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AUTOMATIC TRANSMISSION SERVICE GROUP

INTRODUCTION

SPECTRUM KF-100

The KF-100 Automatic Transaxle found in the new Chevrolet Spectrum is designed for front wheel drive vehicles. It is a compact type transaxle consisting of the transmission and differential in one unit. The transaxle is designed so that the preload on the tapered roller bearings can be adjusted by the use of shims. The final gear in the transaxle is of a helical type design requiring no tooth contact adjustment.

We thank General Motors for
the illustrations and information
that 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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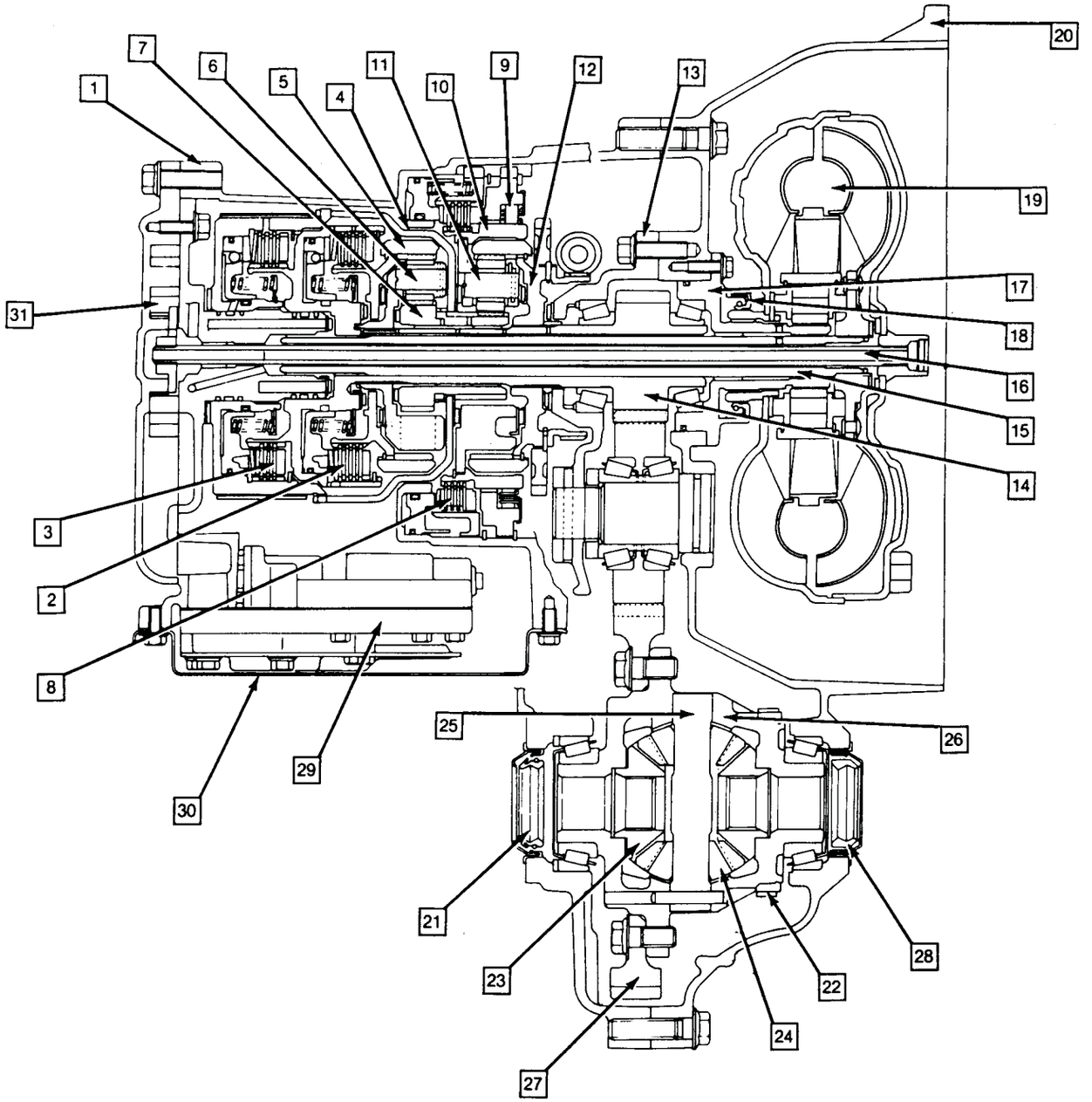
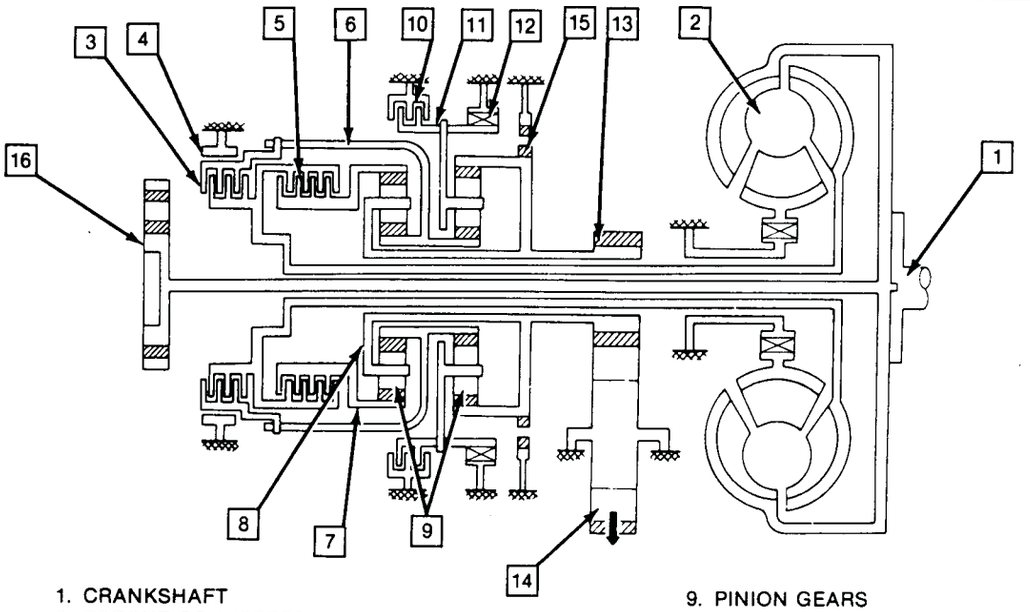


1. TRANSMISSION CASE
2. REAR CLUTCH
3. FRONT CLUTCH
4. CONNECTING SHELL
5. REAR CLUTCH HUB
6. PLANETARY CARRIER
7. SUN GEAR
8. LOW AND REVERSE BRAKE
9. ONE-WAY CLUTCH
10. ONE-WAY CLUTCH INNER RACE
11. PLANETARY CARRIER
12. DRUM HUB ASSEMBLY
13. BEARING HOUSING
14. OUTPUT GEAR
15. TURBINE SHAFT
16. OIL PUMP SHAFT
17. BEARING COVER
18. OIL SEAL
19. TORQUE CONVERTER
20. CONVERTER HOUSING
21. OIL SEAL
22. SPEEDOMETER DRIVE GEAR
23. SIDE GEAR
24. PINION GEAR
25. PINION SHAFT
26. DIFFERENTIAL GEAR CASE
27. RING GEAR
28. OIL SEAL
29. CONTROL VALVE
30. OIL PAN
31. OIL PUMP

Figure 7A-1 KF 100 Cross Section



1. CRANKSHAFT
2. TORQUE CONVERTER
3. FRONT CLUTCH
4. BRAKE BAND
5. REAR CLUTCH
6. CONNECTING SHELL
7. INTERNAL GEAR
8. PLANETARY CARRIER (FRT.)
9. PINION GEARS
10. LOW AND REVERSE BRAKE
11. PLANETARY CARRIER (REAR)
12. ONE-WAY CLUTCH
13. OUTPUT GEAR
14. IDLER GEAR
15. PARKING GEAR
16. OIL PUMP

Figure 7A-2 Power Transmitting System

Shift Position		Gear Ratio	Clutch		Low and Reverse Brake	Band Servo		One-way Clutch
			Front	Rear		Operation	Release	
P		—			o			
R		2.400	o		o		x	
N		—						
D	1st	2.841		o				o
	2nd	1.541		o		o		
	3rd	1.000	o	o		x	x	
2nd		1.541		o		o		
1	2nd	1.541		o		o		
	1st	2.841		o	o			

(x) Part is operating under normal line pressure, but not transmitting power.

Figure 7A-3 Transaxle Component Functions

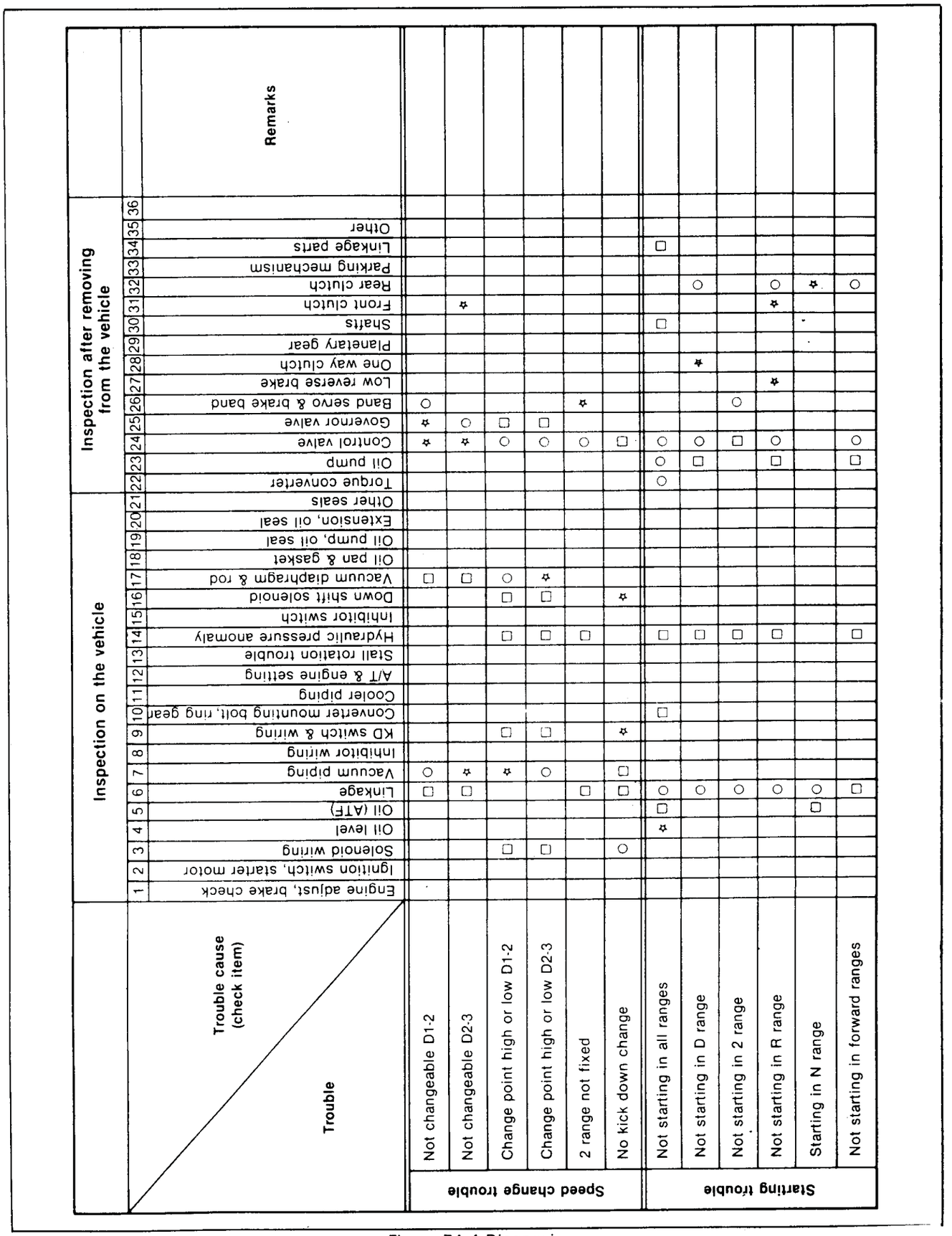


Figure 7A-4 Diagnosis

Trouble	Trouble cause (check item)	Inspection on the vehicle																				Inspection after removing from the vehicle															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
		Engine adjust, brake check	Ignition switch, starter motor	Solenoid wiring	Oil level	Oil (ATF)	Linkage	Vacuum piping	Inhibitor wiring	KD switch & wiring	Converter mounting bolt, ring gear	Cooler piping	A/T & engine setting	Stall rotation trouble	Hydraulic pressure anomaly	Inhibitor switch	Down shift solenoid	Vacuum diaphragm & rod	Oil pan & gasket	Oil pump, oil seal	Extension, oil seal	Other seals	Torque converter	Oil pump	Control valve	Governor valve	Band servo & brake band	Low reverse brake	One way clutch	Planetary gear	Shafts	Front clutch	Rear clutch	Parking mechanism	Linkage parts	Other		
Shock, slip, judder	Shock slip when selecting N-D	☆			□		□	○							□			○					○		○							☆					
	Shock or slip when selecting P-R, N-R	☆			□		□	○							□			○					□	□	□			☆			□	☆					
	Judder or slip when starting in D range	○			□	□	□	□					□	□	□			□					○	☆	□				☆			☆					
	Judder or slip when starting in D1-2			□	□	□	□	□		□					□			□						□	□		☆					□			□		
	Judder or slip when starting in D2-3			□	□	□	□	□		□					□			□						□	□						□	☆			□		
	Judder or slip in 1 range	□			□	□	□	□						□	□			□					○	□	□			☆					☆				
	Judder or slip in 2 range	□			□	□	□	□						□	□			□					○	□	□		☆						☆				
	Judder or slip in R range	□			□	□	□	□						□	□			□					○	□	□			☆			☆						
	Large vibration during drive	□									□		□										☆												□		
Abnormal noise	Large noise in N, P range										□			□									☆	☆													Including beating noise when stalling D,2,1 or when pushing accelerator, etc.
	Large noise in 1,2 speed (especially large when 1₁ coasting)																													☆							
	Large crank noise when selecting 1, 2, D, or R from N, P or when "ON" or "OFF" accelerator																										□	□	□	□		□	□			○		Check for the absence of seizure at the differential gear and propeller shaft, in addition to A/T.
Oper. trouble	Engine starting trouble	□	○				○		○							☆																			□		
	Parking trouble						○																											☆		○		
	Select level operation trouble						☆																		□											□		
Others	White exhaust gas																	☆																				Other oil leak check
	Oil leak				□							○							☆	☆	☆	○		□														

Procedures of inspection shall be first for the A/T related, then for A/T outer, and finally for A/T inner.

[☆ : large probability, ○ : medium probability, □ : small probability]

Figure 7A-4a Diagnosis

ON VEHICLE SERVICE

CHECKING FLUID LEVEL

1. Park the vehicle on level ground.
2. Apply the parking brake.
3. Place the automatic transaxle in "Park" and start the engine. Allow the engine to idle for two minutes.
4. With the brakes applied, move the shift lever through all the gear ranges, ending in "Park"
5. Remove the dipstick. Carefully touch the dipstick with your hand to determine the temperature of the fluid.
   - If the fluid is cool or warm (around room temperature or slightly higher, but not too hot to touch with your hand) the fluid level should be between the two dimples of the "Cold" range (Figure 7A-5).
   - If the fluid is hot, the fluid level should be between the two dimples of the "Hot" range (Figure 7A-5).
     If the vehicle has just been driven for a long period of time at highway speeds or in city traffic in hot weather, wait about 30 minutes until fluid cools down before checking fluid level.
6. If fluid level is low, add enough Dexron II Automatic Transmission Fluid to bring transaxle to its proper fluid level through the oil filler tube.

NOTICE: Overfilling or underfilling could result in damage to the transaxle.

If fluid level is low, inspect the area around the oil pan and the drain plug for leakage. Refer to Figure 7A-6 for points of possible leakage.

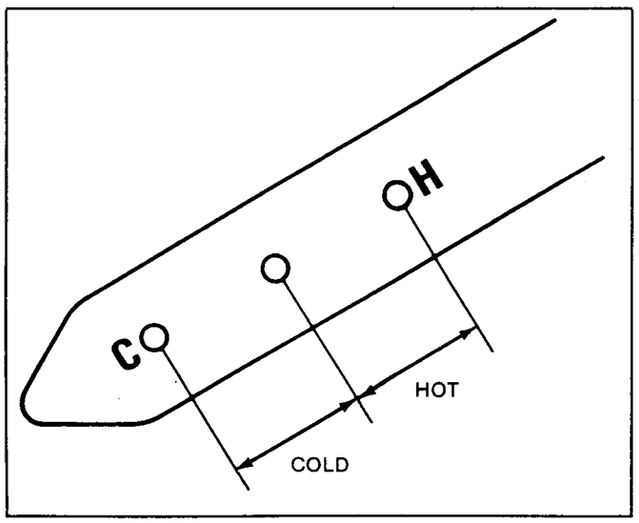


Figure 7A-5 Dipstick

CHANGING TRANSAXLE FLUID

1. Remove the drain plug located at the lower pa of the differential.
2. Remove the oil pan and discard pan gasket.
3. Using a new pan gasket, install gasket and pan to transaxle.
4. Install drain plug and torque to specifications.
5. Fill transaxle through the oil filler tube using Dexron II Automatic Transmission Fluid.

SHIFT CONTROL CABLE

Removal and Installation

1. Disconnect the negative cable at the battery.
2. Remove the floor console.
3. Disconnect the cable at the shifter.
4. Pull floor carpet rearward and remove the screws attaching cable to the floor.
5. Disconnect the cable from the transaxle.
6. Raise vehicle and remove the cable.
7. To install, reverse the removal and adjust the cable (Figure 7A-7) as follows:
   - Loosen the 2 adjusting nuts at the control rod link and connect the shift cable to the link on the transaxle.
   - Shift transaxle into the neutral detent.
   - Place shifter lever into the neutral position.
   - Rotate the link assembly clockwise to remove slack in cable.
   - Tighten rear adjusting nut until it makes contact with the link. Tighten front adjusting nut until it makes contact with link and then torque nuts.

PARK LOCK CABLE

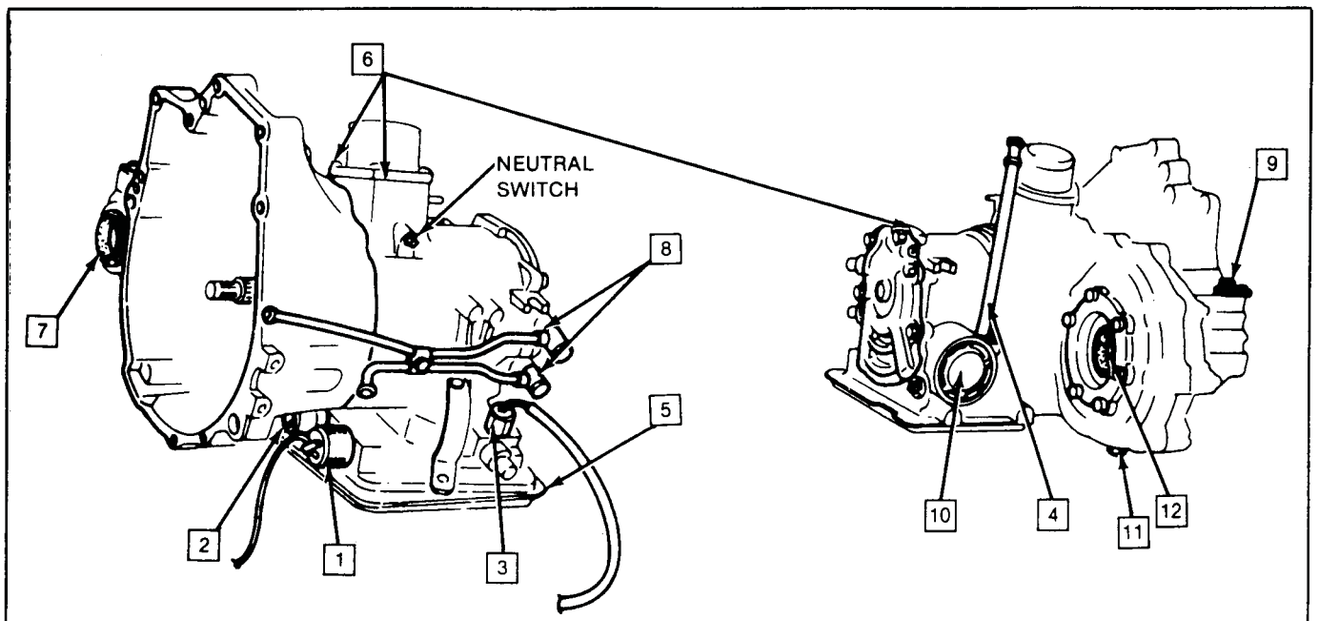
Removal and Installation

1. Disconnect negative cable at the battery.
2. Remove the floor console.
3. Disconnect the cable at the shifter and remove the adjusting nuts.
4. Remove the lower trim cover from the steering column.
5. Disconnect the cable from the column.
6. Pull floor carpet rearward and remove the cable.
7. To install, reverse the removal procedure and adjust cable as follows:
   - Place the ignition key in the "LOCK" position.
   - Place the shifter lever into the park position.
   - Pull cable forward at shifter bracket and tighten the forward nut until it makes contact with bracket. Tighten rear nut until it makes contact with bracket and then torque nuts.

SHIFTER CONTROL

Removal and Installation

1. Disconnect the negative cable at the battery.
2. Remove the floor console.
3. Disconnect shift cable at the control.



1. KICK-DOWN SOLENOID
2. VACUUM DIAPHRAGM
3. INHIBITOR SWITCH
4. OIL LEVEL TUBE
5. OIL PAN
6. HOUSING MATING SURFACE
7. SIDE OIL SEAL
8. OIL PIPE
9. SPEEDOMETER DRIVEN GEAR
10. SERVO RETAINER
11. DRAIN PLUG
12. AXLE SHAFT SEALS

Figure 7A-6 Location For Possible Fluid Leakage

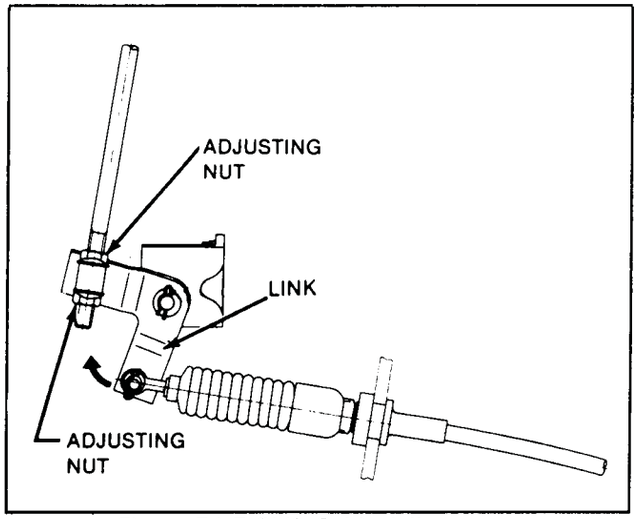


Figure 7A-7 Shift Cable Adjustment

4. Disconnect park lock cable at the shifter.
5. Remove bolts attaching control to floor and remove control assembly.
6. To install, reverse the removal procedures and include the following:
   - Adjust shift cable.
   - Adjust park lock cable.

SPEEDOMETER DRIVEN GEAR

Removal and Installation

1. Disconnect negative cable at the battery.
2. Disconnect speedometer cable at the transaxle.
3. Remove retainer bolt, retainer, speedometer driven gear and "O" ring seal.
4. To install, reverse removal procedure using a new "O ring" seal and adjust fluid level as required.

SERVO ASSEMBLY

Removal and Installation

1. Disconnect negative cable at the battery.
2. Raise vehicle.
3. Remove left front wheel and tire assembly.
4. Remove the left lower control arm tenison rod assembly as outlined in Front Suspension Section (3C).
5. Disconnect tie rod from the left steering arm as outlined in Steering Section (3B).
6. Remove one oil pan bolt nearest to the servo cover. Install J-35278 and compress the servo cover. Remove the cover retaining ring and then cover.
7. Remove J-35278 and servo assembly from the transaxle.
8. Refer to the Unit Repair Section for inspection procedures.
9. To install, reverse the removal procedure and adjust fluid level as required.

GOVERNOR ASSEMBLY

Removal and Installation

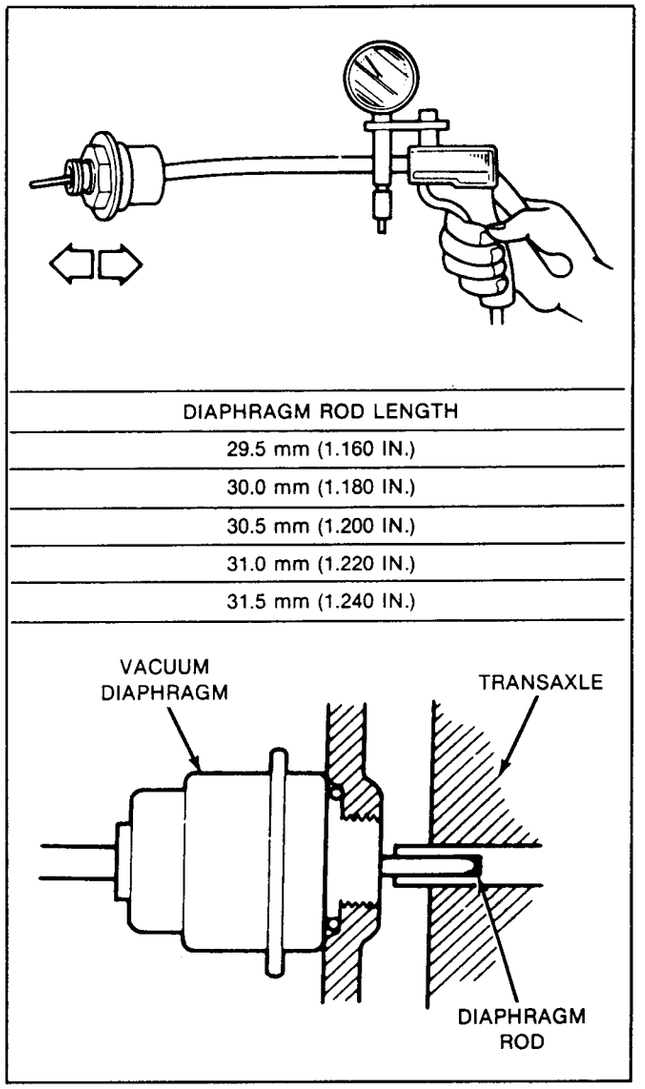
1. Disconnect negative cable at the battery.
2. Remove governor cover retaining bolts.
3. Remove governor assembly.
4. Refer to the Unit Repair Section for cleaning and inspection.
5. To install, reverse the removal procedure.

TRANSAXLE

Removal and Installation

1. Disconnect negative cable at the battery.
2. Remove air intake hose from the air cleaner.
3. Disconnect the shift cable from the transaxle.
4. Disconnect the speedometer cable.
5. Disconnect the vacuum hose at the vacuum diaphragm.
6. Disconnect engine wiring harness clamp at the transaxle.
7. Disconnect the ground cable at the transaxle.
8. Disconnect the inhibitor switch wire connector at the left fender.
9. Disconnect kickdown solenoid wire connector at the left fender.
10. Disconnect the transaxle cooler lines.
11. Remove the 3 upper transaxle to engine attaching bolts.
12. Raise vehicle.
13. Remove both front wheel and tire assemblies.
14. Remove the splash shield at the left front fender.
15. Disconnect both tie rod ends at the steering knuckle.
16. Remove both front tension rod brackets.
17. Disconnect both tension rods from the control arms.
18. Disengage both drive axle shafts from the transaxle.
19. Remove the flywheel dust cover.
20. Remove the converter to flywheel attaching bolts.
21. Remove the rear mount thru bolts at the transaxle.
22. Disconnect the starter motor.
23. Support transaxle.
24. Remove the lower transaxle to engine attaching bolts.
25. Remove the transaxle from the vehicle.
26. To install, reverse the removal procedure and include the following:

- Torque all fasteners to specifications. Also refer to Sections (3B) Steering and (3C) Front Suspension for torque specifications.
  - Transaxle to engine 77 N·m (56 ft. lbs.).
  - Converter to flywheel 40 N·m (30 ft. lbs.).
- Adjust shift linkage.
- Fill transaxle with Dexron II automatic transmission fluid.



DIAPHRAGM ROD LENGTH
29.5 mm (1.160 IN.)
30.0 mm (1.180 IN.)
30.5 mm (1.200 IN.)
31.0 mm (1.220 IN.)
31.5 mm (1.240 IN.)

Figure 7A-8 Vacuum Diaphragm

VACUUM DIAPHRAGM (FIGURE 7A-8)

Removal and Installation

1. Disconnect negative cable at battery.
2. Disconnect the kickdown solenoid wire connector at left fender.
3. Raise vehicle.
4. Remove the kickdown solenoid at the transaxle.
5. Remove the vacuum diaphragm.
6. Inspect the vacuum diaphragm as follows:
   - Make sure when vacuum is applied to the diaphragm, the diaphragm rod moves properly.
   - If the diaphragm is correct, change the rod as a test.

   If the vacuum diaphragm is replaced, it will be necessary to make the measurement shown in Figure 7A-137 for the correct rod length.
7. To install, reverse the removal procedures and include the following:
   - Apply sealant to the threads of kickdown solenoid and vacuum modulator before installing.

- Adjust transaxle fluid level as required.

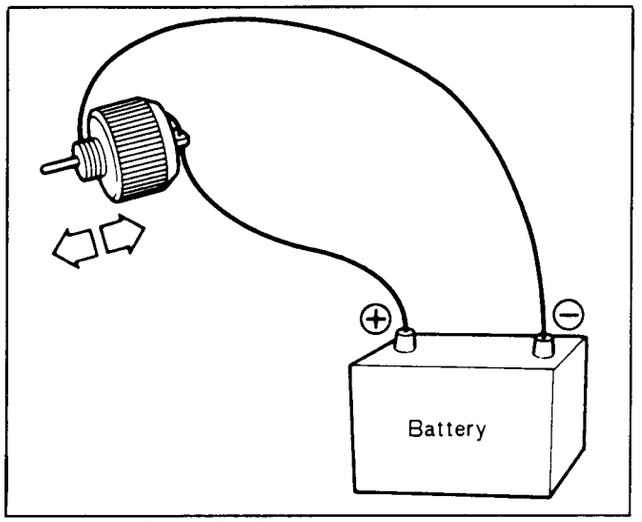


Figure 7A-9 Kickdown Solenoid

KICKDOWN SOLENOID (FIGURE 7A-9)

Inspection

1. Make sure rod functions properly when 12 volts is applied to kickdown solenoid (Figure 7A-9).
2. Connect a circuit tester to the solenoid terminals. Make sure continuity exists when depressing the pedal fully.
3. If continuity does not exist, adjust the kickdown switch. To adjust, turn the switch so that continuity exists when depressing the pedal more than 7/8 of its stroke.

Removal and Installation

1. Disconnect negative cable at the battery.
2. Disconnect electrical connector for the solenoid at the fender.
3. Raise vehicle.
4. Remove the solenoid.
5. To install, reverse the removal procedure.
6. Adjust transaxle fluid as required.

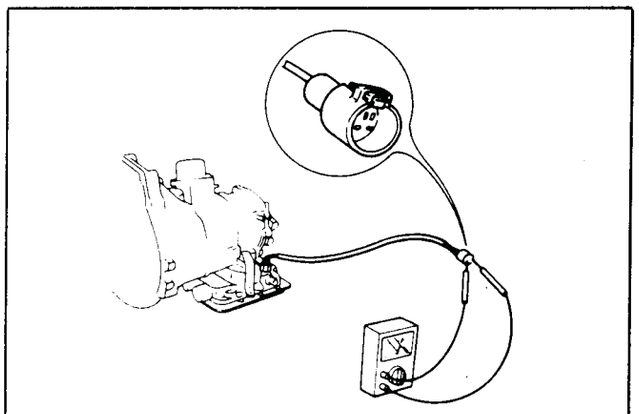
INHIBITOR SWITCH (FIGURE 7A-10)

Inspection

1. Make sure the engine only starts in the "PARK" and "NEUTRAL" detent.
2. Make sure the back-up light is "ON" while the "REVERSE" detent.
3. If the inhibitor switch is faulty, disconnect it and check the continuity between each terminal as shown in Figure 7A-10.

Removal and Installation

1. Disconnect negative cable at the battery.
2. Disconnect electrical connector for the switch at the left fender.
3. Raise the vehicle.
4. Remove the switch.
5. To install, reverse the removal procedures.
6. Adjust transaxle fluid as required.



Shift Position	Coupler Terminal			
	A	B	C	D
P	○——○			
R			○——○	
N	○——○			

○——○: Indicates Continuity.

Figure 7A-10 Inhibitor Switch

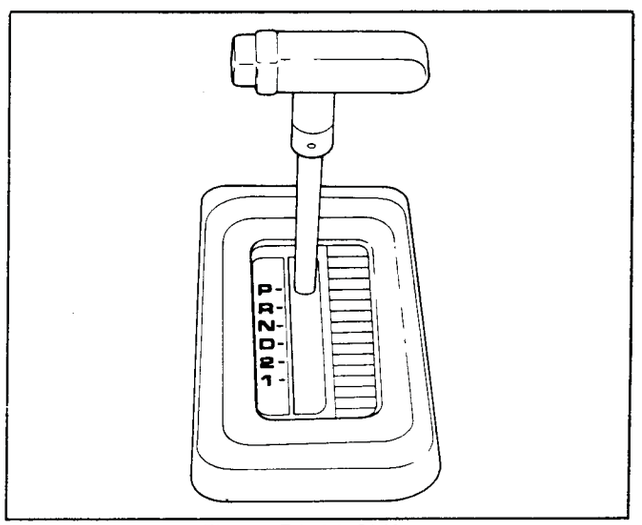


Figure 7A-11 Shifter

MANUAL LINKAGE

Inspection and Adjustment

1. Make sure that when the select lever is shifted "P" to "1", a "clicking" can be felt at each shift position. Make sure the gear corresponds to that of the position plate.
2. Make sure the lever can be shifted between "D" and "N" without depressing the push button. ("D" to "R" cannot be done without depressing the push button.) If the lever can be shifted from "D" to "R" without depressing the push button,

of if push botton is loose, adjust by unscrewing the locknut and twisting the select-lever knob.

FUNCTIONAL CHECKS

To check the operation of the transaxle, perform the following tests:

- Stall Test
- Line Pressure Test
- Governor Pressure Test
- Road Test

Before performing each test, the following checks and operations are required.

- Check the quantity of engine coolant, engine oil and transaxle fluid.
- Warm up the engine and set the transaxle to "PARK".
- When performing the stall test, block the front and rear wheels and apply the parking brake.
- Check line pressure and governor pressure.
- Road test vehicle.

STALL TEST (FIGURE 7A-12)

1. Block the wheels and set parking brake.
2. Connect a tachometer to the engine.
3. Shift the transaxle to "DRIVE".
4. Hold down the brake pedal and slowly press the accelerator pedal.
5. When the engine has settled to a constant speed, quickly read the engine speed and release the accelerator.
6. Shift the transaxle to "NEUTRAL" and run the engine at idle for one minute.

NOTICE: Idling for more than one minute is required to cool the transaxle fluid and to prevent damage from overheating.

7. Perform the stall test in (2), (1) and (R).
   . Make sure the operation is performed within five seconds. Be sure to provide sufficient cooling time between each stall test.

LINE PRESSURE TEST (FIGURE 7A-13)

1. Connect a tachometer to the engine.
2. Install Adapter J-25695-10 to the transaxle.
3. Connect J-21867 Oil Pressure Gage to the adapter.
4. Measure the line pressure at the stall speed while idling in each range (D), (2) and (R).
   Provide sufficient cooling time between each pressure test.

GOVERNOR PRESSURE TEST (FIGURE 7A-14)

1. Install adapter J-25695-10 to the transaxle.
2. Connect J-21867 Oil Pressure Gage to the adapter.
3. Measure the governor pressure at each speed shown in the chart (Figure 7A-14).

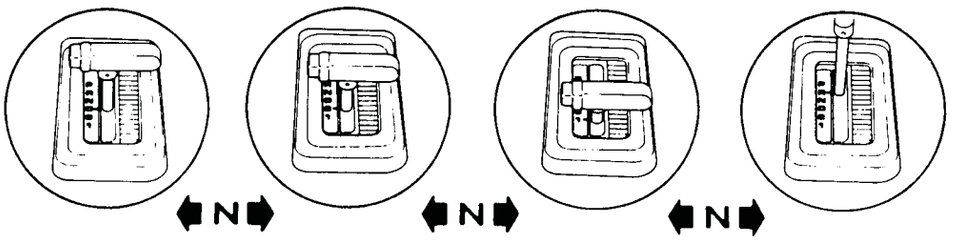
When the pressure does not meet specifications, check the following:

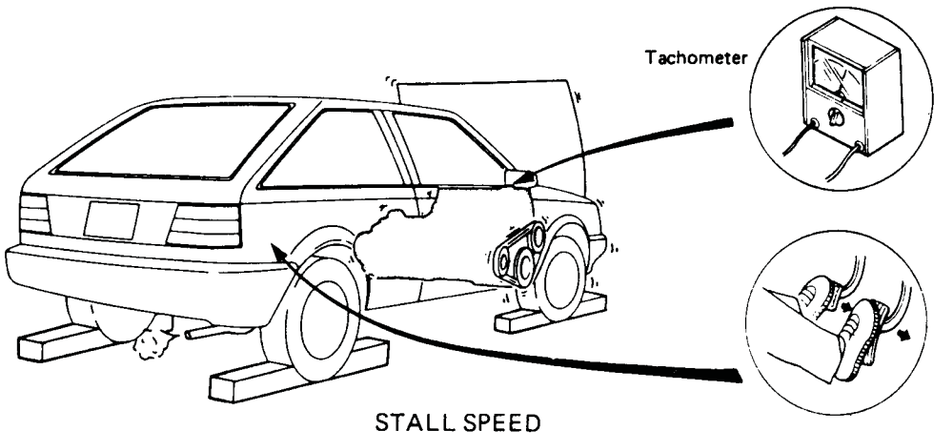
- Fluid is leaking from the line pressure hydraulic circuit.
- Fluid is leaking from the governor pressure hydraulic circuit.
- Faulty governor.

ROAD TEST (FIGURE 7A-15)

Check the vehicle for the following and if any trouble is found, check each part according to the Diagnosis Chart.

- Speed changing upshift is smooth.
- Speed can be changed quickly.
- D1 - D2 - D3 in D.
- Kickdown should be performed within the kickdown limit.
- When shifted from "D" to "2", "D3" changes to "2" and engine braking is applied.
- When shifted from "D" range to "1" range, D3-1/2 - 1/1 and engine braking is applied.
- No upshift in "1".
- No upshift in "2".
- Firmly locked in "P".



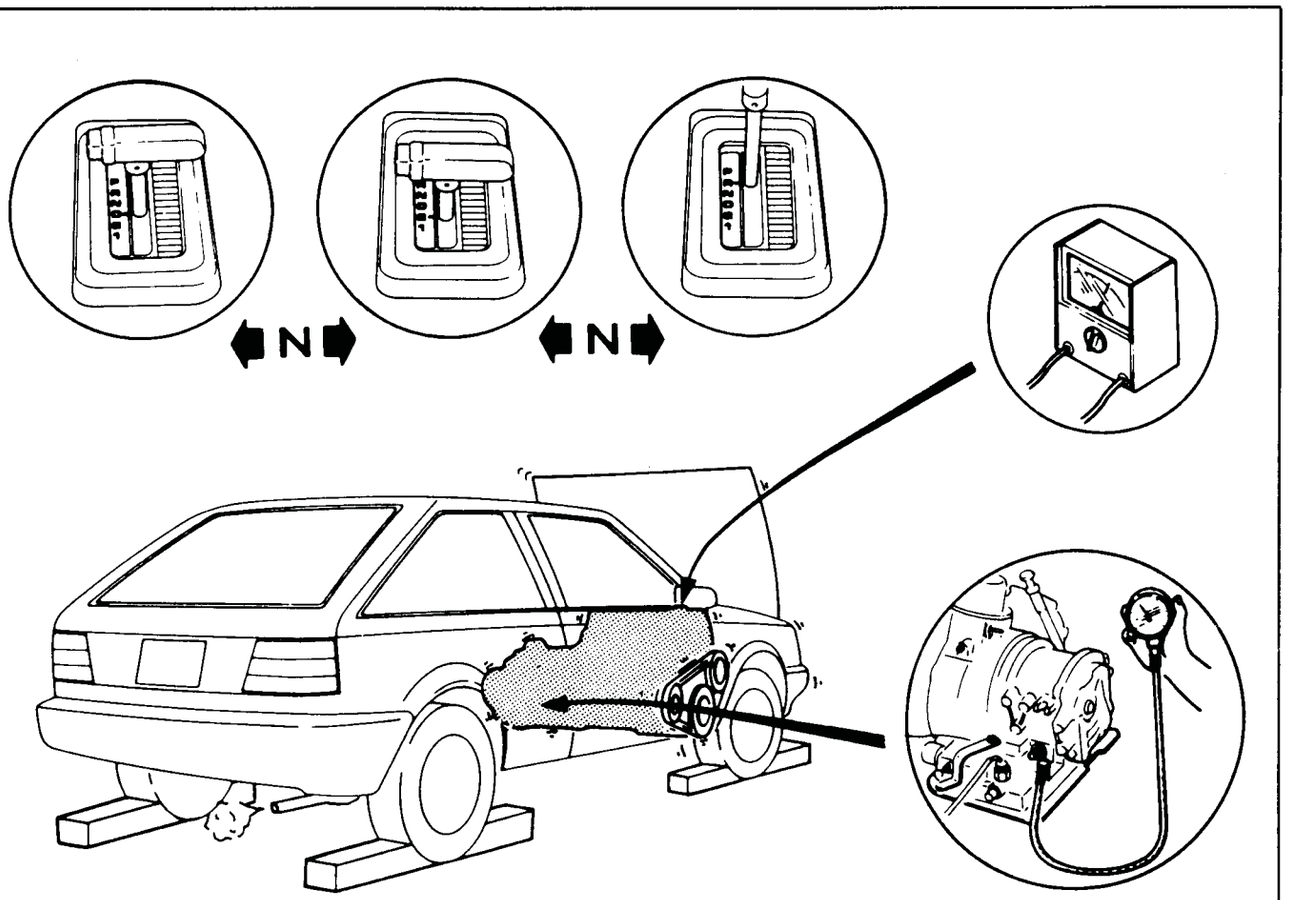


STALL SPEED

AFTER BREAK-IN	2,050 – 2,350 PRM

Stall Speed		Possible Faulty Location
Higher amount than standard	High speed in every range	Low line pressure • Oil pump is weak • Oil leaks from the oil pump control valve or transaxle case • Pressure regulator valve is sticky
	Engine speed is high in D, 2 and 1	Rear clutch is slipping
	Engine speed is high only in D	One-way clutch is slipping
	Engine speed is high only in 2	Brake band is slipping
	Engine speed is high only in R	Low and reverse brakes are slipping Front clutch is slipping Perform a road test to determine whether it is the low and reverse brake or the front clutch • Engine brake is applied in 1 ...Front clutch • Engine brake is not applied in 1 ...Low and reverse brake
Within standard amount		The speed control elements in transaxle are all normal Faulty engine
Lower amount than standard		One-way clutch in torque converter is slipping.

