

**GROUP 21**

**TRANSMISSION (TORQUE CONVERTER)**

**HEAVY DUTY THREE SPEED MANUAL TRANSMISSION  
MODELS TC-1, TC-2**

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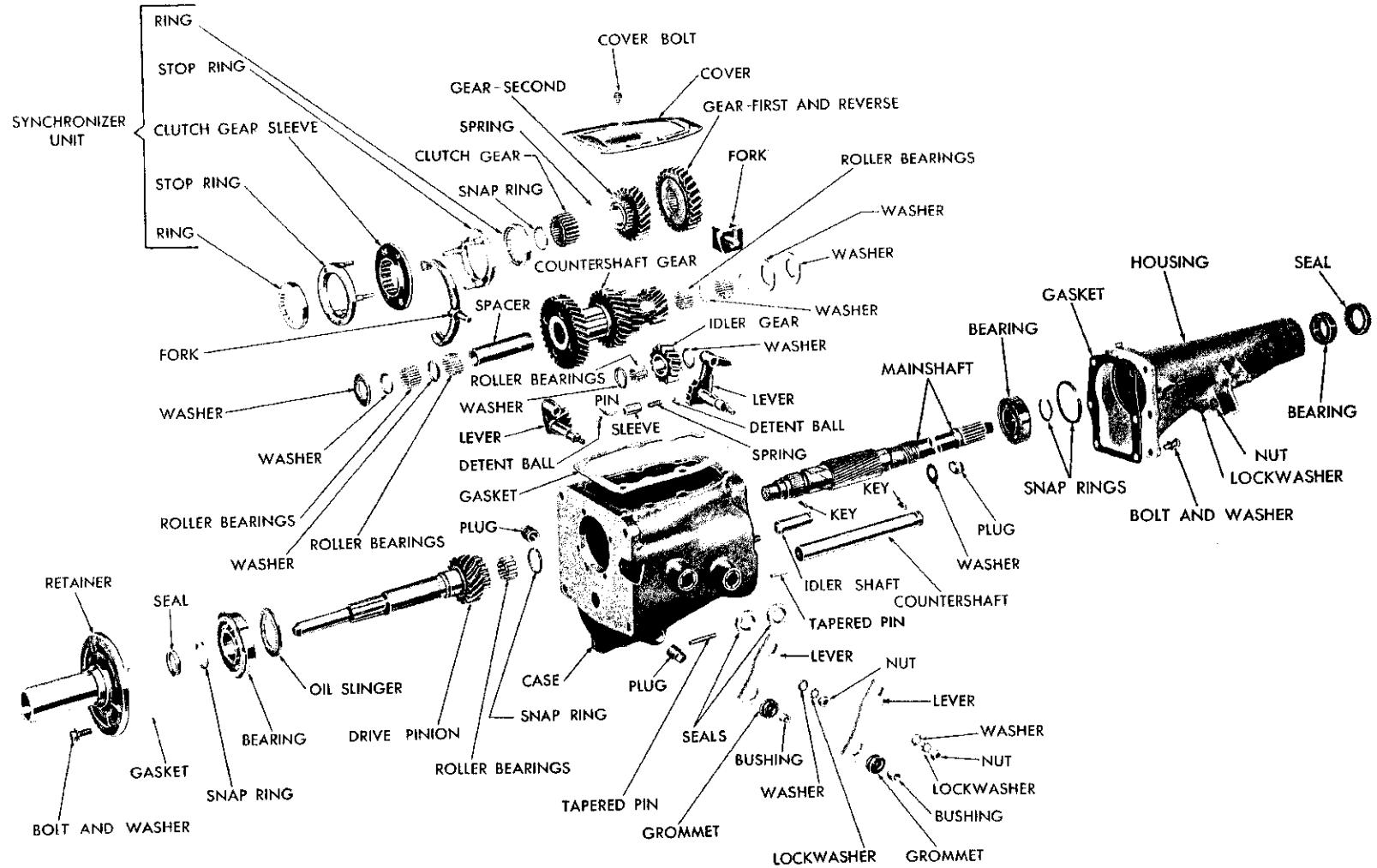


Fig. 1—Transmission (Disassembled View)

**SPECIFICATIONS**

**HEAVY DUTY THREE SPEED MANUAL TRANSMISSION**

**RATIO**

First .....	2.55 to 1
Second .....	1.49 to 1
Direct .....	1.00 to 1
Reverse .....	3.34 to 1

**LUBRICANT**

Capacity .....	4¼ Pints
Type .....	Automatic Transmission Fluid Type "A" Suffix "A"
Gears .....	Helical

**TOLERANCES**

Clutch Housing .....	.006 inch Maximum
Clutch Housing Bore Runout .....	.008 inch Maximum
Countershaft End Play .....	.007 to .012 inch
Thrust Washers .....	.057 to .059 inch—.062 to .064 inch
Second Speed Gear End Play .....	.002 to .011 inch

**TORQUEFLITE TRANSMISSION**

TYPE .....	Automatic Three Speed with Torque Converter
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**TORQUE CONVERTER**

Diameter .....	11¾ inches
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**OIL CAPACITY—TRANSMISSION AND TORQUE CONVERTER**

(Complete Fill) .....	19 pts. Automatic Transmission Fluid Type "A", Suffix "A"
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COOLING METHOD .....	Water-Heat Exchanger
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LUBRICATION .....	Pump (Rotor Type)
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**CLUTCHES**

Number of Front Clutch Plates .....	4
Number of Front Clutch Discs .....	4
Number of Rear Clutch Plates .....	3
Number of Rear Clutch Discs .....	4

**GEAR RATIOS**

1—Low .....	2.45 to 1
2—Second .....	1.45 to 1
D—Drive .....	1 to 1
R—Reverse .....	2.20 to 1
N—Neutral .....	—

**FRONT-REAR PUMPS**

Type .....	Gear (Rotary)
End Clearance .....	.001 to .0025 inch

DRIVE TRAIN END PLAY .....	.030 to .070 inch
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**CLUTCH PLATE CLEARANCE**

Front Clutch .....	.024 to .123 inch
Rear Clutch .....	.026 to .054 inch

## SPECIFICATIONS—(Continued)

## SNAP RINGS

Front and Rear Clutches	
Rear Snap Ring (Selective).....	.060 to .062 inch .074 to .076 inch .088 to .090 inch
Output Shaft Bearing.....	.086 to .088 inch

## THRUST WASHERS

Reaction Shaft Support to Front Clutch Retainer (Selective).....	.043 to .045 inch (Natural) .061 to .063 inch (Green) .084 to .086 inch (Red)
Output Shaft to Input Shaft.....	.062 to .064 inch
Sun Gear Driving Shell Thrust Plate (Steel).....	.034 to .036 inch
Rear Planetary Gear to Driving Shell.....	.062 to .064 inch
Front Planetary Gear to Annulus Gear Support.....	.062 to .064 inch
Front Annulus Gear Support to Driving Shell.....	.062 to .064 inch
Front Clutch Retainer to Rear Clutch Piston Retainer.....	.061 to .063 inch (Green)

## TORQUE REFERENCE

HEAVY DUTY THREE SPEED MANUAL TRANSMISSION	Foot-Pounds	Inch-Pounds
Front Bearing Retainer Bolts.....		276
Extension Housing Bolts.....	50	
Nuts.....	50	
Gearshift Operating Lever Nuts.....		180
Mainshaft Flange Nut.....	175	
Transmission to Clutch Housing Bolts.....	50	
<b>TORQUEFLITE TRANSMISSION</b>		
Kickdown Band Adjusting Screw Lock Nut.....	29	
Kickdown Lever Shaft Plug.....		150
Reverse Band Adjusting Screw Lock Nut.....	35	
Cooler Line Fitting.....		75
Control Cable Adjusting Wheel Bolt.....		40
Converter Drain Plug.....	14	
Converter Drive Plate to Crankshaft Bolt.....	55	
Converter Drive Plate to Torque Converter Bolt.....		270
Extension Housing to Transmission Case Bolt.....	24	
Extension Housing to Insulator Mounting Bolt.....	35	
Extension Housing—Crossmember to Frame Bolt.....	75	
Front Oil Pump Housing to Transmission Case Bolt.....		150
Governor Body to Support Bolt.....		100
Neutral Starter Switch—Initial Contact + ¼ to ¾ Turn.....	60 Max.	
Oil Filler Tube Bracket Bolt.....		150
Oil Pan Bolt.....		150
Oil Pan Drain Plug.....	24	
Overrunning Clutch Cam Set Screw.....		40
Output Shaft Flange Nut.....	175	

**TORQUE REFERENCE—(Continued)**

	Foot Pounds	Inch Pounds
Parking Lock Cable Locking Bolt.....		10
Parking Lock Cover Bolt.....		150
Pressure Test Take-off Plug.....		75
Reaction Shaft Support to Front Oil Pump Bolt.....		150
Rear Oil Pump Cover Bolt.....		140
Transmission to Engine Bolt.....	25-30	
Valve Body Screw.....		28
Valve Body to Transmission Case Bolt.....		100
Speedometer Cable Clamp Screw.....		150

**HEAVY DUTY THREE SPEED MANUAL TRANSMISSION  
MODELS TC-1, TC-2**

The heavy duty three speed manual transmission (Figs. 1 and 2) is of the synchromesh type with helical cut gears to provide silent operation. The countershaft gear is in constant mesh and is supported by

two rows of needle type bearings at each end. The mainshaft is supported by ball bearings at each end of the extension housing. The speedometer drive gear is integral with the mainshaft.

**SERVICE PROCEDURES**

**1. REMOVING TRANSMISSION  
(From the Vehicle)**

- (1) Drain the lubricant from the transmission.
- (2) Disconnect the propeller shaft, speedometer cable and housing and the gearshift control rods.

**CAUTION:** Remove the speedometer cable (pinion comes out with the cable) with hand so that housing is not crushed.

- (3) Remove the back-up light switch leads (if so equipped).
- (4) Install the engine support fixture Tool C-3806, mounting hooks firmly into the holes in the side frame members with the support ends up against the underside of the oil pan flange.

(5) Adjust the fixture to support the weight of the engine, then raise the engine slightly and remove the rear support crossmember attaching bolts.

(6) Support the transmission, using a suitable jack, remove the bolts that attach the transmission to the clutch housing.

(7) Slide the transmission rearward until the pinion shaft clears the clutch disc before lowering the transmission. (This precaution will avoid damaging the clutch disc.)

(8) Lower the transmission and remove from under the vehicle.

(9) Mount the transmission in repair stand DD-1014.

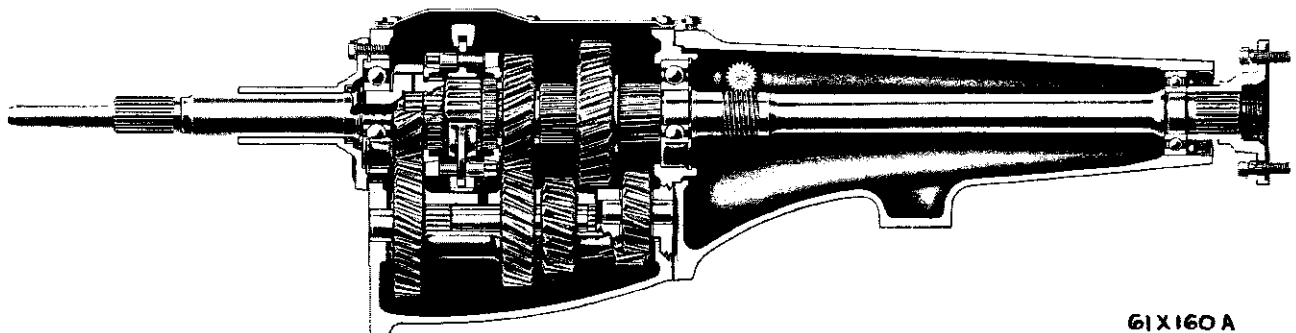


Fig. 2—Transmission (Sectional View)

**2. DISASSEMBLY OF THE TRANSMISSION COMPONENT PARTS (Fig. 1)**

**Extension Housing**

- (1) Using flange holding Tool C-3281, remove the flange retaining nut and washer.
- (2) If necessary, attach puller Tool C-452, and remove the flange assembly.
- (3) Remove the bolts and one stud nut that attaches the extension housing to the transmission case. Slide the extension off the main shaft. Discard the gasket. Remove the oil seal, using Tool C-748.
- (4) Remove the extension housing and the mainshaft bearing.
- (5) Remove the bolts that attach the cover to the case. Remove the cover and discard the gasket.

**Drive Pinion**

- (1) Remove the bolts that attach the main drive pinion bearing retainer, then slide the retainer off the pinion. Discard the gasket and drive the seal out of the retainer, using a suitable drift.
- (2) When removing the drive pinion and the bearing assembly from the transmission case, slide the synchronizer front inner stop ring from the short splines on the pinion as the assembly is being removed from the case, as shown in Figure 3.
- (3) Remove the snap ring which locks the main drive pinion bearing on the pinion shaft, using a snap ring pliers. Carefully press the pinion shaft out of the bearing, using an arbor press. Remove the oil slinger. (Fig. 4.)
- (4) Remove the 15 rollers from the cavity in the end of the drive pinion gear, using a hook.

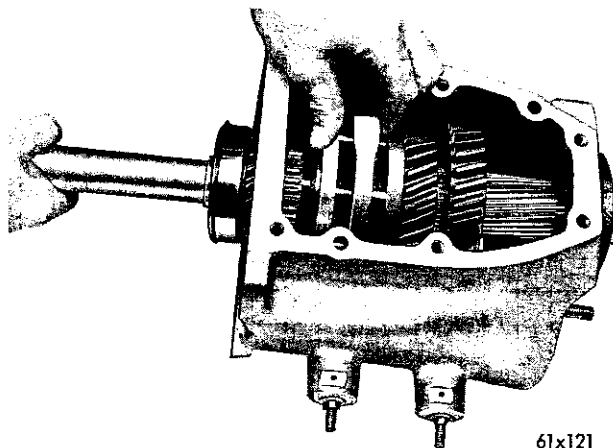


Fig. 3—Removing the Drive Pinion Assembly

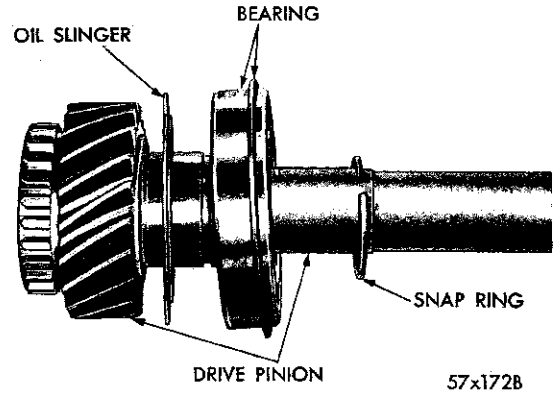


Fig. 4—Drive Pinion Assembly

**Mainshaft**

- (1) Remove the mainshaft rear bearing snap ring from the groove in the mainshaft rear bearing bore in the case.
  - (2) Slide the mainshaft and rear bearing assembly to the rear, until the rear bearing is out of the case.
  - (3) Remove the synchronizer assembly (Fig. 5) from the mainshaft and out of the case.
  - (4) Remove the second and third speed shift fork.
  - (5) Remove the synchronizer clutch gear snap ring using Tool C-484.
  - (6) Remove the synchronizer clutch gear, second speed gear and first and reverse sliding gear from the mainshaft.
- NOTE:** If the synchronizer clutch gear cannot be removed easily from the mainshaft, position the low and reverse fork and sliding gear to the rear of the case and, using a plastic hammer, gently tap the mainshaft back out of the synchronizer clutch gear.
- (7) Remove the mainshaft and bearing out through the rear of the case (Fig. 6).

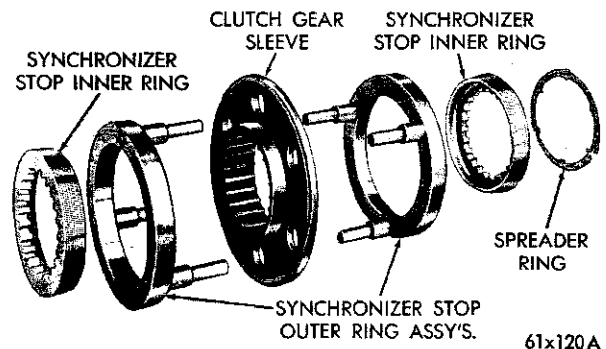


Fig. 5—Synchronizer Assembly

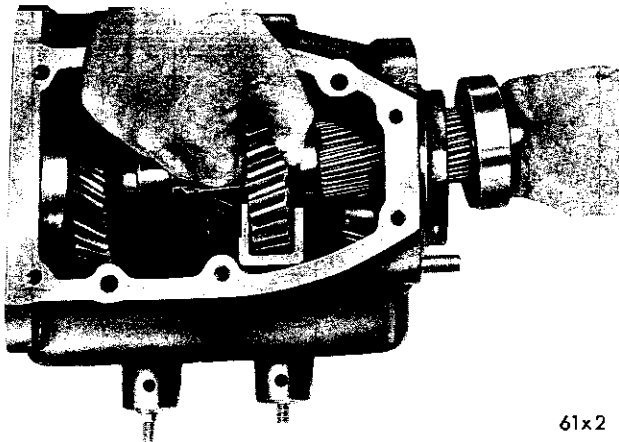


Fig. 6—Removing the Mainshaft Assembly

(8) Remove the low and reverse shift fork from the case.

**Countershaft**

**CAUTION:** Do not drive the countershaft toward the front of the transmission case.

(1) Using the countershaft bearing arbor Tool C-3834, drive the countershaft toward the rear of the case until the small key can be removed from the countershaft.

(2) Drive the countershaft the remaining way out of the case, keeping arbor tight against the end of the countershaft to prevent loss of the roller bearings.

(3) Remove the cluster gear, and the thrust washers from the case.

(4) Remove the (88) roller bearings, (4) spacer rings and the center spacer from the cluster gear.

**Reverse Idler Gear**

(1) Using a blunt drift, drive the reverse idler shaft toward the rear of the case far enough to remove the key from the shaft.

(2) Drive the shaft the remaining way out of the case, and remove the idler gear and the bearing assembly.

(3) Remove the thrust washers and the 22 roller bearings.

**Gearshift Mechanism**

**NOTE:** This operation need only be done if the seals are leaking.

(1) If necessary, remove both of the lever shaft seals, using Tool C-3638. (Fig. 7.)

(2) Using a small punch, remove the low and reverse gear lever shaft tapered lock pin by driving it toward the top of the transmission case.

(3) Remove the second and third gear lever shafts in the same manner.

(4) Remove the lever shafts from the transmission case, taking care not to lose the spring loaded detent balls.

(5) Remove the interlock sleeve, spring pin and detent balls.

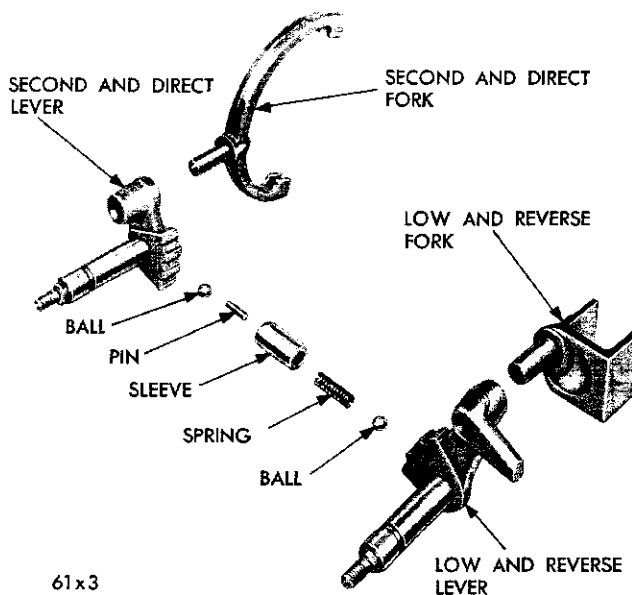


Fig. 7—Gearshift Forks and Shafts

**Cleaning and Inspection**

(1) Before inspecting, wash each part thoroughly in a suitable solvent, then dry. Clean mainshaft, drive pinion shaft end bearings. Dry by applying compressed air directly through the bearing. **Never spin bearings with compressed air.** Apply a little oil and turn the bearing several times by hand.

(2) Inspect the bearings for looseness or noise by comparing with a new bearing. (Be sure to wash the lubricant from the new bearing, then apply a little oil before making the comparison test.)

(3) Inspect the fit of the bearings on their respective shafts and in the bores.

(4) Inspect the bearings, shaft, and case for wear. If installation of a new bearing does not correct conditions, install a new shaft or repair case as required.

(5) Inspect the mainshaft splines for galling or scoring. Inspect bearing mounting surfaces and snap ring groove. Slight nicks or burrs can be stoned off.

Replace the damaged parts.

(6) Inspect the gear teeth and threads on the inner synchronizer rings and synchronizer clutch gear sleeve. If there is evidence of chipped or excessively worn teeth, replace the part. Make sure the synchronizer clutch sleeve slides freely on the clutch gear.

(7) Inspect the pins of the outer synchronizer stop ring assembly for straightness and tightness. Replace stop ring if pins are bent or loose.

(8) Replace the countershaft cluster gear if any of its gear teeth are broken, chipped or excessively worn. Small nicks or burrs can be stoned off.

(9) Inspect the roller bearing and countershaft for pits and scoring.

(10) Inspect condition of thrust washers, and replace if excessive wear is evident.

(11) Inspect the clutch teeth of the drive pinion. If excessively worn, broken or chipped, install a new pinion.

(12) Inspect the mainshaft pilot roller bearings in drive pinion for pitting or scoring. If either of these conditions exist, replace all roller bearings.

(13) Inspect the case at the gearshift bosses and operating levers. Replace rubber lip seals in the case, if worn or torn.

(14) Inspect the interlock sleeve for free movement in its bore. Examine interlock balls for corrosion. If operating lever shaft detents show signs of wear, replace shaft. Inspect shift fork for free movement.

(15) Inspect the general condition of the transmission case, extension housing and the front bearing retainer.

(16) Inspect all the threaded holes and plugs for stripped or pulled threads.

(17) Inspect the case for small cracks and sand holes.

(18) Inspect all mating and gasket surfaces for roughness and scratches.

### 3. ASSEMBLY OF THE TRANSMISSION (Refer to Figs. 1 and 2)

#### Drive Pinion and Bearing Assembly

(1) Place the oil slinger on the main drive pinion with the offset outer portion next to the drive pinion teeth (Fig. 6).

(2) Place the main drive pinion bearing on the pinion shaft with the outer snap ring away from the pinion gear.

(3) Press the bearing into position so it is seated

firmly against the oil slinger and pinion gear.

(4) Install the bearing retaining snap ring on the pinion shaft, using snap ring pliers Tool C-3301. Be sure the snap ring is seated in its groove. (The snap ring should be selected to eliminated end play).

(5) Coat the 15 pilot roller bearings with heavy lubricant and install them in the cavity at the rear of the main drive pinion.

#### Countershaft

(1) Place the bearing spacer in the center of the bore in the cluster gear and use arbor Tool C-3834 to assist in assembling the roller bearings.

(2) Install a row of 22 roller bearings next to one end of the spacer, using heavy lubricant to help hold them in position.

(3) Place one of the 4 bearing spacer rings next to the row of rollers, and install another row of 22 roller bearings next to the spacer ring.

(4) Install another spacer ring at the other end of the second row of roller bearing.

(5) At the opposite end of the cluster gear bore, install the remaining spacer rings and roller bearings in the same sequence, as listed in steps (2), (3) and (4).

(6) With a small amount of lubricant to hold it in place, install the front thrust washer on the arbor at the front end of the cluster gear, with the tabs outward.

(7) Install the tabbed rear thrust washer on the arbor against the rear of the cluster gear with the tabs positioned in the grooves provided in the cluster gear.

(8) Install the remaining rear thrust washer plate on the rear of the gear and arbor with the step in the washer facing upward as viewed from the rear.

**NOTE: The rear thrust washer must be installed with step on O.D. facing clockwise, as viewed from the rear, in order to engage ledge on inside rear of case, thus preventing driving the shaft forward until the key seats in the recess.**

(9) Align the tabs of the front thrust washer vertically to index with the notches in the transmission case, and with the step in the rear thrust washer positioned upward. Position the cluster gear and arbor assembly in the transmission case. Make sure the thrust washers are not dislodged from the arbor, and engage the thrust washer tabs in the case grooves, while sliding the assembly into position.

(10) Measure the end play of the countershaft. The end play should be .007 to .012 inch. The thrust washers are available in two thicknesses.



(11) Using the countershaft and a soft hammer, drive the arbor forward out of the cluster gear and through the bore in the front of the case. Before driving the countershaft all the way into the case, be sure keyway is positioned in line with the key recess provided in the rear of the case. Insert the shaft key and continue to drive the countershaft forward in the case until the key is bottomed in the recess.

### Reverse Idler Gear

(1) Position an arbor Tool C-464 in the reverse idler gear and, using heavy lubricant install the 22 roller bearings in the gear.

(2) Place the front and rear thrust washers at each end of the reverse idler gear, and position the assembly in the transmission case with the chamfered end of the gear teeth toward the front.

(3) Insert the reverse idler shaft into the bore at the rear of the case with keyway to the rear, pushing the arbor toward the front of the transmission.

(4) With the keyway aligned with the recess in the case, drive the shaft forward, inserting the key before the keyway is obscured. Continue driving the shaft forward until the key seats in the recess.

### Gearshift Mechanism

(1) Install two new lever shaft seals in the transmission case, using seal driver Tool C-3650.

(2) Install the 2nd and 3rd speed lever shaft in the bore provided in the transmission case.

(3) Install the 2nd and 3rd speed lever shaft lock pin in the hole in the case boss, (after coating with a suitable sealer) starting the pin at the top of the hole and driving it downward. While the lever shaft lock pins must be driven in firmly to prevent leakage or loss of the pin, some caution must be exercised to avoid driving the pin in too tightly, causing distortion or mushrooming of the pin. This could result in much difficulty if it is necessary to remove the pin at a later date.

(4) Place the interlock parts in position in the case in the following order: ball, sleeve, spring, pin and ball.

(5) While using the detent ball installer Tool C-3765, as shown in Figure 8, to depress the detent ball against the spring tension, push the low and reverse lever shaft firmly into position so it engages the detent ball.

(6) Remove the detent ball installing tool.

(7) Install the low and reverse lever shaft lock

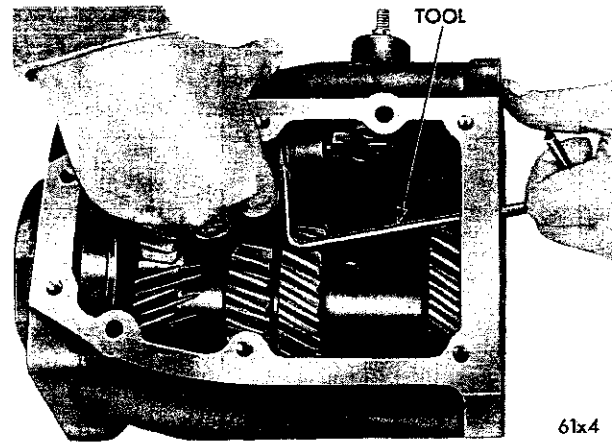


Fig. 8—Installing the Detent Balls (Using Tool C-3765)

pin in the case, driving it down firmly from the top using the caution as stated above.

(8) Place the low and reverse fork in the lever shaft, with the offset toward the rear of transmission (Fig. 8).

### Mainshaft

(1) While holding the low and reverse sliding gear in position in the fork, with the hub extension to the rear, insert the mainshaft with the rear bearing through the rear of the case and into the sliding gear.

(2) Place the synchronizer stop ring spring, and then the rear stop ring on the synchronizer splines of the 2nd speed gear. Install the 2nd speed gear on the mainshaft.

(3) Install the synchronizer clutch gear on the mainshaft with the shoulder to the front.

(4) Select the thickest synchronizer clutch gear snap ring that can be used, and install it in the mainshaft groove. Make certain the ring is bottomed all the way around in the groove.

**NOTE:** Snap rings come in four different thicknesses (thin, medium, thick and extra thick). Use of the thickest ring possible eliminates end play at this point and provides more positive gear engagement in direct drive.

(5) Measure the clearance between the clutch gear and the 2nd speed gear. The clearance should be .004 to .011 inch. End play in excess of .011 inch may cause the 2nd speed gear to "jump out" of gear.

(6) Hold the synchronizer clutch gear sleeve and two outer rings together with pins properly entered in the holes in the clutch gear sleeve and with the clutch gear sleeve engaged in the groove of the 2nd and 3rd speed shift fork, position the fork in the

2nd and 3rd speed lever shaft.

(7) While holding the synchronizer parts and fork in position, slide the mainshaft forward, entering the synchronizer clutch gear into the clutch gear sleeve and at the same time entering the mainshaft rear bearing in the case bore.

**NOTE: If the synchronizer parts are not positioned as described in steps 6 and 7, it will not be possible to place them in position after mainshaft is fully in position, due to interference with countershaft drive gear.**

(8) While continuing to hold the synchronizer parts in position, tap the mainshaft forward until the rear bearing bottoms in the case bore.

(9) Install the mainshaft rear bearing snap ring in place in the groove in the case bore.

#### Drive Pinion

(1) Install the new seal in the retainer using Tool C-3789 until it bottoms on the seat of the counter-bore. Synchronizer front inner ring must be positioned as outlined in steps 2 and 3 while installing the drive pinion, since it will not clear the countershaft drive gear teeth when attempting to install the drive pinion with the inner ring installed on the drive pinion splines.

(2) Place the synchronizer front inner ring in position in the front outer ring, and enter the main drive pinion through the case bore.

(3) Engage the splines on the rear of the pinion with the inner stop ring, and tap the drive pinion into the transmission case until the outer snap ring on the pinion bearing is against the transmission case.

(4) Place the drive pinion bearing retainer, without a gasket, over the pinion shaft, and against the transmission case. While holding the retainer with hand pressure against the transmission case, measure the clearance between the retainer and case, using a feeler gauge.

(5) Select a gasket .003 to .005 inch thicker than the clearance found. This eliminates end play of the front bearing in the transmission case and also eliminates the distortion of the bearing outer race due to excess pressure.

(6) Install and tighten the front bearing retainer attaching bolts to 276 inch-pounds torque.

#### Extension Housing

(1) Install a new seal in the extension housing, using Tool C-3837.

(2) Install the extension housing. Tighten the mounting bolts and nuts to 50 foot-pounds torque.

(3) Install the mainshaft flange. Install the washer and nut and tighten to 175 foot-pounds torque, using the flange holding Tool C-3281.

(4) Install the drain plug in the transmission case.

(5) Install the gearshift operating levers with a flat washer and lockwasher under each nut, and tighten to 180 inch-pounds torque.

(6) Install the plug or back-up light switch (if so equipped), with gasket, tightening securely.

(7) Install the speedometer cable and drive gear pinion.

#### 4. INSTALLATION OF THE TRANSMISSION (In the Vehicle)

A measurement of the clutch housing bore and the face alignment should be made before installation. Refer to "Clutch" Group 6 for procedure. An old transmission drive pinion shaft may be used to measure the clutch disc alignment.

Place a small amount of short fibre wheel bearing lubricant around the inner end of the drive pinion shaft pilot bushing. A sufficient amount will be left at this location after pressing the excess out of the crankshaft cavity. Do not lubricate the bushing or the end of the transmission pinion shaft, the clutch disc splines or clutch release levers.

(1) Remove the transmission from the repair stand and install the rear crossmember and support, then roll transmission under the vehicle using a suitable jack.

(2) Raise the transmission until the main drive pinion is centered in the clutch housing bore.

(3) Roll the transmission slowly forward until the pinion shaft enters the clutch disc. Turn the pinion shaft until the splines are aligned, then push the transmission forward until seated against the clutch housing.

**NOTE: Do not allow the transmission to "hang" after the pinion has entered the clutch disc.**

(4) Install the transmission attaching bolts and tighten to 50 foot-pounds torque.

(5) Using a pointed drift, align the crossmember bolt holes and install the attaching bolts. Tighten to 50 foot-pounds torque.

(6) Remove the engine support fixture and disengage the hooks from the holes in the frame side rails.

(7) Install the back up light switch wires (if so equipped).

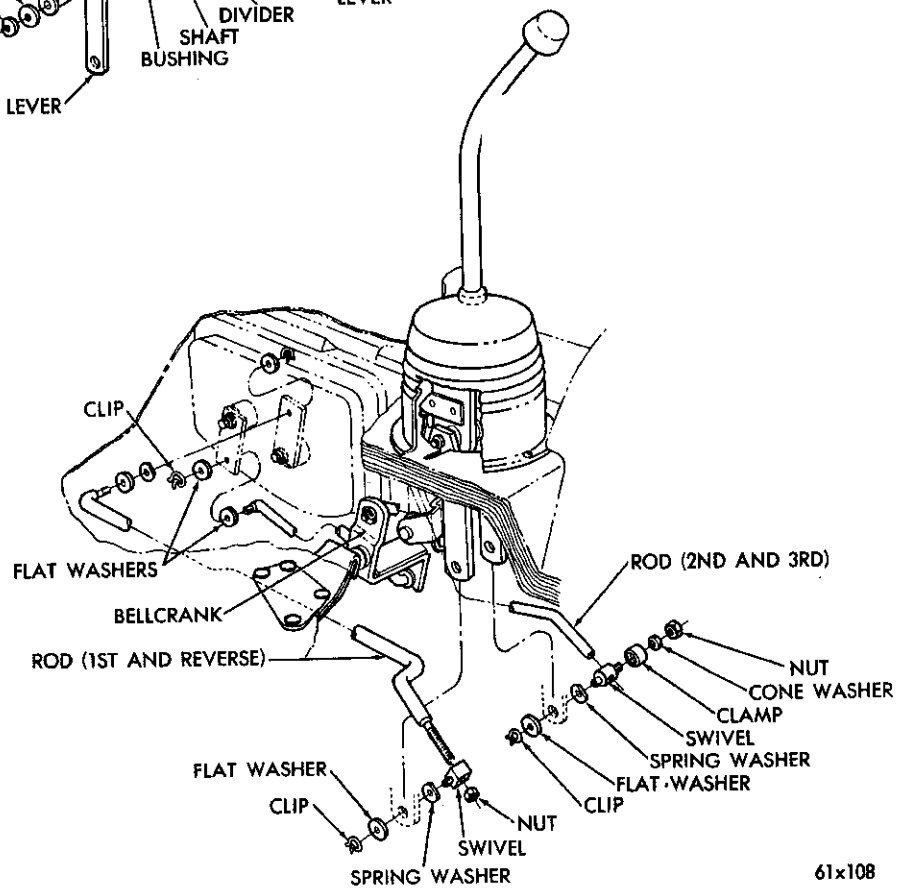
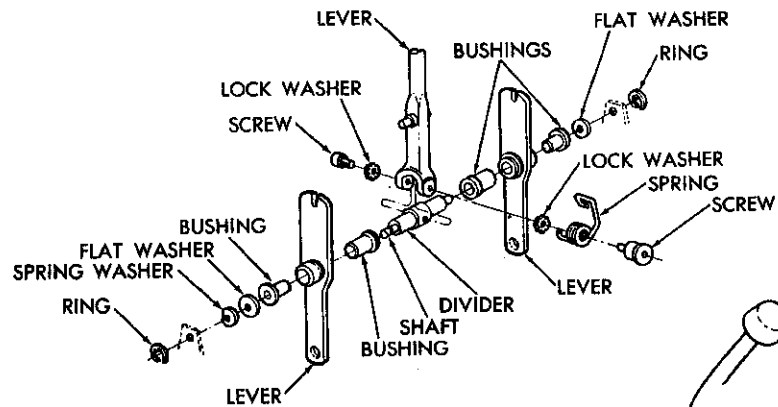
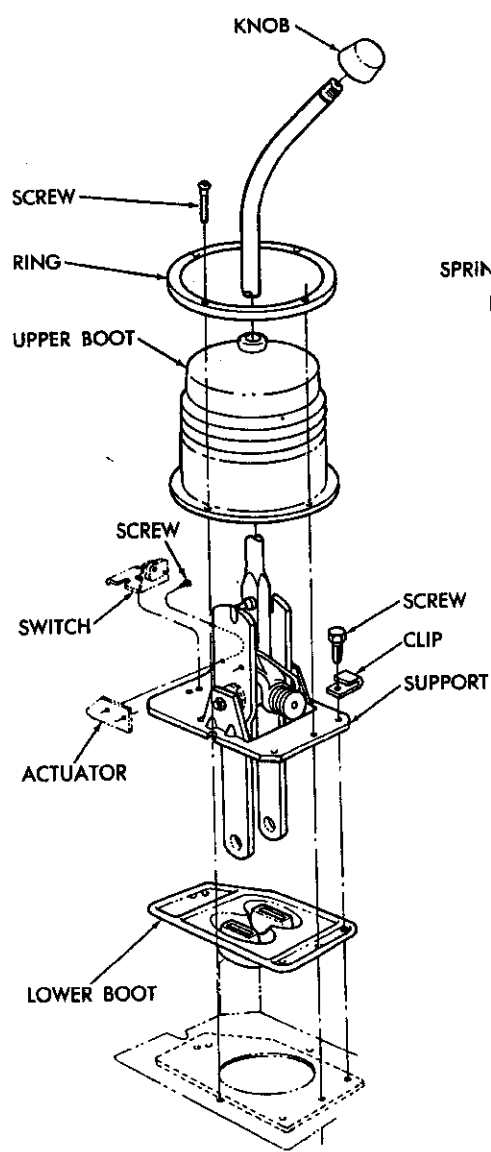


Fig. 9—Gearshift Controls

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## 21-12 TRANSMISSION

(8) Reconnect the speedometer cable, the gearshift control rods, and the propeller shaft.

