



**ACURA
L5
LEGEND 1990**

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INTRODUCTION

L5 - PL5X

ACURA LEGEND 1990

The Legend transmission is a computer controlled 4 speed front wheel drive transaxle with one reverse speed and a converter clutch. The electronic control system consists of an automatic control unit, sensors and 4 solenoids. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The teardown - assembly and trouble shooting is covered in this manual.

*We wish to thank Honda
for the information and illustrations
that have made this booklet possible.*

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been carefully compiled from industry sources known for their
reliability, but ATSG does not guarantee its accuracy.*

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Technical Service Information

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

The 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

S3, **S**4, **D**, **2** and **R**.

ELECTRONIC CONTROL

The electronic control system consists of an automatic control unit, sensors, and 4 solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

The A/T control unit is located under the passenger's seat.

HYDRAULIC CONTROL

The valve assembly includes the main valve body, secondary valve body, servo valve body, regulator valve body and lock-up shift valve body.

They are bolted to the torque converter case as an assembly.

The main valve body contains the 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 oil pump gear.

The secondary valve body includes the CPC valve, 4-3 kickdown valve, 2-1 orifice control valve, 4th orifice control valve, servo control valve, modulator valve and the 2nd orifice control valve.

The servo valve body contains the accumulator pistons, 3-2 kickdown valve and throttle valve B. The regulator valve body contains the lock-up timing valve B, pressure regulator valve and lock-up control valve. Fluid from the regulator passes through the manual valve to the various control valves.

The lock-up shift valve body contains a cooler relief valve and lock-up shift valve. The 1st, 3rd and 4th clutches receive oil from their respective feed pipes.

SHIFT CONTROL MECHANISM

Input from various sensors located throughout the car determines which shift control solenoid valve the A/T control unit will activate. Activating a shift control solenoid valve changes modulator pressure, causing a shift valve to move. This pressurizes a line to one of the clutches, engaging that clutch and its corresponding gear.

LOCK-UP MECHANISM

In **S**4 or **D**, in 2nd, 3rd and 4th, 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. Together with hydraulic control, an electronic control unit optimizes the timing of the lock-up mechanism.

The lock-up shift valve body controls the range of lock-up according to lock-up control solenoid valves A and B, and throttle valve B. When lock-up control solenoid valves A and B activate, modulator pressure changes. Lock-up control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the A/T control unit.



Technical Service Information

GEAR SELECTION

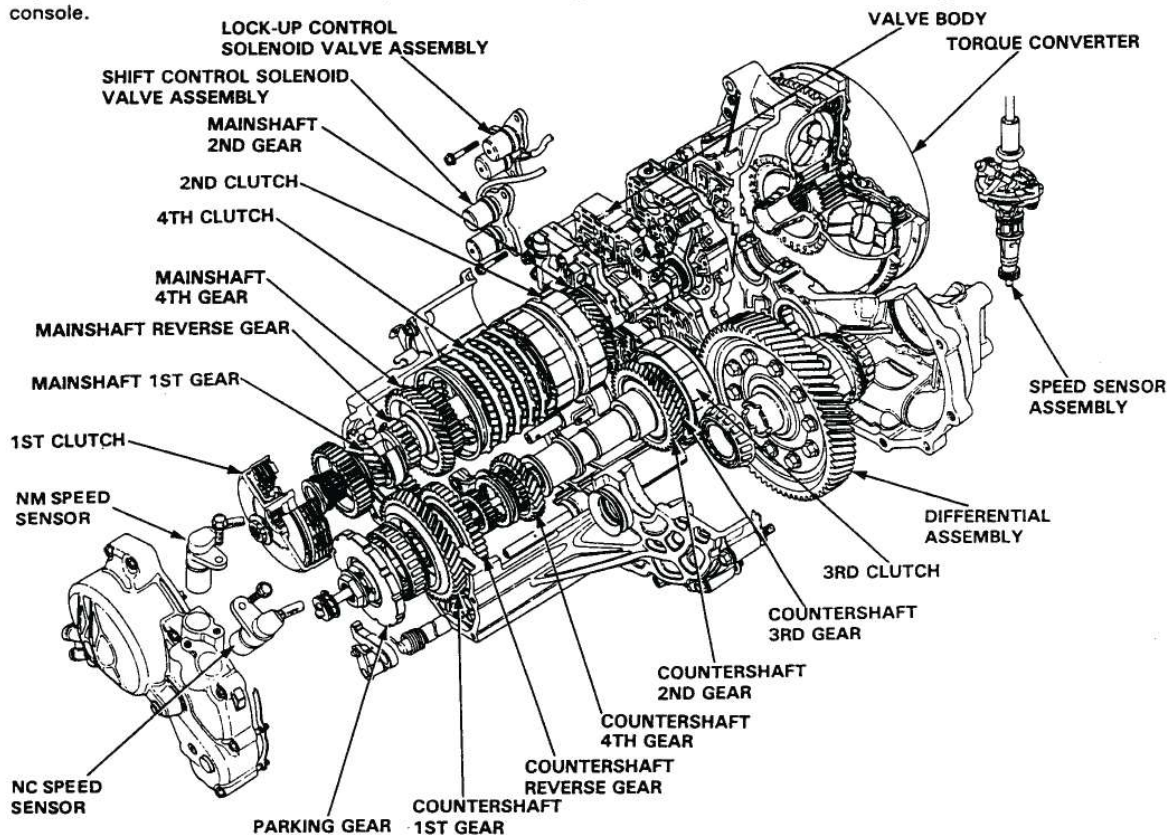
The selector lever has six positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D** or **S4** 1st through 4th gear ranges, **S3** 1st through 3rd gear ranges, and **2** 2nd gear.

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.
D DRIVE and S4 SPORTS (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 in 2nd, 3rd and 4th when the transmission is in D and S4 .
S3 SPORTS (1 through 3)	For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd, then 3rd (S3), and then 4th (S4) depending on vehicle speed and throttle position. Downshifts through lower gears 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.





Technical Service Information

[1st Clutch]

The 1st clutch is on the left end of the mainshaft. In the **S₃**, **S₄**, or **D** range, constant hydraulic pressure is applied to the mainshaft through the 1st clutch to the mainshaft 1st gear.

The clutch plate is mounted on the clutch drum, while the clutch disc is fitted to the mainshaft 1st gear.

The 1st gears are attached to the mainshaft and countershaft through needle bearings, one for each gear.

When select lever is placed in the **S₃**, **S₄**, or **D** range, hydraulic pressure is applied from the left side cover through the mainshaft, and thus to the clutch drum; as the pressure rises, the clutch piston presses the clutch plate and clutch disc, thus causing the clutch to engage.

Power is transmitted from the mainshaft 1st gear, through the countershaft 1st gear, to the one-way clutch, parking gear, and finally to the countershaft. The one-way clutch locks in the forward direction when in 1st gear. In the **S₃**, **S₄**, or **D** range, all others besides 1st gear are not engaged, thus transmitting no power.

[2nd Clutch]

The 2nd clutch is right of center on the mainshaft, and is the same construction as the 1st clutch. The 2nd clutch is joined back-to-back to the 4th clutch. The mainshaft 2nd gear uses a needle bearing. The countershaft 2nd gear is splined to the countershaft.

In 2nd gear of **2**, **S₃**, **S₄**, or **D**, hydraulic pressure is applied to the clutch drum from the mainshaft, thus transmitting power from the mainshaft 2nd gear to the countershaft 2nd gear.

[3rd Clutch]

The 3rd clutch is on the right end of the countershaft.

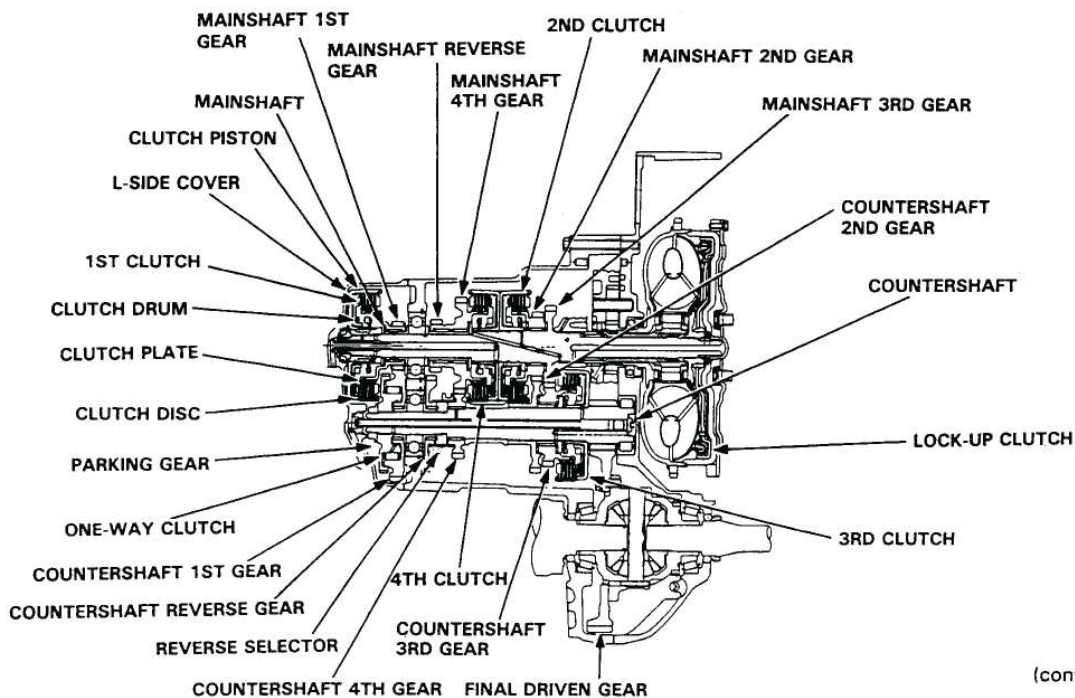
The clutch hub is joined to the countershaft 3rd gear, on the countershaft, supported by a single needle bearing.

In 3rd gear of **S₃**, **S₄**, or **D**, hydraulic pressure is applied to the 3rd clutch on the countershaft, thus causing the clutch to engage, and transmitting power.

[4th Clutch]

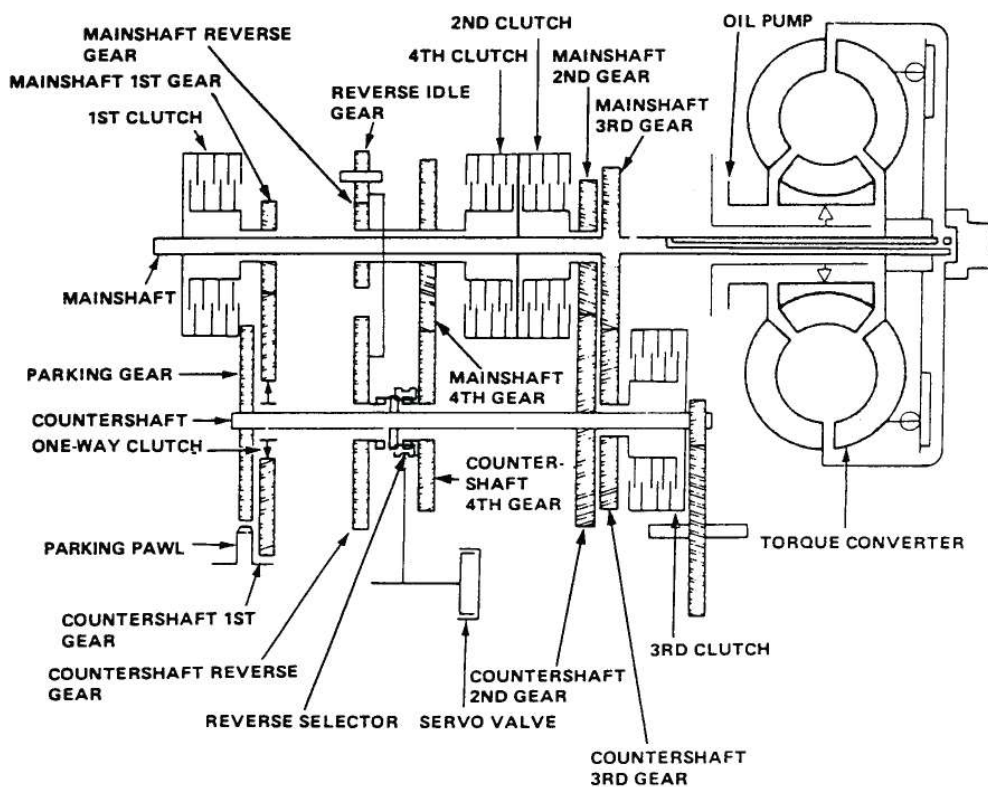
The 4th clutch is identical to the 2nd clutch, to which it is joined on the mainshaft. The clutch hub is joined to the mainshaft 4th gear and reverse gear, supported by two needle bearings.

In 4th gear of **S₄**, or **D**, hydraulic pressure is generated within the mainshaft, applying pressure to the 4th clutch on the mainshaft.



PART RANGE		TORQUE CONVERTER	1ST GEAR 1ST CLUTCH	1ST GEAR ONE-WAY CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH	4TH		REVERSE GEAR	PARKING GEAR
							GEAR	CLUTCH		
P		O	X	X	X	X	X	X	X	O
R		O	X	X	X	X	X	O	O	X
N		O	X	X	X	X	X	X	X	X
S ₃	1ST	O	O	O	X	X	X	X	X	X
	2ND	O	*O	X	O	X	X	X	X	X
	3RD	O	*O	X	X	O	X	X	X	X
S ₄ or D	1ST	O	O	O	X	X	X	X	X	X
	2ND	O	*O	X	O	X	X	X	X	X
	3RD	O	*O	X	X	O	X	X	X	X
	4TH	O	*O	X	X	X	O	O	X	X
2	2RD	O	X	X	O	X	X	X	X	X

O: Operates, X: Doesn't operate, *: Although the 1st clutch engages, driving power is not transmitted as the one-way clutch slips.





Legend:
 TH: THROTTLE ANGLE SENSOR
 TW: COOLANT TEMPERATURE SENSOR

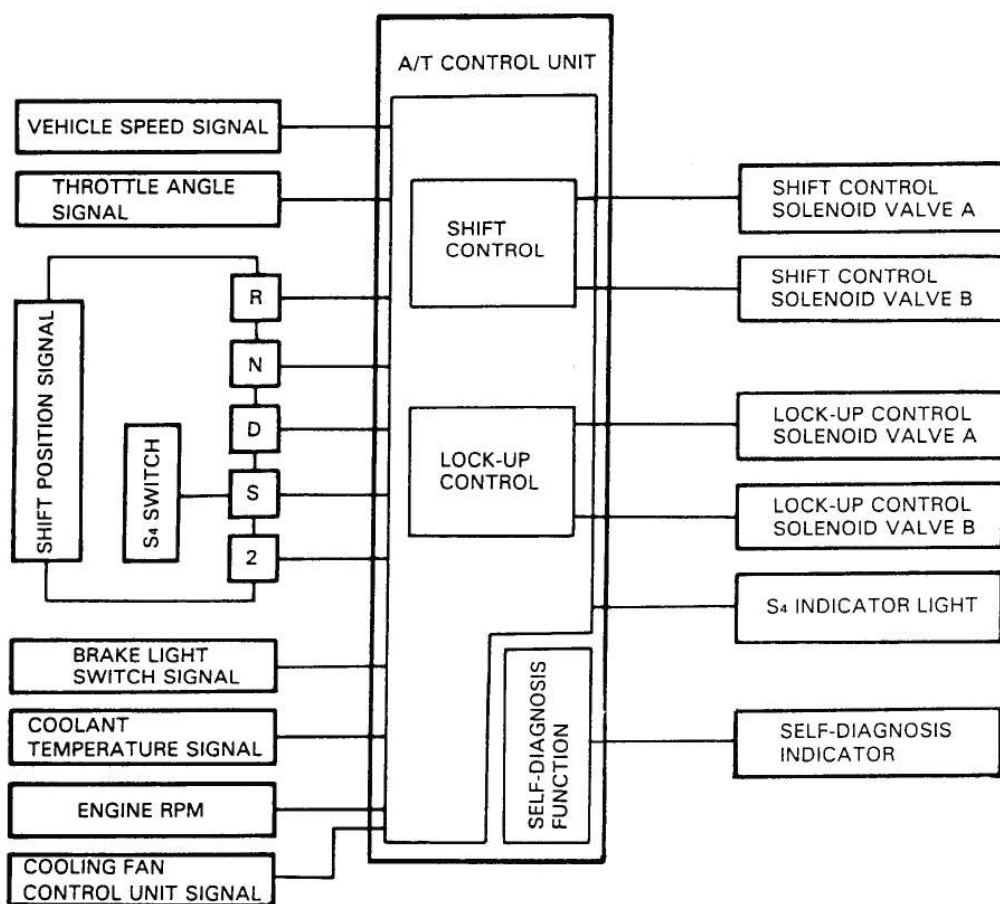
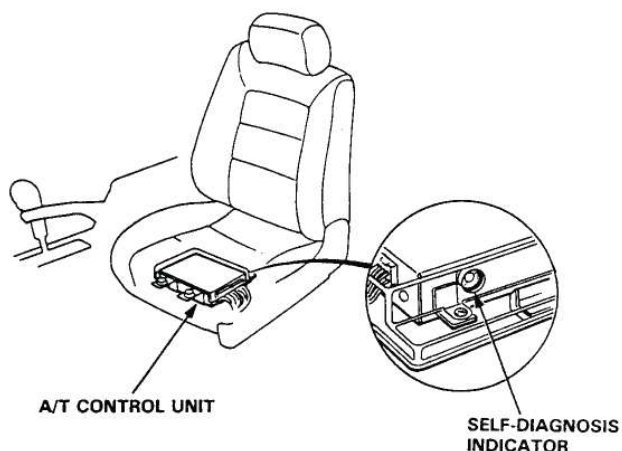
Diagram Description:
 The diagram illustrates the electrical system for the 1990 Honda Civic 1.6i 16V engine. The PGM-FI ECU is the central control unit, connected to various components via a multi-pin connector (pins A1 through A25, B1 through B17, B22, B13, A18, A21, A22, A23).
 - **Ignition System:** Includes the Ignition Coil, Ignition Switch (IG1), and A/C Clutch Relay (IG2).
 - **Sensors:** Throttle Angle Sensor (TH), Coolant Temperature Sensor (TW), NM Speed Sensor, and NC Speed Sensor.
 - **Control Units:** Shift Control Solenoid Valve A and B, Lock-Up Control Solenoid Valve A and B, Cooling Fan Control Unit, Interlock Control Unit, and Gauge Assembly.
 - **Other Components:** Brake Light Switch, S₄ Switch, and Dimming/Cancel Circuit.

TH: THROTTLE ANGLE SENSOR
TW: COOLANT TEMPERATURE SENSOR

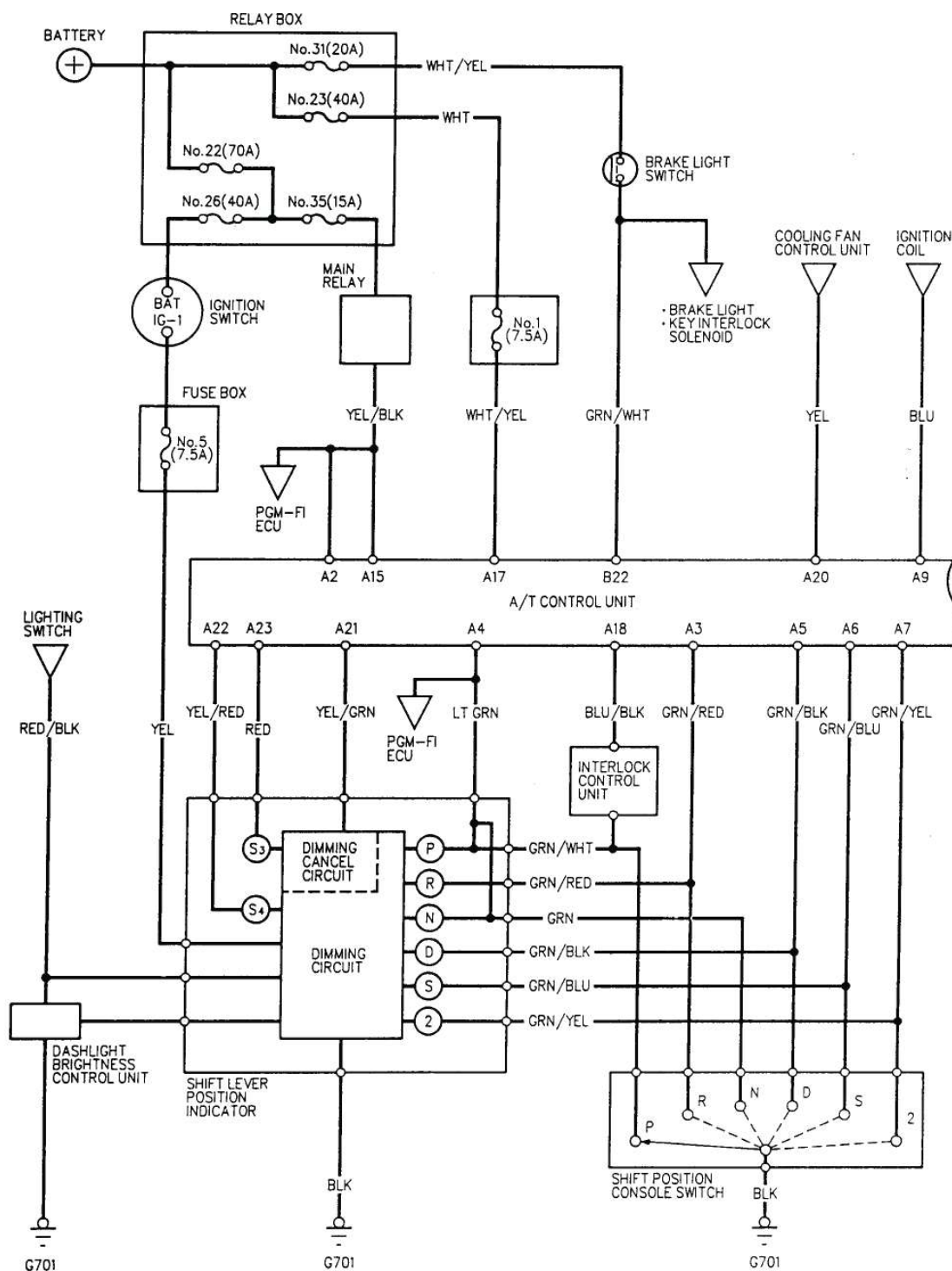
	A12	A11		A9		A7	A6	A5	A4	A3	A2	A1				B9	B8	B7	B6	B5	B4	B3	B2		
	A25	A24	A23	A22	A21	A20	A19	A18	A17	A16	A15	A14		B22					B17			B15	B14	B13	

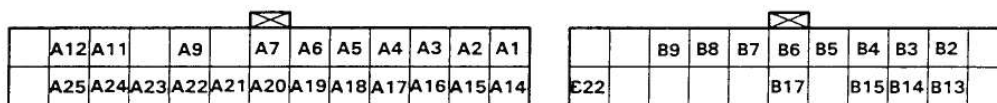
TERMINAL LOCATION

Electronic Control System (cont'd)

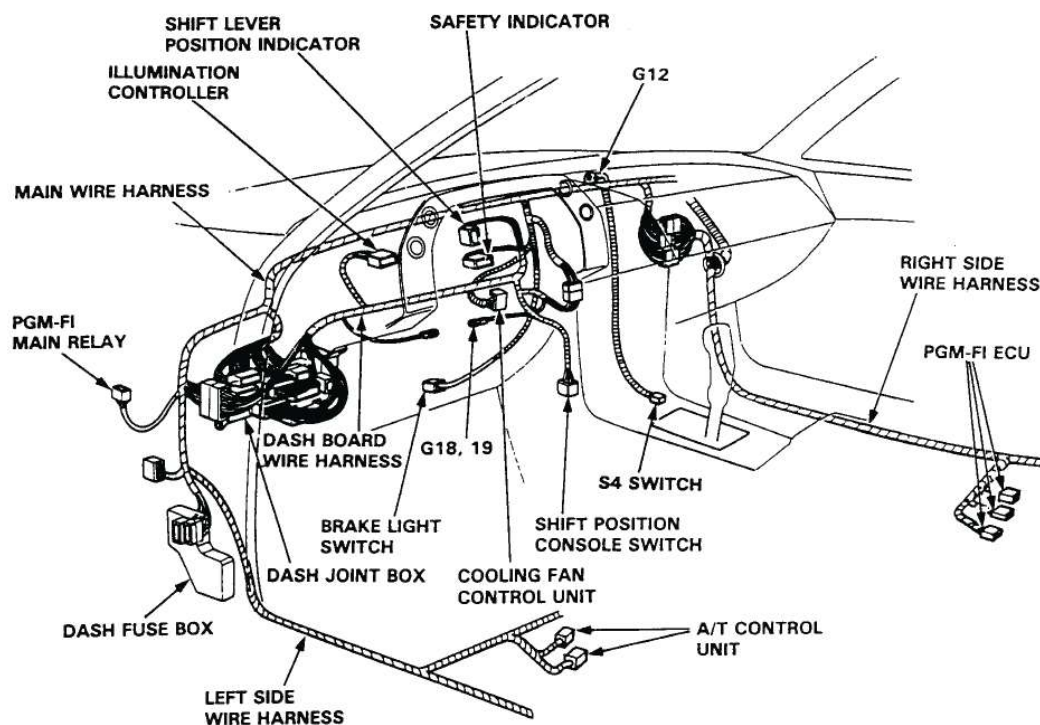
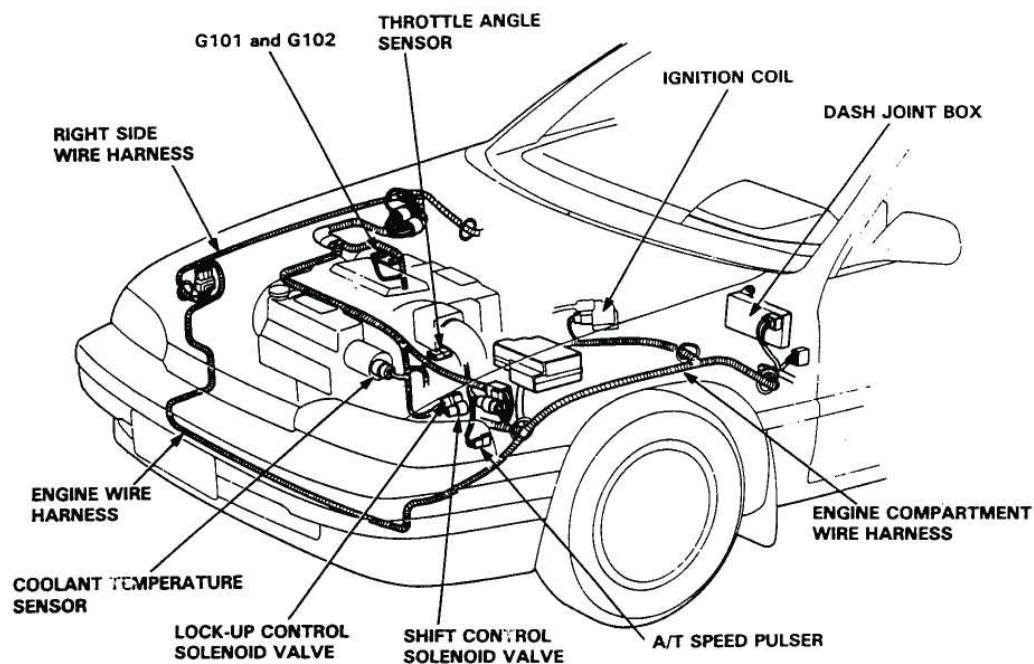


Circuit Diagram



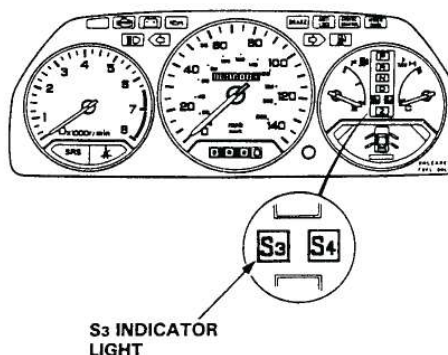
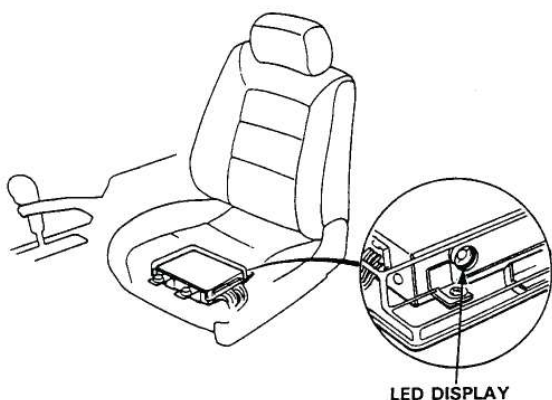


Automatic Transmission Service Group
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The A/T Control Unit has a built-in self-diagnosis function. The S3 indicator light in the gauge assembly and LED display on the A/T control unit blink when the A/T control unit senses an abnormality in the input or output systems. The number of blinks from the LED display varies according to the problem, which can be diagnosed by counting the number of blinks.

For problem diagnosis count the number of blinks from the LED display as shown on the Symptom-to-Component Chart on page 14-36. If no abnormality is found from your inspection, refer to the hydraulic system Symptom-to-Component Chart on page 14-58.



When the ignition switch is turned ON, the S3 indicator light comes on for about two seconds regardless of whether there is a problem. The S3 indicator light will also come on when in S3 mode.

If there is a system problem, the S3 indicator light will come on and continue to blink until the ignition key is turned OFF. When the ignition key is turned ON again, the S3 indicator light will not blink again for the original problem. But if the A/T control unit senses the original abnormality again with ignition switch ON, the S3 indicator light will blink again for the original problem. Therefore, even though the S3 indicator light does not come on when turning the ignition key ON, check the LED display for automatic transmission problem diagnosis.

Since the LED problem code is retained in memory, it will blink again whenever the ignition key is turned on. If the LED problem code is not memorized, check the following causes:

- Check the Alternator Sense fuse (7.5A) in the under-hood relay box.
- Check for an open circuit in the YEL/BLU wire between the Alternator Sense fuse (7.5A) and A/T control unit B12 terminal.

After making repair, disconnect the Alternator Sense fuse (7.5A) in the under-hood relay box for more than ten seconds to reset LED display memory.



Technical Service Information

Electrical System

Number of LED display blinks	S ₃ Indicator light	Possible Cause	Symptom
1	Blinks	• Disconnected lock-up control solenoid valve A coupler • Short or open in lock-up control solenoid valve A wire • Faulty lock-up control solenoid valve A	• Lock-up clutch does not engage. • Lock-up clutch does not disengage. • Frequent engine stalling.
2	Blinks	• Disconnected lock-up control solenoid valve B coupler • Short or open in lock-up control solenoid valve B wire • Faulty lock-up control solenoid valve B	• Lock-up clutch does not engage.
3	Blinks or OFF	• Disconnected throttle angle sensor coupler • Short or open in throttle angle sensor wire • Faulty throttle angle sensor	• Lock-up clutch does not engage.
4	Blinks	• Disconnected pulser coupler • Short or open in speed pulser wire • Faulty speed pulser	• Lock-up clutch does not engage.
5	Blinks	• Short in shift position console switch wire • Faulty shift position console switch	• Fails to shift other than 2nd ↔ 4th gears. • Lock-up clutch does not engage.
6	OFF	• Disconnected shift position console switch coupler • Open in shift position console switch wire • Faulty shift position console switch	• Fails to shift other than 2nd ↔ 4th gears. • Lock-up clutch does not engage. • Lock-up clutch engages and disengages alternately.
7	Blinks	• Disconnected shift control solenoid valve A coupler • Short or open in shift control solenoid valve A wire • Faulty shift control solenoid valve A	• Fails to shift (between 1st ↔ 4th, 2nd ↔ 4th or 2nd ↔ 3rd gears only). • Fails to shift (stuck in 4th gear)
8	Blinks	• Disconnected shift control solenoid valve B coupler • Short or open in shift control solenoid valve B wire • Faulty shift control solenoid valve B	• Fails to shift (stuck in 1st or 4th gears).



Technical Service Information

Number of LED display blinks	S ₃ indicator light	Possible Cause	Symptom
9	Blinks	• Disconnected NC speed pulser coupler • Short or open in the NC speed pulser wire • Faulty NC speed pulser	• Lock-up clutch does not engage.
10	Blinks	• Disconnected water temperature sensor coupler • Short or open in the water temperature sensor wire • Faulty water temperature sensor	• Lock-up clutch does not engage.
11	OFF	• Disconnected ignition coil coupler • Short or open in ignition coil wire • Faulty ignition coil	• Lock-up clutch does not engage.
14	OFF	• Short or open in FAS wire • Trouble in EFI unit	• Transmission jerks hard when shifting.
15	OFF	• Disconnected NM speed pulser coupler • Short or open in NM speed pulser wire • Faulty NM speed pulser	• Transmission jerks hard when shifting.

- If a customer describes the symptoms for codes 3, 6, or 11, yet the LED is not blinking, it will be necessary to recreate the symptom by test driving, and then checking the LED with the ignition still ON.
- If the LED displays codes other than those listed above or stays lit continuously, the control unit is faulty.
- Sometimes the S₃ indicator light and the Check Engine warning light may come on simultaneously. If so, check the PGM-FI system according to the number of blinks on the PGM-FI ECU self-diagnosing indicator, then reset the memory by removing the Clock fuse in the dash fuse box for more than 10 seconds. Drive the vehicle for several minutes at speed over 30 mph (50 km/h), then recheck the lights.

Electronic Control System

The electronic control system consists of the automatic control unit, sensors, and 4 solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

The automatic control unit is located under the passenger's seat.

<Shift control>

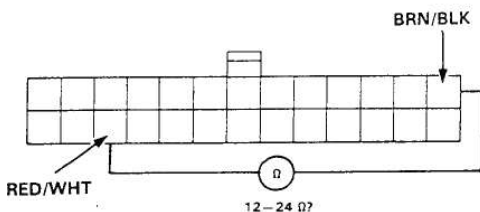
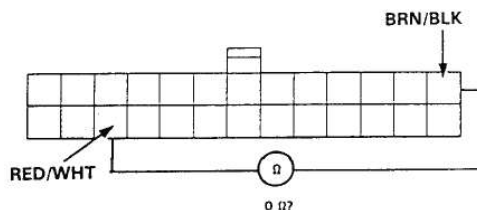
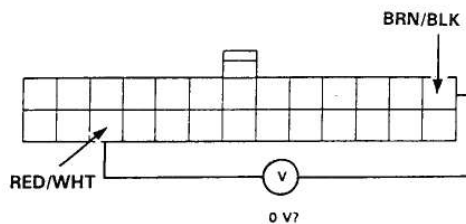
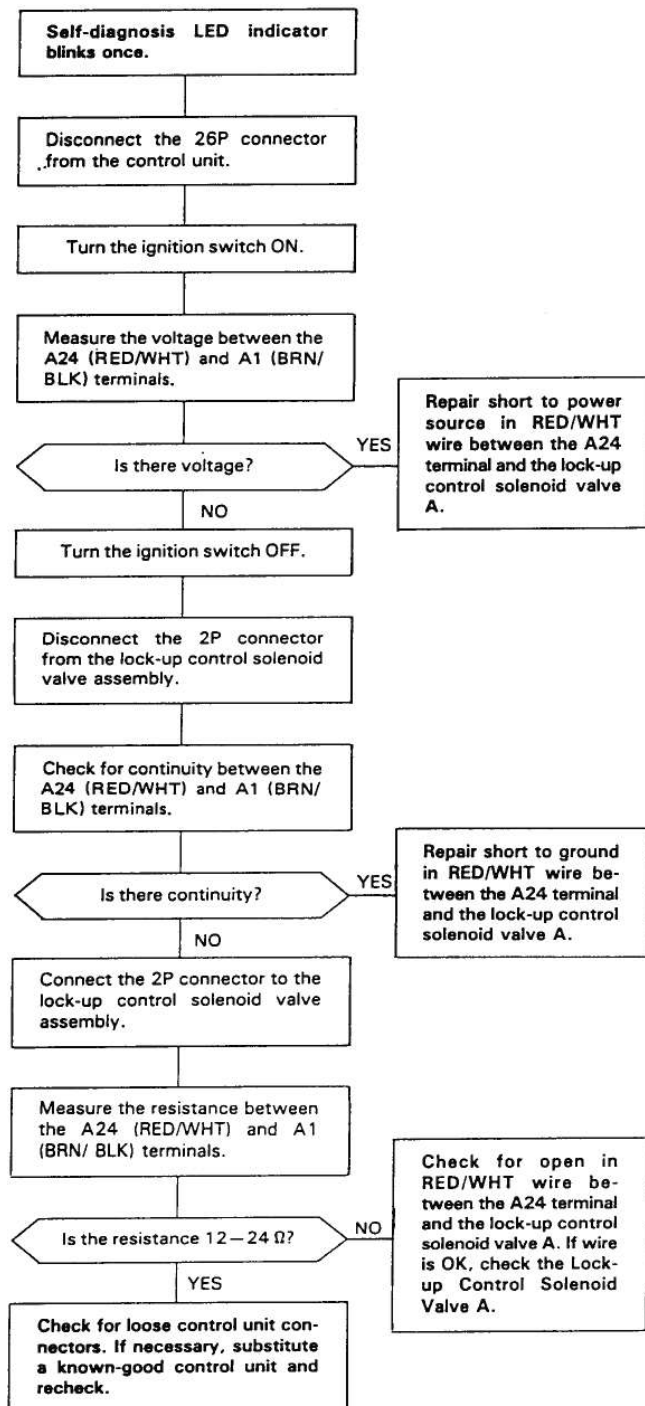
Getting a signal from each sensor, the automatic control unit detects the appropriate gear shifting and activates shift control solenoid valves A and/or B.

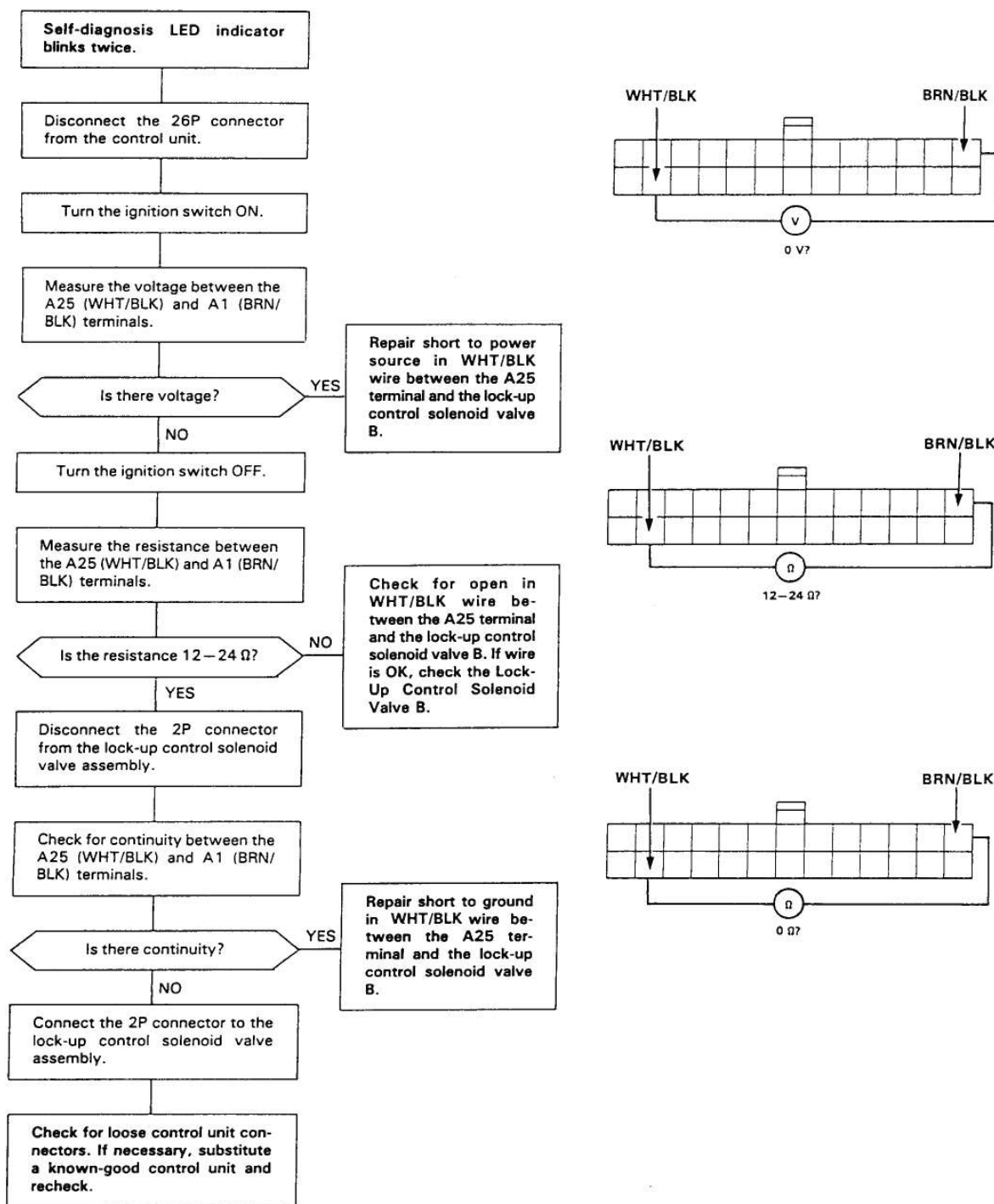
The combination of driving signals to shift control solenoid valves A and B is shown in the table below.

Shift control sol. valve Range (gear)	A	B
D S ₃ S ₄ (1st)	OFF	ON
D S ₃ S ₄ (2nd)	ON	ON
D S ₃ S ₄ (3rd)	ON	OFF
D S ₄ (4th)	OFF	OFF

Solenoid valve	A	B
Lock-up condition		
Lock-up OFF	OFF	OFF
Lock-up, slight	ON	OFF
Lock-up, half	ON	ON
Lock-up, full	ON	ON
Lock-up during deceleration	ON	Duty operation OFF ← → ON

Troubleshooting Flowchart





(cont'd)

Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks three times.

Turn the ignition switch ON.

Check whether the PGM-FI LED display blinks (Section 11).

Does the LED blink?

YES

Repair the PGM-FI System.

NO

Turn the ignition switch OFF.

Disconnect the 26P and 22P connectors from the control unit.

Turn the ignition switch ON.

Measure the voltage between the B14 (ORN) and A1 (BRN/BLK) terminals.

Is the voltage 4.75–5.25 V?

NO

Repair open or short in ORN wire between the B14 terminal and the D14 terminal of the PGM-FI ECU.

YES

Turn the ignition switch OFF.

Connect the 26P and 22P connectors to the control unit.

Turn the ignition switch ON.

Measure the voltage between the B8 (RED/YEL) and A1 (BRN/BLK) terminals.

