

Fig V1-74. Removing or installing output driven oil pump suction tube

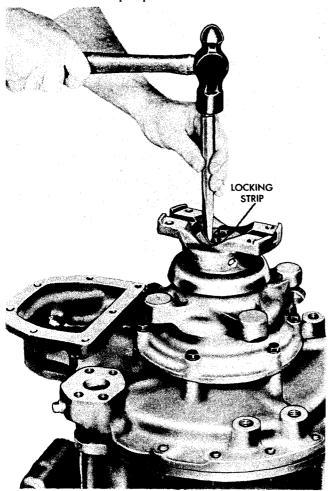


Fig VI-75. Using a hammer and a chisel to bend down ears of locking strip

oil sump to the adapter. Remove the oil sump and gasket (fig VI-83).

- c. REMOVING FLANGE, BEARING RETAINER, OUTPUT DRIVEN OIL PUMP ASSEMBLY, ADAPTER, AND OUTPUT SHAFT
- (1) Using a hammer and a chisel, bend down the ears of the locking strip (fig VI-75). Remove the two bolts, locking strip, retaining washer and output flange.
- (2) If the transmission has a speedometer drive, remove two bolts and lock washers and remove the sleeve (54, fig XIII-1), gasket (53), seal (52), washer (51), and shaft (50).
- (3) Remove the bolts that secure the bearing retainer to the adapter. Remove the retainer (fig VI-82). If the transmission has a speedometer drive, do not remove the speedometer drive shaft bushing from the retainer unless replacement is necessary.
- (4) Remove the spacer (fig VI-76). If the transmission has a speedometer drive, the speedometer drive gear replaces this spacer.

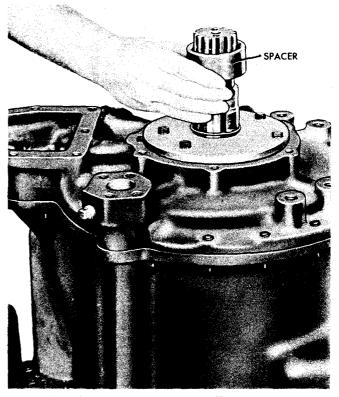


Fig V1-76. Removing or installing spacer

- (5) Remove the snap ring from the output shaft (fig VI-77).
- (6) The transmission may not be equipped with an output driven oil pump assembly. In this case remove the bolts and lock washers from the spacer that takes the place of the output driven oil pump assembly (fig VI-77). Remove the spacer.
- (7) If the transmission is equipped with an output driven oil pump, remove the oil pump body (fig VI-78). Remove the oil pump gears (fig VI-78). Remove the oil pump cover (fig VI-81).
- (8) Remove the bolts that secure the sump adapter to the transmission housing. Remove the adapter (fig VI-80).
  - (9) Remove the output shaft (fig VI-79).

### 6. ASSEMBLY OF MODEL CRT-3330-3 TRANSMISSION

a. BASIC SIMILARITIES. The Model CRT-3330-3 transmission is assembled as

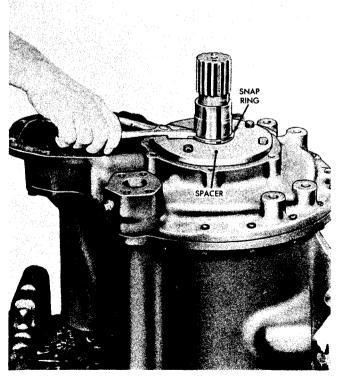


Fig VI-77. Removing or installing snap ring from output shaft

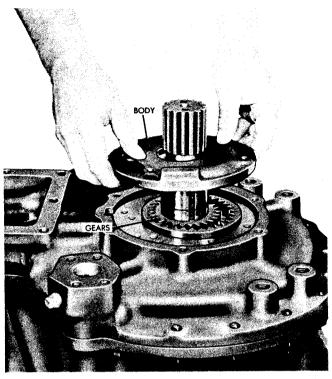


Fig VI-78. Removing or installing output oil pump body

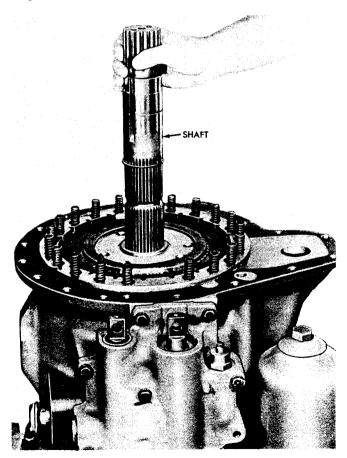


Fig VI-79. Removing or installing output shaft

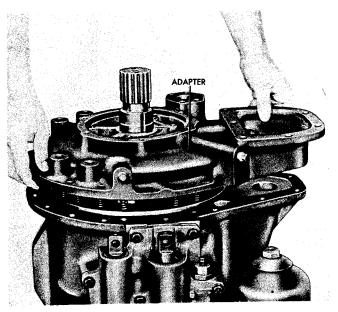


Fig VI-80. Removing or installing adapter

outlined in section VI, paragraph 4 with the exception of the installation of the oil sump adapter, oil sump, and related parts, which is outlined in b and c below.

- b. INSTALLING OUTPUT SHAFT, OIL SUMP ADAPTER, OUTPUT DRIVEN OIL PUMP ASSEMBLY, BEARING RETAINER, AND FLANGE
- (1) Install the output shaft (fig VI-79). The snap ring on the shaft should seat against the low-range planetary carrier.
- (2) Install the adapter on the transmission housing (fig VI-80). Install the bolts and lock washers through the transmission housing into the adapter.
- (3) Install the spacer that takes the place of the oil pump assembly if the transmission is so equipped (fig VI-77). Secure the spacer with five bolts and lock washers.
- (4) If the transmission is equipped with an output driven oil pump, install the oil pump cover (fig VI-81). Install the oil pump gears

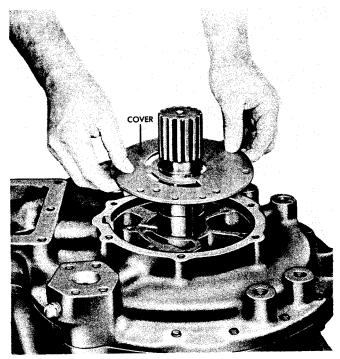


Fig VI-81. Removing or installing oil pump cover

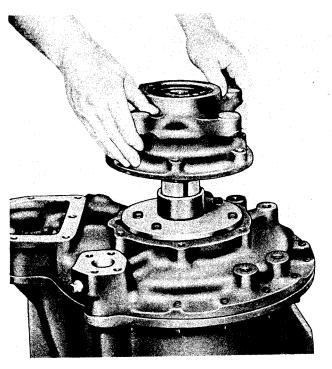


Fig VI-82. Removing or installing bearing retainer

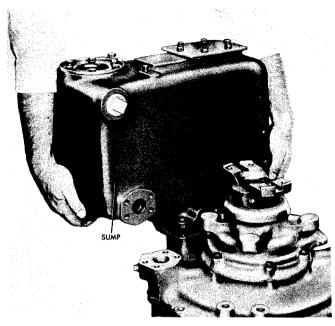


Fig VI-83. Removing or installing oil sump

(fig VI-78). Install the oil pump body (fig VI-78). Secure the cover with five bolts and lock washers.

- (5) Install the snap ring on the output shaft (fig. VI-77).
- (6) Install the spacer on the output shaft (fig VI-76). If the transmission has a speed-ometer drive, the speedometer drive gear replaces this spacer.

- (7) Install the bearing retainer (fig VI-82). Install the bolts and lock washers that secure the bearing retainer to the adapter.
- (8) If the transmission has a speedometer drive, install as an assembly the shaft (50, fig XIII-1), washer (51), seal (52), gasket (53), and sleeve (54) into the retainer.
- (9) Install the output flange, the retaining washer, the locking strip and two bolts. Bend the ears of the locking strip around the bolt heads.
  - c. INSTALLING OIL SUMP, OUTPUT DRIVEN OIL PUMP SUCTION TUBE AND OIL DRAIN TUBE
- (1) Install the oil sump and gasket (fig VI-83). Install the bolts and lock washers that secure the oil sump to the adapter.
- (2) Install the oil pump suction tube and gaskets (fig VI-74). Install the bolts and lock washers that secure the suction tube to the oil sump and the adapter.
- (3) Install the oil drain tube and gaskets (fig VI-73). Install the bolts and lock washers that secure the oil drain tube to the oil sump, the selector valve body assembly and the input pressure and scavenge oil pump assembly.

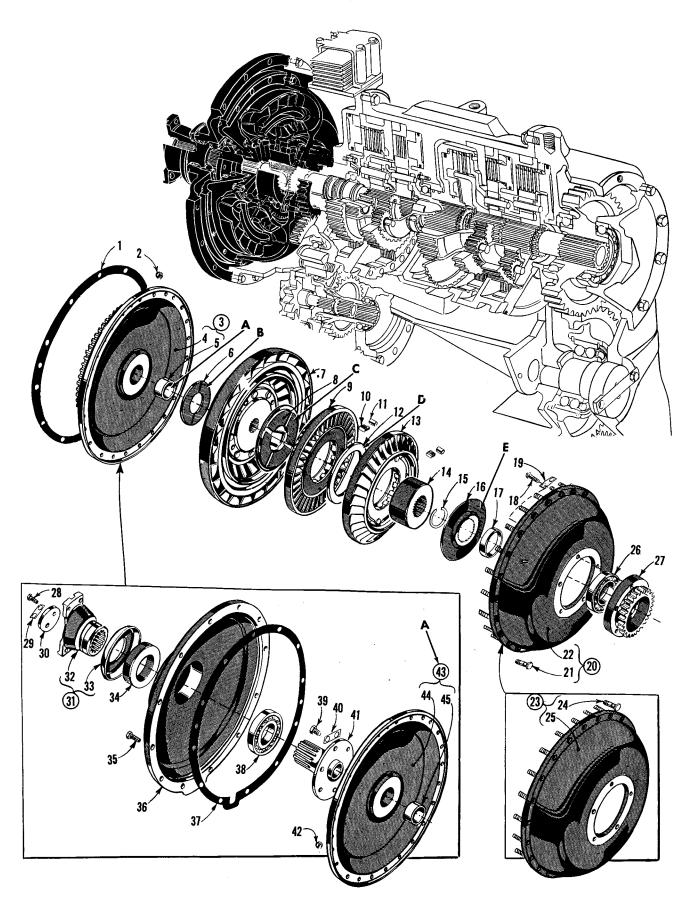


Fig VII-1. Torque converter group, exploded view

### SECTION VII TORQUE CONVERTER GROUP REBUILD

#### 1. CONVERTER PUMP COVER (FIG VII-1)

- <u>a.</u> DISASSEMBLY. Remove bushing (5) from cover (4) only if replacement is necessary. When replacing, cut the bushing out of the cover. Be careful not to damage the bore in the cover.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, g, h, and j for cleaning and inspection procedures, and paragraph 6 for wear limits information.
- c. ASSEMBLY. If the bushing was removed, install the new bushing. Refer to

section VI, paragraph 4j (13) for assembly of the pump cover into the transmission.

#### 2. TRANSMISSION FRONT COVER

#### a. DISASSEMBLY (FIG VII-1)

- (1) Remove bearing assembly (38) from converter drive shaft (41).
- (2) Remove the six bolts and locking strips from the converter drive shaft. Remove the converter drive shaft.
- (3) Remove oil seal (34) from the transmission front cover only if replacement is
- 1 Converter pump cover gasket
- 2 Nut
- 3 Converter pump cover assembly
- 4 Converter pump cover
- 5 Bushing
- 6 Washer
- 7 Turbine
- 8 Stator thrust washer
- 9 First stator
- 10 Freewheel roller spring
- 11 Freewheel roller
- 12 Spacing washer
- 13 Second stator
- 14 Freewheel race
- 15 External snap ring
- 16 Stator spacer
- 17 Pump spacer
- $18 Bolt 1/2'' 20 \times 1 \frac{1}{4}''$
- 19 Locking strip
- 20 Converter pump assembly (TC-320 Converter performance)
- $21 Bolt 5/16'' 24 \times 1.30'' long$
- \*22 Converter pump
- 23 Converter pump assembly (TC-370 Converter performance)

- 24 Bolt 5/16" 24 x 1.30" long
- \*25 Converter pump
- 26 Double row ball bearing assembly
- 27 Input accessory drive gear
- 28 Hexagon head bolt 3/8" 24 x 1 1/8"
- 29 Locking strip
- 30 Flange retainer washer
- 31 Flange assembly Mechanics 6C
- \*32 Flange
- 33 Dust shield
- 34 Seal
- 35 Hexagon head bolt 3/8" 24 x 1 1/2" long
- 36 Transmission front cover
- 37 Transmission front cover gasket
- 38 Single row ball bearing assembly
- 39 Hexagon head bolt 1/2" 13 x 1 1/8"
- 40 Locking strip
- 41 Converter drive shaft
- 42 Hexagon lock nut 5/16" 24
- 43 Converter pump cover assembly
- \*44 Converter pump cover
- 45 Bushing
- A Cover bushing bore point of measurement for wear limit (See Wear Limits Chart)
- B Washer thickness point of measurement for wear limit (See Wear Limits Chart)
- C Washer thickness point of measurement for wear limit (See Wear Limits Chart)
- D Washer thickness point of measurement for wear limit (See Wear Limits Chart)
- E Washer thickness point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only - not as a detail part.

Fig VII-1. Torque converter group, exploded view, legend

necessary When replacing, press the oil seal from the cover.

b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, h, and j for cleaning and nspection procedures.

#### c. ASSEMBLY

- (1) Press a new oil seal into the transmission front cover if the seal was removed.
- (2) Install the converter drive shaft on the converter pump cover and install six bolts and locking strips. Bend up the tabs of the locking strips to secure the bolts.
- (3) Press the bearing assembly on the converter drive shaft. Refer to section VI, paragraph 4<u>j</u> (13) and (14) for assembly procedures

#### 3. CONVERTER PUMP

#### a. DISASSEMBLY (FIG VII-1)

- (1) Remove six bolts (18) and three locking strips (19) from the converter pump (20).
- (2) Remove input accessory drive gear (27) and double row ball bearing assembly (26) from the converter pump.
- (3) Press the double row ball bearing assembly from the input accessory drive gear.
- b. CLEANING, INSPECTION, AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, and i for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) Press the double row ball bearing assembly (26, fig VII-1) in the input accessory drive gear (27, fig VII-1).
- (2) Install the input accessory drive gear and double row ball bearing on the converter pump.

#### NOTE

If a converter housing seal diaphragm (70), figure VIII-1, is used, install seal ring (72), figure VIII-1 in the groove on the accessory drive gear.

(3) Install six bolts and three locking strips in the converter pump. Bend the corners of the locking strips to lock the bolts. Refer to section VI, paragraph 4<u>j</u> (1) for assembly procedures.

