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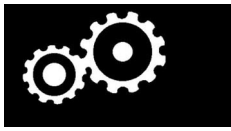
Automatic Transmission
A/T



Automatic Transmission

Service Precautions for 4WD Model

This 4WD model does not have the feature that mechanically switches between 4WD (four-wheel drive) and 2WD (front-wheel drive).

Do not drive the vehicle with rear wheels on the ground even though the front wheels are off the ground. The front wheel power is conveyed to the rear wheels, and the vehicle will start off.

Always lift the vehicle up so all four wheels are off the ground when testing and inspecting the vehicle to rotate the wheels such as Pressure Tests.

Use the free rollers under the rear wheels when performing test the vehicle with the speedometer tester.

Precautions on using free rollers:

- Inspecting and testing using a chassis dynamometer is not feasible.
- Do not operate the accelerator, brake pedal or steering wheel abruptly. It may cause the vehicle to roll and create a hazardous condition.
- The maximum testing speed should be 50 km/h (31 mph).
- The maximum continuous operating time should be 3 minutes.
- Make sure to tie down the vehicle securely with the side anchor wires and center tie down wire. The free rollers are to be set under the rear wheels.

⚠ CAUTION ⚠

- Make sure to place the free rollers parallel to the roller of each speedometer tester.
- Putting the front and rear wheels on the speedometer testers and free rollers inappropriately may cause the vehicle to roll off or over the free rollers and create a hazardous condition.
- The side anchor wires and certain tie-down wire must be appropriately tensioned. If the wires have too much slack, the expected tie-down efficiency cannot be obtained.
- When attaching the side anchor wires and center tie-down wire, make sure they are not interfering with the bumper and other parts of the vehicle body.
- Do not attach the wires to any place other than the designed areas.
- Do not operate the speedometer testers at a speed more than 50 km/h (31 mph) or for more than 3 minutes.

1. Set the free rollers according to the wheel base and tread of the vehicle.
2. Move the vehicle to position the front wheels on the speedometer tester and the rear wheels on the free rollers. Make sure to align the center of the wheels to the center of the speedometer tester and the free rollers.
3. Tie down the vehicle securely using the towing hook and tie-down hook bracket to prevent the vehicle from rolling or over the free rollers.
4. Start the engine, shift the transmission into the [D] position, accelerate the vehicle gradually, and measure the vehicle speed.
5. After measurement, use the brake pedal to gradually decelerate and stop the vehicle.

Special Tools

Ref. No.	Tool Number	Description	Qty
1	07GAD-SD40101	Driver Attachment, 78 x 90 mm	1
2	07HAC-PK40102	Housing Puller	1
3	07HAJ-PK40201	Preload Inspection Tool	1
4	07JAC-PH80000	Adjustable Bearing Remover Set	1
4-a	07JAC-PH80100	Bearing Remover Attachment	1
4-b	07JAC-PH80200	Remover Handle Assembly	1
4-c	07741-0010201	Remover Weight	1
5	07JAD-PH80101	Oil Seal Driver Attachment	1
6	07JAF-SJ80110	Installer Shaft 14 x 165 mm	1
7	07JAF-SJ80120	Installer Nuts 14 mm	2
8	07KAF-PS30120	Bearing Installer Attachment	1
9	07KAF-PS30200	Bearing Separator	1
10	07LAD-PW50601	Attachment, 40 x 50 mm	1
11	07LAE-PX40000	Clutch Spring Compressor Set	1
11-a	07LAE-PX40100	Clutch Spring Compressor Attachment	1
11-b	07HAE-PL50100	Clutch Spring Compressor Attachment	1
11-c	07GAE-PG40200	Clutch Spring Compressor Bolt Assembly	1
12	07LAF-PZ70110	Bearing Installer Attachment	1
13	07LGC-0010100	Snap Ring Pliers	1
14	07PAB-0010000	Mainshaft Holder Set	1
15	07PAB-0020000	Companion Flange Holder	1
16	07QAD-P0A0100	Driver Attachment, 42 mm I.D.	1
17	07ZAE-PRP0100	Clutch Compressor Attachment	1
18	07406-0020004	A/T Oil Pressure Gauge Set	1
19	07746-0010100	Driver Attachment, 32 x 35 mm	1
20	07746-0010200	Driver Attachment, 37 x 40 mm	1
21	07746-0010300	Driver Attachment, 42 x 47 mm	1
22	07746-0010400	Driver Attachment, 52 x 55 mm	1
23	07746-0010500	Driver Attachment, 62 x 68 mm	1
24	07746-0010600	Driver Attachment, 72 x 75 mm	1
25	07746-0010800	Driver Attachment, 22 x 24 mm	1
26	07746-0030100	Driver 40 mm I.D.	1
27	07746-0030400	Driver Attachment, 35 mm I.D.	1
28	07749-0010000	Handle Driver	1
29	07947-SD90101	Oil Seal Driver Attachment	1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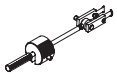
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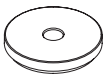
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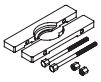
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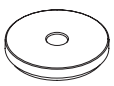
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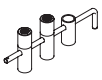
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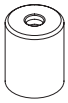
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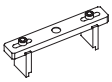
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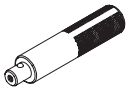
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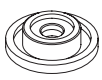
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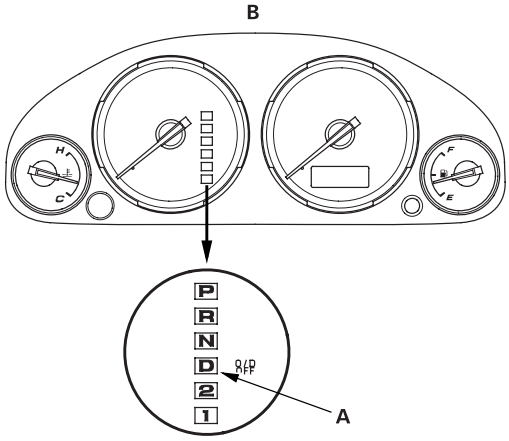
General Troubleshooting Information

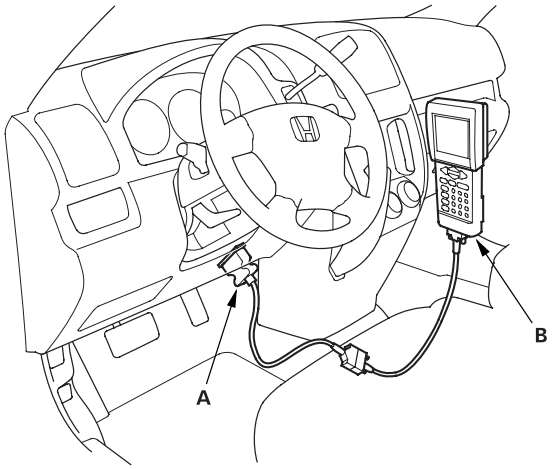
How to Check for DTCs with the PGM Tester/Scan Tool

When the Powertrain Control Module (PCM) senses an abnormality in the input or output systems, the [D] indicator (A) in the gauge assembly (B) will usually blink.



When the 16P Data Link Connector (DLC) (A) (located under the dash behind the center console) is connected to the OBD Scan Tool or Honda PGM Tester (B), it will indicate the Diagnostic Trouble Code (DTC) when the ignition switch is turned ON (II).

NOTE: The illustration shows LHD model; RHD is symmetrical.



If the [D] indicator or MIL has been reported on, or if a driveability problem is suspected, follow this procedure:

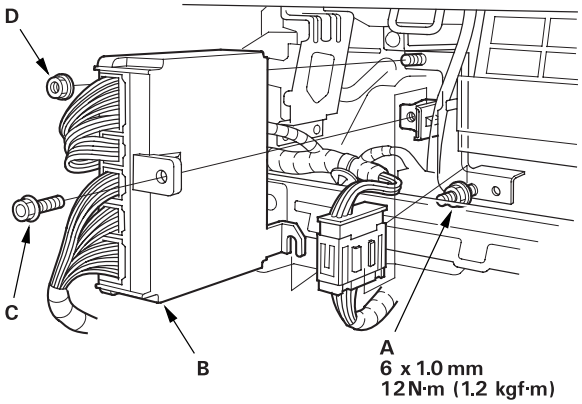
1. Connect the OBD Scan Tool or Honda PGM Tester to the DLC. (See the OBD Scan Tool or Honda PGM Tester user's manual for specific instructions. If you are using the Honda PGM Tester, make sure it is set to the SAE DTC type).
2. Turn the ignition switch ON (II), and observe the DTC on the screen.
3. Record all fuel and emissions DTCs, A/T DTCs, and freeze data.
4. If there is a fuel and emissions DTC, first check the fuel and emissions system as indicated by the DTC except for DTC P0700. DTC P0700 means there is one or more A/T DTCs, and no problems were detected in the fuel and emissions circuit of the PCM.
5. Reset the DTC stored in the PCM with the OBD Scan Tool or PGM Tester.
6. Drive the vehicle for several minutes under the same conditions as those indicated by the freeze data, or at speeds over 30 mph (50 km/h), and then recheck for DTC(s). If the A/T DTC returns, go to the DTC Troubleshooting Index. If the DTC does not return, there was an intermittent problem within the circuit. Make sure all pins and terminals in the circuit are tight.
7. Reset the radio preset stations, and set the clock.

NOTE: You can also check for DTCs with SCS signal terminals short-circuited using with the special tool (DLC pin box 07WAJ-0010100) (see section Appendix).

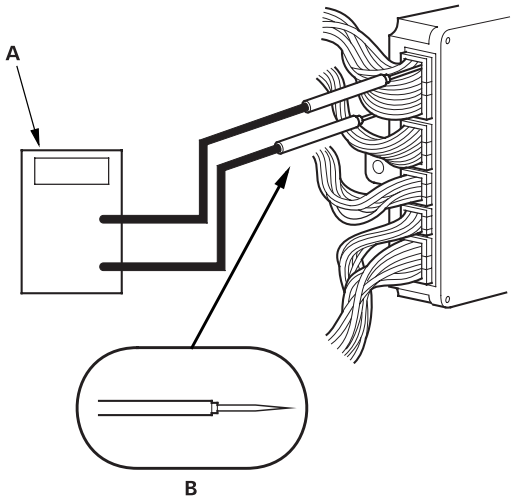
How to Troubleshoot Circuits at the PCM

1. Remove the glove box stops, then bring the glove box down.
2. Loosen the mounting nut (A) on the lower portion of the PCM (B), and remove the mounting bolt (C) and nut (D).

   NOTE: The illustration shows LHD model; RHD is symmetrical.



3. Lift the PCM up to clear the mounting nut on the lower portion of the PCM, then pull out the PCM.
4. Inspect the circuit on the PCM, according to the DTC troubleshooting with a digital multitester (A) and tapered tip probe (B) as shown.



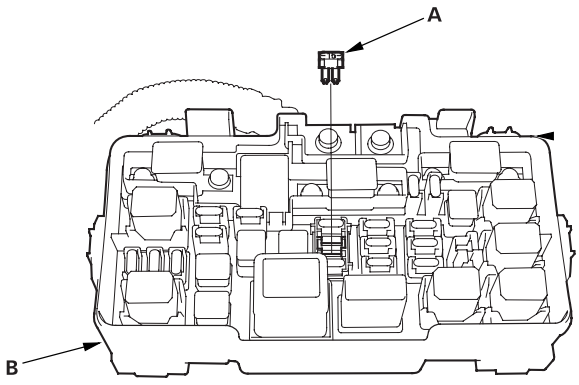
5. If you cannot get to the wire side of the connector or the wire side is sealed, disconnect the connector and use the tester probe to probe the connectors from the terminal side. Do not force the probe into the connector.

(cont'd)

General Troubleshooting Information (cont'd)

PCM Reset Procedure

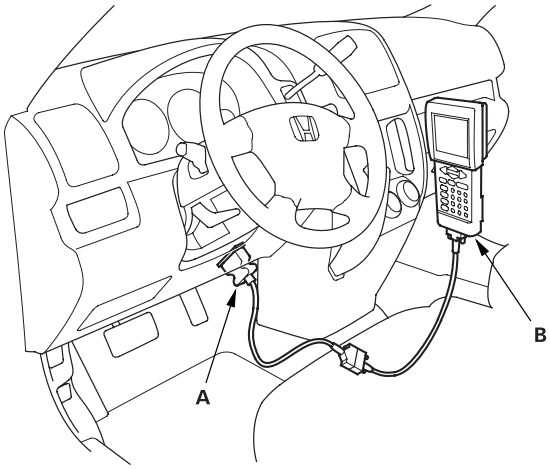
1. Write down the radio station presets.
2. Turn the ignition switch OFF.
3. Remove the No. 6 ECU fuse (15A) (A) from the under-hood fuse/relay box (B) for more than 10 seconds.



How to End a Troubleshooting Session

This procedure must be done after any troubleshooting.

1. Turn the ignition switch OFF.
2. Disconnect the Honda PGM tester (A) from the DLC (B).
   NOTE: The illustration shows LHD model; RHD is symmetrical.



3. Reset the PCM.
4. Turn the ignition switch ON (II).
5. To verify that the problem is repaired, test-drive the vehicle for several minutes at speeds over 30 mph (50 km/h).

DTC Troubleshooting Index

DTC SAE Code (Honda Code)	Detection Item	[D] Indicator	MIL	Page
P0710 (28)	ATF temperature sensor	Blinks	OFF	(see page 14-66)
P0715 (15)	Mainshaft speed sensor	Blinks	ON	(see page 14-68)
P0720 (9)	Countershaft speed sensor	Blinks	ON	(see page 14-71)
P0745 (76)	Hydraulic control system of A/T clutch pressure control solenoid valve A circuit	Blinks	ON	(see page 14-75)
P0748 (16)	A/T clutch pressure control solenoid valve A	Blinks	ON	(see page 14-76)
P0750 (70)	Hydraulic control system of shift solenoid valve A circuit	Blinks	ON	(see page 14-78)
P0753 (7)	Shift solenoid valve A	Blinks	ON	(see page 14-79)
P0758 (8)	Shift solenoid valve B	Blinks	ON	(see page 14-81)
P0763 (22)	Shift solenoid valve C	Blinks	ON	(see page 14-83)
P0773 (61)	Shift solenoid valve E	Blinks	ON	(see page 14-85)
P0775 (77)	Hydraulic control system of A/T clutch pressure control solenoid valve B circuit	Blinks	ON	(see page 14-87)
P0778 (23)	A/T clutch pressure control solenoid valve B	Blinks	ON	(see page 14-88)
P0780 (45)	Mechanical problem in hydraulic control system	Blinks	ON	(see page 14-90)
P0795 (78)	Hydraulic control system of A/T clutch pressure control solenoid valve C circuit	Blinks	ON	(see page 14-91)
P0798 (29)	A/T clutch pressure control solenoid valve C	Blinks	ON	(see page 14-92)
P0840 (25)	2nd clutch pressure switch	Blinks	OFF	(see page 14-94)
P0845 (26)	3rd clutch pressure switch	Blinks	OFF	(see page 14-96)
P1705 (5)	Transmission range switch (short to ground)	Blinks	ON	(see page 14-98)
P1706 (6)	Transmission range switch (open)	OFF	ON	(see page 14-102)
P1717 (62)	Transmission range switch (short or open in [R] circuit)	Blinks	OFF	(see page 14-104)

Symptom Troubleshooting Index

These symptom DO NOT trigger Diagnostic Trouble Codes (DTCs) or cause the [D] indicator to blink. If the Malfunction Indicator Lamp (MIL) was reported ON or the [D] indicator has been blinking, check for DTCs. But if the vehicle has one of the systems in the following chart, check the probable cause(s) for it, in the sequence listed, until you find the problem.

Symptom	Probable cause(s)	Notes
When you turn the ignition switch ON (II), the [D] indicator comes on and stays on or never comes on at all	1 Communication line between multiplex control unit and gauge assembly defective 2 Blown indicator bulb	Check that the MIL indicates code for communication line between the multiplex control unit and gauge assembly (see page 22A-231). If the MIL does not indicate code, replace the indicator bulb (see page 14-171).
[D], [2], or [1] indicator does not indicate while the shift lever is in that position		
Over-drive (O/D) switch does not operate even though the switch is pushed in [D] position	A problem in the O/D switch circuit	Check the O/D switch circuit (see page 14-106).
Shift lever cannot be moved from [P] position while you're pushing on the brake pedal	A problem in the shift lock system (interlock system)	Check the interlock system - shift lock system circuit (see page 14-175).
Shift lever cannot pass through [R] position from [N] position	A problem in the reverse lock system of interlock system	Check the interlock system - reverse lock system circuit (see page 14-178).
Ignition key cannot be moved from ACC (I) position to LOCK (0) position, when you're pushing it with the shift lever in [P] position	A problem in the key interlock system (interlock system)	Check the interlock system - key interlock system circuit (see page 14-179).

Symptom	Probable cause(s)	Notes
Engine runs, but vehicle does not move in any gear	**1** Low ATF level **2** Shift cable broken or out of adjustment **3** Joint in shift cable and transmission or body worn **4** ATF pump worn or binding **5** Regulator valve stuck or spring worn **6** ATF strainer clogged **7** Mainshaft worn or damaged **8** Final gears worn or damaged **9** Transmission-to-engine assembly error **10** Axle disengaged	• Check ATF level and check ATF cooler lines for leakage and loose connections. If necessary, flush ATF cooler lines. • Check for loose shift cable on the shift lever and the transmission control shaft. • Improper alignment of ATF pump and torque converter housing may cause ATF pump seizure. The symptoms are mostly an rpm-related ticking noise or a high pitched squeak. • Measure line pressure. • Be careful not to damage the torque converter housing when replacing the main ball bearing. You may also damage the ATF pump when you torque down the main valve body. This will result in ATF pump seizure if not detected. Use the proper tools. • Install the main seal flush with the torque converter housing. If you push it into the torque converter housing until it bottoms out, it will block the fluid return passage and result in damage. • Check the ATF strainer for clogged. If the ATF strainer is clogged with particles of steel or aluminum, inspect the ATF pump. If the ATF pump is OK, find the damaged components that caused debris, and no cause for contamination is found, replace the torque converter. • Inspect the differential pinion shaft for wear under the pinion gears. If the differential pinion shaft is worn, overhaul the differential assembly, replace the ATF strainer, thoroughly clean the transmission, and flush the torque converter, cooler, and lines.
Vehicle moves in [2] or [R], but not in [D] or [1] position	**1** 1st accumulator defective **2** 1st gears worn or damaged **3** 1st clutch defective	• Check the 1st clutch pressure. • Inspect the clutch piston and O-rings. Check the spring retainer and retainer seal for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch and plate. • Inspect the 1st clutch feed pipe. If the 1st clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the secondary shaft if the bushing for the 1st clutch feed pipe is loose or damaged.

(cont'd)

Symptom Troubleshooting Index (cont'd)

Symptom	Probable cause(s)	Notes
Vehicle moves in [D], [1], [R], but not in [2] position	1 2nd accumulator defective 2 2nd gears worn or damaged 3 2nd clutch defective	• Check the 2nd clutch pressure. • Inspect the clutch piston and O-rings. Check the spring retainer and retainer seal for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate.
Vehicle moves in [D], [2], [1], but not in [R] position	1 Shift solenoid valve E defective 2 Shift fork shaft stuck 3 Shift valve E defective 4 4th/reverse accumulator defective 5 4th clutch defective 6 Reverse gears worn or damaged	• Check for [D] indicator indication, and check for loose connectors. Inspect the shift solenoid valve E for seizure, and O-rings for wear and damage. • Check for a missing shift fork bolt on the shift fork shaft. • Check the 4th clutch pressure. • Inspect the clutch piston, clutch piston check valve, and O-rings. Check the spring retainer for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the reverse selector gear teeth chamfers, and inspect engagement teeth chamfers of the countershaft 4th gear and reverse gear. Replace the reverse gears and the reverse selector if they are worn or damaged. If the transmission clicking, grinding, or whirring noise, also replace the mainshaft 4th gear, reverse idler gear, and countershaft 4th gear.
Poor acceleration; flares on starting off in [D] position: Stall speed high in [2] and [1] positions, and in [D] position in 1st and 2nd gears	1 Low ATF level 2 Shift cable broken or out of adjustment 3 ATF pump worn or binding 4 Regulator valve stuck or spring worn 5 ATF strainer clogged 6 Torque converter check valve defective	• Check ATF level and check ATF cooler lines for leakage and loose connections. If necessary, flush ATF cooler lines. • Check for loose shift cable on the shift lever and the transmission control shaft. • Improper alignment of ATF pump and torque converter housing may cause ATF pump seizure. The symptoms are mostly an rpm-related ticking noise or a high pitched squeak. • Check the ATF strainer for clogged. If the ATF strainer is clogged with particles of steel or aluminum, inspect the ATF pump. If the ATF pump is OK, find the damaged components that caused debris, and no cause for contamination is found, replace the torque converter.

Symptom	Probable cause(s)	Notes
Poor acceleration; flares on starting off in [D] position: Stall spee4d high when starting off in [2] position	2nd clutch defective	• Check the 2nd clutch pressure. • Inspect the clutch piston and O-rings. Check the spring retainer and retainer seal for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate.
Poor acceleration; flares on starting off in [D] position: Stall speed high in [R] position	**1** Shift cable broken or out of adjustment **2** 4th clutch defective	• Check for loose shift cable on the shift lever and the transmission control shaft. • Check the 4th clutch pressure in [D] and [R] positions. • Inspect the clutch piston, clutch piston check valve, and O-rings. Check the spring retainer for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate.
Poor acceleration; flares on starting off in [D] position: Stall speed low in [2] and [1] positions, and in [D] position in 1st and 2nd gears	**1** Shift solenoid valve E defective **2** Torque converter one-way clutch defective **3** Engine output low **4** Torque converter clutch piston defective **5** Lock-up shift valve defective **6** Restricted ATF cooler	• Check the [D] indicator indication, and check for loose connectors. Inspect the shift solenoid valve E for seizure, and O-ring for wear and damage. • Replace the torque converter. • Check ATF cooler system for restriction.
Poor acceleration; flares on starting off in [D] position: Stall speed low in [R] position	**1** Torque converter one-way clutch defective **2** Engine output low **3** Torque converter clutch piston defective **4** Lock-up shift valve defective **5** Restricted ATF cooler	• Replace the torque converter. • Check ATF cooler system for restriction.

(cont'd)

Symptom Troubleshooting Index (cont'd)

Symptom	Probable cause(s)	Notes
Engine idle vibration	1 Low ATF level 2 Shift solenoid valve E defective 3 Drive plate defective or transmission misassembled 4 Engine output low 5 Torque converter clutch piston defective 6 ATF pump worn or binding 7 Lock-up shift valve defective 8 Restricted ATF cooler 9 Misadjusted engine and transmission mounts	• Check ATF level and check ATF cooler lines for leakage and loose connections. If necessary, flush ATF cooler lines. • Improper alignment of ATF pump and torque converter housing may cause ATF pump seizure. The symptoms are mostly an rpm-related ticking noise or a high pitched squeak. • Inspect the ATF strainer for clogged with particles of steel or aluminum. If the ATF strainer is clogged, replace it, and flush the torque converter, cooler, and lines. • Check the [D] indicator indication, and check for loose connectors. Inspect the shift solenoid valve E for seizure, and O-rings for wear and damage. • Check for a misinstalled/damaged drive plate. • Set idle rpm in gear to the specified idle speed. If still no good, adjust the engine and transmission mounts as outlined in the engine section of this shop manual. • Replace the torque converter. • Check ATF cooler system for restriction.
Vehicle moves in [N] position	1 Excessive ATF 2 Foreign material in separator plate orifice 3 Relief valve defective 4 1st clutch defective 5 2nd clutch defective 6 3rd clutch defective 7 4th clutch defective 8 Clutch end plate-to-top disc clearance incorrect 9 Needle bearing seized up, worn, or damaged 10 Thrust washer seized up, worn, or damaged	• Check ATF level, and drain ATF if it is an excess. • Check the ATF strainer for clogged. If the ATF strainer is clogged with particles of steel or aluminum, inspect the ATF pump. If the ATF pump is OK, find the damaged components that caused debris, and no cause for contamination is found, replace the torque converter. • Check the 1st, 2nd, 3rd and 4th clutch pressures. • Inspect the clutch piston, clutch piston check valve (3rd and 4th), and O-rings. Check the spring retainer and retainer seal (1st and 2nd) for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the 1st clutch feed pipe. If the 1st clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the secondary shaft if the bushing for the 1st clutch feed pipe is loose or damaged. • Inspect the 3rd clutch feed pipe. If the 3rd clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the mainshaft if the bushing for the 3rd clutch feed pipe is loose or damaged.

Symptom	Probable cause(s)	Notes
Late shift from [N] position to [D] position, or excessive shock when shifted into [D] position	**1** Shift solenoid valve E defective **2** A/T clutch pressure control solenoid valve A defective **3** A/T clutch pressure control solenoid valves B and C defective **4** Shift cable broken or out of adjustment **5** Joint in shift cable and transmission or body worn **6** Mainshaft speed sensor defective **7** Countershaft speed sensor defective **8** ATF temperature sensor defective **9** Foreign material in separator plate orifice **10** Servo control valve defective **11** 1st accumulator defective **12** 1st check ball stuck **13** Lock-up shift valve defective **14** 1st clutch defective	• Check the [D] indicator indication, check for loose connectors. Inspect the solenoid valve filter/gasket and O-rings for wear and damage, and inspect the solenoid valves for seizure. • Check the mainshaft speed sensor and countershaft speed sensor installation. • Check for loose shift cable on the shift lever and the transmission control shaft. • Check the 1st clutch pressure. • Inspect the clutch piston and O-rings. Check the spring retainer and retainer seal for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the 1st clutch feed pipe. If the 1st clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the secondary shaft if the bushing for the 1st clutch feed pipe is loose or damaged.
Late shift from [N] position to [R] position, or excessive shock when shifted into [R] position	**1** Shift solenoid valve E defective **2** A/T clutch pressure control solenoid valve A defective **3** Shift cable broken or out of adjustment **4** Joint in shift cable and transmission or body worn **5** Mainshaft speed sensor defective **6** Countershaft speed sensor defective **7** ATF temperature sensor defective **8** Shift fork shaft stuck **9** Foreign material in separator plate orifice **10** Shift valve E defective **11** 4th/reverse accumulator defective **12** Lock-up shift valve defective **13** 4th clutch defective	• Check the [D] indicator indication, check for loose connectors. Inspect the solenoid valve filter/gasket and O-rings for wear and damage, and inspect the solenoid valves for seizure. • Check the mainshaft speed sensor and countershaft speed sensor installation. • Check for loose shift cable on the shift lever and the transmission control shaft. • Inspect the clutch piston, clutch piston check valve, and O-rings. Check the spring retainer for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Check for a missing shift fork bolt on the shift fork shaft. • Check the 4th clutch pressure. • Inspect the servo valve and O-ring.

(cont'd)

Symptom Troubleshooting Index (cont'd)

Symptom	Probable cause(s)	Notes
No shift	1 Mainshaft speed sensor defective 2 Countershaft speed sensor defective	Check the [D] indicator indication, and check for loose connectors. Check the mainshaft and countershaft speed sensor installation.
Excessive shock or flares on all upshifts and downshifts	1 A/T clutch pressure control solenoid valves B and C defective 2 Mainshaft speed sensor defective 3 Countershaft speed sensor defective 4 ATF temperature sensor defective 5 Foreign material in separator plate orifice	• Check the [D] indicator indication, check for loose connectors. Inspect the solenoid valve filter/gasket and O-rings for wear and damage, and inspect the solenoid valves for seizure. • Check the mainshaft speed sensor and countershaft speed sensor installation.
Excessive shock or flares on 1-2 upshift or 2-1 downshift	1 Shift solenoid valve E defective 2 A/T clutch pressure control solenoid valve A defective 3 A/T clutch pressure control solenoid valves B and C defective 4 2nd clutch pressure switch defective 5 Foreign material in separator plate orifice 6 1st accumulator defective 7 2nd accumulator defective 8 1st check ball stuck 11 2nd check ball stuck 10 Lock-up shift valve defective 11 1st clutch defective 12 2nd clutch defective	• Check the [D] indicator indication, check for loose connectors. Inspect the solenoid valve filter/gasket and O-rings for wear and damage, and inspect the solenoid valves for seizure. • Check the 1st and 2nd clutch pressures. • Inspect the clutch piston and O-rings. Check the spring retainer and retainer seal for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are warn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the 1st clutch feed pipe. If the 1st clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the secondary shaft if the bushing for the 1st clutch feed pipe is loose or damaged.

Symptom	Probable cause(s)	Notes
Excessive shock or flares on 2-3 upshift or 3-2 downshift	**1** A/T clutch pressure control solenoid valves B and C defective **2** 3rd clutch pressure switch defective **3** Foreign material in separator plate orifice **4** 2nd accumulator defective **5** 3rd accumulator defective **6** 2nd check ball stuck **7** 2nd clutch defective **8** 3rd clutch defective	• Check the [D] indicator indication, and check for loose connectors. Inspect the solenoid valve filter/gasket for wear and damage, and inspect the solenoid valves for seizure. • Check the 2nd and 3rd clutch pressures. • Inspect the clutch piston, clutch piston check valve (3rd), and O-rings. Check the spring retainer and retainer seal (2nd) for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are warn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the 3rd clutch feed pipe. If the 3rd clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the mainshaft if the bushing for the 3rd clutch feed pipe is loose or damaged.
Excessive shock or flares on 3-4 upshift or 4-3 downshift	**1** A/T clutch pressure control solenoid valves B and C defective **2** Foreign material in separator plate orifice **3** 3rd accumulator defective **4** 4th accumulator defective **5** 3rd clutch defective **6** 4th clutch defective	• Check the [D] indicator indication, check for loose connectors. Inspect the solenoid valve filter/gasket and O-rings for wear and damage, and inspect the solenoid valves for seizure. • Check the 3rd and 4th clutch pressures. • Inspect the clutch piston, clutch piston check valve, and O-rings. Check the spring retainer for wear and damage. Inspect the clutch end plate-to-top disc clearance. If the clearance is out of tolerance, inspect the clutch discs and plates for wear and damage. If the discs are worn or damaged, replace them as a set. Inspect clutch waved-plate phase difference. If the phase difference is out of tolerance, replace the waved-plate. If they are OK, adjust the clearance with the clutch end plate. • Inspect the 3rd clutch feed pipe. If the 3rd clutch feed pipe is scored, replace it and O-ring under the feed pipe guide. • Replace the mainshaft if the bushing for the 3rd clutch feed pipe is loose or damaged.

(cont'd)

Syptom Troubleshooting Index (cont'd)

Symptom	Probable cause(s)	Notes
Noise from transmission in all shift lever positions	1 ATF pump worn or binding 2 Mainshaft bearing, countershaft bearing, or secondary shaft bearing defective	• Improper alignment of ATF pump and torque converter housing may cause ATF pump seizure. The symptoms are mostly an rpm-related ticking noise or a high pitched squeak. • Be careful not to damage the torque converter housing when replacing the main ball bearing. You may also damage the ATF pump when you torque down the main valve body. This will result in ATF pump seizure if not detected. Use the proper tools. • Install the main seal flush with the torque converter housing. If you push it into the torque converter housing until it bottoms out, it will block the fluid return passage and result in damage. • Inspect the ATF strainer for clogged with particles of steel or aluminum. If the ATF strainer is clogged, replace it, and flush the torque converter, cooler, and lines. • Inspect the mainshaft, countershaft and secondary shaft for wear or damage.
Vehicle does not accelerate more than 31 mph (50 km/h)	Torque converter one-way clutch defective	• Replace the torque converter. • Check ATF cooler system for restriction.
Vibration in all shift lever positions	Drive plate defective or transmission misassembled	• Check for a misinstalled/damaged drive plate. • Set idle rpm in gear to the specified idle speed. If still no good, adjust the engine and transmission mounts as outlined in the engine section of this shop manual.

Symptom	Probable cause(s)	Notes
Shift lever does not operate smoothly	1 Transmission range switch defective or out of adjustment 2 Shift cable broken out of adjustment 3 Joint in shift cable and transmission or body worn	• Check the [D] indicator indication, and check for loose connectors. Inspect the transmission range switch for operation. • Check for loose shift cable at the shift lever and the transmission control shaft.
Transmission does not shift into [P] position	1 Shift cable broken or out of adjustment 2 Joint in shift cable and transmission or body worn 3 Park mechanism defective	• Check for loose shift cable at the shift lever and the transmission control shaft. • Check the park pawl spring installation and the park lever spring installation. If installation is incorrect, install the spring correctly. Make sure that the park lever stop is not installed upside down. Check the distance between the park pawl shaft and park lever roller pin. If the distance is out of tolerance, adjust the distance with the park lever stop.
Lock-up clutch does not disengage	1 Shift solenoid valve E defective 2 A/T clutch pressure control solenoid valve A defective 3 Torque converter clutch piston defective 4 Lock-up shift valve defective 5 Lock-up control valve defective	• Check the [D] indicator indication, and check for loose connectors. Inspect the solenoid valve filter/gasket for wear and damage, and inspect the solenoid valves for seizure. • Replace the torque converter.
Lock-up clutch operates unstable	1 Shift solenoid valve E defective 2 A/T clutch pressure control solenoid valve A defective 3 Torque converter clutch piston defective 4 Torque converter check valve defective 5 Lock-up shift valve defective 6 Lock-up control valve defective	• Check the [D] indicator indication, and check for loose connectors. Inspect the solenoid valve filter/gasket for wear and damage, and inspect the solenoid valves for seizure. • Replace the torque converter.

(cont'd)

Syptom Troubleshooting Index (cont'd)

Symptom	Probable cause(s)	Notes
Lock-up clutch does not engage	1 Shift solenoid valve E defective 2 A/T clutch pressure control solenoid valve A defective 3 Mainshaft speed sensor defective 4 Countershaft speed sensor defective 5 Torque converter clutch piston defective 6 Torque converter check valve defective 7 Lock-up shift valve defective 8 Lock-up control valve defective	• Check the [D] indicator indication, and check for loose connectors. Inspect the solenoid valve filter/gasket for wear and damage, and inspect the solenoid valves for seizure. • Replace the torque converter. • Check the mainshaft speed sensor and countershaft speed sensor installation.
A/T gear position indicator does not indicate shift lever positions	1 Transmission range switch defective or out of adjustment 2 Shift cable broken or out of adjustment 3 Joint in shift cable and transmission or body worn	• Check the [D] indicator indication, and check for loose connectors. Inspect the transmission range switch operation. • Check for loose shift cable at the shift lever and the transmission control shaft.
Speedometer and odometer do not operate	Countershaft speed sensor defective	• Check the [D] indicator indication, and check for loose connectors. Inspect the transmission range switch operation. • Check the countershaft speed sensor installation.
Transmission shifts up during low-rev engine speed condition; engine cannot rev up to high speed	Engine rocker arms defective	Check the engine rocker arms as described in the engine section of this shop manual.

System Description

General Operation

The automatic transmission is a combination of a 3-element torque converter and triple-shaft electronically controlled unit which provides 4 speeds forward and 1 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 assembly in a single unit. They are connected to the engine crankshaft so they turn together 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 flywheel while transmitting power to the transmission mainshaft, the transmission has three parallel shafts; the mainshaft, the countershaft, the secondary shaft. The mainshaft is in line with the engine crankshaft, and includes the 3rd and 4th clutches, and gears for 3rd, 4th, reverse, and idler. The mainshaft reverse gear is integral with the mainshaft 4th gear. The countershaft includes the gears for 1st, 2nd, 3rd, 4th, reverse, park, and the final drive. The final drive gear is integral with the countershaft. The countershaft 4th gear and the countershaft reverse gear can be locked to the countershaft providing the 4th or reverse gear, depending on which way the selector is moved. The secondary shaft includes the 1st and 2nd clutches, and gears for 1st, 2nd, and idler. The idler shaft is located between the mainshaft and secondary shaft, and the idler gear transmits power between the mainshaft and the secondary shaft. The gears on the mainshaft and the secondary shaft 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 and the secondary shaft to the countershaft provide [D], [2], [1], and [R] positions.

Electronic Control

The electronic control system consists of the Powertrain Control Module (PCM), sensors, and solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The PCM is located below the dashboard, behind the glove box.

Hydraulic Control

The valve bodies include the main valve body, the regulator valve body, and the servo body. They are bolted to the torque converter housing. The main valve body contains the manual valve, the shift valves A, B, C, and E, the relief valve, the lock-up control valve, the cooler check valve, the servo control valve, and the ATF pump gears. The regulator valve body contains the regulator valve, the torque converter check valve, lock-up shift valve, and the 1st accumulator. The servo body contains the servo valve, the CPB valve, accumulators for 2nd, 3rd and 4th and shift solenoid valves for A, B, C, and E. Fluid from the regulator passed through the manual valve to the various control valves. The 1st and 3rd clutches receive fluid their respective feed pipes, and the 2nd and the 4th clutches receive fluid from the internal hydraulic circuit.

Shift Control Mechanism

The PCM controls to shift gears the shift solenoid valves A, B, C, and E, and the A/T clutch pressure control solenoid valves A, B, and C, while receiving input signals from various sensors and switches located throughout the vehicle. The shift solenoid valves shift the positions of the shift valves to switch the port leading hydraulic pressure to the clutch. The A/T clutch pressure control solenoid valves A, B, and C regulate their respective pressure, and pressurize to the clutches to engage it and its corresponding gear. The pressures of the A/T clutch pressure control solenoid valves also apply to the shift valves to switch the port.

Lock-up Mechanism

The lock-up mechanism operates in [D] position (3rd and 4th) and [D] position over-drive off mode (3rd). The pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the torque converter clutch 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 the hydraulic control, the PCM optimizes the timing and volume of the lock-up mechanism. When the shift solenoid valve E is turned on by the PCM, shift solenoid valve E pressure switch the lock-up shift valve lock-up on and off. The A/T clutch pressure control solenoid valve A and the lock-up control valve control the volume of the lock-up conditions.

(cont'd)

System Description (cont'd)

General Operation (cont'd)

Gear Selection

The shift lever has six positions: [P] PARK, [R] REVERSE, [N] NEUTRAL, [D] DRIVE 1st through 4th gear range with Over-drive mode, and 1st through 3rd gear range with Over-drive OFF mode, [2] 2nd gear, and [1] 1st gear.

Position	Description
[P] PARK	Front wheels locked; park pawl engaged with park gear on countershaft. All clutches are released.
[R] REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th clutch engaged.
[N] NEUTRAL	All clutches are released.
[D] DRIVE with Over-drive mode (1st through 4th)	General driving; starts off in 1st, shifts automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshifts through 3rd, 2nd, and 1st on deceleration to stop. The lock-up mechanism operates in 3rd and 4th gears.
[D] DRIVE with Over-drive OFF mode (1st through 3rd)	For rapid acceleration at highway speeds and general driving, up-hill and down-hill driving; starts off in 1st, shifts automatically to 2nd, then 3rd, depending on vehicle speed and throttle position. Downshifts through 2nd to 1st on deceleration to stop. The lock-up mechanism operates in 3rd gear.
[2] SECOND	Used for engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up and down.
[1] FIRST	Used for engine braking; stays in 1st gear, does not shift up.

Starting is possible only in [P] and [N] positions because of a slide-type neutral-safety switch.

Automatic Transaxle (A/T) Gear Position Indicator

The A/T gear position indicator in the instrument panel shows which position has been selected.

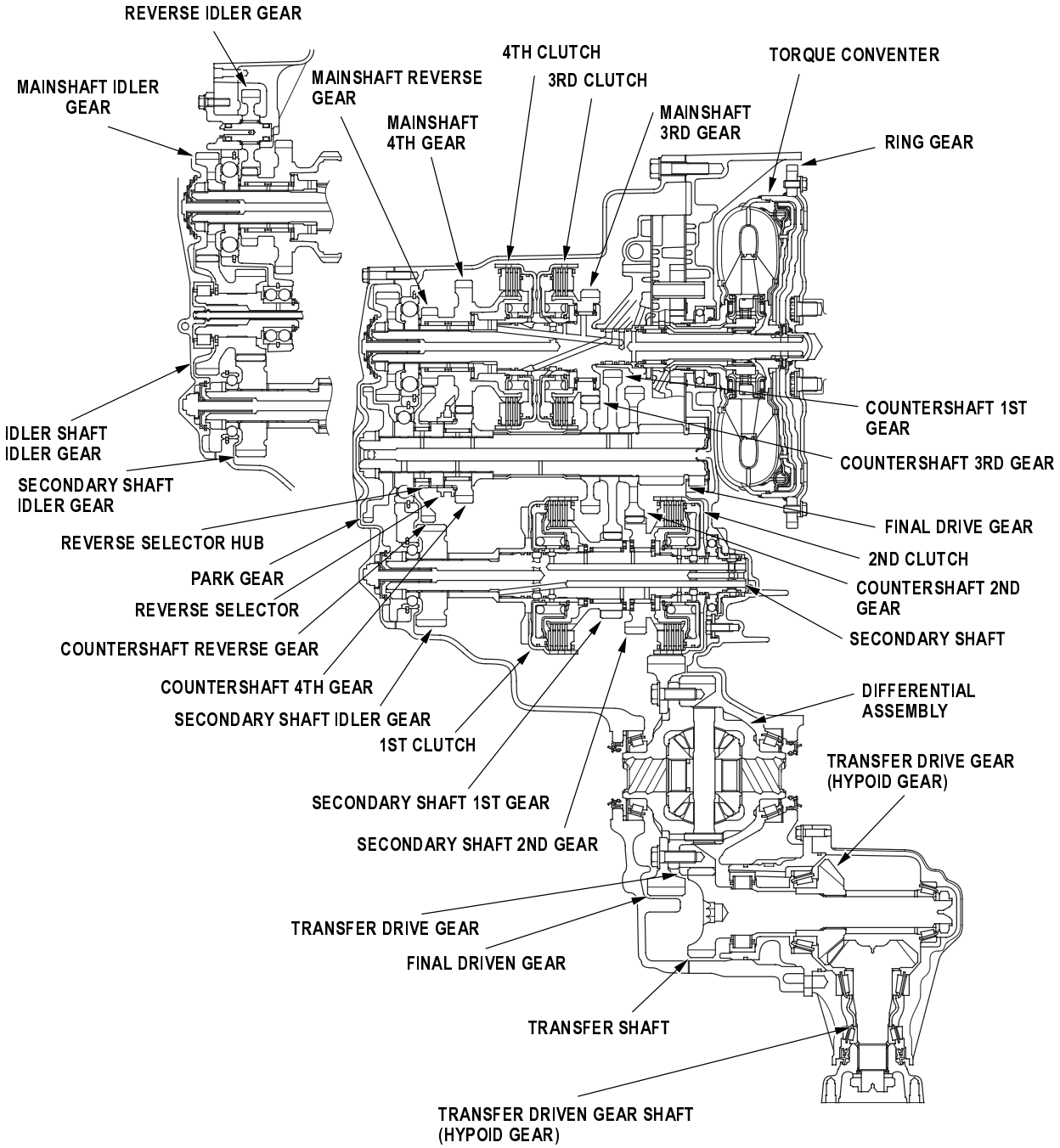
Transfer Mechanism (4WD)

The transfer mechanism consists of the transfer drive gear on the differential, the transfer shaft, the transfer drive gear (hypoid gear), the transfer driven gear shaft (hypoid gear), and the companion flange. The transfer mechanism assembly is on the rear of the transmission, beside the differential. The transfer drive gear on the differential drives the transfer gear shaft and transfer driven gear (hypoid gear), and the transfer drive gear (hypoid gear) drives the transfer driven gear shaft (hypoid gear). Power is transmitted from the transfer drive gear on the differential to the rear differential via the transfer and the propeller shaft.

