SECTION XI
TRANSMISSION

CONTENTS

STANDARD 3-SPEED

POWERFLITE TRANSMISSION

DATA AND SPECIFICATIONS
STANDARD 3-SPEED TRANSMISSION

END PLAY

Second Speed Gear	.002 to .008 in.
Countershaft	.002 to .008 in.
Mainshaft Rear Bearing	Select Snap Ring
Pinion Shaft Bearing (Ball)	to Eliminate
Synchronizer Clutch Gear	End Play
Drive Pinion Bearing Retainer to Case Clearance—Refer to Par. 4 (c)	

GEAR RATIO

1st	2.50 to 1
2nd	1.68 to 1

DATA AND SPECIFICATIONS (Cont'd)
STANDARD 3-SPEED TRANSMISSION

3rd	1.00 to 1
Reverse	3.20 to 1
SPEEDOMETER GEAR	
Number of Teeth	6
LUBRICANT	
Capacity	2¾ pts.
Viscosity	SAE 80

POWERFLITE TRANSMISSION

GENERAL	
Type	Automatic Two Speed with Torque Converter
Torque Converter Diameter (inches)	12½ (11¾ *MODEL C-71)
Oil Capacity of Transmission and Torque Converter	11 Qts. (10.2 Qts.—C-71 MODEL)
Torque Converter Multiplication	2.6 to 1
Method of Cooling	*Water (Air C-71 MODEL)
Lubrication	Front to Rear Pumps
Number of Clutch Plates	7 (*6 MODEL C-71)
Speedometer Pinion	16 (*17 MODEL C-71)
Rear Axle Ratio	3.36 (MODELS C-72, C-73) 3.54 (*MODELS C-71, C-70)
GEAR RATIOS	
Low	1.72 to 1
Drive—Breakaway	1.72 to 1
Drive—Direct	1 to 1
Reverse	2.39 to 1
FRONT—REAR PUMPS	
Type	Gear
End Clearance (Front Pump)	.0012 to .0022 in.
End Clearance (Rear Pump)	.001 to .003 in.

DATA AND SPECIFICATIONS (Cont'd)
POWERFLITE TRANSMISSION (Cont'd)

GOVERNOR (3-STAGE)	
Type	A—Centrifugal
Clearance Between Governor Valve and Body	.002 to .005 in.
THRUST WASHERS	
Direct Clutch Piston Retainer (Fibre)	.078 to .080 in. (thin) .095 to .097 in. (medium) .112 to .114 in. (thick)
Kickdown Planet Pinion Carrier	.124 to .126 in.
Reverse Planet Pinion Carrier	.124 to .126 in.
Planet Pinion Carrier Housing	.124 to .126 in.
SNAP RINGS	
Kickdown Planet Pinion Carrier Housing	**.062 to .064 in. **.072 to .074 in. **.076 to .078 in. **.082 to .084 in.
Kickdown Sun Gear	.059 to .061 in. (thin) .062 to .064 in. (medium) .065 to .067 in. (thick)
Reverse Annulus Gear	.078 to .080 in. (thin) .082 to .084 in. (medium) .086 to .088 in. (thick)

*Applies also to Model C-71 (Power Package)

**If this selection of snap rings fails to provide sufficient clearance, use one of the kickdown sun gear rings of the proper thickness.

SPECIAL TOOLS
STANDARD 3-SPEED TRANSMISSION

Tool Number	Tool Name
C-452	Puller—Universal Flange
C-484	Pliers—Snap Ring
C-578	Arbor—Countershaft
C-748	Puller—Oil Seal

SPECIAL TOOLS (Cont'd)
STANDARD 3-SPEED TRANSMISSION

Tool Number	Tool Name
C-870	Arbor—Clutch Housing Alignment
C-3205	Driver—Oil Seal Installing
C-3339	Set—Dial Indicator
DD-1014	Stand—Repair

POWERFLITE TRANSMISSION

Tool Number	Tool Name
C-452	Puller—Universal Joint Flange
C-484	Pliers—Servo Body Snap Ring Removing
C-589	Wrench—Torque Converter to Crankshaft Stud Nut (5/8 Inch Hex)
C-748	Puller—Output Shaft Rear Bearing Oil Seal
C-760	Pliers—Governor Weight Snap Ring
C-811	Wrench—Torque Converter to Crankshaft Stud Nut (11/16 Inch Hex)
C-870	Bar—Clutch Housing Alignment Checking
C-3201-A	Lo-Jack—Hydraulic Powered Floor Type
C-3203-A	Jack—Hydraulic Powered Two Stage
C-3204	Driver—Extension Rear Bearing
C-3205	Driver—Transmission Rear Oil Seal Installing
C-3275	Driver—Bearing from Transmission Extension
C-3276	Pilots (Pair)—Transmission to Torque Converter Adapter Plate
C-3277	Installer—Manual Valve Lever Shaft Oil Seal
C-3278	Driver—Front Pump Housing Dust Seal
C-3279-B	Wrench—Throttle Pressure Adjusting Screw
C-3280	Stand—Transmission Repair (Bench Type)
C-3281	Wrench—Flange Holding
C-3283	Pilots (Pair)—Extension Housing to Transmission Case
C-3285	Fixture—PowerFlite Transmission Output Shaft Support
C-3288	Pilots (Pair)—Front Pump Housing and Regulator Valve Body
C-3289 (or C-3529)	Fixture—Compressing Servo Springs
C-3292	Gauge—Low Pressure Checking (100 lbs.)
C-3293	Gauge—Main Line Pressure Checking (300 lbs.)

SPECIAL TOOLS (Cont'd)
POWERFLITE TRANSMISSION

Tool Number	Tool Name
C-3294	Stand—Valve Body Repair and Assembly
C-3295	Pilots (Pair)—Valve Body and Transfer Plate
C-3297 (or C-3530)	Remover and Installer—Reaction Shaft Tool
C-3301	Pliers—Snap Ring (Parallel Jaw Type)
C-3302	Compressor—Clutch Spring
C-3335	Straightedge (10 inch)
C-3339	Set—Dial Indicator, Clamp, Swivel and Attaching Rods
C-3380	Wrench—Band Adjusting, Sensory Torque
C-3461	Fixture—Torque Converter Housing Run-out, Checking
C-3487	Support—Engine
DD-1150	Tachometer

TIGHTENING REFERENCE
STANDARD 3-SPEED TRANSMISSION

	(Foot-Pounds) Torque
Transmission to Clutch Housing Bolt	50
Gearshift Housing to Transmission Bolt	15
Transmission Extension to Case Bolt	35
Transmission Pinion Bearing Retainer Bolt	15
Transmission Companion Flange Nut	105

POWERFLITE TRANSMISSION

	(Foot-Pounds) Torque
Transmission Extension to Case Bolt	35
Back-Up Light Switch	25
Companion Flange Nut	160

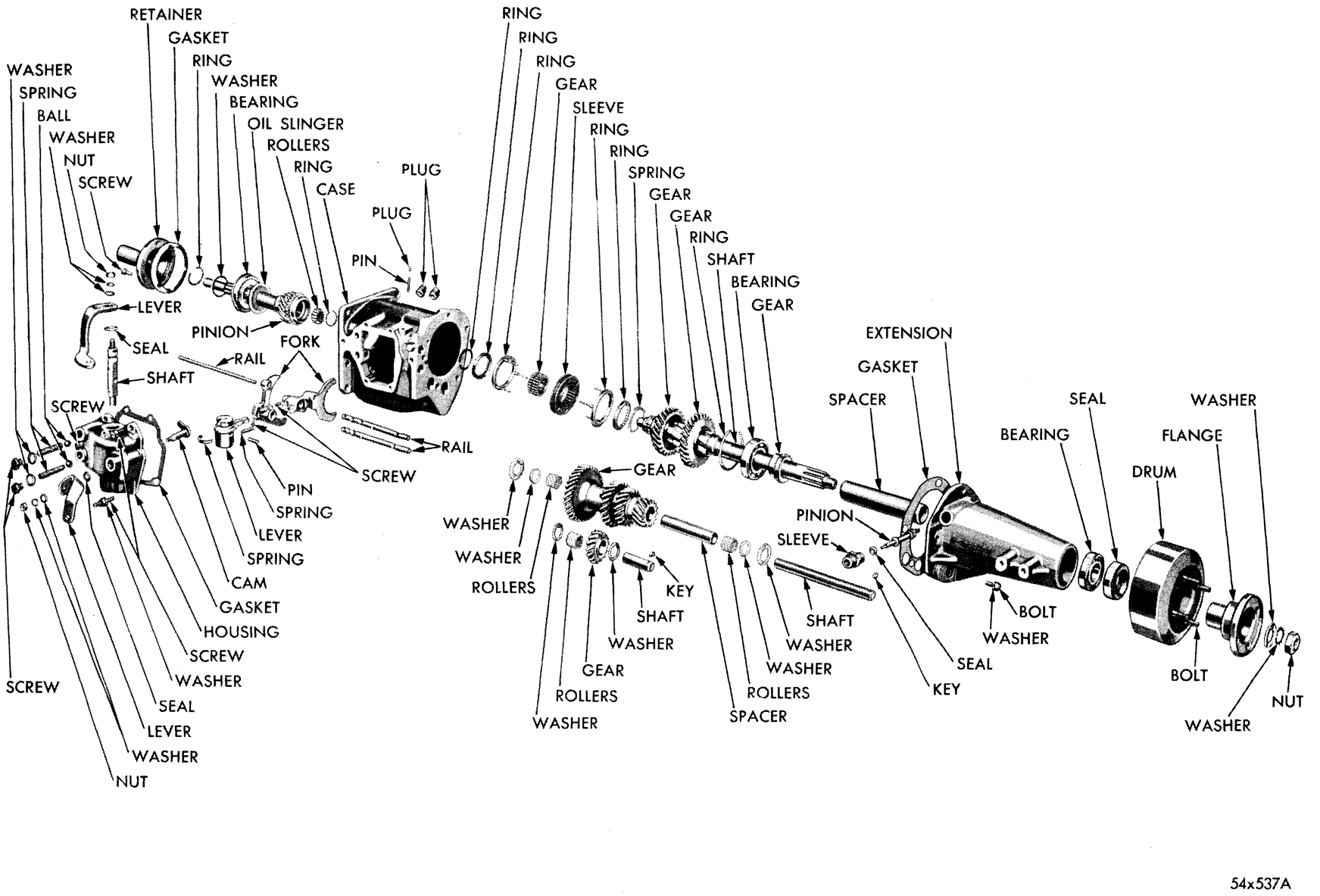

Fig. 1—3-Speed Transmission (Disassembled View)

TIGHTENING REFERENCE (Cont'd)
POWERFLITE TRANSMISSION

	(Foot-Pounds) Torque
Governor Locating Screw	4
Governor Oil Pressure Take-Off Plug	12
Kickdown Band Adjusting Screw Nut (Lock)	40
Kickdown Band Lever Shaft Plug	35
Neutral Starter Switch	25
Oil Pan Drain Plug	25
Oil Pan Filler Tube Nut	40
Oil Pressure Line Take-Off Plug	12
Regulator Valve Spring Retainer	50
Reverse Band Lever Adjusting Screw Nut (Lock)	35
Speedometer Pinion Sleeve Assembly	45
Throttle Oil Pressure Take-Off Plug	12
Throttle Valve Adjusting Screw Plug	25
Torque Converter Drain Plug	50
Torque Converter Control Valve Spring Retainer	40
Transfer Plate Cover Bolt	4
Case to Reaction Shaft Bolt	15
Front Oil Pump Housing to Case Bolts	17
Rear Oil Pump Housing to Support	12
Valve Body End Cover Plate Screws	30 (Inch Pounds)

Section XI
TRANSMISSION
Standard 3-Speed

SERVICE PROCEDURES

1. REMOVAL OF TRANSMISSION

Drain transmission lubricant. Disconnect propeller shaft and loosen companion flange nut.

NOTE

Breaking the nut loose with transmission in car will allow clutch and engine to keep main-

shaft from turning. Set the hand brake and make sure transmission is in low gear.

Disconnect speedometer cable. Remove back-up light switch and leads, (car so equipped). Disconnect hand brake cable. Disconnect gearshift selector and operating lever rods at transmission gearshift housing.

Remove transmission by pulling it straight back until pinion shaft clears clutch disc before lowering. **Do not disengage clutch or otherwise move clutch or clutch disc after removing transmission.** Place transmission on clean bench or mount in repair stand, Tool DD-1014.

2. DISASSEMBLY OF TRANSMISSION (Fig. 1)

Remove speedometer drive pinion from transmission extension. Remove companion flange nut and washers. Pull off universal companion flange and brake drum assembly, using puller, Tool C-452. **Do not hammer.** Remove extension oil seal with puller, Tool C-748. Remove brake band assembly.

a. Gearshift Cover and Shifting Forks

Remove shifter rail detent ball retaining screws on gearshift cover and remove detent ball springs. Remove gearshift cover, and gear selector assembly. Discard gearshift cover gasket. Unscrew and pull out shifter fork guide rail (1, Fig. 2) from front of transmission case. Do not remove "O" ring seal unless inspection reveals that it is necessary. Remove hex head lockscrews (3, Fig. 2) that hold shifter forks to shifter rails. Slide second and high shifter

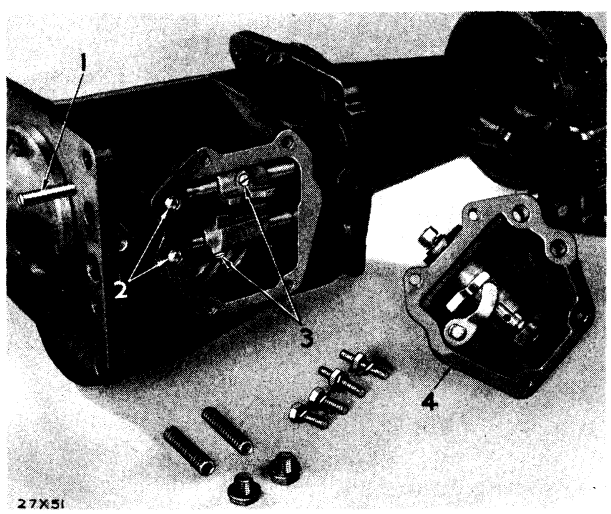

Fig. 2—Removing Manual Remote Gearshift Rails

1—Gearshift fork guide rail
2—Gearshift selector balls
3—Gearshift fork lock screws
4—Gearshift housing assembly

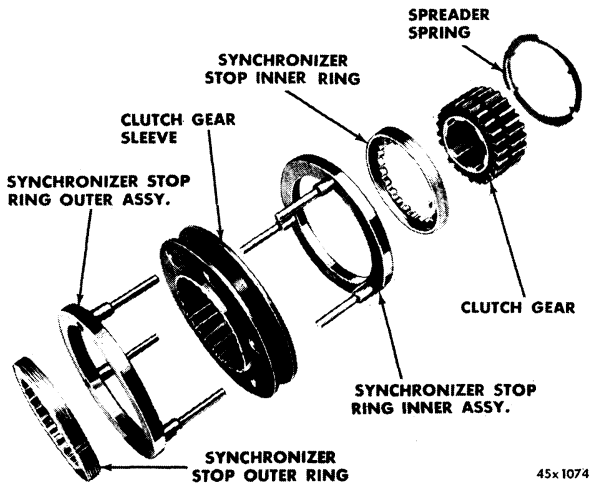

Fig. 3—Pin Type Synchronizer

rail forward until interlock detent is visible. Hold soft drift in detent of rail. By driving against rail at this point, the expansion plug in front of transmission case will be driven out.

Unless it has been possible to shift the transmission into two gears at once, or the shifter rail interlock detents show signs of wear or scoring, it will not be necessary to remove the interlock pin. If it is necessary to remove the interlock pin, drive the cup plug (at top of transmission case) into the interlock pin hole until it falls into a shifter rail bore. **Be sure to remove plug and interlock pin from case.** Remove first and reverse shifter rail and fork, then, remove second and high shifter rail and fork. Remove shifter rail detent balls.

b. Mainshaft

Rotate transmission case 90° (drive pinion down).

NOTE

Before removing mainshaft, mark synchronizer clutch gear and sleeve so they can be indexed in proper position at assembly.

Remove extension housing and mainshaft as a unit from transmission case, leaving synchronizer unit (less clutch gear and spreader spring) resting on drive pinion. Remove and discard extension housing to case gasket. Remove synchronizer clutch gear snap ring with snap ring pliers, Tool C-484. Care must be taken to avoid damaging shaft and gears. Slide off synchronizer clutch gear (Fig. 3), second

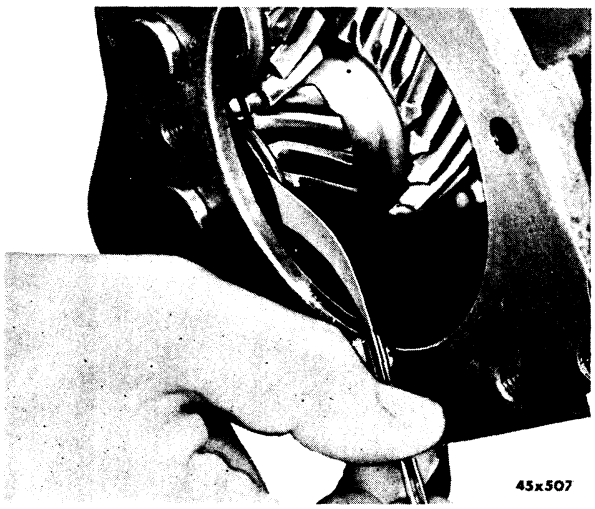

Fig. 4—Checking Countershaft Gear End Play

speed gear, and first and reverse sliding gear. Remove spreader spring from second speed gear. Remove mainshaft rear bearing snap ring and, with plastic hammer, tap mainshaft forward to remove from extension housing. Since the mainshaft rear bearing and extension housing rear bearing are a press fit on the mainshaft, they will be removed with the mainshaft when it is tapped out of the extension housing. Remove extension housing bearing, spacer, speedometer drive gear, and mainshaft rear bearing. Remove synchronizer unit through gearshift cover opening. Remove each piece of synchronizer separately, to simplify removal past cluster gear.

c. Drive Pinion

Rotate transmission assembly to horizontal position. Remove pinion bearing retainer and gasket. Using a soft hammer, tap pinion shaft while working shaft assembly out of transmission case. Remove small snap ring, washer, and bearing outer race snap ring from drive pinion bearing. Remove bearing and oil slinger from pinion shaft. Remove snap ring from cavity in end of pinion shaft, using a hook or flat blade. Pick out bearing rollers.

d. Countershaft and Reverse Idler Gear

Check end play of countershaft gear (Fig. 4) to determine need for new thrust washers. End play should be .002 to .008 inch, **with the low limit preferred.**

Using arbor, Tool C-578, drive countershaft toward rear and out of transmission case. Pick out key when shaft has been driven far enough to reach it. Remove cluster gear (with arbor tool installed) from transmission case. Remove arbor, large thrust washers, bearing roller thrust washers, and bearing rollers and spacer. Drive reverse idler gear shaft toward rear of case. When locking key can be reached, pick it out of keyway. Finish driving out shaft, and lift out reverse idler gear and bearing assembly.

3. INSPECTION

Clean mainshaft and drive pinion shaft bearings. Dry by applying compressed air directly through bearing. **Never spin bearing with compressed air. Instead, apply a little oil and turn the bearing several times by hand.** Check bearings for looseness and noise by comparing them with new bearing. Inspect fit of bearings on their respective shafts and in bores. If bearings are loose at these points, inspect bearings, shaft and case for wear. If installation of a new bearing does not correct condition, install a new shaft or case.

Inspect the mainshaft splines for wear, galling or scoring on bearing mounting surfaces, and for damaged snap ring grooves. Slight nicks or burrs can be stoned off. Replace damaged parts.

Check backlash between the synchronizer clutch gear sleeve and clutch gear. If splines or teeth on clutch gear are worn, replace both parts. **Gear and sleeve are supplied in matched sets so backlash between them will not exceed a maximum of .001 inch.**

There should be no end play between the synchronizer clutch gear and shoulder on the

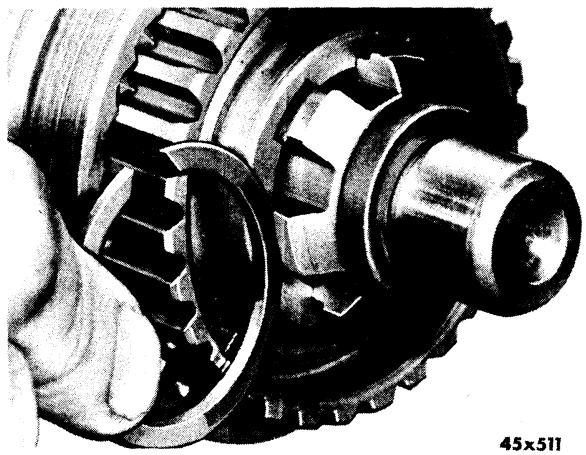

Fig. 5—Selecting Snap Ring for Clutch Gear

mainshaft. If end play is present, select proper thickness clutch gear snap ring (Fig. 5). Snap rings are available in four sizes: Thin (.086 inch to .088 inch); medium (.089 to .091 inch); thick (.092 to .094 inch), and X-thick (.095 to .097 inch). If snap rings do not correct end play condition, check mainshaft with a new clutch gear before discarding gears as the mainshaft may be at fault. Chamfers on clutch gear teeth must retain their original contour to assure proper synchronization.

Inspect the gear teeth and threads on inner and outer synchronizer stop rings. Check the gear teeth on clutch gear sleeve. If there is evidence of chipped or excessively worn gear teeth, replace the part. Check pins of inner and outer synchronizer stop ring assembly for straightness and length. The pins should be 1.570 to 1.580 inches long. Replace countershaft gear cluster, if any of its gear teeth are broken, chipped or excessively worn. Small nicks or burrs can be stoned off. Check rollers for chipping and nicks. Replace rollers that are damaged. Inspect countershaft for wear. Check condition of thrust washers, and replace if excessive wear is evident. Inspect the clutch teeth of drive pinion. If teeth are excessively by worn, broken, or chipped, install new pinion shaft. If drive pinion is loose in bearing or in case, check shaft and case with a new bearing before discarding the old one. Inspect mainshaft pilot rollers for play, pitting or scoring. If any of these conditions exist, replace all roller bearings.

If roller bearings fall out during disassembly, they are too loose and should be replaced. Inspect gearshift cover, shifter rails and forks. Replace any of these parts, if inspection reveals it is necessary. Check condition of "O" ring seal on guide rail. If ring show signs of deterioration or shredding, replace the seal.

4. ASSEMBLY OF TRANSMISSION

Wash all parts thoroughly, and lubricate gears and bearings as transmission is being assembled. Install new oil seals and gaskets. Replace snap rings that have been removed. **Be sure transmission case is clean.**

a. Reverse Idler Gear

When assembling, coat inside of gear lightly with grease to hold rollers in place. Coat ends of gear with oil to hold thrust washers in place. Place gear in case, with chamfered ends of teeth toward front of case. Insert key and drive in shaft until key is properly seated.

b. Countershaft Gear

Coat inside of countershaft gear with a slight amount of grease to hold rollers in place. Install spacer, rollers, and roller thrust washers. Insert arbor, Tool C-578 and position one large thrust washer, with tang facing outward on arbor. Large thrust washers are available in two marked sizes: "A" (.062 to .064 inch) and "B" (.059 to .061 inch) to give .002 to .008 inch end play. Use oil on thrust washer to hold in place. Do not use grease or installation will be difficult. Place cluster gear in case and align arbor, Tool C-578, (in cluster gear) with shaft holes in transmission case. **Be sure cluster gear is properly meshed with reverse idler gear and that tangs of thrust washer enter groove in case.** Using cluster gear shaft as an arbor, drive against arbor, Tool C-578, until cluster gear shaft end is flush with face of large countershaft gear. It will now be possible to correctly insert the remaining large thrust washer in position, with tangs engaged in groove in case. Continue to drive shaft into case until shaft key can be installed. Drive shaft in until fully seated.

c. Drive Pinion

Install oil slinger, bearing, and washer on drive pinion. Pinion bearing snap rings (small) are available in four thicknesses: thin (.086 to .088 inch); medium (.089 to .091 inch); thick (.092 to .094 inch) and X-thick (.095 to .098 inch). Select a snap ring that will eliminate all end play at the pinion bearing (Fig. 6).

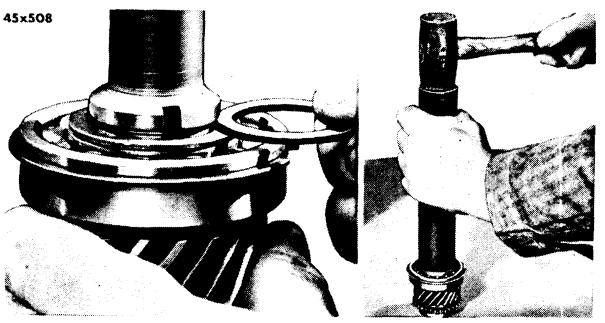

Fig. 6—Selection and Installation of Drive Pinion Bearing Snap Ring

NOTE

Using a short piece of pipe or tubing, install and seat ring on pinion shaft, as shown in Figure 6.

Replace bearing outer race snap ring on pinion bearing. Coat pocket in pinion shaft lightly with grease, and install bearing rollers. Slide the last bearing roller in from the end. Install mainshaft pilot bearing snap ring. Install drive pinion in transmission case, guiding pinion gear into mesh with cluster gear. Slide pinion bearing retainer over shaft against transmission case. While holding retainer with hand pressure against transmission case, measure the clearance between retainer and case, using a feeler gauge (Fig. 7). Select a gasket about .005 inch thicker (consult MOPAR parts catalog for sizes) that the clearance (to eliminate end play on front bearing) and install retainer and tighten bolts. Rotate transmission assembly 90 degree (drive pinion down). Assemble synchronizer unit by placing each piece (Fig. 3) (except spreader spring and stop inner ring) in its relative position on the drive pinion gear.

NOTE

The synchronizer stop ring inner assembly (Fig. 3) can be easily installed if it is carefully rotated into position.

d. Mainshaft Assembly

Install mainshaft rear bearing (large). Install speedometer drive gear and spacer. Place extension housing bearing (small) on mainshaft, and press up against end of spacer. Install the first and reverse sliding gear, with shift fork

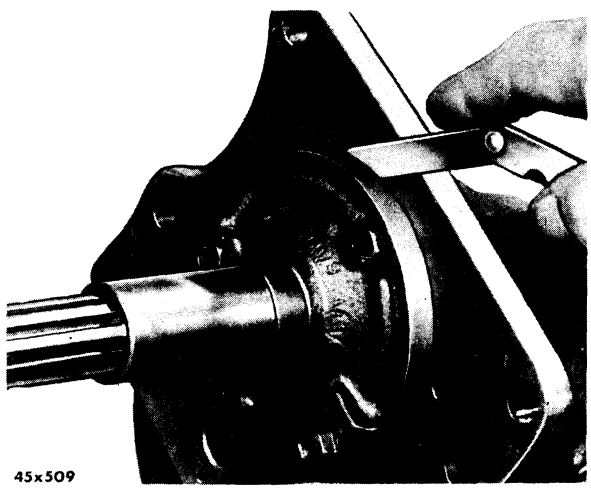

Fig. 7—Measuring Clearance Between Drive Pinion Retainer and Case

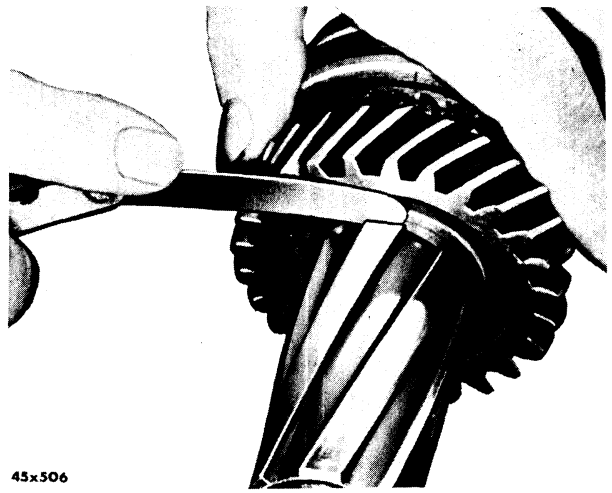

Fig. 8—Checking Second Speed Gear End Play

collar toward front of case. Gear must be free sliding fit on mainshaft splines with minimum backlash. Install second speed gear on mainshaft, with clutch teeth forward.