#### 4. CONVERTER STATORS

#### a. DISASSEMBLY (FIG VII-1)

(1) If the rolls of shim stock which were used to retain the rollers during disassembly of the converter are still in the bores of the stator assemblies, remove them and remove rollers (11) and springs (10).

#### b. CLEANING, INSPECTION, AND WEAR LIMITS

- (1) Refer to section IV, paragraphs 5b, e, g, and j for cleaning and inspection procedures.
- (2) Do not remove the rivets from the stator assemblies. If any part of a stator assembly is worn or damaged, the assembly must be replaced.
- (3) Inspect the roller ramps on each stator cam for wear, pits and scores. If one of these conditions is found, the stator assembly should be replaced.
- (4) Inspect the stator blades for dents, nicks and burrs. If such defects are found, remove them with a fine file and smooth stone. If there are dents that can not be removed with a file or if there are cracks, replace the stator assembly.
- (5) Inspect the freewheel rollers for nicks, burrs, excessive wear, and signs of galling. If these conditions cannot be corrected with crocus cloth, replace the rollers.

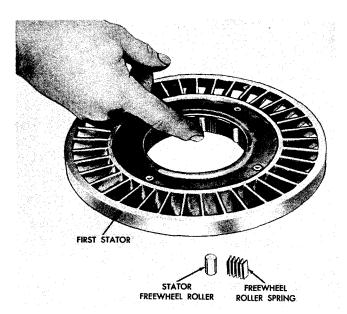


Fig VII-2. Installing stator rollers and springs in stator

- (6) Inspect the freewheel roller springs for distortion. Replace them if they are distorted.
- (7) Make sure the freewheel rollers do not bind or drag in the roller slots.
- (8) Inspect the thrust washers (6), (8), (12), and freewheel race (14), figure VII-1.

#### c. ASSEMBLY

(1) Be sure to note which end of the cam pocket in the cam ring is the shallowest.

Place a quantity of good quality, mineral base, heavy grease in each pocket of the cam. The grease retains the freewheel roller and the freewheel roller spring in the cam pocket before assembly on the freewheel roller race.

- (2) Place a roller in the shallowest part of a cam pocket Place a spring in the deepest part of the cam pocket, making certain it is all the way back in the cam pocket (open ends of the spring when installed should be toward the bore in the stator). It might be necessary to hold the roller in position with a finger or the flat side of a small screw driver while pushing the spring into position (fig VII-2).
- (3) Install the other seven rollers and springs in the same manner. Refer to section VI, paragraph 4j (6) through (9) for assembly procedures. See figure VII-3.

#### 5 CONVERTER TURBINE

- a. REPLACING TURBINE. The turbine assembly is a riveted assembly consisting of a hub, turbine and rivets. If one of these parts needs replacing, replace the entire assembly.
- b. CLEANING AND INSPECTION. Refer to section IV, paragraph 5b, e, and j for cleaning and inspection procedures.

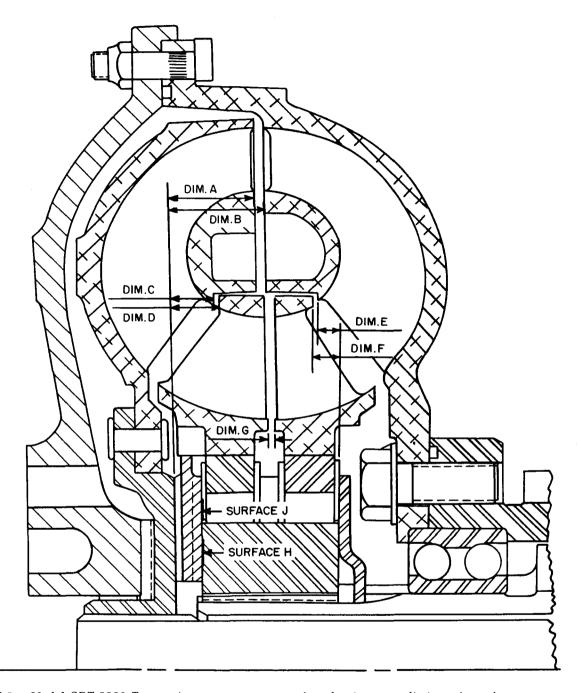


Fig VII-3. Model CRT-3330 Torquatic converter cross section showing wear limits points of measurement.

With stator pack installed, end of roller race (surface H) shall be .007 inch or more beyond stator side plate (surface J). Dimension B minus dimension A shall not be less than .005 inch. Dimension D minus dimension C shall not be less than .010 inch. Dimension G shall not be less than .005 inch. Dimension F minus dimension E shall not be less than .005 inch.

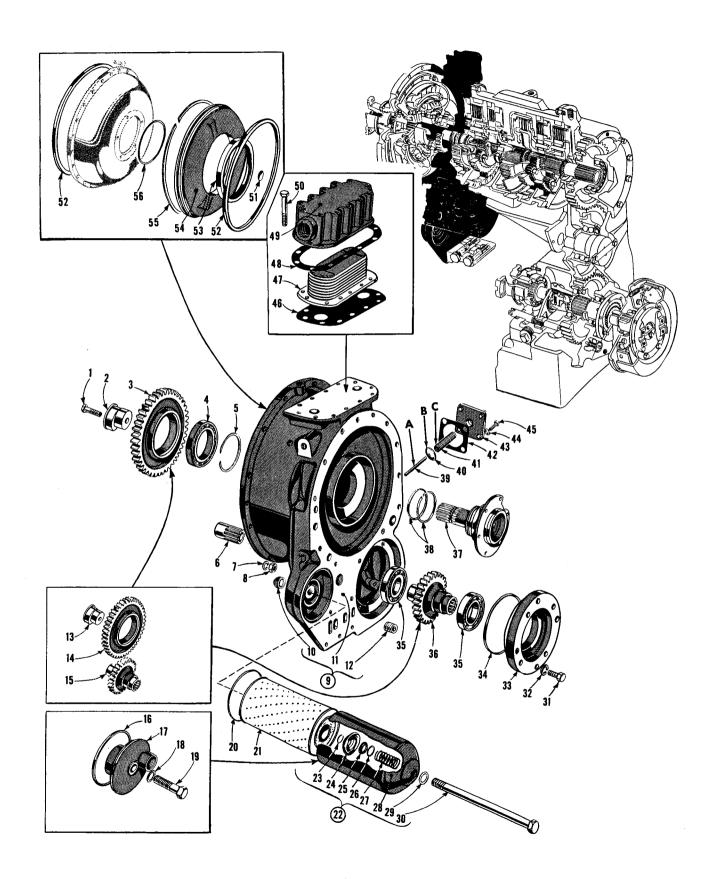


Fig VIII-1. Torque converter housing group, exploded view

### SECTION VIII CONVERTER HOUSING ASSEMBLY REBUILD

#### 1. CONVERTER HOUSING (FIG VIII-1)

#### a. DISASSEMBLY

- (1) Remove four bolts and lock washers from the lube pressure regulator valve cover. Remove the cover, gasket, spring, lube pressure regulator valve, and pin (fig VIII-2).
- (2) Loosen the converter ground sleeve by tapping against the shaft end. Remove the sleeve (fig VIII-3). Remove the two hook-type seal rings from the ground sleeve.
- (3) If the converter housing is equipped with a converter housing seal diaphragm (70, fig VIII-1), remove internal snap ring (71). Remove the diaphragm. Remove seal (68) from the diaphragm. Remove seal (69) only if replacement is necessary.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, e, h, j, l and m for the cleaning and inspection procedures, and 6 for wear limits.
- 1 Hexagon head bolt 7/16" 14 x 1 3/4"
- 2 Accessory drive idler gear spindle
- 3 Accessory drive idler gear (1.27 to 1 ratio)
- 4 Single row ball bearing assembly
- 5 Internal snap ring
- 6 Oil pump drive coupling
- 7 Lock washer 3/8"
- 8 Nut 3/8" 24
- 9 Torque converter housing assembly
- 10 Plug
- 11 Torque converter housing
- 12 Plug
- 13 Accessory drive idler gear spindle
- 14 Accessory drive idler gear (1 to 1 ratio)
- 15 Oil pump and implement pump drive gear (1 to 1 ratio)
- 16 Oil filter adapter gasket
- 17 Remote oil filter adapter
- 18 Filter adapter bolt gasket
- 19 Filter adapter bolt 11/16" 12 x 2 13/'6" long
- 20 Oil filter shell gasket
- 21 Oil filter element
- 22 Oil filter shell assembly
- 23 External snap ring
- 24 Retainer
- 25 Seal
- 26 Washer
- 27 Spring

- 28 Shell
- 29 Gasket
- 30 Bolt
- 31 Hexagon head bolt 1/2" 13 x 1 3/8"
- 32 Lock washer 1/2"
- 33 Bearing retainer
- 34 Seal ring
- 35 Single row ball bearing assembly
- 36 Oil pump and implement pump drive gear (1.27 to 1 ratio)
- 37 Torque converter ground sleeve
- 38 Hook-type seal ring
- 39 Pin
- 40 Lube pressure regulator valve
- 41 Spring
- 42 Regulator valve cover gasket
- 43 Lube pressure regulator valve cover
- 44 Lock washer 3/8"
- 45 Hexagon head bolt 3/8"  $16 \times 1 \cdot 1/8$ "
- 46 Oil cooler gasket
- 47 Oil cooler core assembly
- 48 Oil cooler cover gasket
- 49 Oil cooler cover
- 50 Hexagon head bolt 5/16" x 3 3/4"
- 51 Expansion plug 1"
- 52 Seal ring 13.7" I.D.
- 53 Seal 5 1/2" I.D.
- 54 Converter housing seal diaphragm
- 55 Internal snap ring
- 56 Seal ring 4.98" dia
- A Valve guide clearance point of measurement for wear limit (See Wear Limits Chart)
- B Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- C Spring operating height point of measurement for wear limit (See Wear Limits Chart)

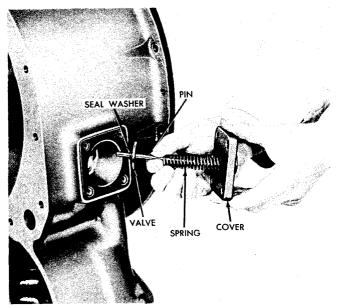


Fig VIII-2. Removing or installing lube pressure regulator valve, pin, seal washer, spring and cover

#### c. ASSEMBLY

- (1) If the converter housing is equipped with a converter housing seal diaphragm, install seal (69, fig VIII-1) if it was removed from the diaphragm. Install seal (68). Install the diaphragm in the converter housing. Install the internal snap ring to retain the diaphragm.
- (2) Install the converter ground sleeve (fig VIII-3). Tap the sleeve into position. Be sure to align the holes and the oil passage on the flange of the ground sleeve.
- (3) Install the pin, lube pressure regulator valve, seal washer, spring, cover, and gasket (fig VIII-2). Install four bolts and lock washers. Refer to section VI, paragraph 4i, j, and 1 (4) and (5) for assembly procedures.

# 2. OIL FILTER AND REMOTE OIL FILTER ADAPTER (FIG VIII-1)

#### a. DISASSEMBLY

- (1) Remove oil filter element (37).
- (2) Remove snap ring (39) from long bolt (46).
- (3) Remove retainer (40), seal (41), washer (42) and spring (43) from the long bolt.
  - (4) Remove long bolt (46) and gasket

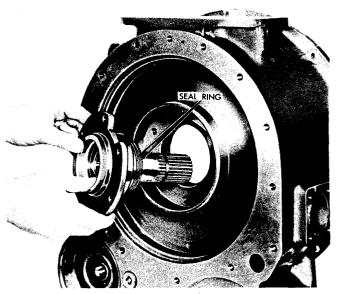


Fig VIII-3. Removing or installing converter ground sleeve

#### (45) from shell (44).

- (5) The remote oil filter adapter is not disassembled any further, once it is removed from the housing.
- b. CLEANING, INSPECTION, AND WEAR LIMITS. Refer to section IV, paragraph 5b, e, h, k, l, and m for cleaning and inspection procedures, and 6 for wear limits.

#### c. ASSEMBLY

- (1) Install gasket (45) on long bolt (46).
- (2) Install the long bolt and the gasket in shell (44).
  - (3) Install spring (43) on the long bolt.
- (4) Install washer (42), seal (41), retainer (40) and external snap ring (39) on the long bolt.
- (5) Install a new oil filter element (37) on the long bolt. Refer to section VI, paragraph 4<u>m</u> (2) for assembly procedures.

#### 3. OIL COOLER

No rebuild of the oil cooler is necessary. Refer to section IV, paragraphs 5b, e, and h for cleaning and inspection procedures. Refer to section VI, paragraph 4m (6) for assembly of the oil cooler.

