



**HONDA  
RO - MPRA**

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## **INTRODUCTION RO ACURA INTEGRA 1990**

The Acura 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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*The information and part numbers contained in this booklet have  
been carefully compiled from industry sources known for their  
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## Technical Service Information

The Automatic Transmission is a combination of a 3-element torque converter and a triple-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 three parallel shafts, the mainshaft, the countershaft and the secondary shaft. The mainshaft is in line with the engine crankshaft.

The mainshaft includes the clutches for 1st, and 4th, and gears for 3rd, 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 2nd, 3rd, and 4th, Reverse and 1st.

The secondary shaft includes 2nd clutch, the secondary drive gear, and 2nd gear.

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 **S<sub>3</sub>**, **S<sub>4</sub>**, **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 below the dash to the left of the steering column.

### HYDRAULIC CONTROL

The valve assembly includes the main valve body, secondary valve body, servo valve body, and regulator 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, cooler relief valve, 3rd orifice control valve, lock-up shift valve, lock-up control valve, 3-2 kickdown valve, pressure relief valve and oil pump gears.

The secondary valve body includes the 4th exhaust valve, 3rd kickdown valve, modulator valve, 2nd modulator valve, servo control valve and the 2nd orifice control valve.

The servo valve body contains the accumulator pistons T/C check valve, and servo valve. The regulator valve body contains pressure regulator valve and lock-up timing valve. Fluid from the regulator passes through the manual valve to the various control valves.

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<sub>4</sub>** 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 valves control 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.

(cont'd)





## Technical Service Information

### GEAR SELECTION

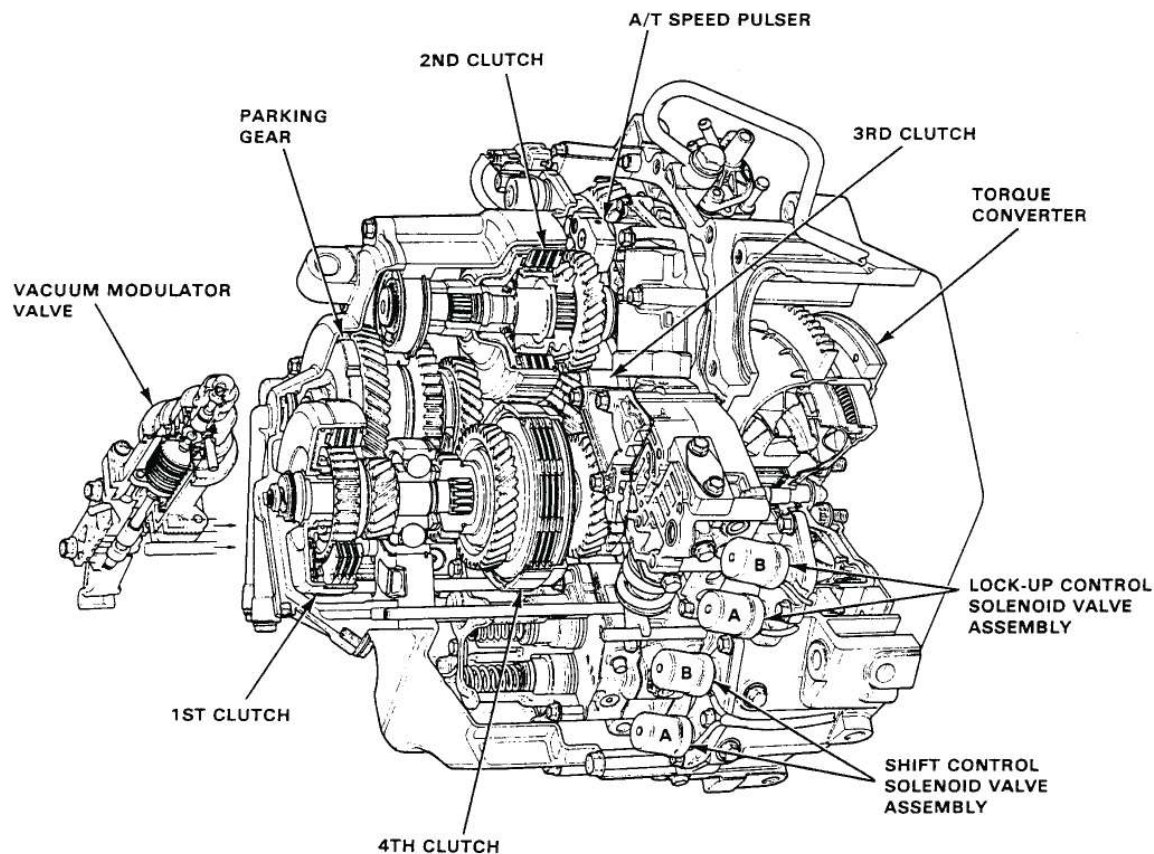
The selector lever has six positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D** or **S4** 1st through 4th gear ranges, **S3** 1st through 3rd gear ranges, and **2** 2nd gear.

| Position                               | Description                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>P</b> PARK                          | Front wheels locked; parking pawl engaged with parking gear on countershaft. All clutches released.                                                                                                                                                                                                                   |
| <b>R</b> REVERSE                       | Reverse; reverse selector engaged with countershaft reverse gear and 4th gear clutch locked.                                                                                                                                                                                                                          |
| <b>N</b> NEUTRAL                       | All clutches released.                                                                                                                                                                                                                                                                                                |
| <b>D</b> DRIVE                         | 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.<br>The lock-up mechanism comes into operation in 2nd, 3rd and 4th when the transmission is in <b>D</b> and <b>S4</b> . |
| <b>S</b> SPORTS<br>(1 through 3, or 4) | For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd, then 3rd ( <b>S3</b> ), and then 4th ( <b>S4</b> ) depending on vehicle speed and throttle position. Downshifts through lower gears on deceleration to stop.                                            |
| <b>2</b> SECOND                        | For engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up or down.                                                                                                                                                                                       |

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

### POSITION INDICATOR

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





## Technical Service Information

### [1st Clutch]

The 1st clutch is on the right 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 right 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 on the secondary shaft, and is the same construction as the 1st clutch. The secondary shaft 2nd drive 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 secondary shaft, thus transmitting power from the mainshaft 3rd gear, countershaft 3rd gear, secondary shaft 2nd gear, 2nd drive gear to the countershaft 2nd gear.

### [3rd Clutch]

The 3rd clutch is on the left 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]

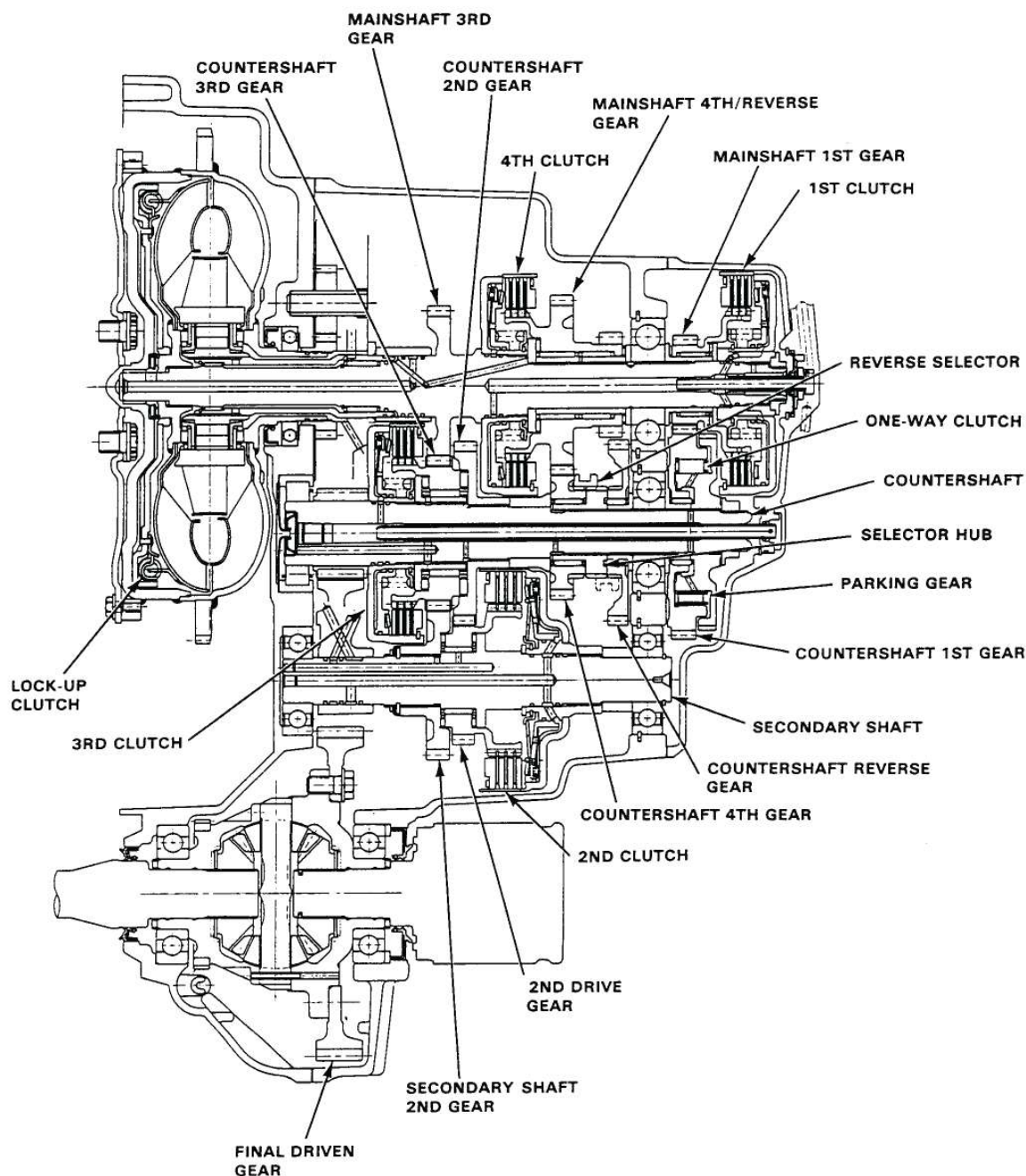
The 4th clutch is on the center of the mainshaft. The clutch hub is joined to the mainshaft 4th gear and reverse gear, supported by two needle bearings.

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

### [One-way Clutch]

A one-way clutch disengages 1st gear when in 2nd, 3rd and 4th gear ranges. The clutch is splined to the countershaft between 1st gear and the parking gear, with sprag elements and the retainer which supports the central section between the sprags, when countershaft 1st gear rotates clockwise and parking gear counterclockwise, the sprags incline to the right, locking the gears together. When shifting from 1st to 2nd in the **[S3]**, **[S4]** or **[D]** range, the higher ratio of 2nd gear causes the countershaft to rotate clockwise at a speed greater than that of 1st gear. The parking gear then rotates clockwise, and the sprags move away from their locking position. In **[S3]**, **[S4]**, or **[D]** the higher ratio of 3rd gear prevents the sprags from locking, keeping 1st gear disengaged.

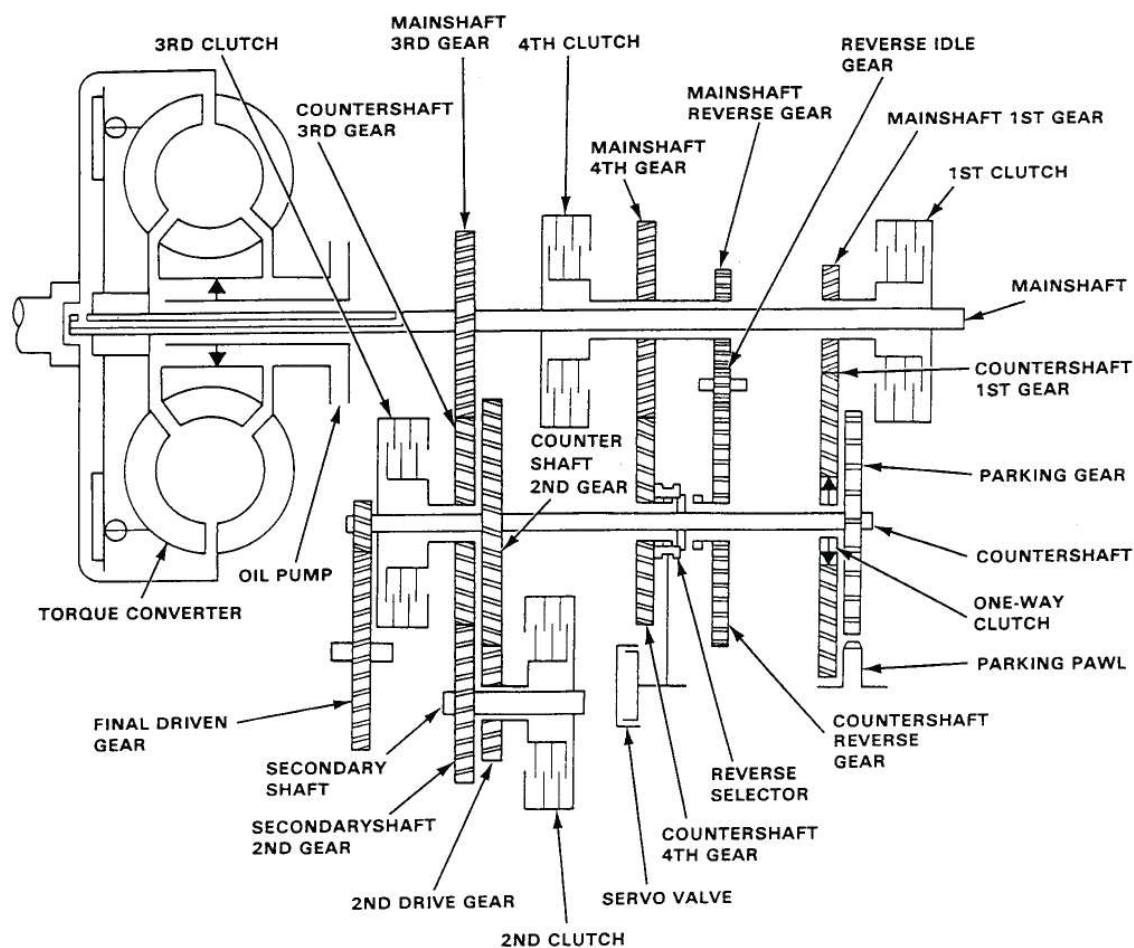






| RANGE                     | PART | TORQUE<br>CONVERTER | 1ST GEAR<br>1ST CLUTCH | 1ST GEAR<br>ONE-WAY<br>CLUTCH | 2ND GEAR<br>2ND<br>CLUTCH | 3RD GEAR<br>3RD<br>CLUTCH | 4TH  |        | REVERSE<br>GEAR | PARKING<br>GEAR |
|---------------------------|------|---------------------|------------------------|-------------------------------|---------------------------|---------------------------|------|--------|-----------------|-----------------|
|                           |      |                     |                        |                               |                           |                           | 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 <sub>3</sub>            | 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 <sub>4</sub><br>or<br>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                      | *O                            | X                         | O                         | 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.







## Technical Service Information

### 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 below the dash to the left of the steering column.

#### <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.

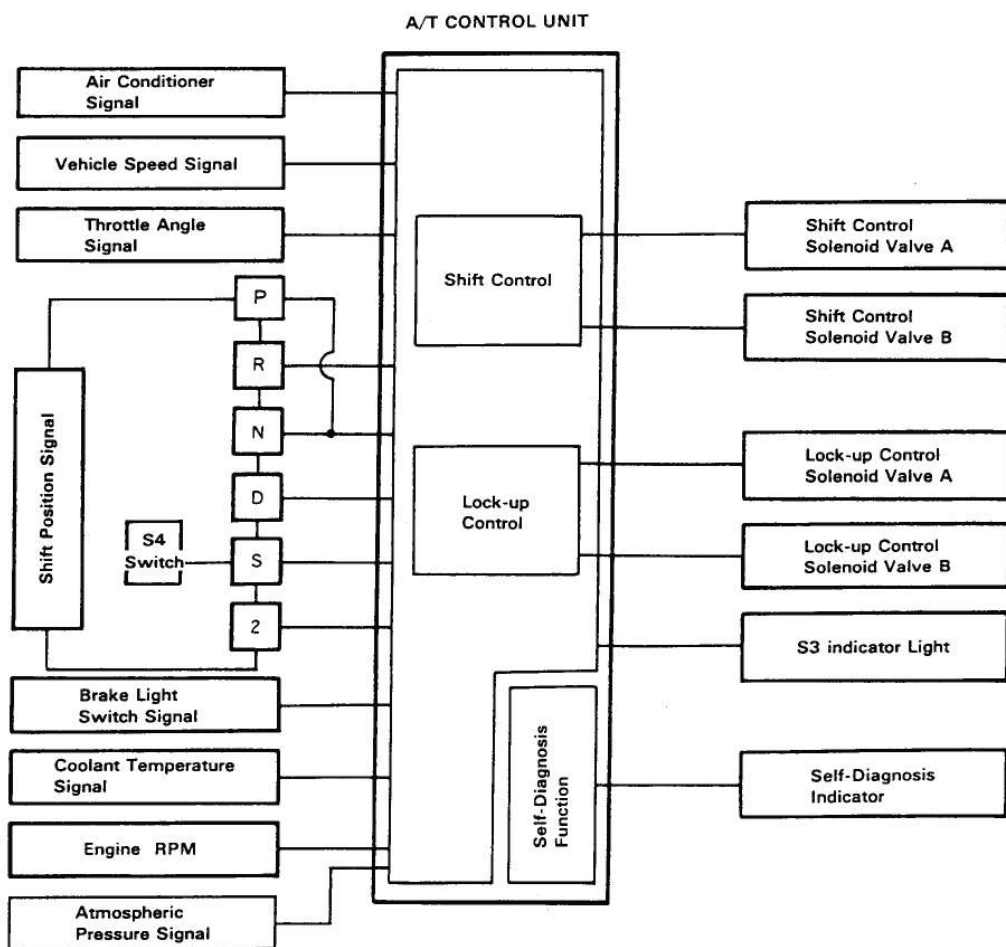
| Shift control sol. valve<br>Range (gear) | A   | B   |
|------------------------------------------|-----|-----|
| D S <sub>3</sub> S <sub>4</sub> (1st)    | OFF | ON  |
| D S <sub>3</sub> S <sub>4</sub> (2nd)    | ON  | ON  |
| D S <sub>3</sub> S <sub>4</sub> (3rd)    | ON  | OFF |
| D S <sub>4</sub> (4th)                   | OFF | OFF |

#### <Lock-up control>

From sensor input signals, the automatic control unit detects whether to turn the lock-up ON or OFF and activates lock-up control solenoid valve A and/or B accordingly.

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

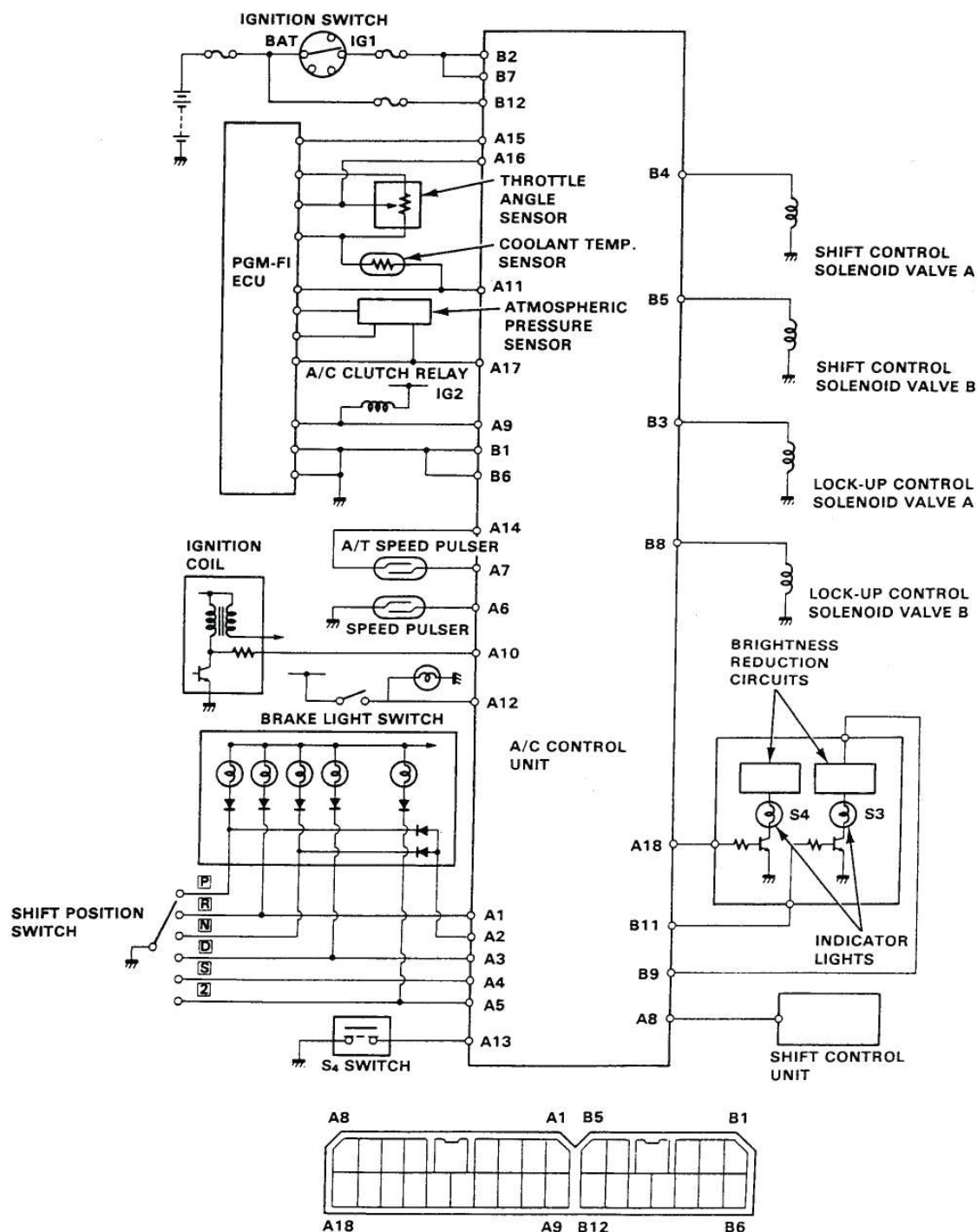
| Solenoid valve<br>Lock-up condition | A   | B                            |
|-------------------------------------|-----|------------------------------|
| Lock-up OFF                         | OFF | OFF                          |
| Lock-up, slight                     | ON  | OFF                    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





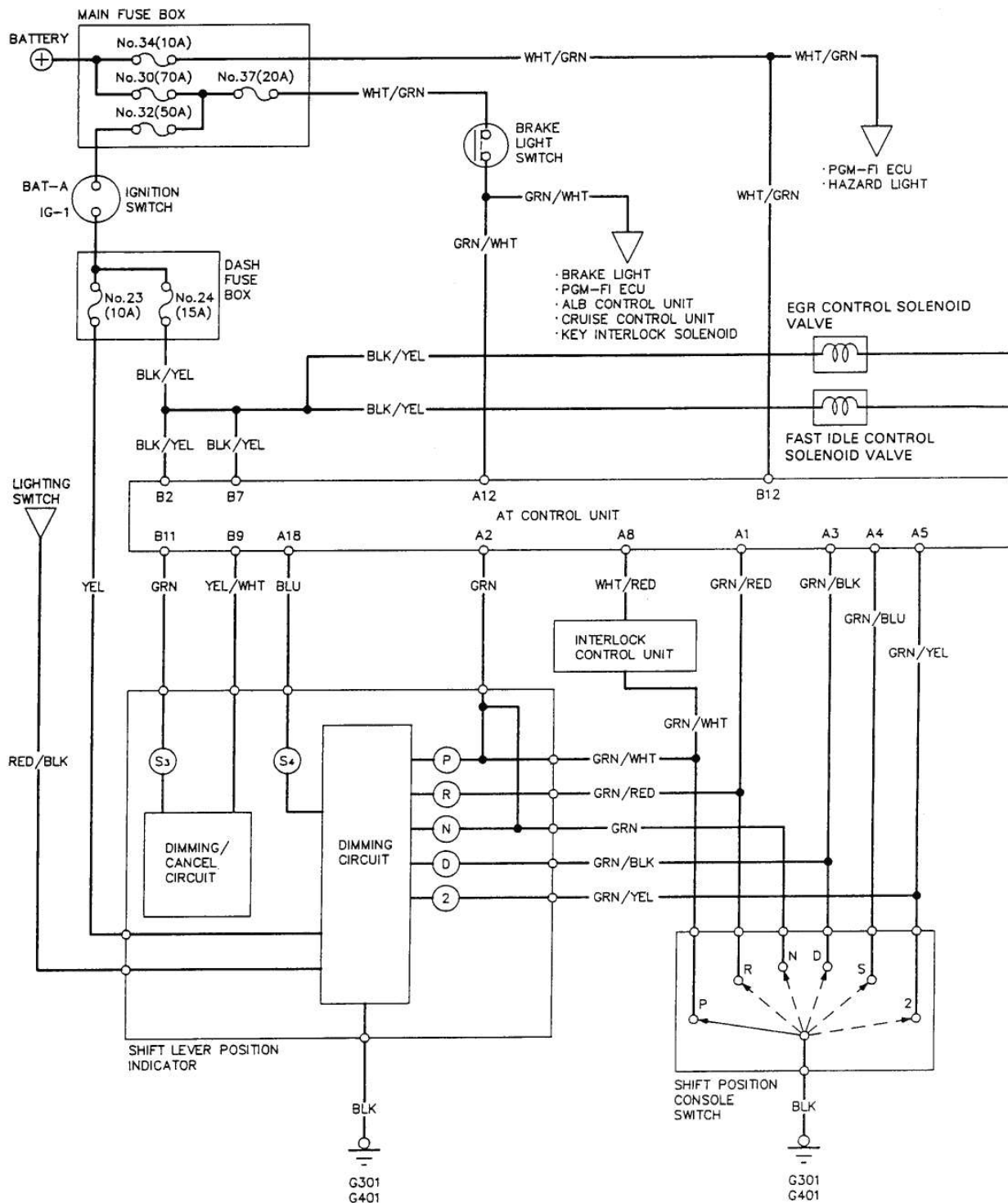
# Technical Service Information

## Circuit Diagram and Terminal Location



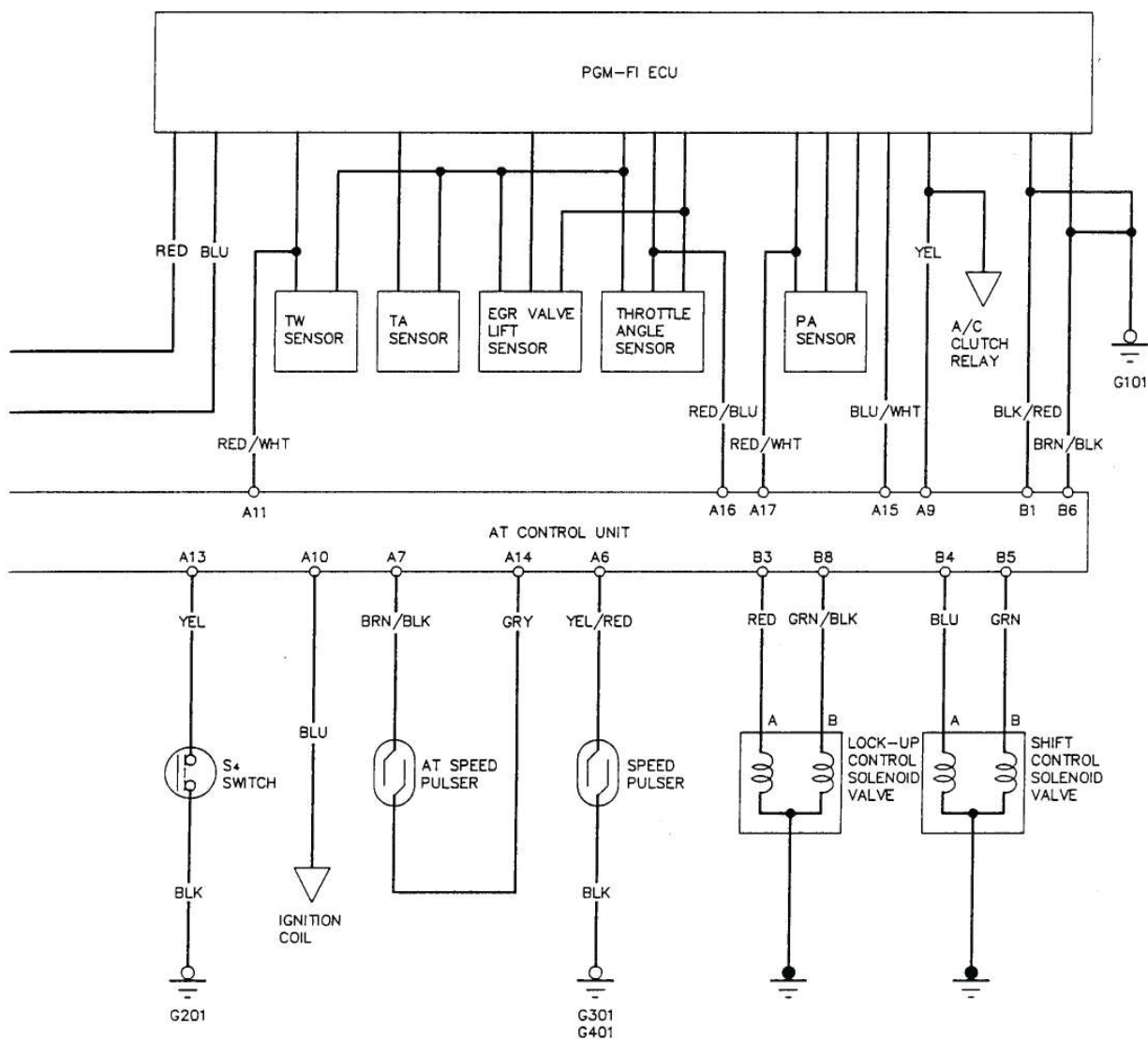
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# Technical Service Information

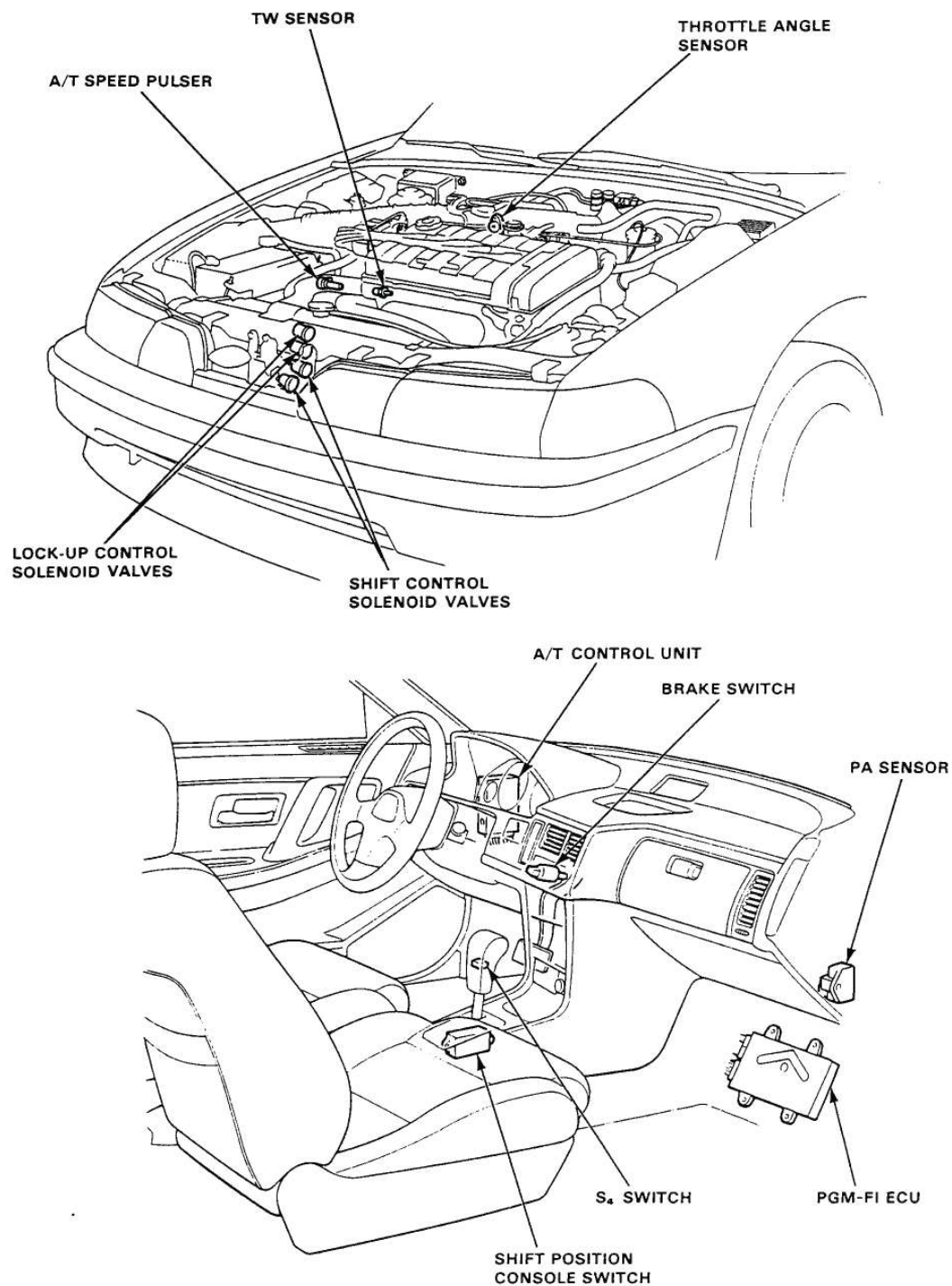


|     |     |     |     |     |     |     |     |     |    |  |  |     |     |  |    |    |    |    |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--|--|-----|-----|--|----|----|----|----|
| A8  | A7  | A6  | A5  |     |     | A4  | A3  | A2  | A1 |  |  | B5  | B4  |  |    | B3 | B2 | B1 |
| A18 | A17 | A16 | A15 | A14 | A13 | A12 | A11 | A10 | A9 |  |  | B12 | B11 |  | B9 | B8 | B7 | B6 |

TERMINAL LOCATION



## Technical Service Information



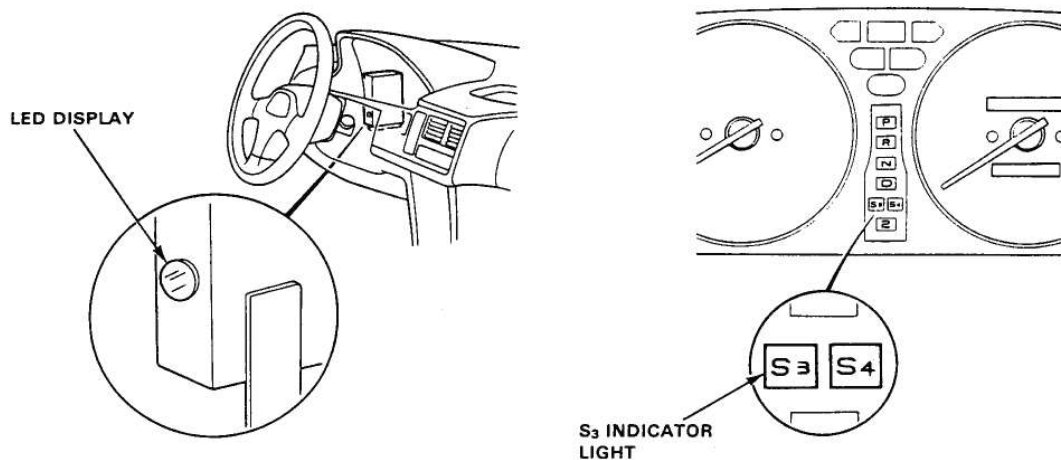
Automatic Transmission Service Group



## Technical Service Information

The A/T Control Unit has a built-in self-diagnosis function. The S<sub>3</sub> 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 14-34. If no abnormality is found from your inspection, refer to the hydraulic system Symptom-to-Component Chart on page 14-60.



When the ignition switch is turned ON, the S<sub>3</sub> indicator light comes on for about two seconds regardless of whether there is a problem. The S<sub>3</sub> indicator light will also come on when in S<sub>3</sub> mode.

If there is a system problem, the S<sub>3</sub> 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 S<sub>3</sub> 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 S<sub>3</sub> indicator light will blink again for the original problem. Therefore, even though the S<sub>3</sub> 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 Sensor fuse (10A) in the under-hood relay box.
- Check for an open circuit in the WHT/YEL wire between the Alternator Sensor fuse (10A) and A/T control unit B 12 terminal.

After making repair, disconnect the Alternator Sensor fuse (10A) in the under-hood relay box for more than ten seconds to reset LED display memory.





## Technical Service Information

| Number of LED display blinks | S <sub>3</sub> indicator light | Symptom                                                                                                                                                                                        | Probable Cause                                                                                                                                                                                                                |
|------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                            | Blinks                         | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> <li>Lock-up clutch does not disengage.</li> <li>Frequent engine stalling.</li> </ul>                               | <ul style="list-style-type: none"> <li>Disconnected lock-up control solenoid valve A connector.</li> <li>Open or short lock-up control solenoid valve A wire.</li> <li>Faulty lock-up control solenoid valve A.</li> </ul>    |
| 2                            | Blinks                         | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected lock-up control solenoid valve B connector.</li> <li>Open or short in lock-up control solenoid valve B wire.</li> <li>Faulty lock-up control solenoid valve B.</li> </ul> |
| 3                            | Blinks or OFF                  | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected throttle angle sensor connector.</li> <li>Open/short in throttle angle sensor wire.</li> <li>Faulty throttle angle sensor.</li> </ul>                                     |
| 4                            | Blinks                         | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected speed pulser connector.</li> <li>Open or short in speed pulser wire.</li> <li>Faulty speed pulser.</li> </ul>                                                             |
| 5                            | Blinks                         | <ul style="list-style-type: none"> <li>Fails to shift other than 2nd→4th gear.</li> <li>Lock-up clutch does not engage.</li> </ul>                                                             | <ul style="list-style-type: none"> <li>Short in shift position console switch wire.</li> <li>Faulty shift position console switch.</li> </ul>                                                                                 |
| 6                            | OFF                            | <ul style="list-style-type: none"> <li>Fails to shift other than 2nd→4th gear.</li> <li>Lock-up clutch does not engage.</li> <li>Lock-up clutch engages and disengages alternately.</li> </ul> | <ul style="list-style-type: none"> <li>Disconnected shift position console switch connector.</li> <li>Open in shift position console switch wire.</li> <li>Faulty shift position console switch.</li> </ul>                   |
| 7                            | Blinks                         | <ul style="list-style-type: none"> <li>Fails to shift other than 1st→4th, 2nd→4th, or 2nd→3rd gears.</li> <li>Fails to shift (stuck in 4th gear).</li> </ul>                                   | <ul style="list-style-type: none"> <li>Disconnected shift control solenoid valve A connector.</li> <li>Open or short in shift control solenoid valve A wire.</li> <li>Faulty shift control solenoid valve A.</li> </ul>       |
| 8                            | Blinks                         | <ul style="list-style-type: none"> <li>Fails to shift (stuck in 1st gear or 4th gear).</li> </ul>                                                                                              | <ul style="list-style-type: none"> <li>Disconnected shift control solenoid valve B connector.</li> <li>Open or short in shift control solenoid valve B wire.</li> <li>Faulty shift control solenoid valve B.</li> </ul>       |
| 9                            | Blinks                         | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected A/T speed pulser.</li> <li>Open or short in A/T speed pulser wire.</li> <li>Faulty A/T speed pulser.</li> </ul>                                                           |
| 10                           | Blinks                         | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected coolant temperature sensor connector.</li> <li>Open or short in coolant temperature sensor wire.</li> <li>Faulty coolant temperature sensor.</li> </ul>                   |
| 11                           | OFF                            | <ul style="list-style-type: none"> <li>Lock-up clutch does not engage.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected ignition coil connector.</li> <li>Open or short in ignition coil wire.</li> <li>Faulty ignition coil.</li> </ul>                                                          |
| 13                           | Blinks                         | <ul style="list-style-type: none"> <li>Late lock-up clutch engagement.</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Disconnected PA sensor connector.</li> <li>Open or short in PA sensor wire.</li> <li>Faulty PA sensor.</li> </ul>                                                                      |

### NOTE:

- 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 display blinks 12 or more than 13 times, the control unit is faulty.
- S<sub>3</sub> indicator light and 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 alternator sensor fuse (10A) in the under-hood relay box for more than 10 seconds. Drive the vehicle for several minutes at speed over 30 mph, then recheck the lights.



