E40D

INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP
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INTRODUCTION
FORD E4OD

The FORD E4OD automatic transmission is a four speed unit with total electronic shift control and is designed for operation in longitudinal powertrains for rear wheel drive applications. The E4OD is currently found in "F" Series Trucks and "E" Series Vans.

The E4OD transmission features a four element torque converter design that includes Torque Converter Clutch (TCC) and a gear train that includes three planetary gearsets. The hydraulic control systems of the E4OD transmission has five electronically controlled solenoids for: Shift feel (through line pressure control), Shift scheduling (through shift valve position control), Engine braking during coast operation (through shift valve control) and TCC apply (ON/OFF).

Note: There have been many engineering changes in this transmission since it s introduction in 1989. ATSG also has available an "Update Handbook" which includes the many changes and is required along with this manual for a proper overhaul or repair.

We wish to thank Ford Motor Company for the information and illustrations that have made this booklet possible.

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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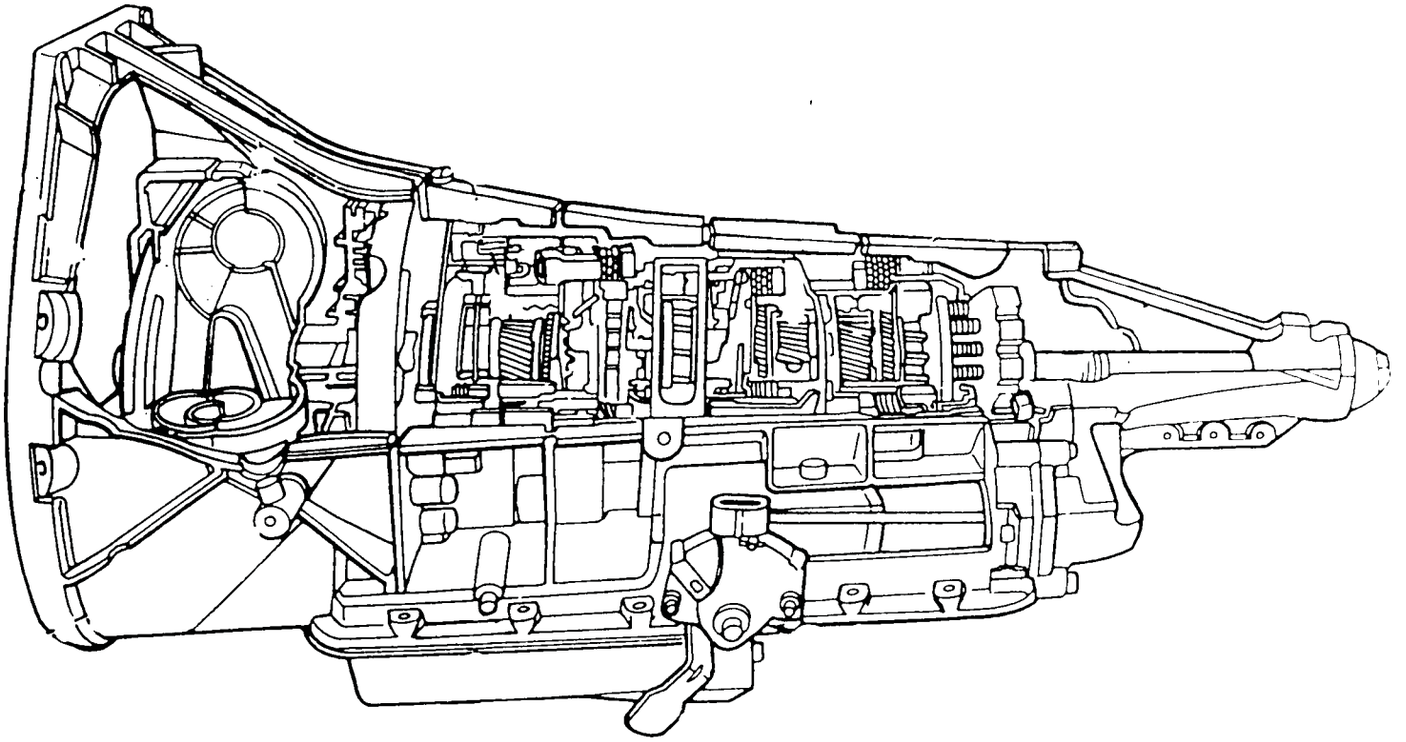
E4OD



E4OD Automatic Transmission

The E4OD Transmission is a fully automatic, electronically controlled, four-speed unit with a three element locking torque converter. The main operating components of the E4OD transmission include a converter clutch, six multiple-disc friction clutches, one band, two sprag one-way clutches and a roller one-way clutch which provide for the desired function of three planetary gear sets.

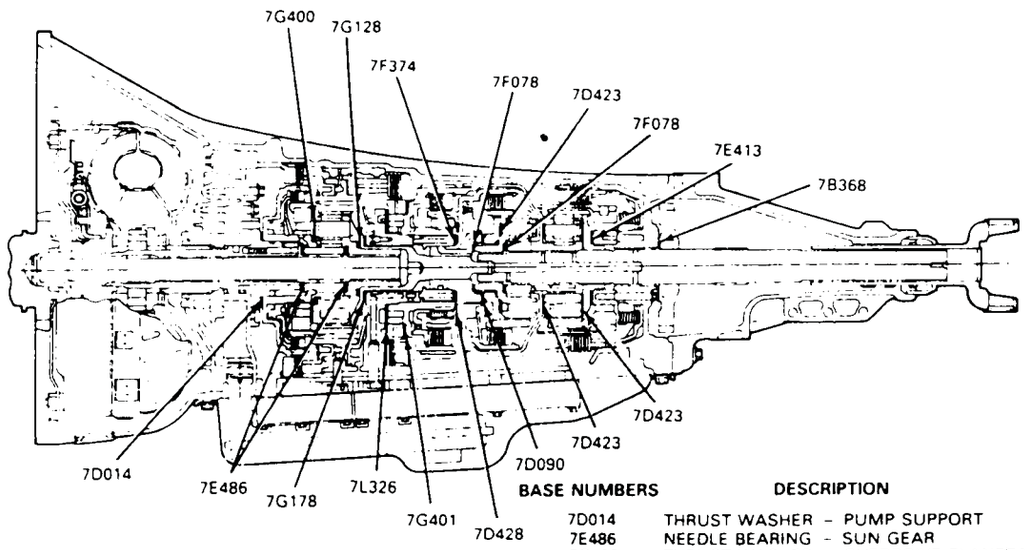
Transmission gear selection in the Ⓓ range and converter clutch operation is controlled by the EEC-IV control system. Operating conditions are relayed to EEC-IV by various sensors throughout the vehicle. The EEC-IV compares these conditions with electronically stored parameters and logically determines the state that the transmission should operate at.

In the Ⓓ range, automatic operation of all four gears is possible. The Overdrive Cancel Switch, located on the vehicle's dashboard, disables overdrive operation and enables automatic operation through the first three gears.

Manual gear selection is available in the 1 and 2 range. Second gear is commanded when the gear selector is in the 2 range and when downshifted into the 1 range at speeds above approximately 56 Km/h (35 mph) (for diesel 48 Km/h (30 mph). First gear is commanded in the 1 range at startups and when downshifted into 1 range below approximately 56 Km/h (35 mph) (for diesel 48 Km/h (30 mph).

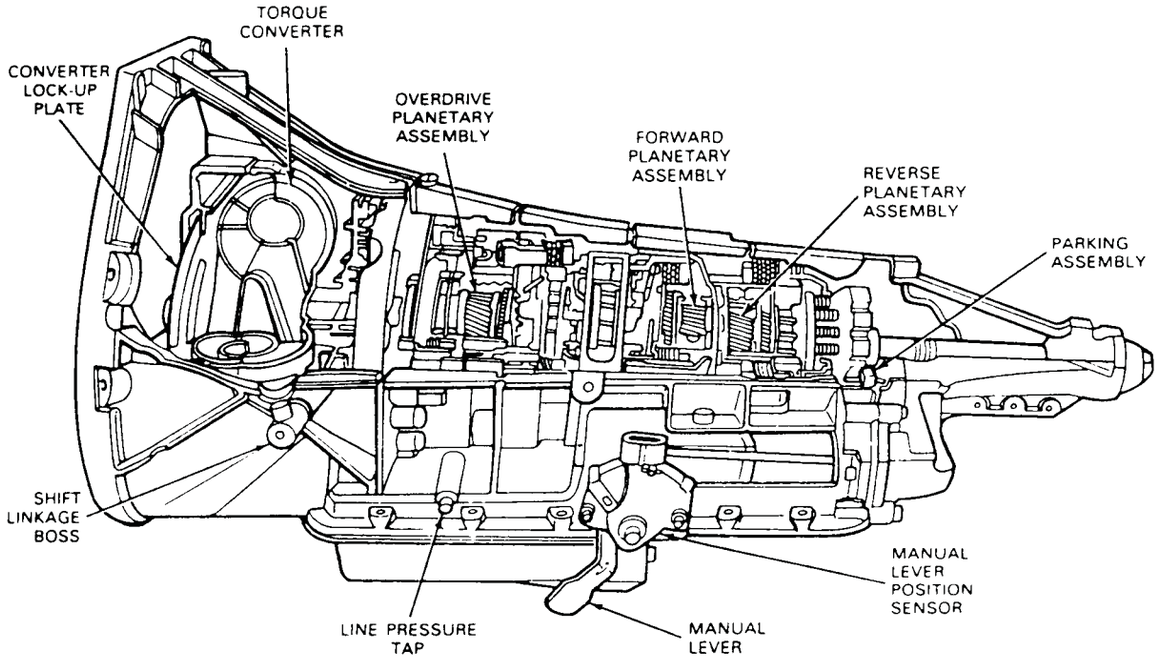
NOTE: Any reference to Intermediate Brake Drum and Direct Clutch Cylinder are one and the same

Thrust Washer and Needle Bearing locations

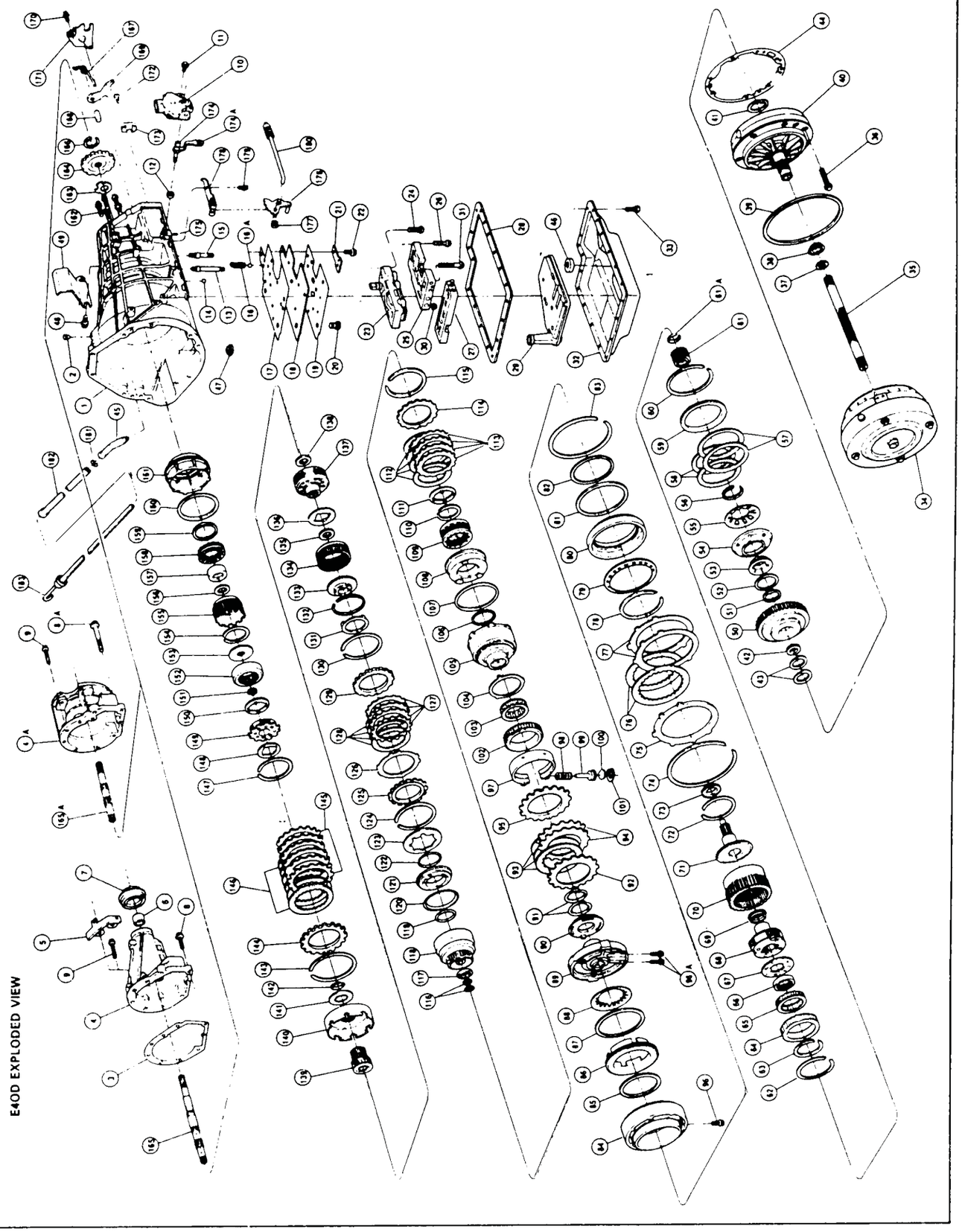


BASE NUMBERS	DESCRIPTION
7D014	THRUST WASHER - PUMP SUPPORT
7E486	NEEDLE BEARING - SUN GEAR
7G400	THRUST WASHER - OVERDRIVE PLANETARY CARRIER
7G128	NEEDLE BEARING - CENTER SHAFT
7G178	NEEDLE BEARING - CENTER SUPPORT
7L326	THRUST WASHER - CENTER SUPPORT
7G401	THRUST WASHER - INTERMEDIATE ONE-WAY CLUTCH
7D428	THRUST WASHER - INTERMEDIATE BRAKE DRUM
7F374	NEEDLE BEARING - FORWARD CLUTCH (PLASTIC) CYLINDER
7F078	NEEDLE BEARING - SUN GEAR
7D090	THRUST WASHER - FORWARD CLUTCH HUB
7D423	THRUST WASHER - PLANETARY CARRIER
7E413	NEEDLE BEARING - OUTPUT SHAFT HUB
7B368	THRUST WASHER - OUTPUT SHAFT

E4OD AUTOMATIC TRANSMISSION



E4OD Automatic Transmission



E4OD EXPLODED VIEW

E4OD EXPLODED VIEW LEGEND

1.	7005	CASE ASSEMBLY
2.	7034	VENT ASSEMBLY
3	7086	GASKET — EXTENSION HOUSING
4	7A039-CB	EXTENSION ASSEMBLY (4X2)
#	7A041	— EXTENSION & BUSHING ASSY
#	7A040	— EXTENSION
4A	7A039-DA	EXTENSION ASSEMBLY (4X4)
	7A039-EA	EXTENSION ASSEMBLY (SUPERDUTY)
#5	7H102	BRACKET — WIRING
6.	7A034	BUSHING — EXTENSION HOUSING (4X2)
7.	7052	SEAL — EXTENSION HOUSING (4X2)
8	N605802-S36	BOLT — EXTENSION (4X2 BOTTOM) (2 PCS.) M10X1.5X35MM
8A.	N606569-S36	BOLT — EXTENSION (SUPERDUTY & 4X4 BOTTOM) (2 PCS.) M10X1.5X90MM
9.	N605803-S36	BOLT — EXTENSION (TOP) (7 PCS.) M10X1.5X40MM
10.	7F293	SENSOR — MANUAL LEVER POSITION
11.	N805312-S100	BOLT ASSEMBLY (2 PCS.) M6X1.0X30MM
12.	7B498	SEAL — MANUAL LEVER
13.	N805331-S	STUD — CASE TO SOLENOID BODY (1 PC.) M6X1.0X79MM
14.	7E195	BALL — RUBBER CHECK (10 PCS.) (2 IN MAIN CONTROL)
	379581-S	BALL — STEEL CHECK (1 PC.)
15.	N805330-S	STUD — CASE TO CONTROL ASSEMBLY (4 PCS.) M6X1.0X61.25MM
16.	7D017	EPC BLOW-OFF SPRING
16A.	353078-S	EPC BLOW-OFF BALL
17.	7D100	GASKET — SEPARATOR
#18.	7A008	PLATE — SEPARATOR
19.	7C155	GASKET — SEPARATOR
20	7G308	SCREEN — SOLENOID
#21.	7F282	PLATE — SEPARATOR PLATE REINFORCING
22.	N605772-S	BOLT (3 PCS.) M6X1.0X16MM
23.	7G391	SOLENOID BODY ASSEMBLY
24.	N805329-S	BOLT — TORX HEAD (9 PCS.) M6X1.0X40MM
25.	7A100	MAIN CONTROL BODY ASSEMBLY
26.	N805326-S	BOLT (18 PCS.) M6X1.0X42.5MM
27.	7G422	ACCUMULATOR BODY ASSEMBLY
28.	7A191	GASKET — OIL PAN
29.	7G186-AA	FILTER AND SEAL ASSEMBLY (4X2)
	7G186-BA	FILTER AND SEAL ASSEMBLY (4X4)
30.	N805328-S	NUT (5 PCS.) M6X1.0
31.	N805327-S	BOLT (7 PCS.) M6X1.0X66MM
32.	7A264-FA	PAN — OIL (4X2)
	7A264-GA	PAN — OIL (4X4)
33.	N605902-S36	BOLT — OIL PAN (20 PCS.) M8X1.25X12MM
34	7902	TORQUE CONVERTER ASSEMBLY
	87650-S2	— PLUG — CONVERTER DRAIN 1/8 IN-27
35.	7017	SHAFT — INPUT
36.	N805260-S	BOLT & WASHER ASSEMBLY — PUMP (9 PCS.) M8X1.25X65MM
	7G379	— WASHER — REPLACEMENT (9 PCS.)
37.	7L323	SEAL RING — TEFLON
38	7A248	SEAL — CONVERTER HUB
39	7D441	SEAL — SQUARE CUT O.D. PUMP
40	7A103	PUMP ASSEMBLY
41.	7D014	WASHER — PUMP THRUST
42.	7E486	NEEDLE BEARING ASSEMBLY
43	7G402	SEAL RING — TEFLON (2 PCS.)
44.	7A136	GASKET — PUMP
45.	7N463	STUB TUBE
46.	7L027	MAGNET — PAN
47.	7N171	PLUG — CONVERTER ACCESS
48.	N605770-S36	BOLT — HEAT SHIELD (2 PCS.)
49.	7A434	HEAT SHIELD — SOLENOID BODY CONNECTOR
50.	7G387	COAST CLUTCH CYLINDER ASSEMBLY
51.	7A548-JA	SEAL — INNER
52.	7A548-EA	SEAL — OUTER
53.	7G419	PISTON
54.	7N519	RING — PISTON APPLY
55.	7B070-EA	SPRING — PISTON RETURN
56.	N804949-S	RING — RETAINING
57.	7B442-CA	PLATE — COAST CLUTCH EXTERNAL SPLINE
58.	7B164-CA	PLATE — COAST CLUTCH INTERNAL SPLINE
59.	7B437-CA	PLATE — COAST CLUTCH PRESSURE
60.	N804950-S	RING — RETAINING (SELECTIVE FIT)
	N804951-S	RING — RETAINING
	N804952-S	RING — RETAINING
61.	7670	GEAR — OVERDRIVE SUN
61A.	377300-S	RING — RETAINING
62.	377155-S	RING — RETAINING (OUTER RACE TO OVERDRIVE RING GEAR)
63.	377135-S	RING — RETAINING (OVERDRIVE OWC TO OUTER RACE)
*64.	7G389	RACE — OVERDRIVE ONE WAY CLUTCH OUTER
*65.	7G381	CLUTCH ASSEMBLY — OVERDRIVE ONE WAY
*66.	7G388	RACE — OVERDRIVE ONE WAY CLUTCH INNER
67.	7G400	WASHER — THRUST
68.	7E031	CARRIER ASSEMBLY — OVERDRIVE PLANETARY
#	7L676	— CARRIER
#	7D008-CA	— PLANET GEARS (4 PCS.)
#	7A238-CA	— PLANET SHAFTS (4 PCS.)
#	7A242-AA	— THRUST WASHERS (8 PCS.)
#	7D037-BA	— NEEDLE BEARINGS (80 PCS.)
#	380225-S	— RETAINING PINS (4 PCS.)
#	7E486	— NEEDLE BEARING ASSEMBLY
69.	7G128	NEEDLE BEARING ASSEMBLY
70.	7653	GEAR — OVERDRIVE RING
71.	7G382	CENTER SHAFT
72.	7G375	RING — RETAINING (CENTER SHAFT TO OVERDRIVE RING GEAR)
73.	7G178	NEEDLE BEARING ASSEMBLY
74.	7B421	RING — OVERDRIVE RETAINING
75.	7B066-BB	PLATE — OVERDRIVE CLUTCH PRESSURE
76.	7B164-EA	PLATE — OVERDRIVE CLUTCH INTERNAL SPLINE
77.	7B442-DA	PLATE — OVERDRIVE CLUTCH EXTERNAL SPLINE
78.	N804948-S	RING — RETURN SPRING RETAINING
79.	7B070-CA	SPRING — OVERDRIVE RETURN
80.	7G418	PISTON — OVERDRIVE
81.	7A548	SEAL — OVERDRIVE OUTER
82.	7F225	SEAL — OVERDRIVE INNER (SAME AS INTERMEDIATE INNER)
83.	7B421	RING — INT./O.D. CYLINDER RETAINING
84	7G385	CYLINDER — INTERMEDIATE/OVERDRIVE
85.	7F225	SEAL — INTERMEDIATE INNER
86.	7E005	PISTON — INTERMEDIATE
87.	7F224	SEAL — INTERMEDIATE OUTER
88.	7B070-DB	SPRING — INTERMEDIATE RETURN
89.	7G033	SUPPORT ASSEMBLY — CENTER
90.	7L326	WASHER — THRUST
91.	7D429-A	SEAL — DIRECT CLUTCH CAST IRON (2 PCS.)
92.	7B066-CA	PLATE — INTERMEDIATE CLUTCH APPLY
93.	7F219	PLATE — INTERMEDIATE CLUTCH INTERNAL SPLINE
94.	7B442	PLATE — INTERMEDIATE CLUTCH EXTERNAL SPLINE
95.	7B437	PLATE — INTERMEDIATE CLUTCH PRESSURE
96.	N805310-S101	BOLT — CYLINDER HYDRAULIC FEED (1 PC.) M10X1.5X24MM
96A.	N805311-S101	BOLT — CENTER SUPPORT HYDRAULIC FEED (2 PCS.) M12X1.75X31MM
97.	7D034	BAND ASSEMBLY
98.	7D028	SPRING — SERVO RETURN
99.	7E221	PISTON ASSEMBLY — SERVO

#NOT SERVICED
*SERVICED IN KITS ONLY

E4OD EXPLODED VIEW LEGEND (CONTINUED)

100.	7D027	PLATE — SERVO COVER
101.	N660246-S	RING — SERVO RETAINING
*102.	7G380	RACE — INTERMEDIATE ONE WAY CLUTCH OUTER
*103.	7F271	CLUTCH ASSEMBLY — INTERMEDIATE ONE WAY
104.	7G401	WASHER — THRUST (LG. DIA.)
105.	7D044	DRUM ASSY. — INTERMEDIATE BRAKE
106.	7A548-GA	SEAL — INNER
107.	7A548-FA	SEAL — OUTER
108.	7A262	PISTON ASSEMBLY
#	7A258	— PISTON
#	375393-S	— CHECK BALL (7/32 INCH DIA.)
#	7E220	— BALL RETAINER
109.	7G298	SPRING — PISTON RETURN
110.	N804817-S	RING — SPRING RETAINING
111.	7D428	WASHER — THRUST (SMALL DIA.)
112.	7B164-GA	PLATE — DIRECT CLUTCH INTERNAL SPLINE
113.	7B442-FA	PLATE — DIRECT CLUTCH EXTERNAL SPLINE
114.	7B066-BA	PLATE — DIRECT CLUTCH PRESSURE
115.	377126-S	RING — RETAINING (SELECTIVE FIT)
	377127-S	RING — RETAINING
	377128-S	RING — RETAINING
	377437-S	RING — RETAINING
	377444-S	RING — RETAINING
116.	7D019	SEAL RING — TEFLON (2 PCS.)
117.	7F374	NEEDLE BEARING ASSEMBLY
118.	7D424	CYLINDER — FORWARD CLUTCH ASSEMBLY
119.	7E244	SEAL — INNER
120.	7A548	SEAL — OUTER
121.	7A262	PISTON ASSEMBLY
#	7A258	— PISTON
#	375393-S	— CHECK BALL
#	7E220	— BALL RETAINER
122.	7D256	RING — PISTON APPLY
123.	7B070-AA	SPRING — PISTON RETURN
124.	377127-S	RING — RETAINING (FOR RETURN SPRING)
125.	7B066-AA	PLATE — FORWARD CLUTCH PRESSURE
126.	7E457	SPRING — CUSHION
127.	7B442-FA	PLATE — FORWARD CLUTCH EXTERNAL SPLINE
128.	7E311-AA	PLATE — FORWARD CLUTCH INTERNAL SPLINE
129.	7B066-BA	PLATE — FORWARD CLUTCH PRESSURE
130.	377127-S	RING — RETAINING (SELECTIVE FIT)
	377437-S	RING — RETAINING
	377444-S	RING — RETAINING
	386841-S	RING — RETAINING
	386842-S	RING — RETAINING
131.	7D090	WASHER — PLASTIC THRUST
132.	377132-S	RING — RETAINING
133.	7D393	HUB — FORWARD
134.	7D392	GEAR — FORWARD RING
135.	7F078	NEEDLE BEARING ASSEMBLY
136.	7D423	WASHER — THRUST
137.	7A398	CARRIER ASSEMBLY — FORWARD PLANETARY
#	7D055	— CARRIER
#	7D008-AB	— PLANET GEARS (4 PCS.)
#	7A238-AA	— PLANET SHAFTS (4 PCS.)
#	7A242-AA	— THRUST WASHERS (8 PCS.)
#	7D037-CA	— NEEDLE BEARINGS (68 PCS.)
#	380225-S	— RETAINING PINS (4 PCS.)
138.	7F078	NEEDLE BEARING ASSEMBLY
139.	7D063	GEAR — FORWARD/REVERSE SUN ASSEMBLY
140.	7D064	INPUT SHELL
141.	7D066	WASHER — THRUST
142.	377300-S	RING — RETAINING
143.	N805207-S	RING — RETAINING
144.	7D408	PLATE — REVERSE CLUTCH PRESSURE
145.	7B442-EA	PLATE — REVERSE CLUTCH EXTERNAL SPLINE
146.	7E312	PLATE — REVERSE CLUTCH INTERNAL SPLINE
147.	377155-S	RING — RETAINING
148.	7D423	WASHER — THRUST
149.	7D006	CARRIER ASSEMBLY — REVERSE PLANETARY
#	7D007	— CARRIER
#	7D008-BB	— PLANET GEARS (4 PCS.)
#	7A238-BA	— PLANET SHAFTS (4 PCS.)
#	7A242-BA	— THRUST WASHERS (8 PCS.)
#	7D037-CA	— NEEDLE BEARINGS (84 PCS.)
#	380225-S	— RETAINING PINS (4 PCS.)
150.	7D423	WASHER — THRUST
151.	387031-S	RING — RETAINING (FOR OUTPUT SHAFT) (1-1/2 IN DIA.)
152.	7A153	GEAR — REVERSE RING
153.	7D164	HUB — OUTPUT SHAFT
154.	377132-S	RING — RETAINING
155.	E7AP-7E193-AA	REVERSE HUB AND CLUTCH ASSY (4X2)
	E7TP-7E193-AA	REVERSE HUB AND CLUTCH ASSY (4X4)
#	E7AP-7D390-AA	— HUB ASSEMBLY (4X2)
#	E7TP-7D390-AA	— HUB ASSEMBLY (4X4)
#	7E392	— SPRING ASSEMBLY
#	7190	— ROLLER — OVERRUNNING CLUTCH
#	377135-S	— RING — RETAINING (2 PCS.)
#	7E194	— BUSHING — OVERRUNNING CLUTCH
156.	7E413	NEEDLE BEARING ASSEMBLY
157.	7D171	RACE — LOW/REVERSE ONE WAY CLUTCH INNER
158.	7F153	SPRING — PISTON RETURN
159.	7D404	SEAL — INNER
160.	7D403	SEAL — OUTER
161.	7D402	PISTON
162.	7D167	BOLTS (5 PCS.) 5/16 IN-24 (ONE WAY CLUTCH TO CASE)
163.	7B368	WASHER — THRUST
164.	7A233	PARKING GEAR
165.	7060-AA	OUTPUT SHAFT ASSEMBLY (4X2)
165A.	7060-CA	OUTPUT SHAFT ASSEMBLY (4X4)
166.	387035-S	RING — RETAINING (1-9/16 IN DIA.)
167.	7D070	SPRING — PARKING PAWL RETURN
168.	387640-S	PIN — PARKING PAWL
169.	7A441	PARKING PAWL
170.	N805232-S	BOLT AND WASHER ASSEMBLY (2 PCS.)
171.	7D419	PLATE — PARKING ROD GUIDE
172.	N805261-S190	BOLT (1 PC.)
173.	7G101	ABUTMENT — PARKING PAWL ACTUATING
174.	7A256	LEVER ASSEMBLY — MANUAL CONTROL
174A.	7341	INSULATOR
175.	7B210	PIN — MANUAL LEVER RETAINING
176.	7A115	LEVER — INNER DETENT
177.	N800287-S36	NUT — INNER DETENT LEVER M14X1.5 HEX
178.	7E332	SPRING ASSEMBLY — MANUAL VALVE DETENT
179.	N805503-S	BOLT — HEX FLANGE HEAD M6X1.0X16.5MM
180.	7D410	ROD ASSEMBLY — PARKING PAWL ACTUATING
181.	87034-94	O-RING FILLER TUBE
182.	7A228	TUBE ASSY. — OIL FILLER
183.	7A020	INDICATOR ASSY. — OIL LEVEL

#NOT SERVICED
*SERVICED IN KITS ONLY

Diagnosis and Testing

Shift Point Tests

This test verifies that the shift control system is operating properly.

Road Test

1. Bring engine transmission up to normal operating temperature.
2. Operate the vehicle with the transmission selector in Ⓓ range.
3. Apply minimum throttle pressure and observe the upshift speeds and speeds at which the converter and clutch apply. Refer to Technical Service Bulletin Special Specifications issue.
4. With vehicle in overdrive (fourth gear), depress overdrive cancel switch. Transmission should downshift into third gear.
5. Depress accelerator pedal to the floor (WOT). Transmission should shift from third to second, or third to first depending on vehicle speed and converter clutch should release and then reapply.
6. With vehicle in Ⓓ range above 80 km/h (50 mph) and less than half throttle, move transmission selector from Ⓓ range to 2 range and remove foot from accelerator pedal. Transmission should immediately downshift into second gear. With vehicle remaining in 2 range, move transmission selector into 1 range, and release accelerator pedal. Transmission should downshift into first gear at speeds below 48-56 Km/h (30-35 mph).
7. If transmission fails to upshift and/or downshift as outlined, refer to Diagnostic Charts Section.

In-Shop Test

1. Raise rear of vehicle so that rear wheels are clear of floor.

CAUTION: Do not exceed 97 Km/h (60 mph) indicated speedometer speed. Do not exceed recommended tire speed rating.

2. To check shift valves, place selector lever in Ⓓ range. Apply throttle pressure and observe upshift speeds. At the shift points, the speedometer needle will make a momentary surge, a slight driveline bump may be felt and engine speed will drop without releasing accelerator pedal.
3. If transmission fails to upshift and/or downshift as outlined, refer to Diagnostic Charts in this Section.

Air Pressure Checks

A NO DRIVE condition can exist, even with correct transmission fluid pressure, because of inoperative clutches or bands. An erratic shift can be located through a series of checks by substituting air pressure for fluid pressure to determine the location of the malfunction.

When the selector lever is in a forward gear range (Ⓓ, 2 and 1) a NO DRIVE condition may be caused by an inoperative forward clutch, overdrive one-way clutch or low/reverse one-way clutch.

No manual low (1) coast could be caused by an inoperative coast clutch or reverse clutch.

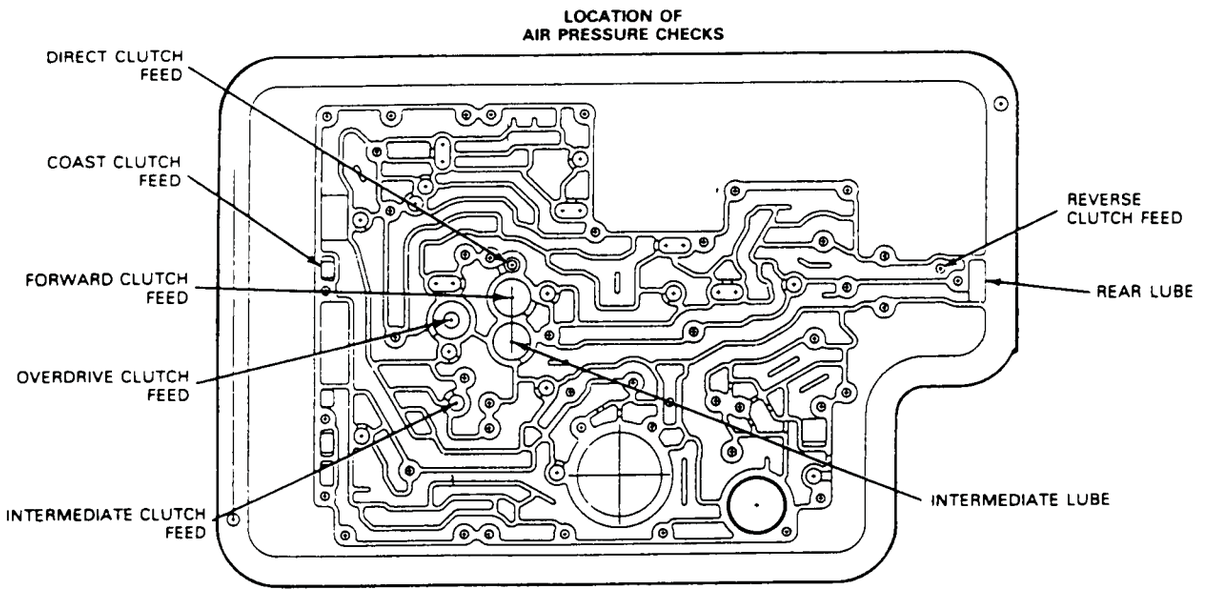
Failure to drive in R (REVERSE) could be caused by a malfunction of the reverse clutch, overdrive one-way clutch or direct clutch.

1. Drain transmission fluid and remove oil pan.
2. Remove filter and seal assembly, solenoid body and the main control assemblies.

DIAGNOSIS AND TESTING (Continued)

3. The inoperative clutches can be located by introducing air pressure into the various test passages as follows:

Air Pressure Check Locations



Clutches: Forward, Coast, Reverse, Overdrive, Direct and Intermediate

Apply air pressure to appropriate clutch test port. A dull thud can be heard, or movement of piston felt when clutch piston is applied. If clutch seal(s) are leaking, a hissing sound will be heard.

Clutch Band Application Chart

Gear	Friction Elements							One-Way Clutch					
								Drive			Coast		
	Coast	Inter-mediate	Direct	Forward	Reverse	Over-Drive	Band	O/D OWC	Inter-mediate OWC	Low Reverse OWC	O/D OWC	Inter-mediate OWC	Low Reverse OWC
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑧	⑨	⑩
Ⓓ first	*			apply				hold		hold	o/r*		o/r
Ⓓ second	*	apply		apply				hold	hold	o/r	o/r*	o/r	o/r
Ⓓ third	*	apply	apply	apply				hold	o/r	o/r	o/r*	o/r	o/r
Ⓓ fourth		apply	apply	apply		apply		o/r	o/r	o/r	o/r	o/r	o/r
1	apply			apply	apply								
2	apply	apply		apply			apply			o/r			o/r
Reverse	apply		apply		apply				o/r			o/r	

O/D — Overdrive
OWC — One-Way Clutch
O/R — Overrunning
*In D Range with the Overdrive Cancel Switch pressed, the coast clutch is applied and the O/D one-way clutch is bypassed.

QUICK TEST: VISUAL CHECK / VEHICLE PREPARATION

SPECIAL NOTES

- Correct results of the QUICK TEST are dependent on the proper operation of related non-EEC-IV components.
- It may be necessary to disconnect or disassemble the harness connector assemblies to do some of the inspections. Pin locations should be noted before disassembly.
- If the engine will not start, starts but stalls, idles rough, or runs rough; continue through QUICK TEST (KOEO SELF TEST on page 13

VISUAL CHECK

1. Inspect the air cleaner and inlet ducting.
2. Check all engine vacuum hoses for damage, leaks, cracks, blockage, proper routing, etc.
3. Check EEC-IV system wiring harness for proper connections, bent or broken pins, corrosion loose wires, proper routing, etc.
4. Check the processor, sensors and actuators for physical damage.
5. Check the engine coolant for proper level.
6. Check transmission fluid level and quality.
7. Make all necessary repairs before continuing with QUICK TEST.

VEHICLE PREPARATION

1. Perform ALL safety steps required to start and run vehicle - apply parking brake, place shift lever firmly into the PARK position, and block the drive wheels, etc.
2. Turn off ALL electrical loads - radios, lights, AC, etc.
3. Start engine and run it up to operating temperature.
4. Turn engine off and proceed to QUICK TEST HOOK-UP on page 12.

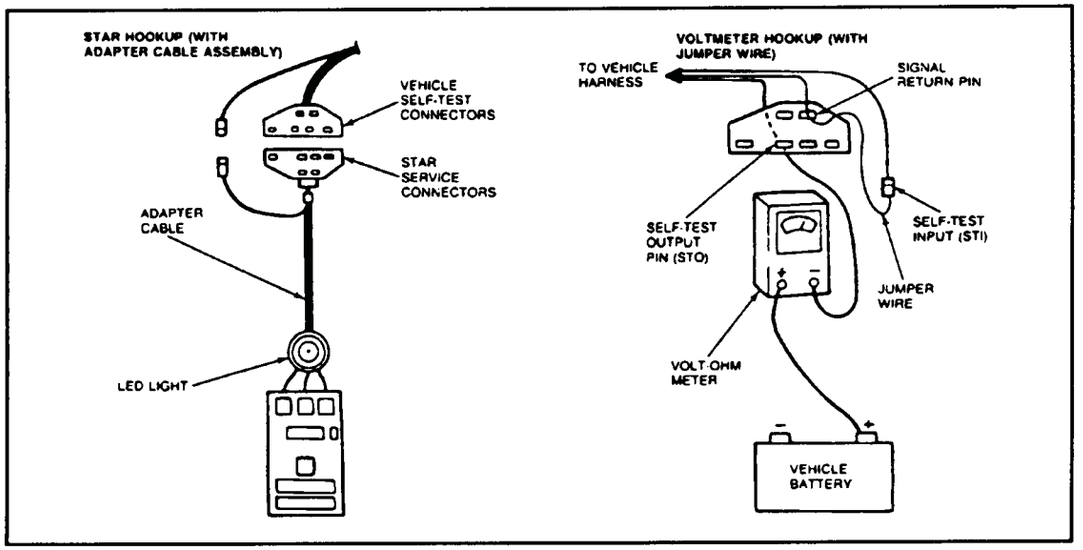
QUICK TEST: EQUIPMENT HOOK-UP

SPECIAL NOTES:

- Refer to the illustrations for self test connector pin orientation and VOM and STAR hook up.
- After the equipment is properly hooked up, proceed to QUICK TEST KOEO TEST on page 13.

USING THE STAR TESTER

1. Turn the ignition key off.
2. Set the VOM on a DC voltage range to read from 0 to 15 volts.
3. Connect the adapter cable leads to the proper Self-Test connectors.
4. Connect the timing light.



USING AN ANALOG VOLT/OHM METER (VOM)

1. Turn the ignition key off.
2. Set the VOM on a DC voltage range to read from 0 to 15 volts.
3. Connect the VOM from the battery + terminal to the Self-Test Output pin of the large Self-Test connector.
4. Connect the timing light.

QUICK TEST: KEY ON ENGINE OFF TEST

SPECIAL NOTES:

- It may be necessary to service non-EEC-IV faults before running Quick Test.
- Continuous Memory Codes recorded in this step will be used for diagnosis in QUICK TEST SERVICE CODES (on page 26) after a pass code 11 is received in both the Key On Engine Off And The Engine Running Self-test.
- Deviation from this procedure may cause the output of false codes.
- On all vehicles equipped with a 2.5L OR 4.9L ENGINE, the clutch must be depressed during the KOEO Self Test.In vehicles equipped with a 7.3L diesel engine, The throttle must be depressed (WOT) during the entire KOEO Self Test.

HOW TO RUN THE KEY ON ENGINE OFF SELF TEST

DO

- Verify that the vehicle has been properly prepared according to QUICK TEST STEPS on pages 12 and 13.
- Place ignition key in the ON position.
- For 7.3 Diesel vehicles only, depress the throttle.
- Activate Self Test.

  STAR TESTER: Latch the center button in the down position.

  Analog VOM: Jumper STI to SIG RTN at the Self Test connectors.

  "Check Engine" light (MIL): Jumper STI to SIG RET at the Self Test connectors. Service Codes will be flashed on the "Check Engine" light.

- Record all service codes.

DON'T

- Depress throttle during KOEO Self Test on gasoline engine applications.
- Activate Self Test before turning key to on position.

READING CODES WITH THE "CHECK ENGINE" LIGHT

READING CODES — "CHECK ENGINE" LIGHT (MIL)

During Self-Test a service code is reported by the "Check Engine" Light. It will represent itself as a flash on the "Check Engine" Light display on the dash panel (Figure 7). A single-digit number of three will be reported by three flashes.

However, as previously stated, a service code is represented by a two-digit number, such as 2-3. As a result, the Self-Test service code of 2-3 will appear on the "Check Engine" Light display as two flashes, then, after a two-second pause, the light will flash three times.

The Continuous Memory Codes are separated from the Key On Engine Off codes by a six-second delay, a single half-second flash, and another six-second delay. They are produced on the "Check Engine" Light display in the same manner as the Key On Engine Off codes.