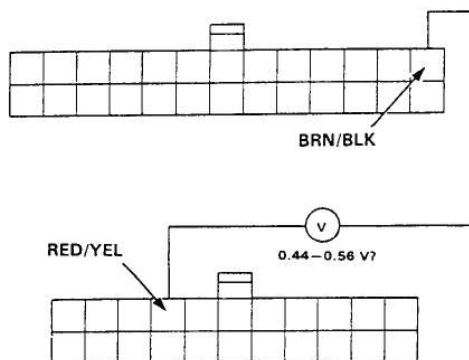
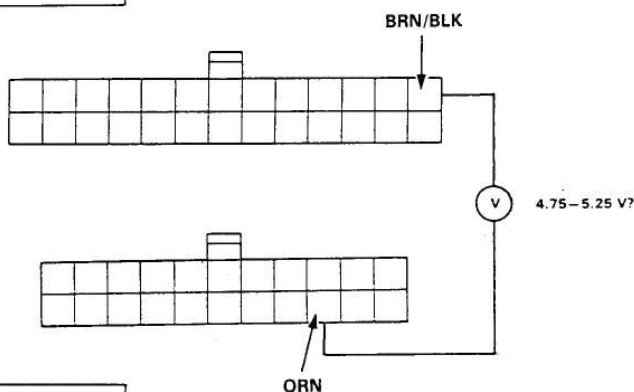
Is the voltage 0.44–0.56 V?*

NO

Repair open or short in RED/YEL wire between the B8 terminal and the throttle angle sensor.

YES * ± 10%

Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.



Self-diagnosis LED indicator blinks four times.

Jack up the front of the car and block one wheel.

Shift transmission to **N**.

Disconnect the 26P and 22P connectors from the control unit.

Turn the ignition switch ON.

Rotate the front wheel and check for voltage between the A1 (BRN/BLK) and B7 (YEL/RED) terminals.

Does the voltage 0–5 V appear alternately?

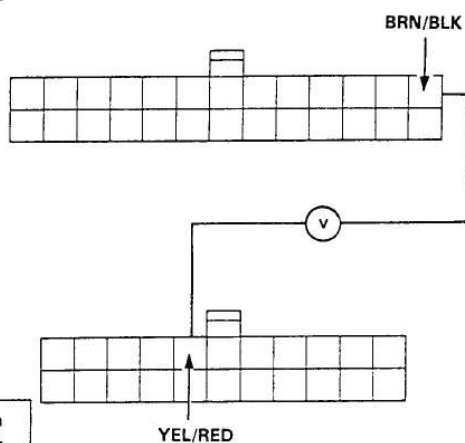
NO

YES

Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

⚠ WARNING

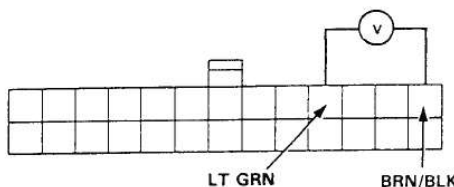
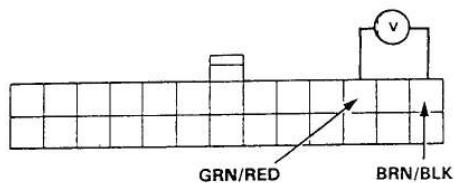
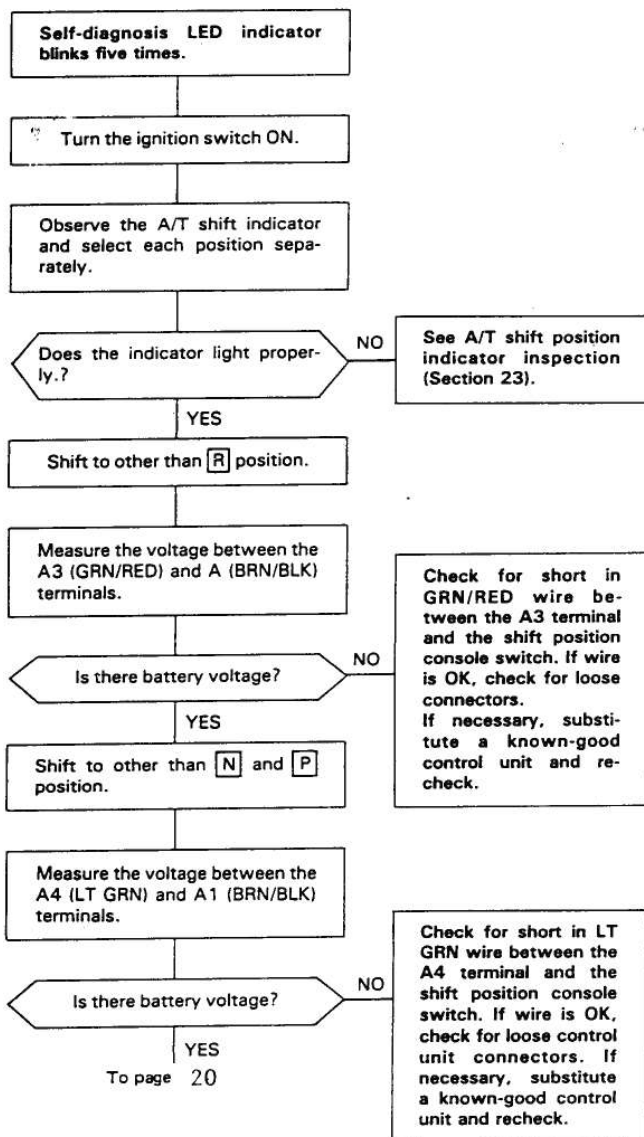
- Set the parking brake securely and block the rear wheels.
- Jack up the front of the car and support with a rigid rack.



Check for short or open in YEL/RED wire between the B7 terminal and the Speed Sensor. If wire is OK, check the Speed Sensor.

(cont'd)

Troubleshooting Flowchart (cont'd)



From page 19

Shift to other than **D** position.

Measure the voltage between the A5 (GRN/BLK) and A1 (BLK/RED) terminals.

Is there battery voltage?

NO

YES

Shift to other than **S** position.

Measure the voltage between the A6 (GRN/BLU) and A1 (BRN/BLK) terminals.

Is there battery voltage?

NO

YES

Shift to other than **2** position.

Measure the voltage between the A7 (GRN/YEL) and A1 (BRN/BLK) terminals.

Is there battery voltage?

NO

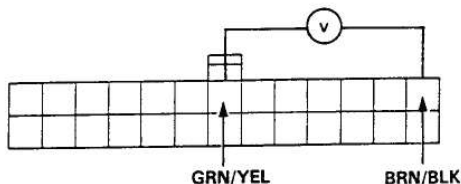
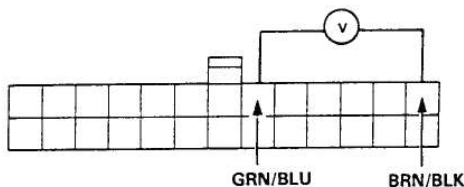
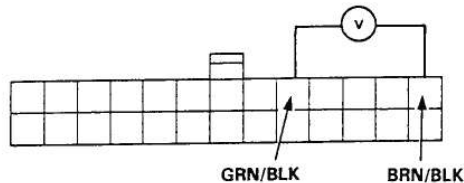
YES

Substitute a known-good control unit and recheck.

Check for short in GRN/BLK wire between the A5 terminal and the shift position console switch. If wire is OK, check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

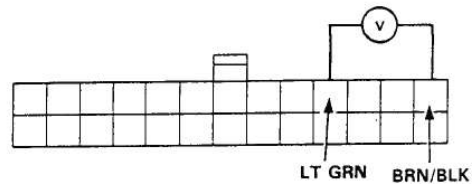
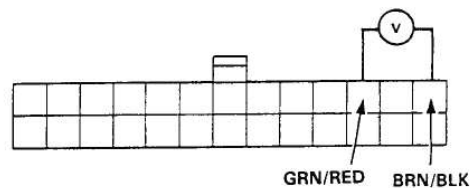
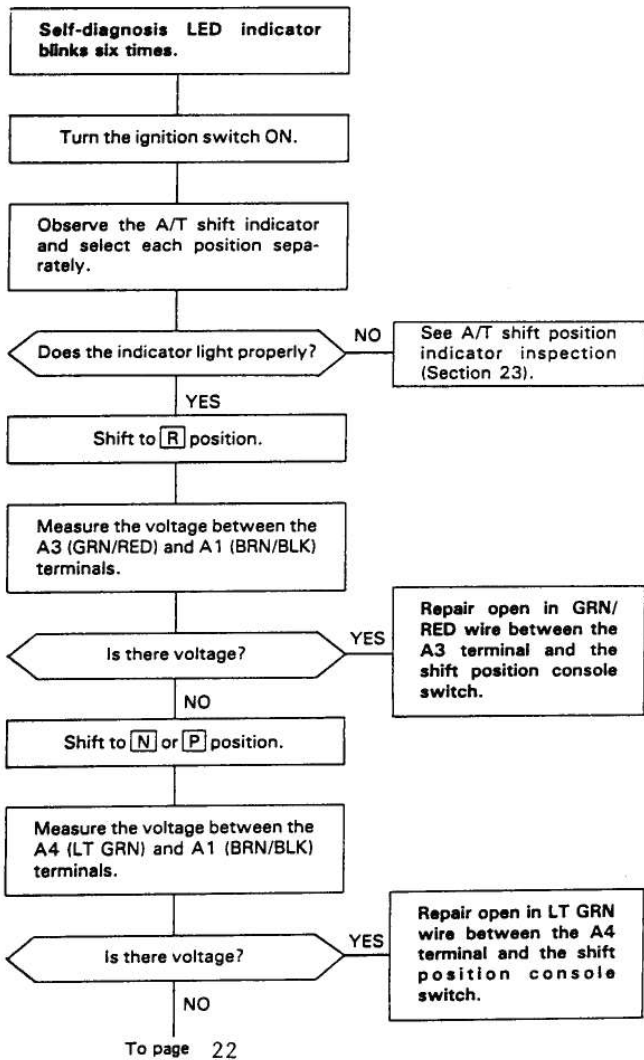
Check for short in GRN/BLU wire between the A6 terminal and the shift position console switch. If wire is OK, check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

Check for short in GRN/YEL wire between the A7 terminal and the shift position console switch. If wire is OK, check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

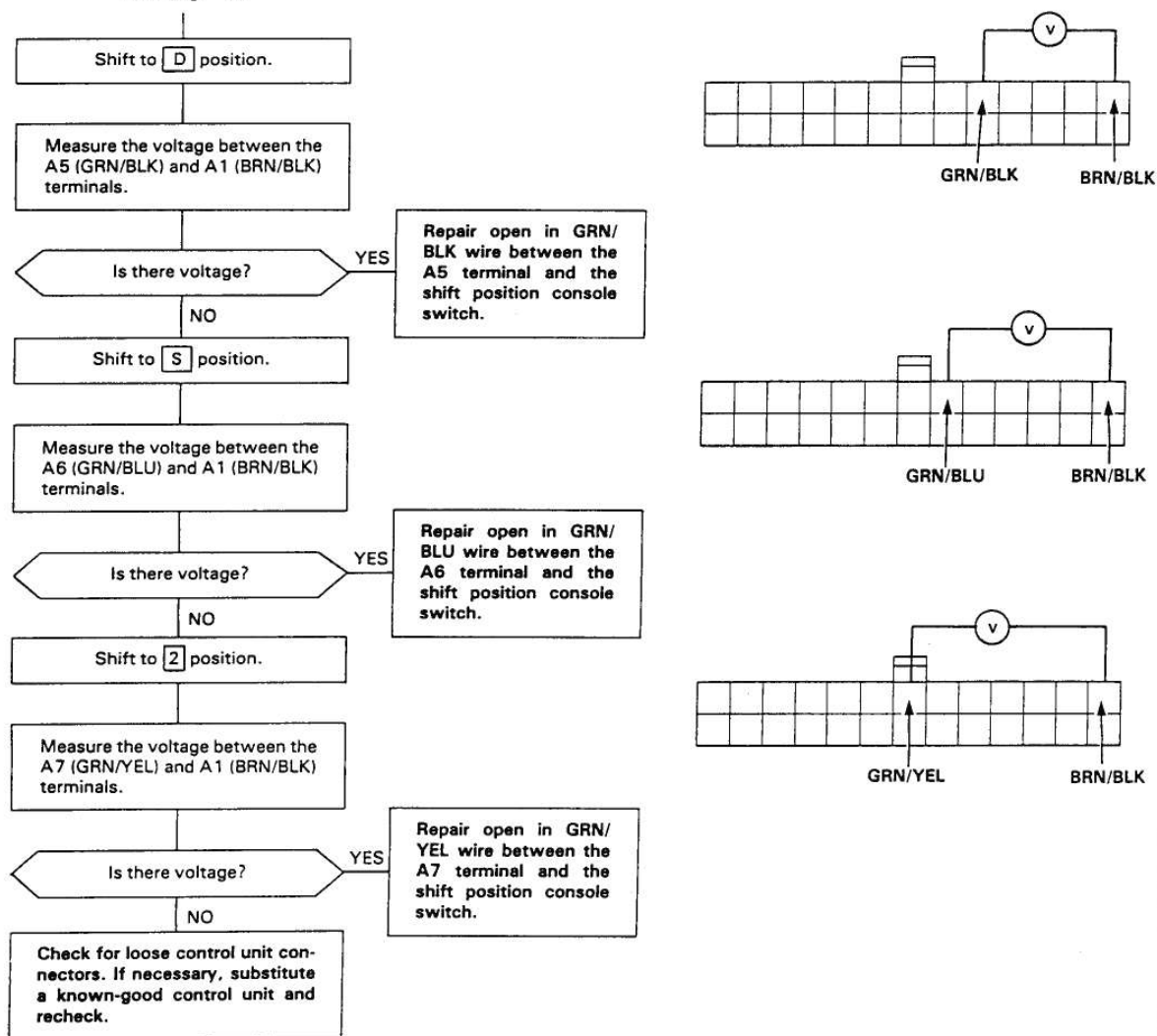


(cont'd)

Troubleshooting Flowchart (cont'd)



From page 21



(cont'd)

Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks seven times.

Disconnect the 26P connector from the control unit.

Turn the ignition switch ON.

Measure the voltage between the A11 (GRN/YEL) and A1 (BRN/BLK) terminals.

Is there voltage?

YES

Repair short to power source in BLU/YEL wire between the A11 terminal and the shift control solenoid valve A.

NO

Turn the ignition switch OFF.

Measure the resistance between the A11 (BLU/YEL) and A1 (BRN/BLK) terminals.

Is the resistance 12–24 Ω ?

NO

Check for open in BLU/YEL wire between the A11 terminal and the shift control solenoid valve A. If wire is OK, check the Shift Control Solenoid Valve A.

YES

Disconnect the 2P connector from the shift control solenoid valve assembly.

Check for continuity between the A11 (BLU/YEL) and A1 (BRN/BLK) terminals.

Is there continuity?

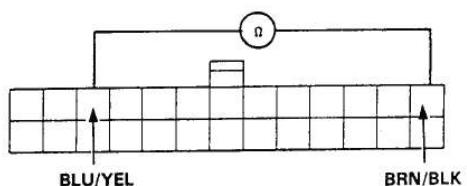
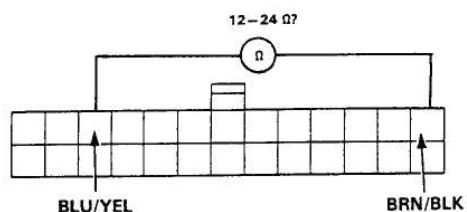
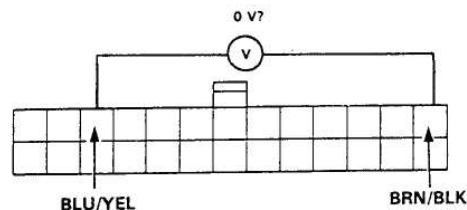
YES

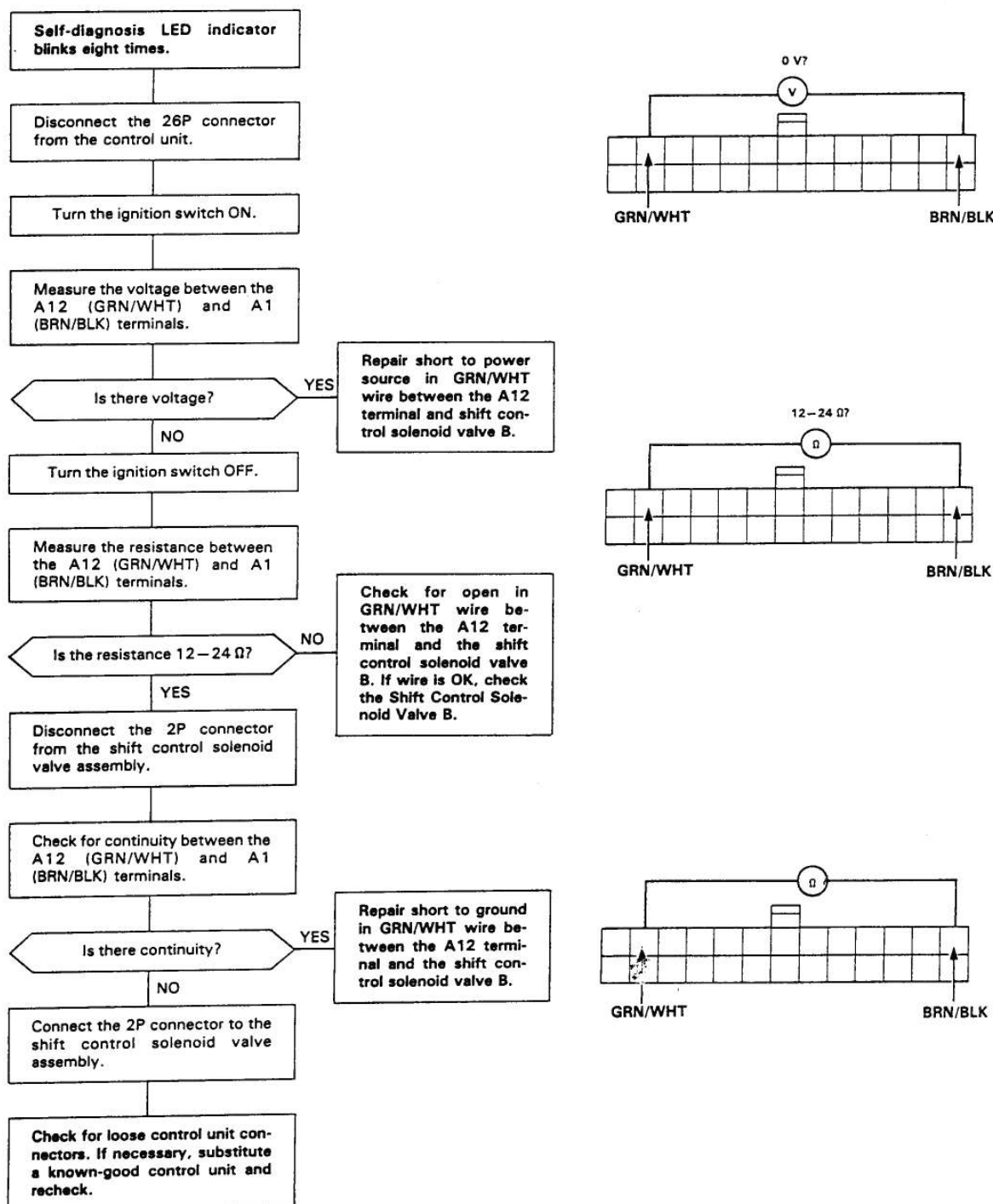
Repair short to ground in BLU/YEL wire between the A11 terminal and the shift control solenoid valve A.

NO

Connect the 2P connector to the shift control solenoid valve assembly.

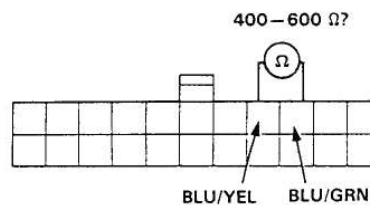
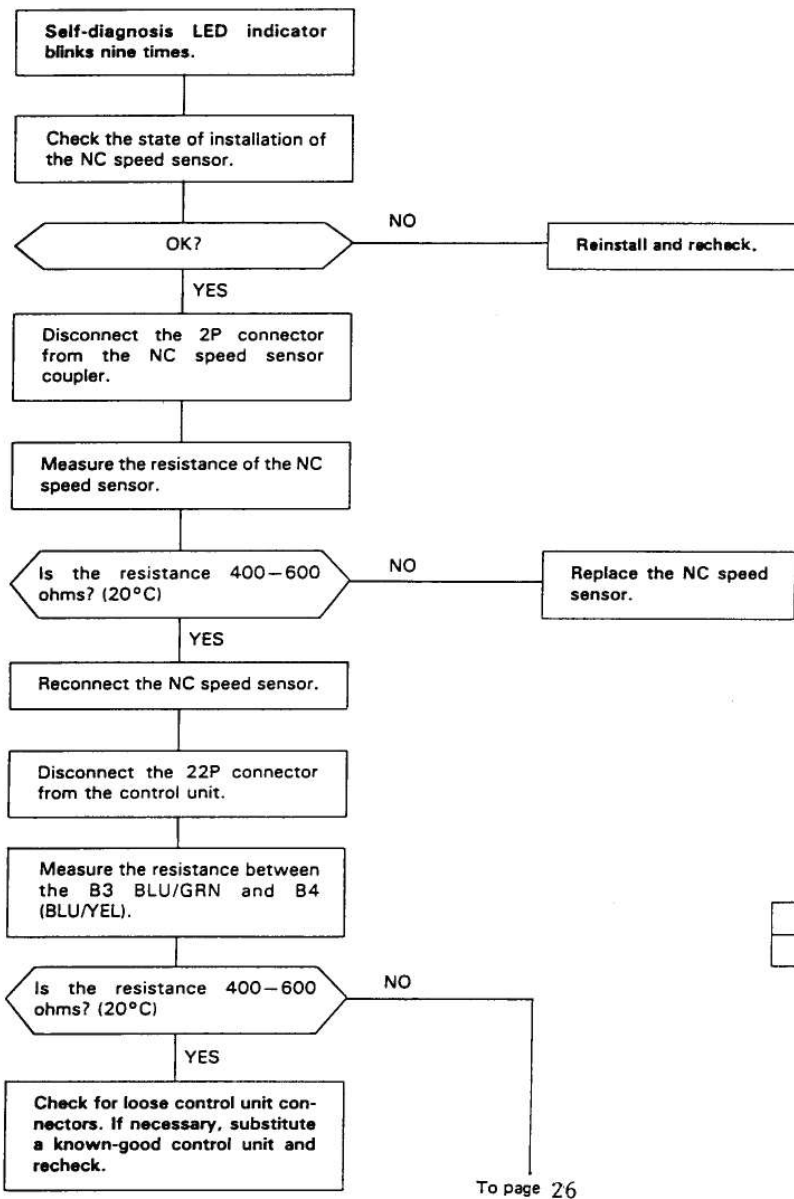
Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.





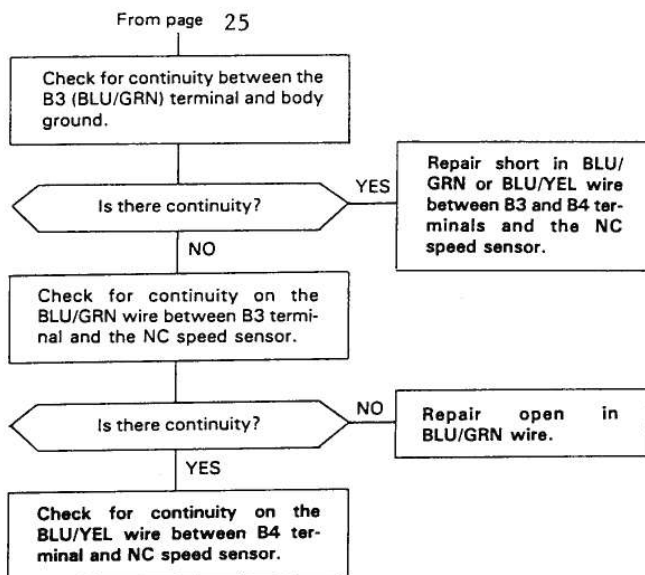
(cont'd)

Troubleshooting Flowchart (cont'd)



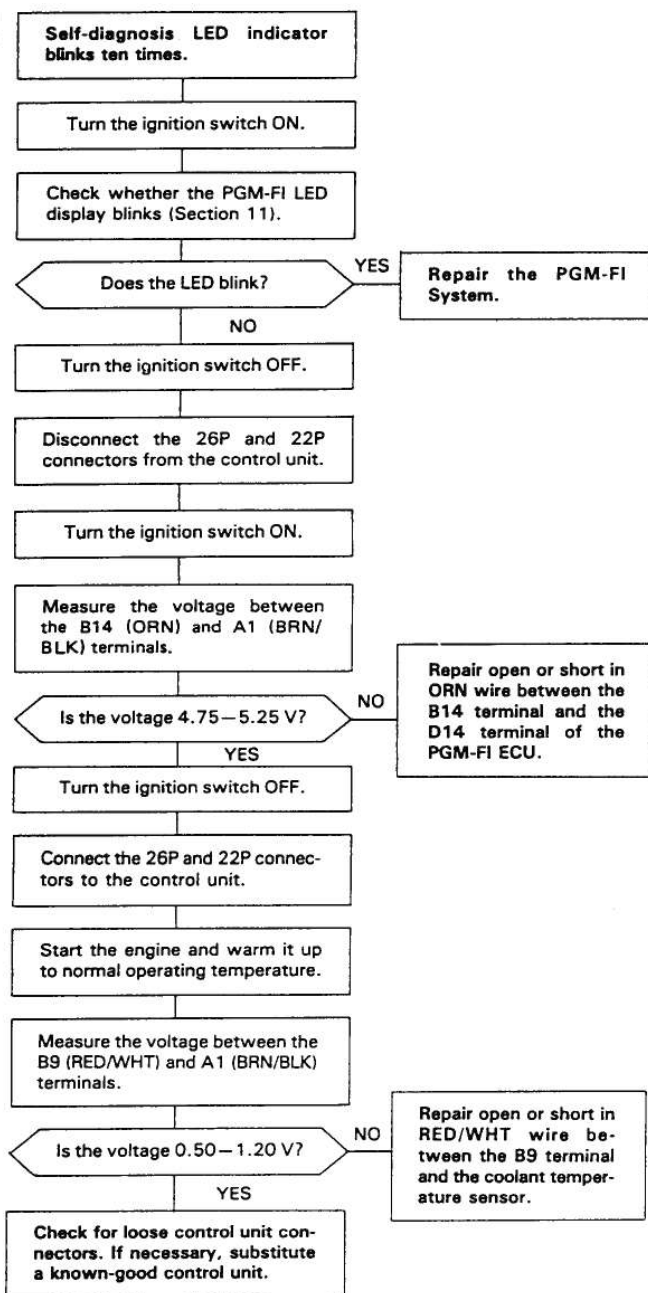


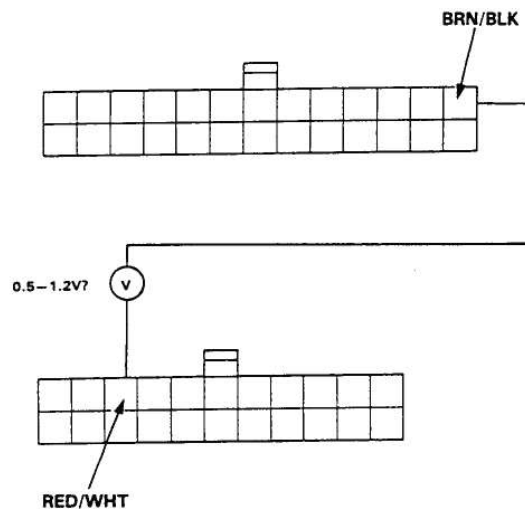
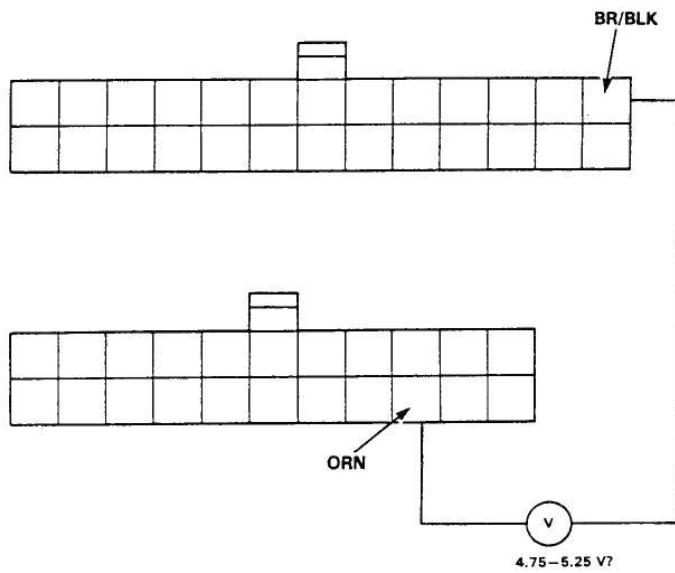
Technical Service Information



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Troubleshooting Flowchart (cont'd)





(cont'd)

Troubleshooting Flowchart (cont'd)

Self-diagnosis LED indicator blinks eleven times.

Disconnect the 26P connectors from the control unit.

Start the engine.

Measure the voltage between the A9 (BLU) and A1 (BRN/BLK) terminals.

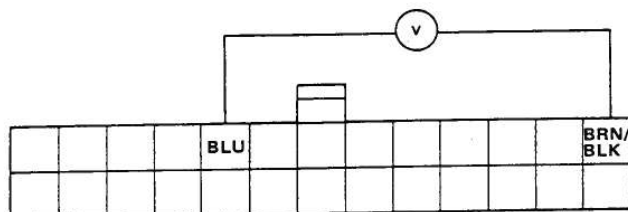
Is there battery voltage?

NO

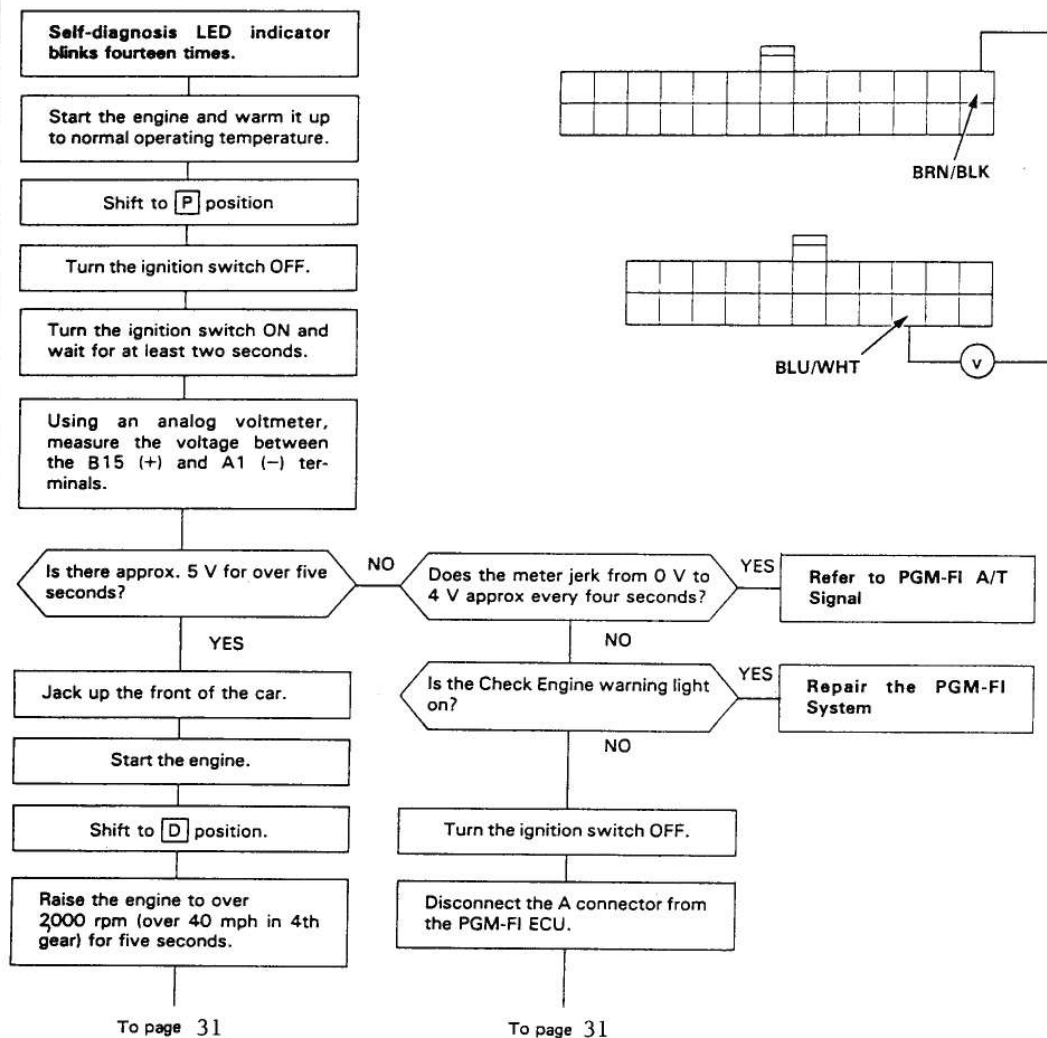
Repair open or short in BLU wire between the A9 terminal and the ignition coil.

YES

Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

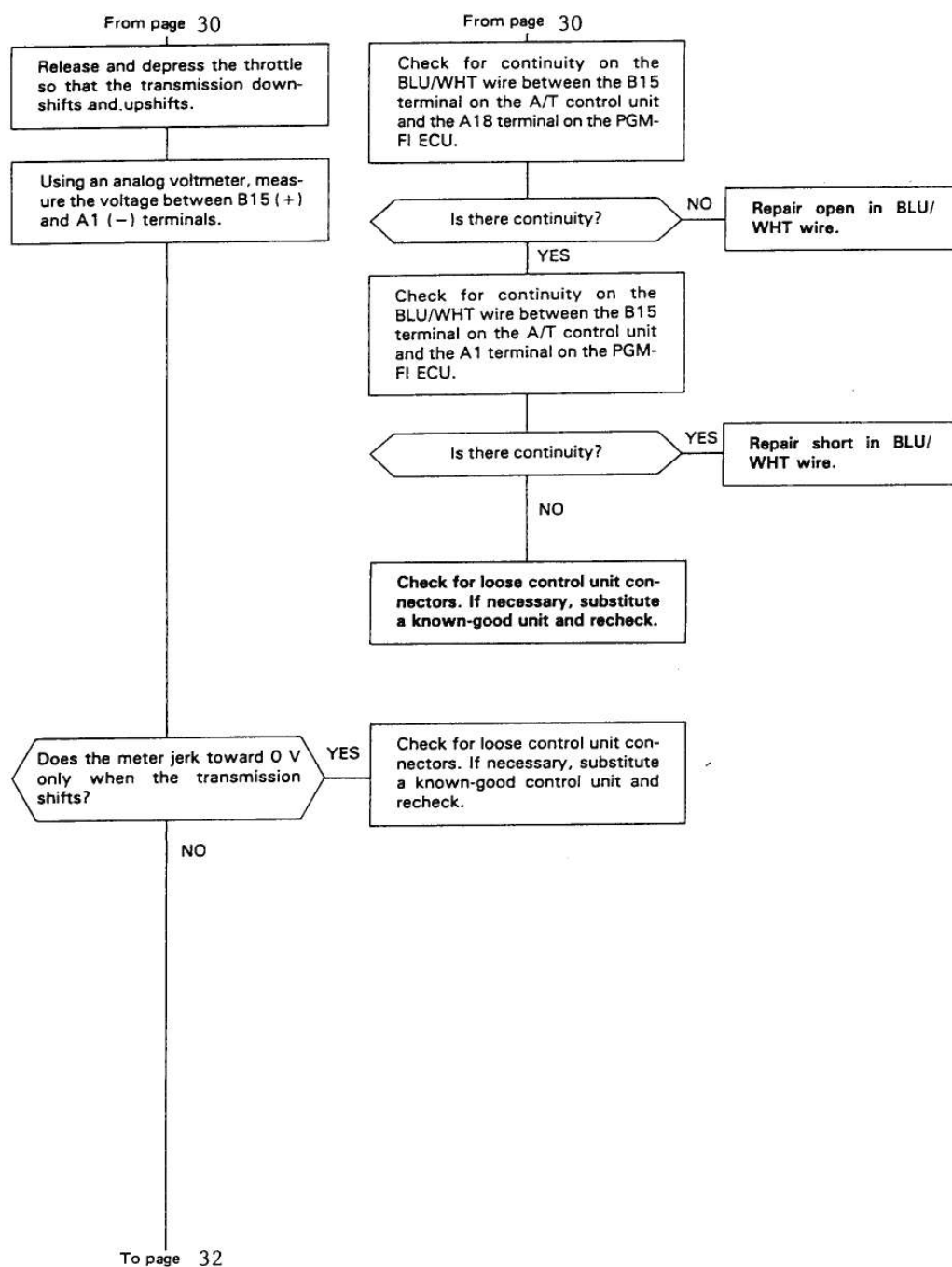


Troubleshooting Flowchart (cont'd)





Technical Service Information



(cont'd)

Troubleshooting Flowchart (cont'd)

From page 31

Apply the brake and shift to **P** position.

Turn the ignition switch OFF.

Disconnect the A connector from the PGM-FI ECU.

Check for continuity on the BLU/WHT wire between the B15 terminal on the A/T control unit and the A18 terminal on the PGM-FI ECU.

Is there continuity?

NO

Repair open in BLU/WHT wire.

YES

Check for continuity on the BLU/WHT wire between the B15 terminal on the A/T control unit and the A1 terminal on the PGM-FI ECU.

Is there continuity?

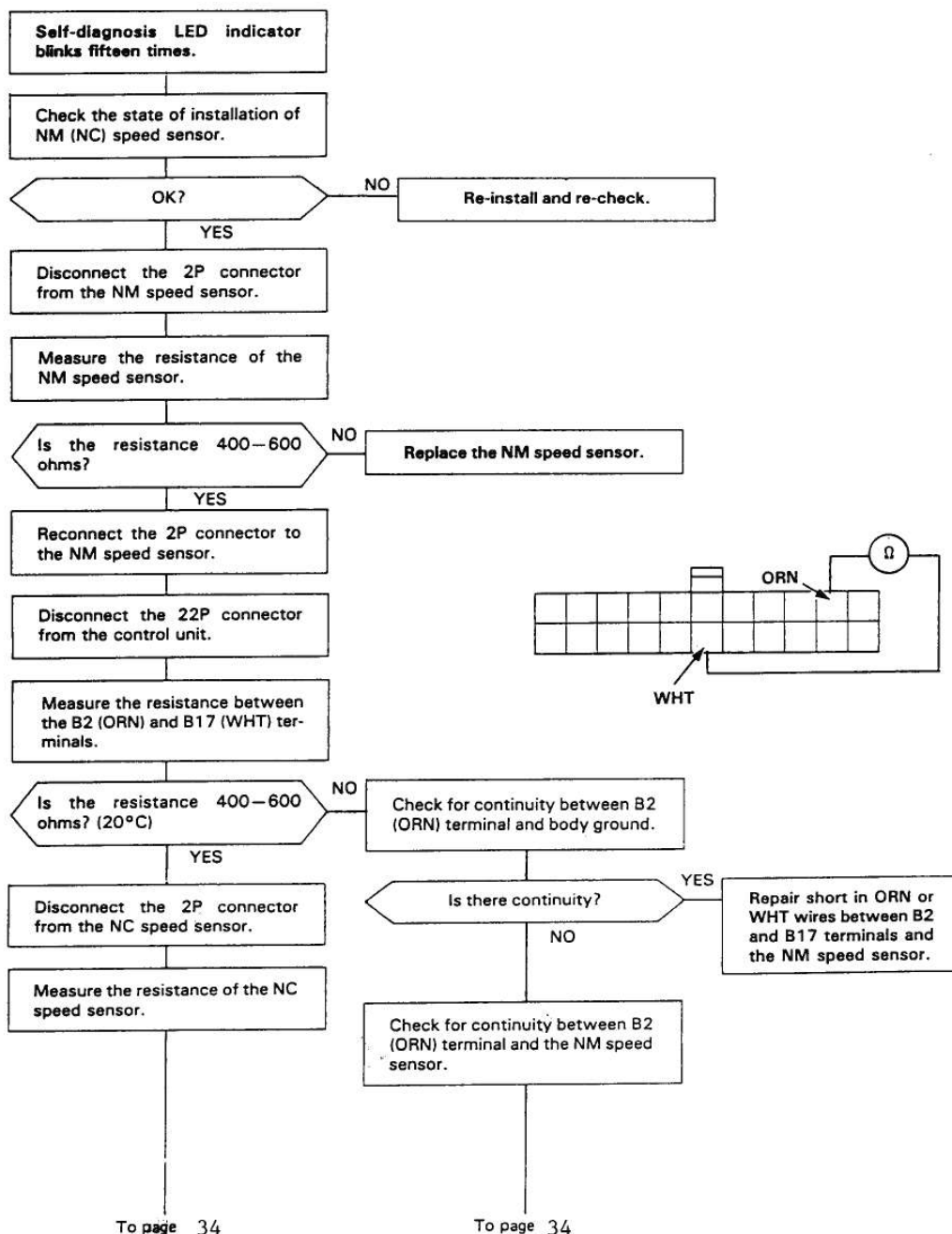
YES

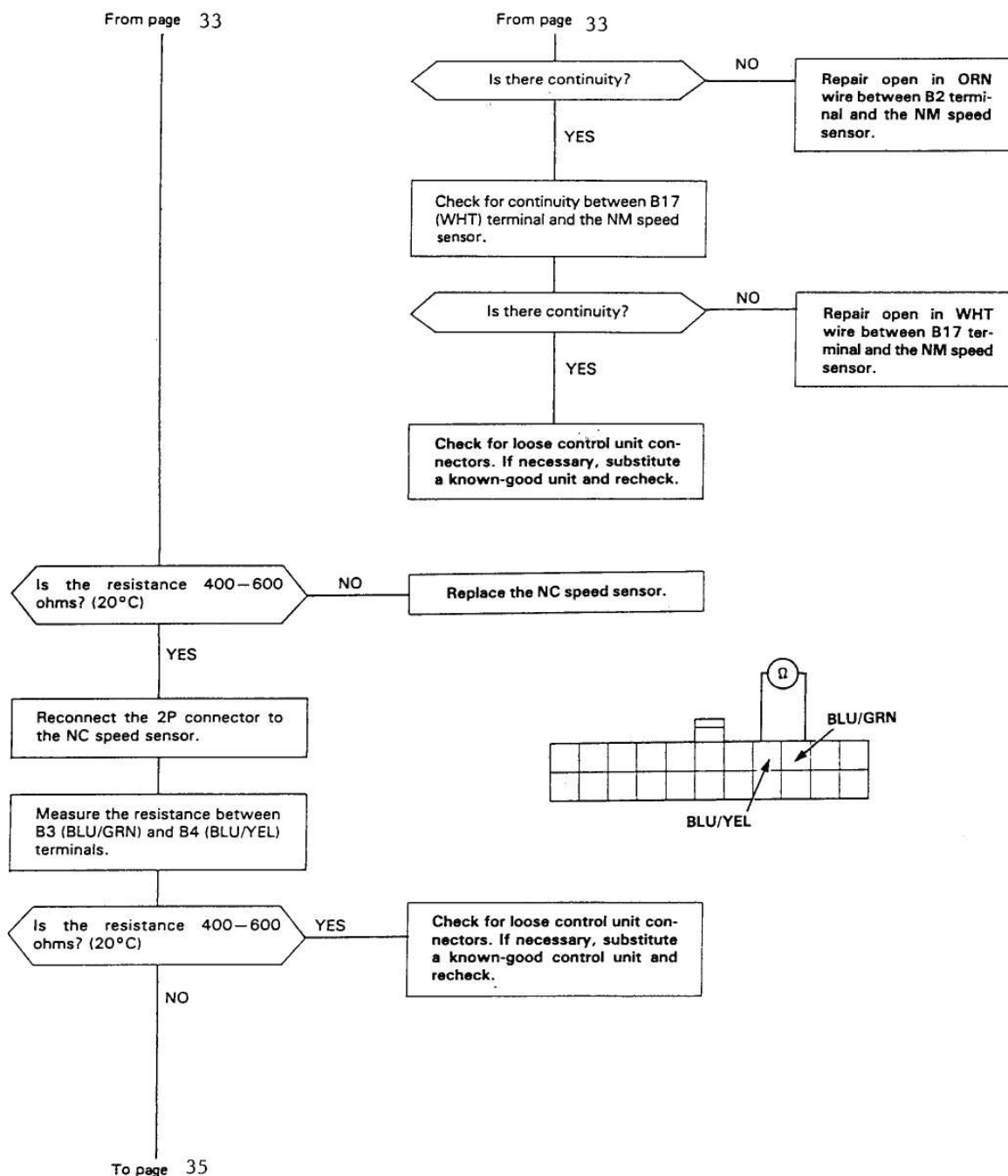
Repair open in BLU/WHT wire.