## Technical Service Information

If the self-diagnosis LED indicator does not blink, perform an inspection according to the table listed below.

| Symptom                                                                                                 | Probable Cause                       |
|---------------------------------------------------------------------------------------------------------|--------------------------------------|
| S <sub>3</sub> light is not on for 2 seconds after ignition is first turned on.                         | —                                    |
| Does not change to S <sub>4</sub> mode.                                                                 | Check S <sub>4</sub> switch signal.  |
| Lock-up clutch does not have duty operation (ON→OFF).                                                   | Check A/C signal with operation A/C. |
| Lock-up clutch does not engage.                                                                         |                                      |
| Fails to shift from 2nd to 1st gear after releasing the brake pedal from a stop when in the  or  range. | Check brake light switch signal.     |
| Shift lever cannot be moved from  range.                                                                | Check shift lock switch signal.      |

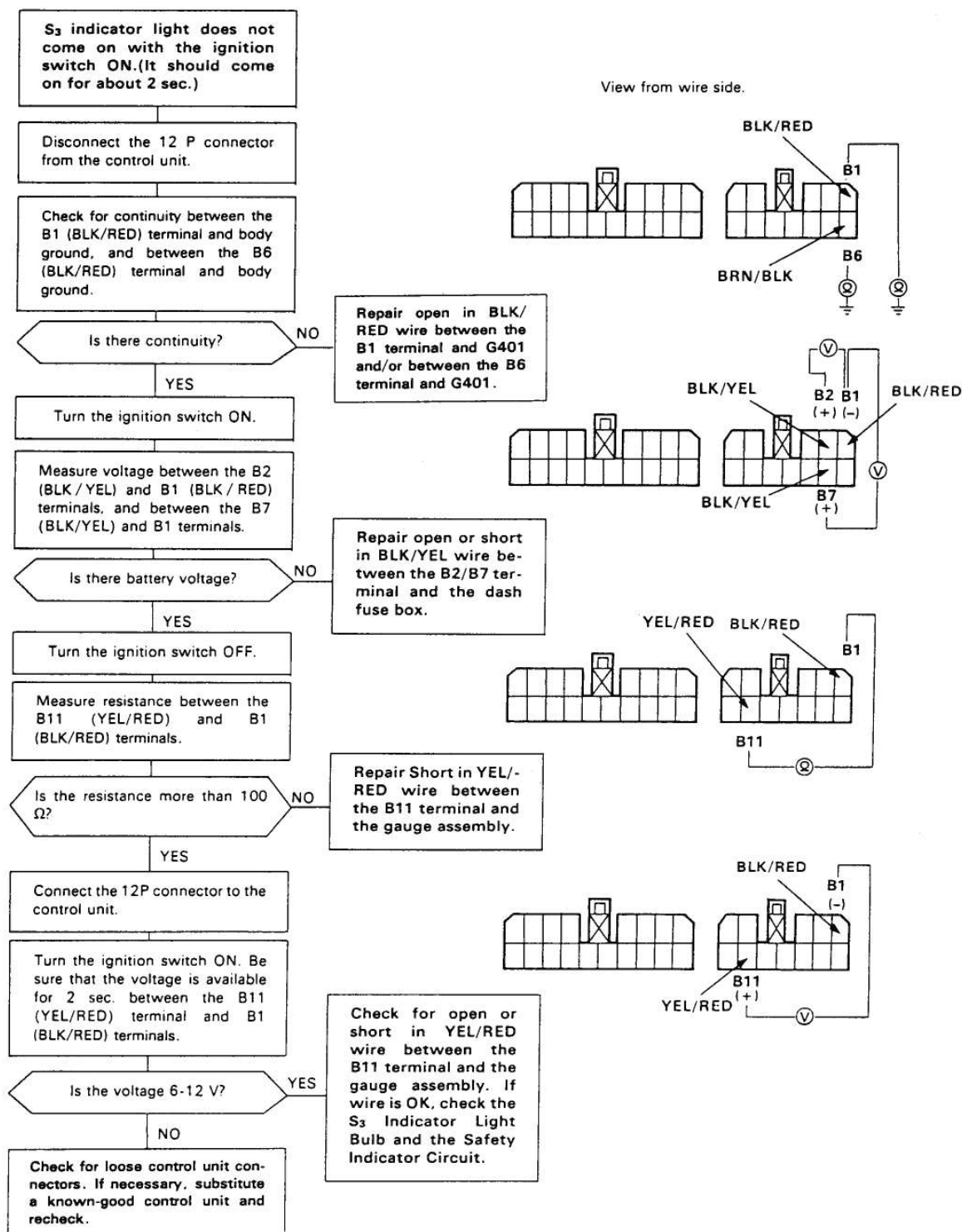
| NO. | DESCRIPTION OF PRESSURE | NO. | DESCRIPTION OF PRESSURE  | NO. | DESCRIPTION OF PRESSURE       | NO. | DESCRIPTION OF PRESSURE |
|-----|-------------------------|-----|--------------------------|-----|-------------------------------|-----|-------------------------|
| 1   | LINE                    | 6   | MODULATOR                | 30  | 3RD CLUTCH                    | 93  | OIL COOLER              |
| 3   | LINE                    | 6'  | MODULATOR (Duty Control) | 31  | 3RD CLUTCH                    | 94  | TORQUE CONVERTER        |
| 3'  | LINE                    | 10  | 1ST CLUTCH               | 40  | 4TH CLUTCH                    | 95  | LUBRICATION             |
| 3'' | LINE                    | 20  | 2ND CLUTCH               | 41  | 4TH CLUTCH                    | 96  | TORQUE CONVERTER        |
| 4   | LINE                    | 21  | 2ND CLUTCH               | 55  | THROTTLE B (VACUUM MODULATOR) | 99  | SUCTION                 |
| 4'  | LINE                    | 22  | 2ND CLUTCH               | 90  | TORQUE CONVERTER              | X   | BLEED                   |
| 4'' | LINE                    | 25  | 2ND MODULATOR            | 91  | TORQUE CONVERTER              |     |                         |
| 5   | LINE                    | 25' | 2ND MODULATOR            | 92  | TORQUE CONVERTER              |     |                         |

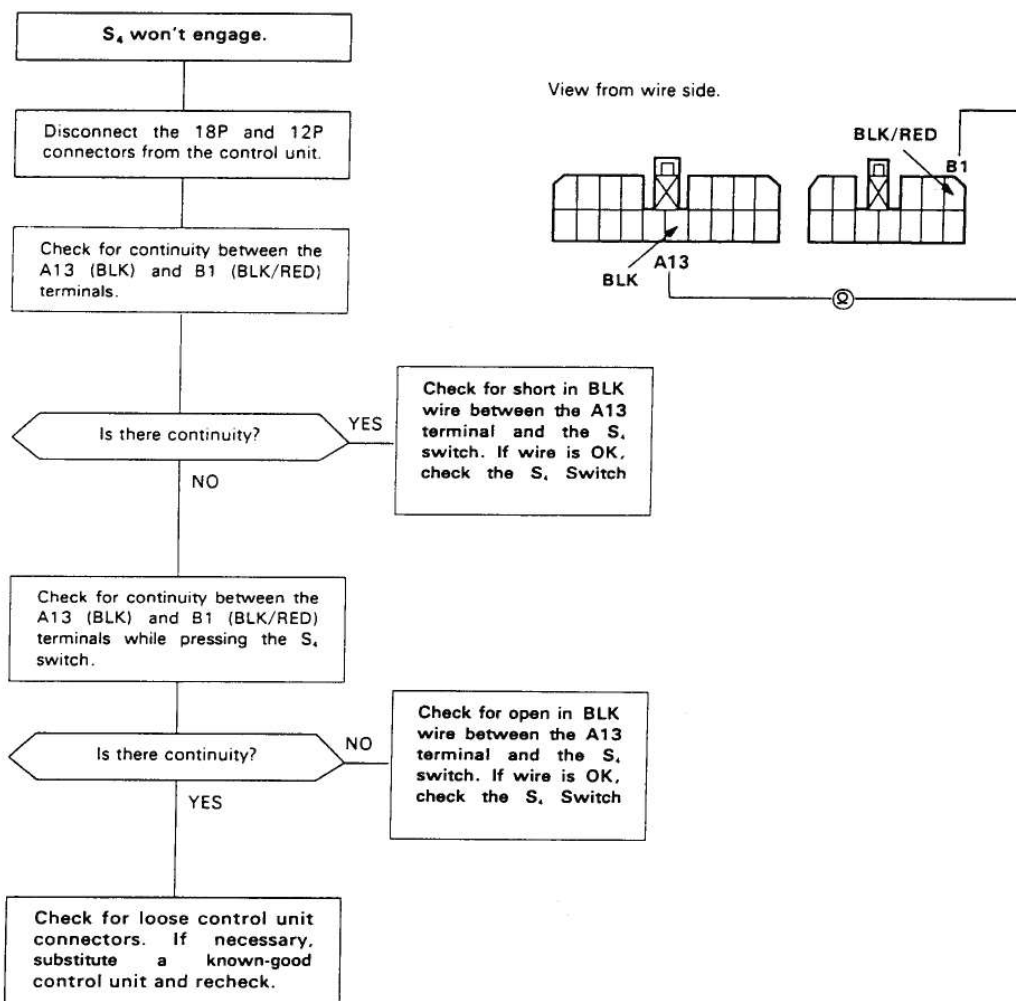
### Position

As the engine turns, the oil pump also starts to operate. Automatic Transmission Fluid is drawn from (99) and discharged into (1). Then, ATF pressure is controlled by the regulator valve and becomes the line pressure (1). The torque converter inlet pressure (1) enters (94) of torque converter through the orifice and discharges into (90).

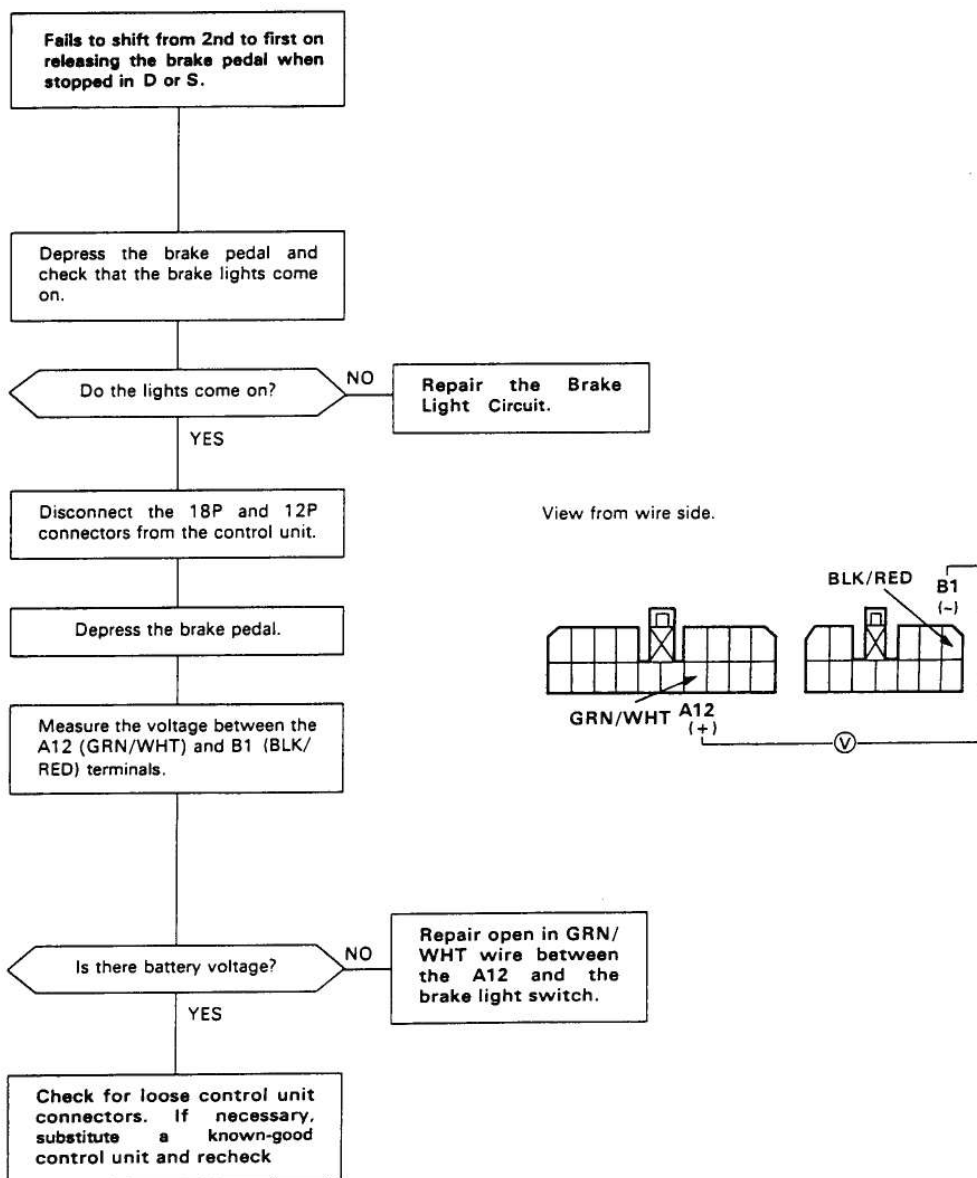
The torque converter check valve prevents the torque converter pressure from falling.

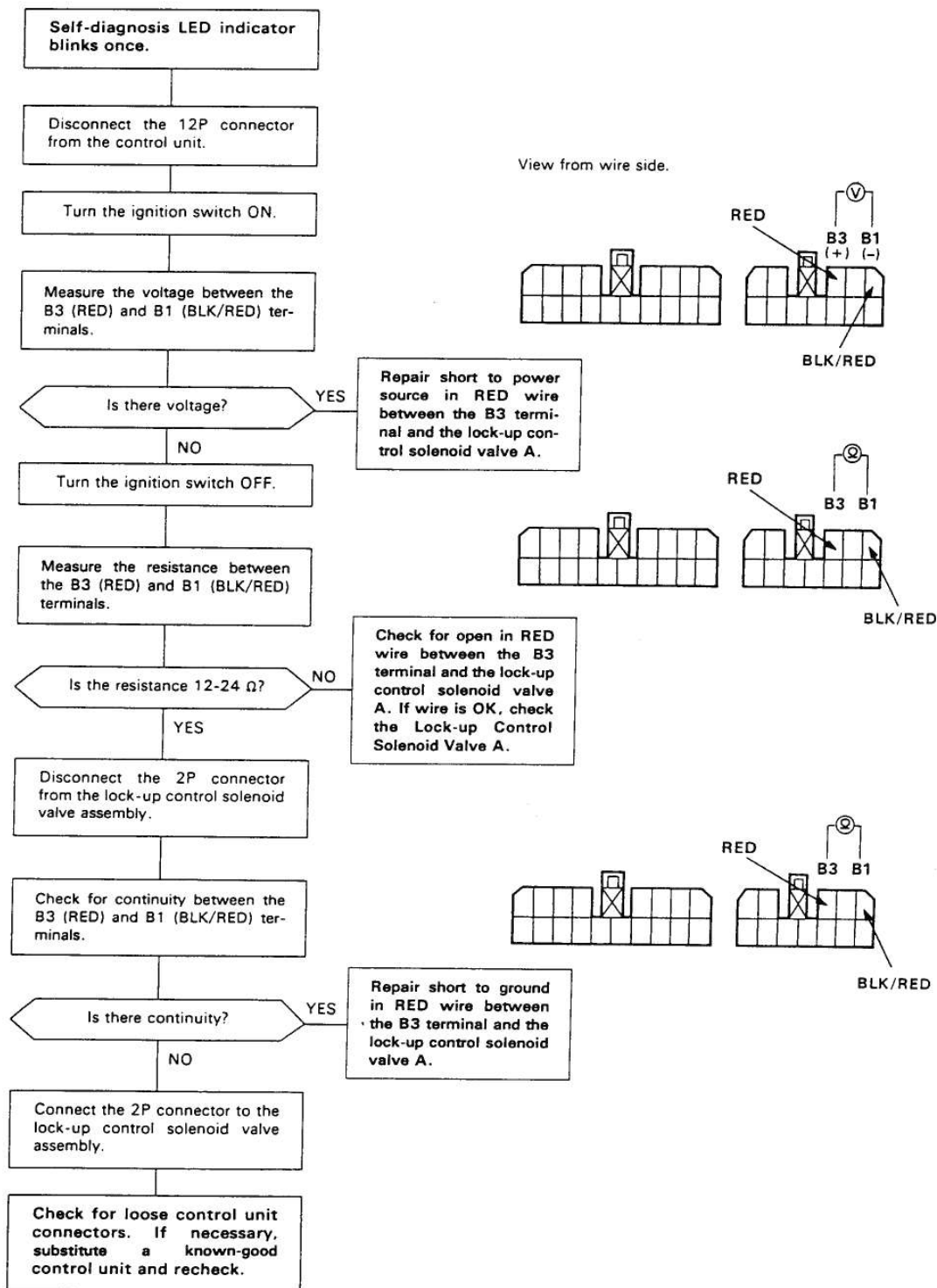
Under this condition, the hydraulic pressure is not applied to the clutches as the manual valve stops line pressure (1).

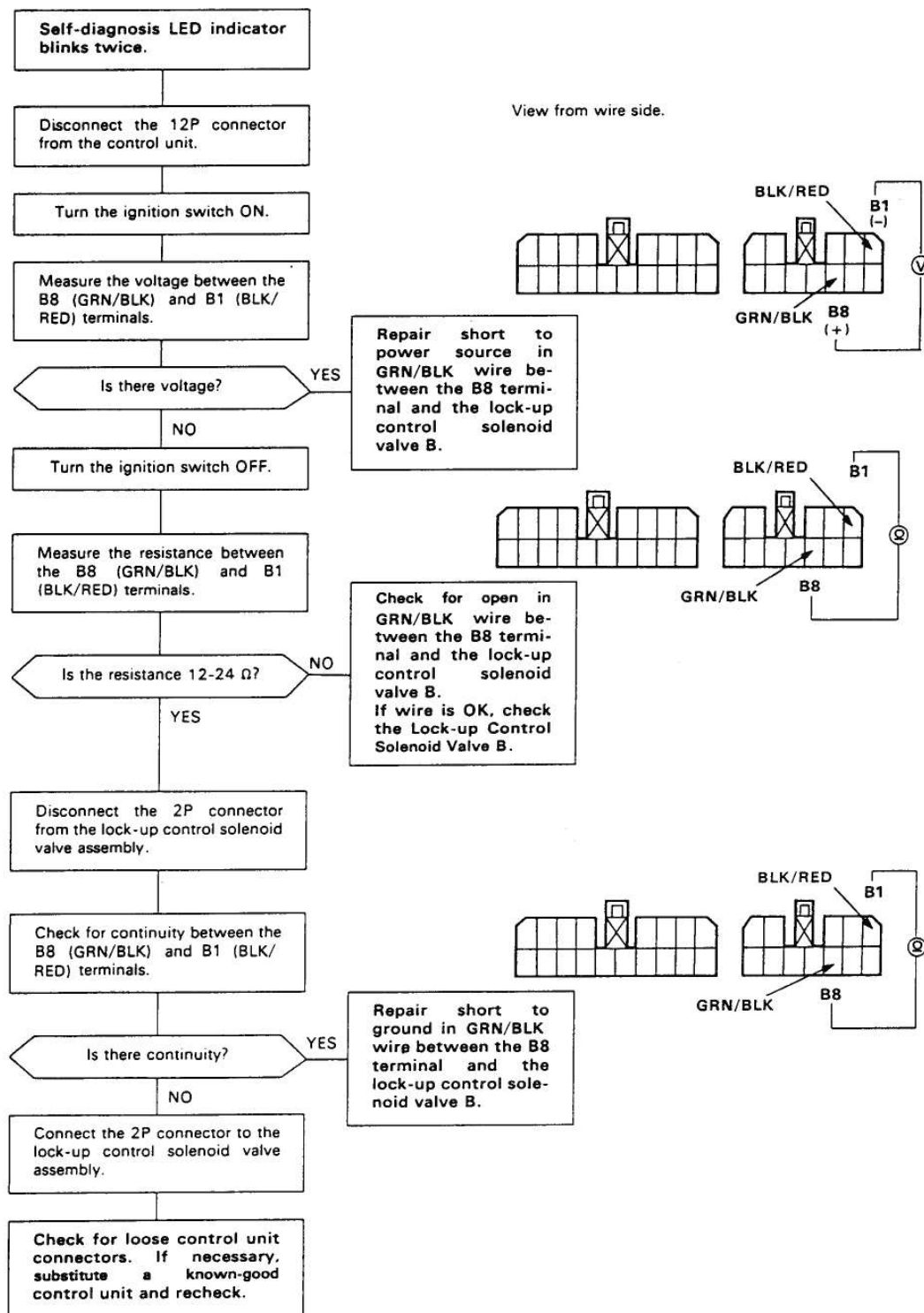


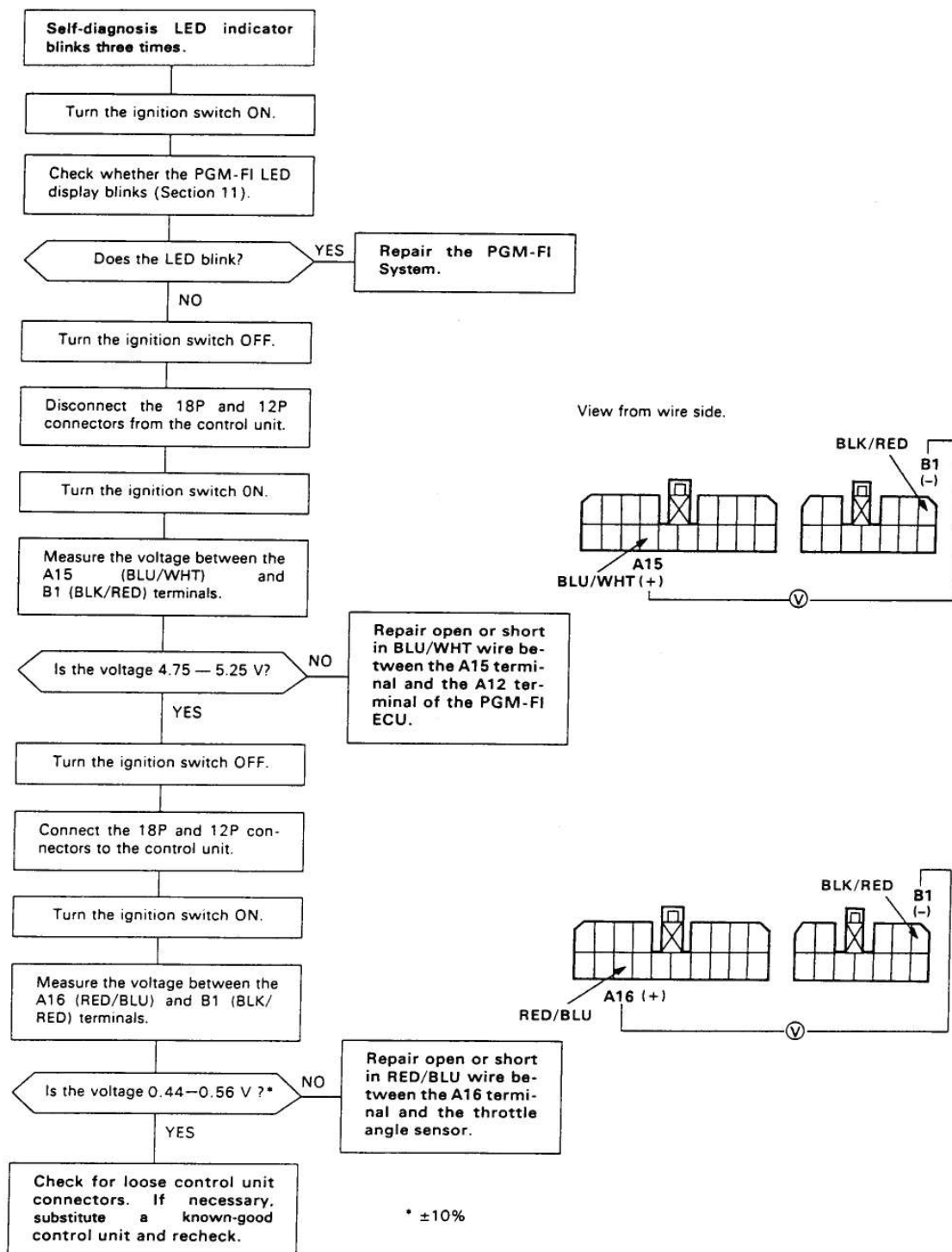














Self-diagnosis LED indicator blinks four times.

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

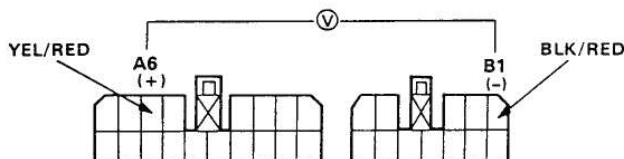
**⚠ WARNING**

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

Turn the ignition switch ON and shift transmission to **N**.

Rotate the front wheel and measure the voltage between the A6 (YEL/RED) and B1 (BLK/RED) terminals.

View from wire side.



Does the voltage 0 — 5 V appear alternately?

NO

Substitute a known-good control unit and recheck.

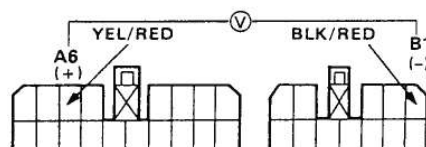
YES

Turn the ignition switch OFF.

Disconnect the 18P and 12P connectors from the control unit.

Turn the ignition switch ON.

Rotate the front wheel and check for voltage between the B1 (BLK/RED) and A6 (YEL/RED) terminals.



Does the voltage 0 — 5 V appear alternately?

NO

Check for short or open in YEL/RED wire between the A6 terminal and the gauge assembly. If wire is OK, check the Speed Pulser.

YES

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



# Technical Service Information

Self-diagnosis LED indicator blinks five times.

Turn the ignition switch ON.

Shift to other than **R** position.

Measure the voltage between the A1 (GRN/RED) and B1 (BLK/RED) terminals.

Is there battery voltage?

NO

YES

Shift to other than **N** position.

Measure the voltage between the A2 (GRN) and B1 (BLK/RED) terminals.

Is there battery voltage?

NO

YES

Shift to other than **D** position.

Measure the voltage between the A3 (GRN/BLK) and B1 (BLK/RED) terminals.

Is there battery voltage?

NO

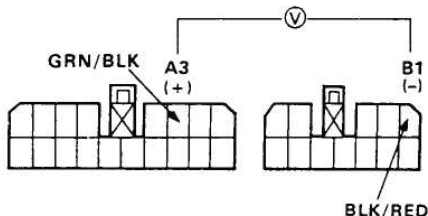
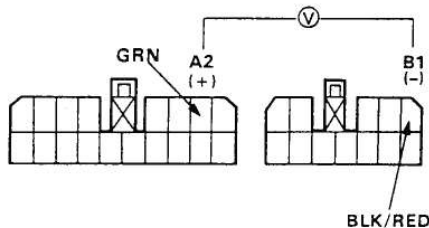
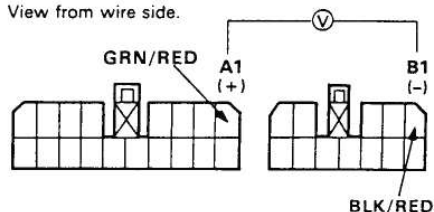
YES

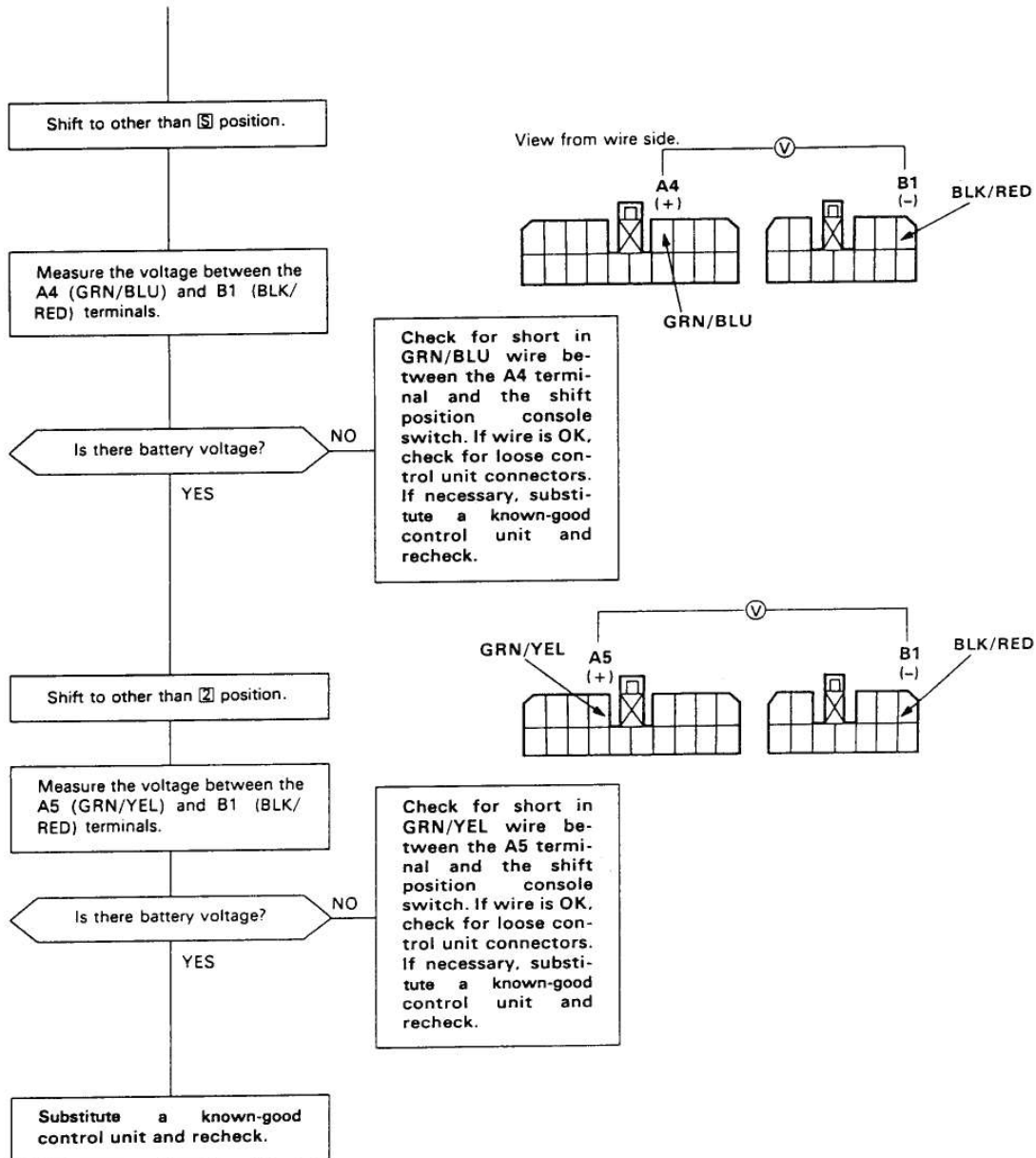
Check for short in GRN/RED wire between the A1 terminal and the shift position console switch. If wire is OK, check for loose connectors. If necessary, substitute a known-good control unit and recheck.

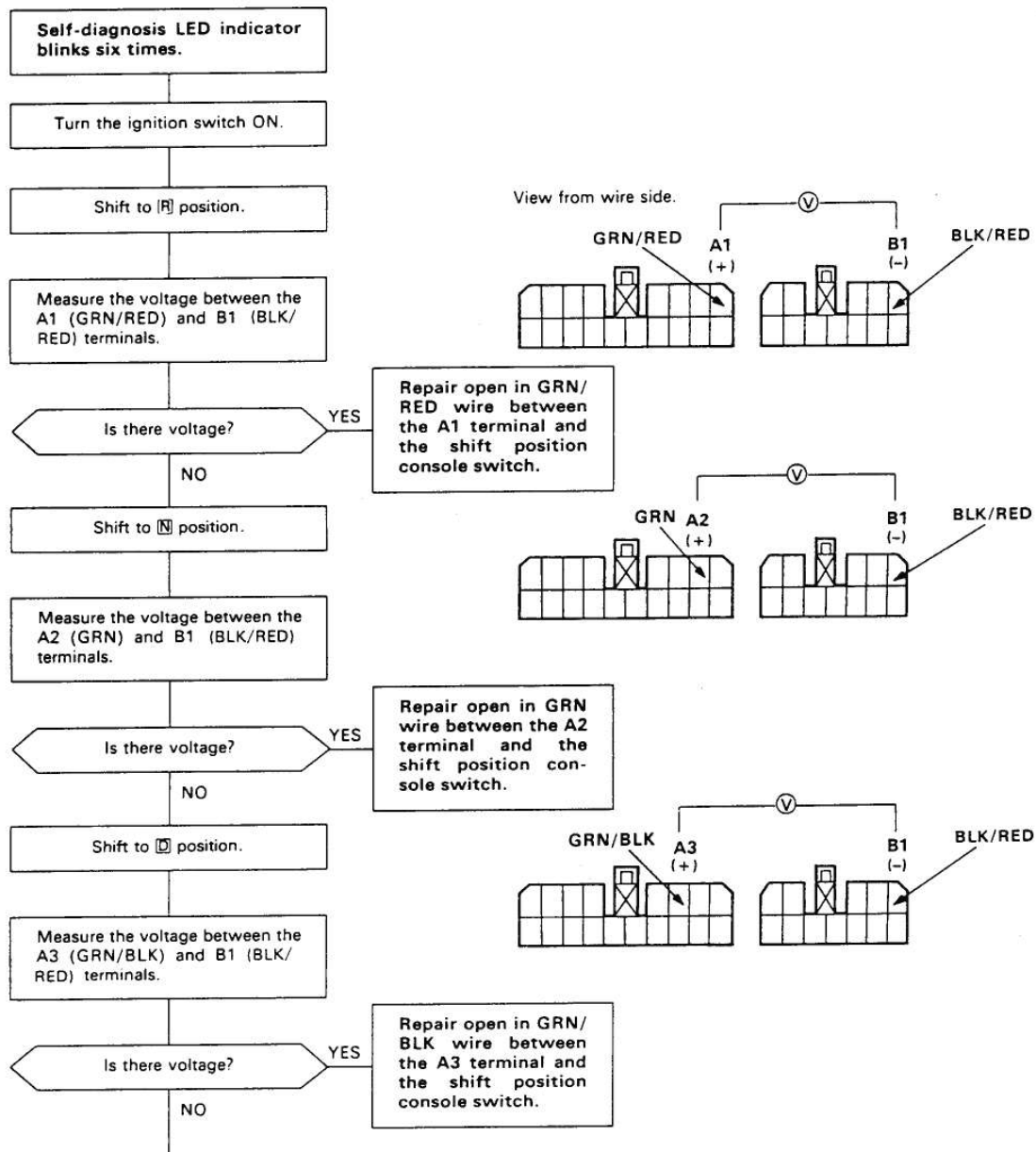
Check for short in GRN wire between the A2 terminal and the shift position console switch. If wire is OK, check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

Check for short in GRN/BLK wire between the A3 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.

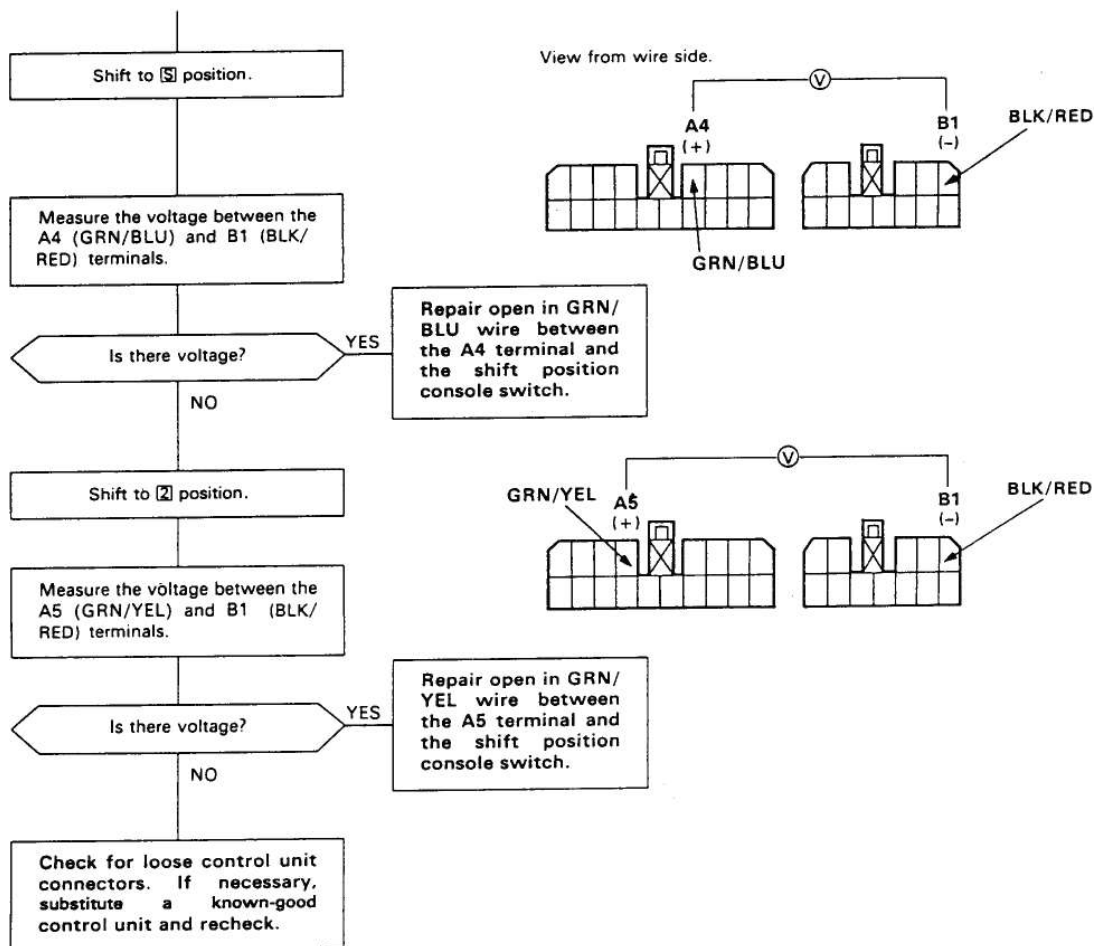
View from wire side.

