



## HONDA AK & AS

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# Description

The Honda Automatic Transmission is a combination of a 3-element torque converter and dual-shaft automatic transmission which provides 4 speeds forward and 1 speed reverse. The entire unit is positioned in line with engine.

## TORQUE CONVERTER, GEARS, AND CLUTCHES.

The torque converter consists of a pump, turbine and stator, assembled in a single unit.

They are connected to the engine crankshaft so they turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is being started. The entire torque converter assembly serves as a flywheel while transmitting power to the transmission mainshaft.

The transmission has two parallel shafts, the mainshaft and countershaft. The mainshaft is in line with the engine crankshaft.

The mainshaft includes the clutches for 1st, and 2nd/4th, and gears for 3rd, 2nd, 4th, Reverse and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with 4th gear).

The countershaft includes 3rd clutch and gears for 3rd, and 4th, Reverse and 1st.

4th and reverse gears can be locked to the countershaft at its center, providing 4th gear or Reverse, depending on which way the selector is moved.

The gears on the mainshaft are in constant mesh with those on the countershaft. When certain combinations of gears in the transmission are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide **D3**, **D4**, **2** or REVERSE.

## HYDRAULIC CONTROL

The valve assembly includes a main valve body and regulator valve bolted to the torque converter case through a separator plate. The servo valve body is bolted on top of the main valve body through another separator plate.

The main valve body contains a manual valve, 1-2 shift valve, 2-3 shift valve, 3-4 shift valve, pressure relief valve, orifice control valve, torque converter check valve and the oil pump gear.

The servo valve body includes the shift fork shaft, throttle control valves, throttle modulator valve, and accumulator pistons.

The regulator valve regulates the fluid pressure within the system. Fluid from the regulator passes through the manual valve to the various control valves.

1st, 3rd and 4th clutches receive oil from the valves through their respective feed pipes.

## LOCK-UP MECHANISM

When the transmission is in D4 at speeds above 43 mph, pressurized fluid is drained from the back of the torque converter through an oil passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft.

The pressure control valve body is bolted to the top of the regulator body and includes the lock-up shift valve and valve body. The lock-up shift valve controls the range of lock-up according to vehicle speed and throttle pressure. The timing valve senses when the transmission is in 4th gear.

The lock-up cut valve is bolted to the top of the servo valve and prevents lock-up from taking place when the throttle is not opened sufficiently.

## GEAR SELECTION

The selector lever has six positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D4** 1st through 4th gear ranges, **D3** 1st through 3rd gear ranges, and **2** 2nd gear.

Position	Description
<b>P</b> PARK	Front wheels locked; parking pawl engaged with parking gear on countershaft. All clutches released.
<b>R</b> REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th gear clutch locked.
<b>N</b> NEUTRAL	All clutches released.
<b>D4</b> DRIVE (1 through 4)	General driving; starts off in 1st, shifts automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshifts through 3rd, 2nd and 1st on deceleration to stop. The lock-up mechanism comes into operation when the transmission is in D4, at speeds above 43 mph. It is released when the speed falls below 41 mph, or when the throttle is released.
<b>D3</b> DRIVE (1 through 3)	For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd, then 3rd, depending on vehicle speed and throttle position. Downshifts through 2nd to 1st on deceleration to stop.
<b>2</b> SECOND	For engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up or down.

Starting is possible only in **P** and **N** through use of a slide-type, neutral-safety switch.

## POSITION INDICATOR

A position indicator in the instrument panel shows what gear has been selected without having to look down at the console.

# Road Test

After transmission is installed:

NOTE:

- Make sure the floor mat does not interfere with accelerator pedal travel. Fully depress accelerator pedal and check carburetor to make sure throttle lever is fully opened.
- Release accelerator pedal and check both inner control cables to be sure they have slight play.

Warm up engine to operating temperature.

## **D3** and **D4** Range

1. Apply parking brake and block the wheels. Move selector to **D4** while depressing brake pedal. Start engine, depress accelerator pedal, and release it suddenly. Engine should not stall.
2. Check that shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

### • Upshift

	1st → 2nd	2nd → 3rd	3rd → 4th
<b>Full-throttle</b> Acceleration from a stop	35–40 mph	59–65 mph	92–98 mph
<b>Half-throttle</b> Acceleration from a stop	18–22 mph	38–44 mph	57–64 mph
<b>Closed-throttle</b> Coasting down-hill from a stop	11–14 mph	22–25 mph	25–31 mph

### • Downshift

	4th → 3rd	3rd → 2nd	2nd → 1st
<b>Full-throttle</b> When car is slowed by increased grade, wind, etc.	83–89 mph	53–58 mph	23–28 mph
<b>Closed-throttle</b> Coasting or braking to a stop	—	18–21 mph	5–8 mph

3. Accelerate to about 35 mph so transmission is in 4th, then shift from **D4** to **2**. The car should immediately begin slowing down from engine braking.

**CAUTION:** Do not shift from **D4** or **D3** to **2** at speeds over 60 mph (96 km/h); you may damage the transmission.

## **2** (2nd Gear)

1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
2. Upshifts and downshifts should not occur with the selector in this range.

## **R** (Reverse)

Accelerate from a stop at full throttle, and check that there is no abnormal noise and clutch slippage.

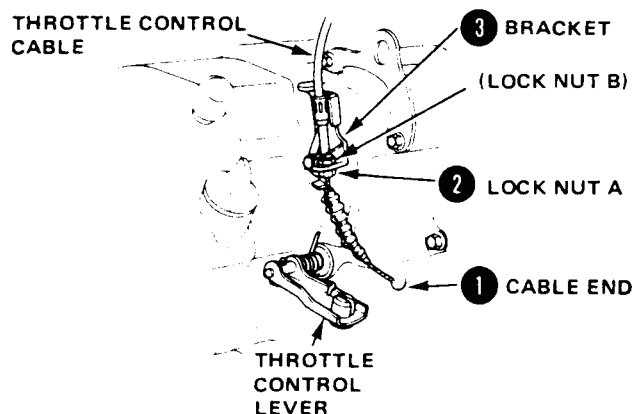
## **P** (Park)

Park car on a slope (approx. 16°), apply the parking brake, and shift into Park. Then release the brake; the car should not move.

# Transmission

## Removal

1. Disconnect ground cable at battery and transmission.
2. Release steering lock, and shift gear selector to N.
3. Disconnect wiring:
  - Battery positive cable from starter.
  - Black/white wire from starter solenoid.
4. Disconnect cooler hoses, and wire them up next to radiator so ATF won't drain out.
5. Remove starter mounting bolts and top transmission mounting bolt.
6. Loosen front wheel nuts.
7. Apply parking brake, block rear wheels, then raise front end on jack stands and remove front wheels.
8. Drain transmission. Reinstall drain plug and washer.
9. Remove throttle control cable:
  - Remove cable end from throttle lever.
  - Loosen lock nut A only.
  - Remove cable from bracket.



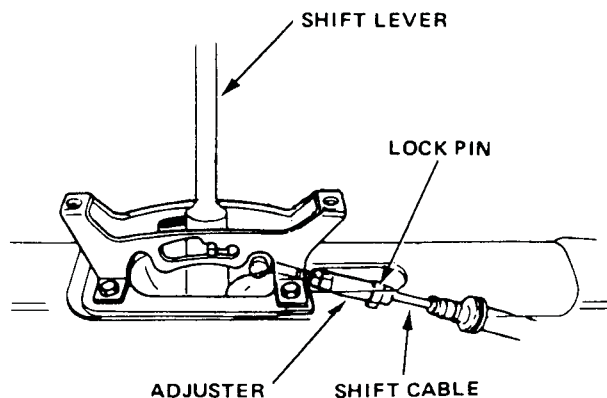
NOTE: For cable adjustment

10. Remove power steering speed sensor complete with speedometer cable and hoses.
11. Remove two upper transmission mounting bolts.
12. Place transmission jack securely beneath transmission, and hook hanger plate with hoist; make sure hoist chain is tight.
13. Remove subframe center beam and splash pan.
14. Remove the ball joint pinch bolt from the right-side lower control arm, then use a puller to disconnect the ball joint from the knuckle. Remove the damper fork bolt.