Transmission Cutaway View

NOTE: The illustration shows 4WD transmission on K20A4 and K20A5 engine models; 2WD does not have the transfer mechanism, K24A1 engine model is similar.

Idler Gears Section Cutway View



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System Description (cont'd)

Clutches

The 4-speed automatic transmission uses hydraulically-actuated clutches to engage or disengage the transmission gears. When hydraulic pressure is introduced into the clutch drum, the clutch piston moves. This presses the friction discs and steel plates together, locking them so they don't slip. Power is then transmitted through the engaged clutch pack to its hub-mounted gear. Likewise, when the hydraulic pressure is bled from the clutch pack, the piston releases the friction discs and steel plates, and they are free to slide past each other. This allows the gear to spin independently on its shaft, transmitting no power.

1st Clutch

The 1st clutch engages/disengages 1st gear, and is located at the middle of the secondary shaft. The 1st clutch is supplied hydraulic pressure by its ATF feed pipe within the secondary shaft.

2nd Clutch

The 2nd clutch engages/disengages 2nd gear, and is located at the end of the secondary shaft, opposite the end cover. The 2nd clutch is supplied hydraulic pressure by a circuit connected to the internal hydraulic circuit.

3rd Clutch

The 3rd clutch engages/disengages 3rd gear, and is located at the middle of the mainshaft. The 3rd clutch is joined back-to-back to the 4th clutch. The 3rd clutch is supplied hydraulic pressure by its ATF feed pipe within the mainshaft.

4th Clutch

The 4th clutch engasges/disengages 4th gear, as well as reverse gear, and is located at the middle of the mainshaft. The 4th clutch is joined back-to-back to the 3rd clutch. The 4th clutch is supplied hydraulic pressure by a circuit connected to the internal hydraulic circuit.

Gear operation

Gears on the mainshaft:

- The 4th gear is engages/disengages with the mainshaft by the 4th clutch.
- The 3rd gear is engages/disengages with the mainshaft by the 3rd clutch.
- The reverse gear is engages/disengages with the mainshaft by the 4th clutch.
- The idler gear is splined with the mainshaft, and rotates with the mainshaft.

Gears on the countershaft:

- The final drive gear is integral with the countershaft.
- The 1st, 2nd, 3rd, and park gears are splined with the countershaft, and rotates with the countershaft.
- The 4th gear and reverse gear are rotate freely from the countershaft. The reverse selector engages 4th gear and reverse gear with the reverse selector hub. The reverse selector hub is splined to the countershaft so that the 4th gear and reverse gear engage with the countershaft.

Gears on the secondary shaft:

- The 1st gear is engaged/disengages with the secondary shaft by the 1st clutch.
- The 2nd gear is engaged/disengages with the secondary shaft by the 2nd clutch.
- The idler gear is splined with the secondary shaft, and rotates with the secondary shaft.

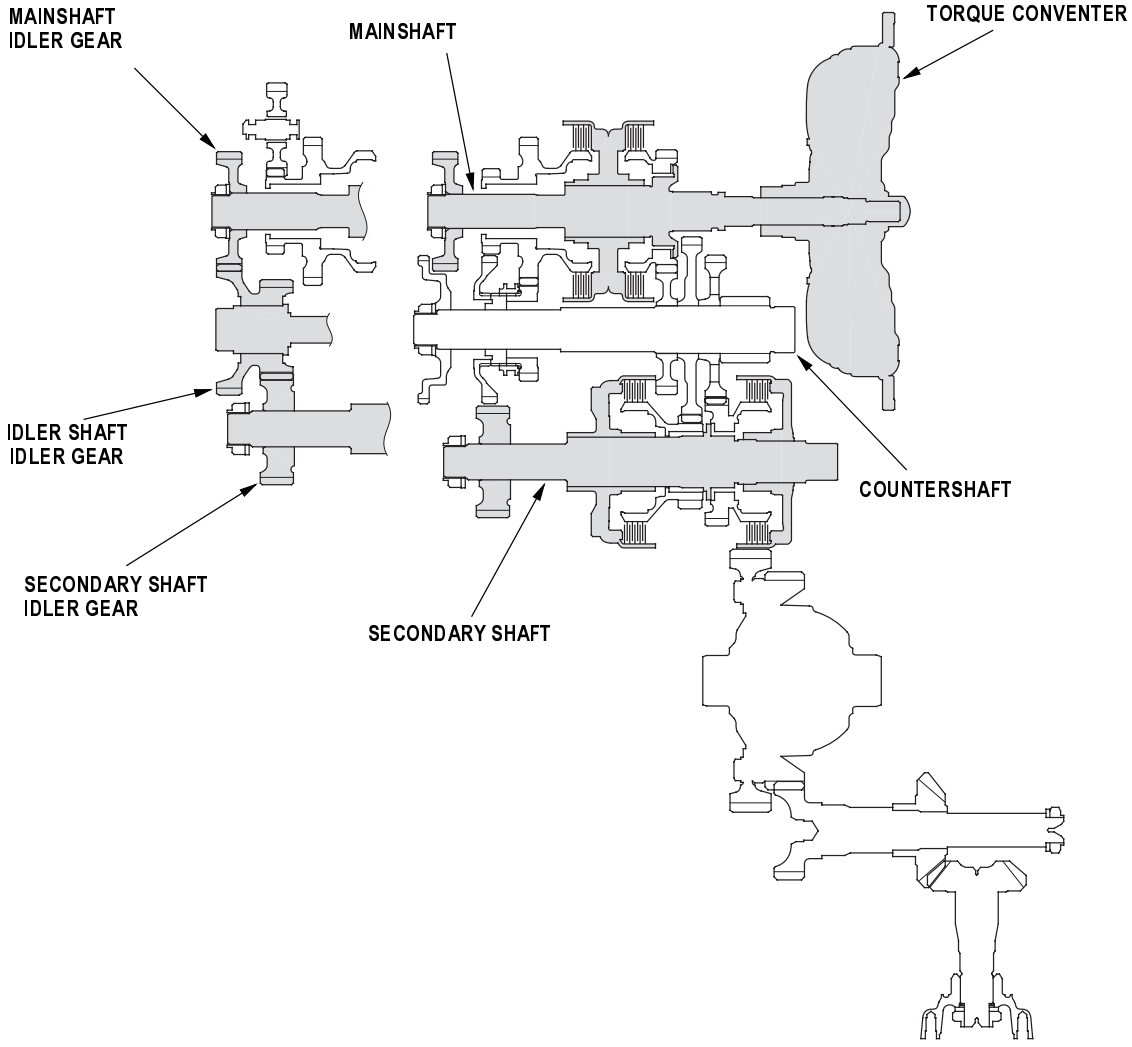
The idler gear on the idler shaft transmits power between the mainshaft and the secondary shaft.
The reverse idler gear transmits power from the mainshaft reverse gear to the countershaft reverse gear, and changes rotation direction of the countershaft to reverse.

[P] Position
Hydraulic pressure is not applied to the clutches. Power is not transmitted to the countershaft. The countershaft is locked by the park pawl interlocking the park gear.

[N] Position
Engine power transmitted from the torque converter drives the mainshaft idler gear, the idler shaft idler gear, and the secondary shaft idler gear, but hydraulic pressure is not applied to the clutches. Power is not transmitted to the countershaft. In this position, the position of the reverse selector differs according to whether the shift lever shifted from [D] or [R] position:

- When shifted from [D] position, the reverse selector engages with the countershaft 4th gear and the reverse selector hub, and the 4th gear engages with the countershaft.
- When shifted from [R] position, the reverse selector engages with the countershaft reverse gear and the reverse selector hub, and the reverse gear engages with the countershaft.

NOTE: The illustration shows the 4WD transmission; 2WD does not have the transfer mechanism.



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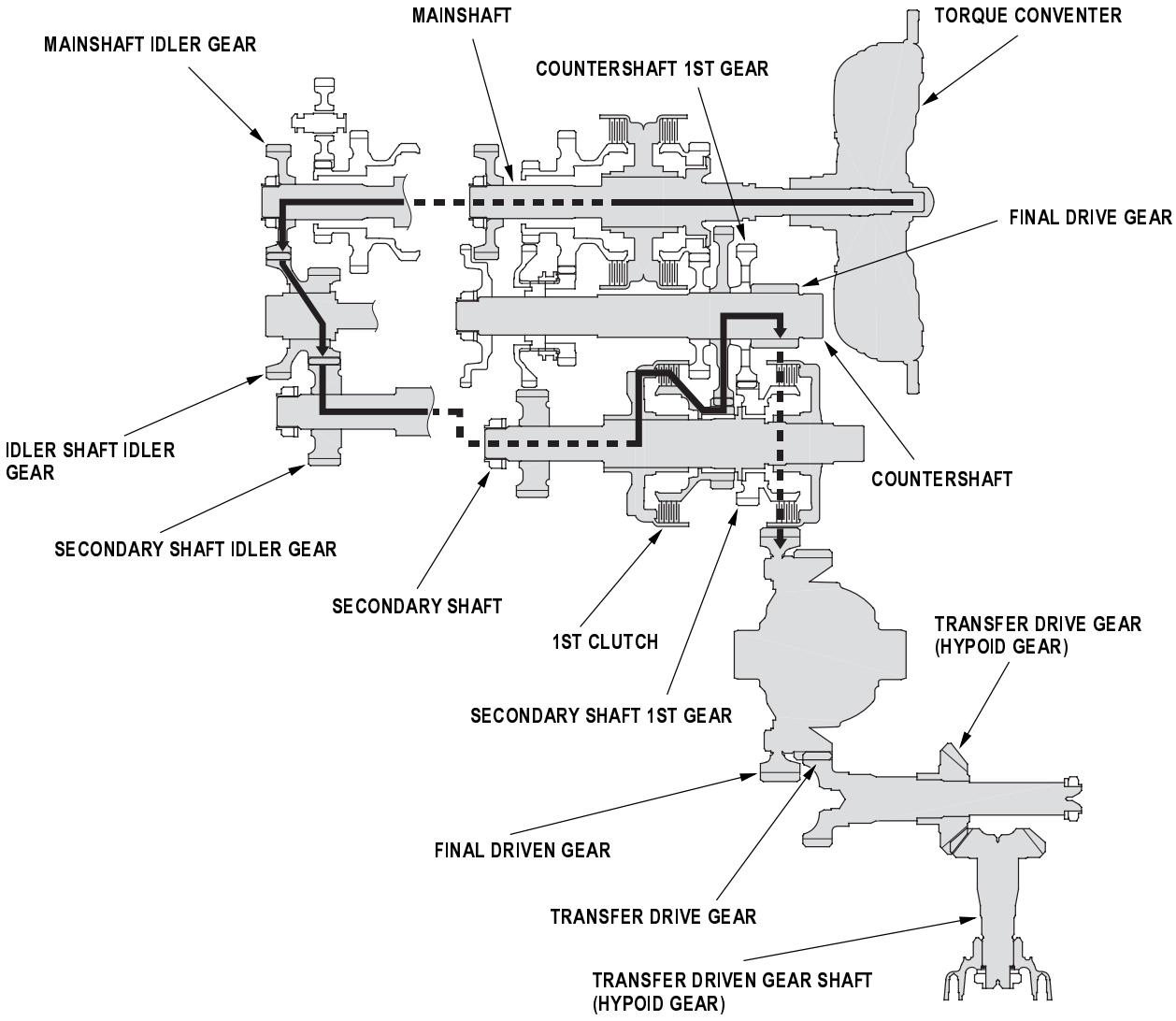
System Description (cont'd)

Power Flow

1st Gear

- Hydraulic pressure is applied to the 1st clutch, then the 1st clutch engages the secondary shaft 1st gear with the secondary shaft.
- The mainshaft idler gear drives the secondary shaft via the idler shaft idler gear and the secondary shaft idler gear.
- The secondary shaft 1st gear drives the countershaft 1st gear and the countershaft.
- Power is transmitted to the final drive gear, which in turn drives the final driven gear and the transfer drive gear.
- The transfer drive gear drives the transfer drive gear (hypoid gear) and the transfer driven gear shaft (hypoid gear).

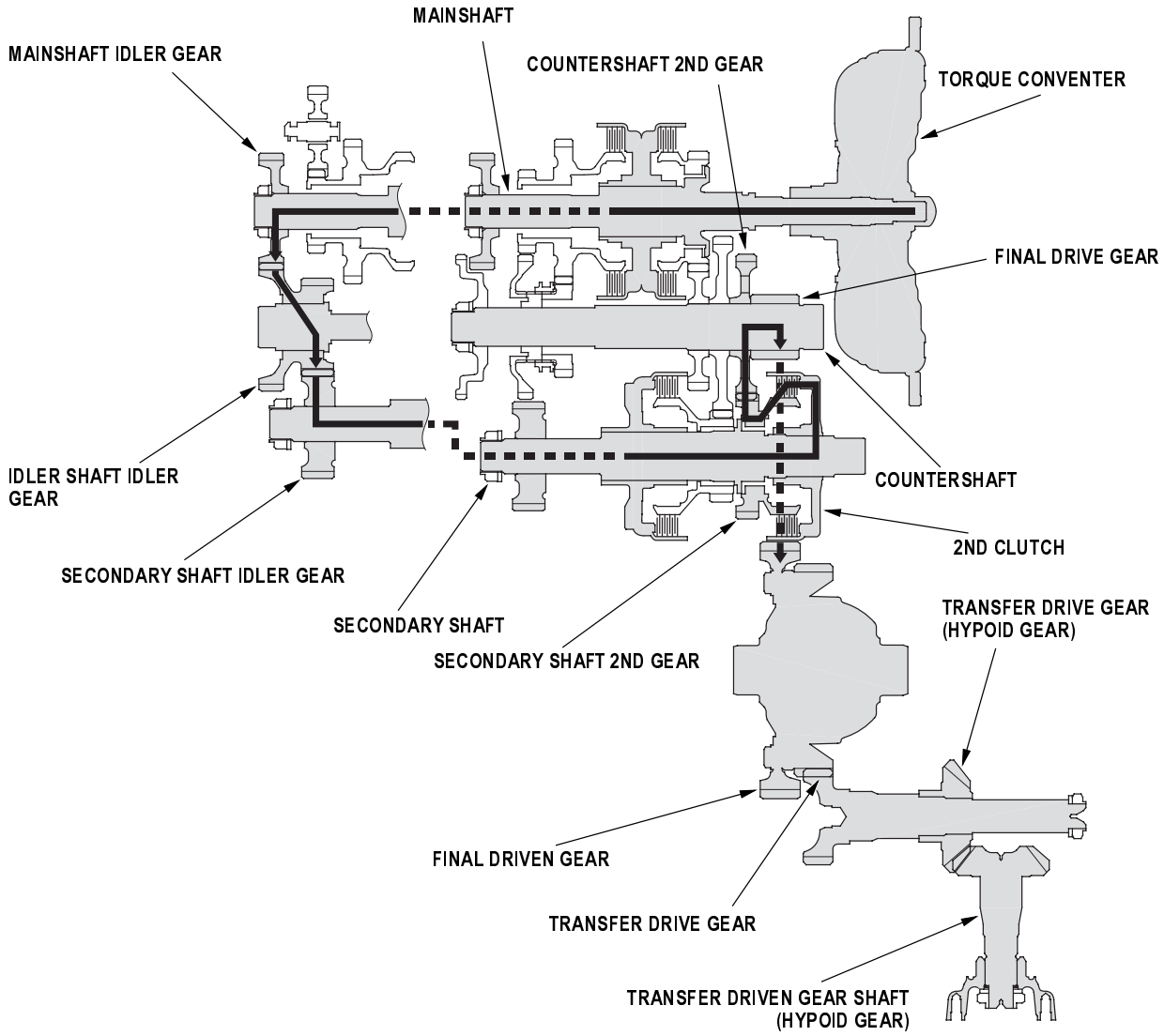
NOTE: The illustration shows the 4WD transmission; 2WD does not have the transfer mechanism.



2nd Gear

- Hydraulic pressure is applied to the 2nd clutch, then the 2nd clutch engages the secondary shaft 2nd gear with the secondary shaft.
- The mainshaft idler gear drives the secondary shaft via the idler shaft idler gear and the secondary shaft idler gear.
- The secondary shaft 2nd gear drives the countershaft 2nd gear and the countershaft.
- Power is transmitted to the final drive gear, which in turn drives the final driven gear and the transfer drive gear.
- The transfer drive gear drives the transfer drive gear (hypoid gear) and the transfer driven gear shaft (hypoid gear).

NOTE: The illustration shows the 4WD transmission; 2WD does not have the transfer mechanism.



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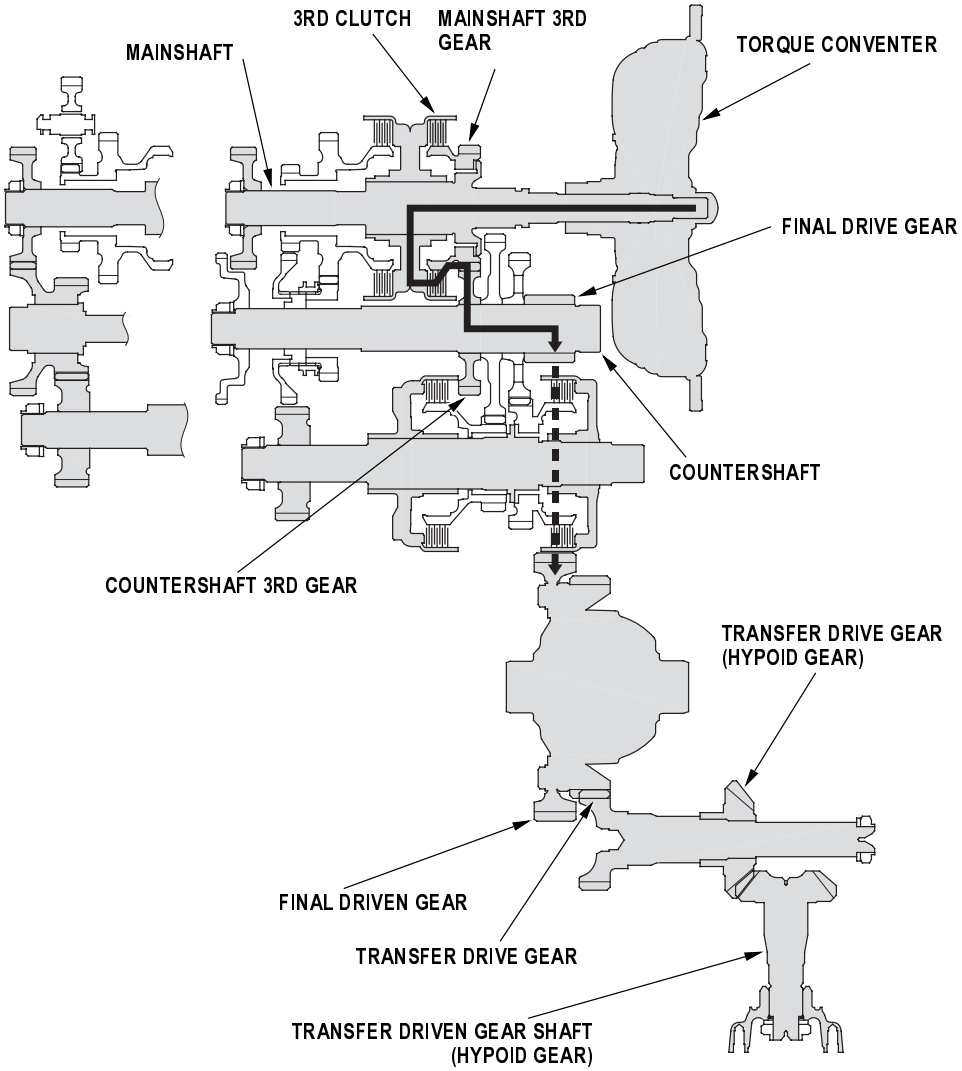
System Description (cont'd)

Power Flow (cont'd)

3rd Gear

- Hydraulic pressure is applied to the 3rd clutch, then the 3rd clutch engages the mainshaft 3rd gear with the mainshaft.
- The mainshaft 3rd gear drives the countershaft 3rd gear and the countershaft.
- Power is transmitted to the final drive gear, which in turn drives the final driven gear and the transfer drive gear.
- The transfer drive gear drives the transfer drive gear (hypoid gear) and the transfer driven gear shaft (hypoid gear).

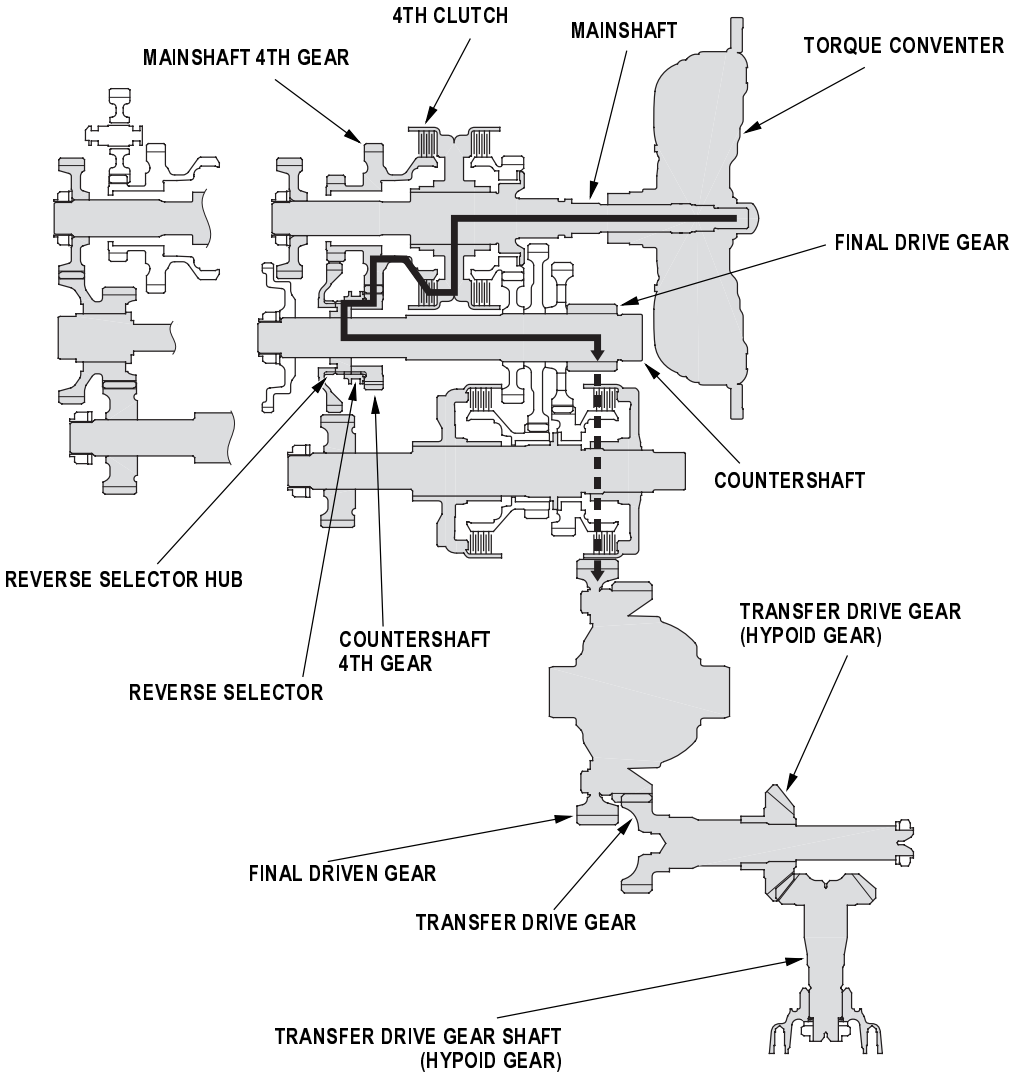
NOTE: The illustration shows the 4WD transmission; 2WD does not have the transfer mechanism.



4th Gear

- Hydraulic pressure is applied to the servo valve to engage the reverse selector with the countershaft 4th gear while the shift lever is in the [D], [2], [1] position (forward range).
- Hydraulic pressure is also applied to the 4th clutch, then the 4th clutch engages the mainshaft 4th gear with the mainshaft.
- The mainshaft 4th gear drives the countershaft 4th gear and the countershaft.
- Power is transmitted to the final drive gear, which in turn drives the final driven gear and the transfer drive gear.
- The transfer drive gear drives the transfer drive gear (hypoid gear) and the transfer driven gear shaft (hypoid gear).

NOTE: The illustration shows the 4WD transmission; 2WD does not have the transfer mechanism.



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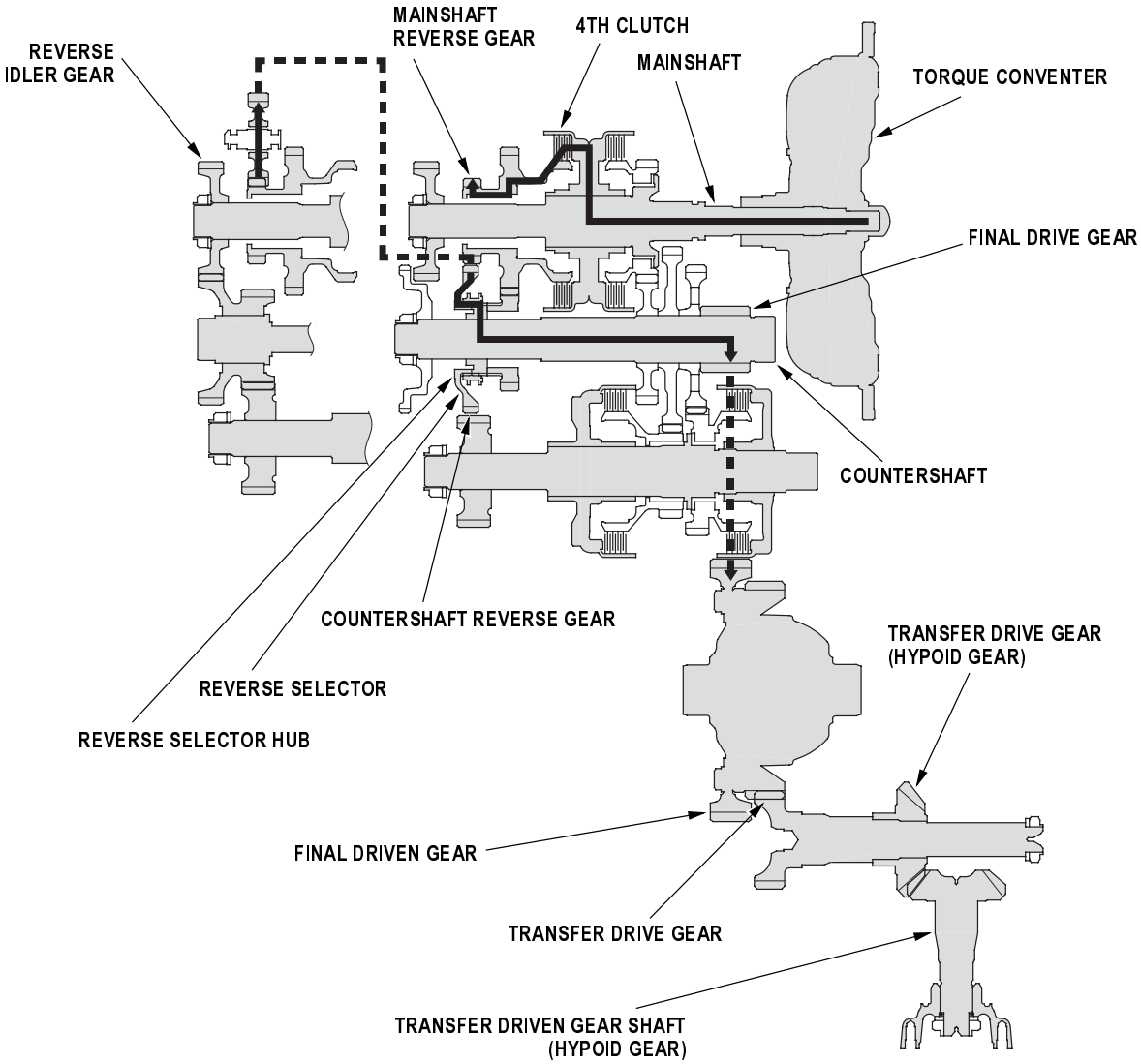
System Description (cont'd)

Power Flow (cont'd)

[R] Position

- Hydraulic pressure is applied to the servo valve to engage the reverse selector with the countershaft reverse gear while the shift lever is in the [R] position.
- Hydraulic pressure is also applied to the 4th clutch, then the 4th clutch engages the mainshaft reverse gear with the mainshaft.
- The mainshaft reverse gear drives the countershaft reverse gear via the reverse idler gear.
- The rotation direction of the countershaft reverse gear is changed by the reverse idler gear.
- The countershaft reverse gear drives the countershaft via the reverse selector which drives the reverse selector hub.
- Power is transmitted to the final drive gear, which in turn drives the final driven gear and the transfer drive gear.
- The transfer drive gear drives the transfer drive gear (hypoid gear) and the transfer driven gear shaft (hypoid gear).

NOTE: The illustration shows 4WD transmission; 2WD does not have the transfer mechanism.



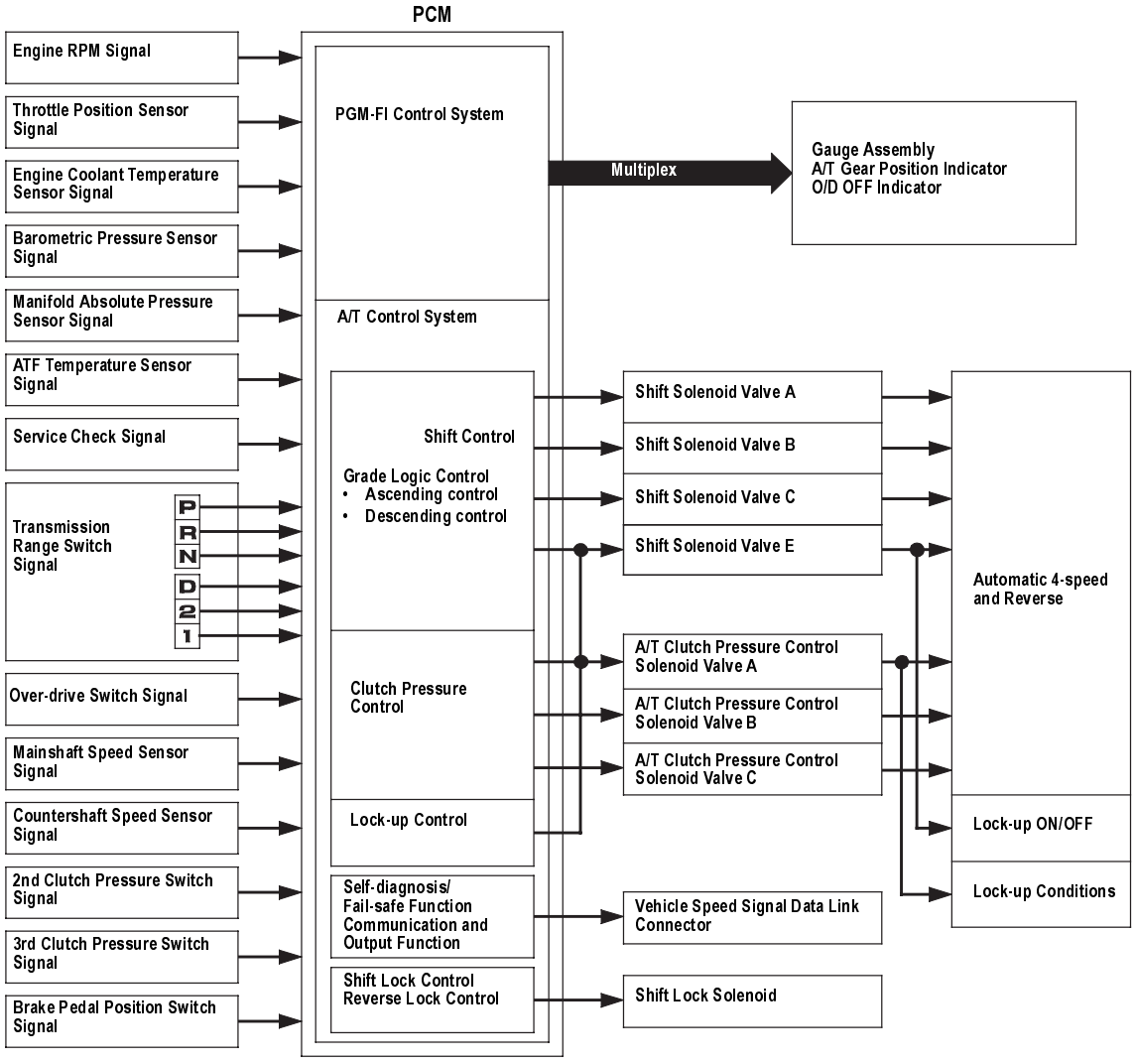
Electronic Control System

Functional Diagram

The electronic control system consists of the Powertrain Control Module (PCM), sensors, and solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions.

The PCM inputs signals from the sensors, switches, and other control units, perform processing data, and outputs signals for engine control system and A/T control system. The A/T control system includes shift control, grade logic control, clutch pressure control, and lock-up control is stored in the PCM.

The PCM switches the shift solenoid valves and the A/T clutch pressure control solenoid valves on hydraulic control to control shifting transmission gears and lock-up torque converter clutch.



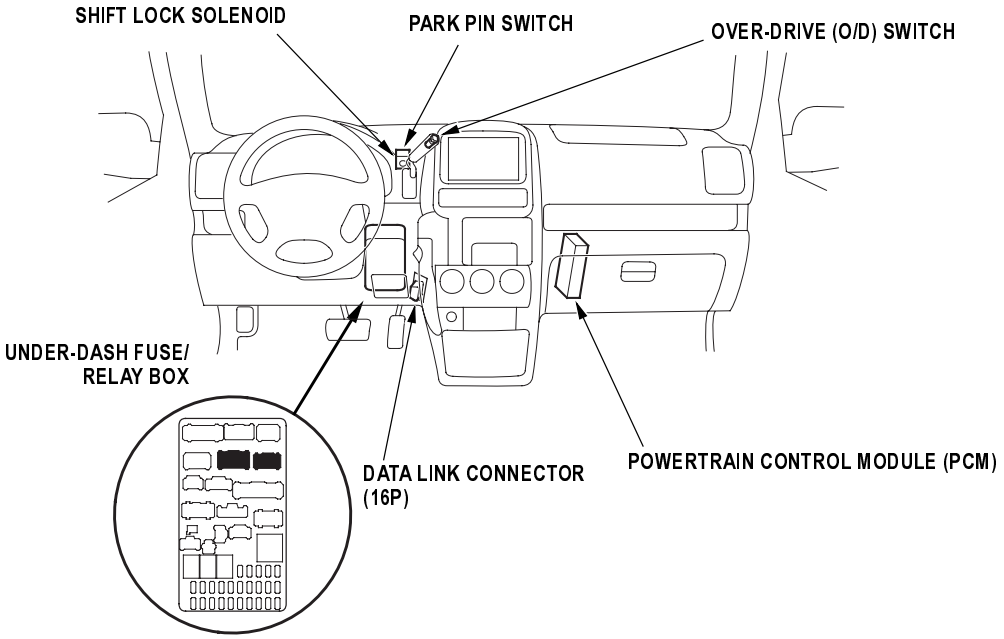
(cont'd)

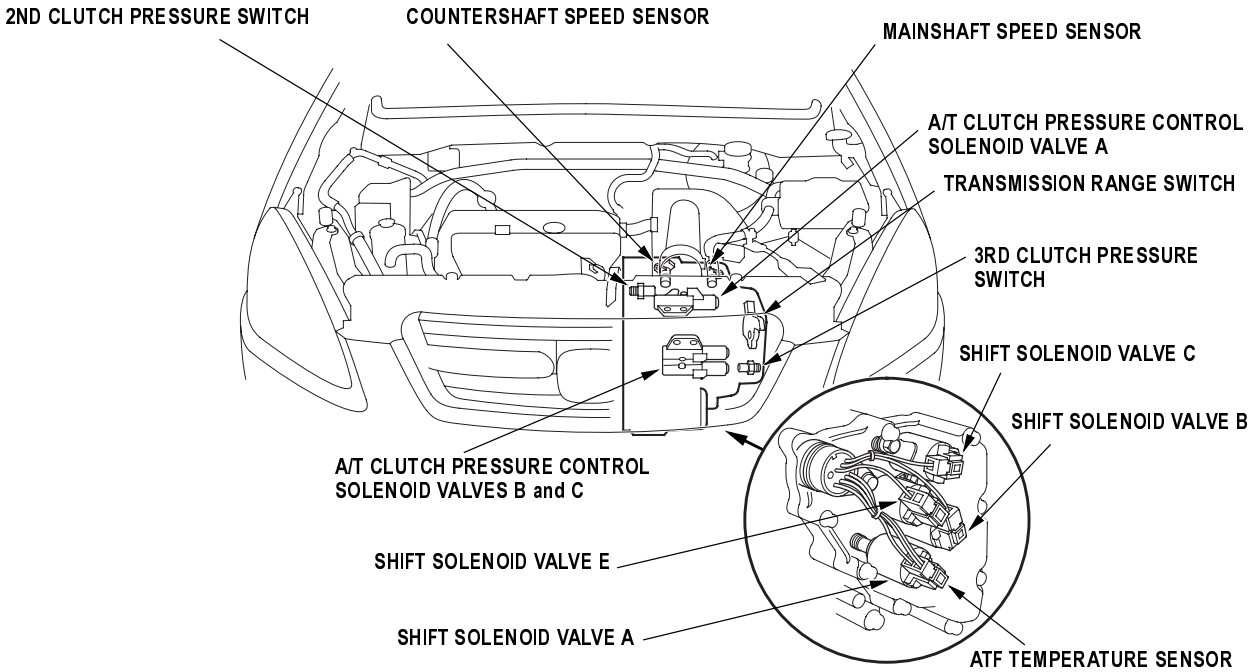
System Description (cont'd)

Electronic Control System (cont'd)

Electronic Controls Location

NOTE: The illustrations shows LHD model; RHD model is similar.

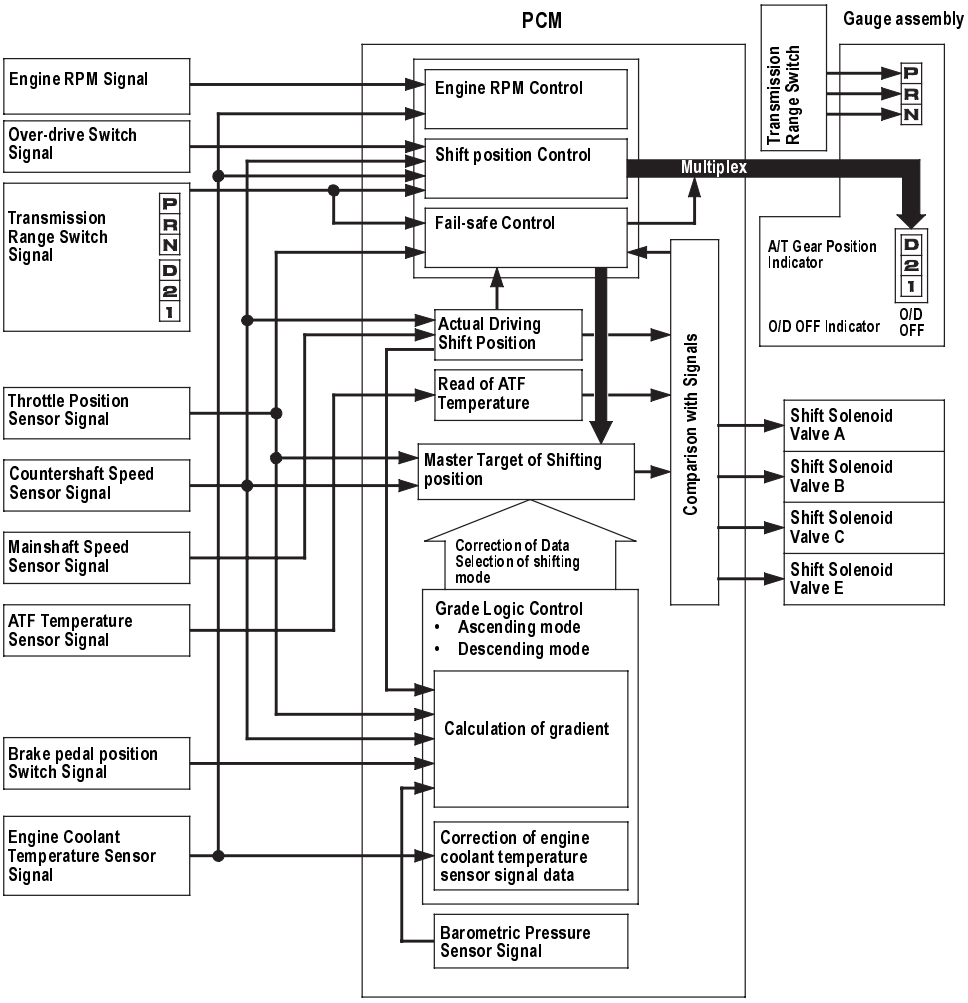




Shift Control

The PCM instantly determines which gear should be selected by various signals sent from sensors and switches, and it actuates the shift solenoid valves A, B, C, and E to control shifting.

Also, a Grade Logic Control System has been adopted to control shifting in [D] position. The PCM compares actual driving conditions with memorized driving conditions, based on the input from the throttle position sensor, the engine coolant temperature sensor, the barometric pressure sensor, the brake pedal position switch signal, and the shift lever position signal, to control shifting while vehicle is ascending or descending a slope.



(cont'd)

System Description (cont'd)

Electronic Control System (cont'd)

The PCM turns the shift solenoid valves A, B, C, and E ON and OFF to control shifting transmission gear. The combination of driving signals to shift solenoid valves A, B, C, and E are shown in table below.