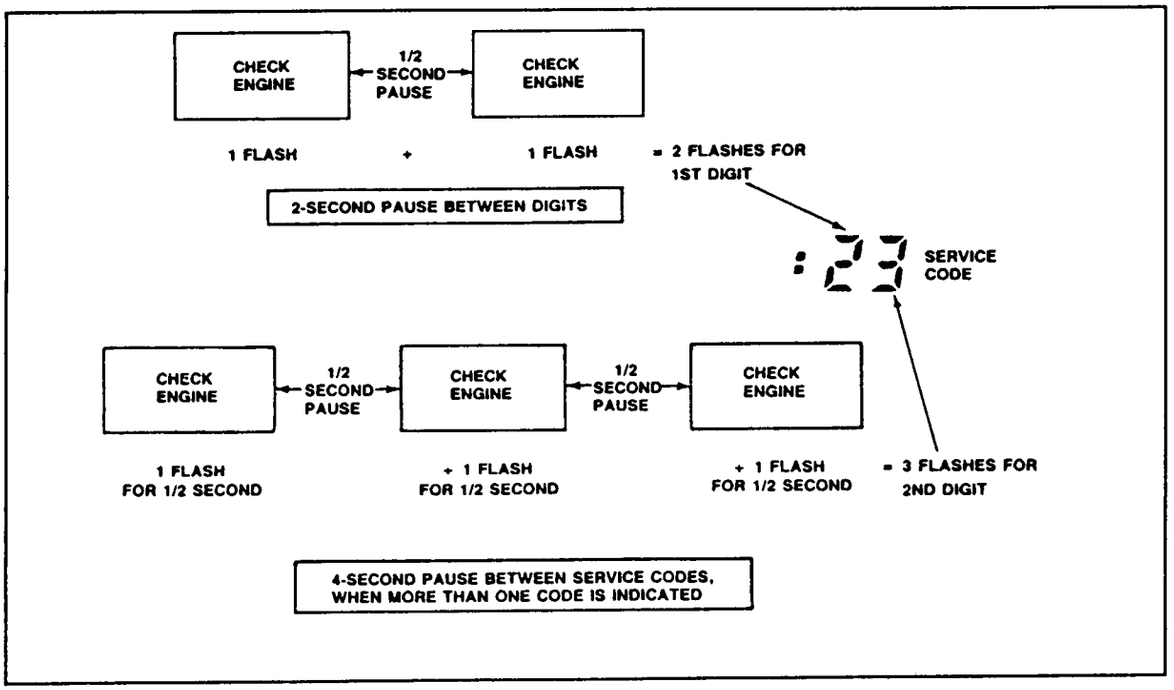


Figure 7 "Check Engine" Light Output Code Format

DIAGNOSIS GUIDE — E4OD

CONDITION	POSSIBLE SOURCE	ACTION
Fluid Leaks	1. Case breather valve — Transmission fluid foaming	1. Refer to service procedure in Mechanical Diagnostics in this section. Service as required.
	2. Leakage at gasket, seals etc.	2. Refer to General Diagnositics at the beginning of this section.
Fluid venting or foaming	1. Check fluid level (venting) — Transmission overfilled	1. Drain transmission to proper level.
	2. Inspect transmission fluid — Contaminated with anti-freeze or engine overheating	2. Determine source of leak. Service as required.
	3. Inspect transmission fluid filter — Damaged seal — Misassembly to pump	3. Replace filter seals or reassemble fluid filter.
Stalls when stopping	1. Poor engine performance	1. Check engine and service as required.
	2. Check fluid level	2. Drain or fill transmission to proper level.
	3. Check electronic engine control operation	3. Refer to Quick Test
	4. Test converter clutch — Converter clutch does not release	4. Refer to service procedure in this section.
Shift efforts high	1. Inspect manual shift linkage — Damaged or misadjusted	1. Service as required. Refer to Removal and Installation in this section.
	2. Inspect manual lever retainer pin — Damaged	2. Adjust linkage and install new pin.
	3. Check detent spring	3. Service as required.
	4. Inspect inner manual lever nut	4. Tighten nut to specification listed at the end of this section.
Poor vehicle performance	1. Poor engine performance	1. Perform Quick Test Section
	2. Test converter clutch — Converter clutch does not release	2. Refer to service procedure in this section.
	3. Inspect torque converter one-way clutch — One-way clutch locked up	3. Replace converter.
Vehicle will not start	1. Inspect ignition switch — Misadjusted or defective	1. Adjust or replace as required.
	2. Check fluid level — Fluid level high or low	2. Drain or fill transmission to proper level.
	3. Check electronic engine control operation	3. Refer to Quick Test Section

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
Transmission overheats	1. Excessive tow loads	1. Check owner's manual for tow restriction.
	2. Check fluid level — Fluid level high or low	2. Drain or fill transmission to proper level.
	3. Check electronic engine control operation	3. Refer to Quick Test Section
	4. Inspect transmission cooler and cooler lines — Restricted or blocked	4. Service as required. Refer to General Diagnosis in the beginning of this section.
	5. Test converter clutch — Converter clutch does not apply	5. Refer to service procedure in this section.
	6. Inspect valve body — Dirty or sticky valves	6. Clean, service or replace valve body.
	7. Inspect torque converter one-way clutch — One-way clutch locked up	7. Refer to General Diagnosis in the beginning of this section. Replace the converter if necessary.
No 1st gear, starts in higher gear	1. Check line pressure — Low line pressure	1. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Check solenoid operation	2. Refer to electrical diagnosis procedure in this section. Service as required.
	3. Inspect D2 valve, 2-3 shift valve and 3-4 shift valve — Springs missing or tangled — Dirty or sticky valve	3. Determine source of contamination or damage. Service as required.
No 1-2 upshift	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Check manual linkage — Misadjusted/damaged	2. Service as required. Refer to Adjustments at the beginning of this section.
	3. Test line pressure — Low to intermediate friction clutch	3. Perform line pressure test. Refer to service procedure in this section if necessary.
	4. Check solenoid operation — (S2 solenoid suspected)	4. Refer to electrical diagnosis procedure in this section. Service as required.
	5. Inspect valve body bolts — Bolts loose or tight	5. Tighten bolts to specification.
	6. Inspect valve body — Dirty/sticky valves	6. Determine source of contamination. Service as required.
	7. Inspect 1-2 shift valve — Stuck, nicked or damaged	7. Determine source of contamination. Service as required.
	8. Inspect D2 valve — Spring missing or damaged — Dirty or sticky valve	8. Determine source of contamination. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No 1-2 upshift (Cont'd)	9. Inspect intermediate clutch accumulator regulator valve — Stuck, nicked or damaged	9. Determine source of contamination. Service as required.
	10. Inspect intermediate clutch accumulator — Plunger stuck or damaged — Springs missing or damaged	10. Determine source of contamination. Service as required.
	11. Inspect intermediate clutch assembly — Clutch plates damaged/missing — Piston or seals damaged — Ball check stuck/missing — Feedbolt loose/missing/sealant leak — Clutch hub damaged	11. Determine source of contamination or damage. Service as required.
	12. Inspect intermediate one-way clutch assembly — Damaged cage/sprags — Misassembled on inner race	12. Disassemble and inspect. Service as required.
1-2 Shift harsh or soft	1. Check line pressure — High or low line pressure	1. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Service line modulator pressure — High or low	2. Refer to service procedure in this section if necessary.
	3. Inspect valve body bolts — Loose or tight	3. Tighten bolts to the specification listed at the back of this section.
	4. Inspect intermediate clutch accumulator regulator valve — Valve stuck, nicked or damaged — Spring missing or tangled	4. Determine source of contamination or damage. Service as required.
	5. Inspect valve body — Dirty or sticky valves	5. Determine source of contamination. Service as required.
	6. Inspect intermediate clutch accumulator — Plunger stuck or damaged — Springs missing or tangled	6. Determine source of contamination or damage. Service as required.
2-3 Shift harsh or soft	1. Check line pressure — High or low line pressure	1. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Service line modulator pressure — High or low	2. Refer to service procedure in this section if necessary.
	3. Inspect valve body bolts — Loose or tight	3. Tighten bolts to the specification listed at the back of this section.
	4. Inspect intermediate clutch accumulator regulator valve — Valve stuck, nicked or damaged — Spring missing or tangled	4. Determine source of contamination or damage. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
2-3 Shift harsh or soft (Cont'd)	5. Inspect intermediate clutch accumulator — Plunger stuck or damaged — Springs missing or tangled	5. Determine source of contamination or damage. Service as required.
	6. Inspect valve body — Dirty or sticky valves	6. Determine source of contamination. Service as required.
	7. Inspect pump air bleed check valve — Valve leaking or damaged	7. Determine source of contamination or damage. Service as required.
	8. Inspect intermediate clutch assembly — Clutch plates damaged/missing — Piston or seals damaged — Ball check stuck or missing — Feedbolt loose/missing sealant leak — Clutch hub damaged	8. Determine source of contamination or damage. Service as required.
No 2-3 upshift	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Check line pressure — Low to direct clutch	2. Perform line pressure test. Refer to service procedure in this section if necessary.
	3. Check solenoid operation — (S1 solenoid suspected)	3. Refer to electrical diagnosis procedure in this section. Service as required.
	4. Inspect valve body bolts — Loose or tight	4. Tighten bolts to the specification listed at the back of this section.
	5. Inspect valve body — Dirty or sticky valves	5. Determine source of contamination. Service as required.
	6. Inspect 2-3 shift valve — Valve stuck, nicked or damaged	6. Determine source of contamination. Service as required.
	7. BS5 check ball missing — Plate seat damaged	7. Service as required.
	8. Inspect direct clutch assembly — Clutch plates damaged/missing — Piston or seals damaged — Ball check assembly stuck or missing	8. Determine source of contamination. Service as required.
	9. Inspect direct clutch cylinder — Seals damaged or missing or holes blocked	9. Determine source of contamination. Service as required.
	10. Inspect center support — Damaged — Feedbolts loose or missing — Center support O.D. or case bore damaged/leaking — Teflon seal damaged	10. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
2-3 Shift harsh or soft	1. Check line pressure — High or low line pressure	1. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Service line modulator pressure — High or low	2. Refer to service procedure in this section if necessary.
	3. Inspect valve body bolts — Bolts tight or loose	3. Tighten bolts to the specification listed at the back of this section
	4. Inspect valve body — Dirty or sticky valves	4. Determine source of contamination. Service as required.
	5. Inspect direct clutch accumulator regulator valve — Valve stuck, nicked or damaged — Spring missing or tangled	5. Determine source of contamination or damage. Service as required.
	6. Inspect direct clutch accumulator — Springs missing or tangled — Plunger nicked or damaged	6. Determine source of contamination. Service as required.
	7. Inspect direct clutch assembly — Clutch plates damaged/missing — Piston or seals damaged — Ball check assembly stuck or missing	7. Determine source of contamination or damage. Service as required.
	8. Inspect direct clutch cylinder — Seals damaged, missing or holes blocked	8. Determine source of contamination. Service as required.
	9. Inspect center support — Damaged — Feedbolts loose or missing — Center support O.D. or case bore damaged/leaking — Teflon seal damaged	9. Service as required.
No 3-4 upshift	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Check line pressure — High or low line pressure	2. Perform line pressure test. Refer to service procedure in this section if necessary.
	3. Check solenoid operation — (S2 solenoid suspected)	3. Refer to electrical diagnosis procedure in this section. Service as required.
	4. Inspect valve body bolts — Bolts tight or loose	4. Tighten bolts to the specification listed at the back of this section.
	5. Inspect valve body — Dirty or sticky valves	5. Determine source of contamination. Service as required.
	6. Inspect 3-4 shift valve — Valve stuck, nicked or damaged — Springs missing or tangled	6. Determine source of contamination. Service as required.
	7. Inspect overdrive accumulator regulator valve — Valve stuck, nicked or damaged — Spring missing or tangled	7. Determine source of contamination or damage. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No 3-4 upshift (Cont'd)	8. Inspect overdrive clutch assembly — Clutch plates burnt or worn — Overdrive clutch cylinder damaged/feedbolt loose or missing/sealant leaking — Cylinder ball check assembly stuck or missing	8. Service as required.
3-4 Shift harsh or soft	1. Check line pressure — Line pressure high or low	1. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Service line modulator pressure — High or low	2. Refer to service procedure in this section if necessary.
	3. Inspect valve body bolts — Bolts loose or tight	3. Tighten bolts to the specification listed at the back of this section.
	4. Inspect valve body — Dirty or sticky valves	4. Determine source of contamination. Service as required.
	5. Inspect overdrive accumulator regulator valve — Valve stuck, nicked/damaged — Spring missing or tangled	5. Determine source of contamination. Service as required.
	6. Inspect overdrive accumulator — Accumulator plunger stuck or damaged — Springs missing or tangled	6. Determine source of contamination. Service as required.
	7. Inspect overdrive clutch assembly — Clutch plates burnt or worn — Overdrive clutch cylinder damaged or feedbolt loose or missing — Cylinder ball check assembly stuck or missing	7. Service as required.
Shifts 1-3	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Check solenoid operation — (S1 solenoid suspected)	2. Refer to electrical service procedure in this section. Service as required.
	3. Inspect D2 shift valve — Dirty or sticky — Spring missing or damaged	3. Determine source of contamination. Service as required.
	4. Inspect intermediate clutch accumulator regulator valve — Valve sticky or dirty	4. Determine source of contamination. Service as required.
	5. Inspect intermediate friction clutch — Burnt or worn	5. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
Shifts 1-3 (Cont'd)	6. Inspect intermediate one-way clutch assembly — Damaged cage/sprags — Misassembled on inner race	6. Disassemble and inspect. Service as required.
Shift speed high or low	1. Check fluid level — Fluid level high or low 2. Check electronic engine control operation 3. Inspect vehicle speed sensor — Wrong gear/damaged gear	1. Drain or fill transmission to the proper level. 2. Refer to Quick Test Section 3. Repair or replace as necessary.
4-3 Downshift harsh	1. CB7 check ball missing — Plate seat damaged	1. Service as required.
3-2 Downshift harsh	1. CB6 check ball missing — Plate seat damaged	1. Service as required.
2-1 Downshift harsh	1. CB14 check ball missing — Plate seat damaged	1. Service as required.
No drive in drive range	1. Check fluid level — Fluid level low 2. Check line pressure — Line pressure low 3. Inspect manual linkage (internal and external) — Misadjusted, disconnected, damaged, broken or bent 4. Check transmission filter inside oil pan 5. Inspect valve body and pump control body bolts — Loose or tight 6. Inspect pump control body and valve body — Dirty or sticky valves 7. Inspect overdrive one-way clutch — Improperly assembled/damaged — Damaged sprags or races 8. Inspect forward clutch assembly — Burnt or missing clutch plates — Damaged piston or seals — Forward clutch ball check assembly missing or damaged — Center support seals damaged or missing/holes blocked/ feedbolt loose or missing — Forward clutch hub damaged	1. Fill transmission to the proper level. 2. Perform line pressure test. Refer to service procedure in this section if necessary. 3. Service as required. 4. Replace filter if plugged. 5. Tighten bolts to the specification listed at the back of this section. 6. Determine source of contamination. Service as required. 7. Service as required. 8. Determine source of contamination or damage. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No drive in drive range (Cont'd)	9. Inspect reverse one-way clutch — Improperly assembled — Damaged rollers	9. Determine source of damage. Service as required.
	10. Inspect front sun gear/shell — Damaged	10. Determine source of damage. Service as required.
	11. Inspect front and rear carrier — Damaged pinions/lugs to rear ring gear	11. Determine source of damage. Service as required.
	12. Inspect reverse ring gear — Damaged gears/lugs to forward carrier	12. Determine source of damage. Service as required.
	13. Inspect output shaft — Damaged splines	13. Determine source of damage. Service as required.
No reverse	1. Check fluid level — Fluid level low	1. Fill transmission to the proper level.
	2. Inspect manual linkage — Misadjusted, disconnected, damaged, broken or bent	2. Service as required.
	3. Check line pressure — Line pressure low	3. Perform line pressure test. Refer to service procedure in this section if necessary.
	4. Check transmission filter inside oil pan	4. Replace filter if plugged.
	5. Inspect valve body and pump control body bolts — Loose or tight	5. Tighten bolts to the specification listed at the back of this section.
	6. Inspect pump control body and valve body — Dirty or sticky valves	6. Determine source of contamination. Service as required.
	7. Inspect direct clutch accumulator regulator valve — Valve stuck, nicked/damaged — Spring missing or tangled	7. Determine source of contamination or damage. Service as required.
	8. BS5 checkball missing — Plate seat damaged	8. Service as required.
	9. Inspect direct clutch assembly (if 3rd gear inoperative) — Damaged piston or seals — Burnt or missing clutch plates — Direct clutch ball check assembly missing or damaged — Center support seals damaged or missing or holes blocked — Direct clutch hub damaged	9. Disassemble and inspect clutch assembly. Service as required.
	10. Inspect coast clutch assembly for leakage	10. Disassemble and inspect clutch assembly. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No reverse (Cont'd)	11. Inspect reverse clutch — Burnt or missing clutch plates — Damaged piston or seals	11. Determine source of damage. Service as required.
	12. Inspect front and rear carrier — Damaged pinions/lugs to rear ring gear	12. Determine source of damage. Service as required.
No park range	1. Inspect manual shift linkage — Damaged or misadjusted	1. Service as required. Refer to Adjustments at the beginning of this section.
	2. Damage park mechanism — Chipped or broken parking pawl or parking gear — Broken park pawl return spring — Bent or broken actuating rod	2. Determine source of damage. Service as required.
Harsh neutral to drive or neutral to reverse engagements	1. Check fluid level — Fluid level low	1. Fill transmission to the proper level.
	2. Check electronic engine control operation	2. Refer to Quick Test Section
	3. Worm/damaged/loose U-joint, slip yoke, rear axle or rear suspension	3. Service as required.
	4. Inspect valve body bolts — Loose or tight	4. Tighten bolts to specification.
	5. Engagement control valve — Valve stuck, nicked or damaged	5. Determine source of contamination. Service as required.
	6. CB13 check ball missing — Plate seat damaged	6. Service as required.
	7. Inspect direct clutch accumulator regulator valves — Valve sticking or dirty — Spring missing or tangled	7. Determine source of contamination. Service as required.
	8. Inspect direct clutch accumulator — Accumulator plunger stuck — Accumulator seal damaged or missing — Springs missing or tangled	8. Determine source of contamination. Service as required.
	9. Inspect forward clutch assembly — Burnt or missing clutch plates — Damaged piston or seals — Forward clutch ball check assembly missing or damaged — Center support seals damaged or missing/holes blocked/ feedbolt loose or missing — Forward clutch hub damaged	9. Determine source of contamination or damage. Service as required.
	10. Inspect reverse clutch for leakage.	10. Identify source of leakage. Service as required.
	11. Excessive transmission end play	11. Check transmission end play. Replace selective thrust washer if necessary.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No forced downshifts	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Check electronic engine control operation	2. Refer to Quick Test Section
	3. Inspect valve body bolts — Bolts loose or tight	3. Tighten bolts to the specification listed in the back of this section.
	4. Inspect valve body — Dirty or sticky valves	4. Determine source of contamination. Service as required.
No engine braking in manual one	1. Check fluid level — Fluid level low	1. Fill transmission to the proper level.
	2. Check line pressure — Line pressure low	2. Perform line pressure test. Refer to service procedure in this section if necessary.
	3. Check solenoid operation — (S1 solenoid suspected)	3. Refer to electrical diagnosis procedure in this section.
	4. Inspect for dirty or sticky valves — Reverse clutch modulator, D2 4-3-2 timing or 2-3 or coast clutch shift valves	4. Determine source of contamination. Service as required.
	5. Check ball missing — BS1, BS3 or CB1 — Plate seat damaged	5. Service as required.
	6. Inspect coast clutch — Worn or burnt — Piston or seals damaged — Stator support damaged or holes blocked — Coast clutch hub damaged or holes blocked	6. Service as required.
	7. Inspect reverse clutch — Worn or burnt — Piston or seals damaged	7. Service as required.
No engine braking in manual second ..	1. Check fluid level — Fluid level low	1. Fill transmission to the proper level.
	2. Check line pressure — Line pressure low	2. Perform line pressure test. Refer to service procedure in this section if necessary.
	3. Inspect for dirty or sticky valves — 4-3-2 timing, D2, 2-3 or coast clutch shift valve	3. Determine source of contamination. Service as required.
	4. Check ball missing — BS1, BS3 or CB1 — Plate seat damaged	4. Service as required.
	5. Check intermediate servo	5. Perform air pressure test of servo for leakage. Service as required.
	6. Inspect intermediate band or drum — Worn or burnt	6. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
No engine braking in manual second (Cont'd)	7. Inspect coast clutch — Worn or burnt — Piston or seals damaged — Stator support damaged or holes blocked — Coast clutch hub damaged or holes blocked	7. Service as required.
Erratic shifts	1. Check fluid level — Fluid level high or low 2. Check electronic engine control operation 3. Inspect vehicle speed sensor — Damaged or defective 4. Inspect valve body bolts — Bolts loose or tight 5. Inspect valve body —Dirty or sticky valves	1. Drain or fill transmission to the proper level. 2. Refer to Quick Test Section 3 Service as required. 4. Tighten bolts to the specification listed at the back of this section. 5. Determine source of contamination. Service as required.
Shift hunting	1. Check fluid level — Fluid level high or low 2. Check electronic engine control operation	1. Drain or fill transmission to the proper level. 2. Refer to Quick Test Section
High or low line pressure	1. Check fluid level — Fluid level high or low 2. Electronic pressure control solenoid malfunction 3. Main regulator valve or spring — Dirty or sticky valve — Damaged spring 4. Pump assembly — Gears damaged, broken or worn	1. Drain or fill transmission to the proper level. 2. Refer to electrical diagnosis procedure in this section. Service as required. 3. Determine source of damage or contamination. Service as required. 4. Determine source of damage. Service as required.
No converter clutch apply	1. Check fluid level — Fluid level high or low 2. Electrical system or electronic engine control — No lock-up signal — S3 solenoid malfunction — Bulkhead connector damaged — Pinched wires 3. Inspect stator shaft Teflon seal — Damaged seal 4. Converter clutch control valve — Dirty or sticky	1. Drain or fill transmission to the proper level. 2. Refer to electrical diagnosis procedure in this section. Service as required. 3. Determine source of contamination. Service as required. 4. Determine source of contamination. Service as required.

DIAGNOSIS GUIDE — E4OD (Cont'd)

CONDITION	POSSIBLE SOURCE	ACTION
Converter clutch does not release	1. Check fluid level — Fluid level high or low	1. Drain or fill transmission to the proper level.
	2. Electrical system or electronic engine control — No unlock signal — S3 solenoid malfunction — Bulkhead connector damaged — Pinched wires	2. Refer to electrical diagnosis procedure in this section. Service as required.
	3. Converter clutch control valve — Dirty or stuck valve	3. Determine source of contamination. Service as required.
Line modulator pressure high or low	1. Check line pressure — High or low line pressure	2. Perform line pressure test. Refer to service procedure in this section if necessary.
	2. Inspect line pressure modulator valve — Valve stuck or damaged — Plunger or sleeve stuck or damaged	2. Determine source of contamination or damage. Service as required.

Electrical Diagnosis

When referred to this Section, perform the Electronic Engine Control (EEC-IV) Quick Test

The following codes may appear during the EEC-IV Quick Test. Service these codes first and repeat the EEC-IV Quick Test before continuing with the transmission diagnosis.

EEC-IV Quick Test Service Codes

- 26: TOT Out of Self-Test Range: The Transmission Oil Temperature (TOT) sensor registers a temperature not in the allowable range of testing. The test should be repeated with the transmission warmed to the correct testing temperature. (Refer to Engine/ Emissions Diagnosis Shop Manual Volume H for correct temperature.)
- 47: 4x4 Switch Closed: Transmission transfer case is activated into four-wheel drive. Release four-wheel drive and repeat test.
- 65: Overdrive Cancel Switch Not Changing State: Operation of the Overdrive Cancel Switch was not recorded during the Engine On Quick Test. Service this switch as outlined in the Pin Point Tests in Engine/Emissions Diagnosis Manual Volume H.
- 67: MLPS Out of Range/AC On: If AC clutch is on during test, this code will appear. Shut off AC or defrost and repeat test. If the AC unit was off during the test, go to the code in the following Section.

If any of the following service codes appear during the EEC-IV Quick Test perform the Drive Cycle Test for continuous codes as outlined:

Transmission Quick Test Service Codes

- 49: 1-2 Shift Error: Engine speed drop during the 1 to 2 shift does not fall within tolerance limits.
- 56: -40 degree F indicated TOT, Sensor Circuit Open: Voltage drop across the TOT sensor exceeds the scale set for the temperature of -40 degrees F.
- 59: 2-3 Shift Error: Engine speed drop during the 2 to 3 shift does not fall within tolerance limits.
- 62: Converter Clutch Failure: The EEC-IV module picks up excessive amount of converter slip while converter is scheduled to be locked up.
- 66: 315 degrees F indicated TOT, Sensor Circuit Grounded: Voltage drop across the TOT sensor does not reach the scale set for the temperature of 315 degrees F.

- 67: MLPS Out of Range/AC On: Indicated voltage drop across the MLPS (Manual Lever Position Sensor) exceeds the limits established for each position. AC or Defrost on: Fault results from the AC clutch being on during Quick Test.
- 69: 3-4 Shift Error: Engine speed drop during the 3 to 4 shift does not fall within tolerance limit.
- 91: Shift Solenoid 1 Circuit Failure: Solenoid 1 circuit fails to provide voltage drop across solenoid. Circuit open or shorted, or EEC Driver failure.
- 92: Shift Solenoid 2 Circuit Failure: Solenoid 2 circuit fails to provide voltage drop across solenoid. Circuit open or shorted, or EEC Driver failure.
- 93: CCS Solenoid Circuit Failure: Solenoid 4 (Coast Clutch Solenoid) fails to provide voltage drop across solenoid. Circuit open or shorted, or EEC Driver failure.
- 94: CCC Solenoid Circuit Failure: Solenoid 3 (Converter Clutch Control Solenoid) fails to provide voltage drop across solenoid. Circuit open or shorted, or EEC Driver failure.
- 98: Failure Mode and Effects Management Failure/Failed EPC Output Driver: During the Quick Test, the voltage through the EPC (Electronic Pressure Control) solenoid is checked and compared to a voltage through the solenoid after a time delay. An error will be noted if the change tolerance is exceeded.
- 99: EPC Solenoid Circuit Failure/Short: Voltage measured across the Electronic Pressure Control Solenoid is less than a calculated minimum voltage.

Drive Cycle Test

After performing the EEC-IV Quick Test, the following drive cycle test for checking E4OD continuous codes should be performed.

NOTE: Faults have to appear four times consecutively for continuous codes 49, 59 and 69 to be set, and five times consecutively for continuous code 62.

1. Record and zero EEC-IV Quick Test codes.
2. Verify that the transmission fluid level is correct.
3. Warm engine to operating temperature.
4. With transmission in Ⓓ range, press the Overdrive Cancel Switch (LED light should illuminate) and moderately accelerate from stop to 64 Km/h (40 mph). This will allow the transmission to shift into third gear. Hold speed and throttle opening steady for a minimum of 15 seconds (30 seconds above 4000 feet altitude).
5. Press Overdrive Cancel Switch (LED light should turn off) and accelerate from 65 Km/h (40 mph) to 80 Km/h (50 mph). This will allow the transmission to shift into fourth gear. Hold sped and throttle position steady for a minimum of 15 seconds.
6. With transmission in fourth and maintaining steady speed and throttle opening, lightly apply and release brake (to operate stop lamps). Then hold speed and throttle steady for an additional 15 seconds minimum.
7. Brake to a stop and remain stopped for a minimum of 20 seconds with the transmission in Ⓓ range.
8. Repeat Steps 4 through 6 at least five times.
9. Perform EEC-IV Quick-Test and record continuous codes.

If the codes appear, refer to the Pinpoint Test charted below for the appropriate service code.

NOTE: If any other service codes appear, service those codes first as they could affect the electrical operation of the transmission.

NOTE: After the servicing of any error codes resulting from the Quick Test, the Quick Test should be repeated.

Electrical Diagnosis Chart Index

Error Codes	Pinpoint Test
49	AA
56	BB
59	AA
62	CC
66	BB
67	EE
69	AA
91	GG
92	GG
93	GG
94	GG
98	HH
99	HH

SERVICE CODES: 49, 59 AND 69 — PINPOINT TESTS AA

TEST STEPS	RESULTS	ACTION TO TAKE
AA1 CHECK HARNESS CONNECTIONS		
• Check that the vehicle harness connector is fully engaged on the transmission bulkhead connector. • Check that the vehicle harness connector terminals are fully engaged in the connector.	(OK) ▶ (OK) ▶	GO to **AA2**. SERVICE or REPLACE as required. REPEAT QUICK TEST
AA2 CHECK RESISTANCE OF SOLENOID		
NOTE: Refer to the E4OD Transmission Wiring Harness Terminal Locations and Color Codes preceding these Pinpoint Tests. • Install service jumper harness to the transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Connect ohmmeter negative lead to the black wire on the service harness and the positive lead to the white wire on the service harness. This is to test solenoid 1. • Record the resistance. • Resistance should be between 20-30 ohms. • Connect ohmmeter negative lead to the black wire on the service harness and the positive lead to the red wire on the service harness. This is to test solenoid 2. • Record the resistance. • Resistance should be between 20-30 ohms.	20-30 ohms ▶ High resistance ▶	GO to **AA3**. REPLACE solenoid body and REPEAT QUICK TEST
AA3 CHECK SOLENOID FOR SHORT TO GROUND		
• Install service jumper harness to transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Check for continuity between an engine ground and appropriate wire with an ohmmeter or other low current tester (less than 200 milliamps). • Connection should show no continuity (infinite resistance).	Continuity ▶ No continuity ▶	REPLACE Solenoid Body. REPEAT QUICK TEST. GO to **AA4**.

Solenoid	Wire
1	White
2	Red

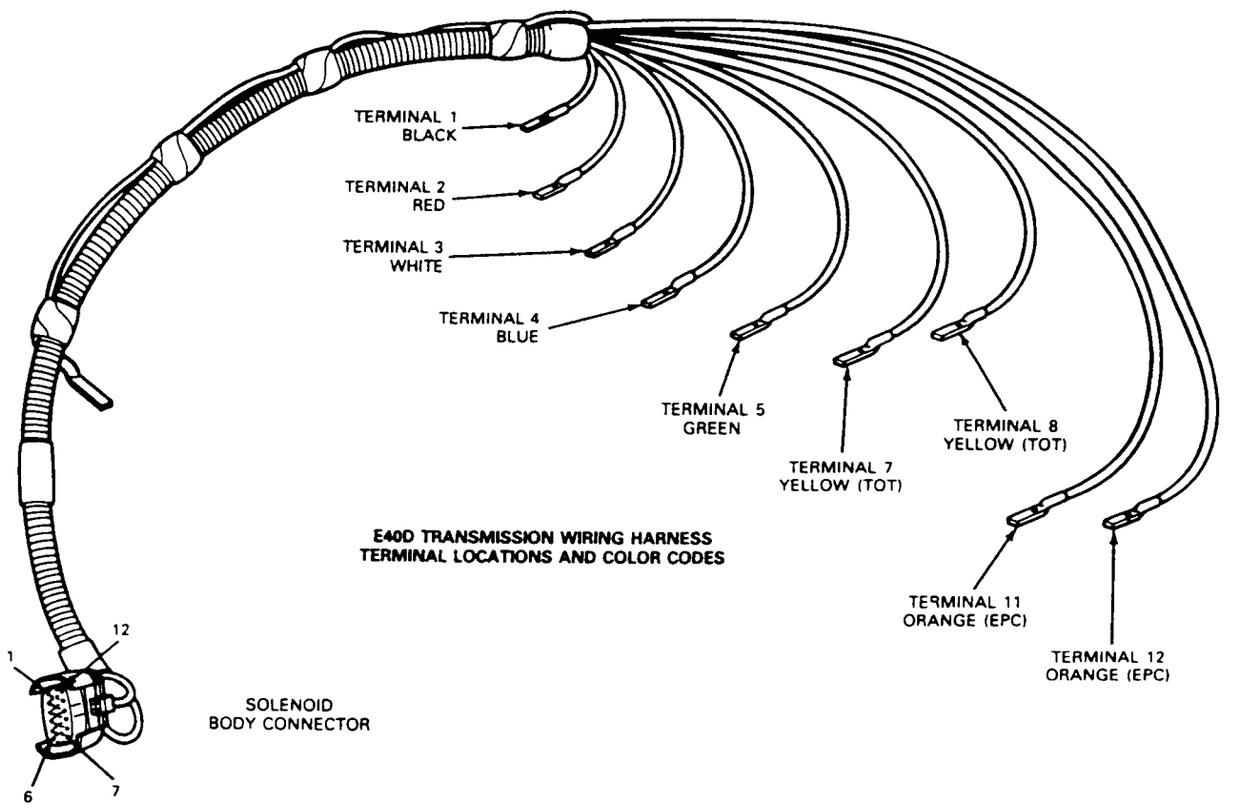
*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

SERVICE CODES: 49, 59 AND 69 — PINPOINT TESTS AA (Continued)

TEST STEPS	RESULTS ▶	ACTION TO TAKE
AA4 CHECK SOLENOID REGULATOR VALVE		
• Tear down to solenoid regulator valve. • Inspect solenoid regulator valve for damage or contamination. • Check for stuck or missing spring.	(OK) ▶	CLEAR errors and REPEAT QUICK TEST
	(OK) ▶	Service as required.

*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

E4OD Test Harness T89T-70100-A



SERVICE CODES: 56 AND 66 — PINPOINT TESTS BB

TEST STEPS	RESULTS ▶	ACTION TO TAKE
BB1 CHECK HARNESS CONNECTIONS		
• Check that the vehicle harness connector is fully engaged on the transmission bulkhead connector. • Check that the vehicle harness connector terminals are fully engaged in the connector.	(OK) ▶ (OK) ▶	GO to **BB2**. SERVICE or REPLACE as required. REPEAT QUICK TEST
BB2 CHECK TOT SENSOR RESISTANCE		
NOTE: Refer to the E4OD Transmission Wiring Harness Terminal locations and Color Codes preceding these Pinpoint Tests. • Install service jumper harness to the transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Carefully touch the transmission oil pan on the driver's side, away from the exhaust system, to approximate the temperature. After running the Quick Test, the transmission oil pan should be warm to the touch. (As a guide, warm to the touch is about 41-70 degrees C [105-158 degrees F]). • Connect ohmmeter negative lead and the positive lead to the yellow wires on the service harness. • Record the resistance. • Resistance should be approximately in the following ranges.	Resistance in range ▶ Resistance greater than 100K ▶ Resistance out of range ▶	GO to **BB3**. REPLACE solenoid body and REPEAT QUICK TEST PERFORM SECOND TEST listed in this step. REPEAT QUICK TEST

TRANSMISSION FLUID TEMPERATURE		
Degrees C	**(Degrees F)**	**Resistance (Ohms)**
0- 20	(32- 58)	37K- 100K
21- 40	(59-104)	16K- 37K
41- 70	(105-158)	5K- 16K
71- 90	(159-194)	2.7K- 5K
91-110	(195-230)	1.5K- 2.7K
111-130	(231-266)	0.8K- 1.5K

• If the resistance was not the appropriate temperature range but was between 0.8K and 100K ohms, perform the following test. If the transmission is cold, run the transmission to heat it up. If the transmission is warm, allow the transmission to cool. Check TOT sensor resistance again. Compare the resistance with the initial resistance. Resistance should decrease if transmission was heated and should increase if transmission was allowed to cool. If the correct change in resistance occurs, REPEAT QUICK TEST.

*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

SERVICE CODES: 56 AND 66 — PINPOINT TESTS BB — Continued

TEST STEPS		RESULTS	ACTION TO TAKE
BB3	CHECK TOT SENSOR FOR SHORT TO GROUND		
	• Install service jumper harness to transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Check for continuity between engine ground and one yellow wire with an ohmmeter or other low current tester (less than 200 milliamps). • Repeat the continuity check with the other yellow wire. • Connection should show no continuity (infinite resistance).	Continuity ▶	REPLACE solenoid body and REPEAT QUICK TEST. REPEAT QUICK TEST
		No continuity ▶	If code was a continuous code, inspect transmission fluid to determine if fluid is burnt. If burnt, teardown transmission and inspect for damage. SERVICE as required and REPEAT QUICK TEST

*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

SERVICE CODE: 62 — PINPOINT TEST CC

TEST STEPS	RESULTS ▶	ACTION TO TAKE
CC1 CHECK HARNESS CONNECTIONS • Check that the vehicle harness connector is fully engaged on the transmission bulkhead connector. • Check that the vehicle harness connector terminals are fully engaged in the connector.	(OK) ▶ (OK) ▶	GO to **CC2**. SERVICE or REPLACE as required. REPEAT QUICK TEST
CC2 CHECK RESISTANCE OF SOLENOID **NOTE: Refer to the E4OD Transmission Wiring Harness Terminal locations and Color Codes preceding these Pinpoint Tests.** • Install service jumper harness to the transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Connect ohmmeter negative lead to the black wire on the service harness and the positive lead to the green wire on the service harness. This is to test converter clutch solenoid. • Record the resistance. • Resistance should be between 20-30 ohms.	20-30 ohms ▶ High resistance ▶	GO to **CC3**. REPLACE solenoid body and REPEAT QUICK TEST
CC3 CHECK SOLENOID FOR SHORT TO GROUND • Install service jumper harness to transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Check for continuity between engine ground and green wire with an ohmmeter or other low current tester (less than 200 millilamps).	No continuity ▶ Continuity ▶	GO to **CC4**. Replace Solenoid Body and REPEAT QUICK TEST
CC4 CHECK CONVERTER CLUTCH REGULATOR VALVE AND CONVERTER CLUTCH CONTROL VALVE • Tear down to converter clutch regulator valve and converter clutch control valve. • Inspect valves for damage or contamination. • Check for struck or missing spring.	(OK) ▶ (OK) ▶	CLEAR errors and REPEAT continuous drive tests. If errors persist, refer to Mechanical Diagnosis in this section. SERVICE as required.

*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

SERVICE CODE: 67 — PINPOINT TEST EE

TEST STEPS	RESULTS ▶	ACTION TO TAKE
EE1 ADJUST MANUAL LEVER POSITION SENSOR • Apply the parking brake. • Place transmission in Neutral position. • Verify that Manual Lever Position Sensor Tool T89T-20010-J fits in appropriate slots.	(OK) ▶	GO to **EE2**.
	(OK) ▶	ADJUST sensor according to adjustment procedures in this manual and REPEAT QUICK TEST
EE2 CHECK OPERATION OF MANUAL LEVER POSITION SENSOR • Insert Manual Lever Position Sensor test harness into the Manual Lever Position Sensor connector. • Plug test box into power supply • With transmission in Park, press the buttons on the box. The GOOD light should light only when the P button is pushed. Repeat the test for R, N, Ⓓ, 2 and 1.	(OK) ▶	REPEAT QUICK TEST
	(OK) ▶	REPLACE Manual Lever Position Sensor and REPEAT QUICK TEST

HOW TO CLEAR THE CONTINUOUS MEMORY CODES

NOTE: Do not disconnect battery to clear Continuous Memory Codes. This will erase the Keep Alive Memory (KAM) information which may cause a driveability concern.

1. Run the Key On Engine Off Self-Test according to Quick Test Step 3.0A.
2. When the Service Codes begin to be displayed, deactivate Self-Test:
   - — STAR Tester: Unlatching the center button (up position).
   - — Analog VOM: Remove the jumper wire from between Self-Test Input (STI) connector and the Signal Return Pin of the Self-Test connector.
   - — "Check Engine" Light (MIL): Remove the jumper wire from between Self-Test Input (STI) connector and the SIGNAL RETURN pin of the Self-Test connector.
   - — Message Center (Continental Only): Remove the jumper wire from between Self-Test input (STI) connector and the SIGNAL RETURN pin of the Self-Test connector.
3. The Continuous Memory codes will be erased from the processor's memory.

SERVICE CODES: 91, 92, 93 AND 94 — PINPOINT TEST GG

TEST STEPS	RESULTS ▶	ACTION TO TAKE
GG1 CHECK HARNESS CONNECTIONS		
• Check that the vehicle harness connector is fully engaged on the transmission bulkhead connector. • Check that the vehicle harness connector terminals are fully engaged in the connector.	(OK) ▶	GO to **GG2**.
	(~~OK~~) ▶	SERVICE or REPLACE as required. REPEAT QUICK TEST
GG2 CHECK RESISTANCE OF SOLENOID		
NOTE: Refer to the E4OD Transmission Wiring Harness Terminal locations and Color Codes preceding these Pinpoint Tests • Install service jumper harness to the transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Connect ohmmeter negative lead to the black wire on the service harness and the positive lead to the appropriate wire on the service harness. • Record the resistance. • Resistance should be between 20-30 ohms.	20-30 ohms ▶	GO to **GG3**.
	High resistance ▶	REPLACE solenoid body and REPEAT QUICK TEST
GG3 CHECK SOLENOID FOR SHORT TO GROUND		
• Install service jumper harness to transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Check for continuity between engine ground and appropriate wire with an ohmmeter or other low current tester (less than 200 milliamps). • Connection should show no continuity (infinite resistance).	Continuity ▶	REPLACE solenoid body and REPEAT QUICK TEST
	No continuity ▶	REPEAT QUICK TEST

Error Code	Wire
91	White
92	Red
93	Green
94	Blue

Error Code	Wire
91	White
92	Red
93	Green
94	Blue

*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

SERVICE CODES: 98 AND 99 — PINPOINT TEST HH

TEST STEPS	RESULTS ▶	ACTION TO TAKE
HH1 CHECK HARNESS CONNECTIONS		
• Check that the vehicle harness connector is fully engaged on the transmission bulkhead connector. • Check that the vehicle harness connector terminals are fully engaged in the connector.	(OK) ▶ (OK) ▶	GO to **HH2**. SERVICE or REPLACE as required. REPEAT QUICK TEST
HH2 CHECK RESISTANCE OF SOLENOID		
NOTE: Refer to the E4OD Transmission Wiring Harness Terminal locations and Color Codes preceding these Pinpoint Tests. • Install service jumper harness to the transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Connect ohmmeter negative lead and positive lead to the orange wires on the service harness. • Record the resistance. • Resistance should be between 4.0-6.5 ohms.	4.0-6.5 ohms ▶ High resistance ▶	GO to **HH3**. REPLACE solenoid body and REPEAT QUICK TEST
HH3 CHECK SOLENOID FOR SHORT TO GROUND		
• Install service jumper harness to transmission bulkhead connector. (Do not pry vehicle harness connector off with a screwdriver.)* • Check for continuity between engine ground and one of the orange wires with an ohmmeter or other low current tester (less than 200 milliamps). • Repeat the continuity check with the other orange wire. • Connection should show no continuity (infinite resistance).	Continuity ▶ No continuity ▶	REPLACE solenoid body and REPEAT QUICK TEST REPEAT QUICK TEST Problem should not reoccur if the solenoid body passed previous tests.

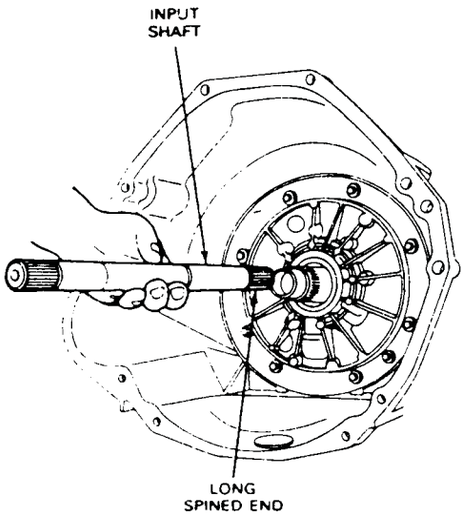
*Remove solenoid body connector by pushing on the center tab and pulling on the wiring harness.
CAUTION: Do not attempt to pry tab with a screwdriver. Remove heat shield from transmission before removing connector.

Teardown

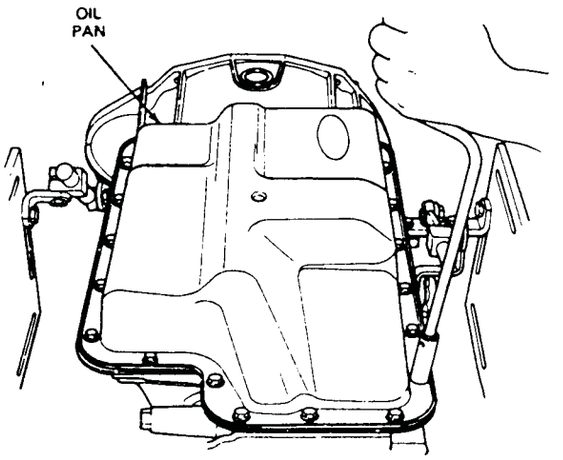
Refer to the transmission disassembled view at the beginning of this Section.

Disassembly

Remove input shaft from transmission.

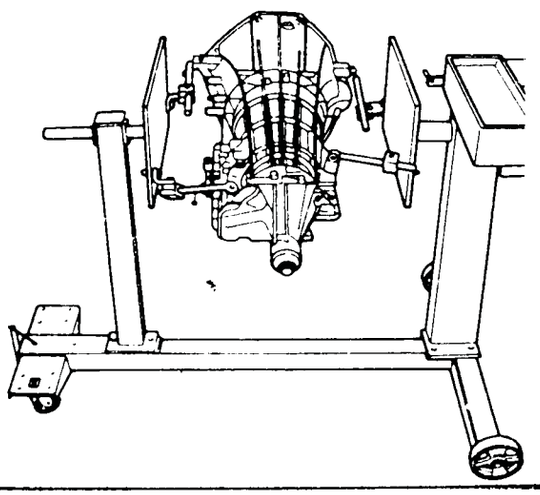


Rotate transmission so that pan is facing up. Remove 20 pan attaching bolts (10mm socket). Remove the pan and gasket, discard gasket.



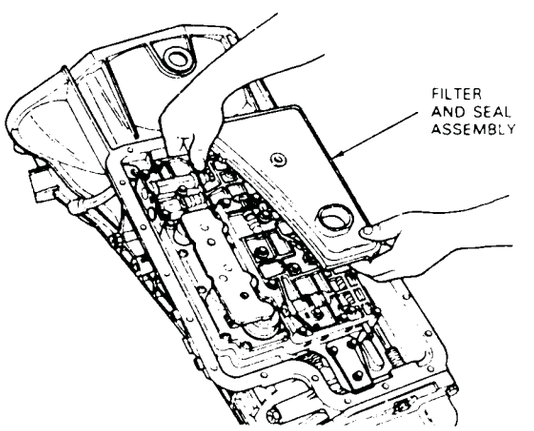
Mount transmission on Twin Post Engine Stand Rotunda 014-00106 or equivalent.

NOTE: Thoroughly clean the solenoid body connector area to avoid contamination.