(9) Fill the transmission with 4½ pints of lubricant.

(10) Road test the vehicle, making sure the transmission shifts smoothly and operates quietly.

(11) If the shaft linkage requires adjustment, refer to the procedure outlined in Paragraph "Gearshift Linkage Adjustments."

### 5. GEARSHIFT ASSEMBLY

#### Removal

(1) Disconnect the first and reverse, second and third shift rods from the shift levers. (Note position of the wavewashers.)

(2) Remove the screws that attach the upper boot retainer to the floor pan. Remove the retainer, and slide the boot up on the hand lever to expose the gearshift mounting bolts.

(3) Remove the bolts that attach the gearshift assembly to the floor pan.

(4) Remove the gearshift assembly (and lower boot) from the vehicle. Slide the lower boot off the shift levers.

(5) Using a ¼-inch Allen wrench, remove the torsion spring retaining screw. Slide the starwasher out from under the spring.

(6) Using a screwdriver, pry the lower end of the spring out of its hole in the divider shaft, then disengage the upper loop of the spring from the shift lever.

(7) Again using an Allen wrench, remove the remaining screw and starwasher that holds the shifter fork to the divider. Slide the gearshift lever fork from the divider shaft and the shift levers.

(8) Remove the lock ring from each end of the divider shaft, and push the divider shaft out of the gearshift support.

(9) Pull the levers, dividers and bushing assembly from the gearshift support.

**NOTE:** The flatwashers between the outer bushings and gearshift support will drop out at this time.

(10) Separate the levers from the divider and remove the nylon bushings.

Inspect all the parts for wear or damage and install new parts if required. At reassembly, lubricate all moving parts that pivot, with lubriplate, also the cross-over pin.

#### Assembly (Fig. 9)

(1) Slide each lever on the divider with the nar-

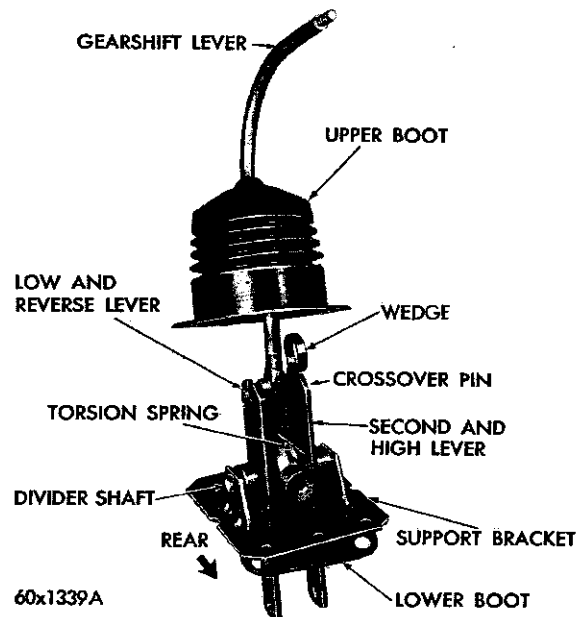


Fig. 10—Positioning Crossover Pin

row shoulder (and nylon bushing bearing surface) down against the shoulder.

(2) Slide the outer bushings into position against the outer shoulders, then place the lever assembly in position in the gearshift support bracket.

(3) Slide the spacer washers (spring washer on 1st reverse side) between the support bracket and the nylon bushing shoulders, then align the divider.

(4) Slide the divider shaft into the support through the shaft lever assembly and out of the support of the other side, far enough to install the retaining lock rings. Install the retaining rings.

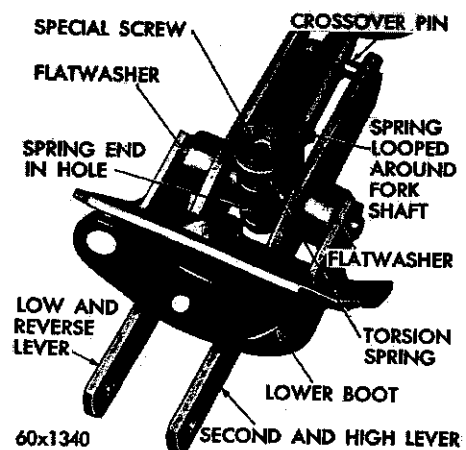


Fig. 11—Lever Torsion Spring (Installed)

(5) Position the shift fork screw holes (in the divider, parallel with the center line of the divider shaft). Slide the gearshift fork and shaft down into position on the divider shaft with the gearshift knob facing to the rear and the three holes in the support plate (Fig. 10).

(6) Install the shift fork retaining screw and lock-washer (front). Do not tighten at this time.

(7) Engage the loop of the torsion spring with the gearshift fork shaft, and slide the other end into the hole at the bottom of the divider, as shown in Figure 11.

(8) Install the spring retaining screw and lock-washer, tighten both screws securely.

(9) Slide the lower boot up over the shift levers, being sure the screw holes are aligned.

(10) Slide the tool wedge between the second and high lever and the gearshift fork, as described in Paragraph "Gearshift Linkage Adjustments," then install gearshift assembly in the vehicle.

(11) Install the attaching bolts and tighten to 150 inch-pounds torque.

(12) Adjust the linkage. After readjustment has been made, reinstall boot and retainer and secure with screws.

**6. GEARSHIFT LINKAGE ADJUSTMENTS**

(1) Remove the screws that hold the upper boot

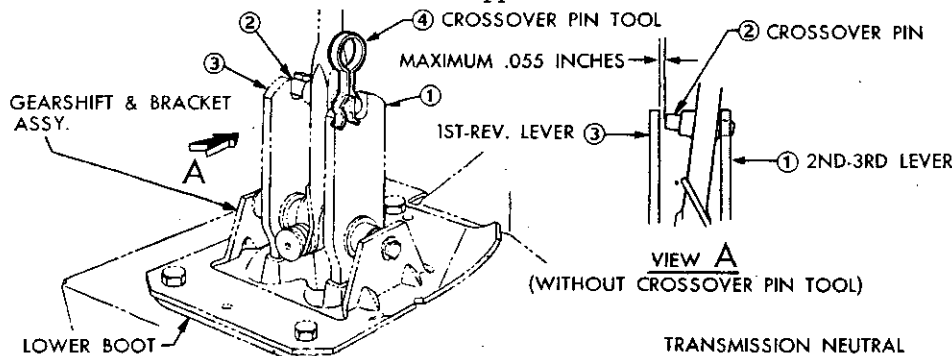


FIG. 1

1. WITH CROSSOVER PIN ENGAGED IN THE 2ND-3RD LEVER, THE GAP FROM CROSSOVER PIN TO 1ST-REV. LEVER SHOULD NOT EXCEED .055 INCHES. (SEE VIEW A.)
2. WITH BOTH GEARSHIFT & BRACKET ASSEMBLY AND LOWER BOOT INSTALLED, CLIP THE CROSSOVER PIN TOOL OVER 2ND-3RD END OF CROSSOVER PIN SO THAT PIN ENGAGES BOTH LEVERS. (SEE FIG. 1.)
3. PRESET THE LENGTH OF THE 1ST-REV. SHIFT ROD, BY ADJUSTING THE SWIVEL, AND INSTALL IT SO THAT THE TRANSMISSION WILL BE IN NEUTRAL AND THE SHIFT LEVERS VERTICAL. (SEE FIG. 2.)
4. INSTALL 2ND-3RD FRONT SHIFT ROD, BELLCRANK, AND 2ND-3RD REAR SHIFT ROD, IN THAT ORDER, AS SHOWN IN FIG. 2. WITH TRANSMISSION IN NEUTRAL, TIGHTEN SWIVEL NUT TO 20 LBS. PER INCH TORQUE.
5. REMOVE CROSSOVER PIN TOOL.

and retaining ring to the floor pan.

(2) Remove the retaining ring and slide the boot up on the gearshift lever far enough to expose the shift mechanism.

(3) Disconnect the first and reverse shift rod by removing the spring clip, flat washer and the wave-washer. Disengage rod from lever.

(4) Disconnect the second and high shift rod by removing the spring clip, flatwasher and the wave-washer. Disengage the rod from the lever.

(5) Place the transmission shift levers in the neutral position and refer to Figure 12 for the linkage adjustment.

**7. TRANSMISSION REAR OIL SEAL**

**Removal and Assembly**

(1) Disconnect the propeller shaft at the transmission flange. Secure the shaft.

(2) Use wrench, Tool C-3281, to hold the mainshaft, while removing the mainshaft flange nut. Remove the mainshaft nut and washer.

(3) Install puller, Tool C-452, on the mainshaft and the flange. Pull the flange from the mainshaft.

**CAUTION: Never use a hammer to drive the flange from the mainshaft as the splines may be damaged.**

(4) Drive the seal from the extension using a suitable chisel.

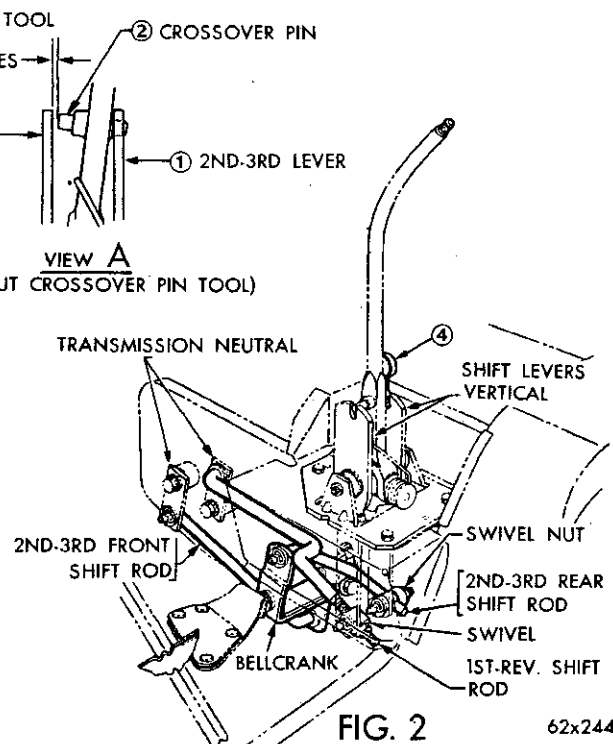


FIG. 2

62x244

Fig. 12—Gearshift Linkage Adjustment

**NOTE: Do not use puller Tool C-748. The mainshaft must not be forced forward.**

(5) When installing a new oil seal, be sure to use special drift, Tool C-3105, which automatically locates the seal in its proper position.

- (7) Reinstall the flange.  
 (8) Install washer (convex side towards nut). Tighten nut to 175 foot-pounds torque.  
 (9) Reconnect the propeller shaft and tighten stud nuts to 30 foot-pounds torque.

## TORQUEFLITE TRANSMISSION

The TorqueFlite Transmission combines a torque converter with a fully-automatic 3-speed gear system (Fig. 1). The torque converter housing and transmission case are an integral aluminum casting. The transmission consists of two multiple disc clutches, an overrunning clutch, two servos and bands, and two planetary gear sets to provide three forward ratios and a reverse ratio. The common sun gear of the planetary gear sets is connected to the front clutch by a driving shell which is splined to the sun gear and to the front clutch retainer. The hydraulic system consists of a front and rear pump, and a single valve body which contains all of the valves except the governor valve.

Venting of the transmission is accomplished by a drilled passage through the upper part of the front oil pump housing.

The torque converter is attached to the crankshaft through a flexible driving plate. Cooling of the converter is accomplished by circulating the transmission fluid through an oil-to-water type cooler, located in the radiator lower tank. The torque converter assembly is a sealed unit which cannot be disassembled. Dirt or other foreign material may be removed by flushing.

The transmission fluid is filtered by means of an external fluid filter "Disposable Type", located in the cooler to transmission return line. The filter has an integral relief valve, which permits fluid to bypass the filter if the element becomes clogged.

Engine torque is transmitted to the torque converter then, through the input shaft to the multiple disc clutches in the transmission. The power flow depends on the application of the clutches and bands. Refer to "Clutch Engagement and Band Application Chart."

### 1. HYDRAULIC CONTROL SYSTEM

Figures 2 through 9 shows the position of the various valves with color coded passages to indicate those under hydraulic pressure for all operations of the transmission.

The hydraulic control system makes the transmission fully automatic, and has four important func-

tions to perform. In a general way, the components of any automatic control system may be grouped into the following basic groups:

The pressure supply system, the clutches and band servos, the pressure regulating valves and the flow control valves.

Taking each of these basic groups or systems in turn, the control system may be described as follows:

#### Pressure Supply System

The pressure supply system consists of a front pump driven by the engine through the torque converter, and a rear pump driven by the transmission output shaft.

#### Pressure Regulating Valves

The pressure regulating valves consist of a regulator valve which controls line pressure at a value dependent on throttle opening.

The torque converter control valve maintains torque converter operating pressure and transmission lubricating pressure.

The governor valve transmits regulated pressure to the transmission (in conjunction with throttle pressure) to control upshift and downshift speeds.

The throttle valve transmits regulated pressure to the transmission (in conjunction with governor pressure) to control upshift and downshift speeds.

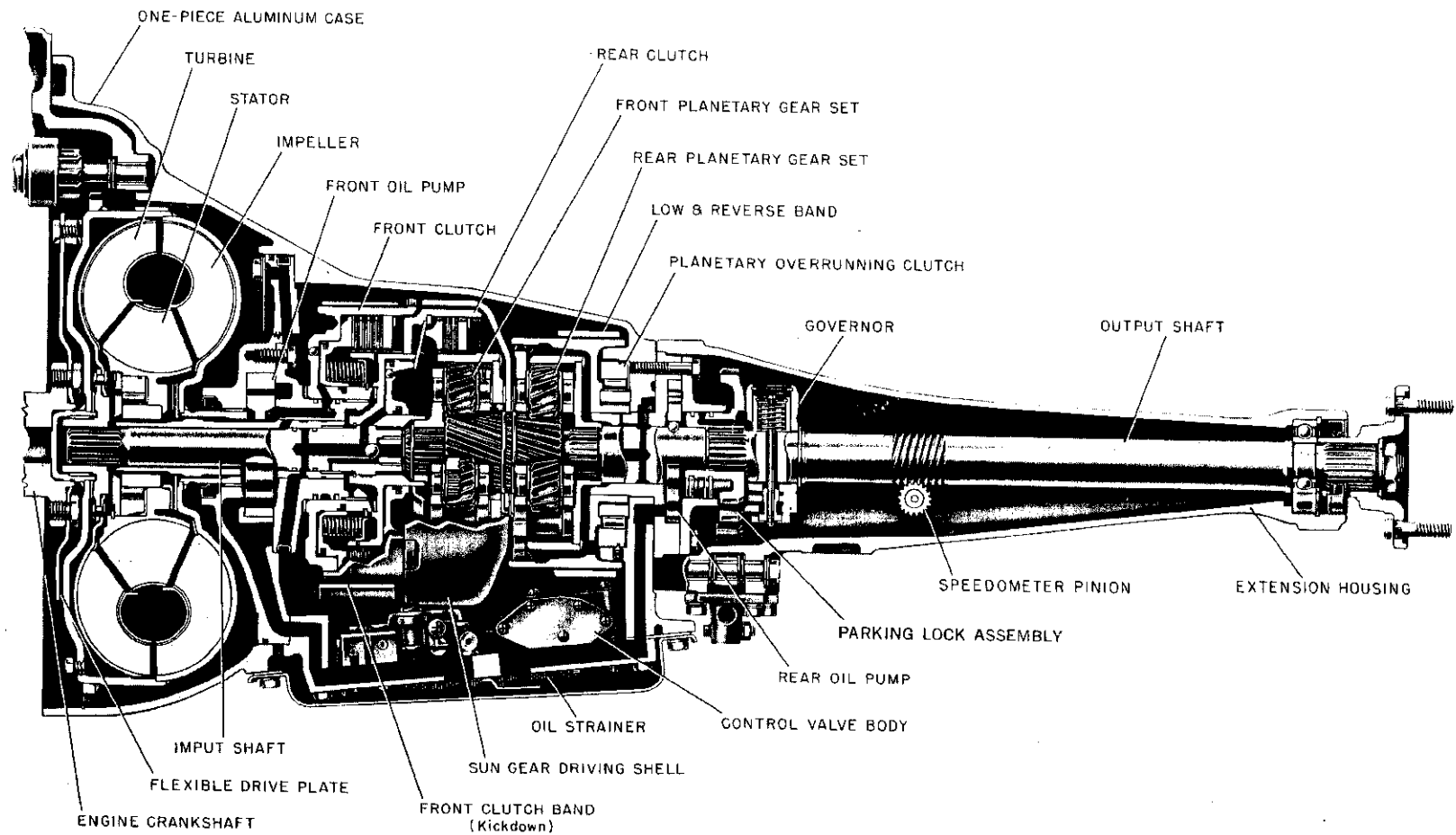
#### Flow Control Valves

The rear pump check valve prevents loss of front pump pressure through the rear pump circuit during reverse operation. The front pump check valve prevents loss of rear pump pressure through the front pump circuit when the front pump flow is recirculating.

The manual valve obtains the different transmission drive ranges as selected by the vehicle operator.

The reverse blocker valve mechanically blocks the manual valve from moving into reverse position above approximately 20 mph.

The 1-2 shift valve automatically shifts the transmission from low to second or from second to low