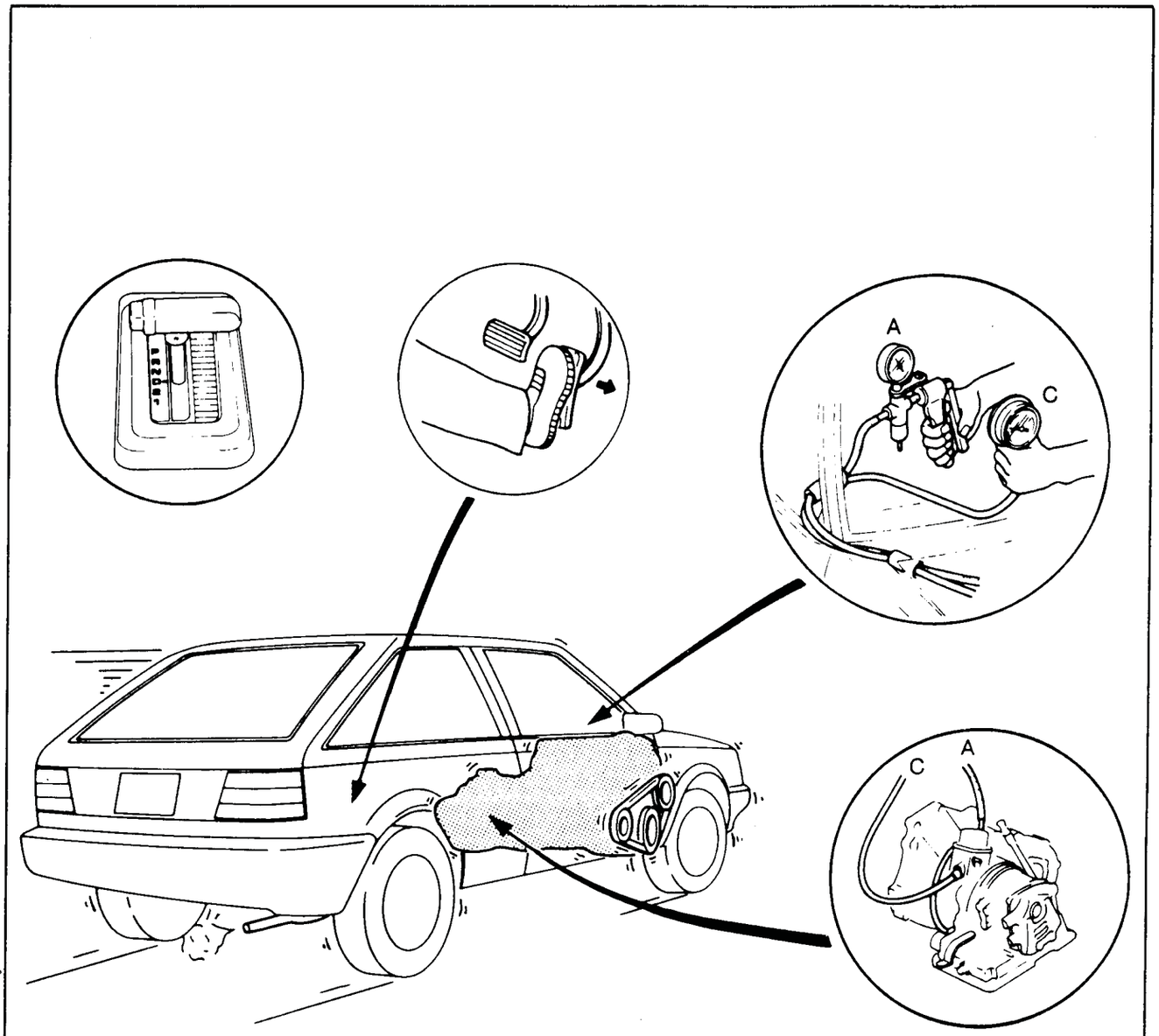
Figure 7A-12 Stall Test Chart



	Line Pressure		
Manual range	D	2	R
When idling	300 — 400 kPa (43 — 57 psi)	800 — 1,200 kPa (114 — 171 psi)	400 — 700 kPa (57 — 110 psi)
At stall speed	900 — 1,100 kPa (128 — 156 psi)	800 — 1,200 kPa (114 — 171 psi)	1,600 — 1,900 kPa (228 — 270 psi)

Line Pressure	Possible Faulty Location
Low pressure in D, 2, 1 or R	• Worm oil pump • Oil is leaking from oil pump, control valve or transaxle case • Pressure regulator valve is sticking • Vacuum throttle valve is sticking
Low pressure in D and 2 only	• Oil is leaking from the hydraulic circuit of "D" and "2" (rear clutch governor)
Low pressure in R only	• Oil is leaking from the hydraulic circuit of R (low and reverse brake)
Line pressure is high when idling	• Vacuum tube is broken or disconnected • Vacuum diaphragm is broken • Vacuum throttle valve is sticking

Figure 7A-13 Line Pressure Test Chart



Speed	Governor Pressure	Speed	Governor Pressure
30 km/h	118 ± 29 kg/cm^2 (17 ± 4 psi)	20 mph	118 ± 29 kg/cm^2 (17 ± 4 psi)
55 km/h	206 ± 34 kg/cm^2 (30 ± 5 psi)	35 mph	206 ± 34 kg/cm^2 (30 ± 5 psi)
80 km/h	343 ± 39 kg/cm^2 (50 ± 6 psi)	55 mph	402 ± 39 kg/cm^2 (58 ± 6 psi)

Figure 7A-14 Governor Pressure Test Chart

Check shift points under following conditions:

Throttle Valve Opening	Completely Closed	Speed Changing Point
Wide open throttle (Kickdown) (0 — 100 mm-Hg, 0 — 3.94 in-Hg)	$D_1 \rightarrow D_2$ $D_2 \rightarrow D_3$ $D_3 \rightarrow D_2$ $D_2 \rightarrow D_1$	51 — 60 km/h (32 — 37 mph) 101 — 110 km/h (63 — 68 mph) 90 — 99 km/h (56 — 62 mph) 40 — 49 km/h (25 — 30 mph)
Half throttle (200 ± 10 mm-Hg, 7.87 ± 0.39 in-Hg)	$D_1 \rightarrow D_2$ $D_2 \rightarrow D_3$ $D_3 \rightarrow D_2$ $D_2 \rightarrow D_1$	12 — 21 km/h (8 — 13 mph) 55 — 63 km/h (34 — 39 mph) 28 — 36 km/h (17 — 22 mph) 10 — 18 km/h (6 — 11 mph)
Fully closed throttle Manual "1"	$1_2 \rightarrow 1$	40 — 48 km/h (25 — 30 mph)

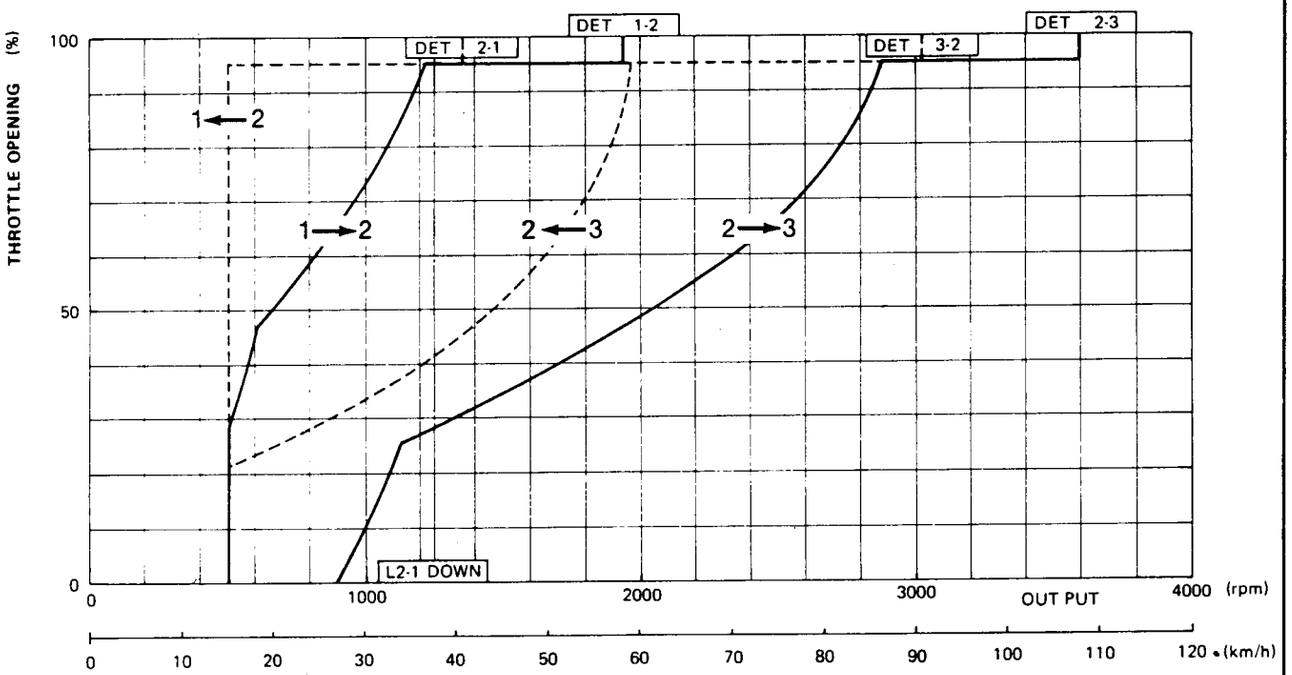
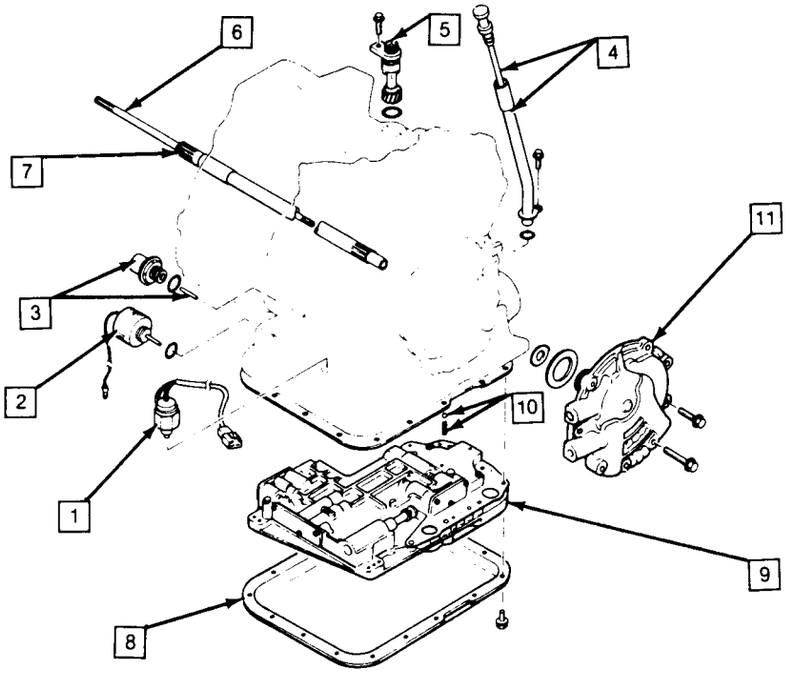
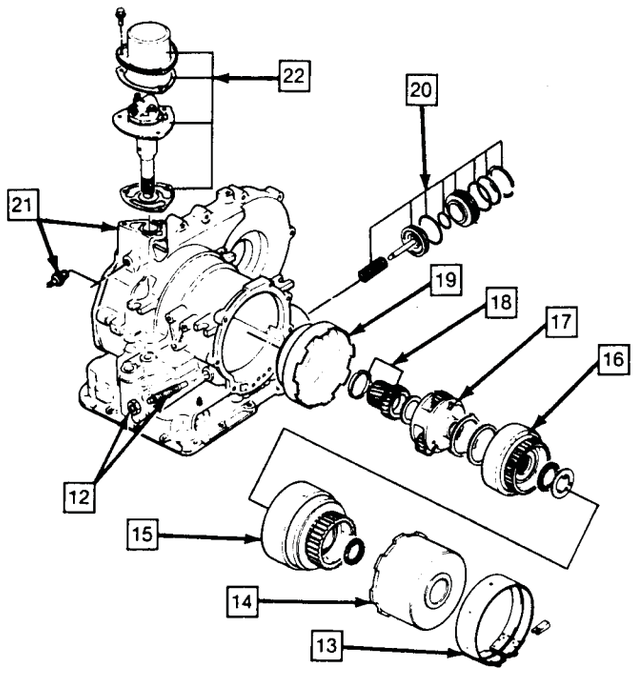


Figure 7A-15 Road Test Chart



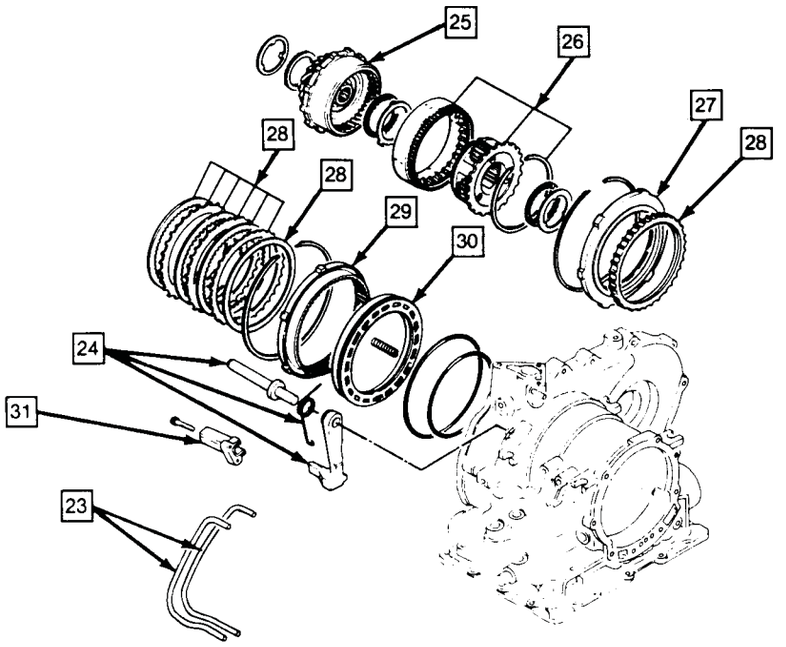
1. INHIBITOR SWITCH
2. KICKDOWN SOLENOID
3. VACUUM DIAPHRAGM AND DIAPHRAGM ROD
4. OIL LEVEL GAUGE AND TUBE
5. SPEEDOMETER DRIVEN GEAR
6. OIL PUMP SHAFT
7. TURBINE SHAFT
8. OIL PAN
9. CONTROL VALVE
10. STEEL BALL AND SPRING
11. OIL PUMP

Figure 7A-16 External Controls



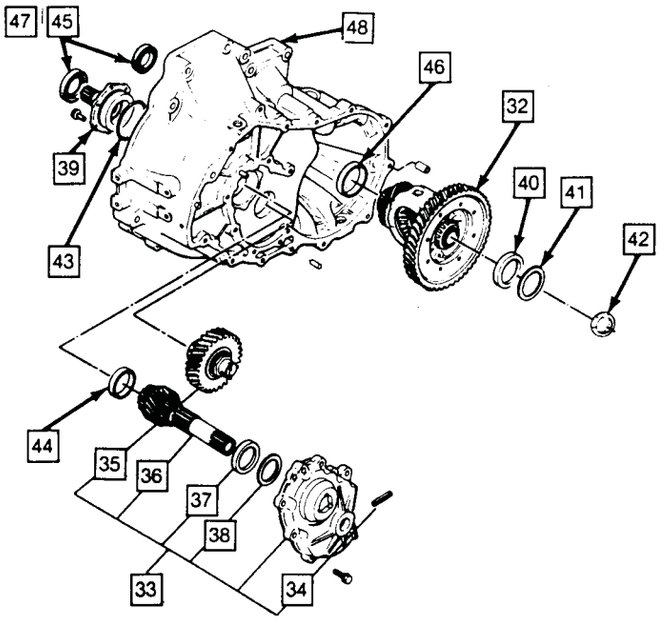
12. ANCHOR END-BOLT AND LOCKNUT
13. BRAKE BAND
14. FRONT CLUTCH
15. REAR CLUTCH
16. REAR CLUTCH HUB ASSEMBLY
17. PLANETARY CARRIER
18. SUN GEAR AND SPACER
19. CONNECTING SHELL
20. SERVO
21. TRANSCASE AND NEUTRAL SWITCH
22. GOVERNOR

Figure 7A-17 Front/Rear Clutch, Servo and Governor Assy.



23. OIL PIPE
24. PARKING PAWL ASSEMBLY
25. DRUM HUB ASSEMBLY
26. ONE-WAY CLUTCH INNER RACE ASSEMBLY
27. ONE-WAY CLUTCH
28. LOW AND REVERSE BRAKE PLATE ASSEMBLY
29. LOW AND REVERSE BRAKE HUB
30. LOW AND REVERSE BRAKE PISTON
31. ACTUATOR SUPPORT

Figure 7A-18 Low/Reverse Clutch Assy.



32. DRIVING AND DIFFERENTIAL ASSEMBLY
33. BEARING HOUSING ASSEMBLY
34. SPRING PIN
35. IDLE GEAR ASSEMBLY
36. OUTPUT GEAR ASSEMBLY
37. BEARING OUTER RACE
38. ADJUSTING SHIM
39. BEARING COVER
40. BEARING OUTER RACE
41. ADJUSTING SHIM
42. OIL SEAL
43. O-RING
44. BEARING OUTER RACE
45. OIL SEAL
46. BEARING OUTER RACE
47. OIL SEAL
48. CONVERTER HOUSING

Figure 7A-19 Final Drive Assy.

UNIT REPAIR

TRANSAXLE

Disassembly

1. Thoroughly clean transaxle case before diassembling.
2. Remove the torque converter.
3. Attach the holding fixture J-35276 to the transaxle and set it on the holding fixture base J-3289-20 (Figure 7A-20).
4. Remove drain plug and drain fluid from transaxle.
5. Remove inhibitor switch and the kickdown solenoid.
6. Remove vacuum diaphrapm and rod (Figure 7A-21).

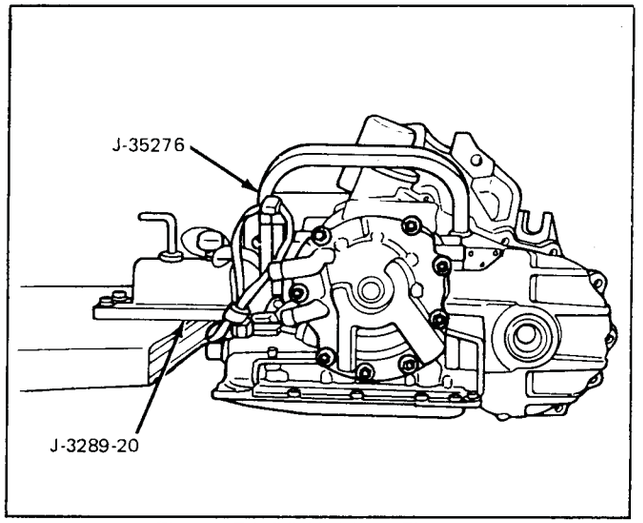


Figure 7A-20 Holding Fixture

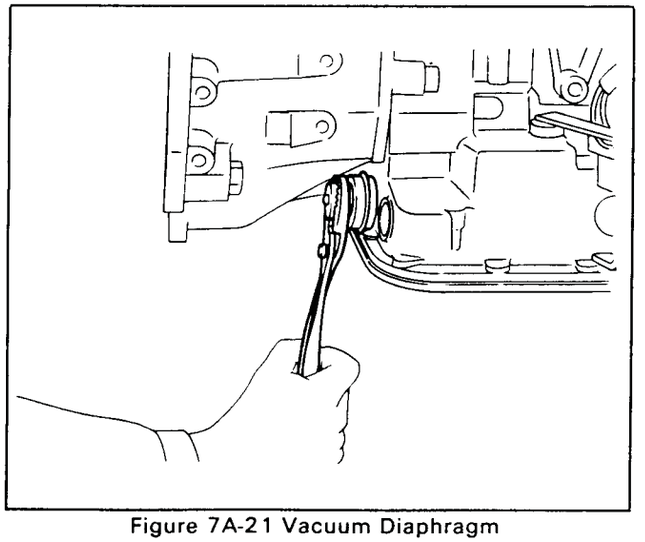


Figure 7A-21 Vacuum Diaphragm

7. Remove oil level gage with the tube.
8. Remove the speedometer driven gear.
9. Remove the oil pump shaft first and then the turbine shaft by pulling outward (Figure 7A-22).

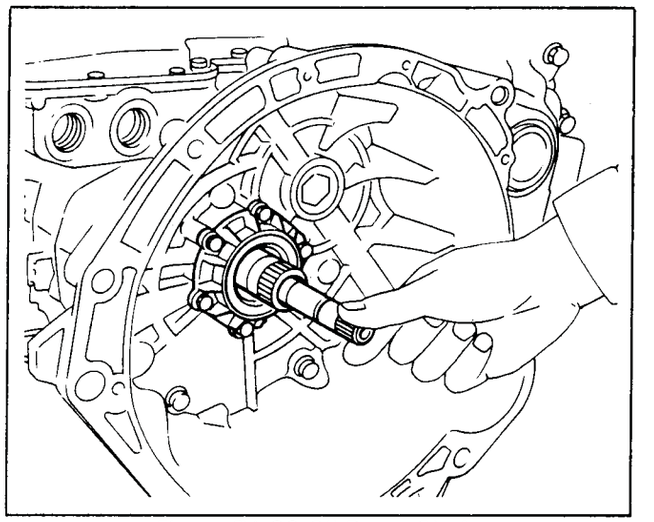


Figure 7A-22 Oil Pump Shaft

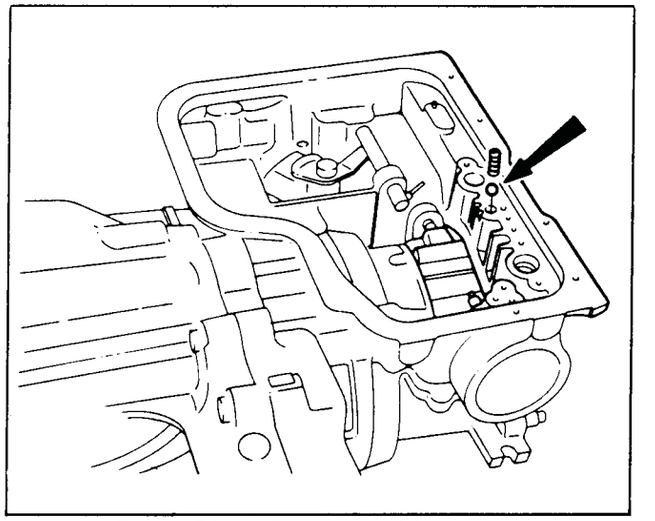


Figure 7A-23 Spring and Check Ball

10. Remove the oil pan.
11. Remove the control valve assembly.
12. Remove the spring and steel check ball from the case (Figure 7A-23).
13. Remove the oil pump assembly. If the oil pump is difficult to remove, tighten the anchor end bolt and lock the front clutch with the brake band (Figure 7A-24).
14. Remove the anchor end bolt and the lock nut.
15. Remove the brake band. To avoid damage to the band, use a paper clip or wire as shown in Figure 7A-25 to prevent the band from fully expanding.
16. Remove the front clutch assembly, rear clutch assembly, rear clutch hub assembly, planetary carrier, sun gear with spacer and the connecting shell (Figure 7A-17).
17. Assemble J-35278 to the case as shown in Figure 7A-26. Remove the snap ring, servo retainer and servo piston from the case.
18. Remove the governor assembly (Figure 7A-17).

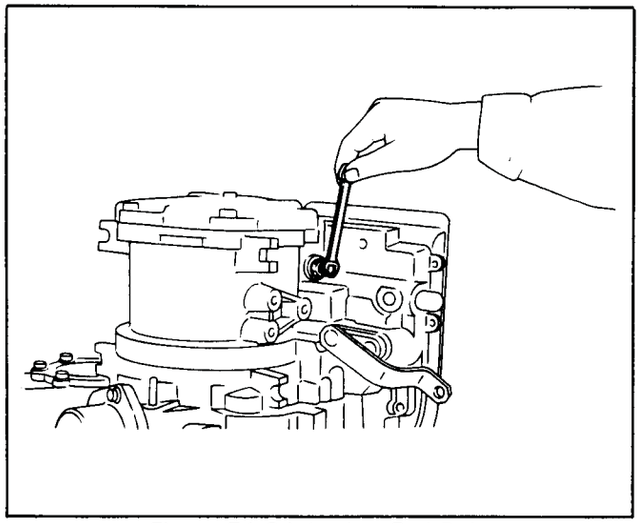


Figure 7A-24 Anchor End Bolt

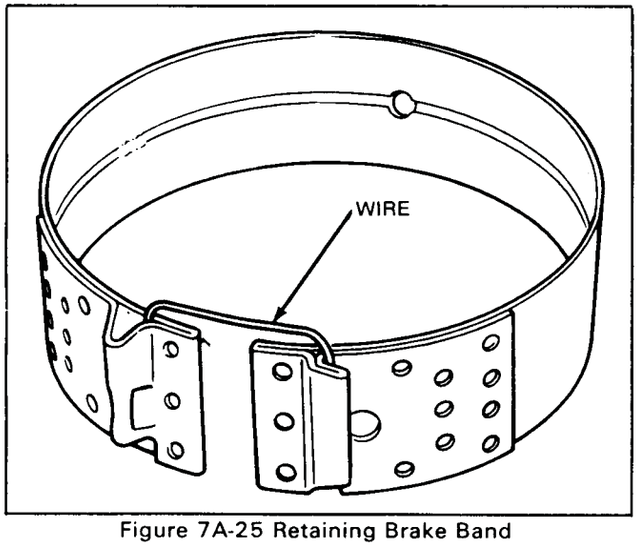


Figure 7A-25 Retaining Brake Band

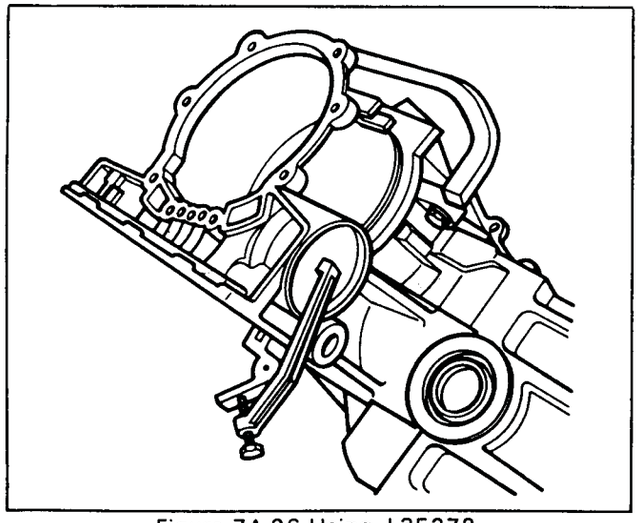


Figure 7A-26 Using J-35278

19. Remove the converter housing to case bolts and remove the housing.

20. Remove the oil pipes as shown in Figure 7A-27. Use care when prying pipes from case to prevent damage to the case to housing surface.

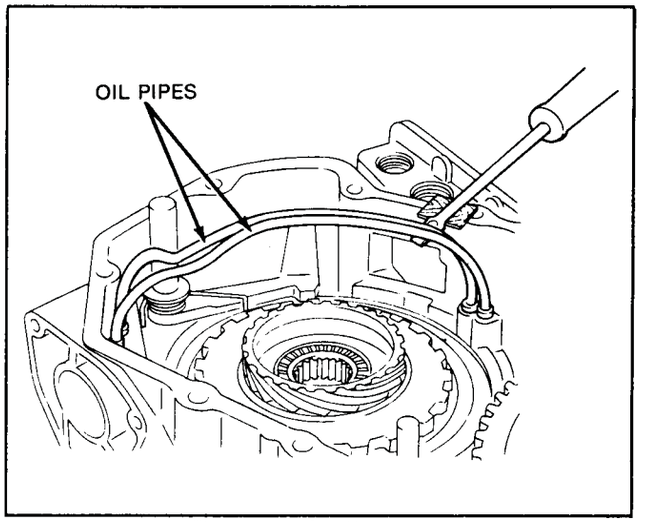


Figure 7A-27 Oil Pipes

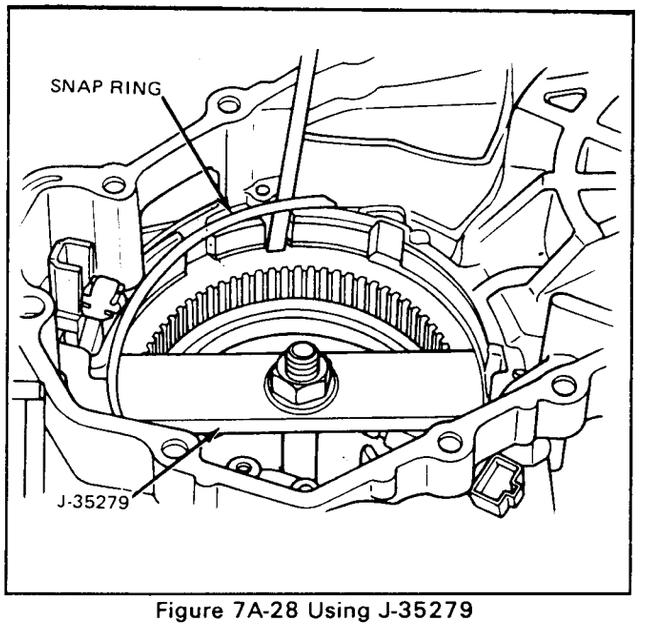


Figure 7A-28 Using J-35279

21. Remove the parking pawl assembly.

22. Remove the differential case assembly.

23. Remove the drum hub assembly and the one way clutch inner race assembly.

24. Remove the snap ring retaining the one way clutch assembly. Remove one way clutch from the case.

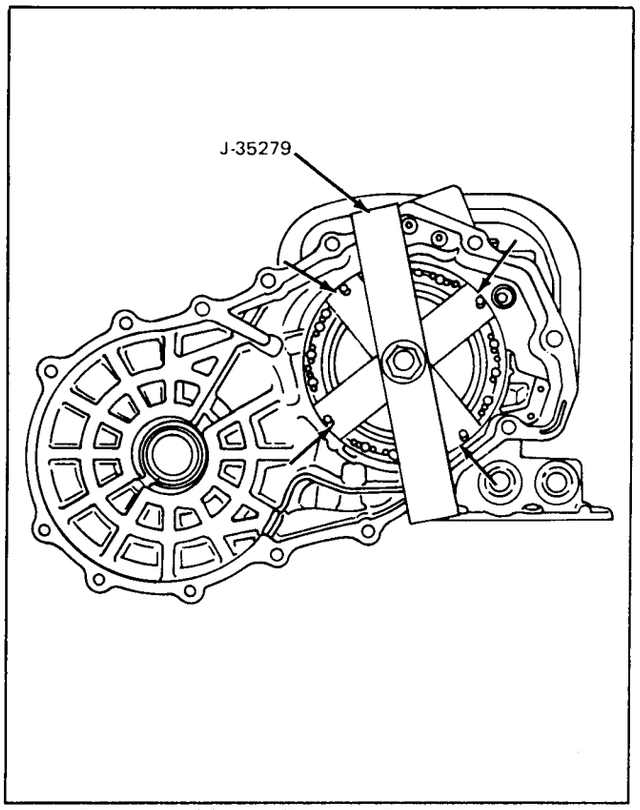


Figure 7A-29 Low/Reverse Piston Removal

25. Install J-35279 as shown in Figure 7A-28. Tighten the bolt to compress the clutch return springs. Remove the snap ring from the clutch return spring retainer. Remove J-35279, spring retainer and springs from the case.
26. Install J-35279 as shown in Figure 7A-29. Thread the four small bolts included with J-35279 through the bar into the piston. Tighten the center bolt to pull piston from the case.

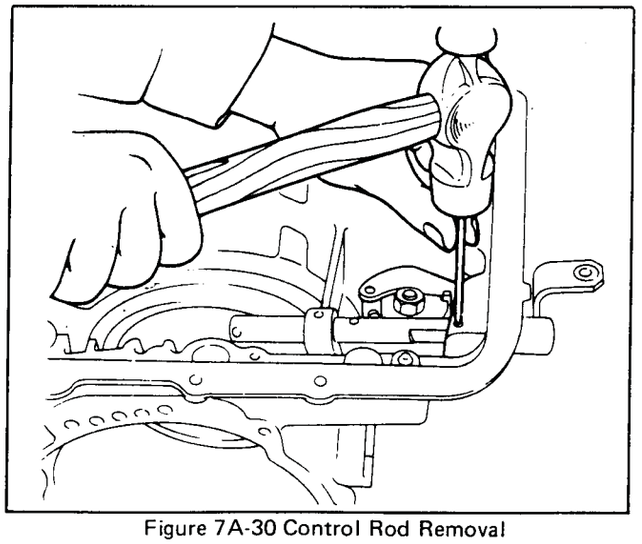


Figure 7A-30 Control Rod Removal

27. Remove the roll pin retaining the manual shaft to the case (Figure 7A-30). Remove the manual shaft from the case.

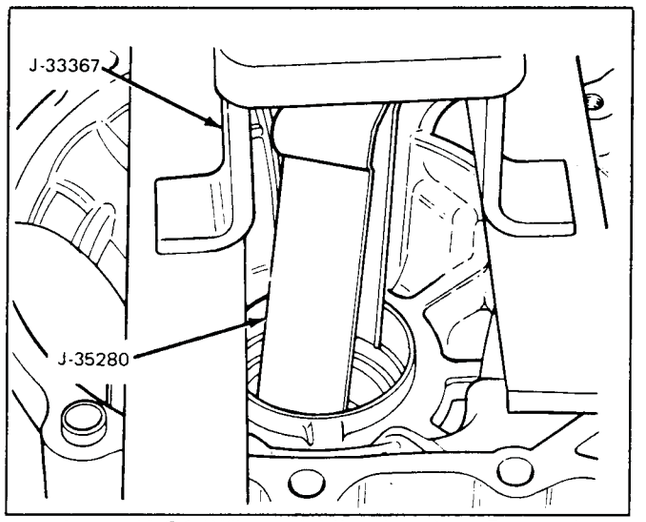


Figure 7A-31 Differential Bearing Race Removal

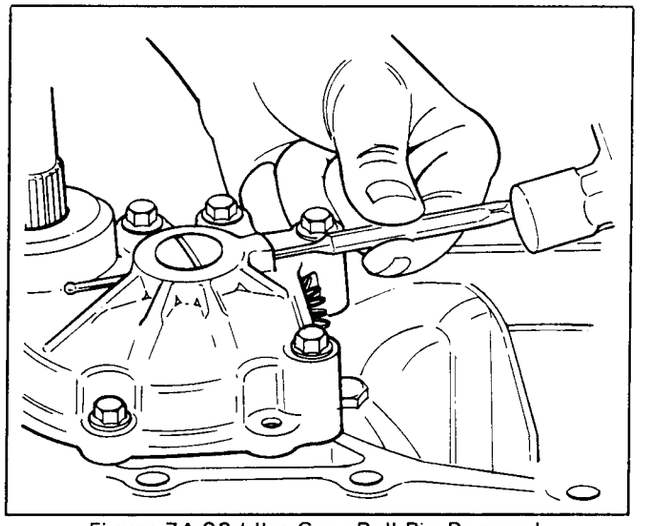


Figure 7A-32 Idler Gear Roll Pin Removal

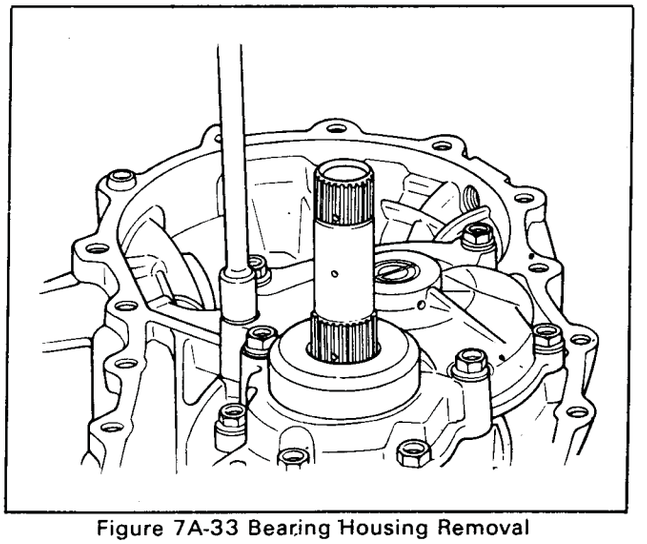


Figure 7A-33 Bearing Housing Removal

28. Remove the differential side bearing outer race and shim from the case using J-33367 puller

bridge and J-35280 bearing race puller (Figure 7A-31). If the shim is damaged during removal, use new shims when reassembling.

29. Using a drift and hammer, remove the roll pin retaining the idler gear to the bearing housing (Figure 7A-32).
30. Remove the bolts retaining the bearing housing to the converter housing. Remove the bearing housing (Figure 7A-33).
31. Remove the output gear from the housing.
32. Remove the idler gear from the housing. Tap idler shaft with soft face hammer from the converter side of the housing for removal (Figure 7A-34).

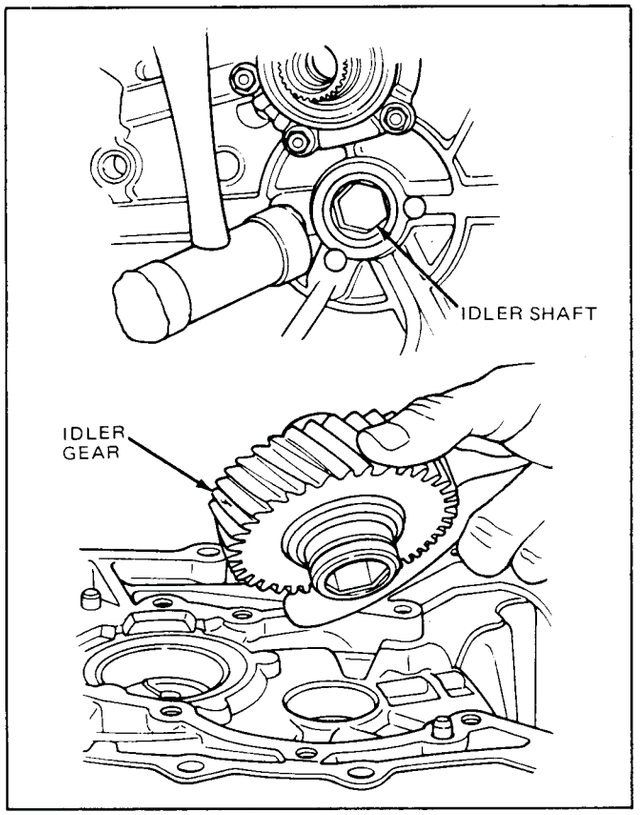


Figure 7A-34 Idler Shaft Removal

33. Remove the bearing outer race from the bearing housing using J-33367 puller bridge with J-35280 bearing race puller (Figure 7A-35).
34. Remove the oil seal from the front bearing cover using J-23129 seal remover and J-6125-1 slide hammer (Figure 7A-36).
35. Use J-31367 puller bridge with J-35280 bearing race puller and remove the bearing race from the converter housing (Figure 7A-37).
36. Remove the differential bearing race from the converter housing using J-33367 puller bridge with J-35280 bearing race remover (Figure 7A-38).
37. Remove the front bearing cover from the converter housing (Figure 7A-39).

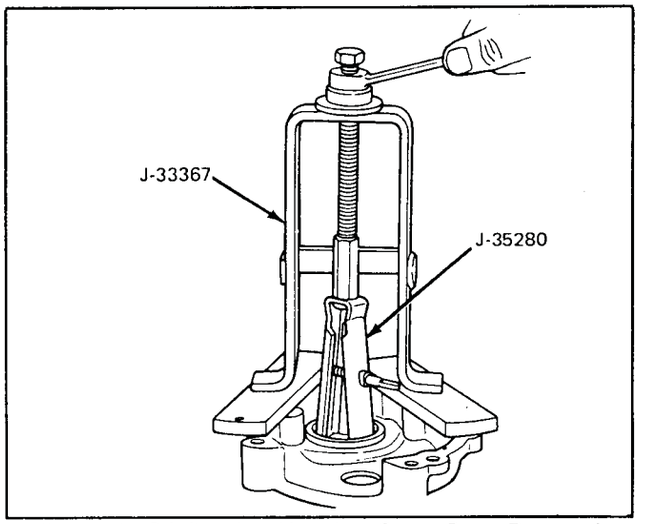


Figure 7A-35 Bearing Housing Outer Race Removal

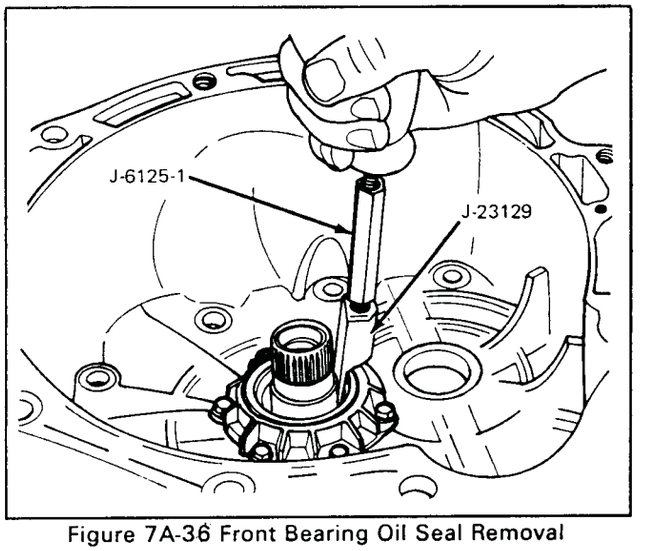


Figure 7A-36 Front Bearing Oil Seal Removal

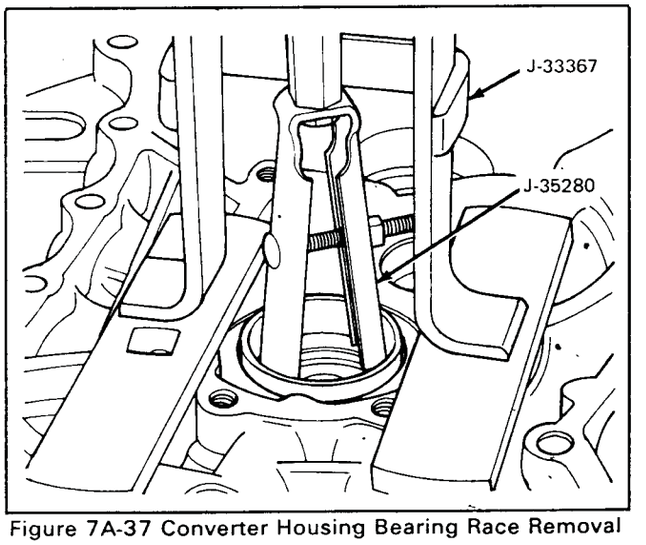


Figure 7A-37 Converter Housing Bearing Race Removal

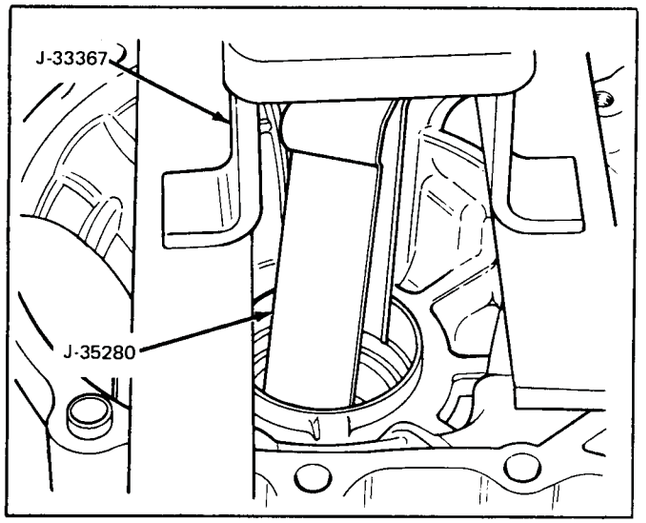


Figure 7A-38 Differential Bearing Race Removal

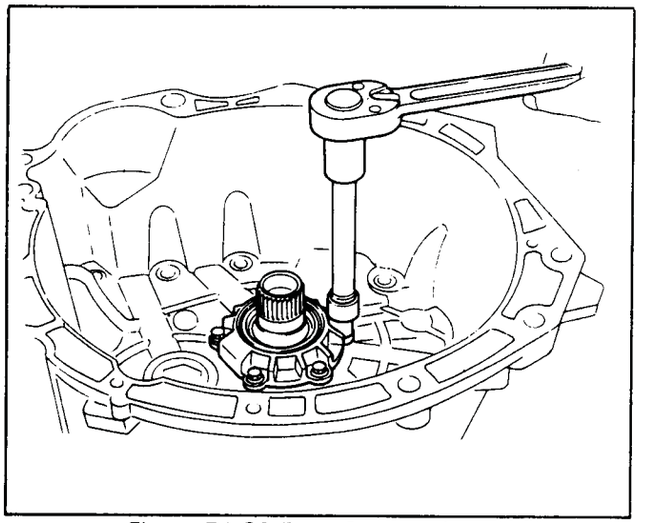


Figure 7A-39 Front Bearing Cover

COMPONENT OVERHAUL

During the disassembly and reassembly of the following components, perform the following:

- Wash each part thoroughly and blow air through each oil passage and groove to eliminate blockage.
- Seal rings, roll pins and gaskets should be replaced with new parts.
- When assembling the components, apply Dexron II automatic transmission fluid to each seal, rotating and sliding part

TORQUE CONVERTER

Inspection

The converter is welded together and cannot be disassembled.

