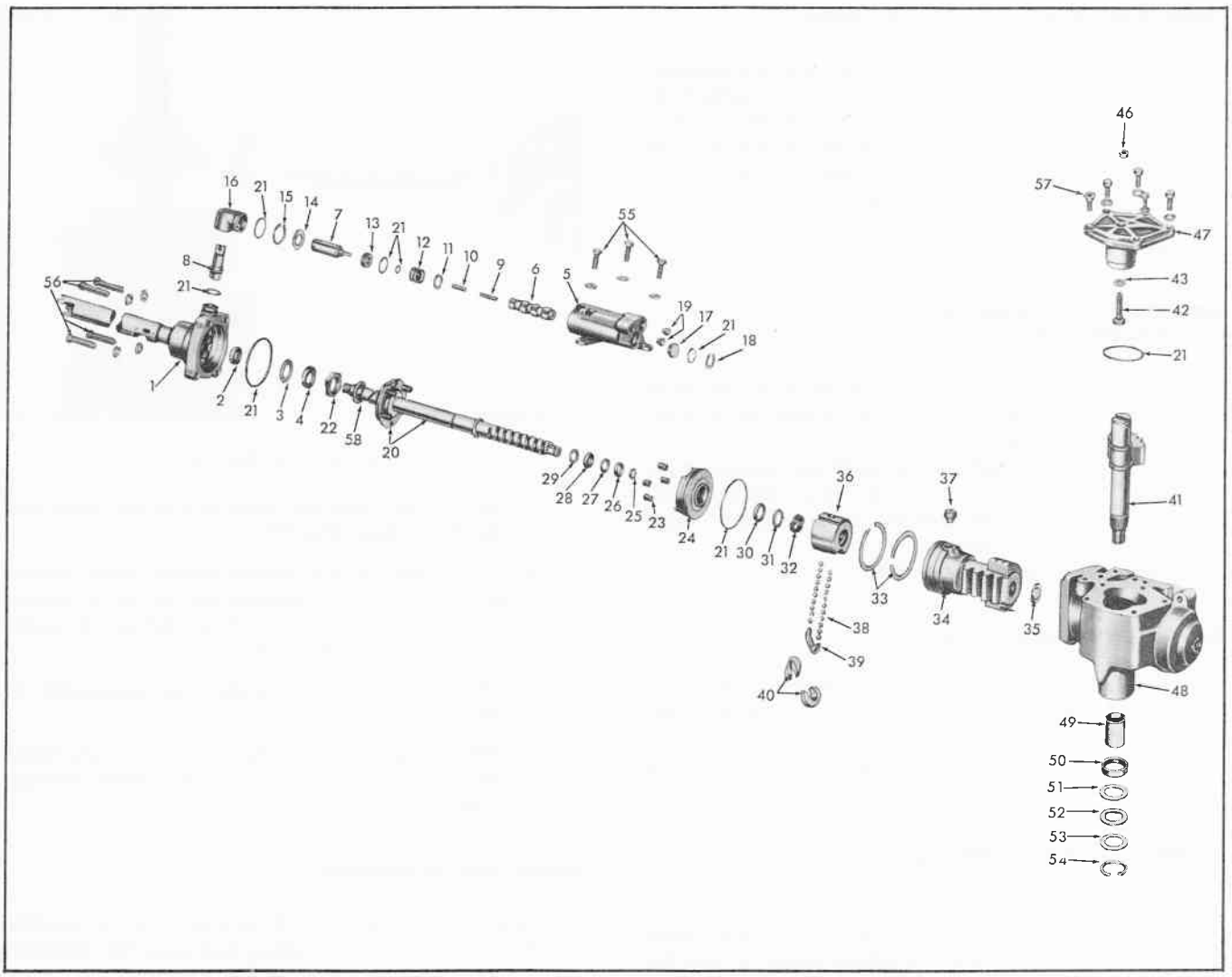


Fig. 68 Staking Nut After Preload Adjustment



1. End Cover
2. Bearing
3. Seal Back-up Washer
4. Oil Seal
5. Valve Body
6. Spool
7. Link
8. Actuator Lever
9. Reaction Control Spring
10. Reaction Control Spool
11. Spring Thrust Washer
12. Valve Centering Spring
13. Annulus
14. Washer
15. Retaining Ring
16. Linkage Cover
17. End Plug
18. Retaining Ring
19. Connectors
20. Worm and Thrust Bearing
21. "O" Ring Seals
22. Thrust Bearing Nut
23. Thrust Bearing Centering Springs
24. Adapter
25. Retaining Ring Washer
26. Retaining Washer
27. Worm Seal Retaining Washer
28. Seal Assembly
29. Seal Retaining Washer
30. Adapter Seal
31. Seal Back-up Washer
32. Spiral Retaining Ring
33. Rack-Piston Rings
34. Rack-Piston
35. Rack-Piston End Plug
36. Ball Nut
37. Ball Nut Retaining Screw
38. Balls
39. Ball Return Guides
40. Ball Return Guide Caps
41. Pitman Shaft
42. Lash Adjuster Screw
43. Shim
44. Number Not Used
45. Number Not Used
46. Lash Adjuster Screw Nut
47. Side Cover
48. Housing
49. Bushing
50. Oil Seal
51. Washer
52. Dust Seal
53. Washer
54. Retaining Ring
55. Valve Retaining Screws
56. End Cover Retaining Screws
57. Side Cover Retaining Screws
58. Thrust Bearing Lockwasher

Fig. 69 Power Steering - Exploded View

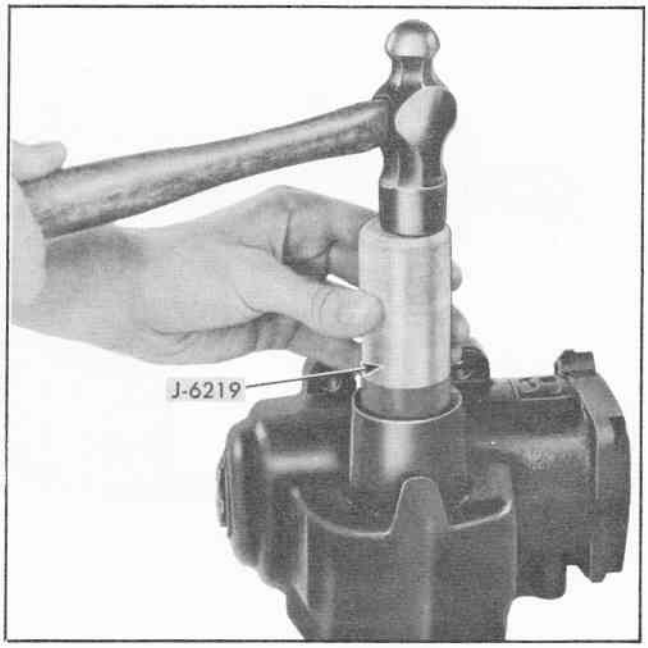


Fig. 70 Replacing Pitman Shaft Seal

ASSEMBLY OF POWER STEERING GEAR

NOTE: Lubricate all parts as they are assembled. See Fig. 69 - Exploded View.

ASSEMBLY OF HOUSING

1. Install pitman shaft oil seal using tool J-6219 (Fig. 70).
2. Install seal back-up washer, leather dust seal, washer and retainer ring, using snap ring pliers J-4245. Make certain that retaining ring is properly seated.

ASSEMBLY OF RACK-PISTON, WORM AND NUT

1. Install thrust bearing assembly with centering springs toward worm. Install thrust bearing nut and tighten to obtain proper preload as outlined in step 5 (page 130).
2. Lubricate adapter seal and "O" ring and install on adapter. Install seal retaining washer and spiral retaining ring. Assemble adapter to worm being careful not to damage seal when passing over worm grooves. Slide ball nut over worm up to adapter with chamfered edge away from worm shoulder (Fig. 71).
3. Align ball return guides with worm groove. Load 17 balls into ball nut. Drop balls into return guide hole farthest from adapter while slowly rotating worm counterclockwise to feed balls through circuit (Fig. 72).
4. Fill one-half of ball return guide with remaining 6 balls. Place other half of guide over balls and plug each end with heavy grease to prevent balls from falling out when installing guide into ball nut (Fig. 73). Push guide into guide holes in ball nut (Fig. 74). If the guide does not push down easily, tap guide lightly with a soft hammer to seat it. Wrap a strip of tape around ball nut and guide to prevent the guide from falling out.

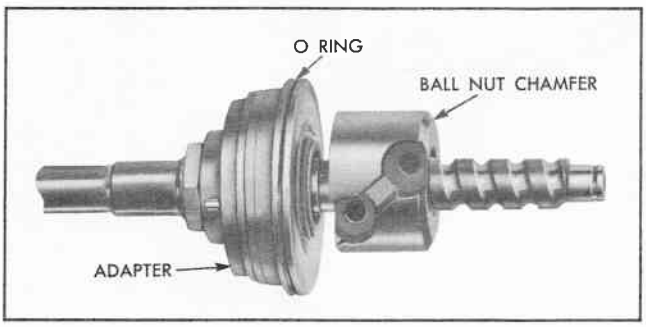


Fig. 71 Shaft, Ball Nut and Adapter Assembly

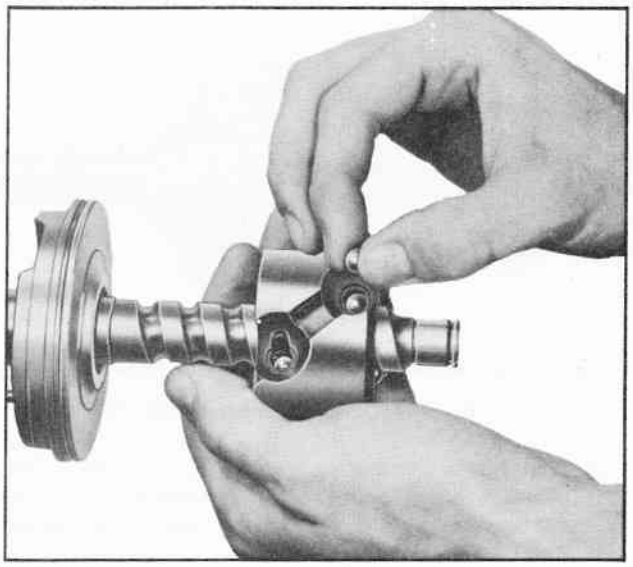


Fig. 72 Loading Balls Into Ball Nut

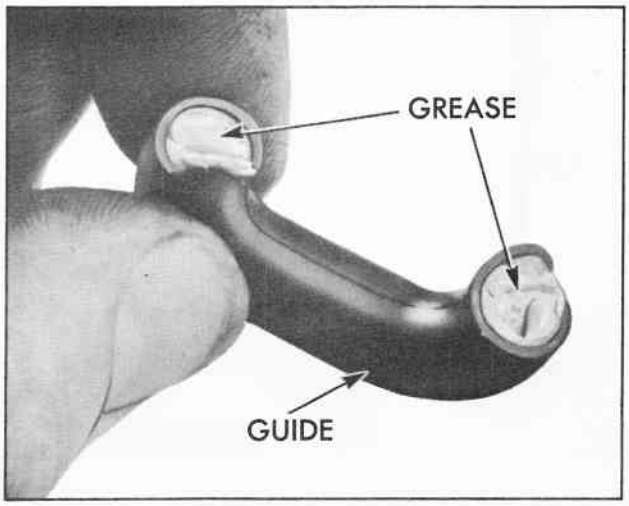


Fig. 73 Ball Return Guide

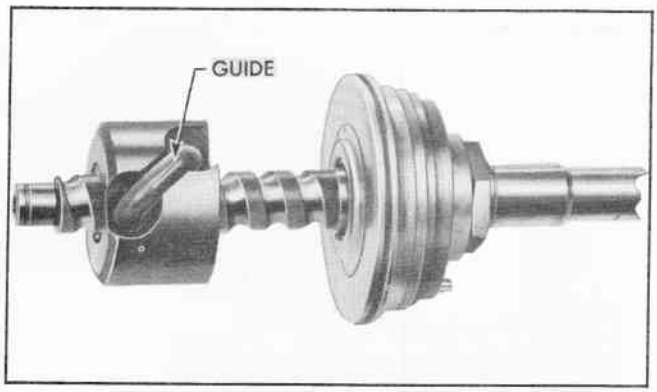


Fig. 74 Ball Guide in Place in Ball Nut

5. The worm groove is ground to provide a "High Point" through center. To measure preload, clamp worm in a vise using soft jaws, fasten a cord to ball nut and wind it around two or three times. Using spring scale J-5178 (Fig. 75) slowly pull, unwinding the cord and rotating ball nut over "High Point". Reading after nut has started to rotate should be between two and six lbs. If preload is below two lbs., install set of next larger balls and recheck (see table). If preload is over six lbs., install next smaller size balls and recheck. NOTE: Ball size used in original assembly is marked on outer diameter of ball nut. Due to wear or use of new parts, it is sometimes necessary to use a size different than indicated.

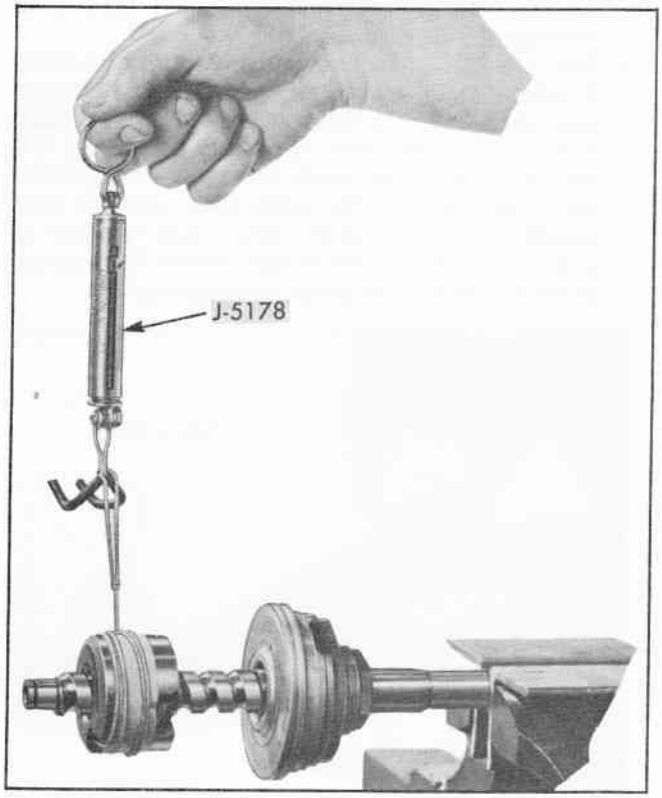


Fig. 75 Measuring Preload of Ball Nut Using Tool J-5178

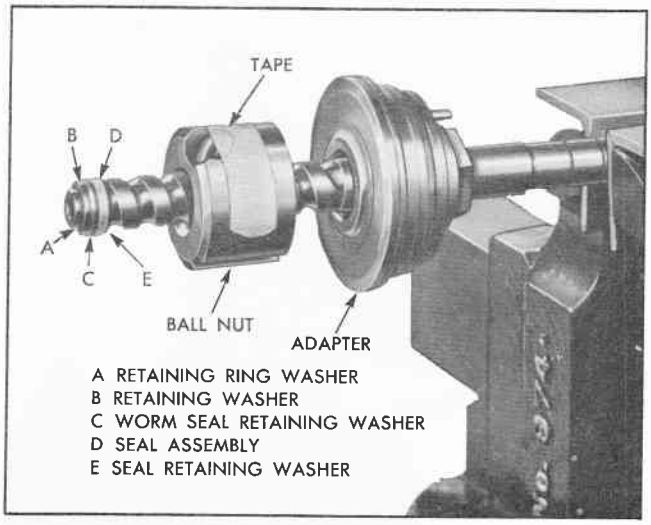


Fig. 76 Worm Shaft, Seal and Washers Installed

SELECTIVE SIZES OF STEERING NUT BALLS

Code	Diameter	Part
1	.28077"	5684001
2	.28085"	5684002
3	.28093"	5684003
4	.28101"	5684004
5	.28109"	5684005
6	.28117"	5684006
7	.28125"	5684007

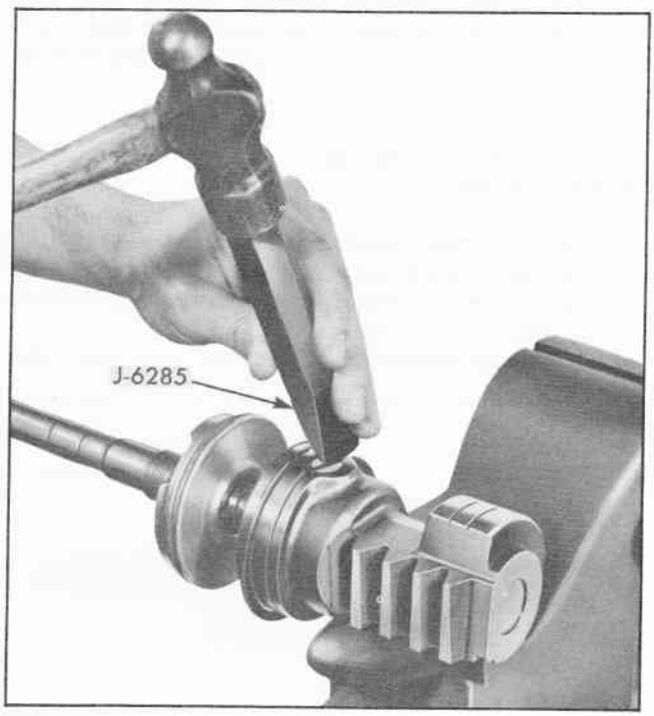


Fig. 77 Staking Ball Nut Retainer Screw

8	.28133"	5684008
9	.28141"	5684009
10	.28149"	5684010
11	.28157"	5684011
12	.28165"	5684012
13	.28173"	5684013

6. Install seal retaining washer, seal assembly, worm seal retaining washer, retaining washer, and retaining ring washer (Fig. 76).
7. Lubricate worm seal, remove tape from ball nut, install ball nut guide caps, and install in rack-piston, being careful not to damage worm seal.
8. Install ball nut retaining screw and tighten to 20 to 25 lb. ft. torque using Tool J-6223. Stake screw securely in two places using Tool J-6285 (Fig. 77). Lubricate piston rings and install on rack-piston.