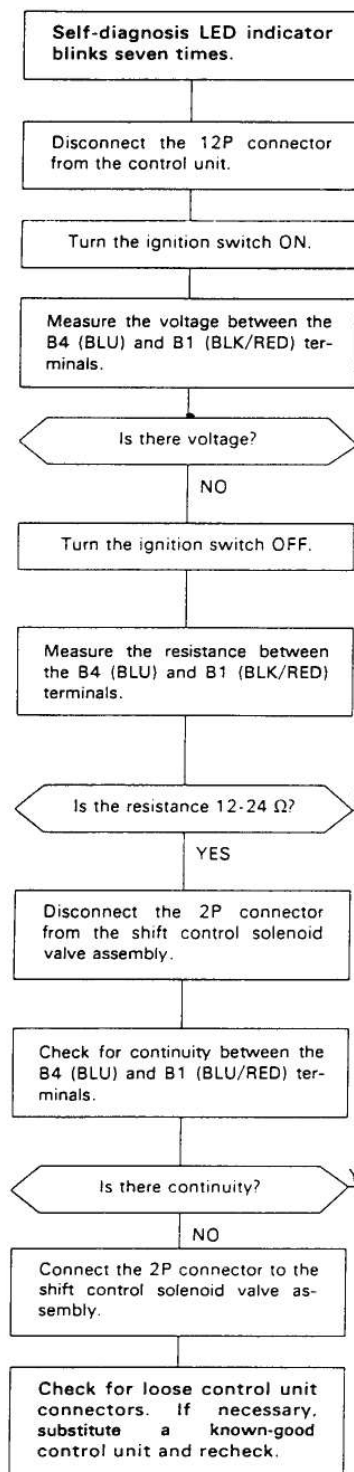




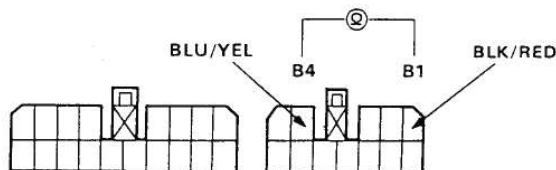
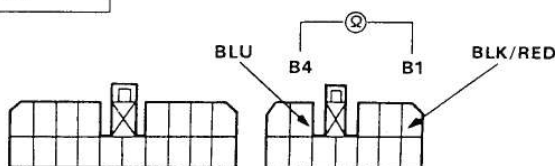
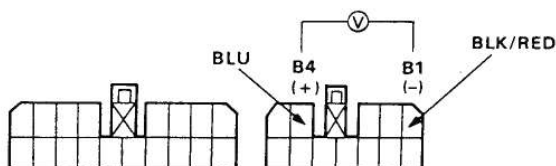


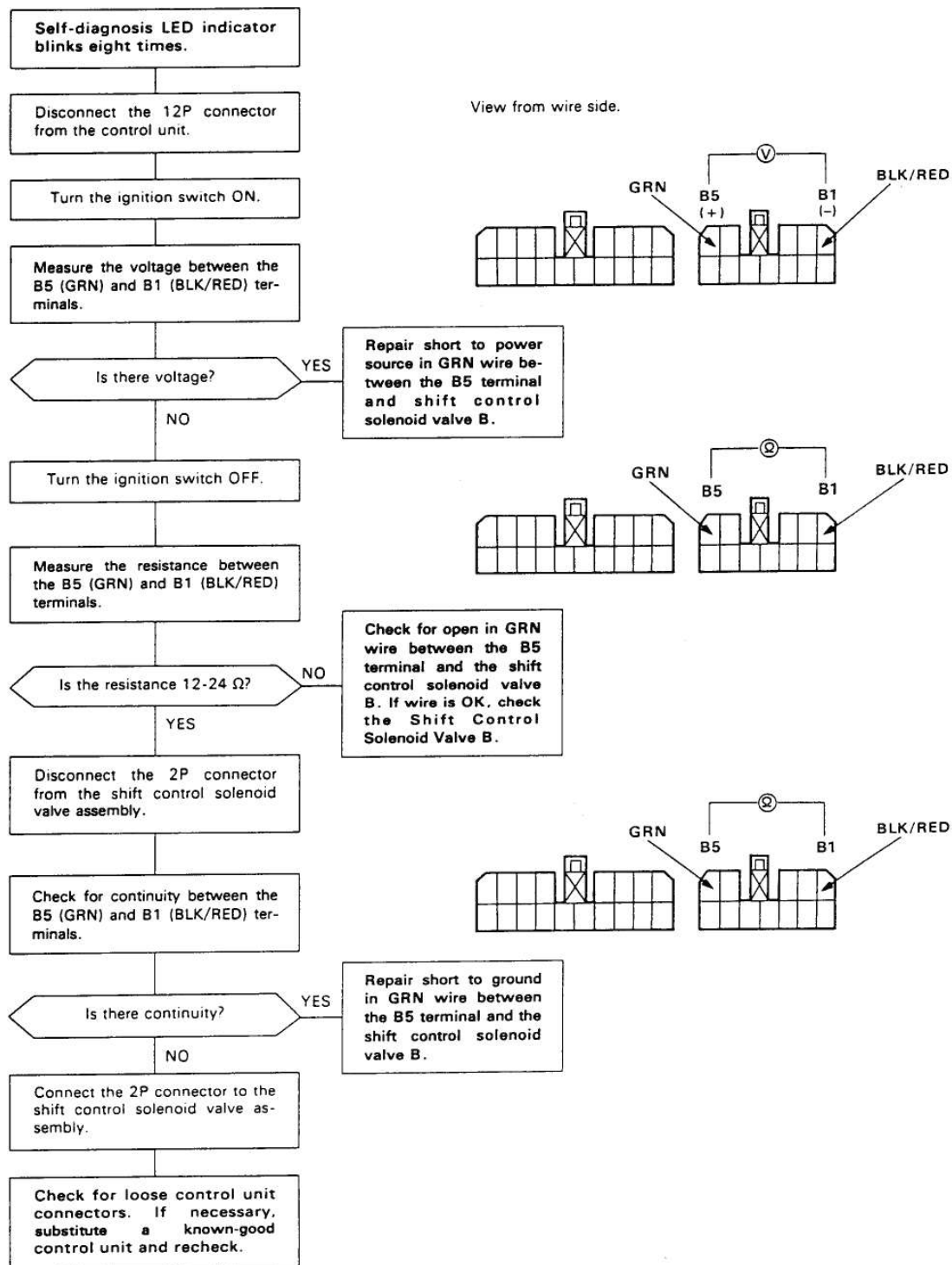


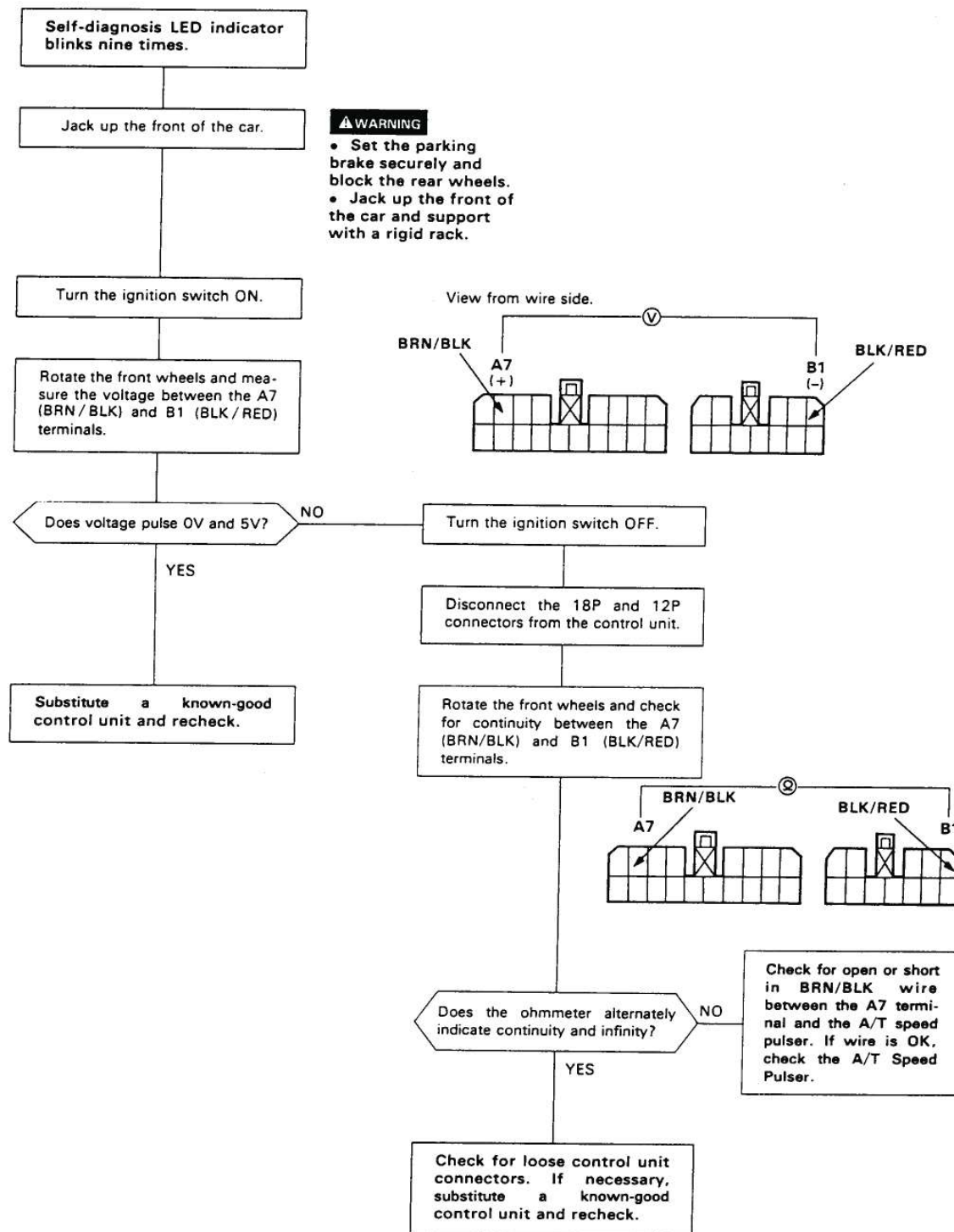




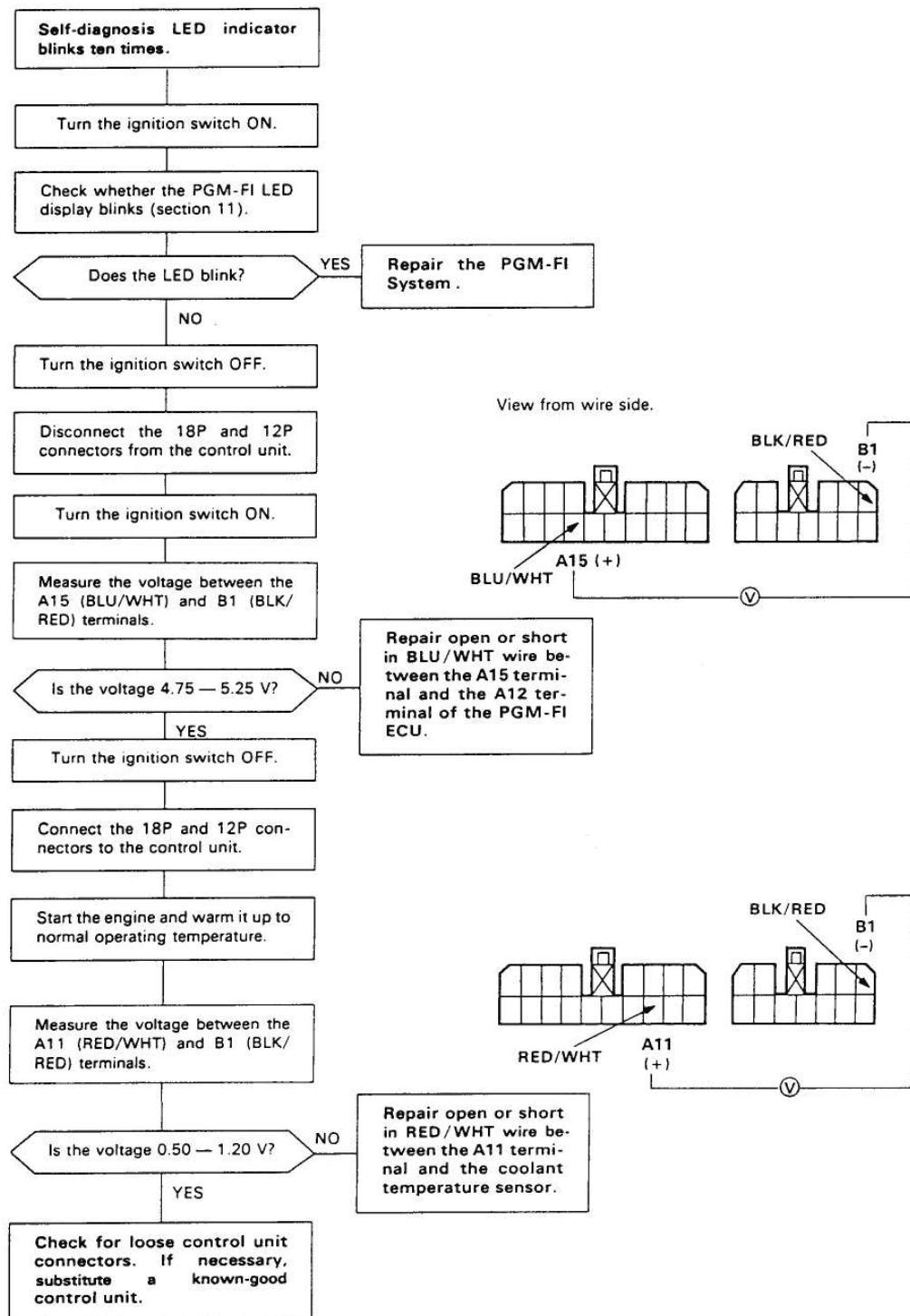
View from wire side.

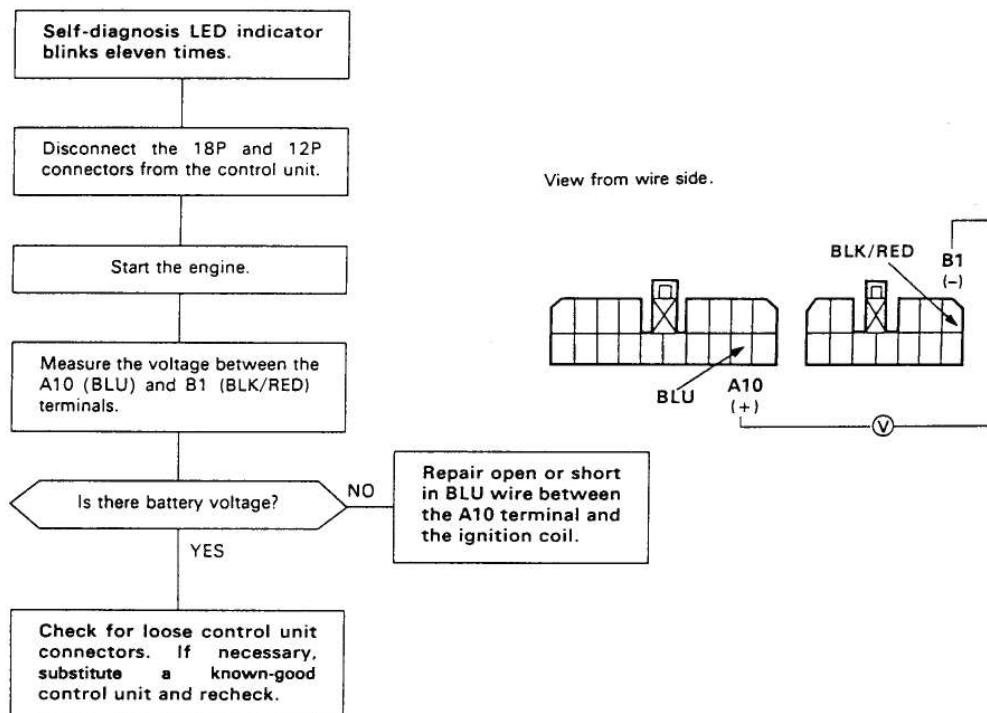


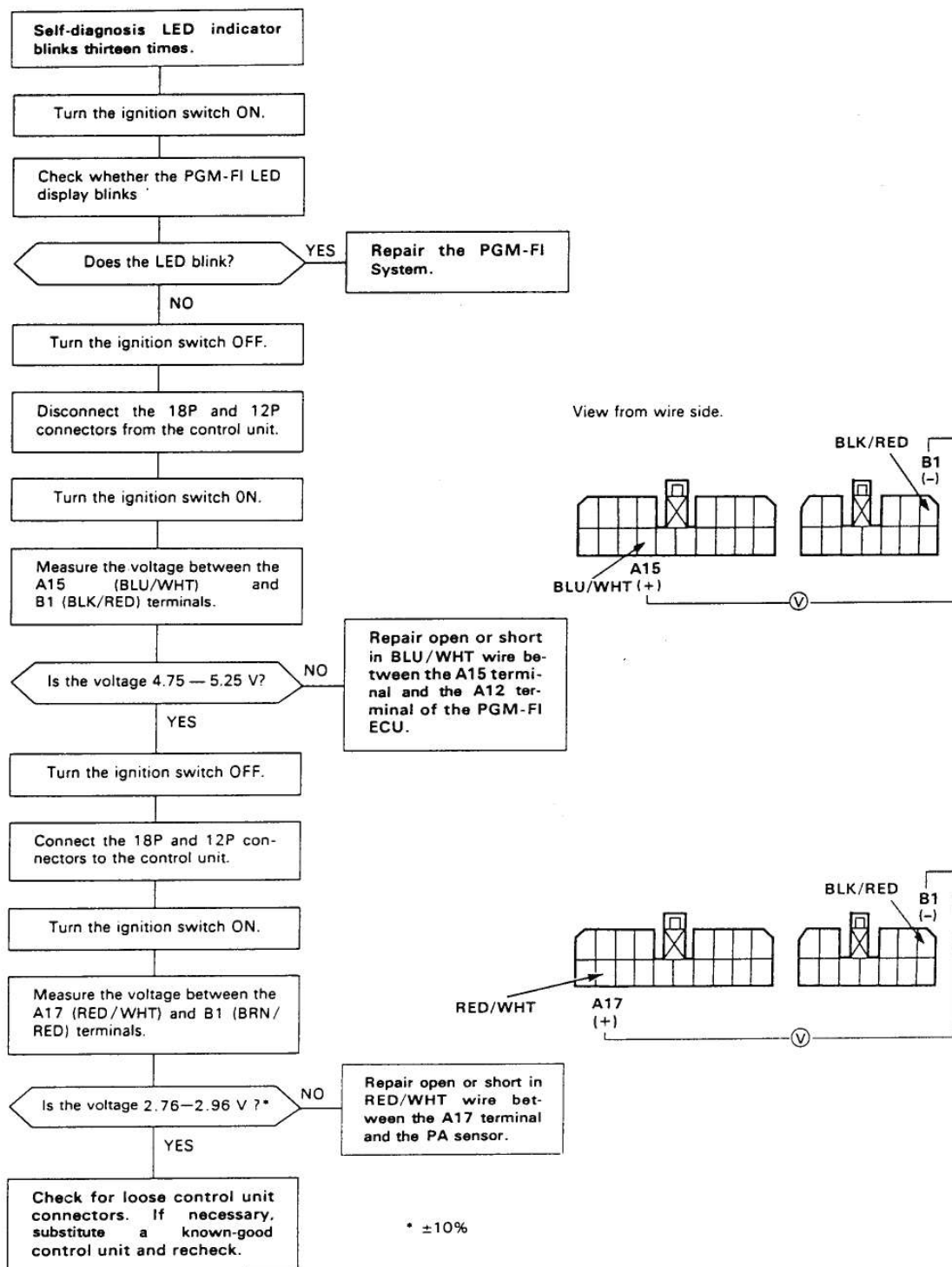


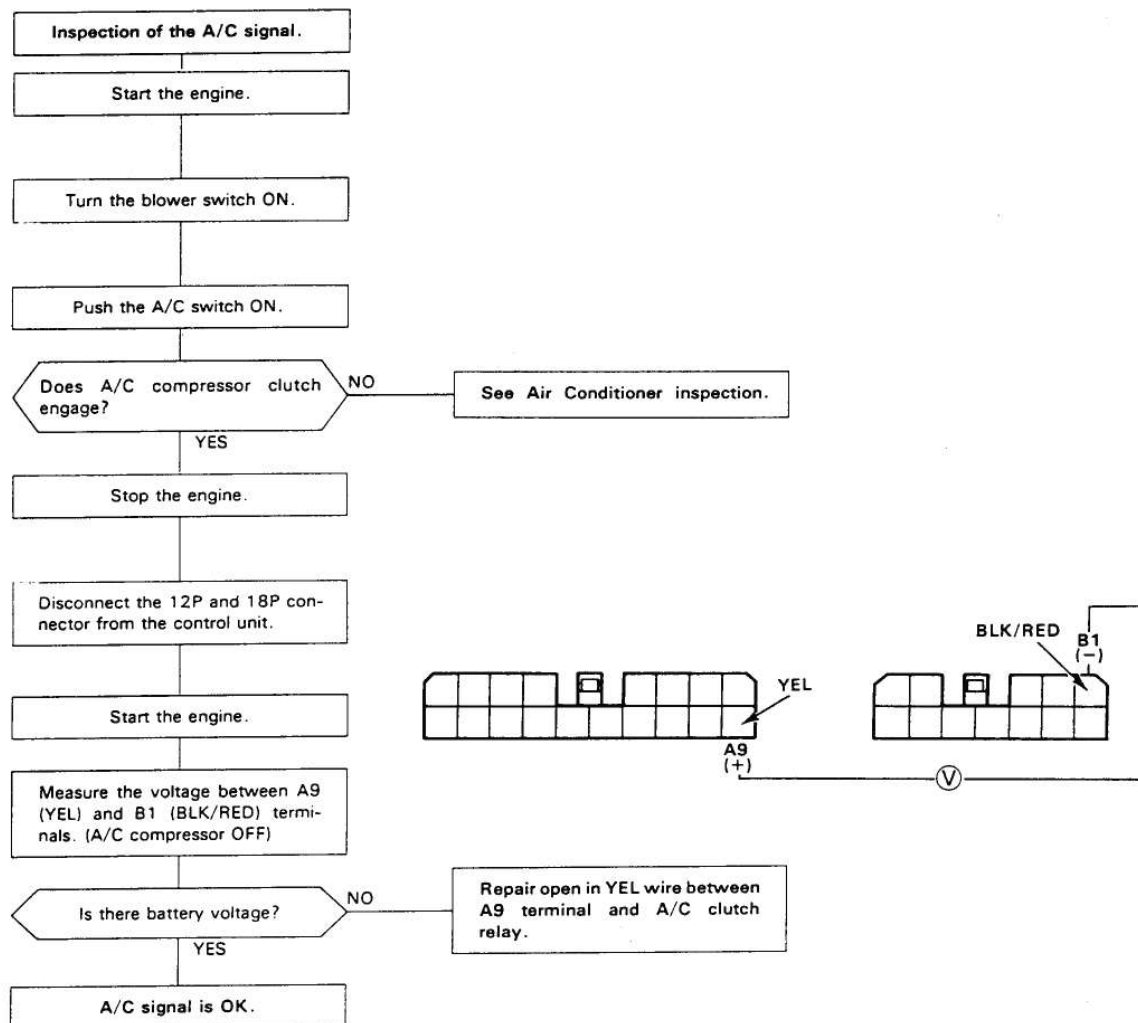




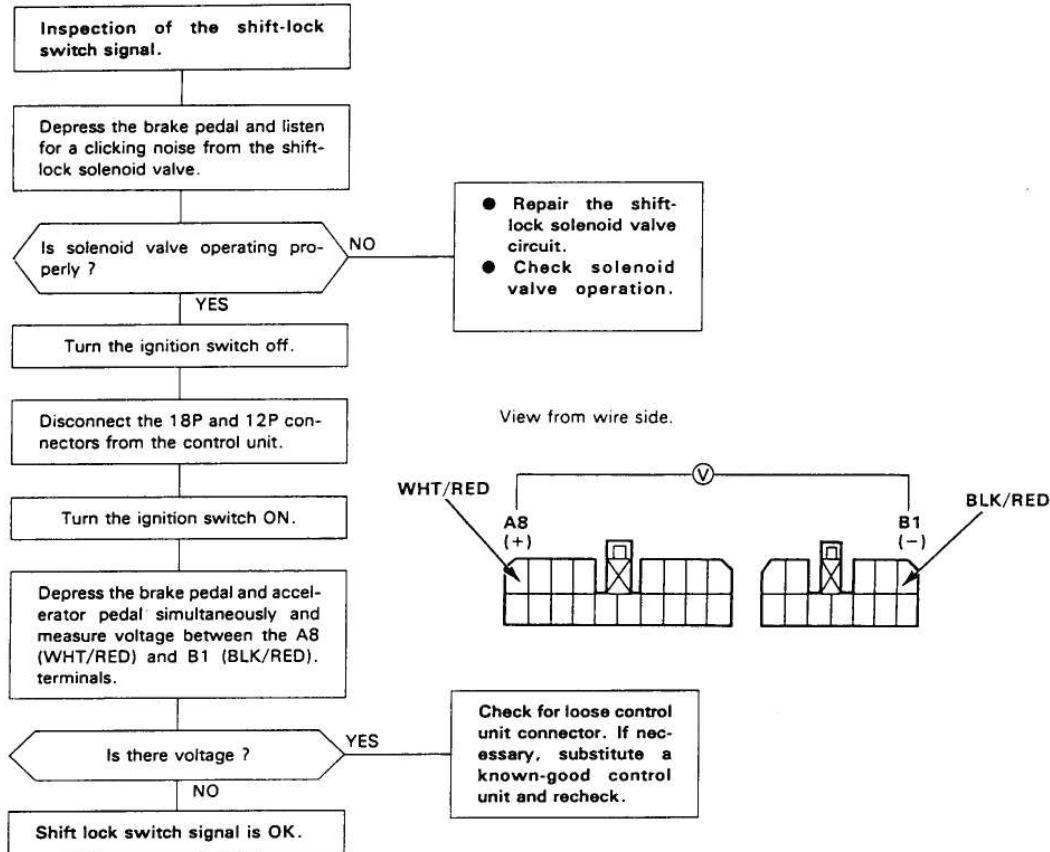






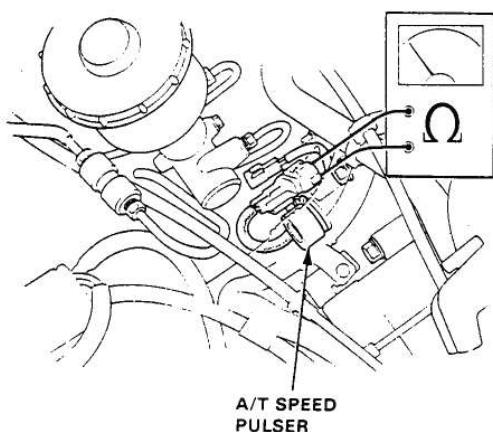






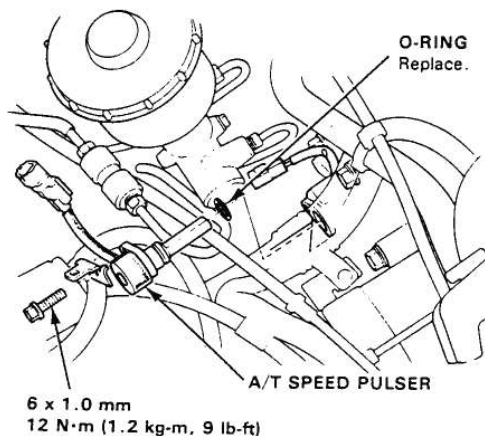
## Test

1. Apply the parking brake, block the rear wheels, and jack up the front of the car.
2. Disconnect the A/T speed pulser 2P connector.
3. Rotate the front wheels and be sure that continuity and no continuity appear alternately between the two terminals.

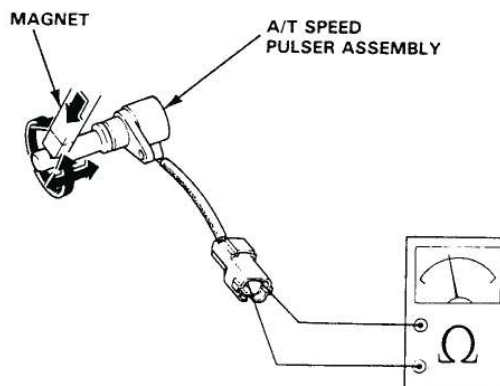


## Removal/Inspection

1. Remove the 6 mm bolt from the transmission housing and remove the A/T speed pulser assembly.



2. Bring a magnet close to the A/T speed pulser assembly and check for continuity.



A/T speed pulser assembly is in good condition if there is:

- Continuity with a magnet close to the pulser assembly.
- No continuity with a magnet away from the pulser assembly.

If the A/T speed pulser is normal, go to Rotor Disassembly/Inspection

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

**CAUTION:** Carefully inspect the A/T speed pulser before installing. Do not install if it shows signs of being dropped or improperly handled.

## Test

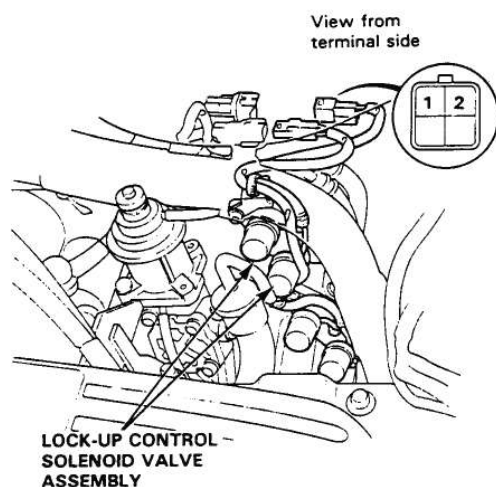
**NOTE:** Lock-up control solenoid valves A and B must be removed/replaced as an assembly.

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 (SOL. V A) of the lock-up control solenoid valve connector and body ground and between the No. 2 terminal (SOL. V B) and body ground.

**STANDARD:** 12–24  $\Omega$



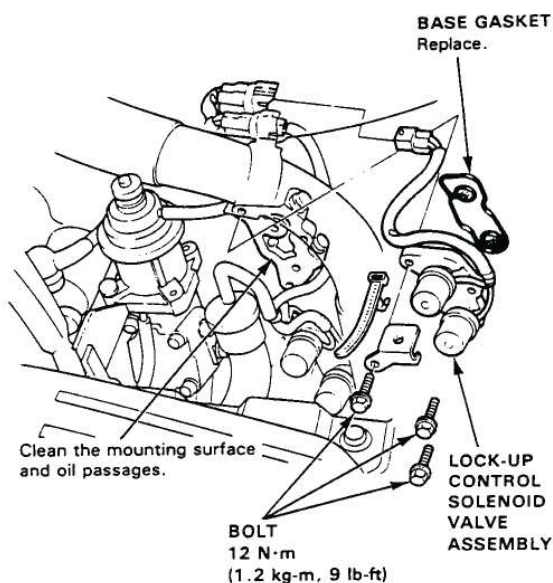
3. Replace the lock-up control solenoid valve assembly if the resistance is out of specification.
4. Connect the No.1 terminal of the lock-up control solenoid valve connector to the battery positive terminal. Connect the No.2 terminal to the battery positive terminal.  
A clicking sound should be heard each time the connection is made.
5. If not, check for continuity between the A/T control unit B3 or B8 harness and body ground.
6. Replace the lock-up control solenoid valve assembly if there is continuity between the A/T control unit B3 or B8 harness and body ground.

## Replacement

1. Remove the four 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.



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, dirt or oil and reconnect it securely.



## Test

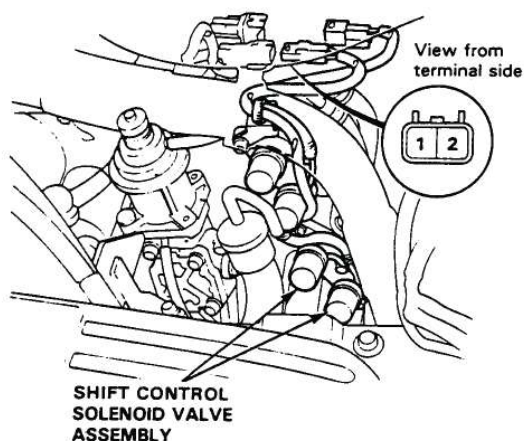
**NOTE:** Shift control solenoid valves A and B must be removed/replaced as an assembly.

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 (SOL. V A) of the shift control solenoid valve connector and body ground and between the No.2 terminal (SOL. V B) and body ground.

**STANDARD:** 12–24  $\Omega$



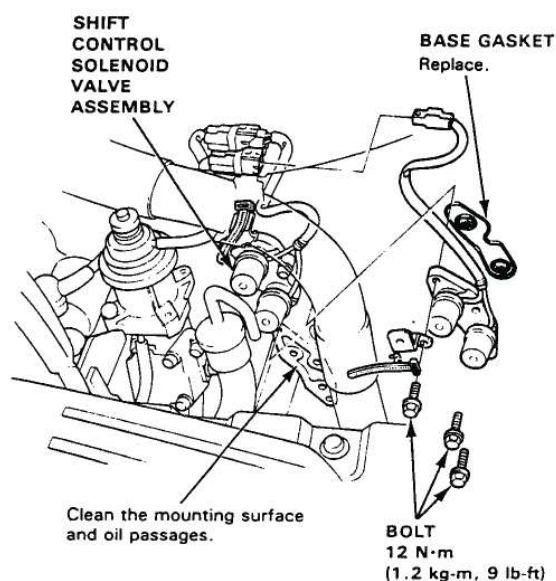
3. Replace the shift control solenoid valve assembly if the resistance is out of specification.
4. Connect the No. 1 terminal of the shift control solenoid valve connector to the battery positive terminal. Connect the No.2 terminal to the battery positive terminal. A clicking sound should be heard each time the connection is made.
5. If not, check for continuity between the A/T control unit B4 or B5 harness and body ground.
6. Replace the shift control solenoid valve assembly if there is continuity between the A/T control unit B4 or B5 harness and body ground.

## Replacement

1. Remove the four mounting 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.

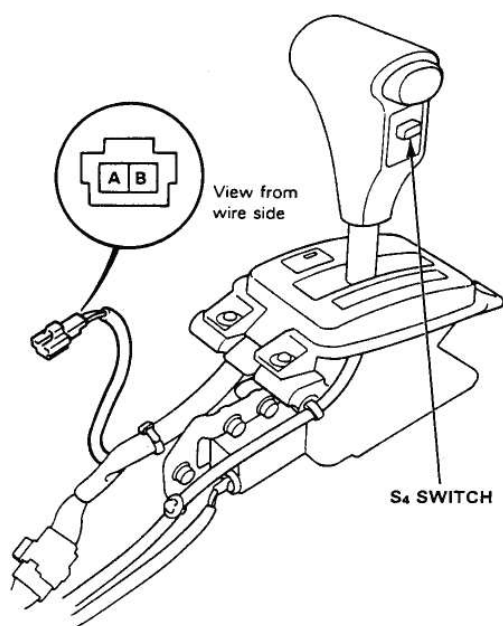


3. Clean the mounting surface and oil passages of the shift control solenoid valve assembly and install a new base gasket.
4. Check the connector for rust, dirt or oil and reconnect it securely.



## 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.





# Technical Service Information

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

| 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                                                         |                                 |
| Noise 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:<br>1. ATV Sensor shaft woodruff key<br>2. Reverse selector gear teeth chamfers<br>3. Engagement teeth chamfers of countershaft 4th & reverse gear<br>4. Shift fork, for scuff marks in center<br>5. Differential pinion shaft for wear under pinion gears<br>6. Bottom of 3rd clutch for swirl marks<br>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.<br>If differential pinion shaft is worn, overhaul differential assy and replace oil screen and thoroughly clean trans, flush torque converter and cooler and lines.<br>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 (vacuum modulator valve).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 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.<br>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

### CAUTION:

- To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
- Do not shift the lever while raising 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 safety chains to both front two hooks and attach, with minimum slack, to some strong stationary object.
3. Connect tachometer, and start the engine.
4. After the engine has warmed up to normal operating temperature, shift into **[2]**.
5. Fully depress the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
6. 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:

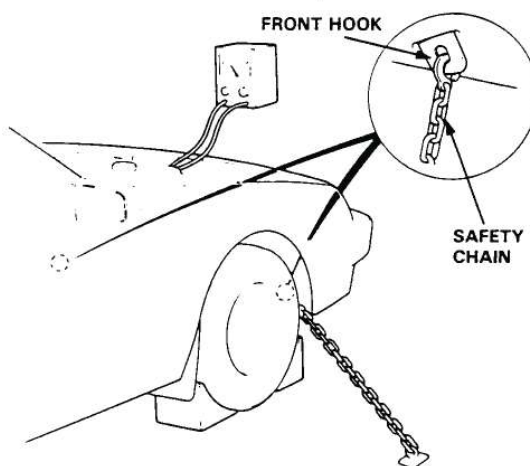
Stall speed test must be made only for checking the cause of trouble.

### Stall Speed RPM:

Specification: 2,600 rpm

Service Limit: 2,450–2,750 rpm

| TROUBLE                                                             | PROBABLE CAUSE                                                                                                                                                                                         |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stall rpm high in <b>[D]</b> , <b>[S]</b> , <b>[2]</b> & <b>[R]</b> | <ul style="list-style-type: none"> <li>• Low fluid level or oil pump output.</li> <li>• Clogged oil strainer.</li> <li>• Pressure regulator valve stuck closed.</li> <li>• Slipping clutch.</li> </ul> |
| Stall rpm high in <b>[R]</b>                                        | <ul style="list-style-type: none"> <li>• Slippage of 4th clutch</li> </ul>                                                                                                                             |
| Stall rpm high in <b>[2]</b>                                        | <ul style="list-style-type: none"> <li>• Slippage of 2nd clutch</li> </ul>                                                                                                                             |
| Stall rpm high in <b>[D]</b> & <b>[S]</b>                           | <ul style="list-style-type: none"> <li>• Slippage of 1st clutch or 1st gear one-way clutch</li> </ul>                                                                                                  |
| Stall rpm low in <b>[D]</b> , <b>[S]</b> , <b>[2]</b> & <b>[R]</b>  | <ul style="list-style-type: none"> <li>• Engine output low</li> <li>• Torque converter one-way clutch slipping</li> </ul>                                                                              |





## Technical Service Information

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 to **S** while depressing the brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.

#### • Upshift

**D**

|                                                 |      | 1st—2nd   | 2nd—3rd    | 3rd—4th     | Lock up Clutch ON |
|-------------------------------------------------|------|-----------|------------|-------------|-------------------|
| 3/40 throttle<br>Coasting down-hill from a stop | km/h | 12.9—17.7 | 31.4—37.0  | 40.2—47.5   | 61.1—66.0         |
|                                                 | mph  | 8—11      | 19.5—23    | 25—29.5     | 38—41             |
| 7/16 throttle<br>Acceleration from a stop       | km/h | 28.2—34.6 | 56.3—65.2  | 88.5—98.1   | 103.8—110.2       |
|                                                 | mph  | 17.5—21.5 | 35—40.5    | 55—61       | 64.5—68.5         |
| Full-throttle<br>Acceleration from a stop       | km/h | 49.9—58.8 | 96.5—110.2 | 156.1—173.8 | 138.4—147.2       |
|                                                 | mph  | 31—36.5   | 60—68.5    | 97—108      | 86—91.5           |

#### **S** (with S4 switch in operation)

|                                                 |      | 1st—2nd   | 2nd—3rd    | 3rd—4th     | Lock up Clutch ON |
|-------------------------------------------------|------|-----------|------------|-------------|-------------------|
| 3/40 throttle<br>Coasting down-hill from a stop | km/h | 12.9—17.7 | 31.4—37.0  | 48.3—55.5   | 69.2—80.5         |
|                                                 | mph  | 8—11      | 19.5—23    | 30—34.5     | 43—50             |
| 7/16 throttle<br>Acceleration from a stop       | km/h | 28.2—34.6 | 66.0—74.8  | 107.8—117.5 | 118.3—124.7       |
|                                                 | mph  | 17.5—21.5 | 41—46.5    | 67—73       | 73.5—77.5         |
| Full-throttle<br>Acceleration from a stop       | km/h | 49.9—58.8 | 96.5—110.2 | 156.1—173.8 | 138.4—147.2       |
|                                                 | mph  | 31—36.5   | 60—68.5    | 97—108      | 86—91.5           |



# Technical Service Information

## ● Downshift

|                                                                       |      | Lock up Clutch OFF | 4th—3rd     | 3rd—2nd   | 2nd—1st   |
|-----------------------------------------------------------------------|------|--------------------|-------------|-----------|-----------|
| 3/40 throttle<br>Coasting or braking to a stop                        | km/h | 55.5—61.1          | —           | 28.2—33.8 | 10.5—16.1 |
|                                                                       | mph  | 34.5—38            | —           | 17.5—21   | 6.5—10    |
| 7/16 throttle<br>When car is slowed by<br>increased grade, wind, etc. | km/h | 90.9—97.3          | —           | —         | —         |
|                                                                       | mph  | 56.5—60.5          | —           | —         | —         |
| Full-throttle<br>When car is slowed by<br>increased grade, wind, etc. | km/h | 135.2—144.0        | 133.5—150.4 | 88.5—99.8 | 43.4—52.3 |
|                                                                       | mph  | 84—89.5            | 83—93.5     | 55—62     | 27—32.5   |

## Ⓢ (with S4 switch in operation)

|                                                                       |      | Lock up Clutch OFF | 4th—3rd     | 3rd—2nd   | 2nd—1st   |
|-----------------------------------------------------------------------|------|--------------------|-------------|-----------|-----------|
| 3/40 throttle<br>Coasting or braking to a stop                        | km/h | 63.4—74.0          | —           | 28.2—33.8 | 10.5—16.1 |
|                                                                       | mph  | 42.5—46            | —           | 17.5—21   | 6.5—10    |
| 7/16 throttle<br>When car is slowed by<br>increased grade, wind, etc. | km/h | 89.3—97.3          | —           | —         | —         |
|                                                                       | mph  | 55.5—60.5          | —           | —         | —         |
| Full-throttle<br>When car is slowed by<br>increased grade, wind, etc. | km/h | 135.2—144.0        | 133.5—150.4 | 88.5—99.8 | 43.4—52.3 |
|                                                                       | mph  | 84—89.5            | 83—93.5     | 55—62     | 27—32.5   |

**CAUTION:** Do not shift from Ⓢ or Ⓢ 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.



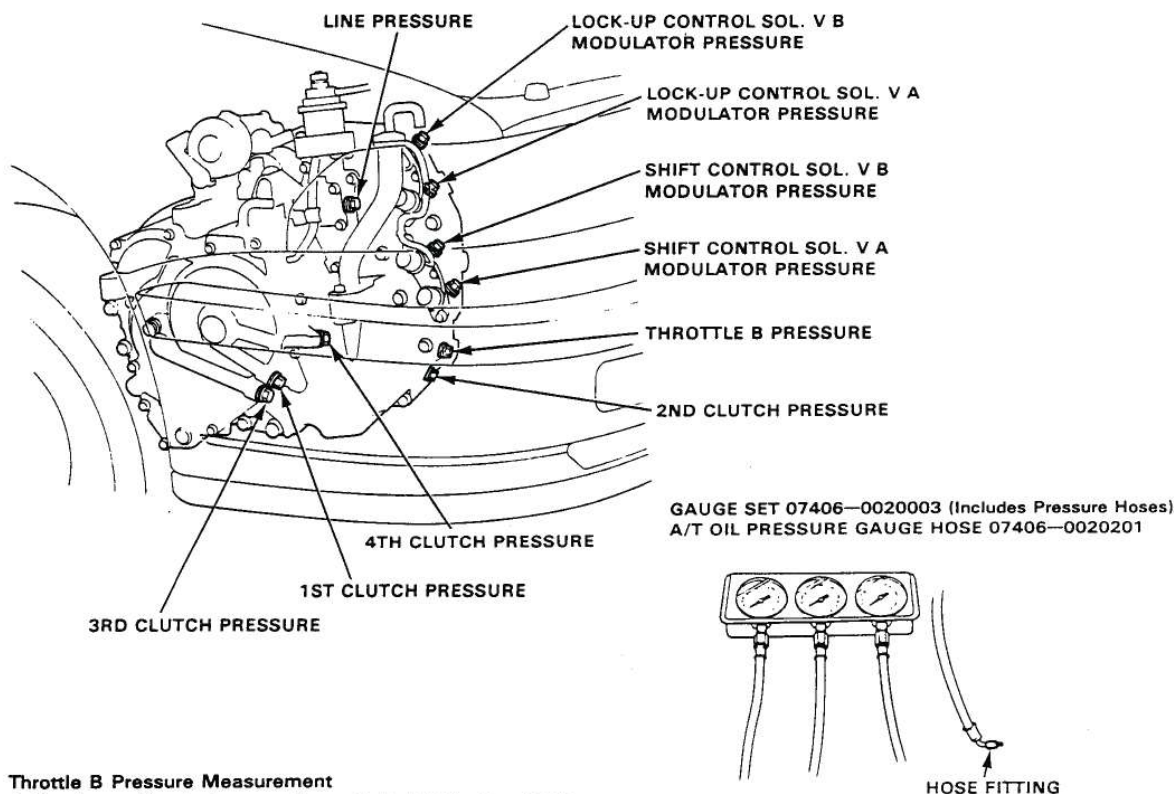
## Technical Service Information

### CAUTION:

- Before testing, be sure the transmission is filled to the proper level.
- Connect an oil pressure gauge securely, being sure not to allow dust and other foreign particles to enter the inspection hole.
- Warm up the engine before testing.
- Set the parking brake securely, and block both rear wheels.
- Raise the front of the car and support with safety stands.

