



HONDA AK & AS

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AUTOMATIC TRANSMISSION SERVICE GROUP

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INTRODUCTION HONDA AS AK

The Honda 4 speed automatic transaxle made its first appearance in the 1983 Honda Accord and Prelude vehicles utilizing the AK model. In 1984 the AS model was introduced and the AK was discontinued. The AS model was the first model with a partial lock up feature. The AS continued through 1985 in all carbureted Accord and Prelude vehicles. The AK and AS model transaxle's are significantly different then the popular F4 model used in the fuel injected Accord and Prelude vehicles beginning in 1986.

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"ATSG would like to thank Honda Motor Co. for the illustrations and information contained in this manual."

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NOTES----NOTES----NOTES----NOTES

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

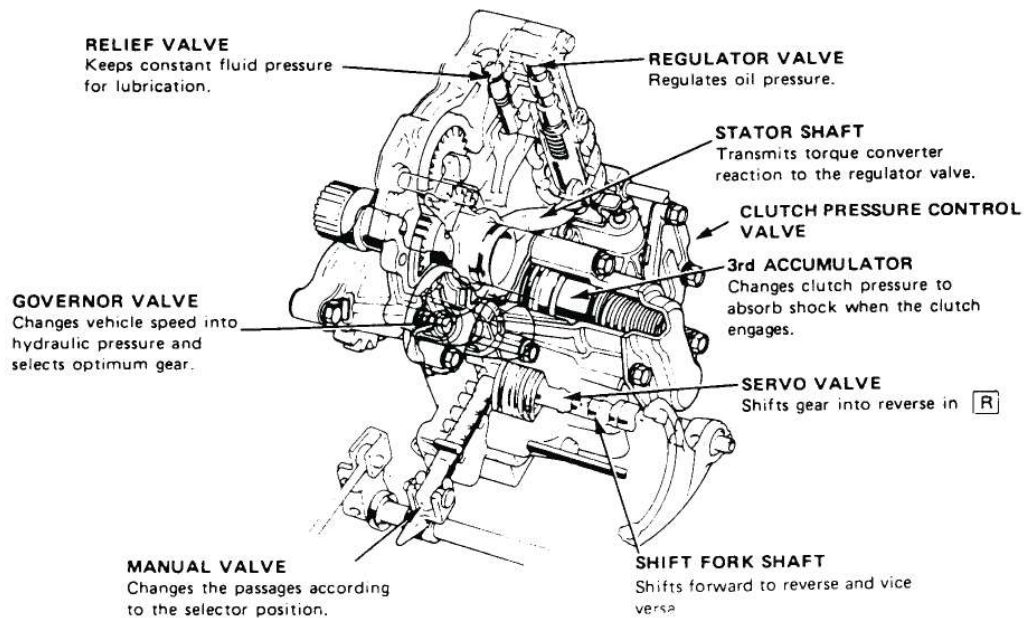
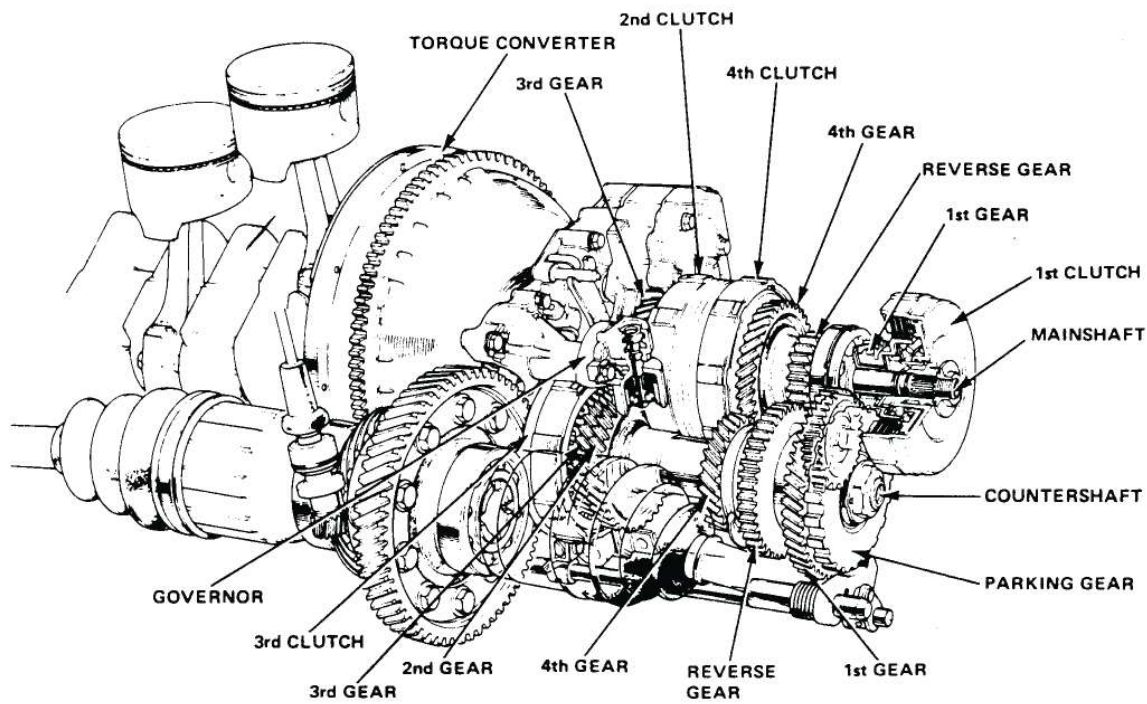
The selector lever has six positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D4** 1st through 4th gear ranges, **D3** 1st through 3rd gear ranges, and **2** 2nd gear.

Position	Description
P PARK	Front wheels locked; parking pawl engaged with parking gear on countershaft. All clutches released.
R REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th gear clutch locked.
N NEUTRAL	All clutches released.
D4 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.
D3 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.
2 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.



Troubleshooting

SYMPTOM	Check these items on PROBABLE CAUSE LIST	Check these items on NOTES PAGE
Engine runs, but car does not move in any gear.	19, 20.	N.
Car moves in R and 2, but not in D3 or D4.	5, 27, 28, 30.	C, Q, R, S.
Car moves in D3, D4 and R, but not in 2.	6, 26.	C.
Car moves in D3, D4 and 2, but not in R.	8, 9, 14, 29, 37.	C, E, F, R, U.
Car moves forward in N.	5, 6, 7, 8.	D.
Excessive idle vibration.	4.	B.
Engine stalls when taking off in D4.	9.	E, F.
Slips in all gears.	19, 20.	N.
Slips in 1st gear.	5, 27, 28, 29.	C, Q, R.
Slips in 2nd gear.	6, 13.	C.
Slips in 3rd gear.	7.	C.
Slips in 4th gear.	8.	C.
Slips in reverse gear.	29.	R.
Slips during 2-3 shift.	2, 15.	J.
Slips during 3-4 shift.	2, 16.	K.
No upshift; trans stays in low gear.	9, 13, 17.	E, F, I, L.
No downshift to low gear.	9.	E, F.
Late upshift.	1, 10.	
Early upshift.	2, 12.	H.
Erratic shifting.	1.	
Vibration in 4th gear between 35 and 40 mph only when the lockup clutch is on.	2, 21, 23.	O, P.
Shift lever cannot be moved into P.	39.	
Harsh shift, (all shifts).	1, 3, 11.	A.
Harsh shift, (1-2).	1, 6.	D, G.
Harsh shift, (2-3).	1, 7, 15.	D, J.
Harsh shift, (3-4).	1, 8, 16.	D, K.
Harsh kickdown, (4-3).	1, 7.	D.
Harsh kickdown, (3-2).	1, 6.	D.
Harsh kickdown, (2-1).	30.	S.
Harsh downshift at closed throttle, (3-2).	1, 6, 25.	D, X.
Harsh downshift, (all downshifts).	1, 3, 11, 25.	A, X.
Axle(s) slips out of trans on turns.	31, 38.	T, N, U.
Rattle noise when shifting into gear from P or N, or on initial take-off.	24.	
Loud popping noise when taking off in R.	32, 33, 37.	U, N.
Grinding noise when shifting from R to P, or from R to N.	33, 36, 37.	U, N.
Noise from trans in all selector lever positions.	18, 24, 35.	M.
Noise from trans only when wheels turn.	32, 34, 36, 38.	U, N.
Gear whine, rpm related (whine pitch changes with shifts).	35.	
Gear whine related to car speed. (The pitch of the whine changes with the speed of the car.)	32, 34, 36.	U, N.

The following symptoms can be caused by improper repair or assembly.	Check these items on PROBABLE CAUSE DUE TO IMPROPER REPAIR	Check these items on NOTES PAGE
Car creeps in N.	R1, R2.	
Car does not move in D3 or D4.	R5.	
Trans locks up in R.	R4.	
Trans has no park.	R3.	
Trans starts off in 2nd gear in D3 or D4.	R6, R9.	
Excessive drag in trans.	R11.	V, M.
Car only creeps forward in D3 & D4 and does not shift up.	R7.	
No 4th or reverse gear.	R8.	
Excessive vibration increasing with engine rpm.	R12.	
Loud noise with wheels moving.	R10.	
Main seal pops out.	R13.	W.
Various shifting problems.	R14, R15.	
Harsh upshifts	R17.	
Trans housing does not slide completely down.	R2, R16.	

PROBABLE CAUSE	
1.	Trans throttle cable adjusted too short.
2.	Trans throttle cable adjusted too long.
3.	Wrong type ATF. (Use only dexron-type ATF).
4.	Idle rpm in gear too low.
5.	Faulty low clutch.
6.	Faulty 2nd clutch.
7.	Faulty 3rd clutch.
8.	Faulty 4th/reverse clutch.
9.	Governor valve stuck.
10.	Throttle A-valve stuck.
11.	Throttle B-valve stuck.
12.	Modulator valve stuck.
13.	1-2 shift valve stuck.
14.	2-3 shift valve stuck.
15.	2nd orifice control valve stuck.
16.	3rd orifice control valve stuck.
17.	Clutch pressure control valve stuck.
18.	Defective oil pump (worn or seized).
19.	Clogged oil screen.
20.	Pressure regulator valve stuck.
21.	Lockup clutch control valve stuck.
22.	Lockup clutch cut valve stuck.
23.	Lockup clutch shift valve stuck.
24.	Defective torque converter.
25.	Throttle retainer/cam stopper misadjusted.
26.	Worn or damaged sealing ring guide.
27.	Broken low clutch feedpipe O-ring.
28.	Mainshaft low feedpipe bushing loose/damaged.
29.	Mainshaft 4th feedpipe bushing loose/damaged.
30.	Worn or damaged sprag clutch.
31.	Worn or missing clip on the inner end of the driveshaft.
32.	Worn or damaged reverse gear (3 gears).
33.	Worn or damaged reverse selector gear.
34.	Worn or damaged final drive gears.
35.	Worn or damaged 3rd gears (2 gears).
36.	Worn or damaged 4th gears (2 gears).
37.	Worn or bent reverse shift fork.
38.	Worn differential pinion shaft.
39.	Broken shift cable (outer cable).

PROBABLE CAUSES DUE TO IMPROPER REPAIR	
R1	Improper clutch clearance
R2	Improper gear clearance
R3	Parking pawl installed upside down.
R4	Parking shift arm installed upside down.
R5	Sprag clutch installed upside down.
R6	Feedpipe missing in governor shaft.
R7	8 x 50 mm feedpipe missing between the servo and the clutch pressure control valve body.
R8	8 x 29.5 mm feedpipe missing between the servo and the clutch pressure control valve body.
R9	Ball detent springs for the 1-2 shift valve and the 2-3 shift valve are switched.
R10	Reverse hub installed upside down: Groove in selector hub facing wrong way; other side of hub (no groove) crushes the end of the bearing when trans is reassembled.
R11	Oil pump binding.
R12	Torque converter not fully seated in oil pump.
R13	Main seal improperly installed.
R14	Springs improperly installed.
R15	Valves improperly installed.
R16	Dowel pins (14 x 20 and 14 x 25) improperly installed.
R17	Ball check valve(s) (5.5 mm steel balls) are missing from the valve body.

NOTES	
A	Flushing procedure (repeat 3 times): 1. Drain the trans. 2. Refill with 3 qts. of Dexron-type ATF. 3. Start the engine and shift the trans to D4. 4. Let the trans shift through all the gears at least 5 times. 5. Shift to reverse and neutral at least 5 times. 6. Drain and refill.
B	Set idle rpm in gear to specified idle speed. If still no good, adjust engine mounts as shown in engine section of shop manual.
C	If the large clutch piston O-ring is broken, inspect the O-ring groove for rough machining.
D	If the clutch pack is seized, or excessively worn, inspect the other clutches for wear, and check the orifice control valves and throttle valve B for free movement.
E	Blowing compressed air through the governor pressure test outlet (at least 3 blasts for 10 seconds each) may free a sticking governor valve. Remove the dipstick to prevent excessive pressure build-up in the trans.
F	If the governor valve is scuffed, replace it. Thoroughly clean the oil passage in the governor base from both directions with solvent and compressed air. (Also clean the oil passage before installing a new complete governor unit.)
G	If throttle valve B is stuck, inspect the clutches for wear.
H	If the modulator valve is stuck open (does not modulate line pressure to maximum throttle valve A pressure), the trans will shift OK with less than 5/8 throttle, but will shift up very late with over 5/8 throttle. If the modulator valve is stuck closed, throttle valve A pressure is zero, and will cause very quick upshifts and no kickdown shifts.
I	If the 1-2 valve is stuck closed, the trans will not shift out of low gear. If it's stuck open, the trans will not shift down to low gear.

NOTES	
J	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
K	If the 3rd orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
L	If the clutch pressure control valve is stuck closed, the trans will not shift out of low gear.
M	Seizure of the oil pump gear to its shaft is caused by improper alignment of the main valve body to the torque converter housing. In most cases it can be identified by a ticking noise. In severe instances, it may stall the engine. (See page 15-118 for free movement inspection.)
N	If the oil screen is clogged with particles of steel or aluminum, inspect the oil pump and differential pinion gear. If both are OK, and there is no apparent cause for the metal, replace the torque converter.
O	The lockup clutch control valve regulates the pressure of the lockup clutch disc against the torque converter cover. If the valve is stuck open, the lockup clutch will slip excessively. If it's stuck closed, there will be no slippage at all.
P	The lockup shift valve engages the clutch when governor pressure overrides throttle valve A and spring pressure. At low speed and low throttle, it allows slight pressure loss between the lockup clutch and the torque converter cover, allowing the clutch to slip.
Q	If the O-ring under the low clutch feedpipe guide in the end cover is broken, inspect the side of the feedpipe guide that faces the mainshaft for scoring marks (made by the mainshaft). If the guide is scored, the problem may have been caused by a dented end cover. Replace the end cover.
R	If the bushings for the low and/or 4th clutch feedpipe are loose or damaged, replace the mainshaft. If the low feedpipe is damaged or out-of-round, replace it. If the 4th feedpipe is damaged or out-of-round, replace the end cover. (The 4th feedpipe is only available as part of the cover.)
S	A worn or damaged sprag clutch is usually caused by shifting into D3 or D4 while moving backwards (such as rocking the car in snow).
T	Also inspect the chassis for collision damage.
U	Inspect for damage or wear: 1. Governor shaft woodruff key and slot. 2. Chamfers on reverse selector gear teeth. 3. Chamfers on engagement teeth of countershaft 4th & reverse gear. 4. Shift fork, for scuff marks from reverse selector gear. 5. Differential pinion shaft. 6. Bottom of 3rd clutch drum for swirl marks due to contact with the differential ring gear. Replace items 1, 2, 3, 4, and 5 if worn or damaged, and item 6 only if severely damaged. If the trans makes noise (clicking, grinding or whirring), and items 1, 2, 3, 4, or 5 are worn or damaged, replace the countershaft reverse gear; mainshaft 4th gear, and reverse idler gear. If item 6 occurred, also replace the countershaft and differential ring gear.
V	When replacing the torque converter main ball bearing in the torque converter housing, use the proper tools with utmost care to avoid damaging the oil pump drive gear bore. If you damage the bore, the oil pump will bind when you torque down the main valve body, and result in oil pump seizure.
W	Install the main seal for the torque converter housing so it's flush with the housing. If you install the seal so it bottoms out, it will block the oil return passage, causing pressure build-up and seal leakage.
X	On downshifts, as the 4th clutch and the 3rd clutch bleed off through throttle valve A and B respectively, a bent-in throttle retainer/cam stop will cause a harsh downshift, even at zero throttle. If the stop is bent-out, the symptoms are the same as a throttle cable adjusted too long. You can compensate for this by shortening the throttle cable adjustment.

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
Full-throttle Acceleration from a stop	35–40 mph	59–65 mph	92–98 mph
Half-throttle Acceleration from a stop	18–22 mph	38–44 mph	57–64 mph
Closed-throttle Coasting down-hill from a stop	11–14 mph	22–25 mph	25–31 mph

• **Downshift**

	4th → 3rd	3rd → 2nd	2nd → 1st
Full-throttle When car is slowed by increased grade, wind, etc.	83–89 mph	53–58 mph	23–28 mph
Closed-throttle 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.

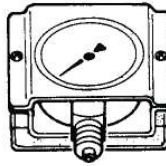
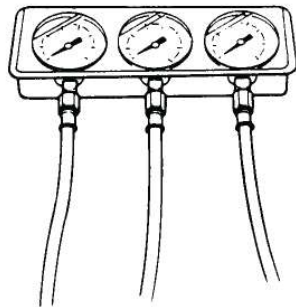
Pressure Test

NOTE:

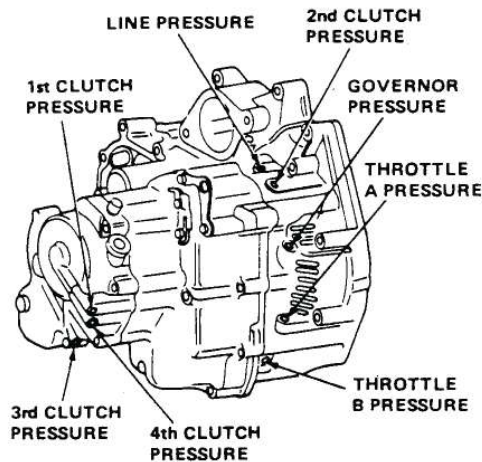
- Stop engine when attaching hoses for pressure tests.
- Torque hose fitting to 18 N·m (1.8 kg·m, 12 lb·ft).
- Do not reuse aluminum washers.
- For throttle and governor test, use Low Pressure Gauge, 07406-0070000.

GAUGE SET 07406-00200003
(includes pressure hose set 07406-0020201)

LOW PRESSURE GAUGE
(07406-0070000)



HOSE FITTING



CAUTION: Before checking, be sure transmission is filled to proper level.

PRESSURE	SELECTOR POSITION	MEASUREMENT	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
					SPECIFICATION	SERVICE LIMIT
LINE	N or P	• With parking brake applied, run engine at 2,000 rpm.	No (or low) LINE pressure	Torque converter, oil pump pressure regulator, torque converter check valve.	784–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)
1st	D3 or D4	MEASUREMENTS • With parking brake applied, raise front wheels off ground and support with safety stands. • Run engine at 2000 rpm.	No (or low) First pressure	1st clutch	784–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)
2nd	2		No (or low) SECOND pressure	2nd clutch	539–834 kPa (5.5–8.5 kg/cm ² , 78–121 psi)	490 kPa (5.0 kg/cm ² , 78 psi) with lever released.
3rd	D3		No (or low) THIRD pressure	3rd clutch	Varies with throttle opening	734 kPa (7.5 kg/cm ² , 107 psi)
4th	D4 or R		No (or low) FOURTH pressure	4th clutch		
THROTTLE	D3 or D4	• With parking brake applied, raise front wheels off ground and support with safety stands. • Run engine at 1,000 rpm. • Disconnect throttle control cable at throttle lever. • Read pressure with lever released. • Manually push lever up simulating full throttle. • Read pressure with lever in full throttle position.	No (or low) THROTTLE pressure	Throttle valve A Throttle modulator valve.	0 kPa (0 kg/cm ² , 0 psi) with lever released. 505–520 kPa (5.15–5.3 kg/cm ² , 73–75 psi) with lever in full throttle position.	500 kPa (5.1 kg/cm ² , 73 psi) with lever in full throttle position.
				Throttle valve B.	0 kg/cm ² (0 psi) with lever released. 784–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi) with lever in full throttle position.	735 kPa (7.5 kg/cm ² , 107 psi)
GOVERNOR	D3 or D4	• Place vehicle on chassis dynamometer, or jack up front of car, support with safety stands, block rear wheels, and set hand brake. • Run vehicle at 38 mph.	No (or low) Governor pressure.	Governor valve	216–226 kPa (2.2–2.3 kg/cm ² , 31–33 psi)	211 kPa (2.15 kg/cm ² , 30.6 psi)

Stall Speed

Test

1. Engage parking brake and block front wheels.
2. Connect tachometer, and start engine.
3. After engine has warmed up to normal operating temperature, shift into **D3**.
4. Fully depress brake pedal and accelerator for 6 to 8 seconds, and note engine speed.

CAUTION: To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.

5. Allow 2 minutes for cooling, then repeat same test in **D4**, **2**.

Stall speed in **D3**, **D4**, **2**, and **R** must be the same, and must also be within limits:

Stall Speed RPM:

Specification: 2400 rpm

Service Limit: 2100–2700 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in 2 , D3 , D4 & R .	Low fluid level or oil pump output, clogged oil strainer, pressure regulator, slipping. Slipping clutch.
Stall rpm high in D3 , D4 only.	Slippage of 1st clutch
Stall rpm low in 2 , D3 , D4 & R .	• Engine output low, throttle cable mis-adjusted at carburetor. • Oil pump seized.

Fluid Level

Checking/Changing

Checking

With the car on level ground, unscrew the transmission dipstick and check the level of fluid immediately after the engine is shut off (within one minute). The fluid level should be between the full and low marks. Do not screw dipstick in to check the fluid level. If the level is at, or below, the low mark, add DEXRON-type automatic transmission fluid.

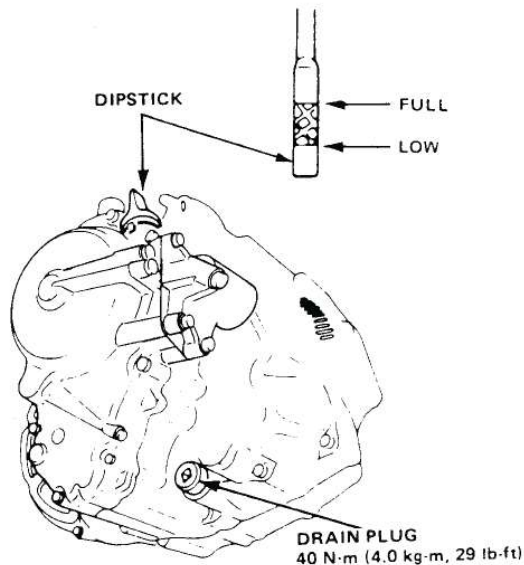
Changing

1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, then remove drain plug.
2. Reinstall the drain plug with a new washer, then refill the transmission to the full mark on the dipstick.

Automatic transmission Capacity:

2.8 l (3.0 U.S. qts., 2.5 Imp. qt) at change

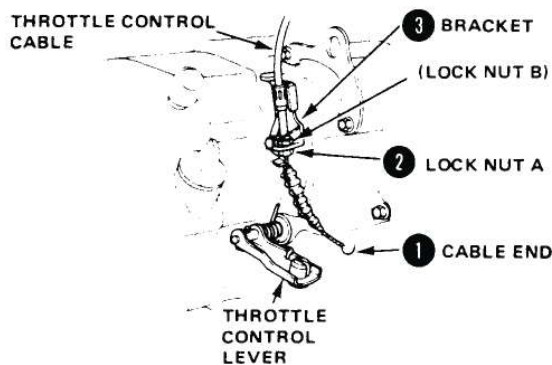
5.6 l (6.0 U.S. qts., 5.0 Imp. qt) after overhaul



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.



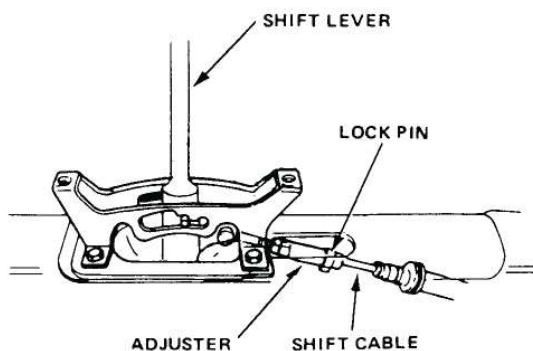
NOTE: For cable adjustment

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.

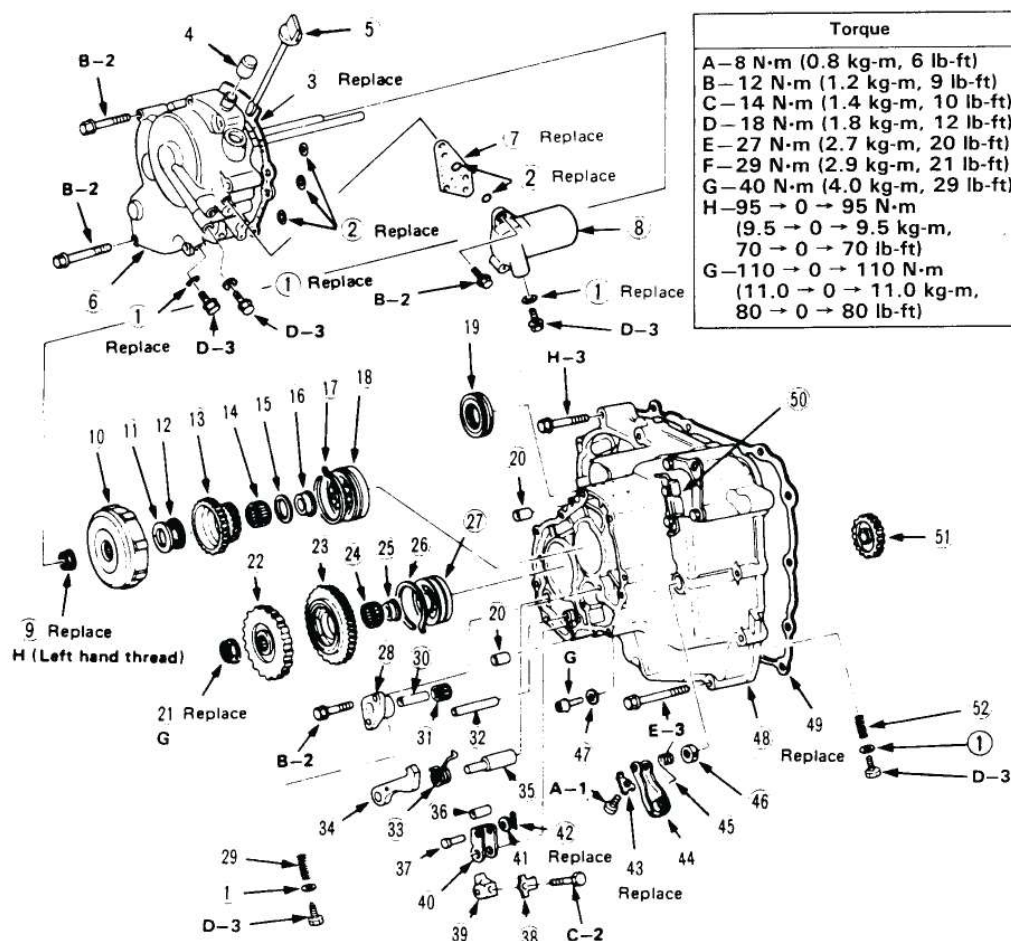
16. Remove transmission damper bracket located in front of torque converter cover plate.
17. Remove torque converter cover plate.
18. Remove center console and shift indicator.