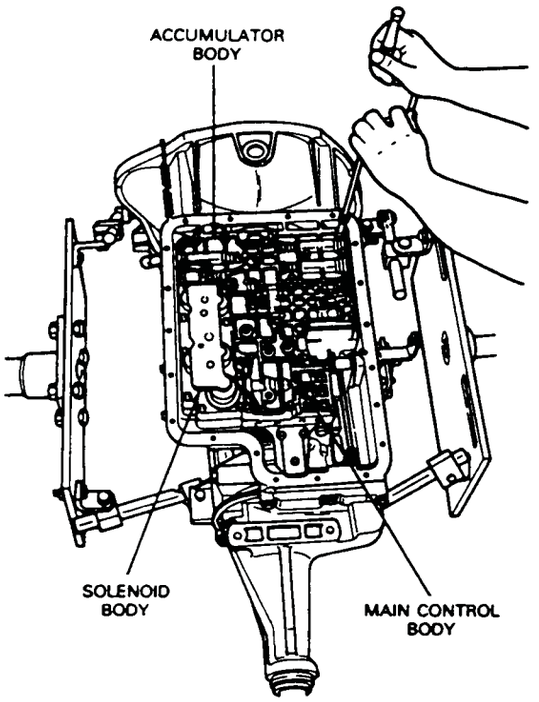


Remove filter and seal assembly by carefully pulling and rotating filter as necessary. If seal remains in bore, carefully remove using O-Ring Tool T71P-19703-C or equivalent.

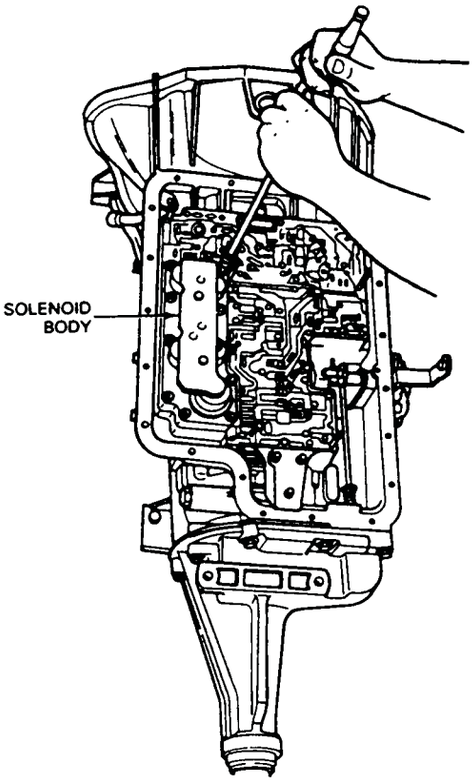
NOTE: Discard filter and seal.



Remove accumulator body, 11 bolts (8mm socket) and two nuts (10mm socket).

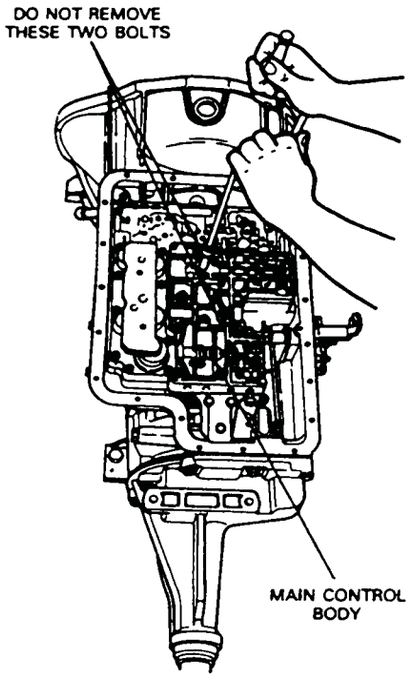


Remove nine solenoid body bolts (30A Torx® bit) and one nut (10mm socket).

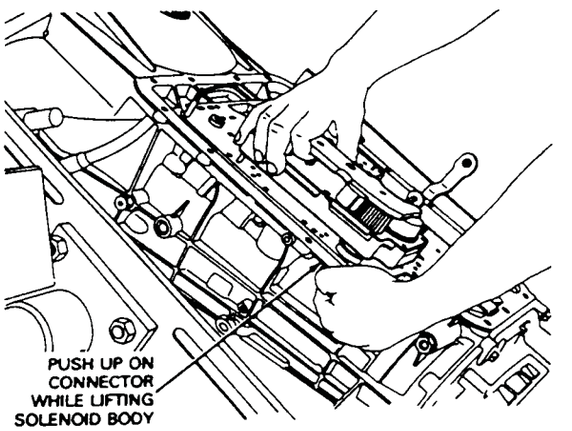


Remove main control body 14 bolts (8mm socket) two nuts (10mm socket).

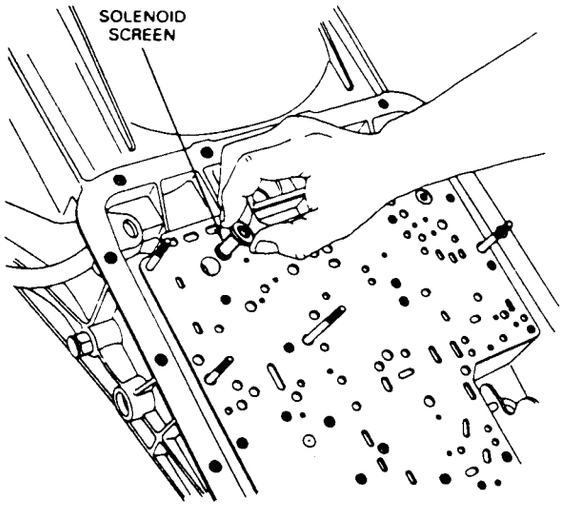
NOTE: Do not remove the two bolts as shown.



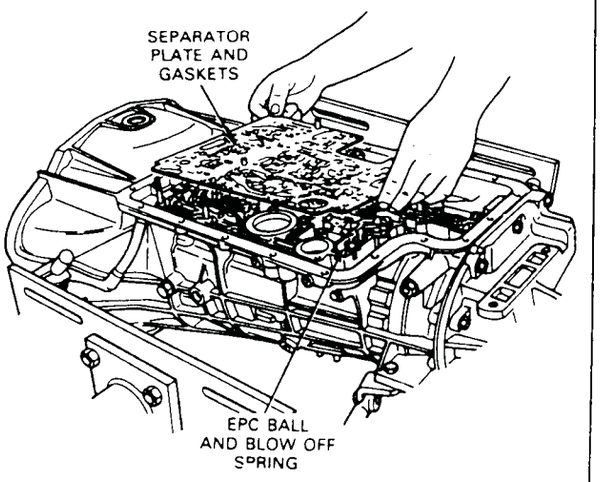
Push up on solenoid body connector while removing solenoid body.



Remove solenoid screen, by turning counterclockwise and pull out.

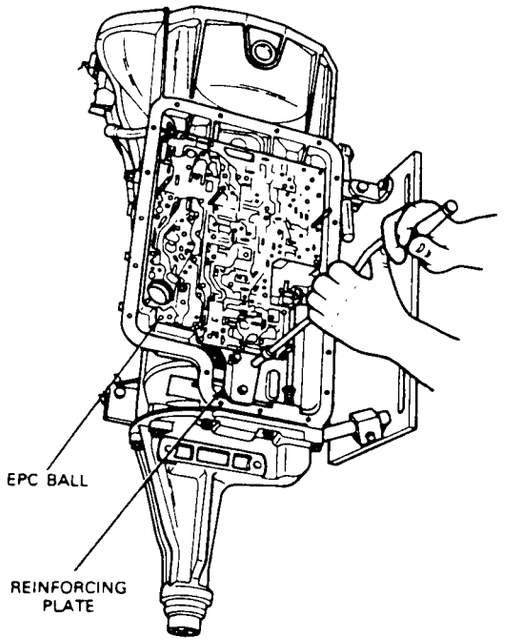


Remove separator plate, two gaskets, EPC ball and blowoff spring, discard gasket.



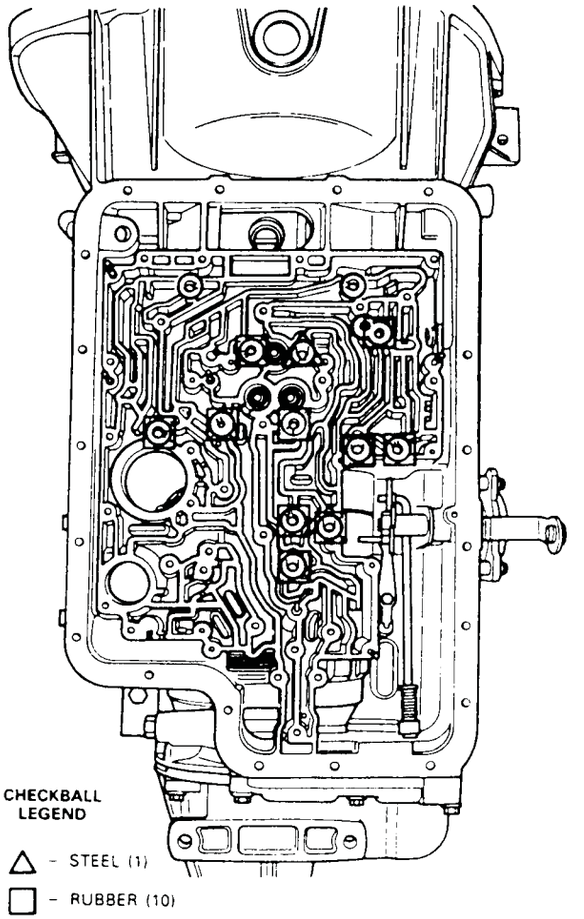
Remove three reinforcing plate bolts (8mm socket), remove plate.

NOTE: EPC ball is spring loaded under separator plate.



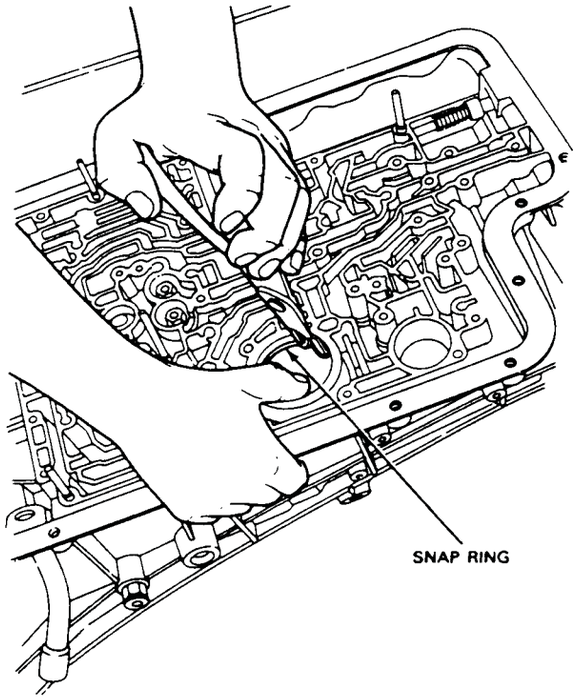
Remove one steel and ten rubber check balls from transmission, using a small screwdriver.

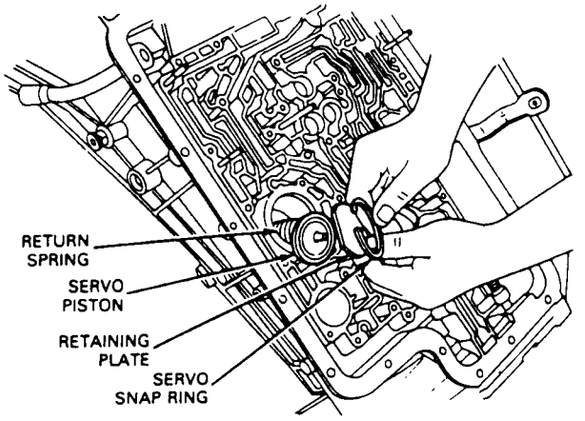
CAUTION: Do not mar rubber check balls.



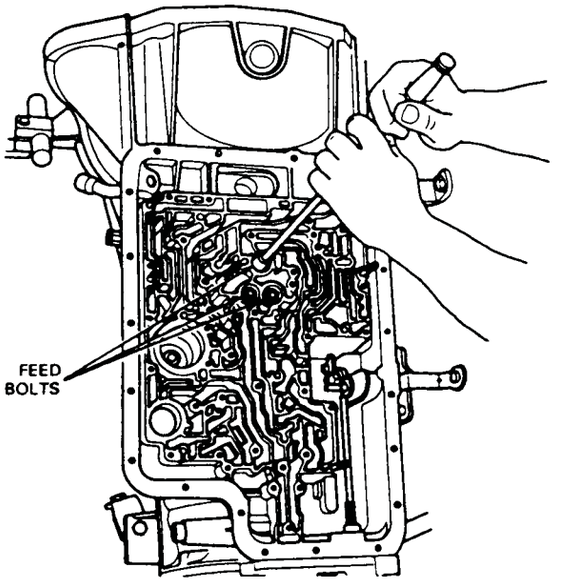
Remove servo snap ring and retaining plate, piston and rod assembly and servo spring.

NOTE: Apply slight downward pressure to plate while removing snap ring.

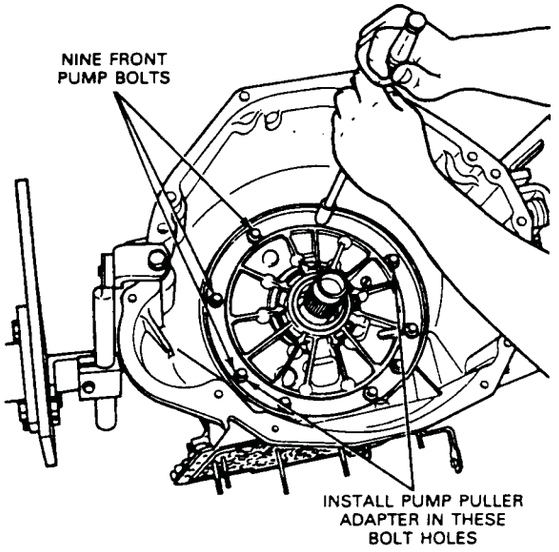




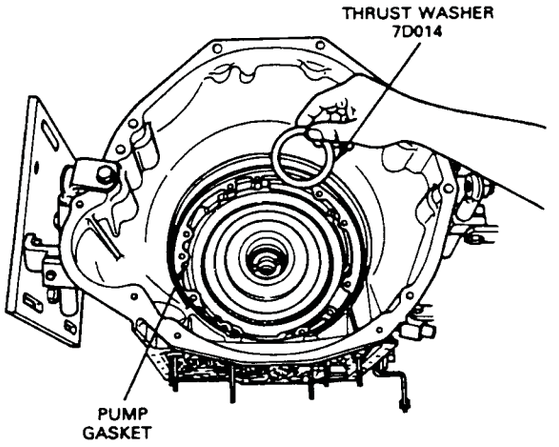
Remove three feed bolts (13mm socket). Discard feed bolts.



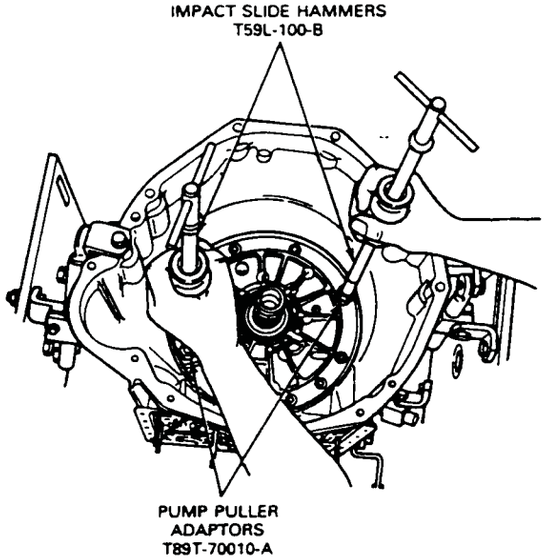
Rotate transmission so that bell housing is facing up. Remove nine pump bolts, (10mm socket). Discard pump bolt washers.



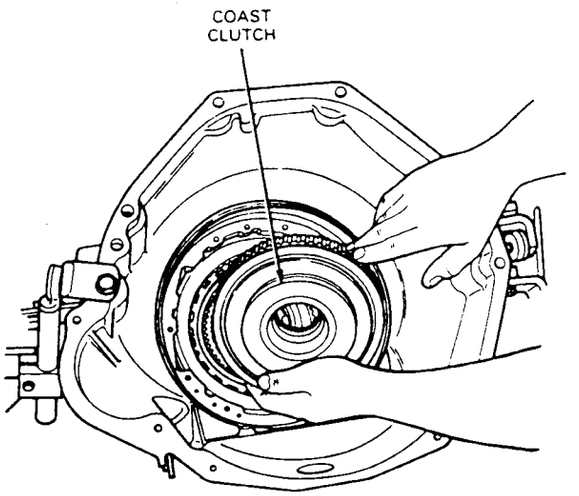
Remove pump gasket and No. 7D014 thrust washer. Discard gasket.



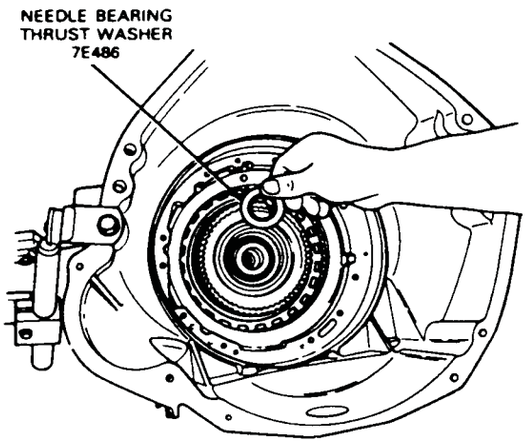
Use two threaded holes in pump and install Pump Puller Adapter T89T-70010-A or equivalent. Install Slide Hammer T59L-100-B or equivalent into adapter and remove pump.



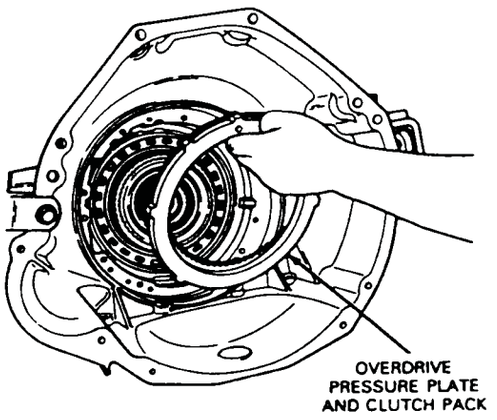
Lift out the coast clutch assembly.



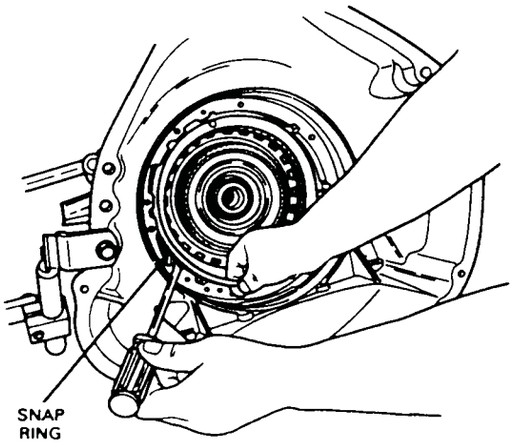
Remove needle bearing assembly 7E486 between front pump and sun gear.



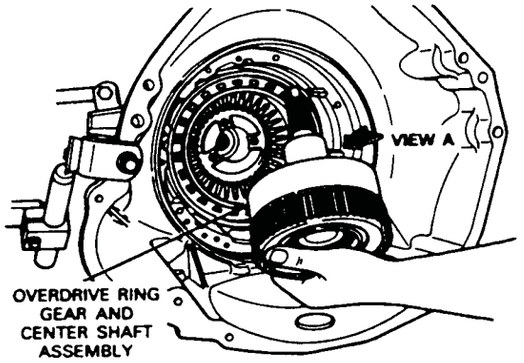
Remove overdrive pressure plate and clutch pack and tag for re-assembly.

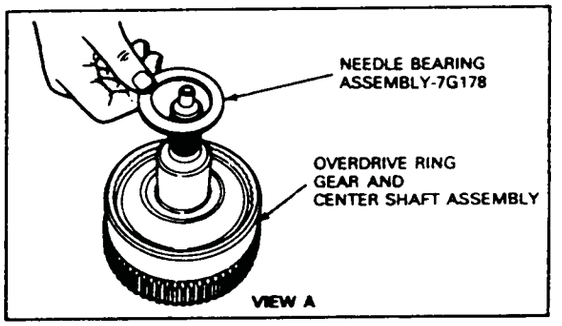


Remove large snap ring using large screwdriver.

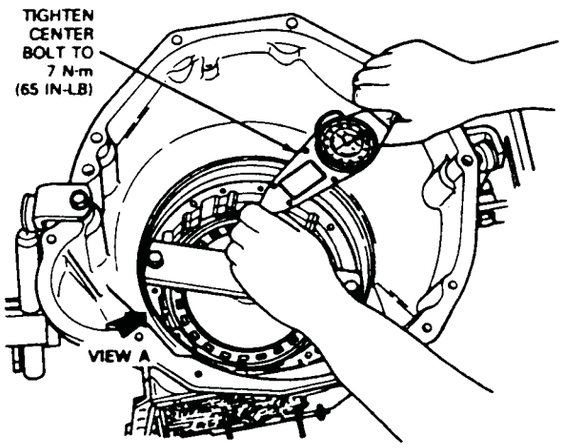


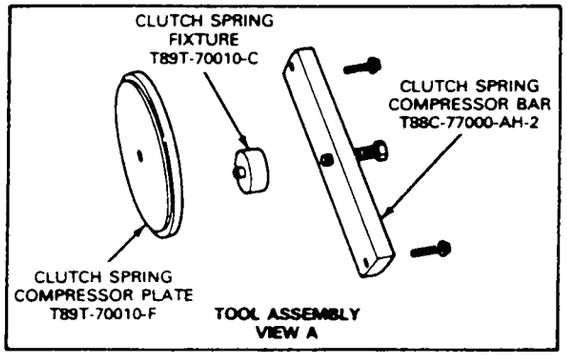
22. Remove overdrive ring gear and center shaft assembly and needle bearing assembly 7G178.



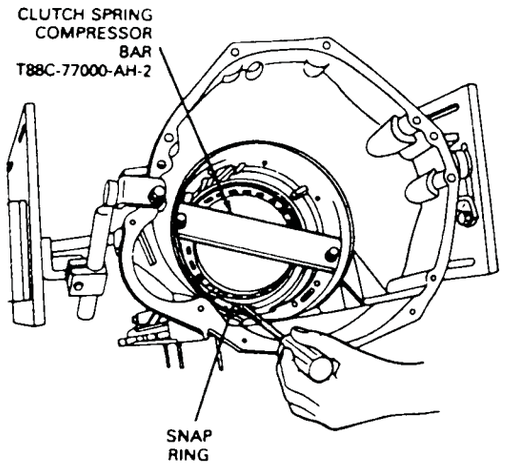


Install Clutch Spring Compressor T89T-70010-F or equivalent into the case. Tighten center bolt to 7 N·m (65 in-lbs).

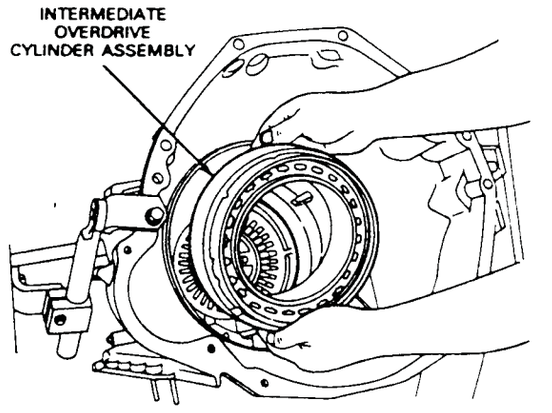




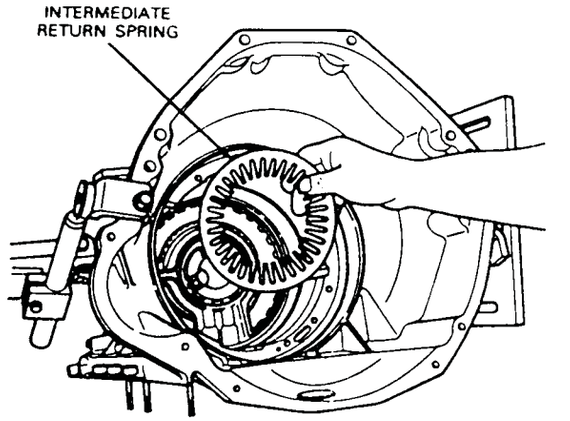
Remove large snap ring with large screwdriver. Loosen spring compressor center bolt and remove compressor tool.



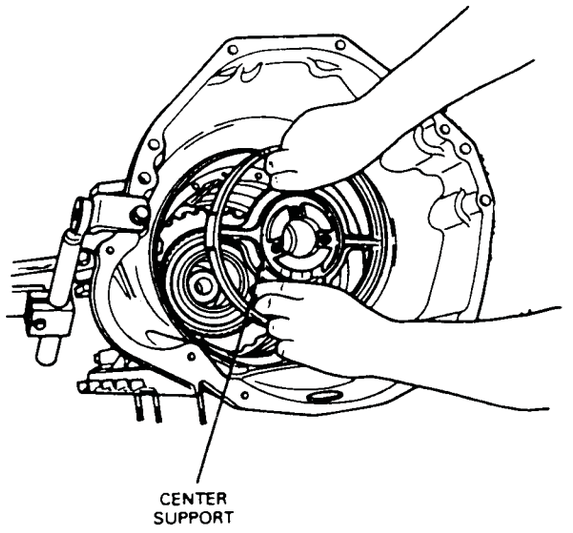
Remove intermediate/overdrive cylinder assembly.



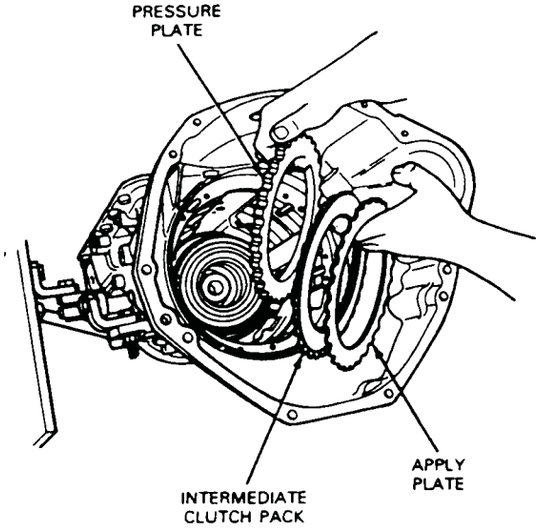
Remove intermediate return spring.



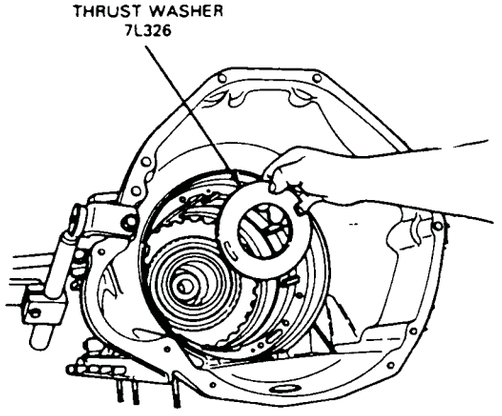
Remove center support.



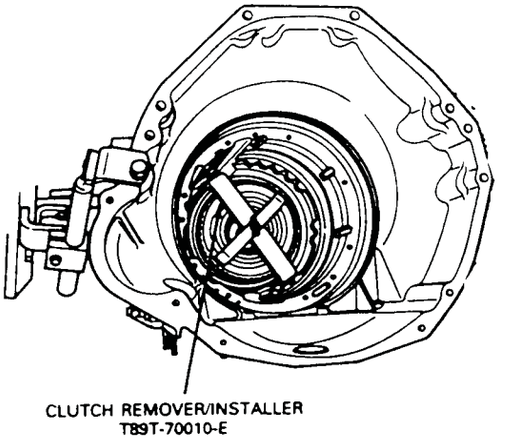
Remove intermediate pressure plate and clutch plates. Tag clutch plates for re-assembly.



Remove thrust washer No. 7L326.

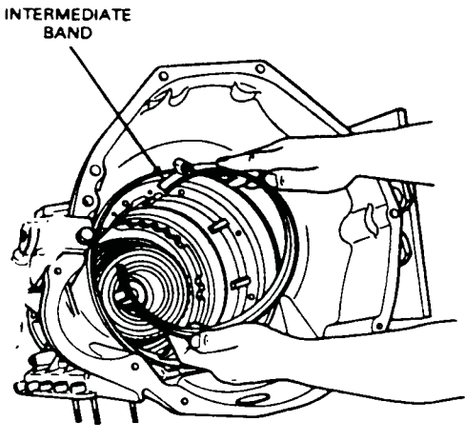


Remove intermediate band.

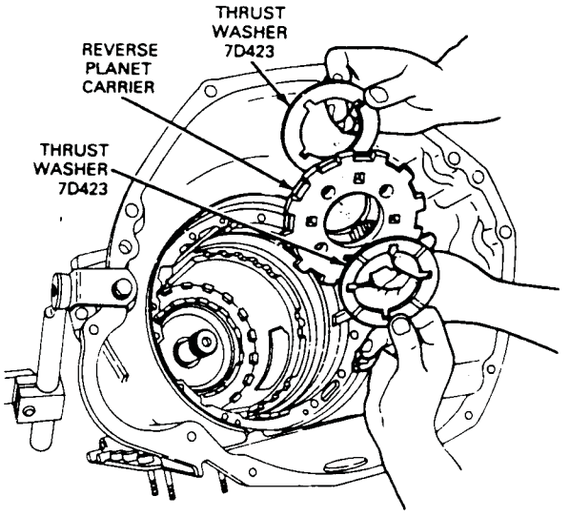


Remove direct clutch forward clutch and shell using Clutch Remover/Installer T89T-70010-E or equivalent.

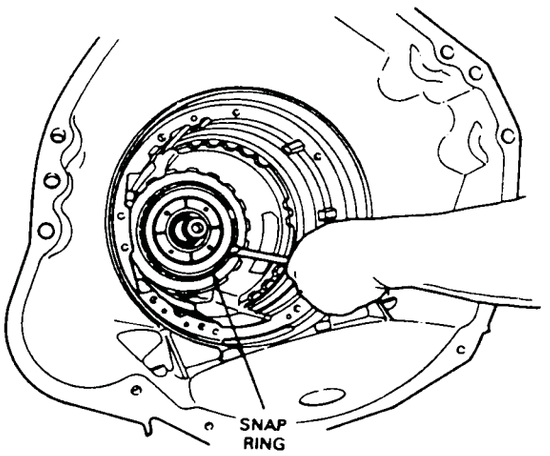
NOTE: Hooks on crossbar must be rotated into notches on input shell. Refer to illustration.



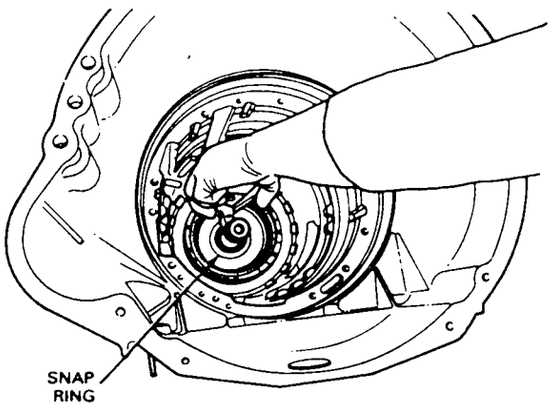
Remove reverse planet carrier and two thrust washers No. 7D423.



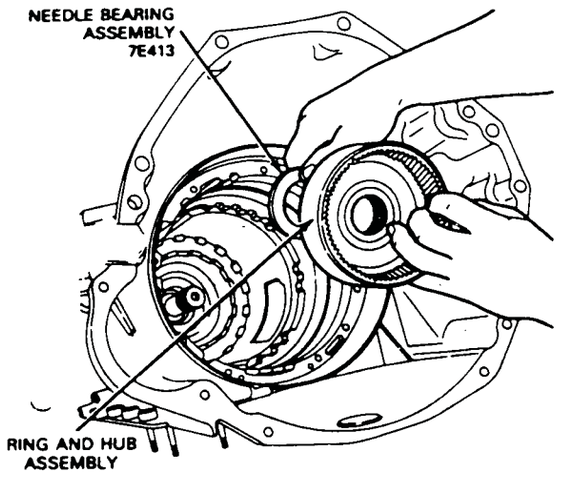
Using large screwdriver, remove reverse snap ring.



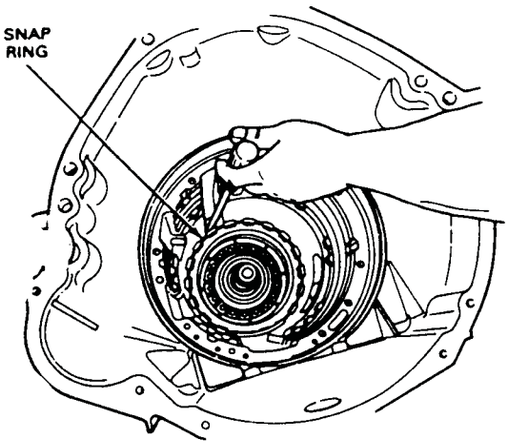
Using Snap Ring Pliers, remove the output shaft snap ring. Discard snap ring.



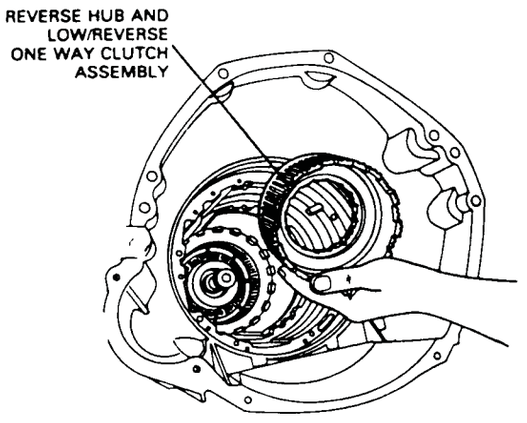
Remove ring gear and hub assembly, and needle bearing assembly No. 7E413.



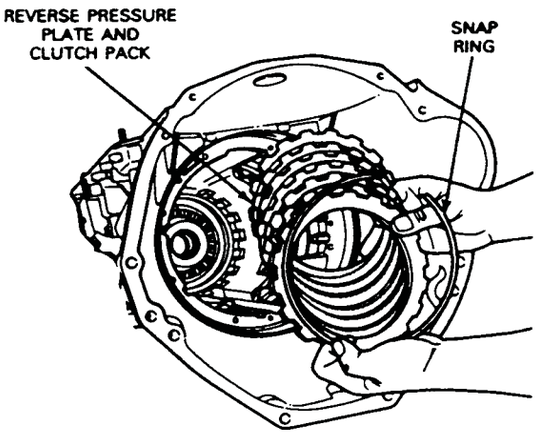
Using a large screwdriver remove reverse clutch snap ring.



Remove reverse hub and one-way clutch assembly.

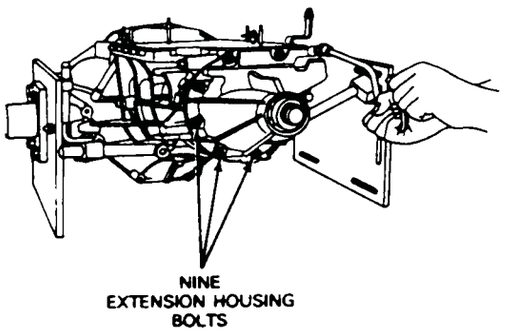


Remove reverse pressure plate and clutch pack. Tag for re-assembly.

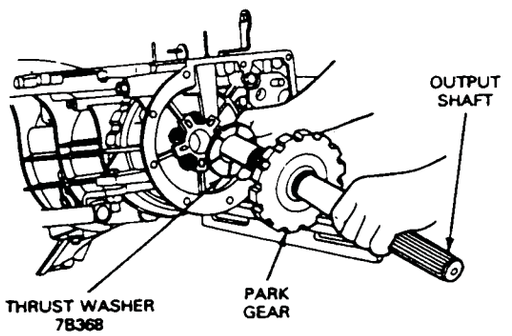


Rotate transmission so that pan surface is facing up.

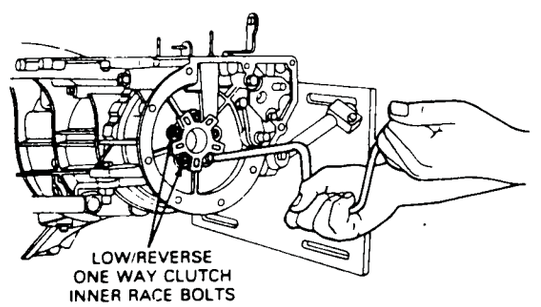
Remove nine extension housing bolts (13mm socket). Remove wiring bracket, extension housing and gasket, (discard gasket).



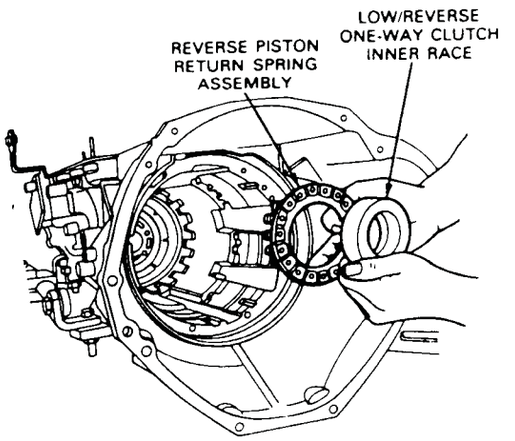
Remove output shaft, park gear and thrust washer No. 7B368.



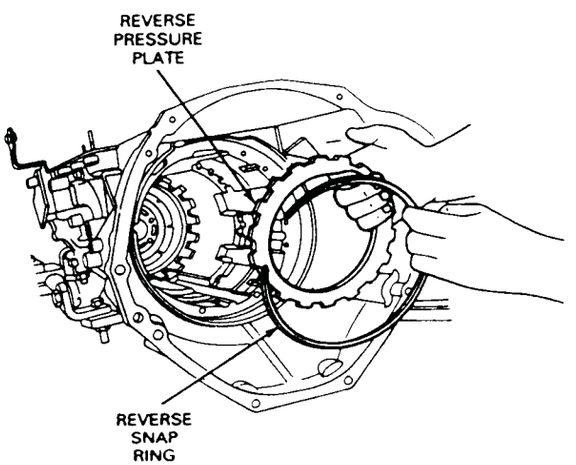
Remove five bolts (11mm socket) from the low/reverse one-way clutch inner race.



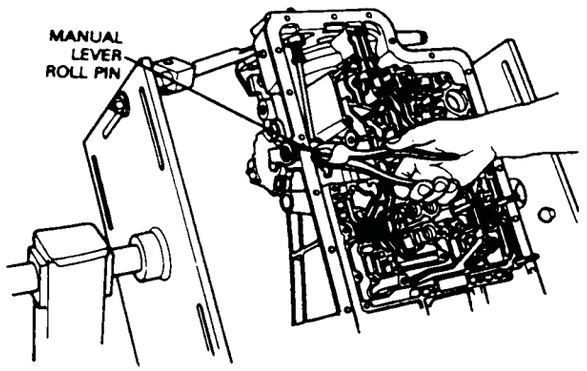
Remove reverse clutch, return spring and inner race.

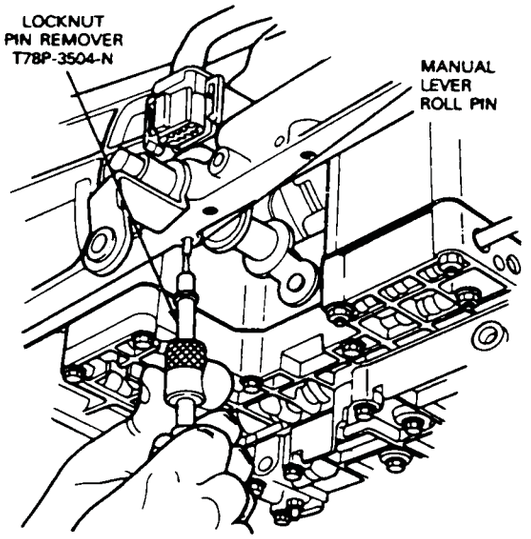


CAUTION: Install reverse clutch pressure plate and snap ring, to hold reverse clutch piston during removal.

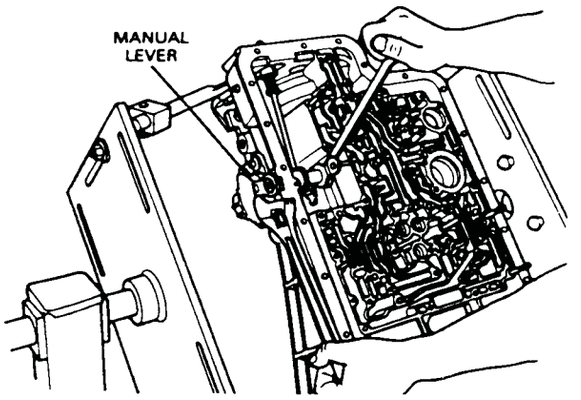


Using side cutters or Locknut Pin Remover T78P-3504-N or equivalent remove manual lever roll-pin from the case.

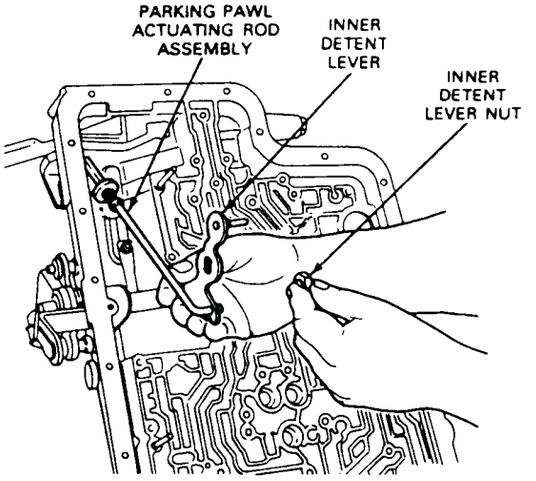




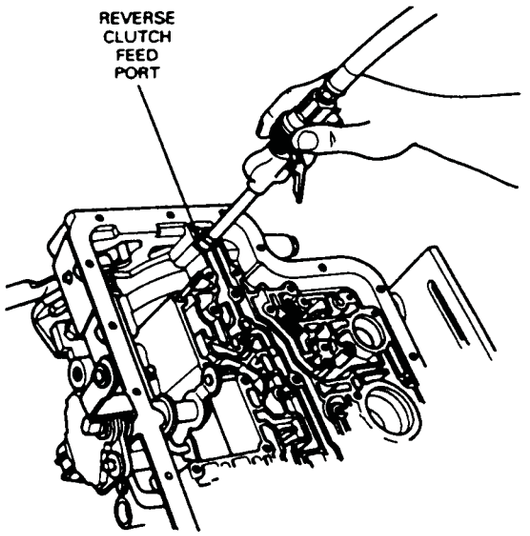
Remove inner detent lever nut (21mm box wrench), while holding lever with crescent wrench.



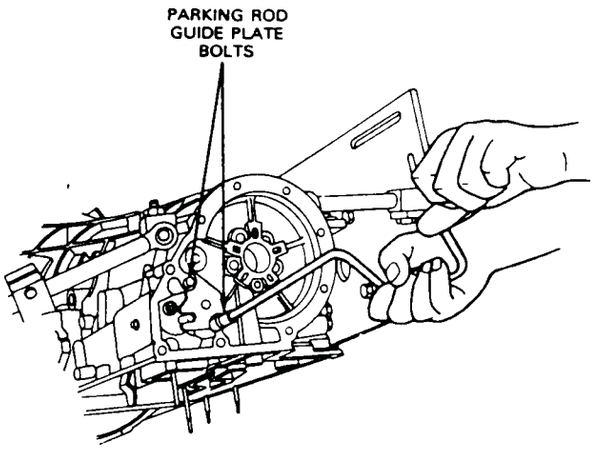
Remove inner detent lever and parking pawl actuating rod assembly from manual lever.



Blow air into reverse clutch feed port using compressed air. This will blow out the reverse clutch piston against the pressure plate.



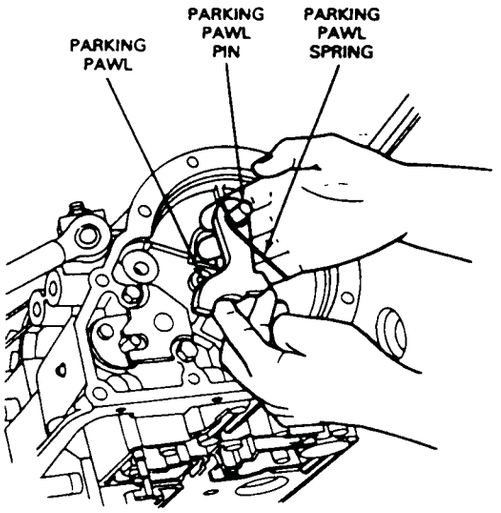
Remove two bolts (13 mm socket) from parking rod guide plate.



