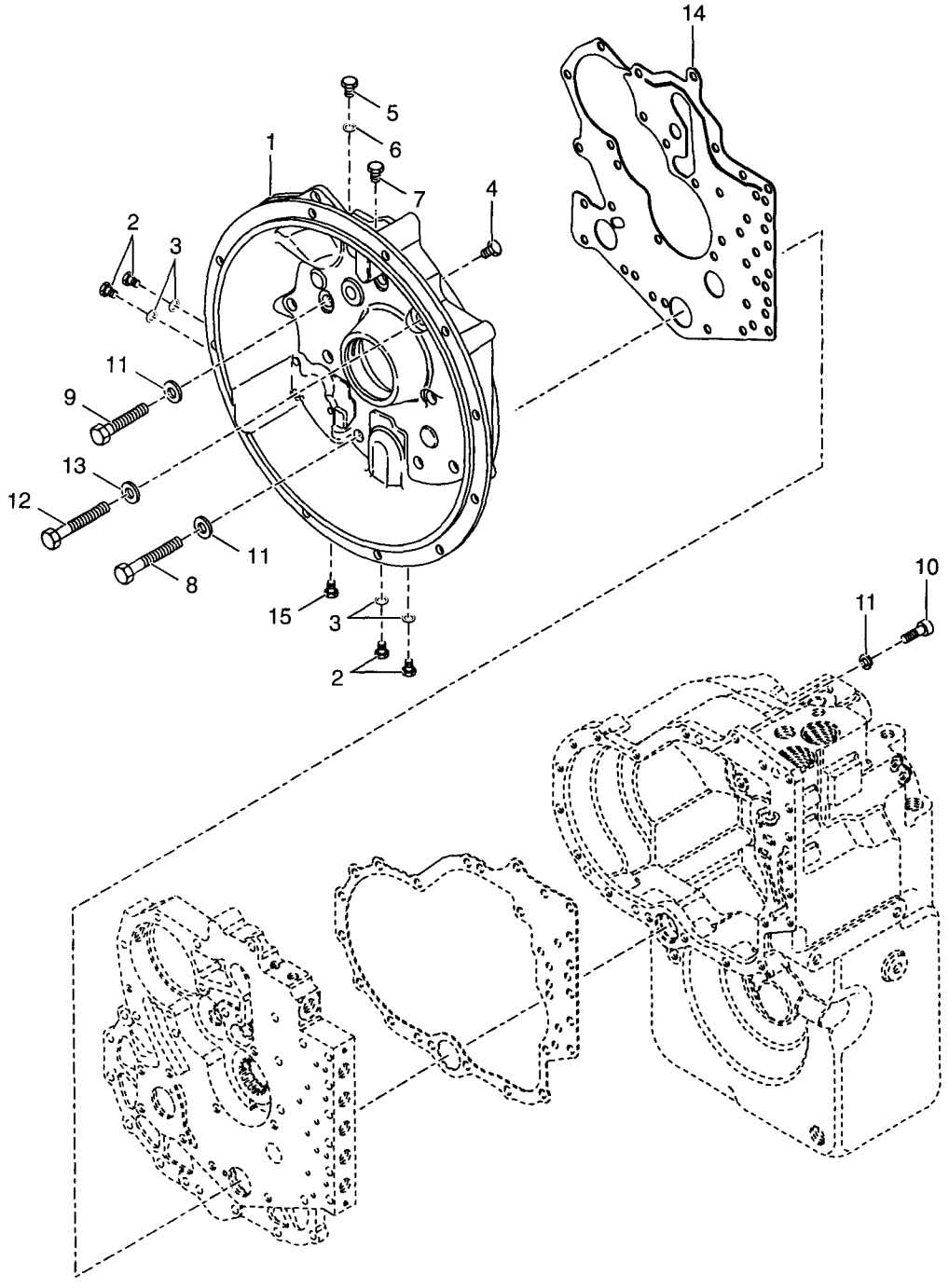
# 8. SECTIONAL VIEWS AND PARTS IDENTIFICATION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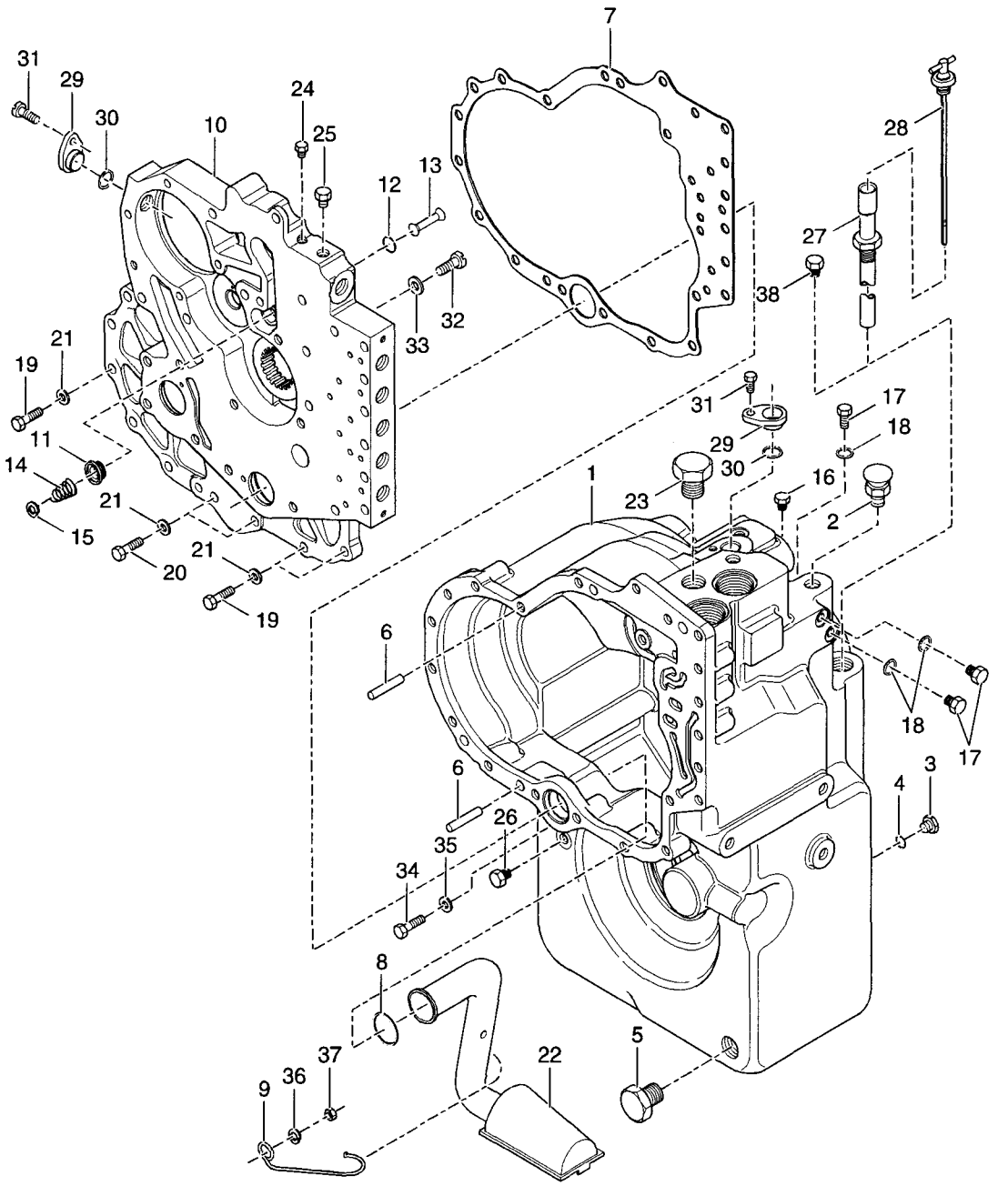
## GROUP - CONVERTER HOUSING

| Item | Description | Quantity |
|---|---|---|
| 1 | Housing - Converter | 1 |
| 2 | Plug | 4 |
| 3 | "O"-ring | 4 |
| 4 | Plug | 1 |
| 5 | Plug | 1 |
| 6 | "O"-ring | 1 |
| 7 | Plug | 1 |
| 8 | Screw - Converter housing to plate | 6 |
| 9 | Screw - Converter housing to plate | 3 |
| 10 | Screw - Converter housing to plate | 1 |
| 11 | Lockwasher - Converter housing to plate screw | 10 |
| 12 | Screw - Converter housing to transmission case | 13 |
| 13 | Lockwasher - Converter housing to transmission case screw | 13 |
| 14 | Gasket - Converter housing to plate | 1 |
| 15 | Plug | 1 |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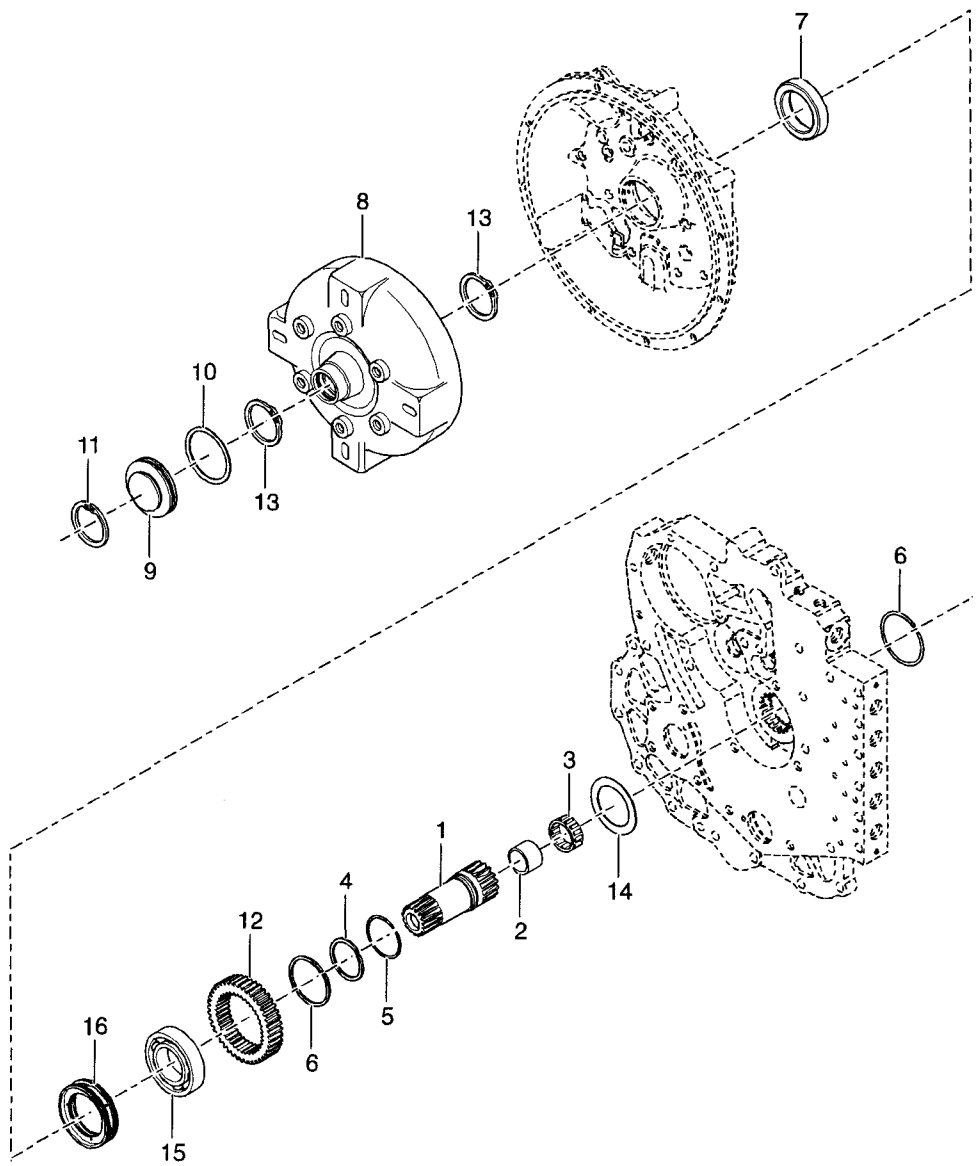
## GROUP -TRANSMISSION CASE AND PLATE

| Item | Description | Quantity |
|---|---|---|
| 1 | Case - Transmission | 1 |
| 2 | Breather - Air | 1 |
| 3 | Plug - Oil level | 1 |
| 4 | "O"-ring | 1 |
| 5 | Plug - Magnetic drain | 1 |
| 6 | Pin - Plate to transmission case dowel | 2 |
| 7 | Gasket - Plate to transmission case | 1 |
| 8 | Ring - Oil supply tube seal | 1 |
| 9 | Clip - Oil supply tube retainer | 1 |
| 10 | Spacer - Plate | 1 |
| 11 | Seat - Safety valve | 1 |
| 12 | Snap ring - Seat | 1 |
| 13 | Poppet - Converter safety valve | 1 |
| 14 | Spring - Converter safety valve | 1 |
| 15 | Washer - Poppet retaining | 1 |
| 16 | Plug | 1 |
| 17 | Plug | 3 |
| 18 | "O"-ring | 3 |
| 19 | Screw - Plate to transmission case | 7 |
| 20 | Screw - Plate to transmission case | 2 |
| 21 | Lockwasher - Plate to transmission case screw | 9 |
| 22 | Assembly - Tube & screen | 1 |
| 23 | Plug - Filler | 1 |
| 24 | Plug | 1 |
| 25 | Plug | 1 |
| 26 | Plug - Drain back port | 1 |
| 27 | Tube - Dipstick | 1 |
| 28 | Assembly - Dipstick | 1 |
| 29 | Plug - Speed sensor port | 2 |
| 30 | "O"-ring - Speed sensor | 2 |
| 31 | Screw - Speed sensor | 2 |
| 32 | Screw - Baffle hole | 1 |
| 33 | Washer - Baffle seal | 1 |
| 34 | Screw | 1 |
| 35 | Washer - Seal | 1 |
| 36 | Washer | 1 |
| 37 | Nut | 1 |
| 38 | Plug - Dipstick hole | 1 |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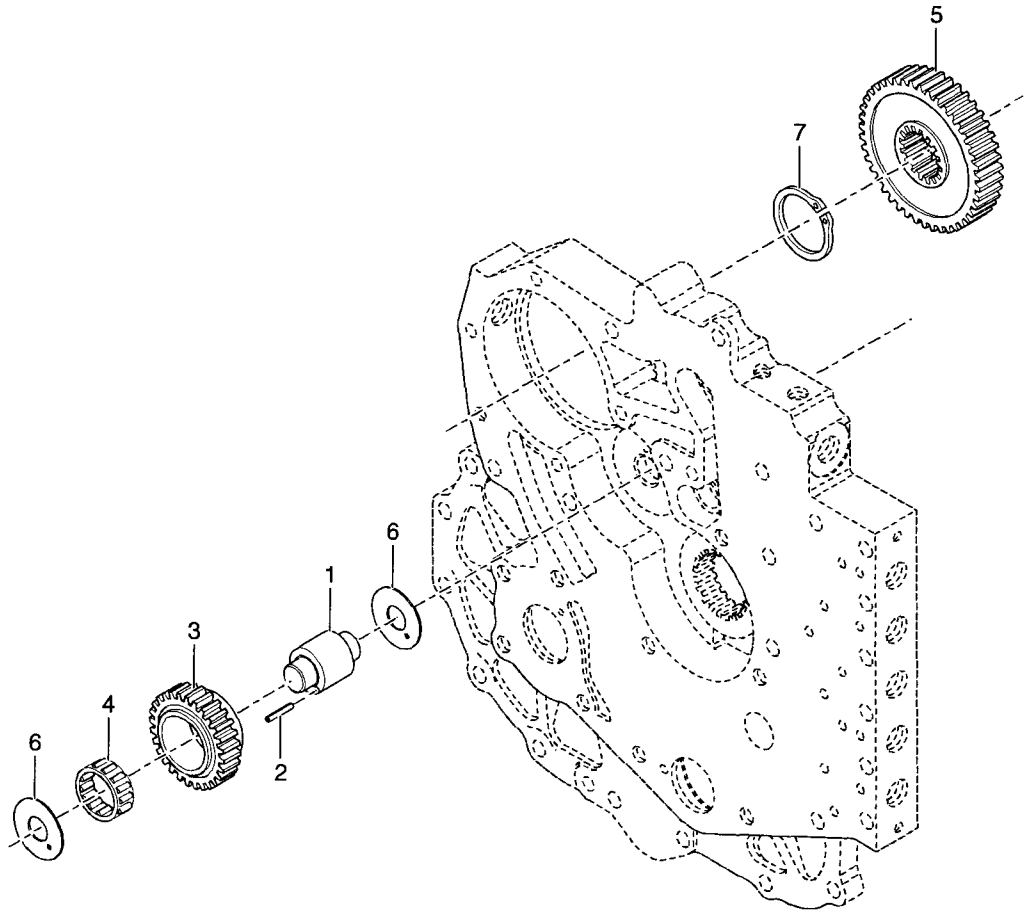
## GROUP - TORQUE CONVERTER

| Item | Description | Quantity |
|---|---|---|
| 1 | Stator support | 1 |
| 2 | Bushing | 1 |
| 3 | Bearing | 1 |
| 4 | Ring - Stator support piston | 1 |
| 5 | Expander - Stator support piston ring | 1 |
| 6 | Snap ring - Stator support | 2 |
| 7 | Seal - Converter housing oil | 1 |
| 8 | Assembly - Torque converter | 1 |
| 9 | Plug - Torque converter | 1 |
| 10 | "O"-ring - Torque converter plug | 1 |
| 11 | Snap ring - Torque converter plug | 1 |
| 12 | Gear - Impeller hub | 1 |
| 13 | Snap ring - Impeller hub | 2 |
| 14 | Washer - Impeller hub gear | 1 |
| 15 | Bearing - Torque converter | 1 |
| 16 | Ring - Oil distributor | 1 |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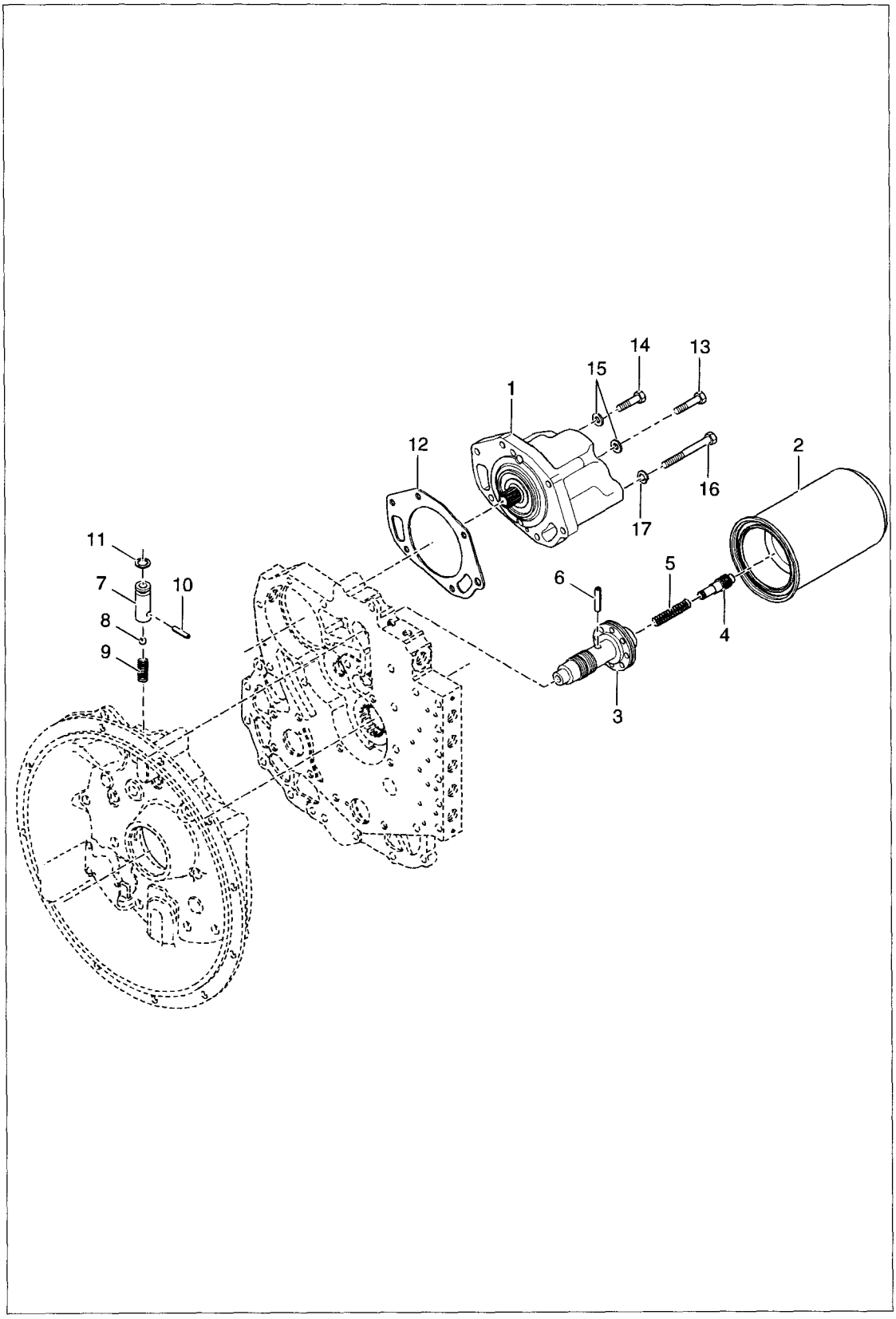
**GROUP - PUMP DRIVE**

| Item | Description | Quantity |
|---|---|---|
| 1 | Shaft - Pump drive idler & pilot | 1 |
| 2 | Pin - Roll | 1 |
| 3 | Gear - Pump drive idler | 1 |
| 4 | Bearing - Idler gear | 1 |
| 5 | Gear - Pump drive | 1 |
| 6 | Washer - Pump drive idler thrust | 2 |
| 7 | Snap ring - Pump drive gear retaining | 1 |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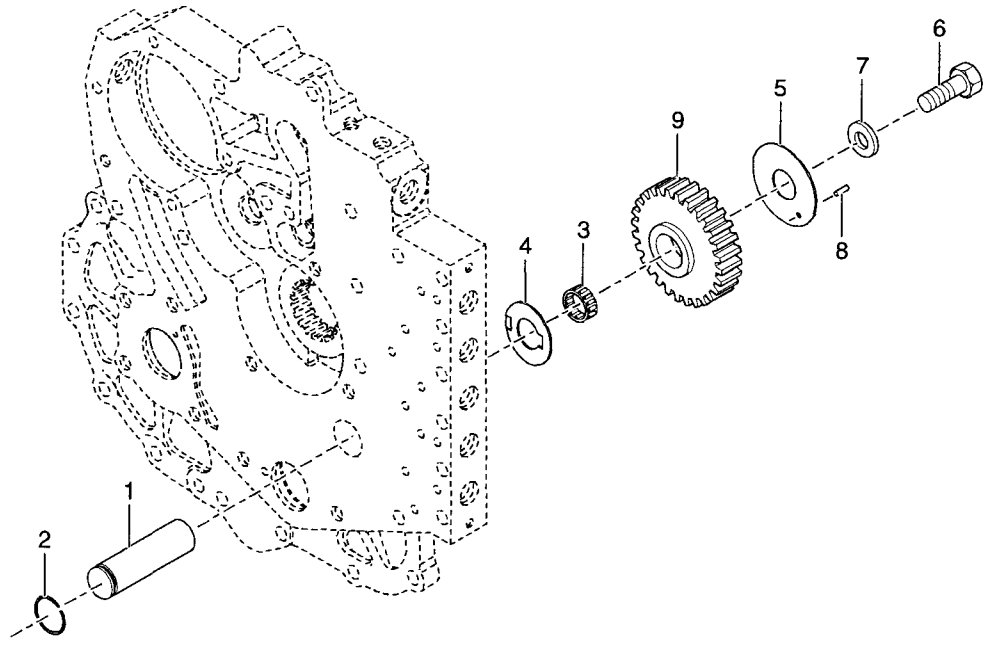
## GROUP - CHARGING PUMP

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - Charge pump | 1 |
| 2 | Assembly - Hydraulic spin filter | 1 |
| 3 | Sleeve - Regulator valve | 1 |
| 4 | Piston - Regulator valve | 1 |
| 5 | Spring - Regulator valve | 1 |
| 6 | Pin | 1 |
| 7 | Body - Check valve | 1 |
| 8 | Ball | 1 |
| 9 | Spring - Check valve | 1 |
| 10 | Pin - Check valve | 1 |
| 11 | "O"-ring | 1 |
| 12 | Gasket - Charging pump | 1 |
| 13 | Screw - Pump mounting | 4 |
| 14 | Screw - Pump mounting | 1 |
| 15 | Lockwasher - Pump mounting screw | 5 |
| 16 | Screw - Pump mounting | 1 |
| 17 | Lockwasher - Pump mounting screw | 1 |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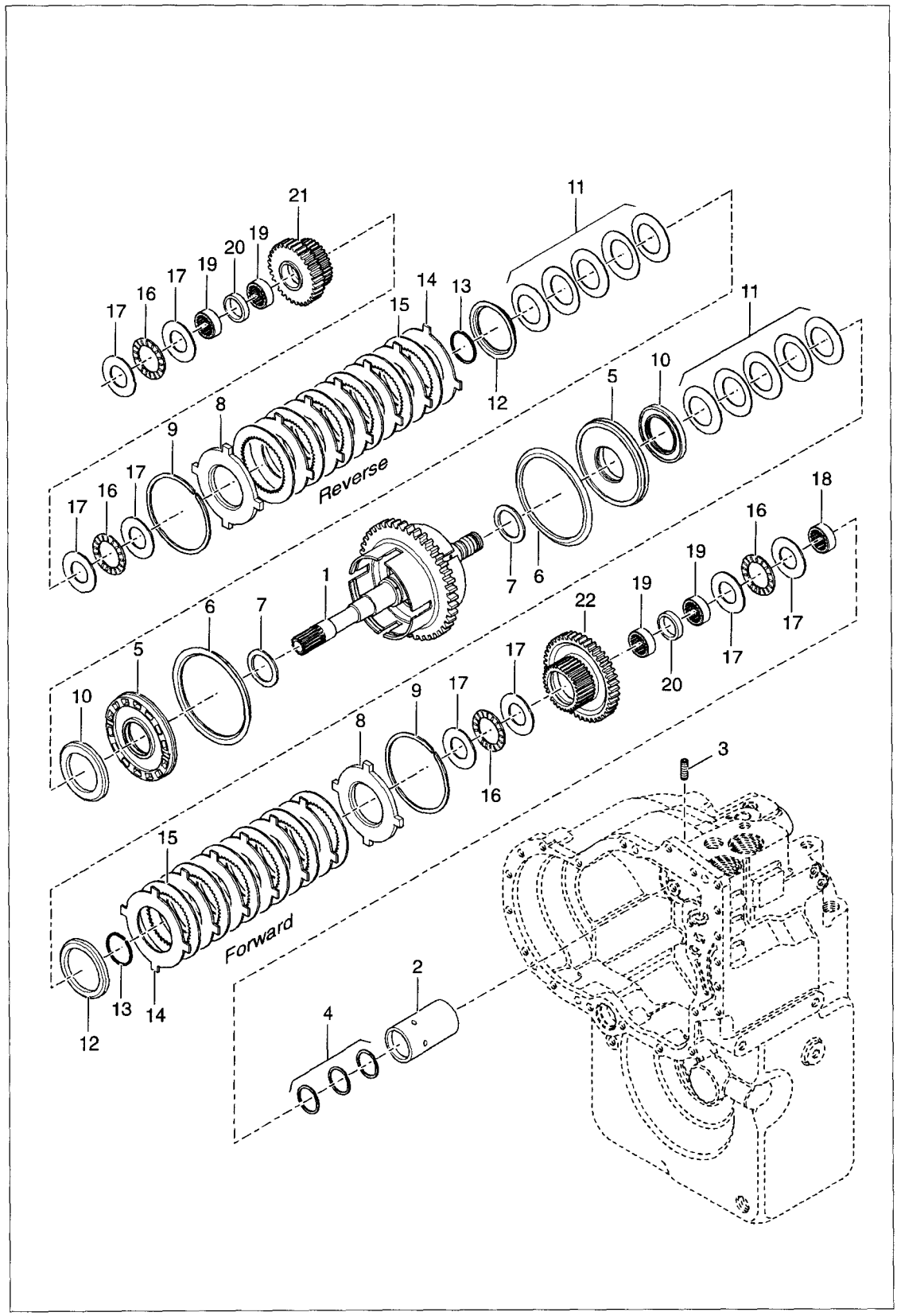
## GROUP - REVERSE IDLER

| Item | Description | Quantity |
|---|---|---|
| 1 | Shaft - Idler & pilot | 1 |
| 2 | Snap ring - Idler shaft | 1 |
| 3 | Bearing - Reverse idler gear | 1 |
| 4 | Washer - Thrust | 1 |
| 5 | Plate - End | 1 |
| 6 | Capscrew - Reverse idler end plate | 1 |
| 7 | Washer - End plate cap screw | 1 |
| 8 | Roll pin - End plate to shaft | 1 |
| 9 | Gear - Reverse idler | 1 |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Reverse
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Forward
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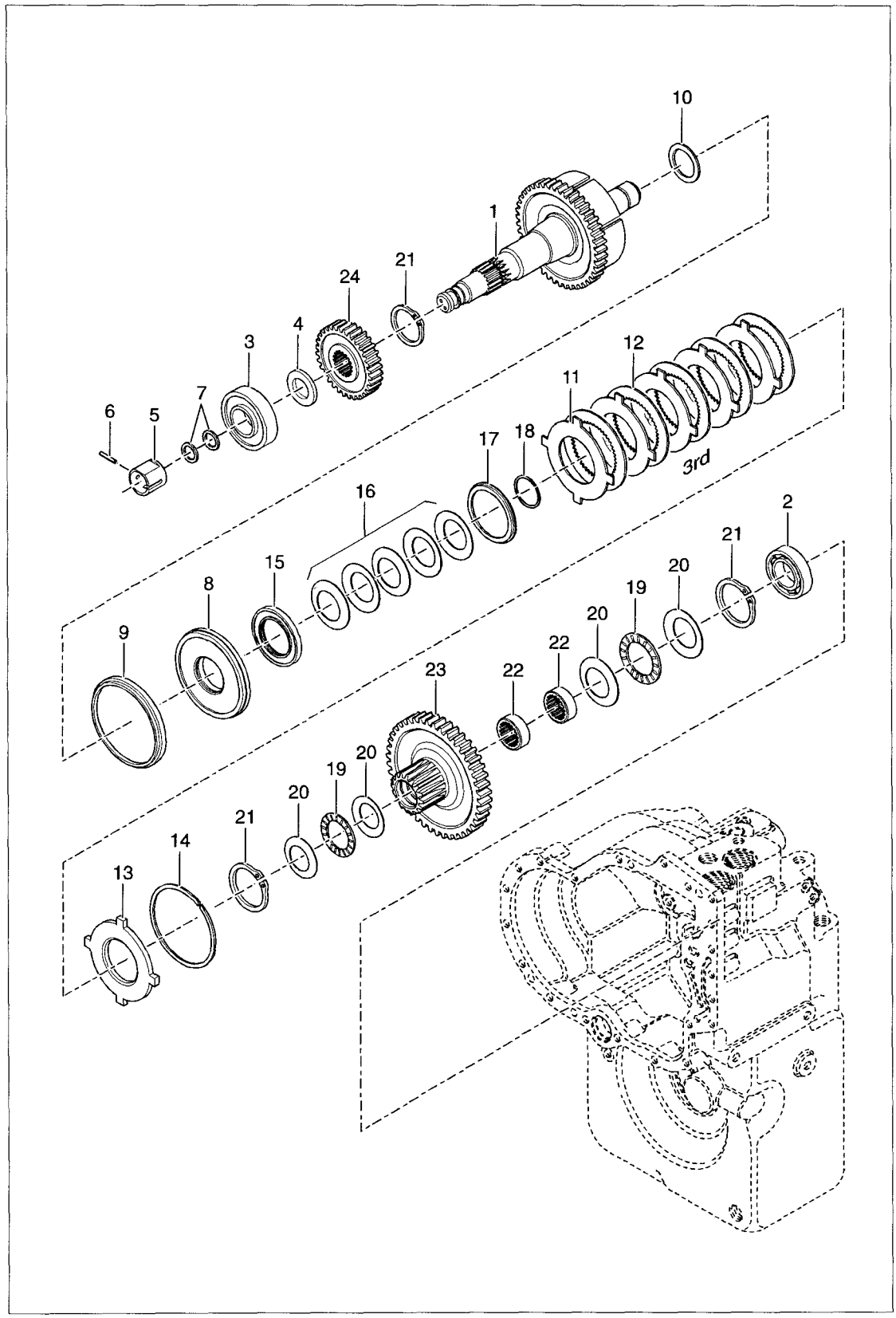
4
12

## GROUP - FORWARD AND REVERSE SHAFT

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - Turbine shaft, drum & plug | 1 |
| 2 | Sleeve - Oil distributor | 1 |
| 3 | Screw - Retainer | 1 |
| 4 | Ring - Piston | 3 |
| 5 | Piston - Clutch | 2 |
| 6 | Seal - Clutch piston (Outer) | 2 |
| 7 | Seal - Clutch piston (Inner) | 2 |
| 8 | Plate - End | 2 |
| 9 | Snap ring - End plate | 2 |
| 10 | Plate - Clutch piston wear | 2 |
| 11 | Assembly - Disc spring | 2 |
| 12 | Retainer - Snap ring | 2 |
| 13 | Snap ring - retainer | 2 |
| 14 | Disc - Outer (6 forward - 6 reverse) | 12 |
| 15 | Disc - Inner (6 forward - 6 reverse) | 12 |
| 16 | Bearing - Clutch gear thrust | 4 |
| 17 | Washer - Clutch gear thrust | 8 |
| 18 | Bearing - Turbine shaft rear | 1 |
| 19 | Bearing | 4 |
| 20 | Spacer | 2 |
| 21 | Gear - Reverse clutch | 1 |
| 22 | Gear - Forward clutch | 1 |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3rd
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23
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19
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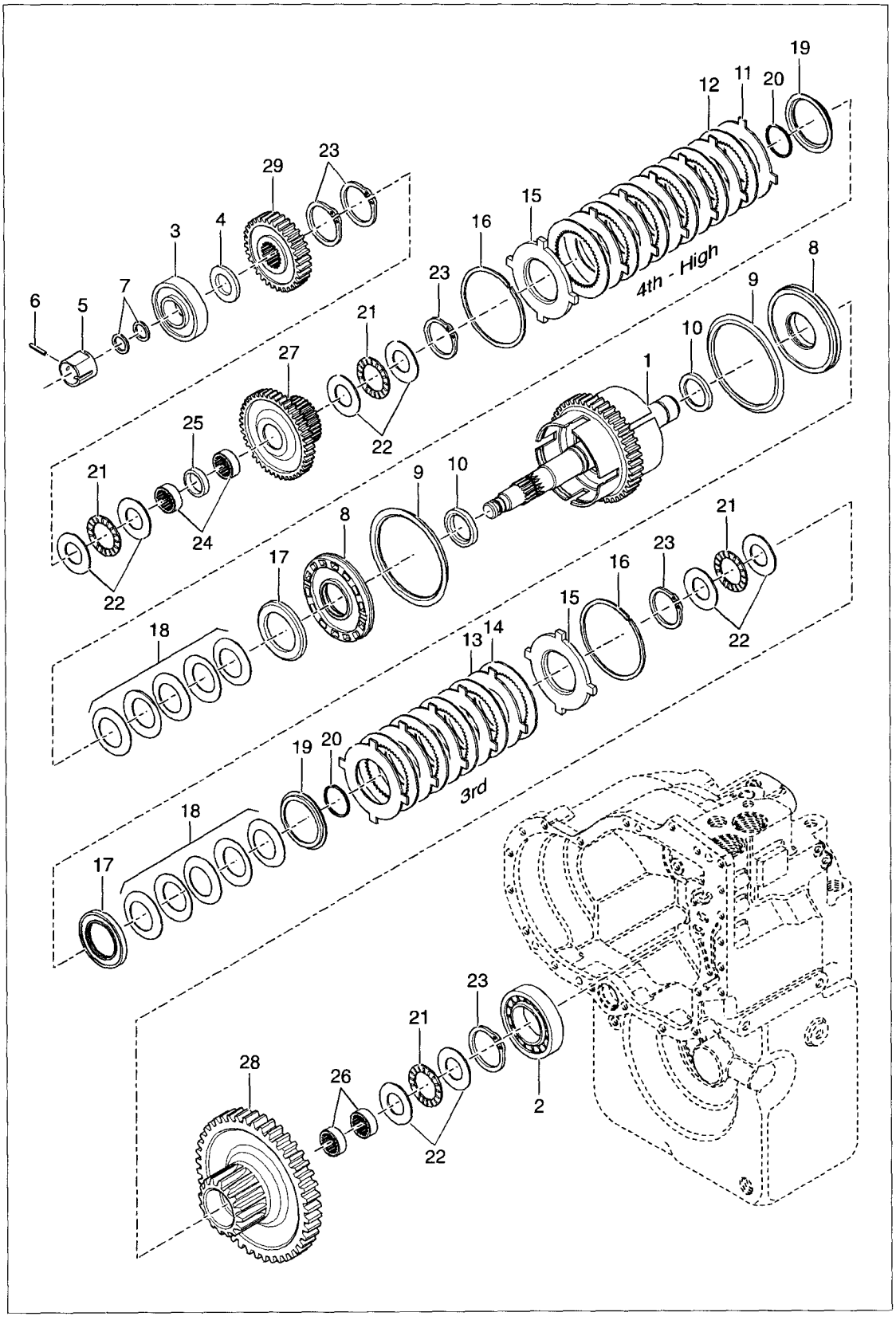
21
14
13