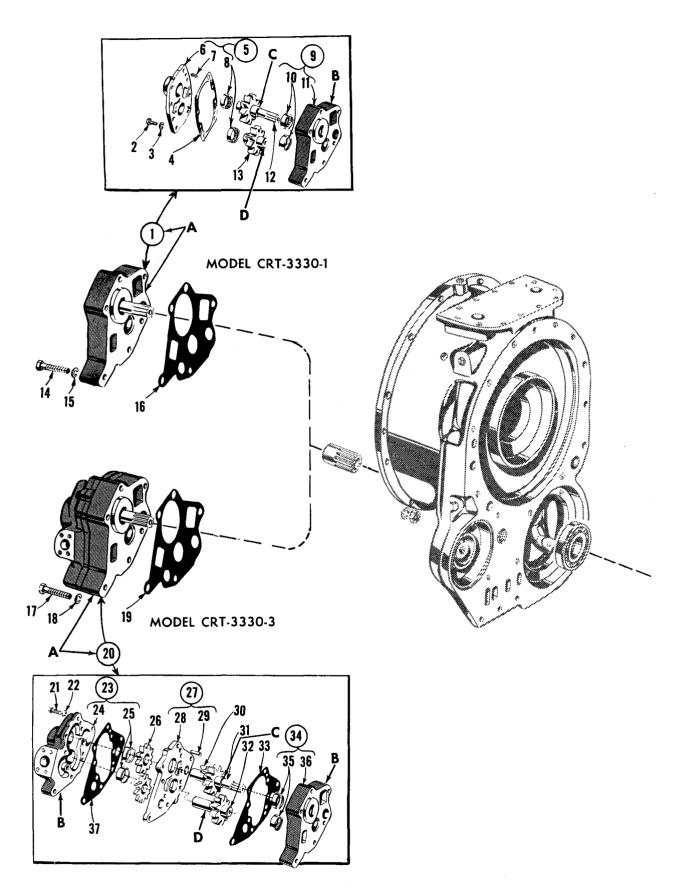


Fig IX-1. Input pressure and scavenge oil pump assembly and input driven charging oil pump assembly, exploded view

### SECTION IX INPUT DRIVEN CHARGING OIL PUMP ASSEMBLY AND INPUT PRESSURE AND SCAVENGE OIL PUMP ASSEMBLY REBUILD

# 1. INPUT DRIVEN CHARGING OIL PUMP (MODEL CRT-3330-1) (FIG IX-1)

#### a. DISASSEMBLY

- (1) Remove four bolts and lock washers from the charging oil pump cover assembly. Remove the cover assembly (fig IX-2).
- (2) Remove the oil pump drive gear and the oil pump idler gear.
- (3) Do not remove the needle bearing assemblies from the oil pump cover assembly or the body unless replacement is necessary. When replacing, press the needle bearing assembly from the body. The needle bearing assemblies in the cover assembly must be collapsed or pried out.

b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, c, d, e, f, i and j for cleaning and inspection procedures and to paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) If the needle bearing assemblies were removed, install new bearings. Be sure to press only on the end that has the manufacturer's name.
- (2) Install the oil pump drive gear and the oil pump idler gear.
- (3) Install the oil pump cover assembly (fig IX-2). Install four bolts and lock washers. Refer to section VI, paragraph  $4\underline{j}$  (16) and (17) for assembly procedures.
- 1 Input driven charging oil pump assembly
- 2 Hexagon head bolt 3/8" 16 x 1"
- 3 Lock washer 3/8"
- 4 Oil pump cover gasket
- 5 Oil pump cover assembly
- \*6 Oil pump cover
- \*7 Dowel pin
- 8 Needle bearing assembly
- 9 Input charging oil pump body assembly
- 10 Needle bearing assembly
- \*11 Oil pump body
- 12 Oil pump drive gear
- 13 Oil pump idler gear
- 14 Hexagon head bolt 3/8" 16 x 2 3/4"
- 15 Lock washer 3/8"
- 16 Oil pump gasket
- 17 Hexagon head bolt 3/8'' 16 x 3 3/4''
- 18 Lock washer 3/8"
- 19 Oil pump gasket

- 20 Input pressure and scavenge oil pump assembly
- 21 Hexagon head bolt 3/8" 16 x 2 1/4"
- 22 Lock washer 3/8"
- 23 Scavenge oil pump body assembly
- 24 Scavenge oil pump body
- 25 Needle bearing
- 26 Scavenge gear
- 27 Plate assembly
- 28 Plate
- 29 Dowel
- 30 Woodruff key
- 31 Oil pump drive gear
- 32 Oil pump idler gear
- 33 Oil pump body gasket
- 34 Input pressure oil pump body assembly
- 35 Needle bearing
- 36 Pressure oil pump body
- 37 Oil pump body gasket
- A Gear end clearance with unit assembled point of measurement for wear limit (See Wear Limits Chart)
- B Body 2.758 in. dia. bore point of measurement for wear limit (See Wear Limits Chart)
- C Shaft 1.000 in. dia. point of measurement for wear limit (See Wear Limits Chart)
- D Shaft 1.000 in. dia. point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only -- not as a detail part.

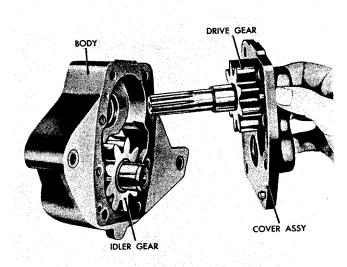


Fig IX-2. Removing or installing oil pump cover assembly

- 2. INPUT PRESSURE AND SCAVENGE OIL PUMP ASSEMBLY (MODEL CRT-3330-3) (FIG IX-1)
  - a. DISASSEMBLY
- (1) Remove four bolts (21) and lock washers from scavenge oil pump body assembly (23).
  - (2) Remove body assembly (23).
  - (3) Remove scavenge gears (26).
  - (4) Remove woodruff key (30).
  - (5) Remove plate assembly (27).

- (6) Remove oil pump idler gear (32).
- (7) Remove oil pump drive gear (31).
- (8) Remove the needle bearing assemblies from the oil pump body assemblies only if replacement is necessary.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, c, d, e, f, i and j for cleaning and inspection procedures and to paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) If the needle bearing assemblies were removed, install new bearings. Be sure to press only on the end that has the manufacturer's name.
- (2) Install oil pump drive gear (31) in the input pressure oil pump body assembly (34).
- (3) Install oil pump idler gear (32) in body assembly (34).
  - (4) Install plate assembly (27).
- (5) Install woodruff key (30) in the shaft of drive gear (31).
- (6) Install scavenge gears (26) on the shafts of the oil pump drive and oil pump driven gears (31) and (32).
- (7) Install the gasket and the scavenge oil pump body assembly (23) and secure it with four bolts (21) and lock washers. Refer to section VI, paragraph  $4\underline{j}$  (16) and (17) for assembly procedures.

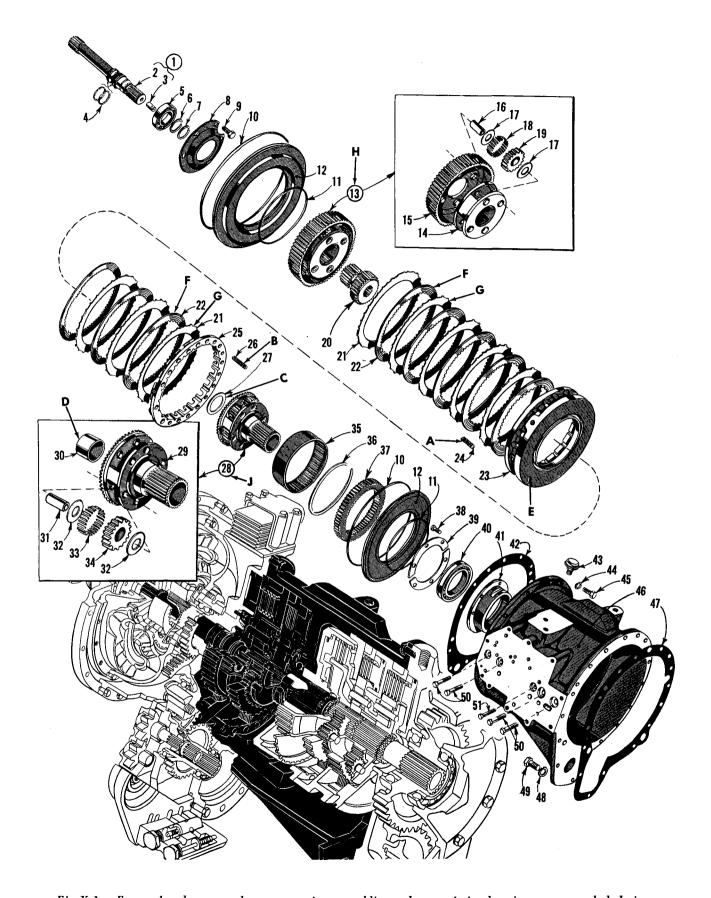


Fig X-1. Forward and reverse planetary carrier assemblies and transmission housing group, exploded view

### SECTION X FORWARD AND REVERSE PLANETARY UNITS, CLUTCH PLATES, CONVERTER OUTPUT SHAFT AND HOUSING REBUILD

#### 1. PLANETARY UNITS (FIG X-1)

#### a. DISASSEMBLY

#### (1) Disassemble the reverse planetary

carrier assembly or the forward planetary carrier assembly only if replacement of parts is necessary. To disassemble the carrier assemblies press planetary spindle pins (16) and (31) from the planetary carriers.

- 1 Converter shaft assembly
- \*2 Converter shaft
- \*3 Lube orifice plug
- 4 Hook-type seal ring
- 5 Single row ball bearing assembly
- 6 External snap ring
- 7 External snap ring
- 8 Bearing retainer
- 9 Hexagon head bolt 3/8" 16 x 7/8"
- 10 Seal ring
- 11 Seal ring
- 12 Clutch apply piston
- 13 Reverse planetary carrier assembly
- 14 Reverse planetary carrier
- 15 Reverse clutch hub
- 16 Planetary spindle pin
- 17 Pinion thrust washer
- 18 Planetary pinion roller
- 19 Reverse planetary pinion
- 20 Forward and reverse sun gear
- 21 External splined clutch plate
- 22 Internal splined clutch plate
- 23 Reverse clutch anchor
- 24 Reverse piston return spring
- 25 Forward clutch anchor
- 26 Forward clutch piston spring

- 27 Thrust washer
- 28 Forward planetary carrier assembly
- 29 Forward planetary carrier
- 30 Bushing
- 31 Planetary spindle pin
- 32 Pinion thrust washer
- 33 Planetary pinion roller
- 34 Forward planetary pinion
- 35 Reverse ring gear
- 36 Internal snap ring
- 37 Forward ring gear
- 38 Hexagon head bolt 3/8" 16 x 7/8"
- 39 Bearing retainer
- 40 Single row ball bearing assembly
- 41 Oil transfer hub
- 42 Converter housing gasket
- 43 Breather
- 44 Lock washer 7/16"
- 45 Bolt 7/16" 14 x 1 1/4"
- 46 Transmission housing
- 47 Transmission housing gasket
- 48 Lock washer 7/16"
- 49 Hexagon head bolt 7/16" 14 x 1 3/8"
- 50 Hexagon head bolt 1/2" 20 x 2"
- 51 Hexagon head bolt 3/8" 24 x 1 1/2"
- A Spring point of measurement for wear limit (See Wear Limits Chart)
- B Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- C Washer thickness point of measurement for wear limit (See Wear Limits Chart)
- D Bushing clearance point of measurement for wear limit (See Wear Limits Chart)
- E Anchor reaction surface point of measurement for wear limit (See Wear Limits Chart)
- F Friction plate thickness and cone point of measurement for wear limit (See Wear Limits Chart)
- G Reaction plate thickness and cone point of measurement for wear limit (See Wear Limits Chart)
- H Gear end clearance with unit assembled point of measurement for wear limit (See Wear Limits Chart)
- J Gear end clearance with unit assembled point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

Fig X-1. Forward and reverse planetary carrier assemblies and transmission housing group, exploded view, legend

- (2) Remove planetary pinions (19) and (34), planetary pinion rollers (18) and (33) and planetary thrust washers (17) and (32).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, g, i, and j for cleaning and inspection procedures and paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) Grease pinion thrust washers (17) and (32) and install them on planetary pinions (19) and (34).
- (2) Grease the bores of planetary pinions (19) and (34) and install rollers (18) and (33) in the bores of the planetary pinions. An aligning tool placed in the bore of the gear will facilitate this installation. An aligning tool can be made by grinding a discarded spindle to 0.005 undersize.
- (3) Install the planetary pinions, planetary pinion rollers, and pinion thrust washers in the planetary carriers (14) and (29).
- (4) Align the bores in the planetary pinions with the bores in the planetary carriers and press the planetary spindle pins in the carriers. If facilities are available, shrink the spindles with dry ice for approximately an hour before installing.
- (5) Swage the ends of the planetary spindle pins.
- (6) Stake the forward planetary spindle pins with a 0.406 inch square punch. Stake both ends of each. Check the planetary pinions after staking to make sure the pinions run freely.
- (7) Stake the reverse planetary spindle pins with a 0.594-inch square punch. Stake both ends of each pin. Check the planetary pinions after staking to make sure the pinions run freely. Refer to section VI, paragraph 4e (2) through 4e and 1e 2e for assembly procedures.

### 2. CLUTCH PLATES, ANCHORS AND SPRINGS (FIG X-1)

Refer to section VI, paragraphs 3b and 3j for disassembly procedures. Refer to section IV, paragraph 5b, e, j and m for cleaning and inspection procedures and paragraph 6 for wear limits. Refer to section VI, paragraph 4e for assembly procedures.

#### 3. CLUTCH PISTONS (FIG X-1)

- a. DISASSEMBLY. Remove seal rings (10) and (11) from pistons (12).
- <u>b.</u> CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5<u>b</u>, <u>e</u>, and <u>h</u> for cleaning and inspection procedures and paragraph 6 for wear limits.
- c. ASSEMBLY. Install the seal rings (10) and (11) on the pistons (12). Refer to section VI, paragraph 4e, step (1), and paragraph 4i step (1) for assembly procedures.

#### 4. CONVERTER SHAFT ASSEMBLY (FIG X-1)

- a. DISASSEMBLY. Remove seal rings (4) from the shaft. Remove two snap rings, (6) and (7). Press bearing (5) toward the orifice end of the shaft.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, e, and j for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) Install two seal rings (4) on the shaft.
- (2) Press bearing (5) onto the shaft, positioning it against the shoulder on the shaft.
  - (3) Install snap rings (6) and (7).
- (4) Refer to section VI, paragraph 4<u>i</u> (2) for assembly procedures.

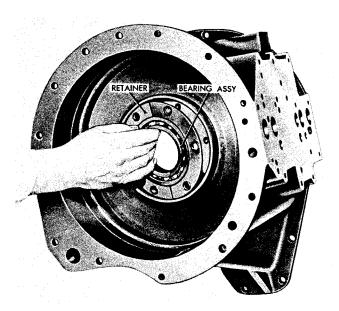


Fig X-2. Removing or installing split bearing retainer and single row ball bearing assembly from transmission housing

#### 5. TRANSMISSION HOUSING (FIG X-1)

#### a. DISASSEMBLY

(1) Remove six bolts (38) that secure split bearing retainer (39) and single row ball bearing assembly (40) to the transmission housing (46).

- (2) Remove the split retainer and the bearing by tapping with a drift and hammer (fig X-2).
- (3) Remove the split retainer from the bearing.
- (4) Remove oil transfer hub (41) from the transmission housing. It may be necessary to tap the hub with a soft drift and a hammer.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraph 5b, c, d, e, and f for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) Install oil transfer hub (41) in the transmission housing. If necessary, tap the hub with a soft drift and a hammer to seat the hub.
- (2) Install split bearing retainer (39) on single row ball bearing assembly (40) and install the retainer in the transmission housing (fig X-2).
- (3) Install six bolts to secure the split bearing retainer to the transmission housing.