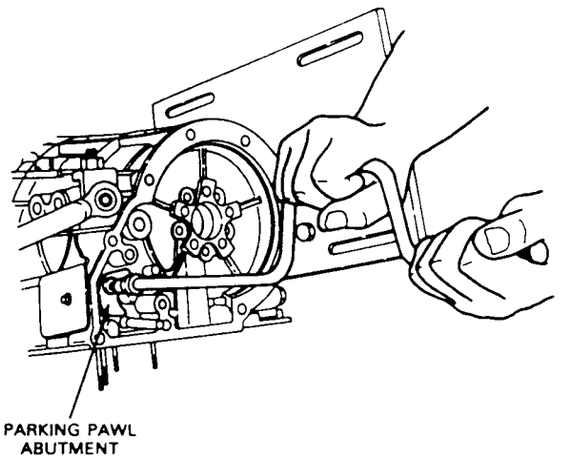
Remove snap ring, reverse clutch pressure plate and piston from case.

Rotate transmission so that pan surface is facing down.

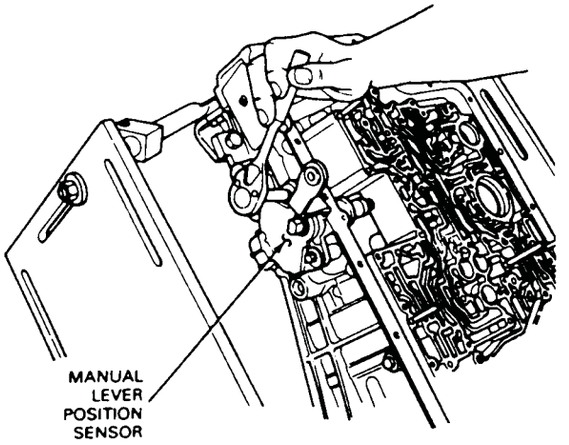
Remove park pawl return spring, pin and parking pawl from case.



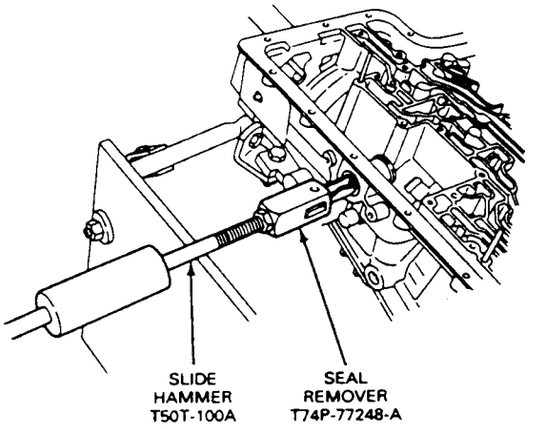
Remove the Torx® head bolt (40A bit) and parking pawl abutment.



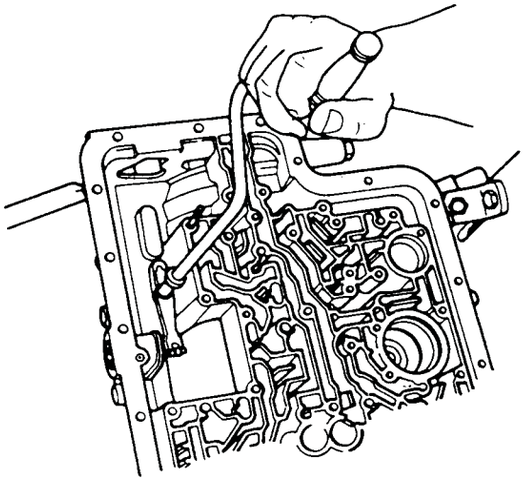
Remove two bolts (8mm socket) and manual lever position sensor.



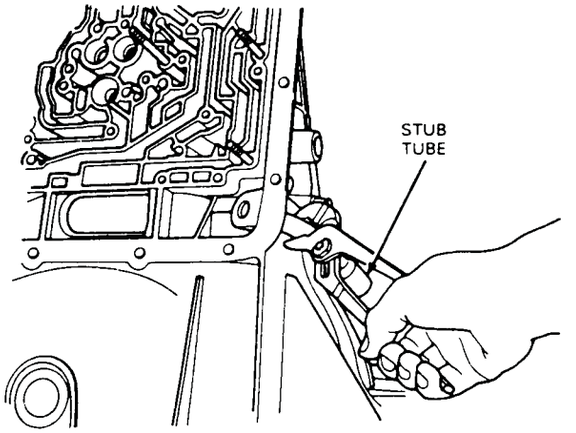
Remove manual lever seal using Seal Remover T74P-77248-A and Slide Hammer T50T-100-A or equivalents.



Remove manual lever.



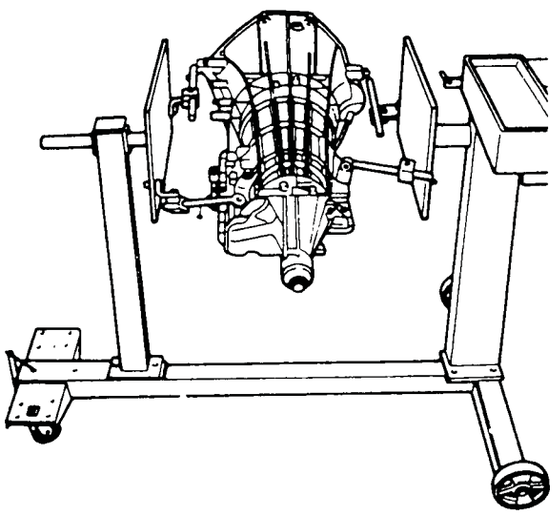
If required, remove stub tube, using channel lock pliers.



Assembly

Assembly

Mount transmission in Twin Post Engine Stand Rotunda 014-00106 or equivalent.

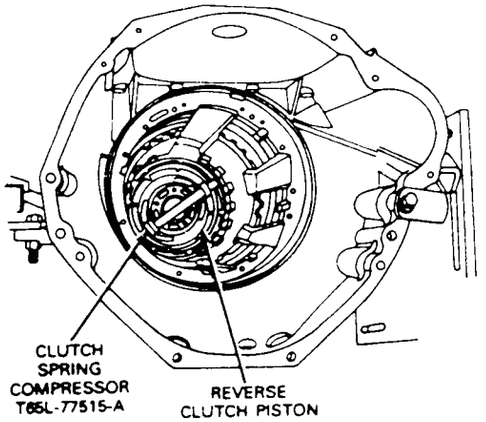


Rotate transmission so that bell housing is facing up.

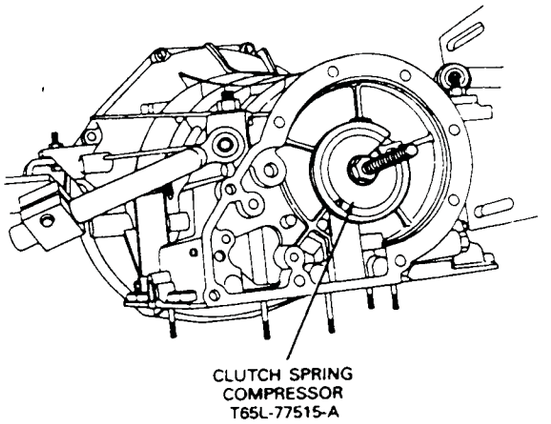
Install inner and outer seals on the reverse clutch piston.

Install reverse clutch piston using Clutch Spring Compressor T65L-77515-A or equivalent. Remove tool after installing piston.

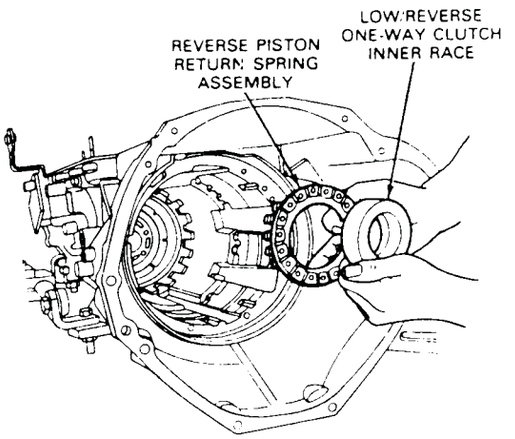
Front View



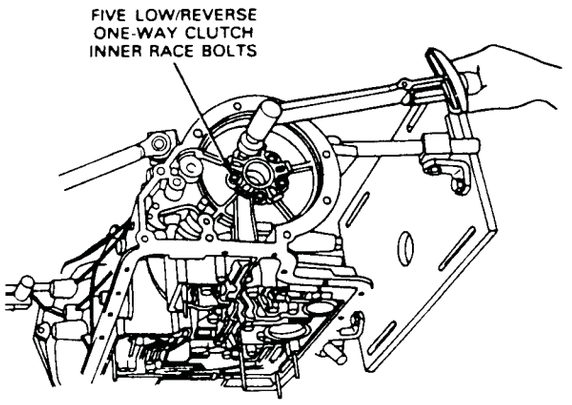
Rear View



Install reverse piston return spring assembly and one-way clutch inner race.

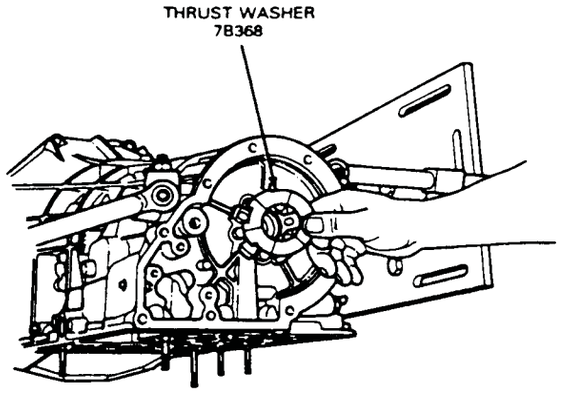


Attach to case with five bolts (11mm socket) and tighten to 25-33 N·m (18-25 ft-lb).



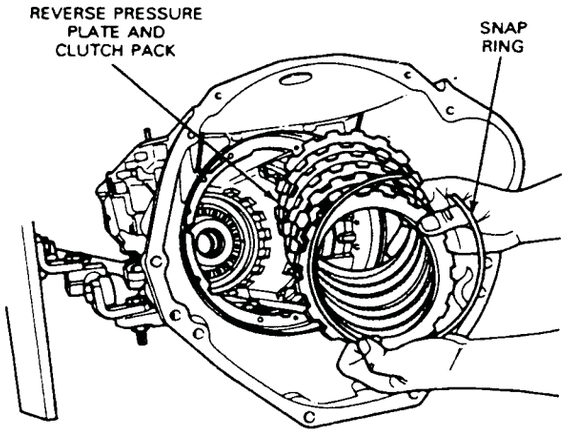
Rotate transmission to horizontal position.

Grease steel side of the thrust washer No. 7B368 and place on rear of case so that bronze side is facing outward.



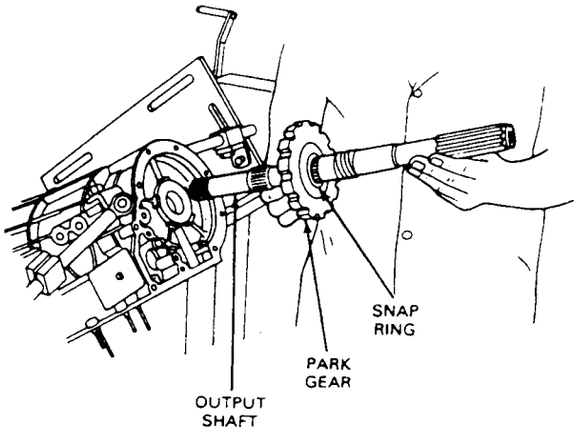
Install a six internal spline plate reverse clutch pack starting with an external spline plate. Alternate external spline plates with internal spline plates. Install snap ring.

NOTE: No stack-up clearance measurement required.

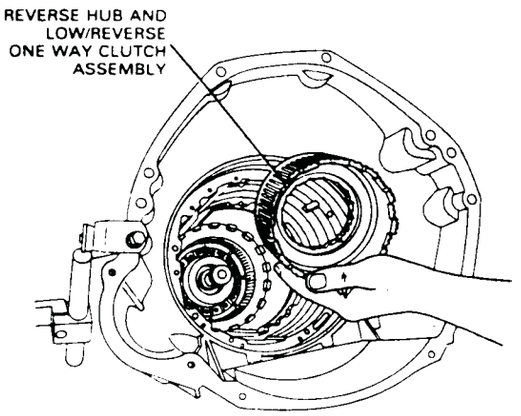


Install snap ring onto output shaft. Slide park gear onto shaft with thrust surface opposite snap ring. Install output shaft.

WARNING: DO NOT OVEREXTEND SNAP RING WHEN INSTALLING. ENSURE SNAP RING IS SECURELY SEATED IN GROOVE.

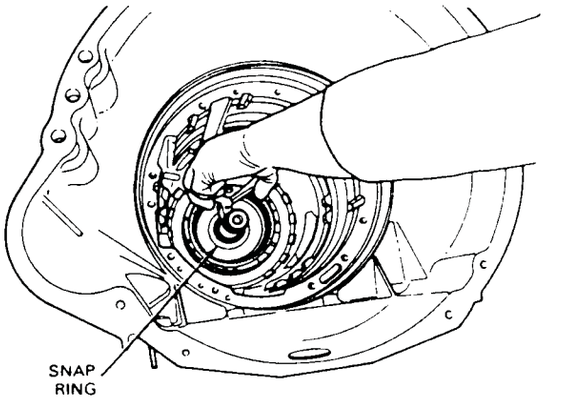


Install reverse hub and low/reverse one way clutch.

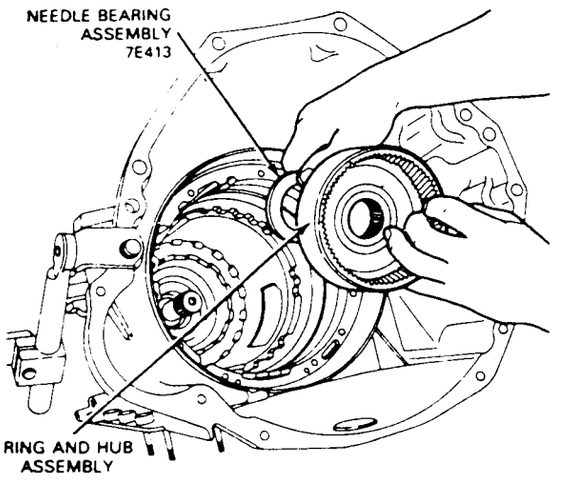


Install new snap ring onto output shaft.

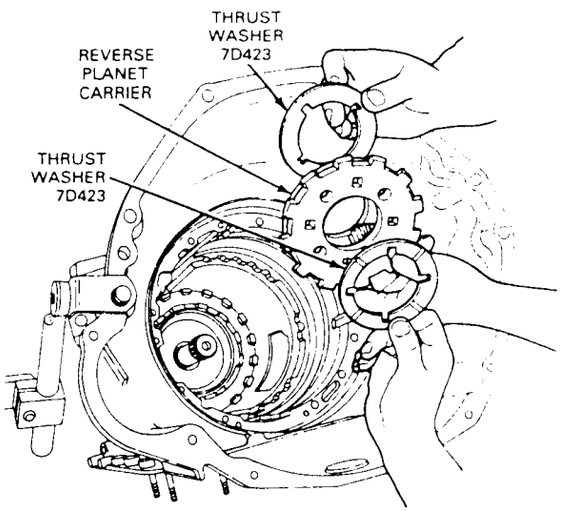
WARNING: DO NOT OVEREXTEND SNAP RING WHEN INSTALLING. ENSURE SNAP RING IS SECURELY SEATED IN GROOVE.



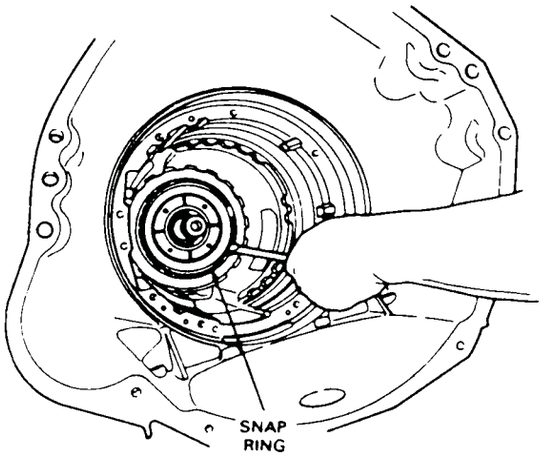
Install output shaft hub and reverse ring gear, placing needle needle bearing assembly No. 7E413 on rear surface of hub. Hold bearing in place with grease.



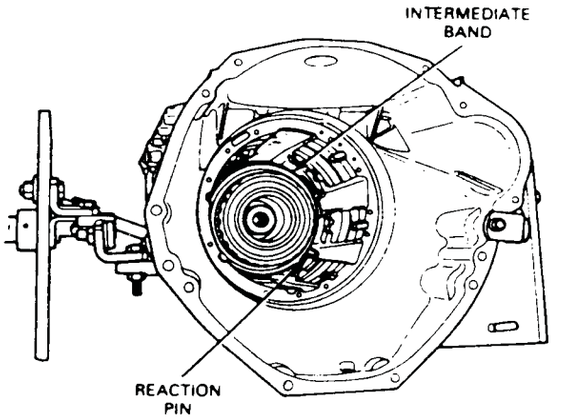
Install reverse plate carrier assembly into hub with thrust washer No. 7D423.



Install snap ring.



Install intermediate band so that one ear is resting on the reaction pin.

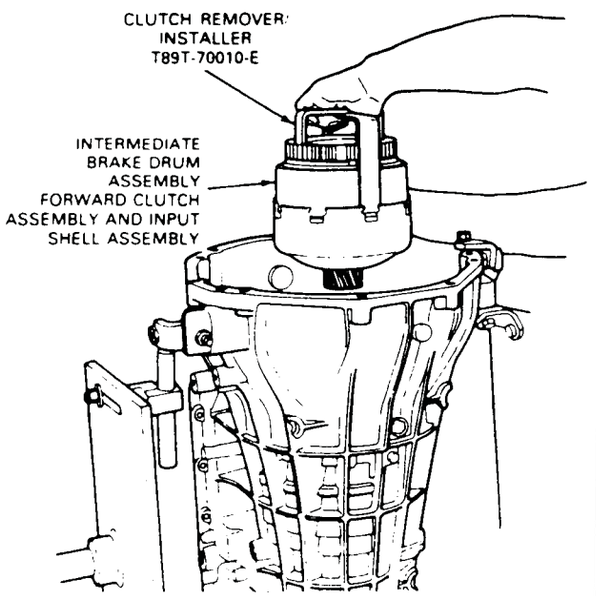


Rotate transmission so that bell housing is facing up.

Attach Clutch Remover/Installer T89T-70010-E or equivalent, onto input shell and lower entire assembly (Intermediate Brake Drum Assembly, Forward Clutch Assembly and Input Shell Assembly) into case.

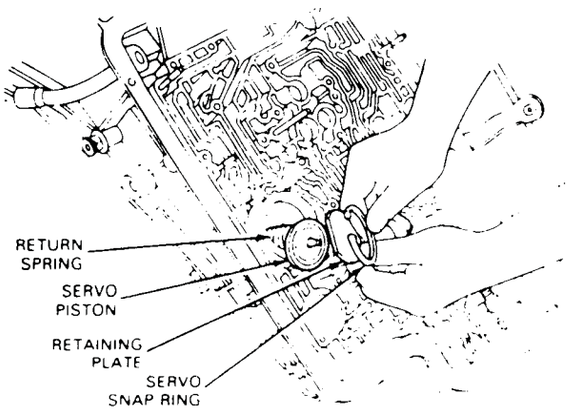
NOTE: It may be necessary to rotate output shaft to seat reverse sun gear.

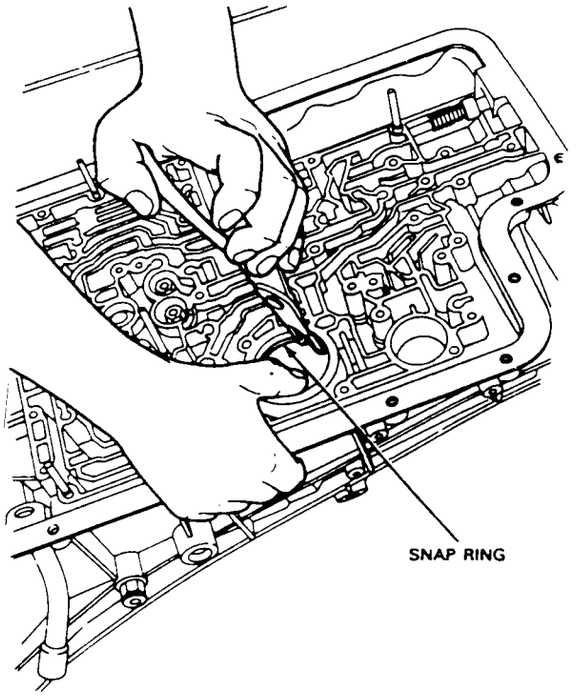
Remove service tool.



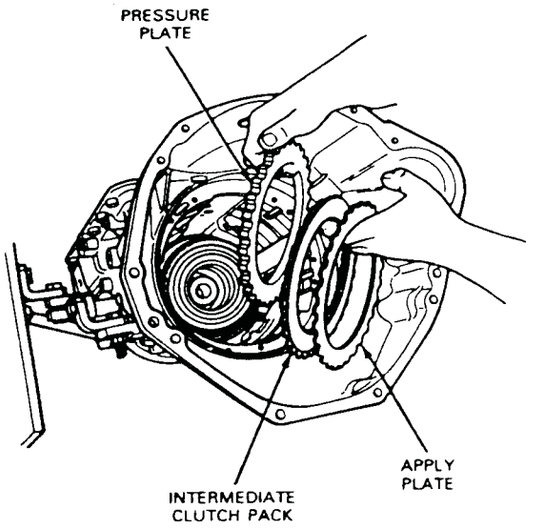
Install servo snap ring, retaining plate, piston and rod assembly and servo spring.

NOTE: Apply slight downward pressure to plate while removing snap ring.





Install intermediate pressure plate. Install clutch pack starting with internal spline plate. Install apply plate.

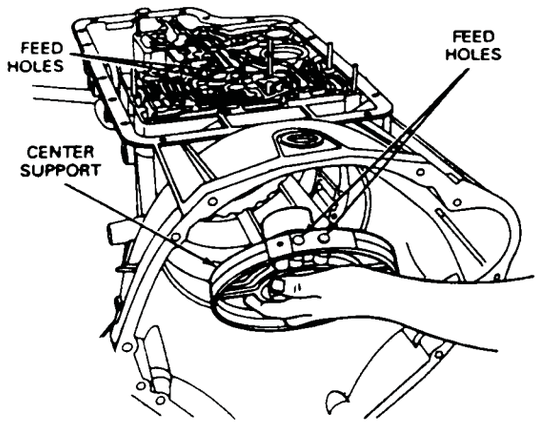


Determine end play with following procedure:

The transmission rear end play check determines:

The amount of space existing between the thrust washer surfaces of the center support and the intermediate brake drum. (2.06-.81mm) (.081-.032 inch)

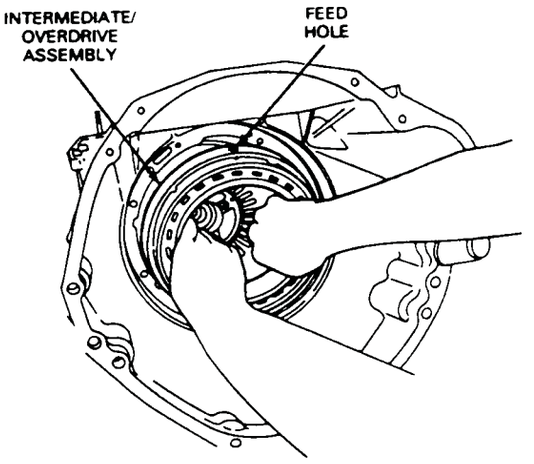
Install center support, align with holes in feed port. Install the two feed bolts. Do **not** tighten at this time.



Install intermediate/overdrive cylinder assembly into case.

NOTE: Align cylinder assembly locator tab with center support and feel hole with hole in case. Install one feed bolt but do not tighten it.

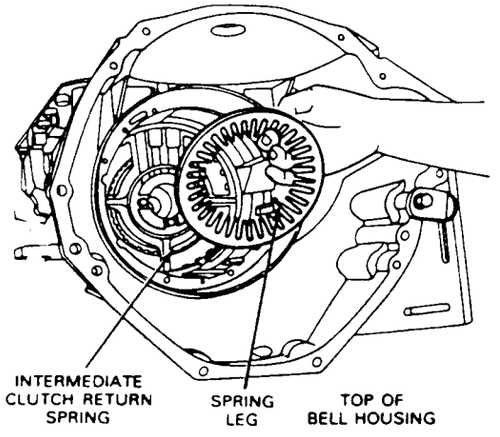
CAUTION: Do not cock cylinder when installing.



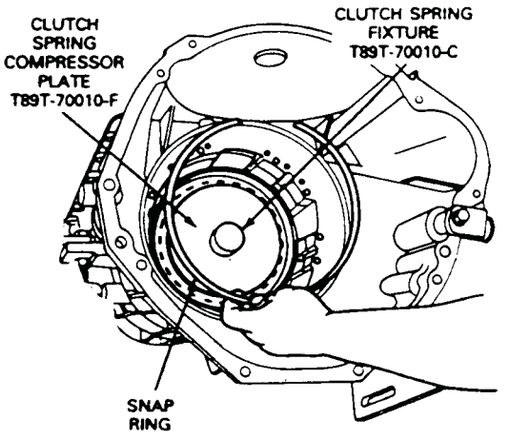
Install intermediate clutch return spring with dished surface inward.

NOTE: Locate one spring leg pointing to the top of the transmission as illustrated.

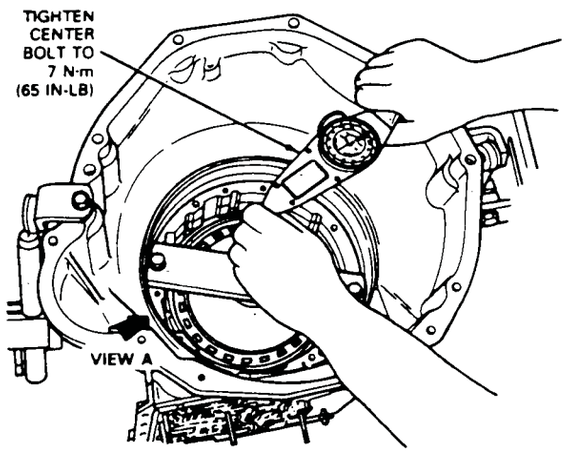
NOTE: Intermediate clutch return spring locator legs must be properly located inside of center support circular cast rib.

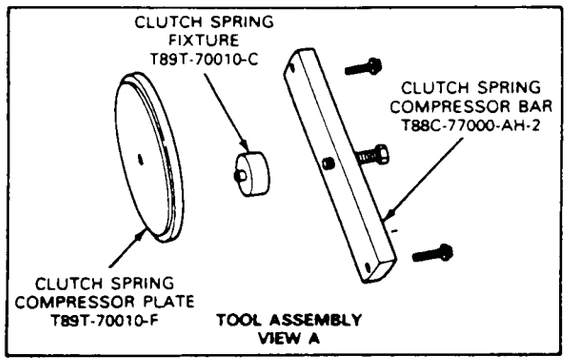


Install trial selective snap ring over intermediate clutch cylinder assembly so that ring opening is at bottom of case for proper oil drainback. Place Clutch Spring Compressor Plate T89T-70010-F and Intermediate Clutch Spring Fixture T89T-70010-C or equivalents onto intermediate clutch cylinder assembly.



Tighten center bolt to 7 N·m (65 in-lb). Seat selective snap ring into case ring groove.





Release torque on center bolt and note reading on indicator. If reading is not within specifications, repeat procedure using the correct selective snap ring.

Specifications:

1.37 - 0.67mm (0.054 - 0.026 inch)

Selective Snap Rings:

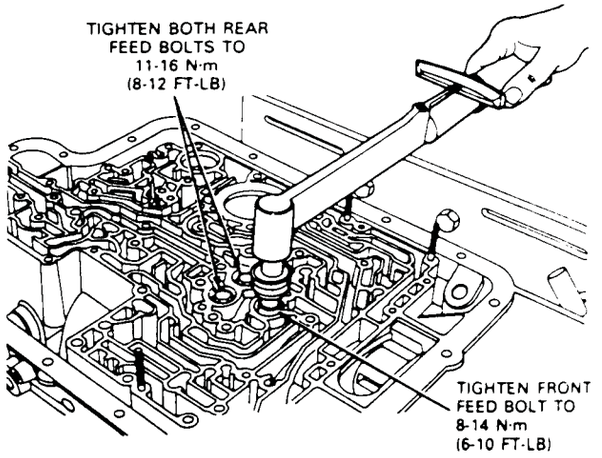
1.55 - 1.45mm (0.061 - 0.057 inch)

2.05 - 1.95mm (0.080 - 0.076 inch)

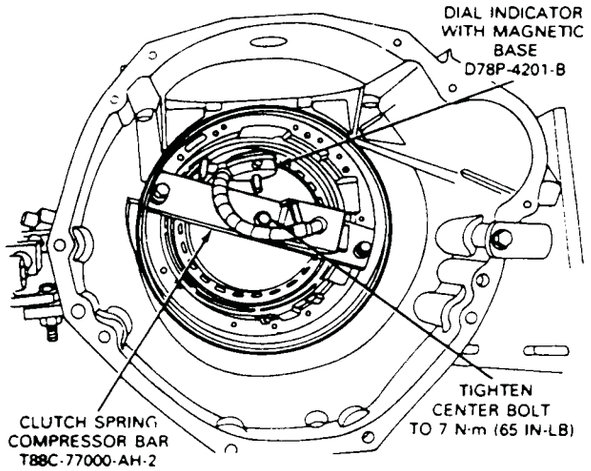
2.60 - 2.50mm (0.100 - 0.098 inch)

32. Remove Clutch Spring Tool Assembly. Tighten three feed bolts (13mm socket) into intermediate/overdrive cylinder assembly and center support.

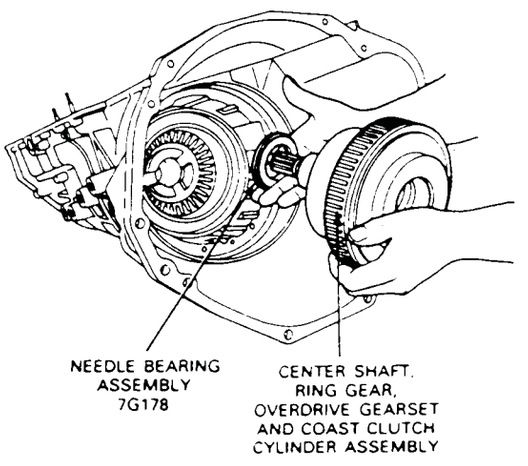
CAUTION: Tighten the front feed bolt to 9-13 N·m (6-10 ft-lbs). Tighten both rear feed bolts to 11-16 N·m (8-12 ft-lbs).



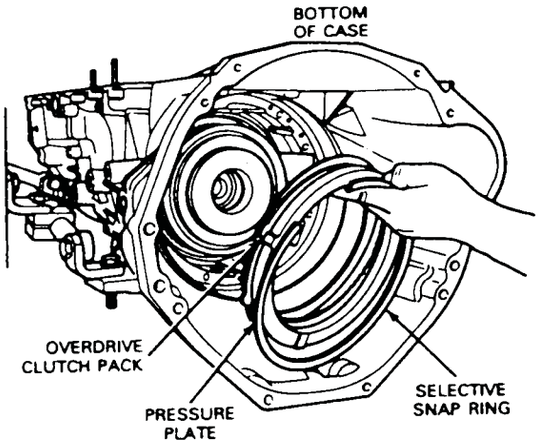
Attach Dial Indicator with Magnetic Base D78P-4201-B or equivalent to bar. Place stylus onto Compressor Plate T89T-70010-F or equivalent and zero dial.



Using grease, place needle bearing assembly No. 7G178 on rear face of center shaft. Install center shaft, overdrive ring gear, overdrive planetary gearset and coast clutch cylinder as an assembly.



Install overdrive clutch pack starting with steel plate. Install pressure plate with dot facing outward and toward the top of the transmission. Install trial selective snap ring with opening at bottom of case.



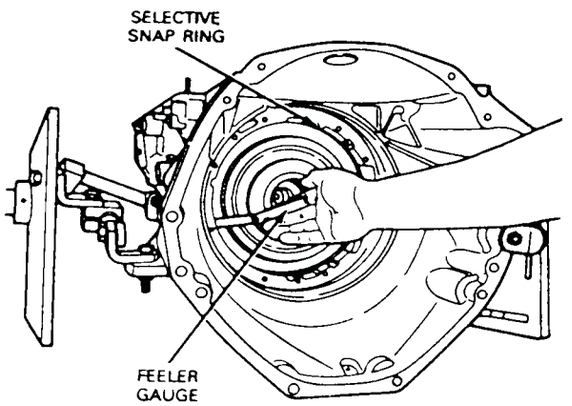
Check stack-up clearance using a feeler gauge. If not within specification, install correct selective snap ring and recheck.

Specification:

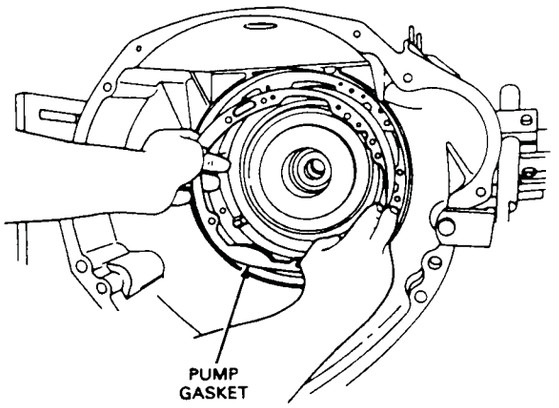
1.20 - 0.55mm (0.047 - 0.022 inch)

Selective Snap Rings

1.55 - 1.45mm (0.061 - 0.057 inch)
2.05 - 1.95mm (0.80 - 0.076 inch)
2.60 - 2.50mm (0.10 - 0.098 inch)
3.10 - 3.00mm (0.12 - 0.118 inch)
3.60 - 3.50mm (0.14 - 0.137 inch)

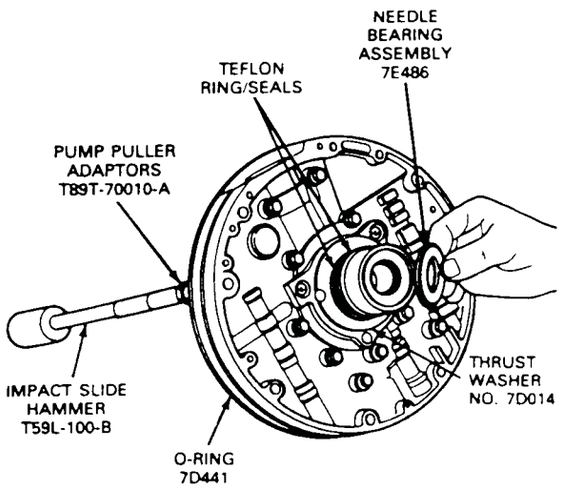


Install pump gasket into case.

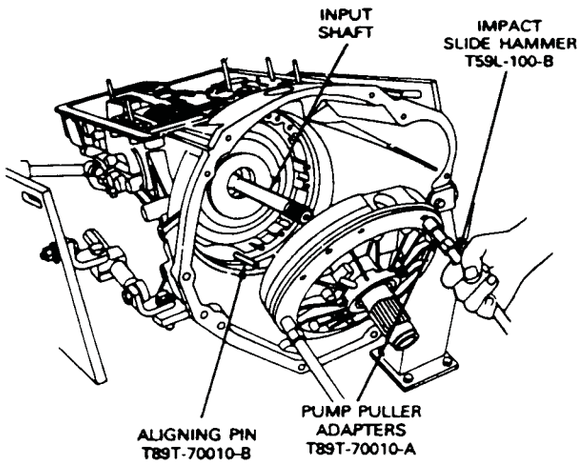


Screw Pump Puller Adapters T89T-70010-A or equivalent into pump threaded holes. Screw on Impact Slide Hammers T59L-100-B or equivalent.

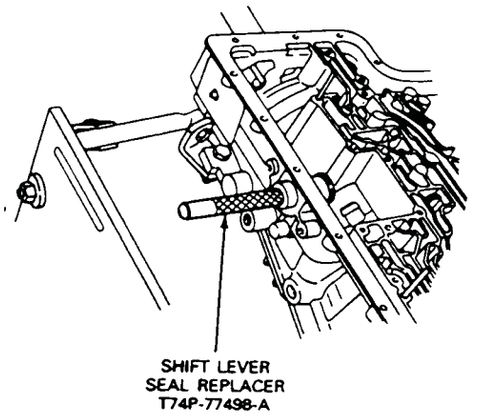
Install thrust washer No. 7D014 and needle bearing assembly 7E486 onto pump. Use grease to hold in place.



Install input shaft (long splined end first) and Alignment Pin T89T-70010-B or equivalent into the case as shown. Install the pump into the case. Orient the filter inlet tube bore towards the valve body mounting surfaces.



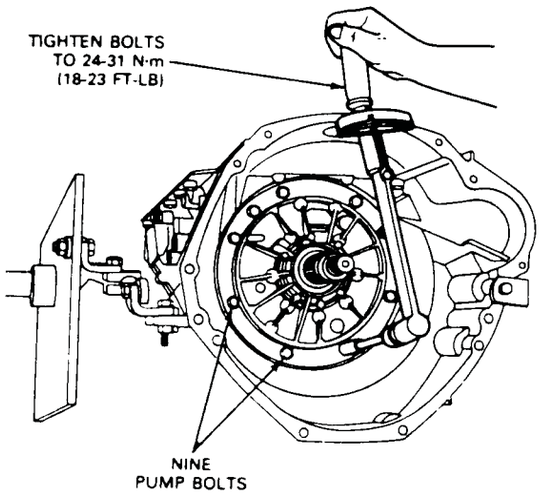
Install manual lever seal using Shift Lever Seal Replacer T74P-77498-A or equivalent.



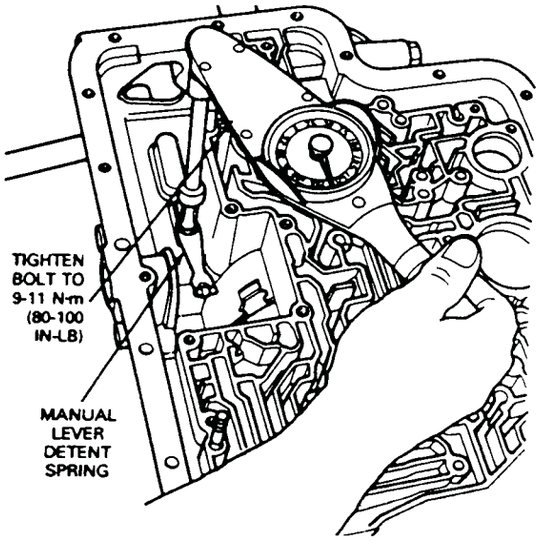
Remove old rubber coated washers from the nine pump to case bolts. Install new pump bolt washers. Remove Aligning Pin T89T-70010-B. Install pump using nine bolts (10mm socket). Tighten to 24-31 N·m (18-23 ft-lb).

NOTE: Draw pump into case evenly to avoid seal damage.

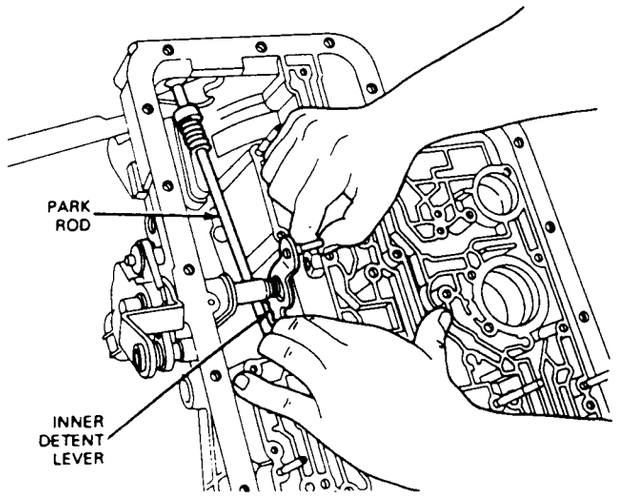
CAUTION: Remove input shaft.



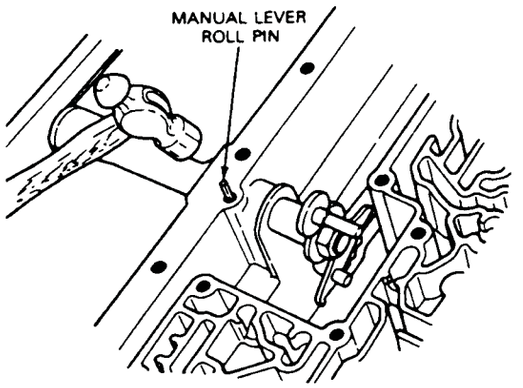
Install manual lever detent spring bolt (8mm socket). Tighten to 9-11 N·m (80-100 in-lb).



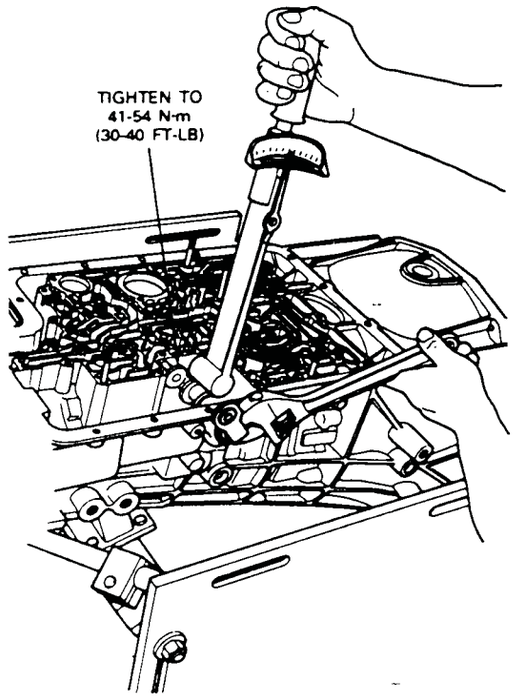
Install manual lever, inner lever, park actuating rod assembly and nut (21mm box wrench).



Install manual lever roll so that pin is just below case surface.

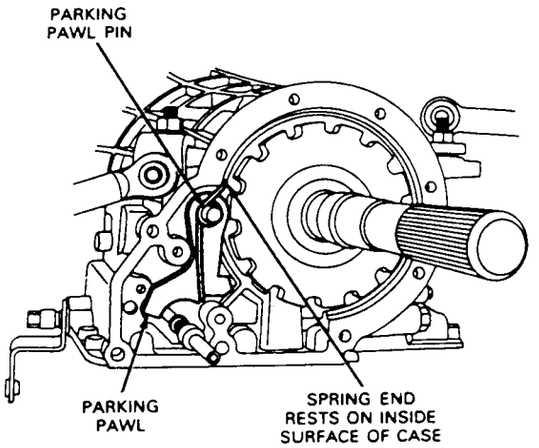


Tighten manual lever nut (13/16 crows foot) to 41-54 N·m (30-40 ft-lbs).

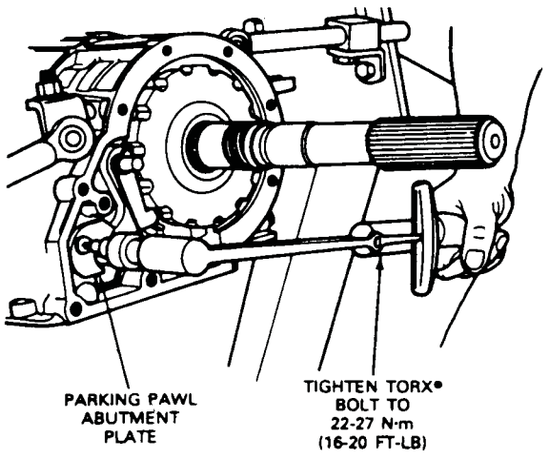


Install parking pawl, pin and parking pawl return spring on rear face.

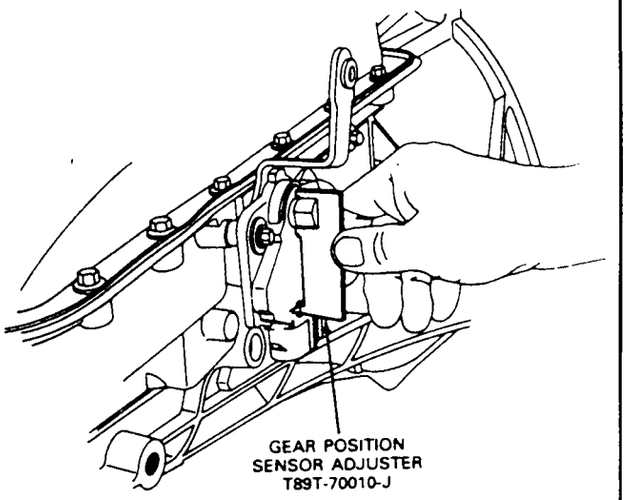
NOTE: Parking pawl return spring end rests on inside surface of case.



