## GROUP 21

# TRANSMISSION (TORQUE CONVERTER)
# HEAVY DUTY THREE SPEED TRANSMISSION
## MODELS SC-1, SC-2

## CONTENTS



## TORQUEFLITE TRANSMISSION

## CONTENTS—CONT'D.



## DATA AND SPECIFICATIONS

### HEAVY DUTY THREE SPEED 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" (All Seasons) |
| Gears | Helical |

## DATA AND SPECIFICATIONS—CONT'D.

### HEAVY DUTY THREE SPEED TRANSMISSION

| | |
|---|---|
| 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 |
| TORQUE CONVERTER DIAMETER | 11¾ inches |
| OIL CAPACITY—TRANSMISSION AND TORQUE CONVERTER (Dry Fill) | 18½ pts. Automatic Transmission Fluid Type "A", Suffix "A" Imperial Measure 15½ pts. |
| COOLING METHOD | Water-Heat Exchanger |
| LUBRICATION | Pump (Rotor Type) |
| 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 |
| CLUTCH PLATE CLEARANCE | |
| Front Clutch | .024 to .123 inch |
| Rear Clutch | .026 to .054 inch |
| SNAP RINGS | |
| Front and Rear Clutches | |
| Rear Snap Ring (Selective) | .060 to .062 inch<br>.074 to .076 inch<br>.088 to .090 inch |
| Output Shaft Bearing | .086 to .088 inch |

## DATA AND SPECIFICATIONS—CONT'D.

### TORQUEFLITE TRANSMISSION

| | |
|---|---|
| THRUST WASHERS | |
| Reaction Shaft Support to Front Clutch Retainer (Selective) | .043 to .045 inch (Natural)<br>.061 to .063 inch (Green)<br>.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) |

## SPECIAL TOOLS

### TORQUEFLITE TRANSMISSION

C-452 . . . . . Puller—Companion Flange
C-484 . . . . . Pliers—Snap Ring
C-748 . . . . . Remover—Output Shaft Oil Seal
C-763 . . . . . Switch—Remote Control Starter
C-3203A . . . . . Jack—Transmission
C-3204 . . . . . Driver—Output Shaft Bearing
C-3229 . . . . . Pliers—Snap Ring
C-3275 . . . . . Remover—Output Shaft Bearing
C-3281 . . . . . Wrench—Companion Flange Holding
C-3288 . . . . . Studs—Pilot
C-3292 . . . . . Gauge—Low Pressure
C-3293 . . . . . Gauge—High Pressure
C-3335 . . . . . Straight Edge
C-3339 . . . . . Dial Indicator
C-3422 . . . . . Compressor—Engine Valve Spring
C-3487 . . . . . Fixture—Engine Support
C-3705 . . . . . Adapter—Transmission Band Adjuster (Use with C-3380 Torque Wrench)
C-3749 . . . . . Stand—Valve Body
C-3752 . . . . . Remover—Front Oil Pump and Reaction Shaft Support
C-3763 . . . . . Gauge—Throttle Pressure Setting
C-3765 . . . . . Installer—Shifter Shaft Detent Ball
C-3837 . . . . . Driver—Output Shaft Oil Seal
C-3860 . . . . . Driver—Front Pump Oil Seal
C-3861 . . . . . Remover—Front Pump Oil Seal
C-3863 . . . . . Compressor—Front Clutch Piston Spring Installer—Overrunning Clutch Cam
C-3864 . . . . . Aligning Sleeve—Rear Oil Pump Cover
C-3881 . . . . . Aligning Tool—Front Oil Pump Rotor
C-3882 . . . . . Adapter Kit—Use with C-3750 Transmission Stand

## TOOL KIT C-3887

| TORQUEFLITE SIX TRANSMISSION (FOR 6-CYLINDER ENGINES) | | TORQUEFLITE TRANSMISSION (FOR 8-CYLINDER ENGINES) | |
|---|---|---|---|
| Front Pump Bushing Remover | SP-3551* | Front Pump Bushing Remover | SP-3550* |
| Front Pump Bushing Installer | SP-3624* | Front Pump Bushing Installer | SP-3625* |
| Reaction Shaft Bushing Remover | SP-3631** | Reaction Shaft Bushing Remover | SP-3632** |
| Reaction Shaft Bushing Installer | SP-3635* | Reaction Shaft Bushing Installer | SP-3634* |
| Front Clutch Retainer Bushing Remover | SP-3627* | Front Clutch Retainer Bushing Remover | SP-3629* |
| Front Clutch Retainer Bushing Installer | SP-3626* | Front Clutch Retainer Bushing Installer | SP-3628* |
| Extension Housing Bushing Remover | C-3755*** | Input Shaft Bushing Remover | SP-3630** |
| Extension Housing Bushing Installer | C-3751*** | Input Shaft Bushing Installer | SP-3636* |

*Use with Tool Handle SP-3549, **Use with Hex Nut SP-1191 and Puller Cap SP-3633, ***Tools not included in Kit C-3887

## TORQUE REFERENCE

| HEAVY DUTY THREE SPEED TRANSMISSION | Foot-Pounds | Inch-Pounds |
|---|---|---|
| Front Bearing Retainer Bolts | | 200 |
| Extension Housing Bolts | 50 | |
| Nuts | 50 | |
| Gearshift Operating Lever Nuts | | 180 |
| Mainshaft Flange Nut | 175 | |
| Transmission to Clutch Housing Bolts | 50 | |
| **TORQUEFLITE TRANSMISSION** | | |
| Kickdown Band Adjusting Screw Lock Nut | 29 | |
| 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 |
| Kickdown Lever Shaft Plug | | 150 |
| Neutral Starter Switch—Initial Contact ⅓ to ½ Turn | 60 Max. | |
| Oil Filler Tube Bracket Bolt | | 150 |
| Oil Pan Bolt | | 150 |
| Oil Pan Drain Plug | 15 | |
| Overrunning Clutch Cam Set Screw | | 40 |
| Output Shaft Flange Nut | 175 | |
| 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 |

# GROUP 21

# TRANSMISSION (TORQUE CONVERTER)

# HEAVY DUTY THREE SPEED TRANSMISSION

## MODELS SC-1, SC-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 bail bearings at each end of the extension housing. The speedometer drive gear is integral with the mainshaft.

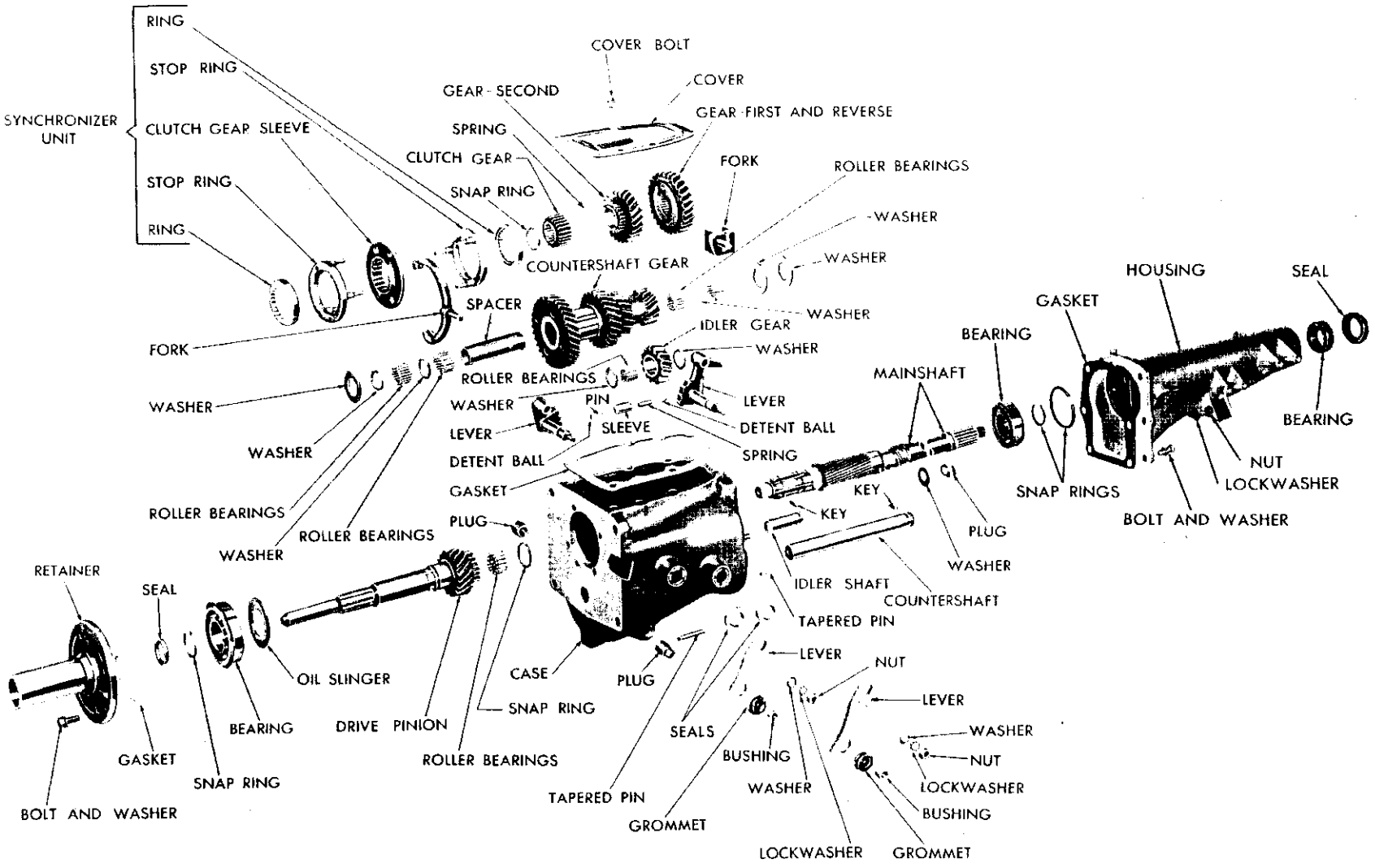


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**Fig. 1—Heavy Duty Transmission (Disassembled View)**

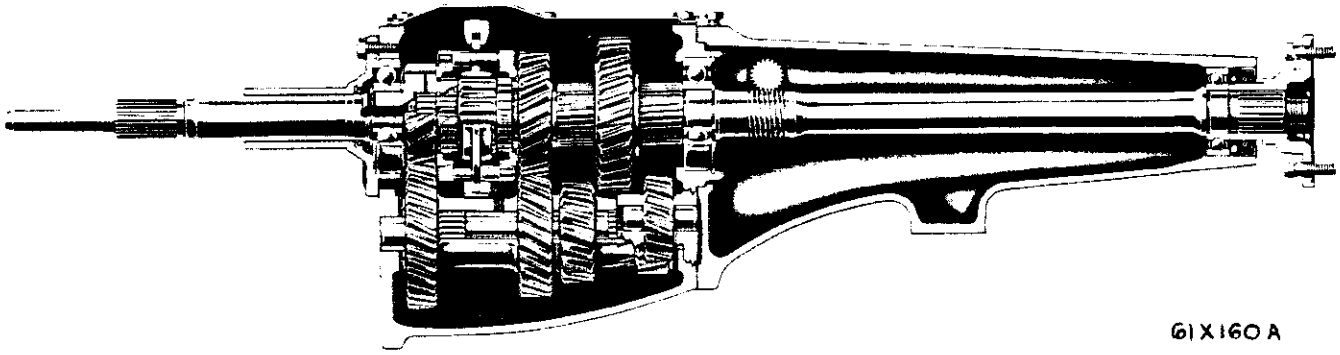



Fig. 2—Heavy Duty Transmission (Sectional View)

## SERVICE PROCEDURES

### 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. Disconnect parking brake controls.

CAUTION

**Remove speedometer cable (pinion comes out with 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 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.

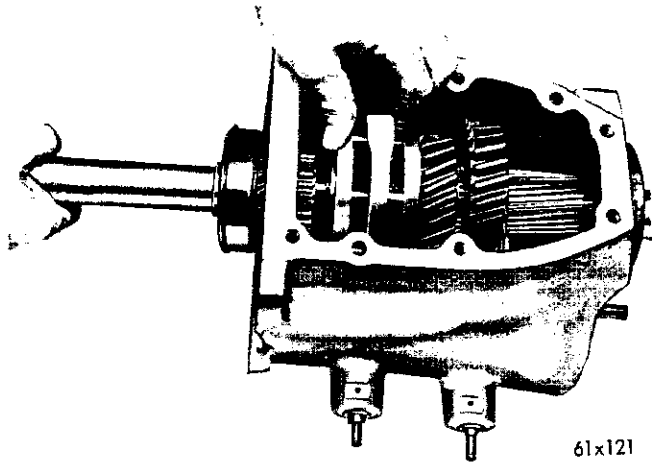



Fig. 3—Removing the Drive Pinion Assembly

(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.

### DISASSEMBLY OF THE TRANSMISSION COMPONENT PARTS (Fig. 1)

#### Extension Housing

(1) Using Tool C-3281, flange holding tool, 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 mainshaft. 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.

**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.

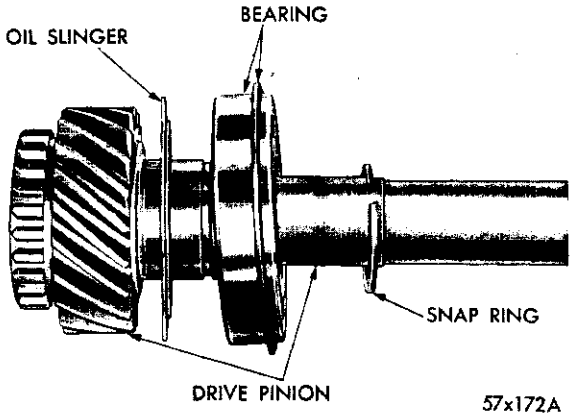



Fig. 4—Drive Pinion Assembly

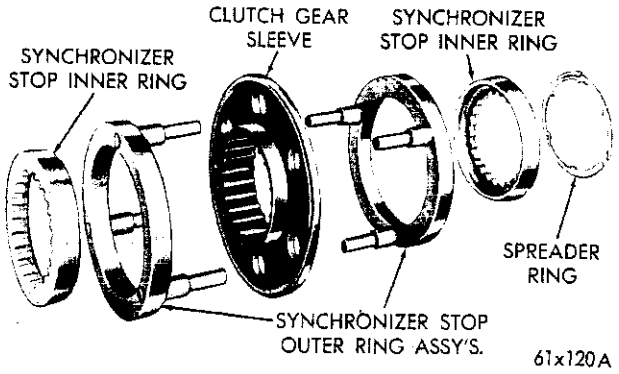



Fig. 5—Synchronizer Assembly

**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).

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

**Countershaft**

CAUTION

**Do not drive countershaft toward front of 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

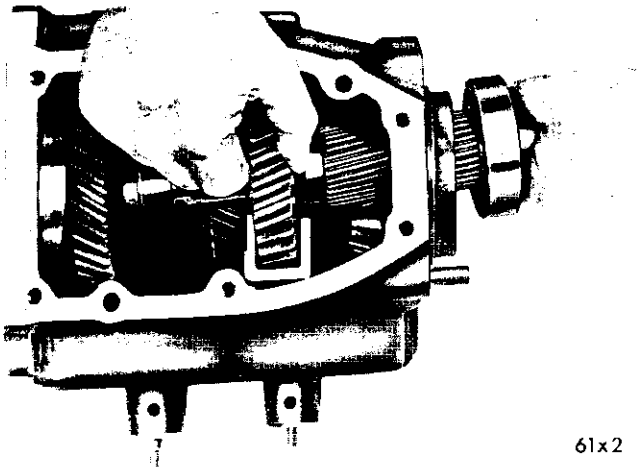



Fig. 6—Removing the Mainshaft Assembly

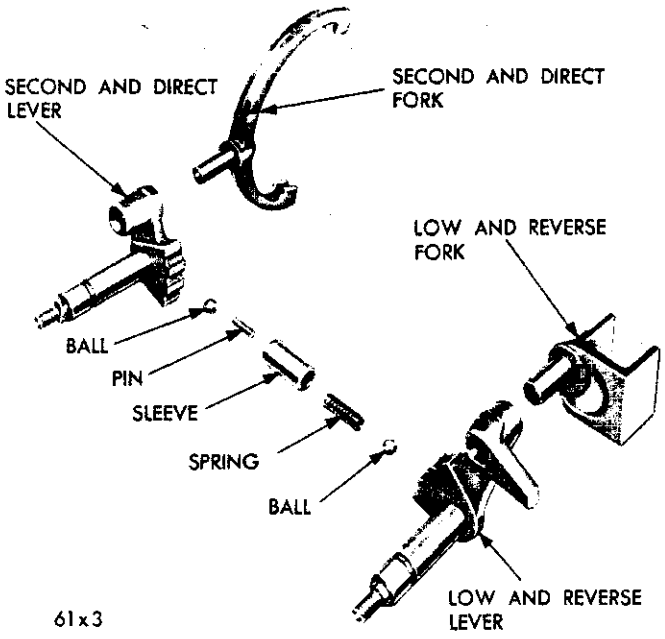



**Fig. 7—Gearshift Forks and Shafts**

out of the case, keeping arbor tight against the end of the countershaft to prevent loss of the roller bearing.

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

(4) Remove the roller bearings (88), spacer rings (4), 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 needle 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 shaft 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, springs pin and detent balls.

**INSPECTION AND CLEANING**

(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 grease 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 synchronizer clutch sleeve slides freely on 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 rollers 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 rollers 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. Check 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 casings for small cracks and sand holes.

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

## ASSEMBLY OF THE TRANSMISSION COMPONENT PARTS (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 bearing rollers with heavy grease 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 bearing rollers next to one end of the spacer, using heavy grease 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 rollers next to the spacer ring.

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

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

(6) With a small amount of grease 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 rear.

**NOTE: Rear thrust washer must be installed with step on O.D. facing clockwise, as viewed from 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 grease, 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 lightly, 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 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 rear of transmission (Fig. 8).

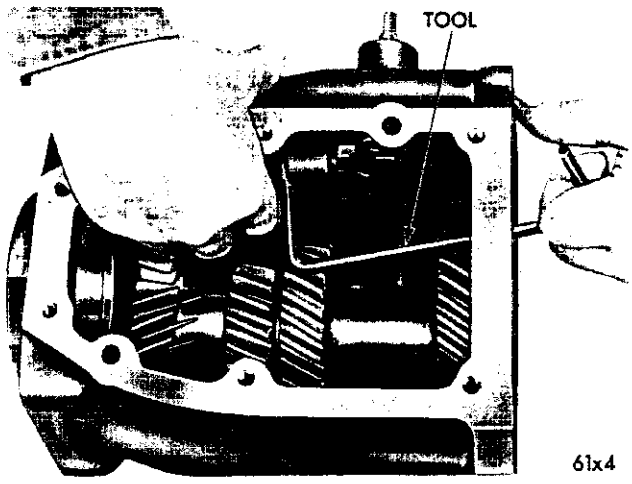



**Fig. 8—Installing the Detent Balls (Using Tool C-3765)**

**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 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) Check 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 50 foot-pounds torque.

(3) Install the parking brake assembly.

(4) Install the parking brake drum end flange assembly. Install the washer and nut and tighten to 140 foot-pounds torque, using the flange holding Tool C-3281.

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

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

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

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

## 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 check 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 under the vehicle using a suitable transmission 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 speedometer drive pinion, and back up light switch wires (if so equipped).

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

(9) Fill the transmission with 4½ pints of Automatic Transmission Fluid Type "A" Suffix "A" for all seasons.

(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."

## SERVICING THE GEARSHIFT ASSEMBLY (Fig. 9)
**Removal**

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

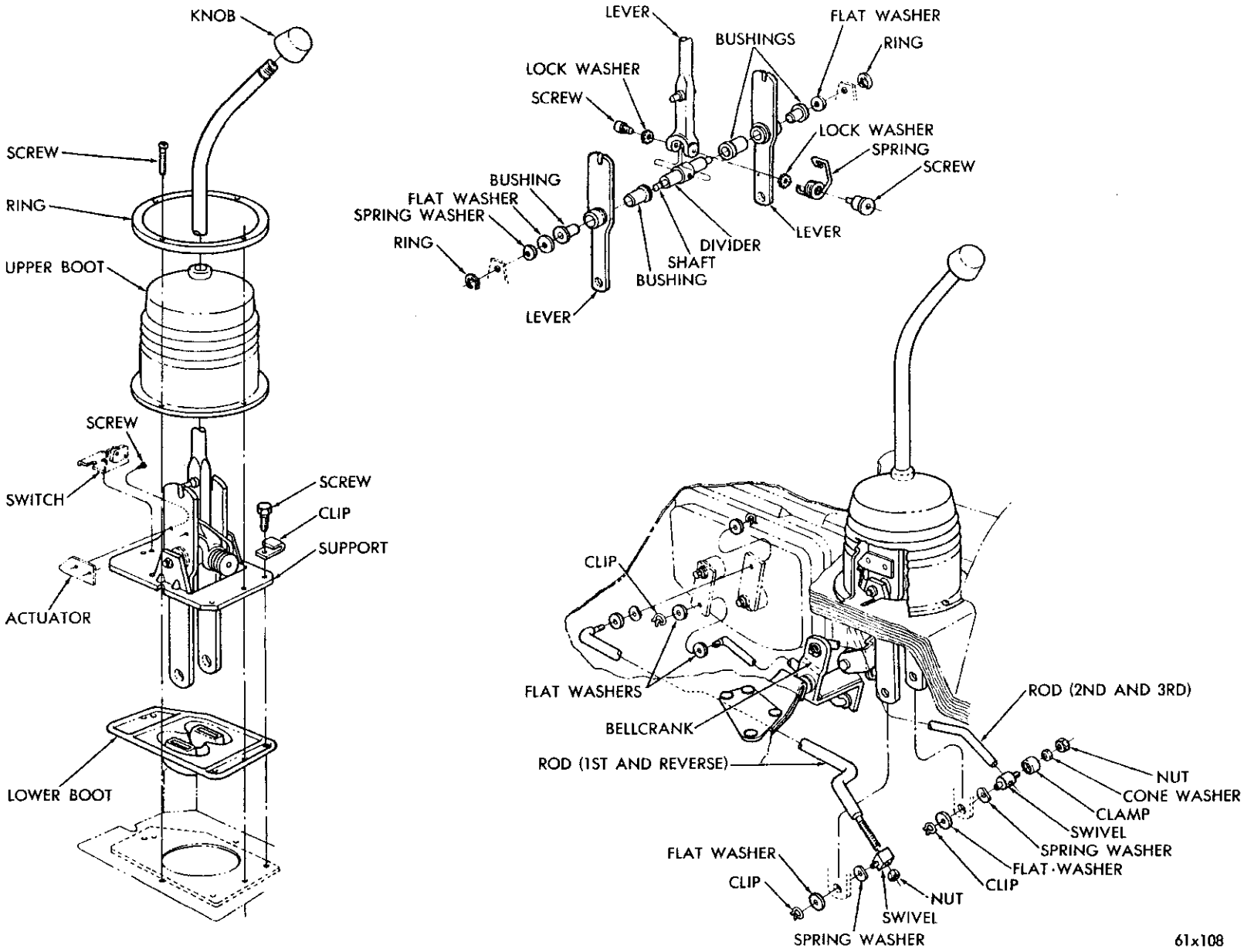



**Fig. 9—Gearshift Controls**

(2) Remove the screws that attach the upper boot retainer to the floor pan. Remove the retainer, and slide 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 starwasher out from under spring.

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

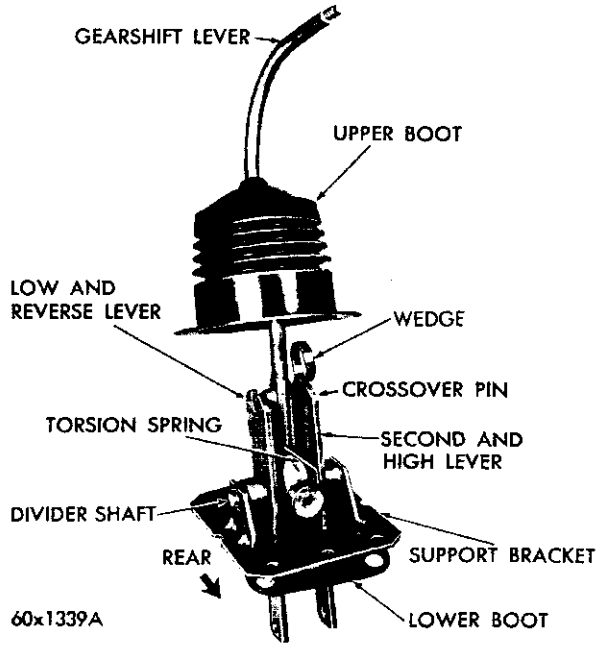



**Fig. 10—Positioning Crossover Pin**

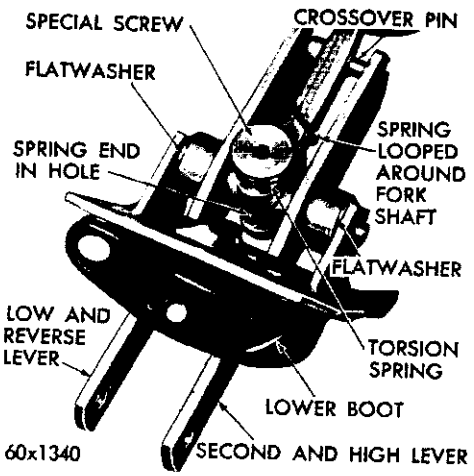



**Fig. 11—Lever Torsion Spring (Installed)**

Check all the parts for wear or damage; installing new parts as 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 narrow 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.

(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 lockwasher (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 lockwasher, tighten both screws securely.

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

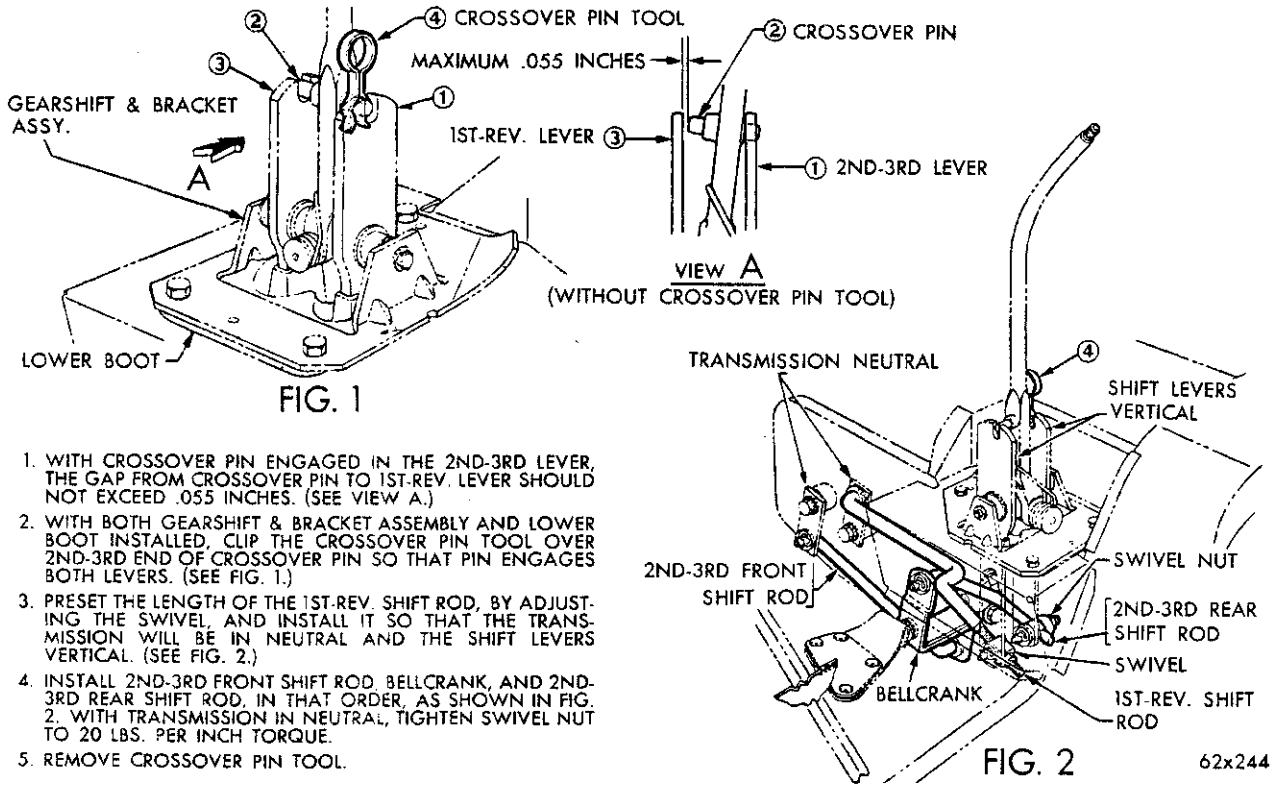



**Fig. 12—Gearshift Linkage Adjustment**

(10) Slide the tool wedge between the second and high lever and 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.

## GEARSHIFT LINKAGE ADJUSTMENTS

(1) Remove the screws that hold the upper boot 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 wavewasher. Disengage rod from lever.

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

(5) Place the transmission shift levers in the neutral position and refer to Figure 12 as follows:

## SERVICING THE TRANSMISSION

### REAR OIL SEAL

The transmission rear oil seal can be removed as follows:

(1) Disconnect the propeller shaft at transmission brake drum and flange assembly. Secure shaft to a frame member for clearance.

(2) Use wrench, Tool C-3281, to hold mainshaft, while removing mainshaft flange nut. If wrench, Tool C-3281 is not available, apply handbrake to hold mainshaft. Remove mainshaft nut and washer.

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

CAUTION

**Never use a hammer to drive the brake drum and flange assembly from the mainshaft as splines may be damaged or brake drum made out of round.**

(4) Remove the brake band.

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

**NOTE: Do not use C-748 Puller. Main shaft must not be forced forward.**

(6) When installing a new oil seal, be sure to use

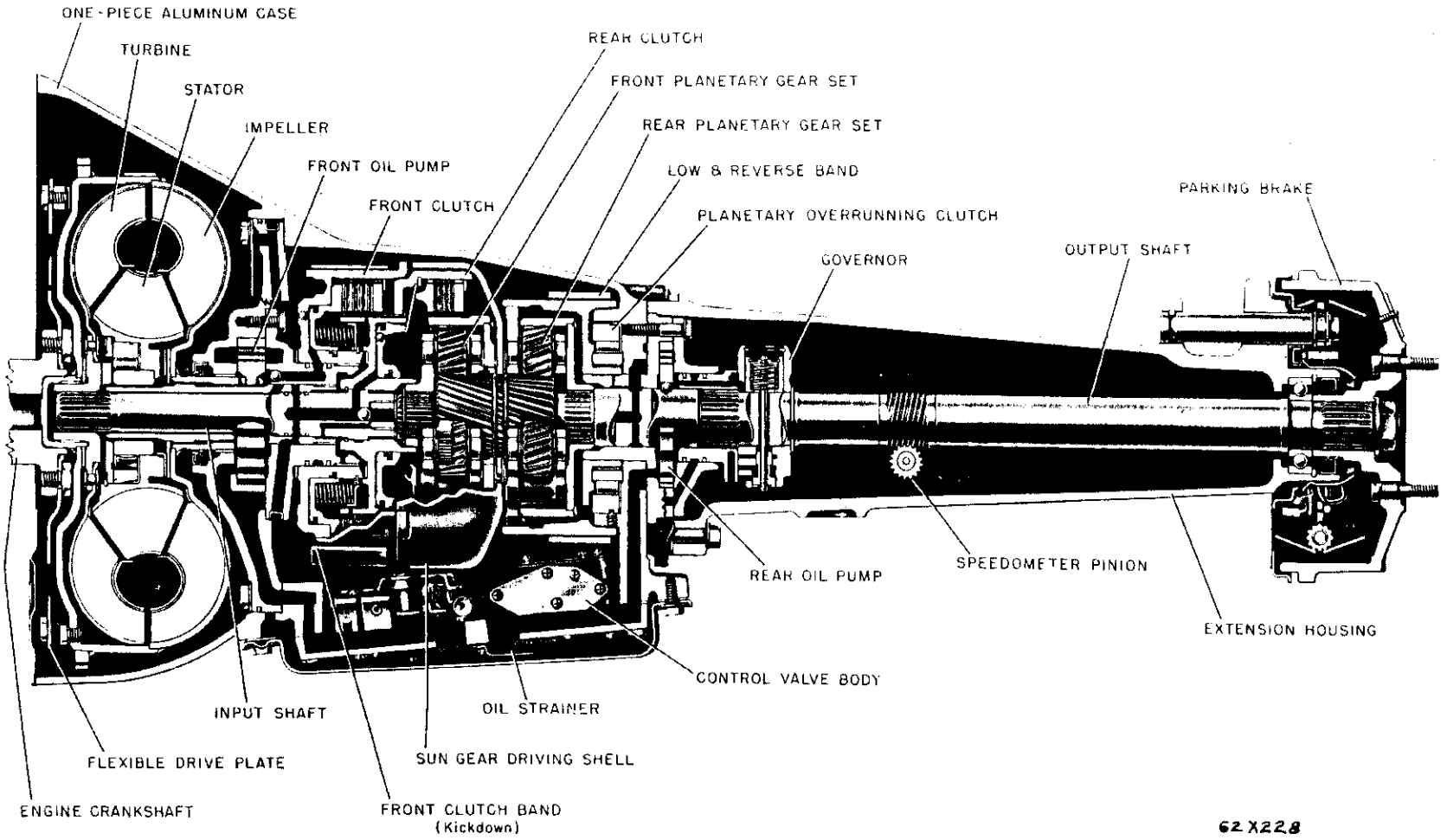



**Fig. 1—TorqueFlite Transmission and Torque Converter**

special drift, Tool C-3105, which automatically locates the seal in its proper position.

(7) Reinstall the brake drum and flange assembly.

(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.

(10) Install the brake band and adjust the brake.

## 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 behind a shield plate.

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.

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).

In the drive range, the transmission shifts through all three ratios automatically. Shift points are determined by throttle opening and car speed. If additional acceleration is desired while in drive range, the transmission will downshift (depending on vehicle speed to 'second' or 'breakaway' automatically when the accelerator pedal is completely depressed.

The 'intermediate' or 'second' range is used to operate the transmission in the first two ratios only. This range is suitable for heavy city traffic where the driver may desire part throttle second operation for more precise control. It may also be used on long down grades where additional engine braking is needed. A 'low' or 'first' range is also available to keep the transmission in first ratio only. This range provides added handling ease in mountain driving and exceptional pulling qualities in sand and snow.

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.

### HYDRAULIC CONTROL SYSTEM

The hydraulic control system makes the transmission fully automatic, and has four important functions to perform.

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

The pressure supply system, the 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

#### Front Pump

At idle, the front pump, driven at engine speed, provides all oil needed for torque converter pressure, control pressures and lubrication. As the vehicle speed increases, the front pump is aided by the rear

## 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 |

*In push button low, the rear band is applied to prevent the transmission from free wheeling when coasting.

pump turning at propelled shaft speed.

The front pump delivers oil at pressures ranging from 55-60 psi at closed throttle to 90-95 psi at wide open throttle. In reverse, the front pump pressure is increased to approximately 260 psi in order to handle the high torque loads imposed during reverse operation. Front pump pressure is reduced at high vehicle speeds by the action of the rear pump. This reduces transmission drag losses.

**Rear Pump**

The rear pump (smaller than the front pump and driven by the output shaft) furnishes all of the oil required by the transmission in normal driving at the higher vehicle speeds. The rear clutch and low-reverse band are applied by the oil pressure developed by the rear pump when the engine is started by pushing the vehicle in push button "low".