### NOTE:

- Do not reuse old aluminum washers.  
Install the sealing bolt in the inspection hole and tighten to the specified torque 18 N·m (1.8 kg-m, 12 lb-ft).
1. Stop the engine and connect a tachometer.
  2. Connect an oil pressure gauge to each inspection hole.
  3. Start the engine and measure respective pressures as follows.



### Throttle B Pressure Measurement

- Set the parking brake securely, and block both rear wheels.
- Raise the front of the car and support with safety stands.
- Allow the front wheels to rotate freely.
- Run the engine at 2,000 rpm.
- Connect a vacuum pump to the negative tube of the vacuum modulator valve, and apply a vacuum of 500–600 mmHg (19.7–23.6 inHg).

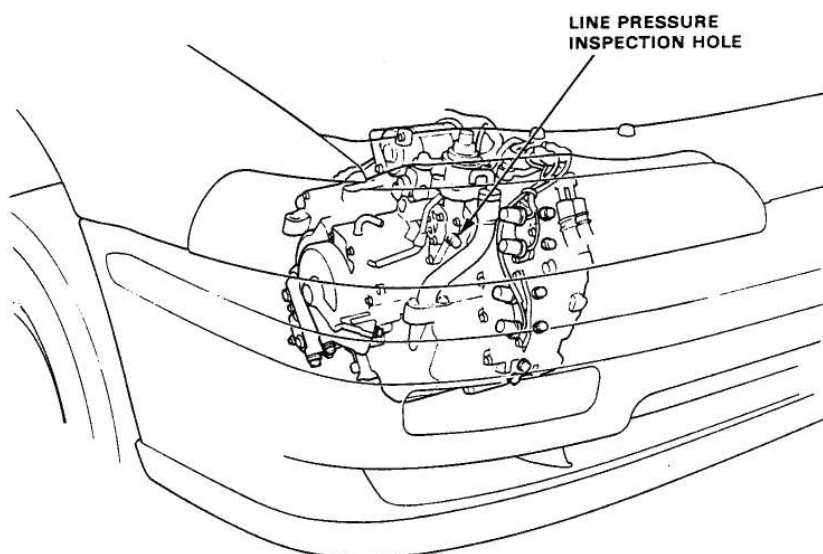
| PRESSURE   | SELECTOR POSITION | VACUUM MODULATOR TUBE  | SYMPTOM            | PROBABLE CAUSE                                          | FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi) |                |
|------------|-------------------|------------------------|--------------------|---------------------------------------------------------|-----------------------------------------------|----------------|
|            |                   |                        |                    |                                                         | Standard                                      | Service Limit  |
| Throttle B | S or D            | Vacuum of 500–600 mmHg | Pressure too high  | Faulty vacuum tube or damaged modulator valve diaphragm | 0                                             | —              |
|            |                   | Vacuum of 0            | No or low pressure | Faulty vacuum modulator valve                           | 765–814 (7.8–8.3, 111–118)                    | 716 (7.3, 104) |



## Line Pressure Measurement

- Set the parking brake and block both rear wheels securely.
- Raise the front of the car and support with safety stands.
- Run the engine at 2,000 rpm.
- Connect a vacuum pump to the vacuum tube of the vacuum modulator valve, and apply a vacuum of 500-600 mmHg.
- Measure the pressure line (under condition equivalent to throttle valve full close).
- Disconnect the vacuum tube from the vacuum modulator valve.
- Measure the line pressure (under condition equivalent to throttle valve full open).

NOTE: Before testing, be sure that the throttle B pressure is held within the specified limits.



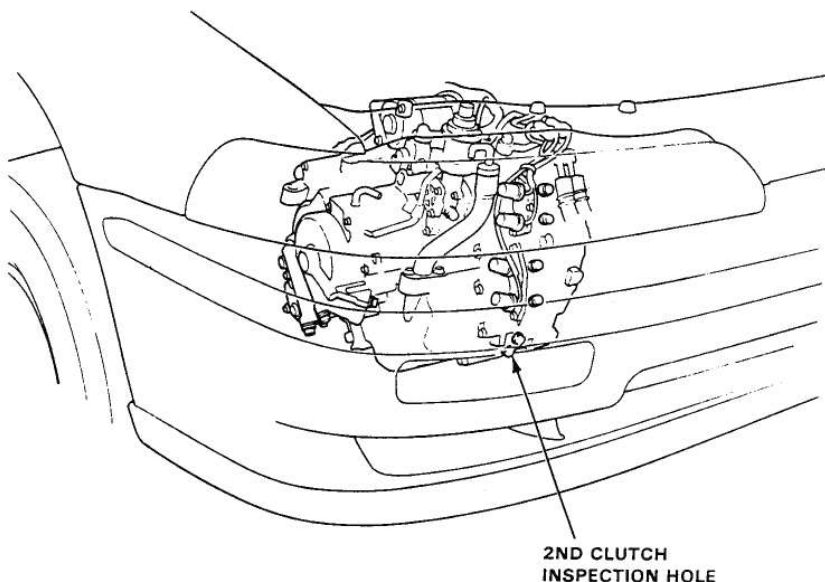
| PRESSURE | SELECTOR POSITION | VACUUM MODULATOR TUBE  | SYMPTOM                 | PROBABLE CAUSE                                                                                                                      | FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi) |                |
|----------|-------------------|------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------|
|          |                   |                        |                         |                                                                                                                                     | Standard                                      | Service Limit  |
| Line     | N or P            | Vacuum of 500—600 mmHg | Excessive LINE pressure | Faulty vacuum modulator valve or stuck regulator valve                                                                              | 490—588 (5.0—6.0, 71—85)                      | 441 (4.5, 64)  |
|          |                   | Vacuum of 0            | No or low LINE pressure | Torque converter, oil pump, pressure regulator, torque converter check valve, vacuum modulator valve, lack of ATF, clogged strainer | 765—814 (7.8—8.3, 111—118)                    | 716 (7.3, 104) |

NOTE: Higher pressures may be indicated if measurements are made in selector positions other than N or P.

## Clutch Pressure Measurement in 2

- Set the parking brake and block both rear wheels securely.
- Raise the front of the car and support with safety stands.
- Allow the front wheel to rotate freely.
- Run the engine at 2,000 rpm.
- Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator valve, and apply a vacuum of 500-600 mmHg.
- Measure the second clutch pressure (under condition equivalent to throttle valve full close).
- Disconnect the vacuum tube from the vacuum modulator valve.
- Measure the second clutch pressure (under condition equivalent to throttle valve full open).

NOTE: Before testing, be sure that the vacuum modulator pressure is held within the specified limits.



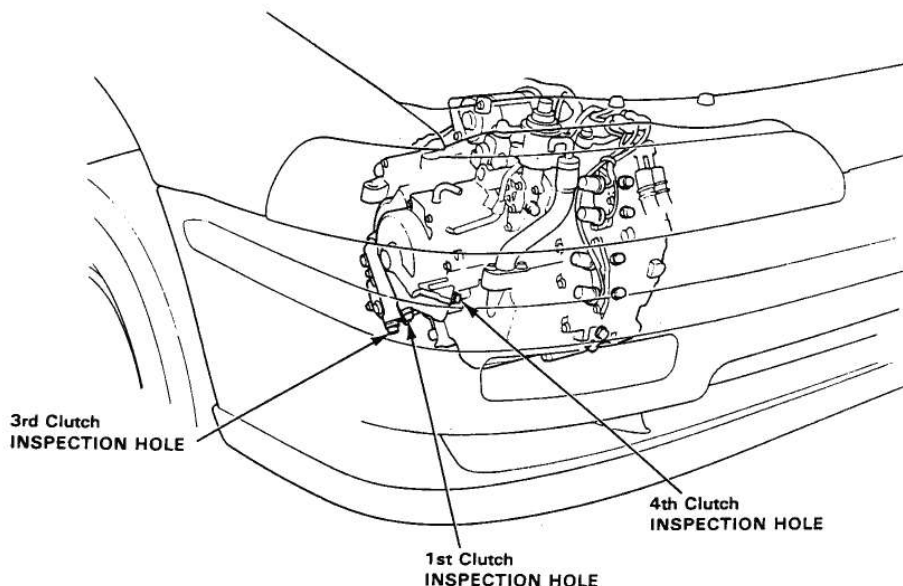
| PRESSURE   | SELECTOR POSITION | VACUUM MODULATOR TUBE  | SYMPTOM                   | PROBABLE CAUSE                           | FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi) |                   |
|------------|-------------------|------------------------|---------------------------|------------------------------------------|-----------------------------------------------|-------------------|
|            |                   |                        |                           |                                          | Standard                                      | service Limit     |
| 2nd Clutch | 2                 | Vacuum of 500—600 mmHg | NO or low SECOND pressure | Faulty 2nd clutch or 2nd modulator valve | 765—863 (7.8—8.8, 111—125)                    | 716 (7.3, 104)    |
|            |                   |                        | Excessive SECOND pressure | Faulty 2nd modulator valve               |                                               |                   |
|            |                   | Vacuum of 0            | No or low SECOND pressure | Faulty 2nd clutch                        | 1,069—1,118 (10.9—11.4, 155—162)              | 1,020 (10.4, 148) |
|            |                   |                        | Excessive SECOND pressure | Faulty 2nd modulator valve               |                                               |                   |



## Technical Service Information

### Clutch Pressure Measurement in **S**, **D** and **R**

- Set the parking brake and block both rear wheels securely.
  - Raise the front of the car and support with safety stands.
  - Allow the front wheels to rotate freely.
  - Run the engine at 2,000 rpm.
  - Connect a vacuum pump to the manifold vacuum tube of the vacuum modulator valve, and apply a vacuum of 500-600 mmHg.
  - Measure each clutch line pressure (under condition equivalent to throttle valve full close).
  - Disconnect the vacuum tube from the vacuum modulator valve.
  - Measure each clutch line pressure (under condition equivalent to throttle valve full open).
- NOTE: Before testing, be sure the throttle B pressure is held within the specified limits.

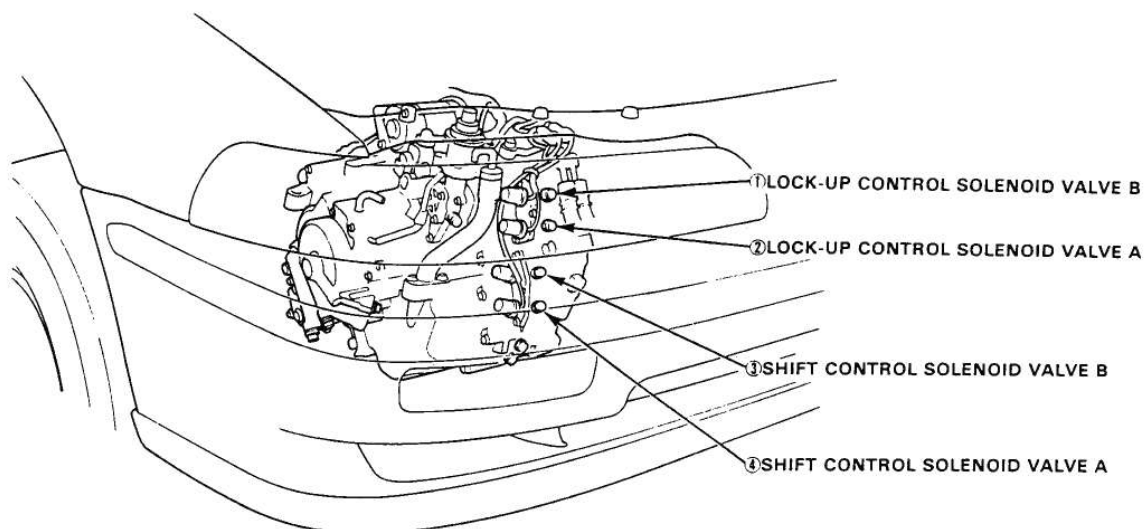


| PRESSURE   | SELECTOR POSITION                   | SYMPTOM                   | PROBABLE CAUSE                           | FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi) |                             |
|------------|-------------------------------------|---------------------------|------------------------------------------|-----------------------------------------------|-----------------------------|
|            |                                     |                           |                                          | Standard                                      | Service Limit               |
| 1st Clutch | <b>S</b> or <b>D</b>                | No or low FIRST pressure  | Faulty 1st clutch or O-ring              | 490—588 (5.0—6.0, 71—85)                      | 441 (4.5, 64)               |
| 3rd Clutch | <b>S</b> (S4 switch OFF)            | No or low THIRD pressure  | Faulty 3rd clutch or O-ring              | ↓<br>Vacuum of 500—600 mmHg                   | ↓<br>Vacuum of 500—600 mmHg |
| 4th Clutch | <b>S</b> (S4 switch ON) or <b>D</b> | No or low FOURTH pressure | Faulty 4th clutch or O-ring              | 775—824 (7.9—8.4, 112—119)                    | 726 (7.4, 105)              |
| 4th Clutch | <b>R</b>                            | No or low FOURTH pressure | Faulty servo valve, 4th clutch or O-ring | ↓<br>Vacuum of 0                              | ↓<br>Vacuum of 0            |

## Solenoid valve Pressure test

- Set the parking brake securely. \*
- Start the engine and run in at 2,000 rpm.
- Measure pressure at each of the 4 ports shown below.

NOTE: Before testing, be sure that the line pressure is held within the specified limits.



| PRESSURE           | SELECTOR LEVER | SYMPTOM                              | PROBABLE CAUSE                                                                                                                                   | FLUID PRESSURE kPa (kg/cm <sup>2</sup> , psi) |               |
|--------------------|----------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------|
|                    |                |                                      |                                                                                                                                                  | Standard                                      | Service Limit |
| Modulator pressure | N or P         | NO or low (On 1 to 3 ports) pressure | ①Lock-up Control Solenoid Valve B.<br>②Lock-up Control Solenoid Valve A.<br>③Shift Control Solenoid Valve B.<br>④Shift Control Solenoid Valve A. | 510—549<br>(5.2—5.6, 74—80)                   | 441 (4.5, 64) |
|                    |                | All 4 ports low                      | Modulator Valve                                                                                                                                  |                                               |               |
|                    |                | High pressure                        | Modulator Valve                                                                                                                                  |                                               |               |



## Checking/Changing

### Checking

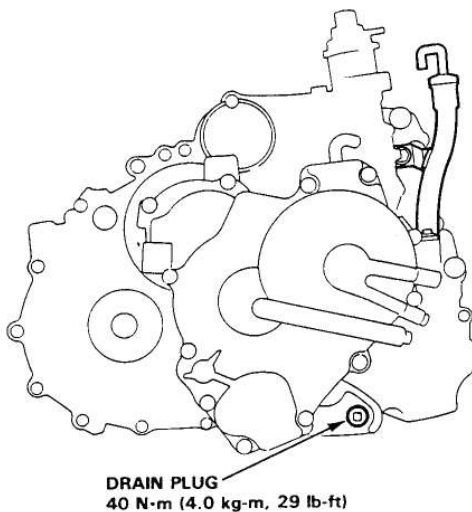
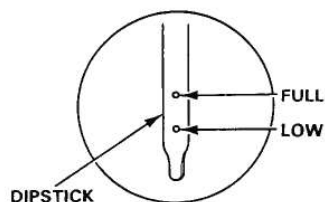
With the car on level ground, pull the transmission dipstick and check the level of fluid immediately after the engine is shut off (within one minute). The fluid level should be between the full and low marks. Push the dipstick all the way in to check the fluid level. If the level is at, or below, the low mark, add DEXRON-II type automatic transmission fluid.

### Changing

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

#### Automatic transmission Capacity:

3.0 l (3.2 US qts., 2.6 Imp. qt) at change  
6.3 l (6.7 US qts., 5.5 Imp. qt) after overhaul



**⚠ WARNING**

- Make sure jacks and safety stands are placed properly, and hoist brackets are attached to correct positions on the engine.
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

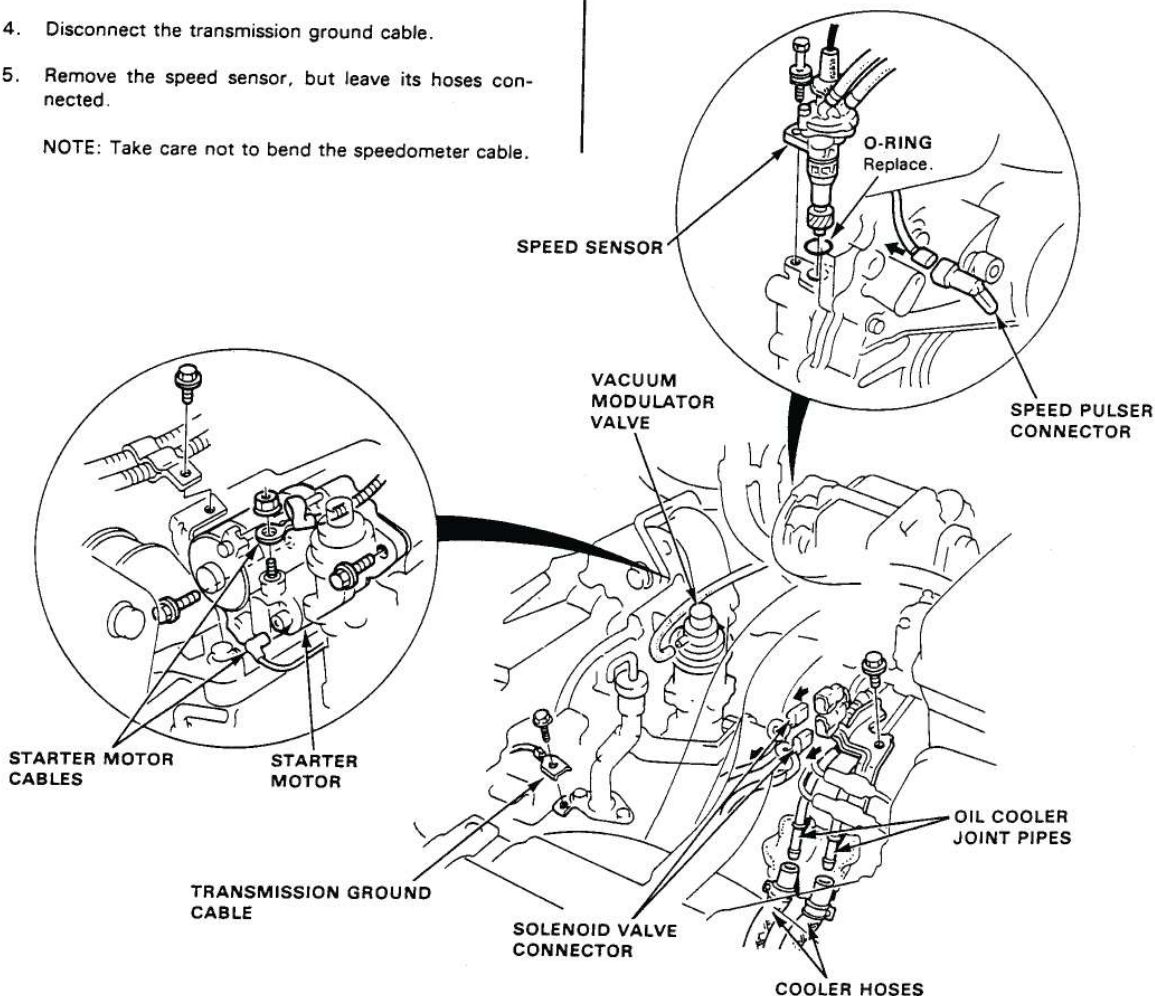
**CAUTION:** Use fender covers to avoid damaging painted surfaces.

1. Disconnect the battery negative (–) and positive (+) cables from the battery, and remove the battery.
2. Remove the air intake hose and battery base (See Section 6).
3. Disconnect the starter motor cables, remove the starter mounting bolts, then remove the starter motor.
4. Disconnect the transmission ground cable.
5. Remove the speed sensor, but leave its hoses connected.

**NOTE:** Take care not to bend the speedometer cable.

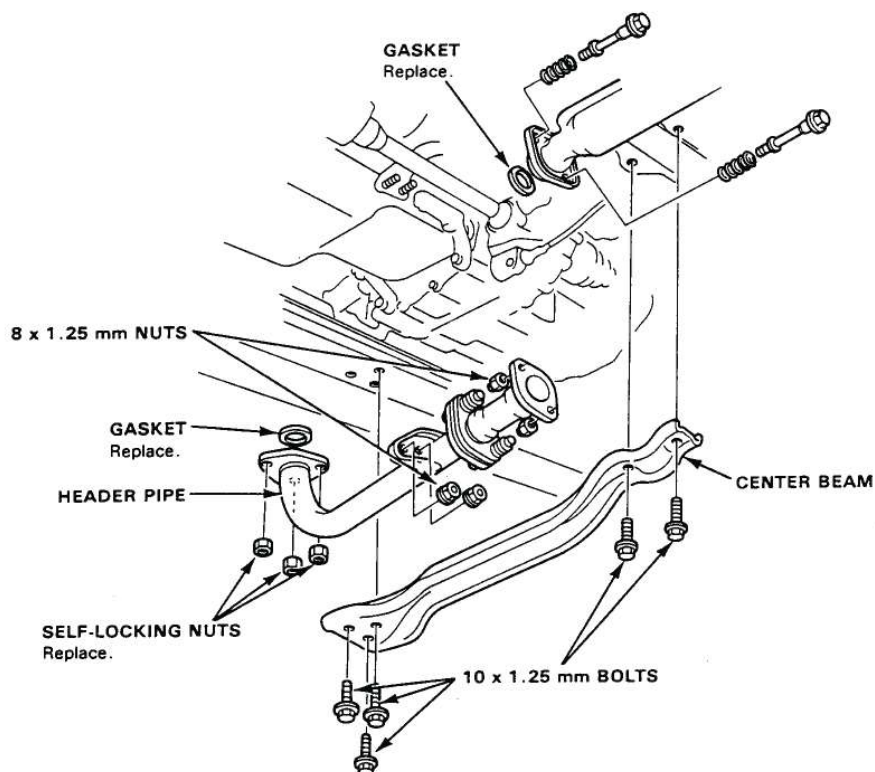
6. Disconnect the speed pulser connector.
7. Disconnect the lock-up control solenoid valve wire connectors.
8. Disconnect the vacuum hose from the vacuum modulator valve.
9. Drain transmission oil/fluid. Use a socket wrench to remove the drain plug. Remove the oil filler plug to speed draining. Reinstall the drain plug with a new washer.
10. Disconnect the cooler hoses at the joint pipes. Turn the ends up to prevent ATF from flowing out.

**NOTE:** Check for any signs of leakage at the hose joints.



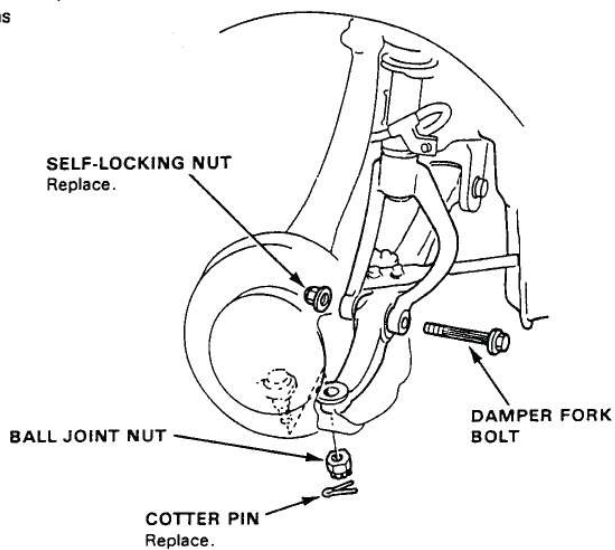
11. Remove the center beam.

12. Remove the header pipe.

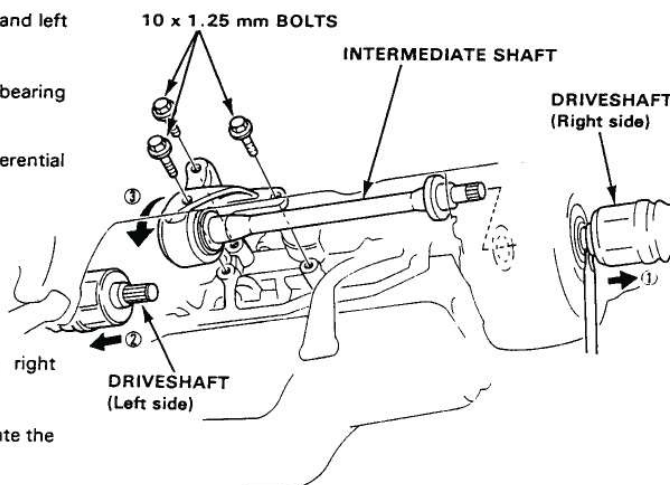


13. Remove the cotter pins and lower arm ball joint nuts, then separate the ball joints and lower arms

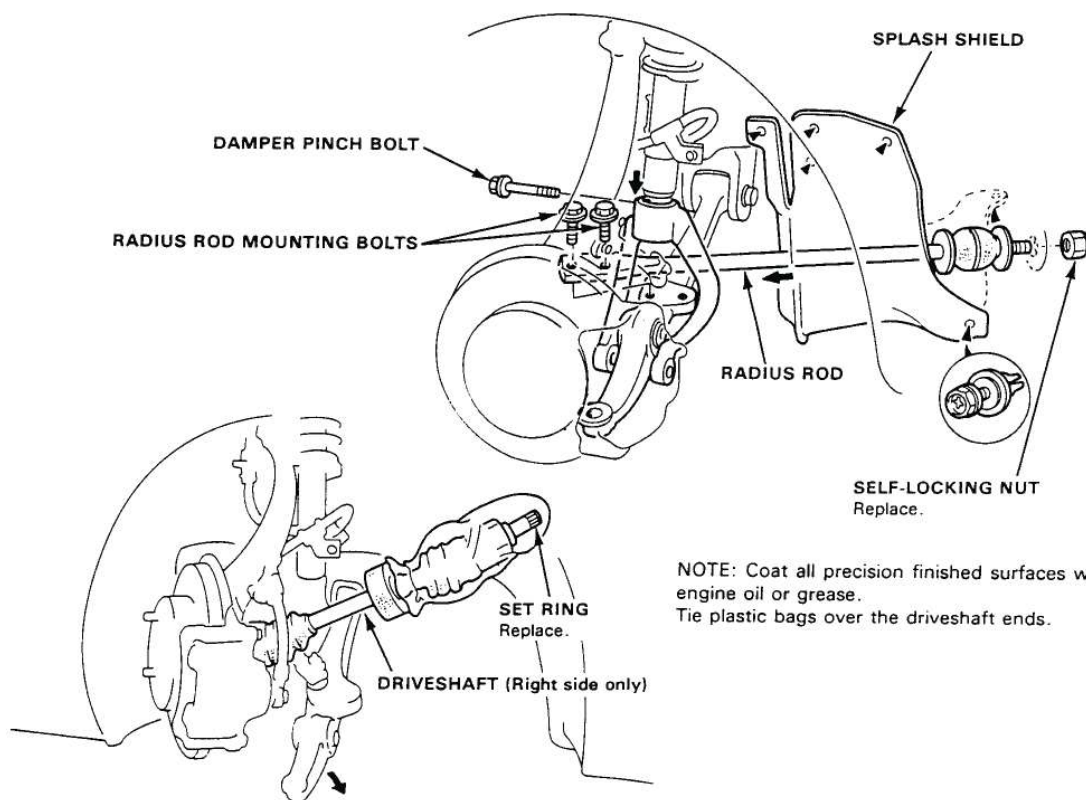
14. Remove the damper fork bolt.



15. Pry the right and left driveshafts out of the differential and the intermediate shaft.
16. Pull on the inboard joint and remove the right and left driveshafts
17. Remove the 3 mounting bolts and lower the bearing support.
18. Remove the intermediate shaft from the differential



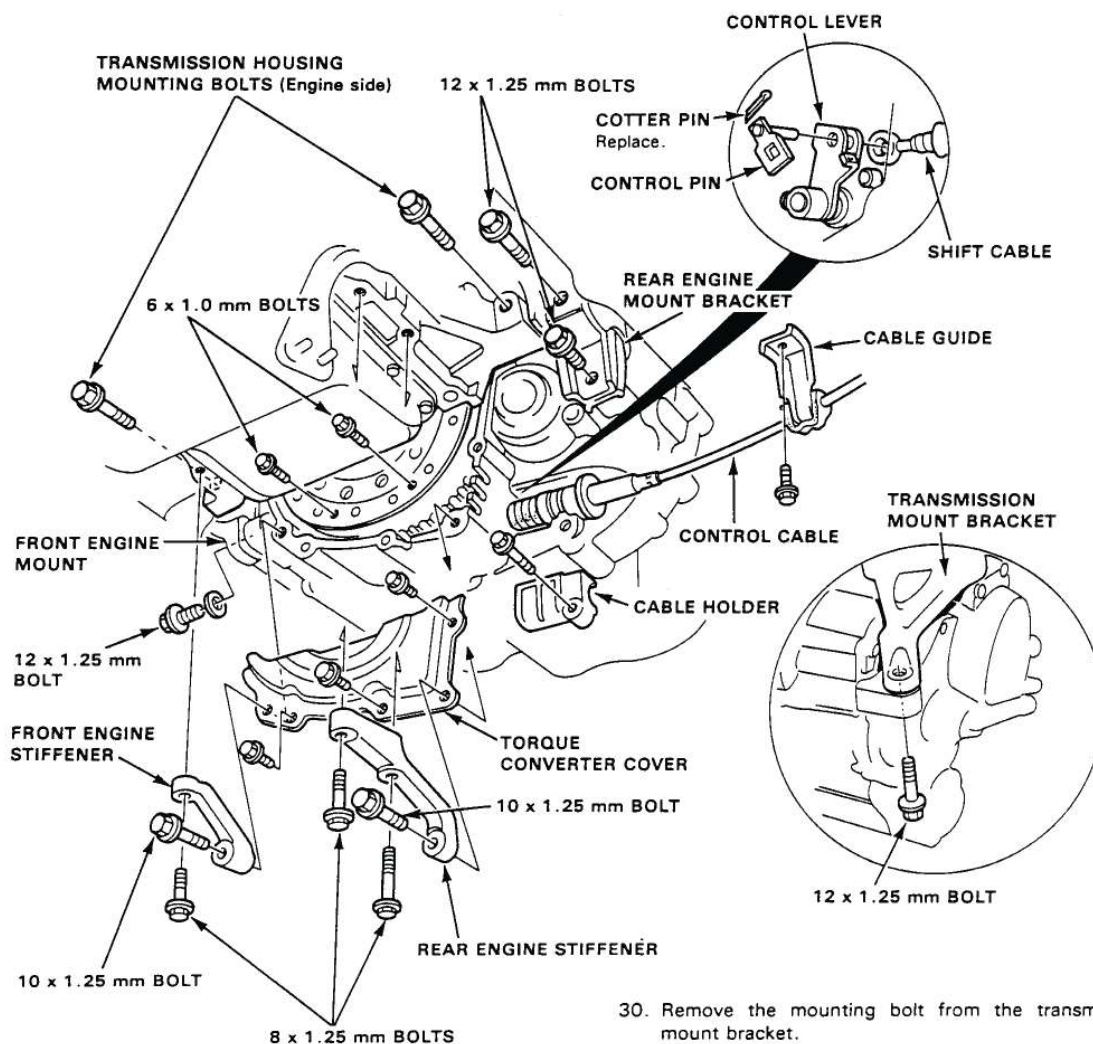
19. Remove the engine splash shield and the right wheelwell splash shield.
20. Remove the right damper pinch bolt, then separate the damper fork and damper.
21. Remove the bolts and nut, then remove the right radius rod.



NOTE: Coat all precision finished surfaces with clean engine oil or grease.  
Tie plastic bags over the driveshaft ends.



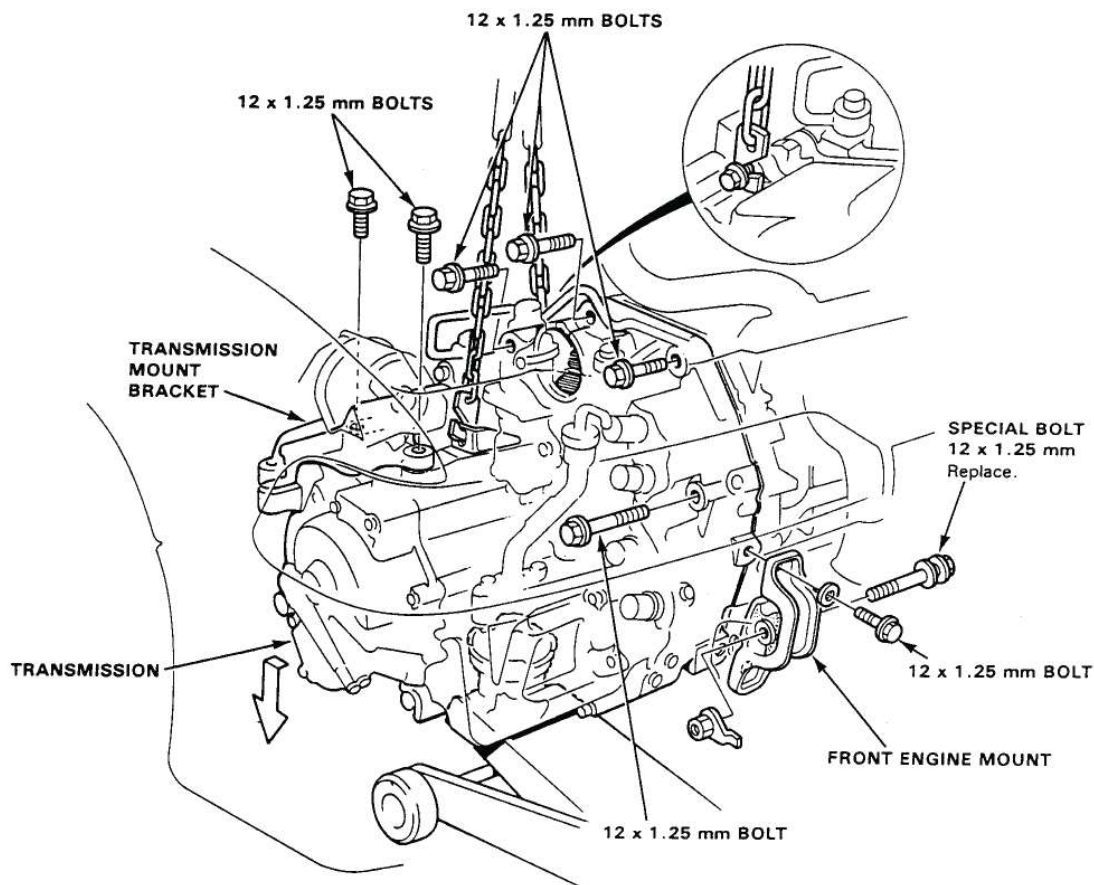
22. Remove the front and rear engine stiffeners.
23. Remove the torque converter cover and cable holder.
24. Remove the shift control cable by removing the cotter pin, control pin and control lever roller from the control lever.
25. Remove the shift control cable guide.  
**CAUTION: Take care not to bend the control cable.**
26. Remove the plug, then remove the drive plate bolts one at a time while rotating the crankshaft pulley.
27. Remove the mounting bolt from the front engine mount.
28. Remove the 2 mounting bolts from the rear engine mount bracket.
29. Remove the front and rear transmission housing mounting bolts (Engine side).





## Technical Service Information

31. Loosen the differential housing mounting bolt.
32. Attach a chain hoist to the transmission housing hoist bracket and differential housing-to-engine mounting bolt, then lift the engine slightly to unload the mounts as shown.
33. Place a jack under the transmission and raise transmission just enough to take weight off mounts.
34. Remove the front engine mount.
35. Remove the 4 transmission housing mounting bolts and 2 mount bracket bolts.
36. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.









## Technical Service Information

| Torque Value                                        | Bolt Size | Note               |
|-----------------------------------------------------|-----------|--------------------|
| A—12 N·m (1.2 kg-m, 9 lb-ft)                        | 6 mm      | Left-hand threads. |
| B—18 N·m (1.8 kg-m, 13 lb-ft)                       | 8 mm      |                    |
| C—140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft) | 23 mm     |                    |
| D—29 N·m (2.9 kg-m, 21 lb-ft)                       | 12 mm     |                    |
| E—55 N·m (5.5 kg-m, 40 lb-ft)                       | 10 mm     |                    |
| F—95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)       | 19 mm     |                    |
| G—14 N·m (1.4 kg-m, 11 lb-ft)                       | 6 mm      |                    |
| H—40 N·m (4.0 kg-m, 29 lb-ft)                       | 14 mm     |                    |
| I—27 N·m (2.7 kg-m, 20 lb-ft)                       | 8 mm      |                    |
|                                                     |           |                    |

①SEALING WASHER

②R. SIDE COVER

③GASKET

④DOWEL PIN

⑤FEED PIPE WASHER

⑥PIN

⑦O-RING

⑧FEED PIPE FLANGE

⑨O-RING

⑩SNAP RING

⑪3RD CLUTCH FEED PIPE

⑫COUNTERSHAFT LOCKNUT

⑬PARKING GEAR

⑭ONE-WAY CLUTCH

⑮COUNTERSHAFT 1ST GEAR

⑯NEEDLE BEARING

⑰COLLAR

⑱BRACKET

⑲A/T SPEED PULSER

⑳O-RING

㉑O-RING

㉒SPEED SENSER ASSEMBLY

㉓SPECIAL BOLT

㉔SEALING WASHERS

㉕ATF COOLER PIPE (A)

㉖SEALING WASHERS

㉗ATF COOLER PIPE (B)

㉘LEVEL GAUGE PIPE

㉙ATF LEVEL GAUGE

㉚TRANSMISSION BRACKET

㉛COLLAR

㉜THRUST WASHER

㉝O-RINGS

㉞MAINSHAFT 1ST GEAR

㉟NEEDLE BEARING

㊱THRUST NEEDLE BEARING

㊲THRUST WASHER

㊳1ST CLUTCH ASSEMBLY

㊴MAINSHAFT LOCKNUT

㊵SNAP RING

㊶FEED PIPE GUIDE

㊷O-RING

㊸O-RING

㊹1ST CLUTCH FEED PIPE

㊺SEALING WASHER

㊻SEALING WASHER

㊼O-RINGS

㊽DOWEL PIN

㊾COTTER PIN Replace.

㊿DRAIN PLUG

①SEALING WASHER Replace.

②LOCK WASHER Replace.