19. Remove lock pin from adjuster and shift cable.
NOTE: On reassembly, check cable adjustment

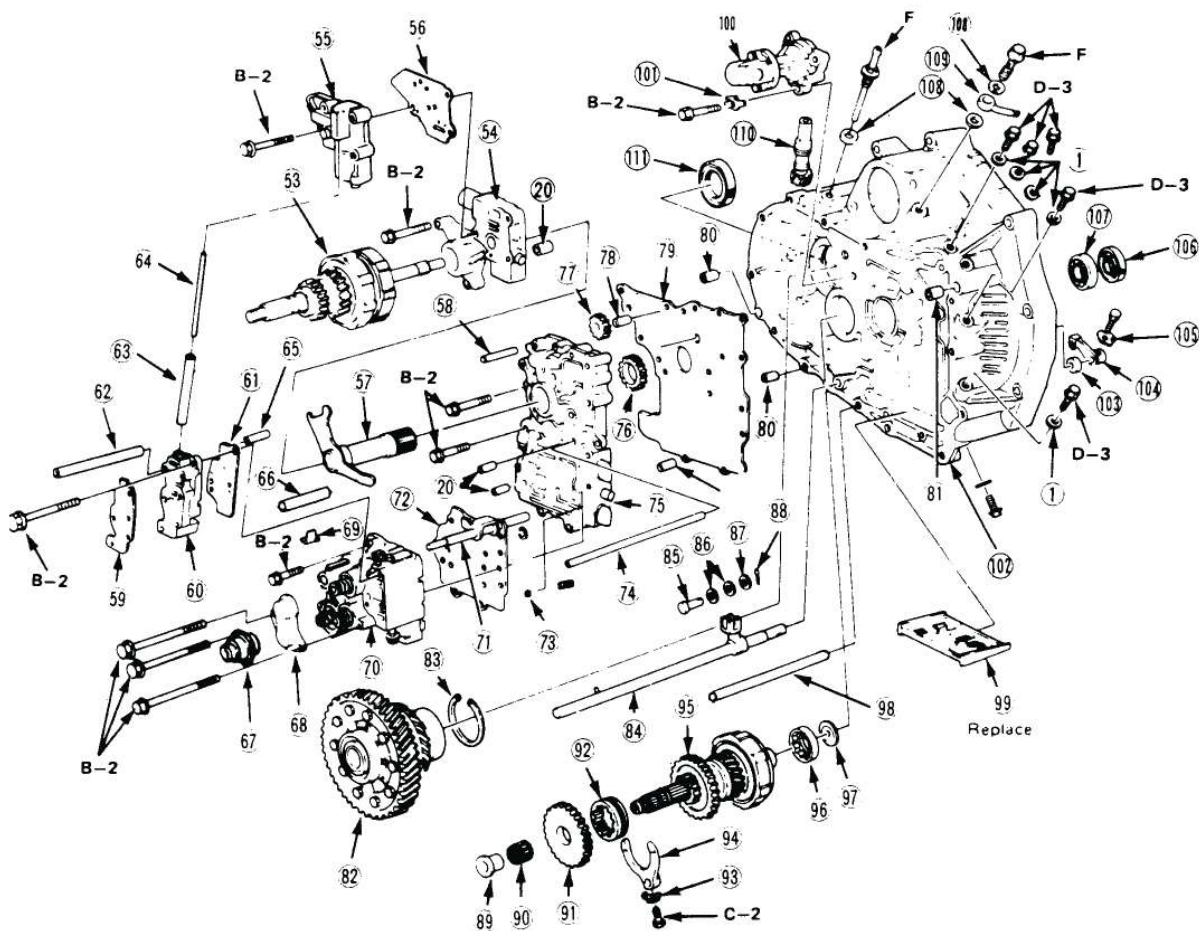
20. Remove both bolts and pull shift cable out of housing.
21. Unbolt torque converter assy from drive plate by removing eight bolts.
22. Remove the three rear engine mounting bolts from transmission housing.
Remove the rear engine mount.
23. Remove the front transmission mount's two bolts.
24. Remove 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.

Illustrated Index



Torque	Bolt size
A-8 N·m (0.8 kg-m, 6 lb-ft)	1-5 × 0.8 mm
B-12 N·m (1.2 kg-m, 9 lb-ft)	2-6 × 1.0 mm
C-14 N·m (1.4 kg-m, 10 lb-ft)	3-8 × 1.25 mm
D-18 N·m (1.8 kg-m, 12 lb-ft)	
E-27 N·m (2.7 kg-m, 20 lb-ft)	
F-29 N·m (2.9 kg-m, 21 lb-ft)	
G-40 N·m (4.0 kg-m, 29 lb-ft)	
H-95 → 0 → 95 N·m (9.5 → 0 → 9.5 kg-m, 70 → 0 → 70 lb-ft)	
G-110 → 0 → 110 N·m (11.0 → 0 → 11.0 kg-m, 80 → 0 → 80 lb-ft)	

- | | | | |
|--------------------------|---|--|-------------------------|
| 1 WASHER 8 mm
Replace | 13 MAINSHAFT 1st GEAR
NEEDLE BEARING | 28 REVERSE IDLER
BEARING HOLDER
Removal, | 43 LOCK PLATE |
| 2 O-RING 6 × 2.3 mm | 14 31 × 36 × 18.5 mm | 29 SPRING A | 44 THROTTLE CONTROL |
| 3 GASKET | 15 THRUST WASHER | 30 REVERSE IDLER SHAFT | 45 LEVER |
| 4 BREATHER CAP | 16 COLLAR 26 mm | 31 NEEDLE BEARING | THROTTLE CONTROL |
| 5 DIPSTICK | 17 SNAP RING 68 mm | 32 STOP PIN | SHAFT SPRING |
| 6 END COVER | 18 MAINSHAFT BEARING | 33 PARKING PAWL | Removal, |
| Disassembly/Inspection, | 19 DIFFERENTIAL | 34 PARKING PAWL SPRING | Installation, |
| 7 GASKET | 20 OIL SEAL | 35 PARKING PAWL SHAFT | 46 THROTTLE CONTROL |
| 8 1st ACCUMULATOR | 21 LOCKNUT | 36 PARKING PAWL ROLLER | SHAFT SEAL |
| Disassembly/Inspection, | 22 Installation, | 37 ROLLER PIN | 47 DRAIN PLUG WASHER |
| 9 LOCKNUT | 23 PARKING GEAR | 38 LOCK PLATE | 48 TRANSMISSION HOUSING |
| Removal, | 24 COUNTERSHAFT 1st GEAR | 39 PARKING LEVER | Removal, |
| Installation, | Disassembly/Inspection, | 40 WASHER 5 mm | 49 GASKET |
| 10 1st CLUTCH | 25 NEEDLE BEARING | 41 COTTER PIN | THROTTLE CONTROL |
| Removal, | 30 × 35 × 11 mm | 42 Removal, | CABLE BRACKET |
| Disassembly, | 26 1st GEAR COLLAR | Disassembly, | Adjustment, |
| Reassembly, | 27 SNAP RING 62 mm | | 51 REVERSE IDLER GEAR |
| 11 THRUST WASHER 26 mm | COUNTERSHAFT BEARING | | Replacement, |
| 12 THRUST NEEDLE | | | 52 SPRING B |
| BEARING 31 × 47 × 2 mm | | | |



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54 REGULATOR ASSY

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Installation,
Disassembly,
Repair, page

55 LOCK-UP SHIFT VALVE

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56 SEPARATOR PLATE

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57 STATOR SHAFT

58 3rd CLUTCH PIPE

59 COVER

60 CPC VALVE

Removal,

61 SEPARATOR PLATE

62 4th CLUTCH PIPE

63 8 x 136 mm PIPE

64 5 x 168 mm PIPE

65 8 x 29.5 mm PIPE

66 8 x 50 mm PIPE

67 4th ACCUMULATOR COVER

68 2nd/3rd ACCUMULATOR

COVER

69 STOPPER PLATE

70 SERVO VALVE BODY

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SHAFT

72 SERVO SEPARATOR

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73 STEEL BALL No. 6

74 1st CLUTCH PIPE

75 MAIN VALVE BODY

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77 PUMP DRIVEN GEAR

78 PUMP SHAFT

79 MAIN VALVE SEPARATOR

PLATE

80 DOWEL PIN 14 x 20 mm

81 DOWEL PIN 14 x 25 mm

82 DIFFERENTIAL

83 SNAP RING 80 mm

Selection,

Installation,

84 CONTROL SHAFT

85 MANUAL VALVE PIN

86 ROLLERS

87 WASHER 5 mm

88 COTTER PIN

89 REVERSE GEAR COLLAR

90 NEEDLE BEARING

91 COUNTERSHAFT

REVERSE GEAR

92 SELECTOR HUB

93 LOCK PLATE

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99 FILTER SCREEN

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103 CONTROL SHAFT OIL

SEAL

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107 MAINSHAFT BEARING

Replacement,

108 WASHER 12 mm

109 HOSE JOINT

110 SPEEDOMETER DRIVE

GEAR

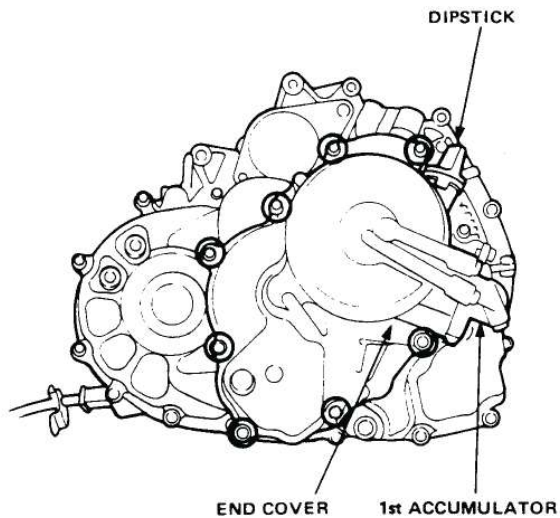
111 DEFERENTIAL OIL SEAL

Transmission Housing

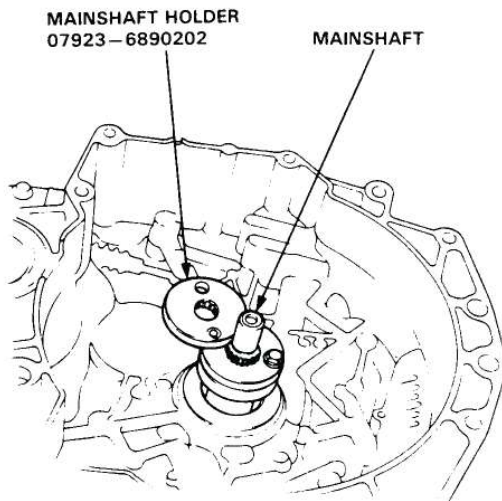
Removal

1. Remove the dipstick.
2. Remove the nine bolts from the end cover, then remove the cover.

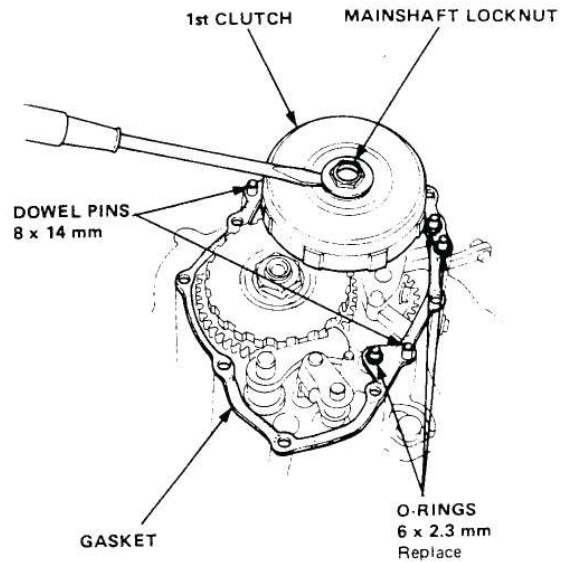
NOTE: Refer to page 15-116 for 1st Accumulator removal and disassembly.



3. Shift the transmission to PARK.
4. Lock the mainshaft using the mainshaft holder.

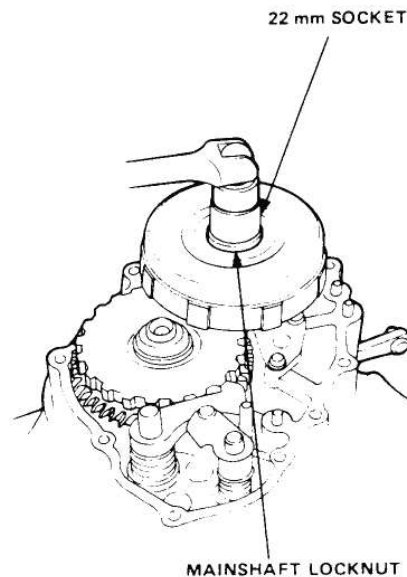


5. Remove the end cover gasket, dowel pins, and O-rings.
6. Pry the staked edge of the locknut flange out of the notch in the 1st clutch.



7. Remove the mainshaft locknut.

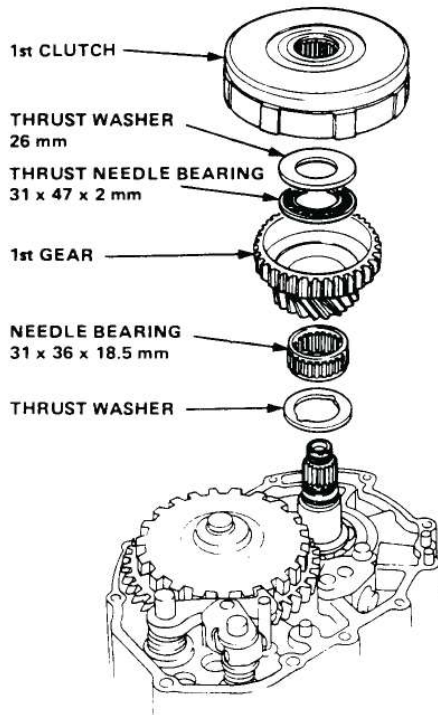
CAUTION: The mainshaft locknut has left-hand threads.



8. Remove the 1st clutch.

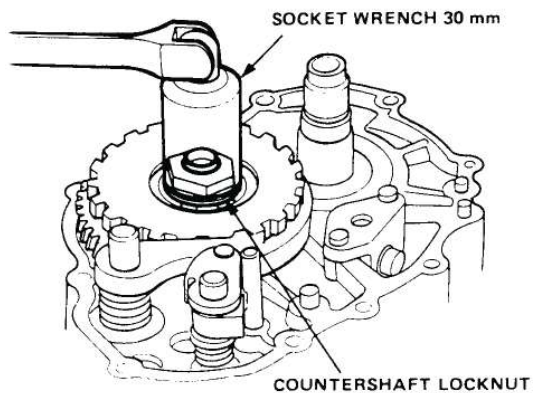
9. Remove the thrust washer, needle bearing and 1st gear.

10. Remove the needle bearing and thrust washer from the mainshaft.

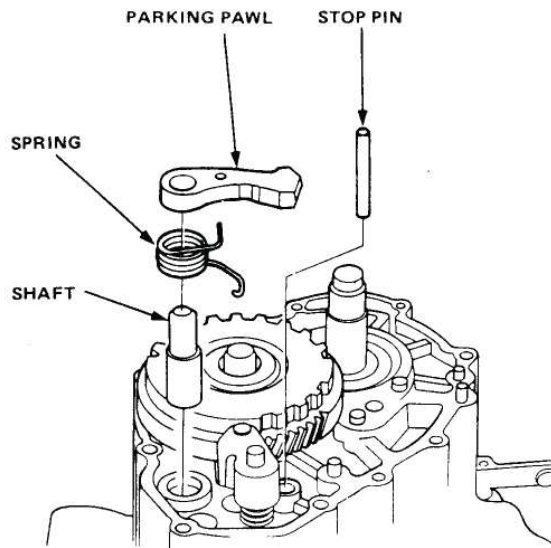


11. Pry the staked edge of the locknut out of the notch in the parking gear.

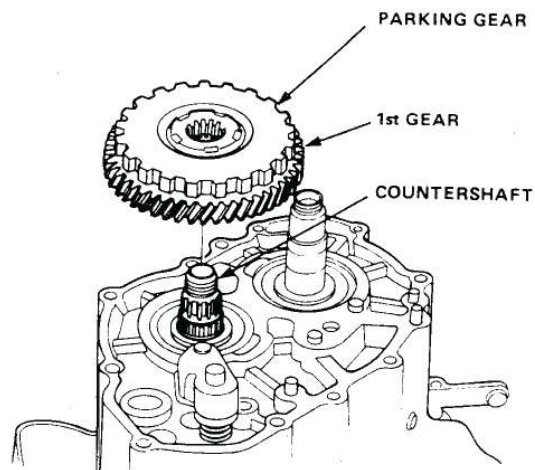
12. Remove the countershaft locknut.



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



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



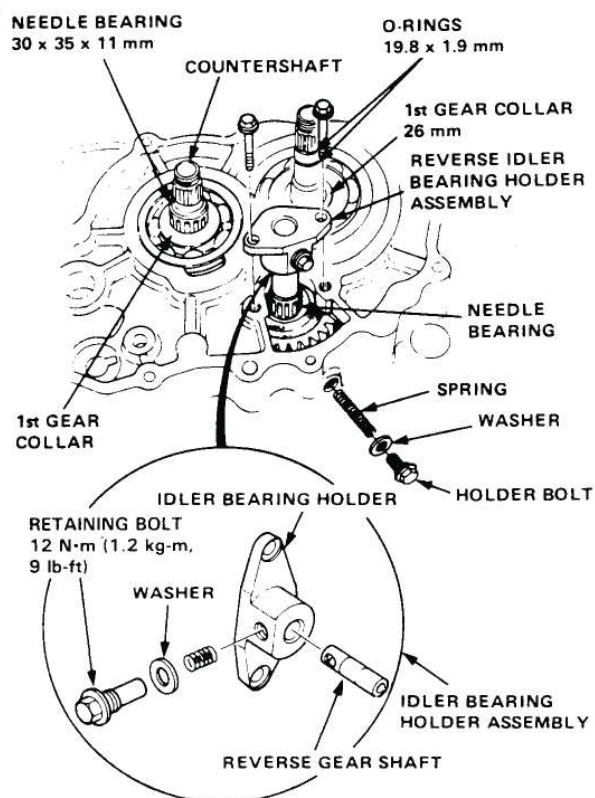
(cont'd)

Transmission Housing

Removal (cont'd)

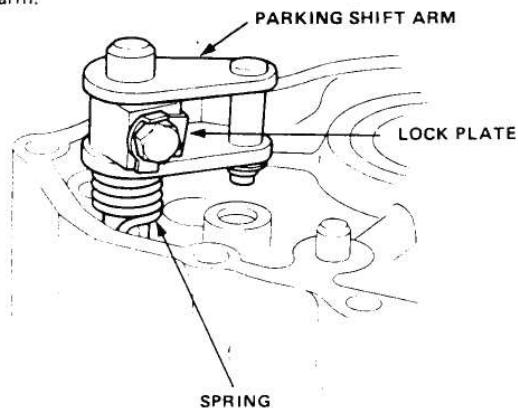
15. From the countershaft, remove the needle bearing and 1st gear collar. From the mainshaft, remove the O-rings and 1st gear collar.

16. Remove the reverse idler bearing holder assembly.

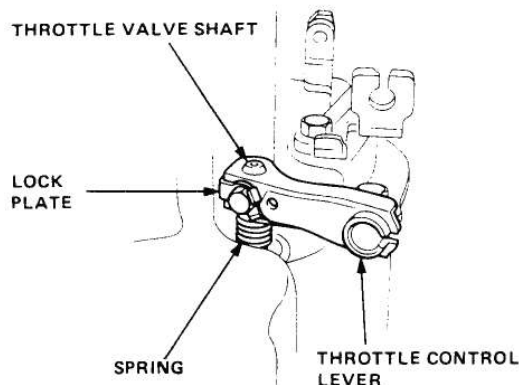


17. Bend down the tab on the lock plate under the parking shift arm bolt.

18. Remove the bolt, then remove the parking shift arm.

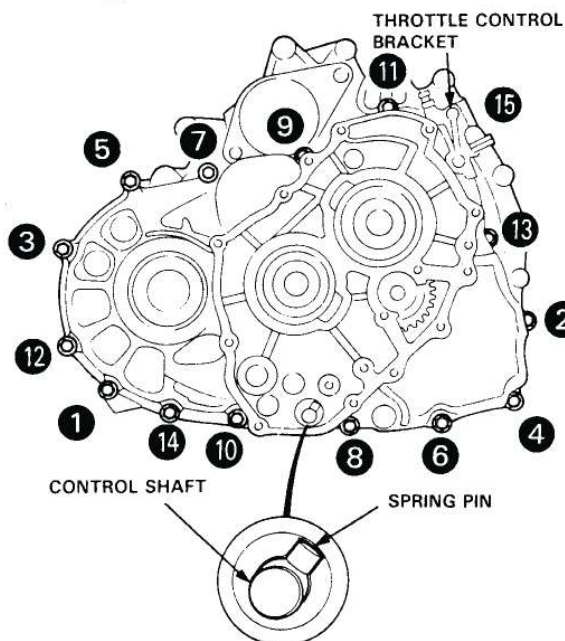


19. Bend down the tab on the throttle control lever bolt lock plate, then remove the bolt. Now, remove the throttle control lever and spring from the throttle valve shaft.



20. Remove the 8 x 1.25 mm bolts, (1) thru (15), in the sequence shown.

NOTE: Bolt 1 will not come all the way out of the transmission housing because the throttle control cable bracket is in the way; just unscrew it free of the threads in the torque converter housing and leave in place — If you remove the bracket, it must be adjusted, when reinstalled

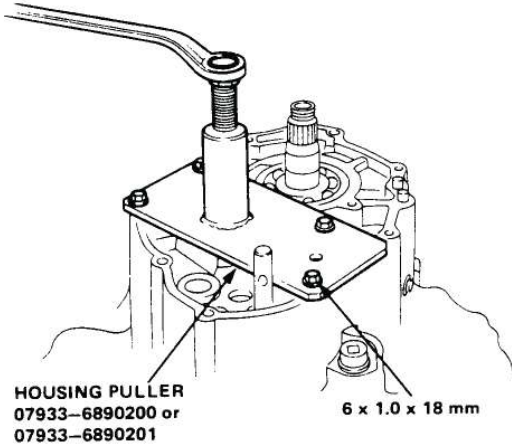


21. Align the control shaft spring pin with the cutout in the transmission housing.

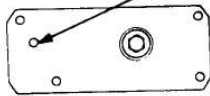
Mainshaft/ Countershaft

Removal

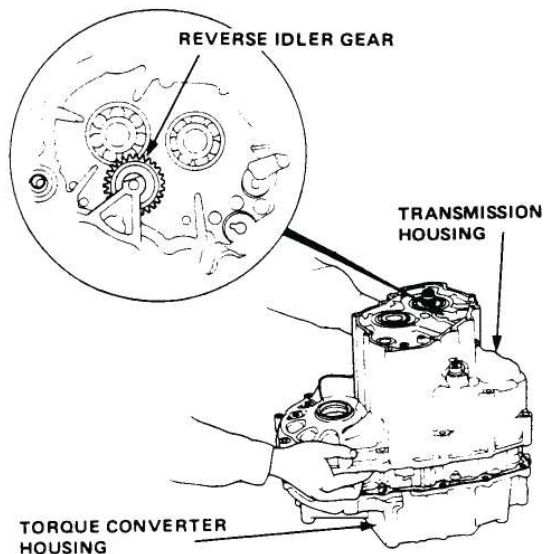
22. Install the transmission housing puller over the countershaft with four bolts and tighten securely. Then screw in the puller bolt against the end of the countershaft until the transmission housing comes loose.



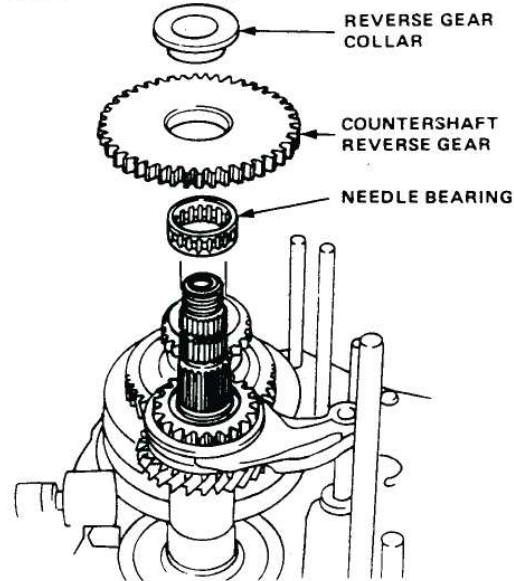
NOTE: Special tool (No. 07933-6890200) can be used if this hole is enlarged to 10 mm.



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.

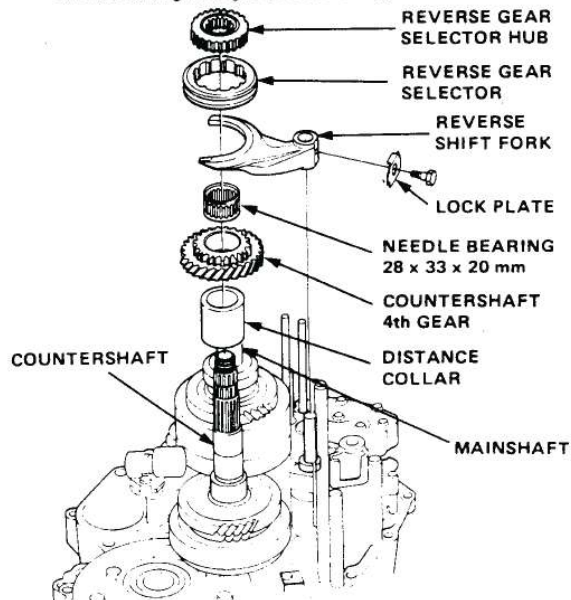


1. Remove the reverse gear collar, countershaft reverse gear and needle bearing.



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.

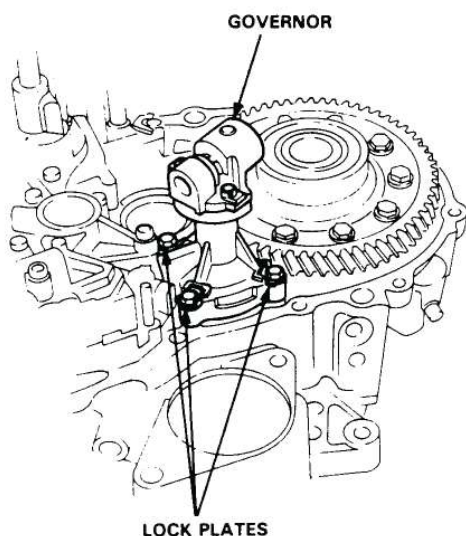
NOTE: It will be necessary to pull up the countershaft at a slight angle to clear the governor.



Governor Valve

Removal

Bend down the tabs on the lock plates, remove the bolts holding the governor to the torque converter housing, and remove the governor.



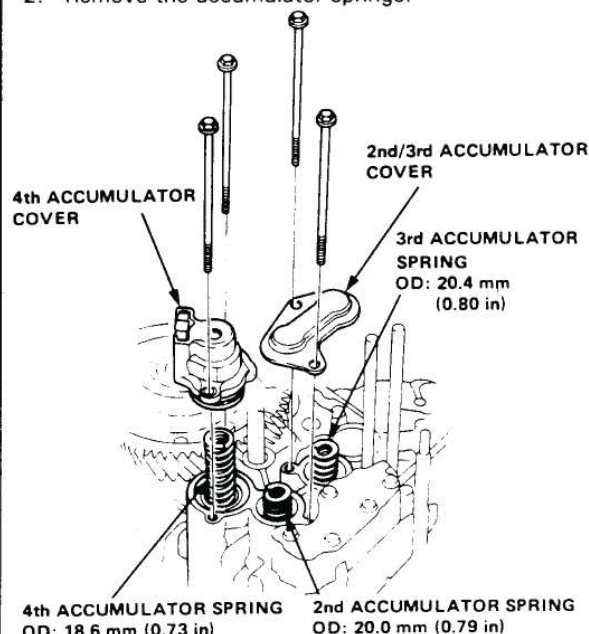
Main Valve

Removal

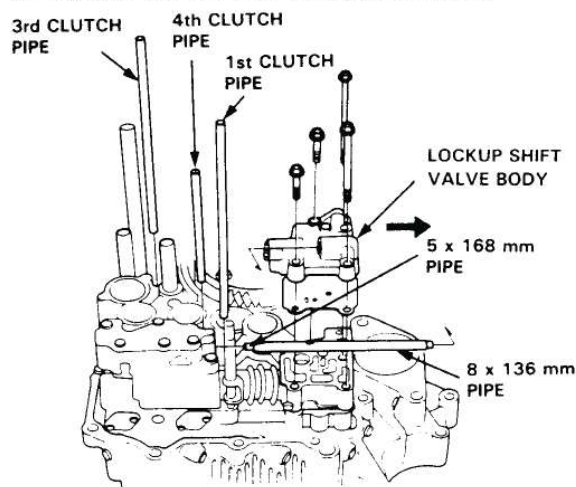
1. Remove the accumulator covers.

CAUTION: Accumulator covers are spring loaded; to prevent stripping the threads in the torque converter housing, press down on the accumulator covers while unscrewing the bolts in a crisscross pattern.