## CLUTCHES AND BAND SERVOS

### Front Clutch

The front clutch contains four steel plates and four discs to provide the required capacity. Both front and rear clutches are engaged to transmit full engine and converter torque in direct drive. The front clutch is also engaged to drive the car in reverse.

The front clutch piston is actuated hydraulically to engage the multiple clutch plates and discs, and is released by means of the clutch piston return spring when hydraulic pressure is released.

### Rear Clutch

The rear clutch contains three steel plates and four disc's, and a washer type return spring. The rear clutch is engaged in all forward driving ranges and is disengaged during reverse operation.

Hydraulic pressure against the rear clutch piston moves the piston into contact with the spring washer which multiplies the force to lock the clutch plates together. The spring washer returns the clutch to "disengaged" position when hydraulic pressure is released.

### Kickdown Servo

The kickdown piston actuates the kickdown band through the kickdown lever, strut and anchor holding the front clutch piston retainer, driving shell and sun gear stationary.

The kickdown piston is hydraulically applied by a variable pressure which is a function of line pressure. The kickdown piston is released by spring tension or spring tension with hydraulic pressure depending upon the operation.

### Low-Reverse Servo

The low-reverse servo has two functions which are performed independently. The low-reverse servo piston is moved hydraulically to apply the low-reverse band through the low-reverse lever, strut, and anchor. The results are:

To hold the carrier of the rear planetary gear set stationary while the front clutch (applied) drives the sun gear. This provides a reverse ratio of 2.20 to 1 through the rear planetary gear set.

To hold the carrier of the rear planetary gear set stationary when the vehicle is retarding in manual low. This provides engine braking at a 2.45 to 1 ratio change through the planetary gear sets. The band is necessary to hold the carrier stationary because the direction of applied torque is opposite that required for overrunning clutch engagement.

Initial engagement of the low-reverse servo (when shifting from neutral to low or reverse) is softened by compression of the low-reverse servo cushion spring.

The servo piston is released by a return spring when the source of apply pressure is discontinued.

### Accumulator

The accumulator controls the pressure on the apply side of the kickdown servo during the 1-2 shift. At light throttle, accumulator pressure is low, at heavy throttle pressure is high. Therefore, the application of the kickdown band is cushioned at any throttle position by the action of the accumulator.

In neutral and reverse the accumulator piston is held released by the accumulator spring, there being no hydraulic pressure to the piston at these times.

## PRESSURE REGULATING VALVES

### Regulator Valve

The regulator valve controls line pressure at a value dependent on throttle opening, and it ranges from 55-60 psi at closed throttle to 90-95 psi at wide open throttle in forward operation.

For reverse operation, oil must be at a pressure of 240-280 psi. This is accomplished by switching the effective reaction area of the regulator valve, with the result that a line pressure of 240-280 psi applied to the smaller reaction area, is required to overcome the force of the regulator valve spring.

### Torque Converter Control Valve

This valve maintains an oil pressure of approximately 30 psi within the torque converter. When the torque converter pressure rises to 30 psi, the control valve will move against the spring load and allow oil to flow through the cooler then back to the lubrication circuit. From the cooler, oil is routed through the transmission lubrication system to lubricate the gear train at approximately 5 to 25 psi pressure.

### Governor Valve

The governor valve assembly regulates a hydraulic pressure to the transmission which is proportional to car speed. This governed pressure, in conjunction with throttle pressure, controls upshift and downshift speeds. The governor is so mounted on the output shaft that when the output shaft rotates; the governor weight assembly exerts a centrifugal force on the governor shaft. The governor shaft transmits

this force to the governor valve. Oil is allowed to flow from the line pressure port to the governor pressure port, building up pressure in the governor circuit and against the valve reaction area sufficient to balance the centrifugal force of the weight.

The greater the vehicle speed, the greater is the centrifugal force of the weights, and hence the greater the governor pressure necessary to balance the centrifugal force. If the vehicle speed decreases, the decrease in centrifugal force allows the valve to move out slightly, venting excess oil and bringing the governor once more in balance at a lower pressure.

The governor weight assembly is constructed so that for vehicle speeds under approximately 30 mph, both weights act as a unit, with the result that small changes in vehicle speed result in comparatively large changes in centrifugal force and governor pressure. Above approximately 30 mph, the primary weight moves outward against the preload of the spring and bottoms against the snap ring leaving only the secondary weight active. Small variations in vehicle speed above approximately 30 mph; therefore, result in only small variations in governor pressure.

## SHIFT PATTERN SUMMARY CHART

| Condition | Car Speed to Axle Ratios SC-1, SC-2, SC-3 | SC-2—300H | SY-1 |
|---|---|---|---|
| | 2.93-1 | 3.23-1 | 2.93-1 |
| Closed Throttle 1-2 Upshift | 8-15 | 7-13 | 8-15 |
| Closed Throttle 2-3 Upshift | 13-19 | 12-17 | 14-20 |
| Wide Open Throttle 1-2 Upshift | 32-47 | 40-53 | 34-48 |
| Wide Open Throttle 2-3 Upshift | 69-83 | 73-84 | 73-85 |
| 3-2 Kickdown Limit | 60-76 | 65-77 | 64-78 |
| 3-1Kickdown Limit | 30-40 | 28-46 | 32-41 |
| Closed Throttle Downshift | 5-13 | 5-12 | 5-14 |

### Throttle Valve

The throttle valve assembly regulates a hydraulic pressure to the transmission which is proportional to the amount of throttle opening. The throttle valve lever shaft is rotated in proportion to the amount of throttle opening of the carburetor by a linkage connecting the throttle valve lever shaft to the car's throttle linkage. The throttle valve lever shaft positions the kickdown valve and throttle valve spring in accordance with the amount of carburetor throttle opening. The spring is free (no load) at closed throttle and compressed at wide open throttle. Therefore, the throttle valve spring exerts a force on the throttle valve that increases with carburetor throttle opening.

Throttle pressure will vary with the amount of carburetor throttle opening from a value of 0 (zero) pressure at closed throttle to a value of approximately 90 psi at wide open throttle.

## FLOW CONTROL VALVES

### Front and Rear Pump Check Valves

The front pump check valve is located in the valve body. The valve is opened when front pump is supplying operating pressure and is closed when rear pump is supplying the pressure.

The rear pump check valve is located in the transfer plate. The valve is opened when rear pump is supplying operating pressure and is closed when the vehicle is at a standstill and during all reverse operation.

### Manual Valve

The manual valve obtains the different transmission drive ranges as selected by the vehicle operator. The valve is moved by a cable which is connected to the push button control unit on the instrument panel. It is held in these positions by the force of a springloaded detent ball on the valve body.

The manual valve distributes hydraulic pressure to various clutches, servos, and other valves to apply clutches and servos automatically, dependent on car speed and throttle opening.

### Reverse Blocker Valve

The reverse blocker valve mechanically blocks the

manual valve from moving into reverse position to prevent accidental reverse engagement above approximately 20 mph. When the reverse button is depressed above this speed the manual valve is stopped at neutral and the transmission remains in neutral until another button is depressed. The reverse blocker valve is actuated by governor pressure.

#### 1-2 Shift Valve

The 1-2 shift valve determines whether the transmission is either in "breakaway" (low gear) ratio or second gear ratio depending upon whether the valve is in the up-shift or down-shift position. The 1-2 shift valve train consists of a shift valve, valve spring and a governor plug.

The factors controlling the upshift and downshift of 1-2 shift valve are determined by governor pressure and throttle pressure.

The 1-2 shift valve is moved to upshift position by governor pressure acting on the governor plug, when the governor pressure is high enough to overcome shift valve spring tension and throttle pressure. The 1-2 shift valve is moved to downshift position by shift valve spring tension alone at normal closed throttle stops or by spring and kickdown pressure which overcomes governor pressure during a forced downshift (kickdown).

#### 2-3 Shift Valve

The 2-3 shift valve automatically shifts the transmission from second to direct or from direct to second depending on the vehicle operation. This shift valve train is similar in construction and operation to the 1-2 shift valve train, in that it is controlled by governor and throttle pressures and spring force.

#### Kickdown Valve

The kickdown valve makes possible a forced downshift from 'direct' to 'second' — 'second to breakaway' or 'direct to breakaway' by depressing the accelerator pedal past the detent "feel" near wide open throttle.

It is desirable to limit the maximum vehicle speed at which kickdown may be made (approximately 60 mph from 'drive to second' and approximately 30 mph from drive or 'second to breakaway'). The throttle pressure actuated kickdown detent plug on the stem of the kickdown valve supplies the resistance necessary for a detent "feel" at kickdown.

The kickdown pressure, when applied to the spring end of the shift valves is great enough to make the shift valves downshift against the force of any governor pressure, up to the kickdown limit speeds.

#### Shuttle Valve and Shuttle Valve Plug

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

The "lift-foot" upshift is made by accelerating the vehicle in 'breakaway' or 'second' and then returning the accelerator pedal to closed throttle. Without the shuttle valve, the resulting upshift to direct would consist of a series of lurches, caused first by the braking effects on the vehicle by the second gear ratio and then by the harsh engagement of the front clutch.

The second function of the shuttle valve is to regulate the application of the kickdown piston when making 'direct' to 'second' kickdowns.

The kickdowns made at low vehicle speeds require very little time in which to complete the shift due to the comparatively small change in engine speed between direct and kickdown gear. The higher the vehicle speed at which the kickdown is made, the longer is the time required to make a smooth shift. The shuttle valve controls the timing of the shift by controlling the rate of oil flow to the kickdown servo.

### SEQUENCE OF OPERATION HYDRAULIC CIRCUITS

#### Neutral Circuits (Fig. 2)

The engine can be started only when the "N" (neutral) button is pushed in, because the starter electrical circuit is closed only when grounded through the neutral starter switch actuated by the neutral finger on the manual valve operating lever.

As soon as the engine is started the front pump turns at engine speed, providing fluid pressure through a passage in the valve body to the regulator valve front pump pressure port and, through the front pump check valve and the manual valve to the line pressure reaction areas at the regulator valve. As pressure builds up in the system, the regulator valve is gradually moved over against spring force by the force of reaction pressure until, at about 55 psi system pressure, the regulating land of the regulator valve is metering enough front pump flow into the sump to hold line pressure steady.

As the pressure in the system approaches line pressure value, the outer land of the regulator valve

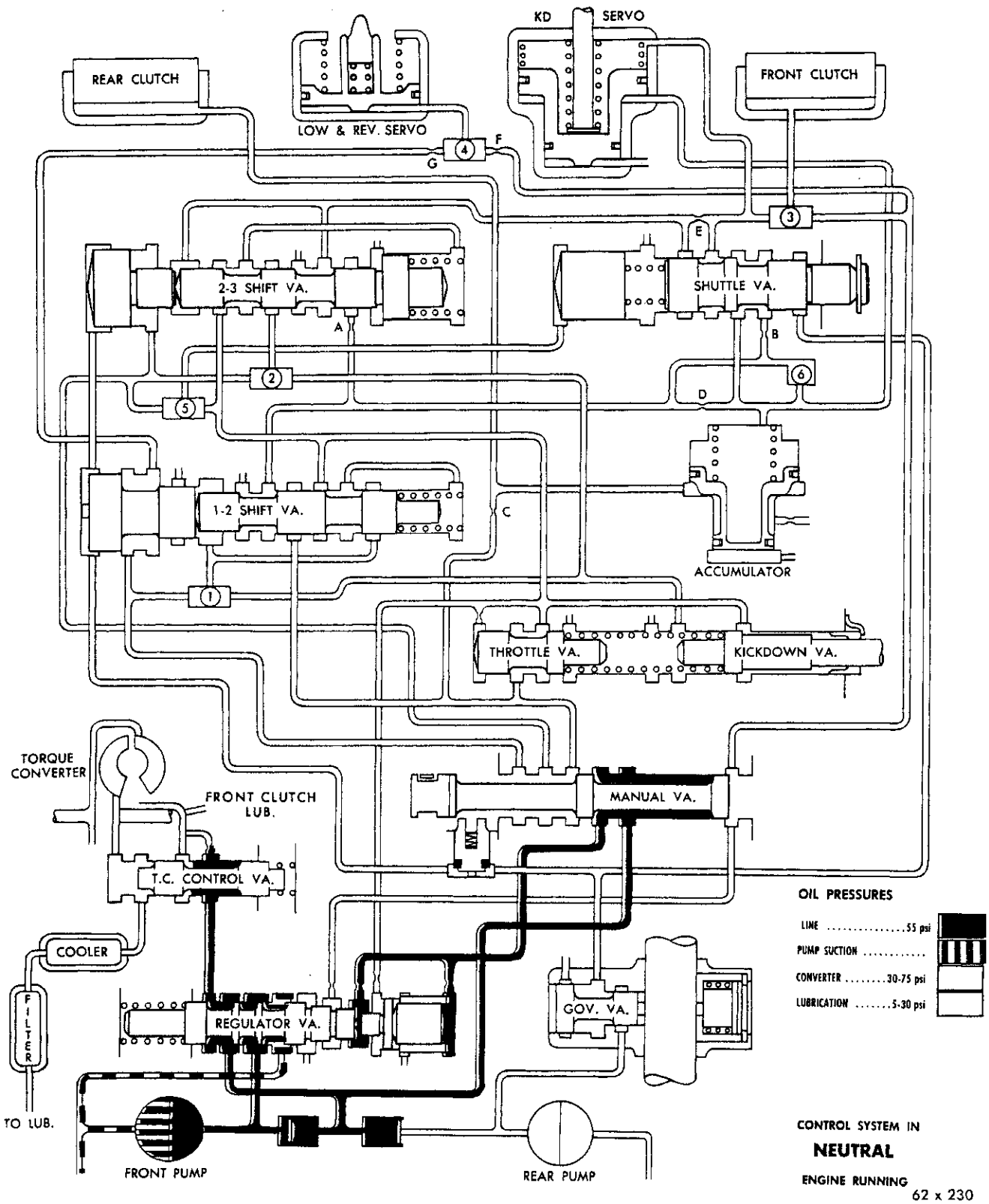



**Fig. 2—Neutral Hydraulic Circuits**

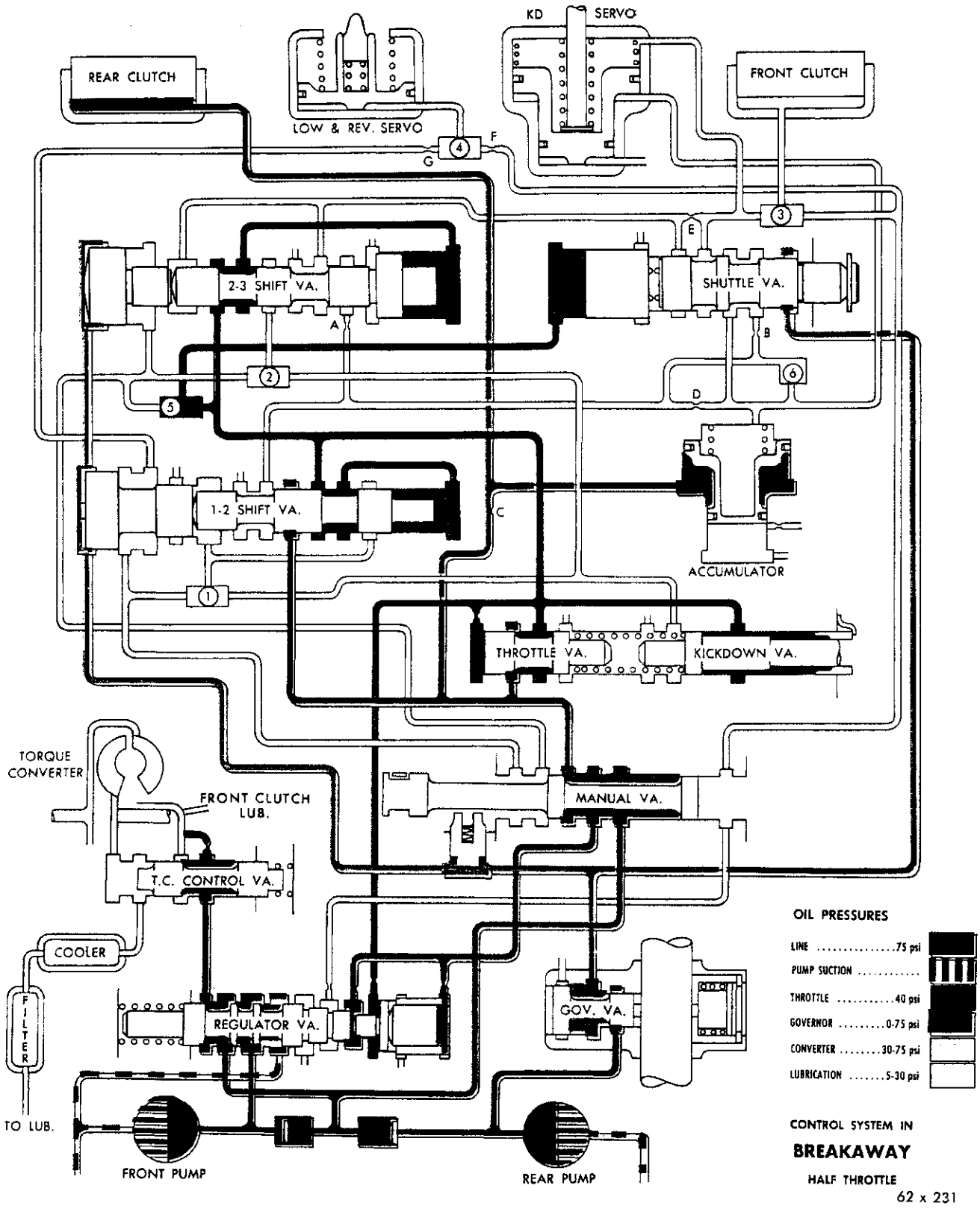



**Fig. 3—Drive-Breakaway Hydraulic Circuits**

uncovers the torque converter "in" port and pressure begins to build up in the torque converter. When converter pressure acting on the reaction area of the torque converter control valve reaches 30 psi, the valve begins to move out, so that the inner land begins to regulate, reducing the line pressure flow to the converter. Should converter pressure approach 75 psi as in reverse when line pressure is high or due to particles of foreign matter lodging in lubrication passages, the converter control valve would completely cut off flow from the regulator to prevent converter pressure from exceeding 75 psi.

A restricted passage, from the center groove of the torque converter control valve to the converter "in" passage, bypasses enough line pressure, around the metering land of the torque converter control valve. This prevents momentary changes of pressure on either side of the valve from causing the valve to flutter. Without this passage, the valve would at times hunt or flutter, causing a buzzing noise.

Because the front clutch requires lubrication as soon as the engine starts, the front clutch lubrication come off the converter "in" passage. As soon as the control system is filled and the regulator valve begins to direct flow into the converter circuit, the front clutch is lubricated. Thus, the front clutch lubrication pressure is higher than the lubrication pressure in other members.

**Power Flow-Neutral**

With the engine running and the transmission in neutral, the torque converter impeller drives the front pump and turbine. Torque is transmitted from the turbine through the input shaft to the rear clutch retainer and front clutch hub, which are integral. Neither clutch is engaged and neither band is applied, so no torque is transmitted beyond the rear clutch retainer.

**Breakaway Circuits (Fig. 3)**

When the "D" (drive) button is engaged, the manual valve is moved out one detent, connecting the pump and regulating circuits to the drive circuit, which directs line pressure to the throttle valve, the 1-2 shift valve and the rear clutch and accumulator.

The rear clutch engagement is cushioned by the

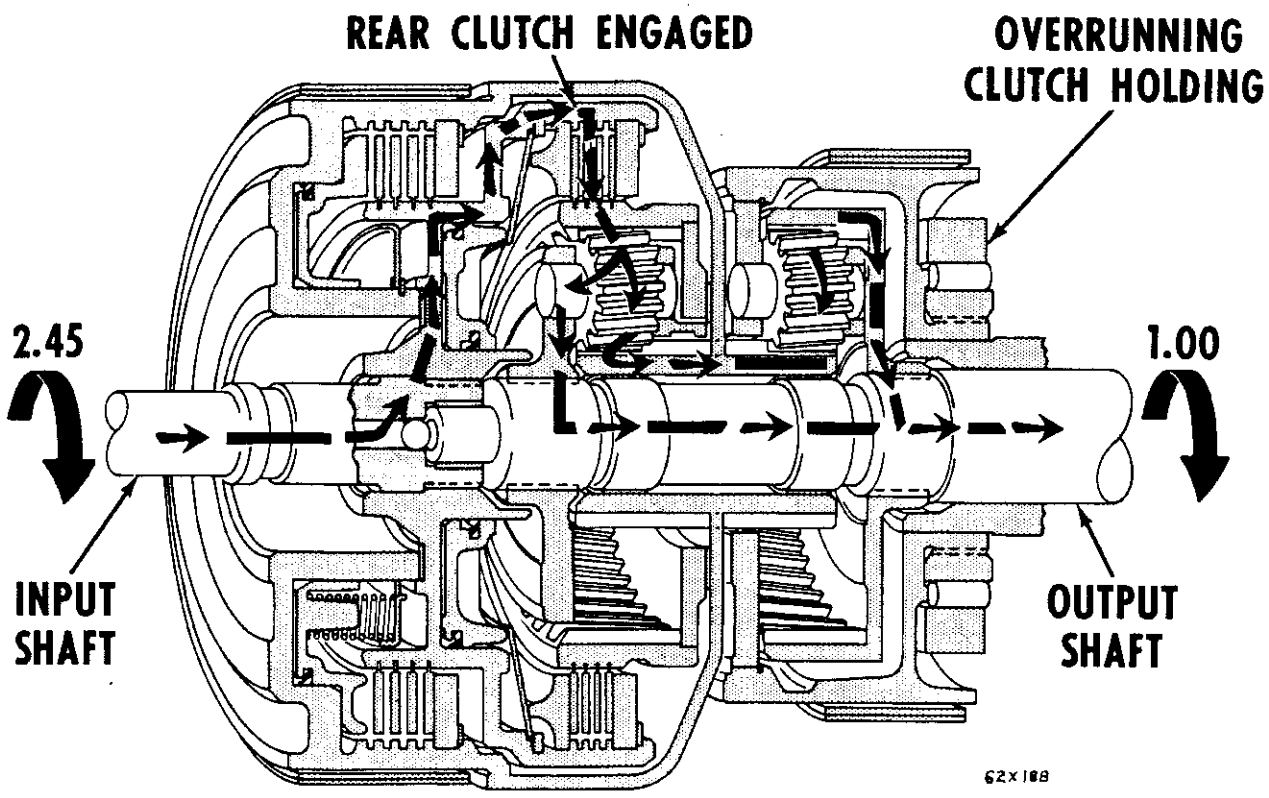



Fig. 4—Power Flow in D (Drive) Position-Breakaway

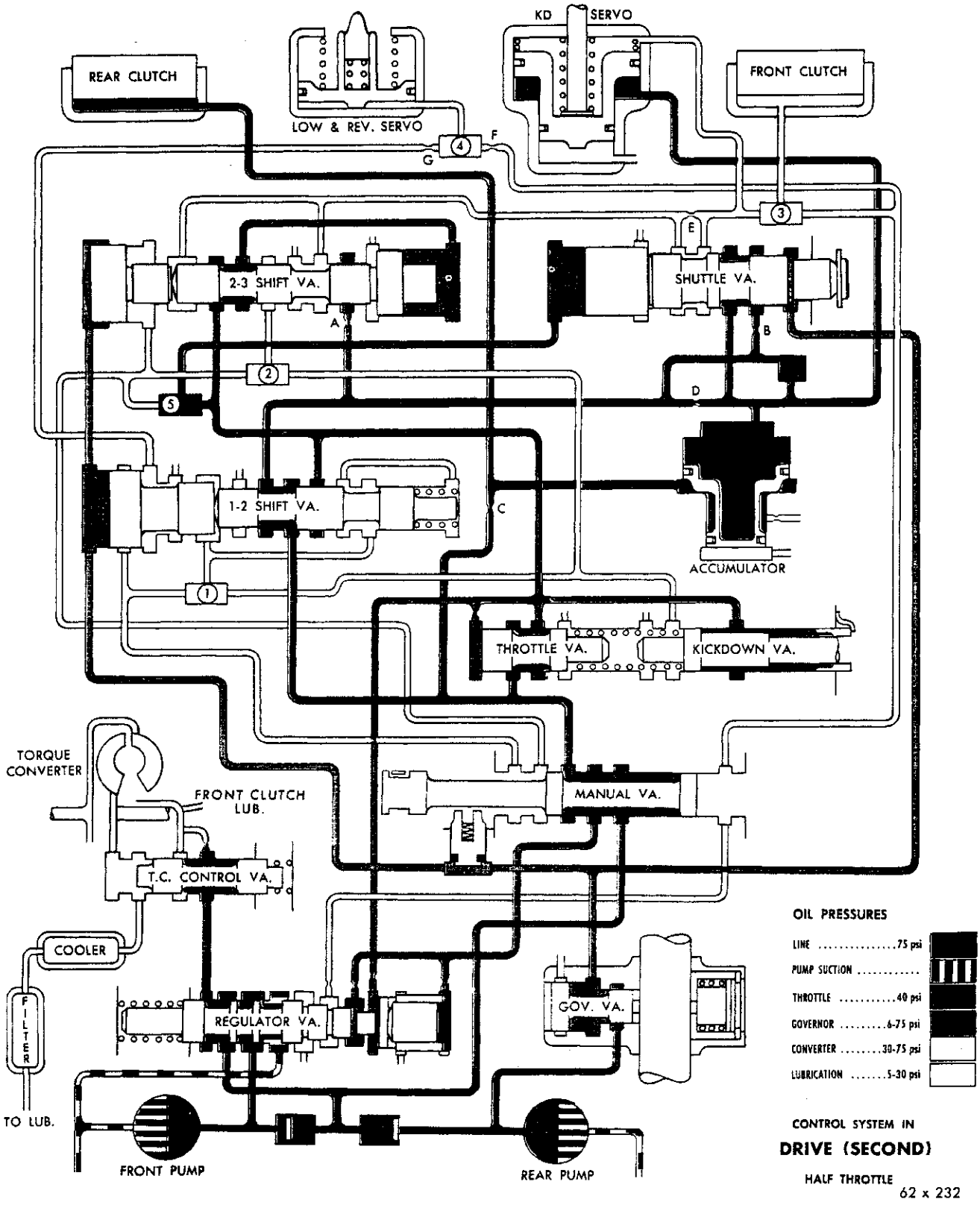



**Fig. 5—Drive-Second Hydraulic Circuits**

"C" orifice and by the accumulator. The "C" orifice restricts flow to the accumulator and clutch while compression of the accumulator spring assures a gradual increase in pressure.

At half throttle, the throttle valve meters enough line pressure flow into the throttle pressure circuit to regulate throttle pressure at about 40 psi. At the regulator valve, throttle pressure acts with spring force to regulate line pressure at about 75 psi. The throttle pressure circuit also directs throttle pressure to the spring end of each shift valve and to the shuttle valve plug.

As the vehicle speed builds up, the rear pump flow and pressure increase. The governor valve meters some of this flow into the governor circuit to regulate governor pressure proportionate to vehicle speed. Governor pressure will increase from 0 to 75 psi with vehicle speed, reaching 15 psi at about 16 mph. 45 psi at about 33 mph, and 75 psi at about 60 mph, depending on rear axle ratio and tire size.

**Power Flow Breakaway (Fig. 4)**

In breakaway, the rear clutch is engaged and the overrunning clutch holds. The torque is transmitted from the converter turbine through the input shaft to the rear clutch retainer. Since this clutch is engaged, the power is transmitted to the kickdown annulus gear. The annulus gear drives the kickdown planet pinions, from which the torque is transmitted to the sun gear and to the carrier. The pinions, being meshed with the sungear, rotate the sun gear in the reverse direction. The sun gear rotates the low and reverse planet pinions in the forward directions. The low and reverse planet pinion carrier is held by the overrunning clutch, so the planet pinions rotate the low and reverse annulus gear and output shaft in the forward direction.

Some torque is transmitted from the front planet pinion carrier to the output shaft. The product of the torque transmitted to the output shaft by the front carrier and the rear annulus support equals the 2.45-1 gear ratio of breakaway.

**Upshift to Second Circuits (Figs. 3 and 5)**

With the "D" (Drive) button engaged and the transmission operating in breakaway, governor pressure increases with car speed until, at 10-40 mph, depending on throttle opening, the governor pressure on the 1-2 shift valve governor pressure plug is sufficient to overcome the combined force of spring load and throttle pressure. As soon as the valve moves slightly in the upshift direction, the middle land of the valve cuts off throttle pressure and the inner land vents the throttle pressure chamber. The valve then "snaps" over into the upshift position and remains there under normal operating conditions until vehicle speed falls off to below 8 mph.

On the 1-2 upshift, line pressure is admitted to the 2-3 shift valve and, through the shuttle valve and accumulator circuit to the kickdown servo "apply" area.

**Power Flow—Upshift to Second (Fig. 6)**

In second and in kickdown the rear clutch is engaged and the kickdown band is applied.

The torque flows from the converter turbine through the input shaft to the rear clutch retainer. Since this clutch is engaged, the power is transmitted to the kickdown annulus gear.

Since the kickdown band is applied, the sun gear cannot operate, so the kickdown annulus gear "walks" the planet pinions clockwise around the sun gear, rotating the planet pinion carrier and the output shaft in the same direction at a 1.45-1 ratio.

**Upshift to Direct Circuits (Fig. 7)**

On the 2-3 upshift, governor pressure overcomes the combined force of throttle pressure and spring force on the 2-3 shift valve, and the valve upshifts with the same "snap" action as the 1-2 shift valve. In the upshifted position, the 2-3 shift valve directs line pressure to its own interlock area and, through the shuttle valve circuit, to the kickdown servo release area and the front clutch.

On a normal upshift, throttle pressure has the shuttle valve plug in against the stop and governor pressure holds the shuttle valve against the plug, leaving the "E" orifice by-pass open so that the clutch engagement is rapid and the transmission is in direct drive as soon as the kickdown band is released, permitting no "engine runaway" with resultant rough shift quality.

On a lift-foot upshift, there being no throttle pressure, the shuttle valve plug moves out, reducing spring load on the shuttle valve. Governor pressure moves the shuttle valve in to connect the kickdown servo apply circuit with the release circuit, equalizing pressure on both sides of the servo piston until the piston return spring releases the band. Then pressure builds up to apply the front clutch, so that there is a delay between the release of the band and the engagement of the clutch. During this period, the engine slows down from the 1.45-1 ratio of drive second to about 1-1 ratio of direct, so that when the front clutch engages it does so with very little shock.

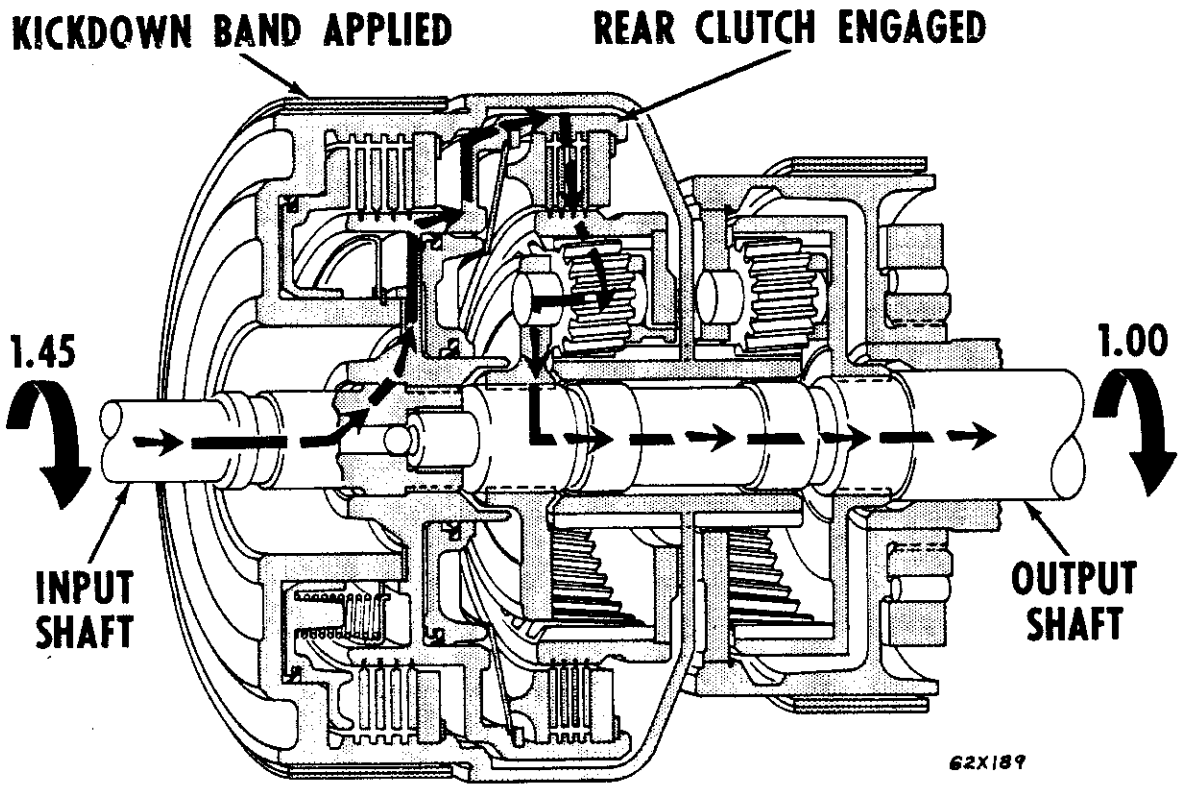



Fig. 6—Power Flow in D (Drive) Position-Second or Kickdown

**Power Flow—Upshift to Direct (Fig. 8)**

In direct, both clutches are engaged.

The torque flows from the converter turbine through the input shaft to the rear clutch retainer and front clutch hub, which are integral.

Since the front clutch is engaged, the torque is transmitted through the front clutch retainer and sun gear driving shell to the sun gear.

Since the rear clutch is engaged, it turns the kickdown annulus gear in the same direction and at the same rpm as the input shaft and sun gear.

Because the kickdown annulus gear and sun gear are both rotating in the same direction and at the same speed as the input shaft, the whole kickdown planetary gear assembly is locked up and the splines on the pinion carrier turn the output shaft at the same rpm as the input shaft.

**Closed or Part Throttle Downshift (Fig. 7)**

In direct drive, line pressure acting on the interlock area of the 2-3 shift valve keeps the valve upshifted, even when governor pressure falls off and the governor plug moves outward. When vehicle speed is reduced to about 7 or 8 mph, the 1-2 shift valve spring overcomes governor pressure and downshifts the 1-2 shift valve. The middle land of the 1-2 shift valve cuts off line pressure to the 2-3 shift valve and kickdown servo apply area and the inner annular groove of the 1-2 shift valve vents this circuit.

The 2-3 shift valve downshifts simultaneously because its spring is no longer opposed by interlock line pressure, and its outer annular groove vents the kickdown servo release and front clutch apply circuit. Thus, there is no closed or part throttle downshift until vehicle speed is reduced to 7-8 mph, when the transmission shifts from direct to breakaway. When the vehicle is stopped, with the service brakes applied, only the torque converter impeller and front pump turn and the torque converter is "stalled."

**3-2 Kickdown or Forced Downshift Circuits (Fig. 9)**

When the accelerator is fully depressed in direct drive, additional pedal effort is required in the last few degrees of pedal travel, to overcome throttle pressure force on the inner end of the kickdown detent sleeve and move the sleeve and kickdown valve all the way in.