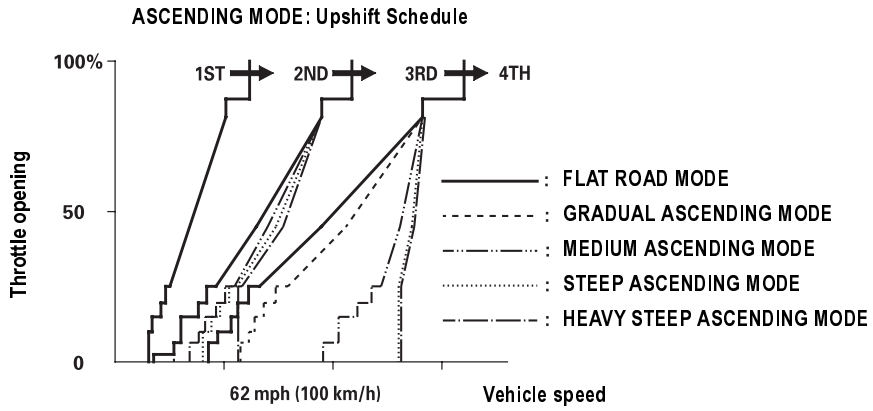
Position	Gear position	Shift solenoid valves			
		A	B	C	E
[D]	Shifting from [N] position	OFF	ON	ON	OFF
	Stays in 1st	ON	ON	ON	OFF
	Shifting gears between 1st and 2nd	OFF	ON	ON	OFF
	Stays in 2nd	OFF	ON	OFF	OFF
	Shifting gears between 2nd and 3rd	OFF	ON	ON	OFF
	Stays in 3rd	OFF	OFF	ON	OFF
	Shifting gears between 3rd and 4th	OFF	OFF	OFF	OFF
	Stays in 4th	ON	OFF	OFF	OFF
[2]	2nd gear	OFF	ON	OFF	OFF
[1]	1st gear	ON	ON	ON	OFF
[R]	Shifting from [P] and [N] position	OFF	ON	OFF	ON
	Stays in reverse	ON	ON	OFF	ON
	Reverse inhibitor control	OFF	OFF	ON	OFF
[P]	Park	OFF	ON	OFF	ON
[N]	Neutral	OFF	ON	ON	OFF

Grade Logic Control

Ascending Control

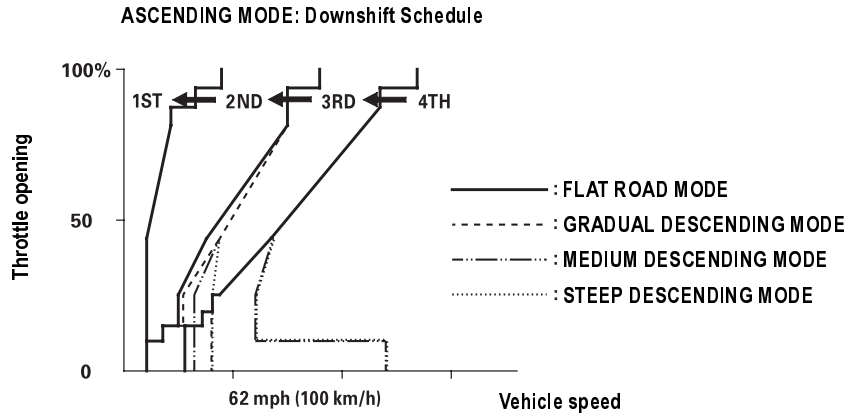
When the PCM determines that the vehicle is climbing a hill in [D] position, the system extends the engagement area of 2nd, and 3rd gears to prevent the transmission from frequently shifting between 2nd and 3rd gears, and between 3rd and 4th gears, so the vehicle can run smooth and have more power when needed.

Shift schedules stored in the PCM between 2nd and 3rd gears, and between 3rd and 4th gears, enable it to automatically select the most suitable gear according to the magnitude of a gradient.



Descending Control

When the PCM determines that the vehicle is going down a hill in [D] position, the shift-up speed from 3rd to 4th gear, and from 2nd to 3rd gear (when the throttle is closed) becomes faster than the set speed for flat road driving to widen the 3rd gear and 2nd gear driving area. This, in combination with engine braking from the deceleration lock-up, achieves smooth driving when the vehicle is descending. There are three descending modes with different 3rd gear driving areas, and 2nd gear driving areas according to the magnitude of a gradient stored in the PCM. When the vehicle is 4th gear, and you are decelerating when you are applying the brakes on a steep hill, the transmission will downshift to lower gear. When you accelerate, the transmission will then return to higher gear.



(cont'd)

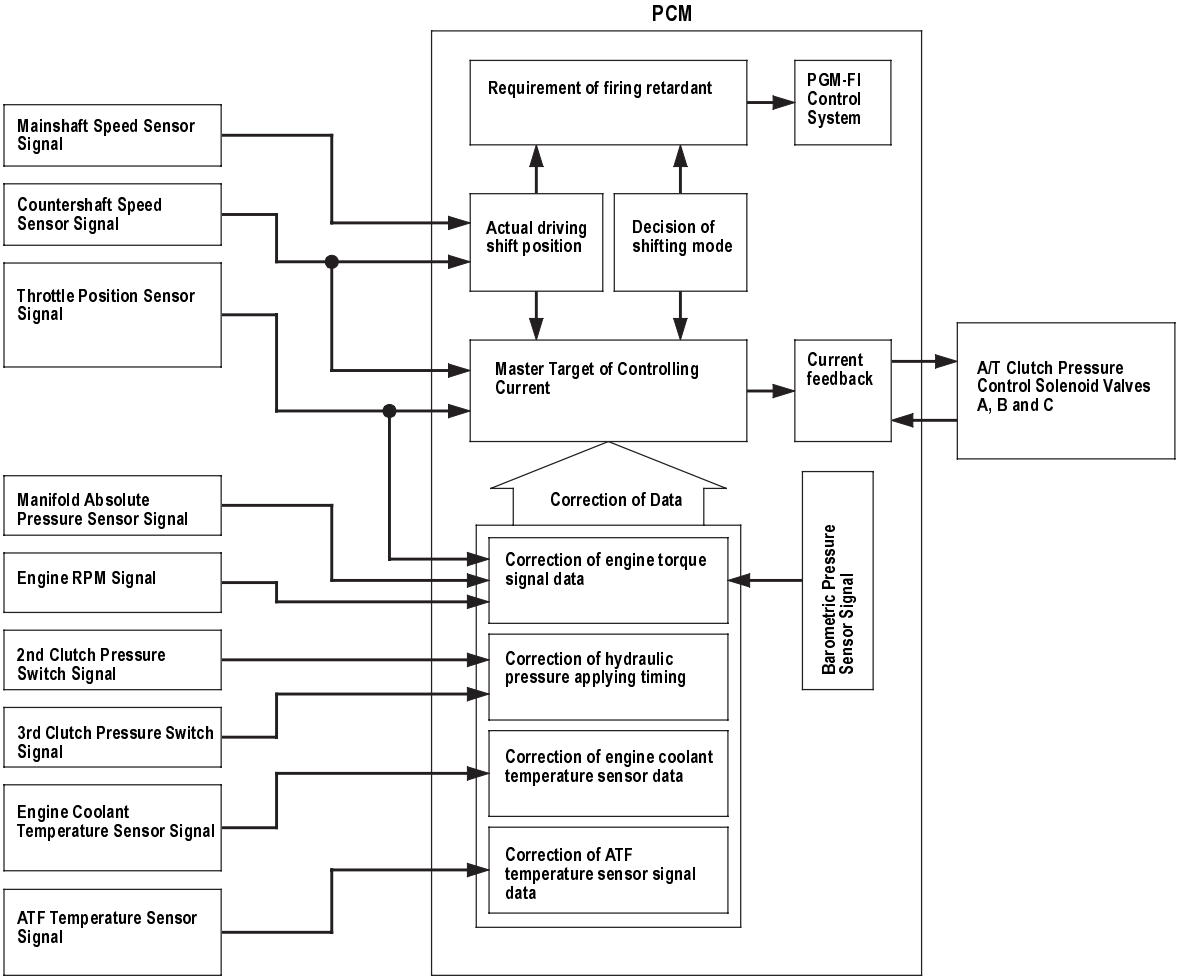
System Description (cont'd)

Electronic Control System (cont'd)

Clutch Pressure Control

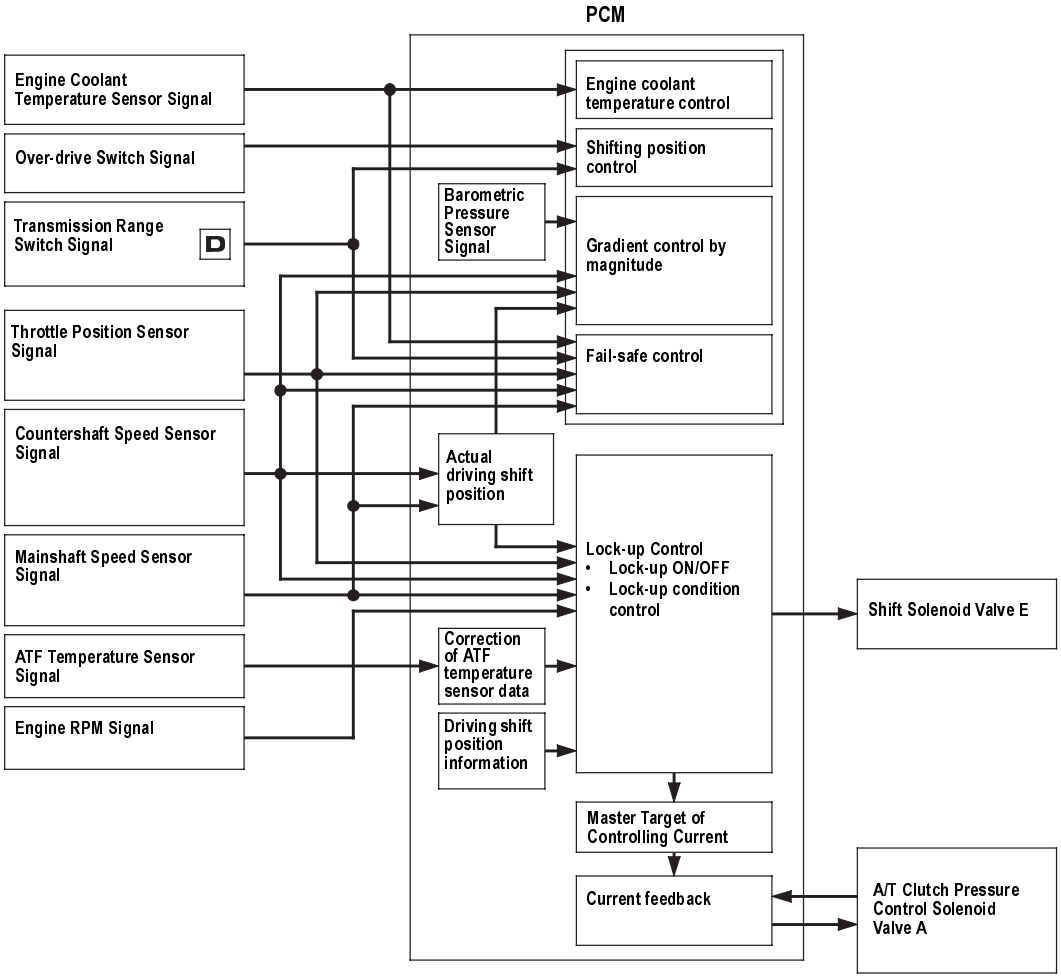
The PCM actuates the A/T clutch pressure control solenoid valves A, B and C to control the clutch pressure. When shifting between lower and higher gears, the clutch pressure regulated by the A/T clutch pressure control solenoid valves A, B, and C engage and disengage the clutch smoothly.

The PCM inputs signals from the various sensors and switches, perform processing data, and outputs a current to the A/T clutch pressure control solenoid valves A, B, and C.



Lock-up Control

The shift solenoid valve E controls the hydraulic pressure to switch the lock-up shift valve and lock-up ON and OFF.
The PCM actuates the shift solenoid valve E and the A/T clutch pressure control solenoid valve A to control the torque converter clutch lock-up. When the shift solenoid valve E is turned ON, the condition of the lock-up starts.
The A/T clutch pressure control solenoid valve A regulates and apply the hydraulic pressure to the lock-up control valve to control the volume of the lock-up.
The lock-up mechanism operates in 3rd and 4th gears in [D] position, and 3rd gear in [D] position over-drive off mode.

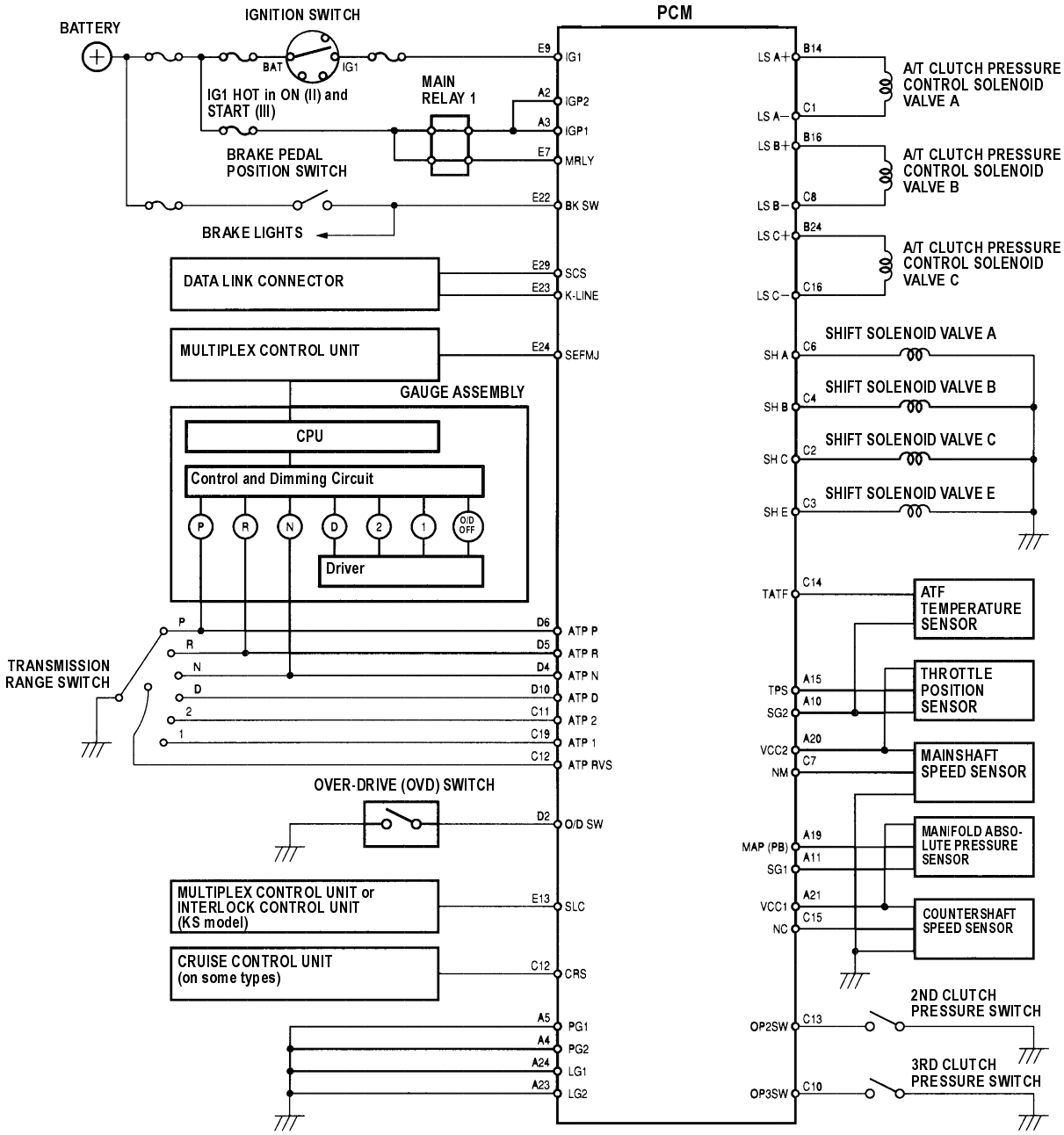


(cont'd)

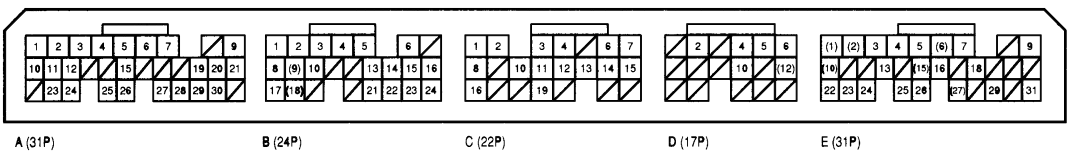
System Description (cont'd)

Electronic Control System (cont'd)

PCM Electrical Connections



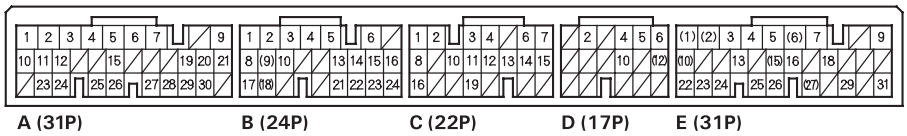
PCM Connector Terminal Location



PCM Inputs and Outputs

The PCM terminal voltage and measuring conditions are shown for the connector terminals that are related to the A/T control system. The other PCM terminal voltage and measuring conditions are described in section 11 (see section 11).

PCM Connector Terminal Locations



PCM CONNECTOR A (31P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
A2	YEL/BLK	IGP2	Power supply circuit from main relay	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
A3	YEL/BLK	IGP1	Power supply circuit from main relay	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
A4	BLK	PG2	Ground	
A5	BLK	PG1	Ground	
A10	GRN/YEL	SG2	Sensor ground	
A11	GRN/WHT	SG1	Sensor ground	
A20	YEL/BLU	VCC2	Power supply circuit for sensors	With ignition switch ON (II): About 5 V With ignition switch OFF: 0 V
A21	YEL/RED	VCC1	Power supply circuit for sensors	With ignition switch ON (II): About 5 V With ignition switch OFF: 0 V
A23	BRN/YEL	LG2	Ground	
A24	BRN/YEL	LG1	Ground	

PCM CONNECTOR B (24P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
B14	RED/BLK	LS A+	A/T clutch pressure control solenoid valve A power supply positive electrode	With ignition switch ON (II): Pulsing signal
B16	BRN/WHT	LS B+	A/T clutch pressure control solenoid valve B power supply positive electrode	With ignition switch ON (II): Pulsing signal
B24	BLU/YEL	LS C+	A/T clutch pressure control solenoid valve C power supply positive electrode	With ignition switch ON (II): Pulsing signal

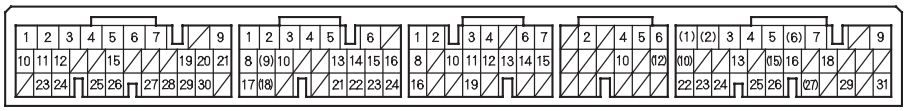
(cont'd)

System Description (cont'd)

Electronic Control System (cont'd)

PCM Inputs and Outputs (cont'd)

PCM Connector Terminal Locations



PCM CONNECTOR C (22P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
C1	WHT/BLK	LS A-	A/T clutch pressure control solenoid valve A power supply negative electrode	With ignition switch ON (II): 0 V
C2	GRN	SH C	Shift solenoid valve C control	Battery voltage in these positions: • [N] and [1] • 1st and 3rd gears in [D] 0 V in these positions: • [2], [P] and [R] • 2nd and 4th gears in [D]
C3	YEL	SH E	Shift solenoid valve E control	Battery voltage in these positions: • [P] and [R] 0 V in these positions: • [N], [D], [2], and [1]
C4	GRN/WHT	SH B	Shift solenoid valve B control	Battery voltage in these positions: • [2], [1], [P], [R], and [N] • 1st and 2nd gears in [D] 0 V in these positions: • 3rd and 4th gears in [D]
C6	BLU/BLK	SH A	Shift solenoid valve A control	Battery voltage in these positions: • [R] and [1] • 1st and 4th gears in [D] 0 V in these positions: • [2], [P] and [N] • 2nd and 3rd gears in [D]
C7	WHT/RED	NM	Mainshaft speed sensor input	With ignition switch ON (II): 0 V or about 5 V With engine at idle in [N] position: 1.5 V - 3.5 V

PCM CONNECTOR C (22P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
C8	BLK/RED	LS B-	A/T clutch pressure control solenoid valve B power supply negative electrode	With ignition switch ON (II): 0 V
C10	BLU/WHT	OP3SW	3rd clutch pressure switch signal input	With ignition switch ON (II): About 5 V (No 3rd clutch pressure) With 3rd clutch pressure: About 0 V
C11	GRN/RED	ATP 2	Transmission range switch [2] position signal input	In [2] position: 0 V In other than [2] position: About 5 V
C12	RED/WHT	ATP RVS	Transmission range switch RVS ([R] position) signal input	In [R] position: 0 V In other than [R] position: About 5 V
C13	BLU/RED	OP2SW	2nd clutch pressure switch signal input	With ignition switch ON (II): About 5 V (No 2nd clutch pressure) With 2nd clutch pressure: About 0 V
C14	RED/YEL	TATF	ATF temperature sensor signal input	With ignition switch ON (II): 0.2 V - 4.8 V With ignition switch OFF: 0 V
C15	BLU	NC	Countershaft speed sensor input	With ignition switch ON (II): 0V or about 5 V With driving: About 1.5 V - 3.5 V
C16	WHT/BLU	LS C-	A/T clutch pressure control solenoid valve C power supply negative electrode	With ignition switch ON (II): 0 V
C19	BRN	ATP 1	Transmission range switch [1] position signal input	In [1] position: 0 V In other than [1] position: About 5 V

PCM CONNECTOR D (17P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
D2	GRN	O/D SW	Over-drive (O/D) switch signal input	With ignition switch ON (II): About 5 V With ignition switch ON (II) and O/D switch ON: 0 V
D4	BLK/RED	ATP N	Transmission range switch [N] position signal input	In [N] position: 0 V In other than [N] position: About 5 V
D5	WHT	ATP R	Transmission range switch [R] position signal input	In [R] position: 0 V In other than [R] position: About 5 V
D6	BLU/BLK	ATP P	Transmission range switch [P] position signal input	In [P] position: 0 V In other than [P] position: About 5 V
D10	WHT/GRN	ATP D	Transmission range switch [D] position signal input	In [D] position: 0 V In other than [D] position: About 5 V

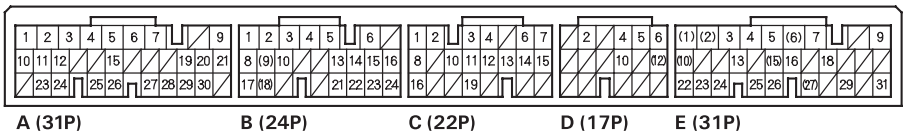
(cont'd)

System Description (cont'd)

Electronic Control System (cont'd)

PCM Inputs and Outputs (cont'd)

PCM Connector Terminal Locations

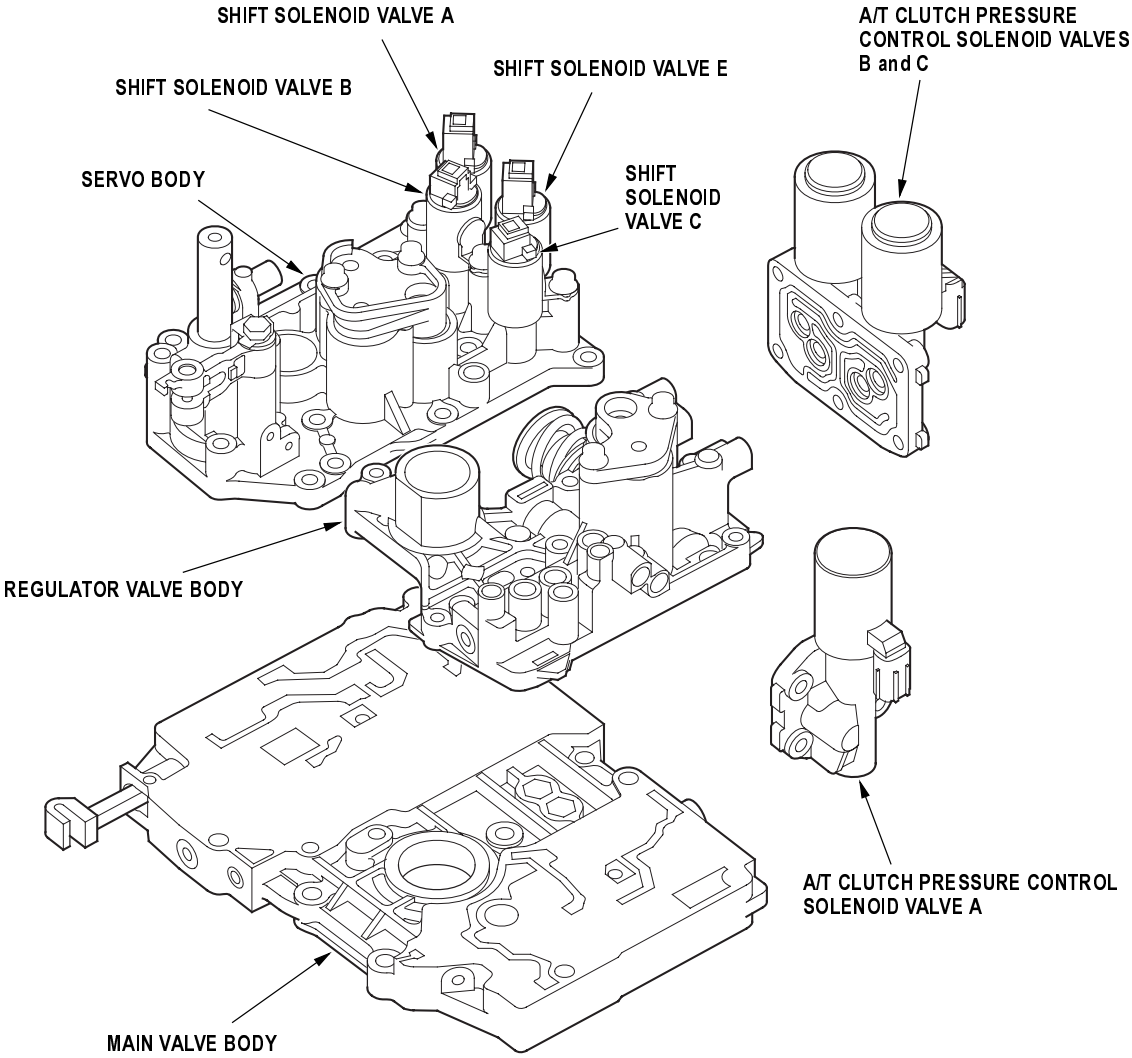


PCM CONNECTOR E (20P)

Terminal Number	Wire Color	Signal	Description	Measuring Conditions/Terminal Voltage
E7	RED/YEL	MRLY	Power supply circuit from main relay 1	With ignition switch ON (II): 0 V With ignition switch OFF: Battery voltage
E9	YEL/BLK	IG1	Power supply circuit for solenoid valves	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
E13	WHT/BLU	SLC	Shift lock control	With ignition switch ON (II), brake pedal pressed, and accelerator pedal released: About 5 V
E22	WHT/BLK	BK SW	Brake pedal position switch signal input	Brake pedal pressed: Battery voltage Brake pedal released: 0 V
E23	LT BLU	K-LINE	Communication line PCM-to-DLC	With ignition switch ON (II): Battery voltage
E24	YEL	SEFMJ	Multiplex line PCM-to-gauge assembly	With ignition switch ON (II): About 5 V
E29	BRN	SCS	SCS terminal on the DLC signal input	With ignition switch ON (II) • SCS terminals on the DLC open: About 5 V or battery voltage • SCS terminals short-circuited to ground: 0 V

Hydraulic Controls

The valve body includes the main valve body, the regulator valve body, and the servo body. The ATF pump is driven by splines on the left end of the torque converter which is attached to the engine. Fluid flows through the regulator valve to maintain specified pressure through the main valve body to the manual valve, directing pressure to the shift valves and to each of the clutches via the solenoid valves. The shift solenoid valves A, B, C, and E are bolted on the servo body. The A/T clutch pressure control solenoid valves A, B, and C are mounted on the outside of the transmission housing.



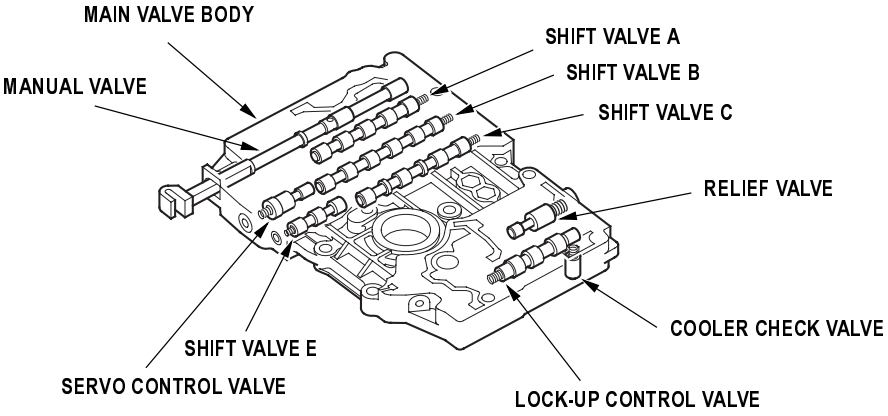
(cont'd)

System Description (cont'd)

Hydraulic Controls (cont'd)

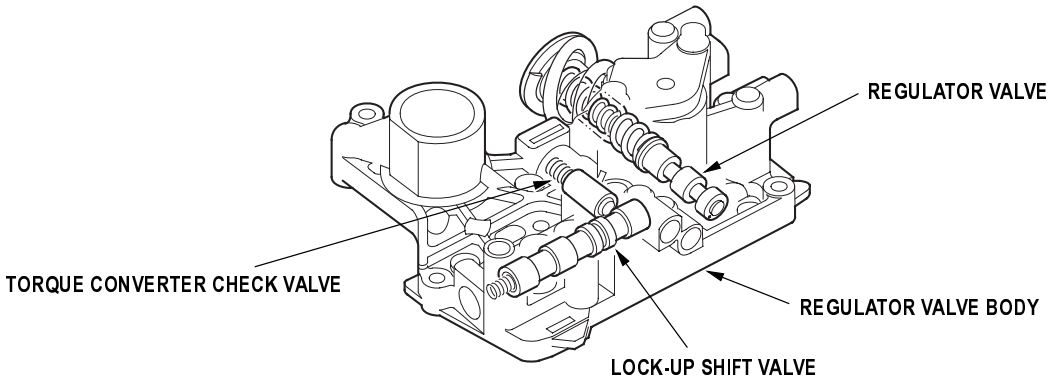
Main Valve Body

The main valve body contains the manual valve, the shift valves A, B, C, and E, the relief valve, the lock-up control valve, the cooler check valve, the servo control valve, and the ATF pump gears. The primary function of the main valve body is to switch fluid pressure on and off and to control hydraulic pressure going to the hydraulic control system.



Regulator Valve Body

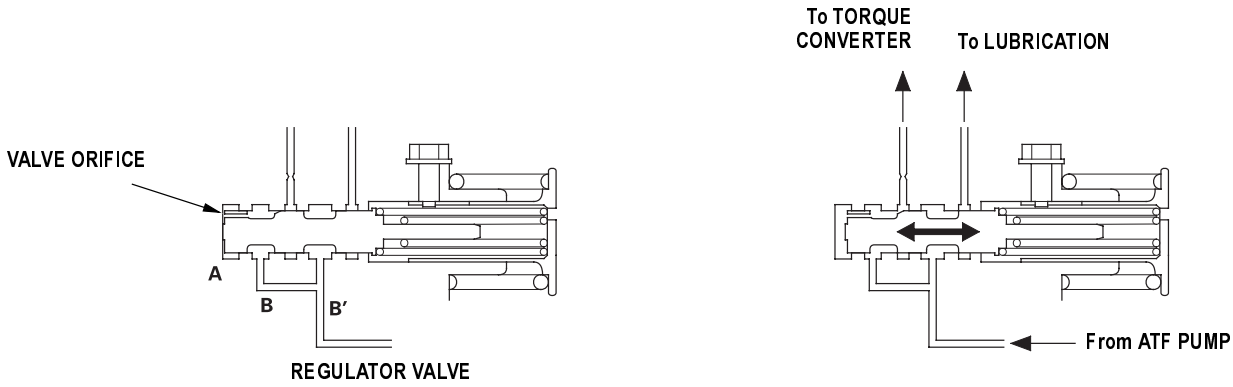
The regulator valve body contains the regulator valve, the torque converter check valve, lock-up shift valve, and the 1st accumulator.



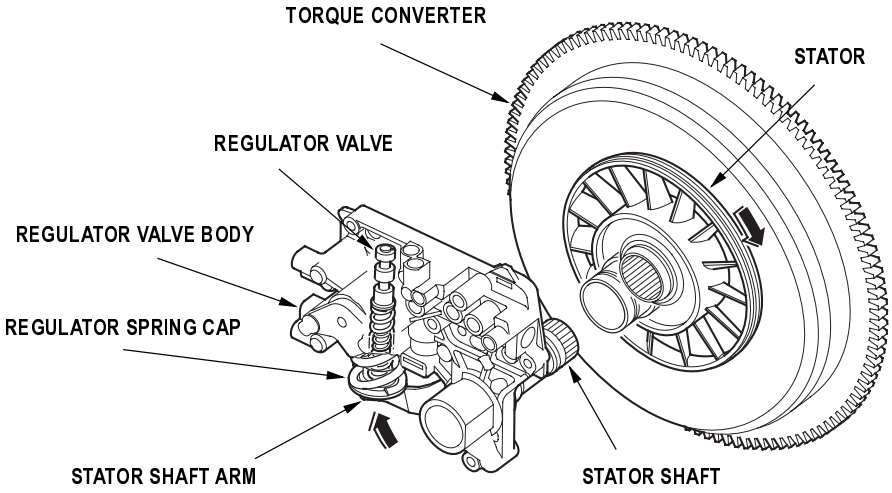
Regulator Valve

The regulator valve maintains a constant hydraulic pressure from the ATF pump to the hydraulic control system, while also furnishing fluid to the lubrication system and torque converter. The fluid from the ATF pump flows through B and B'. Fluid entering from B flows through the valve orifice to the A cavity. This pressure of the A cavity pushes the regulator valve to the right side, and this movement of the regulator valve uncovers the fluid port to the torque converter and the relief valve. The fluid flows out to the torque converter and the relief valve, and the regulator valve moves to the left side. According to the level of the hydraulic pressure through B, the position of the regulator valve changes, and the amount of fluid from B' through torque converter also changes. This operation is continued, maintaining the line pressure.

NOTE: When used, "left" or "right" indicates direction on the illustration below.



Increases in hydraulic pressure according to torque are performed by the regulator valve using stator torque reaction. The stator shaft is splined with the stator in the torque converter, and its arm end contacts the regulator spring cap. When the vehicle is accelerating or climbing (Torque Converter Range), stator torque reaction acts on the stator shaft, and the stator arm pushes the regulator spring cap in the direction of the arrow in proportion to the reaction. The stator reaction spring compresses, and the regulator valve moves to increase the line pressure which is regulated by the regulator valve. The line pressure reaches its maximum when the stator torque reaction reaches its maximum.



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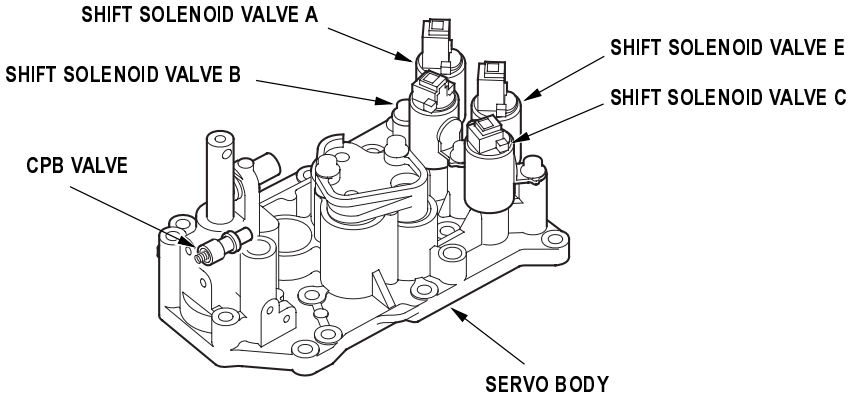
System Description (cont'd)

Hydraulic Controls (cont'd)

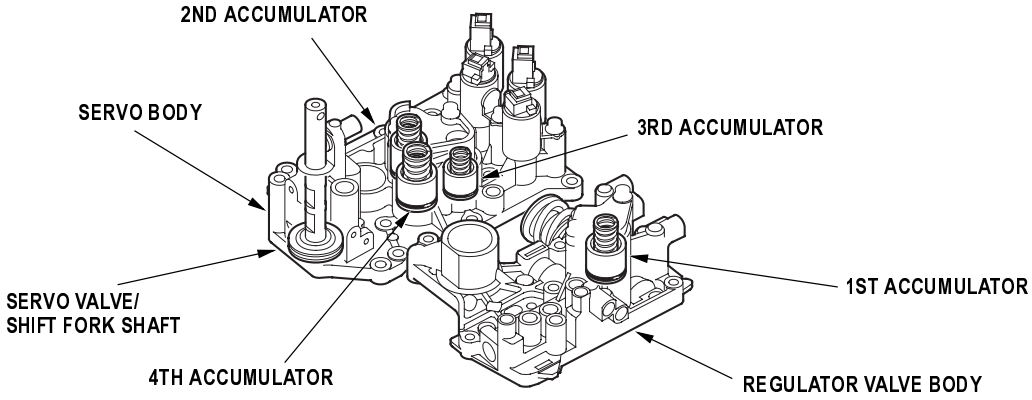
Servo Body

The servo body contains the servo valve, the clutch pressure back-up (CPB) valve, accumulators for 2nd, 3rd, and 4th, and shift solenoid valves for A, B, C, and E.



Accumulator

The accumulators are located in the regulator valve body and the servo body. The regulator valve body contains the 1st accumulator, and the servo body contains the 2nd, 3rd, and 4th accumulators.



Hydraulic Flow

Distribution of Hydraulic Pressure

As the engine turns, the ATF pump starts to operate. Automatic transmission fluid (ATF) is drawn through the ATF strainer (filter) and discharged into the hydraulic circuit. Then, ATF flowing from the ATF pump becomes line pressure that's regulated by the regulator valve. Torque converter pressure from the regulator valve enters the torque converter through the lock-up shift valve, and it is discharged from the torque converter. The torque converter check valve prevents torque converter pressure from rising.

The PCM controls the shift solenoid valves ON and OFF. The shift valve intercepts line pressure from the ATF pump via the manual valve when the shift solenoid valve is OFF. When the shift solenoid valve is turned ON, line pressure changes to shift solenoid valve pressure at the shift solenoid valve, then the solenoid valve pressure flows to the shift valve. Applying shift solenoid pressure to the shift valves moves the position of the shift valve, and switches the port of the hydraulic circuit. The PCM also controls A/T clutch pressure control solenoid valves A, B, and C. The A/T clutch pressure control solenoid valves regulate hydraulic pressure, and apply the pressure to the clutches for engaging smoothly. The clutches are received optimum clutch pressure which is regulated by the A/T clutch pressure control solenoid valves for comfortable driving and shifting under all conditions.

Hydraulic pressure at the port is as follows:

PORT NO.	DESCRIPTION OF PRESSURE	PORT NO.	DESCRIPTION OF PRESSURE
1	LINE	SC	SHIFT SOLENOID VALVE C
3	LINE	SE	SHIFT SOLENOID VALVE E
3'	LINE	10	1ST CLUTCH
4	LINE	20	2ND CLUTCH
4'	LINE	30	3RD CLUTCH
4''	LINE	40	4TH CLUTCH
7	LINE	55	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A
1A	LINE or A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A	55'	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A
1B	LINE	56	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B
3A	LINE	57	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C
3B	LINE	90	TORQUE CONVERTER
3C	LINE	91	TORQUE CONVERTER
5A	LINE	92	TORQUE CONVERTER
5B	LINE	93	ATF COOLER
5C	LINE	94	TORQUE CONVERTER
5D	LINE	95	LUBRICATION
5E	LINE or A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B	96	TORQUE CONVERTER
5F	LINE or A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A or B	97	TORQUE CONVERTER
5G	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B	99	SUCTION
5H	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C	X	DRAIN
5K	A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C	HX	HIGH POSITION DRAIN
SA	SHIFT SOLENOID VALVE A	AX	AIR DRAIN
SB	SHIFT SOLENOID VALVE B		

(cont'd)

System Description (cont'd)

Hydraulic Flow (cont'd)

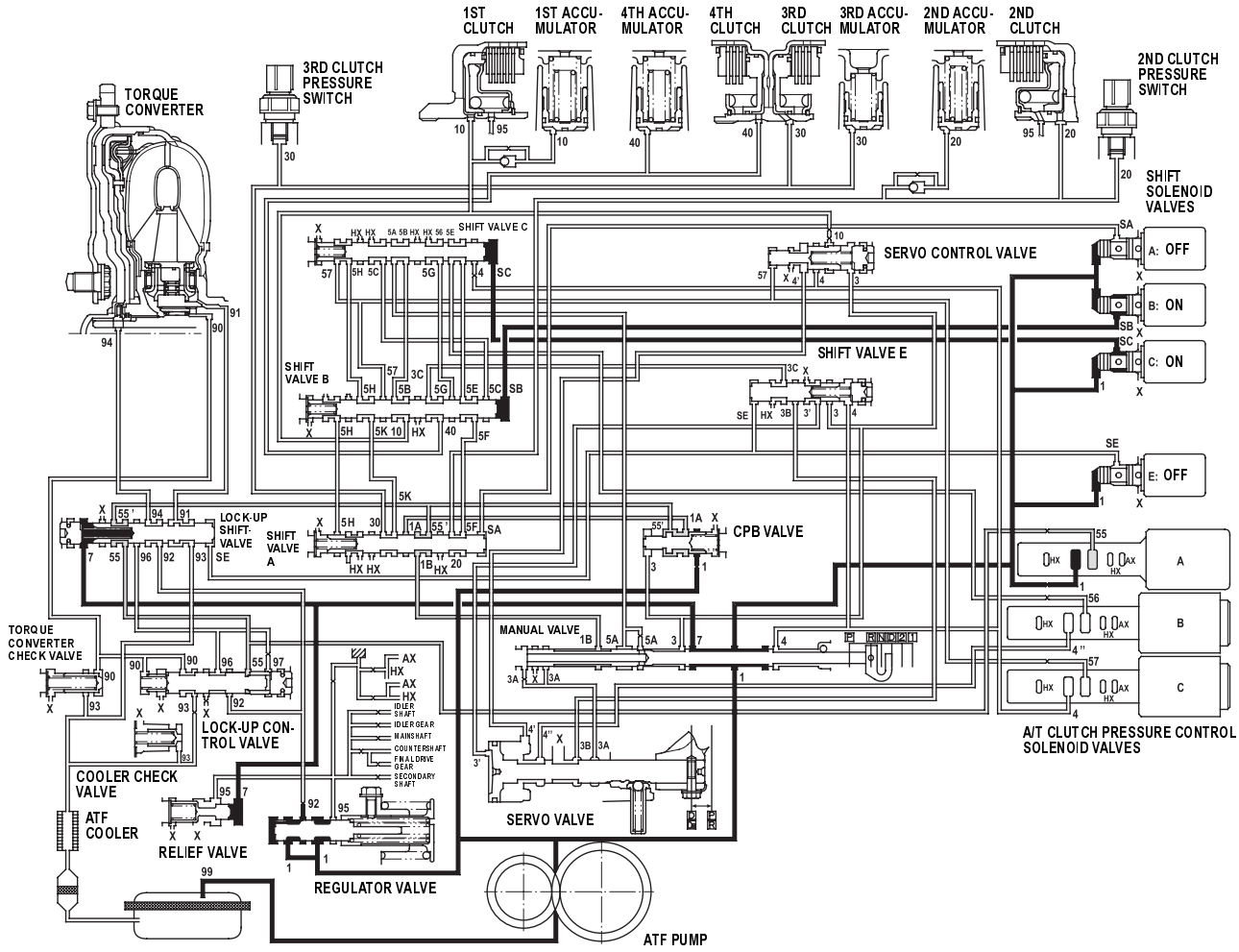
[N] Position

The PCM controls the shift solenoid valves. The conditions of the shift solenoid valves and positions of the shift valves are as follows:

- Shift solenoid valve A: OFF Shift valve A remains in right side
- Shift solenoid valve B: ON Shift valve B moves to left side
- Shift solenoid valve C: ON Shift valve C moves to left side
- Shift solenoid valve E: OFF Shift valve E remains in left side

Line pressure (1) flows to the shift solenoid valves and the A/T clutch pressure control solenoid valve A, and changes to A/T clutch pressure control solenoid valve A pressure (55) at the A/T clutch pressure control solenoid valve A. A/T clutch pressure control solenoid valve A pressure (55) becomes to line pressure (1B) at the shift valve A, and stops at the manual valve. Under this condition, hydraulic pressure is not applied to the clutches.