15. Turn right side steering knuckle to its most out-board position. With screwdriver, pry CV joint out approximately 1/2", then pull CV joint out of transmission housing.

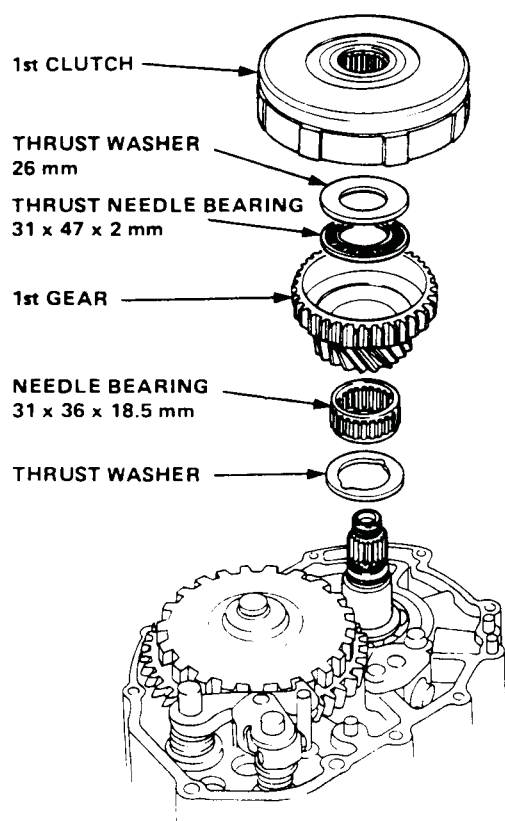
**CAUTION:** Do not pull on the driveshaft or knuckle since this may cause the inboard CV joint to separate; pull on the inboard CV joint.

16. Remove transmission damper bracket located in front of torque converter cover plate.
17. Remove torque converter cover plate.
18. Remove center console and shift indicator.

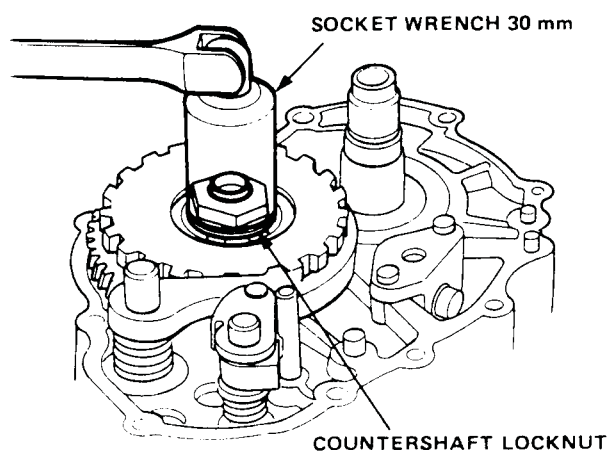


19. Remove lock pin from adjuster and shift cable.  
NOTE: On reassembly, check cable adjustment
20. Remove both bolts and pull shift cable out of housing.
21. Unbolt torque converter assy from drive plate by removing eight bolts.
22. Remove the three rear engine mounting bolts from transmission housing. Remove the rear engine mount.
23. Remove the front transmission mount's two bolts.
24. Remove the lower transmission mounting bolt.
25. Pull transmission away from engine to clear the two 14 mm dowel pins.
  - Pry left-side CV joint out approximately 1/2".
  - Pull transmission out and lower on transmission jack.
  - Remove torque converter from transmission.

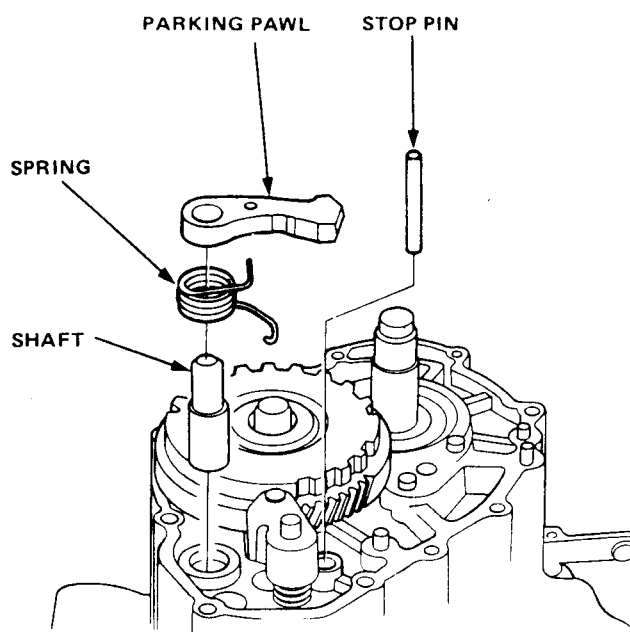
8. Remove the 1st clutch.
9. Remove the thrust washer, needle bearing and 1st gear.
10. Remove the needle bearing and thrust washer from the mainshaft.



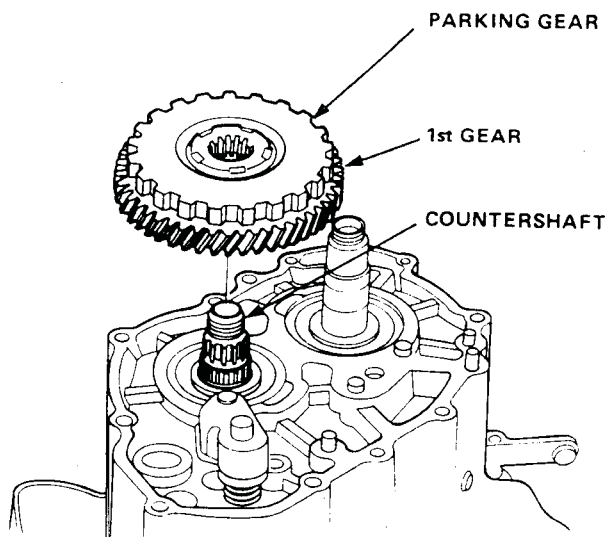
11. Pry the staked edge of the locknut out of the notch in the parking gear.
12. Remove the countershaft locknut.



13. Remove the parking pawl, shaft, stop pin and spring.



14. Remove the parking gear and countershaft 1st gear as a unit.

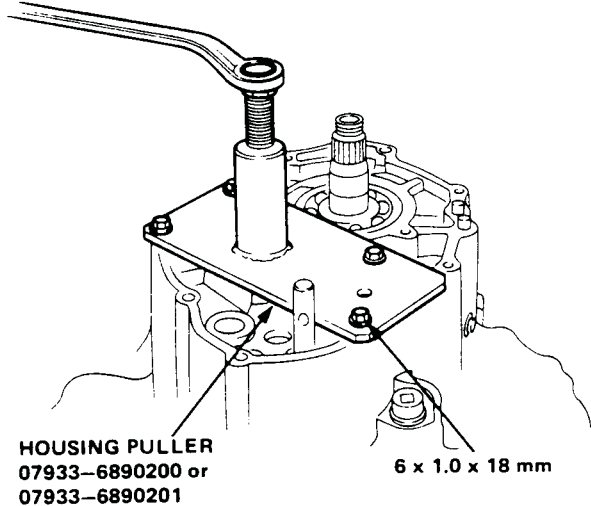


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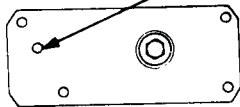
# Mainshaft/ Countershaft

## Removal

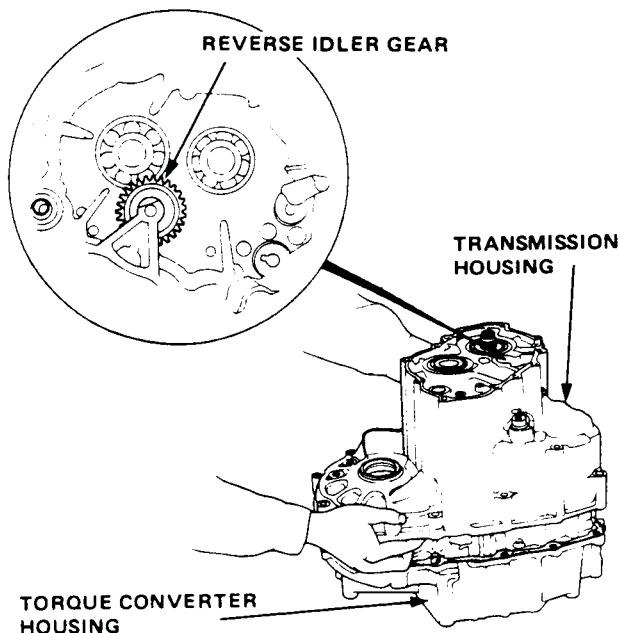
22. Install the transmission housing puller over the countershaft with four bolts and tighten securely. Then screw in the puller bolt against the end of the countershaft until the transmission housing comes loose.