③PARKING BRAKE STOPPER

④ROLLER PIN

⑤PARKING SHIFT ARM

⑥ROLLER

⑦WASHER

⑧PARKING PAWL

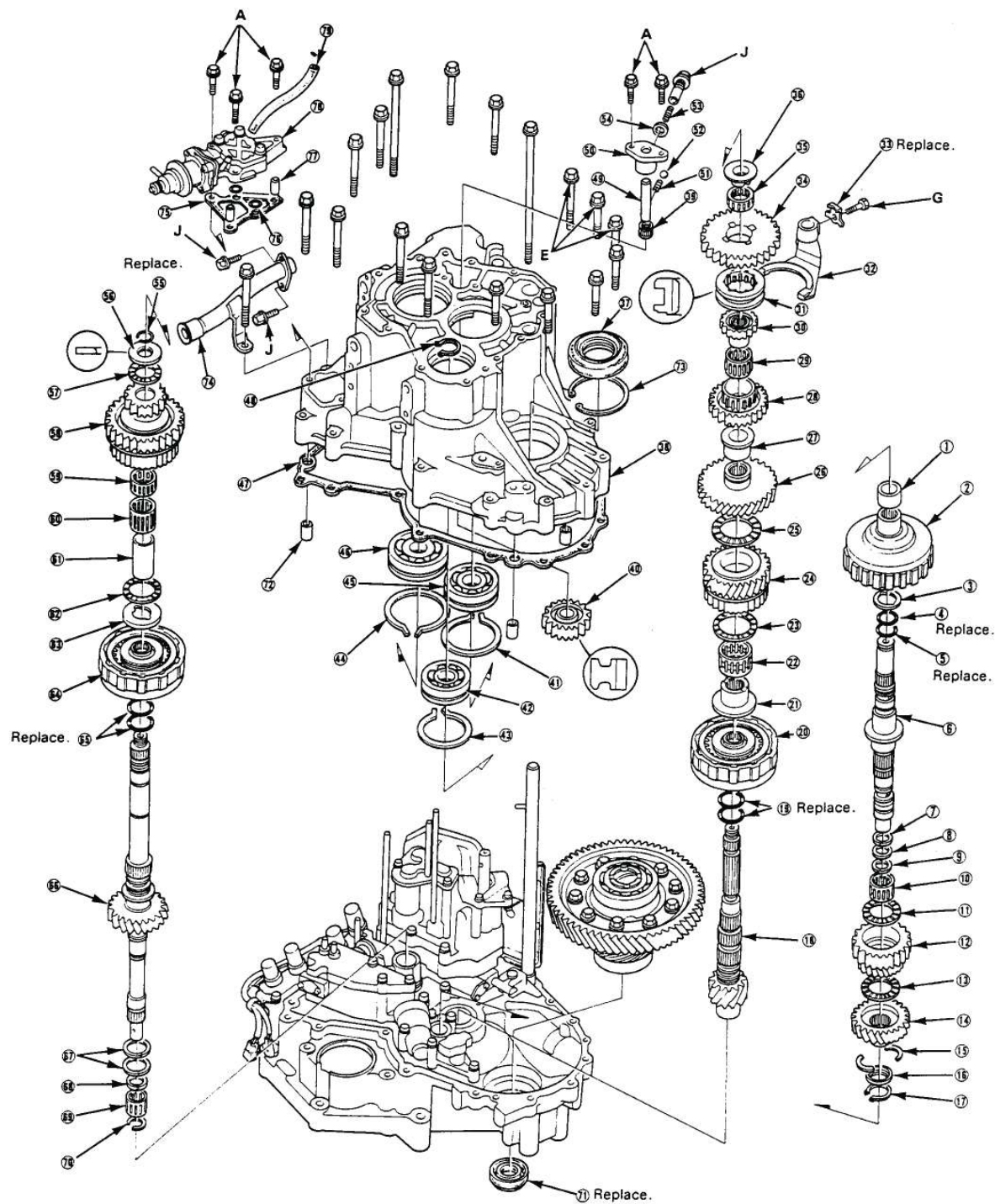
⑨PARKING BRAKE SPRING

⑩STOPPER PIN

⑪PARKING PAWL SHAFT

⑫RETURN SPRING







# Technical Service Information

| Torque Value                  | Bolt Size | Note |
|-------------------------------|-----------|------|
| A—12 N·m (1.2 kg-m, 9 lb-ft)  | 6 mm      |      |
| G—14 N·m (1.4 kg-m, 11 lb-ft) | 6 mm      |      |
| E—55 N·m (5.5 kg-m, 40 lb-ft) | 10 mm     |      |
| J—27 N·m (2.7 kg-m, 20 lb-ft) | 10 mm     |      |

①DISTANCE COLLAR 25 mm  
 ②2ND CLUTCH  
 ③THRUST WASHER  
 ④O-RING  
 ⑤O-RING  
 ⑥SECONDARY SHAFT  
 ⑦SEAL RING  
 ⑧SEAL RING  
 ⑨SEAL RING  
 ⑩NEEDLE BEARING  
 ⑪THRUST NEEDLE BEARING  
 ⑫2ND DRIVE GEAR  
 ⑬THRUST NEEDLE BEARING  
 ⑭SECONDARY 2ND GEAR  
 ⑮COTTER 26 mm  
 ⑯COTTER RETAINER  
 ⑰CIRCLIP  
 ⑱COUNTERSHAFT  
 ⑲O-RINGS  
 ⑳3RD CLUTCH  
 ㉑DISTANCE COLLAR  
 (A, B, C)  
 ㉒NEEDLE BEARING  
 ㉓THRUST NEEDLE BEARING  
 ㉔COUNTERSHAFT 3RD GEAR  
 ㉕THRUST NEEDLE BEARING  
 ㉖COUNTERSHAFT 2ND GEAR

㉗DISTANCE COLLAR 28 mm  
 ㉘COUNTERSHAFT 4TH GEAR  
 ㉙NEEDLE BEARING  
 ㉚SELECTOR HUB  
 ㉛REVERSE SELECTOR  
 ㉜REVERSE SHIFT FORK  
 ㉝LOCK WASHER  
 ㉞COUNTERSHAFT REVERSE GEAR  
 ㉟NEEDLE BEARING  
 ㊱REVERSE GEAR COLLAR  
 ㊲OIL SEAL 40 x 76 x 9 mm Replace.  
 ㊳TRANSMISSION HOUSING  
 ㊴NEEDLE BEARING  
 ㊵REVERSE IDLER GEAR  
 ㊶SNAP RING 68 mm  
 ㊷BALL BEARING 6305  
 ㊸SNAP RING  
 ㊹SNAP RING 75 mm  
 ㊺BALL BEARING  
 ㊻BALL BEARING  
 ㊼GASKET Replace.  
 ㊽SET RING 25 mm  
 ㊾REVERSE IDLER SHAFT  
 ㊿REVERSE IDLER SHAFT  
 HOLDER  
 ①SPRING  
 ②STEEL BALL

③SPRING  
 ④WASHER  
 ⑤SNAP RING 26 mm  
 ⑥WASHER  
 ⑦THRUST NEEDLE  
 BEARING  
 ⑧MAINSHAFT 4TH GEAR  
 ⑨NEEDLE BEARING  
 ⑩NEEDLE BEARING  
 ⑪MAINSHAFT 4TH GEAR COLLAR  
 ⑫THRUST NEEDLE BEARING  
 ⑬THRUST WASHER  
 ⑭4TH CLUTCH  
 ⑮O-RINGS  
 ⑯MAINSHAFT  
 (MAINSHAFT 3RD GEAR)  
 ⑰SEAL RINGS 35 mm  
 ⑱SEAL RING 29 mm  
 ⑲NEEDLE BEARING  
 ㉑SET RING 23 mm  
 ㉒OIL SEAL  
 ㉓DOWEL PIN  
 ㉔SNAP RING  
 ㉕LEVEL GAUGE PIPE  
 ㉖GASKET Replace.  
 ㉗O-RING Replace.  
 ㉘DOWEL PIN  
 ㉙VACUUM MODULATOR  
 VALVE ASSEMBLY  
 ㉚TUBE Replace.







## Technical Service Information

| Torque Value                  | Bolt Size | Note |
|-------------------------------|-----------|------|
| A—12 N·m (1.2 kg-m, 9 lb-ft)  | 6 mm      |      |
| B—18 N·m (1.8 kg-m, 13 lb-ft) | 8 mm      |      |

①CLUTCH FEED PIPE  
 ②ACCUMULATOR COVER  
 ③TRANSMISSION STRAINER  
 ④SERVO BODY  
 ⑤SERVO DETENT BASE  
 ⑥SERVO SEPARATING PLATE  
 ⑦SECONDARY VALVE BODY  
 ⑧DOWEL PIN  
 ⑨SECONDARY SEPARATING PLATE  
 ⑩DOWEL PIN  
 ⑪CLUTCH FEED PIPE  
 ⑫CONTROL SHAFT  
 ⑬SECOND ACCUMULATOR BODY  
 ⑭LOCK-UP SEPARATING PLATE  
 ⑮LOCK-UP COVER  
 ⑯REGULATOR VALVE BODY  
 ⑰O-RING Replace.  
 ⑱STATOR SHAFT ASSEMBLY  
 ⑲SECOND ACCUMULATOR BODY PLATE

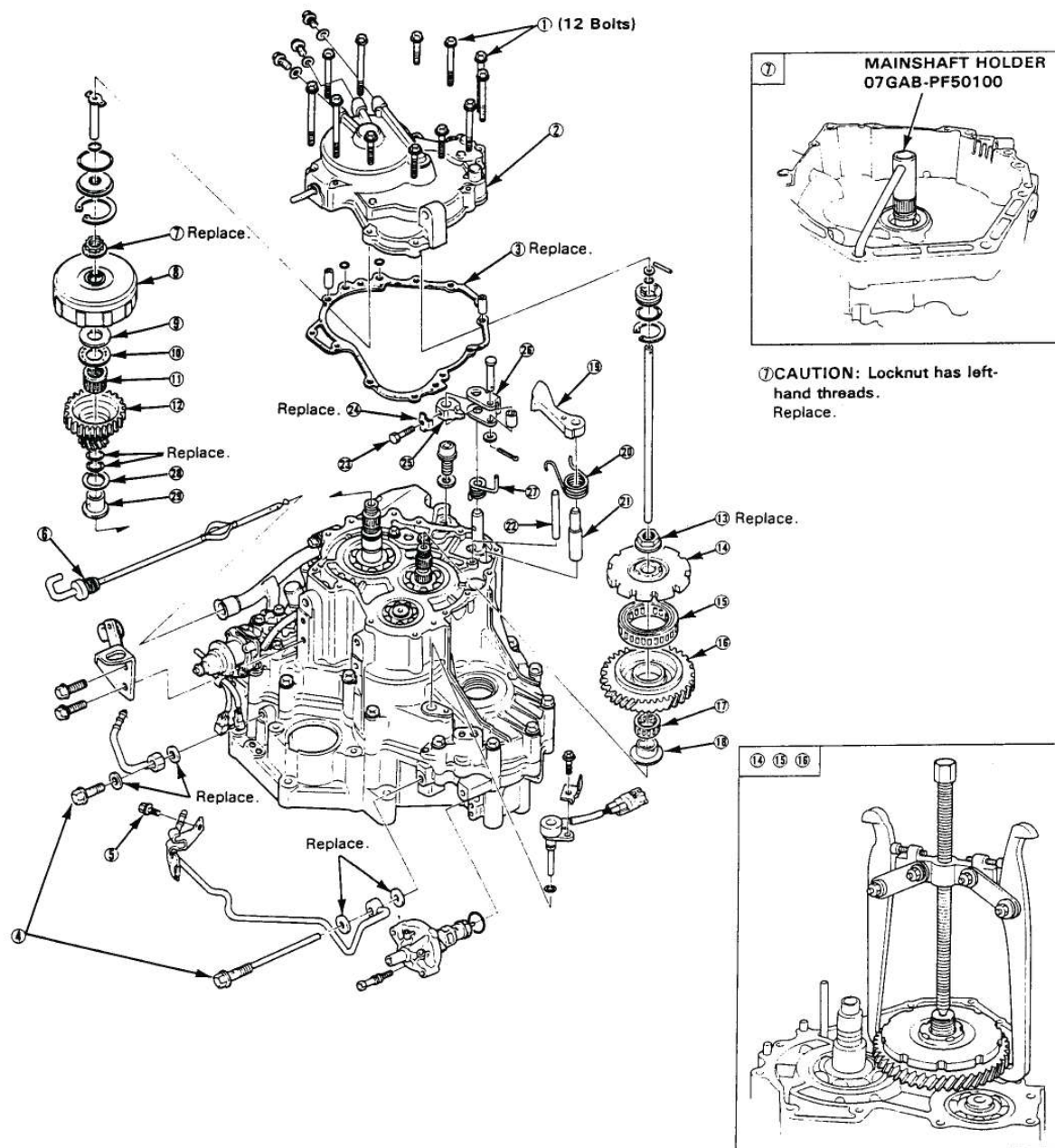
⑳CLUTCH FEED PIPE  
 ㉑MAIN VALVE BODY  
 ㉒DOWEL PIN  
 ㉓MAIN SEPARATING PLATE  
 ㉔PUMP DRIVE GEAR  
 ㉕PUMP DRIVEN GEAR  
 ㉖TORQUE CONVERTER HOUSING  
 ㉗NEEDLE BEARING 36 x 62 x 18 mm  
 ㉘OIL GUIDE PLATE Replace.  
 ㉙BALL BEARING Replace.  
 ㉚OIL SEAL  
 ㉛CONTROL LEVER  
 ㉜LOCK WASHER  
 ㉝OIL SEAL 44 x 68 x 8 mm  
 ㉞BALL BEARING 16008  
 ㉟LOCK-UP CONTROL SOLENOID VALVE ASSEMBLY  
 ㊱SHIFT CONTROL SOLENOID FILTER ASSEMBLY Replace.  
 ㊲SHIFT CONTROL SOLENOID VALVE ASSEMBLY  
 ㊳PUMP DRIVEN GEAR SHAFT  
 ㊴DOWEL PIN



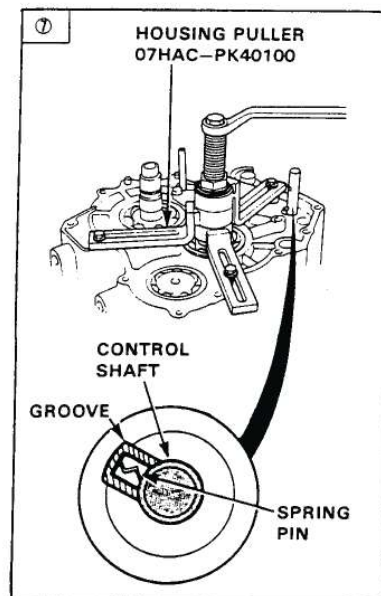
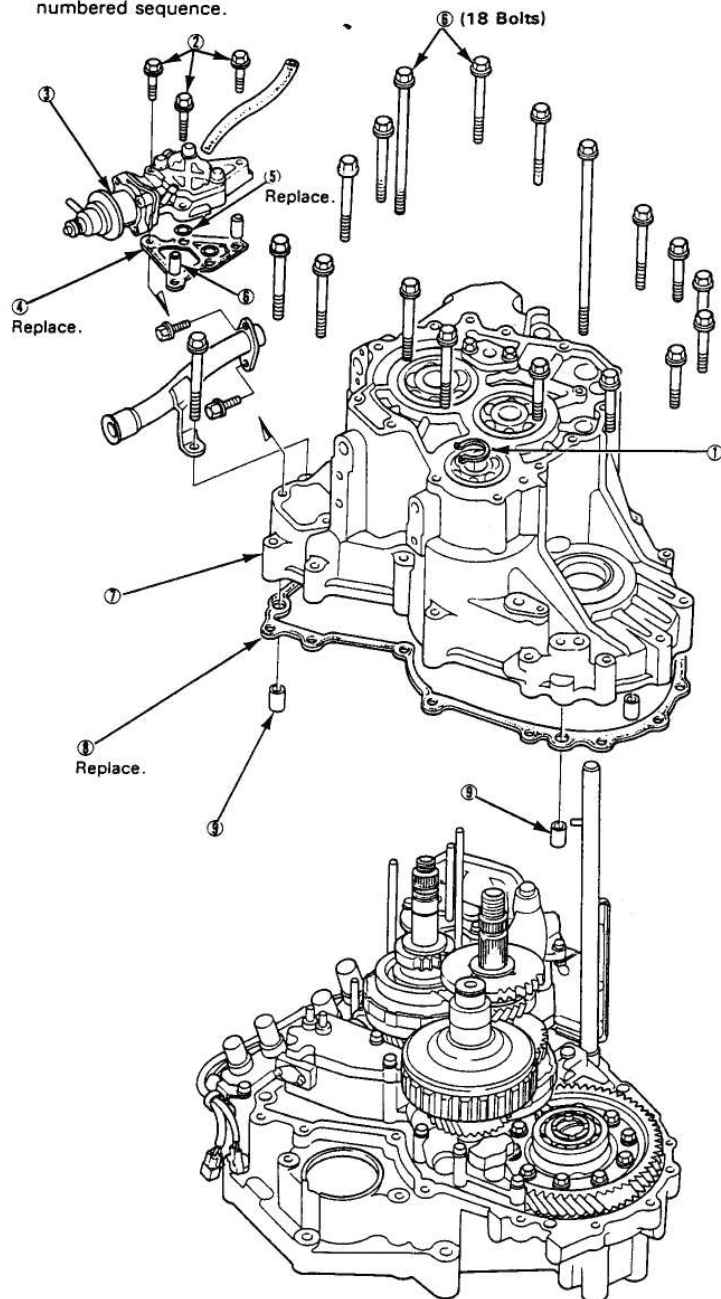
**NOTE:**

- 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.

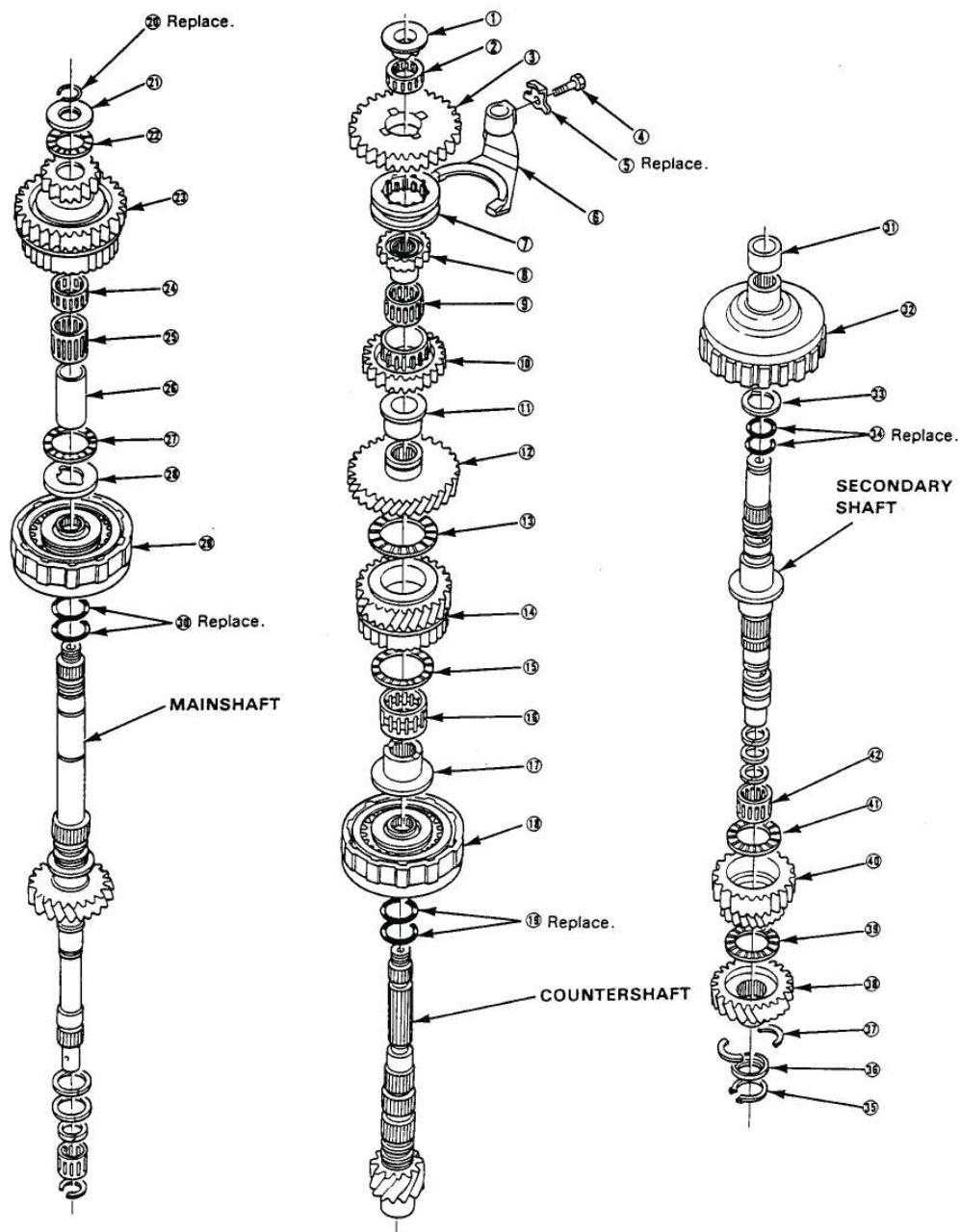
1. Remove the transmission housing in the following numbered sequence.



1. Remove the transmission housing in the following numbered sequence.

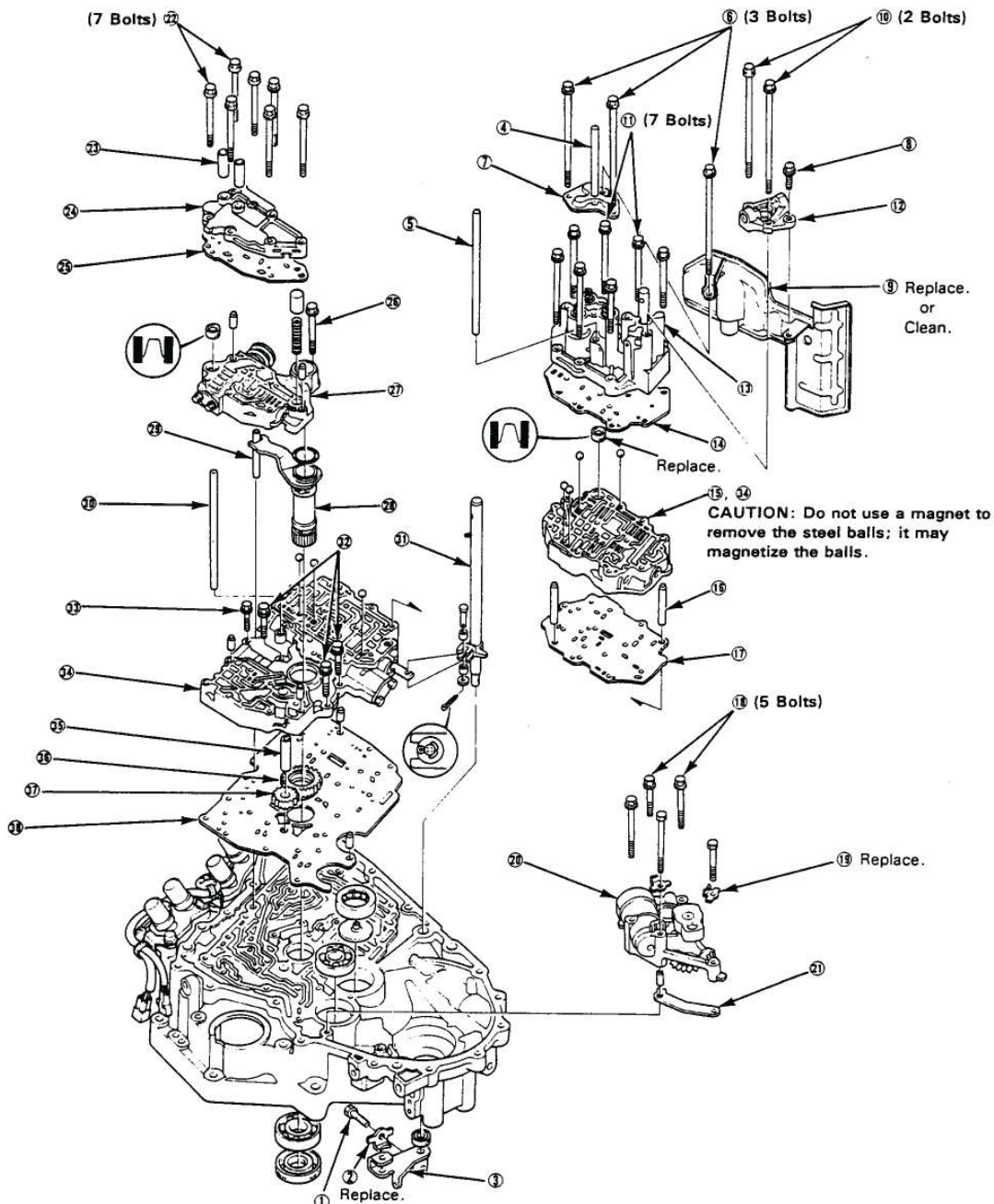


1. Remove parts number ① through ⑪ with the mainshaft, countershaft and secondary shaft installed in the transmission.
2. Remove the mainshaft and countershaft together.
3. Remove parts number ⑫ through ⑬ from the countershaft.
4. Remove parts number ⑭ through ⑳ from the mainshaft.
5. Remove parts number ㉑ through ㉒ from the secondary shaft.



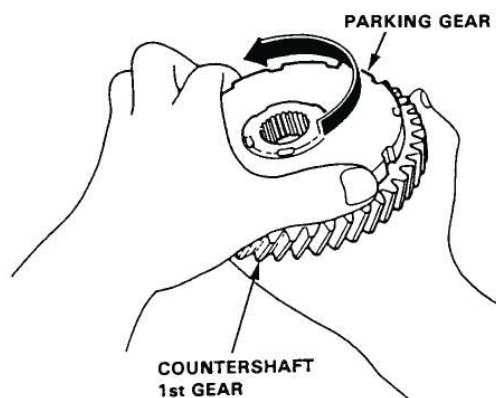


1. Remove the valve body in the following numbered sequence. **CAUTION:** Accumulator covers are spring loaded; to prevent stripping the threads in the torque converter housing, press down on the accumulator covers while unscrewing the bolts in a crisscross pattern.



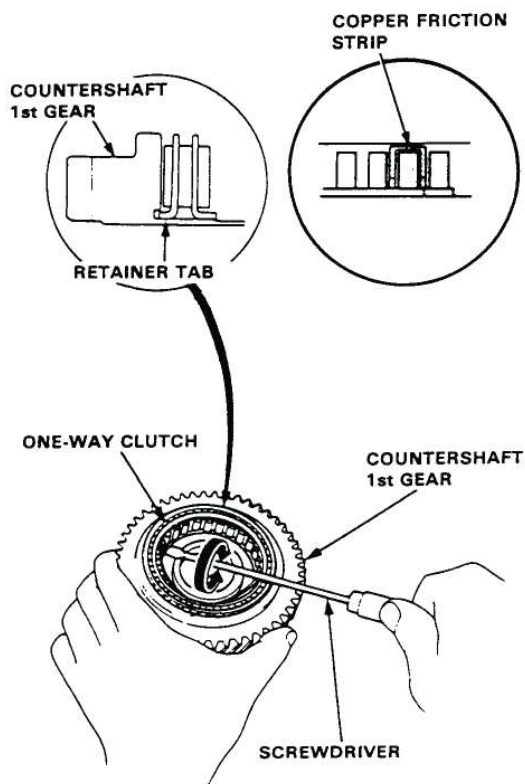


1. Separate the countershaft 1st gear from the parking gear by turning the parking gear in the direction shown.

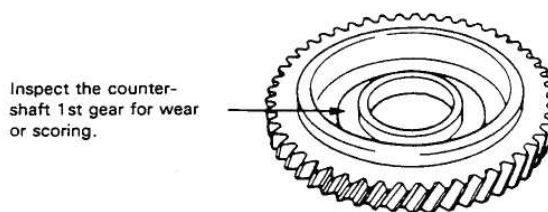
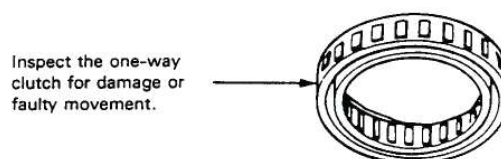
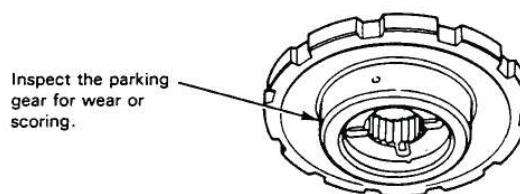


2. Remove the one-way clutch by prying it up with the end of a screwdriver.

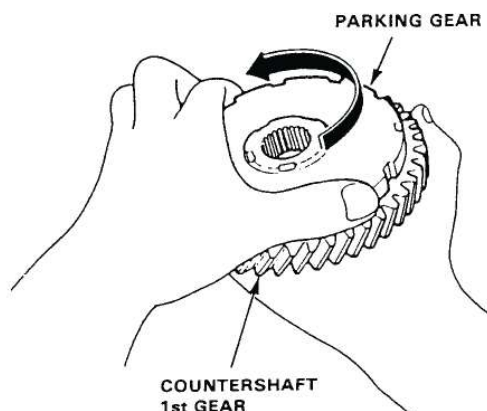
**CAUTION:** Do not pry on the three copper friction strips; if you break a strip, the clutch will not work properly.



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.

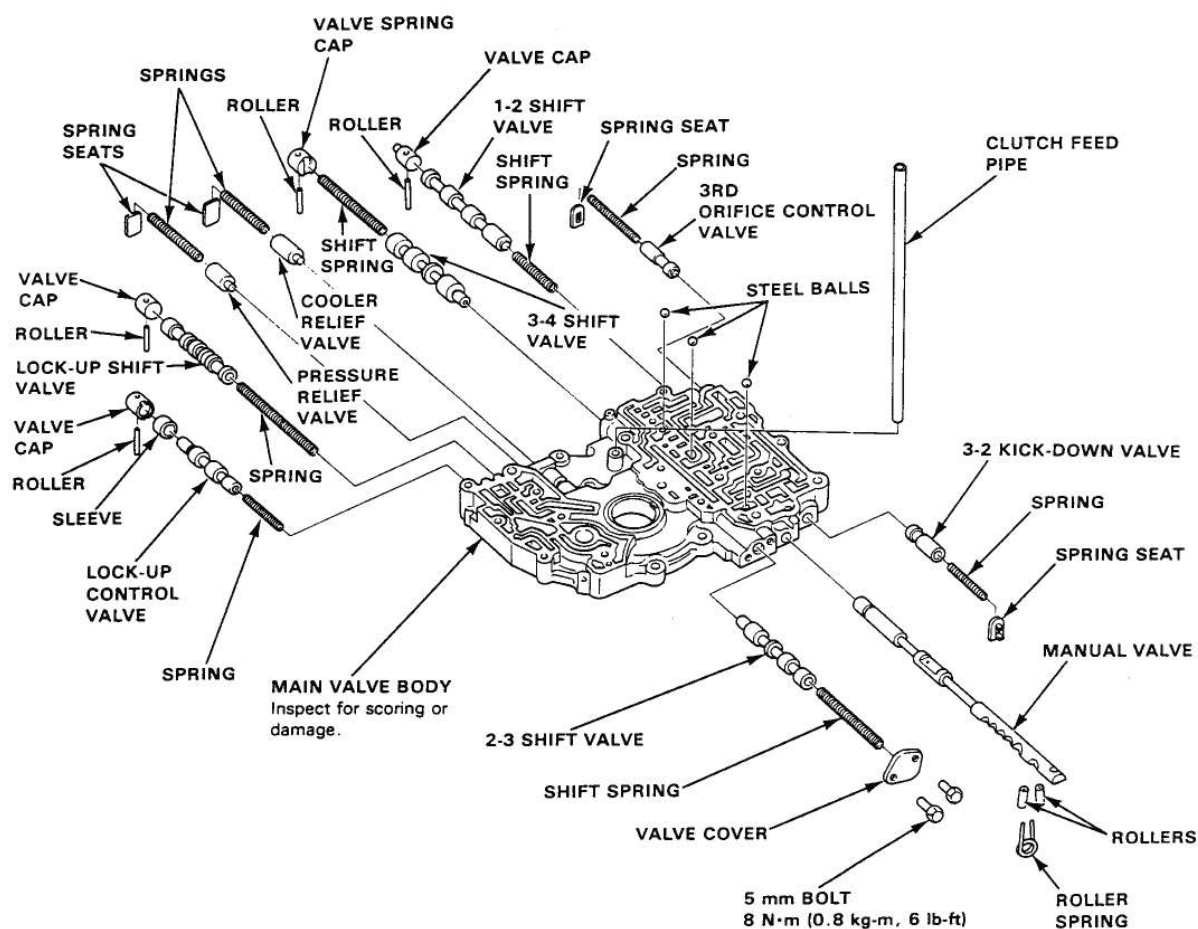




## Technical Service Information

### NOTE:

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

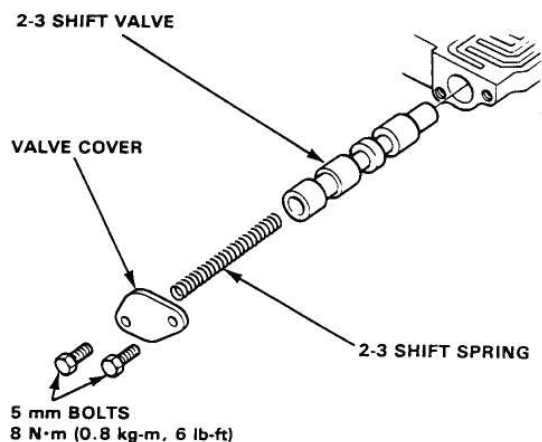




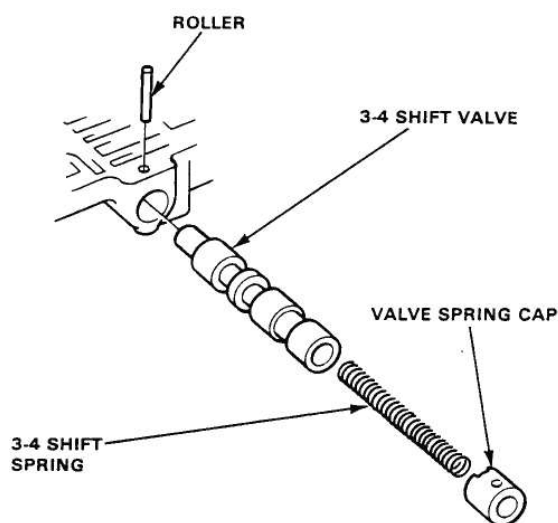
## Technical Service Information

NOTE: Coat all parts with ATF before assembling.

1. Place the shift spring in the shift valve, then slip it into the valve body and install the valve cover.

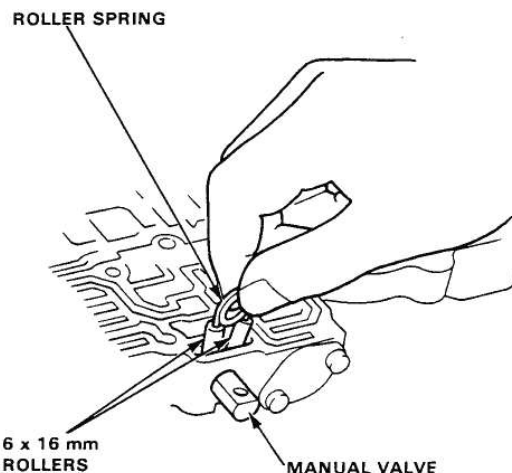


2. Install the 3-4 shift valve, 3-4 shift valve spring and shift cap in the main valve body and secure with the roller.

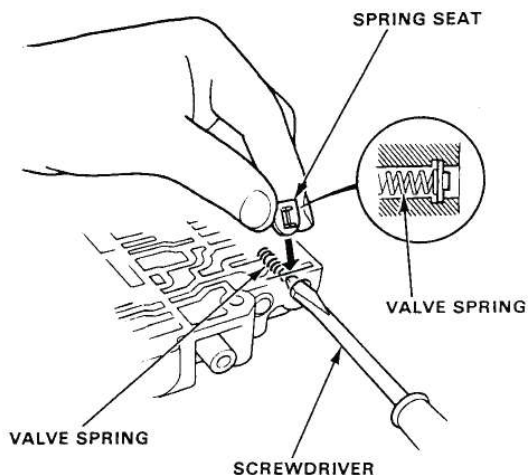


3. Install the 1-2 shift valve, lock-up shift valve and lock-up control valve in the main valve body in the same procedure as for 3-4 shift valve.

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

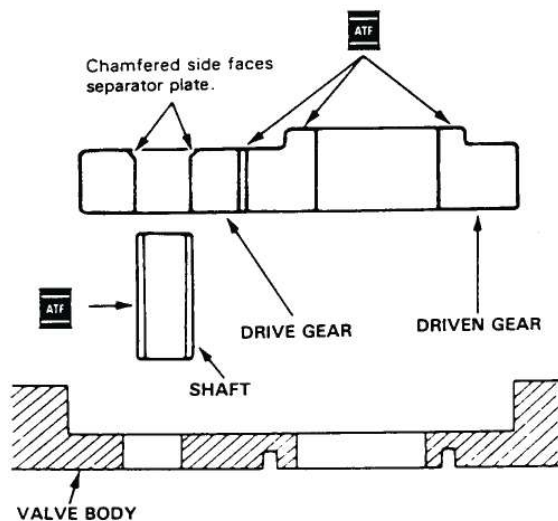


5. Set the kick-down spring in the 3-2 kick-down valve and install it in the main valve body.
6. Push the spring in with a screwdriver, then install the spring seat.



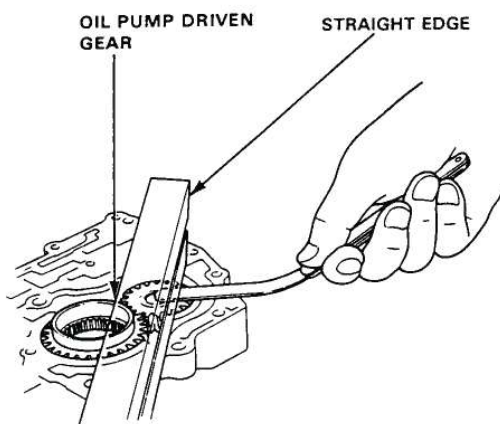
7. Install the orifice control valve, cooler relief valve and relief valve in the main valve body in the same manner described in step 6.

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



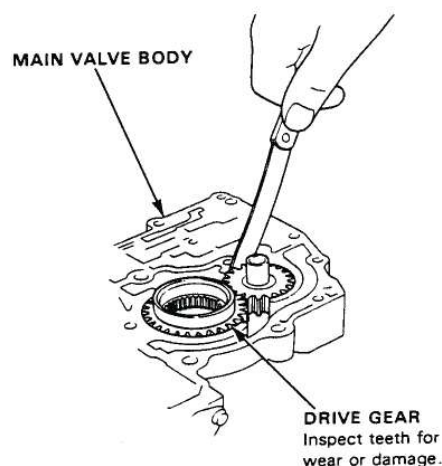
2. Measure the thrust clearance of the driven gear-to-valve body.

**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.)



3. 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 0.210–0.265 mm  
 (diameter) (0.0083–0.0104 in.)  
 Driven gear 0.035–0.063 mm  
 (radius) (0.0014–0.0025 in.)