ASSEMBLY OF END COVER AND MAST JACKET

1. Lubricate needle bearing with wheel bearing lubricant and install in end cover using Tool J-5188 (Fig. 78). NOTE: The bearing identification marks must be against shoulder of tool.
2. Install back-up washer.
3. Lubricate oil seal and install. NOTE: Tool J-5188 is used to install bearing and oil seal in end cover.

ASSEMBLY OF PITMAN SHAFT AND RELATED PARTS

1. Check end play of lash adjuster screw in slot of pitman shaft by inserting a feeler gauge between head of screw and bottom of slot (Fig. 79). If end play exceeds .002", select proper shim to give less end play. The shims are available in four different thicknesses: .063", .065", .067" and .069".

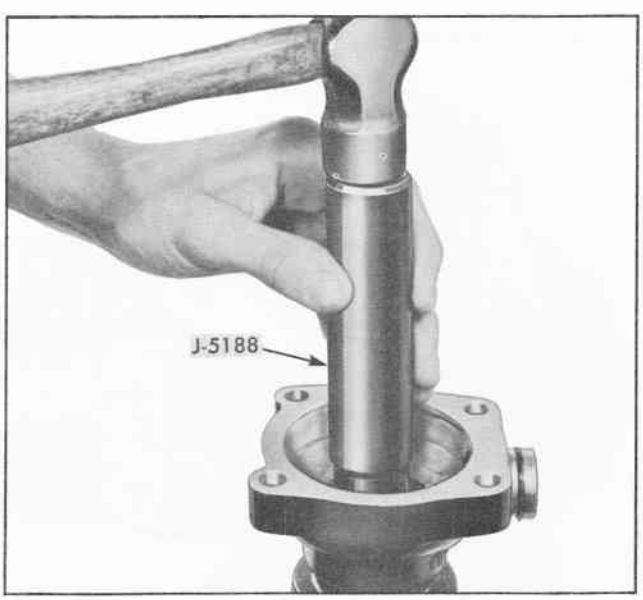


Fig. 78 Replacing End Cover Bearing or Seal

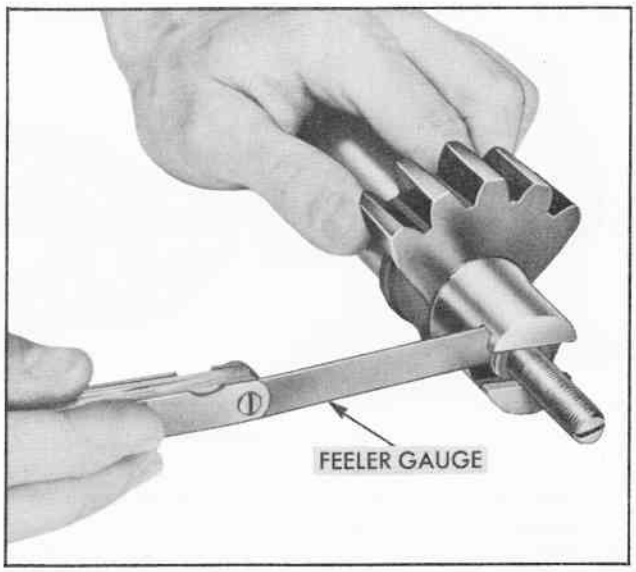


Fig. 79 Checking End Play of Lash Adjuster Screw

2. Assemble side cover on pitman shaft. Screw lash adjuster screw through side cover until side cover bottoms on pitman shaft. Lubricate side cover "O" ring seal and install in groove in face of side cover.
3. Install lash adjuster screw and lock nut.

ASSEMBLY OF CONTROL VALVE

1. Thoroughly clean all parts and lubricate internal parts.
2. Clamp spool in vise on lower end and install reaction control spring and spool. Assemble spring thrust washer and valve centering spring on spool. Lubricate new annulus "O" ring seals and install on annulus. Assemble annulus on spool with the narrow land of the annulus toward the spring.
3. Hold annulus down on spool compressing spring assembly and thread link into spool. Tighten to 8-10 lb. ft. torque using tool J-6224.
4. Remove spool from vise and carefully insert assembly into valve body. The spool and valve body are selective fits and have very little clearance, only if properly started can spool be assembled

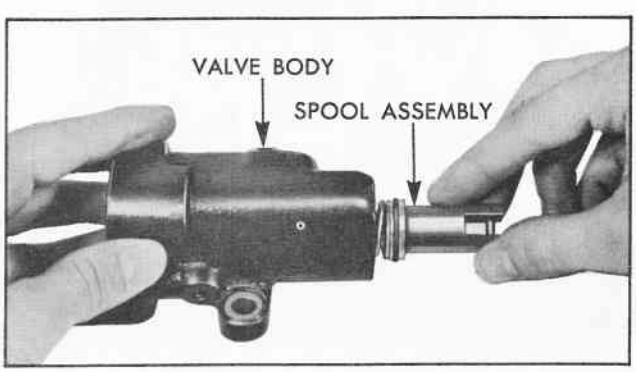


Fig. 80 Spool Assembly Started in Valve Body

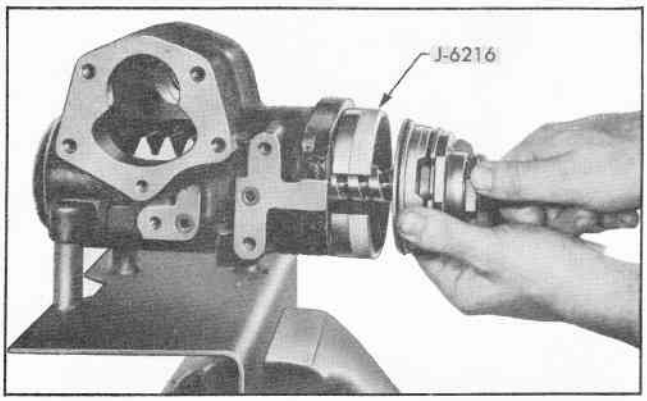


Fig. 81 Replacing Rack-Piston

(Fig. 80). NOTE: Do not attempt to force spool assembly into valve body.

5. Install annulus retaining washer and retaining ring making certain that retaining ring is properly seated.
6. Lubricate new end plug "O" ring seal. Install end plug and end plug retaining ring in valve body, making certain that retaining ring is properly seated.

REPLACEMENT OF RACK-PISTON, WORM, AND NUT IN HOUSING

1. Install ring compressor Tool J-6216 to compress piston rings and hold tightly against shoulder of housing and push rack-piston assembly into housing until piston rings are into cylinder bore (Fig. 81).
2. Remove ring compressor. Turn worm counterclockwise to give clearance. If more clearance is needed, push rack-piston assembly into housing until adapter is seated in housing counterbore.
3. Align actuator lever relief on adapter with control valve mounting face on housing (Fig. 82).

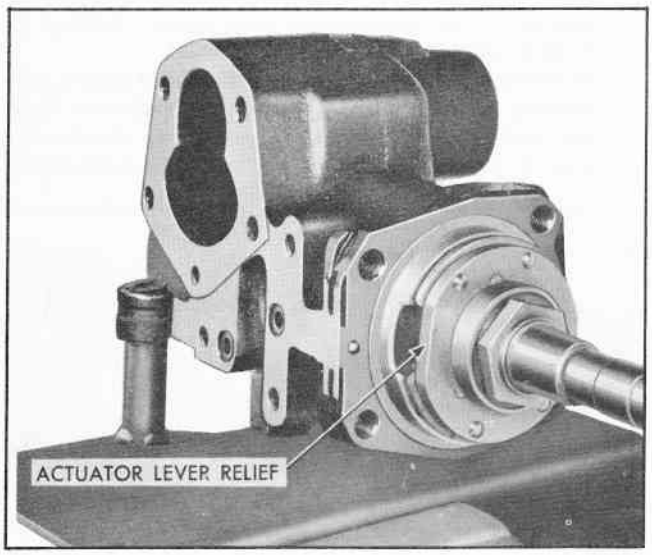


Fig. 82 Actuator Lever Relief Aligned on Adapter

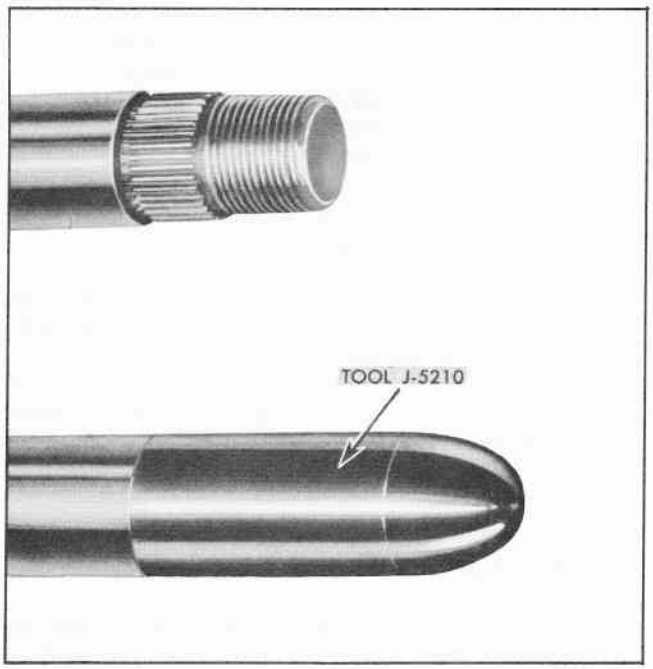


Fig. 83 Tool J-5210 Installed on Steering Shaft

Install tool J-5210 over serrations at steering wheel end of shaft (Fig. 83).

REPLACEMENT OF END COVER ASSEMBLY ON HOUSING

1. Assemble end cover over worm and adapter making certain that adapter pin enters pilot hole in end cover. Align end cover holes with housing holes and install retaining screws and lockwashers. Tighten to 25-30 lb. ft. torque.
2. Install actuator lever in end cover making certain that it is seated over thrust bearing center race. The actuator lever should enter freely into the end cover bore.

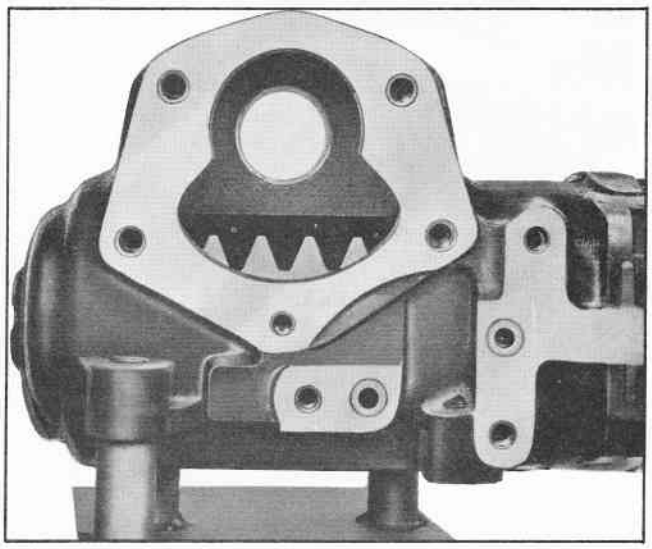


Fig. 84 Centering Rack-Piston

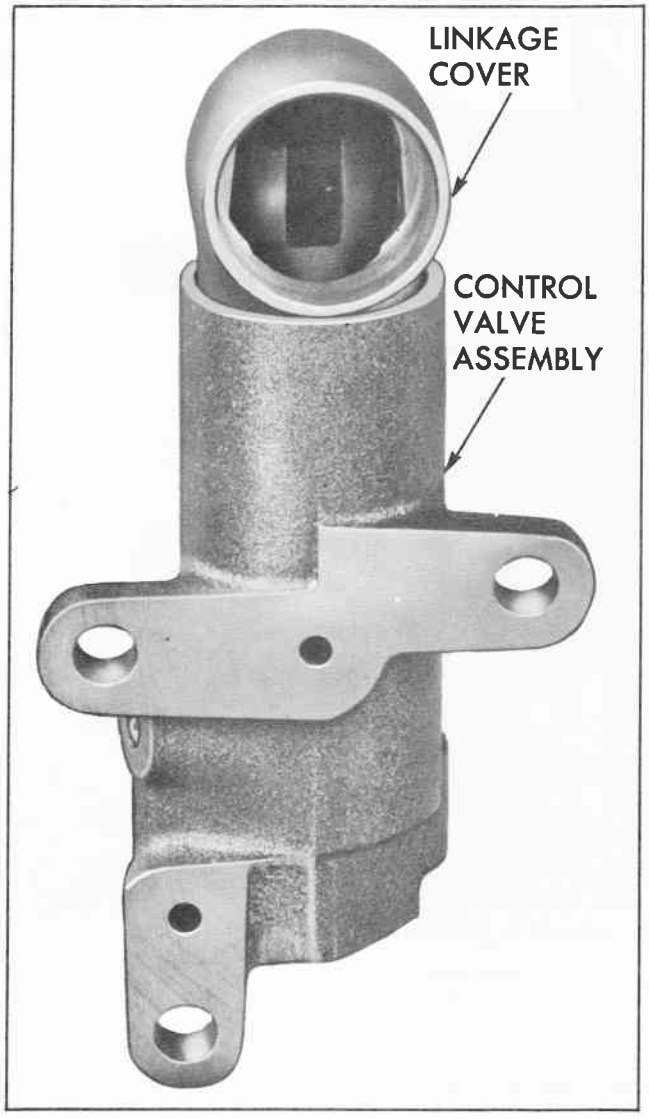


Fig. 85 Control Valve and Linkage Cover

REPLACEMENT OF PITMAN SHAFT AND RELATED PARTS

1. Turn worm shaft until center groove of rack-piston is aligned with center of pitman shaft bushing (Fig. 84). Tape serrations of pitman shaft before installing to protect oil seal.
2. Install pitman shaft so that the center tooth in the sector meshes with the center groove of rack-piston. Make sure that side cover "O" ring is in place before pushing side cover down on gear housing.
3. Install four 3/8" and one 5/16" side cover screws finger tight. Tighten flat head screw first. Tighten all screws to 15-30 lb. ft. torque.

REPLACEMENT OF CONTROL VALVE ASSEMBLY ON HOUSING

1. Lubricate linkage cover "O" ring seal and install on linkage cover and assemble to control valve. Position valve link so that slot is perpendicular with bottom of valve (Fig. 85).
2. Lubricate new housing valve port "O" ring seals and assemble to housing.
3. Position control valve and linkage cover over gear housing and end cover. Start the actuator lever into link slot and then push down on linkage cover until valve is seated on housing.
4. Install control valve retaining screws starting with screw on lower end of control valve, tighten to 15 to 20 lb. ft. torque (Fig. 86). NOTE: Be sure not to force valve in either direction while tightening retaining screws as this will cause malfunctioning of the valve.

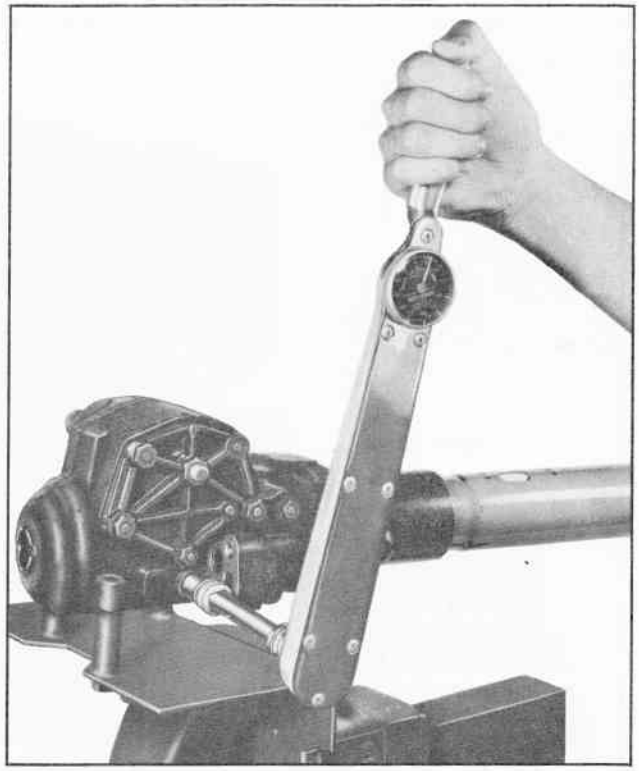


Fig. 86 Tightening Control Valve Retaining Screws

INSTALLATION OF POWER STEERING GEAR IN CAR

1. With hairpin spring retainer removed, move brake pedal as far to right as it will go.
2. Push steering connecting linkage down and toward rear and install steering gear assembly by guiding between lower control arm and steering connecting linkage. Remove tool J-5571 hold down hook.
3. Install top front steering gear housing to frame bolt with lockwasher finger tight. CAUTION: Be sure to install shims which were between steering gear housing and frame when unit was removed.
4. Install steering column lower bracket with lockwashers and bolts to upper bracket on instrument panel.