## GROUP - 3RD SHAFT (FOR 3-SPEED TRANSMISSION ONLY)

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - 3rd shaft, drum and plug | 1 |
| 2 | Bearing - Roller | 1 |
| 3 | Assembly - Bearing and seal | 1 |
| 4 | Washer - Bearing support | 1 |
| 5 | Sleeve - Oil distributor | 1 |
| 6 | Screw - Sleeve retaining | 1 |
| 7 | Ring - Piston | 2 |
| 8 | Clutch - Piston | 1 |
| 9 | Seal - Clutch piston (Outer) | 1 |
| 10 | Seal - Clutch piston (Inner) | 1 |
| 11 | Disc (Outer) | 5 |
| 12 | Disc (Inner) | 5 |
| 13 | Plate - End | 1 |
| 14 | Snap ring - end plate | 1 |
| 15 | Plate - Clutch piston wear | 1 |
| 16 | Assembly - disc spring | 1 |
| 17 | Retainer - Snap ring | 1 |
| 18 | Snap ring - Retainer | 1 |
| 19 | Bearing - Thrust needle roller | 2 |
| 20 | Washer - Clutch gear thrust | 4 |
| 21 | Snap ring - External | 3 |
| 22 | Bearing - 3rd clutch gear | 2 |
| 23 | Gear - 3rd clutch | 1 |
| 24 | Gear - First drive | 1 |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4th - High
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25
22
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9
10
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21
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17
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22
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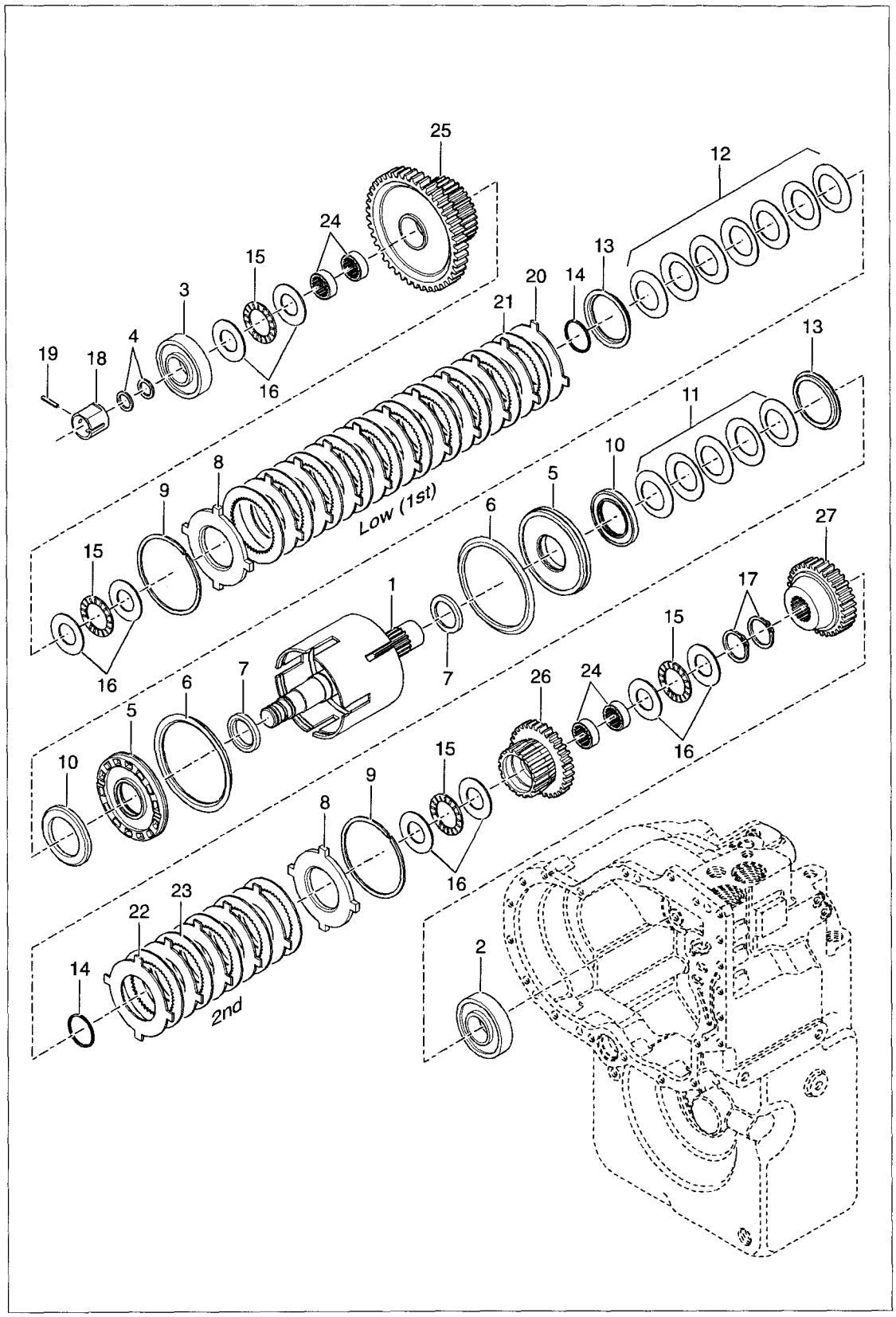
18
13
14
22
19
20
3rd
18
17
23
21
28
26
2
22

## GROUP - HIGH (4TH) AND 3RD SHAFT

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - High and 3rd shaft, drum and plug | 1 |
| 2 | Bearing - Roller | 1 |
| 3 | Assembly - Bearing and seal | 1 |
| 4 | Washer - Bearing support | 1 |
| 5 | Sleeve - Oil distributor | 1 |
| 6 | Screw - Sleeve retaining | 1 |
| 7 | Ring - Piston | 2 |
| 8 | Clutch - Piston | 2 |
| 9 | Seal - Clutch piston (Outer) | 2 |
| 10 | Seal - Clutch piston (Inner) | 2 |
| 11 | Disc (Outer) Hi | 6 |
| 12 | Disc (Inner) Hi | 6 |
| 13 | Disc (Outer) 3rd | 5 |
| 14 | Disc (Inner) 3rd | 5 |
| 15 | Plate - End | 2 |
| 16 | Snap ring - End plate | 2 |
| 17 | Plate - Clutch piston wear | 2 |
| 18 | Assembly - Disc spring | 2 |
| 19 | Retainer - Snap ring | 2 |
| 20 | Snap ring - Retainer | 2 |
| 21 | Bearing - thrust needle roller | 4 |
| 22 | Washer - Clutch gear thrust | 8 |
| 23 | Snap ring - Gear hub | 5 |
| 24 | Bearing - 4th clutch gear | 2 |
| 25 | Spacer | 1 |
| 26 | Bearing - 3rd clutch gear | 2 |
| 27 | Gear 4th clutch | 1 |
| 28 | Gear 3rd clutch | 1 |
| 29 | Gear - First drive | 1 |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Low (1st)
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27
15
1
17
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26
24
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16
10
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9
8
16
23
22
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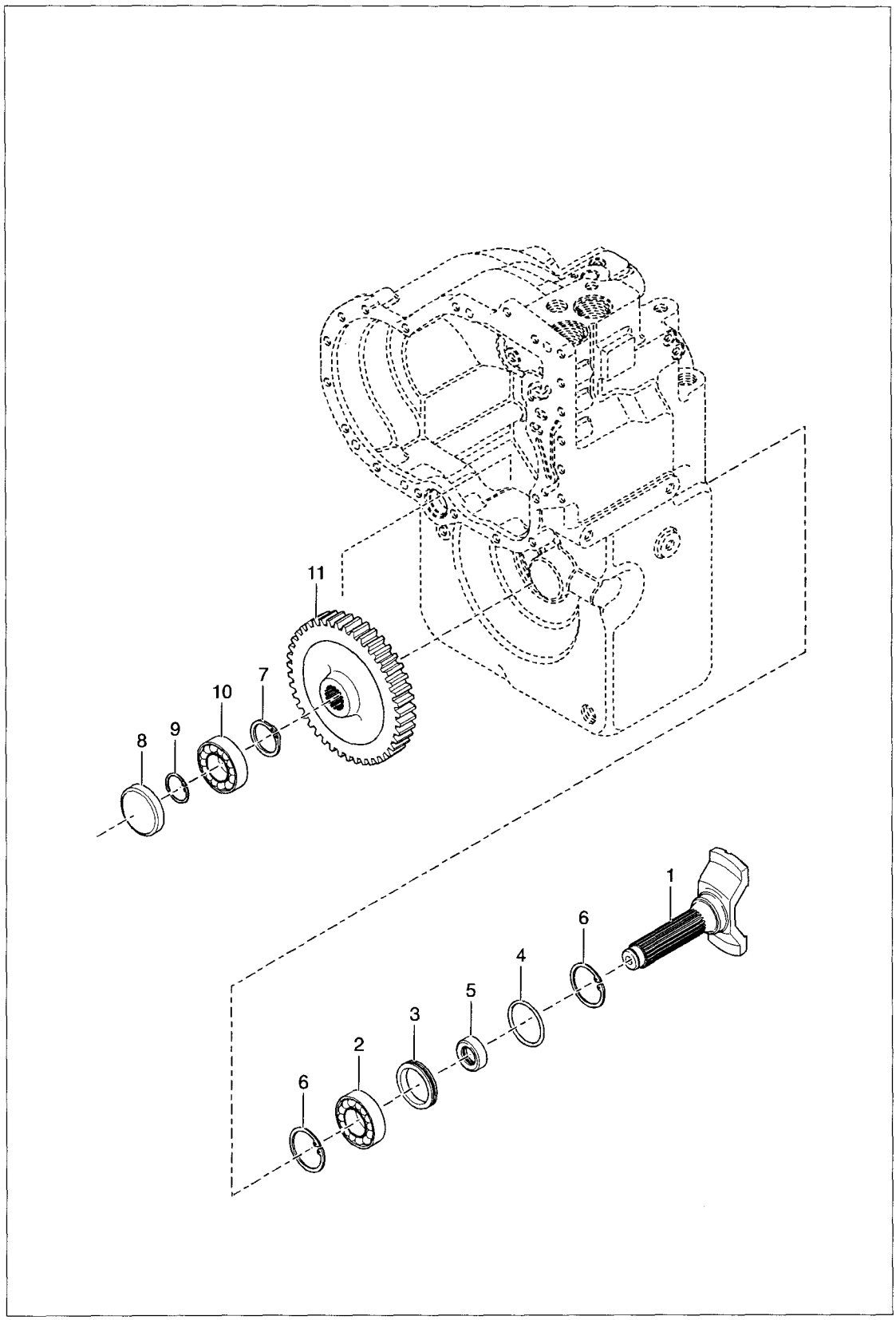
14
2nd

## GROUP - 1ST AND 2ND SHAFT

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly 1st and 2nd shaft, drum, plug and seat | 1 |
| 2 | Bearing - Roller | 1 |
| 3 | Assembly - Bearing and seal | 1 |
| 4 | Ring - Piston | 2 |
| 5 | Piston - Clutch | 2 |
| 6 | Seal - Clutch piston (Outer) | 2 |
| 7 | Seal - Clutch piston (Inner) | 2 |
| 8 | Plate - End | 2 |
| 9 | Snap ring - End plate | 2 |
| 10 | Plate - Clutch piston wear | 2 |
| 11 | Assembly - Disc spring | 1 |
| 12 | Assembly - Disc spring | 1 |
| 13 | Retainer - Snap ring | 2 |
| 14 | Snap ring - Retainer | 2 |
| 15 | Bearing - Clutch gear thrust | 4 |
| 16 | Washer - Clutch gear thrust | 8 |
| 17 | Snap ring - 2nd clutch gear hub | 2 |
| 18 | Sleeve - Oil distributor | 1 |
| 19 | Screw - Sleeve retaining | 1 |
| 20 | Disc (Outer) 1st | 10 |
| 21 | Disc (Inner) 1st | 10 |
| 22 | Disc (Outer) 2nd | 5 |
| 23 | Disc (Inner) 2nd | 5 |
| 24 | Bearing | 4 |
| 25 | Gear - 1st clutch | 1 |
| 26 | Gear - 2nd clutch | 1 |
| 27 | Gear - 3rd driven | 1 |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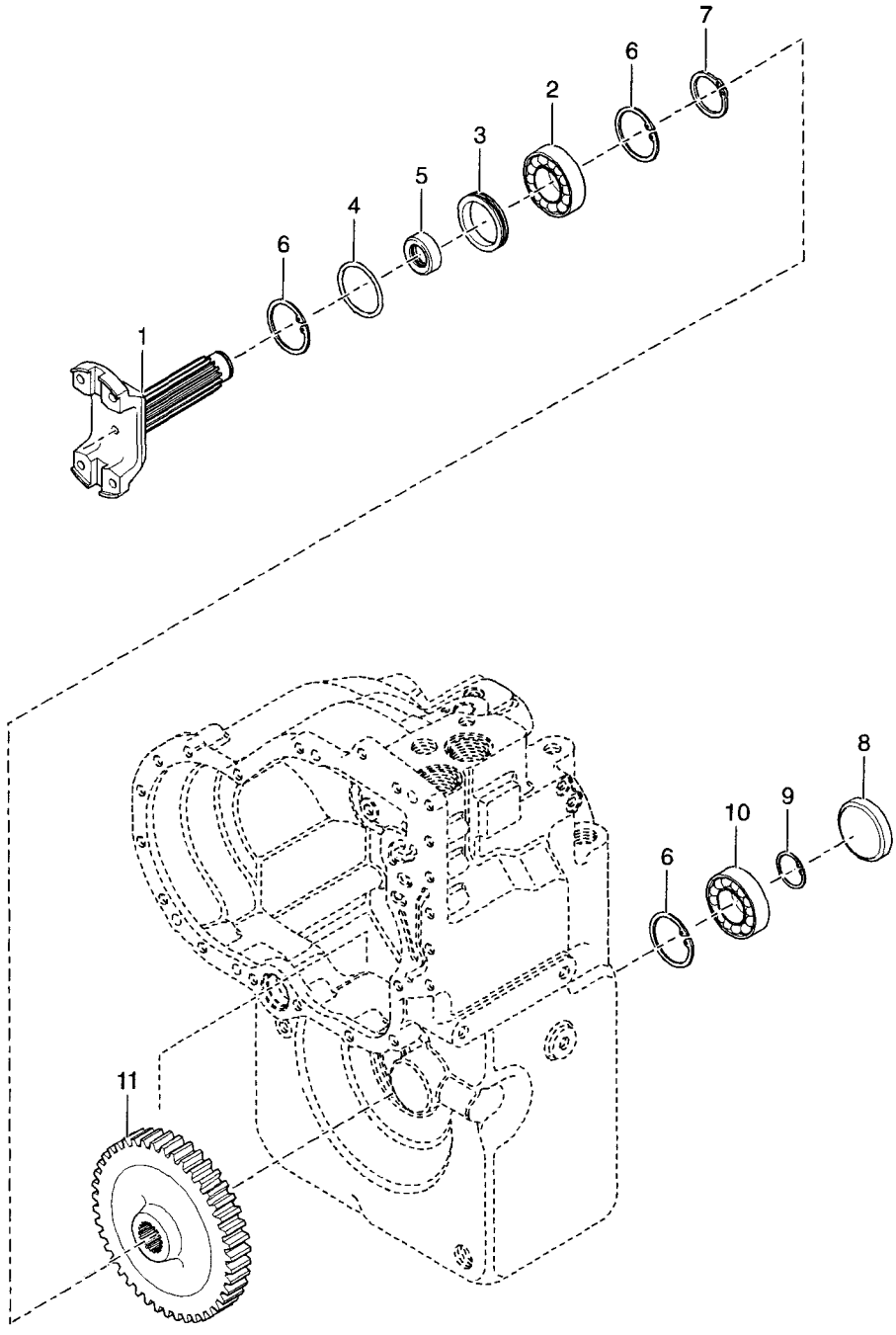
**GROUP - OUTPUT SHAFT (REAR ONLY)**

| Item | Description | Quantity |
|---|---|---|
| 1 | Shaft - Output | 1 |
| 2 | Bearing - Output shaft | 1 |
| 3 | Sleeve - Oil seal | 1 |
| 4 | "O"ring - Oil seal sleeve | 1 |
| 5 | Seal - Output shaft oil | 1 |
| 6 | Snap ring - Output shaft bearing | 2 |
| 7 | Snap ring - Gear & bearing retaining | 1 |
| 8 | Plug - End | 1 |
| 9 | Snap ring - Bearing retainer | 1 |
| 10 | Bearing - Output shaft | 1 |
| 11 | Gear - Output shaft | 1 |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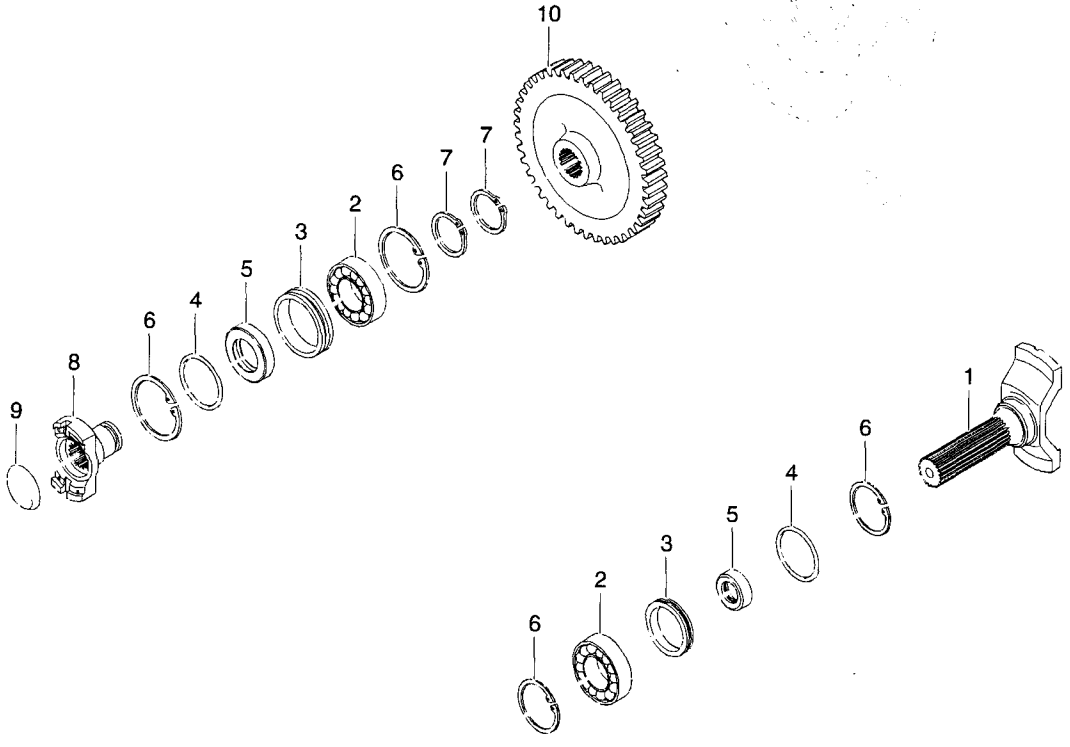
11

## GROUP - OUTPUT SHAFT (FRONT ONLY)

| Item | Description | Quantity |
|---|---|---|
| 1 | Shaft - Output | 1 |
| 2 | Bearing - Output shaft | 1 |
| 3 | Sleeve - Oil seal | 1 |
| 4 | "O"ring - Oil seal sleeve | 1 |
| 5 | Seal - Output shaft bearing | 1 |
| 6 | Snap ring - Output shaft bearing | 3 |
| 7 | Snap ring - Gear & bearing retaining | 1 |
| 8 | Plug - End | 1 |
| 9 | Snap ring - Bearing retainer | 1 |
| 10 | Bearing - Output shaft | 1 |
| 11 | Gear - Output shaft | 1 |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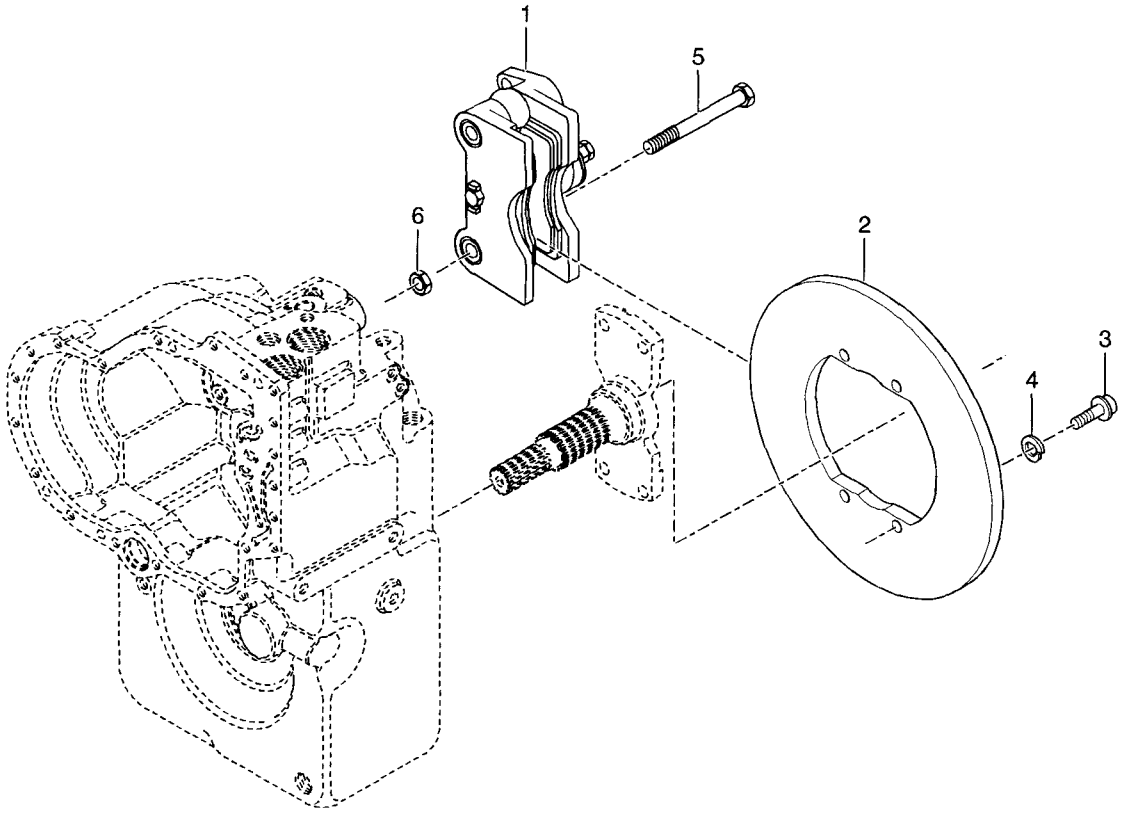
## GROUP - OUTPUT SHAFT (FRONT & REAR)

| Item | Description | Quantity |
|---|---|---|
| 1 | Shaft - Output | 1 |
| 2 | Bearing - Output shaft | 2 |
| 3 | Sleeve - Oil seal | 2 |
| 4 | "O"-ring - Oil seal sleeve | 2 |
| 5 | Seal - Output shaft oil | 2 |
| 6 | Snap ring - Output shaft bearing | 4 |
| 7 | Snap ring - Gear & bearing retaining | 2 |
| 8 | Flange - Output | 1 |
| 9 | Plug - Flange | 1 |
| 10 | Gear - Output shaft | 1 |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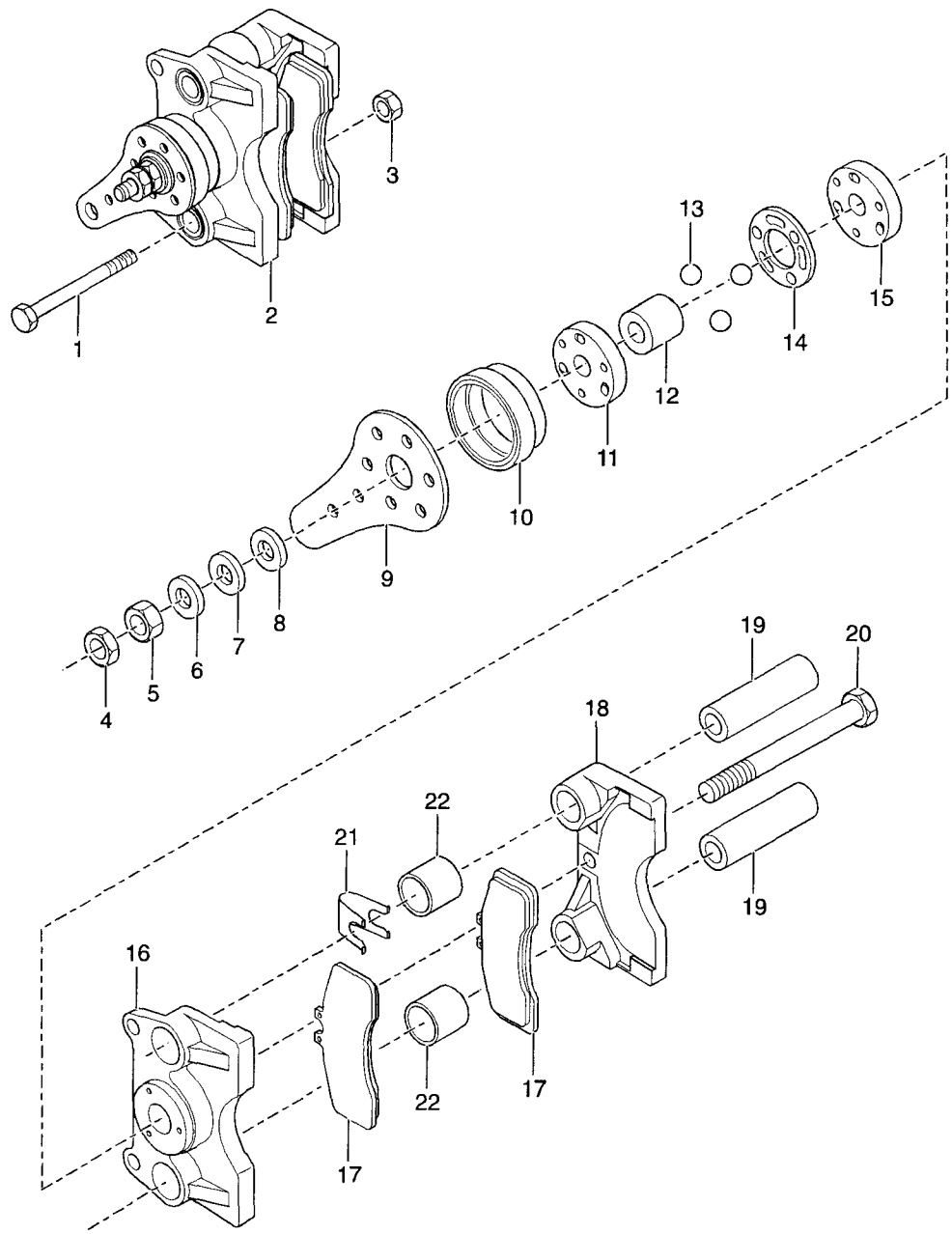
**GROUP - DISK BRAKE**

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - Caliper | 1 |
| 2 | Disc - Brake | 1 |
| 3 | Capscrew - Brake disc | 4 |
| 4 | Lockwasher | 4 |
| 5 | Capscrew - Caliper assembly mounting | 2 |
| 6 | Nut - Caliper assembly capscrew locking | 2 |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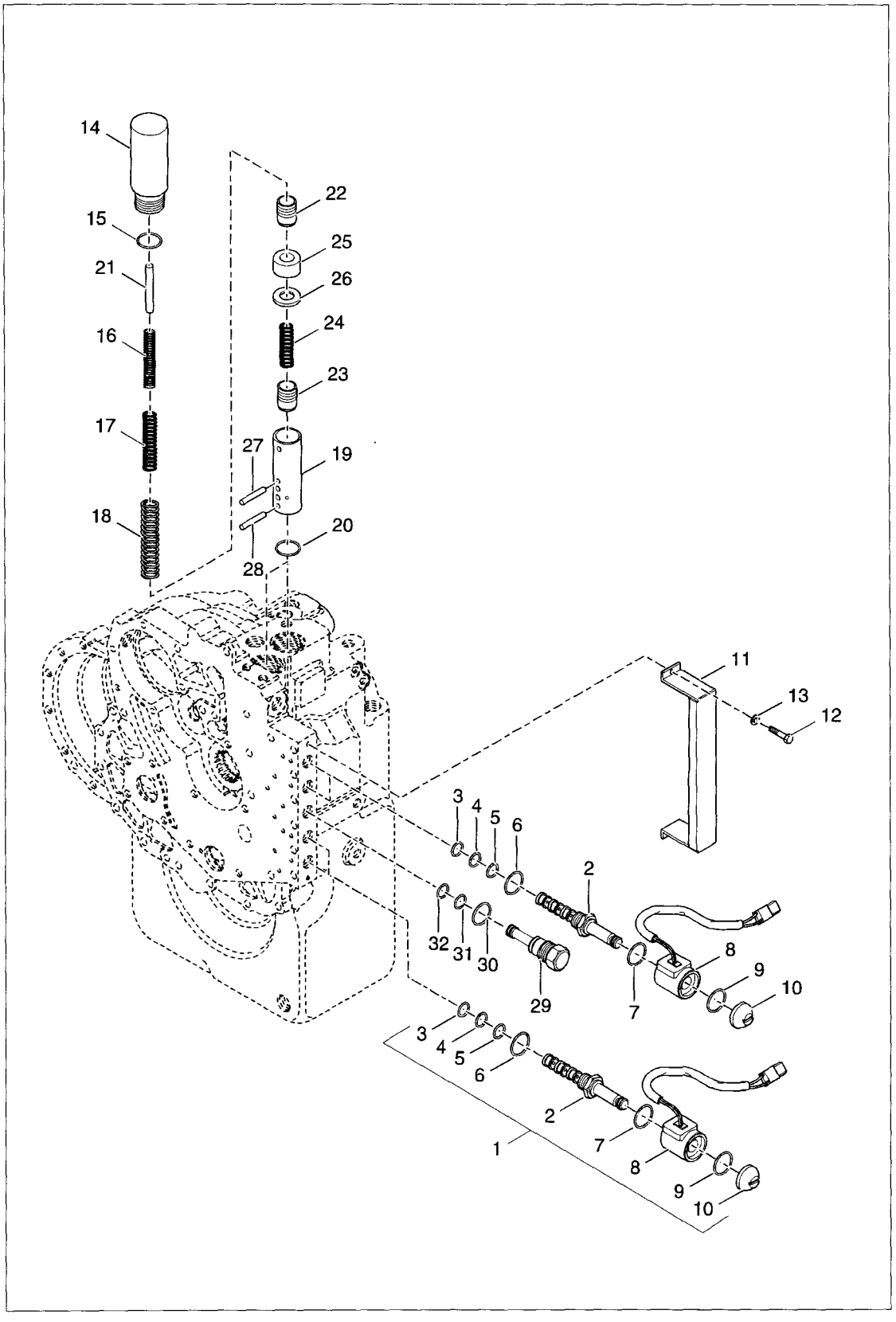
22

**GROUP - CALIPER ASSEMBLY**

| Item | Description | Quantity |
|---|---|---|
| 1 | Screw - Brake mounting | 2 |
| 2 | Assembly - Caliper | 1 |
| 3 | Nut - Brake mounting screw | 2 |
| 4 | Nut - Jam adjustment | 1 |
| 5 | Nut - Adjustment | 1 |
| 6 | Washer - Hardened | 1 |
| 7 | Washer - Stainless steel | 1 |
| 8 | Washer - Thrust | 1 |
| 9 | Lever | 1 |
| 10 | Boot | 1 |
| 11 | Cam | 1 |
| 12 | Id seal | 1 |
| 13 | Ball bearing | 3 |
| 14 | Plastic retainer | 1 |
| 15 | Cam | 1 |
| 16 | Torque plate (Front) | 1 |
| 17 | Carrier and lining assembly | 2 |
| 18 | Torque plate (Rear) | 1 |
| 19 | Sleeve mounting | 2 |
| 20 | Bolt - Adjusting | 1 |
| 21 | Spring | 1 |
| 22 | Seal - Sleeve | 2 |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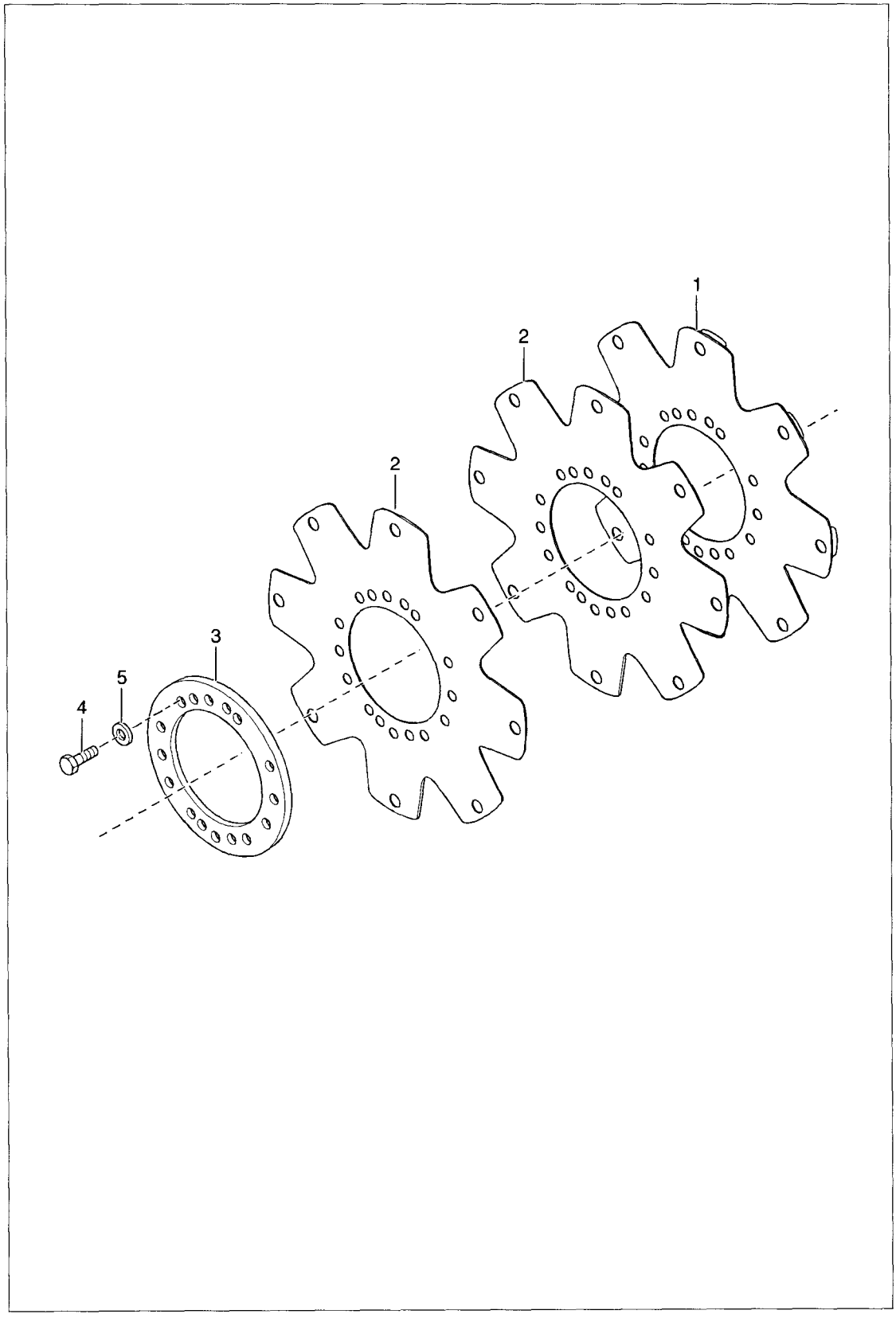
1

**GROUP - ELECTRIC CONTROL**

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - Solenoid cartridge | 5* |
| 2 | Cartridge - Valve 4-way including items 3, 4, 5 and 6 | 5* |
| 3 | "O"-ring - Cartridge | 5* |
| 4 | "O"-ring - Cartridge | 5* |
| 5 | "O"-ring - Cartridge | 5* |
| 6 | "O"-ring - Cartridge | 5* |
| 7 | "O"-ring - Cartridge to coil | 5* |
| 8 | Coil - Solenoid | 5* |
| 9 | "O"-ring - Coil to nut | 5* |
| 10 | Nut - Valve cartridge retainer | 5* |
| 11 | Cover - Protective | 1 |
| 12 | Screw - Protective cover | 2 |
| 13 | Lockwasher - Protective cover screw | 2 |
| 14 | Housing - Modulation valve | 2 |
| 15 | "O"-ring - Modulation housing | 2 |
| 16 | Spring (Inner) | 2 |
| 17 | Spring (Middle) | 2 |
| 18 | Spring (Outer) | 2 |
| 19 | Sleeve - Modulation valve | 2 |
| 20 | "O"-Ring - Sleeve | 2 |
| 21 | Pin - Stop | 2 |
| 22 | Spool - Accumulator | 2 |
| 23 | Spool - Regulator | 2 |
| 24 | Spring - Modulation valve | 2 |
| 25 | Retainer - Spring | 2 |
| 26 | Spacer - Spring | 2 |
| 27 | Pin (Upper) | 2 |
| 28 | Pin (Lower) | 2 |
| 29 | Plug - Solenoid bore plug, used at forward high and low | 1** |
| 30 | "O"-ring - Plug | 1** |
| 31 | "O"-ring - Plug | 1** |
| 32 | "O"-ring - Plug | 1** |

* - Quantity = 4, with 3-speed.
** - Used with 3-speed only.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5

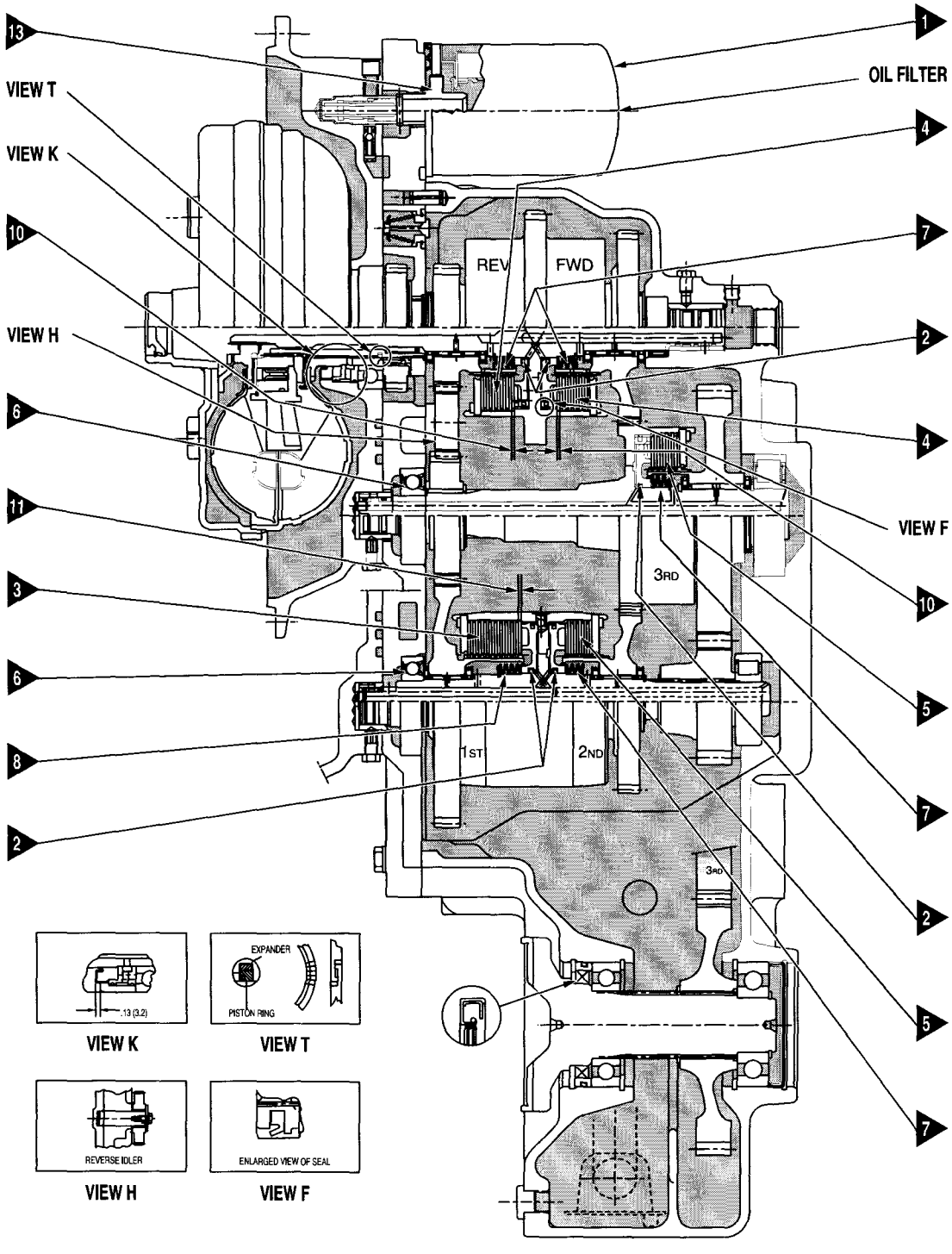
**GROUP - DRIVE PLATE**

| Item | Description | Quantity |
|---|---|---|
| 1 | Assembly - Drive plate and (when used) weld nut | 1 |
| 2 | Plate - Drive | 2 |
| 3 | Ring - Drive plate backing | 1 |
| 4 | Screw - Drive plate mounting | 6 |
| 5 | Lockwasher - Drive plate mounting screw | 6 |