NO

Check for loose control unit connectors. If necessary, substitute a known-good unit and recheck.

Troubleshooting Flowchart (cont'd)



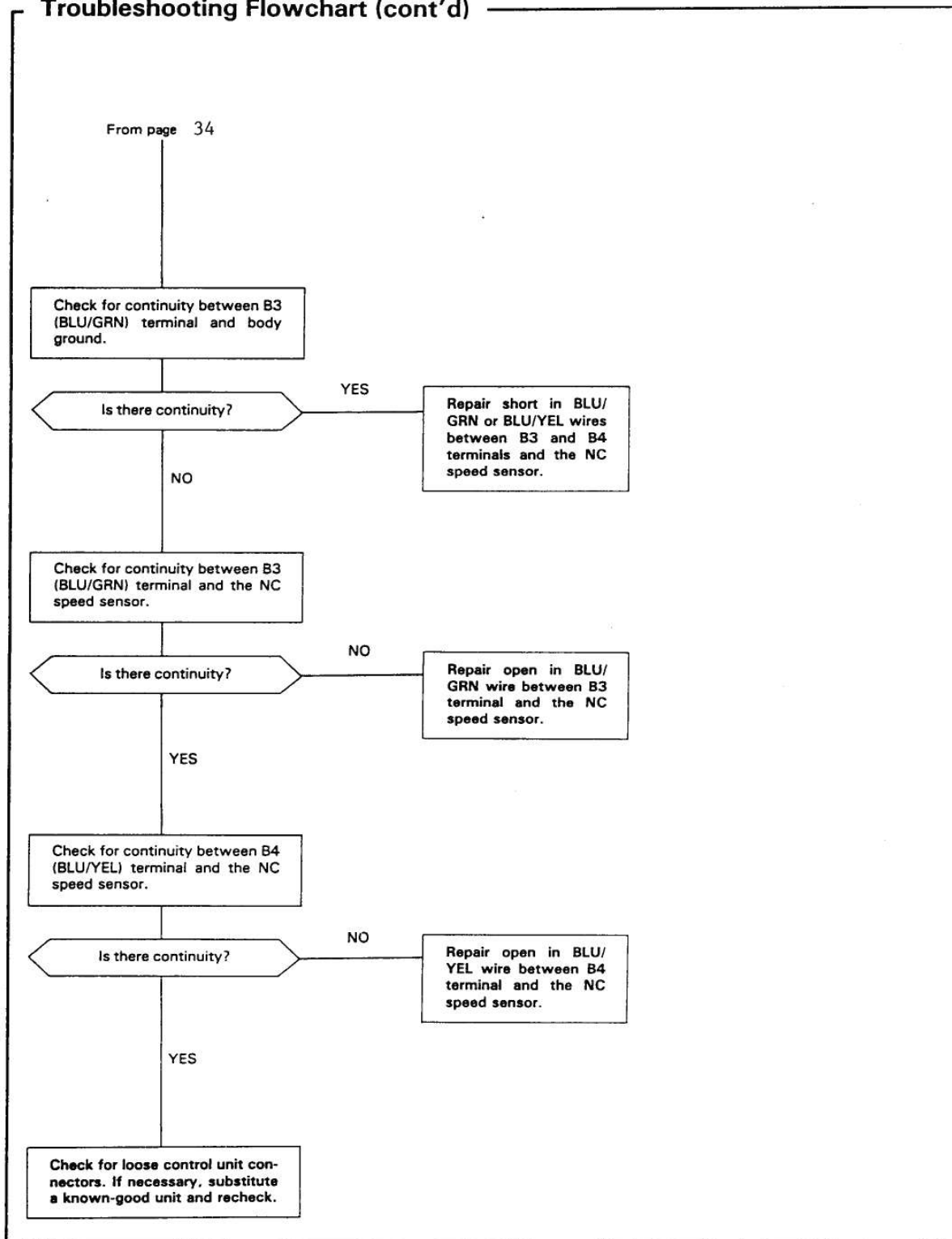


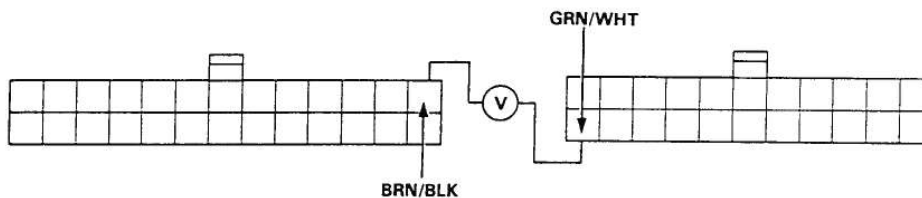
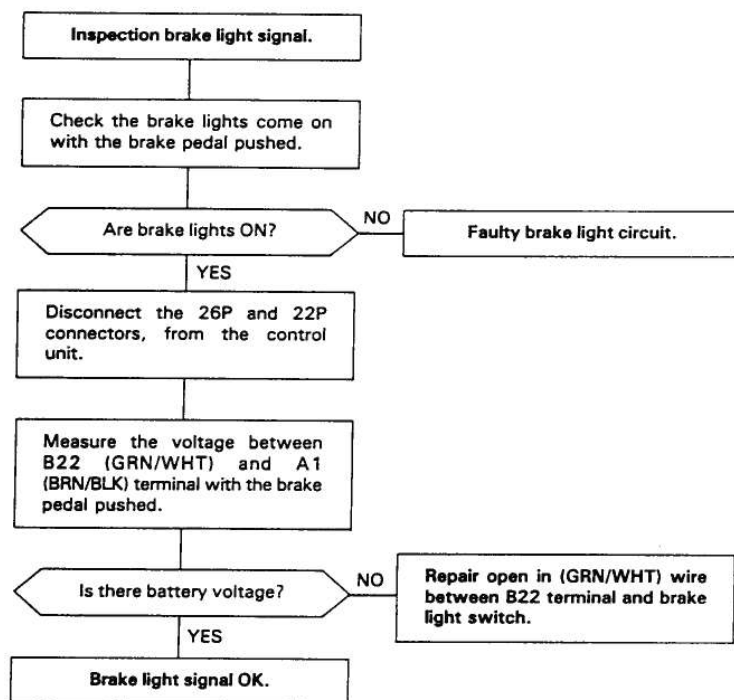
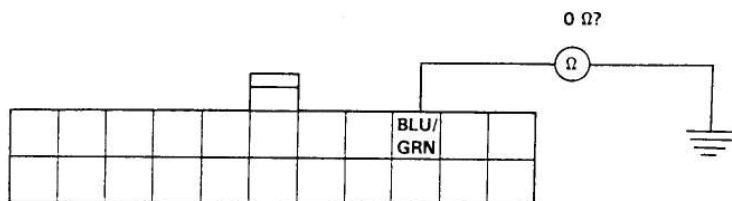
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Technical Service Information

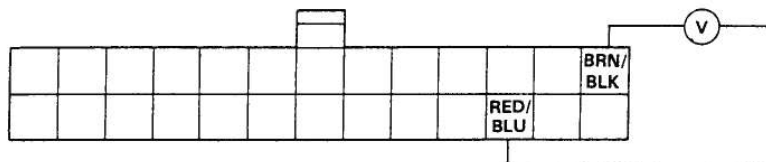
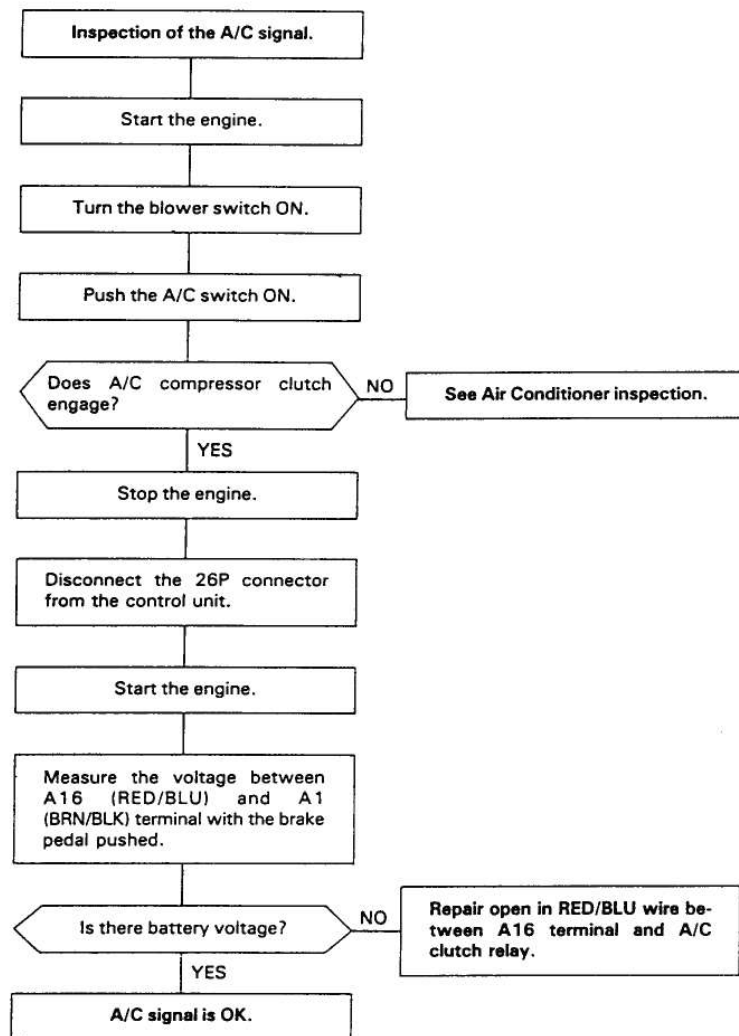
Troubleshooting Flowchart (cont'd)





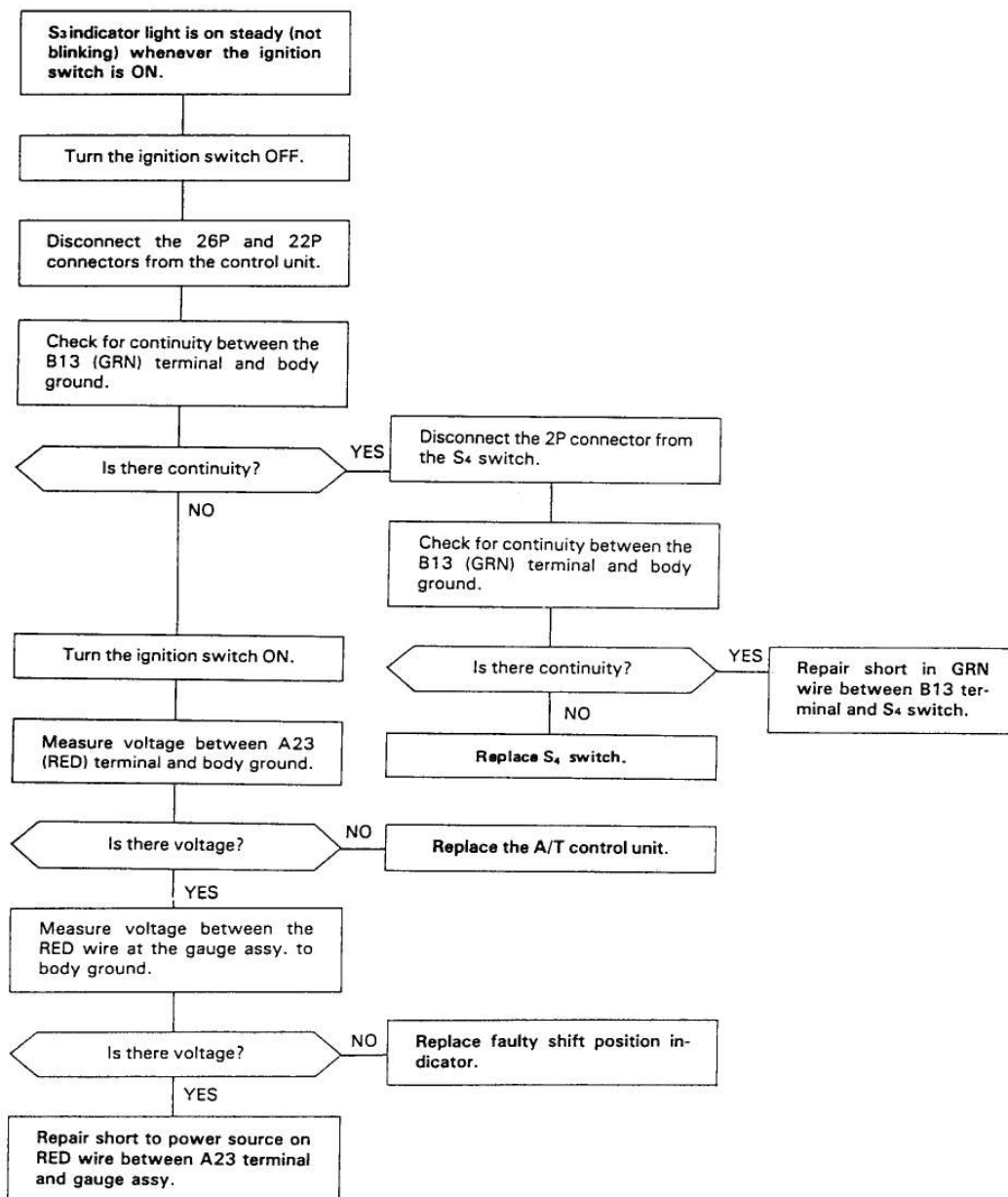


Technical Service Information



(cont'd)

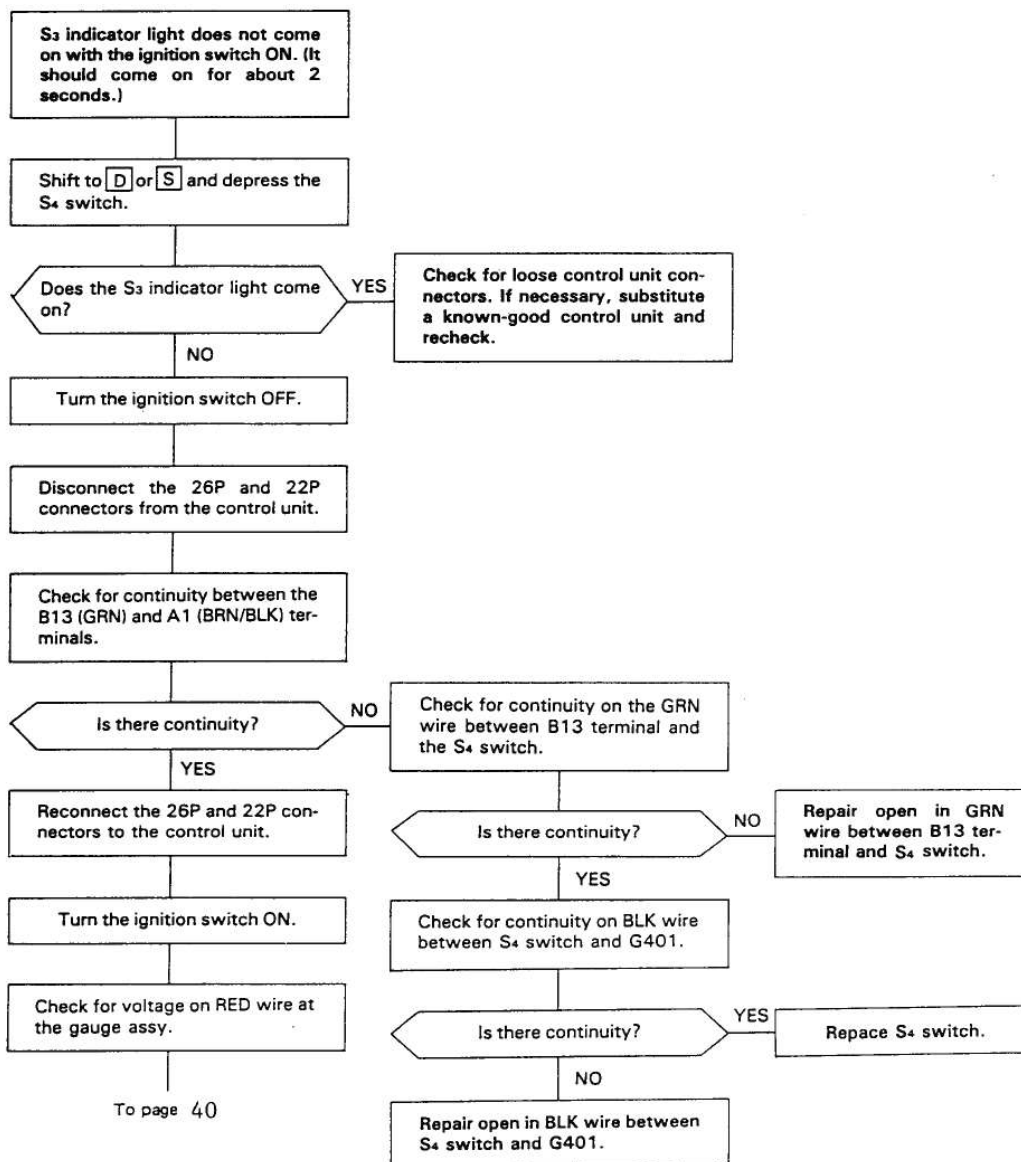
Troubleshooting Flowchart (cont'd)

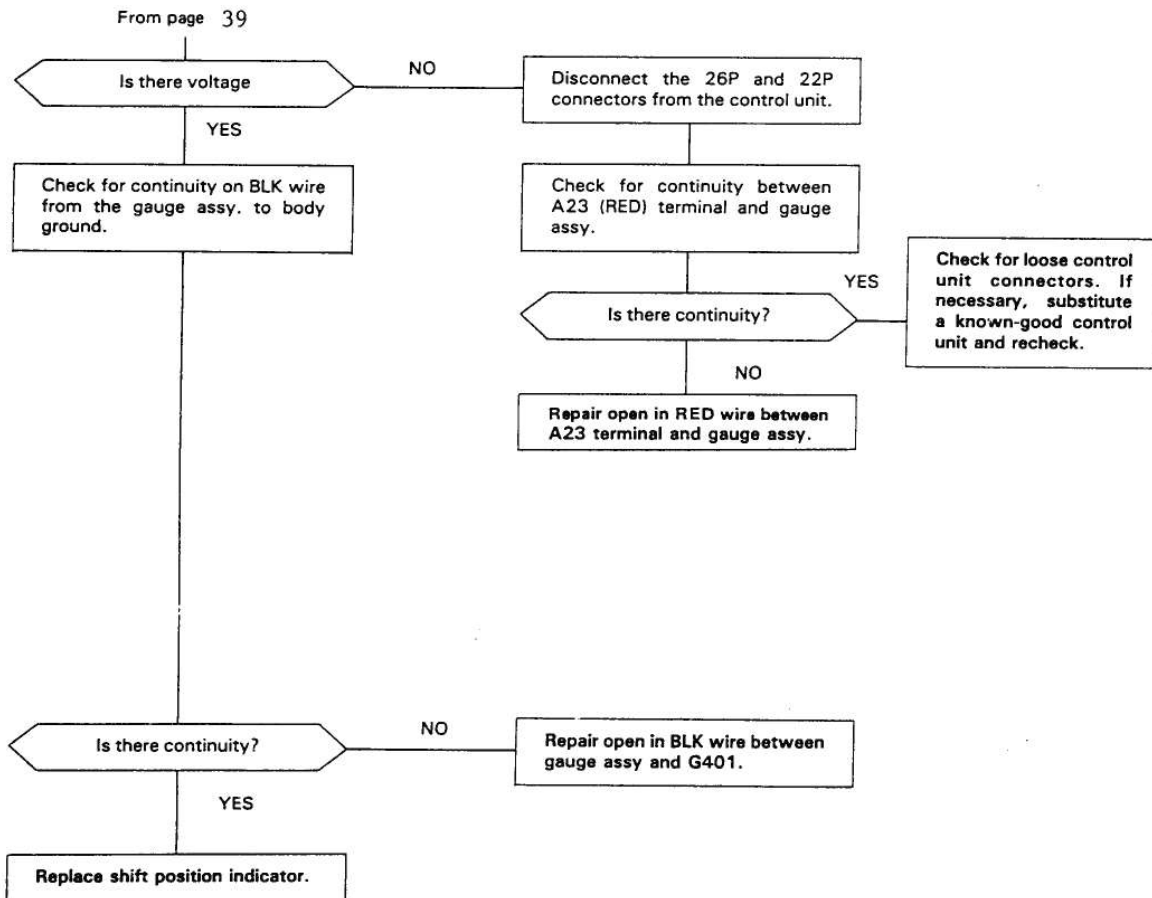




Technical Service Information

Troubleshooting Flowchart (cont'd)





Test

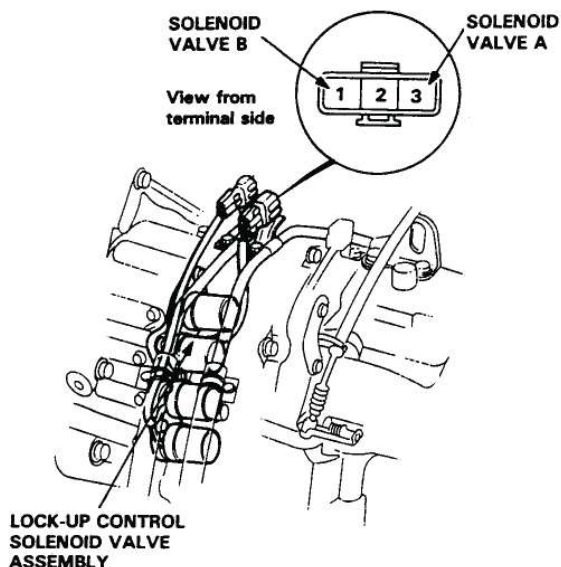
NOTE: Lock-up control solenoid valves A and B must be removed/replaced as an assembly.

1. Disconnect the connector from the lock-up control solenoid valve A/B.

NOTE: Do not remove the lock-up control solenoid valve A/B stay.

2. Measure the resistance between the No.1 terminal of the lock-up control solenoid valve connector and body ground and between the No.3 terminal and body ground.

STANDARD: 14–30 Ω



3. Replace the lock-up control solenoid valve assembly if the resistance is out of specification.
4. Connect the No.1 terminal of the lock-up control solenoid valve connector to the battery positive terminal and No.3 terminal to the battery positive terminal.
A clicking sound should be heard each time the connection is made.
5. If not, check for continuity between the harness and body ground.
6. Replace the lock-up control solenoid valve assembly if there is continuity between the harness and body ground.

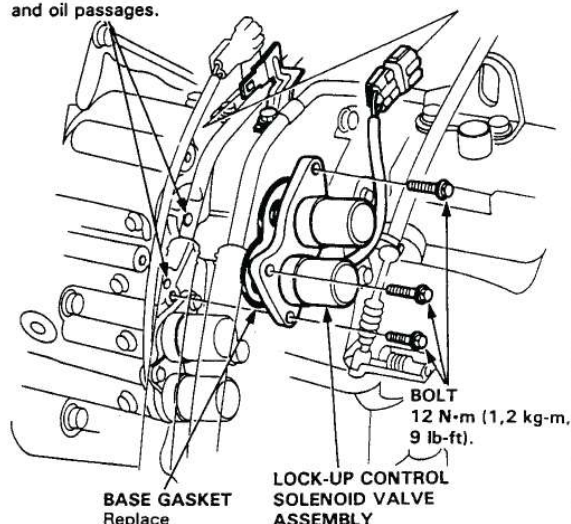
Replacement

1. Remove the three mounting bolts and lock-up control solenoid valve assembly.

NOTE: Be sure to remove or replace the lock-up control solenoid valves A and B as an assembly.

2. Check the lock-up control solenoid valve oil passages for dust or dirt and replace as an assembly, if necessary.

Clean the mounting surface and oil passages.



3. Clean the mounting surface and oil passages of the lock-up control solenoid valve assembly and install a new base gasket.
4. Check the connector for rust or dirt and reconnect it securely.

Test

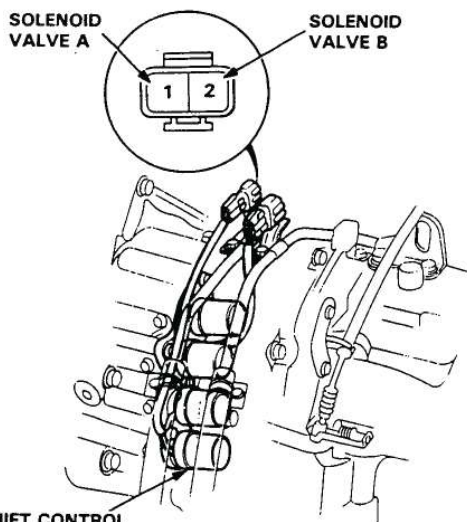
NOTE: Shift control solenoid valves A and B must be removed/replaced as an assembly.

1. Disconnect the connector from the shift control solenoid valve A/B.

NOTE: Do not remove the shift control solenoid valve A/B stay.

2. Measure the resistance between the No.1 terminal of the solenoid valve connector and body ground and between the No.2 terminal and body ground.

STANDARD: 14–30 Ω



SHIFT CONTROL SOLENOID VALVE ASSEMBLY

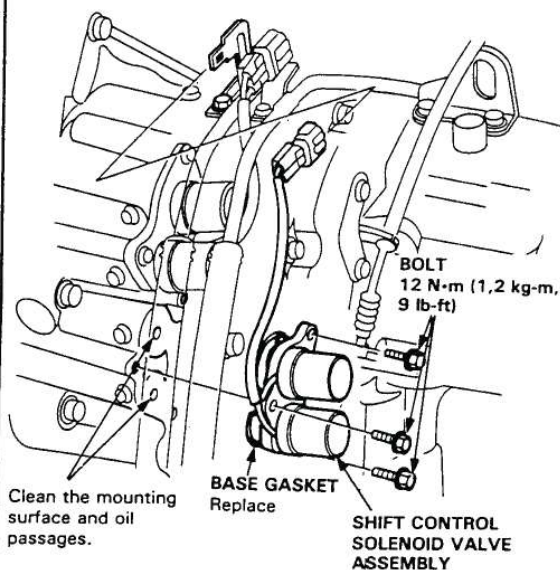
3. Replace the shift control solenoid valve assembly if the resistance is out of specification.
4. Connect the No.1 terminal of the solenoid valve connector to the battery positive terminal and the No.2 terminal to the battery positive terminal. A clicking sound should be heard each time the connection is made.
5. If not check for continuity between the harness and body ground.
6. Replace the shift control solenoid valve assembly if there is continuity between the harness and body ground.

Replacement

1. Remove the three bolts and shift control solenoid valve assembly.

NOTE: Be sure to remove or replace the shift control solenoid valves A and B as an assembly.

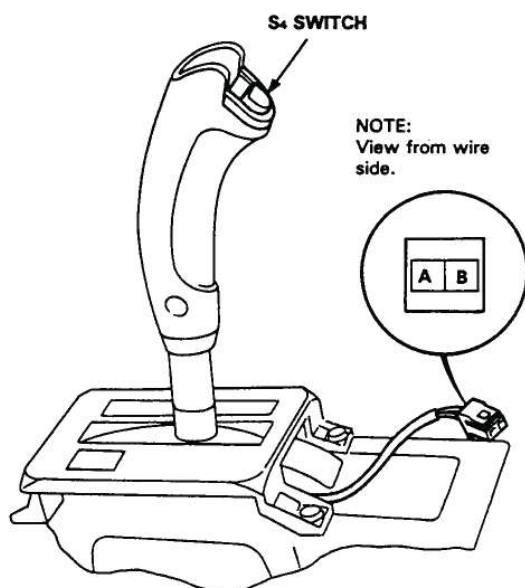
2. Check the shift control solenoid valve oil passages for dust or dirt and replace as an assembly, if necessary.



3. Clean the mounting surface and oil passage of the shift control solenoid valve assembly, and install a new base gasket.
4. Check the connector for rust or dirt and reconnect it securely.

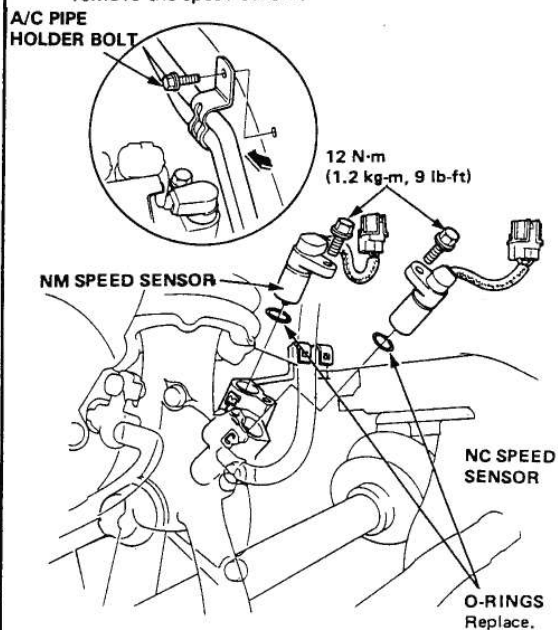
Test

1. Remove the center console.
2. Disconnect the switch connector.
3. Check for continuity between A and B terminals. There should be continuity when the switch is pressed.



Replacement

1. Disconnect the connector.
2. Remove the A/C pipe holder bolt.
3. Remove the 6 mm bolt from the L. side cover and remove the speed sensor.



4. Replace the O-ring with a new one before reassembling the A/T speed sensor.



Technical Service Information

Hydraulic System

SYMPTOM	Check these items on PROBABLE CAUSE LIST	Check these items on NOTES PAGE	PROBABLE CAUSE
Engine runs, but car does not move in any gear	1,2,3,6,7,8,39,44	K,L,R,S	1. ATF level too low 2. Oil pump seized, gear damaged, foreign matter stuck in gear
Car moves in 2, but not in S or D	7,9,10,11	C,M,O	3. Regulator valve stuck or spring weak/damaged
Car moves in S or D, but not in 2	7,12,13	C	4. Servo shaft stuck
Car moves S, D or 2, but not in R	4,7,14,23,36,59	C,N,Q	5. 3rd gears worn/damaged 6. Mainshaft damaged
Poor acceleration Engine races when starting off in S: —Stall rpm high in S, D and 2	1,2,3,7,44,47	C K,L	7. Shift cable misadjusted or cut; end pin disconnected 8. Final gear worn/damaged
—Stall rpm high in S and D	7,9,11	M,N	9. Countershaft and one-way clutch seized/damaged
—Stall rpm high in 2	7,13	O	10. 1st gear worn/damaged
—Stall rpm normal	16		11. 1st clutch faulty
—Stall rpm low	17,35,50,51		a. Clutch piston stuck b. Foreign matter stuck in clutch check valve c. Clutch O-ring worn/damaged d. Clutch disc worn e. Clutch feed pipe/O-ring worn/damaged
Excessive idle vibration	2,35,39,50,51	B,K,L	12. 2nd gear worn/damaged
No up shift	57,46	J,L	13. 2nd clutch faulty
Jumps from 1st to 3rd in S	57		a. Clutch piston stuck b. Foreign matter stuck in clutch check valve c. Clutch O-ring worn/damaged d. Clutch disc worn e. Clutch seal ring seized/damaged
Jumps from 1st to 4th in D	54,57		14. Reverse gears worn/damaged
Shift-up point too early/late: —1st to 2nd, 2nd to 3rd, 3rd to 4th	57		15. ATF level too high
—1st to 2nd	23,53,57		16. Torque converter one-way clutch seized
—2nd to 3rd	24,54,57		17. Engine throttle cable misadjusted
—3rd to 4th	25,53,57		18. Intake manifold vacuum tube broken
Harsh upshift from 1st to 2nd	13,19,20,18,23,29	A,C,D,E,V	19. Throttle valve B faulty
Harsh upshift from 2nd to 3rd	19,21,23,18,24,26,29,30,33	A,C,D,E,H,V	20. 1-2 shift valve faulty
Harsh upshift from 3rd to 4th	19,22,24,18,25,30,31,32,34	A,C,D,E,V	21. 2-3 shift valve faulty 22. 3-4 shift valve faulty 23. 2nd accumulator faulty 24. 3rd accumulator faulty 25. 4th accumulator faulty
Harsh downshift from 2nd to 1st	19,20,23,18,26,29,40,62	A,C,D,E,H,V	26. 2nd orifice control valve faulty
Harsh downshift from 3rd to 2nd	19,21,23,18,24,31,41,61	A,C,D,E,I,T,V	27. Foreign material in main orifice
Harsh downshift from 4th to 3rd	19,22,24,18,25,32,42,58,60	A,C,D,E,V	28. Foreign material in 1st orifice 29. Foreign material in 2nd orifice 30. 3rd orifice control valve faulty
Engine races when shifting from 2nd to 3rd. (Shift point OK)	19,21,23,18,24,26,27,31,33	C,D,E,H,U,V	31. Foreign material in 3rd orifice 32. Foreign material in 4th orifice
Engine races when shifting from 3rd to 4th. (Shift point OK)	19,22,24,18,25,27,30,32,34	C,D,E,I,U,V	33. 3rd clutch faulty
Excessive shock when shifting from 2nd to 3rd (Shift point OK)	19,23,24,18,29,41,48	E,V	a. Clutch piston stuck b. Foreign material stuck in clutch check valve c. Clutch O-ring worn/damaged d. Clutch disc worn e. Clutch feed pipe/O-ring worn/damaged
Excessive shock when shifting from 3rd to 4th (Shift point OK)	19,24,25,18,30,31,42,48	E,I,V	34. 4th clutch faulty
Car creeps forward in N (Shift cable adjusted properly).	11,13,33,34,36,37,38	C,D	a. Clutch piston stuck b. Foreign material stuck in clutch check valve c. Clutch O-ring worn/damaged d. Clutch disc worn e. Clutch feed pipe/O-ring worn/damaged
Excessive time lag from N to S/D (Shift cable adjusted properly).	11,28	C	35. Engine power low 36. Needle bearing seized 37. Thrust washer seized



Technical Service Information

SYMPTOM	Check these items on PROBABLE CAUSE LIST	Check these items on NOTES PAGE	PROBABLE CAUSE
Excessive time lag from N to R (Shift cable adjusted properly).	4,20,34,59	C	38. Clutch clearance incorrect
Abnormal noise in all gears, neutral and park	2,5,43	K,L,Q	39. Drive plate faulty or transmission assembly im- properly installed.
Engine accelerates up to 31 mph (50 km/h), but not more	16		40. 2nd check ball stuck
Vibration in all gears	39		41. 3rd check ball stuck
Hard to shift	7,45	P	42. 4th check ball stuck
Car has only 4th gear	57	L	43. Mainshaft/countershaft bearing damaged
Transmission has no parking	7,45	P	44. Oil filter clogged
Stall rpm is high, but clutch pressure OK in all positions	47		45. Body/case shift cable joint damaged
Lock-up clutch disengagement	18,19,49,50,	E,V	46. Modulator valve faulty
—Engine stalls easily	51,52,55,56,		47. Torque converter check valve faulty
—No power in low/middle speed	57		48. Foreign material in separator orifice
—Noise/vibration in low/middle speed			49. Lock-up timing valve B faulty
—Excessive shock while shifting			50. Lock-up shift valve faulty
Lock-up clutch hunts ON-OFF	18,19,51,55,	E,V	51. Lock-up piston in torque converter faulty
—Engine RPM goes up and down while holding throttle steady.	56,57		52. Lock-up control valve faulty
—Car surges back and forth while driving.			53. Shift control solenoid valve A faulty
Lock-up clutch does not engage	18,19,47,49,	E,V	54. Shift control solenoid valve B faulty
	50,51,55,57		55. Lock-up control solenoid valve A faulty
			56. Lock-up control solenoid valve B faulty
			57. Automatic transmission control unit faulty
			58. 4th exhaust valve faulty
			59. Servo control valve faulty
			60. 4-3 kickdown valve faulty
			61. 3-2 kickdown valve faulty
			62. 2-1 orifice control valve faulty

(cont'd)



Technical Service Information

Hydraulic System (cont'd)

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 S or D.	R5	
Trans lock up in R.	R4	
Trans has no park.	R3	
Excessive drag in trans.	R8	R, K
Excessive vibration, rpm related.	R9	
Noises with wheels moving only.	R7	
Main seal pops out.	R10	S
Various shifting problems.	R11, R12	
Harsh upshifts.	R13	

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	Feed pipe missing in governor shaft
R7	Reverse hub installed upside down
R8	Oil pump binding
R9	Torque converter not fully seated in oil pump
R10	Main seal improperly installed
R11	Springs improperly installed
R12	Valves improperly installed
R13	Ball check valves not installed
R14	Shift fork bolt not installed

NOTES	
A	Flushing procedure (repeat 3 times): 1. Drain the trans. 2. Refill with 3 qts. of Dexron recommended type ATF. 3. Start the engine and shift trans to D. 4. Let trans shift through 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 the motor mounts as outlined in engine section of service manual.
C	If the large clutch piston O-ring is broken, inspect the piston groove for rough machining.
D	If the clutch pack is seized, or is excessively worn, inspect the other clutches for wear, and check the orifice control valves and throttle valves for free movement.
E	If throttle valve B is stuck, inspect the clutches for wear.
G	If the 1-2 valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no low gear.
H	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I	If the 3rd orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
J	If the clutch pressure control valve is stuck closed, the transmission will not shift out of low gear.

NOTES	
K	Improper alignment of main valve body and torque converter case may cause oil pump seizure. The symptoms are mostly an rpm-related ticking noise high pitched squeak. In severe instances, it may stall the engine.
L	If the oil screen is clogged with particles of steel or aluminum, inspect the oil pump and differential pinion shaft. If both are OK, and no cause for the contamination is found, replace the torque converter.
M	If the low clutch feedpipe guide in the end cover is scored by the mainshaft, inspect the ball bearing for excessive movement in the transmission housing. If OK, replace the end cover as it is dented. The O-ring under the guide is probably broken.
N	Replace the mainshaft if the bushings for the low and 4th feedpipe are loose or damaged. 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.
O	A worn or damaged sprag clutch is mostly a result of shifting the trans in S or D while the wheels rotate in reverse, such as rocking the car in snow.
P	Inspect the frame for collision damage.
Q	Inspect for damage or wear: 1. ATV Sensor shaft woodruff key 2. Reverse selector gear teeth chamfers 3. Engagement teeth chamfers of countershaft 4th & reverse gear 4. Shift fork, for scuff marks in center 5. Differential pinion shaft for wear under pinion gears 6. Bottom of 3rd clutch for swirl marks Replace items 1, 2, 3 and 4 if worn or damaged. If trans makes clicking, grinding or whirring noise, also replace mainshaft 4th gear and reverse idler gear and counter 4th gear in addition to 1, 2, 3, or 4. If differential pinion shaft is worn, overhaul differential assembly and replace oil screen and thoroughly clean trans, flush torque converter and cooler and lines. If bottom of 3rd clutch is swirled and trans makes gear noise, replace countershaft and ring gear.
R	Be very careful not to damage the torque converter case when replacing the main ball bearing. You may also damage the oil pump when you torque down the main valve body; this will result in oil pump seizure if not detected. Use proper tools.
S	Install the main seal flush with the torque converter case. If you push it into the torque converter case until it bottoms out, it will block the oil return passage and result in damage.
T	Harsh downshifts when coasting to a stop with zero throttle may be caused by a bent-in throttle valve B.
U	Check if servo valve check valve stopper cap is installed. If it was not installed, the check valve may have been pushed out by hydraulic pressure causing a leak (internal) affecting all forward gears.
V	Throttle cable adjustment is essential for proper operation of the transmission. Not only does it affect the shift points if misadjusted but also the shift quality and lockup clutch operation. A too long adjusted cable will result in throttle pressure being too low for the amount of engine torque input into the transmission, and may cause clutch slippage. A too short adjusted cable will result in too high throttle pressures which may cause harsh shifts, erratic shifts and torque converter hunting.



Technical Service Information

Test Stall Speed

CAUTION:

- To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
- Do not shift the lever while rising the engine speed.
- Be sure to remove the pressure gauge before testing stall speed.

1. Engage parking brake and block the front wheels.
2. Connect tachometer, and start the engine.
3. After the engine has warmed up to normal operating temperature, shift into **[2]**.
4. Fully depress the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
5. Allow 2 minutes for cooling, then repeat same test in **[D]**, **[S]**, and **[R]**.

Stall speed in **[D]**, **[S]**, **[2]** and **[R]** must be the same, and must also be within limits:

NOTE:

Stall speed test must be made only for checking the cause of trouble.

Stall Speed RPM:

Specification: 2,300 rpm

Service Limit: 2,150—2,450 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in [D] , [S] , [2] & [R]	• Low fluid level or oil pump output. • Clogged oil strainer. • Pressure regulator valve stuck closed. • Slipping clutch.
Stall rpm high in [R]	• Slippage of 4th clutch
Stall rpm high in [2]	• Slippage of 2nd clutch
Stall rpm high in [D] & [S]	• Slippage of 1st clutch or 1st gear one-way clutch
Stall rpm low in [D] , [S] , [2] & [R]	• Engine output low • Torque converter one-way clutch slipping

Road Test

NOTE: After transmission is installed:

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

Warm up the engine to operating temperature.

[D] and **[S]** Range

1. Apply parking brake and block the wheels. Start the engine, then move the selector to **[D]** while depressing the brake pedal. Depress the 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.
3. Apply parking brake and block the wheels. Start the engine, then move the selector **[S]** while depressing the brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.