62x185A

Fig. 1—TorqueFlite Transmission and Torque Converter

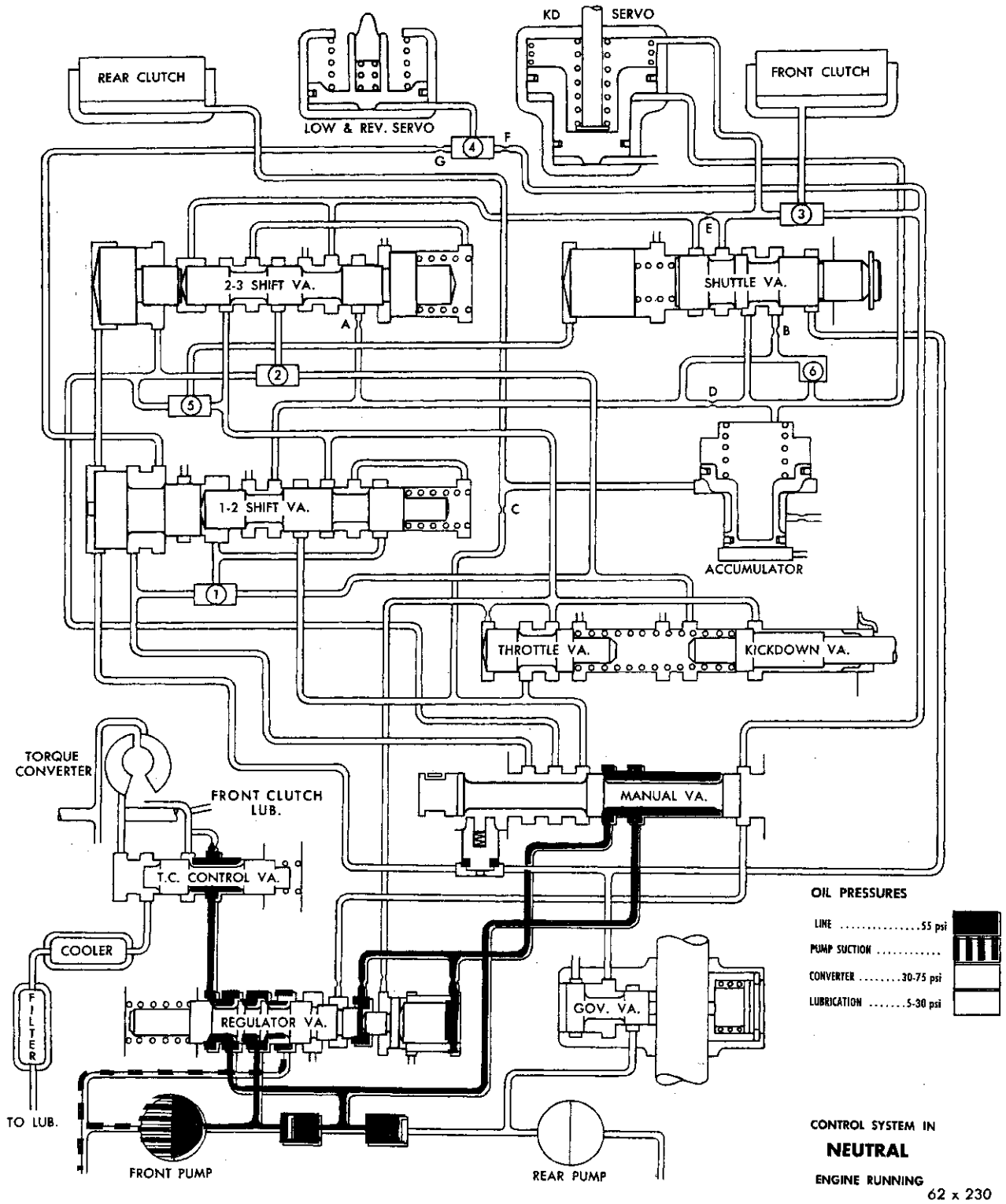


Fig. 2—Neutral Hydraulic Circuits



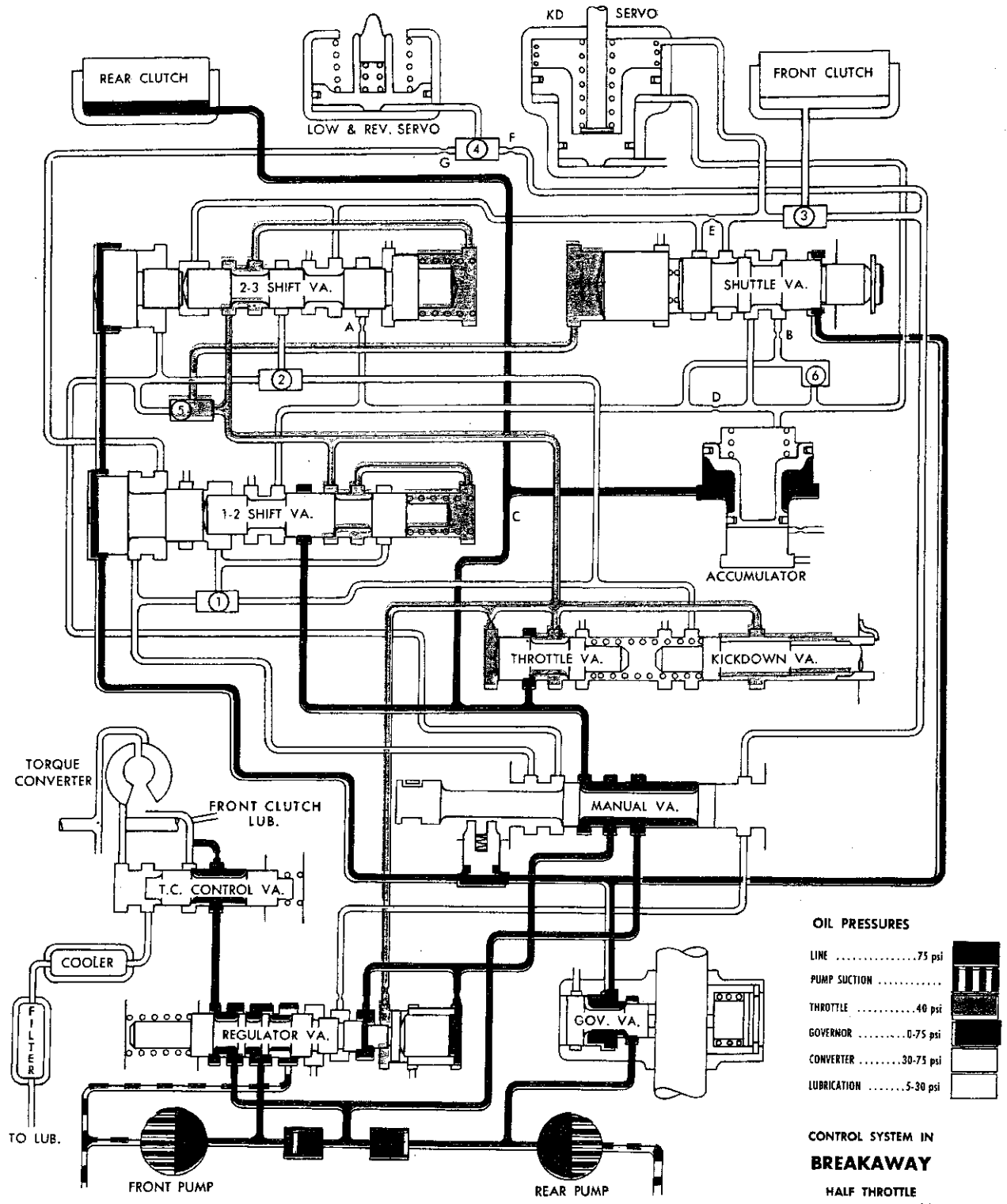


Fig. 3—Drive-Breakaway Hydraulic Circuits

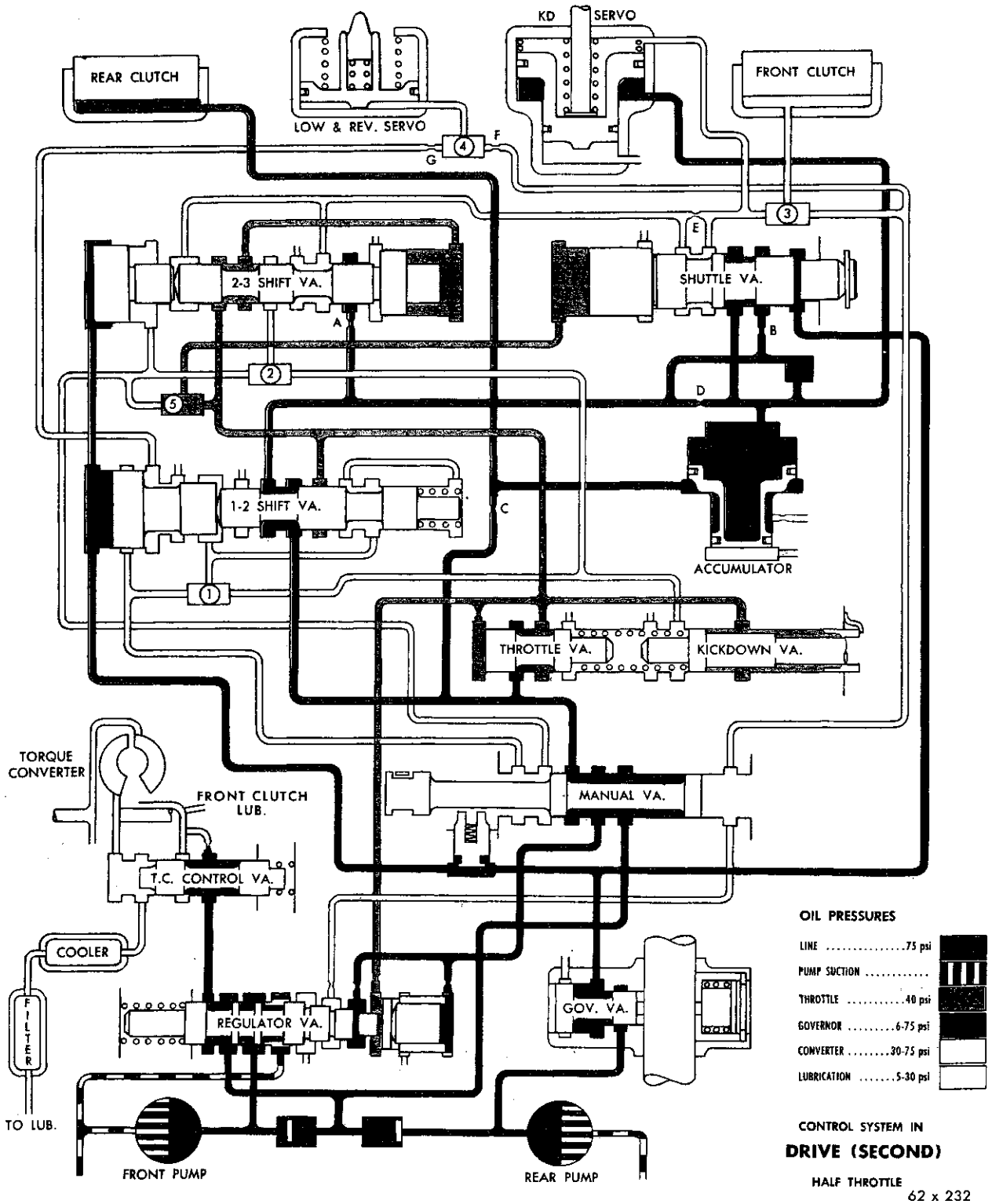


Fig. 4—Drive-Second Hydraulic Circuits

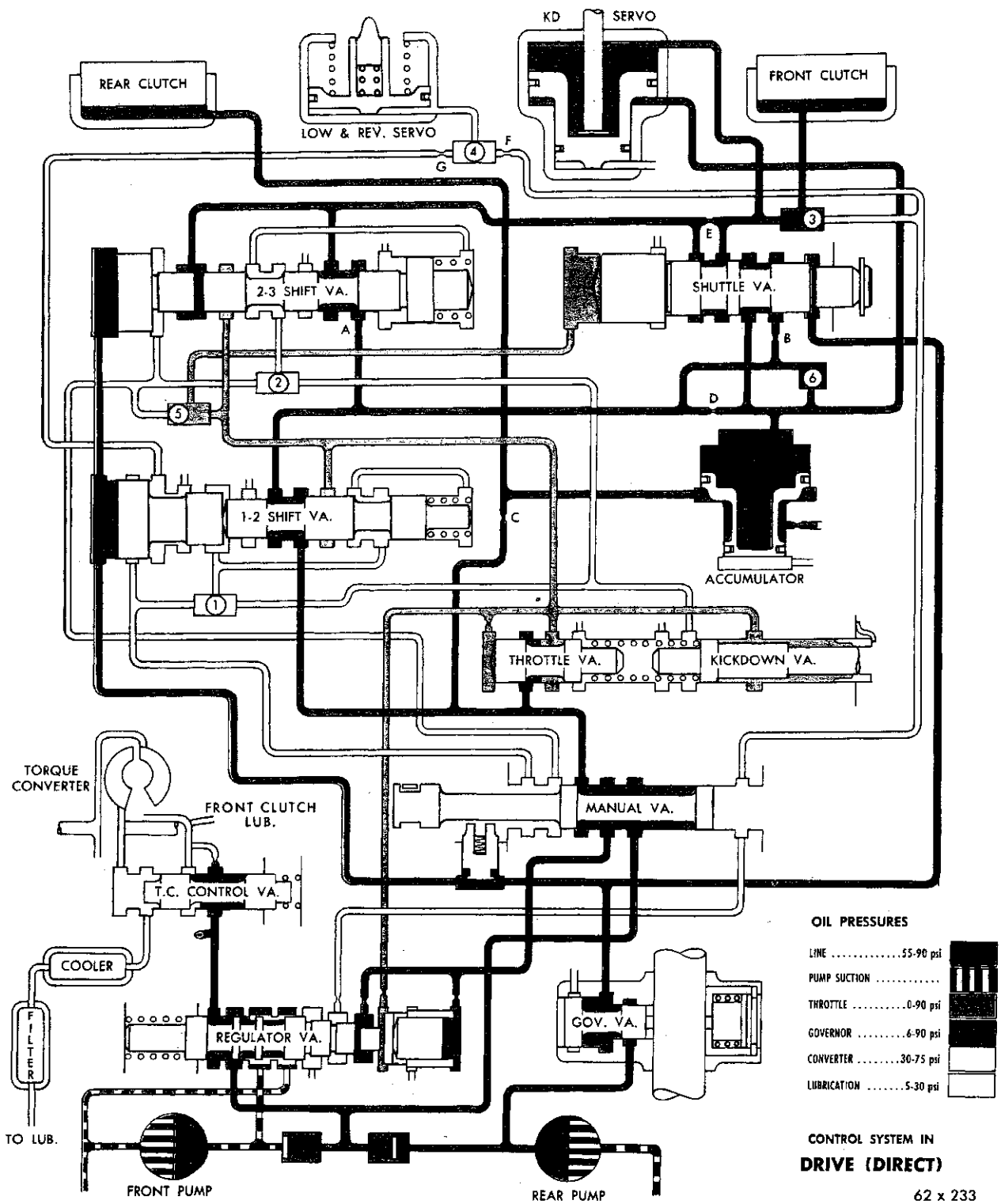


Fig. 5—Drive-Direct Hydraulic Circuits

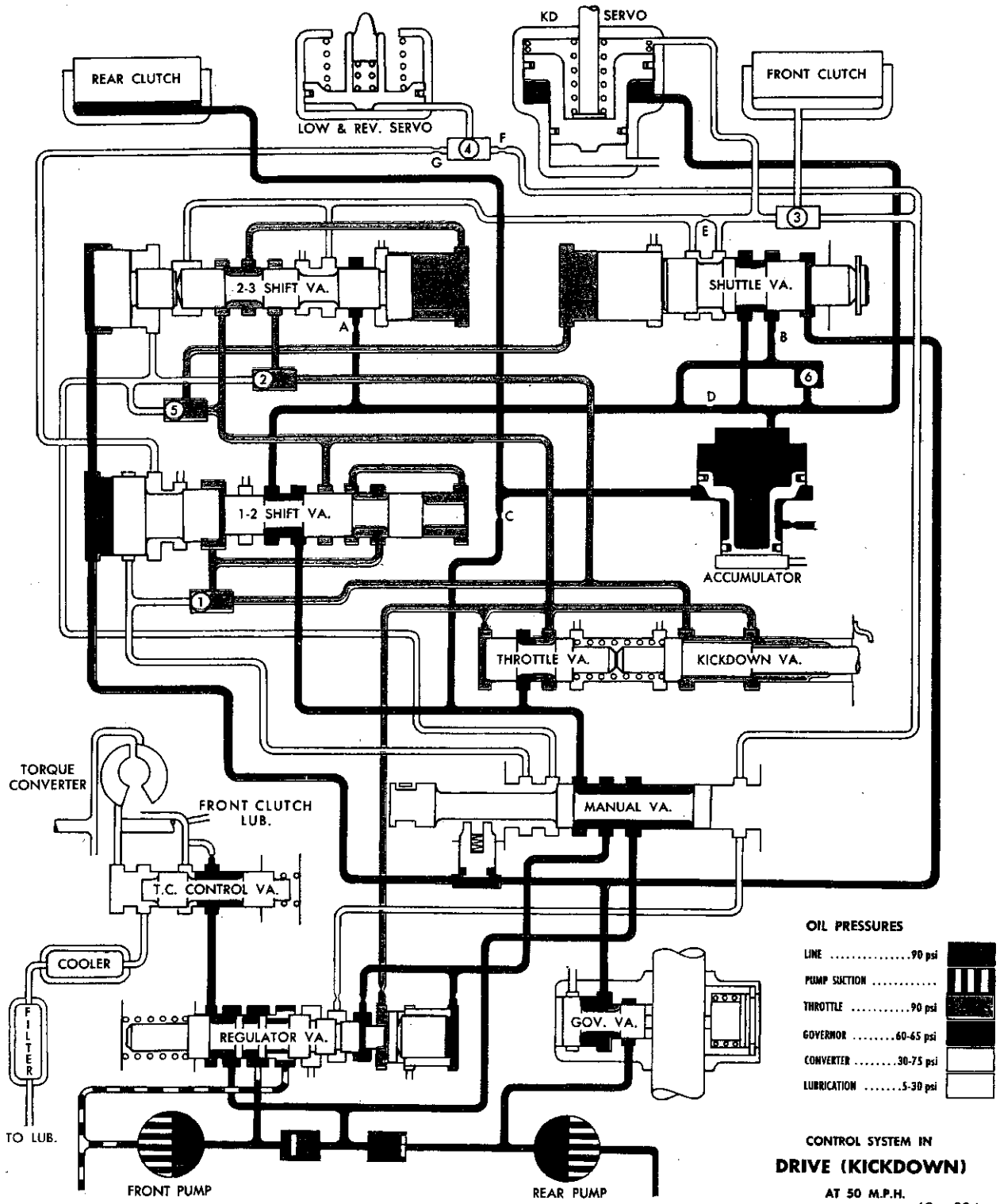


Fig. 6—Drive-Kickdown Hydraulic Circuits

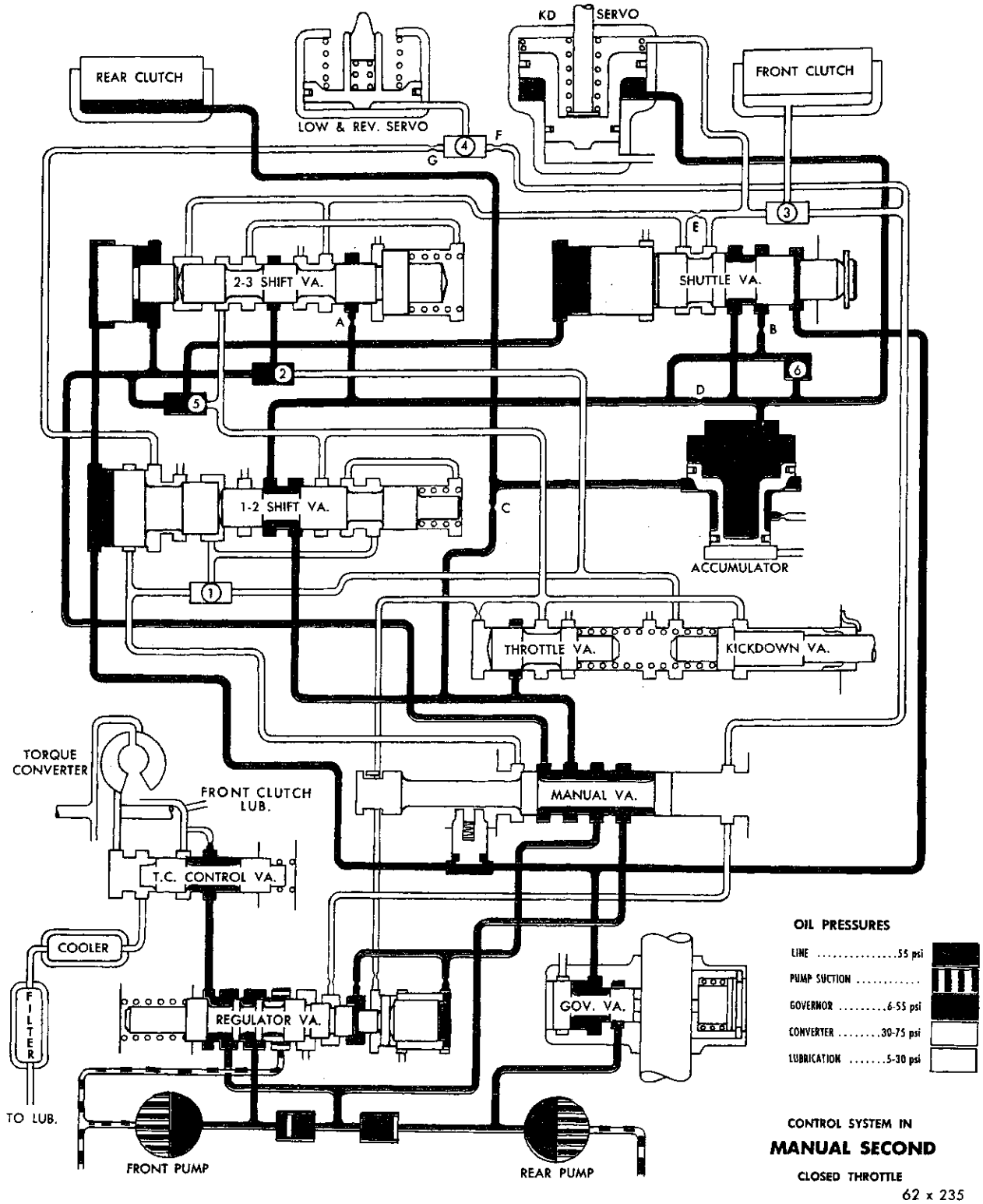


Fig. 7—Push Button Second—Hydraulic Circuits

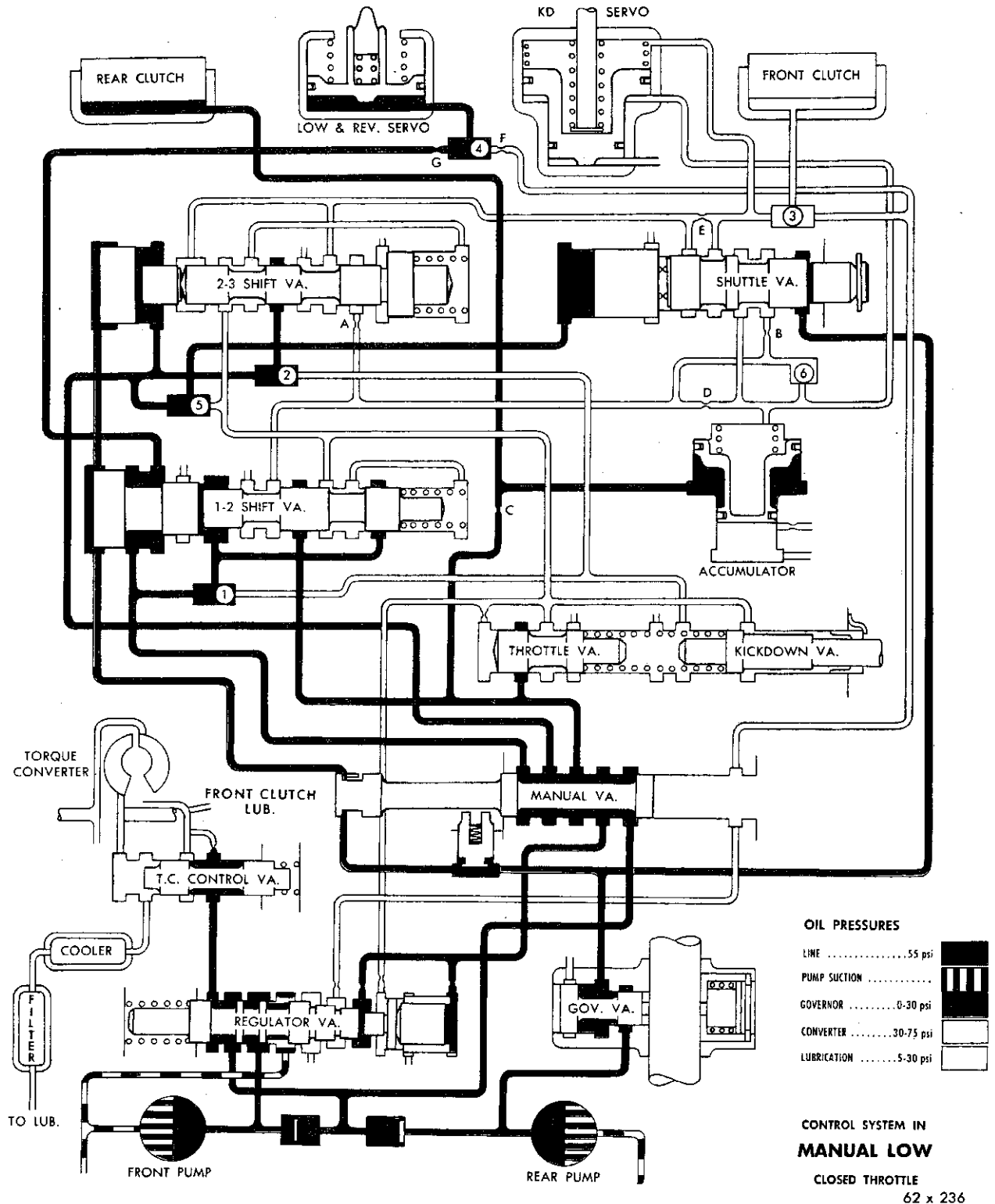


Fig. 8—Push Button Low—Hydraulic Circuits

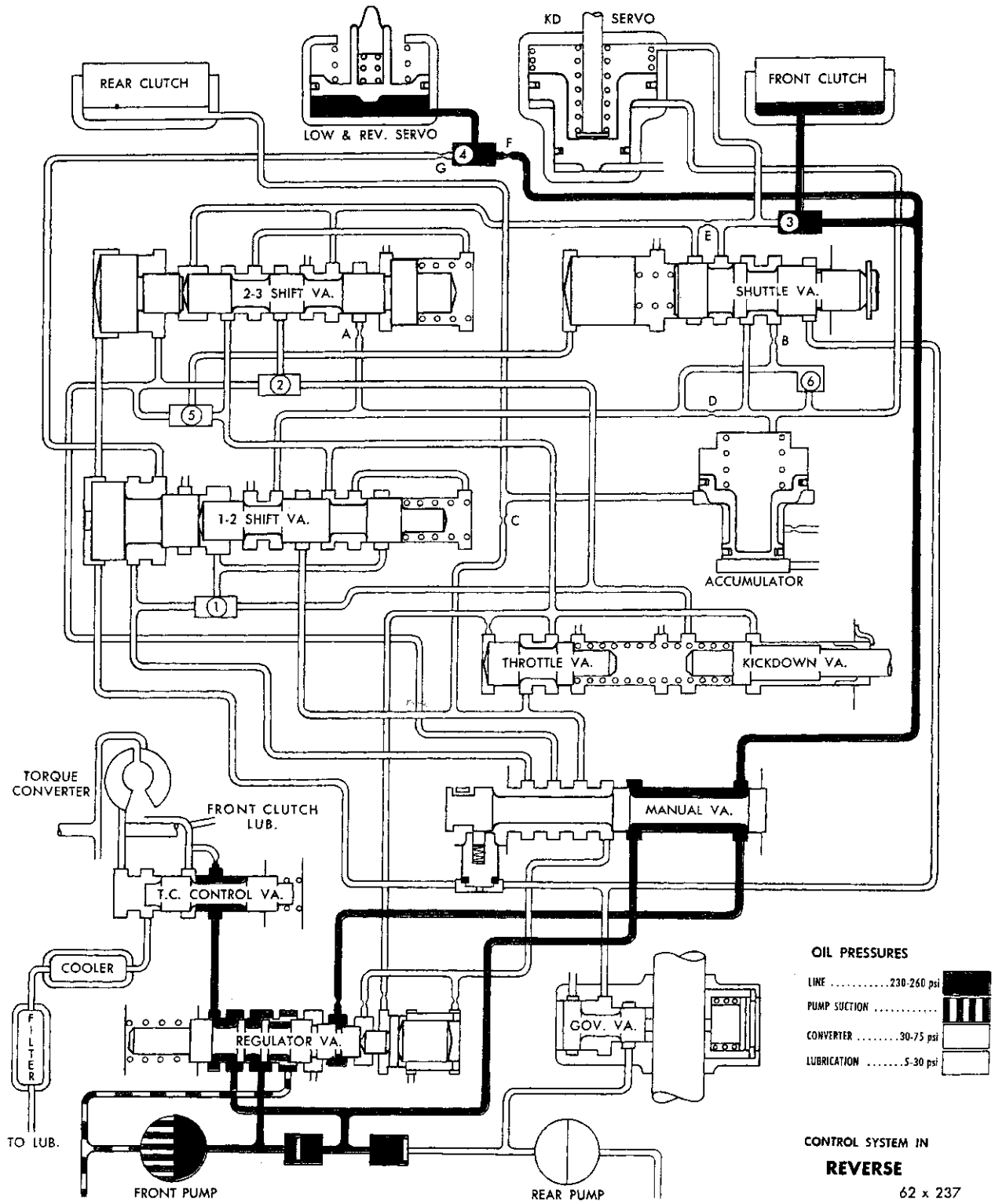


Fig. 9—Reverse Hydraulic Circuits

**21-24 TRANSMISSION**

**CLUTCH ENGAGEMENT AND BAND APPLICATION CHART**

BUTTON POSITION AND DRIVE CONDITION	FRONT CLUTCH	REAR CLUTCH	FRONT (KICKDOWN) BAND	REAR (LOW-REV) BAND	OVERRUNNING CLUTCH
N NEUTRAL	DISENGAGED	DISENGAGED	RELEASED	RELEASED	NO MOVEMENT
D-DRIVE (DIRECT) 1.00 to 1	ENGAGED	ENGAGED	RELEASED	RELEASED	OVER RUNS
D-DRIVE (BREAKAWAY) 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	RELEASED	HOLDS
D-DRIVE KICKDOWN (TO SECOND) 1.45 to 1	DISENGAGED	ENGAGED	APPLIED	RELEASED	OVER RUNS
2-SECOND 1.45 to 1	DISENGAGED	ENGAGED	APPLIED	RELEASED	OVER RUNS
2-SECOND KICKDOWN (TO LOW) 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	RELEASED	HOLDS
1-LOW 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	APPLIED	PARTIAL HOLD
1-LOW (RETARDING) 2.45 to 1	DISENGAGED	ENGAGED	RELEASED	APPLIED	NO MOVEMENT
R-REVERSE 2.20 to 1	ENGAGED	DISENGAGED	RELEASED	APPLIED	NO MOVEMENT

**SHIFT PATTERN SUMMARY CHART**

Condition	Vehicle Speed to Axle Ratios		
	NEWPORT, 300, NEW YORKER	300J	IMPERIAL
	2.93-1	3.23-1	2.93-1
Closed Throttle 1-2 Upshift.....	8-15	6-13	8-15
Closed Throttle 2-3 Upshift.....	13-19	12-18	14-20
Wide Open Throttle 1-2 Upshift.....	32-47	53-59	34-48
Wide Open Throttle 2-3 Upshift.....	69-83	89-101	73-85
3-2 Kickdown Limit.....	60-76	67-90	64-78
3-1 Kickdown Limit.....	30-40	27-55	32-41
Closed Throttle Downshift.....	5-13	4-12	5-14



depending on the vehicle operation.

The 2-3 shift valve automatically shifts the transmission from second to direct or from direct to second depending on the vehicle operation.

The kickdown valve makes possible a forced downshift from direct to second-second to breakaway or direct to breakaway (depending on vehicle speed) by depressing the accelerator pedal past the detent "feel" near wide open throttle.

The shuttle valve has two separate functions and performs each independently of each other. The first is that of providing fast release of the kickdown band, and smooth front clutch engagement when the driver makes a "lift-foot" upshift from second to direct. The second function of the shuttle valve is to regulate the application of the kickdown servo and band when making direct to second kickdowns.

### **Clutches, Band Servos and Accumulator**

The front and rear clutch pistons, and both servo pistons are moved hydraulically to engage the clutches and apply the bands. The pistons are released by spring tension when hydraulic pressure is released. On the 2-3 upshift, the kickdown servo piston is released by spring tension and hydraulic pressure.

The accumulator controls the hydraulic pressure on the apply side of the kickdown servo during the 1-2 shift; thereby, cushioning the kickdown band application at any throttle position.

## **2. OPERATING INSTRUCTIONS**

The transmission is operated by a gearshift control unit consisting of five push buttons, identified by R (reverse), N (neutral), D (drive), 2 (second) and 1 (low).

The transmission will automatically upshift and

downshift at approximately the miles per hour given in the Shift Pattern Summary Chart.

**NOTE:** All shift speeds given in the "Shift Pattern Summary Chart" may vary somewhat due to production tolerances and rear axle ratios. This is not too important; however, the quality of the shifts is very important. All shifts should be smooth, responsive, and with no noticeable engine runaway.

### **Mountain Driving**

When driving in the mountains with either heavy loads or when pulling trailers, the 2 (second) or 1 (low) position should be selected on upgrades which requires heavy throttle for ½ mile or more. Lower ratios reduces the possibility of overheating the transmission and converter under these conditions. 1 (low) position is for severe operation or to obtain better control.

### **Push Starting**

If the engine fails to start in the normal manner, it may be started by pushing. **Towing the vehicle to start is not recommended due to the sudden surge of power when the engine starts.**

Turn the ignition on, then push the 1 (low) button in and depress the accelerator pedal slightly. After the vehicle has been pushed to a speed of 15 to 25 mph (approximately), the transmission will drive the engine.

### **Towing Vehicle**

**Transmission Inoperative:** Tow the vehicle with a rear end pickup or remove the propeller shaft.

**Transmission Operating Properly:** The vehicle may be towed safely in N (neutral) at moderate speeds. For long distance towing (over 100 miles), the propeller shaft should be removed.

## **SERVICE PROCEDURES**

### **GEARSHIFT (PUSH BUTTON) AND PARKING LOCK CONTROL UNIT**

The transmission gearshift control unit is essentially the same on all cars, except that the push buttons are arranged in a different manner. The transmission parking lock control lever is attached to the control unit. The lock control handle is located on the instrument panel at the left of the push buttons.

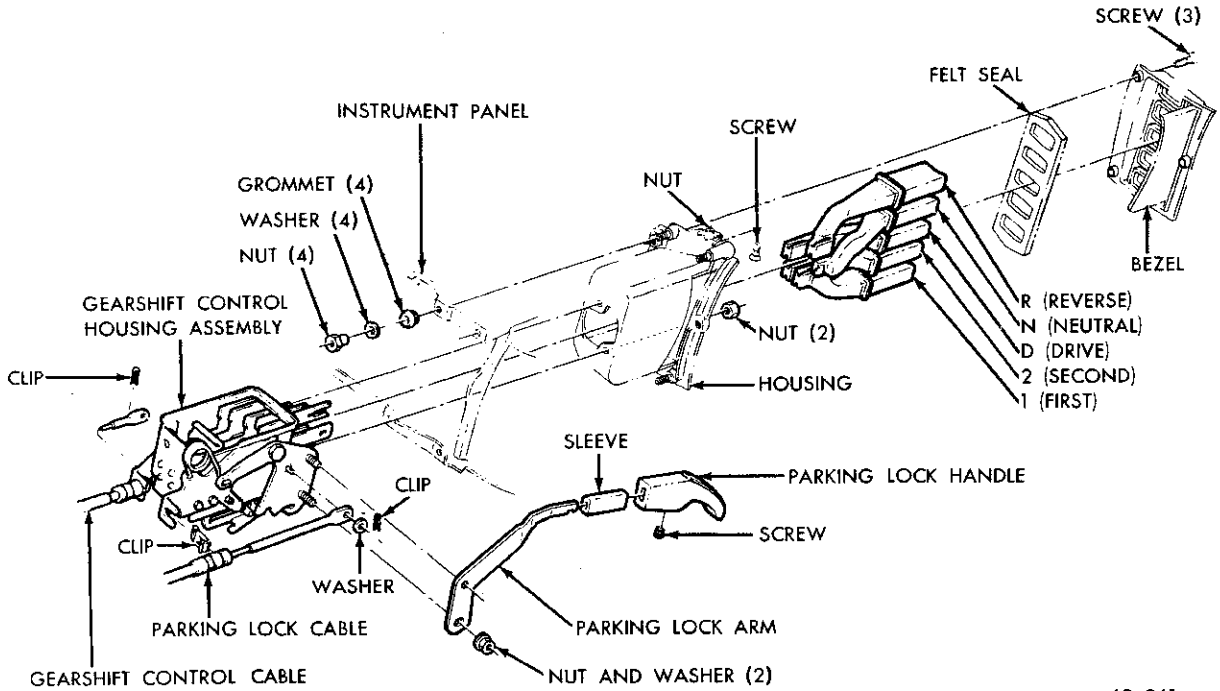
When the parking lock is applied, the gearshift control unit automatically shifts the transmission to neutral.

**CAUTION:** Never apply the parking lock until the vehicle has stopped. Otherwise, a severe ratcheting noise will occur, which might result in damage to the transmission lock components.

## **3. CONTROL UNIT-REMOVAL ADJUSTMENT AND INSTALLATION**

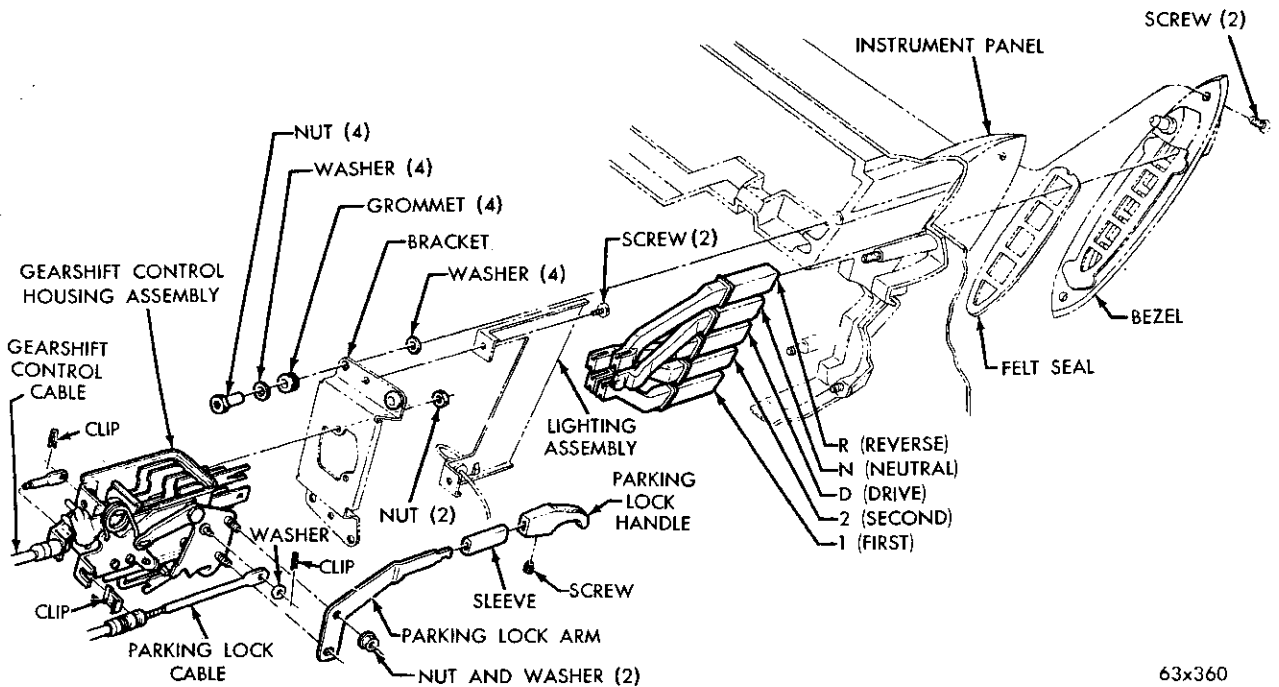
### **Removal**

- (1) Disconnect the negative (ground) cable from the battery.
- (2) Disconnect the back-up lamp switch wire connectors (if so equipped).



63x361

Fig. 10—Removing or Installing Gearshift Control Unit (Chrysler)



63x360

Fig. 11—Removing or Installing Gearshift Control Unit (Imperial)

(3) Remove the parking lock handle from the arm (Figs. 10 or 11).

(4) Chrysler Models: Remove the retaining screws and remove the plate beneath the instrument cluster hood; the chrome moulding from the left side of the instrument panel, and the push button bezel and seal.

Imperial Models: Remove the push button bezel (trim plate) retaining screws and carefully remove the bezel and seal.

(5) Remove all push buttons (except neutral button) by pulling them off the control actuator slides.

(6) Using a socket and long extension through the push button opening, remove the two nuts securing the control assembly to the mounting bracket (Figs. 10 or 11). Carefully work the assembly rearward out of the cluster.

(7) Remove the neutral push button, and disconnect the gearshift and parking lock cables from the control unit.

**Control Unit Adjustment**

The following procedures describe the gearshift control unit adjustments. If the transmission fails to shift into NEUTRAL when the parking lock is applied, inspect the parking lock lever travel in the instrument panel slot and the parking lock cable adjustment at the transmission before adjusting the control unit. Refer to Paragraph 11.

(1) Remove the overcenter spring and back off the lever stop screw (Fig. 12). Make sure no binding exists in the neutral slide, neutral slide pin and bushing, cam pivot, and that they are adequately lubricated.

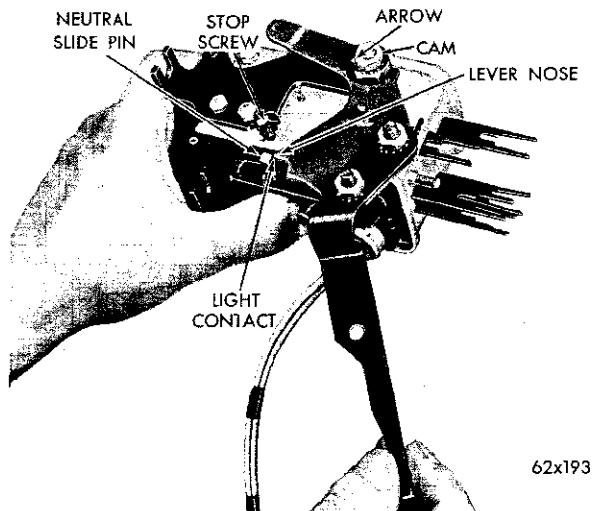


Fig. 12—Adjusting Lever Nose Contact at Neutral Slide Pin

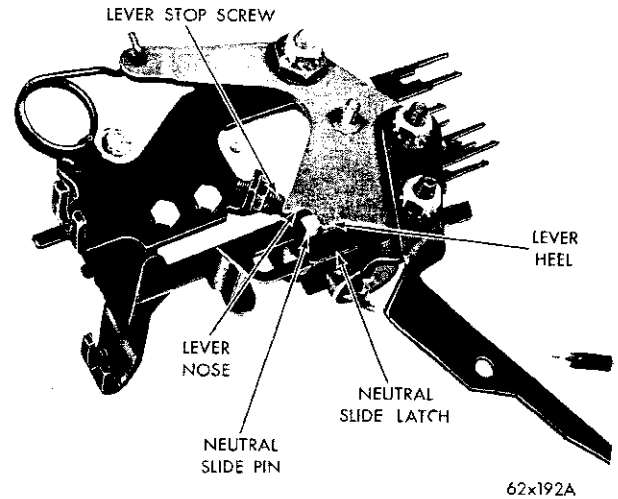


Fig. 13—Adjusting Lever Heel to Neutral Slide Pin Clearance

(2) Hold the neutral slide in against the rocker bar with about 5 to 10 pound load.

(3) Loosen the lock nut and rotate the cam so the lever nose just touches the neutral slide pin as it passes over the pin when moving the parking lock lever from the OFF to ON position. Only light contact should occur so the lever does not hang up on the pin. Hold the cam in this position and tighten the lock nut to 95 inch-pounds torque. Install overcenter spring.

(4) Adjust the lever stop screw to obtain .010 inch clearance between the neutral slide pin and the lever heel (Fig. 13). Tighten the lever stop screw lock nut securely.

**Installation**

(1) Connect the gearshift and parking lock cables to the control unit. Secure the cable housings by clamping them in the control brackets.

(2) Install the neutral push button on the neutral actuator slide. Carefully guide the control unit into position from the rear of the instrument cluster. Install the two retaining nuts and tighten securely.

(3) Install the other push buttons in proper order on the control actuator slides.

(4) Chrysler Models: Install the push button seal, bezel and retaining screws, tighten the screws.

Install the chrome moulding and, then the plate beneath the instrument cluster hood. Install and tighten the retaining screws.

Imperial Models: Install the push button seal, bezel and retaining screws, tighten the screws.

(5) Operate the push buttons and correct any binding that might exist.

(6) Install the parking lock control handle. Connect the back-up switch wires (if so equipped).

(7) Connect the battery ground cable.

#### 4. BACK-UP LAMP SWITCH REPLACEMENT

(1) Remove the gearshift control unit from the instrument panel and disconnect the back-up switch wires.

(2) Straighten the four tabs that hold the switch to the control unit and remove the switch.

(3) To install, place the switch in position on the control unit and bend over the retaining tabs.

(4) Connect the switch wires and reinstall the control unit assembly.

#### 5. PUSH BUTTON LAMP REPLACEMENT

The Chrysler push button lamp is located approximately in the center of the push button cluster (Fig. 10). To replace the bulb, refer to Paragraph 3 and perform steps 1 through 5. Slide a short piece of tight fitting rubber hose over the bulb to remove it from the socket.

The Imperial push buttons are illuminated by a panelescent lighting panel attached to the control unit attaching bracket (Fig. 11). The lighting panel can be replaced by removing the control unit and bracket. Refer to Paragraph 3.

#### 6. GEARSHIFT CONTROL CABLE (Transmission End)

##### Removal and Installation

(1) Place the parking lock lever in the OFF position, then raise the vehicle on a hoist and drain approximately two quarts of fluid from the transmission.

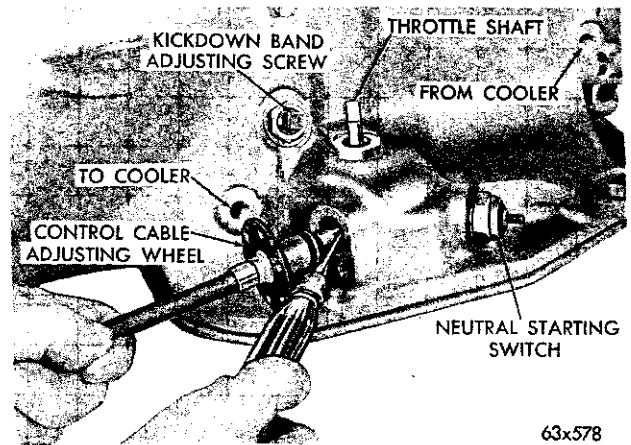
(2) Remove the gearshift control cable to transmission adjusting wheel lock screw.

(3) Pull the gearshift cable out of the transmission case as far as possible, back off the adjusting wheel a few turns if necessary.

(4) Insert a small screwdriver above and slightly to the right of the gearshift cable (Fig. 14). Disengage the cable adapter lock spring by pushing the screwdriver handle to the right while pulling outward on the cable.

(5) To install the cable, have an assistant engage the (R) button and hold it firmly engaged until the cable attachment operation is completed.

(6) Back the adjustment wheel off on the cable housing (counter-clockwise) until two or three threads



63x578

Fig. 14—Removing Gearshift Control Cable

are showing on the guide behind the wheel.

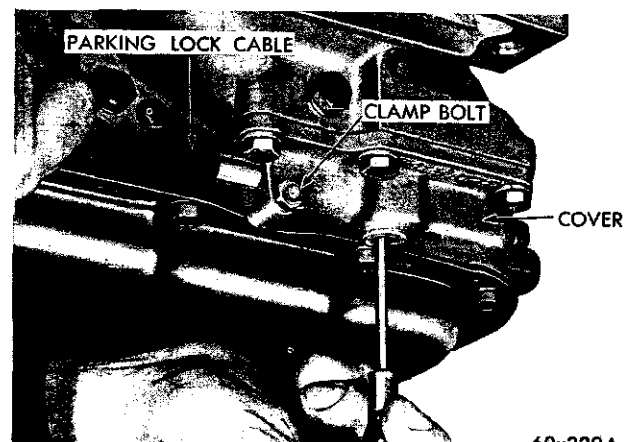
(7) Lubricate the cable housing with transmission fluid, insert the cable in the transmission case, push inward on the cable making sure the lock-spring engages the cable. Adjust the control cable as outlined in "Maintenance, Adjustments and Tests," Paragraph 9.

(8) Refill the transmission with Automatic Transmission Fluid Type "A" Suffix "A" to proper level. Refer to Paragraph 8.

#### 7. PARKING LOCK CABLE (Transmission End)

##### Removal and Installation

(1) Loosen the parking lock cable clamp bolt where the cable enters the housing cover (Fig. 15). Tap the end of the clamp bolt lightly to release its hold on the cable. Remove the housing cover lower plug.



60x229A

Fig. 15—Removing Parking Lock Cable

(2) With a screw driver inserted through the plug opening, push gently against projecting portion of the cable lock-spring, then withdraw the lock cable. **Do not use pliers or similar tool to withdraw cable from adapter cover as the cable cover might be damaged causing an oil leak.**

(3) To install the cable, have an assistant hold the parking lock lever (on instrument panel) in the OFF position.

(4) Insert a screw driver through the plug opening and position it behind the cable adapter stop washer (Fig. 16). Hold the adapter outward while pushing the cable in as far as possible, making sure the lock-spring engages the cable.

(5) Gently pull outward on the cable housing to its limit of travel, release and then tighten the clamp

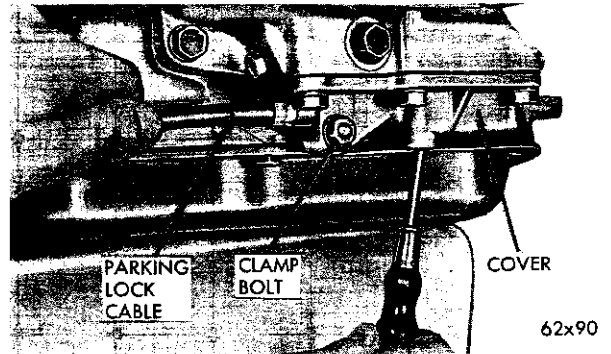


Fig. 16—Installing Parking Lock Cable

bolt to 10 inch-pounds torque. Reinstall the plug in the cover and tighten to 75 inch-pounds torque.

## MAINTENANCE, ADJUSTMENTS AND TESTS

While in the process of making adjustments and tests, do not stall test the torque converter. For safety reasons and because damage to the transmission may occur, wide open throttle stall operation should be avoided.

### 8. LUBRICATION

The fluid and the filter installed at the factory will provide satisfactory lubrication and protection of the automatic transmission for the life of the vehicle. Oil changes therefore, will not be required except when service is severe. If the regular operation of the vehicle is similar to any of the following, the transmission should be adjusted (See Periodic Adjustments) and the fluid and the filter changed approximately every 32,000 miles. For extreme severe service, it may be necessary to change the fluid as often as every 10,000 miles.

**NOTE:** Police cars, taxicabs and cars which frequently tow trailers, operate in heavy traffic in hot weather or operate continuously with abnormal loads, should have more frequent periodic maintenance. The transmission should not be idled in gear for long periods.

#### Drain and Refill

(1) Remove the drain plug (if so equipped) from the transmission oil pan and allow the fluid to drain.

**NOTE:** If the oil pan does not have a drain plug, loosen the pan bolts and tap pan with a soft mallet to break it loose, permitting the fluid to drain.

(2) Remove the flywheel access plate and remove the converter drain plug and allow the fluid to drain. (Fig. 17).

(3) Replace the torque converter and oil pan drain plugs and the flywheel access plate.

(4) Remove the transmission oil pan. Clean the intake screen and pan.

(5) If necessary, adjust the reverse band. Refer to Paragraph 12.

(6) Reinstall the intake screen and oil pan. Be sure to use a new gasket.

(7) Install a new fluid filter in the oil cooler to transmission return line.

(8) Pour eight quarts of Automatic Transmission Fluid, Type "A" Suffix "A" into the transmission.

(9) Start the engine and allow to idle for at least two minutes. With the parking brake on, depress each push button momentarily, ending with the N (Neutral) button pushed in.

(10) Add sufficient fluid to bring the fluid level to the "ADD ONE PINT" mark. (Approximately 1½ quarts.)

(11) Recheck the fluid level after the transmission is at normal operating temperature. The level should

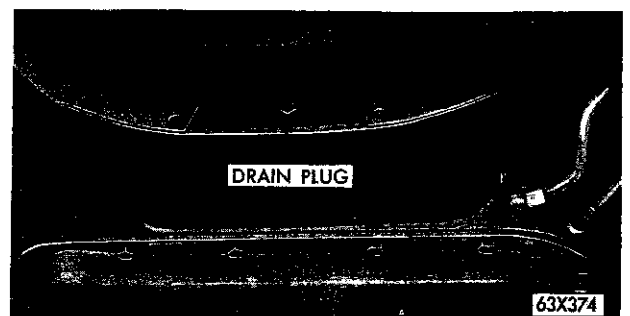
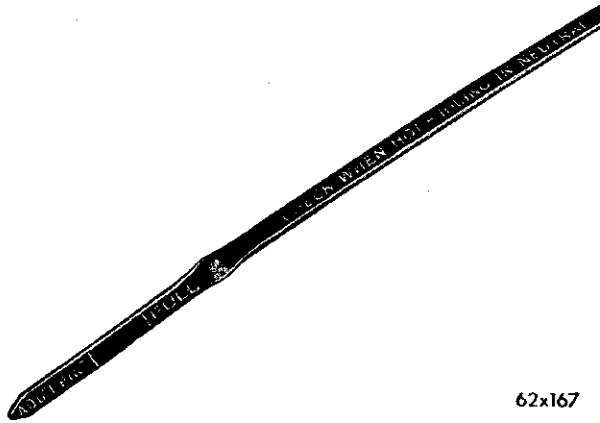


Fig. 17—Converter Drain Plug



62x167

Fig. 18—Dip Stick Markings

be between the "FULL" mark and the "ADD ONE PINT" mark. (Fig. 18).

**CAUTION:** To prevent dirt from entering the transmission, make certain that the dip stick cap is fully seated onto the filler tube.

### Periodic Adjustments

The following adjustments should be performed at 32,000 mile intervals or more frequent under severe operating conditions.

- (1) Adjust the kickdown band. Refer to Paragraph 12.
- (2) Adjust the gearshift control cable. Refer to Paragraph 9.
- (3) Adjust the engine idle in neutral. Refer to the Fuel System, Group. 14.
- (4) Adjust the transmission and carburetor throttle linkage to obtain the proper shift pattern. Refer to Paragraph 13.

### 9. GEARSHIFT CONTROL CABLE ADJUSTMENT

- (1) Raise vehicle on a hoist. Have an assistant hold the R (reverse) button firmly depressed.
- (2) Remove the gearshift control cable adjustment wheel lock screw at the left side of the transmission (Fig. 14).
- (3) Back the adjustment wheel off on the cable guide (turn counter-clockwise) until two or three threads are showing on the guide behind the wheel.

**NOTE:** Inspect the wheel for free turning on the guide; remove any dirt or burrs in the threads of the cable guide that may interfere. Lubricate the cable guide threads with a few drops of transmission fluid.

- (4) Hold the control cable guide centered in the hole of the transmission case and apply only enough inward force (approximately two pounds) to bottom the assembly at the reverse detent. While holding the cable bottomed, rotate the adjustment wheel clockwise until it just contacts the case squarely.

- (5) Turn the wheel clockwise just enough to make the next adjustment hole in the wheel line up with the screw hole in the case.

- (6) Counting this hole as number one, continue turning the wheel clockwise until the fifth hole lines up with the screw hole in the case.

- (7) Install the lock screw, tighten to 75 inch-pounds torque.

### 10. NEUTRAL STARTING SWITCH

#### Adjustment and Test

- (1) With the proper control cable adjustment assured, depress the N (neutral) push button.