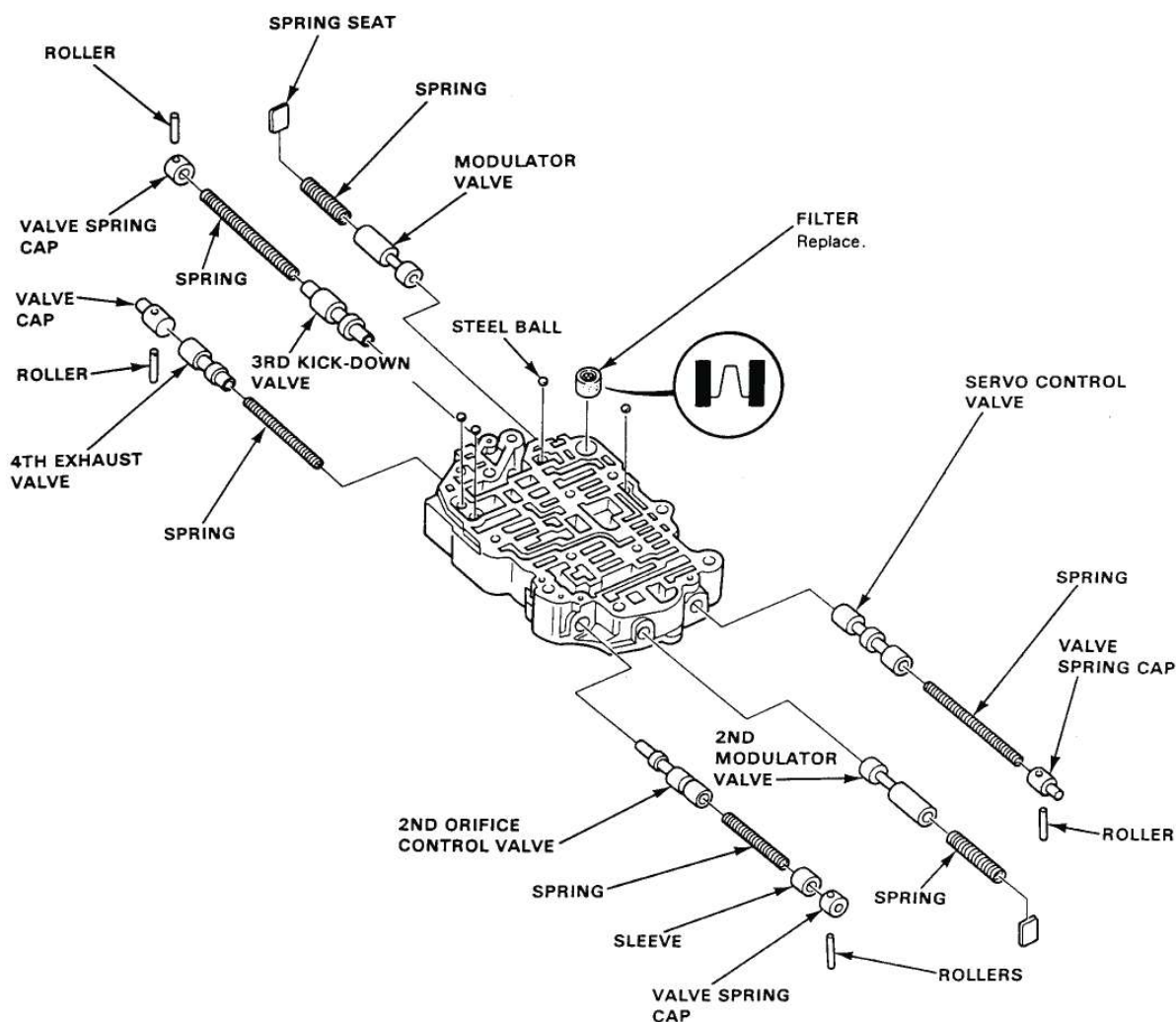




## Technical Service Information

### NOTE:

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



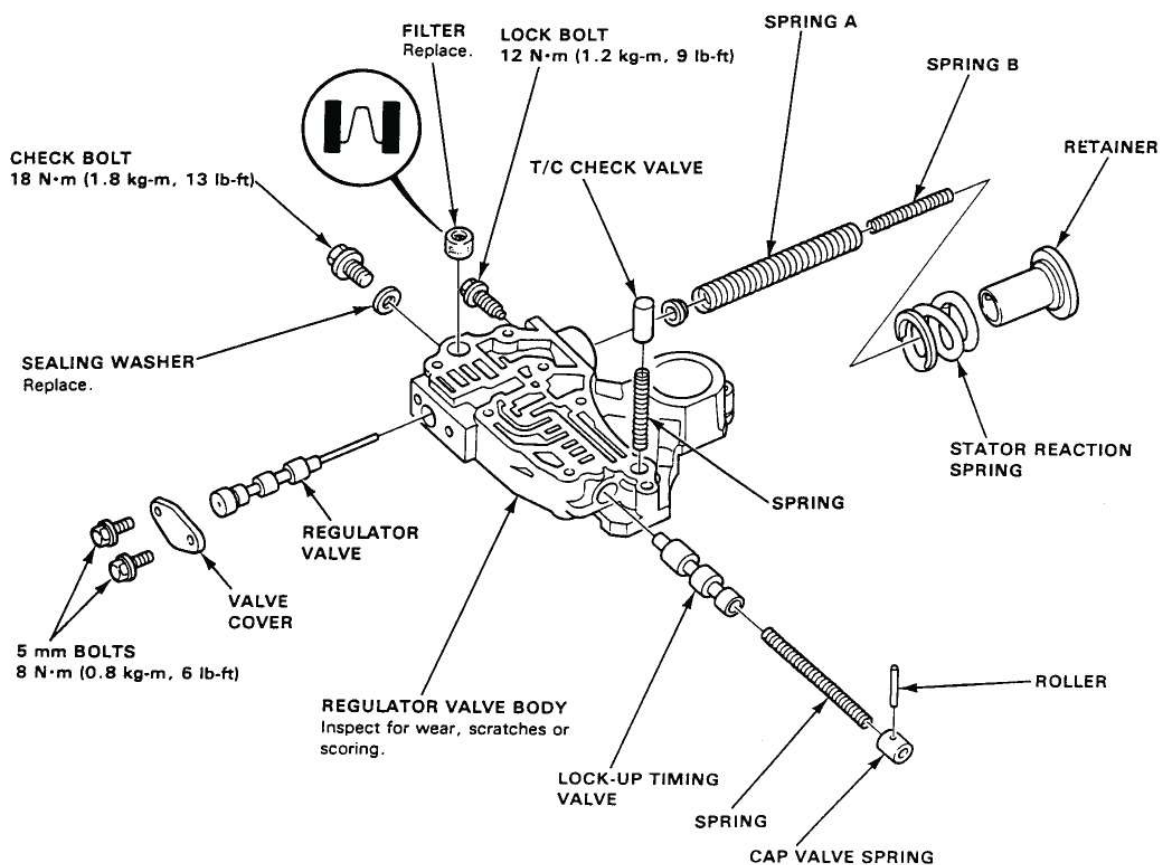


## Technical Service Information

### NOTE:

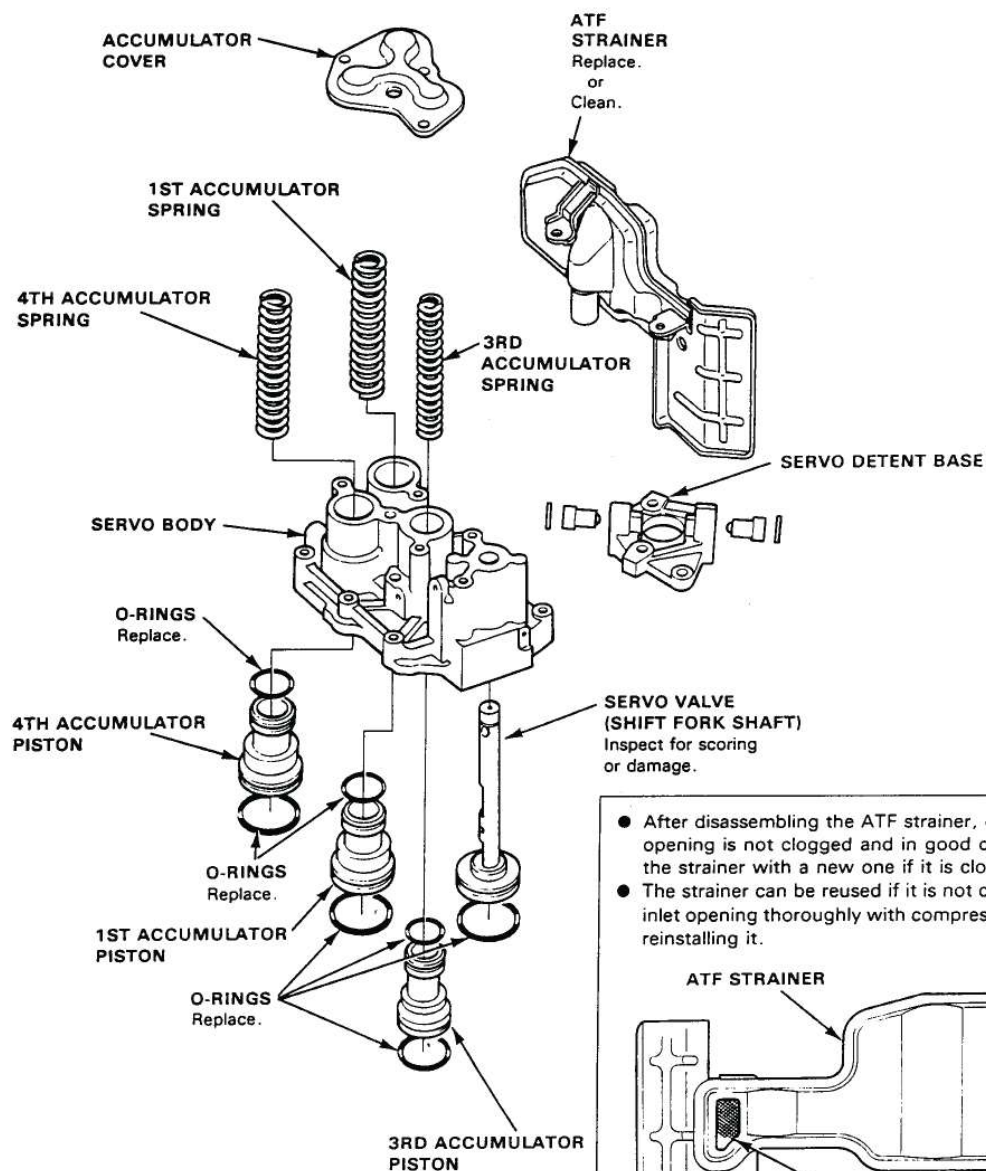
- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as assembly if any parts are worn or damaged.
- Check all valves for free movement; if any fail to slide freely,
- See Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

1. Hold the retainer in place while removing the lock bolt. Once the bolt is removed, release the retainer slowly.
2. Reassembly is in the reverse order of disassembly.  
NOTE: Align the hole in the retainer with the hole in the valve body, then press the retainer into the valve body and tighten the lock bolt.

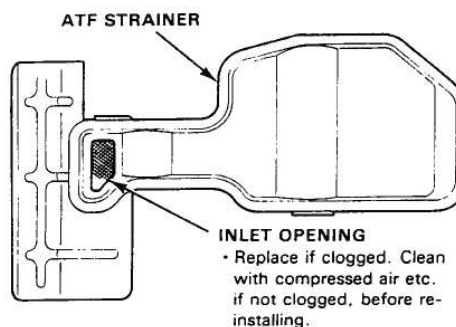


**NOTE:**

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely,
- See Section 3 for spring specifications.



- After disassembling the ATF strainer, check that its inlet opening is not clogged and in good condition. Replace the strainer with a new one if it is clogged.
- The strainer can be reused if it is not clogged. Clean the inlet opening thoroughly with compressed air etc. before reinstalling it.

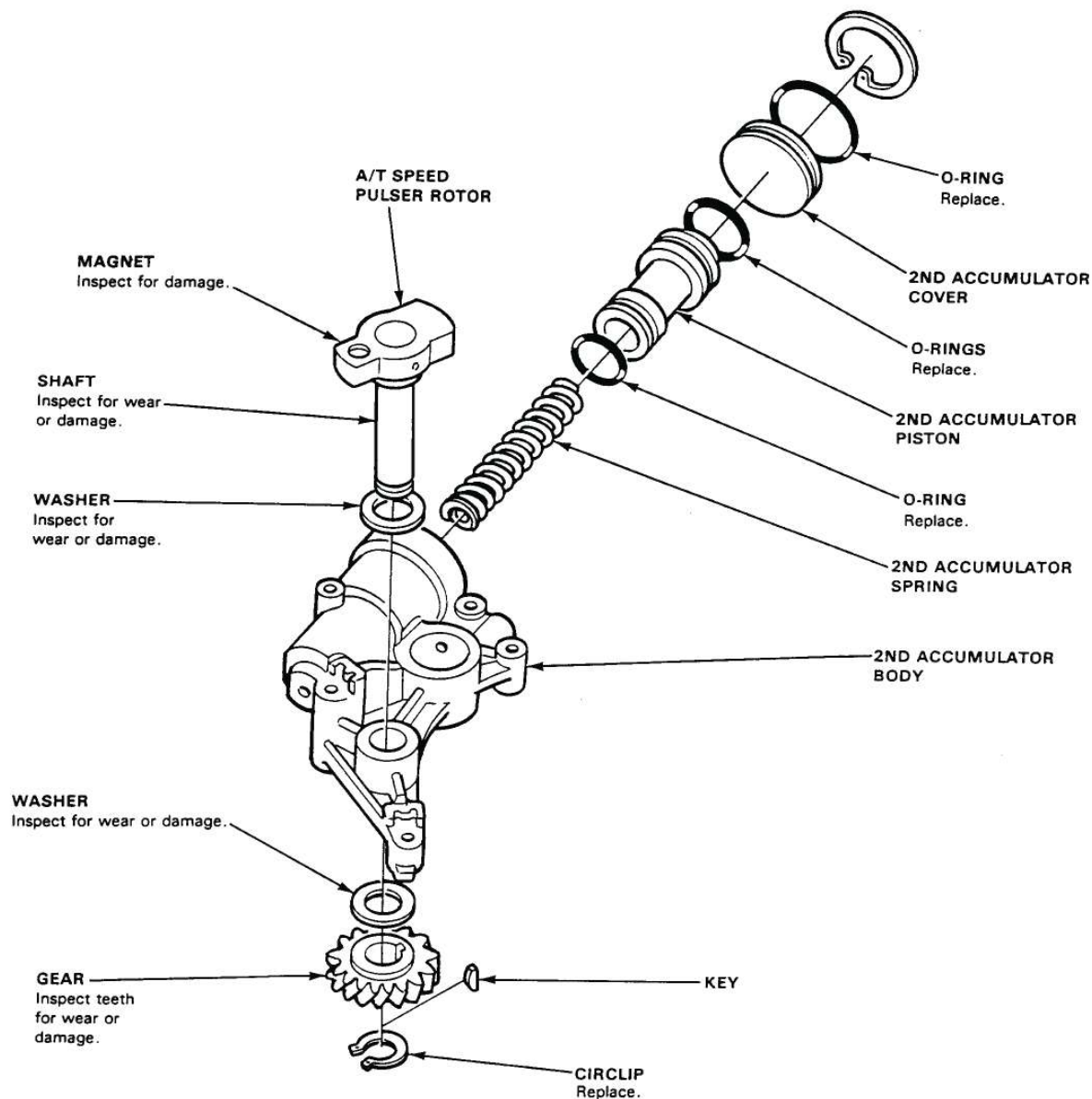




## Technical Service Information

### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely,
- See Section 3 for spring specifications.







## Technical Service Information

**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.

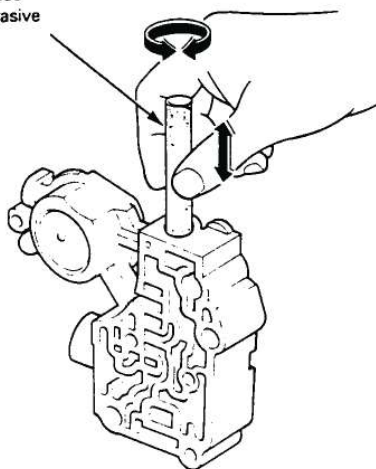
1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

**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.

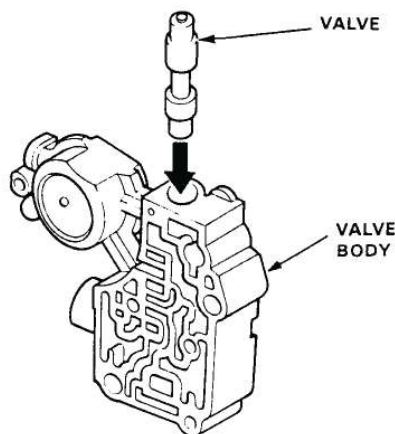
3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly,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



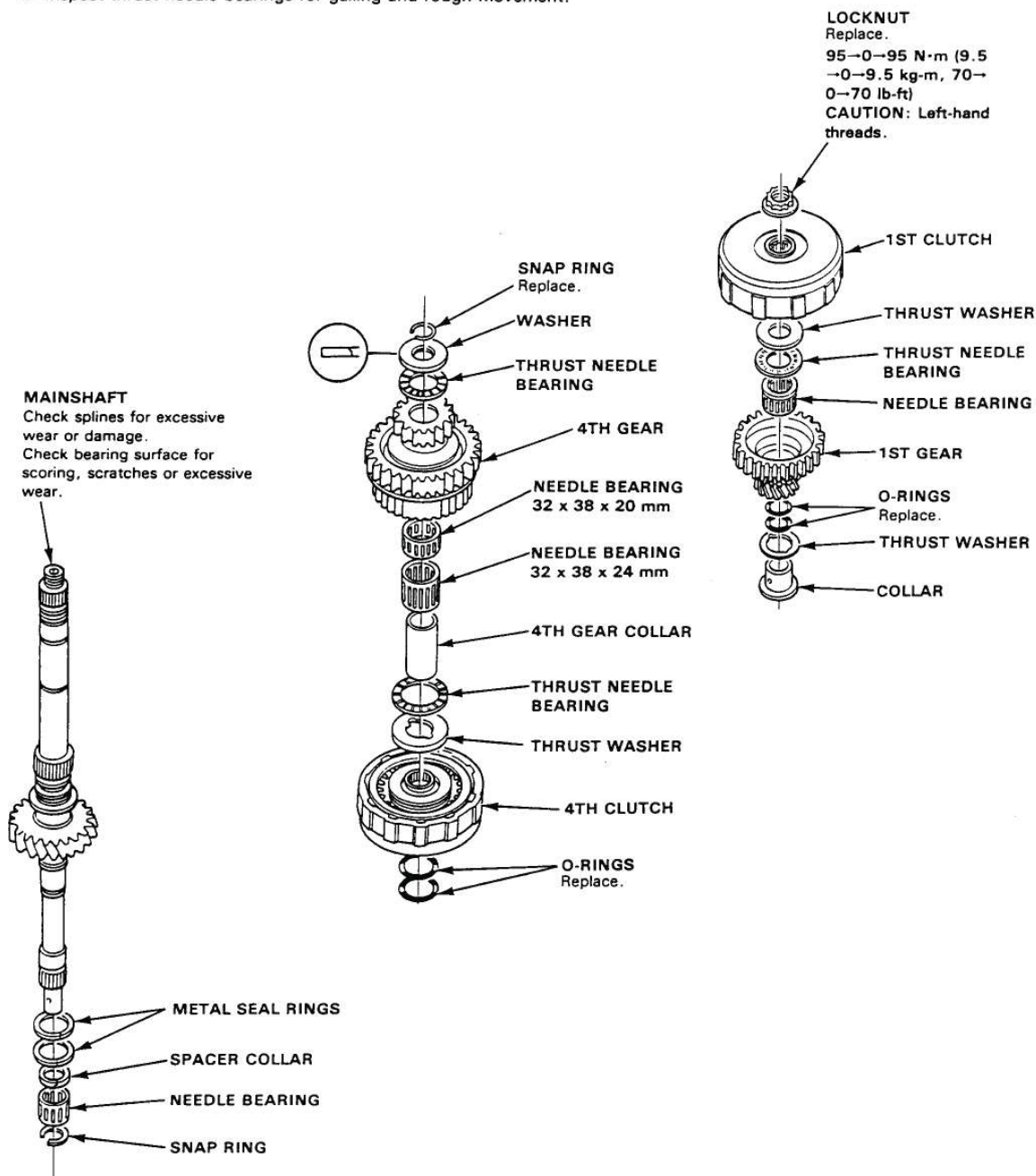
7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.



# Technical Service Information

## NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle bearings for galling and rough movement.

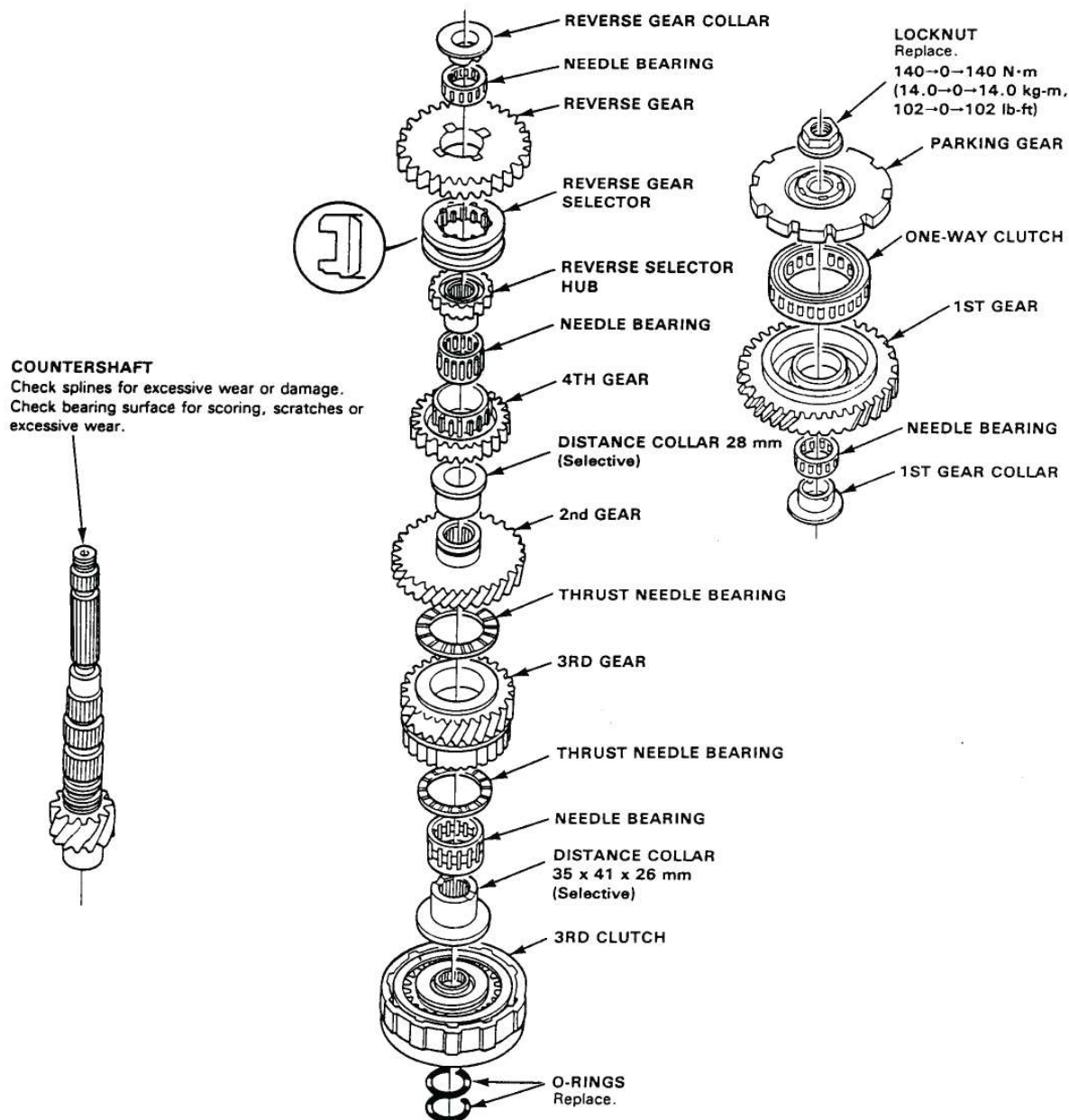




## Technical Service Information

### NOTE:

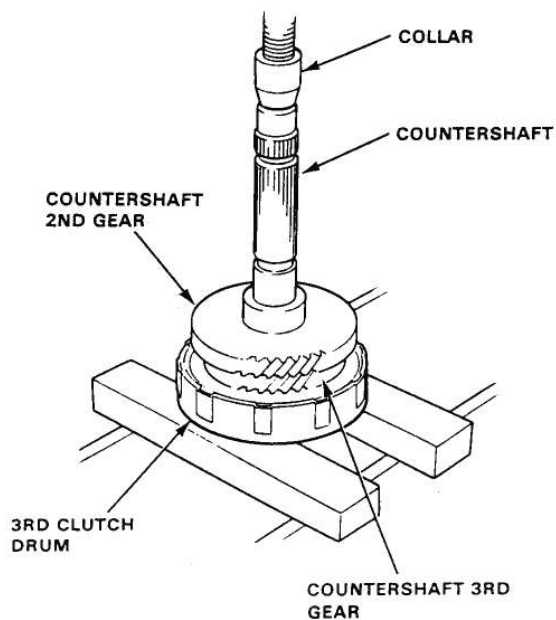
- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle and needle bearings for galling and rough movement.



## Removal

1. Using a hydraulic press, press out the countershaft while supporting the 3rd clutch drum.

NOTE: Place an attachment between the hydraulic press and countershaft to prevent damage to the shaft.

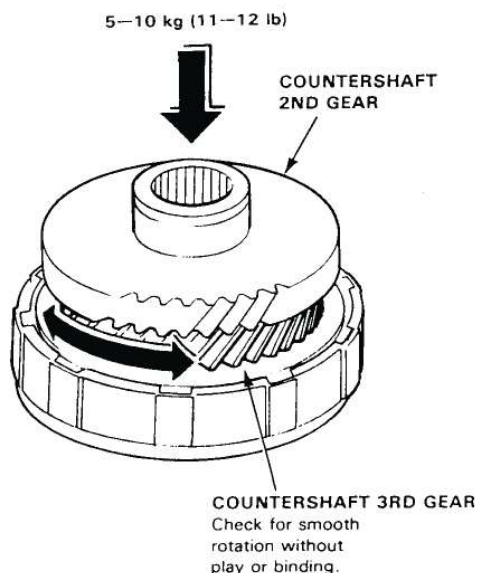
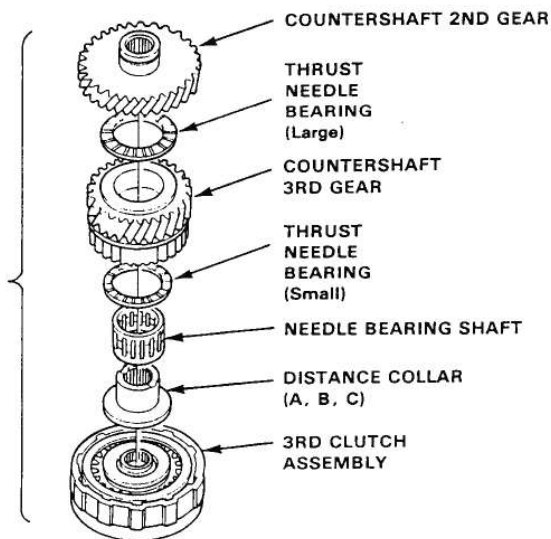
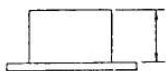




1. Assemble the 3rd clutch assembly, distance collar (A), thrust needle bearing (small), needle bearing, countershaft 3rd gear, thrust needle bearing (large) and countershaft 2nd gear without installing the countershaft.
2. With the 3rd clutch assembly held stationary, hold the countershaft 2nd gear against the 3rd clutch assembly with a force of 5–10 kg (11–12 lb).
3. Spin the countershaft 3rd gear by hand to check for clearances. The clearances are considered normal if it turns freely without binding.
4. If the 3rd gear binds, or turns but sluggishly, the clearances are too small and should be adjusted.
5. Replace the distance collar (A) with (B), and repeat the steps (1) thru (3) above.
6. If the gear still binds, repeat the steps (1) thru (3) again with the distance collar (C) installed.
7. The clearances are excessive if there is play in the shaft direction when you perform the step (3).
8. Check the countershaft 3rd gear, countershaft 2nd gear, distance collar (A), thrust needle bearings (large and small), and needle bearing for wear, and replace any worn parts.

NOTE: After replacing parts, repeat the steps (1) thru (3) with the distance collar (A) installed.

|   | Parts No.     | Collar Width (mm, in) |
|---|---------------|-----------------------|
| A | 90501-PRO-000 | 25.985 (1.0230)       |
| B | 90511-PRO-000 | 26.015 (1.0242)       |
| C | 90512-PRO-000 | 26.045 (1.0254)       |





## Technical Service Information

1. Remove the countershaft bearings from the transmission housing.
2. Assemble the countershaft including bearing and all parts
3. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 30 N·m (3.0 kg-m, 22 lb-ft).



Lubricate all parts with ATF before final reassembly.

4. Hold the selector hub firmly against the countershaft 4th gear, the insert a feeler gauge between the countershaft reverse gear and selector hub to keep the hub in contact with the countershaft 4th gear.
5. Measure the clearance of the countershaft 2nd gear with a Feeler gauge.

| Parts No.     | Thickness (mm, in) |
|---------------|--------------------|
| 90503-PRO-010 | 23.10 (0.9094)     |
| 90504-PRO-010 | 23.15 (0.9114)     |
| 90505-PRO-010 | 23.20 (0.9134)     |
| 90506-PRO-010 | 23.25 (0.9154)     |
| 90507-PRO-010 | 23.30 (0.9173)     |
| 90508-PRO-010 | 23.35 (0.9193)     |
| 90509-PRO-010 | 23.40 (0.9213)     |

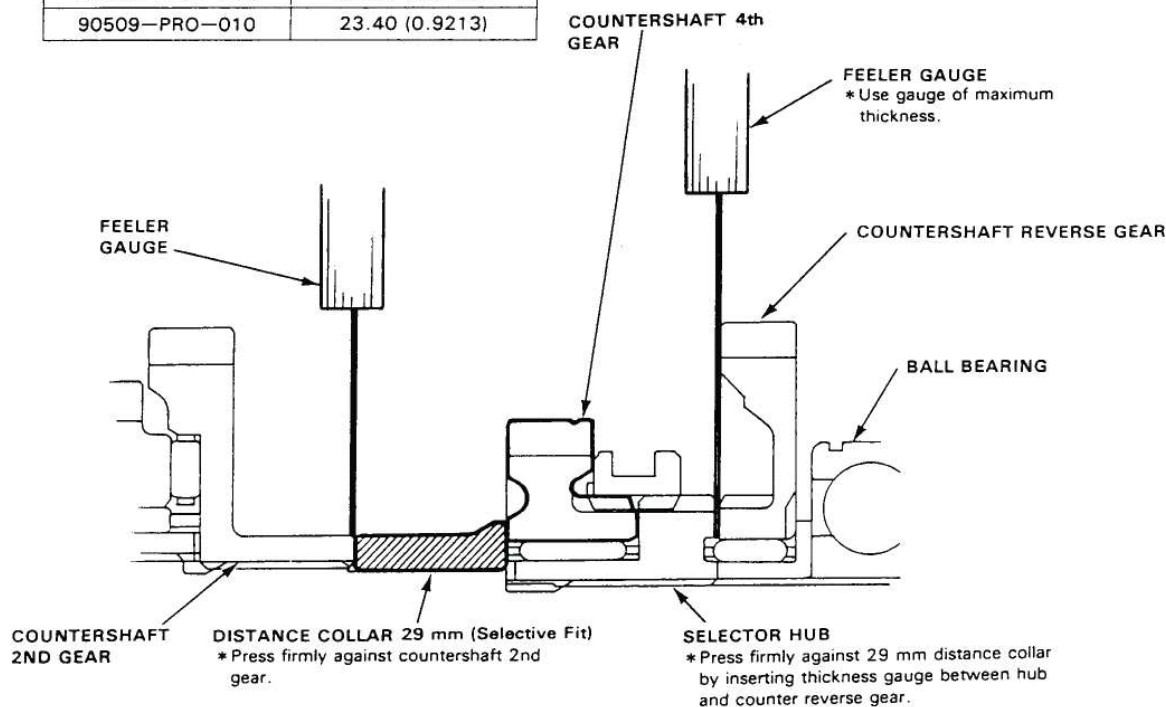
6. Take measurements at least three locations equally. Take the average as the actual gear clearance.

Standard: 0-0.08 mm (0-0.0031 in)

7. If out of specs, measure the length of the distance collar used, then select the one which will bring the clearance within the specified limits.
8. After replacing the distance collar, repeat the steps (4) thru (6) to make sure that the end play is within the specified limits.
9. If the end play still exceeds the service limit even when the shortest distance collar is installed, check the countershaft 2nd gear and distance collar 29 mm for wear, and replace any worn parts.

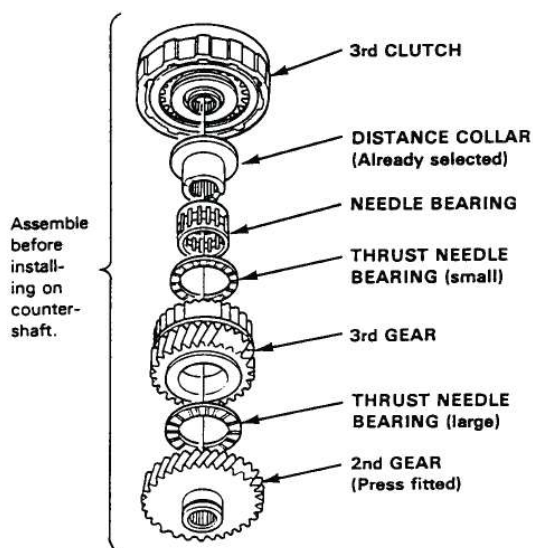
After replacing parts, perform the steps (4) thru (6) to make sure that the clearance is held within the specified values.

NOTE: Measure the length of the old distance collar to determine the required length of new distance collar.



NOTE: Lubricate all parts with ATF during reassembly.

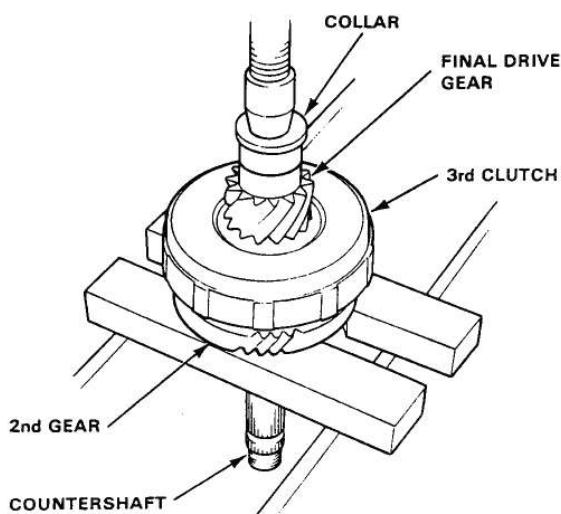
1. Install two new O-rings on the countershaft.  
NOTE: Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.
2. Assemble the 3rd clutch, distance collar (selected), small thrust needle bearing, 3rd gear, large thrust needle bearing, and 2nd gear.
3. Install the above assembly on the countershaft.



4. With the shaft splines aligned with those of the 2nd gear, press the countershaft into the 2nd gear in a hydraulic press.

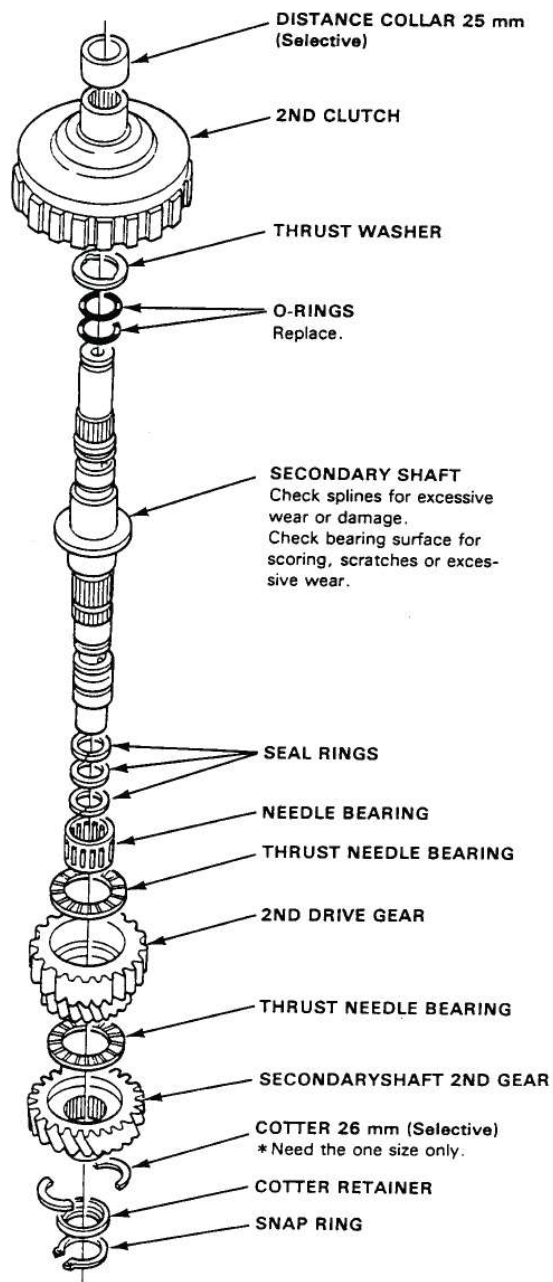
NOTE:

- Also align the shaft splines with those of the 3rd clutch when pressing the countershaft into the 2nd gear.
- Use an old collar between the shaft end and hydraulic press to prevent damage to the countershaft.
- Stop pressing the countershaft when the 3rd clutch contacts the final drive gear.



**NOTE:**

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle and needle bearings for galling and rough movement.





## Removal

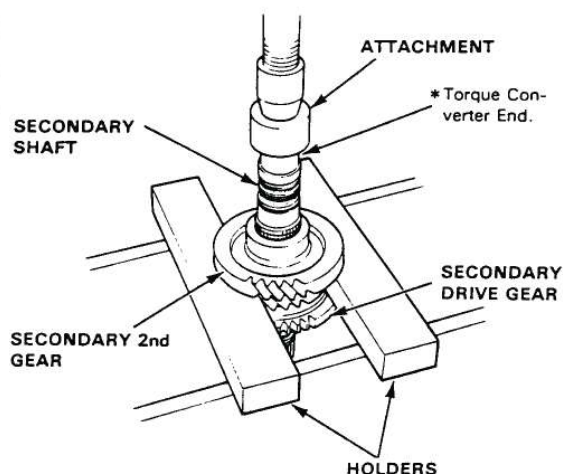
1. Remove the snap ring, cotter retainer and cotter from the secondary shaft.
2. Rest the secondary 2nd gear on a pair of guides as shown.

**CAUTION:** Do not rest the 2nd drive gear on the guides.

3. Press the torque converter end of the secondary shaft down with a hydraulic press until the secondary 2nd gear is clear of the shaft.

**CAUTION:** Be sure to use a pad between the secondary shaft and hydraulic press to prevent damage to the shaft.

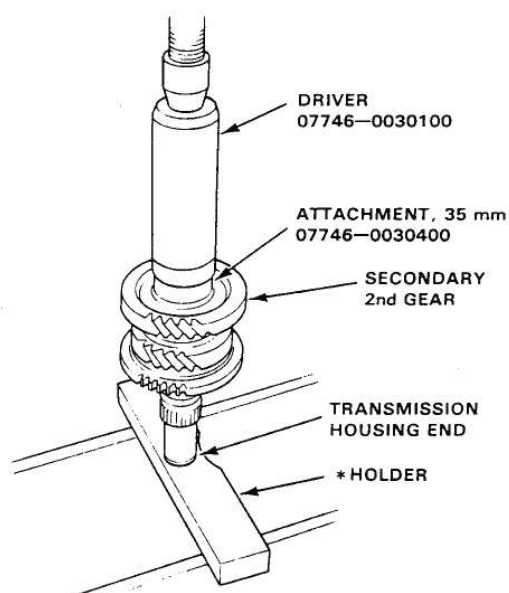
4. Remove the remaining parts.



## Installation

1. Install the needle bearing, thrust needle bearing, 2nd drive gear and thrust needle bearing on the secondary shaft.
2. Install the secondary 2nd gear on the secondary shaft and align their splines.
3. Place the secondary shaft upright on a holder with the transmission end down, then press the secondary gear onto the shaft until bottoms using the Driver and Attachment as shown.

**CAUTION:** Do not use excessive load to install the secondary 2nd gear on the shaft.

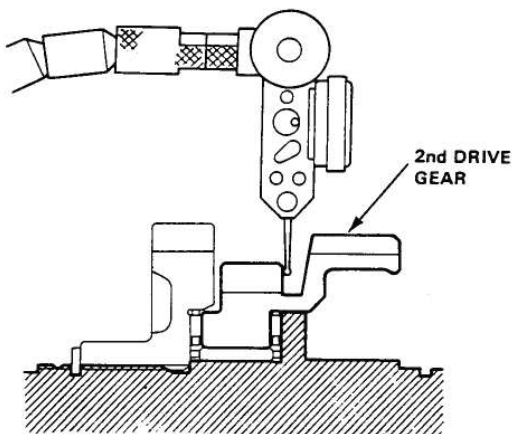


## Axial Clearance

1. Measure 2nd drive gear axial clearance.

**NOTE:** Measure the clearance at three places 120° apart, and take the average as the actual clearance.

**Standard:** 0—0.08 mm (0—0.0031 in.)  
**Service Limit:** 0.10 mm (0.0039 in.)



2. Replace the two needle bearings if any readings are out of tolerance, and recheck the clearance.

**NOTE:** It is recommended to replace the thrust needle bearings if any readings exceed the standard limits.

3. Replace the 2nd drive gear and secondary shaft as a set if the service limits are still exceeded with new thrust needle bearings.
4. Also check that the axial clearance is held within the standard limits (0—0.08 mm (0—0.0031 in.)) if any other parts are replaced.