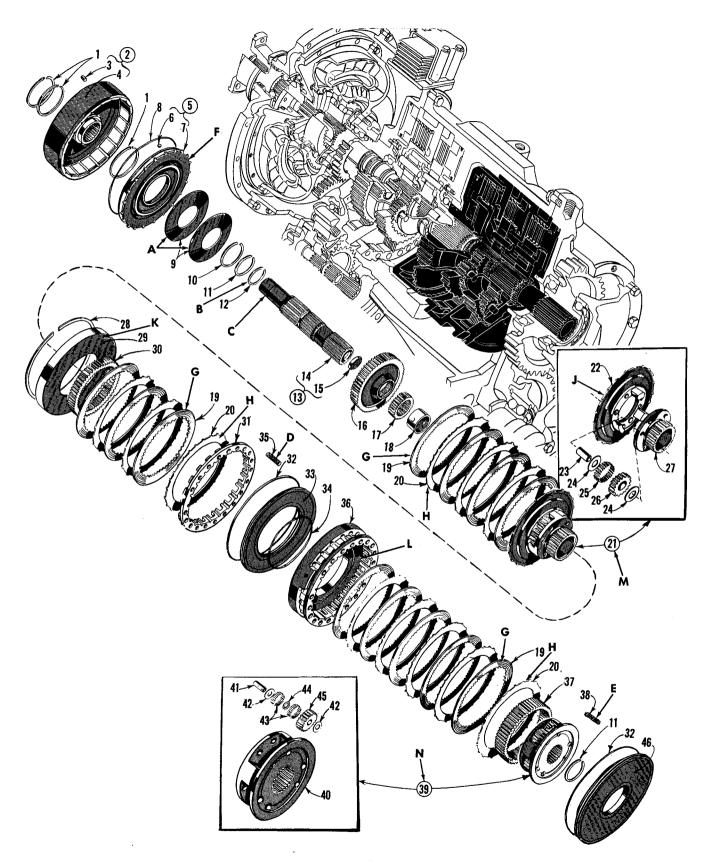


Fig XI-1. Intermediate-, high-, and low-range clutches, high- and low-range planetary carrier assemblies, and intermediate-range clutch drum, exploded view

### SECTION XI INTERMEDIATE-, HIGH-, AND LOW-RANGE PLANETARY UNITS, TRANSMISSION SHAFT AND CLUTCH PLATES REBUILD

- 1 Hook-type seal ring
- 2 Intermediate-range clutch drum assembly
- $*3 Pin = 1/4" \times 1/4"$
- \*4 Clutch drum
- 5 Intermediate-range clutch piston assembly 28 Internal snap ring
- \*6 Ball
- \*7 Clutch piston
- 8 Seal ring
- 9 Intermediate-range piston return spring
- 10 Spring retainer snap ring
- 11 Drum retainer snap ring
- 12 External snap ring (for -3 model snap ring replaced by thrust washer)
- 13 Transmission shaft assembly
- \*14 Transmission shaft
- 15 Cup plug
- 16 Intermediate-range clutch hub
- 17 High-range sun gear
- 18 Spacer
- 19 Internal splined clutch plate
- 20 External splined clutch plate
- 21 High-range planetary carrier assembly
- 22 Planetary carrier
- 23 Planetary pinion pin

- 24 Pinion thrust washer
- 25 Planetary pinion roller
- 26 Planetary pinion
- 27 Low-range sun gear
- 29 High-range clutch reaction plate
- 30 High-range ring gear
- 31 High-range clutch anchor
- 32 Seal ring
- 33 High-range clutch piston
- 34 Seal ring
- 35 High-range piston return spring
- 36 High-range piston and low-range anchor housing
- 37 Low-range ring gear
- 38 Low-range piston return spring
- 39 Low-range planetary carrier assembly
- 40 Planetary carrier
- 41 Planetary pinion pin
- 42 Pinion thrust washer
- 43 Planetary pinion roller
- 44 Spacer
- 45 Planetary pinion
- 46 Low-range clutch piston
- A Belleville spring free height point of measurement for wear limit (See Wear Limits Chart)
- B Washer thickness point of measurement for wear limit (See Wear Limits Chart)
- C Shaft clearance point of measurement for wear limit (See Wear Limits Chart)
- D Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- E Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- F Piston face wear point of measurement for wear limit (See Wear Limits Chart)
- G Friction plate thickness and cone point of measurement for wear limit (See Wear Limits Chart)
- H Reaction plate thickness and cone point of measurement for wear limit (See Wear Limits Chart)
- J Planetary carrier reaction surface wear point of measurement for wear limit (See Wear Limits Chart)
- K Reaction plate reaction surface wear point of measurement for wear limit (See Wear Limits Chart)
- L Housing reaction surface wear point of measurement for wear limit (See Wear Limits Chart)
- M Gear end clearance with unit assembled point of measurement for wear limit (See Wear Limits Chart)
- N Gear end clearance with unit assembled point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

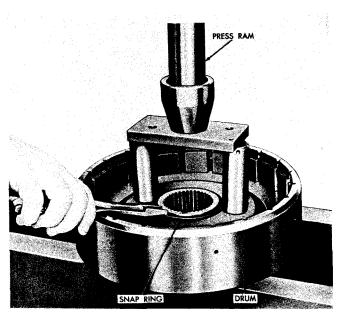


Fig XI-2. Removing or installing snap ring from intermediate-range clutch drum

# 1. INTERMEDIATE-RANGE CLUTCH DRUM ASSEMBLY (FIG XI-1)

#### a. DISASSEMBLY

- (1) Use a press to hold down the intermediate-range piston return springs (fig XI-2). Remove the snap ring (fig XI-2).
- (2) Remove the intermediate-range piston return springs (fig XI-3).
- (3) Remove the intermediate-range clutch piston assembly (fig XI-4). Remove the seal ring from the piston.
- (4) Remove the hook-type seal ring from the drum (fig XI-4).
- <u>b.</u> CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, h, j, 1 and m for cleaning and inspection procedures and paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) Install the hook-type seal ring in the drum (fig XI-4).
- (2) Install the seal ring on the piston. Install the intermediate-range clutch piston assembly (fig XI-4).

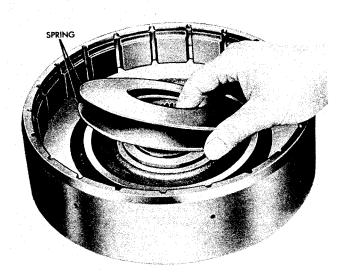


Fig XI-3. Removing or installing intermediate-range piston return springs

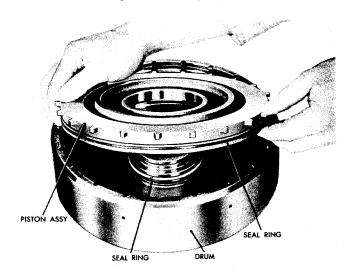


Fig XI-4. Removing or installing intermediate-range clutch piston assembly

- (3) Install the intermediate-range piston return springs (fig XI-3).
- (4) Using a press, hold down the intermediate-range piston return springs and install the snap ring (fig XI-2).

# 2. TRANSMISSION SHAFT ASSEMBLY (FIG XI-1)

a. MODEL DIFFERENCES. Transmissions with a governor drive do not have cup plug (15) in the transmission shaft (14). Transmissions without a governor drive have

a cup plug in the splined end of the transmission shaft.

- b. DISASSEMBLY. Refer to section VI, paragraph 3i (3) for removal of the shaft from the transmission. Remove snap ring (12) from the Model CRT-3330-1 shaft. The Model CRT-3330-3 shaft has a thrust washer at this location in place of the snap ring.
- c. CLEANING, INSPECTION, AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, and j for cleaning and inspection procedures and paragraph 6 for wear limits.
- d. ASSEMBLY. Install snap ring (12) on the Model CRT-3330-1 shaft. The Model CRT-3330-3 shaft uses a thrust washer at this location in place of the snap ring. Refer to section VI, paragraph 4f, step (3) for assembly into the transmission.

### 3. HIGH-RANGE PLANETARY CARRIER ASSEMBLY (FIG XI-1)

#### a. DISASSEMBLY

- (1) Disassemble the high-range planetary carrier assembly only if replacement of parts is necessary. To disassemble it, press planetary spindle pins (23) from the planetary carrier.
- (2) Remove planetary carrier pinions (26), planetary pinion rollers (25) and pinion thrust washers (24).
- <u>b.</u> CLEANING AND INSPECTION. Refer to section IV, paragraphs 5b, <u>c</u>, <u>d</u>, <u>e</u>, <u>g</u>, and <u>i</u> for cleaning and inspection procedures and paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) Grease pinion thrust washers (24) and install them on planetary pinions (26).
- (2) Grease the bores of planetary pinions (26) and install rollers (25) in the bores of the high-range planetary carrier pinions. If available, place an aligning tool in the bore of the gear to hold the rollers in place. An aligning tool can be made by grinding a discarded spindle to 0.005 undersize.

- (3) Install the planetary pinions, planetary pinion rollers, and pinion thrust washers in planetary carriers (22).
- (4) Align the bores in the planetary pinions with the bores in the planetary carrier and press the planetary spindle pins into the carrier. If facilities are available, shrink the pins with dry ice for approximately an hour before installing.
- (5) Swage the ends of the planetary spindle pins.
- (6) Stake the pins with a 0.406-inch square punch. Stake both ends of each pin. Check the planetary pinions after staking to make sure the pinions run freely.

## 4. LOW-RANGE PLANETARY CARRIER ASSEMBLY (FIG XI-1)

#### a. DISASSEMBLY

- (1) Disassemble the low-range planetary carrier assembly only if replacement of parts is necessary. To disassemble it, press planetary spindle pins (41) from the planetary carrier.
- (2) Remove planetary carrier pinions (45), planetary pinion rollers (43), pinion thrust washers (42) and spacers (44).
- b. CLEANING AND INSPECTION. Refer to section IV, paragraphs 5b, e, g and i for cleaning and inspection procedures, and paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) Grease pinion thrust washers (42) and install them on planetary pinions (45).
- (2) Grease the bores of planetary pinions (45) and install one set of rollers (43) in the bores of the planetary carrier pinions. Install spacer (44) against the rollers. Install a second row of rollers in the bores of the pinions. If available, place an aligning tool in the bore of the gear to hold the rollers in place while installing. An aligning tool can be made by grinding a discarded spindle 0.005 undersize.

- (3) Install the planetary pinions, planetary pinion rollers, and pinion thrust washers in planetary carrier (40).
- (4) Align the bores in the planetary pinions with the bores in the planetary carrier and press the planetary spindle pins into the carrier. If facilities are available, shrink the spindles with dry ice for approximately one hour before installing.
- (5) Swage the ends of the planetary spindle pins.
- (6) Stake the planetary spindle pins with a 0.406-inch square punch. Stake both ends of each pin. Check the planetary pinions after staking to make sure the pinions run freely.

### 5. CLUTCH PLATES, ANCHORS AND SPRINGS (FIG XI-1)

Refer to section VI, paragraphs  $\underline{4f}$ ,  $\underline{g}$ ,  $\underline{h}$ , and  $\underline{k}$  for cleaning and inspection procedures. and paragraph 6 for wear limits. Refer to section VI, paragraphs  $\underline{f}$ ,  $\underline{g}$ ,  $\underline{h}$ , and  $\underline{k}$  for in-

stallation of the clutch plates, anchors, and piston return springs.

#### 6. CLUTCH PISTONS (FIG XI-1)

- <u>a.</u> DISASSEMBLY. Remove external and internal seal rings (32) and (34) from high-range clutch piston (33) and low-range clutch piston (46).
- <u>b.</u> CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, and h for cleaning and inspection procedures and paragraph 6 for wear limits.
- $\underline{c}$ . ASSEMBLY. Install the external and the internal seal rings of the high-range clutch piston and the low-range clutch piston.

#### 7. PLANETARY RING GEARS (FIG XI-1)

Refer to section VI, paragraphs 3g and 3h for disassembly procedures. Refer to section IV, paragraphs 5b, e, i and j for cleaning and inspection procedures. Refer to section VI, paragraphs 4g and h for installation of the planetary ring gears.

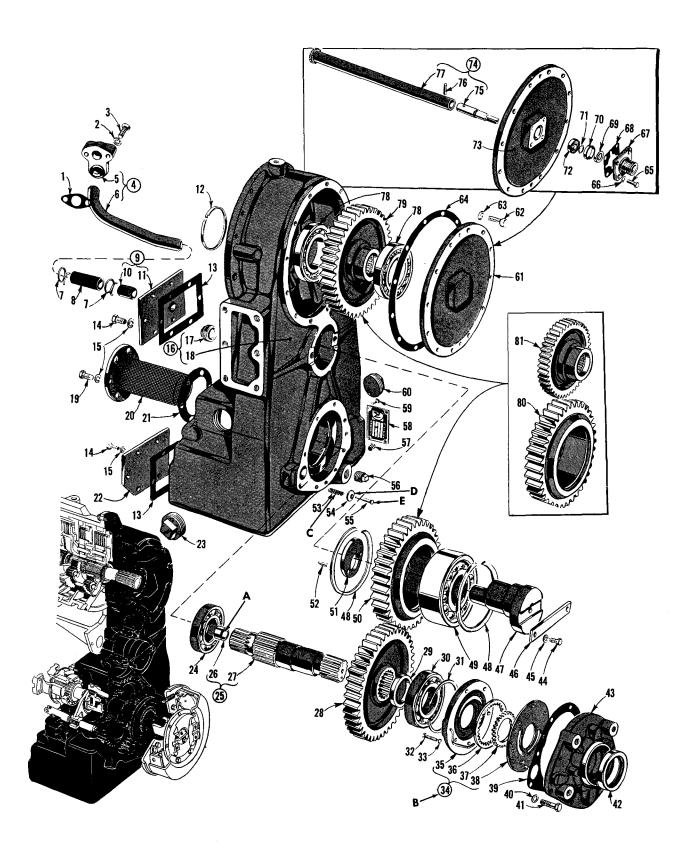


Fig XII-1. Model CRT-3330-1 transfer gear housing group, exploded view

### SECTION XII TRANSFER GEAR HOUSING GROUP AND GOVERNOR DRIVE REBUILD (MODEL CRT-3330-1)

- 41 Hexagon head bolt 3/8"  $16 \times 1 \frac{1}{2}$ " 1 - Converter housing drain tube gasket 2 - Lock washer - 3/8" 42 - Oil seal 3 - Hexagon head bolt — 3/8" - 16 x 2" 43 - Output oil pump housing 44 - Hexagon head bolt - 3/8" - 16 x 1" 4 - Converter housing drain tube assembly \*5 - Drain tube flange 45 - Washer \*6 - Drain tube 46 - Spindle retainer 7 - Hose clamp - type E 47 - Output idler gear spindle 8 - Converter housing drain hose 48 - External snap ring 9 - Inspection and converter drain cover 49 - Double row ball bearing assembly assembly 50 - Output idler gear — 1 to 1 ratio \*10 - Nipple 51 - Spacer 52 - Pin \*11 - Cover 53 - Check valve spring 12 - Hook-type seal ring 13 - Inspection cover gasket 54 - Check valve 14 - Hexagon head bolt - 3/8" - 16 x 1" 55 - Check valve guide 15 - Lock washer - 3/8" 56 - Square head pipe plug — 3/4" 16 - Transfer gear housing assembly 57 - Square head pipe plug — 1/4" 58 - Transmission name plate \*17 - Pipe plug — 1" \*18 - Transfer gear housing 59 - Drive screw 19 - Hexagon head bolt - 3/8" - 16 x 7/8" 60 - Oil filler hole plug 20 - Oil strainer 61 - Output drive gear cover 21 - Oil strainer gasket 62 - Hexagon head bolt - 3/8" - 16 x 1 1/4" 22 - Inspection cover 63 - Lock washer - 3/8" 23 - Pipe plug — 2" 64 - Output drive gear cover gasket 24 - Single row ball bearing assembly 65 - Hexagon head bolt - 5/16" -  $18 \times 17/8$ " 66 - Washer — 5/16" 25 - Rear output shaft assembly 67 - Governor drive adapter 26 - Bushing 27 - Rear output shaft 68 - Adapter gasket \*28 - Output driven gear 69 - Seal 29 - Output driven gear spacer 70 - Spacer 30 - Single row ball bearing assembly 71 - External snap ring 72 - Single row ball bearing 31 - External snap ring 73 - Output drive gear cover 32 - Hexagon head bolt — 5/16" -  $18 \times 1 \ 3/8$ " 33 - Lock washer — 5/16" 74 - Governor drive shaft assembly 34 - Output driven oil pump assembly 75 - Accessory drive coupling \*35 - Oil pump body  $76 - Spring pin - 1/8" \times 7/8"$ \*36 - Oil pump driven gear \*77 - Drive shaft \*37 - Oil pump drive gear 78 - Single row ball bearing assembly \*38 - Oil pump cover 79 - Output drive gear — 1 to 1 ratio 39 - Oil pump housing gasket 80 - Output idler gear — 1.62 to 1 ratio 40 - Lock washer - 3/8" 81 - Output drive gear — 1.62 to 1 ratio
  - A Bushing clearance point of measurement for wear limit (See Wear Limits Chart)
  - B Gear end clearance with unit assembled and gear O.D. clearance point of measurement for wear limit (See Wear Limits Chart)
  - C Spring operating height point of measurement for wear limit (See Wear Limits Chart)
  - D Valve clearance point of measurement for wear limit (See Wear Limits Chart)
  - E Valve guide clearance point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