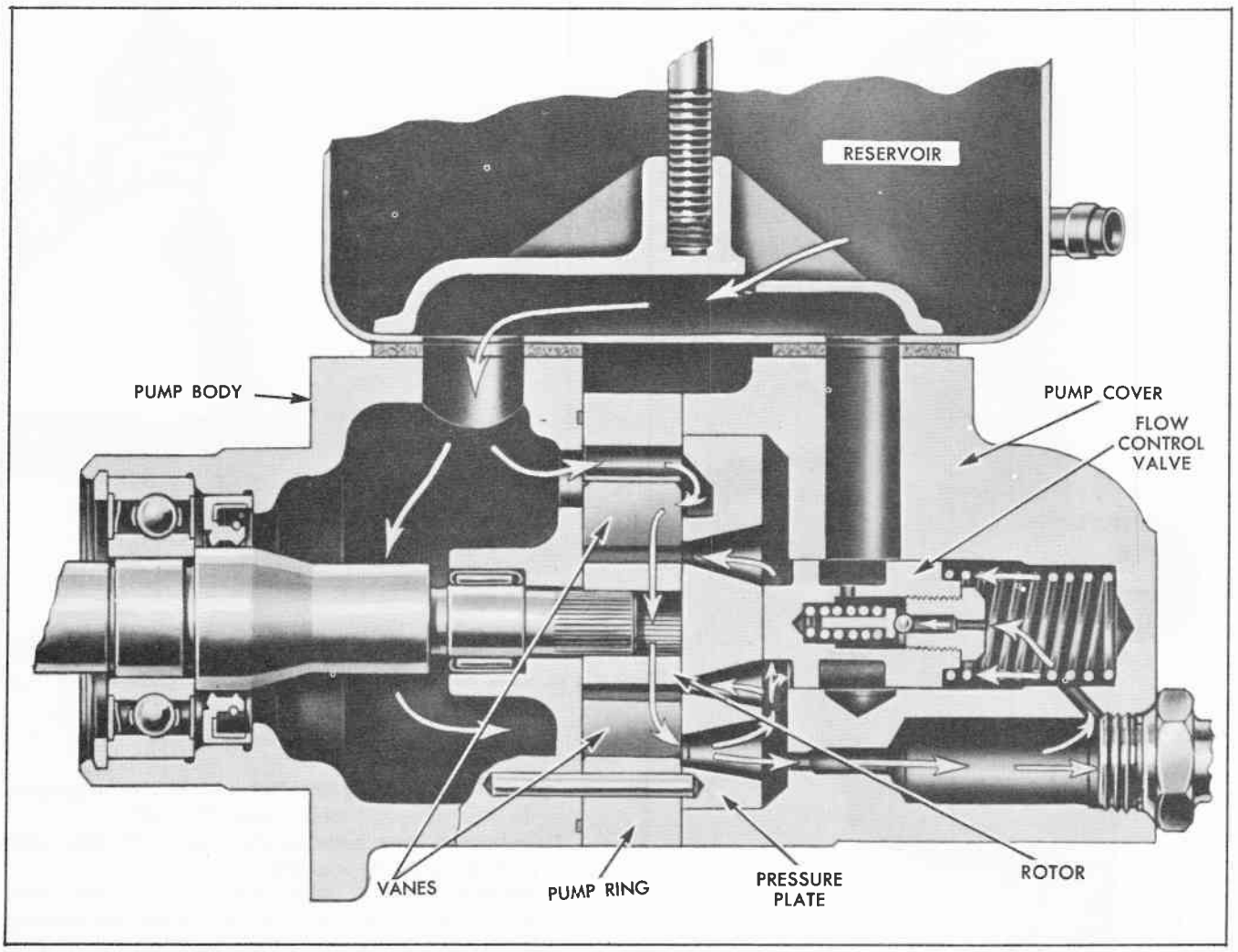


Fig. 87 Low Speed During a Partial Turn

5. Install two remaining steering gear housing to frame bolts with plain and lockwashers and tighten all three bolts.
6. Check for correct shimming of steering gear housing to frame by seeing if steering column aligns with upper bracket when bracket bolts are loosened. If alignment is correct, tighten steering column bracket bolts. NOTE: If misalignment exists, it will be necessary to change steering gear housing to frame shims to correct alignment.
7. Position brake pedal and install hairpin retaining spring.
8. Connect direction signal wires.
9. Connect power steering oil lines to gear.
10. Connect gear shift and selector rods.
11. Install engine left side pan.
12. Install pitman arm and secure with lockwasher and nut. Tighten nut to 100 to 125 lb. ft. torque.
13. Install starter motor.
14. Install neutralizer and back-up light switch on Hydra-Matic equipped cars.
15. Install pedal plates, floor mat and position steering column jacket rubber grommet on floor.
16. Install direction signal switch handle and gear-shift lever.
17. Install steering wheel.
18. Check fluid level in pump reservoir. Fluid should be up to oil level mark in reservoir. If not, add Hydra-Matic fluid or Automatic Transmission fluid identified by an AQ-ATF qualification number. With front wheels off floor start engine and bleed hydraulic system by manually steering through cycles several times until there is no evidence of air bubbles in reservoir. Recheck fluid level.

IN-LINE POWER STEERING VANE TYPE PUMP GENERAL DESCRIPTION

The power steering gear pump is mounted on the engine in position to be driven by a belt from the crankshaft pulley. The pump components are explained in the following paragraphs.

The pump body is the intake or low pressure side of the pump and houses two bearings, drive shaft and

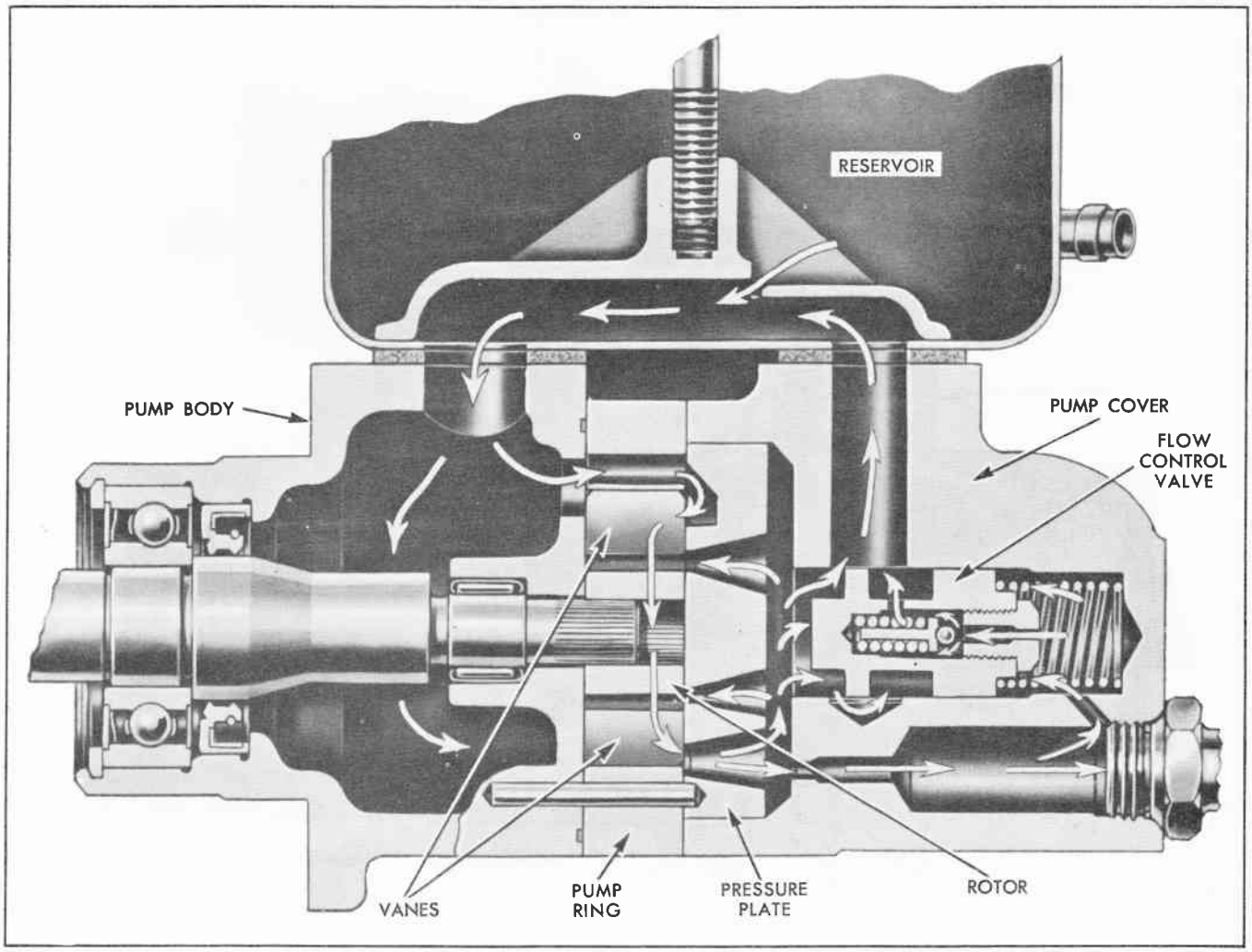


Fig. 88 Steering Wheel Turned Against Resistance

seal. The pump body is directly connected to the pump reservoir through an opening at the top. The face of the pump body has two kidney shaped slots which function as intake ports.

The pump ring is a flat plate with a cam surface opening. The ring is located next to face of pump body by two dowel pins (Figs. 87 and 105).

The pressure plate contains four kidney shaped openings, two for intake and two for discharge. It is located next to pump ring by the same dowel pins which locate the pump ring.

The pump cover also is located next to the pump ring and encircles the pressure plate. It is located by four bolts which hold the pump together. The cover also houses the flow control valve and spring and is provided with the pressure fitting for the external circuit (Figs. 88 and 105).

The reservoir provides oil storage space and a means of directing return oil back to intake side of the pump.

The drive shaft is belt-driven by the crankshaft at a 1.31 ratio to engine r.p.m.

The pump rotor is loosely splined to end of drive shaft and is located next to face of pump body and is encircled by the pump ring. It contains ten vanes freely mounted in radial positions (Figs. 89 and 105).

DESCRIPTION OF OPERATION OF VANE TYPE OIL PUMP

As the drive shaft rotates the rotor, the vanes follow the cam surface machined in the pump ring. This cam consists of two rising and two falling areas, and, therefore, cause a complete pumping cycle to occur every 180° rotation.

The spaces between vanes pick up oil on rising portions of cam from two kidney shaped slots in pump body and two in pressure plate. Feeding of kidney shaped slots in pressure plate is accomplished by cross-over holes in pump body. This oil is then discharged on falling portion of cam through two other

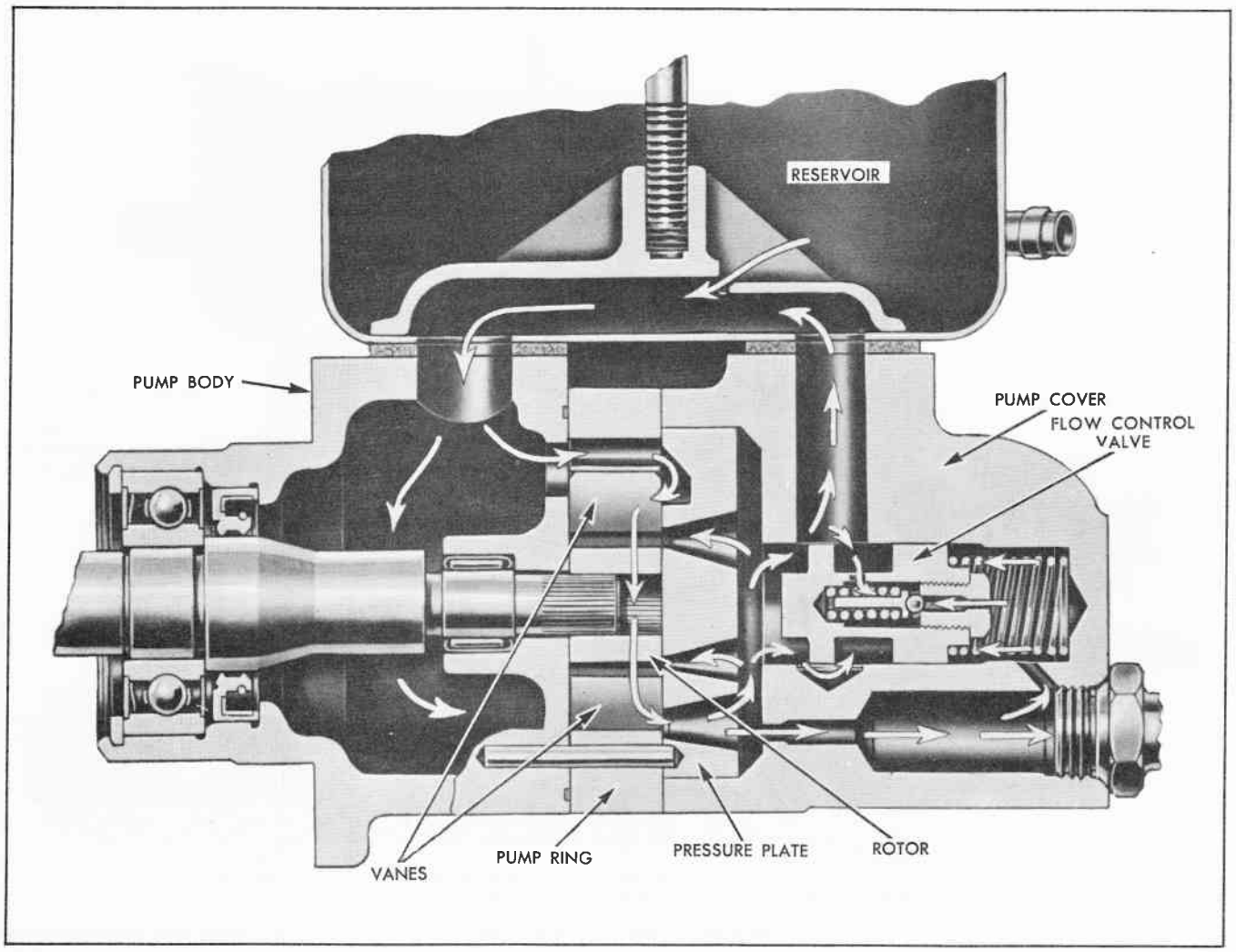


Fig. 89 Straight Ahead Position

kidney shaped openings in pressure plate only. The oil passes through pressure plate into the cavity behind it. A portion of this oil is directed back through other passages in pressure plate so that it may enter behind the vanes forcing them to follow cam surface of pump ring (Fig. 90).

The remainder of discharged oil up to 2.2 gallons per minute passes through an orifice in pump cover and out of pump. This orifice is so calibrated that any flow in excess of 2.2 gallons per minute will cause a pressure drop across the orifice large enough to force the flow control valve back against the spring pressure of flow control spring. The small hole which communicates between the downstream side of orifice and cavity behind flow control valve causes excess oil flow to pass into return passage where it joins oil returning from external circuit and passes through reservoir plate into intake side of the pump.

The pressure relief valve is contained inside flow control valve. If pump pressure exceeds a certain predetermined pressure (975-1075), pressure relief ball will open allowing a small amount of oil to flow through flow control valve and into reservoir. This flow of oil causes a pressure drop across the communicating hole thus creating a pressure which moves flow control valve back against spring pressure and allowing the major portion of oil to pass into return passage.

Fig. 87 is typical of pump operating when car is being driven at low speed during a partial turn. The oil pressure cannot build up high enough to cause the pressure relief valve to open as external circuit still allows some oil to flow through the system. Also the flow of oil is less than 2.2 gallons per minute, therefore, flow control valve is completely closed.

Fig. 88 is typical of pump operating with medium to high engine speeds when turning steering wheel against resistance and control valve in steering gear is closed. In this case maximum pump pressure is developed and pressure relief occurs as described above.

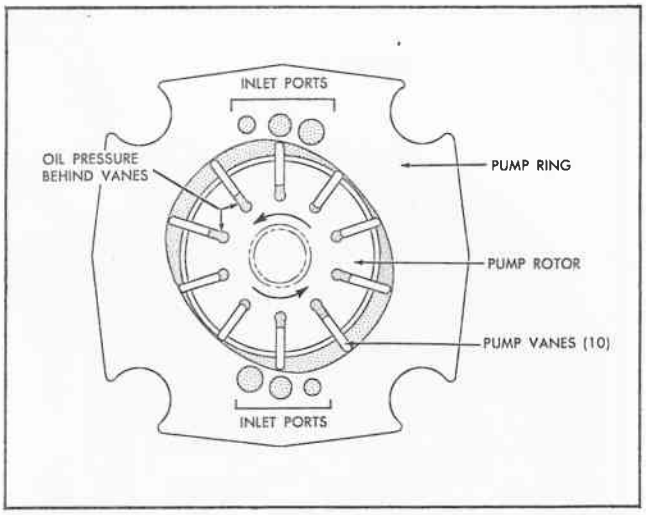


Fig. 90 Oil Flow in Rotor and Vanes in Pump Ring

Fig. 89 is typical of pump operating medium to high engine speeds in a straight-ahead position. In this case, the flow control valve has opened to allow all oil flow in excess of 2.2 gallons per minute to by-pass into the reservoir.

PERIODIC SERVICE RECOMMENDATIONS

No periodic service of the pump is required except checking oil level in reservoir as outlined in general lubrication section.

PUMP BELT TENSION ADJUSTMENT

Loosen pump to bracket bolts two full turns so pump falls of its own weight. Place pump belt tightener J-5574, over head of hinge bolt as shown in Fig. 91. Using torque wrench perpendicular to tool, tighten a new belt 58-65 lb. ft. or a used belt 51-53 lb. ft.

Tighten clamp bolt. Remove tool and tighten mounting bolt.

REMOVAL OF PUMP FROM CAR

1. Cover generator to protect it from spillage of oil.
2. Disconnect hoses at unions on pump. Where hoses are disconnected, secure ends in a raised position to prevent drainage of oil.
3. Install two caps at pump fittings to prevent drainage of oil from pump.
4. Remove drive pulley attaching nut.
5. Loosen bracket-to-pump mounting bolts.
6. Remove pump belt.
7. Slide pulley from shaft. NOTE: Do not hammer pulley off shaft as this can damage the pump bearings.
8. Remove bracket-to-pump bolts.
9. Remove pump.