Technical Service Information

• Upshift

		1st—2nd	2nd—3rd	3rd—4th	LC.ON
1/12 throttle Coasting down-hill from a stop	km/h	14.5—19	25—30.5	37—44	61—67
	mph	9—12	15.5—19	23—27.5	38—42
7/16 throttle Acceleration from a stop	km/h	26.5—33	48—57	65.5—75	89.5—96
	mph	16.5—20.5	30—35.5	41—47	56—60
Full-throttle Acceleration from a stop	km/h	56—65	99.5—109.5	153.5—171.5	142.5—149
	mph	35—40.5	62—68.5	96—107	89—93

[S] (with S4 switch in operation)

		1st—2nd	2nd—3rd	3rd—4th	LC.ON
1/12 throttle Coasting down-hill from a stop	km/h	19.5—24	51.5—38.5	46.5—54	61—67.5
	mph	12—15	20.5—24	29—33.5	38—42
7/16 throttle Acceleration from a stop	km/h	34.5—42.5	61—70	93.5—103	104.5—111
	mph	21.5—26.5	38—43.5	58—64	65—69
Full-throttle Acceleration from a stop	km/h	56.5—65	100—110	154.5—172	148—154.5
	mph	35—40.5	62—68.5	96—107	92—96

• Downshift

		LC.OFF	4th—3rd	3rd—2nd	2nd—1st
1/12 throttle Coasting or braking to a stop	km/h	56.5—63	15.5—21	—	7—13
	mph	35—39	9.5—13	—	4.5—8
7/16 throttle When car is slowed by increased grade, wind, etc.	km/h	77—83.5	—	—	—
	mph	48—52	—	—	—
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	138.5—145	137—153.5	77—88.5	40—49
	mph	86—90	85—95.5	48—55	25—30.5

[S] (with S4 switch in operation)

		LC.OFF	4th—3rd	3rd—2nd	2nd—1st
1/12 throttle Coasting or braking to a stop	km/h	56.5—63	18.5—25.5	—	7—13
	mph	35—39	11.5—16	—	4.5—8
7/16 throttle When car is slowed by increased grade, wind, etc.	km/h	83.5—90	—	—	—
	mph	52—56	—	—	—
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	143—149.5	141.5—158.5	88.5—100	45—54
	mph	89—93	88—98.5	55—62	28—33.5

CAUTION: Do not shift from [D] or [S] to [2] at speeds over 100 km/h (62.5 mph); 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 for abnormal noise and clutch slippage.

[P] (Park)

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

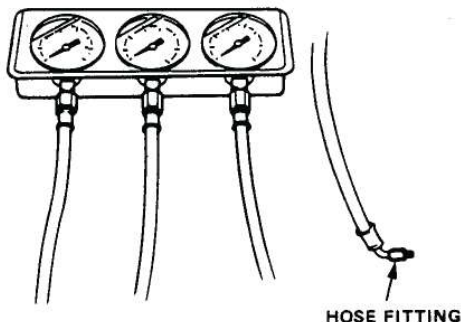
Testing

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

NOTE:

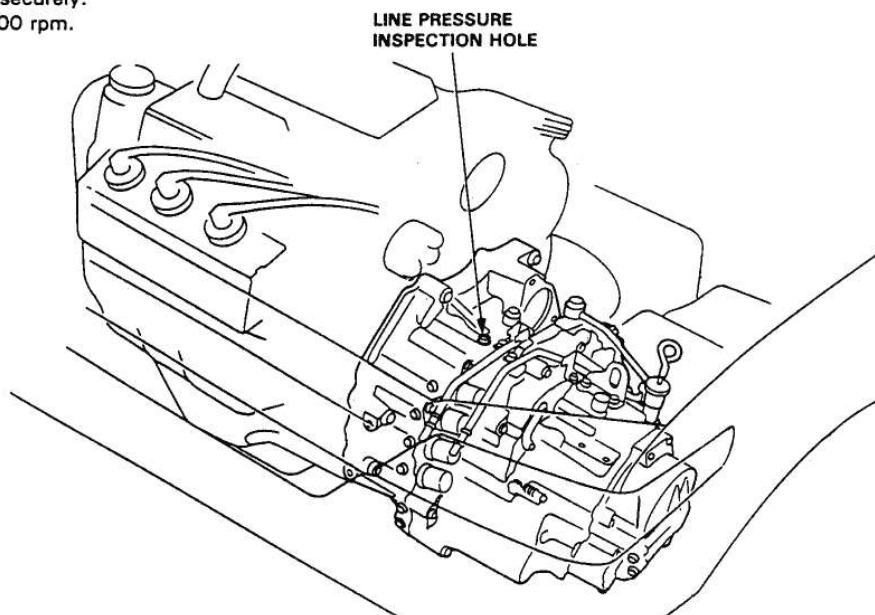
- Stop engine when attaching hoses for pressure tests.
Torque hose fitting to 18 N·m (1.8 kg-m, 12 lb-ft).
- Do not reuse aluminum washers.

GAUGE SET 07406—0020003 (Includes Pressure Hoses)
A/T OIL PRESSURE GAUGE HOSE 07406—0020201



Line Pressure Measurement

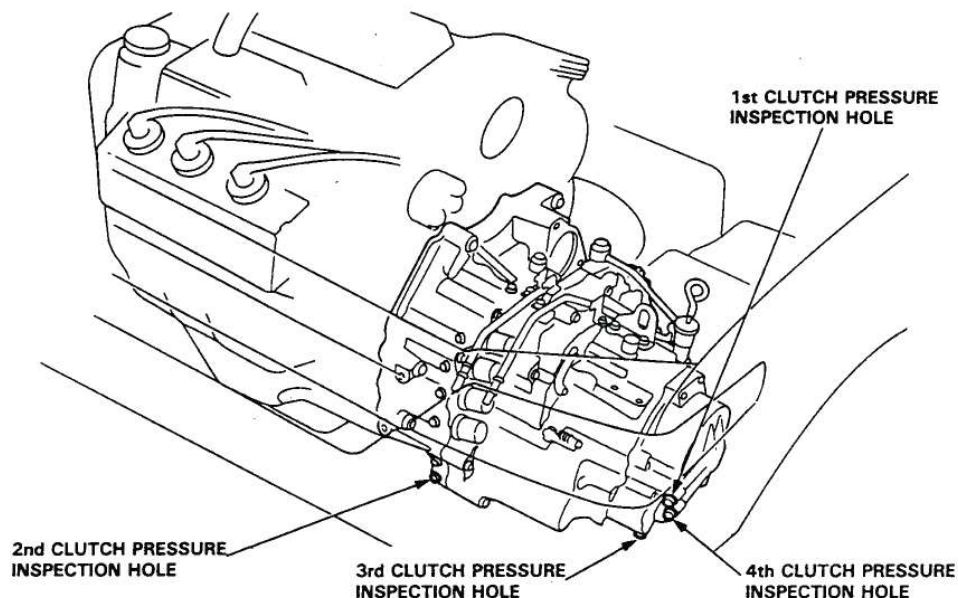
- Set the parking brake securely.
- Run the engine at 2,000 rpm.



PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Line	N or P	No (or low) Line pressure	Torque converter, oil pump pressure regulator, torque converter check valve, oil pump	785—834 kPa (8.0—8.5 kg/cm ² , 114—121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)

Clutch Pressure Measurement

- Set the parking brake securely and block the wheels.
- Jack up the front of the car and support it with a rigid rack.
- Run the engine at idle speed to check 1st clutch only. Test stall speed in **[D]** or **[S]** if the 1st clutch pressure is low.
- Run the engine at 2,000 rpm other clutches.



PRESURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
1st Clutch	[S] or [D]	No or low 1st pressure	1st Clutch	785–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)
2nd Clutch	[2]	No or low 2nd pressure	2nd Clutch		
3rd Clutch	[S] (S ₄ switch OFF)	No or low 3rd pressure	3rd Clutch	490 kPa (5.0 kg/cm ² , 71 psi) (throttle fully closed)	441 kPa (4.5 kg/cm ² , 64 psi) (throttle fully closed)
4th Clutch	[S] (with S ₄ switch in operation) or [D]	No or low 4th pressure	4th Clutch	834 kPa (8.5 kg/cm ² , 121 psi) (throttle more than 3/8 opened)	735 kPa (7.5 kg/cm ² , 107 psi) (throttle more than 3/8 opened)
	[R]	No or low 4th pressure	Servo valve or 4th Clutch	785–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)

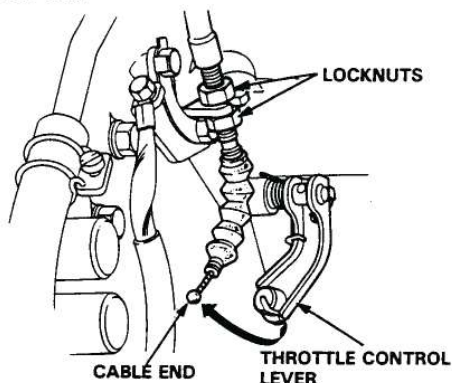
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Testing (cont'd)

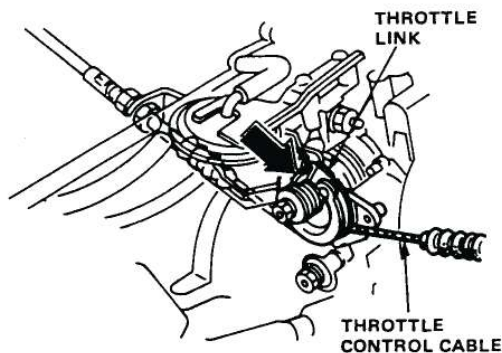
Low/High Pressure Test

1. Set the parking brake and block rear wheels securely.
2. Raise the car and support with safety stands.
3. Attach the gauge set to the appropriate pressure test port.
4. Remove the cable end of the throttle control lever.

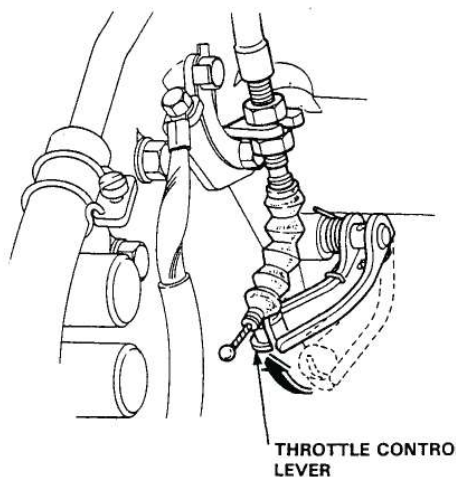
NOTE: Do not loosen the locknuts, simply unhook the cable end.



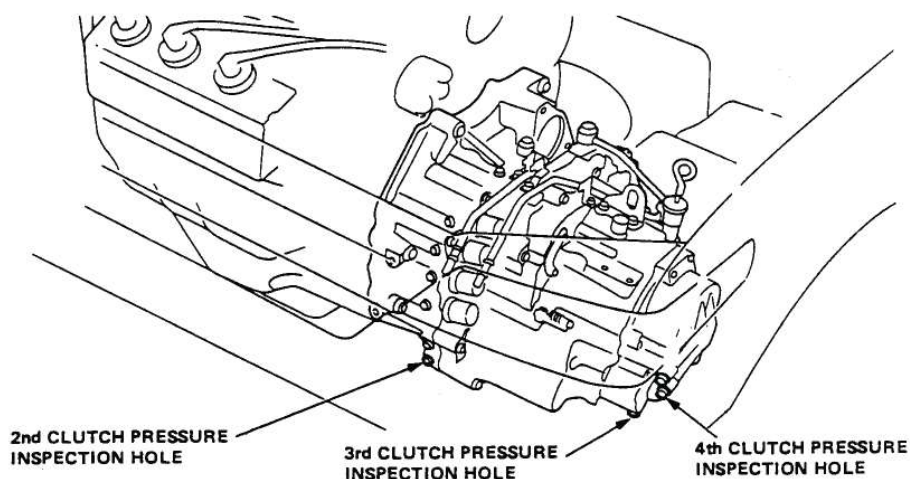
5. Warm up the engine to normal operating temperature (cooling fan comes on).
6. With the engine idling, move the selector lever to D₃ or D₄.
7. Slowly move the throttle linkage to increase engine rpm until pressure is indicated on the appropriate gauge. Then release the throttle linkage, allowing the engine to return to an idle, and record the pressure reading.
8. Repeat step 7 for each clutch pressure being inspected.



9. With the engine idling, lift the throttle control lever up approximately 1/2 of its possible travel and increase the engine rpm until pressure is indicated on the appropriate gauge. Record the highest pressure reading obtained.



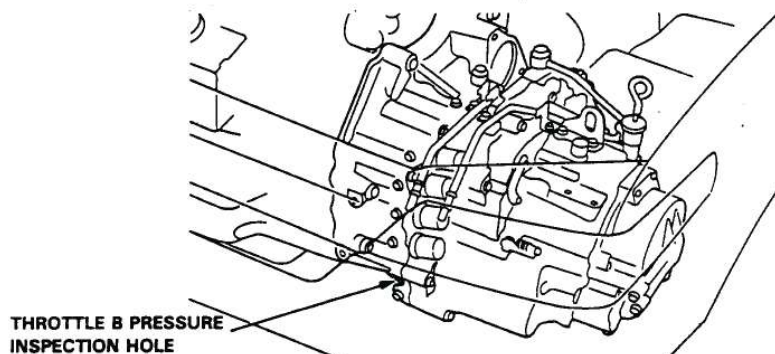
10. Repeat step 9 for each clutch pressure being inspected.



PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
2nd Clutch	[2]	No or low 2nd pressure	2nd Clutch	490–834 kPa (5.0–8.5 kg/cm ² , 71–121 psi) varies with throttle opening	441 kPa (4.5 kg/cm ² , 64 psi) with lever released 735 kPa (7.5 kg/cm ² , 107 psi) with lever in full throttle position
3rd Clutch	[S] or [D]	No or low 3rd pressure	3rd Clutch		
4th Clutch	[S] (with S4 switch in operation) or [D]	No or low 4th pressure	4th Clutch		

Throttle B Pressure Measurement

- Set the parking brake securely and block the wheels.
- Run the engine at 1,000 rpm.
- Disconnect the throttle control cable from the throttle lever and set the control lever in full throttle position.

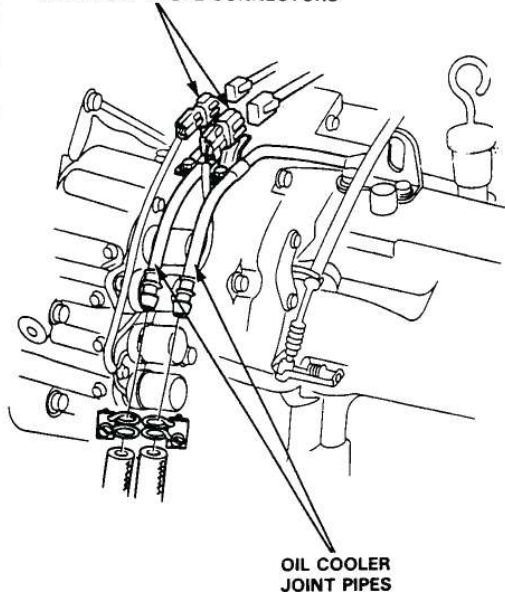


PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Throttle B	[S] or [D]	No (or low) Throttle B pressure	Throttle valve B	785–834 kPa (8.0–8.5 kg/cm ² , 114–121 psi)	735 kPa (7.5 kg/cm ² , 107 psi)

Removal

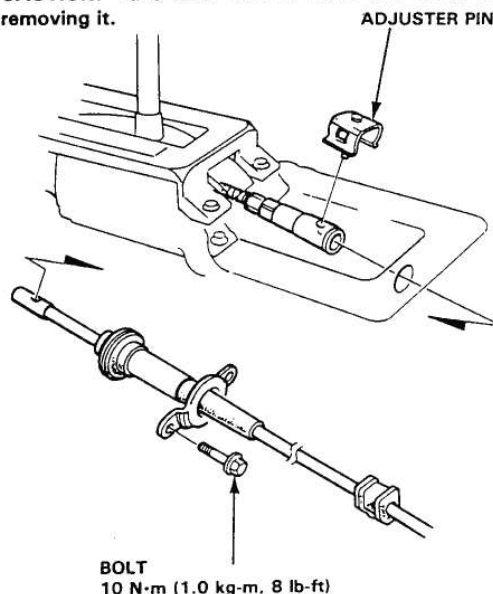
1. Disconnect the battery negative (-) and positive (+) cables from the battery.
 2. Disconnect the starter motor and ground cables.
 3. Drain ATF. Reinstall the drain plug and washer.
 4. Remove the two 6 x 1.0 mm bolts located at the side of the battery base, and intake hose band of the throttle body.
 5. Remove the air cleaner case complete with the intake hose (see Section 11).
 6. Remove the speedometer gearbox without removing the power steering speed sensor hose.
 7. Disconnect the throttle control cable at the transmission housing.
 8. Disconnect the cooler hoses at the joint pipes. Turn the ends up to prevent ATF from flowing out.
- NOTE:** Check for any signs of leak at the hose joints.
9. Disconnect the lock-up control solenoid valve wire connector, shift control solenoid valve wire connector, and speed sensor wire connectors.

SOLENOID VALVE CONNECTORS

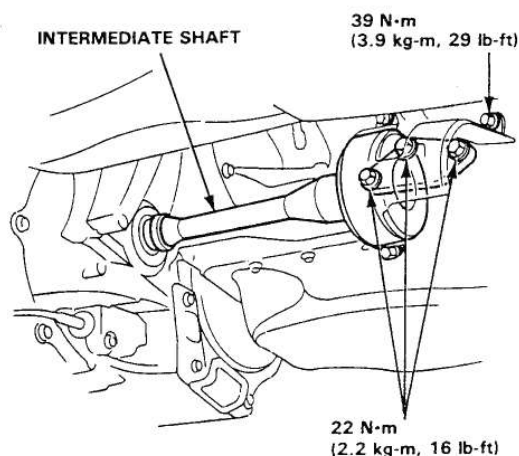


10. Remove the center console, pry off the adjuster pin, and disconnect the control cable.
11. Remove the shift cable guide bolts, and pull the cable out of the cable.

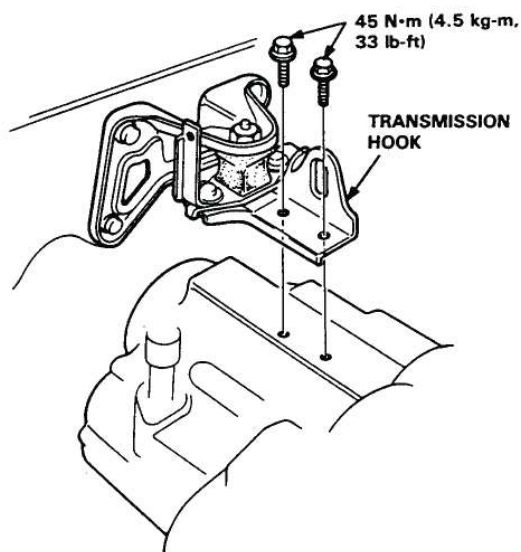
CAUTION: Take care not to bend the cable when removing it.



12. Remove the right and left axles, then remove the intermediate shaft.

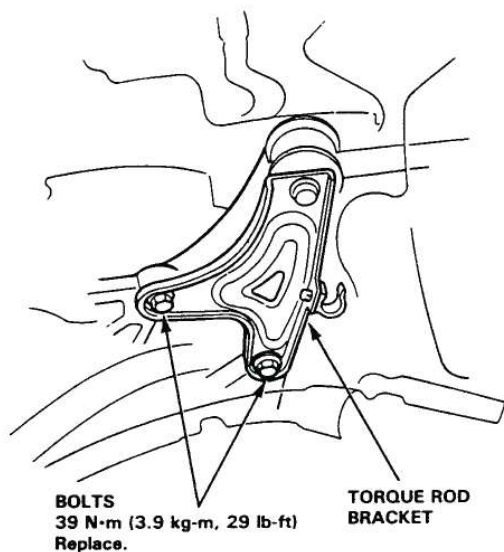


13. Remove the transmission housing mounting bolts from the transmission hook.



14. Remove the torque converter case mounting bolts from the torque rod bracket.

NOTE: Replace the bolts with new ones whenever loosened or removed.

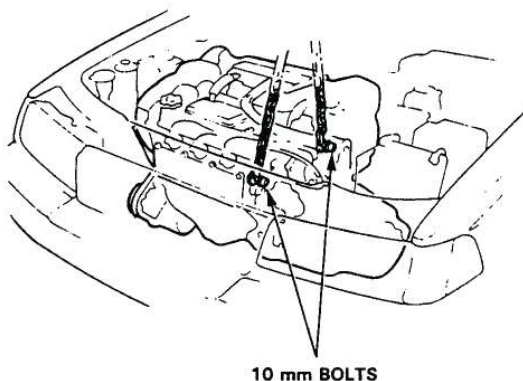


15. Place a jack under the transmission and raise the transmission just enough to take weight off the mounts.

16. Remove the center beam.

17. Attach a chain hoist with the two bolts, then raise the engine a slight amount to unload the mounts.

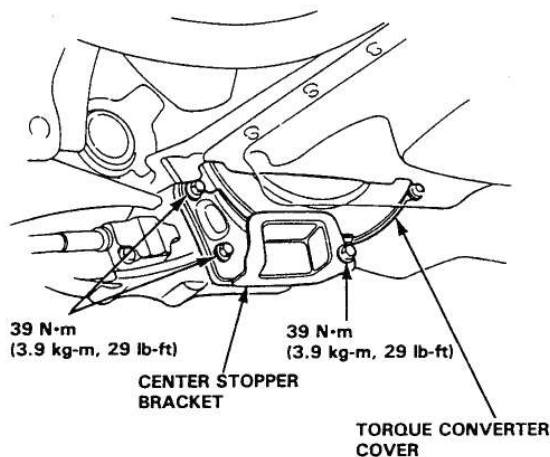
NOTE: Be sure the hoist does not interfere with distributor high tension wires.



18. While holding the lock nut, remove the radius rod.

19. Remove the center stopper bracket from the transmission.

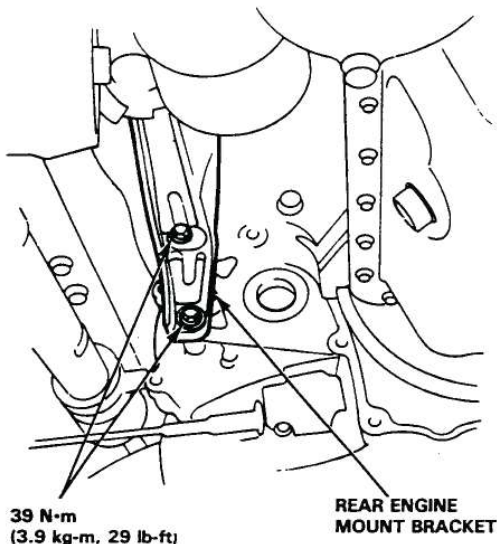
20. Remove the torque converter cover.



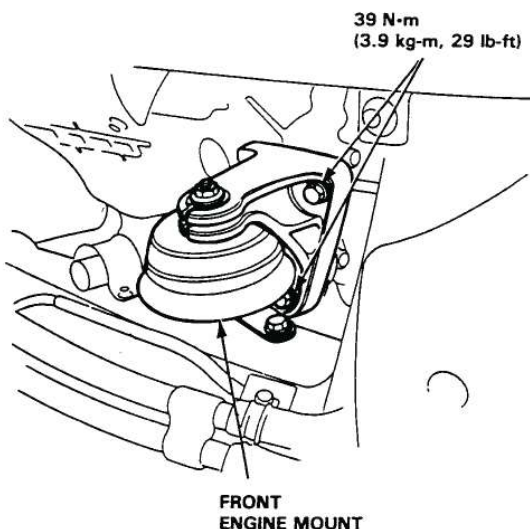
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Removal (cont'd)

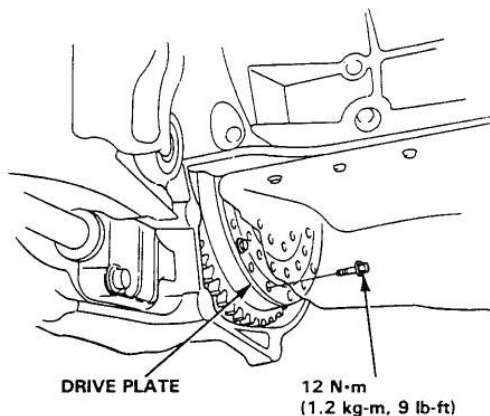
21. Remove the two rear engine mount bolts from the transmission.



22. Remove the front engine mount bolts from the transmission.

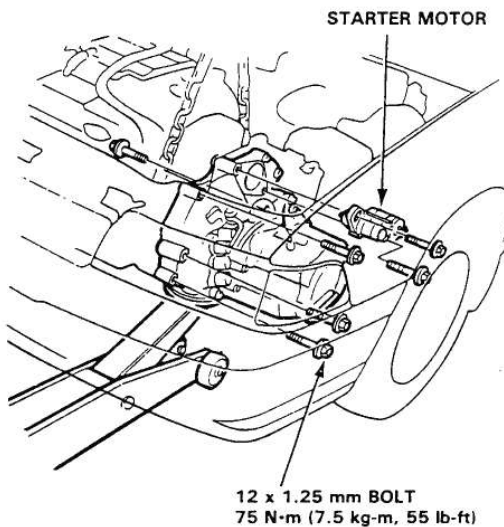


23. Remove the plug, then remove the drive plate bolts one at a time while rotating the crankshaft pulley.



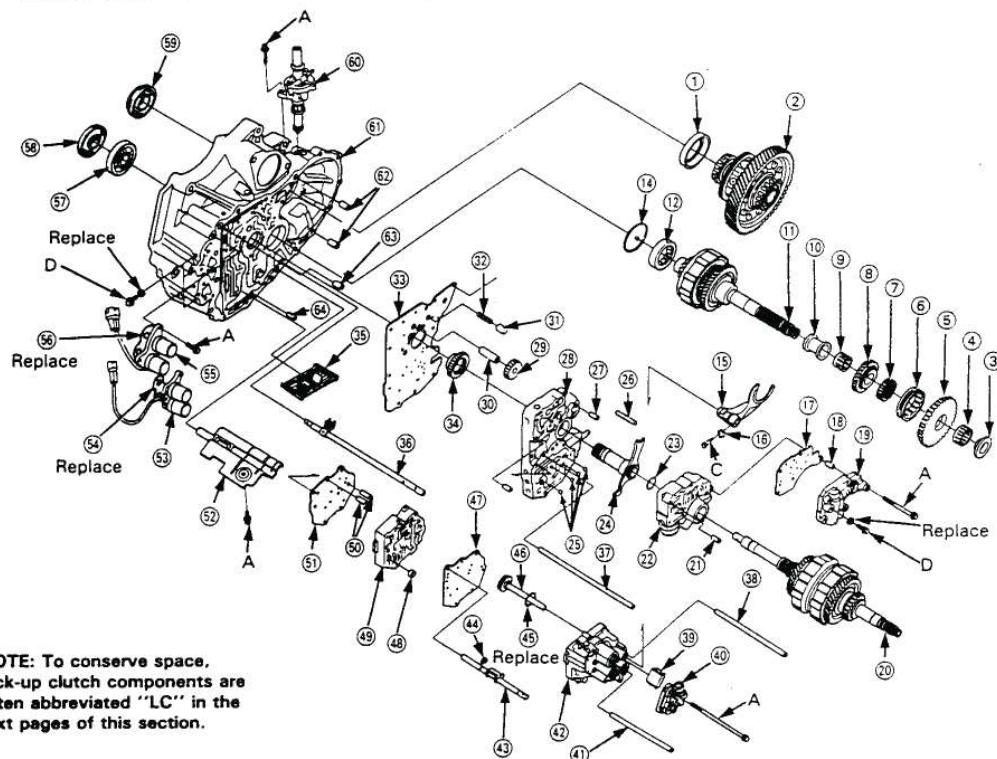
24. Remove the starter motor mount bolts and the starter motor.

25. Remove the remaining bolts attaching the transmission housing to the engine.



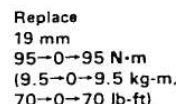
NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Coat all parts with ATF before reassembly.



NOTE: To conserve space, lock-up clutch components are often abbreviated "LC" in the text pages of this section.

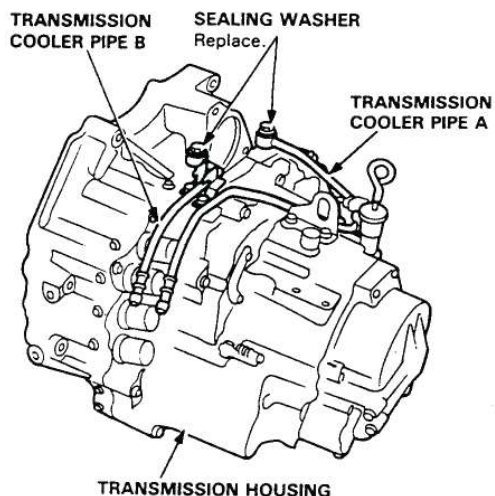
- | | | | |
|---|---|--|--|
| 1 DIFFERENTIAL BEARING
OUTER RACE | 18 DOWEL PIN 8 x 14 mm | 33 MAIN VALVE BODY
SEPARATOR PLATE | 52 BAFFLE PLATE |
| 2 DIFFERENTIAL ASSY | 19 L/C SHIFT VALVE BODY
Removal, page 14-96 | 34 PUMP DRIVE GEAR | 53 SHIFT CONTROL SOL.
A/B VALVE ASSEMBLY |
| 3 REVERSE GEAR COLLAR | Disassembly, page 14-110 | 35 FILTER SCREEN Replace | 54 SHIFT CONTROL SOL.
BASE GASKET |
| 4 NEEDLE BEARING | 20 MAINSHAFT
Disassembly/Inspection, page
14-112 | 36 CONTROL SHAFT | 55 L/C CONTROL SOL. A/B
VALVE ASSEMBLY
Inspection, page 14-68
Replacement, page 14-68 |
| 5 COUNTERSHAFT
REVERSE GEAR | 21 DOWEL PIN 8 x 14 mm | 37 1st CLUTCH PIPE | 56 L/C CONTROL SOL. BASE
GASKET |
| 6 REVERSE GEAR
SELECTOR | 22 REGULATOR VALVE
BODY
Removal, page 14-96
Repair, page 14-99 | 38 3rd CLUTCH PIPE | 57 BALL BEARING 16008 |
| 7 SELECTOR HUB | Disassembly, page 14-105 | 39 TRANSMISSION MAGNET | 58 OIL SEAL 44 x 68 x 8 mm |
| 8 COUNTERSHAFT
4th GEAR | 23 O-RING 31 x 1.7 mm
Replace | 40 SERVO COVER | 59 OIL SEAL 40 x 56 x 9 mm |
| 9 NEEDLE BEARING | 24 STATOR SHAFT ARM I | 41 4th CLUTCH PIPE | 60 SPEED SENSOR ASSEMBLY
Do not remove except for
power steering overhaul. |
| 10 SPACER COLLAR | 25 STEEL BALL | 42 SERVO VALVE BODY
Removal, page 14-95
Disassembly, page 14-108 | 61 TORQUE CONVERTER
HOUSING |
| 11 COUNTERSHAFT
Disassembly/Inspection, page
14-113 | 26 STOP PIN 8 x 55 mm | 43 THROTTLE CONTROL SHAFT | 62 DOWEL PIN 14 x 25 mm |
| 12 NEEDLE BEARING
38.5 x 67 x 19 mm | 27 DOWEL PIN 8 x 14 mm | 44 E-CLIP 7 mm Replace | 63 DOWEL PIN 14 x 20 mm |
| 14 OIL GUIDE PLATE | 28 MAIN VALVE BODY
Removal, page 14-97
Disassembly, page 14-102 | 45 O-RING 31 x 2.7 mm | 64 DOWEL PIN 8 x 14 mm |
| 15 REVERSE SHIFT FORK | 29 PUMP DRIVEN GEAR | 46 SHIFT FORK SHAFT | |
| 16 LOCK WASHER Replace | 30 PUMP GEAR SHAFT | 47 SERVO SEPARATOR PLATE
Filter Replace | |
| 17 L/C SHIFT VALVE
SEPARATOR PLATE | 31 TORQUE CONVERTER
CHECK VALVE | 48 SERVO SEPARATOR PLATE
Removal, page 14-96
Disassembly/Inspection, page
14-106 | |
| | 32 CHECK VALVE SPRING | 49 SECONDARY VALVE BODY
ASSEMBLY
Removal, page 14-96
Disassembly/Inspection, page
14-106 | |
| | | 50 DOWEL PIN 8 x 40 mm | |
| | | 51 SECONDARY
SEPARATOR PLATE | |



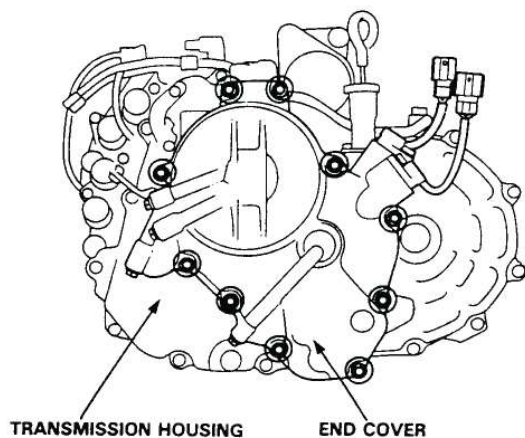
65	LOCK NUT 19 mm Removal, page 14-91 Installation, page 14-141	83	LOCK NUT 23 mm Removal, page 14-91 Installation, page 14-140	104	IDLE SHAFT SPRING
66	1st CLUTCH ASSEMBLY Removal, page 14-91 Disassembly, page 14-117 Reassembly, page 14-123	84	PARKING GEAR	105	STEEL BALL
67	THRUST WASHER 26 mm	85	ONE-WAY CLUTCH ASSEMBLY Disassembly/Inspection, page 14-101	106	NEEDLE BEARING 14 x 18 x 15 mm
68	THRUST NEEDLE BEARING 31 x 47 x 2 mm	86	COUNTERSHAFT 1st GEAR	107	THROTTLE CONTROL LEVER
69	NEEDLE BEARING 31 x 36 x 18.5 mm	87	NEEDLE BEARING	108	THROTTLE CONTROL SHAFT SPRING Removal, page 14-93 Installation, page 14-132
70	MAINSHAFT 1st GEAR	88	1st GEAR COLLAR	109	OIL SEAL
71	THRUST WASHER 31 x 42 x 1.5 mm	89	BALL BEARING 28 x 75 x 18.2 mm	110	REVERSE IDLER GEAR
72	COLLAR 26 mm	90	SNAP RING 75 mm	111	DIFFERENTIAL BEARING OUTER RACE
73	BALL BEARING 26 x 75 x 18.2 mm	91	STOP PIN	112	DIFFERENTIAL THRUST SHIM
74	SNAP RING 75 mm	92	DOWEL PIN 8 x 14 mm	113	BREATHER JOINT
75	NM SPEED SENSOR	93	O-RING 7.7 x 2.3 mm Replace	114	BREATHER CAP
76	NC SPEED SENSOR	94	THROTTLE CABLE STAY	115	TRANSMISSION HOOK
77	OIL SEAL 40 x 56 x 9 mm Installation, See Section 15	95	LOCK PLATE	116	DIPSTICK HOLDER
78	PARKING PAWL SHAFT	96	PARKING BRAKE SPRING	117	O-RING 21.5 x 3.2 mm
79	PARKING PAWL SPRING	97	COTTER PIN 1.6 mm	118	DIPSTICK
80	PARKING PAWL	98	WASHER 6 mm	119	TRANSMISSION HOUSING
81	END COVER Disassembly/Inspection, page 14-143	99	PARKING BRAKE ROLLER	120	TRANSMISSION GASKET
82	GASKET	100	PARKING SHIFT ARM	121	O-RINGS Replace
		101	ROLLER PIN		
		102	PARKING BRAKE STOPPER		
		103	IDLE SHAFT HOLDER Removal, page 14-92		

Removal

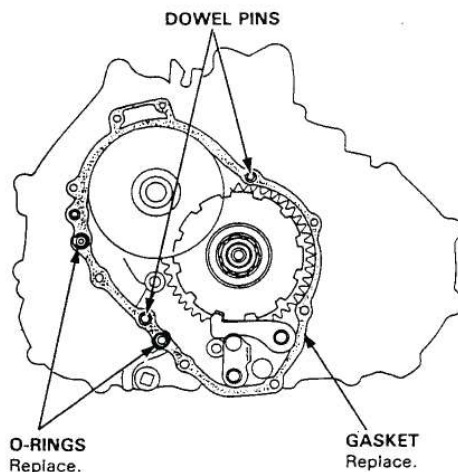
1. Remove the transmission cooler pipes A and B from the transmission.



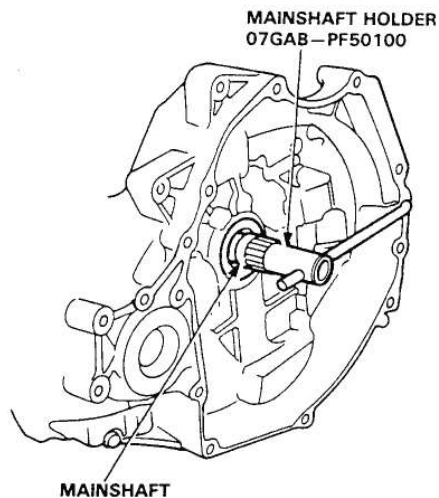
2. Remove the ten bolts from the end cover, then remove the cover.



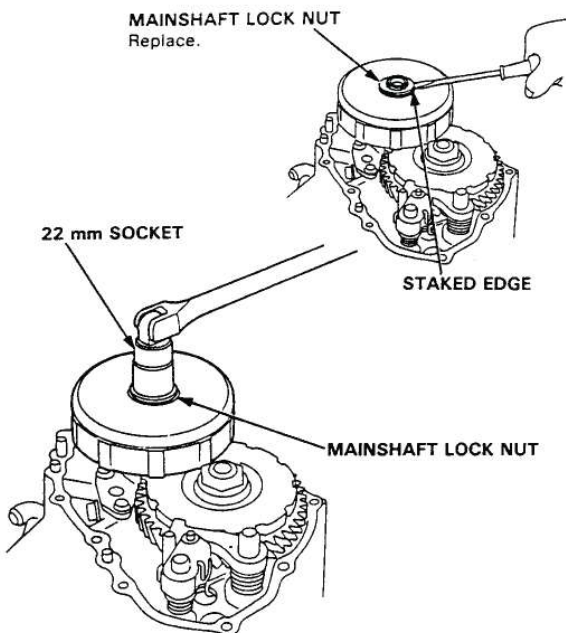
3. Remove the end cover gasket, dowel pins, and O-rings.



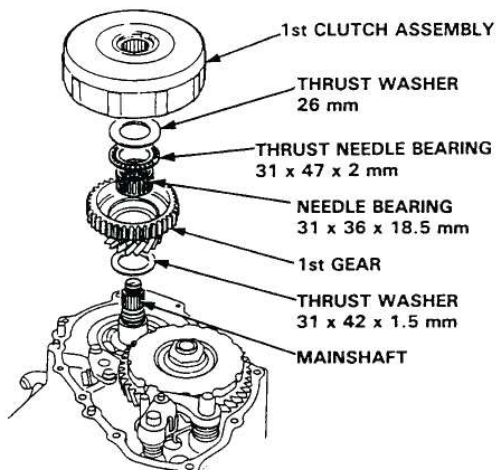
4. Shift the transmission to PARK. Lock the mainshaft using the mainshaft holder.



5. Pry the staked edge of the locknut flange out of the notch in the 1st clutch, and remove the mainshaft lock nut.



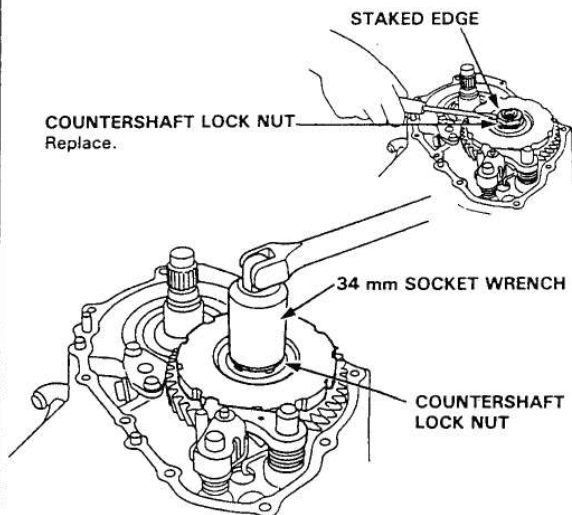
6. Remove the 1st clutch.
7. Remove the thrust washer, thrust needle bearing and 1st gear from the mainshaft.
8. Remove the needle bearing and thrust washer from the mainshaft.



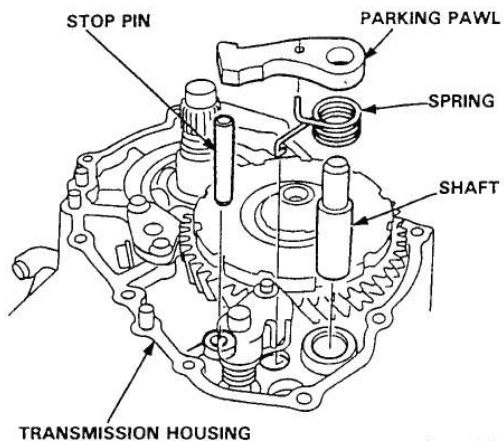
9. Pry the staked edge of the locknut out of the notch in the parking gear.

10. Remove the countershaft locknut.

NOTE: Countershaft lock nut has left hand thread.



11. Remove the mainshaft holder.
12. Move the control shaft and release the transmission from PARK.
13. Remove the parking pawl, shaft, stop pin and spring.

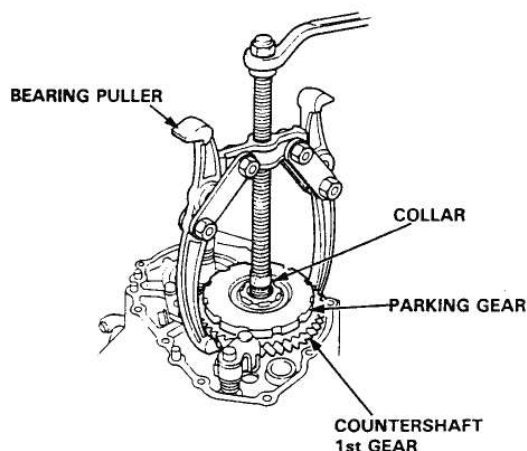


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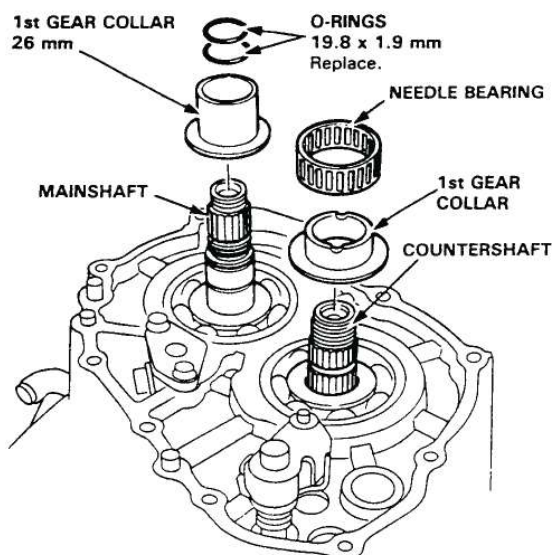
Removal (cont'd)

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

NOTE: Install the collar on the countershaft to prevent it from damage.