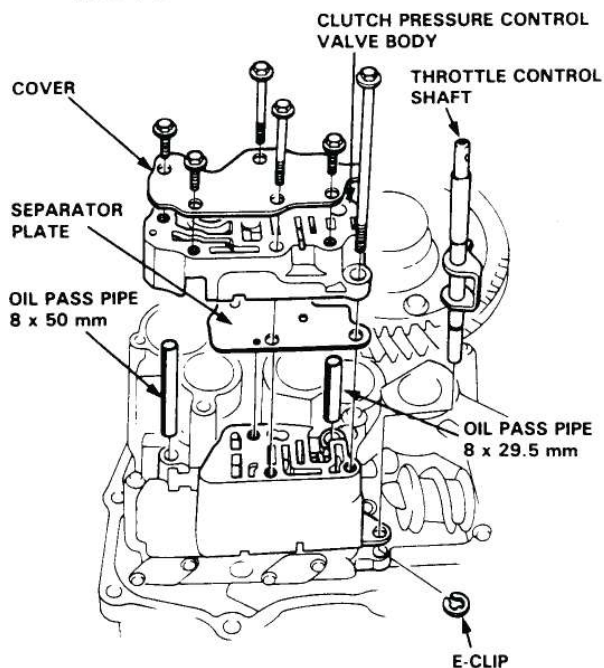
2. Remove the accumulator springs.



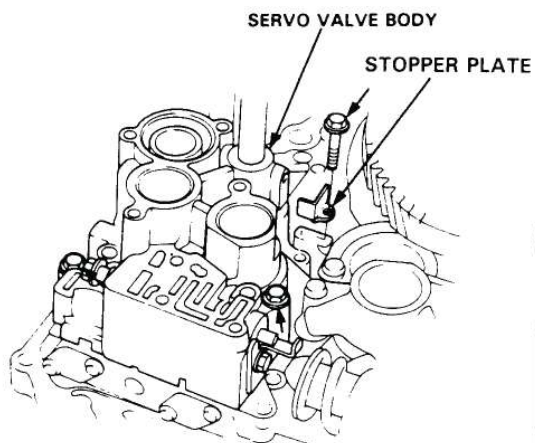
3. Remove the three bolts attaching the lockup shift valve body.
4. Remove the oil pass pipes (5 x 168 mm and 8 x 136 mm) by moving the lockup shift valve body in the direction of the arrow.
5. Remove the 1st, 3rd and 4th clutch pipes.



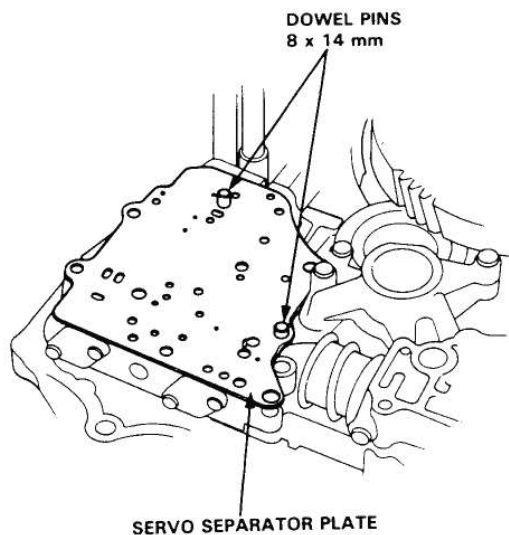
6. Remove the clutch pressure control valve body.
7. Remove the oil pass pipes (8 x 29.5 mm and 8 x 50 mm).
8. Remove the E-clip. Then remove the throttle control shaft.



9. Remove the servo valve body (3 bolts) and the stopper plate for the check valve.

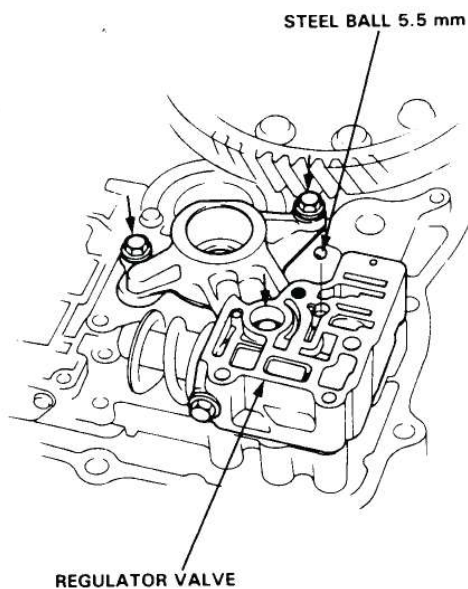


10. Remove the separator plate and dowel pins.



11. Remove the regulator valve (3 bolts).

CAUTION: Be careful not to lose the steel ball.

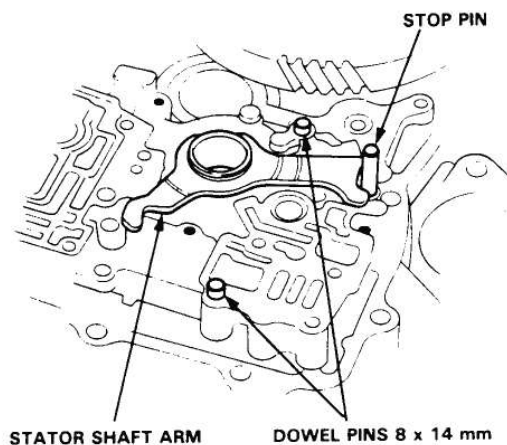


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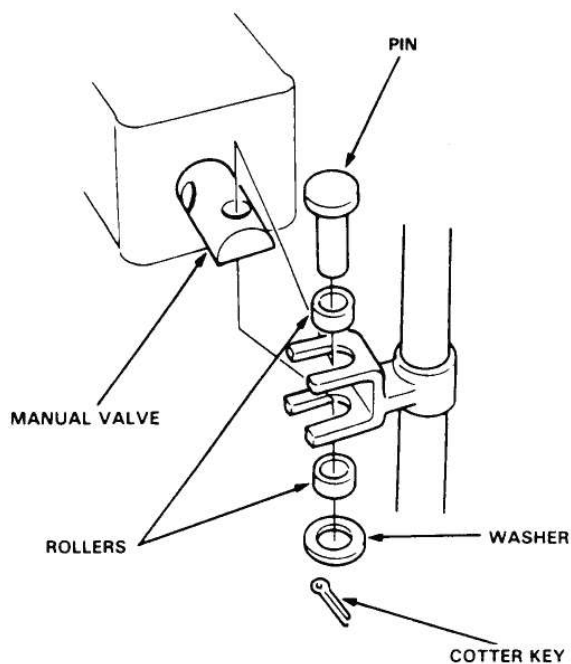
Main Valve Body

Removal (cont'd)

12. Remove the stator shaft arm, dowel pins and stop pin.



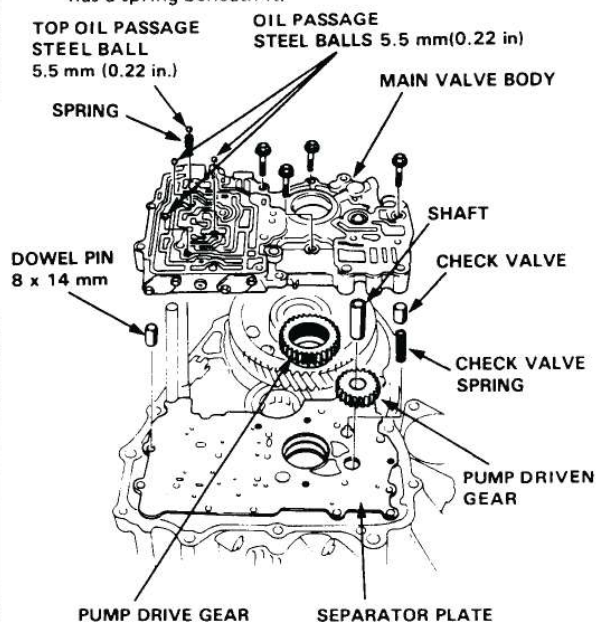
13. Remove the cotter key, washer, rollers, and pin from the manual valve.



14. Remove the main valve body being careful not to lose the 4 steel balls, check ball spring, torque converter check valve and spring.

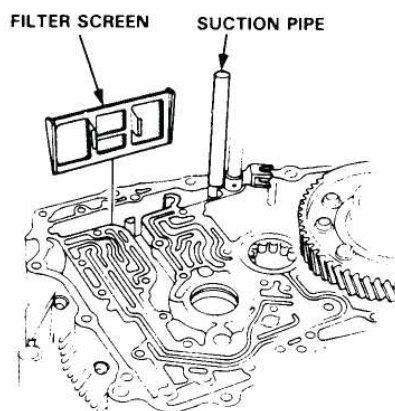
CAUTION: Do not use a magnet to remove the steel balls; it may magnetize the balls.

NOTE: Top oil passage steel ball in this drawing has a spring beneath it.



15. Remove the pump gears and shaft.
16. Remove the separator plate, dowel pins, check valve, and spring.
17. Remove the filter screen and suction pipe.

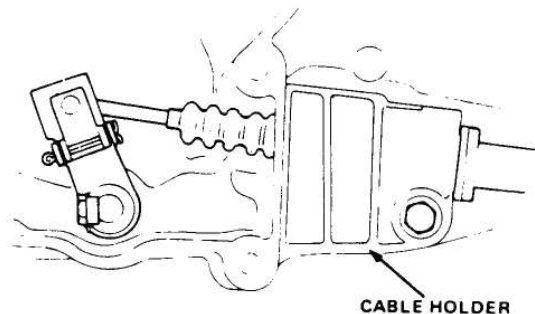
NOTE: Do not reuse filter screen; install a new one on reassembly.



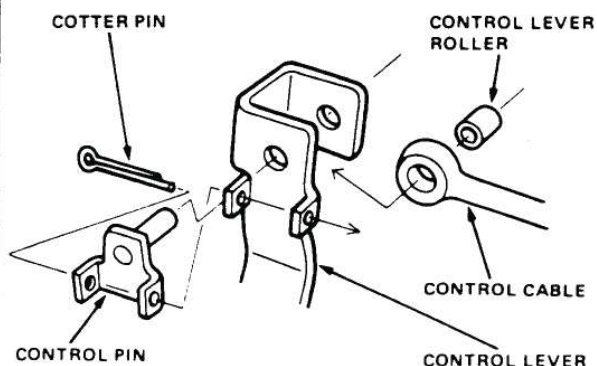
Control Shaft

Removal

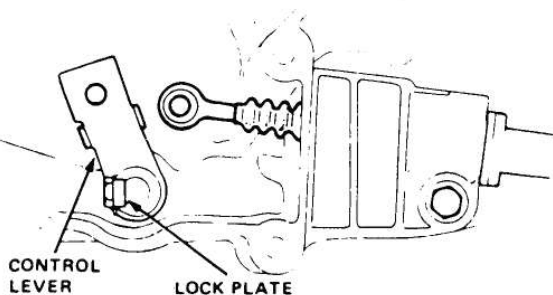
1. Remove the cable holder.



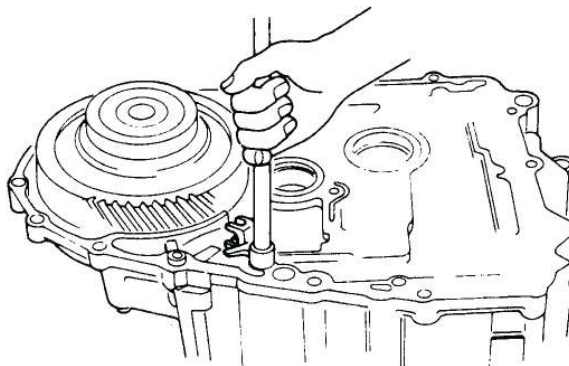
2. Remove the cotter pin, control pin, and control lever roller from the control lever.



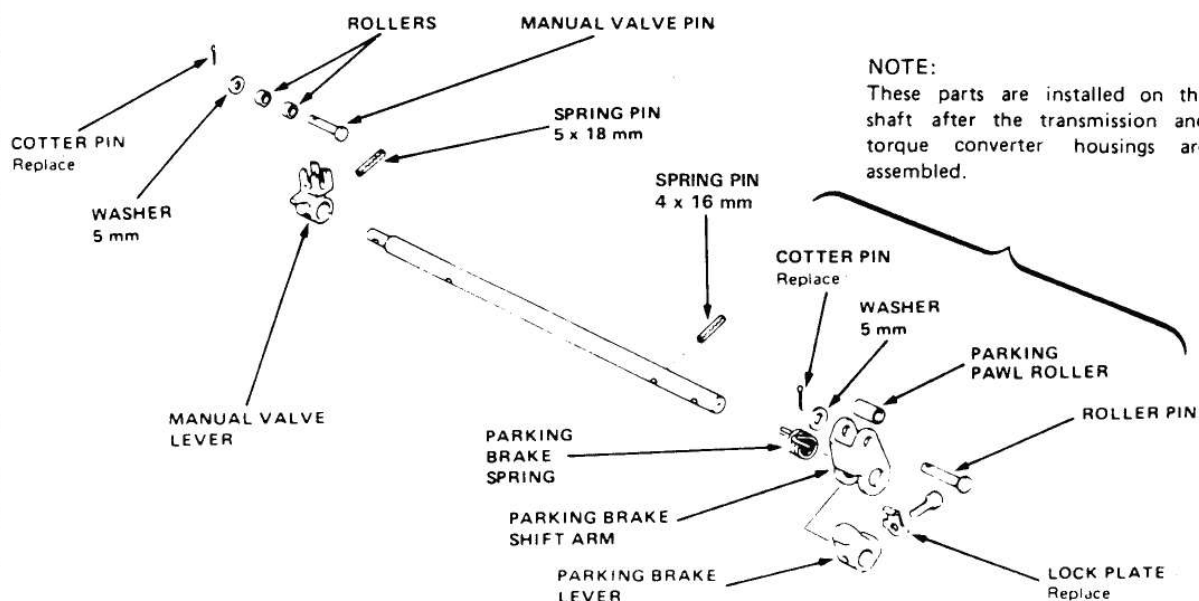
3. Bend down the tab on the lock plate under the bolt in the control lever. Then remove the bolt and lever.



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



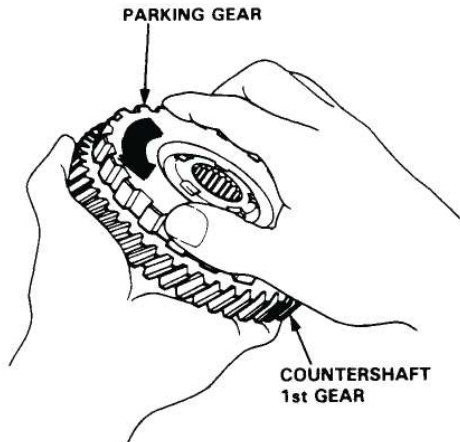
Disassembly/Reassembly



One-Way Clutch/Parking Gear

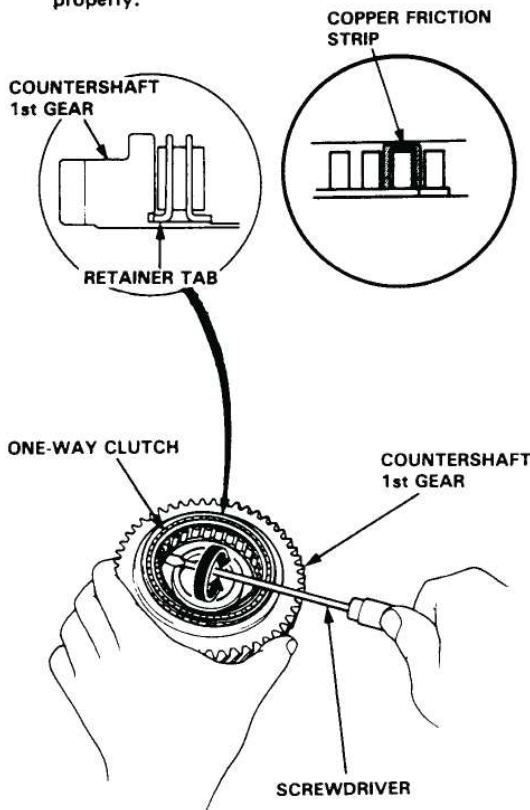
Disassembly and Inspection

1. Separate the countershaft 1st gear from the parking gear by turning the parking gear in the direction shown.

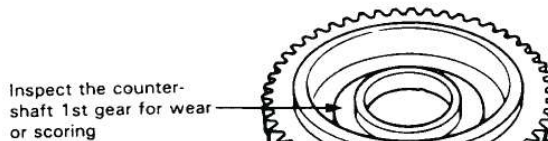
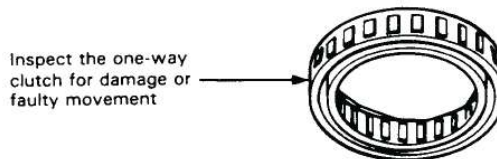
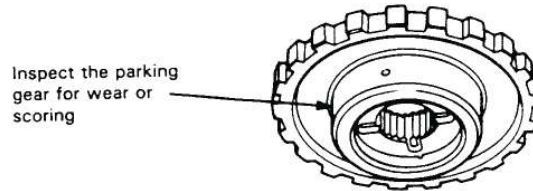


2. Remove the one-way clutch by prying it up with the end of a screwdriver.

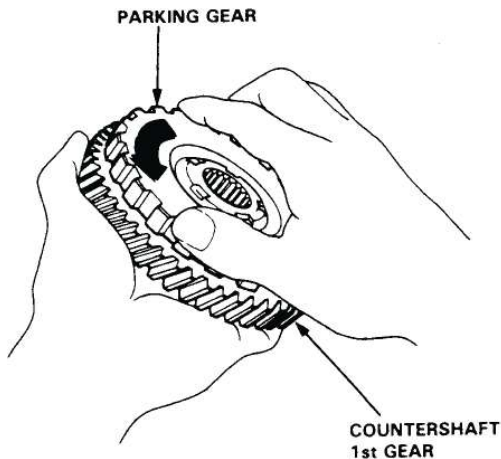
CAUTION: Do not pry on the three copper friction strips; if you break a strip, the clutch will not work properly.



Inspect the parts as follows:



After the parts are assembled, hold the countershaft 1st gear and turn the parking gear in direction shown to be sure it turns freely.

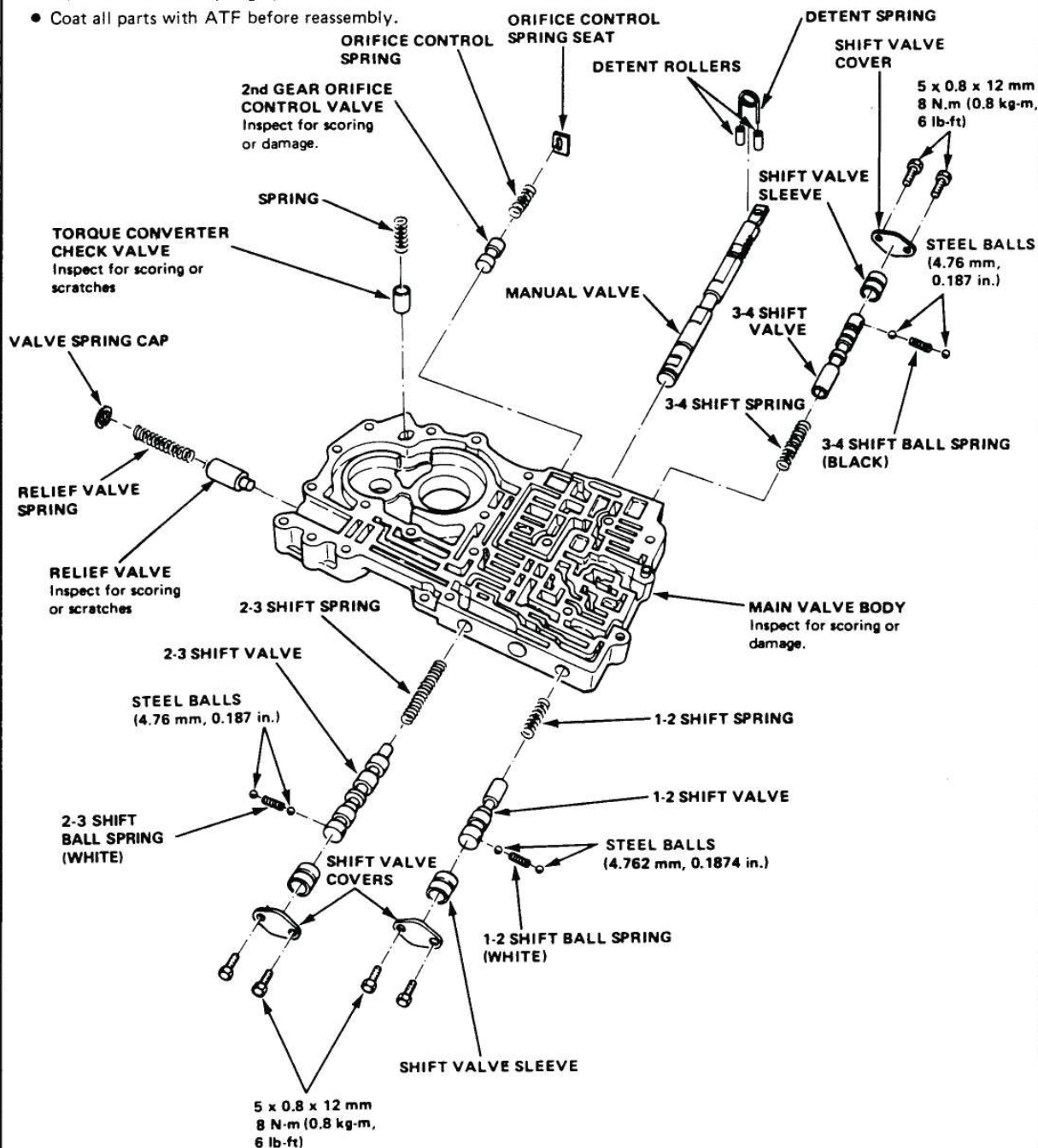


Main Valve Body

Disassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely,
- See Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

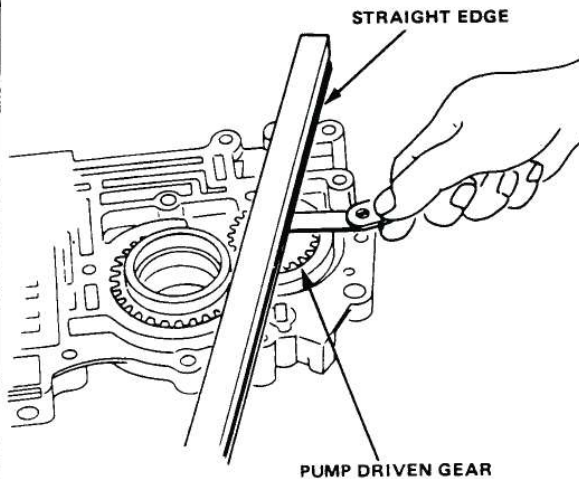


Main Valve Body

Reassembly (cont'd)

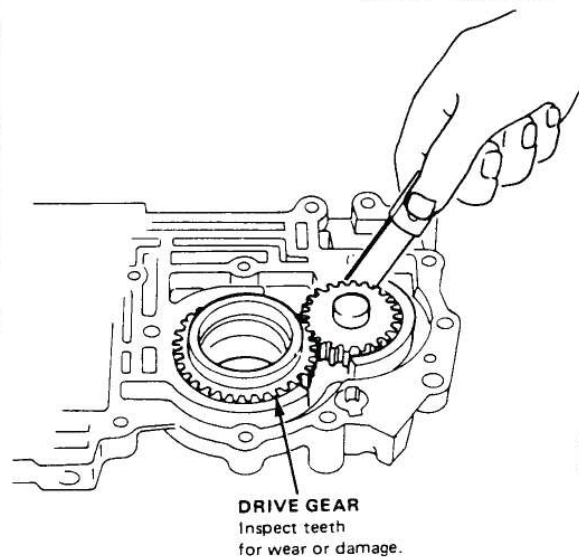
- Measure the thrust clearance of the driven gear-to-valve body.

Drive/Driven Gear thrust (Axial) Clearance:
Standard (New): 0.03–0.05 mm (0.001–0.002 in.)
Service Limit: 0.08 mm (0.003 in.)



- Install the oil pump shaft and measure the side clearance of the drive and driven gears.

Pump Gears Side (Radial) Clearance:
Standard (New): Driven gear 0.21–0.27 mm (0.008–0.010 in.)
 Drive gear 0.05–0.09 mm (0.002–0.004 in.)



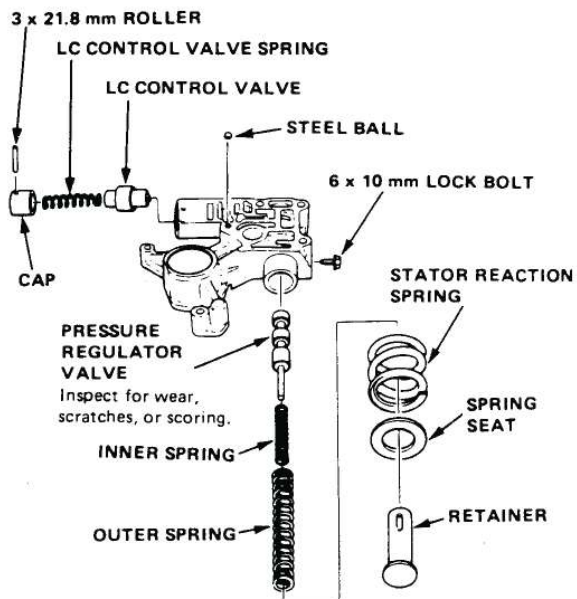
Regulator Valve

Disassembly/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as assembly if any parts are worn or damaged.
- Check all valves for free movement, if any fail to slide freely, see Valve Body Repair on page 15-94.
- See Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

- Hold the retainer in place while removing the lock bolt. Once the bolt is removed, release the retainer slowly.
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.

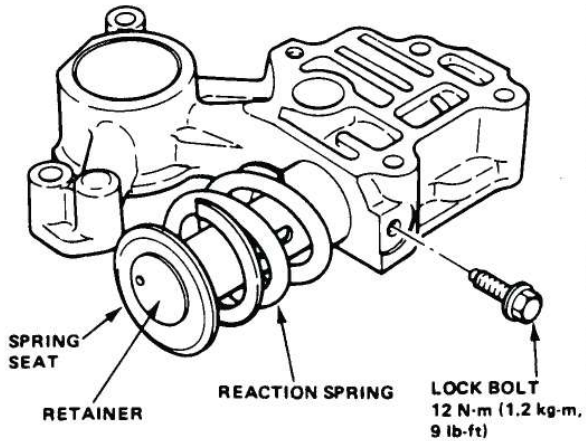


- Install the pressure regulator valve, and the inner and outer springs.

Lock-Up Shift Valve Body

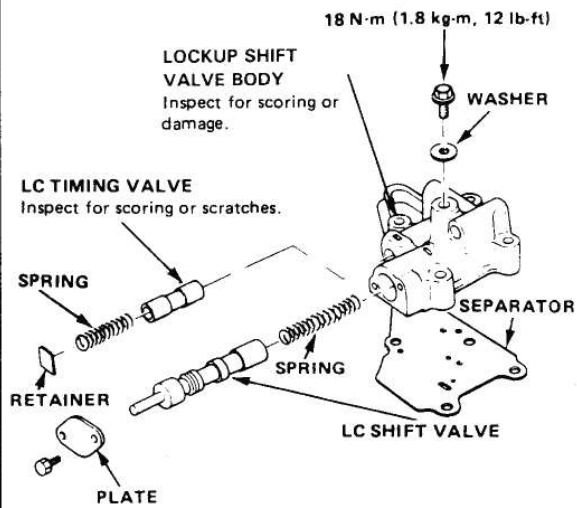
Disassembly/Inspection

4. Install the reaction spring, spring seat, and retainer. Align the hole in the retainer with the hole in the valve body, then press the retainer into the valve body and tighten the lock bolt.



NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as assembly if any parts are worn or damaged.
- Check all valves for free movement, if any fail to slide freely, see Valve Body Repair on page 15-94.
- See Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

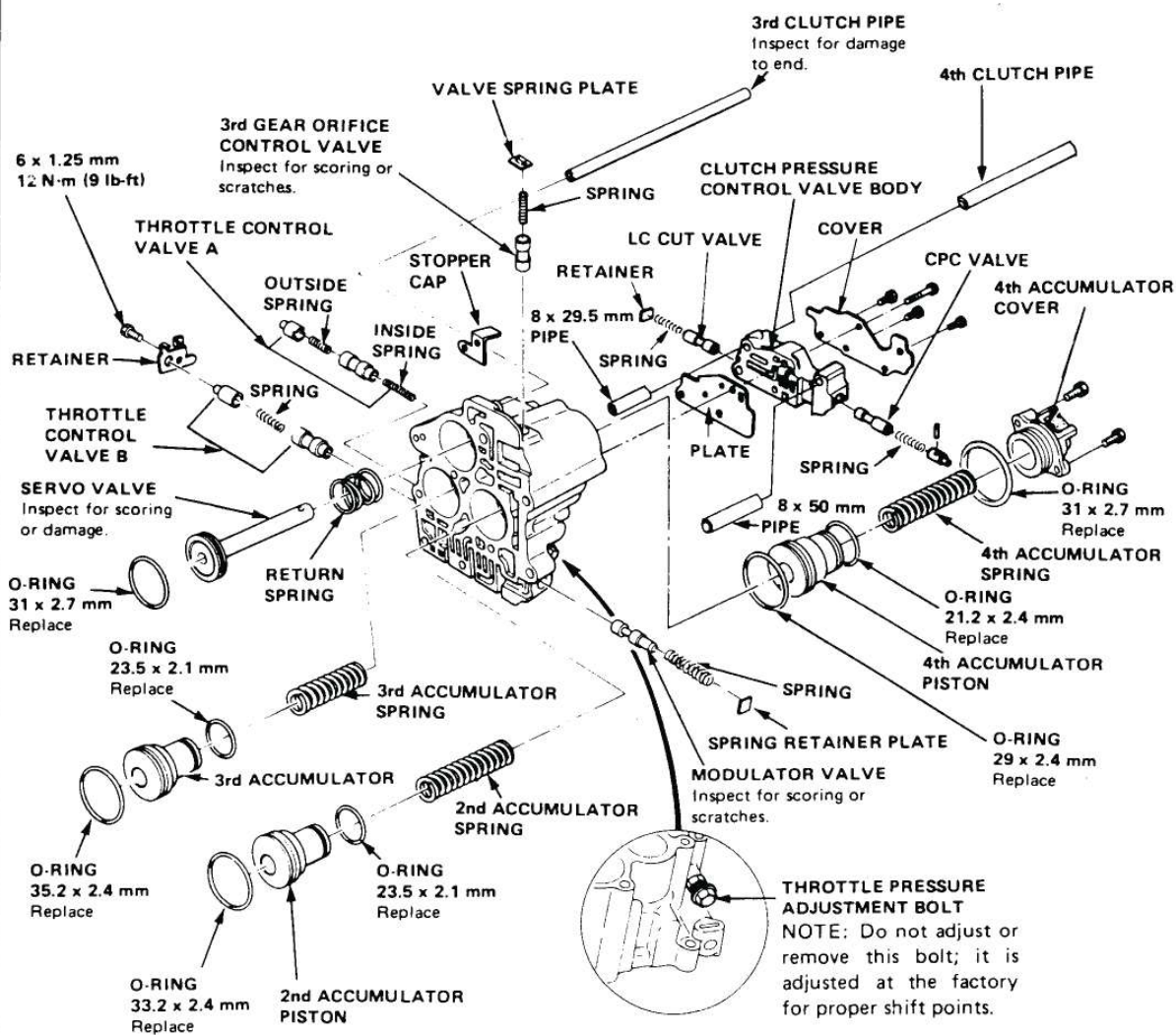


Servo Valve Body

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.

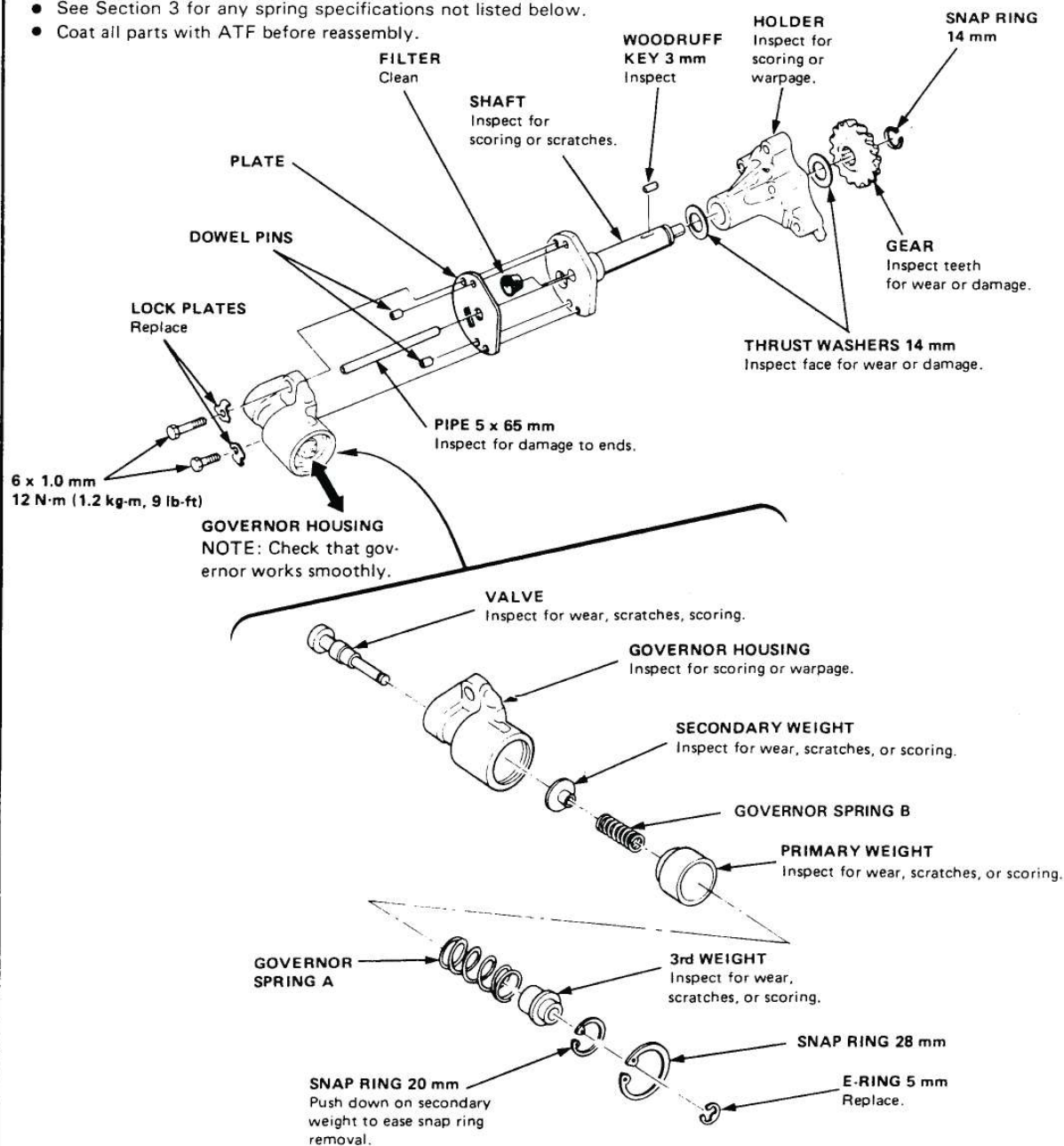


Governor Valve

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check that the governor works smoothly; replace it if it does not.
- See Section 3 for any spring specifications not listed below.
- Coat all parts with ATF before reassembly.

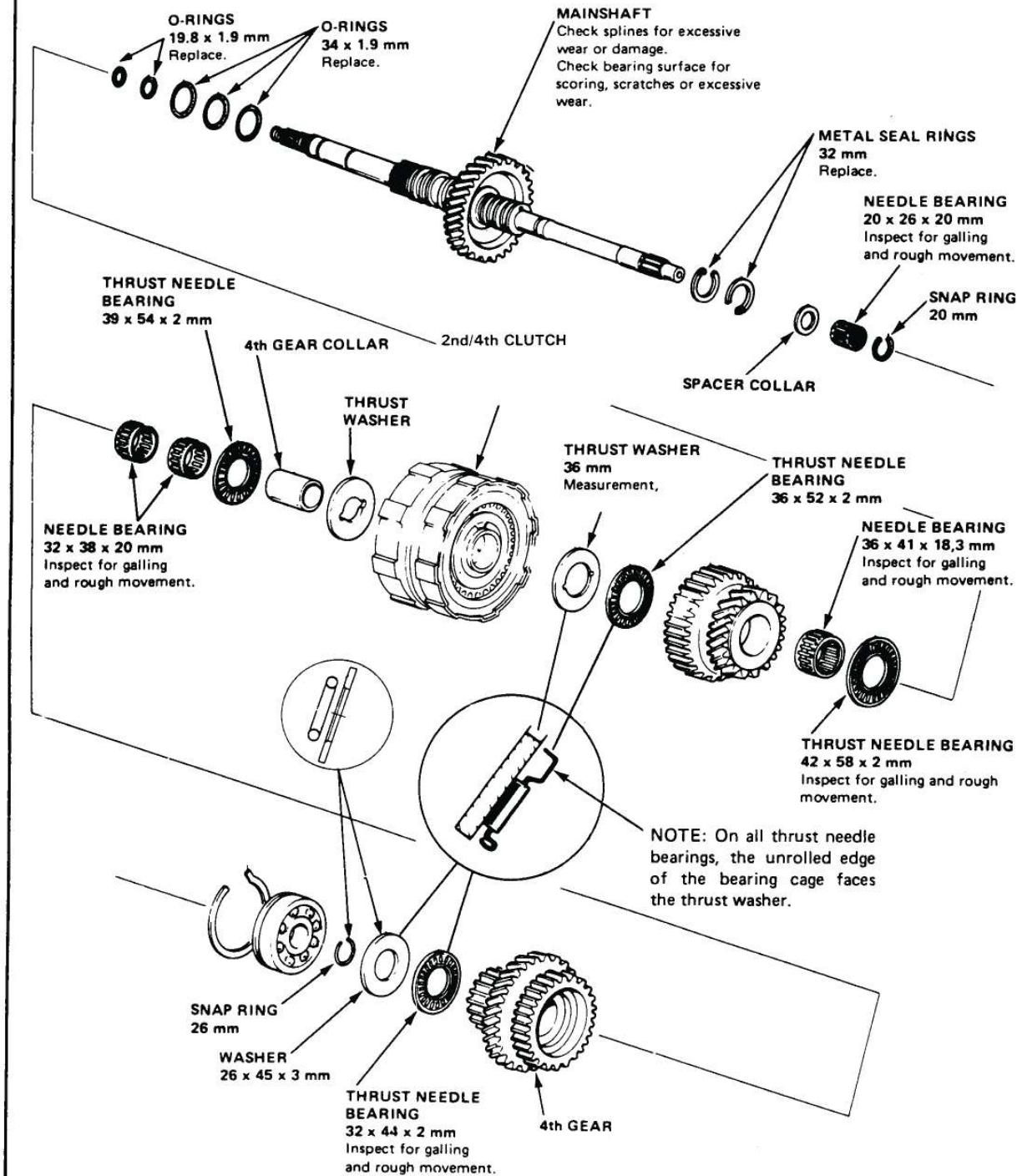


Mainshaft

Disassembly/Inspection/Reassembly

NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.

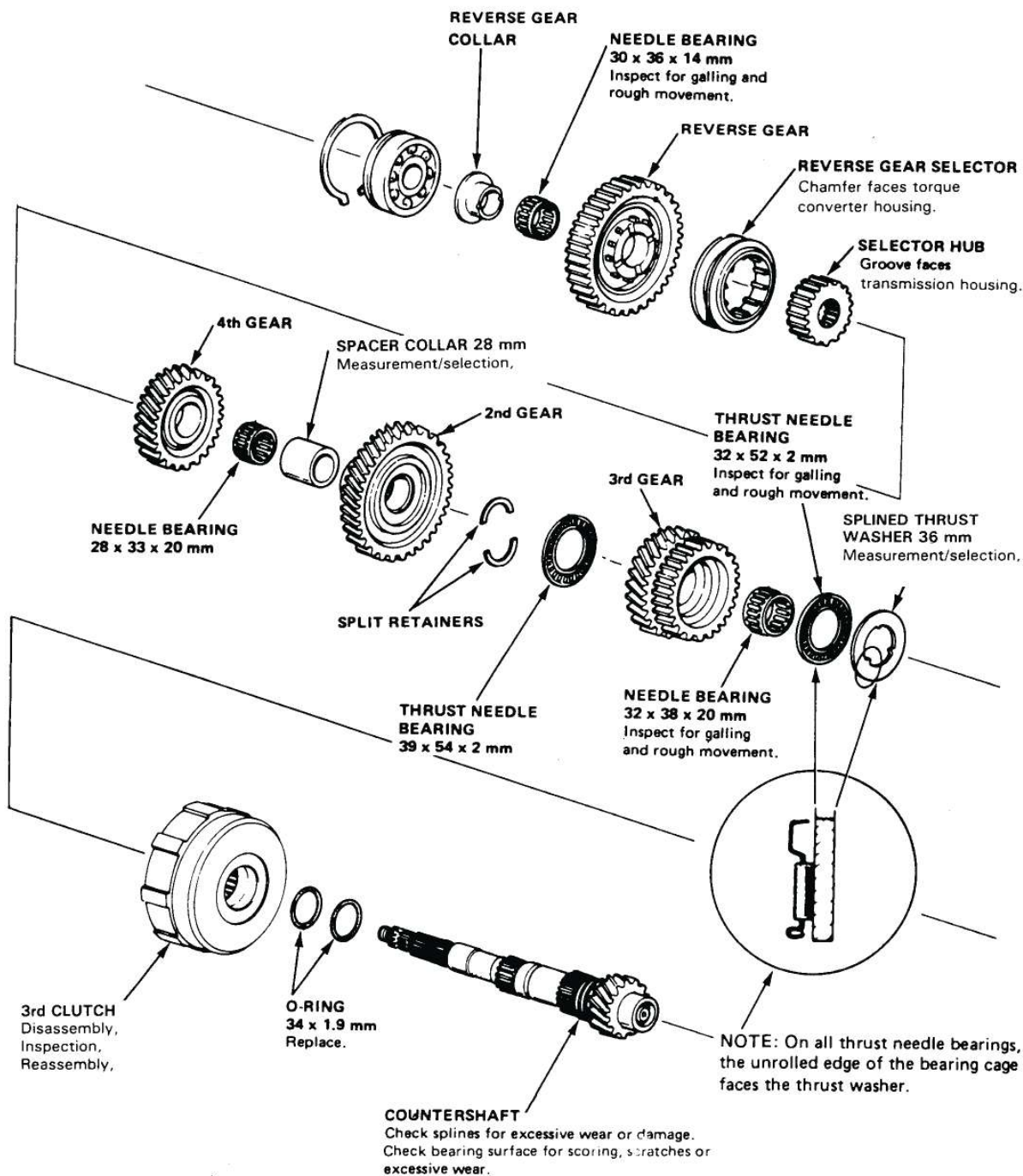


Countershaft

Disassembly/Inspection/Reassembly

NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearing with unrolled edge of bearing retainer facing washer.



Countershaft/Mainshaft

Clearance Measurements

1. Remove both the mainshaft and countershaft bearings from the transmission housing.
2. Assemble the mainshaft and the countershaft including bearings and all parts shown below.

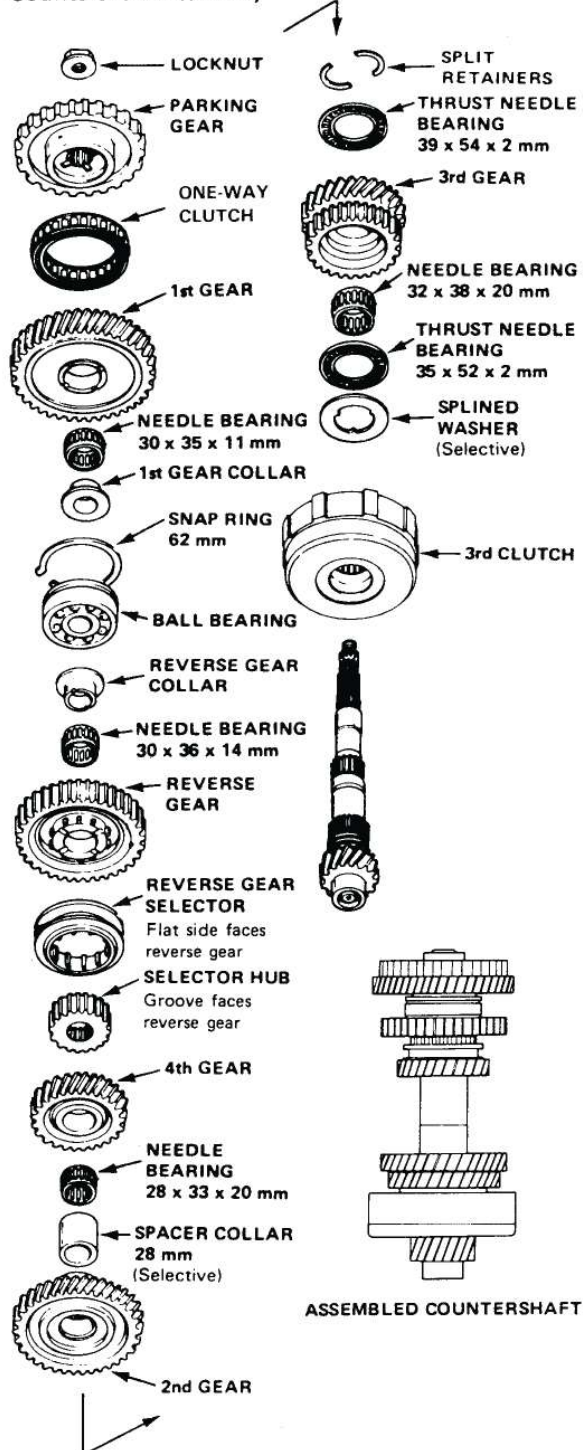
NOTE: On all thrust needle bearings, the unrolled edge of the bearing cage faces the thrust washer.



3. Install the mainshaft and countershaft assemblies into the torque converter housing.
4. Install the mainshaft holder to prevent the shafts from turning.
5. Torque the mainshaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft). (Left hand threads.)
6. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft).
7. Measure clearances as described on the next page.

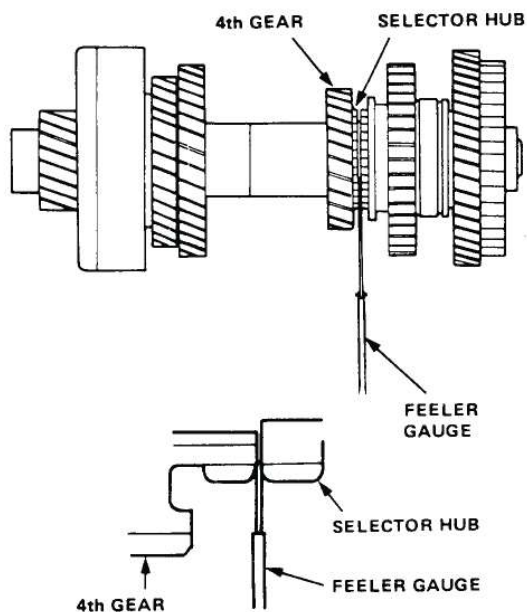
 Lubricate all parts with ATF before final re-assembly.

Countershaft Assembly



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.

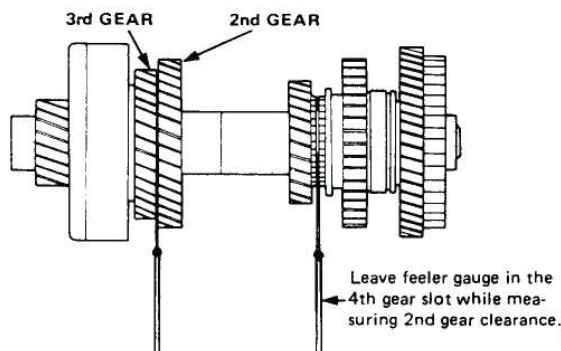
Replacement spacer collars:

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.)

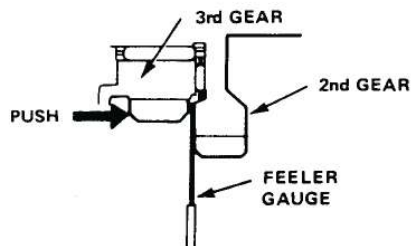
NOTE: Leave feeler gauge in place (4th gear) while measuring 2nd gear clearance.

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:

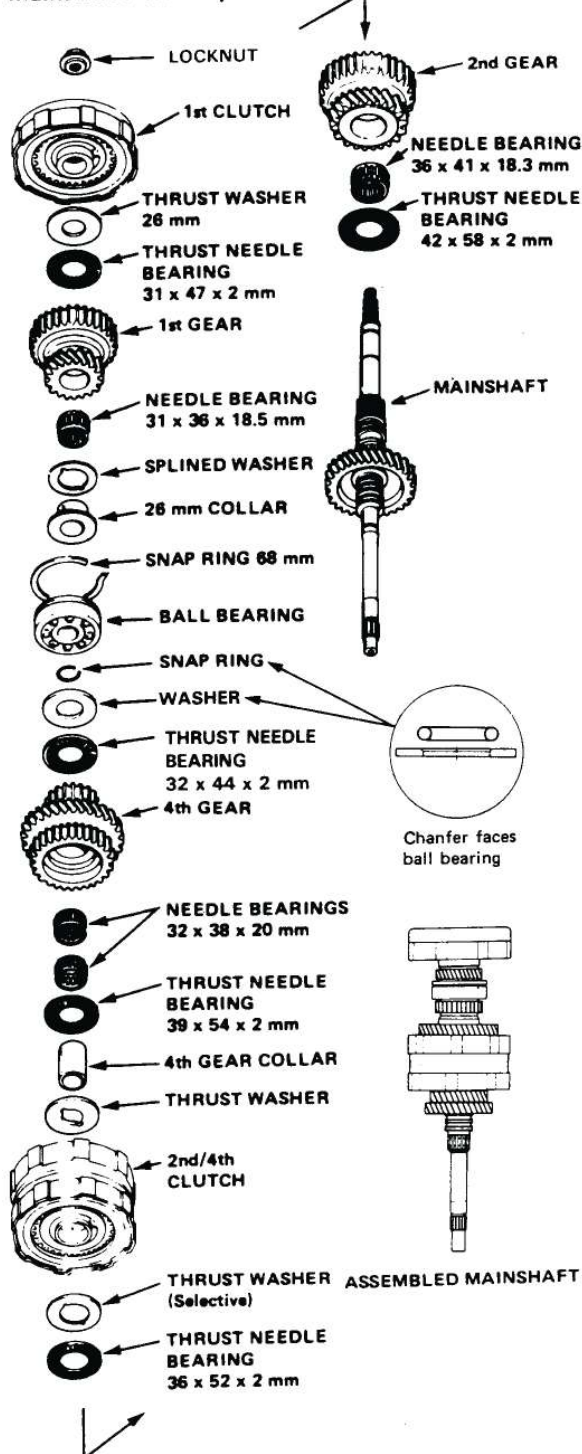
CLASS	P/N	THICKNESS
A	90411-PA9-010	2.97–3.00 mm (0.117–0.118 in.)
B	90412-PA9-010	3.02–3.05 mm (0.119–0.120 in.)
C	90413-PA9-010	3.07–3.10 mm (0.121–0.122 in.)
D	90414-PA9-010	3.12–3.15 mm (0.123–0.124 in.)
E	90415-PA9-010	3.17–3.20 mm (0.125–0.126 in.)
F	90418-PA9-010	3.22–3.25 mm (0.127–0.128 in.)
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.)

(cont'd)

Countershaft/Mainshaft

Clearance Measurements (cont'd)

Mainshaft Assembly

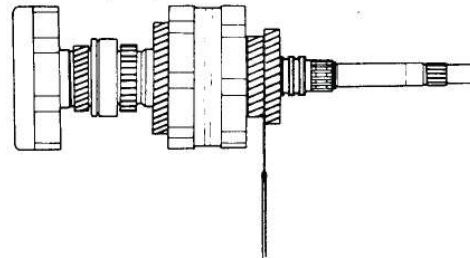


NOTE: Make all measurements before changing the thrust washers. Recheck after making the adjustments.

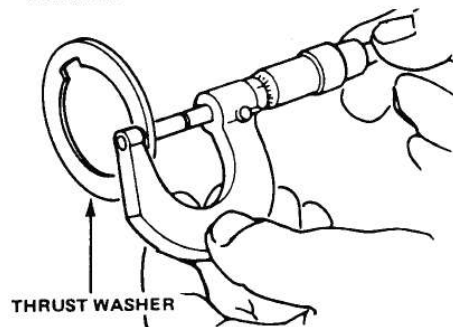
10. On the mainshaft measure the clearance between the shoulder of 2nd gear and main 3rd gear, the same way you did on the countershaft in step 9.

Mainshaft 2nd Gear Clearance:

Standard (New): 0.07–0.15 mm (0.003–0.006 in.)



If the clearance exceeds the service limit, measure the thickness of the 2nd clutch thrust washer (36 mm I.D.) and select one which gives the correct clearance.



Replacement washer (36 mm I.D.)

CLASS	P/N	THICKNESS
A	90441-PC9-000	3.47–3.50 mm (0.137–0.138 in.)
B	90442-PC9-000	3.52–3.55 mm (0.139–0.140 in.)
C	90443-PC9-000	3.57–3.60 mm (0.141–0.142 in.)
D	90444-PC9-000	3.62–3.65 mm (0.143–0.144 in.)
E	90445-PC9-000	3.67–3.70 mm (0.145–0.146 in.)
F	90446-PC9-000	3.72–3.75 mm (0.147–0.148 in.)
G	90447-PC9-000	3.77–3.80 mm (0.149–0.150 in.)
H	90448-PC9-000	3.82–3.85 mm (0.151–0.152 in.)
I	90449-PC9-000	3.87–3.90 mm (0.153–0.154 in.)

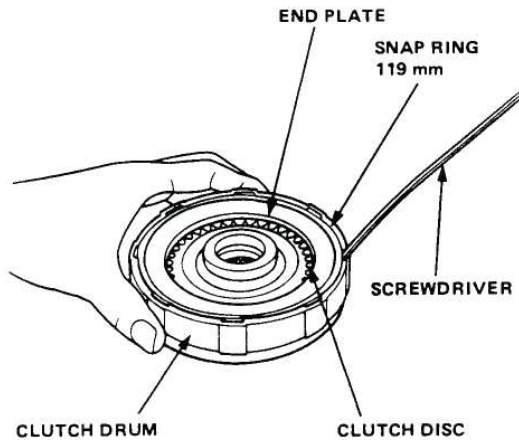
Clutch

Disassembly

NOTE:

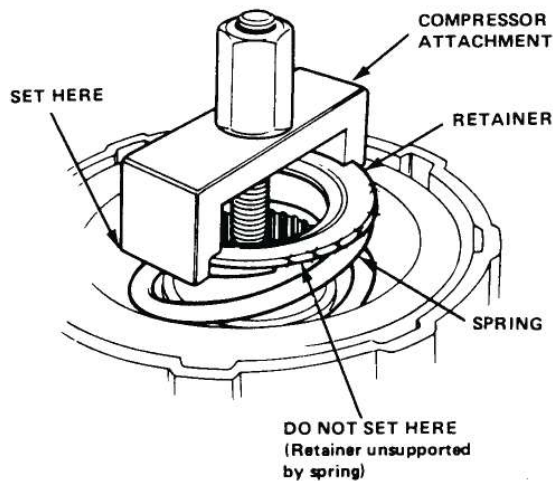
- The 1st and 3rd clutches are identical.
- To disassemble the 2nd/4th clutch, use the special tool in Step 3 in the same manner as for the 1st and 3rd clutches.

1. Remove the snap ring.

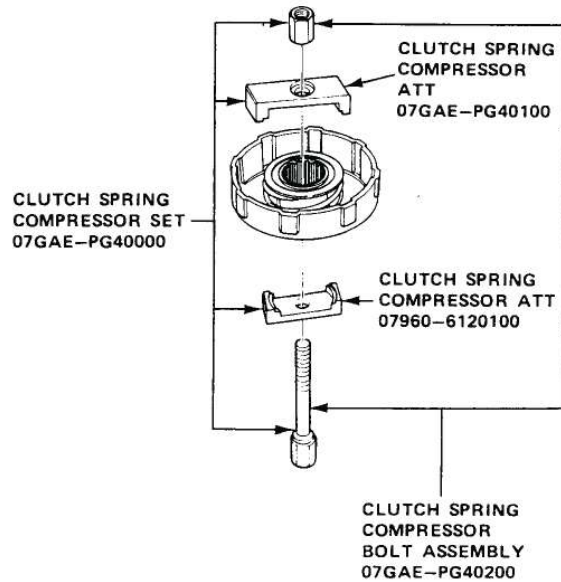


2. Remove the end plate, clutch discs and plates.
3. Install the clutch spring compressor as shown.

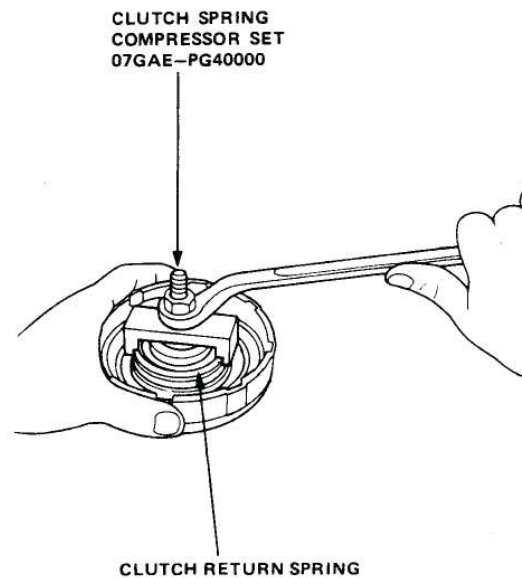
CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.