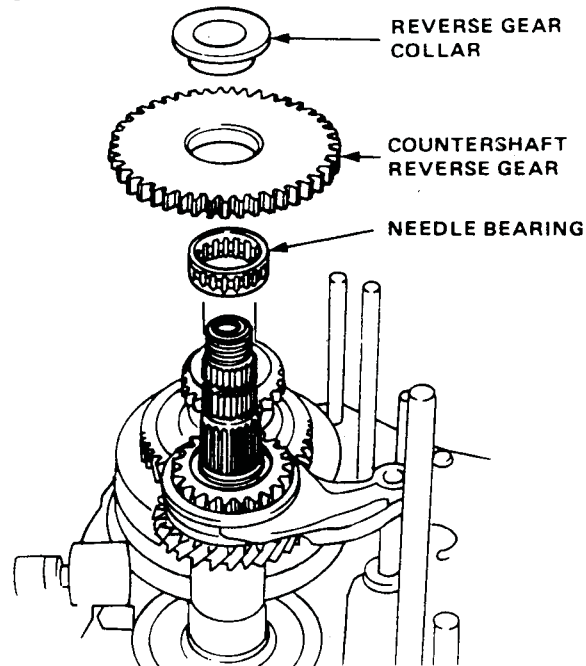
NOTE: Special tool (No. 07933-6890200) can be used if this hole is enlarged to 10 mm.



23. Remove the puller and separate the housings. Remove the reverse idler gear and needle bearing from the transmission housing.
24. Remove the gasket and the dowel pins.

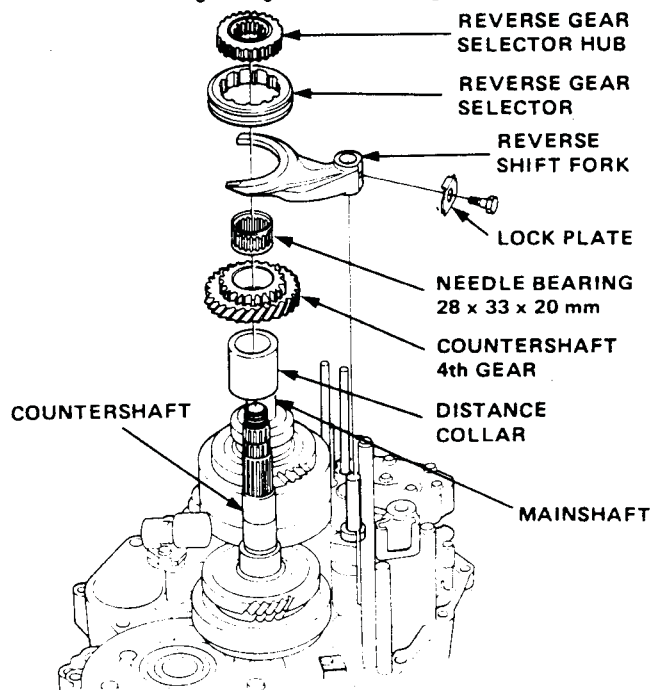


1. Remove the reverse gear collar, countershaft reverse gear and needle bearing.



2. Bend down the tab on the lock plate and remove the bolt from the reverse shift fork.
3. Remove the reverse shift fork and reverse gear selector as a unit.
4. Remove the selector hub, countershaft 4th gear, needle bearing and distance collar.
5. Remove the mainshaft and countershaft together.

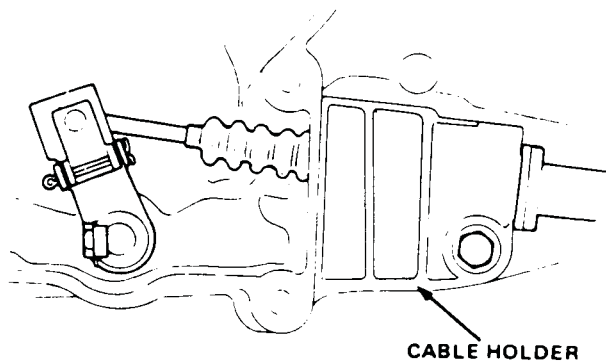
NOTE: It will be necessary to pull up the countershaft at a slight angle to clear the governor.



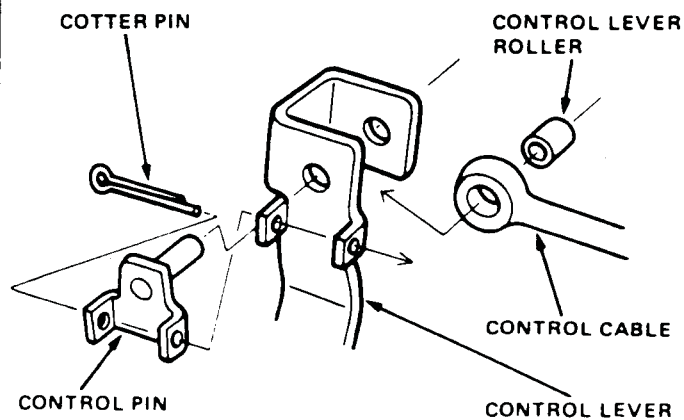
# Control Shaft

## Removal

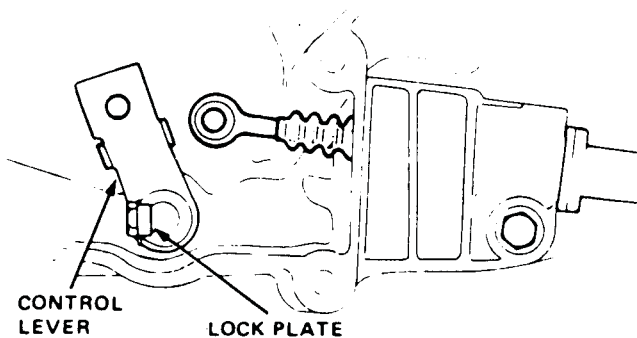
1. Remove the cable holder.



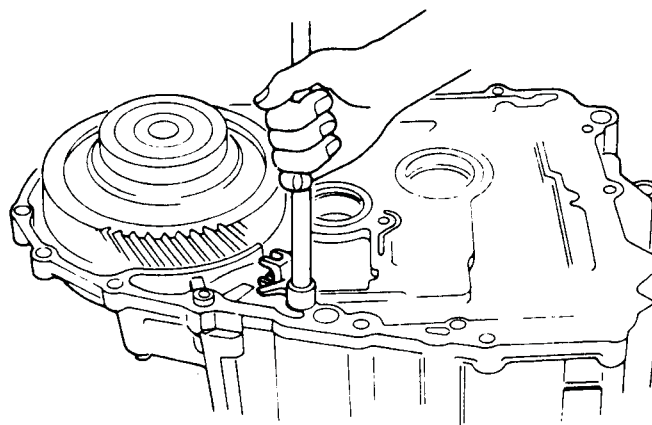
2. Remove the cotter pin, control pin, and control lever roller from the control lever.