1. Check the converter for damage or cracks and replace it if any defect is found.
2. Check the converter's pilot and boss units for rust. Remove any rust found.

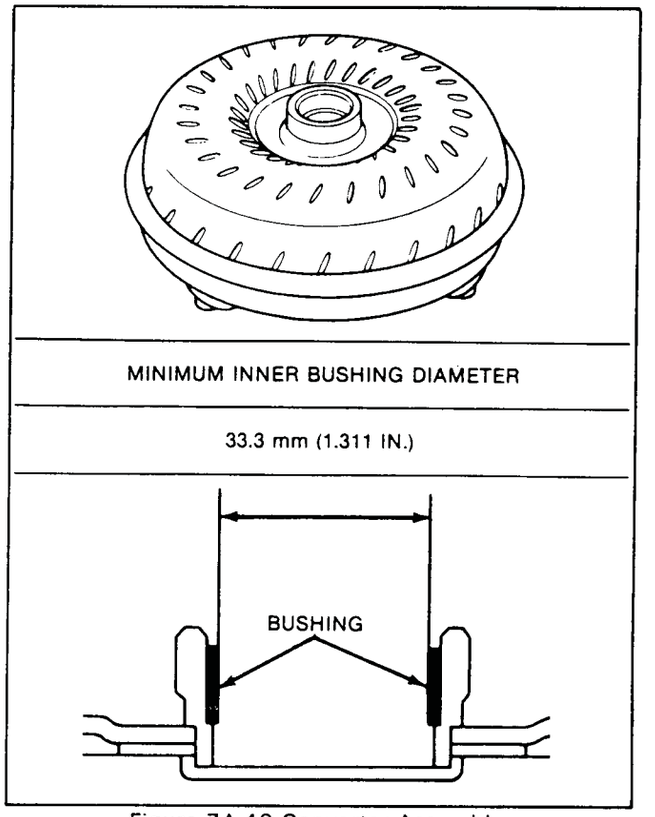


Figure 7A-40 Converter Assembly

3. Measure the bushing in the boss and, if worn, replace the converter assembly (Figure 7A-40).
4. Drain any fluid remaining in the converter.
5. Pour kerosene into the converter.
6. Wash the inside by shaking and then drain.
7. Blow air into the converter until the inside is completely empty.
8. Pour clean Dexron II ATF into the converter.
9. Wash the inside again by shaking and then drain.

OIL PUMP (FIGURE 7A-41)

Disassembly and Reassembly

1. Disassemble oil pump.
2. Inspect the inner and outer gear tooth surfaces for wear or damage. Replace any defective parts.
3. Measure oil pump clearances as shown in Figure 7A-42. Replace any part that is not within the limits shown.
4. Assemble oil pump. Tighten pump bolts to 23 N·m (16 ft. lbs.).
5. Install oil pump shaft into the pump and make sure gears turn easily.

FRONT CLUTCH (FIGURE 7A-43)

Disassembly

1. Remove the large snap ring from the front clutch pack as shown in Figure 7A-44.
2. Remove the clutch pack from the clutch hub.
3. Use J-23327 clutch spring compressor with a press and compress the piston retain springs.

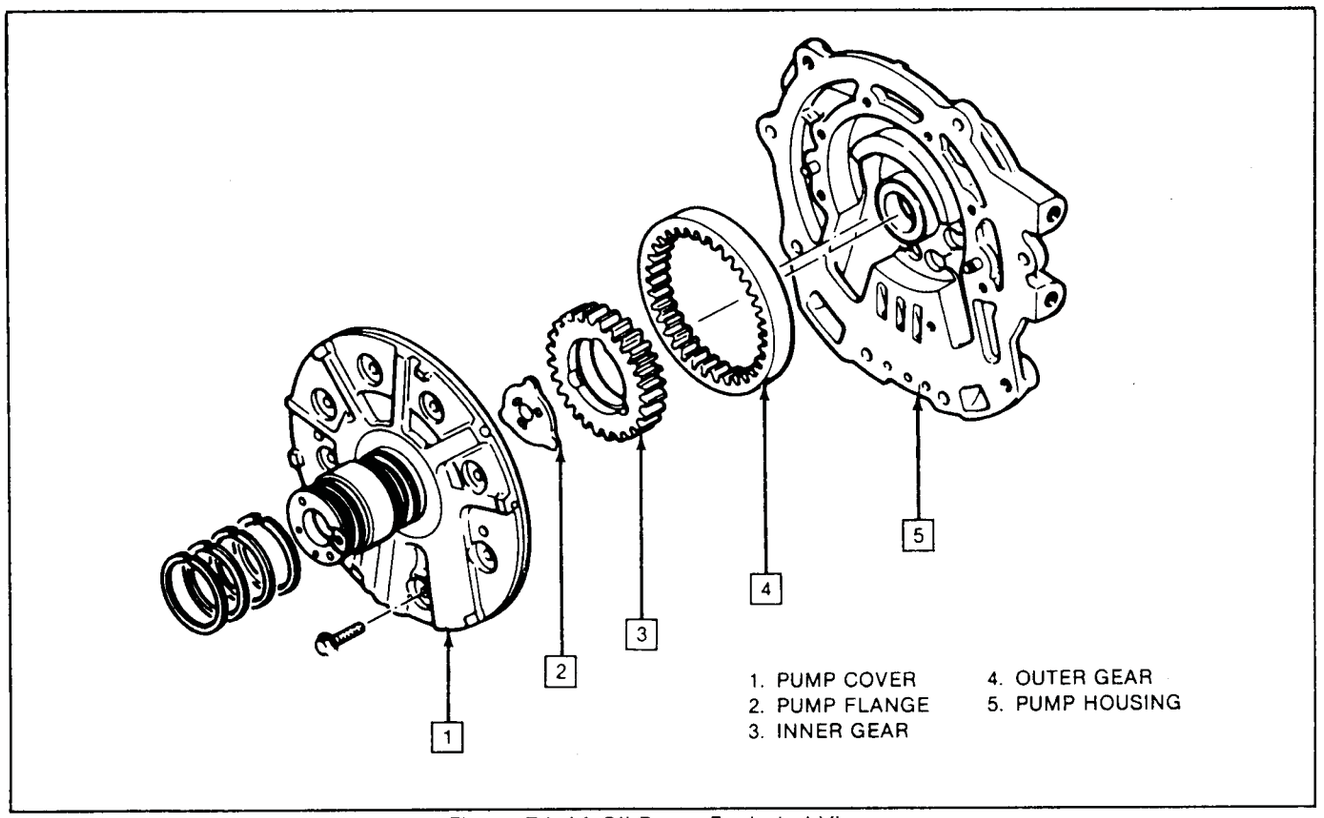


Figure 7A-41 Oil Pump Exploded View

Remove the snap ring from the piston spring retainer (Figure 7A-45).

4. Remove the spring retainer and (10) springs from the front clutch piston (Figure 7A-46).
5. Apply air to the clutch hub to remove the piston as shown in Figure 7A-47.
6. Measure the drum bushing inside diameter. Replace the drum if the bushing is out of specification.
   - 1.735mm (1.735 in.) Maximum I.D.
7. Remove the "O" ring from the clutch hub.
8. Inspect the clutch components for the following and replace any defective parts.
   - Damaged or worn clutch plates.
   - Damaged or worn snap rings.
   - Damaged or worn spring retainer.
   - Free length of piston springs. 25.2 - 27.2mm (0.992 - 1.071 in.).

Reassembly

Apply clean Dexron II automatic transmission fluid on seals and seal surfaces before assembling.

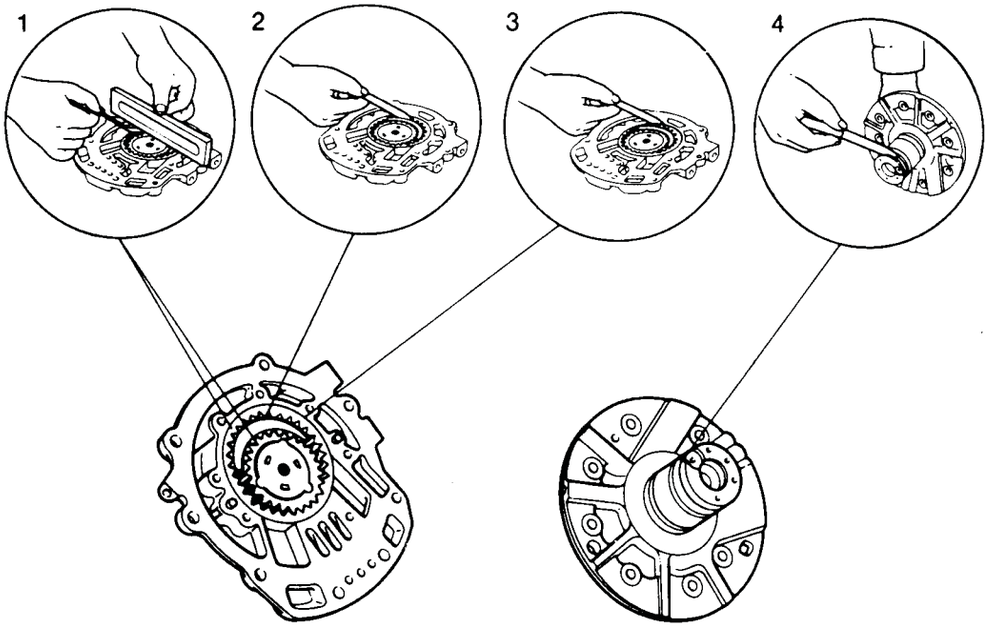
1. Install a new seal on the clutch piston.
2. Install a new "O" ring seal on the clutch hub.
3. Install the clutch piston in the front clutch hub.
4. Install (10) return springs and spring retainer in the clutch hub.
5. Compress the return springs using J-23327 with a press. Install a new snap ring on the spring retainer.
6. Install the dished plate in the clutch hub with the concave side facing the piston.
7. Install (3) steel and (3) fiber clutch discs in the clutch hub. The first disc installed on the dished plate is steel (Figure 7A-48).
8. Install the backing plate onto the clutch disc with the smooth side down. Install a new snap ring in the clutch hub.
9. Place the assembled front clutch on the pump hub as shown in Figure 7A-49. Install a dial indicator as shown with the pin positioned on the backing plate. To measure clutch pack travel, engage the clutch by applying air to the pump as shown and record reading.

   If the dial indicator reading is not within the clearance specifications, change the thickness of the retaining plate. Available sizes are shown in Figure 7A-49.

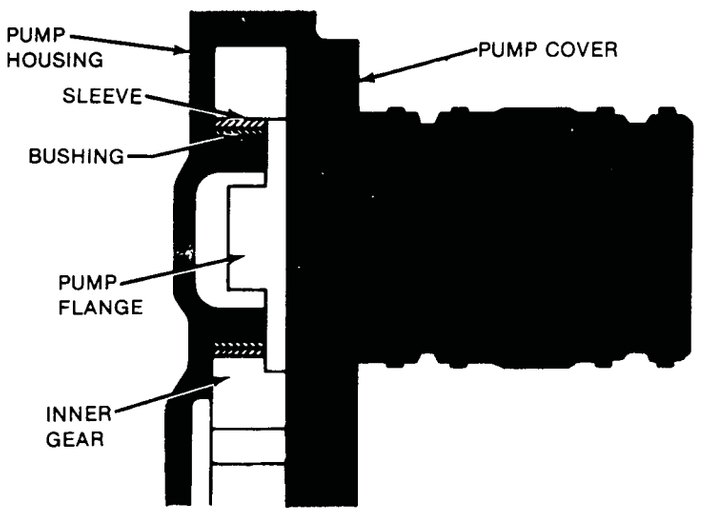
REAR CLUTCH (FIGURE 7A-50)

Disassembly

1. Remove the large snap ring from the rear clutch pack as shown in Figure 7A-51.
2. Remove the clutch pack from the clutch hub.
3. Use J-23327 clutch spring compressor with a press and compress the piston return springs. Remove the snap ring from the piston spring retainer (Figure 7A-52).
4. Remove the spring retainer and (10) springs from the rear clutch piston (Figure 7A-53).
5. Apply air to the clutch hub to remove the piston as shown in Figure 7A-54.
6. Remove the "O" ring from the clutch hub.



	Measured Location	Standard Value	Limit
1	Inner gear — Pump cover Outer gear — Pump cover	0.02 — 0.04 mm (0.001 — 0.002 in.)	0.08 mm (0.003 in.)
2	Head of outer gear teeth Crescent dam	0.14 — 0.21 mm (0.006 — 0.008 in.)	0.25 mm (0.010 in.)
3	Outer gear - Housing	0.05 — 0.20 mm (0.002 — 0.008 in.)	0.25 mm (0.010 in.)
4	Seal ring — Seal ring groove	0.04 — 0.16 mm (0.002 — 0.006 in.)	0.40 mm (0.016 in.)



Limit of sleeve outer diameter:	37.900 mm (1.492 in.)
Limit of bushing inner diameter:	38.075 mm (1.499 in.)

Figure 7A-42 Measuring Oil Pump

1. SNAP RING
2. RETAINING PLATE
3. DRIVE AND DRIVEN PLATE
4. DISHED PLATE
5. SNAP RING
6. SPRING RETAINER
7. RETURN SPRING
8. PISTON
9. SEAL RING
10. FRONT CLUTCH DRUM

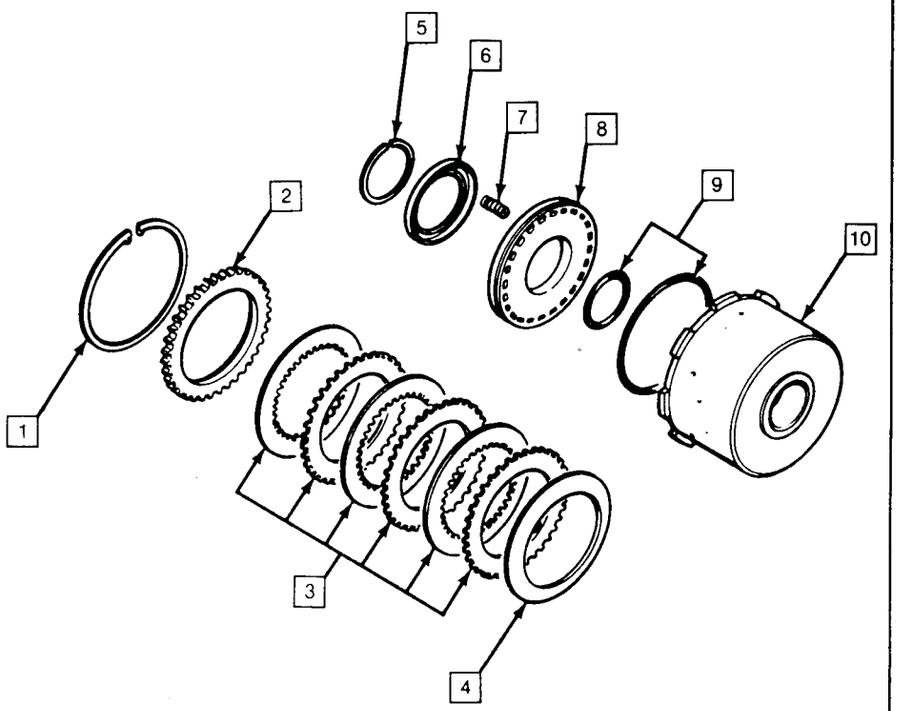


Figure 7A-43 Front Clutch Exploded View

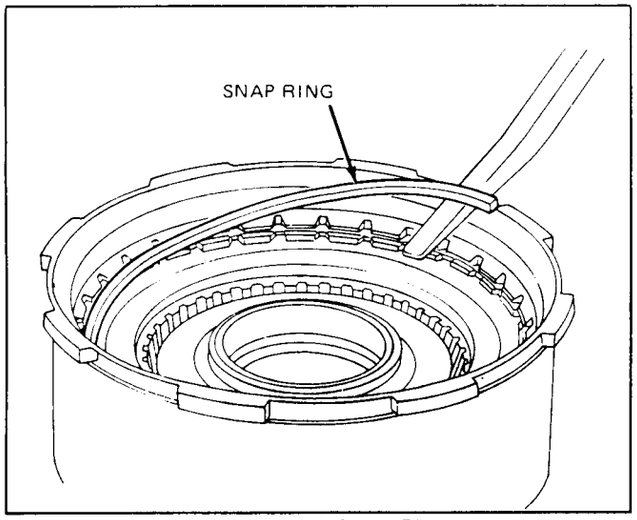


Figure 7A-44 Snap Ring

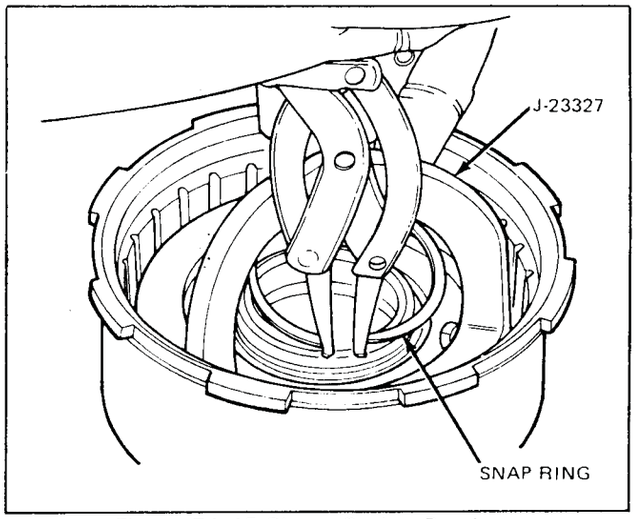


Figure 7A-45 Piston Spring Retainer

7. Inspect the clutch components for the following and replace any defective parts.
   - Damaged or worn clutch plates.
   - Damaged or worn snap rings.
   - Damaged or worn spring retainer.
   - Free length of piston springs. 25.2 - 27.2mm (0.992 - 1.071 in.).

Reassembly

Apply clean Dexron II automatic transmission fluid on seals and seal surfaces before assembling.

1. Install a new seal on the clutch piston.
2. Install a new "O" ring seal on the clutch hub.
3. Install the clutch piston in the rear clutch hub.
4. Install (10) return springs and spring retainers in the clutch hub.
5. Compress the return springs using J-23327 with a press. Install a new snap ring on the spring retainer.
6. Install the dished plate in the clutch hub with the concave side facing the piston.
7. Install (4) steel and (4) fiber clutch discs in the clutch hub. The first disc installed on the dished plate is steel (Figure 7A-55).

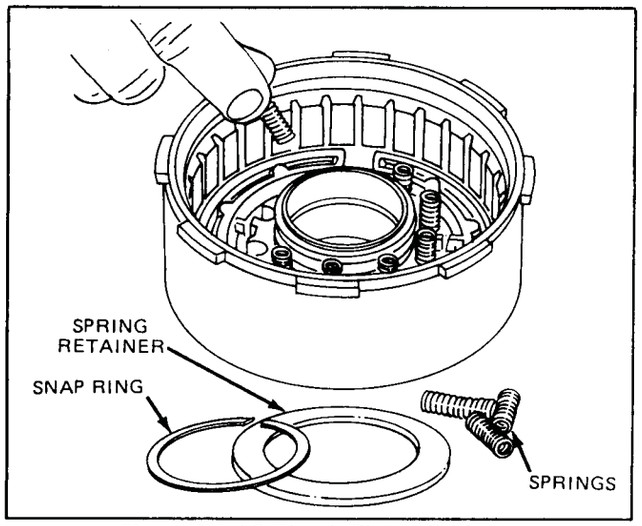


Figure 7A-46 Clutch Piston Springs

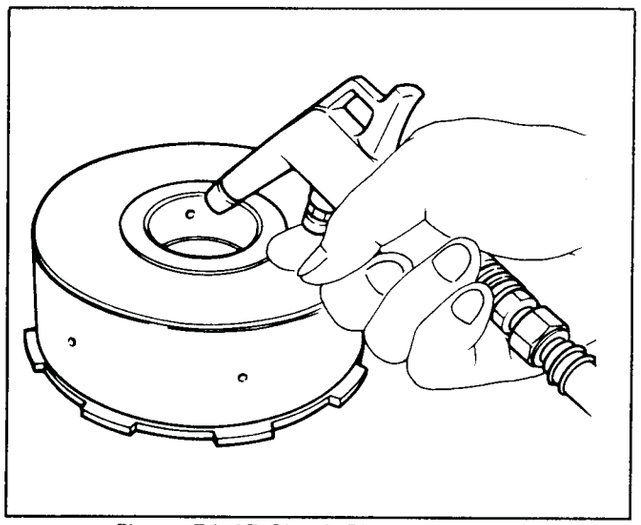


Figure 7A-47 Clutch Piston Removal

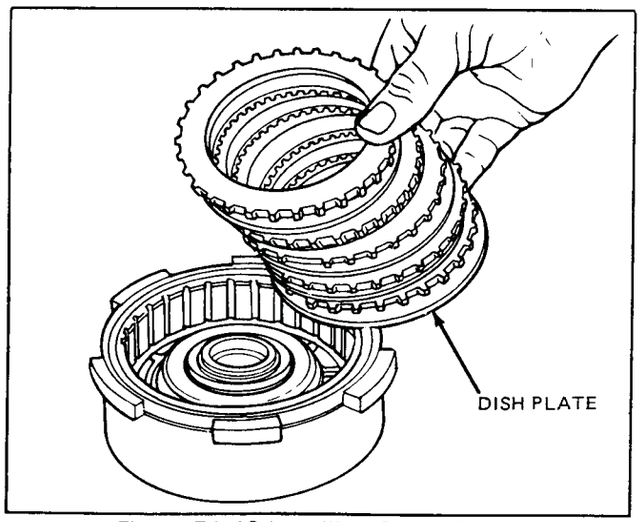


Figure 7A-48 Installing Clutch Discs

8. Install the backing plate onto the clutch discs with the beveled edge facing the clutch discs. Install a new snap ring in the clutch hub.
9. Place the assembled rear clutch on the front clutch as shown in Figure 7A-56. Install a dial indicator as shown with the pin positioned on the backing plate. To measure clutch pack travel, engage the clutch by applying air to the pump as shown and record the reading.

   If the clearance is not within specifications, replace the clutch discs.

DRUM HUB (FIGURE 7A-57)

Disassembly

1. Remove the parking gear spring.
2. Remove the parking gear from the drive hub by pushing in the pins protruding from the drive hub (Figure 7A-58).
3. Remove the snap ring, then separate the internal gear from the drive hub.
4. Inspect the components for the following and replace any defective parts.
   - Broken or worn snap ring.
   - Damaged or worn gears.

Reassembly

1. Install the internal gear in the drive hub.
2. Install a new snap ring to retain the internal gear to the drive hub.
3. Install the parking gear on the drive hub. Make sure pins are seated in the holes on the parking gear.
4. Install the parking gear spring.

REAR CLUTCH HUB (FIGURE 7A-59)

Disassembly

1. Remove the snap ring.
2. Separate the rear clutch hub from the internal gear.
3. Inspect the components for the following and replace any defective parts.
   - Broken or worn snap ring.
   - Damaged or worn gears.

Reassembly

1. Install the clutch hub in the internal gear.
2. Install a new snap ring to retain the clutch hub in the internal gear.

ONE WAY CLUTCH INNER RACE (FIGURE 7A-60)

Disassembly

1. Remove the snap ring.
2. Separate the planetary carrier from the one way clutch inner race.
3. Inspect the components for the following and replace any defective parts.
   - Broken or worn snap ring.
   - Damaged or worn gears.
   - Damaged or worn inner race.

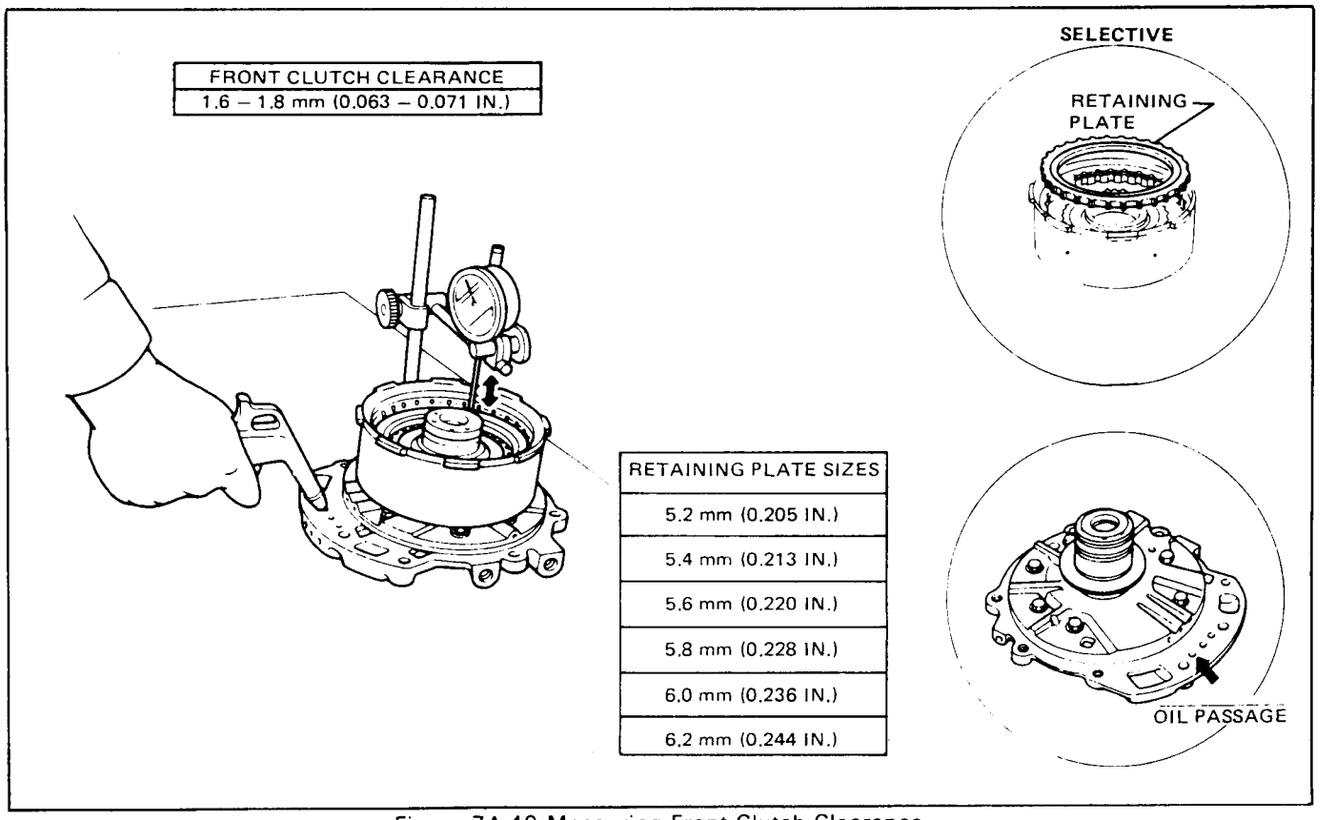
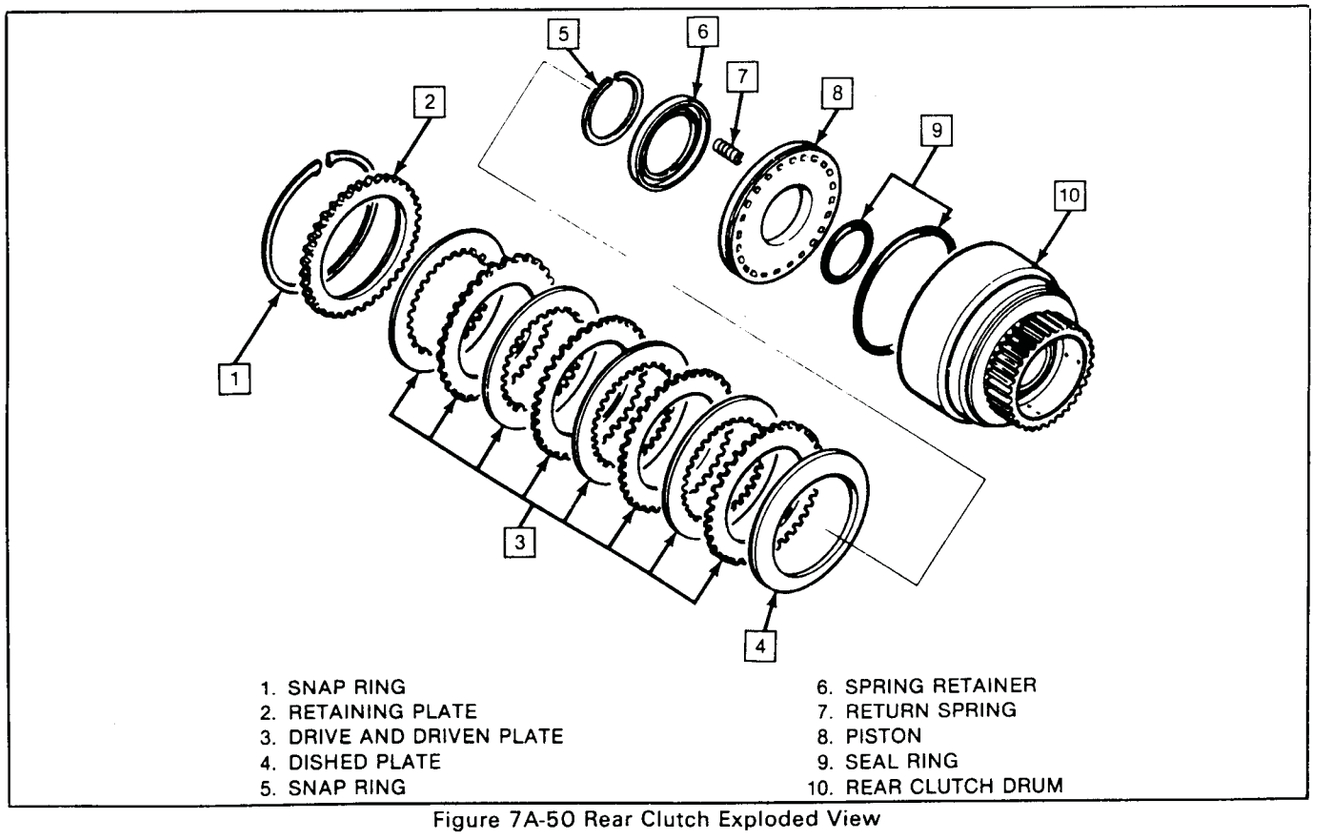


Figure 7A-49 Measuring Front Clutch Clearance



1. SNAP RING
2. RETAINING PLATE
3. DRIVE AND DRIVEN PLATE
4. DISHED PLATE
5. SNAP RING
6. SPRING RETAINER
7. RETURN SPRING
8. PISTON
9. SEAL RING
10. REAR CLUTCH DRUM

Figure 7A-50 Rear Clutch Exploded View

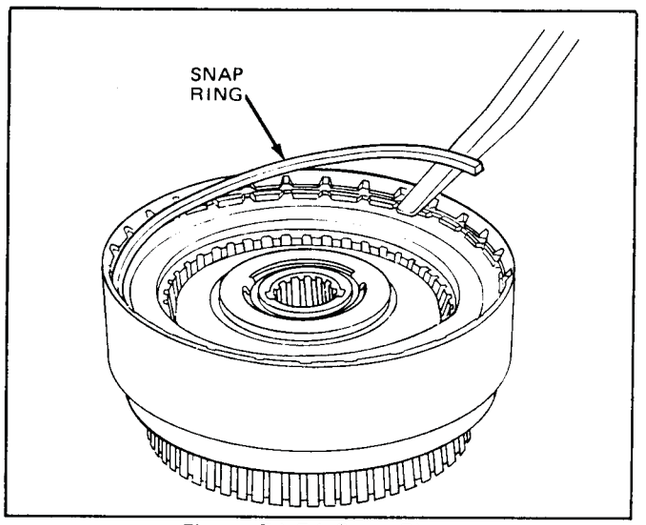


Figure 7A-51 Snap Ring

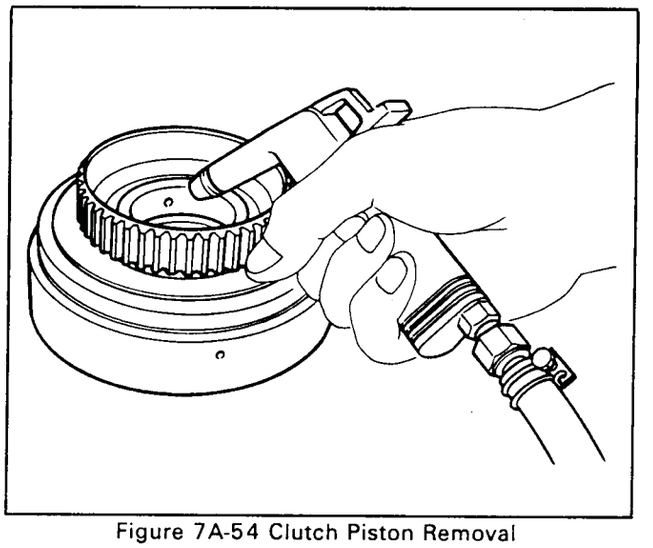


Figure 7A-54 Clutch Piston Removal

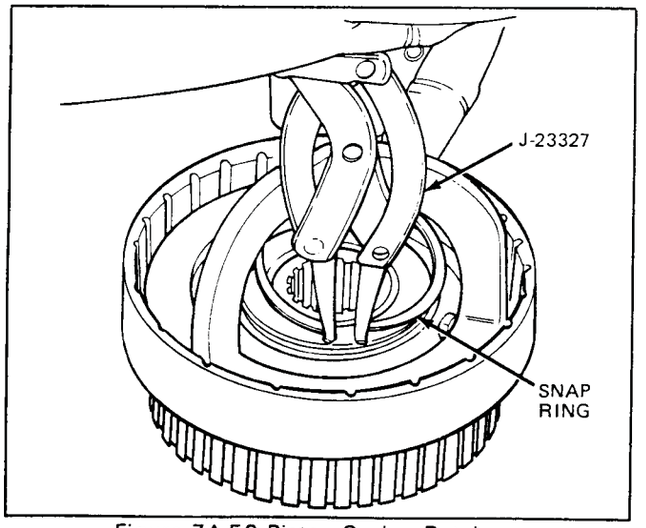


Figure 7A-52 Piston Spring Retainer

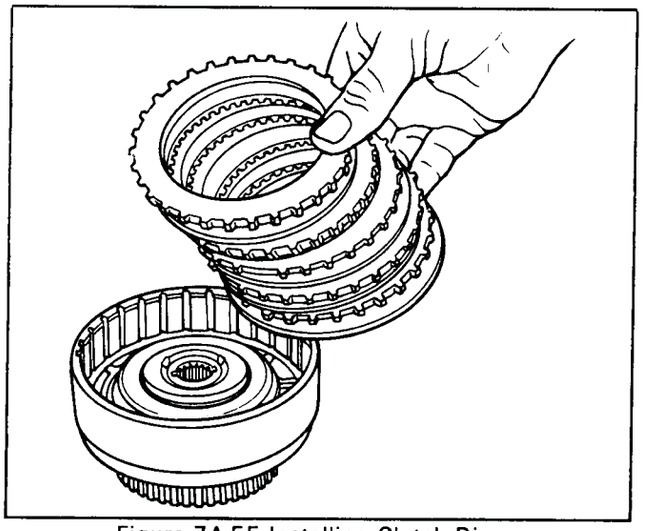


Figure 7A-55 Installing Clutch Discs

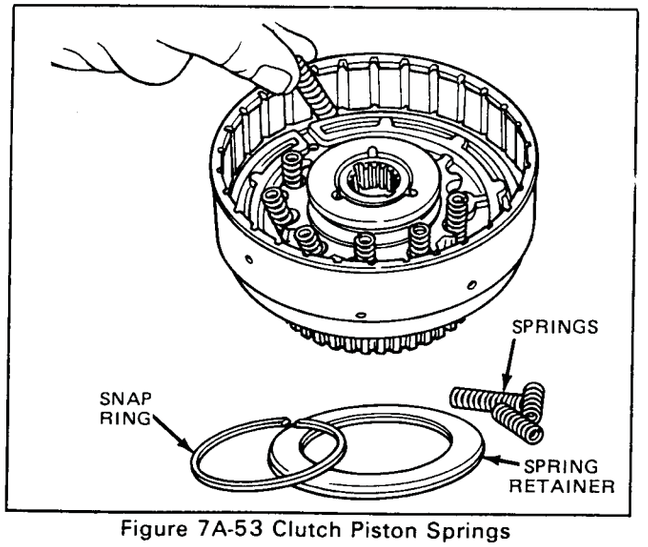


Figure 7A-53 Clutch Piston Springs

- Pinion gear operation.
- Clearance between pinion washer and the planetary carrier (Figure 7A-61).
- Make sure that when the one way clutch is held and the inner race is twisted, the clutch turns smoothly in only one direction.
- Wear on the bushing (Figure 7A-62).

Reassembly

1. Install the planetary carrier in the one way clutch inner race.
2. Install a new snap ring to retain the planetary carrier in the inner race.

LOW AND REVERSE BRAKE

Inspection (Figure 7A-63)

Inspect the components for the following and replace any defective parts.

- Damaged or worn drive plate facings.
- Worn return springs.
  Limit-26.7 - 28.7mm (1.051 - 1.130 in.).
- Damaged or wear on the brake band.

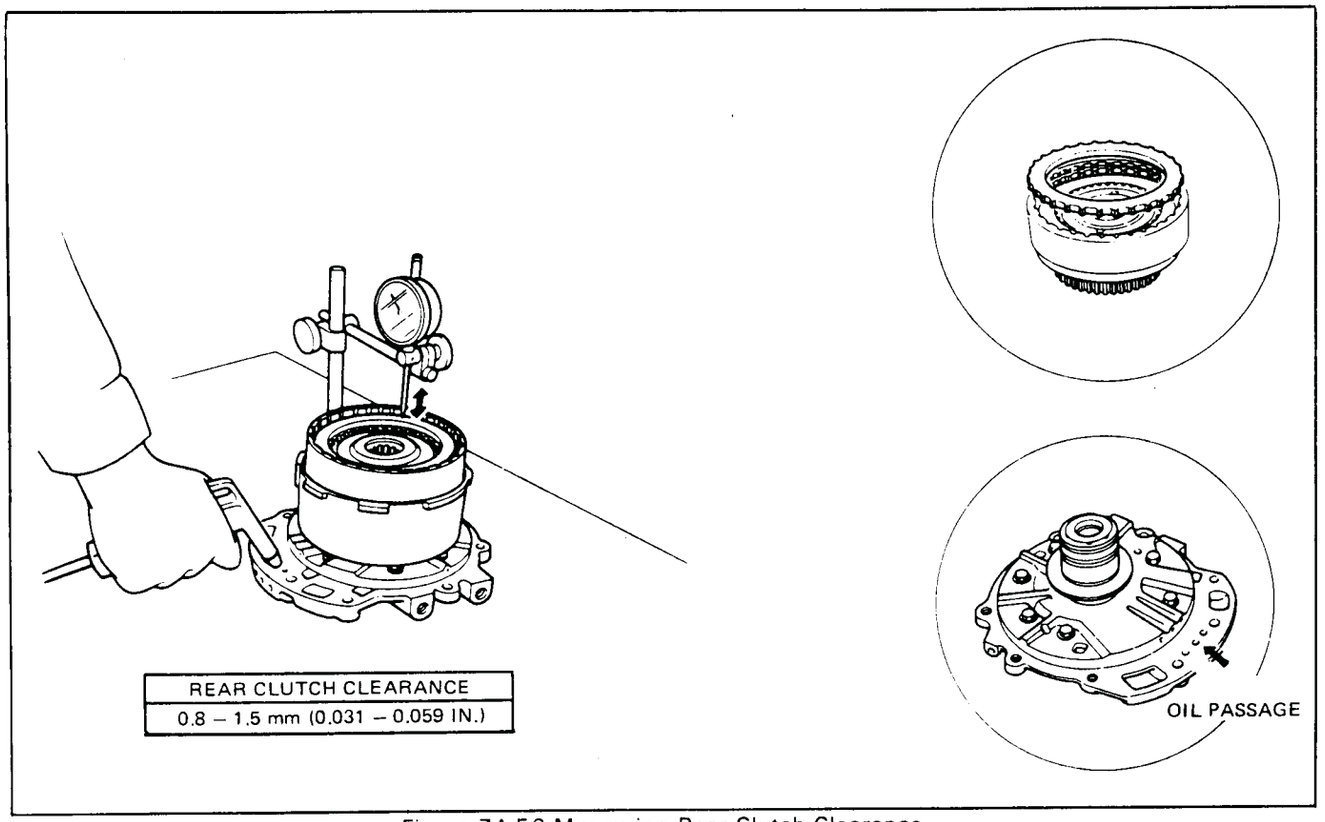


Figure 7A-56 Measuring Rear Clutch Clearance

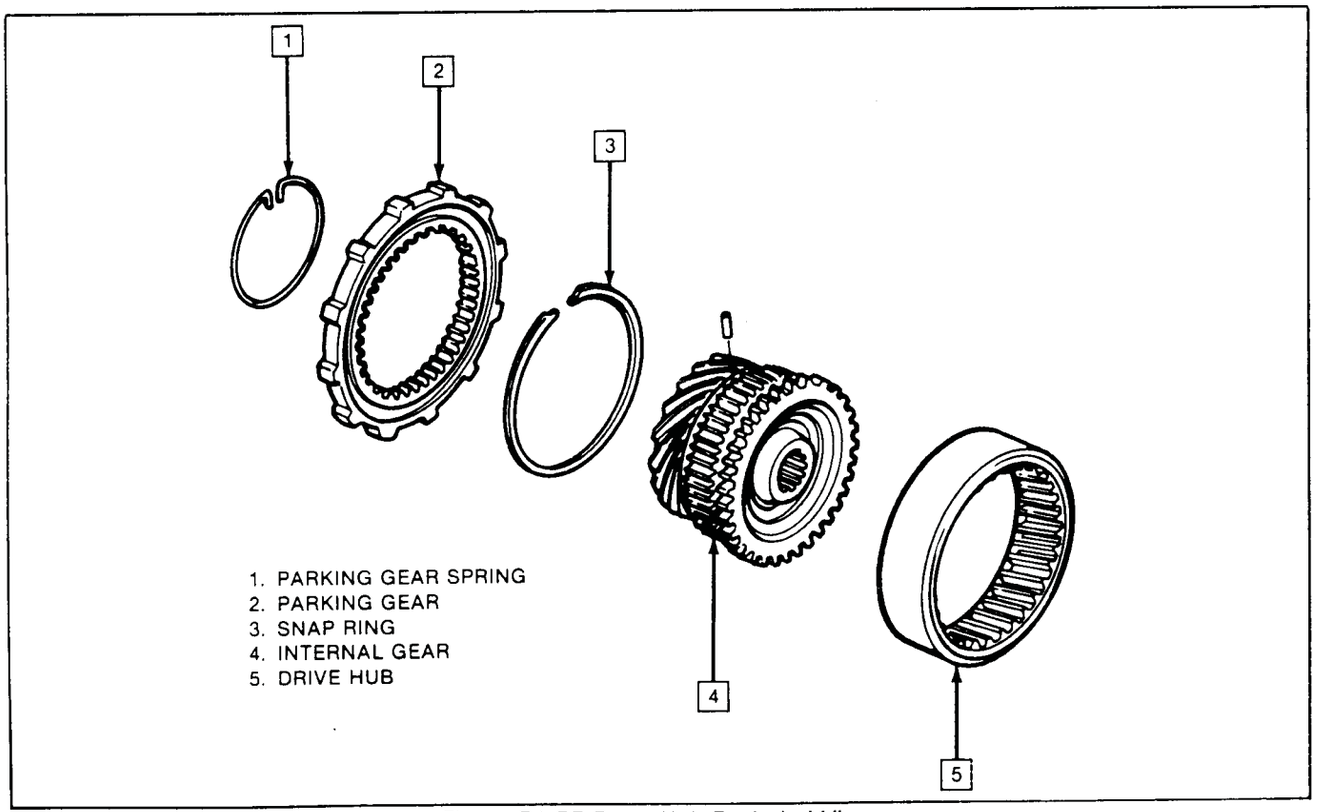


Figure 7A-57 Drum Hub Exploded View

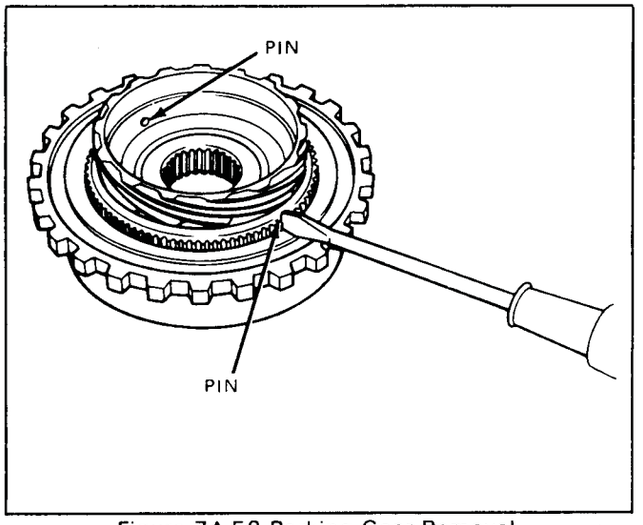


Figure 7A-58 Parking Gear Removal

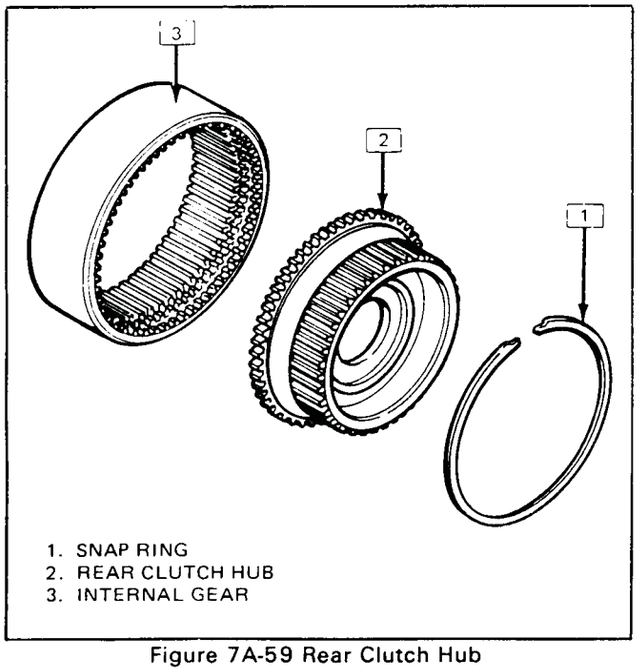


Figure 7A-59 Rear Clutch Hub

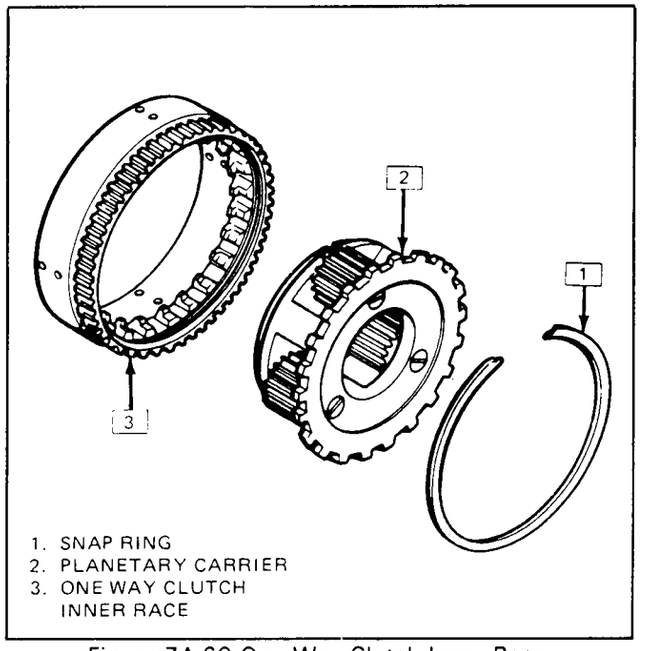


Figure 7A-60 One Way Clutch Inner Race

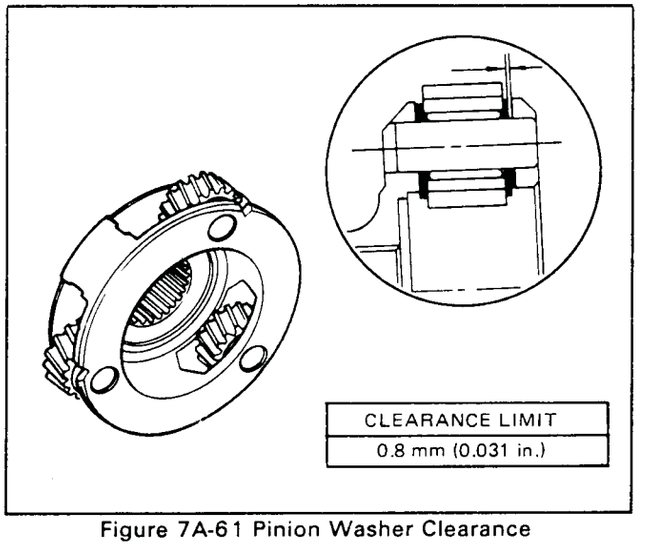


Figure 7A-61 Pinion Washer Clearance

SERVO ASSEMBLY (FIGURE 7A-64)

Inspection

Inspect the components for the following and replace any defective parts.