# 9. ASSEMBLY INSTRUCTIONS

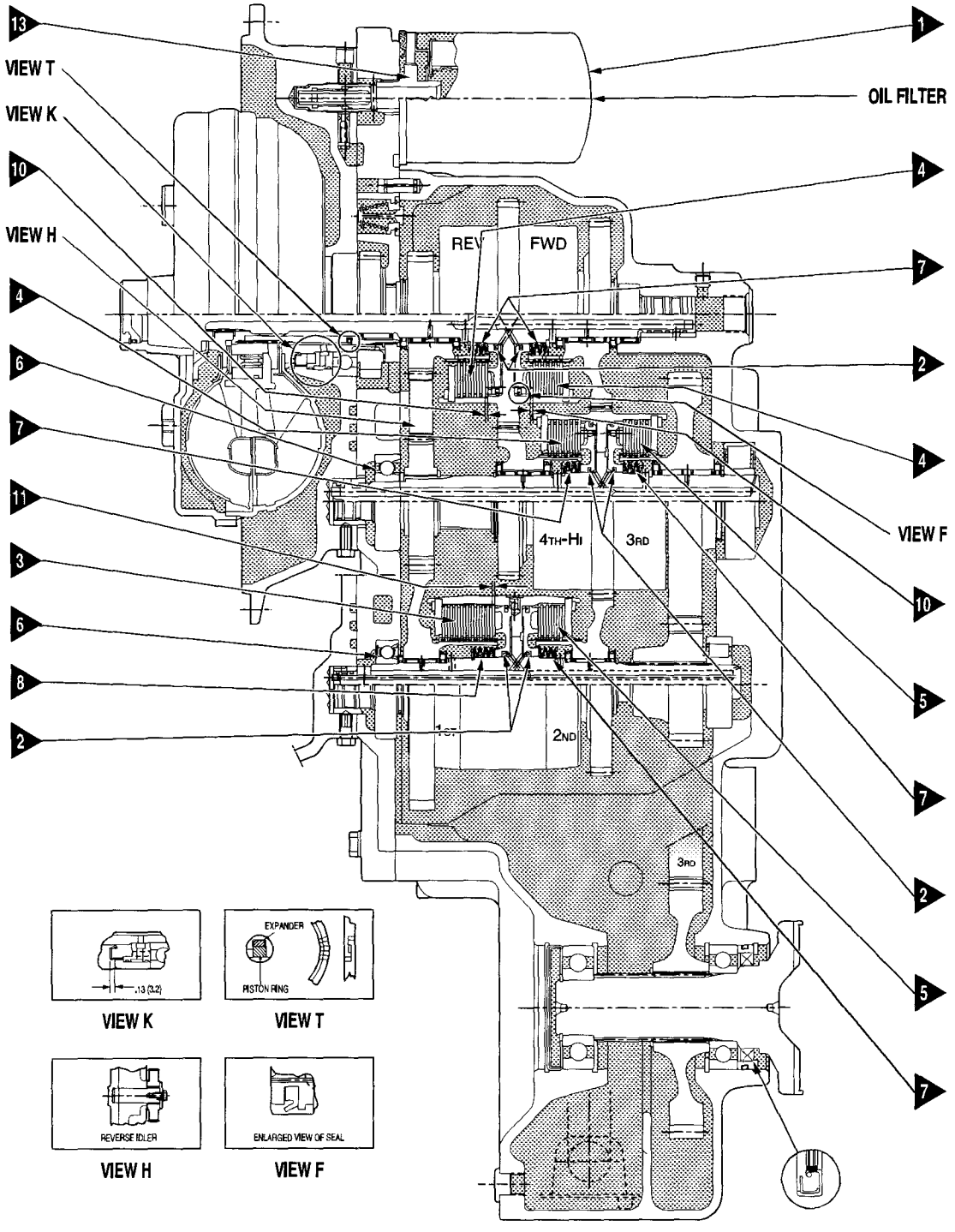
## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)

### 3-Speed cross section

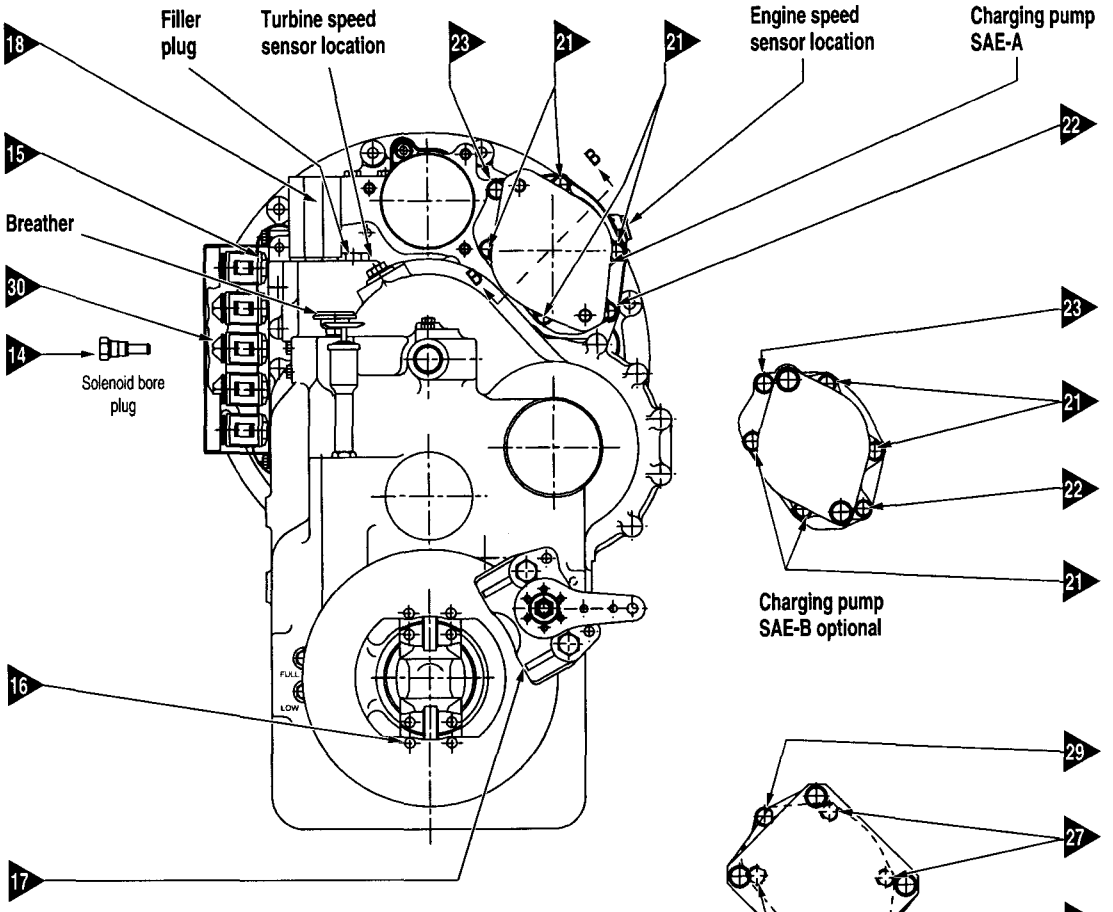


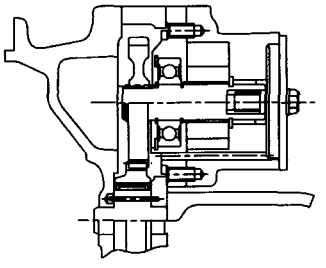
## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)

### 4 and 6-speed cross section



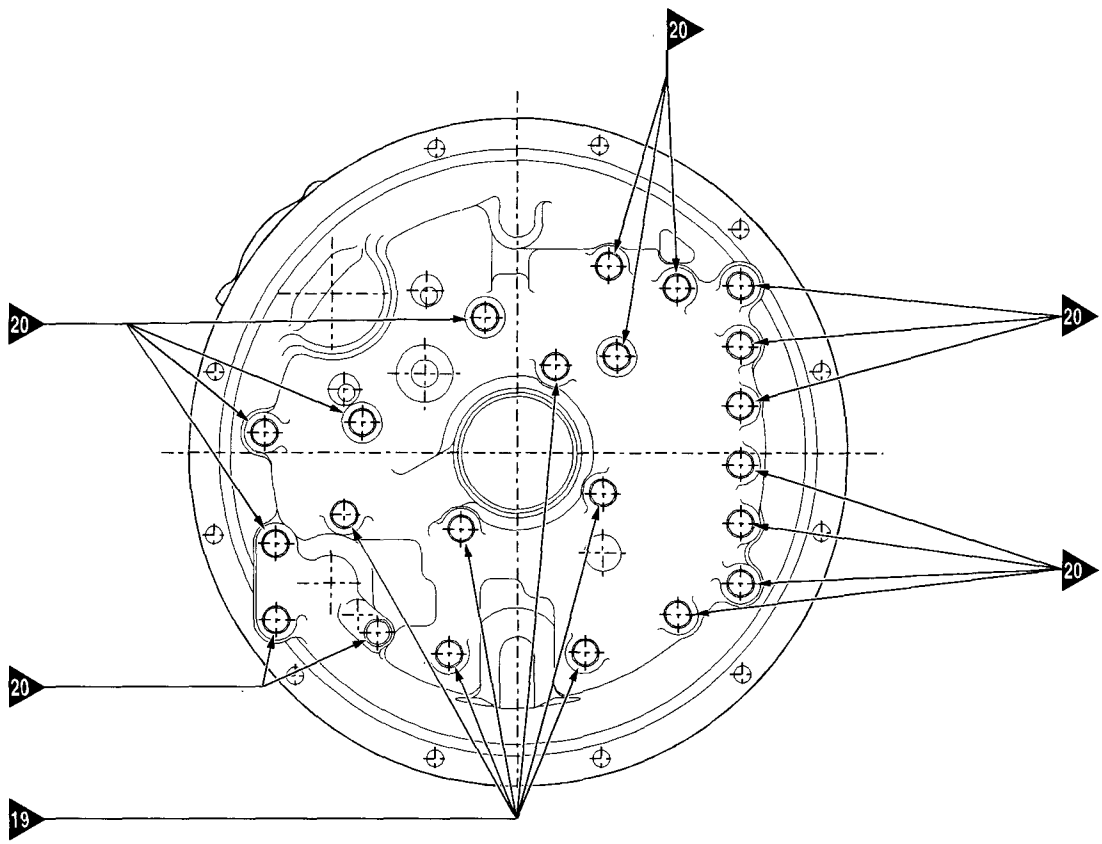
## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)

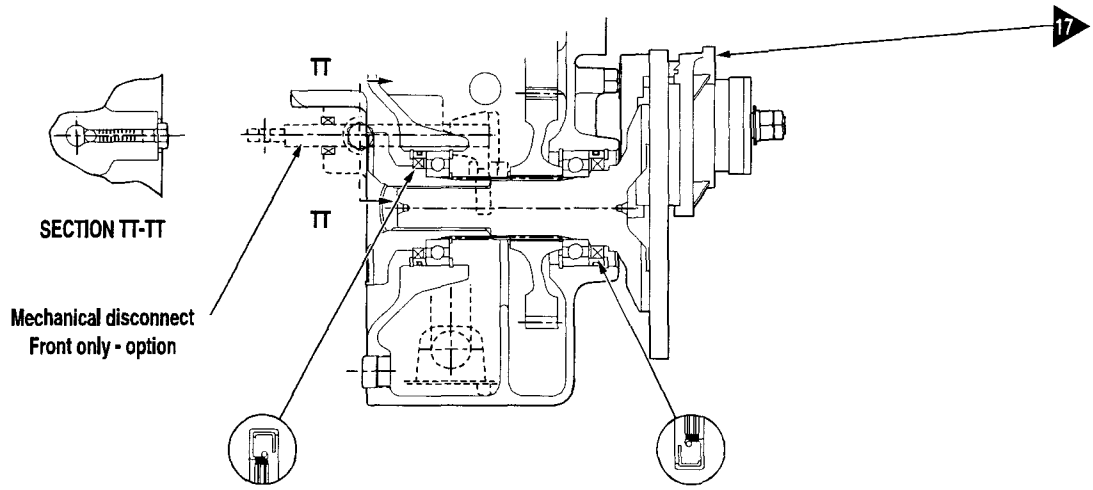


SECTION B-B

## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)




FRONT AND REAR OUTPUT WITH
BRAKE (OPTIONAL) AND DISCONNECT (OPTIONAL)

## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)

Use Permatex and Loctite only where specified.

All lead in chamfers for oil seals, piston rings, and "O"-rings must be smooth and free from burrs. Inspect before assembly.

Lubricate all piston ring grooves and "O"-rings with oil before assembly.

Apply a thin coat of grease between seal lips on lip type seals prior to assembly.

Apply a thin coat of Permatex No. 2 or Loctite No. 641 to O.D. of all oil seals before assembly.

Apply a thin coat of Loctite No. 592 or 506 Dryseal to all pipe plugs.

After assembly of parts using Loctite or Permatex, there must not be any free or excess material which might enter the oil circuit.

1. Assemble oil filter and tighten to 20-25 lbf.ft [27-34 N.m].

2. Teflon seals must be sized prior to assembly.

3. 10 outer steel plates, 10 inner plates, alternately assemble, starting with outer steel plate.

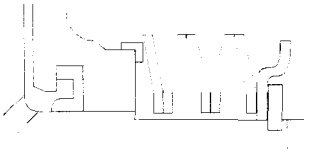
4. 6 outer steel plates, 6 inner plates, alternately assemble, starting with outer steel plate.

5. 5 outer steel plates, 5 inner plates, alternately assemble, starting with outer steel plate.

6. Shield bearing, assembly with shield as shown.

   Add a coating of Loctite 641 to outer diameter of bearings.

7. Fwd. ,Rev., 2nd and 3rd. clutch return disc springs. Concave side of first disc spring to be placed against clutch piston wear sleeve. Remaining four springs to be stacked alternately as shown.



8. Low clutch return disc springs concave side of first disc spring to be placed against clutch piston wear sleeve. Remaining six springs to be stacked alternately as shown.

10. Clearance between clutch piston and steel seperator plate to be .048-.108 [1.22-2.74]. If over .108 [2.74] clearance, add one steel outer disc under end plate.

## 9. ASSEMBLY INSTRUCTIONS (CONTINUED)

11. Clearance between clutch piston and steel separator plate to be .080-.135 [2.03-3.43]. If over .135 [3.43] clearance, add one steel outer disc under end plate.

13. Tighten regulator sleeve to 45-50 lbf.ft [61-68 N.m].

14. Use solenoid bore plug in middle position for 3-speed version only.

15. Solenoid cartridge to be assembled and tightened to 16-20 lbf.ft [22-27 N.m].

16. Apply Loctite No. 243 to thread of disc mounting screws.

17. See page 4-4 for brake information.

18. Tighten modulation valve and inching valve to 60-65 lbf.ft [81-88 N.m].

19. M10 x 1.17 - 1.20. [M10 x 30].

20. M10 x 2.32 - 2.4. [M10 x 60].

21. Use 5/16-18 x 5.00 screw.

22. Use 5/16-18 x 3.500 screw.

23. Use 3/8-16 x 5.00 screw.

24. Use 5/16-18 x 3.250 screw.

25. Use 5/16-18 x 2.00 screw.

26. Use 3/8-18 x 3.250 screw.

27. Use 5/16-24 nut.

28. Use 5/16-24 nut.

29. Use 3/8-24 nut.

30. Tighten all cartridge nuts to 4-5 lbf.ft [5-7 N.m].

# 10. Disassembly and reassembly of T12000 ID transmission

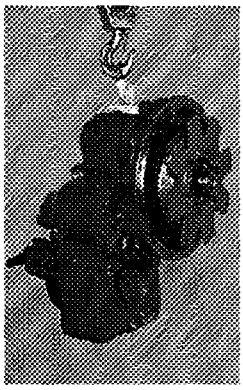


**Figure 1**
Side view of T12000 intermediate drop transmission.

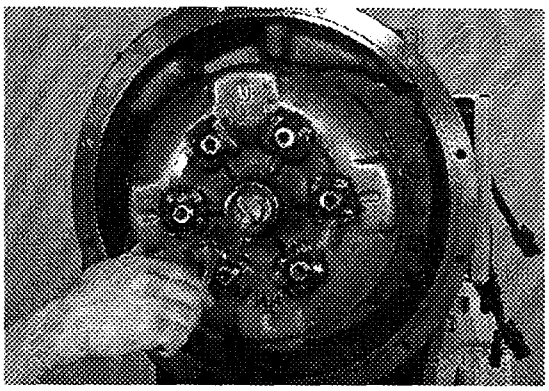


**Figure 4**
Remove torque converter plug retainer ring.

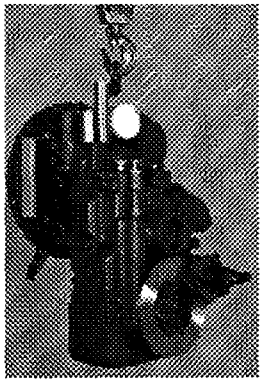


**Figure 2**
Rear view showing disc brake and electric control.

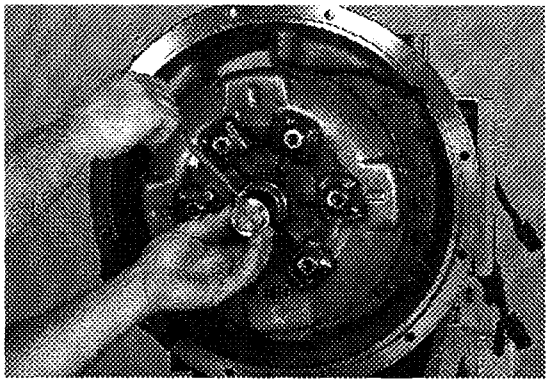


**Figure 5**
Remove plug and "O"-ring.

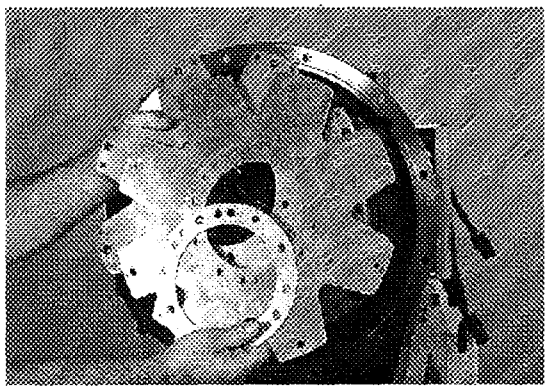


**Figure 3**
Remove drive plate attaching capscrews and washers. Remove drive plate and backing ring.

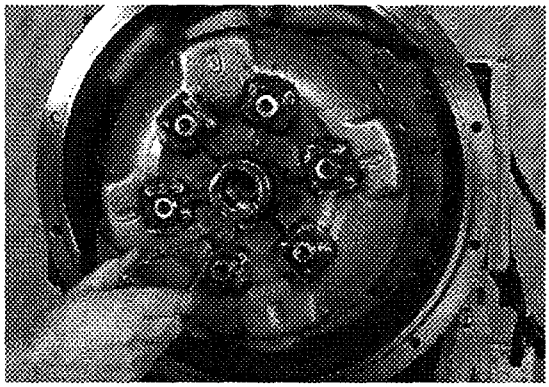


**Figure 6**
Remove torque converter to turbine shaft retainer ring.

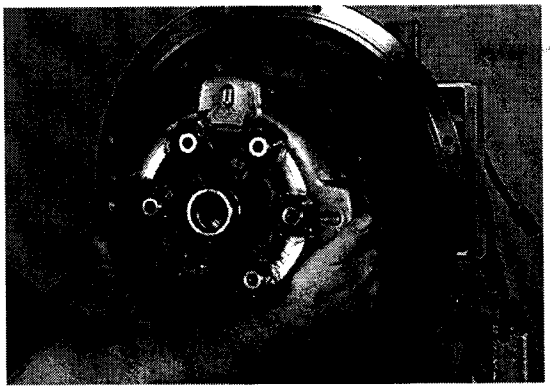


**Figure 7**
Remove torque converter assembly.

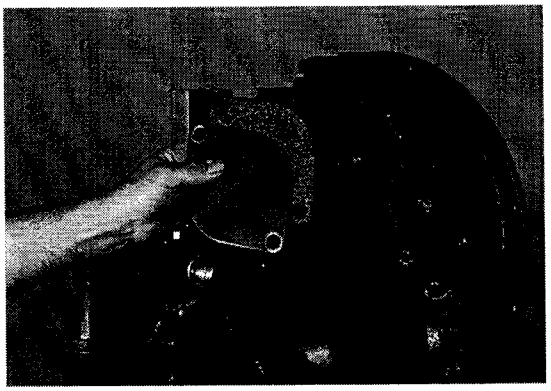


**Figure 10**
Remove charging pump permanent pump hole cover (not used when auxiliary pump is used).

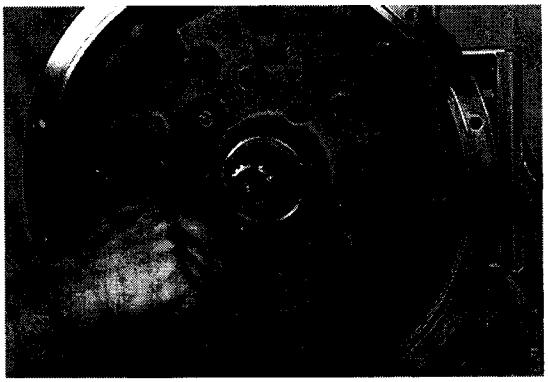


**Figure 8**
Remove torque converter to shaft locating ring.

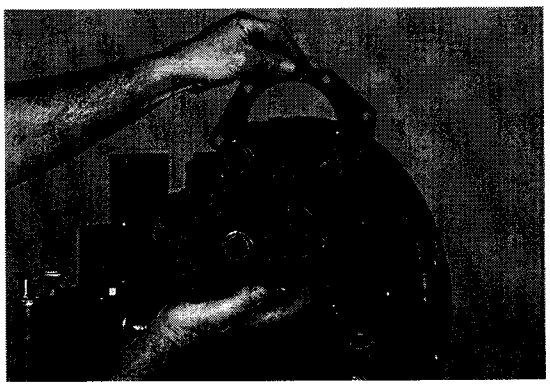


**Figure 11**
Remove pump mounting bolts and washers. Remove pump and gasket.

**Figure 9**
Remove filter assembly.

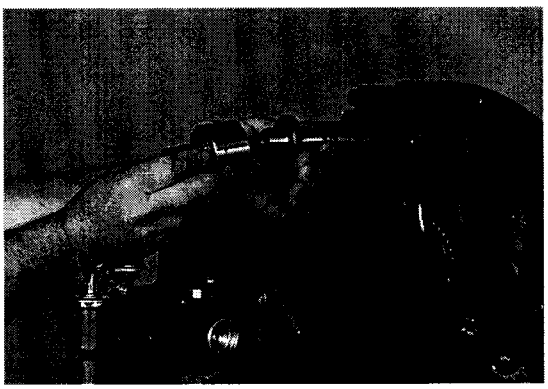


**Figure 12**
Remove pressure regulator and regulator sleeve.
**NOTE:** special tool can be fabricated. See Figure 427.

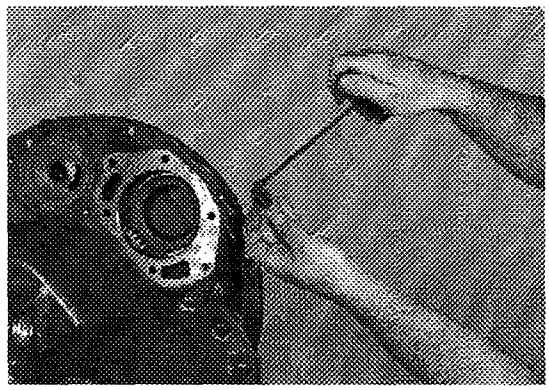


**Figure 13**
Remove sensor port plug and "O"-ring.

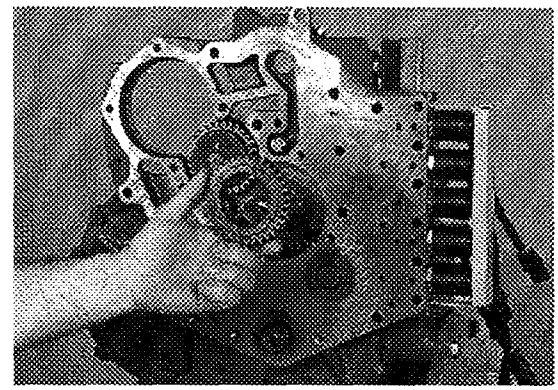


**Figure 16**
Remove impeller hub gear.

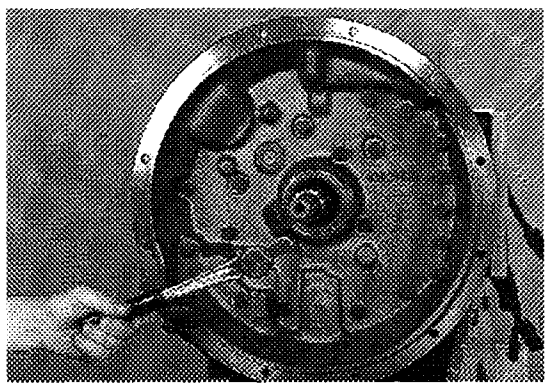


**Figure 14**
Remove converter housing to transmission case bolts and washers.

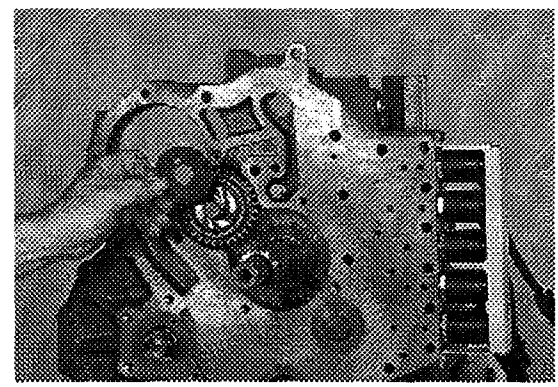


**Figure 17**
Remove pump drive idler gear washer.

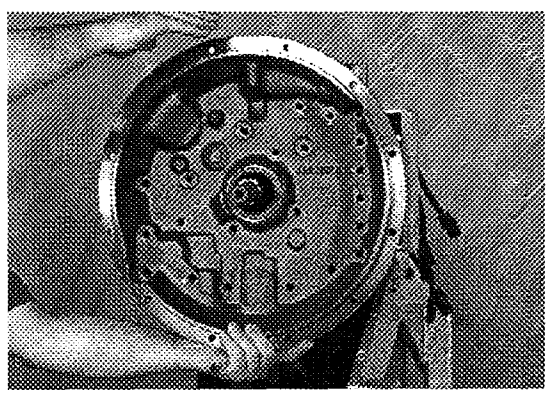


**Figure 15**
Remove converter housing and gasket.

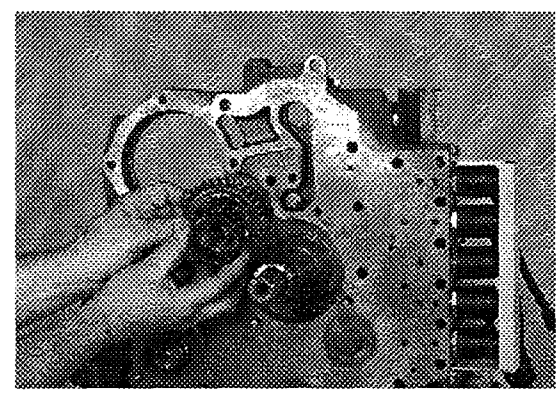


**Figure 18**
Remove pump drive gear and bearing.

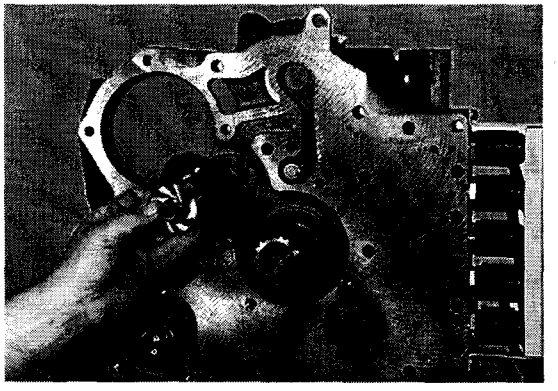


**Figure 19**
Remove pump drive idler shaft and washer.

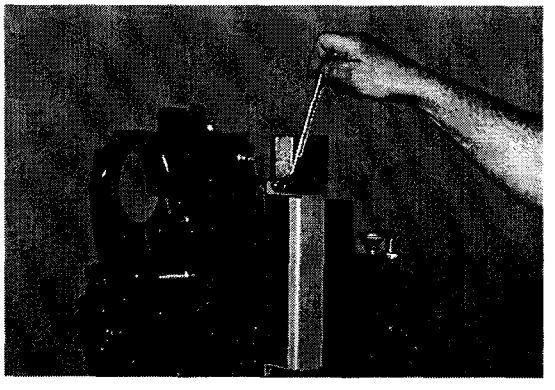


**Figure 20**
Remove solenoid protection cover screws.

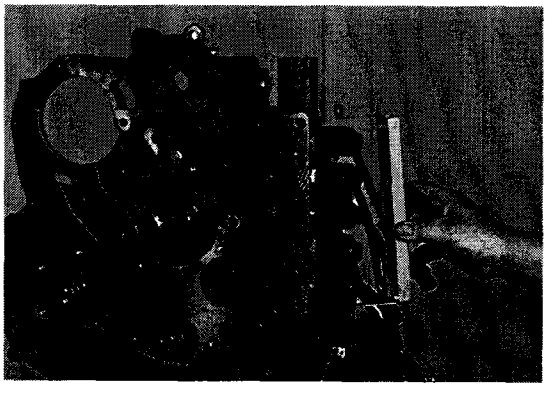


**Figure 21**
Remove solenoid protection cover .

**Figure 22**
Remove solenoid valve cartridge retainer nut and "O"-ring.

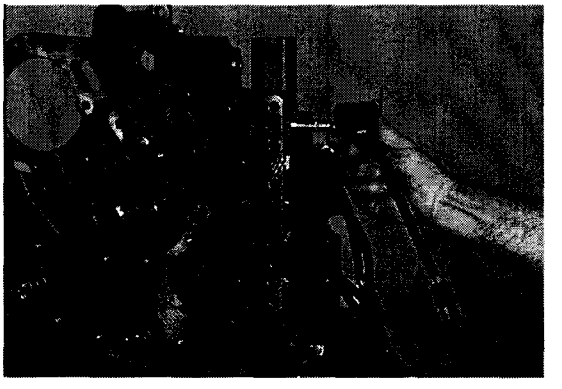


**Figure 23**
Remove solenoid coil and "O"-ring.

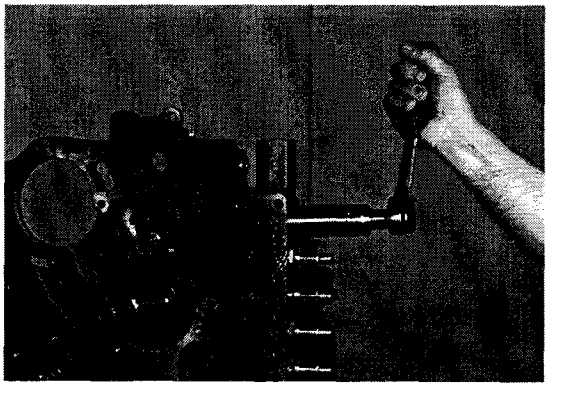


**Figure 24**
Remove valve cartridge and "O"-ring.

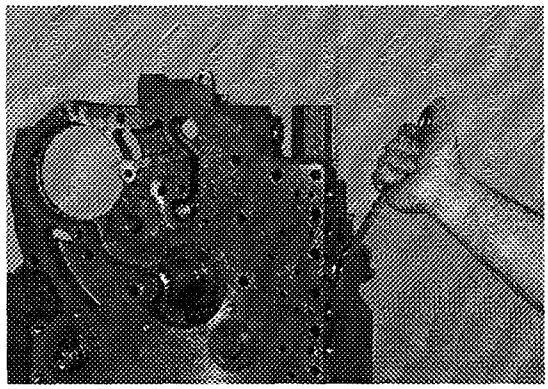


**Figure 25**

Repeat procedures figures 22 through 25 for remaining solenoid valves.
**NOTE:** A 3-speed will have a bore plug in the center box. Remove bore plug.

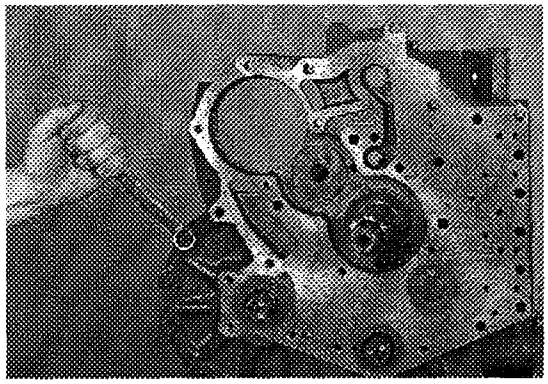


**Figure 26**

Remove spacer plate bolts and washers.

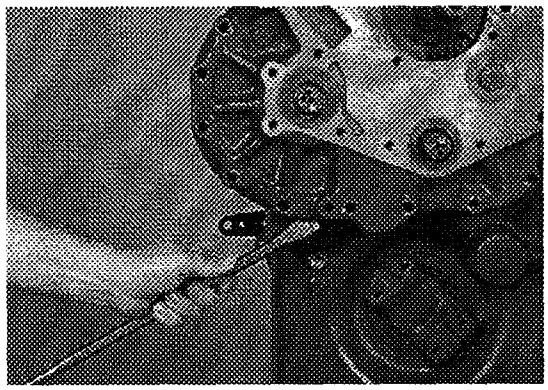


**Figure 27**

Pry spacer plate away from transmission case at dowel pin holes.

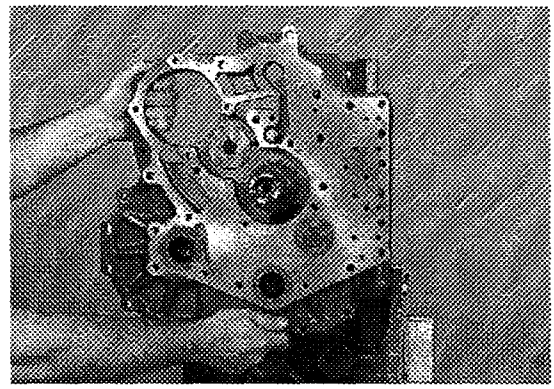


**Figure 28**

Remove spacer plate and gasket.

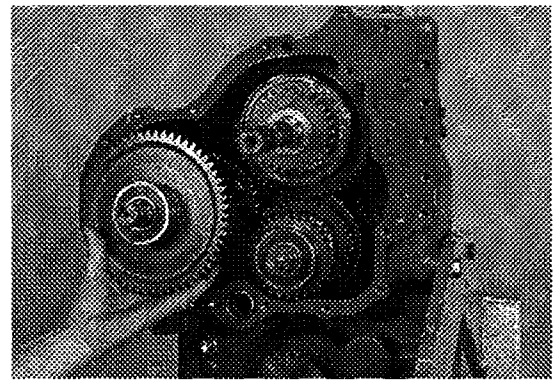


**Figure 29**

Remove 1st and 2nd clutch assembly.

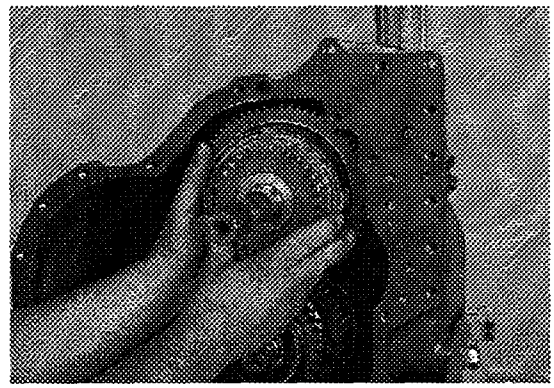


**Figure 30**

Remove forward and reverse clutch assembly.

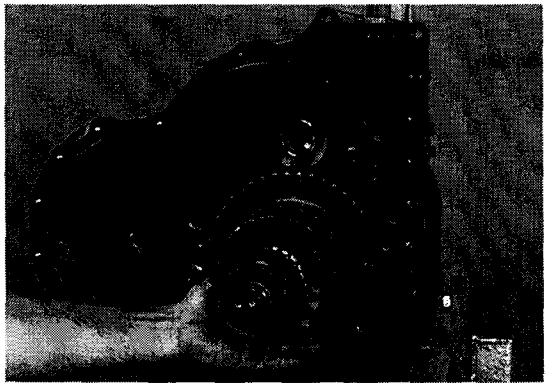


**Figure 31**
Remove high and 3rd clutch assembly.
**NOTE:** A 3-speed will only have 3rd clutch.

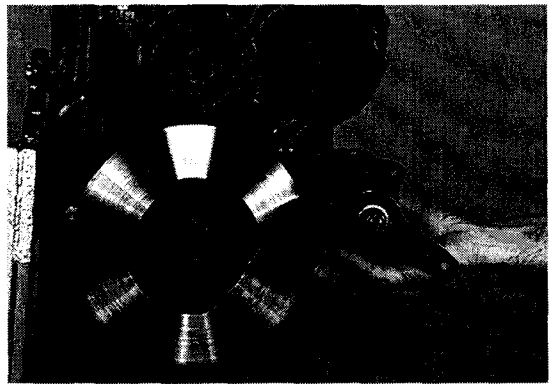


**Figure 34**
Remove brake caliper assembly.

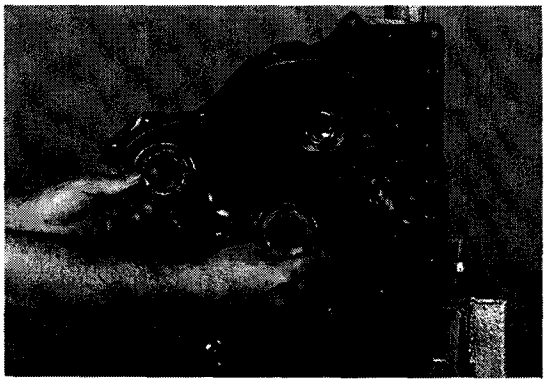


**Figure 32**
Remove clutch shaft rear bearing outer races.

**Figure 35**
Turn front output flange as shown. Remove retainer ring from ring groove and pry output flange from housing.

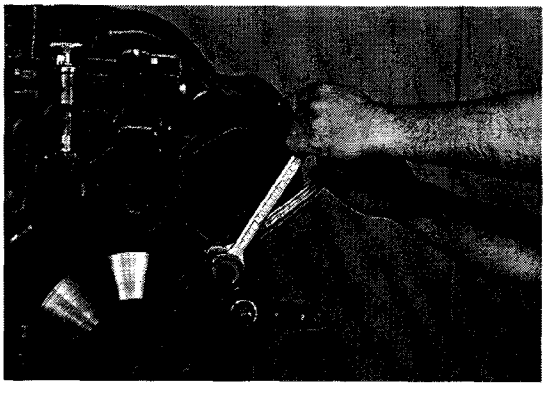


**Figure 33**
Remove brake disc assembly bolts from brake and housing.
**NOTE**: brake is an option and will not be on all units.