3. Install the clutch spring compressor as shown.



- Compress the clutch return spring.



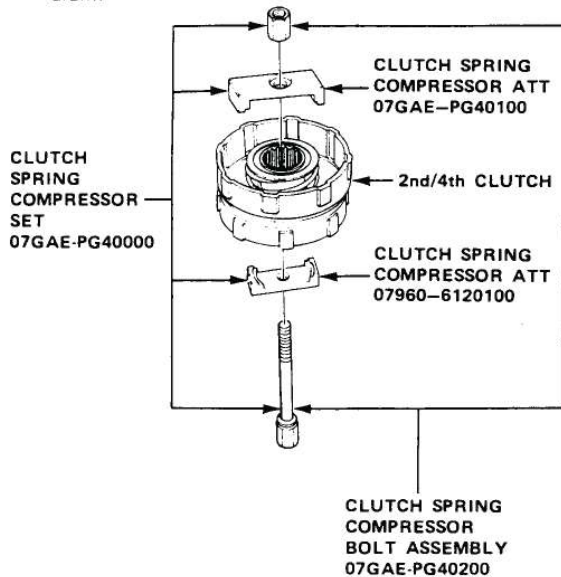
(cont'd)

Clutch

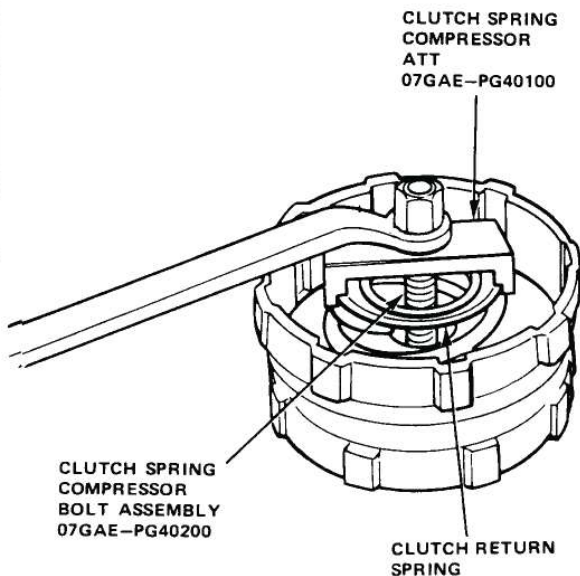
Disassembly (cont'd)

2nd/4th Clutch

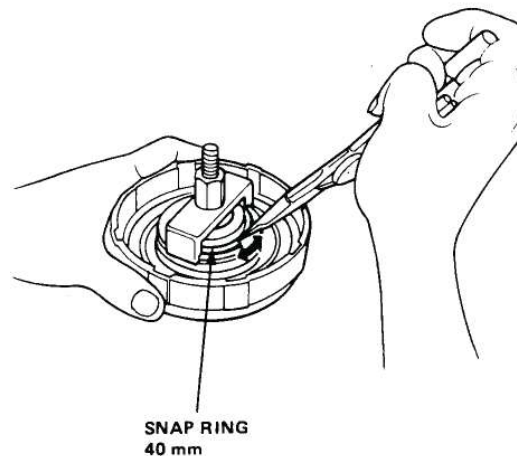
- Assemble the spring compressor on the clutch drum.



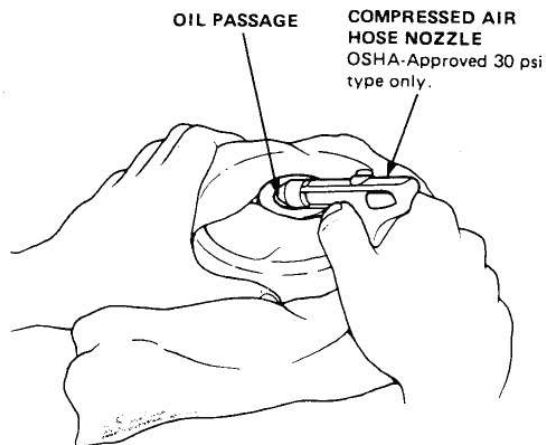
- Compress the clutch return spring.



4. Remove the snap ring. Then remove the clutch spring compressor, spring retainer and spring.

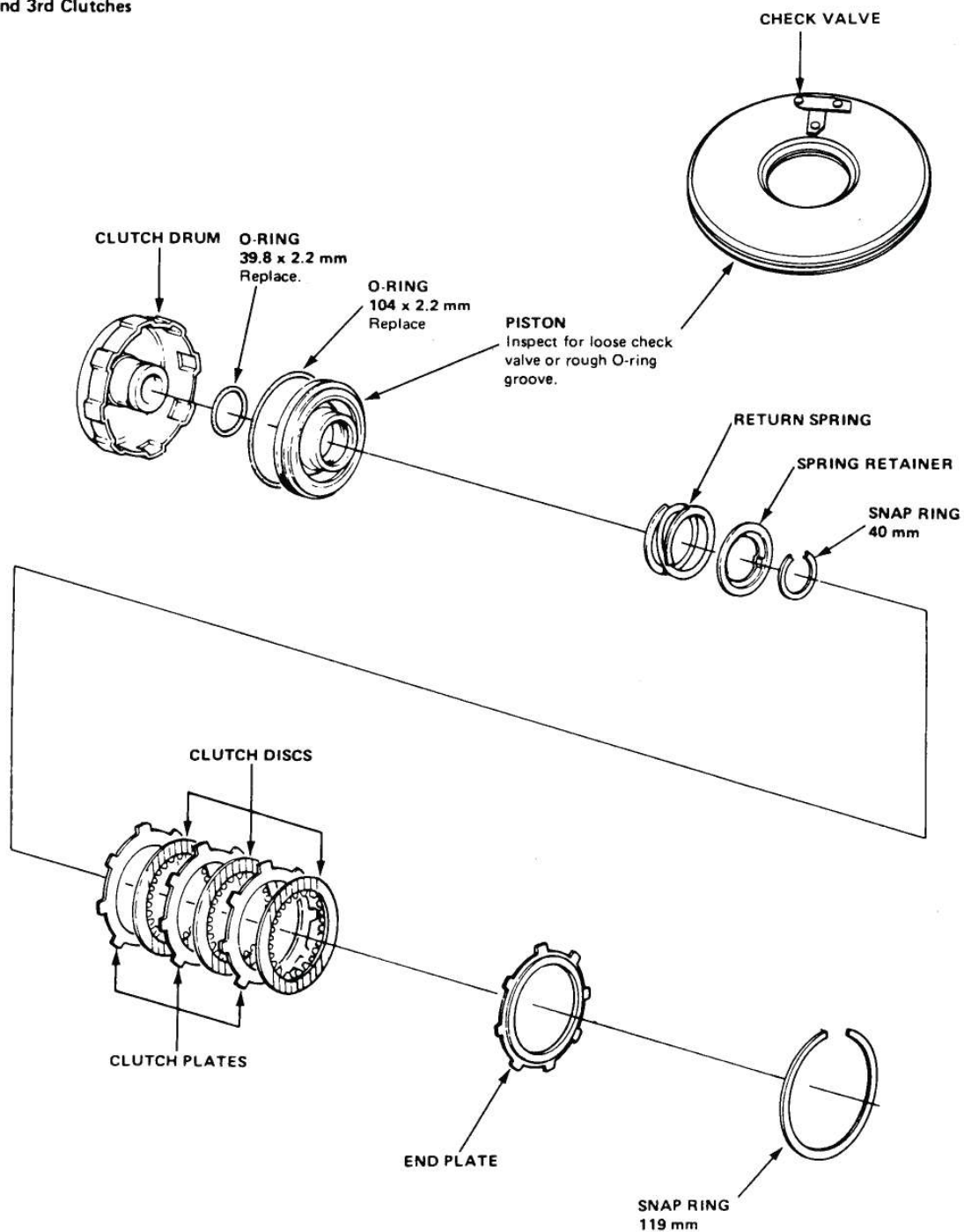


5. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



Disassembly/Inspection

1st and 3rd Clutches

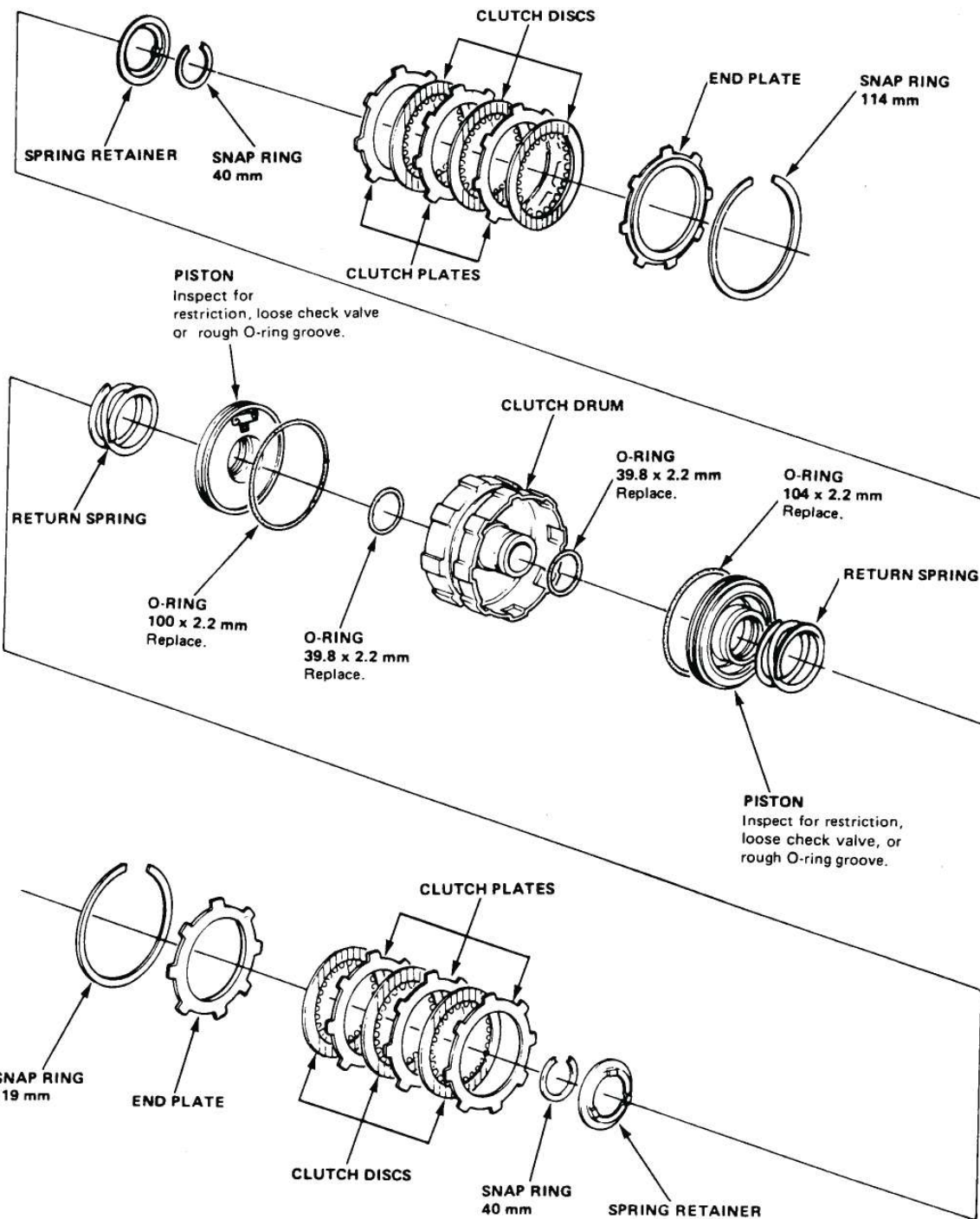


(cont'd)

Clutch

Disassembly/Inspection (cont'd)

2nd/4th Clutch

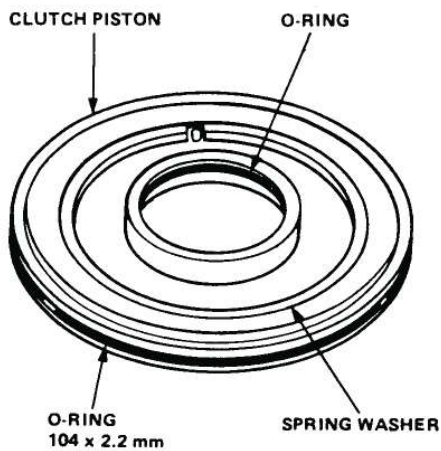


Reassembly

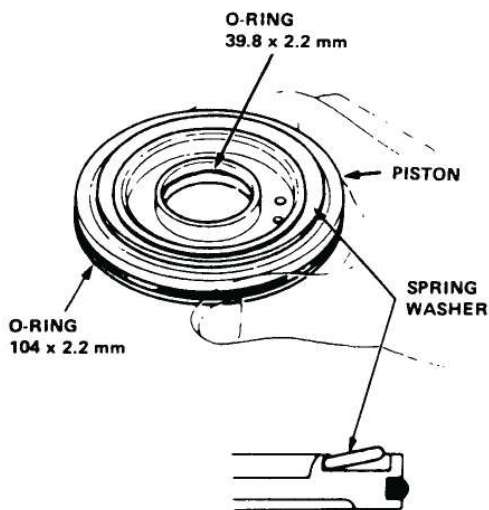
NOTE:

- The 1st and 3rd clutches are identical.
- To reassemble the 2nd/4th clutch, use the special tool in Step 7 in the same manner as for the 1st and 3rd clutches.

1. Clean all parts thoroughly in solvent, and dry with compressed air. Blow out all passages.
2. Lubricate all parts with ATF before reassembly.



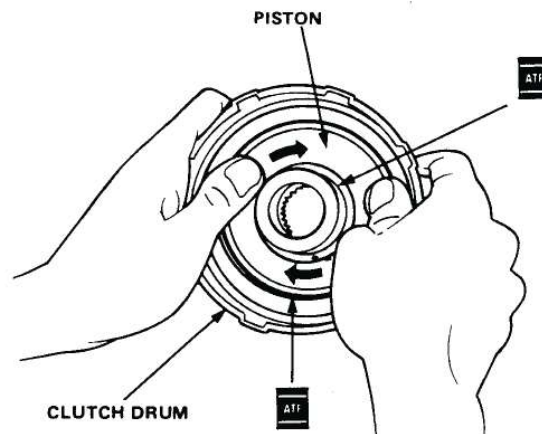
3. Install new O-ring on clutch piston. Make sure the spring washer is properly positioned as shown.



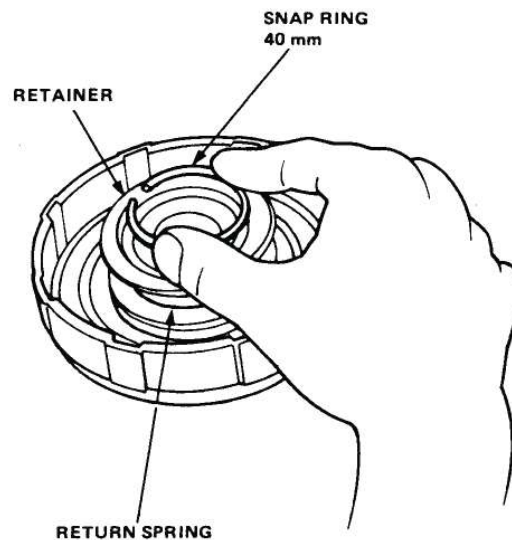
4. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

NOTE: Lubricate the piston O-ring with ATF before installing.

CAUTION: Do not pinch O-ring by forcing piston installation.



5. Install the return spring and retainer.
6. Position the 40 mm snap ring on the spring retainer.



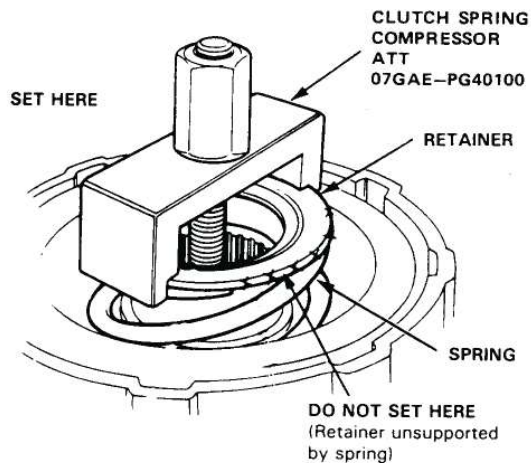
(cont'd)

Clutch

Reassembly (cont'd)

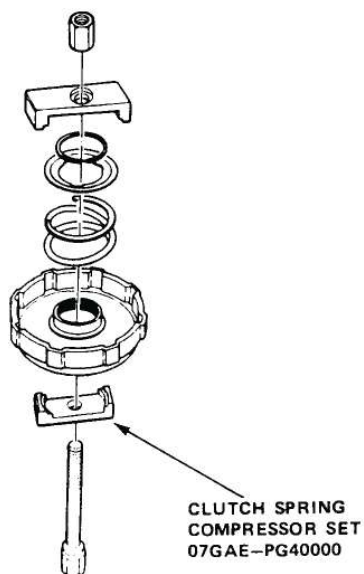
7. Assemble the spring compressor on the clutch drum.

CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.

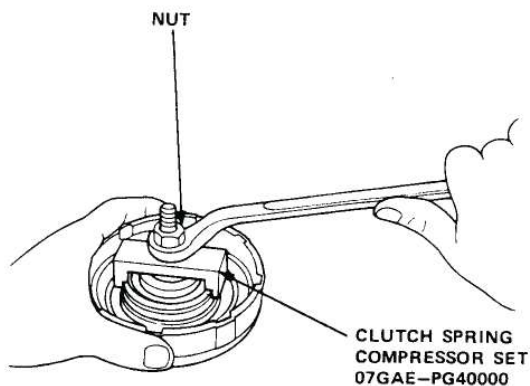


1st and 3rd clutches

- Assemble the spring compressor on the clutch drum.

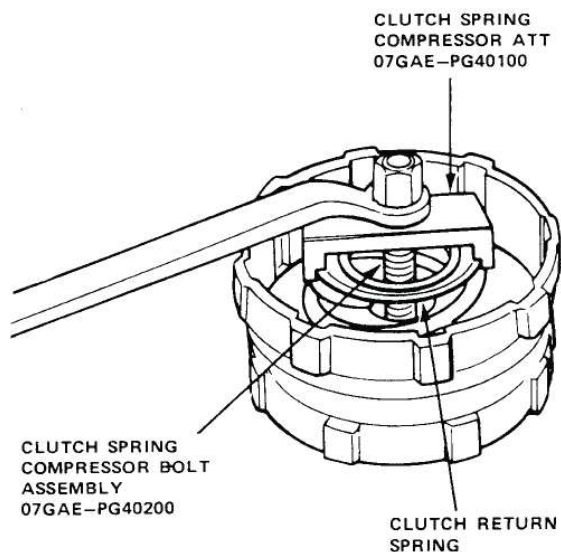


8. Compress the spring until the retainer is below the snap ring groove in the hub.

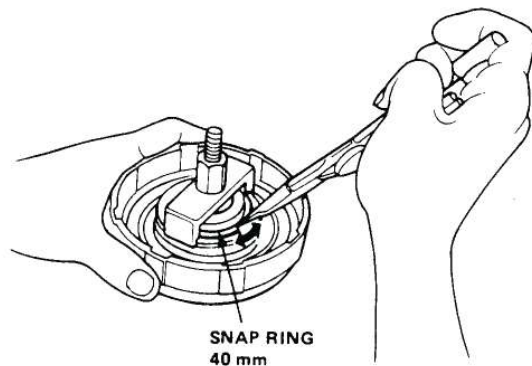


2nd/4th Clutch

- Compress the clutch return spring.



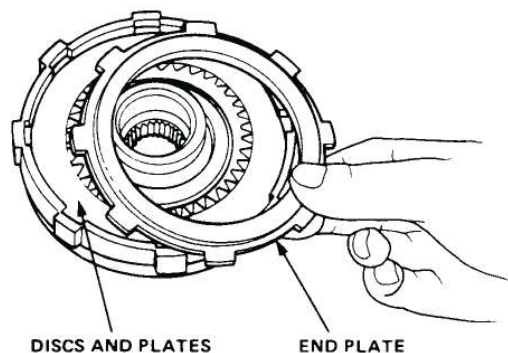
9. Then install the snap ring (with its rounded edge facing in) in the hub groove and remove the spring compressor.



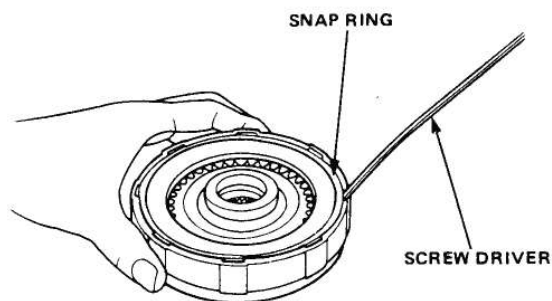
10. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.

11. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.

NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of grit or other foreign matter.



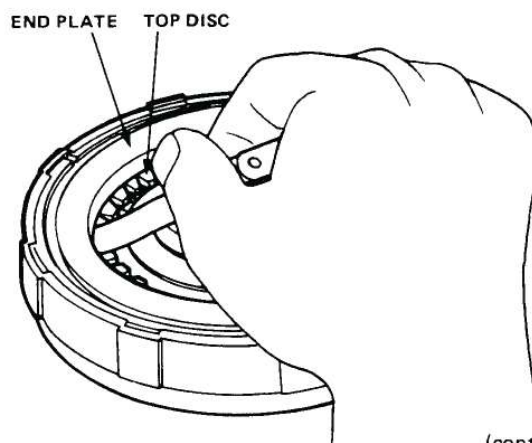
12. Install the 119 mm snap ring.



13. Using bent feeler gauges, carefully measure the clearance between the clutch end plate and the top disc. Do not damage the disc.

End Plate-to-Top Disc Clearance:

	Service Limit	
1ST	0.4–0.7 mm	(0.016–0.028 in.)
2ND	0.65–0.8 mm	(0.026–0.031 in.)
3RD	0.4–0.6 mm	(0.016–0.023 in.)
4TH	0.4–0.6 mm	(0.016–0.023 in.)



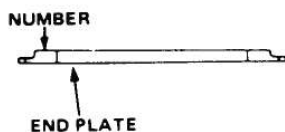
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Clutch

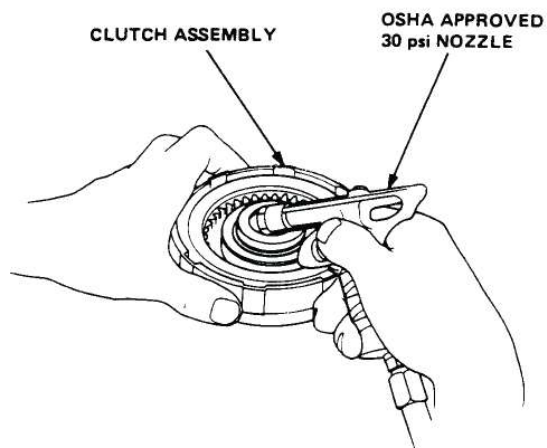
Reassembly (cont'd)

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.)



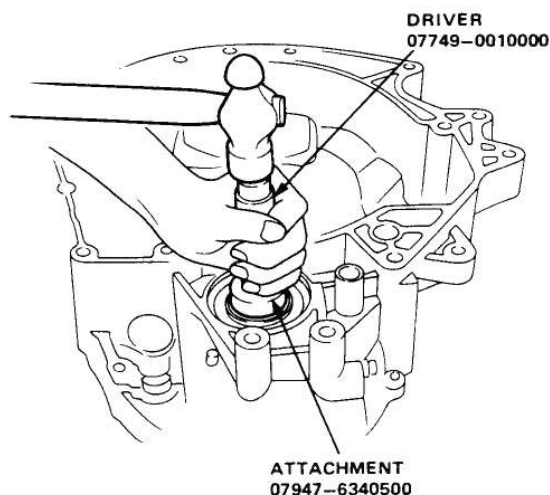
15. Check the clutch engagement by blowing air into the oil passage in the clutch drum hub. Remove the air pressure and check that the clutch releases.



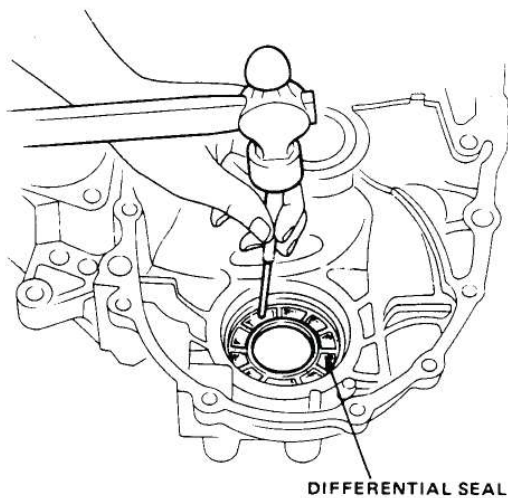
Differential

Replacement

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



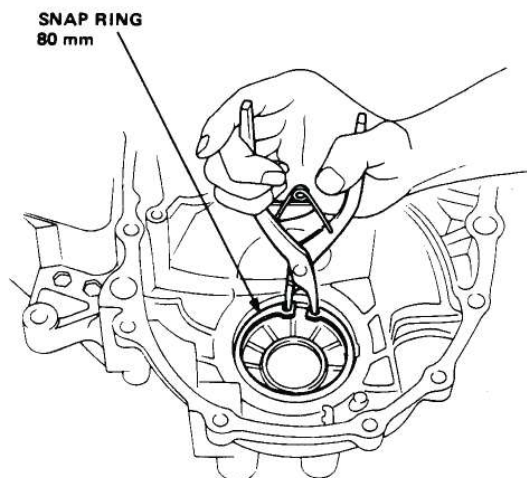
2. On the torque converter housing, remove the 80 mm snap ring, then drive out the seal as shown.
3. Remove the differential seal from the transmission housing in the same way.



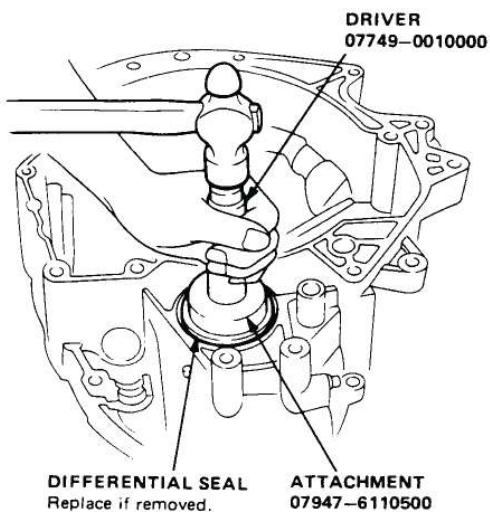
Bearings and

Replacement

4. On the torque converter housing, install the differential 80 mm snap ring if removed.

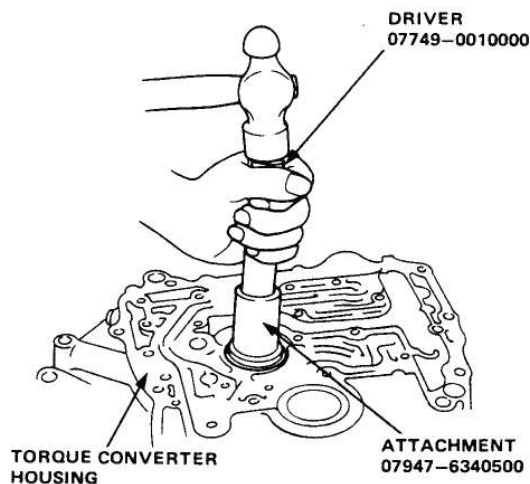


5. Install the differential seals into the torque converter housing and transmission housing.

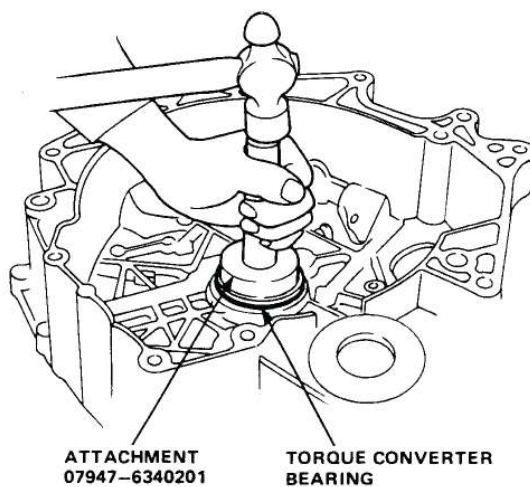


Torque converter housing

1. Remove the mainshaft bearing and seal from the torque converter housing.



2. Drive in the new mainshaft bearing until it bottoms in housing.



3. Then install the new mainshaft seal flush with the housing, using attachment 07947-6340201.

(cont'd)

Bearings and Seals

Replacement (cont'd)

- Turn the torque converter housing over and remove the countershaft bearing.