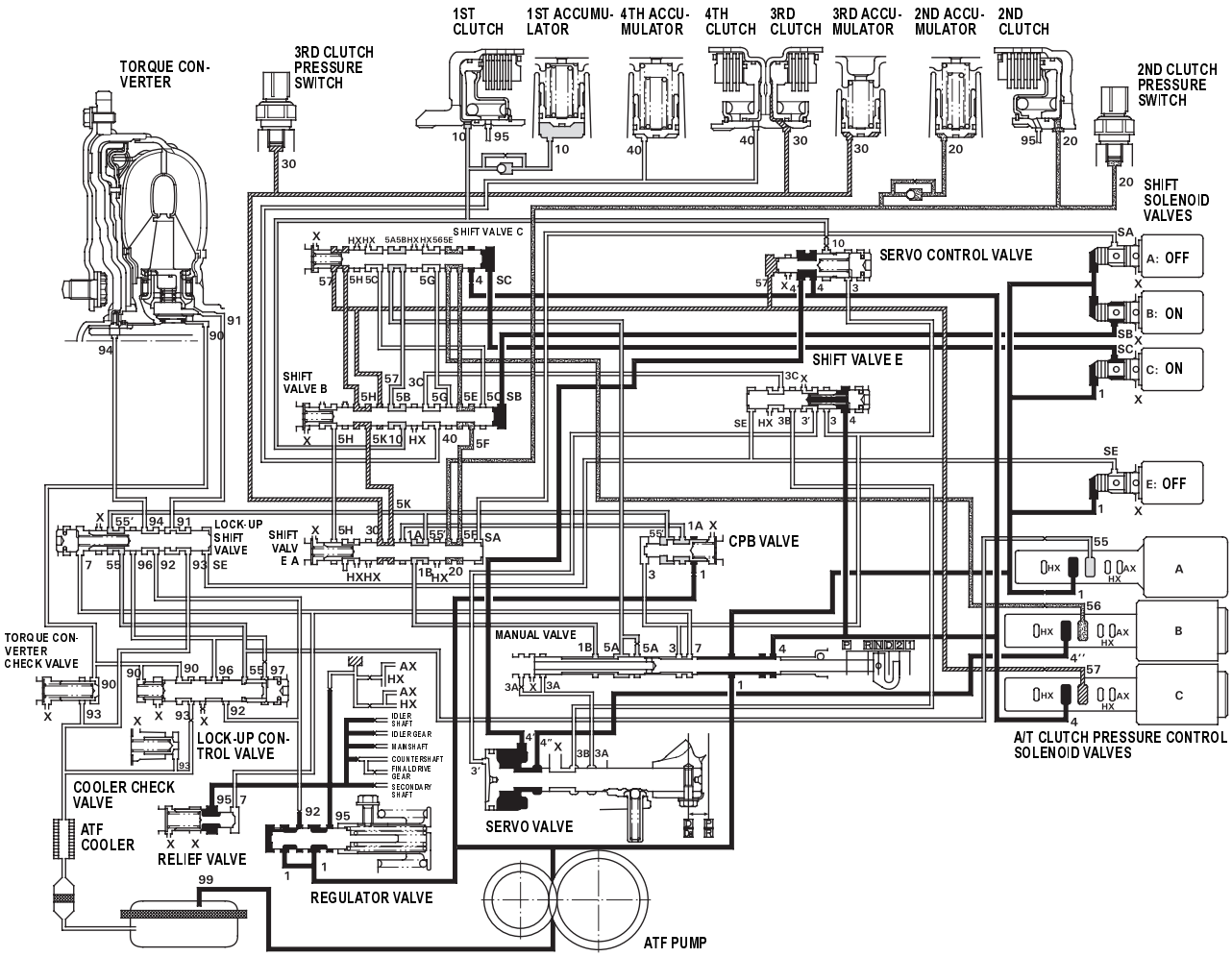
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[D] Position: 1st gear shifting from [N] position

Shift solenoid valves remain the same as in [N] position, when shifting to [D] position from [N]. The manual valve is moved to [D] position, and switches the port of line pressure (4) leading to the A/T clutch pressure control solenoid valves. Hydraulic pressure line to the 1st clutch from the A/T clutch pressure control solenoid valve A is created as shift solenoid valve A is OFF, B and C remain ON. A/T clutch pressure control solenoid valve A pressure (55) changes to 1st clutch pressure (10) at the shift valve B, and flows to the 1st clutch. A/T clutch pressure control solenoid valves B and C pressures also flow to the 2nd and 3rd clutches. The 2nd and 3rd clutch engagement reduces 1st clutch engaging shock. The 1st clutch is engaged gently when shifting to [D] position from [N].

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

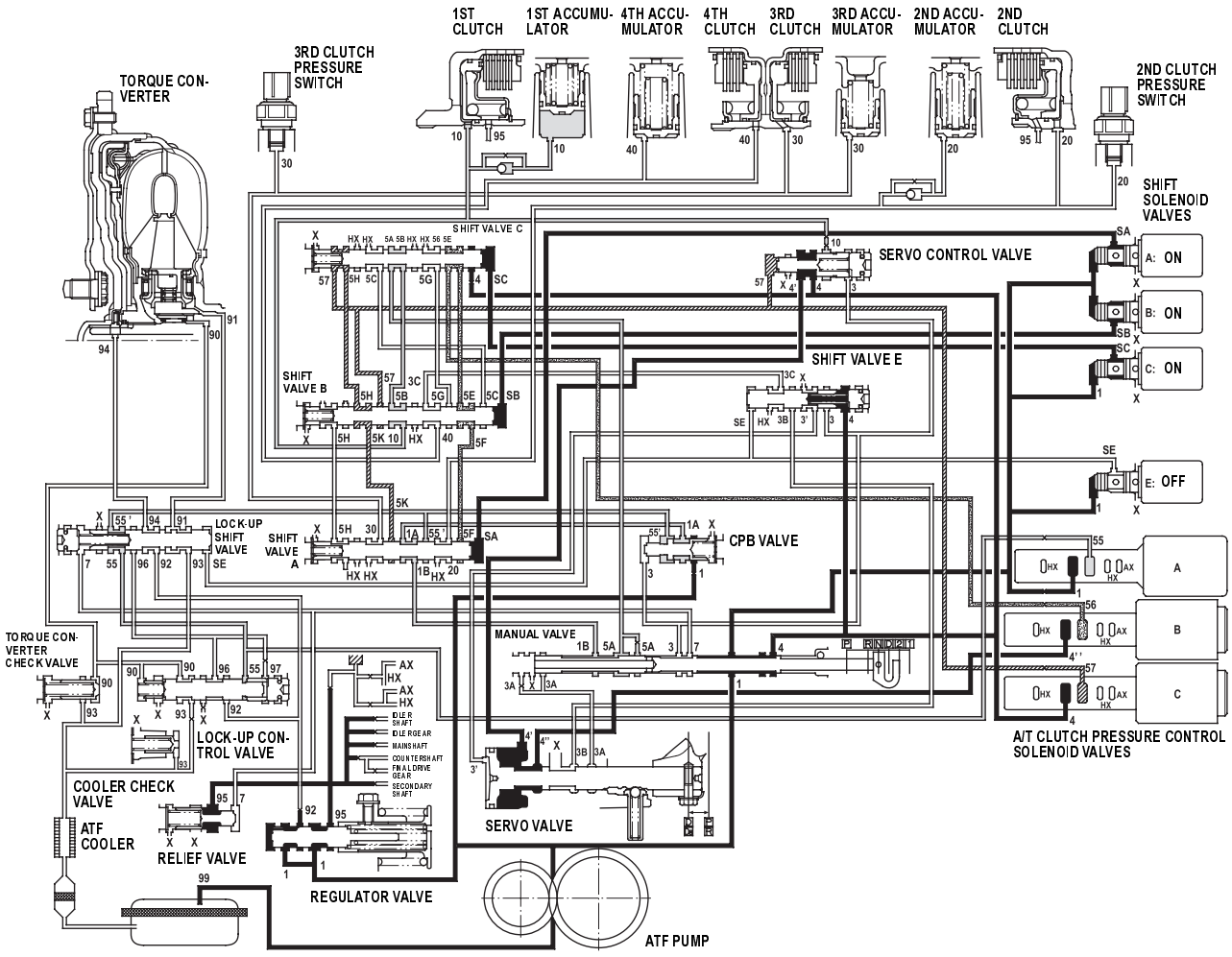
Hydraulic Flow (cont'd)

[D] Position: Driving in 1st gear

The PCM turns shift solenoid valves A ON, and remains B and C ON, E OFF. Shift solenoid valve A pressure (SA) is applied to the right side of the shift valve A. The shift valve A is moved to the left side to uncover the port of line pressure leading to the 1st clutch, and to cover the ports of A/T clutch pressure control solenoid valve pressures. Then A/T clutch pressure control solenoid valves pressures are released at the shift valve A.

Fluid flows to the 1st clutch by way of:
Line pressure (1) A/T clutch pressure control solenoid valve A - A/T clutch pressure control solenoid valve A pressure (55) → CPB valve - Line pressure (1A) → Shift valve A - Line pressure (1B) → Manual valve - Line pressure (5A) → Shift valve C - Line pressure (5B) → Shift valve B - 1st clutch pressure (10) → 1st clutch
The 1st clutch pressure (10) is applied to the 1st clutch, and the 1st clutch is engaged securely.

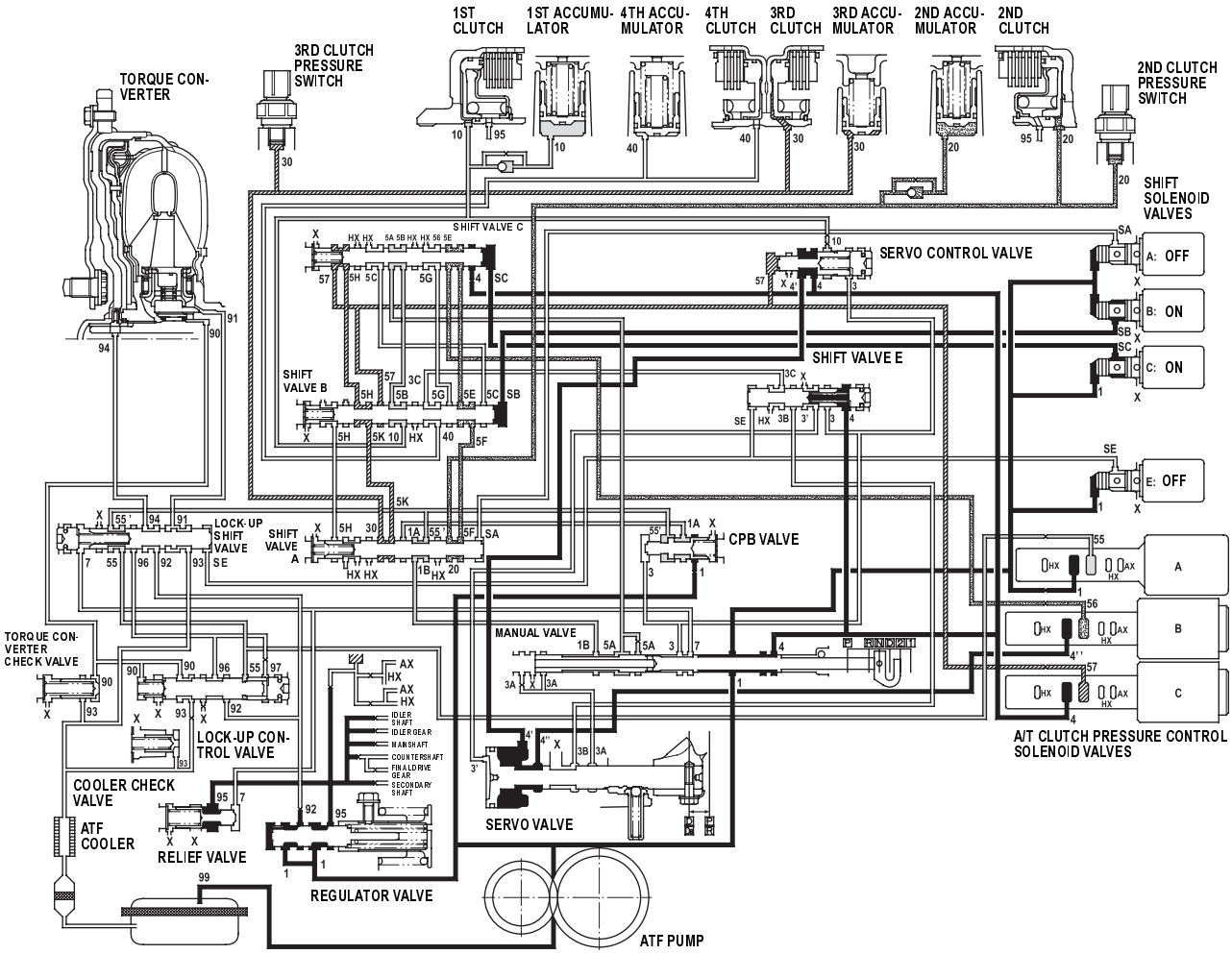
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[D] Position: Shifting between 1st gear and 2nd gear

As the speed of the vehicle reaches the prescribed value, the PCM turns shift solenoid valves A OFF, and remains B and C ON, E OFF. Shift solenoid valve A pressure (SA) in the right side of the shift valve A is released. The shift valve A is moved to the right side to uncover the ports of A/T clutch pressure control solenoid valves pressures leading to the 1st, 2nd, and 3rd clutches. The PCM controls the A/T clutch pressure control solenoid valves to regulate hydraulic pressure. A/T clutch pressure control solenoid valve B pressure (56) changes to 2nd clutch pressure (20) at the shift valve A, and flows to the 2nd clutch. The 2nd clutch is engaged gently.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

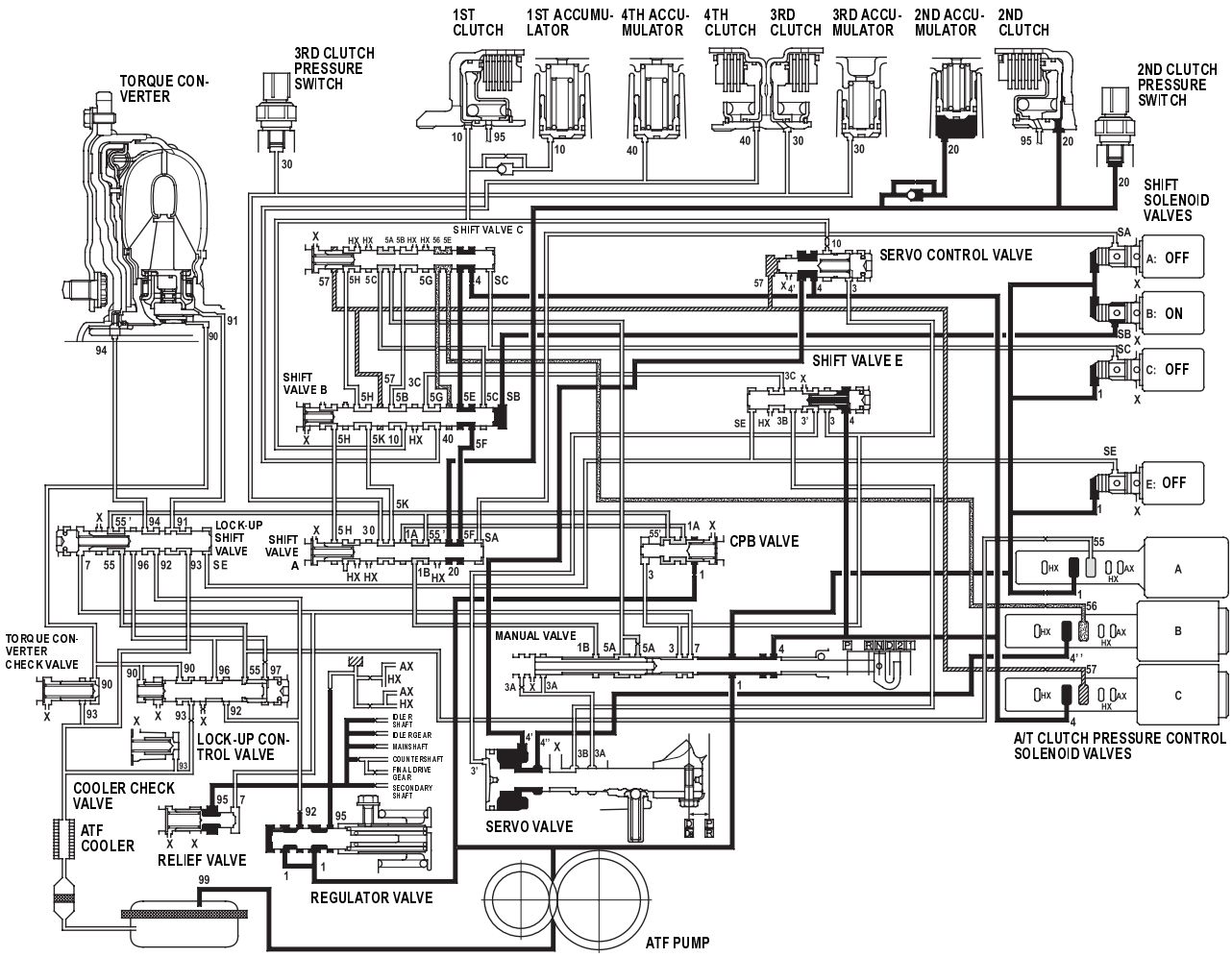
Hydraulic Flow (cont'd)

[D] Position: Driving in 2nd gear

The PCM turns shift solenoid valves C OFF and remains A and E OFF, B ON. Shift solenoid valve C pressure (SC) in the right side of the shift valve C is released. The shift valve C is moved to the right side to switch the ports. This movement covers A/T clutch pressure control solenoid valves pressures to stop at the shift valve C and B, and uncover the port of line pressure leading to the 2nd clutch.

Fluid flows to 2nd clutch by way of:
Line pressure (1) → Manual valve - Line pressure (4) → Shift valve C - Line pressure (5E) → Shift valve B - Line pressure (5F) → Shift valve A - 2nd clutch pressure (20) → 2nd clutch
The 2nd clutch pressure (20) is applied to the 2nd clutch, and the 2nd clutch is engaged securely.

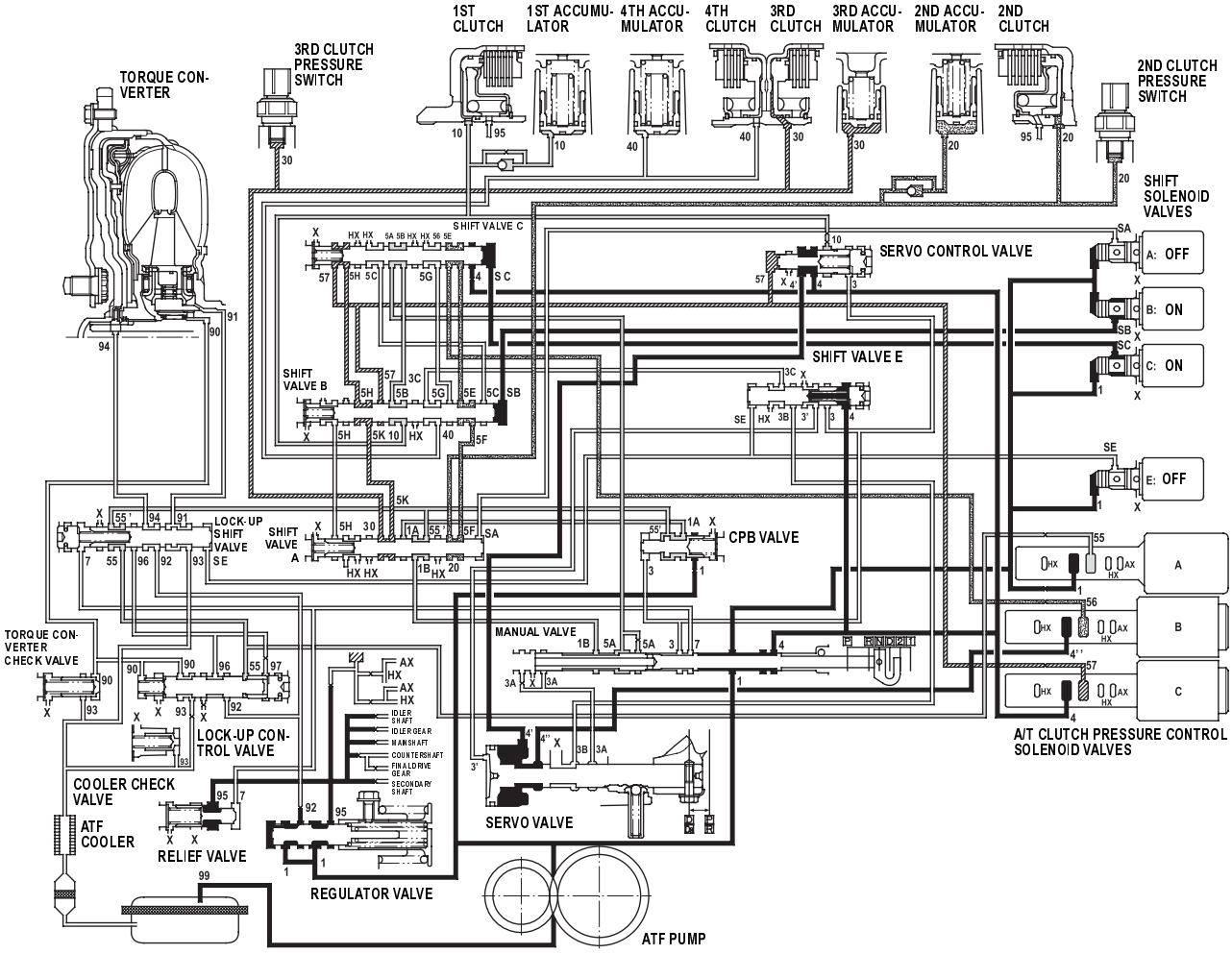
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[D] Position: Shifting between 2nd gear and 3rd gear

As the speed of the vehicle reaches the prescribed value, the PCM turns shift solenoid valves C ON, and remains A and E OFF, B ON. Shift solenoid valve C pressure (SC) is applied to the right side of the shift valve C. The shift valve C is moved to the left side to uncover the ports of A/T clutch pressure control solenoid valves pressures leading to the 1st, 2nd, and 3rd clutches. The PCM controls the A/T clutch pressure control solenoid valves to regulate hydraulic pressure. A/T clutch pressure control solenoid valve B pressure (56) changes to 2nd clutch pressure (20) at the shift valve A, and A/T clutch pressure control solenoid valve C pressure (57) changes to 3rd clutch pressure (30) at the shift valve A. The 2nd and 3rd clutches are engaged gently.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

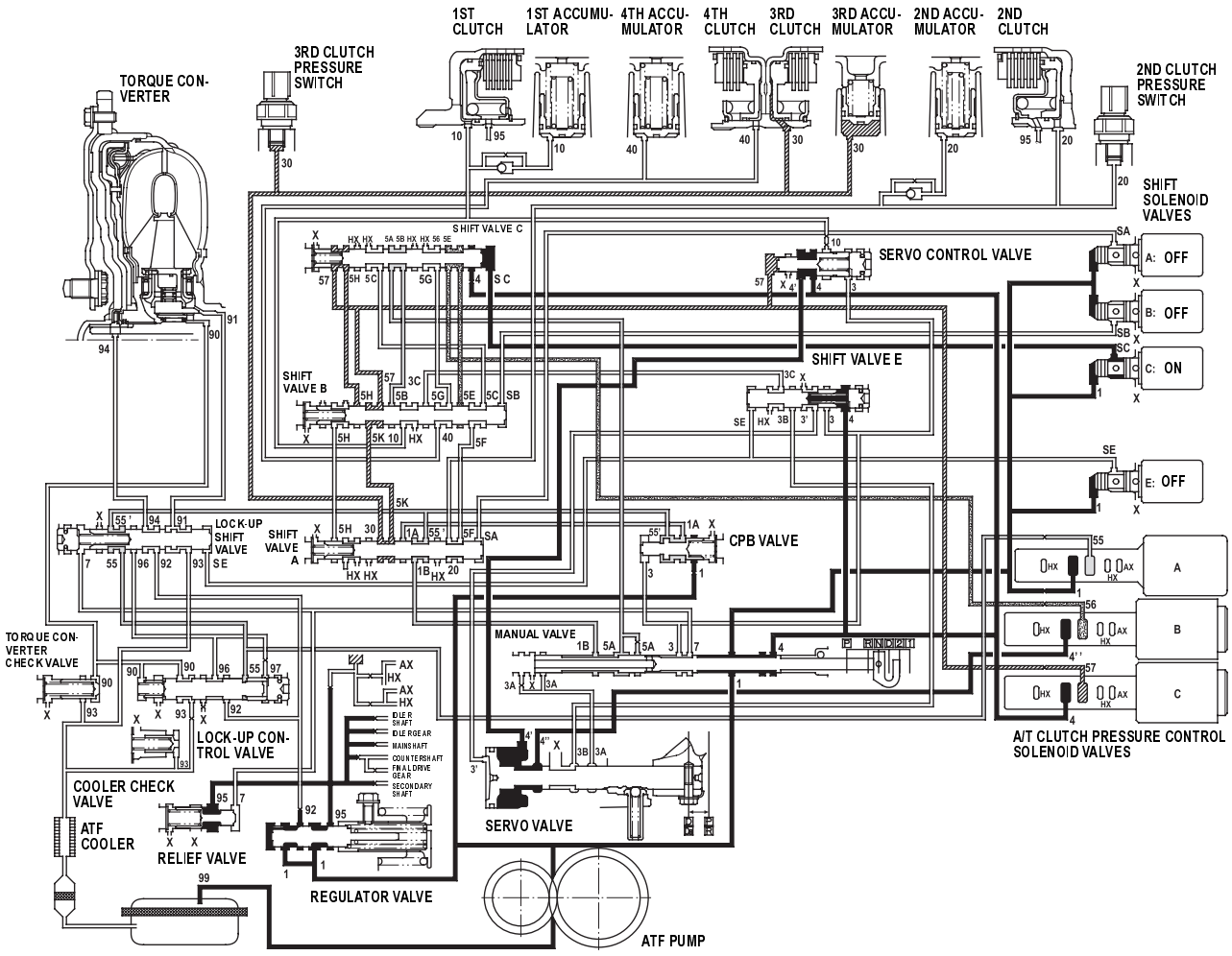
Hydraulic Flow (cont'd)

[D] Position: Driving in 3rd gear

The PCM turns shift solenoid valves B OFF, and remains A and E OFF, C ON. Shift solenoid valve B pressure (SB) in the right side of the shift valve B is released, and the shift valve B is moved to the right side. This movement switches the port of A/T clutch pressure control solenoid valve C pressure leading to the 3rd clutch.

A/T clutch pressure control solenoid valve C pressure (57) changes to (5K) at the shift valve B, and becomes to 3rd clutch pressure (30) at the shift valve A. The 3rd clutch pressure (30) is applied to the 3rd clutch, and the 3rd clutch is engaged securely.

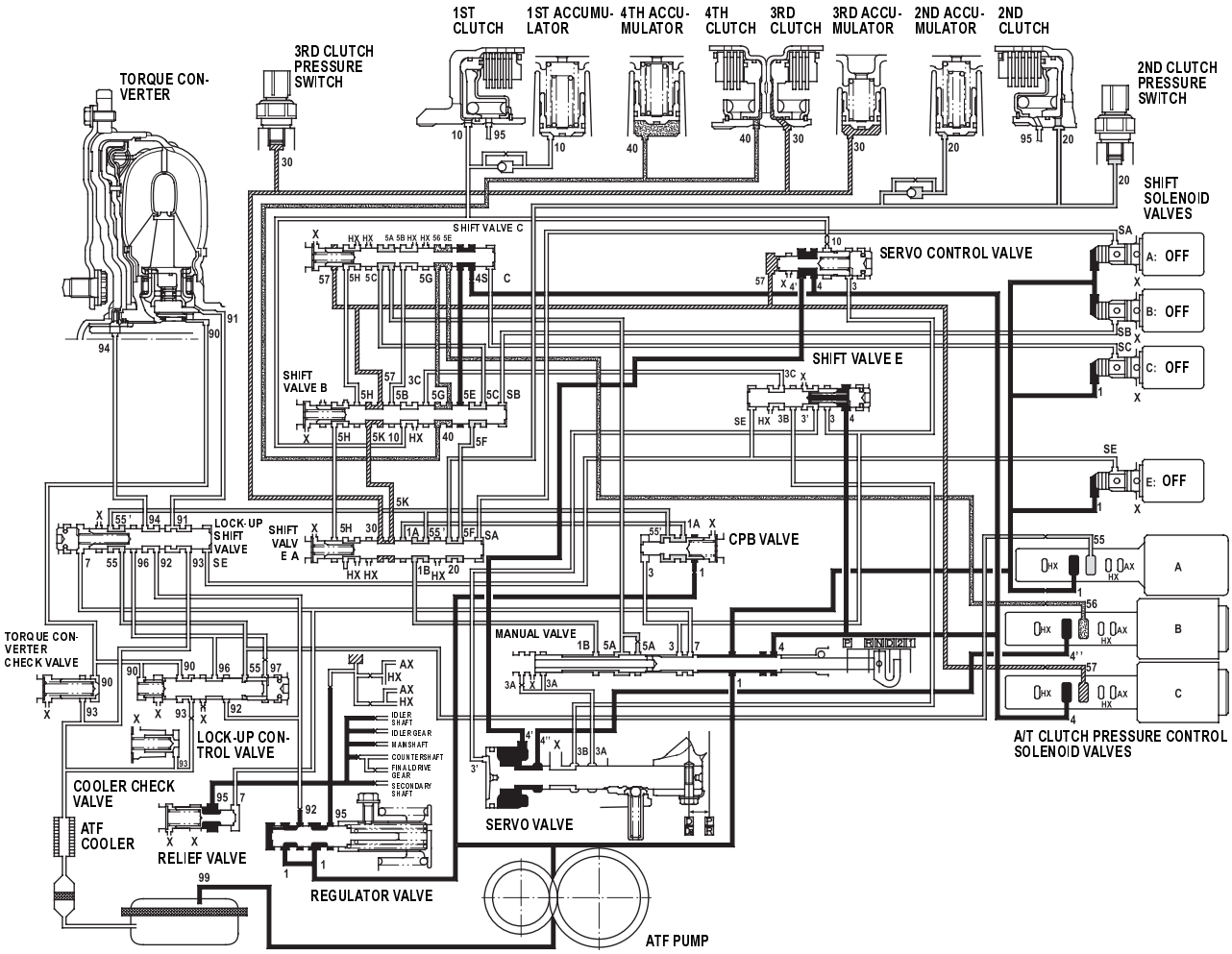
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[D] Position: Shifting between 3rd gear and 4th gear

As the speed of the vehicle reaches the prescribed value, the PCM turns shift solenoid valves C OFF, and remains A, B and E OFF. Shift solenoid valve C pressure (SC) in the right side of the shift valve C is released. The shift valve C is moved to the right side to uncover the ports of A/T clutch pressure control solenoid valves A and B pressures leading to the 2nd and 4th clutches. The PCM controls the A/T clutch pressure control solenoid valves to regulate hydraulic pressure. A/T clutch pressure control solenoid valve A pressure changes to 2nd clutch pressure (20) at the shift valve A, and A/T clutch pressure control solenoid valve B pressure changes to 4th clutch pressure (40) at the shift valve B. The 3rd clutch pressure is regulated to low by the A/T clutch pressure control solenoid valve C. The 3rd and 4th clutches are engaged gently.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

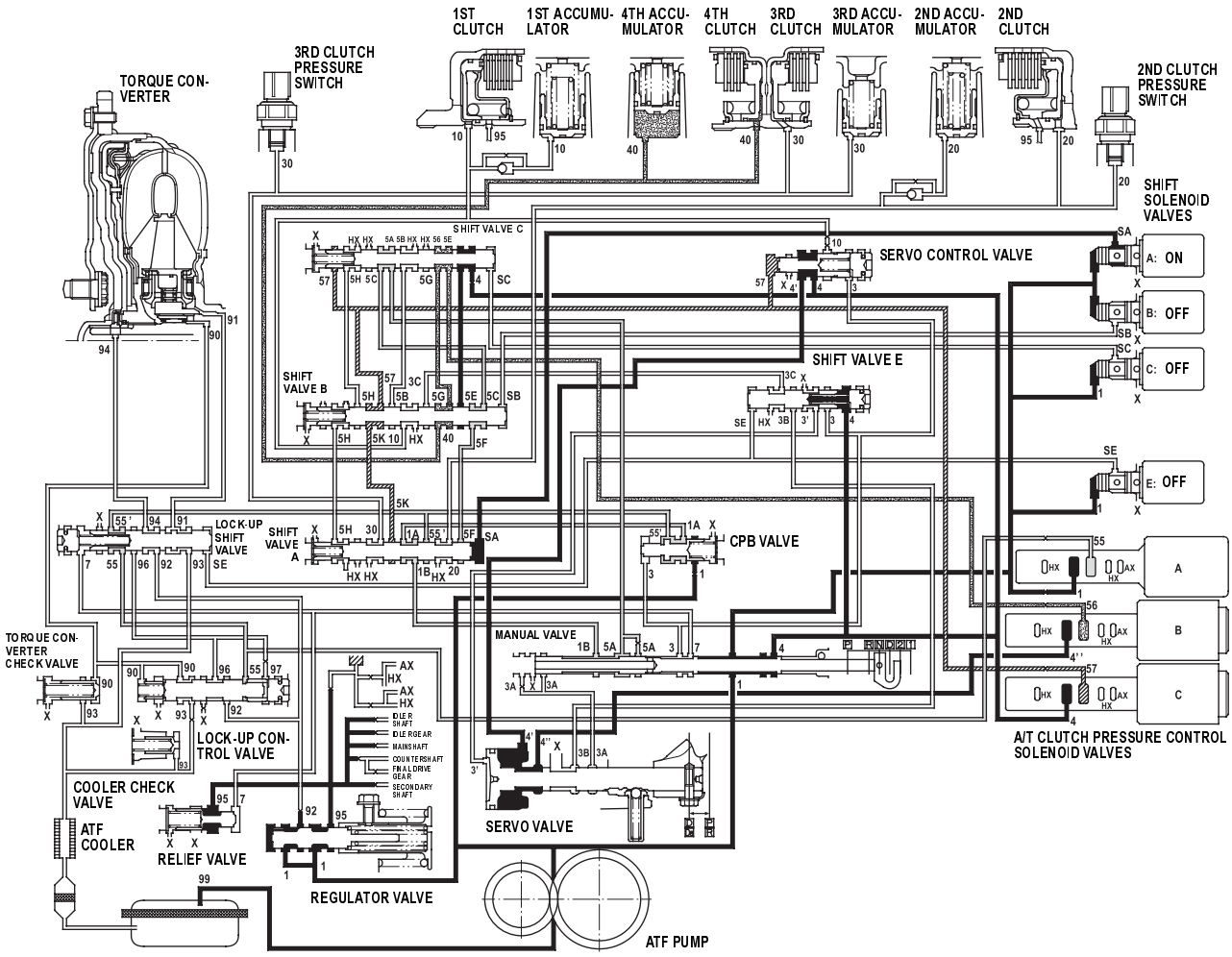
Hydraulic Flow (cont'd)

[D] Position: Driving in 4th gear

The PCM turns shift solenoid valves A ON, and remains B, C and E OFF. Shift solenoid valve A pressure (SA) is applied to the right side of the shift valve A. The shift valve A is moved to the left side to cover the ports of A/T clutch pressure control solenoid valves A and C pressure leading to the 2nd and 3rd clutches.

A/T clutch pressure control solenoid valve B pressure (56) changes to (5G) at the shift solenoid valve C, and becomes to 4th clutch pressure (40) at the shift valve B. The 4th clutch pressure (40) is regulated to high by the A/T clutch pressure control solenoid valve B, and the 4th clutch is engaged securely.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[2] Position

The PCM controls the shift solenoid valves. The conditions of the shift solenoid valves and positions of the shift valves are as follows:

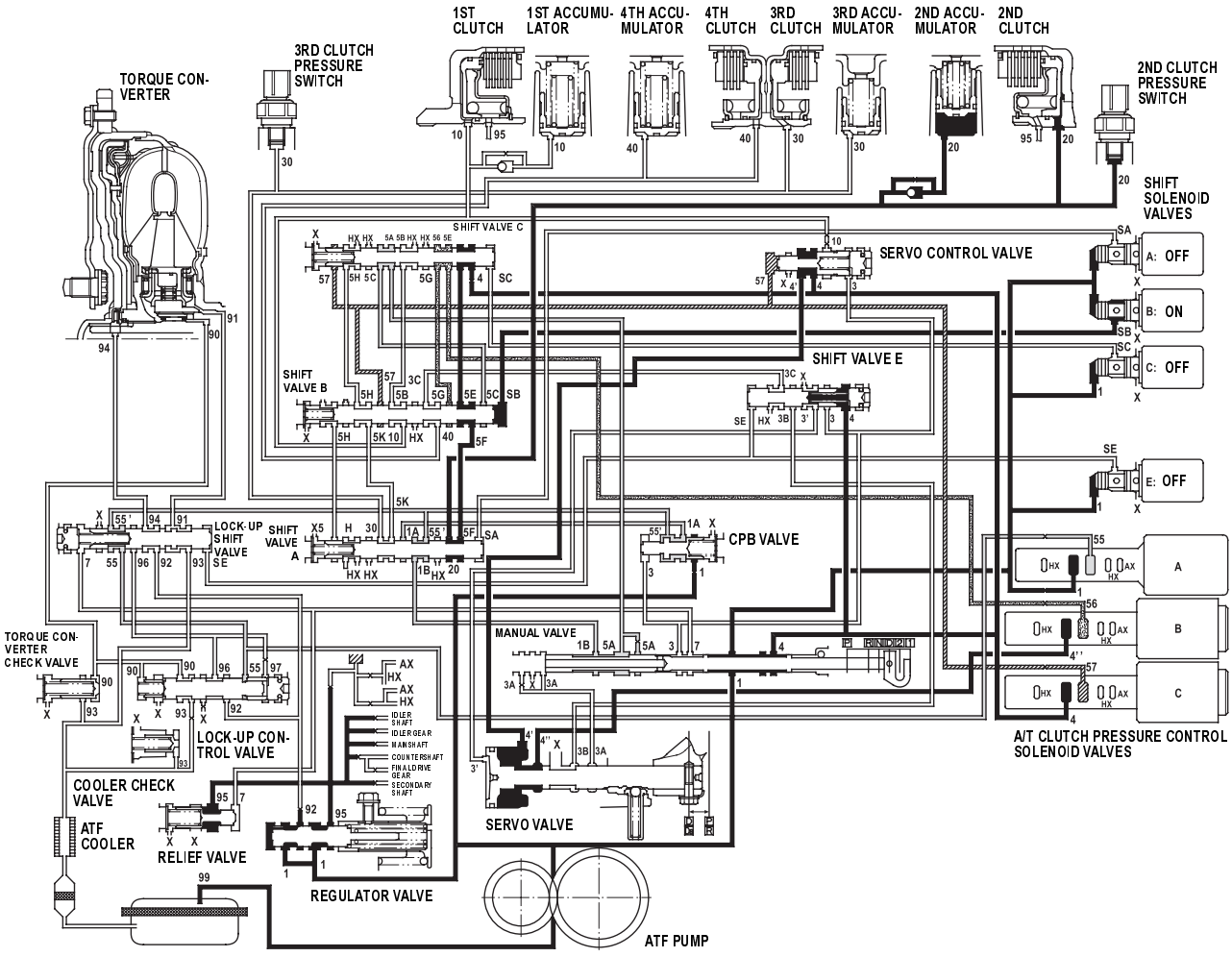
- Shift solenoid valve A: OFF Shift valve A remains in right side
- Shift solenoid valve B: ON Shift valve B moves to left side
- Shift solenoid valve C: OFF Shift valve C remains in right side
- Shift solenoid valve E: OFF Shift valve E remains in left side

Line pressure (1) changes (4) at the manual valve, and flows to the shift valve C. Line pressure (4) becomes the 2nd clutch pressure (20) at the shift valve A.