The kickdown valve inner stem contacts the outer end of the throttle valve, and mechanically pushes it in to a point where its inner land completely un-

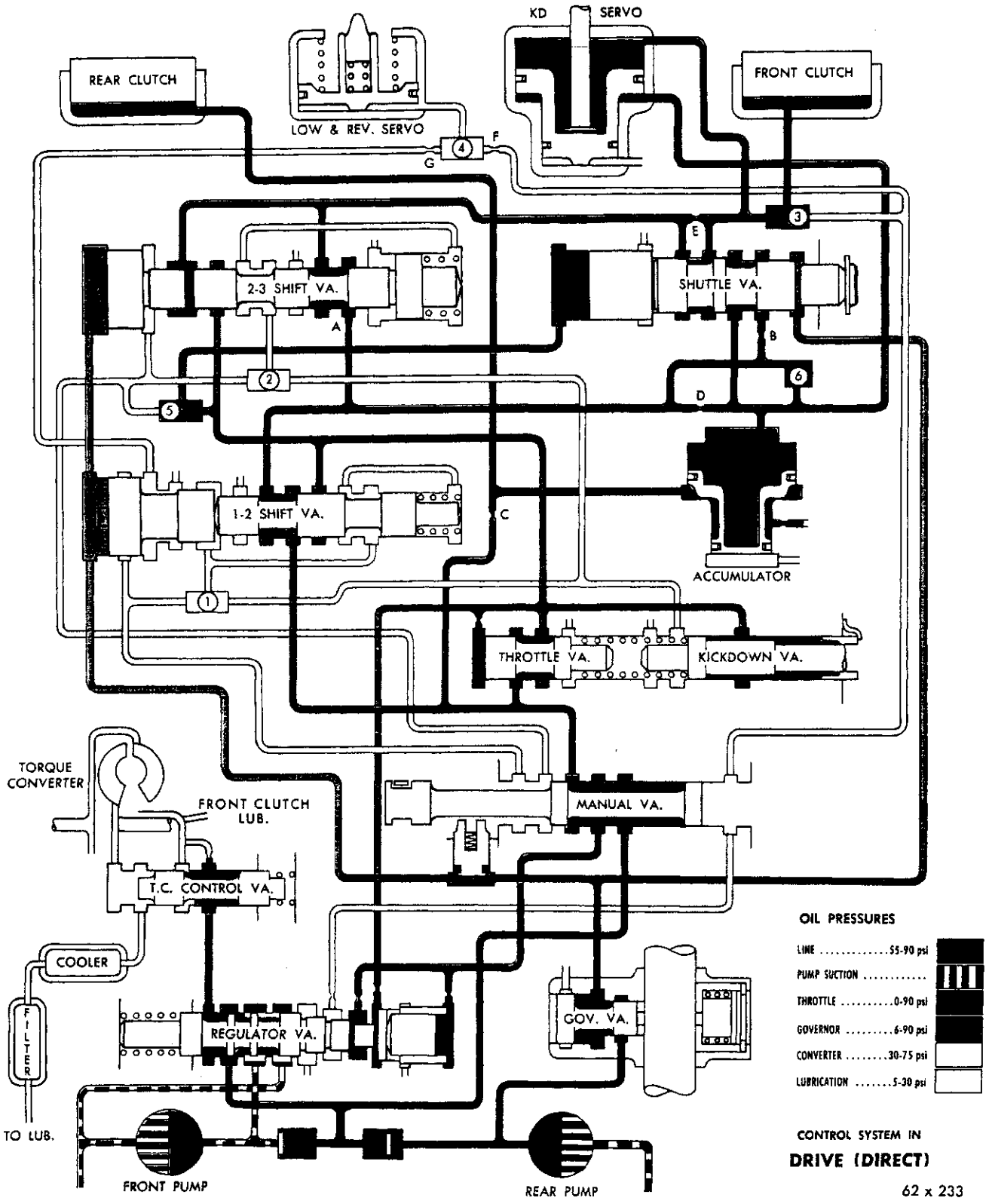



Fig. 7—Drive-Direct Hydraulic Circuits

covers the line pressure "in" port, so that line pressure enters the throttle pressure circuit without being metered by the throttle pressure valve. Thus, throttle pressure achieves line pressure valve, which is regulated at about 90 psi.

Meanwhile, because the kickdown valve is moved all the way in to uncover the kickdown circuit port, kickdown pressure is directed to the spring ends of both shift valves if they are upshifted and to the inner end of the 1-2 shift valve governor plug. The force of this pressure on the spring end of the 2-3 shift valve "kicks" the valve in far enough to allow throttle pressure, also at 90 psi to reach the spring end of the valve when the kickdown circuit port is closed off by the second land of the shift valve. This force will downshift the valve, and hold it downshifted, up to about 50 mph.

When the 2-3 shift valve downshifts, its third land blocks off the line pressure "in" port while the second land uncovers a port that vents the front clutch, kickdown servo release and 2-3 shift valve interlock pressure. The "E" orifice by-pass is open at the shuttle valve to provide an unrestricted circuit to the vent port.

**Power Flow—3-2 Kickdown or Forced Downshift (Fig. 6)**

Power flow is the same as in Drive, Second.

**3-1 or 2-1 Kickdown Circuits (Fig. 9)**

When the accelerator is fully depressed with the transmission operating in direct or second, it will downshift to breakaway below about 25 mph. The 1-2 shift valve is downshifted in much the same manner as described for the 2-3 shift valve, with pressure from the kickdown servo supplying the initial "kick". Because the area of the spring end of the 1-2 shift valve is smaller in relation to the governor plug, the kickdown circuit supplies pressure to the inner end of the governor plug to supply the initial "kick", allowing the spring to downshift the valve and to hold the governor plug out during wide open throttle breakaway operation.

**Push Button—Second Circuits (Fig. 10)**

When the "2" button is depressed, the manual valve moves out one detent farther than in the "D" button position, allowing line pressure to enter the manual second or selective second circuit, which carries line pressure to the inner side of the 2-3 shift valve governor plug, to the kickdown pressure port of the 2-3 shift valve and to the shuttle valve plug. This pressure inside the governor plug causes a 3-2 downshift and prevents a 2-3 upshift regardless of vehicle speed when the "2" button is depressed.

You will note that the #5 ball check valve directs

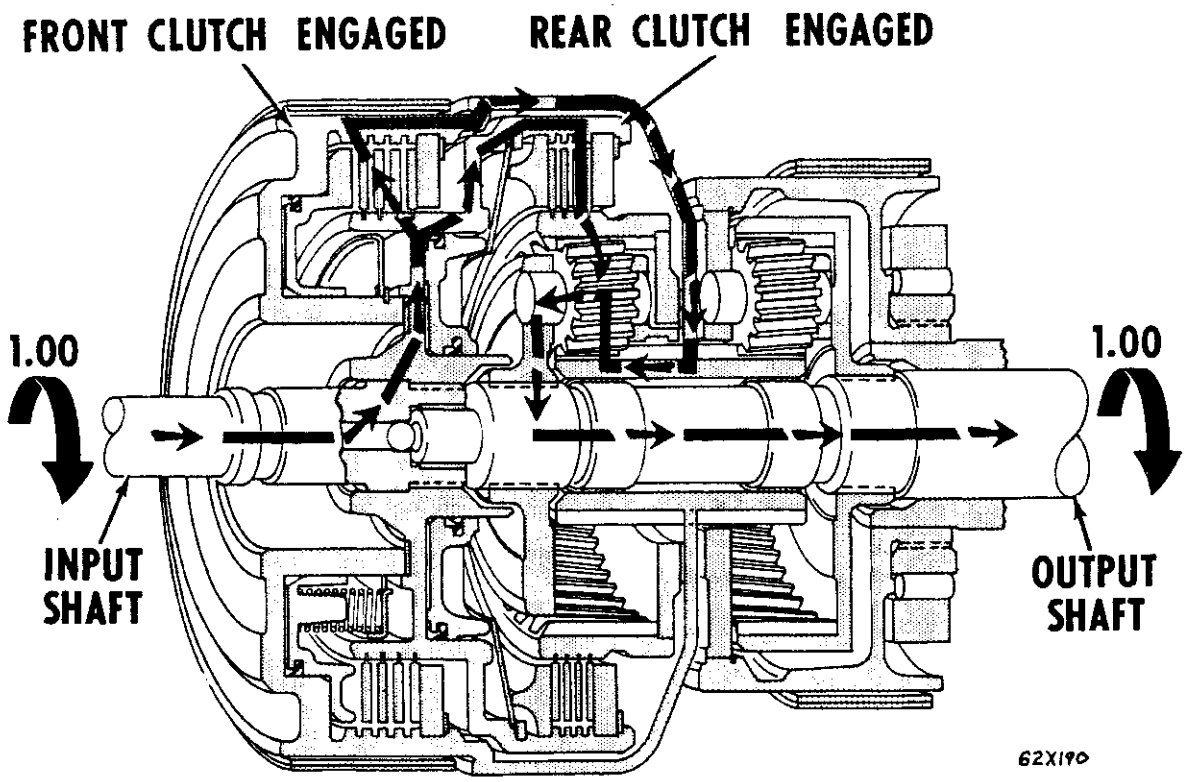



Fig. 8—Power Flow in D (Drive) Position-Direct

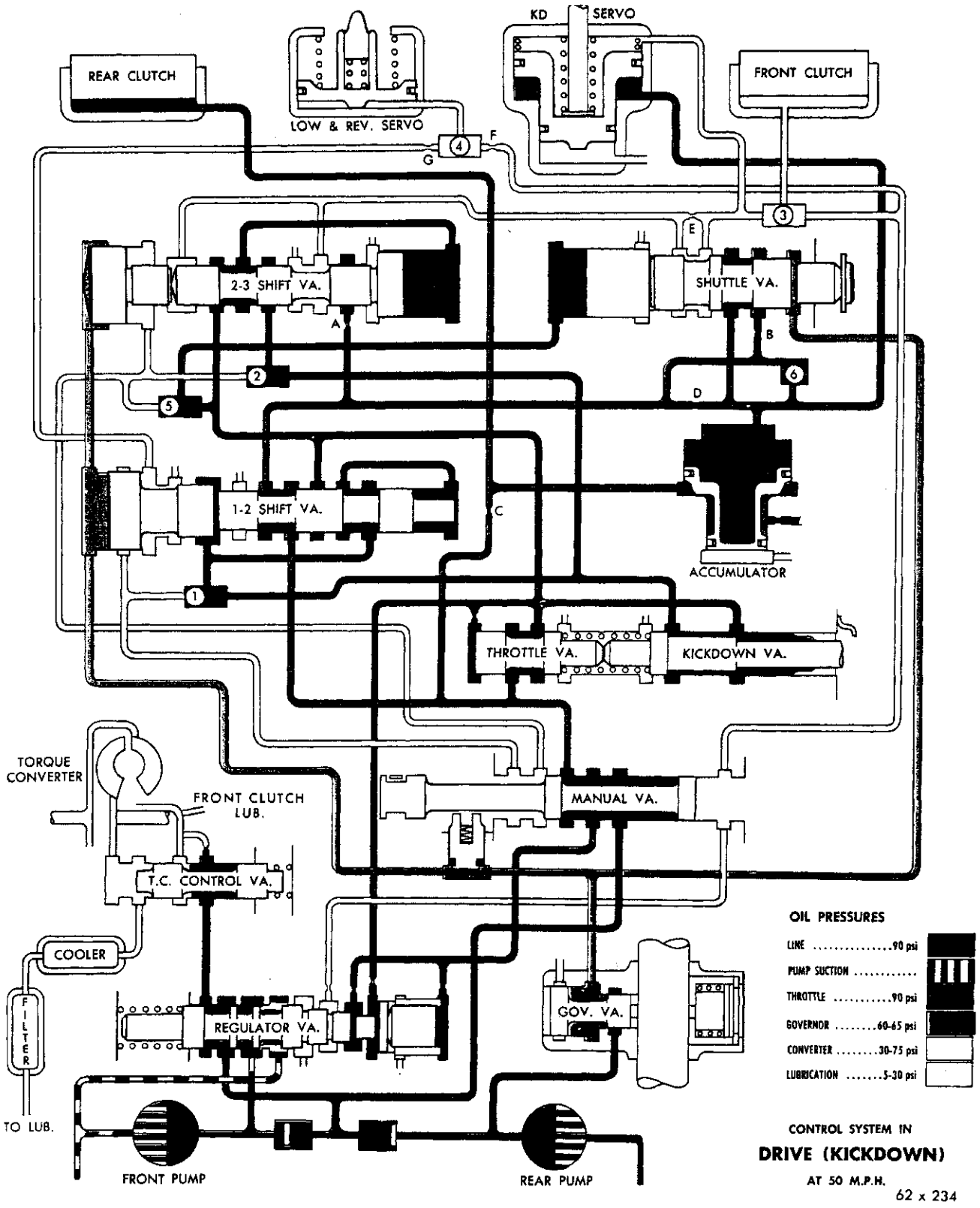



Fig. 9—Drive Kickdown Hydraulic Circuits

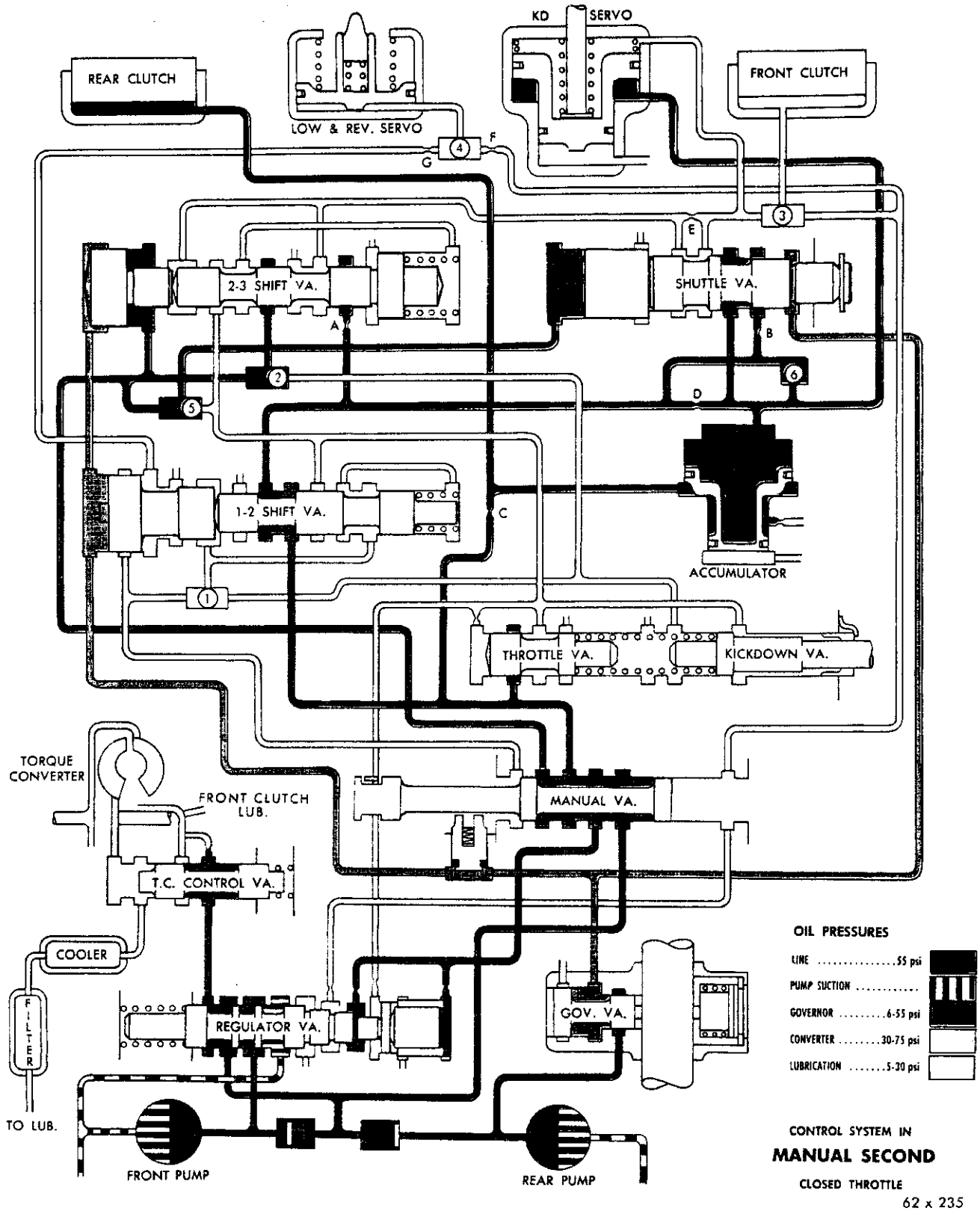



Fig. 10—Push Button Second-Hydraulic Circuits

flow to the shuttle valve plug and blocks off the throttle pressure circuit, and the #2 ball check valve directs it to the 2-3 shift valve throttle pressure port and blocks off the kickdown circuit.

The reason for directing line pressure to the shuttle valve plug in manual second is that this gear selection is used at closed throttle for engine braking as well for driving with the throttle open. Without pressure on the shuttle valve plug during operation in second, the kickdown servo apply circuit could be vented across the shuttle valve and 2-3 shift valve.

The 1-2 shift valve receives the same hydraulic pressures as in drive, and the 1-2 upshift is the same as in drive.

**Power Flow—Push Button Second (Fig. 11)**

Power flow in Push Button (2) Second is the same as in (D) Drive Second or Kickdown from Drive Direct.

**Push Button—Low Circuits (Fig. 12)**

When the "1" (Low) button is engaged the manual valve is moved out to the last detent, uncovering another "out" port in addition to those uncovered for Drive and Push Button Second operation.

The Push Button Low circuit delivers line pressure to the inner end of the 1-2 governor plug and the spring end of the 1-2 shift valve to downshift the valve, to the annular groove of the 1-2 shift valve governor plug and to the low and reverse servo apply area. You will note that this circuit cannot deliver pressure to the annular groove of the 1-2 shift valve governor plug until the 2-1 downshift has been completed. The 2-1 downshift is impossible at speeds above about 20 mph. The #1 check valve ball seats against the kickdown pressure circuit passage to prevent venting of the Low circuit through the kickdown pressure circuit. When line pressure is admitted to the annular groove of the 1-2 shift valve governor plug it holds the plug in the downshifted position. As long as the "1" button is engaged, the transmission cannot upshift to Second, even at closed throttle, because if the valve starts to move against spring force, line pressure from the Low circuit will gain admission to the spring end of the valve before the valve has moved far enough to uncover the Second circuit port.

**Power Flow—Push Button Low (Fig. 13)**

The power flow in Push Button Low follows the same path as in breakaway. The low and reverse band holds the rear planet pinion carrier, instead of the

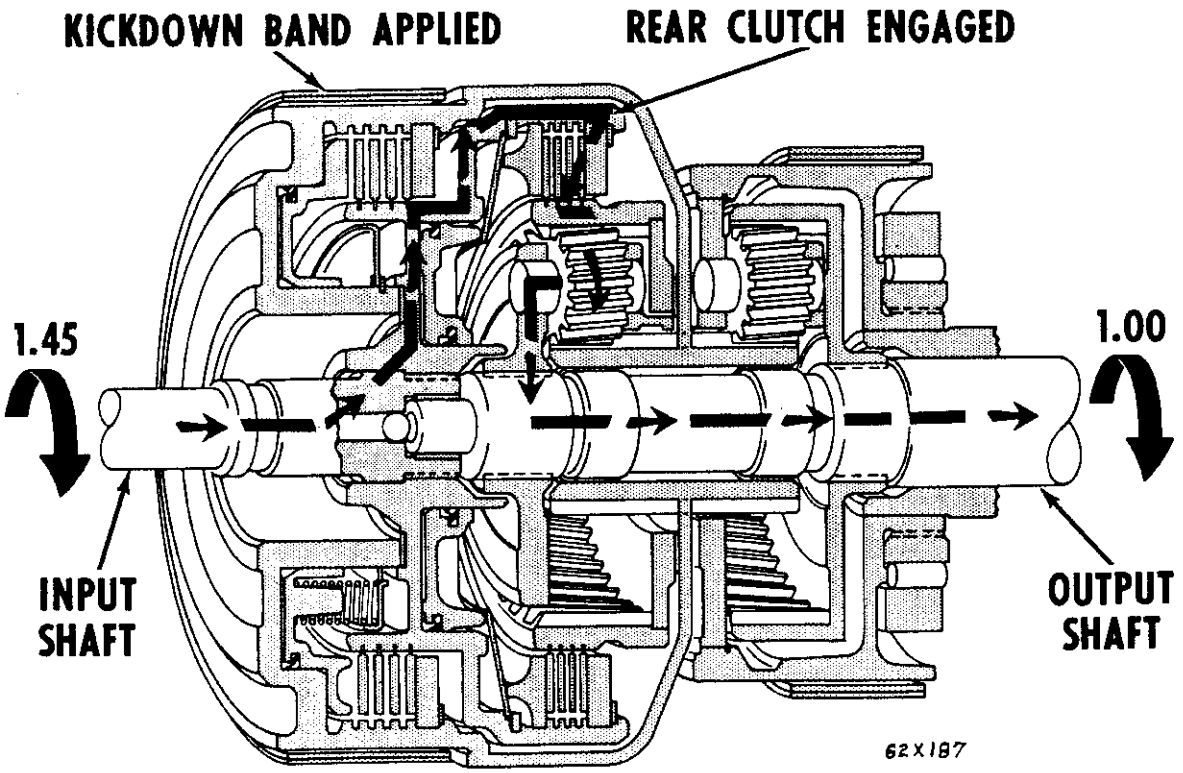



Fig. 11—Power Flow in Push Button 2 (Second)

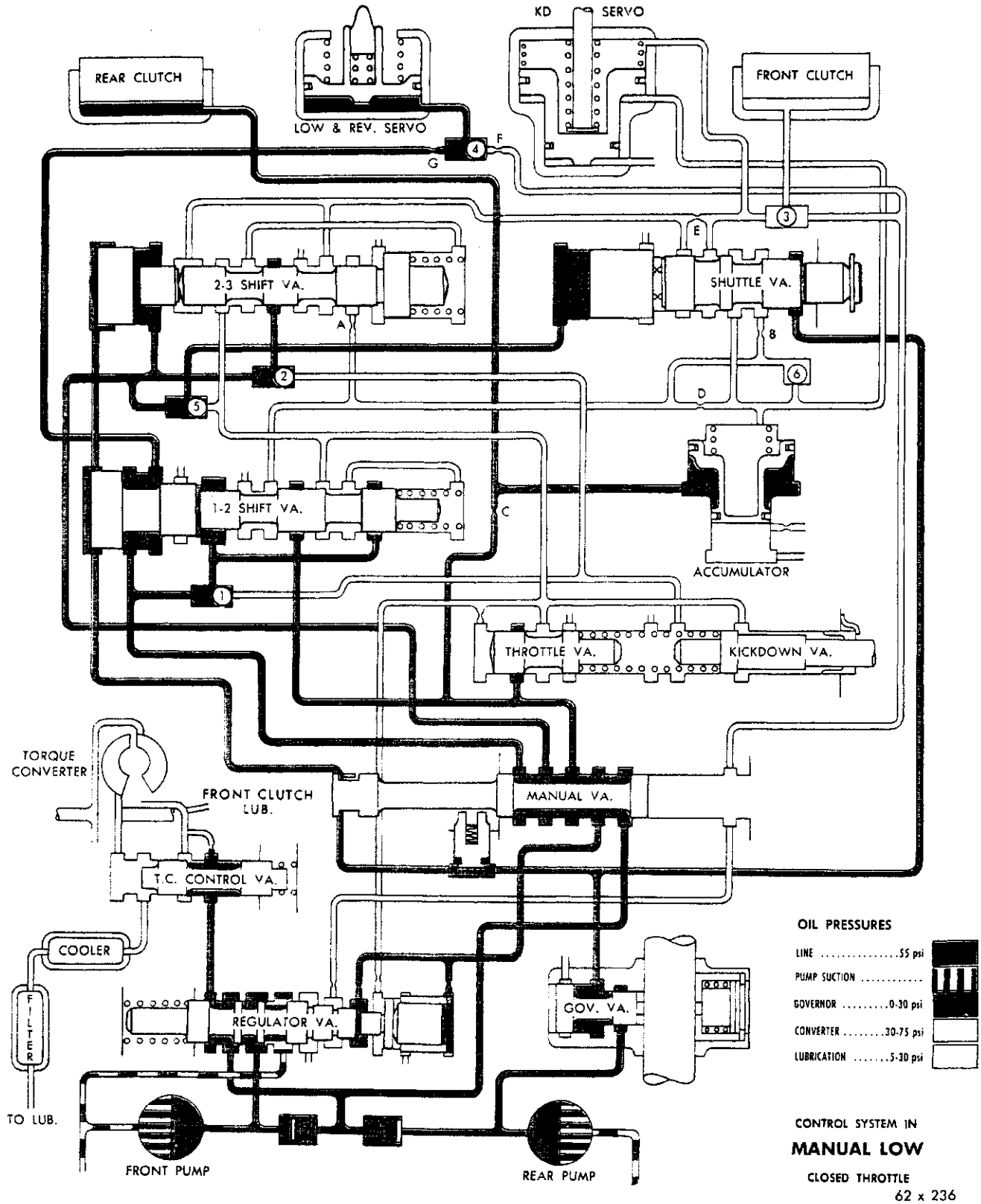



**Fig. 12—Push Button Low-Hydraulic Circuits**

overrunning clutch holding it. The overrunning clutch cannot be utilized because closed throttle Push Button Low is designed to serve as a retarding gear. When the transmission is being used for retarding (Engine Braking) the output shaft is trying to rotate faster than the input shaft, and since the overrunning clutch cannot prevent this, the low and reverse band is applied when the "I" button is engaged.

**Reverse Circuits (Fig. 14)**

The "R" (Reverse) button cannot shift the transmission into reverse at forward speeds upward of about 18 mph because of blocker valve action. When the "R" (Reverse) button is engaged, the manual valve is pushed all the way in. With the manual valve in the extreme "in" position, its inner annular groove connects the line pressure "in" port with an "out" port leading to the regulator valve and to the apply areas of the front clutch and the low and reverse servo. Metered restrictions "F" delays the application of the low and reverse servo until the front clutch is applied to provide a smooth engagement.

The #3 check valve ball blocks off the passage that would vent front clutch apply pressure through the 2-3 shift valve, and the #4 check valve ball blocks off the passage that would vent low and reverse servo apply pressure through the Manual Low line pressure port at the manual valve.

At the regulator valve, as soon as the middle land of the manual valve moves in and vents the regulator valve line pressure plug circuit, the regulator valve spring moves the regulator valve in enough to stop metering pump flow into the sump, and line pressure starts to build up. When this line pressure, acting on the differential area of the inner annular groove of the regulator valve, reaches about 260 psi it begins to force the valve out to meter pump flow into the sump. Reverse line pressure is regulated at a higher value than forward line pressure since the differential area of the inner annular groove of the regulator valve is smaller than the neutral and forward reaction area.

In Reverse, the rear pump is reversed, and the rear pump check valve is seated to prevent venting of front pump flow through the reat pump.

**Power Flow—Reverse (Fig. 15)**

With the "R" button engaged the front clutch is engaged and the low and reverse band is applied.

The torque is transmitted from the converter

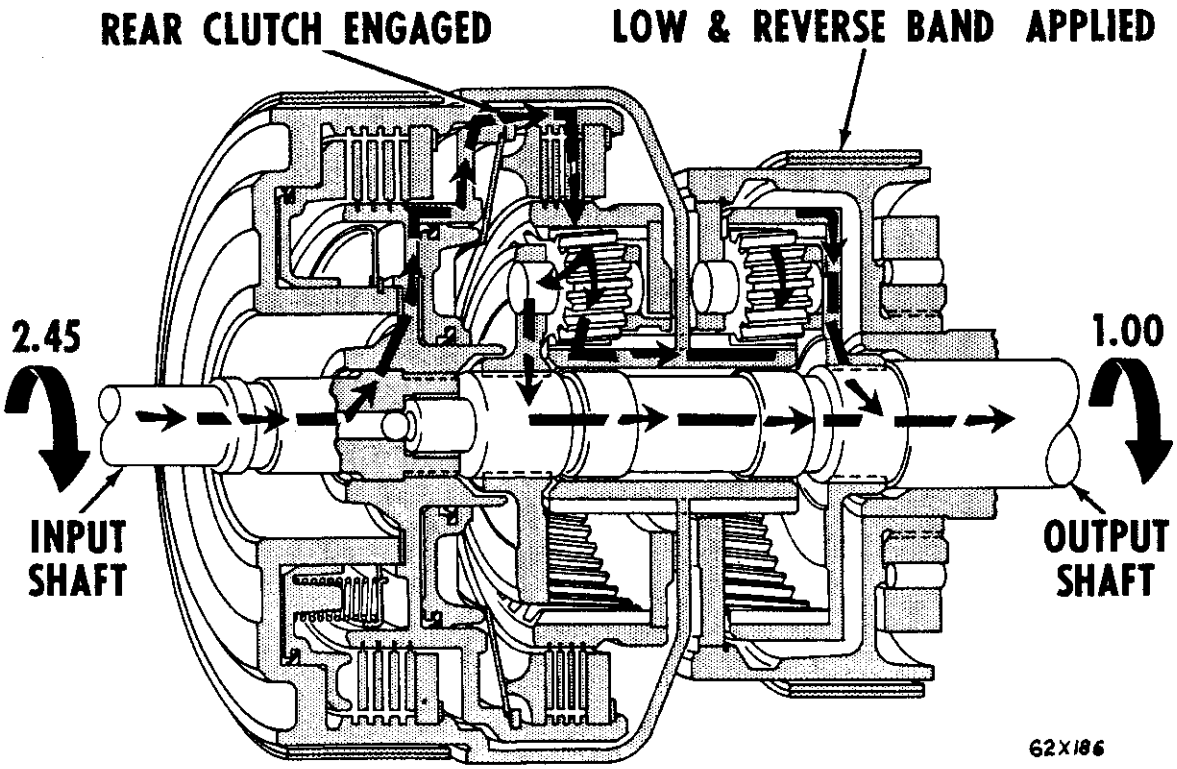



Fig. 13—Power Flow in Push Button 1 (Low) Position-Low or Retarding

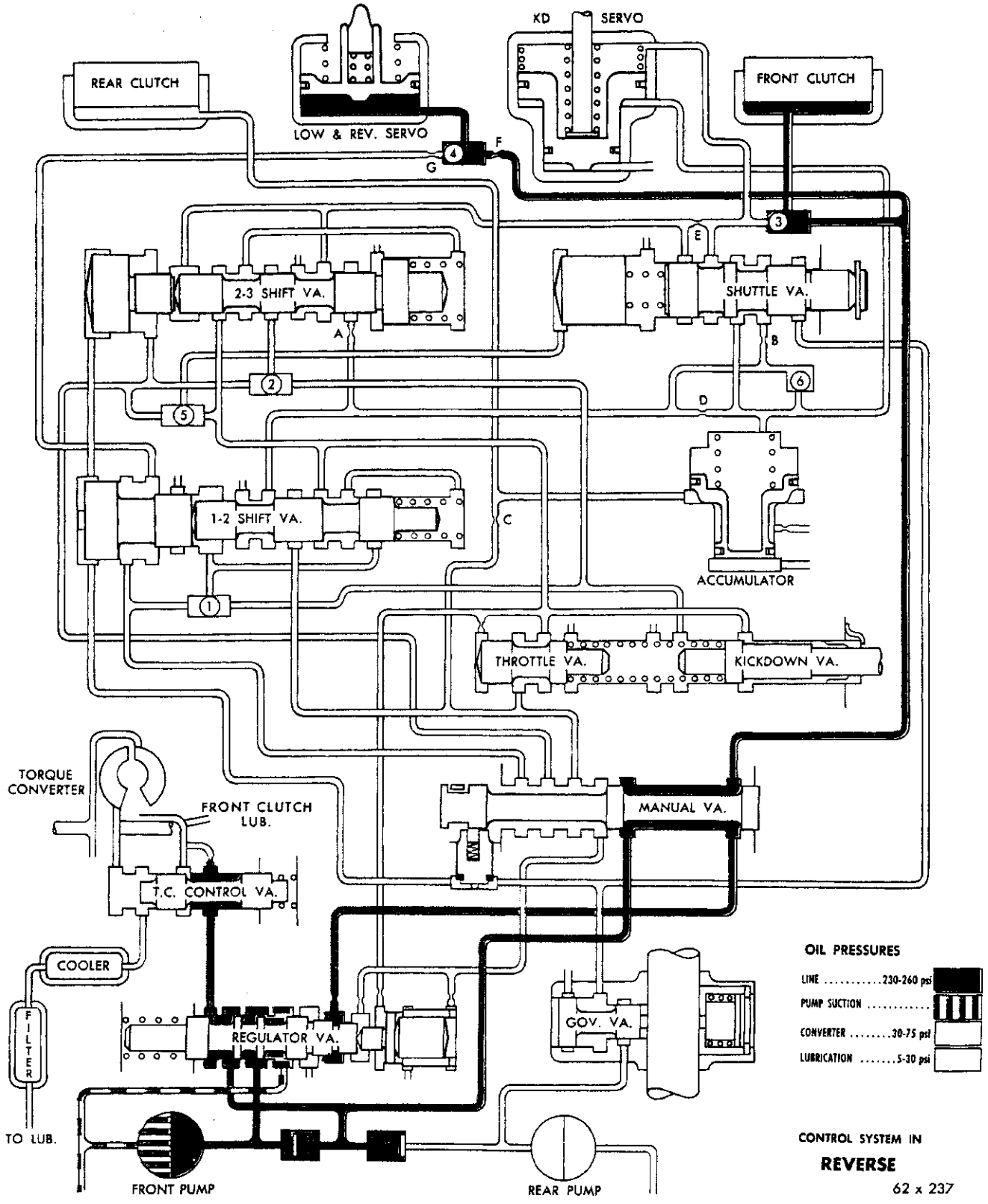



**Fig. 14—Reverse Hydraulic Circuits**

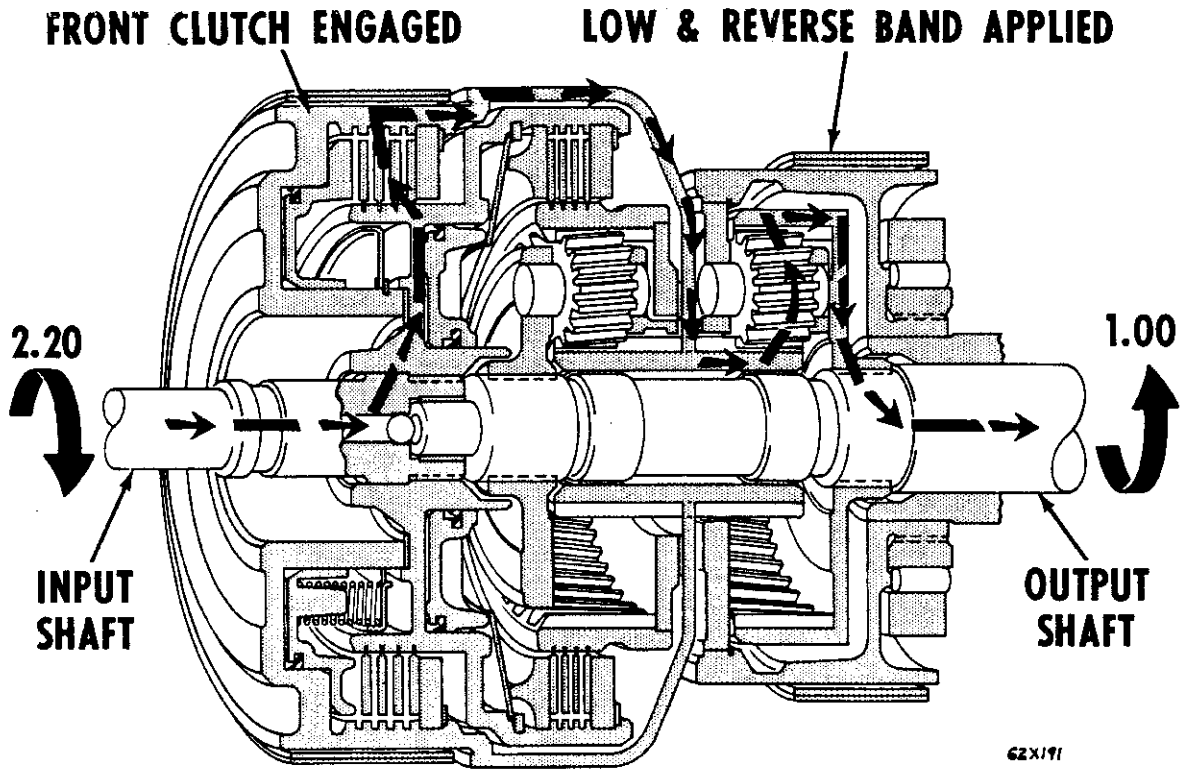



Fig. 15—Power Flow in R (Reverse) Position

turbine through the input shaft to the front clutch hub.