BEARING PULLER
07936-6340000
or:
Commercially
Available 3/8 x 16
Slide Hammer.

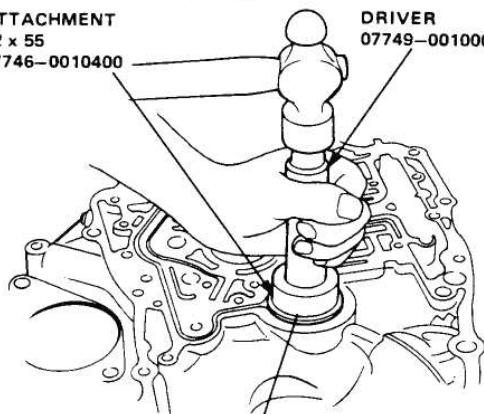
**ADJUSTABLE BEARING
REMOVER**
25-40 mm
07736-A01000A
or:
ATTACHMENT
07936-6890101

**COUNTERSHAFT
NEEDLE BEARING**
Replace with new
bearing if removed.

- Make sure the oil guide plate is installed in the bearing hole, then install a new countershaft bearing flush with the housing.

ATTACHMENT
52 x 55
07746-0010400

DRIVER
07749-0010000



Bearing face should be
flush with housing surface.

HOUSING

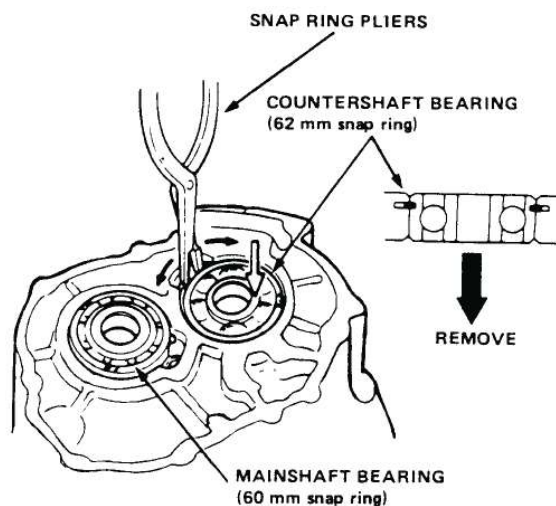
BEARING

OIL GUIDE PLATE

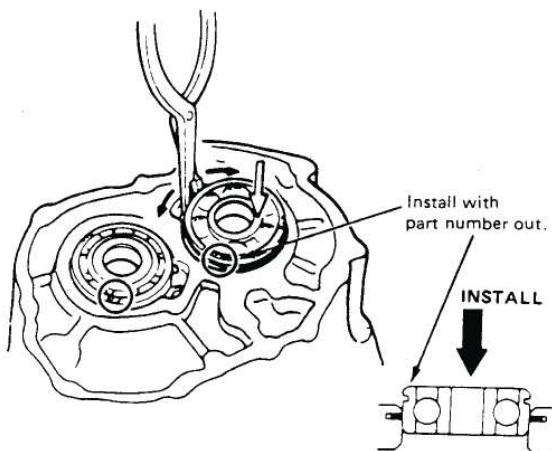
Transmission housing

- To remove the mainshaft and countershaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out by hand.

NOTE: Do not remove the snap rings unless it's necessary to clean the grooves in the housing.



- Expand each snap ring with snap ring pliers, insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transmission until the ring snaps in place around it.

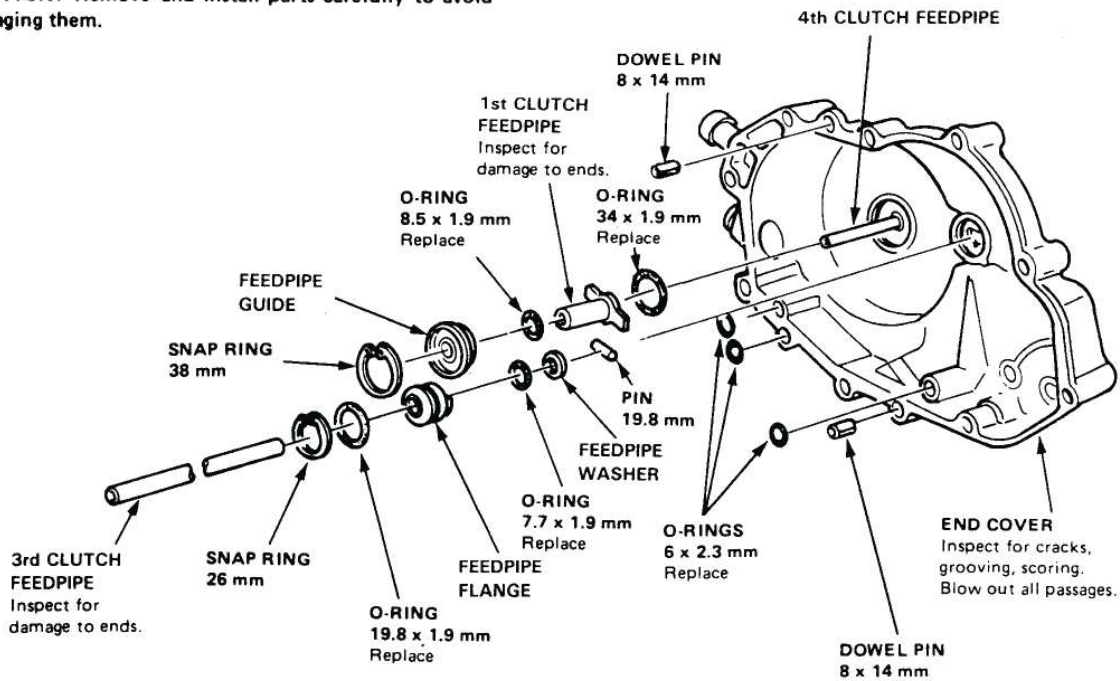


- Make sure the snap rings are seated in the bearing and housing grooves.

End Cover

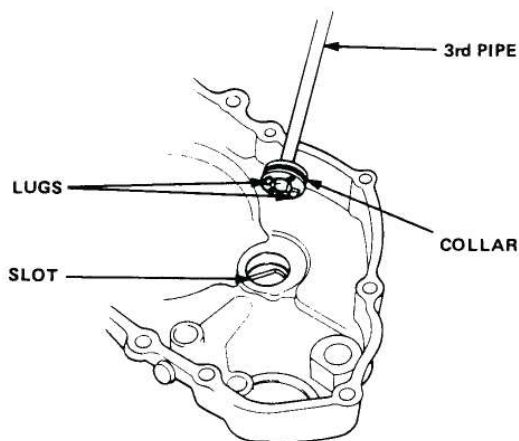
Disassembly/Inspection

CAUTION: Remove and install parts carefully to avoid damaging them.

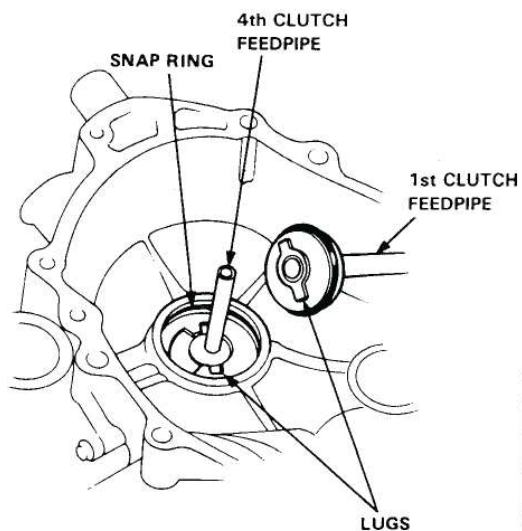


Reassembly

1. With feedpipes assembled, align lugs on the collars with slot in end cover.
2. Install the snap ring.



3. Install the feedpipes in the end cover, aligning the lugs of the 1st clutch feedpipe with the grooves of the end cover.



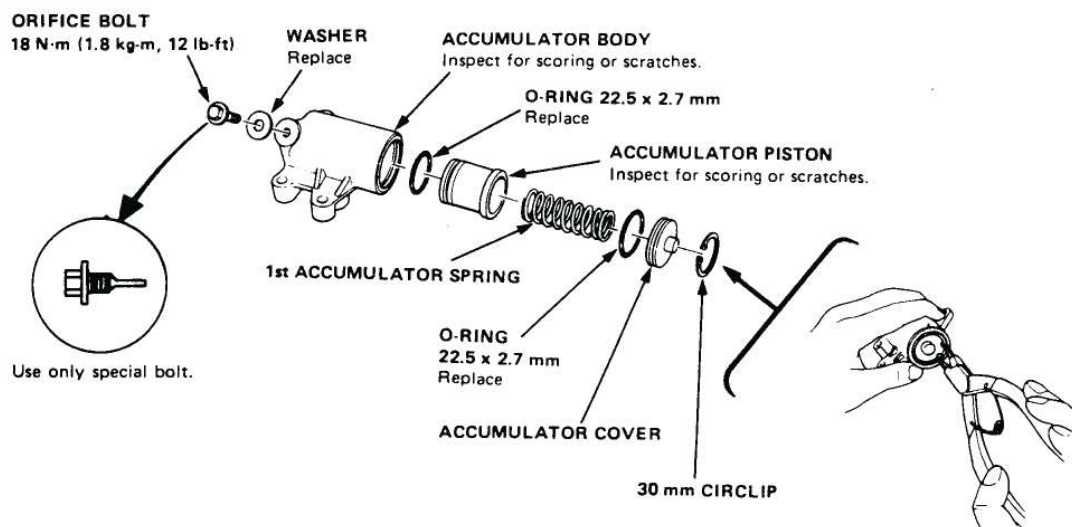
4. Install the snap ring.

1st Accumulator

Disassembly/Inspection

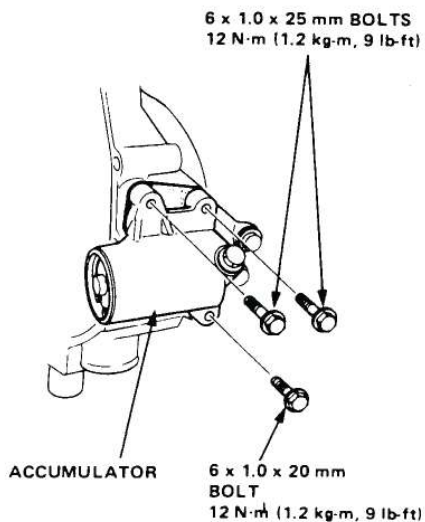
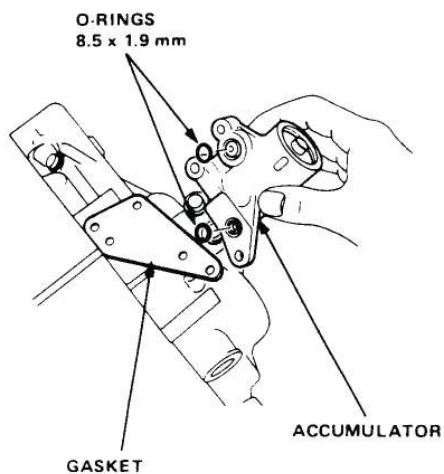
NOTE:

- The 1st accumulator can be removed with the end cover installed.
- See Section 3 for spring specifications.



Installation

1. Install new gasket onto the end cover.
2. Install new O-rings onto the 1st accumulator body.
3. Set the accumulator body and tighten the three 6 mm bolts.

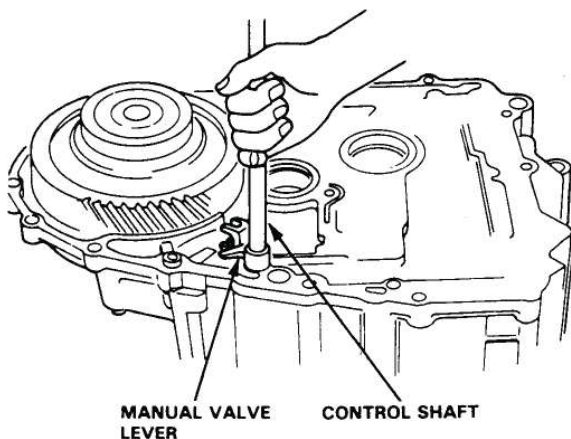


Transmission Assy

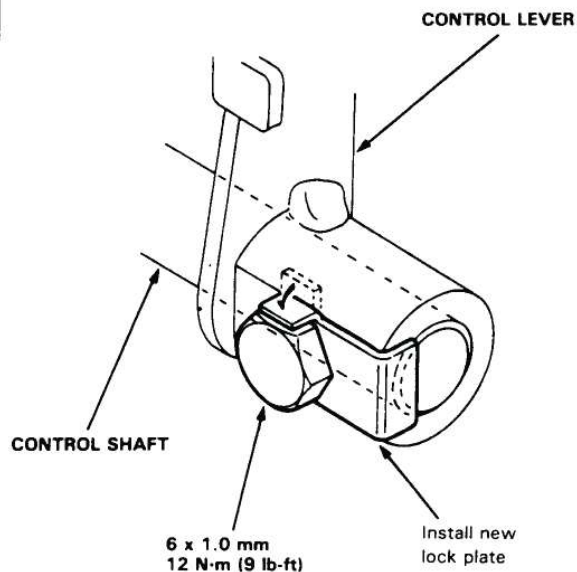
Reassembly

NOTE: Lubricate all parts with ATF during reassembly.

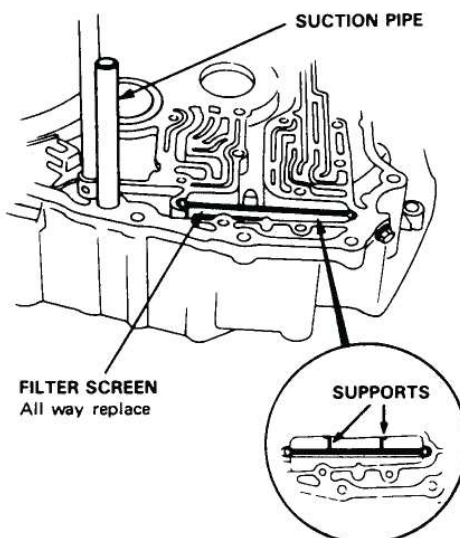
1. Install the differential assembly. If the torque converter housing, transmission housing and/or differential side bearings were replaced, the differential side clearance must be checked as shown in section 16.
2. Assemble the manual valve lever on the control shaft, then install in the torque converter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



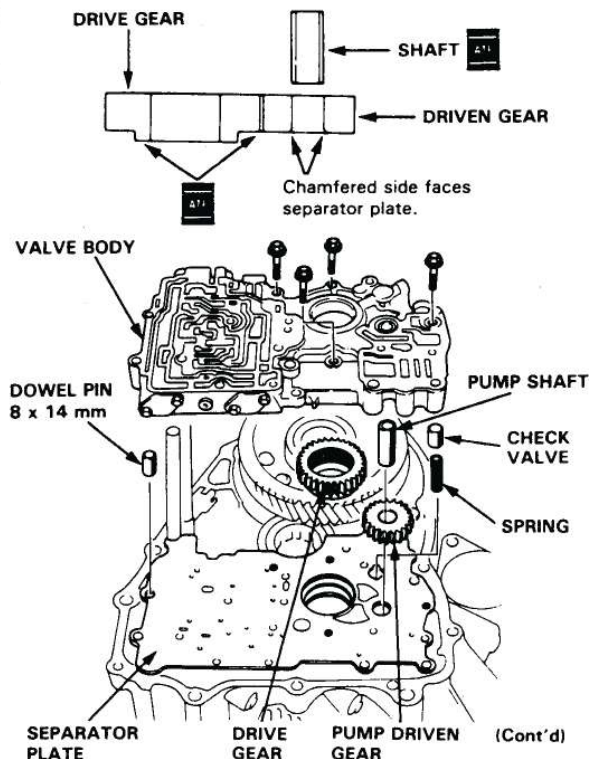
3. Install the control lever and new lock plate on the other end of the shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.



4. Install the suction pipe and new filter screen.



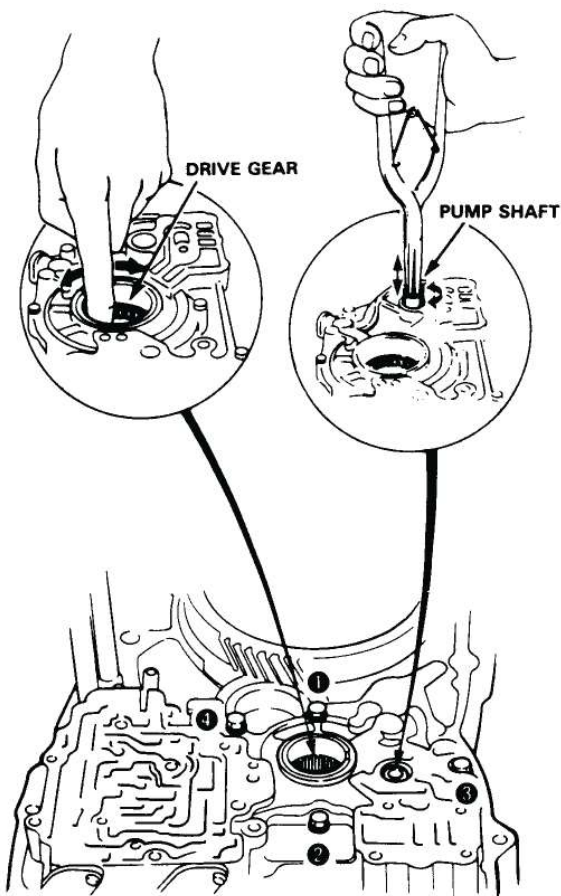
5. Install the separator plate, dowel pin, pump gears, and shaft.
6. Install the check valve and spring, then install the main valve body on the torque converter housing.



Transmission Assy

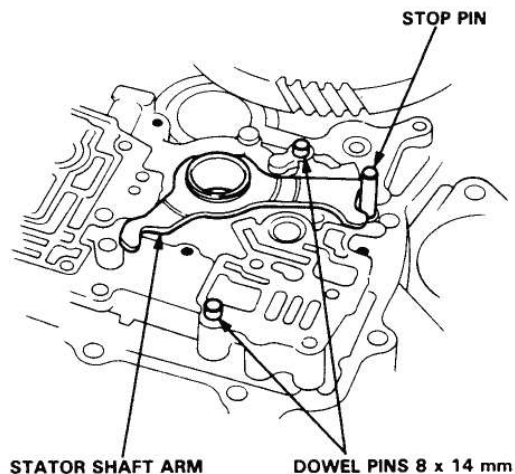
Reassembly (cont'd)

7. Tighten the 4 valve body bolts in the sequence shown. Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in both the axial and normal operating directions.

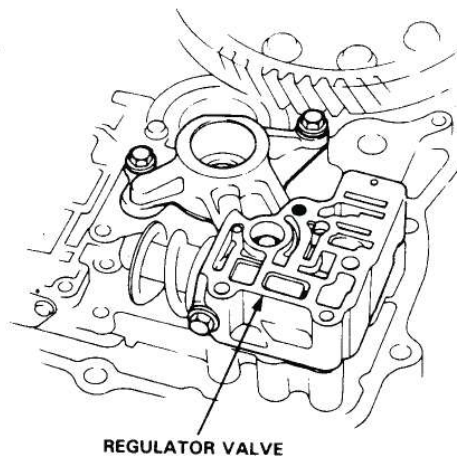


8. Torque the valve body bolts to 12 N·m (1.2 kg·m, 9 lb·ft), and again check that the pump gear and pump shaft move freely.

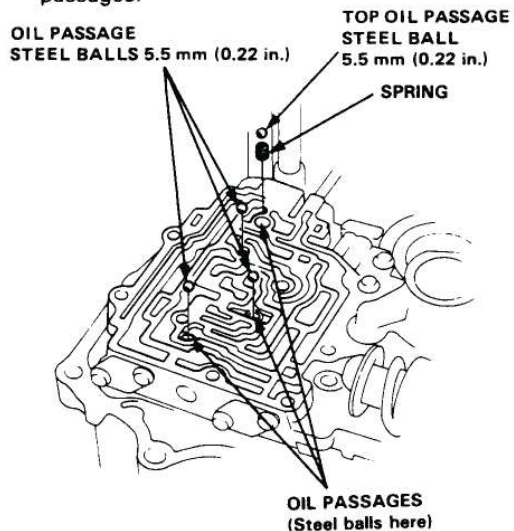
9. Install the stator shaft arm, stop pin and dowel pins.



10. Install the regulator valve and torque its 3 bolts to 12 N·m (1.2 kg·m, 9 lb·ft).

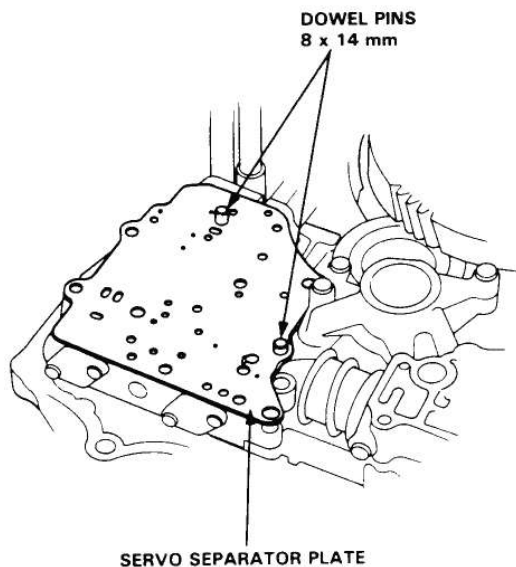


11. Install the 4 steel balls in main valve body oil passages.

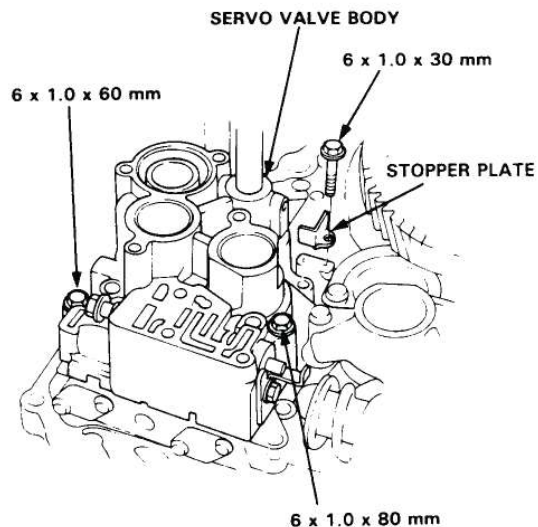


NOTE: The ball for the top oil passage has a spring to press the ball against the separator plate.

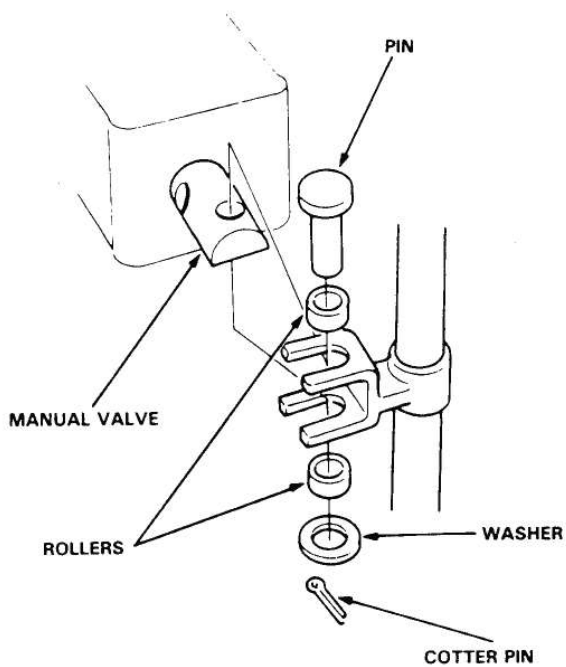
12. Install the separator plate and dowel pins.



13. Install the servo valve body (2 bolts) and stopper plate (1 bolt) as shown.



14. Put the rollers on each side of the manual valve stem, then attach the valve to the lever with the pin. Secure with the lock pin.

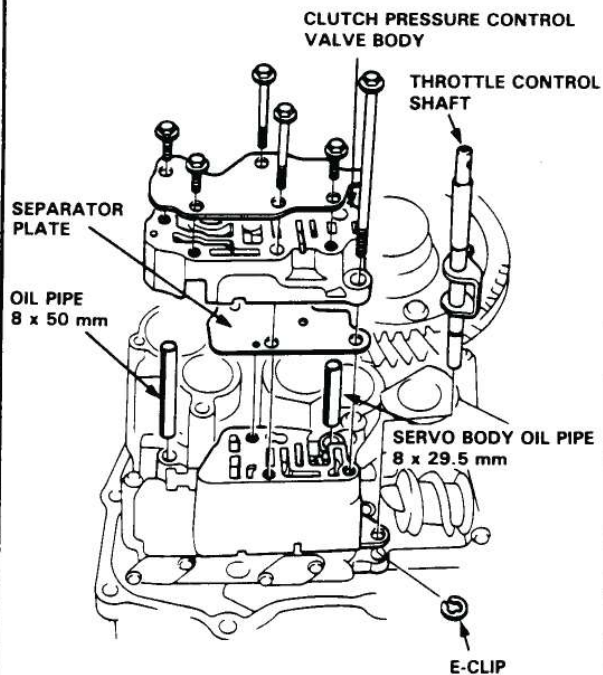


(cont'd)

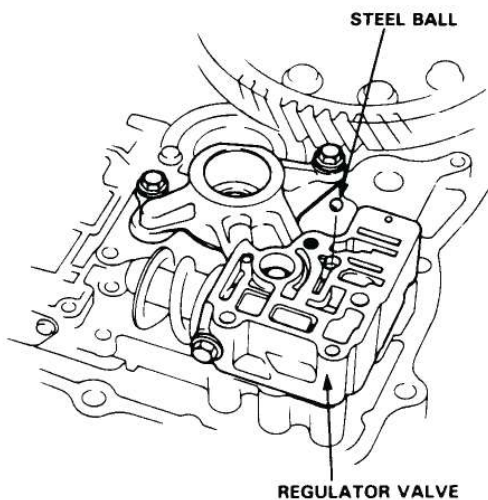
Transmission Assy

Reassembly (cont'd)

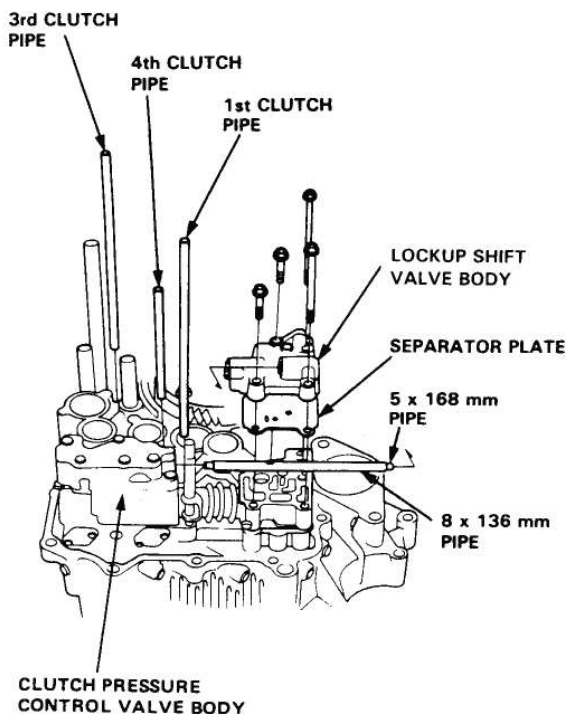
15. Install the throttle control shaft and E-clip.
16. Install the oil pass pipes (8 x 50 mm and 8 x 29.5 mm).
17. Install the clutch pressure control valve body, body cover and separator plate on the servo body.
18. Install the clutch pressure control valve body bolts and torque to 12 N·m (1.2 kg-m, 9 lb-ft).