Install synchronizer spreader spring, second speed gear clutch stop ring, and clutch gear. Lock synchronizer clutch gear with snap ring. Install mainshaft in extension case and select proper mainshaft rear bearing snap ring to remove all end play in case. Snap rings are available in four thicknesses: (thin) .088 inch; (medium) .091 inch; (thick) .094 inch, and (X-thick) .097 inch. Select one to eliminate all end play.

Check end play of second speed gear (Fig. 8). Limits are from .002 to .008 inch. More than .008 inch end play may result in noise and possible jumping out of second gear. Excessive end play may be caused by end play of the clutch gear or wear on the thrust faces of second speed gear, clutch gear, and ends of mainshaft spiral splines. Worn parts should be replaced if noise is objectional or gear disengagement is encountered. If there is no end play in the clutch gear and no evidence of wear on gears or shaft, select combination of parts (clutch gear assembly, second speed gear, or mainshaft) that will bring second speed gear end play within limits. Coat the rear face of transmission case with light grease and place a new gasket in position. Holding synchronizer stop inner ring and spreader spring in position (by placing hand through gearshift cover opening), lower mainshaft assembly into case and through balance of synchronizer assembly.

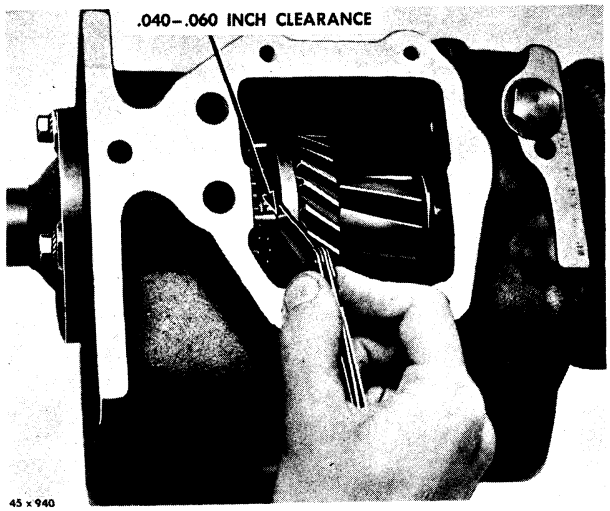

Fig. 9—Checking Synchronizer Pin Clearance

NOTE

Be sure to index clutch sleeve and gear, as marked previously.

CAUTION

If spreader spring falls out of position, mainshaft assembly must be withdrawn and spreader spring repositioned.

Place new grommets on two lower transmission case to extension screws and tighten all screws 35 foot-pounds torque. Install rear oil seal, using driver, Tool C-3205. Install hand brake assembly and drum. Final tightening of mainshaft nut should be done with transmission in car. Replace speedometer drive pinion. Check clearance between pins of synchronizer stop ring (outer), and face of stop ring (inner) assembly (Fig. 9). If clearance is in excess of .060 inch, replace both inner and outer synchronizer stop ring assemblies. If clearance is less than .040 inch, remove synchronizer, and file pins to obtain proper clearance.

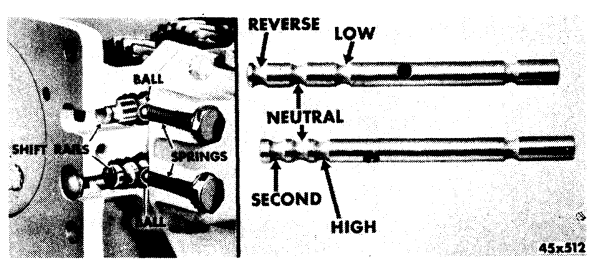

Fig. 10—Shifter Rails Identification

e. Shifter Rails and Forks (Fig. 10)

Manually place synchronizer clutch sleeve in neutral position. Insert fingers of second and high shifter fork into groove in synchronizer sleeve.

NOTE

If interlock was removed, insert it in hole in case and install the cup plug.

Slide second and high gear shifter rail through front of case and through shifter fork. Line up hole in shifter rail with hex head set screw and tighten set screw securely. Install expansion plug. Place the low and reverse sliding gear in neutral position and insert fingers of low and reverse shifter fork in groove of gear, with the hole for guide rail at the top. Slide low and reverse shifter rail through front of case and through hole in shifter fork. Be sure second and high rail is in neutral position and interlock pin is down in detent in rail. Line up hole in low and reverse rail with hex head set screw in fork, and tighten set screw securely.

Place "O" ring seal (if removed) on guide rail, and insert guide rail through hole in front of case and through both shifter forks. Tighten securely with screw driver.

f. Gearshift Housing

Set gearshift lever and shifter forks in neutral position. Place gearshift housing gasket and housing on transmission case. Tighten screws securely. Drop gearshift selector balls into holes and insert selector ball springs. Use new wash-

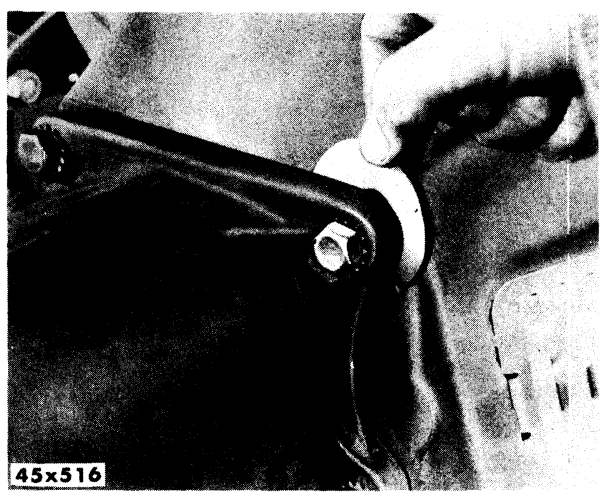

Fig. 11—Inserting Shim Between Transmission and Clutch Housing

ers and install selector ball retaining screws. **To insure proper operation of transmission, manually shift transmission, through all ranges before installing in vehicle.**

5. INSTALLATION OF TRANSMISSION

a. Clutch Housing Alignment

If transmission has been jumping out of gear, check clutch housing face alignment with housing alignment arbor, Tool C-870, and indicator, Tool C-3339, before installing transmission in car. Runout on this surface should not exceed .003 inch, total indicator reading. To correct excessive runout, place proper thickness shim stock between clutch housing and transmission (Fig. 11). Check runout of housing bore (Fig. 12). Bore should not be off center more than .005 inch, total indicator reading. If it is necessary to correct bore alignment, tap out dowels that align clutch housing to engine. Loosen mounting bolts slightly and tap housing to line it up with crankshaft. Tighten bolts 35 foot-pounds torque and recheck alignment. Ream out dowel holes and install .010 inch oversize dowels, if check indicates that housing is still out of alignment.

b. Installing Transmission

Do not put grease on end of drive pinion. Place 1/2 teaspoon of short fiber grease in cavity of pinion shaft pilot bushing in engine crankshaft. Do not get grease on face of flywheel as this will cause disc slippage and chattering. Use extreme care when installing transmission to avoid springing the clutch disc. Tighten transmission case to clutch housing bolts 50 foot-pounds torque. Tighten mainshaft flange nut 95 to 105 foot-pounds torque. Install hand brake cable. Connect gearshift selector and operating lever rods. Connect back-up light switch leads, if vehicle is so equipped. **Always check clutch pedal adjustment after installing transmission.** Adjust the shift linkage with transmission in neutral position. Install transmission drain plug and fill case to required level with proper lubricant. Refer to Lubrication Section of this Manual.

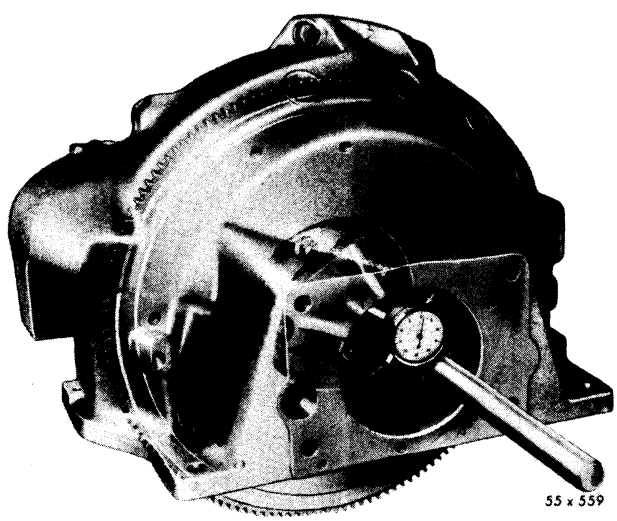

Fig. 12—Typical Method of Attaching Fixture C-870 and Checking Clutch Housing Bore

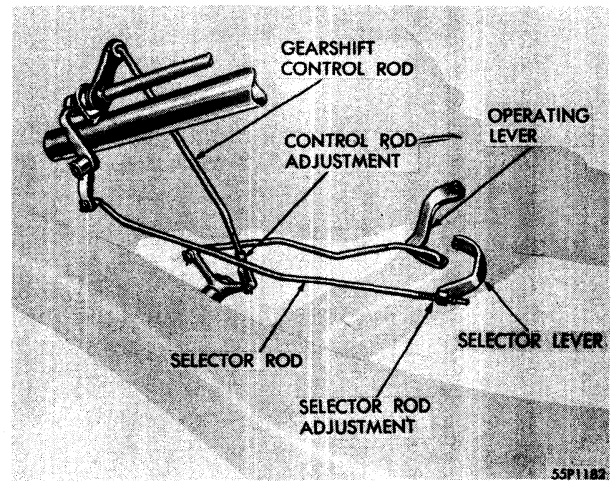

Fig. 13—Adjusting Gearshift Selector Rod and Gearshift Control Rod

6. GEARSHIFT CONTROL ADJUSTMENT (Figs. 13 and 14)

Set gearshift rod in its normal full-returned position before making the cross-over adjustment.

Adjust cross-over linkage to secure 3/8 to 5/8 inch free play cross-over movement of gearshift knob when transmission is in high gear position.

Make adjustment at selector rod and swivel so that selector rod swivel pivot end can be placed freely into selector lever hole (when selector lever is approximately 1/16 inch back from contact with shift fork), with no tension or compression of selector rod. **Transmission manual control shift lever should lie in horizontal position when transmission gears are in neutral.**

7. REMOVAL AND INSTALLATION OF TRANSMISSION EXTENSION REAR OIL SEAL

Pull off universal joint flange and brake drum

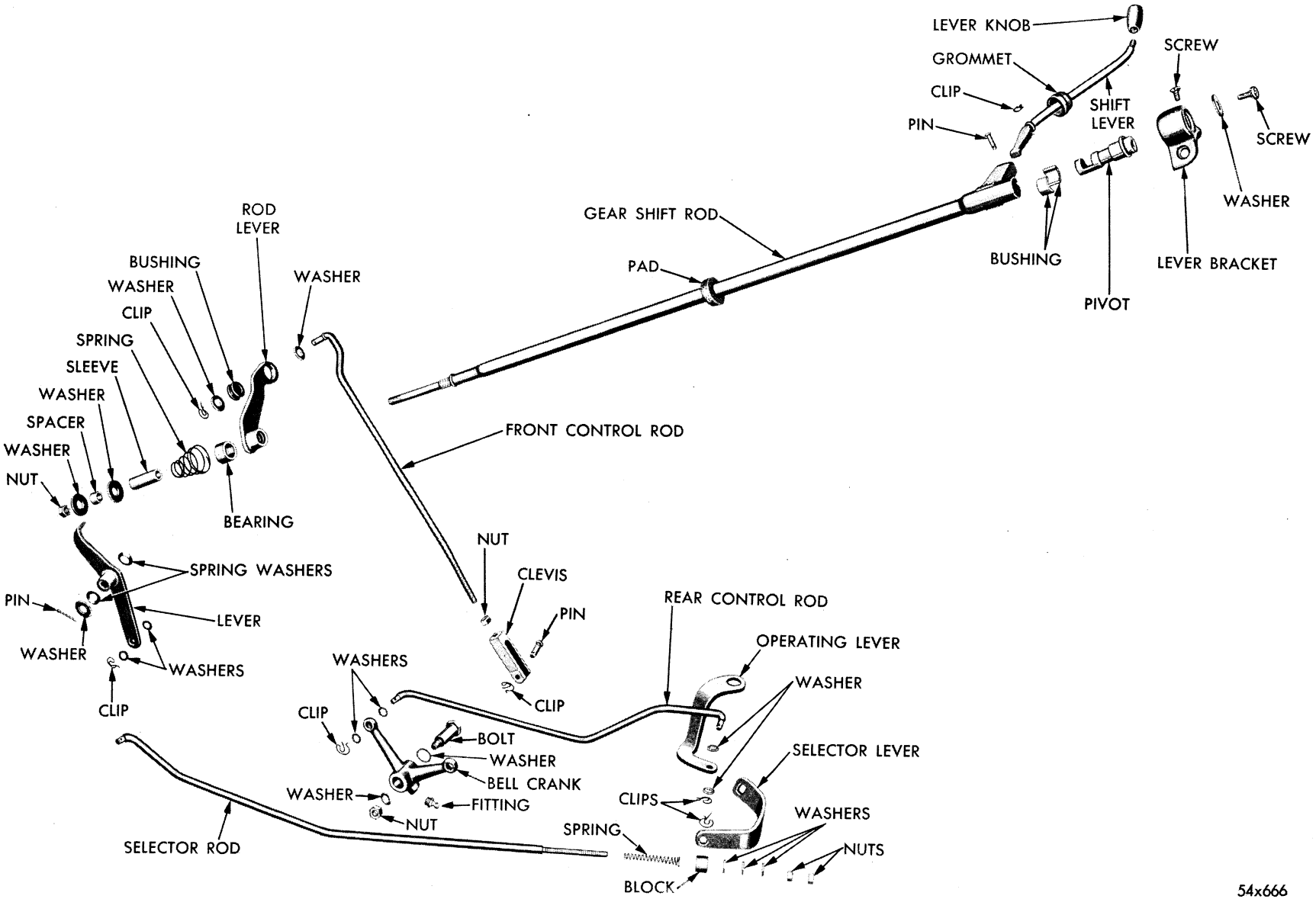

Fig. 14—Gearshift Linkage (Disassembled View)

assembly, using special puller, Tool C-452. **Never drive the flange off with hammer.** Insert oil seal puller, Tool C-748, securely into seal and draw seat out of housing.

When installing new seal, use special driver, Tool C-3205, which automatically locates seal in its proper position. If special driver is not available, oil seal must be pressed .500 inch into extension.

SERVICE DIAGNOSIS

8. NOISES

It is always wise, when diagnosing transmission noise, to note the gear position in which the noise occurs. Noise present in all gear position may be due to worn or damaged constant mesh gear or bearings. Noise present in only one gear position can usually be traced to the particular gear involved.

a. The sound made by a worn or damaged pinion gear, or a mating cluster gear, will have about the same tone when the transmission is in low, second or reverse gears, but it will be hardly noticeable when transmission is in high gear.

b. The noise caused by a worn or damaged second speed gear, or a mating cluster gear will be more pronounced while car is driven in second gear. When transmission is in high, low or reverse gear, the noise caused will be indistinct.

c. A worn or damaged low and reverse sliding gear will be noisy only while transmission is in either of these two gears. If sliding gear is in good condition, and a noise is heard when low gear is used, it is heard when reverse gear is at fault. If noise is heard when reverse gear is used, the reverse idler, or mating cluster gear, may be worn or damagerd.

d. Damaged roller bearings, or worn cluster gear shaft, will create more noise when transmission is in low, second and reverse gear, rather than when transmission is in high gear.

e. A pinion shaft bearing noise can often be determined by disengaging and engaging the clutch with engine running and transmission in neutral. The noise should disappear when clutch is disengaged and pinion stops. With this test, other similar noises may be heard, if the following constant mesh gears are worn or damaged, pinion gear, front cluster gear, second speed cluster gear, second speed mainshaft gear, reverse cluster gear, and reverse idler gear.

f. Noise caused by damaged roller bearings or shaft, in either cluster gear or reverse idler gear, will also be apparent when test is made.

g. A mainshaft bearing noise can usually be determined by driving car in high gear at a speed where the noise is more apparent, and then shifting into neutral, shutting off engine and coasting. This action stops operation of pinion bearing and then any noise (in either the center or rear bearing) may be heard.

h. The noise made by a worn drive pinion pilot bushing (in rear end of crankshaft) is usually apparent while coasting in low or second gear at moderate speeds, with transmission in gear and clutch disengaged, or during a cold start, with transmission in gear and clutch disengaged.

i. Noises caused by excessive backlash, or end play, are similar. To determine which condition exists, it will be necessary to check backlash or end play.

(1) If backlash appears to be excessive, check mating gears for wear or improper fitting. If excessive backlash is present, it will be more apparent in second gear. If in high gear, the noise would be due to excessive end play, rather than excessive backlash.

(2) To determine if end play is excessive, check thrust washers or snap rings for wear, improper fitting or any condition which will allow too much endwise movement of parts. End play may be checked without removing transmission from car by removing gear shift housing only.

9. HARD SHIFTING

a. High or Second Gears

(1) If the selector rod is adjusted too short,

the up-and-down movement of gearshift lever in neutral position will be limited and hard shifting into second and high gears may result.

(2) Hard shifting into second or high gears, or failure to complete a shift into these gears may be caused by a binding action due to a loose shifter fork, or locking of stop rings to second speed gear or drive pinion. If the latter condition occurs, the shifter collar is prevented from aligning the teeth of stop ring with clutch teeth on second speed gear or drive pinion, making a complete shift impossible. If this occurs frequently, the stop ring should be replaced.

(3) Hard shifting into high or second gear may also result if following parts are damaged or worn: Clutch gear sleeve, clutch gear, stop rings, shifting plates, plate springs, clutch gear snap ring. A broken or damaged selector and cam assembly will also cause hard shifting.

b. Low or Reverse Gears

(1) Hard shifting into low or reverse gear may result if selector rod is adjusted too long.

(2) A loose fork or shifter rail may cause binding action and result in hard shifting.

(3) Failure to shift into low or reverse, without re-engaging the clutch, is generally due to "gear butting" which is caused by the leading edges, or bevels of gears, being flattened by continual unnecessary gear clashing on the part of driver.

(4) A tight idler gear due to damaged roller bearings will cause hard shifting into and out of low and reverse gears.

c. One or More Gears

(1) If it is difficult to shift into one or more gears, following parts may be broken, damaged, or loose gearshift housing shift lever, shift lever shaft, shifter rails, shifter forks or shifter fork guide rail.

(2) Inspect for bent control rods.

(3) If the clutch is dragging, it may be difficult to shift into or out of all gear positions, particularly low and reverse.

10. SLIPPING OUT OF GEAR

Slipping out of gear is usually the result of a condition which prevents complete gear engagement, such as, misalignment or excessive clearances. Restricted travel of shifter linkage is the most common cause of slipping out of gear.

a. High Gear

(1) Inspect for misalignment between clutch bell housing and engine; between transmission case and clutch housing, and between mainshaft and drive pinion.

(2) Inspect following parts for wear or damage; pinion bearing, mainshaft bearing, drive pinion clutch teeth, synchronizer clutch teeth, shifter rail detents, shifter forks or shifter fork set screws.

b. Second Gear

(1) Inspect alignment between clutch housing and engine, and between transmission and clutch housings.

(2) Inspect pinion bearing and mainshaft bearing, synchronizer clutch teeth, second speed gear clutch teeth, shifter rail detents, shifter forks or shifter fork set screws, for wear.

(3) Inspect pinion shaft, countershaft gear and second speed mainshaft gear, for excessive end play.

c. Low and Reverse Gears

(1) Inspect following parts for wear or damage: mainshaft sliding gear spline, sliding gear, countershaft gear, countershaft, reverse idler gear shaft, shifter rail detents, reverse idler gear shifter forks or shifter fork set screws.

(2) Inspect for excessive end play in countershaft gear.

11. LEAKAGE

a. Inspect gaskets for damage or wrinkles at following points: transmission to clutch housing; gearshift housing to transmission case; extension to transmission case, and pinion bearing retainer.

b. Inspect grommets for deterioration at extension screws and pinion bearing retainer screws.

c. Inspect washers on selector ball spring screw for damage.

d. Inspect mainshaft rear bearing oil seal for wear or damage.

e. Inspect speedometer pinion seal for wear.

f. Inspect for proper fit at following points: pinion bearing retainer and transmission case, and countershaft at front of transmission case.

g. Inspect drive pinion bearing retainer for proper location of end of oil return thread in relation to slot in this retainer.

NOTE

Leakage at pinion bearing retainer gaskets, or grommets, will be indicated by traces of oil in clutch housing pan. This should not be confused with leakage of the crankshaft rear main bearing oil seal.

POWERFLITE TRANSMISSION OPERATING INFORMATION

12. GEARSHIFT CONTROL UNIT AND LINKAGE (Fig. 15)

Gear range selection is obtained by pressing one of four gearshift control unit push buttons mounted on instrument panel to left of starting column.

The buttons provide ranges of (N) Neutral, (D) Drive, (L) Low, and (R) Reverse. A hydraulic blocker valve prevents the driver from inadvertently using (R) Reverse when car is traveling forward above 10 m.p.h.

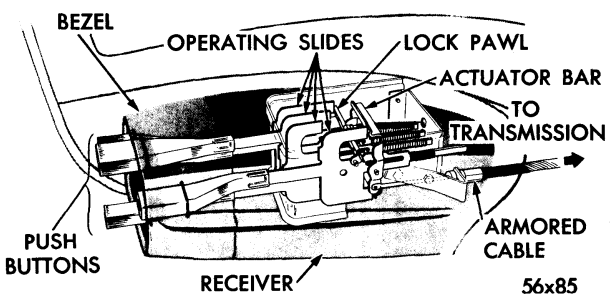

Fig. 15—Push Button Control Unit (Phantom View) (Early Design)

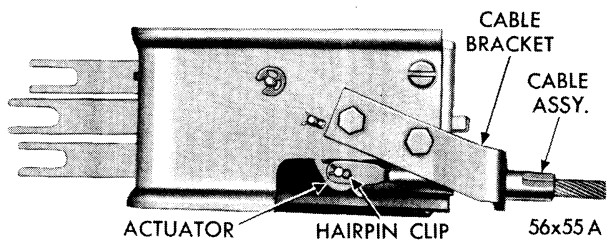

Fig. 16—Exterior View of Push Button Control Unit

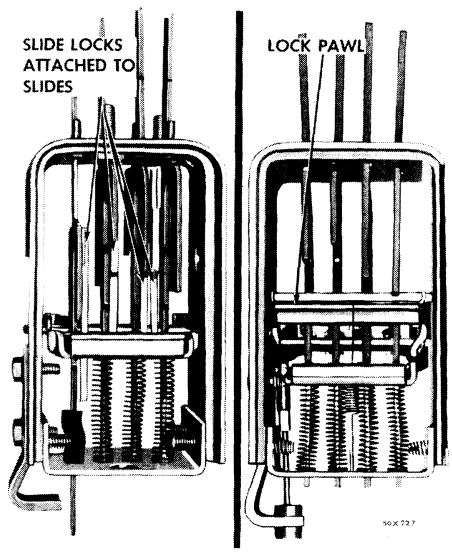

Fig. 17—Gearshift Control Unit (Interior View). Early Design—Right View; Late Design—Left View

NOTE

Should operator engage the (R) Reverse button at a speed in excess of 10 m.p.h., the manual valve would be moved to (N) Netural position, and operator would again be required to engage the proper button.