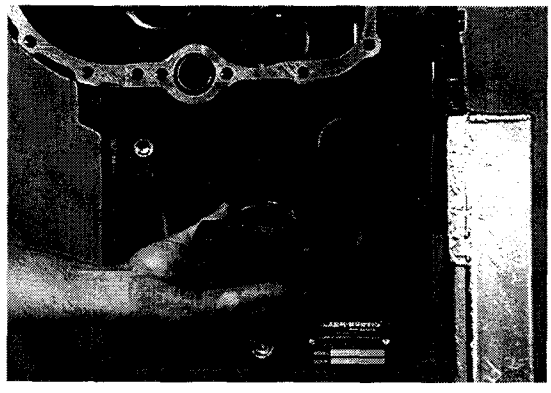


**Figure 36**
Output flange, oil seal sleeve and front bearing removed.

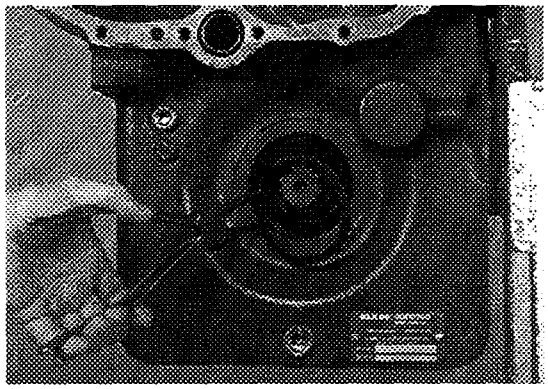


**Figure 37**
Remove bearing locating ring.

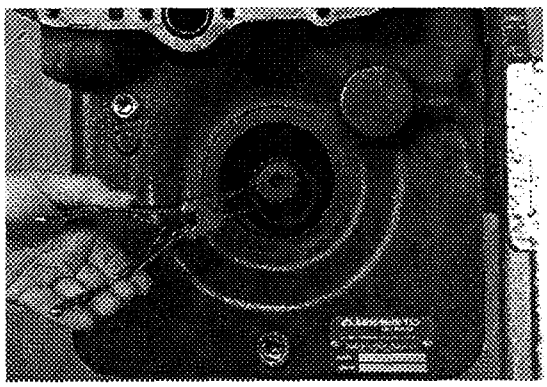


**Figure 38**
Remove output gear to shaft retainer ring.

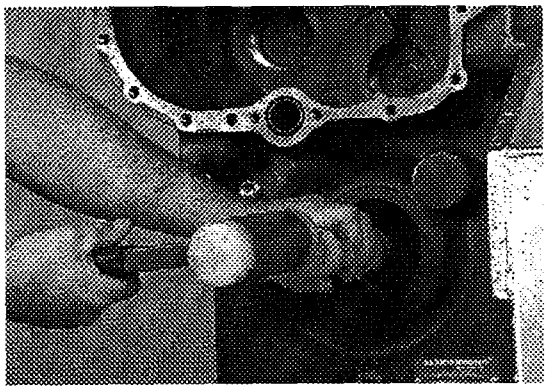


**Figure 39**
Tap output shaft and flange from housing.

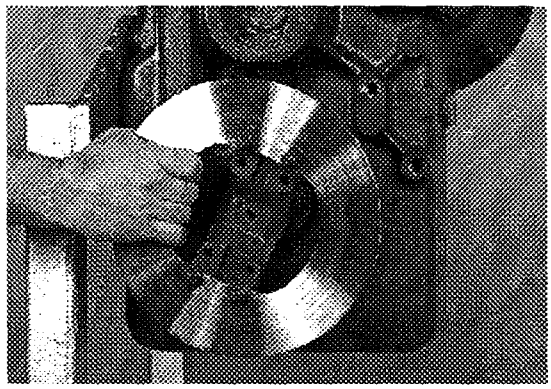


**Figure 40**
Flange removed.
**NOTE:** brake disc is optional and was removed with flange.

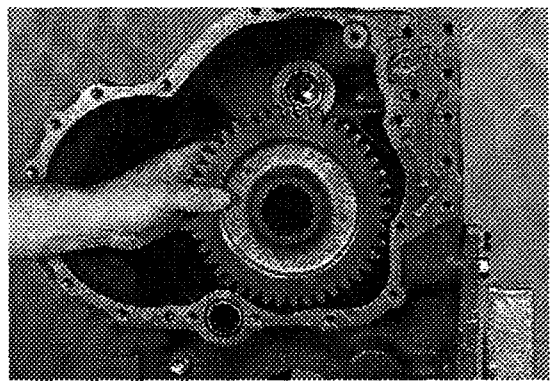


**Figure 41**
Remove output gear.

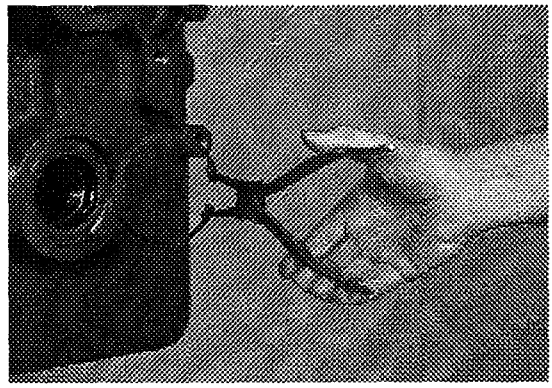


**Figure 42**
Remove flange oil seal sleeve retainer ring.

**Figure 43**
Remove sleeve and "O"-ring.

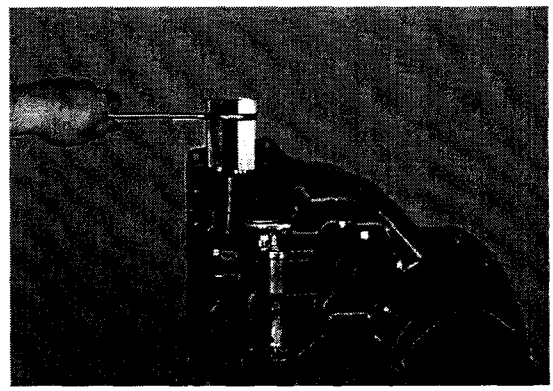


**Figure 46**
Remove modulator valve housing.
**NOTE:** for single modulation and hydraulic inching. See section 11.1.

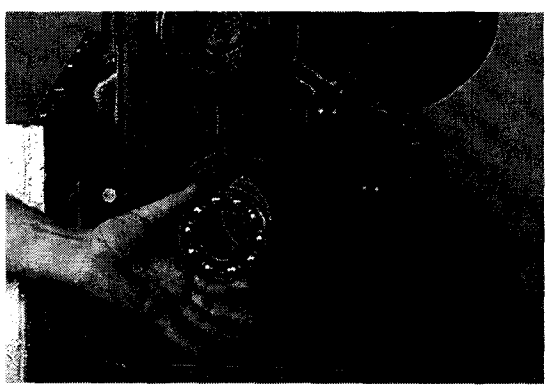


**Figure 44**
Remove output shaft rear bearing.

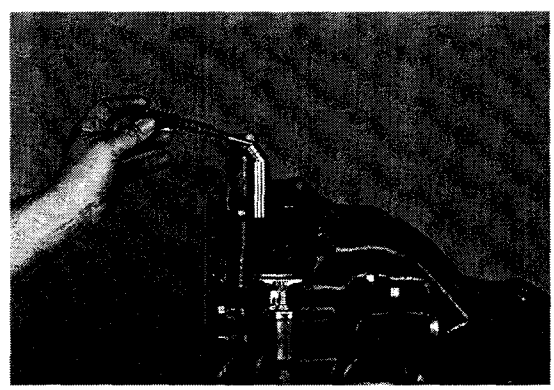


**Figure 47**
Remove inner, middle and outer springs.
Remove valve stop pin and accumulator spool.
Remove regulator spool and sleeve assembly.

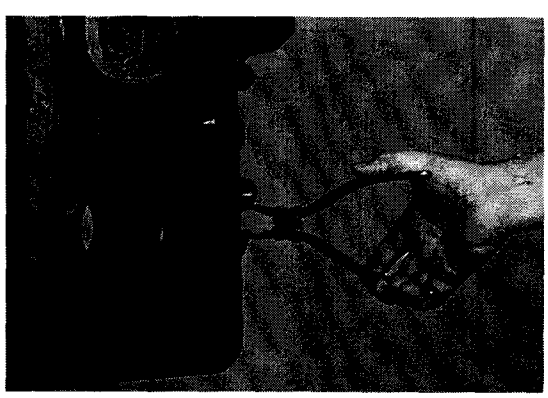


**Figure 45**
Remove bearing locating ring.

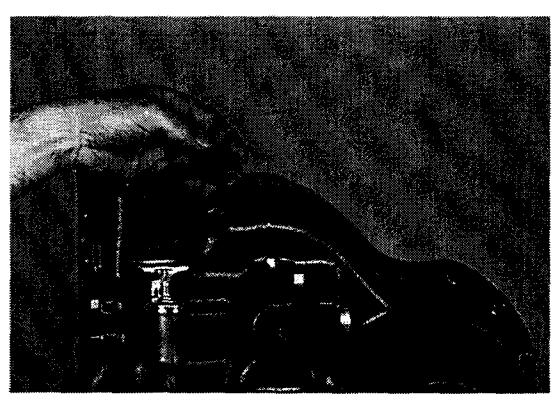


**Figure 48**
Remove sensor hole plug and "O"-ring.

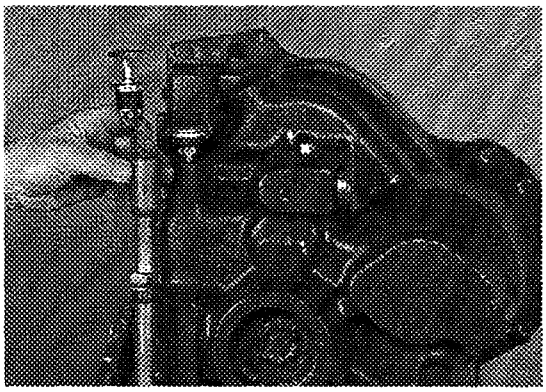


**Figure 49**
Remove dipstick and dipstick tube.

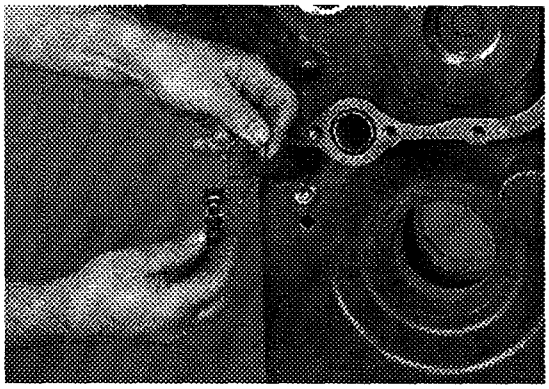


**Figure 52**
Tube retainer, screw, sealwasher, clip, washer and nut removed as shown.

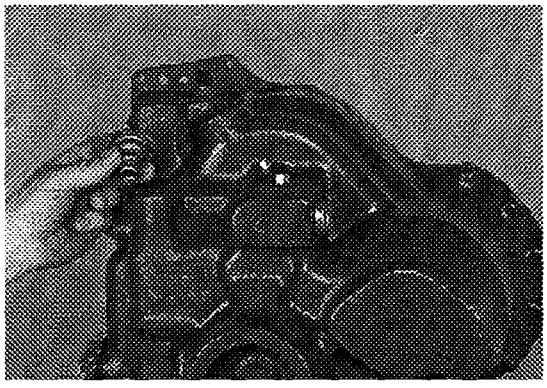


**Figure 50**
Remove air breather.

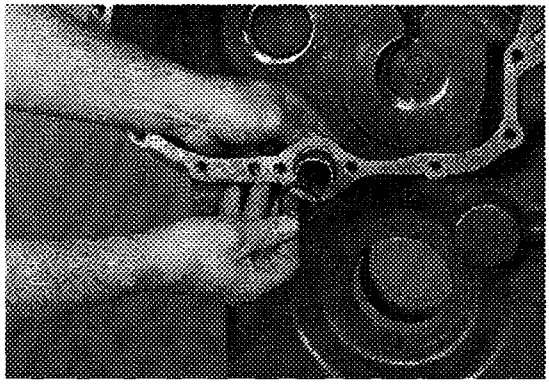


**Figure 53**
Remove supply tube "O"-ring.

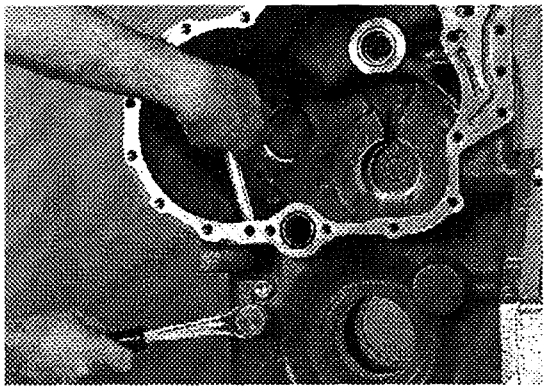


**Figure 51**
Remove supply tube retainer screw.

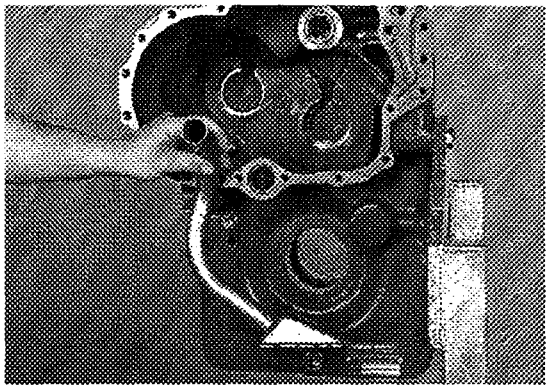


**Figure 54**
Remove supply tube and screen assembly.

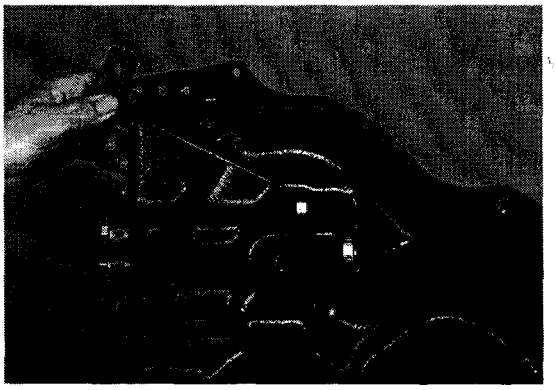


**Figure 55**
Remove oil sleeve distributor lock screw plug. Remove lock screw.

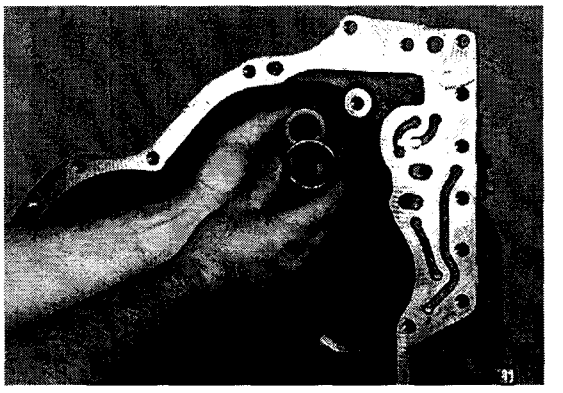


**Figure 58**
Pilot bearing and oil distributor sleeve removed.

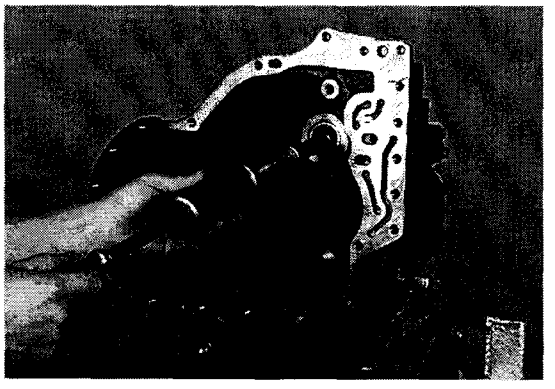


**Figure 56**
Use a hammer puller as shown to remove distributor sleeve.

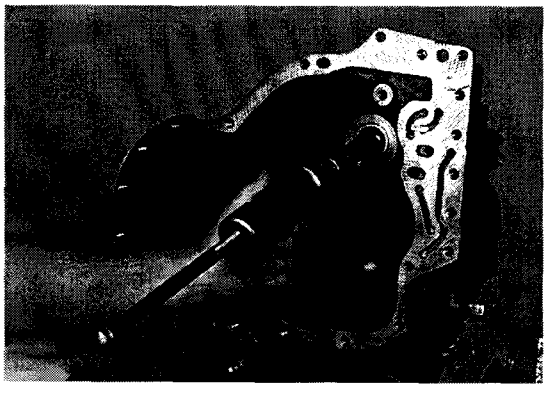


**Figure 57**
Sleeve being removed. Remove pilot bearing.

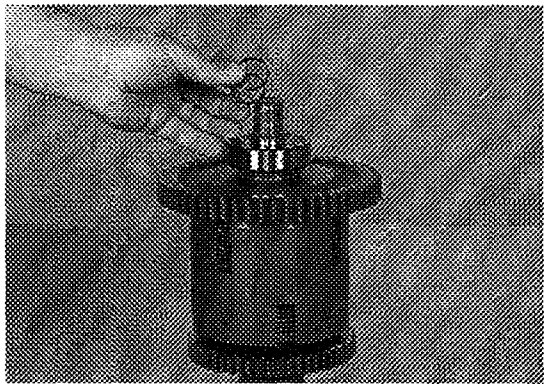


**Figure 59**
Remove clutch shaft oil sealing rings.

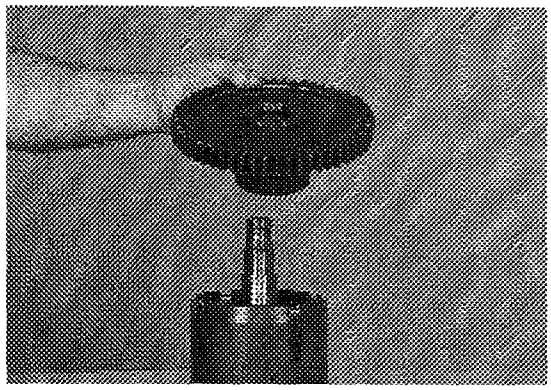


**Figure 62**
Remove clutch gear and disc hub.

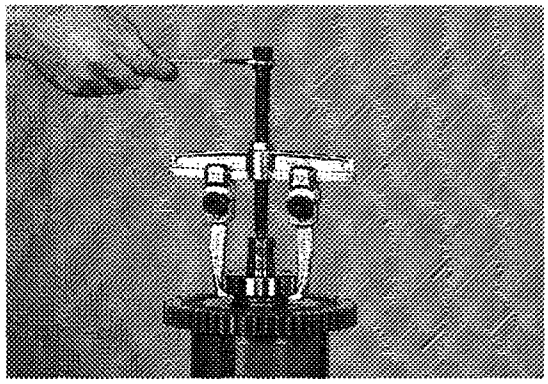


**Figure 60**
Remove front bearing.

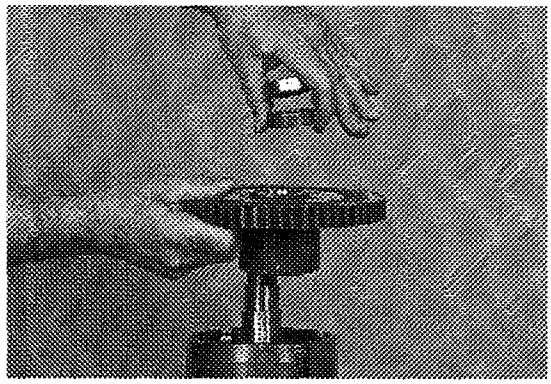


**Figure 63**
Clutch gear and pilot bearings removed.

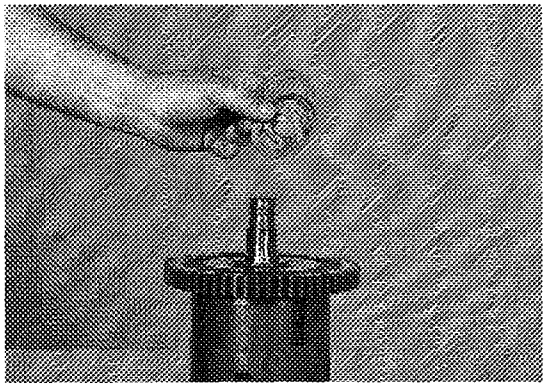


**Figure 61**
Remove outer thrust washer, bearing and inner thrust washer.

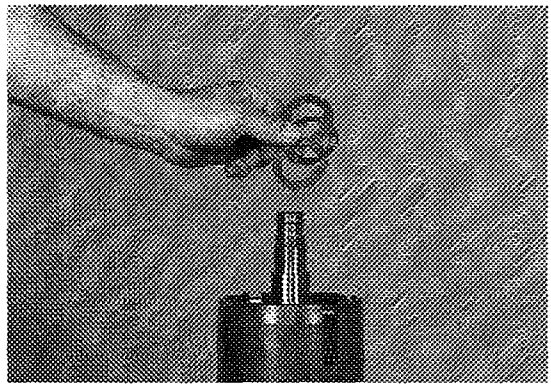


**Figure 64**
Remove outer thrust washer, thrust bearing and inner thrust washer.

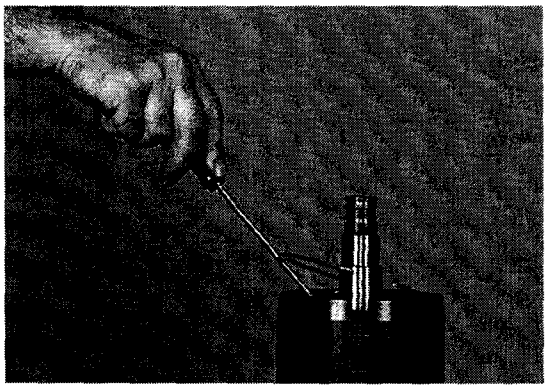


**Figure 65**
Remove clutch disc end plate retainer ring.

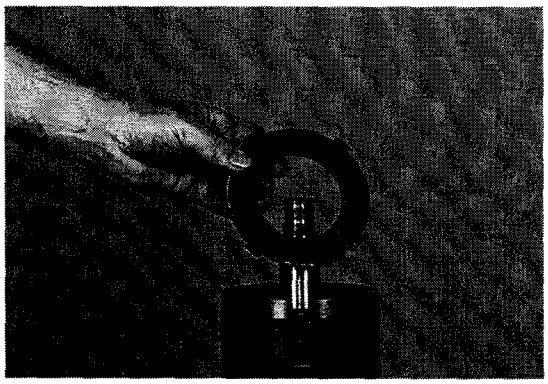


**Figure 66**
Remove clutch disc end plate.

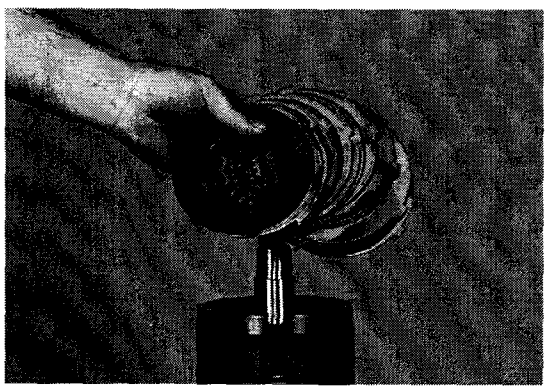


**Figure 67**
Remove inner and outer clutch discs.

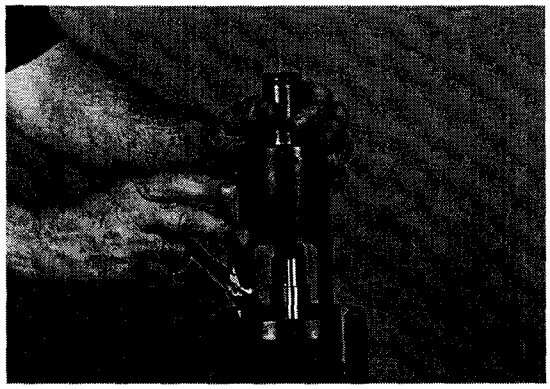


**Figure 68**
Compress disc springs and remove retainer ring.

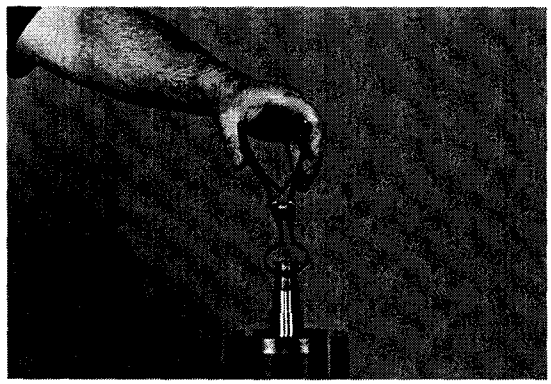


**Figure 69**
Remove retainer ring.

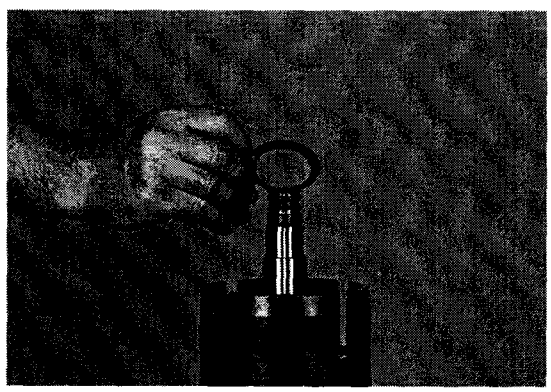


**Figure 70**
Remove retainer ring retainer.

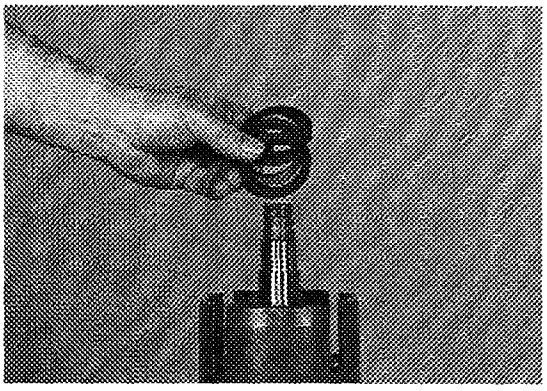


**Figure 71**
Remove disc spring.
**NOTE:** See page 10-85.

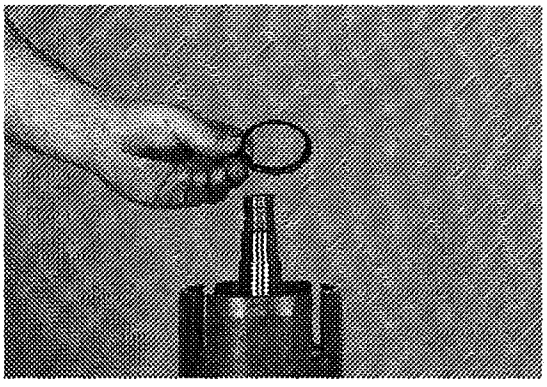


**Figure 72**
Remove clutch piston wear plate.

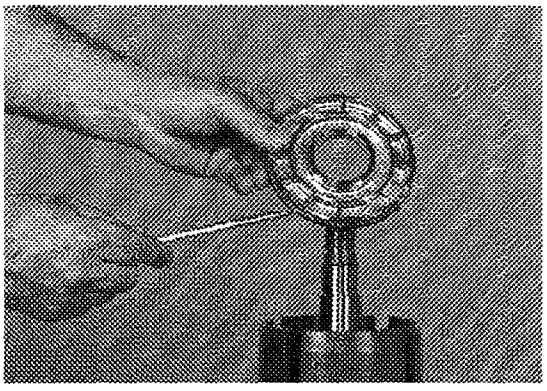


**Figure 73**
Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston.

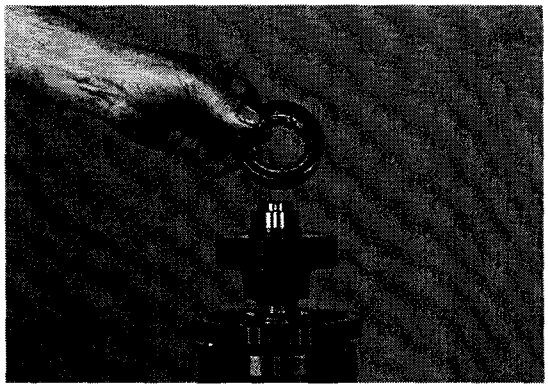


**Figure 74**
Remove clutch shaft rear bearing outer race.

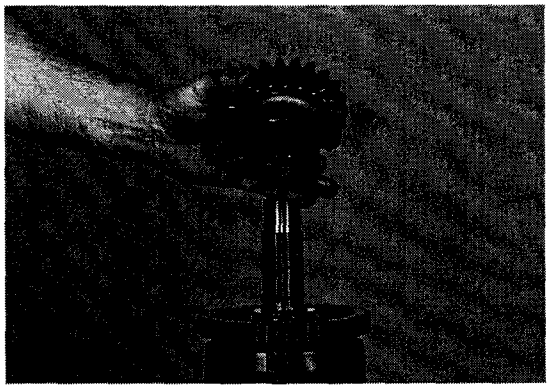


**Figure 77**
Remove gear from shaft.

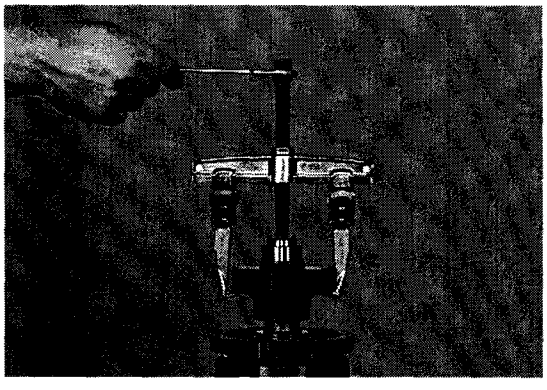


**Figure 75**
Using a gear puller as shown, remove gear and rear bearing inner race.

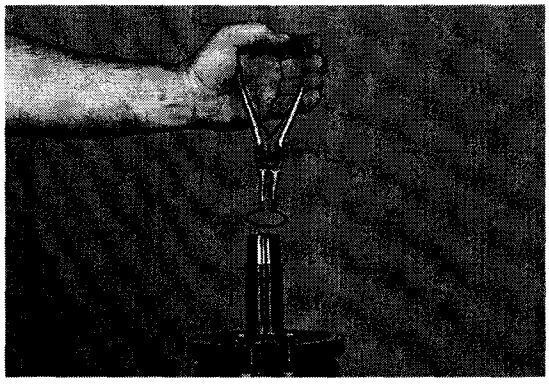


**Figure 78**
Remove gear locating ring from shaft.

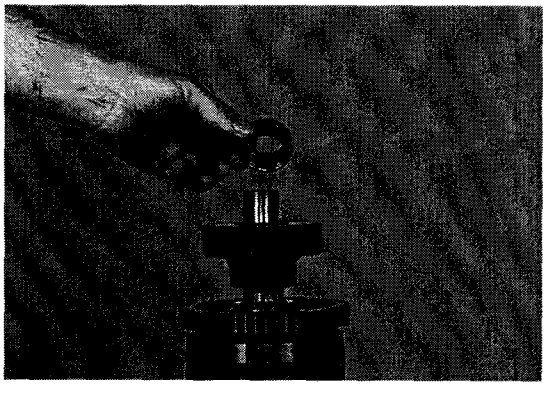


**Figure 76**
Remove inner race from shaft.

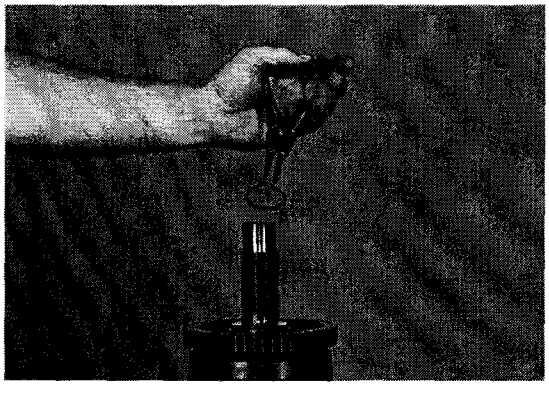


**Figure 79**
Remove thrust bearing and clutch gear retainer ring.

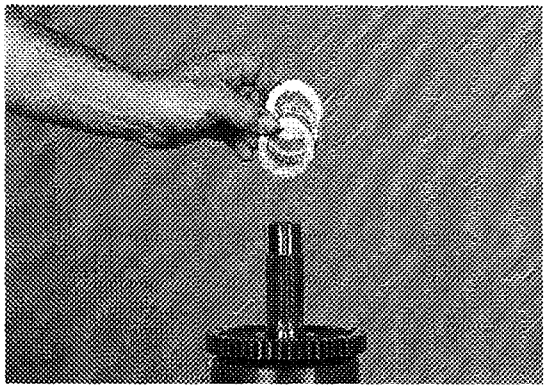


**Figure 80**
Remove outer thrust washer, thrust bearing and inner thrust washer.

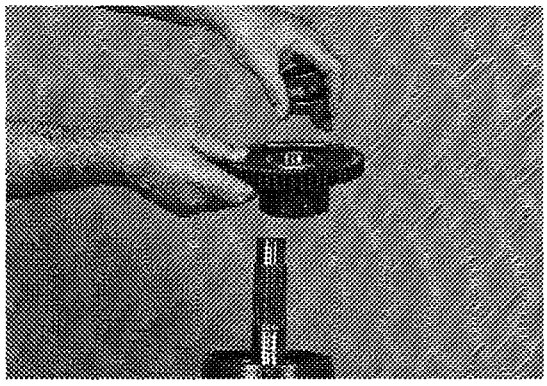


**Figure 81**
Remove clutch gear and hub and gear bearings.

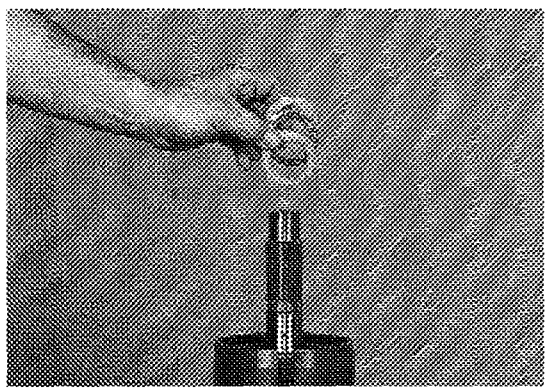


**Figure 82**
Remove outer thrust washer, thrust bearing and inner thrust washer.

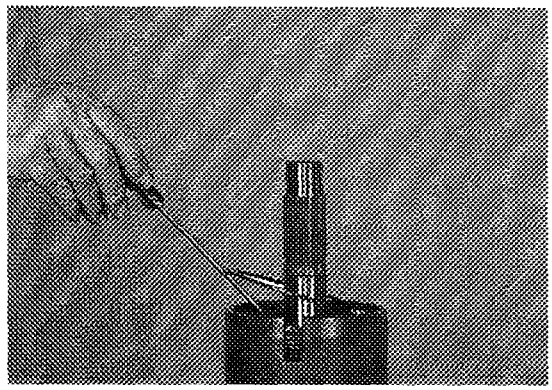


**Figure 83**
Remove clutch disc and end plate retainer ring.

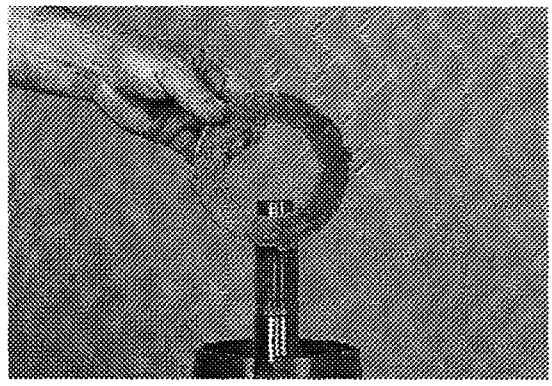


**Figure 84**
Remove end plate.

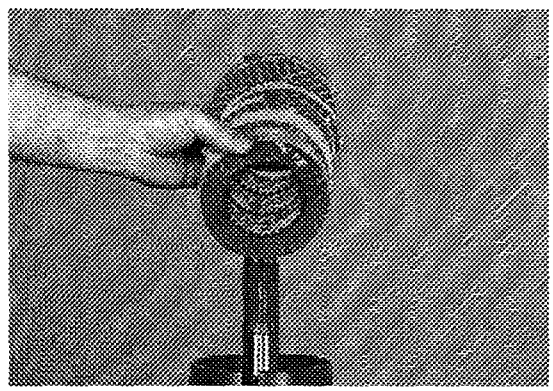


**Figure 85**
Remove inner and outer clutch discs.

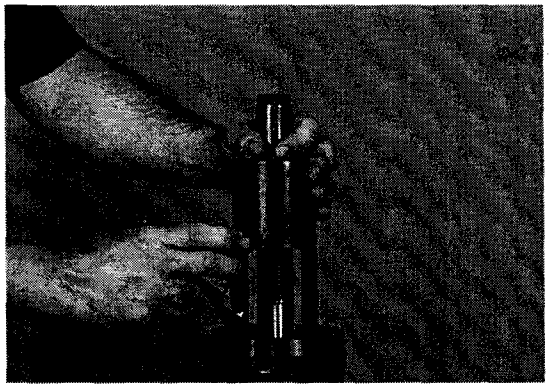


**Figure 86**
Compress disc springs and remove retainer ring.

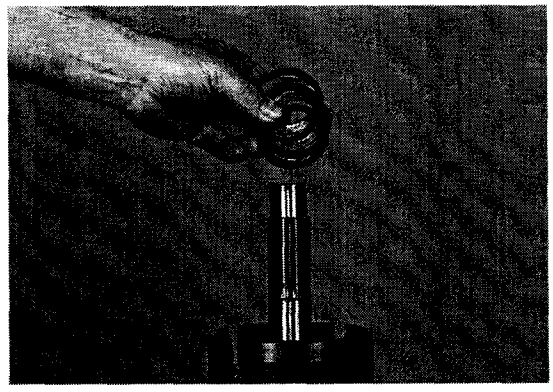


**Figure 89**
Remove disc springs.
**NOTE**: see page 10-85.

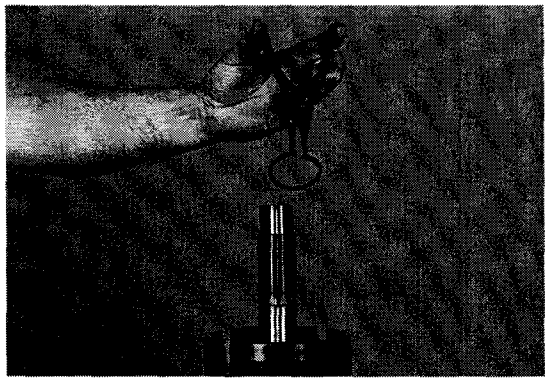


**Figure 87**
Remove retainer ring.

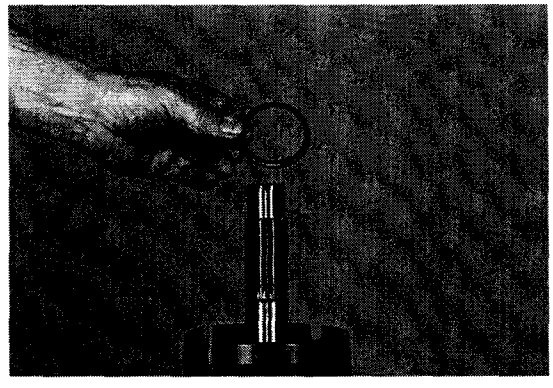


**Figure 90**
Remove clutch piston wear plate.

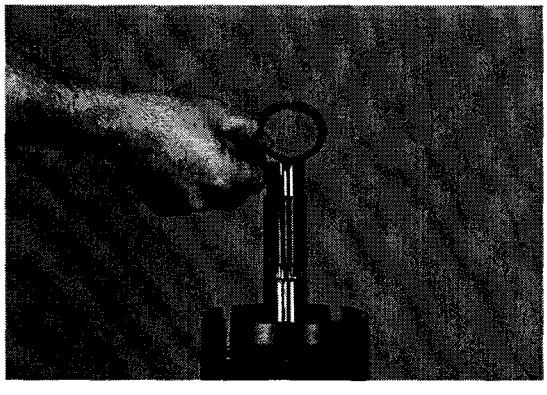


**Figure 88**
Remove retainer ring retainer.

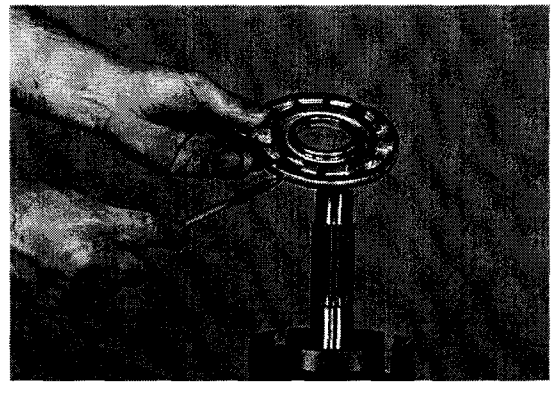


**Figure 91**
Remove clutch piston.

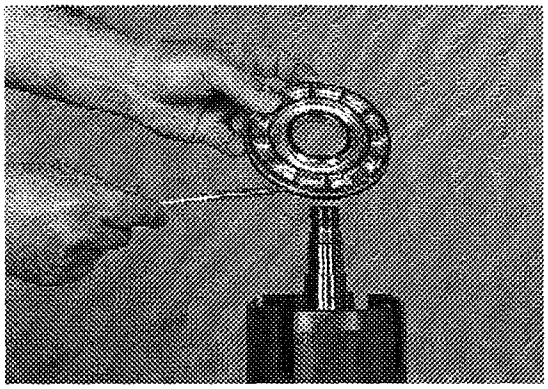


**Figure 92**

The two bleed valves in the clutch drum must be clean and free of any foreign material.
Refer to the "Cleaning and inspection" pages.
Install clutch piston outer seal ring.