- (2) Raise the vehicle and drain approximately two quarts of fluid from the transmission.

- (3) Unscrew the neutral starting switch from the transmission case and inspect to see that the switch operating lever is aligned in the center of the switch opening in the case.

- (4) Place the cupped washer and "O" ring over the threads of the switch (Fig. 19), then screw the switch into the transmission case a few turns.

- (5) Connect one lead of a test lamp to the battery current and the other lead to the switch terminal. Screw the switch into the transmission case until the lamp lights, then tighten switch an additional  $\frac{1}{4}$  to  $\frac{3}{8}$  turn.

**NOTE:** The switch must be tight enough to prevent oil leakage. If not, add a thin washer and readjust the switch. Do not tighten over 60 foot-pounds torque.

- (6) Remove test lamp and connect wire to the switch.

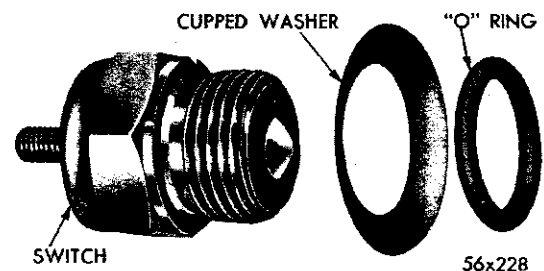


Fig. 19—Neutral Starting Switch (Disassembled)

(7) Add fluid to the transmission to bring up to the proper level. Refer to Paragraph 8.

**NOTE:** Test the starter for operating in all push button positions. If it should operate in any position other than neutral, readjust the gearshift control cable. Refer to Paragraph 9. In some cases, it may be necessary to align the valve body neutral finger with the switch plunger. Refer to Paragraph 24.

## 11. PARKING LOCK CABLE ADJUSTMENT

(1) Operate the parking lock lever from one end of the slot in the instrument panel to the other. The lever should have clearance at both ends. One hole in the parking lock arm is slotted to permit parking lock lever adjustment (Fig. 10 or 11). If adjustment of the lever is required, first loosen the cable clamp bolt on the transmission, making sure the cable housing is free to move in the parking sprag cover hole.

(2) To adjust, move the lever to the fully OFF position. Loosen the two nuts attaching the lock arm to the pushbutton housing. Loosen the nuts just enough to free up the lock arm.

(3) Block the locking lever  $\frac{1}{16}$  inch from the OFF end of the lever slot, then tighten the two nuts on the pushbutton housing. Inspect the level travel to be certain that clearance exists at both ends of the lever travel.

(4) Place the parking lock lever (on instrument panel) in the OFF position.

(5) If not performed in step 1, loosen the clamp bolt securing the cable housing in the parking lever cover on bottom of the transmission extension housing. Tap the end of clamp bolt lightly to release its hold on the cable.

(6) Gently pull outward on the cable housing to its limit of travel, release and then tighten the clamp bolt to 10 inch-pounds torque. **Do not use pliers or similar tool to pull outward on the cable as the cable cover might be damaged causing an oil leak.**

(7) Inspect the adjustments by allowing the vehicle to roll slowly on a slight incline. The parking sprag should fully engage the parking gear with the lever in ON position, and there should be no ratcheting noise with the lever in the OFF position.

## 12. BAND ADJUSTMENTS

### Kickdown Band

The kickdown band adjusting screw is located on the left side of the transmission case near the throttle lever shaft (Fig. 14).

(1) Loosen the lock nut and back off approximately

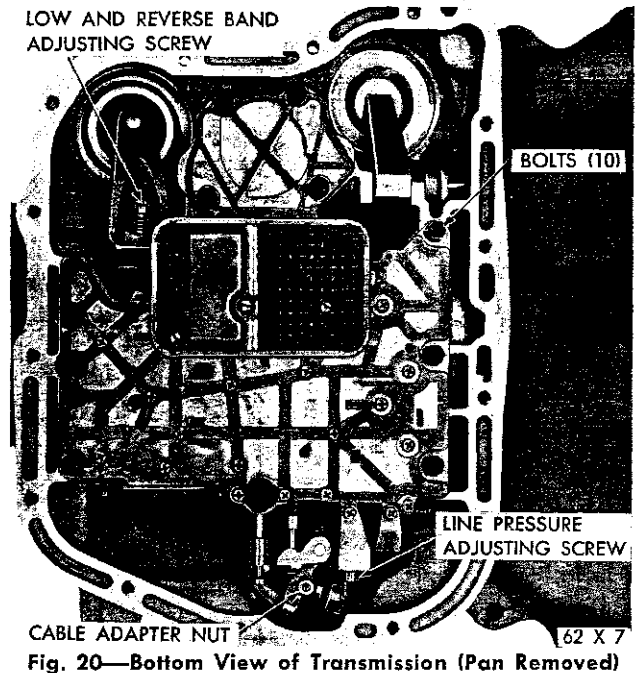


Fig. 20—Bottom View of Transmission (Pan Removed)

five turns. Inspect the adjusting screw for free turning in the transmission case.

(2) Using wrench, Tool C-3380 with adapter C-3705, tighten the band adjusting screw 47-50 inch-pounds torque. If adapter C-3705 is not used, tighten the adjusting screw to 72 inch-pounds which is the true torque.

(3) Back off the adjusting screw 2 turns. Hold the adjusting screw in this position and tighten the lock nut to 29 foot-pounds torque.

### Low and Reverse Band

(1) Raise the vehicle, drain the transmission fluid and remove the oil pan.

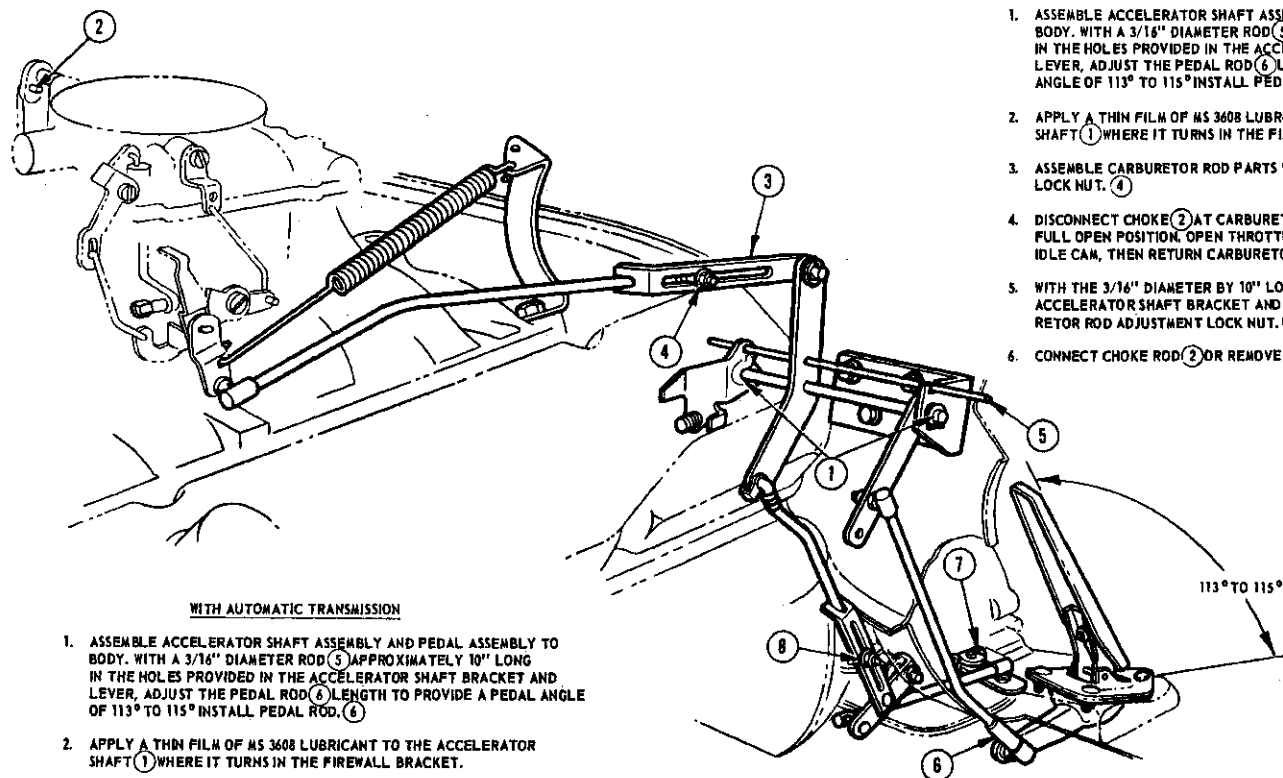
(2) Loosen the adjusting screw lock nut and back off the nut approximately five turns (Fig. 20). Inspect the adjusting screw for free turning in the lever.

(3) Using wrench, Tool C-3380 with adapter C-3705, tighten the band adjusting screw 47-50 inch-pounds torque. If adapter C-3705 is not used, tighten the adjusting screw to 72 inch-pounds which is the true torque.

(4) Back off the adjusting screw 3 turns. Hold the adjusting screw in this position and tighten the lock nut to 35 foot-pounds torque.

(5) Reinstall the oil pan using a new gasket. Tighten the oil pan bolts to 150 inch-pounds torque.

(6) Fill the transmission with Automatic Transmission Fluid Type "A", Suffix "A". Refer to Paragraph 8.



WITH AUTOMATIC TRANSMISSION

1. ASSEMBLE ACCELERATOR SHAFT ASSEMBLY AND PEDAL ASSEMBLY TO BODY. WITH A 3/16" DIAMETER ROD (5) APPROXIMATELY 10" LONG IN THE HOLES PROVIDED IN THE ACCELERATOR SHAFT BRACKET AND LEVER, ADJUST THE PEDAL ROD (6) LENGTH TO PROVIDE A PEDAL ANGLE OF 113° TO 115° INSTALL PEDAL ROD. (6)
2. APPLY A THIN FILM OF MS 3608 LUBRICANT TO THE ACCELERATOR SHAFT (1) WHERE IT TURNS IN THE FIREWALL BRACKET.
3. ASSEMBLE CARBURETOR ROD PARTS BUT DO NOT TIGHTEN ADJUSTMENT LOCK NUT. (4)
4. DISCONNECT CHOKE (2) AT CARBURETOR OR BLOCK CHOKE VALVE IN FULL OPEN POSITION, OPEN THROTTLE SLIGHTLY TO RELEASE FAST IDLE CAM, THEN RETURN CARBURETOR TO CURB IDLE.
5. WITH THE TRANSMISSION ROD ASSEMBLY AND TRANSMISSION THROTTLE LEVER IN PLACE, MOVE THE TRANSMISSION THROTTLE LEVER (7) FORWARD AGAINST THE STOP AND TIGHTEN TRANSMISSION ROD ADJUSTMENT LOCK NUT. (8) REMOVE 3/16" DIAMETER ROD (5) FROM ACCELERATOR SHAFT BRACKET.

WITH MANUAL TRANSMISSION

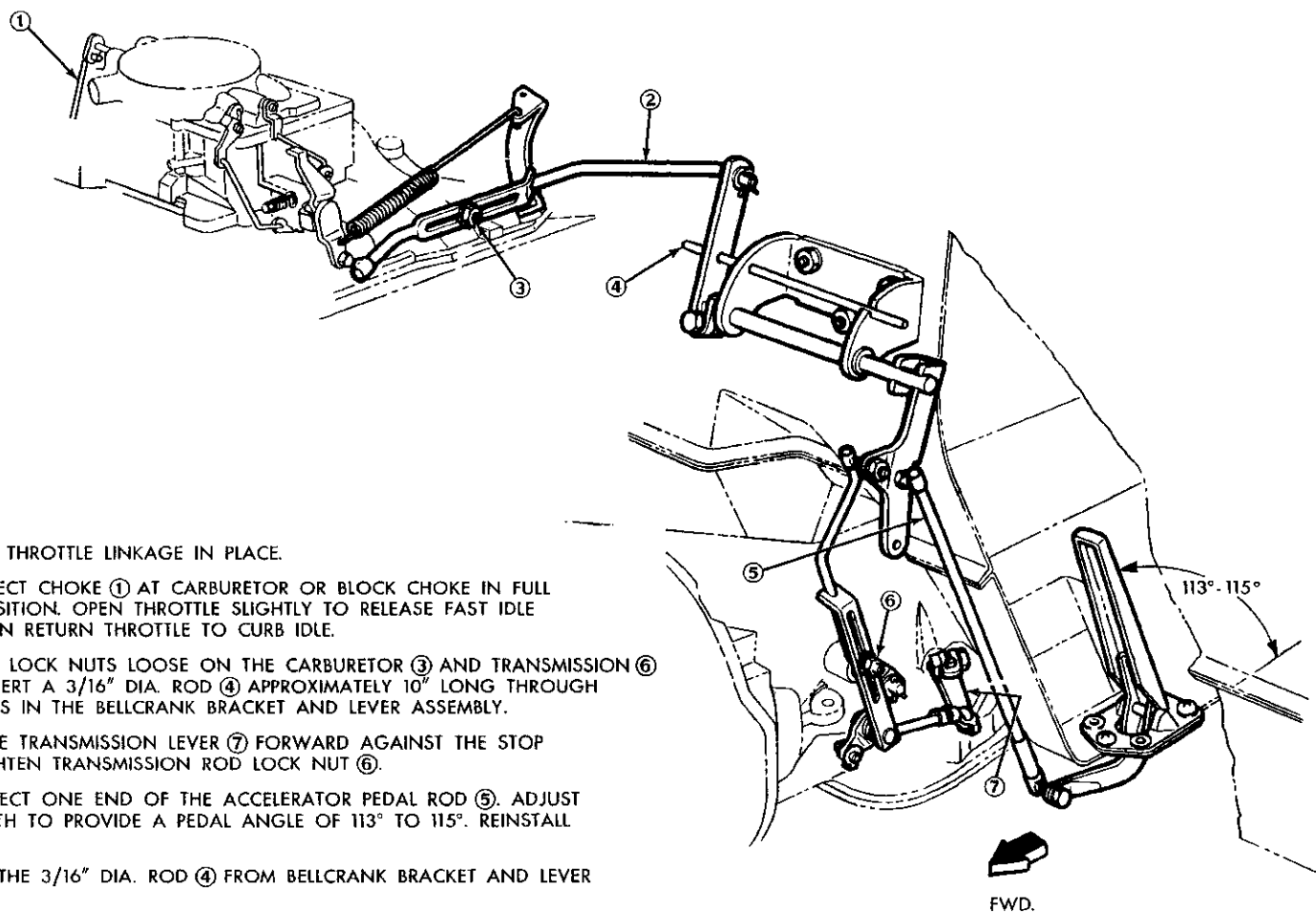
1. ASSEMBLE ACCELERATOR SHAFT ASSEMBLY AND PEDAL ASSEMBLY TO BODY. WITH A 3/16" DIAMETER ROD (5) APPROXIMATELY 10" LONG IN THE HOLES PROVIDED IN THE ACCELERATOR SHAFT BRACKET AND LEVER, ADJUST THE PEDAL ROD (6) LENGTH TO PROVIDE A PEDAL ANGLE OF 113° TO 115° INSTALL PEDAL ROD. (6)
2. APPLY A THIN FILM OF MS 3608 LUBRICANT TO THE ACCELERATOR SHAFT (1) WHERE IT TURNS IN THE FIREWALL BRACKET.
3. ASSEMBLE CARBURETOR ROD PARTS BUT DO NOT TIGHTEN ADJUSTMENT LOCK NUT. (4)
4. DISCONNECT CHOKE (2) AT CARBURETOR OR BLOCK CHOKE VALVE IN FULL OPEN POSITION, OPEN THROTTLE SLIGHTLY TO RELEASE FAST IDLE CAM, THEN RETURN CARBURETOR TO CURB IDLE.
5. WITH THE 3/16" DIAMETER BY 10" LONG ROD (5) IN PLACE IN THE ACCELERATOR SHAFT BRACKET AND LEVER ASSEMBLY, TIGHTEN CARBURETOR ROD ADJUSTMENT LOCK NUT. (4)
6. CONNECT CHOKE ROD (2) OR REMOVE BLOCKING FIXTURE.

6. MOVE REAR PORTION OF CARBURETOR ROD ASSEMBLY (3) REARWARD UNTIL TRANSMISSION THROTTLE LEVER (7) STOP IS CONTACTED. TIGHTEN CARBURETOR ROD ADJUSTMENT LOCK NUT. (4)
7. CONNECT CHOKE ROD (2) OR REMOVE BLOCKING FIXTURE.

63x367

Fig. 21—Throttle Linkage Adjustment (Chrysler)





1. ASSEMBLE THROTTLE LINKAGE IN PLACE.
2. DISCONNECT CHOKE ① AT CARBURETOR OR BLOCK CHOKE IN FULL OPEN POSITION. OPEN THROTTLE SLIGHTLY TO RELEASE FAST IDLE CAM, THEN RETURN THROTTLE TO CURB IDLE.
3. WITH THE LOCK NUTS LOOSE ON THE CARBURETOR ③ AND TRANSMISSION ⑥ RODS INSERT A 3/16" DIA. ROD ④ APPROXIMATELY 10" LONG THROUGH THE HOLES IN THE BELLCRANK BRACKET AND LEVER ASSEMBLY.
4. MOVE THE TRANSMISSION LEVER ⑦ FORWARD AGAINST THE STOP AND TIGHTEN TRANSMISSION ROD LOCK NUT ⑥.
5. DISCONNECT ONE END OF THE ACCELERATOR PEDAL ROD ⑤. ADJUST ITS LENGTH TO PROVIDE A PEDAL ANGLE OF 113° TO 115°. REINSTALL THE ROD.
6. REMOVE THE 3/16" DIA. ROD ④ FROM BELLCRANK BRACKET AND LEVER ASSY.
7. MOVE LINK ② OF CARBURETOR ROD ASSY. REARWARD UNTIL THE TRANSMISSION LEVER STOP IS CONTACTED. TIGHTEN CARBURETOR ROD LOCK NUT ③.
8. CONNECT CHOKE ROD ① OR REMOVE BLOCKING FIXTURE.

Fig. 22—Throttle Linkage Adjustment (Imperial)

62x148

**13. THROTTLE LINKAGE ADJUSTMENT**

(1) With the engine at normal operating temperature, carburetor off the fast idle cam and choke valves open, adjust idle speed to 500 rpm for Chrysler and Imperial — 900 rpm for 300J (use tachometer).

(2) Chrysler and Imperial: Adjust the throttle linkage as outlined and illustrated in Figure 21 or 22.

(3) Model 300J, Refer to Figure 23. Loosen the locking nuts "A" and "B" (accelerator shaft to trans-

mission rod and accelerator shaft to throttle shaft lever rod).

a. Insert a piece of  $\frac{3}{16}$  inch drill rod, 10 inches long into the accelerator shaft bracket and through the hole in the lever.

b. Move the transmission throttle control lever forward against its stop, then tighten the locknut "A" securely. This positions the accelerator shaft.

c. Unsnap the accelerator pedal to shaft rod. Turn the threaded end of the rod either in or out until

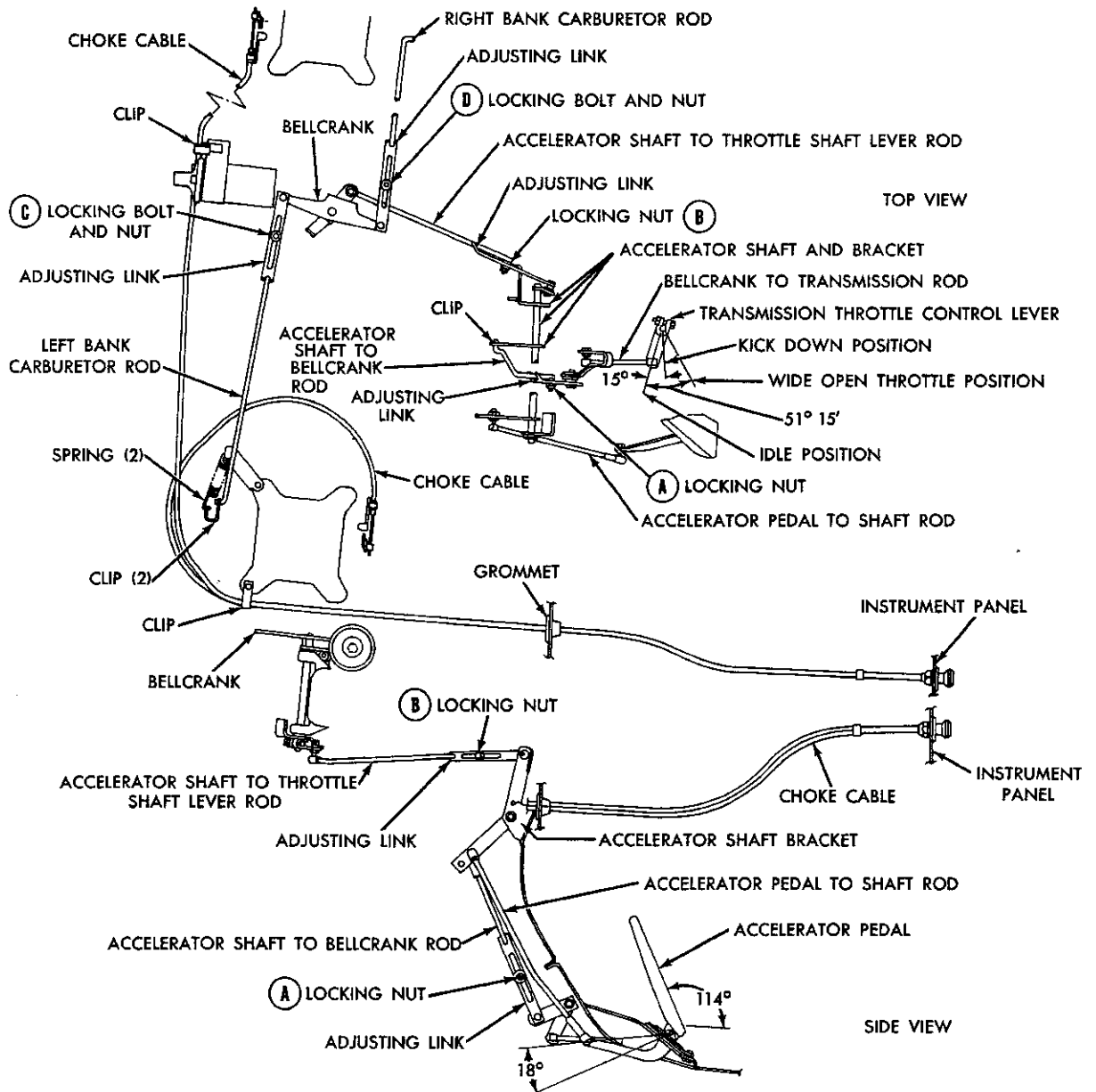


Fig. 23—Throttle Linkage Adjustment (C-300J)

an angle measurement of 114 degrees is obtained between the floor of vehicle and the flat face of the accelerator pedal. Use a protractor to obtain the angle. Reconnect the rod and remove the locating drill rod.

- d. Inspect each carburetor to be sure the choke valves are open; that the fast idle cams are released and the throttle valves are closed.
- e. Loosen the locking nuts "C" and "D" (left and right bank carburetor rods).
- f. Back off the anti-stall adjusting plunger far enough to allow the bellcrank to be pivoted.
- g. Pivot bellcrank until a piece of  $\frac{3}{16}$  inch drill rod, 3 inches long can be inserted through the bellcrank hole and locating hole in the manifold. Tighten locking nuts "C" and "D" securely, and remove the locating drill rod from the bellcrank.
- h. Push rearward on the accelerator shaft to throttle shaft lever rod adjusting link, until the transmission stop is reached, then tighten locking nut "B" securely.
- i. Make sure the idle speed is adjusted to 900 rpm with the engine at normal operating temperature, then disconnect the vacuum line from the anti-stall unit.
- j. With the engine running and the transmission in "Neutral", turn the anti-stall plunger either toward or away from the bellcrank to obtain 1500 rpm. Reconnect the vacuum line.

#### 14. HYDRAULIC CONTROL PRESSURE TESTS

##### Line Pressure and Front Servo Release Pressure

Line pressure and front servo release pressure tests must be made in D (drive) position with the rear wheels free to turn. The transmission fluid must be at operating temperature (150° F to 200° F).

(1) Install an engine tachometer, raise the car on a hoist and position the tachometer so it can be read under the car.

(2) Connect two 0-100 psi pressure gauges, Tool C-3292 to pressure take-off-points at the side of the accumulator and at the front servo release (Fig. 24).

(3) With the control in D (drive) position, speed up the engine slightly until the transmission shifts into direct. (Front servo release will be pressurized in direct). Reduce engine speed slowly to 1,000 rpm. Line pressure at this time (1,000 rpm) must be 54-60 psi, and the front servo release pressure must not be more than 3 psi below line pressure.

(4) Disconnect the throttle linkage from the transmission throttle lever and move the throttle lever

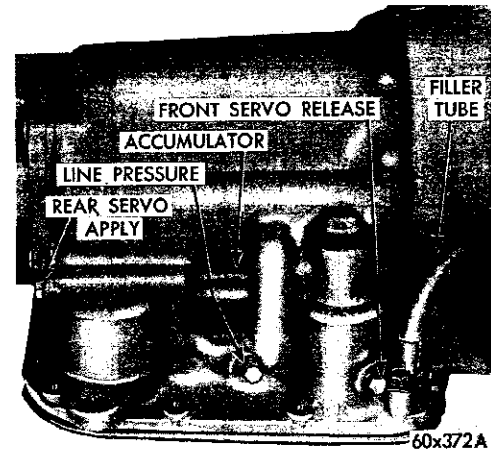


Fig. 24—Pressure Test Locations (Right Side of Case)

gradually to full throttle position. Line pressure must rise to a maximum of 90-96 psi just before or at kickdown into low gear. Front servo release pressure must follow line pressure up to the kickdown point and should not be more than 3 psi below line pressure.

If line pressure is not 54-60 psi at 1,000 rpm, adjust the pressure as outlined in Paragraph 15.

If front servo release pressures are less than pressures specified and line pressures are within limits, there is excessive leakage in the front clutch and/or front servo circuits.

**CAUTION:** Always inspect the external transmission throttle lever for looseness on the valve body shaft when making the pressure tests.

##### Lubrication Pressures

The lubrication pressure test should be made at the same time that line pressure and front servo

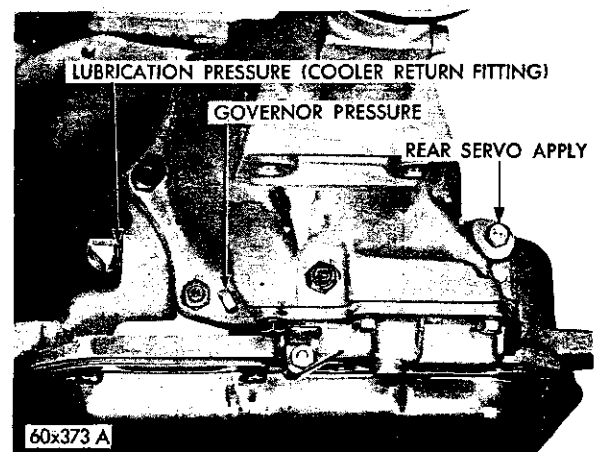


Fig. 25—Pressure Test Locations (Rear End of Case)

## 21-36 TRANSMISSION

release pressure are tested.

(1) Install a "tee" fitting between the cooler return line fitting and fitting hole in transmission case at rear of left side of transmission (Fig. 25). Connect a 0-100 psi pressure gauge, Tool C-3292 to the "tee" fitting.

(2) At 1,000 engine rpm, with the throttle closed and the transmission in direct, lubrication pressure should be 5-15 psi. Lubrication pressure will be approximately doubled as the throttle is opened to maximum line pressure.

### Rear Servo Apply Pressure

(1) Connect a 0-300 psi pressure gauge, Tool C-

3293 to the apply pressure take-off point at the rear servo (Fig. 25).

(2) With the transmission control in R (reverse) position and the engine speed set at 1600 rpm, the reverse servo apply pressure should be 240-280 psi.

### Governor Pressure

(1) Connect a 0-100 psi pressure gauge, Tool C-3292 to the governor pressure take-off point, located at lower left side of the extension near the mounting flange (Fig. 25).

(2) Governor pressures should fall within the limits given in the Governor Pressure Chart.

## GOVERNOR PRESSURE CHART

TC-1, TC-2	TC-3	VEHICLE SPEED TO AXLE RATIOS TC-2, 300J	TY-1	PRESSURE LIMITS*
2.93-1	2.93-1	3.23-1	2.93-1	PSI
17-22	18-23	18-20	19-24	15
40-51	41-53	50-66	43-55	50
58-68	61-71	69-86	62-73	65

\*The governor pressure should respond smoothly to changes in m.p.h. and should return to 0 to 1½ psi when the vehicle is stopped. High pressure at standstill (above 2 psi) will prevent the transmission from downshifting.

If governor pressures are incorrect at the given vehicle speeds, the governor valve and/or weights are probably sticking.

### Throttle Pressure

No provisions are made to test the throttle pressure. Incorrect throttle pressure should only be suspected if the part throttle shift speeds are either very delayed or occur too early in relation to vehicle speeds. In which case, the throttle linkage should be adjusted before throttle pressure setting is adjusted. Refer to Paragraphs 13 and 15.

## 15. HYDRAULIC CONTROL PRESSURE ADJUSTMENTS

### Line Pressure

An incorrect throttle pressure setting will cause incorrect line pressure readings even though the line pressure adjustment is correct. Always inspect and correct the throttle pressure adjustment before adjusting the line pressure.

If the line pressure is not correct, it will be necessary to remove the valve body assembly to perform the adjustment. Refer to Paragraph 24.

**NOTE:** Before adjusting the line pressure, measure the distance between the manual valve (valve in 1-low position) and line pressure adjusting screw (Fig. 26). This measurement must be 1-7/8 inches; correct by loosening the spring retainer screws and repositioning the spring retainer. The regulator valve may cock and hang up in its bore if the spring retainer is out of position.

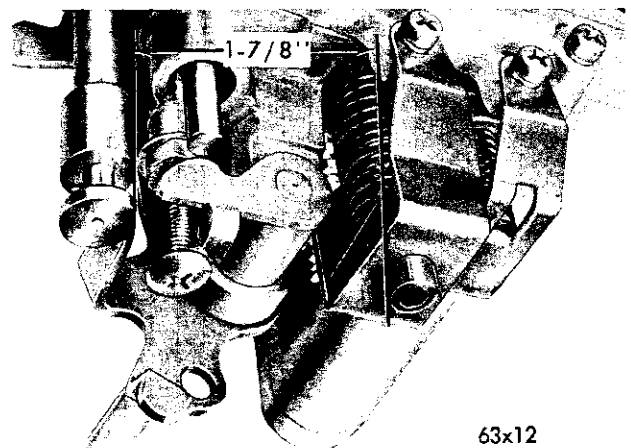


Fig. 26—Inspecting Spring Retainer Locations

The approximate adjustment is  $1\frac{5}{16}$  inches, measured from the valve body to the inner edge of the adjusting nut (Fig. 27). However, due to manufacturing tolerances, the adjustment can be varied to obtain the specified line pressure.

The adjusting screw may be turned with an Allen wrench. One complete turn of the adjusting screw changes closed throttle line pressure approximately  $1\frac{1}{8}$  psi. Turning the adjusting screw counterclockwise increases pressure, and clockwise decreases the pressure.

**Throttle Pressure**

Throttle pressure cannot be tested accurately; therefore, the adjustment should be inspected if a malfunction is evident.

(1) Remove the valve body assembly from the transmission to perform the adjustment. Refer to Paragraph 24.

(2) Loosen the throttle lever stop screw lock nut and back off approximately five turns (Fig. 28).

(3) Insert the gauge pin of Tool C-3763 between the throttle lever cam and the kickdown valve.

(4) By pushing in on the tool, compress the kickdown valve against its spring so the throttle valve is completely bottomed inside the valve body.

(5) As force is being exerted to compress the spring, tighten the throttle lever stop screw finger tight against the throttle lever tang with the throttle lever cam touching the tool and the throttle valve bottomed. **Be sure the adjustment is made with the spring fully compressed and the valve bottomed in the valve body.**

(6) Remove the tool and tighten the stop screw lock nut securely.

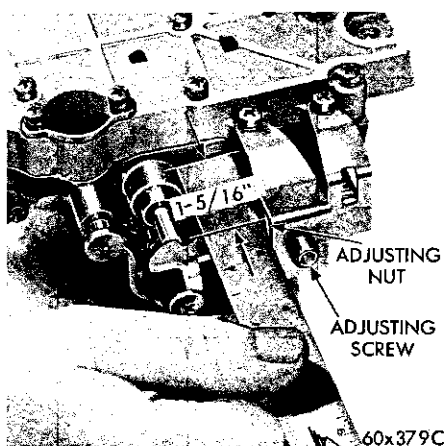


Fig. 27—Line Pressure Adjustment

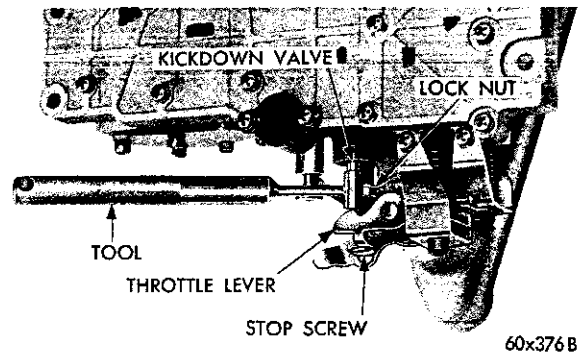


Fig. 28—Throttle Pressure Adjustment

**16. AIR PRESSURE TESTS**

A “NO DRIVE” condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutches, bands and servos can be located through a series of tests by substituting air pressure for the fluid pressure (Fig. 29). The front and rear clutches, kickdown servo, and low-reverse servo may be tested by applying air pressure to their respective passage after the valve body assembly has been removed. Refer to Paragraph 24. To make the air pressure tests, proceed as follows:

**NOTE: Compressed air supply must be free of all dirt or moisture.**

**Front Clutch**

Apply air pressure to the front clutch “apply”

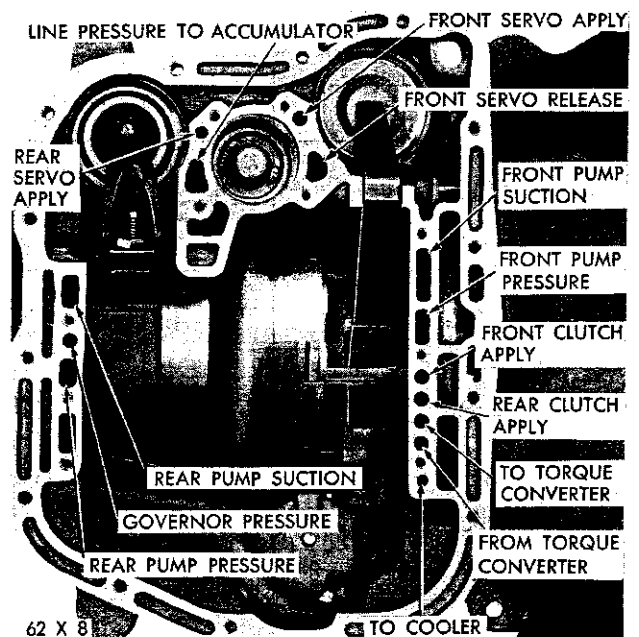


Fig. 29—Air Pressure Tests

passage and listen for a dull "thud" which indicates that the front clutch is operating. Hold the air pressure on for a few seconds and inspect the system for excessive oil leaks.

**Rear Clutch**

Apply air pressure to the rear clutch "apply" passage and listen for a dull "thud" which indicates that the rear clutch is operating. Also check for excessive oil leaks.

**NOTE:** If a dull "thud" cannot be heard in the clutches, place the finger tips on the clutch housing and again apply air pressure. Movement of the piston can be felt as the clutch is applied.

**Kickdown Servo**

Direct air pressure into the front servo "apply"

passage. Operation of the servo is indicated by a tightening of the front band. Spring tension on the servo piston should release the band.

**Low and Reverse Servo**

Direct air pressure into the rear servo "apply" passage. Operation of the servo is indicated by a tightening of the rear band. Spring tension on the servo piston should release the band.

If the clutches and servos operate properly; no upshift or erratic shift conditions indicate that the malfunctions exists in the control valve body assembly.

**Governor**

Governor operating failures can generally be diagnosed by a road test or hydraulic pressure tests. Refer to Paragraph 14.

**SERVICING OPERATIONS WITH TRANSMISSION IN VEHICLE**

Various transmission components can be removed for repairs without removing the transmission from the vehicle. The removal, reconditioning and installation procedures for these components are covered here, except valve body reconditioning, which is

described in Paragraph 31.

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts. Refer to Paragraph 27.

**17. SPEEDOMETER PINION**

**Removal and Installation**

(1) Remove screw and retainer securing the speedometer cable to the extension housing. Carefully work the pinion and sleeve assembly out of the housing (Fig. 30).

(2) To replace the pinion and/or oil seal, pry the clip off the pinion and slide the pinion assembly off the cable. Install a new seal on the cable housing.

(3) If transmission fluid is found in the cable

housing, replace the seal inside the pinion bore (Fig. 31). Pry the old seal out of pinion bore. Place a new seal on end of the cable with its lips toward the cable, then slide the pinion over the seal and cable. Secure with the spring clip.