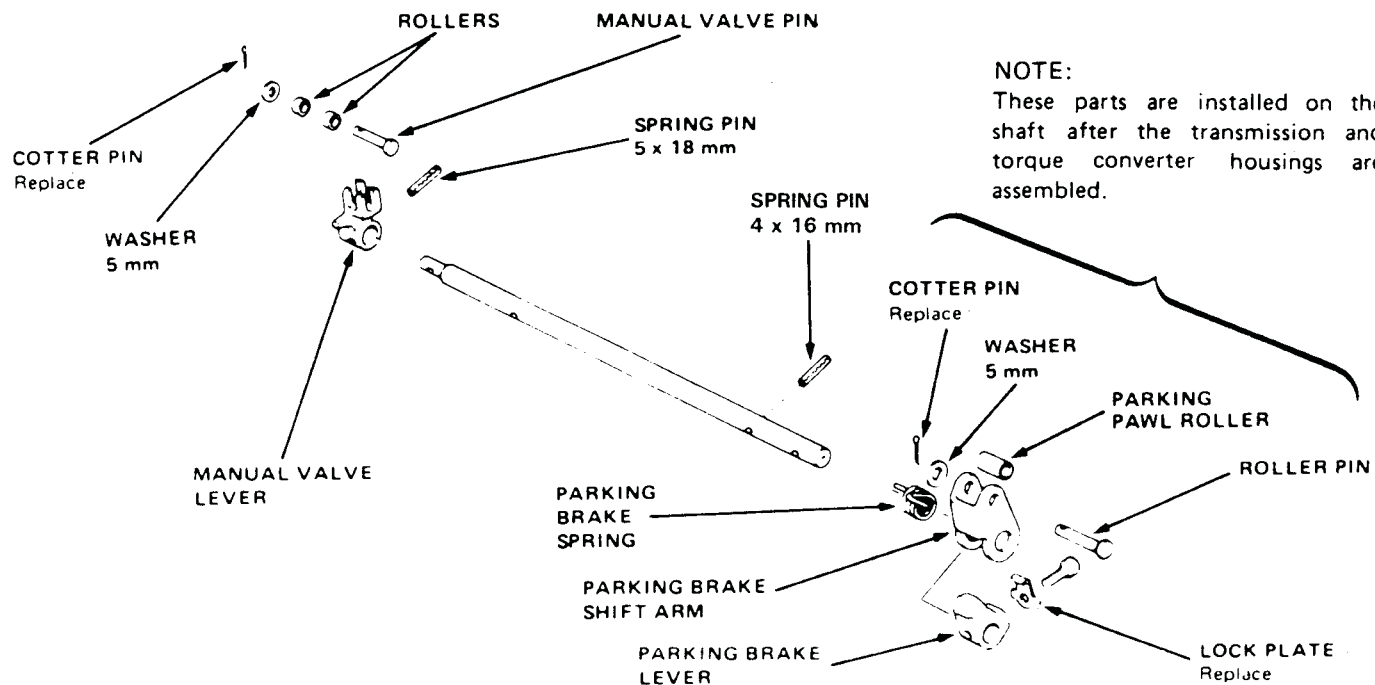
3. Bend down the tab on the lock plate under the bolt in the control lever. Then remove the bolt and lever.



4. Turn the torque converter housing over and remove the control shaft.



## Disassembly/Reassembly

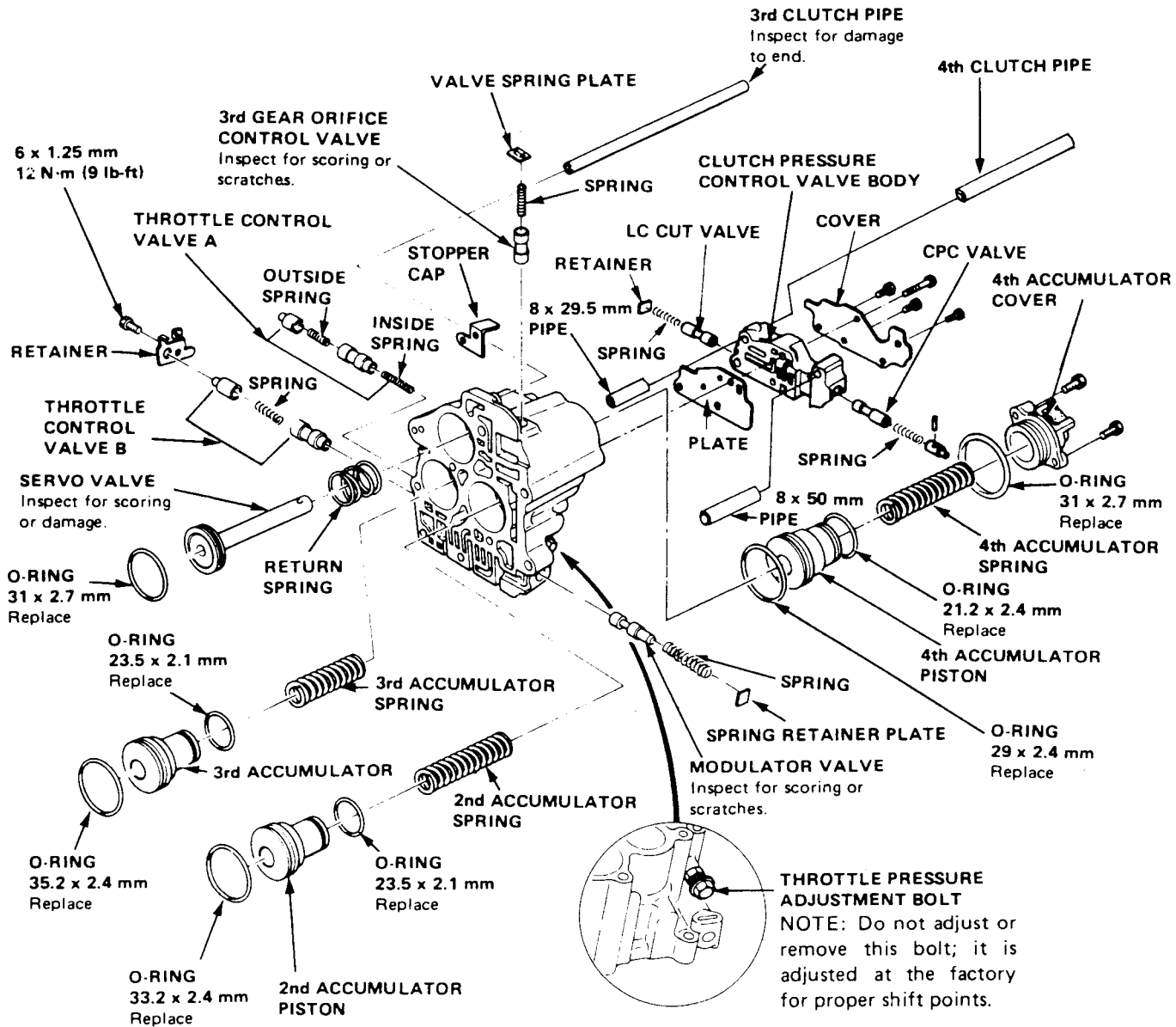


# Servo Valve Body

## Disassembly/Inspection/Reassembly

### NOTE:

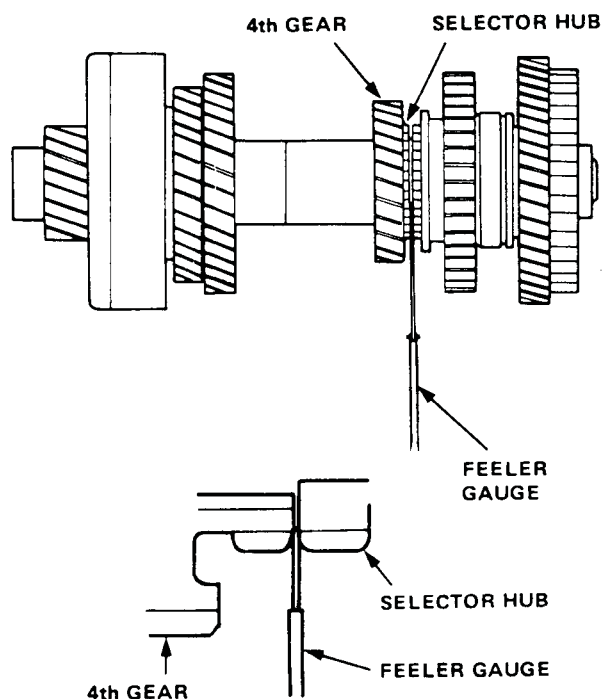
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.  
Blow out all passages.
- Check all valves for free movement. If any fail to slide freely,
- See Section 3 for any spring specifications which are not listed below.