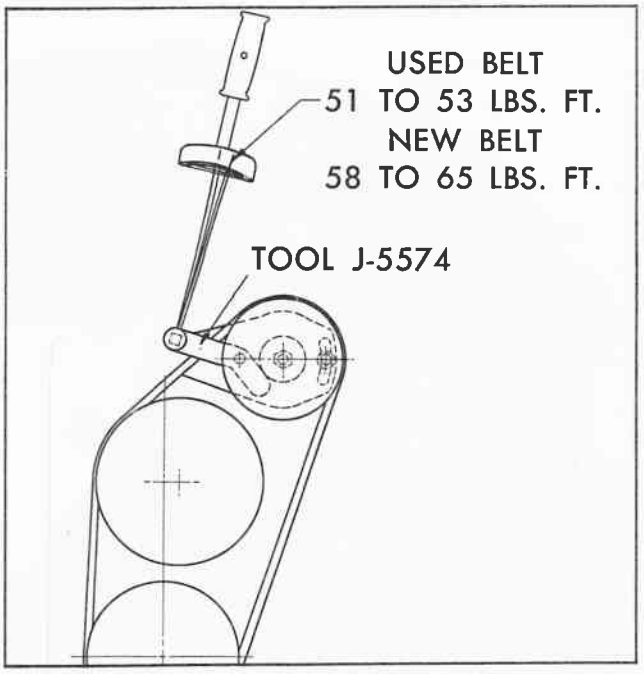


Fig. 91 Adjusting Pump Belt Tension

REPAIRS

(The following operations must be done after disassembly.)

FLOW CONTROL VALVE

If flow control valve is stuck, dislodge by jarring front of pump cover. If pump cover control valve bore is worn or scored, replace pump cover. Disassemble flow control valve and if internal parts are found to be worn or scored, replace assembly. NOTE: The control valve assembly is calibrated at the factory and components of assembly cannot be serviced.

INTERNAL GROUND SURFACES OF PUMP

If pressure plate, pump body, rotor, or pump ring is scored, the following corrections can be made. On a flat surface lap the scored surfaces with a lapping compound until the surfaces are smooth. NOTE: Thoroughly clean in a suitable solvent when lapping operation is completed.

REPLACEMENT OF DRIVE SHAFT INNER AND OUTER BEARINGS

1. With pump body supported in vise, drive inner bearing out of pump body using tool J-6279.
2. Drive new inner bearing into pump body with stamped face toward front of pump using tool J-6280.
3. Remove outer sealed bearing by pressing from pump shaft.
4. Press new sealed bearing over threaded end of shaft with stamped face of inner race toward front of pump.

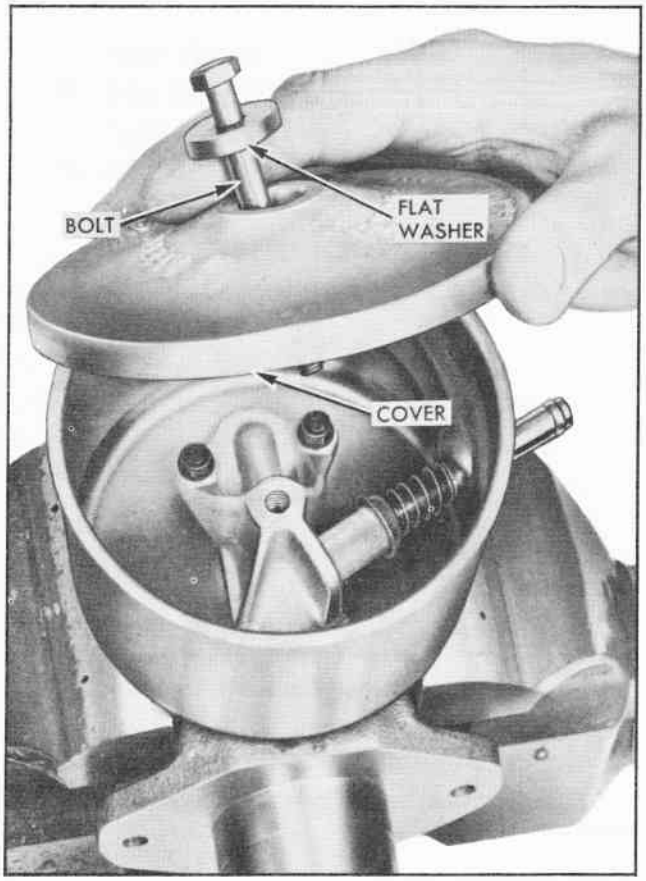


Fig. 92 Removing Reservoir Cover

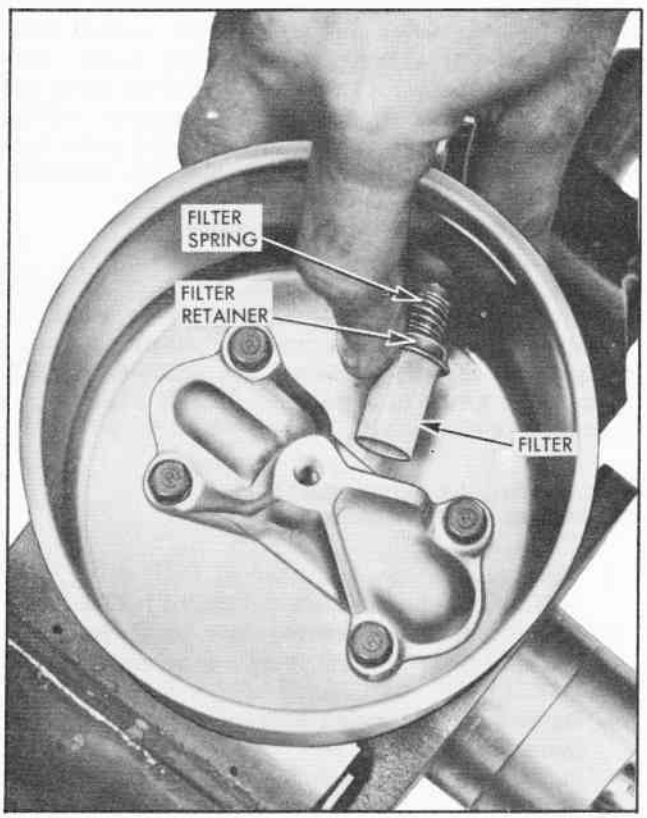


Fig. 93 Removing Filter Screen

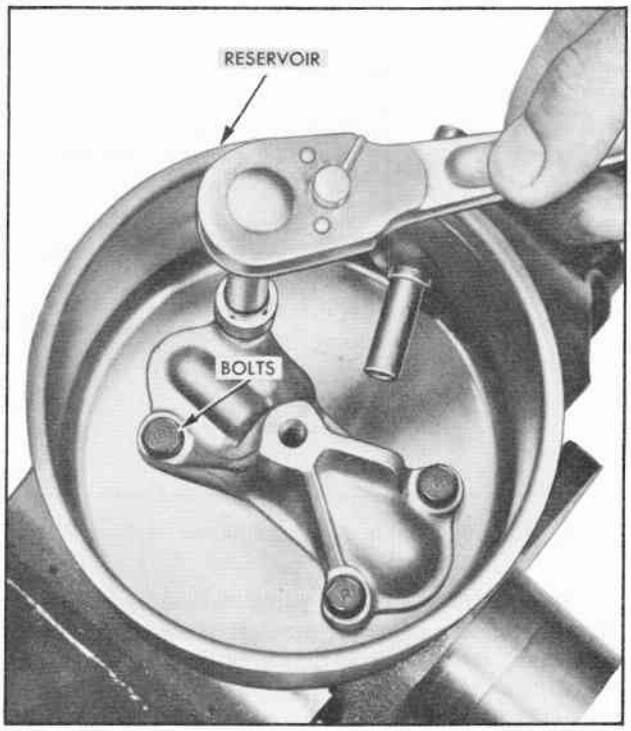


Fig. 94 Removing Pump Reservoir

DISASSEMBLY OF PUMP

1. Remove reservoir cover bolt, flat washer, and reservoir cover with gasket (Fig. 92).
2. Remove gasket from reservoir cover.
3. Remove filter screen, filter retainer and filter spring by pushing the retainer back against the spring as shown in Fig. 93.
4. Remove four reservoir-to-pump bolts (Fig. 94).
5. Remove reservoir and cork gaskets under the reservoir.

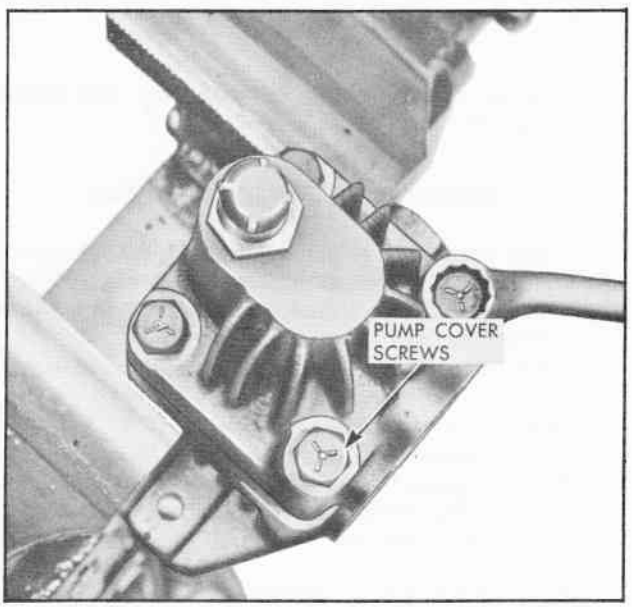


Fig. 95 Removing Pump Cover Screws

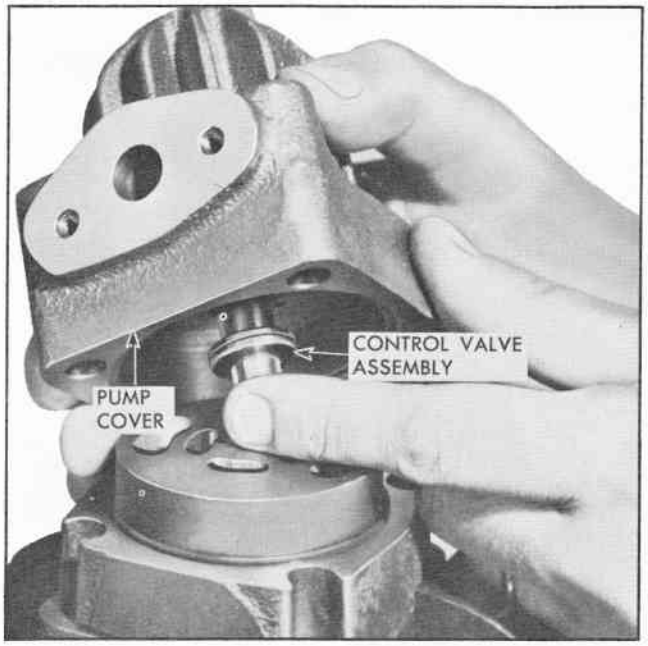


Fig. 96 Removing Pump Cover and Valve Assembly

6. Remove four pump cover to pump body attaching screws (Fig. 95). NOTE: Do not clamp on front hub of pump as this may brinell the bearing housed therein.
7. Lift pump cover with flow control valve assembly and spring from assembly. Be especially careful to insure that flow control assembly does not drop out (Fig. 96).
8. Mark position of pressure plate and remove plate from dowel pins (Fig. 97).

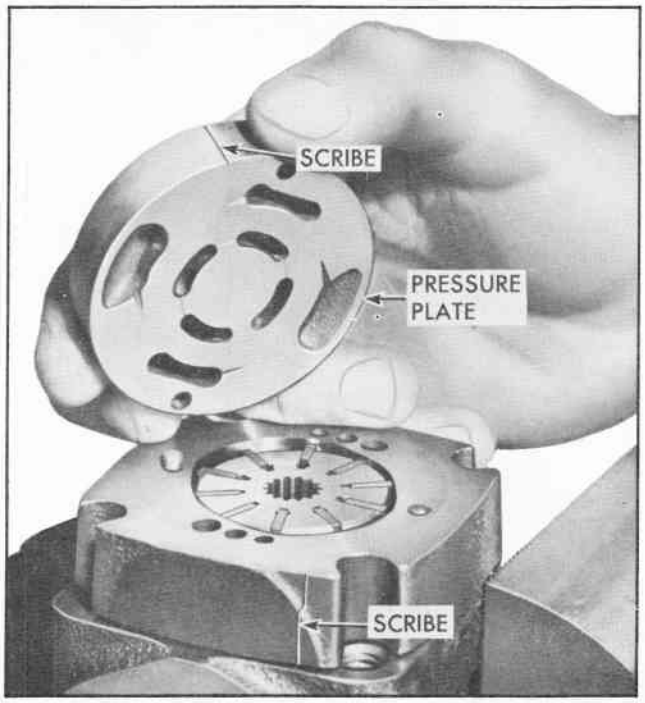


Fig. 97 Removing Pressure Plate

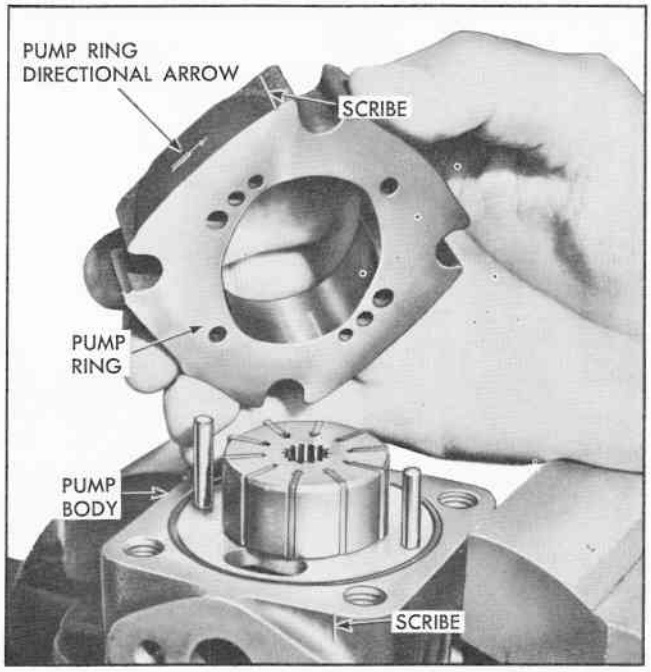


Fig. 98 Removing Pump Ring from Pump Body

9. Mark position of pump ring in relation to pump body, and remove ring from dowel pins (Fig. 98). NOTE: Arrows on outer edge of pump ring point in direction of pump rotation.
10. Remove ten pump vanes (Fig. 99).
11. Remove pump rotor (Fig. 100).
12. Remove dowel pins from pump body. Any further disassembly should be avoided unless parts are dirty or repair operations are necessary on any of the remaining parts.
13. Remove shaft bearing retainer snap ring from front hub of pump body using tool J-4245 (Fig. 101).

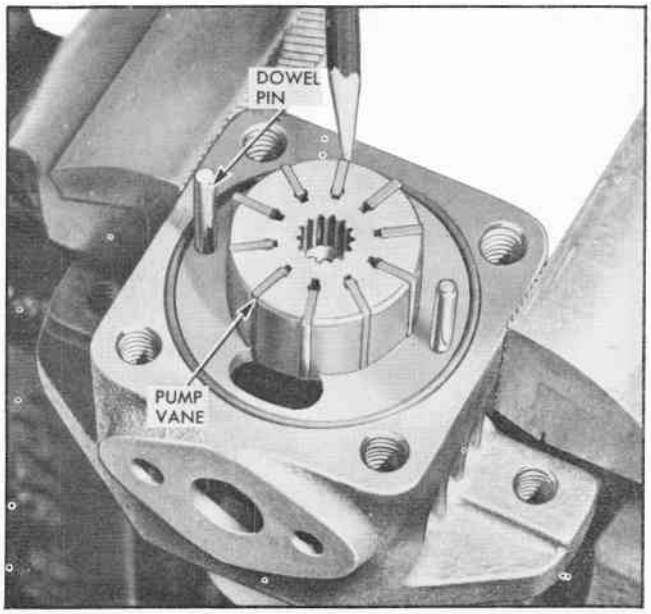


Fig. 99 Removing Pump Vanes

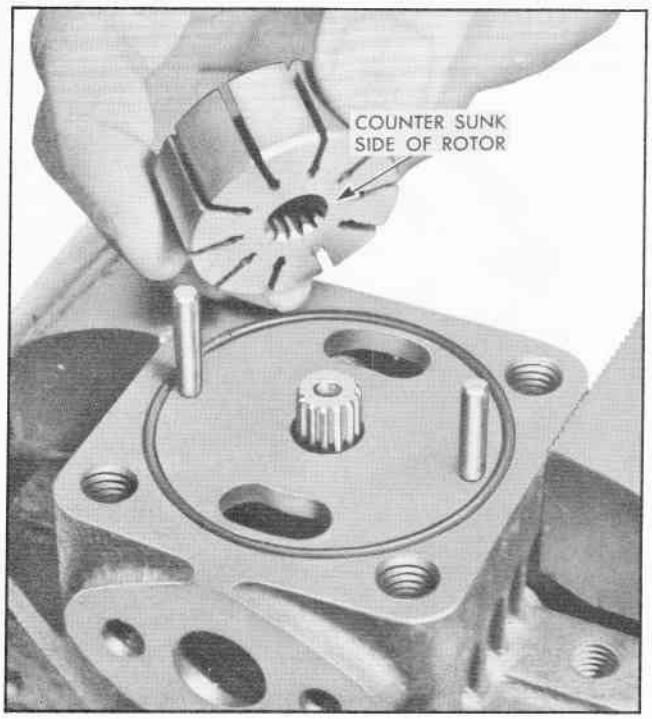


Fig. 100 Removing Pump Rotor

14. Remove drive shaft with large sealed bearing by lightly tapping on splined end (Fig. 102).
15. Remove oil seal from body with a long punch inserted through large holes in machined face of the pump body (Fig. 103).