#### 1. HOUSING (FIG XII-1)

Refer to section VI, paragraphs 3k, 1, m and n for disassembly procedures. Refer to section IV, paragraphs 5b and e for cleaning and inspection procedures and paragraph 6 for wear limits. Refer to section VI, paragraphs 4a, b, c, and d for assembly or the transfer gear housing.

#### 2. GOVERNOR DRIVE (FIG XII-1)

#### a. DISASSEMBLY

- (1) Remove four bolts (65) and lock washers from adapter (67). Remove the adapter, gasket, and seal. Do not remove the seal from the adapter unless replacement is necessary. If the seal is replaced, install a new seal with the spring loaded side next to the inside of the transmission.
- (2) Remove snap ring (71) from the governor drive coupling. Remove the governor drive shaft assembly.
- (3) Remove spring pin (76) from governor drive shaft assembly (74). Remove governor drive coupling (75) from shaft (77).
- (4) Press bearing (72) and spacer (70) from output drive gear cover (73).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, h, j, k, and 1 for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) Install governor drive shaft (77) on the governor drive coupling (75). Install spring pin (76) in the governor drive shaft assembly.
- (2) Press bearing (72) and spacer (70) in output drive gear cover (73).
- (3) Install governor drive coupling (75) in the bearing. Install snap ring (71) on the coupling.
- (4) Install adapter (67), gasket (68), and seal (69) on output drive gear cover (73). Install four bolts (65) and lock washers in the adapter.

### 3. TRANSFER GEARS AND REAR OUTPUT SHAFT (FIG XII-1)

#### a. DISASSEMBLY

- (1) Using a bearing puller, remove one single row ball bearing assembly (78) from output drive gear (79).
- (2) Remove the other bearing assembly the same way.
- (3) Press rear output shaft (27) from bearing assembly (30) and spacer (29).
- (4) If replacement of bushing (26) is necessary, cut out the bushing.
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, g, i, j, and 1 for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) If bushing (26) was removed, press in a new bushing.
- (2) Press rear output shaft (27) in bearing assembly (30) and spacer (29).
- (3) Press single row ball bearing assemblies (78) on output drive gear (79).

### 4. OUTPUT DRIVEN OIL PUMP ASSEMBLY (FIG XII-1)

#### a. DISASSEMBLY

- (1) Remove five bolts (32) and lock washers from output oil pump body (35).
- (2) Remove the ouptut oil pump body, oil pump driven gear and oil pump drive gear from the oil pump housing (fig XII-2).
- (3) Remove the driven gear and the drive gear from the pump body (fig XII-2).
- (4) Remove the oil pump cover from the pump housing.

#### NOTE

Do not remove seal (42) from

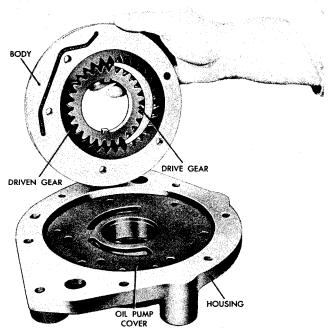


Fig XII-2. Removing or installing output oil pump body, oil pump driven gear and oil pump drive gear from output oil pump housing

pump housing (43) unless replacement of parts is necessary. When replacing the seal, press out the old seal.

b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, h, and i for cleaning and inspection procedures and paragraph 6 for wear limits.

#### c. ASSEMBLY

- (1) If the seal was removed from the output oil pump housing, press the new seal in the housing with the spring side of the seal toward the oil to be sealed in.
- (2) Install the oil pump cover in the output oil pump housing.
- (3) Install the driven gear and the drive gear in the pump body.
- (4) Install the output oil pump body, driven gear and drive gear in the output oil pump housing (fig XII-2). Install five bolts and lock washers in the output oil pump body.

#### 5. OIL STRAINER (FIG XII-1)

No rebuild of the oil strainer is necessary. Refer to section IV, paragraphs 5b, e and h for cleaning and inspection procedure. Refer to section VI, paragraph 4b (4) for installation of the oil strainer.

### 6. CONVERTER HOUSING DRAIN TUBE ASSEMBLY (FIG XII-1)

No rebuild of the drain tube assembly is necessary. Refer to section IV, paragraphs 5b and e for cleaning and inspection procedures. Refer to section VI, paragraph 4m, (3) for installation of the tube assembly.

# 7. FRONT OUTPUT SHAFT AND FLANGES (FIG XII-3)

- a. DISASSEMBLY. Press the front output shaft (13) from the single row ball bearing assembly (12).
- <u>b.</u> CLEANING, INSPECTION, AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, h, and j for cleaning and inspection procedures and paragraph 6 for wear limits.
- c. ASSEMBLY. Press the front output shaft into the single row ball bearing.
- <u>d.</u> FLANGES. No rebuild of the flanges is necessary. Refer to section IV, paragraphs 5b, <u>e</u>, and <u>j</u> for cleaning and inspection procedures.

## 8. FRONT OUTPUT DISCONNECT CLUTCH (FIG XII-3)

#### a. DISASSEMBLY

- (1) Remove disconnect clutch coupling (20), two disconnect clutch detent balls (19), and disconnect clutch detent spring (18) from front output shaft (13).
- (2) Press the front ouptut shaft from single row ball bearing assembly (12).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, c, d, e, f, h, j and m for cleaning and inspection procedures and paragraph 6 for wear limits.

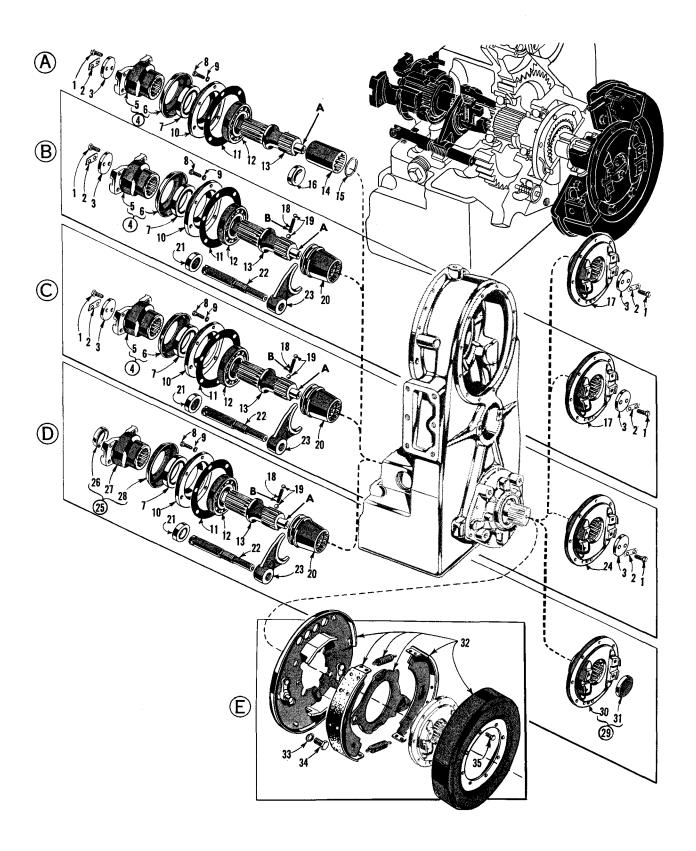


Fig XII-3. Front output shaft, disconnect flanges, and parking brake, exploded view

#### c. ASSEMBLY

- (1) Press the front output shaft into the single row ball bearing assembly.
- (2) Install spring (18) and two balls (19) in the hole drilled through front output shaft (13). Place one disconnect clutch detent ball (19) on each end of the disconnect clutch detent spring.
  - (3) Slide disconnect clutch coupling (20)

over the spring and two balls to the point where the balls drop into the detent on the coupling.

#### 9. PARKING BRAKE

Refer to section VI, paragraph 3k. Refer to section IV, paragraph 5b, e, and m for cleaning and inspection procedures. Refer to section VI, paragraph 4d for installation of the parking brake.

- 1 Hexagon head bolt  $3/8" 24 \times 11/8"$
- 2 Locking strip
- 3 Flange retainer washer
- 4 Front output flange assembly
- \*5 Front output flange
- 6 Dust shield
- 7 Oil seal
- 8 Hexagon head bolt 3/8" 16 x 1"
- 9 Lock washer 3/8"
- 10 Bearing retainer
- 11 Bearing retainer gasket
- 12 Single row ball bearing assembly
- 13 Front output shaft
- 14 Coupling
- 15 Internal snap ring
- 16 Plug
- 17 Brake mounting flange
- 18 Disconnect clutch detent spring

- 19 Disconnect clutch detent ball 3/8"
- 20 Disconnect clutch coupling
- 21 Shifter fork shaft oil seal
- 22 Shifter fork shaft
- 23 Shifter fork
- 24 Brake mounting flange
- 25 Front output flange assembly
- 26 Dust cup
- \*27 Front output flange
- 28 Dush shield
- 29 Brake mounting flange assembly
- 30 Brake mounting flange
- 31 Dust cup
- 32 Parking brake assembly 13 3/8" dia
- 33 Washer 5/8"
- 34 Hexagon head bolt 5/8'' 11 x 1 1/4''
- 35 Hexagon head bolt 3/8" 24 x 3/4"
- A Shaft clearance point of measurement for wear limit (See Wear Limits Chart)
- B Spring operating height point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

Fig XII-3. Front output shaft, disconnect clutch, flanges, and parking brake, exploded view, legend

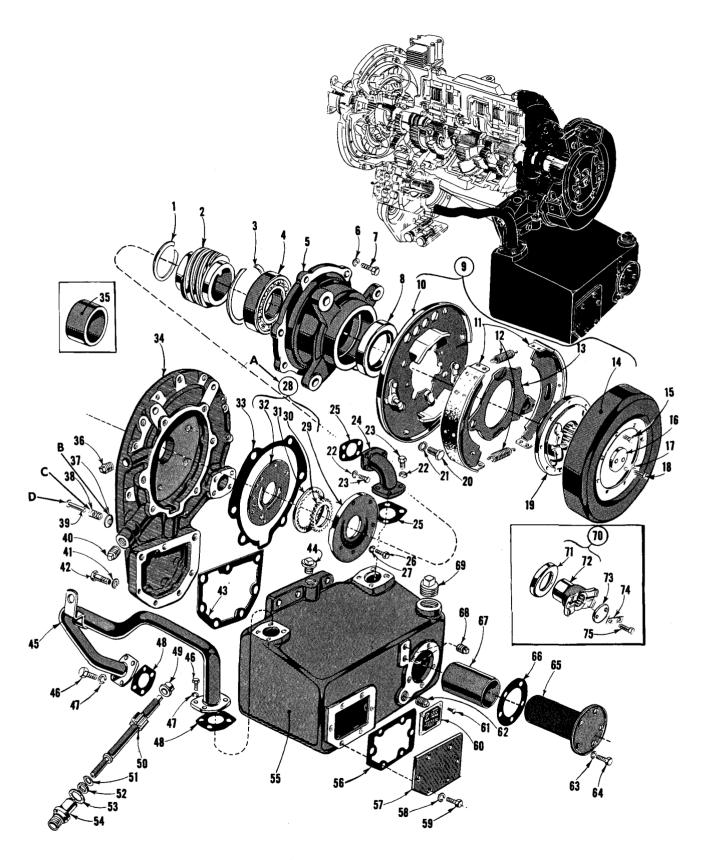


Fig XIII-1. Model CRT-3330-3 oil sump adapter, output driven oil pump assembly, parking brake assembly, and oil sump, exploded view

# SECTION XIII OIL SUMP ADAPTER, OIL SUMP, AND RELATED PARTS REBUILD (MODEL CRT-3330-3)

1 - External snap ring 2 - Speedometer drive gear 3 - Internal snap ring — 4.140 O.D. 4 - Single row ball bearing assembly 5 - Bearing retainer 6 - Lock washer 7 - Hexagon head bolt 8 - Oil seal 9 - Parking brake assembly — 13 3/8" dia *10 - Brake backing plate 11 - Shoe and lining assembly 12 - Brake shoe return spring 13 - Operating cam lever 14 - Brake drum 15 - Hexagon head bolt — 3/8" - 24 x 3/4" 16 - Flange retainer washer 17 - Locking strip 18 - Hexagon head bolt 19 - Brake mounting flange 20 - Hexagon head bolt 19 - Lock washer — 5/8" 21 - Lock washer 23 - Hexagon head bolt 24 - Output driven oil pump suction tube 25 - Suction tube gasket 26 - Hexagon head bolt 27 - Lock washer 28 - Output driven oil pump assembly 29 - Oil pump body 30 - Oil pump drive gear 31 - Oil pump drive gear 31 - Oil pump driven gear 32 - Oil pump cover 33 - Bearing retainer gasket 34 - Oil sump adapter	38 - Spring 39 - Guide 40 - Plug 41 - Lock washer 42 - Hexagon head bolt 43 - Sump gasket 44 - Plug 45 - Oil drain tube 46 - Hexagon head bolt 47 - Washer 48 - Gasket 49 - Bushing 50 - Shaft 51 - Washer 52 - Seal 53 - Gasket 54 - Sleeve 55 - Oil sump 56 - Inspection and cleanout cover gasket 57 - Inspection and cleanout cover 58 - Lock washer 59 - Hexagon head bolt 60 - Transmission name plate 61 - Drive screw 62 - Sump drain plug 63 - Lock washer 64 - Hexagon head bolt 65 - Oil strainer assembly 66 - Oil strainer gasket 67 - Oil strainer shield 68 - Oil level check plug 69 - Oil filler plug 70 - Output flange assembly 71 - Dust shield
<ul><li>33 - Bearing retainer gasket</li><li>34 - Oil sump adapter</li></ul>	70 - Output flange assembly 71 - Dust shield
<ul> <li>35 - Spacer (For use on models not requiring speedometer drive)</li> <li>36 - Plug</li> <li>37 - Check valve</li> </ul>	72 - Flange 73 - Flange retaining washer 74 - Locking strip 75 - Hexagon head bolt
OI ONZOUM THEFT	10 TroimPour Home port