Install parking pawl abutment with Torx® head bolt (40A bit) and tighten to 22-27 N·m (16-20 ft. lbs).

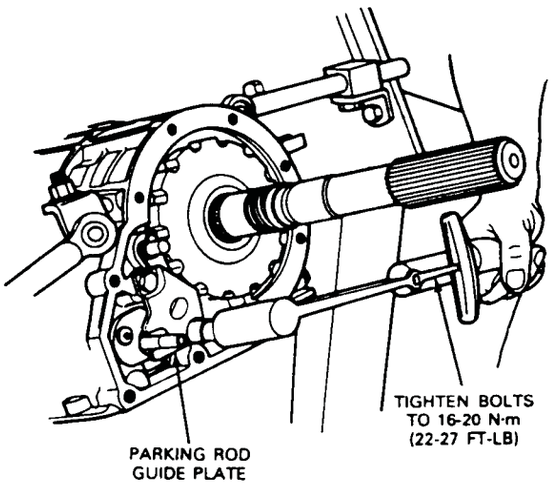


Install manual lever position sensor with two bolts (8mm socket) and washers. Do not tighten bolts at this time. Align manual lever position sensor for neutral gear position using Gear Position Sensor Adjuster T89T-70010-J or equivalent.

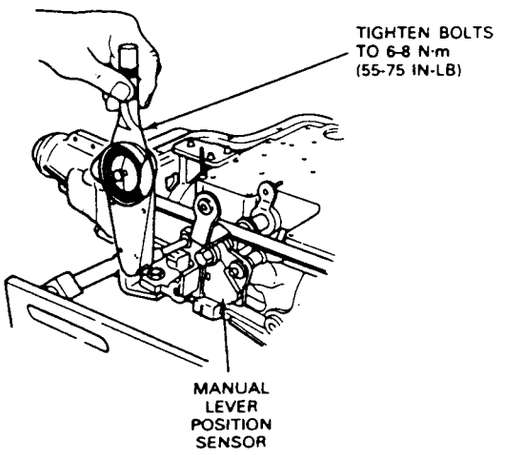


Attach parking rod guide plate with two bolts (13mm socket) and washers. Tighten to 22-27 N·m (16-20 ft9. lbs.).

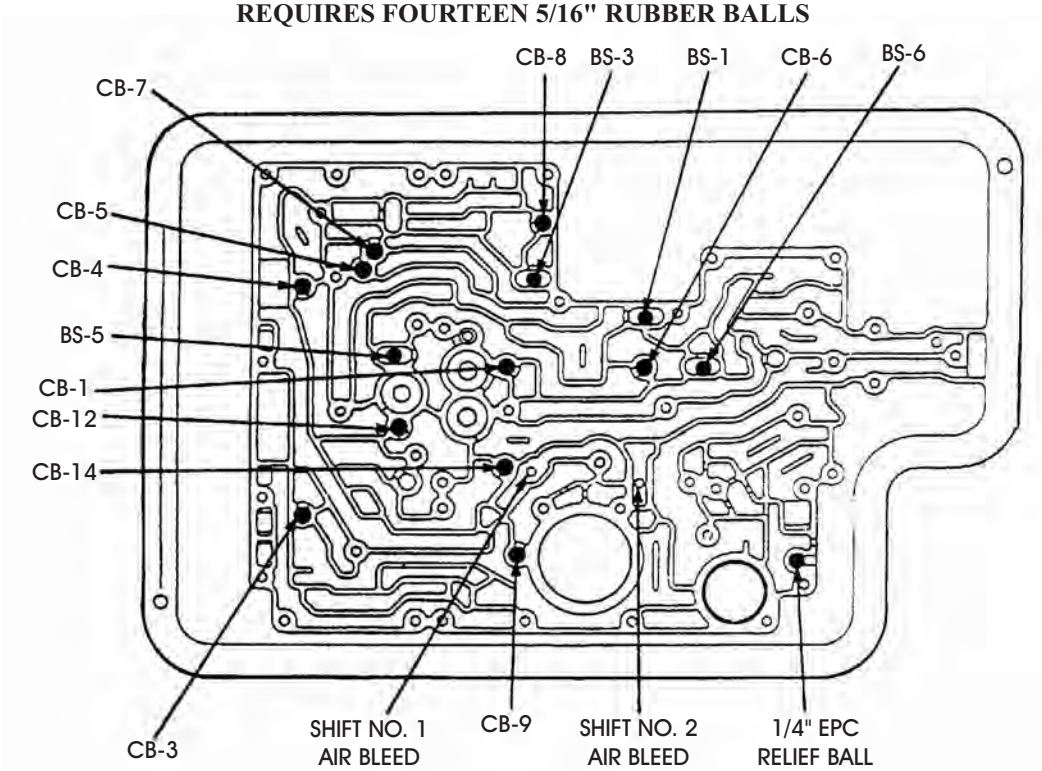
NOTE: Ensure plate dimple is facing inward.



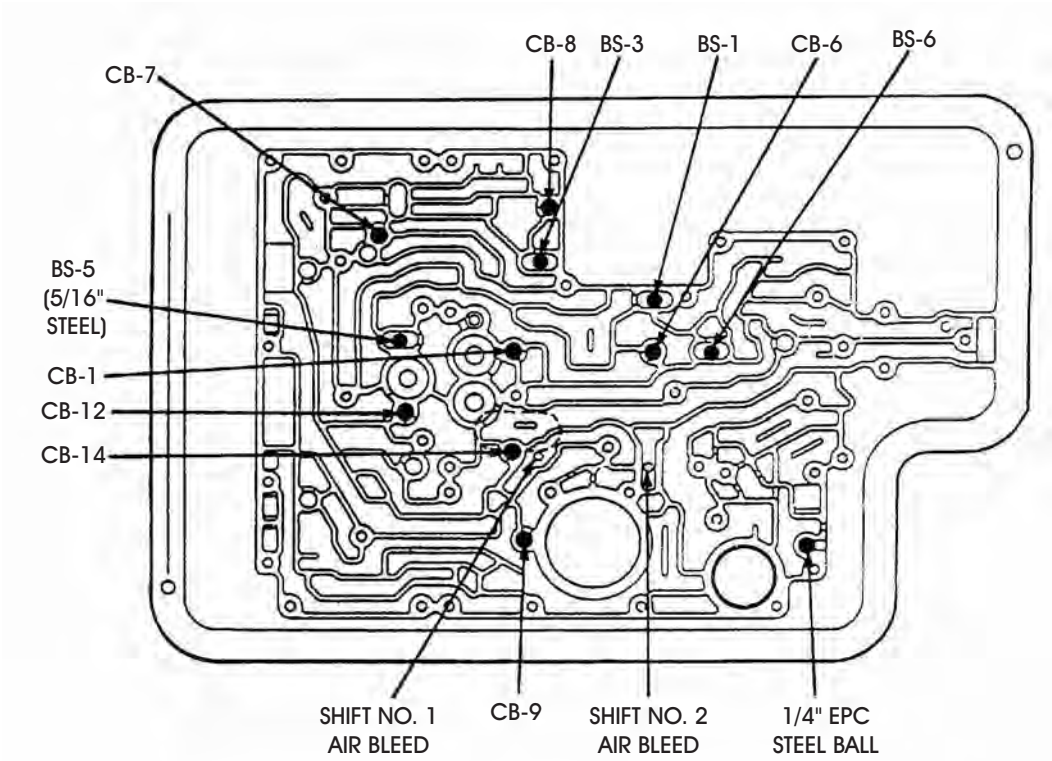
Tighten bolts (8mm socket) and washer to 6-8 N·m (55-75 in. lb.).



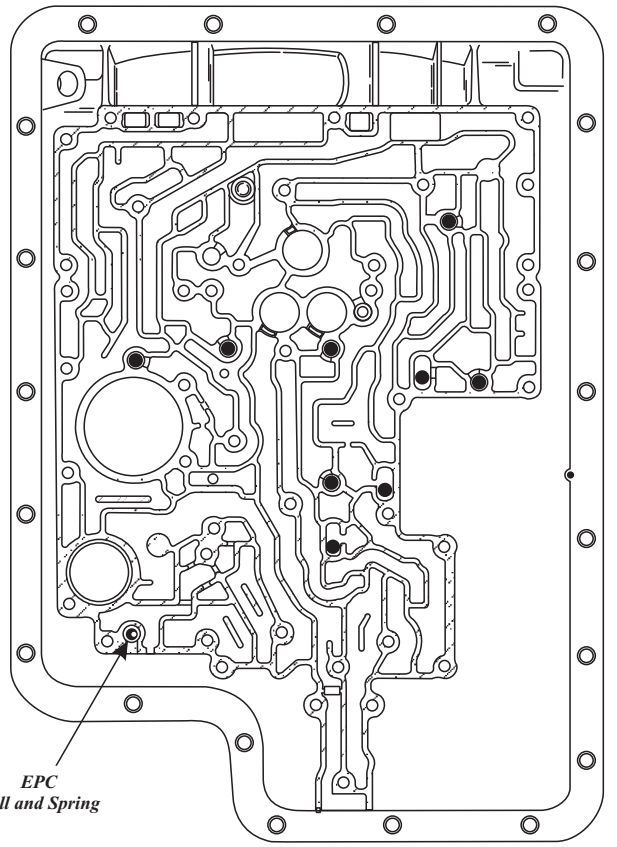
LATE-1989 CASE CHECKBALL LOCATIONS
REQUIRES FOURTEEN 5/16" RUBBER BALLS



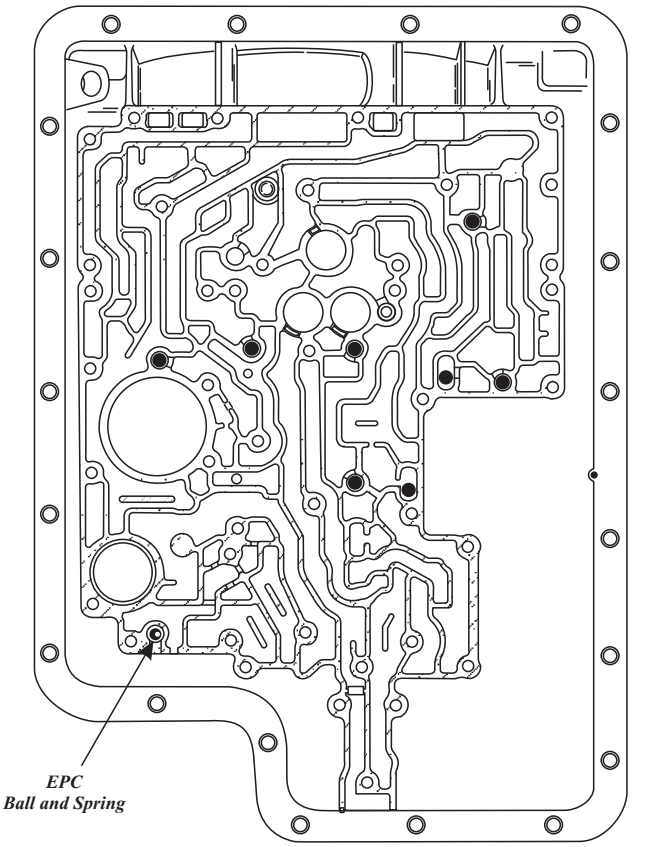
LATE-1989 CASE CHECKBALL LOCATIONS
REQUIRES TEN 5/16" RUBBER BALLS,
AND ONE 5/16" STEEL BALL, TOTAL 11



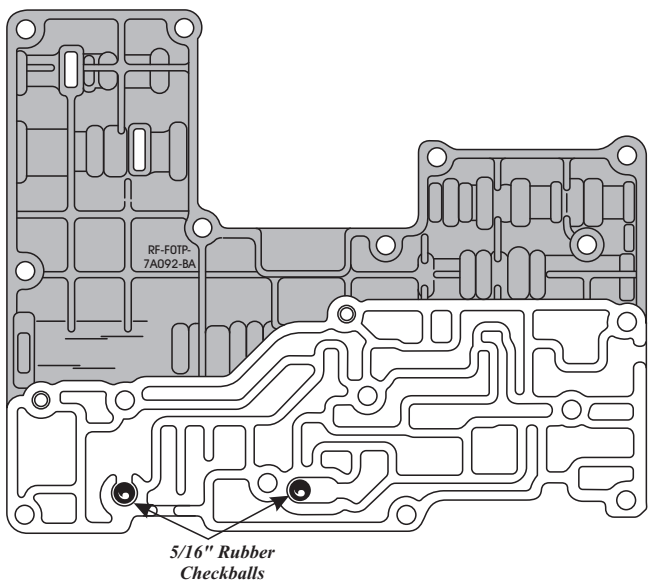
1990-1995 CASE CHECKBALL LOCATIONS
REQUIRES NINE 5/16" RUBBER BALLS



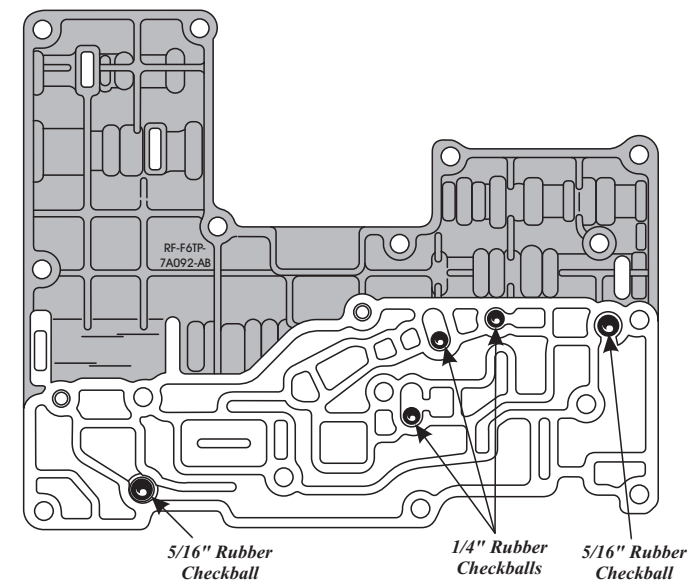
1996-1998 CASE CHECKBALL LOCATIONS
REQUIRES EIGHT 5/16" RUBBER BALLS



1989-1995 VALVE BODY CHECKBALL LOCATIONS
TWO 5/16" RUBBER BALLS - ALL MODELS



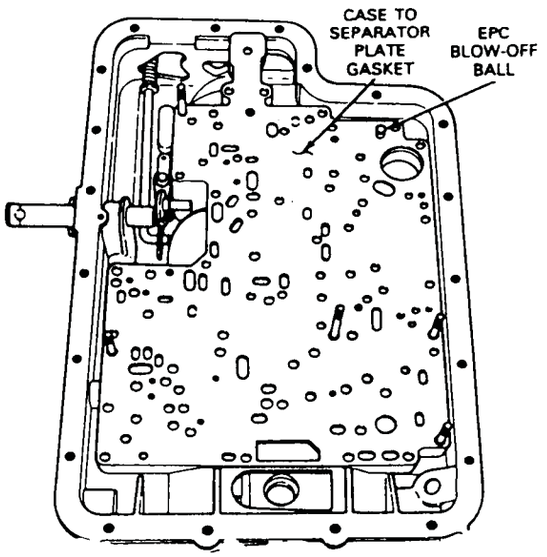
1996-1998 VALVE BODY CHECKBALL LOCATIONS
REQUIRES THREE 1/4" RUBBER BALLS,
AND TWO 5/16" RUBBER BALLS



SPECIAL NOTE:

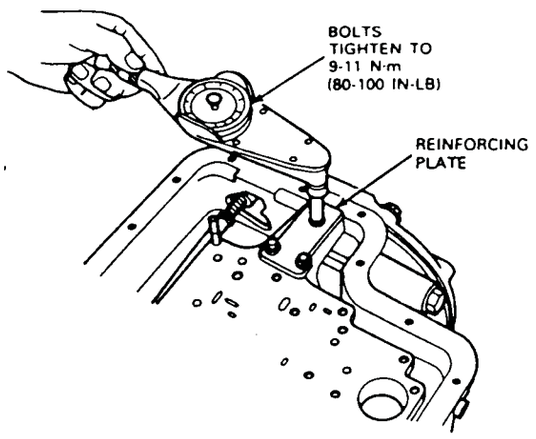
Some 1995 models were built with 1996 production valve body, spacer plate, and valve body gaskets. Be very careful to identify the parts on any 1995 model properly.

Install case-to-separator plate gasket.

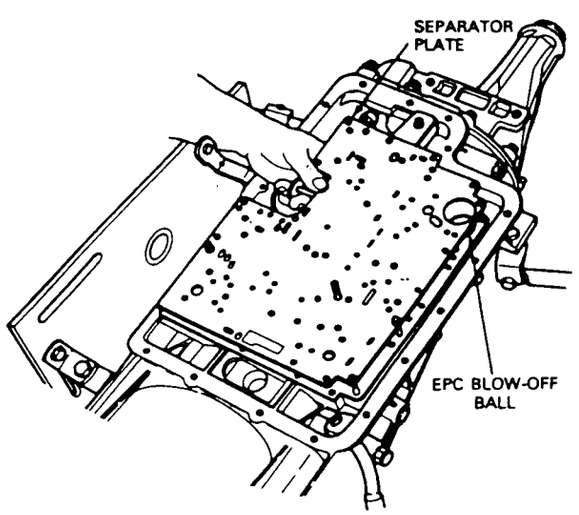


Attach reinforcing plate with three bolts (8mm socket) with stamped "up" facing up. Tighten to 9-11 N·m (80-100 in-lb).

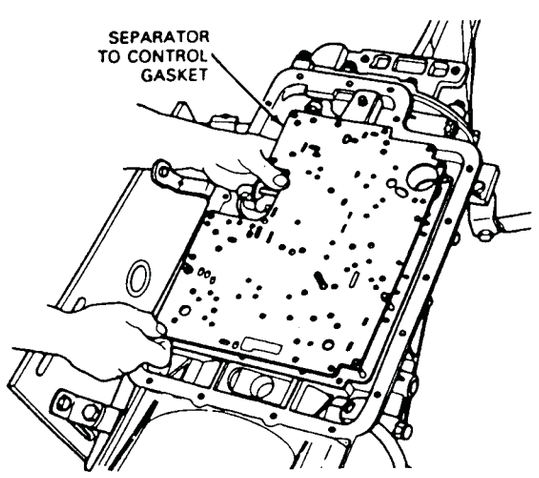
NOTE: Check placement of EPC blow-off ball.



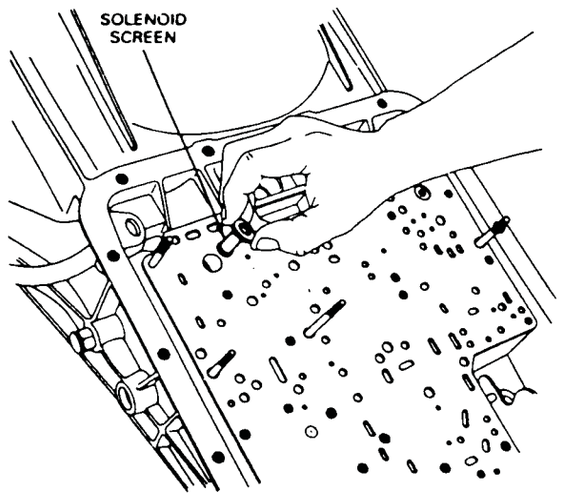
Install separator plate.



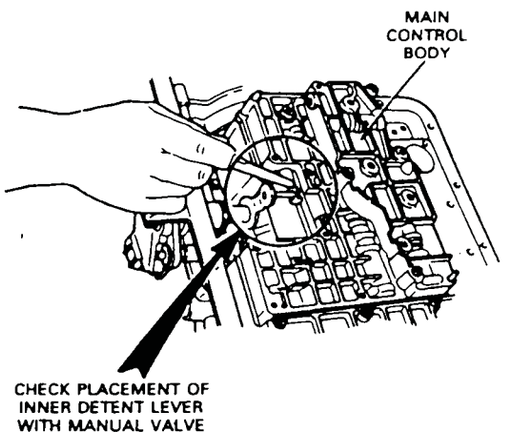
57. Install new separator-to-control gasket.



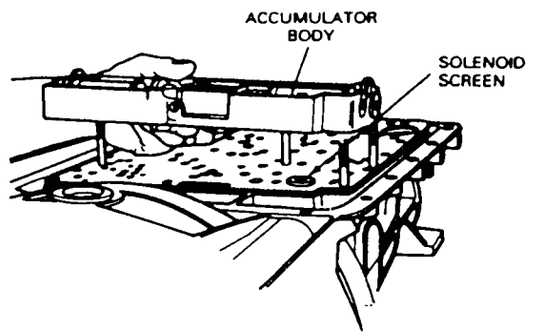
Install solenoid screen into separator plate. Turn and lock solenoid screen.

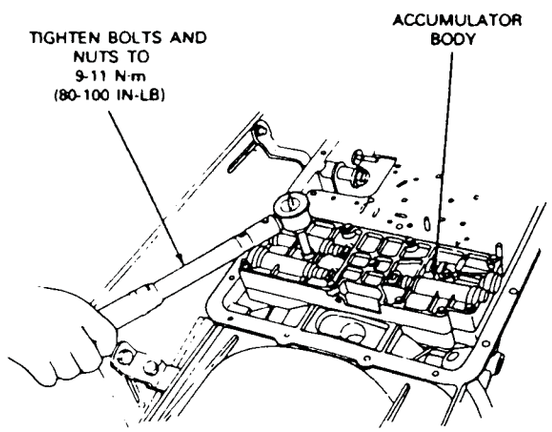


Lower main control body over studs. Align manual valve with manual lever.

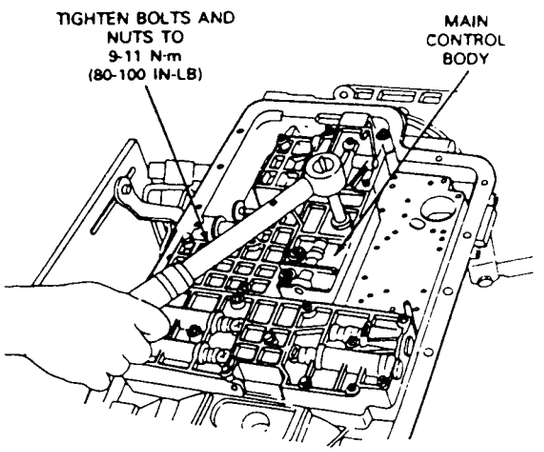


Install accumulator body over studs and attach with two nuts (10mm socket) and 11 bolts (8mm socket). Tighten to 9-11 N·m (80-100 in-lb).



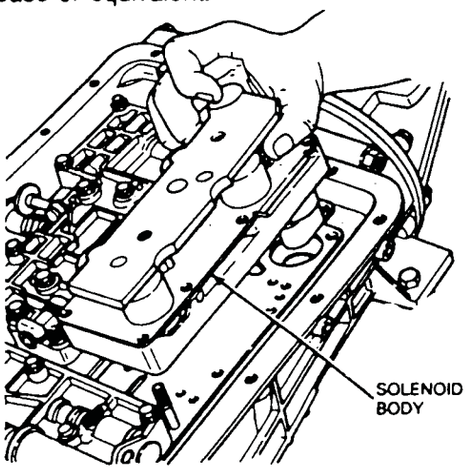


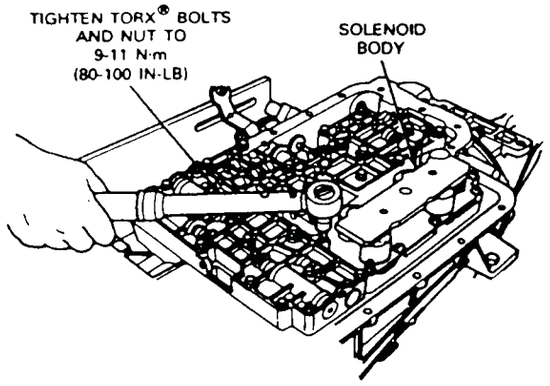
Attach valve body with two nuts (10mm socket) and 14 bolts (8mm socket). Tighten to 9-11 N·m (80-100 in-lb).



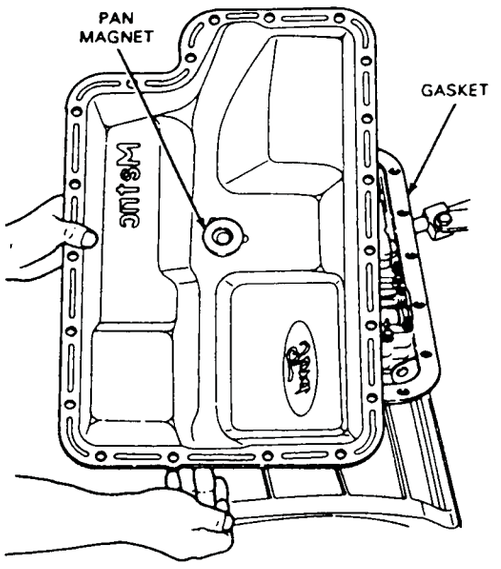
Install solenoid body over stud and attach with nine Torx® bolts (30A bit) and one nut (10mm socket). Tighten to 9-11 N·m (80-100 in-lb).

NOTE: Prior to installing solenoid body assembly, coat the case connector bore with M1C172-A grease or equivalent.



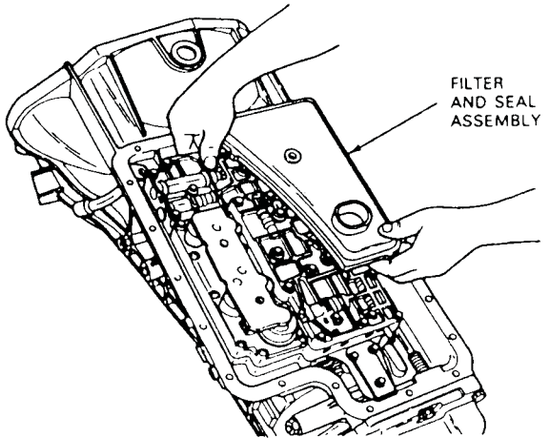


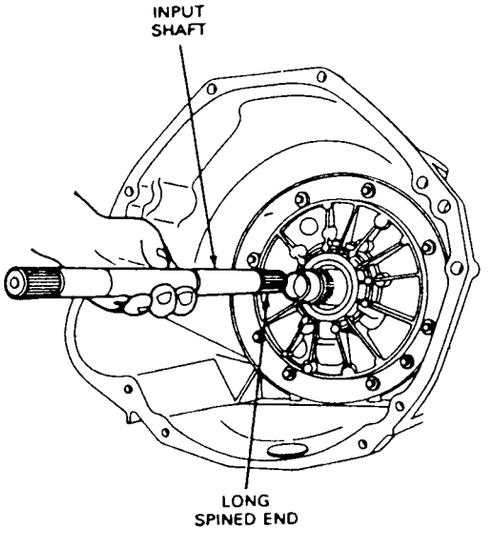
Place pan magnet on dimple in bottom of pan. Install new pan gasket. Use grease to hold in place.



TIGHTEN BOLTS TO 14-16 N·m (10 -12 FT-LB)

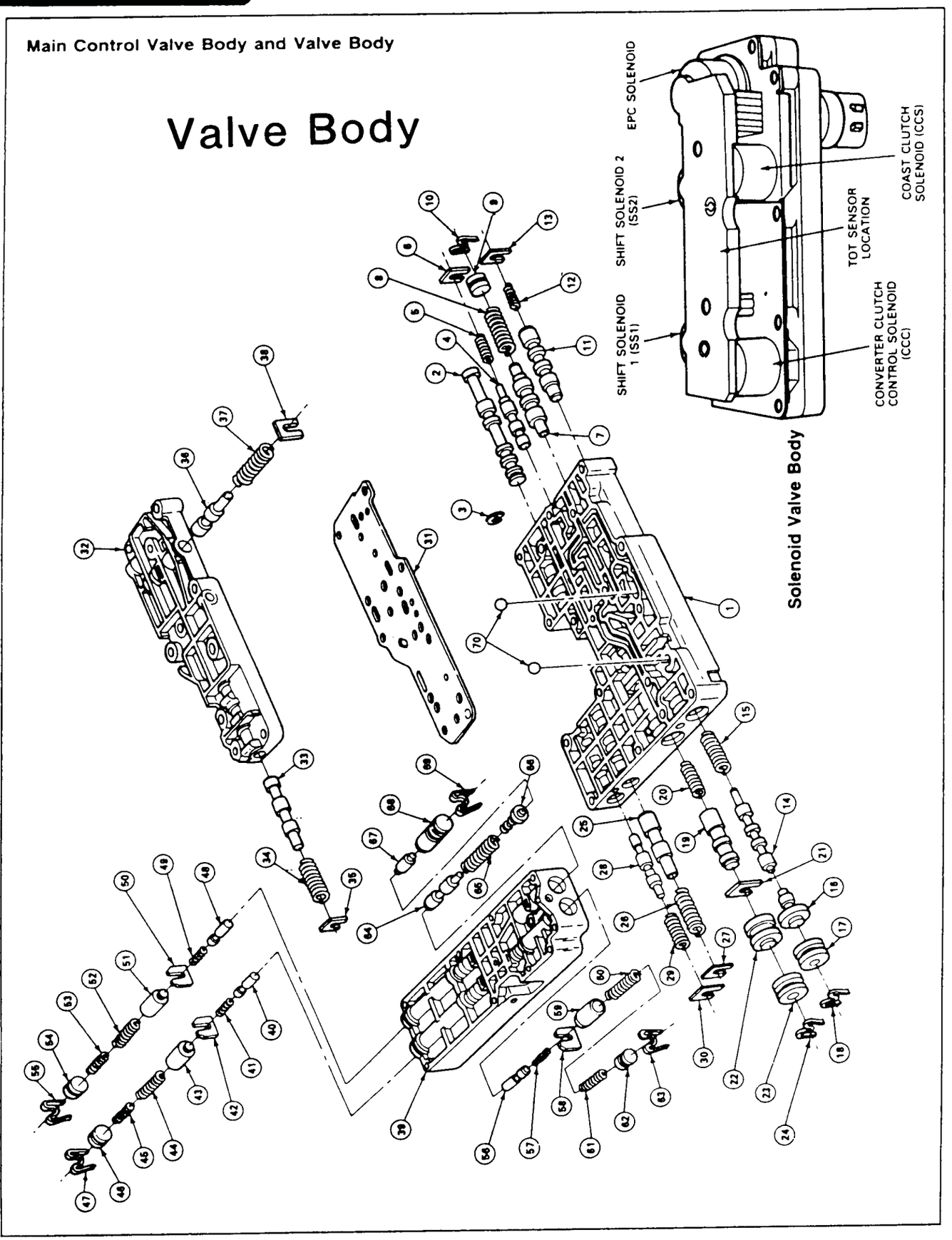
Install a new filter and seal assembly by lubricating the seal with transmission fluid and pressing the filter into place. Do not reuse old filter or seal.





Reinstall input shaft, long splined end first.

Main Control Valve Body and Valve Body

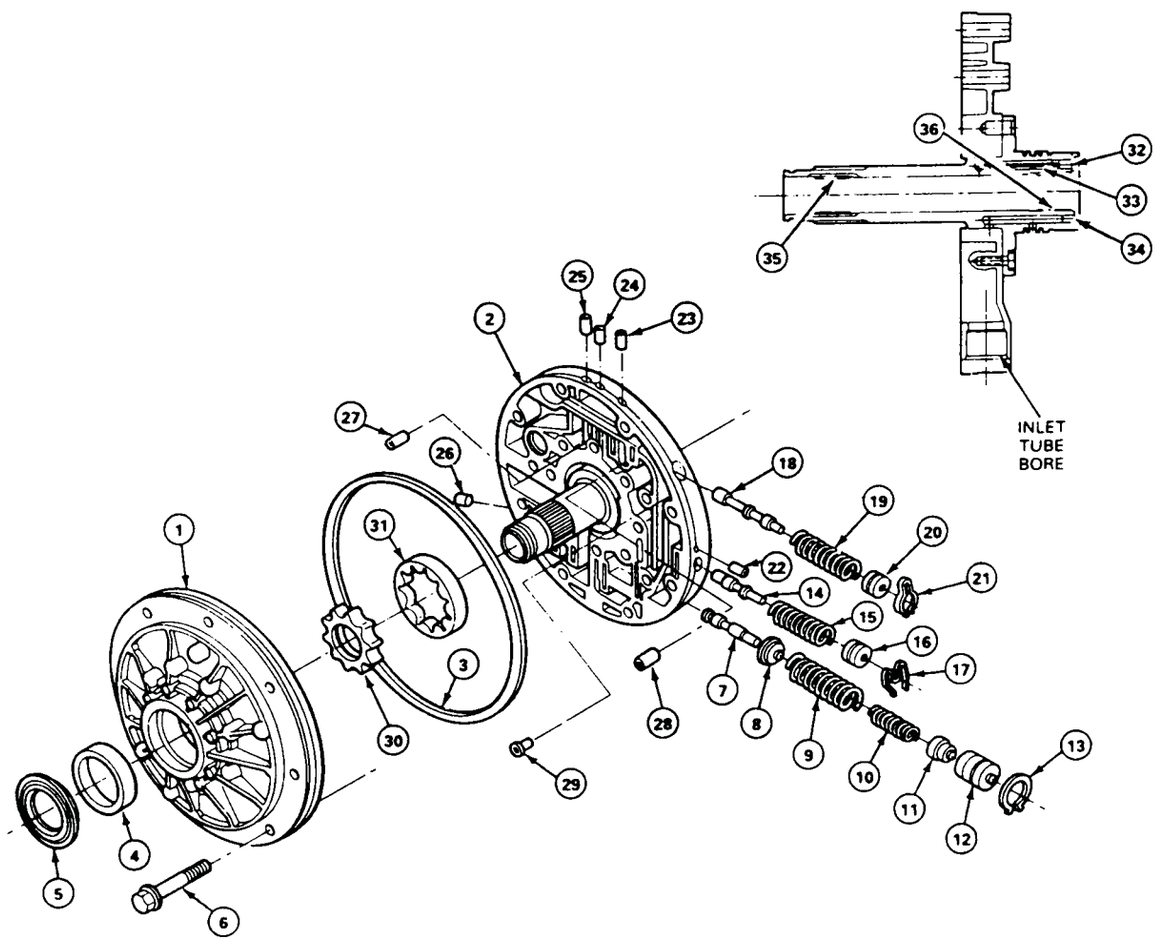


Legend—Main Control Valve Body and Valve Body

Description	Part Number	Description	Part Number
1. Main Control Body	7A092	36. 1-2 Manual Transition Valve	7G414
2. Manual Valve	7340	37. Spring	7K721
3. Retainer	97411-S	38. Retainer	7F194
4. Low/Reverse Modulator Valve	7E238	39. Accumulator Body	7G393
5. Spring	7E338	40. Overdrive Clutch Accumulator Regulator Valve	7G321
6. Retainer	7F194	41. Spring	7G310
7. 3-4 Shift Valve	7F259	42. Retainer	7G409
8. Spring	7K721	43. Overdrive Clutch Accumulator Plunger	7G322
9. Plug	7F187	44. Outer Spring	7G394
10. Clip	7E335	45. Inner Spring	7G395
11. 2-3 Shift Valve	7D053	46. Plug	7F187
12. Spring	7A320	47. Clip	7E335
13. Retainer	7F194	48. Direct Clutch Accumulator Regulator Valve	7G321
14. D2 Shift Valve	7D368	49. Spring	7G310
15. Spring	7A288	50. Retainer	7G409
16. 1-2 Shift Valve	7A334	51. Direct Clutch Accumulator Plunger	7G322
17. Plug	7F187	52. Outer Spring	7G394
18. Clip	7E335	53. Inner Spring	7G395
19. 4-3-2 Manual Timing Valve	7G398	54. Plug	7F187
20. Spring	7G410	55. Clip	7E335
21. Retainer	7G396	56. Intermediate Clutch Accumulator Regulator Valve	7G321
22. 4-3-2 Manual Timing Plunger	7G399	57. Spring	7G310
23. Plug	7F187	58. Retainer	7G409
24. Clip	7E335	59. Intermediate Clutch Accumulator Plunger	7G322
25. Coast Clutch Shift Valve	7G416	60. Outer Spring	7G394
26. Spring	7K721	61. Inner Spring	7G395
27. Retainer	7F194	62. Plug	7F187
28. Solenoid Regulator Valve	7G392	63. Clip	7E335
29. Spring	7G411	64. Line Pressure Modulator Valve	7G408
30. Retainer	7F194	65. Outer Spring	7G314
31. Separator Plate	7A008	66. Spring and Retainer Assembly	7H149
32. Lower Control Body	7A101	67. Line Pressure Modulator Plunger Valve	7G415
33. Engagement Control Valve	7G317	68. Line Pressure Modulator Sleeve	7G407
34. Spring	7G312	69. Clip	7E335
35. Retainer	7F194	70. Check Ball	7E195

Component Assembly

Subassemblies
Pump



Description	Part Number	Description	Part Number
1. Pump Body	7A105	20. Plug	7F187
2. Control Body	7G406	21. Clip	7E335
3. Square Cut O.D. Pump Seal	7D441	22. Solid Cup Plug	N805212
4. Converter Hub Bushing	7B258	23. Solid Cup Plug	N805212
5. Seal	7A248	24. Solid Cup Plug	N805212
6. Bolt and Washer Assembly	N805260	25. Solid Cup Plug	N805212
7. Main Regulator Valve	7C338	26. Solid Cup Plug	N805212
8. Spring Retainer	7E337	27. Orificed Cup Plug (.077-.083 inch diameter orifice)	N805213
9. Outer Spring (Green)	7A270	28. Orificed Cup Plug (.049-.055 inch diameter orifice)	N805214
10. Inner Spring (Green)	7G498	29. Air Bleed Check Valve Assembly	7H000
11. Main Regulator Booster Valve	7D003	30. Inner Gerotor Gear	7C010
12. Main Regulator Booster Sleeve	7D002	31. Outer Gerotor Gear	7C011
13. Retainer	N660225	32. Orifice Cup Plug (.057-.062 inch diameter orifice)	N805802
14. Converter Regulator Valve	7G307	33. Valve Assembly	7A250
15. Spring (White)	7G316	34. Solid Cup Plug	N805175
16. Plug	7F187	35. Front Input Shaft Bushing	7B261
17. Clip	7G007	36. Rear Input Shaft Bushing	7D018
18. Converter Clutch Control Valve	7L318		
19. Spring (Yellow)	7L490		

Pump Disassembly

Remove two Teflon® coast clutch seals from stator support. Remove converter clutch seal from front of stator support. Remove pump outer diameter square cut seal.

Obtain a banding tool prior to removing pump body bolts. This tool is needed to align the pump with the control body assembly during re-assembly.

Remove eleven bolts and separate pump control body from pump body.

For Steps 4 through 6 refer to pump control body assembly illustration.

Apply pressure to main regulator booster sleeve and remove internal snap ring. Remove main regulator valve train.

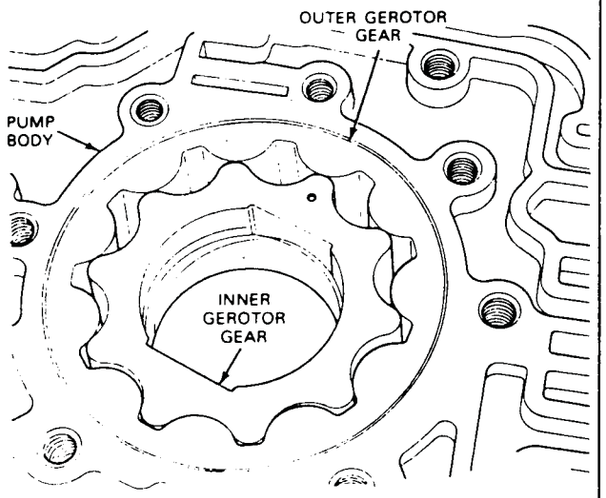
Remove converter regulator valve assembly by applying pressure to end plug and removing retainer clip with small screwdriver or tweezers.

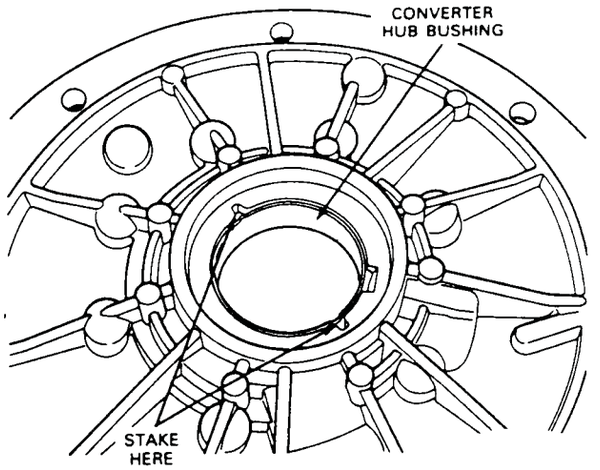
Remove converter clutch shift valve assembly by applying pressure to end plug and removing retainer clip with small screwdriver or tweezers.

NOTE: DO NOT remove any of the cup plugs unless they are damaged or leaking.

NOTE: DO NOT remove stator support from control body as this may distort the surface of the control body.

Remove gerotor gearset from pump body.

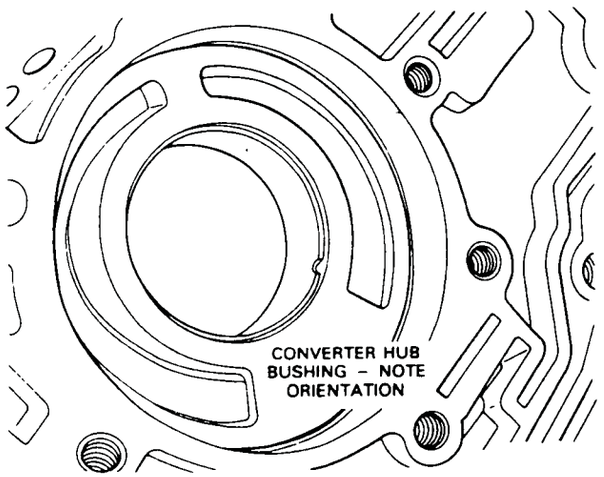




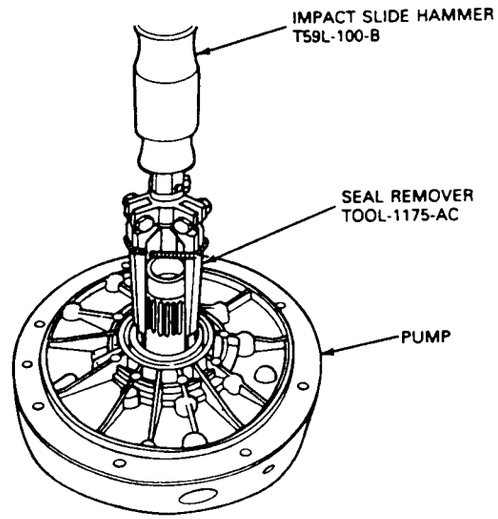
Remove gasket material from control body surface. Clean all pump parts in solvent and dry with compressed air.

Inspect pump gears, faces, gear teeth, pump housing and mating surfaces for damage or scoring. Replace entire pump if any part is damaged or worn.

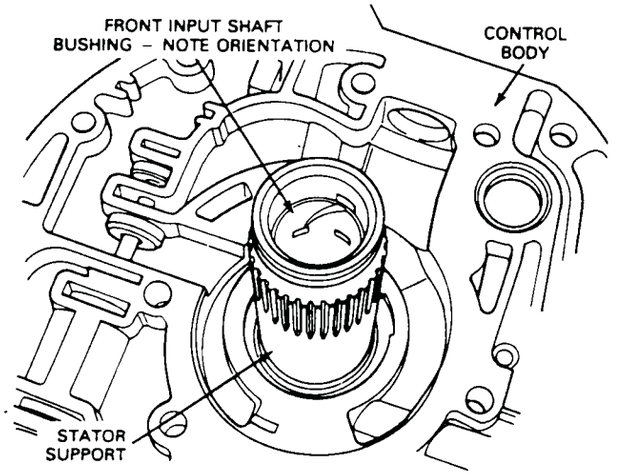
Inspect converter hub bushing. Replace if scored or excessively worn. Install as shown. Stake bushing at notches.