Fluid Flows to 2nd clutch by way of:
Line pressure (1) → Manual valve - Line pressure (4) → Shift valve C - Line pressure (5E) → Shift valve B - Line pressure (5F) → Shift valve A - 2nd clutch pressure (20) → 2nd clutch

The 2nd clutch pressure (20) is applied to the 2nd clutch, and the 2nd clutch is engaged.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

Hydraulic Flow (cont'd)

[1] Position

The PCM controls the shift solenoid valves. The conditions of the shift solenoid valves and positions of the shift valves are as follows:

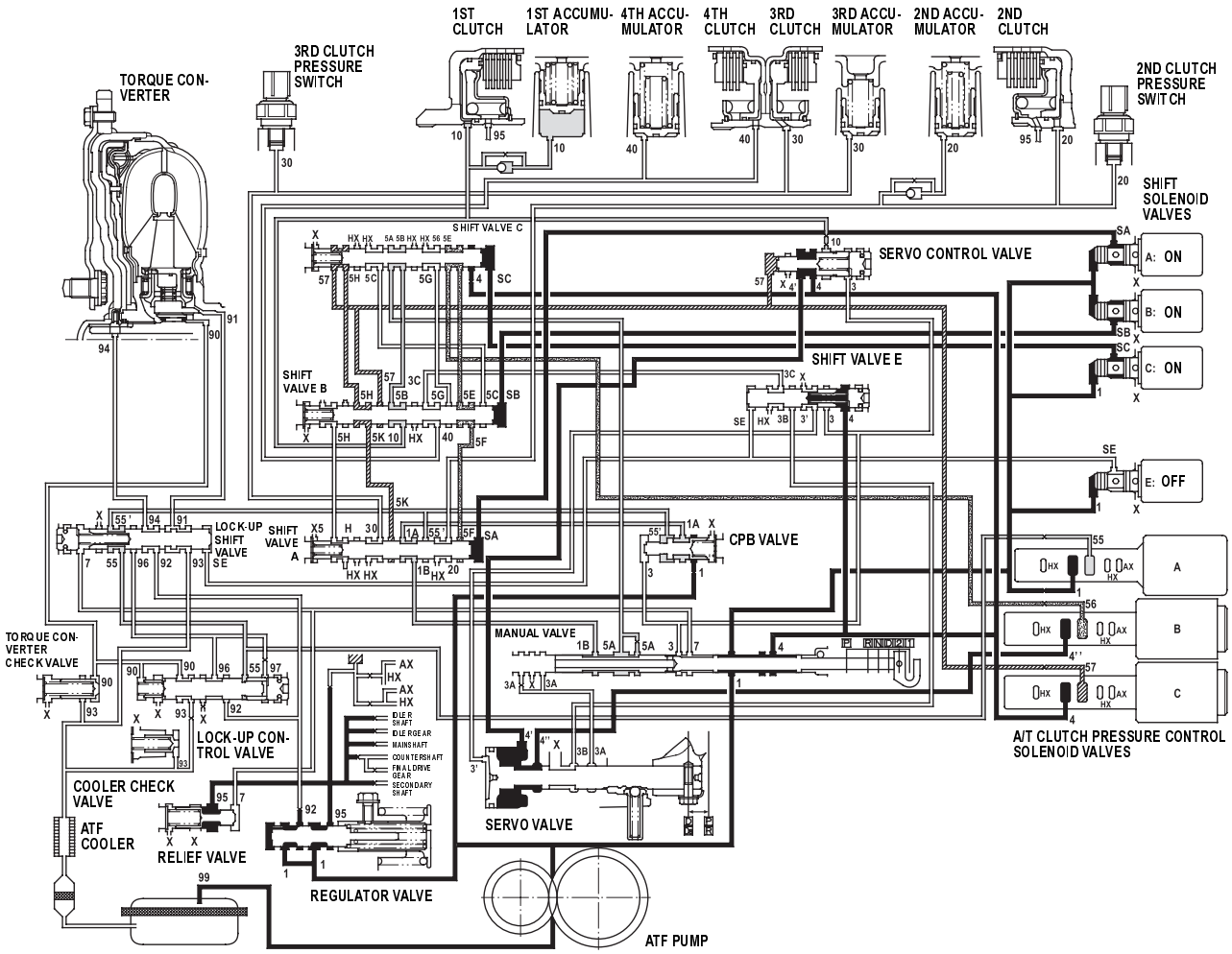
- Shift solenoid valve A: ON Shift valve A moves to left side
- Shift solenoid valve B: ON Shift valve B moves to left side
- Shift solenoid valve C: ON Shift valve C moves to left side
- Shift solenoid valve E: OFF Shift valve E remains in left side

Line pressure (1) flows to the shift solenoid valves and the A/T clutch pressure control solenoid valve A, and changes to A/T clutch pressure control solenoid pressure (55) at the A/T clutch pressure control solenoid valve A.

Fluid Flows to 1st clutch by way of:
A/T clutch pressure control solenoid pressure (55) → CPB valve - Line pressure (1A) → Shift valve A - Line pressure (1B) → Manual valve - Line pressure (5A) → Shift valve C - Line pressure (5B) → Shift valve B - 1st clutch pressure (10) → 1st clutch

The 1st clutch pressure (10) is applied to the 1st clutch, and the 1st clutch is engaged.

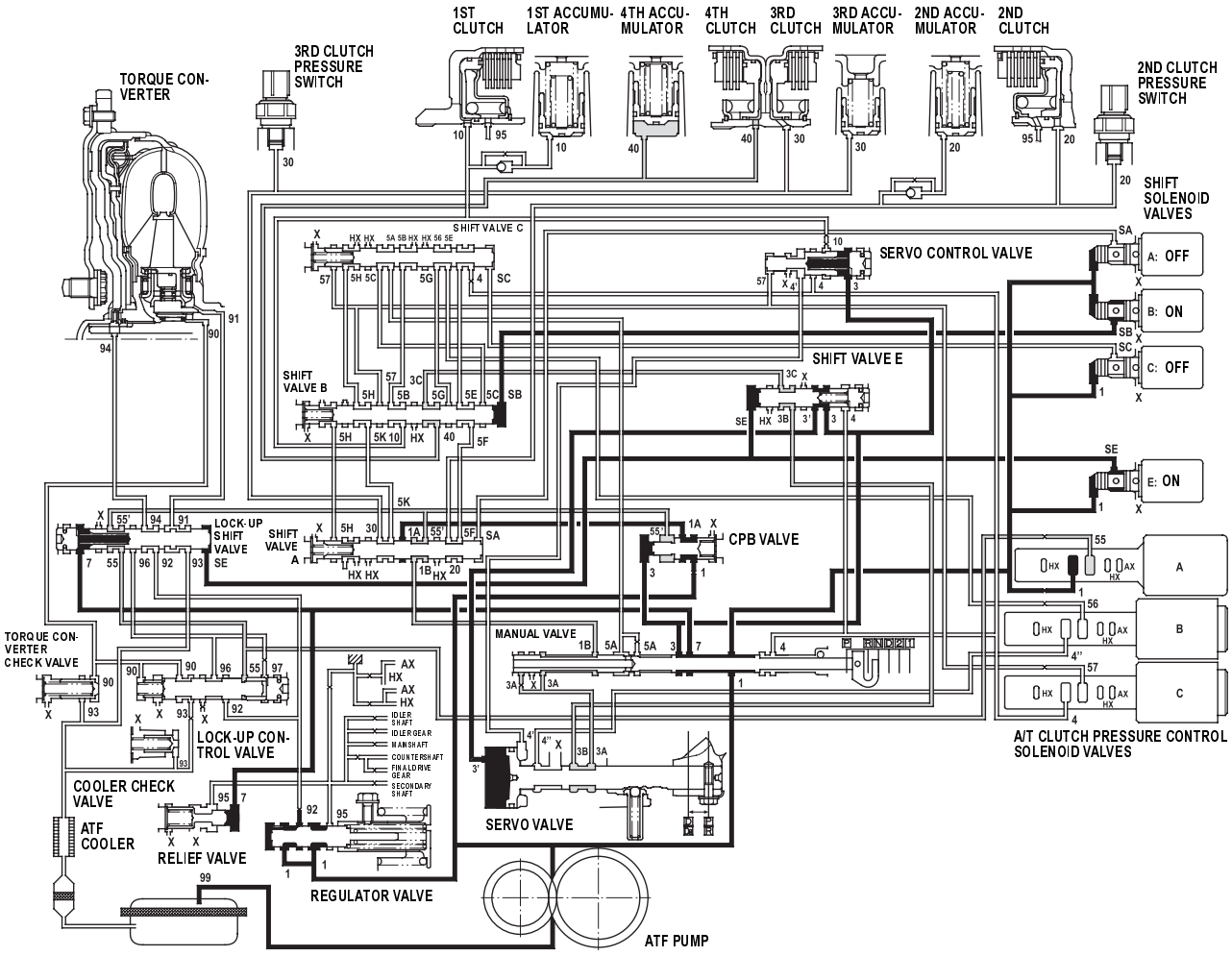
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[R] Position: Shifting to [R] position from [P] or [N] position

When shifting in [R] position, the PCM turns shift solenoid valves B and E ON, A and C OFF. Shift solenoid valve B pressure (SB) is applied to the right side of the shift valve B, and the shift valve B is moved to left side. Shift solenoid valve E pressure (SE) is applied to the left side of the shift valve E, and the shift valve E is moved to the right side. Line pressure (1) changes to (3) at the manual valve, and flows to the servo valve via the shift valve E. The servo valve is moved to reverse range position. Movement of the shift valves B and E, and servo valve creates 4th clutch pressure line between the 4th clutch and the A/T clutch pressure control solenoid valve A. The 4th clutch pressure (40) is applied to the 4th clutch, and the 4th clutch is engaged gently.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

System Description (cont'd)

Hydraulic Flow (cont'd)

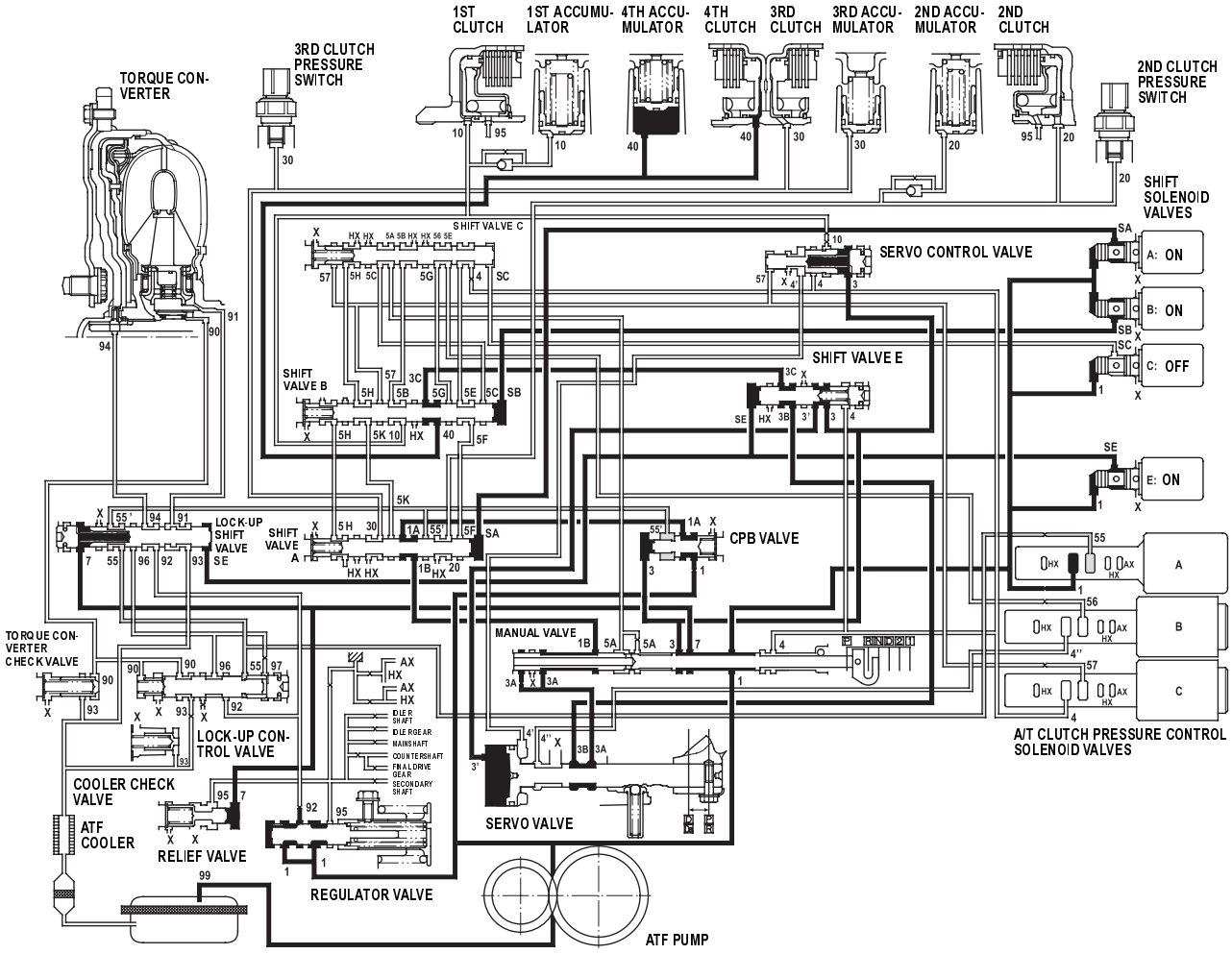
[R] Position: Driving in reverse gear

After starting off in reverse gear, the PCM turns shift solenoid valves A ON, and remains B and E ON, C OFF. Shift solenoid valve A pressure (SA) is applied to the right side of the shift valve A to cover the port of A/T clutch pressure control solenoid valve A pressure, and to uncover the port of line pressure leading to the 4th clutch creating full line pressure. The 4th clutch is engaged securely with line pressure.

Reverse Inhibitor Control

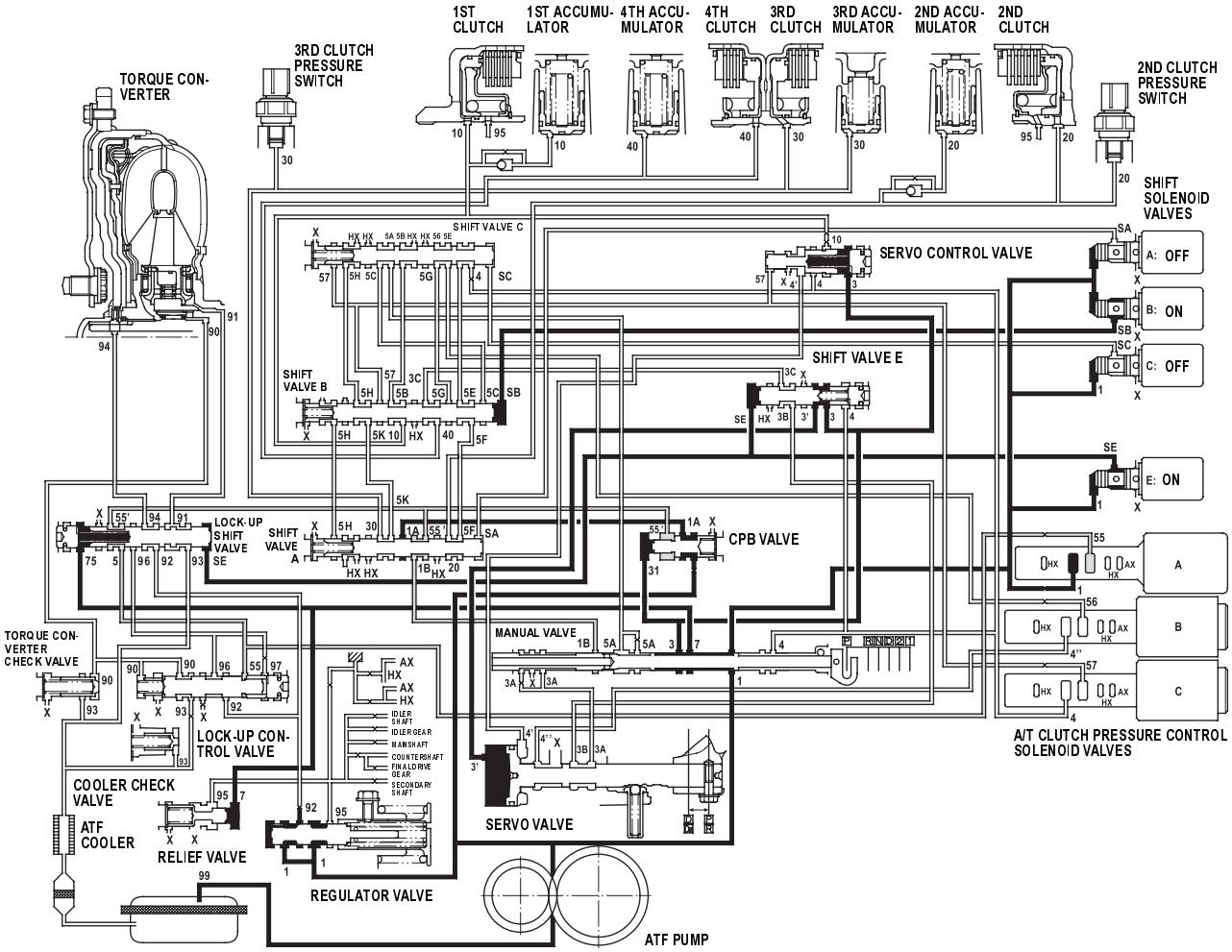
While the vehicle is moving forward, the PCM controls shift solenoid valve E remaining OFF. The shift valve E covers the port of line pressure (3') leading to the servo valve reverse position. The servo valve cannot be shifted to reverse position, and hydraulic pressure is not applied to the 4th clutch from servo valve for reverse, as a result, power is not transmitted to the reverse direction.

NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



[P] Position

Shift solenoid valves B and E are turned ON, and A, and C OFF by the PCM. Line pressure (1) flows to the shift solenoid valves and the A/T clutch pressure control solenoid valve A. Line pressure (3) changes to (3') at the shift valve E, and flows to the servo valve. The servo valve is moved to reverse/park position. Hydraulic pressure is not applied to the clutches.



(cont'd)

System Description (cont'd)

Lock-up System

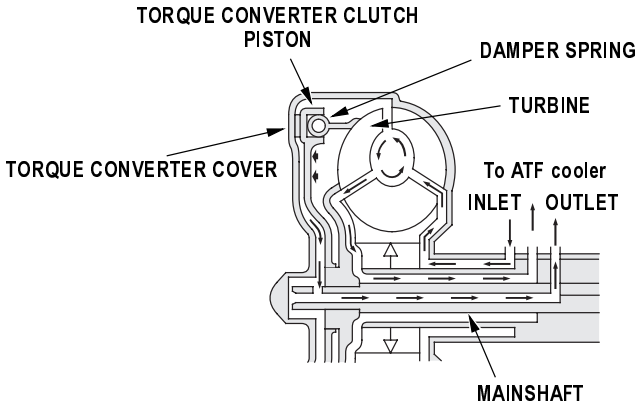
The lock-up mechanism of the torque converter clutch operates in [D] position (3rd and 4th) and [D] position over-drive off mode (3rd). The pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the torque converter clutch piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with the hydraulic control, the PCM optimizes the timing and volume of the lock-up mechanism. When the shift solenoid valve E is turned on by the PCM, shift solenoid valve E pressure switch the lock-up shift valve lock-up on and off. The A/T clutch pressure control solenoid valve A and the lock-up control valve control the volume of the lock-up conditions.

Torque Converter Clutch Lock-up ON (Engaging Torque Converter Clutch)
Fluid in the chamber between the torque converter cover and the torque converter clutch piston is drained off, and fluid entered from the chamber between the pump and stator exerts pressure through the torque converter clutch piston against the torque converter cover. The torque converter clutch piston engages with the torque converter cover; torque converter clutch lock-up ON, and the mainshaft rotates at the same as the engine.

Power flow

The power flows by way of:

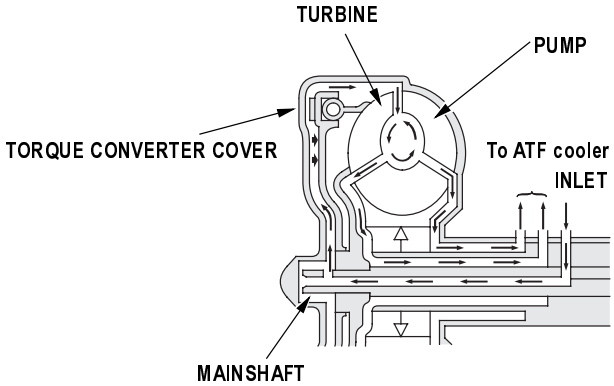
Engine
↓
Drive plate
↓
Torque converter cover
↓
Torque converter clutch piston
↓
Damper spring
↓
Turbine
↓
Mainshaft



Torque Converter Clutch Lock-up OFF (Disengaging Torque Converter Clutch)
Fluid entered from the chamber between the torque converter cover and the torque converter clutch piston passes through the torque converter and goes out from the chambers between the turbine and the stator, and between the pump and the stator. As a result, the torque converter clutch piston moves away from the torque converter, and the torque converter clutch lock-up is released; torque converter clutch lock-up OFF.

Power flow

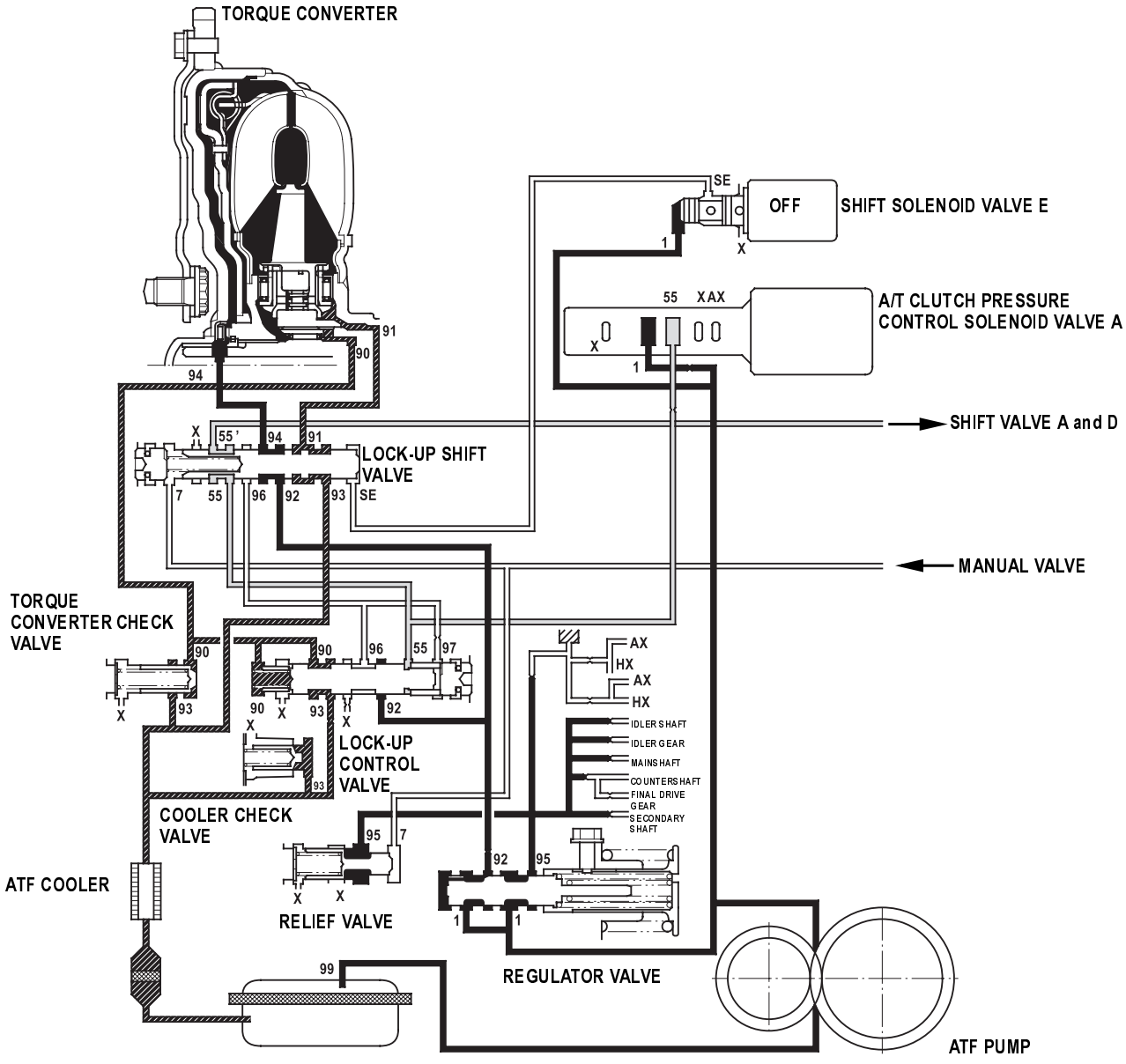
Engine
↓
Drive plate
↓
Torque converter cover
↓
Pump
↓
Turbine
↓
Mainshaft



No Lock-up

Shift solenoid valve E is turned OFF by the PCM, and shift solenoid valve E pressure (SE) is not applied to the lock-up shift valve. The lock-up shift valve stays in the right side to uncover the ports of torque converter pressure leading to the left side of the torque converter and releasing from the right side of the torque converter. Torque converter pressure (92) changes to (94) at the lock-up shift valve, and enters into the left side of the torque converter to disengage the torque converter clutch. The torque converter clutch piston keeps away from the torque converter cover, the torque converter clutch lock-up is OFF.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



(cont’d)

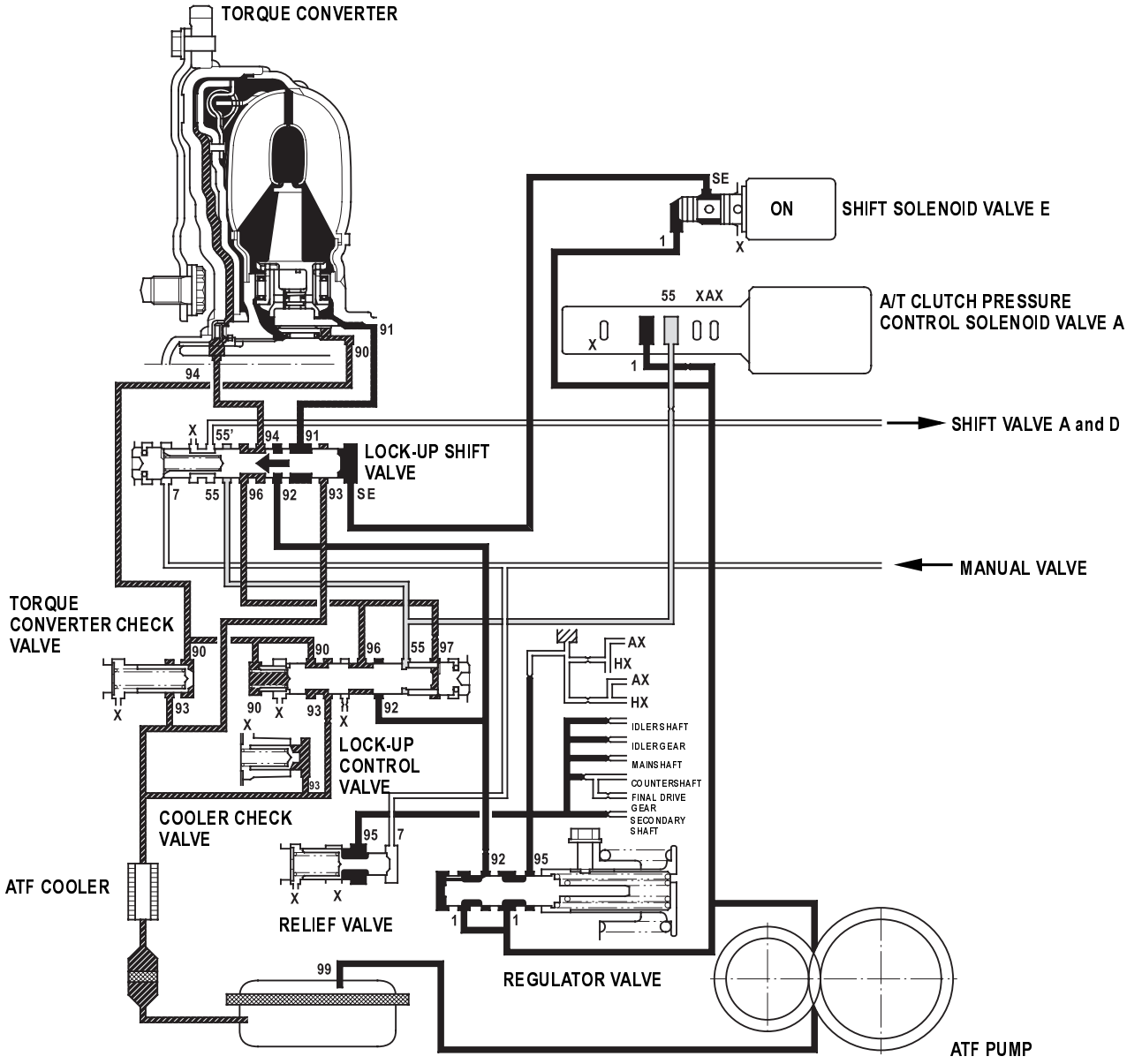
System Description (cont'd)

Lock-up System (cont'd)

Partial Lock-up

As the speed of the vehicle reaches the prescribed value, shift solenoid valve E is turned ON by the PCM, and shift solenoid valve E pressure (SE) is applied to the right side of the lock-up shift valve. The lock-up shift valve is moved to the left side to switch the port of torque converter pressure (91) leading to the right side of the torque converter, and the port of torque converter pressure (94) releasing from the left side of the torque converter. Torque converter pressure (91) flows to the right side of the torque converter to engage the torque converter clutch. The PCM also controls the A/T clutch pressure control solenoid valve A to regulate A/T clutch pressure control solenoid valve A pressure (55) applying to the lock-up shift valve and lock-up control valve. The position of the lock-up control valve depends on A/T clutch pressure control solenoid valve A pressure (55) and torque converter pressure released from the torque converter. The lock-up control valve controls volume of the torque converter clutch lock-up conditions until fluid between the clutch piston and torque converter cover is released fully; the torque converter clutch partial lock-up condition.

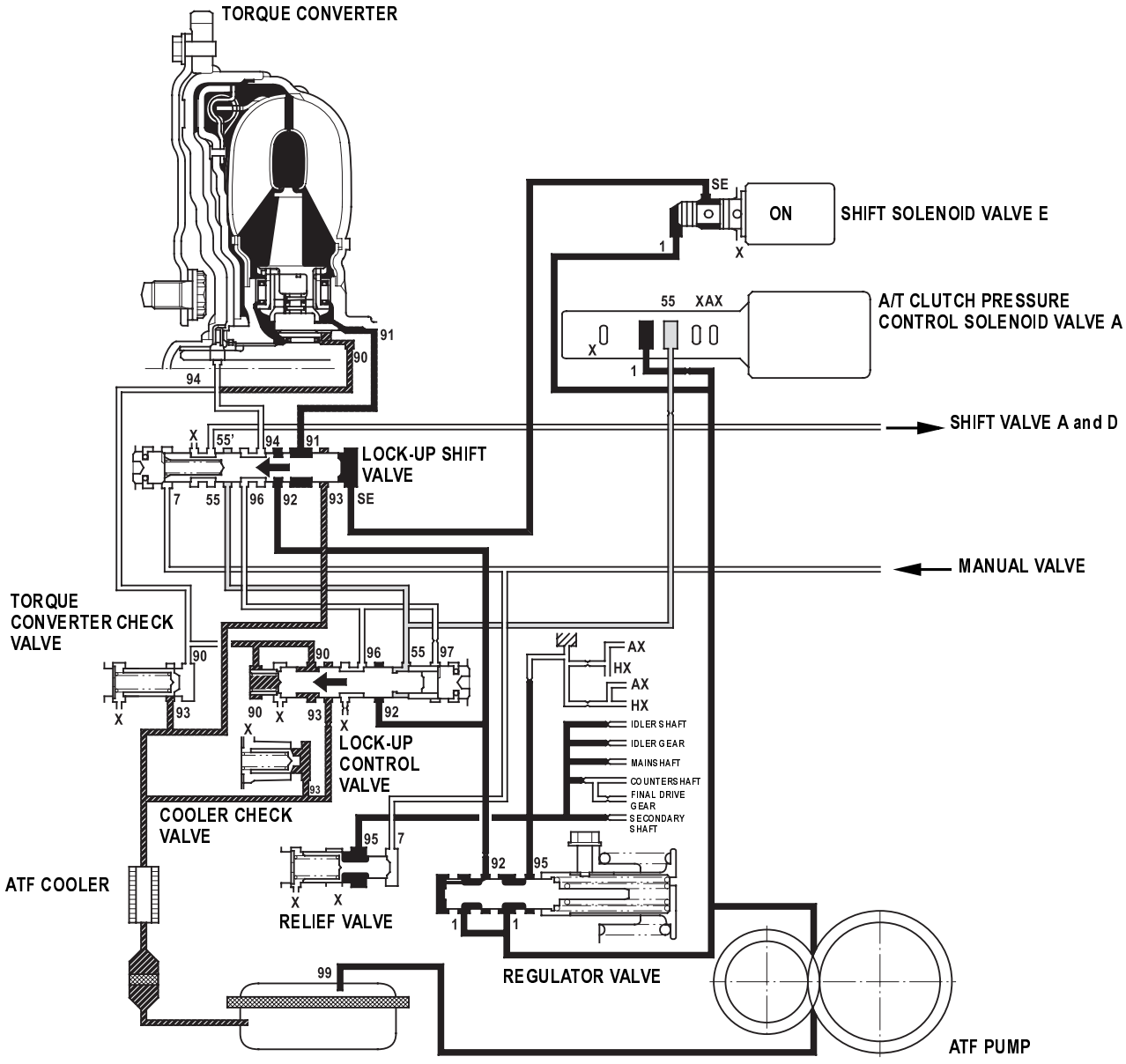
NOTE: When used, "left" or "right" indicates direction on the hydraulic circuit.



Full Lock-up

When the vehicle speed further increased, the PCM controls the A/T clutch pressure control solenoid valve A to increase A/T clutch pressure control solenoid valve A pressure (55), and the lock-up control valve is moved to the left by pressure increased amount. Torque converter pressure (94) from the left side of the torque converter is released fully at the lock-up control valve, and torque converter pressure (91) engages the torque converter clutch securely; the torque converter clutch full lock-up condition.

NOTE: When used, ”left” or ”right” indicates direction on the hydraulic circuit.



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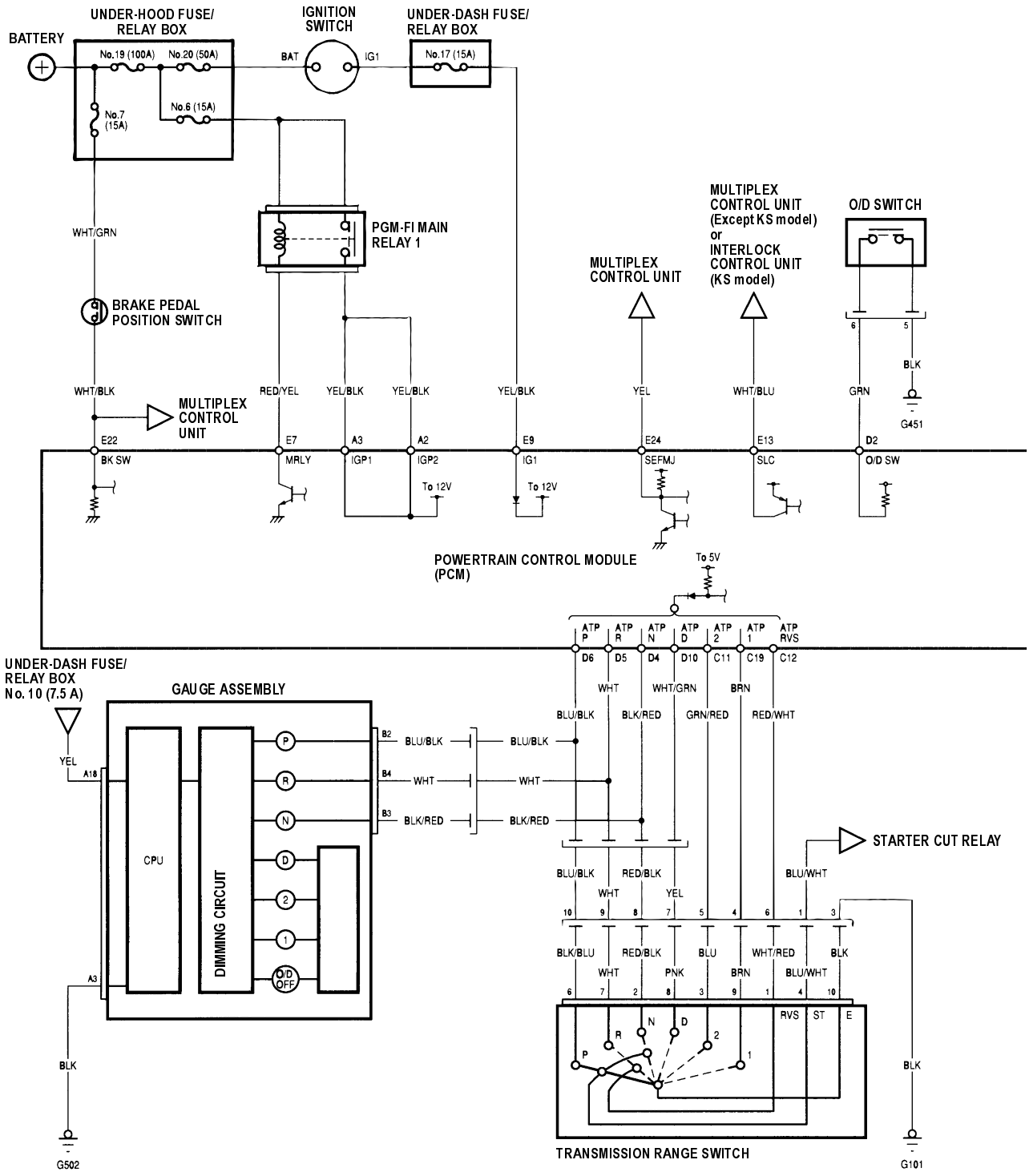
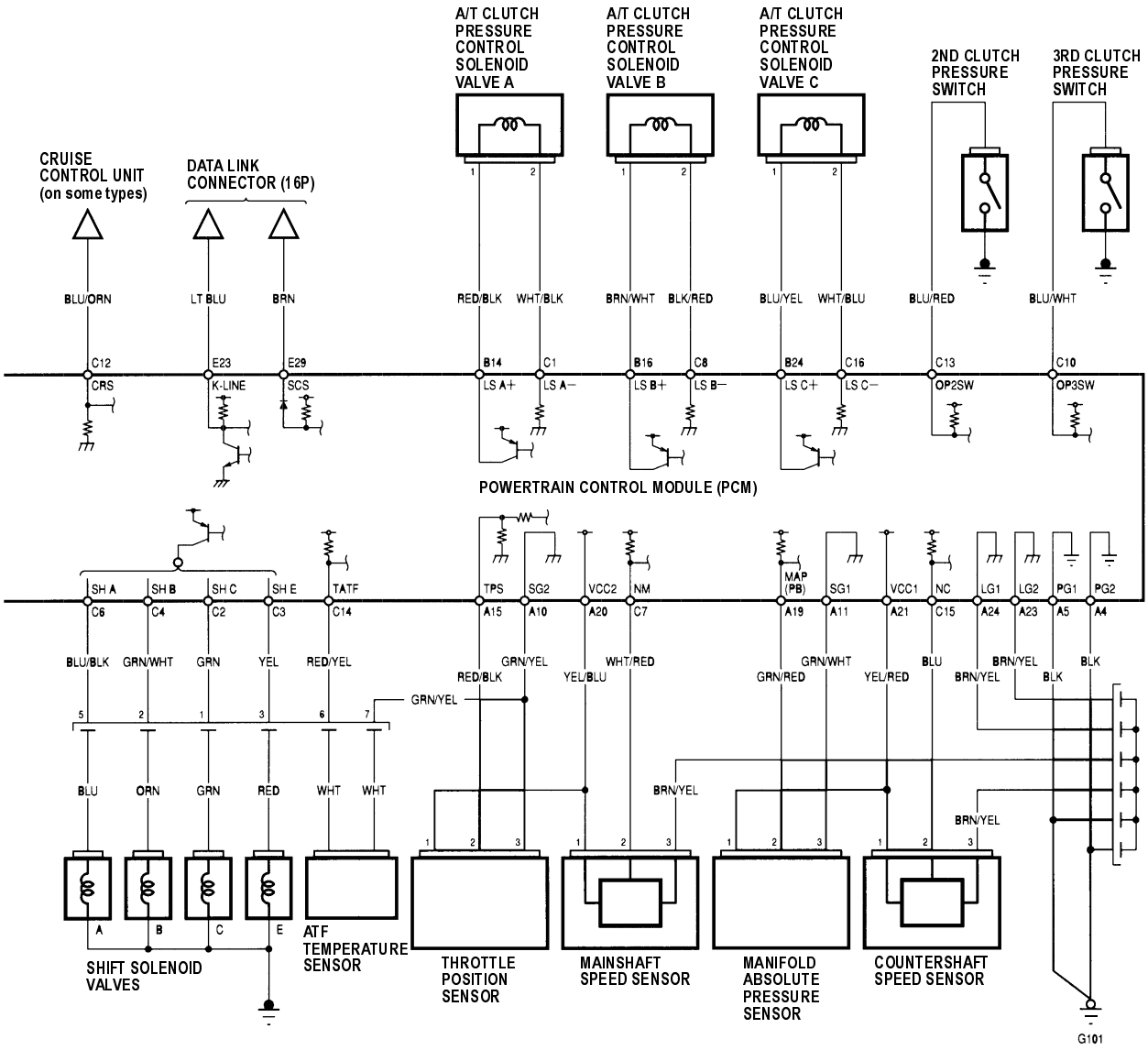
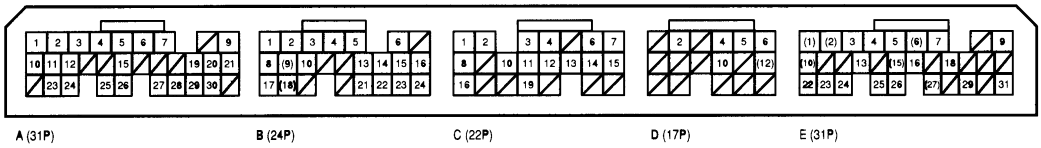
System Description (cont'd)

Circuit Diagram - PCM A/T Control System





PCM Connector Terminal Location

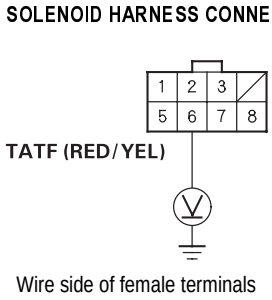


DTC Troubleshooting

DTC P0710: Problem in ATF Temperature Sensor Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch OFF.
2. Disconnect the shift solenoid harness connector.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the No. 6 terminal of the shift solenoid harness connector and body ground.

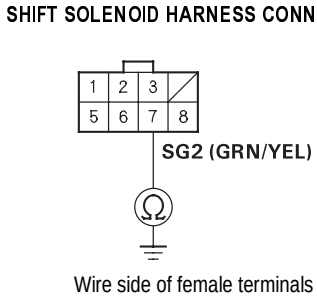


Is there about 5 V?

Yes Go to step 5.

No Go to step 15.

5. Turn the ignition switch OFF.
6. Disconnect the battery nagative terminal.
7. Disconnect PCM connector A (31P).
8. Check for continuity between the No. 7 terminal of the shift solenoid harness connector and body ground.



Is there continuity?

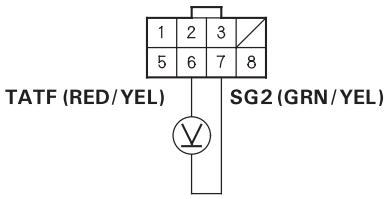
Yes Repair short in the wire between PCM connector terminal A10 and the shift solenoid harness connector.■

No Go to step 9.

9. Connect PCM connector A (31P).
10. Connect the battery nagative terminal.
11. Turn the ignition switch ON (II).

12. Measure the voltage between the No. 6 and No. 7 terminals of the shift solenoid harness connector.

SHIFT SOLENOID HARNESS CONNECTOR



Wire side of female terminals

Is there about 5 V?

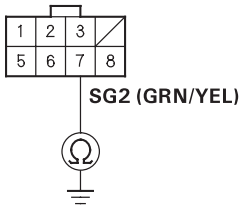
Yes Check the ATF temperature sensor and shift solenoid harness in the transmission housing (see page 14-122).■

No Go to step 13.