All of the push buttons are illuminated by a single bulb. The push buttons are moved approximately 7/8 inch in operation, and require a pressure of 3 to 5 pounds to operate. Mechanical connection between push button unit and transmission manual control valve is obtained through the use of a push-pull cable. One end of the wire cable is secured to cable

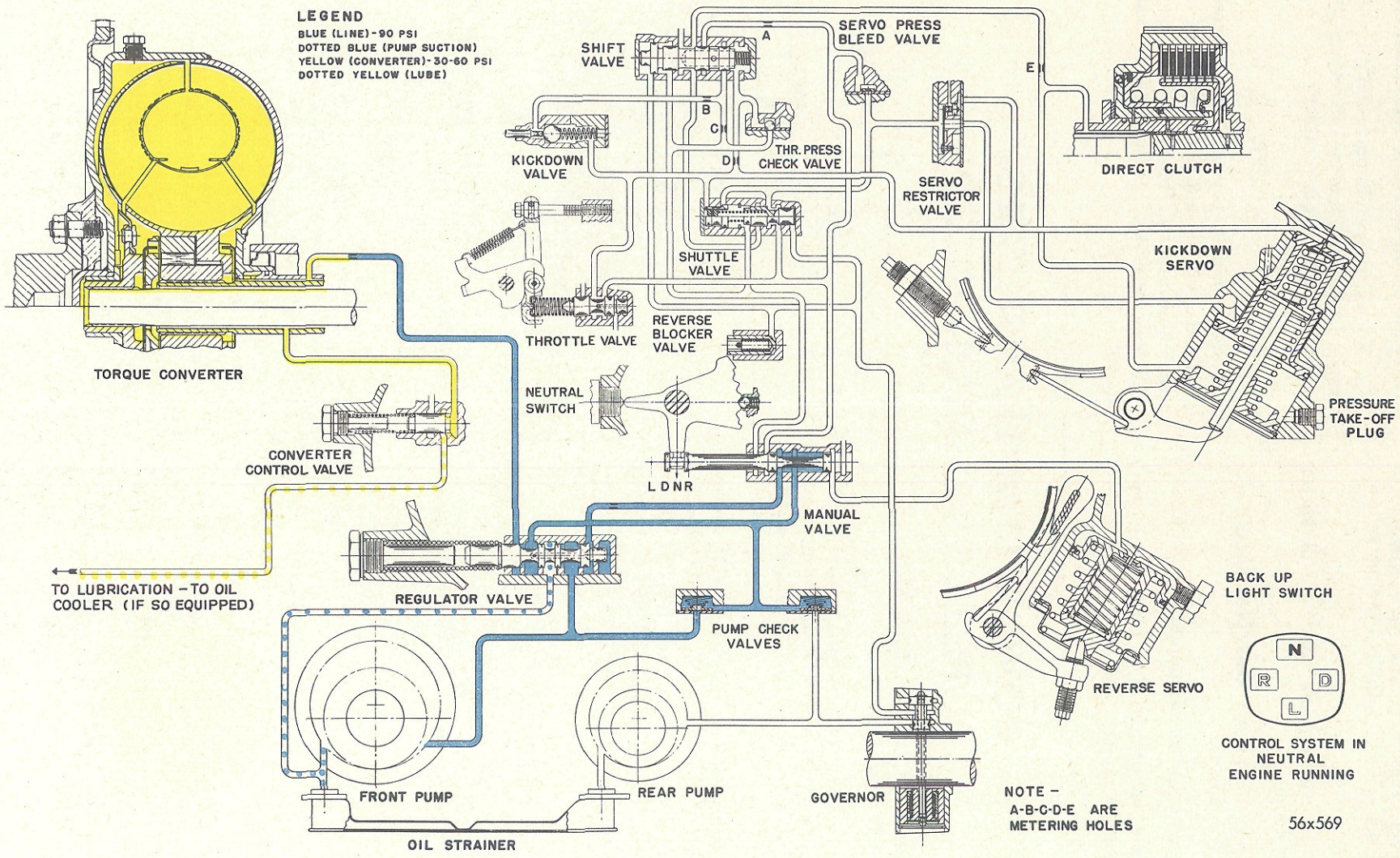

Fig. 18—Hydraulic Circuit—Neutral

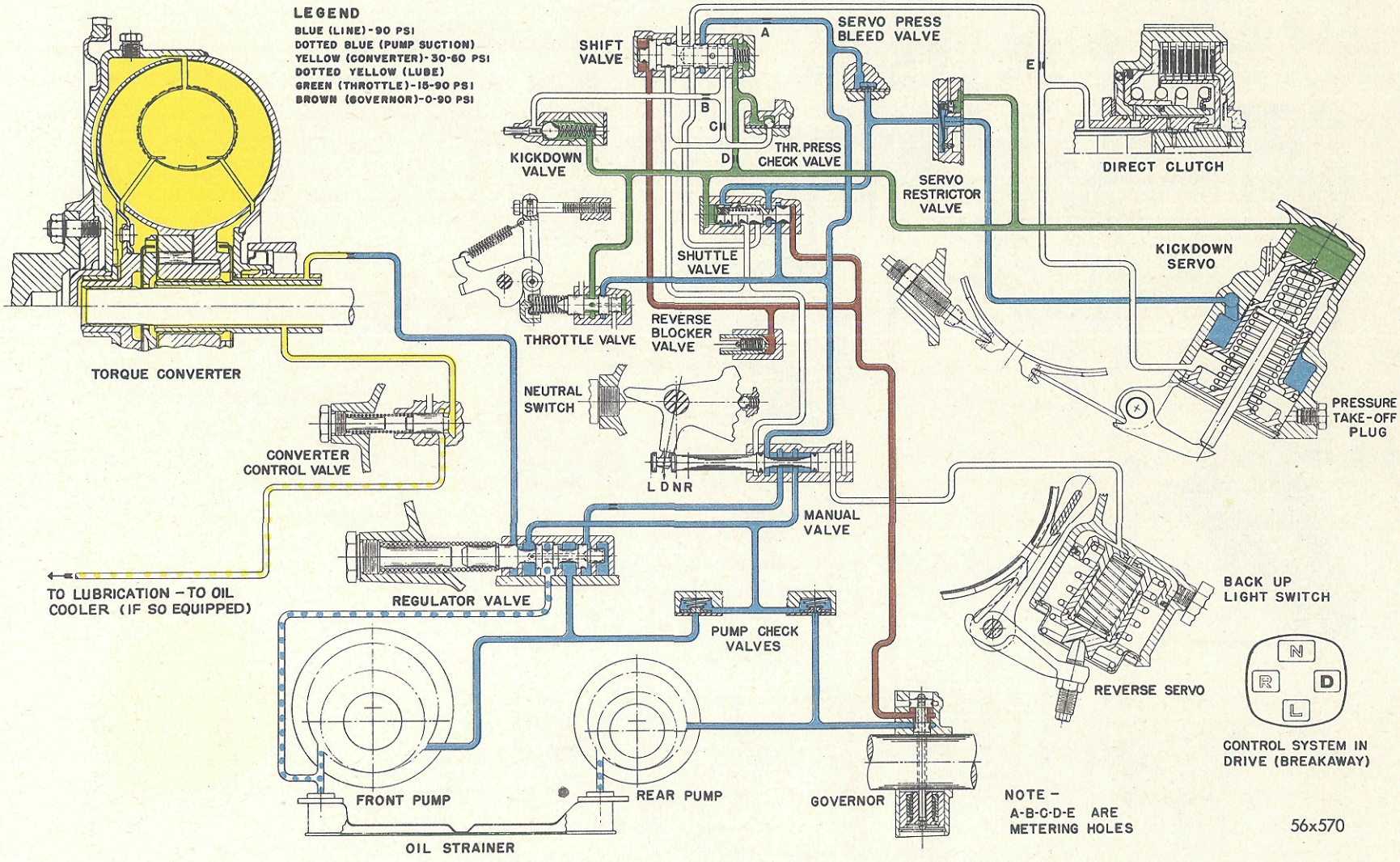

Fig. 19—Hydraulic Circuit—Breakaway

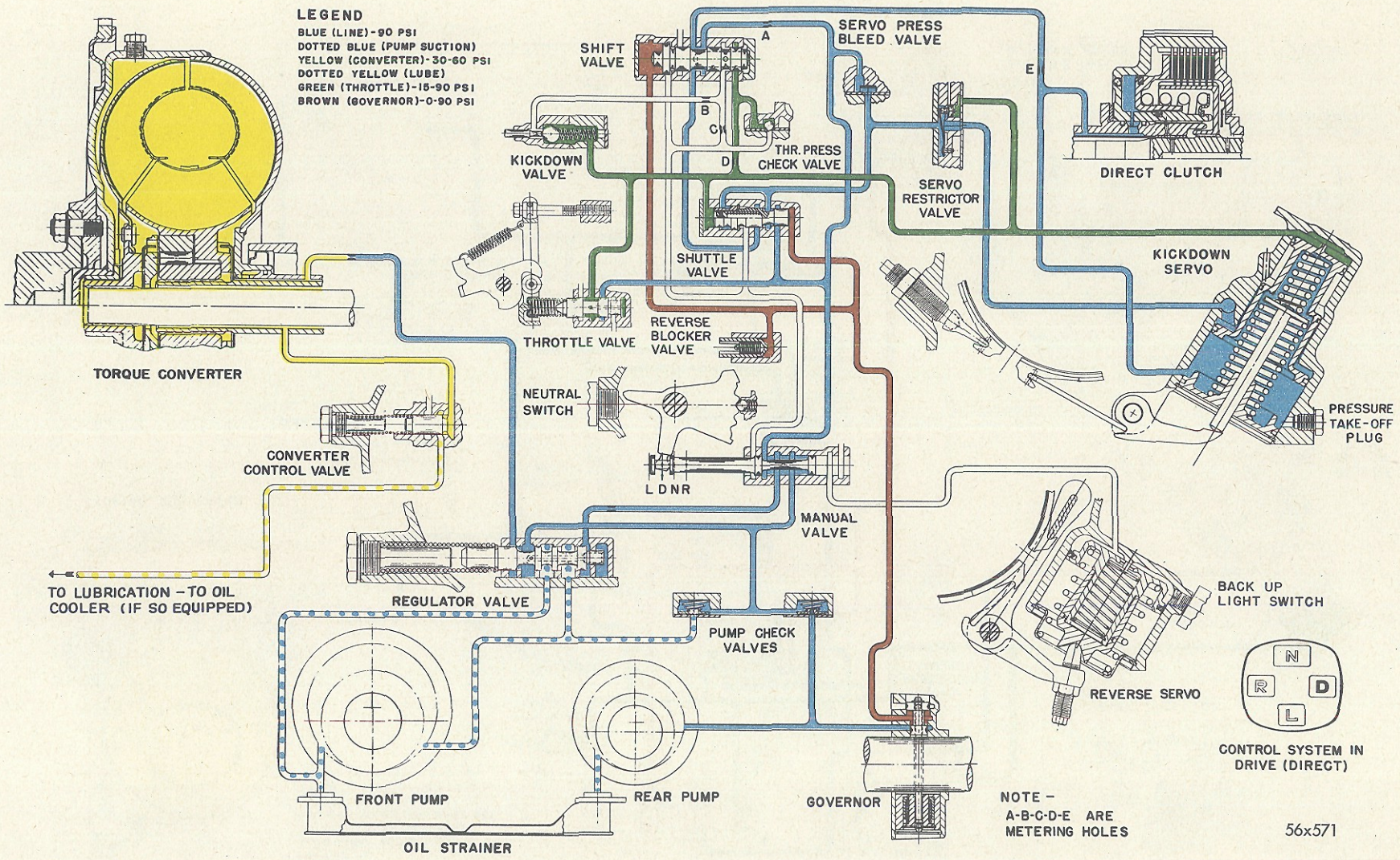

Fig. 20—Hydraulic Circuit—Direct

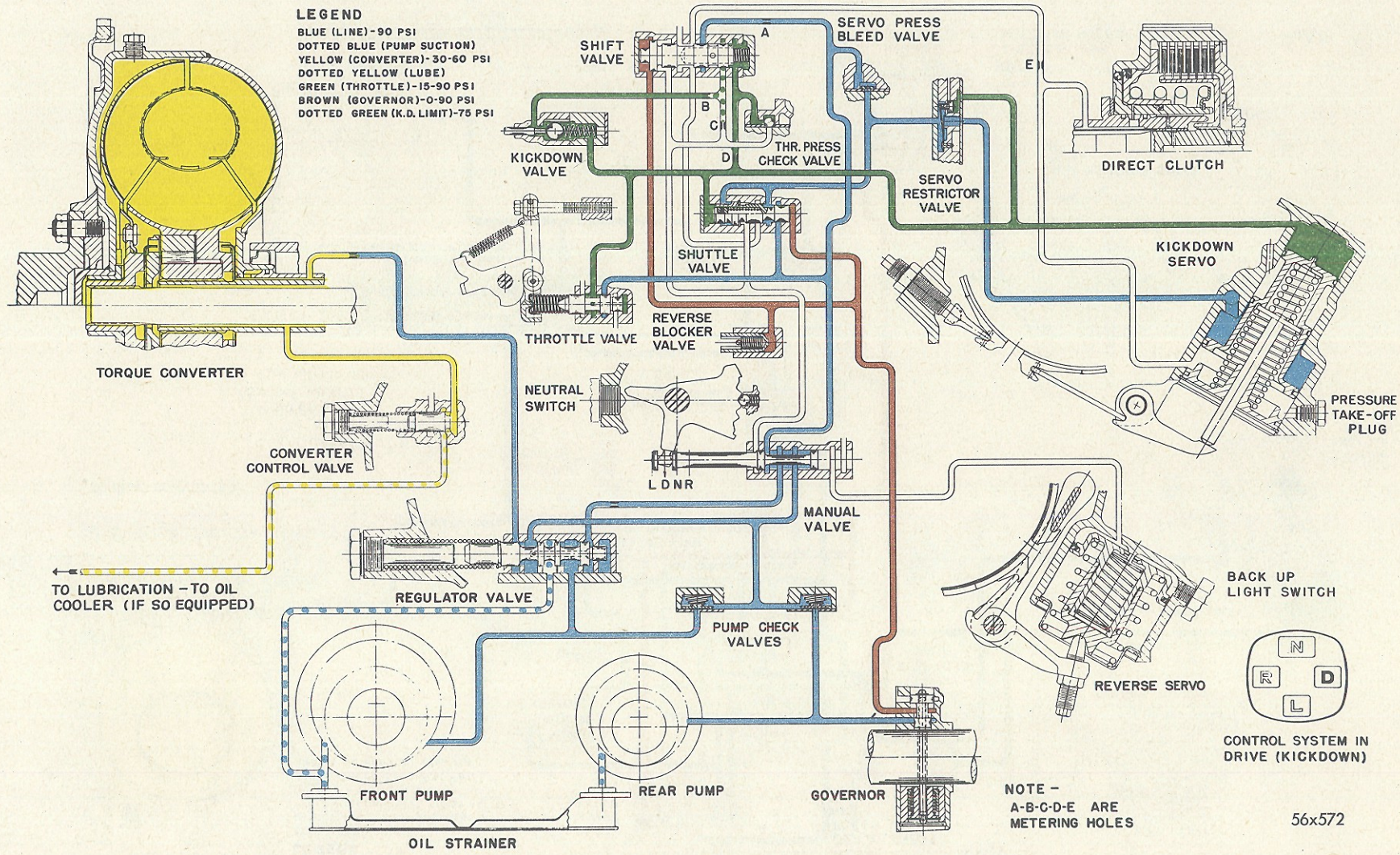

Fig. 21—Hydraulic Circuit—Kickdown

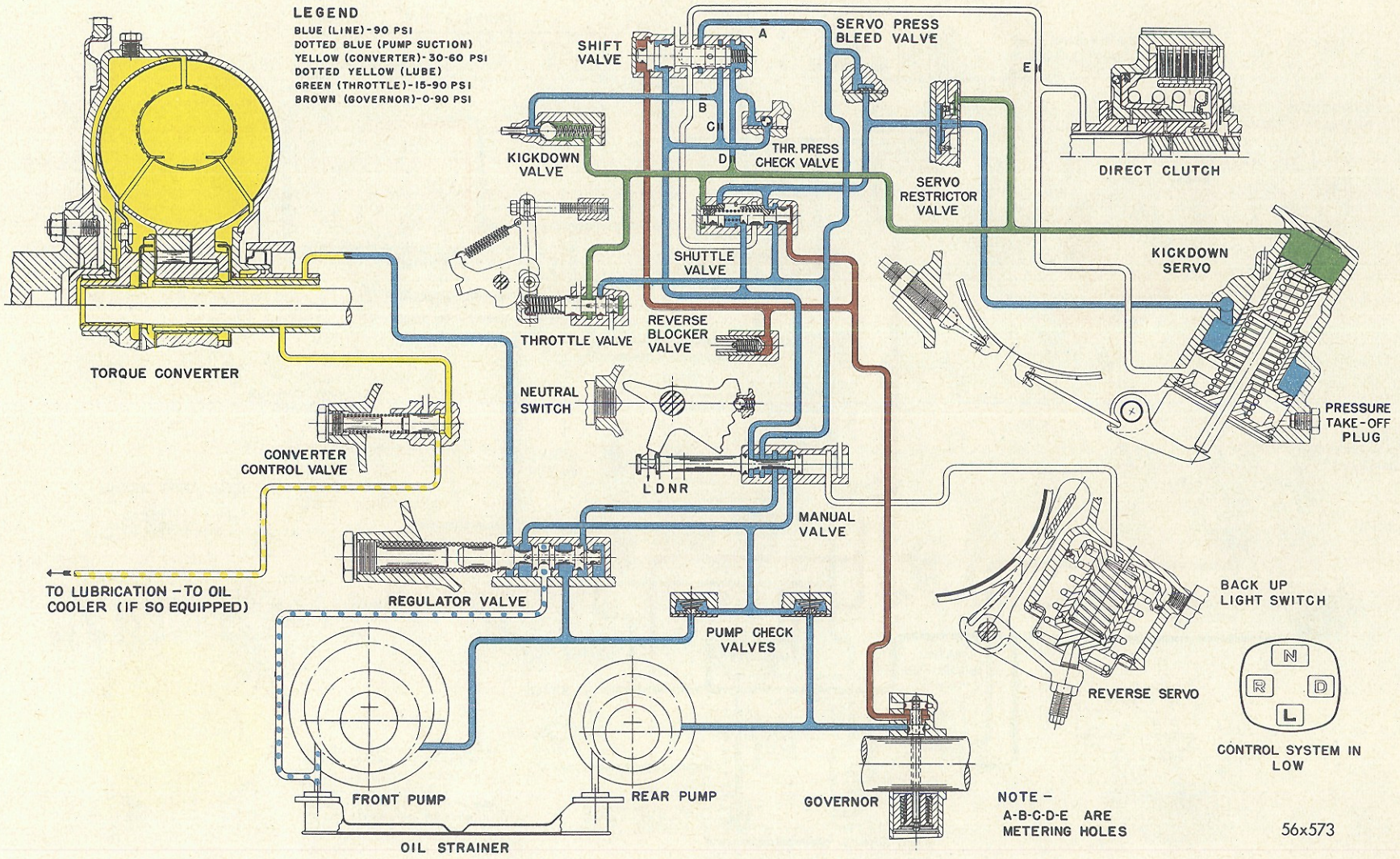

Fig. 22—Hydraulic Circuit—Low

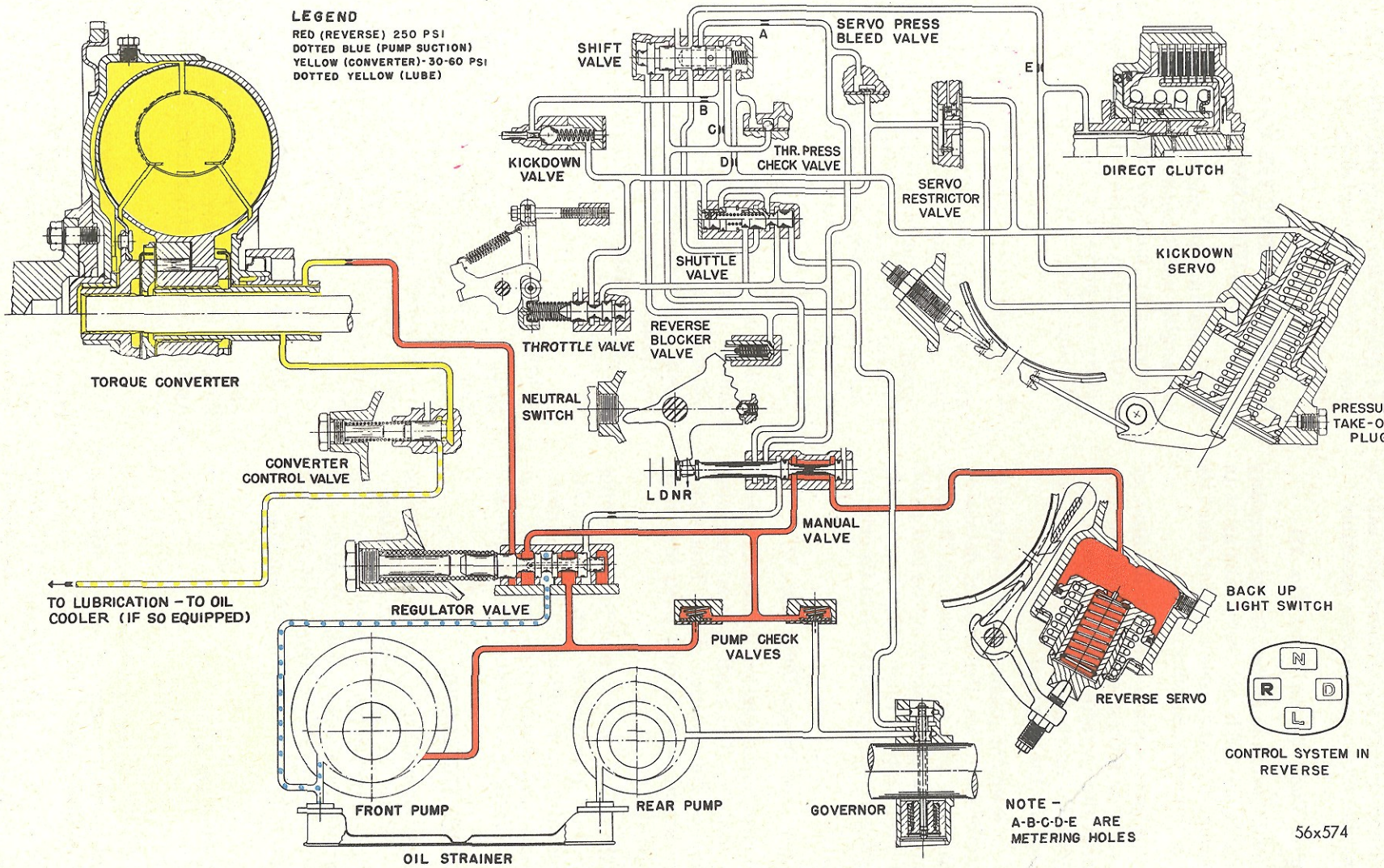

Fig. 23—Hydraulic Circuit—Reverse

actuator in push button control unit (Fig. 16), and the other end enters transmission case to engage manual control valve lever assembly.

a. Operation (Early Design Units) (Fig. 17)

When a push button is pushed in, its operating slide contacts the cable actuator, causing it to pivot. Movement of the cable actuator about its axis moves the attached wire cable.

When the push button reaches its limit of travel, a relieved portion on the operating slide passes under the operating slide lock pawl. This action allows the spring-loaded pawl to lock the push button in the engaged position.

When the operator pushes another button to select a different range, the edge of detent on slide strikes the lock pawl, releasing the first push button from the restraint of the lock pawl. The first push button (and slide) is now free to return (under spring pressure) to its original position.

b. Operation (Late Design Units) (Fig. 17)

When the push button reaches its limit of travel, a spring lock (on the push button operating slide) engages the actuator shaft. This action allows the spring lock to hold push button in engaged position.

When the driver selects a different driving range, the top or bottom portion of operating slide (depending upon which button was pushed) contacts the actuator, releasing the first push button from the restraint of spring lock.

13. STARTING THE ENGINE

As a safety precaution, apply hand brake or foot brake. Push "in" the Neutral (N) selector button. The starting motor is wired so that engine cannot be started unless Neutral (N) selector button is pushed in. Depress accelerator pedal slightly, and turn ignition key to extreme clockwise position.

14. PUSH STARTING

CAUTION

Towing car to start engine is not recommended because of sudden surge of power resulting when the engine starts.

With Neutral (N) button pushed in, turn ignition key to ON position. When car reaches a speed of approximately 25 m.p.h., push in Low (L) push button. This will allow the transmission to drive the engine by power transmitted from rear wheels.

15. HOW TO DRIVE THE CAR WITH POWERFLITE TRANSMISSION

When starting in extremely cold weather, allow engine and transmission to warm up with Neutral (N) push button engaged. If engine is cold (engine on fast idle), apply foot brake lightly to prevent a "creep" tendency when selecting Drive (D) or Reverse (R) positions.

a. Drive (D)

All normal driving will be done in this range. The vehicle will have a slight tendency to "creep" after pushing the selector button from Neutral (N) to Drive (D) at idle. This creeping can be prevented by applying the foot brake lightly. As soon as the accelerator is depressed, the car will move forward in drive (breakaway) range. At a speed of between 13 to 65 m.p.h., depending on the car model and amount accelerator is depressed, transmission will upshift to Drive (direct). When slowing car down, at throttle openings short of wide open, the transmission will automatically downshift at approximately 9 to 13 m.p.h. depending on car model.

b. Low (L)

In this position, the transmission operates in first speed only, and will not upshift (into direct) regardless of car speed. It is possible to push selector buttons from Low (L) to Drive (D) to Low (L), at any normal speed. Damage may result if a shift from Drive (D) to Low (L) is made above 60 m.p.h.

c. Reverse (R)

Bring car to a complete stop before pressing Reverse (R) selector button. Apply foot brake lightly when switching from Drive (D) to Reverse (R).

CAUTION

Do not engage the Reverse (R) selector button if car is moving forward at a speed above 5 m.p.h.

d. Kickdown or Forced Downshift

At speeds below 42 or 63 m.p.h. (depending on car model) in Drive (after transmission has upshifted to direct), maximum acceleration can be obtained for passing or climbing a steep grade by pressing the accelerator wide open. This will cause transmission to downshift. It will automatically upshift to direct when accelerator is released, or a speed of between 51 to 65 m.p.h. (depending on car model) is reached. Any variation in downshift speed limits may be due to permissible operating fluid leakage within the transmission.

16. TOWING

a. Transmission Inoperative

Disconnect the propeller shaft before towing car.

b. Transmission Operating Properly

The car may be towed safely in Neutral (N) at moderate speeds. For long distance towing (over 100 miles), the propeller shaft should be removed.

17. HYDRAULIC CONTROL SYSTEM

Figures 18, 19, 20, 21, 22 and 23 are schematic diagrams of the hydraulic circuit and show positions of various valves and passages (color coded to indicate those under hydraulic pressure) in conditions of neutral, breakaway, direct, kickdown, low and reverse.

MAINTENANCE AND ADJUSTMENTS

18. CHECKING THE FLUID LEVEL (EVERY 1000 MILES)

a. Transmission Cold (Up to Approximately 100 Degrees F.)

Start engine, set parking brake, and move selector buttons through all ranges. Allow engine to run approximately two minutes. Push "in" Neutral (N) selector button. Check oil level with engine idling. The oil level should not be higher than ½ inch above "Low" mark on dip stick, and it should not be below the "Low" mark.

b. Transmission Hot

With engine idling, the oil level should not be above the "Full" mark on dip stick, after car has been driven sufficiently to bring engine and transmission up to operating temperature. If oil is slightly below desired level indicated in the preceding instructions, add a little oil at a time and recheck. Do not add a full quart unless checks indicate that it is needed.

19. DRAINING AND REFILLING (EVERY 20,000 MILES)

NOTE

If oil pan is not equipped with drain plug, remove connector at filler tube.

a. To Drain

Remove transmission oil pan drain plug, and allow transmission oil to drain. Remove access plate from bottom of torque converter housing, and rotate torque converter until drain plug is accessible. Remove plug and drain fluid. Check gaskets on torque converter and transmission drain plugs, and install new gaskets, if necessary; install both plugs or filler tube connector and tighten. Install access plate on housing and tighten bolts.

b. To Refill

Apply parking grake. Add five quarts of Automatic Transmission Fluid, Type "A", through transmission oil pan filler tube. Start engine and add approximately four quarts more while engine is running. Allow engine to idle for two minutes. Move each push putton through its range. Push "in" Neutral (N) push button and add sufficient fluid to bring fluid level to "L" mark on transmission dip stick (approximately one quart). Overfilling can result in oil being forced out of filler tube.

20. SEASONAL PREPARATION

a. Preparation for Winter Driving

Should slow engine turnover be experienced on starting (during extreme cold weather for

which SAE 5-W oil is recommended for use in the engine), it is permissible to drain one quart of automatic Transmission Fluid, Type "A", from transmission and replace it with one quart of refined kerosene. The fluid level of transmission should then be checked in accordance with recommended procedures. If additional lubricant is required, Automatic Transmission Fluid, Type "A" should be added.

b. Preparation for Summer Driving

If Automatic Transmission Fluid, Type "A", has been thinned with Kerosene for extreme cold weather operation, it will not be necessary to drain and refiill the transmission for summer driving. It is only necessary to assure that proper lubricant level in transmission is maintained by adding Automatic Transmission Fluid, Type "A", as required.

CAUTION

Make sure the oil level indicator dip stick seats properly in filler tube to prevent dirt from entering transmission.

21. CHECKING FOR OIL LEAKS

a. Leak Points Repaired with Transmission in Car

Transmission output shaft rear oil seal; speedometer pinion assembly in rear extension; oil pan drain plug; oil pan to transmission case gasket; regulator valve and torque converter control valve plugs; governor, direct clutch, line, and throttle pressure pipe plugs in case (pressure test holes); throttle valve lever shaft seals; fittings in oil cooler lines at transmission and cooler, and selector button control cable entrance hole (damaged "O" ring). If oil is found inside torque converter housing, determine whether it is Automatic Transmission Fluid, Type "A", or Engine Oil. Check torque converter drain plug. Automatic Transmission Fluid, Type "A", has a sligh sulfurous odor.

Leaks at these locations should be corrected regardless of how slight they are. Correct leaks by tightening loose screws or plugs. If this does not remedy the condition, replace faulty gaskets, seals or plugs.

b. Leak Points Requiring the Removal of Transmission from Car

Sand hole in transmission case; sand hole in front oil pump housing; damaged front oil pump housing screws or sealing washers; torque converter impeller hub seal located on forward end of front oil pump housing (front oil pump housing dust seal), and front oil pump housing seal (located on outside diameter of front oil pump housing).

22. ADJUSTING GEARSHIFT CONTROL CABLE

a. Removal and Inspection of Cable Assembly

Push in the Reverse (R) push button (to position cable adapter for removal of cable lock spring, and placing cable adapter in close proximity to cable entrance hole in transmission case), (for reinstallation of cable). Raise car on hoist and remove neutral starting switch from transmission case.

CAUTION

Transmission fluid may be hot!!

Loosen cable to transmission adjustable mounting bracket. Discard large spacer washer, if present. Place screwdriver blade through neutral starting switch hole, and gently push against cable lock spring (Fig. 24). With the other hand, withdraw cable assembly for transmission case.

NOTE

The early design lock spring (Fig. 24) has been replaced by a lock spring with three coils.