- Damaged or worn piston.
- Worn return springs.
  Limit-47 - 49mm (1.850 - 1.929 in.).

GOVERNOR ASSEMBLY (FIGURE 7A-65)

Disassembly

1. Remove (2) bolts from the governor body. Remove the body and spacer from the governor shaft assembly.
2. Remove the spring retainers from the governor body by pressing primary return spring. Remove the secondary retainer and return spring the same way (Figure 7A-66).
3. Remove the roll pin from the governor driven gear and remove the gear from the shaft.
4. Remove the governor shaft, bearing and outer race from the sleeve.
5. Inspect the components for the following and replace any defective parts.
   - Damaged or worn valve.
   - Clogged filter.
   - Worn return springs (Figure 7A-67).
   - Valve operation.

Reassembly

1. Install (3) seal rings on the shaft.
2. Install the bearing and the outer race on the sleeve. Install the governor shaft in the sleeve.
3. Install the governor driven gear on the shaft and retain the gear with a roll pin.

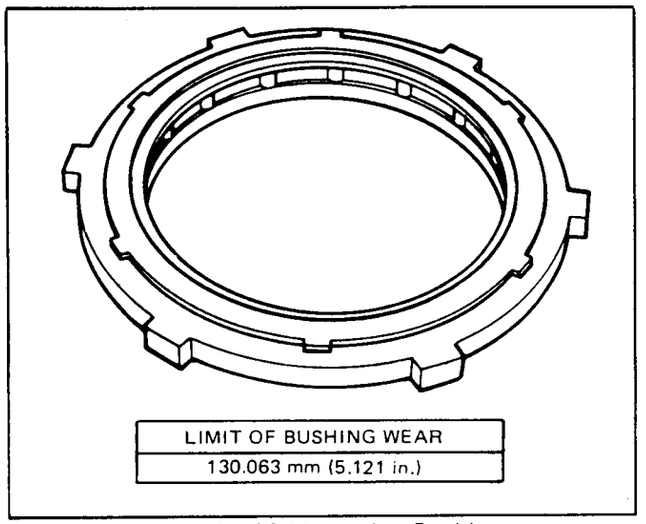


Figure 7A-62 Measuring Bushing

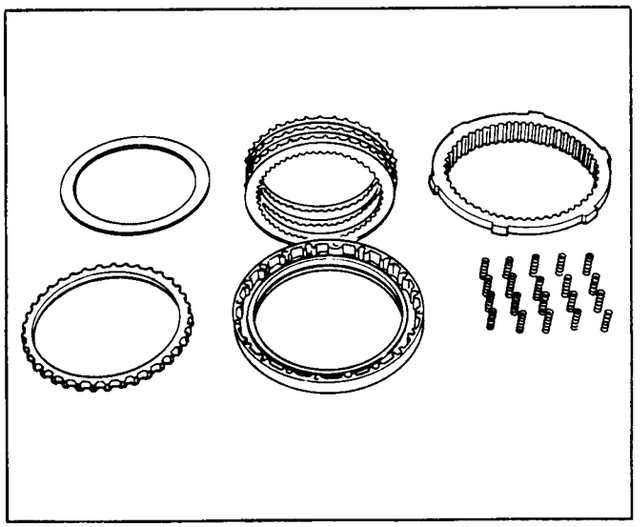


Figure 7A-63 Low and Reverse Brake

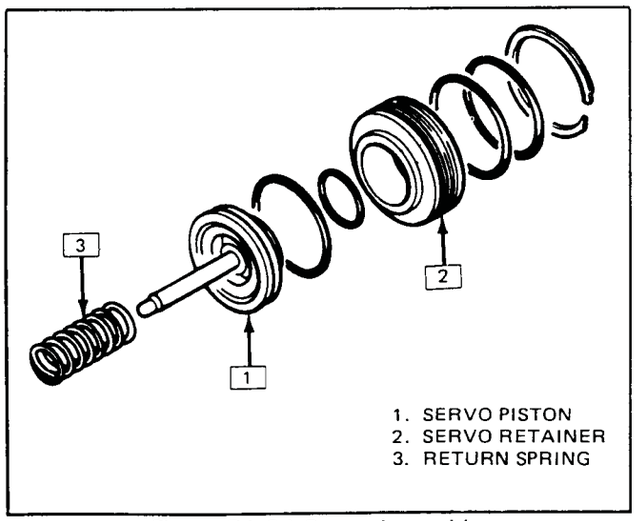


Figure 7A-64 Servo Assembly

4. Install the secondary valve, return spring and retainer plate in the governor body. The secondary return spring is shorter and uses a heavier gage wire than primary return spring.
5. Install the primary valve, return spring and retainer plate in the governor body.
6. Using a new filter, install the filter, spacer and governor body on the shaft. Install the (2) retaining bolts and torque to 7 N·m (5 ft. lbs.).
7. Apply air to the governor in hole "A" as shown in Figure 7A-68 to check the governor valve operation.
   The valve should vibrate and make a buzzing noise when air pressure is applied.

CONTROL VALVE (FIGURE 7A-69)

The control valve is one of the highest-precision parts used in the automatic transaxle and, therefore, it should be handled with the utmost care. Since many part look alike, they should be kept in a well arranged order for reassembly.

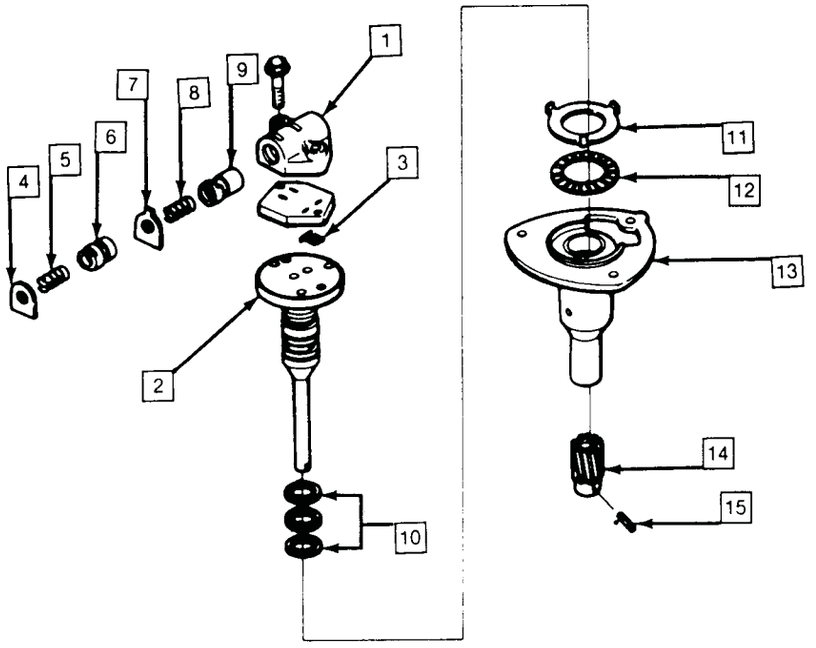
If the clutch has been overheated or the brake band has been burnt, be sure to disassemble, clean and inspect the control valve. Replace any parts that are defective.

Disassembly

1. Remove (3) bolts retaining the filter to the valve body (Figure 7A-70).
2. Remove (4) bolts retaining the valve sub-body and remove the sub-body from the valve body (Figure 7A-71).
3. Remove the manual valve from the valve body (Figure 7A-72).
4. Remove (17) bolts retaining the upper and lower valve bodies. Separate the upper body from the lower body and remove the separator plate.
5. Remove (2) orifices, (1) check ball and (3) springs from the lower valve body.
6. Refer to Figure 7A-69 and disassemble the upper valve body. It is best to arrange parts on a bench in the exact order of removal to ease in reassemble of the valve body.
   Inspect for the following and replace any damaged or worn parts.
   - Damage or wear to each valve.
   - Damage in oil passages.
   - Cracks or damage to each valve body.
   - Valve operations.
   - Spring fatigue (Refer to Figure 7A-73 for spring dimensions).

Reassembly

1. Assemble the upper valve body (Figure 7A-69). When installing the side plate, align the center of the hole that is arrowed in Figure 7A-75 with the center of the vacuum throttle valve.
2. Install the (3) springs, (2) orifices and (1) check ball in the lower valve body as shown in Figure 7A-74.
3. Position the separator plate and the upper valve body on the lower valve body. Install the retaining bolts and torque bolts to the value shown in Figure 7A-75.



1. GOVERNOR BODY
2. GOVERNOR SHAFT ASSEMBLY
3. FILTER
4. RETAINER PLATE
5. RETURN SPRING
6. PRIMARY GOVERNOR
7. RETAINER PLATE
8. RETURN SPRING
9. SECONDARY GOVERNOR
10. SEAL RING
11. BEARING OUTER RACE
12. BEARING
13. SLEEVE
14. GOVERNOR DRIVEN GEAR
15. ROLL PIN

Figure 7A-65 Governor Assembly

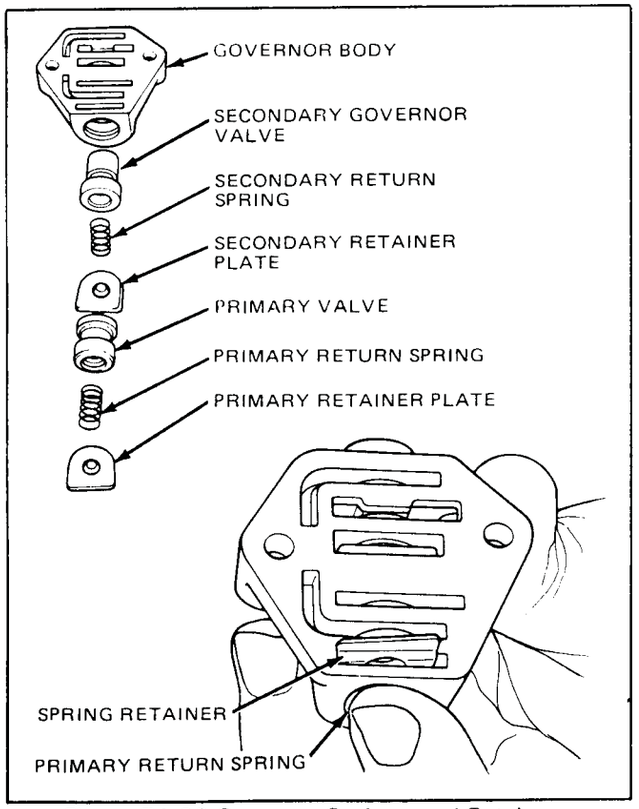


Figure 7A-66 Governor Springs and Retainers

	Outer diameter	Free length
Primary spring	8.7 – 9.3 mm (0.350 – 0.366 in)	16.5 – 18.5 mm (0.650 – 0.728 in)
Secondary spring	8.95 – 9.55 mm (0.352 – 0.396 in)	12.4 – 14.4 mm (0.488 – 0.567 in)

Figure 7A-67 Return Spring Specification

4. Install the manual valve in the upper valve body.
5. Position and align valve sub-body on the separator plate and install retaining bolts. Refer to Figure 7A-75 for torque specs.
6. Install the valve body filter and retaining bolts. Refer to Figure 7A-75 for torque specs.

DIFFERENTIAL CASE (FIGURE 7A-76)

Disassembly

1. Remove the side bearings from the differential case using J-22888 bearing puller with J-35288 pilot as shown in Figure 7A-77.
2. Remove the speedometer drive gear using J-22888 puller with J-35288 pilot. Heat gear with a heat gun before pulling gear off.

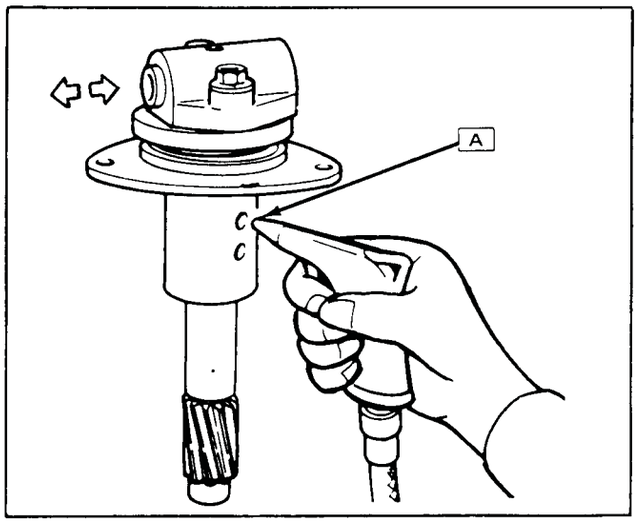


Figure 7A-68 Checking Valve Operation

Do not attempt to remove the speedometer drive gear unless it is damaged. The gear cannot be reused after removal.

3. Remove the ring gear from the differential case. Ring gear bolts are not reusable, discard used bolts and use new bolts during reassembly.
4. Remove the lock pin used to retain the cross pin (Figure 7A-78). Remove the cross pin from the differential case.
5. Remove the pinion gears, side gears and thrust washers from the differential case.

Inspection

1. Measure the clearance between the pinion gear and the cross pin as shown in Figure 7A-79.
2. Measure the clearance between the differential case and the side gear as shown in Figure 7A-80.
3. Measure the diameter in the differential case of the drive axle shaft as shown in Figure 7A-81.
4. Measure the backlash between the side gear and the pinion gear as shown in Figure 7A-82. If the backlash is beyond the limit, correct by installing new thrust washers.

Reassembly

1. Install the thrust washers in the case.
2. Install the side gears in the case.
3. Install the pinion gears in the case. Align the cross pin hole of the pinion gear with the cross pin hole in the differential case.
4. Install the cross pin in the case (Figure 7A-83). Aligning lock pin hole in the cross pin with the lock pin hole in the differential case.
5. Install the lock pin as shown in Figure 7A-84. After installation of the pin, stake the edge of the lock pin hole in the case with a punch to prevent the loss of the lock pin.
6. Install a new speedometer drive gear if removed. Heat the gear to approximately 95°C with a heat gun before installing. Do not use hot water to heat the gear.
7. Install both differential side bearings using J-35291 installer, J-8092 handle and J-35288 pilot as shown in Figure 7A-85.
8. Install the ring gear and tighten bolts to the sequence shown in Figure 7A-86. Use new ring gear bolts if the ring gear has been removed. Apply oil to the contact surface of the ring gear and the differential case before installing gear.

OUTPUT GEAR (FIGURE 7A-87)

Disassembly

1. Remove the output gear bearings from the gear using J-35281 puller and a press (Figure 7A-88).
2. Inspect the gear and bearings for damage or wear and replace any defective part.

Reassembly

1. Install the output gear bearings on the gear using J-35283 bearing installer with a press. Press bearings on the shaft as shown in Figure 7A-89.

IDLER GEAR (FIGURE 7A-90)

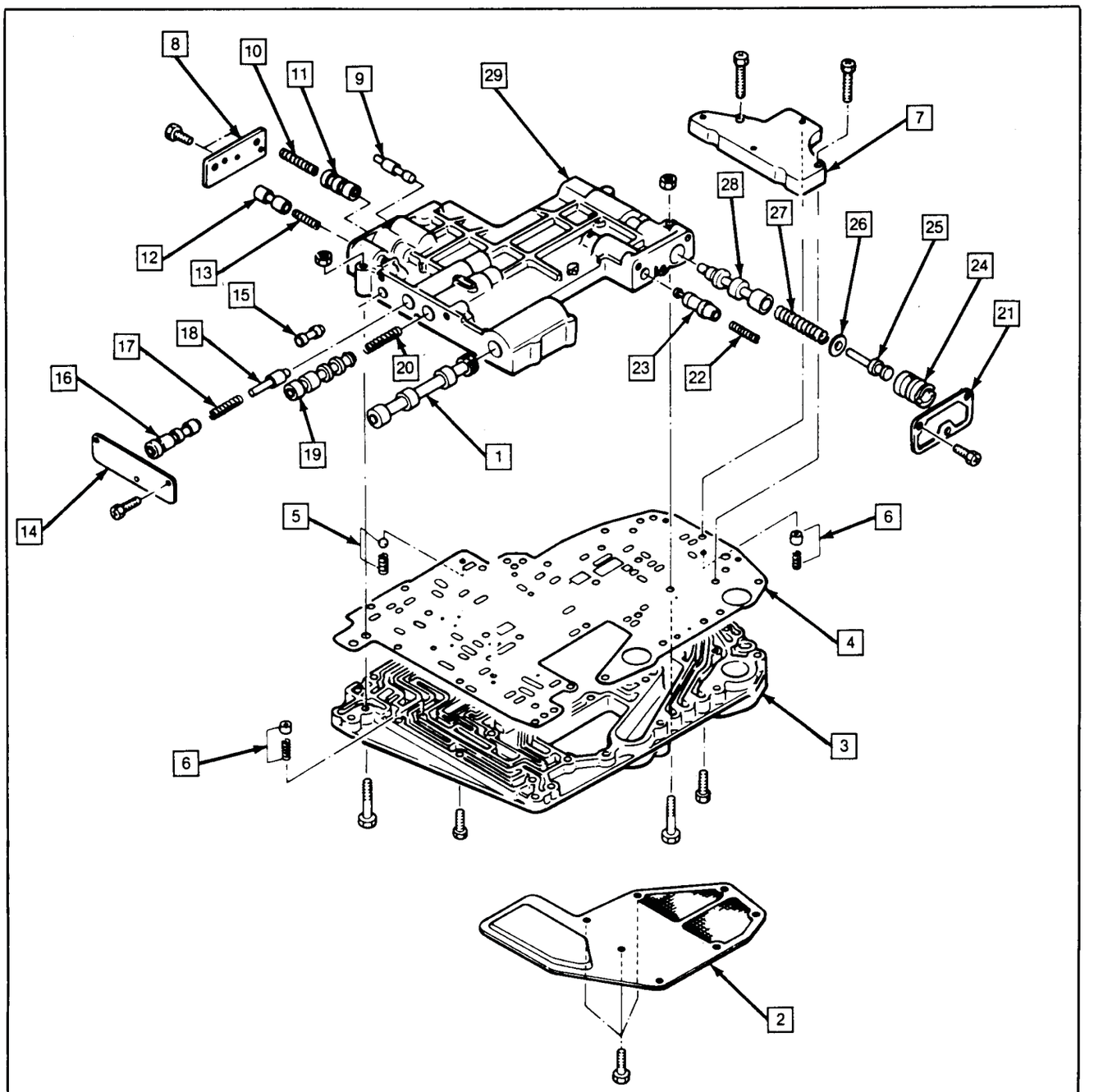
Disassembly

1. Secure J-35286 idler gearshaft holder in a vise. Position the idler gear assembly on J-35286 and remove the shaft retaining nut as shown in Figure 7A-91.
2. Disassemble the idler gear assembly (Figure 7A-90).
3. Remove the bearing races from the idler gear as shown in Figure 7A-92 using J-26941 with a press.
4. Inspect the gear assembly for the following and replace any defective parts.
   - Damage or wear to the idler gear.
   - Worn or damaged bearings.
   - Damaged "O" ring seal.

Reassembly

1. Install the bearing races in the idler gear using J-35287 race installer, J-8092 handle and a press (Figure 7A-93).
2. Position the idler gear shaft on J-35286.
3. Install bearing, idler gear, shims, spacer, bearing and nut on the idler shaft. Torque nut to 130-180 N·m (94-130 ft. lbs.).
4. Remove the idler gear assembly and J-35286 from the vise. Using brass inserts on the vise jaws, position the idler gear in the vise as shown in Figure 7A-94.
5. Check bearing preload as follows:
   - Install J-35259 bearing preload checker on the idler shaft. Attach J-544-01 pull scale to J-35259 as shown in Figure 7A-94, pull the scale and record the reading.
   - Specification - 0.3-9N (0.07-2.1 lb.).

   If the specified preload cannot be obtained within the specified torque, adjust by adding or removing shims (maximum allowable number of shims is seven). Preload can be reduced by increasing the thickness of the shims.



1. MANUAL VALVE
2. OIL STRAINER
3. LOWER BODY
4. SEPARATE PLATE
5. CHECK BALL AND SPRING
6. ORIFICE CHECK VALVE AND SPRING
7. SUB-BODY
8. SIDE PLATE
9. VACUUM THROTTLE VALVE
10. SPRING
11. THROTTLE BACK-UP VALVE
12. DOWNSHIFT VALVE
13. SPRING
14. SIDE PLATE
15. PRESSURE MODIFIER VALVE
16. 2-3 SHIFT VALVE
17. SPRING
18. 2-3 SHIFT PLUG
19. 1-2 SHIFT VALVE
20. SPRING
21. SIDE PLATE
22. SPRING
23. SECOND LOCK VALVE
24. PRESSURE REGULATOR SLEEVE
25. PRESSURE REGULATOR PLUG
26. SPRING SEAT
27. SPRING
28. PRESSURE REGULATOR VALVE
29. UPPER BODY

Figure 7A-69 Control Valve Exploded View

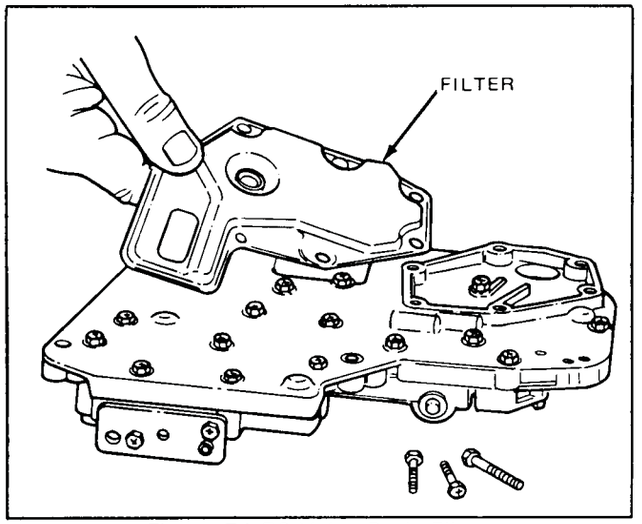


Figure 7A-70 Valve Body Filter

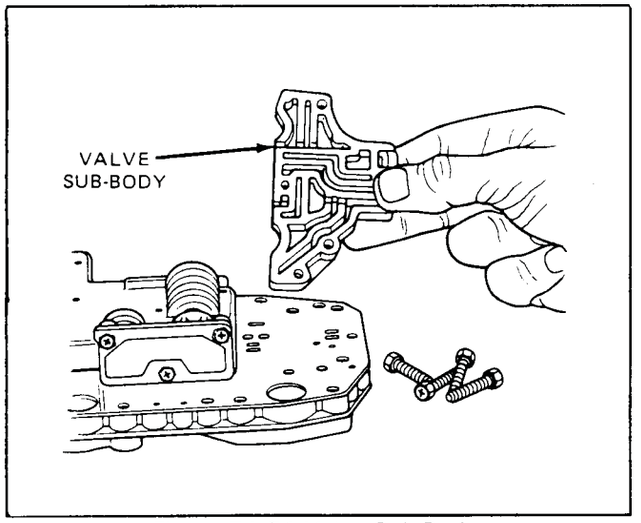


Figure 7A-71 Valve Sub-Body

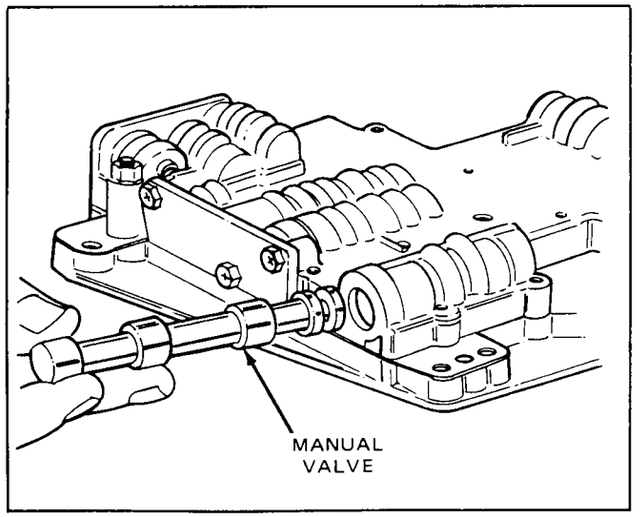


Figure 7A-72 Manual Valve

6. Install a new "O" ring on the idler shaft.

Name of spring	Outer diameter	Free length
Throttle backup	7.3 mm (0.287 in)	36.0 mm (1.417 in)
Downshift	5.55 mm (0.218 in)	22.0 mm (0.866 in)
2-3 shift	6.9 mm (0.272 in)	41.0 mm (1.614 in)
1-2 shift	6.55 mm (0.258 in)	32.0 mm (1.260 in)
Second lock	5.55 mm (0.218 in)	33.5 mm (1.319 in)
Pressure regulator	11.7 mm (0.461 in)	43.0 mm (1.693 in)
Steel ball	6.5 mm (0.256 in)	26.8 mm (1.516 in)
Office check	5.0 mm (0.197 in)	21.5 mm (0.846 in)

Figure 7A-73 Valve Body Spring Dimensions

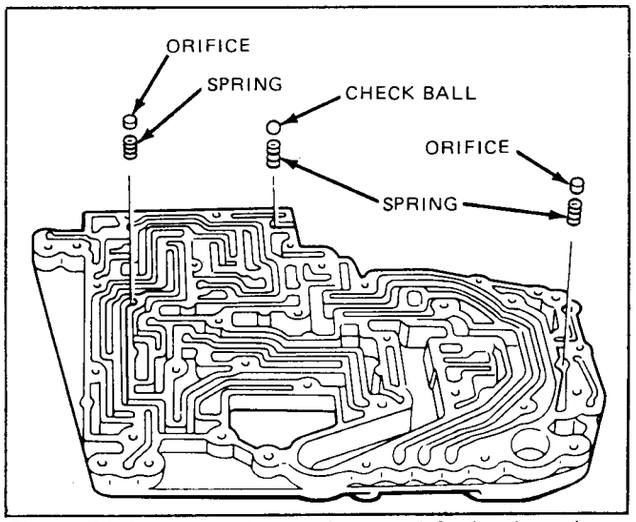


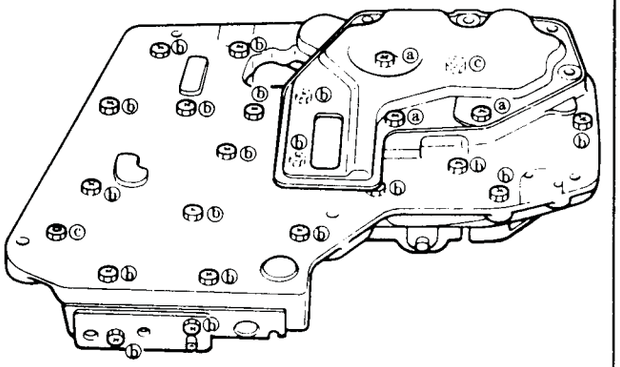
Figure 7A-74 Check Ball, Orifices and Spring Locations

TRANSAXLE

Apply Dexron II automatic transmission fluid to each seal ring, rotating parts and sliding parts before assembling.

Reassembly

1. Install the differential side bearing race in the converter housing using J-35290 bearing race installer with J-8092 driver handle (Figure 7A-95).
2. Place the differential case assembly in the converter housing.
3. Set (Shim Selector Gage) J-35284 bridge and leg assembly with J-35284-4 gage cylinder and J-35284-8 differential gear gage pin on the transaxle case over the differential bearing housing. Loosen the thumb screw allowing gage pin to rest on the bearing race seat. Tighten the



BOLT "a"	3-4 N·m (2.2-2.9 FT. LBS.)
BOLT "b"	2.5-3.5 N·m (1.8-2.5 FT. LBS.)
BOLT "c"	5-7 N·m (3.6-5.1 FT. LBS.)

Figure 7A-75 Valve Body Bolt Torques

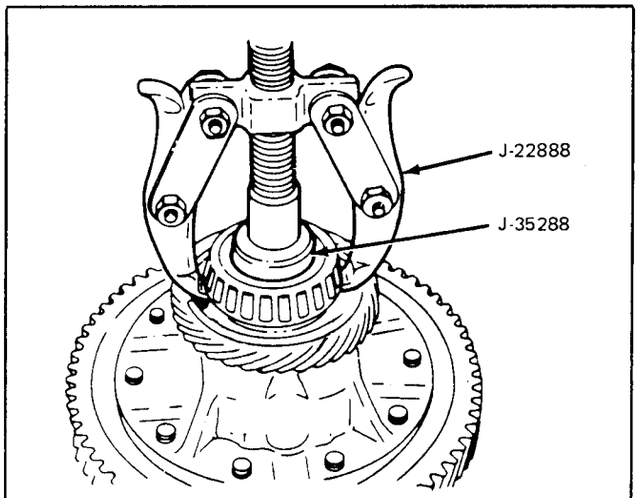
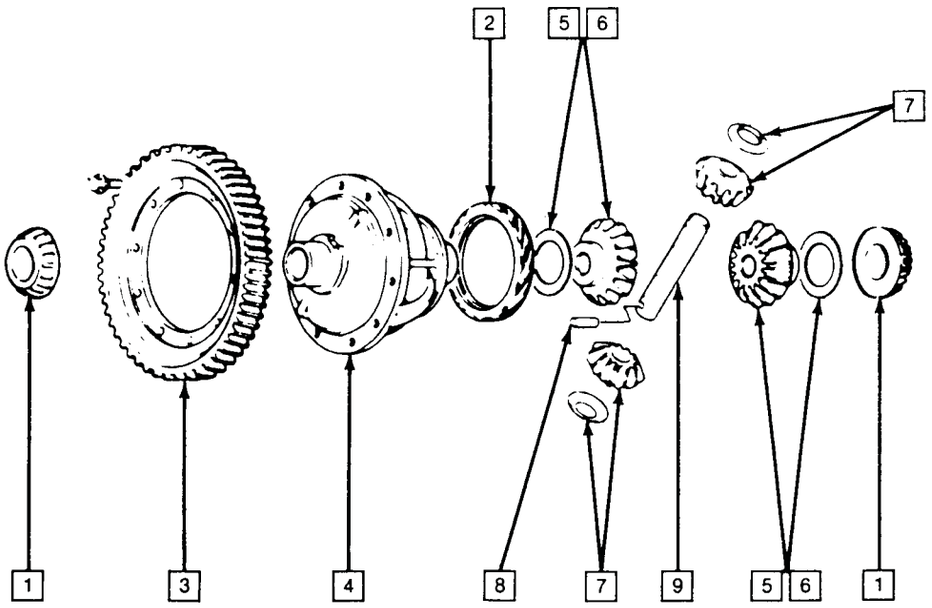


Figure 7A-77 Differential Bearing Removal

thumb screw and remove tool from the case (Figure 7A-96).

4. Install the other side bearing race on the exposed side bearing. Set the shim selector gage on the converter housing over the differential case as shown in Figure 7A-97. Loosen the thumb screw allowing the gage pin to rest on the bearing race and then lock thumb screw. Select the appropriate side bearing shim according to the remaining gap in the gage pin as shown.



1. SIDE BEARING
2. SPEEDOMETER DRIVE GEAR
3. RING GEAR
4. DIFFERENTIAL CASE
5. THRUST WASHER
6. SIDE GEAR
7. PINION GEAR
8. LOCK PIN
9. CROSS PIN

Figure 7A-76 Differential Case Exploded View

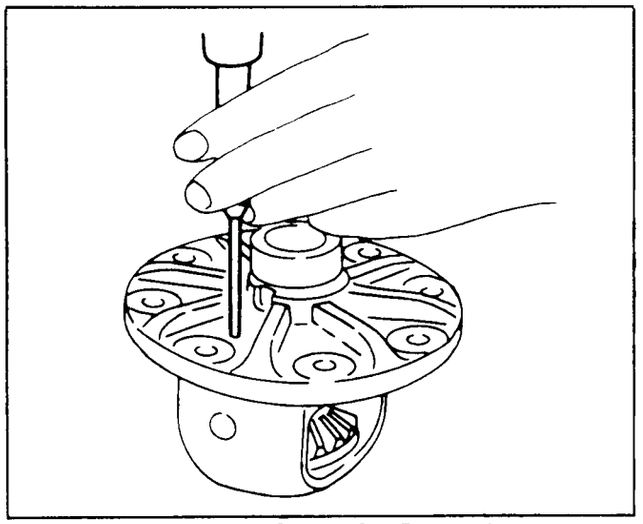


Figure 7A-78 Lock Pin Removal

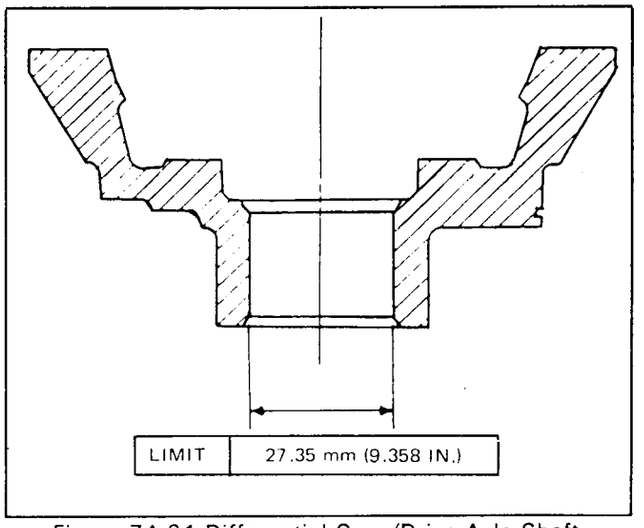


Figure 7A-81 Differential Case/Drive Axle Shaft Clearance

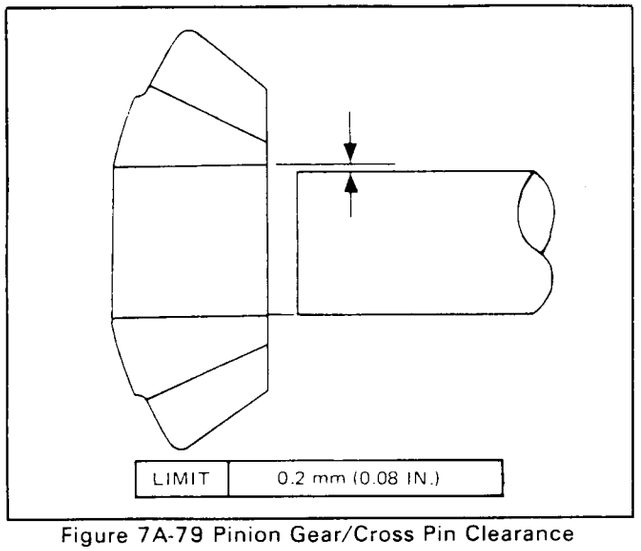


Figure 7A-79 Pinion Gear/Cross Pin Clearance

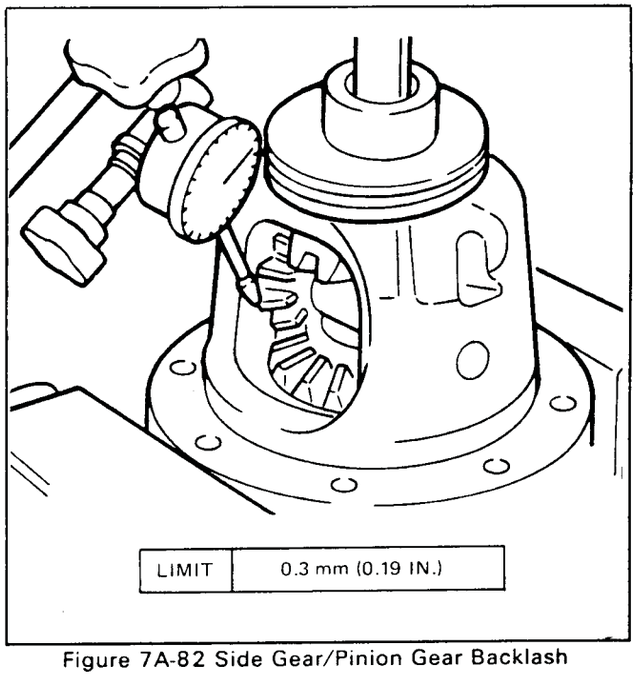


Figure 7A-82 Side Gear/Pinion Gear Backlash

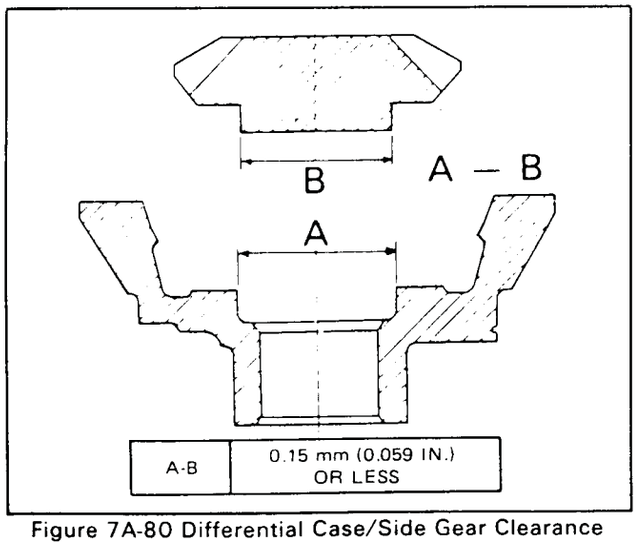


Figure 7A-80 Differential Case/Side Gear Clearance

5. Install the selected shim into the side bearing race bore of the transaxle case. Install the bearing race using J-35290 bearing race installer with J-8092 driver handle as shown in Figure 7A-98.
6. Install a new O-ring seal on the bearing cover and install cover on converter housing (Figure 7A-99). Torque bolts to 13 N·m (9 ft. lbs.).
7. Install a new oil seal in the bearing cover using J-29184 as shown in Figure 7A-100.
8. Install the bearing race in the bearing cover using J-35287 bearing race installer and J-8092 driver handle (Figure 7A-101).
9. Set (Shim Selector Gage) J-35284 bridge and leg assembly with J-35284-4 gage cylinder and J-35284-8 differential and output gear gage pin on the bearing housing as shown in Figure 7A-102. Loosen thumb screw allowing the gage pin to rest on the output shaft bearing race and shim seat. Lock thumb screw and remove the bridge from the bearing housing.