13. Turn the ignition switch OFF.

14. Check for continuity between the No. 7 terminal of the shift solenoid harness connector and body ground.

SHIFT SOLENOID HARNESS CONNECTOR



Wire side of female terminals

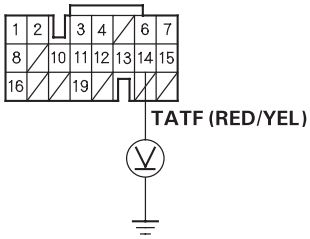
Is there continuity?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Repair open in the wire between PCM connector terminal A10 and the shift solenoid harness connector, or between PCM connector terminals A23 and ground (G101), between A24 and ground (G101), and repair poor ground (G101).■

15. Measure the voltage between PCM connector terminal C14 and body ground.

PCM CONNECTOR C (22P)



Wire side of female terminals

Is there about 5 V?

Yes Repair open in the wire between PCM connector terminal C14 and the shift solenoid harness connector.■

No Check for a short in the wire between PCM connector terminal C14 and the shift solenoid harness connector. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

(cont'd)

DTC Troubleshooting (cont'd)

DTC P0715: Problem in Mainshaft Speed Sensor Circuit

NOTE: Record all freeze data before you troubleshoot.

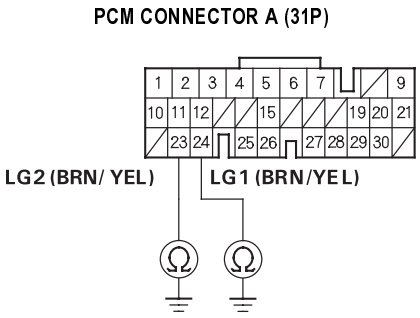
1. Check the fuel and emissions system problem is indicated by the DTC.

   Is there any fuel and emissions DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Recheck for code P0715 after troubleshooting.■

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Disconnect the battery negative terminal.
4. Disconnect PCM connector A (31P).
5. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



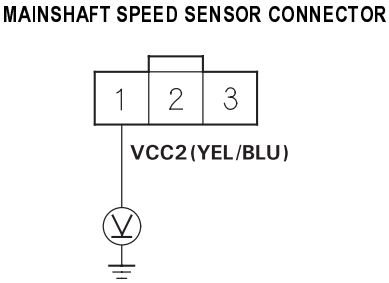
Wire side of female terminals

   Is there continuity?

   Yes Go to step 6.

   No Repair open in the wires between PCM connector terminals A23 and ground (G101), between A24 and ground (G101), and repair poor ground (G101).■

6. Connect PCM connector A (31P).
7. Connect the battery negative terminal.
8. Disconnect the mainshaft speed sensor connector.
9. Turn the ignition switch ON (II).
10. Measure the voltage between the No. 1 terminal of the mainshaft speed sensor connector and body ground.



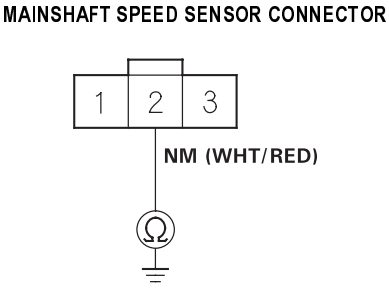
Wire side of female terminals

    Is there about 5 V?

    Yes Go to step 11.

    No Go to step 20.

11. Turn the ignition switch OFF.
12. Check for continuity between the No. 2 terminal of the mainshaft speed sensor connector and body ground.



Wire side of female terminals

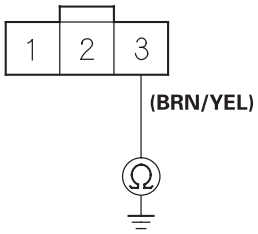
    Is there continuity?

    Yes Repair short to ground in the wire between PCM connector terminal C7 and mainshaft speed sensor connector.■

    No Go to step 13.

13. Check for continuity between the No. 3 terminal of the mainshaft speed sensor connector and body ground.

MAINSHAFT SPEED SENSOR CONNECTOR



Wire side of female terminals

Is there continuity?

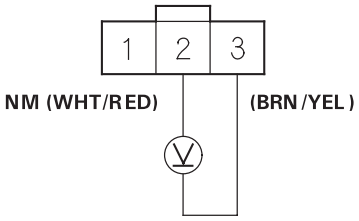
Yes Go to step 14.

No Repair open in the wire between the mainshaft speed sensor connector and ground (G101).■

14. Turn the ignition switch ON (II).

15. Measure the voltage between the No. 2 and No. 3 terminals of the mainshaft speed sensor connector.

MAINSHAFT SPEED SENSOR CONNECTOR



Wire side of female terminals

Is there about 5 V?

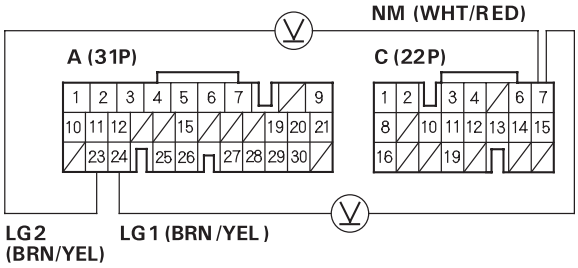
Yes Go to step 16.

No Go to step 25.

16. Connect the mainshaft speed sensor connector.

17. Measure the voltage between PCM connector terminals C7 and A23 or A24.

PCM CONNECTORS



Wire side of female terminals

Is the voltage 0 V or about 5 V?

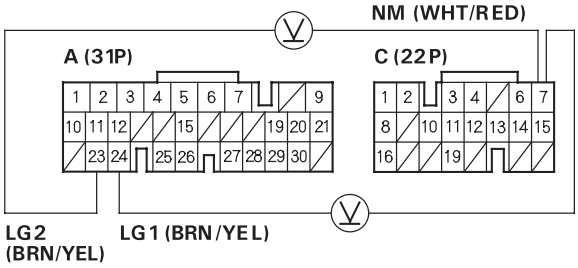
Yes Go to step 18.

No Replace the mainshaft speed sensor.■

18. Shift to [P] position. Start the engine, and run it idle.

19. With engine idling, measure the voltage between PCM connector terminals C7 and A23 or A24.

PCM CONNECTORS



Wire side of female terminals

Is there 1.5 V - 3.5 V?

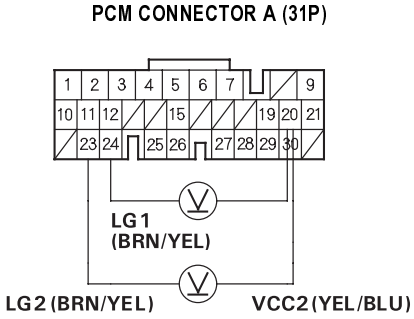
Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Replace the mainshaft speed sensor.■

(cont'd)

DTC Troubleshooting (cont'd)

20. Measure the voltage between PCM connector terminal A20 and A23 or A24.



Wire side of female terminals

Is there 4.75 V - 5.25 V?

Yes Repair open in the wire between PCM connector terminal A20 and the mainshaft speed sensor connector.■

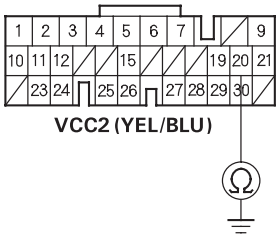
No Go to step 21.

21. Turn the ignition switch OFF.

22. Disconnect the battery negative terminal.

23. Disconnect PCM connector A (31P).

24. Check for continuity between PCM connector A20 and body ground.



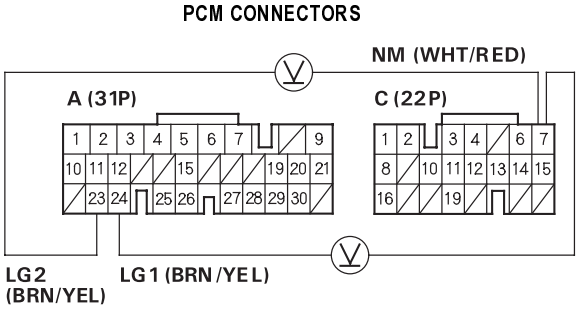
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal A20 and the mainshaft speed sensor connector.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

25. Measure the voltage between PCM connector terminal C7 and A23 or A24.



Wire side of female terminals

Is there about 5 V?

Yes Repair open in the wire between PCM connector C7 and the mainshaft speed sensor connector.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

DTC P0720: Problem in Countershaft Speed Sensor Circuit

NOTE: Record all freeze data before you troubleshoot.

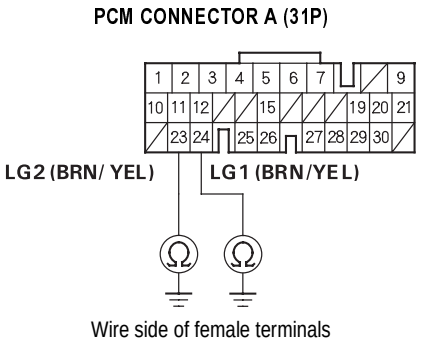
1. Check the fuel and emissions system problem is indicated by the DTC.

   Is there any fuel and emissions DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Recheck for code P0720 after troubleshooting.■

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Disconnect the battery negative terminal.
4. Disconnect PCM connector A (31P).
5. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.

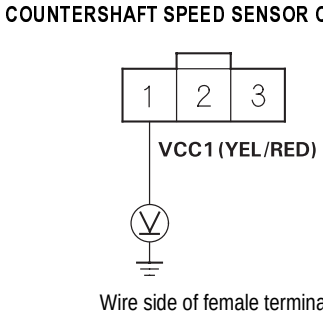


   Is there continuity?

   Yes Go to step 6.

   No Repair open in the wires between PCM connector terminals A23 and ground (G101), between A24 and ground (G101), and repair poor ground (G101).■

6. Connect PCM connector A (31P).
7. Connect the battery negative terminal.
8. Disconnect the countershaft speed sensor connector.
9. Turn the ignition switch ON (II).
10. Measure the voltage between the No. 1 terminal of the countershaft speed sensor connector and body ground.

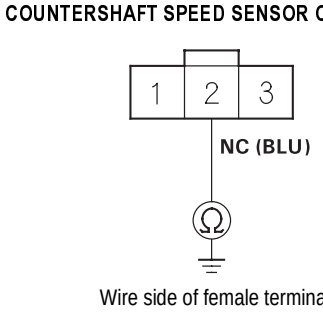


   Is there about 5 V?

   Yes Go to step 11.

   No Go to step 21.

11. Turn the ignition switch OFF.
12. Check for continuity between the No. 2 terminal of the countershaft speed sensor connector and body ground.



   Is there continuity?

   Yes Repair short to ground in the wire between PCM connector terminal C15 and the countershaft speed sensor connector.■

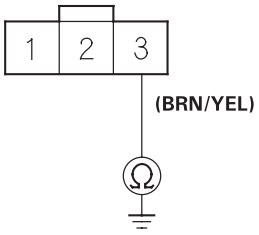
   No Go to step 13.

(cont'd)

DTC Troubleshooting (cont'd)

13. Check for continuity between the No. 3 terminal of the countershaft speed sensor connector and body ground.

COUNTERSHAFT SPEED SENSOR CONNECTOR



Wire side of female terminals

Is there continuity?

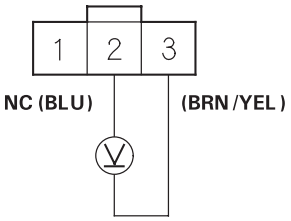
Yes Go to step 14.

No Repair open in the wire between the countershaft speed sensor connector and ground (G101).■

14. Turn the ignition switch ON (II).

15. Measure the voltage between the No. 2 and No. 3 terminals of the countershaft speed sensor connector.

COUNTERSHAFT SPEED SENSOR CONNECTOR



Wire side of female terminals

Is there about 5 V?

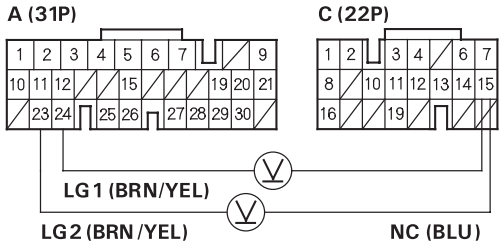
Yes Go to step 16.

No Go to step 26.

16. Connect the countershaft speed sensor connector.

17. Measure the voltage between PCM connector terminals C15 and A23 or A24.

PCM CONNECTORS



Wire side of female terminals

Is the voltage 0 V or about 5 V?

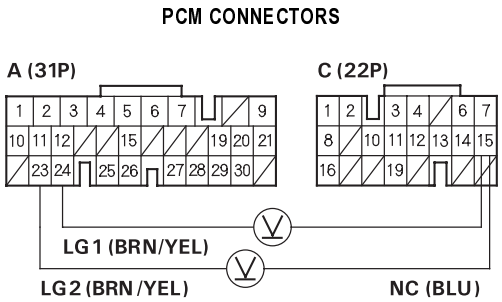
Yes Go to step 18.

No Replace the countershaft speed sensor.■

18. For 4WD model: Raise the vehicle, make sure it is securely supported, and allow the all four wheels to rotate freely.
For 2WD model: Raise the front of the vehicle, make sure it is securely supported, and allow the front wheels to rotate freely.

19. Start the engine, then shift to [D] position and drive the vehicle.

20. Measure the voltage between PCM connector terminals C15 and A23 or A24.



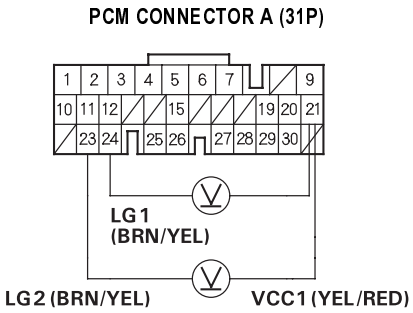
Wire side of female terminals

Is there 1.5 V - 3.5 V?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Replace the countershaft speed sensor.■

21. Measure the voltage between PCM connector terminals A21 and A23 or A24.



Wire side of female terminals

Is there 4.75 V - 5.25 V?

Yes Repair open in the wire between PCM connector terminal A21 and the countershaft speed sensor connector.■

No Go to step 22.

(cont'd)

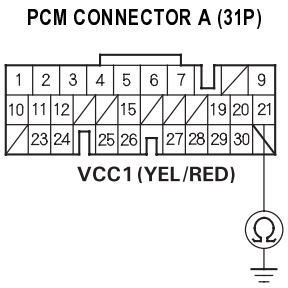
DTC Troubleshooting (cont'd)

22. Turn the ignition switch OFF.

23. Disconnect the battery negative terminal.

24. Disconnect PCM connector A (31P).

25. Check for continuity between PCM connector terminal A21 and body ground.



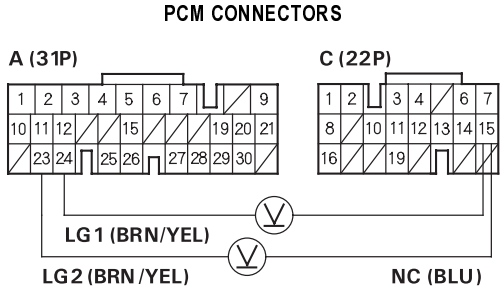
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal A21 and the countershaft speed sensor connector.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

26. Measure the voltage between PCM connector terminals C15 and A23 or A24.



Wire side of female terminals

Is there about 5 V?

Yes Repair open in the wire between PCM connector terminal C15 and the countershaft speed sensor connector.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

DTC P0745: Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve A Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Check the fuel and emissions system problem or A/T system problem is indicated by the DTC.

   Is there any of the DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Turn the ignition switch OFF, and go to step 4 after troubleshooting.

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Replace the A/T clutch pressure control solenoid valve A (see page 14-117).
4. Reset the PCM memory by removing the No. 6 ECU fuse (15A) in the under-hood fuse/relay box for more than 10 seconds.
5. Start the engine, and shift to [1] position. Start the vehicle off in [1] position, drive at 19 mph (30 km/h) for 10 seconds, shift into [2] position, drive at 19 mph (30 km/h) for 10 seconds, then decelerate to a stop.
6. Repeat step 5 to test-drive the vehicle.
7. Recheck for DTC P0745.

   Is DTC P0745 indicated?

   Yes Replace the transmission assembly.■

   No The problem has been corrected.■

(cont'd)

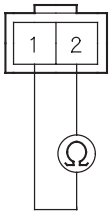
DTC Troubleshooting (cont'd)

DTC P0748: Problem in A/T Clutch Pressure Control Solenoid Valve A Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Disconnect the A/T clutch pressure control solenoid valve A connector.
2. Measure A/T clutch pressure control solenoid valve A resistance at the solenoid valve connector terminals.

A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE A CONNECTOR



Terminal side of male terminals

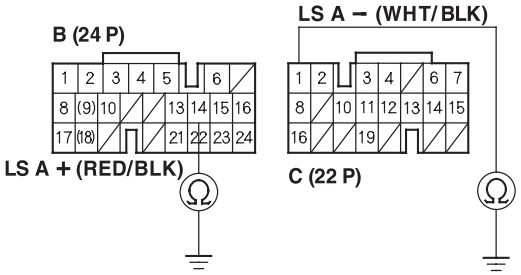
Is there about 5 Ω?

Yes Go to step 3.

No Replace the A/T clutch pressure control solenoid valve A.■

3. Disconnect the battery negative terminal.
4. Disconnect PCM connectors B (24P) and C (22P).
5. Check for continuity between PCM connector terminals B14 and body ground, and between C1 and body ground.

PCM CONNECTORS



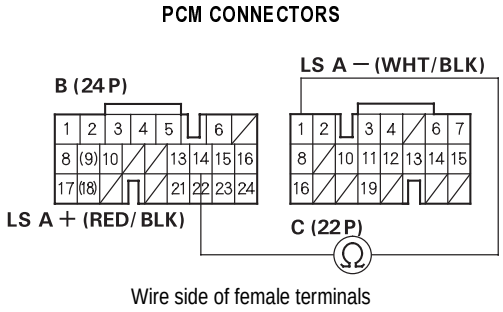
Wirel side of female terminals

Is there continuity?

Yes Repair short to ground in the wires between PCM connector terminals B14 and the A/T clutch pressure control solenoid valve A, and between C1 and the solenoid valve A.■

No Go to step 6.

6. Connect the A/T clutch pressure control solenoid valve A connector.
7. Measure the resistance between PCM connector terminals B14 and C1.

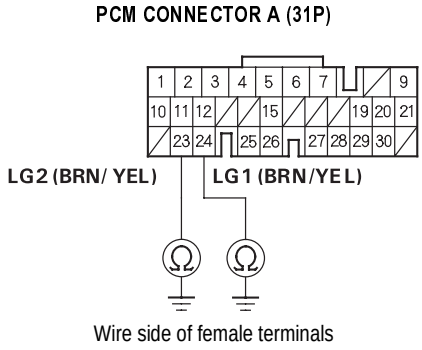


Is there about 5 Ω?

Yes Go to step 8.

No Repair loose terminal or open in the wires between PCM connector terminals B14 and the A/T clutch pressure control solenoid valve A, and between C1 and the solenoid valve A.■

8. Disconnect PCM connector A (31P).
9. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



Is there continuity?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Repair open in the wires between PCM connector terminals A23 and ground (G101), and between A24 and ground (G101), and repair poor ground (G101).■

(cont'd)

DTC Troubleshooting (cont'd)

DTC P0750: Problem in Hydraulic Control System of Shift Solenoid Valve A Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Check the fuel and emissions system problem or A/T system problem is indicated by the DTC.

   Is there any of the DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Turn the ignition switch OFF, and go to step 4 after troubleshooting.

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Replace the shift solenoid valve A (see page 14-114).
4. Reset the PCM memory by removing the No. 6 ECU fuse (15 A) in the under-hood fuse/relay box for more than 10 seconds.
5. Start the engine, and shift to [1] position. Start the vehicle off in [1] position, drive at 25 mph (40 km/h) for 10 seconds, shift into [2] position, drive at 25 mph (40 km/h) for 10 seconds, then shift into [1] position, and drive at 25 mph (40 km/h) for 10 seconds.
6. Recheck for DTC P0750.

   Is DTC P0750 indicated?

   Yes Go to step 7.

   No The problem has been corrected.■

7. Turn the ignition switch OFF.
8. Remove the transmission, and overhaul transmission hydraulic control system and the 2nd clutch line.
9. Install the transmission on the vehicle.
10. Reset the PCM memory by removing the No. 6 ECU fuse (15 A) in the under-hood fuse/relay box for more than 10 seconds, if necessary.
11. Start the engine, and shift to [1] position. Start the vehicle off in [1] position, drive at 25 mph (40 km/h) for 10 seconds, shift into [2] position, drive at 25 mph (40 km/h) for 10 seconds, then shift into [1] position, and drive at 25 mph (40 km/h) for 10 seconds.
12. Recheck for DTC P0750.

    Is DTC P0750 indicated?

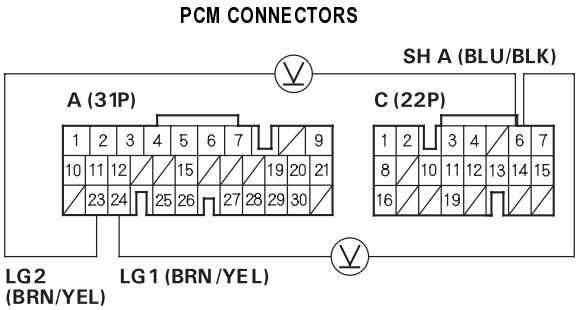
    Yes Replace the transmission assembly.■

    No The problem has been corrected.■

DTC P0753: Problem in Shift Solenoid Valve A Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch OFF.
2. Disconnect the battery negative terminal.
3. Disconnect PCM connectors A (31P) and C (22P).
4. Reconnect the battery negative terminal.
5. Turn the ignition switch ON (II).
6. Measure the voltage between PCM connector terminals C6 and A23 or A24.



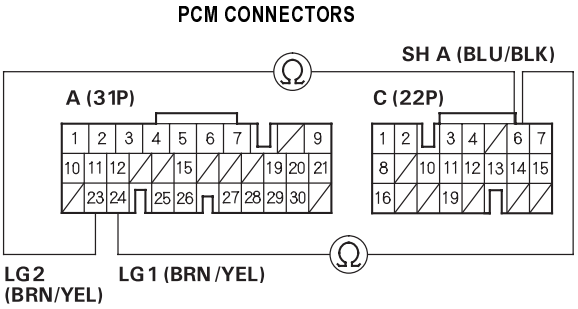
Wire side of female terminals

Is there voltage?

Yes Repair short to power in the wire between PCM connector terminal C6 and the shift solenoid valve A.■

No Go to step 7.

7. Turn the ignition switch OFF.
8. Disconnect the shift solenoid harness connector at the transmission housing.
9. Check for continuity between PCM connector terminals C6 and A23 or A24.



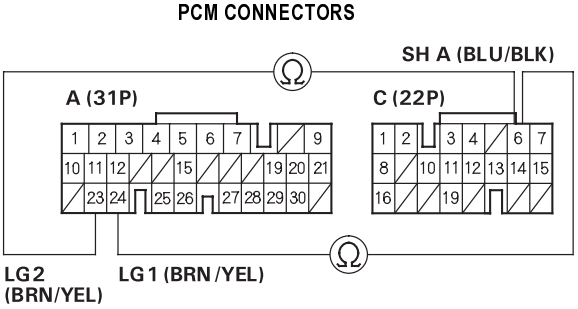
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal C6 and the shift solenoid harness connector.■

No Go to step 10.

10. Connect the shift solenoid harness connector.
11. Measure the resistance between PCM connector terminals C6 and A23 or A24.



Wire side of female terminals

Is there 12 - 25 Ω?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

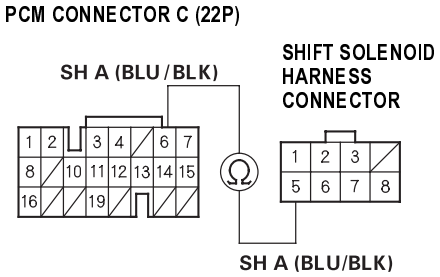
No Go to step 12.

(cont'd)

DTC Troubleshooting (cont'd)

12. Disconnect the shift solenoid harness connector.

13. Check for continuity between PCM connector terminal C6 and the No. 5 terminal of the shift solenoid harness connector.



Wire side of female terminals

Is there continuity?

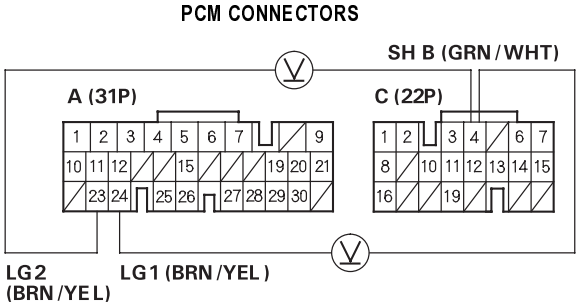
Yes Check the shift solenoid valve A, and check for an open in the shift solenoid harness in the transmission (see page 14-112).■

No Repair open in the wire between PCM connector terminal C6 and the shift solenoid harness connector.■

DTC P0758: Problem in Shift Solenoid Valve B Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch OFF.
2. Disconnect the battery negative terminal.
3. Disconnect PCM connectors A (31P) and C (22P).
4. Reconnect the battery negative terminal.
5. Turn the ignition switch ON (II).
6. Measure the voltage between PCM connector terminals C4 and A23 or A24.



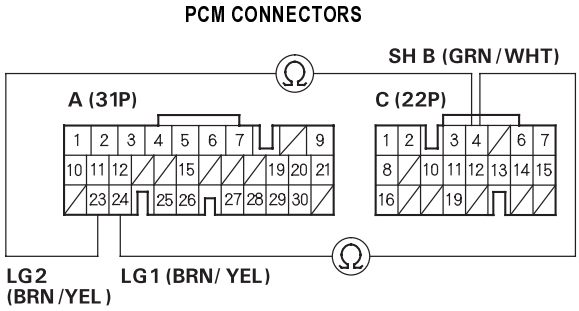
Wire side of female terminals

Is there voltage?

Yes Repair short to power in the wire between PCM connector terminal C4 and the shift solenoid valve B.■

No Go to step 7.

7. Turn the ignition switch OFF.
8. Disconnect the shift solenoid harness connector at the transmission housing.
9. Check for continuity between PCM connector terminals C4 and A23 or A24.



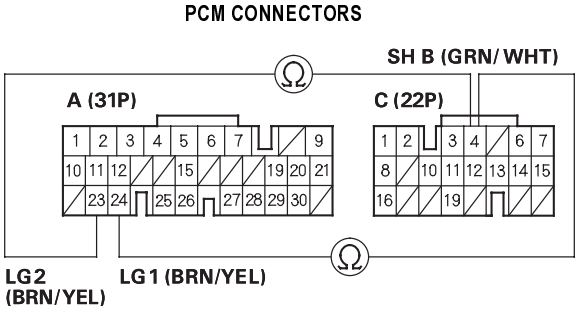
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal C4 and the shift solenoid harness connector.■

No Go to step 10.

10. Connect the shift solenoid harness connector.
11. Measure the resistance between PCM connector terminals C4 and A23 or A24.



Wire side of female terminals

Is there 12 - 25 Ω?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

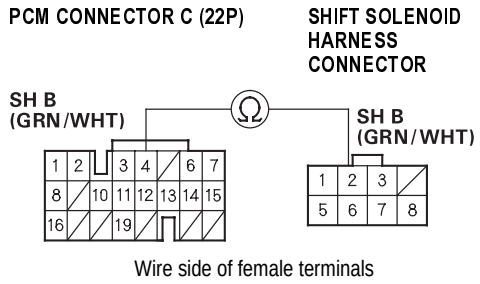
No Go to step 12.

(cont'd)

DTC Troubleshooting (cont'd)

12. Disconnect the shift solenoid harness connector.

13. Check for continuity between PCM connector terminal C4 and No. 2 terminal of the shift solenoid harness connector.



Wire side of female terminals

Is there continuity?

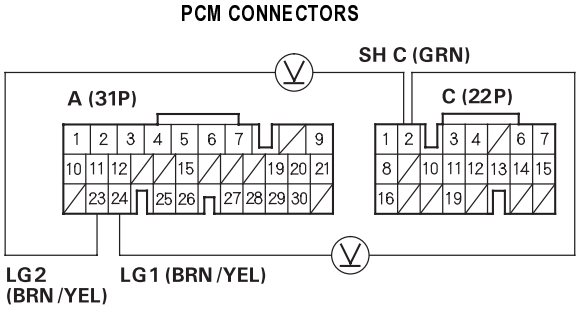
Yes Check the shift solenoid valve B, and check for an open in the shift solenoid harness in the transmission (see page 14-112).■

No Repair open in the wire between PCM connector terminal C4 and the shift solenoid harness connector.■

DTC P0763: Problem in Shift Solenoid Valve C Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch OFF.
2. Disconnect the battery negative terminal.
3. Disconnect PCM connectors A (31P) and C (22P).
4. Reconnect the battery negative terminal.
5. Turn the ignition switch ON (II).
6. Measure the voltage between PCM connector terminals C2 and A23 or A24.



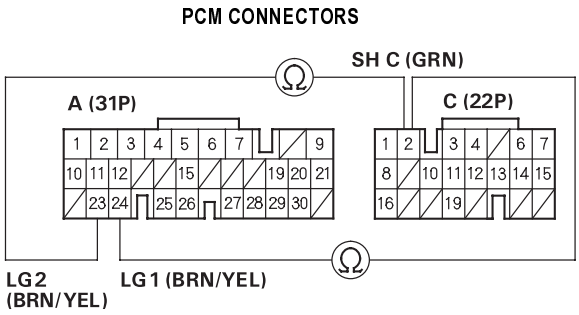
Wire side of female terminals

Is there voltage?

Yes Repair short to power in the wire between PCM connector terminal C2 and the shift solenoid valve C.■

No Go to step 7.

7. Turn the ignition switch OFF.
8. Disconnect the shift solenoid harness connector at the transmission housing.
9. Check for continuity between PCM connector terminals C2 and A23 or A24.



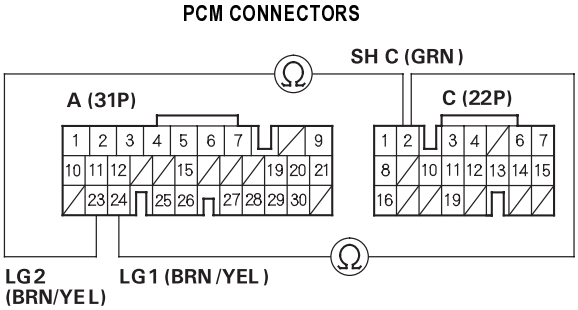
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal C2 and the shift solenoid harness connector.■

No Go to step 10.

10. Connect the shift solenoid harness connector.
11. Measure the resistance between PCM connector terminals C2 and A23 or A24.



Wire side of female terminals

Is there 12 - 25 Ω?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

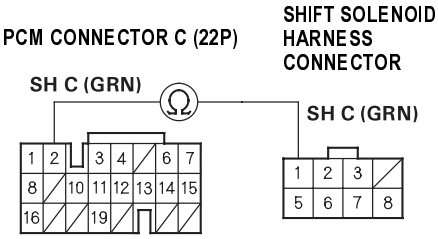
No Go to step 12.

(cont'd)

DTC Troubleshooting (cont'd)

12. Disconnect the shift solenoid harness connector.

13. Check for continuity between PCM connector terminal C2 and the No. 1 terminal of the shift solenoid harness connector.



Wire side of female terminals

Is there continuity?

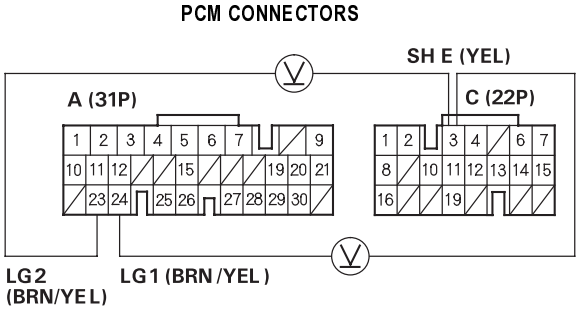
Yes Check the shift solenoid valve C, and check for an open in the shift solenoid harness in the transmission (see page 14-112).■

No Repair open in the wire between PCM connector terminal C2 and the shift solenoid harness connector.■

DTC P0773: Problem in Shift Solenoid Valve E Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch OFF.
2. Disconnect the battery negative terminal.
3. Disconnect PCM connectors A (31P) and C (22P).
4. Reconnect the battery negative terminal.
5. Turn the ignition switch ON (II).
6. Measure the voltage between PCM connector terminals C3 and A23 or A24.



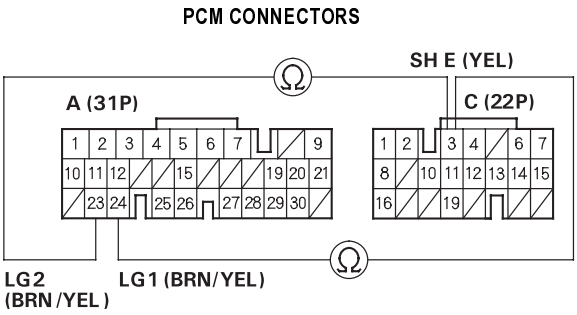
Wire side of female terminals

Is there voltage?

Yes Repair short to power in the wire between PCM connector terminal C3 and the shift solenoid valve E.■

No Go to step 7.

7. Turn the ignition switch OFF.
8. Disconnect the shift solenoid harness connector at the transmission housing.
9. Check for continuity between PCM connector terminals C3 and A23 or A24.



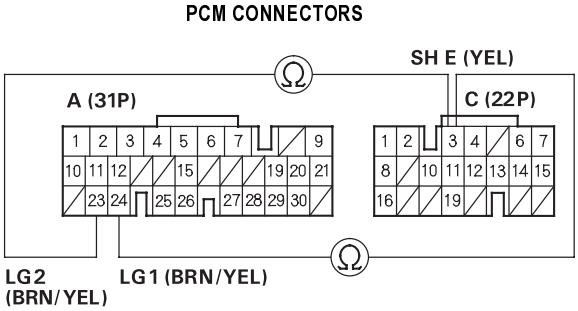
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wire between PCM connector terminal C3 and the shift solenoid harness connector.■

No Go to step 10.

10. Connect the shift solenoid harness connector.
11. Measure the resistance between PCM connector terminals C3 and A23 or A24.



Wire side of female terminals

Is there 12 - 25 Ω?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

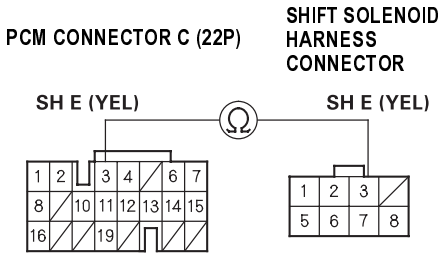
No Go to step 12.

(cont'd)

DTC Troubleshooting (cont'd)

12. Disconnect the shift solenoid harness connector.

13. Check for continuity between PCM connector terminal C3 and the No. 3 terminal of the shift solenoid harness connector.



Wire side of female terminals

Is there continuity?

Yes Check the shift solenoid valve E, and check for an open in the shift solenoid harness in the transmission (see page 14-112).■

No Repair open in the wire between PCM connector terminal C3 and the shift solenoid harness connector.■

DTC P0775: Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve B Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Check the fuel and emissions system problem or A/T system problem is indicated by the DTC.

   Is there any of the DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Turn the ignition switch OFF, and go to step 4 after troubleshooting.

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Replace the A/T clutch pressure control solenoid valve B (with C as a set) (see page 14-119).
4. Reset the PCM memory by removing the No. 6 ECU (15 A) fuse in the under-hood fuse/relay box for more than 10 seconds.
5. Start the engine, and shift to [2] position. Test-drive the vehicle in [2] position at 25 mph (40 km/h) for 10 seconds, shift into [D] position with over-drive OFF mode in 3rd gear, drive at 25 mph (40 km/h) for 10 seconds, then decelerate to a stop. Do not stop the engine. Start off in [1] position, and drive at 19 mph (30 km/h) for 10 seconds.
6. Repeat step 5 to test-drive the vehicle.
7. Recheck for DTC P0775.

   Is DTC P0775 indicated?

   Yes Replace the transmission assembly.■

   No The problem has been corrected.■

(cont'd)

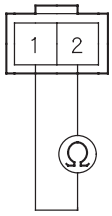
DTC Troubleshooting (cont'd)

DTC P0778: Problem in A/T Clutch Pressure Control Solenoid Valve B Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Disconnect the A/T clutch pressure control solenoid valve B connector.
2. Measure A/T clutch pressure control solenoid valve B resistance at the solenoid valve connector terminals.

A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE B CONNECTOR



Terminal side of male terminals

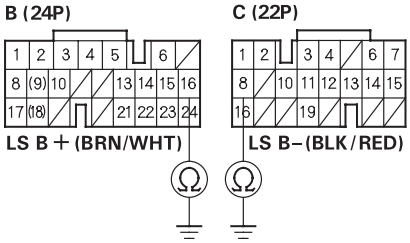
Is there about 5 Ω?

Yes Go to step 3.

No Replace the A/T clutch pressure control solenoid valve B.■

3. Disconnect the battery negative terminal.
4. Disconnect PCM connectors B (24P) and C (22P).
5. Check for continuity between PCM connector terminals B16 and body ground, and between C8 and body ground.

PCM CONNECTORS



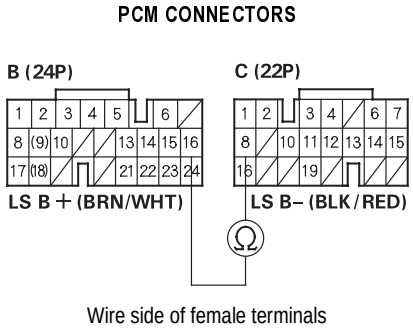
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wires between PCM connector terminals B16 and the A/T clutch pressure control solenoid valve B, and between C8 and the solenoid valve B.■

No Go to step 6.

6. Connect the A/T clutch pressure control solenoid valve B connector.
7. Measure the resistance between PCM connector terminals B16 and C8.

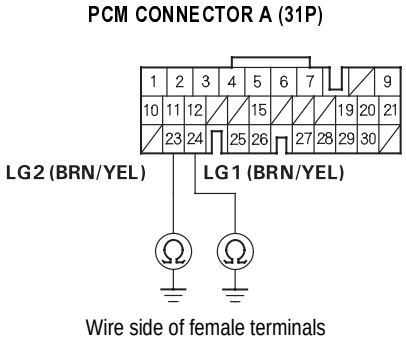


Is there about 5 Ω?

Yes Go to step 8.

No Repair loose terminal or open in the wires between PCM connector terminals B16 and the A/T clutch pressure control solenoid valve B, and between C8 and the solenoid valve B.■

8. Disconnect PCM connector A (31P).
9. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



Is there continuity?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Repair open in the wires between PCM connector terminals A23 and ground (G101), and between A24 and ground (G101), and repair poor ground (G101).■

(cont'd)

DTC Troubleshooting (cont'd)

DTC P0780: Mechanical Problem in Hydraulic Control System

NOTE:
- Record all freeze data before you troubleshoot.
- Keep these replacement solenoid valves on hand:
  - A/T clutch pressure control solenoid valves A, B and C.
  - Shift solenoid valves A, B, C and E.

1. Check the fuel and emissions system problem and A/T system problem is indicated by the DTC.

   Is there any of the DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Check for DTC P0780 after troubleshooting.■

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Replace the A/T clutch pressure control solenoid valve A (see page 14-117).
4. Replace the A/T clutch pressure control solenoid valves B and C (see page 14-119).
5. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
6. Drive the vehicle for several minutes in 1st, 2nd, 3rd and 4th gears in [D] position, and stop the vehicle. Do not stop the engine.
7. Repeat step 6 to test-drive the vehicle five times.
8. Recheck for DTC P0780.

   Is DTC P0780 indicated?

   Yes Go to step 9.

   No The problem has been corrected.■

9. Turn the ignition switch OFF.
10. Replace the shift solenoid valves A, B, C and E (see page 14-114).
11. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
12. Drive the vehicle for several minutes in 1st, 2nd, 3rd and 4th gears in [D] position, and stop the vehicle. Do not stop the engine.
13. Repeat step 12 to test-drive the vehicle five times.
14. Recheck for DTC P0780.

    Is DTC P0780 indicated?

    Yes Go to step 15.

    No The problem has been corrected.■

15. Turn the ignition switch OFF.
16. Remove the transmission, and overhaul transmission hydraulic control system.
17. Install the transmission on the vehicle.
18. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
19. Drive the vehicle for several minutes in 1st, 2nd, 3rd and 4th gears in [D] position, and stop the vehicle. Do not stop the engine.
20. Repeat step 19 to test-drive the vehicle five times.
21. Recheck for DTC P0780.

    Is DTC P0780 indicated?

    Yes Replace the transmission assembly.■

    No The problem has been corrected.■

DTC P0795: Problem in Hydraulic Control System of A/T Clutch Pressure Control Solenoid Valve C Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Check the fuel and emissions system problem or A/T system problem is indicated by the DTC.

   Is there any of the DTC?

   Yes Perform the troubleshooting flowchart for the indicated code(s). Turn the ignition switch OFF, and go to step 4 after troubleshooting.

   No Go to step 2.

2. Turn the ignition switch OFF.
3. Replace the A/T clutch pressure control solenoid valve C (with B as a set) (see page 14-119).
4. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
5. Start the vehicle off in [2] position, accelerate to 25 mph (40 km/h), then shift into [D] position with the O/D switch turned off for over-drive off mode. Drive in 3rd gear at 25 mph (40 km/h) for several seconds, then shift into [2] position and drive at 25 mph (40 km/h) for 10 seconds.
6. Recheck for DTC P0795.

   Is DTC P0795 indicated?

   Yes Go to step 7.

   No The problem has been corrected.■

7. Turn the ignition switch OFF.
8. Remove the transmission, and overhaul transmission hydraulic control system and the 3rd clutch line.
9. Install the transmission on the vehicle.
10. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
11. Start the vehicle off in [2] position, accelerate to 25 mph (40 km/h), then shift into [D] position with the O/D switch turned off for over-drive off mode. Drive in 3rd gear at 25 mph (40 km/h) for several seconds, then shift into [2] position and drive at 25 mph (40 km/h) for 10 seconds.
12. Recheck for DTC P0795.

    Is DTC P0795 indicated?

    Yes Replace the transmission assembly.■

    No The problem has been corrected.■

(cont'd)

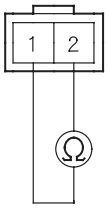
DTC Troubleshooting (cont'd)

DTC P0798: Problem in A/T Clutch Pressure Control Solenoid Valve C Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Disconnect the A/T clutch pressure control solenoid valve C connector.
2. Measure A/T clutch pressure control solenoid valve C resistance at the solenoid valve connector terminals.

A/T CLUTCH PRESSURE CONTROL SOLENOID VALVE C CONNECTOR



Terminal side of male terminals

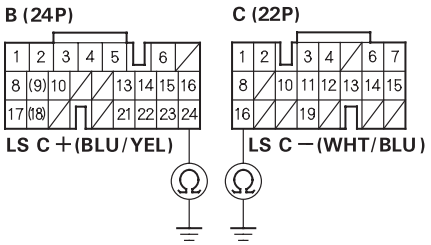
Is there about 5 Ω?

Yes Go to step 3.

No Replace the A/T clutch pressure control solenoid valve C.■

3. Disconnect the battery negative terminal.
4. Disconnect PCM connectors B (24P) and C (22P).
5. Check for continuity between PCM connector terminals B24 and body ground, and between C16 and body ground.