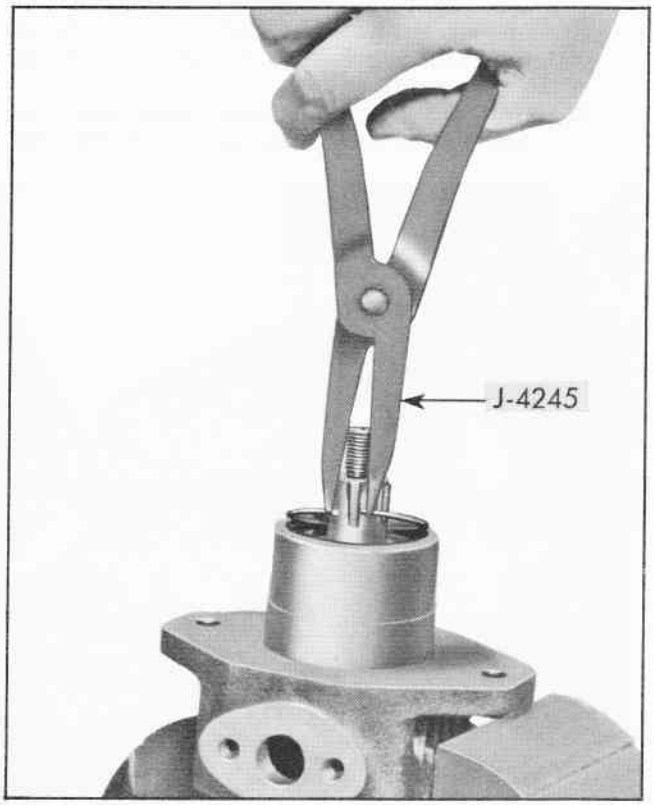


Fig. 101 Removing Bearing Retaining Rings

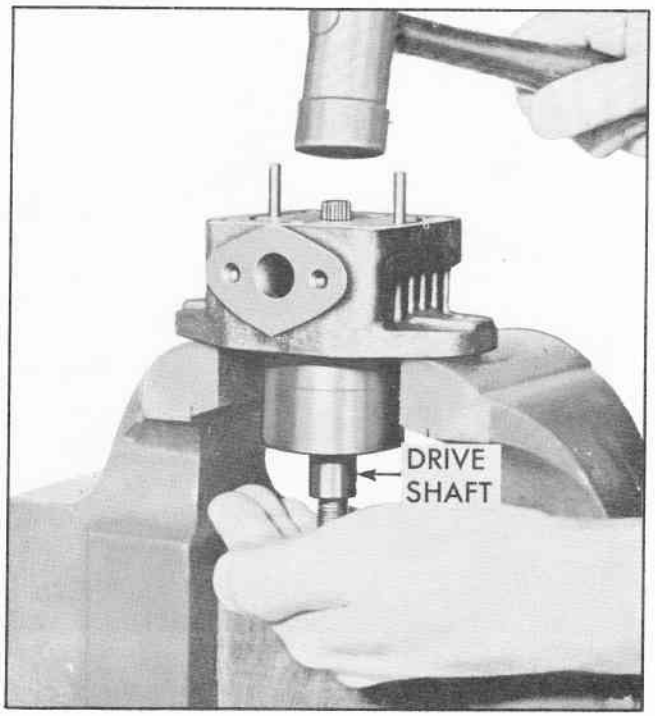


Fig. 102 Removing Pump Drive Shaft and Bearing from Pump Body

16. Remove inner needle bearing from pump body using tool J-6279 (Fig. 104).
17. Remove key from shaft.
18. Remove outer bearing by pressing from the pump shaft.

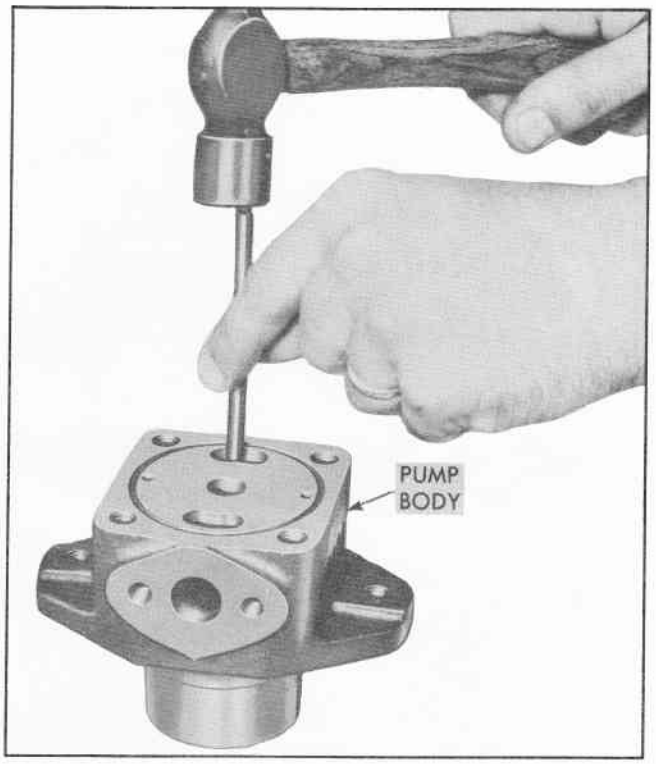


Fig. 103 Removing Oil Seal from Pump Body

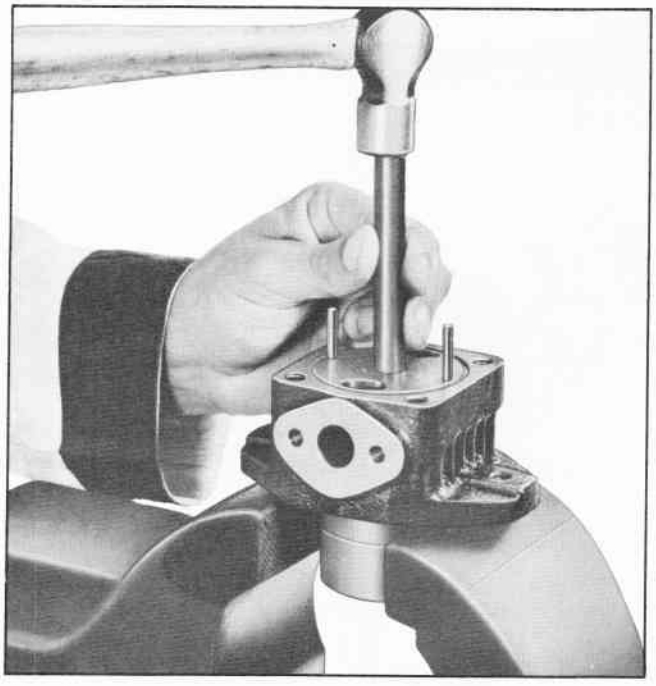


Fig. 104 Removing Inner Needle Bearing from Pump Body

CLEANING AND INSPECTION OF PUMP PARTS

1. Carefully wash all parts in a suitable cleaning solvent, except the drive shaft bearing, as the lubricant sealed into the bearing may be diluted by the solvent.
2. Inspect "O" ring seals and gaskets, if cut, damaged, or distorted, seals and gaskets should be replaced.
3. Inspect pump cover flow control valve bore for scores and wear.
4. Inspect flow control valve for being free in its bore. Inspect all passages in cover and body for obstructions or dirt.
5. Inspect pressure plate for scoring.
6. Inspect contour surface of pump ring for scoring.
7. Inspect rotor faces for metal pick up or scoring.
8. Check vanes for bind in slots of rotor.
9. Inspect face of pump body for scoring or wear.
10. Inspect bearings for roughness or noisy operation.
11. Inspect drive shaft seal surface for scratches and wear.
12. Inspect drive shaft inner and outer bearings for roughness or noisy operation.

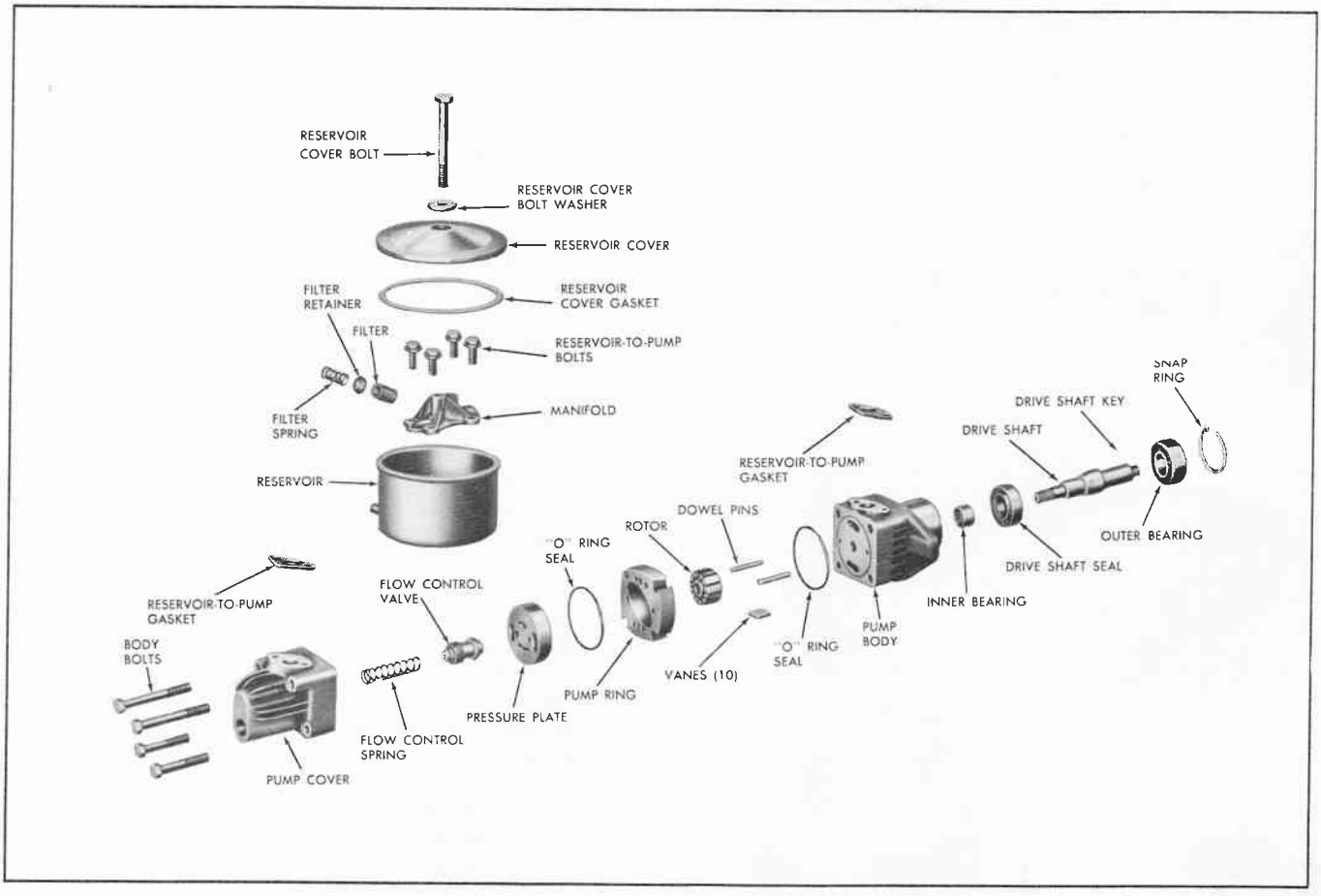


Fig. 105 Exploded View of Pump

Fig. 106 Driving Needle Bearing Into Pump Body

ASSEMBLY OF PUMP

Before assembling make sure all parts are absolutely clean. Lubricate "O" rings and all moving parts as assembled (Fig. 105 - Exploded View).

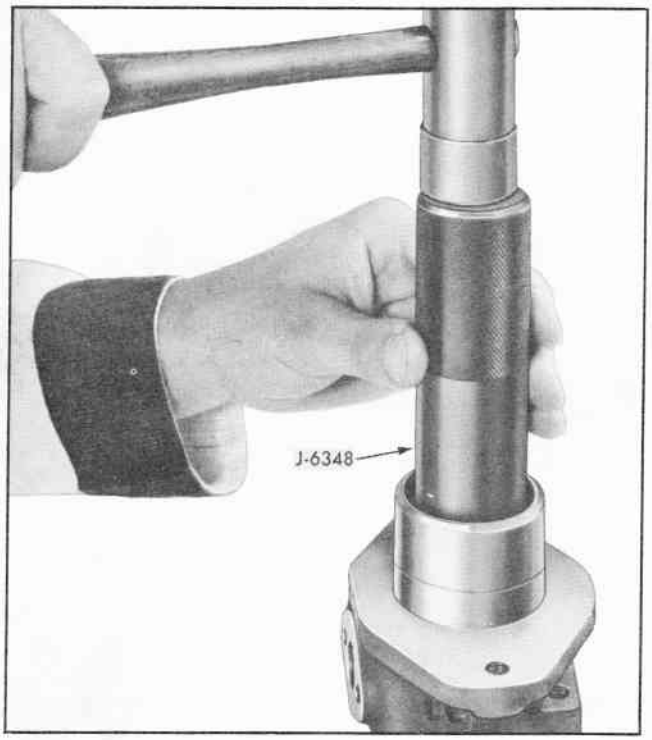


Fig. 107 Driving Shaft Seal Into Pump Body

Fig. 108 Driving Shaft and Bearing Into Pump Body

1. Press large sealed bearing over threaded end of drive shaft with stamped face of inner race toward front of pump.
2. Install key into shaft keyway. NOTE: Shaft should be supported on opposite side when installing key.
3. Install needle bearing into pump body with the stamped face toward the front of pump using tool J-6280 (Fig. 106). NOTE: Be sure needles are free to roll after installation.
4. Install shaft seal in body using tool J-6348 (Fig. 107). Install seal with the word "outside" toward front of pump.
5. With pump body in vise drive shaft and bearing assembly into pump body using pitman shaft oil seal tool J-6219 (Fig. 108).
6. Install shaft bearing retainer snap ring, using tool J-4245.
7. Install "O" ring in groove of pump body.
8. Install dowel pins in pump body. Tap lightly if necessary.
9. Install rotor over splined end of drive shaft. NOTE: Assemble rotor with countersunk side toward front of pump and be sure rotor is free on splines.
10. Install vanes in rotor slots with radius edge toward outside.
11. Install pump ring on dowel pins and position correctly according to scribed marks. NOTE: Arrow on outer edge of pump ring points to rotation of pump.

12. Install pressure plate on dowel pins. NOTE: Pressure plate must be free with no binding on dowel pins.
13. Install "O" ring around pressure plate.
14. Install flow control valve and spring in pump cover. Be sure that end with screw goes into the bore first.
15. Position pump cover assembly over pressure plate being careful not to pinch "O" ring.
16. Install four cover-to-body attaching bolts. Tighten alternately to 25-30 lb. ft. torque.
17. Install gaskets on pump body and cover.
18. Position reservoir on pump assembly with extrusions in reservoir bottom inside the smaller gasket holes and install four bolts. Tighten to 8-10 lb. ft. torque.
19. Install filter spring, filter retainer, and filter. Be sure flared end of filter retainer is toward filter.
20. Install reservoir cover with gasket bolt and washer. Tighten cover bolt to 7-9 lb. ft. torque.

INSTALLATION OF PUMP ON CAR

1. Position pump assembly on mounting bracket with holes lined up and install bolts loosely.
2. Slide pulley on shaft. NOTE: Do not hammer pulley on.
3. Install pulley nut finger tight against pulley.
4. Connect and tighten hose fittings.
5. Fill reservoir. Bleed pump by turning pulley backward (counterclockwise as viewed from front) until air bubbles cease to appear.
6. Install pump belt over pulley.
7. Move pump outward until belt is properly adjusted. See Pump Tension Adjustment (page 137).
8. Tighten pulley nut to 35-45 lb. ft. torque.

TROUBLE DIAGNOSIS AND TESTING

The power steering pump is not completely noiseless. Some noise will be present at standstill parking, particularly when wheels are against the wheel stops.

Power steering pump noise can be confused with many other noises, such as transmission, rear axle, generator, etc. If it is determined that excessive noise is present, remove the pump drive belt, determining for sure if the pump is at fault. If it is determined that excessive pump noise is present, see Noisy Pump After Refilling Reservoir.

STEERING KNOCKS WHILE TURNING WITH ENGINE RUNNING

Improper pitman shaft adjustment.

STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING

Loose pump belt.

NOISY PUMP AFTER REFILLING RESERVOIR

1. Check oil level, fill reservoir to level mark if necessary.
2. Check belt adjustment and all fittings and bolts to insure tightness.
3. Check to make sure hoses are not touching any other parts of car, particularly sheet metal.
4. Be sure there is no air present in oil. Air will show up as bubbles or the oil will appear milky. Very small amounts of air will cause extremely noisy operation. If it is impossible to expell all air, either air is leaking in the system or air is trapped in steering gear cylinder.
5. Air trapped in cylinder should be bled as described for the steering gear. (See page 134) Air can leak into the system at any place. Air leaks usually occur at joints in the system where oil passes through at high velocity, such as hose connections. Air can leak into system where no external oil leakage appears.
6. If after Step 4 there is no air present, install pressure gauge in the pressure line between the pump and gear. If, when racing engine to about 1000 RPM and without turning the steering wheel, the pressure exceeds 125 lbs., hoses and/or steering gear are restricting oil flow and these parts should be examined to determine cause of restriction.
7. If the pressure in Step 6 is normal (less than 125 lbs.) and the pump is noisy it will be necessary to remove pump from car and disassemble or partially disassemble following the steps outlined under DISASSEMBLY OF PUMP (page 138).