- A Gear end clearance with unit assembled and gear O.D. clearance point of measurement for wear limit (See Wear Limits Chart)
- B Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- C Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- D Valve guide clearance point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

Fig XIII-1. Model CRT-3330-3 oil sump adapter, output driven oil pump assembly, parking brake assembly, and oil sump, exploded view, legend

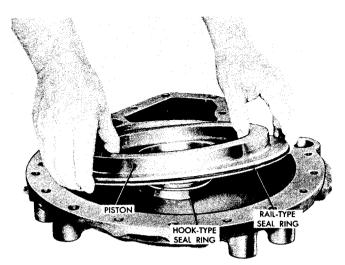


Fig XIII-2. Removing or installing low-range piston from adapter

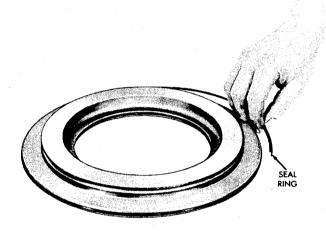


Fig XIII-3. Removing or installing external seal ring from piston

#### 1. OIL SUMP ADAPTER (FIG XIII-1)

#### a. DISASSEMBLY

- (1) Remove the low-range piston from the adapter (fig XIII-2).
- (2) Pry out one rail-type seal ring. Refer to figure XIII-3. Remove the other three rail-type seal rings. Remove the expander ring. Refer to figure XIII-4.
- (3) Remove the hook-type seal ring from the adapter (fig XIII-2).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, and h for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) Install the hook-type seal ring on the adapter (fig XIII-2).
- (2) Install the expander ring. Refer to figure XIII-4. Install four seal rings, one at a time. Refer to figure XIII-3. Space the rings so that the openings on the rings will be staggered approximately two inches apart.
- (3) Install the low-range piston in the adapter (fig XIII-2).

#### 2. BEARING RETAINER (FIG XIII-1)

#### a. DISASSEMBLY

- (1) Remove the snap ring from the bearing retainer (fig XIII-5).
- (2) Remove the single row ball bearing assembly from the bearing retainer.
- (3) Do not remove the oil seal from the bearing retainer unless replacement of parts is necessary. If replacement is needed, press the seal out of the retainer.
- <u>b.</u> CLEANING AND INSPECTION. Refer to section IV, paragraphs <u>5b</u>, <u>c</u>, <u>d</u>, <u>e</u>, <u>f</u>, <u>h</u>, and l for cleaning and inspection procedures.

#### c. ASSEMBLY

- (1) If the old oil seal was removed, install the new seal in the bearing retainer. The spring side of the seal goes toward the oil to be sealed in.
- (2) Install the ball bearing assembly in the bearing retainer.
- (3) Install the snap ring in the bearing retainer (fig XIII-5).

#### 3. OIL SUMP (FIG XIII-1)

a. INPUT PRESSURE AND SCAVENGE OIL PUMP ASSEMBLY. Refer to section IX, paragraph 2 for rebuild of the scavenge pump.

#### b. DISASSEMBLY

(1) Remove the bolts that secure the oil strainer assembly to the oil sump. Re-

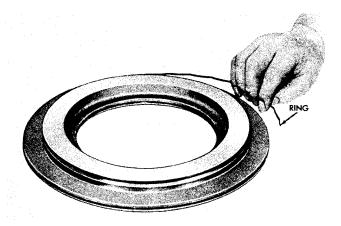


Fig XIII-4. Removing or installing expander ring from piston

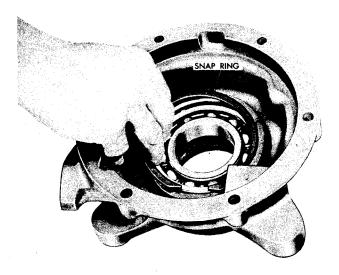


Fig XIII-5. Removing or installing snap ring from bearing retainer

move the oil strainer assembly (fig XIII-6).

- (2) Remove the bolts that secure the inspection and cleanout cover to the oil sump. Remove the cover (fig XIII-6).
- (3) Remove the oil filler plug, oil level check plugs, and the sump drain plug.

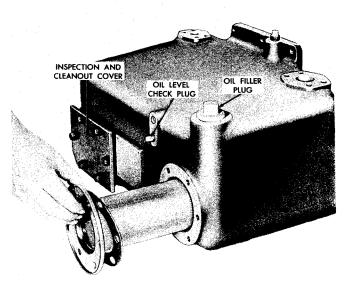


Fig XIII-6. Removing or installing oil strainer assembly

<u>c</u>. CLEANING AND INSPECTION. Refer to section IV, paragraphs 5b, e, and <u>k</u> for cleaning and inspection procedures.

#### d. ASSEMBLY

- (1) Install the filler plug, the sump drain plug, and the oil level check plugs.
- (2) Install the inspection and cleanout cover (fig XIII-6). Install the cover bolts.
- (3) Install the oil strainer assembly (fig XIII-6). Install the oil strainer bolts.

## 4. SPEEDOMETER DRIVE (CRT-3330-3 MODEL) (FIG XIII-1)

Refer to section VI, paragraph 5c (2) for disassembly procedure. Refer to section IV, paragraph 5b, e, g, h, and i for cleaning and inspection procedures. Refer to the note in section VI, paragraph 6b (8) for assembly of the speedometer drive.

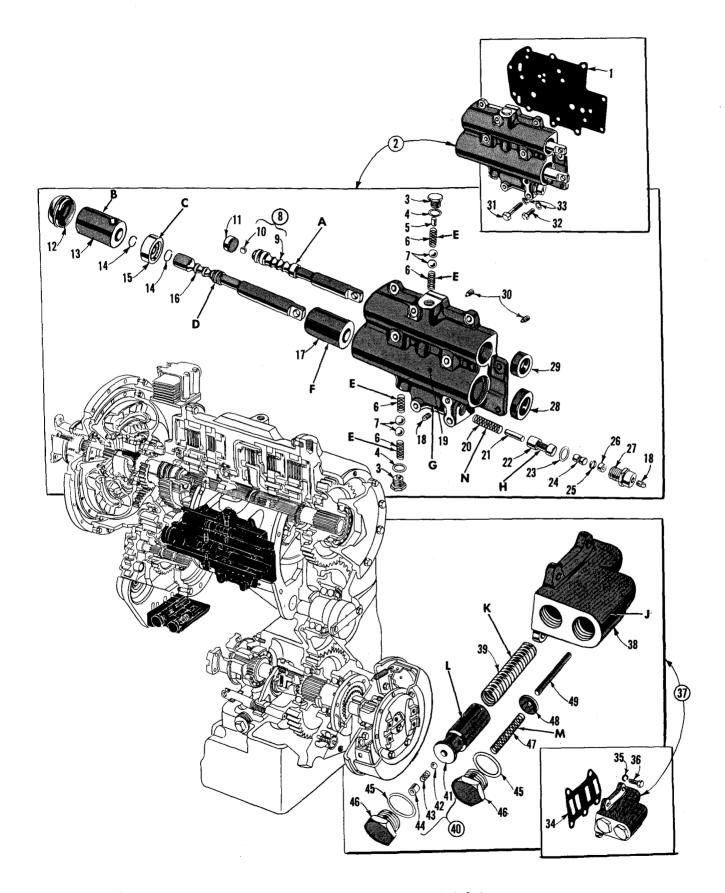


Fig XIV-1. Valve body group, exploded view

# SECTION XIV PRESSURE REGULATOR AND SELECTOR VALVE BODIES REBUILD

1. PRESSURE REGULATOR VALVE BODY (FIG XIV-1)

pressure regulator valve body (38).

- a. DISASSEMBLY
  - (1) Remove plug (46) and gasket from
- (2) Remove the main pressure regulator valve assembly and the spring from the pressure regulator valve body (fig XIV-2).
- 1 Selector valve body gasket2 Selector valve body assembly
- 3 Plug
- 4 Annular gasket
- 5 Pin
- 6 Spring
- 7 Ball
- 8 Range selector valve assembly
- \*9 Range selector valve
- 10 Ball
- 11 Plug
- 12 Plug
- 13 Reverse shift sleeve
- 14 Internal snap ring
- 15 Forward and reverse valve piston
- 16 Forward and reverse valve
- 17 Forward shift sleeve
- 18 Pipe plug 1/8"
- 19 Selector valve body
- 20 Spring
- 21 Pin 3/8" x 1 3/8"
- 22 Clutch cutoff valve
- 23 Annular gasket 7/8"
- 24 Clutch cutoff valve plug
- 25 Seal ring

- 26 Clutch cutoff valve piston cup
- 27 Cutoff valve retainer plug
- 28 Seal
- 29 Seal
- 30 Hexagon socket head screw 3/8" 16 x 3/4"
- 31 Hexagon head bolt 3/8" 16 x 3"
- 32 Hexagon head bolt 3/8" 16 x 1 1/4"
- 33 Washer
- 34 Pressure regulator valve body gasket
- 35 Lock washer 3/8"
- 36 Hexagon head bolt 3/8" 16 x 1 1/4"
- 37 Pressure regulator valve body assembly
- 38 Pressure regulator valve body
- 39 Spring
- 40 Main pressure regulator valve assembly
- \*41 Main pressure regulator valve
- \*42 Ball
- \*43 Spring
- \*44 Dash pot spring retainer
- 45 Gasket
- 46 Plug
- 47 Spring
- 48 Oil filter check valve
- 49 Oil filter check valve guide
- A Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- B Sleeve clearance point of measurement for wear limit (See Wear Limits Chart)
- C Piston clearance point of measurement for wear limit (See Wear Limits Chart)
- D Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- E Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- F Sleeve clearance point of measurement for wear limit (See Wear Limits Chart)
- G Body clearance point of measurement for wear limit (See Wear Limits Chart)
- H Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- J Body clearance point of measurement for wear limit (See Wear Limits Chart)
- K Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- L Valve clearance point of measurement for wear limit (See Wear Limits Chart)
- M Spring operating height point of measurement for wear limit (See Wear Limits Chart)
- N Spring operating height point of measurement for wear limit (See Wear Limits Chart)

\*Serviced in assembly only — not as a detail part.

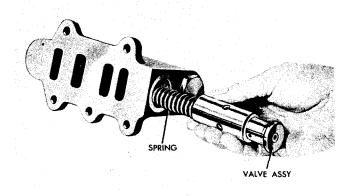


Fig XIV-2. Removing or installing main pressure regulator valve assembly and spring

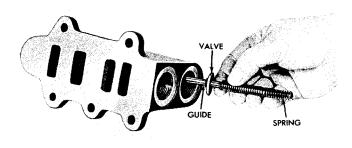


Fig XIV-3. Removing or installing spring, oil filter check valve, and check valve guide

- (3) Remove plug (46) and the gasket from the pressure regulator valve body.
- (4) Remove the spring, oil filter check valve, and check valve guide (fig XIV-3).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, and m for cleaning and inspection procedures and paragraph 6 for wear limits.

### c. ASSEMBLY

- (1) Install the check valve guide, oil filter check valve, and spring in the pressure regulator valve body (fig XIV-3).
- (2) Install the plug and the gasket in the pressure regulator valve body.
- (3) Install the main pressure regulator valve assembly and the spring in the pressure regulator valve body (fig XIV-2).

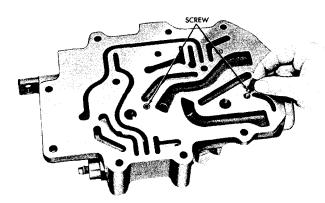


Fig XIV-4. Removing or installing socket head screws from range selector valve body

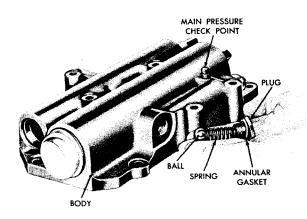


Fig XIV-5. Removing or installing plug, annular gasket, spring, and ball from range selector valve body

(4) Install plug (46) and gasket in the pressure regulator valve body.

## 2. SELECTOR VALVE BODY (FIG XIV-1)

### a. DISASSEMBLY

- (1) Remove two socket head screws from the body (fig XIV-4).
- (2) Remove the plug, annular gasket, spring and ball from the body (fig XIV-5).
- (3) Remove the plug from the body (fig XIV-6).
- (4) Using a hammer and a drift (fig XIV-7) loosen the forward and reverse valve, seal, forward shift sleeve, and forward and

reverse valve piston. Remove these parts (fig XIV-8).

- (5) Remove the remaining spring and ball from the body (fig XIV-9).
- (6) Remove the reverse shift sleeve (fig XIV-10).
- (7) Remove the plug, annular gasket, pin, spring, and ball from the body (fig XIV-11).

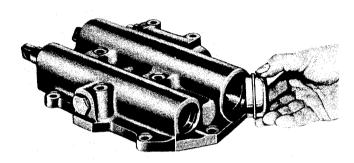


Fig XIV-6. Removing or installing plug from range selector valve body

- (8) Remove the range selector valve (fig XIV-12).
- (9) Remove the remaining spring and ball from the body (fig XIV-13).
- (10) Remove the cutoff valve retainer plug, annular gasket, clutch cutoff valve, spring and pin (fig XIV-14).