8. On the countershaft, measure the clearance between the shoulder on the selector hub and the shoulder on 4th gear.

**Countershaft 4th Gear Clearance:**  
Standard: 0.07–0.15 mm (0.003–0.006 in.)



If clearance exceeds the service limit, measure the thickness of the spacer collar and select one which gives correct clearance.

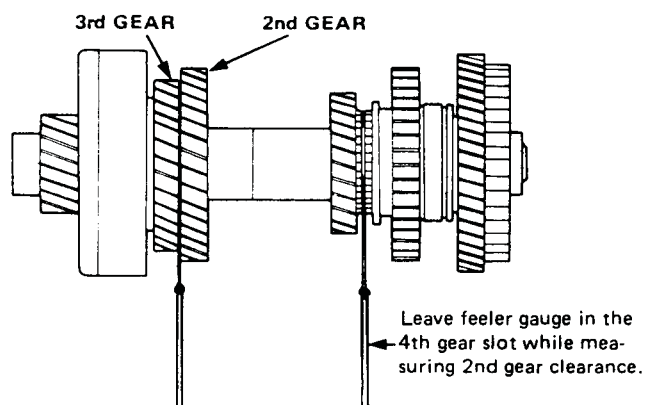
Replacement spacer collars:

CLASS	P/N	THICKNESS
A	90503-PC9-000	38.97–39.00 mm (1.534–1.535 in.)
B	90508-PC9-000	39.02–39.05 mm (1.536–1.537 in.)
C	90504-PC9-000	39.07–39.10 mm (1.538–1.539 in.)
D	90509-PC9-000	39.12–39.15 mm (1.540–1.541 in.)
E	90505-PC9-000	39.17–39.20 mm (1.542–1.543 in.)
F	90510-PC9-000	39.22–39.25 mm (1.544–1.545 in.)
G	90507-PC9-000	39.27–39.30 mm (1.546–1.547 in.)

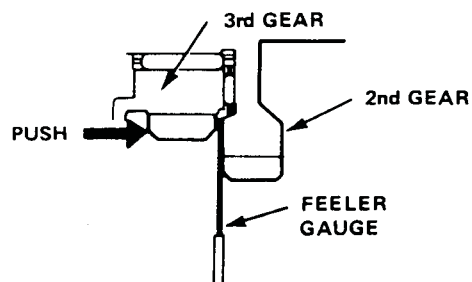
NOTE: Leave feeler gauge in place (4th gear) while measuring 2nd gear clearance.

**Countershaft 2nd Gear Clearance:**  
Standard: 0.07–0.15 mm (0.003–0.006 in.)

9. Slide the 3rd gear out fully. Measure and record the clearance between the 2nd and 3rd gears with a feeler gauge.



- Slide the 3rd gear in fully and again measure the clearance between the 2nd and 3rd gears with another feeler gauge.
- Calculate the difference between the two readings to determine the actual clearance between the two gears.



If clearance exceeds service limit, measure the thickness of the splined thrust washer (35 mm I.D.) and select one which gives the proper clearance.

Replacement splined thrust washers:

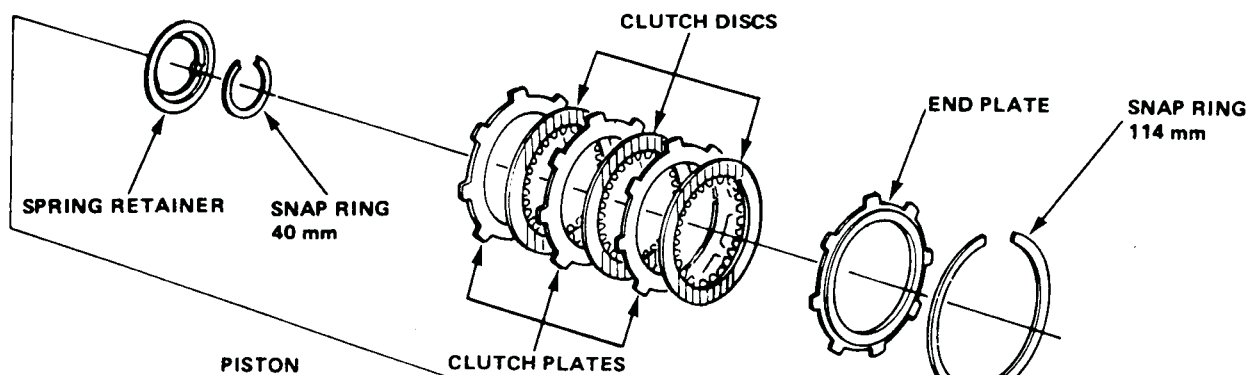
CLASS	P/N	THICKNESS
A	90411-PA9-010	2.97–3.00 mm (0.117–0.118 in.)
B	90412-PA9-010	3.02–3.05 mm (0.119–0.120 in.)
C	90413-PA9-010	3.07–3.10 mm (0.121–0.122 in.)
D	90414-PA9-010	3.12–3.15 mm (0.123–0.124 in.)
E	90415-PA9-010	3.17–3.20 mm (0.125–0.126 in.)
F	90418-PA9-010	3.22–3.25 mm (0.127–0.128 in.)
G	90419-PA9-010	3.27–3.30 mm (0.129–0.130 in.)
H	90420-PA9-010	3.32–3.35 mm (0.131–0.132 in.)
I	90421-PA9-010	3.37–3.40 mm (0.133–0.134 in.)

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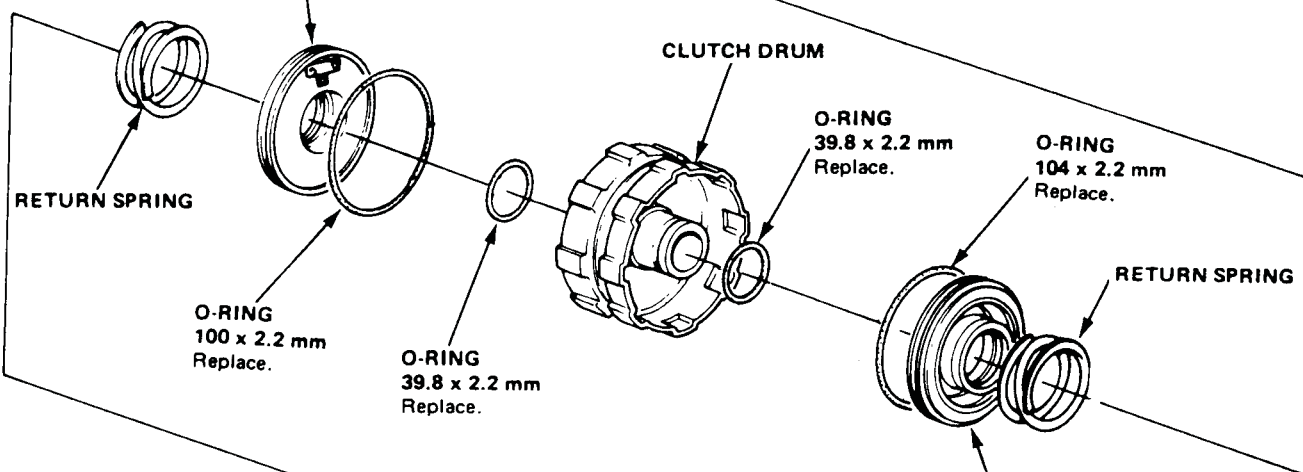
# Clutch