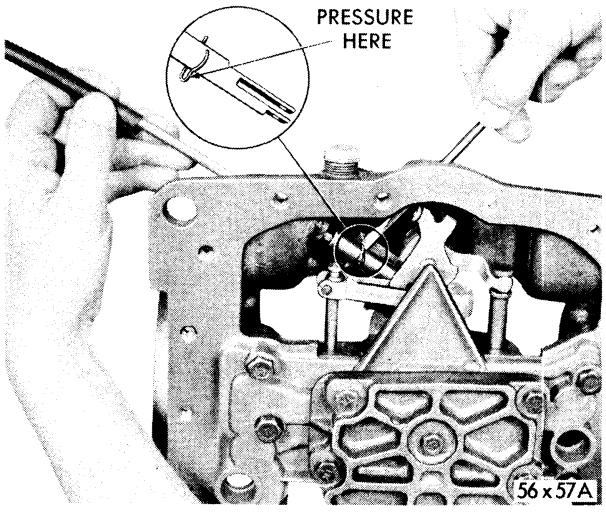

Fig. 24—Removing Control Cable Assembly, Showing Early Design Lock Spring (Oil Pan Removed to Show Operation)

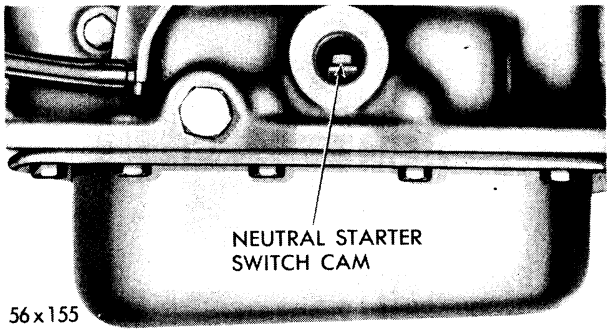

Fig. 25—Neutral Switch Cam Centered in Neutral Start Switch Mounting Hole

Cable removal procedure is the same as that for the other lock spring.

Examine "O" ring seal on cable ferrule. Replace seal if it shows signs of roughness, shredding or deterioration. Inspect fit of bracket slot and cable ferrule groove. The bracket should fit **just** freely into ferrule groove to full depth of bracket slot. If cable bracket slotted section does not meet this requirement, remove excess metal with a file.

b. Installing Cable

Push in Low (L) push button. The transmission manual valve lever should be in Reverse (R) position—if not so positioned, move neutral switch contact part of lever (full travel) towards rear of car manually, by using screw driver (or other suitable tool) in neutral starting switch hole. With Low (L) push button held tightly in (full travel), insert cable assembly into transmission case engaging cable ferrule groove with lock spring in cable adapter. Push and pull the cable, using light pressure, to be sure groove in cable ferrule has engaged lock spring. Replace adjustable mounting bracket and tighten cap screw finger tight.

c. Cable and Neutral Starting Switch Adjustment

Move the cable and bracket assembly (manually) as required, to position the manual valve lever into neutral. Hold the N (neutral) button tightly "in" at full travel. The neutral starting switch cam should then be practically centered in the neutral starting switch mounting hole, (Fig. 25).

Use a free-fitting flat-faced shaft, inserted through the neutral switch mounting hole (Fig. 26), and apply **light** pressure against the manual valve lever to maintain the neutral detent position of the manual lever.

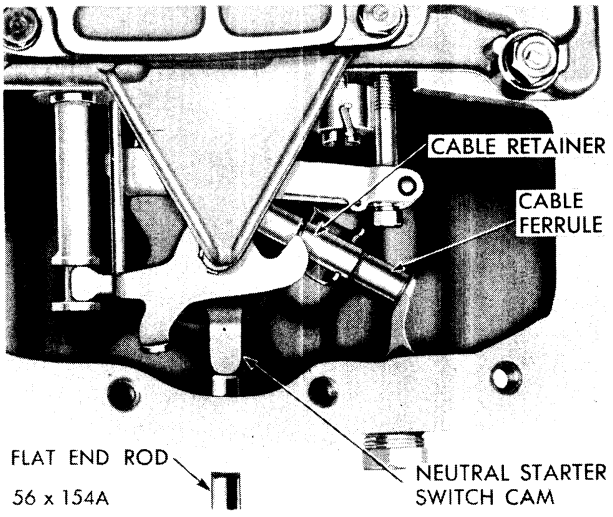

Fig. 26—"Locking" Manual Valve Lever in Neutral Position (Oil Pan Removed to Show Operation)

NOTE

If tool is not available, lever may be held by finger pressure.

Carefully move cable assembly "in" and "out" without **moving** the manual lever, to determine total free-play travel of cable. Locate the cable in mid-position of the free-play, release the pressure against the manual lever and tighten the mounting bracket securely. Do not allow the **cable** to move when tightening the bracket.

Replace the neutral starting switch. Check transmission fluid level as outlined in Paragraph 18.

NOTE

The manual valve lever detent ball spring tension has been reduced to minimize the effort required to operate the push button control mechanism. The contact plunger spring tension of the neutral starting switch has also been reduced in proportion. Therefore, previous model neutral starting switches must not be used instead of the current model switch. To determine if a switch is of current design, apply finger pressure to the contact plunger. The effort required to depress the contact plunger of the new switch 8 oz. at .030 inch depression—maximum load) is considerably less than that required for the previous model switch. If the transmission is

equipped with the late design neutral starting switch, shown in Figure 27, the following installation instructions must be followed: Place transmission manual lever in neutral detent position. Install switch and seal assembly. With an electrical contact indicator attached to the switch outer terminal and transmission case, tighten switch until initial electrical contact is made, then tighten switch an additional ⅓ to ½ turn. The late design switch is intended to be used only in those transmissions having a .870/.890 inch diameter 60 degrees (included angle) counter-sink in the switch assembly hole (in transmission case). However, use of the new seal and washer is possible on early design transmission cases provided the tolerance stack-up permits proper adjustment of the switch without exceeding a tightening torque of 75 foot-pounds; in which case, the original washer should be used. The original type switch can also be adjusted by using an extra washer (Part No. 1113113) and reducing its thickness as required to secure proper switch contact. The washer, Part No. 1113113, must not be used on transmission cases having the new countersink.

d. Testing the Cable and Neutral Starting Switch Adjustment (Electrical Indicator)

Attach an electrical contact indicator (test lamp) to switch terminal and transmission case. Lower vehicle sufficiently to gain access to gear-shift control unit. Push in Drive (D) push button and then the Neutral (N) button. When the Neutral (N) button is engaged, the test lamp should light. Repeat this procedure for each push button. If switch cam does not indicate correct position each time Neutral (N) button is depressed, the cable and/or switch adjustment is incorrect and must be made again.

NOTE

A positive check for correct cable adjustment

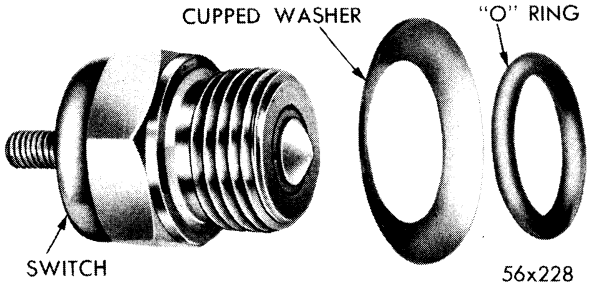

Fig. 27—Late Design Neutral Starter Switch

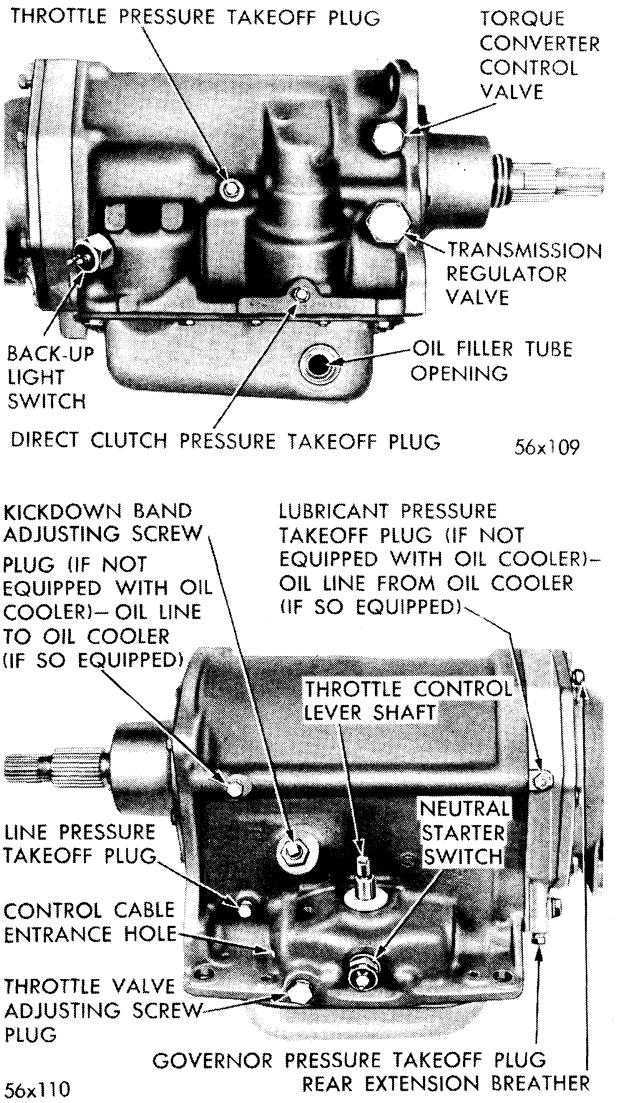

Fig. 28—Exterior Views of Transmission (Upper View—Right Side, Lower View—Left Side)

can be made with the oil pan removed. When the Neutral (N) push button is engaged, the manual valve lever detent ball must be in contact at full depth of neutral detent. Use a pen light to illuminate the detent ball. Check all detent positions.

e. Checking Cable and Neutral Starting Switch Adjustment (Neutral Starting) (Check Method)

With the assembly completed and the hoist lowered to permit entry into car, make the following tests:

Follow the procedure for electrical indicator checks. If cable and neutral starting switch adjustments are correct, and the ignition starting switch is held in starting position, the starter

should be energized only whenever the Neutral (N) button is engaged. Failure to do so will necessitate resetting cable and/or switch adjustment at the transmission. If adjustment is satisfactory, lower the car to the floor and add sufficient Automatic Transmission Fluid, Type A, to bring the fluid to the correct level.

23. HYDRAULIC PRESSURE CHECKS

a. Line Pressure

Remove the 1/8 inch pipe plug from the line pressure take-off hole located on front left side of transmission case (Fig. 28). Install gauge, Tool C-3290 (300 psi.), at this point.

If line pressure is not correct, investigate the Trouble Diagnosis Chart.

b. Throttle Pressure

Remove the 1/8 inch plug from throttle pressure take-off hole located on right-hand side of transmission case (Fig. 28). Install gauge, Tool C-3292 (100 psi.), at this point.

NOTE

Do not hold throttle wide open for longer than a few seconds.

If throttle pressure is not correct, investigate the Trouble Diagnosis Chart. When checking throttle pressure, always follow up by checking throttle linkage adjustment.

c. Governor Pressure

Remove the 1/8 inch pipe plug from governor pressure take-off hole located on lower left side of output shaft support (Fig. 28). Install gauge, Tool C-3292 (100 psi.), at this point.

d. Clutch Pressure

Remove the 1/8 inch pipe plug fitting from pressure take-off hole tapped in kickdown servo (Fig. 28) and install gauge, Tool C-3292 (100 psi.). With rear wheels free to turn, accelerate engine slowly until an upshift occurs. During upshift, the pressure gauge attached to kickdown servo should show a very rapid pressure rise from 0 to final clutch or line pressure.

HYDRAULIC PRESSURE CHARTS

LINE PRESSURE CHART

Push Button Position	Rear Wheels	Engine Speed (r.p.m.)	Line Pressure (psi.)
R	Free to Turn	1,600	225 to 275
N	———	800	85 to 95
D	Brakes Applied	800	85 to 95
L	Brakes Applied	800	85 to 95

THROTTLE PRESSURE CHART

Push Button Position	Brakes	Throttle	Engine Speed (r.p.m.)	Throttle Pressure
(D)	Applied	Closed	Idle	13 to 15
(D)	Applied	Wide Open	C-71 1920—2020 (Power Pkge.) C-71, C-72 1580—1680 C-73, C-70 1585—1685	80 to 90

GOVERNOR PRESSURE CHART

Push Button Engaged	Wheels	Car Speed (m.p.h.) (C-71)	Car Speed (m.p.h.) (C-72, C-73, C-70)	Governor Pressure (psi.)
D	Free to Turn	13 to 15	14 to 16	15
D	Free to Turn	23 to 31	25 to 33	45
D	Free to Turn	51 to 58	56 to 64	60

This rise should not take more than 1½ to 2 seconds.

With engine speed not less than 650 r.p.m. (transmission upshifted), the direct clutch pressure should read not lower than 10 psi. below line pressure.

Should a slow rise in clutch pressure be observed or a clutch pressure of more than 10 psi. lower than line pressure be obtained, it is an indication of abnormal leakage.

For possible source of abnormal leakage, check the Trouble Diagnosis Chart.

e. Lubrication Pressure

Remove the ⅛ inch pipe plug fitting at the upper left side of output shaft support (Fig. 28) and install a ⅛ inch flared tube connector. Install gauge, Tool C-3292 (C-71 Model only).

On other models, disconnect oil cooler line at this point, install a ⅛ inch flared tube connector and connect gauge, Tool C-3292.

NOTE

Always place a flared tube nut in the flared tube fitting when screwing it in and out. This will prevent crushing of the fitting.

With engine running at 800 r.p.m. in (N) position, lubrication pressure should read 35 to 50 psi. If the pressure is incorrect, check the Trouble Diagnosis Chart.

24. THROTTLE LINKAGE AND PRESSURE ADJUSTMENTS

a. Throttle Linkage Adjustment

Be sure there is no bind in throttle linkage. If there is binding, correct the condition. Run engine until normal operating temperature is reached. Remove air clearner to make certain the choke is in fully opened position. Connect tachometer leads to coil and ground. Adjust engine idle adjusting screw on carburetor to give 475 to 500 r.p.m. (transmission in neutral position). Stop engine and loosen throttle linkage adjusting screw (located on accelerator shaft to carburetor rod). Move rear portion of accelerator shaft or carburetor rod rearward until it is stopped by the idle stop on transmission throttle cam. With rods in line and front portion of rod pre-loaded by its spring, lock the throttle linkage adjusting screw by applying 10 to 15 foot-pounds torque. Start engine and recheck idle setting (475 to 500 r.p.m.) with transmission in neutral and hand brake set. Stop engine and remove tachometer.

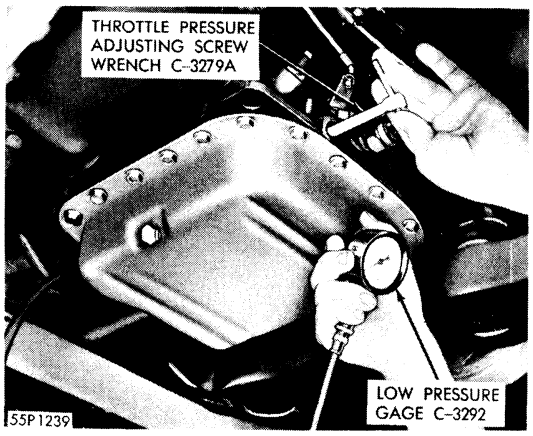

Fig. 29—Adjusting Throttle Pressure

b. Throttle Pressure Adjustment

With throttle linkage properly adjusted and tachometer attached, start engine and recheck idle setting (475 to 500 r.p.m.) with transmission in neutral and hand brake set. Stop engine and raise vehicle on hoist. Remove throttle oil pressure take-off plug (⅛ inch pipe) located between the reverse and kickdown servos on the right side of transmission (Fig. 28). Connect 100 psi. pressure gauge, Tool C-3292. Start engine and push in Drive (D) push button. Oil pressure should read 13 to 15 psi. If pressure is not within specifications, adjust as follows:

Remove throttle valve adjusting screw access hole plug (⅜ inch pipe). About one quart of transmission fluid will drain out. Insert adjusting screw wrench, Tool C-3279B, and adjust throttle pressure to 14 psi. (Fig. 29). Turn screw OUT to increase pressure and turn screw IN to decrease pressure.

Replace throttle valve adjusting screw access hole plug and tighten 20 to 25 foot-pounds torque. With accelerator pedal fully released (engine speed at 475 to 500 r.p.m.), the pressure should read 14 psi. Move accelerator pedal or lever from underneath, very slowly. With throttle pressure and linkage properly adjusted, the throttle pressure will rise (approximately 6 to 8 psi.), the instant engine r.p.m. is increased.

NOTE

Do not use throttle rod when making this check.

Instead, use accelerator pedal located on underside of floor pan.

Stop engine and remove oil pressure gauge. Install 1/8 inch pipe plug. Tighten 12 foot-pounds torque. If throttle pressure was adjusted, replace fluid that drained out with Automatic Transmission Fluid, "A". Check accelerator pedal height, at wide open throttle. There should be sufficient clearance between tip of pedal and floor mat. Adjust, if necessary, by lengthening or shortening the accelerator pedal to accelerator shaft rod assembly.

25. ADJUSTMENT OF BANDS

a. Kickdown (Front) Band

Transmission band adjustments can be made under the vehicle. Using a 3/4 inch open end wrench, loosen the locknut (Fig. 28). Check freeness of adjusting screw in transmission case. If it is free, set the click device on the small inch-pound torque wrench, Tool C-3380, for 72 inch-pounds. Install a 3/8 inch 12 point socket (3/8 drive) on wrench. Tighten adjusting screw to specified torque. With chalk, mark a reference point on adjusting screw and transmission case. Using extreme care, back adjusting screw out exactly 2 3/4 turns. Hold adjusting screw stationary with a small wrench and tighten the locknut securely. Use care in performing this operation to insure correct adjustment, otherwise, serious damage will occur when transmission is in operation.

b. Reverse (Rear) Band

Drain transmission and remove transmission oil pan. Loosen reverse band adjusting screw locknut and tighten adjusting screw 20 to 25 inch-pounds torque (Fig. 30). Back out adjusting screw 10 turns. Holding adjusting screw in this location, tighten adjusting screw locknut 30 to 35 foot-pounds torque.

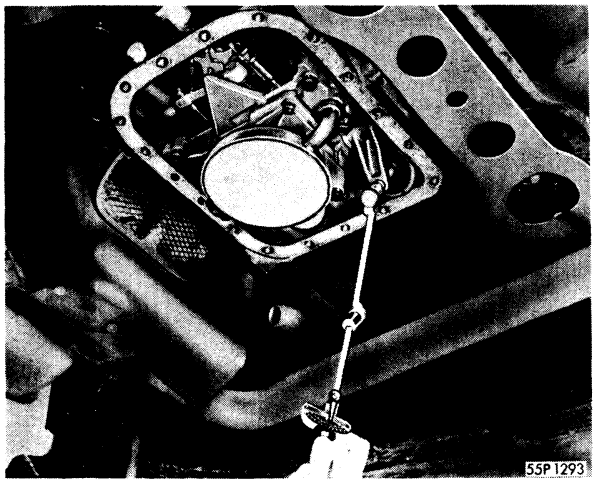

Fig. 30—Adjusting Reverse Band, Using Wrench (Tool C-3380)

Using new gasket, replace transmission oil pan and refill transmission with Automatic Transmission Fluid, Type "A".

26. ROAD TESTING

When faulty operation of transmission is reported, transmission fluid level and engine idle should be checked before making other checks. Good transmission operation also depends upon good engine operation. If, when tuning engine, the throttle linkage between carburetor and transmission is disturbed, it will be necessary to readjust the linkage.

The following test procedure is suggested as a means of checking the complete transmission operation. Specific complaints may be investigated more thoroughly.

Move selector push buttons through their positions. Check for binding (hanging) or insufficient travel. Do not operate engine in reverse at wide open throttle.

Attach an electric tachometer to engine as specified by the manufacturer. Push in Drive (D) selector button. Check speed and smoothness of engagement. Apply both hand brake and foot brakes and check for band slippage at wide open throttle. **Do not hold throttle wide open for more than a few seconds.** Check the kickdown band adjustment before proceeding with the road test.

Accelerate the engine at very light throttle. The transmission should upshift at speeds given in shift pattern summary chart. Check quality of shift.

Slow car to approximately 15 m.p.h., and go quickly to wide open throttle (without going into kickdown). Check for possible clutch slippage. The transmission should not downshift at this time.

Make a kickdown at 15 to 20 m.p.h., and check the quality of shift. Release accelerator to approximately half throttle so that transmission upshifts at 25 to 30 m.p.h. Check quality of shift.

Make a kickdown, between kickdown limits

TROUBLE DIAGNOSIS CHART

This Trouble Diagnosis Chart has the operating difficulties listed in three groups. After road testing, match the trouble found to its particular group and to the specific difficulty under that group. The "Index" and "Item" in the "Items to check" column are next checked against the "Explanation of Index Items." Capital letter items refer to those operations which may be performed without removing the transmission. The small letter items refer to those operations done after removal of transmission from car.

ITEMS TO CHECK See "Explanation of Index Items' INDEX ITEM	OPERATING DIFFICULTY																					
	Shift Abnormalties								Response						Miscellaneous							
	Harsh N to R or N to D	Delayed N to D	Runaway on Upshift and K.D.	Harh Upshift and K.D.	No Upshift	No K.D. or Normal Downshift	Shifts Erratically	Slips in Drive Position	Slips in All Ranges	No Drive in D-L	Reverse Band Slips	Moves Forward in Neutral	No Drive in Any Range	Moves Backward in Neutral	Drags or Locks	Grating, Scraping, Growling Noises	Buzzing Noise	Trans. Hard to Fill—Oil Blows Out Fill Tube	Trans. Overheats	Impossible to Push Start Engine	Starter Won't Energize
A. Oil Level		●	●		●	●	●	●	●				●				●	●	●		
B. Throttle Link Adj.			●	●	●	●	●														
C. Gearshift Control Cable Adj.						●	●					●		●							●
D. Pressure Checks—Line Lube., etc.	●	●	●	●	●	●	●	●	●	●			●							●	
E. K.D. Band Adj.	●		●	●		●			●	●					●				●	●	
F. Reverse Band Adj.	●								●		●				●				●		
G. Engine Idle	●																				
H. Neutral Start SW.																					●
I. Handbrake Adj.															●	●			●		
J. Regulator Valves—Springs							●		●				●				●	●	●		
K. Converter Control Valve																	●	●	●		
L. Breather																		●			
M. Output Shaft Rear Bearing S.R.							●									●					
N. T.C. Cooler-Lines																			●		
O. K.D. Servo-Band Linkage	●		●	●		●			●	●					●					●	
P. R. Servo Band Linkage	●			●					●		●			●	●						
Q. Oil Strainer							●						●				●	●			
R. Valve Body-Bolts—Mating Surfaces		●	●	●	●	●	●	●	●	●	●	●	●	●						●	
S. Speedometer Pinion																					
T. Governor					●	●	●									●				●	
U. Rear Pump																●			●		
a. Front Pump—Drive Sleeve		●					●	●	●				●			●		●	●		
b. Reg. Valve Body, Gasket, Surfaces	●			●					●		●		●				●	●	●		
c. Converter																			●		
d. Direct Clutch			●	●	●			●		●		●			●				●		
e. Planetary Gear Set															●	●					
f. Seal Rings		●	●		●		●			●	●										

indicated in Shift Pattern Summary Chart, and check the quality of shift. Release accelerator to close throttle and check quality of "lift foot" shift.

Make a kickdown at 45 m.p.h. and check quality of shift. Accelerate (in kickdown) at wide open throttle until transmission upshifts. The shift should occur at speeds indicated in Shift Pattern Summary Chart. Check quality of shift.

Slow down to maximum kickdown limit, specified in Shift Pattern Summary Chart, and try to make a kickdown at this speed. This is above the kickdown limit so no shift should take place.

Slow down to 40 to 50 m.p.h. and push in Low (L) selector button. The transmission should downshift. Push in Drive (D) selector button at approximately 20 m.p.h. The transmission will upshift. Coast to a stop. The transmission should downshift at 9 to 13 m.p.h. Check quality of downshift.

SHIFT PATTERN SUMMARY CHART (M.P.H.)

	CHRYSLER		IMPERIAL	
	C-71	C-72	C-73	C-70
Closed Throttle Upshift	13-16	15-18	14-17	15-18
W.O.T. Downshift (Short of Kickdown)	10-17	10-19	10-19	10-19
Kickdown Limit	42-58	45-62	43-60	45-63
W.O.T. Upshift	51-61	55-65	53-63	55-65
Closed Throttle Downshift	10-12	10-12	10-12	10-12
Reverse Blocker Effective	9-12	9-13	9-13	9-13

NOTE: All speeds are true car speeds to the nearest m.p.h. and include process standard limits where specified or maximum tolerance variations.

EXPLANATION OF INDEX ITEMS ON TROUBLE DIAGNOSIS CHART

A. **Oil level**—The transmission should be filled to the low level on dispstick when transmission oil temperature is approximately equal to ambient air temperature. Oil level will rise to full level when normal operating temperature is achieved.

B. **Throttle linkage**—Adjust to data and specification. Refer to paragraph 24.

C. **Gearshift control cable**—Adjust to data and specification. Refer to paragraph 22.

D. **Pressure tap check**—Hydraulic pressure taps have been provided to check the following pressures: line, lubrication, governor, and throttle. These pressures should fall within specified limits stated in Hydraulic Control Pressure Check Charts.

E. **Kickdown band adjustment**—The kickdown band adjustment screw is found on the left side of transmission case. The adjustment is made by backing off adjusting screw lock nut; torque the set screw in to 70 to 75 **inch** pounds and back adjusting set screw out 2¾ turns. Tighten lock nut.

F. **Low and reverse band adjustment**—The oil pan must be removed to make this adjustment. The adjustment is made by backing off adjusting screw lock nut. Torque the set screw in to 20 to 25 **inch** pounds torque and back adjusting set screw out 10 turns. Tighten lock nut.

G. **Engine idle**—Adjust to 475 to 500 r.p.m.

H. **Neutral starter switch**—Check wire, connections and switch.

I. **Handbrake**—Check for excessive drag. Adjust as outlined in Brakes Section III.

J. **Regulator valve, spring**—The regulator valve may be removed by removing the regulator valve spring retainer which is on right side of transmission case. Check for a stuck or scratched valve and/or buckled spring.

K. **Converter control valve, spring**—The converter control valve may be removed by removing the converter control valve spring retainer which is on right side of transmission case. Check for a stuck or scratched valve and/or buckled spring.

L. **Breather**—Check to determine whether breather is free of dirt, undercoating etc.

M. **Output shaft rear bearing, snap ring**—Check for rough bearing and/or unseated snap ring.

N. **Torque converter cooler and lines**—(Water cooled transmissions)—**Torque converter housing cooling air passages**—check for dirt, mud, or other foreign material on screens or torque converter cooling fins.

O. **Kickdown servo, band and linkage**—Check for broken seal rings, stuck servo piston or broken linkage.

P. **Low and reverse servo, band and linkage**—Check for torn seal, stuck piston sleeve, broken band and/or linkage.

Q. **Oil strainer and suction tubes**—Check for possible air leakage at front pump suction tube, or rear pump suction tube.

R. **Valve body attaching bolts and mating surface**—Check for loose bolts, burrs or scratches on mating surfaces. Clean valve body assembly. Check for stuck valves, dirt, scratched valves or body, and burrs on valves. Torque valve body bolts to specifications.

S. **Speedometer pinion**—Check nylon teeth for wear, shredding.

T. **Governor**—Clean assembly, and check weight assembly and valve for burrs, scratches or sticky operation. Examine the governor valve shaft, shaft snap rings and seal rings.