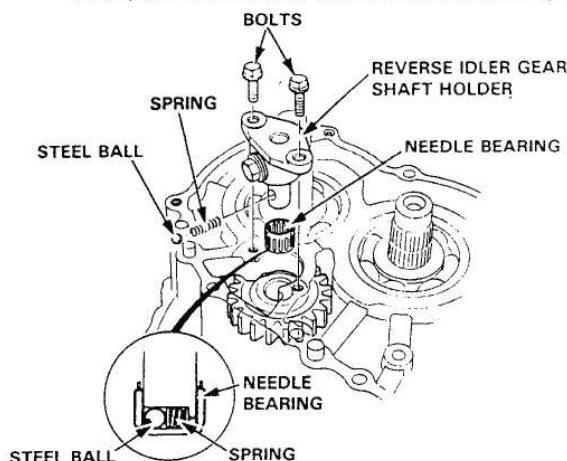


15. From the countershaft, remove the needle bearing and 1st gear collar. From the mainshaft, remove the 1st gear collar and O-rings.



16. Remove the two bolts from the reverse idler gear shaft holder and remove the reverse idler gear shaft holder, needle bearing, steel ball and spring from the transmission housing.

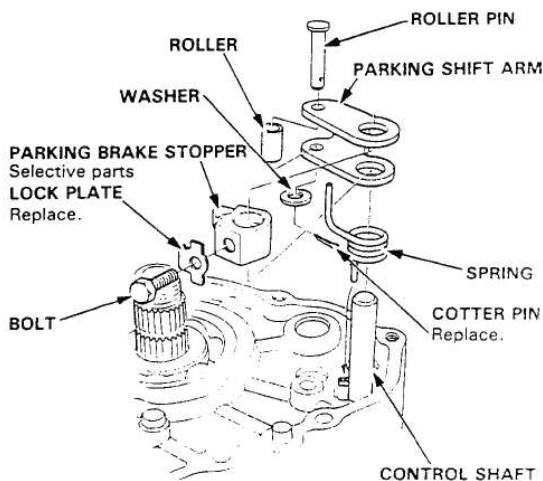
NOTE: Remove the reverse idler gear shaft holder together with the needle bearing being careful not to drop the steel ball into the transmission housing.



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

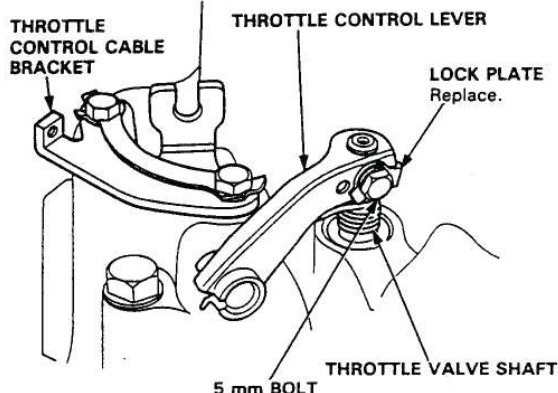
18. Remove the bolt, then remove the parking shift arm, parking brake stopper and spring from the control shaft.

19. Remove the cotter pin, washer, roller and roller pin from the parking shift arm.



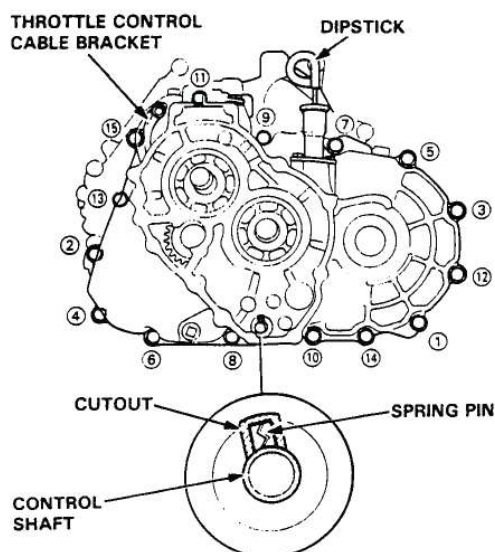
20. Bend down the tab on the throttle control lever bolt lock plate, then remove the bolt. Remove the throttle control lever and spring from the throttle valve shaft.

NOTE: Do not loosen the throttle control cable bracket mounting bolts.



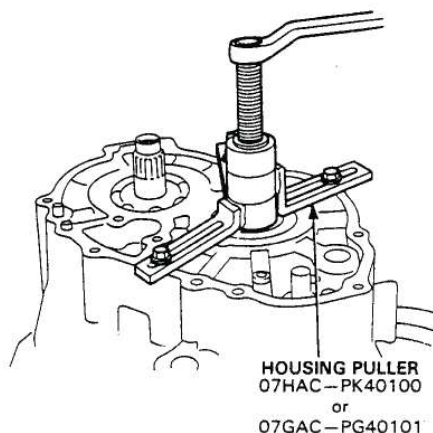
21. Remove the dipstick.
22. Remove the 10 x 1.25 mm bolts, (1) thru (15), in the sequence shown.

NOTE: Do not loosen the throttle control cable bracket mounting bolts.

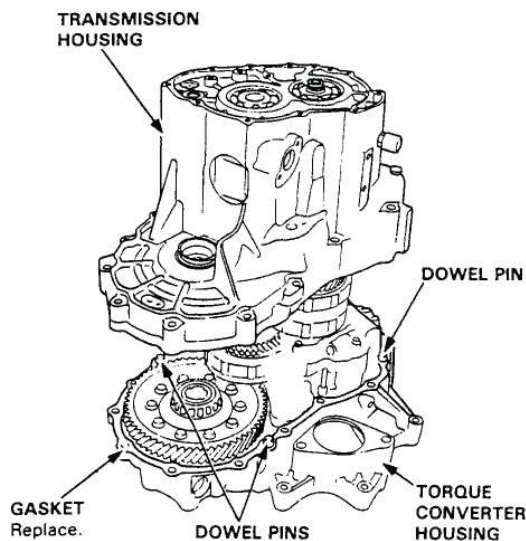


23. Align the control shaft spring pin with the cutout in the transmission housing.

24. 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.



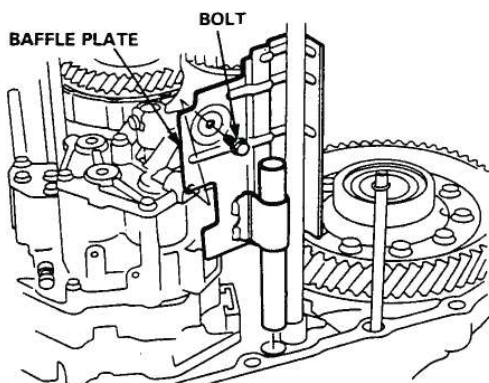
25. Remove the puller and separate the housings, then remove the reverse idler gear from the transmission housing.



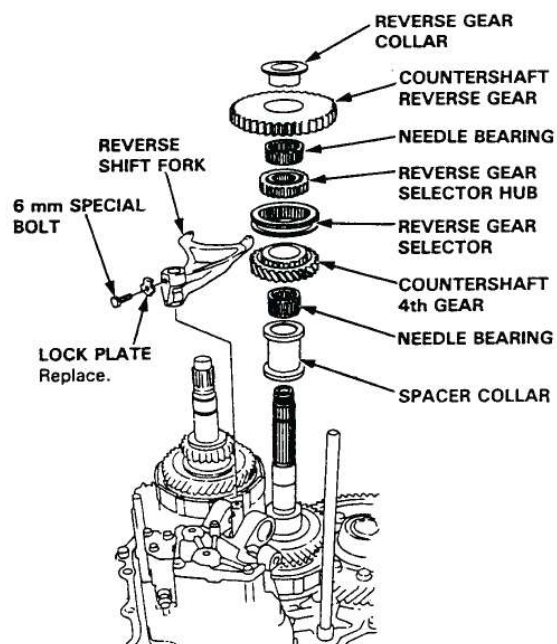
26. Remove the gasket and the dowel pins.

Removal

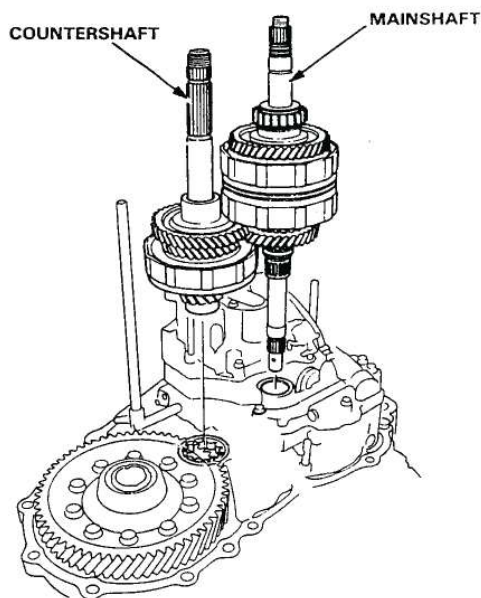
1. Remove the baffle plate.



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

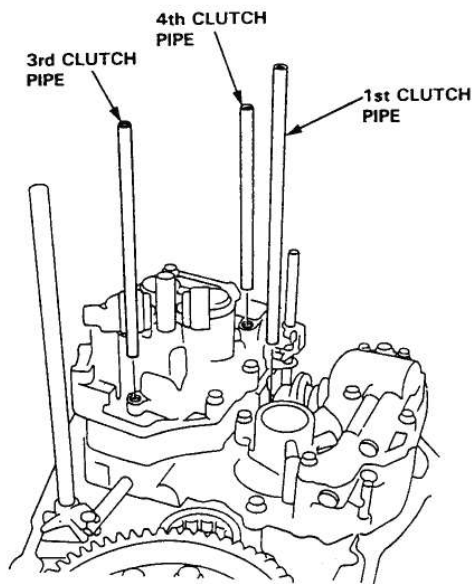


6. Remove the mainshaft and countershaft together.



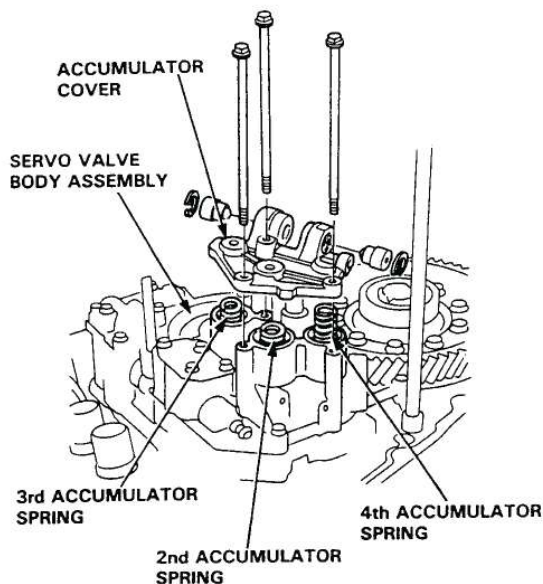
Removal

1. Remove the 1st, 4th and 3rd clutch pipes.



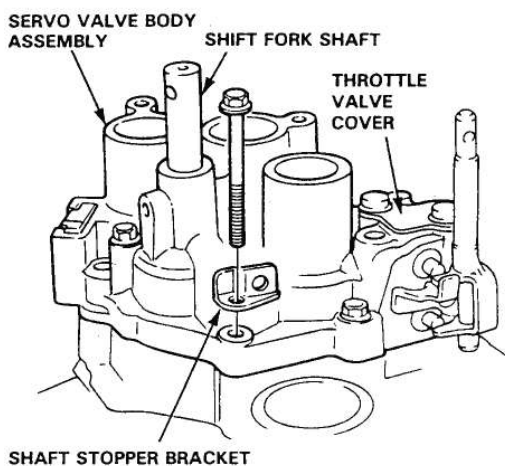
2. Remove the accumulator cover.

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



3. Remove the accumulator springs.

4. Remove the servo valve body assembly and remove the shift fork shaft and servo return spring.

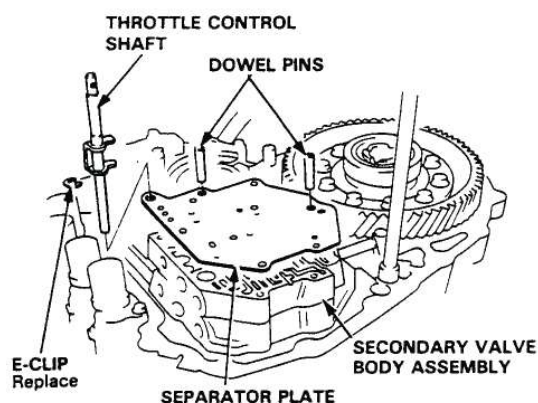


(cont'd)

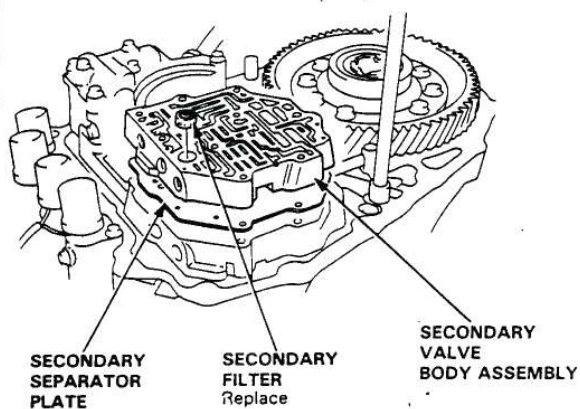
Removal (cont'd)

5. Remove the E-clip. Then remove the throttle control shaft from the separator plate.
6. Remove the separator plate and dowel pins.

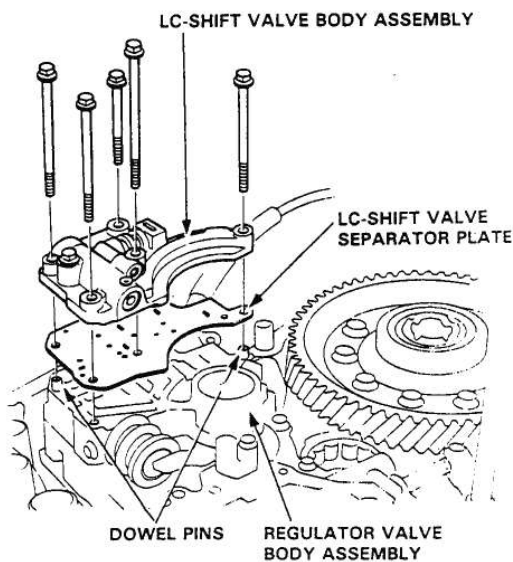
NOTE: With the dowel pins removed the secondary valve body can be accidentally shifted out of position.



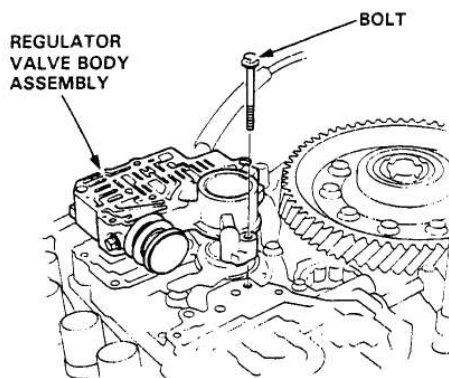
7. Remove the secondary filter from the oil passages of the secondary valve body assembly.
8. Remove the secondary valve body assembly.
9. Remove the secondary separator plate.



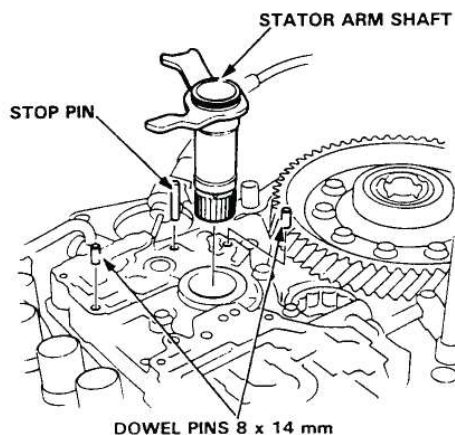
10. Remove the 5 bolts, LC-Shift valve body assembly, LC-Shift valve separator plate and 2 dowel pins from the regulator valve body assembly.



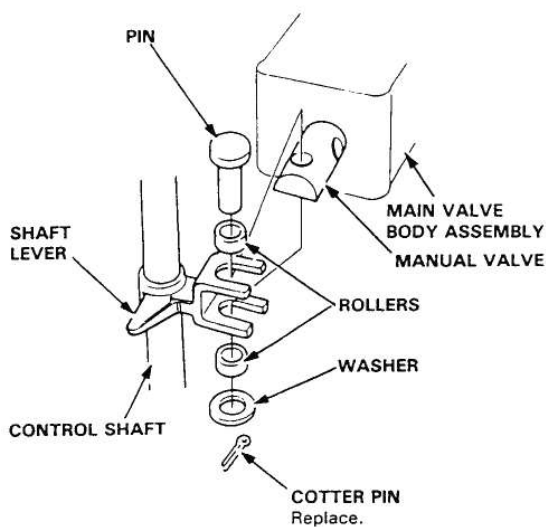
11. Remove the bolt from the regulator valve body assembly and remove the regulator valve body.



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



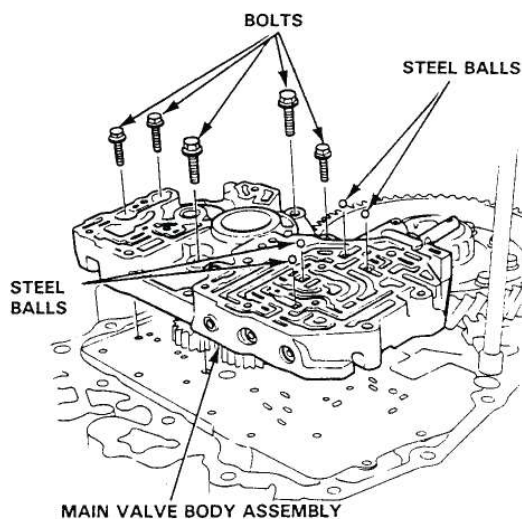
13. Remove the cotter pin, washer, rollers, and pin from the manual valve.



14. Remove the 4 steel balls and 5 bolts from the main valve body assembly and remove the main valve body assembly.

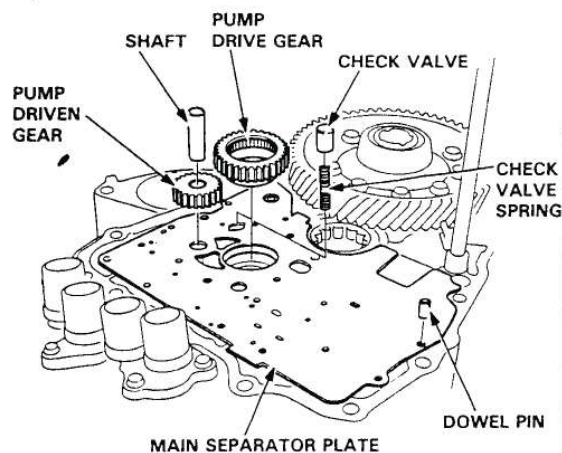
NOTE: Take care not to lose the torque converter check valve and spring.

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



15. Remove the pump gears and shaft.

16. Remove the main separator plate, dowel pins, check valve, and spring.

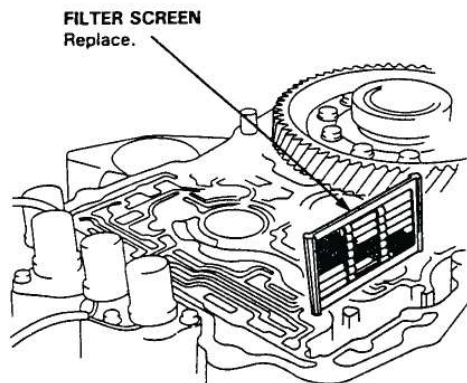


(cont'd)

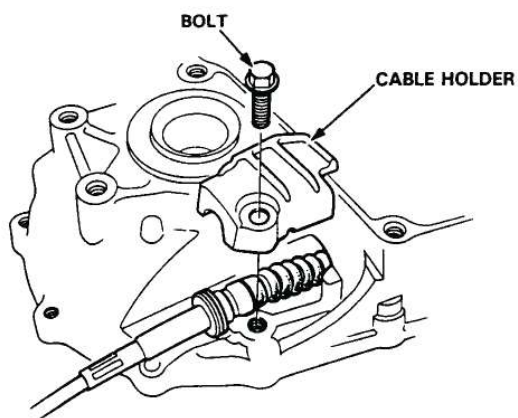
Removal (cont'd)

17. Remove the filter screen.

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

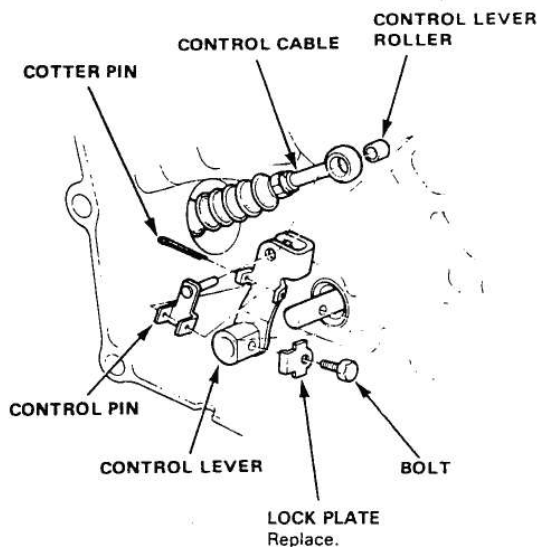


18. Remove the cable holder.

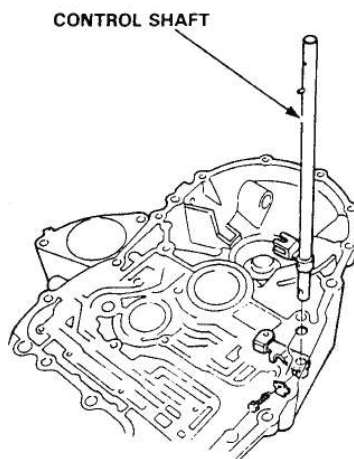


19. Remove the cotter pin, control pin, and control lever roller from the control lever.

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



21. Remove the control shaft.



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.

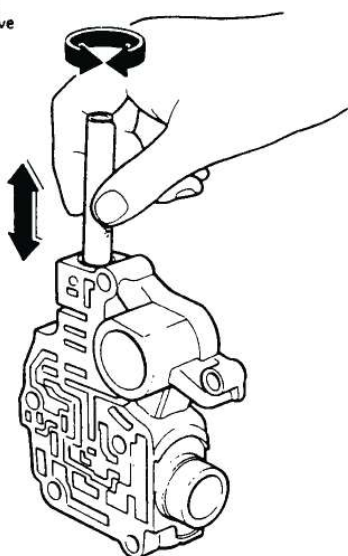
1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

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.

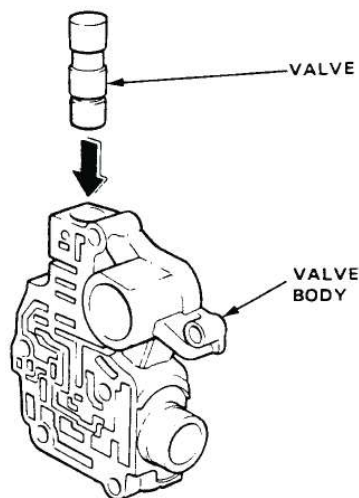
3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly,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

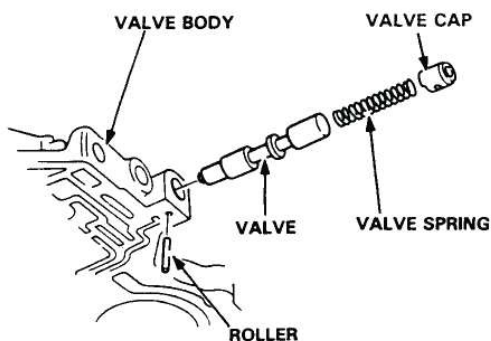


7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.

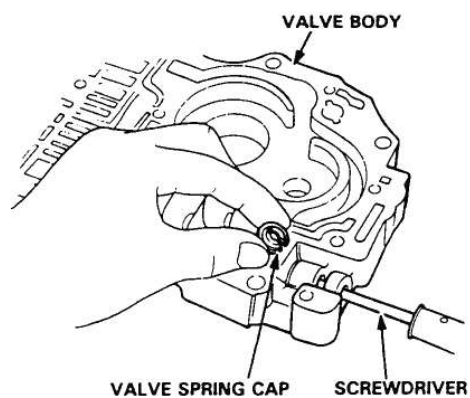
Assembly

NOTE: Coat all parts with ATF before assembling.

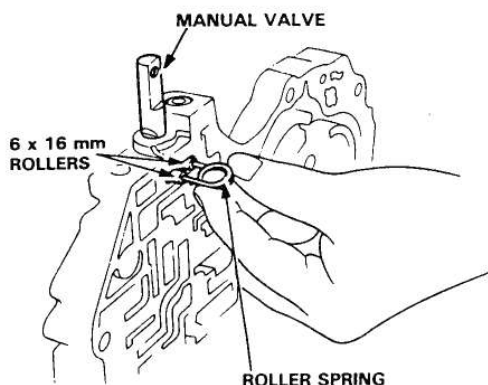
1. Install the valve, valve spring and valve cap in the valve body and secure with the roller.



2. Set the spring in the valve and install it in the valve body.
3. Install the spring with a screwdriver, then install the valve cap with the cutout aligned with the screwdriver.



4. Install the manual valve, 6 x 16 mm rollers and spring.



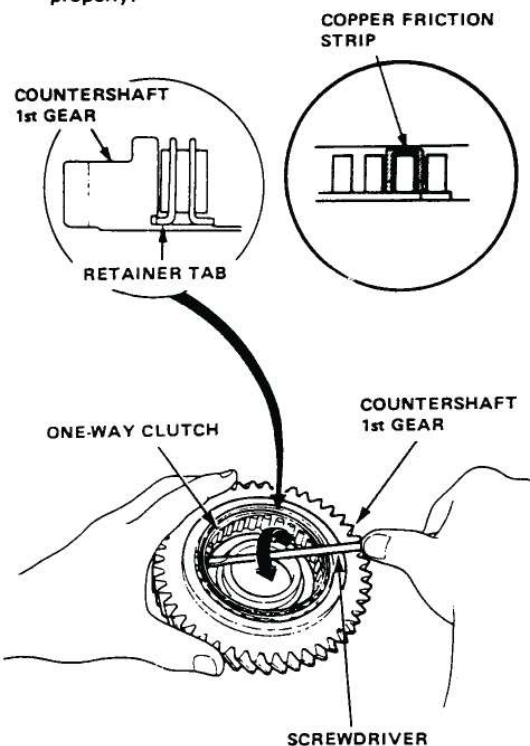
Disassembly and Inspection

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

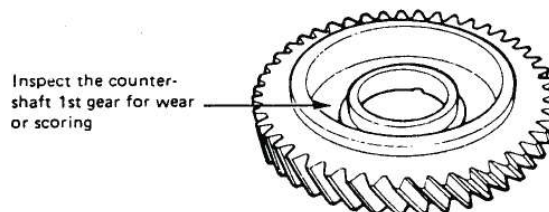
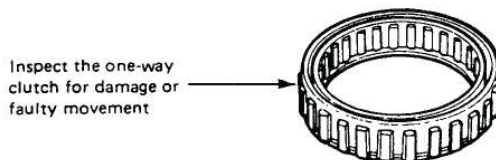
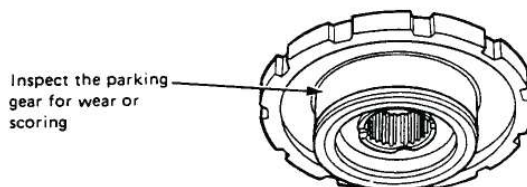


2. Remove the one-way clutch by prying it up with the end of a screwdriver.

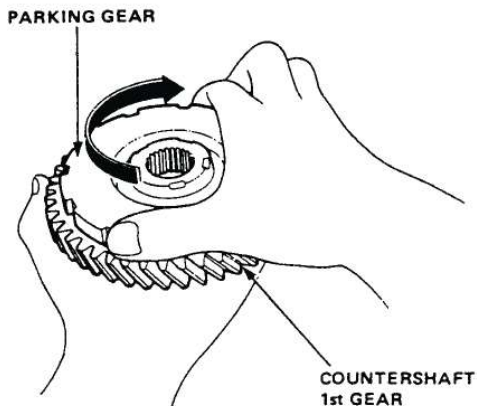
CAUTION: Do not pry on the three copper friction strips; if you break a strip, the clutch will not work properly.



Inspect the parts as follows:



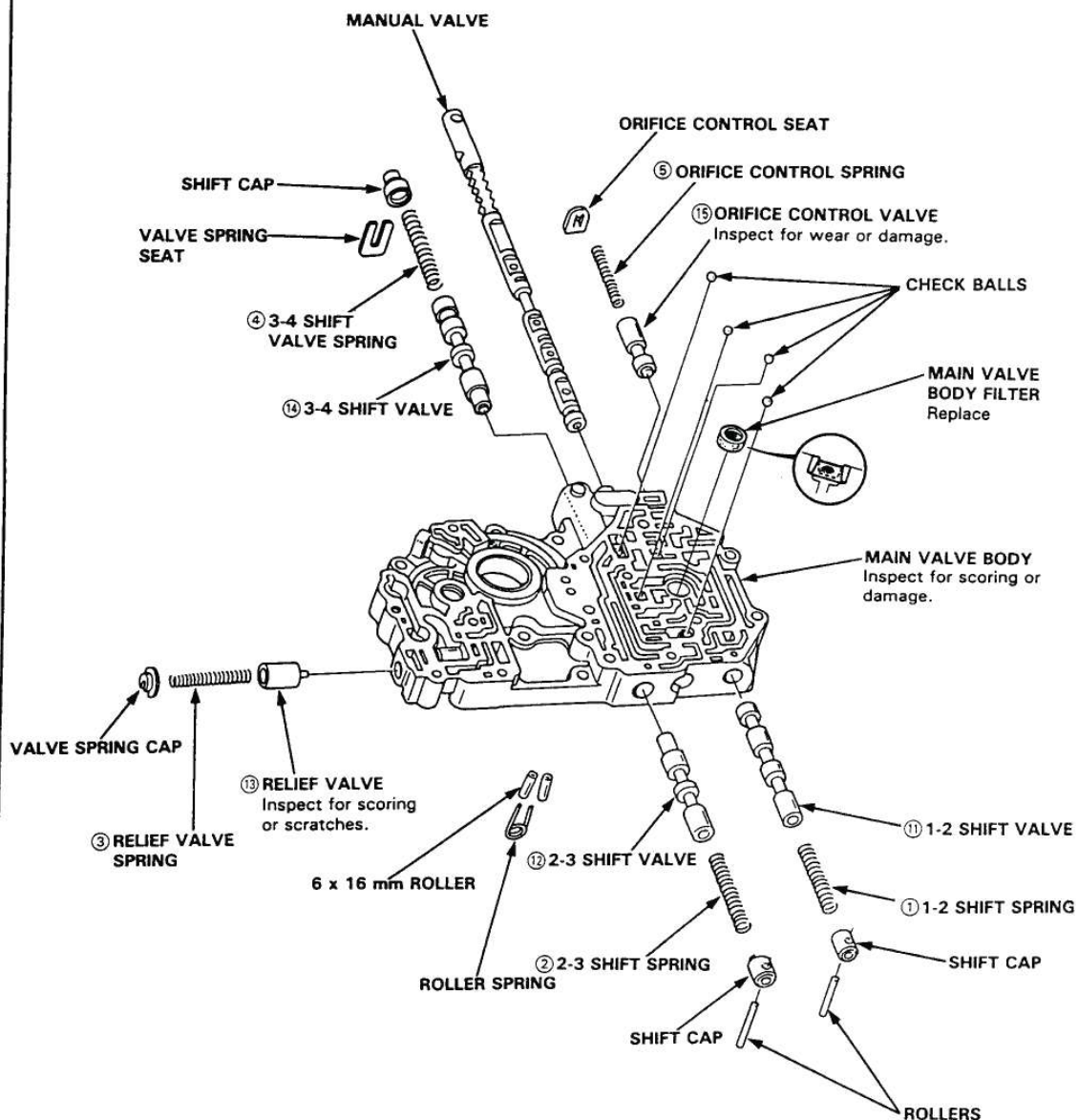
3. After the parts are assembled, hold the countershaft 1st gear and turn the parking gear in direction shown to be sure it turns freely.



Disassembly/Inspection/Reassembly

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 Valve Body Repair
- Coat all parts with ATF before reassembly.

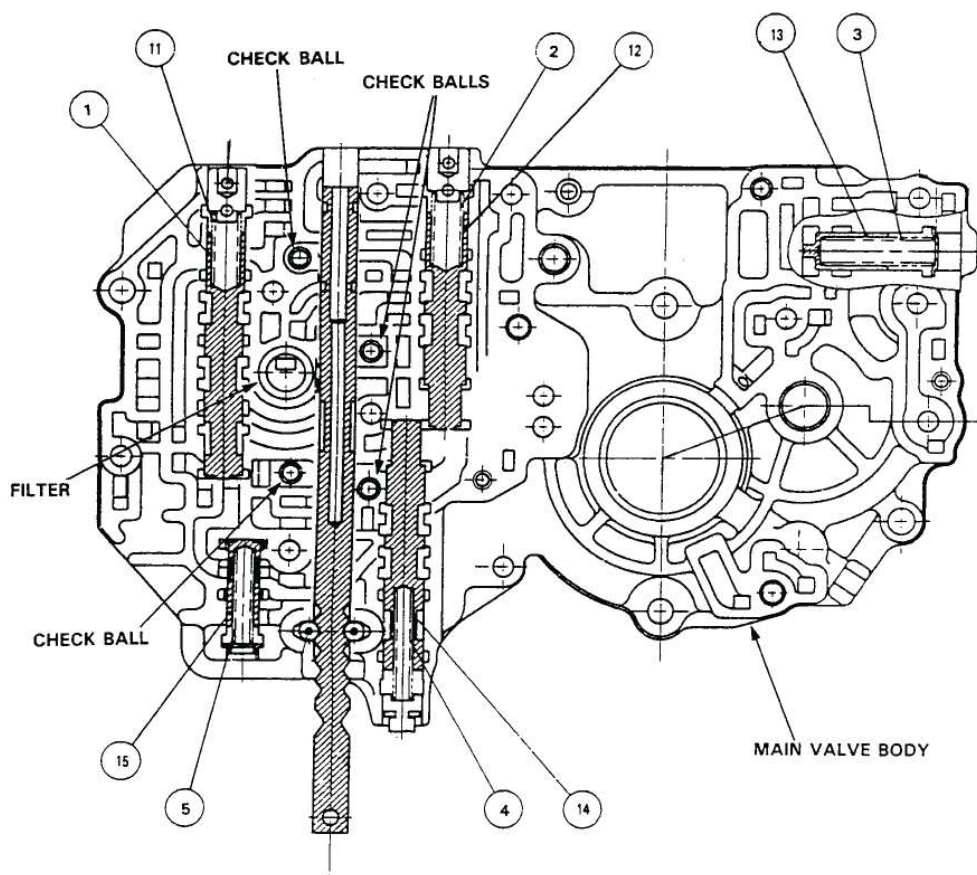


Spring Specifications

Unit of length: mm (in)

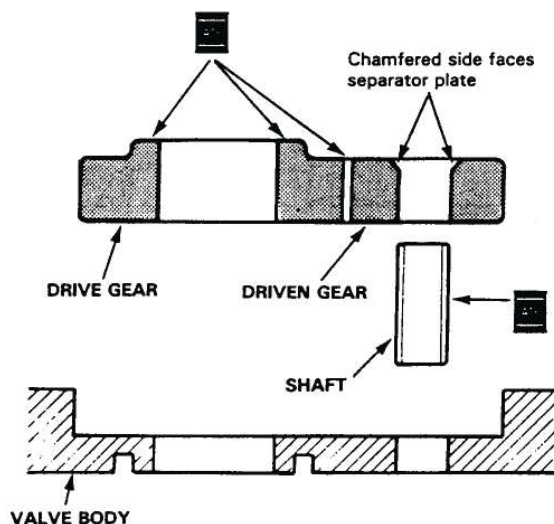
Spring Specifications		Standard (New)			
No.	Spring	Wire Dia.	O.D.	Free Length	No. of Coils
①	1-2 shift spring	0.9 (0.035)	8.6 (0.339)	40.4 (1.591)	14.5
②	2-3 shift spring	0.9 (0.035)	9.6 (0.378)	39.6 (1.559)	12
③	Relief valve spring	1.0 (0.039)	8.4 (0.331)	52.0 (2.047)	23
④	3-4 shift spring	0.7 (0.028)	5.6 (0.220)	48.3 (1.902)	27.8
⑤	Orifice control spring	0.9 (0.035)	6.1 (0.240)	35.9 (1.413)	20
—	Torque converter check valve spring (not shown; located under the main valve body, see page 14-133)	1.1 (0.043)	8.4 (0.331)	36.4 (1.433)	12

Sectional View



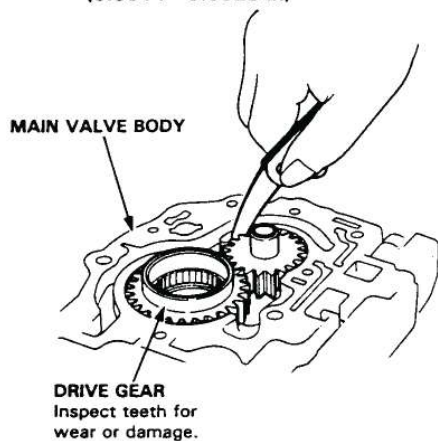
Inspection

1. Install the pump gears and shaft in the main valve body.



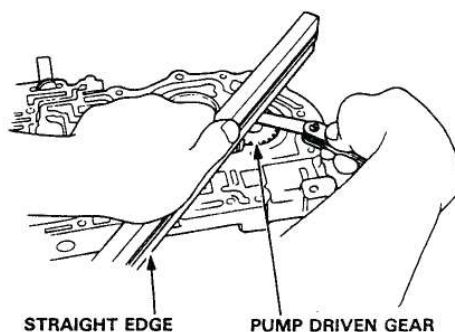
2. Install the oil pump shaft and measure the side clearance of the drive and driven gears.

Pump Gears Side (Radial) Clearance:
Standard (New): Drive gear (diameter)
 0.210–0.265 mm
 (0.0083–0.0104 in.)
 Driven gear (radius)
 0.035–0.063 mm
 (0.0014–0.0025 in.)



3. 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: 0.07 mm (0.0028 in.)



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, see Valve Body Repair
- Replace the valve body as an assembly if any parts are worn or damaged.

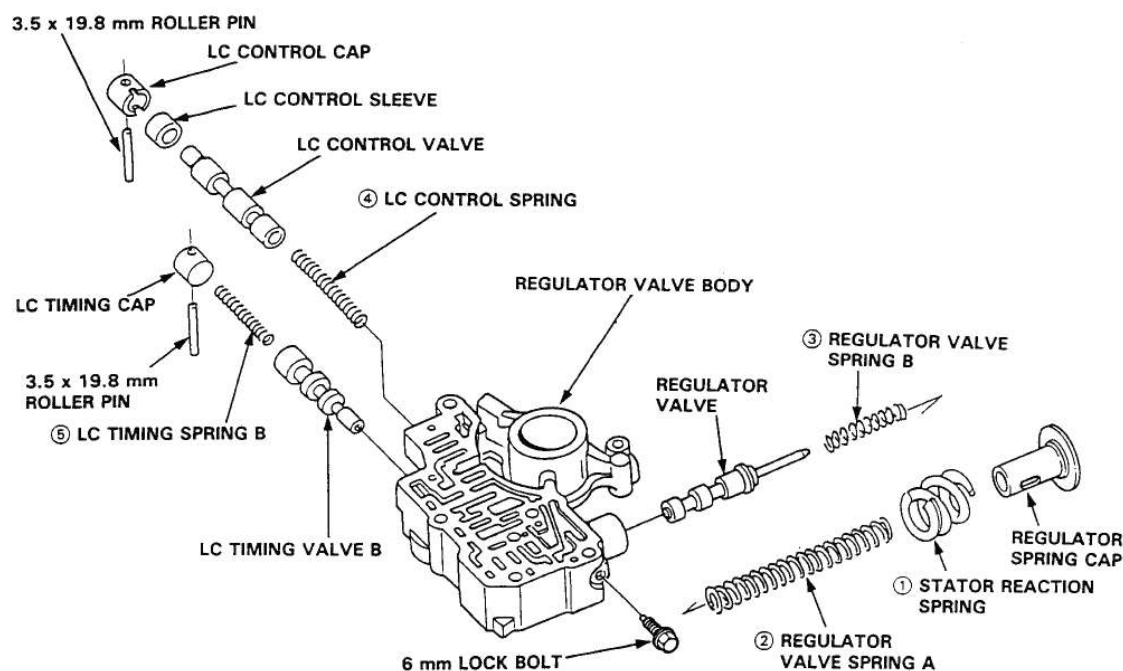
1. Hold the regulator spring cap in place while removing the stopper bolt. Once the bolt is removed, release the spring cap slowly.

CAUTION: The regulator spring cap can pop out when the lock bolt is removed.

2. Reassembly is in the reverse order of disassembly.

NOTE:

- Coat all parts with ATF.
- Align the hole in the regulator spring cap with the hole in the valve body, press the spring cap into the body, and tighten the lock bolt.