Because the front clutch is engaged, the power flows through it and through the sun gear driving shell to rotate the sun gear in the forward direction.

Because the low and reverse band is applied on the rear planetary gear drum, the pinion carrier is held and the sun gear rotates the planet pinions forcing the low and reverse annulus gear of the rear planetary gear set and the output shaft to rotate in the reverse direction.

## TRANSMISSION MAINTENANCE

### Towing Car (Transmission Inoperative)

Tow the vehicle with a rear end pickup or remove the propeller shaft.

### Towing Car (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.

### Checking Fluid Level

The fluid level should be checked every 4,000 miles. When checking, the engine and transmission should be at normal operating temperature.

(1) With the parking brake on and the engine idling, depress each push button momentarily, ending with the N (neutral) button pushed in.

(2) The fluid level should be between the "FULL" mark and the "ADD ONE PINT" mark, but never above the "FULL" mark when the engine is at its normal warmed condition described above. Add or remove fluid as necessary to bring to this prescribed level (Fig. 16).

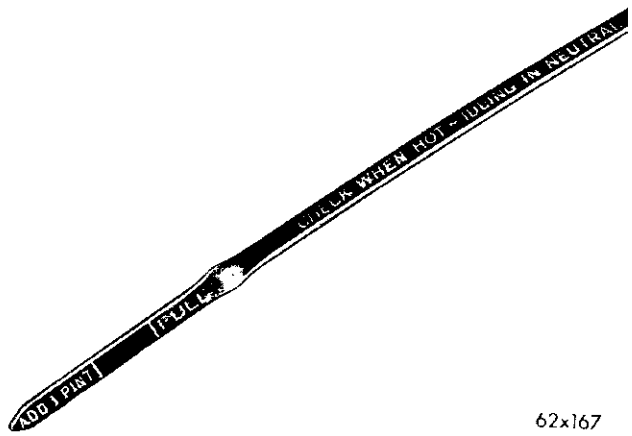
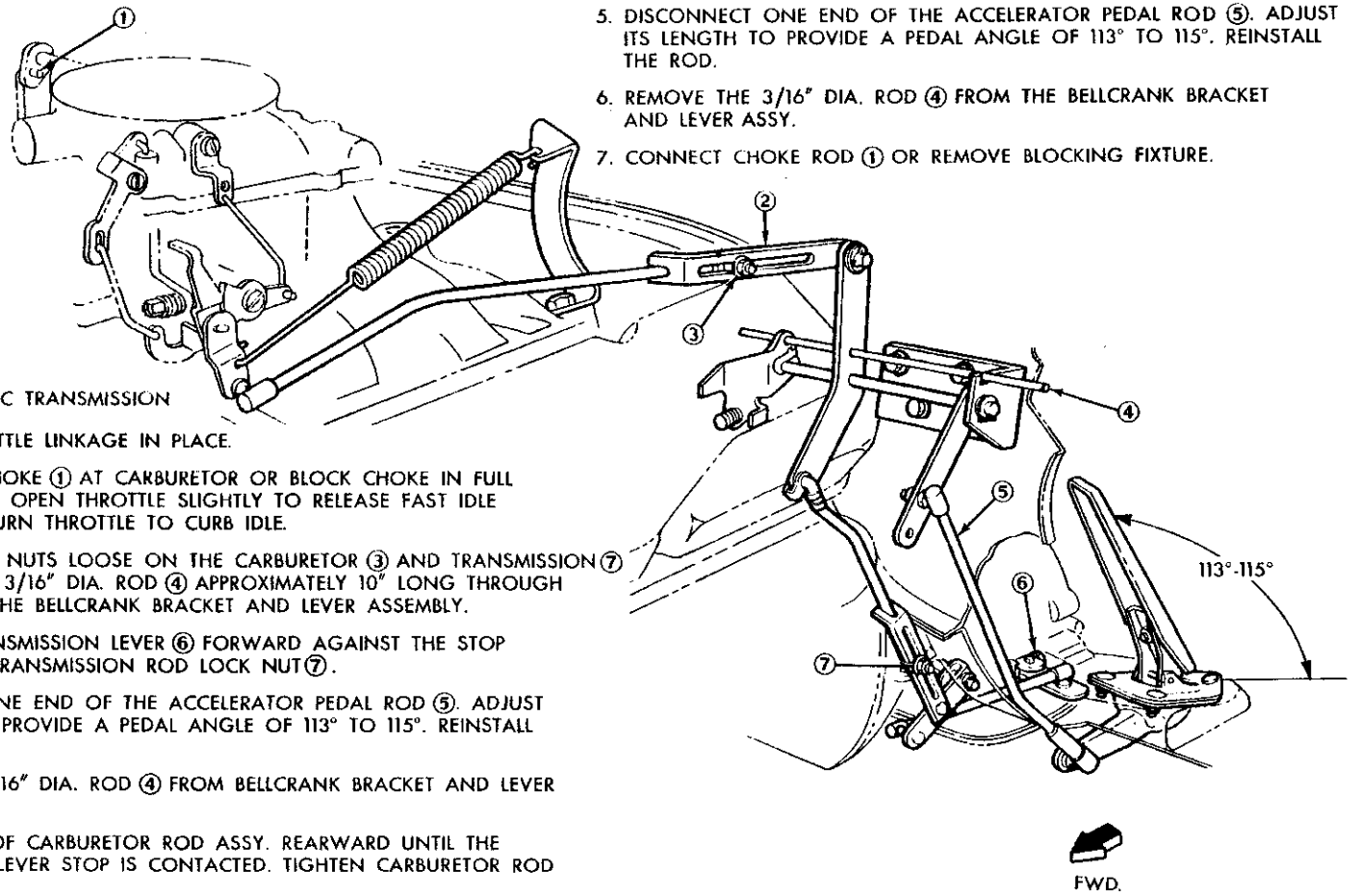



Fig. 16—Dip Stick Markings

WITH MANUAL TRANSMISSION

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 NUT ③ LOOSE IN THE CARBURETOR ROD INSERT A 3/16" DIA. ROD ④ APPROXIMATELY 10" LONG THROUGH THE HOLES IN THE BELLCRANK BRACKET AND LEVER ASSY.
4. TIGHTEN CARBURETOR ROD LOCK NUT ③.
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 THE BELLCRANK BRACKET AND LEVER ASSY.
7. CONNECT CHOKE ROD ① OR REMOVE BLOCKING FIXTURE.

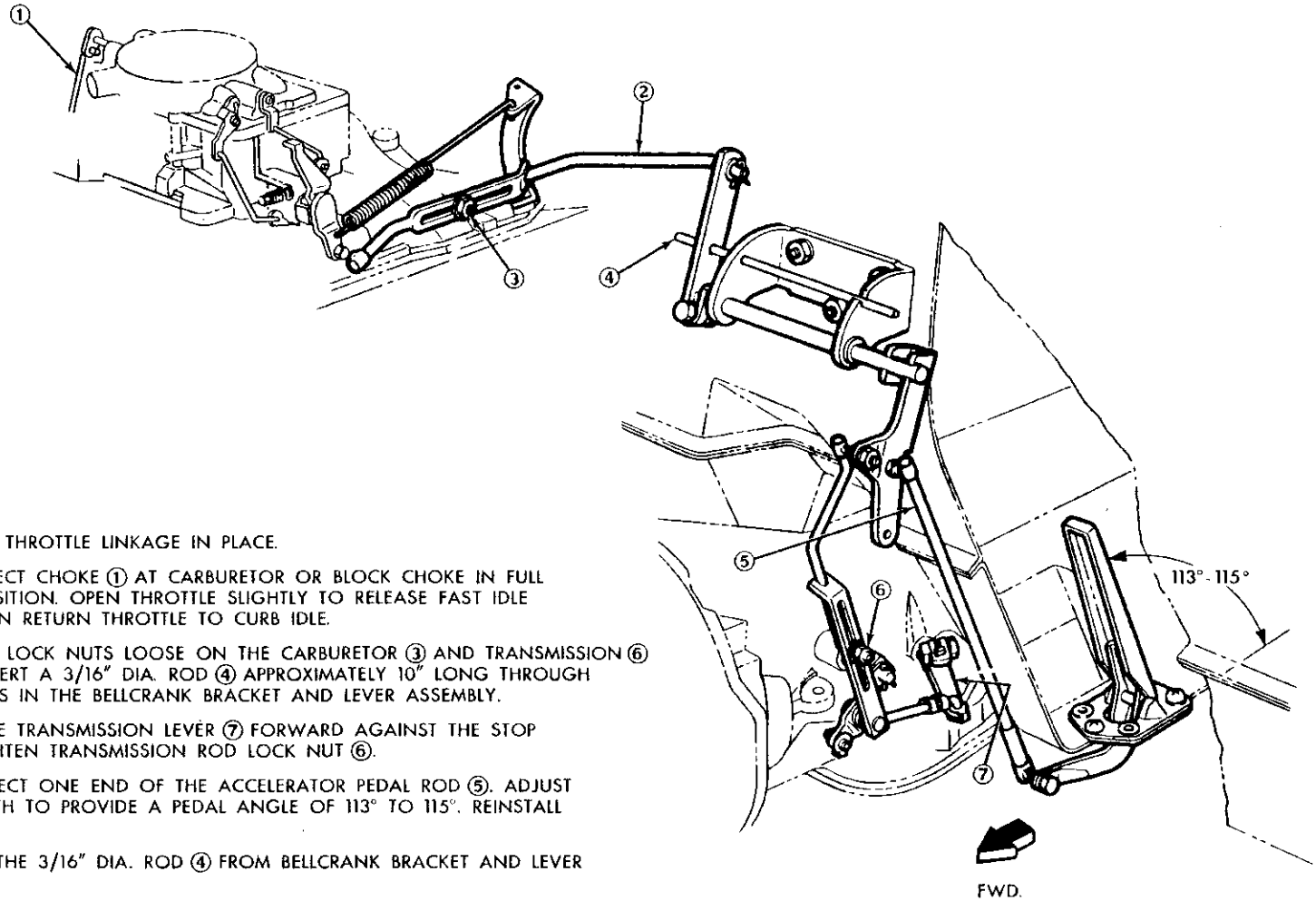



WITH AUTOMATIC TRANSMISSION

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 ⑦ 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 ⑥ FORWARD AGAINST THE STOP AND TIGHTEN TRANSMISSION ROD LOCK NUT ⑦.
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.

62x147

**Fig. 17—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.

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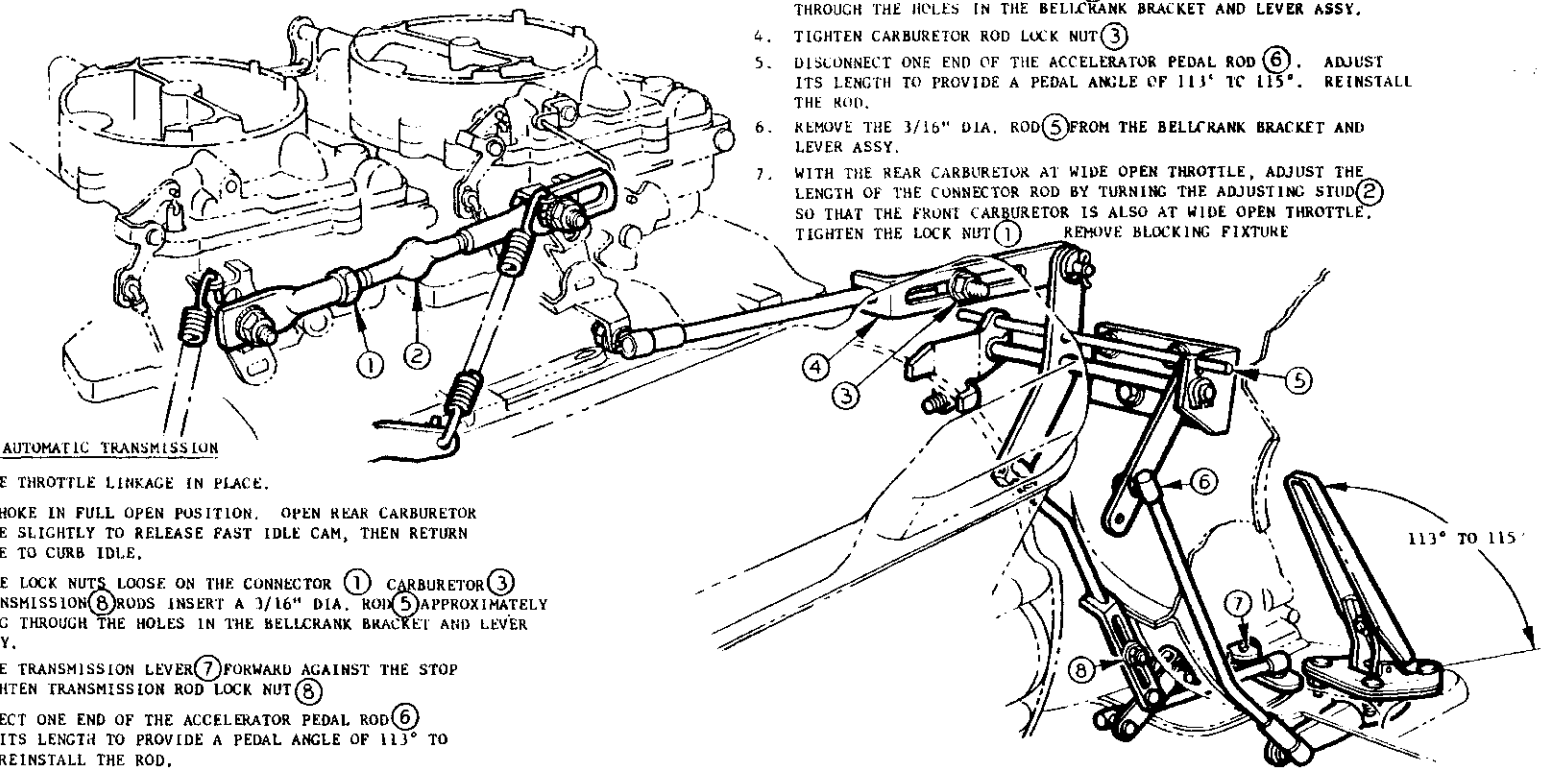
**Fig. 18—Throttle Linkage Adjustment (Imperial)**




WITH AUTOMATIC TRANSMISSION

1. ASSEMBLE THROTTLE LINKAGE IN PLACE.
2. BLOCK CHOKE IN FULL OPEN POSITION. OPEN REAR CARBURETOR THROTTLE SLIGHTLY TO RELEASE FAST IDLE CAM, THEN RETURN THROTTLE TO CURB IDLE.
3. WITH THE LOCK NUTS LOOSE ON THE CONNECTOR (1) CARBURETOR (3) AND TRANSMISSION (8) RODS INSERT A 3/16" DIA. ROD (5) 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 (8)
5. DISCONNECT ONE END OF THE ACCELERATOR PEDAL ROD (6) ADJUST ITS LENGTH TO PROVIDE A PEDAL ANGLE OF 113° TO 115°. REINSTALL THE ROD.
6. REMOVE THE 3/16" DIA. ROD (5) FROM BELLCRANK BRACKET AND LEVER ASSY.
7. MOVE LINK (4) OF CARBURETOR ROD ASSY. REARWARD UNTIL THE TRANSMISSION LEVER STOP IS CONTACTED. TIGHTEN CARBURETOR ROD LOCK NUT (3)
8. WITH THE REAR CARBURETOR AT WIDE OPEN THROTTLE, ADJUST THE LENGTH OF THE CONNECTOR ROD BY TURNING THE ADJUSTING STUD SO THAT THE FRONT CARBURETOR IS ALSO AT WIDE OPEN THROTTLE. TIGHTEN THE LOCK NUT (1) REMOVE BLOCKING FIXTURE

WITH MANUAL TRANSMISSION

1. ASSEMBLE THROTTLE LINKAGE IN PLACE.
2. BLOCK CHOKE IN FULL OPEN POSITION. OPEN REAR CARBURETOR THROTTLE SLIGHTLY TO RELEASE FAST IDLE CAM, THEN RETURN THROTTLE TO CURB IDLE.
3. WITH THE LOCK NUTS LOOSE ON THE CONNECTOR (1) & CARBURETOR (3) RODS, INSERT A 3/16" DIA. ROD (5) APPROXIMATELY 10" LONG THROUGH THE HOLES IN THE BELLCRANK BRACKET AND LEVER ASSY.
4. TIGHTEN CARBURETOR ROD LOCK NUT (3)
5. DISCONNECT ONE END OF THE ACCELERATOR PEDAL ROD (6). ADJUST ITS LENGTH TO PROVIDE A PEDAL ANGLE OF 113° TO 115°. REINSTALL THE ROD.
6. REMOVE THE 3/16" DIA. ROD (5) FROM THE BELLCRANK BRACKET AND LEVER ASSY.
7. WITH THE REAR CARBURETOR AT WIDE OPEN THROTTLE, ADJUST THE LENGTH OF THE CONNECTOR ROD BY TURNING THE ADJUSTING STUD (2) SO THAT THE FRONT CARBURETOR IS ALSO AT WIDE OPEN THROTTLE. TIGHTEN THE LOCK NUT (1) REMOVE BLOCKING FIXTURE

7

62 x 297

**Fig. 19—Throttle Linkage Adjustment (C-300H)**

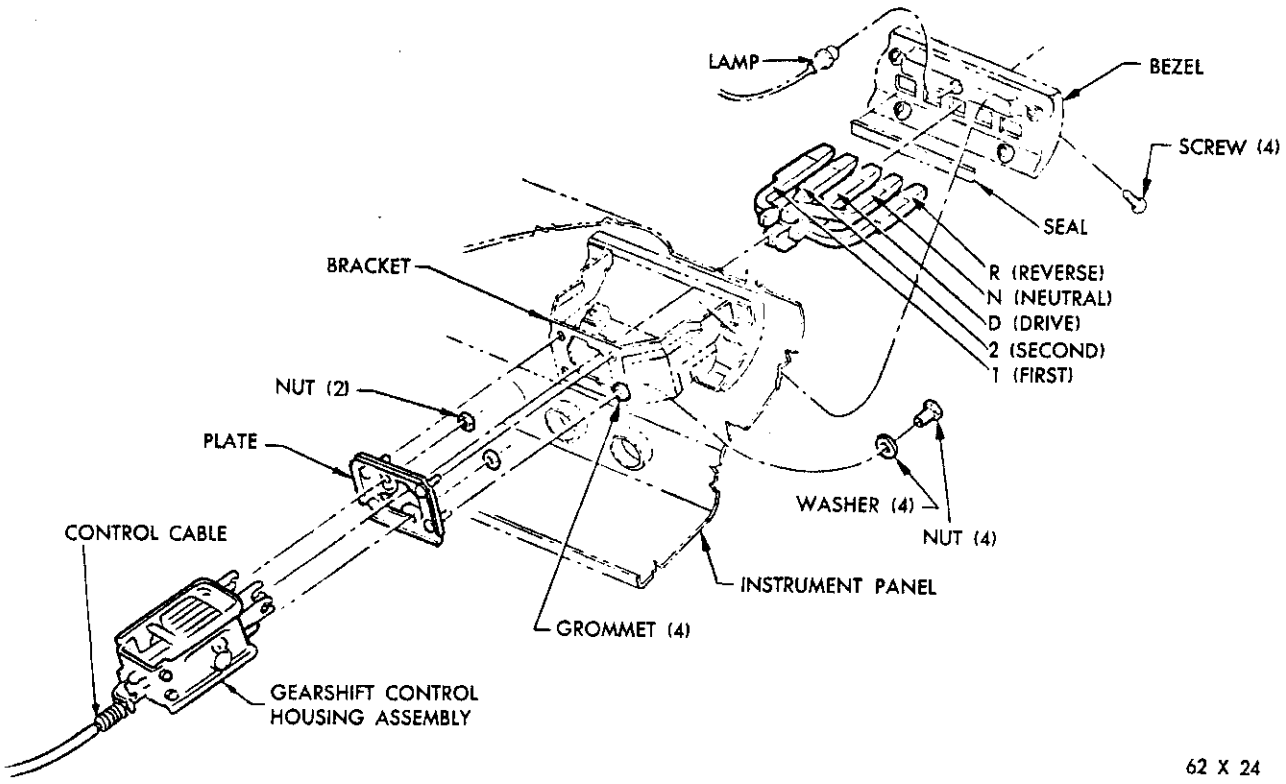



Fig. 20—Removing or Installing Gearshift Control Unit (Chrysler)

**CAUTION: To prevent dirt from entering the transmission after checking or replenishing fluid, make certain that the dip stick cap is reseated properly onto the filler tube.**

(3) If it is necessary to check the fluid level when the transmission is cold, the fluid level should be at the "ADD ONE PINT" mark to 3/8 inch below the "ADD ONE PINT" mark.

### Throttle Linkage Adjustment

(1) With the engine at operating temperature and carburetor off the fast idle cam, adjust idle speed to 500 rpm (use tachometer).

(2) Adjust the throttle linkage as outlined and illustrated in Figure 17, 18 or 19.

## GEARSHIFT CONTROL UNIT REPLACEMENT

**NOTE: On the Imperial Models, in order to have access to the control unit from the rear of the instrument panel, the speedometer should be removed. Refer to the "Electrical" Group 8 of this Manual under "Instruments" for removal procedures.**

### Removal

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

(2) Remove the push button bezel retaining screws and carefully remove the bezel, and rubber or felt seal (Figs. 20 or 21).

(3) Remove the push buttons by pulling them off the push button slides.

(4) Disconnect the back-up switch wire connectors (if so equipped).

(5) On Chrysler Models (Fig. 20), remove the four nuts attaching the control unit and bracket assembly to the instrument panel bracket.

Carefully remove the assembly, remove the mounting bracket and disconnect the control cable assembly from the control unit.

(6) On Imperial Models (Fig. 21), remove the four nuts attaching the control unit, brackets and lighting panel assembly to the instrument panel.

Disconnect the lighting panel wire connector and carefully remove the control unit assembly from the instrument panel. Remove the lighting panel and mounting brackets from the control unit, disconnect control cable assembly from the unit.

### Installation

(1) On Chrysler Models (Fig. 20), install the

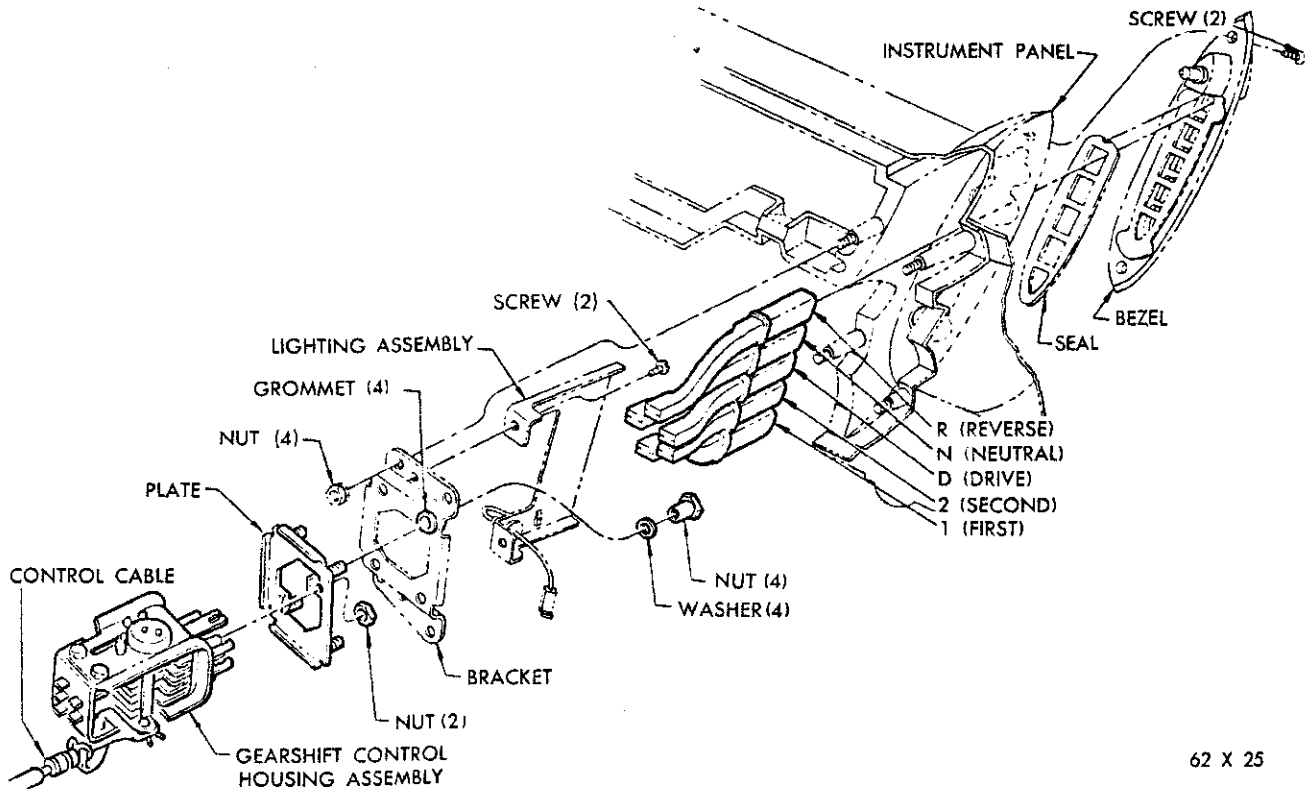



**Fig. 21—Removing or Installing Gearshift Control Unit (Imperial)**

mounting bracket on the control unit. Attach the control cable to the unit and clamp the cable housing securely in the bracket.

(2) On Imperial Models (Fig. 21), install the mounting brackets and lighting panel on the control unit. Attach the control cable to the unit and clamp the cable housing securely in the bracket.

(3) Carefully guide the control unit into position in the instrument panel. Install the retaining nuts and tighten securely.

(4) Connect the back-up switch wire connectors. Connect the panel lighting wire connector on Imperial Models.

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

(6) Install the rubber or felt seal, bezel and attach with the bezel retaining screws. Operate the push buttons and correct any binding of buttons that might exist.

(7) Connect the battery ground cable.

### 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.

### PUSH BUTTON LAMP REPLACEMENT

The Chrysler push button lamp is located in the push button bezel (Fig. 20). The bulb can be replaced by removing four screws and lifting off the bezel.

The Imperial push buttons are illuminated by a panelescent lighting panel attached to the control unit attaching bracket (Fig. 21). The lighting panel can be replaced by removing the control unit and bracket assembly.

### GEARSHIFT CONTROL CABLE (Transmission End)

### REMOVAL AND INSTALLATION

(1) Raise vehicle on hoist and drain approximately two quarts of fluid from transmission.

(2) Depress 1 (low) push button to position cable for removal from transmission.

(3) Disconnect wire from neutral starting switch and remove switch.

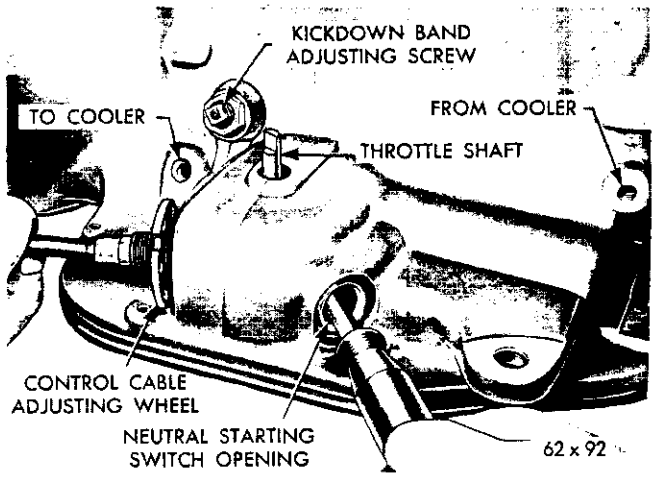



**Fig. 22—Removing Gearshift Control Cable**

(4) Remove push button control cable to transmission adjusting wheel lock screw.

(5) With a screwdriver inserted through the neutral starter switch opening, gently push against the upper projecting portion of the cable adapter lock-spring and pull outward on cable to remove cable assembly from case (Fig. 22).

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

(7) Back the adjustment wheel off on the cable housing (counter-clockwise) until two or three threads are showing on the guide behind the wheel.

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

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

## 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 **must be avoided.**

## LUBRICATION

### Drain, Refill and Periodic Adjustments

The transmission adjustments, fluid and filter change should be made every 32,000 miles as outlined in the following steps.

**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. Transmissions should not be idled in gear for long periods.**

(1) Remove the drain plug from the transmission oil pan and allow transmission to drain (Fig. 23).

(2) Remove the torque converter access plate and remove the converter drain plug and allow to drain (Fig. 23).

(3) Replace the torque converter drain plug. Tighten the plug to 14 foot-pounds torque.

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

(5) Adjust the reverse band. Refer to "Band Adjustments".

(6) Adjust the kickdown band. Refer to "Band Adjustments".

(7) Adjust the push button cable. Refer to "Gearshift Control Cable Adjustments".

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

(9) Install a new fluid filter. Run the engine for a few minutes and check filter and tube connections for leaks.

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

(11) Start the engine and allow to idle for at least

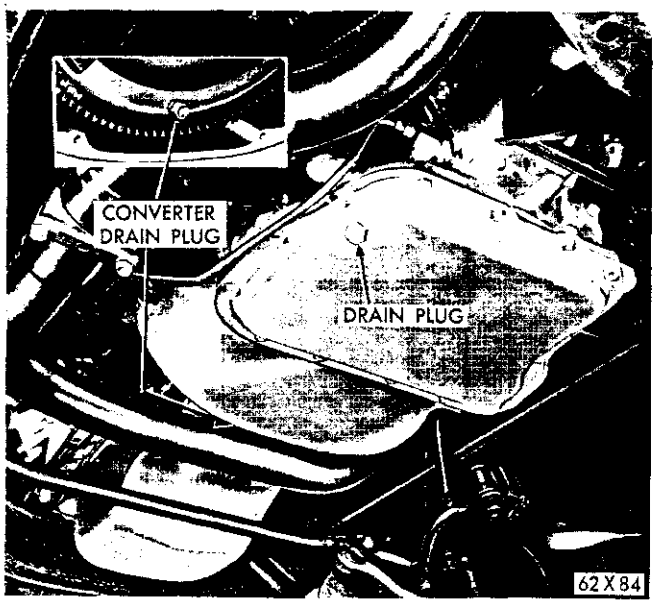



**Fig. 23—Transmission and Converter Drain Plugs**

two minutes. Then, with the parking brake on, depress each push button momentarily, ending with the N (neutral) button pushed in.

(12) Add sufficient fluid to bring the fluid level to the "ADD ONE PINT" mark, (approximately 1½ quarts).

Recheck the fluid level after the transmission is at normal operating temperature. The level should be at the "FULL" mark or slightly below.

(13) Adjust the transmission and carburetor throttle linkage to obtain the proper shift pattern. Refer to Paragraph "Transmission Maintenance".

CAUTION

**To prevent dirt from entering the transmission, make certain that the dip stick cap is reseated properly onto the filler tube.**

## FLUID LEAKS

### Leaks which can be Corrected with Transmission in the Vehicle

Transmission output shaft oil seal. Extension housing gasket. Speedometer pinion seal and cable seal. Oil filler tube seal. Oil pan gasket and drain plug gasket. Gearshift control cable seal. Throttle shaft seal. Neutral starting switch seal. Oil cooler line fittings and pressure take-off plugs.

CAUTION

**If the oil filler tube is removed, every precaution must be taken to prevent dirt from falling into the transmission hole. If necessary remove oil pan and clean.**

**NOTE: The transmission fluid is colored with a red dye. The colored fluid will aid in determining the exact location of seepage should a fluid leak be encountered.**

If oil is found inside torque converter housing, determine whether it is transmission fluid or engine oil. Inspect converter drain plug for tightness. Correct torque (14 foot-pounds) on this plug is very important.

Leaks at these locations should be corrected, regardless of how slight. Correct by tightening loose screws, nuts or plugs. Where this does not remedy the situation, replace faulty gaskets, seals, plugs or other parts as required.

### Leaks Requiring Removal of Transmission

Porous transmission case. Sand hole in front oil pump housing. Front oil pump housing retaining screws or damaged sealing washers. Front oil pump housing seal (located-on outside diameter of pump-housing). Torque converter assembly and converter impeller hub oil seal (located in front pump housing).

Leaks at these locations may be corrected by tightening loose bolts or replacing damaged or faulty parts. Any sharp edges on the converter impeller hub which could contact the seal during installation should be removed by stoning with a fine stone.

## GEARSHIFT CONTROL CABLE ADJUSTMENT

(1) Raise the car on a hoist. Have an assistant hold the R (reverse) button firmly depressed.

(2) Remove the push button control cable adjustment wheel lock screw at the left side of transmission (Fig. 22).

(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.

IMPORTANT

**Test 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, and tighten to 40 inch-pounds torque.

## NEUTRAL STARTING SWITCH

### Adjustment and Test

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

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

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

(4) Place cupped washer and "O" ring over threads of the switch (Fig. 24), then screw switch

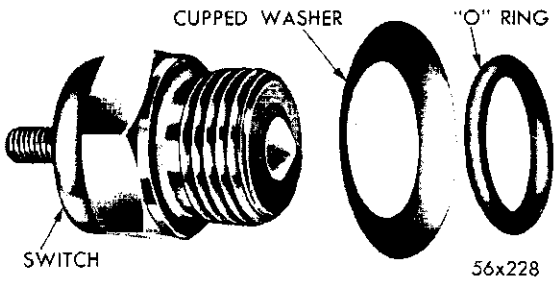



**Fig. 24—Neutral Starting Switch (Disassembled)**

into transmission case a few turns.

(5) Connect one lead of a test lamp to battery current and the other lead to the switch terminal. Screw switch into transmission case until the lamp lights, then tighten switch an additional ⅓ to ½ turn.

**NOTE: The switch must be tight enough to prevent oil leakage. If not, add a thin washer and readjust the switch.**

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

(7) Add fluid to transmission to bring up to proper level.