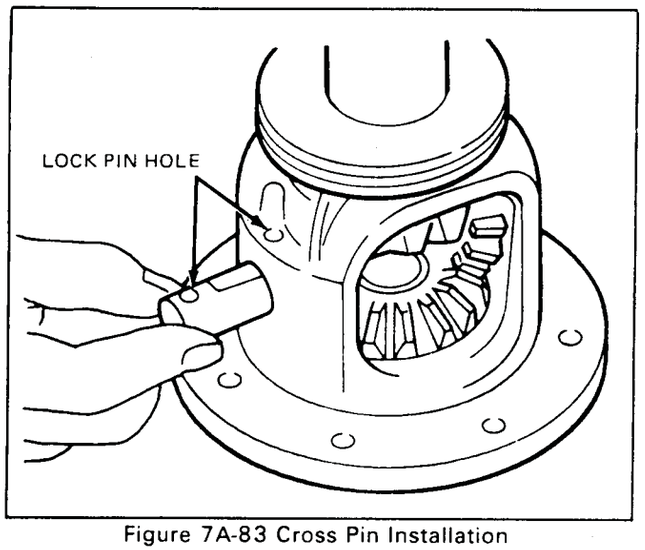


Figure 7A-83 Cross Pin Installation

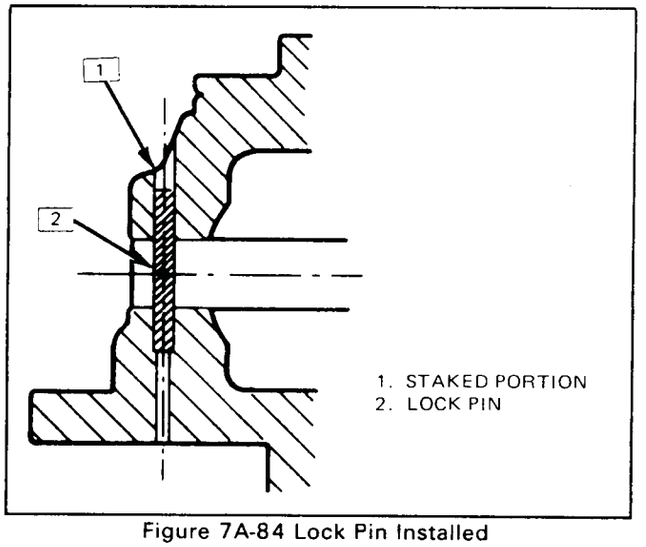


Figure 7A-84 Lock Pin Installed

10. Install the output gear in the converter housing with the bearing race on the exposed bearing. Place J-35284-1 bridge assembly on the converter housing as shown in Figure 7A-103. Loosen thumb screw so that J-35284-8 gage pin rests on the output shaft bearing race. Tighten the thumb screw. Select the appropriate output gear bearing shim according to the remaining gap in the gage pin.

    Selected shim should be a snug fit in gage. Available shim sizes:

    - 0.10mm (0.004 in.)
    - 0.12mm (0.005 in.)
    - 0.14mm (0.006 in.)
    - 0.16mm (0.007 in.)
    - 0.20mm (0.008 in.)
    - 0.50mm (0.020 in.)

11. Install the selected output gear shim into bearing race bore of the bearing housing. Install the bearing race using J-35287 bearing race installer with J-8092 driver handle as shown in Figure 7A-104.

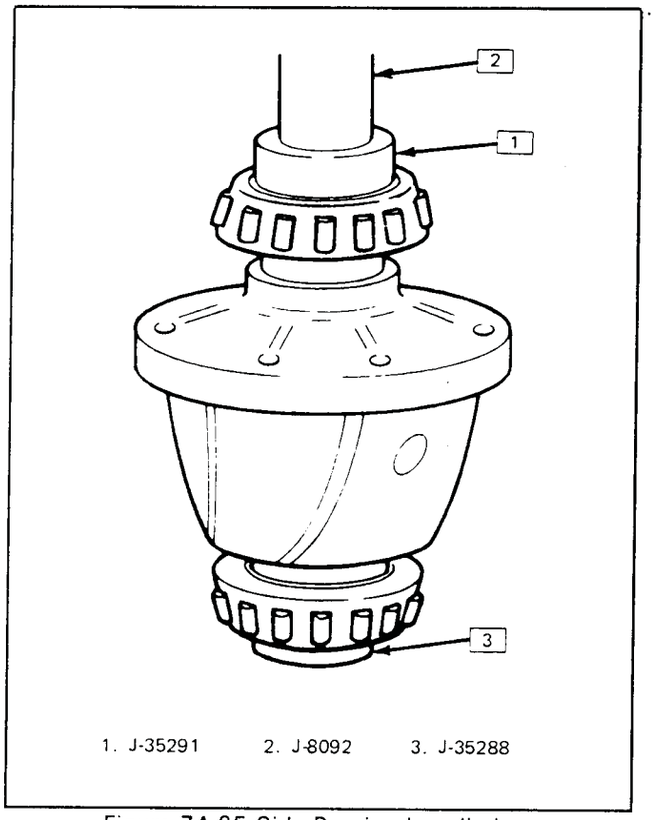


Figure 7A-85 Side Bearing Installation

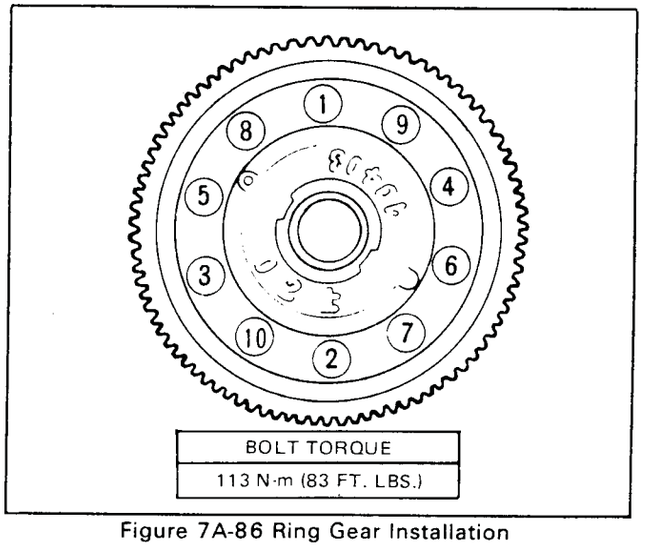


Figure 7A-86 Ring Gear Installation

12. Install the idler gear assembly in the converter housing. Tap the idler shaft with a plastic hammer to seat gear assembly.

13. Install the output gear assembly in the converter housing as shown in Figure 7A-105.

14. Install the bearing housing on the converter housing as shown in Figure 7A-106. Torque bolts to 23 N·m (17 ft. lbs.).

15. Align idler gear shaft roll pin hole with the bearing housing roll pin hole. Install idler gear roll pin with a hammer and drift (Figure 7A-107).

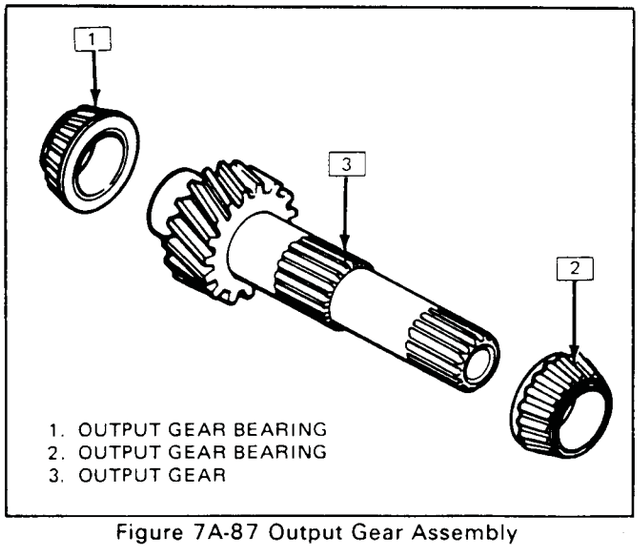


Figure 7A-87 Output Gear Assembly

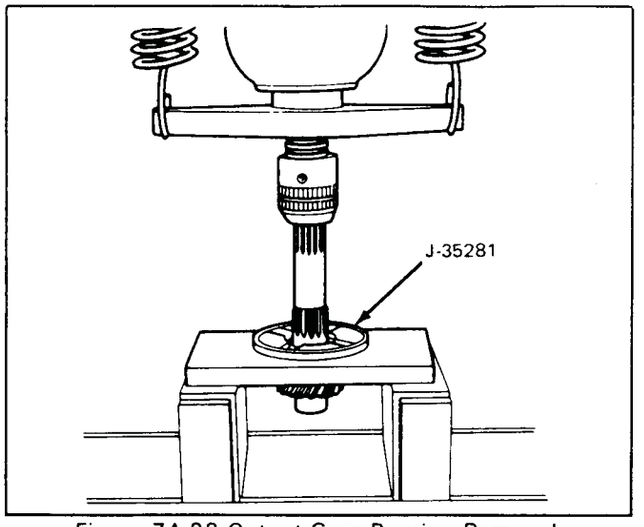


Figure 7A-88 Output Gear Bearing Removal

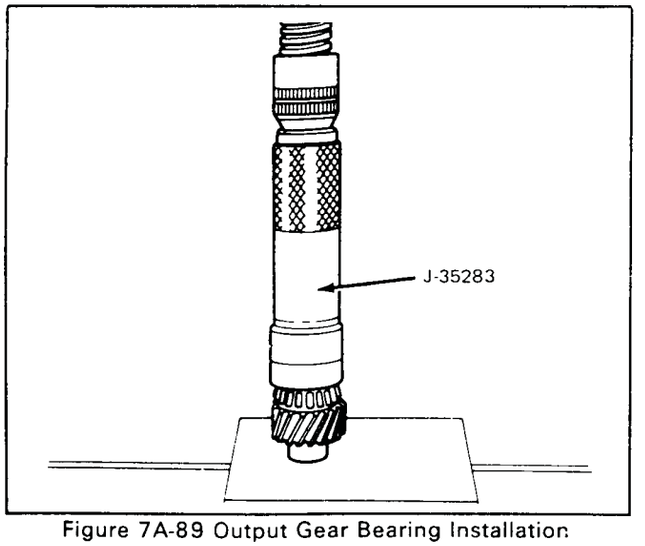


Figure 7A-89 Output Gear Bearing Installation

The slot in the idler gear shaft aligns 90° to the bearing housing roll pin hole.

16. Install the low/reverse piston in the transaxle case. Lubricate the seals with clean transmission fluid first, then press piston into the case using J-35279 low/reverse spring compressor.
17. Install (20) springs into the spring pockets on the low/reverse piston. Install the spring retainer plate on the springs. Compress piston springs with J-35279 spring compresor and install snap ring as shown in Figure 7A-108. Make sure snap ring is seated in groove.
18. Install the multiple disc clutch pack. Install the dish plate first with the concave side facing the piston, then alternate clutch discs, four steel, four fibers starting with steel disc first.
19. Install the backing plate on the clutch discs with the smooth flat side facing the discs. Install the one-way clutch on the backing plate with the machined surface facing the backing plate and retain with a new snap ring.
20. Measure the low/reverse clutch clearance as follows:
    - Set a dial indicator on the case with the gage pin on the clutch plate as shown in Figure 7A-109.
    - Apply air through the oil passage to engage the clutch as shown.
    - If the dial indicator reading is not within the clearance specifications, change the thicknekss of the retaining plate. Available sizes are shown in Figure 7A-109.
21. Install J-35513 low/reverse clutch pack spacer between case and bottom disc as shown in Figure 7A-110.
22. Install the one-way clutch inner race assembly with the thrust washer as shown (Figure 7A-111).
23. Install the drum hub gear assembly with (2) thrust bearings on the one-way clutch inner race assembly. One thrust bearing goes between drum hub and one-way inner clutch. Next, install the thrust washer with the lip side down on the thrust bearing as shown in Figure 7A-112.
24. Install the parking rod assembly in the case.
25. Install control rod assembly in the case after spring and detent ball has been installed. Install locating pin as shown in Figure 7A-113.
26. Install the manual shaft with a new O-ring into the case. Install the manual plate lever on the end of the manual shaft and install retaining nut.
27. Connect the manual plate lever to the parking rod assembly and install retaining clip.
28. Install the actuator support in the transaxle case as shown in Figure 7A-114. Torque bolt to 14 N·m (10 ft. lbs.).
29. Install the parking pawl assembly as shown in Figure 7A-115.
30. Install the (2) oil pipes in the transaxle case as shown in Figure 7A-116.
31. Install the differential case assembly in the case with the speedometer gear facing upward (Figure 7A-117).
32. Install the governor assembly with a new gasket in the case aligning tab on the governor plate with the mark on the case (Figure 7A-118). Install the

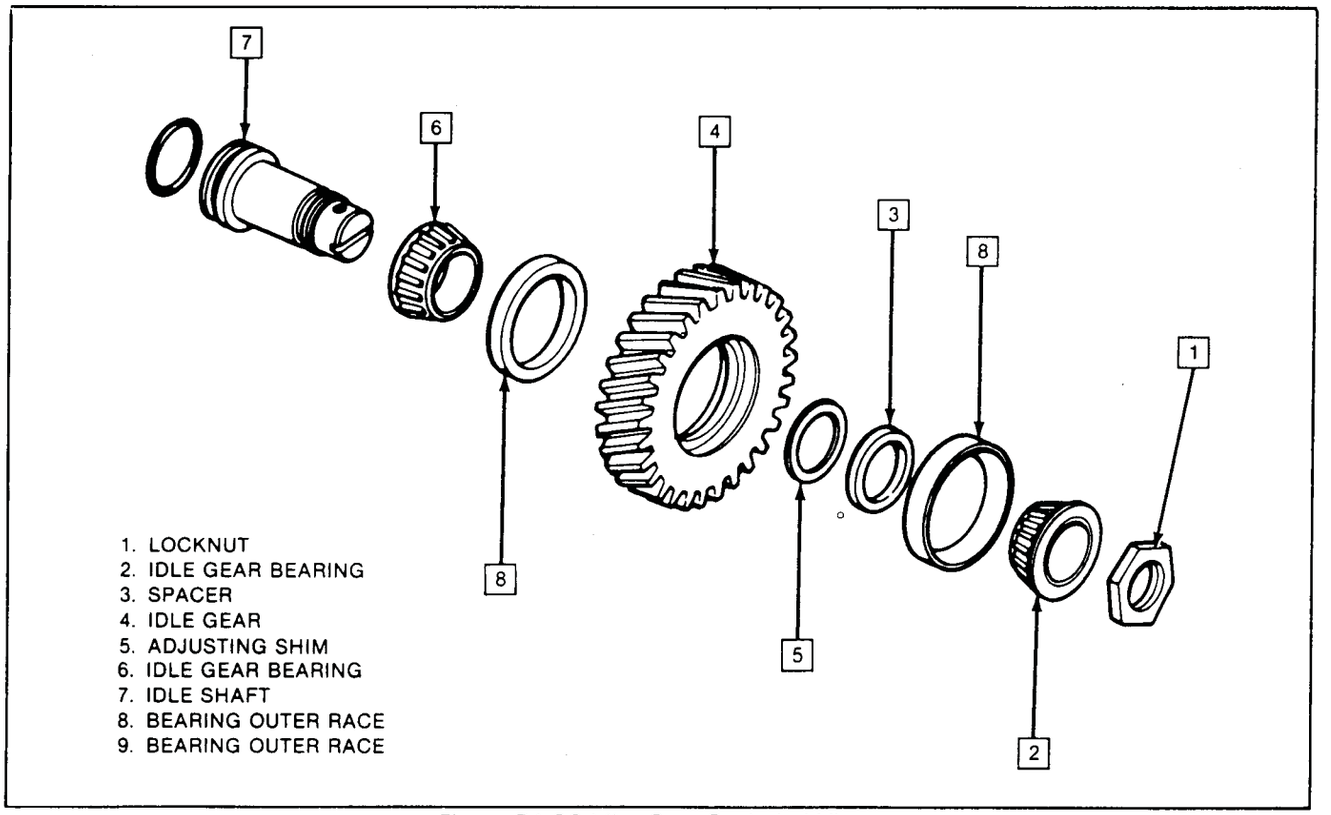


Figure 7A-90 Idler Gear Exploded View

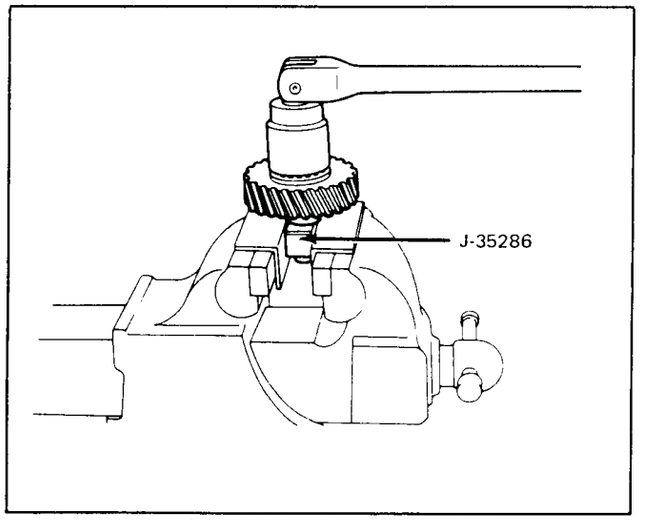


Figure 7A-91 Idler Gear Shaft Holder

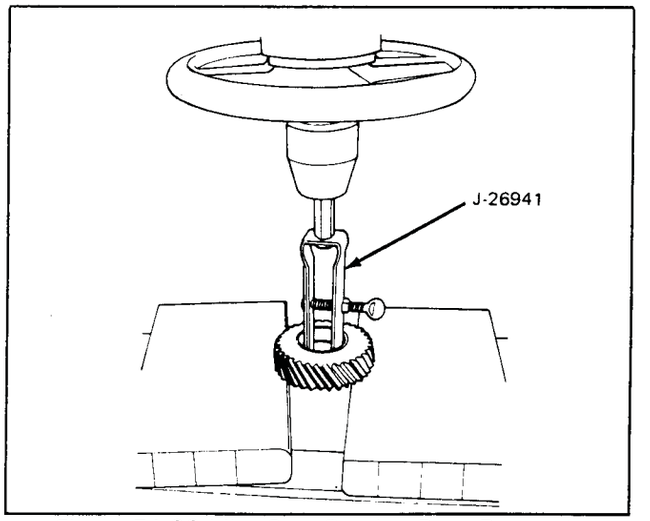


Figure 7A-92 Idler Gear Bearing Race Removal

governor cover with a new gasket on the governor assembly. Install (3) bolts and torque to 7 N·m (5 ft. lbs.).

33. Apply a thin bead of Loctite No. 518 or equivalent on the transaxle case.
34. Install the converter housing on the transaxle case. Install (15) retaining bolts and torque to 40 N·m (30 ft. lbs.).
35. Install the servo and spring assembly into the case as shown in Figure 7A-119. Coat seals and seal surfaces with clean transmission fluid before installing.
36. Install the servo cover using J-35278 servo piston compressor (Figure 7A-120). Use a new snap ring to retain the cover.
37. Remove J-35513 low/reverse clutch pack spacer as shown in Figure 7A-121.
38. Install the thrust bearing and washer on the planetary carrier as shown in Figure 7A-122.
39. Install the spacer and sun gear into the connecting shell as shown in Figure 7A-123. Install the connecting shell in the transaxle case.

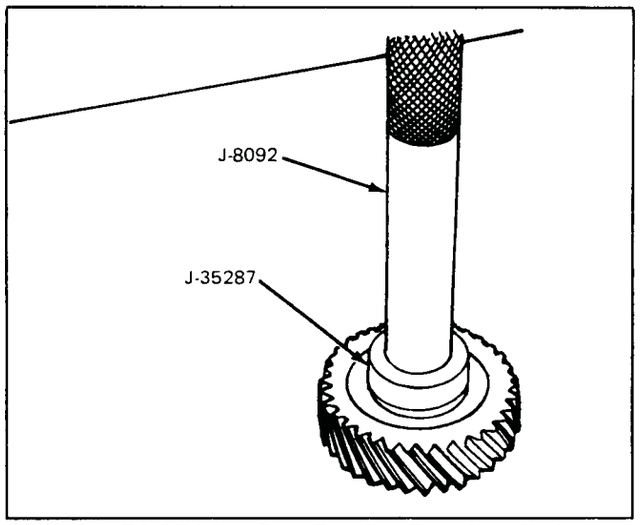


Figure 7A-93 Idler Gear Bearing Race Installation

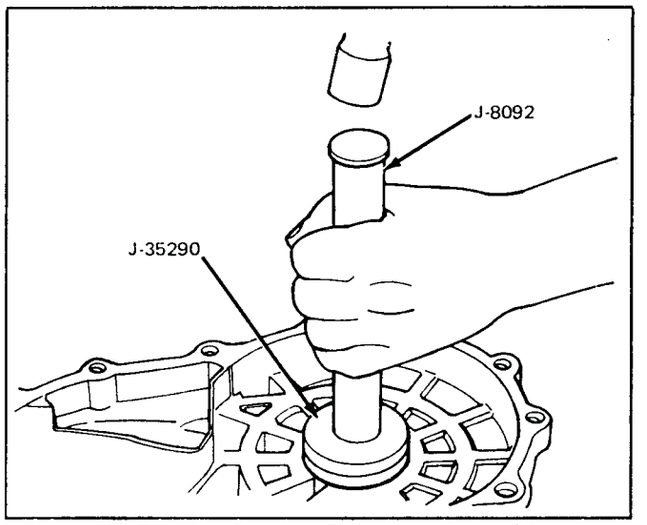


Figure 7A-95 Side Bearing Race Installation/Housing

40. Install the planetary carrier assembly on the sun gear. Place the thrust washer and bearing on the carrier as shown in Figure 7A-124.
41. Install the rear clutch hub with the thrust bearing in the case as shown in Figure 7A-125.
42. Install the lube oil seal in the case as shown in Figure 7A-126.
43. Install the rear clutch assembly in the case as shown in Figure 7A-127. Make sure the tabbed thrust washer is in place on the back side of the clutch before installing.
44. Measure total end play in the transaxle case as follows:

- Set (Shim Selector Gage) J-35284-1 bridge and leg assembly with J-35284-4 gage cylinder and J-35284-10 on the pump gasket surface (gasket removed) of the oil pump as shown in Figure 7A-128.
- Loosen thumb screw to allow the gage pin to rest on the pump hub, then tighten the thumb screw.

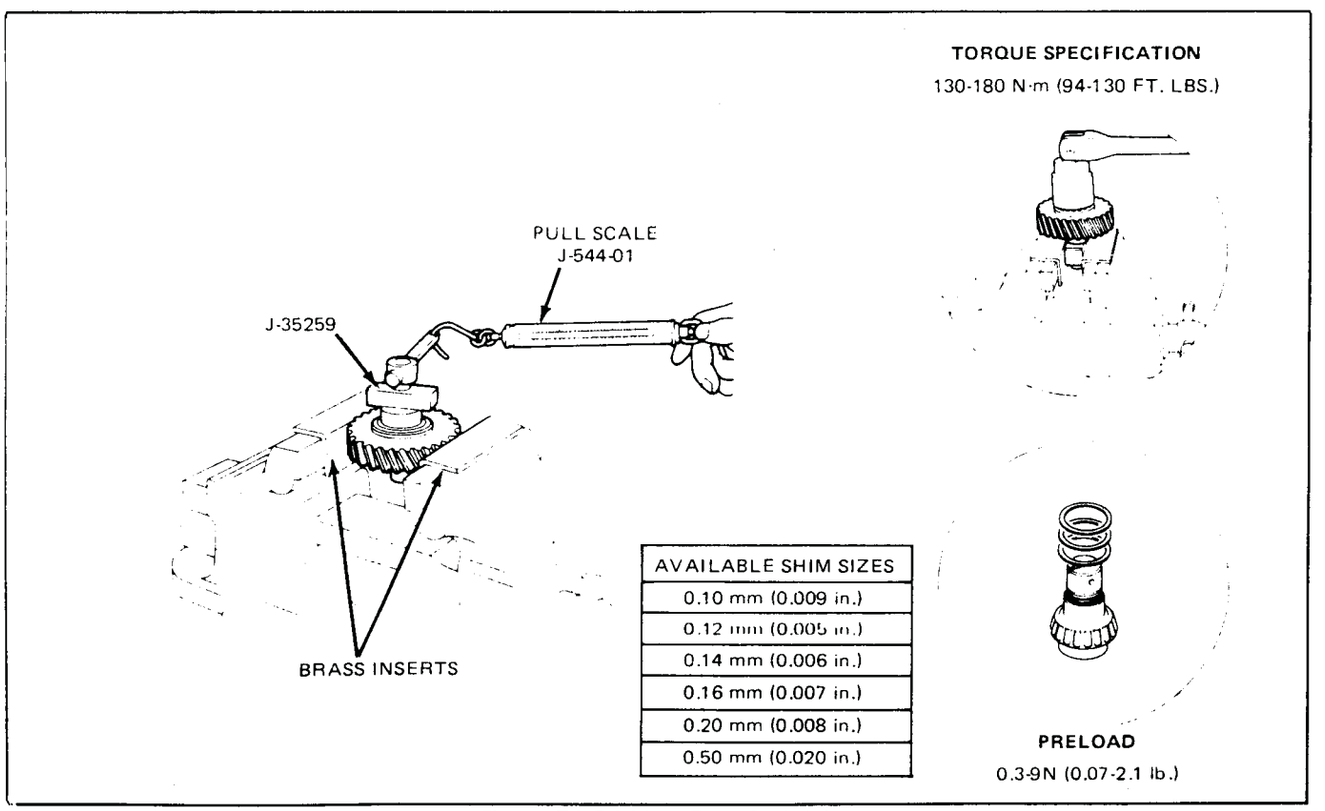


Figure 7A-94 Idler Gear Preload

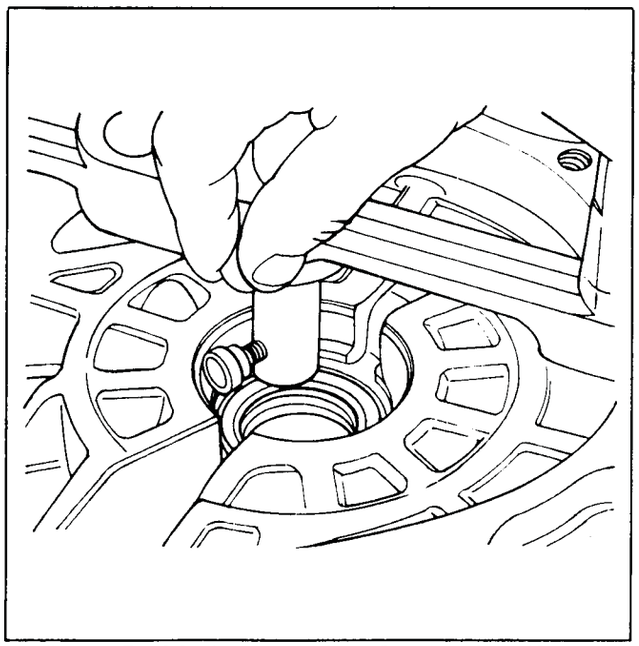


Figure 7A-96 Measuring Side Bearing Seat/Case

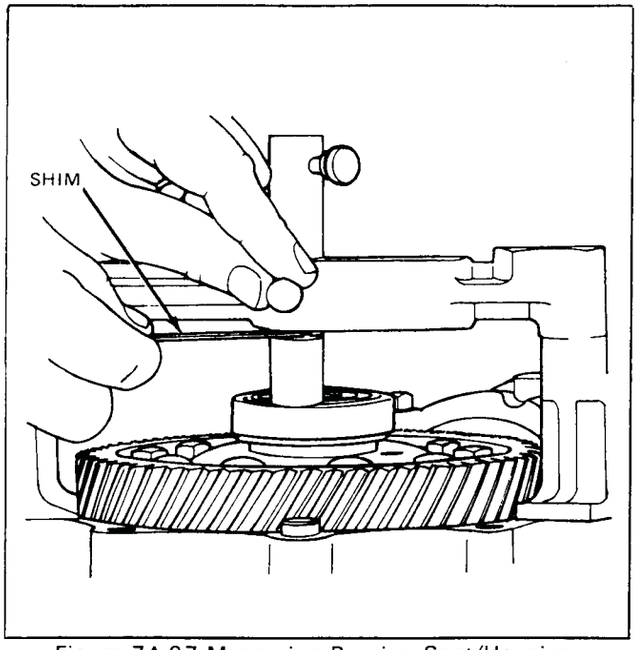


Figure 7A-97 Measuring Bearing Seat/Housing

- Place the bridge assembly on the transaxle case as shown in Figure 7A-129.
- Loosen the thumb screw allowing gage pin to rest on the rear clutch hub bearing. Tighten the thumb screw.
- The remaining gap between the gage cylinder and gage pin will be the size of the selective bearing outer race to use.
- Available bearing outer race sizes:
  - 1.2mm (0.047 in.)
  - 1.4mm (0.055 in.)
  - 1.6mm (0.063 in.)
  - 1.8mm (0.071 in.)

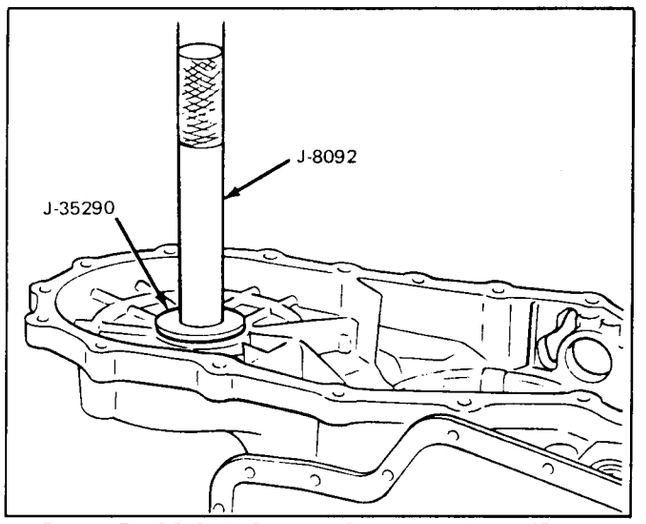


Figure 7A-98 Side Bearing Race Installation/Case

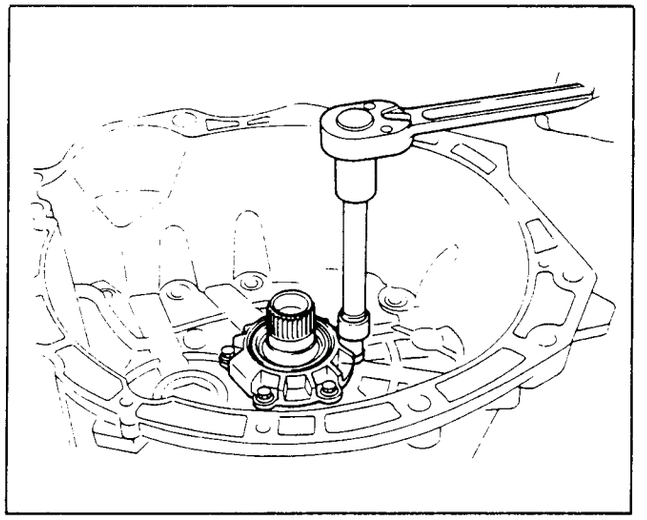


Figure 7A-99 Installing Bearing Cover

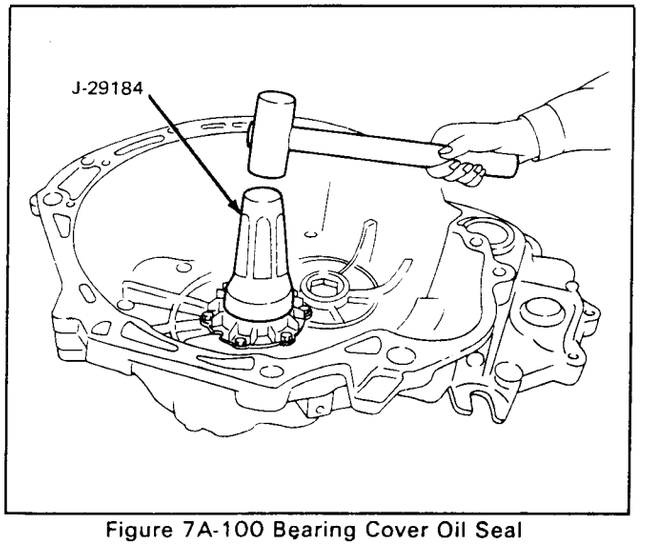


Figure 7A-100 Bearing Cover Oil Seal

- 2.0mm (0.079 in.)
- 2.2mm (0.087 in.)

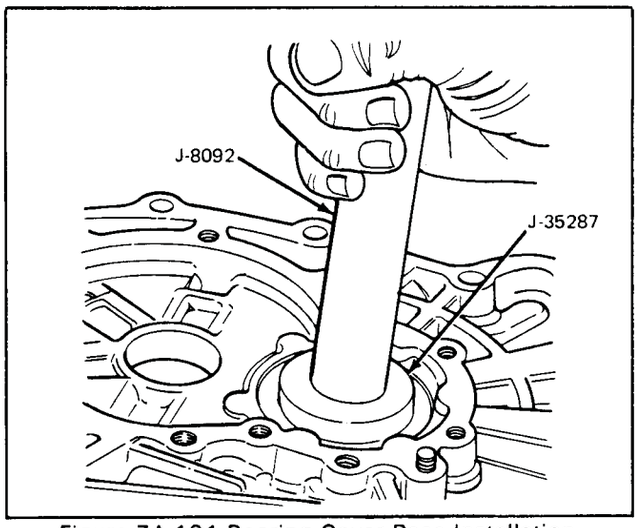


Figure 7A-101 Bearing Cover Race Installation

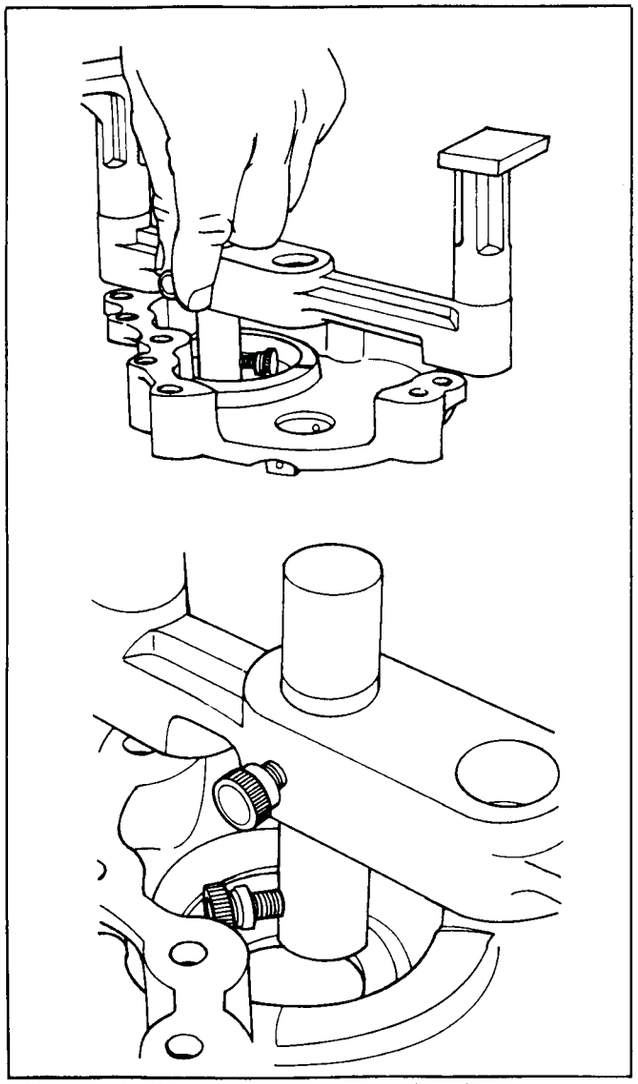


Figure 7A-102 Measuring Bearing Seat/Brg. Housing

- Install selective bearing outer race on the pump hub.

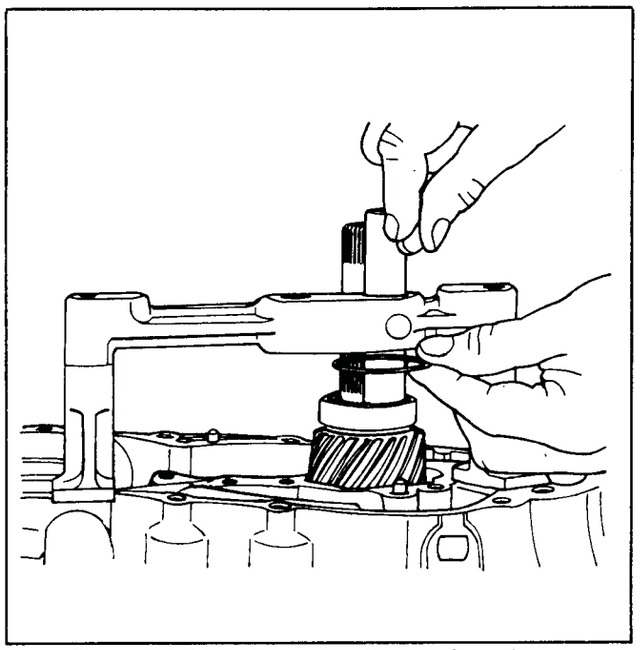


Figure 7A-103 Measuring Output Gear Shim

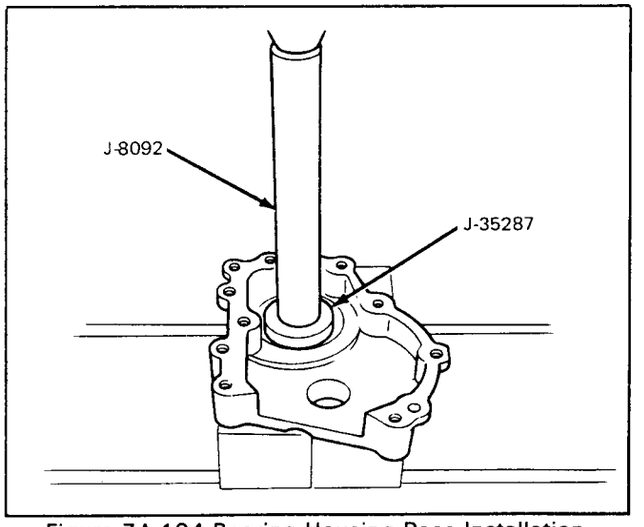


Figure 7A-104 Bearing Housing Race Installation

45. Install the front clutch assembly in the transaxle case as shown in Figure 7A-130.

46. Measure front clutch to pump end play as follows:

    - Set (Shim Selector Gage) J-35284-1 bridge and leg assembly with J-35284-4 gage cylinder and J-35284-9 front clutch gage pin on the transaxle case as shown in Figure 7A-131.
    - Loosen thumb screw to allow gage pin to rest on the clutch hub. Tighten thumb screw and remove bridge and leg assembly from the case.
    - Place bridge and leg assembly on the pump gasket surface (gasket removed) as shown in Figure 7A-132.

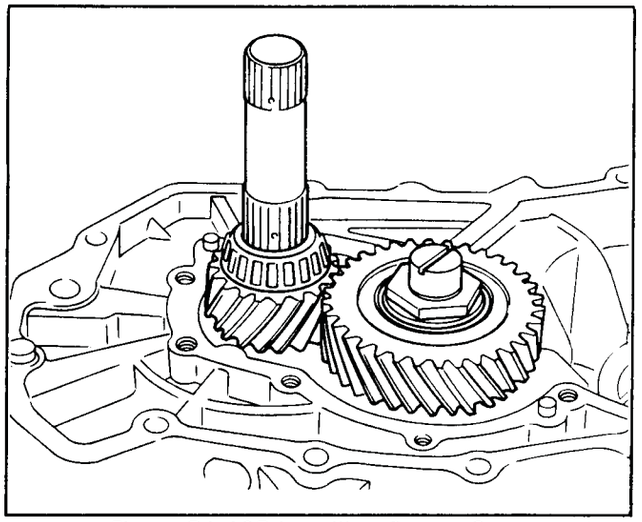


Figure 7A-105 Installing Output Gear

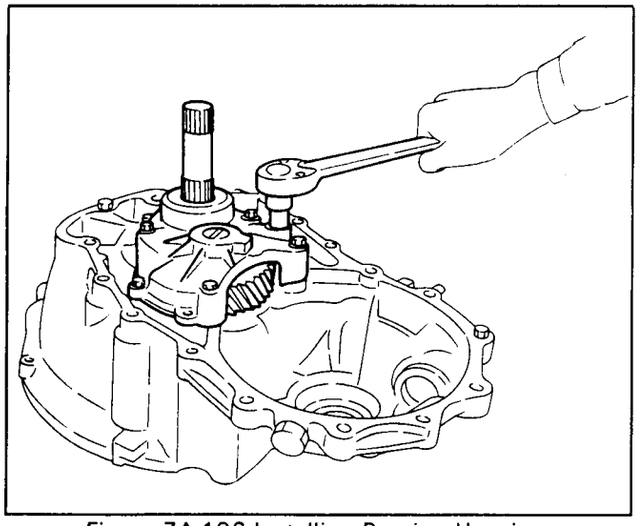


Figure 7A-106 Installing Bearing Housing

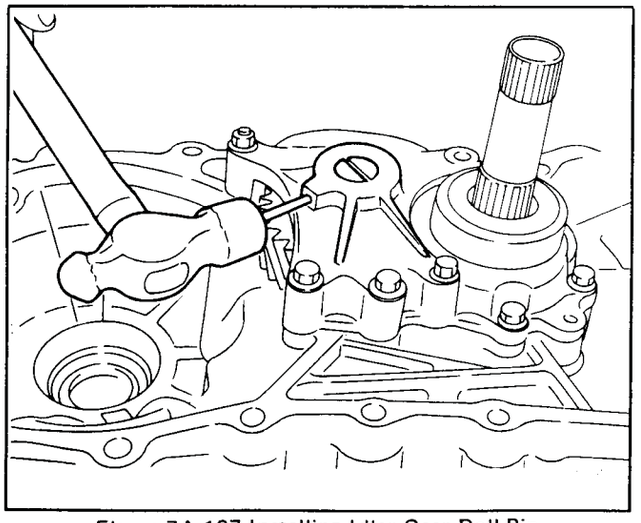


Figure 7A-107 Installing Idler Gear Roll Pin

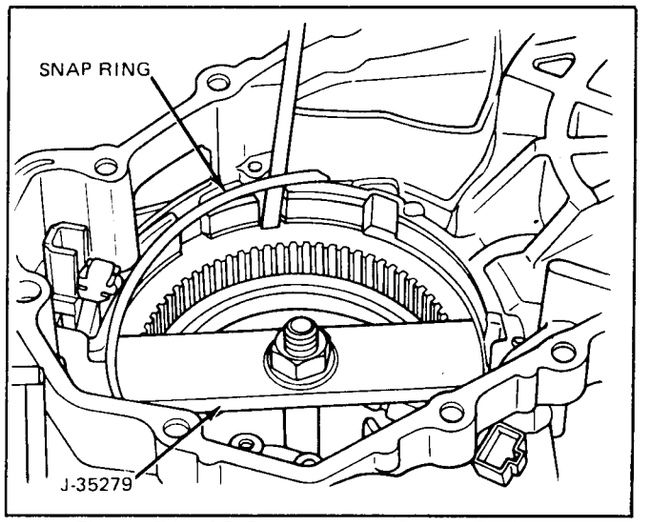


Figure 7A-108 Compressing Piston Springs

- Loosen thumb screw so that the gage pin rests on the pump shim surface. Tighten thumb screw.
- The remaining gap between the gage cylinder and gage pin will be the size of the selective shim.
- Available selective shims:
  - 1.3mm (0.0051 in.)
  - 1.5mm (0.059 in.)
  - 1.7mm (0.067 in.)
  - 1.9mm (0.075 in.)
  - 2.1mm (0.083 in.)
  - 2.3mm (0.091 in.)
  - 2.5mm (0.098 in.)
  - 2.7mm (0.106 in.)
- Install the selective shim on the oil pump.

47. Install the brake band with the strut in the case as shown in Figure 7A-133.
48. Install the anchor end bolt and torque the bolt to 14 N·m (10 ft. lbs.), then loosen the bolt (2) full turns. Tighten the lock nut to 68 N·m (50 ft. lbs.).
49. Install the oil pump assembly on the case as shown in Figure 7A-134. Install bolts and torque to 23 N·m (17 ft. lbs.).
50. Install the spring and check ball in the transaxle case as shown in Figure 7A-135.
51. Install the control valve on the transaxle case aligning the manual valve with the shift lever arm. Install (9) bolts and torque to 10 N·m (7 ft. lbs.) as shown in Figure 7A-136.
52. Install a new pan gasket on the pan. Install gasket and pan on the transaxle case and install (16) pan bolts. Torque pan bolts to 7 N·m (5 ft. lbs.).
53. Install the turbine shaft and then the oil pump shaft.
54. Install the speedometer driven gear assembly.
55. Install the oil level gage and tube.
56. Install the rod in the vacuum diaphragm and then install the vacuum diaphragm in the case. Before installing, apply sealant to the threads of the vacuum diaphragm.