## Disassembly/Inspection (cont'd)

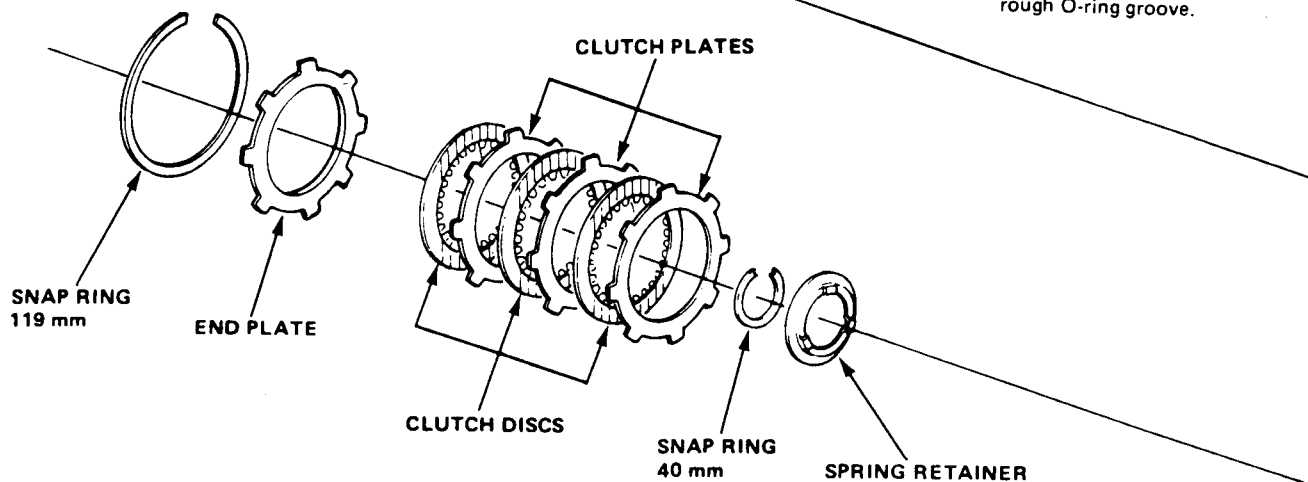
### 2nd/4th Clutch



**PISTON**  
Inspect for restriction, loose check valve or rough O-ring groove.



**PISTON**  
Inspect for restriction, loose check valve, or rough O-ring groove.

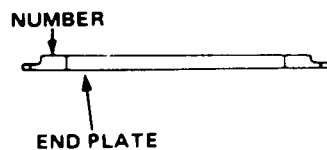


## Clutch

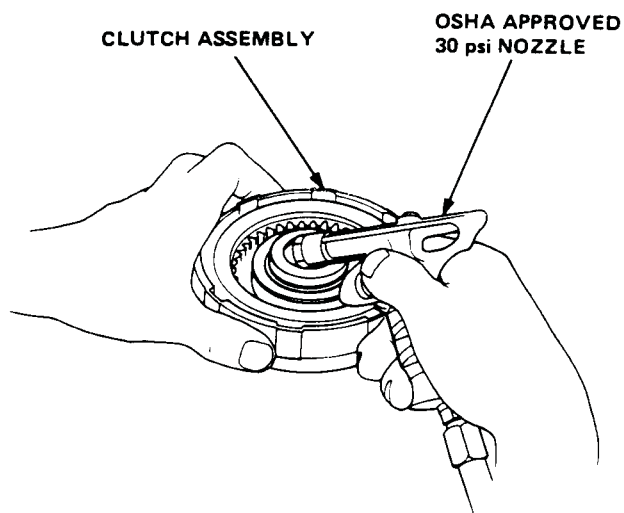
### Reassembly (cont'd)

14. If not within service limit, select a new clutch end plate from following table.

P/N	PLATE NO.	THICKNESS
22551-PC9-000	1	2.4 mm (0.094 in.)
22552-PC9-000	2	2.5 mm (0.098 in.)
22553-PC9-000	3	2.6 mm (0.102 in.)
22554-PC9-000	4	2.7 mm (0.106 in.)
22555-PC9-000	5	2.8 mm (0.110 in.)
22556-PC9-000	6	2.9 mm (0.114 in.)
22557-PC9-000	7	3.0 mm (0.118 in.)
22558-PC9-000	8	3.1 mm (0.122 in.)
22559-PC9-000	9	3.2 mm (0.126 in.)
22560-PC9-000	10	3.3 mm (0.130 in.)



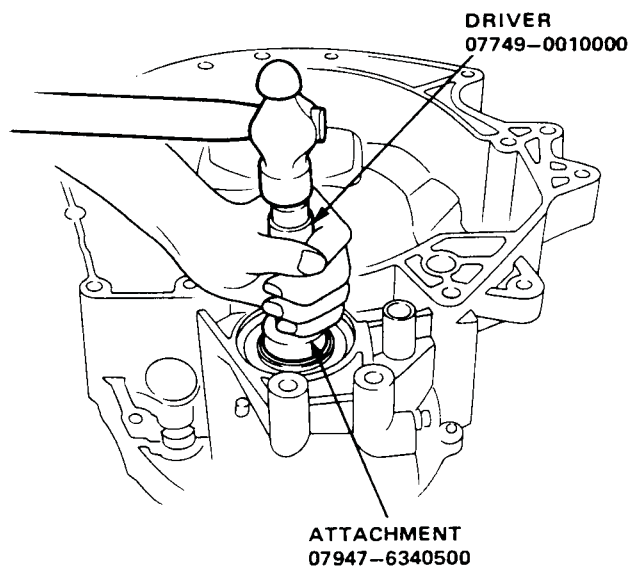
15. Check the clutch engagement by blowing air into the oil passage in the clutch drum hub. Remove the air pressure and check that the clutch releases.



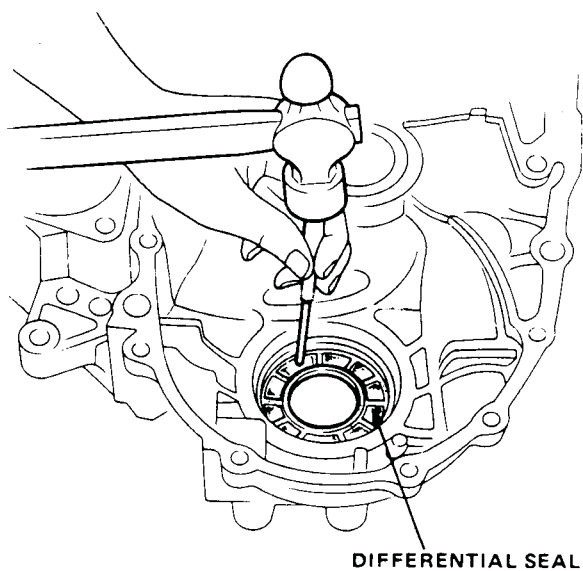
## Differential

### Replacement

1. If seals are to be replaced, or if the differential needs repair, remove the differential.



2. On the torque converter housing, remove the 80 mm snap ring, then drive out the seal as shown.
3. Remove the differential seal from the transmission housing in the same way.