(4) To install, push the pinion and sleeve assembly into the extension housing so the sleeve flange is tight against the housing, then install the retainer and screw. Tighten the screw to 150 inch-pounds torque.

**SPEEDOMETER PINION USAGE CHART**

Tire Size	Axle Ratio	Output Shaft	No. Teeth	Pinion Color
8.00-14	2.93:1	8 Teeth	17	Orange
	3.23:1	8 Teeth	19	Dark Blue
8.50-14	2.93:1	8 Teeth	17	Orange
	3.23:1	8 Teeth	19	Dark Blue
9.00-14	2.93:1	8 Teeth	16	Brown
	3.23:1	8 Teeth	18	Dark Purple
7.60-15	3.23:1	8 Teeth	18	Dark Purple
8.20-15	2.93:1	8 Teeth	16	Brown

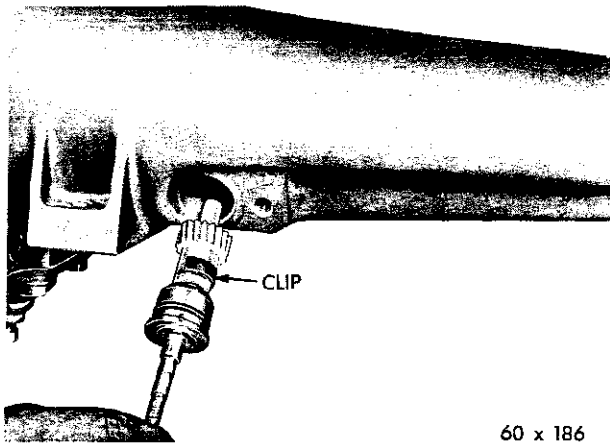


Fig. 30—Removing or Installing Speedometer Pinion

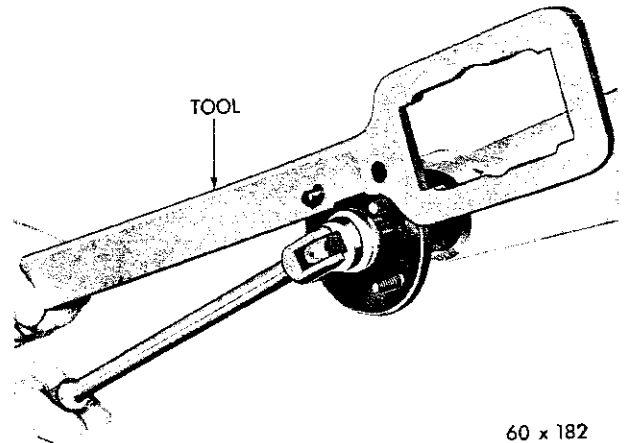


Fig. 32—Removing or Installing Output Shaft Flange Nut

## 18. OUTPUT SHAFT OIL SEAL

### Replacement

(1) Disconnect the propeller shaft at the transmission flange.

(2) Hold the transmission flange with Tool C-3281 and remove the retaining nut and washer (Fig. 32). Slide the flange off the output shaft. (Use puller Tool C-452 if necessary).

(3) Screw the taper threaded end of Tool C-748 into the seal (Fig. 33) then tighten the screw of the tool to remove the seal.

(4) To install a new seal, position seal in the opening of the extension housing with lip of seal facing inward. Drive the seal into the housing with Tool C-3837 (Fig. 34).

(5) Install the transmission output shaft flange. Install washer with its three projections toward the flange and the nut with its convoluted surface con-

tacting the washer. Hold the flange with Tool C-3281, and tighten nut to 175 foot-pounds torque.

(6) Connect the propeller shaft to the transmission flange.

## 19. EXTENSION HOUSING

### Removal

(1) Remove the speedometer drive pinion and

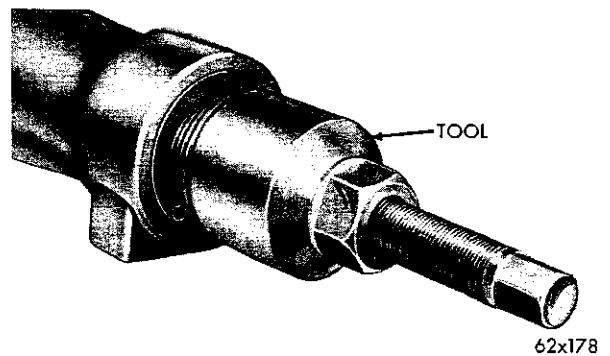


Fig. 33—Removing Output Shaft Oil Seal

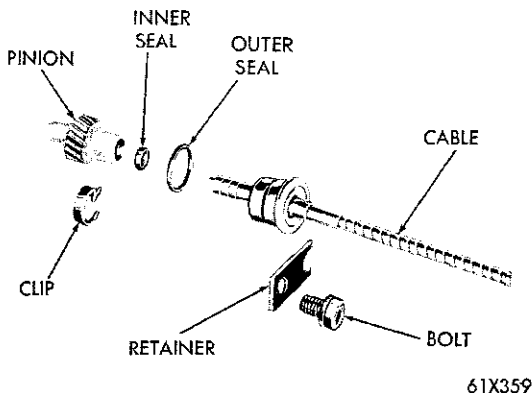


Fig. 31—Speedometer Pinion (Disassembled)

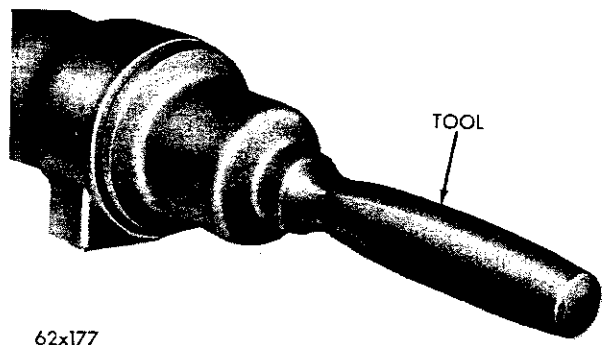


Fig. 34—Installing Output Shaft Oil Seal

sleeve assembly. See Paragraph 17.

(2) Remove the transmission flange. See Paragraph 18.

(3) Drain approximately two quarts of fluid from the transmission.

(4) Loosen the parking lock cable clamp bolt where cable enters the housing cover. Refer to Figure 15. Tap the end of clamp bolt lightly to release its hold on the cable. Remove the housing cover lower plug. Insert a screw driver through the hole, then while exerting pressure against projecting portion of the cable lock-spring, withdraw the lock cable.

(5) Remove two bolts securing the extension housing to the crossmember insulator.

(6) Raise the transmission slightly to clear the crossmember with a service jack, Tool 3203A. Remove crossmember attaching bolts and remove the crossmember, insulator and spring assembly.

(7) Remove the extension housing to transmission bolts, tap the housing lightly with a soft mallet to break it loose from the transmission, then remove the housing.

### Bearing Replacement

(1) Pry or drive the oil seal out of the extension housing with a long blunt drift. Be sure not to mar the oil seal surface in the housing.

(2) Remove the bearing snap ring from the extension housing. Drive the bearing rearward out of the housing with Tool C-3275 (Fig. 35).

(3) Place a new bearing in the opening of the extension housing. Using Tool C-3204, drive the bearing into housing (Fig. 36). Install bearing retaining snap ring.

(4) Place a new seal in the opening of extension

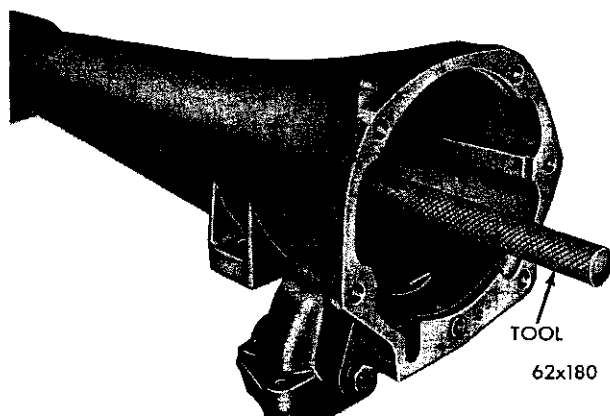


Fig. 35—Removing Output Shaft Bearing

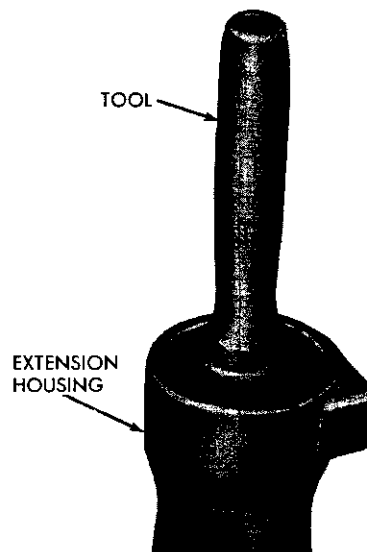


Fig. 36—Installing Output Shaft Bearing

housing (lip of seal facing inward). Using Tool C-3837, drive the seal into housing until tool bottoms (Fig. 34).

### Installation

(1) Using a new gasket, carefully slide the extension housing into place, install the retaining bolts and washers, tighten bolts to 24 foot-pounds torque.

(2) Install the crossmember, insulator and spring assembly. Tighten the crossmember attaching bolts to 75 foot-pounds torque. Lower the transmission so the extension housing rests on, and is aligned with the insulator. Install insulator to extension housing bolts and tighten to 35 foot-pounds torque.

(3) Install and adjust the parking lock cable. Refer to Paragraphs 7 and 11.

(4) Install the transmission flange and connect the propeller shaft. Refer to Paragraph 18, step 5.

(5) Install the speedometer drive pinion and sleeve.

(6) Add fluid to the transmission to bring up to proper level. Refer to Paragraph 8.

## 20. GOVERNOR

### Removal

(1) Remove the extension housing. See Paragraph 19.

(2) Using a screw driver carefully pry the snap ring from the weight end of governor valve shaft (Fig. 37). Slide the valve and shaft assembly out of the governor body.

(3) Remove the large snap ring from weight end



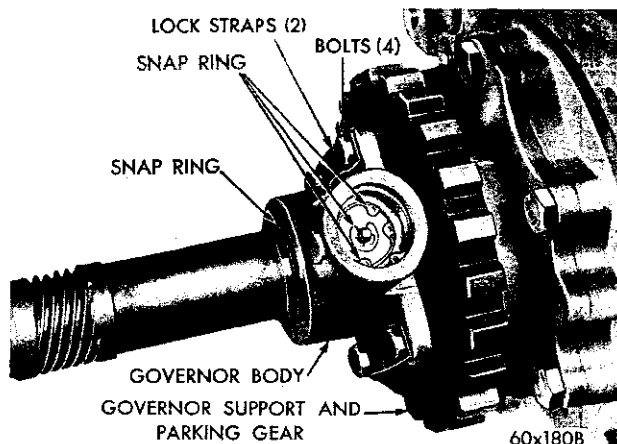


Fig. 37—Governor Shaft and Weight Snap Rings

of the governor body, lift out governor weight assembly.

(4) Remove the snap ring from inside the governor weight, remove the inner weight and spring from the outer weight. Figure 38 shows a disassembled view of the governor assembly.

(5) Remove the snap ring from behind the governor body, then slide the body and support assembly off the output shaft. If necessary remove four bolts and separate the governor from the support.

### Cleaning and Inspection

The primary cause of governor operating failure is due to a sticking governor valve or weights. Rough surfaces may be removed with crocus cloth. Thoroughly clean all parts in clean solvent and inspect for free movement before assembly.

### Installation

(1) Assemble the governor body to the support (if

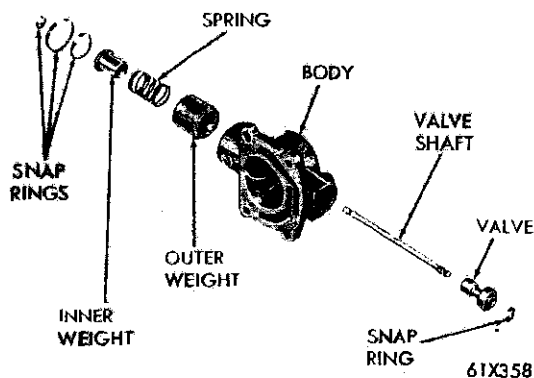


Fig. 38—Governor Assembly (Disassembled View)

disassembled) and tighten the bolts finger tight. Make sure oil passage of governor body aligns with passage in the support.

(2) Position the support and governor assembly on output shaft. Align the assembly so the governor valve shaft hole in governor body aligns with the hole in the output shaft, then slide the assembly into place. Install snap ring behind the governor body (Fig. 37). Tighten body to support bolts to 100 inch-pounds torque. Bend ends of lock straps over bolt heads.

(3) Assemble the governor weights and spring, and secure with snap ring inside of large governor weight. Place the weight assembly in the governor body and install snap ring.

(4) Place the governor valve on valve shaft, insert the assembly into body and through the governor weights. Install the valve shaft retaining snap ring. Inspect valve and weight assembly for free movement after installation.

(5) Install the extension housing, transmission flange and connect propeller shaft.

(6) Connect and adjust the parking lock cable. Refer to Paragraphs 7 and 11.

## 21. REAR OIL PUMP

### Removal

(1) Remove the extension housing. See Paragraph 19.

(2) Remove the governor and support. See Paragraph 20.

(3) Unscrew the rear oil pump cover retaining bolts and remove cover.

(4) The oil pump inner rotor is keyed to output shaft by a small ball, therefore, use care in sliding

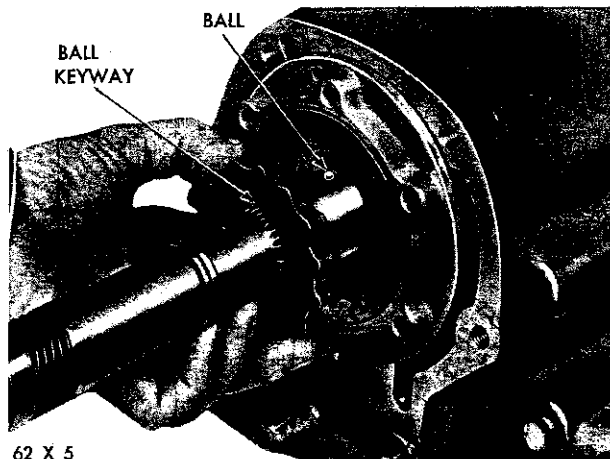


Fig. 39—Removing or Installing Rear Oil Pump Inner Rotor

out the inner rotor so as not to lose the ball (Fig. 39). Remove the outer rotor from the pump body.

**NOTE:** If the rear oil pump body requires replacement, it will be necessary to disassemble the transmission as the pump body must be driven rearward out of the case with a wood block.

### Inspection

Inspect the oil pump body and cover machine surfaces for nicks and burrs. Inspect the rotors for scoring or pitting. With the gears cleaned and installed in the pump body, place a straight edge across the face of rotors and pump body. Using a feeler gauge, measure the clearance between straight edge and face of rotors. Clearance limits are from .0015 to .003 inch.

### Installation

- (1) Place the outer rotor in the pump body.
- (2) Turn the output shaft so the inner rotor driving ball pocket is up. Install the ball and slide inner rotor on the output shaft in alignment with the ball and outer rotor (Fig. 39).
- (3) Install the oil pump cover with the retaining bolts threaded in a few turns. Slide the aligning fixture Tool C-3864 all the way in until it bottoms against rotors (Fig. 40), then retighten the cover bolts evenly to 140 inch-pounds torque.
- (4) Install the governor and support. See Paragraph 20.
- (5) Install the extension housing, transmission flange and connect the propeller shaft.
- (6) Connect the parking lock cable.

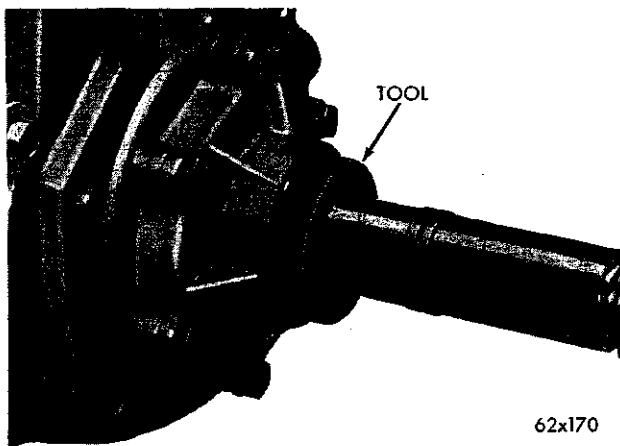


Fig. 40—Aligning Oil Pump Cover

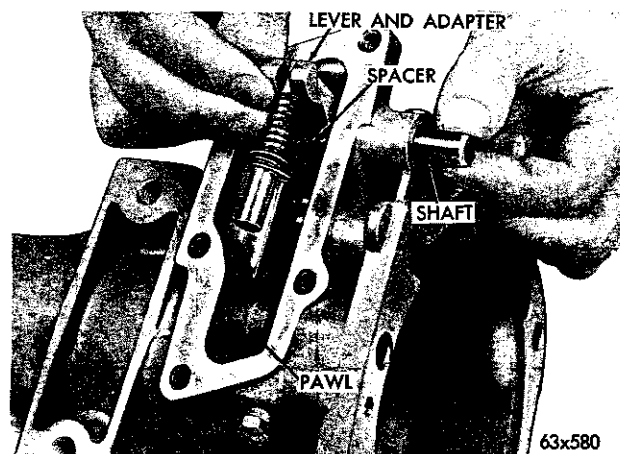


Fig. 41—Removing or Installing Parking Lock Lever and Cable Adapter

## 22. PARKING LOCK COMPONENTS

### Removal

- (1) Remove the extension housing. See Paragraph 19.
- (2) To replace the governor support, refer to Paragraph 20.
- (3) Remove the parking lock cable adapter cover from the bottom of the extension housing.
- (4) Remove the plug from the extension housing, slide out the shaft to remove the parking lock lever, shim and cable adapter (Fig. 41). Replace the adapter spring if it is distorted.
- (5) Slide the bushing sleeve out of the housing to remove the parking sprag and spring (Fig. 42).

### Installation

- (1) Position the sprag and spring in the housing

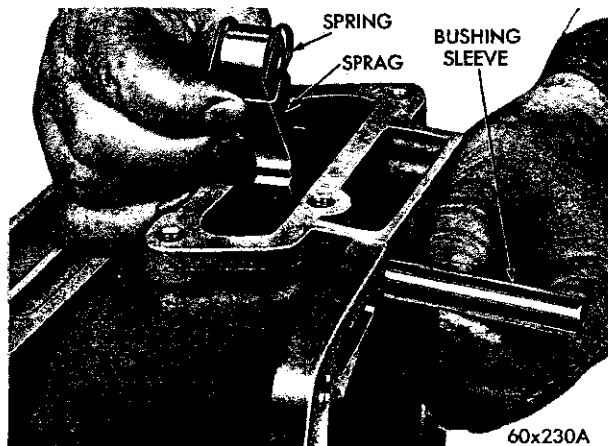


Fig. 42—Removing or Installing Parking Sprag

and insert the bushing sleeve (Fig. 42). Make sure the square lug on the sprag is toward the gear and the spring is positioned so as to lift the sprag away from the parking gear.

(2) Position the lock lever, shim and cable adapter assembly in the extension housing and install the lever shaft (Fig. 41). The lever roller must be on top of the sprag so as to push it into engagement with the parking gear. Install and tighten the plug to 150 inch-pounds torque.

(3) Insert a small punch through the cable opening in the adapter cover and into end of adapter. Carefully lower the cover into position, feeding the adapter into cable opening in the cover. Install the cover retaining screws and tighten to 150 inch-pounds torque.

(4) Install the extension housing, transmission flange and connect the propeller shaft.

(5) Connect the parking lock cable. See Paragraphs 7 and 11.

### 23. NEUTRAL STARTING SWITCH

#### Removal

(1) Drain approximately two quarts of fluid from the transmission.

(2) Disconnect wire from the switch and unscrew the switch from the transmission case.

#### Installation and Tests

(1) With proper gearshift control cable adjustment assured and N (neutral) button depressed, inspect to see that the switch operating lever is aligned in center of the switch opening in the case.

(2) Place the cupped washer and "O" ring over threads of the switch (Fig. 19), then screw the switch into transmission case a few turns.

(3) Connect one lead of a test lamp to battery current and the other lead to the switch terminal. Screw the switch into the transmission case until the lamp lights, then tighten the switch an additional  $\frac{1}{4}$  to  $\frac{3}{8}$  turn.

**NOTE: The switch must be tight enough to prevent oil leakage. If not, add a thin washer and readjust the switch. Do not tighten over 60 foot-pounds torque.**

(4) Remove the test lamp and connect the wire to the switch.

(5) Add fluid to transmission to bring up to proper level. Refer to Paragraph 8.

**NOTE: Test the starter for operating in all push button positions. If it should operate in any position other than neutral, readjust the gearshift control**

**cable. Refer to Paragraph 9. In some cases, it may be necessary to align the valve body neutral finger with the switch plunger. Refer to Paragraph 24.**

### 24. VALVE BODY ASSEMBLY AND ACCUMULATOR PISTON

#### Removal

(1) Remove the drain plug from the transmission oil pan and drain the transmission fluid.

(2) Remove the oil pan and gasket.

(3) Loosen clamp bolt and lift the throttle lever and washer off the transmission throttle lever shaft.

(4) Shift the manual lever into the 1 (low) position to expose the nut securing the cable adapter to the lever (Fig. 20). Remove nut and disengage the cable adapter from the manual lever.

(5) Place a drain pan under the transmission, then remove the ten hex-head valve body to transmission case bolts. Hold the valve body in position while removing the bolts.

(6) Lower the valve body assembly down out of the transmission, being careful not to cock the throttle lever shaft in the case hole or lose the accumulator spring.

(7) Withdraw the accumulator piston from the transmission case. Inspect the piston for scoring, check rings for wear or breakage. Replace as required.

**NOTE: Servicing the valve body assembly is outlined in Paragraph 31.**

#### Installation

(1) Clean mating surfaces and inspect for burrs on both the transmission case and valve body steel plate.

(2) Install the accumulator piston in the transmission case.

(3) Position the accumulator spring on the valve body.

(4) Carefully position the valve body assembly in the transmission case, install the retaining bolts and tighten finger tight. With the neutral starting switch installed, place the manual valve in the neutral position. Shift the valve body if necessary to center the neutral finger over the neutral switch plunger. Snug the bolts down evenly, then tighten to 100 inch-pounds torque.

(5) Connect the control cable adapter to the manual lever and install retaining nut.

(6) Install the seal, flat washer and throttle lever on throttle shaft. Tighten the clamping bolt. Check

the throttle lever for looseness by forcing it in both directions.

(7) Install the oil pan, using a new gasket.

(8) Add fluid to the transmission to bring it up to proper level. Refer to Paragraph 8.

## 25. TRANSMISSION AND CONVERTER REMOVAL AND INSTALLATION

The transmission and converter must be removed and installed as an assembly; otherwise, the converter drive plate, front pump bushing, and oil seal will be damaged. The drive plate will not support a load; therefore, none of the weight of the transmission should be allowed to rest on the plate during removal or installation.

### Removal

(1) Connect a Remote Control Starter Switch, Tool C-763 to the starter solenoid and position the switch so the engine can be rotated from under the vehicle.

(2) Disconnect the secondary (high tension) cable from the ignition coil.

(3) Place the parking lock lever in the OFF position, then raise the vehicle on a hoist or support with stands.

(4) Remove the cover plate from in front of converter assembly to provide access to the converter drain plug and mounting bolts.

(5) Rotate the engine with the Remote Control Switch to bring the drain plug to "6 o'clock" position. Drain the torque converter and transmission.

(6) Mark the converter and drive plate to aid in reassembly. The crankshaft flange bolt circle, the inner and outer circle of holes in the drive plate, and the four tapped holes in the front face of the converter all have one hole offset so these parts will be installed in the original position. This maintains the balance of the engine and converter.

(7) Rotate the engine with Remote Control Switch to locate two converter to drive plate bolts at "5 and 7 o'clock" positions. Remove the two bolts, rotate engine with switch and remove the other two bolts. Do not rotate converter or drive plate by prying with a screw driver or similar tool as the drive plate might become distorted. Also, the starter should never be engaged if the drive plate is not attached to the converter with at least one bolt or if the transmission case to engine block bolts have been loosened.

(8) Disconnect the negative (ground) cable from the battery.

(9) Remove the starting motor assembly.

(10) Disconnect the wire from the neutral starting switch.

(11) Remove the gearshift control cable to transmission adjusting wheel lock screw. Pull the gearshift cable out of the transmission case as far as possible, back off the adjusting wheel a few turns if necessary.

(12) Insert a small screwdriver above and slightly to the right of the gearshift cable (Fig. 14). Disengage the cable adapter lock spring by pushing the screwdriver handle to the right while pulling outward on the cable.

(13) Disconnect the throttle rod from the relay lever at left side of the transmission.

(14) Disconnect the oil cooler lines at the transmission and remove the oil filler tube.

(15) Remove the speedometer pinion and sleeve assembly from the transmission (Fig. 30).

(16) Loosen the transmission parking lock cable clamp bolt where cable enters the cover (Fig. 15). Remove the housing cover lower plug. Insert a screw driver through the hole, then gently exert pressure against projecting portion of the cable lock-spring and withdraw the lock cable.

(17) Disconnect the front universal joint and support the propeller shaft out of the way.

Imperial Models: Remove the propeller shaft center bearing housing bolts. Slide the front propeller shaft rearward to disengage the front universal joint from the front flange.

(18) Remove the engine rear mount insulator to extension housing bolts.

(19) Install engine support fixture, Tool C-3487 and raise the engine slightly.

(20) Remove the crossmember attaching bolts and remove crossmember.

(21) Place a transmission service jack under the transmission to support the assembly.

(22) Attach a small "C" clamp to edge of the con-

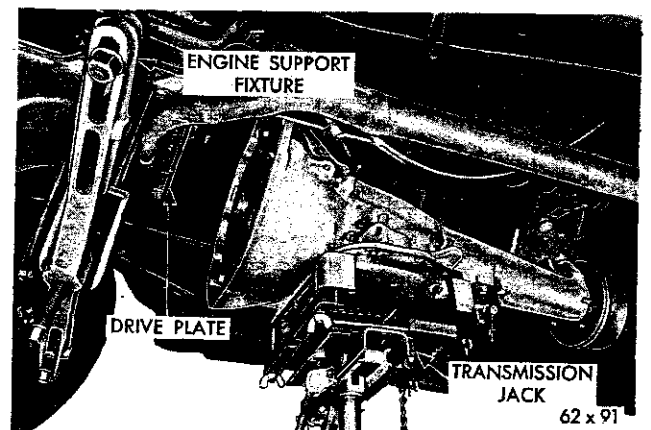


Fig. 43—Removing or Installing Transmission and Converter Assembly

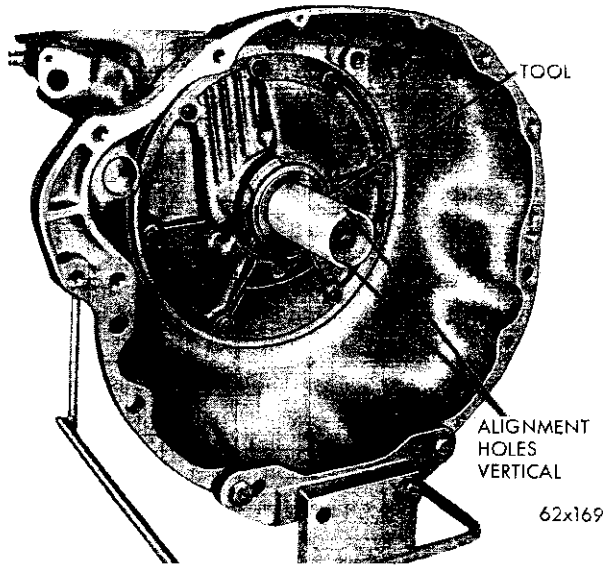


Fig. 44—Aligning Front Pump Rotors

verter housing to hold the converter in place during removal of the transmission.

(23) Remove the converter housing retaining bolts. Carefully work the transmission rearward off the engine block dowels and disengage the converter hub from the end of the crankshaft (Fig. 43).

(24) Lower the transmission jack and remove the transmission and converter assembly.

(25) To remove the converter assembly, remove the "C" clamp from the edge of the housing, then carefully slide the assembly out of the transmission.

**Converter Installation**

(1) Rotate the front pump rotors with Tool C-3881

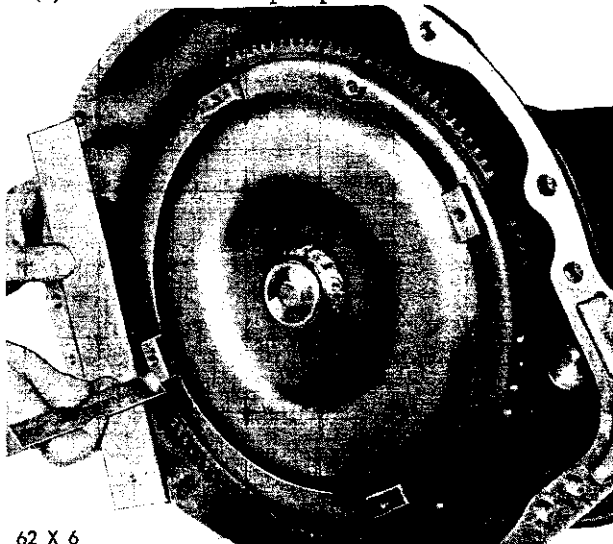


Fig. 45—Checking Converter for Full Engagement in Transmission

until the two small holes in the handle of Tool are vertical (Fig. 44).

(2) Carefully slide the converter assembly over the input shaft and reaction shaft. Make sure the converter impeller shaft slots are also vertical and fully engage the front pump inner rotor lugs.

Inspect for full engagement by placing a straight-edge on the face of the case (Fig. 45). The surface of the converter front cover lug should be at least 1/2 inch to the rear of the straightedge when the converter is pushed all the way into the transmission.

(3) Attach a small "C" clamp to the edge of the converter housing to hold the converter in place during transmission installation.

**Installation**

(1) Inspect the converter drive plate for distortion or cracks and replace if necessary.

(2) Coat the converter hub hole in the crankshaft with wheel bearing lubricant. Place the transmission and converter assembly on a service jack and position the assembly under the vehicle for installation. Raise or tilt as necessary until the transmission is aligned with the engine.

(3) Rotate the converter so mark on converter (made during removal) will align with mark on drive plate. The offset holes in the plate are located next to the 1/8 inch hole in the inner circle of the plate. A stamped V mark identifies the offset hole in the converter front cover (Fig. 46). Carefully work the

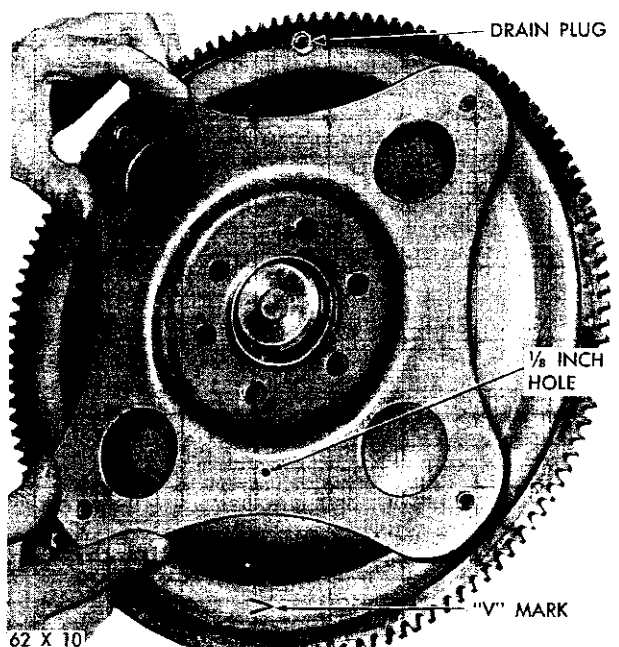


Fig. 46—Converter and Drive Plate Markings

transmission assembly forward over the engine block dowels with the converter hub entering the crankshaft opening.

(4) After the transmission is in position, install the converter housing bolts and tighten 25 to 30 foot-pounds torque.

(5) Install and tighten the two lower drive plate to converter bolts to 270 inch-pounds torque.

(6) Install the starting motor and connect battery ground cable.

(7) Rotate the engine with Remote Control Switch and install the other two drive plate to converter bolts. Tighten bolts to 270 inch-pounds torque.

(8) Install the crossmember and tighten attaching bolts securely. Lower the transmission so the extension housing is aligned and rests on the insulator. Install bolts and tighten to 35 foot-pounds torque.

(9) Insert a screw driver through parking lock cover plug opening and position it behind the cable adapter stop washer (Fig. 16). Hold the adapter outward while pushing the cable in as far as possible, making sure lock-spring engages cable. Gently pull outward on cable housing to its limit of travel, then tighten the clamp bolt to 10 inch-pounds torque. Remove the screw driver and reinstall the plug in cover.

(10) Connect the propeller shaft to the front flange.

Tighten the flange nuts to 35 foot-pounds torque.

Imperial Models: Place the propeller shaft center bearing housing shims under the housing, install the retaining bolts and tighten to 35 foot-pounds torque.

(11) Install the speedometer drive pinion and sleeve.

(12) Connect the oil cooler lines to the transmission. Install the oil filler tube.

(13) Connect the throttle rod to the relay lever at left side of the transmission.

(14) Have an assistant engage the R (reverse) button and hold it firmly depressed. Insert the push button control cable in transmission case, push inward on the cable making sure lock-spring engages the cable. Adjust the cable if necessary. Install the control cable adjusting wheel retaining screw.

(15) Connect the wire to the neutral starting switch.

(16) Install the cover plate in front of the converter assembly.

(17) Refill the transmission with Automatic Transmission Fluid, Type "A" Suffix "A".

**NOTE: To completely adjust the throttle linkage, push button control cable, and neutral starting switch, refer to "Maintenance, Adjustments and Tests". Paragraphs 9, 10 and 13.**

## RECONDITION TRANSMISSION UNIT OUT OF VEHICLE

The following reconditioning paragraphs cover the removal, disassembly, inspection, repair, assembly and installation procedures for each sub-assembly in detail.

In the event that any part has failed in the transmission, the torque converter should be flushed to insure that fine metal particles are not later transferred back into the reconditioned transmission.

### 26. FLUSHING THE TORQUE CONVERTER

The torque converter **must be removed** from the vehicle for flushing, as the converter should never be rotated by the starter with the transmission removed.

(1) Place the torque converter in an upright position and pour two quarts of new clean solvent or kerosene into the converter through the impeller hub.

(2) Turn and shake the converter so as to swirl the solvent through the internal parts. Turning the turbine and stator with transmission input and reaction shafts will aid in dislodging foreign material.

(3) Position the converter in its normal operating position with drain plug at the lowest point. Remove the drain plug and drain the solvent. Rotate the turbine and stator, and shake the converter while draining to prevent dirt particles from settling.

(4) Repeat the flushing operation at least once, or as many times as required until the solvent or kerosene drained out is clear.

(5) After flushing, shake and rotate the converter several times with drain plug out to remove any residual solvent and dirt. Flush any remaining solvent from the converter with two quarts of new transmission fluid. This will prevent any adverse effect the solvent may have on the transmission seals. Reinstall the drain plug and tighten to 14 foot-pounds torque.

### 27. ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils. Essentially, this repair consists of drilling out the worn or damaged threads, tapping

HELI-COIL INSERT			DRILL	TAP	INSERTING TOOL	EXTRACTING TOOL
Thread Size	Part No.	Insert Length	Size	Part No.	Part No.	Part No.
10-24	1185-3	.285"	$\frac{1}{4}$ " (.203")	3 CPB	528-3N	1227-6
$\frac{1}{4}$ -20	1185-4	$\frac{3}{8}$ "	$\frac{1}{4}$ " (.265")	4 CPB	528-4N	1227-6
$\frac{3}{16}$ -18	1185-5	$\frac{15}{32}$ "	Q (.332")	5 CPB	528-5N	1227-6
$\frac{3}{8}$ -16	1185-6	$\frac{1}{2}$ "	X (.397")	6 CPB	528-6N	1227-6

**NOTE:** Some thread drag may occur in screwing a bolt into the installed Heli-Coil insert. Therefore, a torque reading should be taken of the thread drag with an inch-pound torque wrench and added to the specified bolt torque, so that all bolts securing a particular part will be tightened to the same torque.

the hole with a special Heli-Coil Tap, and installing a Heli-Coil insert into the tapped hole. This brings the hole back to its original thread size.

The chart lists the threaded hole sizes which are used in the aluminum case and valve body, and the necessary tools and inserts for the repair of damaged or worn threads. Heli-Coil tools and inserts are readily available from most automotive parts jobbers.

### 28. FRONT PUMP OIL SEAL

#### Replacement

The front pump oil seal can be replaced without removing the front pump and reaction shaft support assembly from the transmission case.

- (1) Screw seal remover, Tool C-3861 into the seal (Fig. 47). Tighten the screw portion of tool to withdraw the seal.
- (2) To install a new seal, place the seal in the

opening of the pump housing (lip side facing inward). Using Tool C-3860, drive the seal into housing until tool bottoms (Fig. 48).

### 29. REMOVAL OF SUB-ASSEMBLIES

Prior to removing any of the transmission sub-assemblies, plug all openings and thoroughly clean the exterior of the unit, preferably by steam. Cleanliness through the entire disassembly and assembly cannot be over-emphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All of the mating surfaces in the transmission are accurately machined; therefore, careful handling of the parts must be exercised to avoid nicks or burrs.