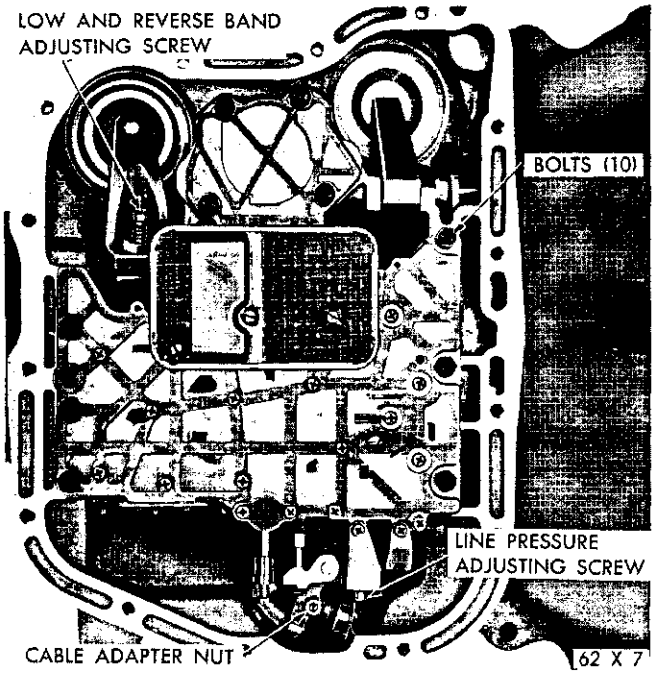



**Fig. 25—Bottom View of Transmission (Pan Removed)**

## 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. 22).

(1) Loosen the lock nut and back off approximately five turns. Check adjusting screw for free turning in the transmission case.

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

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

### Low and Reverse Band

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

(2) Loosen the adjusting screw lock nut and back off nut approximately five turns (Fig. 25). Check adjusting screw for free turning in the lever.

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

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

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

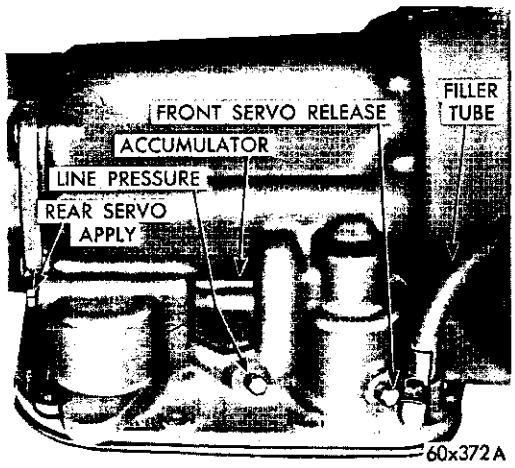



**Fig. 26—Pressure Test Locations (Right Side of Case)**

(6) Fill the transmission to the correct level with Automatic Transmission Fluid, Type "A" Suffix "A".

## HYDRAULIC CONTROL PRESSURE TESTS

### Line Pressure and Front Servo Release Pressure

The 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 car on a hoist and position 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. 26).

(3) With the control in D (drive) position, speed up the engine slightly until transmission shifts into direct. (Front servo release will be pressurized in direct.) Reduce engine speed slowly to 1000 rpm. Line pressure at this time (1000 rpm) must be 54-60 psi, and 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 to full throttle position gradually. The line pressure must rise to a maximum of 90-96 psi just before or at kickdown into low gear. The front servo release pressure must follow line pressure up to the kickdown point and should not be more than 3 psi below the line pressure.

If the line pressure is not 54-60 psi at 1000 rpm, adjust the pressure as outlined in "Hydraulic Control Pressure Adjustments."

If the 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 release pressures 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. 27). Connect a 0-100 psi pressure gauge, Tool C-3292 to the "tee" fitting.

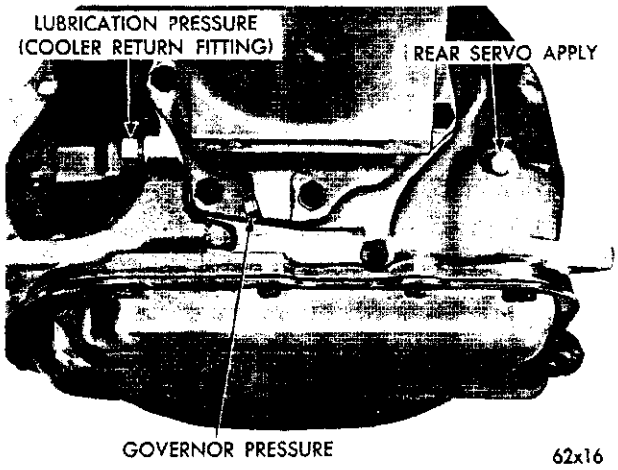



**Fig. 27—Pressure Test Locations (Rear End of Case)**

(2) At 1000 engine rpm, with the throttle closed and the transmission in direct, the lubrication pressure should be 5-15 psi and should be approximately doubled as the throttle valve is opened to maximum line pressure.

### Rear Servo Apply Pressure

(1) Connect a 0-300 psi pressure gauge, Tool C-3293 to apply pressure take-off point at rear servo (Fig. 27).

(2) With the transmission control in R (reverse) position and the engine speed set at 1600 rpm, the reverse servo apply pressure should be 230-280 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 extension near the mounting flange (Fig. 27).

(2) The governor pressures should fall within the limits given in the following chart:

If the governor pressures are incorrect at the given car speeds, the governor valve and/or weights are probably sticking (See Page 46).

### Throttle Pressure

No provisions are made to test 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.

## GOVERNOR PRESSURE CHART

| CAR SPEED TO AXLE RATIOS | | | | PRESSURE |
|---|---|---|---|---|
| SC-1—SC-2 | SC-3 | SC-2 (C-300H) | SY-1 | LIMITS* |
| 2.93-1 | 2.93-1 | 3.23-1 | 2.93-1 | PSI |
| 17-22 | 18-23 | 16-21 | 19-24 | 15 |
| 40-51 | 41-53 | 48-58 | 43-55 | 50 |
| 58-68 | 61-71 | 64-73 | 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.

## 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.

The approximate adjustment is $^{15}/_{16}$ inches, measured from the valve body to the inner edge of the adjusting nut (Fig. 28). 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 1⅔ psi. Turning adjusting screw counterclockwise **increases** pressure, and clockwise **decreases** the pressure.

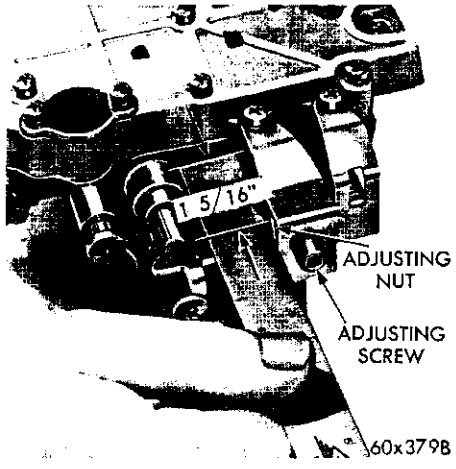



**Fig. 28—Line Pressure Adjustment**

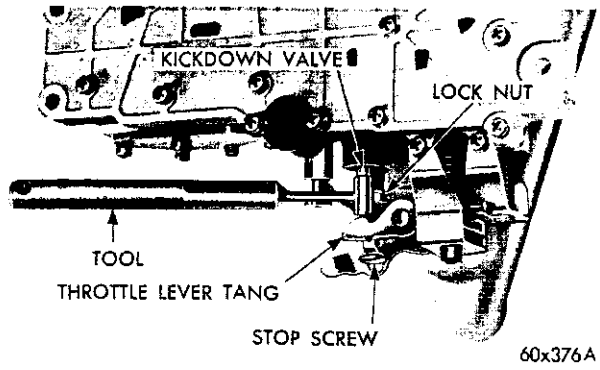



**Fig. 29—Throttle Pressure Adjustment**

### Throttle Pressure

The throttle pressures cannot be tested accurately; therefore, the adjustment should be measured and adjusted whenever the valve body is serviced or the adjustment has been disturbed.

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

(2) Loosen the throttle lever stop screw lock nut and back off screw approximately five turns (Fig. 29).

(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 the force is being exerted to compress the spring, tighten 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.

## AIR PRESSURE TESTS

A "NO DRIVE" condition might exist even with correct fluid pressure, because of inoperative clutches or bands. The inoperative units, clutch bands and servos can be located through a series of tests by substituting air pressure for the fluid pressure. 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 (Fig. 30). To make the complete air pressure tests, proceed as follows:

### CAUTION

**Compressed air supply must be free of all dirt and moisture.**

### Front Clutch

Apply the air pressure to the front clutch "apply" 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.

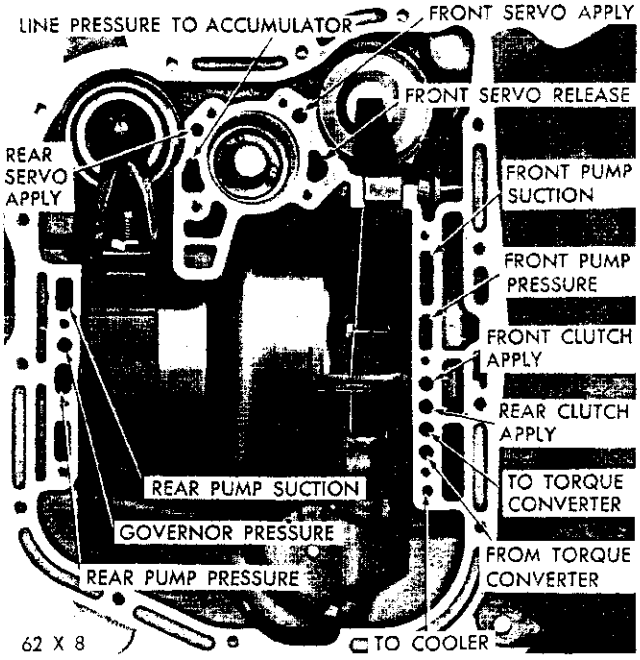



**Fig. 30—Air Pressure Tests**

### Rear Clutch

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

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

### Kickdown Servo

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

### Low and Reverse Servo

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

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

### Governor

Governor operating malfunction can generally be diagnosed by a road test or hydraulic pressure tests.

## SERVICING OPERATIONS WITH TRANSMISSION IN VEHICLE

Various transmission components can be removed for servicing without removing the transmission from vehicle. The removal, reconditioning and installation procedures for these components are covered here, except valve body reconditioning, which is described in "Recondition of the Sub-Assemblies."

Heli-coil inserts are recommended for repairing damage, stripped or worn threads in aluminum parts. Refer to "Aluminum Thread Repair."

## SPEEDOMETER PINION

### Removal and Installation

(1) Remove the screw and retainer attaching the speedometer cable to the extension housing. Carefully work the pinion and sleeve assembly out of the housing (Fig. 31).

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

## SPEEDOMETER PINION USAGE CHART

| Tire Size | Axle Ratio | Output Shaft | Pinion 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 |

(3) If the transmission fluid is found in the cable housing, replace seal inside the pinion bore (Fig. 32). Pry old seal out of pinion bore. Place new seal on end of cable with lips toward cable, then slide pinion over seal and cable. Fasten 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 screw to 150 inch-pounds torque.

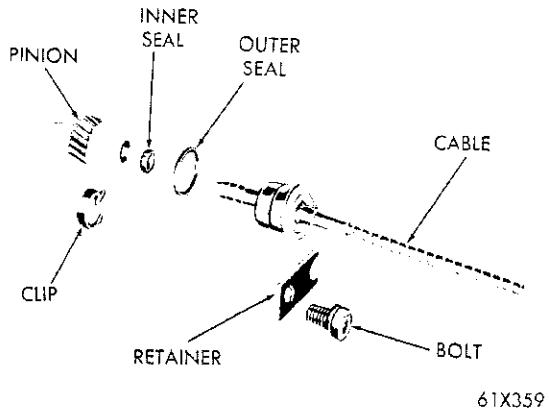



Fig. 32—Speedometer Pinion (Disassembled)

### PARKING BRAKE ASSEMBLY

#### Removal

(1) Disconnect the propeller shaft at parking brake drum flange.

(2) Hold brake drum flange with Tool C-3281, and remove retaining nut and washer (Fig. 33).

(3) Attach the puller, Tool C-452 (if necessary) and remove drum and flange assembly.

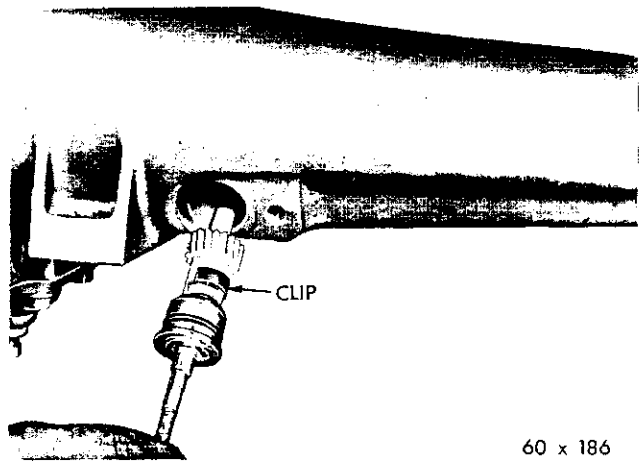



Fig. 31—Removing or Installing Speedometer Pinion

(4) Remove the brake shoe adjusting nut cover plate and loosen cable guide clamp bolt on brake support (Fig. 34). Disengage ball end of cable from operating lever and remove cable from the brake support.

(5) Remove the brake support grease shield

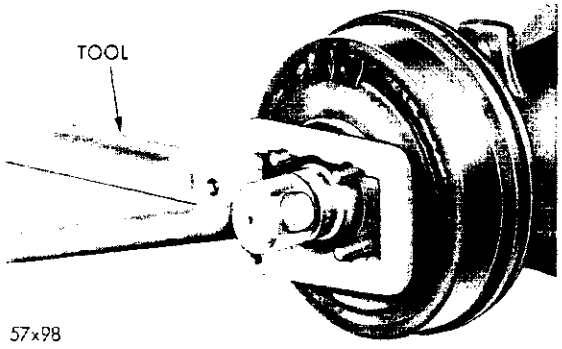



Fig. 33—Removing or Installing Brake Drum Flange Nut

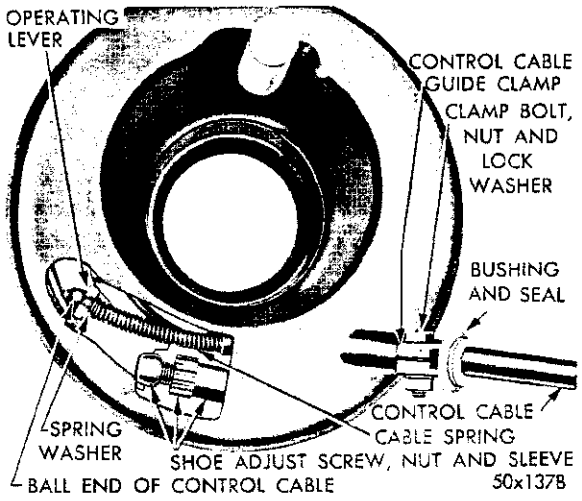



**Fig. 34—Internal Expanding Parking Brake (Rear View)**

spring, and remove grease shield (Fig. 35). Be careful not to damage the neoprene spacer in back of shield during removal.

(6) Remove the anchor pin locking washer and shoe guide.

(7) Slide the brake assembly off the anchor pin and extension housing.

(8) Remove the neoprene spacer and steel sleeve from back of brake support.

**Installation**

(1) Place the neoprene spacer in position on back of brake support plate with steel sleeve in center of support.

(2) Place the brake assembly on extension housing with support and brake shoes positioned over the anchor pin. Install brake shoe guide and locking washer on anchor pin.

(3) Install the grease shield, with flat on shield aligned with flat on extension housing. Install grease shield retainer spring with opening of spring toward brake shoe adjusting nut. Make sure spring is properly seated in groove.

(4) Slide the brake shoe return spring behind the grease shield spring and hook into position (Fig. 35).

(5) Engage the ball end of parking cable in brake shoe operating lever and tighten cable clamp bolt.

(6) Install the cover plate on back side of parking brake support plate.

(7) Install the parking brake drum, install the washer with its three projections toward the drum

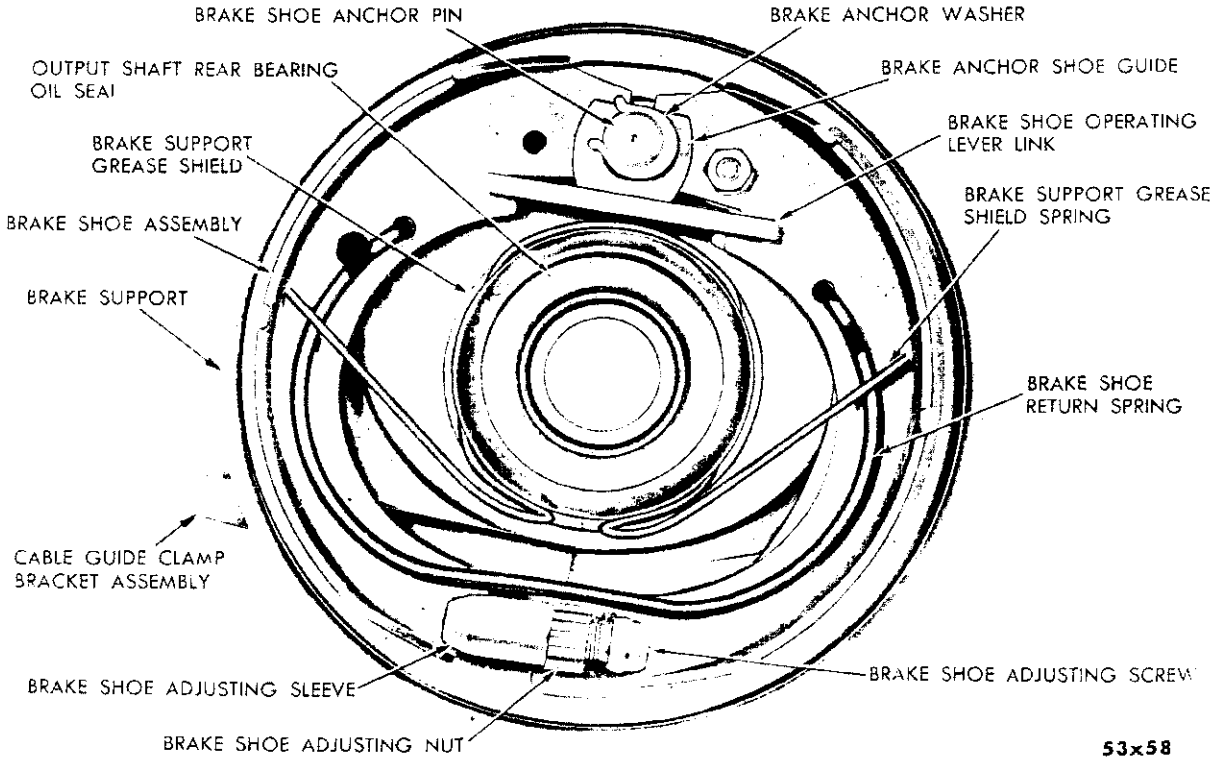



**Fig. 35—Internal Expending Parking Brake (Drum Removed)**

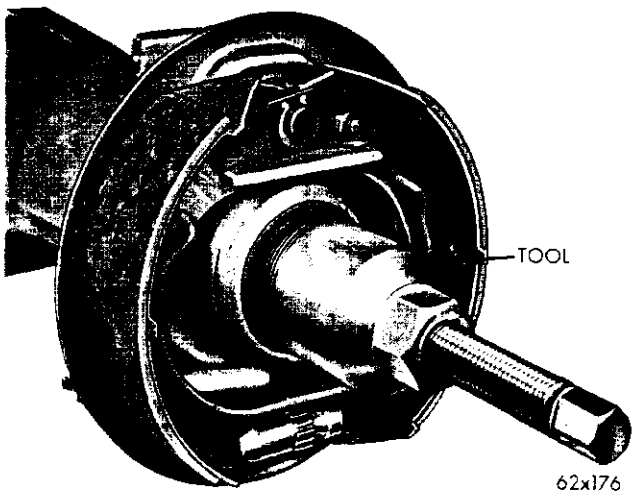



Fig. 36—Removing Output Shaft Oil Seal

and the nut with its convoluted surface contacting the washer. Hold the drum with Tool C-3281, and tighten nut to 175 foot-pounds torque.

(8) Connect the propeller shaft at the front flange.

## OUTPUT SHAFT OIL SEAL

### Replacement

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

(2) Apply the parking brake or hold the drum with Tool C-3281 and remove retaining nut and washer (Fig. 33). Release the parking brake (if applied) and remove the parking brake drum assembly. (Use puller, Tool C-452 if necessary.)

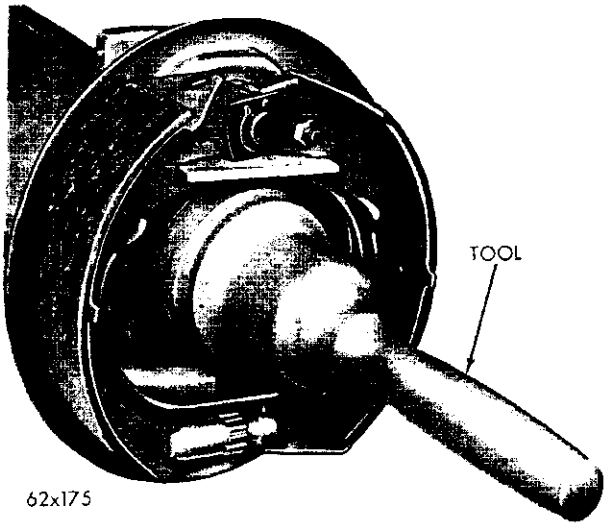



Fig. 37—Installing Output Shaft Oil Seal

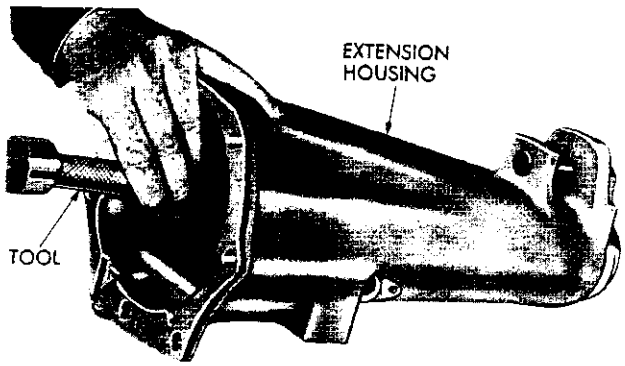



Fig. 38—Removing Output Shaft Bearing

(3) Remove the brake support grease shield spring and grease shield. Be careful not to damage the neoprene insulator.

(4) Screw the taper threaded end of Tool C-748 into the seal (Fig. 36), then tighten screw of tool to remove the seal.

(5) To install a new seal, position the seal in the opening of the extension housing with the lip of seal facing inward. Drive the seal into the housing with Tool C-3837 (Fig. 37).

(6) Install the brake support grease shield and spring.

(7) Install the brake drum and flange assembly. Tighten the flange nut to 175 foot-pounds torque.

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

## EXTENSION HOUSING

### Removal

(1) Remove the speedometer drive pinion and sleeve assembly.

(2) Remove the parking brake drum.

(3) Disconnect parking brake cable.

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

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

(6) Using transmission service jack, Tool C-3203-A, raise the transmission slightly to clear the crossmember. Remove crossmember attaching bolts and remove crossmember.

(7) Remove extension housing to transmission bolts, tap the housing lightly with a soft mallet to

break it loose from the transmission, then remove the housing.

(8) If necessary, remove the parking brake assembly from the extension housing.

**Bearing Replacement**

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

(2) Remove the bearing snap ring from the extension housing. Drive the bearing rearward out of housing with Tool C-3275 (Fig. 38).

(3) Place a new bearing in the opening of the extension housing. Using Tool C-3204, drive the bearing into the housing (Fig. 39). Install the bearing retaining snap ring.

(4) Place a new seal in the opening of the extension housing (lip of seal facing inward). Using Tool C-3837, drive the seal into the housing until the tool "bottoms" (Fig. 37).

**Installation**

(1) If removed, install the parking brake assembly on the extension housing.

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

(3) Install the crossmember and tighten the 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.

(4) Connect the parking brake cable.

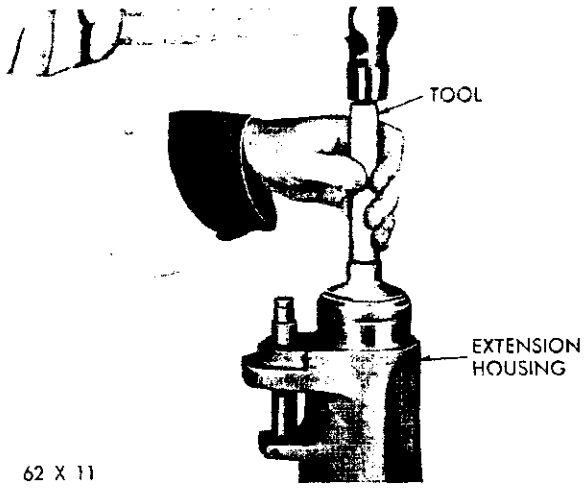



**Fig. 39—Installing Output Shaft Bearing**

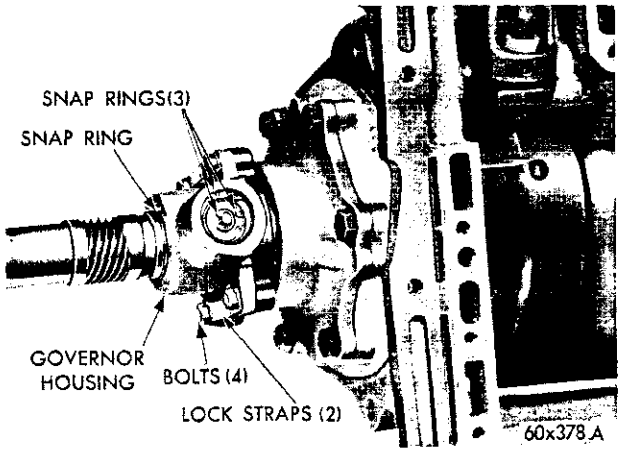



**Fig. 40—Governor Shaft and Weight Snap Rings**

(5) Install the parking brake drum.

(6) Connect propeller shaft to the parking brake drum flange.

(7) Install the speedometer drive pinion and sleeve.

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

## GOVERNOR

**Removal**

(1) Remove the extension housing.

(2) Using a screw driver carefully pry the snap ring from the weight end of governor valve shaft (Fig. 40). Slide the valve and shaft assembly out of governor housing.

(3) Remove large snap ring from weight end of governor housing, lift out governor weight assembly.

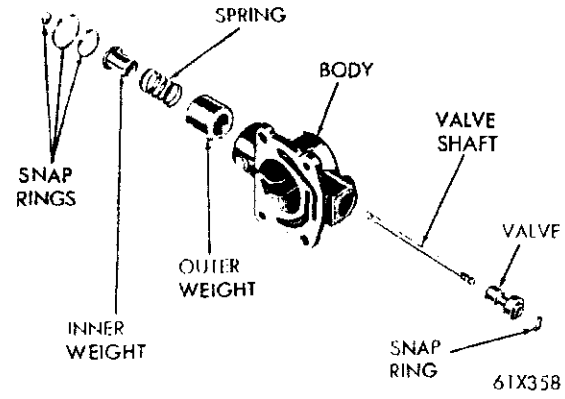



**Fig. 41—Governor Assembly (Disassembled)**

(4) Remove snap ring from inside governor weight. Remove inner weight and spring from the outer weight. Figure 41 shows a disassembled view of the governor assembly.

(5) Remove the snap ring from behind the governor housing, then slide the governor housing and support assembly off the output shaft. If necessary remove four bolts and separate governor housing 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 test for free movement before assembly.

### Installation

(1) Assemble the governor housing to the support (if disassembled) and tighten bolts finger tight. Make sure oil passage of governor housing aligns with passage in the support.

(2) Position the governor housing and support 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 snap ring behind the governor housing (Fig. 40). Tighten the housing to support bolts to 100 inch-pounds torque. Bend ends of the lock straps against the bolt heads.

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

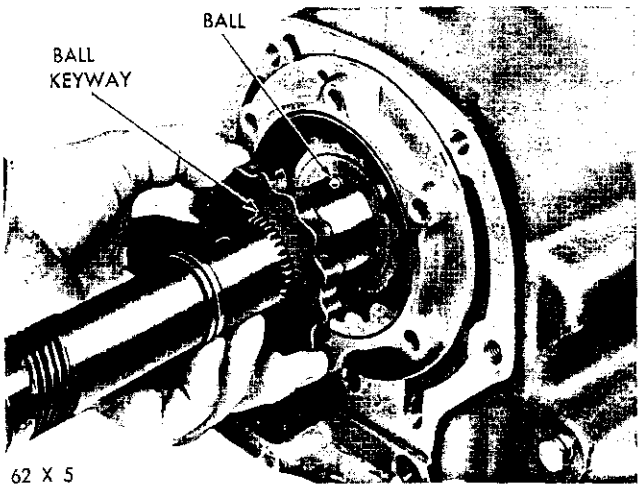



**Fig. 42—Removing or Installing Rear Oil Pump Inner Rotor**

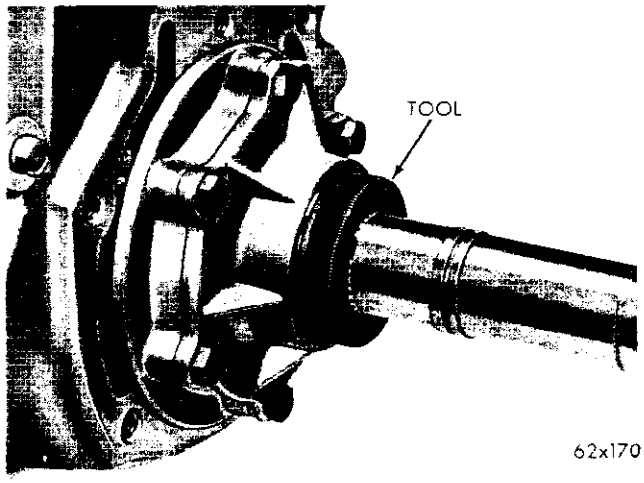



**Fig. 43—Aligning Oil Pump Cover**

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

(5) Install the extension housing, parking brake and connect propeller shaft.

(6) Connect the parking brake cable.

## REAR OIL PUMP

### Removal

(1) Remove the extension housing.

(2) Remove the governor and support assembly.

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

(4) The oil pump inner rotor is driven by the output shaft by a small ball. Therefore, use care in sliding out inner rotor so as not to lose the ball (Fig. 42). Remove outer rotor from the pump body.

**NOTE: If 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 oil pump body and cover machined surfaces for nicks and burrs. Inspect rotors for scoring or pitting. With gears cleaned and installed in 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 rotors. Clearance limits are from .0015 to .003 inch.

**Installation**

(1) Place the outer rotor in the pump body.

(2) Rotate the output shaft so inner rotor driving ball pocket is up. Install the ball and slide inner rotor on the output shaft in alignment with the ball (Fig. 42).

(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. 43). Tighten the cover bolts evenly to 140 inch-pounds torque.

(4) Install the governor and support assembly.

(5) Install the extension housing, and parking brake.

(6) Connect the parking brake cable.

## NEUTRAL STARTING SWITCH

**Removal**

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

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

**Installation and Tests**

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

(2) Place the cupped washer and "O" ring over threads of switch (Fig. 24), then screw switch into transmission case a few turns.

(3) Connect the one lead of a test lamp to battery current and the other lead to the switch terminal. Screw switch into the transmission case until the lamp lights, then tighten switch an additional ⅓ to ½ turn.

**NOTE: The switch must be tight enough to prevent oil leakage. If not, add a thin washer and readjust the switch.**

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

(5) Add the fluid to the transmission to bring up to proper level.

## VALVE BODY ASSEMBLY AND ACCUMULATOR PISTON

**Removal**

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

(2) Remove the oil pan and gasket.

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

(4) Shift the manual lever into the 1 (low) position to expose the nut attaching the cable adapter to the lever (Fig. 25). Remove nut and disengage cable adapter from the manual lever.

(5) Place the drain pan under transmission, then remove the ten hex-head valve body to transmission case bolts. Hold valve body in position while removing 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) Remove the accumulator piston from transmission case. Inspect piston for scoring. Inspect the rings for wear or breakage. Replace as required.

**NOTE: Servicing the valve body assembly is outlined under "Valve Body Assembly".**

**Installation**

(1) Clean the 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 into place in transmission case and start all the retaining bolts.

(5) Snug the bolts down evenly. Tighten to 100 inch-pounds torque.

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

(7) Install the seal, flat washer and throttle lever on the throttle shaft. Tighten clamping bolt. Inspect the lever for looseness by forcing it in both directions.

(8) Install the oil pan, using new gasket.

(9) Add the fluid to the transmission to bring up to the proper level.

## 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 the Remote Control Starter Switch, Tool C-763 to 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) 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.

**CAUTION**

**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) Depress 1 (low) push button to position control cable for removal from transmission.

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

(10) Remove the starting motor assembly.

(11) Disconnect the wire from the neutral starting switch and remove the switch.

(12) Remove the push button control cable to the transmission adjusting wheel lock screw. Insert screw driver through neutral starting switch opening (Fig. 22). Push gently against upper projecting portion of cable lock-spring and pull outward on cable to remove cable from adapter and transmission case.

(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 oil filler tube.

(15) Remove the speedometer pinion and sleeve assembly from the transmission (Fig. 31).

(16) Disconnect the parking brake cable from the parking brake.

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

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

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

(22) Attach a small "C" clamp to edge of converter housing to hold converter in place during removal of transmission.

(23) Remove the converter housing retaining bolts. Carefully work the transmission rearward off the engine block dowels and disengage converter hub from the end of crankshaft (Fig. 44).

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

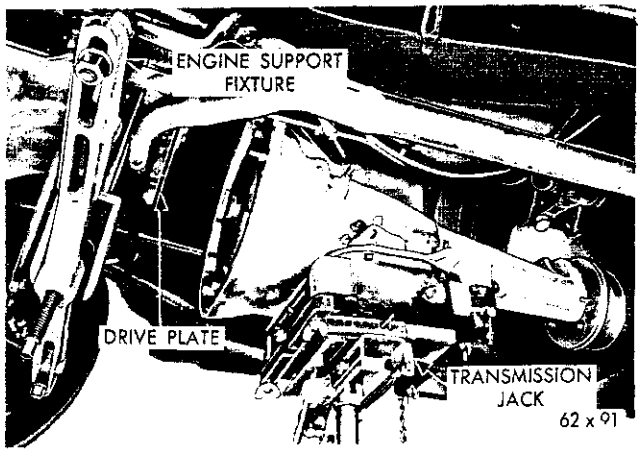



**Fig. 44—Removing or Installing Transmission and Converter Assembly**

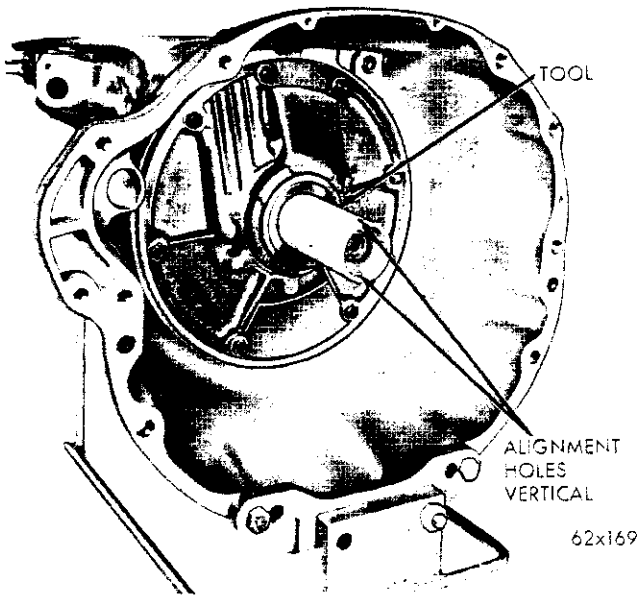



Fig. 45—Aligning Front Pump Rotors

(25) To remove the converter assembly, remove "C" clamp from 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 until the two small holes in handle of Tool are vertical (Fig. 45).