U. **Rear pump**—Clean and inspect assembly for side and diametral clearance. Note whether rear oil pump pinion ball is in place. Examine output shaft support face for scoring.

V. **Front pump—Drive sleeve**—Clean and inspect assembly for side and diametral clearance. Examine oil pump inner and outer rotor for scoring. Check front pump drive sleeve seal ring.

W. **Regulator valve body, mating surfaces, gasket**—Clean and inspect valve body for scratches and scoring on valve bores and face which bears against the front pump housing. Examine valve body to determine if secondary reaction orifice is free of dirt. Check gasket for uniformness of compression by valve body.

X. **Converter**—Flush out converter and check converter to housing runout.

Y. **Direct clutch**—Clean and inspect discs, plates, drive hub, return spring and piston.

Z. **Planetary gear set**—Clean and inspect gear set for worn thrust washers nicked or rough gear teeth, and excessive pinion end clearance.

DISASSEMBLY AND INSPECTION

27. REMOVAL OF TRANSMISSION FROM CAR

Drain transmission and torque converter. When fluid has drained, replace drain plugs and tighten.

NOTE

If transmission oil pan is not equipped with a drain plug, remove filler tube connector at the oil pan.

Disconnect oil pan filler tube assembly from oil pan. Disconnect front propeller shaft universal joint and secure shaft to frame. Remove hand brake adjusting screw cover plate and cable bolt from hand brake support. Disengage

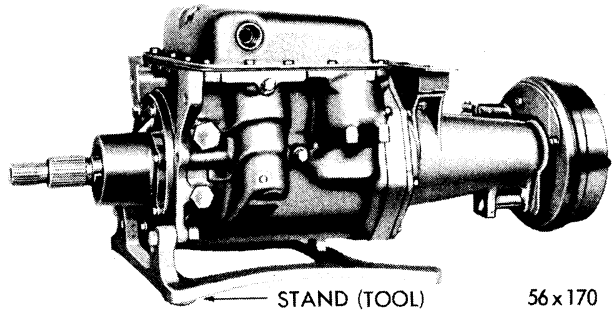

Fig. 31—Transmission Inverted in Stand

ball end of cable from operating lever and remove cable from brake support. Disconnect speedometer cable housing from drive pinion. Disconnect neutral starter and back-up light wires from switches.

NOTE

To avoid damage to neutral starter and back-up light switches, remove each from transmission case before removing transmission from car.

Disconnect throttle linkage from lever at transmission. Remove push button control cable. Remove oil cooler oil lines (if so equipped). Remove nuts and lockwashers from rear engine mount. Install engine support fixture, Tool C-3487. Adjust fixture to support weight of engine and raise engine slightly. Remove crossmember to frame bolts and remove crossmember, leaving engine rear support adaptor attached to transmission. Work carefully when removing crossmember to avoid damaging brake line.

CAUTION

When using fixture, Tool C-3487, do not lower engine more than three inches from floor pan to avoid moving the set position of water hose and other engine attachments.

Remove two upper transmission case to converter housing screws and lockwashers and install guide studs, Tool C-3276. Remove two lower transmission case to converter housing screws and lockwashers. Slide transmission straight back to avoid damaging front pump drive sleeve. After removing transmission from

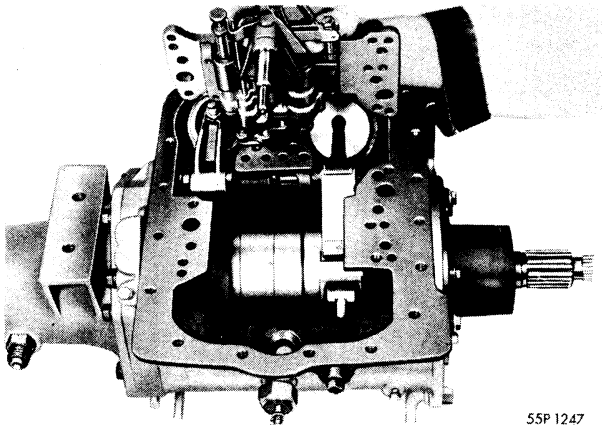

Fig. 32—Removing Valve Body and Transfer Plate Assembly (Typical Illustration) (Early Design Valve Body and Transfer Plate Shown)

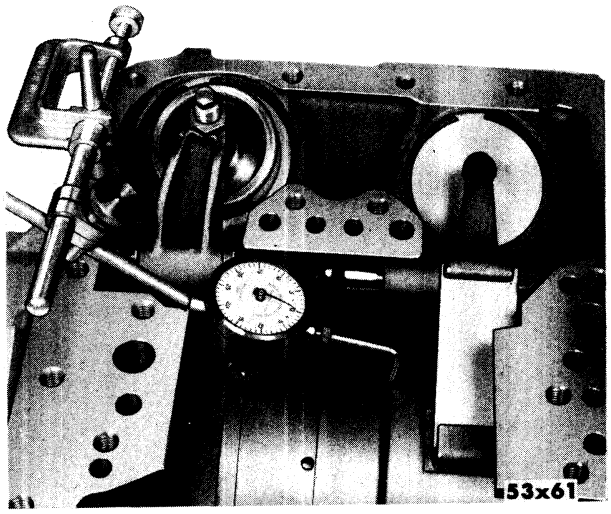

Fig. 33—Checking Transmission End Clearance (Typical View)

car, attach fixture, Tool C-3280, and invert entire transmission assembly (Fig. 31).

Remove front oil pump drive sleeve and inspect. Check drive lugs and machined surfaces for burrs and wear. Check ring for broken ends and freeness in ring groove. If seal ring is rubber "O" type, inspect for brittleness and shredding. Remove bolts and lockwashers which hold engine rear support adaptor to extension housing and remove adaptor. Inspect bolts and holes in housing for stripped or worn threads. Remove oil pan bolts, oil pan, and gasket. Loosen throttle control lever assembly locking screw. Slide throttle control lever assembly off shaft and remove felt retainer and felt. Inspect throttle control lever for wear.

Remove oil strainer support bolts and washers and remove oil strainer assembly. Inspect seal rings located at both outlets of strainer. Remove five transfer plate bolts and lockwashers. Remove valve body and transfer plate assembly from transmission case (Fig. 32). The mating surfaces are machined. Work carefully to avoid damaging these surfaces. Place valve body in stand, Tool C-3294.

28. CHECKING TRANSMISSION END PLAY

Prior to removal of propeller shaft flange and drum assembly, check end clearance at front clutch piston retainer assembly using dial indicator, Tool C-3339, as shown in Figure 33.

To make this check, pry direct clutch forward by inserting screwdriver between the direct clutch assembly and pinion carrier housing. Re-

move screwdriver; and with dial indicator point contacting edge of direct clutch retainer, set dial indicator to zero. Pry direct clutch assembly rearward against pinion carrier housing, remove screwdriver, and take indicator reading. This clearance should be from .026 to .052 inch. If this clearance exceeds the specified limit, particular attention should be paid to the condition of direct clutch retainer thrust washer when disassembling transmission.

NOTE

Record amount of end clearance, so the proper thickness of the thrust washer can be installed at assembly.

If clearance exceeds .052 inch, install a thicker direct clutch piston retainer thrust washer (fiber). If clearance is less than .026 inch, install a thinner washer. The thrust washer is selectively fit and is available in following thicknesses: .078-.080, .095-097, and .112-.114 inch.

29. REMOVAL OF HAND BRAKE ASSEMBLY

Use wrench, Tool C-3281, to hold the mainshaft. Remove transmission flange nut, shakeproof washer and flatwasher. Install puller, Tool C-452, to remove brake drum assembly. Using a suitable drift, remove pin which secures brake shoe anchor in extension housing. Remove brake support grease shield spring and remove shield. If screwdriver or sharp instrument is used in removing shield, care must be exercised to avoid damaging the neoprene sealing surface at bottom of shield. Slide hand brake assembly intact from extension housing.

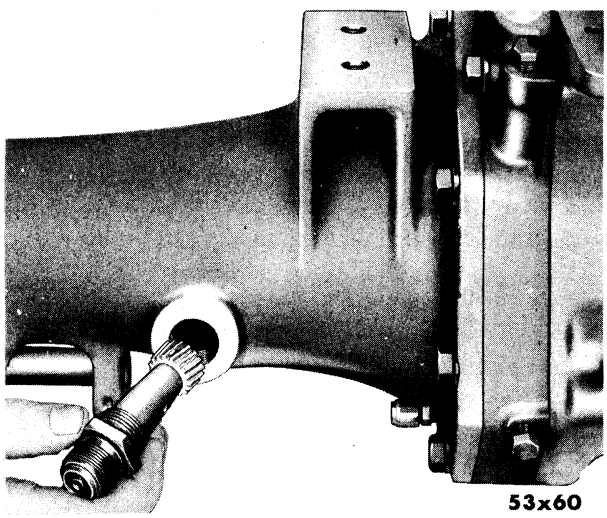

Fig. 34—Removal and Installation of Speedometer Drive Pinion

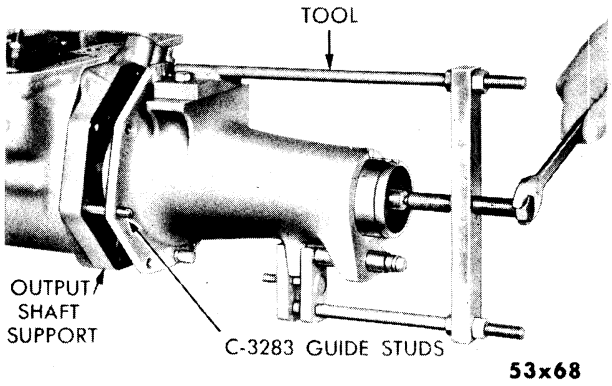

Fig. 35—Removing Extension Housing (when Tool C-3282 is Available)

30. REMOVAL, DISASSEMBLY AND INSPECTION OF TRANSMISSION EXTENSION

Remove the speedometer drive pinion (Fig. 34).

CAUTION

The nylon gear can be easily damaged if extension housing is removed without first removing the speedometer drive pinion.

Using puller, Tool C-748, remove output shaft rear bearing oil seal. Remove burrs from counterbore of extension housing. Remove seven transmission extension to case screws and lockwashers. Install guide studs, Tool C-3283 and remove extension assembly by carefully tapping assembly rearward, using a soft hammer.

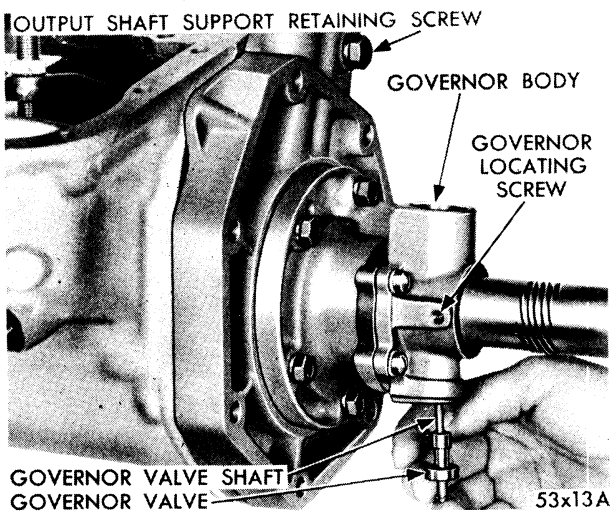

Fig. 36—Removal and Installation of Governor Valve and Shaft

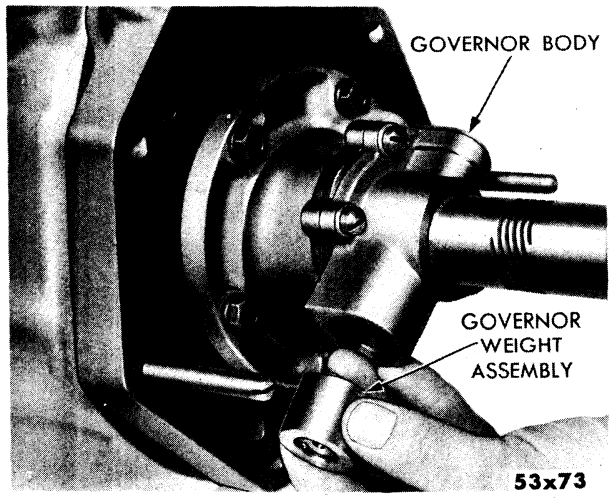

Fig. 37—Removal and Installation of Governor Weight Assembly

Remove transmission extension gasket and discard. If Tool C-3282 is available, use as shown in Figure 35.

Using a pair of long nose pliers, remove output shaft rear bearing snap ring. Inspect ring for distortion. Do not remove bearing unless inspection reveals it is necessary. Never re-use a bearing which has been removed. If necessary to remove bearing, use driver, Tool C-3275, and drive bearing out of extension housing.

31. REMOVAL, DISASSEMBLY AND INSPECTION OF GOVERNOR

Loosen governor body to support screws to aid in removal of governor assembly. Using a sharp instrument, such as an ice pick, remove governor valve shaft snap ring, (weight end) and remove governor valve shaft and valve from governor valve body assembly (Fig. 36). Using pliers, Tool C-760, remove governor weight assembly snap ring (large one), and remove governor weight assembly from governor body (Fig. 37). Remove governor secondary weight snap ring (Fig. 38).

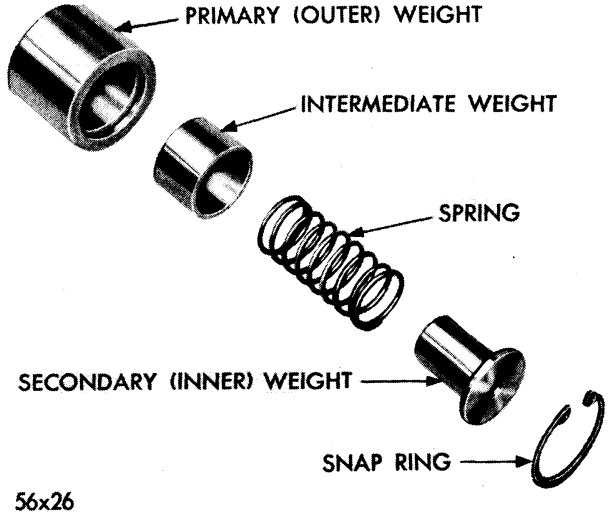

Fig. 38—3-Stage Governor Weight Assembly (Disassembled View)

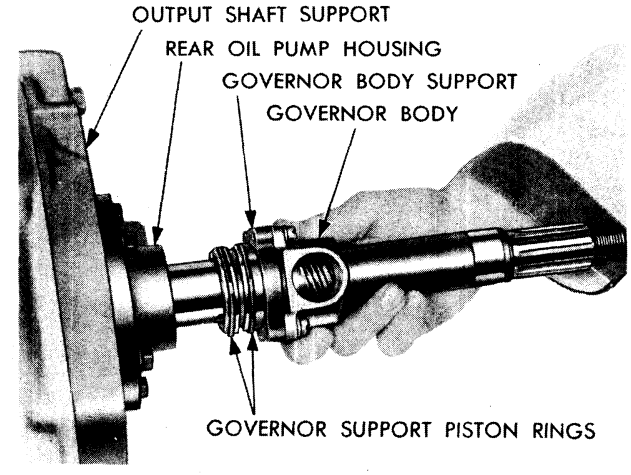

Fig. 39—Removal and Installation of Governor Body and Support Assembly

CAUTION

Keep thumb pressure against secondary weight when removing snap ring (spring loaded).

Remove governor secondary weight and spring and intermediate weight. Inspect all parts (Fig. 38) for burrs and wear. Check intermediate weight for free movement in primary weight by placing intermediate weight in primary weight. Intermediate weight should

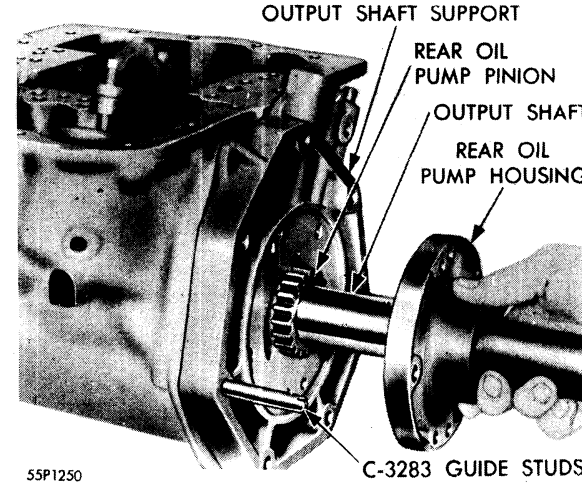

Fig. 40—Removal and Installation of Rear Oil Pump Housing

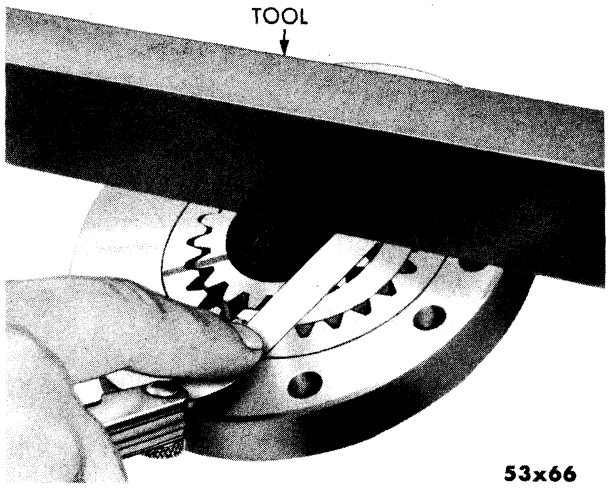

Fig. 41—Checking Clearance between Pump Body and Gears

fall freely when both parts are clean and dry. Inspect spring for distortion and inspect secondary weight. Remove governor locating screw from governor body and output shaft (wrench, Tool C-3279, may be used, if available). Slide governor body and support from output shaft (Fig. 39). Remove and inspect the two governor support piston rings.

Remove four governor body to support screws and lockwashers and separate body from support.

CAUTION

Mating surfaces are machined and can be easily damaged. Inspect oil passages. Clean passages thoroughly with compressed air. Inspect valve and governor body for scores. Check ball plug in face of governor support.

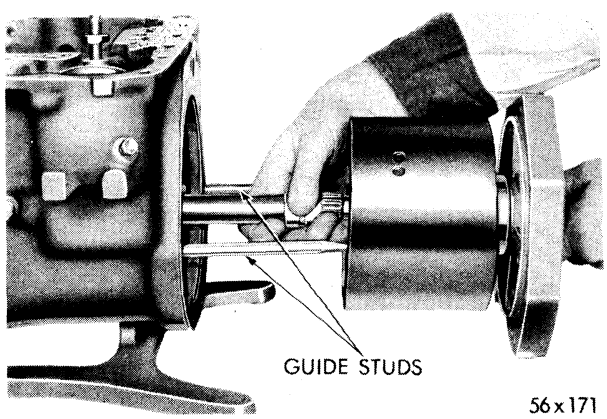

Fig. 42—Removing Output Shaft, Carrier Housing, and Input Shaft Assemblies

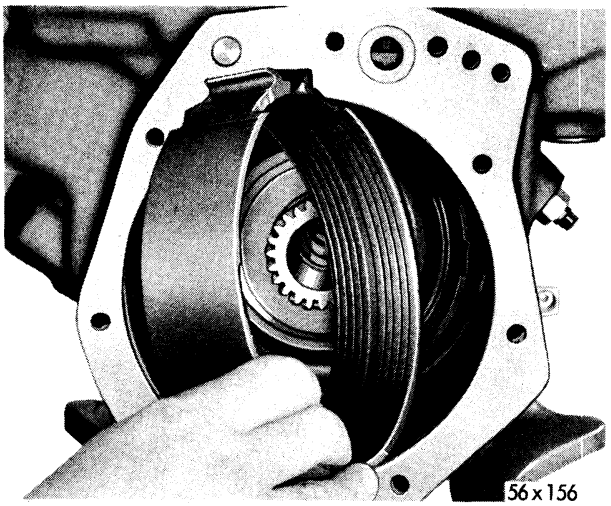

Fig. 43—Removing or Installing Reverse Band

32. REMOVAL, DISASSEMBLY, AND INSPECTION OF REAR OIL PUMP

Remove five rear oil pump housing to output shaft support screws and lockwashers. Remove pump housing (Fig. 40). Use Prussian blue to mark front side of gear in housing. **Do not use scribe.** Inspect machined surfaces for nicks and burrs, the oil pump gear and housing for scoring or pitting and pump housing plug for leaks. Remove rear oil pump pinion from output shaft and mark front side with Prussian blue.

CAUTION

The oil pump pinion is keyed to output shaft by a small ball. When removing pinion, do not lose the ball. Inspect keyway in pinion and ball pocket in output shaft for wear, and also the gear for pitting or scoring.

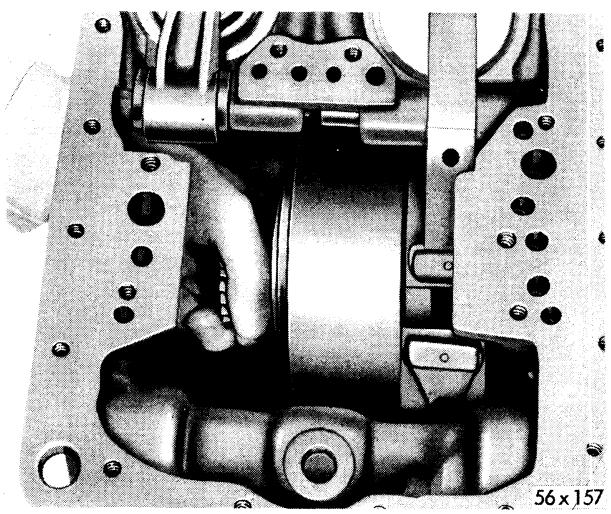

Fig. 44—Removing or Installing Direct Clutch Assembly

Using a straightedge, Tool C-3335, and feeler gauge, check clearance between pump housing face and face of gears (Fig. 41). Clearance limits are from .001 to .003 inch.

33. REMOVAL OF OUTPUT SHAFT SUPPORT, PLANET PINION CARRIERS, AND DIRECT CLUTCH ASSEMBLIES

Remove output shaft support to transmission case screw and washer. Loosen reverse band adjusting screw and locknut to release any tension of reverse band on carrier housing. Grasping output shaft in both hands, carefully work shaft, planet pinion carrier assemblies, housing and support, out of transmission case (Fig. 42). Mount assembly in fixture Tool C-3285 (if available). Remove kickdown planet pinion carrier thrust washer from direct clutch piston retainer.

NOTE

If support is stuck to transmission case and cannot be removed as described, install an oil pan screw in transmission case. With aid of pry bar, lightly pry against support to separate from case.

Because diameter of direct clutch retainer is greater than diameter of reverse band, it is necessary to first remove the reverse band before the direct clutch assembly can be withdrawn from transmission case.

To remove reverse band, loosen band adjusting screw and locknut and compress band sufficiently to remove band strut. Unhook reverse band from link assembly. Remove band by rotating it through the relieved area in transmission case (Fig. 43).

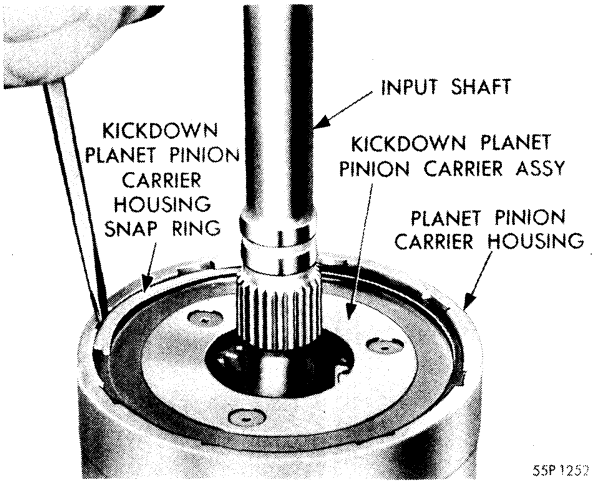

Fig. 45—Removing or Installing Snap Ring

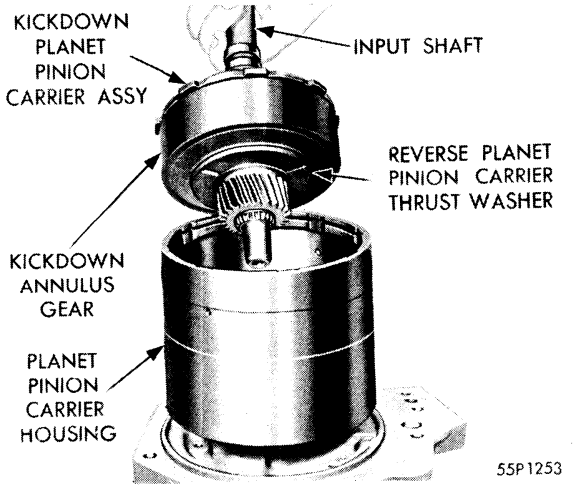

Fig. 46—Removing or Installing Input Shaft and Carrier Assembly (Typical View)

To remove the direct clutch assembly, loosen kickdown band adjusting screw locknut and back off adjusting screw sufficiently to provide clearance for removal of clutch retainer. Remove the direct clutch assembly from the reaction shaft (Fig. 44).

Be sure to remove direct clutch retainer thrust washer (fiber) from reaction shaft.

34. REMOVAL AND INSPECTION OF PLANET PINION CARRIERS

Using a feeler gauge, check clearance between planet pinion carrier housing snap ring and kickdown planet carrier assembly. This clearance should be .010 to .021 inch. Snap rings are available in following thicknesses: .062-.064, .072-.074, .076-.078, and .082-.084 inch.

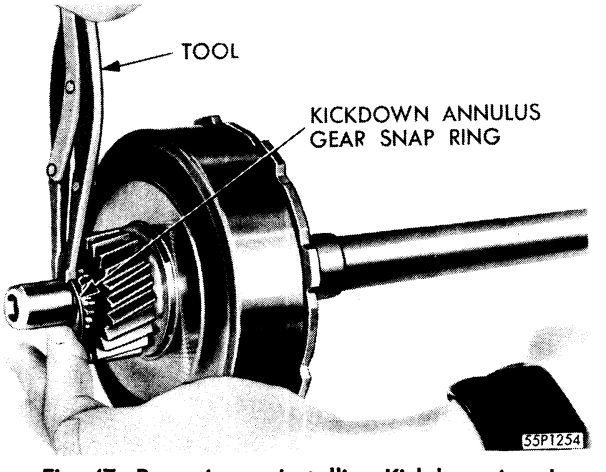

Fig. 47—Removing or Installing Kickdown Annulus Gear Snap Ring

NOTE

If this selection of snap rings fails to provide necessary clearance, use one of the kickdown sun gear snap rings.

Using screwdriver, remove planet pinion carrier housing snap ring (Fig. 45). Identify snap ring to aid in reassembly. Remove input shaft, kickdown planet pinion carrier assembly and kickdown annulus gear from carrier housing (Fig. 46). Remove reverse planet pinion carrier thrust washer and inspect for cracks, burrs, and wear. Remove kickdown annulus gear after removing snap ring (Fig. 47) from input shaft. Inspect for worn, cracked and broken teeth. Remove kickdown planet pinion carrier assembly from input shaft (Fig. 48). Inspect stop ring on end of shaft which controls position of kickdown annulus gear on input shaft. Check all oil passages in both gear and shaft for obstructions. Inspect splines and bearing surfaces on input shaft for burrs and wear. Inspect snap ring groove. Check bronze bushing for free movement and scoring.

Inspect kickdown planet pinion carrier for scores on thrust surfaces, or broken and worn gear teeth. Using a feeler gauge, check end clearance on individual planet pinion gears. Clearance should be .006 to .017 inch. Inspect pinion shafts for fit in carrier and make sure pinions are free to rotate.