#### Oil Pan

- (1) Place the transmission assembly in repair stand,

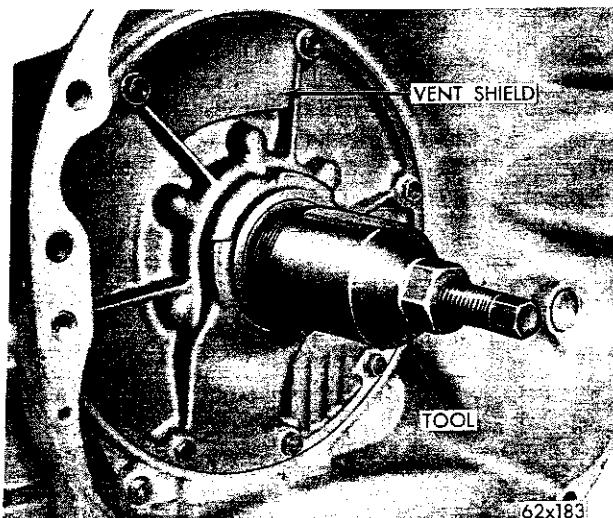


Fig. 47—Removing Front Pump Oil Seal

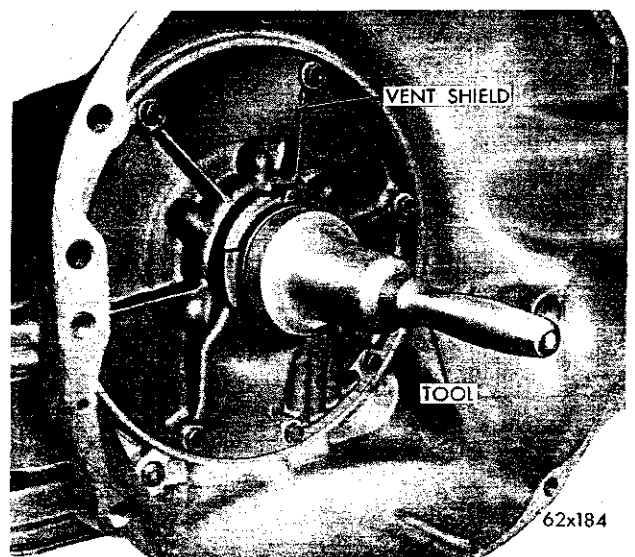


Fig. 48—Installing Front Pump Oil Seal

Tool C-3750 with adapter C-3882 (Fig. 49).

(2) Unscrew the oil pan bolts and remove the oil pan and gasket.

**Valve Body Assembly**

(1) Unscrew the retaining nut and remove the control cable adapter from the valve body manual lever (Fig. 20).

(2) Remove the ten hex-head valve body assembly to transmission case bolts (Fig. 20). Hold the valve body in position while removing the bolts.

(3) Lift the valve body assembly out of the transmission case, being careful not to cock the throttle lever shaft.

**Accumulator Piston and Spring**

(1) Lift the spring off the accumulator piston and withdraw the piston from the case.

**Measuring Drive Train End Play**

Measure the drive train end play before removal of the output shaft universal joint flange. This will usually indicate when a change in the thrust washer between the reaction shaft support and front clutch retainer is required to properly adjust end play during assembly (except when major parts are replaced).

(1) Attach a dial indicator to the transmission bell housing with its plunger seated against the end of input shaft (Fig. 50).

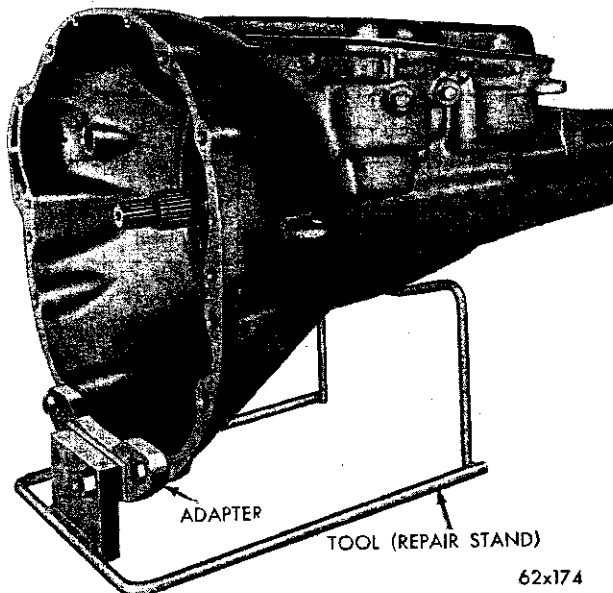


Fig. 49—Transmission Installed in Repair Stand

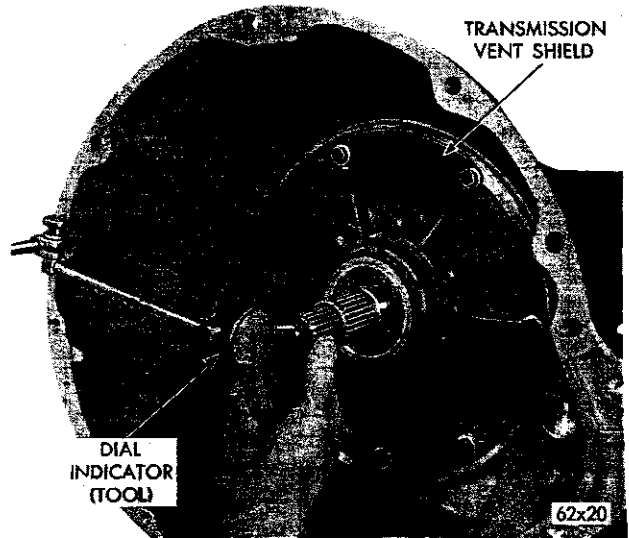


Fig. 50—Measuring Drive Train End Play

(2) Chuck the input shaft in and out to obtain end play reading.

(3) Record the indicator reading for reference when reassembling the transmission. End play specifications are .030-.070 inch.

**Extension Housing**

(1) Hold the transmission flange with Tool C-3281, and remove the retaining nut and washer (Fig. 32). Slide the flange off the output shaft. (Use puller, Tool C-452 if necessary).

(2) Remove the extension housing to transmission bolts, tap the housing lightly with a soft mallet to break it loose from the transmission, then carefully remove the housing.

**Governor and Support**

(1) Using a screw driver, carefully pry the snap ring from the weight end of governor valve shaft (Fig. 37). Slide the valve and shaft assembly out of the governor body.

(2) Remove the snap ring from behind the governor body, then slide the governor body and support assembly off the output shaft.

**Rear Oil Pump**

(1) Unscrew the rear oil pump cover retaining bolts and remove the cover.

(2) The oil pump inner rotor is keyed to the output shaft by a small ball. Therefore, (use care in sliding out the inner rotor so as not to lose the ball (Fig. 39). Remove the outer rotor from the pump body.



**NOTE:** If replacement of the rear oil pump body is required, drive it rearward out of the case with a wood block after the transmission has been disassembled.

### **Front Oil Pump and Reaction Shaft Support**

- (1) Remove the front oil pump housing retaining bolts.
- (2) Tighten the front band adjusting screw until the band is tight on the front clutch retainer. This prevents the clutch retainer from coming out with the pump which might cause unnecessary damage to the clutches.
- (3) Attach Tool C-3752 to the pump housing flange as shown in Figure 51, thread the screws of the tool into the flange holes at 9 and 3 to o'clock locations.
- (4) Bump outward evenly on the two "knocker weights" to withdraw the oil pump and reaction shaft support assembly from the case.

### **Front Band and Front Clutch**

- (1) Loosen the front band adjuster, remove the band strut and slide the band out of the case.
- (2) Slide the front clutch assembly out of the case.

### **Input Shaft and Rear Clutch**

- (1) Grasp the input shaft, and slide input shaft and rear clutch assembly out of the case.

**CAUTION:** Be careful not to lose the thrust washer located between the rear end of input shaft and forward end of output shaft.

### **Planetary Gear Assemblies, Sun Gear, Driving Shell**

- (1) While supporting the output shaft and driving shell, carefully slide the assembly forward and out through the case.

**CAUTION:** Be very careful not to damage the ground surfaces on the output shaft during removal.

### **Rear Band and Low-Reverse Drum**

- (1) Remove the low-reverse drum, then loosen the rear band adjuster, remove the band strut and remove the band from the case.

### **Overrunning Clutch**

- (1) Note the position of the overrunning clutch rollers and springs before disassembly to assist in reassembly.

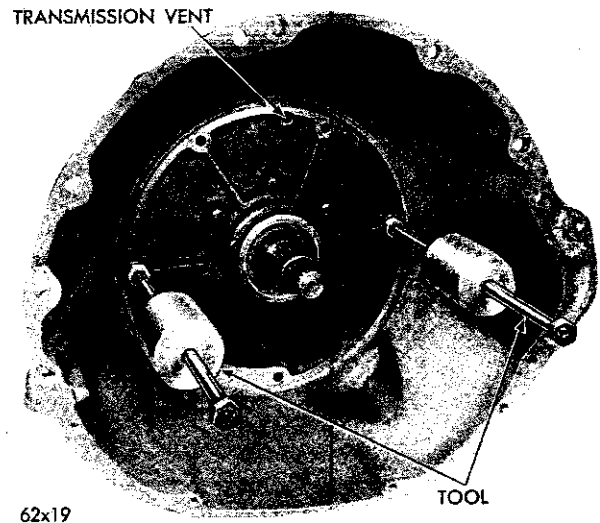


Fig. 51—Removing Front Oil Pump and Reaction Shaft Support Assembly

- (2) Carefully slide out the clutch hub and remove rollers and springs.

**NOTE:** If the overrunning clutch cam and/or roller spring retainer are found damaged or worn, refer to Paragraph 41 for replacement procedures.

### **Kickdown Servo**

- (1) Compress the kickdown servo spring by using "Engine Valve Spring Compressor Tool C-3422", then remove the snap ring (Fig. 52).

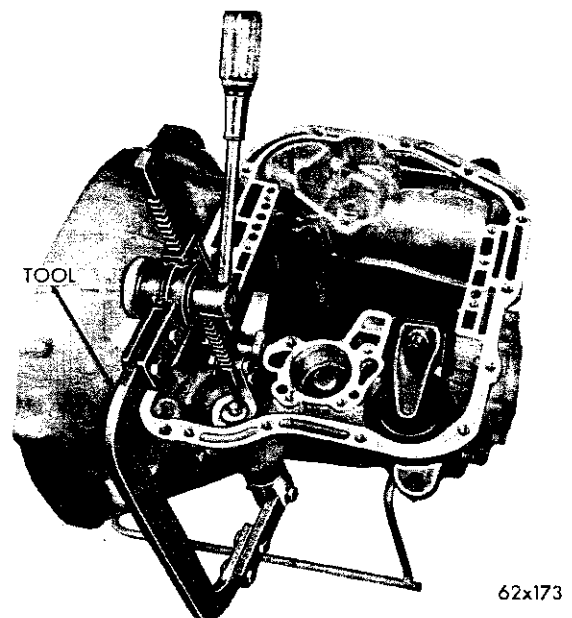


Fig. 52—Compressing Kickdown Servo Spring

## 21-50 TRANSMISSION

(2) Remove the rod guide, springs and piston rod from the case. Be careful not to damage the piston rod or guide during removal.

(3) Insert Tool C-484 inside piston and withdraw the piston from the transmission case.

### Low and Reverse Servo

(1) Compress the low and reverse servo piston spring by using "Engine Valve Spring Compressor Tool C-3422", then remove the snap ring.

(2) Remove the spring retainer, spring, and servo piston and plug assembly from the case.

## 30. RECONDITION SUB-ASSEMBLIES

The following procedures cover the disassembly, inspection, repair, and assembly of each sub-assembly as removed from the transmission.

Pre-sized service bushings are available for replacement for most all bushings in the TorqueFlite transmission. The two bushing in the sun gear are not serviced because of the low cost of the sun gear assembly. If the bushings are found worn or scored, they should be replaced as outlined in the following reconditioning procedures.

The bushing replacement tools listed by "SP" numbers are part of Tool Kit C-3887.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off the sharp edges. The sharp edge is vitally important to this type valve. Sharp edges prevent dirt and foreign matter from getting between the valve and body, thus reducing the possibilities of sticking. When it becomes necessary to recondition the transmission, and vehicle has accumulated considerable mileage, install new seal rings on parts requiring their usage.

**NOTE:** Coat each part with Automatic Transmission Fluid—Type "A", Suffix "A" during assembly.

## 31. VALVE BODY ASSEMBLY

### Disassembly

**NOTE:** Never clamp any portion of the valve body or transfer plate in a vise. Any slight distortion of the aluminum body or the transfer plate will result in sticking valves, excessive leakage or both. When removing or installing valves or plugs, slide them in or out carefully. Do not use force.

(1) Place the valve body assembly on a repair stand, Tool C-3749 (Fig. 53). Remove three screws from the oil screen and lift off the screen.

(2) While holding the spring retainer bracket firmly

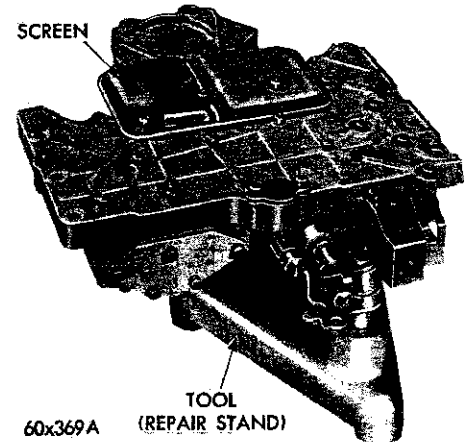


Fig. 53—Removing or Installing Oil Screen

against the spring force, remove the three bracket retaining screws (Fig. 54).

(3) Remove the spring bracket, torque converter control valve spring, and the regulator valve spring with line pressure adjusting screw assembly.

**NOTE:** Do not alter the setting of the line pressure adjusting screw and nut. The nut has an interference thread and does not turn easily on the screw.

(4) Slide the regulator valve out of the valve body. Slide the torque converter control valve out of the valve body.

(5) Remove the 14 transfer plate retaining screws. Carefully lift the transfer plate and steel plate assembly off the valve body.

(6) Invert the transfer plate assembly and remove the stiffener plate. Remove remaining screws securing

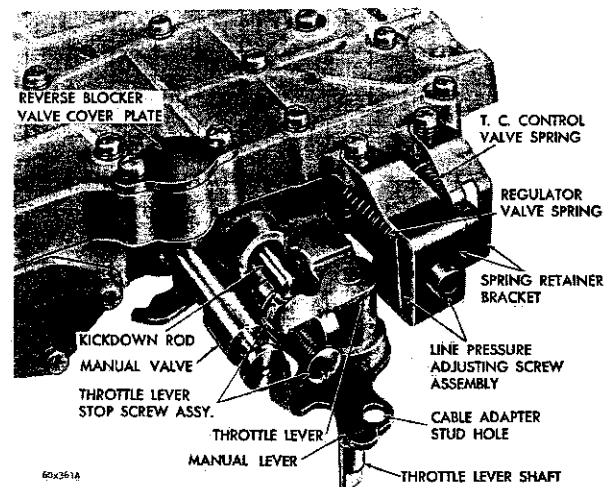


Fig. 54—Regulator and Converter Control Valves (Assembled View)

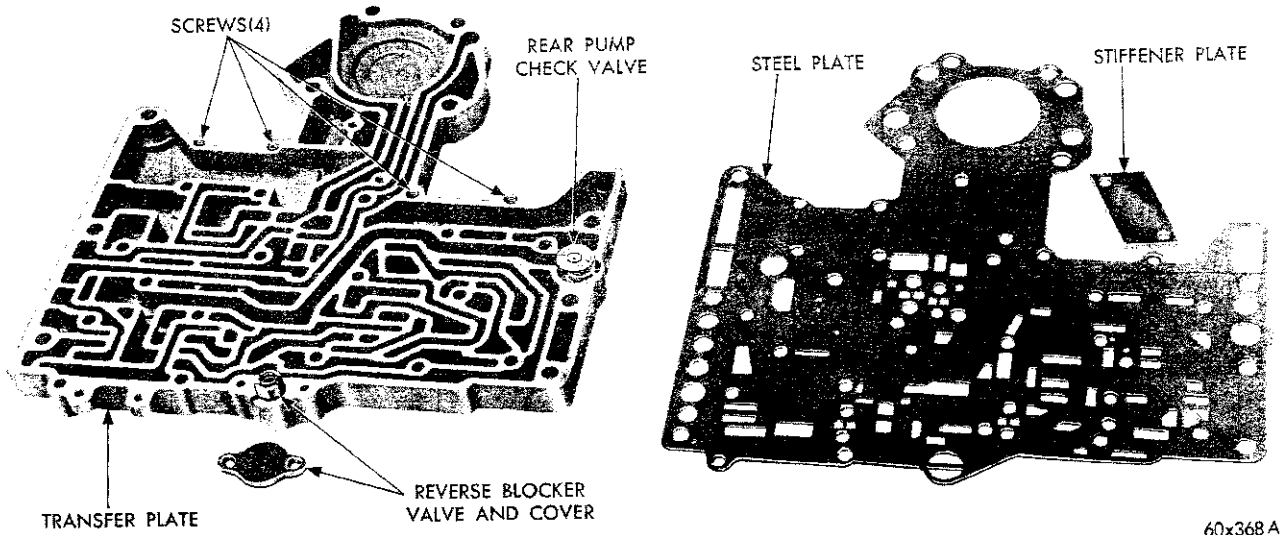


Fig. 55—Transfer and Steel Separator Plate Assembly (Disassembled View)

the steel plate to the transfer plate, and carefully lift off the steel plate (Fig. 55). Remove the rear pump check valve and spring.

(7) Remove the reverse blocker valve cover and lift out the spring and valve.

(8) Note location of the six steel balls in the valve body, one of them is larger than the other five and is in the larger chamber (Fig. 56). Remove the steel balls, front pump check valve and spring.

(9) Invert the valve body and lay it on a clean cloth or paper. Remove E-clip from the throttle lever shaft (Fig. 57). Remove any burrs from the shaft, then while holding the manual lever detent ball and

spring in their bore with Tool C-3765 or similar tool, slide the manual lever off the throttle shaft. Remove the detent ball and spring.

(10) Remove the manual valve, carefully slide it out of the valve body with a rotating motion.

(11) Remove throttle lever and shaft from the valve body.

(12) Remove the shuttle valve cover plate (Fig. 57). Remove E-clip from the exposed end of the shuttle valve.

(13) Remove the throttle lever stop screw assembly

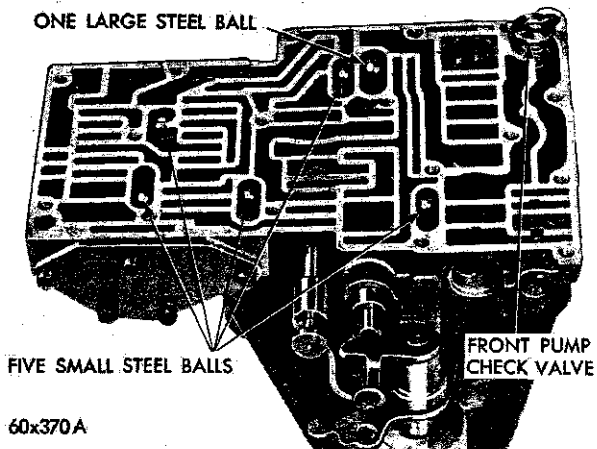


Fig. 56—Front Pump Check Valve and Steel Ball Locations

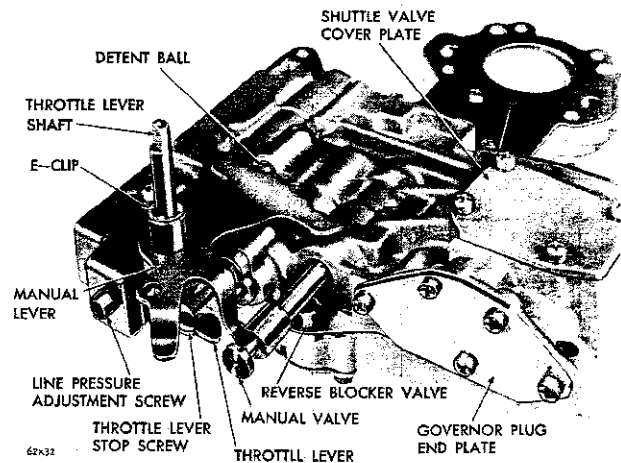


Fig. 57—Valve Body Controls (Assembled View)

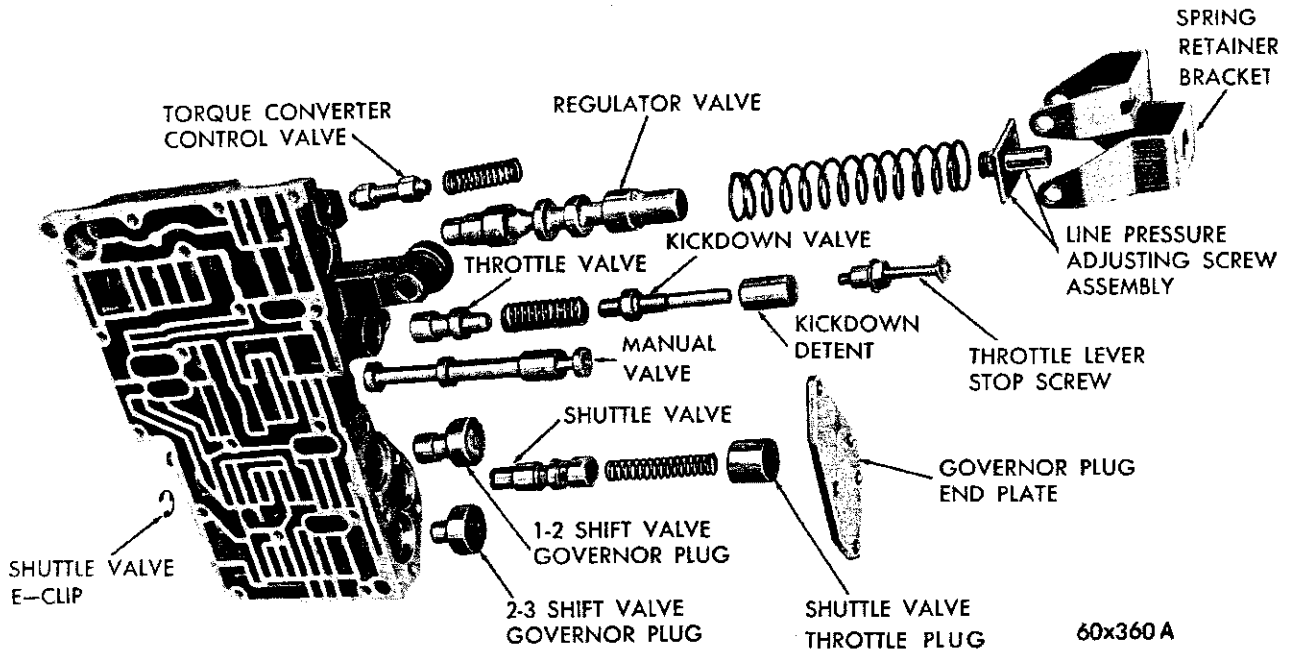


Fig. 58—Valve Body—Lever Side (Disassembled View)

(Fig. 58), be careful not to disturb the setting any more than is necessary.

(14) Remove the kickdown detent, kickdown valve, throttle valve spring and the throttle valve (Fig. 58).

(15) Remove the governor plug end plate (Fig. 58). Tip up the valve body to allow the shuttle valve, throttle plug, spring, shuttle valve, and the shift valve governor plugs to slide out into your hand.

Note the longer stem on the 1-2 shift valve plug as a means for identification.

(16) Remove the shift valve end plate (Fig. 59). and slide out the two springs and valves.

(17) Remove the regulator valve end plate. Slide the regulator valve line pressure plug, sleeve, and the regulator valve throttle pressure plug out of the valve body.

**Cleaning and Inspection**

Allow all parts to soak a few minutes in a suitable clean solvent. Wash thoroughly and blow dry with compressed air. Make sure all passages are clean and free from obstructions.

Inspect the manual and throttle valve operating levers and shafts for being bent, worn or loose. If a lever is loose on its shaft, it may be silver soldered only, or the lever and shaft assembly should be replaced.

**CAUTION:** Do not attempt to straighten bent levers.

Inspect all mating surfaces for burrs, nicks and scratches. Minor blemishes may be removed with crocus cloth, using only a very light pressure. Using straightedge, Tool C-3335, check all mating surfaces for warpage or distortion. Slight distortion may be corrected, using a surface plate. Make sure all metering holes in the steel plate are open. Using a pen light, inspect bores in the valve body for scores, scratches, pits and irregularities.

Inspect all valve springs for distortion and col-

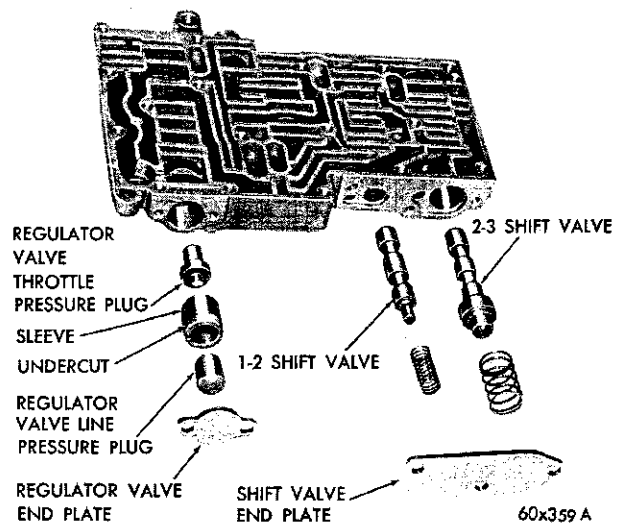


Fig. 59—Valve Body—Shift Valve Side (Disassembled View)

lapsed coils. Inspect all valves and plugs for burrs, nicks and scores. Small nicks and scores may be removed with crocus cloth, providing extreme care is taken not to round off sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between the valve and the valve body, thus reducing the possibility of sticking. Inspect all valves and plugs for freedom of operation in the valve body bores. When bores, valves and plugs are clean and dry, the valve and plugs should fall freely in the bores.

**NOTE:** The valve body bores do not change dimensionally with use. Therefore, a valve body that was functioning properly when the vehicle was new, will operate correctly if it is properly and thoroughly cleaned. There is no need to replace the valve body unless it is damaged in handling.

### Assembly

(1) Place the rear pump check valve and spring in the transfer plate (Fig. 55). Position the steel plate on the transfer plate, hold the rear pump check valve in its bore with a thin steel scale, and install four steel plate to transfer plate retaining screws. Make sure bolt holes in the steel plate and transfer plate are aligned, then tighten the screws evenly to 28 inch-pounds torque. Inspect the rear pump check valve for free movement in the transfer plate. Install the stiffener plate and tighten retaining screws to 28 inch-pounds torque.

(2) Turn transfer plate over and install the reverse blocker valve spring and valve (Fig. 55). Rotate the valve until it seats through the steel plate. Hold the valve down and install blocker valve cover plate. Tighten the two retaining screws to 28 inch-pounds torque.

(3) Place the 1-2 and 2-3 shift valve governor plugs in their respective bores (Fig. 58). Install the shuttle valve, spring and shuttle valve throttle plug. Install the governor plug end plate and tighten the five retaining screws to 28 inch-pounds torque.

(4) Install E-clip on end of the shuttle valve (Fig. 58). Install the shuttle valve cover plate and tighten the four retaining screws to 28 inch-pounds torque.

(5) Install the 1-2 and 2-3 shift valves and springs (Fig. 59). Install the shift valve end plate and tighten the three retaining screws to 28 inch-pounds torque.

(6) Install the regulator valve throttle pressure plug, sleeve (under cut on sleeve toward end plate), and the line pressure plug (Fig. 59). Install the regulator valve end plate and tighten the two retaining screws to 28 inch-pounds torque.

(7) Install the throttle valve and spring (Fig. 58).

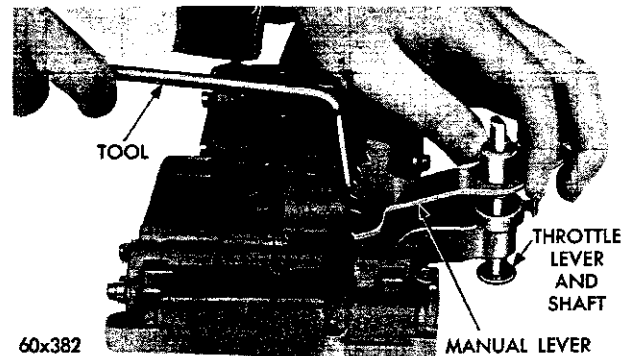


Fig. 60—Installing Detent Ball, Spring and Manual Valve

Slide the kickdown detent on kickdown valve (counterbore side of detent toward valve), then install the assembly in the valve body.

(8) Install the throttle lever stop screw (Fig. 58), and tighten lock nut finger tight.

(9) Install the manual valve in the valve body (Fig. 58).

(10) Install the throttle lever and shaft on the valve body (Fig. 60). Insert the detent spring and ball in its bore in the valve body. Depress the ball and spring with Tool C-3765 or similar tool and slide the manual lever over the throttle shaft so that it engages the manual valve and detent ball. Install the retaining E-clip on the throttle shaft.

(11) Position the valve body assembly on the holding stand.

(12) Place the six steel balls in the valve body chambers with large ball in the large chamber (Fig. 56). Place the front pump check valve and spring in valve body.

(13) Position the transfer plate assembly on the valve body. Hold the front pump check valve in its bore with a thin steel scale. Install the 14 retaining screws, starting at the center and working outward, tighten the screws to 28 inch-pounds torque.

(14) Install the torque converter valve and the regulator valve. (Fig. 58).

(15) Position the torque converter valve spring and regulator valve spring over the ends of their respective valves. Place the line pressure adjusting screw assembly on the end of the regulator valve spring with long dimension of nut at right angles to the valve body.

(16) Install the spring retainer bracket, making sure the converter valve spring is engaged on the tang and position squarely in the bracket. Tighten the three bracket retaining screws to 28 inch-pounds torque.

**NOTE:** Measure and if necessary, align the spring retainer bracket as described in Paragraph 15.

(17) Install the oil strainer and tighten the three retaining screws to 28 inch-pounds torque.

**NOTE:** After the valve body has been serviced and completely assembled, adjust the throttle and line pressures as outlined in Paragraph 15. However, if pressures were satisfactory prior to disassembly, use original settings.

### 32. ACCUMULATOR PISTON AND SPRING

#### Inspection

Inspect the two seal rings for wear and make sure they turn freely in the piston grooves. It is not necessary to remove rings unless condition warrants. Inspect the piston for nicks, burrs, scores and wear. Inspect the piston bore in the case for scores or other damage and the piston spring for distortion. Replace parts as required.

### 33. EXTENSION HOUSING BEARING AND OIL SEAL

#### Replacement

(1) Pry or drive the oil seal out of the extension housing with a long blunt drift. Be sure not to mar the oil seal surface in the extension housing.

(2) Remove the bearing snap ring from the extension housing.

(3) Drive the bearing rearward out of the extension housing with Tool C-3275 (Fig. 35).

(4) Place a new bearing in opening of the extension housing. Using Tool C-3204, drive the bearing into the housing (Fig. 36). Install the bearing retaining snap ring.

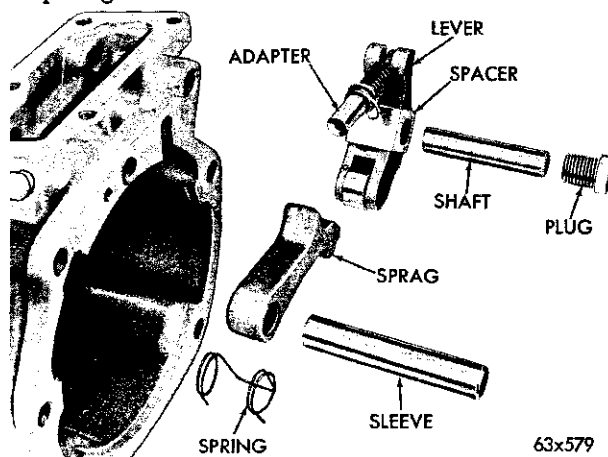


Fig. 61—Parking Lock Lever, Sprag and Cable Adapter (Disassembled)

(5) Place a new oil seal in the opening of the extension housing (lip of seal facing inward). Using Tool C-3837, drive the seal into housing until tool bottoms (Fig. 34).

### 34. PARKING SPRAG AND LEVER

#### Disassembly

(1) Remove the parking lock cable adapter cover from bottom of the extension housing.

(2) Remove the plug and slide the shaft out of the extension housing to remove the parking lock lever, adapter and shim (Fig. 41).

(3) Slide bushing sleeve out of housing to remove the sprag and spring (Fig. 42).

#### Inspection

Figure 61 shows the parking sprag and lever disassembled.

Inspect the bushing sleeve and shaft for scores and free movement in the housing, and in the sprag and lever and the roller for nicks, burrs, and free turning. Inspect the square lug on the parking sprag for broken edges or other damage. Replace as required.

#### Assembly

(1) Position the parking sprag and spring in the housing and insert the bushing sleeve (Fig. 42). Make sure the square lug on the sprag is toward the support gear, and the spring is positioned so as to lift the sprag away from the gear.

(2) Position the lock lever, adapter and shim in the housing and install the lever shaft (Fig. 41). The lever roller must be on top of the sprag so as to push it into engagement with the gear.

(3) Place a new adapter cover gasket on the extension housing, then insert a small punch through cable opening in the adapter cover and into end of the adapter. Carefully lower the cover into position, feeding the adapter into cable opening in the cover. Install the cover retaining screws and tighten to 150 inch-pounds torque.

### 35. GOVERNOR AND SUPPORT

#### Disassembly

(1) Remove the large snap ring from the weight end of the governor body and lift out the weight assembly.

(2) Remove the snap ring from inside the governor weight, remove inner weight and spring from the outer weight.

(3) If lugs on parking gear are damaged, remove

the four bolts and separate the support from the governor body.

### **Cleaning and Inspection**

Figure 38 shows a disassembled view of the governor assembly.

Inspect all parts for burrs and wear. Inspect the inner weight for free movement in the outer weight, and outer weight for free movement in the governor body. Inspect the valve for free movement in the governor body. The weights and valve should fall freely in the bores when clean and dry. Rough surfaces may be removed with crocus cloth.

Inspect the governor weight spring for distortion. Inspect the lugs on the parking gear for broken edges or other damage. Thoroughly clean all governor parts in clean solvent and inspect for free movement before assembly.

### **Assembly**

(1) If the support was separated from the governor body, assemble and tighten the bolts finger tight. Make sure oil passage of the governor body aligns with passage in the support.

(2) Assemble the governor weights and spring, and secure with snap ring inside of large governor weight. Place the weight assembly in governor body and install the snap ring.

## **36. REAR OIL PUMP**

### **Inspection**

Inspect the oil pump body and cover machined surfaces for nicks and burrs. Inspect the rotors for scoring or pitting. With the rotors cleaned and installed in the pump body, place a straight edge across face of rotors and pump body. Using a feeler gauge, measure the clearance between straight edge and face of the rotors. Clearance limits are from .0015 to .003 inch.

### **Rear Oil Pump Body Replacement**

If replacement of the rear oil pump body is required, drive it rearward out of the case with a wood block and hammer. The following procedures must be followed when installing a new rear oil pump body or reinstalling the original pump body to prevent pump body distortion.

(1) Screw two pilot studs, Tool C-3288 into the case to guide the pump body during installation.

(2) Chill the pump body in cold water or with ice. Quickly position the body over the pilot studs, and drive it firmly into the case with a wood block and hammer. Remove the pilot studs.

## **37. FRONT OIL PUMP AND REACTION SHAFT SUPPORT**

### **Disassembly**

Figure 62 shows the front oil pump and reaction shaft support disassembled.

(1) Remove bolts from the rear side of the reaction shaft support, remove the vent baffle and lift the support off the oil pump.

(2) Remove the rubber seal ring from the front pump body flange.

(3) Drive out the oil seal with a blunt punch.

### **Inspection**

Inspect the interlocking seal rings (Fig. 62) on the reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect the bushing and bore of the reaction shaft for wear. Inspect machined surfaces on the oil pump body and reaction shaft support for nicks and burrs. Inspect the oil pump rotors for scoring or pitting. With the rotors cleaned and installed in the pump body, place a straightedge across the face of the rotors and pump body. Using a feeler gauge, measure the clearance between the straight edge and face of the rotors. Clearance limits are from .001 to .0025 inch. Also, with a feeler gauge, measure the rotor tip clearance between the inner and outer rotor teeth. Clearance limits are from .007 to .012 inch.

### **Front Pump Bushing Replacement**

(1) Place the front pump housing on a clean smooth surface with the rotor cavity down.

(2) Place the removing head Tool SP-3550 in the bushing, and install the handle Tool SP-3549 in the removing head (Fig. 63).

(3) Drive the bushing straight down and out of the bore. Be careful not to cock the tool in the bore.