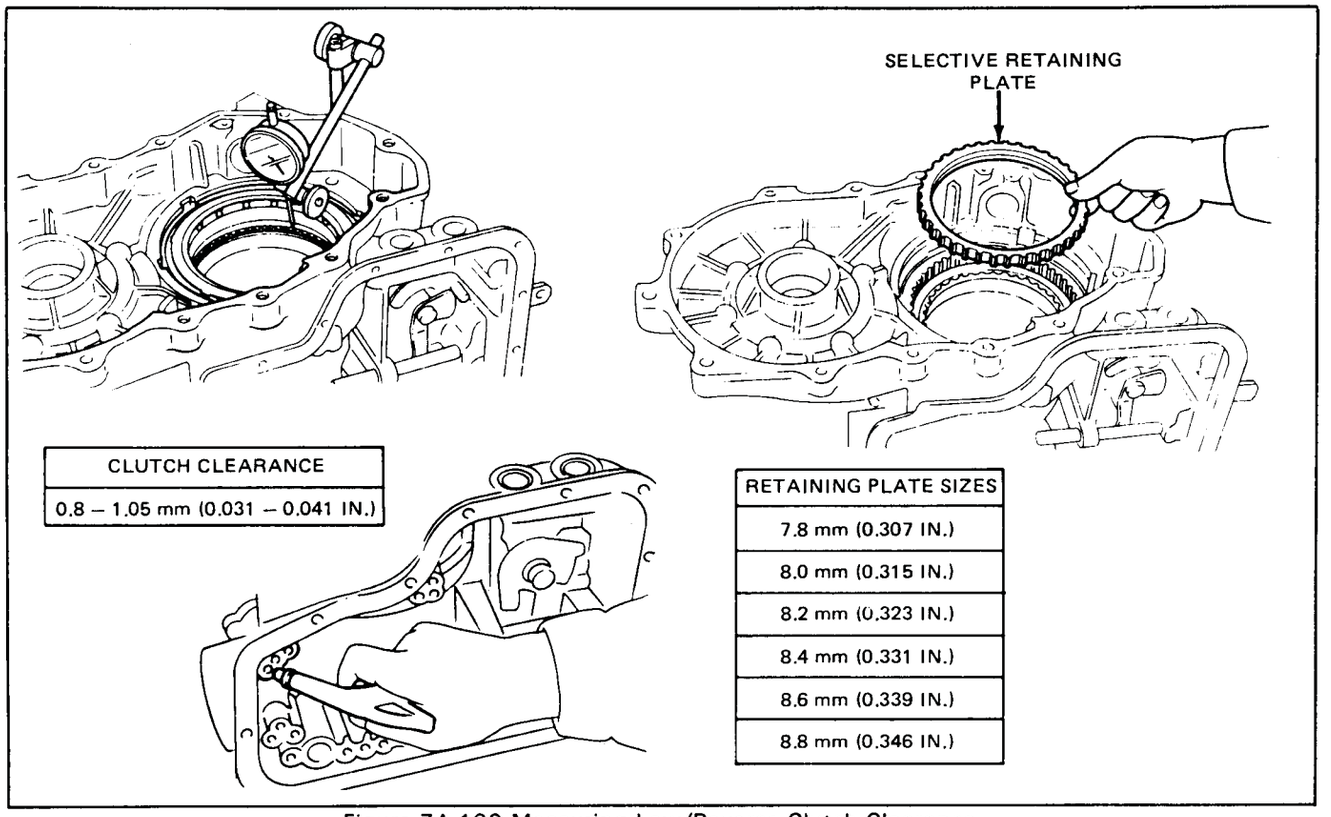


Figure 7A-109 Measuring Low/Reverse Clutch Clearance

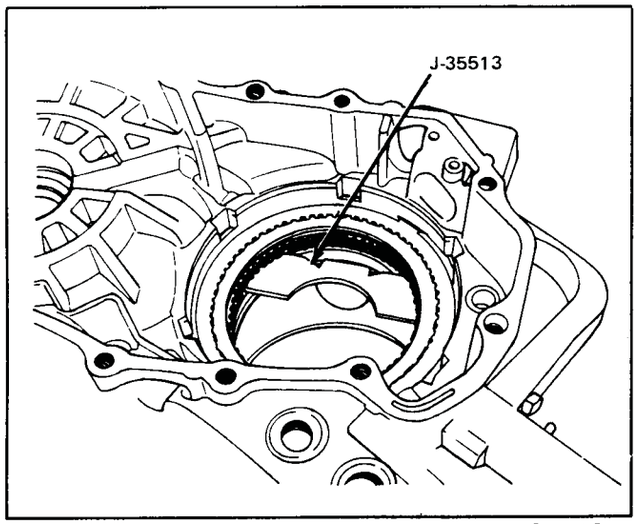


Figure 7A-110 Low/Reverse Clutch Spacer (J-35513)

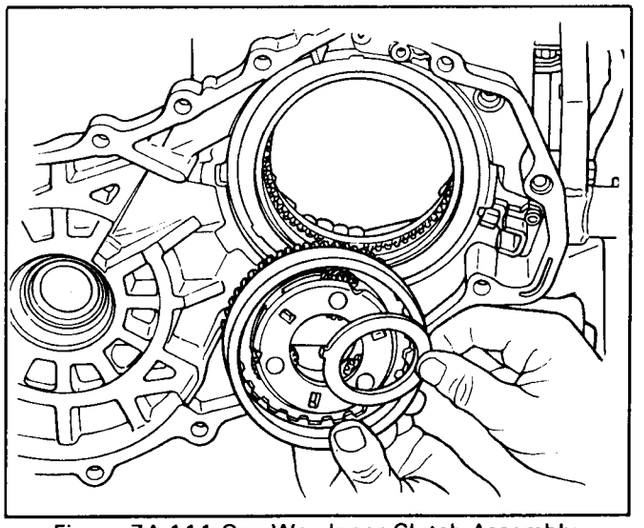


Figure 7A-111 One-Way Inner Clutch Assembly

If the control valve or vacuum diaphragm was replaced, it will be necessary to make the measurement shown in Figure 7A-137 to select the proper rod length.

57. Install the inhibitor switch in the case.

58. Apply sealant to the threads of the kickdown solenoid and install in the case.

59. With the converter in an erect position, fill with Dexron II automatic transmission fluid. Install the converter. To insure the converter is installed properly, measure the clearance between the end-surface of the torque converter and that of the converter housing as shown in Figure 7A-138.

60. Install the drive axle shaft seals using J-29130 seal installer with J-8092 driver handle (Figure 7A-139).

61. Remove the transaxle and J-35276 holding fixture from J-3289-20 holding fixture base. Remove J-35276 holding fixture from the transaxle.

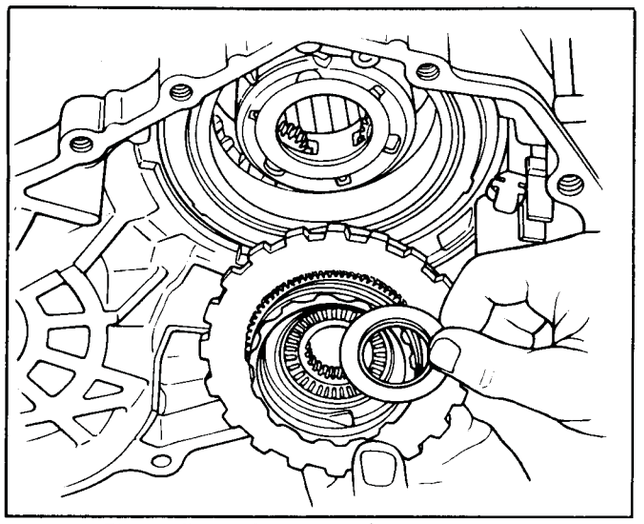


Figure 7A-112 Internal Gear Assembly

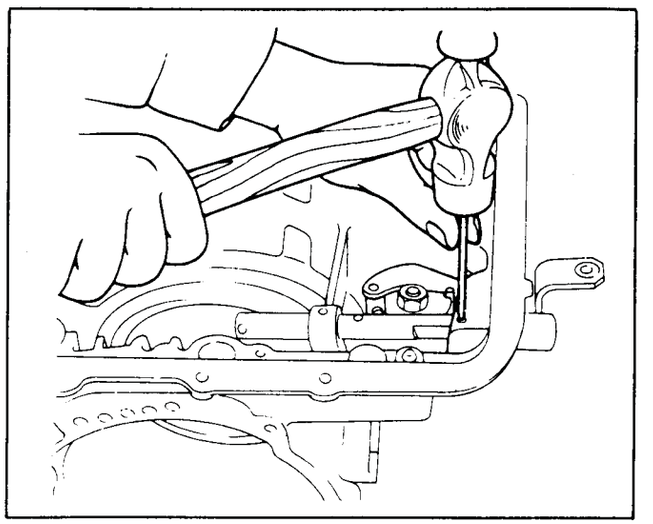


Figure 7A-113 Installing Control Rod

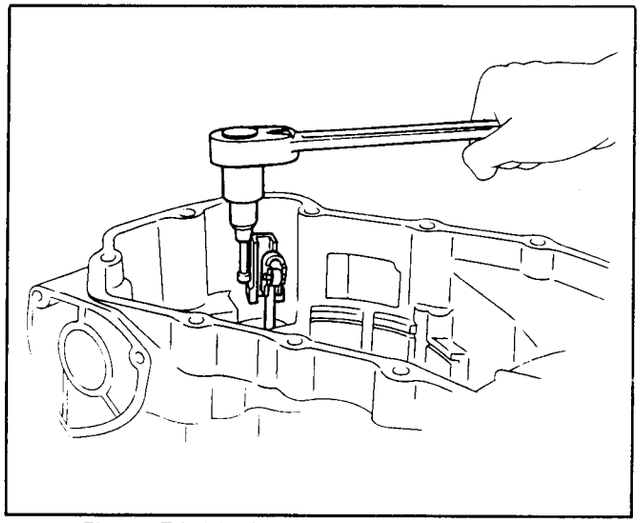


Figure 7A-114 Installing Actuator Support

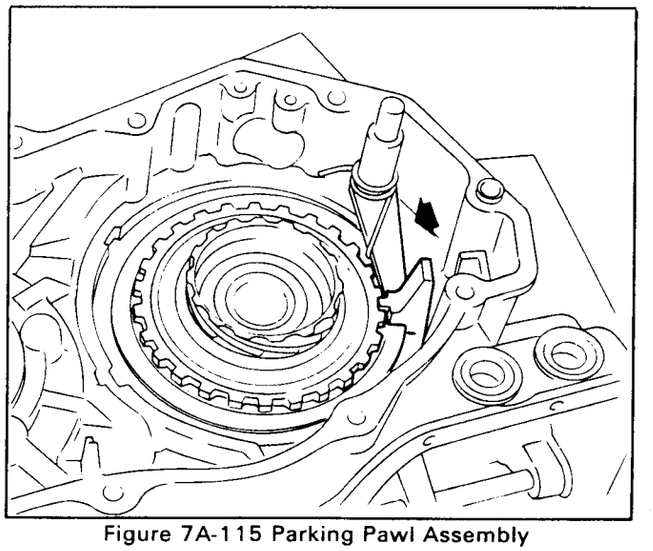


Figure 7A-115 Parking Pawl Assembly

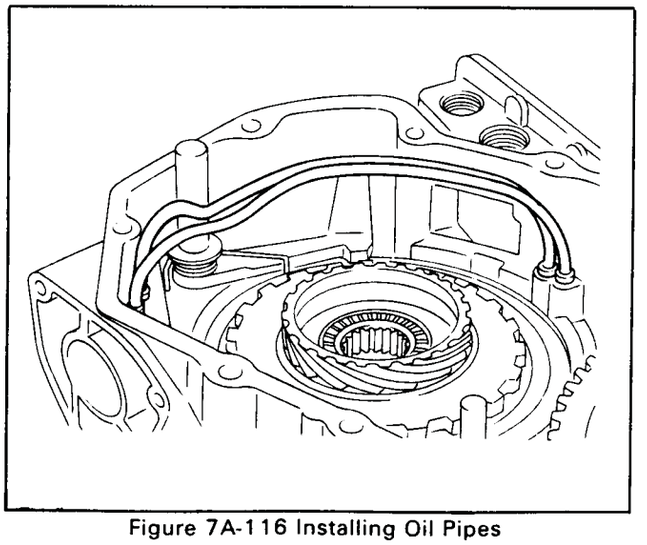


Figure 7A-116 Installing Oil Pipes

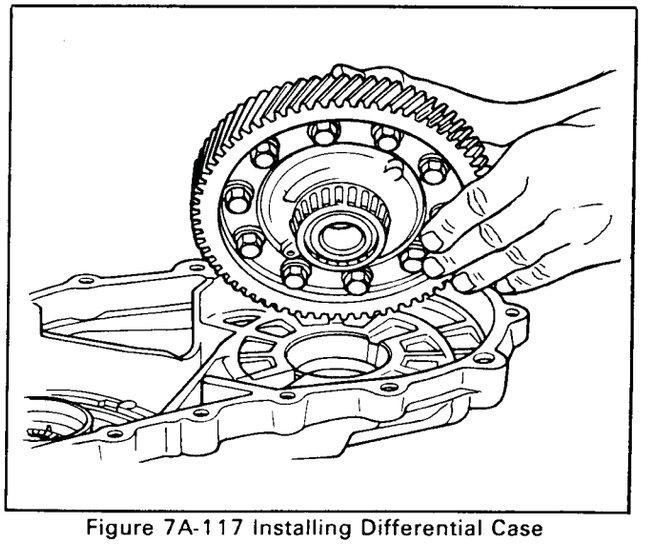


Figure 7A-117 Installing Differential Case

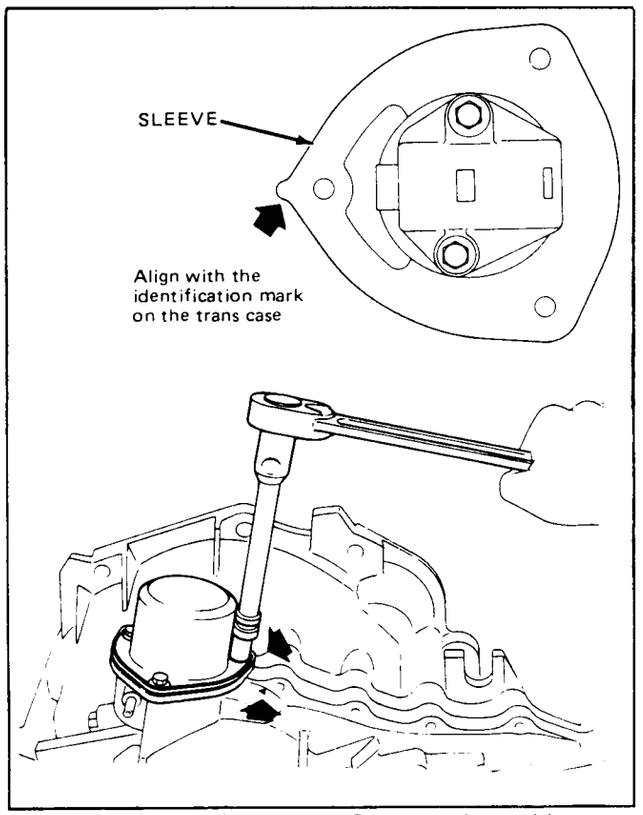


Figure 7A-118 Installing Governor Assembly

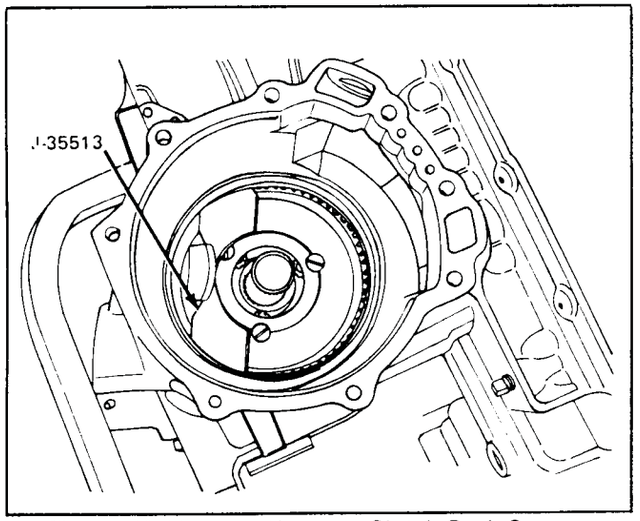


Figure 7A-121 Low/Reverse Clutch Pack Spacer

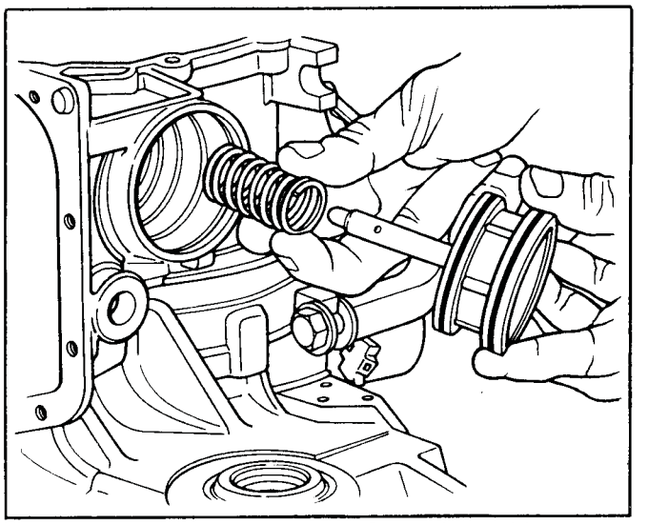


Figure 7A-119 Installing Servo Assembly

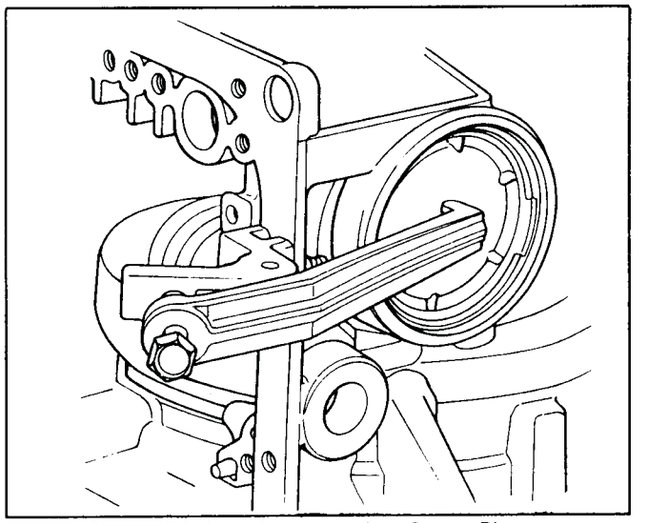


Figure 7A-120 Compressing Servo Piston

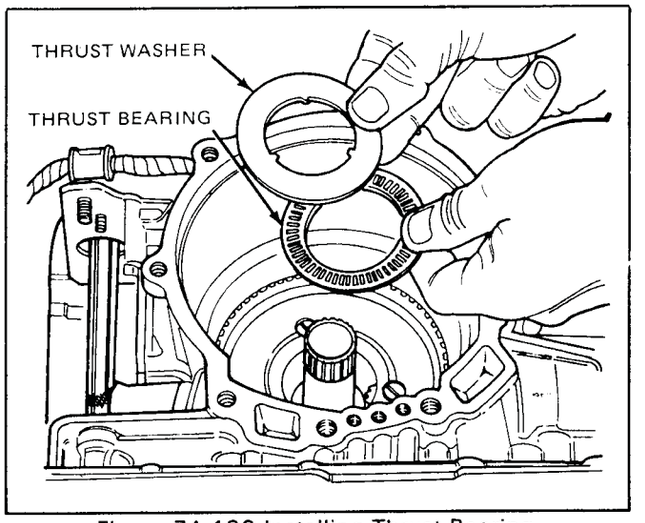


Figure 7A-122 Installing Thrust Bearing

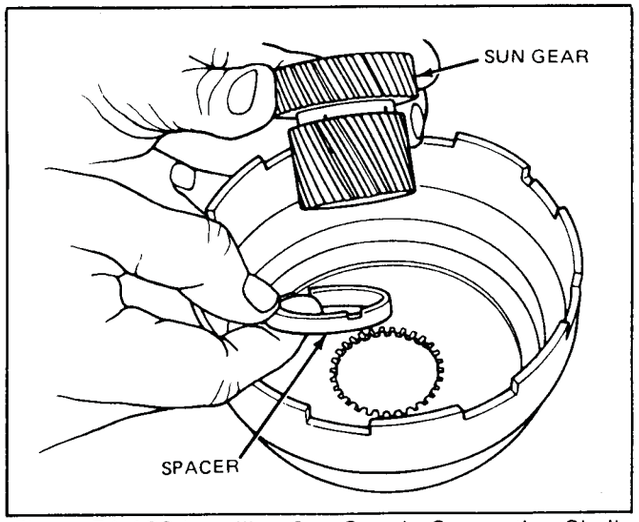


Figure 7A-123 Installing Sun Gear in Connecting Shell

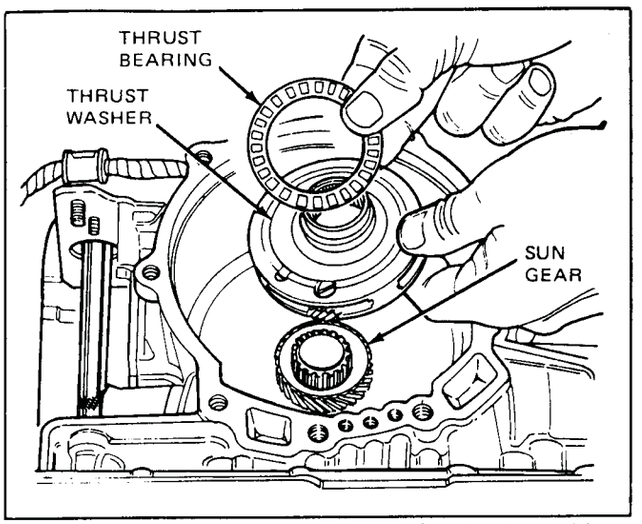


Figure 7A-124 Installing Planetary Carrier Assembly

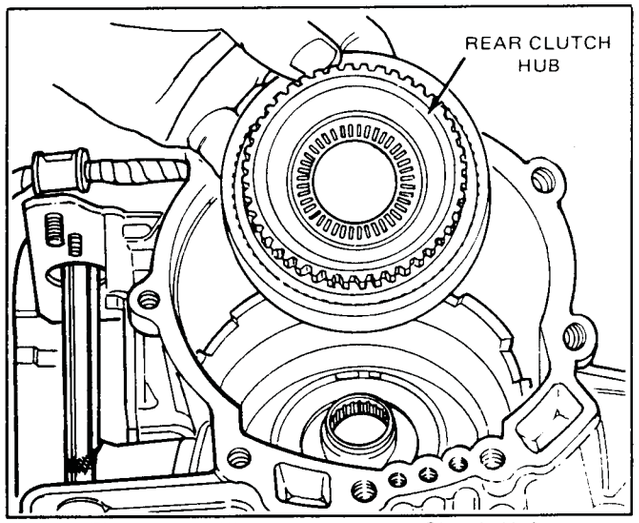


Figure 7A-125 Installing Rear Clutch Hub

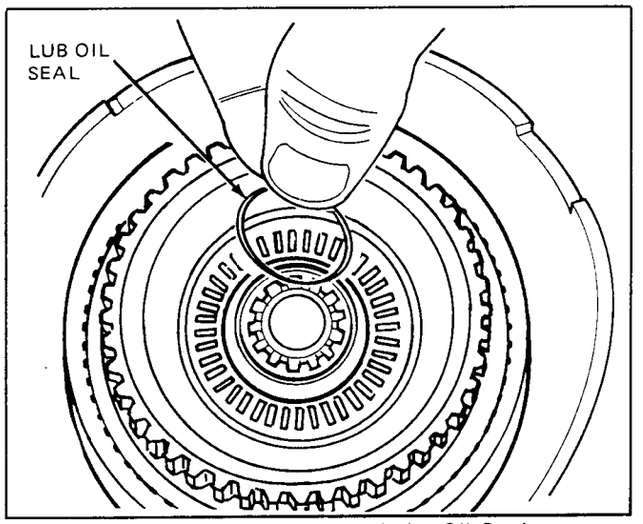


Figure 7A-126 Installing Lube Oil Seal

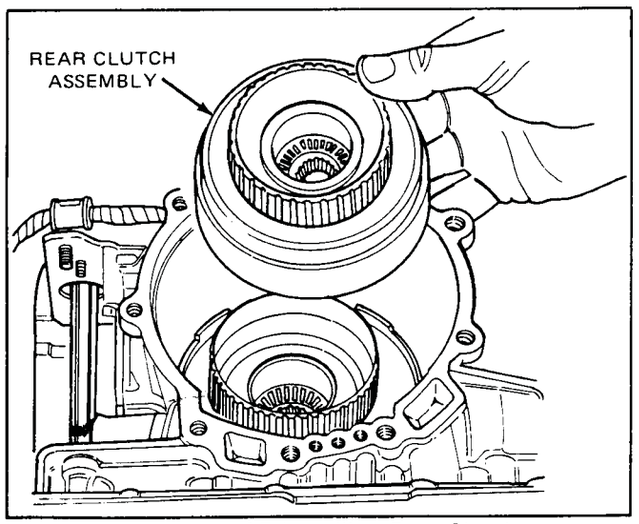


Figure 7A-127 Installing Rear Clutch

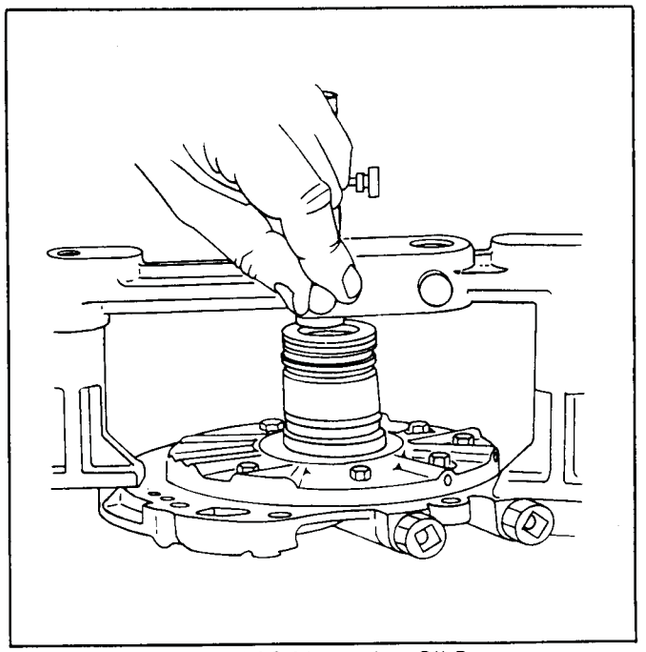


Figure 7A-128 Measuring Oil Pump

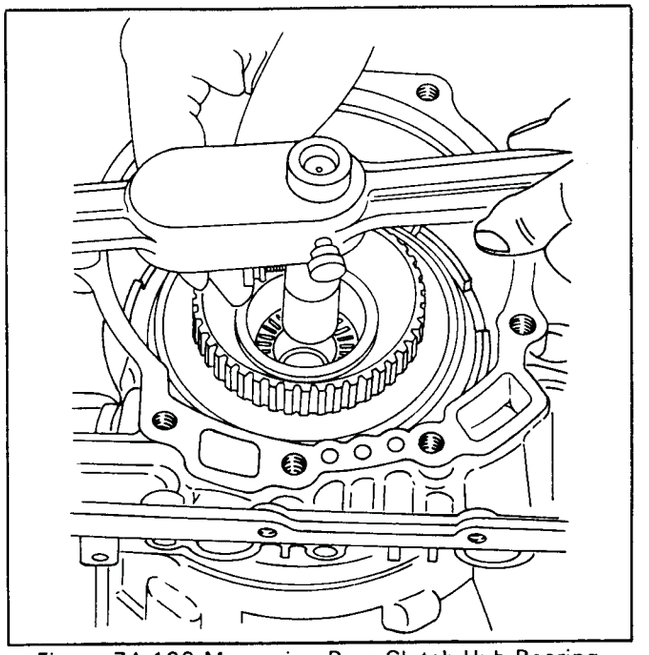


Figure 7A-129 Measuring Rear Clutch Hub Bearing

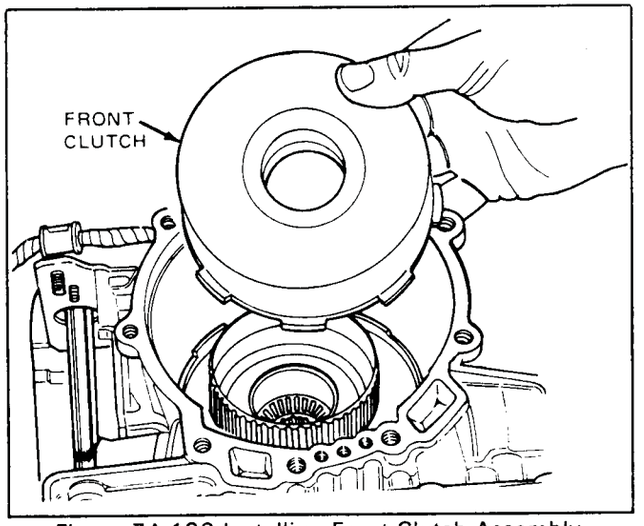


Figure 7A-130 Installing Front Clutch Assembly

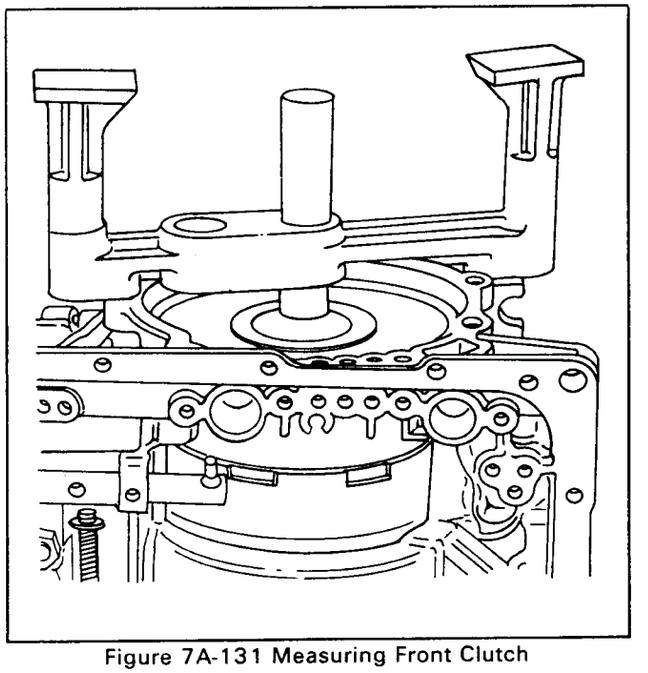


Figure 7A-131 Measuring Front Clutch

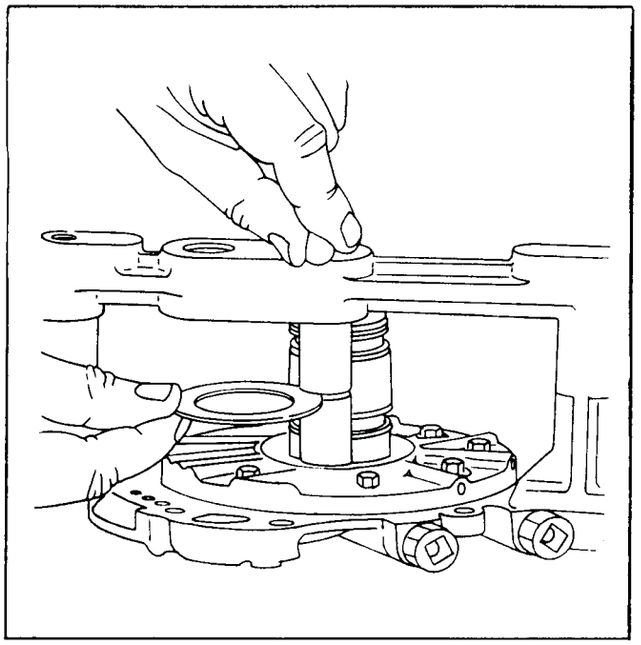


Figure 7A-132 Measuring Oil Pump

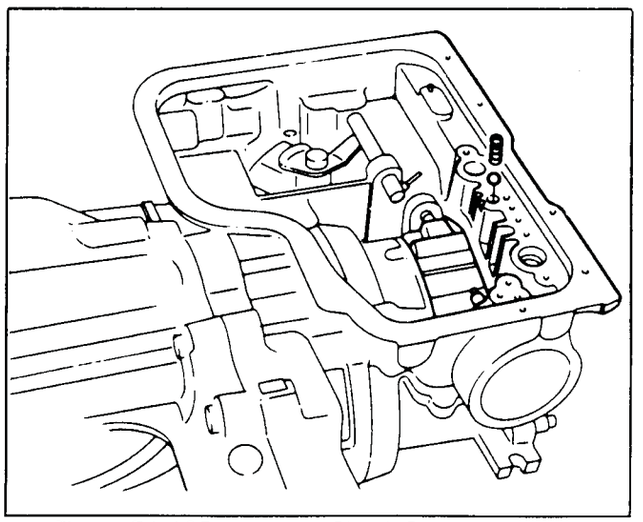


Figure 7A-135 Installing Check Ball and Spring

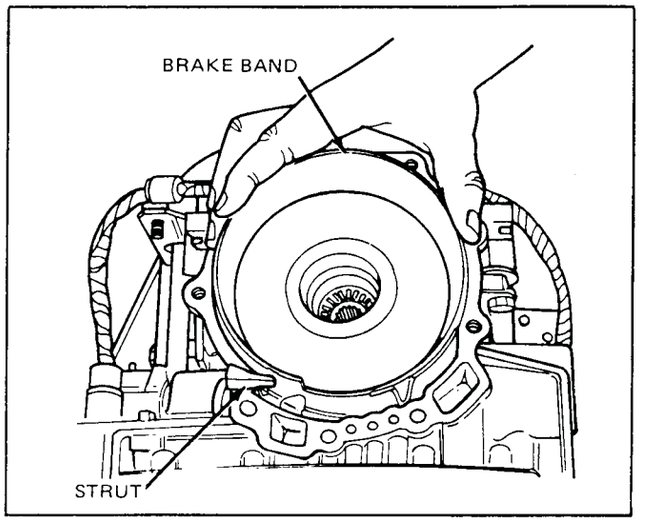


Figure 7A-133 Installing Brake Band

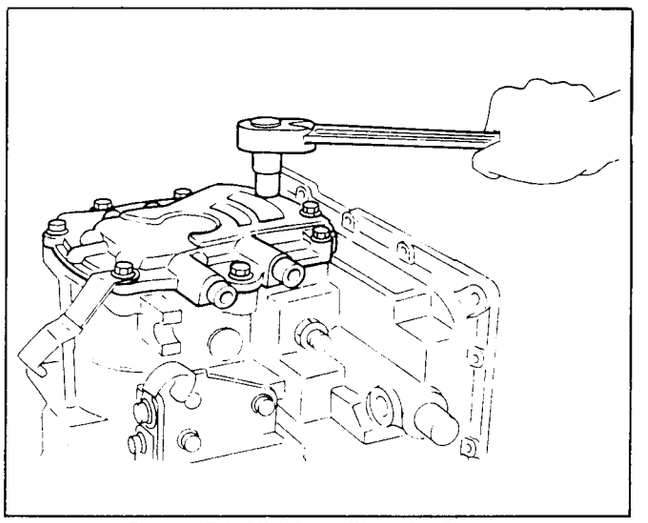


Figure 7A-134 Installing Oil Pump

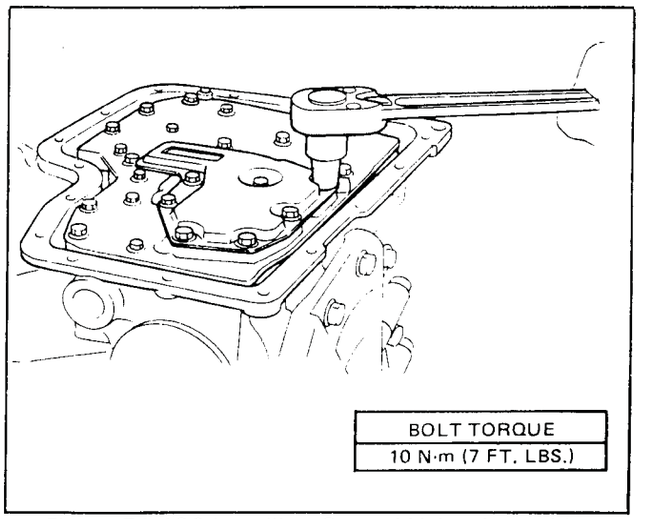
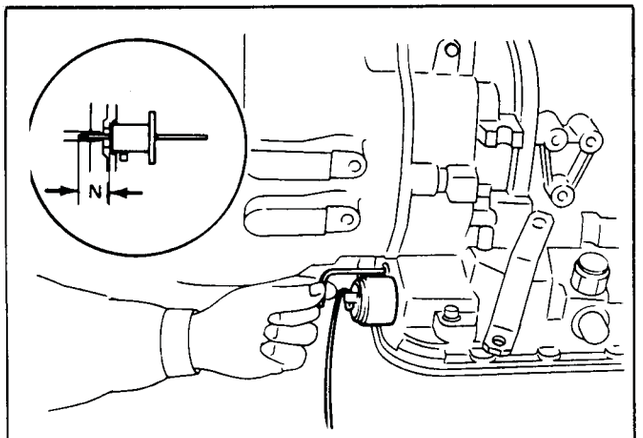


Figure 7A-136 Installing Control Valve Assembly



Size N	Diaphragm Rod Used
Under 26.9 mm (Under 1.06 in)	31.5 mm (1.24 in)
Over 25.4 mm (Over 1.00 in)	29.5 mm (1.160 in)
25.4 – 25.9 mm (1.00 – 1.02 in)	30.0 mm (1.180 in)
25.9 – 26.4 mm (1.02 – 1.04 in)	30.5 mm (1.200 in)
26.4 – 26.9 mm (1.04 – 1.06 in)	31.0 mm (1.220 in)

Figure 7A-137 Measuring Vacuum Diaphragm Rod

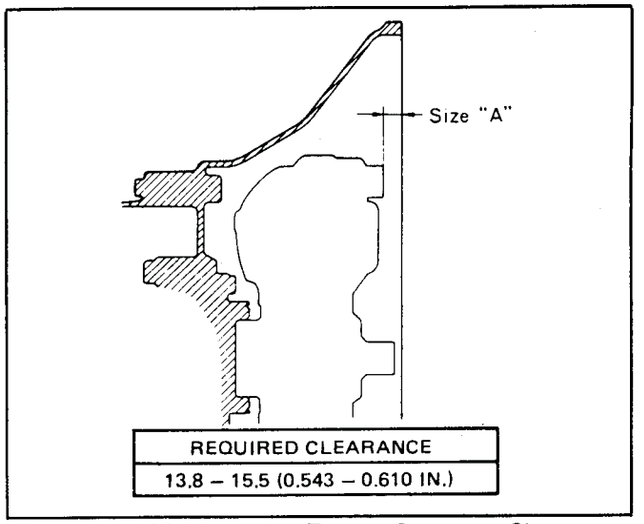


Figure 7A-138 Measuring Torque Converter Clearance

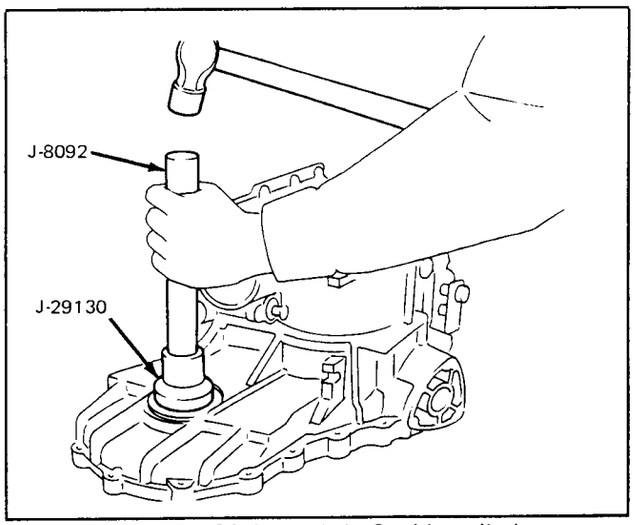


Figure 7A-139 Drive Axle Seal Installation

HYDRAULIC CIRCUITS

VALVE POSITION AT ENGINE STOP

- The oil pump is not driven at engine stop.
- Each valve condition is as follows:

Pressure Regulator Valve

- A spring is located between the plug and the valve, the valve is pushed upside and the plug is pushed down.

Manual Valve

- It is positioned at random. (It is set in the "N" range or "P" range at the time of engine stop).

1-2 Shift Valve

- The spring is located to the left of the valve, the valve is pushed to the right.

2-3 Shift Valve

- The spring is set between valves, the plug is pushed to the left and the valve is pushed to the right.

Pressure Modifier Valve

- The spring is located to the left, the pressure modifier valve is pushed to the right.

Vacuum Throttle Valve

- The vacuum throttle valve is pushed to the lower position by the vacuum diaphragm spring through the rod.

Throttle Back-Up Valve

- The spring is located at the upper position, the back-up valve is pushed to the lower position.

Kickdown Solenoid Down Shift Valve

- The spring is located at the lower position, the downshift valve is pushed to the upper position.

Second Lock Valve

- As the spring is located at the lower position, the lock valve is pushed to the upper position.

Note - "Upper", "Lower", "Right" and "Left" is used to clarify explanation of the hydraulic circuits.