Unit of length: mm (in)

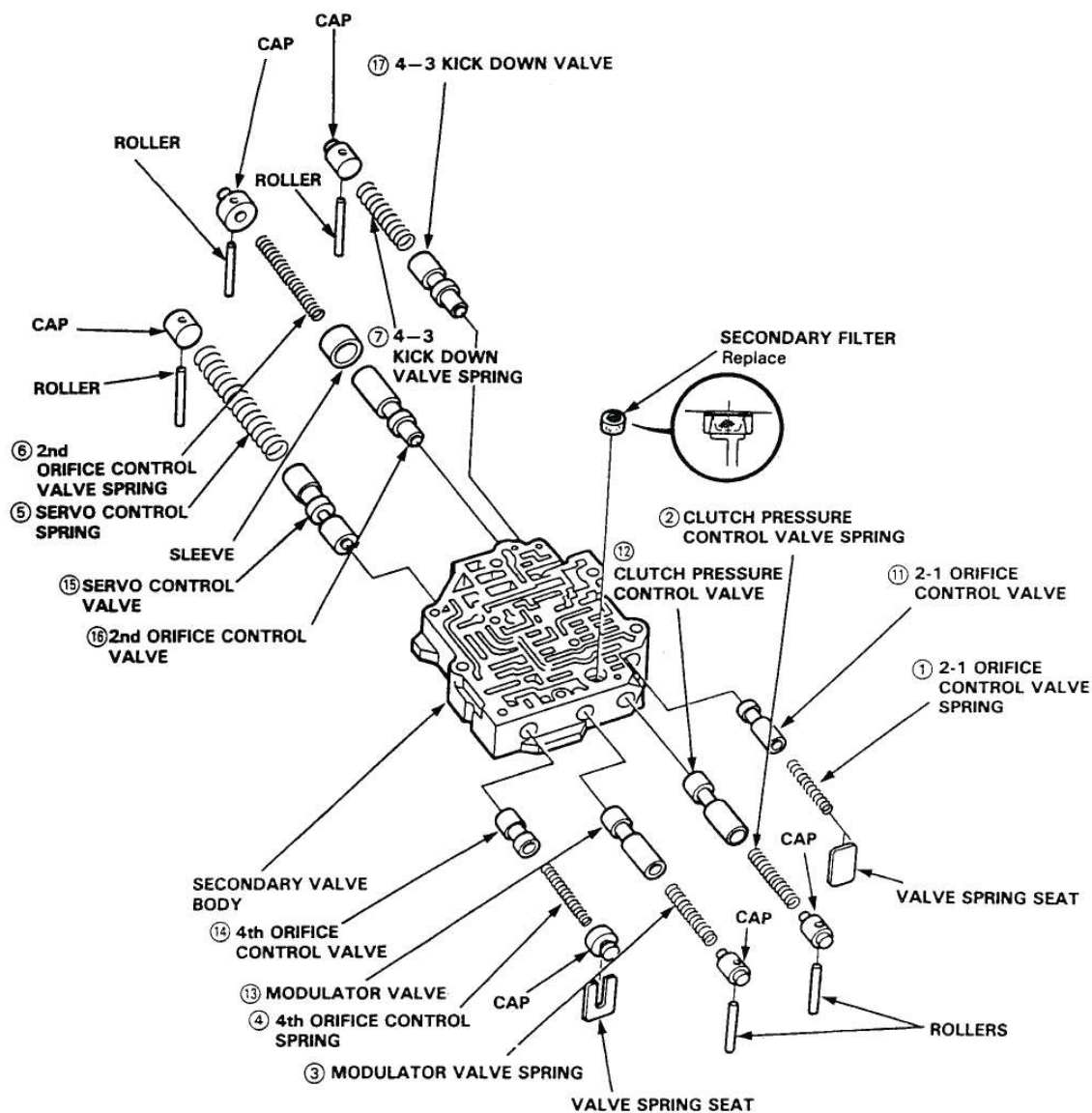
Spring Specifications

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Stator reaction spring	6.0 (0.236)	38.4 (1.512)	30.3 (1.193)	2
②	Regulator valve spring A	1.8 (0.071)	14.7 (0.579)	86.5 (3.406)	16.5
③	Regulator valve spring B	1.8 (0.071)	9.6 (0.378)	44.0 (1.732)	7.5
④	Lock-up control spring	0.8 (0.031)	6.6 (0.260)	39.5 (1.555) 40.2 (1.583) 41.0 (1.614)	25
⑤	Lock-up timing spring B	0.9 (0.035)	5.6 (0.220)	40.7 (1.602)	30

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 Valve Body Repair
- Replace as an assembly if any parts are worn or damaged.

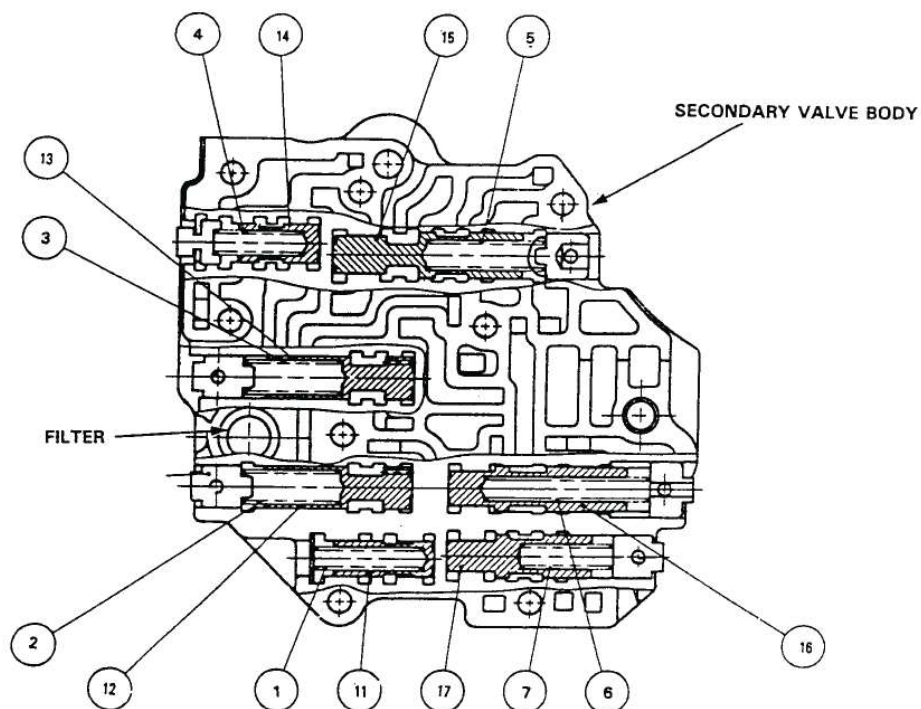


Spring Specifications

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	2-1 orifice control spring	0.8 (0.031)	6.4 (0.252)	41.5 (1.634)	22.8
②	CPC valve spring	1.4 (0.055)	9.4 (0.370)	32.4 (1.276)	10.5
③	Modulator valve spring	1.4 (0.055)	9.4 (0.370)	33.0 (1.299)	10.5
④	4th orifice control spring	1.5 (0.059)	9.4 (0.370)	30.6 (1.205)	9.9
⑤	Servo control valve spring	0.9 (0.035)	6.6 (0.260)	27.6 (1.087)	10
⑥	2nd orifice control spring	1.2 (0.047)	8.1 (0.319)	43.2 (1.701)	19
⑦	2nd orifice control spring	0.8 (0.031)	6.6 (0.260)	38.5 (1.516)	28
⑦	4-3 kick down valve spring	0.9 (0.035)	6.6 (0.260)	32.2 (1.268)	16

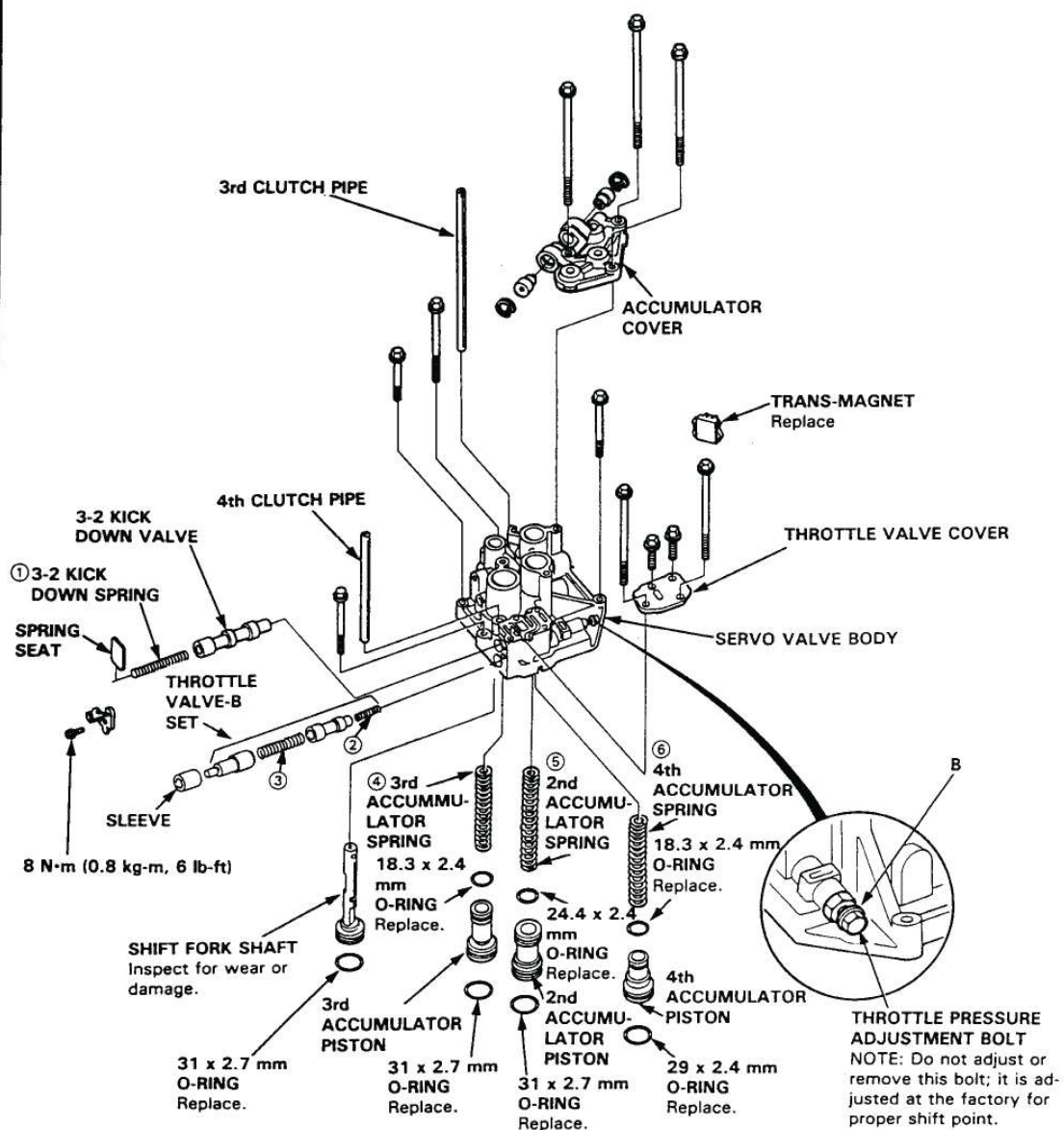
Sectional View



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 Valve Body Repair
- Replace valve body an as assembly if any parts are worn or damaged.





Technical Service Information

Spring Specifications

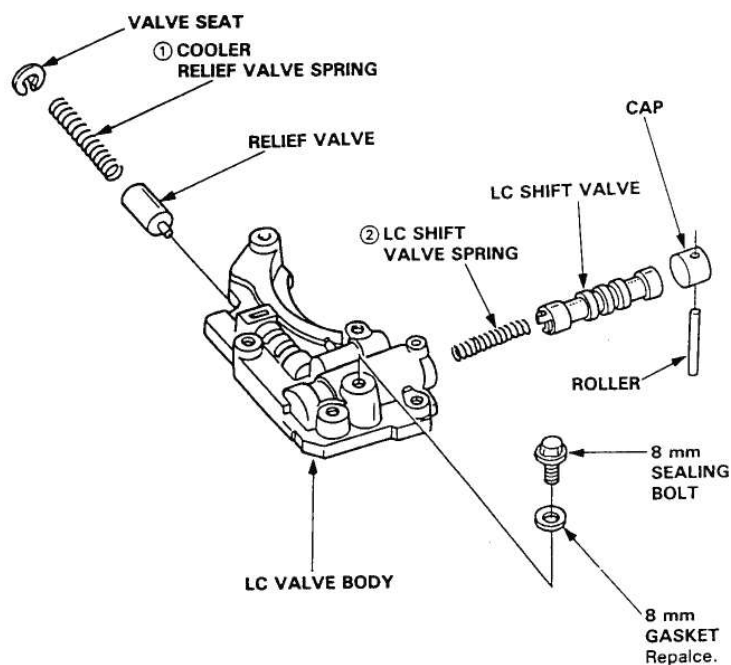
Unit of length: mm (in)

Spring Specifications					
No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	3-2 kick down valve	1.0 (0.039)	6.6 (0.260)	40.5 (1.594)	20
②	Throttle control valve B adjusting spring	0.8 (0.031)	6.2 (0.244)	30.0 (1.181)	8
③	Throttle control valve B spring	1.6 (0.063)	8.5 (0.335)	41.3 (1.626)	13.9
④	3rd accumulator spring	2.9 (0.114)	17.9 (0.705)	82.8 (3.260)	13.6
⑤	2nd accumulator spring	2.71 x 4.4 (0.107 x 0.173)	20.0 (0.787)	79.7 (3.138)	16.2
⑥	4th accumulator spring	3.0 (0.118)	16.4 (0.646)	81.7 (3.217)	16.4

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- 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
- Coat all parts with ATF before reassembly.



Unit of length: mm (in)

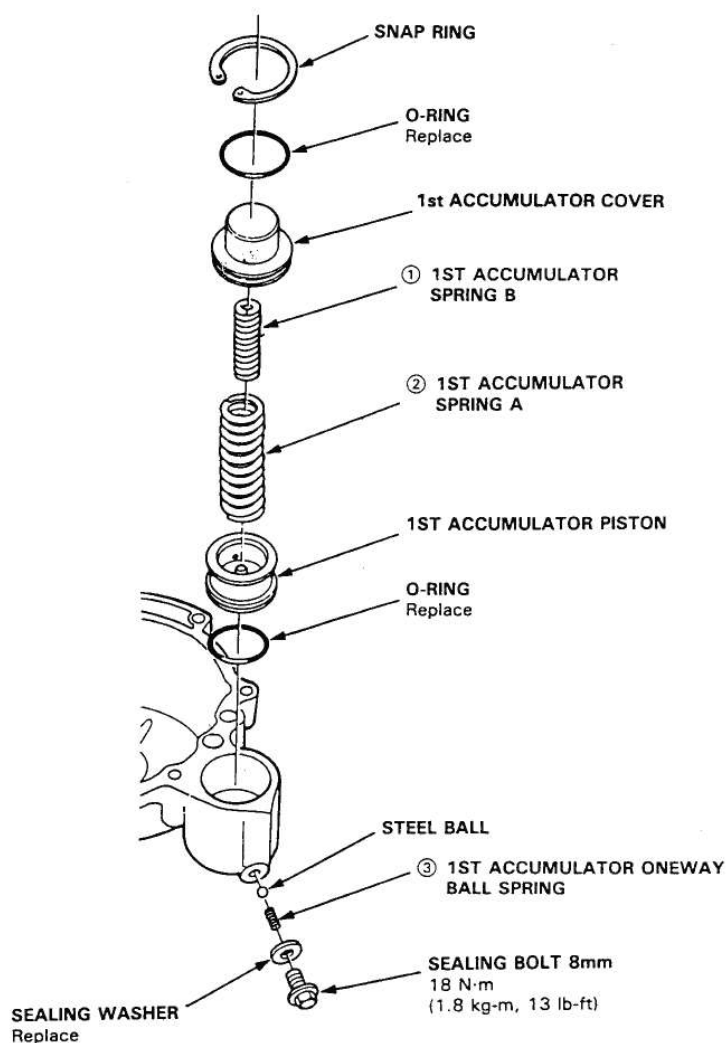
Spring Specifications

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Cooler relief valve spring	1.2 (0.047)	8.4 (0.331)	35.7 (1.406)	16.5
②	Lock-up shift spring	1.1 (0.043)	8.6 (0.339)	51.0 (2.008)	18.6

Disassembly/Inspection

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry compressed air.
- Blow out all passages.



Unit of length: mm (in)

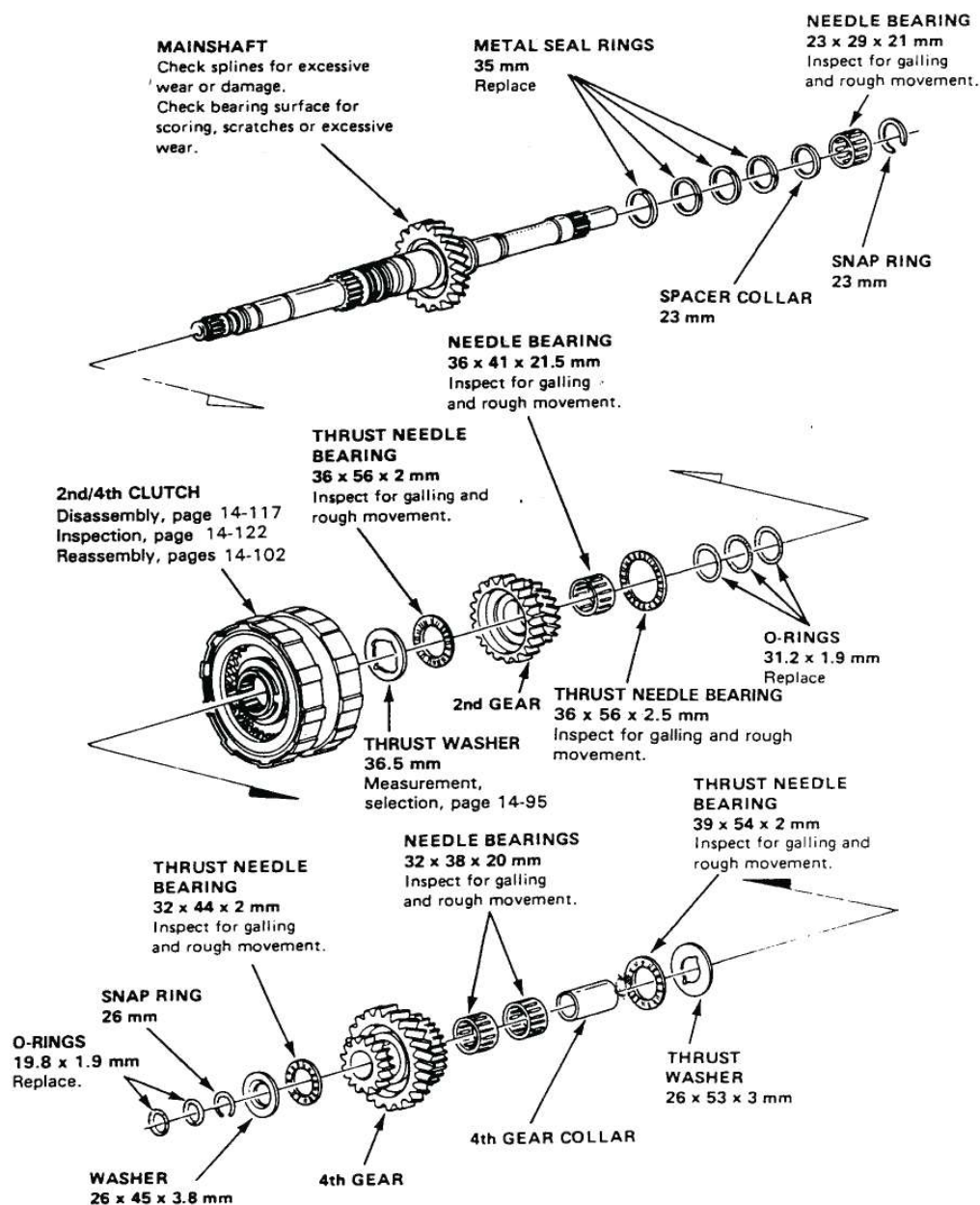
Spring Specifications

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	1st accumulator spring B	2.3 (0.091)	12.1 (0.476)	40.0 (1.575)	7.4
②	1st accumulator spring A	2.8 (0.110)	21.5 (0.846)	58.5 (2.303)	8.3
③	1st accumulator oneway ball spring	0.29 (0.011)	4.0 (0.157)	14.0 (0.551)	13

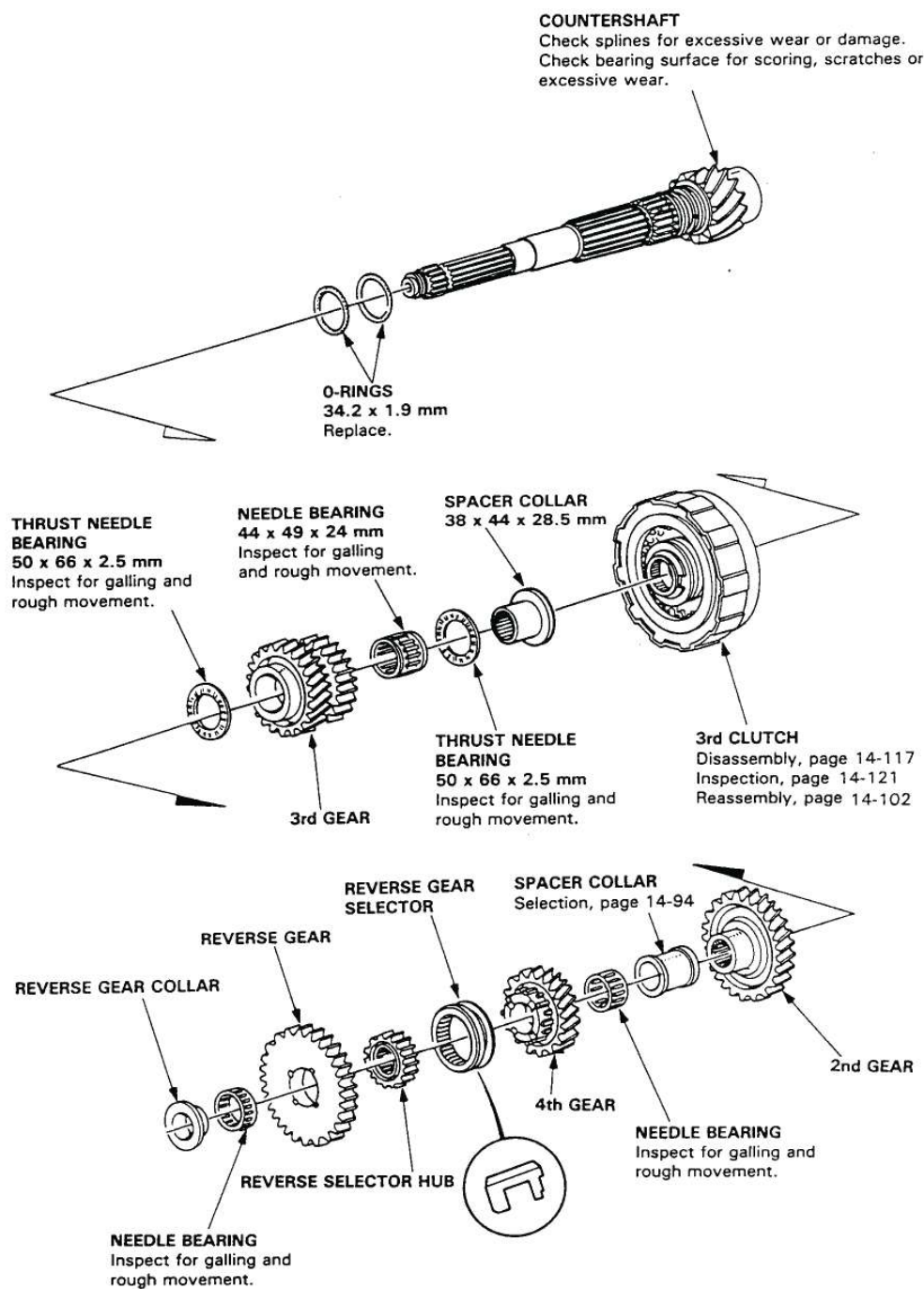
Disassembly/Inspection/Reassembly

NOTE:

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



Disassembly/Inspection/Reassembly

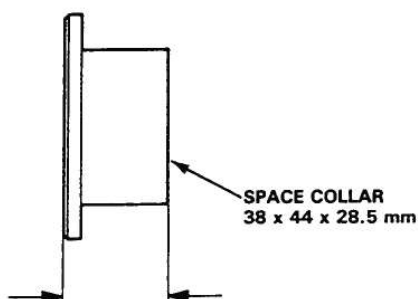


Clearance Measurements

1. Measure the 38 x 44 x 28.5 mm spacer collar height.

Standard: 28.45–28.55 mm (1.120–1.124 in)

Replace if the measurement is below 28.40 mm (1.118 in)



2. Remove both the mainshaft and countershaft bearings from the transmission housing.
3. Assemble the mainshaft and the countershaft including bearings and all parts shown to the right.
4. Torque the mainshaft and countershaft locknuts to 30 N·m (3.0 kg·m, 22 lb·ft).

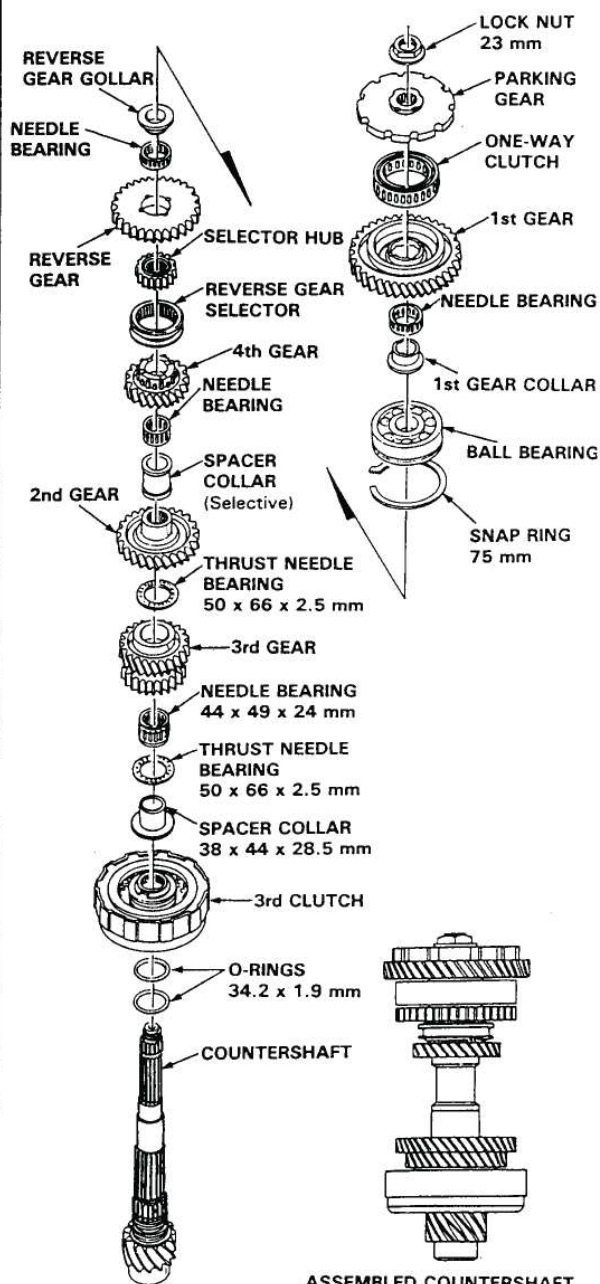
NOTE: The countershaft locknut has left-hand threads.

5. Measure clearances as described on the next page.



Lubricate all parts with ATF before final reassembly.

Countershaft Assembly

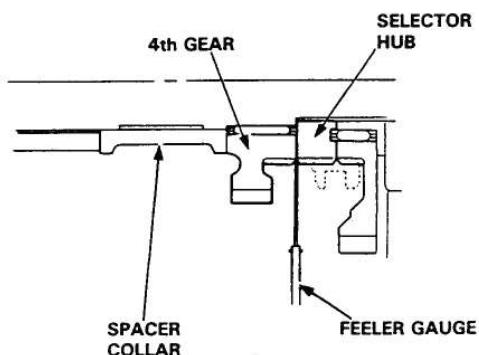
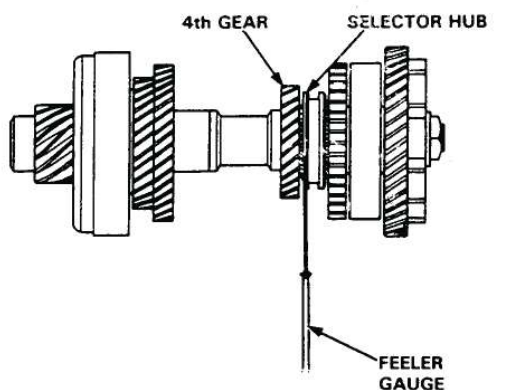




Technical Service Information

6. 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.

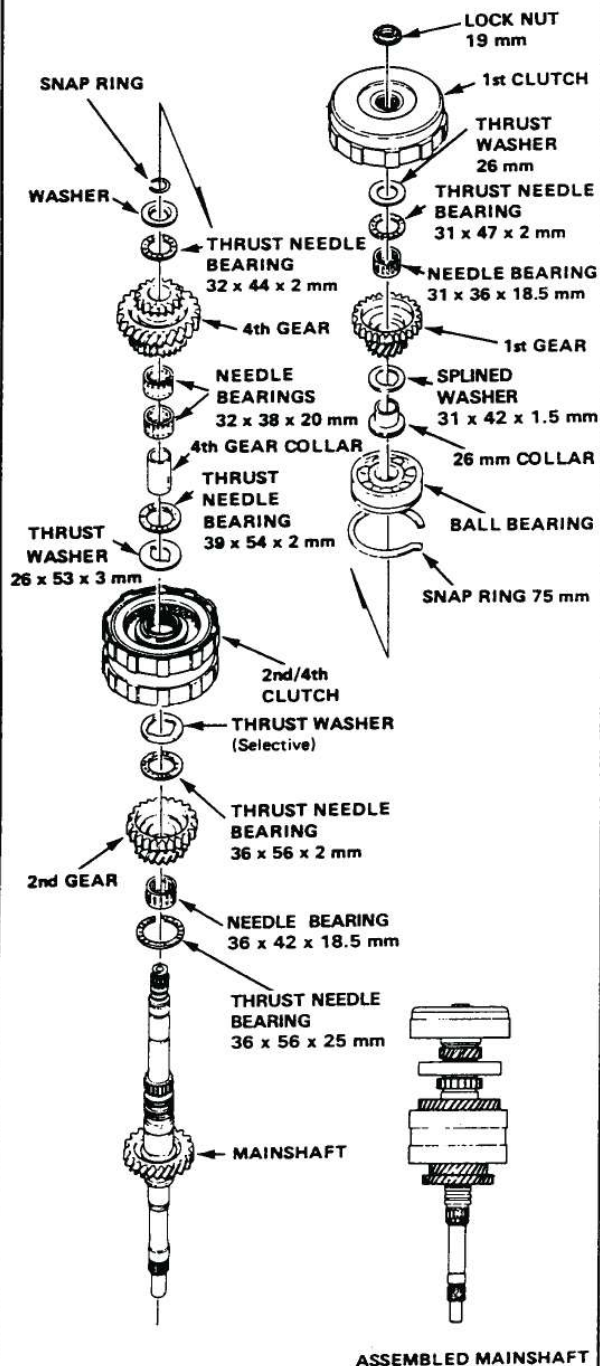
Replacement spacer collars:

P/N	THICKNESS
90501–PL5–000	47.45 mm (1.868 in)
90502–PL5–000	47.50 mm (1.870 in)
90503–PL5–000	47.55 mm (1.872 in)
90504–PL5–000	47.60 mm (1.874 in)
90505–PL5–000	47.65 mm (1.876 in)
90506–PL5–000	47.70 mm (1.878 in)
90507–PL5–000	47.75 mm (1.880 in)
90508–PL5–000	47.80 mm (1.882 in)
90509–PL5–000	47.85 mm (1.884 in)
90510–PL5–000	47.90 mm (1.886 in)

(cont'd)

Clearance Measurement (cont'd)

Mainshaft Assembly

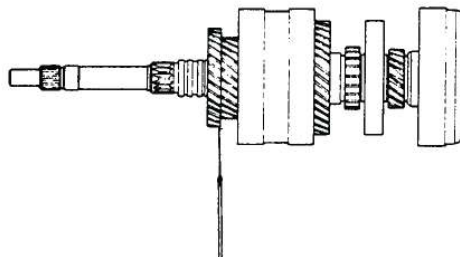


NOTE: Make all measurements before changing the thrust washers. Recheck after making the adjustments.

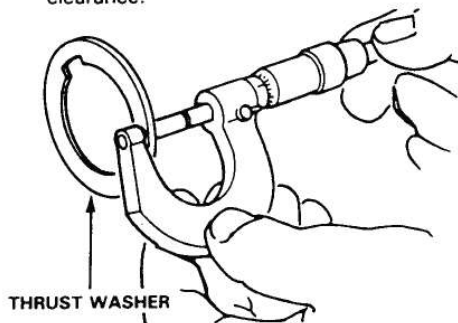
- On the mainshaft measure the clearance between the shoulder of 2nd gear and main 3rd gear, the same way you did on the countershaft in step 6.

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 (36.5 mm I.D.) and select one which gives the correct clearance.



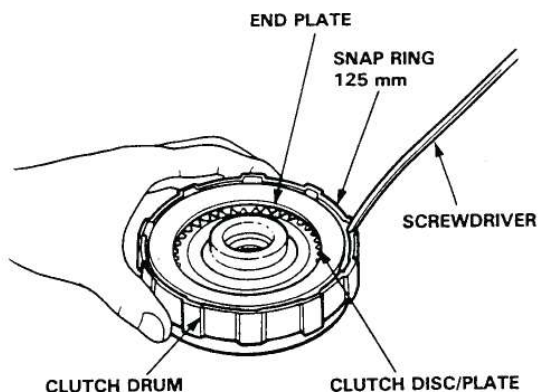
Replacement washer (36.5 mm I.D.)

P/N	THICKNESS
90441—PL5—000	4.00 mm (0.157 in.)
90442—PL5—000	4.05 mm (0.159 in.)
90443—PL5—000	4.10 mm (0.161 in.)
90444—PL5—000	4.15 mm (0.163 in.)
90445—PL5—000	4.20 mm (0.165 in.)
90446—PL5—000	4.25 mm (0.167 in.)
90447—PL5—000	4.30 mm (0.169 in.)
90448—PL5—000	4.35 mm (0.171 in.)
90449—PL5—000	4.40 mm (0.173 in.)

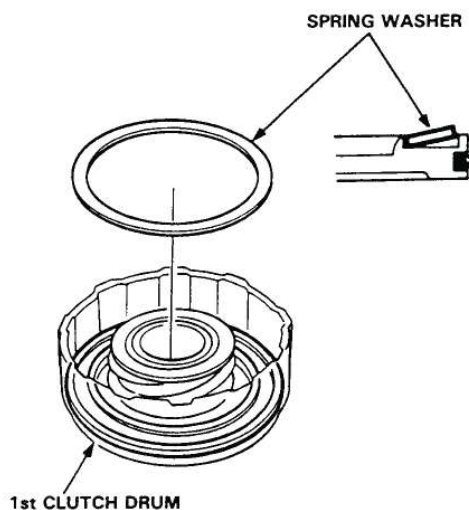
Disassembly

1. 1st Clutch

- 1. Remove the snap ring.
- 2. Remove the end plate, clutch discs and plates.

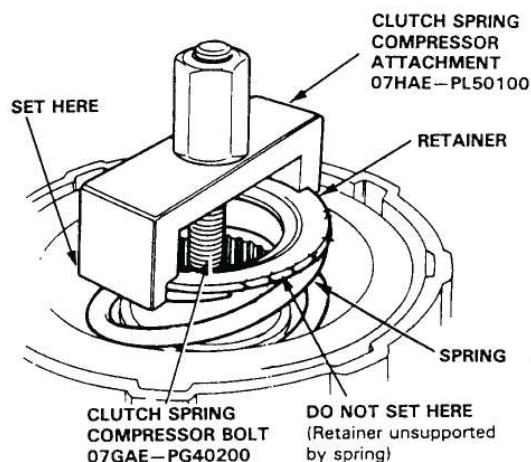


- 3. Remove the spring washer.



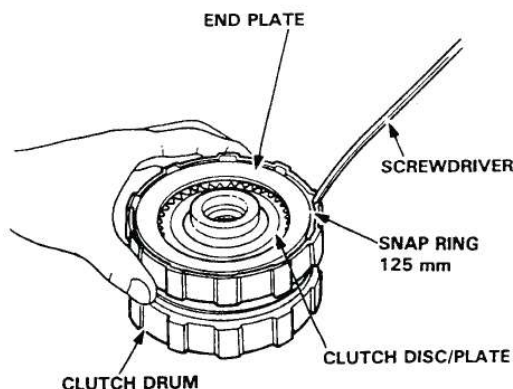
- 4. Install the clutch spring compressor as shown and compress the clutch return spring.

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.



2. 2nd Clutch

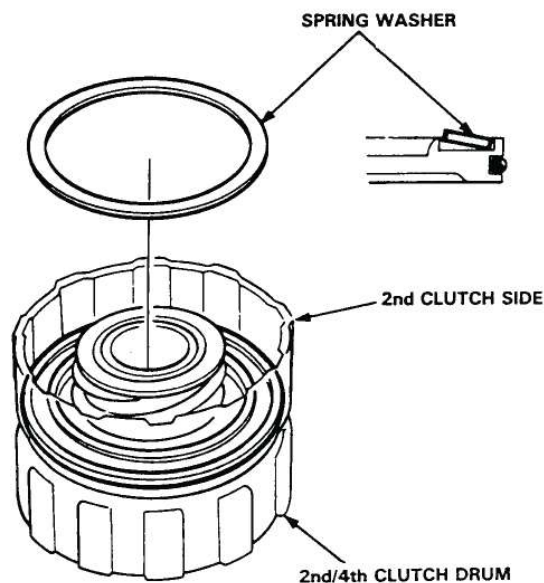
- 1. Remove the snap ring.
- 2. Remove the end plate, clutch discs and plates.



(cont'd)

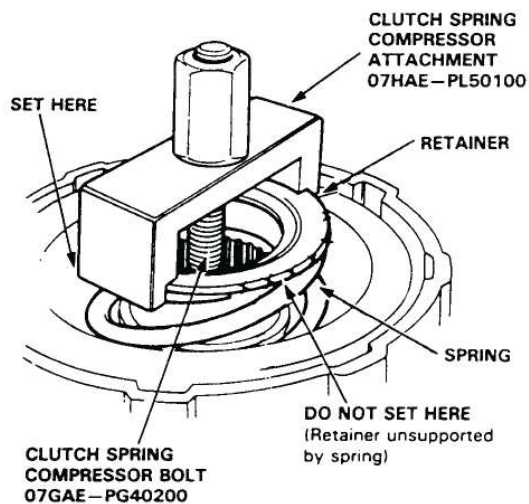
Disassembly (cont'd)

- 3.Remove the spring washer.



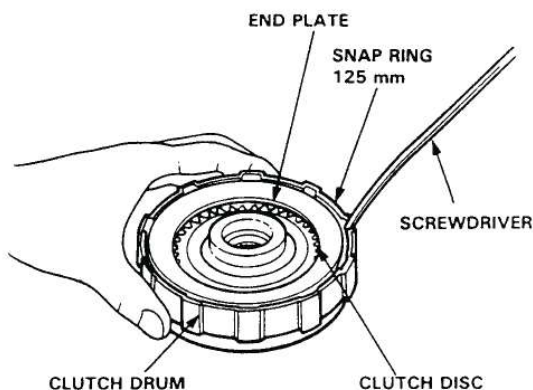
- 4.Install the clutch spring compressor as shown and compress the clutch return spring.

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.



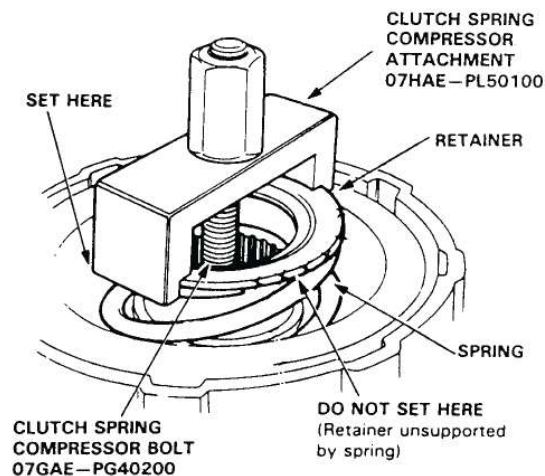
3. 3rd Clutch

- 1.Remove the snap ring.
—2.Remove the end plate, clutch discs and plates.



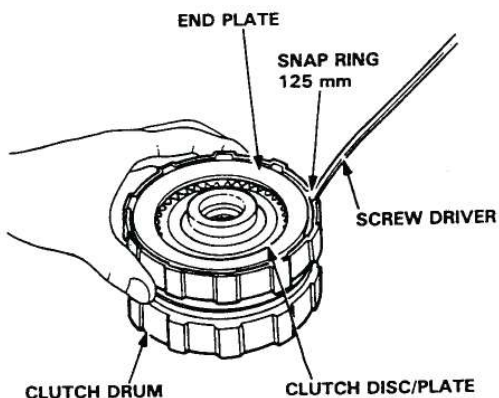
- 3.Install the clutch spring compressor as shown and compress the clutch return spring.

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.



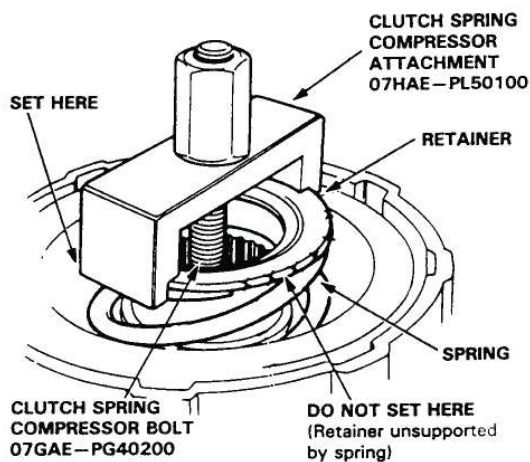
4. 4th Clutch

- 1. Remove the snap ring.
- 2. Remove the end plate, clutch discs and plates.



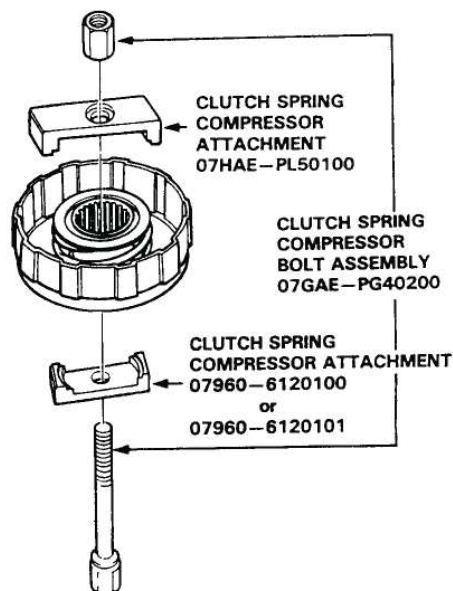
- 3. Install the clutch spring compressor as shown and compress the clutch return spring.

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

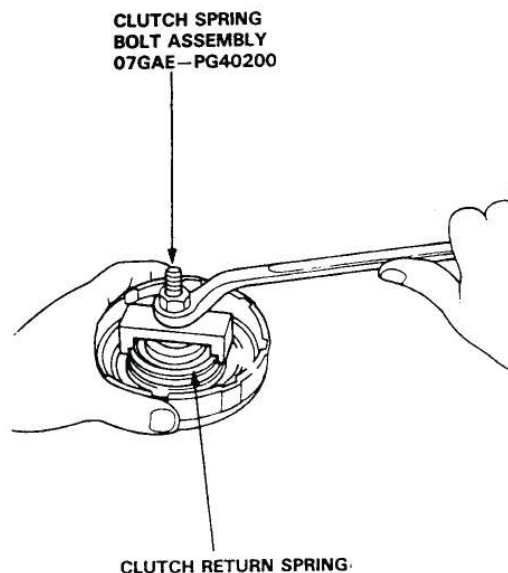


5. 1st and 3rd Clutch

- 1. Assemble the spring compressor on the clutch drum.



- 2. Compress the clutch return spring.