NOTE

Do not replace carrier unless inspection reveals it is necessary. The kickdown planet pinion carrier assembly is serviced only as a complete assembly.

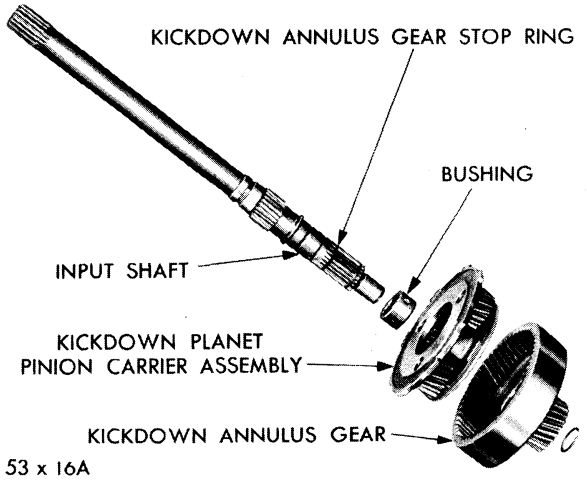

Fig. 48—Input Shaft and Kickdown Planetary Gear Set (Disassembled View)

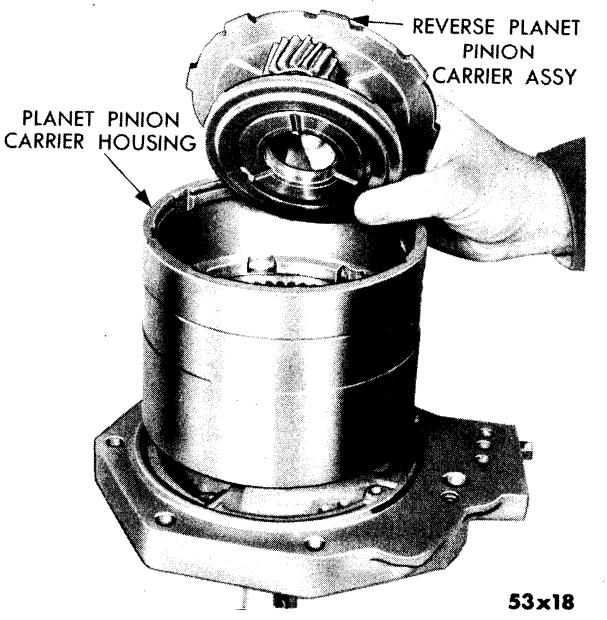

Fig. 49—Removal and Installation of Reverse Planet Pinion Carrier Assembly

Remove reverse planet pinion carrier from carrier housing (Fig. 49). Remove the output shaft and reverse annulus gear assembly and thrust washer from carrier housing. Using pliers, Tool C-3301, remove reverse annulus gear snap ring and remove annulus gear from output shaft. Inspect annulus gear for worn or broken teeth. Inspect output shaft ring grooves (seal and snap) for burrs and rings for broken ends. Inspect splines on both shaft and annulus gear for burrs and wear. Check speedometer

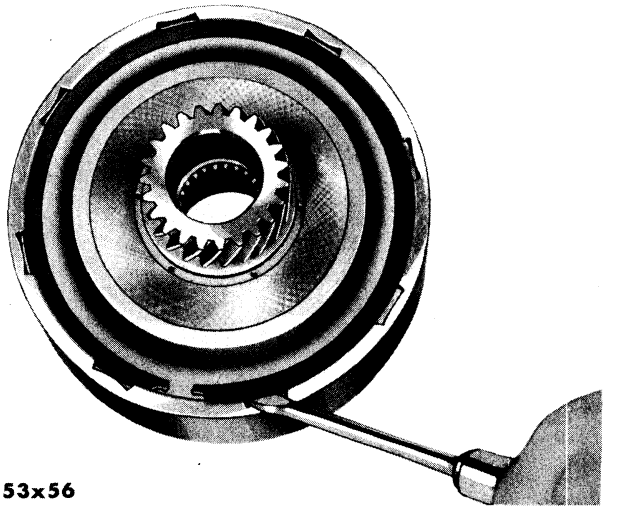

Fig. 50—Removal or Installation of Kickdown Sun Gear Snap Ring

gear for burrs. Check output shaft bronze pilot bushing for wear, scoring. The output shaft is serviced only as an assembly.

Inspect reverse planet pinion carrier housing thrust washer for cracks and wear. Inspect planet pinion carrier housing, and driving lug slots inside housing for wear. Inspect bearing and thrust surfaces for scores and burrs. Closely inspect band contacting surface for burned spots and scoring, especially if reverse band lining has become excessively worn.

Inspect all oil passages in output shaft support for obstructions. Check rear oil pump mating surface for burrs and score marks. Check for stripped threads in support. Inspect gasket surfaces for burrs and dirt. Inspect both inside and outside bearing surfaces for wear and scoring.

35. DISASSEMBLY AND INSPECTION OF DIRECT CLUTCH PISTON RETAINER

Using screwdriver, remove kickdown sun gear snap ring (Fig. 50). The ring is a select fit, identify to aid in reassembly.

Lift out kickdown sun gear assembly and note oil slinger on reverse side. Oil passages in front are to lubricate kickdown planet pinion carrier thrust washer. Inspect for clutch material obstructing oil passages and slinger. Remove foreign material which may have accumulated on front side. Inspect driving disc contact surface for evidence of burning or scoring.

Inspect sun gear for cracked or broken teeth. Lift out direct clutch hub from center of direct clutch piston retainer. Oil passages in hub are to lubricate clutch plates and driving discs when clutch is in released position. Inspect clutch hub driving lugs for wear and remove metal pickup which may have accumulated on either side of hub. Inspect hub splines for burrs and wear.

Invert direct clutch piston retainer and remove clutch plates (steel) and driving disc assemblies. Note position in which these were assembled. If assembly was started with cork portion on outer top, the same sequence must be followed all through assembly, or vice versa. Assembling unit in this manner assures a more even contact. Inspect driving discs for evidence of burning, glazing, and flaking off of facing material. Check discs by scratching facings with finger nail; if material collects under nail, replace all driving discs. Replace driving discs if splines have become damaged. Ispect steel clutch plates for evidence of burning, scoring, and damaged splines.

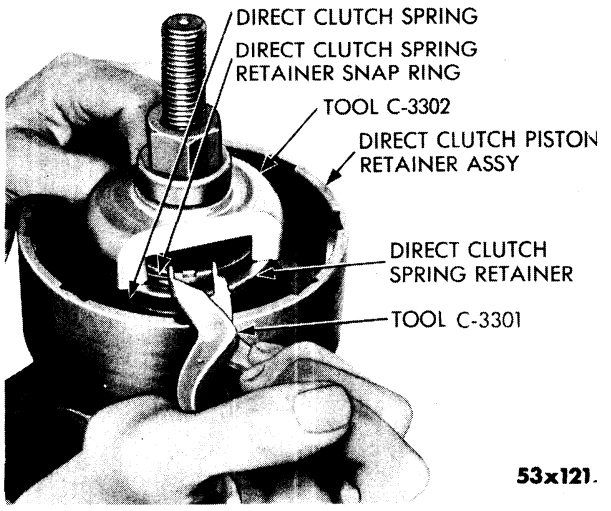

Fig. 51—Removal and Installation of Direct Clutch Spring Retainer Snap Ring (Typical View)

Using compressor, Tool C-3302, compress direct clutch spring sufficiently to unseat the direct clutch spring retainer snap ring with pliers, Tool C-3301 (Fig. 51). Release compressor, Tool C-3302, and remove direct clutch spring retainer snap ring, spring retainer and spring from clutch retainer. Check spring, retainer and snap ring for distortion.

Using a twisting motion, remove direct clutch piston from retainer. Note ball check in clutch retainer housing. The ball check relieves centrifugal oil pressure when transmission is in neutral and prevents clutch engagement when engine speeds are increased. Make sure ball operates freely. The bronze bushing used in the direct clutch piston retainer is not replaceable. Inspect reaction shaft seal ring contacting areas on retainer for grooving. Inspect the band contacting surface for deep scores and burns, especially if kickdown band lining is worn to point where steel band has been contacting direct clutch piston retainer. **Do not turn the direct clutch piston retainer in lathe to remove score marks.**

Inspect steel clutch plate contacting surfaces for deep scores and burrs. Make sure clutch driving lugs will slide freely into retainer. Remove any metal pickup on hub of retainer. Inspect bore of piston for score marks. If score marks are light, remove with crocus cloth. If they are heavy, replace piston. Remove direct clutch piston retainer seal ring (lip type neo-

prene) from retainer hub, using a suitable piece of wire. Remove direct clutch piston seal ring (neoprene) from outer circumference of piston.

36. REMOVAL AND INSPECTION OF KICKDOWN BAND

Compress kickdown band ends sufficiently to remove kickdown band strut. Note that strut is grooved to act as a guide to kickdown band strut pin on band end. Remove adjusting screw blade.

Remove kickdown band assembly by rotating band ends through rear opening in transmission case. Both reverse and kickdown bands have bonded lining and no attempt should be made to reline them. The kickdown band is narrower, larger in diameter, and has a different lining material. Make visual inspection of lining for wear and bond. If lining is worn so that grooves are no longer visible, the band assembly must be replaced. Inspect band for distortion and cracked ends.

37. REMOVAL OF REVERSE AND KICKDOWN BAND LEVERS

Inspect reverse band link assembly for wear and riveting of assembly. Inspect levers for cracks and wear. Make sure they have side clearance and are free to turn on shafts. Do not remove these assemblies unless inspection reveals it is necessary to do so.

If necessary, remove levers as follows:

Insert fingers in back of reverse band and link assembly lever shaft. Holding reverse band

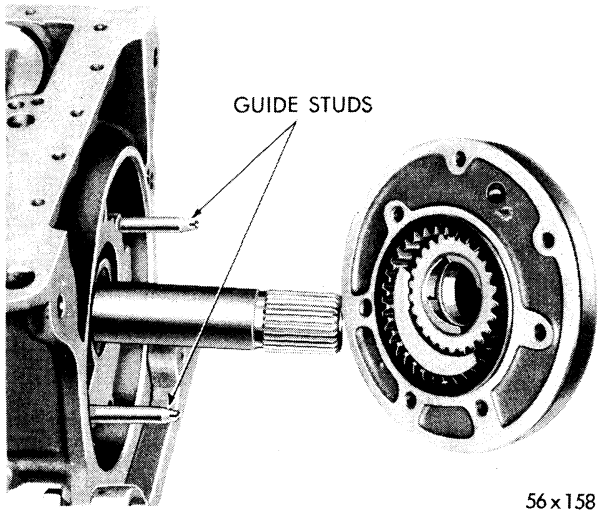

Fig. 52—Removing or Installing Front Oil Pump

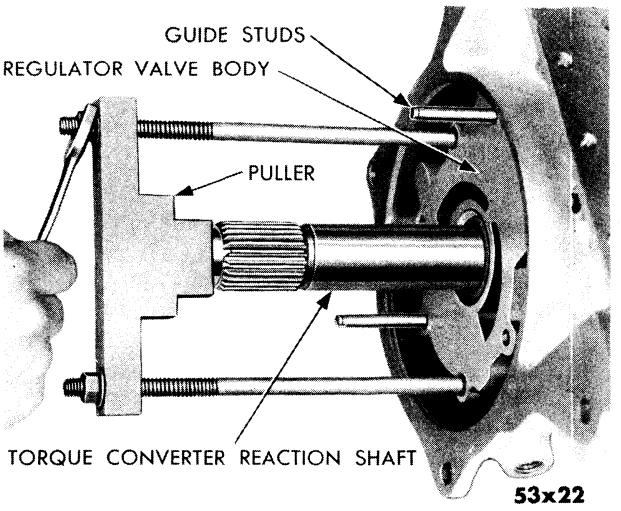

Fig. 53—Removal of Regulator Valve Body (when Tool C-3287 is Available)

lever and link assembly with the other hand, push shaft out of rear opening in case.

Remove kickdown band lever shaft plug in front of transmission case. Remove kickdown band lever by inserting finger in back of kickdown lever shaft and, holding band lever with other hand, push shaft out front of transmission case.

38. REMOVAL OF THE FRONT OIL PUMP

Remove transmission regulator valve spring retainer, gasket and spring. Remove torque converter control valve spring retainer, gasket and spring. Do not remove valves. To remove these valves when transmission is installed in vehicle, use a mechanical retriever or piece of welding rod inserted in end of valve. Valves are so constructed that they will not drop into front housing when removing. Remove front oil pump housing to transmission case bolts and washers. Install guide studs, Tool C-3288.

Using a soft hammer, gently tap on circumference of housing to loosen. Pull oil pump housing assembly and gears from transmission case (Fig. 52). Using Prussian blue, mark front side of gears. **Do not use scribe marks.**

Remove oil pump gear from front oil pump housing. Remove front oil pump housing seal (large neoprene) from housing. Using a brass drift, drive front oil pump housing dust seal from front of housing.

Inspect front oil pump housing bushing for scores (bushing is not replaceable). This bushing supports the front oil pump drive sleeve.

Slight scores may be removed with crocus cloth. Inspect pump housing and gears for scores and wear.

Using straightedge, Tool C-3335, and feeler gauge, check clearance between pump housing face and face of gears. Clearance limits are .0012 to .0022 inch. Make sure oil passages are open by blowing them out with compressed air.

39. REMOVAL OF REGULATOR VALVE BODY

If regulator valve body cannot be removed by installing guide studs, Tool C-3283 in tapped holes in body and pulling outward with hands, use two threaded holes provided in regulator valve body to attach puller, Tool C-3287, and install (if removed) guide studs, Tool C-3288 (Fig. 53). Pull regulator valve body from torque converter reaction shaft and discard gasket.

Handle regulator valve body carefully. Place body and both valves in pan containing a clean solvent, wash thoroughly, and dry with compressed air. Inspect both valves for free movement in valve body. They should fall in and out of bores when both valves and body are dry. Crocus cloth may be used to polish valves, providing care is exercised not to round sharp edge portion of valves. The sharp edge portion prevents dirt and foreign matter from getting between the valve and body, reducing the possibility of sticking. Check all fluid passages for obstructions and inspect all mating surfaces for burrs and distortion. If regulator valve body should have a slight nick or raised portion on mating surfaces, it may be removed by using a surface plate and crocus cloth.

Check regulator valve spring seat (snap ring). After both valves and regulator valve body have been thoroughly cleaned and inspected, place them on clean paper and cover them with clean paper until ready for installation. Leave valves in regulator body bores.

40. REMOVAL OF REVERSE SERVO PISTON

Lift out reverse servo piston sleeve. Inspect inside bore and lever contacting surface on piston sleeve for scores and wear. Make sure the two bleeder holes are open. These oil holes provide cushioning effect when reverse band is applied.

Install compressor, Tool C-3289, or C-3529 on transmission case (use oil pan screws) and compress reverse servo piston spring retainer.

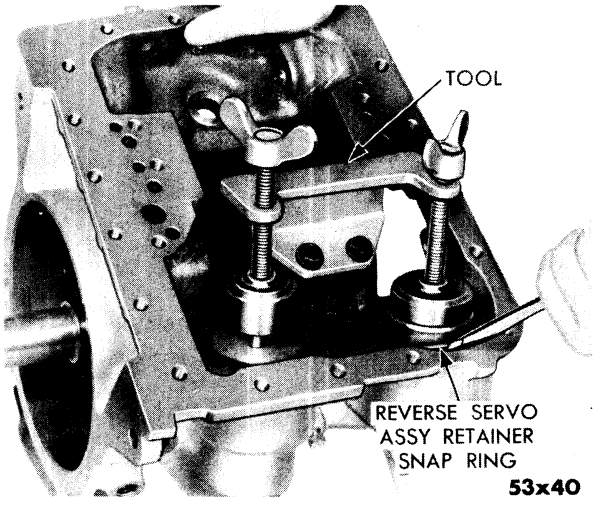

Fig. 54—Removal and Installation of Reverse Servo Assembly Retainer Snap Ring

Using screwdriver, remove reverse servo piston and valve assembly spring retainer snap ring (Fig. 54). Loosen compressing portion of tool. Spring retainer may require guiding out of transmission case.

Remove spring retainer, spring, servo piston and valve assembly.

Remove servo piston seal (lip type neoprene) from piston.

Using pliers, Tool C-3229, remove reverse servo piston valve spring snap ring.

Remove spring and valve from piston. Inspect servo bore for scoring. Light scores may be removed with crocus cloth.

41. REMOVAL OF KICKDOWN PISTON

Using compressor, Tool C-3289 or C-3529, apply sufficient pressure on kickdown piston rod guide to remove piston snap ring. Loosen compressing portion of tool and remove tool from transmission case. Remove piston rod guide, piston spring, kickdown piston rod assembly and kickdown piston cushion spring. Inspect riveting of kickdown piston rod to kickdown piston spring retainer. Remove seal ring from guide. Inspect for light scores and wear on piston rod and guide. Using lock ring pliers, Tool C-484, remove kickdown piston from transmission case. Remove three seal rings (two locking and one open type) from kickdown piston. Inspect piston for light scores and wear. Inspect rings for broken ends.

42. REMOVAL OF TORQUE CONVERTER REACTION SHAFT

Inspect torque converter reaction shaft steel seal rings (interlocking type) for broken ends. Make sure they are free to rotate in the lands. Inspect splines on shaft for burrs and wear. Inspect thrust surfaces for wear and slight scores. Remove the reaction shaft seal (neoprene). Do not remove the torque converter reaction shaft unless inspection reveals it is necessary to do so. If necessary to remove reaction shaft, proceed as follows: Remove three transmission case to reaction shaft screws and washers. Using Tool C-3297 or (C-3531) press reaction shaft out of transmission case (Fig. 55). Remove two torque converter reaction shaft seal rings (interlocking).

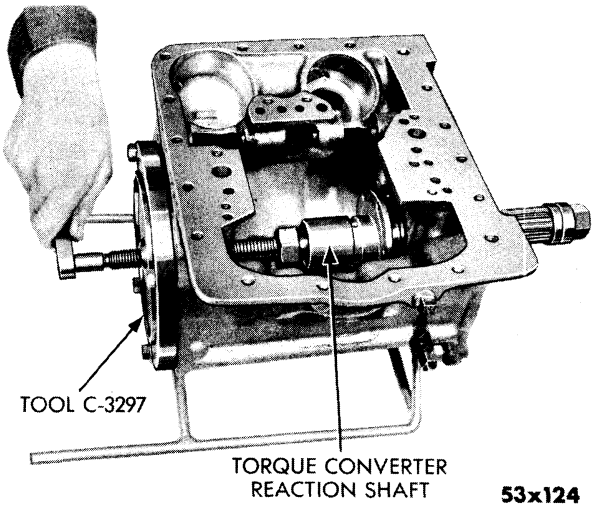

Fig. 55—Removing Torque Converter Reaction Shaft (Typical View)

43. REMOVAL OF THROTTLE CAMSHAFT SLEEVE OIL SEAL

Using a suitable drift, drive seal out of transmission case.

44. REMOVAL OF KICKDOWN BAND ADJUSTING SCREW

Loosen locking nut and remove kickdown band adjustment screw and locknut. When locknut is loosened, the adjusting screw must be finger free. If it is not, inspect screw and nut for pulled threads or foreign material in threads. The transmission and its components have been disassembled as necessary for inspection, cleaning and replacement of worn or damaged parts. Inspect transmission case for cracks, sand holes, and stripped threads. Check for burrs on mating surfaces. Blow compressed air through all passages to make sure they are open. Check oil pressure take off plugs for tightness. Check drive type breather in extension housing for being plugged (undercoating) and looseness.

ASSEMBLING THE TRANSMISSION

45. INSTALLING THE KICKDOWN BAND ADJUSTING SCREW

It is vitally important that adjusting screw fit freely into transmission case. Install adjusting screw, with locking nut attached, into transmission case until there is approximately one inch of screw left on outside of case. Do not lock screw into position at this time.

46. INSTALLING THE THROTTLE VALVE CAMSHAFT SLEEVE OIL SEAL

Using installer, Tool C-3277, start seal squarely (with lip of seal toward outside of case) and tighten until tool bottoms on transmission case.

47. INSTALLING THE TORQUE CONVERTER REACTION SHAFT

Coat two steel torque converter reaction shaft seal rings with transmission fluid. Install rings on shaft. Make sure they are interlocked and rotate freely in ring lands.

Coat portion of reaction shaft (that presses into case) with transmission fluid. Position torque converter reaction shaft into transmission case so that holes in shaft align with bolt holes in case. Install Tool C-3297 or (C-3531).

Place two front oil pump to transmission case screws (coarse thread) through reaction shaft screw holes in transmission case until threads contact machine threads of reaction shaft flange screw (fine thread) holes. Use very light finger pressure to tighten (approximately one turn).

In this position, the bolts will serve as guides in aligning reaction shaft flange dowel hole with dowel in transmission case. Press reaction shaft into transmission case. Remove Tool C-3297, (or Tool C-3531).

Remove the two front pump screws (guide), start three transmission case to reaction shaft bolts and washers and tighten 10 to 15 foot-pounds torque. Coat new torque converter reaction shaft seal ring (neoprene) with transmission fluid and install on shaft.

48. INSTALLING THE KICKDOWN PISTON

Coat three kickdown piston rings with transmission fluid (two locking and one open type) and install on piston. Interlock rings and make sure they are free to rotate in lands.

Place kickdown piston assembly into transmission case. Compress bottom ring (large) with a piece of brass rod. After bottom ring has entered, piston will seem to hang at two different locations while being pushed into case. This is due to rings entering cylinder. **DO NOT HAMMER.**

Place kickdown piston cushion spring in piston. Place kickdown piston rod in piston and slide piston spring over kickdown piston rod. Coat new kickdown piston rod guide seal ring with transmission fluid and install on kickdown piston rod guide. Make sure ring rotates freely in land. Install compressor, Tool C-3289, (or C-3523) on transmission case. Using extreme care, compress kickdown piston spring to point that piston guide seal ring slightly binds on case. Using a piece of brass rod flattened on end, work seal ring into position, gradually compressing spring until seal ring enters case. Install kickdown piston rod guide snap ring. Make sure snap ring is properly seated.

49. INSTALLING THE REVERSE SERVO PISTON

Place reverse servo piston valve and spring in reverse servo piston (shaft on valve protruding through hole in bottom of piston). Using pliers, Tool C-3229, install reverse servo piston valve spring snap ring. Make sure snap ring is properly seated. Coat the new reverse servo piston ring (neoprene) with transmission fluid and install (lip facing down) on piston. Insert reverse servo piston and valve assembly into transmission case in a cocked position. Then, by rotating piston, piston ring will enter case without being damaged.

Place reverse servo piston spring over piston and position spring retainer over spring. Compress spring with compressor, Tool C-3289, or C-3529 sufficiently to install snap ring. The spring retainer may require guiding into case. Make sure snap ring seats properly. Remove installing tool from transmission case. Inspect interior of reverse servo piston sleeve for burrs, and place sleeve over piston. Make sure sleeve slides freely on piston (by working it up and down).

50. INSTALLING THE REGULATOR VALVE BODY

Inspect regulator valve body and valves to make sure that no damage has occurred since first inspection and cleaning. Blow out passages with compressed air. Make sure torque converter reaction shaft seal (neoprene) is coated with transmission fluid. Place transmission regulator valve and torque converter control valve in regulator valve body (Fig. 56). Install guide studs, Tool C-3288 (if removed) in front of transmission case, position new regulator valve body gasket and valve body assembly (with oil passages to rear) over torque converter reaction shaft. Seat firmly against gasket on front of transmission case. Use extreme care when placing regulator body in position to prevent reaction shaft screws from damaging passages in regulator body.

51. INSTALLING THE FRONT OIL PUMP

Position front oil pump housing dust seal in front of oil pump housing (metal portion of seal down). Using driver, Tool C-3278, bottom seal into housing (Fig. 57).

Coat new front oil pump housing seal (neo-

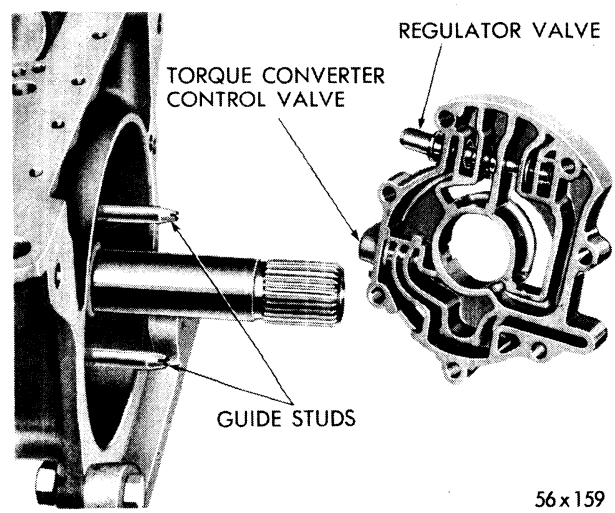

Fig. 56—Installing Regulator Valve Body

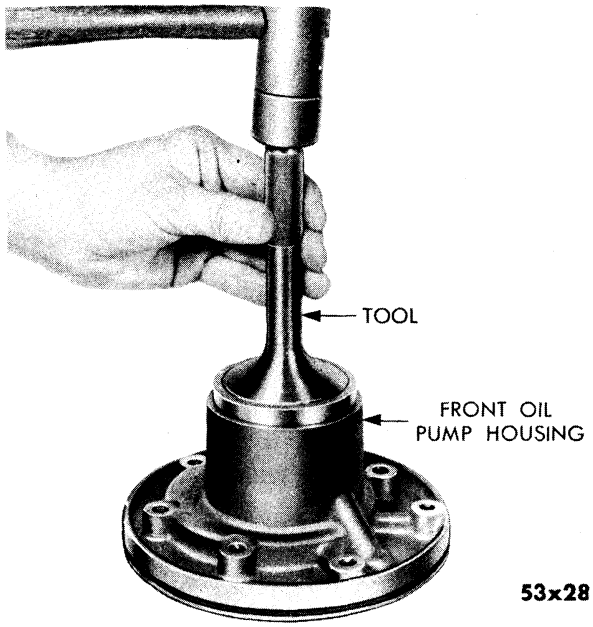

Fig. 57—Installing Front Oil Pump Housing Dust Seal

prene) with transmission fluid and install on housing. Make sure seal is properly seated in groove (lip facing down) and that it protrudes .010 inch above circumference of housing. Place transmission front oil pump gear and pinion (driving lugs of pinion facing up) in oil pump housing (Fig. 52) and check marking. Unless oil pump pinion is installed correctly, considerable damage will result when transmission is installed in vehicle. Lubricate oil pump gears with Automatic Transmission Fluid, Type "A".

Place front oil pump housing assembly (with oil drain facing up) over torque converter reaction shaft and slide into position over guide studs and up against regulator valve body. Start five bolts and draw housing down evenly until seated into transmission case. Remove guide studs and install two remaining bolts and washers. Tighten 17 foot-pounds torque. After all bolts have been installed and properly torqued, engage driving lugs of oil pump pinion to determine if oil pump pinion turns freely. Use oil pump drive sleeve for this check. If pinion does not turn freely, remove pump and check for foreign matter between pump gears and housing. If lugs of drive sleeve cover portion of reaction shaft splines when pump is installed, it is an indication that pinion gear is improperly installed, (See Fig. 52). Using new gasket, install torque converter control valve spring and retainer. Tighten 40 foot-pounds torque. Using new gasket, install the transmission regulator valve spring and retainer. Tighten to 50 foot-pounds torque.

52. INSTALLING THE KICKDOWN BAND AND LEVERS

Place kickdown band lever assembly in transmission case and slide kickdown band lever shaft into position from front of transmission case. The lever should operate freely on shaft.

Install kickdown band lever shaft plug in front of transmission case and tighten to 35 foot-pounds torque. Place kickdown band assembly into transmission case by rotating ends of band through rear opening in case. Fit either end of kickdown band over adjusting screw blade and compress band sufficiently to install kickdown band strut between other band end and kickdown band lever.