## Selection

**NOTE:**

- Adjust the 2nd drive gear axial clearance before selecting the cotters.
- Check that the 2nd drive gear is pressed to the shoulder on the secondary shaft fully.

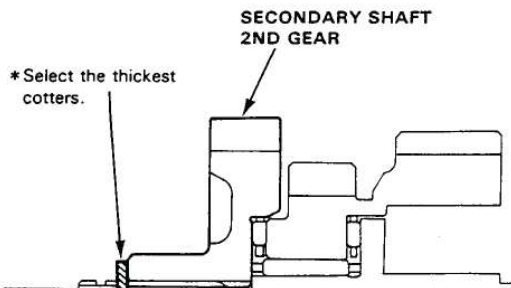
1. Before selecting, measure the thickness of each cotter, and keep them in order.

**CAUTION:** Never use cotters of different thicknesses on a shaft.

| Part No.      | Thickness (mm, in) |
|---------------|--------------------|
| 90428—PRO—000 | 2.00 (0.0787)      |
| 90429—PRO—000 | 2.03 (0.0799)      |
| 90430—PRO—000 | 2.06 (0.0811)      |
| 90431—PRO—010 | 2.09 (0.0823)      |

2. Select the two cotters which are thickest for the grooves in the shaft starting with the thickest cotters measured.

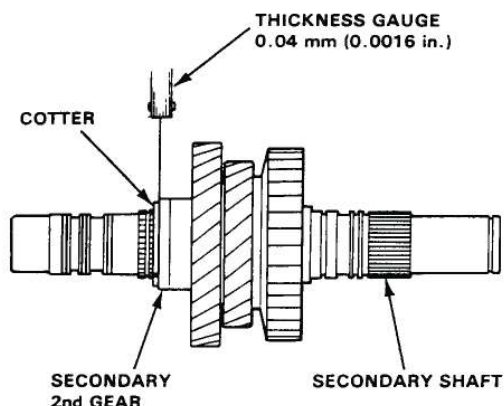
Seat the selected cotters in the groove properly.



(cont'd)

3. Measure the clearance between the secondary 2nd gear and cotter using a 0.04 mm (0.0016 in.) feeler gauge.

**Standard:** 0–0.04 mm (0–0.0016 in.)  
**Service Limit:** 0.06 mm (0.0024 in.)



4. The clearance should be rechecked with a 0.06 mm (0.0024 in.) feeler gauge if the 0.04 mm (0.0016 in.) gauge goes in.
5. The clearance is out of tolerance if the 0.06 mm (0.0024 in.) gauge goes in.
6. Remove the cotters and select cotters which will bring the clearance within tolerance.

**NOTE:** It is recommended to adjust the clearance if it exceeds 0.04 mm (0.0016 in.).

1. Assemble the secondary shaft assembly (page 14-105).
2. Select and install the shortest distance collar 25 mm (standard).

| Part No.      | Collar Width (mm, in) |
|---------------|-----------------------|
| 90520–PRO–000 | 16.85 (0.6634)        |
| 90521–PRO–000 | 16.90 (0.6654)        |
| 90522–PRO–000 | 16.95 (0.6673)        |
| 90513–PRO–000 | 17.00 (0.6693)        |
| 90514–PRO–000 | 17.05 (0.6713)        |
| 90515–PRO–000 | 17.10 (0.6732)        |
| 90516–PRO–000 | 17.15 (0.6752)        |
| 90517–PRO–000 | 17.20 (0.6772)        |
| 90518–PRO–000 | 17.25 (0.6791)        |
| 90519–PRO–000 | 17.30 (0.6811)        |

3. Install the secondary shaft assembly in the torque converter housing.

**NOTE:** It is not necessary to install the countershaft, mainshaft, etc. at this time.

4. Place a new packing on the torque converter housing, and install the transmission housing.

**NOTE:** Check that all shafts and gearings in the torque converter and transmission rotate freely without binding.



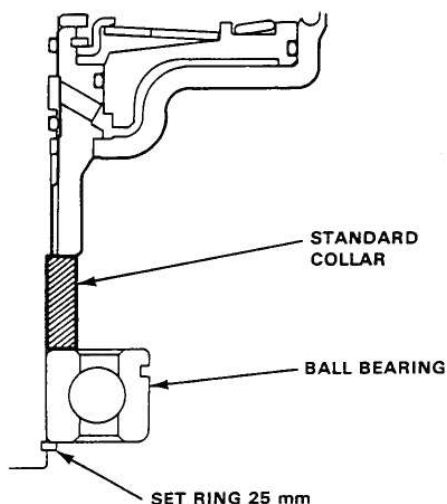
## Technical Service Information

5. Install 4–5 bolts around the secondary shaft and tighten them to the specified torque.

**Specified torque:** 55 N·m (5.5 kg-m, 40 lb-ft)

6. Install the set ring 25 mm.
7. Place the transmission upside down.
8. Measure the clearance between the set ring 25 mm and secondary shaft ball bearing.

**Standard:** 0–0.06 mm (0–0.0024 in.)  
**Service Limit:** 0.08 mm (0.0031 in.)



9. Calculate the required thickness of the collar using the following formula:

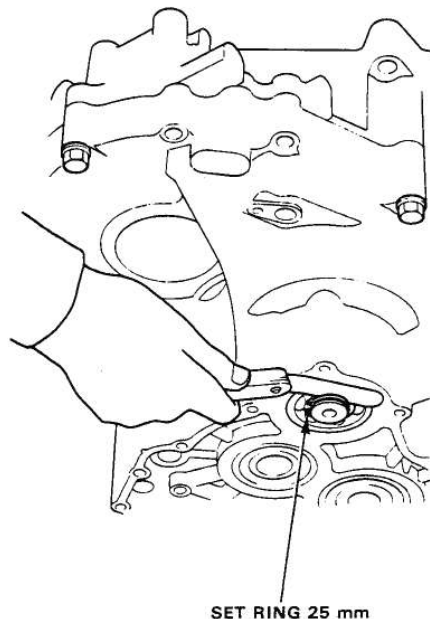
(Clearance measured) – (Standard (0–0.06 mm (0–0.0024 in.)) + (width of standard collar) = Thickness of collar required

(Example)

$$\begin{aligned} (0.12 \text{ mm}) - (0 \text{ mm}) + (16.99 \text{ mm}) &= (17.11 \text{ mm}) \\ (0.12 \text{ mm}) - (0.06 \text{ mm}) + (16.99 \text{ mm}) &= (17.05 \text{ mm}) \\ (17.05 - 17.11 \text{ mm}) &= (17.07 - 17.10 \text{ mm}) \text{ Collar} \end{aligned}$$

10. Replace the existing collar with the collar selected, and repeat the step 3 thru 8.

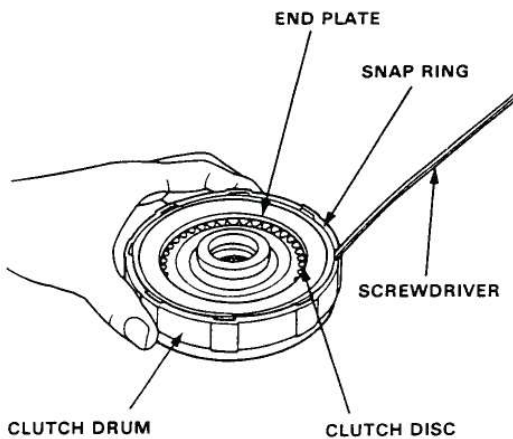
Check that the clearance is below 0.06 mm (0.0024 in.).





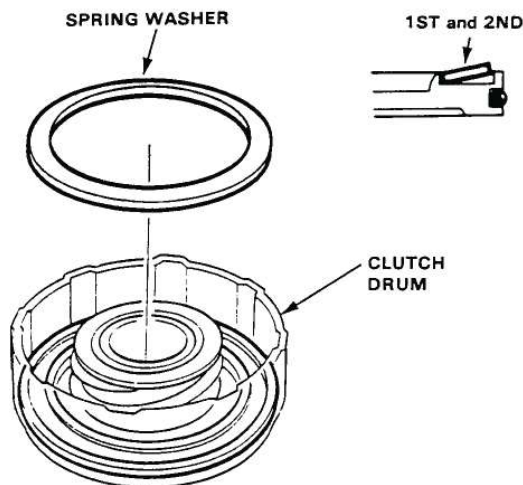
## 1. All clutches

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



## 2. 1st and 2nd clutch only

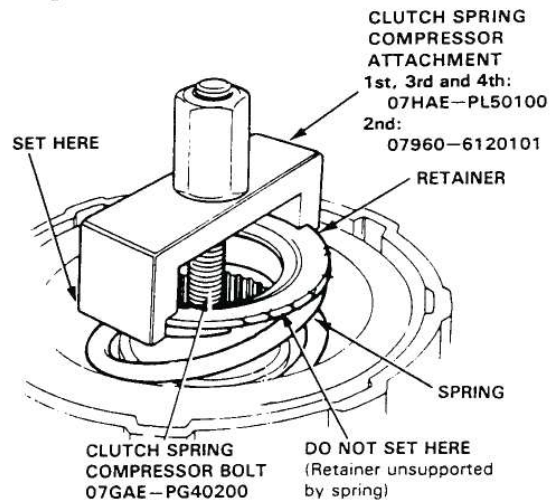
- 1. Remove the spring washer.



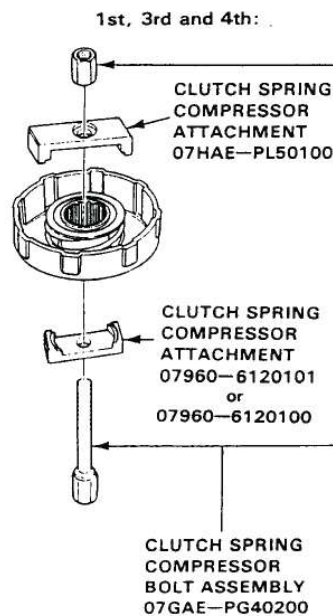
NOTE: Steps 3 thru 7 are for all clutches.

- 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.



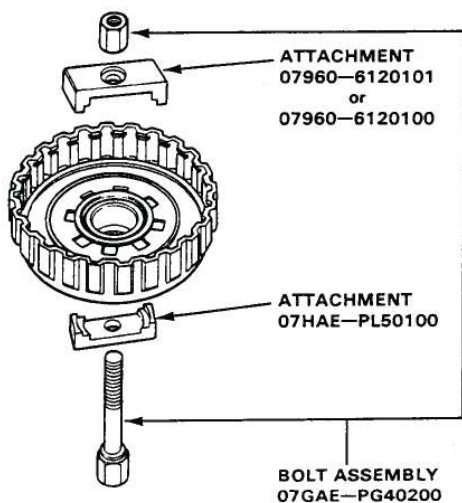
## 4.



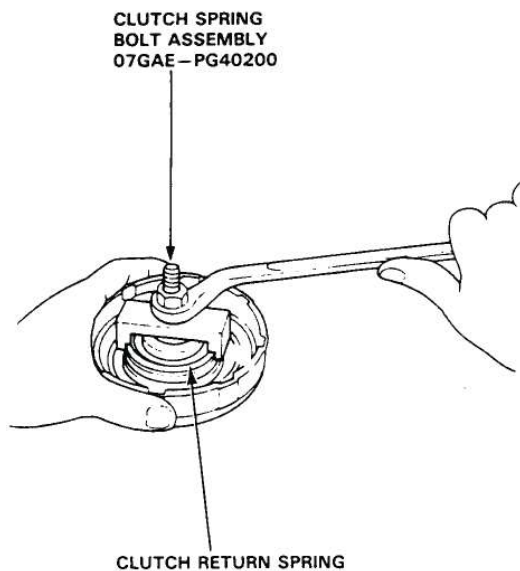


## Technical Service Information

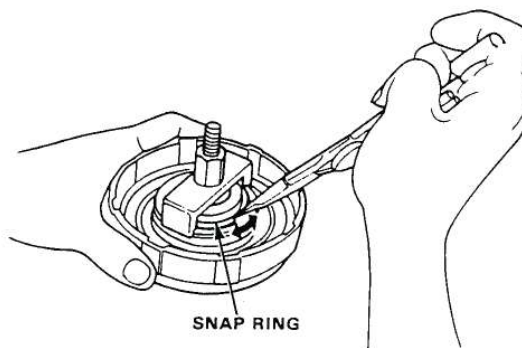
2nd:



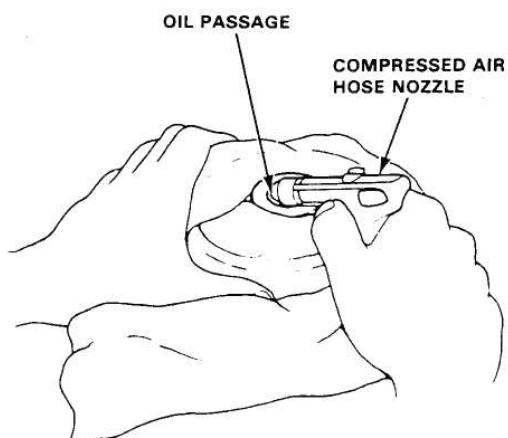
5. Compress the clutch return spring.



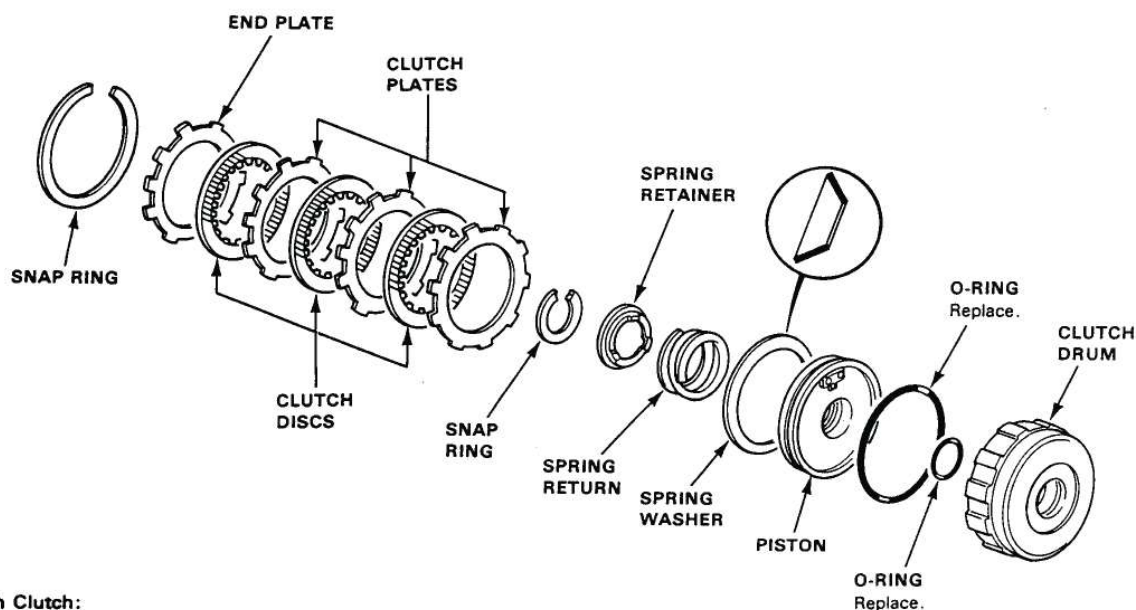
6. Remove the snap ring. Then remove the special tool, spring retainer and spring.



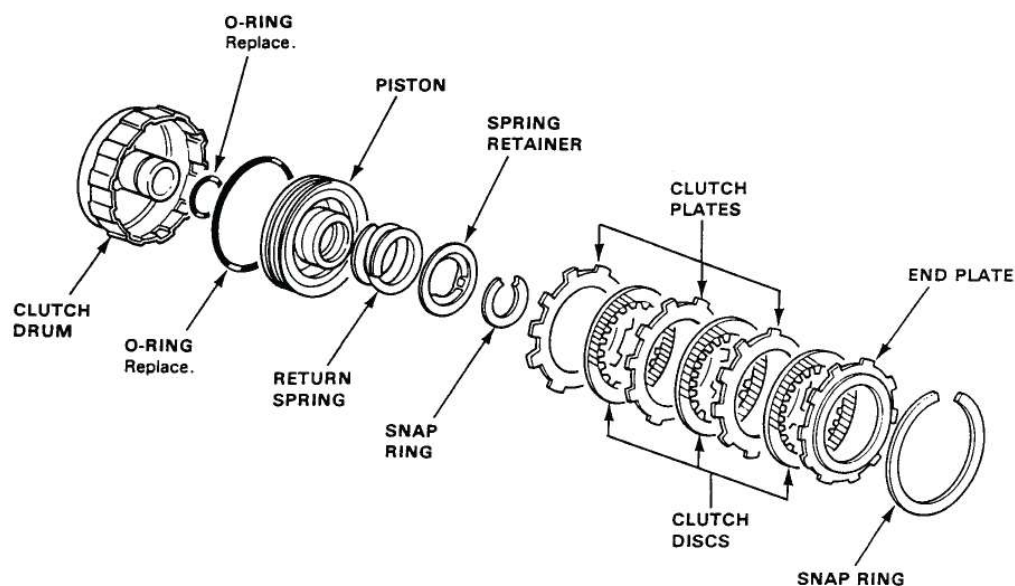
7. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



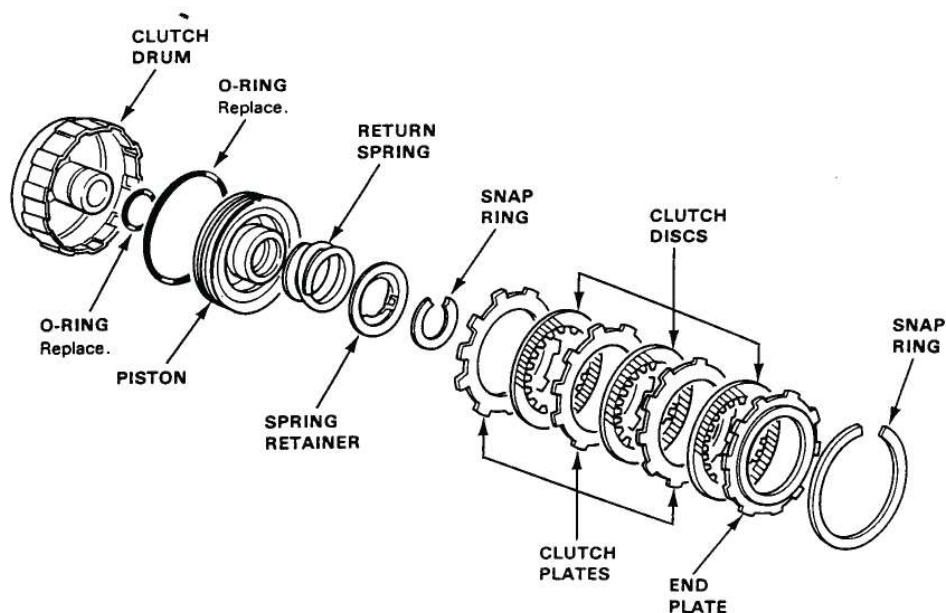
## 1st Clutch:



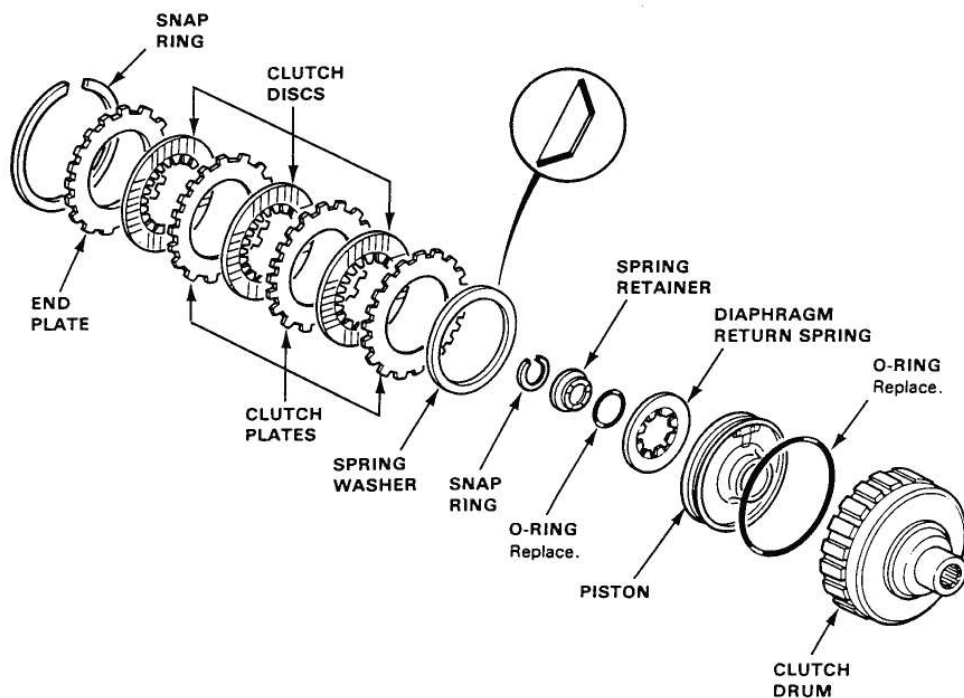
## 4th Clutch:



## 3rd Clutch:



## 2nd Clutch:



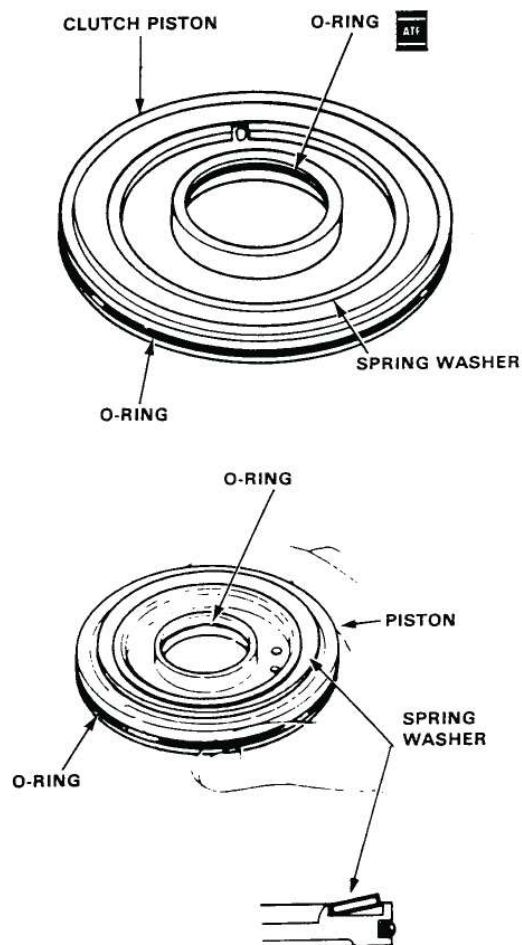


**NOTE:**

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

1. 3rd and 4th clutch.

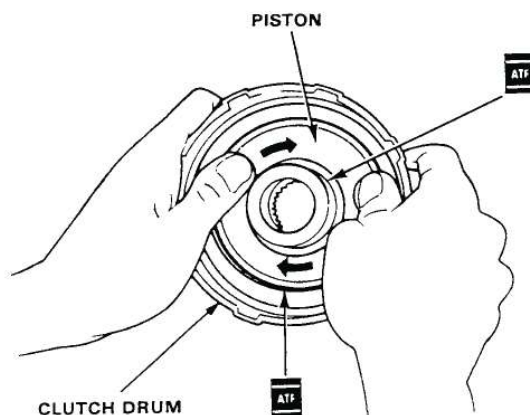
- 1. Install a new O-ring on the clutch piston. Be sure that the disc spring is securely staked.



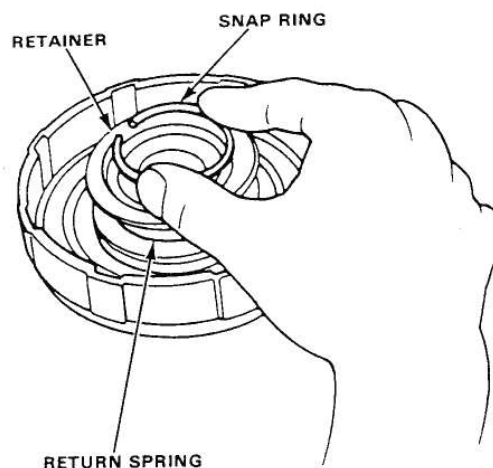
- 2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

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

**CAUTION:** Do not pinch O-ring by installing the piston with force.

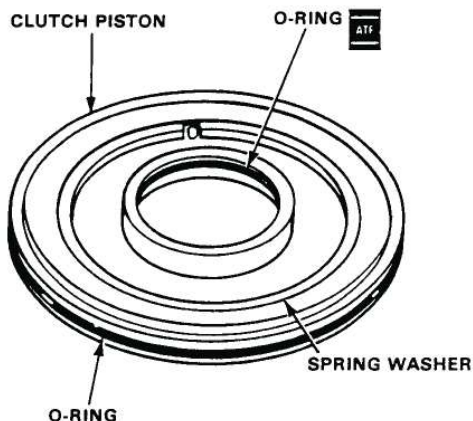


- 3. Install the return spring and retainer.
- 4. Position the snap ring on the spring retainer.



## 2. 1st and 2nd clutch.

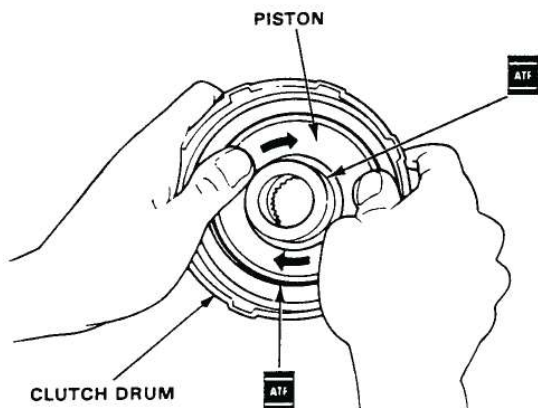
- 1. Install new O-ring on the clutch piston.



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

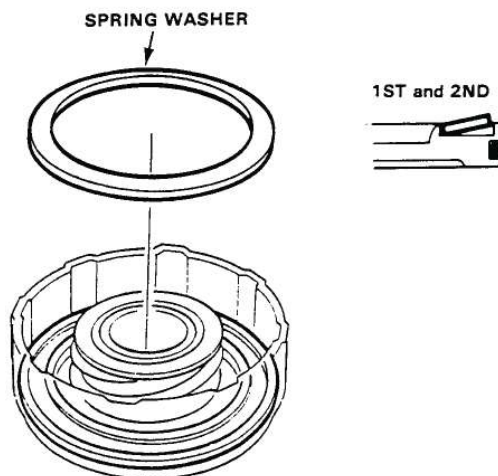
NOTE: Lubricate the piston O-ring with ATF before installing.

CAUTION: Do not pinch O-ring by installing the piston with force.

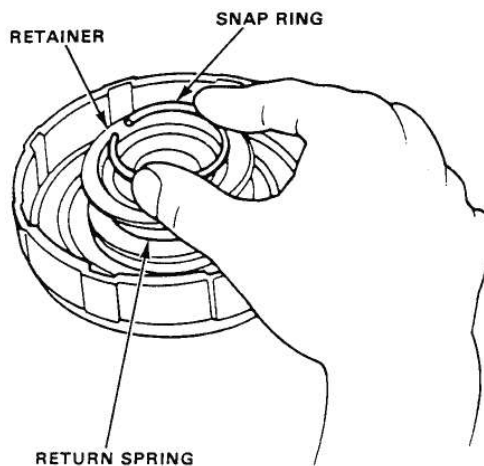


- 3. Install the spring washer.

NOTE: Note the spring washer direction.



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

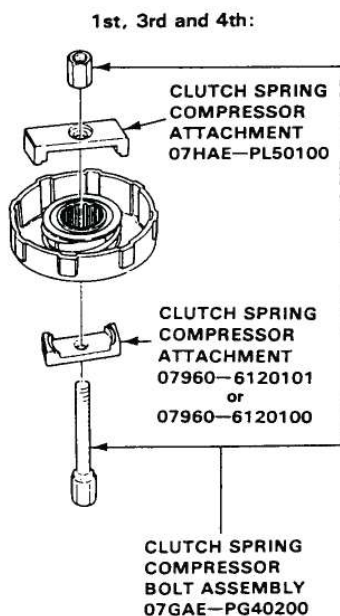
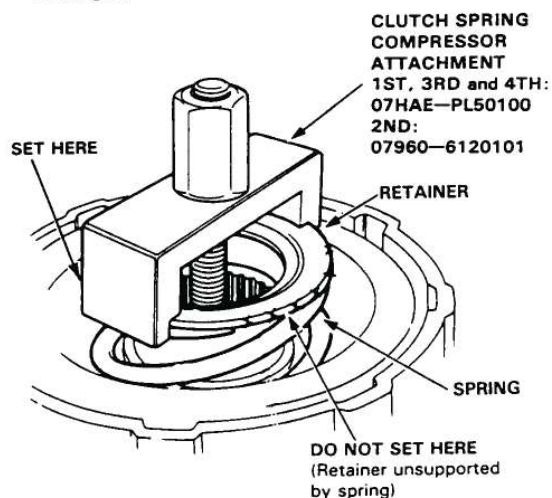


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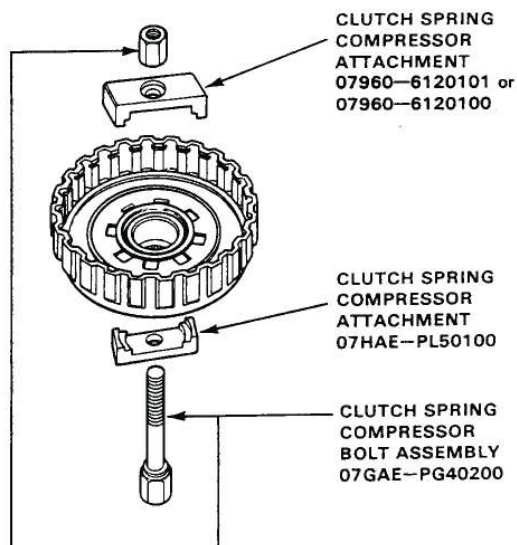
NOTE: Step 3 thru 12 are for all clutches.

3. Install the special tools on the clutch drum and compress the clutch return spring.

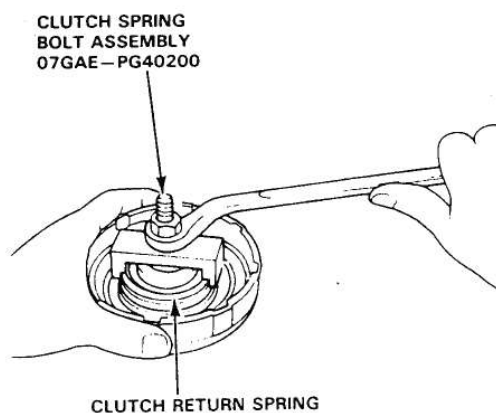
**CAUTION:** If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.



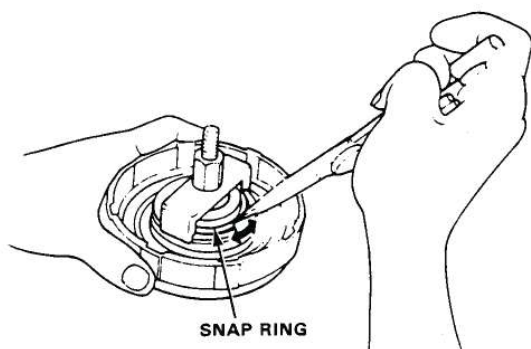
2nd:



4. Compress the clutch return spring.

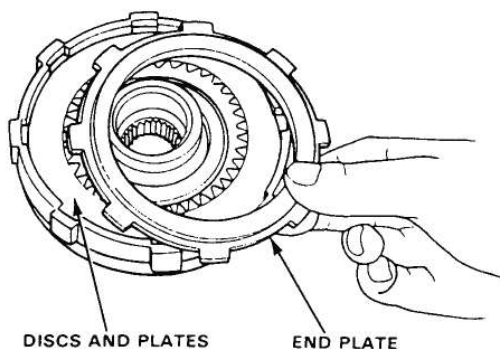


5. Install the snap ring.
6. Remove the special tools.

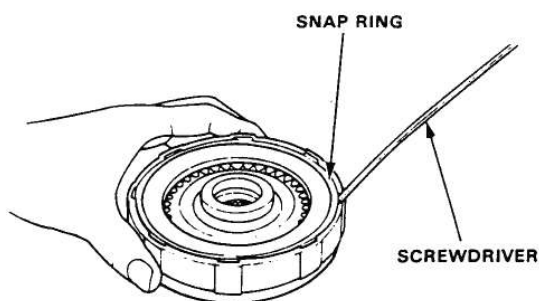


7. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.
8. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the side.

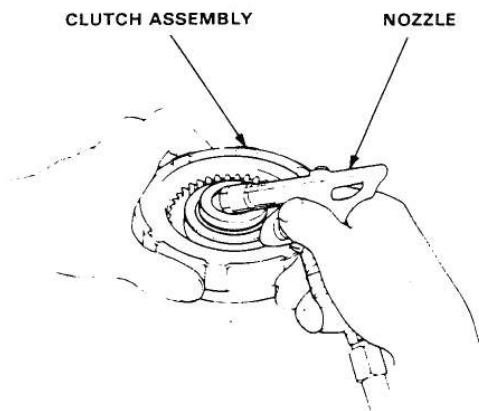
**NOTE:** Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt or other foreign matter.



9. Install the snap ring.



10. 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.



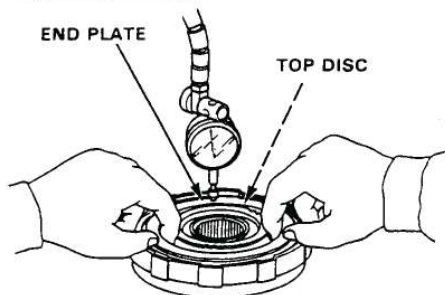


11. Measure the clearance between the clutch end plate and top disc with a dial indicator. Zero the dial indicator with the clutch end plate lowered and lift it up to the snap ring. Distance where the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE: Measure at three locations.

## End Plate-to-Top Disc Clearance:

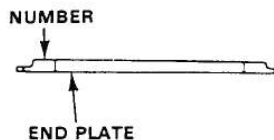
|     | Service Limit |                   |
|-----|---------------|-------------------|
| 1st | 0.65–0.85 mm  | (0.026–0.033 in.) |
| 2nd | 0.50–0.70 mm  | (0.020–0.028 in.) |
| 3rd | 0.40–0.60 mm  | (0.016–0.024 in.) |
| 4th | 0.40–0.60 mm  | (0.016–0.024 in.) |



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

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

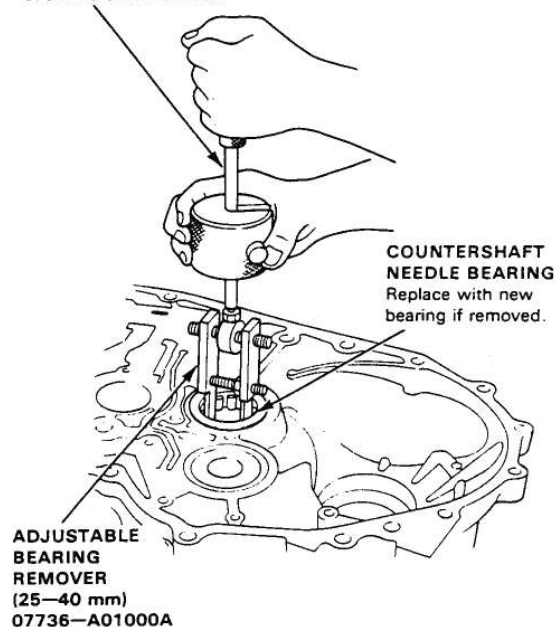
|                  | P/N           | PLATE NO. | THICKNESS mm (in.) |
|------------------|---------------|-----------|--------------------|
| 1st, 3rd and 4th | 22551–PF4–000 | 1         | 2.1 (0.082)        |
|                  | 22552–PF4–000 | 2         | 2.2 (0.086)        |
|                  | 22553–PF4–000 | 3         | 2.3 (0.090)        |
|                  | 22554–PF4–000 | 4         | 2.4 (0.094)        |
|                  | 22555–PF4–000 | 5         | 2.5 (0.098)        |
|                  | 22556–PF4–000 | 6         | 2.6 (0.102)        |
|                  | 22557–PF4–000 | 7         | 2.7 (0.106)        |
|                  | 22558–PF4–000 | 8         | 2.8 (0.110)        |
|                  | 22559–PF4–000 | 9         | 2.9 (0.114)        |
|                  | 22560–PF4–000 | 10        | 3.0 (0.118)        |
|                  | 22561–PF4–000 | 11        | 3.1 (0.122)        |
|                  | 22562–PF4–000 | 12        | 3.2 (0.126)        |
|                  | 22563–PF4–000 | 13        | 3.3 (0.130)        |
|                  | 22564–PF4–000 | 14        | 3.4 (0.134)        |
| 2nd only         | 22631–PRO–013 | 1         | 3.1 (0.122)        |
|                  | 22632–PRO–013 | 2         | 3.2 (0.126)        |
|                  | 22633–PRO–013 | 3         | 3.3 (0.130)        |
|                  | 22634–PRO–013 | 4         | 3.4 (0.134)        |
|                  | 22635–PRO–013 | No mark   | 3.5 (0.138)        |
|                  | 22636–PRO–013 | 6         | 3.6 (0.142)        |
|                  | 22637–PRO–013 | 7         | 3.7 (0.146)        |
|                  | 22638–PRO–013 | 8         | 3.8 (0.150)        |
|                  | 22639–PRO–013 | 9         | 3.9 (0.154)        |



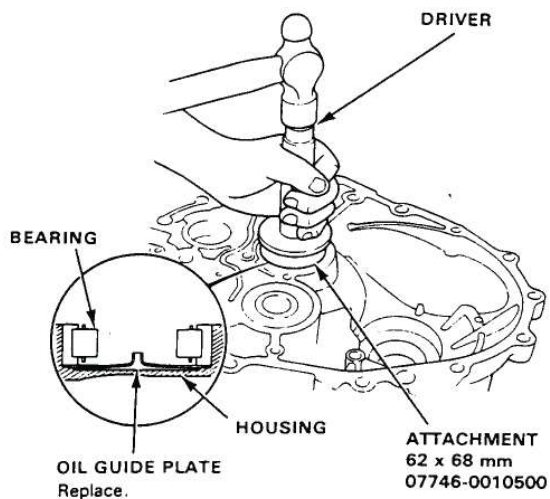
## Replacement

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

Commercially Available  
3/8 x 16 slide Hammer.

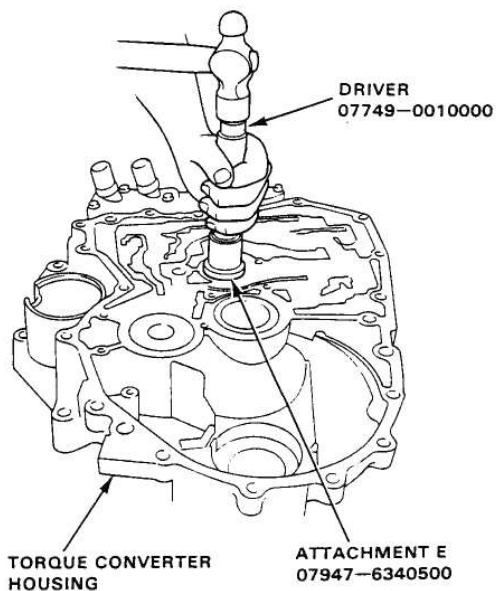


4. Drive the new bearing into the housing using the special tools.

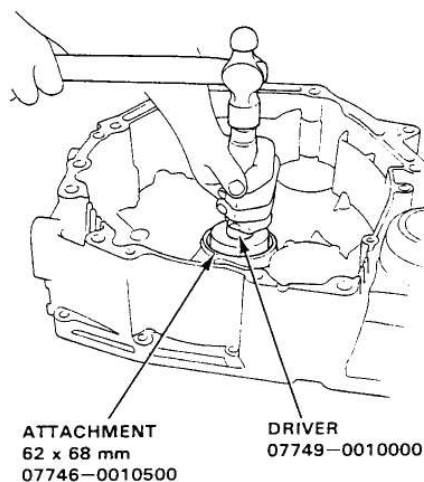


## Replacement

1. Drive out the mainshaft bearing and oil seal using the special tools.



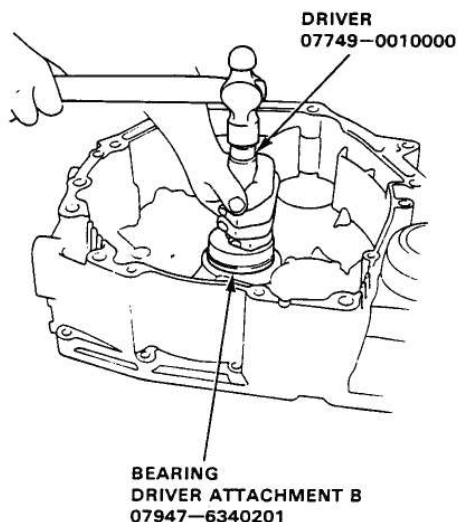
2. Drive in the new mainshaft bearing until it bottoms in the housing, using the special tools.