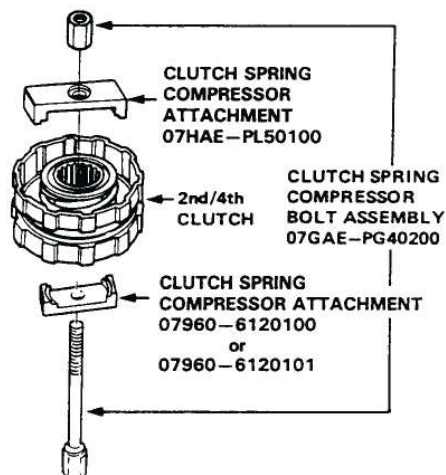


(cont'd)

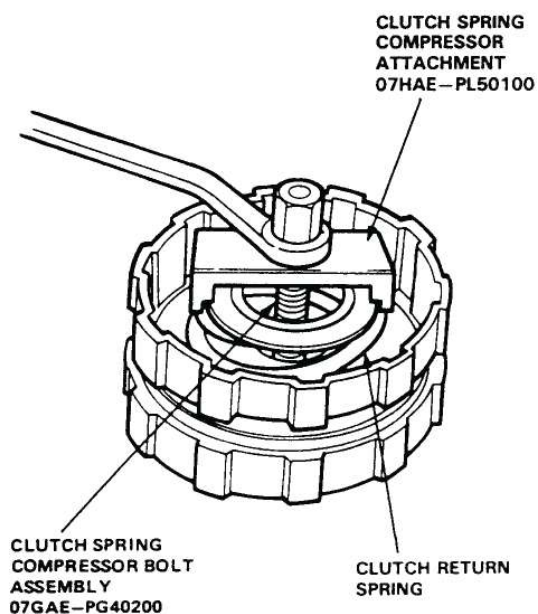
Disassembly (cont'd)

6. 2nd/4th Clutch

- 1. Assemble the spring compressor on the clutch drum.

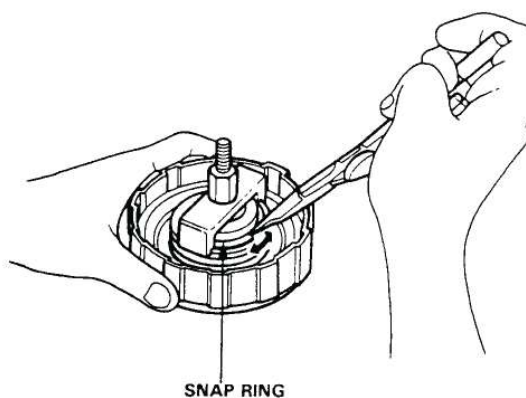


- 2. Compress the clutch return spring.

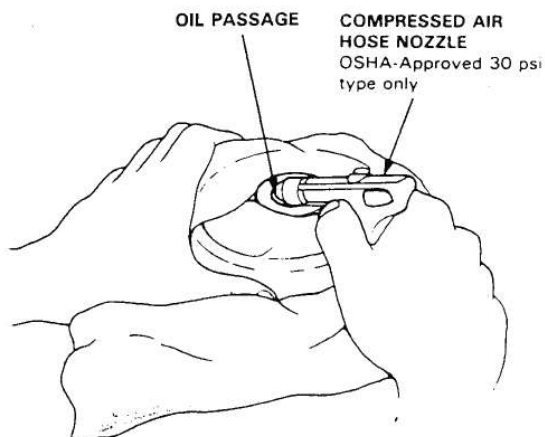


NOTE: Steps 7 and 8 are for all clutches.

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



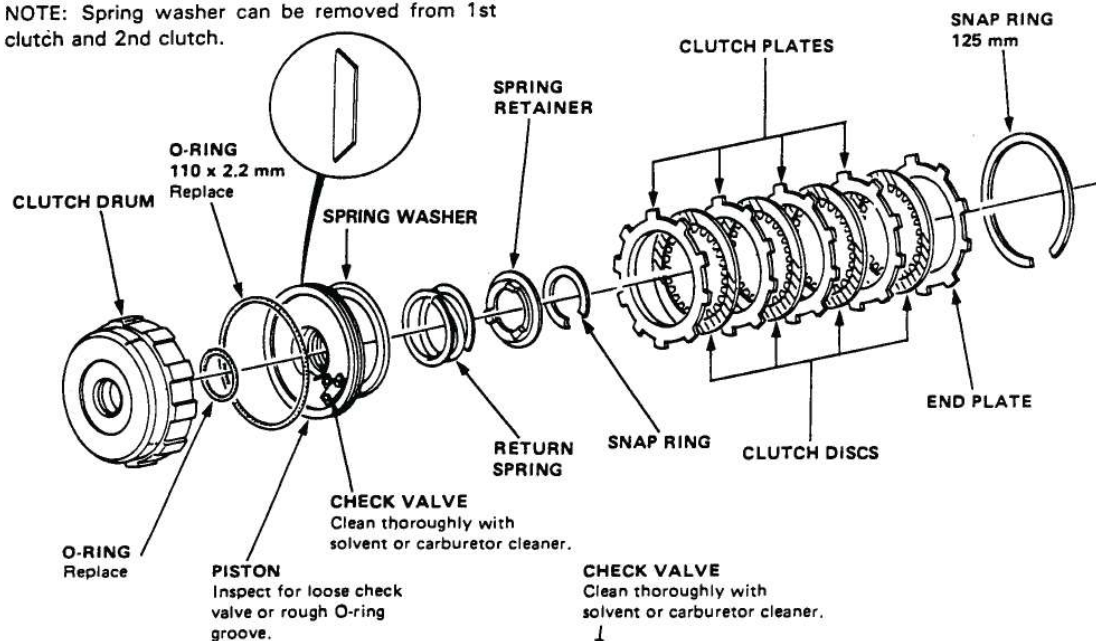
8. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



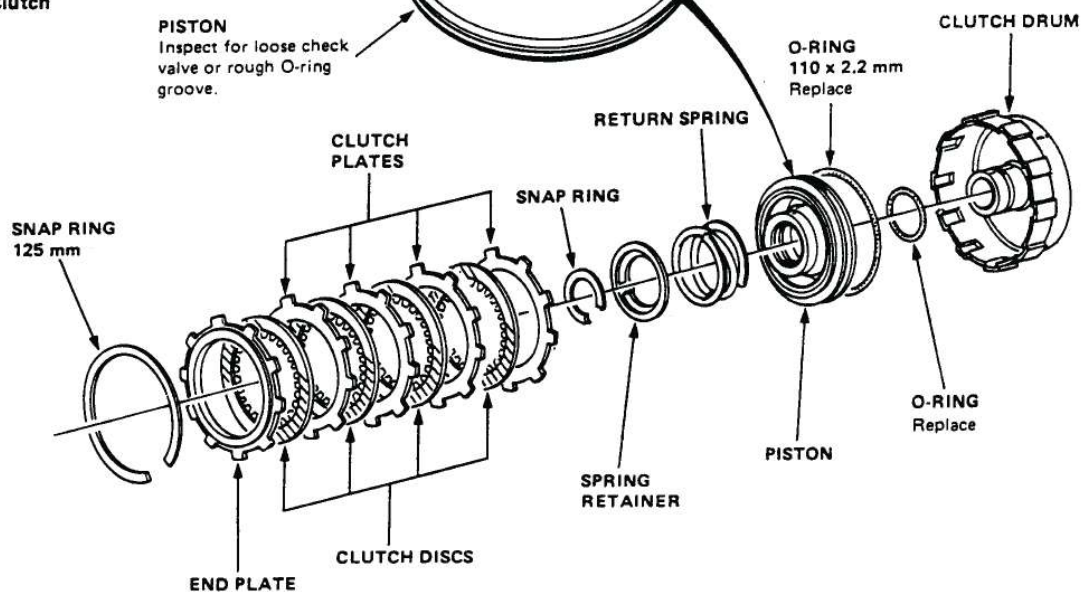
Disassembly/Inspection

1st Clutch

NOTE: Spring washer can be removed from 1st clutch and 2nd clutch.



3rd Clutch

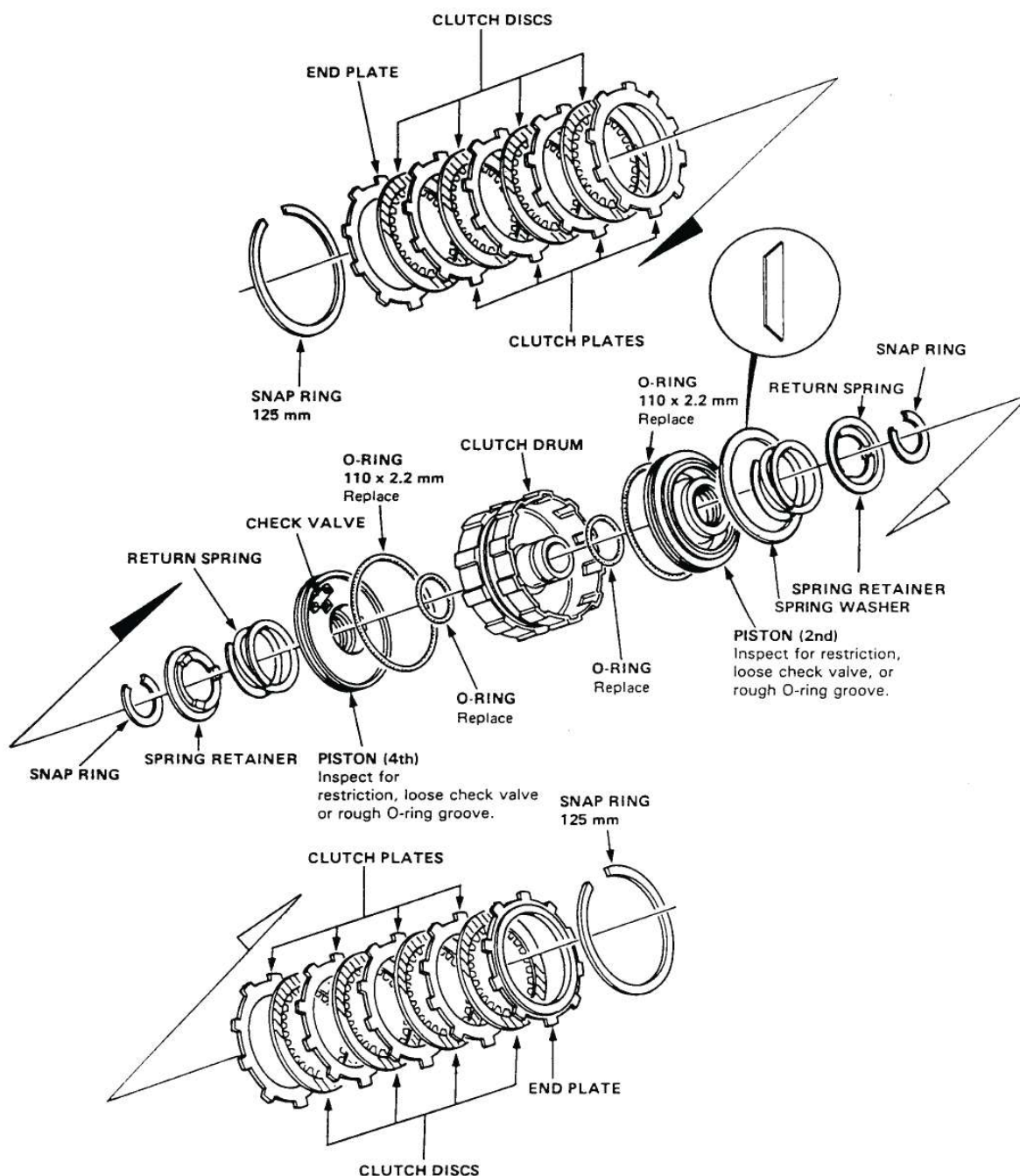


(cont'd)

Disassembly/Inspection (cont'd)

2nd/4th Clutch

NOTE: The 2nd clutch spring washer faces the opposite direction of the 1st, 3rd and 4th clutch spring washers.



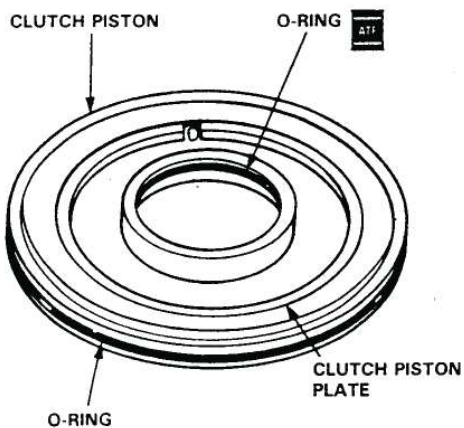
Reassembly

NOTE:

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

1. 1st Clutch

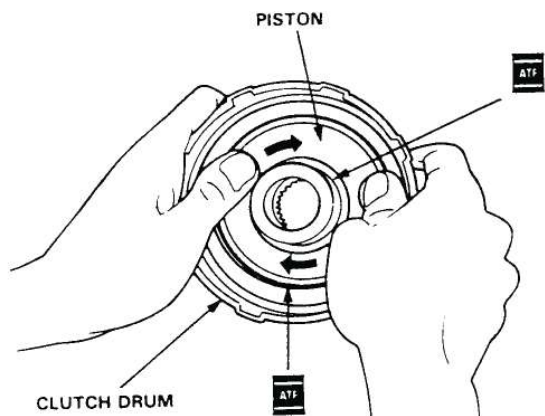
- 1. Install new O-ring on the clutch piston.



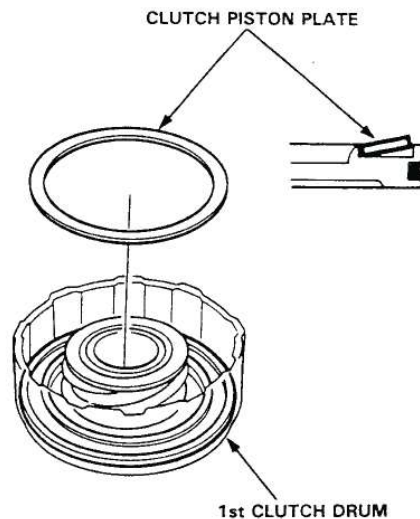
- 2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

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

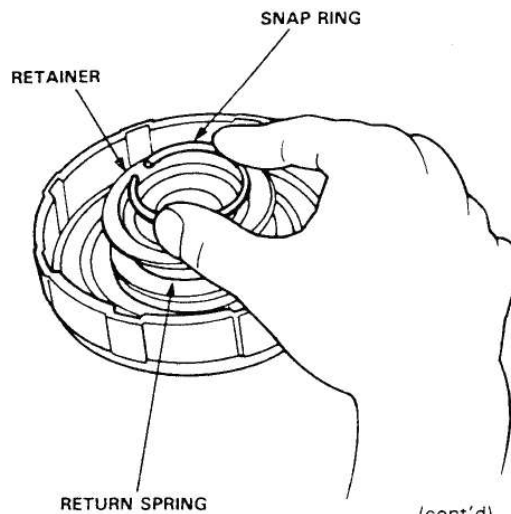
CAUTION: Do not pinch O-ring by forcing piston installation.



- 3. Install the spring washer.



- 4. Install the return spring and retainer.
— 5. Position the snap ring on the spring retainer.

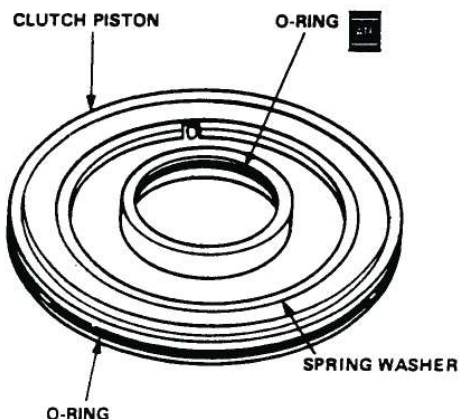


(cont'd)

Reassembly (cont'd)

2. 2nd Clutch

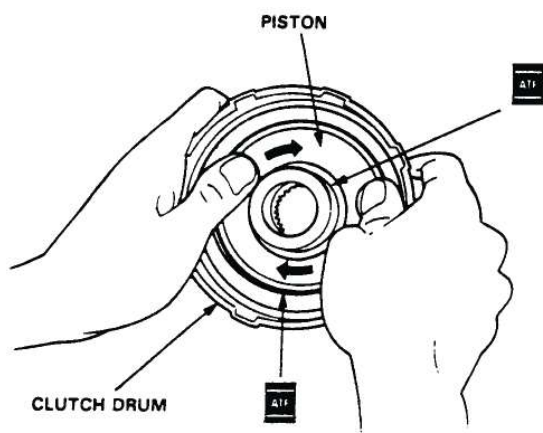
- 1. Install new O-ring on the clutch piston.



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

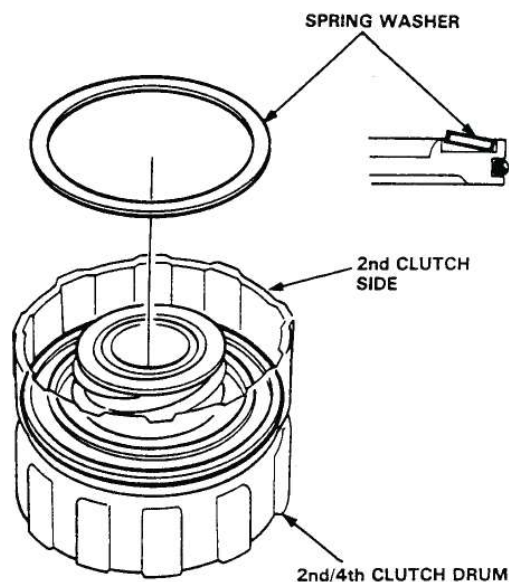
NOTE: Lubricate the piston O-ring with ATF before installing.

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

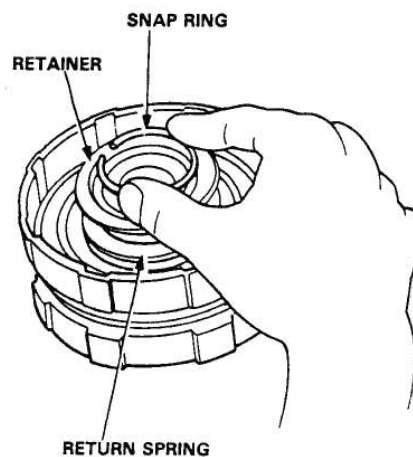


- 3. Install the spring washer.

NOTE: Note the spring washer direction.



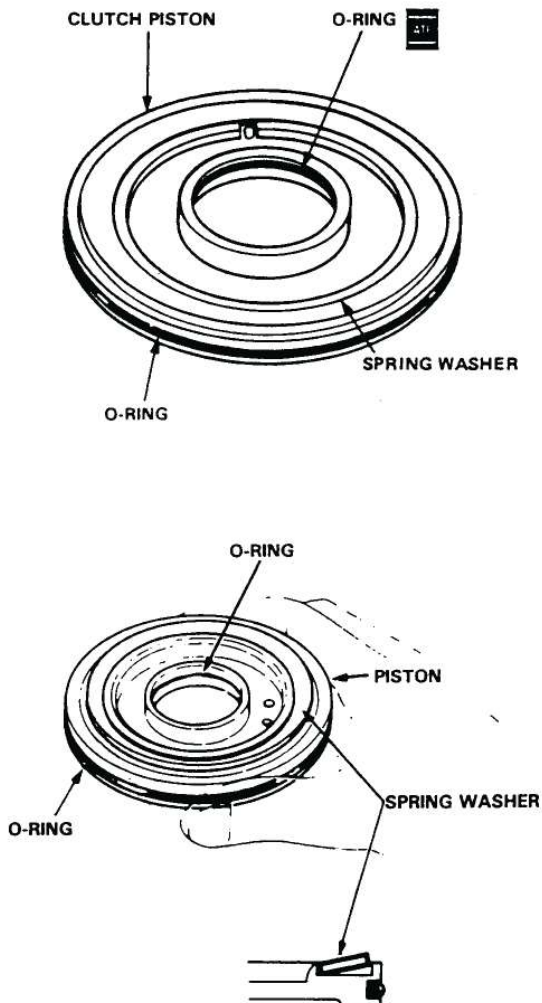
- 4. Install the return spring and retainer.
- 5. Position the snap ring on the spring retainer.



(cont'd)

3. 3rd Clutch

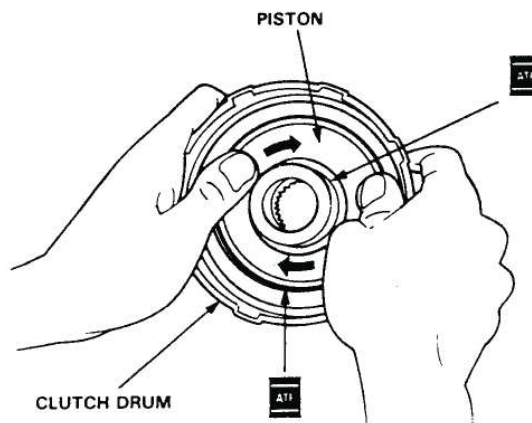
- 1. Install a new O-ring on the clutch piston.
Be sure that the disc spring is securely staked.



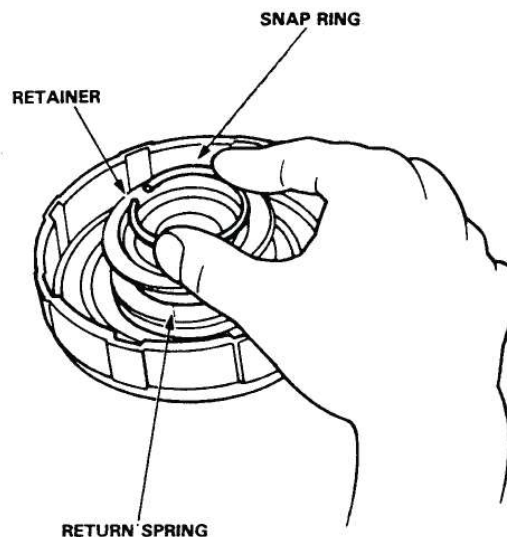
- 2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

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

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



- 3. Install the return spring and retainer.
- 4. Position the snap ring on the spring retainer.

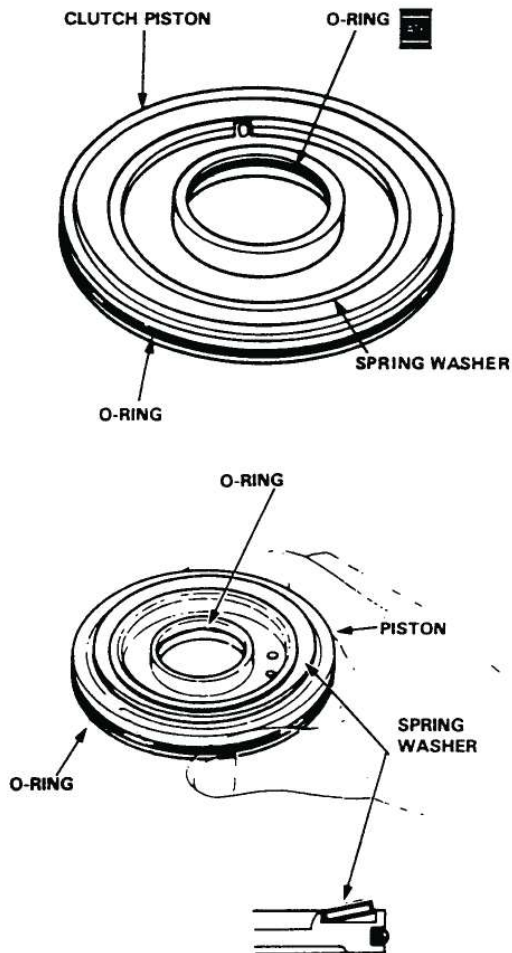


(cont'd)

Reassembly (cont'd)

4. 4th Clutch

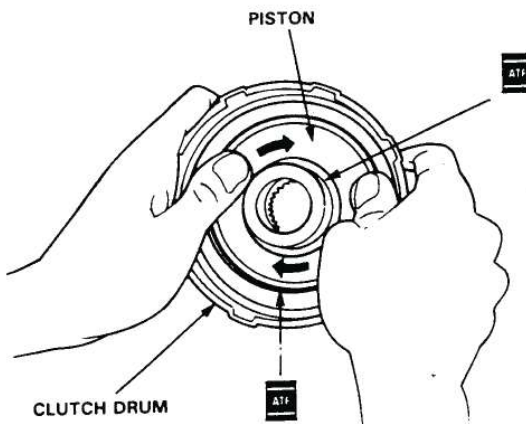
- 1. Install a new O-ring on the clutch piston.
Be sure that the disc spring is securely staked.



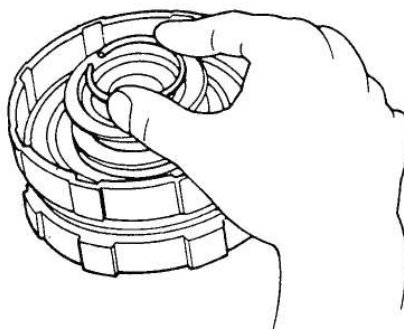
- 2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

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

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



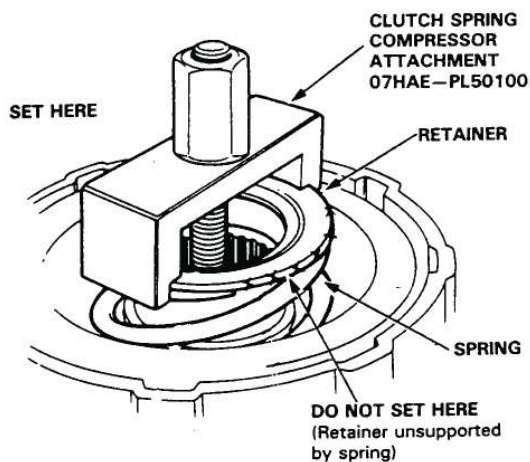
- 3. Install the return spring and retainer.
- 4. Position the snap ring on the spring retainer.



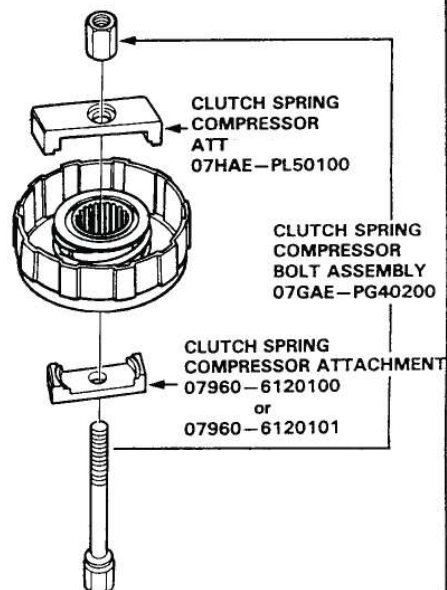
NOTE: Step 5 is for all clutches.

5. Install the spring compressor on the clutch drum and compress the clutch return spring.

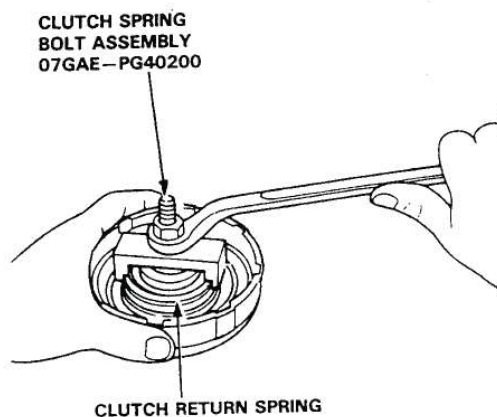
CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.



6. 1st and 3rd Clutch



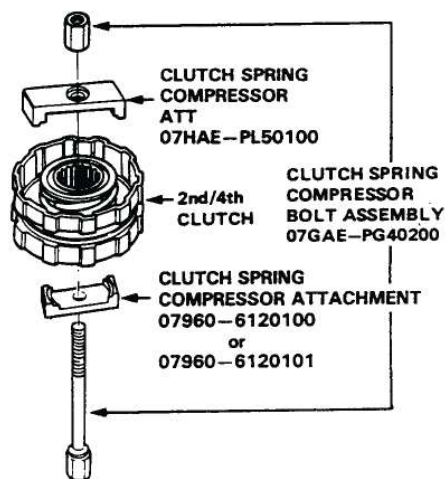
- 1. Compress the clutch return spring.



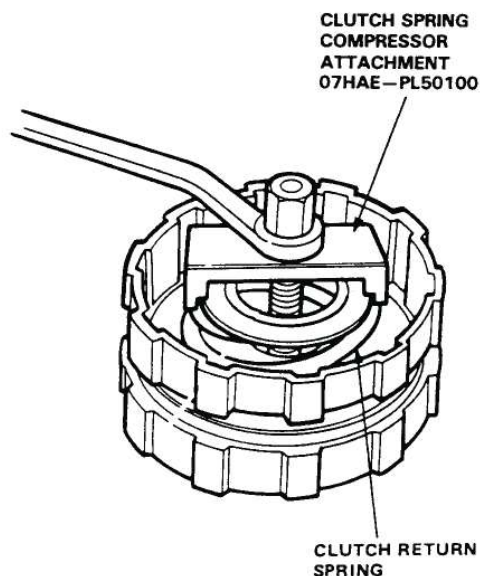
(cont'd)

Reassembly (cont'd)

7. 2nd/4th Clutch

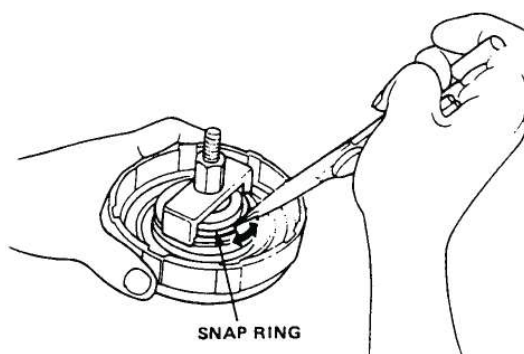


— 1. Compress the clutch return spring.



NOTE: Steps 8 thru 15 are for all clutches.

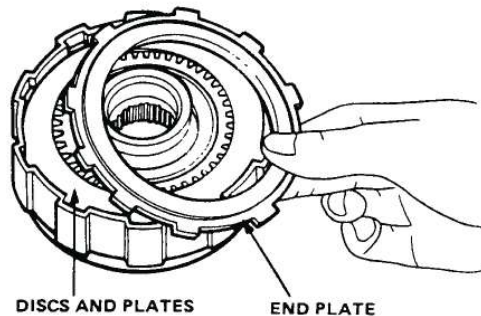
8. Install the snap ring.
9. Remove the clutch spring compressor.



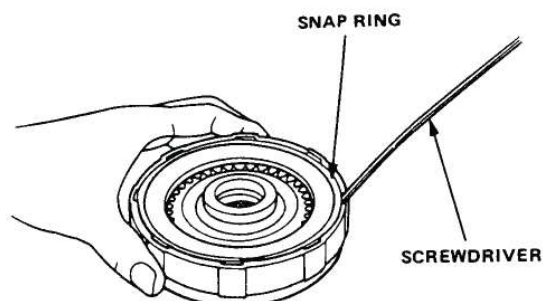
10. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.

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

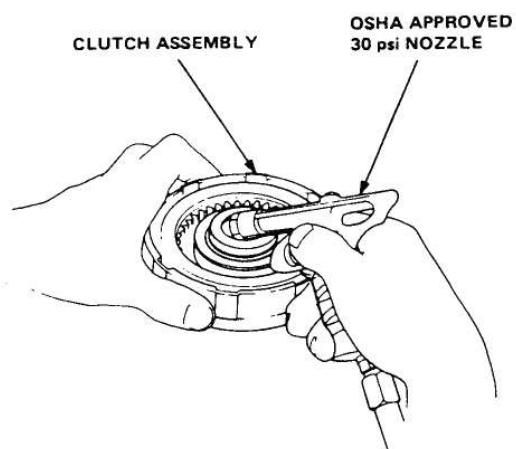
NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt or other foreign matter.



12. Install the 125 mm snap ring.



13. 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.



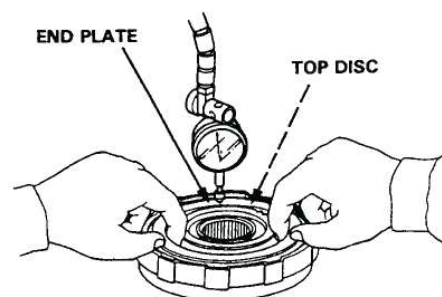
14. Measure the clearance between the clutch end plate and top disc with a dial indicator.

Zero the dial indicator with the clutch end plate lowered and lift it up to the snap ring. The distance that the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE: Measure at three locations.

End Plate-to-Top Disc Clearance:

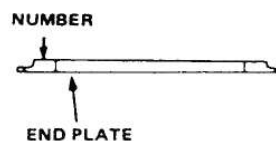
	Service Limit	
LOW	0.65—0.85 mm	(0.026—0.033 in.)
2ND	0.40—0.60 mm	(0.016—0.024 in.)
3RD	0.40—0.60 mm	(0.016—0.024 in.)
4TH	0.40—0.60 mm	(0.016—0.024 in.)



15. If the clearance is not within the service limits, select a new clutch end plate from the following table.

NOTE: If the thickest clutch and plate is installed but the clearance is still over the standard, replace the clutch discs and clutch plates.

	P/N	PLATE NO.	THICKNESS
ALL CLUTCHES	22551—PF4—000	1	2.1 mm (0.082 in.)
	22552—PF4—000	2	2.2 mm (0.086 in.)
	22553—PF4—000	3	2.3 mm (0.090 in.)
	22554—PF4—000	4	2.4 mm (0.094 in.)
	22555—PF4—000	5	2.5 mm (0.098 in.)
	22556—PF4—000	6	2.6 mm (0.102 in.)
	22557—PF4—000	7	2.7 mm (0.106 in.)
	22558—PF4—000	8	2.8 mm (0.110 in.)
	22559—PF4—000	9	2.9 mm (0.114 in.)
	22560—PF4—000	10	3.0 mm (0.118 in.)
1st CLUTCH ONLY	22561—PF4—000	11	3.1 mm (0.122 in.)
	22562—PF4—000	12	3.2 mm (0.126 in.)
	22563—PF4—000	13	3.3 mm (0.130 in.)
	22564—PF4—000	14	3.4 mm (0.134 in.)

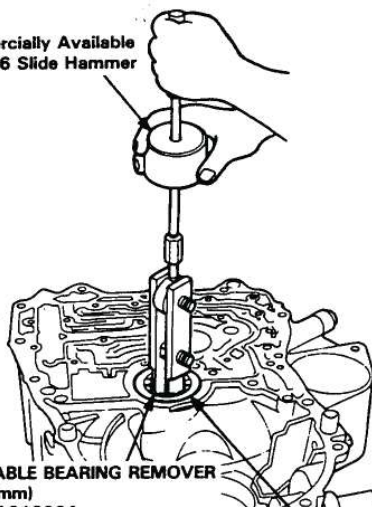


Replacement

Torque converter housing

1. Remove the differential assembly.
2. Remove the countershaft bearing.
3. Replace the oil guide plate.

Commercially Available
3/8 x 16 Slide Hammer

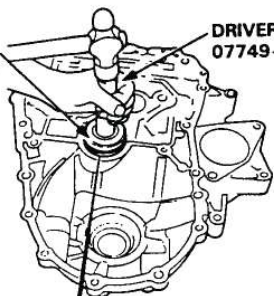


ADJUSTABLE BEARING REMOVER
(25–40 mm)
07736–A01000A

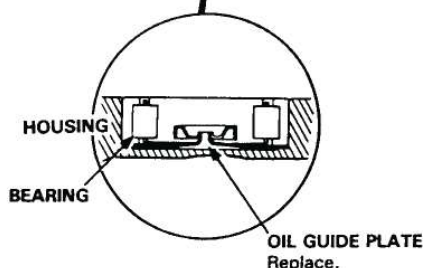
COUNTERSHAFT
NEEDLE BEARING
Replace with new
bearing if removed.

4. Drive in the new bearing until it bottoms in the housing.

ATTACHMENT
62 x 68 mm
07746–0010500



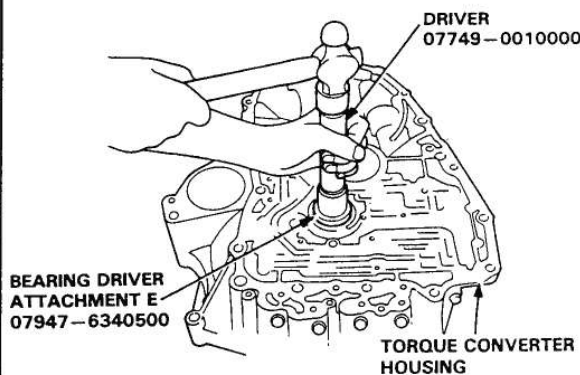
DRIVER
07749–0010000



HOUSING
BEARING

OIL GUIDE PLATE
Replace.

5. Drive out the mainshaft bearing and oil seal.

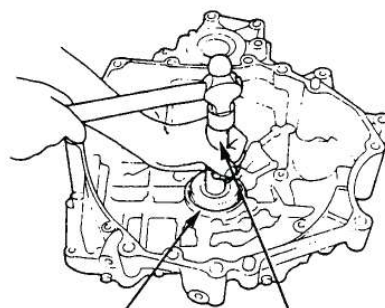


BEARING DRIVER
ATTACHMENT E
07947–6340500

DRIVER
07749–0010000

TORQUE CONVERTER
HOUSING

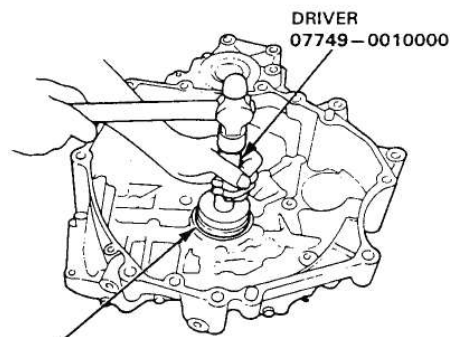
6. Drive in the new mainshaft bearing until it bottoms in housing.



ATTACHMENT
62 x 68 mm
07746–0010500

DRIVER
07749–0010000

7. Install the oil seal flush with the housing.



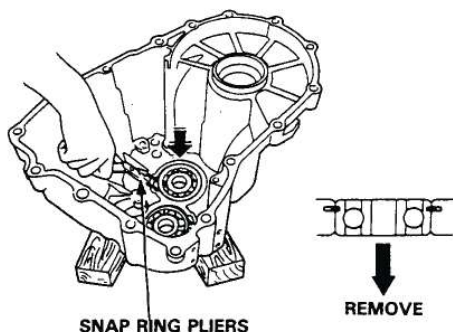
DRIVER
07749–0010000

DRIVER ATTACHMENT E
07947–6340201

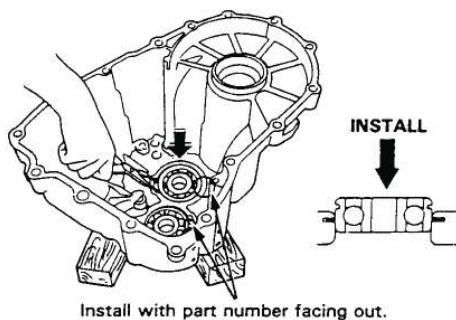
Transmission housing

8. 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.



9. 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.

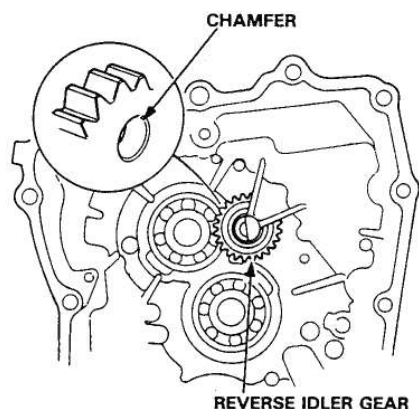


10. Make sure the snap rings are seated in the bearing and housing grooves.

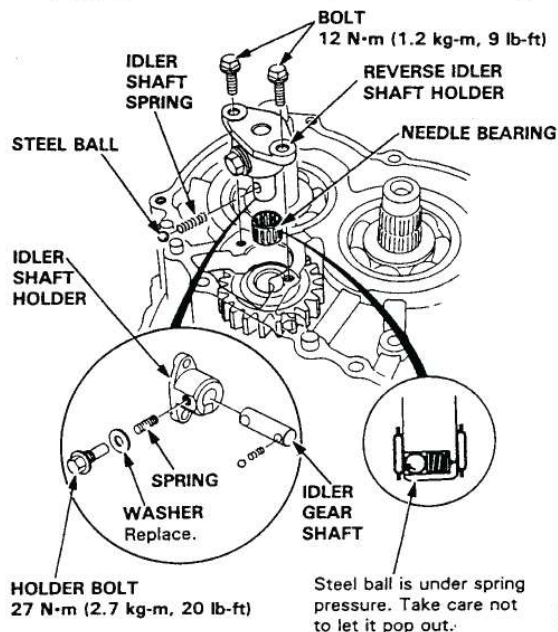
Installation

1. Install the reverse idler gear from the inner side of the housing.

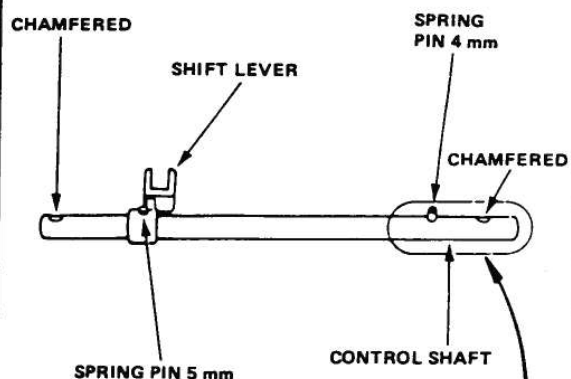
NOTE: Be sure to install the reverse idler gear with the chamfered side toward torque converter housing.



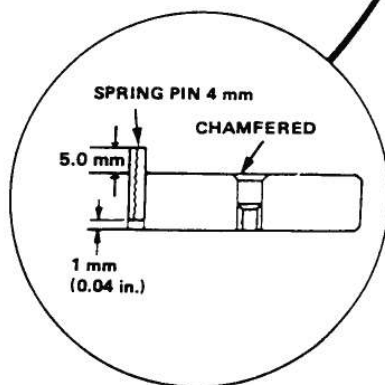
2. Install the reverse idler gear shaft, spring, new washer and holder bolt on the reverse idler gear shaft holder.
3. Set the spring and steel ball in the idler gear shaft hole, then install the needle bearing.
4. Install the idler shaft holder in the transmission housing with care not to drop the needle bearing.



Installation



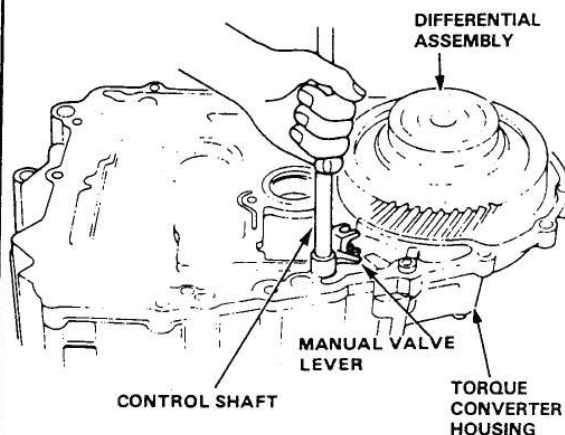
Drive the 4 mm spring pin in from the side with the chamfered hole, to a depth of 1 mm from the opposite side.