WATER IN FLUID

Should the fluid be cloudy, i.e., have the appearance of a mixture of coffee with cream, it is due to water being in the system. Once water is in the system there is no way to clarify the fluid so it is necessary that the fluid be replaced. This can best be done by removing the pump return pipe or flexible hose and catching the discarded fluid in a container. Pump the system as clear as possible, then fill with new fluid and cycle the steering from extreme right to extreme left and in this way force out all of the contaminated fluids. When the fluid being pumped through the return hose shows clean of this clouded mixture, connect the hose to the pump, fill the reservoir and again cycle the unit while the pump is operating until there is no evidence of air bubbles in the reservoir. Again fill the reservoir to level and install cover.

HARD STEERING WHEN PARKING

When engine is idling, car stopped, and steering wheel is turned in an effort to park, normal effort required at steering wheel rim is approximately 5 pounds with oil at normal operating temperature between 150°F. and 170°F. measured with a thermometer in the reservoir.

Temperature will build up if steering wheel is turned from side to side with car standing. Therefore, if a complaint of hard steering when parking is encountered, carefully follow procedure below:

Simulate parking by applying hand brake and turning wheels on a clean dry service floor. If effort exceeds 5 pounds when checked with spring scale J-5178, make the following checks:

1. Check pump drive belt tension and adjust. (See page 137).
2. Check for lack of lubrication in steering gear, linkage and front suspension.
3. Test tires for proper inflation and inflate to recommended pressures.
4. Check tie rod and connecting rod ball seats for being too tight.
5. Check steering pitman shaft adjustment. See Adjustments on Car (page 121).
6. Check lines and gear for signs of oil leakage.
7. If the above mentioned checks and their corrections do not eliminate the difficulty, perform pressure test.

PRESSURE CHECK

TEST NO. 1 - OIL CIRCUIT OPEN

1. Install pressure gauge in pressure line between pump and gear and turn valve to open position. NOTE: Use present pressure gauge J-5176 (Fig. 89) for 1200 lb. pressure reading. Mark gauge face below 1000 lb. reading with a line using same distance between 800 and 1000 pound reading. Divide this distance with a line showing 1100 first line and 1200 second line.

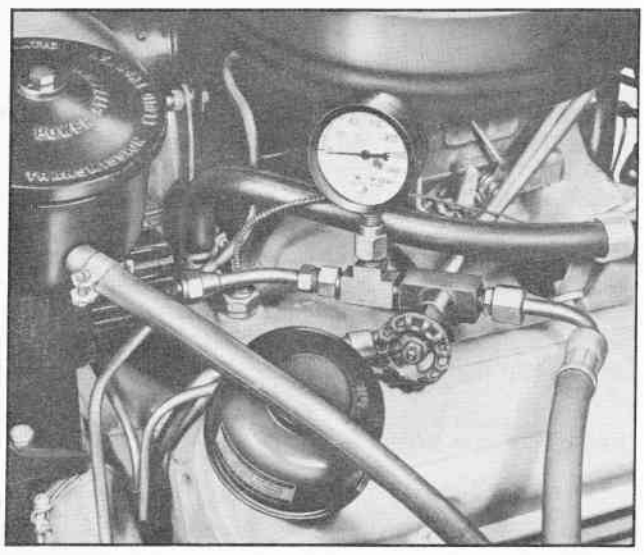


Fig. 109 Pressure Gauge Installed Between Pump and Gear

2. Turn steering wheel from one stop to other stop and note pressure on gauge while turning wheel. Especially note maximum pressure that can be built up with steering wheel held in either extreme right or extreme left position. This maximum pressure reading should not be less than 850 lbs., with engine idling at 460 RPM and oil temperature in reservoir between 150^{O} to 170^{O} as measured with a thermometer. NOTE: To obtain temperatures of 150^{O} to 170^{O} desired for testing, turn wheels through normal operating range several times. CAUTION: Do not hold steering wheel against stop for any extended period of time.
3. If maximum pressure is below 850 lbs., it indicates there is some trouble in hydraulic circuit; however, it does not indicate whether pump or gear is at fault. To determine if pump alone or if both are at fault, proceed with Test No. 2.

TEST NO. 2 - OIL CIRCUIT CLOSED

1. With engine idling at 460 RPM, turn shut-off valve of gauge to closed position.
2. Observe and compare maximum pump pressure at idle. It should not be less than 850 lbs. NOTE: By comparing this reading with Test No. 1 (testing complete circuit), it is possible to determine whether fault is with the pump or steering gear, or both.

TEST RESULTS	DIAGNOSIS
1. First Test below 850 lbs. - Second Test normal 850 lbs. minimum EXAMPLE: First test 600 lbs., Second test 850 lbs.	Defective steering gear
2. First Test below 850 lbs. - Second Test not more than 50 lbs. greater EXAMPLE: First test 400 lbs., Second test 450 lbs.	Defective pump

If pressure test under Test No. 1 and Test No. 2 shows pressure above 1150 lbs., remove pressure line fitting from back of pump. Check to determine if small hole inside pump cover drilled at an angle toward flow control valve assembly is plugged. This hole must be through to communicate between downstream side of orifice to the cavity behind flow control valve assembly. If this hole is not plugged, install a new flow control valve assembly, making sure it is free in its bore. Recheck pump pressure after installation of new flow control valve assembly.

TORQUE SPECIFICATIONS	LB. FT. TORQUE
Tie Rod Clamp Nuts	18 to 20
End Cover to Housing Screws	25 to 30
Steering Gear Pitman Arm Nut	100 to 125
Pitman Shaft Lash Adjusting Screw Nut	25 to 35
Side Cover to Housing Screws	15 to 30
Steering Wheel to Shaft Nut	25 to 30
Gear Housing to Frame Bolts	23 to 28
Pump Reservoir Cover Bolts	7 to 9
Reservoir to Pump Bolts	8 to 10
Cover to Pump Body Bolts	25 to 30
Pump Belt Tension New Belt	58 to 65
Pump Belt Tension Used Belt	51 to 53
Pulley Hub to Pump Shaft Nut	35 to 45

SPECIFICATIONS (POWER STEERING)

Type	In-Line Saginaw Recirculating Ball Nut
Pump	Vane Type
Pull at Steering Wheel	5 lbs. Maximum
Steering Jacket Diameter	2-3/8"
Over-All Steering Ratio	22.5:1
Fluid Level	Fill to Filler Line on Reservoir
Fluid Capacity Steering Gear	1 qt.
Engine to Pump Ratio	1.31

ELECTRICAL AND INSTRUMENTS

The 1956 wiring diagram is shown in Fig.110.

BATTERY

A 12-volt Delco Model 2SMR53 9-plate, 53 ampere hour battery is standard equipment on all 1956 Pontiacs. While this battery is very similar to the one used in 1955, capacity has been increased by 3 ampere hours. The optional heavy duty battery is a 12-volt Delco model 3SMR72 11-plate, 72 ampere hour battery. Both model batteries have new rubber separators and other improvements to lengthen battery life. New vent plugs with improved baffle construction reduce electrolyte leakage. Gaskets are not used with the new plugs. Both of these batteries have a specific gravity of 1.260 - 1.280 at full charge corrected to 80°F.

GENERATOR REGULATOR

The generator regulator has also been changed to make it as dirt and moisture free as possible. Improved cover sealing is obtained by the use of two short cover screws which bear on the flange of the cover instead of passing through it as before. These screws also eliminate the possibility of distortion which could effect regulation. The underside of the base is now painted to more effectively avoid corrosion.

STARTING MOTOR

The primary change in the 1956 starting motor was to expand the drive end casting to completely enclose the solenoid to starter shift lever and linkage. Because of this design, the starting motor and solenoid assembly is drier, cleaner and less accessible to water and road splash.

The starting difficulties which might result from freezing of moisture in the linkage and solenoid plunger are, therefore, eliminated and more trouble-free service and longer life are assured. The overall length of the starting motor has been reduced approximately 1" and a smaller clutch and smaller solenoid are used.

SERVICING STARTING MOTOR

In general the procedure for disassembling and assembling the starting motor is the same as in 1955. With the new design of the drive end housing, proper pinion clearance is obtained automatically by correct assembly of solenoid linkage and no provision is made for adjusting pinion clearance. Pinion clearance should be checked after the starting motor is reassembled and should be .010" - .140". If outside these limits, it may indicate excessive wear of solenoid linkage or shift lever yoke buttons, or improper assembly of the shift lever mechanism.

SPARK PLUGS

Type 44, 14 mm., spark plugs are used in the 1956 engines. The plugs are of new design, having four ribs cast into the upper insulator. These ribs minimize the possibility of miss-fire by making a longer path for the electrical charge to follow down the insulator to ground. The plugs are stronger than the ones previously used due to the increased thickness of the upper insulator along with the additional strength gained from the ribbed construction. The ribbed construction of the top insulator aids in sealing between the spark plug and the wire nipple. Therefore, the internal ridges formerly used on the spark plug wire nipples have been removed.

A new spark plug wire bracket with the spark plug wire mounting points coated with Neoprene is used. This eliminates the separate spark plug wire grommet used in 1955.

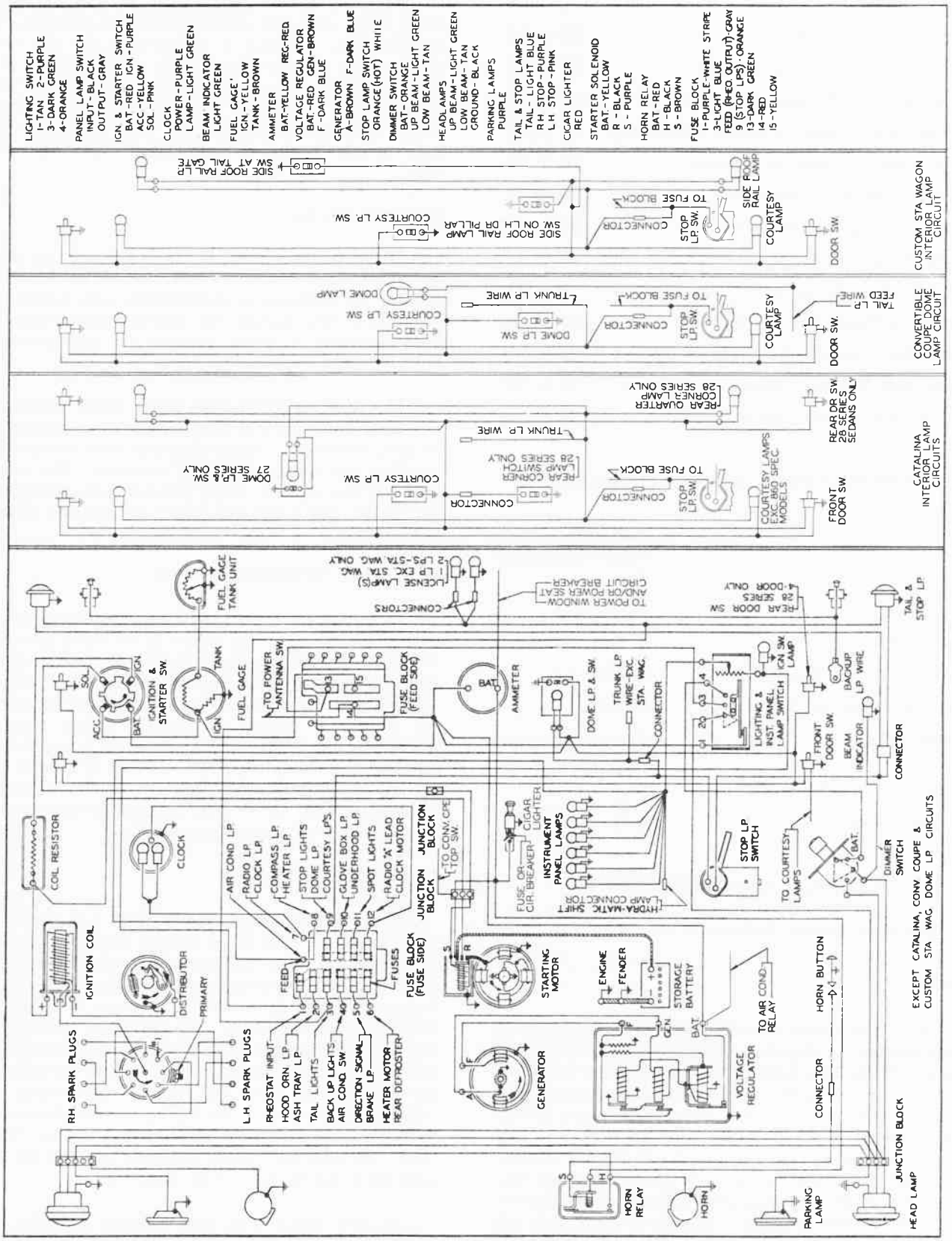


Fig. 110 1956 Wiring Diagram

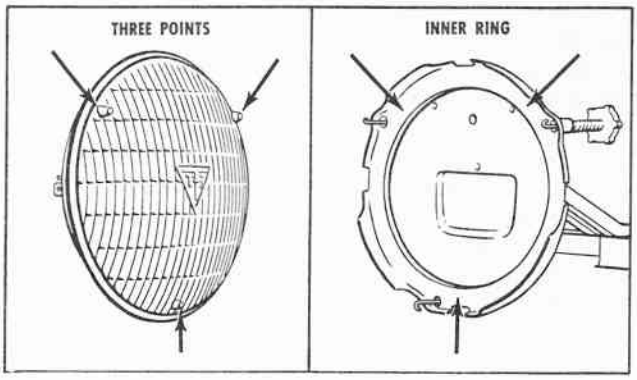


Fig. 111 Safety-Aimer Headlamp and Aimer

SAFETY-AIMER HEADLAMPS

A new Guide sealed beam unit designated "T-3" will be used in 1956 production. This headlamp incorporates the filament hood or shield, that was put into production in 1955, and also incorporates three ground glass points projecting from the face of the lens. These three points are used when aiming headlamps using the new Guide T-3 Safety Aimer.

AIMING SAFETY-AIM HEADLAMPS
USING GUIDE T-3 SAFETY-AIMER

Note: The T-3 Safety-Aimer can be used only on Guide Safety-Aim Headlamps.