NOTE

Make sure kickdown band strut slot engages with kickdown strut pin in band end.

53. ASSEMBLING THE CLUTCH PISTON RETAINER

Coat a new direct clutch piston seal ring with transmission fluid and install on piston, with lip of seal facing away from flange. Coat a new direct clutch piston retainer seal ring with transmission fluid and install (lip of seal down) on retainer hub. Place piston assembly in direct clutch retainer and, with twisting motion, seat piston in bottom of retainer. Work carefully to avoid damaging lip of seals. Seat direct clutch spring into direct clutch piston retainer and position spring retainer and snap ring on spring. Using compressor, Tool C-3302, compress direct clutch spring sufficiently to seat snap ring (Fig. 57). Piston spring retainer may require guiding past the snap ring groove. Make sure snap ring is properly seated.

Remove compressor, Tool C-3302. Place direct clutch hub in center of direct clutch piston retainer.

Lubricate clutch plates and driving discs with Automatic Transmission Fluid, Type "A". Place one of the clutch plates (steel) in the direct clutch piston retainer, followed by a driving disc. If assembly of driving discs was started with cork portion on outer top, the same sequence must be followed all through

assembly. Place kickdown sun gear assembly in direct clutch piston retainer and install snap ring (select fit). Using a feeler gauge, check clearance under the kickdown sun gear snap ring. Select a snap ring to give minimum clearance (close to zero as possible). Make sure snap ring seats properly. Snap rings are available in following three thicknesses: .059 to .061, .062 to .064, .065 to .067 inch. Place fiber thrust washer (select fit, see "Checking Transmission End Play") on reaction shaft and install direct clutch assembly in transmission case (Fig. 44).

54. INSTALLATING REVERSE BAND AND LEVERS ASSEMBLY

Place reverse band lever assembly in reverse band link assembly and position into transmission case. Align holes in lever and link assemblies to shaft hole in transmission case. Slide reverse band lever shaft into position from rear of transmission case. Place reverse band assembly into transmission case by rotating ends of band through relieved area in transmission case (Fig. 43). Hook end of band in link assembly. Compress band sufficiently to install strut in slots of band and lever assembly. (Figure 58 illustrates assembly of reverse band linkage after installation in transmission case).

55. INSTALLING THE PLANET PINION CARRIERS IN HOUSING

Place output shaft support on fixture, Tool C-3285 (if available), with bearing surface up. Lubricate bearing surface of planet pinion carrier housing, and place bearing surface of

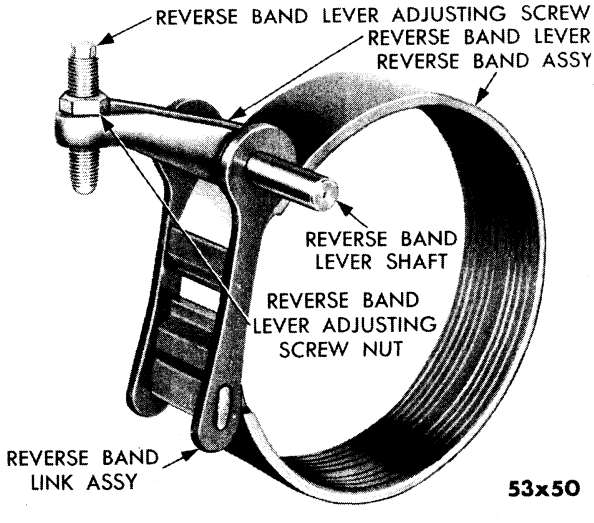

Fig. 58—Reverse Band Linkage

housing over output shaft support bearing surface. Place reverse annulus gear on output shaft and install snap ring. Output shaft may be placed in a vise, providing it is clean and equipped with soft jaws.

NOTE

Reverse annulus gear must fit tightly on output shaft. End clearance is controlled by various snap rings which are available in following thicknesses: .078 to .080, .082 to .084, and .086 to .088 inch.

Make sure snap ring seats properly. Coat output shaft seal ring with transmission fluid and install on shaft. Interlock the seal ring into position and make sure ring rotates freely in lands. Coat planet pinion carrier housing thrust washer with Lubriplate, slide washer over output shaft and against thrust surface on reverse annulus gear. Place output shaft and reverse annulus gear into position in planet pinion carrier housing.

Be careful not to damage output shaft seal ring as it enters output shaft support. Make sure reverse planet pinion carrier thrust washer seats properly between reverse annulus gear and planet pinion carrier housing. Coat reverse annulus gear teeth with transmission fluid.

Lubricate thrust surfaces and gear teeth of reverse planet pinion gears and carrier assembly. Place carrier assembly in reverse annulus gear. Make sure driving lugs on carrier assembly properly engage slots in planet pinion carrier housing.

Coat input shaft bearing and thrust surfaces and gear teeth on kickdown planet pinion gears and carrier assembly with transmission fluid. Slide assembly (oil collector ring up) carefully down on rear end of input shaft and over stop ring.

Lubricate teeth and thrust surfaces, and slide kickdown annulus gear over input shaft down to stop ring (Fig. 48). Install kickdown annulus gear snap ring and make sure it is seated properly (Fig. 47). Input shaft may be placed in a vise, providing vise is clean and equipped with soft jaws. Coat the reverse planet pinion carrier thrust washer with Lubriplate and install on kickdown annulus gear.

Place kickdown planet pinion carrier assembly, annulus gear and input shaft into position

in planet pinion carrier housing. Make sure reverse planet pinion carrier thrust washer remains on kickdown annulus gear and driving lugs on carrier assembly properly engage slots in planet pinion housing.

Install planet pinion carrier housing snap ring (raise housing slightly from fixture C-3285 (if available) to aid in installing snap ring). Make sure it is positioned and seated properly. Using feeler gauge, check clearance between kickdown planet pinion carrier housing snap ring and kickdown planet pinion carrier assembly. Limits are .010 to .021 inch. If clearance is not within these limits, select a new snap ring. Snap rings are available in following thicknesses: .062 to .064, .072 to .074, .076 to .078 and .082 to .084 inch. If this selection of snap rings fails to provide sufficient clearance, use a kickdown sun gear snap ring.

56. INSTALLING THE OUTPUT SHAFT SUPPORT, PLANET PINION CARRIERS AND HOUSING ASSEMBLY

Coat kickdown planet pinion carrier thrust washer with Lubriplate, place over kickdown sun gear and against thrust surface of direct clutch piston retainer assembly. Install guide studs, Tool C-3283, in rear of transmission case. Position new output shaft support gasket over guide studs and against case.

Insert input shaft, planet pinion carrier housing, output shaft support and output shaft through rear of transmission case (Fig. 42). Do not force assembly into case. Install one output shaft support to transmission case screw and lockwasher and tighten **finger tight**.

57. INSTALLING THE REAR OIL PUMP

Coat transmission rear oil pump pinion ball with transmission fluid and insert in ball pocket in output shaft. Lubricate rear oil pump drive pinion with transmission fluid, place over output shaft and slide into position. Align keyway in pinion wall ball in shaft. Pinion was marked when removed in disassembly, so make sure it is installed correctly. Check the marking. Slide rear oil pump housing assembly over output shaft and into position against output shaft support.

Install five rear oil pump housing to output shaft support bolts and lockwashers. Draw down evenly and tighten 10 to 12 foot-pounds torque.

NOTE

After bolts have been properly tightened, turn output shaft to make sure pump gears are free to rotate. If they are not, remove pump to determine cause.

58. INSTALLING THE GOVERNOR ON OUTPUT SHAFT

Coat two governor support piston rings with transmission fluid and install on governor support. Stagger rings and make sure they are free to rotate in lands. Position governor on support and install four screws and lockwashers. **Do not tighten screws at this time.**

Slide governor support and body assembly over output shaft (Fig. 39) and into position in rear oil pump housing. Compress governor support piston rings with fingers as support enters oil pump housing. Align locating hole in output shaft to locating screw hole in governor body and install governor locating screw. Tighten 3½ to 4 foot-pounds torque. Holes can be easily aligned by turning output shaft and holding governor body. Tighten four governor body screws 5 to 10 foot-pounds torque.

Dry governor parts with compressed air, but do not lubricate when assembling. Place governor intermediate weight in primary weight. Install secondary weight spring and weight. Compress spring sufficiently to install snap ring. Make sure spring seats properly and that snap ring is seated properly. Place governor weight assembly (secondary weight snap ring up) into governor body (Fig. 37) and install snap ring. Make sure snap ring seats properly. Slide governor valve (small end up) over governor valve shaft. Slide governor shaft into governor body (Fig. 36) through output shaft and governor weight assembly. At same time, position valve into body. Install governor valve shaft snap ring (make sure snap ring is positioned at outer end of groove — if positioned at inner end of groove, it may limit travel of governor valve), and make sure it is properly locked to shaft. Check operation of governor weight assembly and valve by turning output shaft. Both should fall freely in body.

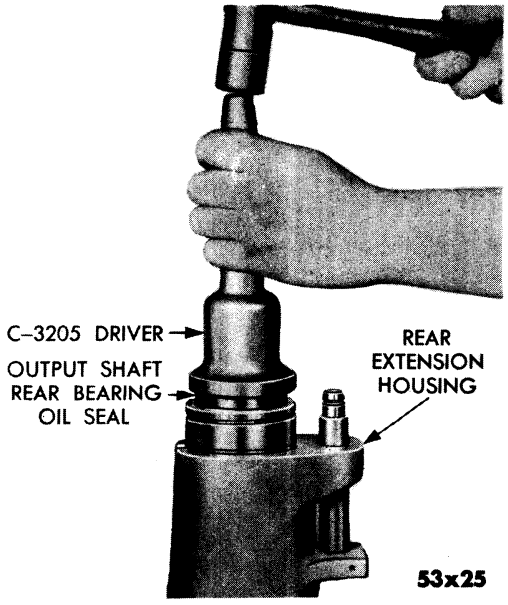

Fig. 59—Installation of Output Shaft Rear Bearing Oil Seal

59. INSTALLING THE TRANSMISSION EXTENSION, OIL SEAL AND BEARING

Install output shaft rear bearing in extension housing with driver, Tool C-3294. Make sure bearing is properly seated and libricate with Automatic Transmission Fluid, Type "A". Install output shaft rear bearing snap ring. Install extension oil seal with driver, Tool C-3205 (Fig. 59).

Place new transmission extension gasket over guide studs, Tool C-3283, and into position against output shaft support. Do not use sealing material on gasket. Avoid damaging governor housing when placing rear extension housing over output shaft and onto guide studs. Position housing by tapping with soft hammer. Remove guide studs and install seven transmission extension to case bolts and lockwashers. Draw down evenly and tighten 25 to 30 foot-pounds torque.

Tighten the output shaft support to case bolt 25 to 30 foot-pounds torque. Turn output shaft to make sure it turns freely. Coat nylon gear and threads on speedometer drive pinion with transmission fluid and install in transmission

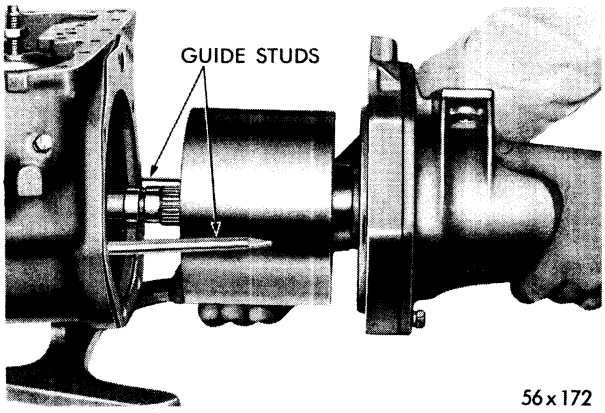

Fig. 60—Removing Power Train Assembly as a Unit to Replace Direct Clutch Retainer Thrust Washer

extension (Fig. 34). Tighten 40 to 45 foot-pounds torque.

60. CHECKING TRANSMISSION END PLAY

Before transmission end play is checked, it is necessary that hand brake drum be installed and tightened to required torque specifications (140-160 foot-pounds torque). This operation is necessary to aid in proper seating of extension rear bearing. (Refer to Paragraph 28).

If end play does not fall within specifications, the transmission will have to be partially disassembled in following manner to allow an direct clutch retainer thrust washer (fiber) of proper thickness to be installed. Thrust washers are available in following three thicknesses: .078-.080, .095-.097, and .112-.114 inch

Remove screws and lockwashers from transmission extension and install guide studs, Tool C-3283. Remove output shaft support to case screw and washers, and remove extension housing, output shaft support and planet pinion carrier housing as one assembly (Fig. 60). Slide direct clutch piston retainer from torque converter reaction shaft (it is necessary to remove it from transmission case) and remove input shaft thrust washer. Using a micrometer, measure thickness of washer and select washer to give correct clearance. Assemble as previously instructed. Adjust kickdown and reverse bands as described in Paragraph 25.

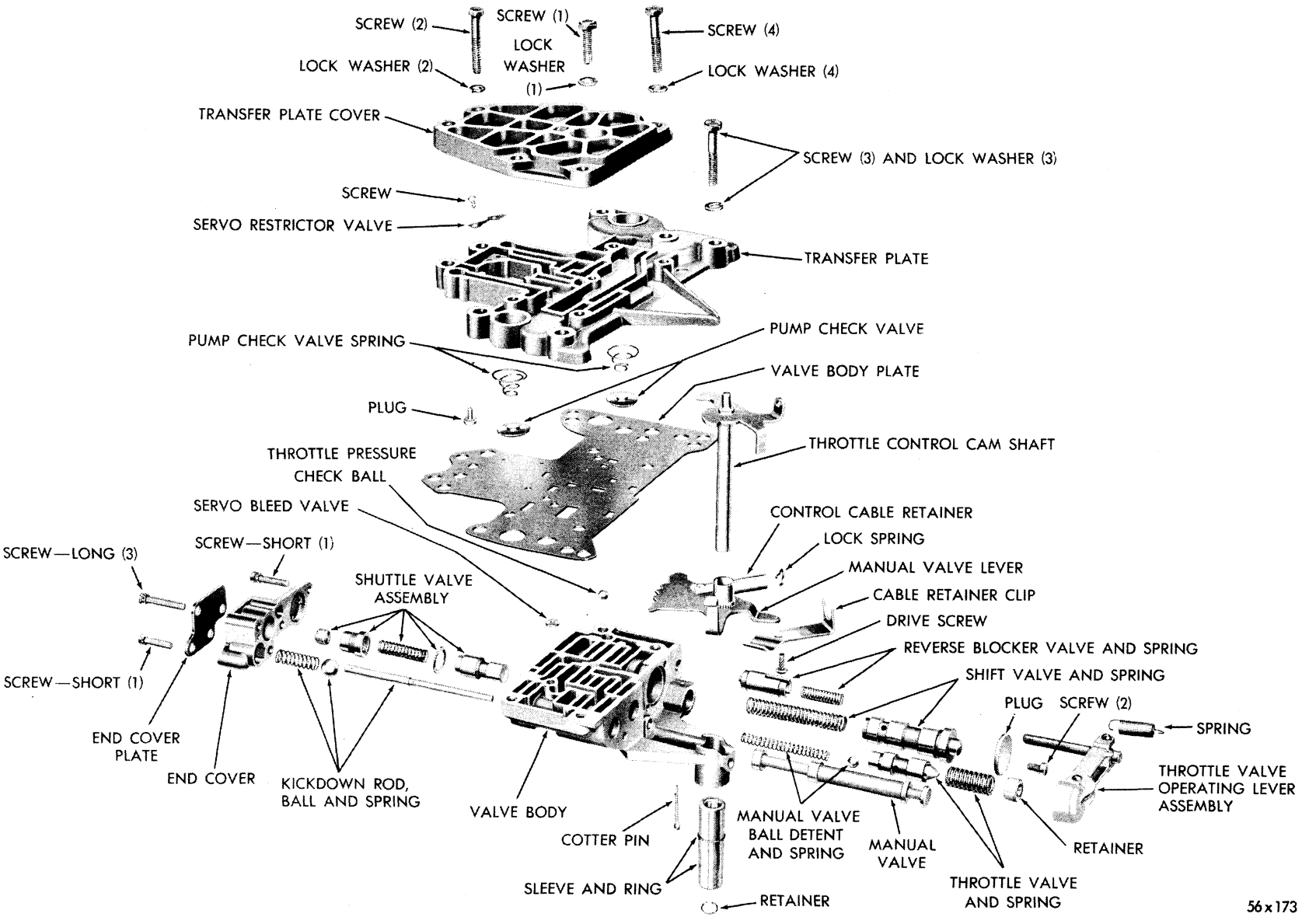

Fig. 61—Valve Body and Transfer Plate Assembly (Disassembled View)

SERVICING THE VALVE BODY AND TRANSFER PLATE

61. DISASSEMBLING THE VALVE BODY AND TRANSFER PLATE

To disassemble valve body and transfer plate for cleaning, inspection, and overhaul, refer to Figure 61, and proceed as follows:

Place valve body and transfer plate assembly in stand, Tool C-3294 (Fig. 62). Do not use vise to hold valve body and transfer plate. Remove two of the long transfer plate cover bolts and lockwashers and install guide studs, Tool C-3295. Keeping finger pressure against transfer plate, remove remaining three (2 long and 1 short) transfer plate cover bolts, and remove transfer plate cover (Fig. 62).

Do not lose the servo restrictor valve operating plug from transfer plate when removing transfer plate from valve body plate (Fig. 63). Observe position of front and rear pump check valves in transfer plate. Rear pump check valve has metering hole. Remove valve body plate from valve body. **The serve pressure bleed valve may stick to valve body plate when it is removed.** Note position of servo pressure bleed valve and pressure check valve ball (Fig. 64). Remove valve body from stand, Tool C-3294, and remove guide studs. Remove servo pressure bleed valve and pressure check valve ball, and place in clean container.

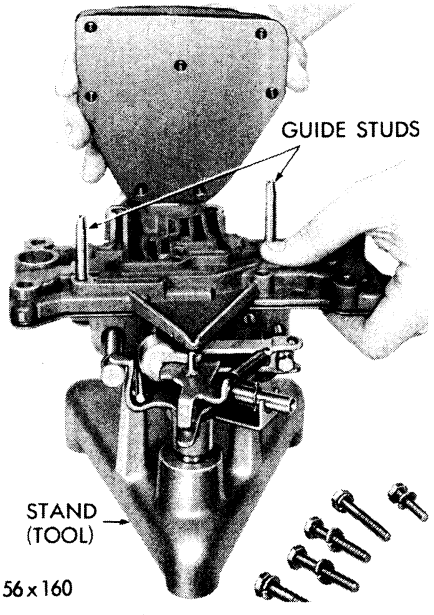

Fig. 62—Removing or Installing Transfer Plate Cover

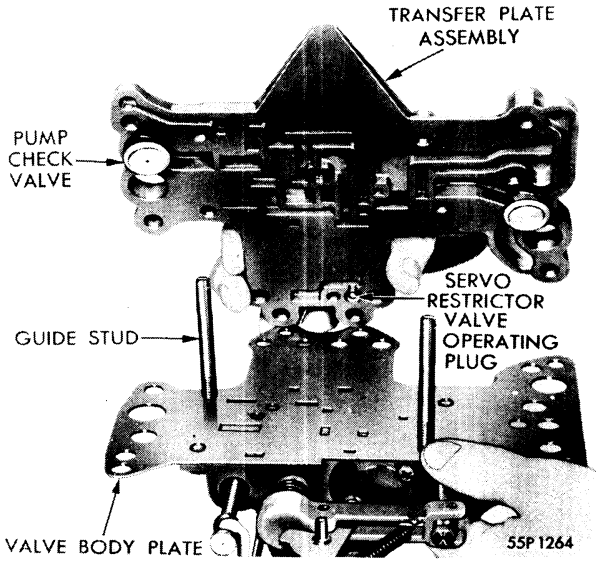

Fig. 63—Removing Transfer Plate Assembly

Remove throttle valve cam return spring from cam and throttle operating lever. Compressing throttle valve operating lever assembly against throttle valve spring (Fig. 65), rotate throttle valve operating assembly outward from spring throttle valve cam. Swing throttle valve operating lever out of way and remove throttle

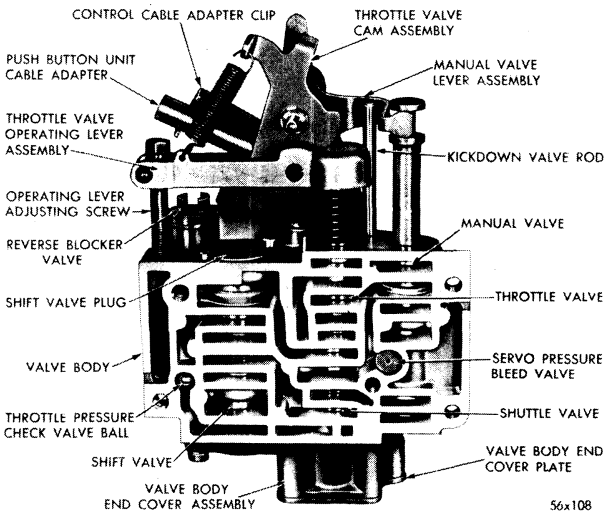

Fig. 64—Valve Body Assembly (Valve Body Plate Removed)

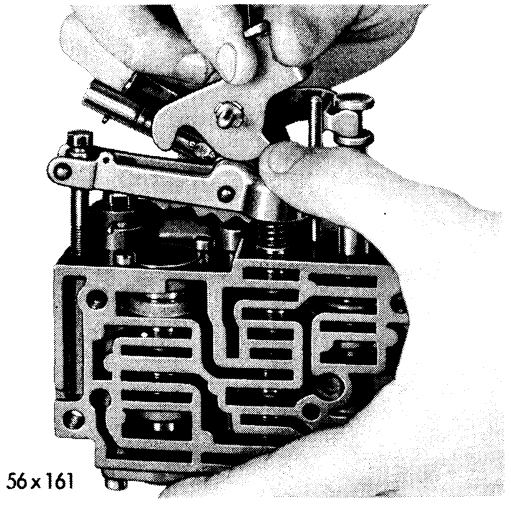

Fig. 65—Compressing Throttle Valve Operating Lever to Remove Throttle Valve Camshaft

valve spring and retainer from throttle valve. Remove throttle valve from valve body bore. Check distance from valve body to end of throttle valve operating adjusting screw. This should be approximately $1\frac{11}{16}$ inches. Using wrench, Tool C-3279B, remove throttle valve adjusting screw and throttle valve operating lever assembly. Normally, it is not necessary to remove this assembly unless damaged parts are to be replaced.

Holding manual valve lever detent plate and sleeve securely, remove small retainer ring which locks throttle camshaft in sleeve (Fig. 66). While maintaining constant thum pressure on detent plate, carefully withdraw sleeve from valve body. Remove throttle valve cam assembly and manual valve lever assembly. Detent plate ball is spring loaded. **Do not lose the detent ball.**

Remove detent ball and spring from valve body. Remove manual valve by slowly rotating it out of its bore. Remove reverse blocker valve cotter pin, spring and valve. Remove valve by rotating it out of bore. Do not remove push button unit control cable adapter, lock spring or cable adapter clip, unless inspection reveals it is necessary to do so. (Fig. 64).

Remove four (three long and one short) valve body end cover plate bolts and lockwashers and remove valve body end cover plate. Remove valve body end cover screw and lockwasher (oval fillister). Keep pressure against valve body and cover when removing screw as there are three springs behind cover.

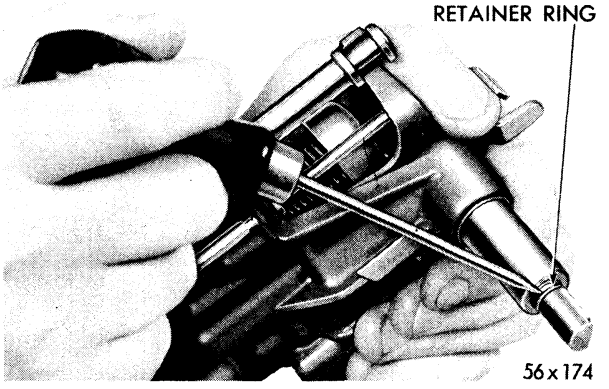

Fig. 66—Removing Throttle Camshaft Retainer Ring

Carefully remove valve body end cover to avoid losing any of the springs or kickdown valve ball. Remove kickdown ball spring, ball, and rod from valve body. Remove shuttle valve by pulling out shuttle valve spring. The shuttle stop ring will come out with valve. Remove shift valve spring from valve body. Mark shift valve plug with Prussian blue, in order to install it in same direction. Remove shift valve plug screws. Remove plug by pushing on open end of shift valve with finger. Remove shuttle valve plug from end cover. **Do not disturb the setting.**

62. CLEANING AND INSPECTING THE VALVE BODY AND TRANSFER PLATE

After each part has been thoroughly cleaned and inspected, place them on clean paper until ready for assembly. Make sure all parts are free from obstructions, and inspect all mating

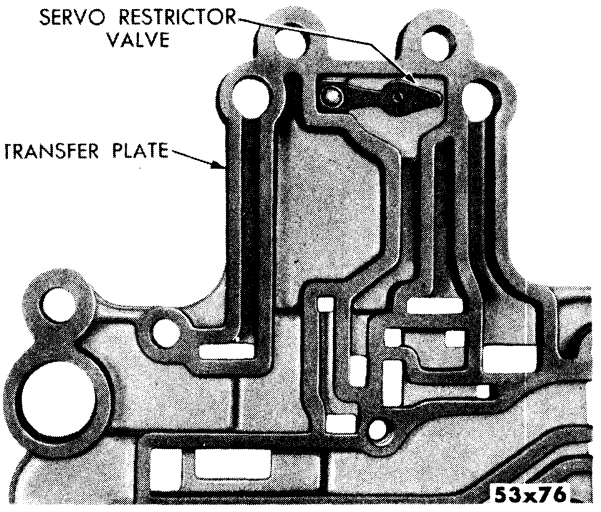

Fig. 67—Servo Restrictor Valve

surfaces for burrs, nicks and grooves. Small nicks etc., may be removed with crocus cloth, otherwise, damaged parts must be replaced. Using straightedge, Tool C-3335, check all mating surfaces for distortion. Inspect bores in valve body for score marks, pits and irregularities. Inspect all springs for distortion and collapsed coils.

Inspect all valves and plugs for burrs, nicks and scores. Small ones may be removed with crocus cloth, providing extreme care is taken to avoid rounding off the sharp edge portion of valve which helps to prevent dirt and foreign matter from getting between valves and body, reducing the possibility of sticking. Check valves and plugs (dry) for free operation in bores. All must fall freely in bores when valves, plugs and bores are clean and dry. Inspect detent portions on manual valve lever assembly for wear. Inspect detent ball for wear and make sure it slides freely into valve body.