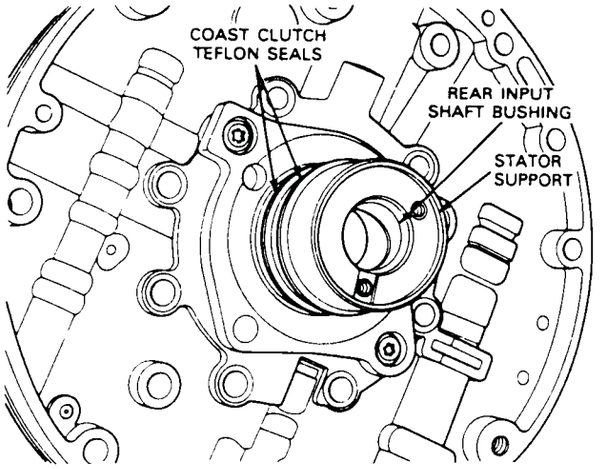


Inspect converter hub seal. If damaged, remove with Impact Slide Hammer Tool no. T59L-100-B and Seal Remover Tool no. 1175-AC. Install new seal with Seal Installer Tool no. T63L-77837-A.



Inspect stator input shaft bushings. If bushings are worn or scored, replace complete control body assembly.





Inspect all valve and plug bores for scoring, or damage. Check all passages for obstructions. Inspect mating surfaces for burrs and scoring. If necessary, use crocus cloth to polish components. Use caution to avoid rounding sharp edges of valves and plugs.

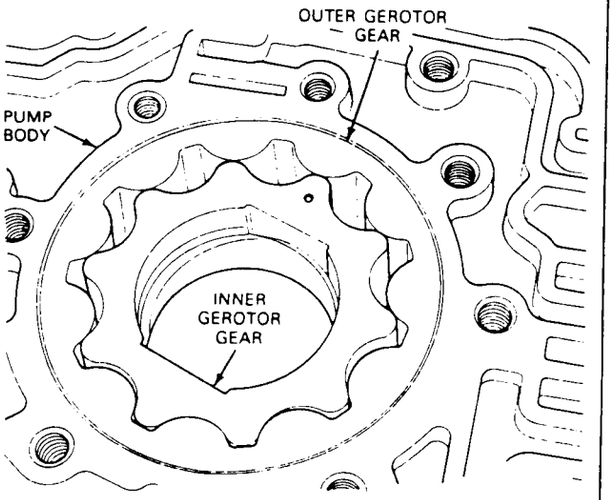
Inspect all springs for distortion. Check all valves and plugs that when dry they fall freely from their bores.

Assembly

Install main regulator valve assembly as shown in control body assembly drawing. Apply pressure to main regulator booster sleeve and install internal snap ring. Ensure snap ring is properly seated.

Install converter shuttle valve assembly as shown in pump exploded view.

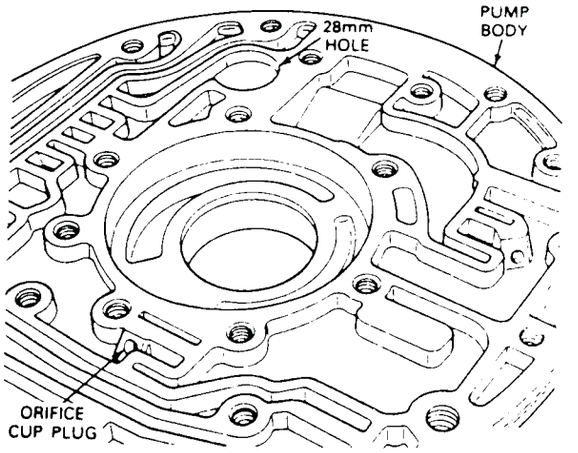
Lightly coat the gerotor gears and install in pump housing. The dot on the inner gerotor gear must face the control body assembly.

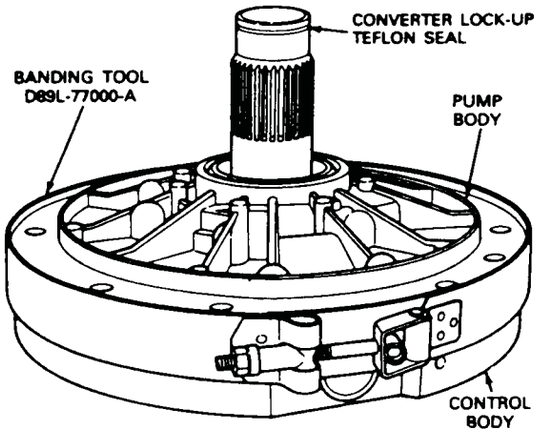


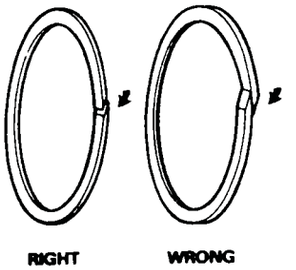
Inspect mating surfaces of pump body and control body to be sure they are clean and free of nicks and burrs. Lower the control body and stator assembly onto the pump body, aligning the 28mm round hole in the control body with the 28mm hole in the pump body.

Loosely install eleven M8x50 bolts into pump body. Install banding tool no D89L-77000- or equivalent with clamp by filter inlet. Align outer bolt holes and tighten banding tool. (This aligns input shaft bushings to the converter hub bushings.)

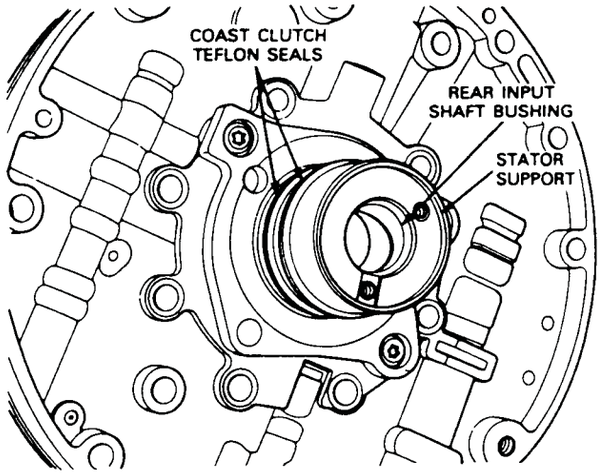
Tighten bolts to 24-31 N·m (18-23 ft. lbs.) and remove banding tool. Ensure the outer edges of the control body and the pump body are completely aligned.



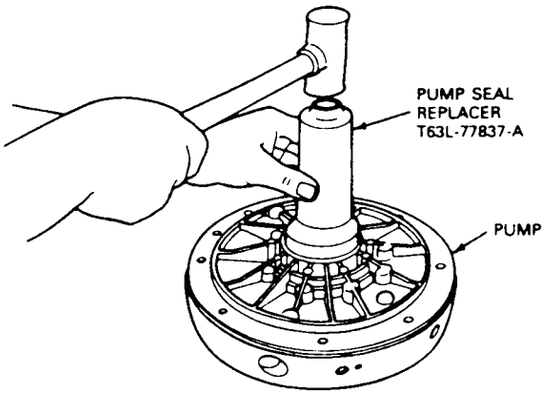




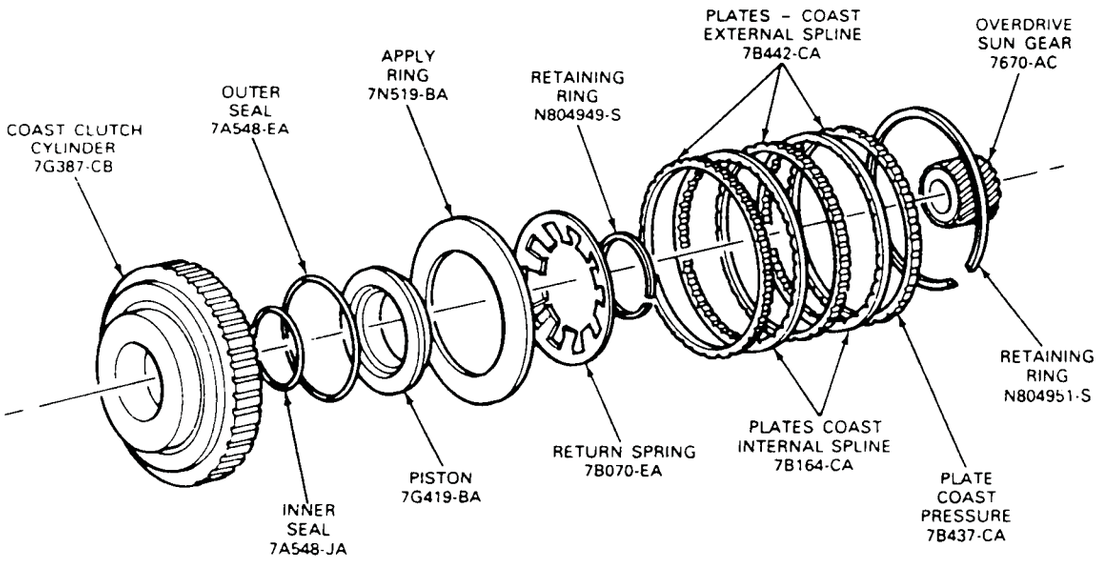
Install coast clutch Teflon® seals as shown. Install converter lock up seal on front of stator support in same manner.



Install pump outer diameter seal. Be sure groove is clean and free of burrs. Lubricate outer diameter seal with transmission fluid before installing pump into transmission case.



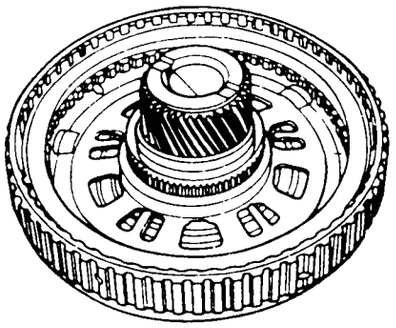
Coast Clutch Cylinder Assembly



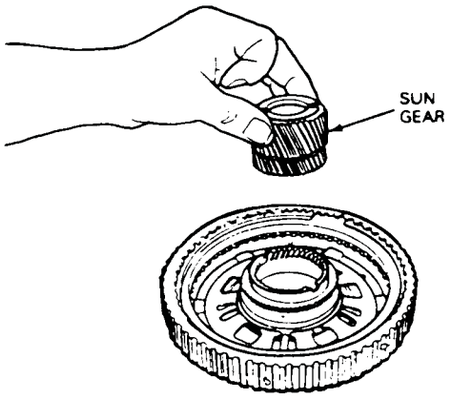
Disassembly

Complete assembly shown.

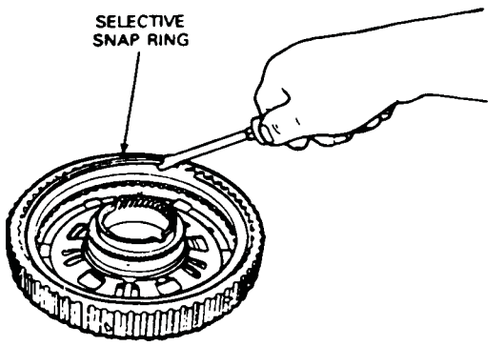
COAST CLUTCH CYLINDER ASSEMBLY



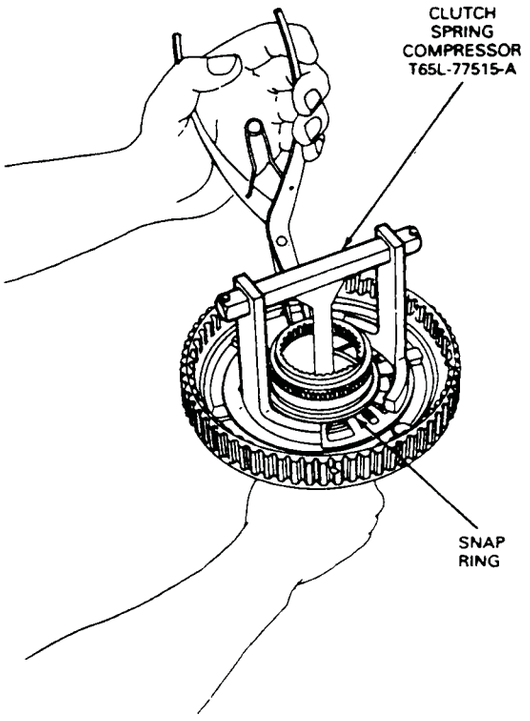
Remove sun gear assembly from coast clutch cylinder.



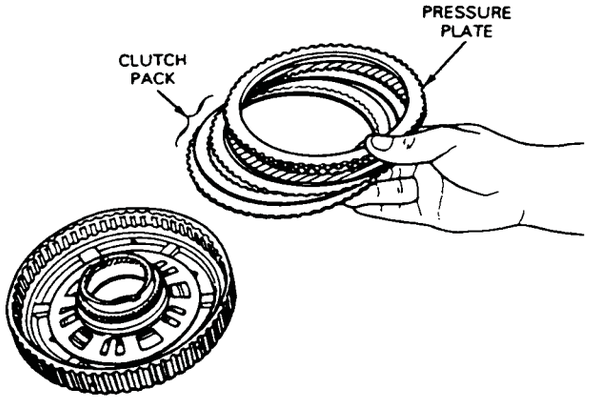
Remove snap ring and discard.



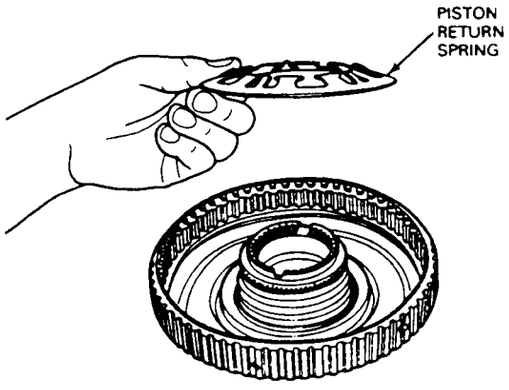
Using Clutch Spring Compressor T65L-77515-A or equivalent remove return spring retaining ring. Remove compressor tool.



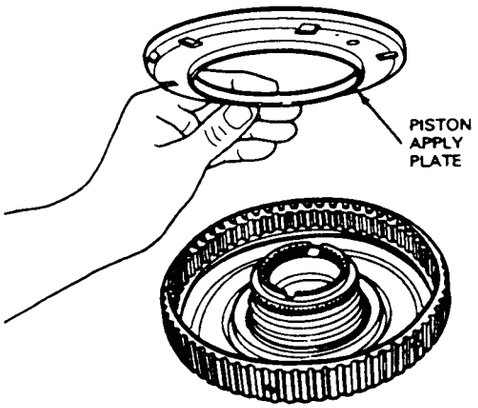
Remove pressure and clutch plates from cylinder. Tag for re-assembly.



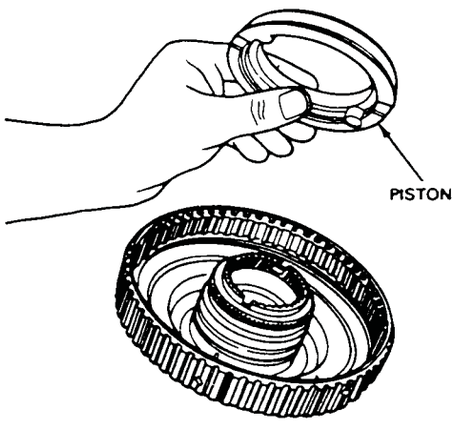
Remove piston return spring.



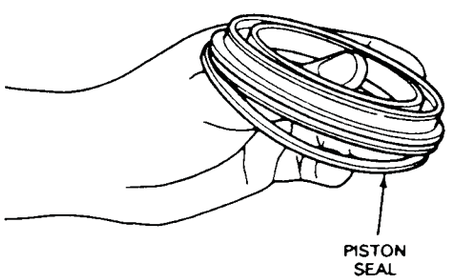
Remove piston apply plate.



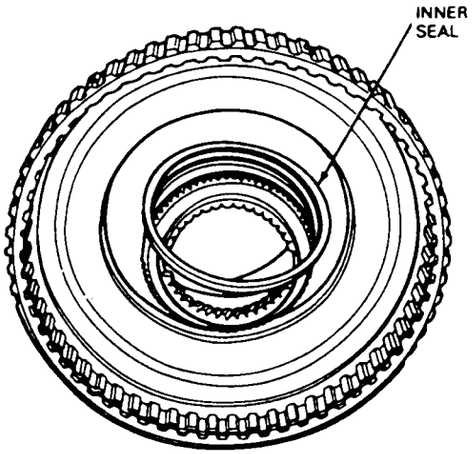
Remove piston from cylinder.



Remove outer seal from piston.



Remove inner seal from cylinder.

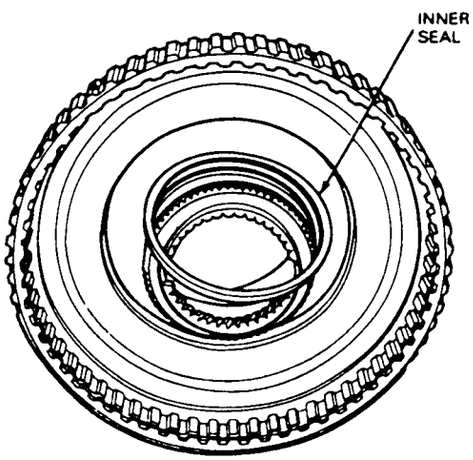


Assembly

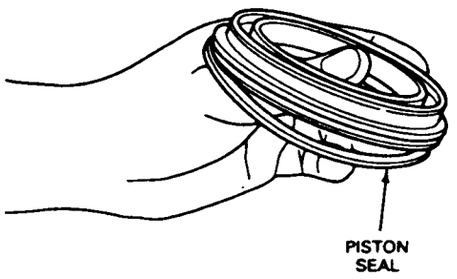
NOTE: Soak all friction plates in clean transmission fluid ESP-M2C166-H or equivalent for 15 minutes.

Lightly lube all O-ring seals before installing using transmission fluid ESP-M2C66-H or equivalent.

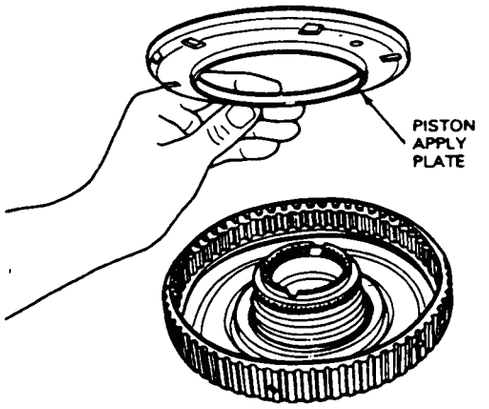
Install inner seal so that lip is facing toward bottom (down) into cylinder.



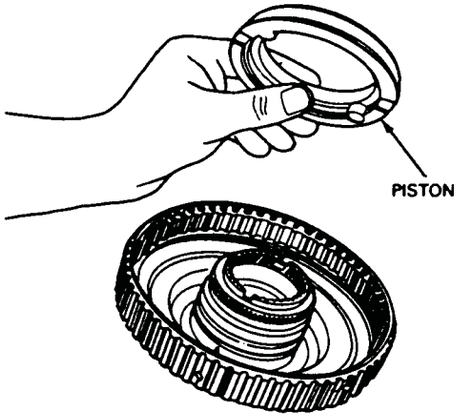
Install outer seal so that lip is facing toward bottom (down) onto piston.



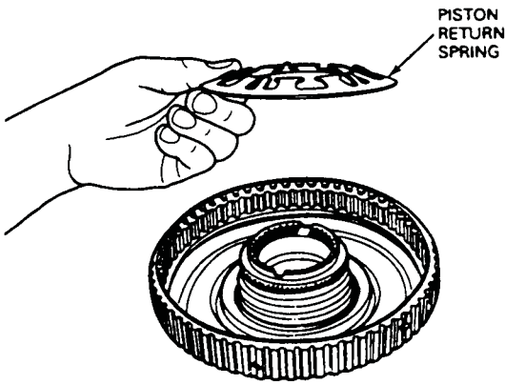
Install piston apply plate.



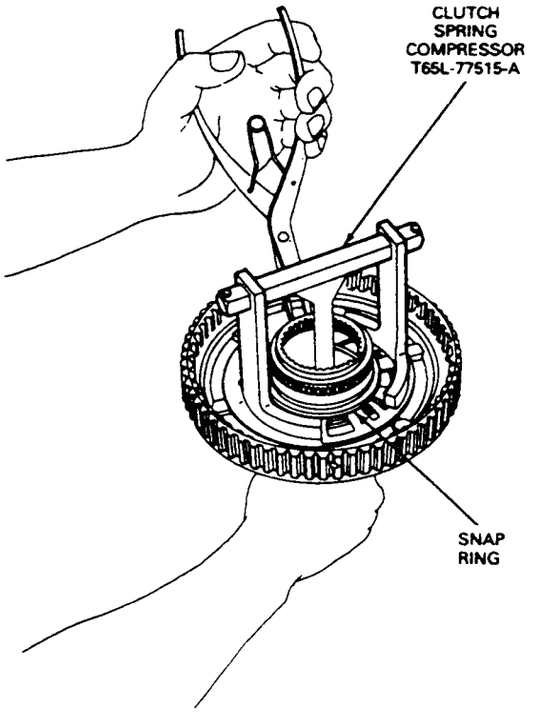
Install piston into cylinder.



Install piston return spring.



Using Clutch Spring Compressor T65L-77515-A or equivalent, install snap ring.



Install selective snap ring and check stack-up using feeler gauge. If not within specification, install correct selective snap ring and recheck.

Specification:

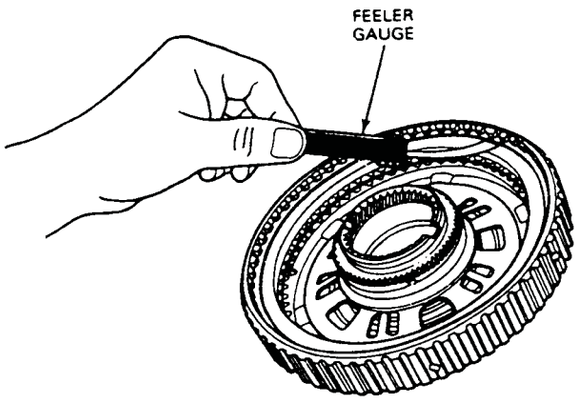
1.14 - 0.62mm (0.045 - 0.025 inch)

Selective Snap Rings

1.45 - 1.35mm (0.057 - 0.053 inch)

1.85 - 1.75mm (0.072 - 0.068 inch)

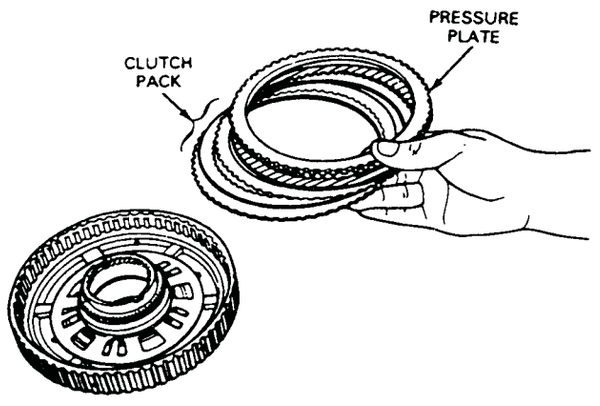
2.25 - 2.15mm (0.088 - 0.084 inch)



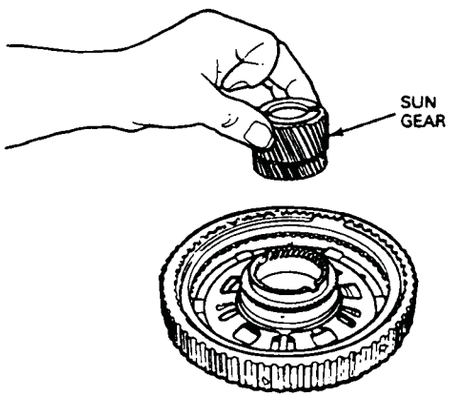
Install clutch pack plates, alternately starting with steel plate.

NOTE: Soak the clutch plates in clean transmission fluid (Ford Specification Mercon® ESP-M2C1166-H) or equivalent, for 15 minutes.

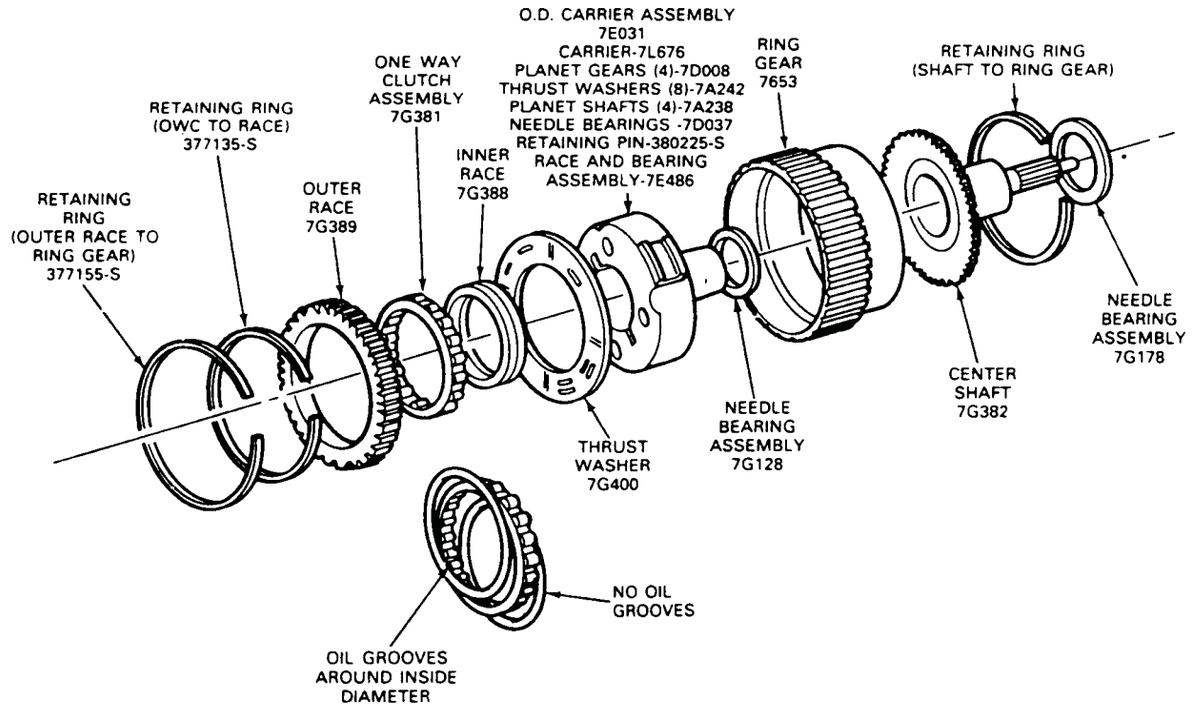
Install pressure plate.



Install overdrive sun gear with short end of gear down into coast clutch cylinder.

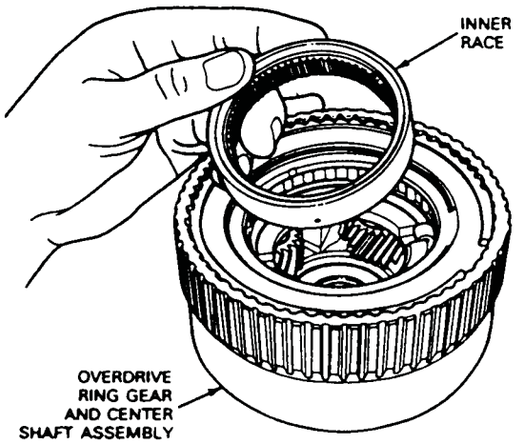


Overdrive Ring Gear And Center Shaft Assembly

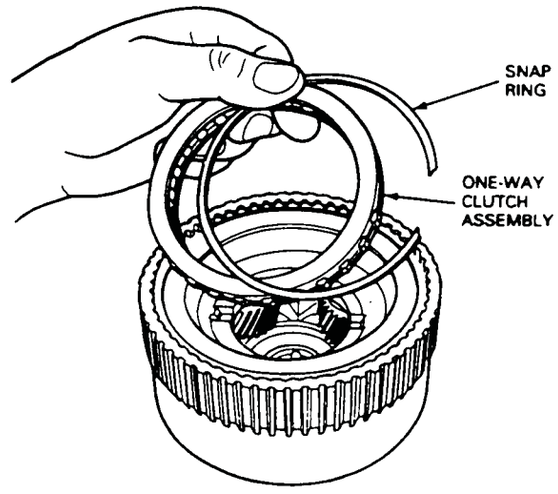


Disassembly

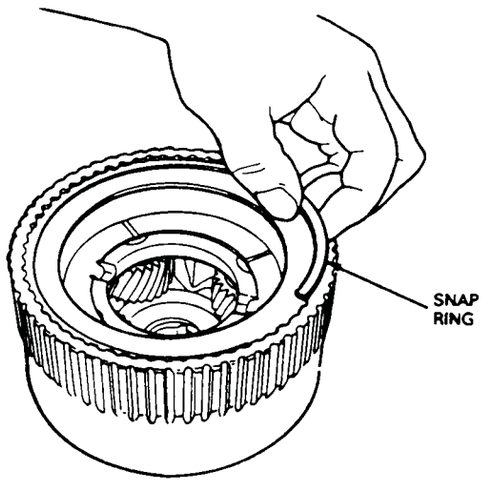
Remove inner race.



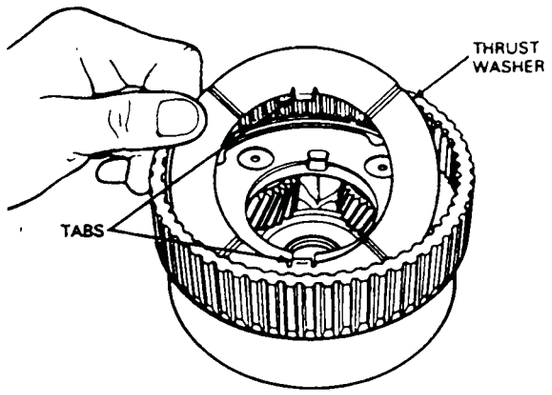
Remove small (inner) snap ring and one-way clutch assembly.



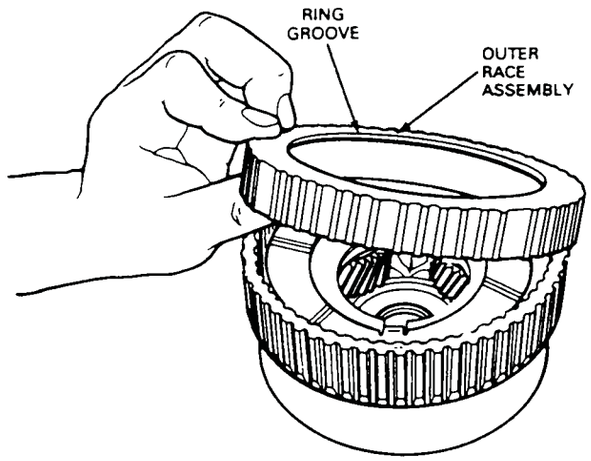
Remove large snap ring.



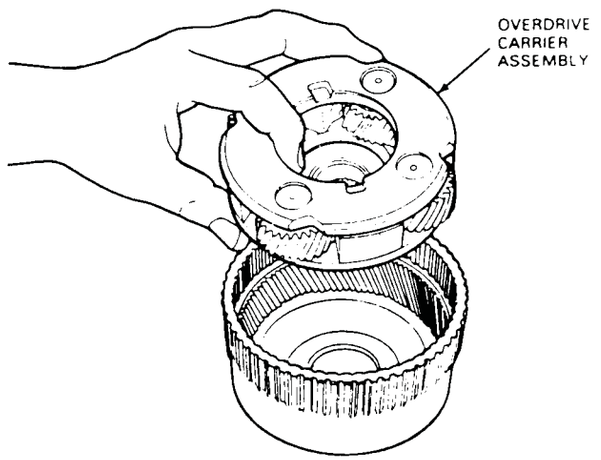
Remove thrust washer No. 7G400 from front of carrier.



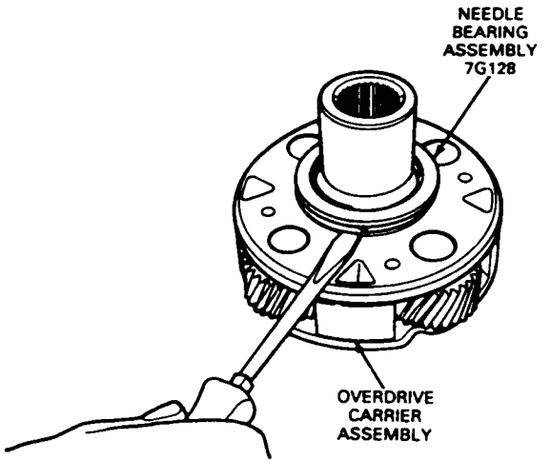
Remove outer race assembly from ring gear.



Remove overdrive carrier from ring gear assembly.

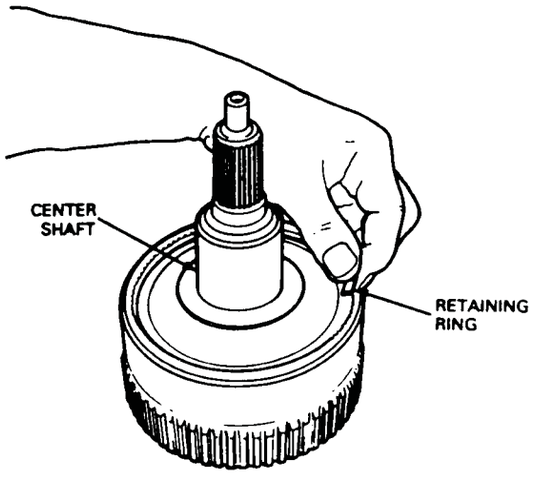


Remove needle bearing assembly No. 7G128 from rear face of carrier, using screwdriver.



Remove center shaft to ring gear wave-type snap ring.

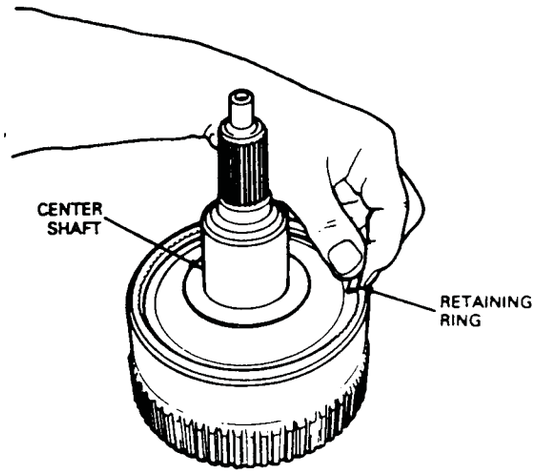
Remove center shaft from ring gear.



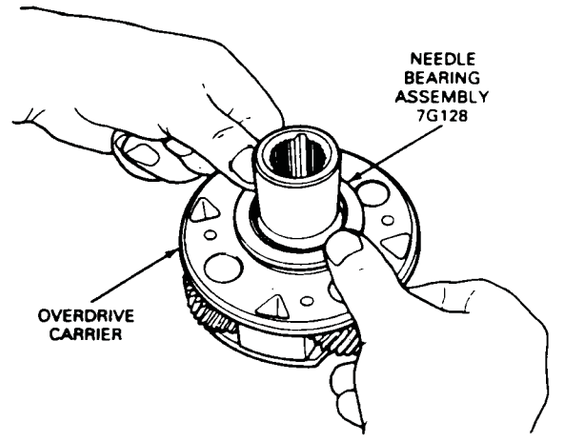
Assembly

Install center shaft into overdrive ring gear.

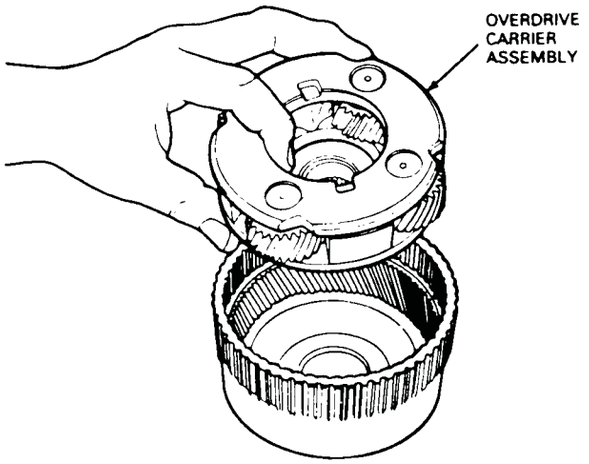
Install center shaft to ring gear with retaining ring.



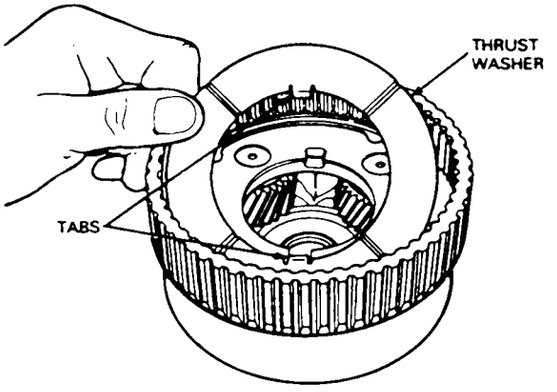
Install needle bearing assembly No. 7G128 on rear face of carrier.



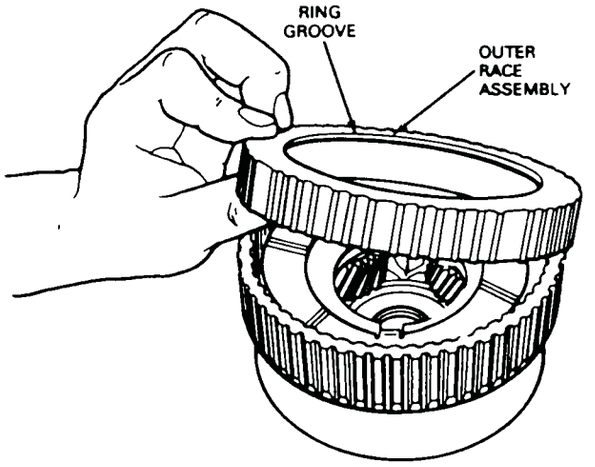
Install overdrive carrier into center shaft and ring gear assembly.

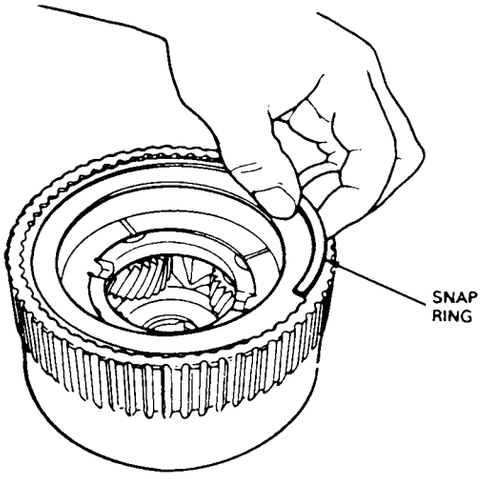


Install thrust washer No. 7G400 on front of carrier.



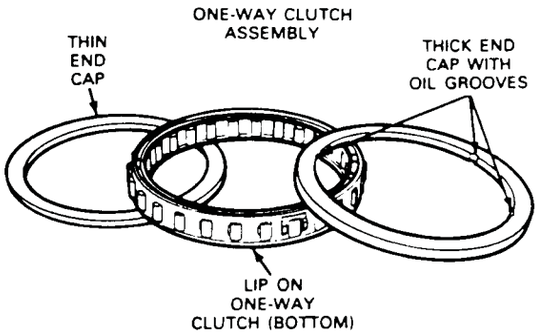
Install outer race assembly into ring gear with snap ring groove facing up. Attach to ring gear with snap ring.



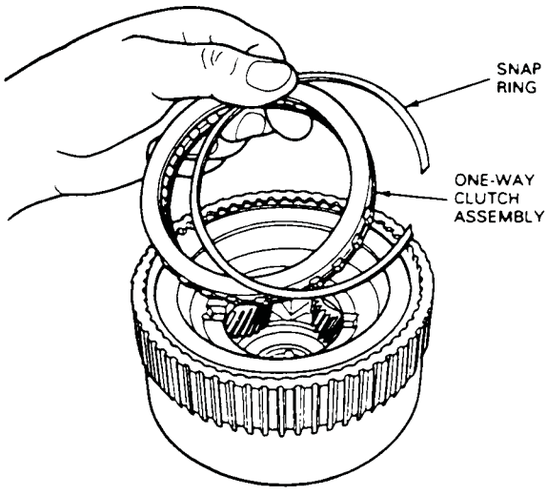


NOTE: E4OD overdrive one way clutch end caps must be installed as shown to achieve durability. The end cap with the scallops on the inner diameter must be toward the front of the transmission for proper lubrication.

Place top (thick) end cap onto one-way clutch. Place thin end cap onto bottom one-way clutch.

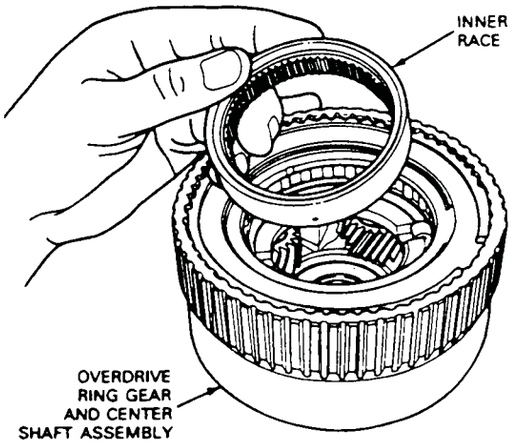


Install one-way clutch assembly. Date code on outside of thick end cap must be visible. Secure in place with snap ring.

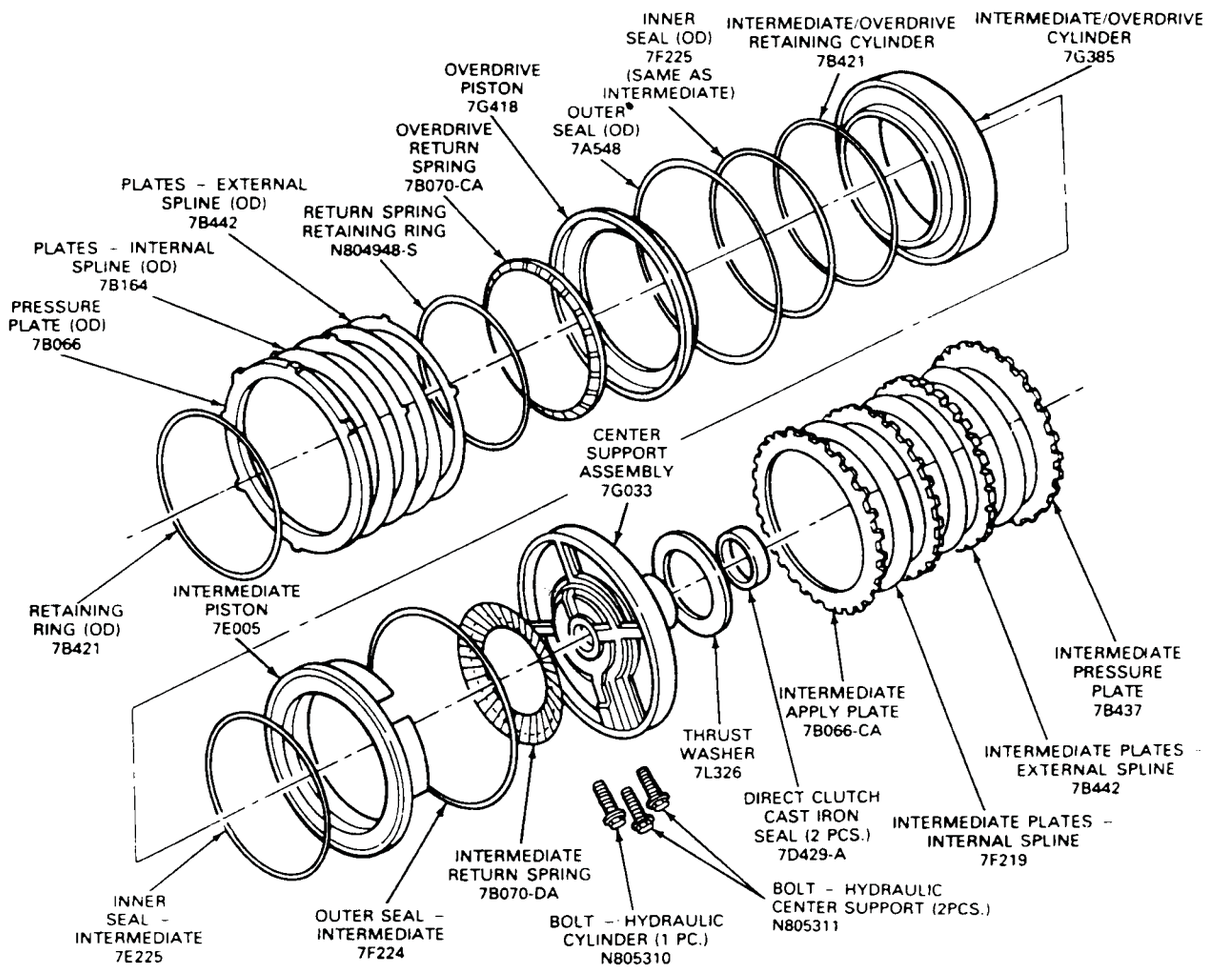


Install inner race.