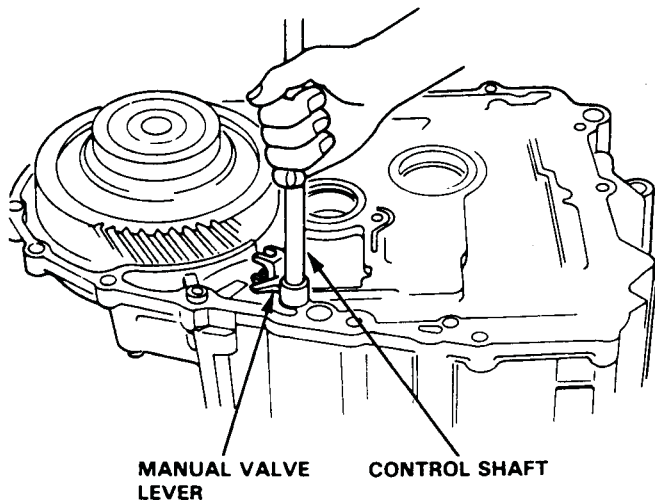


# Transmission Assy

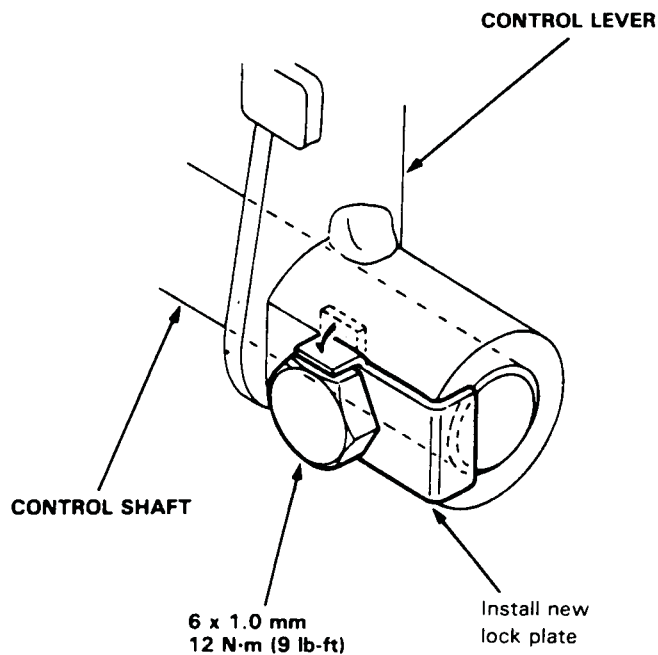
## Reassembly

**NOTE:** Lubricate all parts with ATF during reassembly.

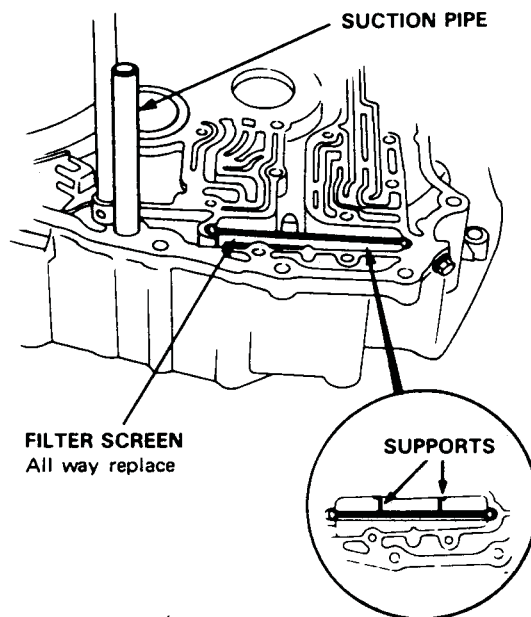
1. Install the differential assembly. If the torque converter housing, transmission housing and/or differential side bearings were replaced, the differential side clearance must be checked as shown in section 16.
2. Assemble the manual valve lever on the control shaft, then install in the torque converter housing as shown.



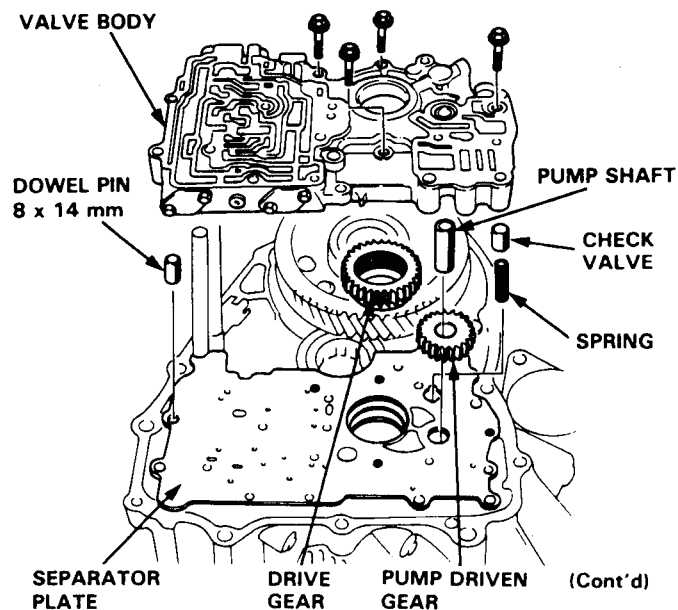
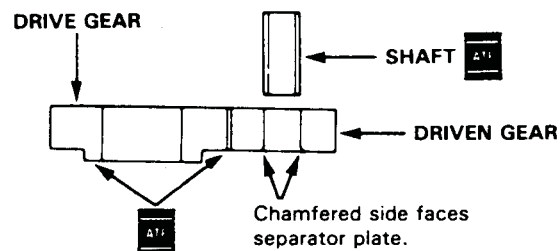
3. Install the control lever and new lock plate on the other end of the shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.



4. Install the suction pipe and new filter screen.



5. Install the separator plate, dowel pin, pump gears, and shaft.
6. Install the check valve and spring, then install the main valve body on the torque converter housing.



# Transmission Assy

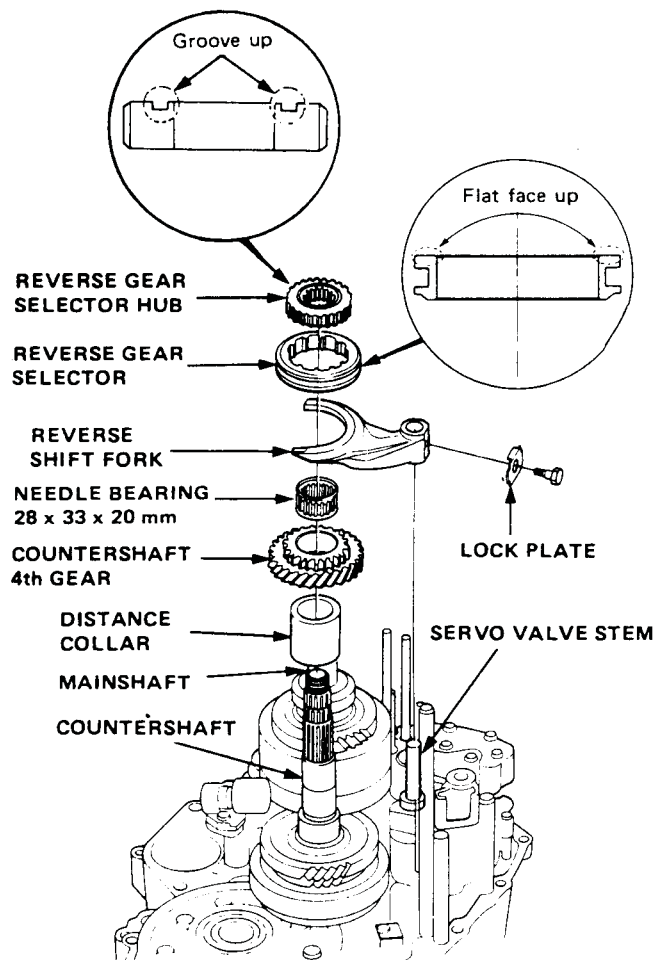
## Reassembly (cont'd)

29. Install 4th gear and its needle bearing, and the countershaft 4th gear and its selector hub.

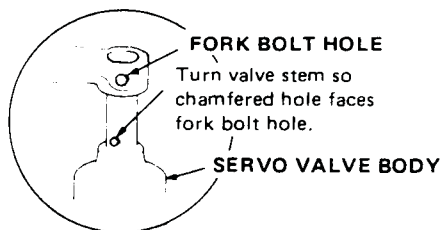
30. Assemble the reverse shift fork and selector sleeve, then install them as an assembly on the countershaft.