(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 straightedge on the face of the case (Fig. 46). The surface of the converter front cover lug should be at least ½ 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 edge of the converter housing to hold converter in place during transmission installation.

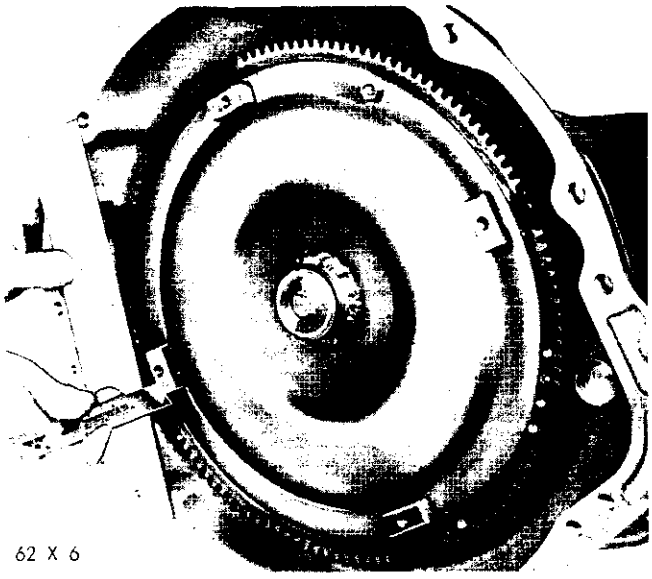



Fig. 46—Checking Converter for Full Engagement in Transmission

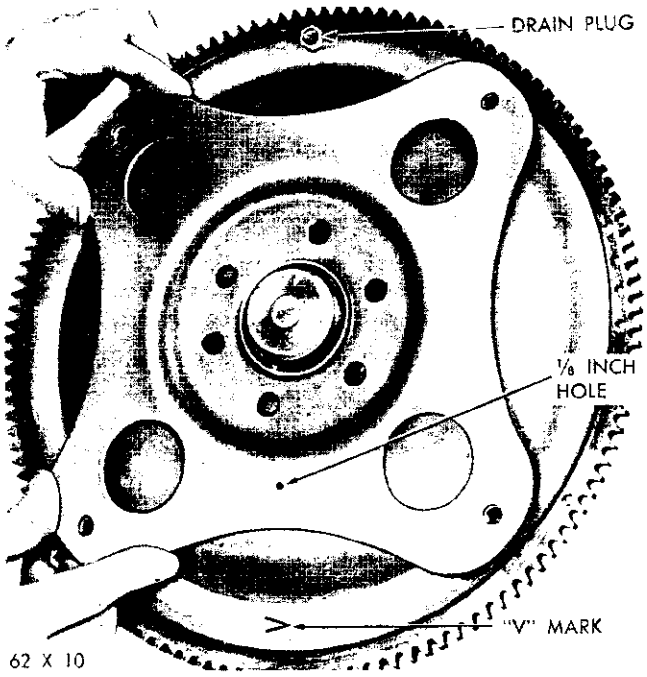



Fig. 47—Converter and Drive Plate Markings

### 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 grease. Place transmission and converter assembly on service jack and position assembly under vehicle for installation. Raise or tilt as necessary until the transmission is aligned with 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 ⅛ inch hole in the inner circle of the plate. A stamped V mark identifies the offset hole in the converter front cover (Fig. 47). Carefully work the transmission assembly forward over the engine block dowels with the converter hub entering the crankshaft opening.

(4) After the transmission is in position, install converter housing bolts and tighten to 25-30 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) Connect the parking brake cable to the parking brake.

(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 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 push button control cable in transmission case, push inward on cable making sure lock-spring engages cable. Adjust the cable if necessary. Install control cable adjusting wheel retaining screw.

(15) Install the neutral starting switch and connect wire.

(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".**

## RECONDITION TRANSMISSION-UNIT OUT OF VEHICLE

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

### CAUTION

**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.**

## ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils. Essentially, this repair consists of drilling out the worn or damaged threads, tapping the hole with a special Heli-Coil Tap, and installing a Heli-Coil Insert into the tapped hole. This brings the hole back to its original thread size.

The following 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.

| HELI-COIL INSERT | | | DRILL | TAP | INSERTING TOOL | RETRACTING TOOL |
|---|---|---|---|---|---|---|
| Thread Size | Part No. | Insert Length | Size | Part No. | Part No. | Part No. |
| 10-24 | 1185-3 | .285″ | 13/64″ (.203″) | 3 CPB | 528-3N | 1227-6 |
| 1/4-20 | 1185-4 | 3/8″ | 17/64″ (.265″) | 4 CPB | 528-4N | 1227-6 |
| 5/16-18 | 1185-5 | 15/32″ | Q (.332″) | 5 CPB | 528-5N | 1227-6 |
| 3/8-16 | 1185-6 | 9/16″ | X (.397″) | 6 CPB | 528-6N | 1227-6 |

**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 attaching a particular part will be tightened to the proper torque.**

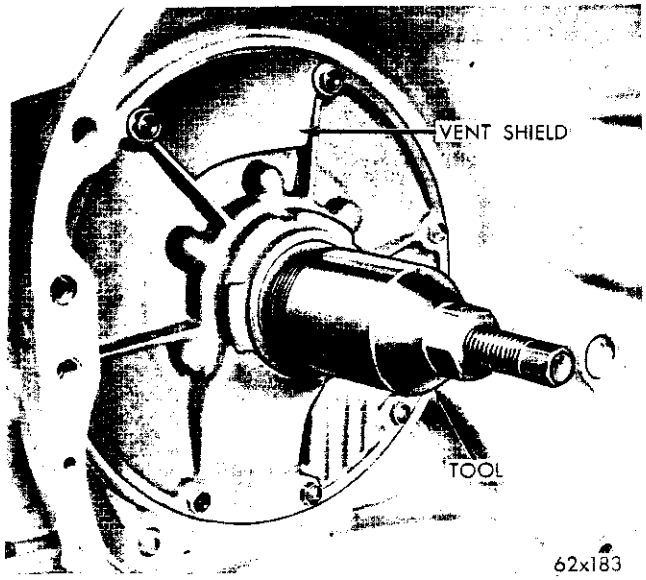



Fig. 48—Removing Front Oil Seal

## 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 the seal remover, Tool C-3861 into the seal (Fig. 48). Tighten screw position 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 seal into housing until the tool "bottoms" (Fig. 49).

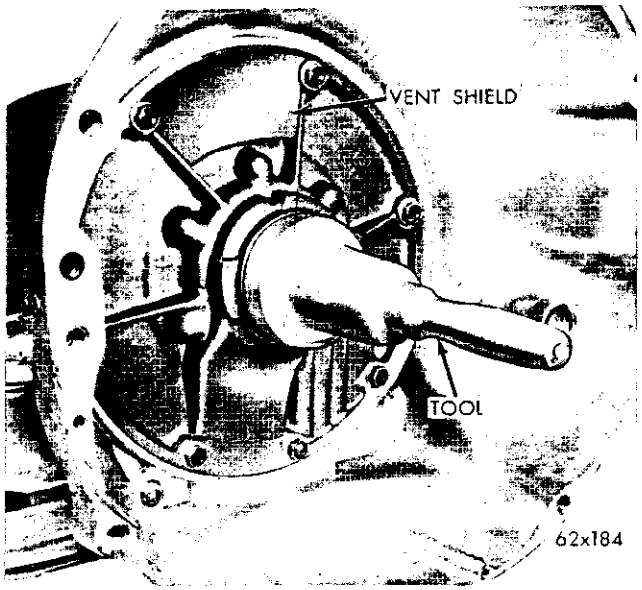



Fig. 49—Installing Front Pump Oil Seal

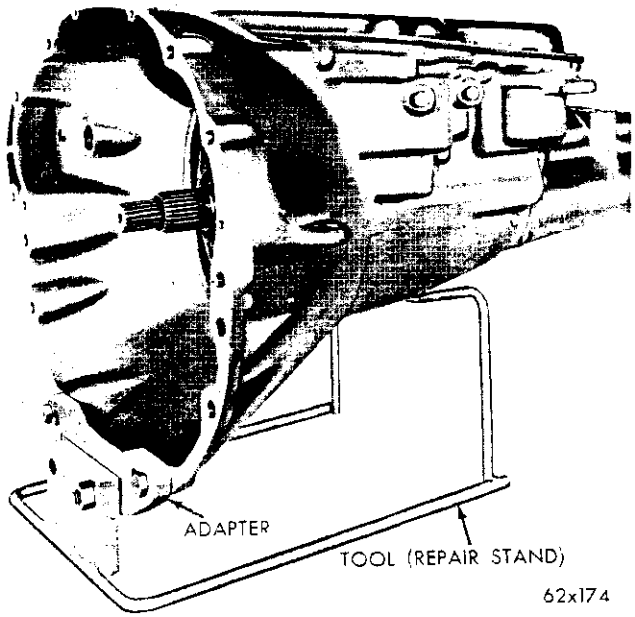



Fig. 50—Transmission Installed in Repair Stand

## REMOVAL OF SUB-ASSEMBLIES

Prior to removing any of the transmission sub-assemblies, plug all openings before cleaning, and thoroughly clean the exterior of the unit, preferably by steam. Cleanliness through the entire disassembly and assembly cannot be overemphasized. 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 parts must be exercised to avoid nicks or burrs.

### Oil Pan

(1) Place the transmission assembly in repair stand, Tool C-3750 with adapter C-3882 (Fig. 50).

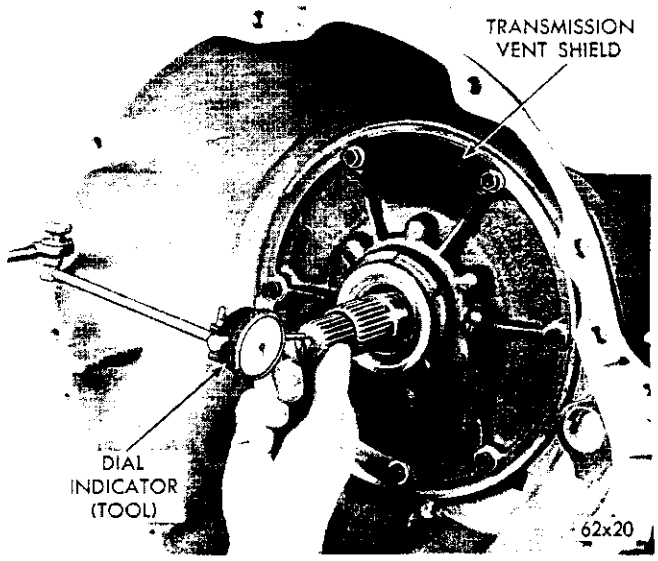
(2) Unscrew the oil pan bolts and remove oil pan and gasket.

### Valve Body Assembly

(1) Unscrew the nut and remove control cable adapter from valve body manual lever (Fig. 25).

(2) Remove the ten hex-head valve body assembly to transmission case bolts (Fig. 25). Hold the valve body in position while removing bolts.

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




51—Measuring Drive Train End Play

### Accumulator Piston and Spring

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

### Measuring the Drive Train End Play

Measure the drive train end play before removal of the parking brake drum. 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 housing with its plunger seated against the end of input shaft (Fig. 51).

(2) Move 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 universal joint flange with Tool C-3281, and remove the retaining nut and washer (Fig. 33). Attach puller, Tool C-452 (if necessary) and remove the drum and flange assembly.

(2) Remove the brake support grease shield and spring (Fig. 35). Remove the anchor pin locking washer and shoe guide. Slide the brake and support assembly off the anchor pin and extension housing.

(3) Remove the extension housing to transmission bolts, tap the housing lightly with a soft mallet to break it loose, 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. 40). Slide the valve and shaft assembly out of the governor housing.

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

### Rear Oil Pump

(1) Remove the real oil pump cover retaining bolts and remove cover.

(2) The oil pump inner rotor is keyed to the output shaft by a small ball. Therefore, use care in sliding out inner rotor so as not to loose the ball (Fig. 42). Remove the outer rotor from the pump body.

**NOTE: If replacement of 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

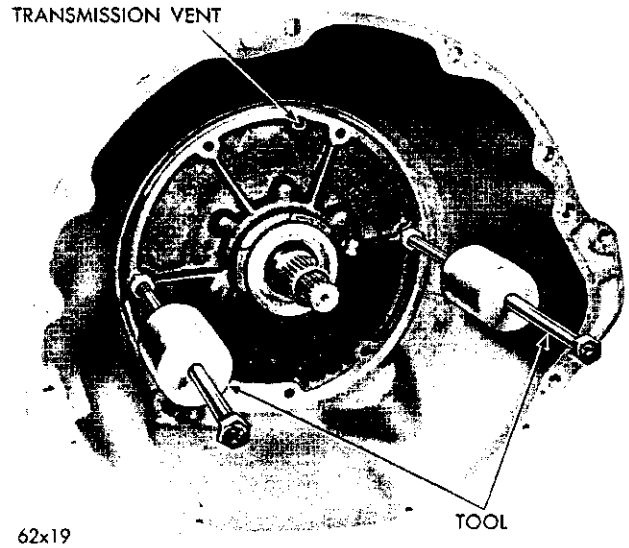



Fig. 52—Removing Front Oil Pump and Reaction Shaft Support Assembly

the pump which might cause unnecessary damage to the clutches.

(3) Attach Tool C-3752 to the pump housing flange, as shown in Figure 52, thread the screws of the tool into the flange holes at the 9 and 3 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 the input shaft and rear clutch assembly out of the case.

CAUTION

**Be careful not to lose the thrust washer located between 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.

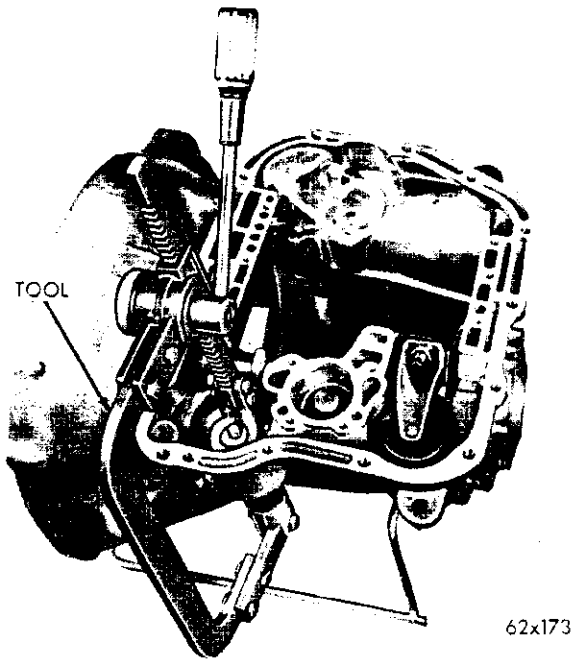



**Fig. 53—Compression Kickdown Servo Spring**

CAUTION

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

#### Rear Band and Low-Reverse Drum

(1) Remove the low-reverse drum.

(2) Loosen the rear band adjuster, remove the band strut and remove band from the case.

#### Overrunning Clutch

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

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

**NOTE: If the overrunning clutch cam and/or roller spring retainer are found to be damaged or worn refer to "Overrunning Clutch Cam Replacement."**

#### Kickdown Servo

(1) Compress the kickdown servo springs by using "Engine Valve Spring Compressor Tool C-3422", then remove the snap ring (Fig. 53).

(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 the 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.

### RECONDITION OF THE SUB-ASSEMBLIES

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

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

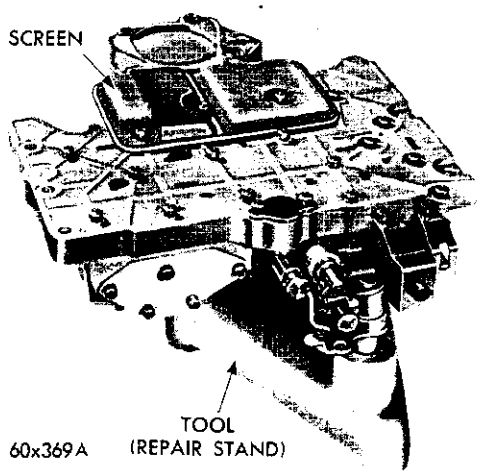



Fig. 54—Removing or Installing Oil Screen

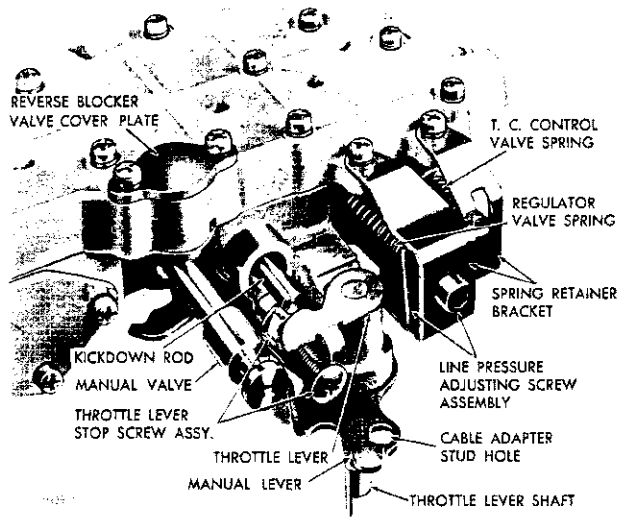



Fig. 55—Regulator and Converter Control Valves (Assembled View)

body, thus reducing the possibilities of sticking. When it becomes necessary to recondition the transmission, and vehicle has accumulated considerable mileage, install a new seal ring on parts requiring their usage.

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

## VALVE BODY ASSEMBLY

### Disassembly

CAUTION

**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 repair stand Tool C-3749 (Fig. 54). Remove three screws from the oil screen and lift off the screen.

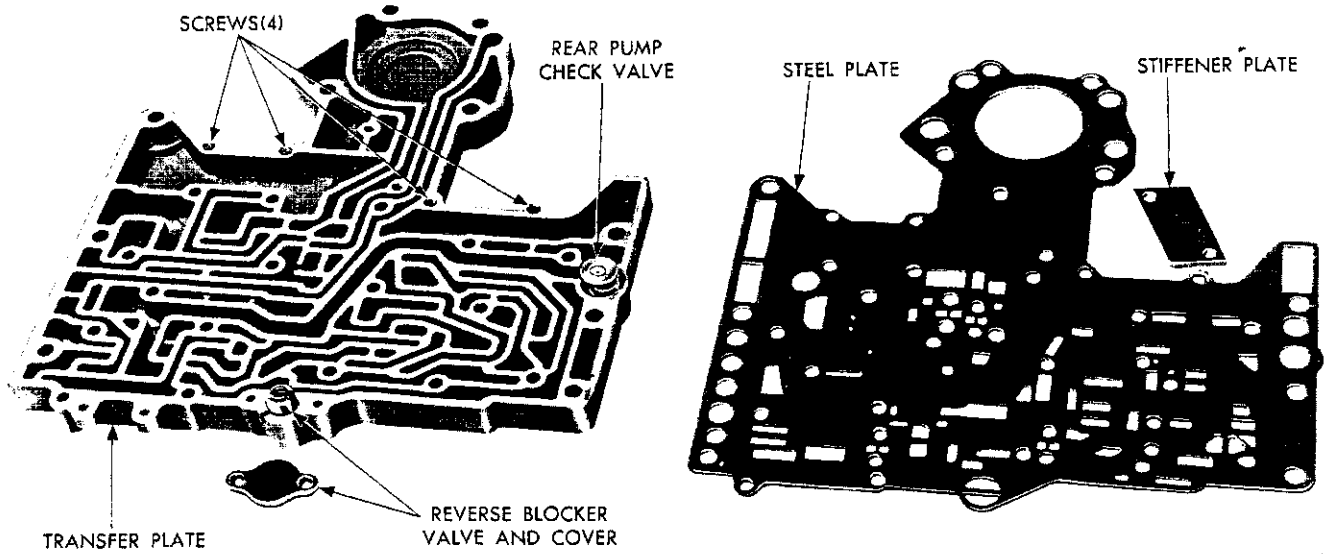



Fig. 56—Transfer and Steel Separator Plate Assembly (Disassembled View)

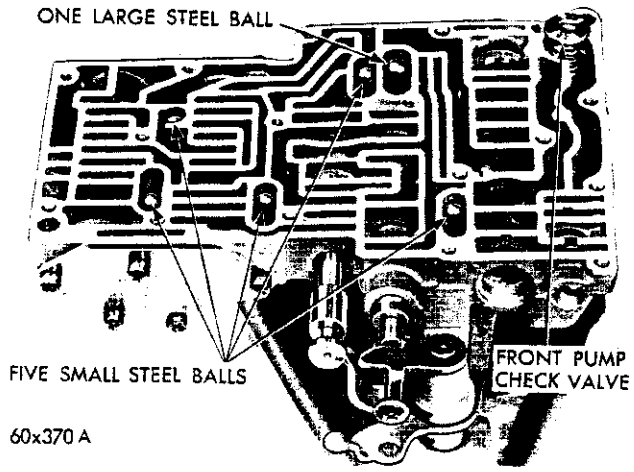



**Fig. 57—Front Pump Check Valve and Steel Ball Locations**

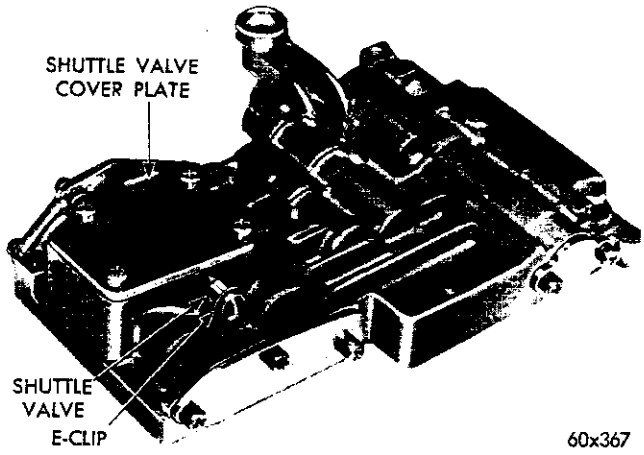



**Fig. 59—Shuttle Valve and Retainer Clip**

(2) While holding the spring retainer bracket firmly against the spring force, remove the three bracket retaining screws (Fig. 55).

(3) Remove the spring bracket, the 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 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.

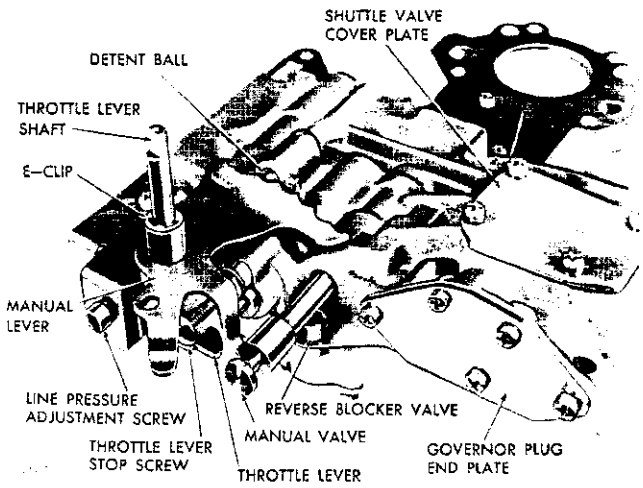



**Fig. 58—Valve Body Controls (Assembled View)**

(6) Invert the transfer plate assembly and remove the stiffener plate. Remove the remaining screws attaching the steel plate to the transfer plate, and carefully lift off the steel plate (Fig. 56). Remove the rear pump check valve and spring.

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

(8) Note the 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. 57). Remove the steel balls, front pump check valve and spring.

(9) Invert valve body and lay it on a clean cloth or paper. Remove E-clip from the throttle lever shaft (Fig. 58). Remove any burrs from the shaft, then while holding manual lever detent ball and spring in their bore with Tool C-3765 or similar tool, slide manual lever off the throttle shaft. Remove detent ball and spring.

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

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

(12) Remove the shuttle valve cover plate (Fig. 59). Remove the E-clip from the exposed end of the shuttle valve.

(13) If necessary, remove the throttle lever stop screw assembly (Fig. 60). 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. 60).

(15) Remove the governor plug end plate (Fig. 60). Tip up the valve body to allow the shuttle valve

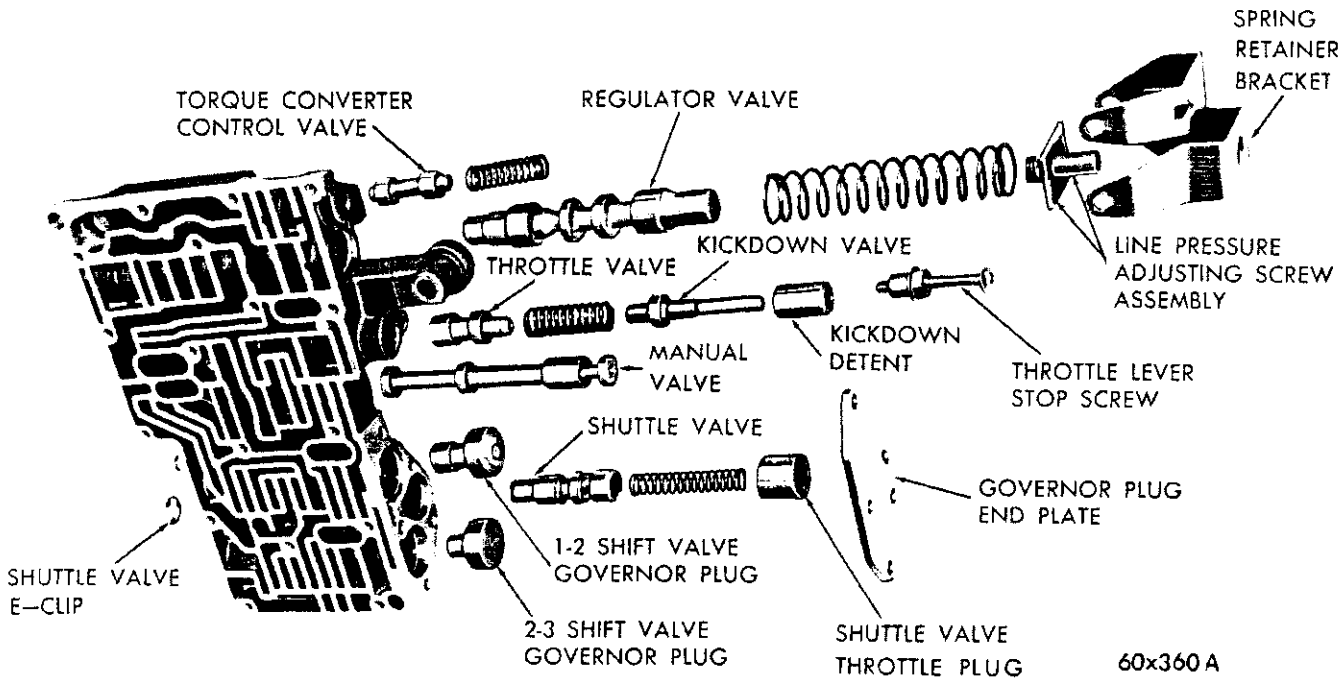



**Fig. 60—Valve Body-Lever Side (Disassembled)**

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. 61) 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, inspect 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 collapsed coils. Inspect all valves and plugs for burrs, nicks and scores. Small nicks and scores may be

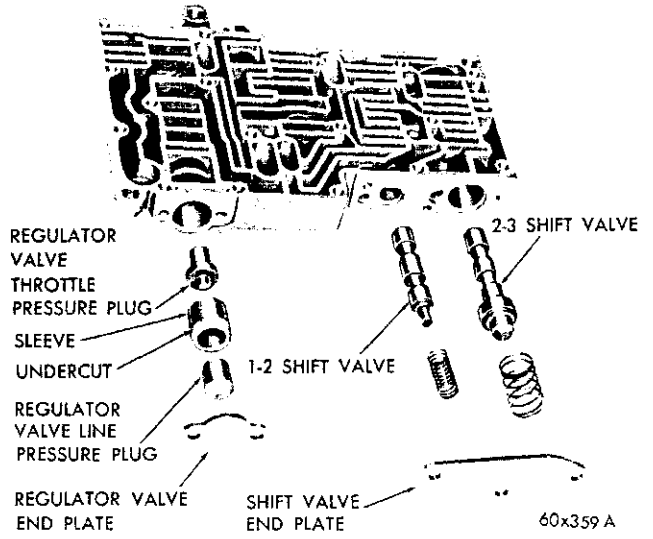



**Fig. 61—Valve Body-Shift Valve Side (Disassembled)**

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. Test all valves and plugs for freedom of operation in the valve body bores. When bores, valves and plugs are clean and dry, the valves and plugs should, by their own weight fall freely in the bores.

**Assembly**

(1) Place the rear pump check valve and spring in the transfer plate (Fig. 56). 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 the bolt holes in the steel plate and transfer plate are aligned, then tighten screws evenly to 28 inch-pounds torque. Test 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 the transfer plate over and install the reverse blocker valve spring and valve (Fig. 56). Rotate the valve until it seats through the steel plate. Hold the valve down and install the 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. 60). Install the shuttle valve, spring and shuttle valve throttle plug. Install the governor plug end plate and tighten the four retaining screws to 28 inch-pounds torque.

(4) Install E-clip on end of shuttle valve (Fig. 47). Install shuttle valve cover plate and tighten the four retaining screws to 28 inch-pounds torque.

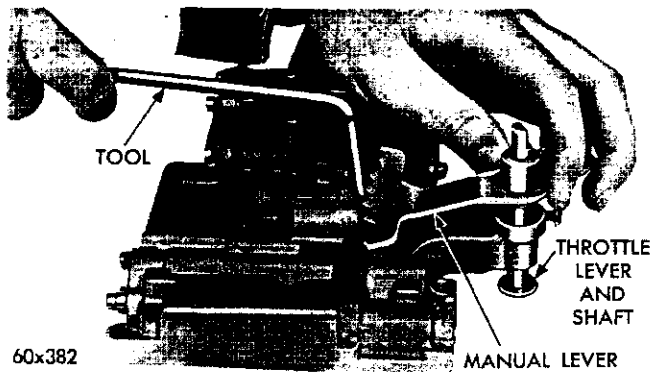



**Fig. 62—Installing Detent Ball, Spring and Manual Lever**

(5) Install the 1-2 and 2-3 shift valves and springs (Fig. 61). Install 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. 61). 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. 60). Slide the kickdown detent on the kickdown valve (counterbore side of detent toward valve), then install the assembly in the valve body.

(8) If removed, install throttle lever stop screw (Fig. 60), and tighten the lock nut finger tight.

(9) Install the manual valve in the valve body (Fig. 60).

(10) Install the throttle lever and shaft on the valve body (Fig. 62). Insert 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 ball in the valve body chambers with large ball in the large chamber (Fig. 57). Place the front pump check valve and spring in the 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 screws to 28 inch-pounds torque.

(14) Install the converter valve and the regulator valve (Fig. 60).

(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 regulator valve spring with the long dimension of nut at right angles to the valve body (Fig. 60).

(16) Install the spring retainer bracket, making sure the converter valve spring is engaged on the tang in the bracket. Tighten the three bracket retaining screws to 28 inch-pounds torque (Fig. 55).

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

**IMPORTANT:**

**After the valve body has been serviced and completely assembled, adjust the throttle and line pressures as outlined under "Hydraulic Control Pressure Adjustments". However, if line pressure was satisfactory prior to disassembly, do not alter this adjustment.**

## 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 the 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. Inspect the piston spring for distortion. Replace the parts as required.

## 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 extension housing with Tool C-3275 (Fig. 38).

(4) Place a new bearing in the opening of the extension housing. Using Tool C-3204 drive the bearing into the housing (Fig. 39). Install the bearing retaining snap ring.

(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 the housing until the tool bottoms (Fig. 37).

## GOVERNOR AND SUPPORT

### Disassembly

(1) Remove the large snap ring from the weight end of the governor housing, 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 necessary, remove the four bolts and separate the support from the governor housing.

### Cleaning and Inspection

Figure 41 shows a disassembled view of the governor assembly.

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

Inspect governor weight spring for distortion. Inspect seal rings on governor support for breakage or wear. Thoroughly clean governor parts in clean solvent and test for free movement before assembly.

### Assembly

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

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

## REAR OIL PUMP

### Inspection

Inspect the oil pump body and cover the machined surfaces for nicks and burrs. Inspect rotors for scoring or pitting. With the rotors cleaned and installed in the pump body, place a straight edge across face of the rotors and pump body. Using a feeler gauge, measure the clearance between the straight edge and the 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 transmission case with a wood block and hammer. The following procedures must be followed when installing a new rear oil pump body or reinstalling 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 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.

## FRONT OIL PUMP AND REACTION SHAFT SUPPORT

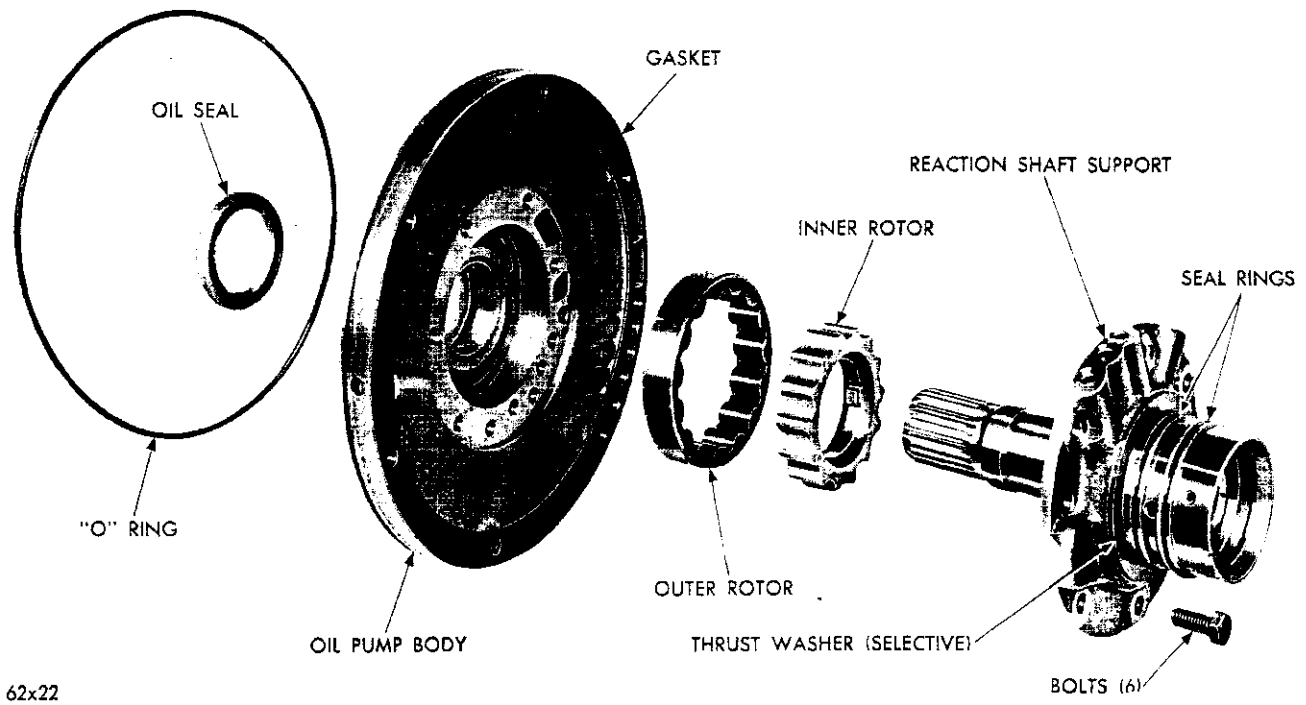



**Fig. 63—Front Oil Pump and Reaction Shaft Support (Disassembled)**

**Disassembly**

Figure 63 shows the front oil pump and reaction shaft support disassembled.