PCM CONNECTORS



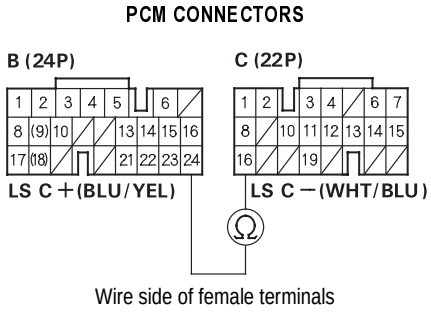
Wire side of female terminals

Is there continuity?

Yes Repair short to ground in the wires between PCM connector terminals B24 and the A/T clutch pressure control solenoid valve C, and between C16 and the solenoid valve C.■

No Go to step 6.

6. Connect the A/T clutch pressure control solenoid valve C connector.
7. Measure the resistance between PCM connector terminals B24 and C16.

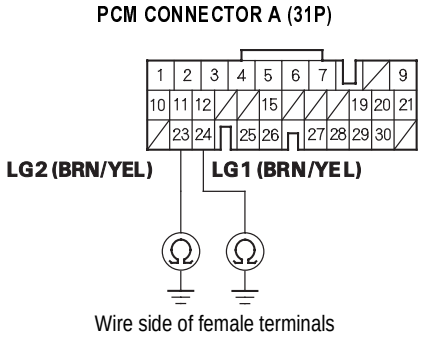


Is there about 5 Ω?

Yes Go to step 8.

No Repair loose terminal or open in the wires between PCM connector terminals B24 and the A/T clutch pressure control solenoid valve C, and between C16 and the solenoid valve C.■

8. Disconnect PCM connector A (31P).
9. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



Is there continuity?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Repair open in the wires between PCM connector terminals A23 and ground (G101), and between A24 and ground (G101), and repair poor ground (G101).■

(cont'd)

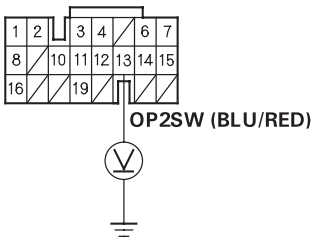
DTC Troubleshooting (cont'd)

DTC P0840: Problem in 2nd Clutch Pressure Switch Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Disconnect the 2nd clutch pressure switch.
2. Turn the ignition switch ON (II).
3. Measure the voltage between PCM connector terminal C13 and body ground.

PCM CONNECTOR C (22P)



Wire side of female terminals

Is there about 5 V?

Yes Go to step 4.

No Check for a short to ground in the wire between PCM connector terminal C13 and the 2nd clutch pressure switch. If wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

4. Measure the voltage between the 2nd clutch pressure switch connector terminal and body ground.

2ND CLUTCH PRESSURE SWITCH CONNECTOR

Wire side of female terminals

Is there about 5 V?

Yes Go to step 5.

No Repair open in the wire between PCM connector terminal C13 and the 2nd clutch pressure switch.■

5. Turn the ignition switch OFF.
6. Measure the resistance between the 2nd clutch pressure switch connector terminal and body ground.

2ND CLUTCH PRESSURE SWITCH CONNECTOR

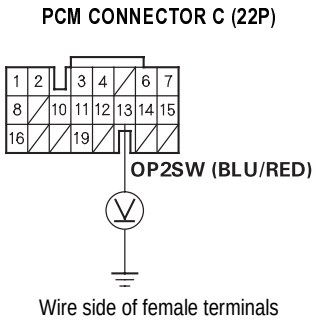
Terminal side of male terminals

Is there 40 M Ω or more?

Yes Go to step 7.

No Replace the 2nd clutch pressure switch.■

7. Connect the 2nd clutch pressure switch connector.
8. Raise the front of the vehicle, make sure it is securely supported, and allow the front wheels to rotate freely.
9. Start the engine, and shift into [2] position.
10. Drive the vehicle in 2nd gear for more than five seconds.
11. With driving in [2] position, measure the voltage between PCM connector terminal C13 and body ground.



Is there 0 V?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Replace the 2nd clutch pressure switch.■

(cont'd)

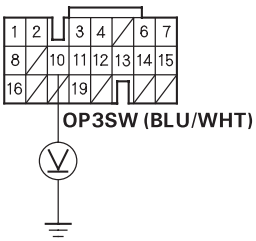
DTC Troubleshooting (cont'd)

DTC P0845: Problem in 3rd Clutch Pressure Switch Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Disconnect the 3rd clutch pressure switch.
2. Turn the ignition switch ON (II).
3. Measure the voltage between PCM connector terminal C10 and body ground.

PCM CONNECTOR C (22P)



Wire side of female terminals

Is there about 5 V?

Yes Go to step 4.

No Check for short to ground in the wire between PCM connector terminal C10 and the 3rd clutch pressure switch. If wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

4. Measure the voltage between the 3rd clutch pressure switch connector terminal and body ground.

3RD CLUTCH PRESSURE SWITCH CONNECTOR

Wire side of female terminals

Is there about 5 V?

Yes Go to step 5.

No Repair open in the wire between PCM connector terminal C10 and the 3rd clutch pressure switch.■

5. Turn the ignition switch OFF.
6. Measure the resistance between the 3rd clutch pressure switch connector terminal and body ground.

3RD CLUTCH PRESSURE SWITCH CONNECTOR

Terminal side of male terminals

Is there 40 M Ω or more?

Yes Go to step 7.

No Replace the 3rd clutch pressure switch.■

7. Connect the 3rd clutch pressure switch connector.

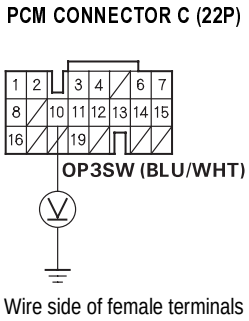
8. For 4WD model: Raise the vehicle, make sure it is securely supported, and allow the all four wheels to rotate freely.
For 2WD model: Raise the front of the vehicle, make sure it is securely supported, and allow the front wheels to rotate freely.

9. Start the engine. Shift into the [D] position, then turn the O/D switch off for driving with over-drive OFF mode.

10. Accelerate the vehicle until the speed exceeds 19 mph (30 km/h), then release the accelerator. Shift into the [N] positon, and return to the [D]; the transmission will shift to 3rd gear.

11. Drive the vehicle in 3rd gear for more than 5 seconds.

12. With driving in 3rd gear, measure the voltage between PCM connector terminal C10 and body ground.



Is there 0 V?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Replace the 3rd clutch pressure switch.■

(cont'd)

DTC Troubleshooting (cont'd)

DTC P1705: Short in Transmission Range Switch Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Turn the ignition switch ON (II).
2. Observe the A/T gear position indicator while shifting to each position.

   Do any indicators stay on when the shift lever is not in that position?

   Yes Go to step 3.
3. Turn the ignition switch OFF, then go to step Disconnect the transmission range switch connector, and watch the A/T gear position indicator.

   Do all gear position indicators go out?

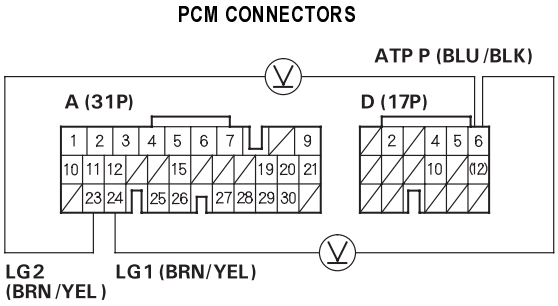
   Yes Replace the transmission range switch.■

   No Turn the ignition switch OFF, then go to step 5.
4. Inspect the transmission range switch (see page 14-168).

   Is the switch OK?

   Yes Go to step 5.

   No Replace the transmission range switch.■
5. Connect the transmission range switch connector.
6. Turn the ignition switch ON (II).
7. Shift to all positions other than [P].
8. Measure the voltage between PCM connector terminals D6 and A23 or A24.



Wire side of female terminals

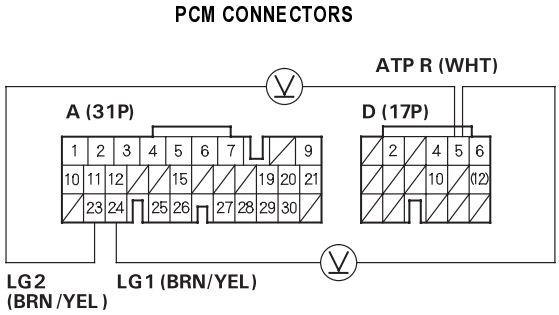
Is there about 5 V?

Yes Go to step 9.

No Check for a short in the wire between PCM connector terminal D6 and the transmission range switch or A/T gear position indicator, and check for an open in the wires between ground G101 and PCM connector terminals A23 and A24. If the wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

9. Shift to all positions other than [R].

10. Measure the voltage between PCM connector terminals D5 and A23 or A24.



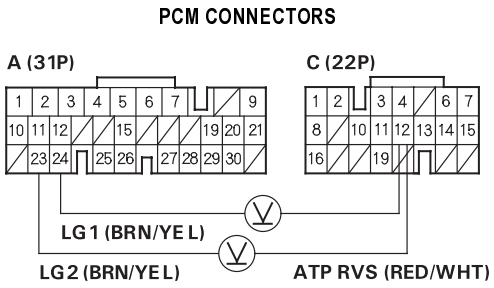
Wire side of female terminals

Is there about 5 V?

Yes Go to step 11.

No Check for a short in the wire between PCM connector terminal D5 and the transmission range switch or A/T gear position indicator. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

11. Measure the voltage between PCM connector terminals C12 and A23 or A24.



Wire side of female terminals

Is there about 5 V?

Yes Go to step 12.

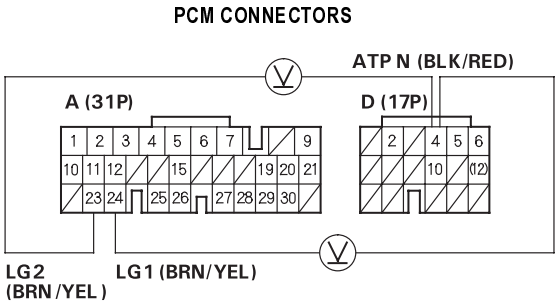
No Check for a short in the wire between PCM connector terminal C12 and the transmission range switch. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

(cont'd)

DTC Troubleshooting (cont'd)

12. Shift to all positions other than [N].

13. Measure the voltage between PCM connector terminals D4 and A23 or A24.



Wire side of female terminals

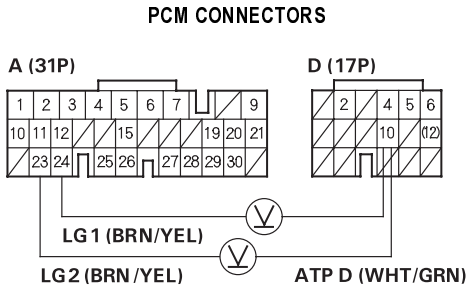
Is there about 5 V?

Yes Go to step 14.

No Check for a short in the wire between PCM connector terminal D4 and the transmission range switch, or A/T gear position indicator. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

14. Shift to all positions other than [D].

15. Measure the voltage between PCM connector terminals D10 and A23 or A24.



Wire side of female terminals

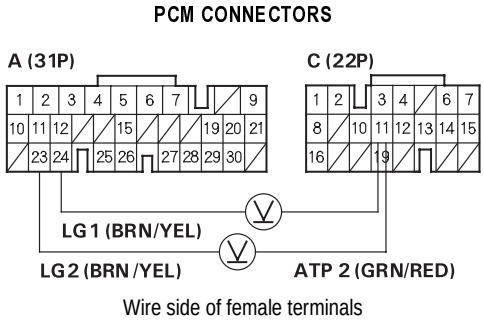
Is there about 5 V?

Yes Go to step 16.

No Check for a short in the wire between PCM connector terminal D10 and the transmission range switch. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

16. Shift to all positions other than [2].

17. Measure the voltage between PCM connector terminals C11 and A23 or A24.



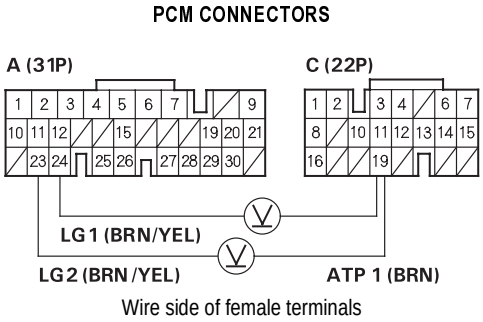
Is there about 5 V?

Yes Go to step 18.

No Check for a short in the wire between PCM connector terminal C11 and the transmission range switch. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

18. Shift to all positions other than [1].

19. Measure the voltage between PCM connector terminals C19 and A23 or A24.



Is there about 5 V?

Yes Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

No Check for a short in the wire between PCM connector terminal C19 and the transmission range switch. If the wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

(cont'd)

DTC Troubleshooting (cont'd)

DTC P1706: Open in Transmission Range Switch Circuit

NOTE: Record all freeze data before you troubleshoot.

1. Check whether DTC P1705 is indicated.

   Is there DTC P1705?

   Yes Perform the troubleshooting flowchart for DTC P1705, then go to step 2.

   No Go to step 8.

2. Turn the ignition switch OFF.
3. Reset the PCM memory by removing the No. 6 ECU (15A) fuse in the under-hood fuse/relay box for more than 10 seconds.
4. Drive the vehicle in [D] position until vehicle speed reaches to 37 mph (60 km/h), and decelerate to a stop.
5. Turn the ignition switch OFF, and turn it ON (II) again.
6. Drive the vehicle in [D] position until vehicle speed reaches to 37 mph (60 km/h), and decelerate to a stop.
7. Recheck for DTC P1706.

   Is DTC P1706 indicated?

   Yes Go to step 8.

   No The problem has been corrected.■

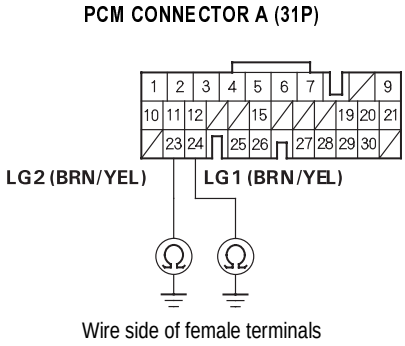
8. Inspect the transmission range switch (see page 14-168).

   Is the switch OK?

   Yes Go to step 9.

   No Replace the transmission range switch.■

9. Connect the transmission range switch connector.
10. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



Wire side of female terminals

Is there continuity?

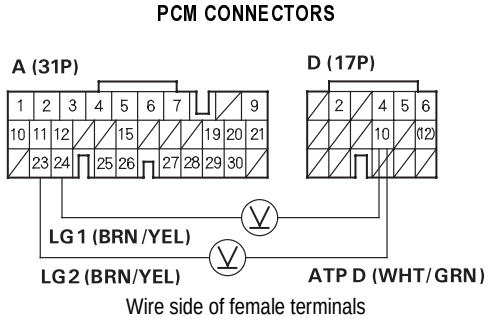
Yes Go to step 11.

No Repair open in the wire between PCM connector terminals A23 and ground (G101), and between A24 and ground (G101), and repair poor ground (G101).■

11. Turn the ignition switch ON (II).

12. Shift to [D] position.

13. Measure the voltage between PCM connector terminals D10 and A23 or A24.



Is there voltage?

Yes Repair open in the wire between PCM connector terminal D10 and the transmission range switch.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

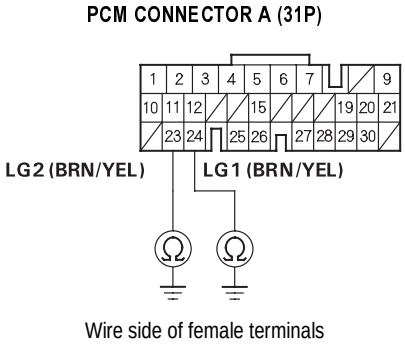
(cont'd)

DTC Troubleshooting (cont'd)

DTC P1717: Problem in ATP RVS Signal Circuit of Transmission Range Switch

NOTE: Record all freeze data before you troubleshoot.

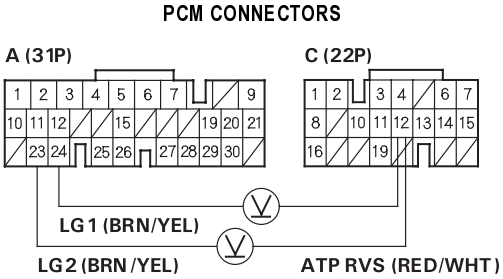
1. Check whether DTC P1705 or P1706 is indicated.
   Is DTC P1705 or P1706 indicated?
   Yes Perform the troubleshooting flowchart for the indicated code(s), then go to step 2.
   No Go to step 6.
2. Shift the shift lever into [P] position, and shift to [R], [N], [D], then shift back to [N], [R], and into [P]. The shift lever should stop for more than 2 seconds at each position.
3. Turn the ignition switch OFF, then turn it ON (II).
4. Shift the shift lever to [R] position for more than 2 seconds, then shift into [N].
5. Check for DTC P1717.
   Is DTC P1717 indicated?
   Yes Go to step 6.
   No The problem has been corrected.■
6. Turn the ignition switch OFF.
7. Check for continuity between PCM connector terminals A23 and body ground, and between A24 and body ground.



Wire side of female terminals

Is there continuity?
Yes Go to step 8.
No Repair open in the wires between PCM connector terminals A23 and ground (G101), and between A24 and ground (G101), and repair poor ground (G101).■

8. Turn the ignition switch ON (II).
9. Shift to [R] position.
10. Measure the voltage between PCM connector terminals C12 and A23 or A24.



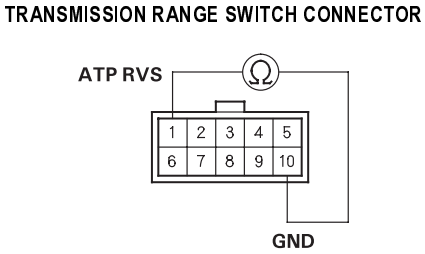
Wire side of female terminals

Is there voltage?

Yes Go to step 11.

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

11. Turn the ignition switch OFF.
12. Disconnect the transmission range switch connector.
13. Check for continuity between the No. 1 and No. 10 terminals of the transmission range switch connector. The shift position must be [R].



Terminal side of male terminals

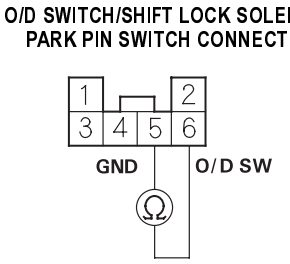
Is there continuity?

Yes Repair open in the wire between PCM connector terminal C12 and the transmission range switch.■

No Replace the transmission range switch.■

Over-drive (O/D) Switch Circuit Troubleshooting

1. Turn the ignition switch OFF.
2. Disconnect the O/D switch/shift lock solenoid/park pin switch connector (see page 14-124).
3. Check for continuity between the No. 5 and No. 6 terminals of the O/D switch/shift lock solenoid/park pin switch connector while pushing the O/D switch and when the switch released.



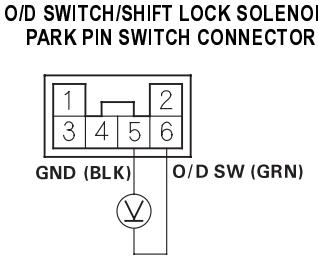
Wire side of female terminals

Is there continuity while pushing the O/D switch, and no continuity when the switch released?

Yes Go to step 4.

No Replace the O/D switch.■

4. Turn the ignition switch ON (II).
5. Shift to [D] position.
6. Measure the voltage between the No. 5 and No. 6 terminals of the O/D switch/shift lock solenoid/park pin switch connector.



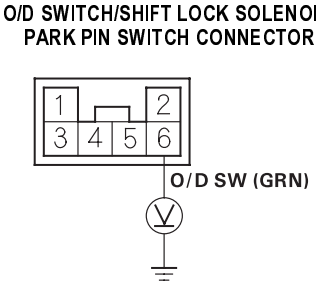
Terminal side of male terminals

Is there about 5 V?

Yes O/D switch circuit is OK.■

No Go to step 7.

7. Measure the voltage between No. 6 terminal and body ground.



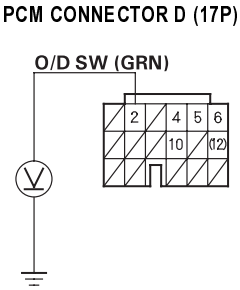
Terminal side of male terminals

Is there about 5 V?

Yes Repair open in the wire between the No. 5 terminal of the O/D switch/shift lock solenoid/park pin switch connector and ground (G451), or repair poor ground (G451).■

No Go to step 8.

8. Measure the voltage between PCM connector terminal D2 and body ground.



Wire side of female terminals

Is there about 5 V?

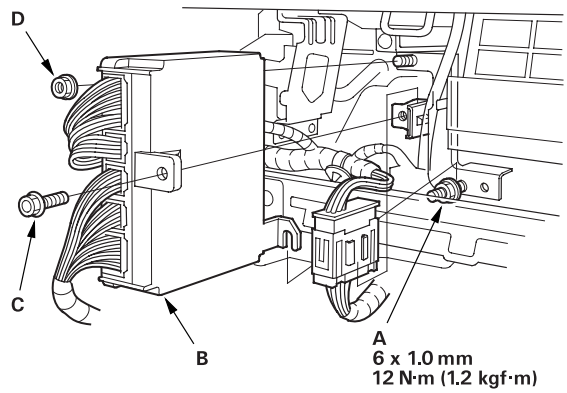
Yes Repair open or short in the wire between PCM connector terminal D2 and O/D switch/shift lock solenoid/park pin switch connector.■

No Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.■

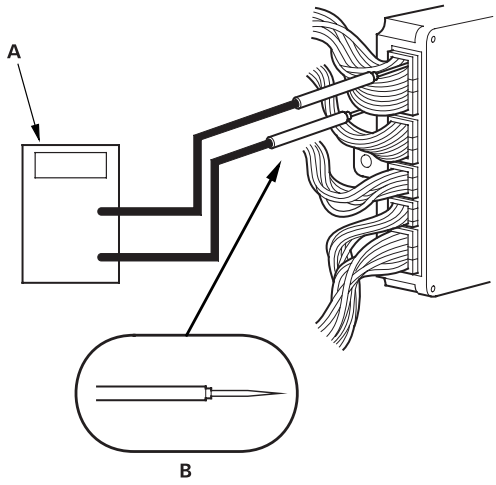
Road Test

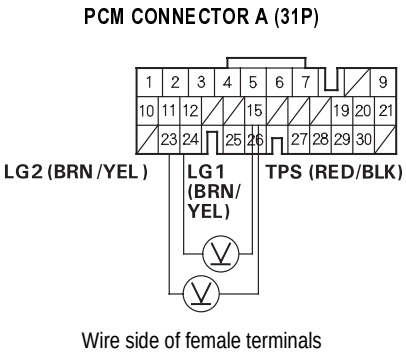
1. Warm up the engine to normal operating temperature (the radiator fan comes on).
2. Apply the parking brake, and block all four wheels. Start the engine, then shift to [D] position while pressing the brake pedal. Press the accelerator pedal, and release it suddenly. The engine should not stall.
3. If the Honda PGM Tester is available, connect the Honda PGM Tester to the DLC (see page 14-4), and go to the PGM-FI Data List, then go to step 8. If the PGM Tester is not available, go to step 4.
4. Remove the glove box stops, then bring the glove box down.
5. Loosen the mounting nut (A) on the lower portion of the PCM (B), and remove the mounting bolt (C) and nut (D).

   NOTE: The illustration shows LHD model; RHD model is symmetrical.



6. Lift the PCM up to clear the mounting nut on the lower portion of the PCM, then pull out the PCM.
7. Connect a digital multitester (A) and tapered tip probe (B) to check voltage between the A15 (+) terminal and A23 (-) or A24 (-) terminal of the PCM.





(cont'd)

Road Test (cont'd)

8. Test-drive the vehicle on a flat road in the [D] position, check for abnormal noise and clutch slippage. While driving, check that the shift points occur at the proper speeds by monitoring the throttle position sensor voltage and comparing your shift point speeds and voltage to those in the table. (The throttle position sensor voltage represents the throttle opening.)

[D] position
Upshift

Throttle Opening	Unit of Speed	1st → 2nd	2nd → 3rd	3rd → 4th
Throttle position sensor voltage: 0.8 V	mph	11 - 13	20 - 23	27 - 32
	km/h	17 - 21	32 - 37	44 - 51
Throttle position sensor voltage: 2.25 V	mph	21 - 24	38 - 43	56 - 62
	km/h	33 - 39	61 - 69	90 - 99
Fully-opened throttle, throttle position sensor voltage: 4.5 V	mph	34 - 39	63 - 71	94 - 104
	km/h	55 - 63	101 - 114	151 - 168

Downshift

Throttle Opening	Unit of Speed	4th → 3rd	3rd → 2nd	2nd → 1st
Throttle position sensor voltage: 0.8 V	mph	19 - 22	5 - 8 (3rd → 1st)	
	km/h	30 - 35	8 - 13 (3rd → 1st)	
Fully-opened throttle, throttle position sensor voltage: 4.5 V	mph	80 - 89	53 - 60	25 - 30
	km/h	128 - 144	85 - 96	41 - 49

Lock-up ON and OFF
(Schedule of shift solenoid valve E turned ON and OFF)

Throttle Opening	Unit of Speed	Lock-up ON	Lock-up OFF
Throttle position sensor voltage: 0.8 V	mph	55 - 61	53 - 60
	km/h	88 - 98	86 - 86
Throttle position sensor voltage: 2.25 V	mph	93 - 106	73 - 81
	km/h	150 - 170	117 - 130
Fully-opened throttle, throttle position sensor voltage: 4.5 V	mph	93 - 106	90 - 99
	km/h	150 - 170	145 - 160

9. Accelerate to about 35 mph (57 km/h) so the transmission is in 4th gear, then shift to 2nd gear. The vehicle should immediately begin slowing down from engine braking.

10. Accelerate from a stop at full throttle in [1] position. Check that there is no abnormal noise or slippage.Upshifts should not occur with the shift lever in this position.

11. Accelerate from a stop at full throttle in [2] position. Check that there is no abnormal noise or slippage.Upshifts and downshifts should not occur with the shift lever in this position.

12. Accelerate from a stop at full throttle in [R] position. Check that there is no abnormal noise or slippage.

13. Test in [P] (Parking) Position.
Park the vehicle on a slope (about 16°), apply the parking brake, and shift into [P] position. Release the brake; the vehicle should not move.

Stall Speed Test

1. Set the parking brake, and block all four wheels.
2. Connect a tachometer to the engine, and start the engine.
3. Make sure the A/C switch is OFF.
4. After the engine has warmed up to normal operating temperature (the radiator fan comes on), shift to [2] position.
5. Fully press the brake pedal and accelerator for 6 to 8 seconds, and note engine speed. Do not move the shift lever while raising engine speed.
6. Allow 2 minutes for cooling, then repeat the test in [D], [1] and [R] positions.

   NOTE:
   - Do not test stall speed for more than 10 seconds at a time.
   - Stall speed tests should be used for diagnostic purposes only.
   - Stall speed should be the same in [D], [2], [1] and [R] positions.
   - Do not stall speed with the A/T pressure gauges installed.

   Stall Speed rpm:
   Specification: **2,320 rpm (min^{-1})**
   Service Limit: **2,170 - 2,470 rpm (min^{-1})**

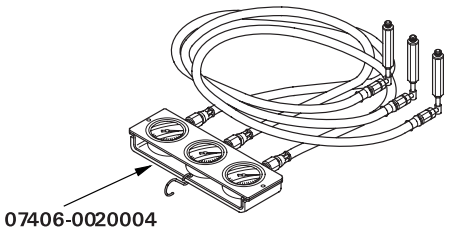
7. If the measurements are out of the service limit, problems and probable causes are listed in the table below:

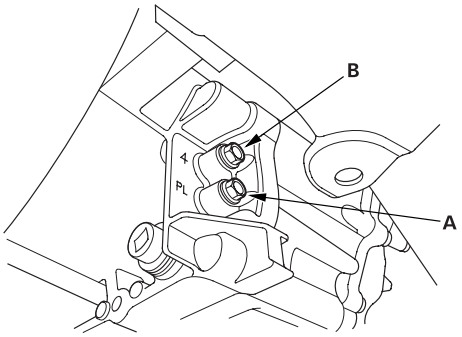
Problem	Probable causes
Stall speed rpm high in [D], [2], [1] and [R] positions	• Low fluid level • ATF pump output low • ATF pump defective • Clogged ATF strainer • Pressure regulator valve stuck closed
Stall speed high in [R] position	Slippage of 4th clutch
Stall speed high in [2] position	Slippage of 2nd clutch
Stall speed high in [1] position	Slippage of 1st clutch
Stall speed low in [D], [2], [1] and [R] positions	• Engine output low • Engine throttle valve closed • Torque converter one-way clutch slipping

Pressure Tests

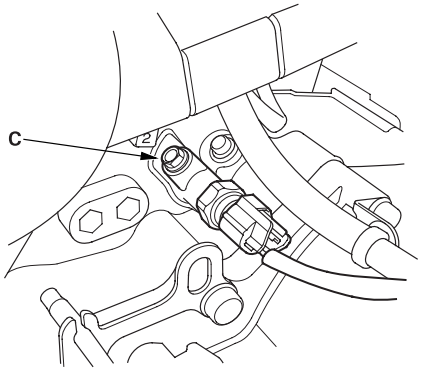
Special Tools Required
A/T oil pressure gauge set 07406-0020004

1. Before testing, be sure the transmission fluid filled to the proper level.
2. 4WD: Lift up the vehicle.
   2WD: Raise the front of the vehicle, and make sure it is securely supported. Set the parking brake, and block rear wheels securely.
3. Allow the all four wheels (4WD) or front wheels (2WD) to rotate freely.
4. Warm up the engine (the radiator fan comes on), then stop it, and connect the tachometer.
5. Connect the oil pressure gauge to the line pressure inspection hole (A) and 4th clutch pressure inspection hole (B). Do not allow dust or other foreign particles to enter the holes while connecting the gages.

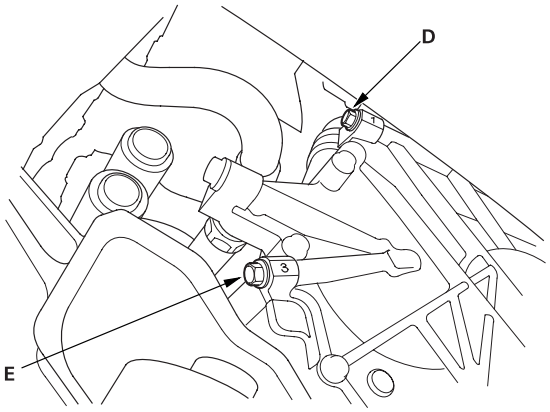




6. Remove the air cleaner housing, and connect the oil pressure gauge to the 2nd clutch pressure inspection hole (C). Then temporarily reinstall the air cleaner housing.



7. Connect the oil pressure gauges to the 1st clutch pressure inspection hole (D) and 3rd clutch pressure inspection hole (E).



8. Start the engine, and run it at 2,000 rpm (min^{-1}).
9. Shift to [N] or [P] position, and measure line pressure at the line pressure inspection hole (A).

   NOTE: Higher pressure may be indicated if measurements are made in shift lever position other than [N] or [P].

PRESSURE	FLUID PRESSURE	
	Standard	Service Limit
Line (A)	900 - 960 kPa (9.2 - 9.8 kgf/cm², 130 - 140 psi)	850 kPa (8.7 kgf/cm², 120 psi)

10. Shift to [1] position, and measure 1st clutch pressure at the 1st clutch pressure inspection hole (D) with holding engine speed at 2,000 rpm (min^{-1}).
11. Shift to [2] position, and measure 2nd clutch pressure at the 2nd clutch pressure inspection hole (C) with holding engine speed at 2,000 rpm (min^{-1}).
12. Shift to [D] position, and select the over-drive OFF mode by turning the O/D switch off. Measure 3rd clutch pressure at the 3rd clutch pressure inspection hole (E) with holding engine speed at 2,000 rpm (min^{-1}).
13. Select the over-drive mode by turning the O/D switch on, and measure 4th clutch pressure at the 4th clutch pressure inspection hole (B) with holding engine speed at 2,000 rpm (min^{-1}).
14. Shift to [R] position, and measure 4th clutch pressure at the 4th clutch pressure inspection hole (B) with holding engine speed at 2,000 rpm (min^{-1}).

PRESSURE	FLUID PRESSURE	
	Standard	Service Limit
1st clutch (D) 2nd clutch (C) 3rd clutch (E) 4th clutch (B)	890 - 970 kPa (9.1 - 9.9 kgf/cm², 130 - 140 psi)	840 kPa (8.6 kgf/cm², 120 psi)

15. If the measurements are out of service limit, problems and probable causes are listed in the table below:

Problem	Probable causes
No or low line pressure	• Torque converter • Regulator valve • Torque converter check valve • ATF pump • Low fluid level • Clogged ATF strainer
No or low 1st clutch pressure	• 1st clutch • O-rings
No or low 2nd clutch pressure	• 2nd clutch • O-rings
No or low 3rd clutch pressure	• 3rd clutch • O-rings
No or low 4th clutch pressure in [D] position	• 4th clutch • O-rings
No or low 4th clutch pressure in [R] position	• Servo valve • 4th clutch • O-rings

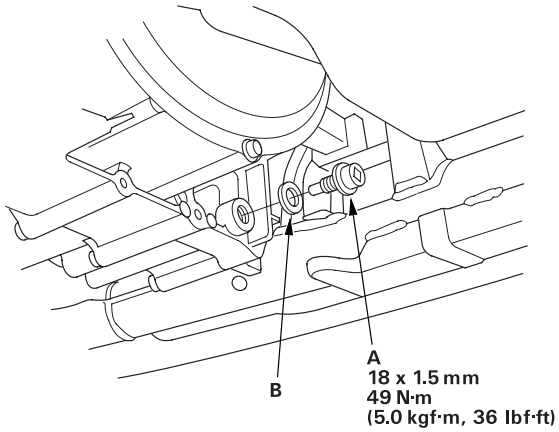
16. Install the sealing bolt with a new sealing washer, and tighten the bolts to the specified torque.

    TORQUE: 18 N·m (1.8 kgf·m,13 lbf·ft)

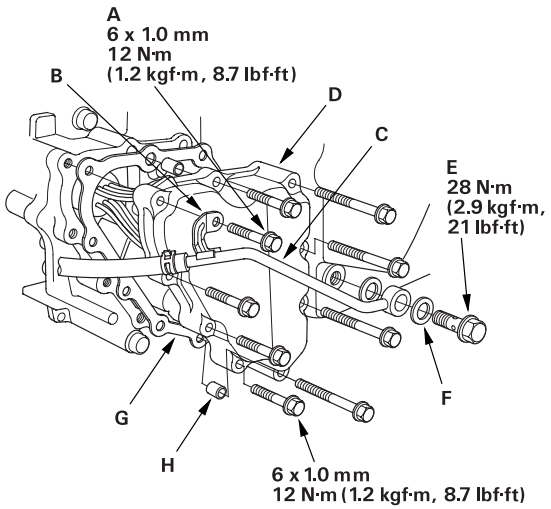
    NOTE: Do not reuse old sealing washers.
17. Install the air cleaner housing.

Shift Solenoid Valves Test

1. Remove the drain plug (A), and drain the automatic transmission fluid (ATF).

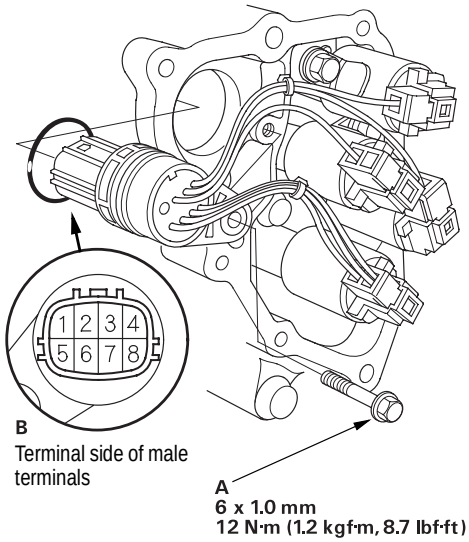


2. Reinstall the drain plug with a new sealing washer (B).
3. Place the transmission jack under the transmission, and lift it up create clearance between the transmission and front sub-frame.
4. Disconnect the shift solenoid harness connector.
5. Remove the bolt (A) securing the bracket (B) of the AFT cooler inlet line (C) on the shift solenoid valve cover (D), and remove the line bolt (E) with sealing washers (F).



6. Remove the shift solenoid valve cover, gasket (G), and dowel pins (H).

7. Remove the bolt (A), and remove the shift solenoid harness connector (B).



8. Measure shift solenoid valves resistance between the shift solenoid harness connector terminals No. 1, No. 2, No. 3, No. 5 and body ground.
Shift solenoid valve A: No. 5 terminal (BLU)
Shift solenoid valve B: No. 2 terminal (ORN)
Shift solenoid valve C: No. 1 terminal (GRN)
Shift solenoid valve E: No. 3 terminal (RED)

   STANDARD: 12 - 25 Ω

9. If the resistance is out of standard, disconnect the shift solenoid valve connector, and measure its resistance at the solenoid valve connector. Replace the shift solenoid valve if the resistance is out of standard.

10. Connect the battery positive terminal to the shift solenoid harness connector terminals, and connect the battery negative terminal to body ground individually. A clicking sound should be heard.

11. If no sound is heard, connect the battery positive terminal to the shift solenoid valve connector terminal, and check the clicking sound is heard. Replace the shift solenoid valve if no sound is heard.

12. Replace the solenoid harness if the tests results are OK.

13. Install the new O-ring on the shift solenoid harness connector, and install the connector in the transmission housing.

14. Install the shift solenoid valve cover with the new gasket and dowel pins.

15. Install the ATF cooler inlet line with the line bolt and the new sealing washers. Create clearance with the jack between the transmission and the front sub-frame to tighten the line bolt with the torque wrench.

16. Install the bracket of the ATF cooler inlet line on the shift solenoid valve cover with the bolt.

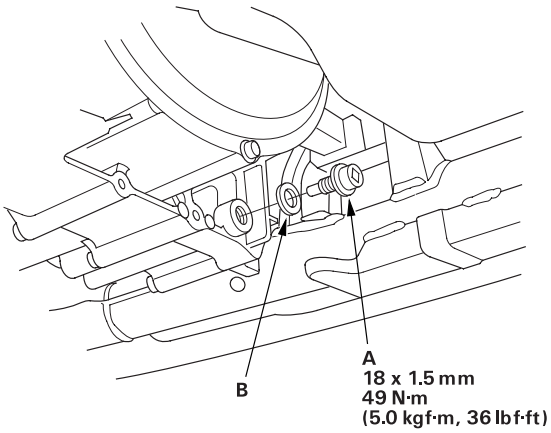
17. Check the connector for rust, dirt, or oil, then connect the connector securely.

18. Remove the transmission jack.

19. Refill the transmission with the recommended fluid (see page 14-131).

Shift Solenoid Valves Replacement

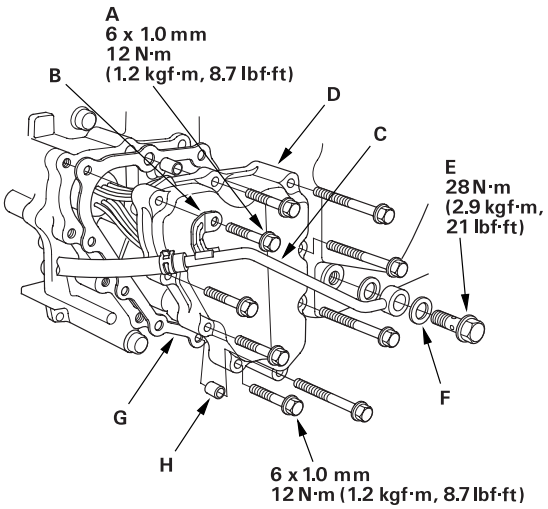
1. Remove the drain plug (A), and drain the automatic transmission fluid (ATF).



2. Reinstall the drain plug with a new sealing washer (B).

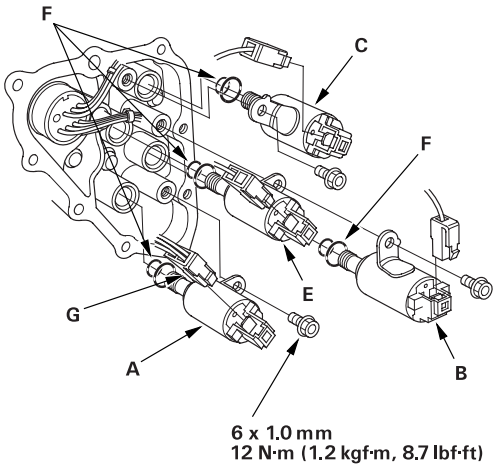
3. Place the transmission jack under the transmission, and lift it up to create clearance between the transmission and front sub-frame.

4. Remove the bolt (A) securing the bracket (B) of the ATF cooler inlet line (C) on the shift solenoid valve cover (D), and remove the line bolt (E) with sealing washers (F).



5. Remove the shift solenoid valve cover, gasket (G), and dowel pins (H).

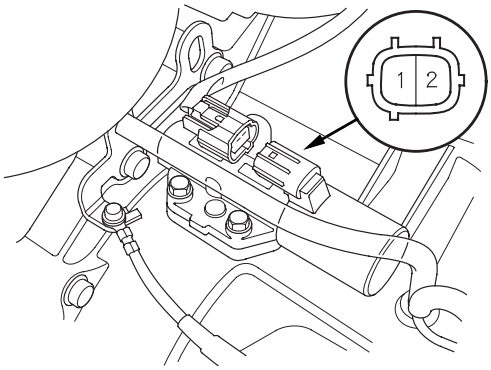
6. Disconnect the shift solenoid valve connectors.
7. Remove the bolts, and hold the shift solenoid valve body, then remove them. Do not hold the connector to remove.
8. Install the new O-rings (two O-rings per a solenoid valve) (F) on the good solenoid valve. The replacement solenoid valve is equipped with the new O-rings.



9. Install the shift solenoid valve A, C, and E with holding the shift solenoid valve body, be sure to install the solenoid valves until their mounting bolt brackets contact to the servo body.
10. Install the shift solenoid valve B with holding the shift solenoid valve body, be sure to install the solenoid valve until its mounting bolt brackets contact to the bracket of installed solenoid. Do not install the shift solenoid valve B before installing the shift solenoid valve E. If solenoid valve B is installed before solenoid valve E, it may damage to hydraulic control system.
11. Connect the shift solenoid valve A connector (G) with the ATF temperature sensor.
12. Connect the solenoid valve B connector (ORN wire), solenoid valve C connector (GRN wire), and solenoid valve E connector (RED wire).
13. Install the shift solenoid valve cover with the new gasket and dowel pins.
14. Install the ATF cooler inlet line with the line bolt and the new sealing washers. Create clearance with the jack between the transmission and the front sub-frame to tighten the line bolt with the torque wrench.
15. Install the bracket of the ATF cooler inlet line on the shift solenoid valve cover with the bolt.
16. Remove the transmission jack.
17. Refill the transmission with the recommended fluid (see page 14-131).