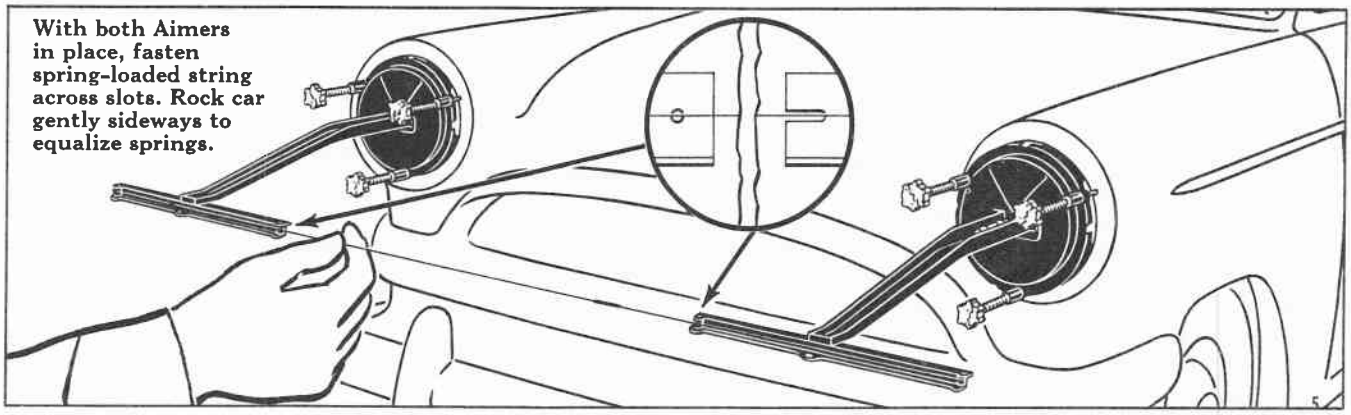


Fig. 112 Setting Up T-3 Safety-Aimer

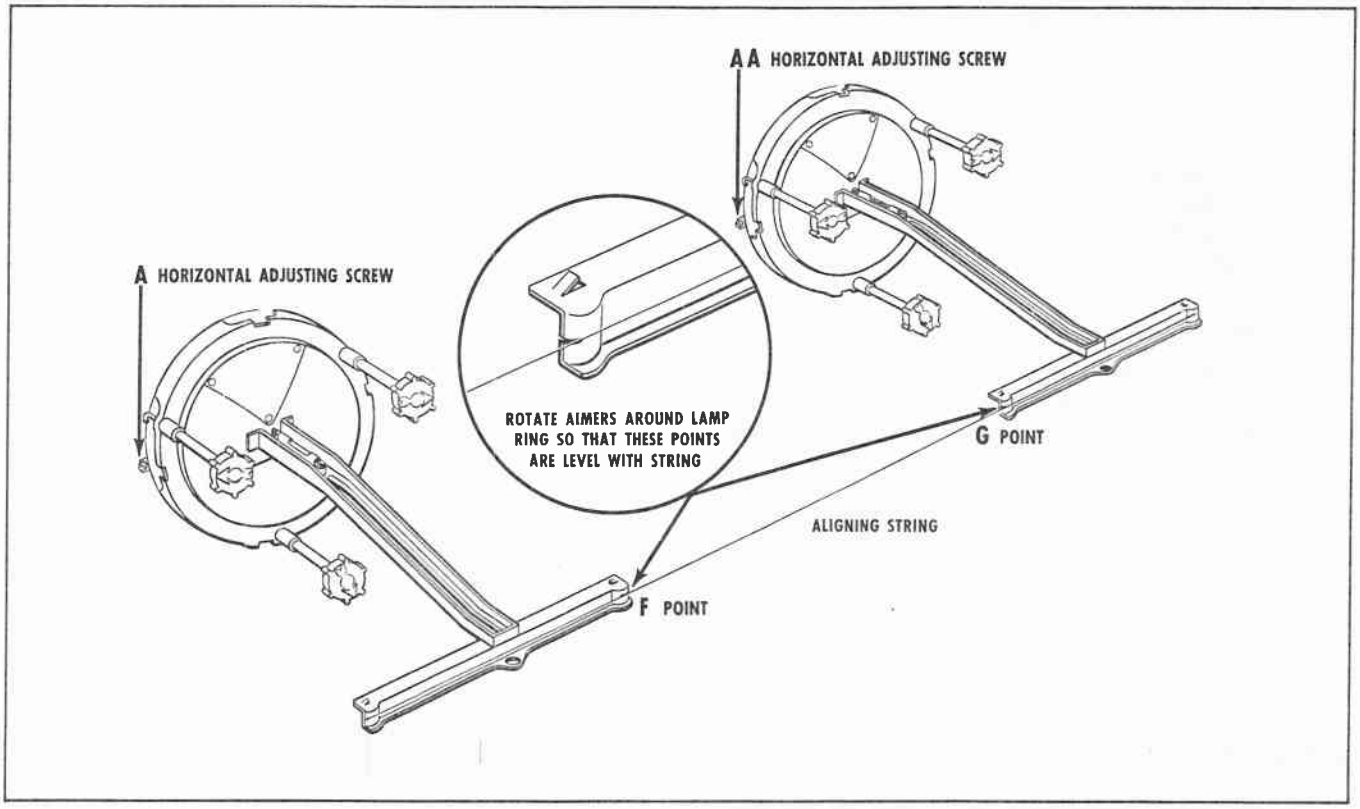


Fig. 113 Horizontal Adjustment

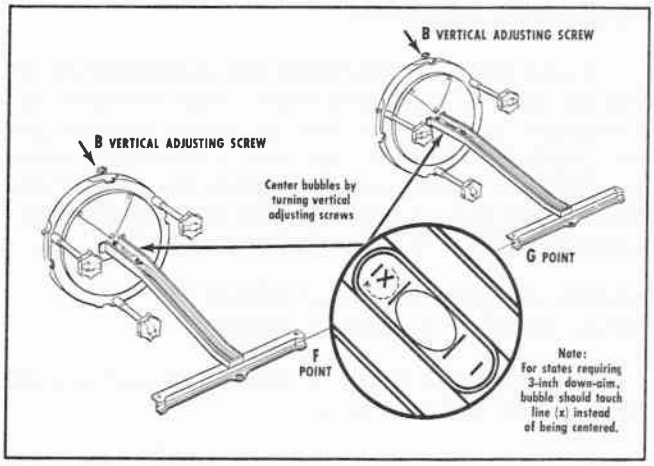


Fig. 114 Vertical Adjustment

1. Place car on level floor. Note: Aimers can be used to select a level floor or they can be calibrated for an unlevel floor (see below).
2. Remove headlamp door.
3. Using spring-loaded hooks of Safety-Aimer to engage headlamp retaining ring, fasten T-3 Safety-Aimer on each headlamp with inner ring against points on lens and cross arms horizontal (Fig. 111). (Aimer with the string should be fastened to left headlamp.)
4. Fasten spring loaded string from left aimer across slots to far side of right hand aimer. Rock car gently from side to side to equalize springs (Fig. 112).
5. Adjust horizontal aim as follows:
   a. Adjust left headlamp by turning horizontal adjusting screw AA in or out to make string first touch point G (Fig. 113).
   b. Repeat the operation on the other headlamp by moving horizontal adjusting screw in or out to make string touch point F.
   c. Recheck points F and G. If necessary, make slight adjustments to have string barely touch points F and G.
6. Adjust vertical aim as follows:
   a. Center bubble by turning vertical adjusting screw B (Fig. 114). (To insure proper location, back screw out until bubble is at end of vial. Then turn screw clockwise to center bubble.) NOTE: For states requiring 3-inch down-aim, bubble should touch line (X) instead of being centered.
   b. Repeat the same operation on the other headlamp.
   c. Recheck the string at points F and G, and be sure bubbles are centered. Remove aimers and reinstall bezels.

SELECTING A LEVEL AIMING AREA

If you have a wheel-alignment ramp or any other level floor area, your problem is solved. If not, select an area which you believe to be level. Drive a car onto the selected surface and install the T-3 Aimer on both headlamps. Then turn headlamp vertical adjusting screw to center level bubbles.

Once you have both bubbles in the level position, turn the car end for end. Make sure that the wheels rest on the same spots and recheck the bubbles. If the bubbles are still within the two outside black marks on the vial, the floor is level enough to use the T-3 Aimer as it comes from the factory.

You can also make a quick check by using the T-3 Safety-Aimer as level. Use it with a true eight to ten-foot two-by-four as an extension. Place the board where you expect the car wheels to be and take readings as outlined above.

If either bubble moves beyond the outside black marks on the vial, there is too much slant to the floor. In this event a level position may be found by driving the car onto the aiming area at different angles.

Once you have determined a level aiming area, mark it so that cars of every wheelbase will be on a level surface. (Wheelbases range from 108" to 150".)

COMPENSATING FOR UNLEVEL FLOOR

Drive car onto a surface you know to be level, such as a wheel-alignment ramp. Install T-3 Aimers on both lamps and level bubble by adjusting headlamp vertical adjusting screws.

Remove the T-3 Aimers from the headlamps (leaving the bezels off) and return the car to the aiming area which will be used. Reinstall T-3 Aimers on headlamps but do not touch headlamp vertical adjusting screws! Rock car sideways to equalize the springs. The bubbles will not be centered.

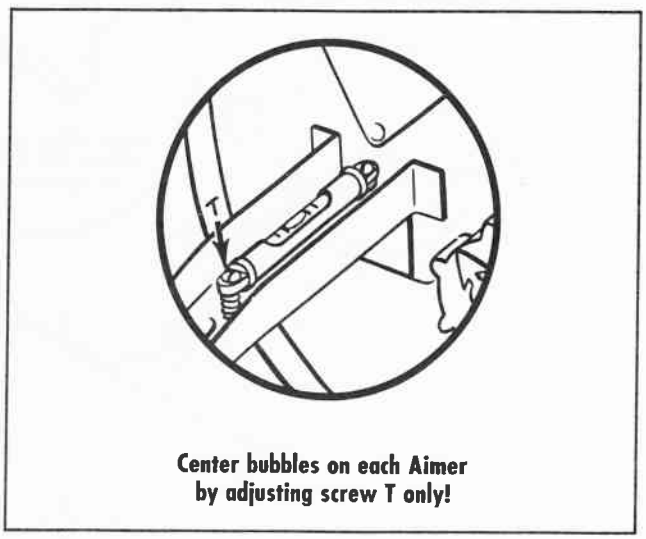


Fig. 115 Bubble Adjusting Screw

Center the bubbles on each Aimer by turning screw T (Fig. 115). The T-3 Aimer is now calibrated for the unlevel floor area. Therefore, all future aimings must be made with cars placed in the same area and faced in the same direction.

RECHECKING BUBBLES ON T-3 AIMER

Once the aimer is set up for use, whether on a level floor or compensated for an unlevel floor, the following will provide a quick check of the bubble accuracy at any time.

Find a spot on the wall for each aimer where the bubble will be centered without making any adjustment of the aimer. Carefully mark these spots, identifying which is for right aimer and which for left. Then, any time the accuracy may be questioned, it can immediately be rechecked by placing the aimers on the same spots to see that the bubbles are still centered. If not centered, they can quickly be adjusted while holding them in position against the wall.

CIGAR LIGHTERS

Cigar Lighter and Ash Tray - The position of the cigar lighter and ash tray has been reversed from that used in 1955. The ash tray is now at the right of the radio control panel and the cigar lighter is at the left.

Two new cigar lighters incorporate an ash guard or shield consisting of a steel sleeve which encloses and extends beyond the igniter core (Fig. 116). These lighters are safer to handle and minimize the possibility of burning ashes falling on clothing or car trim.

One lighter is made by Rochester Products Division and incorporates a circuit breaker instead of a fuse. The circuit breaker is a manual reset type located behind the instrument panel recepticle. To reset circuit breaker, remove connector and contact cover on rear of lighter recepticle and push circuit breaker in all the way. The other lighter made by Casco uses a fuse as in 1955. The Casco lighter will be used in all B.O.P. built cars. The Rochester lighter will be used only in Pontiac built cars.

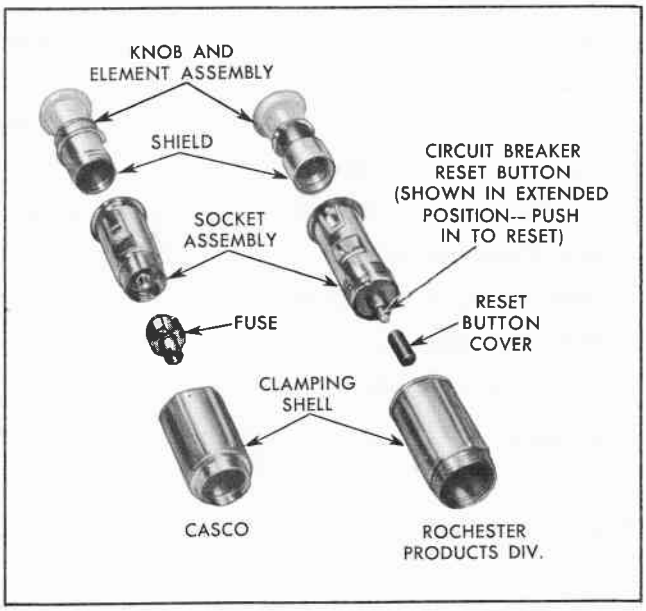


Fig. 116 1956 Cigar Lighter

Lighters can be identified by the appearance of the instrument panel ferrule as follows:

Rochester (circuit breaker) -- Ferrule indented several places.
Casco (fuse) -- Ferrule is smooth - same as in 1955.

INSTRUMENTS

Intermediate markings have been added to the gauge dials to simplify their use. The letters on the face of the dial indicate direction of pointer travel while the dots themselves indicate quantity. For example: The fuel gauge has four marks which are interpreted from left to right as empty, 1/4 full, 1/2 full, 3/4 full and full. The "E" at the left end means that as the pointer moves in that direction it is approaching "empty". The "F" indicates that as the pointer travels in that direction it approaches "full".

ELECTRICAL SPECIFICATIONS

Generator	Standard	Air Conditioning	Heavy-Duty
Model	1100304	1102047	1102054
Brush Spring Tension	28 oz.	28 oz.	28 oz.
Cold Output	25 amperes at 14.0 volts 2780 Gen. RPM	35 amperes at 14.0 volts 2350 Gen. RPM	35 amperes at 14.0 volts 2150 Gen. RPM
Field Current Draw	1.5 - 1.62 amperes at 12 V, 80°F	1.64 - 1.82 amperes at 12 V, 80°F	1.48 - 1.62 amperes at 12 V, 80°F

Regulator	Standard	Heavy Duty and Air Conditioning
Model	1119000	1119002
Cutout Relay Air Gap	.020"	.020"
Cutout Relay Point Opening	.020"	.020"
Cutout Relay Closing Voltage	11.8 - 13.5	11.8 - 13.5
Voltage Regulator Air Gap	.075"	.075"
Voltage Regulator Normal Range	13.8 -, 14.8	13.8 - 14.8
Current Regulator Air Gap	.075"	.075"
Current Regulator Allowable Limits	23 - 27	32 - 37

NOTE: The regulator adjustment procedure is the same as outlined in the 1955 Shop Manual.

Distributor		
Model	1110862	
Rotation (viewed from top)	counterclockwise	
Ignition timing	5^{O} BTDC*	
Point Opening	.016"	
Cam Angle	26^{O} - 33^{O}	
Breaker Lever Tension	19 - 23 oz.	
Condenser Capacity	.18 - .23	
Centrifugal Advance	Eng. RPM	Eng. Deg.
Start	650-975	0
Intermediate	2100	14-18
Intermediate	2800	16-20
Maximum	3600	18-22
Vacuum Control	1116080	
Inches of mercury to start advance	4 - 6	
Inches of mercury for full advance	12.5 - 13.5	
Maximum Advance (Dist. Deg.)	8	
Ignition Resistor	1927809	
Resistance	1.40 - 1.65 ohms	
Spark Plug Gap	.033" - .038"	
Starting Motor		
Model	1107641	
Brush Spring Tension	35 oz. min.	
Free Speed		
Volts	10.1	
Amperes	95	
RPM	3500	
Solenoid Switch	1119781	
Hold-in Winding	9.5 - 12 amperes at 10 volts	
Both Windings	40 - 45.5 amperes at 10 volts	

*With engine operating at normal idle speed and distributor vacuum line disconnected.

Battery	Standard	Heavy Duty and Air Conditioning
Model	2SMR53	3SMR72
Plates	9	11
Capacity at 20 hr. rate	53 amp. hr.	72 amp. hr.
Separators	Rubber	Rubber
Case	Hard Rubber	Hard Rubber
Horn	**1999763**	**1999768**
Type	Low note - R.H.	High Note - L.H.
Ampere draw at 11.5 volts	8.5 - 10.5	7.5 - 9.5
Horn Relay	**1116781**	
Air Gap (points closed)	.014	
Point Opening	.027	
Closing Voltage	5.0 - 9.5	

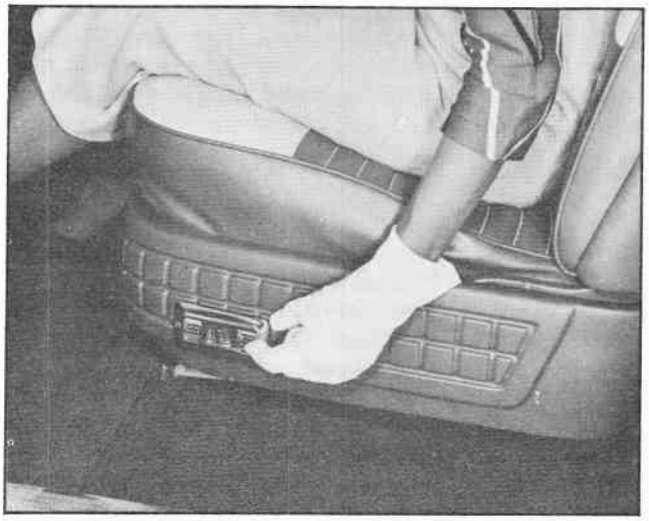


Fig. 117 Power Seat

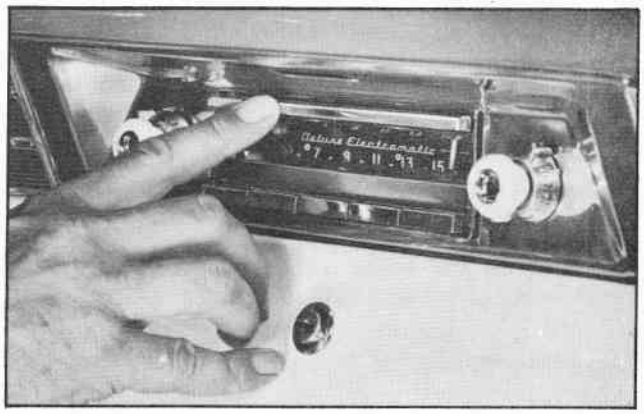


Fig. 118 Deluxe Electromatic Radio

ACCESSORIES

POWER SEAT (FIG. 117)

In addition to the six way manually operated "Comfort Control" front seat first used in 1955, a six way power seat is being offered in 1956. Forward and backward travel of 5", vertical travel of 2" and tilting movement through 15° provide a comfort range without parallel in any other power operated seat. Control of the seat is accomplished through three switches mounted in a control panel located at the left hand side of the seat. Raising or lowering of the front of the seat is caused by up or down movement of the front switch. Elevation of the rear of the seat, up or down, is controlled by the rear switch and, overall up or down movement of the seat is controlled by the simultaneous or alternate actuation of both the front and rear switches. Fore and aft (horizontal) movement of the seat is controlled by the center switch. The power seat electrical circuit as well as the power windows are protected by a 40 ampere circuit breaker mounted at the top of the left side kick pad.

DELUXE ELECTROMATIC RADIO (FIG. 118)

Two radios are offered in 1956: the "Deluxe" manual selection type similar to that used in 1955 and the new signal seeking type called the "Deluxe Electromatic". This new unit is equipped with a "selector bar" and five push buttons to provide automatic tuning of all available stations in any locality. The push buttons are of course preset to the owners favorite stations while the selector bar provides tuning to all stations transmitting in the area. Two control knobs flank the radio dial. The left hand knob is the on-off switch and volume control. The tone control is mounted behind the left knob. The tone control provides regulation of tone characteristics. The right knob is the manual tuner. Behind the manual tuning knob is a three position "sensitivity" control that

limits signal strength. When the control is moved full counterclockwise only the strongest stations are picked up by the selector bar. Movement of the sensitivity control in a clockwise direction to the second and third positions will simply increase the signal pick up ability of the selector bar to all listenable stations.

Antenna height controls automatic station selection similarly to the sensitivity control. If the station indicator sweeps the dial repeatedly without stopping, the antenna should be raised to help strengthen the broadcasting signal before any service work is attempted.

SETTING PUSH BUTTONS

Setting of the five push buttons is accomplished as follows: Manually select desired station starting at low end of dial and adjust for peak reception. Pull open door above push buttons and line up one of the five red tabs with the station indicator (starting with left hand tab). By repeating this process five stations will be preset to push button operation. Where two stations operate at close to the same frequency it may be necessary to offset the tabs slightly to assure selection of the station desired.