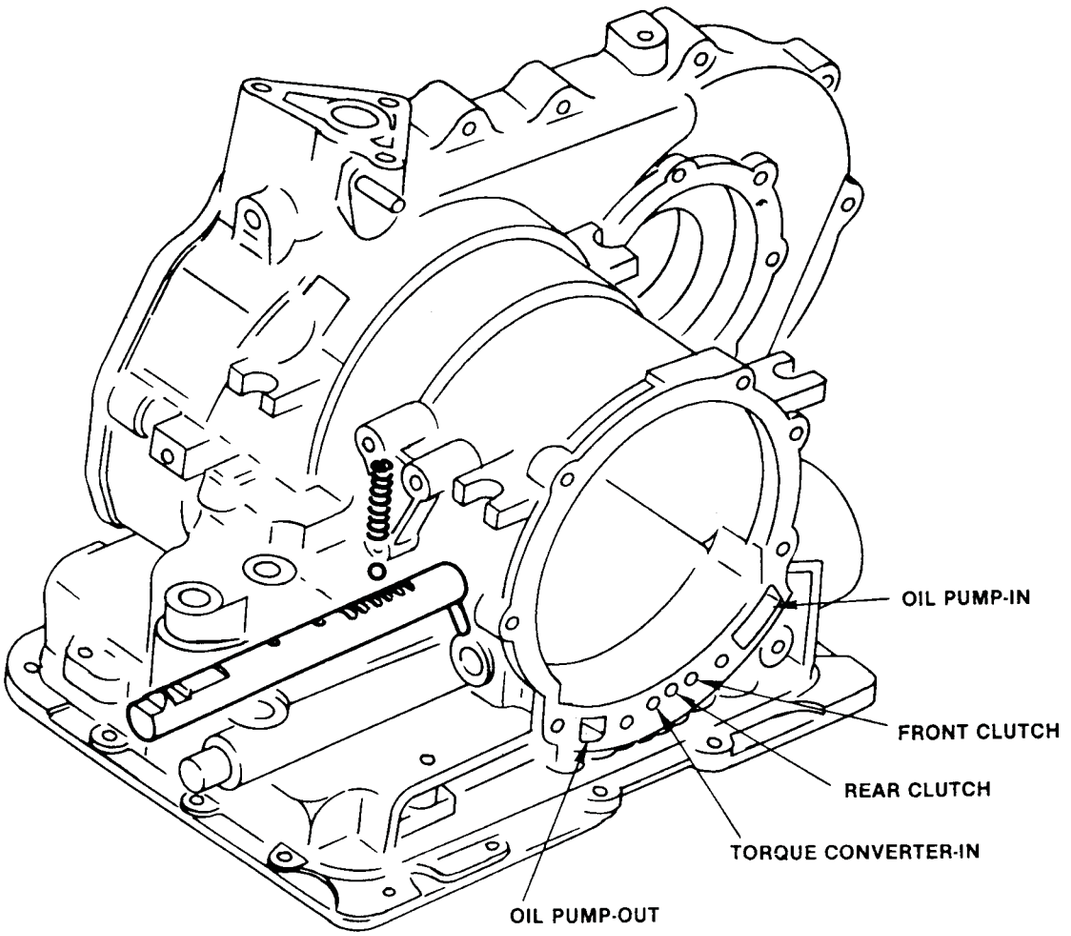


Figure 7A-140 Transaxle Housing Oil Passages

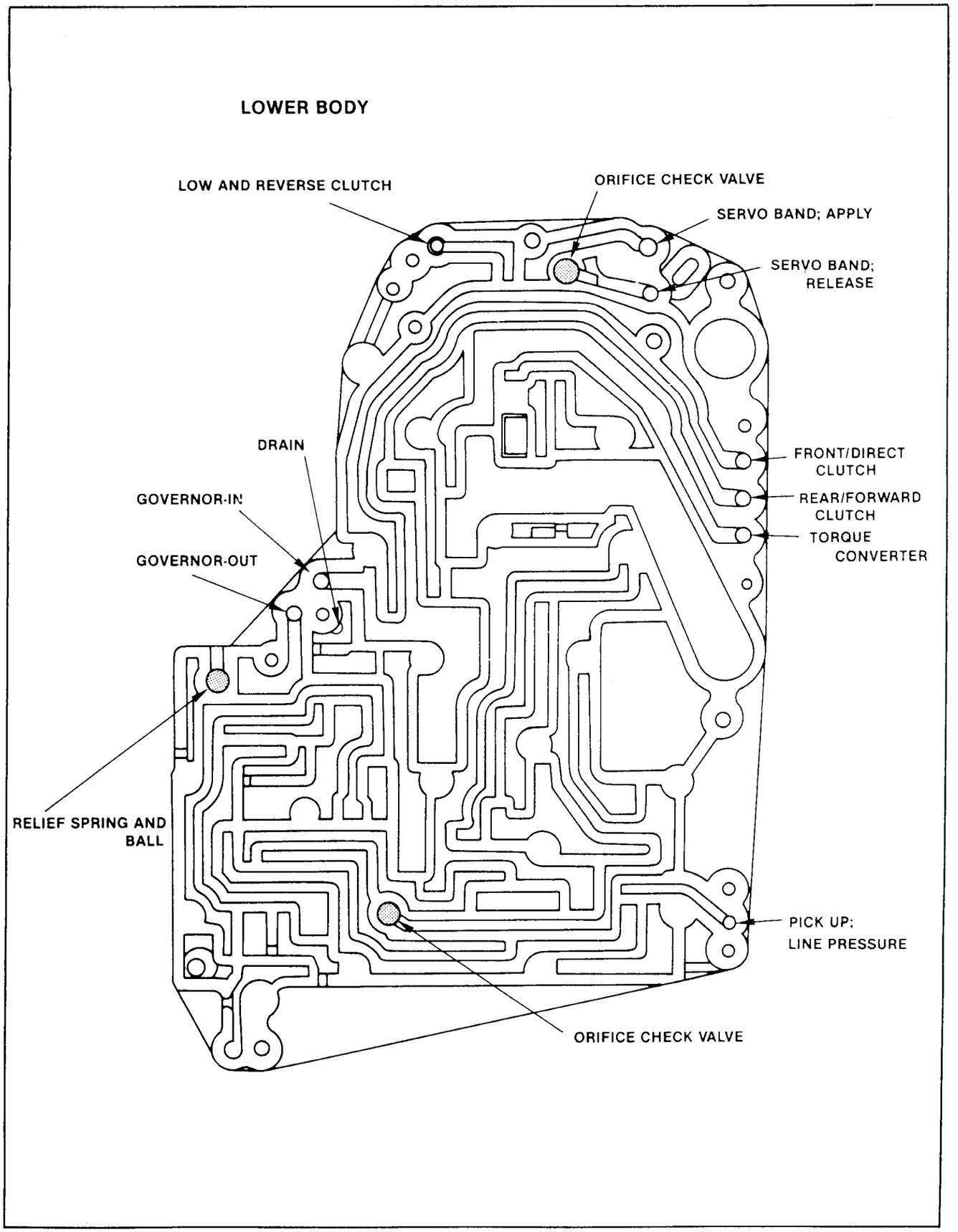


Figure 7A-141 Vavle Body Oil Passages

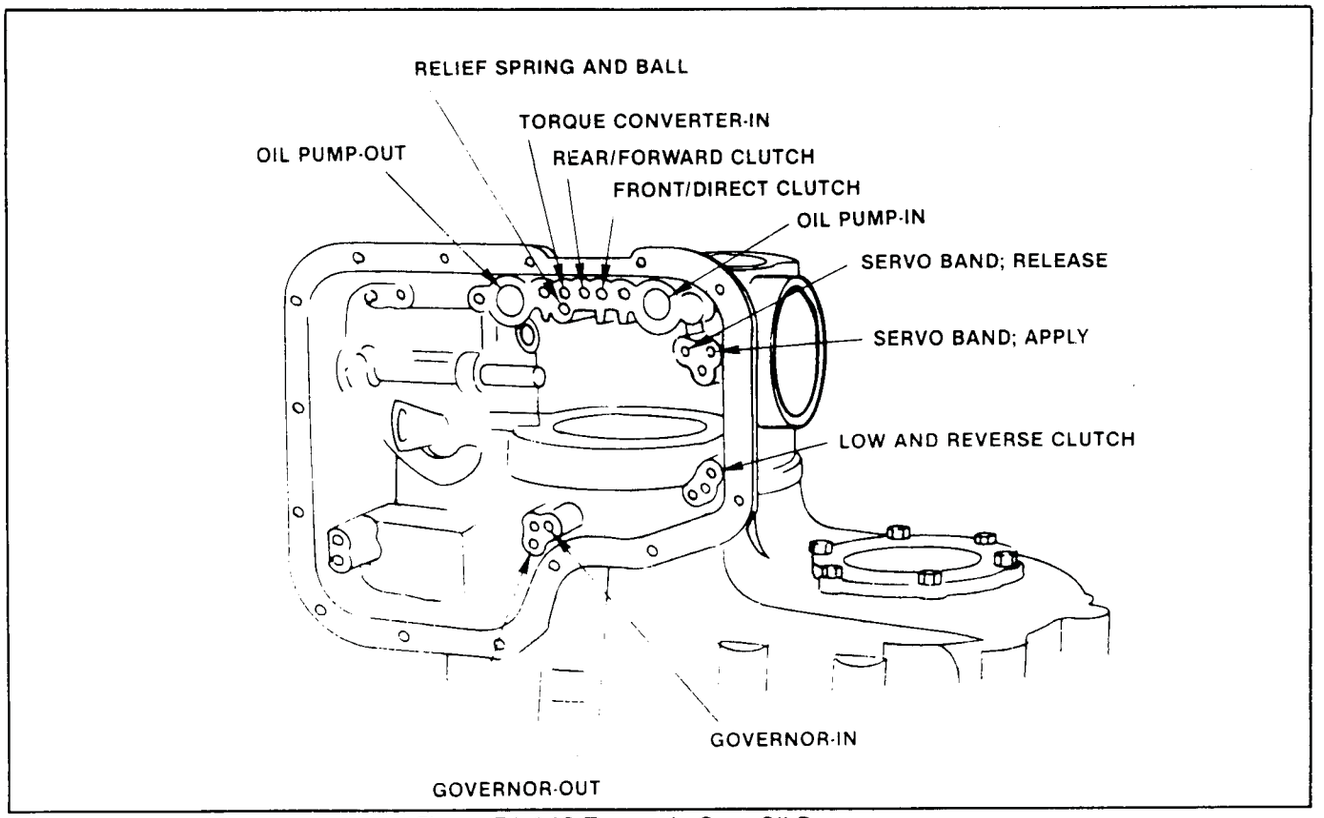


Figure 7A-142 Transaxle Case Oil Passages

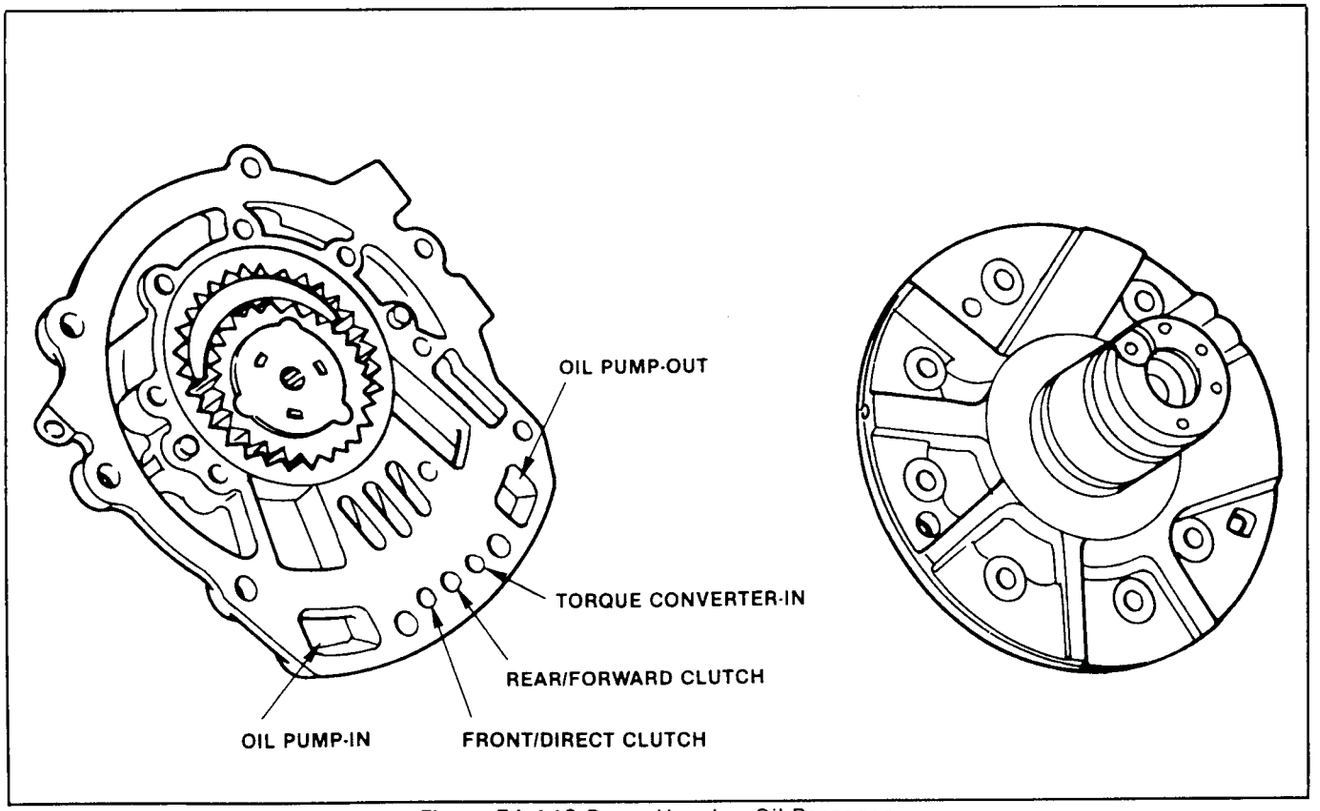


Figure 7A-143 Pump Housing Oil Passages

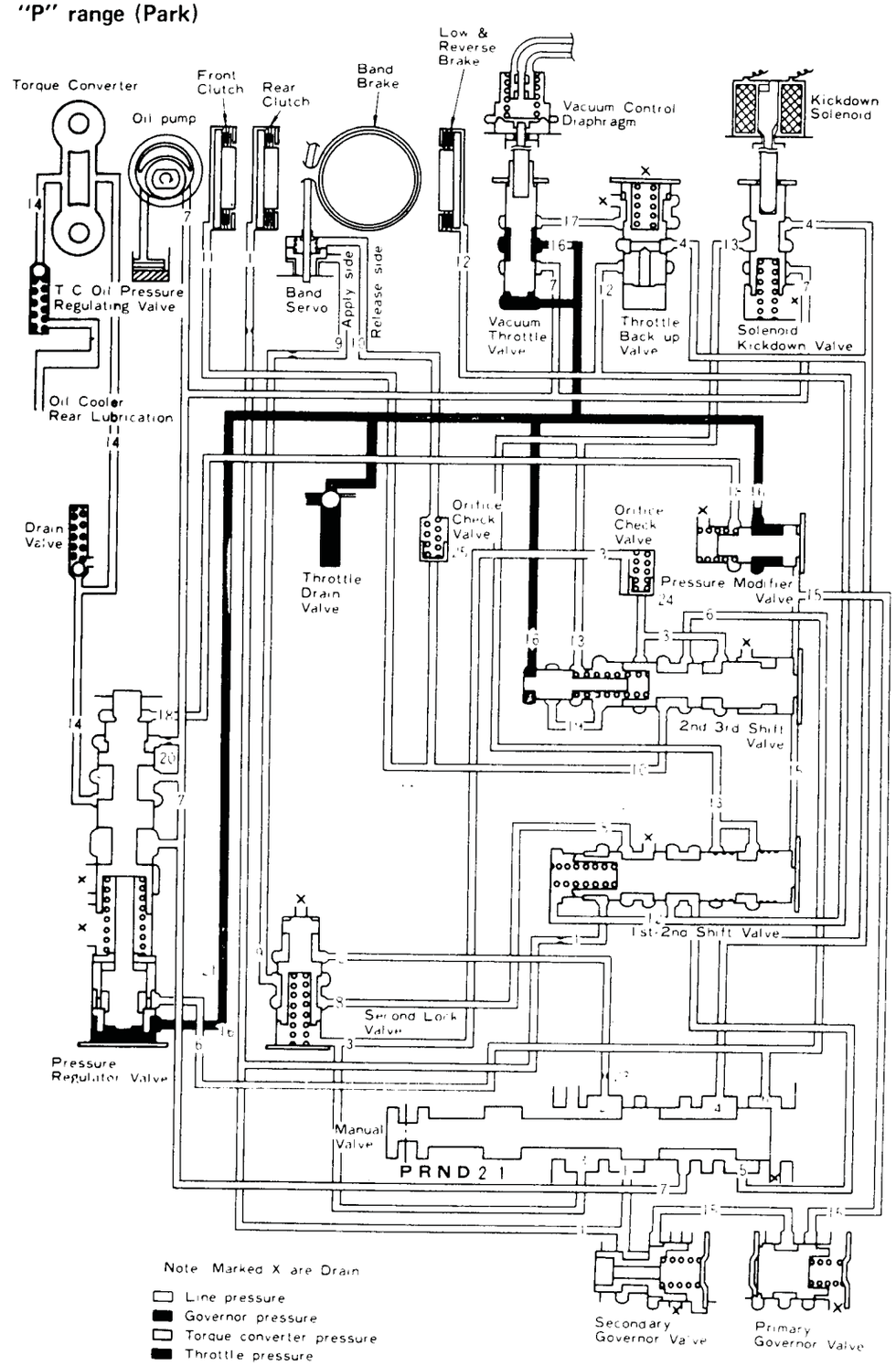
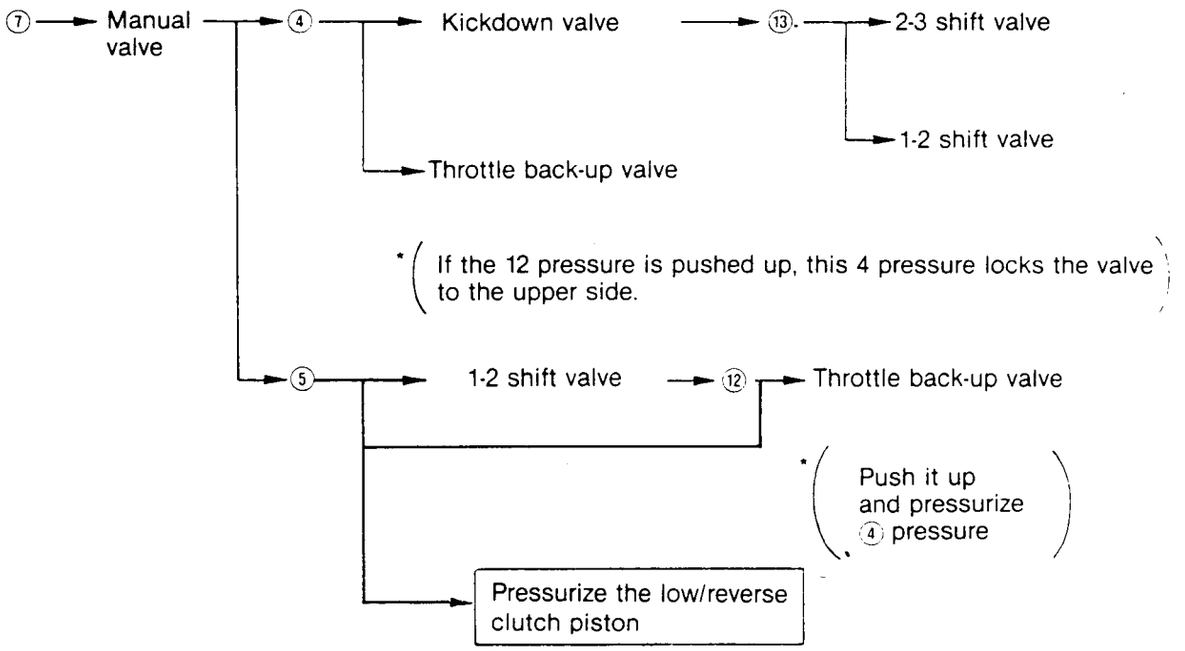


Figure 7A-144 Oil Flow Circuit (Park, Engine Running)

Park — Engine Running

With the selector lever in the park (P) position, oil from the pump is directed to the valves, forming the hydraulic circuit shown in Figure 7A-144.



Oil Flow, Park, Engine Running.

Figure 7A-144a Oil Flow Chart (Park, Engine Running)

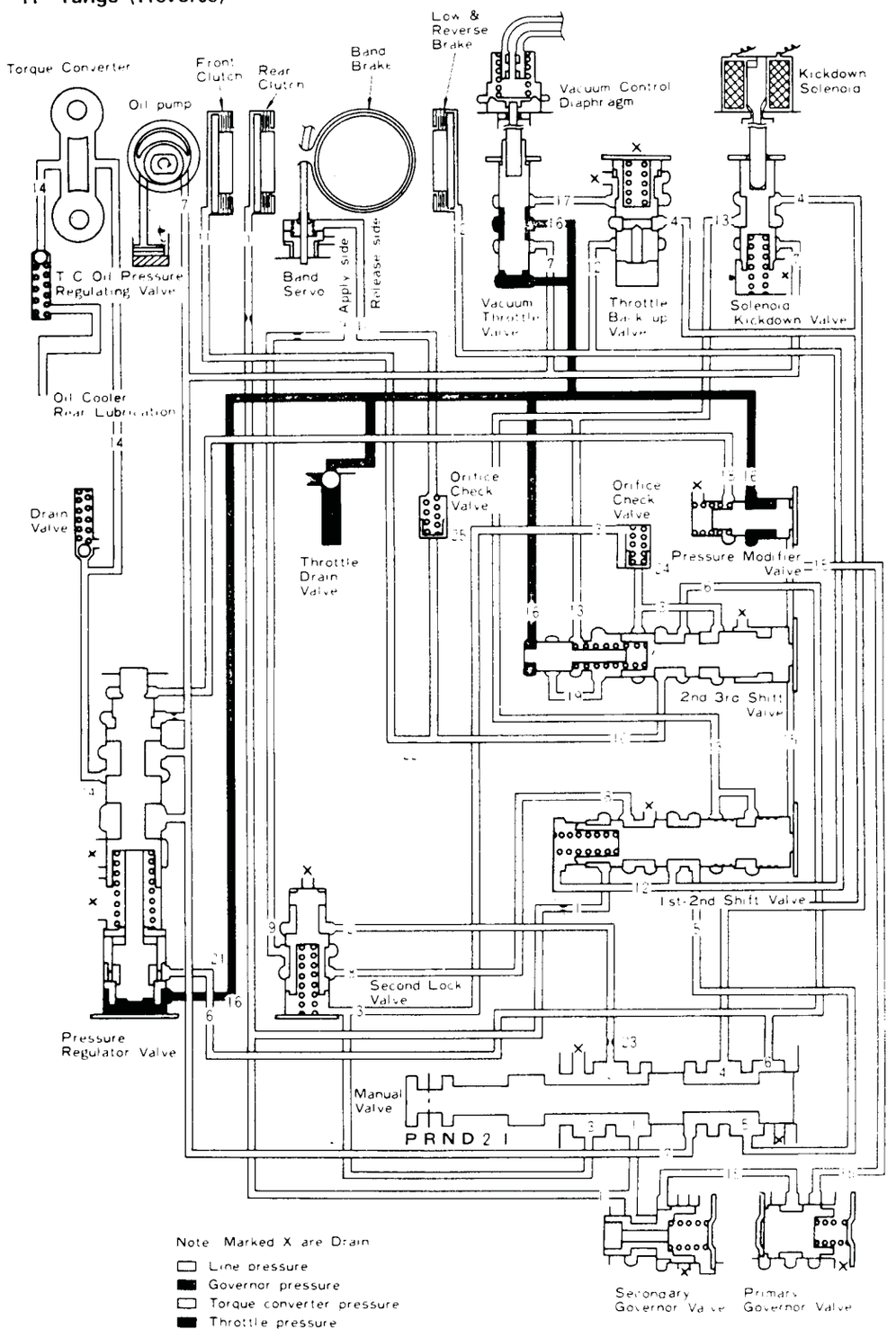
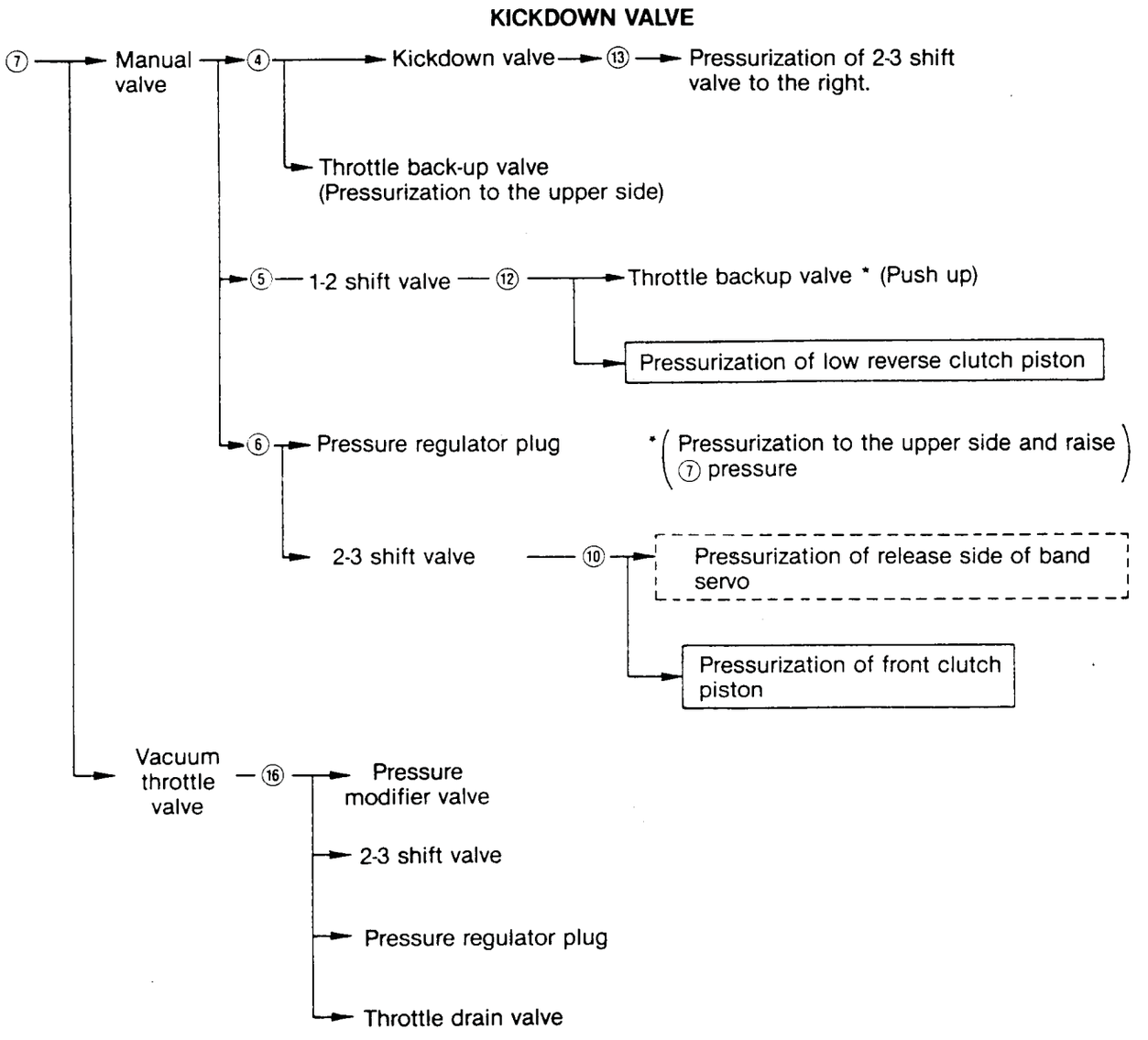


Figure7A-145 Oil Flow Circuits (Reverse)

Reverse

With the selector lever in the reverse position, oil from the pump is directed to the valves, forming the hydraulic circuit shown in Figure 7A-145.



Oil Flow, Reverse.

Figure 7A-145a Oil Flow Chart (Reverse)

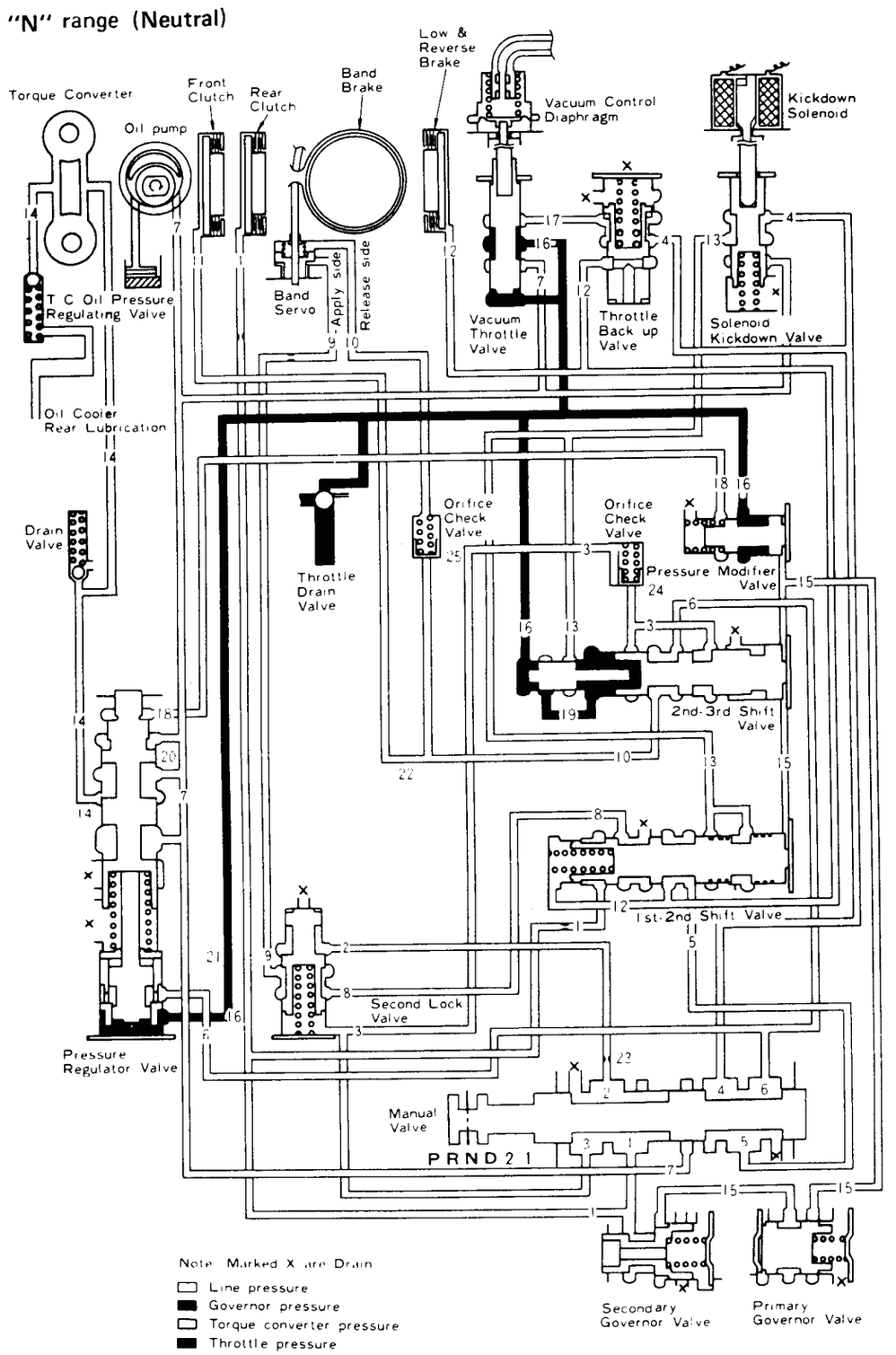
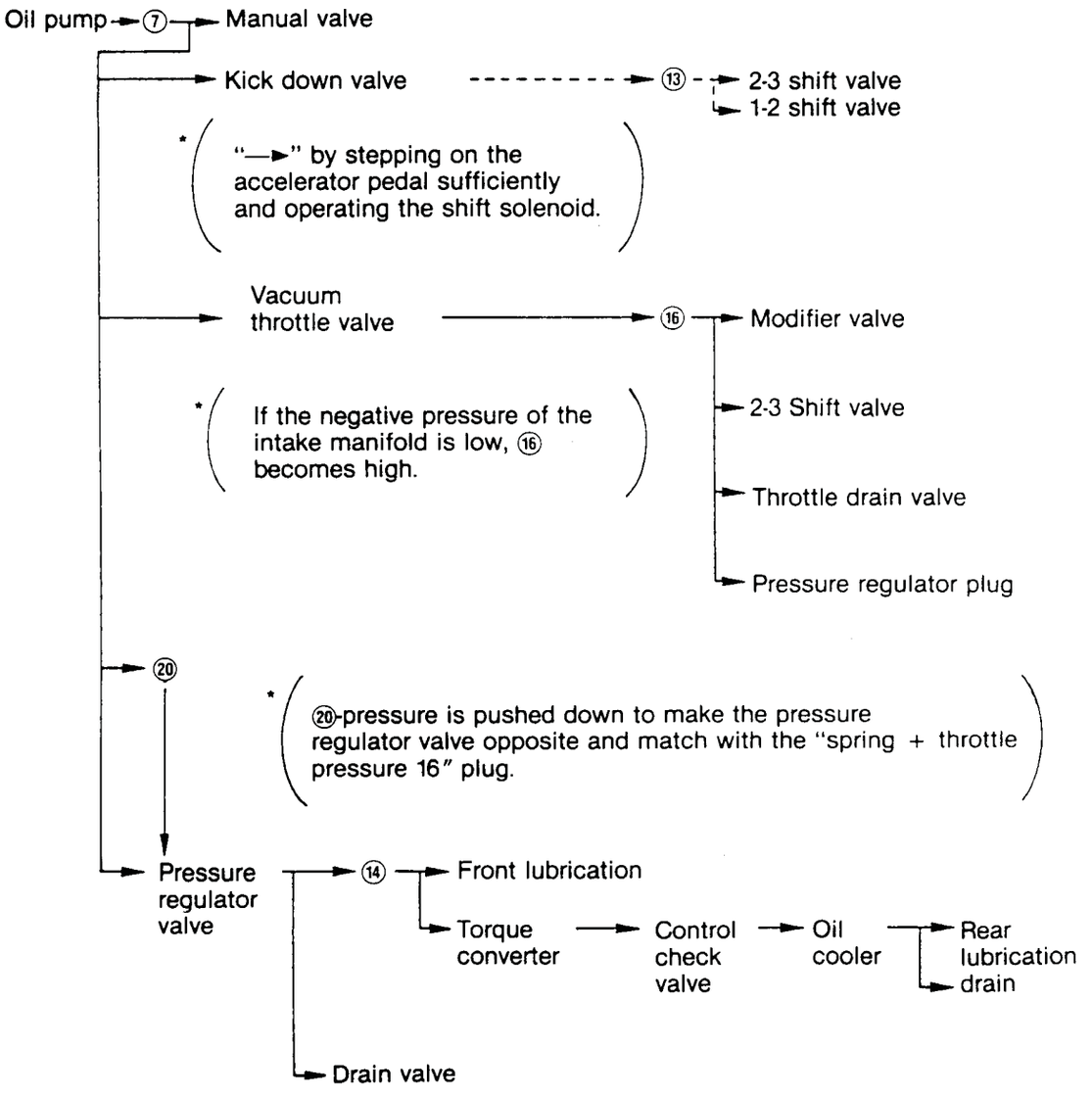


Figure 7A-146 Oil Flow Circuits (Neutral)

Neutral — Engine Running

With the selector lever in the neutral (N) position, oil from the pump is directed to the valves, forming the hydraulic circuit shown in Figure 7A-146.



Oil Flow, Neutral.

Figure 7A-146a Oil Flow Chart (Neutral)

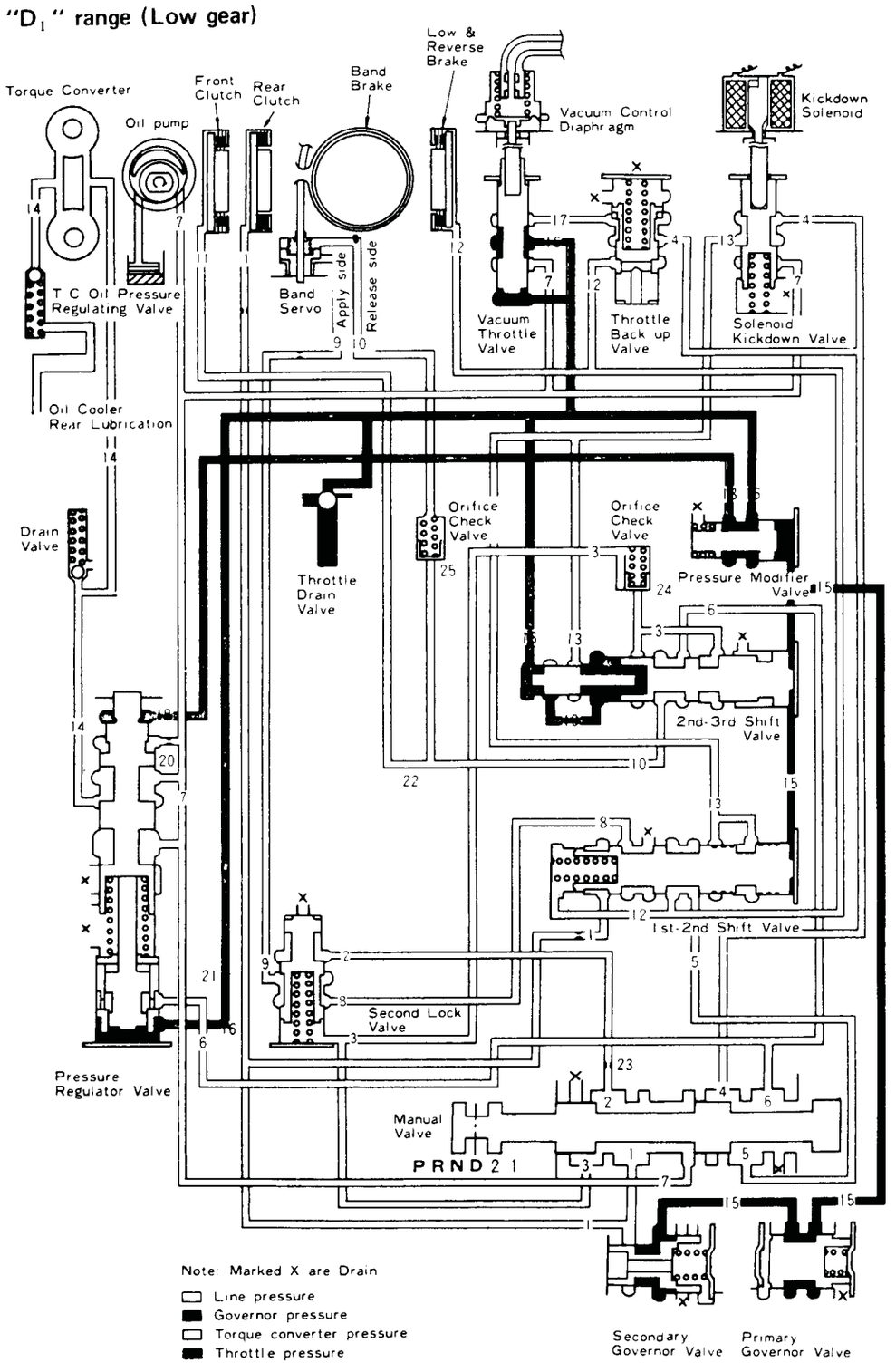
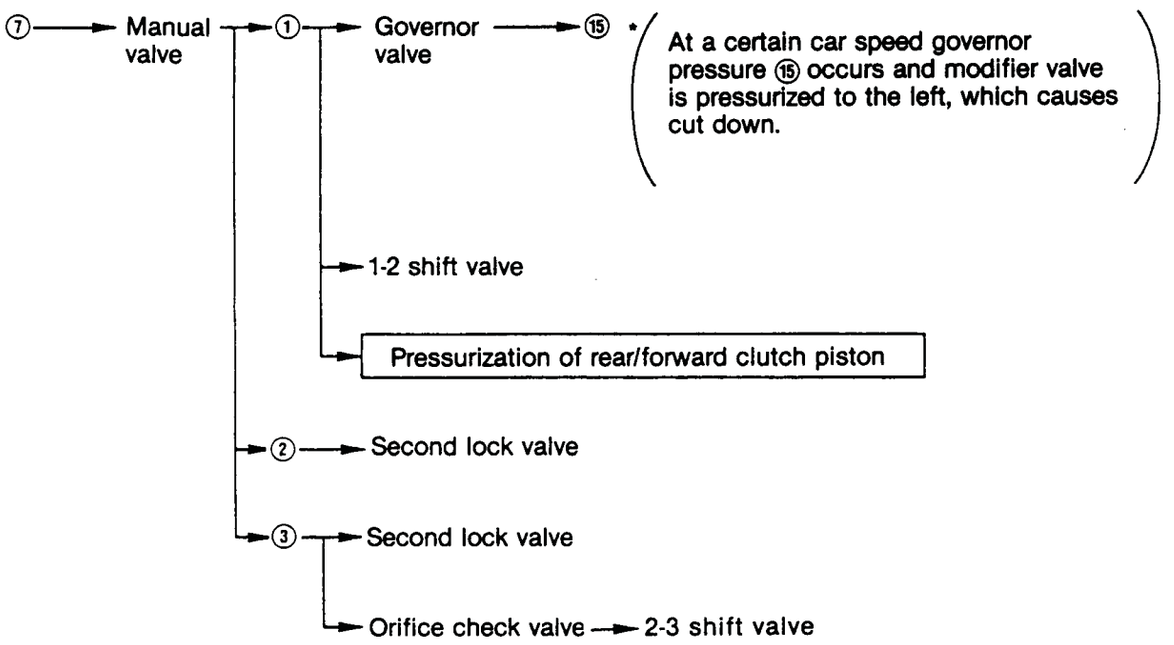


Figure 7A-147 Oil Flow Circuits (Drive(1), Low Gear)

Drive Range — First Gear

With the selector lever in the drive (D) position, oil from the pump is directed to the following valves, forming the hydraulic circuit as shown in Figure 7A-147.



Oil Flow Drive, Low Gear.

LINE PRESSURE "CUT DOWN"

If car is driven at high speed with high line pressure, gear shift shock becomes bigger and oil pump loss also becomes larger. To prevent this, line pressure is reduced, which is named "Cut Down" cut down can be practiced only when car starts in D_1 or D_2 range.

In R-Range governor pressure ⑮ does not occur, so cut down is not practiced.

1. When car starts, load is large (Intake manifold negative pressure is low), so vacuum throttle valve goes down, ⑦ pressure is transmitted to ⑯ pressure, pressure regulator plug is pressurized by oil and ⑦ pressure is raised.
2. When car starts to run at a certain speed, governor pressure ⑮ occurs, modifier valve is pressurized to the left, ⑯ pressure is transmitted to ⑱ pressure which pressurize the upper side of pressure regulator valve and ⑦ pressure is introduced (cut down).

Figure 7A-147a Oil Flow Chart (Drive(1), Low Gear)

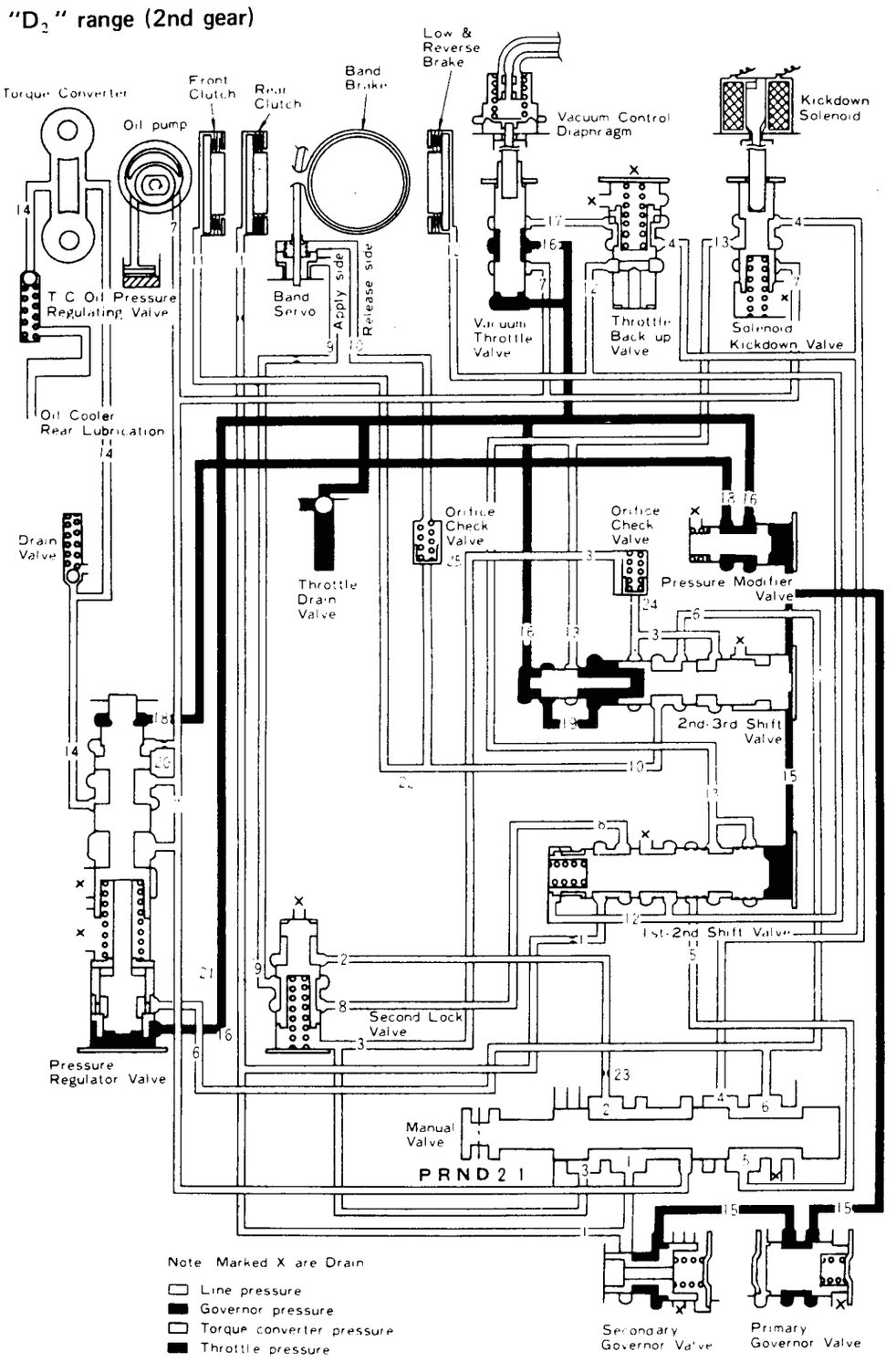
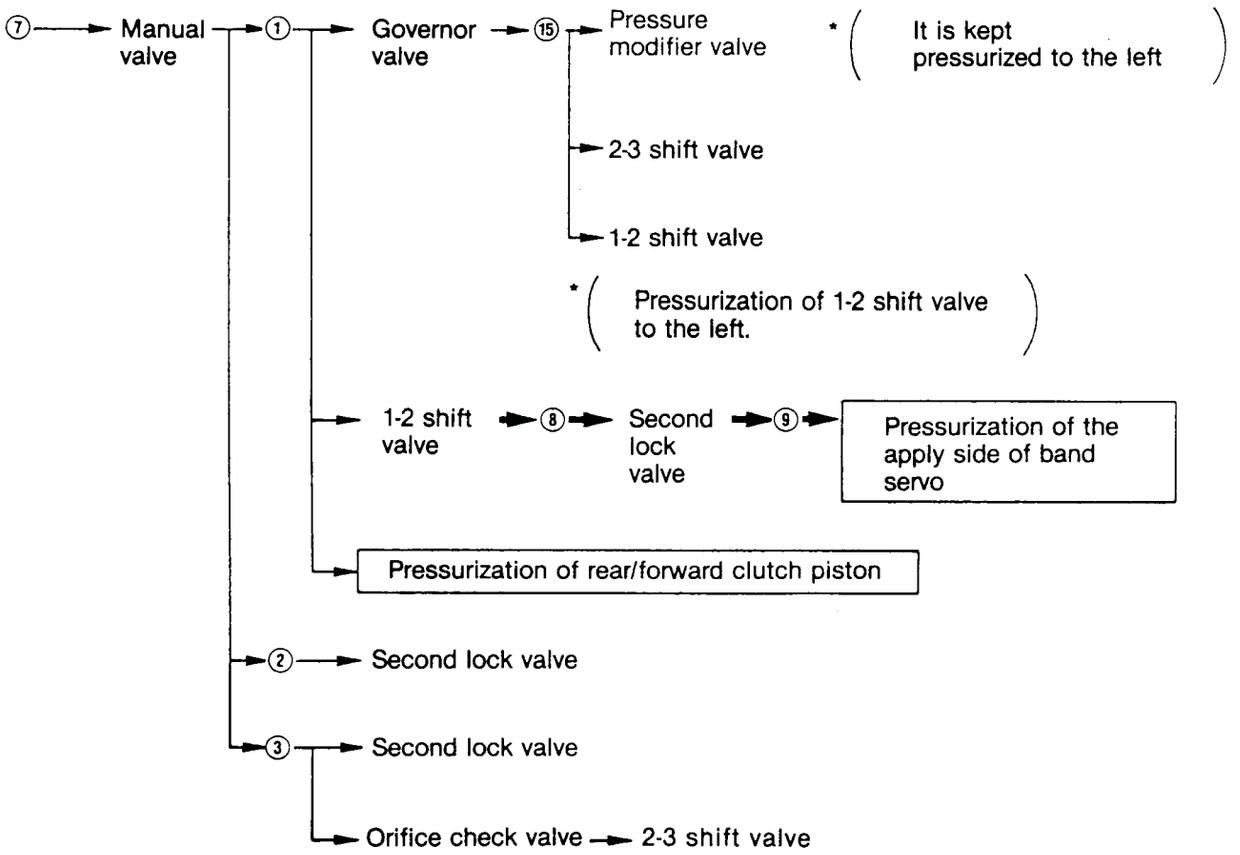


Figure 7A-148 Oil Flow Circuits (Drive(2) Second Gear)

Drive Range — Second Gear

As both vehicle speed and governor pressure increase the transaxle shifts to 2nd gear which routes oil to the valves, forming the hydraulic circuit shown in Figure 7A-148.