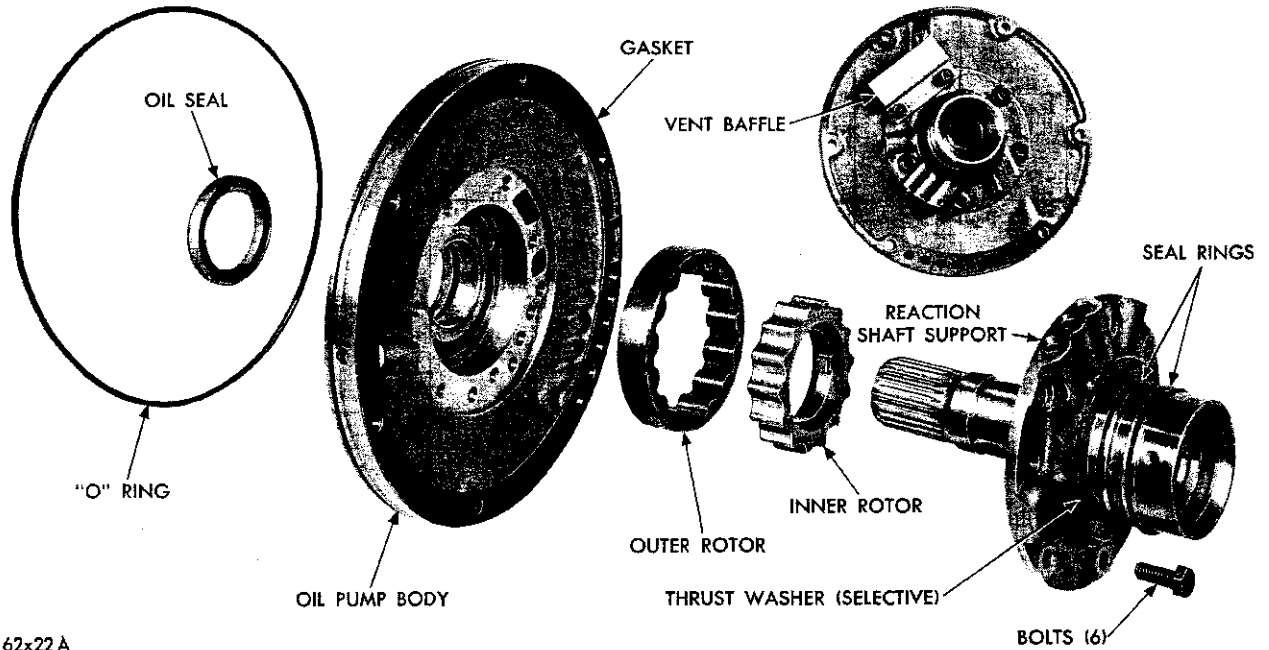
(4) Position a new bushing on the installing head Tool SP-3625.

(5) With the pump housing on a smooth clean surface (hub end down), start the bushing and installing head in the bushing bore. Install the handle Tool SP-3549 in the installing head (Fig. 63).

(6) Drive the bushing into the housing until the tool bottoms in the pump cavity. Be careful not to cock the tool during installation.

(7) Stake the bushing in place by using a blunt punch or similar tool (Fig. 64). A gentle tap at each stake slot location will suffice.

(8) Using a narrow-bladed knife or similar tool, remove the high points or burrs around the staked

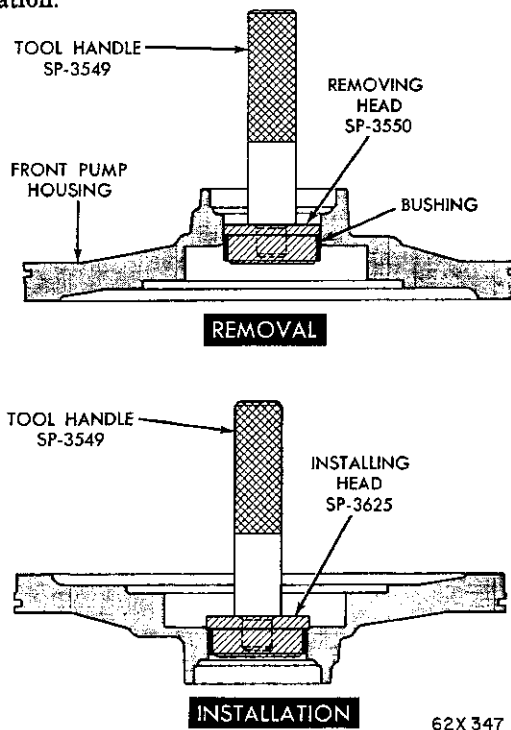


62x22 A

Fig. 62—Front Oil Pump and Reaction Shaft Support (Disassembled)

area (Fig. 64). Do not use a file or similar tool that will remove more metal than is necessary.

(9) Thoroughly clean the pump housing before installation.



62X 347

Fig. 63—Replacing Front Pump Bushing

**Reaction Shaft Bushing Replacement**

(1) Assemble the remover Tool SP-3632, the cup Tool SP-3633, and the hex nut Tool SP-1191.

**CAUTION:** Do not clamp any part of the reaction shaft or support in a vise.

(2) With the cup held firmly against the reaction shaft, thread the remover into the bushing as far as possible by hand (Fig. 65).

(3) Using a wrench, screw the remover into the bushing 3 to 4 additional turns to firmly engage the

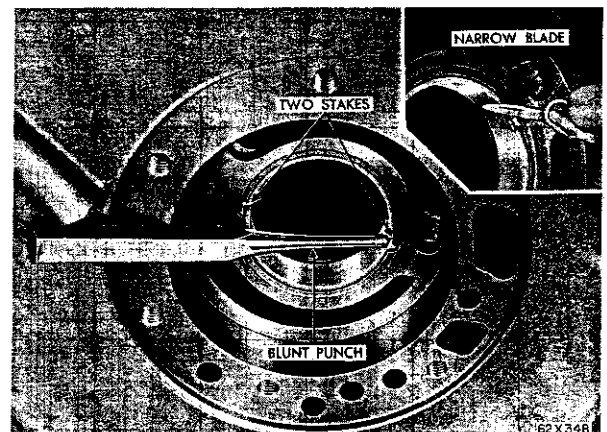


Fig. 64—Staking Front Pump Bushing



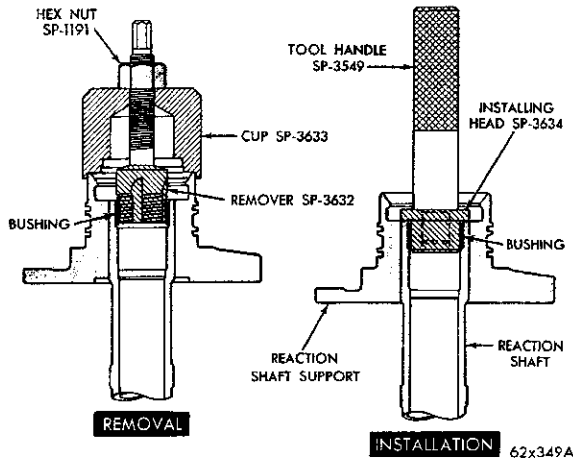


Fig. 65—Replacing Reaction Shaft Bushing

threads in the bushing.

(4) Turn the hex nut down against the cup to pull the bushing from the reaction shaft. Thoroughly clean the reaction shaft to remove the chips made by the remover threads.

(5) Lightly grip the bushing in a vise or with pliers and back the tool out of the bushing. Be careful not to damage the threads on the bushing remover.

(6) Slide a new bushing (chamfered end first) on the installing head Tool SP-3634, and start them in the bore of the reaction shaft.

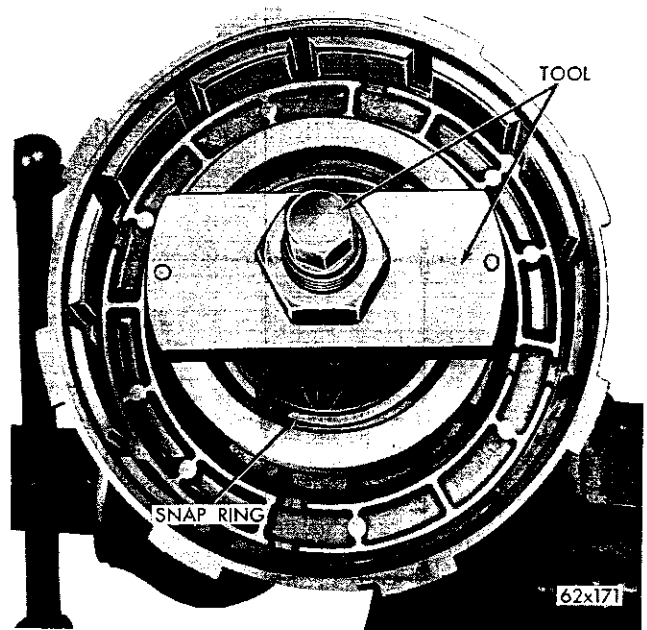


Fig. 67—Removing or Installing Front Clutch Spring Retainer Snap Ring

(7) Support the reaction shaft upright on a clean smooth surface and install handle Tool SP-3549 in the installing head (Fig. 65). Drive the bushing into the shaft until the tool bottoms.

(8) Thoroughly clean the reaction shaft support assembly before installation.

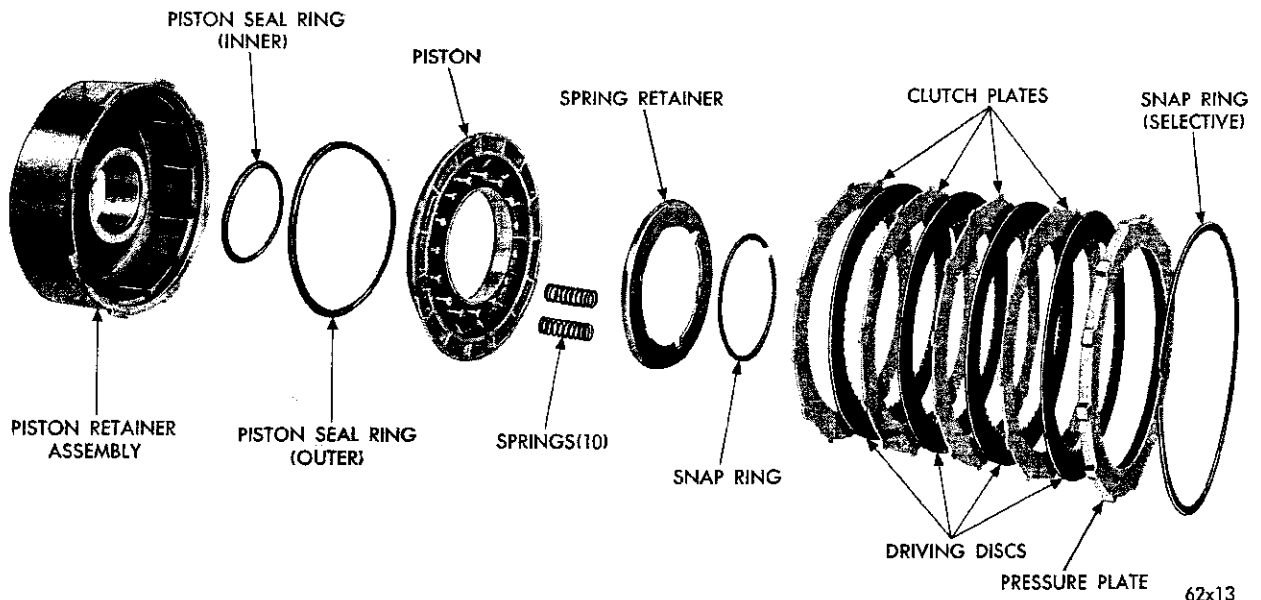


Fig. 66—Front Clutch Assembly (Disassembled View)

### Assembly

- (1) Assemble the pump rotors in the pump housing (Fig. 62).
- (2) Install the reaction shaft support and position the vent baffle over the vent opening. Install the retaining bolts and tighten to 150 inch-pounds torque.
- (3) Place a new oil seal in the opening of the front oil pump housing (lip of seal facing inward) using Tool C-3860 drive the seal into housing until tool bottoms.

## 38. FRONT CLUTCH

### Disassembly

Figure 66 shows a disassembled view of the front clutch assembly.

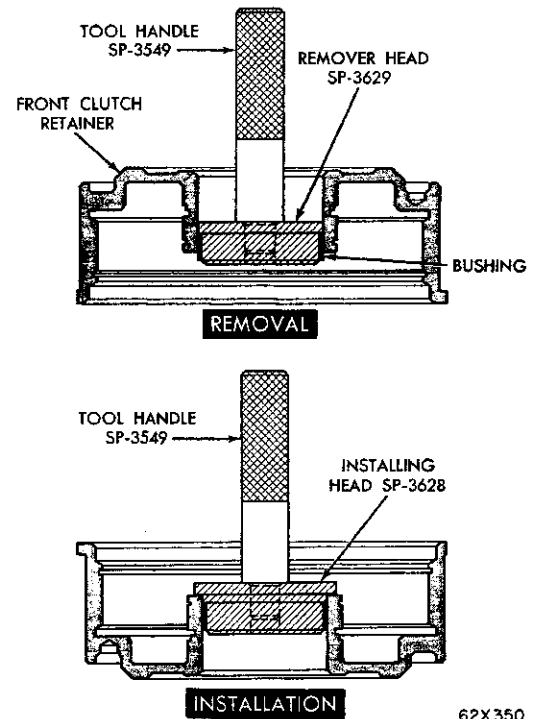
- (1) Using a screw driver, remove the large snap ring that secures the pressure plate in the clutch piston retainer. Lift the pressure plate and clutch plates out of the retainer.
- (2) Install compressor, Tool C-3863 over the piston spring retainer as shown in Figure 67. Compress the springs and remove the snap ring, then slowly release the tool until the spring retainer is free of the hub. Remove the tool, retainer and springs.
- (3) Invert the clutch retainer assembly and bump on a wood block to remove the piston. Remove the seals from the piston and clutch retainer hub.

### Inspection

Inspect the facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if the facing material can be scraped off easily. Inspect the driving disc splines for wear or other damage. Inspect the steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect the steel plate lug grooves in the clutch retainer for smooth surfaces, plates must travel freely in the grooves. Inspect the band contacting surface on the clutch retainer for scores. Note the ball check in the clutch retainer, make sure the ball moves freely. Inspect the seal surfaces in the clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene rings. Inspect the clutch retainer bushing for wear or scores.

Inspect the inside bore of the piston for score marks, if light, remove with crocus cloth. Check the seal grooves for nicks and burrs. Inspect the neoprene seals for deterioration, wear, and hardness, and the piston springs, retainer and snap ring for distortion.



62X350

Fig. 68—Replacing Front Clutch Retainer Bushing

### Front Clutch Retainer Bushing Replacement

- (1) Lay the clutch retainer (open end down) on a clean smooth surface and place the removing head Tool SP-3629 in the bushing. Install the handle Tool SP-3549 in the removing head (Fig. 68).
- (2) Drive the bushing straight down and out of the clutch retainer bore. Be careful not to cock the tool in the bore.
- (3) Lay the clutch retainer (open end up) on a clean smooth surface. Slide a new bushing on the installing head Tool SP-3628, and start them in the clutch retainer bore.
- (4) Install handle Tool SP-3549 in the installer (Fig. 68). Drive the bushing into the clutch retainer until the tool bottoms.
- (5) Thoroughly clean the clutch retainer before assembly and installation.

### Assembly

- (1) Lubricate and install the inner seal on hub of the clutch retainer. Make sure lip of the seal faces down and is properly seated in the groove.
- (2) Install the outer seal on the clutch piston, with lip of seal toward bottom of the clutch retainer. Apply a coating of "Door Ease" to the outer edge of

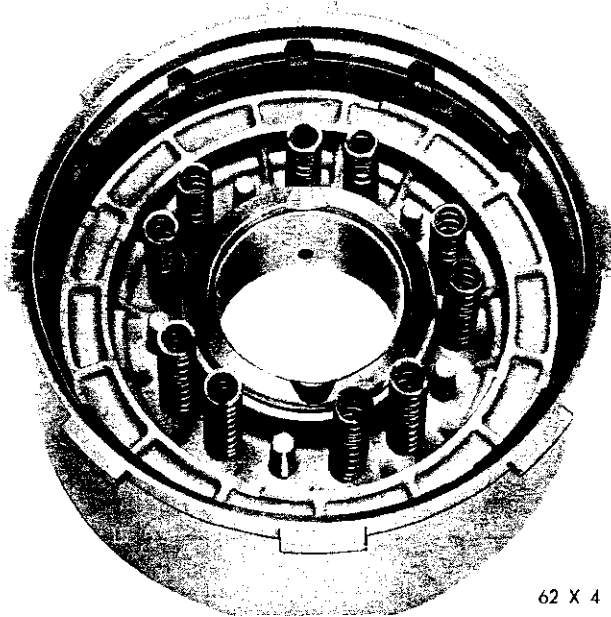


Fig. 69—Front Clutch Return Springs—Location

the seal for easier installation of the piston assembly. Place the piston assembly in retainer and carefully seat the piston in bottom of the retainer.

(3) Place the 10 springs on piston hub exactly as shown in Figure 69. Position the spring retainer and snap ring on the springs. Compress springs with Tool C-3863 (Fig. 67), and seat snap ring in the hub groove. Remove the compressor tool.

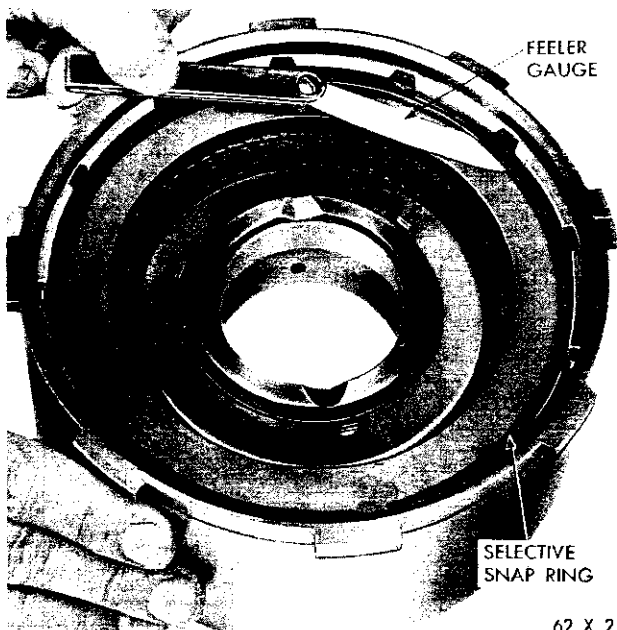


Fig. 70—Checking Front Clutch Plate Clearance

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate until all plates are installed. Install the pressure plate and snap ring. Make sure the snap ring is properly seated.

(5) With the front clutch completely assembled, insert a feeler gauge between the pressure plate and snap ring (Fig. 70). The clearance should be .024 to .123 inch. If not, install a snap ring of proper thickness to obtain the specified clearance.

**NOTE:** Snap rings are the same as that used in the rear clutch and are available in .060-.062, .074-.076 and .088-.090 inch thickness.

### 39. REAR CLUTCH

#### Disassembly

Figure 71 shows a disassembled view of the rear clutch assembly.

(1) Using a screw driver, remove the large snap ring that secures the pressure plate in the clutch retainer. Lift the pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Remove the piston spring snap ring and remove the spring.

(3) Invert the clutch piston retainer assembly and bump on a wood block to remove the piston. Remove seals from the piston.

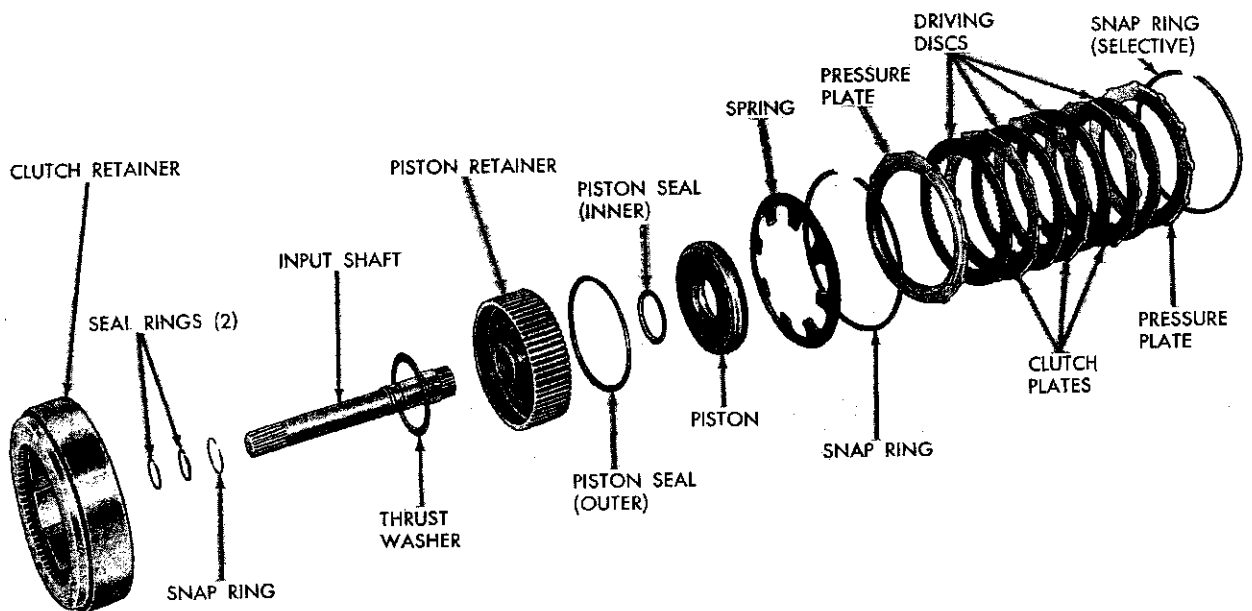
(4) If necessary, remove the snap ring and press the input shaft from the clutch piston retainer.

#### Inspection

Inspect the facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if the facing material can be scraped off easily. Inspect the driving disc splines for wear or other damage. Inspect the steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect the steel plate lug grooves in the clutch retainer for smooth surfaces, plates must travel freely in grooves. Note the ball check in the piston, make sure the ball moves freely. Inspect the seal surfaces in the clutch retainer for nicks or deep scratches, light scratches will not interfere with sealing of neoprene seals. Inspect the neoprene seals for deterioration, wear, and hardness, and the piston spring and snap rings for distortion.

Inspect the inter locking seal rings (Fig. 71) on the input shaft for wear or broken locks, make sure they turn freely in the grooves. Do not remove the rings unless conditions warrant. Inspect the bushing in the input shaft for wear or scores. Inspect the rear



62x165

Fig. 71—Rear Clutch Assembly (Disassembled View)

clutch to front clutch thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary.

### Input Shaft Bushing Replacement

(1) Clamp the input shaft in a vise with soft jaws, being careful not to clamp on the seal ring lands or journals.

(2) Assemble the remover Tool SP-3630, the cup Tool SP-3633, and the hex nut Tool SP-1191.

(3) With the cup held firmly against the clutch piston retainer, thread the remover into the bushing as far as possible by hand (Fig. 72).

(4) Using a wrench, screw the remover into the bushing 3 to 4 additional turns to firmly engage the threads in the bushing.

(5) Turn the hex nut down against the cup to pull the bushing from the input shaft.

(6) Thoroughly clean the input shaft to remove the chips made by the remover threads. Make certain the small lubrication hole next to the ball in the end of the shaft is not plugged with chips. Be sure no chips are lodged next to the steel ball.

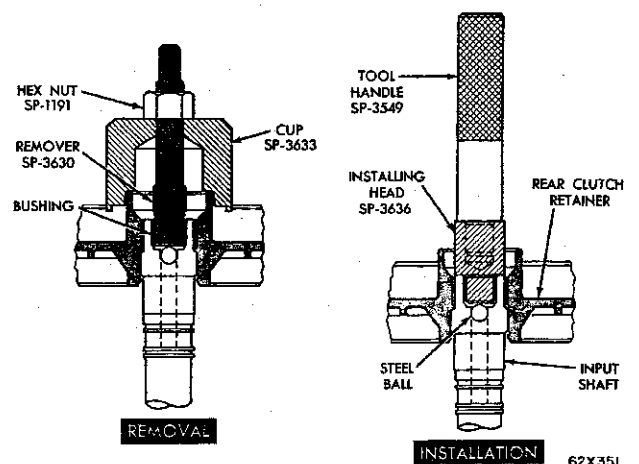
(7) Slide a new bushing on the installing head Tool SP-3636, and start them in the bore of the input shaft.

(8) Stand the input shaft upright on a clean smooth surface and install handle Tool SP-3549 in the installing head (Fig. 72). Drive the bushing into the shaft until the tool bottoms.

(9) Thoroughly clean the input shaft and clutch piston retainer before assembly and installation.

### Assembly

(1) If removed, press the input shaft into the clutch



62X351

Fig. 72—Replacing Input Shaft Bushing

piston retainer and install the snap ring.

(2) Lubricate and install the inner and outer seal rings on the clutch piston. Make sure lip of seals face toward head of the clutch retainer, and are properly seated in the piston grooves.

(3) Place the piston assembly in the retainer and, with a twisting motion, seat the piston in bottom of the retainer.

(4) Position the clutch retainer over the piston retainer splines and support the assembly so the clutch retainer remains in place.

(5) Place spring over the piston with outer edge of spring positioned below the snap ring groove. Start one end of snap ring in the groove, make sure the spring is exactly centered on the piston, then progressively tap the snap ring into the groove (Fig. 73). Be sure the snap ring is fully seated in the groove.

(6) Install the inner pressure plate in the clutch retainer with raised portion of plate resting on the spring.

(7) Lubricate all clutch plates, install one lined plate followed by a steel plate until all plates are installed. Install the outer pressure plate and snap ring.

(8) With the rear clutch completely assembled, insert a feeler gauge between the pressure plate and

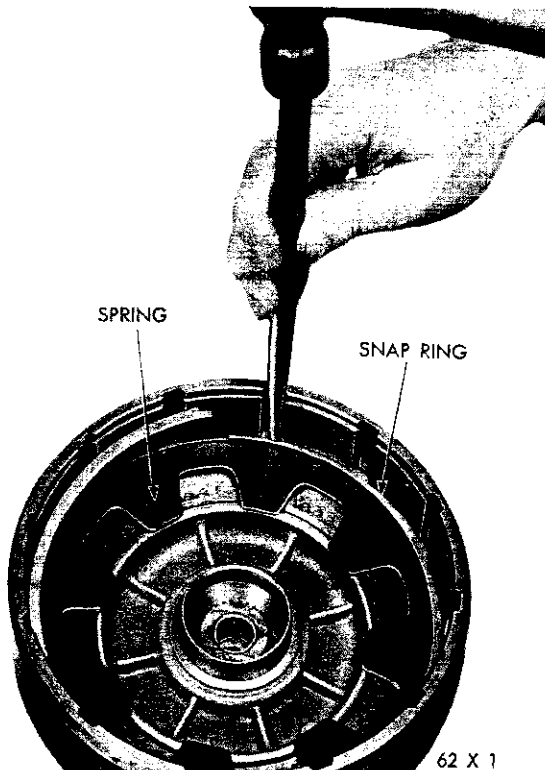


Fig. 73—Installing Rear Clutch Spring and Snap Ring

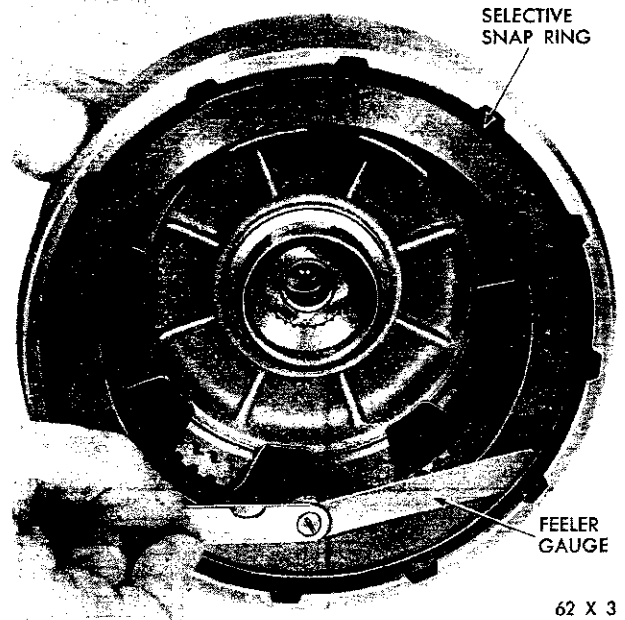


Fig. 74—Checking Rear Clutch Plate Clearance

snap ring (Fig. 74). The clearance should be .026-.054 inch. If not, install a snap ring of proper thickness to obtain the specified clearance. Low limit clearances are desirable.

**NOTE:** Rear clutch plate clearance is very important in obtaining proper clutch operation. The clearance can be adjusted by the use of various thickness outer

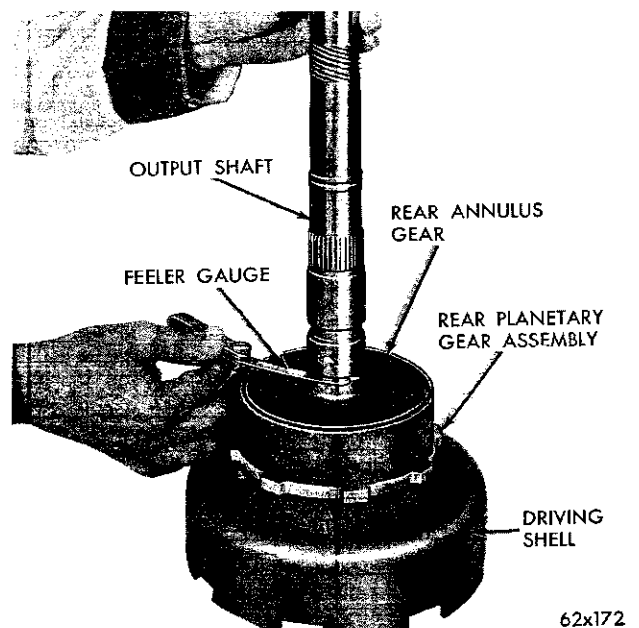


Fig. 75—Measuring End Play of Planetary Gear Assemblies, Sun Gear and Driving Shell

snap rings. Snap rings are available in .060-.062, .074-.076 and .088-.090 inch thickness.

#### 40. PLANETARY GEAR ASSEMBLIES, SUN GEAR, DRIVING SHELL

Measure the end play of the planetary gear assemblies, sun gear and driving shell before removing these parts from the output shaft. With the assembly in an upright position, push the rear annulus gear support downward on the output shaft. Insert a feeler gauge between the rear annulus gear support hub and the shoulder on the output shaft (Fig. 75). The clearance should be .012 to .055 inch.

#### Disassembly

- (1) Remove the thrust washer from forward end of the output shaft (Fig. 76).
- (2) Remove the snap ring from forward end of the output shaft, then slide the front planetary assembly off the shaft.
- (3) Slide the front annulus gear off the planetary gear set (Fig. 76). Remove the thrust washer from rear side of the planetary gear set.
- (4) Slide the sun gear, driving shell, rear planetary assembly with low and reverse drum off the output shaft.

(5) Lift the sun gear and driving shell off the rear planetary gear assembly. Remove the thrust washer from inside the driving shell. Remove snap ring and steel washer from the sun gear (rear side of driving shell) and slide the sun gear out of the shell. Remove front snap ring from the sun gear if necessary. Note that the front end of the sun gear is longer than the rear.

(6) Remove the thrust washer from forward side of the rear planetary gear assembly, remove the planetary gear set from the rear annulus gear.

#### Inspection

Inspect bearing surfaces on the output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect the speedometer drive gear for any nicks or burrs, and remove with a sharp edged stone. Make sure all oil passages in the shaft are open and clean.

Inspect the bushings in the sun gear for wear or scores, replace the sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect the thrust faces of the planetary gear carriers for wear, scores or other damage, replace as required. Inspect the planetary gear carrier for

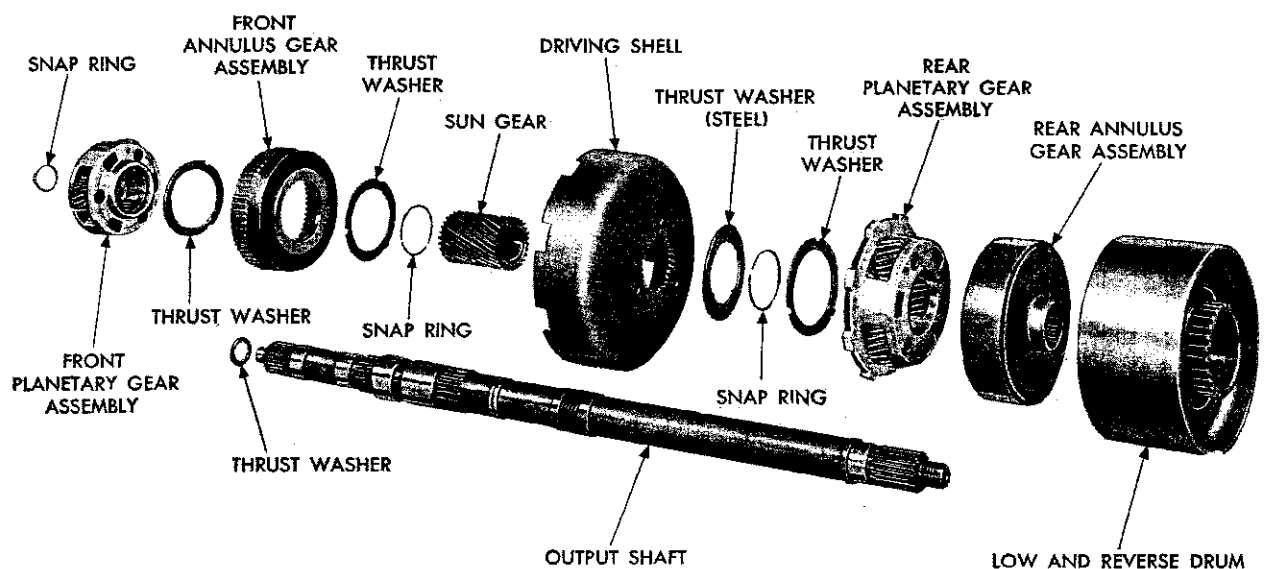


Fig. 76—Planetary Gear Assemblies, Sun Gear, Driving Shell, Low and Reverse Drum and Output Shaft (Disassembled View)

cracks and pinions for broken or worn gear teeth and for broken pinion shaft lock pins. Inspect the annulus gear and driving gear teeth for damage. Replace distorted lock rings.

### Assembly

Refer to Figure 76 for parts reference.

(1) Position the rear planetary gear assembly in the rear annulus gear. Place the thrust washer on front side of the planetary gear assembly.

(2) Insert the output shaft in rear opening of the rear annulus gear. Carefully work the shaft through the annulus gear and planetary gear assembly. Make sure the shaft splines are fully engaged in splines of the annulus gear.

(3) Install the snap ring in front groove of the sun gear (long end of gear). Insert the sun gear through the front side of the driving shell, install the rear steel washer and snap ring.

(4) Carefully slide the driving shell and sun gear assembly on the output shaft, engaging sun gear teeth with the rear planetary pinion teeth. Place thrust washer inside the front of the driving shell.

(5) Place thrust washer on the rear hub of the front planetary gear set, then slide the assembly into the front annulus gear.

(6) Carefully work the front planetary and annulus gear assembly on the output shaft, meshing planetary pinions with the sun gear teeth.

(7) With all components properly positioned, install retaining snap ring on front end of the output shaft.

## 41. OVERRUNNING CLUTCH

### Inspection

Inspect the clutch rollers for smooth round surfaces, they must be free of flat spots and chipped edges. Inspect the roller contacting surfaces in the cam and race for brinelling. Inspect the roller springs for distortion, wear or other damage. Inspect the cam set screw for tightness. If loose, tighten and restake the case around the screw.

### Overrunning Clutch Cam Replacement

If the overrunning clutch cam and/or the roller spring retainer are found damaged, replace the cam and spring retainer in the following manner:

(1) Remove set screw from the case below the clutch cam.

(2) Insert a punch through the pump body bolt holes and drive the cam from the case (Fig. 77).

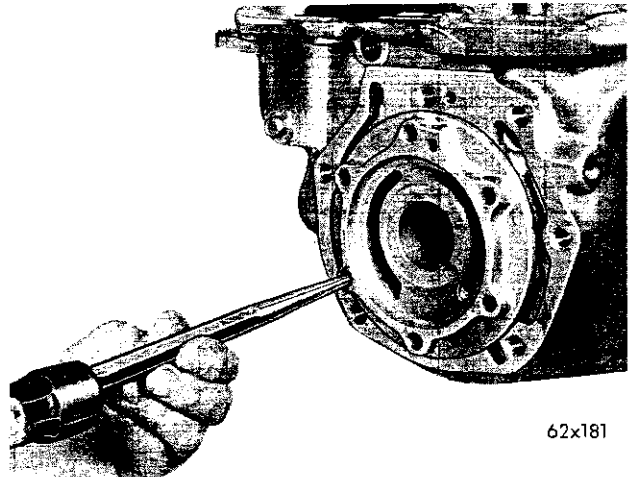


Fig. 77—Removing Overrunning Clutch Cam

Alternate the punch from one bolt hole to another so the cam will be driven evenly from the case.

(3) Clean all burrs and chips from the cam area in the case.

(4) Place the spring retainer on the cam, making sure the retainer lugs snap firmly into the notches on the cam.

(5) Position the cam in the case with cam serrations aligned with those in the case. Tap the cam **evenly** into the case as far as possible with a soft mallet.