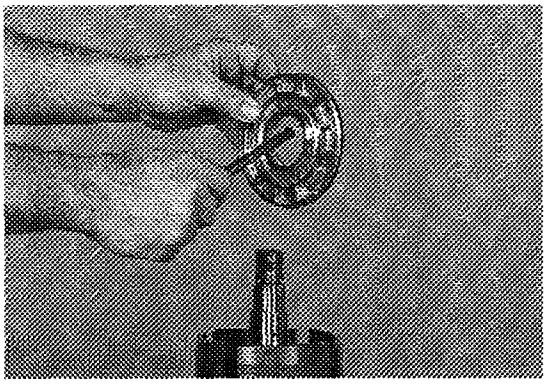


**Figure 93**

Install clutch piston inner seal ring.
**NOTE:** Ring must be sized before installing in clutch drum. Sizing is best accomplished by rotating piston while holding a round object against the new seal ring as shown. Rotate piston until seal ring is flush with outer diameter of piston.

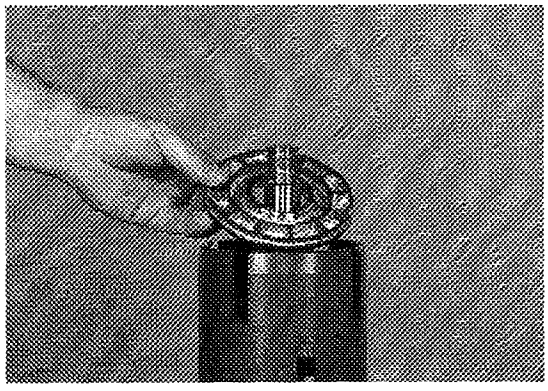


**Figure 94**

Position piston in low clutch drum as shown. Use caution as not to damage inner and outer piston sealing rings.

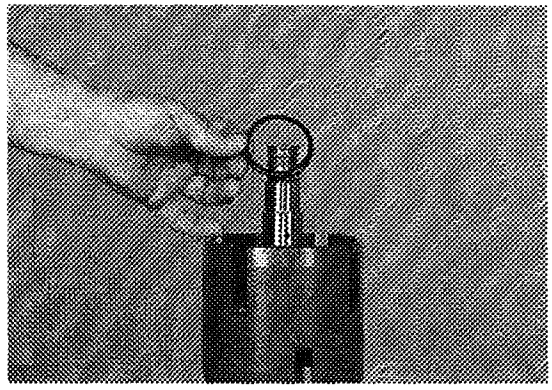


**Figure 95**

Position clutch piston wear plate on piston.

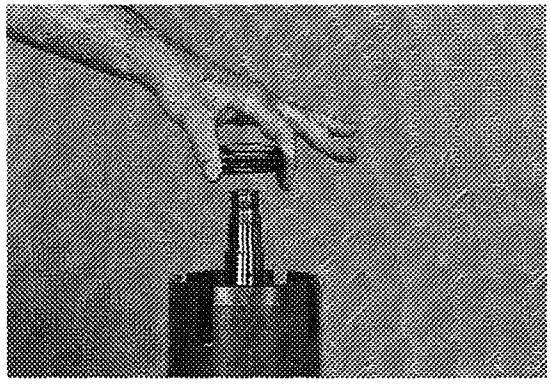


**Figure 96**

Install piston return disc springs. First spring with large diameter of bevel toward wear plate.
Alternate seven (7) springs. **NOTE:** see page 10-85.

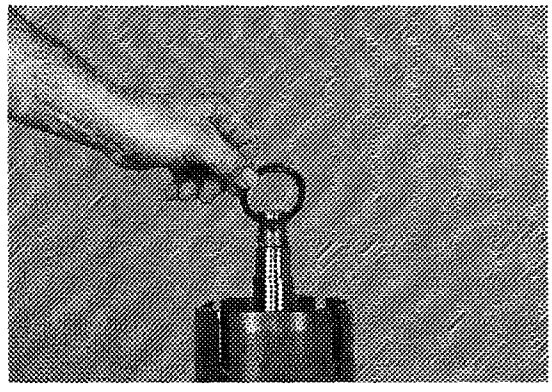


**Figure 97**

Position return spring retainer on clutch shaft.

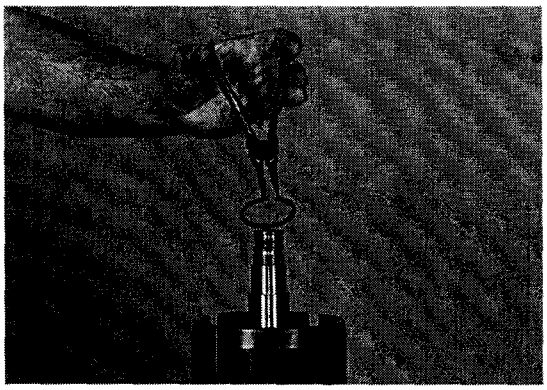


**Figure 98**
Start ring on shaft with snap ring pliers.

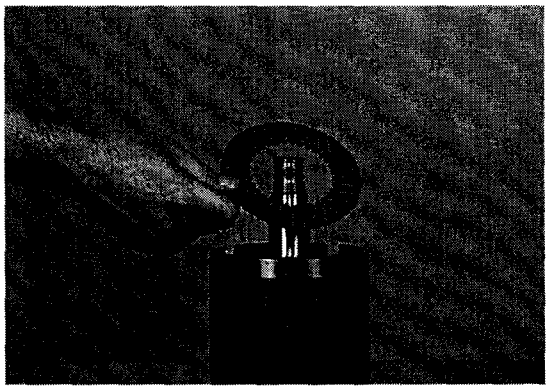


**Figure 101**
Install first friction (inner) clutch disc.
Alternate steel and friction until ten (10) steel and ten (10) friction discs are in position.

**Figure 99**
Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and seat retainer ring. Be sure ring is in full position in groove.

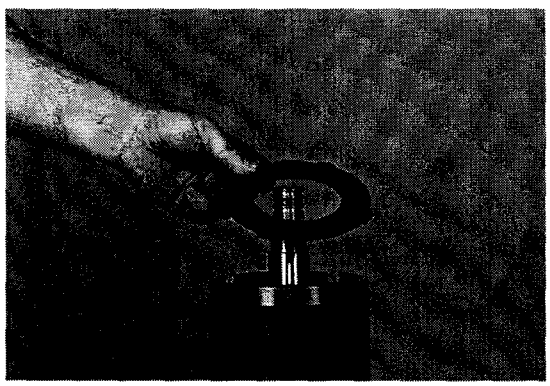


**Figure 102**
Install clutch disc end plate.

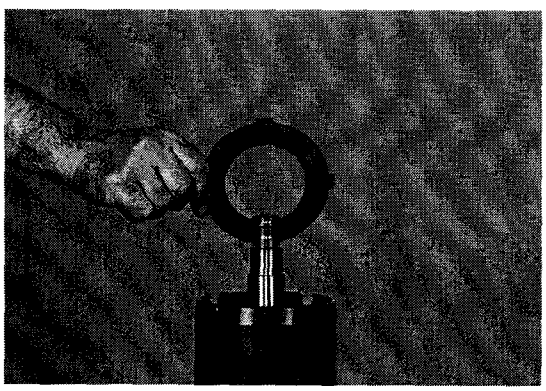


**Figure 100**
Install first steel outer clutch disc.

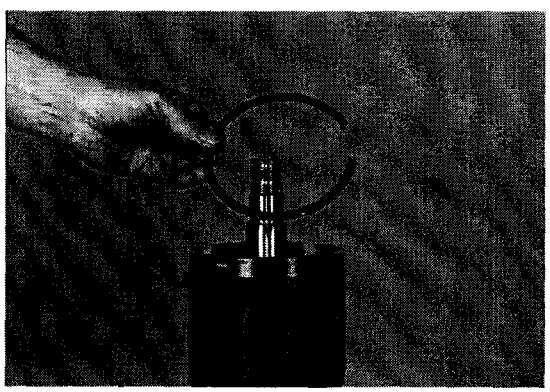


**Figure 103**
Install end plate retainer ring.

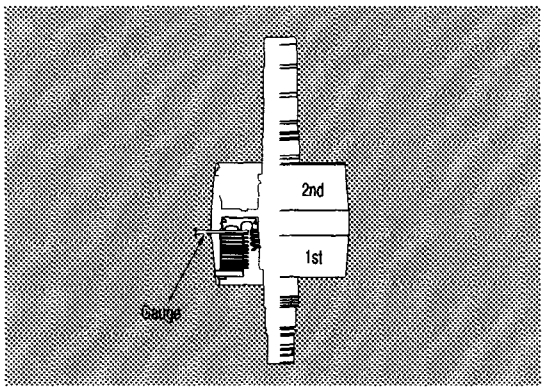



**Figure 104**

**NOTE**: Low (1st) clutch pack must be checked for clutch disc clearance. Stand the clutch assembly on end. The clutch discs on the bottom will fall to the end plate. Measure the distance between the clutch piston and the first steel disc by inserting a feeler gauge or taper gauge through the slots in the clutch drum. The required clearance is .080-.135 [2.03-3.43]. If the clearance is greater than .135 [3.43], add one steel disc under the end plate.

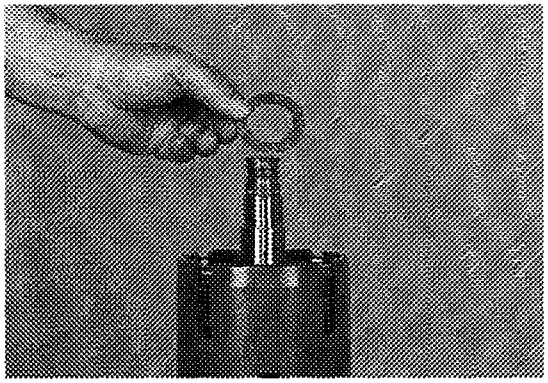


**Figure 105**

Position thrust bearing inner washer on clutch shaft.

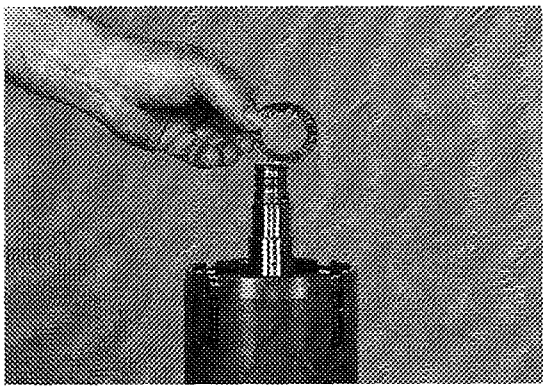


**Figure 106**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

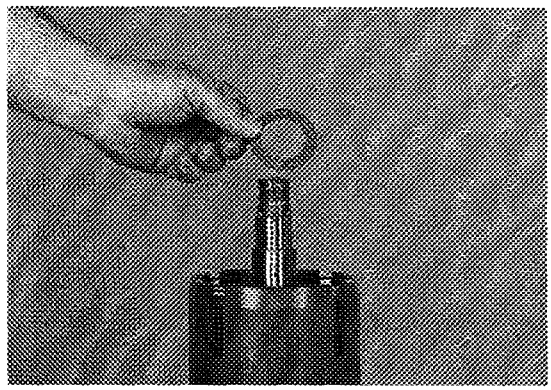


**Figure 107**

Install outer thrust bearing washer against bearing.

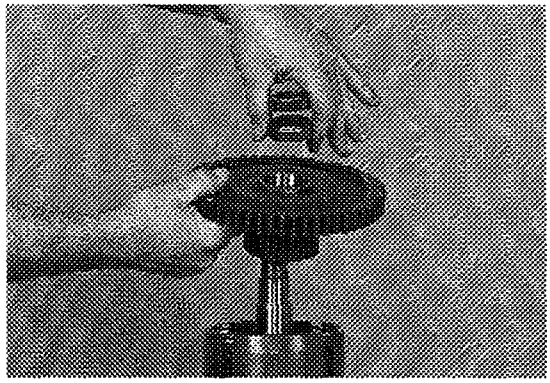


**Figure 108**

Press bearings in clutch gear and disc hub, being certain bearings are pressed flush with face of gear on both sides.

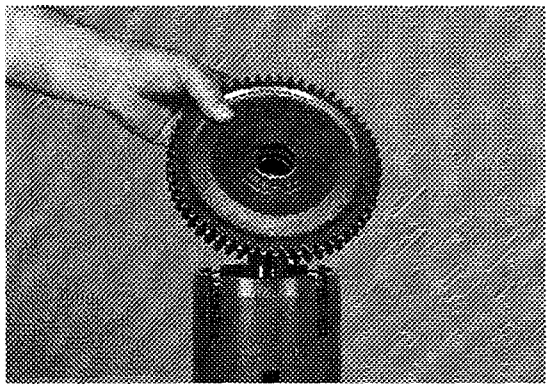


**Figure 109**

Install clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs.
Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

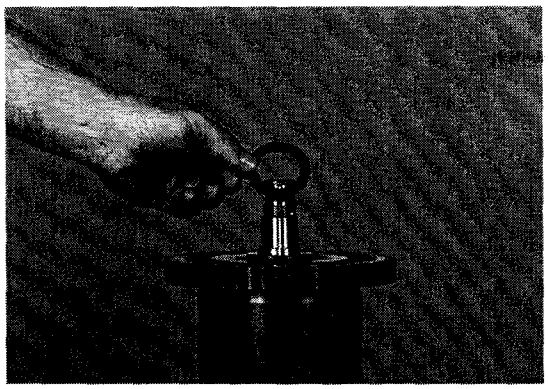


**Figure 110**
Position inner thrust washer on shaft.

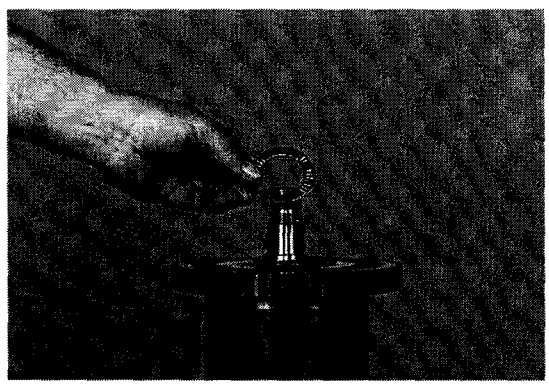


**Figure 111**
Position thrust bearing on shaft.

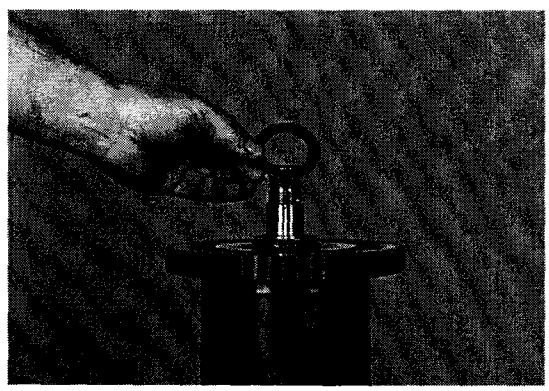


**Figure 112**
Position outer thrust washer on shaft.

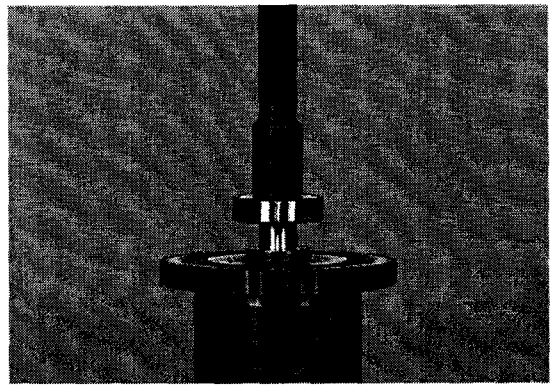


**Figure 113**
Install clutch shaft front bearing.
**NOTE:** bearing has a shield in it.
This shield must be up.

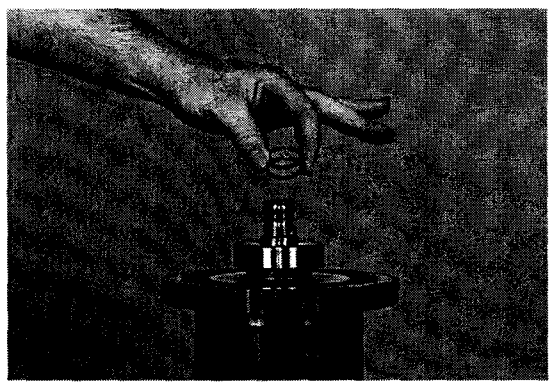
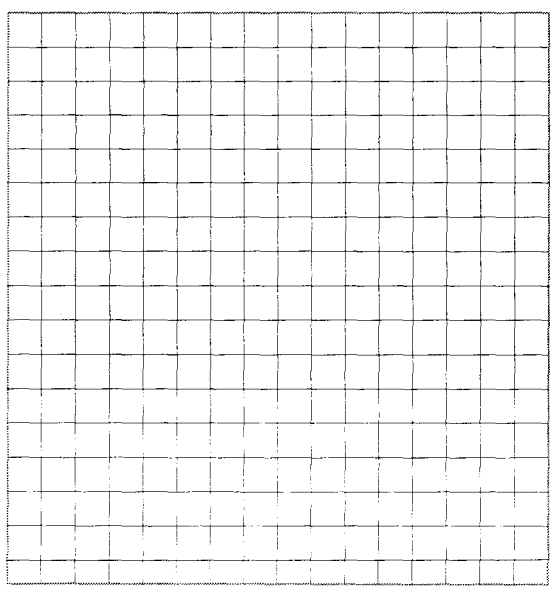


**Figure 114**
Install clutch shaft oil sealing rings.
Grease rings to facilitate reassembly into front housing.



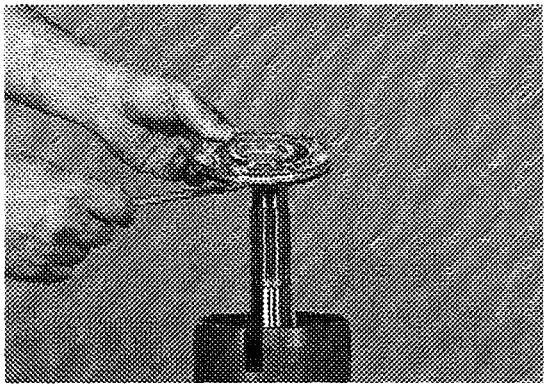


**Figure 115**

Install inner and outer clutch piston seal rings.
Size inner ring as explained in figure 93.
Refer to the cleaning and inspection pages.

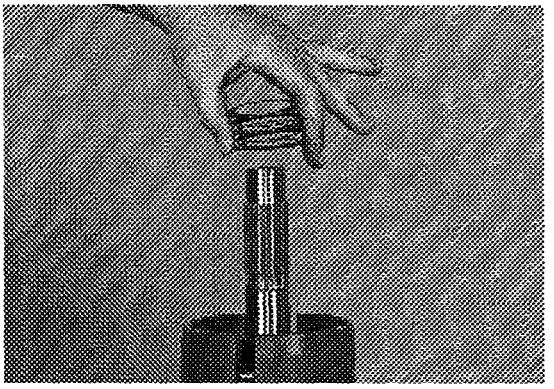


**Figure 118**

Install piston return disc springs. First spring with large diameter of bevel towards wear plate.
Alternate (5) springs. **NOTE:** see page 10-85.

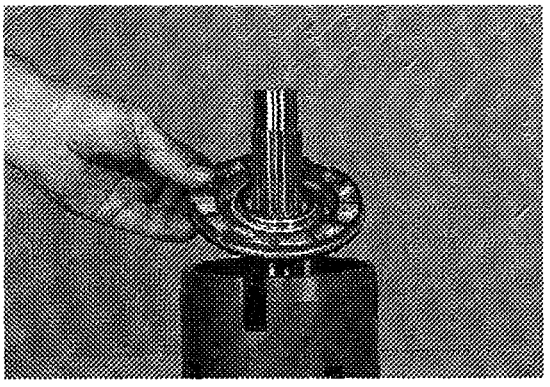


**Figure 116**

Position piston in clutch drum, using caution as not to damage piston sealing rings.

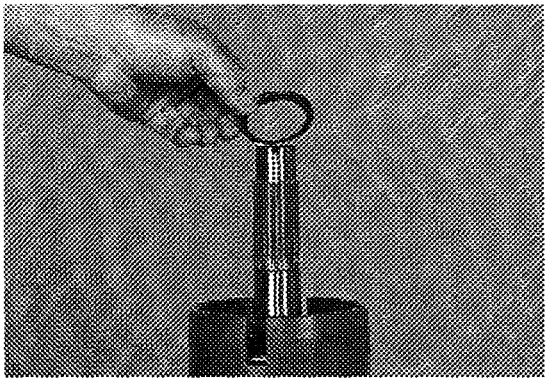


**Figure 119**

Position return spring ring retainer on clutch shaft.

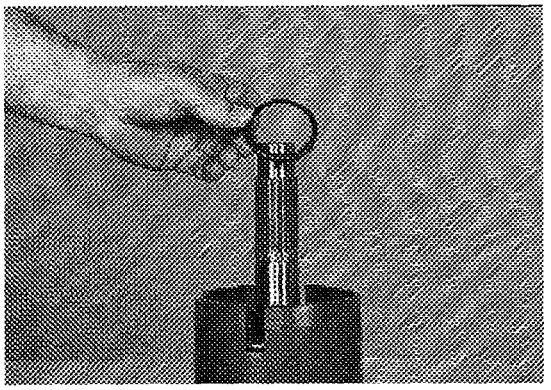


**Figure 117**

Install clutch piston wear plate.

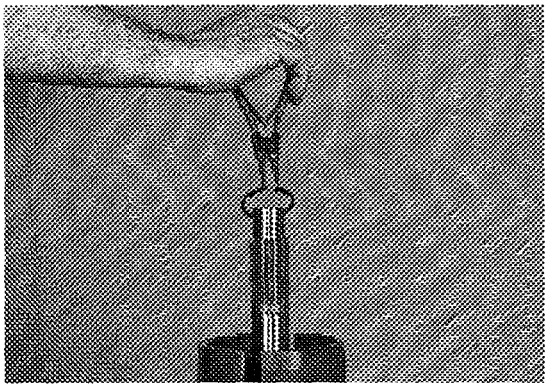


**Figure 120**

Start ring on shaft with snap ring pliers.

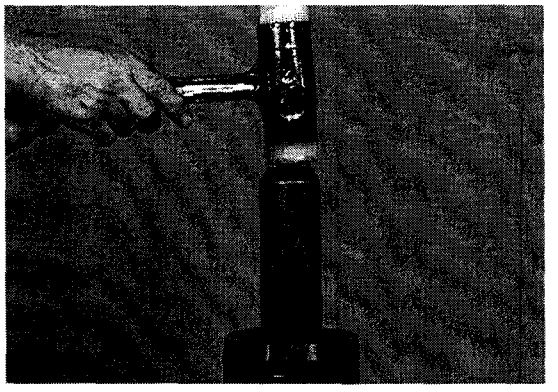


**Figure 121**
Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a shaft hammer will compress springs and seat retainer ring. Be sure ring is in full position in groove.

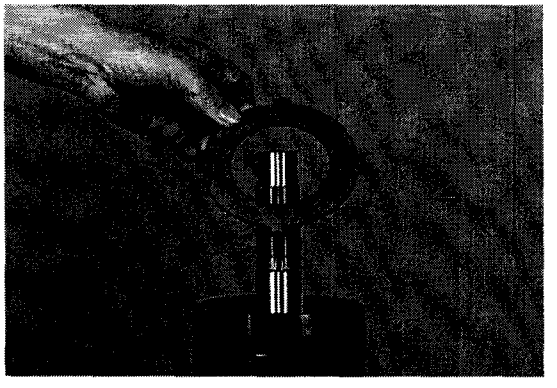


**Figure 122**
Install first steel (outer) clutch disc.

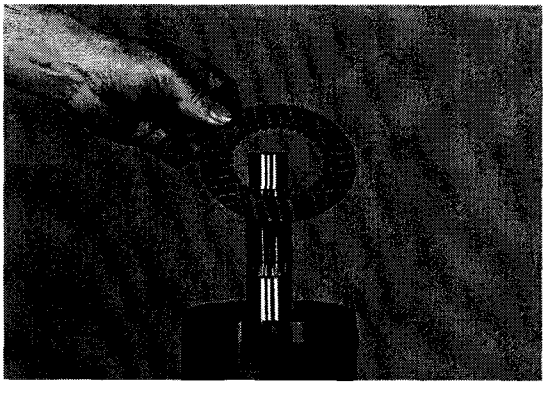


**Figure 123**
Install first friction (inner) clutch disc. Alternate steel and friction until five (5) steel and five (5) friction discs are in position.

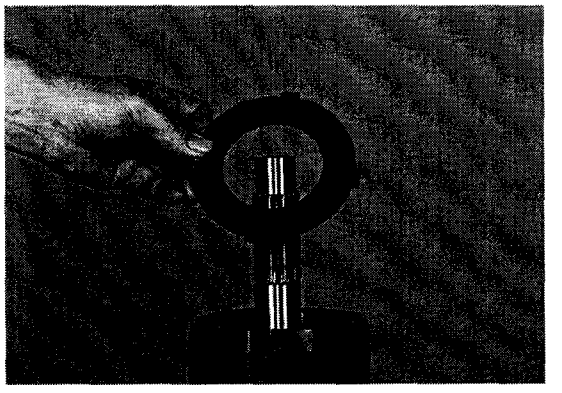


**Figure 124**
Install clutch disc end plate.

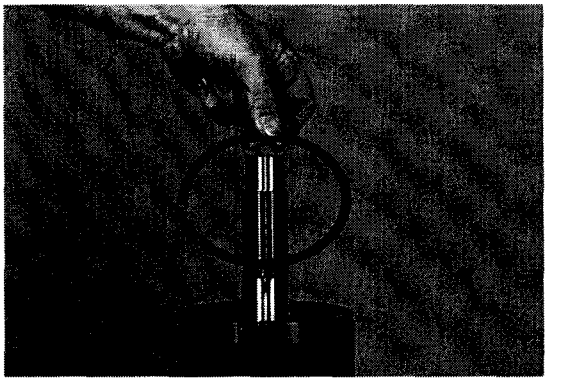


**Figure 125**
Install end plate retainer ring.

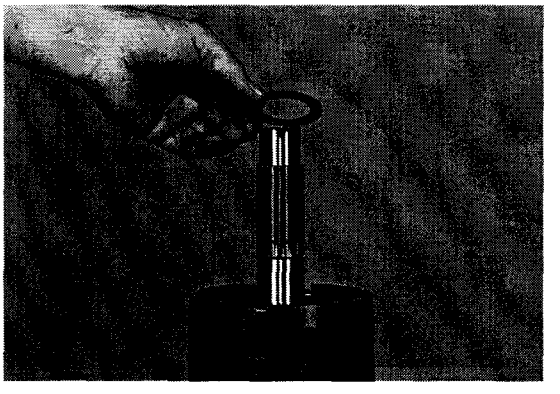


**Figure 126**
Position thrust bearing inner washer on clutch shaft.

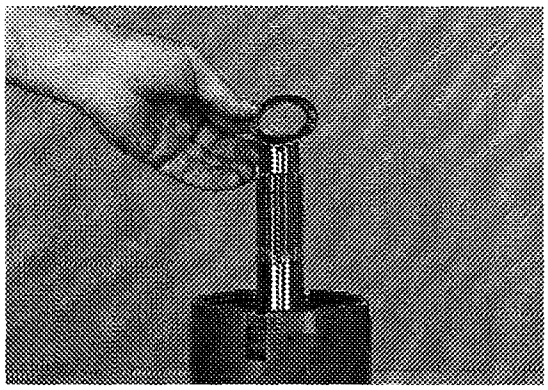


**Figure 127**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

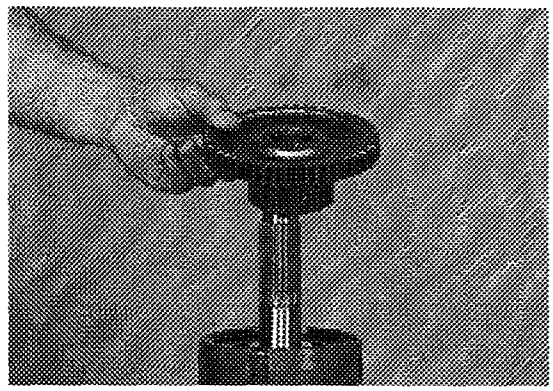


**Figure 130**

Install the clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs. Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

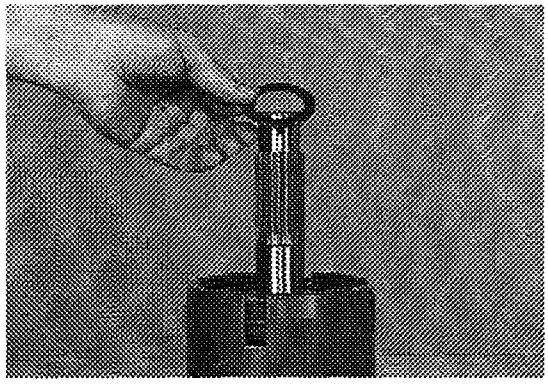


**Figure 128**

Install outer thrust bearing washer against thrust bearing.

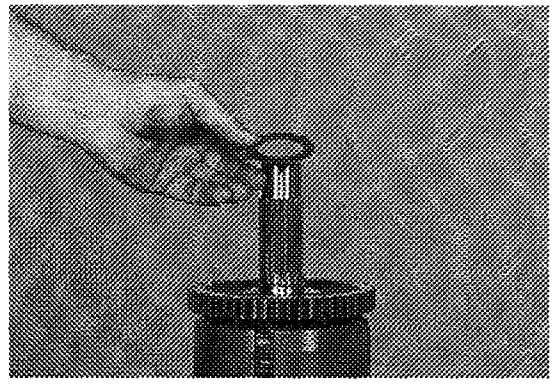


**Figure 131**

Position thrust bearing inner washer on clutch shaft.

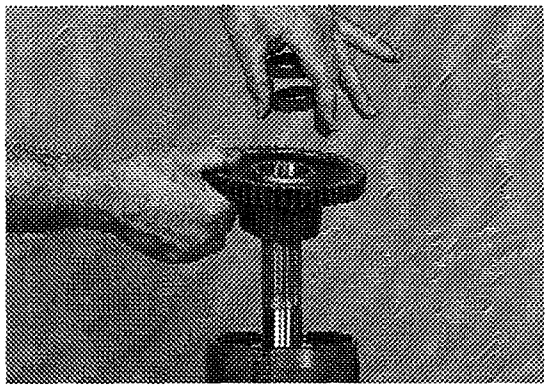


**Figure 129**

Press needle bearings in clutch gear and disc hub, being certain bearings are pressed with face of gear on both sides.

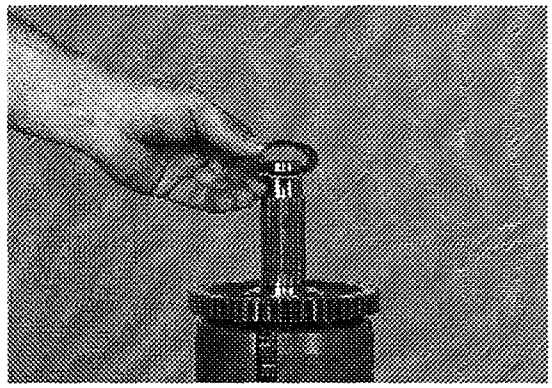


**Figure 132**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

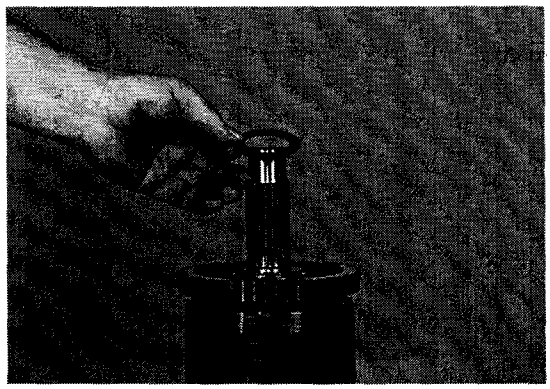


**Figure 133**
Install outer thrust bearing washer against bearing.

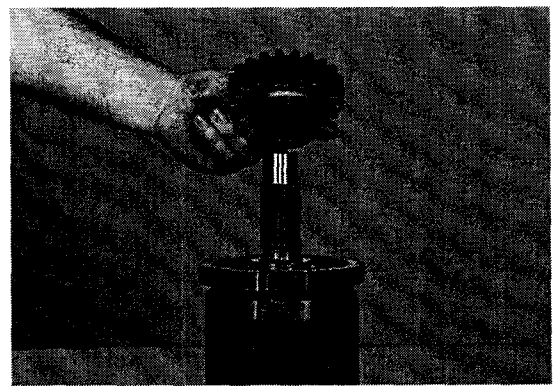


**Figure 136**
Install clutch shaft gear on clutch shaft with long hub of gear down.

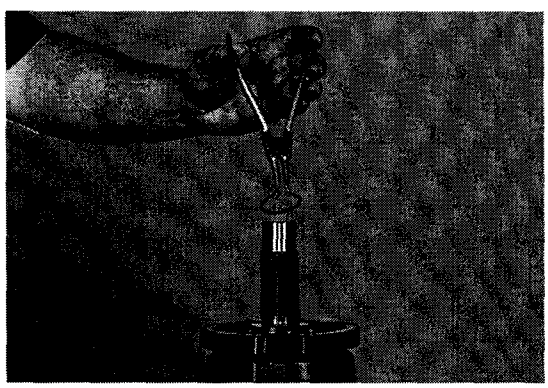


**Figure 134**
Install thrust washer retainer ring.

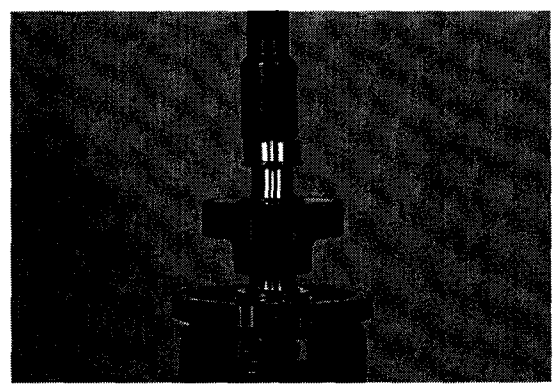


**Figure 137**
Install rear bearing inner race on clutch shaft with bearing race shoulder down.

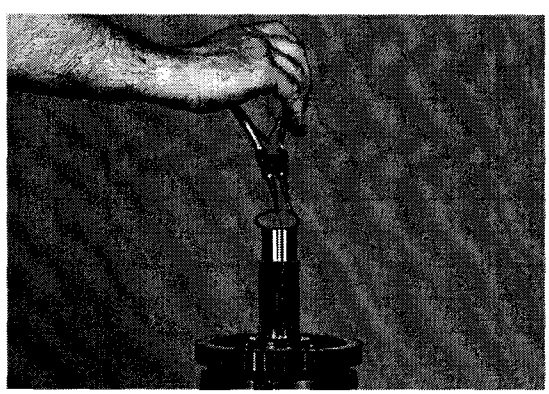


**Figure 135**
Install clutch shaft gear locating ring.

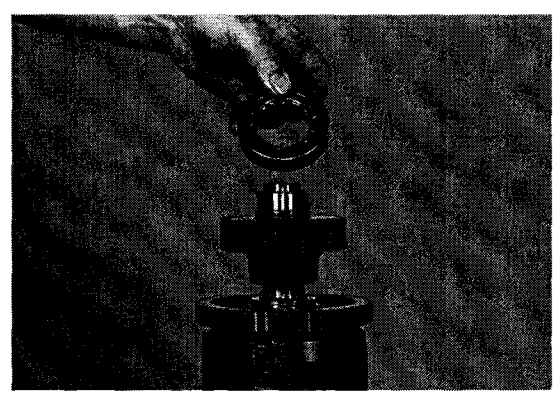


**Figure 138**
Position rear bearing on bearing race.

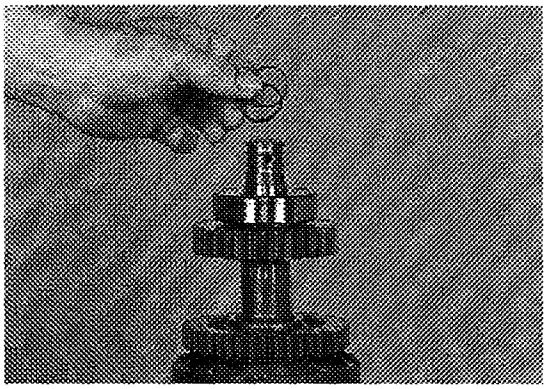


**Figure 139**

Remove clutch shaft oil sealing rings.
**NOTE:** The 4th clutch is only used on the 4 and 6 speed models.

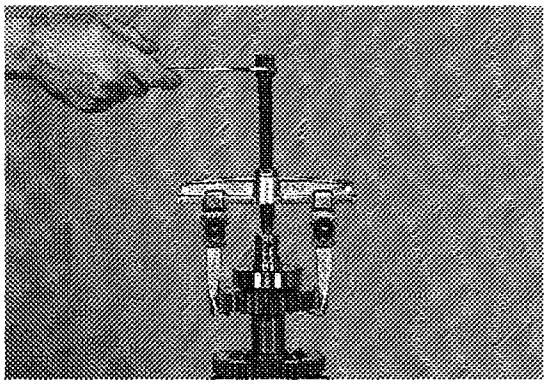


**Figure 140**

Using a gear puller as shown, remove first drive gear and front bearing.

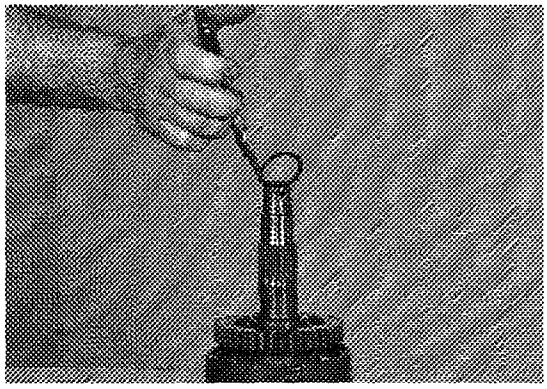


**Figure 141**

Remove first drive gear locating ring.
For 3-speed models, proceed to figure 155.