19. Install the steel ball in regulator valve oil passage.

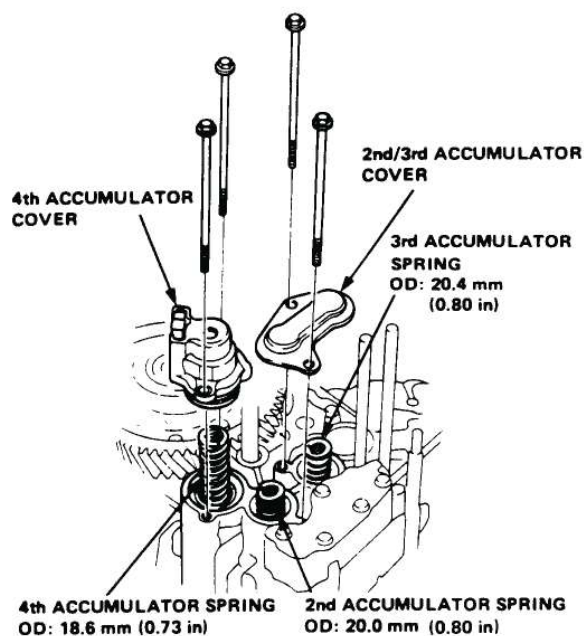


20. Install the separator plate.
21. Install the 1st, 3rd and 4th clutch feedpipes.
22. Position the oil pass pipes (8 x 136 mm and 5 x 168 mm) between the lockup shift valve body and clutch pressure control valve body and slide the lockup shift valve body into place.
23. Install the lockup shift valve body bolts as shown, and torque to 12 N·m (1.2 kg-m, 9 lb-ft).

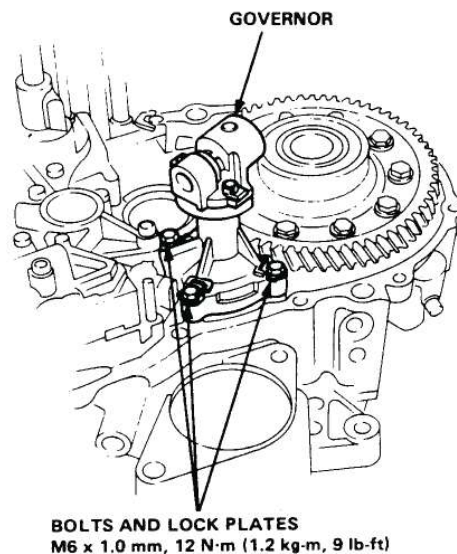


24. Install the accumulator springs.
25. Install the 2nd/3rd accumulator cover, and torque the bolts to 12 N·m (1.2 kg-m, 9 lb-ft) in a criss-cross pattern.
26. Install the 4th accumulator cover, and torque the bolts to 12 N·m (1.2 kg-m, 9 lb-ft) in a crisscross pattern.

CAUTION: To prevent stripping the threads, press down on accumulator cover, then install the bolts.

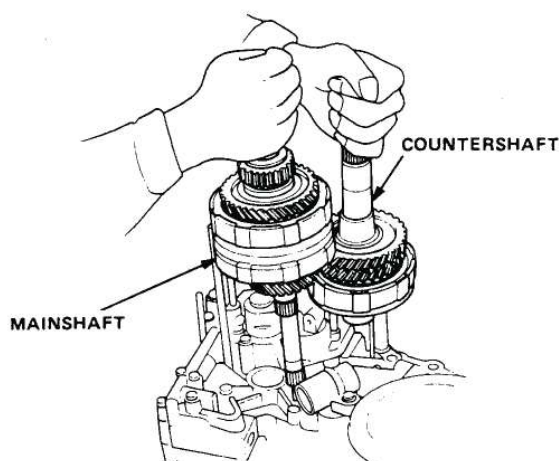


27. Install the governor valve using new lock plates, and the three 6 mm bolts.



28. Set the countershaft and mainshaft in place as an assembly.

NOTE: Do not tap on the shafts with a hammer to drive in.



(cont'd)

Transmission Assy

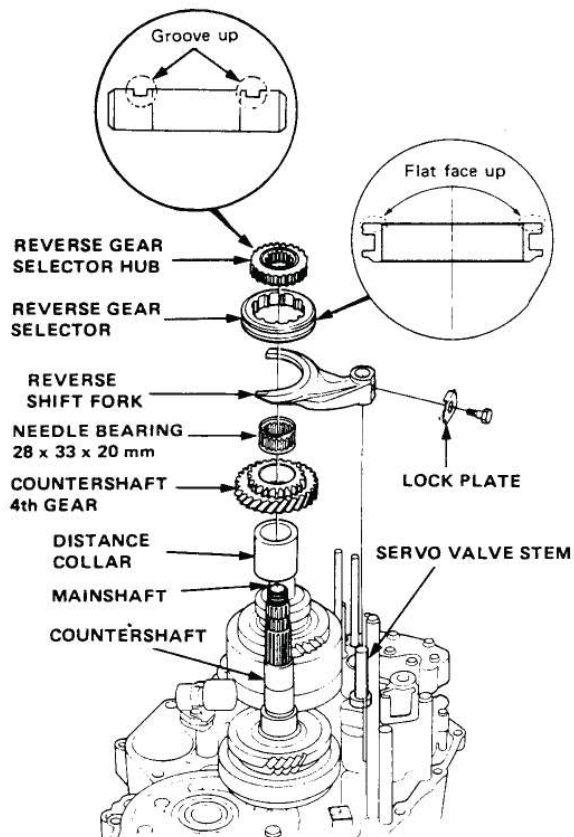
Reassembly (cont'd)

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

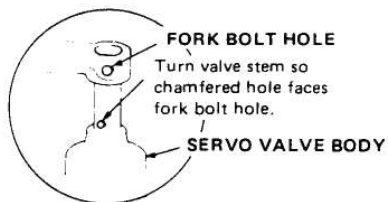
30. Assemble the reverse shift fork and selector sleeve, then install them as an assembly on the countershaft.

NOTE:

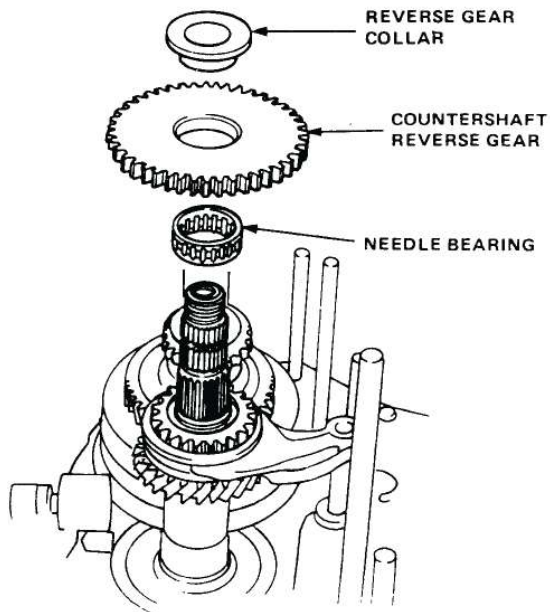
- Install the sleeve with its flat face up.
- Install the reverse gear selector hub with the groove facing up.



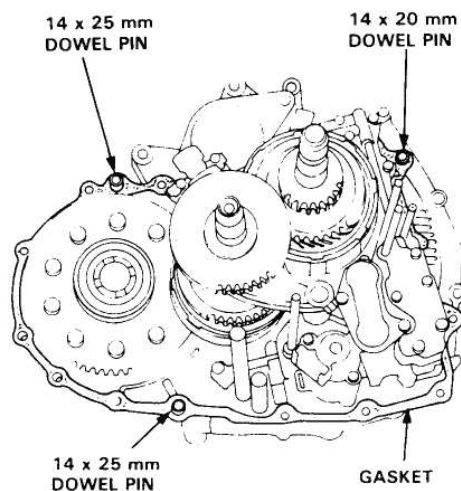
31. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock plate. Bend the lock tab against the bolt head.



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

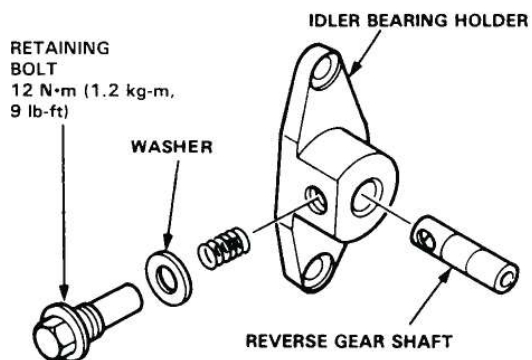


33. Install the new gasket and three dowel pins in the torque converter housing.



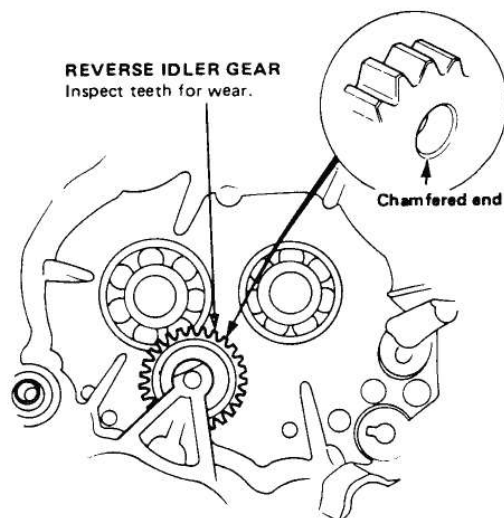
34. Assemble the idler bearing holder.

NOTE: Align the hole in the shaft with the spring.



35. Install the reverse idler gear.

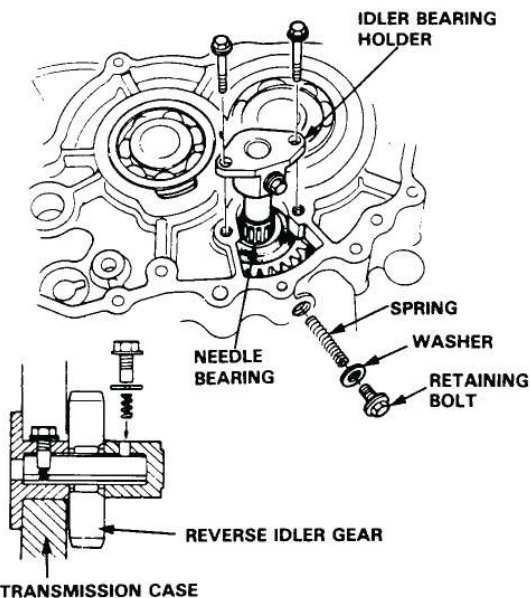
NOTE: Install the reverse idler gear so that the larger chamfer on the shaft bore faces the torque converter housing.



36. Install the needle bearing into the idler gear.
37. Install the idler bearing holder into the transmission housing.

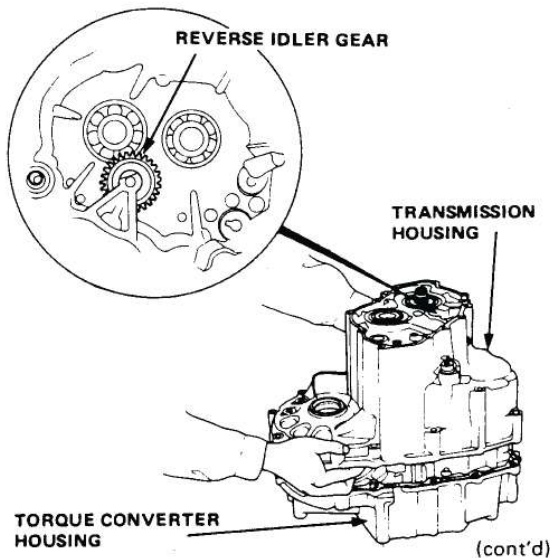
38. Tighten the reverse idler bearing holder bolts.

39. Install the spring and then tighten the retaining bolt with sealed washer.



40. Place the transmission housing on the torque converter housing.

NOTE: Be sure the main valve control shaft lines up with the hole in the housing and that the reverse idler gear meshes with the mainshaft and countershaft, or the housing will not go on.

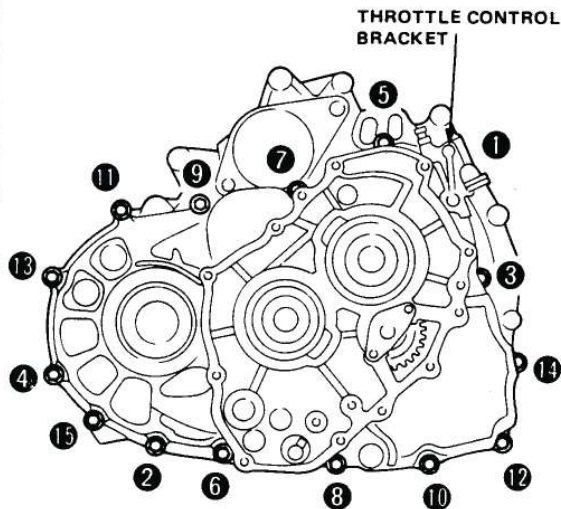


Transmission Assy

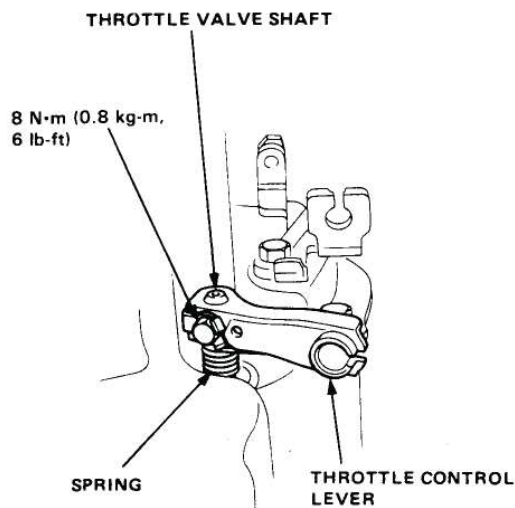
Reassembly (cont'd)

41. Torque bolts to 27 N·m (2.7 kg-m, 20 lb-ft) in order of (1) thru (15) in two or more steps.

NOTE: When tightening the transmission housing bolts, take care that you do not distort or damage the throttle control bracket; distortion or damage to the bracket will change transmission shift points.

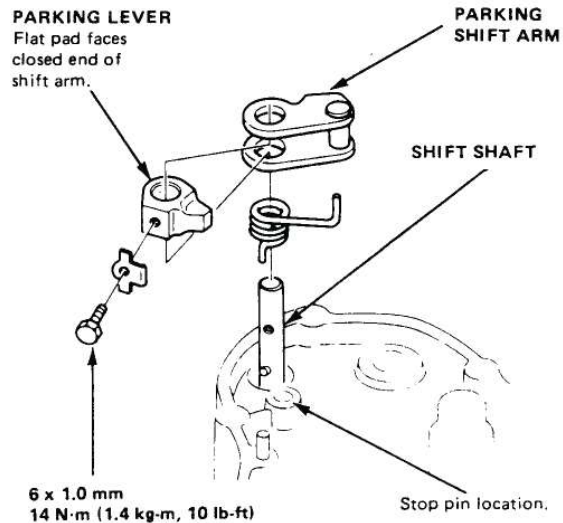


42. Install the throttle control lever and spring on the throttle control shaft.
43. Install the bolt and new lock plate. Bend the lock tab against the bolt head.

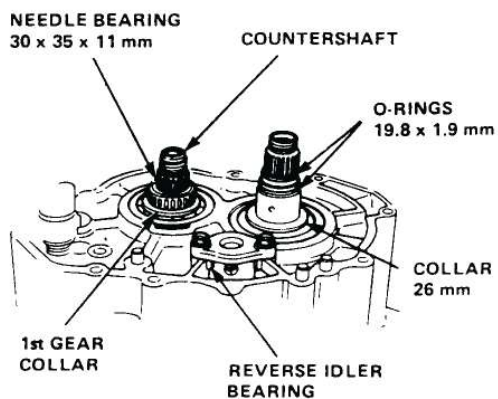


44. Install the parking shift arm and spring on the shift shaft with the bolt and a new lock plate. Bend the lock tab against the bolt head.

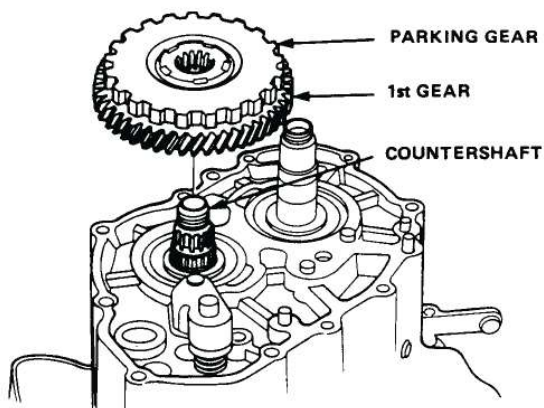
NOTE: The spring should put clockwise tension on the shift arm, forcing it against the stop pin.



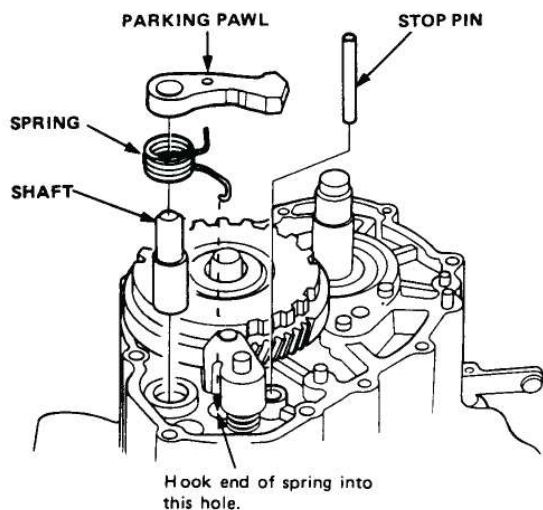
45. Install the 1st gear collar and needle bearing on the countershaft. Install the 26 mm collar on the mainshaft.
46. Install new 19.8 x 1.9 mm O-rings on the mainshaft.



47. Install the countershaft 1st gear and parking gear on the countershaft.



48. Install the stop pin, parking pawl shaft, parking pawl, and pawl release spring.

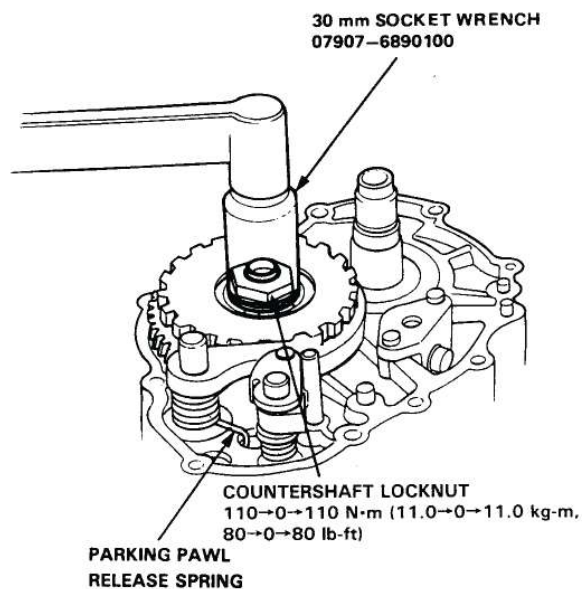


NOTE:

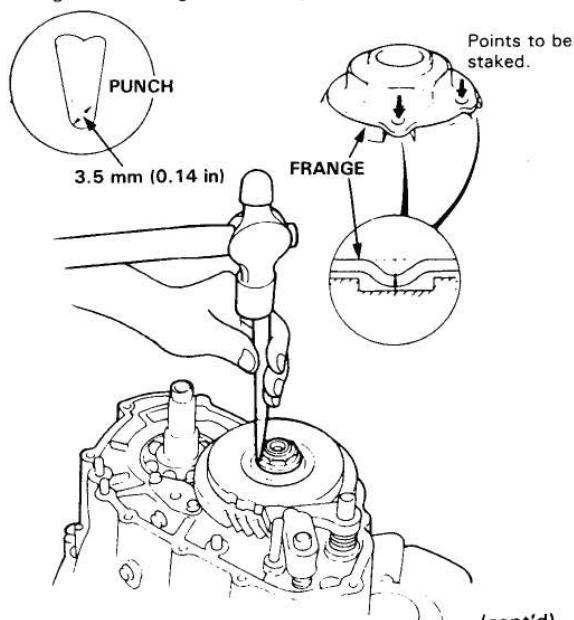
- One end of the parking pawl release spring fits into the hole in the parking pawl, the other end into the hole in the transmission housing as shown.
- The release spring should put clockwise tension on the pawl, forcing it away from the parking gear.

49. Shift to PARK and install the mainshaft holder.

50. Install and torque the new countershaft locknut.



51. Stake the locknut flange at two places into the gear grooves using a 3.5 mm punch.

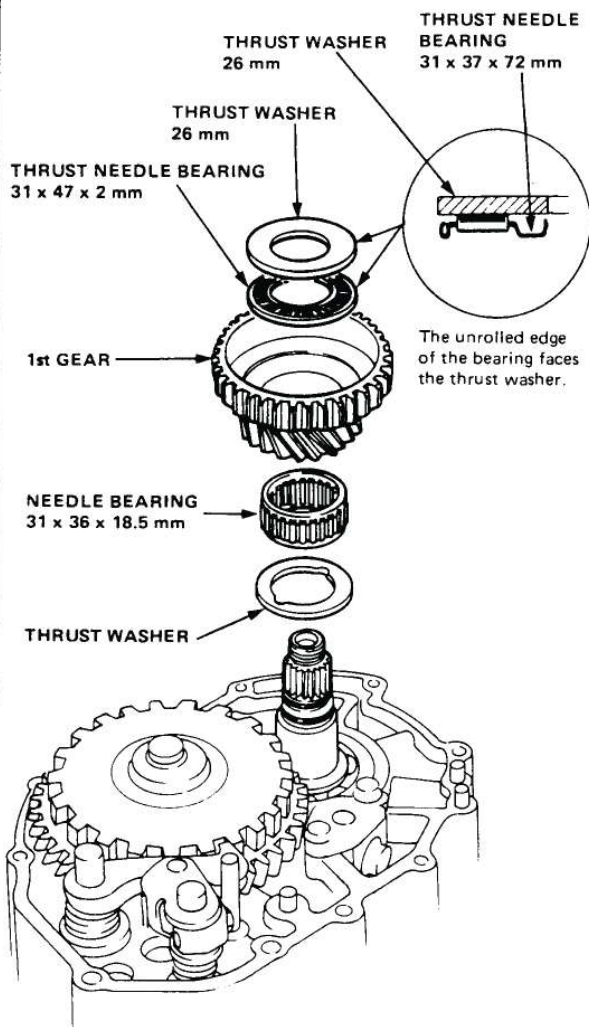


(cont'd)

Transmission Assy

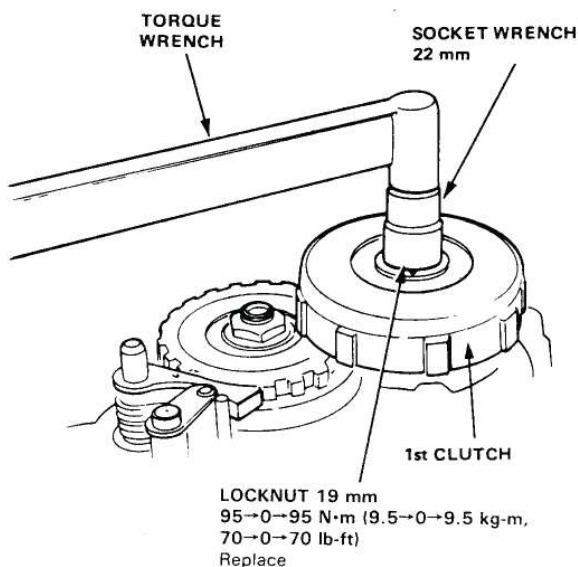
Reassembly (cont'd)

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.

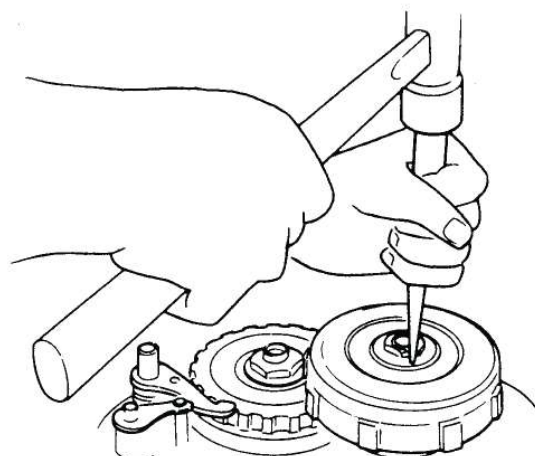


54. Install the 1st clutch on the mainshaft.
55. Attach the mainshaft holder from the underside of the torque converter case.
56. Install and torque the new mainshaft locknut.

CAUTION: Locknut has left-hand threads.



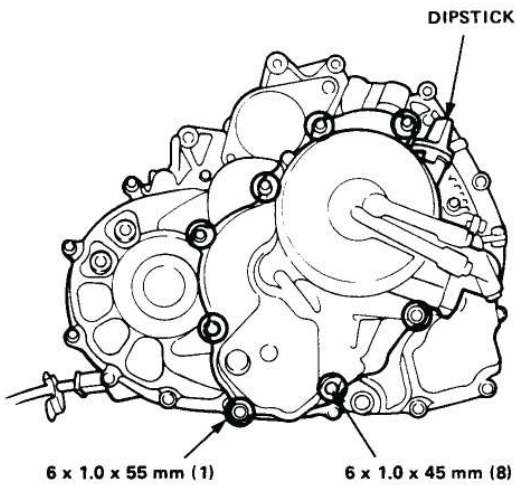
57. Stake the locknut flange into the groove in the 1st clutch.



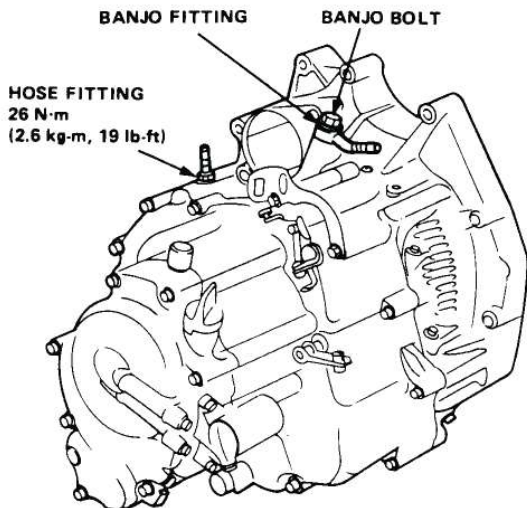
Torque Converter

Disassembly

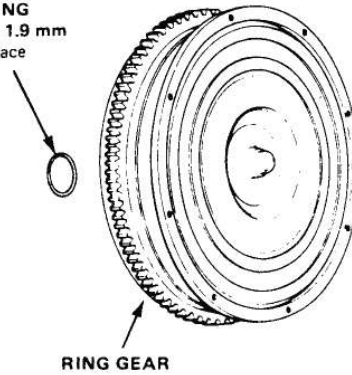
58. Install the gasket, dowel pins, and O-rings on the transmission housing.
59. Install the end cover and torque all bolts (9) to 12 N·m (1.2 kg·m, 9 lb·ft).
60. Install the dipstick.
61. Install the transmission cooler banjo fitting, but do not tighten until the transmission is installed in the car and the hose is positioned properly.



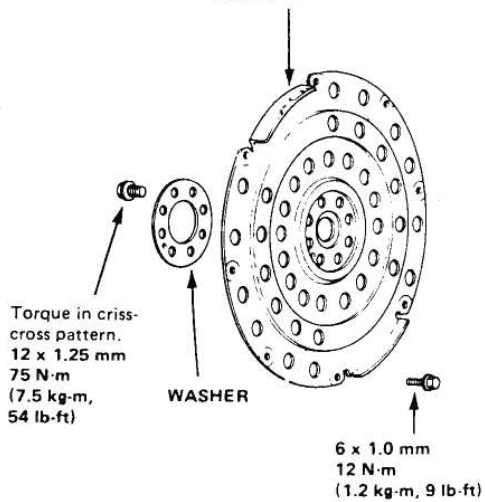
62. Install the transmission cooler hose fitting and torque to 26 N·m (2.6 kg·m, 19 lb·ft).