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

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

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

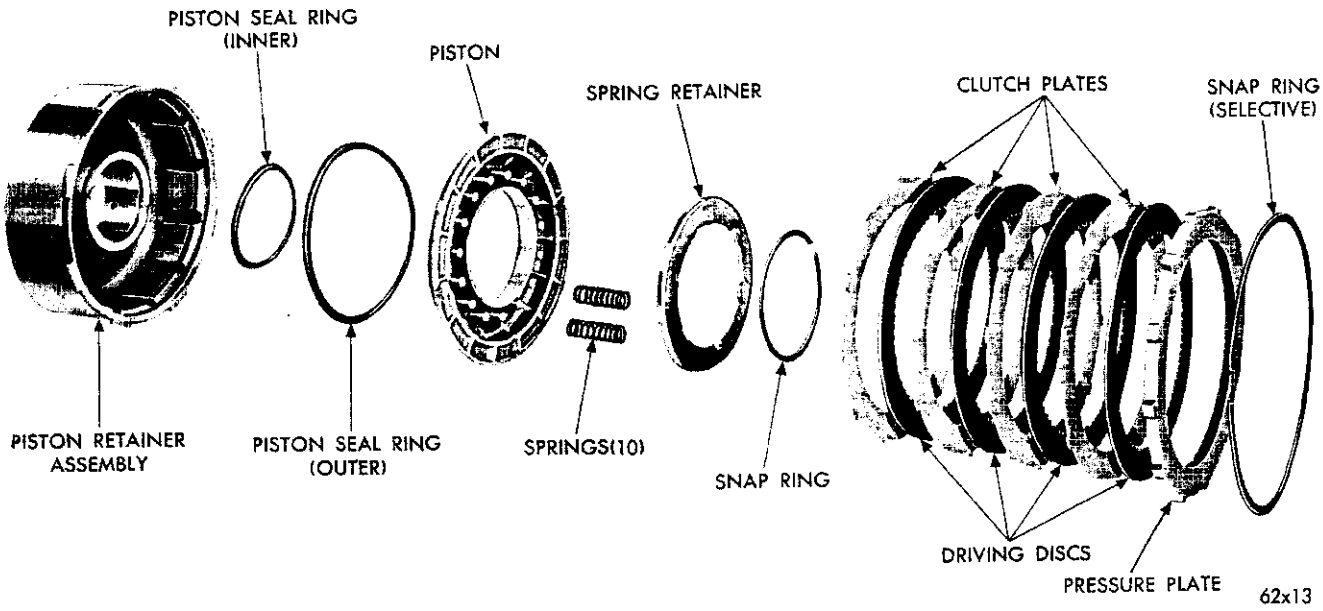



**Fig. 64—Front Clutch Assembly (Disassembled)**

**Inspection**

Inspect the interlocking seal rings (Fig. 63) on the reaction shaft support 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 reaction shaft for wear. Inspect machined surfaces on oil pump body and reaction shaft support for nicks and burrs. Inspect oil pump rotors for scoring or pitting. With rotors cleaned and installed in pump body, place a straightedge across face of rotors and pump body. Using a feeler gauge, measure the clearance between straightedge and face of rotors. Clearance limits are from .0015 to .003 inch.

**Assembly**

(1) Assemble the pump rotors in the pump housing (Fig. 63).

(2) Install the reaction shaft support. 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 seal into the housing until the tool "bottoms".

## FRONT CLUTCH

**Disassembly**

Figure 64 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 clutch piston retainer. Lift the pressure plate and clutch plates out of the retainer.

(2) Install compressor, Tool C-3863 over piston spring retainer as shown in Figure 65. Compress spring and remove snap ring, then slowly release tool until spring retainer is free of the hub. Remove the tool, retainer and spring.

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

**Inspection**

Inspect the driving discs for evidence of burning, glazing and flaking off of facing material. Scratch facings with finger nail, if material collects under nail, replace all driving discs. Inspect the disc driving 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. Inspect band contacting surface on clutch retainer for scores. Note the ball check in 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 inside bore of piston for score marks. If the scores are small light, remove with crocus cloth. Check the seal grooves for nicks and burrs. Inspect the neoprene seals for deterioration, wear, and hardness. Inspect the piston springs, retainer and snap ring for distortion.

**Assembly**

(1) Lubricate and install the inner seal on the hub of clutch retainer. Make sure the lip of seal faces down and is properly seated in the groove.

(2) Install the outer seal on the clutch piston, with the lip of seal toward bottom of the clutch retainer. Apply a coating of "Door Ease" to the outer edge of the seal for easier installation of the piston assembly. Place the piston assembly in the retainer and carefully seat the piston in the bottom of the retainer.

(3) Place the 10 springs on piston hub exactly

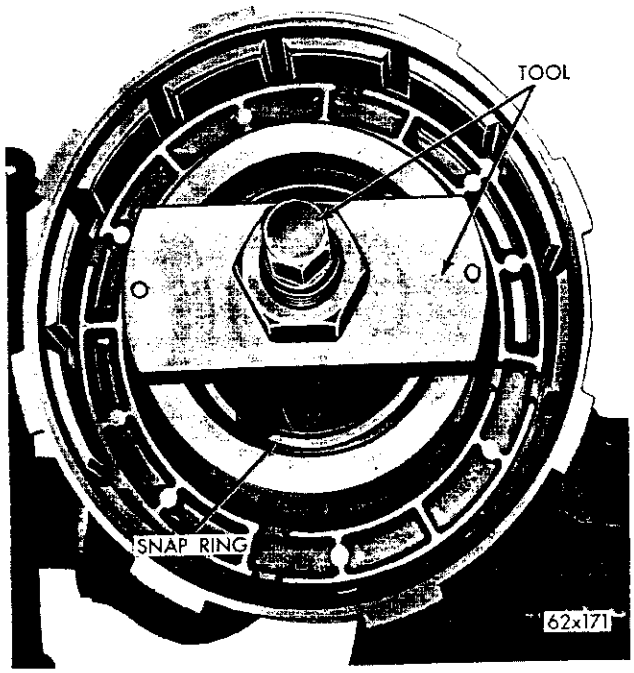



**Fig. 65—Removing or Installing Front Clutch Spring Retainer Snap Ring**

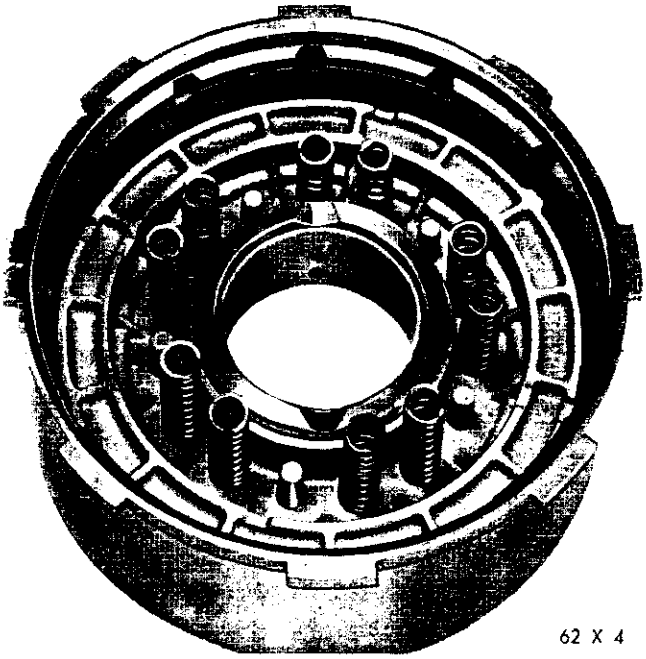



**Fig. 66—Front Clutch Piston Return Springs—Location**

as shown in Figure 66. Position the spring retainer and snap ring on the springs. Compress springs with Tool C-3863 (Fig. 65), and seat snap ring in the hub groove. Remove compressor tool.

(4) Lubricate all the 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 the snap ring (Fig. 67). 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 those used in the rear clutch and are available in .060-.062, .074-.076 and .088-.090 inch thickness.**

## REAR CLUTCH

### Disassembly

Figure 68 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 the seals from the piston.

### Inspection

Inspect the driving discs for evidence of burning, glazing and flaking off of facing material. Scratch the facings with finger nail, if material collects under the nail, replace all driving discs. Inspect the disc driving splines for wear or other damage. Inspect the steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Check the steel plate lug grooves in the clutch retainer for smooth surfaces, as plates must travel freely in the 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. Small scratches will not interfere with the sealing of the neoprene rings. Inspect neoprene seals for deterioration, wear, and hardness. Inspect the spring and snap rings for distortion.

Inspect the interlocking seal rings (Fig. 68) on input shaft for wear or broken locks, make sure they turn freely in the grooves. Do not remove rings unless conditions warrant. Inspect the bushing in the input shaft for wear or scores. Replace the bushing if necessary. Inspect rear clutch to front clutch thrust washer for wear. The washer thickness should be .061 to .063 inch, replace if necessary.

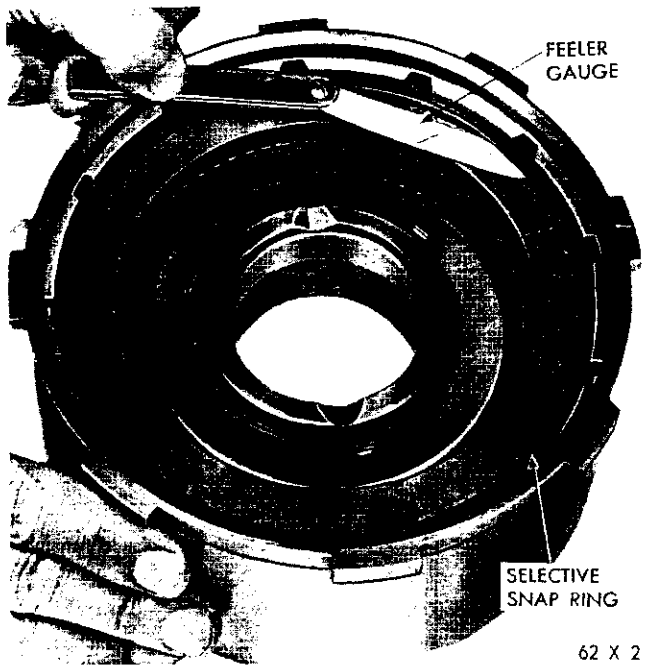



**Fig. 67—Checking Front Clutch Plate Clearance**

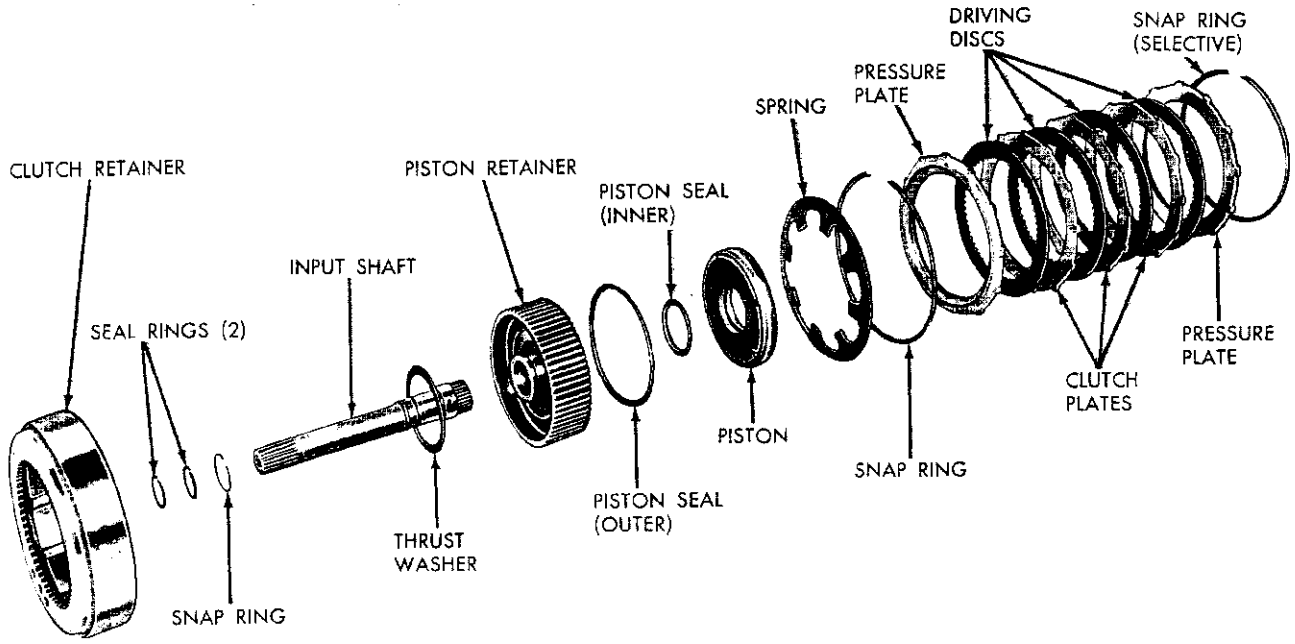



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**Fig. 68—Rear Clutch Assembly (Disassembled)**

**Assembly**

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

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

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

(4) Place the spring over the piston with the outer edge of the spring positioned below the snap ring groove. Start one end of the snap ring in the groove, make sure the spring is exactly centered on the piston, then progressively tap snap ring into the groove (Fig. 69). Be sure the snap ring is fully seated in the groove.

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

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

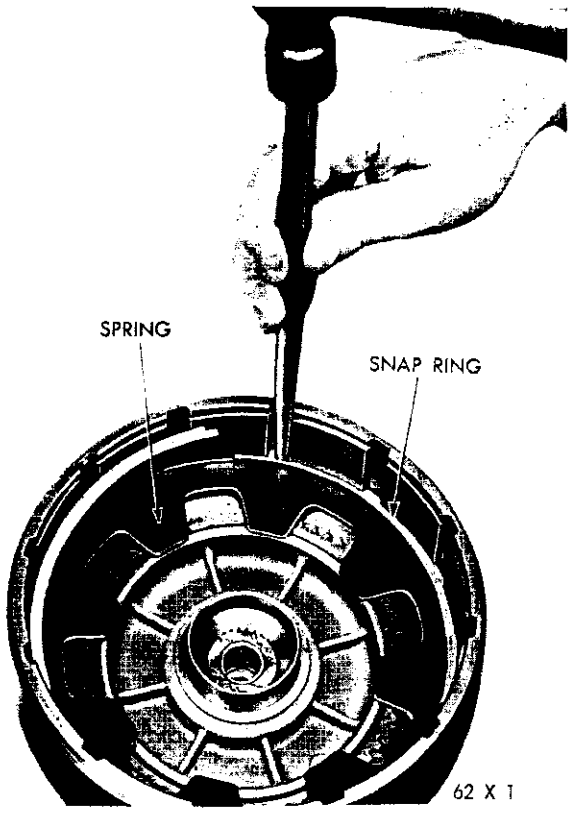


**Fig. 69—Installing Rear Clutch Spring and Snap Ring**

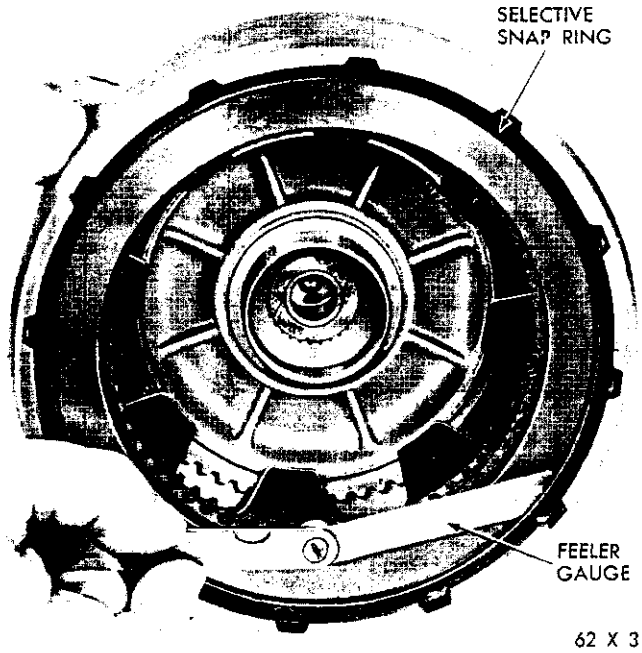


**Fig. 70—Checking Rear Clutch Plate Clearance**

(7) With the rear clutch completely assembled, insert a feeler gauge between the pressure plate and the snap ring (Fig. 70). The clearance should be .026-.054 inch. If the clearance is incorrect, install a snap ring of the proper thickness to obtain the specified clearance. Low limit clearances are desirable.

**NOTE: The rear clutch plate clearance is very important in obtaining proper clutch operation. The clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060-.062, .074-.076 and .088-.090 inch thickness.**

## PLANETARY GEAR ASSEMBLIES, SUN GEAR, AND 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. 71). The clearance should be .012 to .055 inch.

### Disassembly

(1) Remove the thrust washer from the forward end of the output shaft (Fig. 72).

(2) Remove the snap ring from the 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. 72). Remove the thrust washer from the rear side of planetary gear set.

(4) Slide the sun gear, driving shell, and the rear planetary assembly off the output shaft.

(5) Lift the sun gear and driving shell off the rear planetary gear assembly and remove the thrust washer from inside the driving shell. Remove the snap ring and steel washer from the sun gear (rear side of driving shell) and slide sun gear out of the shell. Remove the 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 the forward side of the rear planetary gear assembly, remove the planetary gear set from the rear annulus gear.

### Inspection

Inspect the 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 the bushings are damaged. Inspect all thrust washers for

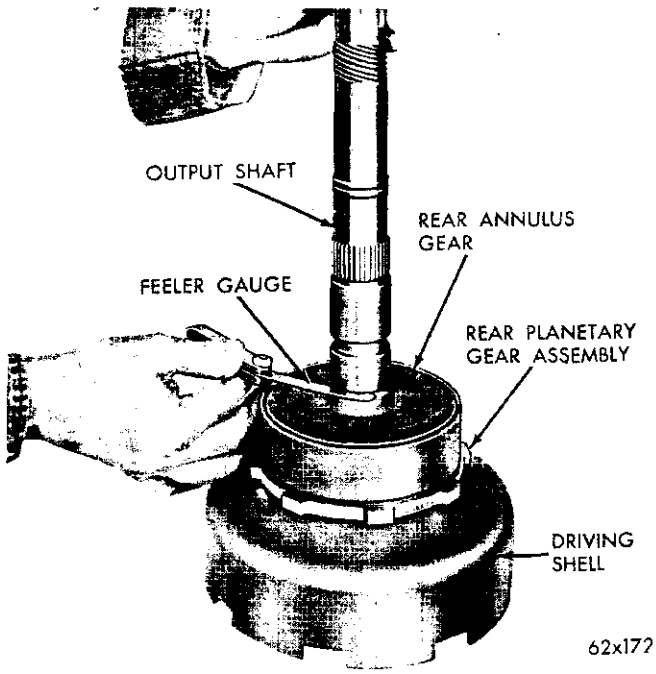


**Fig. 71—Measuring End Play of Planetary Gear Assemblies, Sun Gear and Driving Shell**

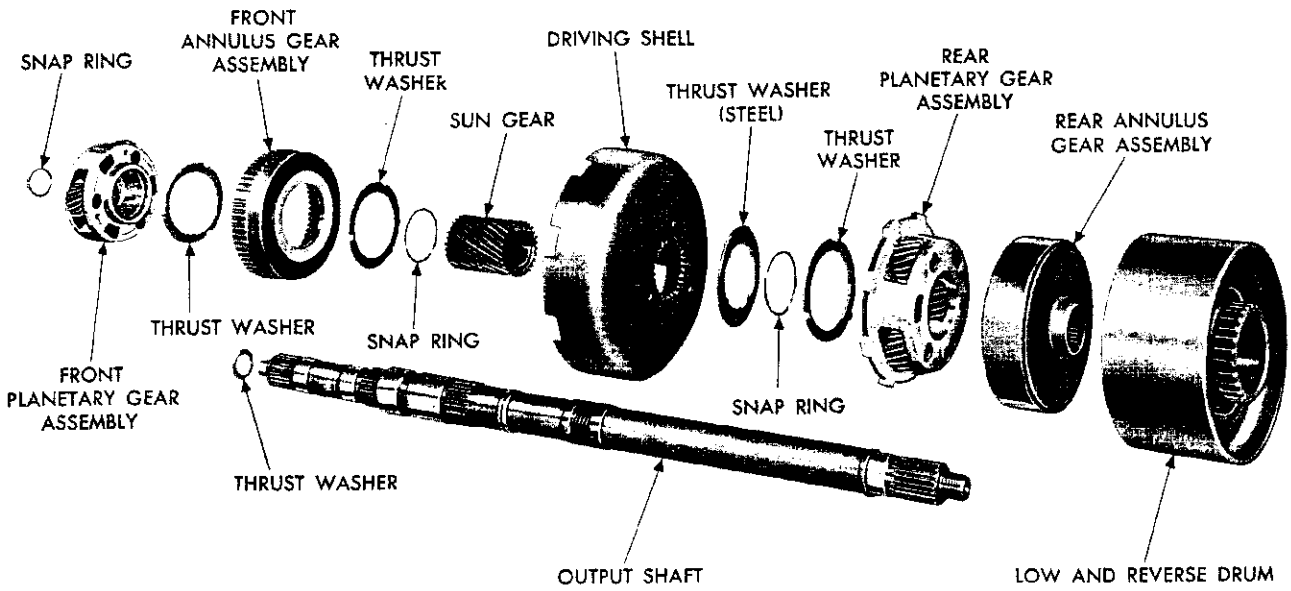


**Fig. 72—Planetary Gear Assemblies, Sun Gear, Driving Shell, Low and Reverse Drum Output Shaft (Disassembled)**

wear and scores, replace if damaged or worn below specifications. Inspect the thrust faces of the planetary gear carriers and annulus gears for wear, scores or other damage, replace as required. Inspect the planetary gear carrier for cracks, and pinions for broken or worn gear teeth. Inspect the annulus gear and driving gear teeth for damage. Replace distorted lock rings.

### Assembly

Refer to Figure 72 for parts reference.

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

(2) Insert the output shaft in the 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 the splines of the annulus gear.

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

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

(5) Place the thrust washer on the 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 the planetary pinions with the sun gear teeth.

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

## OVERRUNNING CLUTCH

### Inspection

Inspect the clutch rollers for smooth round surfaces, as 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 retaining set screw to make sure it is tight. 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

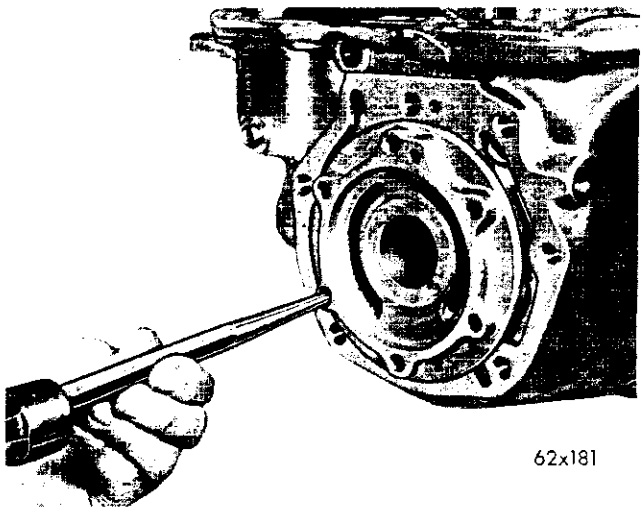


Fig. 73—Removing Overrunning Clutch Cam

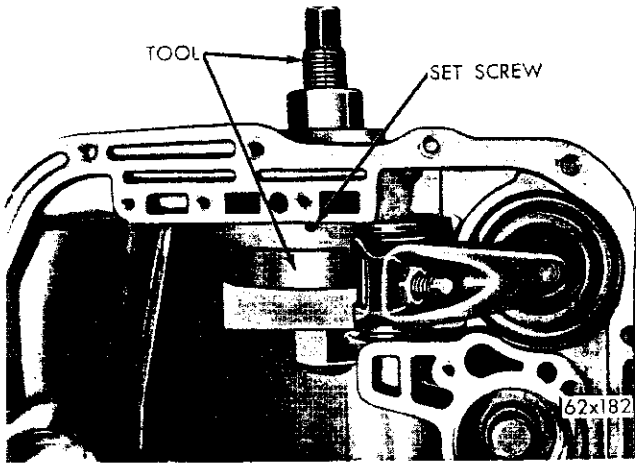


Fig. 74—Installing Overrunning Clutch Cam

and spring retainer in the following manner:

(1) Remove the 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. 73). 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 74, 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.

## KICKDOWN SERVO AND BAND

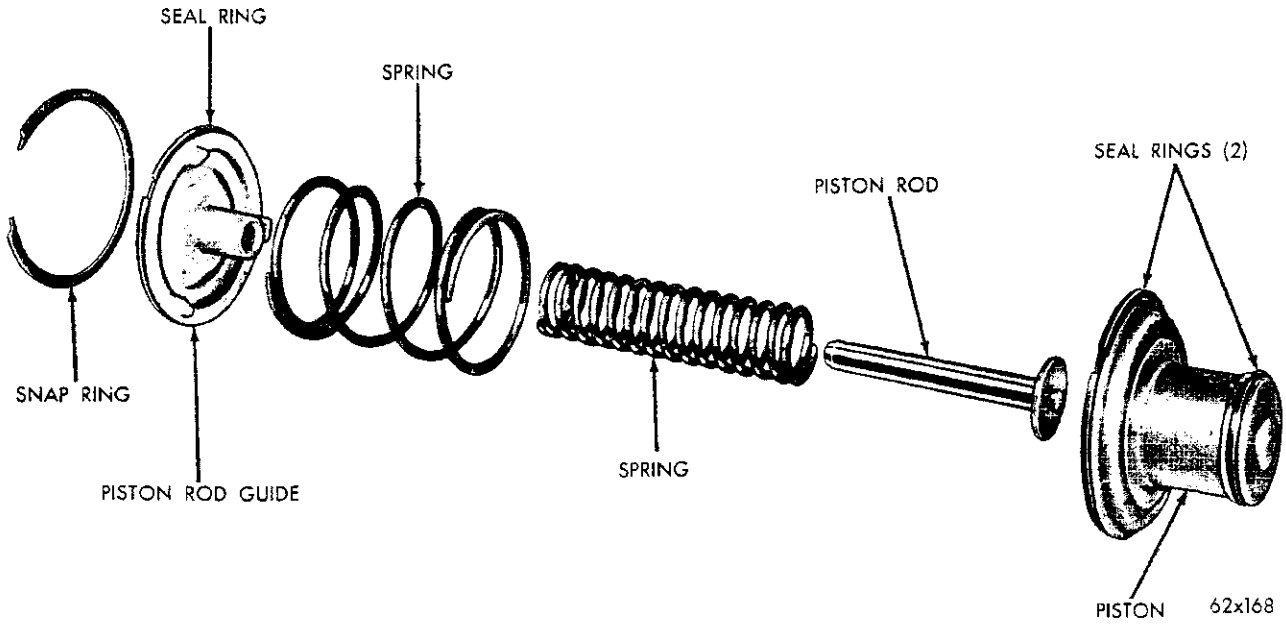


Fig. 75—Kickdown Servo (Disassembled)

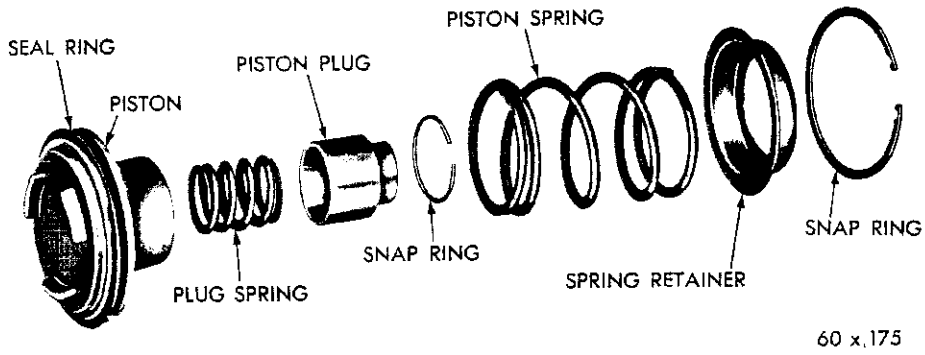


**Fig. 76—Low and Reverse Servo (Disassembled)**

**Inspection**

Figure 75 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. Inspect the piston bore in the case for scores or other damage. Inspect the fit of the guide on the piston rod. Inspect the piston spring for distortion.

Inspect the band lining for wear, non-uniform wear pattern, black burn marks, glazing, flaking, 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, replace the band. Inspect the band for distortion or cracked ends.

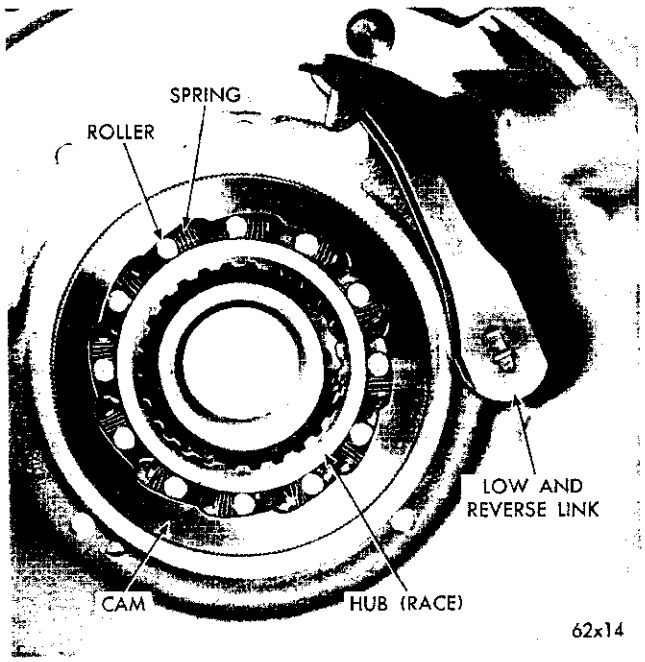


**Fig. 77—Overrunning Clutch, Low and Reverse Band Link**

## LOW AND REVERSE SERVO BAND

**Disassembly**

(1) Remove the snap ring from the piston and remove the piston plug and spring (Fig. 76).

**Inspection**

Inspect the seal for deterioration, wear and hardness. Inspect 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. Inspect 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, 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 lock with the snap ring.

## 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 77.

**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. 76).

(2) Compress the low and reverse servo piston spring by using "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. 78). 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 77, to provide running clearance for the low and reverse drum. Install the low-reverse drum.

**Kickdown Servo**

(1) Carefully push the servo piston into case bore. Install piston rod, the two springs and the guide (Fig. 75).

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

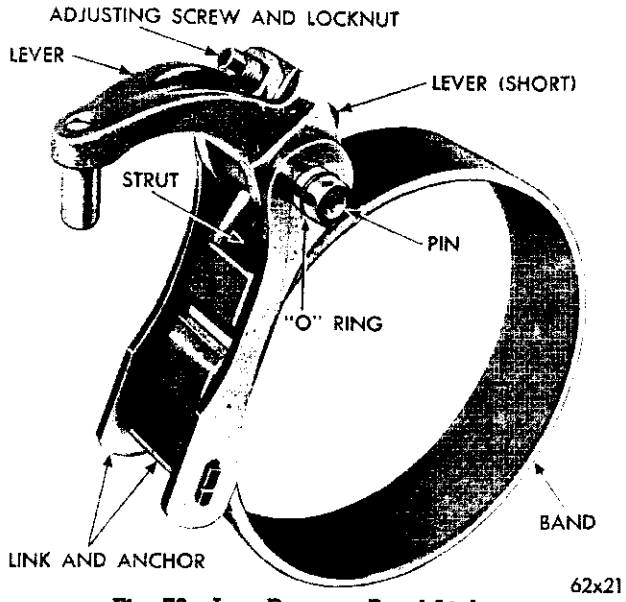


**Fig. 78—Low-Reverse Band Linkage**

**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 grease on the input to output shaft thrust washer (Fig. 72), and install the 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 the splines of the front annulus gear.

(4) Coat one side of the fiber thrust washer with heavy grease, then position washer in the recess on the 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 the 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 79 shows a disassembled view of the kickdown 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

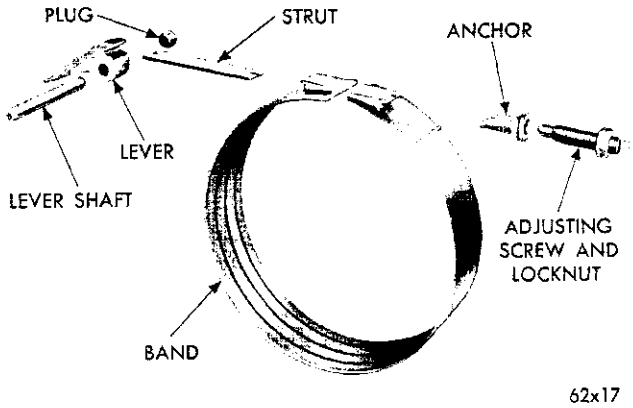


**Fig. 79—Kickdown Band and Linkage**

oil pump assembly due to an exceptionally tight fit in the case, is may be necessary to expand the case with heat during the pump installation. Using a suitable heat lamp, heat the case in the area of the front pump 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 before disassembly, replace the thrust washer on the 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. 80). 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.

(3) Insert aligning Tool C-3881 through the pump body and engage with the 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 the 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 the handle of the tool are vertical (Fig. 45). 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. 42).

(3) Install the oil pump cover with the retaining bolts threaded in a few turns. Slide the aligning sleeve, Tool C-3864 all the way in until it bottoms against the rotors (Fig. 43), then tighten the cover bolts evenly to 140 inch-pounds torque.

**Governor and Support**

(1) Position the support and governor housing assembly on the output shaft. Align the assembly so the governor valve shaft hole in the governor body aligns with the hole in the output shaft, then slide the assembly into place. Install the snap ring behind the governor housing (Fig. 40). Tighten the governor housing to support bolts to 100 inch-pounds torque. Bend the ends of the lock straps against the bolt heads.

(2) Place the governor valve on the valve shaft, insert the assembly into the housing and through the governor weights. Install the valve shaft retaining snap ring.