Inspect staking of control cable adapter to detent plate and cable adapter clip to valve body. Inspect staking of manual valve lever and throttle valve cam to their respective shafts. Inspect throttle valve operating lever roller to make sure it rolls freely. Inspect throttle valve operating lever adjusting screw and pin for wear. Make sure adjusting screw rotates freely in throttle valve operating lever (which contacts throttle valve spring retainer) for wear. Inspect kickdown valve rod for wear and scoring, and also inspect for wear at entering point in valve body. Inspect kickdown valve ball seat in valve body. Inspect servo restrictor valve

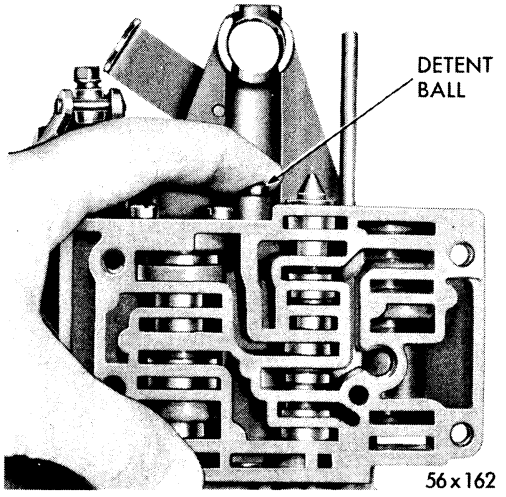

Fig. 68—Holding Manual Valve Lever Detent Ball in Position

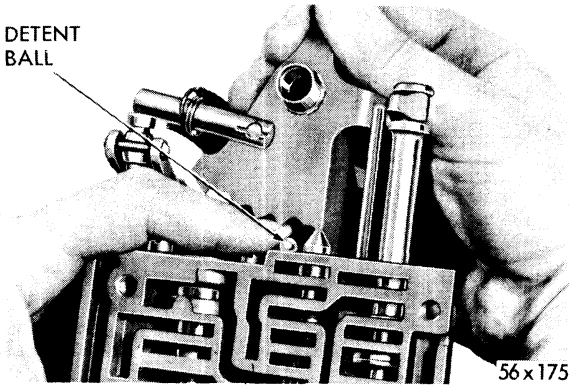

Fig. 69—Aligning Manual Control Valve Lever Assembly

(Fig. 67) in transfer plate to make sure valve is seating properly. If valve is distorted, carefully remove the drive screw. Install new valve and new drive screw. Make sure drive screw is tight. Avoid distorting transfer plate when performing this operation. Inspect valve body plate for burrs and make sure five small metering holes are open. Visually inspect pump check valve springs in transfer plate.

63. ASSEMBLING THE VALVE BODY AND TRANSFER PLATE

NOTE

Three steel balls are used in the valve body and each must be installed in its correct position. Each is identified by size as follows: Kickdown Rod—Large, Manual valve lever detent—medium, Throttle pressure check—small.

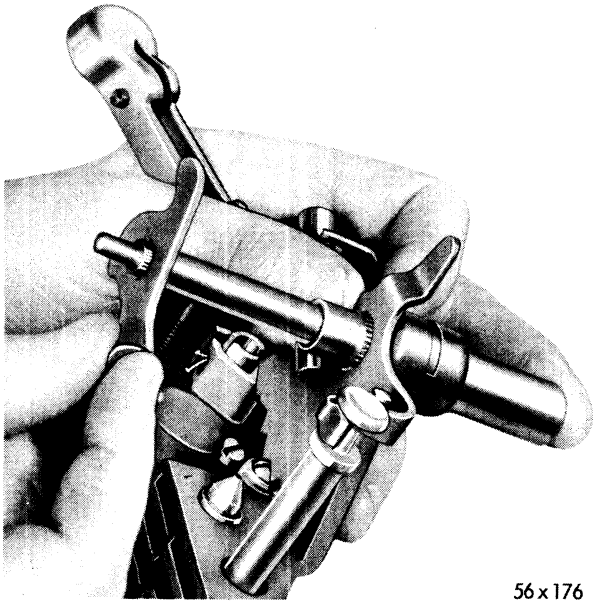

Fig. 70—Placing Throttle Valve Camshaft in Sleeve

Install reverse blocker valve, spring. Use new cotter pin. Place manual valve in its bore. Install shift valve and plug. Place manual valve lever detent spring and ball in valve body and hold in position (Fig. 68). While holding detent ball, position manual valve lever assembly so that lever arm engages manual valve (manual valve lever may be positioned to assist in this alignment) and push button control cable adapter in direct alignment with control cable adapter clip (Fig. 69). At same time, align shoulder on manual valve lever with sleeve bore in valve body so that detent ball will engage detent plate when finger pressure on detent ball is released.

With finger pressure holding manual valve shoulder in bore, insert sleeve into bore, (up to stop ring). Position throttle valve cam in sleeve (Fig. 70) and lock in place with retainer. If retainer is not placed in position at this time, the detent plate may move out of position, allowing detent ball to escape from its bore.

Place valve body in stand, Tool C-3294. Place kickdown rod (small end toward end cover) into position in valve body. Install the shift valve spring in valve. Install shuttle valve in valve body. Coat stop ring lightly with transmission fluid and place into recess in valve body. Place shuttle valve spring in shuttle valve. Place kickdown valve ball into valve body. Place valve body end cover plate on end cover. Install the one short screw and lockwasher and tighten snugly. Place adjustable shuttle valve plug into position in valve body end cover. Plug must fit to full depth of bore. Install kickdown valve spring into place in end cover. Install valve body end cover to valve body. Make sure shift valve, shuttle valve and kickdown valve springs are properly seated in position when cover is being installed.

Install valve body end cover screw and lockwasher but do not torque. Install three (long) valve body end cover plate screws and lockwashers. Draw them down evenly and tighten 24 to 30 inch-pounds torque. Remove valve body from repair stand. Using wrench, Tool C-3279A, install throttle valve adjusting screw, and throttle valve operating lever assembly. Adjust to approximately $1\frac{11}{16}$ inches distance between valve body and end of throttle valve adjusting screw.

Install throttle valve (point outward) in valve body. Place throttle valve spring and retainer

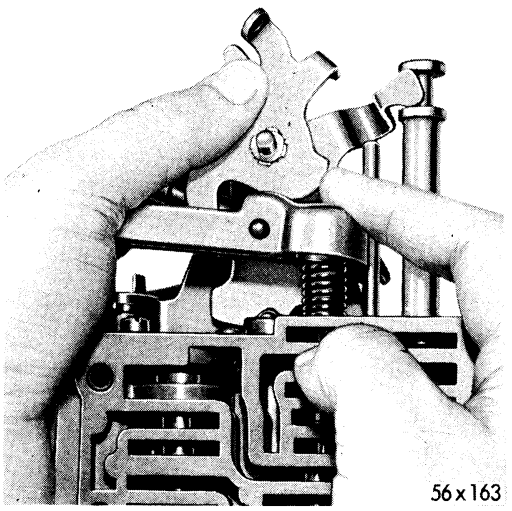

Fig. 71—Indexing Throttle Camshaft with Throttle Operating Lever

over throttle valve. Swing throttle valve operating lever over spring and retainer. Compressing throttle operating lever assembly against throttle valve spring, slide throttle valve cam assembly into throttle valve operating lever, indexing the cam portion in slot of operating lever (Fig. 71). Replace throttle valve cam assembly return spring and replace valve body in stand. Install servo bleed valve and throttle pressure check valve ball into position in valve body, and install guide studs, Tool C-3295.

Install servo restrictor valve operating plug (long end first) into transfer plate (Fig. 72).

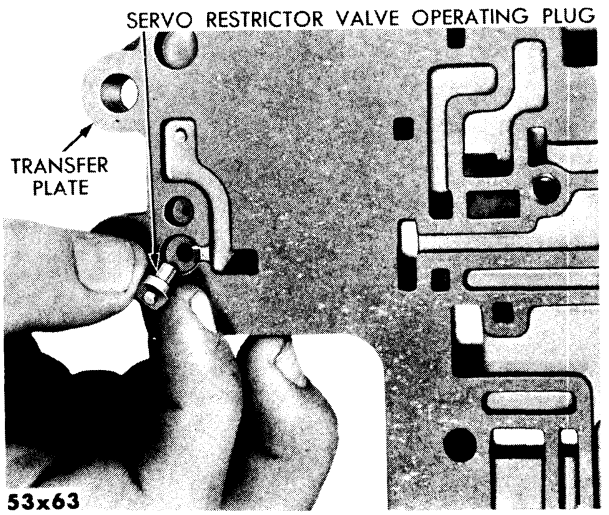

Fig. 72—Installation of Servo Restrictor Valve Operating Plug

Make sure the pump check valves and springs are properly positioned in transfer plate. The pump check valve with the metering hole should be toward rear of transmission. Place valve body plate flush into position on valve plate by compressing pump check valve springs. Make sure pump check valves enter transfer plate, otherwise, valve body plate will be damaged when assembly is drawn down onto valve body.

Keep sufficient pressure on transfer plate and valve body plate to hold them together. Place them over the guide studs and into position on valve body. Palce transfer plate cover into position and install two of the transfer plate cover screws and lockwashers (one each side) finger tight. Make sure pump check valves remain in position in body plate. Remove guide studs and install the remaining two transfer plate cover bolts and lockwashers. Tighten bolts 45 to 50 inch-pounds torque. Avoid over-tightening as this will distort valve body, resulting in sticky valves. Operate pump check valves to make sure they can be unseated before final tightening.

64. INSTALLING THE VALVE BODY AND TRANSFER PLATE

Place valve body and transfer plate into position on transmission case. Install five transfer plate bolts and lockwashers. Two bolts are 1⅝ inches long and go through transfer plate cover on valve body. The other three are 1⅛ inches long. Draw bolts down evenly and tighten 12 to 17 foot-pounds torque.

Make sure the two oil strainer tube seals are in position on oil strainer, and place oil strainer assembly into position on valve body. Install the two oil strainer support bolts (1¼ inches long) and lockwashers. Tighten 12 to 17 foot-pounds torque. Replace oil pan and gasket (new). Tighten oil pan bolts 12 to 17 foot-pounds torque. Replace oil pan drain plug if so equipped and tighten 20 to 25 foot-pounds torque. Install throttle control lever assembly. Tighten lock screw securely. Place engine rear support adapter into position on extension housing and install bolts and lockwashers. Tighten to 50 foot-pounds torque.

65. INSTALLING THE TRANSMISSION IN VEHICLE

Install guide studs, Tool C-3276, in the two upper transmission case to converter housing bolt holes. Lubricate front oil pump drive sleeve ring and bearing surface with transmission fluid. Install drive sleeve in front oil pump housing (if not previously installed) **making sure driving lugs are properly engaged in front oil pump pinion gear.** Note position of driving lugs on front oil pump drive sleeve, and position accordingly, to aid in proper engagement with torque converter hub, when transmission is installed.

Slide transmission over guide studs and into position. To avoid damage to front oil pump, the transmission must be properly aligned. Do not attempt to use transmission to converter housing bolts to bring transmission and converter housings together. If oil pump drive sleeve and input shaft have been properly aligned, transmission should slide into position relatively easy. **DO NOT FORCE** it into position.

Install two lower transmission case to converter housing bolts and lockwashers, but do not tighten. Remove guide studs and install two upper transmission case to converter housing bolts and lockwashers. Draw all bolts down evenly and tighten 45 to 50 foot-pounds torque.

Place crossmember into position and install crossmember to frame bolts.

Lower engine, and align mounting holes in adapter with holes in crossmember. Install two bolts and lockwashers that hold engine rear support to crossmember. Tighten bolts 30 to 50 foot-pounds torque. Remove engine holding fixture, Tool C-3487.

Connect throttle linkage to lever, insert push button unit control cable into transmission, and adjust as outlined in "Maintenance and Adjustments." Install neutral starter switch and back-up light switches and lead wires. Connect speedometer cable housing to drive pinion.

Engage ball end of brake cable with brake operating lever, secure cable to support and tighten support screw securely. Connect oil cooler lines (if so equipped). Connect propeller shaft and tighten nuts 33 to 37 foot-pounds torque.

Connect oil pan filler tube and refill transmission to proper level. Connect battery and make all necessary adjustments and tests, as outlined in "Maintenance and Adjustments."

SERVICING THE TORQUE CONVERTER AND HOUSING

66. REMOVAL

Remove transmission. Remove torque converter housing to adapter screws and lockwashers. Remove torque converter housing. If torque converter is being removed because of excessive runout damage, check runout by using a dial indicator on hub and mark the highest point of runout on both converter and crankshaft flange. The reason for this is so it may be determined later if runout was caused by the converter or crankshaft, after crankshaft has been checked in same manner.

Using wrench, Tool C-589, remove eight torque converter stud nuts and lockwashers from crankshaft flange (Fig 73). Remove torque converter from crankshaft. Check crankshaft flange runout (maxium .002 inch).

67. CORRECTING HUB RUNOUT

Permissible torque converter hub runout, when mounted on crankshaft, is .004 inch total indicator reading. The following method is provided for bringing converter hub within this tolerance. If new torque converter is being installed, make sure all visible foreign matter such as raised metal around studs, burrs, chips, etc., have been removed from converter and crankshaft drive flanges. Check crankshaft flange runout (maxium .002 inch T. I. R.)

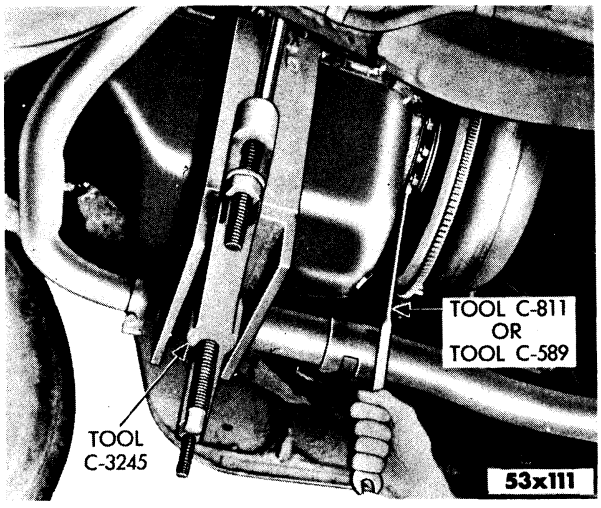

Fig. 73—Removing or Installing Torque Converter Mounting Stud Nuts

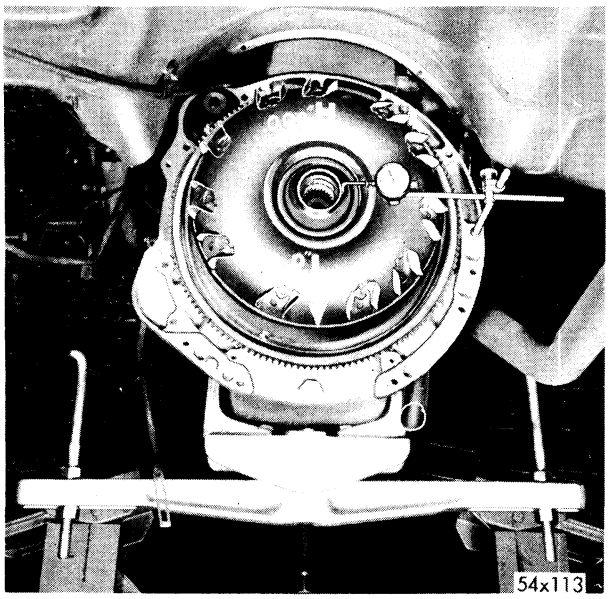

Fig. 74—Checking Torque Converter Runout

Check torque converter runout by mounting a dial indicator to adapter plate or some other unit which is mounted rigidly to engine block (Fig. 74).

Rotate converter 360 degrees and determine the converter hub O. D. runout. If this exceeds .004 inch total indicator reading, then correct by using heat in following manner:

CAUTION

Before using heat, make definitely sure the torque converter has been drained.

Mark position of hub low spot as accurately as possible on the impeller shell. Rotate converter so this mark is directly down.

Remove dust shield from front of adapter plate. Using chalk, mark front cover radius directly opposite hub low spot previously marked on impeller shell. The subsequent heating operation can now be done through opening in adapter plate (Fig. 75).

The size of spot to be heated is governed by magnitude of hub rounout and is usually about ½ inch diameter for .008 inch total indicator reading. Using an acetylene torch containing a No. 3 tip, and set to maximum heat, apply it to

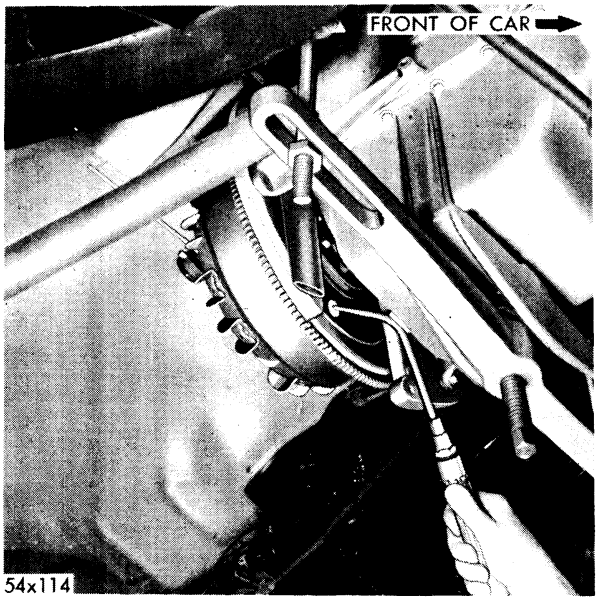

Fig. 75—Heating Torque Converter to Correct Runout

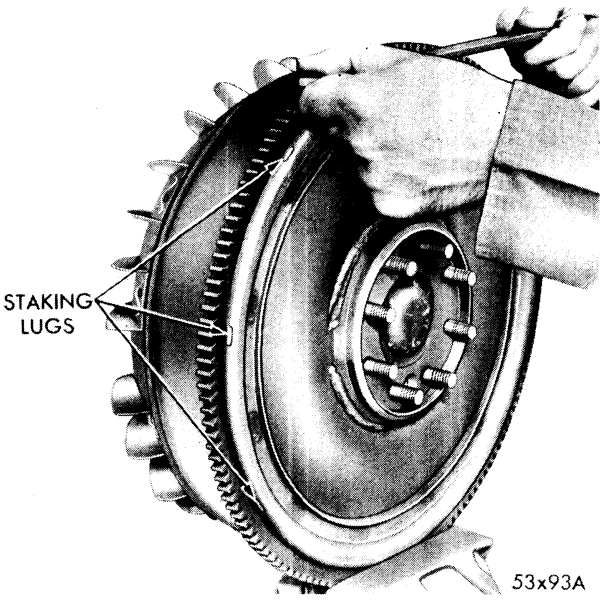

Fig. 76—Removal of Staking Lugs from Torque Converter

selected spot until it becomes a dull red. Rapid heating of local area is essential and if the torch is adjusted properly, the spot will become red within a few seconds.

CAUTION

If sparks are noted, it is an idication that torch is too close and metal is starting to burn; move torch back slightly. Care should be taken to remove torch the instant selected spot becomes a dull red to avoid over correction or damage to unit.

The area is then quenched as rapidly as possible with cold water (hose or wet rags). It is suggested this be done by starting around heated area and working in toward the spot. This prevents the heat from spreading. **The hub runout should not be rechecked until the converter has returned to a uniform room temperature.**

If the converter hub runout exceeds .016 inch total indicator reading, remove the converter and recheck the drive flanges for raised metal chip, etc. Check crankshaft flange runout (maximum .002 inch). if hub runout ramains in excess of .016 inch total indicator reading, install a new converter.

68. REPLACING STARTER RING GEAR ON TORQUE CONVERTER

a. Removal

Support torque converter assembly in a vise and with a file carefully remove staking lugs which retain ring gear to torque converter (Fig. 76). **Be careful when supporting torque converter in the vise to avoid distortion.**

Place torque converter on blocks of wood for support while removing gear. Using a blunt chisel, or drift, tap around ring gear until it comes off torque converter (Fig. 77).

b. Installation

Remove burrs or raised spots (left on the gear contact surface of the torque converter) with a file.

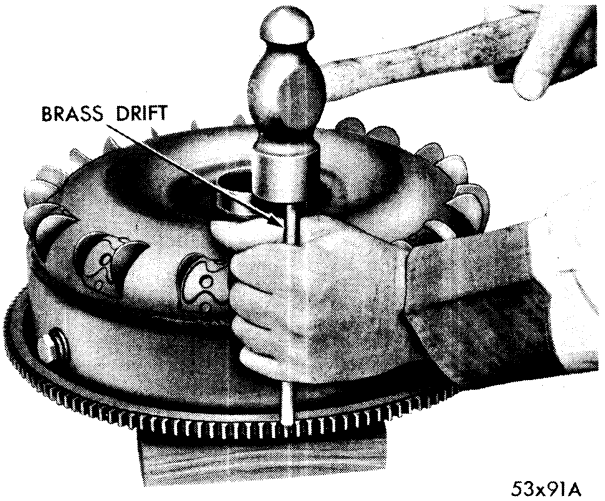

Fig. 77—Removing Starter Ring Gear

CAUTION

Do not remove more metal from the torque converter than is required to remove burrs and rough surfaces.

Any of the following methods may be used to heat the starter ring gear for installation on converter:

Over — when available, use Oven C-794 and set temperature at 150 degrees F. Allows ring gear to remain in oven for approximately 15 to 20 miuntes.

Boiling Water — Place ring gear in a shallow container, add water, and heat for approximately eight minutes after water has come to a boil.

Steam — Place ring gear on a flat surface and direct a steam flow around the gear for approximately two minutes.

Flame — Place ring gear squarely on flat surface. Using a medium-size tip, direct a slow flame around inner rim of gear, being careful not to direct flame onto teeth of ring gear. Place a few drops of water on face of the gear at short intervals during heating process. When gear is hot enough to boil the drops of water, installation of gear to torque converter can be made.

Place starter gear over flange surface of torque converter, making sure that rear face of gear contacts flange on torque converter evenly around entire diameter.

Reweld ring gear to torque converter, using extreme care to place as nearly as possible same amount of metal in exactly same location as original assembly. This is necessary in order to maintain proper balance of unit. Place welds alternately on opposite sides of converter to minimize distortion.

The following suggestions are offered as an aid in making the above weld:

Use a welding current of 200 amps.

Use a D. C. welder that is set a straight polarity or and A. C. welder.

Use a $\frac{5}{32}$ inch diameter, Fleet Weld No. 47 or a $\frac{5}{32}$ inch diameter. General Electric No. W2B or their equivalent.

CAUTION

To prevent burning through the torque converter, the arc should be directed at the intersection of the gear and housing from an angle of approximately 45 degrees from face of gear. DO NOT GAS WELD. Such a procedure would ruin the unit.

Before installing the torque converter, inspect all gear teeth and remove all nicks where metal is raised, welding splatter, etc., as these will cause noisy starter operation.

69. INSTALLATION OF TORQUE CONVERTER

Inspect mating surfaces on torque converter and crankshaft flange for burrs and dirt. Install torque converter on crankshaft. Install eight torque converter stud nuts and lockwashers. Draw down evenly and tighten (Fig. 73).

NOTE

When torque converter assembly is removed from crankshaft drive flange for any reason, the converter assembly runout should be checked when reinstalled. Runout should not exceed .004 inch total indicator reading. Refer to Correcting Hub Runout.

Place torque converter housing over dowels and into position against adapter. Install torque converter housing to adapter screws and lockwashers, draw down evenly and tighten 25 to 50 foot-pounds torque. Install transmission.

70. CORRECTING TORQUE CONVERTER HOUSING RUNOUT

CAUTION

Before the following procedures are followed, it is essential that torque converter impeller hub runout be within .004 inch total indicator reading.

a. Torque Converter Housing Bore Runout

Mount Tool C-3461 shown in Figure 78, inside converter with ears of washer behind converter pump drive lugs. The square end of bolt can be held with a wrench as nut is tightened. Dial indicator set, Tool C-3339, can then be attached to square end of bolt. Adjust follower of indicator so that it bears on housing bore. Rotate converter by prying with a screwdriver on

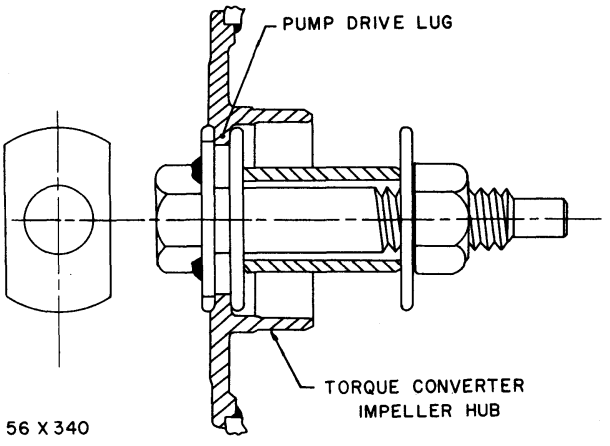

Fig. 78—Tool C-3461 Installed in Torque Converter Hub

ring gear teeth, using side of housing oil drain hole as a fulcrum. If total indicator reading is greater than .010" remove converter housing, torque converter and adapter plate. Force out housing dowel pins with a drift pin. Reinstall adapter plate, torque converter and converter housing (without the dowels) leaving all but two opposite bolts loose. These bolts should be tight enough to prevent housing from moving when it is used as a fulcrum to rotate the converter. Rotate the converter noting location and magnitude of maximum (shortest radius) and minimum (longest radius) indicator reading. Rotate converter until indicator is on "minimum (or longest radius) points." Loosen (slightly) two bolts mentioned above. Using rubber mallet, drive housing half the total indicator reading, observed above, by striking housing at a point adjacent to indicator.

Tighten all bolts 45-50 foot-pounds torque and rotate converter, noting the total indicator reading. If total indicator reading is more than .010" repeat above procedure.

When the bore is properly aligned proceed to ream out two dowel holes using following reamers as indicated:

.505" Hand reamer
.510" Hand reamer
.515" Hand reamer
.520" Hand reamer
.535" Hand reamer
.53125" Hand reamer
.53125" Machine reamer

The machine reamer has no lead-in taper and must be used to produced a straight hole in upper dowel pin hole since this is a blind hole Therefore, the machine reamer can be omitted in the above sequence when reaming lower dowel pin (through) hole if the .53125 reamer is brought far enough (¾") through hole to overcome lead in taper. **Be sure to clean hole and reamer at frequent intervals and use oil as a lubricant.**

Press oversize dowel pins No. 1639173 (.533/.534" OD) into upper and lower dowel holes.

b. Housing Rear Face Runout

Relocate indicator so that it is bearing on rear face of converter housing and rotate converter as outlined in Paragraph 70.

If total indicator reading is greater than .005" note magnitude of total indicator reading and location of lowest indicator reading (ie, the point where indicator arm or follower is extended the furthest).

Install a shim over one or more of transmission to housing bolts so that shim will lie between transmission and housing when two are bolted together. For correct location and thickness of the shim consult following table:

Location of Housing Face Low Point	Location of Shim	Total Indicator Reading Observed on Housing Face	Total Shim Thickness
(a) Near one of the lower trans. to housing bolt holes.	(a) Place shim on bolt which will enter this hole.	(a) 1) .005" to .010" 2) .010" to .015" 3) .015" to .020"	(a) 1) .013" 2) .020" 3) .026"
(b) Near one of the upper trans. to housing bolt holes.	(b) Place shim on bolt which will enter this hole.	(b) 1) .005" to .010" 2) .010" to .015" 3) .015" to .020"	(b) 1) .014" 2) .021" 3) .029"

Location of Housing Face Low Point	Location of Shim	Total Indicator Reading Observed on Housing Face	Total Shim Thickness
(c) Between the two lower trans. to housing bolt holes.	(c) Place shims on both bolts which will enter these holes.	(c) 1) .005″ to .010″ 2) .010″ to .015″ 3) .015″ to .020″	(c) 1) .010″ 2) .015″ 3) .020″
(d) Between the two upper trans. to housing bolt holes.	(d) Place shims on both bolts which will enter these holes.	(d) 1) .005″ to .010″ 2) .010″ to .015″ 3) .015″ to .020″	(d) 1) .003″ 2) .012″ 3) .016″
(e) Between the upper and lower trans. to housing bolt holes.	(e) Place shims on both bolts which will enter these holes.	(e) 1) .005″ to .010″ 2) .010″ to .015″ 3) .015″ to .020″	(e) 1) upper .010″ lower .014″ 2) upper .015″ lower .020″ 3) upper .020″ lower .027″

The shims released for correcting the runout of the converter with respect to the crankshaft can be used in the above procedure. These shims are available under the following part number:

PART NUMBER	THICKNESS
1610442	.002″
1610443	.003″
1610444	.005″

The above shims, when used in combination, will satisfy any of the required shim thickness listed in the table.