(cont'd)

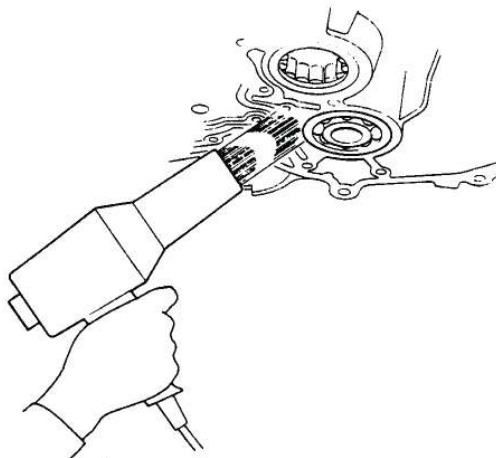
## Replacement (cont'd)

3. Install the oil seal flush with the housing using the special tools.

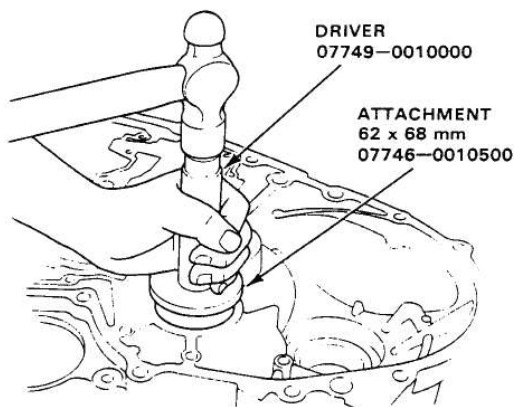


## Replacement

1. Remove the secondary shaft bearing. By heating the torque converter housing to 100°C (212°F) with a heat gun turn the heating outer race top on the mark side of the bearing area.  
**CAUTION:** Do not heat the housing in excess of 100°C (212°F).



2. Drive the new bearing flush with the housing using the special tools.



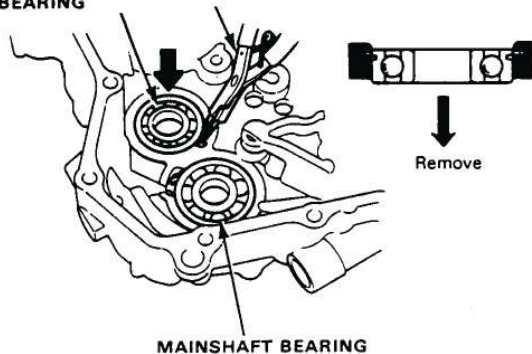


## Technical Service Information

1. To remove the mainshaft, countershaft and secondary shaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out.

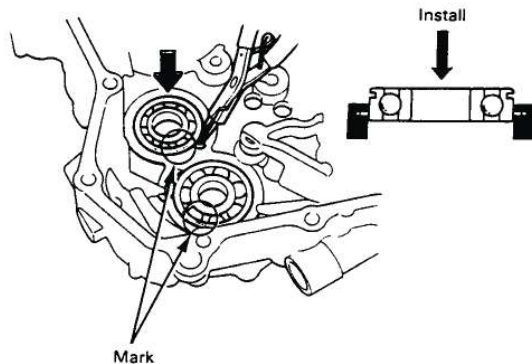
NOTE: Do not remove the snap rings unless it's necessary to clean the grooves in the housing.

COUNTERSHAFT  
BEARING



MAINSHAFT BEARING

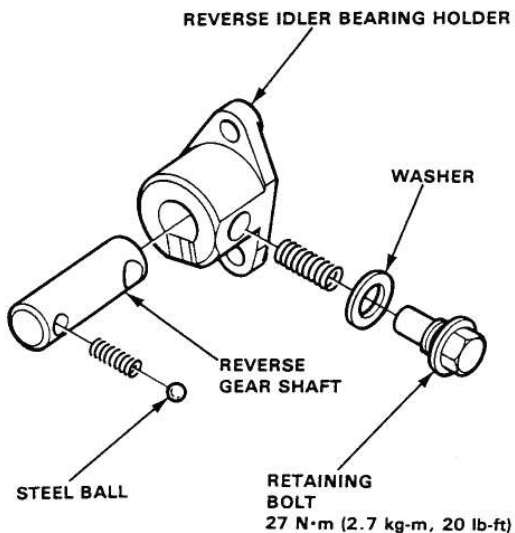
2. Expand each snap ring with snap ring pliers, insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transmission until the ring snaps in place around it.





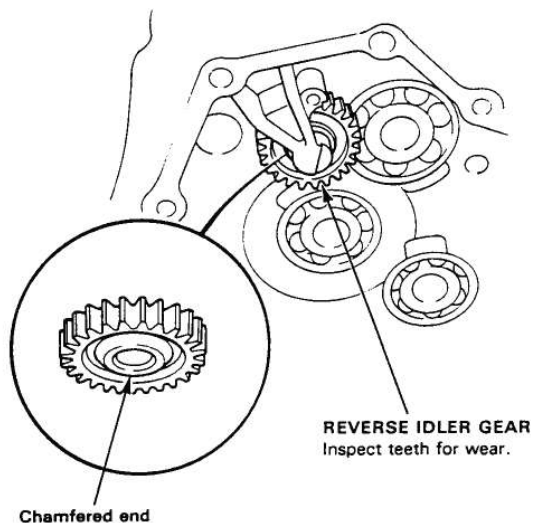
1. Assemble the reverse idler bearing holder.

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



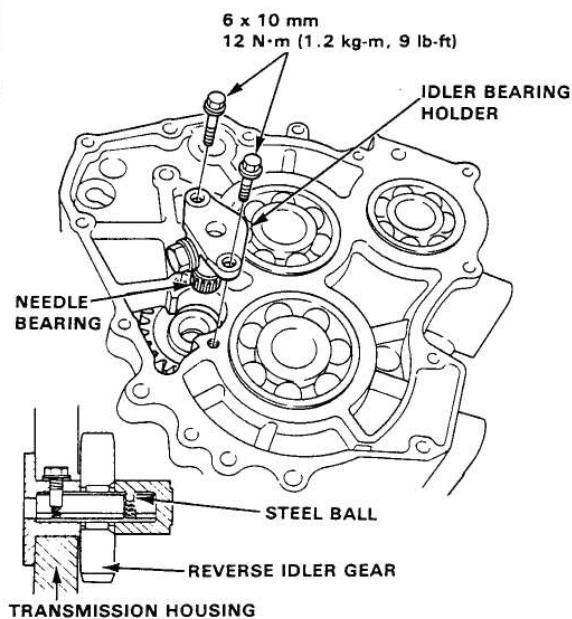
2. Install the reverse idler gear.

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



3. Install the needle bearing into the idler gear.
4. Install the reverse idler bearing holder into the transmission housing.

5. Tighten the reverse idler bearing holder bolts.
6. Install the spring and then tighten the retaining bolt and washer.



1. Reassemble the transmission in the following numbered sequence:

\* ⑥, ⑬, ⑮, ②②, ②④, ②⑤, ②⑥, ②④ Bolts  
12 N·m (1.2 kg-m, 9 lb-ft)  
☆ ⑦ Bolts  
18 N·m (1.8 kg-m, 13 lb-ft)

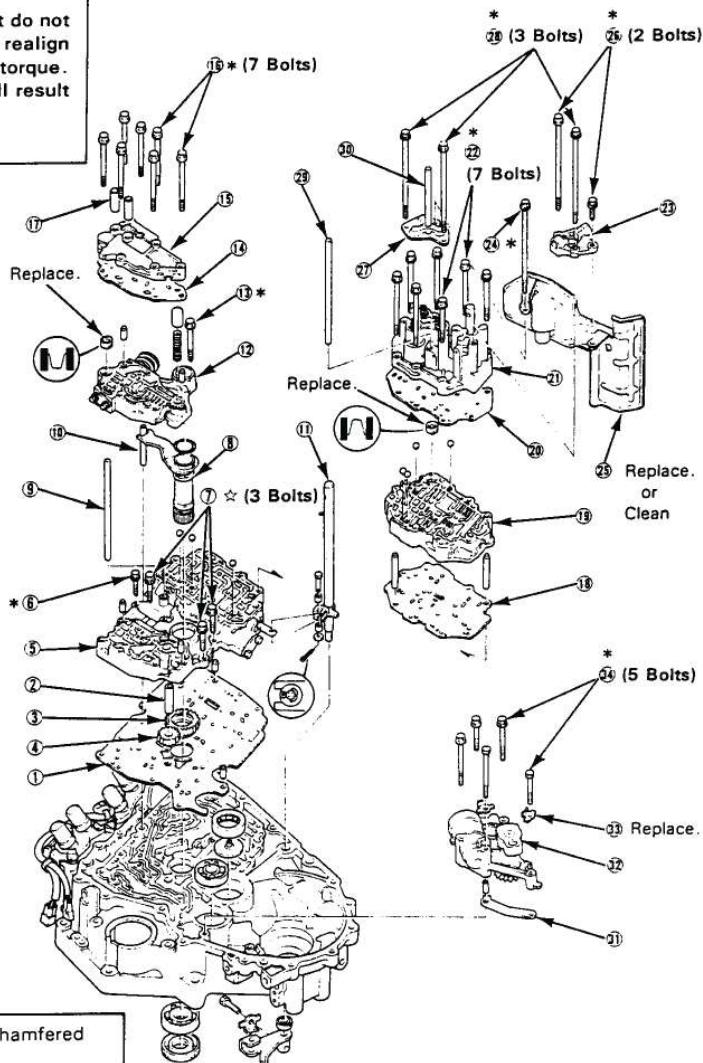
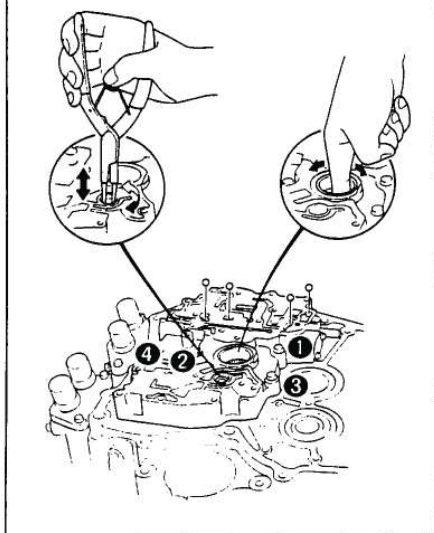
**NOTE:**

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 valve 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.

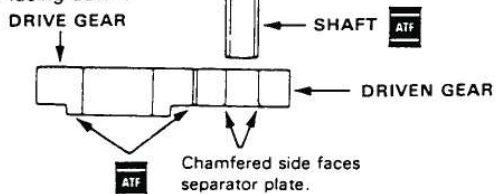
②⑥

**CAUTION:** To prevent stripping the threads, press down on the accumulator cover while installing the bolts.



②, ③, ④

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

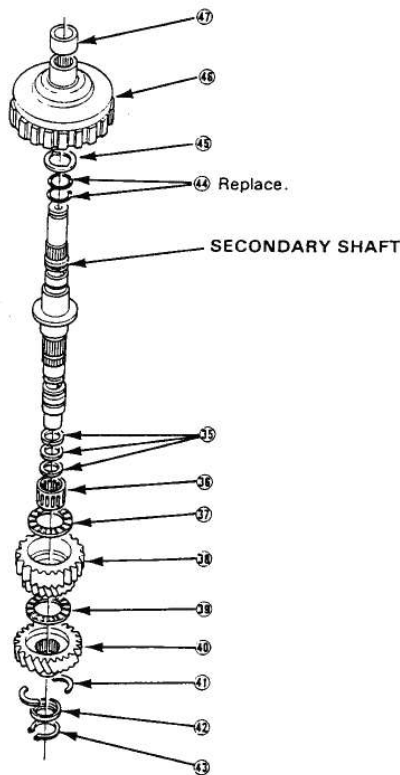
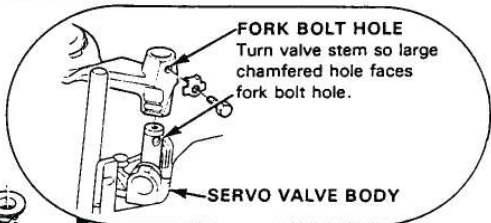




- NOTE:** Do not tap on the shafts with a hammer to drive in.

- NOTE:** Install the reverse gear selector with its flat facing up.

- and new lock plate. Bend the lock tab against the bolt head.

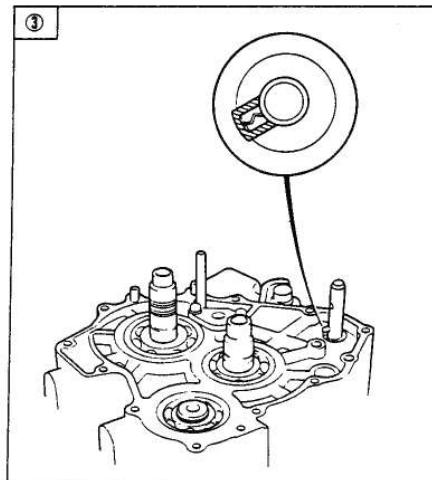
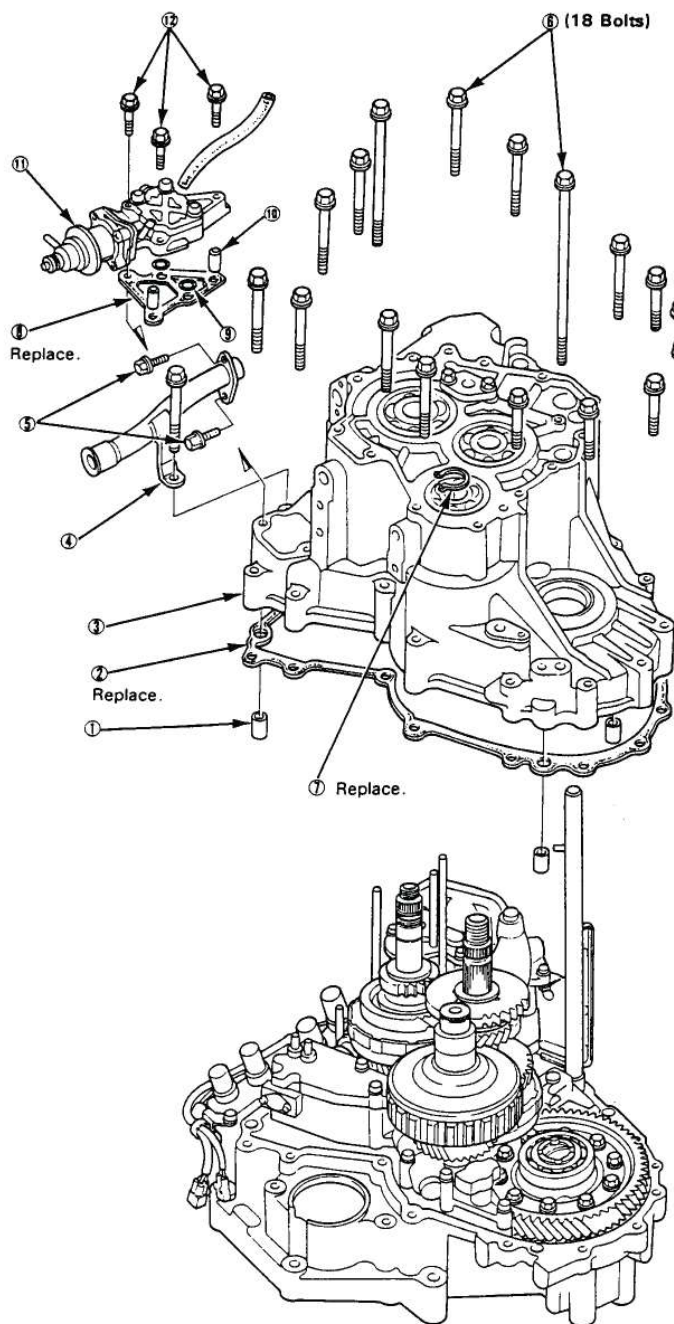




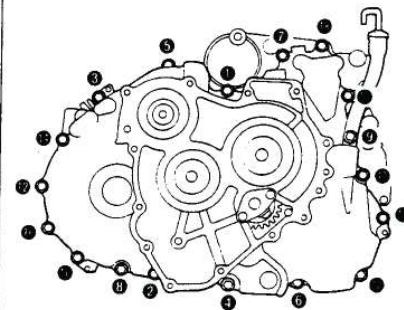
9. Assemble the transmission in the following numbered sequence.

⑤ : 27 N·m (2.7 kg-m, 20 lb-ft)

⑫ : 12 N·m (1.2 kg-m, 9 lb-ft)



⑥ Install the bolts in the locations shown.  
55 N·m (5.5 kg-m, 40 lb-ft)



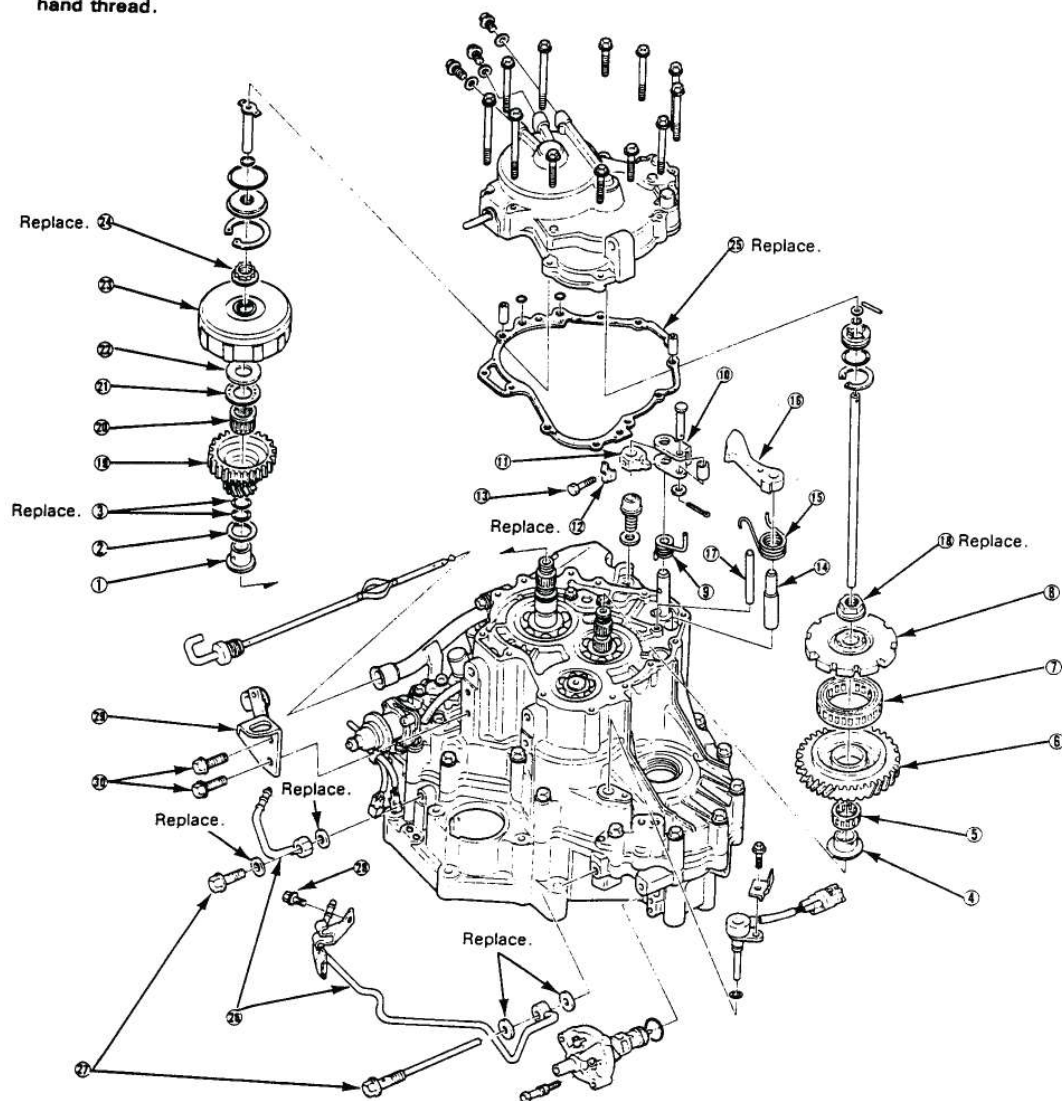


10. Assemble the transmission in the following numbered sequence.

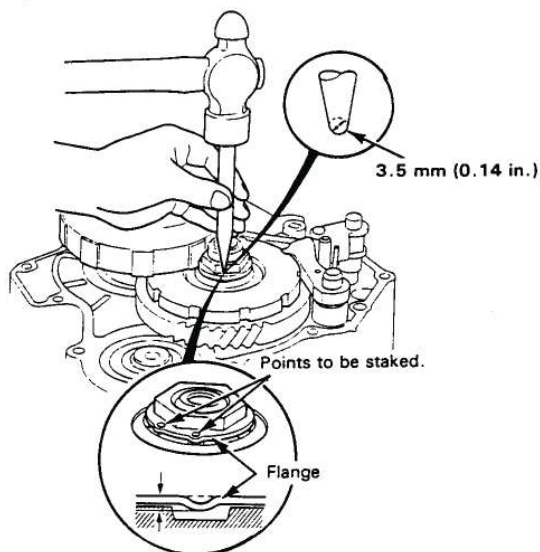
NOTE:

- 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.
- ⑬ : 14 N·m (1.4 kg-m, 11 lb-ft)
- ⑮ : 140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft)
- ⑳ : 95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)
- ㉑ : 29 N·m (2.9 kg-m, 21 lb-ft)
- ㉒ : 12 N·m (1.2 kg-m, 9 lb-ft)
- ㉓ : 55 N·m (5.5 kg-m, 40 lb-ft)

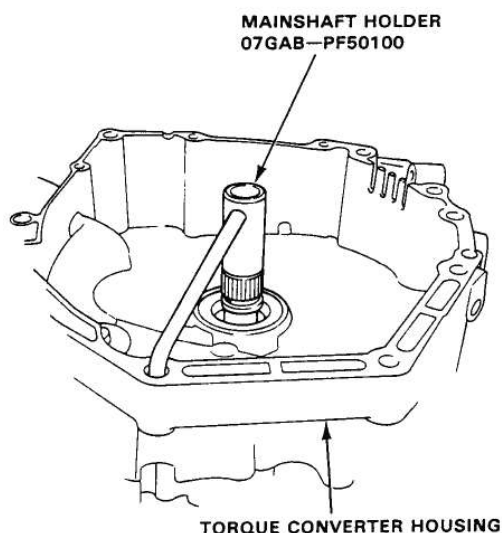
ⓉCAUTION: Lock-nut has left-hand thread.



11. Shift to PARK.
12. Install and torque the new countershaft locknut. Tighten to specified torque, then loosen and retighten to same torque.  
Torque: 140→0→140 N·m (14.0→0→14.0 kg-m, 102→0→102 lb-ft)
13. Stake the locknut flange at two places into the gear grooves using a 3.5 mm punch.



14. Install the special tool as shown.

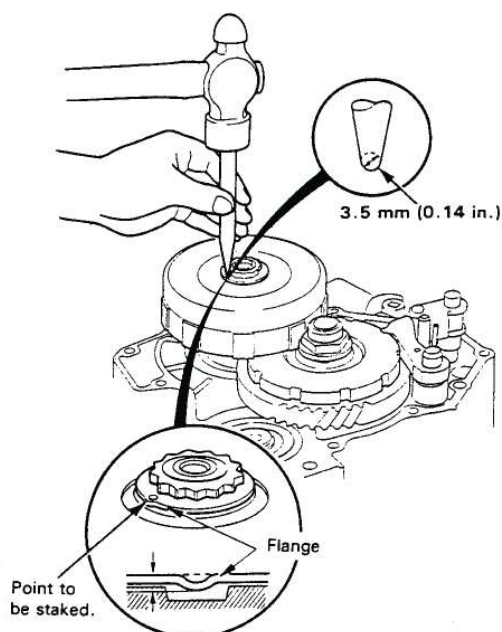


15. Install and torque the new mainshaft locknut. Tighten to specified torque, then loosen and retighten to same torque.

Torque: 95→0→95 N·m (9.5→0→9.5 kg-m, 70→0→70 lb-ft)

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

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

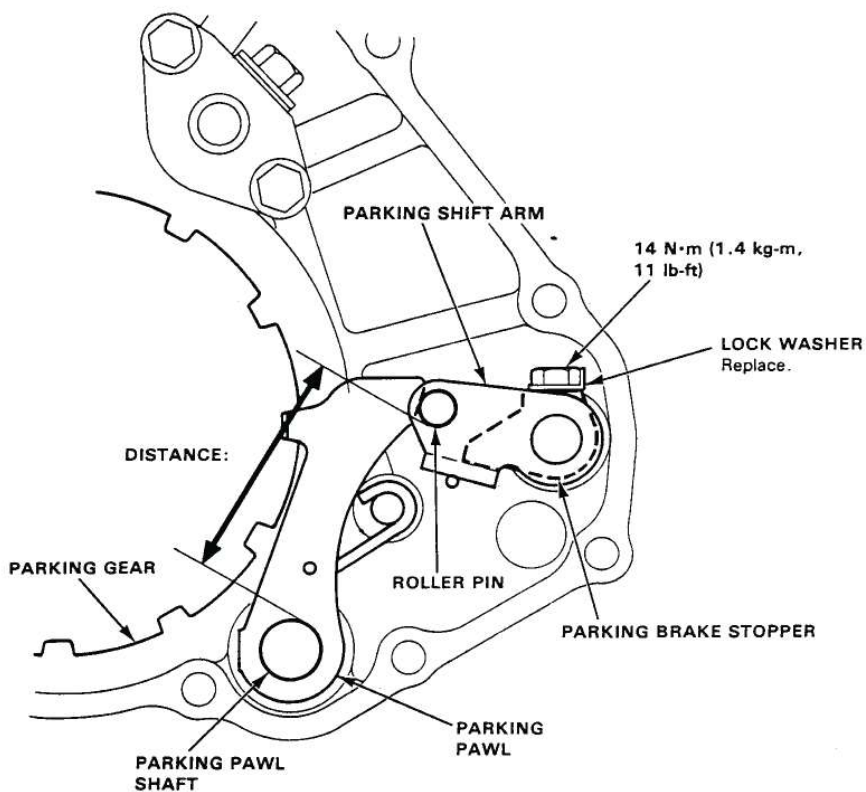




## Technical Service Information

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

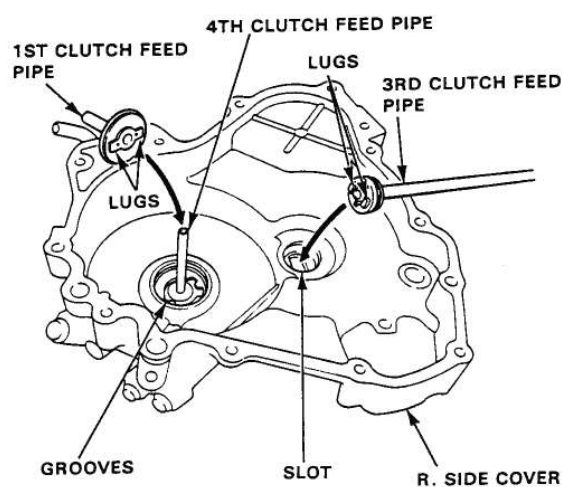
Distance: 55.8–56.8 mm (2.197–2.236 in.)



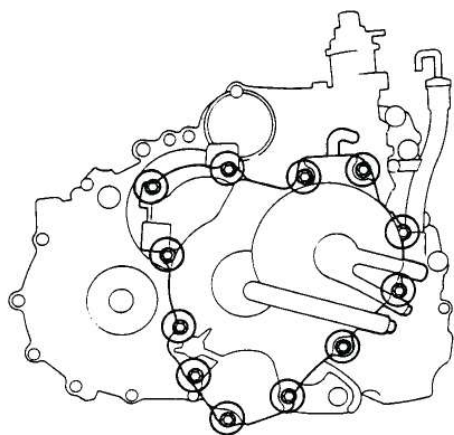
3. If the measurement is out of specification, select the appropriate parking brake stopper using the table below, and install it on the parking shift arm.

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

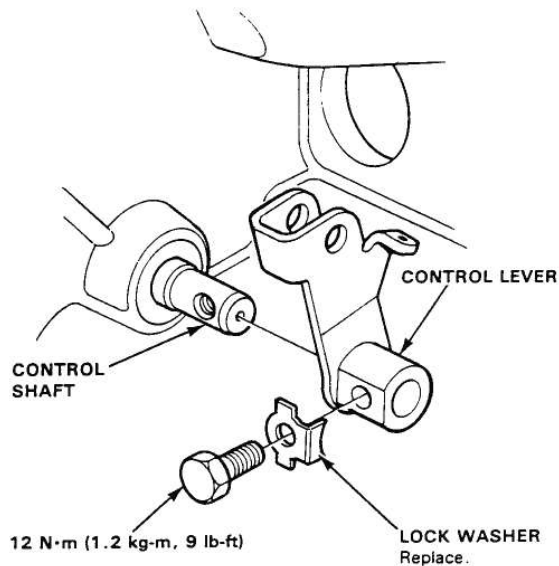
1. With feed pipes assembled, align lugs on the collars with slot in end cover.
2. Install the snap ring.
3. Install the feed pipes in the end cover, aligning the lugs of the 1st clutch feed pipe with the grooves of the end cover.
4. Install the snap ring.



5. Install the R. Side cover.  
Torque: 12 N·m (1.2 kg-m, 9 lb-ft)

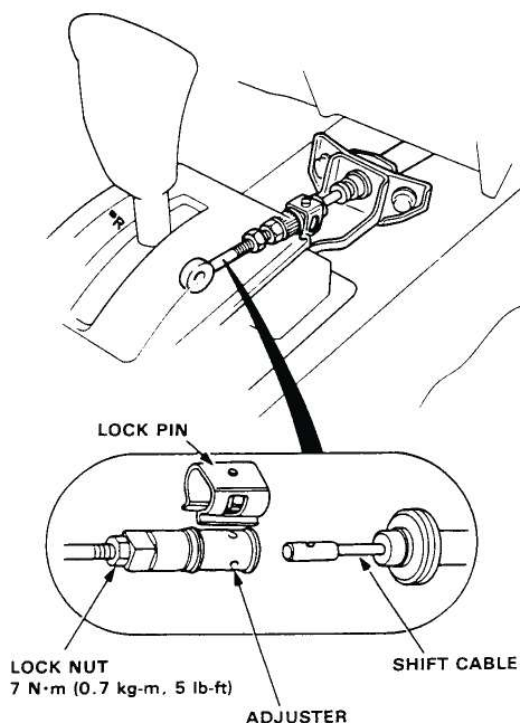


6. Install the control lever and new lock plate on the other end of shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.

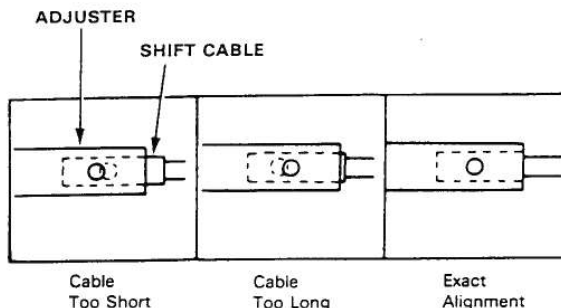




1. Start the engine. Shift to reverse to see if the reverse gear engages. If not, refer to Troubleshooting.
2. With the engine off, remove the console.
3. Shift to **N** or **R** position, then remove the lock pin from the cable adjuster.



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



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

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

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

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

## ⚠ WARNING

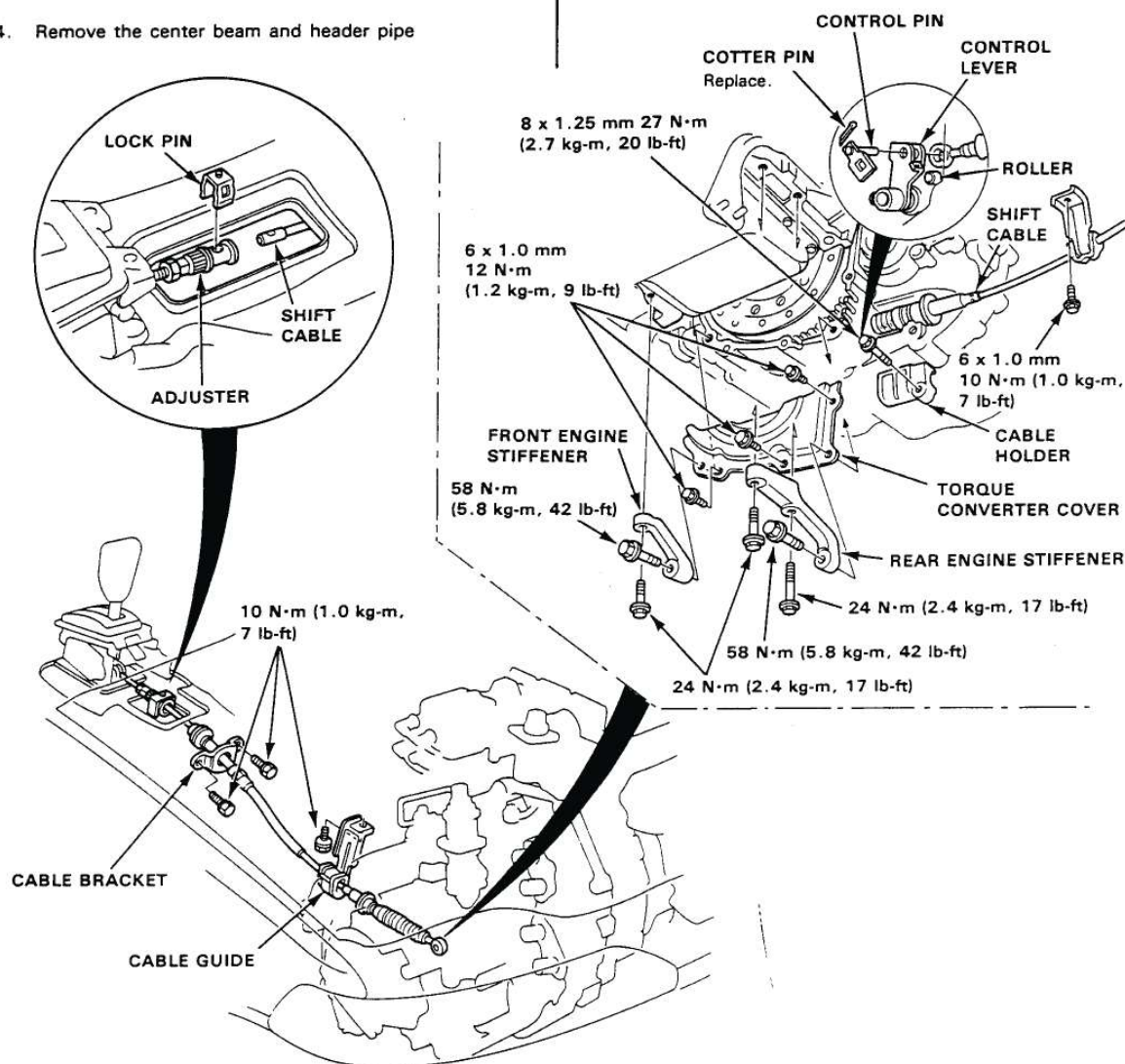
- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine.
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

1. Remove the front console.
2. Remove the lock pin from the cable adjuster.
3. Remove the bolts, then remove the cable bracket and cable guide.
4. Remove the center beam and header pipe

5. Remove the front and rear engine stiffeners.
6. Remove the torque converter cover and cable holder.
7. Remove the shift cable by removing the cotter pin control pin and control lever roller from the control lever.

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

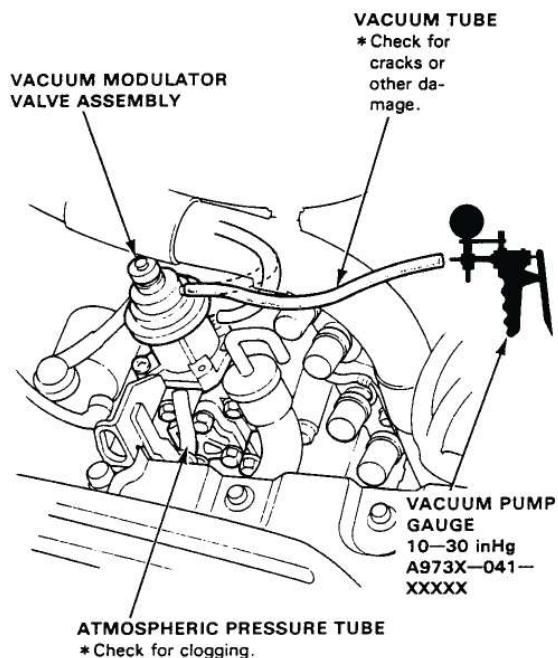
8. Install the shift cable in the reverse order of removal.
- NOTE:** On reassembly, check the cable adjustment



**NOTE:**

the vacuum modulator is faulty or the throttle B pressure is out of specs, perform the following inspections.

1. Stop the engine.
2. Connect a vacuum pump to the intake manifold tube of the vacuum modulator valve, and apply a vacuum of 500–600 mmHg. (19.7–23.6 inHg)

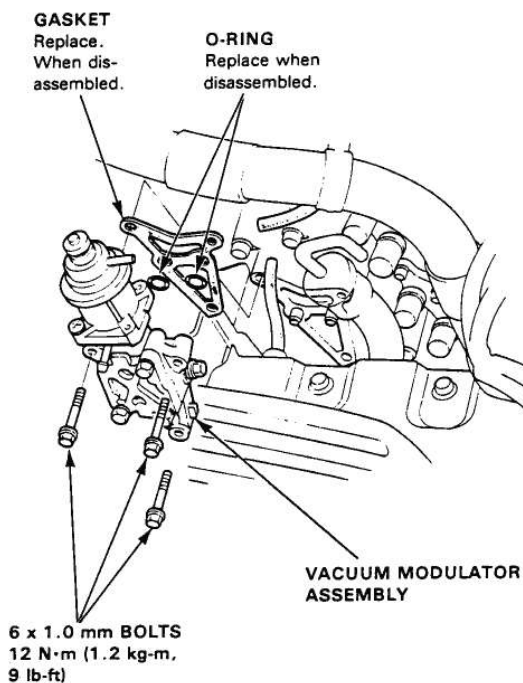


**NOTE:**

- Be sure that the atmospheric pressure tube is not clogged.
- Before checking, be sure that the vacuum tube is not damaged, and in good condition.

3. If the vacuum is not maintained, replace the modulator valve as an assembly.
4. If the vacuum is maintained, remove the vacuum modulator valve assembly by removing the three 6 x 1.0 mm bolts.

**NOTE:** Do not loosen or remove the three bolts fastening the vacuum body cover.



(cont'd)

## Inspection/Replacement (cont'd)

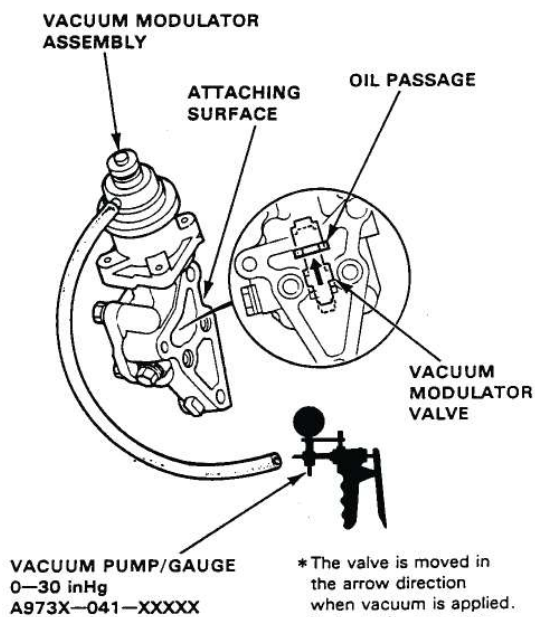
5. Apply a vacuum of 500–600 mmHg (19.7–23.6 inHg) to the intake manifold vacuum tube again to check that the modulator valve is moved.

Also check that the modulator valve moves in the opposite direction by releasing the vacuum.

Repeat the above steps 2–3 times.

NOTE: You can see the movements of the valve through the oil passage in the attaching surface of the modulator valve assembly.

6. If the valve binds, or is moved but sluggishly, replace the vacuum modulator as an assembly.



\*The valve is moved in the arrow direction when vacuum is applied. It should be moved in the opposite direction when vacuum is released.