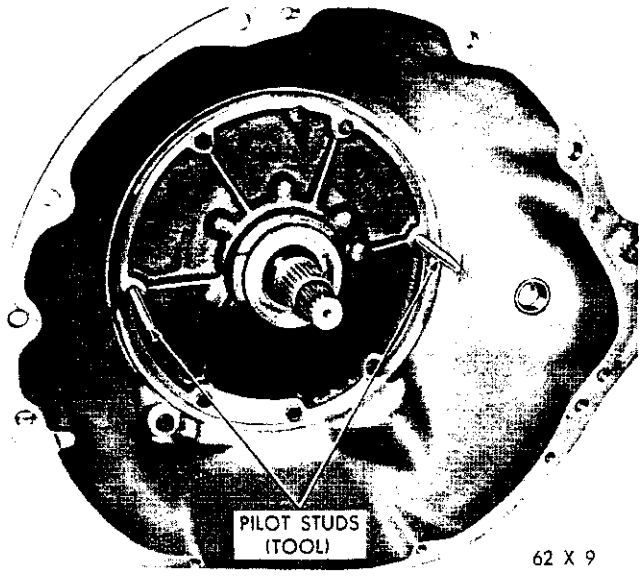


**Fig. 80—Installing Front Pump and Reaction Shaft Support Assembly**

**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) Place the neoprene spacer in position on back of the brake support plate with steel sleeve in the center of the support.

(3) Place the brake assembly on the extension housing with the support and brake shoes positioned over the anchor pin. Install the brake shoe guide and locking washer on the anchor pin.

(4) Install the grease shield, with flat on the shield aligned with flat on the extension housing. Install the grease shield retainer spring with the opening of the spring toward the brake shoe adjusting nut. Make sure the spring is properly seated in the groove.

(5) Slide the brake shoe return spring behind the grease shield spring and hook into position (Fig. 35).

(6) Install the parking brake drum, install the washer with its three projections toward the drum and the nut with its convoluted surface contacting the washer. Hold the drum with Tool C-3281, and tighten nut to 175 foot-pounds torque.

**IMPORTANT**

**Measure the drive train end play. 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 piston spring on the accumulator piston.

(3) Carefully position the valve body assembly into place in the transmission case and start all the retaining bolts. 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.

(7) Install the oil pan, using a new gasket. Tighten the pan bolts to 150 inch-pounds torque.

## SERVICE REPLACEMENT BUSHINGS

## AUTOMATIC TRANSMISSIONS

Service bushings are available for replacement for most all bushings in the TorqueFlite and TorqueFlite Six transmissions. The two bushings in the sun gear are not serviced because of the low cost of the sun gear assembly.

### GENERAL SERVICE INFORMATION

**Bushings**

The materials from which the bushings are usually made are necessarily soft. Consequently, bushings are easily distorted or otherwise damaged. Very little distortion is permissible if the bushing is to serve its purpose effectively. For these reasons, special care should be taken when replacing these parts.

**Bushing Bores**

Whenever a bushing is removed from a bore, the bore should be thoroughly cleaned and examined for smoothness. Bushing bores are not machined to as high a degree as the shafts or hubs that turn within the bushing. However, the bore must be free of burrs metal build-up, etc., if the bushing is to seat properly.

After installing a new bushing, double check to make sure no loose particles of metal are left in the bore, especially in blind hole bores.

**Sealing Surfaces**

Some of the components have a very accurately machined sealing surface. When driving bushings out or into these parts, be sure the part is resting on a **clean smooth** surface to avoid scratching or burring the sealing surface and creating leaks.

**Tool Usage**

The bushing removal and installation tools, Kit C-3887 (17 separate tools) are packed in a metal case. The "Special Tool" list gives the function of each tool and their individual SP numbers.

Care should be taken in using the tools so as not to allow them to cock in the bushing bore. The sharp

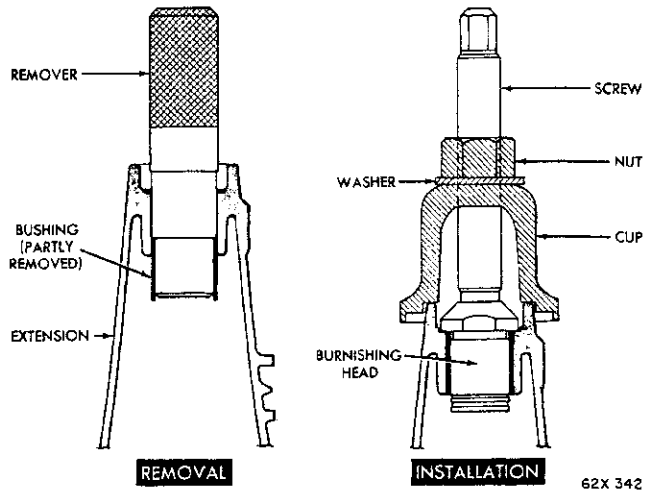


**Fig. 81—Installing Extension Housing Bushing—TorqueFlite Six**

edge tools can damage the bushing bore, and if an installer is cocked, it will distort the new bushing.

Bushing remover Tool C-3755, and the installer and burnisher Tool C-3751 for the extension housing bushing in the TorqueFlite Six transmission were released with the introduction of the transmission.

## BUSHING REPLACEMENT—TORQUEFLITE SIX

### Extension Housing Bushing

(1) Drive out the bushing with Tool C-3755 (Fig. 81).

(2) Slide a new bushing over the ground end of Tool C-3751, then drive the bushing into the housing with the tool (Fig. 81). Make sure the oil hole of the bushing aligns with the slot in the housing.

(3) While holding the screw from turning, tighten the tool nut to draw the burnisher through the bushing.

### Front Pump Bushing

(1) Place the front pump housing (seal face-down) on a smooth firm surface.

(2) Place the removing head, Tool SP-3551 in the bushing and install the handle, Tool SP-3549 in the removing head (Fig. 82).

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

(4) Position the new bushing on the installing head, Tool SP-3624.

(5) With the pump housing on a smooth clean surface, start the bushing and installing head in

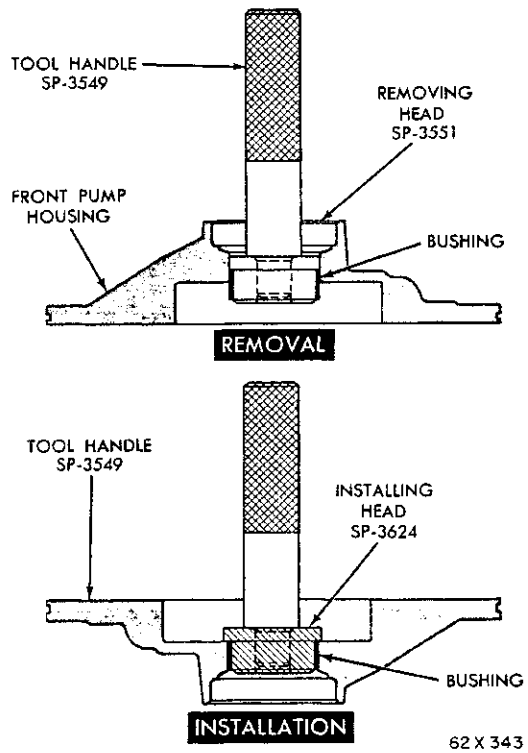


**Fig. 82—Removing and Installing Front Pump Bushing—TorqueFlite Six**

the bushing bore. Install the handle, Tool SP-3549 in the installing head (Fig. 82).

(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. 83). A gentle tap at each stake slot location will suffice.

(8) Using a narrow-bladed knife or similar tool,

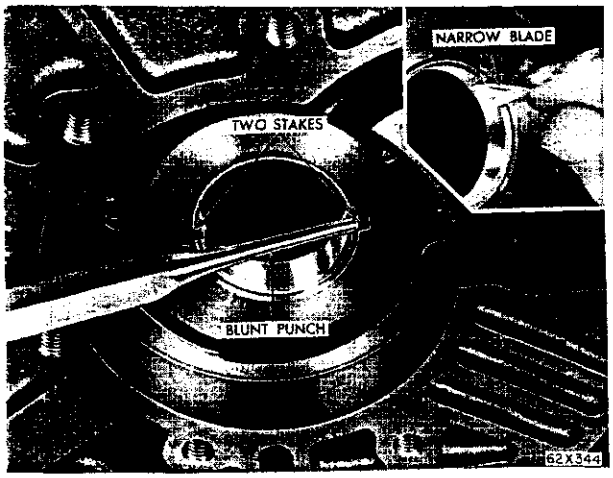


**Fig. 83—Staking Front Pump Bushing—TorqueFlite Six**

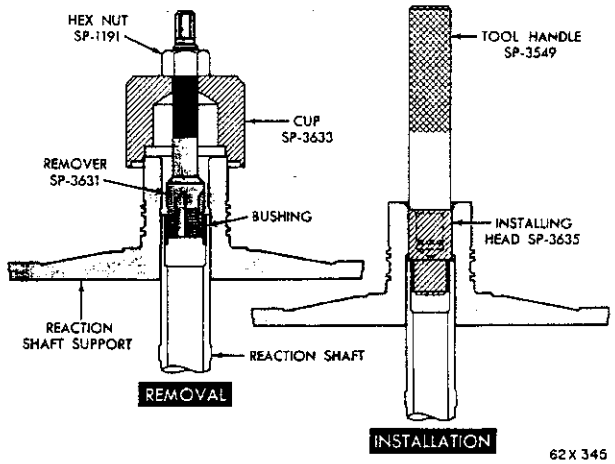


**Fig. 84—Removing the Reaction Shaft Bushing—TorqueFlite Six**

remove the high points or burrs around the staked area (Fig. 83). Do not use a file or similar tool that will remove more metal than is necessary.

(9) Thoroughly clean the pump housing before installation.

### Reaction Shaft Bushing

(1) Assemble the remover Tool SP-3631, 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. 84).

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

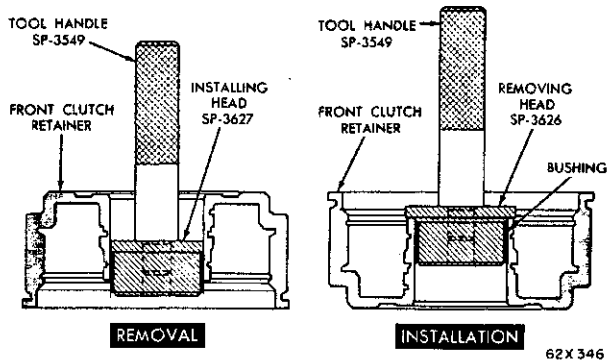


**Fig. 85—Removing the Front Clutch Retainer Bushing—TorqueFlite Six**

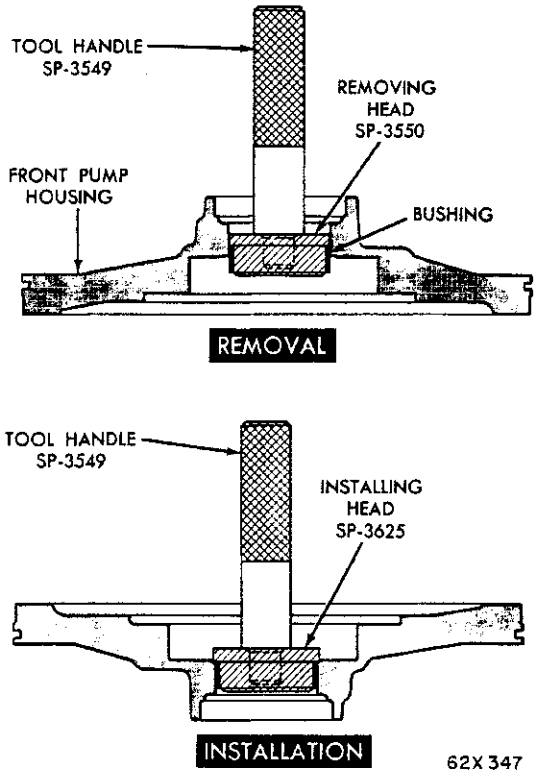


**Fig. 86—Removing the Front Pump Bushing—TorqueFlite**

(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 on the installing head Tool SP-3635, and start them in the bore of the reaction shaft.

(7) Support the reaction shaft upright on a clean smooth surface and install the handle Tool SP-3549 in the installing head (Fig. 84). Drive the bushing into the shaft until the tool bottoms.

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

### Front Clutch Retainer Bushing

(1) Lay the clutch retainer (open end down) on a clean smooth surface and place the removing head Tool SP-3627 in the bushing (Fig. 85). Install the handle Tool SP-3549 in the removing head.

(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-3626, and start them in the clutch retainer bore (Fig. 85).

(4) Install handle Tool SP-3549 in the installing head. Drive the bushing into the clutch retainer until the tool bottoms.

(5) Thoroughly clean the clutch retainer before asembly and installation.

### BUSHING REPLACEMENT—TORQUEFLITE

#### Front Pump Bushing

(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. 86).

(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. 86).

(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. 87). 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 area (Fig. 87). Do not use a file or similar tool that will remove more metal than is necessary.

(9) Thoroughly clean the pump housing before installation.

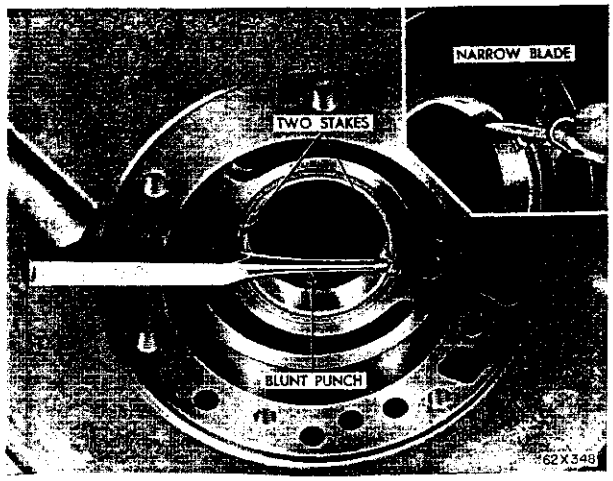


Fig. 87—Staking the Front Pump Bushing—TorqueFlite

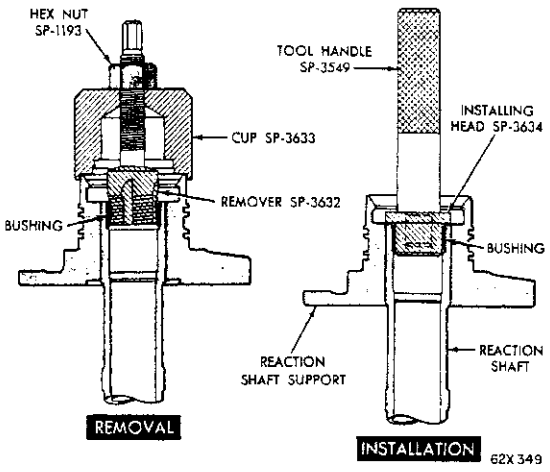


Fig. 88—Removing the Reaction Shaft Bushing—TorqueFlite

#### Reaction Shaft Bushing

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

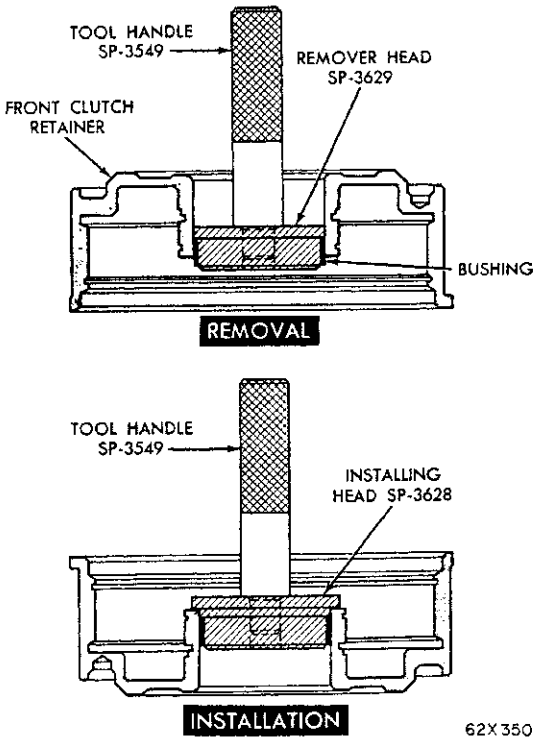


Fig. 89—Removing the Front Clutch Retainer Bushing—TorqueFlite

**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. 88).

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

**CAUTION**

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

(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-3534, and start them in the bore of the reaction shaft.

(7) Support the reaction shaft upright on a clean smooth surface and install handle Tool SP-3549 in the installing head (Fig. 88). Drive the bushing into the shaft until the tool "bottoms."

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

**Front Clutch Retainer Bushing**

(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. 89).

(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. 89). Drive the bushing into the clutch retainer until the tool "bottoms."

(5) Thoroughly clean the clutch retainer before assembly and installation.

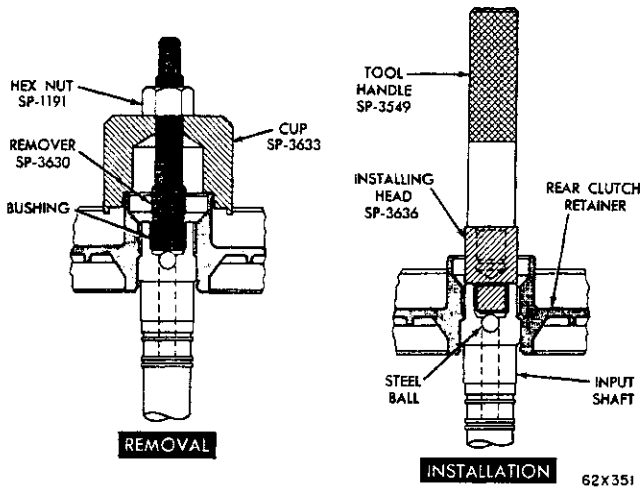


**Fig. 90—Removing the Input Shaft Bushing—TorqueFlite**

**Input Shaft Bushing**

(1) Clamp the input shaft in a vise with soft jaws, being careful not to clamp on 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. 90).

(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. 90). Drive the bushing into the shaft until the tool bottoms.

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

## TORQUE CONVERTER
## FLUSHING 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 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 drain plug and drain the solvent. Rotate the turbine and stator, and shake 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.

## 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

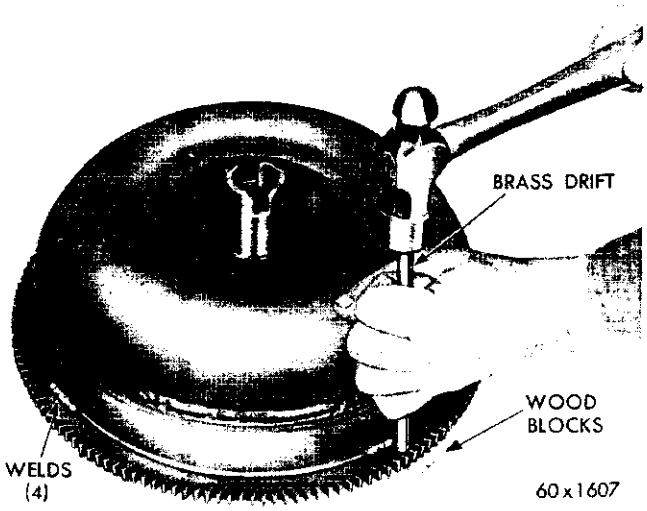


**Fig. 91—Removing the Starter Ring Gear**

(1) Carefully cut through the weld material at the rear side of ring gear with a hack saw or grinding wheel (Fig. 91). 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 drive 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 ring gear near welded areas to break any remaining weld material (Fig. 91). Tap around ring gear until it comes off the converter.

(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 the temperature at 200 degree F. Allow the ring gear to remain in the 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 the front face of 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 op-

posite sides of converter to minimize distortion.

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

**CAUTION**

**Do not gas weld.**

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

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

c. Direct the arc at the intersection of 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 insure quiet starter operation.

## SERVICE DIAGNOSIS

## HEAVY DUTY THREE SPEED TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| **Hard Shifting** | (a) Incorrect clutch adjustment. | (a) Refer to the Clutch Group for corrections |
| | (b) Improper cross-over adjustment. | (b) Perform the cross-over adjustment a-outlined in Paragraph "Gearshift Link age Adjustments". |
| | (c) Synchronizer clutch sleeve damaged. | (c-d-e) Causes noted can only be corrected by disassembling the transmission and replacing damaged or worn parts. |
| | (d) Synchronizer spring improperly installed. | |
| | (e) Broken or worn synchronizer stop rings. | |
| **Transmission Slips Out of Gear** | (a) Linkage interference. | (a) Inspect and remove all linkage interferences. |
| | (b) Gearshift rods out of adjustment. | (b) Adjust the gearshift rods as outlined in Paragraph "Gearshift Linkage Adjustments". |
| | (c) Second or direct speed gear synchronizer clutch teeth worn. | (c) Disassemble the transmission and replace parts as necessary. |
| | (d) Clutch housing bore or face out of alignment. | (d) Refer to the Clutch Group for correction procedures. |
| **Transmission Noises Backlash Noise** | (a) Excessive end play in the cluster gear. | (a) Replace the worn gear. |
| | (b) Loose synchronizer hub spline fit on mainshaft. | (b) Inspect the mainshaft and synchronizer hub and replace parts as necessary. |
| | (c) Loose spline fit on low speed sliding gear to mainshaft spline. | (c) Inspect the low speed sliding gear and mainshaft. Replace parts as necessary. |
| | (d) Loose spline fit of rear mainshaft flange. | (d) Inspect the mainshaft and flange splines. Replace parts as necessary. |
| | (e) Damaged, broken or excessively worn gear teeth. | (e) Replace the worn gears. |
| | (f) Drive pinion bearing worn. | (f) Replace the worn bearing. |

## SERVICE DIAGNOSIS

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| **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) Check fluid level, then perform hydraulic pressure tests and adjust to specifications. |
| | (c) Low-reverse band out of adjustment. | (c) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (d) Valve body malfunction or leakage. | (d) Remove and recondition the valve body assembly. |
| | (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 clutch. | (g) Inspect the clutch plates for free movement and for loose lining material, clutch piston for sticking and for damaged piston seals. Inspect the ball check for free movement and seating properly. Repair as required. |
| | (h) Worn or faulty rear clutch. | (h) Inspect the clutch plates for free movement and for loose lining material, clutch piston for sticking and for damaged piston seals. Inspect the ball check for free movement and seating properly. Repair as required. |
| **Delayed Engagement in D, 1, 2 and R** | (a) Low fluid level. | (a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Incorrect control cable adjustment. | (b) Adjust the control cable. |
| | (c) Hydraulic pressures too high or low. | (c) Perform the hydraulic pressure tests and adjust to specifications. |
| | (d) Valve body malfunction or leakage. | (d) Remove and recondition the valve body assembly. |
| | (e) Accumulator sticking, broken rings or spring. | (e) Inspect the accumulator for sticking, broken rings or spring. Repair as required. |
| | (f) Clutches or servos sticking or not operating. | (f) Remove the valve body assembly and air pressure tests. Repair as required. |
| | (g) Faulty front pump. | (g) Perform the hydraulic pressure tests. Adjust or repair as required. |
| | (h) Worn or faulty front and/or rear clutch. | (h) Inspect the clutch plates for free movement and wear, clutch piston for sticking and for damaged seal rings. Inspect the ball check for free movement and seating properly. Repair as required. |
| | (i) Worn or broken input shaft and/or reaction shaft support seal rings. | (i) Inspect and replace the seal rings as required, also inspect respective bores for wear. Replace the parts as required. |
| | (j) Aerated fluid. | (j) Inspect for air leakage into the front pump suction passages. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| **Runaway or Harsh Upshift and 3-2 Kickdown** | (a) Low fluid level. | (a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Incorrect the throttle linkage adjustment. | (b) Adjust the throttle linkage. |
| | (c) Hydraulic pressures too high or low. | (c) Perform the hydraulic pressure tests and adjust to specifications. |
| | (d) Kickdown band out of adjustment. | (d) Tighten the band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (e) Valve body malfunction or leakage. | (e) Remove and recondition the valve body assembly. |
| | (f) Governor malfunction. | (f) Inspect the governor and repair as required. |
| | (g) Accumulator sticking, broken rings or spring. | (g) Inspect the accumulator for sticking, broken rings or spring. Repair as required. |
| | (h) Clutches or servos sticking or not operating. | (h) Remove the valve body assembly and perform the air pressure tests. Repair as required. |
| | (i) Kickdown servo, band or linkage malfunction. | (i) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required. |
| | (j) Worn or faulty front clutch. | (j) Inspect the clutch plates for free movement and wear, clutch piston for sticking and for damaged seals. Inspect the ball check for free movement and seating properly. Repair as required. |
| | (k) Worn or broken input shaft and/or reaction shaft support seal rings. | (k) Inspect and replace seal rings as required, also inspect the respective bores for wear. Replace parts as required. |
| **No Upshift** | (a) Low fluid level. | (a) Refill to correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Incorrect throttle linkage adjustment. | (b) Adjust the throttle linkage. |
| | (c) Kickdown band out of adjustment. | (c) Tighten band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (d) Hydraulic pressures too high or low. | (d) Perform the hydraulic pressure tests and adjust to specifications. |
| | (e) Governor sticking. | (e) Remove and clean the governor. Replace parts if necessary. |
| | (f) Valve body malfunction or leakage. | (f) Remove and recondition the valve body assembly. |
| | (g) Accumulator sticking, broken rings or spring. | (g) Inspect accumulator for sticking, broken rings or spring. Repair as required. |
| | (h) Clutches or servos sticking or not operating. | (h) Remove the valve body assembly and perform the air pressure tests. Repair as required. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| | (i) Faulty rear oil pump. | (i) Perform the hydraulic pressure tests, adjust or repair as required. |
| | (j) Kickdown servo, band or linkage malfunction. | (j) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required. |
| | (k) Worn or faulty front clutch. | (k) Inspect the clutch plates for free movement and wear, clutch piston for sticking and for damaged seal rings. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| | (l) Worn or broken input shaft and/or reaction shaft support seal rings. | (l) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required. |
| **No Kickdown or Normal Downshift** | (a) Incorrect throttle linkage adjustment. | (a) Adjust the throttle linkage. |
| | (b) Incorrect control cable adjustment. | (b) Adjust the control cable. |
| | (c) Kickdown band out of adjustment. | (c) Tighten band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (d) Hydraulic pressures too high or low. | (d) Perform the hydraulic pressure tests and adjust to specifications. |
| | (e) Governor sticking. | (e) Remove and clean the governor. Replace parts if necessary. |
| | (f) Valve body malfunction or leakage. | (f) Remove and recondition the valve body assembly. |
| | (g) Accumulator sticking, broken rings or spring. | (g) Inspect the accumulator for sticking, broken rings or spring. Repair as required. |
| | (h) Clutches or servos sticking or not operating. | (h) Remove the valve body assembly and perform the air pressure tests. Repair as required. |
| | (i) Kickdown servo, band or linkage malfunction. | (i) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required. |
| | (j) Overrunning clutch not holding. | (j) Disassemble the transmission and repair the overrunning clutch as required. |
| **Shifts Erratic** | (a) Low fluid level. | (a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Areated fluid. | (b) Inspect for air leakage into the front pump suction passages. |
| | (c) Incorrect throttle linkage adjustment. | (c) Adjust the throttle linkage. |
| | (d) Incorrect control cable adjustment. | (d) Adjust the control cable. |
| | (e) Hydraulic pressures too high or low. | (e) Perform the hydraulic pressure tests and adjust to specifications. |
| | (f) Governor sticking. | (f) Remove and clean the governor. Replace parts if necessary. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| | (g) Oil strainer clogged. | (g) Clean the oil strainer. |
| | (h) Valve body malfunction or leakage. | (h) Remove and recondition the valve body assembly. |
| | (i) Clutches or servos sticking or not operating. | (i) Remove the valve body assembly and perform air pressure tests. Repair as required. |
| | (j) Faulty rear and/or front oil pump. | (j) Perform the hydraulic pressure tests, adjust or repair as required. |
| **Slips in Forward Drive Positions** | (a) Low fluid level. | (a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Areated fluid. | (b) Inspect for air leakage into the front pump suction passages. |
| | (c) Incorrect throttle linkage adjustment. | (c) Adjust the throttle linkage. |
| | (d) Incorrect control cable adjustment. | (d) Adjust the control cable. |
| | (e) Hydraulic pressures too low. | (e) Perform the hydraulic pressure tests and adjust to specifications. |
| | (f) Valve body malfunction or leakage. | (f) Remove and recondition the valve body assembly. |
| | (g) Accumulator sticking, broken rings or spring. | (g) Inspect the accumulator for sticking, broken rings or spring. Repair as required. |
| | (h) Clutches or servos sticking or not operating. | (h) Remove the valve body assembly and perform air pressure tests. Repair as required. |
| | (i) Warn or faulty front and/or rear clutch. | (i) Inspect the clutch plates for free movement and wear, clutch piston for sticking and for damaged seal rings. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| | (j) Overrunning clutch nor holding. | (j) Disassemble the transmission and repair the overrunning clutch as required. |
| | (k) Worn or broken input shaft and/or reaction shaft support seal rings. | (k) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required. |
| **Slips in Reverse Only** | (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) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (f) Valve body malfunction or leakage. | (f) Remove and recondition the valve body assembly. |
| | (g) Front clutch or rear servo, sticking or not operating. | (g) Remove the valve body assembly and perform air pressure tests. Repair as required. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| | (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. |
| **Slips in All Positions** | (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) Remove and recondition the valve body assembly. |
| | (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. |
| **No Drive in Any Position** | (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) Remove and recondition the valve body assembly. |
| | (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. |
| **No Drive in Forward Drive Positions** | (a) Hydraulic pressures too low. | (a) Perform the hydraulic pressure tests and adjust to specifications. |
| | (b) Valve body malfunction or leakage. | (b) Remove and recondition the valve body assembly. |
| | (c) Accumulator sticking, broken rings or spring. | (c) Inspect the accumulator for sticking, broken rings or spring. Repair as required. |
| | (d) Clutches or servos, sticking or not operating. | (d) Remove the valve body assembly and perform air pressure tests. Repair as required. |
| | (e) Worn or faulty rear clutch. | (e) Inspect the clutch plates for free movement and wear, clutch piston for sticking and for damaged seals. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| | (f) Overrunning clutch not holding. | (f) Disassemble the transmission and repair overrunning clutch as required. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| | (g) Worn or broken input shaft and/or reaction shaft support seal rings. | (g) Inspect and replace the seal rings as required, also inspect the respective bores for wear. Replace parts as required. |
| **No Drive in Reverse** | (a) Incorrect control cable adjustment. | (a) Adjust the control cable. |
| | (b) Hydraulic pressures too low. | (b) Perform the hydraulic pressure tests and adjust to specifications. |
| | (c) Low-reverse band out of adjustment. | (c) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (d) Valve body malfunction or leakage. | (d) Remove and recondition the valve body assembly. |
| | (e) Front clutch or rear servo, sticking or not operating. | (e) Remove the valve body assembly and perform air pressure tests. 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 clutch. | (g) Inspect the clutch plates for free movement and wear, clutch piston for damaged seals and for damaged seal rings on front support. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| **Drives in Neutral** | (a) Incorrect control cable adjustment. | (a) Adjust the control cable. |
| | (b) Valve body malfunction or leakage. | (b) Remove and recondition the valve body assembly. |
| | (c) Rear clutch inoperative. | (c) Inspect the clutch and repair as required. |
| **Drags or Locks** | (a) Kickdown band out of adjustment. | (a) Tighten the band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (b) Low-reverse band out of adjustment. | (b) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (c) Parking brake sticking or out of adjustment. | (c) Free up and adjust as required. |
| | (d) Kickdown and/or low-reverse servo, band, linkage malfunction. | (d) Inspect the servo for sticking, broken seal rings, binding linkage or faulty band lining. Repair as required. |
| | (e) Front and/or rear clutch faulty. | (e) Inspect the clutch plates for free movement and wear, clutch piston for damaged seals. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| | (f) Planetary gear sets broken or seized. | (f) Inspect the condition of the planetary gear sets and replace as required. |
| | (g) Overrunning clutch worn, broken or seized. | (g) Inspect the condtion of the overrunning clutch and replace parts as required. |

## SERVICE DIAGNOSIS—CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| **Grating, Scraping or Growling Noise** | (a) Parking brake sticking or out of adjustment. | (a) Free up and adjust as required. |
| | (b) Kickdown band out of adjustment. | (b) Tighten the band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (c) Low-reverse band out of adjustment. | (c) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (d) Output shaft bearing damaged. | (d) Remove the extension housing and replace the bearing. |
| | (e) Governor support binding or broken seal rings. | (e) Inspect the condition of the governor support and repair as required. |
| | (f) Front and/or rear oil pump scored or binding. | (f) Inspect the condition of the pump and repair as required. |
| | (g) Front and/or rear clutch faulty. | (g) Inspect the clutch plates for free movement and wear, clutch piston for damaged seals. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| | (h) Planetary gear sets broken or seized. | (h) Inspect the condition of the planetary gear sets and replace as required. |
| | (i) Overrunning clutch worn, broken or seized. | (i) Inspect the condition of overrunning clutch and replace parts as required. |
| **Buzzing Noise** | (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. |
| | (d) Overrunning clutch inner race damaged. | (d) Inspect and repair the clutch as required. |
| **Hard to Fill, Oil Flows out Filler Tube** | (a) High fluid level. | (a) Drain the fluid to the correct level. |
| | (b) Breather clogged. | (b) Remove shield plate from front pump and clean breather opening. |
| | (c) Oil strainer clogged. | (c) Remove and clean the oil strainer. |
| | (d) Aerated fluid. | (d) Inspect for air leakage into front pump suction passages. |
| **Transmission Overheats** | (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) Tighten the band screw to 47-50 inch-pounds torque and back off 2 turns. |
| | (c) Low-reverse band adjustment too tight. | (c) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (d) Faulty cooling system. | (d) Inspect the transmission cooling system, clean and repair as required. |

## SERVICE DIAGNOSIS CONT'D.

## TORQUEFLITE TRANSMISSION

| Condition | Possible Cause | Correction |
|---|---|---|
| | (e) Parking brake sticking or out of adjustment. | (e) Free up and adjust as required. |
| | (f) Rear oil pump faulty. | (f) Inspect the rear oil pump for incorrect clearance, repair as required. |
| | (g) Front oil pump faulty. | (g) Inspect the front oil pump for incorrect clearance, repair as required. |
| | (h) Insufficient clutch plate clearance in front and/or rear clutches. | (h) Measure the clutch plate clearance and correct with the proper size snap ring. |
| **Impossible to Push Start** | (a) Low fluid level. | (a) Refill to the correct level with Automatic Transmission Fluid, Type A, Suffix A. |
| | (b) Low-reverse band slipping. | (b) Tighten the band screw to 47-50 inch-pounds torque and back off 3 turns. |
| | (c) Valve body malfunction or leakage. | (c) Remove and recondition the valve body assembly. |
| | (d) Rear oil pump faulty. | (d) Inspect and repair the rear oil pump as required. |
| | (e) Low-reverse servo, band or linkage malfunction. | (e) Inspect the servo for damaged seals, binding linkage or faulty band lining. Repair as required. |
| | (f) Worn or faulty rear clutch. | (f) Inspect the clutch plates for free movement and wear, clutch piston for damaged seals and for damaged seal rings on input shaft. Inspect the ball check for free movement and for seating properly. Replace parts as needed. |
| **Etarter Will Not Snergize in Neutral** | (a) Incorrect control cable adjustment. | (a) Adjust the control cable. |
| | (b) Faulty or incorrectly adjusted neutral starting switch. | (b) Test the operation of the switch with a test lamp. Adjust or replace as required |
| | (c) Broken lead to neutral switch. | (c) Inspect the lead and test with a test lamp. Repair the broken lead. |