In support of the civil defense program, both Pontiac radios feature the "civil defense marking" (black circle and white triangle) at the CONELRAD frequencies of 640 and 1240 kilocycles.

ANTENNA TRIMMER

In order to make the antenna trimmer adjustment, the car should be outdoors and as far removed from electrical disturbances as possible. Extend the antenna to its full height. Tune in a weak station between 600 and 1000 kilocycles where it is possible to turn the volume control full on. This is necessary in order to offset the action of the automatic volume control. Using a screw driver inserted through the small hole indicated by arrow in the right side of the tuner, turn the trimmer adjusting screw clockwise until the station fades out. Turn the screw counterclockwise until the station peaks in volume and starts to fade. Then adjust the trimmer screw between these two extremes for maximum volume.

This should be done on new car per-delivery inspection and also after a set has been removed from the car and worked on by a radio repair man. The reason for trimming the antenna after service work has been performed is that the radio repair man will undoubtedly have adjusted the trimmer to match his antenna so that it no longer matches the antenna in the car from which it was removed. Trimming the antenna is especially important with the deluxe electromatic radio inasmuch as this will directly affect the sensitivity control of the selector bar.

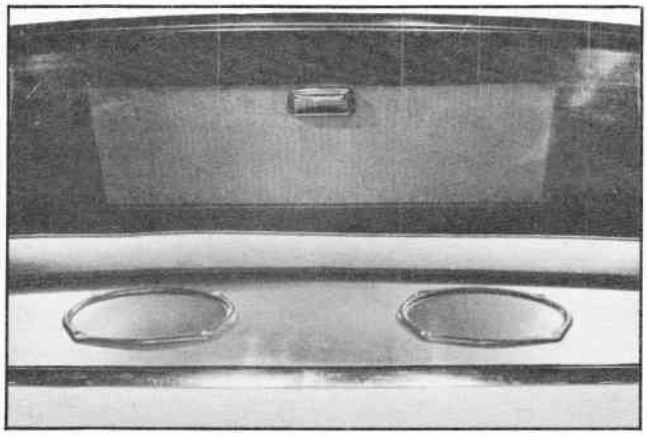


Fig. 119 Rear Seat Speakers

REAR SEAT SPEAKER (FIG. 119)

A new radio rear speaker system employing two rear speakers and conventional single front speaker, is introduced this year to bring the magic of Hi Fidelity sound to automobile radio reception. The twin rear speakers, each having different response characteristics, are mounted left and right of center in the rear package shelf. Control of the radio's speaker system is accomplished through the use of a five position switch that provides the following selections:

1. Front speaker only.
2. High response rear speaker only.
3. Low response rear speaker only.
4. Both rear speakers (Hi-Fi).
5. All speakers (Hi-Fi).

The rear speaker control switch, in conjunction with the radio tone control knob, now makes possible twenty different sound combinations to assure personal satisfaction in tone control or sound distribution, and compensates for many variations in program characteristics.

WINDSHIELD WASHER (FIG. 120)

Operated by a foot pedal and including a wiper coordinator, a new windshield washer replaces the vacuum type used heretofore. The actuating pedal for the new washer is located above and to the left of the clutch pedal area in the toe board. A new pump is used in conjunction with a jar and mounting bracket. A single nozzle is mounted centrally on the rear of hood. This nozzle contains two adjustable ball type openings that provide control of the stream's direction and windshield contact area.

By depressing the foot pedal at the toeboard the pump forces twin jets of washer solution onto the windshield while the coordinator simultaneously activates the windshield wiper. Release of the foot pedal automatically shuts off the solution and windshield wiper.

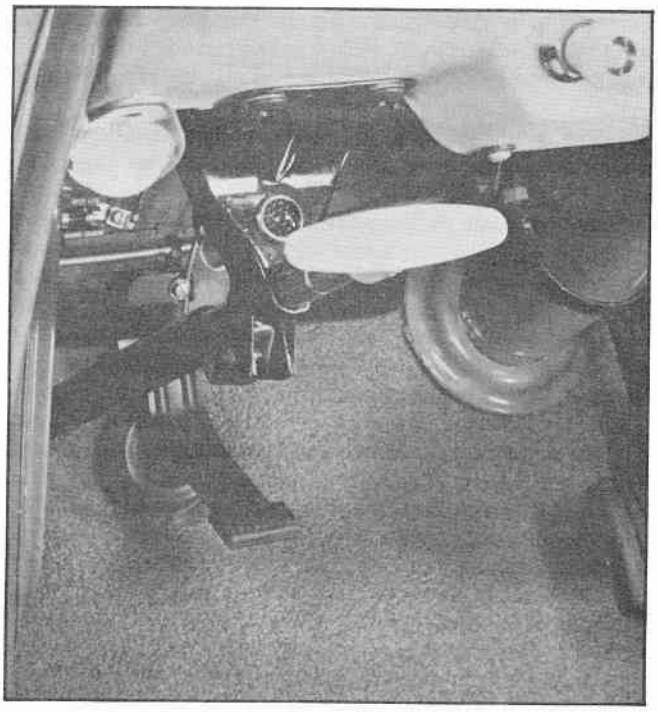


Fig. 120 Windshield Washer Foot Control

The obvious safety feature of foot operation coupled with better solution dispersal at high speeds provide sales appeal for this fine new accessory.

LUGGAGE COMPARTMENT AND UTILITY LAMP (FIG. 121)

This new compartment and utility lamp replaces the unit that was formerly located under the hood and is used on all models except Station Wagons. The light is incorporated with a reel containing seventeen feet of wire that is held to a deck lid bracket by two spring clips. A mercury switch mounted on the deck lid automatically closes the electrical circuit when the deck lid is raised.

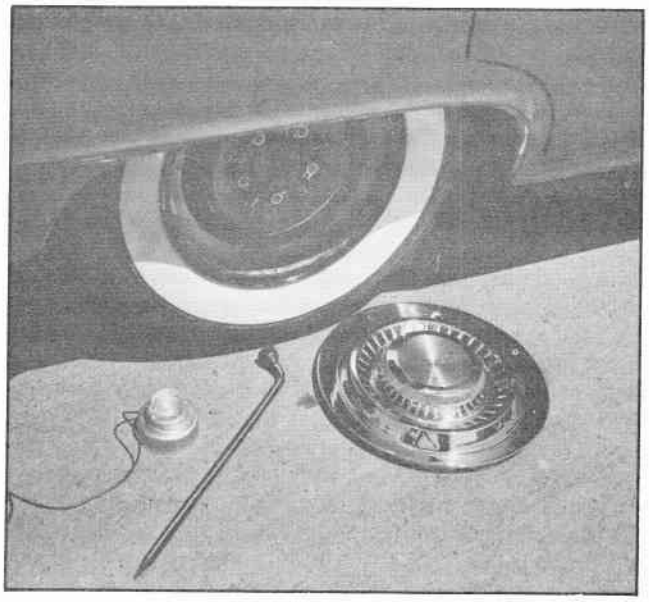


Fig. 121 Luggage Compartment and Utility Lamp

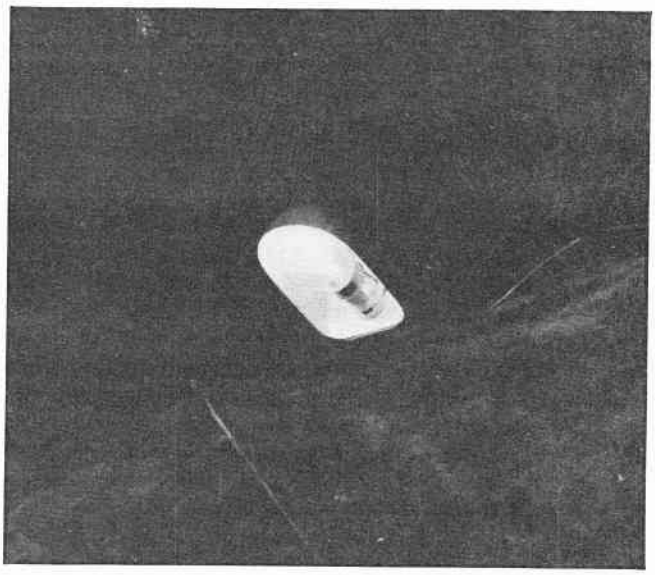


Fig. 122 Underhood Lamp

Since this unit cannot be used on the Station Wagon the under the hood style utility lamp is used.

UNDERHOOD LAMP (FIG. 122)

With the adoption of the new luggage compartment and utility lamp on all models except Station Wagons, Pontiac's 1956 underhood lamp is now a stationary unit located near the front of the hood and operated by a mercury switch. The electrical circuit is so arranged that the lamp circuit will be energized only when the hood is raised with the headlight switch in the "ON" position. In this manner unnecessary usage of current is prohibited.

BACK-UP LAMPS

A new back-up lamp switch is used when the vehicle is Synchro-Mesh Transmission equipped. The switch is now mounted on the steering column instead of the transmission case as it was in 1955. Moving the shift lever to the reverse position causes the switch actuating pin in the gearshift lower lever to close the switch, completing the electrical circuit anytime the ignition switch is in the "ON" position. The actuating pin should be adjusted to clear the switch by 1/8" when the gearshift lower lever is moved into second gear position.

POWER ANTENNA

The wiring to the power antenna motor is now routed through the passenger compartment on all models equipped with the power antenna except the custom Station Wagon. In this manner the wiring

harness is no longer subject to road splash and dirt, insuring more trouble free service. The antenna storage tube has been redesigned to reduce friction and motor load. Instead of having an aluminum tube clamped directly to the body tube, a flexible plastic storage tube is used. When the antenna is mounted in the car the plastic storage tube is clipped along the rear edge of the fuel tank on sedans and coupes, and along the frame rear cross member on station wagons. A felt wick in the end of the plastic tube provides for drainage without allowing foreign material to enter. When the car is serviced, this felt wick should be checked to make sure it is not plugged or undercoated. NOTE: First production antennas will have the old style storage tube.

In all other respects, service procedures are the same as in 1955.

ELECTRIC WINDSHIELD WIPER

A new electric windshield wiper is available on all 1956 Pontiacs as an accessory. A 12 volt D. C. motor with both a series and shunt field is used to drive a worm shaft which in turn drives an oscillating mechanism through a nylon worm gear. This electrically operated wiper will clean through about 125-1/2° of blade travel as compared to about 103° of blade travel with the vacuum operated wiper. The blade and arm assembly is heavier and utilizes increased spring tension to keep the blades on the windshield through a full arc to the end of the wrap-around windshield corner. With this wiper there is no slow down when passing cars, going up hills, or accelerating. When the electric wiper is installed at the factory, the combination fuel and vacuum pump used as standard equipment will be replaced with a fuel pump only.

The wiper motor switch is located in the wiper motor housing and is controlled by a cable connected to the switch control knob. The switch control knob which is the same as that used on vacuum wipers is located in the same place on the instrument panel and operated in much the same manner. It is a three position control; off, slow speed and fast speed. There is no detent or feel between the positions, so that when the wiper is turned on, it will usually be turned to the fast speed position. This wiper can be turned on by the foot operated windshield washer the same as if a vacuum wiper was installed.

The motor is protected against overheating by a 18 amp. thermal circuit breaker which is built into the case assembly. It is an automatic reset type circuit breaker which, if caused to open through an overload, will automatically reset in a short period of time. For additional protection, a 30 amp. fuse is located in a line holder inside the body next to the accessory fuse block. This fuse arrangement is designed primarily to protect the car's wiring harness.

The wiper blades will park in the full down position regardless of their position at the time the switch is turned to "OFF". This is made possible through a cam or eccentric drive mechanism built into the wiper motor assembly. The only differences in the complete wiper assembly between vacuum and electrically operated, are in the wiper motor, wiper arms and wiper blades. The transmissions, cable drives, and cable tension adjustments are exactly the same on either installation.

Do not manually move the blades through any part of the wiper arc at any time. The motor will act as a brake if the wipers are not operating. Forced lateral movement will cause a bent arm and/or a broken wiper transmission. To free blades which have frozen to the windshield move the blades straight away from windshield to remove ice.

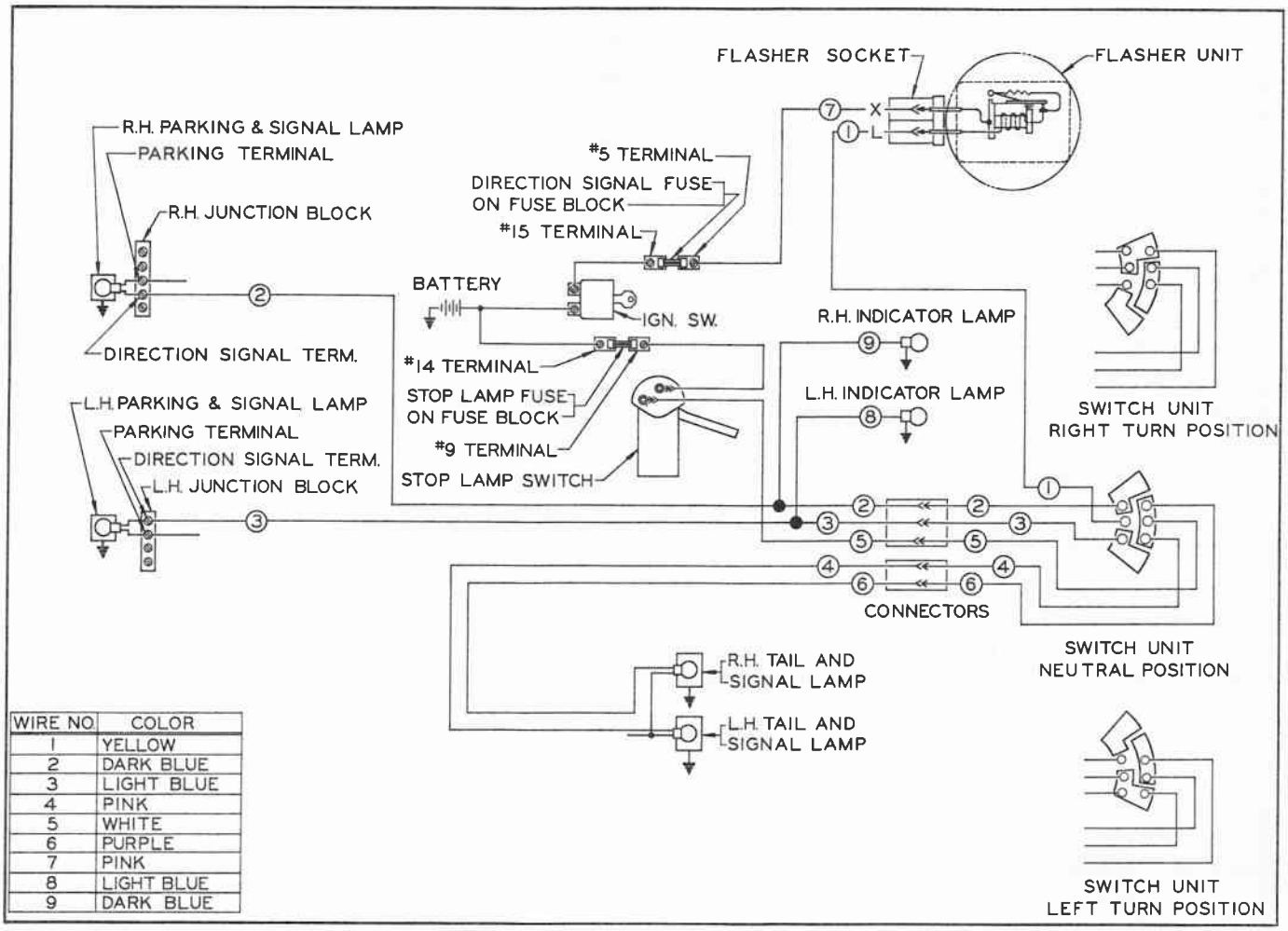
Wiper blades should operate through 90-110 wipes per minute on slow speed, 145-170 wipes per minute on fast speed, both with a wet windshield.

DIRECTION SIGNAL CIRCUIT (FIG. 123)

Minor changes have been made in the 1956 direction signal wiring circuit that will assist the servicing mechanic in trouble diagnosis. The direction indicator lamps located in the speedometer are grounded at their sockets instead of through the opposite signal lamp in the parking lamp. This change in ground necessitates a change in the wiring circuit. Two makes of direction signal flashers are available. Now, depending on the flasher used in the system, if the right front or rear signal lamp fails, the right turn indicator lamp will remain "ON" continually or will flash more rapidly when direction signal lever is moved to the right turn position. Left front or rear signal lamp failure is indicated at the left turn indicator in the same manner. It can readily be seen that failure of any lamp in the system may be quickly and accurately diagnosed.

HEATER-DEFROSTER

A change has been made in the defroster outlets at the windshield to improve the overall efficiency of the defroster and provide quicker cleaning of the most used vision areas of the windshield. The four outlets used in 1955 have been replaced by two outlets which are longer, using larger diameter hoses that offer less resistance to air flow. The exact positioning of these outlets provides for faster clearing of these areas required by the driver to insure complete vehicle control.



WIRE NO.	COLOR
1	YELLOW
2	DARK BLUE
3	LIGHT BLUE
4	PINK
5	WHITE
6	PURPLE
7	PINK
8	LIGHT BLUE
9	DARK BLUE

Fig. 123 Direction Signal Wiring Diagram

NOTES

NOTES

EDITORS NOTE: The last of five 1955 Service Craftsman Examinations is included in this issue. Remove the examination, complete and return to the zone office by November 15, 1955.

SERVICE MANAGER—IMPORTANT

This News contains important service information on Pontiac cars. Each subject should be cross-referenced in the space provided at the end of each section in the Shop Manual or its Supplement. ***Be sure and cover every point with your entire organization.***

Each service man should sign in the space below after he has read and understands the information in this issue.