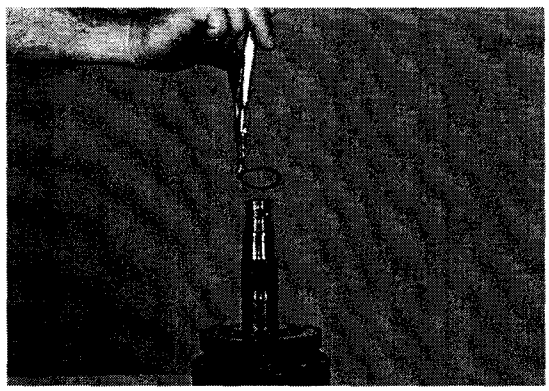


**Figure 142**
Remove outer thrust washer retainer ring.

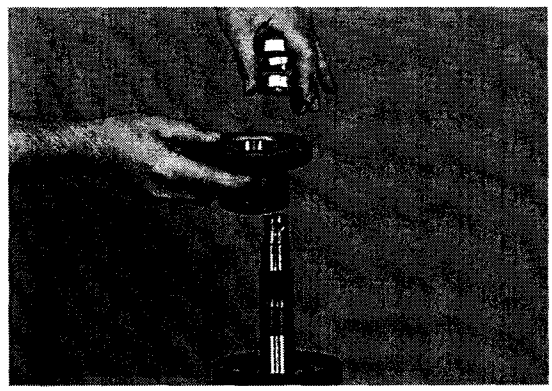


**Figure 145**
Remove bearings and spacer from clutch gear.

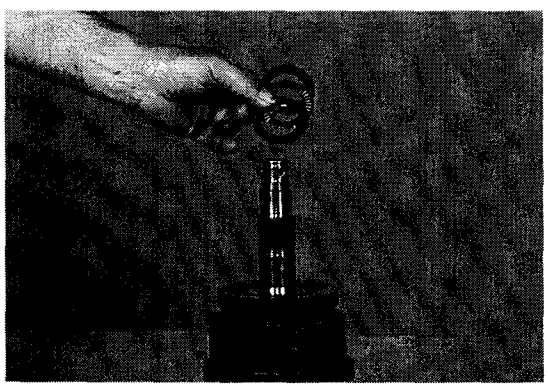


**Figure 143**
Remove outer washer, thrust bearing and inner thrust washer.

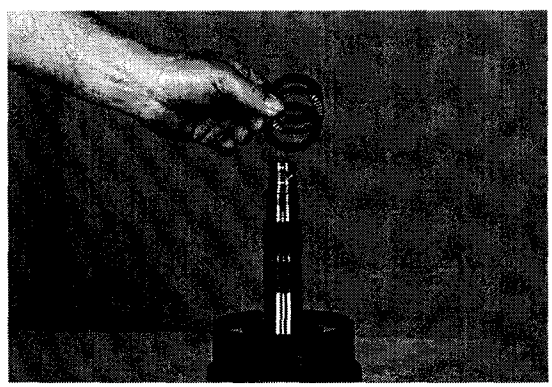


**Figure 146**
Remove outer thrust washer, thrust bearing and inner thrust washer.

**Figure 144**
Remove clutch gear and disc hub.

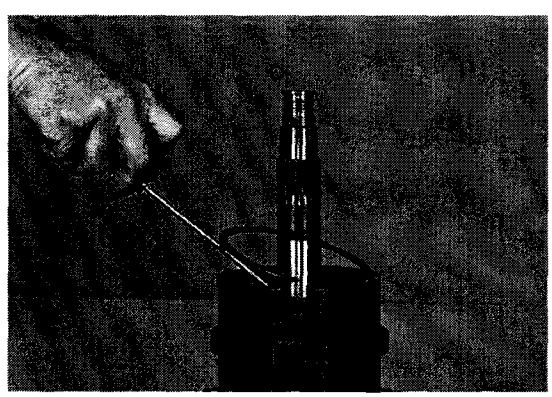


**Figure 147**
Remove end plate retainer ring.

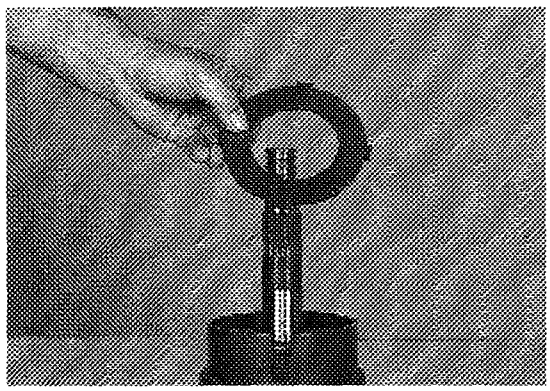


**Figure 148**
Remove end plate.

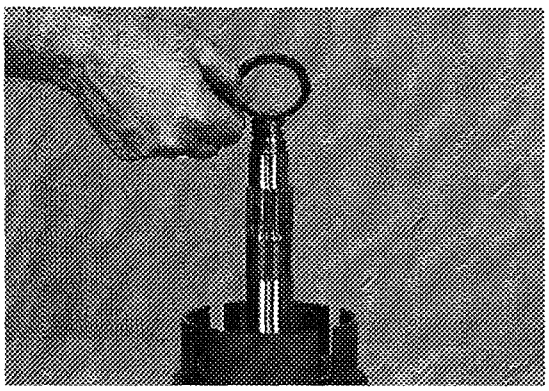


**Figure 151**
Remove retainer ring retainer.

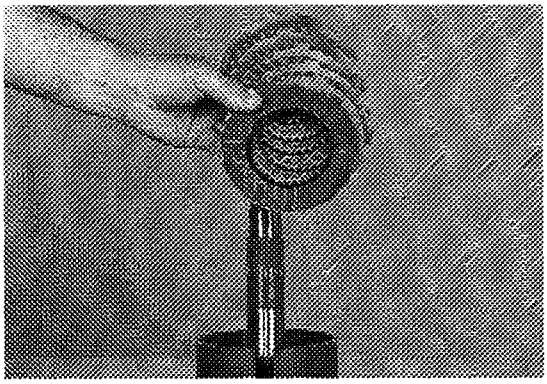


**Figure 149**
Remove clutch discs.

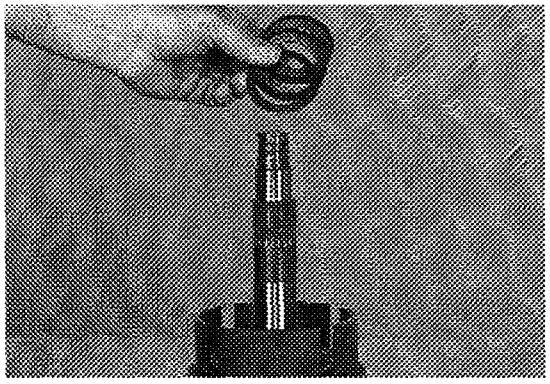


**Figure 152**
Remove disc springs.
**NOTE:** see page 10-85.

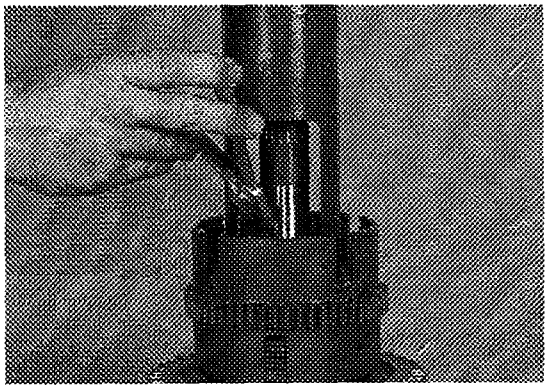


**Figure 150**
Compress disc springs and remove retainer ring.

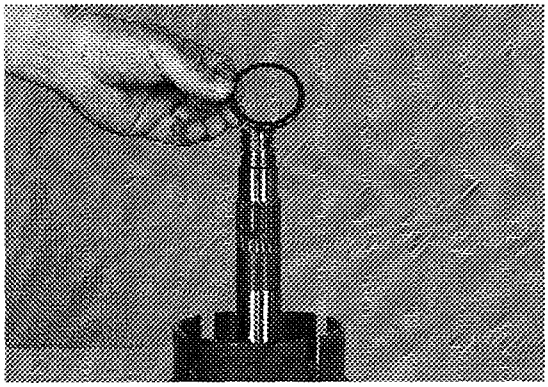


**Figure 153**
Remove clutch piston wear plate.

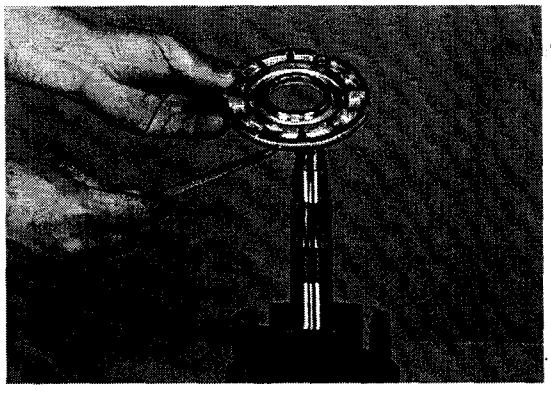


**Figure 154**
Remove clutch piston.

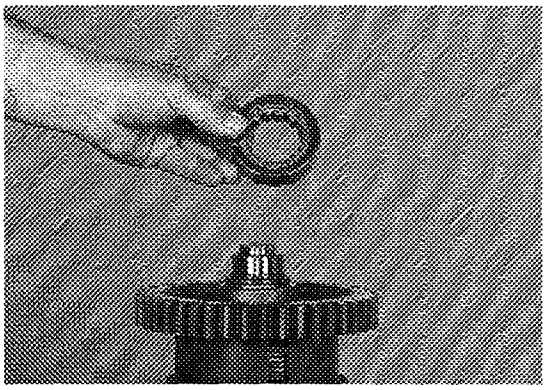


**Figure 155**
Remove clutch shaft rear bearing outer race.

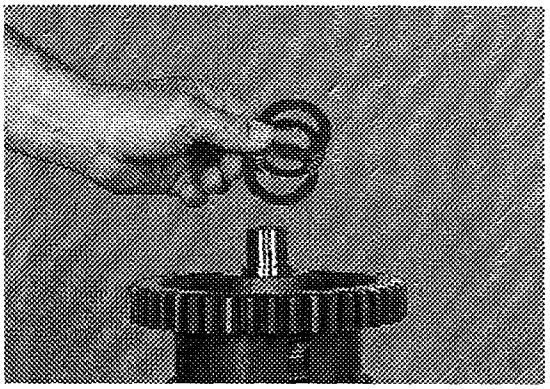


**Figure 158**
Remove outer thrust washer, thrust bearing and inner thrust washer.

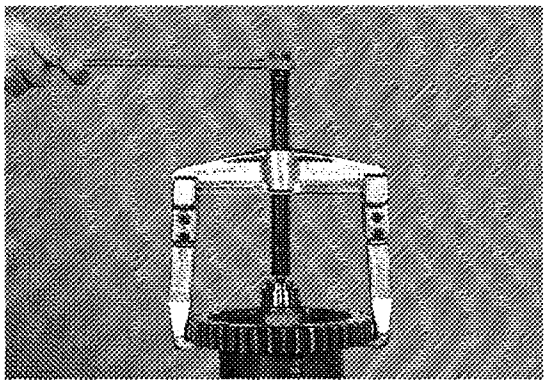


**Figure 156**
Use gear puller to remove clutch gear and bearing inner race.

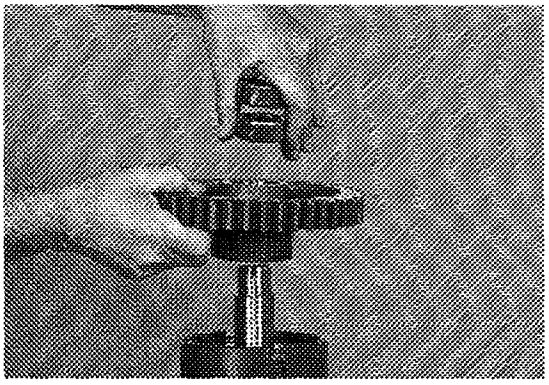


**Figure 159**
Remove clutch gear and hub and gear bearings.

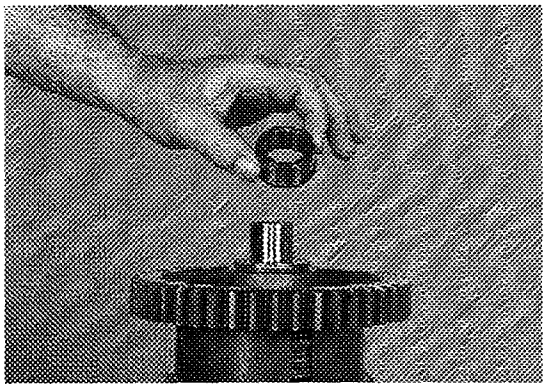


**Figure 157**
Remove clutch shaft rear bearing inner race.

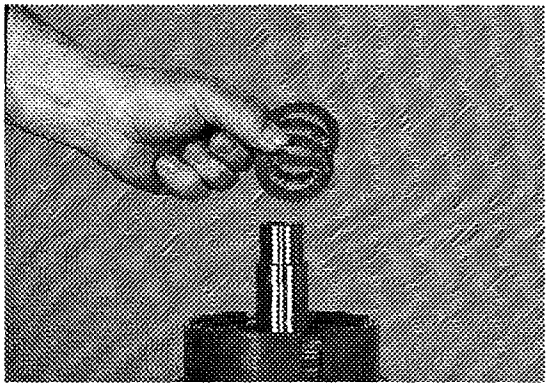


**Figure 160**
Remove outer thrust washer, thrust bearing and inner thrust washer.

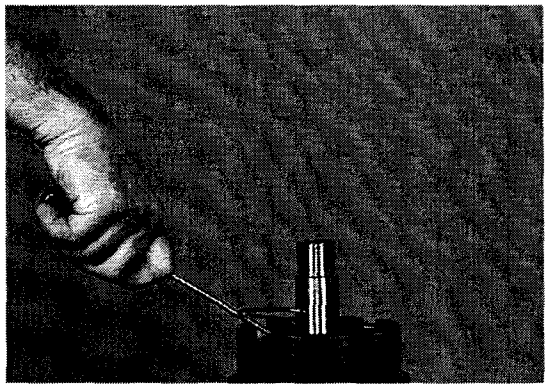


**Figure 161**
Remove end plate retainer ring.

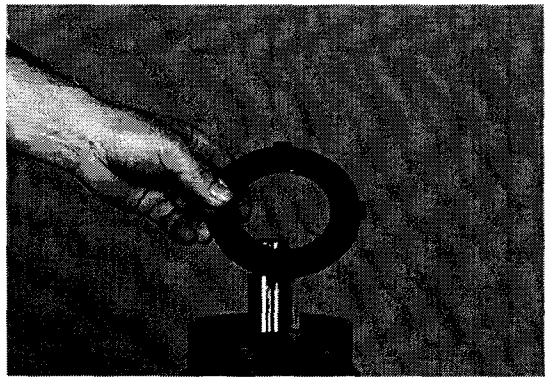


**Figure 162**
Remove end plate.

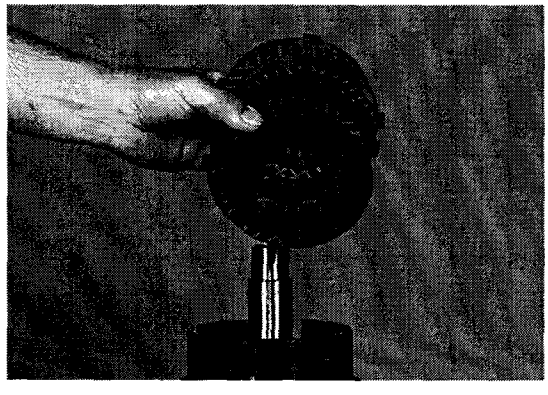


**Figure 163**
Remove clutch discs.

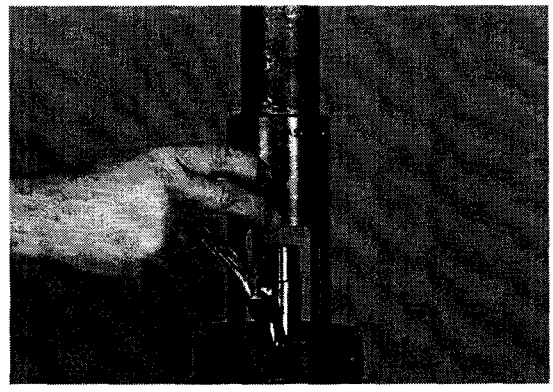


**Figure 164**
Compress disc springs and remove retainer ring.

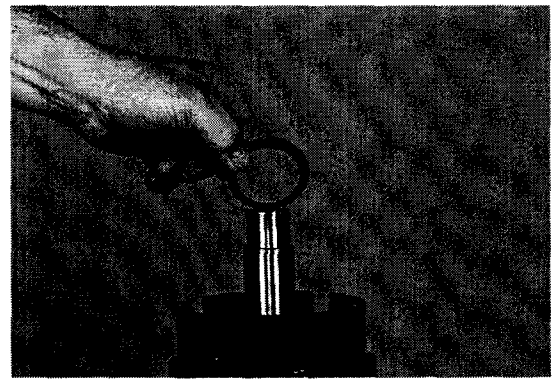


**Figure 165**
Remove retainer ring retainer.

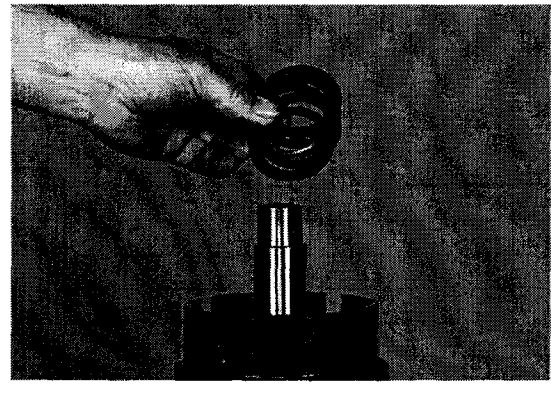


**Figure 166**
Remove disc springs.
**NOTE:** See page 10-85.

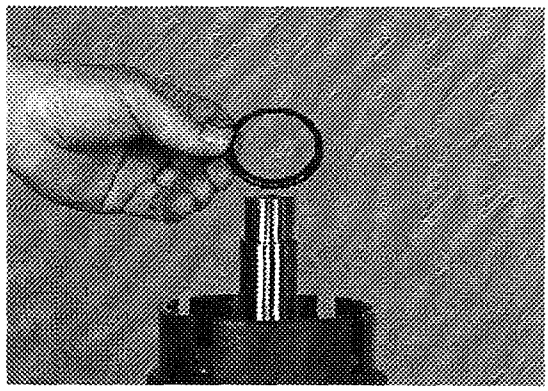


**Figure 167**
Remove clutch piston wear plate.

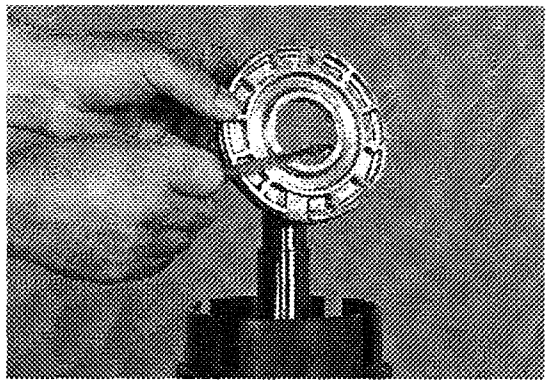


**Figure 168**
Remove clutch piston.

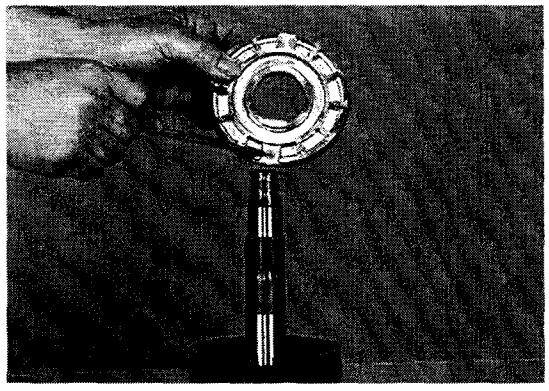


**Figure 169**

Clutch piston bleed ball must be clean and free of any foreign material. Refer to the cleaning and inspection page. For the 3-speed version, proceed to figure 189

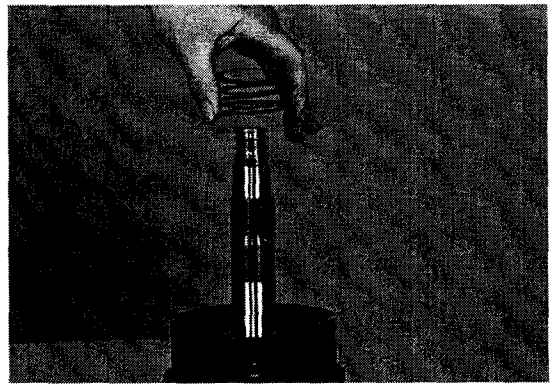


**Figure 172**

Install piston return disc springs. First spring with large diameter of bevel towards wear plate. Alternate five (5) springs. **NOTE:** see page 10-85.

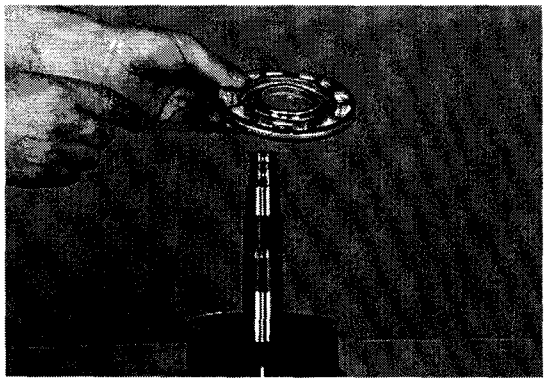


**Figure 170**

Install inner and outer clutch piston seal rings. Size inner ring as explained in figure 93. Install clutch piston in clutch drum. Use caution as not to damage sealing rings.

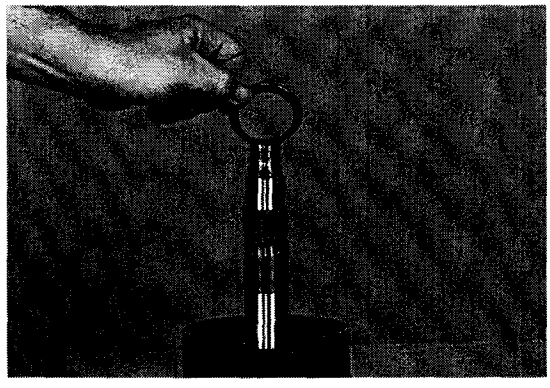


**Figure 173**

Position return spring ring retainer on clutch shaft.

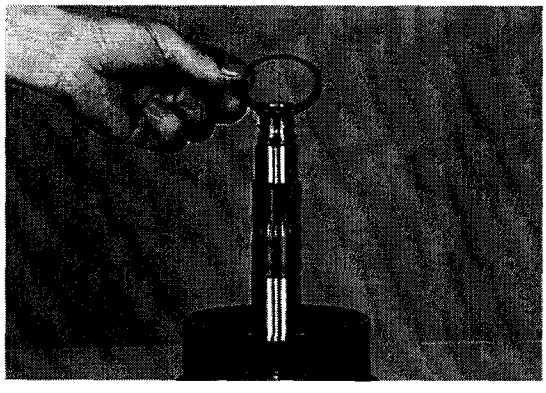


**Figure 171**

Install clutch piston wear plate.

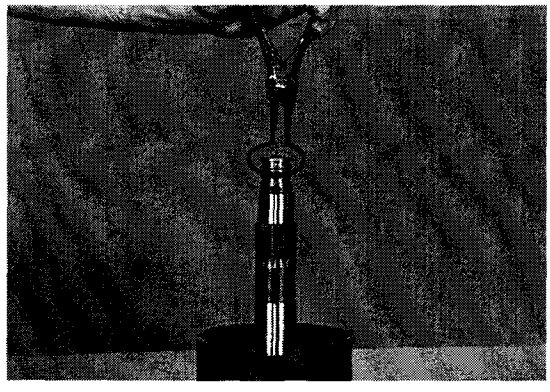


**Figure 174**

Start ring on shaft with snap ring pliers.

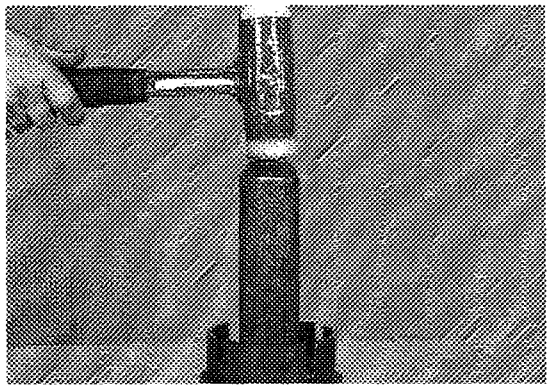


**Figure 175**

Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and seat retainer ring; be sure ring is in full position in groove.

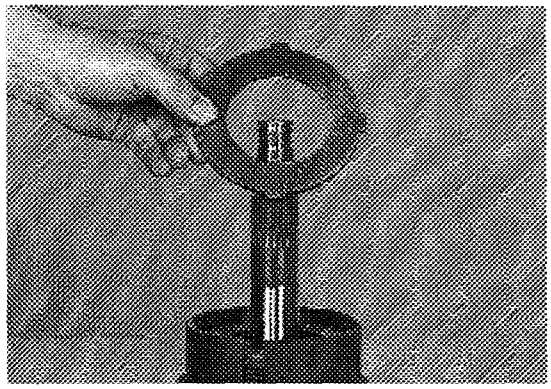


**Figure 178**

Install clutch disc end plate.

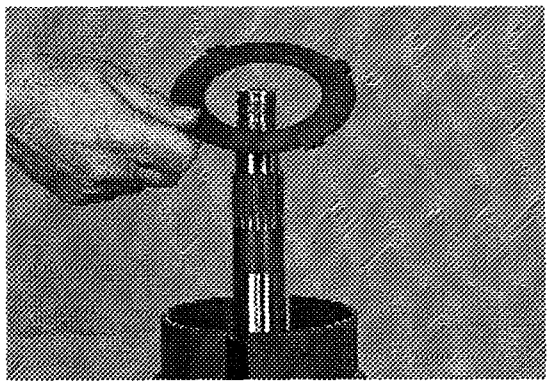


**Figure 176**

Install first steel (outer) clutch disc.

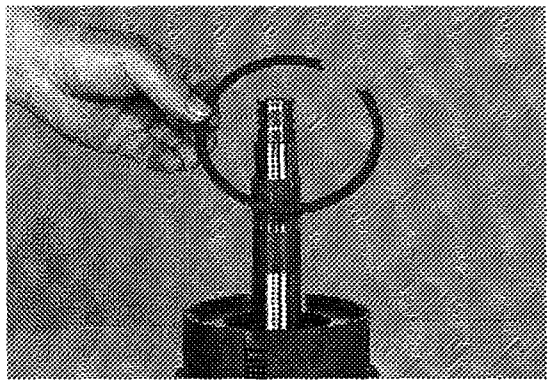


**Figure 179**

Install end plate retainer ring.

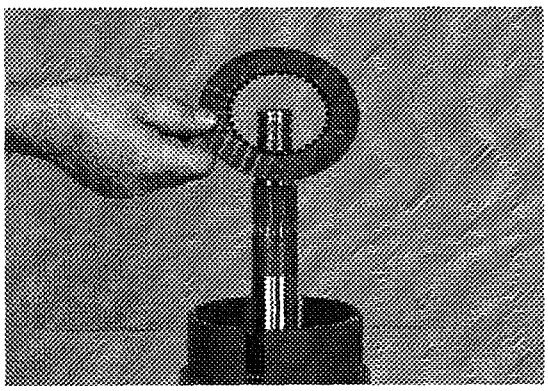


**Figure 177**

Install first friction (inner) clutch disc. Alternate steel and friction until six (6) steel and six (6) friction discs are in position.

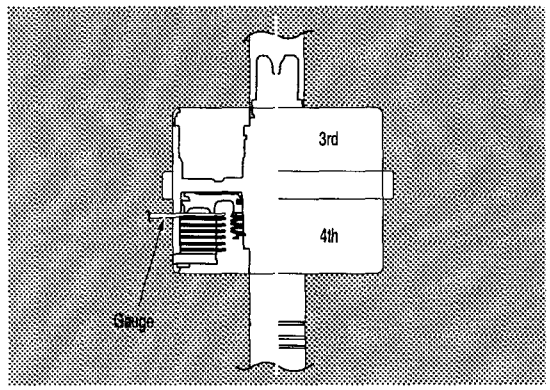



**Figure 180**

**NOTE:** 4th (high) clutch pack must be checked for clutch disc clearance. Stand the clutch assembly on end. The clutch discs on the bottom will fall to the end plate. Measure the distance between the clutch piston and the first steel disc by inserting a feeler gauge or taper gauge through the slots in the clutch drum. The required clearance is .048-.108 [1,22-2,74]. If the clearance is greater than .108 [2,74), add one steel disc under the end plate.

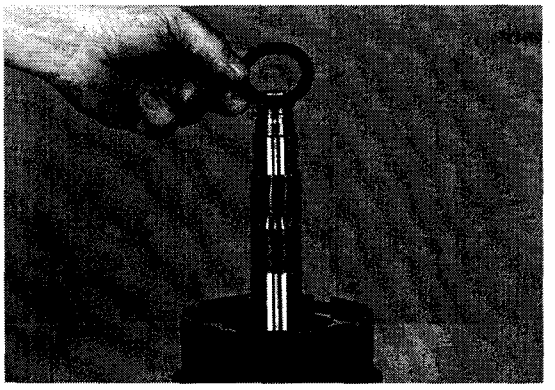


**Figure 181**
Position thrust bearing inner washer on clutch shaft.

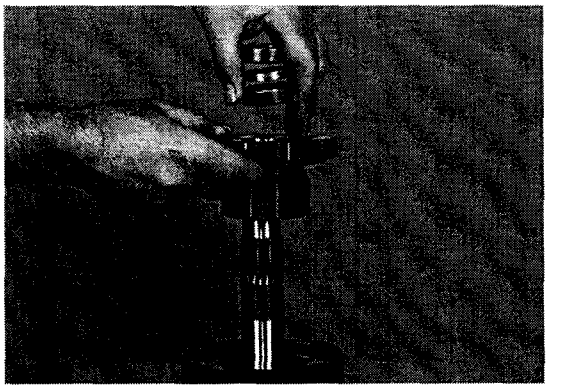


**Figure 184**

Press one bearing in clutch gear. Install bearing spacer next to bearing. Press second bearing in gear, being certain bearings are pressed flush with face of gears on both sides. Install the clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs. Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

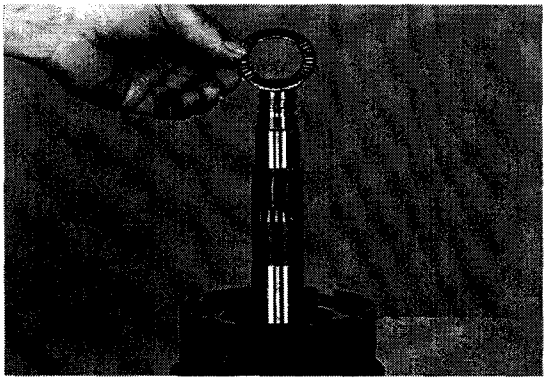


**Figure 182**
Position thrust bearing on clutch shaft against inner thrust bearing washer.

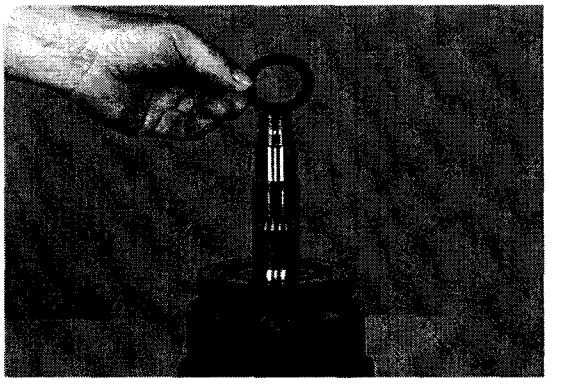


**Figure 185**
Position thrust washer on shaft.

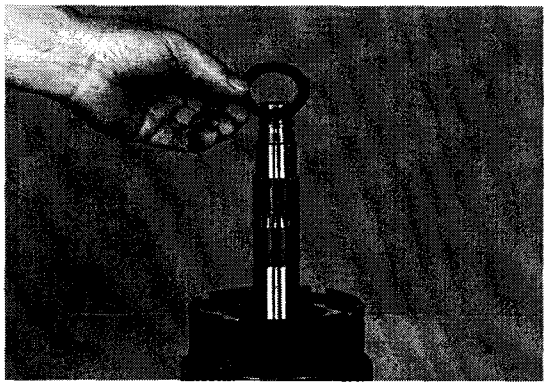


**Figure 183**
Install outer thrust bearing washer against bearing.

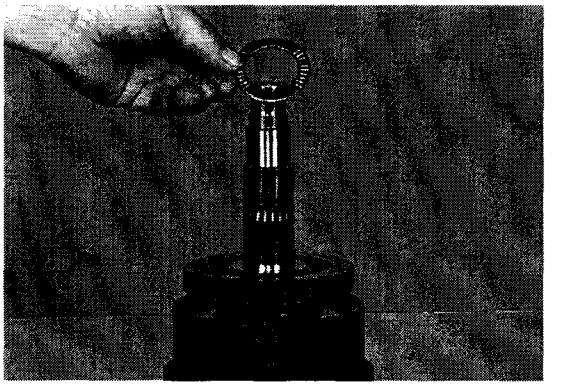


**Figure 186**
Position thrust bearing on shaft.

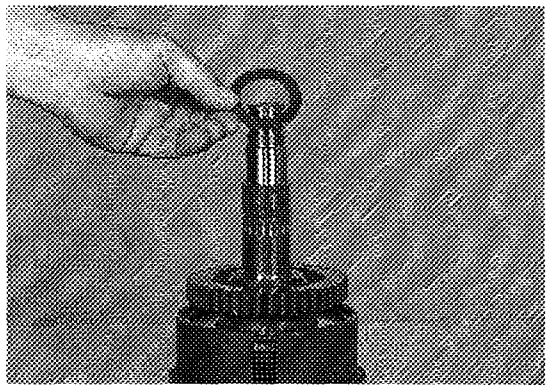


**Figure 187**
Position thrust washer on shaft.

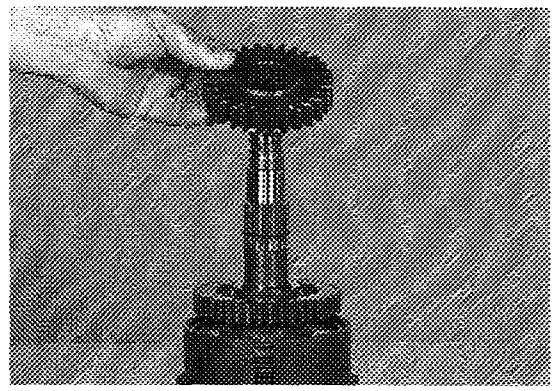


**Figure 190**
Position gear on clutch shaft.

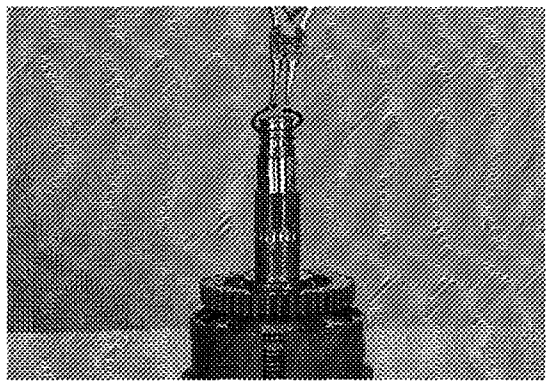


**Figure 188**
Install thrust washer retainer ring
**NOTE:** 3-speed clutch drum not as shown.

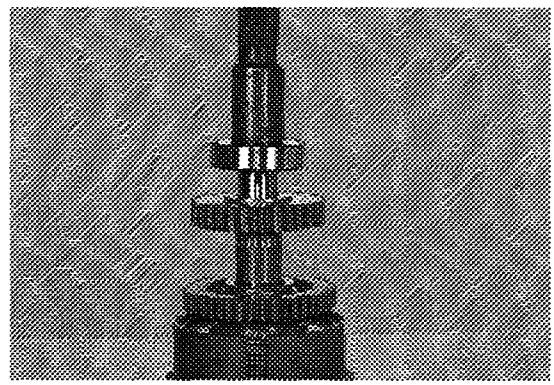


**Figure 191**
Install clutch shaft front bearing. Note bearing has a shield in it. This shield must be up.

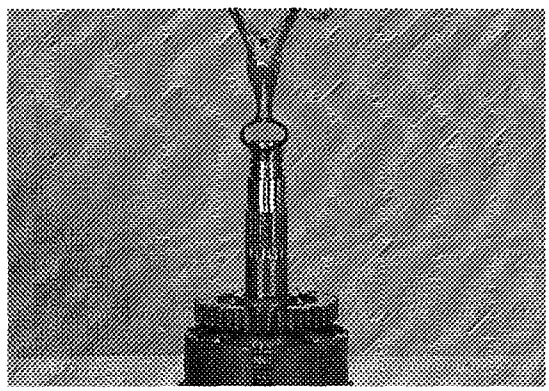


**Figure 189**
Install clutch shaft gear locating ring.

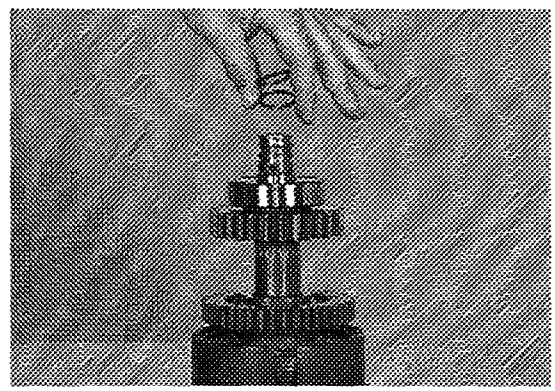


**Figure 192**
Install clutch shaft oil sealing rings. Grease rings to facilitate reassembly into front housing.

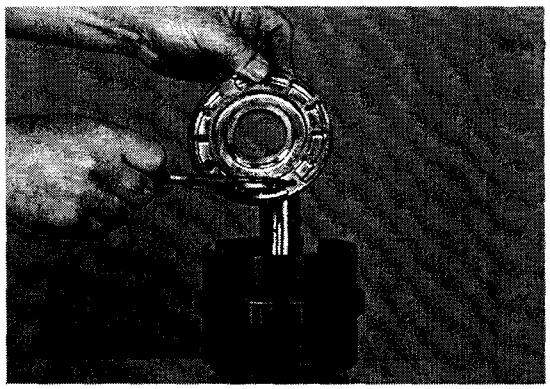


**Figure 193**

Clutch piston bleed ball must be clean and free of any foreign material. Refer to the cleaning and inspection pages.

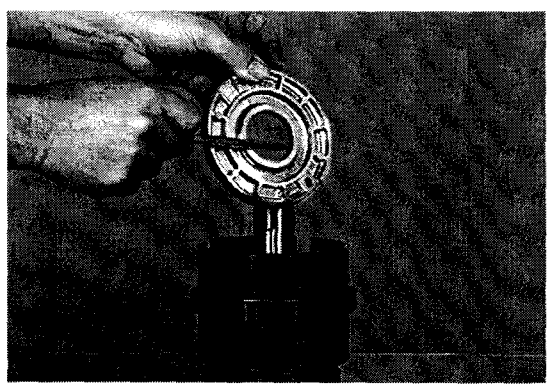


**Figure 194**

Install inner and outer clutch piston seal rings. Size inner ring as explained in figure 93. Install clutch piston in clutch drum. Use caution as not to damage sealing rings.