NOTE: Inner race must rotate counterclockwise.

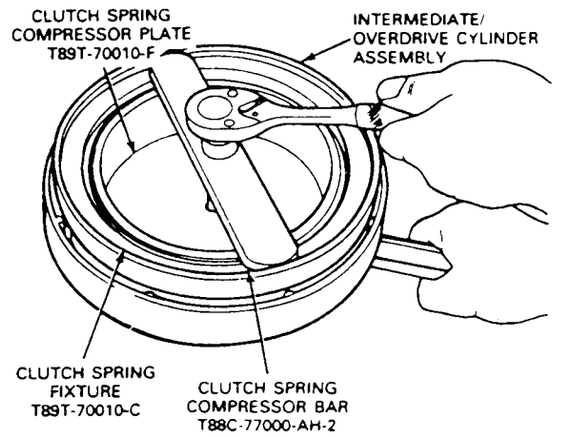


Intermediate/Overdrive Cylinder Assembly

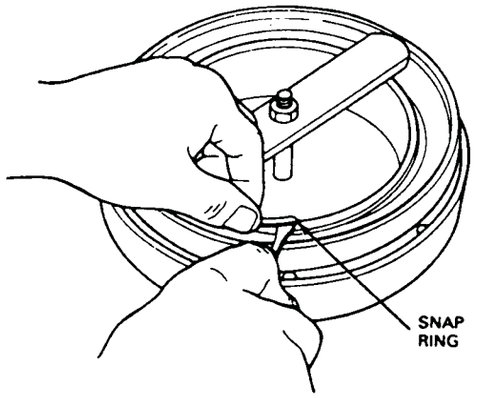


Disassembly

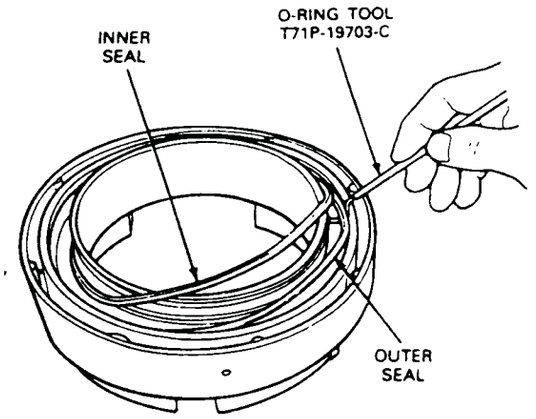
Using Clutch Spring Compressor Plate T89T-70010-F, Clutch Spring Compressor Bar T88C-77000-AH2 and Intermediate Clutch Spring Fixture T89T-7100-C or equivalent, compress the overdrive return spring.



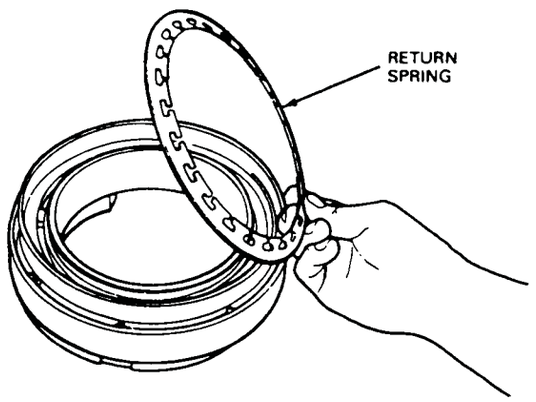
Remove snap ring.



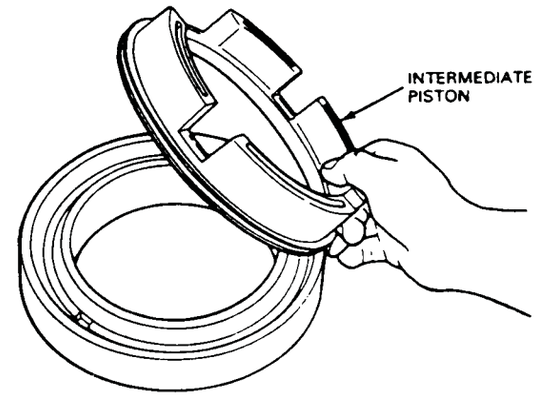
Remove outer and inner seals, using O-ring Tool T71P-19703-C or equivalent.



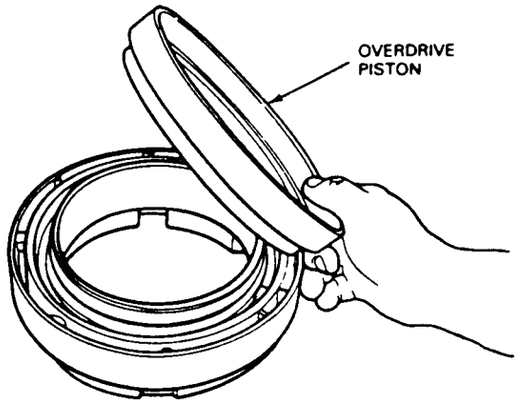
Remove compressor tool assembly.
Remove return spring.



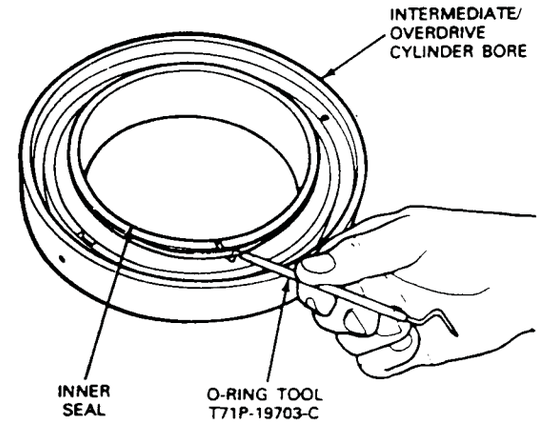
Remove intermediate piston.



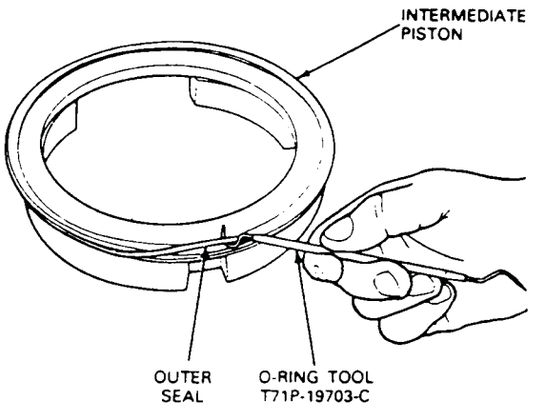
Remove overdrive piston.



Remove intermediate/overdrive inner seal from cylinder bore, using O-Ring Tool T71P-19703-C or equivalent.

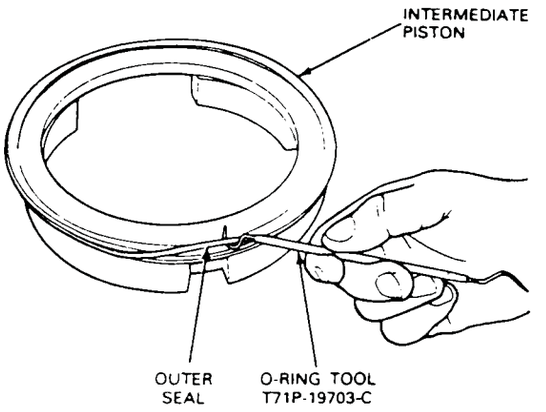


Remove outer seal from intermediate piston.

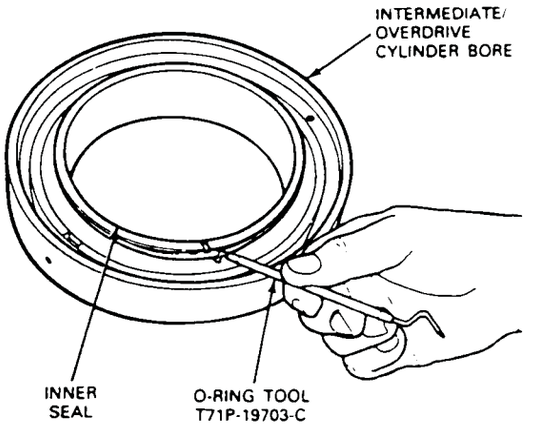


Assembly

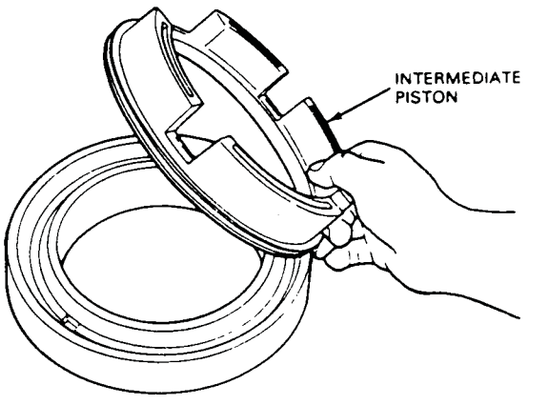
Install outer seal onto intermediate piston with lip seal facing down towards cylinder.



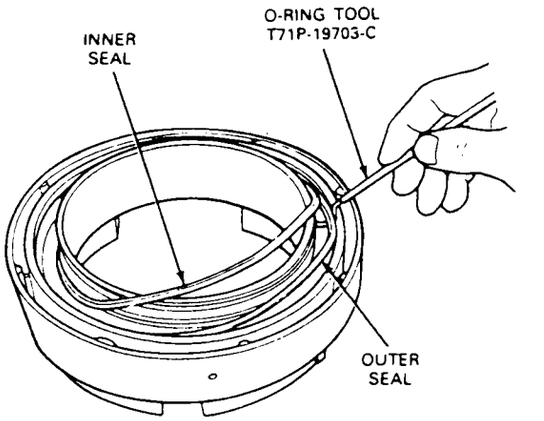
Install intermediate/overdrive inner seal into cylinder bore with lip seal facing down towards cylinder.



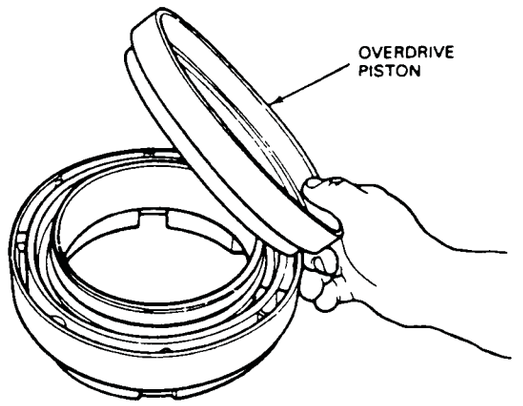
Install intermediate piston.



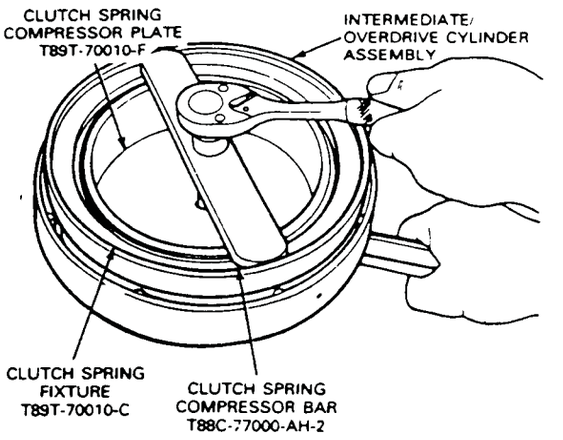
Install overdrive outer and inner seals with lip seal facing down towards cylinder.



Install overdrive piston.

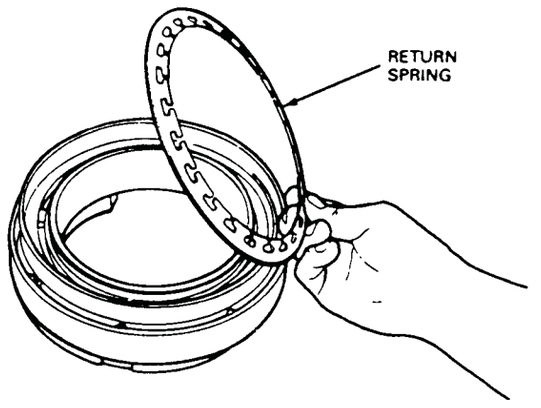


Using Clutch Spring Compressor Plate T89T-70010-F Clutch Spring Compressor Bar T88C-77000-AH2 and Intermediate Clutch Spring Fixture T89T-70010-C or equivalents, compress return spring.

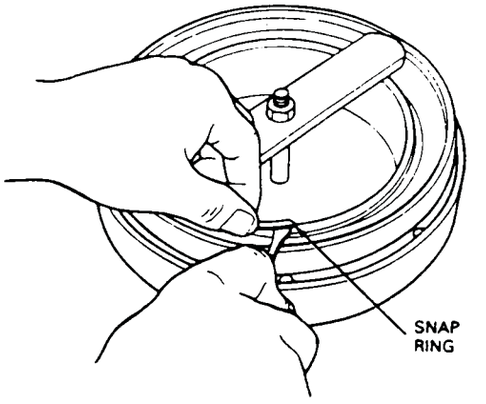


Install return spring.

NOTE: Spring fingers facing up.



Install snap ring.

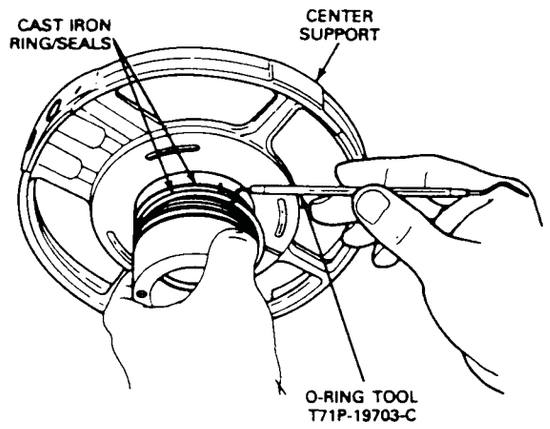


Remove tool assembly.

Center Support

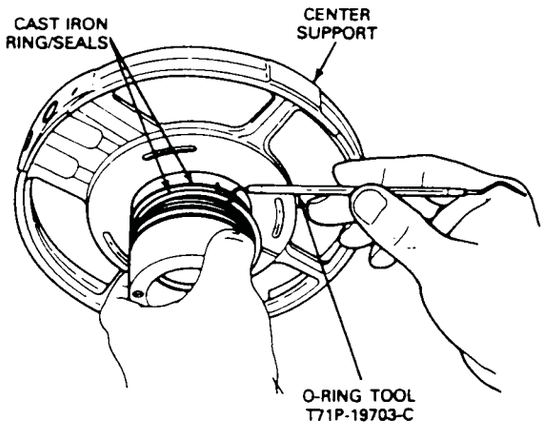
Disassembly

Remove two cast iron outer seal rings.



Assembly

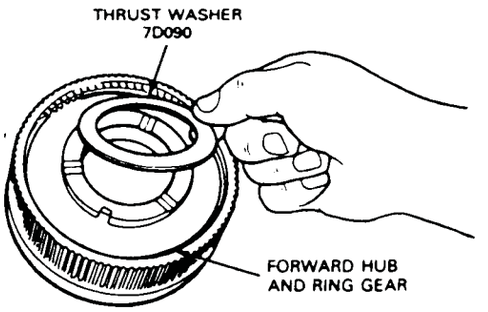
Install two cast iron seal rings.



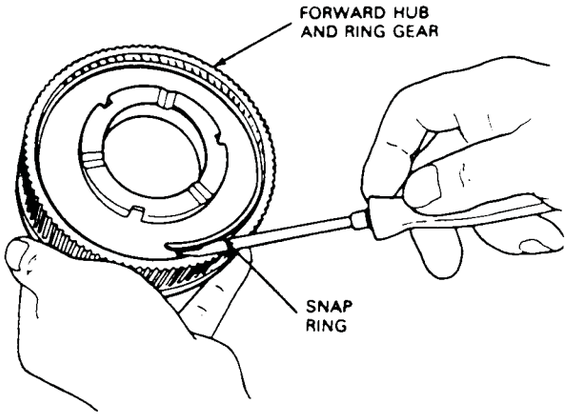
Forward Hub and Ring Gear

Disassembly

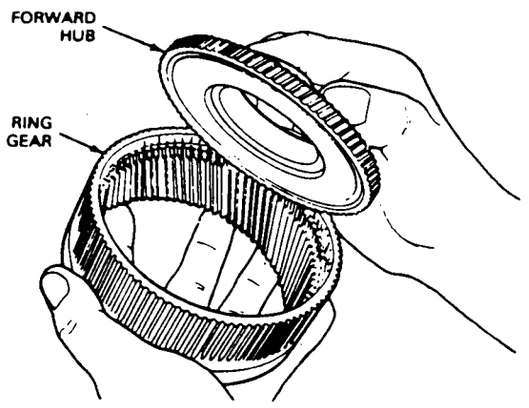
Remove plastic thrust washer No. 7D090 from front face of hub.



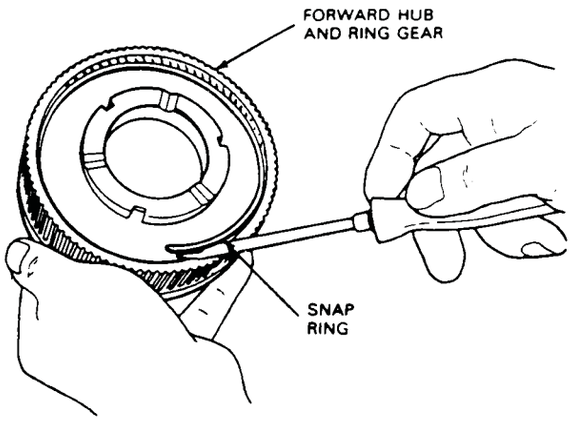
Remove snap ring using screwdriver.



Remove forward hub from ring gear.

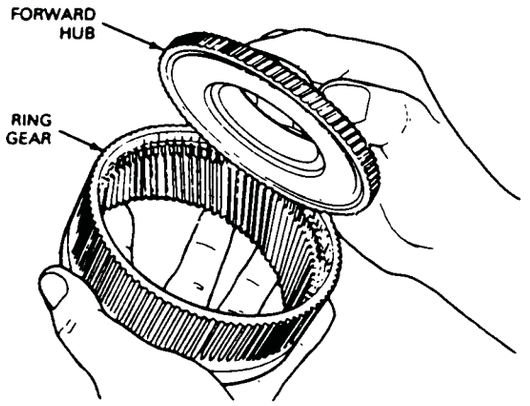


Install snap ring.

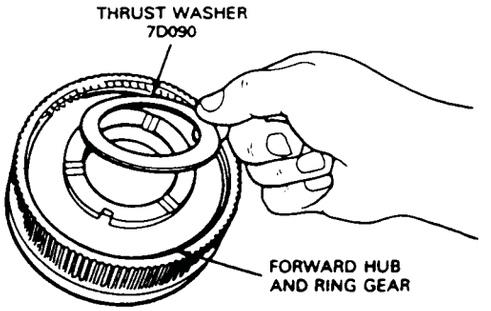


Assembly

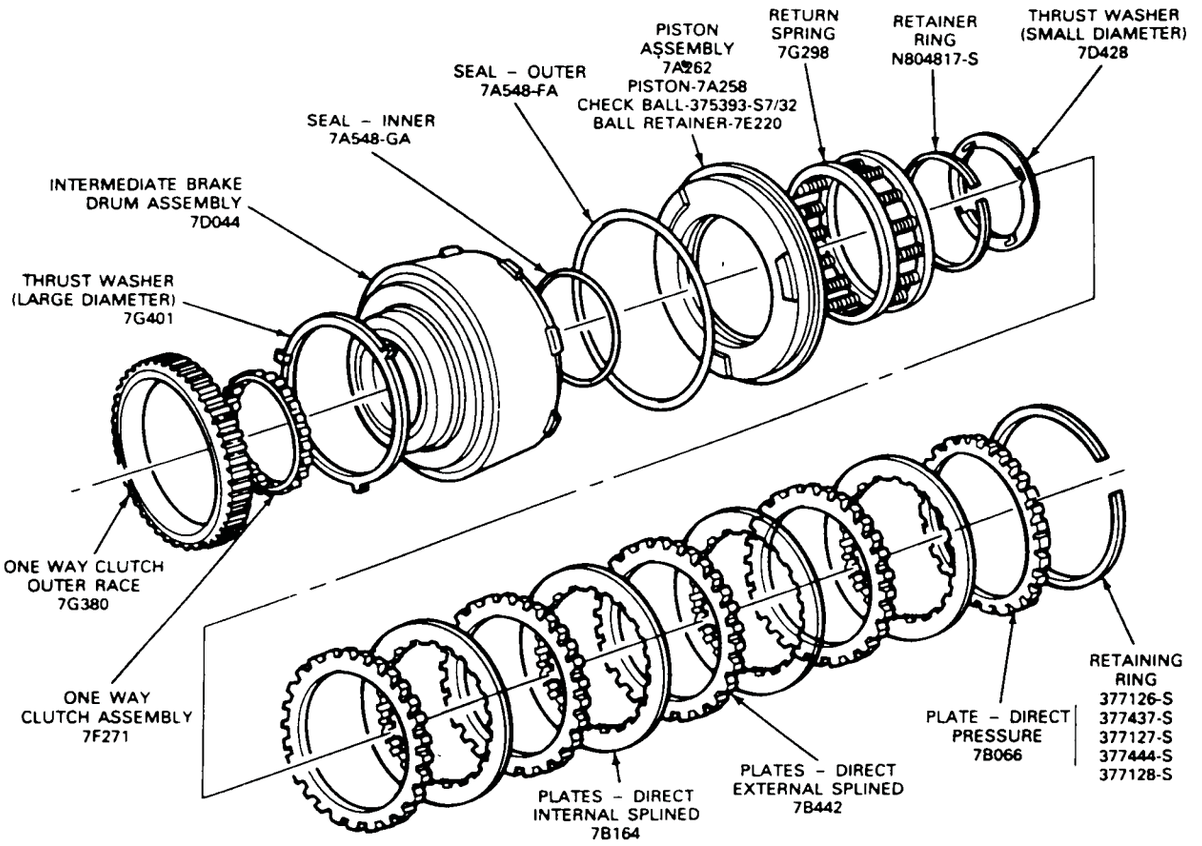
Install forward hub into gear.



Install plastic thrust washer No. 7D090 on the hub, using grease.

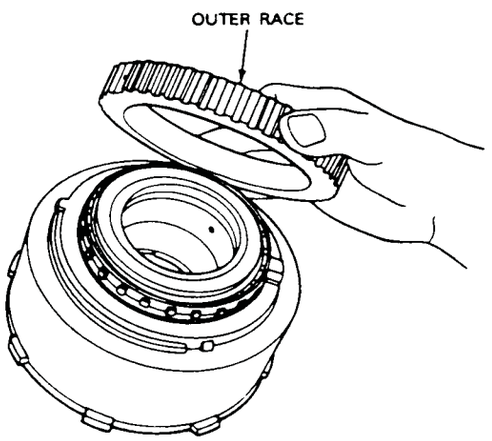


Intermediate Brake Drum

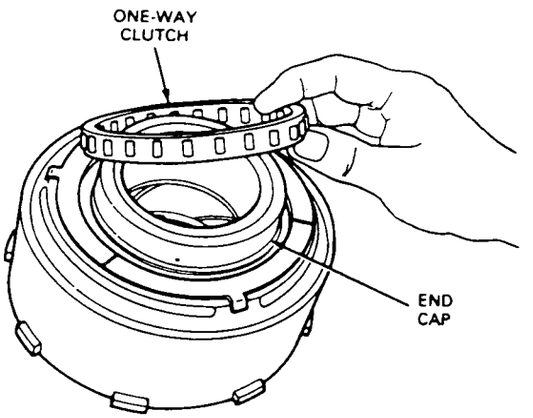


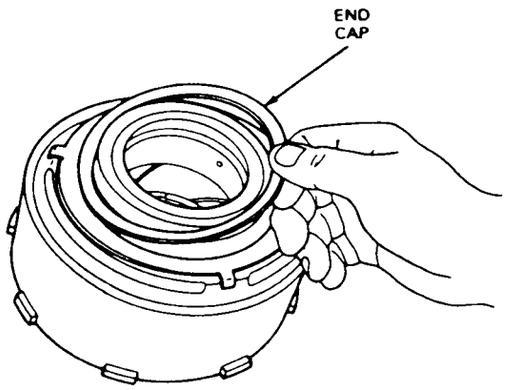
Disassembly

Remove outer race.

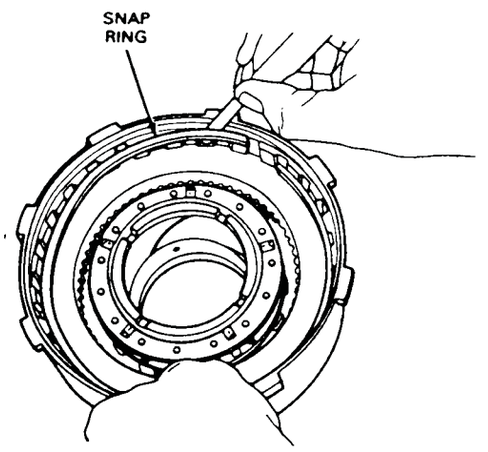


Remove one-way clutch assembly and end caps.

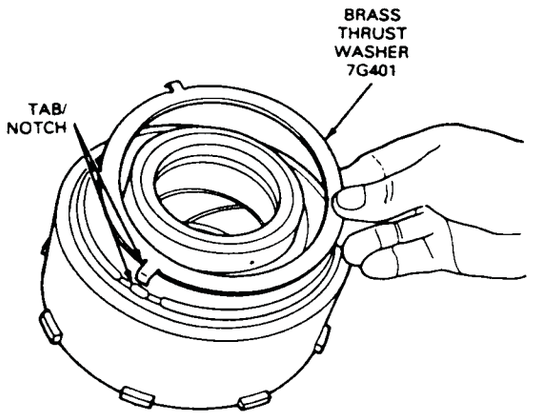




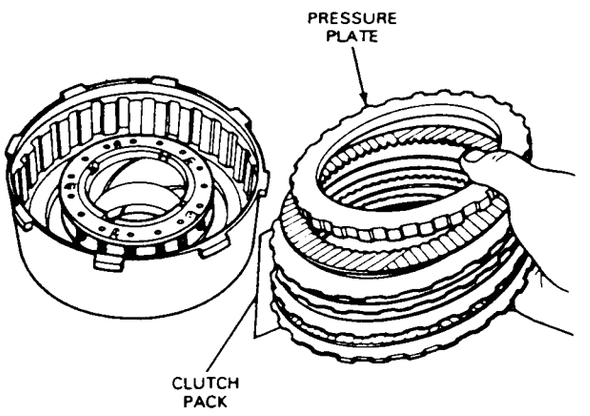
Remove snap ring using screwdriver.



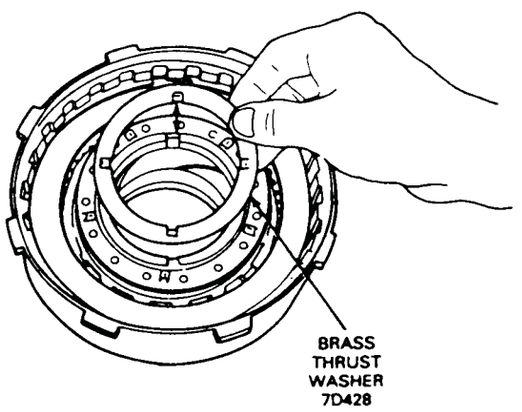
Remove large brass thrust washer No. 7G401 from rear face of cylinder.



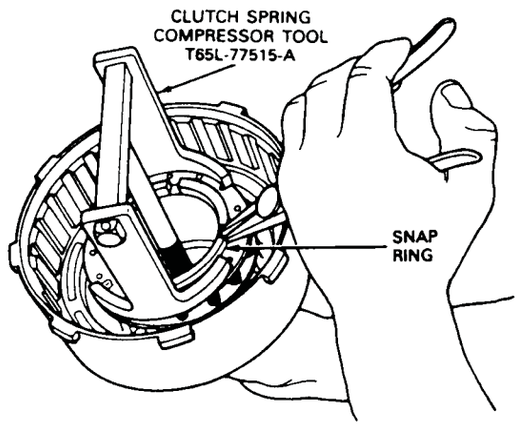
Remove pressure plate and clutch pack. Tag for re-assembly.



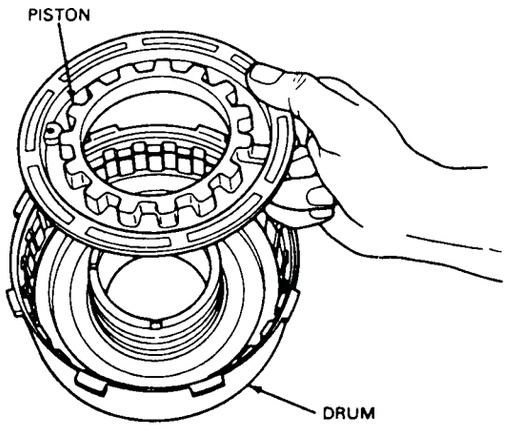
Remove small brass thrust washer No. 7D428 from front face of cylinder.



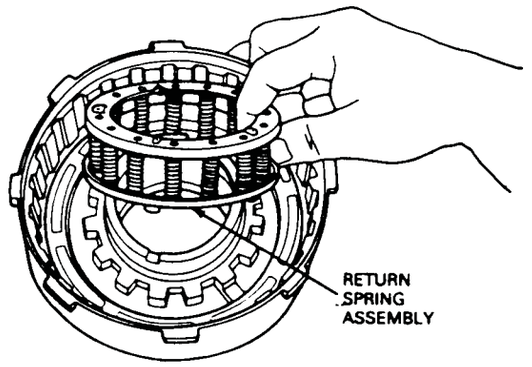
Install Clutch Spring Compressor Tool T65L-77515-A or equivalent and remove return spring snap ring.



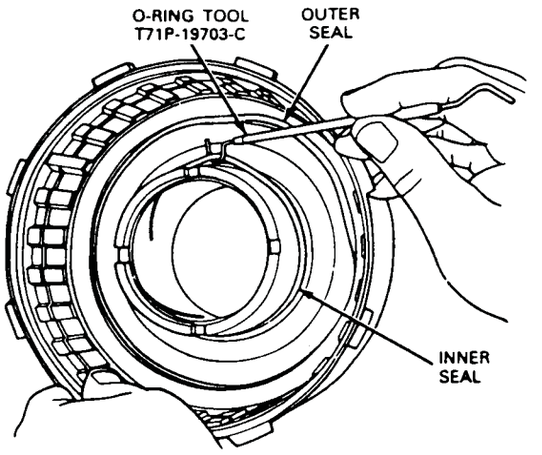
Remove piston from intermediate brake drum.



Remove return spring assembly.

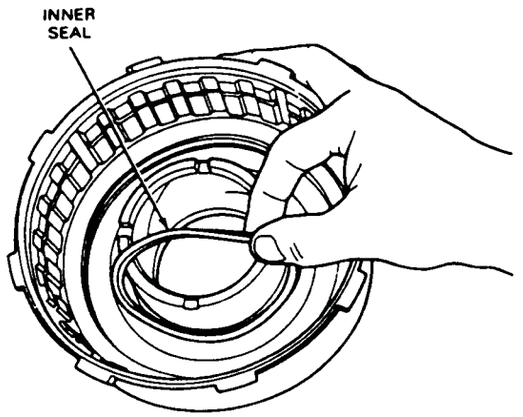


Remove inner and outer seals from drum using O-Ring Tool T71P-19703-C or equivalent.



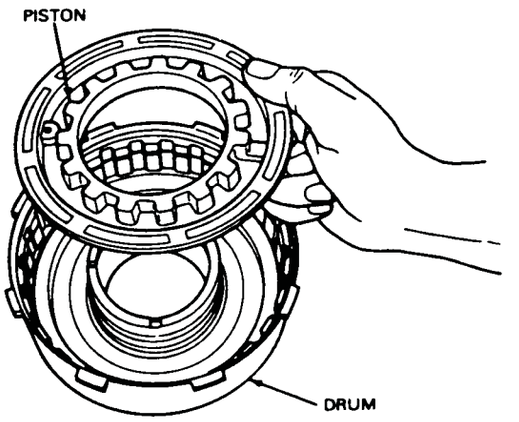
Assembly

Install inner seal into cylinder with seal groove facing down.

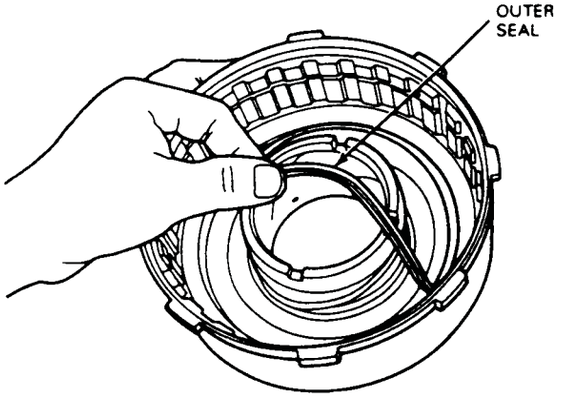


Inspect piston check ball for freedom of movement. clean with solvent if necessary.

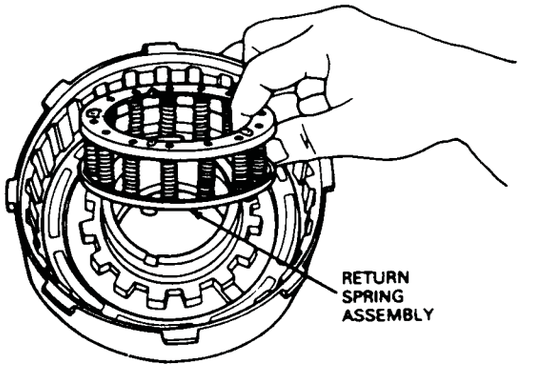
Install piston into drum.



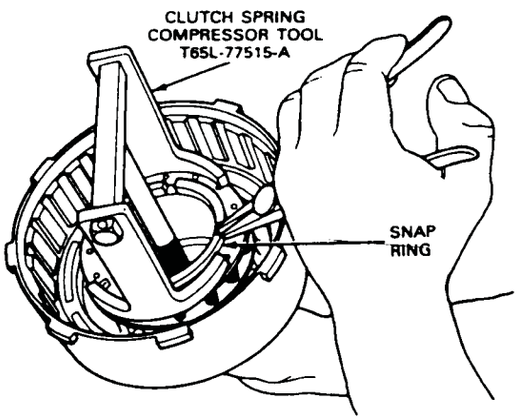
Install outer seal into intermediate brake drum with seal groove facing down.



Install return spring assembly.

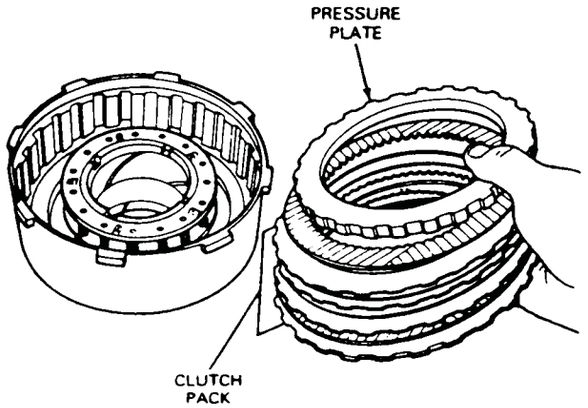


Install return spring assembly. Using Clutch Spring Compressor Tool T65L-77515-A or equivalent. Install snap ring. Ensure protrusions on spring retainer are properly engaged with lugs on clutch piston.



Install four plate clutch pack, starting with steel plate. Install pressure plate.

NOTE: Soak the clutch plates with clean transmission fluid (Ford Specification Mercon® ESA-M2C1166-H) or equivalent for fifteen minutes.



Install selective snap ring. Check stack-up using feeler gauge. If not within specification, install correct snap ring and recheck.

Specification:

1.52 - 1.15mm (0.060 - 0.045 inch)

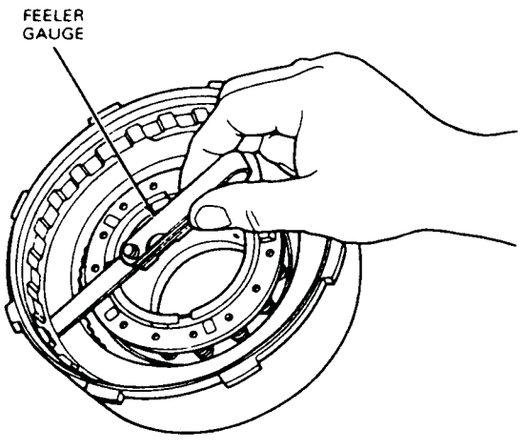
Selective Snap Rings:

Selective Snap Rings

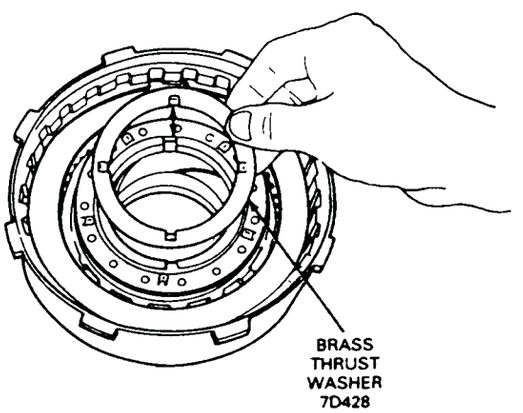
1.65 - 1.75mm (0.065 - 0.069 inch)

1.88 - 1.98mm (0.074 - 0.078 inch)

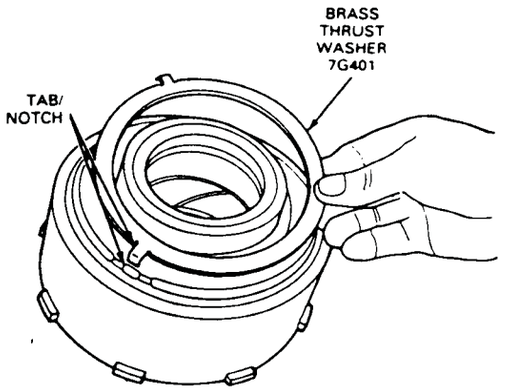
2.10 - 2.20mm (0.083 - 0.087 inch)



Install small brass thrust washer No. 7D428 on face of cylinder.



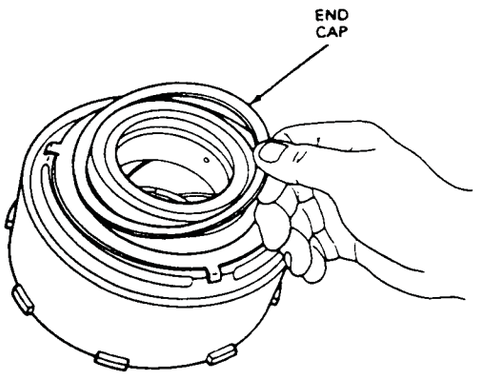
Install large brass thrust washer No. 7G401 on face of cylinder.



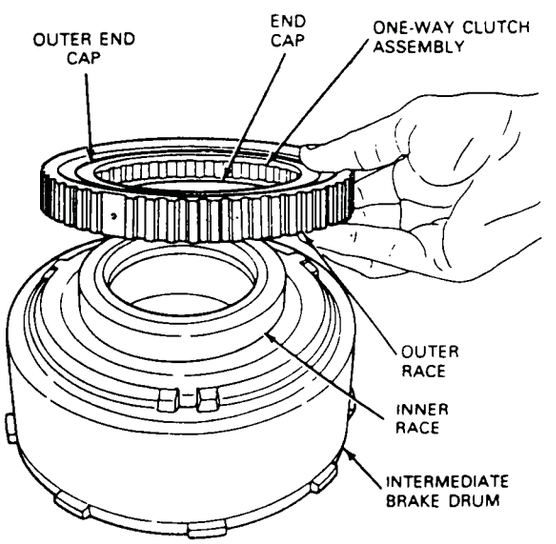
Install intermediate one-way clutch end cap, one-way clutch assembly, outer race, and outer end cap over inner race.

NOTE: Lip is up on one-way clutch.

NOTE: Install onto inner race so that the outer race turns counterclockwise.

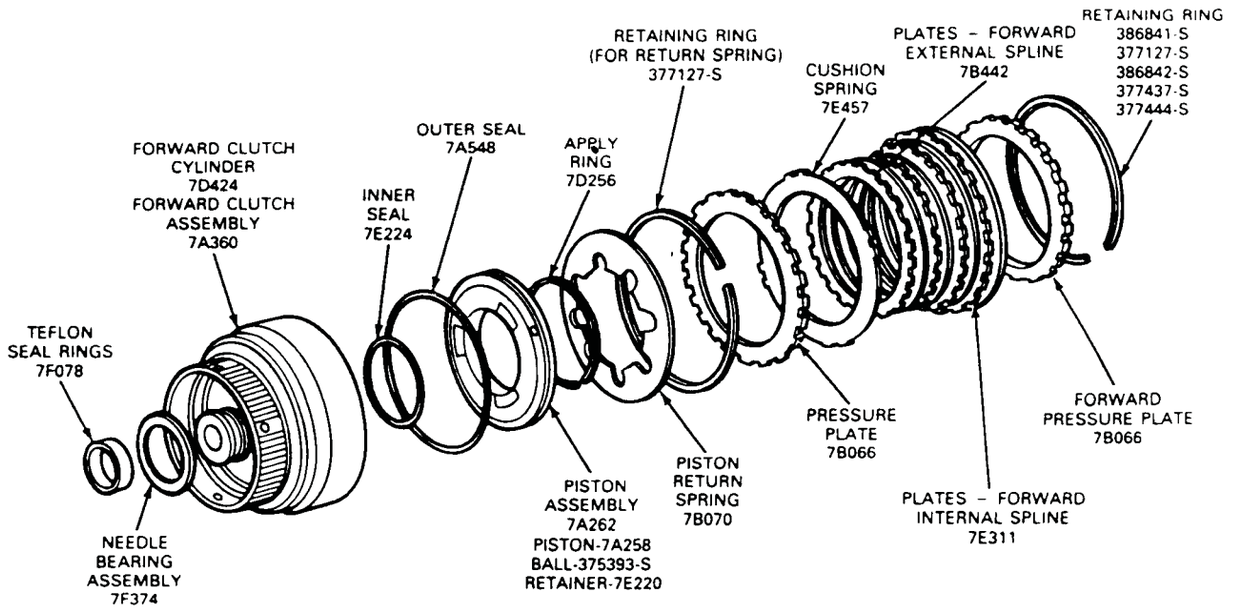


Install outer race so that the race turns counterclockwise.

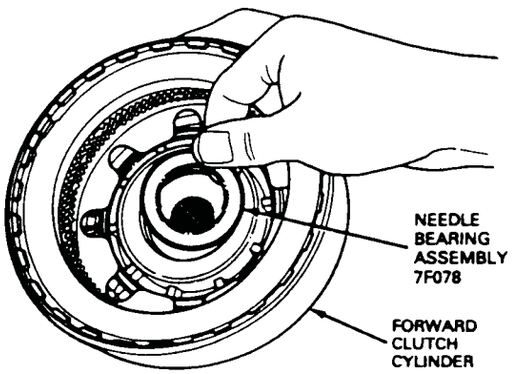


Forward Clutch Assembly

Disassembly

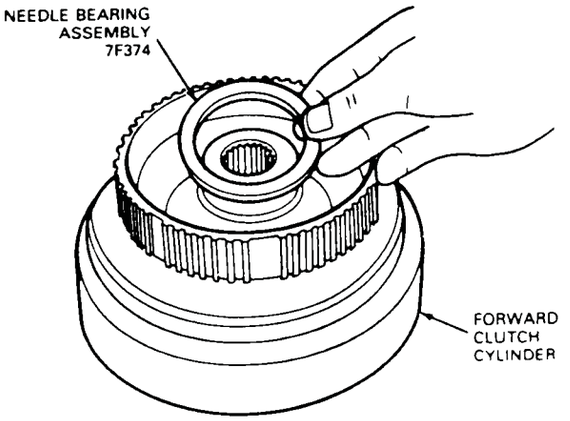


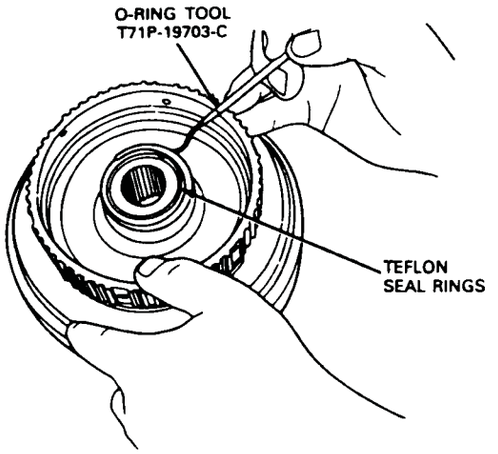
Remove needle bearing assembly from inner face of cylinder.