(6) Install Tool C-3863, as shown in Figure 78, tighten nut on the tool to seat the cam into the case. Make sure the cam is firmly bottomed, then install the cam retaining set screw. Stake the case around the set screw to prevent it from coming loose.

## 42. KICKDOWN SERVO AND BAND

### Inspection

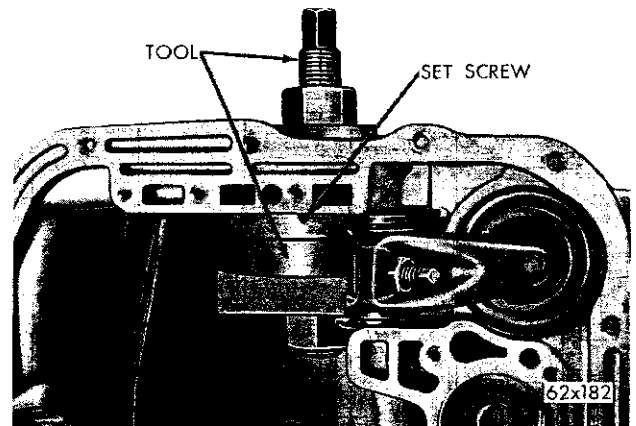


Fig. 78—Installing Overrunning Clutch Cam

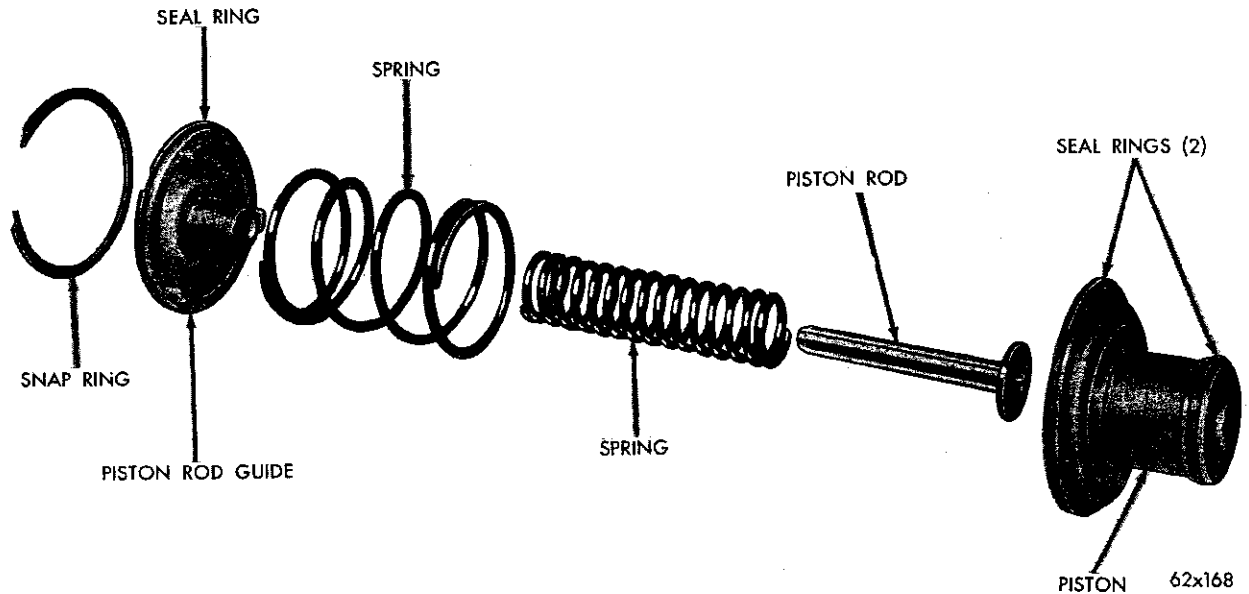


Fig. 79—Kickdown Servo (Disassembled View)

Figure 79 shows a disassembled view of the kick-down servo assembly.

Inspect the piston and guide seal rings for wear, and make sure they turn freely in the grooves. It is not necessary to remove the seal rings unless conditions warrant. Inspect the piston for nicks, burrs, scores and wear and the piston bore in the case for scores or other damage. Inspect the fit of the guide on the piston rod and the piston spring for distortion.

Inspect the band lining for wear and bond of lining to the band and the lining for black burn marks, glazing, non-uniform wear pattern and flaking. If the lining is worn so grooves are not visible at the ends or any portion of the band, replace the band. Inspect the band for distortion or cracked ends.

### 43. LOW AND REVERSE SERVO AND BAND

#### Disassembly

(1) Remove the snap ring from the piston and remove the piston plug and spring (Fig. 80).

#### Inspection

Inspect the seal for deterioration, wear and hardness and the piston and piston plug for nicks, burrs, scores and wear; piston plug must operate freely in the piston. Inspect the piston bore in the case for scores or other damage and the springs for distortion. Inspect the band lining for wear and bond of lining to the band. If the lining is worn so grooves are not visible at the ends or any portion of the band,

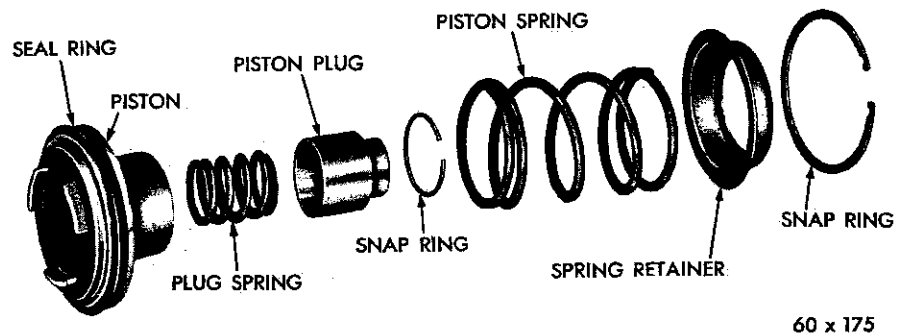


Fig. 80—Low and Reverse Servo (Disassembled View)



replace the band. Inspect the band for distortion or cracked ends.

**Assembly**

(1) Lubricate and insert the piston plug and spring in the piston, and secure with the snap ring.

**44. INSTALLATION OF SUB-ASSEMBLIES**

The assembly procedures given here include the installation of sub-assemblies in the transmission case and adjusting drive train end play. Do not use force to assemble mating parts. If the parts do not assemble freely, investigate the cause, and correct the trouble before proceeding with the assembly procedures. Always use new gaskets during the assembly operations.

**IMPORTANT:** Use only Automatic Transmission Fluid Type "A", Suffix "A" to lubricate transmission parts during assembly.

**Overrunning Clutch**

(1) With the transmission case in an upright position, insert the clutch race inside the cam. Install the overrunning clutch rollers and springs exactly as shown in Figure 81.

**Low and Reverse Servo and Band**

(1) Carefully work the servo piston assembly into the case with a twisting motion. Place the spring, retainer and snap ring over the piston (Fig. 80).

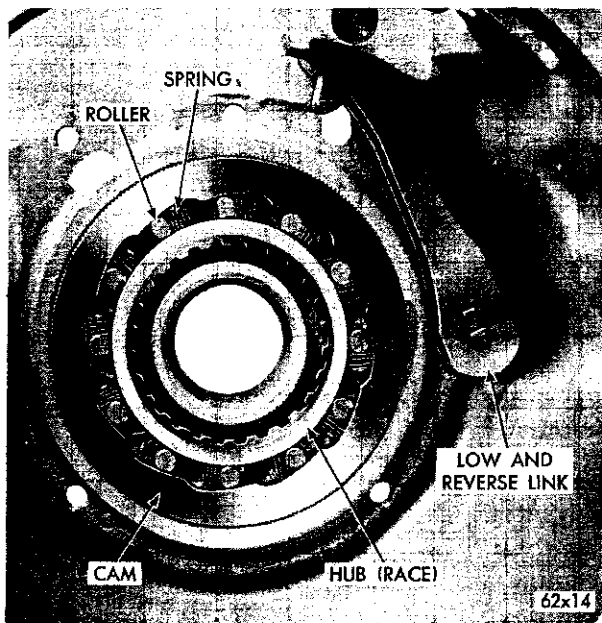


Fig. 81—Overrunning Clutch, Low and Reverse Band Link

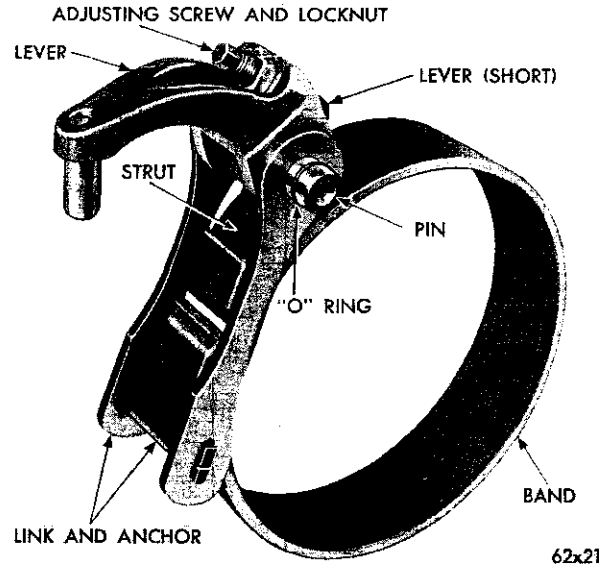


Fig. 82—Low-Reverse Band and Linkage

(2) Compress the low and reverse servo piston spring by using the Engine Valve Spring Compressor Tool C-3422, then install the snap ring.

(3) Position the rear band in the case, install the short strut, then connect the long lever and strut to the band (Fig. 82). Screw in the band adjuster just enough to hold the struts in place. Be sure the long lever and strut assembly is installed, as shown in Figure 81 to provide a running clearance for the low and reverse drum. Install the low-reverse drum.

**Kickdown Servo**

(1) Carefully push the servo piston into the case bore. Install the piston rod, the two springs and the guide (Fig. 79).

(2) Compress the kickdown servo springs by using Engine Valve Spring Compressor Tool C-3422, then install the snap ring.

**Planetary Gear Assemblies, Sun Gear. Driving Shell**

(1) While supporting the assembly in the case, insert the output shaft through the rear pump housing. Carefully work the assembly rearward engaging the rear planetary carrier lugs into the low-reverse drum slots.

**CAUTION:** Be very careful not to damage the ground surfaces on the output shaft during installation.

(2) Apply a coat of lubricant on the input to output shaft thrust washer (Fig. 76), and install washer on the front end of the output shaft.

**Input Shaft and Rear Clutch**

- (1) Invert the transmission and support in an upright position with the output shaft downward.
- (2) Align the rear clutch plate inner splines, lower the input shaft and clutch assembly into position in the case.
- (3) Carefully work the clutch assembly in a circular motion to engage the clutch splines over splines of the front annulus gear.
- (4) Coat one side of the fiber thrust washer with heavy grease, then position the washer in the recess on front face of the rear clutch piston retainer.

**Front Clutch**

- (1) Align the front clutch plate inner splines, lower the clutch assembly into position in the case.
- (2) Carefully work the clutch assembly in a circular motion to engage the clutch splines over splines of the rear clutch piston retainer. Make sure the front clutch driving lugs are fully engaged in the slots in the driving shell.

**Front Band**

Figure 83 shows a disassembled view of the kick-down band assembly.

- (1) Slide the band over the front clutch assembly.
- (2) Install the band strut, screw in adjuster just enough to hold the strut in place.

**Front Oil Pump and Reaction Shaft Support**

If difficulty was encountered in removing the front oil pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat lamp, heat the case in the area of front pump

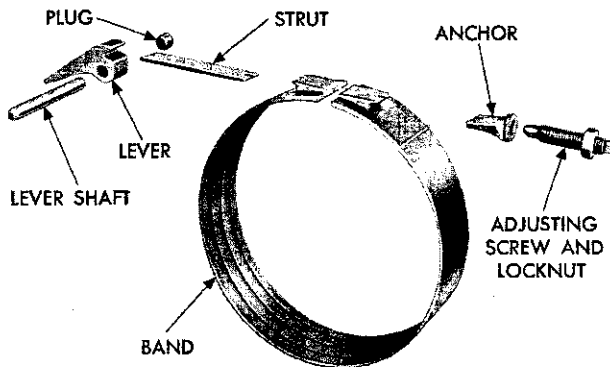


Fig. 83—Kickdown Band and Linkage

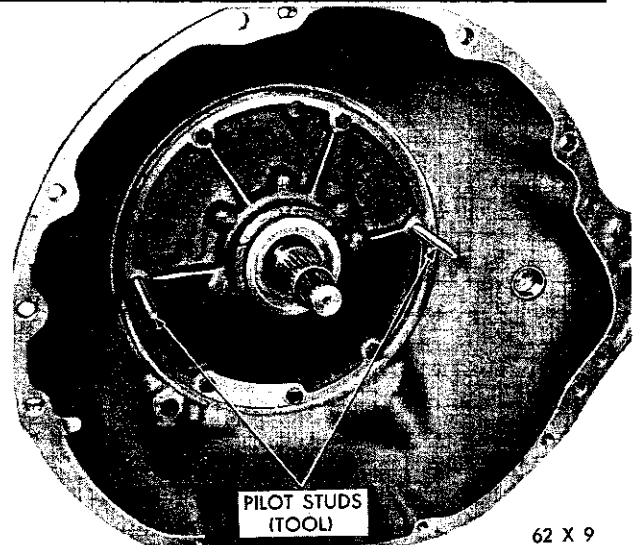


Fig. 84—Installing Front Pump and Reaction Shaft Support Assembly

for a few minutes prior to installing the front pump and reaction shaft support assembly.

**NOTE:** If the drive train end play was not within specifications (.030-.070 inch) when measured in Paragraph 29, replace the thrust washer on reaction shaft support hub with one of proper thickness.

The following selective thrust washers are available:

Thickness	Color
.043-.045 inch	Natural
.061-.063 inch	Green
.084-.086 inch	Red

- (1) Screw two pilot studs, Tool C-3288 in the front oil pump opening in the case (Fig. 84). Install a new gasket over the pilot studs.
- (2) Place a new rubber seal ring in the groove on the outer flange of the oil pump housing. Make sure the seal ring is not twisted. Coat the seal ring with grease for easy installation.
- (3) Insert aligning Tool C-3881 through the pump body and engage with inner rotor.
- (4) Install the assembly in the case, tap lightly with a soft mallet if necessary. Place the deflector over the vent opening and install four pump body bolts, remove pilot studs and install the remaining bolts. Snug bolts down evenly, then tighten to 150 inch-pounds torque.
- (5) Rotate the pump rotors with Tool C-3881 until the two small holes in handle of the tool are vertical (Fig. 44). This will locate the inner rotor so the converter impeller shaft will engage the inner rotor lugs during installation.

### Rear Oil Pump

- (1) Place the outer rotor in the pump body.
- (2) Turn the output shaft so the inner rotor driving ball pocket is up. Install the ball and slide the inner rotor on the output shaft in alignment with the ball (Fig. 39).
- (3) Install the oil pump cover with the retaining bolts threaded in a few turns. Slide aligning sleeve, Tool C-3864 all the way in until it bottoms against the rotors (Fig. 40), then tighten the cover bolts evenly to 150 inch-pounds torque.

### Governor and Support

- (1) Position the support and governor body assembly on the output shaft. Align the assembly so the governor valve shaft hole in governor body aligns with the hole in the output shaft, then slide the assembly into place. Install the snap ring behind the governor body. Tighten the housing to support bolts to 100 inch-pounds torque. Bend ends of lock straps against the bolt heads.
- (2) Place the governor valve on valve shaft, insert the assembly into body and through the governor weights. Install the valve shaft retaining snap ring.

### Extension Housing

- (1) Using a new gasket, carefully slide the extension housing into place. Install the retaining bolts and washers, tighten bolts to 24 foot-pounds torque.
- (2) Install the transmission flange, install washer with its three projections toward the flange and the nut with its convoluted surface contacting the washer. Hold flange with Tool C-3281, and tighten the nut to 175 foot-pounds torque.

**IMPORTANT:** Measure the drive train end play as described in Paragraph 29. Correct if necessary.

### Valve Body Assembly and Accumulator Piston

- (1) Clean the mating surfaces and inspect for burrs on both the transmission case and valve body transfer plate.
- (2) Install the accumulator piston in the transmission case and place the piston spring on the accumulator piston.
- (3) Carefully position the valve body assembly in the transmission case, install the retaining bolts and tighten finger tight. With the neutral starting switch installed, place the manual valve in the neutral position. Shift the valve body if necessary to center the

neutral finger over the neutral switch plunger. Snug the bolts down evenly, then tighten to 100 inch-pounds torque.

- (4) Connect the control cable adapter to the manual lever and install the retaining nut.
- (5) Install the seal, flat washer and throttle lever on the throttle shaft. Tighten the clamp bolt.
- (6) Adjust the kickdown, and low-reverse bands as described in Paragraph 12.
- (7) Install the oil pan, using a new gasket. Tighten the pan bolts to 150 inch-pounds torque.

### 45. STARTER RING GEAR REPLACEMENT

The starter ring gear is mounted directly on the outer diameter of the torque converter front cover. With the torque converter removed from vehicle, replacement of the gear is as follows:

#### Removing Ring Gear

- (1) Cut through the weld material at the rear side of ring gear with a hack saw or grinding wheel (Fig. 85). Be careful not to cut or grind into the front cover stamping.
- (2) Scribe a heavy line on the front cover next to the front face of the ring gear to aid in locating the new gear.
- (3) Support the converter with the four lug faces resting on blocks of wood. **The converter must not rest on front cover hub during this operation.** Using a blunt chisel or drift and hammer, tap downward on the ring gear near the welded areas to break any remaining weld material (Fig. 85). Tap around the ring gear until it comes off the converter.

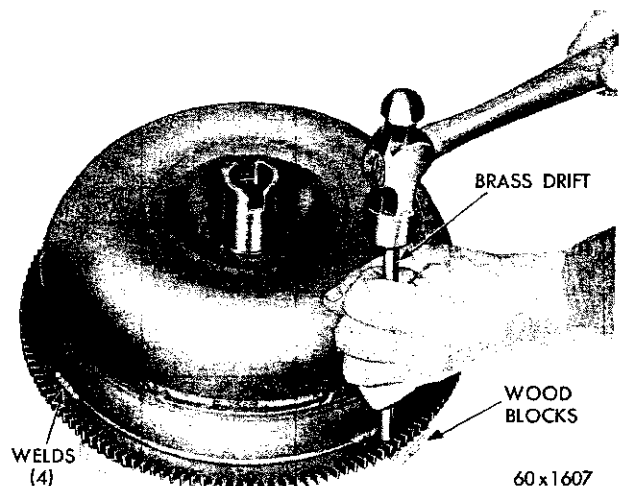


Fig. 85—Removing Starter Ring Gear

- (4) Smooth off weld areas on cover with a file.

### Installing Ring Gear

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

**Oven:** Place the ring gear in Oven C-794 and set temperature at 200 degrees F. Allow the ring gear to remain in oven for 15 to 20 minutes.

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

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

**Flame:** Place the ring gear squarely on a flat surface. Using a medium size tip, direct a slow flame evenly around the inner rim of the gear. **Do not apply flame to the gear teeth.** Place a few drops of water on the face of gear at intervals during the heating process. When the gear is hot enough to just boil the water, installation of the gear on the torque converter can be made.

(1) After the ring gear is expanded by heating, place the gear in position on the converter front cover. Tap the gear on the cover evenly with a plastic or rawhide mallet until front face of the gear is even with the scribed line (made during removal) on the front cover. Make sure the gear is even with scribed line

around the full circumference of the front cover.

(2) Reweld the ring gear to the torque converter front cover, being careful to place, as nearly as possible, the same amount of weld material in exactly the same location as was used in the original weld. This is necessary in order to maintain proper balance of the unit. Place the welds alternately on opposite sides of the converter to minimize distortion.

(3) The following suggestions are offered as an aid in making the weld:

a. **Do not gas weld.**

b. Use a D.C. welder that is set at straight polarity or an A.C. welder if proper electrode is available.

c. Use a 1/8 inch diameter welding rod, and a welding current of 80 to 125 amps.

d. Direct the arc at the intersection of the gear and front cover from an angle of 45 degrees from the rear face of the gear.

(4) Inspect the gear teeth and remove all nicks where metal is raised, weld metal splatter, etc., in order to ensure quiet starter operation.

**NOTE: The transmission should not be removed nor disassembled until a careful diagnosis is made, the definite cause determined and all possible external corrections performed. In diagnosing any abnormal shift condition, always make the hydraulic pressure tests before disassembly or replacement of parts.**

## SERVICE DIAGNOSIS

Condition	Possible Causes	Correction
46. Harsh Engagement in D, 1, 2 and R	(a) Engine idle speed too high.	(a) Adjust the engine idle speed to 500 rpm. Readjust throttle linkage.
	(b) Hydraulic pressures too high or low.	(b) Inspect the fluid level, then perform hydraulic pressure tests and adjust to specifications.
	(c) Low-reverse band out of adjustment.	(c) Adjust the low-reverse band.
	(d) Valve body malfunction or leakage.	(d) Perform pressure tests to determine cause and correct as required.
	(e) Accumulator sticking, broken rings or spring.	(e) Inspect the accumulator for sticking, broken rings or spring. Repair as required.
	(f) Low-reverse servo, band or linkage malfunction.	(f) Inspect the servo for damaged seals, binding linkage or faulty band lining. Repair as required.
	(g) Worn or faulty front and/or rear clutch.	(g) Disassemble and inspect clutch. Repair or replace as required.

## SERVICE DIAGNOSIS—(Continued)

Condition	Possible Causes	Correction
<b>47. Delayed Engagement in D, 1, 2 and R</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Incorrect control cable adjustment.</li> <li>(c) Hydraulic pressures too high or low.</li> <li>(d) Valve body malfunction or leakage.</li> <li>(e) Accumulator sticking, broken rings or spring.</li> <li>(f) Clutches or servos sticking or not operating.</li> <li>(g) Faulty front pump.</li> <li>(h) Worn or faulty front and/or rear clutch.</li> <li>(i) Worn or broken input shaft and/or reaction shaft support seal rings.</li> <li>(j) Aerated fluid.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A.</li> <li>(b) Adjust the control cable.</li> <li>(c) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(d) Perform pressure tests to determine cause and correct as required.</li> <li>(e) Inspect the accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(f) Remove the valve body assembly and perform air pressure tests. Repair as required.</li> <li>(g) Perform the hydraulic pressure tests. Adjust or repair as required.</li> <li>(h) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(i) Inspect and replace seal rings as required, also inspect respective bores for wear. Replace the parts as required.</li> <li>(j) Inspect for air leakage into the front pump suction passages.</li> </ul>
<b>48. Runaway or Harsh Upshift and 3-2 Kickdown</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Incorrect throttle linkage adjustment.</li> <li>(c) Hydraulic pressures too high or low.</li> <li>(d) Kickdown band out of adjustment.</li> <li>(e) Valve body malfunction or leakage.</li> <li>(f) Governor malfunction.</li> <li>(g) Accumulator sticking, broken rings or spring.</li> <li>(h) Clutches or servos sticking or not operating.</li> <li>(i) Kickdown servo, band or linkage malfunction.</li> <li>(j) Worn or faulty front clutch.</li> <li>(k) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A.</li> <li>(b) Adjust the throttle linkage.</li> <li>(c) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(d) Adjust the kickdown band.</li> <li>(e) Perform pressure tests to determine cause and correct as required.</li> <li>(f) Inspect the governor and repair as required.</li> <li>(g) Inspect the accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(h) Remove the valve body assembly and perform the air pressure tests. Repair as required.</li> <li>(i) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.</li> <li>(j) Disassemble and inspect the clutch. Repair or replace as required.</li> <li>(k) Inspect and replace seal rings as required, also inspect the respective bores for wear. Replace parts as required.</li> </ul>

## SERVICE DIAGNOSIS—(Continued)

Condition	Possible Causes	Corrections
<b>49. No Upshift.</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Incorrect throttle linkage adjustment.</li> <li>(c) Kickdown band out of adjustment.</li> <li>(d) Hydraulic pressures too high or low.</li> <li>(e) Governor sticking.</li> <li>(f) Valve body malfunction or leakage.</li> <li>(g) Accumulator sticking, broken rings or spring.</li> <li>(h) Clutches or servos sticking or not operating.</li> <li>(i) Faulty rear oil pump.</li> <li>(j) Kickdown servo, band or linkage malfunction.</li> <li>(k) Worn or faulty front clutch.</li> <li>(l) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to correct level with Automatic Transmission Fluid Type "A", Suffix "A".</li> <li>(b) Adjust the throttle linkage.</li> <li>(c) Adjust the kickdown band.</li> <li>(d) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(e) Remove and clean the governor. Replace parts if necessary.</li> <li>(f) Perform pressure tests to determine cause and correct as required.</li> <li>(g) Inspect accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(h) Remove the valve body assembly and perform the air pressure tests. Repair as required.</li> <li>(i) Perform the hydraulic pressure tests, adjust or repair as required.</li> <li>(j) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.</li> <li>(k) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(l) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required.</li> </ul>
<b>50. No Kickdown or Normal Downshift</b>	<ul style="list-style-type: none"> <li>(a) Incorrect throttle linkage adjustment.</li> <li>(b) Incorrect control cable adjustment.</li> <li>(c) Kickdown band out of adjustment.</li> <li>(d) Hydraulic pressures too high or low.</li> <li>(e) Governor sticking.</li> <li>(f) Valve body malfunction or leakage.</li> <li>(g) Accumulator sticking, broken rings or spring.</li> <li>(h) Clutches or servos sticking or not operating.</li> <li>(i) Kickdown servo, band or linkage malfunction.</li> <li>(j) Overrunning clutch not holding.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Adjust the throttle linkage.</li> <li>(b) Adjust the control cable.</li> <li>(c) Adjust the kickdown band.</li> <li>(d) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(e) Remove and clean the governor. Replace parts if necessary.</li> <li>(f) Perform pressure tests to determine cause and correct as required.</li> <li>(g) Inspect the accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(h) Remove the valve body assembly and perform the air pressure tests. Repair as required.</li> <li>(i) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.</li> <li>(j) Disassemble the transmission and repair the overrunning clutch as required.</li> </ul>

**SERVICE DIAGNOSIS—(Continued)**

Condition	Possible Causes	Corrections
<b>51. Shifts Erratic</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Aerated fluid.</li> <li>(c) Incorrect throttle linkage adjustment.</li> <li>(d) Incorrect control cable adjustment.</li> <li>(e) Hydraulic pressures too high or low.</li> <li>(f) Governor sticking.</li> <li>(g) Oil strainer clogged.</li> <li>(h) Valve body malfunction or leakage.</li> <li>(i) Clutches or servos sticking or not operating.</li> <li>(j) Faulty rear and/or front oil pump.</li> <li>(k) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.</li> <li>(b) Inspect for air leakage into the front pump suction passages.</li> <li>(c) Adjust the throttle linkage.</li> <li>(d) Adjust the control cable.</li> <li>(e) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(f) Remove and clean the governor. Replace parts if necessary.</li> <li>(g) Clean the oil strainer.</li> <li>(h) Perform pressure tests to determine cause and correct as required.</li> <li>(i) Remove the valve body assembly and perform air pressure tests. Repair as required.</li> <li>(j) Perform the hydraulic pressure tests, adjust or repair as required.</li> <li>(k) Inspect and replace the seal rings as required, also inspect respective bores for wear. Replace the parts as required.</li> </ul>
<b>52. Slips in Forward Drive Positions</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Aerated fluid.</li> <li>(c) Incorrect throttle linkage adjustment.</li> <li>(d) Incorrect control cable adjustment.</li> <li>(e) Hydraulic pressures too low.</li> <li>(f) Valve body malfunction or leakage.</li> <li>(g) Accumulator sticking, broken rings or spring.</li> <li>(h) Clutches or servos sticking or not operating.</li> <li>(i) Worn or faulty front and/or rear clutch.</li> <li>(j) Overrunning clutch not holding.</li> <li>(k) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.</li> <li>(b) Inspect for air leakage into the front pump suction passages.</li> <li>(c) Adjust the throttle linkage.</li> <li>(d) Adjust the control cable.</li> <li>(e) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(f) Perform pressure tests to determine cause and correct as required.</li> <li>(g) Inspect the accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(h) Remove the valve body assembly perform air pressure tests. Repair as required.</li> <li>(i) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(j) Disassemble the transmission and repair the overrunning clutch as required.</li> <li>(k) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required.</li> </ul>

**SERVICE DIAGNOSIS—(Continued)**

Condition	Possible Causes	Corrections
<b>53. Slips in Reverse Only</b>	(a) Low fluid level.	(a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A.
	(b) Aerated fluid.	(b) Inspect for air leakage into front pump suction passages.
	(c) Incorrect control cable adjustment.	(c) Adjust the control cable.
	(d) Hydraulic pressures too high or low.	(d) Perform the hydraulic pressure tests and adjust to specifications.
	(e) Low-reverse band out of adjustment.	(e) Adjust the low-reverse band.
	(f) Valve body malfunction or leakage.	(f) Perform pressure tests to determine cause and correct as required.
	(g) Front clutch or rear servo, sticking or not operating.	(g) Remove the valve body assembly and perform air pressure tests. Repair as required.
	(h) Low-reverse servo, band or linkage malfunction.	(h) Inspect the servo for damaged seals, binding linkage or faulty band lining. Repair as required.
	(i) Faulty front oil pump.	(i) Perform the hydraulic pressure tests, adjust or repair as required.
<b>54. Slips in All Positions</b>	(a) Low fluid level.	(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.
	(b) Hydraulic pressures too low.	(b) Perform the hydraulic pressure tests and adjust to specifications.
	(c) Valve body malfunction or leakage.	(c) Perform pressure tests to determine cause and correct as required.
	(d) Faulty front oil pump.	(d) Perform the hydraulic pressure tests, adjust or repair as required.
	(e) Clutches or servos sticking or not operating.	(e) Remove the valve body assembly and perform air pressure tests. Repair as required.
	(f) Worn or broken input shaft and/or reaction shaft support seal rings.	(f) Inspect and replace the seal rings as required, also inspect respective bores for wear. Replace the parts as required.
<b>55. No Drive in Any Position</b>	(a) Low fluid level.	(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.
	(b) Hydraulic pressures too low.	(b) Perform the hydraulic pressure tests and adjust to specifications.
	(c) Oil strainer clogged.	(c) Clean the oil strainer.
	(d) Valve body malfunction or leakage.	(d) Perform pressure tests to determine cause and correct as required.
	(e) Faulty front oil pump.	(e) Perform the hydraulic pressure tests, adjust or repair as required.
	(f) Clutches or servos sticking or not operating.	(f) Remove the valve body assembly and perform air pressure tests. Repair as required.



## SERVICE DIAGNOSIS—(Continued)

Condition	Possible Causes	Corrections
<b>56. No Drive in Forward Drive Positions</b>	<ul style="list-style-type: none"> <li>(a) Hydraulic pressures too low.</li> <li>(b) Valve body malfunction or leakage.</li> <li>(c) Accumulator sticking, broken rings or spring.</li> <li>(d) Clutches or servos, sticking or not operating.</li> <li>(e) Worn or faulty rear clutch.</li> <li>(f) Overrunning clutch not holding.</li> <li>(g) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(b) Perform pressure tests to determine cause and correct as required.</li> <li>(c) Inspect the accumulator for sticking, broken rings or spring. Repair as required.</li> <li>(d) Remove the valve body assembly perform air pressure tests. Repair as required.</li> <li>(e) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(f) Disassemble the transmission and repair overrunning clutch as required.</li> <li>(g) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required.</li> </ul>
<b>57. No Drive in Reverse</b>	<ul style="list-style-type: none"> <li>(a) Incorrect control cable adjustment.</li> <li>(b) Hydraulic pressures too low.</li> <li>(c) Low-reverse band out of adjustment.</li> <li>(d) Valve body malfunction or leakage.</li> <li>(e) Front clutch or rear servo, sticking or not operating.</li> <li>(f) Low-reverse servo, band or linkage malfunction.</li> <li>(g) Worn or faulty front clutch.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Adjust the control cable.</li> <li>(b) Perform the hydraulic pressure tests and adjust to specifications.</li> <li>(c) Adjust the low-reverse band.</li> <li>(d) Perform pressure tests to determine cause and correct as required.</li> <li>(e) Remove the valve body assembly and perform air pressure tests. Repair as required.</li> <li>(f) Inspect the servo for damaged seals, binding linkage or faulty band lining. Repair as required.</li> <li>(g) Disassemble and inspect clutch. Repair or replace as required.</li> </ul>
<b>58. Drives in Neutral</b>	<ul style="list-style-type: none"> <li>(a) Incorrect control cable adjustment.</li> <li>(b) Valve body malfunction or leakage.</li> <li>(c) Rear clutch inoperative.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Adjust the control cable.</li> <li>(b) Perform pressure tests to determine cause and correct as required.</li> <li>(c) Inspect the clutch and repair as required.</li> </ul>
<b>59. Drags or Locks</b>	<ul style="list-style-type: none"> <li>(a) Kickdown band out of adjustment.</li> <li>(b) Low-reverse band out of adjustment.</li> <li>(c) Kickdown and/or low-reverse servo, band, linkage malfunction.</li> <li>(d) Front and/or rear clutch faulty.</li> <li>(e) Planetary gear sets broken or seized.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Adjust the kickdown band.</li> <li>(b) Adjust the low-reverse band.</li> <li>(c) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required.</li> <li>(d) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(e) Inspect the condition of the planetary gear sets and replace as required.</li> </ul>

## SERVICE DIAGNOSIS—(Continued)

Condition	Possible Causes	Corrections
60. Grating, Scraping or Growling Noise	(f) Overrunning clutch worn, broken or seized.	(f) Inspect the condition of the over-running clutch and replace parts as required.
	(a) Kickdown band out of adjustment.	(a) Adjust the kickdown band.
	(b) Low-reverse band out of adjustment.	(b) Adjust the low-reverse band.
	(c) Output shaft bearing damaged.	(c) Remove the extension housing and replace the bearing.
	(d) Governor support binding or broken seal rings.	(d) Inspect the condition of the governor support and repair as required.
	(e) Front and/or rear oil pump scored or binding.	(e) Inspect the condition of the pump and repair as required.
	(f) Front and/or rear clutch faulty.	(f) Disassemble and inspect clutch. Repair or replace as required.
	(g) Planetary gear sets broken or seized.	(g) Inspect the condition of the planetary gear sets and replace as required.
61. Buzzing Noise	(h) Overrunning clutch worn, broken or seized.	(h) Inspect the condition of over-running clutch and replace parts as required.
	(a) Low fluid level.	(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.
	(b) Pumps sucking air.	(b) Inspect the pumps for nicks or burrs on mating surfaces, porous casting, and/or excessive rotor clearance. Replace the parts as required.
	(c) Valve body malfunction.	(c) Remove and recondition the valve body assembly.
62. Hard to Fill, Oil Flows out Filler Tube	(d) Overrunning clutch inner race damaged.	(d) Inspect and repair the clutch as required.
	(a) High fluid level.	(a) Drain the fluid to the correct level.
	(b) Breather clogged.	(b) Inspect and clean breather vent opening in front pump housing.
	(c) Oil strainer clogged.	(c) Remove and clean the oil strainer.
63. Transmission Overheats	(d) Aerated fluid.	(d) Inspect for air leakage into front pump suction passages.
	(a) Low fluid level.	(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.
	(b) Kickdown band adjustment too tight.	(b) Adjust the kickdown band.
	(c) Low-reverse band adjustment too tight.	(c) Adjust the low-reverse band.
	(d) Faulty cooling system.	(d) Inspect the transmission cooling system, clean and repair as required.
	(e) Faulty rear and/or front oil pump.	(e) Inspect the oil pump for incorrect clearance, repair as required.
	(f) Insufficient clutch plate clearance in front and/or rear clutches.	(f) Measure the clutch plate clearance and correct with the proper size snap ring.

**SERVICE DIAGNOSIS—(Continued)**

Condition	Possible Causes	Corrections
<b>64. Impossible to Push Start</b>	<ul style="list-style-type: none"> <li>(a) Low fluid level.</li> <li>(b) Low-reverse band slipping.</li> <li>(c) Valve body malfunction or leakage.</li> <li>(d) Rear oil pump faulty.</li> <li>(e) Low-reverse servo, band or linkage malfunction.</li> <li>(f) Worn or faulty rear clutch.</li> <li>(g) Worn or broken input shaft and/or reaction shaft support seal rings.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A.</li> <li>(b) Adjust the low-reverse band.</li> <li>(c) Remove and recondition the valve body assembly.</li> <li>(d) Inspect and repair the rear oil pump as required.</li> <li>(e) Inspect the servo for damaged seals, binding linkage or faulty band lining. Repair as required.</li> <li>(f) Disassemble and inspect clutch. Repair or replace as required.</li> <li>(g) Inspect and replace the seal rings as required, also inspect respective bores for wear. Replace the parts as required.</li> </ul>
<b>65. Starter Will Not Energize in Neutral</b>	<ul style="list-style-type: none"> <li>(a) Incorrect control cable adjustment.</li> <li>(b) Faulty or incorrectly adjusted neutral starting switch.</li> <li>(c) Broken lead to neutral switch.</li> </ul>	<ul style="list-style-type: none"> <li>(a) Adjust the control cable.</li> <li>(b) Test the operation of the switch with a test lamp. Adjust or replace as required.</li> <li>(c) Inspect the lead and test with a test lamp. Repair the broken lead.</li> </ul>