O-RING
32 x 1.9 mm
Replace



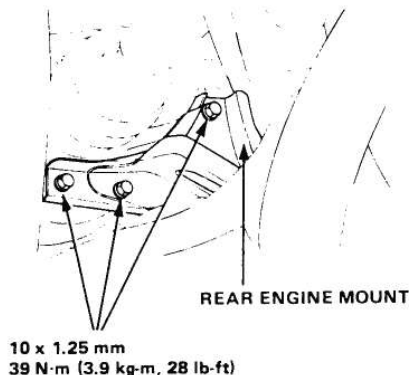
DRIVE PLATE
Inspect for cracks.



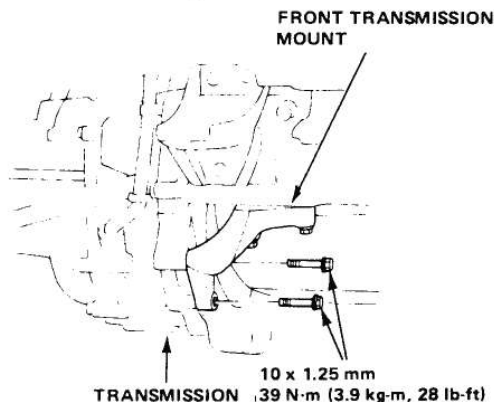
Transmission

Installation

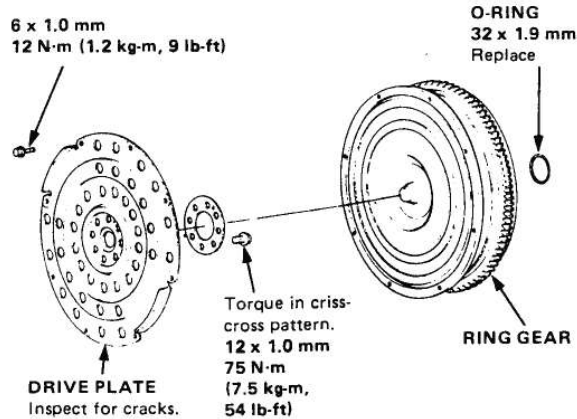
1. Attach shift cable to shift arm with pin, then secure cable to edge of housing with cable holder and bolts, 12 N·m (1.2 kg-m, 9 lb-ft).
2. Install torque converter on transmission.
3. Place transmission on transmission jack, and raise to engine level.
4. Hook hanger plate with hoist and make hoist chain tight.
5. Check that the two 14 mm dowel pins are installed in transmission housing.
6. Install new 26 mm spring clips on the end of each axle.
7. Align dowel pins with holes in block; align torque converter bolt head with holes in drive plate.
8. Fit the left axle into the differential as you raise the transmission up to the engine.
9. Secure transmission to engine with two (10 x 1.25 x 90 mm) lower mounting bolts, torque bolts when others are installed in step 23.
10. Install rear engine mounts on transmission housing, torque to 39 N·m (3.9 kg-m, 28 lb-ft).



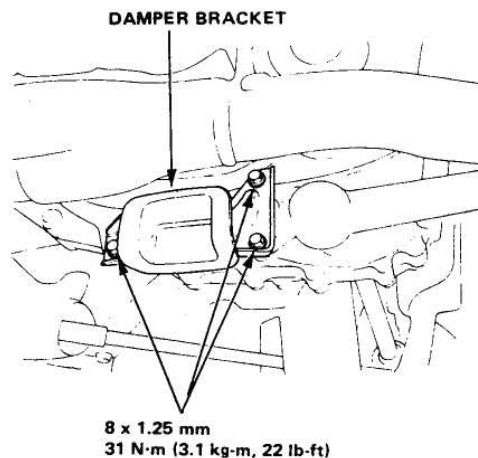
11. Install the front transmission mount bolts and torque to 39 N·m (3.9 kg-m, 28 lb-ft).



12. Attach torque converter to drive plate with eight (6 x 1.0 x 12 mm) bolts, and torque to 12 N·m (1.2 kg-m, 9 lb-ft). Rotate crank as necessary to tighten bolts to 1/2 torque, then the final torque, in a criss-cross pattern. Check for free rotation after tightening the last bolt.

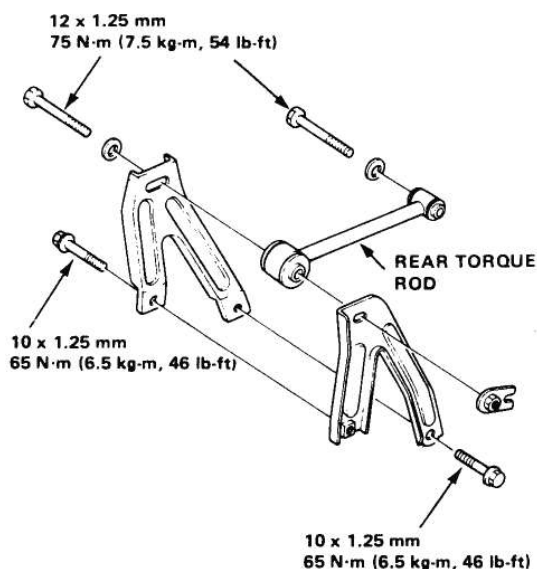


13. Remove the transmission jack.
14. Install torque converter cover plate, torque two 6 x 1.0 mm bolts (in oil pan flange) to 12 N·m (1.2 kg-m, 9 lb-ft).
15. Install damper bracket, torque two 10 x 1.25 mm nuts to 55 N·m (5.5 kg-m, 40 lb-ft) and three 8 x 1.25 mm bolts to 31 N·m (3.1 kg-m, 22 lb-ft).

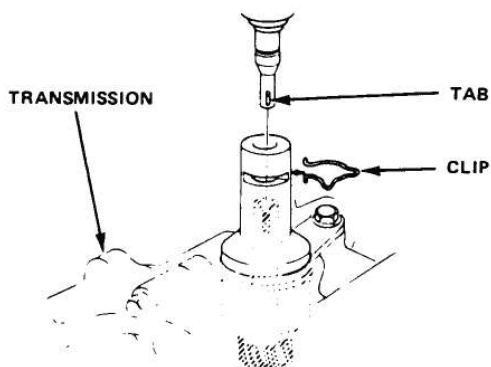


16. Remove hoist from transmission.
17. Install starter mount bolts (10 x 1.25 x 125 mm) and torque to 45 N·m (4.5 kg-m, 33 lb-ft).

18. Install the rear torque rod bracket as shown.



19. Turn right steering knuckle fully outward, and slide axle into differential until you feel its spring clip engage side gear. Check that the left axle spring clip is engaged in its side gear.
20. Reconnect ball joint to knuckle, then torque its bolt to 55 N·m (5.5 kg·m, 40 lb·ft). Reinstall the damper fork and torque its bolt to 44 N·m (4.4 kg·m, 32 lb·ft).
21. Install speedometer cable.
- Align tab on cable end with slot in holder.
 - Install clip so bent leg is on groove side.



NOTE: After installing, pull speedometer cable to see that it is secure.

22. Install front wheels, lower car to ground, and torque nuts to 110 N·m (11.0 kg·m, 80 lb·ft).
23. Install transmission mounting bolt (10 x 1.25 x 90 mm) and torque all bolts to 45 N·m (4.5 kg·m, 33 lb·ft).
24. Connect cooler hoses, and torque banjo bolts to 29 N·m (2.9 kg·m, 21 lb·ft).
25. Connect wiring:
- Battery positive cable to starter.
 - Black/white wire to starter solenoid.
 - Yellow/green wire to water temperature sending unit.
 - Black/yellow and yellow wires to ignition timing thermosensor.

26. With ignition key in 0 position, connect ground cable to battery and transmission.
27. Unscrew dipstick from top of transmission end cover and add 3.0 quarts Dexron® ATF through the hole. Reinstall dipstick.

NOTE: If transmission and torque converter have been disassembled, add a total of 6.0 quarts.

28. Install and reconnect shift cable
29. Install console.
30. Start engine, set parking brake, and shift transmission through all gears three times. Check for proper shift cable adjustment
31. Let engine reach operating temperature with transmission in Neutral or Park, then turn it off and check fluid level.
32. Install throttle control cable and adjust.
33. Road test

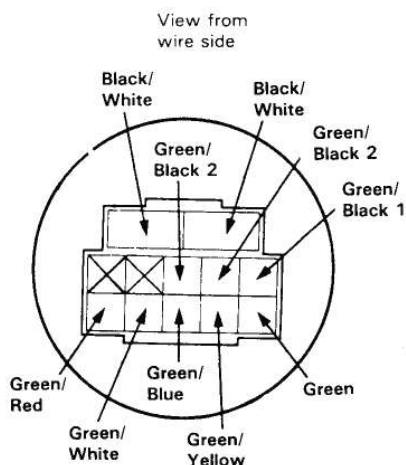
Shift Position Switch

Check and Installation

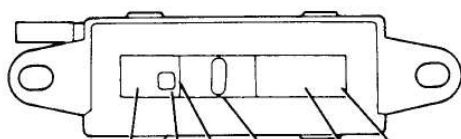
Move the selector lever to shift position to check continuity of combined neutral safety (Inhibiter) and shift position switch.

Replace the switch if there is no continuity between connector terminals shown on the chart.

NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example G/BI¹ and G/BI² are not the same).



SHIFT POSITION SWITCH

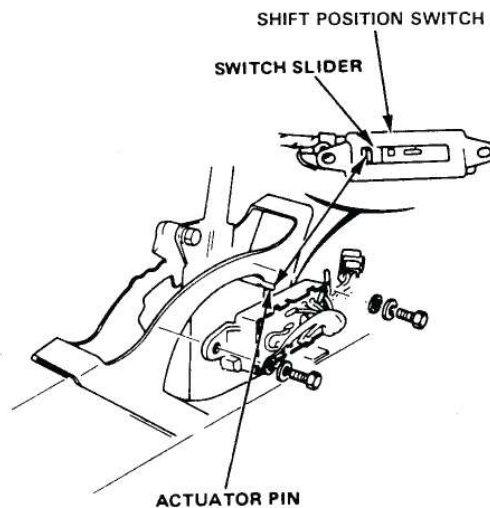


Wire color	2	D3	D4	N	R	P
GND						
Green/Yellow						
Green/Blue						
Green/Black						
Green						
Green/Red						
Green/White						

INHIBITER SWITCH

Wire color	N	R	P
Black/White			
Green/Black 2			
Black/White			
Green/Black 2			

1. Position the switch slider to Park, as shown.
2. Shift the selector lever to Park.

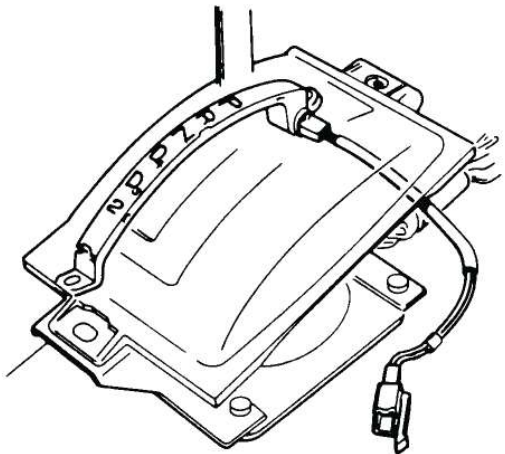


3. Tighten the switch with two bolts and lockwashers.

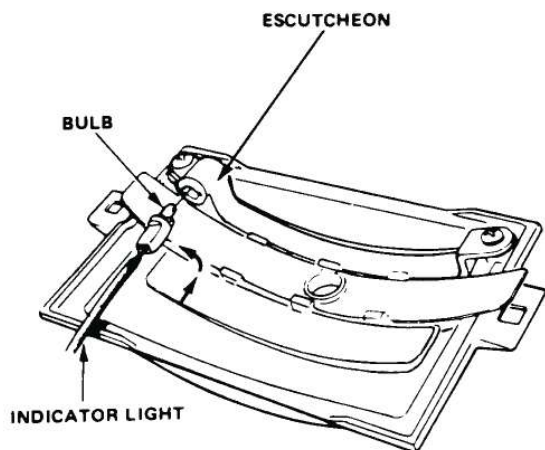
Shift Indicator Light

Check and Installation

Check for continuity between indicator light connector terminals as shown. If there is no continuity, check for burned out bulb or open circuit.



1. Install the indicator bulb in the bulb housing. Insert the bulb housing into slot in escutcheon, then turn 90° to bulb housing.

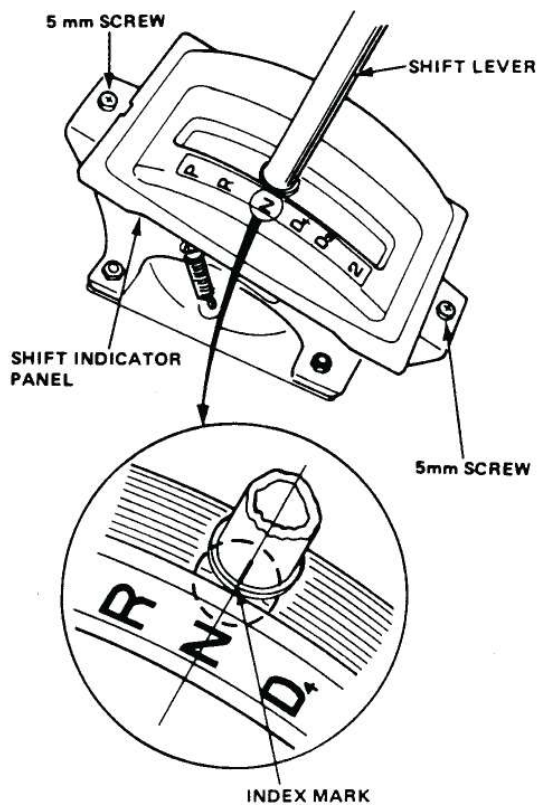


Shift Indicator

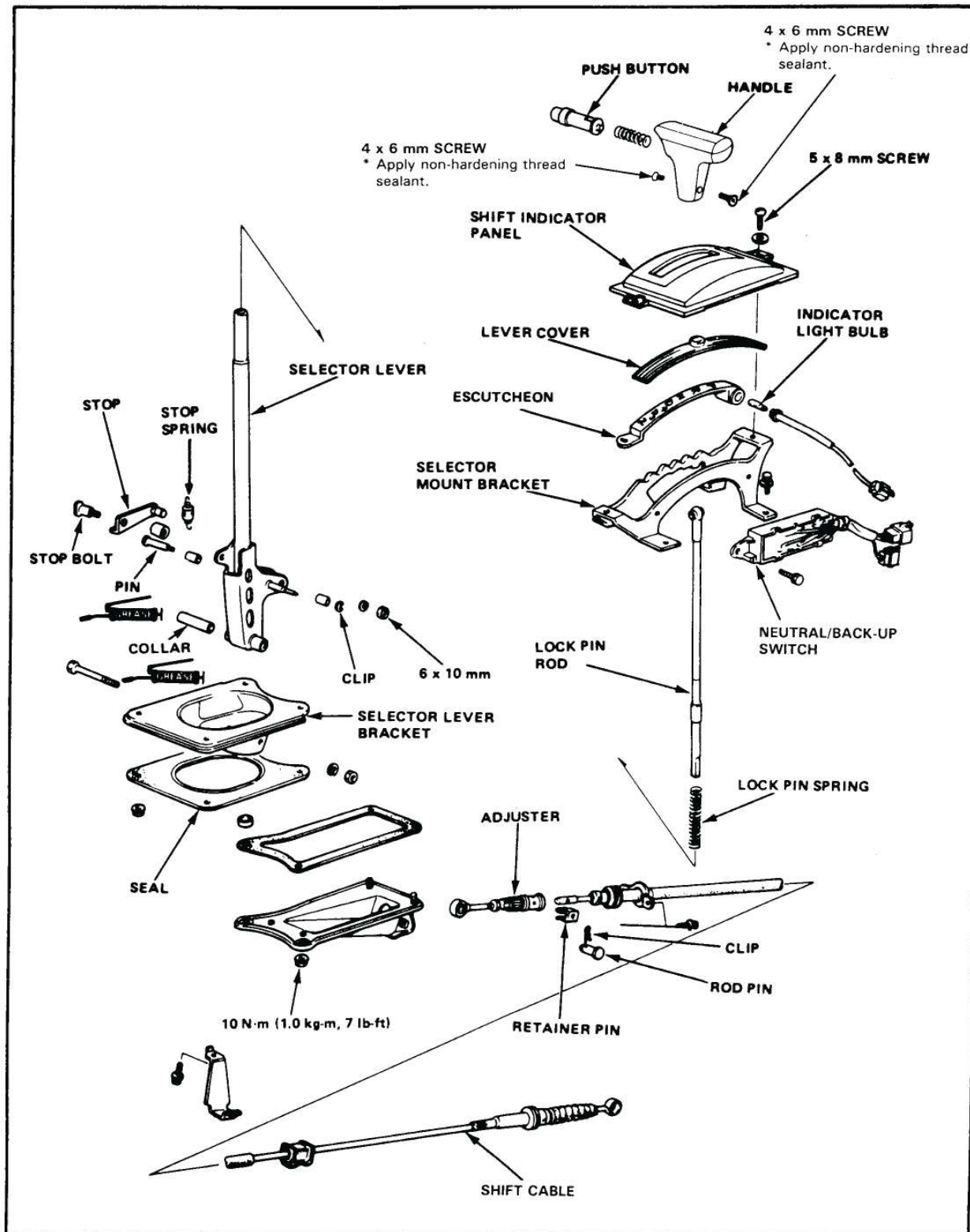
Adjustment

1. Check that the index mark of the indicator aligns with the N mark of the shift indicator panel with the transmission is in NEUTRAL.
2. If not aligned, remove the panel mounting screws and adjust by moving panel.

NOTE: Whenever escutcheon is removed for indicator bulb replacement etc., reinstall the panel as described above.



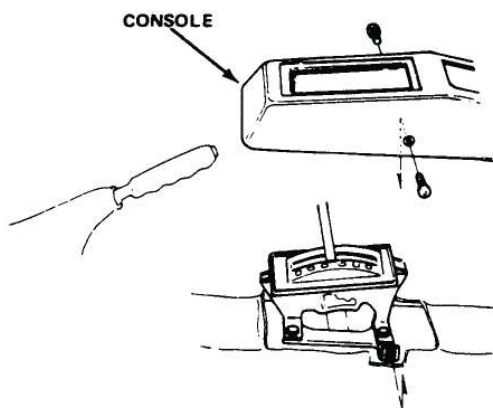
Gearshift Selector



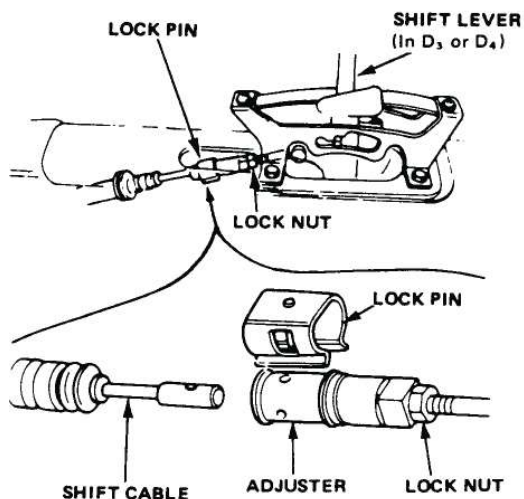
Shift Cable

Adjustment

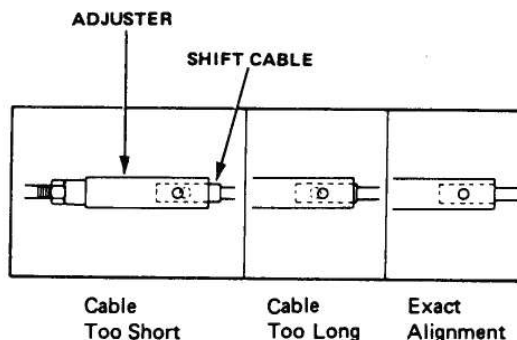
1. Start the engine. Shift to Reverse to see if the reverse gear engages. If not, refer to troubleshooting.
2. With the engine off, remove the console.



3. Shift to Drive, then remove the lock pin from the cable adjuster.



4. Check that the hole in the adjuster is perfectly aligned with the hole in the shift cable.



NOTE: There are two holes in the end of the shift cable. They are positioned 90° apart to allow cable adjustments in 1/4 turn increments.

5. If not perfectly aligned, loosen the locknut on shift cable and adjust as required.
6. Tighten the locknut.
7. Install the lock pin on the adjuster.

NOTE: If you feel the lock pin binding as you reinstall it, the cable is still out of adjustment and must be readjusted again.

8. Start the engine and check the shift lever in all gears. If any gear does not work properly, refer to troubleshooting.

Throttle Control Cable Bracket Throttle Co

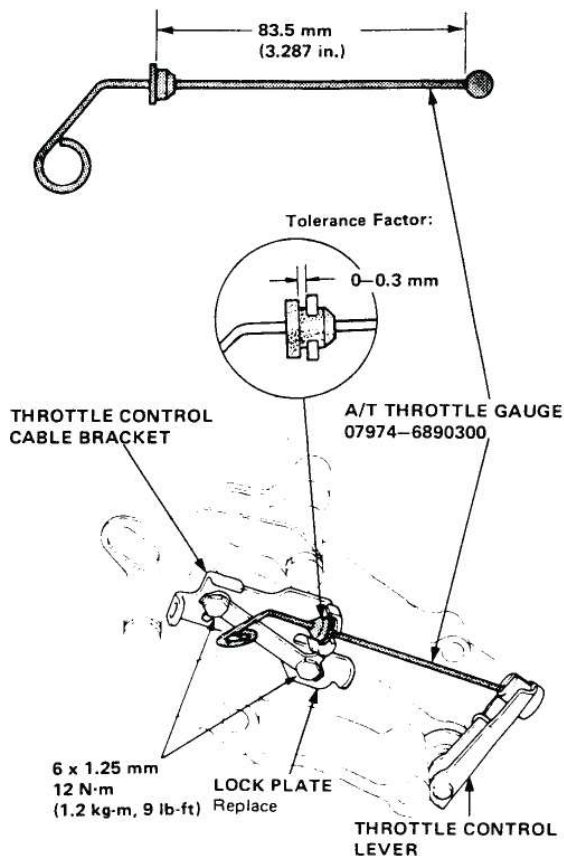
Adjustment

1. Disconnect the throttle control cable from the throttle control lever.
2. Bend down the lock tabs of the lock plate and remove the two 6 mm bolts to free the bracket.
3. Loosely install a new lock plate.
4. Position the special tool between the throttle control lever and the bracket as shown.

NOTE: The special tool is designed so that the distance between the lever and the bracket is 83.5 mm (3.287 in.) when it is installed.

5. Position the bracket so that there is no binding between the bracket and the special tool (tolerance 0 ± 0.3 mm). Then tighten the two 6 mm bolts, bend up the lock plate tabs against the bolts heads.

CAUTION: Make sure the control lever doesn't get pulled toward the bracket side as you tighten the bolts.



Adjustment

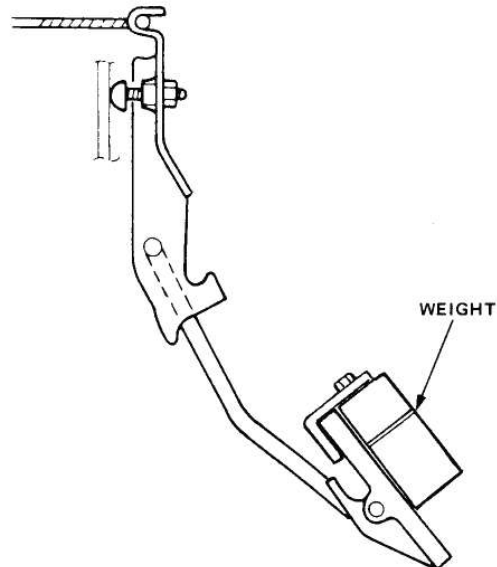
NOTE: Perform the following inspections before adjusting the throttle control cable.

- The accelerator pedal adjustment is correct.
- The carburetor throttle cable play is correct.
- The engine is warmed-up to operating temperature.

NOTE: The cooling fan should come on twice or more:

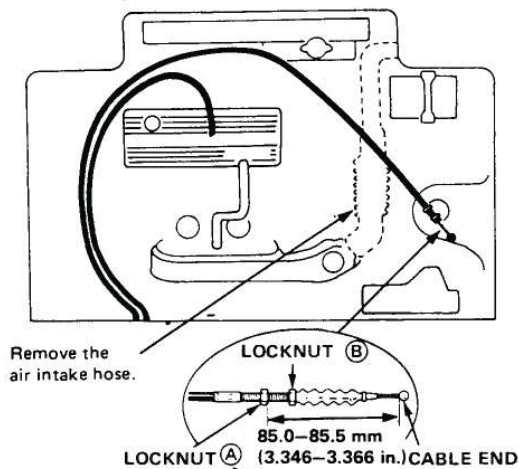
- The idle speed is correct,
- The automatic choke operation is correct.
- The distance between the throttle control lever and the throttle control bracket is correct. See previous column.

1. Attach a weight of about 1.5 kg (3 lbs) to the accelerator pedal. Raise the pedal, then release it, this will allow the weight to remove the normal free play from the throttle cable.

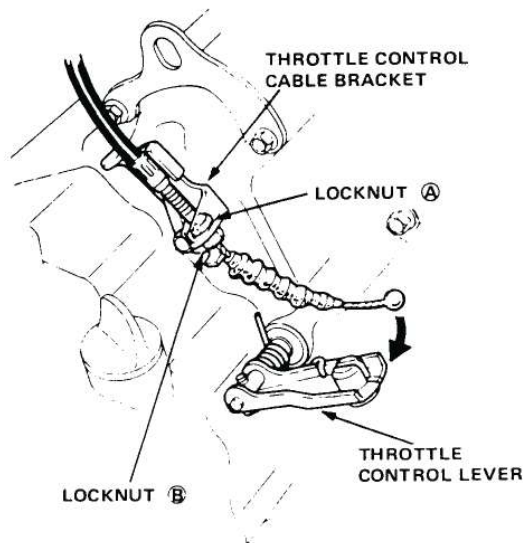


2. Secure the throttle control cable with clamps as shown.
3. Remove the air intake duct.

4. Lay the end of the throttle control cable on the shock tower.
5. Adjust the distance between the throttle control cable end and nut (A) to 85.0–85.5 mm (3.346–3.366 in.).



6. Insert the end of throttle control cable in the groove of the throttle control lever.



7. Insert the throttle control cable in the bracket and secure with locknut (B).

NOTE: Make sure the cable is not kinked or twisted.

8. Check that the cable moves freely by depressing the accelerator.

9. Start the engine and check the synchronization between the carburetor and the throttle control cable.

NOTE: The throttle control lever should start to move as engine speed increases.

- If the throttle control lever moves before engine speed increases, turn the cable locknut A counter clockwise and tighten locknut B.
- If the throttle control lever moves after engine speed increases, turn locknut A clockwise and tighten the locknut B.

Repair

NOTE: This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. You may use this procedure to free the valves in the main valve body, regulator valve body, lock-up shift valve body, and servo valve body. **DO NOT** use this procedure to free the valves in the governor; if any governor valves are stuck, the governor must be replaced as an assembly.

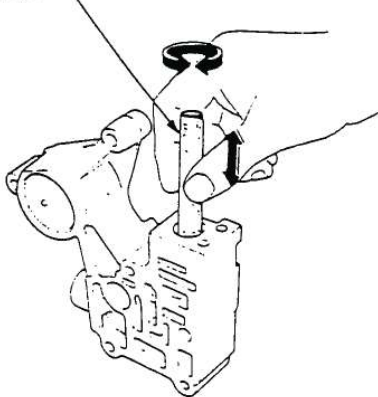
1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

CAUTION: It may be necessary to use a small screwdriver to pry the valve free. Be careful not to scratch the bore with the screwdriver.

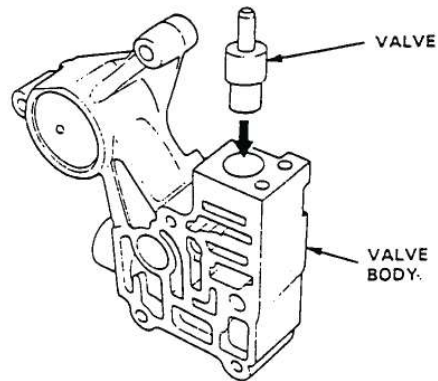
3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

CAUTION: The valve body is aluminum and doesn't require much polishing to remove any burrs.

ATF-soaked
#600 abrasive
paper



5. Remove the #600 paper and thoroughly wash the entire valve body in solvent, then dry with compressed air.
6. Coat the valve with ATF then drop it into its bore. It should drop to the bottom of the bore under its own weight. If not, repeat step 4, then retest.



7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.