Oil Flow, Drive 2, Second Gear.

Figure 7A-148a Oil Flow Chart (Drive(2), Second Gear)

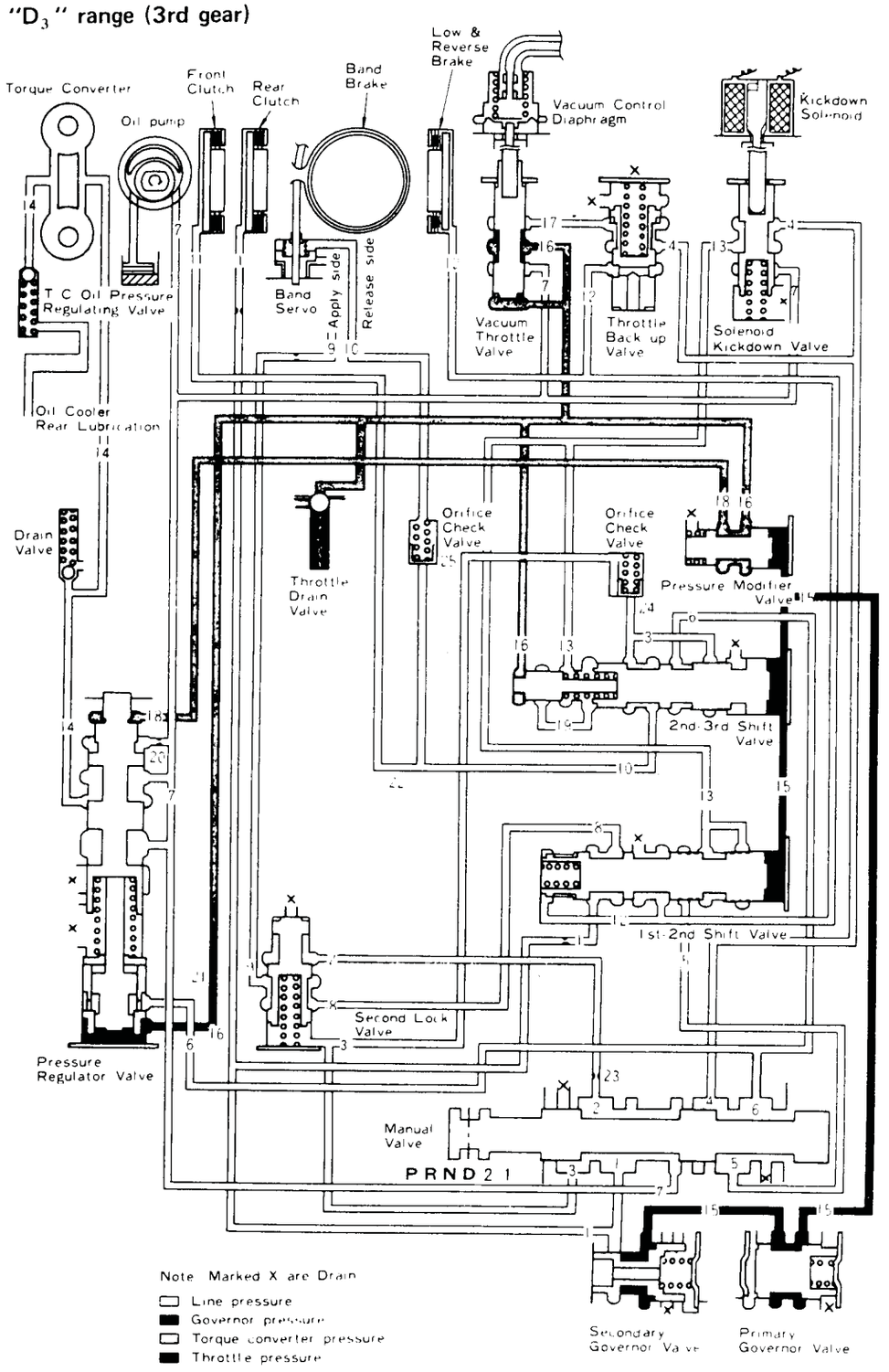
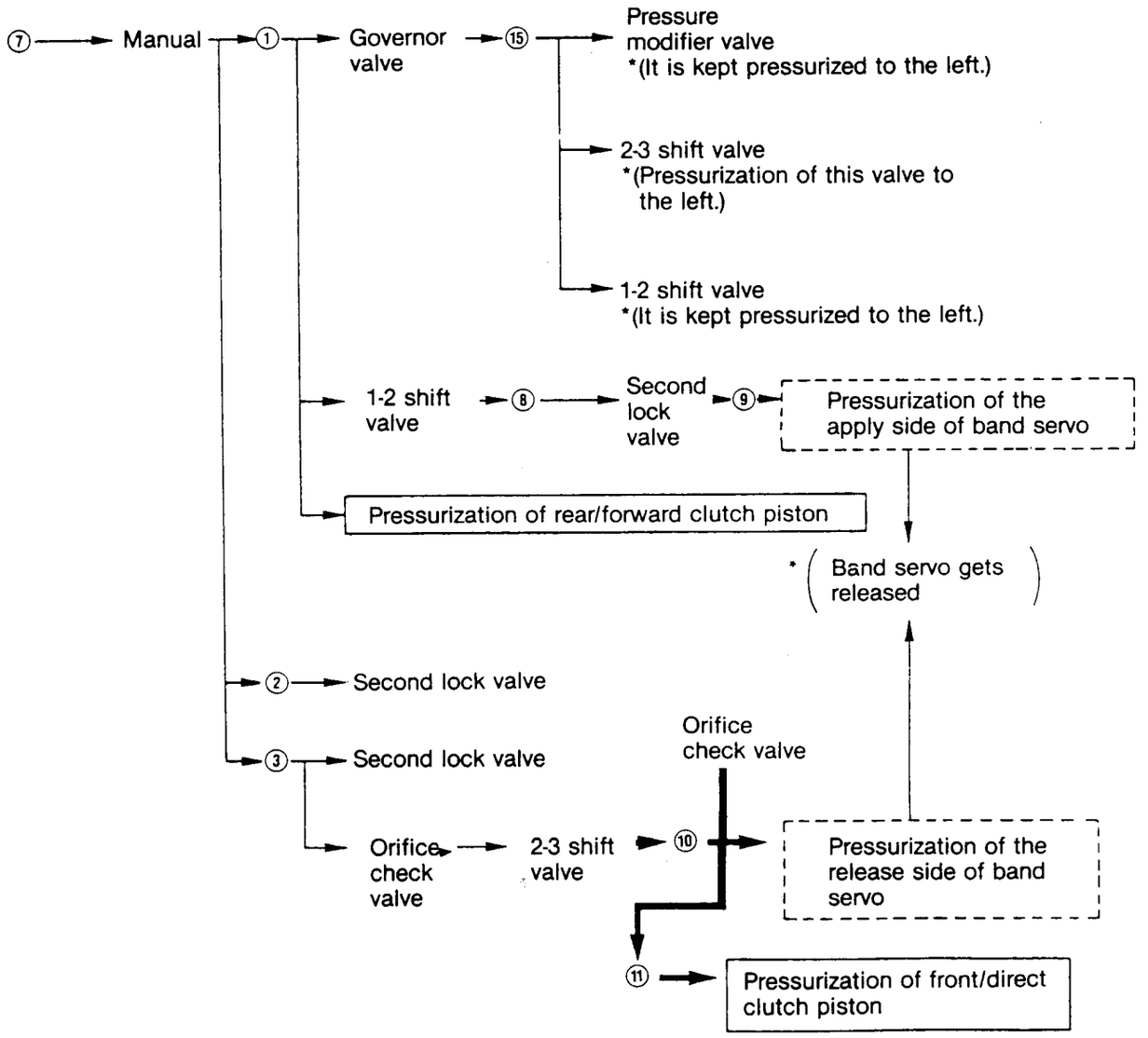


Figure 7A-149 Oil Flow Circuits (Drive(3), Third Gear)

Drive Range — Third gear

As both vehicle speed and governor pressure increase, the transmission shifts to third gear and oil from the pump is directed to the valves, forming the hydraulic circuit shown in Figure 7A-149.



Oil Flow, Drive 3, Third Gear.

Figure 7A-149a Oil Flow Chart (Drive(3), Third Gear)

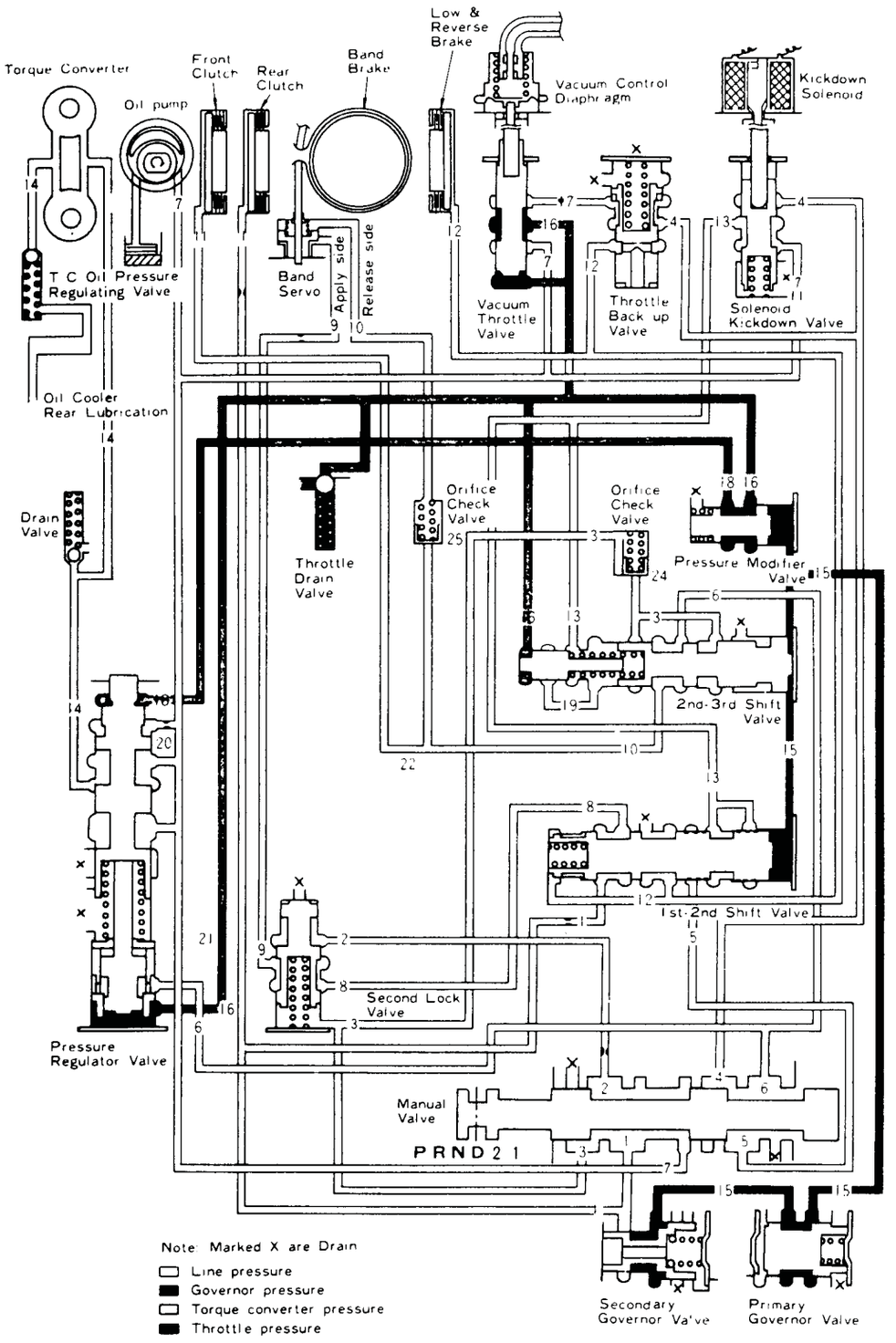
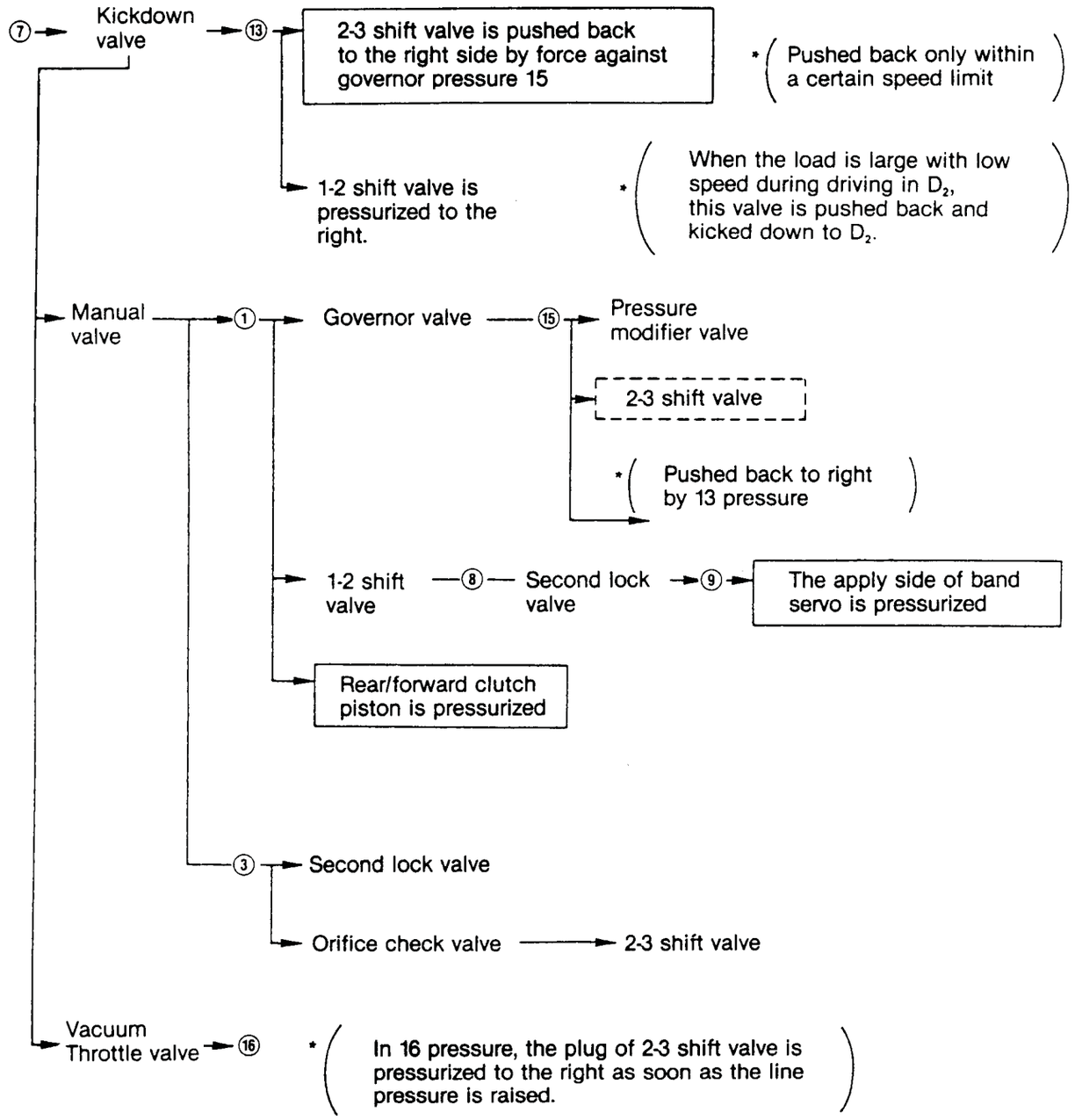


Figure 7A-150 Oil Flow Circuits (Drive(3-2), Downshift)

Drive Range — 3-2 Downshift

When the accelerator pedal is depressed for a part throttle downshift, the kick down switch is energized and the solenoid valve is pushed down through the rod of the solenoid, Figure 7A-150, oil from the pump is directed as follows.



Oil Flow Drive, 3-2 Downshift.

Figure 7A-150a Oil Flow Chart (Drive(3-2), Downshift)

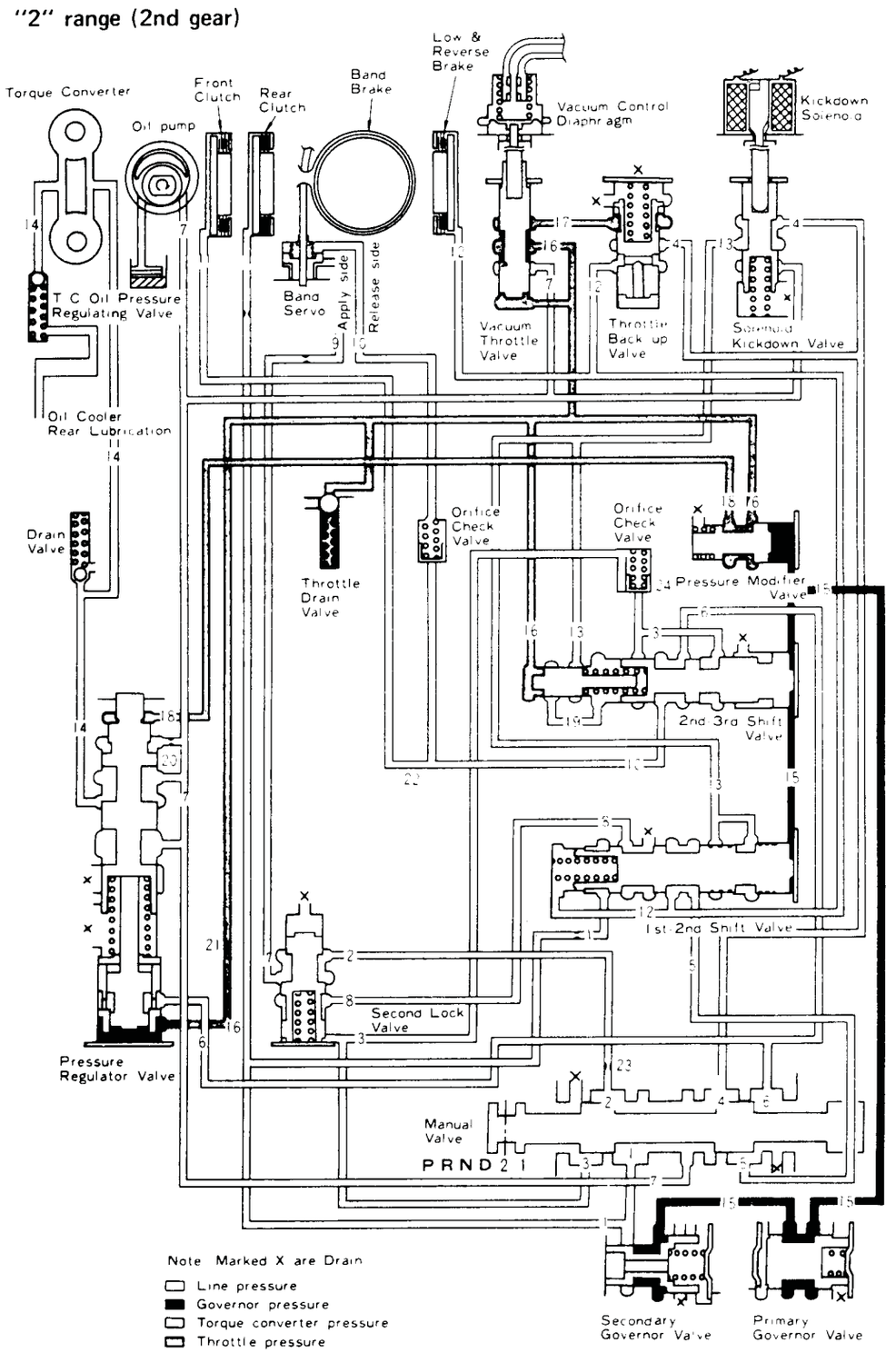
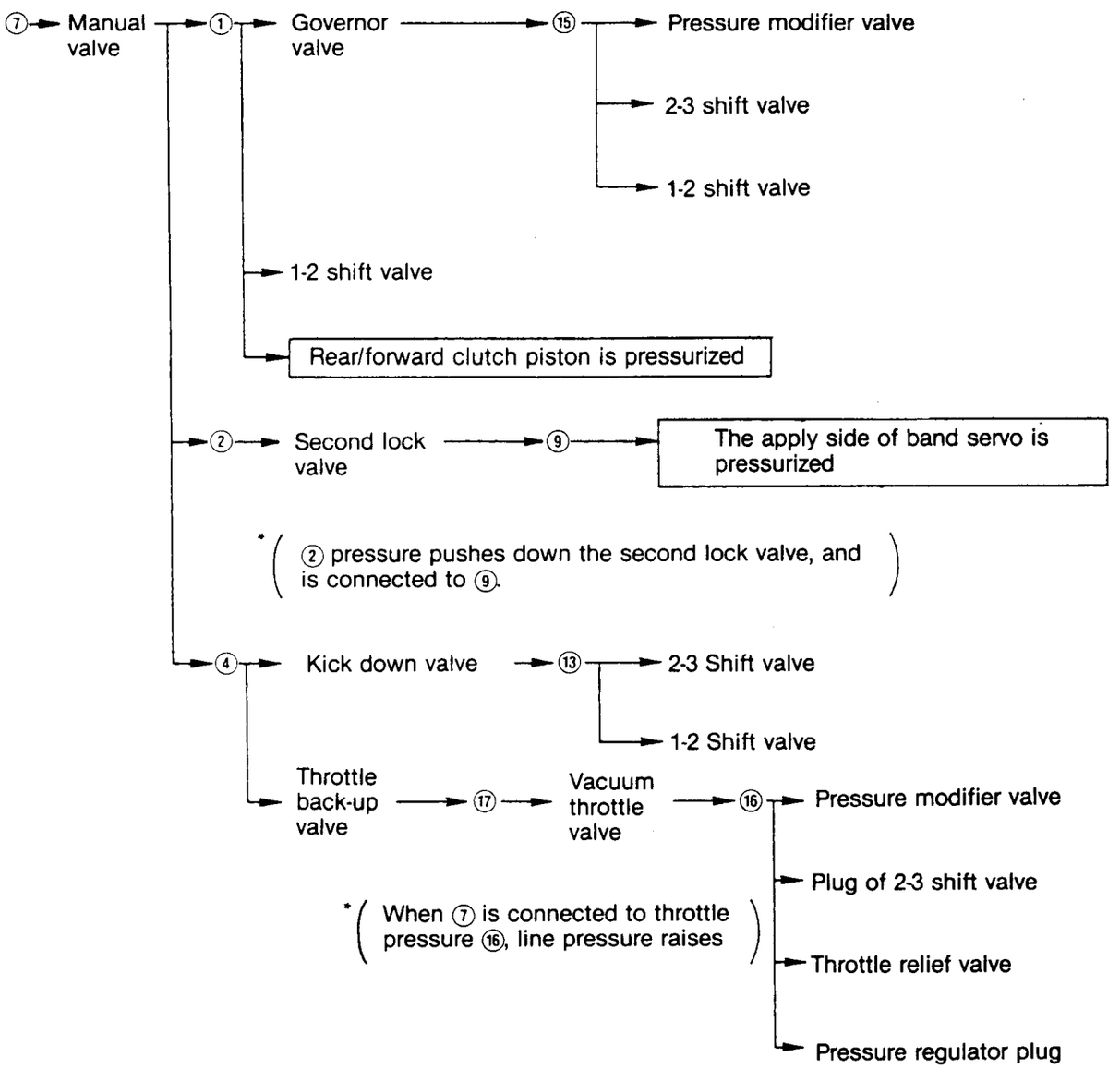


Figure 7A-151 Oil Flow Circuits (Manual(2), Second Gear)

Manual 2 Range — Second Gear

See Figure 7A-151. When the selector lever is moved from the drive (D) position to the manual 2nd range (2) oil from the pump is directed as follows:



Oil Flow, Manual 2, Second Gear.

Figure 7A-151a Oil Flow Chart (Manual(2), Second Gear)

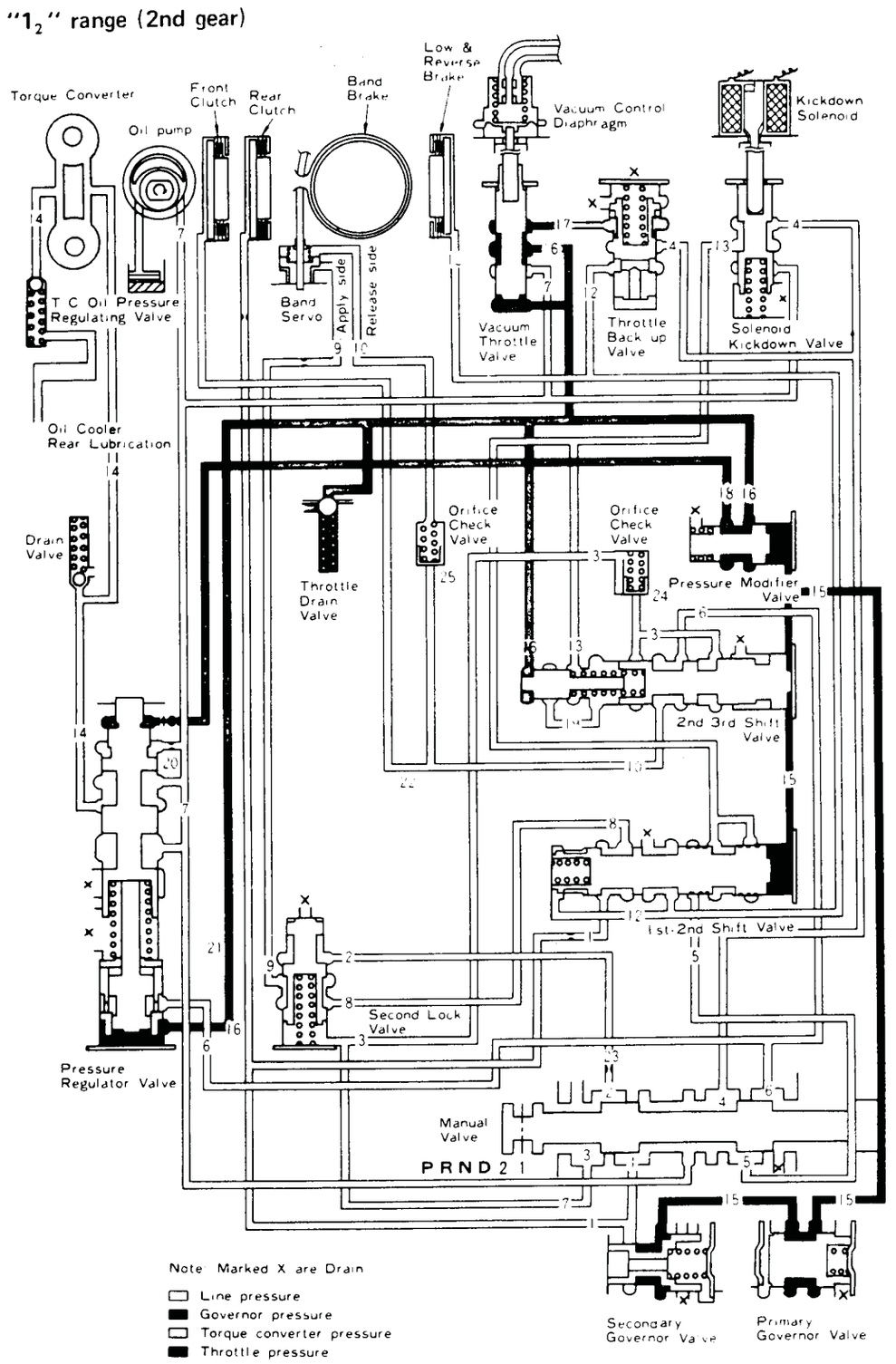
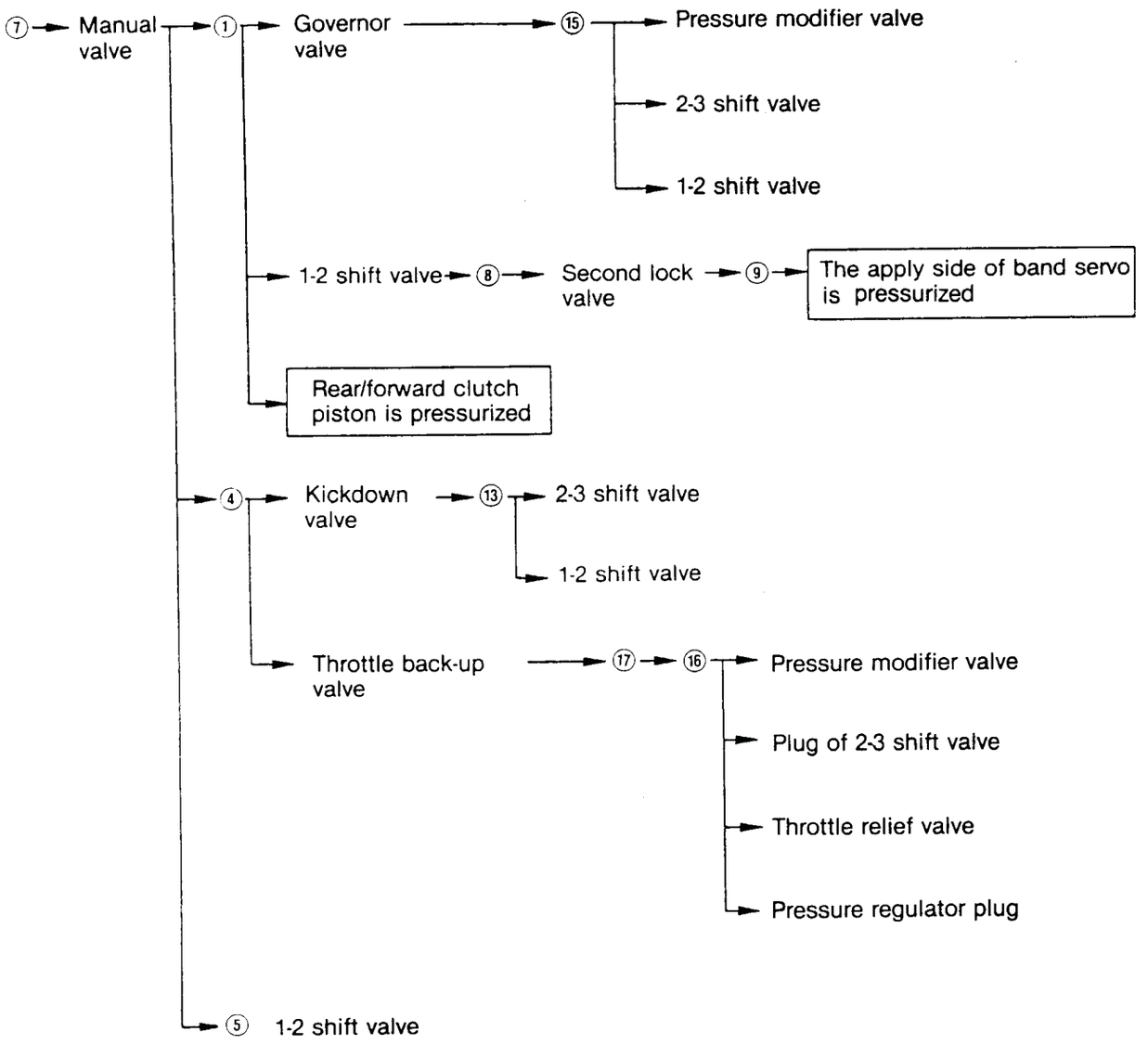


Figure 7A-152 Oil Flow Circuits (Manual(1), Second Gear)

Manual 1 Range — Second Gear

See Figure 7A-152. When the selector lever is moved to the manual 1 range (1) and vehicle speed and governor pressure are sufficient, the transmission will be in 2nd gear. Oil from the pump is directed as follows:



Oil Flow, Manual 1, Second Gear.

Figure 7A-152a Oil Flow Chart (Manual(1), Second Gear)

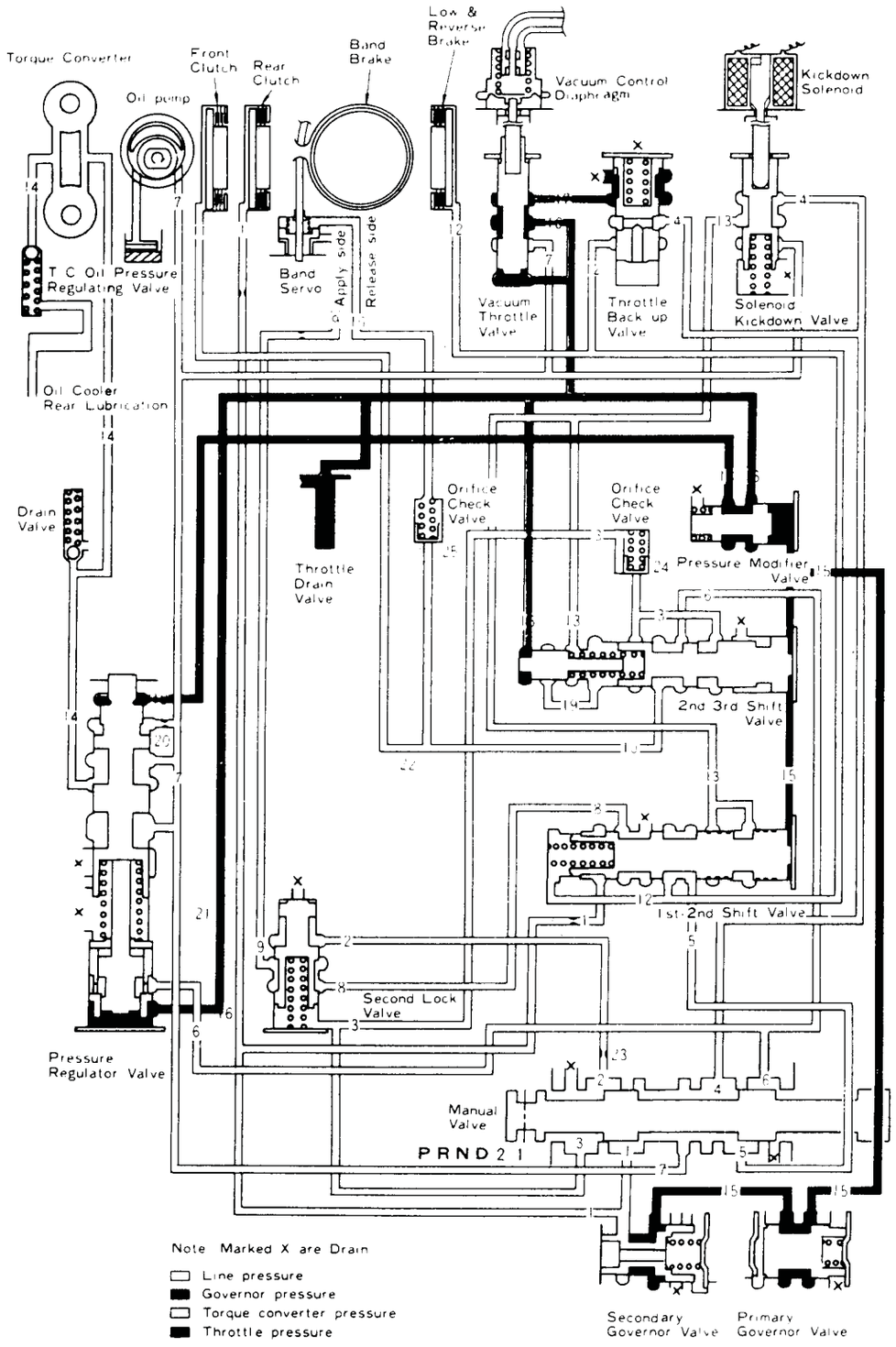
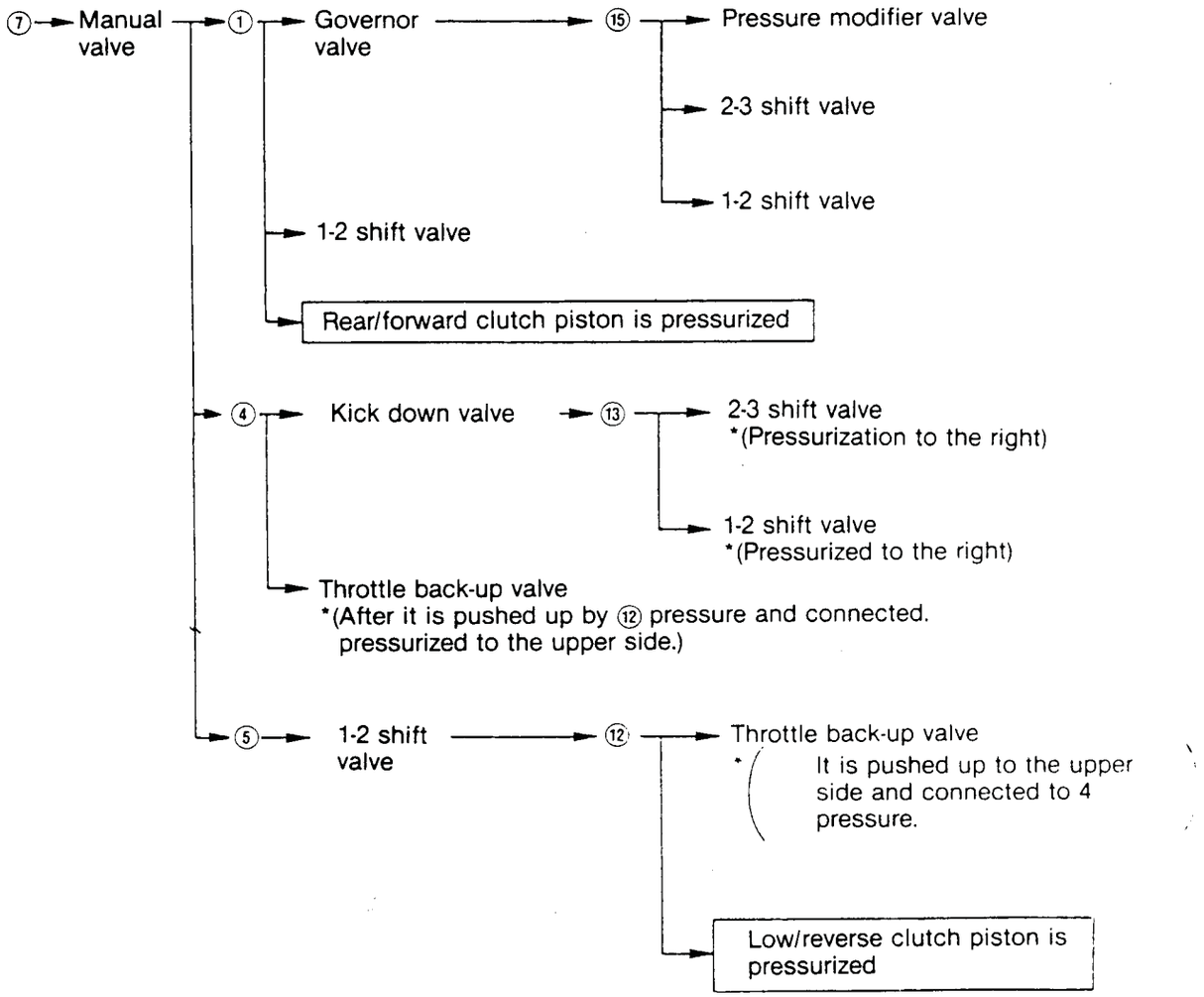


Figure 7A-153 Oil Flow Circuits (Manual(1), First Gear)

Manual 1 Range — First Gear

See Figure 7A-153. With the selector lever in the manual 1 range and both vehicle speed and governor pressure are reduced, oil from the pump is directed as follows:



Oil Flow, Manual 1, First Gear.

Figure 7A-153a Oil Flow Chart (Manual(1), First Gear)

Characteristics of torque converter	Stall capacity	2.000
Planetary gear ratio	1st	2.841
	2nd	1.541
	3rd	1.000
	Reverse	2.400
Hydraulic unit	Number of front clutch plate	3
	Number of rear clutch plate	4
	Number of low and reverse brake plates	4
	Servo diameter (piston outer diameter/ retainer inner diameter)	64mm/46mm (2.520 in/1.811 in)
Speedometer gear ratio		0.857 (30/35)
Final gear ratio		3.526
Number of output gear teeth		19
Number of idler gear teeth		36
Number of ring gear teeth		67
Oil used	Type	ATF DEXRON II
	Capacity	5.8 liters (6.1 U.S. quarts)

Figure 7A-SP Specifications

SPECIAL TOOLS

J-3289-20	Holding Fixture Base
J-35276	Holding Fixture
J-35263	Output Shaft Bearing Remover Pilot
J-25695-10	Oil Pressure Gage Adapter
J-21867	Oil Pressure Gage
J-35278	Servo Piston Compressor
J-35279	Low/Reverse Spring Compressor
J-35280	Bearing Outer Race Puller
J-26941	Bearing Race Puller
J-33367	Puller Bridge
J-35281	Output Gear Bearing Remover
J-29184	Front Cover Seal Installer
J-35283	Output Gear Bearing Installer
J-35286	Idler Gear Shaft Holder
J-35287	Bearing Outer Race Installer
J-8092	Driver Handle
J-35288	Diff. Side Bearing Puller Pilot
J-22888	Diff. Side Bearing Puller
J-35290	Diff. Side Bearing Outer Race Installer
J-35291	Diff. Side Bearing Installer
J-35259	Bearing Preload Checker
J-544-01	Spring Tension Scale
J-35513	Low/Reverse Clutch Pack Support
J-35284	Shim Selector
J-23327-A	Clutch Spring Compressor
J-25018-A	Clutch Spring Compressor Adapter
J-29130	Axle Seal Installer
J-23129	Seal Remover
J-6125-1	Slide Hammer