Fig XIV-7. Using hammer and drift to remove forward and reverse valve, seal, forward shift sleeve, and forward and reverse valve piston

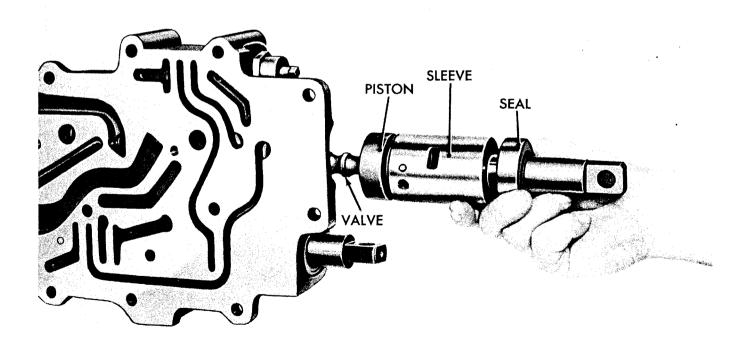


Fig XIV-8. Removing or installing forward and reverse valve, seal, forward shift sleeve, and forward-and-reverse-valve piston

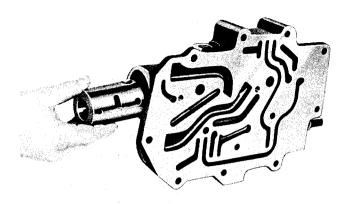


Fig XIV-9. Removing or installing spring and ball from range selector valve body

- (11) Remove pipe plug (18), clutch cutoff valve plug (24), seal ring (25), clutch cutoff valve piston cup (26) from cutoff valve retainer plug (27).
- (12) Remove seal (28), forward shift sleeve (17), snap ring (14) and forward and reverse valve piston (15) from forward and reverse valve (16).
- b. CLEANING, INSPECTION AND WEAR LIMITS. Refer to section IV, paragraphs 5b, e, h, l, and m for cleaning and inspection procedures and paragraph 6 for wear limits.

## c. ASSEMBLY

- (1) Install forward and reverse valve piston (15), snap ring (14), forward shift sleeve (17), and seal (28) on forward and reverse valve (16).
- (2) Install the clutch cutoff valve piston cup (26), seal ring (25, fig VII, exp. view), clutch cutoff valve plug (24) and pipe plug (18) in cutoff valve retainer plug (27).
- (3) Install the pin, spring, clutch cutoff valve, annular gasket and the cutoff valve retainer plug (fig XIV-14).
- (4) Install the spring and the ball in the body (fig XIV-13).
- (5) Push the ball and the spring down with a soft drift and install the range selector valve. Refer to figure XIV-12.

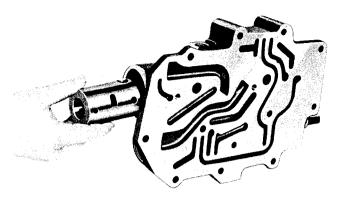


Fig XIV-10. Removing or installing reverse shift sleeve

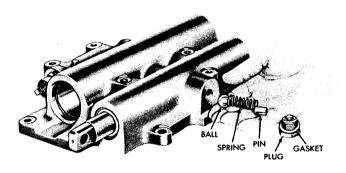


Fig XIV-11. Removing or installing plug, pin, annular gasket, spring, and ball from selector valve body assembly

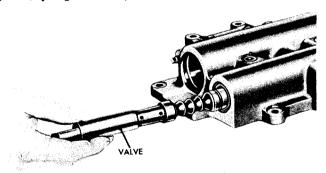


Fig XIV-12. Removing or installing range selector valve

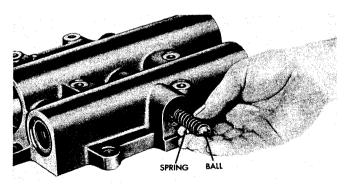


Fig XIV-13. Removing or installing spring and ball from selector valve body assembly

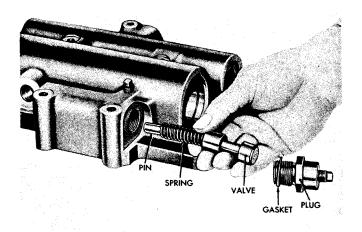


Fig XIV-14. Removing or installing cutoff valve retainer plug, annular gasket, clutch cutoff valve, spring, and pin

(6) Install the ball, spring, pin, plug, and annular gasket in the body (fig XIV-11).

- (7) Align the sleeve with the valve body as illustrated and install the reverse shift sleeve (fig XIV-10). Secure the sleeve with a socket head set screw. Refer to figure XIV-4.
- (8) Install the spring and the ball in the body (fig XIV-9) and compress the spring while the forward and reverse valve, seal, forward shift sleeve, and forward and reverse valve piston are installed (fig XIV-8). Align the sleeve with the valve body as illustrated, and secure the sleeve with a socket head set screw. Refer to figure XIV-4.
- (9) Install the plug in the body (fig XIV-6).
- (10) Install the ball, spring, annular gasket and the plug in the body (fig XIV-5).

# **INDEX**

A	Section Page No.	Par. No
Assembly of Model CRT-3330-1 transmission		
installing converter elements, converter pump		
cover assembly, and input charging oil		
pump assembly	VI 25-27	4j
installing forward and reverse clutch parts · · · · · · ·	VI 20-22	4 <u>j</u> 4e
installing front output shaft bearing retainer,		
front output flange assembly, output oil		
pump assembly, output drive gear, and	40 00	
output drive gear cover	VI 19-20	4 <u>c</u>
installing high-range planetary gearing and	00	
clutch parts		4 <u>g</u> 4 <u>f</u>
installing intermediate-range clutch parts	. VI 22-23	4 <u>f</u>
installing low-range planetary gearing and		
clutch anchor		4 <u>h</u>
installing minor subassemblies	. VI 28-29	4 <u>m</u>
installing miscellaneous parts into transfer gear	40	41
housing assembly	. VI 19	4 <u>b</u>
installing output driven gear, rear output shaft		
assembly, output idler gear and bearing	777 10 10	4-5
assembly, and output idler gear spindle		4 <u>a</u>
installing parking brake	. VI 20	4 <u>d</u>
installing reverse clutch plates, reverse planetary	. VI 28	41
gearing assembly and converter housing assembly installing reverse piston, converter shaft assembly,	. 4120	47
accessory drive idler gear, and oil pump drive gear.	. VI 25	<b>4</b> i
installing transmission housing assembly on transfer	. , , , ,	<u> </u>
gear housing assembly	VI 28	4k
Assembly of Model CRT-3330-3 transmission	, , , , , ,	<u></u>
basic similarities	. VI 31-32	6a
installing oil sump, output driven oil pump suction	. ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
tube and oil drain tube	. VI 33	6c
installing output shaft, oil sump adapter, output	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	==
driven oil pump assembly, bearing retainer,		6b
and flange	. VI 32-33	-
В		
Bearing retainer		
assembly	. XIII 2	2c
cleaning and inspection		$2\overline{\mathbf{b}}$
disassembly	. XIII 2	$2\overline{a}$
Bearings, cleaning	. IV 1-2	5 <u>c</u> 5 <u>f</u>
Bearings, inspecting		5 <u>f</u>
Bushings and thrust washers, inspecting	. IV 2-3	5 <u>g</u>
С		
Changing oil		
draining transmission		6 <u>b</u>
filling hydraulic system	. III 3	<u>6</u>
hydraulic system	. IП 3	$6\overline{\underline{a}}$

C (Cont'd)	Section	Page No.	Par. No.
Checking and adjusting linkage			
adjusting linkage		III 5	10c
checking linkage		III 5	$10\overline{b}$
		-	$10\overline{a}$
scope	•	III 4	102
procedure		III 3	7b
general		III 3	$7\overline{a}$
Checking oil temperature	•	111 3	
		TTT A	8b
checking for locked stators		III 4 III 4	8 <u>a</u>
oil temperature	•	111 4	<u>-</u>
Cleaning and inspection		TT 1 0	5.0
cleaning bearings		IV 1-2	5 <u>c</u> 5b
cleaning parts		IV 1	
dirt and other abrasive material harmful		IV 1	5 <u>a</u>
inspecting bearings		IV 2	<u>5</u>
inspecting bushings and thrust washers		IV 2-3	5 <u>g</u> 5e
inspecting cast parts and machined surfaces		IV 2	5 <u>e</u>
inspecting gears	• •	IV 3	<u>5<u>ī</u></u>
inspecting oil seals and gaskets	• •	IV 3	$5\overline{h}$
inspecting snap rings		IV 3	5 <u>1</u> _5 <u>j</u>
inspecting splined parts		IV 3	_5 <u>j</u>
inspecting springs		IV 3	5 <u>m</u>
inspecting threaded parts		IV 3	<u>5k</u>
keeping bearings clean		IV 2	5 <u>d</u>
Clutch cutoff valve		I 5	5 <u>c</u>
Clutch pistons (Forward and reverse)			
assembly		<b>X 2</b>	3 <u>c</u>
cleaning, inspection and wear limits		<b>X</b> 2	$3\overline{\mathbf{b}}$
disassembly		<b>X 2</b>	$3\overline{\underline{\mathbf{a}}}$
Clutch pistons (intermediate-, high-, and low-range)			
assembly		XI 4	6 <u>c</u>
cleaning, inspection and wear limits		XI 4	$6\overline{\mathbf{b}}$
disassembly		XI 4	$6\overline{\underline{a}}$
Clutch plates, anchors and spring (intermediate-, high-,			
and low-range)		XI 4	5
Clutch plates, anchor and springs (forward and			
reverse)		<b>X 2</b>	2
Converter housing			
assembly		VIII 2	1c
cleaning, inspection and wear limits		VIII 1	$1\overline{b}$
disassembly		VIII 1	$1\overline{a}$
Converter housing drain tube assembly		XII 3	<u>6</u>
Converter pump			
assembly		VII 2	3c
cleaning and inspection		VII 2	$3\overline{\mathbf{b}}$
disassembly		VΠ 2	$3\overline{a}$
Converter pump cover			_
assembly		VII 1	1 <u>c</u>
cleaning, inspection and wear limits		VII 1	$1\overline{\mathbf{b}}$
disassembly		VII 1	$1\overline{a}$
Converter shaft assembly			_
assembly		X 2	4 <u>c</u>
cleaning, inspection and wear limits		<b>X</b> 2	$4\overline{\mathrm{b}}$
disassembly		<b>X</b> 2	$4\overline{a}$

C (Cont'd)	Section Page No.	Par. No.
Converter stall check		
procedure	. III 4	9b
purpose		$9\overline{a}$
Converter stators		
assembly	. VII 3	4c
cleaning, inspection, and wear limits		$4\overline{b}$
disassembly		$\frac{4\overline{a}}{a}$
Converter turbine		-=
cleaning and inspection	. VII 3	5b
replacing turbine.		5 <u>a</u>
CRT-3330 transmission gauge reading -	. , , , ,	<u> </u>
instrument panel	. III 1	2
instrument paner.		2
D		
Design features		
compact design · · · · · · · · · · · · · · · · · · ·	. I3	3a
converter pump ratio · · · · · · · · · · · · · · · · · · ·		3 <del>1</del>
disconnect for front output shaft		3 <u>i</u> 3 <u>k</u> 3 <u>g</u> 3 <u>m</u>
governor drive		$3\overline{\mathbf{k}}$
implement pump drive ratio		$3\overline{g}$
oil cooler		$3\overline{f m}$
output oil pump assembly		3e
parking brake		3 <del>ī</del>
planetary system		3 <u>j</u> 3b
range clutches		$3\overline{c}$
remote oil filter adapter		$3\overline{h}$
speedometer drive	- T	31
transfer gearing ratio		3d
transmission mounting		3n
Disassembly of Model CRT-3330-1 transmission		
removing converter housing assembly, reverse		
planetary gearing assembly, and reverse		
clutch plates	. VI 7-8	<b>3</b> b
removing high-range planetary gearing and	. 41 1-0	<u> </u>
	. VI 12-13	3h
clutch parts	. VI 12-13	<u> </u>
pump assembly	. VI 8-9	3d
removing intermediate-range clutch parts		3 <u>i</u>
removing low-range planetary gearing and	. 4110-14	<u>-</u>
clutch anchor	. VI 12	3σ
removing minor subassemblies		3 <u>g</u> 3a
	. VI 6-7	<u> </u>
removing miscellaneous parts from transfer gear	TTT 177	3m
housing assembly	. VI 17	2111
removing oil pump drive gear, accessory drive		
idler gear, converter shaft assembly, and	777 10 10	9.6
reverse piston from converter housing assembly	. VI 10-12	3 <u>f</u>
removing output drive gear, output oil pump		
assembly, and front output flange assembly and	40 4=	01
bearing retainer		31
removing parking brake	. VI 15-16	3 <u>k</u>
removing rear output shaft assembly, output idler		
gear and bearing assembly, spindle, and output		_
driven gear $\dots$	. VI 17-18	3 <u>n</u>

D (Cont'd)	Section Page No.	Par. No.
removing reverse and forward clutch parts removing transmission front cover, converter	VI 14-15	3 <u>j</u>
pump cover assembly, and converter elements		
(remote engine mounted transmission only)		3 <u>e</u>
removing transmission housing	VI 8	3 <u>c</u>
Disassembly of Model CRT-3330-3 transmission		
basic similarities	VI 29	5 <u>a</u>
removing flange, bearing retainer, output driven oil pump assembly, adapter, and output shaft	VI 30-31	5c
removing oil drain tube, output driven oil pump	VI 30-31	<u> </u>
suction tube and oil sump	VI 29-30	5b
Draining transmission		$6\overline{ m b}$
Driving instructions		<del>-</del>
driving tips		8 <u>a</u>
temperatures and pressures	I 6	8 <u>b</u>
tow or push start	I 6-7	8 <u>c</u>
E		
Elements of hydraulic coupling	77 9	7b
Elements of hydraune coupling		$12\frac{5}{a}$
	11 0	
F		
Filters, when to change	. III 2	5c
Floating fulcrum principle	. II 6	10
Forward-high range torque path		17 <u>e</u>
Forward-intermediate range torque path		17 <u>d</u>
Forward-low range torque path	. II 22-23	17 <u>c</u>
Front output disconnect clutch assembly	. XII 5	90
cleaning, inspection and wear limits		8 <u>c</u> 8 <del>b</del>
disassembly		$8\overline{a}$
Front Output shaft and flanges		
assembly		7c
cleaning, inspection, and wear limits		$7\overline{b}$
disassembly		$7\overline{a}$
flanges	. XII 3	7 <u>d</u> 3
Fulcrum and lever	. II 1 . II 2	ა 5
a dioi din a reaction member	. 112	J
G		
Gears, inspecting	. IV 3	5 <u>i</u>
Governor drive	0	_
assembly		2 <u>c</u>
cleaning, inspection and wear limits		2 <u>b</u> 2a
disassembly	. XII 2	<u> </u>
H		
High-Range Planetary Carrier Assembly		
assembly		3 <u>c</u>
cleaning and inspection	. XI 3	3 <u>b</u> 3 <u>a</u>
disassembly	. XI 3	3 <u>a</u>