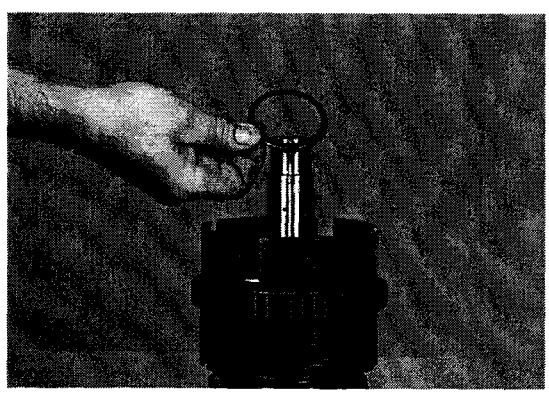


**Figure 195**

Install clutch piston wear plate.

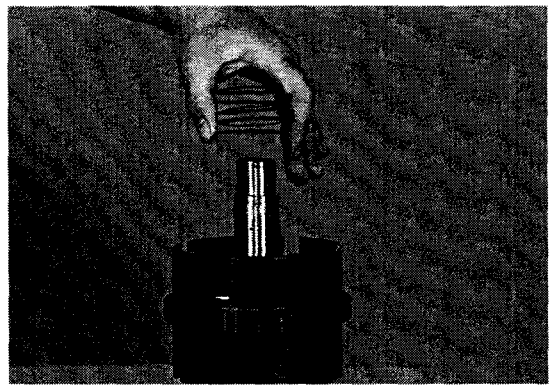


**Figure 196**

Install piston return disc springs. First spring with large diameter of bevel towards wear plate. Alternate five (5) springs. **NOTE:** see page 10-85.

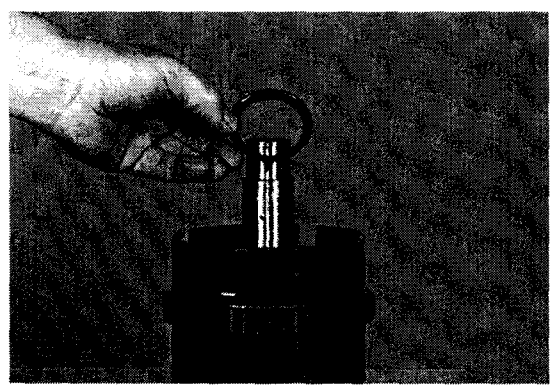


**Figure 197**

Position return spring ring retainer on clutch shaft.

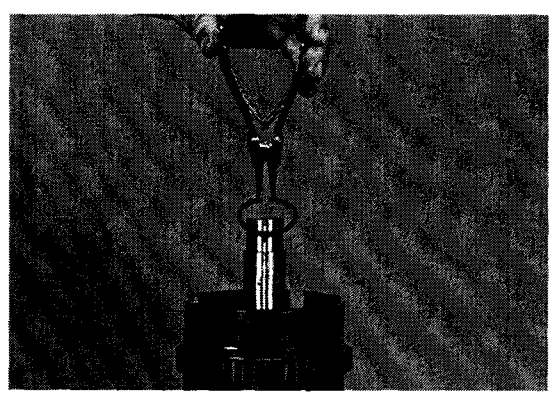


**Figure 198**

Start ring on shaft with snap ring pliers.

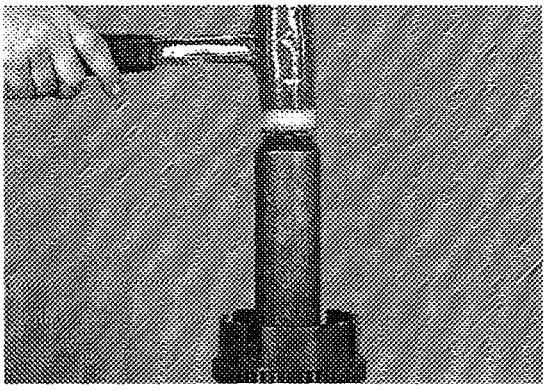


**Figure 199**

Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and retainer ring; be sure ring is in full position in groove.

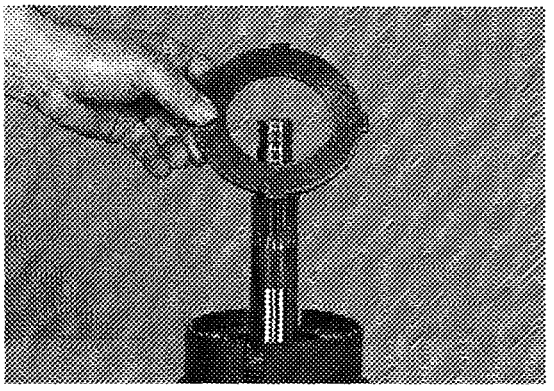


**Figure 202**

Install clutch disc end plate.

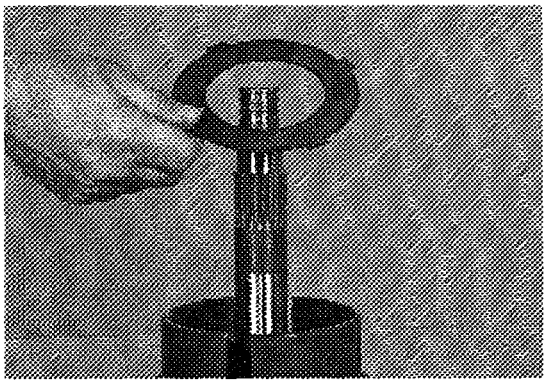


**Figure 200**

Install first steel (outer) clutch disc.

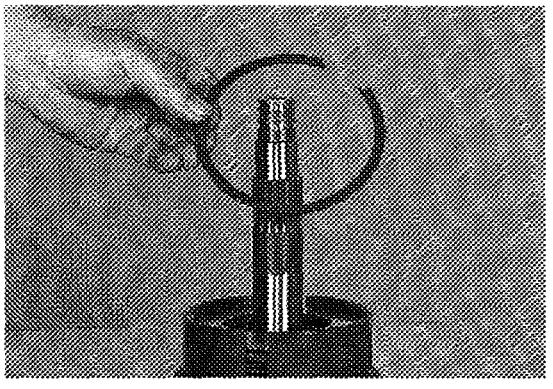


**Figure 203**

Install end plate retainer ring.

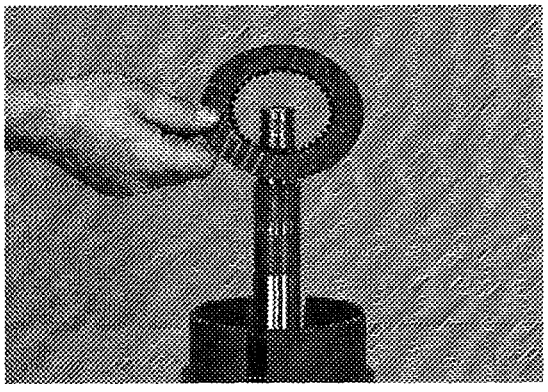


**Figure 201**

Install first friction (inner) clutch disc.
Alternate steel and friction until five (5) steel and five (5) friction discs are in position.

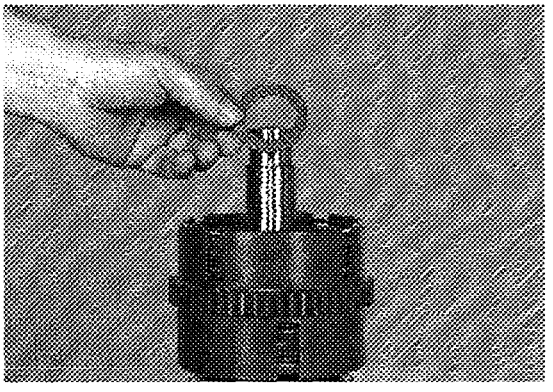


**Figure 204**

Position thrust bearing inner washer on clutch shaft.

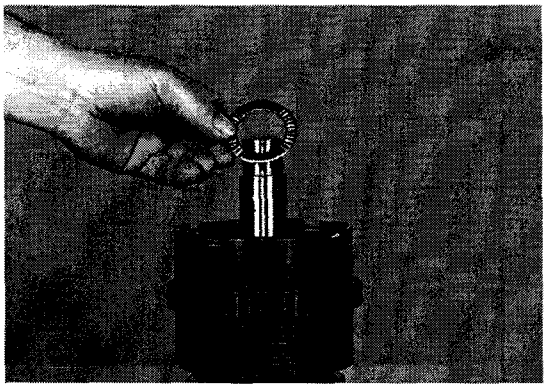


**Figure 205**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

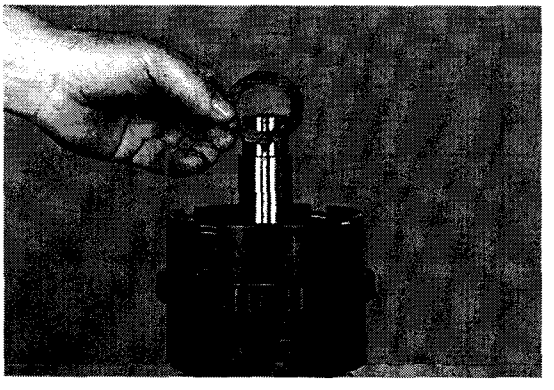


**Figure 206**

Install outer thrust bearing washer against thrust bearing.

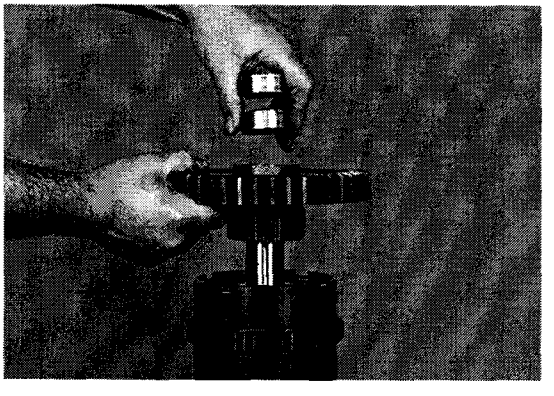


**Figure 207**

Press needle bearings in clutch gear and disc hub, being certain bearings are pressed flush with face of gear on both sides.

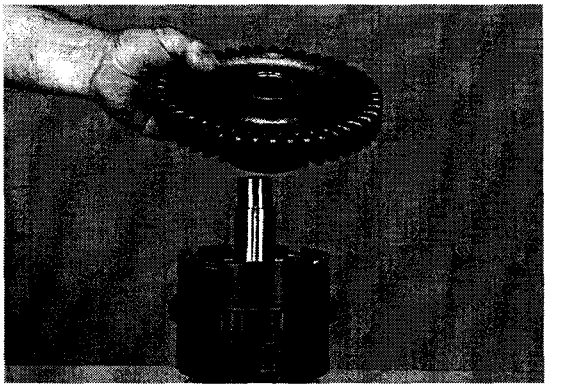


**Figure 208**

Install clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs. Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

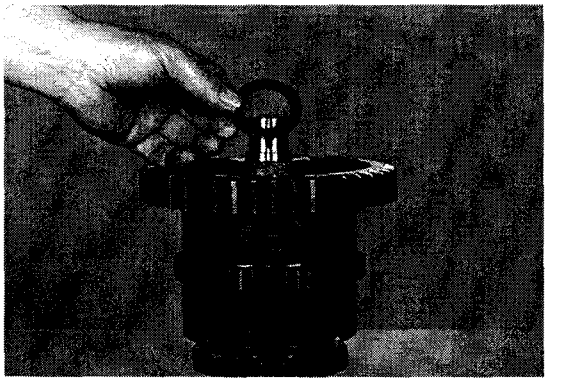


**Figure 209**

Position thrust bearing inner washer on clutch shaft.

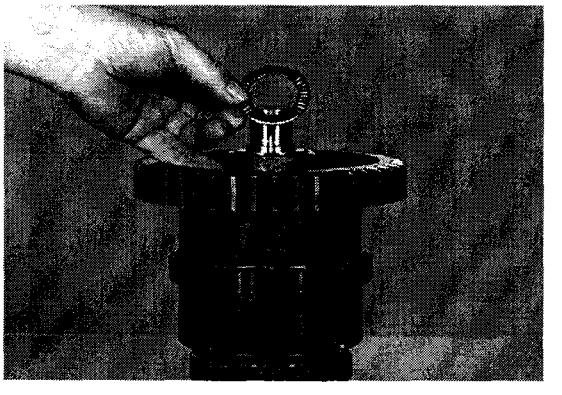


**Figure 210**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

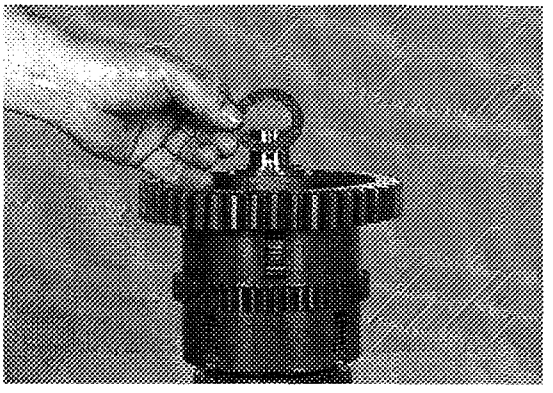


**Figure 211**
Install outer thrust bearing washer against thrust bearing.

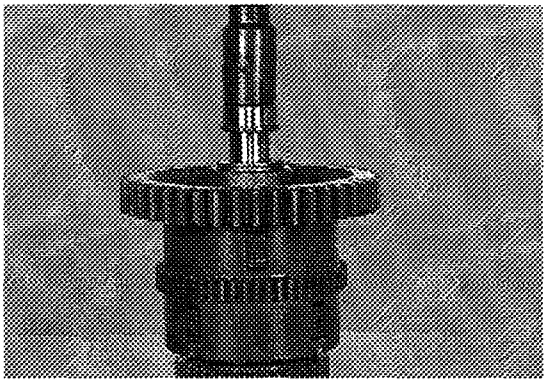


**Figure 212**
Install clutch shaft rear bearing inner race.

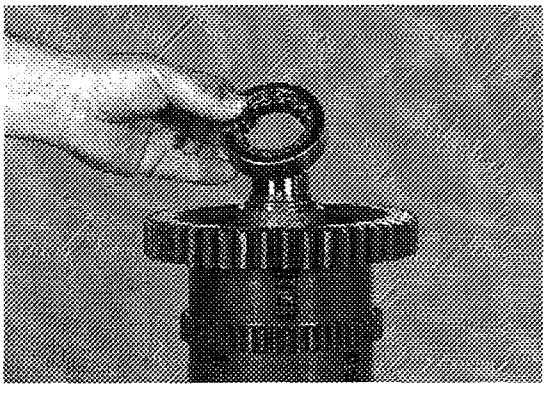


**Figure 213**
Install clutch shaft rear bearing outer race.

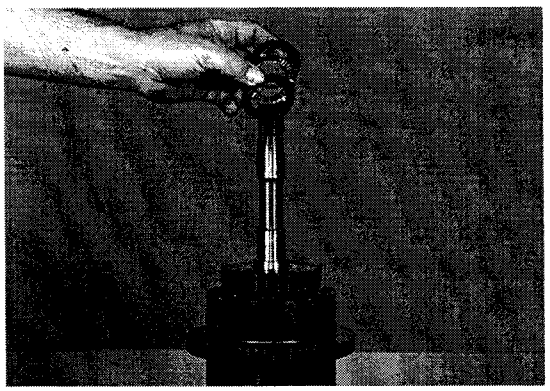


**Figure 214**

Remove outer thrust washer, thrust bearing and inner thrust washer. **Note**: a 3-speed transmission will not have external gear teeth on the forward and reverse clutch drum.

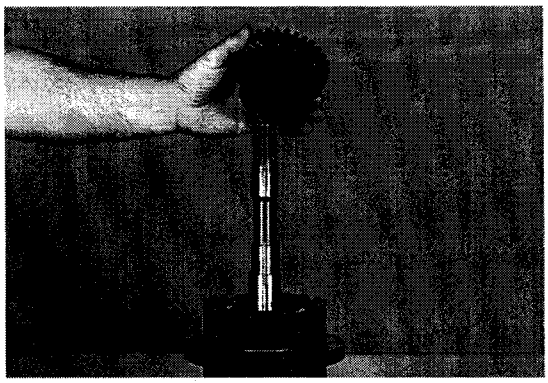


**Figure 215**

Remove clutch gear and disc hub.

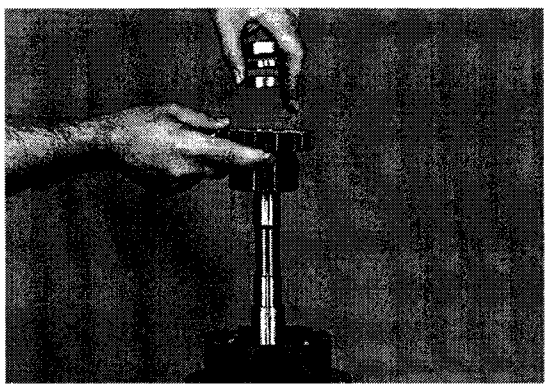


**Figure 216**

Remove bearings and spacer from clutch gear.

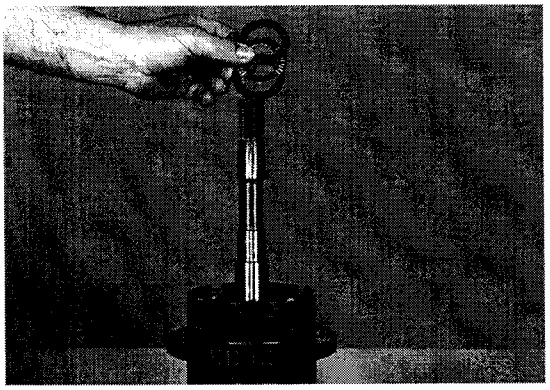


**Figure 217**

Remove outer thrust washer, thrust bearing and inner thrust washer.

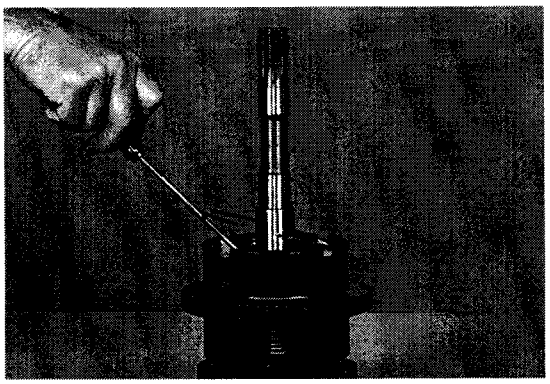


**Figure 218**

Remove end plate retainer ring.

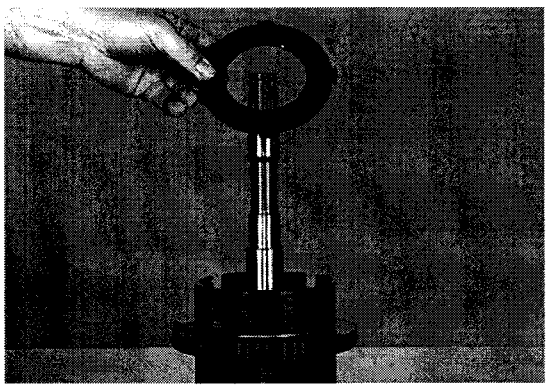


**Figure 219**

Remove end plate.

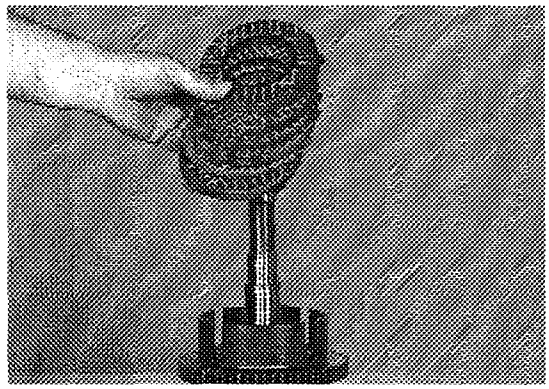


**Figure 220**
Remove clutch discs.

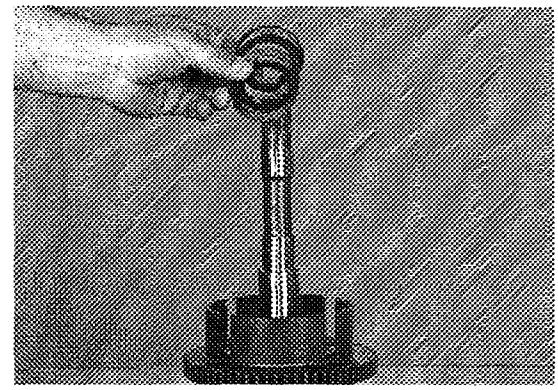


**Figure 223**
Remove disc springs.
**NOTE:** see page 10-85.

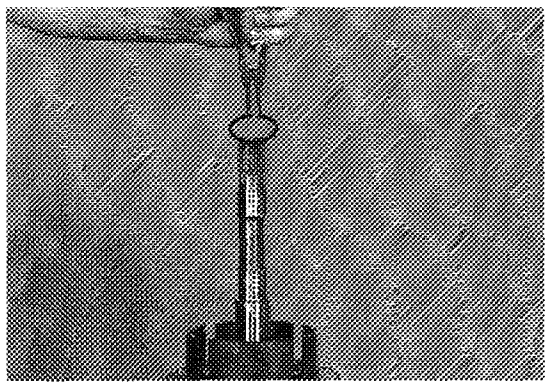


**Figure 221**
Compress disc springs and remove retainer ring.

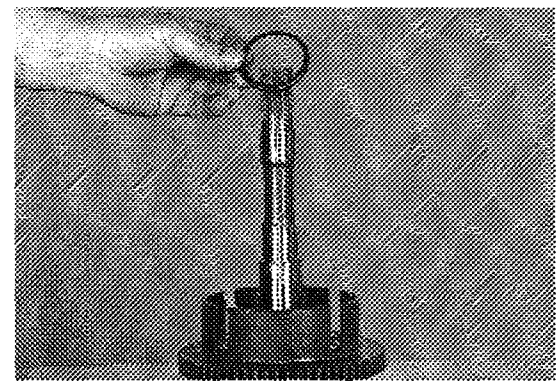


**Figure 224**
Remove clutch piston wear plate.

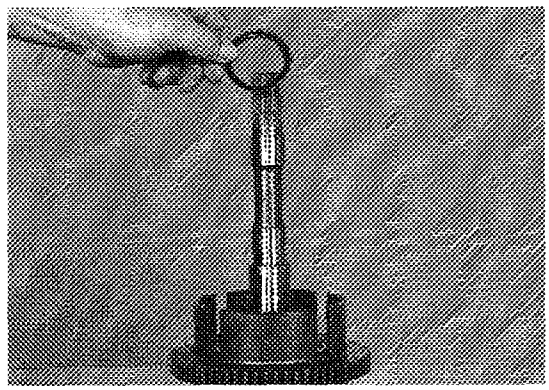


**Figure 222**
Remove retainer ring retainer.

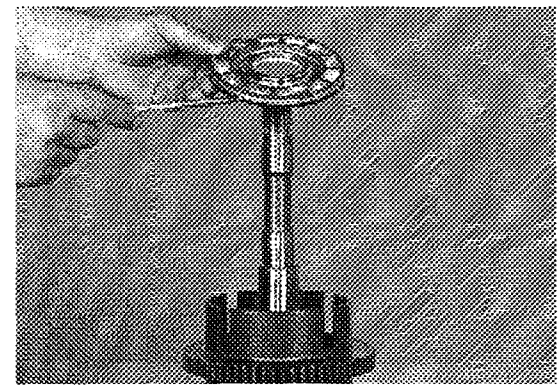


**Figure 225**
Remove clutch piston.

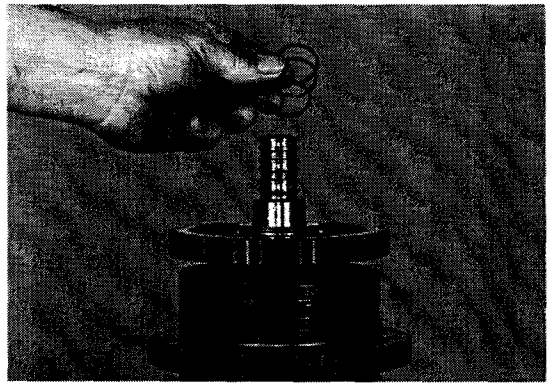


**Figure 226**
Remove clutch shaft oil sealing rings.

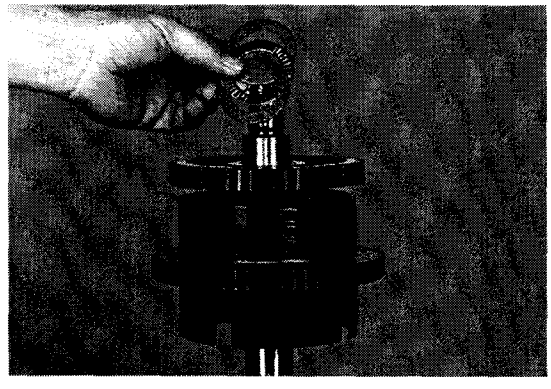


**Figure 227**
Remove outer thrust washer, thrust bearing and inner thrust washer.

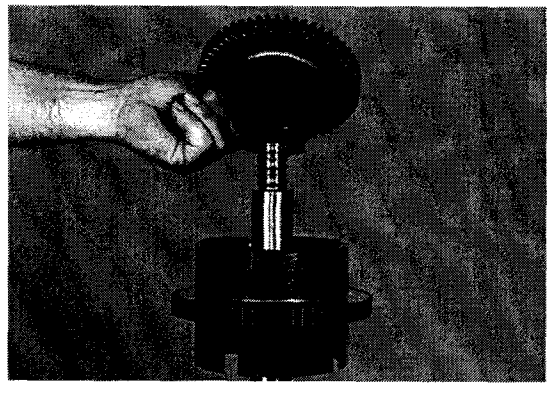


**Figure 228**
Remove clutch gear and disc hub.

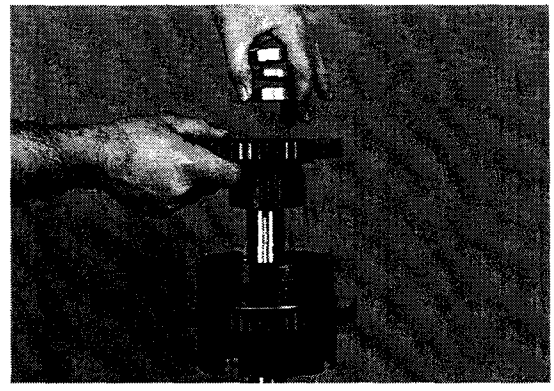


**Figure 229**
Remove bearings and spacer from clutch gear.

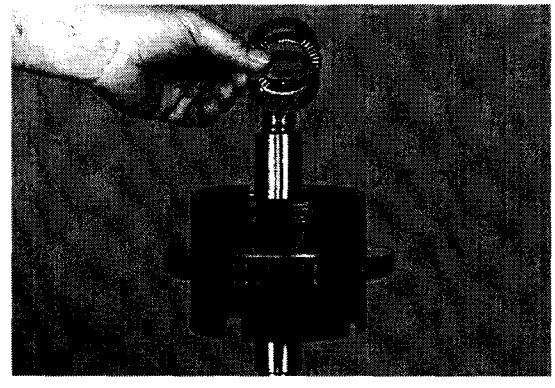


**Figure 230**
Remove outer thrust washer, thrust bearing and inner thrust washer.

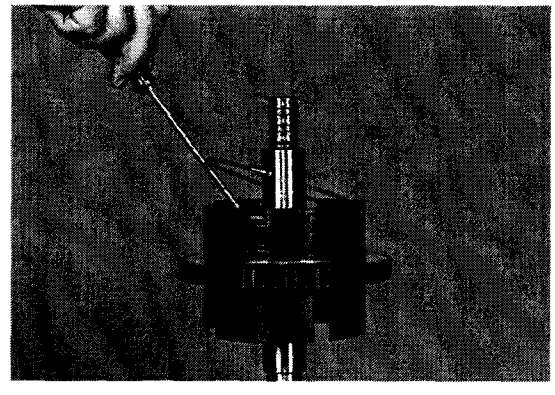


**Figure 231**
Remove end plate retainer ring.

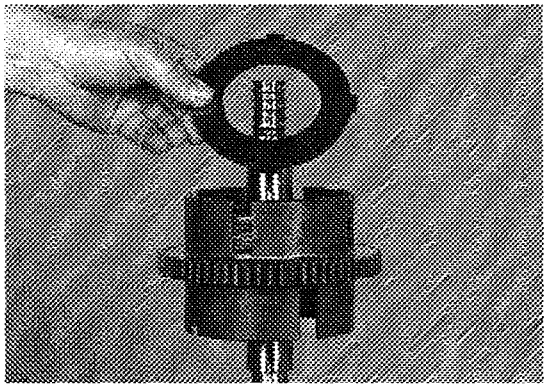


**Figure 232**
Remove end plate.

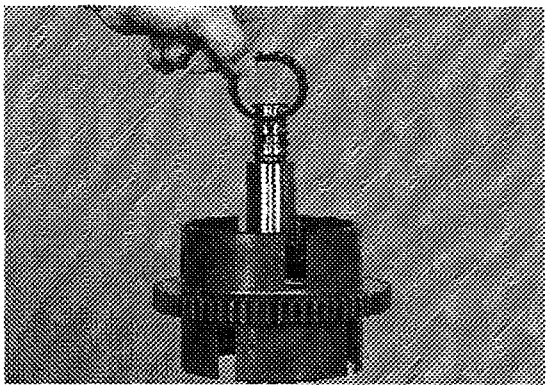


**Figure 235**
Remove retainer ring retainer.

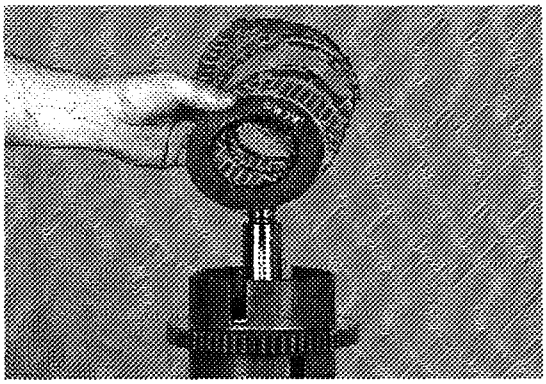


**Figure 233**
Remove clutch discs.

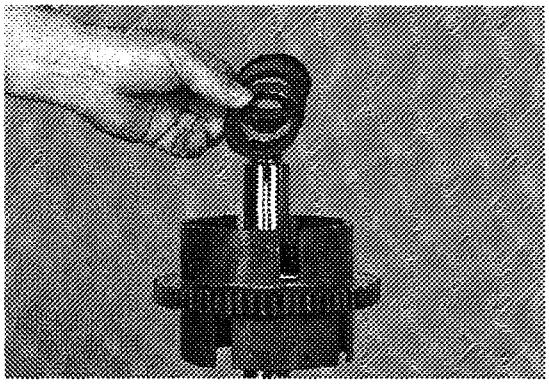


**Figure 236**
Remove disc springs.
**NOTE:** see page 10-85.

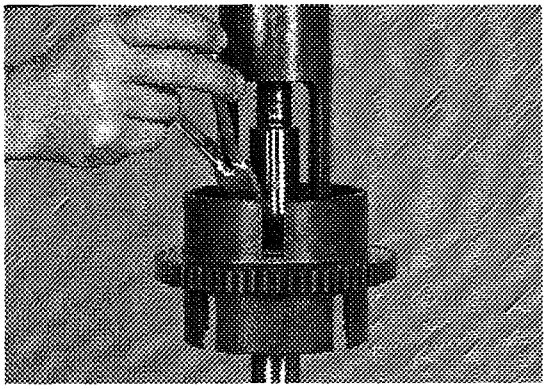


**Figure 234**
Compress disc springs and remove retainer ring.

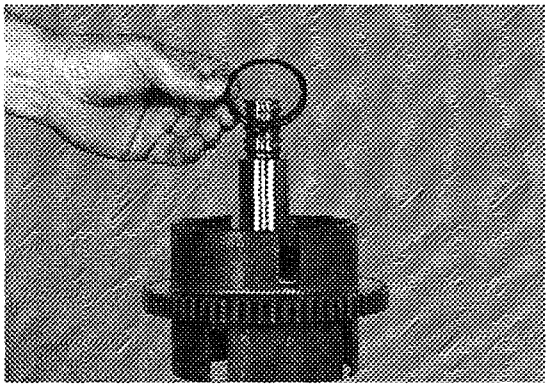


**Figure 237**
Remove clutch piston wear plate.

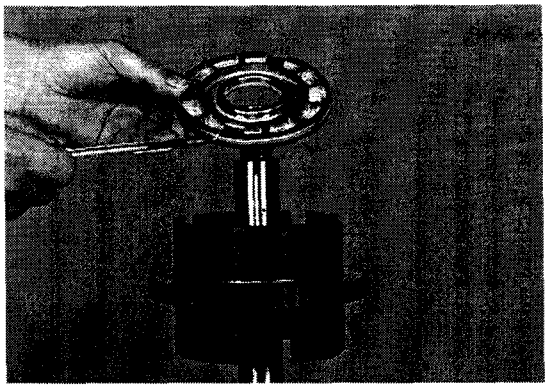


**Figure 238**
Remove clutch piston.

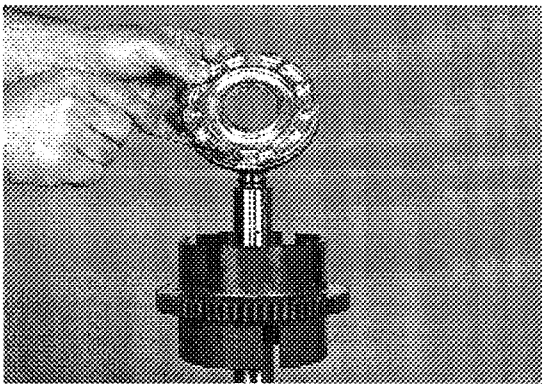


**Figure 239**

Clutch piston bleed orific must be clean free of any foreign material. Refer to the cleaning and inspection pages.

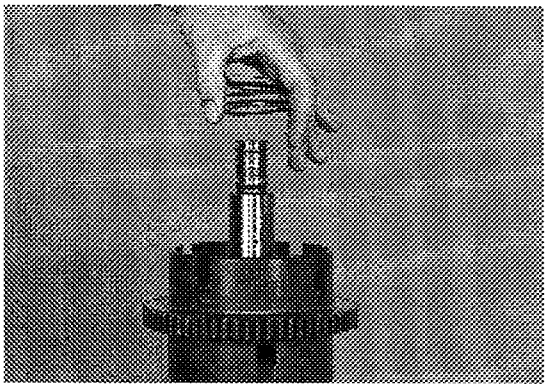


**Figure 242**

Install piston return disc springs. First spring with large diameter of bevel towards wear plate. Alternate five (5) springs. **NOTE:** see page 10-85.

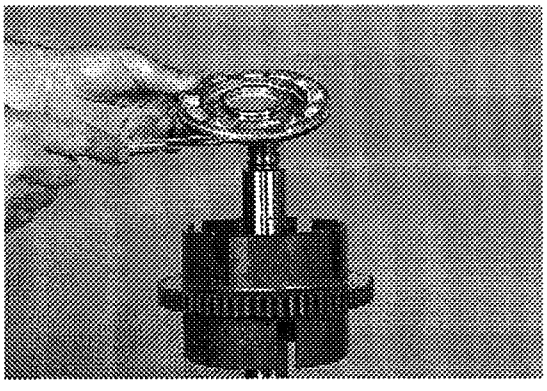


**Figure 240**

Install inner and outer clutch piston seal rings. Size inner ring as explained in figure 93. Install clutch piston in clutch drum. Use caution as not to damage sealing rings.

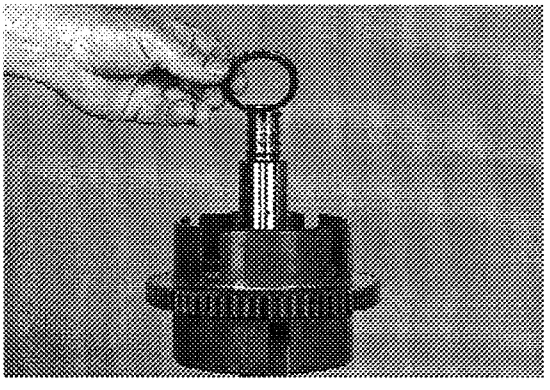


**Figure 243**

Position return spring ring retainer on clutch shaft.

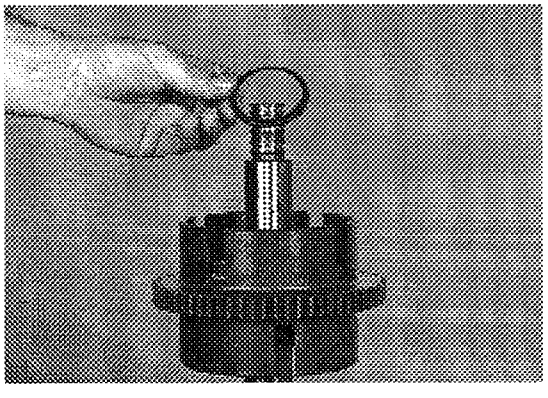


**Figure 241**

Install clutch piston wear plate.

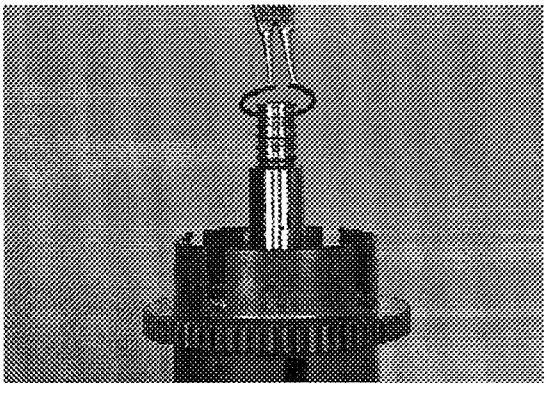


**Figure 244**

Start ring on clutch with snap ring pliers.

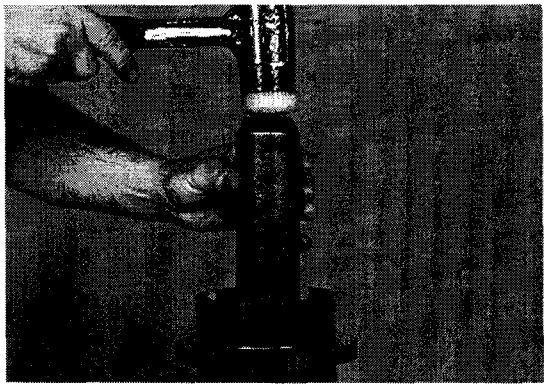


**Figure 245**

Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and seat retainer ring. Be sure ring is in full position in groove.

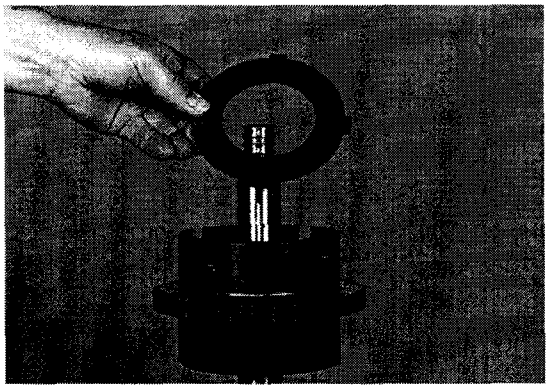


**Figure 248**

Install clutch disc end plate.