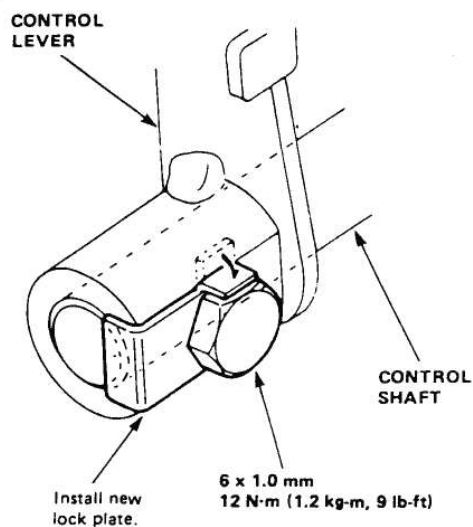
Reassembly

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 taper roller bearing preload must be checked.
2. Assemble the manual valve lever on the control shaft, then install in the torque converter housing as shown.

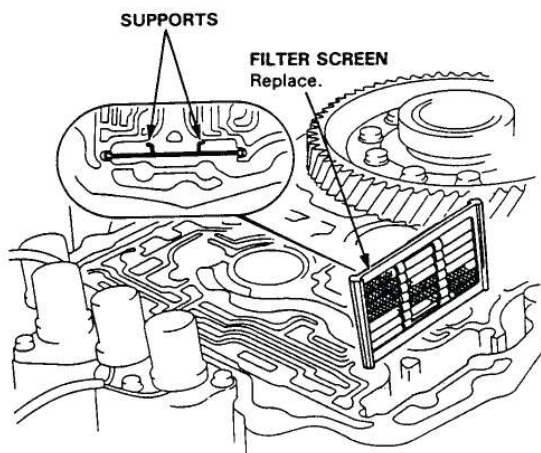


3. Install the control lever and new lock plate on the other end of the shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.

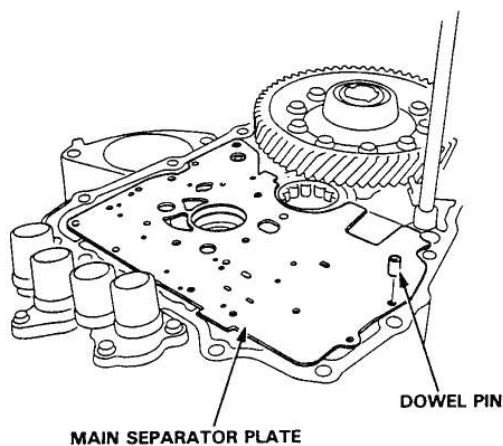


4. Install a new filter screen on the torque converter housing.

NOTE: Install the filter screen with its supports facing in.

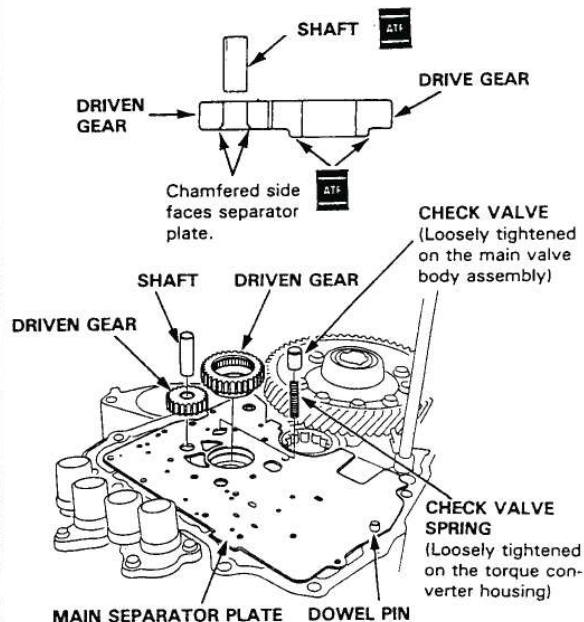


5. Install the main separator plate and dowel pin on the torque converter housing.

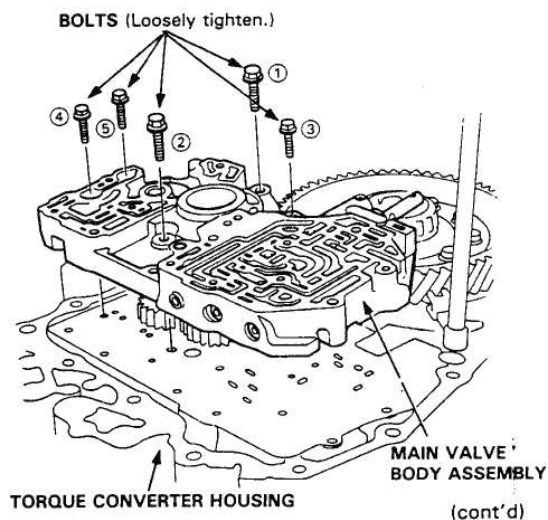


6. Install the oil pump gears and shaft, then loosely tighten the check valve on the main valve body assembly and the check valve spring on the torque converter housing.

NOTE: Install the oil pump driven gear with its chamfered side facing down.



7. Install the main valve body on the torque converter housing and loosely tighten with 5 bolts in the sequence shown.



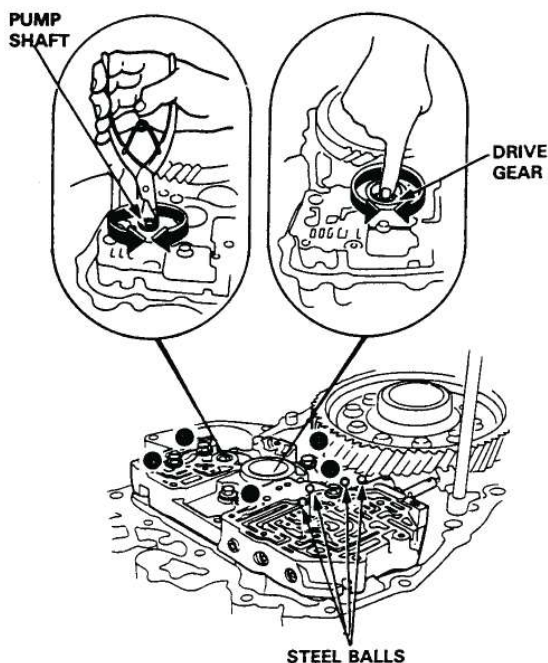
- Reassembly (cont'd)

8. Securely tighten the 5 bolts in the sequence shown in step 7.

9. Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in the axial and normal operating directions.

CAUTION: If the pump gear and pump shaft do not move freely, loosen the valv body bolts, realign the shaft, and then retighten to the specified torque. Failure to align the pump shaft correctly will result in seized pump gear or pump shaft.

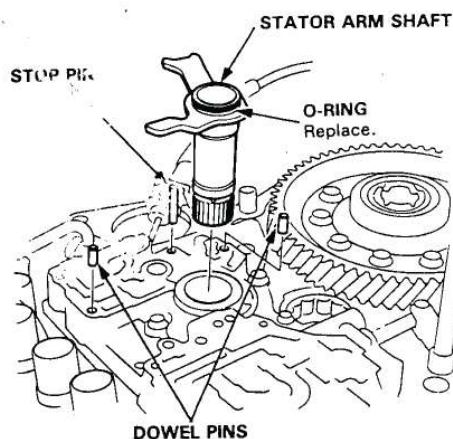
10. Install the 4 steel balls in main valve body oil passages.



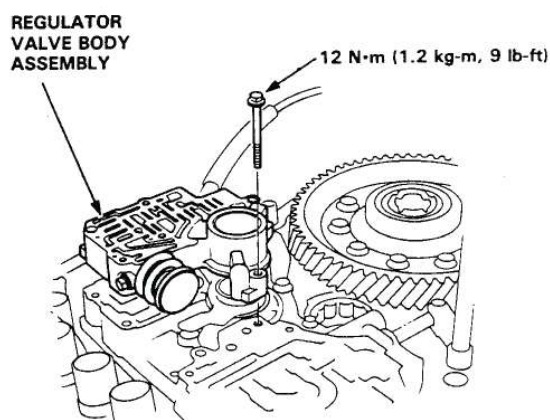
TORQUE:

- ① and ② : 17.5 N·m (1.75 kg-m, 13 lb-ft)
③, ④ and ⑤: 12 N·m (1.2 kg-m, 9 lb-ft)

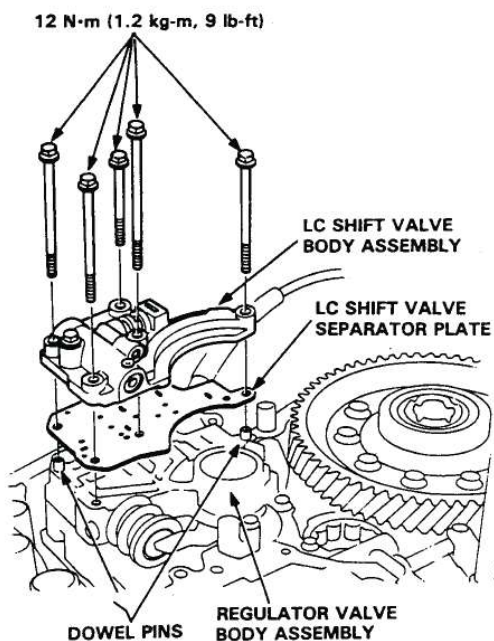
11. Install the stator shaft arm, stop pin and dowel pins.



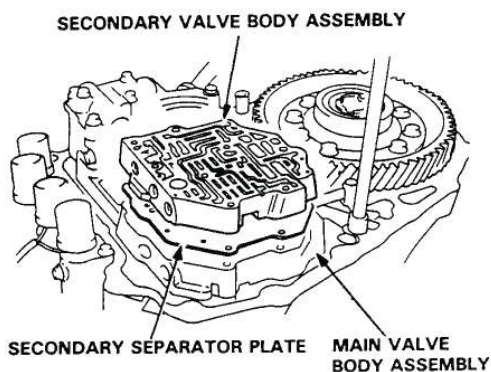
12. Install the regulator valve body assembly on the main valve body assembly.



13. Install the lock-up shift valve separator plate with 2 dowel pins and lock-up shift valve body assembly with 5 bolts as shown.

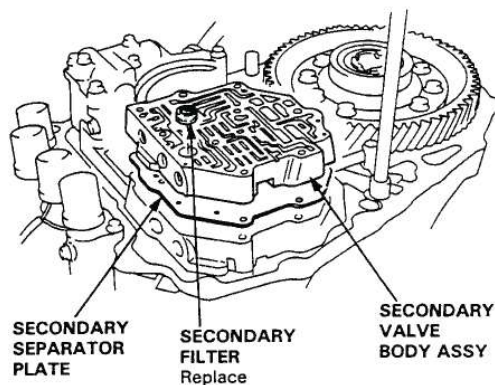


14. Install the secondary separator plate and secondary valve body assembly on the main valve body assembly.

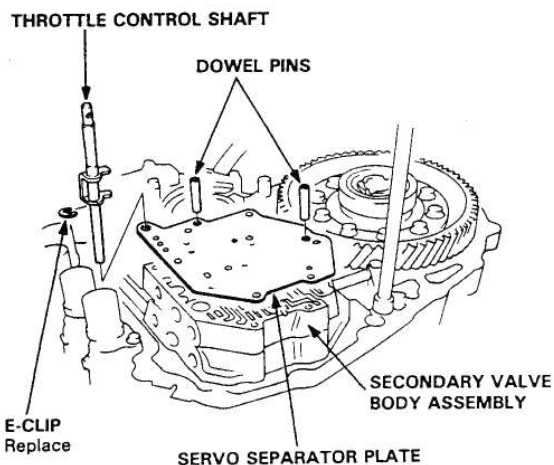


15. Install the secondary filter in the secondary valve body assembly.

NOTE: Secondary valve body assembly is not fixed on the main valve body assembly.



16. Install the separator plate and dowel pins, then install the throttle control shaft.

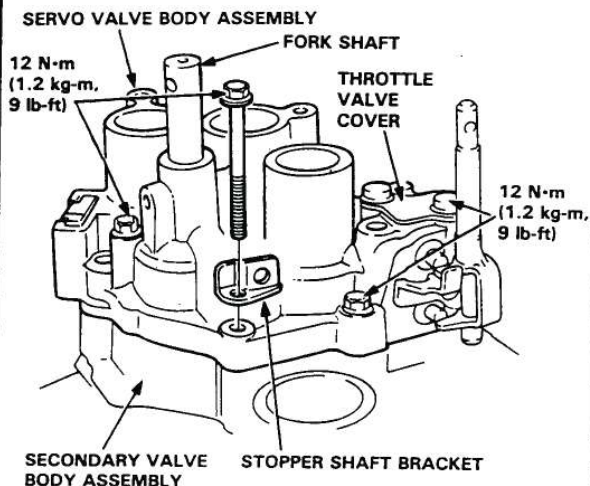


(cont'd)

Reassembly (cont'd)

17. Install the shift fork shaft and servo return spring on the servo valve body assembly, then install the assembly on the secondary valve body assembly.

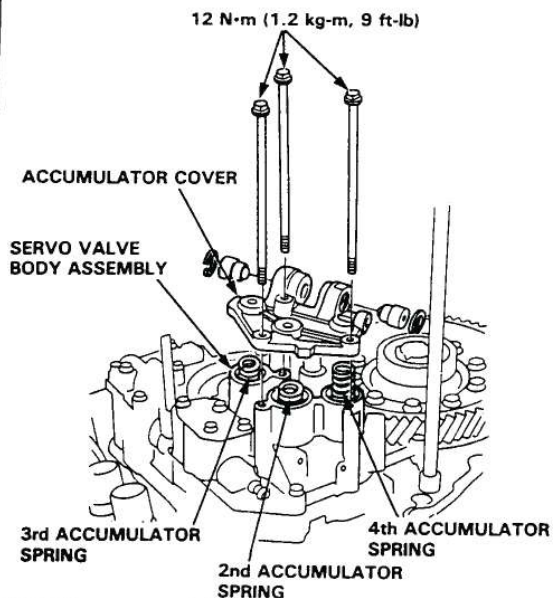
NOTE: Install the stopper shaft stay as shown.



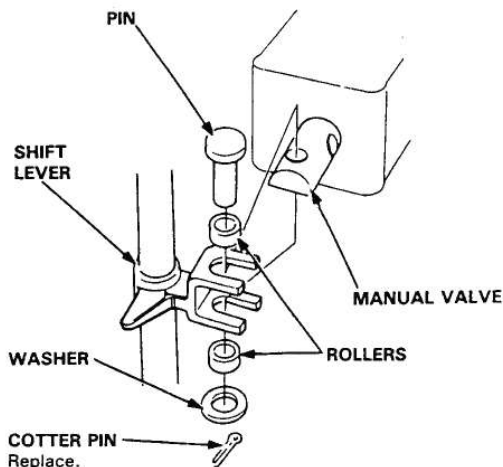
18. Install the accumulator springs.

19. Install the accumulator cover, and torque the bolts to 12 N·m (1.2 kg-m, 9 lb-ft) in a crisscross pattern.

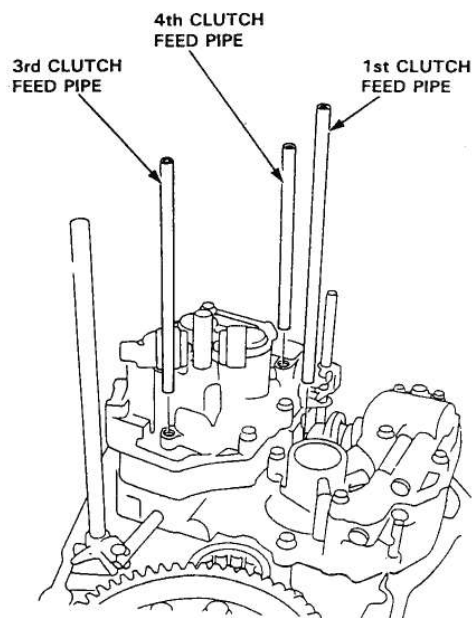
CAUTION: To prevent stripping the threads, press down on accumulator cover, then install the bolts.



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

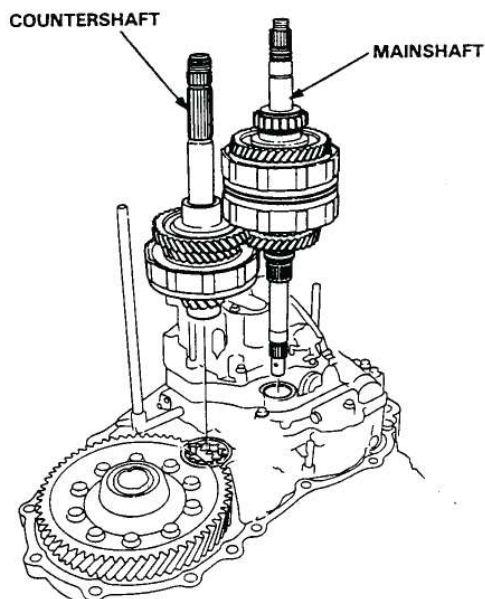


21. Install the 1st, 3rd and 4th clutch feed pipes.



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

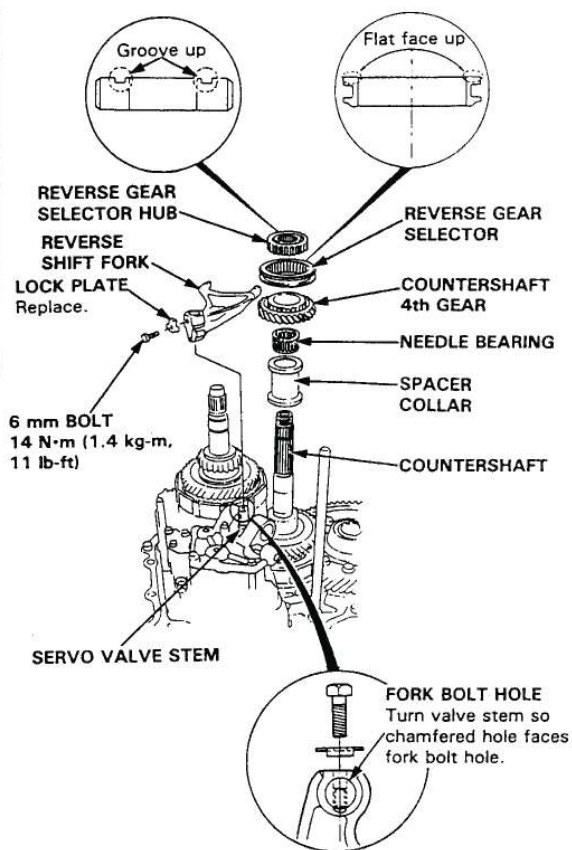
NOTE: Do not tap on the shafts with a hammer to drive in.



23. Install the spacer collar, needle bearing, countershaft 4th gear, reverse shaft fork, reverse gear selector and reverse selector hub.

NOTE:

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

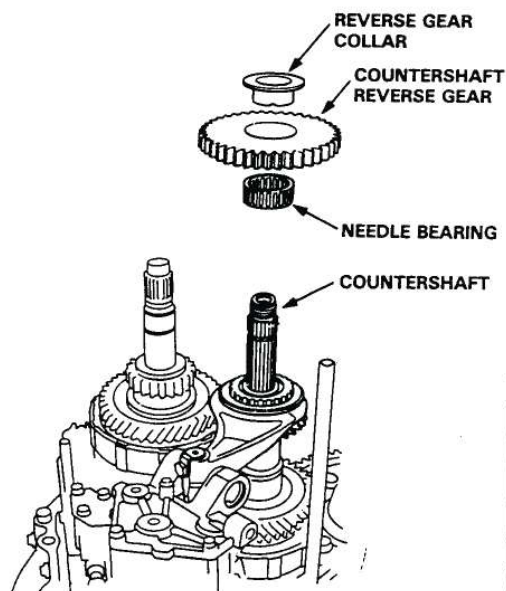


24. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock plate. Bend the lock tab against the bolt head.

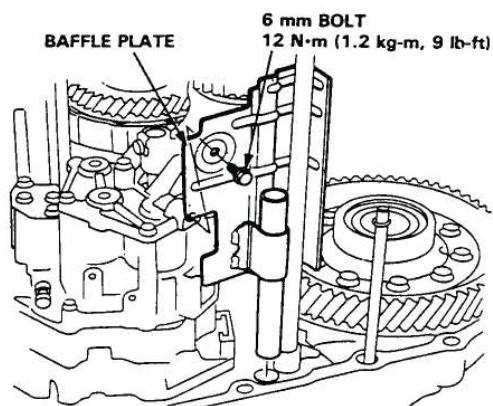
(cont'd)

Reassembly (cont'd)

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

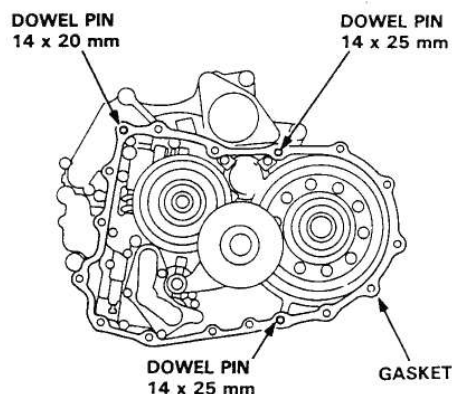


26. Install the baffle plate.



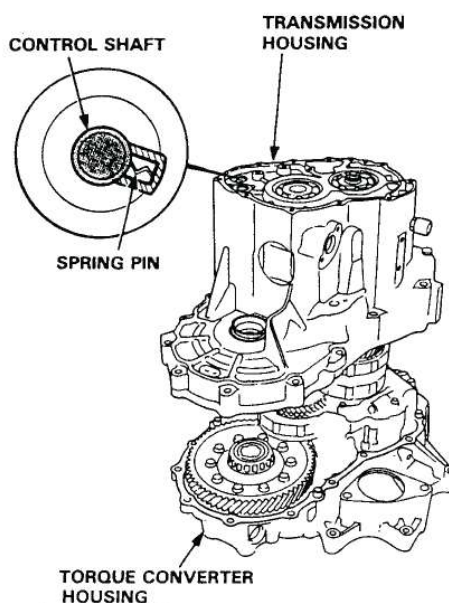
27. Install the new gasket and three dowel pins in the torque converter housing.

NOTE: Dowel pins are different in length. Be sure to install properly.



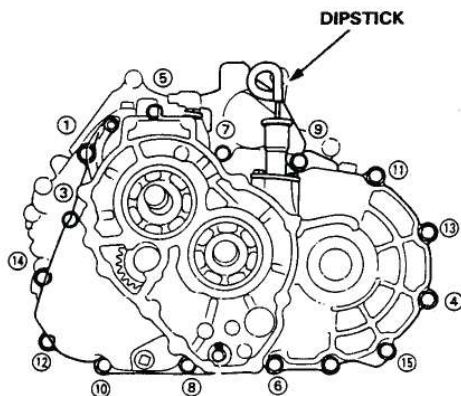
28. Place the transmission housing on the torque converter housing.

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.

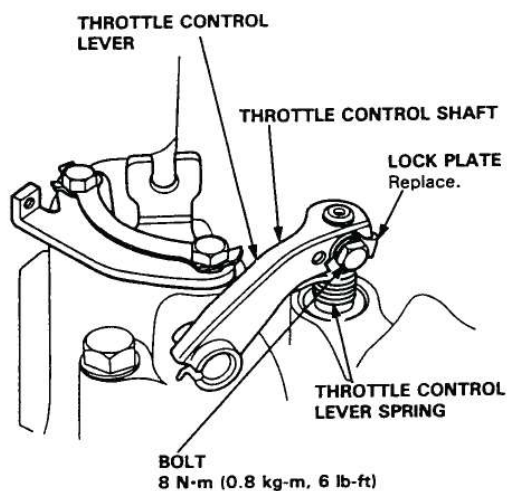


29. Torque bolts to 55 N·m (5.5 kg-m, 40 lb-ft) in order of (1) thru (15) in two or more steps.

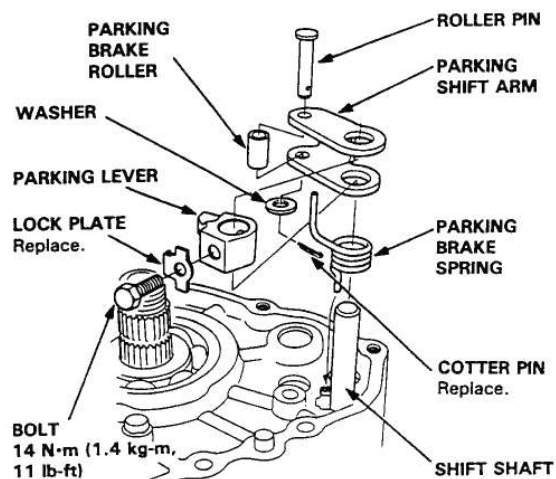
NOTE: When tightening the transmission housing bolts, take care that you do not distort or damage the throttle control bracket; distortion or damage to the bracket will change transmission shift points.



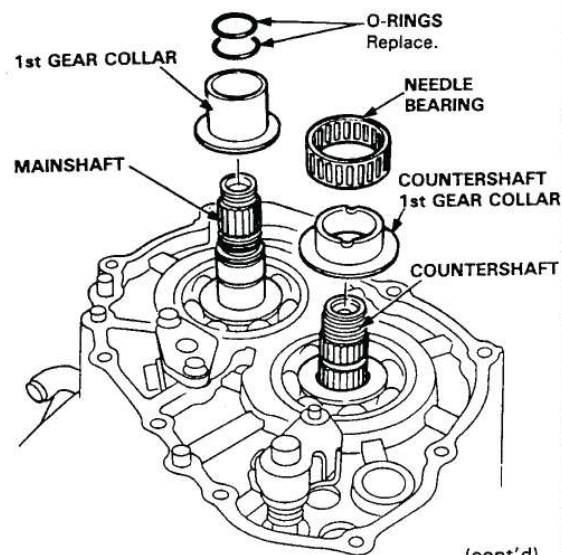
30. Install the throttle control lever and spring on the throttle control shaft.
31. Install the bolt and new lock plate. Bend the lock tab against the bolt head.



32. Install the parking brake roller, roller pin and washer on the parking shift arm and secure with a new cotter pin.
33. Install the parking brake spring, parking shift arm and parking lever on the shift shaft with the bolt. Bend the lock tab against the bolt head.



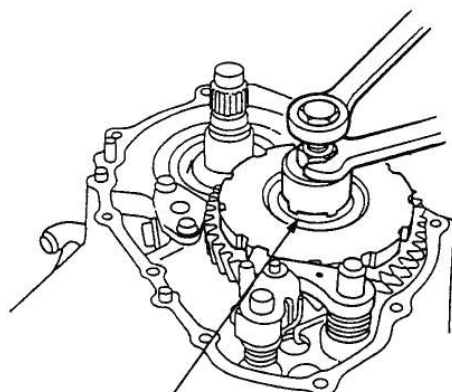
34. Install the countershaft 1st gear collar and needle bearing on the countershaft. Install the 1st gear collar and new O-rings on the mainshaft.



Reassembly (cont'd)

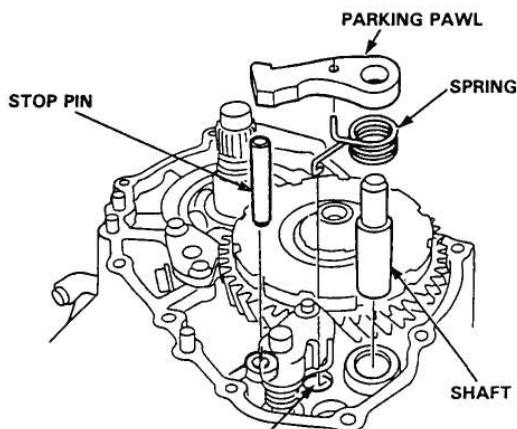
35. Install the parking gear and countershaft 1st gear on the countershaft with the parking gear installer. Loosely install a new lock nut on the countershaft.

CAUTION: Lock nut has left-hand threads.



GEAR INSTALLER
07HAF-PL50100

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



Hook end of spring into this hole.

NOTE:

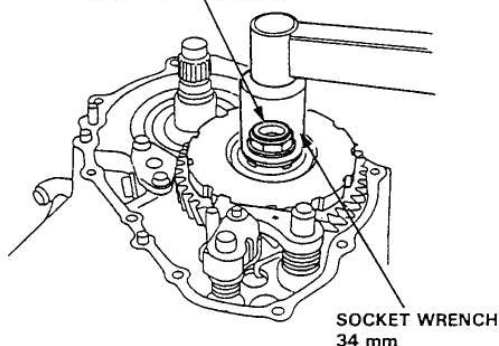
- One end of the parking pawl release spring fits into the hole in the parking pawl, the other end into the hole in the transmission housing as shown.
- The release spring should put clockwise tension on the pawl, forcing it away from the parking gear.

37. Shift to PARK and install the mainshaft holder.

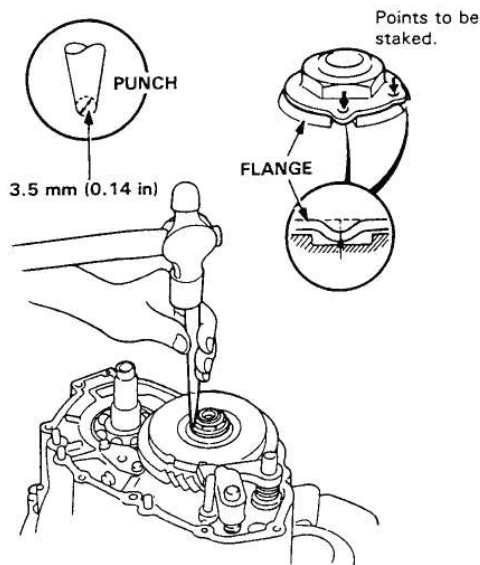
38. Install and torque the new countershaft locknut.

CAUTION: Locknut has left-hand threads.

COUNTERSHAFT LOCKNUT
140 → 0 → 140 N·m
(14.0 → 0 → 14.0 kg-m,
102 → 0 → 102 lb-ft)

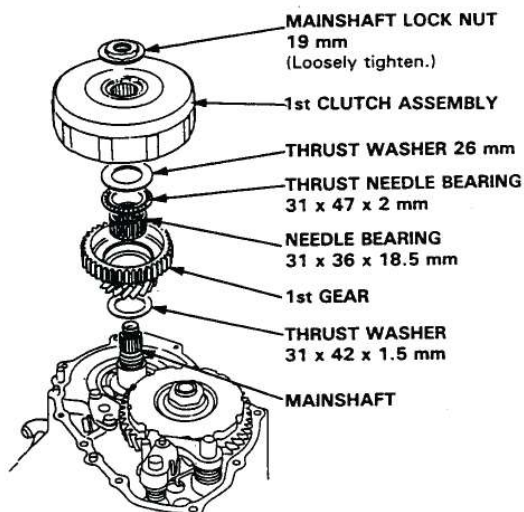


39. Stake the locknut flange at two places into the gear grooves using a 3.5 mm punch.



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

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

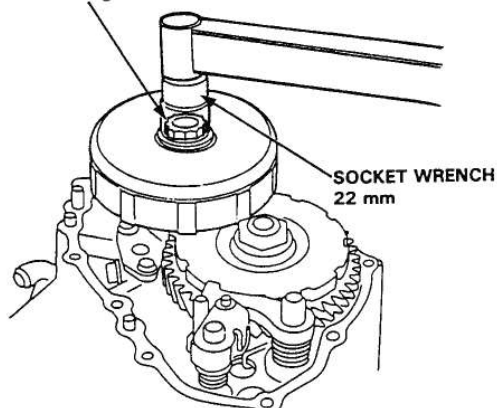


42. Install the 1st clutch assembly on the mainshaft.

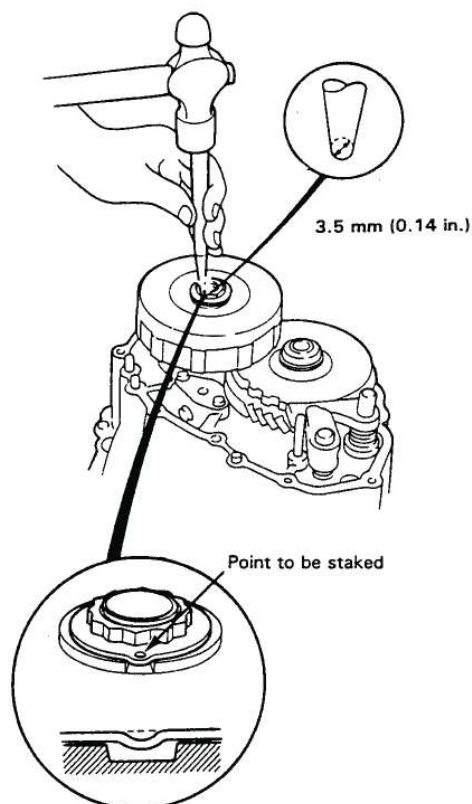
43. Attach the mainshaft holder from the underside of the torque converter case.

44. Torque the new mainshaft locknut.

LOCKNUT 19 mm
95 → 0 → 95 N·m
(9.5 → 0 → 9.5 kg·m, 70 → 0 → 70 lb·ft)



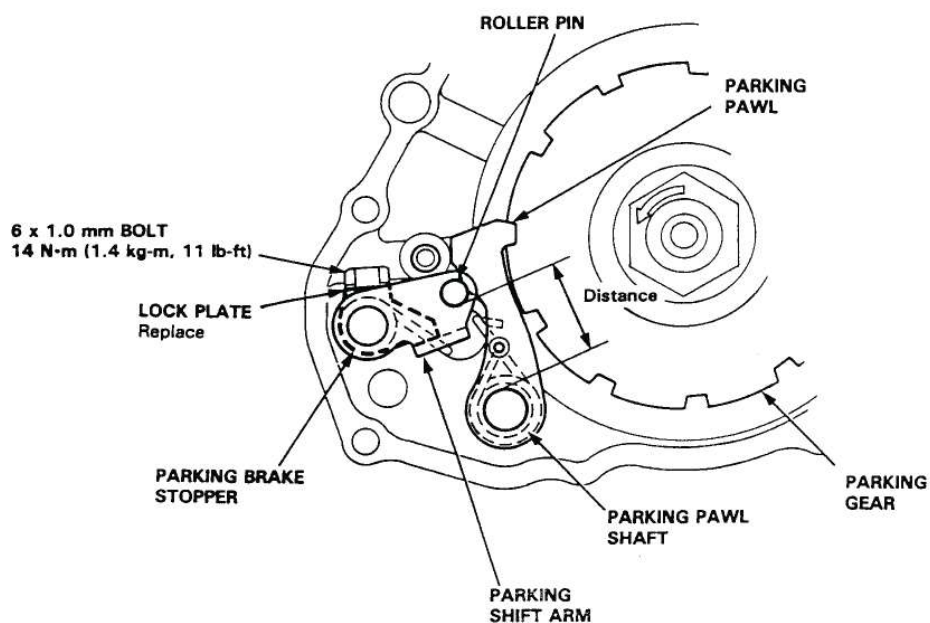
45. Stake the locknut flange into the groove in the 1st clutch.



Inspection/Adjustment

1. Set the parking shift arm in PARKING position.
2. Measure the distance between the outer face of the parking pawl shaft and outer face of the parking shift arm roller pin.

Distance: 30.5–31.5 mm (1.201–1.240 in.)

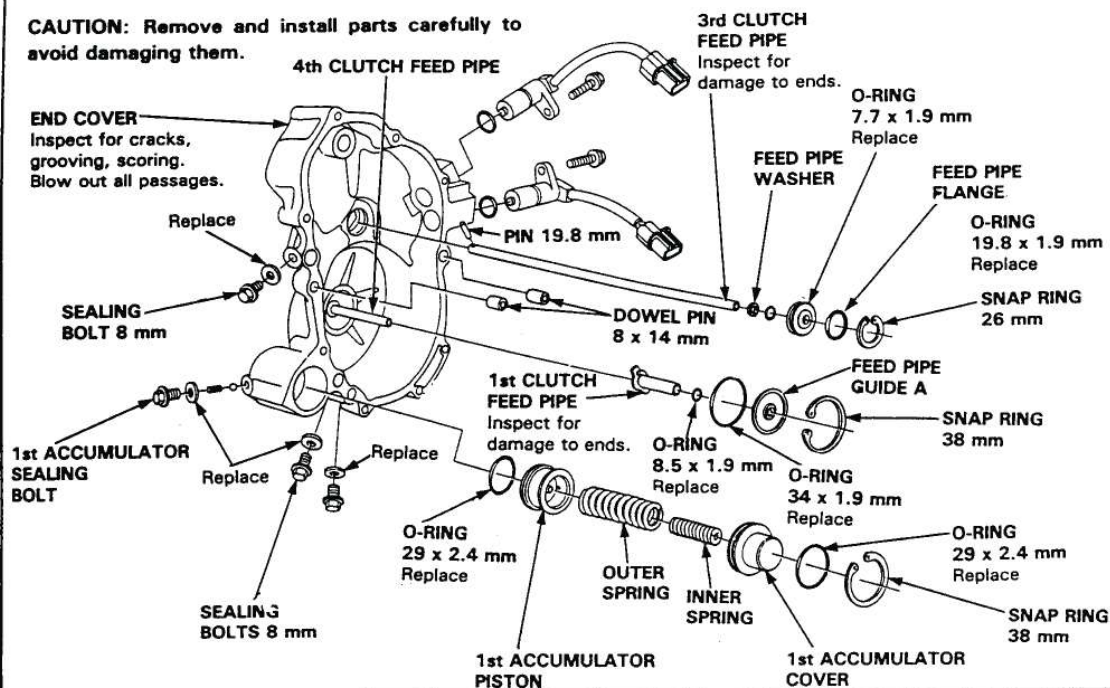


3. If the measurement is out of the specification (distance), select the appropriate parking brake stopper using the table below, and install it on the parking shift arm.

No.	PART NUMBER
1	24537-PA9-003
2	24538-PA9-003
3	24539-PA9-003

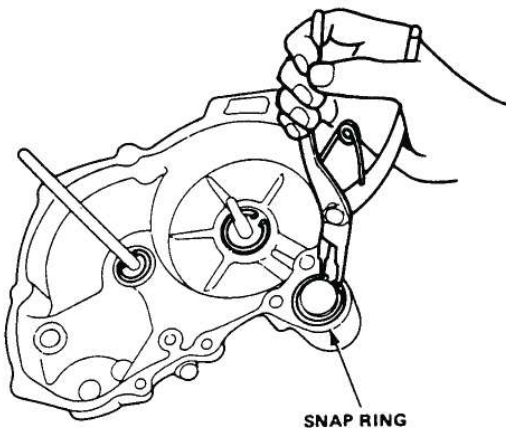
Disassembly/Inspection

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

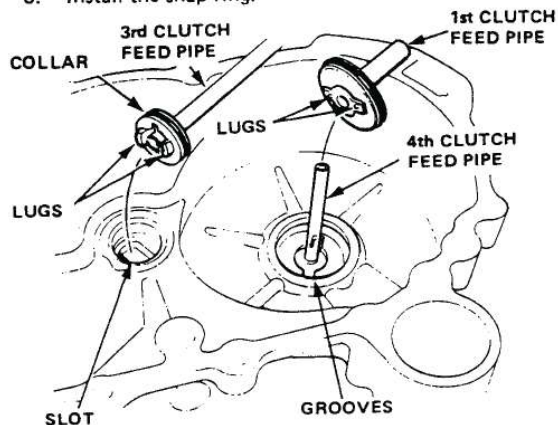


Reassembly

1. Seat a new O-ring in the groove of the 1st accumulator, and slide the accumulator piston into the right side transmission cover. Install the outer spring, inner spring, another new O-ring and the accumulator cover, in that order.
2. Install 38 mm snap ring.

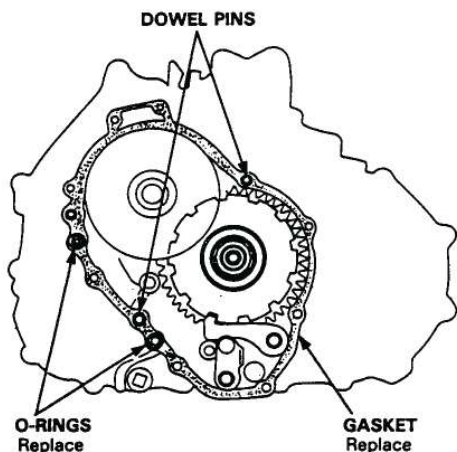


3. With feed pipes assembled, align lugs on the collars with slot in end cover.
4. Install the snap ring.
5. Install the feed pipes in the end cover, aligning the lugs of the 1st clutch feed pipe with the grooves of the end cover.
6. Install the snap ring.

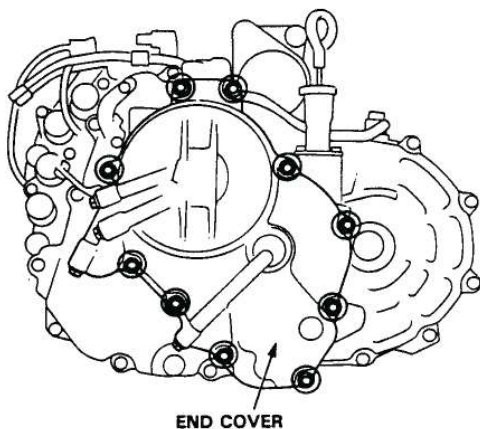


Reassembly

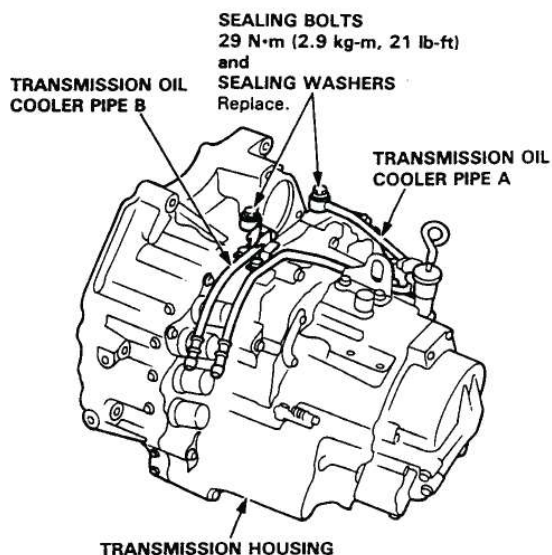
1. Install the gasket, dowel pins, and O-rings on the transmission housing.



2. Install the end cover and torque all 10 bolts to 12 N·m (1.2 kg-m, 9 lb-ft).

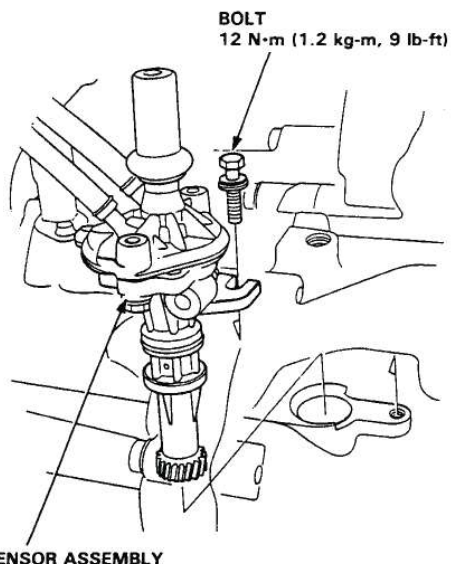


3. Install the transmission oil cooler pipes A and B on the transmission housing with new sealing washers.



4. Install the speed sensor assembly.

NOTE: Speed sensor assembly removal/installation is required only if the power steering is to be overhauled.



SPEED SENSOR ASSEMBLY