H (Cont'd)	Section Page No.	Par. No.
Horsepower range	. 11	2a
Housing, transfer gear		7
How a converter works		
blade design	. II 4	9a
flow pattern		9 <del>b</del>
kinetic energy and the stator		9 <u>~</u>
some new terms		9 <u>c</u>
How the Torquatic converter works	. 11 5	<u> </u>
	. п 8-9	13c
first converter phase		13 <u>e</u>
fluid coupling phase	== : :	$13\overline{a}$
same principle for one- or two-stator converter		13 <u>a</u> 13 <u>d</u>
second converter phase		13 <u>b</u>
vortex and rotary flows	. I 7-8	190
How to check oil level	4	4.
cold check		4 <u>a</u>
hot check	. III 1-2	4 <u>b</u>
Hydraulic coupling	•	pg1_
elements of hydraulic coupling	. II 3	<u>7b</u>
how the hydraulic coupling works	. II 3-4	<u>7</u>
simple transmission	. II 3	$7\overline{\underline{a}}$
Hydraulic direction and range control		
forward-high range	. II 13	16 <u>e</u>
forward-intermediate range		16 <u>d</u>
forward-low range	. II 13	16 <u>c</u>
general		16 <u>a</u>
neutral range		16 <u>b</u>
reverse-high range		$16\overline{h}$
reverse-intermediate range		$16\overline{g}$
reverse-low range		16 <del>∏</del>
tow start		16 <del>ī</del>
Hydraulic System		_
clutch cutoff valve	. 15	5c
hydraulic system oil flow	<u> </u>	5 <del>5</del>
nydraune system on now	I 5	5 <u>a</u>
oil reservoir	•	5 <u>a</u> 5 <u>d</u>
sense-feel operation	•	_
Hydraulic system oil flow	. I 5	5 <u>b</u>
Hydraulic system schematics	. III 5	$1\overline{2}$
I		
Input driven charging oil pump (Model CRT-3330-1)		
assembly	. IX 1	1c
cleaning, inspection and wear limits		1 <u>b</u>
disassembly		1 <u>5</u> 1 <u>a</u>
Input pressure and scavenge oil pump assembly		<u> 14</u>
(Model CRT-3330-3)		_
assembly	. IX 2	2 <u>c</u>
cleaning, inspection and wear limits	. IX 2	$2\overline{\mathbf{b}}$
disassembly	. IX 2	$2\overline{\underline{\mathbf{a}}}$
Installing torquatic transmission in drive line		_
(Models CRT-3330-1 and CRT-3330-3)	_	
filling transmission with oil		3 <u>b</u>
installation procedure	. V 1-2	$3\overline{\underline{a}}$

	Section Page No.	Par. No.
ntermediate-range clutch drum assembly		
assembly	. XI 2	1 <u>c</u>
cleaning, inspection and wear limits	. XI 2	$1\overline{\overline{\mathbf{b}}}$
disassembly		$1\overline{\underline{\mathbf{a}}}$
K		
Keeping bearings clean	. IV 2	5d
Keeping manual current		$1\overline{\underline{\mathbf{b}}}$
<b>L</b>		
Locked stators, checking for	. III 4	8 <u>b</u>
ow-range planetary carrier assembly		
assembly	. XI 3-4	4c
cleaning and inspection		$4\overline{\overline{b}}$ $4\overline{a}$
disassembly	. XI 3	$4\overline{a}$
M		
Maintenance intervals and precautions		
intervals		3a
keeping oil clean	. III 1	$3\overline{\mathbf{b}}$
Mechanical step-gear transmission		_
driver must adjust fulcrum	. II 2-3	6b
fulcrum points	. II 2	$6\overline{a}$
Models covered		$1\overline{a}$
Model designation	. I 6	<u>6</u>
N		
·		
Neutral-range torque path	. II 22	17 <u>b</u>
Neutral-range torque path	. п 22	17 <u>b</u>
0	II 22	17 <u>b</u>
0		_
O  Oil capacity and when to change oil	. III 2-3	- 5d
O  Oil capacity and when to change oil metal contamination of oil	III 2-3 III 2	 5 <u>d</u> 5 <u>a</u>
O  Oil capacity and when to change oil metal contamination of oil	III 2-3 III 2 III 2	 5 <u>d</u> 5 <u>a</u> 5c
O  Oil capacity and when to change oil metal contamination of oil	III 2-3 III 2 III 2 III 2 III 2	5 <u>d</u> 5 <u>a</u> 5 <u>c</u> 5b
Oil capacity and when to change oil metal contamination of oil	III 2-3 III 2 III 2 III 2 III 2	 5 <u>d</u> 5 <u>a</u> 5c
Oil capacity and when to change oil metal contamination of oil	III 2-3 III 2	5 <u>d</u> 5 <u>a</u> 5 <u>c</u> 5 <u>b</u> 5 <u>a</u> 5c
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change	III 2-3 III 2	5d 5 <u>a</u> 5 <u>c</u> 5 <u>b</u> 5 <u>a</u>
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change	III 2-3 III 2	5 <u>d</u> 5 <u>a</u> 5 <u>c</u> 5 <u>b</u> 5 <u>a</u> 5c
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change	III 2-3 III 2	5d 5a 5c 5b 5a 5c 3
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change Oil filter and remote oil filter adapter assembly	III 2-3 III 2	5 <u>d</u> 5 <u>a</u> 5 <u>c</u> 5 <u>b</u> 5 <u>a</u> 5c
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change Oil filter and remote oil filter adapter assembly cleaning, inspection, and wear limits	III 2-3 III 2 VIII 2 VIII 2 VIII 2	5d 5a 5c 5b 5a 5c 3 2c 2b
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change Oil filter and remote oil filter adapter assembly cleaning, inspection, and wear limits disassembly	VIII 2	5d 5a 5c 5b 5a 5c 3
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change Oil filter and remote oil filter adapter assembly cleaning, inspection, and wear limits disassembly Oil level, how to check	VIII 2	5d 5a 5c 5b 5a 5c 3 2c 2b 2a
Oil capacity and when to change oil metal contamination of oil oil capacity when to change filters when to change oil Oil capacity Oil change (See Changing Oil) Oil cooler Oil filters, when to change Oil filter and remote oil filter adapter assembly cleaning, inspection, and wear limits disassembly	VIII 2	5d 5a 5b 5b 5a 5c 3 2c 2b 2a 4

O (Cont'd)	Section Page No.	Par. No.
Oil sump		
assembly	. XIII 3	3 <u>d</u>
cleaning and inspection	. XIII 3	3 <u>c</u>
disassembly	. XIII 2-3	$3\overline{\mathbf{b}}$
input pressure and scavenge oil pump assembly	. XIII 2	$3\overline{a}$
Oil sump adapter		_
assembly	. XIII 2	1c
cleaning, inspection and wear limits		$1\overline{b}$
disassembly		1 <u>a</u>
Oil temperature, checking		8 <u>a</u>
Oil, when to change		5 <u>b</u>
		<u> </u>
Ordering parts	TT7 1	4a
how to order		4 <del>b</del>
new parts needed	IV 1	# <u>n</u>
Output driven oil pump assembly		4
assembly		4 <u>c</u>
cleaning, inspection and wear limits		$4\overline{\mathbf{b}}$
disassembly	XII 2-3	4 <u>a</u>
P		
We did not been to	****	9
Parking brake	XII 5	8
Planetary gearing principle		4.4-
members of a planetary unit		142
output combinations		14 <u>b</u>
Planetary ring gear	XI 4	7
Planetary units		
assembly		1 <u>c</u>
cleaning, inspection and wear limits		1 <u>b</u>
disassembly	X 1-2	1 <u>a</u>
Pressure regulator valve body		
assembly	XIV 2	1 <u>c</u>
cleaning, inspection and wear limits		1 <u>b</u>
disassembly		1 <u>a</u>
Procedures subject to change		2
1 1000 date of Sanjoot to Camago	· · · · ·	
R		
Removing Torqmatic transmission from drive line (Models CRT-3330-1 and CRT-3330-3)		
preparation for removal	V 1	2 <u>a</u>
removal procedure	<b>V</b> 1	<b>2</b> <u>b</u>
Reverse-high range torque path		17 <u>h</u>
Reverse-intermediate range torque path		$17\overline{g}$
Reverse-low range torque path		17Ē
21010250 1011 22280 101410 10111 1 1 1 1 1 1 1 1 1 1 1 1 1	11.20	
S		
Selector valve body		
assembly	XIV 4-5	2c
cleaning, inspection and wear limits		2 <u>b</u>
disassembly		2 <u>0</u> 2 <u>a</u>
Sense-feel one matter	. AIV 4-4	
Sense-feel operation		5 <u>d</u>
Simple maintenance		1
Snap rings, inspecting	IV 3	<u>51</u>

S (Cont'd)	Section Pag	e No. Pa	r. No.
Specifications and data	. XII	16 13 V3 V3	7 4 5 <u>j</u> 5m
Stators, like fulcrum, make torque multiplication possible	. 1	П 4	8
T			
Threaded parts, inspecting	• •	IV 3	5 <u>k</u>
careful handling		IV 1	3b
equipment needed		IV 1	$3\frac{\tilde{a}}{a}$
Torqmatic converter	• •		_
elements		II 6	12a
freewheeling stators		II 6	$12\overline{c}$
input driven charging oil pump		II 6	$12\overline{d}$
oil flow to and from the converter		II 7	$12\overline{e}$
rotating housing		II 6	$12\overline{\mathrm{b}}$
Torqmatic drive			_
hydraulic torque multiplier and fluid coupling		II 6	11a
torqmatic transmission		II 6	$11\overline{b}$
Torqmatic drive advantages	• •	I 2	$2\overline{d}$
Torqmatic planetary gearing			_
compound planetary gearing	п1	1-12	15a
forward-reverse gearing in operation	п1	2-13	$15\overline{b}$
range clutches	• •	II 13	15 <u>c</u>
Torque and speed			
increasing torque ratio		Π 2	4 <u>b</u>
mathematical formula		II 2	4 <u>d</u>
one-to-one ratio		П 1	$4\frac{\overline{d}}{4a}$ $4\overline{c}$
speed, torque and load	• •	II 2	4 <u>c</u>
Torque paths through transmission		0-	4.
forward-high range torque path		II 25	17e
forward-intermediate range torque path		II 24	17 <u>d</u>
forward-low range torque path		2-23	17c
general		II 22	17a
neutral		II 22	17b 17h
reverse-high range torque path		II 28 II 27	_
reverse-intermediate range torque path		II 26	17g 17f
Tow or push start		I 6-7	8c
Transfer gears and rear output shaft			_
assembly		XII 3	3c
cleaning, inspection and wear limits		XII 3 I 2-3	$3\overline{b}$ $3\overline{a}$
disassembly	XI	1 2-3	3 <u>a</u>
converter type		I 2	2c
horsepower range		I 2	$\frac{2c}{2a}$
torqmatic drive advantages		I 2-3	$2\frac{a}{d}$
torque multiplier, fluid coupling and	• •	. 2-0	<u> 2u</u>
planetary gearing	• •	I 1-2	2 <u>b</u>

\_\_ \_

T (Cont'd)	Section Pag	e No. Par. No.
Transmission front cover		
assembly	• • •	VII 2 2c
cleaning, inspection and wear limits		VII 2 $2\overline{b}$
disassembly		$\begin{array}{ccc} VII & 2\overline{b} \\ I & 1-2 & 2\overline{a} \end{array}$
Transmission housing		- '
assembly		X 3 5c
cleaning, inspection and wear limits		$\mathbf{X}$ 3 $5\overline{\mathbf{b}}$
disassembly		$\sqrt{2-3}$ $\sqrt{5a}$
Transmission shaft assembly		- · · · · -
assembly		XI 3 2d
cleaning, inspection, and wear limits		$XI3$ $2\overline{c}$
disassembly		$\begin{array}{ccc} \mathbf{XI} \ 3 & 2 \overline{\mathbf{c}} \\ \mathbf{XI} \ 3 & 2 \overline{\mathbf{b}} \\ \mathbf{I} \ \mathbf{2-3} & 2 \overline{\mathbf{a}} \end{array}$
model differences		$\overline{12-3}$ $2\overline{a}$
Trouble shooting		III-5 1 <del>1</del>
v		
Vortex and rotary flows	п	7-8 13 <u>b</u>
w		
Wear limits	IV	3-6 6
What is meant by torque multiplication?		II-1 2
When to change filters		III 2 5c
When to change oil		III 2 5 <del>b</del>
<del>-</del>		· · · · · · · · · · · · · · · · · · ·





# TORQMATIC drive speeds the job cycle

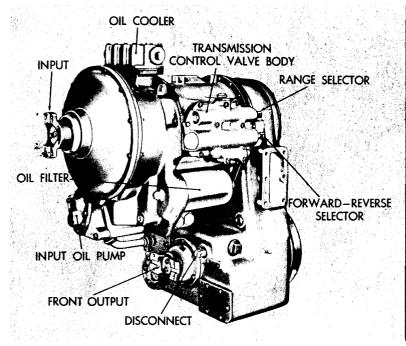
TORQMATIC Drive provides "cycle controlled" horsepower. No matter at what phase of the job cycle, TORQMATIC Drive fits the engine speed and torque to the job—instantly. Your "power dollar" goes farther with TORQMATIC Drive.

### **OPERATIONAL ADVANTAGES**

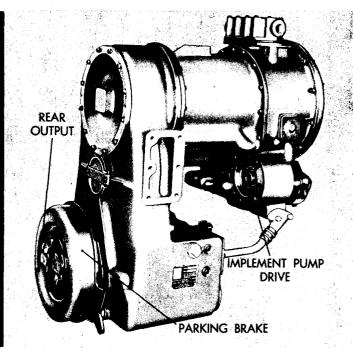
- SENSE-FEEL\* hydraulic control for "feeling" the load pick-up
- Quick-shift at full power—forward or reverse
- Easier to operate—less operator fatigue
- Permits full engine power at implement pump
- No stalled engine when the going is rough Starts and accelerates heavy loads easily—
- smoothly Permits "inching" the load

#### **ECONOMIC ADVANTAGES**

- Speeds job cycle
- Eliminates shock load damage to engine and drive train components
- Prevents harmful engine lugging
- Permits engine to operate at maximum efficiency
- Increases equipment availability
- Cuts operator training time
- Provides more effective horsepower
- \* SENSE-FEEL hydraulic control is an exclusive feature developed by Allison for enabling the operator to "feel the load" pick-up as in the engagement of a conventional mechanical clutch.



More than 55,000 TORQMATIC Drives have been built to date. The various models are providing cycle controlled horsepower in loaders, graders, heavy duty off-highway trucks, earth movers, scrapers, tractors, rollers, drag lines, cranes, shovels, locomotives, rail cars, oil field servicing rigs, ski tows, tanks and atomic gun carriers.



Whatever your power-drive requirements, investigate TORQMATIC Drive. There is a Torqmatic converter to fit your heavy-duty needs from 40 to 400 horsepower—and a Torquatic transmission—TG series or CT series from 70 to 300 horsepower. Bulletins and brochures on these other models are furnished free on request.



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