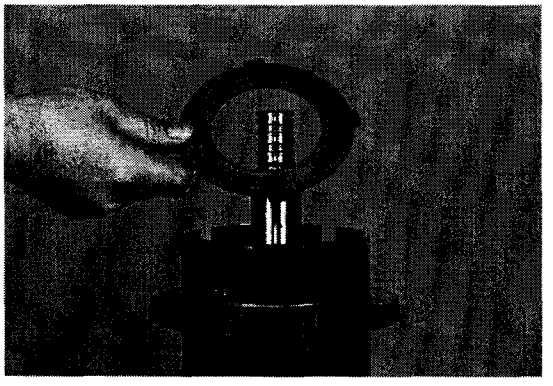


**Figure 246**

Install first steel (outer) clutch disc.

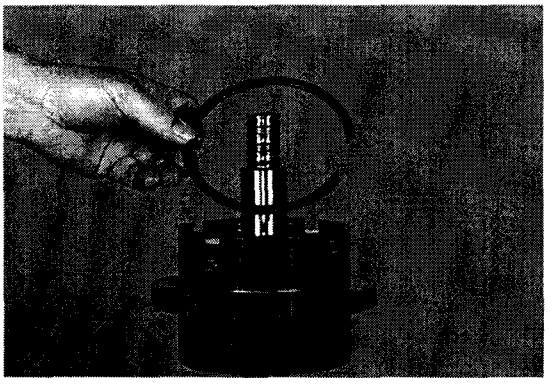


**Figure 249**

Install end plate retainer ring.

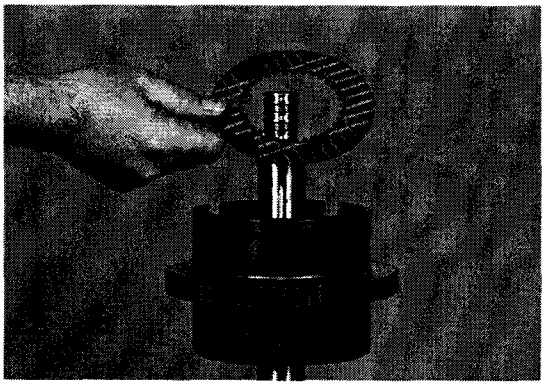


**Figure 247**

Install first friction (inner) clutch disc. Alternate steel and friction until six (6) steel and six (6) friction discs are in position.

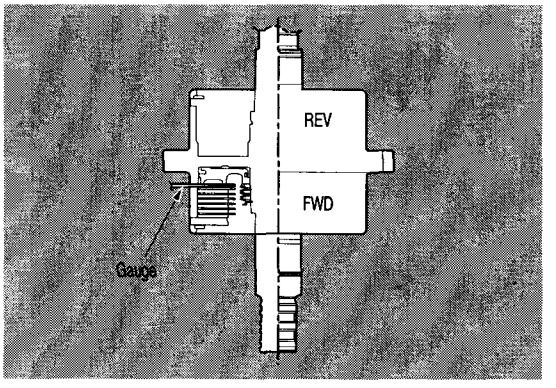



**Figure 250**

**NOTE:** forward clutch pack must be checked for clutch disc clearance. Stand the clutch assembly on end. The clutch discs on the bottom will fall to the end plate. Measure the distance between the clutch piston and the first steel disc by inserting a feeler gauge or taper gauge through the slots in the clutch drum.
The required clearance is .048-.108 [1.22 - 2.74]. If the clearance is greater than .108 [2.74], add one steel disc under the end plate.

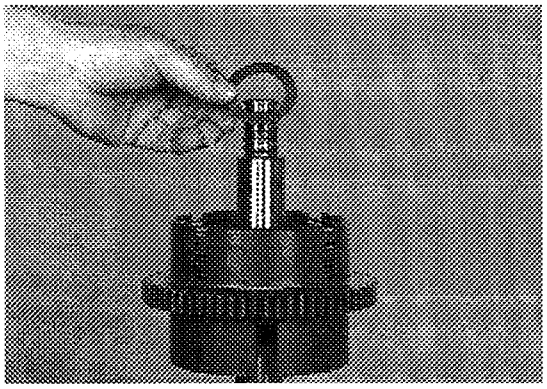


**Figure 251**
Position thrust bearing inner washer on clutch shaft.

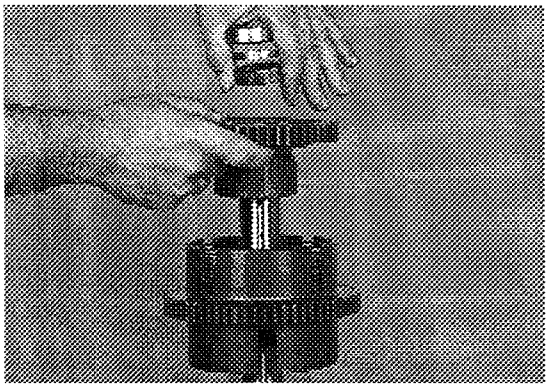


**Figure 254**
Press one bearing in clutch gear, flush with face of gear. Install bearing spacer next to bearing, press second bearing in gear, flush with face of gear. Install the clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs. Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

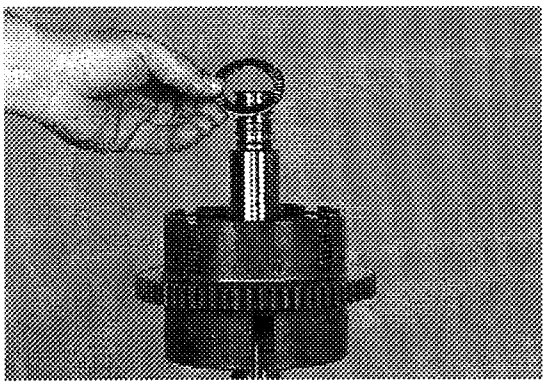


**Figure 252**
Position thrust bearing on clutch shaft against inner thrust bearing washer.

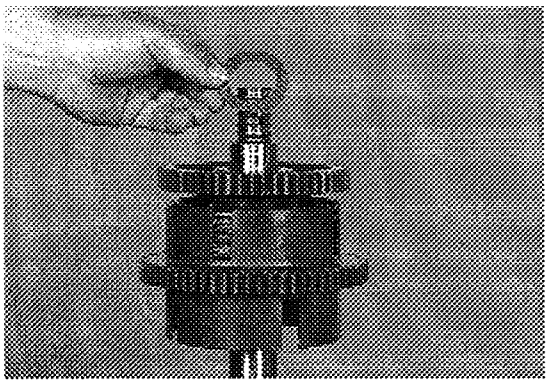


**Figure 255**
Position inner thrust washer on shaft.

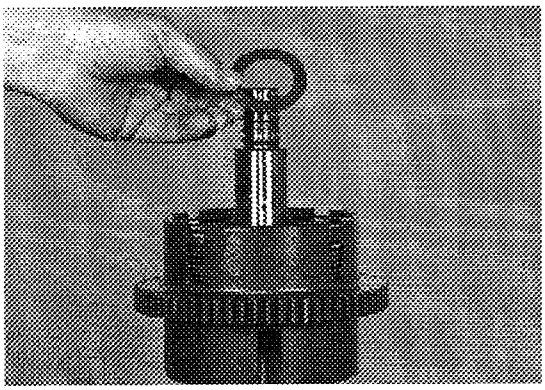


**Figure 253**
Install outer thrust bearing washer against thrust bearing.

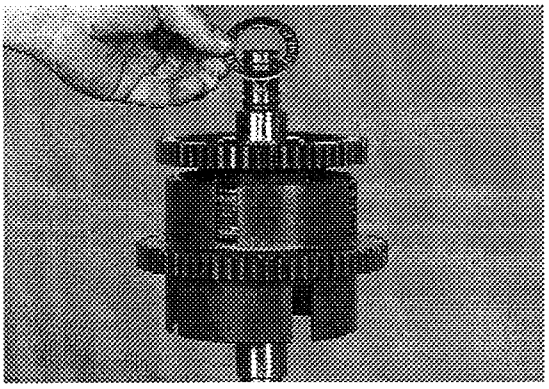


**Figure 256**
Position thrust bearing on shaft.

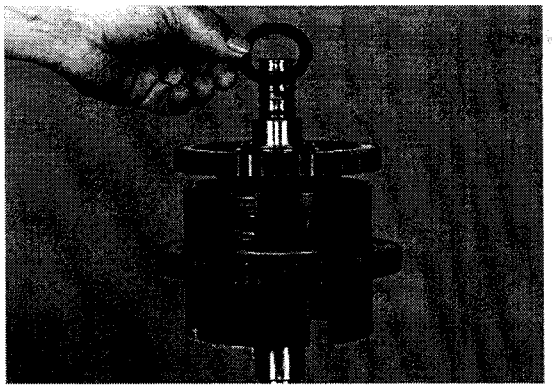


**Figure 257**
Position outer thrust washer on shaft.

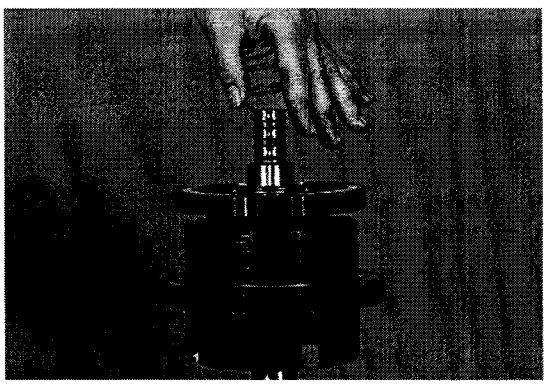


**Figure 258**
Install clutch shaft oil sealing rings. Grease rings to facilitate reassembly into front housing.

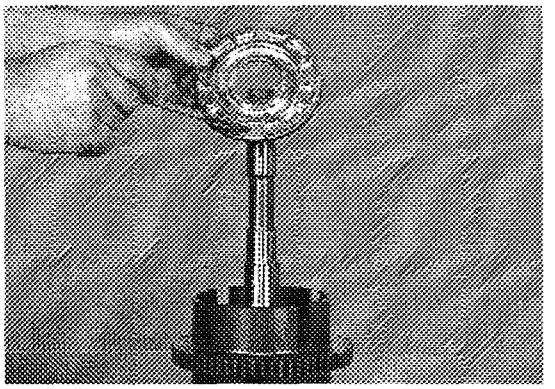


**Figure 259**

Clutch piston bleed orifice must be clean and free of any foreign material. Refer to the cleaning and inspection pages.

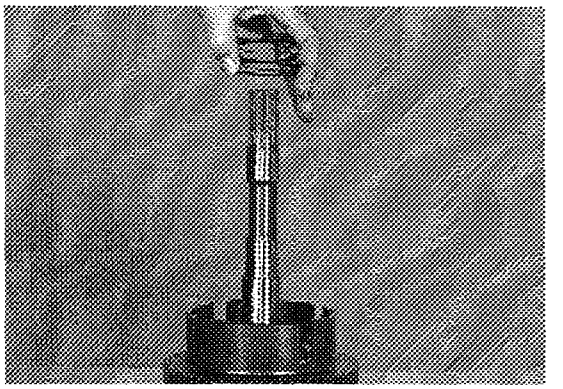


**Figure 262**

Install piston return disc springs. First spring with large diameter of bevel towards wear plate. Alternate five (5) springs. **NOTE:** see page 10-85.

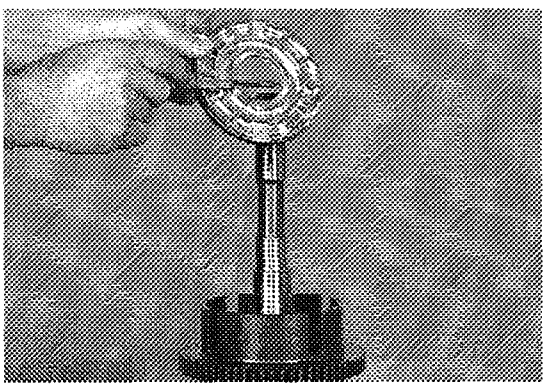


**Figure 260**

Install inner and outer clutch piston seal rings. Size inner ring as explained in figure 93. Install clutch piston in clutch drum. Use caution as not to damage sealing rings.

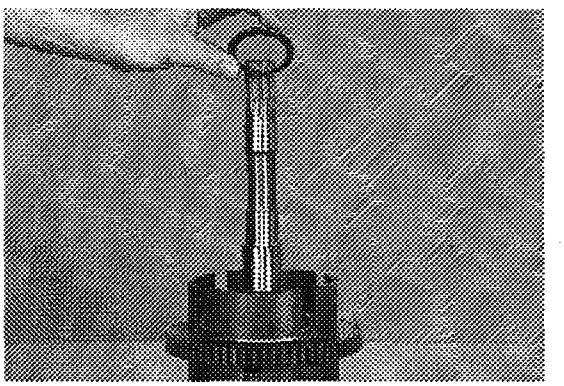


**Figure 263**

Position return spring ring retainer on clutch shaft.

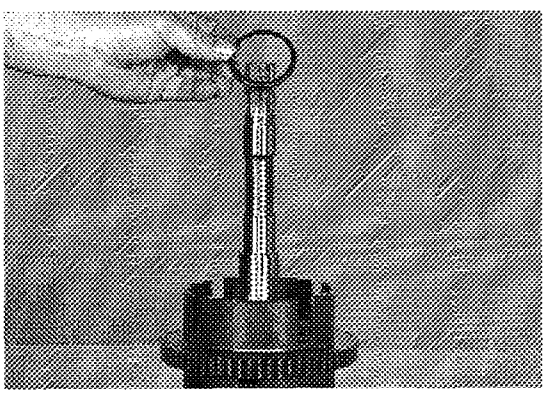


**Figure 261**

Install clutch piston wear plate.

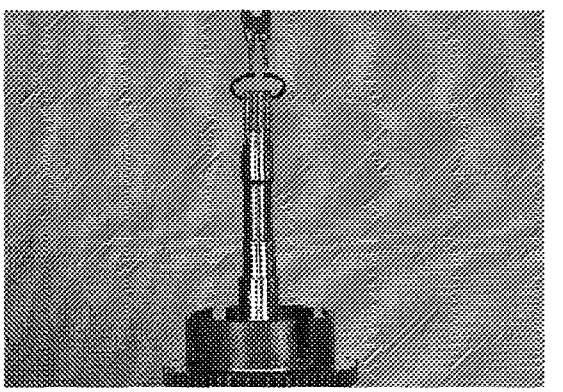


**Figure 264**

Start ring on shaft with snap ring pliers.

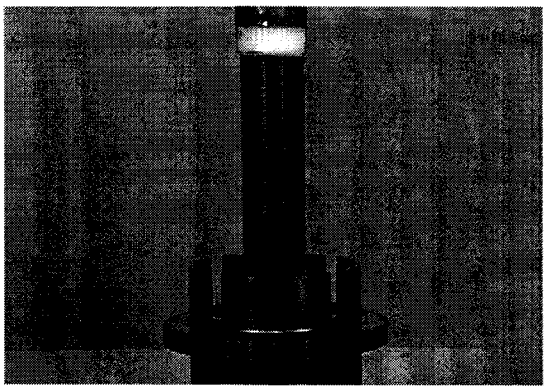


**Figure 265**

Use a sleeve with the proper inner diameter to fit over shaft and against retainer ring. A sharp blow with a soft hammer will compress springs and seat retainer ring. Be sure ring is in full position in groove.

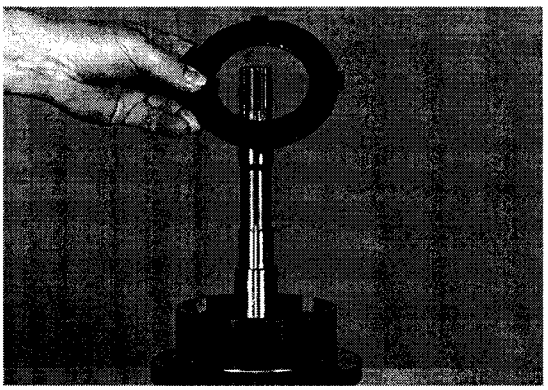


**Figure 268**

Install clutch disc end plate.

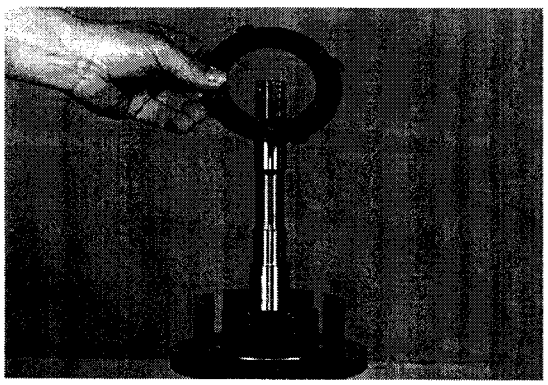


**Figure 266**

Install first steel (outer) clutch disc.

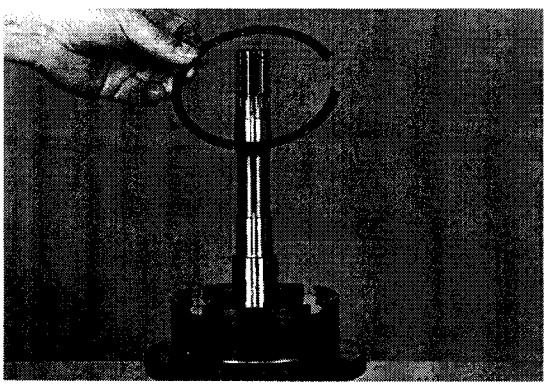


**Figure 269**

Install end plate retainer ring.

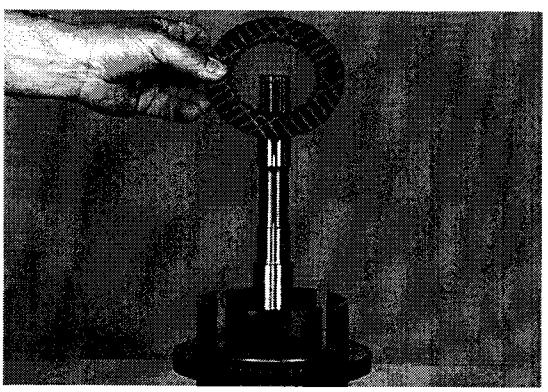


**Figure 267**

Install first friction (inner) clutch disc. Alternate steel and friction until six (6) steel and six (6) friction discs are in position.

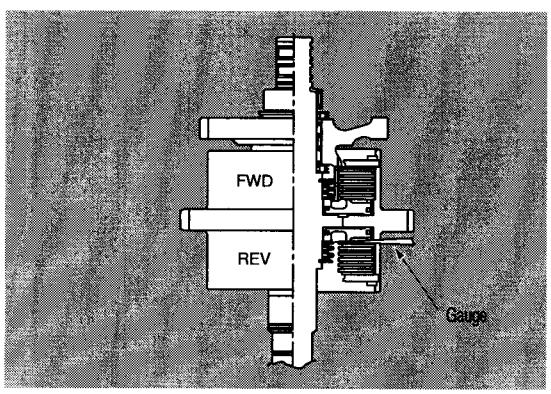



**Figure 270**

**NOTE:** reverse clutch pack must be checked for clutch disc clearance. Stand the clutch assembly on end. The clutch disc on the bottom will fall to the end plate. Measure the distance between the clutch piston and the first steel disc by inserting a feeler gauge or taper gauge through the slots in the clutch drum. The required clearance is .048-.108 [1,22-2,74]. If the clearance is greater than .108 [2,74] add one steel disc under the end plate.

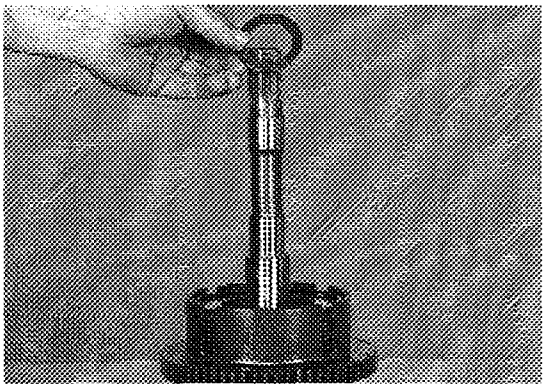


**Figure 271**

Position thrust bearing inner washer on clutch shaft.

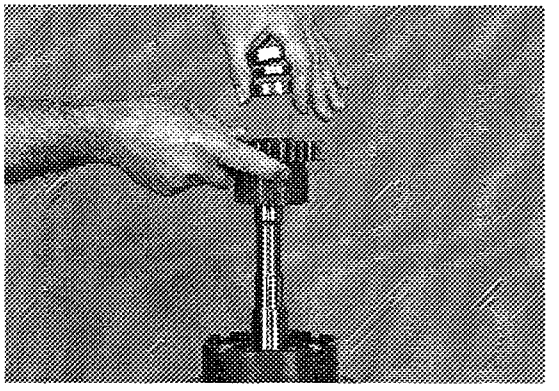


**Figure 274**

Press one bearing in clutch gear, flush with face of gear. Install bearing spacer next to bearing. Press second bearing in gear, flush with face of gear. Install the clutch gear in the clutch assembly by aligning the clutch hub teeth with the clutch inner discs. Be sure the clutch hub is in full position in the clutch assembly. Do not force this operation.

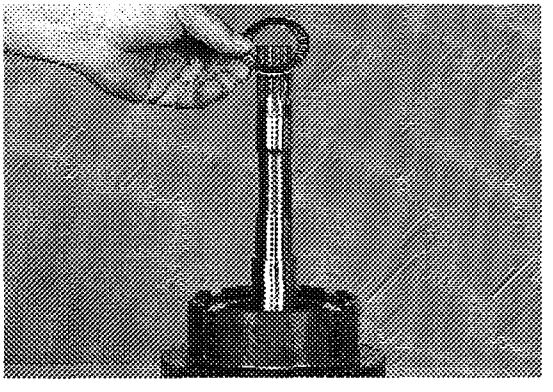


**Figure 272**

Position thrust bearing on clutch shaft against inner thrust bearing washer.

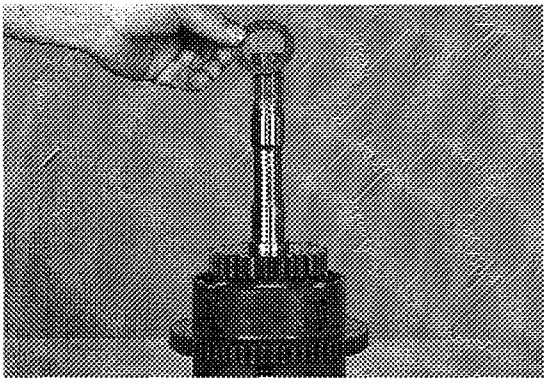


**Figure 275**

Position inner thrust washer on shaft.

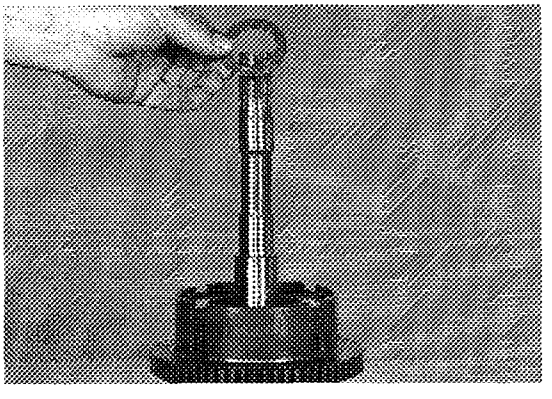


**Figure 273**

Install outer thrust bearing washer against bearing.

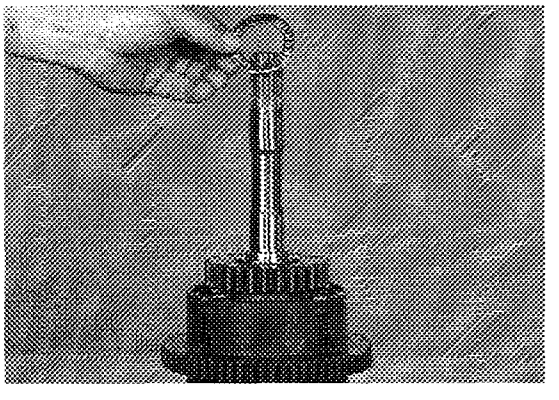


**Figure 276**

Position thrust bearing on shaft.

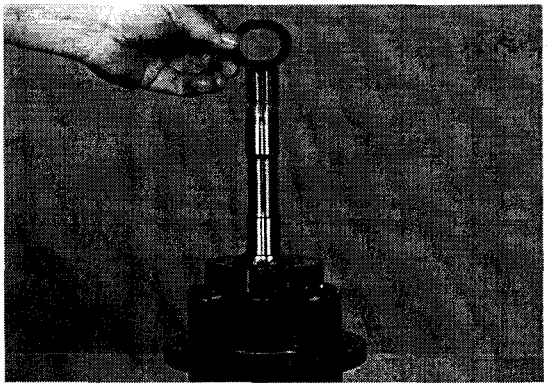


**Figure 277**
Position outer thrust washer on shaft.

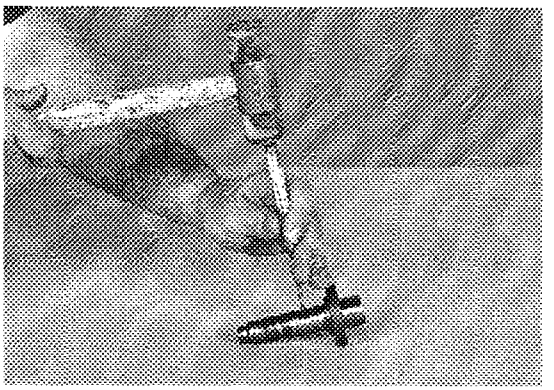


**Figure 278**

Tap pin from regulator valve sleeve. Use caution as valve spool is under spring pressure.

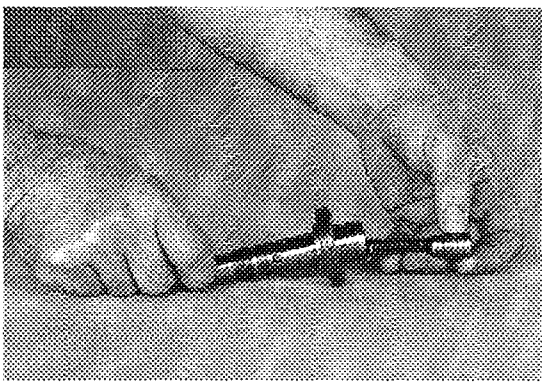


**Figure 279**

Remove regulator valve piston and pressure regulator valve spring.

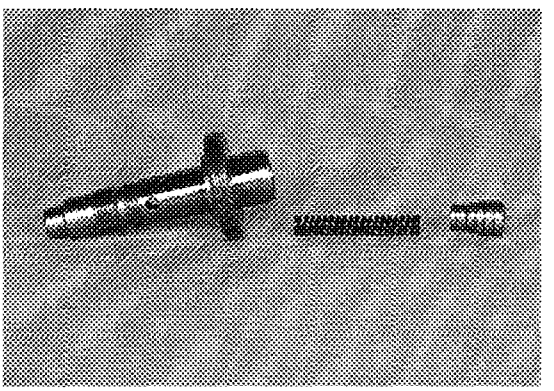


**Figure 280**

Spring and piston removed.

**Figure 281**

Position pressure regulator valve spring into regulator valve piston. Refer to the cleaning and inspection pages.

**Figure 282**

Install pressure regulator valve spring and regulator valve piston as an assembly into regulator valve sleeve.

**Figure 283**

Compress valve spring and valve and install pin into regulator valve sleeve.

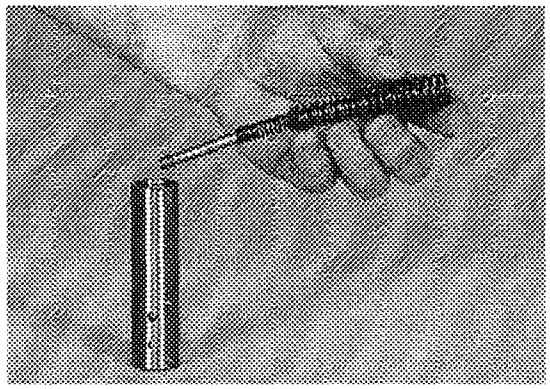


**Figure 284**

Remove inner, middle and outer spring and stop pin from modulation housing sleeve. Reference figure 47.

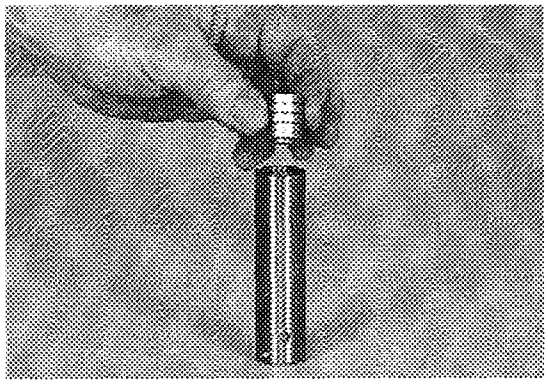


**Figure 285**

Remove accumulator spool. Reference figure 47.

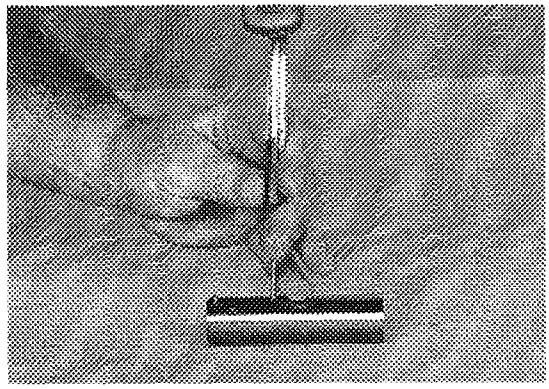


**Figure 286**

Remove cross pin from sleeve

**NOTE:** Some units will have two cross pins the same length. Some units will have two pins of different lengths. The longest pin goes in the bottom hole.

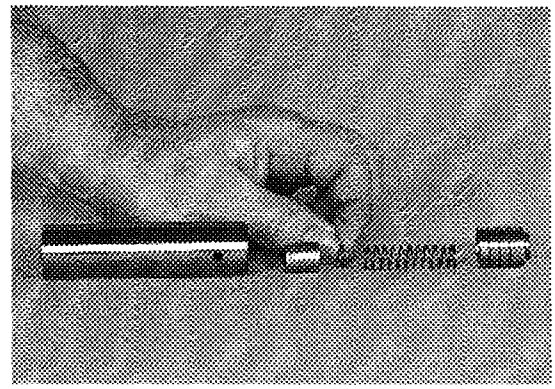


**Figure 287**

Remove regulator spool, spring, retainer spring and spacer spring from housing sleeve.

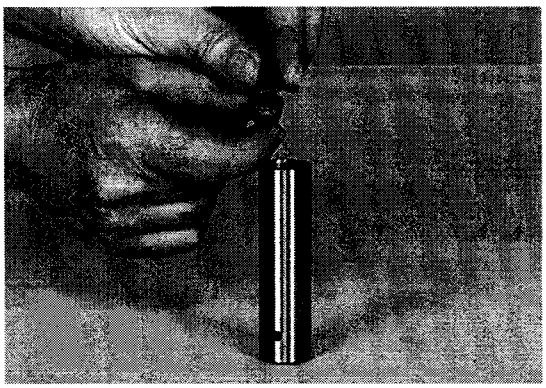


**Figure 288**

Install spring spacer in spring retainer.
Refer to the cleaning and inspection pages.

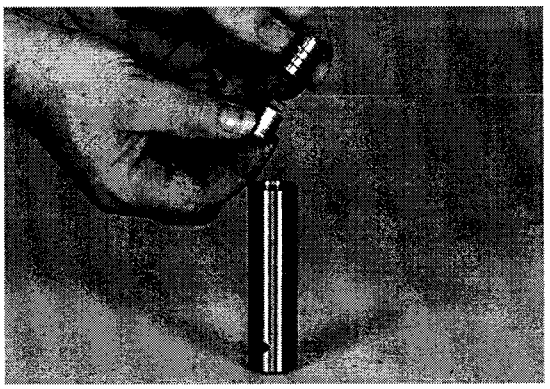


**Figure 291**

Install spring retainer, spring and regulator valve in sleeve against inner cross pin.

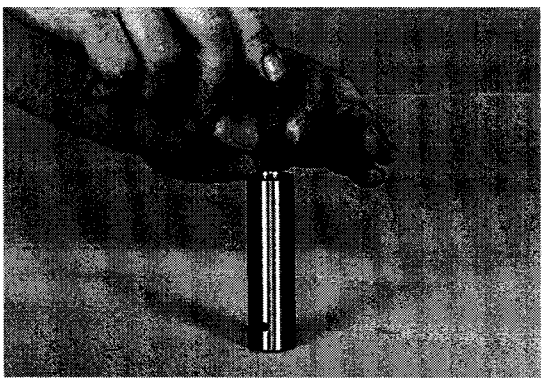


**Figure 289**

Install spring in spring retainer.

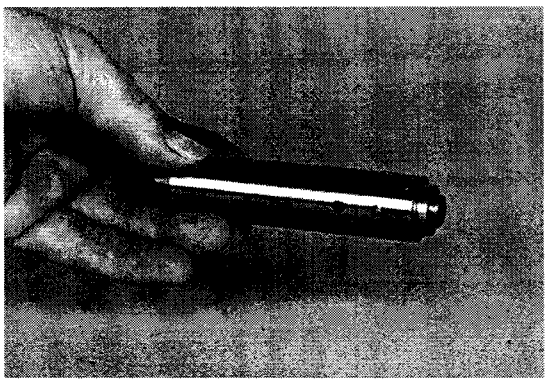


**Figure 292**

Compress regulator spool and spring in sleeve far enough to install cross pin.

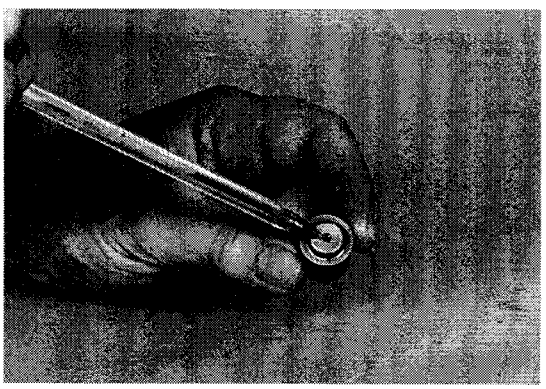


**Figure 290**

Check orifice in regulator spool to be free and clear of any foreign material.

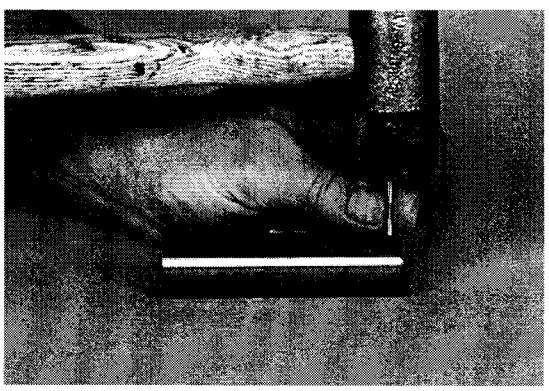


**Figure 293**

Install cross pin.
**NOTE:** Some units will have two cross pins the same length. Some units will have two pins of different lengths. The longest pin goes in the bottom hole.

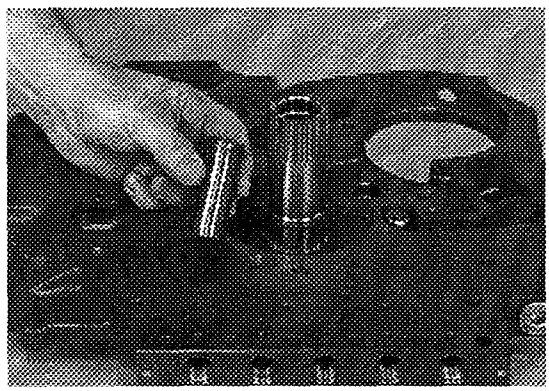


**Figure 306**
Idler shaft and locating ring removed.

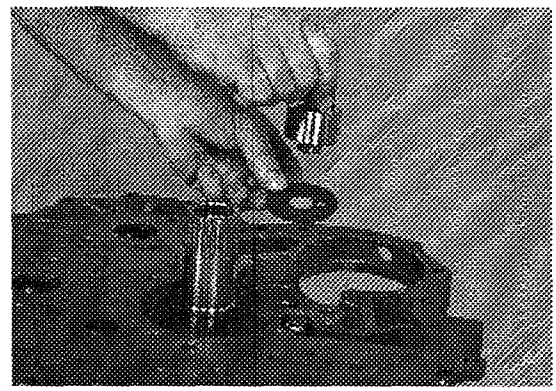


**Figure 309**
Remove pump drive idler shaft and thrust washer.

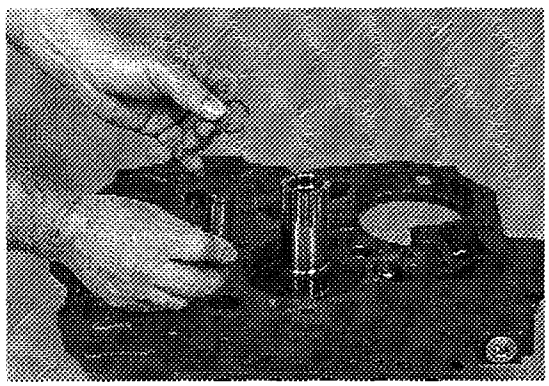


**Figure 307**
Remove locating ring from idler shaft.

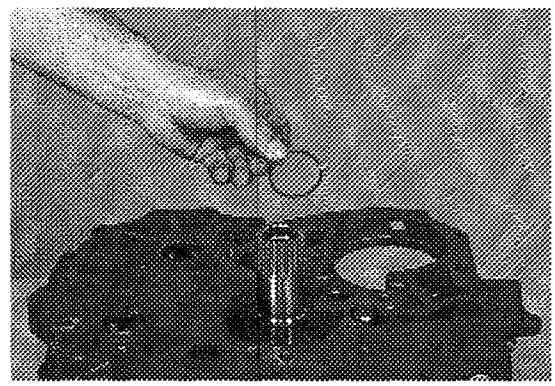


**Figure 310**
The stator support is held in place by two retaining rings. Remove converter end retainer ring from groove.

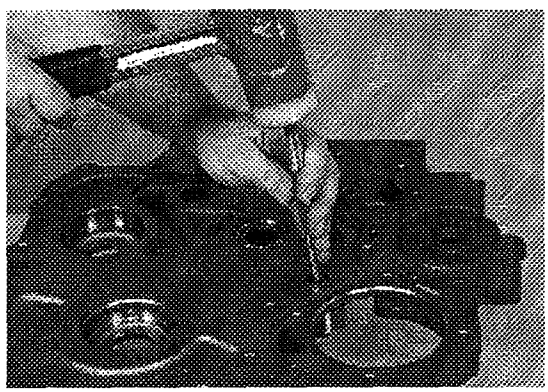


**Figure 308**
Tap pump drive idler shaft from spacer plate.

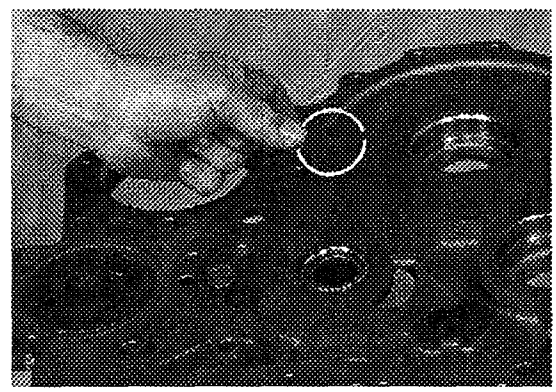


**Figure 311**
Push support towards transmission side far enough to expose retainer ring. Remove retainer ring.