Remove needle bearing assembly No. 7F374.

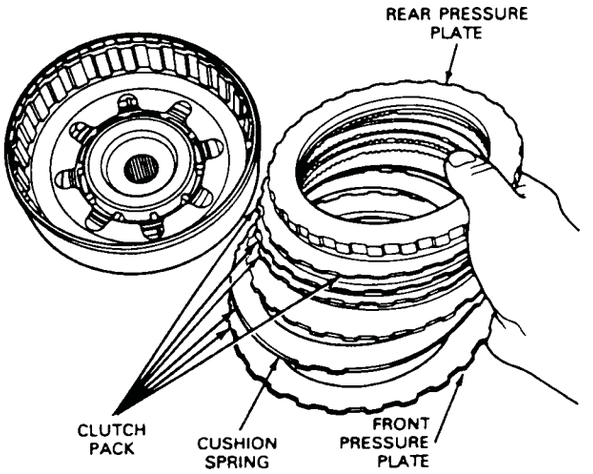
Remove both teflon seal/rings from grooves using O-Ring Tool T71P-19703-C or equivalent.



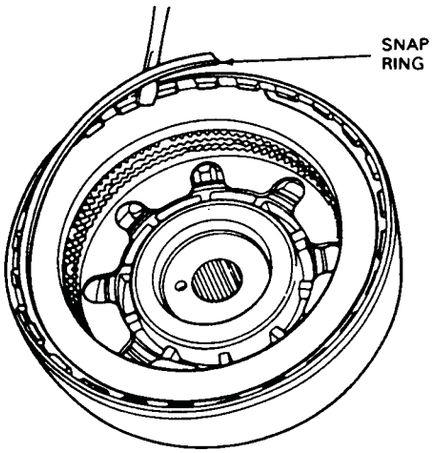


Remove rear pressure plate.

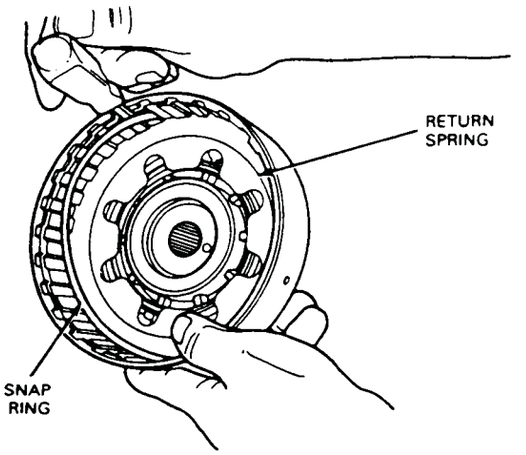
Remove four plate clutch pack, cushion spring and front pressure plate. Tag for re-assembly.



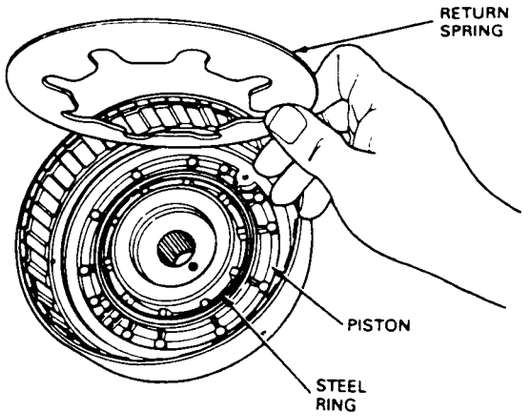
Remove snap ring.



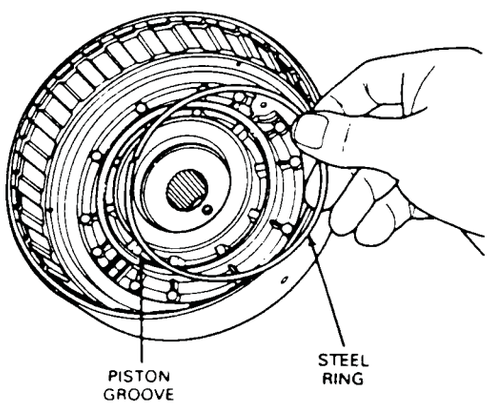
Remove return spring snap ring.



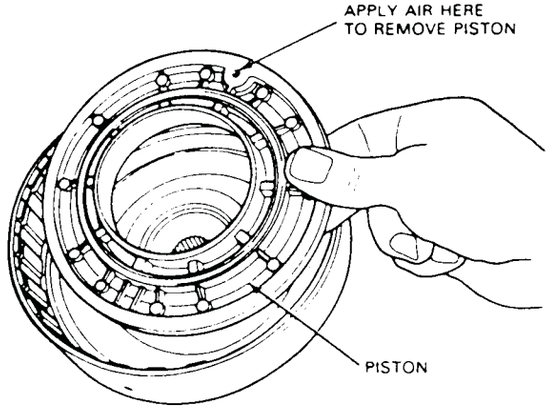
Remove return spring.



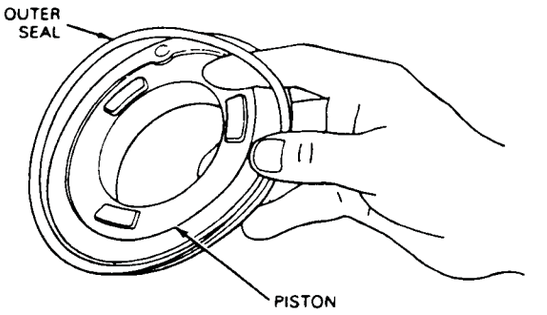
Remove steel ring from piston groove.



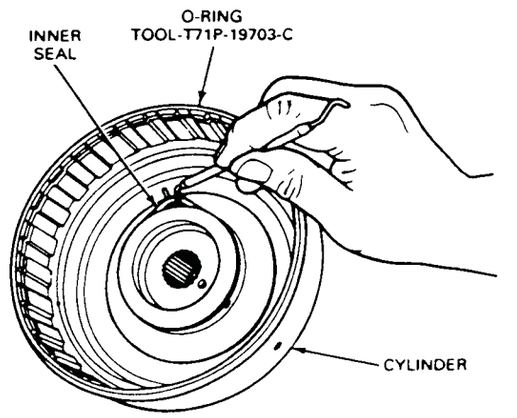
Remove piston from cylinder using an air nozzle.



Remove outer seal from piston.

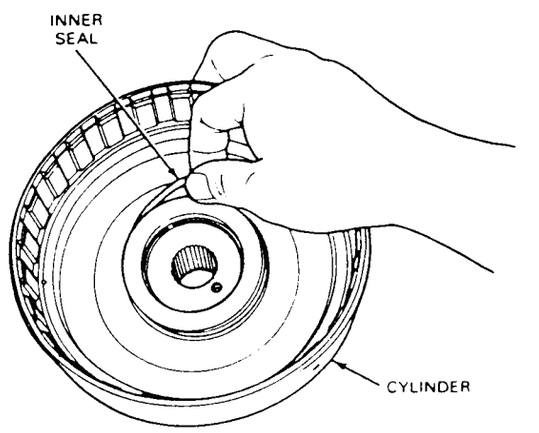


Remove inner seal from the cylinder.

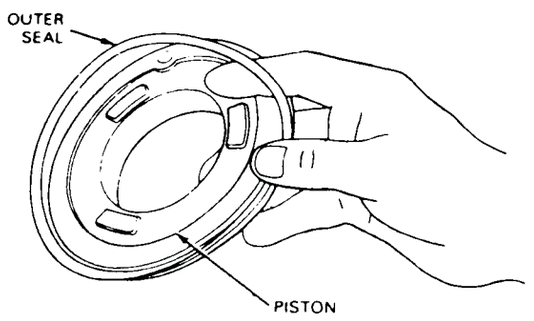


Assembly

Install inner seal in cylinder.

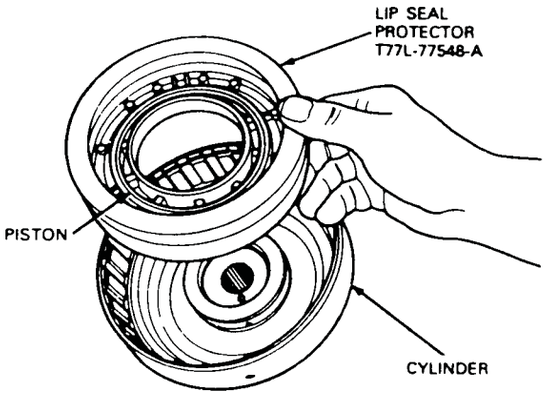


Install outer seal on piston.

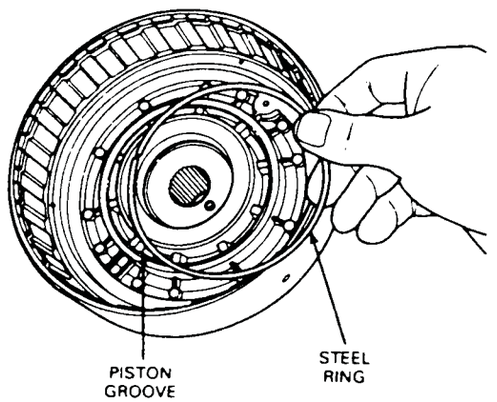


Inspect piston check ball for freedom of movement. Clean with solvent if necessary.

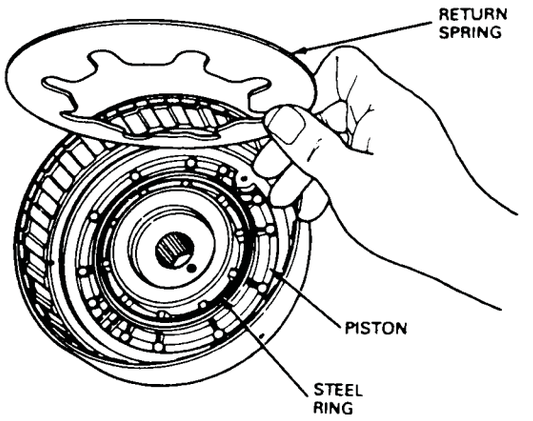
Install piston into cylinder using Lip Seal Protector T77L-77548-A or equivalent.



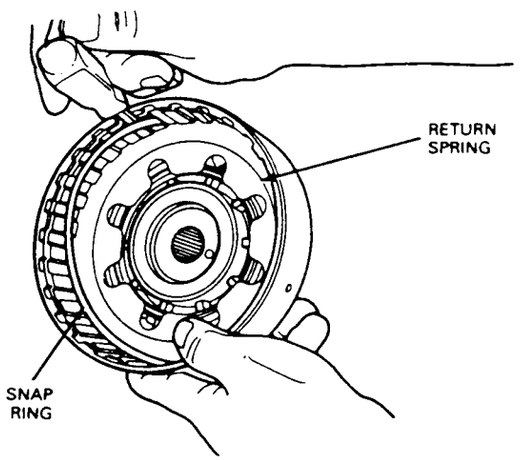
Install steel ring into groove on piston.



Install return spring with the return spring fingers against the piston/steel ring.



Install snap ring.



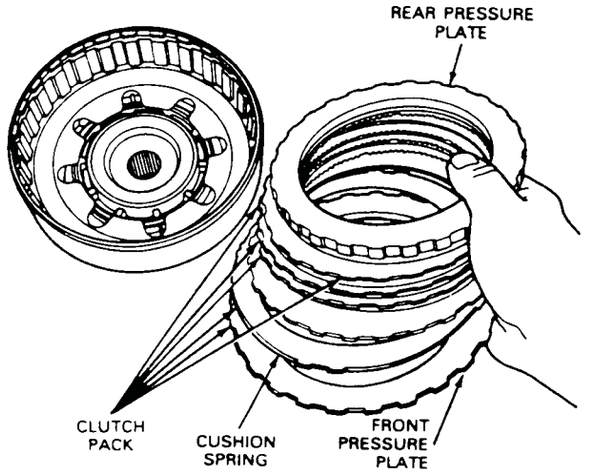
Install front pressure plate.

Install cushion spring.

Install four steel plates and four friction plates alternately, starting with a steel plate.

NOTE: Soak the clutch plates with clean transmission fluid (Ford Specification Mercon® ESP-M2C1166-H) or equivalent for fifteen minutes.

11. Install rear pressure plate.



Install selective snap ring.

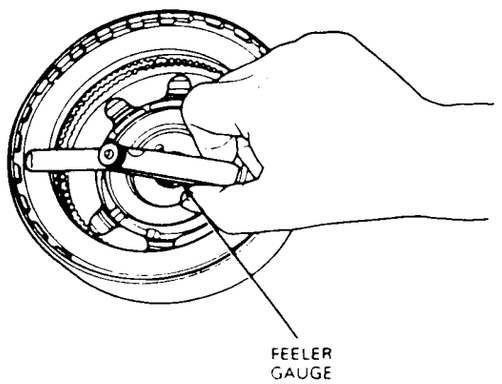
Check stack-up clearance, using feeler gauge. If not within specification install correct snap ring and recheck.

Stack Up Clearance Specification:

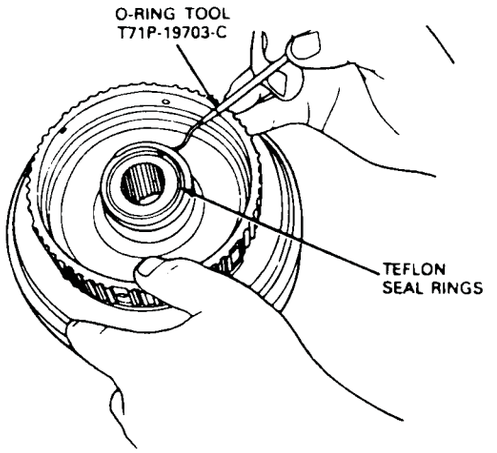
1.40 - 0.76mm (0.055 - 0.030 inch)

Selective Snap Rings:

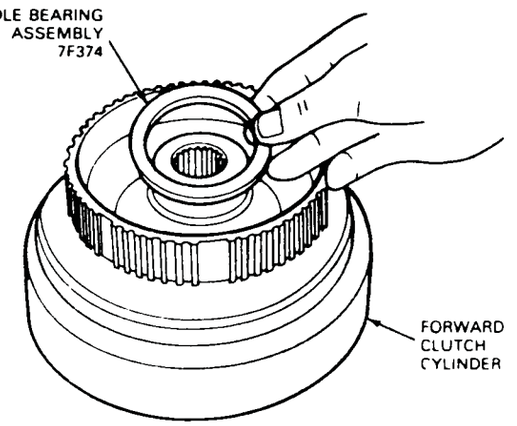
1.42 - 1.52mm (0.056 - 0.060 inch)
1.88 - 1.98mm (0.074 - 0.078 inch)
2.34 - 2.44mm (0.092 - 0.096 inch)
2.79 - 2.90mm (0.110 - 0.114 inch)
3.25 - 3.35mm (0.128 - 0.132 inch)



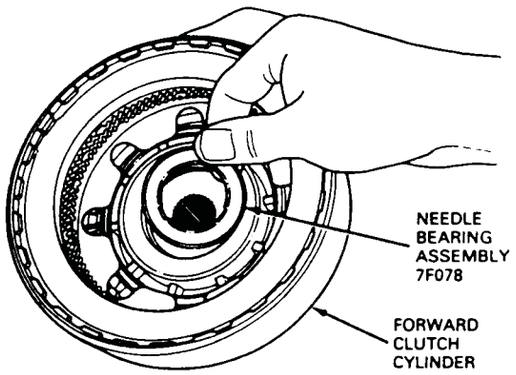
Install Teflon® seal rings in grooves.



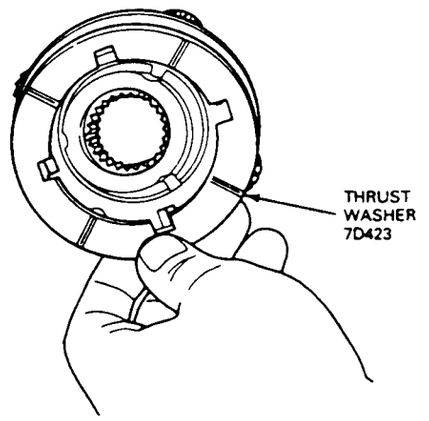
Install needle bearing assembly no. 75374 over Teflon® seal snout.



Install needle bearing assembly on inner face of cylinder, with notched inner race facing outward.



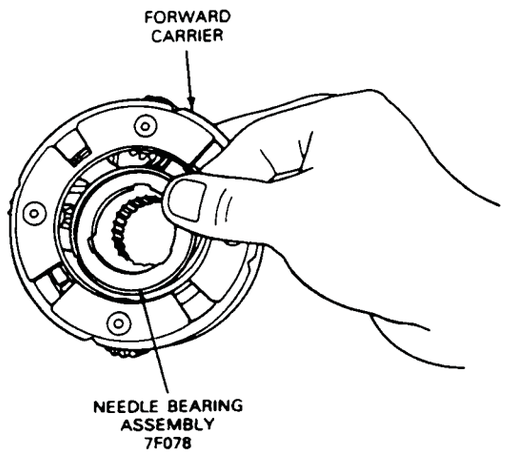
Remove thrust washer No. 7D423 from front side of carrier.



Forward Carrier

Disassembly

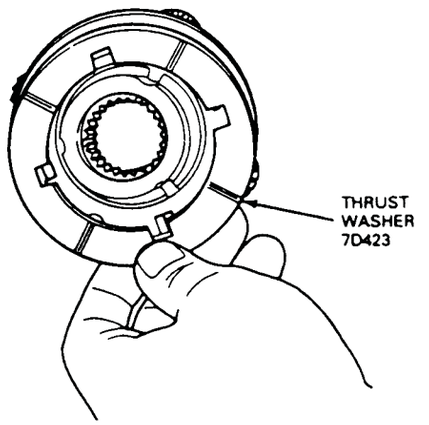
Remove needle bearing assembly No. 7F078 from carrier.



Assembly

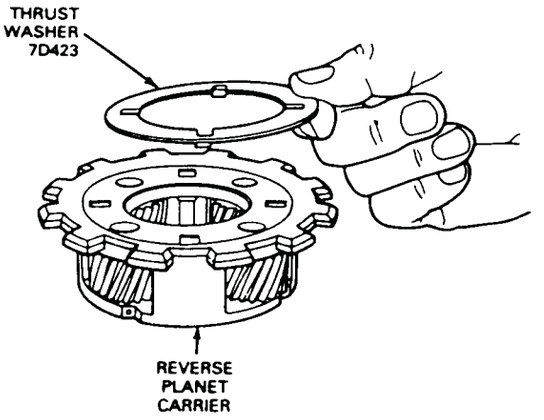
Place thrust washer No. 7D423 on front side of carrier, using grease to hold in place.

NOTE: Thrust washer tabs go into carrier.

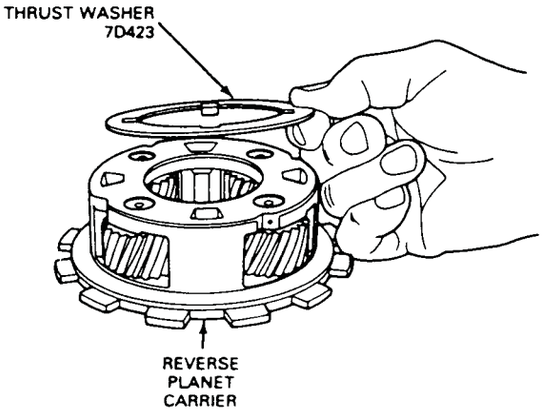


Assembly

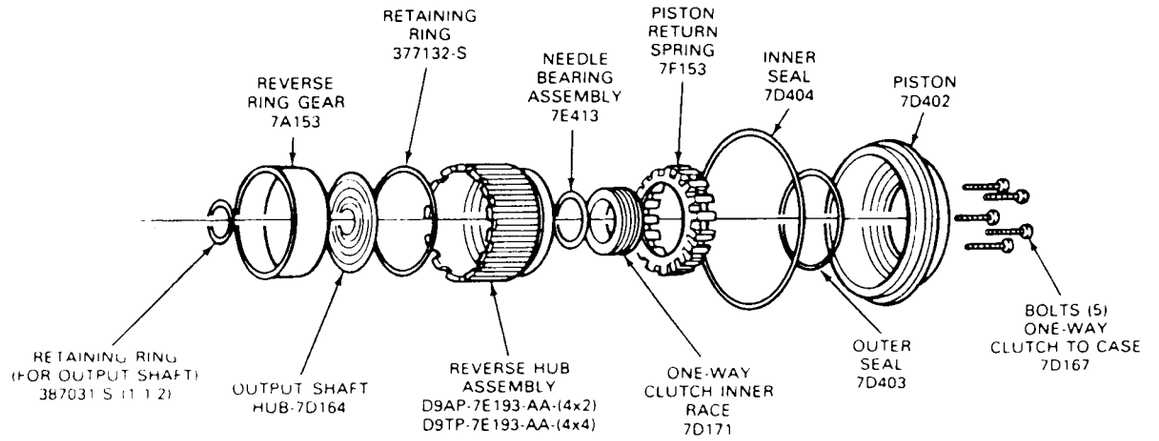
Install front thrust washer No. 7D423. Hold in place using grease.



Install rear thrust washer No. 7D423. Hold in place using grease.

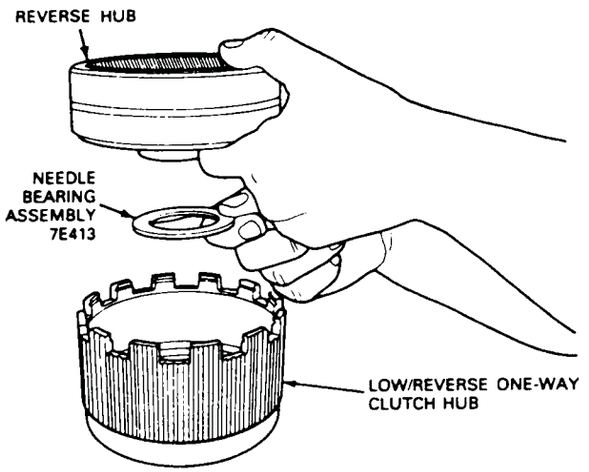


Reverse One-Way Clutch

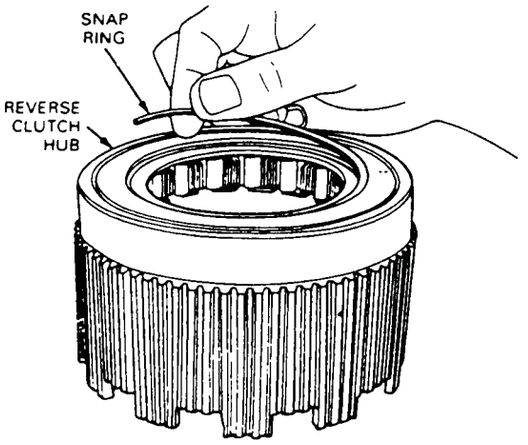


Disassembly

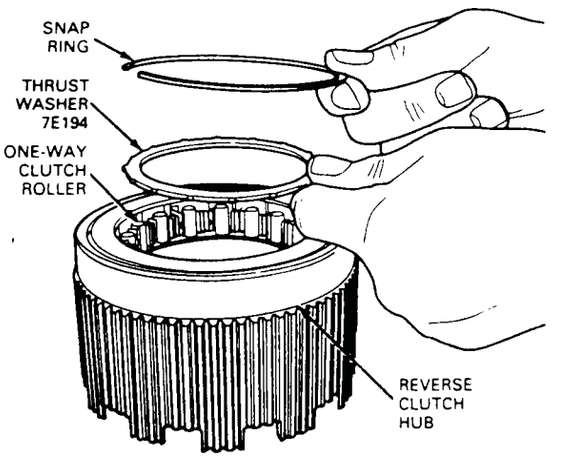
Remove reverse hub and needle bearing assembly No. 7E413 from reverse one-way clutch hub.



Remove snap ring from reverse one-way clutch hub.

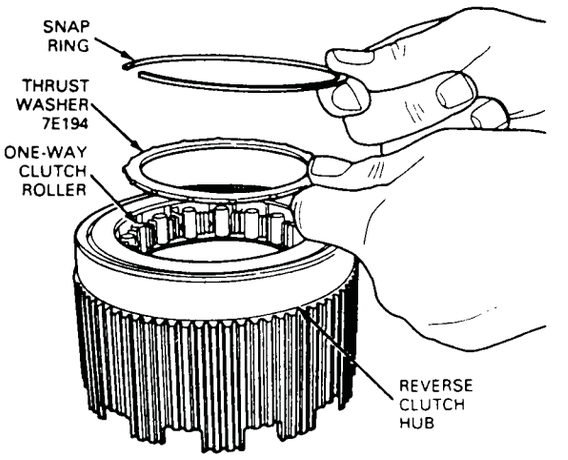


Remove brass thrust washer and rollers from reverse clutch hub.

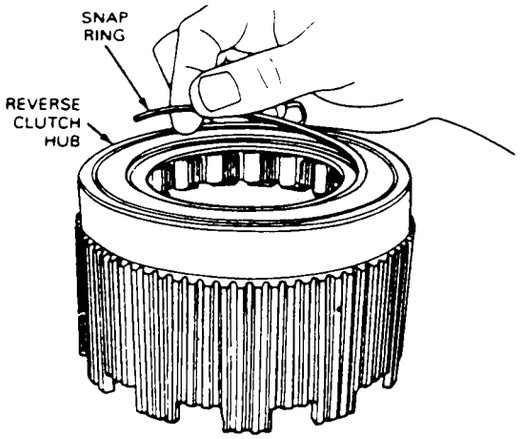


Assembly

Install one-way clutch rollers and brass thrust washer No. 7E194.



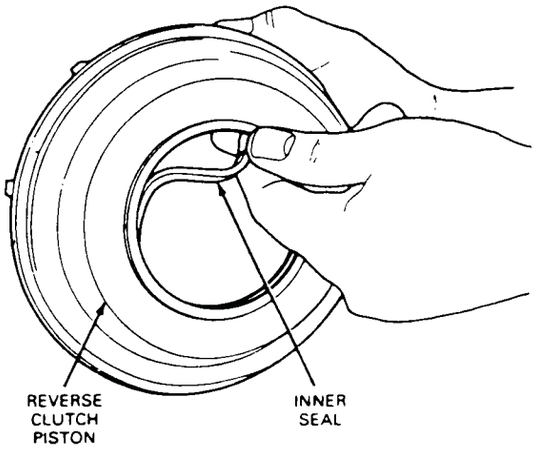
Install snap ring onto one-way clutch hub.



Install needle bearing assembly No. 7E413 with smooth race surface facing up.

NOTE: Lightly grease thrust washer.

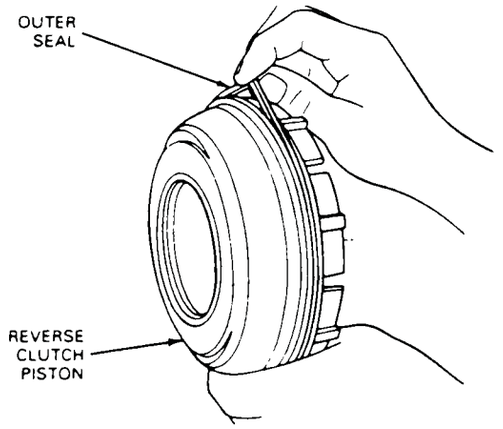
Remove inner piston seal.



Reverse Clutch Piston

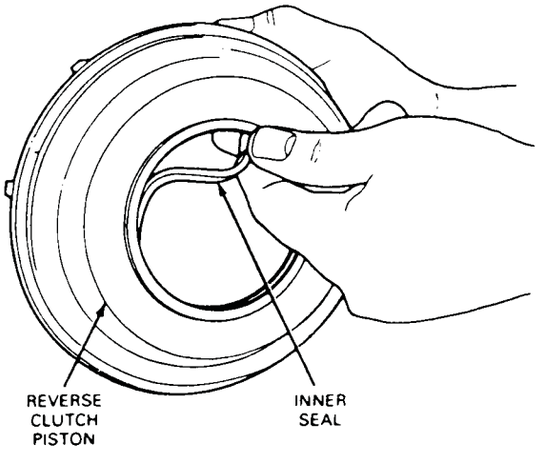
Disassembly

Remove outer piston seal.

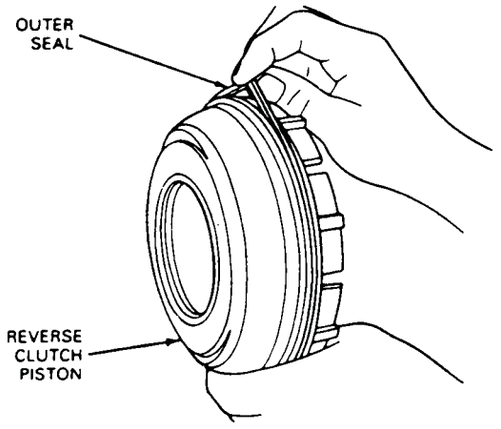


Assembly

Install inner piston seal.

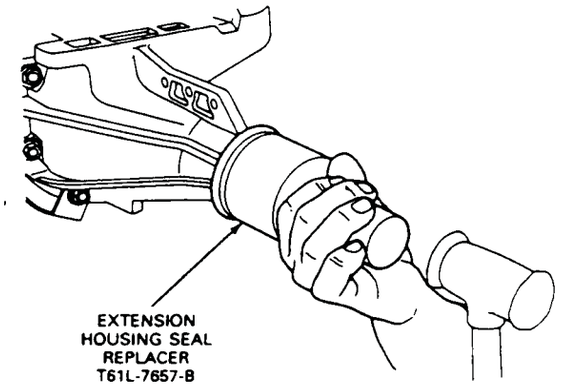


Install outer piston seal.



Assembly

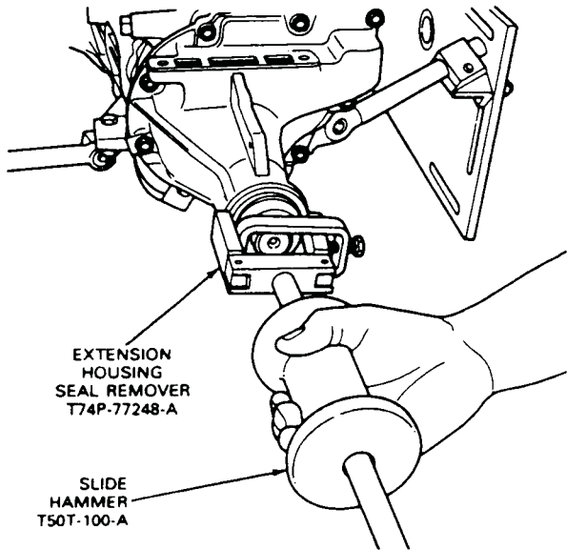
Install extension housing seal, using Extension Housing Seal Replacer T61L-7657-B or equivalent.



Extension Housing

Disassembly

Using Extension Housing Seal Remover T74P-77248-A and Slide Hammer T50T-100-A or equivalents, remove seal.

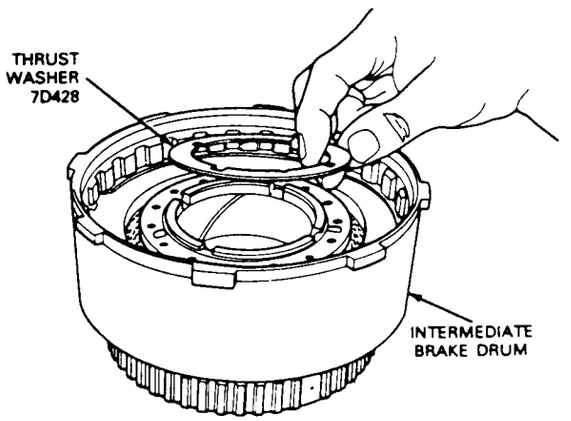


ASSEMBLY OF SUBASSEMBLIES

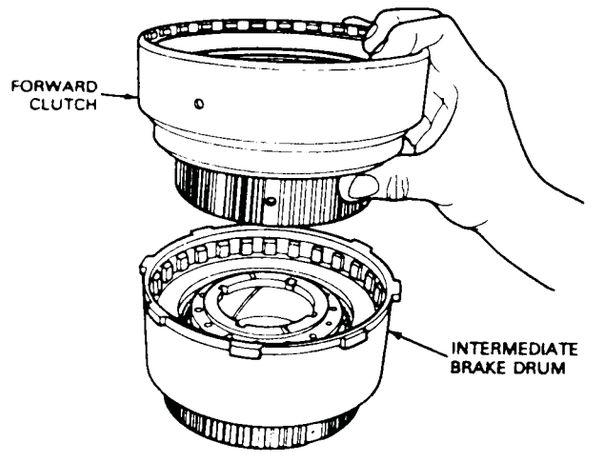
Assembly

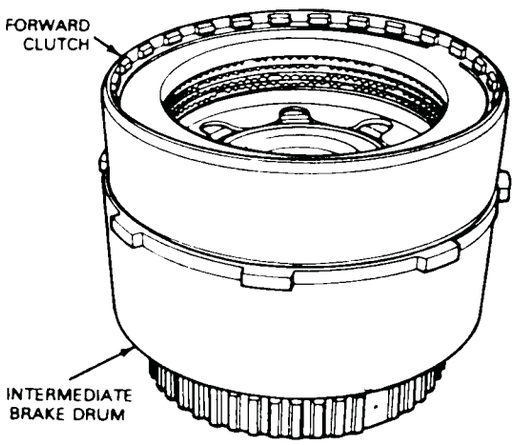
Place thrust washer No. 7D428 onto intermediate brake drum.

NOTE: Lightly grease thrust washer.



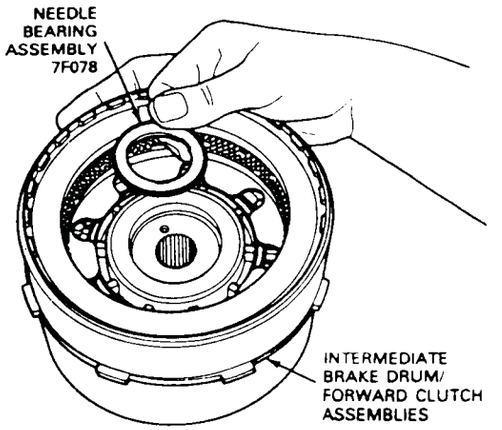
Install forward clutch onto intermediate brake drum.



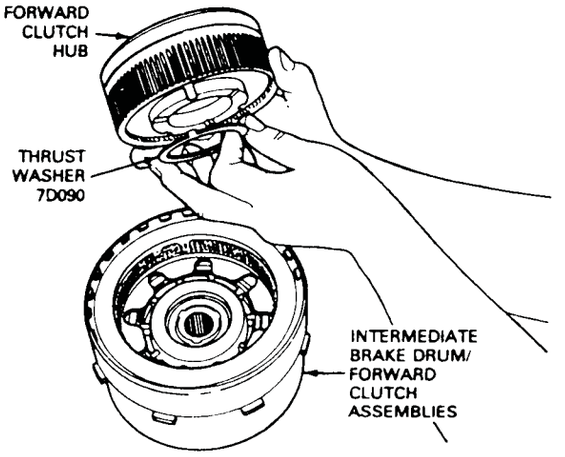


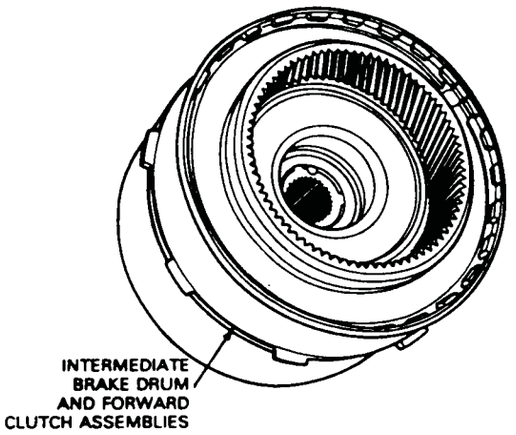
Install needle bearing assembly 7F078 onto intermediate brake drum and forward clutch assembly.

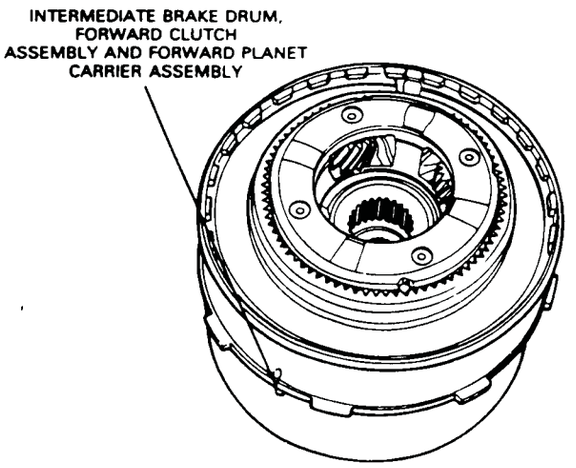
NOTE: Lightly grease needle bearing assembly. Notched inner race facing outward (up).



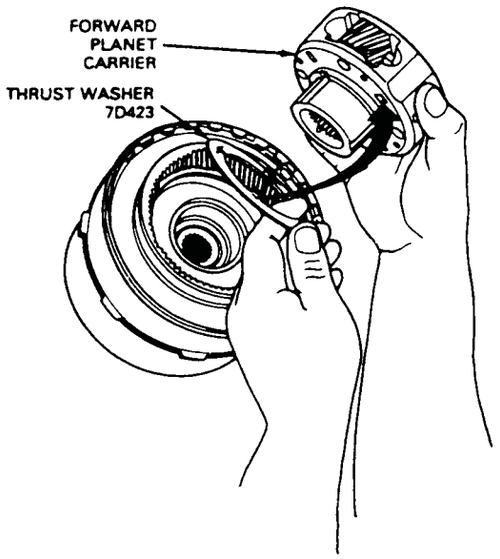
Grease plastic thrust washer No. 7D090 and place onto forward clutch hub. Place forward clutch hub into intermediate brake drum and forward clutch assemblies.





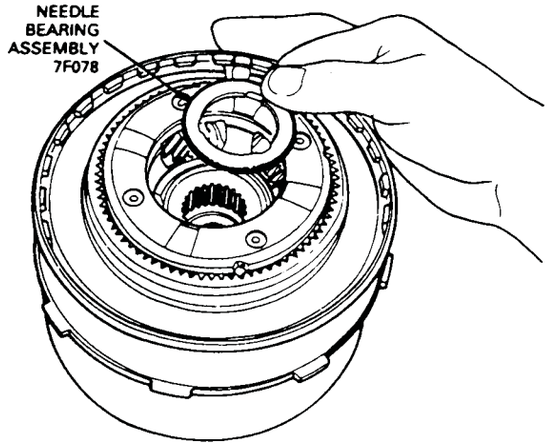


Grease thrust washer No. 7D423 and place onto forward planet carrier. Place carrier into assembly.

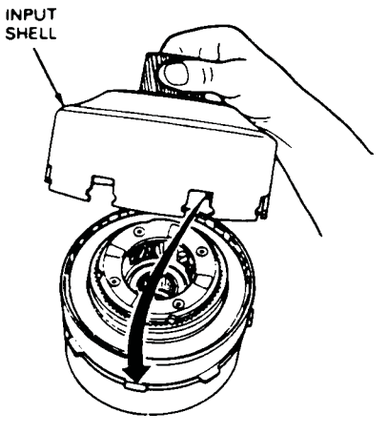


Install needle bearing assembly No. 7F078 into forward carrier assembly.

NOTE: Lightly grease needle bearing to hold in place. Notched inner race surface should face up.

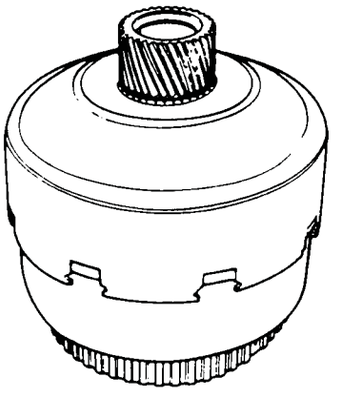


Align input shell notches with intermediate brake drum.

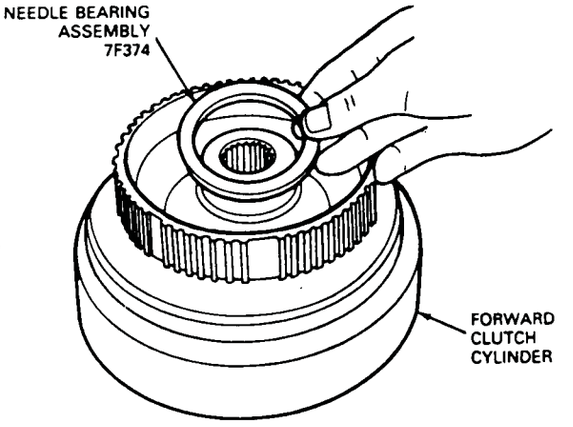


Install input shell onto assembly.

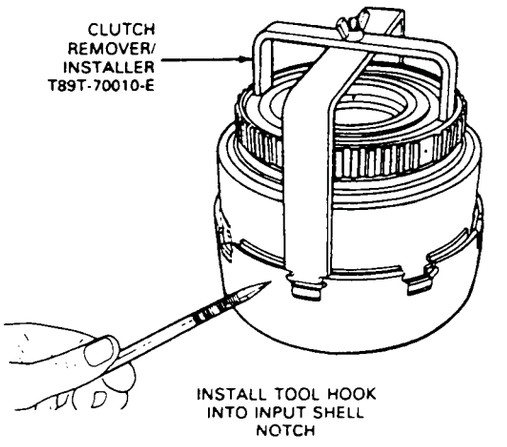
INTERMEDIATE BRAKE DRUM, FORWARD CLUTCH AND INPUT SHELL ASSEMBLY



Install needle bearing assembly No. 7F374 into front end of forward clutch assembly.



Install Intermediate Brake Drum, Forward Clutch and Input Shell Remover/Install T89T-70010-E or equivalent and proceed with transmission assembly.



CLEANING AND INSPECTION

Transmission

Clean all parts with suitable solvent and use moisture-free air to dry off all parts and clean out fluid passages.

The composition clutch plates, bands and synthetic seals should not be cleaned in a vapor degreaser or with any type of detergent solution. To clean these parts, wipe them off with a lint- free cloth. New clutch plates or bands should be soaked in the specified transmission fluid for 15 minutes before being assembled.

SPECIFICATIONS

Description	Torque	
	N-m	ft-lbs
Inner O.W.C. Race to Case	24-34	(18-25)
Connector to Case (Fluid) Cooler Line	24-31	(18-23)
Plug Line Pressure Case	8-16	(6-12)
Plug — Throttle Pressure Case	8-16	(6-12)
Inner and Outer Lever to Manual Control Shaft	40-54	(30-40)
Positive Detent Spring to Case	9-11	(80-100 lb. in.)
Parking Rod Guide Plate to Case	22-27	(16-20)
Neutral Switch Assembly to Case	6-8	(55-75 lb. in.)
Center Support to Hub	9-14	(80-120 lb. in.)
Center Support Fluid Feed	11-16	(8-12)
Extension Housing to Case	27-39	(20-29)
Extension Housing to Case (4x2)	27-39	(20-29)
Extension Housing to Case (4x4)	27-39	(20-29)
Stator Support to Pump Body	9-11	(80-100 lb. in.)
Oil Pump Body to Case	24-31	(18-23)
Reinforcing Plate to Case	9-11	(80-100 lb. in.)
Main Accum. and Sol. Body to Case	9-11	(80-100 lb. in.)
Main and Lower Body to Case	9-11	(80-100 lb. in.)
Lower Body to Main Body	9-11	(80-100 lb. in.)
Sol. Body to Case	9-11	(80-100 lb. in.)
Park Rod Abutment to Case	22-27	(16-20)
Control Assembly to Pump	24-31	(18-23)
Oil Pan to Case	14-16	(10-12)
Converter Drain Plug	24-27	(18-20)
O/Drive Cylinder Fluid Feed	8-14	(6-10)
Stud — Valve Body to Case Short	9-11	(80-100 lb. in.)
Stud — Valve Body to Case Long	9-11	(80-100 lb. in.)
Nut — Valve Body to Case	9-11	(80-100 lb. in.)
Nut — Manual Detent Lever	41-54	(30-40)

Installation of Cooling Lines

Transmission	Radiator		Transmission		Fluid Line Nut	
	ft-lbs	N-m	ft-lbs	N-m	ft-lbs	N-m
E4OD	8-12	11-16	18-23	24-31	12-18	17-24

Fluid Capacity

Transmission Type	Liters	Quarts
4 x 2	16.4	15.5
4 x 4	16.9	16