**NOTE:**

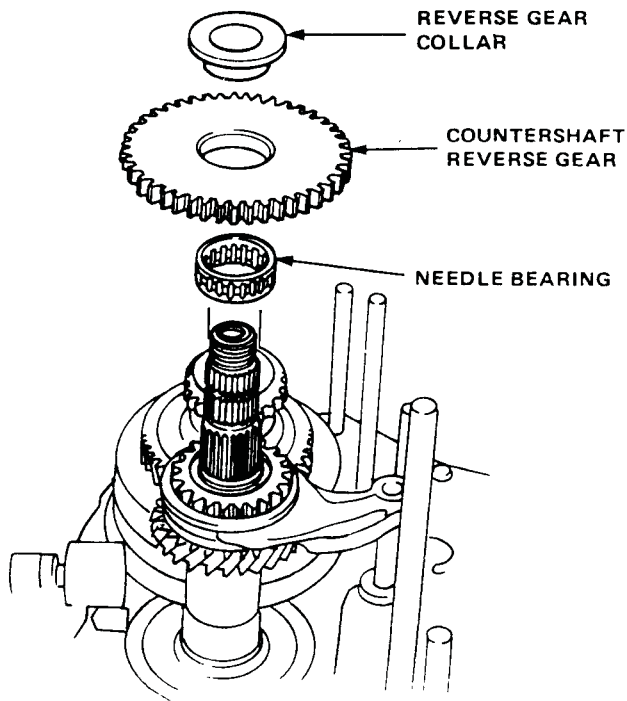
- Install the sleeve with its flat face up.
- Install the reverse gear selector hub with the groove facing up.



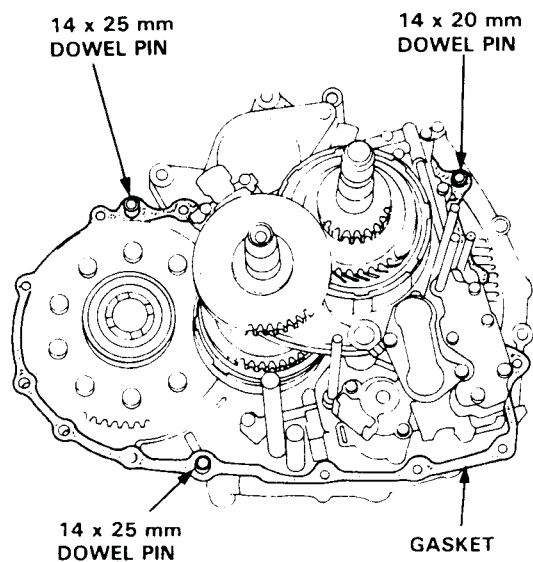
31. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock plate. Bend the lock tab against the bolt head.



32. Install the countershaft reverse gear, needle bearing, and reverse gear collar.



33. Install the new gasket and three dowel pins in the torque converter housing.

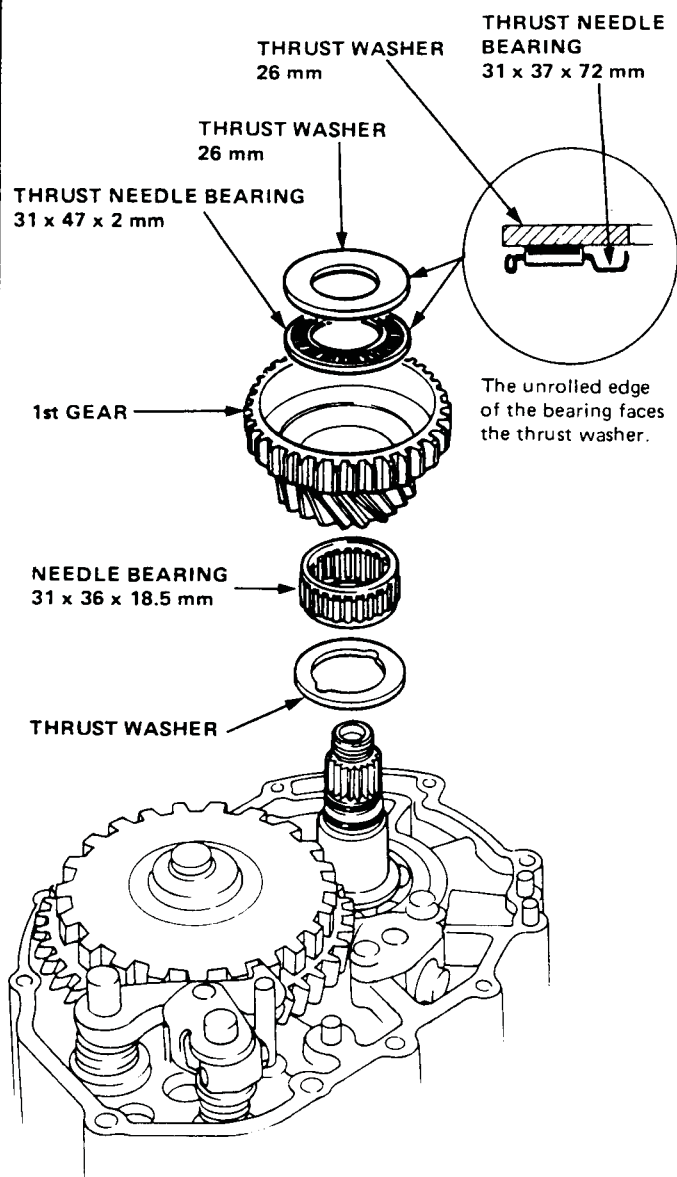


# Transmission Assy

## Reassembly (cont'd)

52. Install 31 x 36 x 18.5 mm needle bearing and thrust washer on the mainshaft.

53. Install 1st gear, thrust needle bearing, and the thrust washer on the mainshaft.

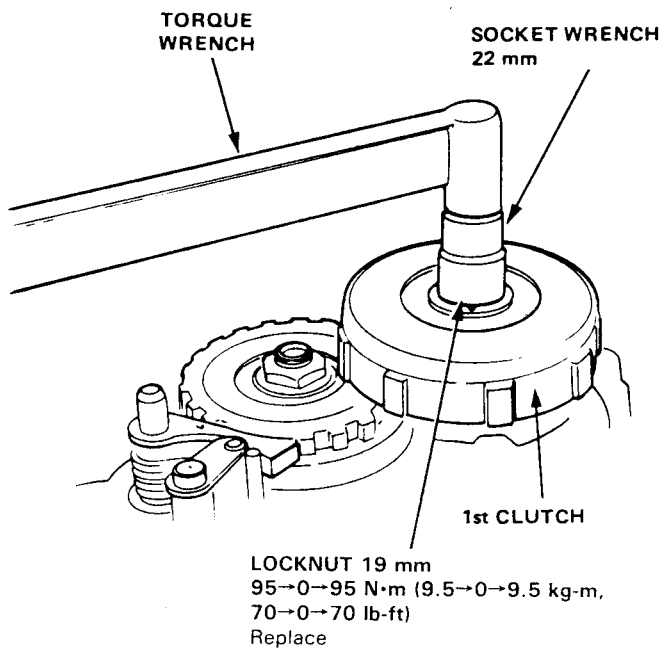


54. Install the 1st clutch on the mainshaft.

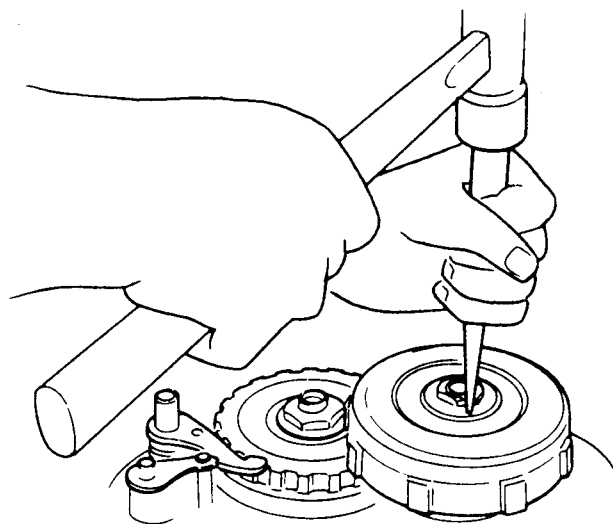
55. Attach the mainshaft holder from the underside of the torque converter case.

56. Install and torque the new mainshaft locknut.

**CAUTION: Locknut has left-hand threads.**



57. Stake the locknut flange into the groove in the 1st clutch.



# Gearshift Selector