A/T Clutch Pressure Control Solenoid Valve A Test

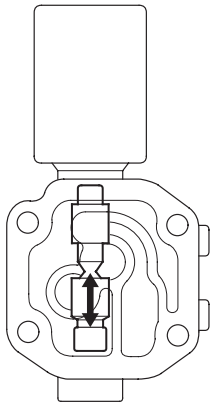
1. Remove the air cleaner housing.
2. Disconnect the A/T clutch pressure control solenoid valve A connector.



3. Measure A/T clutch pressure control solenoid valve A resistance at the solenoid valve A connector.

   STANDARD: About 5 Ω

4. If the resistance is out of standard, replace the A/T clutch pressure control solenoid valve A.
5. Connect the battery positive terminal to the No. 1 terminal of the A/T clutch pressure control solenoid valve A connector, and connect the battery negative terminal to the No. 2 terminal. A clicking sound should be heard.
6. If no sound is heard, remove the A/T clutch pressure control solenoid valve A.
7. Check the fluid passage of the A/T clutch pressure control solenoid valve for dust or dirt.
8. Connect the No. 1 terminal of the A/T clutch pressure control solenoid valve A connector to the battery positive terminal, and connect the No. 2 terminal to the battery negative terminal. Make sure the A/T clutch pressure control solenoid valve moves.



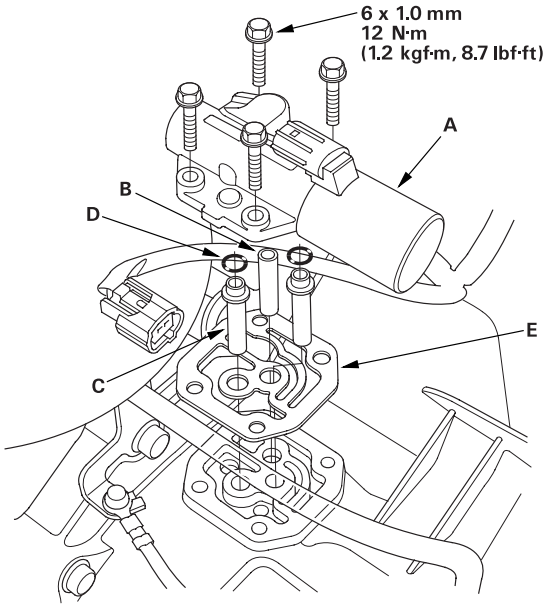
9. Disconnect one of the battery terminal and check valve movement.

   NOTE: You can see valve movement through the fluid passage in the mounting surface of the A/T clutch pressure control solenoid valve A body.

10. If the valve binds or moves sluggishly, or if the solenoid valve does not operate, replace the A/T clutch pressure control solenoid valve A.

A/T Clutch Pressure Control Solenoid Valve A Replacement

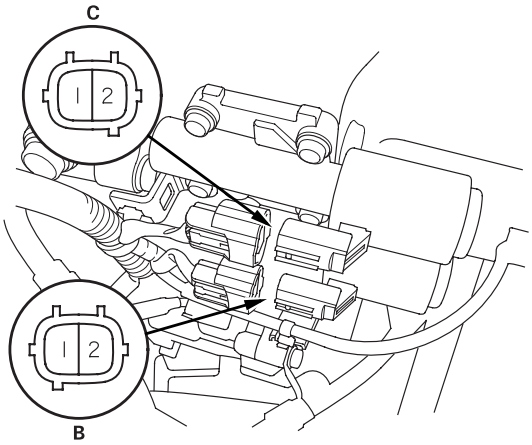
1. Remove the air cleaner housing.
2. Disconnect the A/T clutch pressure control solenoid valve A connector.
3. Remove the mounting bolts and the A/T clutch pressure control solenoid valve A.



4. Remove the ATF pipe (B), ATF joint pipes (C), O-rings (D), and gasket (E).
5. Clean the mounting surface and fluid passage of the A/T clutch pressure control solenoid valve A and transmission housing.
6. Install the new gasket on the transmission housing, and install the ATF pipe and ATF joint pipes.
7. Install the new O-rings over the ATF joint pipes.
8. Install the new A/T clutch pressure control solenoid valve A.
9. Check the A/T clutch pressure control solenoid valve A connector for rust, dirt, or oil, then connect it securely.
10. Install the air cleaner housing.

A/T Clutch Pressure Control Solenoid Valves B and C Test

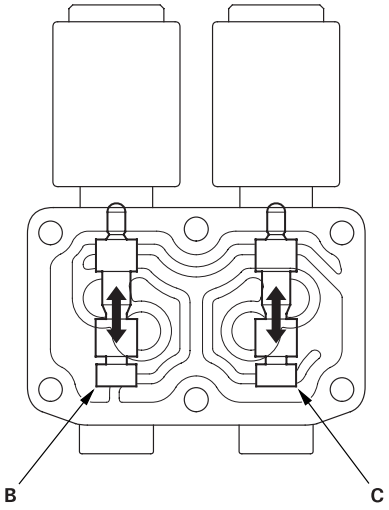
1. Remove the air cleaner housing.
2. Disconnect the A/T clutch pressure control solenoid valves B and C connectors.



3. Measure A/T clutch pressure control solenoid valve B resistance at the solenoid valve B connector, and measure A/T clutch pressure control solenoid valve C resistance at the solenoid valve C connector.

   STANDARD: About 5 Ω

4. If the resistance of either A/T clutch pressure control solenoid valve is out of standard, replace the A/T clutch pressure control solenoid valves B and C.
5. Connect the battery positive terminal to the No. 1 terminal of the A/T clutch pressure control solenoid valves B and C connectors, and connect the battery negative terminal to the No. 2 terminal. A clicking sound should be heard.
6. If no sound is heard, remove the A/T clutch pressure control solenoid valves B and C.
7. Check the fluid passage of the A/T clutch pressure control solenoid valve for dust or dirt.
8. Connect the No. 1 terminal of the A/T clutch pressure control solenoid valves B and C connectors to the battery positive terminal, and connect the No. 2 terminal to the battery negative terminal. Make sure the A/T clutch pressure control solenoid valves B and C move.



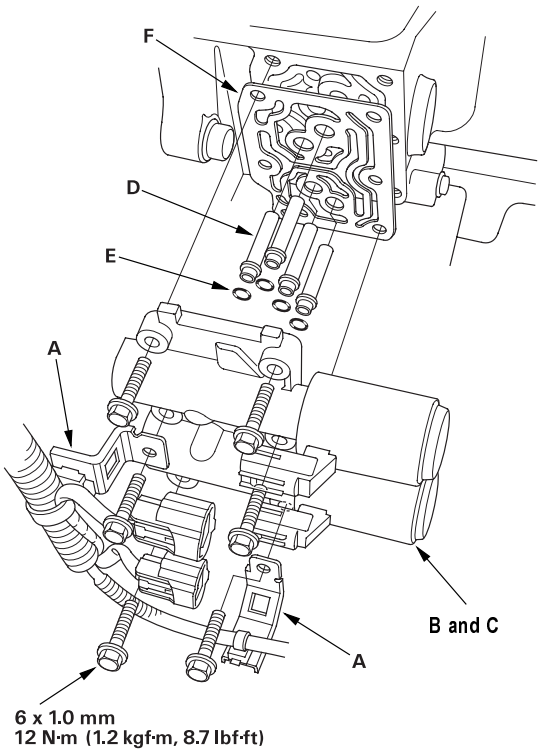
9. Disconnect one of the battery terminal and check valve movement.

   NOTE: You can see valve movement through the fluid passage in the mounting surface of the A/T clutch pressure control solenoid valves B and C body.

10. If either valve binds or moves sluggishly, or if the solenoid valve does not operate, replace the A/T clutch pressure control solenoid valves B and C.

A/T Clutch Pressure Control Solenoid Valves B and C Replacement

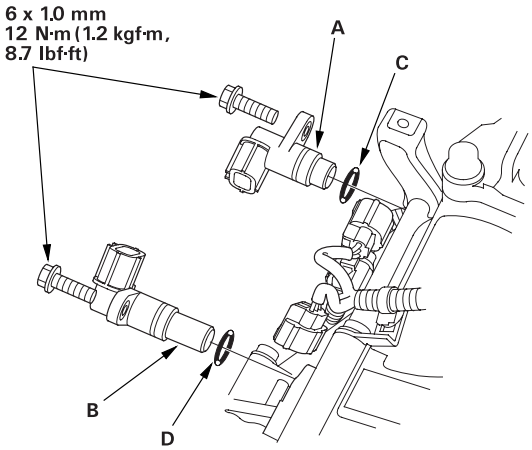
1. Remove the air cleaner housing.
2. Disconnect the A/T clutch pressure control solenoid valves B and C connectors.
3. Remove the mounting bolts, harness clamp brackets (A), and the A/T clutch pressure control solenoid valves B and C.



4. Remove the ATF joint pipes (D), O-rings (E), and gasket (F).
5. Clean the mounting surface and fluid passage of the A/T clutch pressure control solenoid valves B and C and transmission housing.
6. Install the new gasket on the transmission housing, and install the ATF joint pipes.
7. Install the new O-rings over the ATF joint pipes.
8. Install the new A/T clutch pressure control solenoid valves B and C, and harness clamp brackets.
9. Check the A/T clutch pressure control solenoid valves B and C connectors for rust, dirt, or oil, then connect them securely.
10. Install the air cleaner housing.

Mainshaft and Countershaft Speed Sensors Replacement

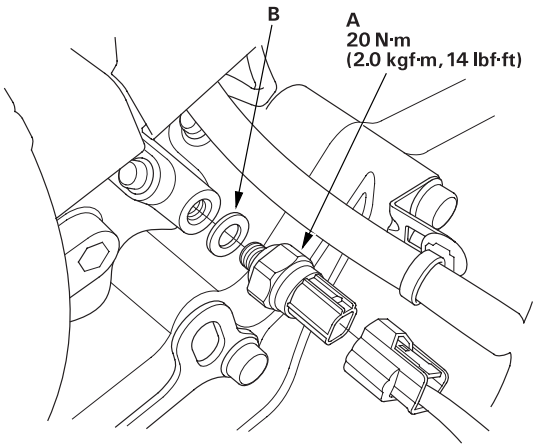
1. Disconnect the mainshaft speed sensor connector and countershaft speed sensor connector.
2. Remove the mainshaft speed sensor (A) and countershaft speed sensor (B).



3. Install the new O-ring (C) on the mainshaft speed sensor, and install the mainshaft speed sensor in the transmission housing.
4. Install the new O-ring (D) on the countershaft speed sensor, and install the countershaft speed sensor in the transmission housing.
5. Check the connectors for rust, dirt, or oil, then connect the connectors securely.

2nd Clutch Pressure Switch Replacement

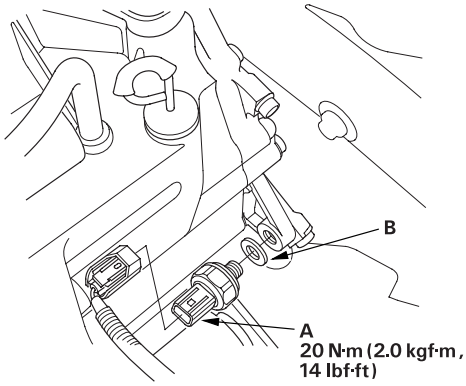
1. Remove the air cleaner housing.
2. Disconnect the connector from the 2nd clutch pressure switch (A).



3. Replace the 2nd clutch pressure switch, then install a new one with a new sealing washer (B). Tighten the switch on the metal pert, not the plastic part.
4. Reconnect the connector, making sure there is no water, oil, dust, or foreign particles inside it.
5. Install the air cleaner housing.

3rd Clutch Pressure Switch Replacement

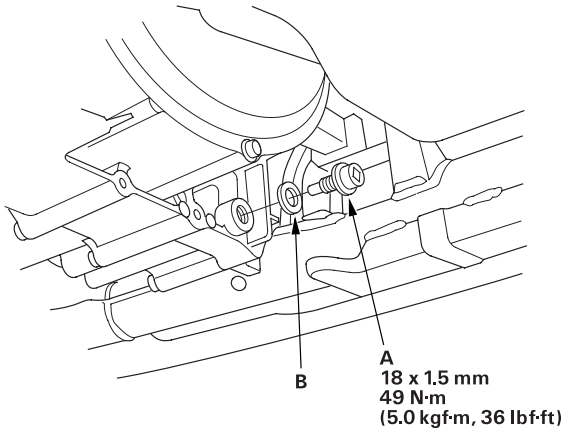
1. Disconnect the connector from the 3rd clutch pressure switch (A).



2. Replace the 3rd clutch pressure switch ,then install a new one with a new sealing washer (B). Tighten the switch on the metal part, not the plastic part.
3. Reconnect the connector, making sure there is no water, oil, dust, or foreign particles inside it.

ATF Temperature Sensor Test/Replacement

1. Remove the drain plug (A), and drain the automatic transmission fluid (ATF).

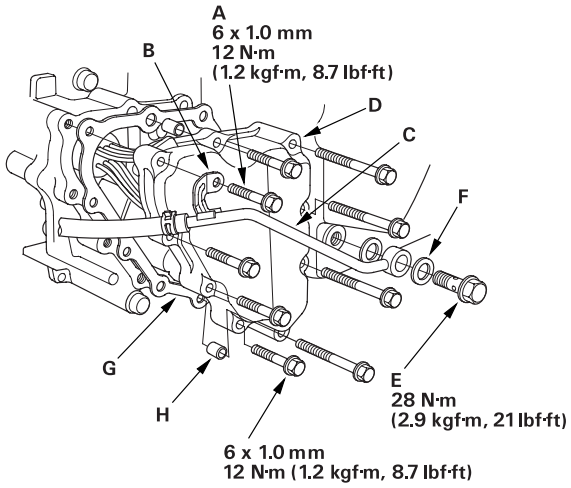


2. Reinstall the drain plug with a new sealing washer (B).

3. Place the transmission jack under the transmission, and lift it up to create clearance between the transmission and front sub-frame.

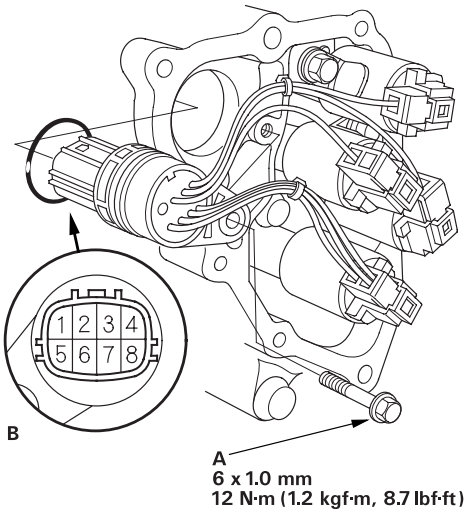
4. Disconnect the shift solenoid harness connector.

5. Remove the bolt (A) securing the bracket (B) of the ATF cooler inlet line (C) on the shift solenoid valve cover (D), and remove the line bolt (E) with sealing washers (F).



6. Remove the shift solenoid valve cover, gasket (G), and dowel pins (H).

7. Remove the bolt (A), and remove the shift solenoid harness connector (B).



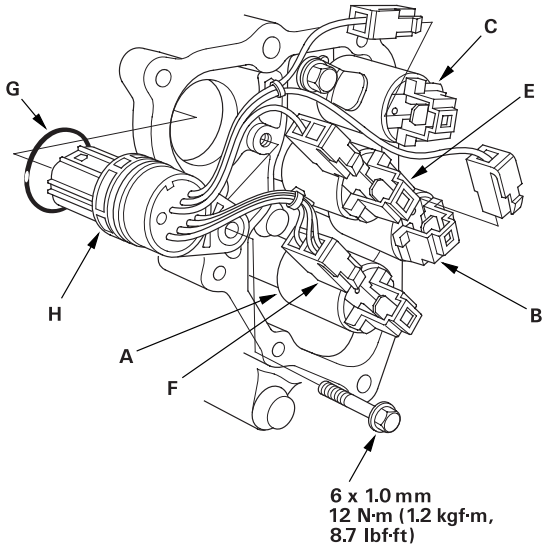
8. Measure ATF temperature sensor resistance between the No. 6 and No. 7 terminals of the shift solenoid harness connector.

   STANDARD: 50 Ω - 25 k Ω

9. If the resistance is out of standard, replace the ATF temperature sensor. The ATF temperature sensor is not available separately.

10. Disconnect the connectors from the shift solenoid valves.

11. Connect the shift solenoid valve A connector with the ATF temperature sensor (F) on the new solenoid harness.



12. Connect the solenoid valve B connector (ORN wire), solenoid valve C connector (GRN wire), and solenoid valve E connector (RED wire).

13. Install the new O-ring (G) on the shift solenoid harness connector (H), and install the connector in the transmission housing.

14. Install the shift solenoid valve cover with the new gasket and dowel pins.

15. Install the ATF cooler inlet line with the line bolt and the new sealing washers. Create clearance with the jack between the transmission and the front sub-frame to tighten the line bolt with the torque wrench.

16. Install the bracket of the ATF cooler inlet line on the shift solenoid valve cover with the bolt.

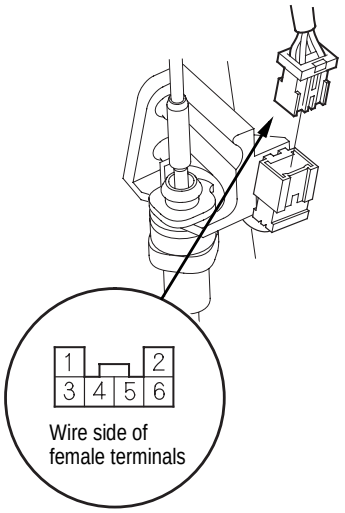
17. Check the connector for rust, dirt, or oil, then connect the connector securely.

18. Remove the transmission jack.

19. Refill the transmission with the recommended fluid (see page 14-131).

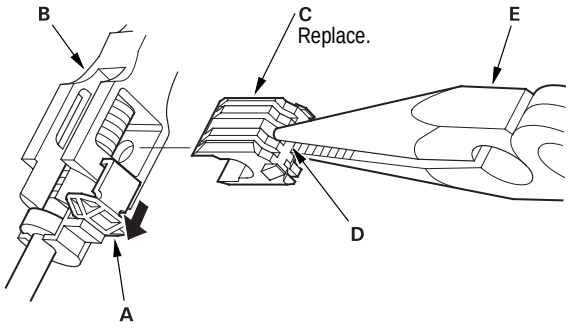
O/D Switch Test/Replacement

1. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
2. Disconnect the O/D switch/shift lock solenoid/park pin switch connector.
   NOTE: The illustration shows LHD model; RHD is symmetrical.



O/D SWITCH/SHIFT LOCK SOLENOID
PARK PIN SWITCH CONNECTOR

3. Check for continuity between the No. 5 and No. 6 terminals of the O/D switch/shift lock solenoid/park pin switch connector while pushing the O/D switch, and when the switch is released.
4. If the O/D switch is OK, connect the connector and install the removed parts.
   If the switch is faulty, go to step 5 for the O/D switch replacement.
5. Shift the shift lever to [R] position.
6. Slide the lock tab (A) down on the shift cable and holder (B).

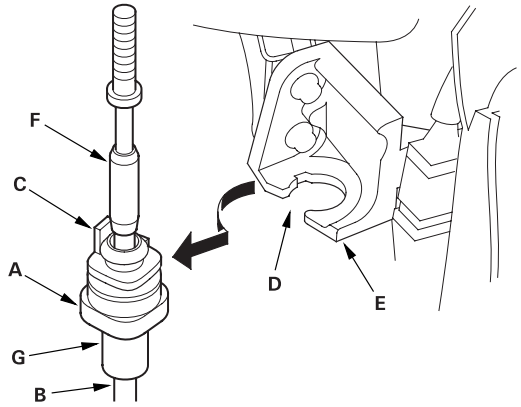


7. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cable end holder.
   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.
8. Separate the shift cable end from the shift cable end holder.

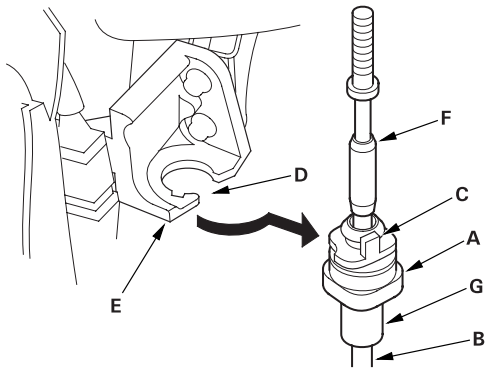
9. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

NOTE: Do not remove the shift cable by twisting the shift cable guide (F) and damper (G).

LHD Model:

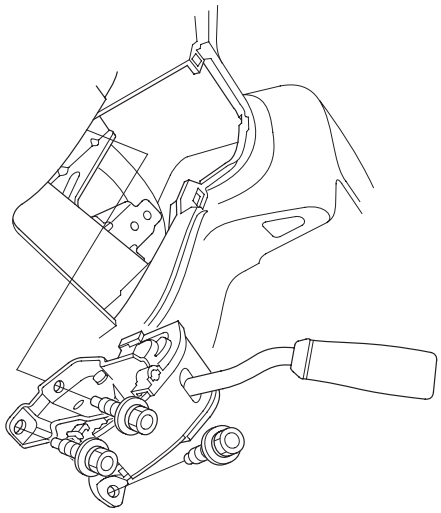


RHD Model:



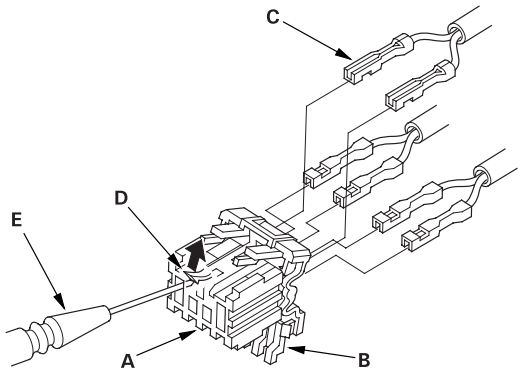
10. Remove the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



11. Remove the harness from the harness clamp on the shift lever bracket base, and remove the harness band from the harness.

12. Pry the lock tabs on the back of the O/D switch/shift lock solenoid/park pin switch connector (A), and remove the back cover (B).

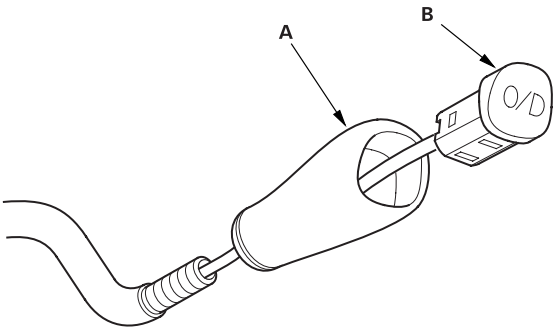


13. Remove the terminal (C) from the connector by pushing the lock tab (D) up in the connector using a thin blade screwdriver (E). Remove all six terminals.

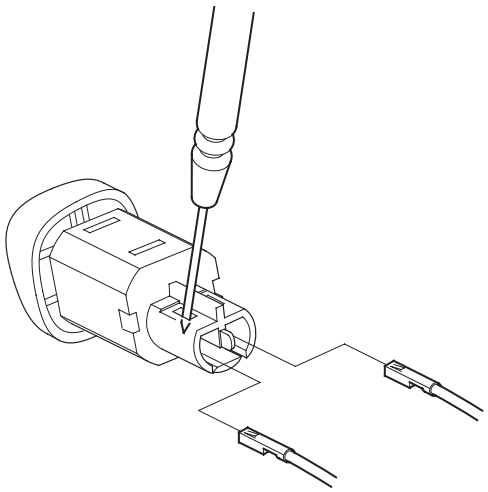
(cont'd)

O/D Switch Test/Replacement (cont'd)

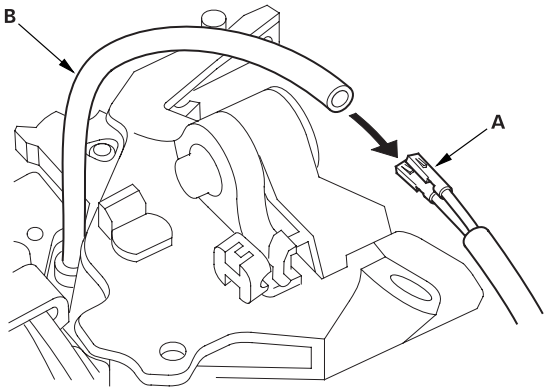
14. Remove the shift lever knob (A), then remove the O/D switch (B) from the knob.



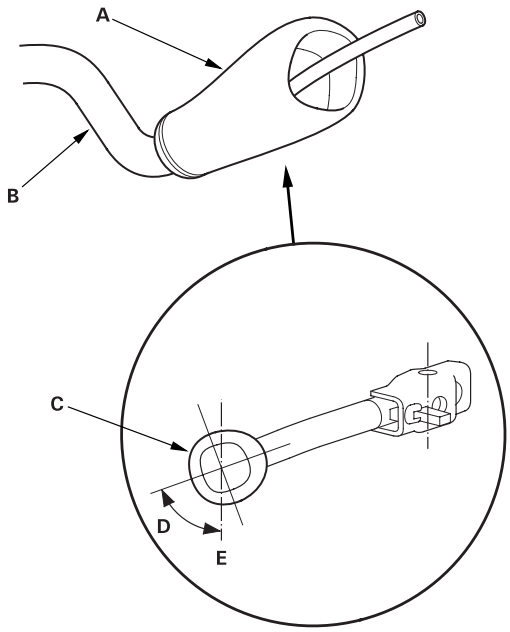
15. Remove the O/D switch connector terminals by pushing the lock tabs in the connector using a thin blade screwdriver.



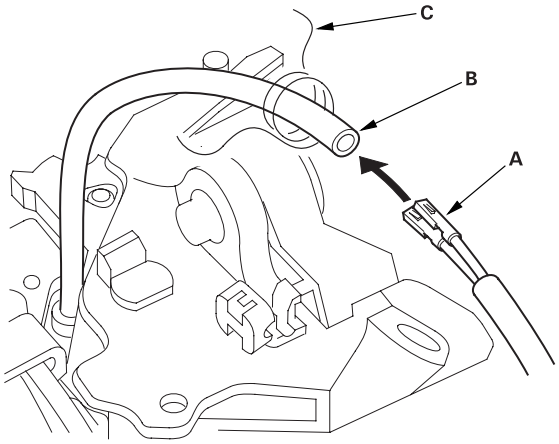
16. Pull the O/D switch harnesses (A) from shift lever bracket side, and remove them. Leave the harness tube (B) while removing the harnesses.



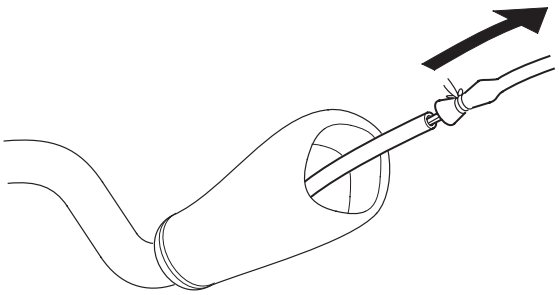
17. Install the shift lever knob (A) on the shift lever (B), and align the opening (C) of the switch with inclined 50° (D) toward the vartical axis (E).



18. Insert the new O/D switch harness terminals (A) in preserved harness tube (B), then tie a string (C) over the tube not to allow the terminals out of the tube.

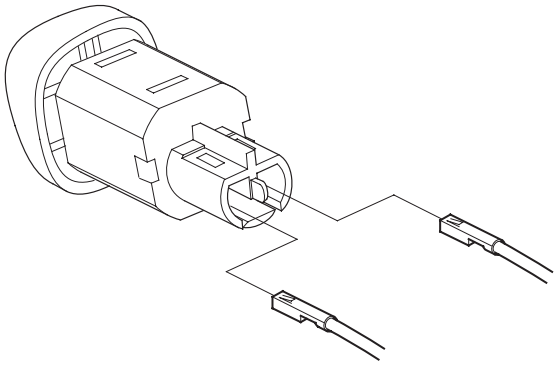


19. Pull the old tube from the shift lever knob side, and install the O/D switch harnesses.



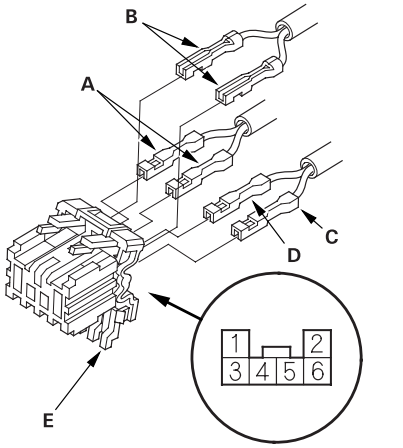
20. Remove the old harness tube from the O/D switch harness terminals.

21. Install the O/D switch harness terminals in the new O/D switch. Both harness terminals can be installed in either cavities.



22. Install the new O/D switch in the shift lever knob.

23. Install the O/D switch harness terminals (A) in the No. 5 and No. 6 cavities. Both of O/D switch harness terminals can be installed in No. 5 and No.6 cavities.



Wire side of female terminals

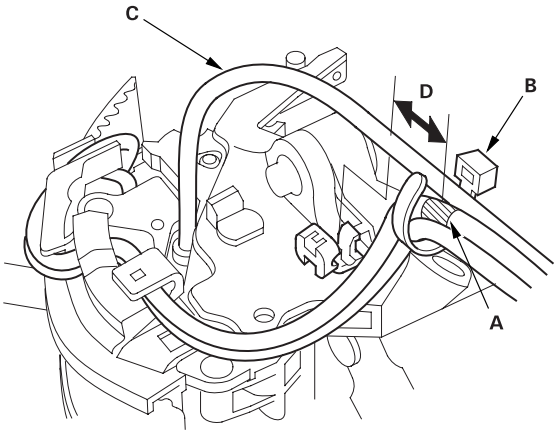
24. Install the park pin switch harness terminals (B) in the No. 1 and No. 2 cavities. Both of park pin switch harness terminals can be installed in No. 1 and No. 2 cavities.

25. Install BLU harness terminal (C) of the shift lock solenoid in the No. 3 cavity, and RED harness terminal (D) in the No. 4 cavity. Make sure that the all six terminals lock securely, then install the back cover (E) locked securely in place.

(cont'd)

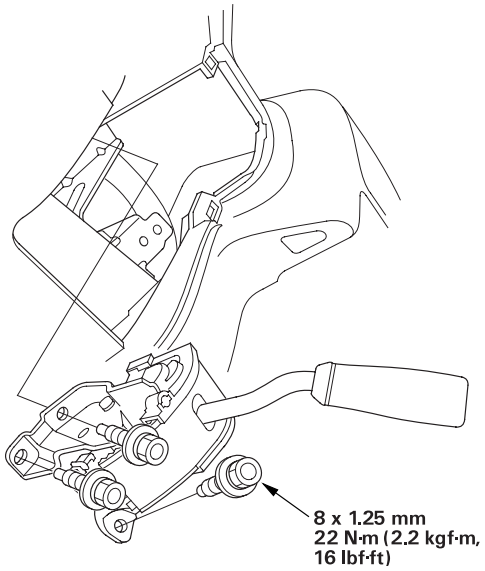
O/D Switch Test/Replacement (cont'd)

26. Align the marks (A) on the harnesses, and tie the harness band (B) over the marks. Clamp the O/D switch harness (C) at 15 mm (0.6 in.) (D) from the harness band.



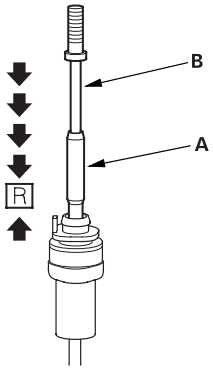
27. Install the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



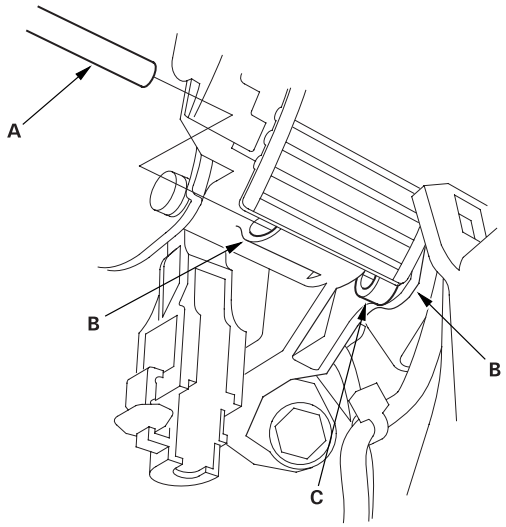
28. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.

29. If necessary, push the shift cable until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).



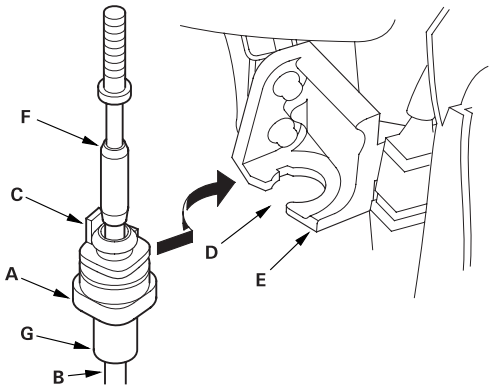
30. Turn the ignition switch OFF.

31. Insert a 6.0 mm (0.24 in.) pin (A) into the positioning holes (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

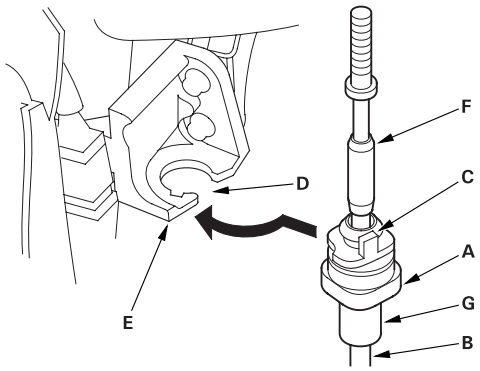


32. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening in the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

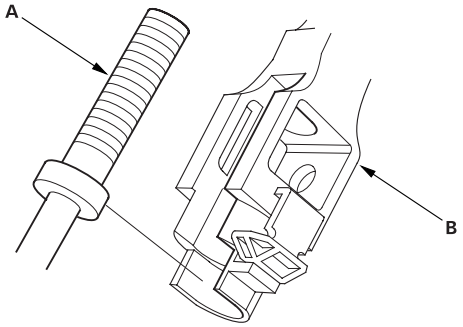
LHD Model:



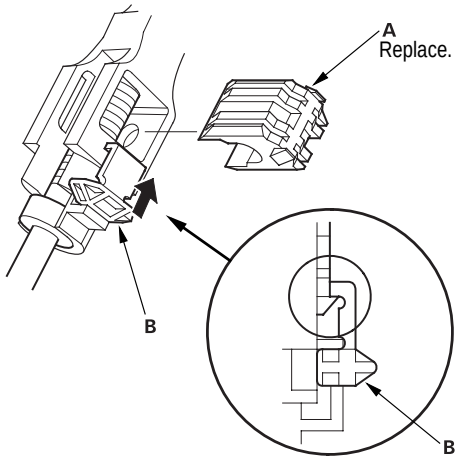
RHD Model:



33. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



34. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up until it stops to lock the joint.



35. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.

36. Connect the O/D switch/shift lock solenoid/park pin switch connector.

37. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.

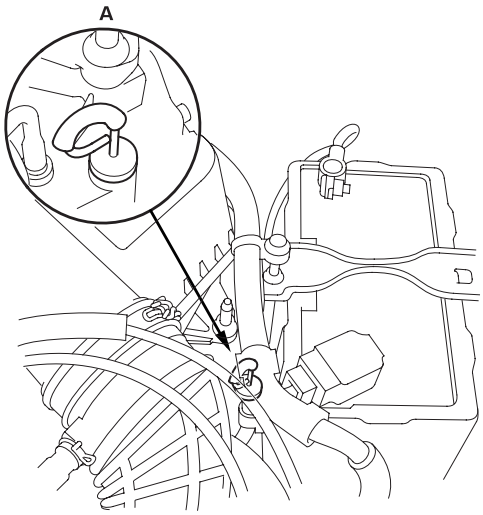
38. Check that the O/D switch operates.

39. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboard lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

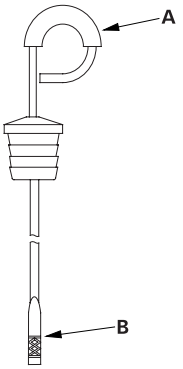
ATF Level Check

NOTE: Keep all foreign particles out of the transmission.

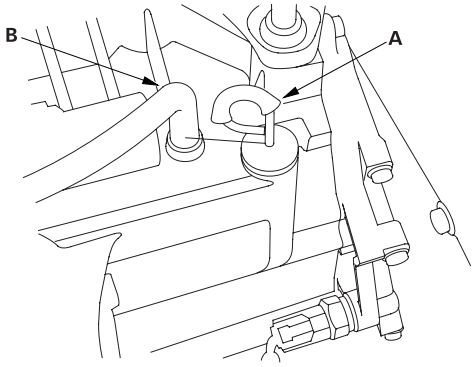
1. Warm up the engine to normal operating temperature (the radiator fan comes on).
2. Park the vehicle on level ground, and turn the engine off.
3. Remove the dipstick (yellow loop) (A) from the transmission, and wipe it with a clean cloth.



4. Insert the dipstick back into the transmission.
5. Remove the dipstick (A) and check the fluid level. It should be at upper mark (B).



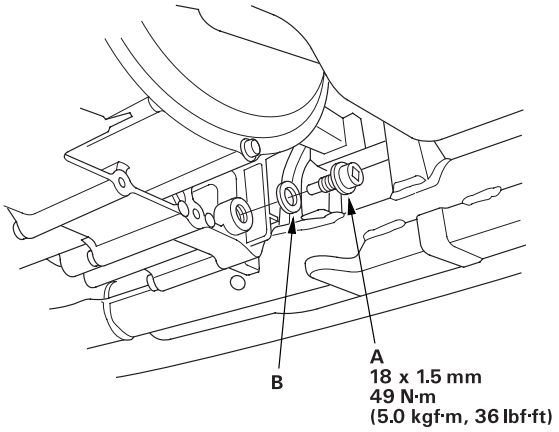
6. If the level is below the upper mark, check for fluid leaks at the transmission, hose and line joints, and cooler lines.
7. Pour the recommended fluid amount into the dipstick hole to bring it to the upper mark. Always use Genuine Honda ATF-Z1 Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.
8. Insert the dipstick (A) back into the transmission with facing the handle toward the breathe tube (B).



ATF Replacement

NOTE: Keep all foreign particles out of the transmission.

1. Bring the transmission up to normal operating temperature (the radiator fan comes on) by driving the vehicle.
2. Park the vehicle on level ground, and turn the engine off.
3. Remove the drain plug (A), and drain the automatic transmission fluid (ATF).

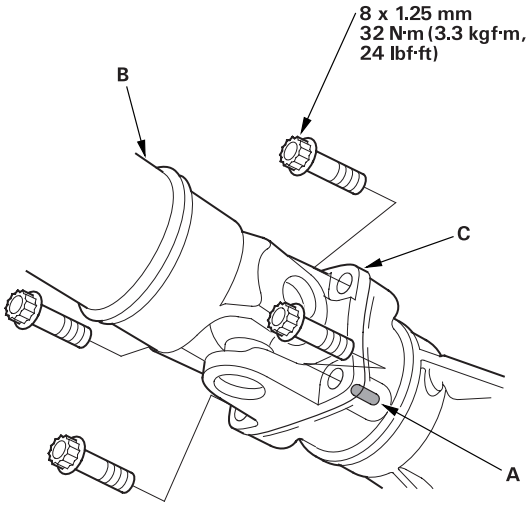


4. Reinstall the drain plug with a new sealing washer (B).
5. Refill transmission with the recommended fluid amount through the dipstick hole until the lever reaches the upper mark on the dipstick. Always use Genuine Honda ATF-Z1 Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.

Automatic Transmission Fluid Capacity:
4WD:
3.1 L (3.3 US qt, 2.7 Imp qt) at change
7.2 L (7.6 US qt, 6.3 Imp qt) at overhaul
2WD:
2.9 L (3.1 US qt, 2.6 Imp qt) at change
6.5 L (6.9 US qt, 5.7 Imp qt) at overhaul

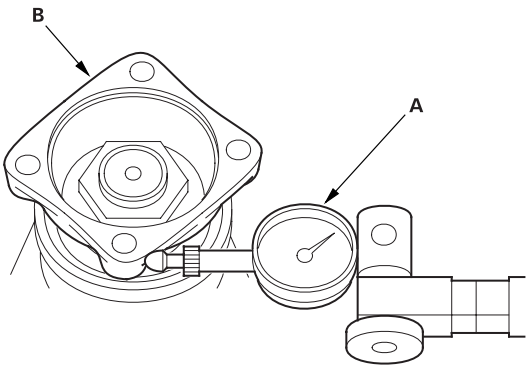
Transfer Assembly Inspection

1. Rise the vehicle, and make sure it is supported securely.
2. Shift the transmission into the [N] position.
3. Make a reference mark (A) across the propeller shaft (B) and the transfer companion flange (C).



4. Separate the propeller shaft from the transfer assembly.
5. Set a dial indicator (A) on the transfer companion flange (B), and measure the transfer gear backlash.

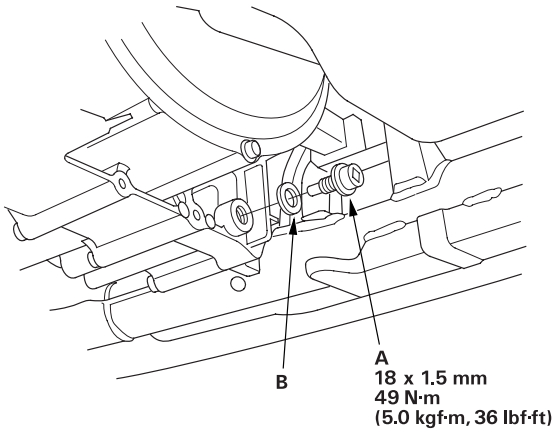
STANDARD: 0.06 - 0.16 mm (0.02 - 0.06 in.)



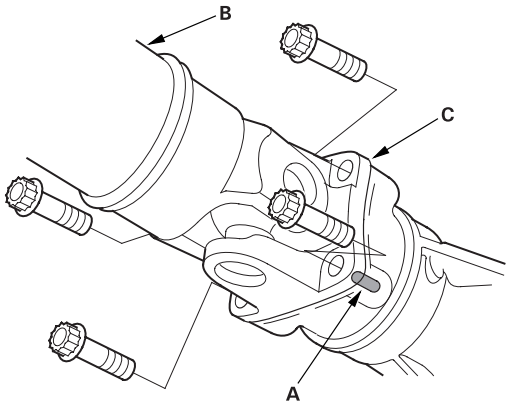
6. If the measurement is out of standard, remove the transfer assembly, and adjust the transfer gear backlash (see page 14-281).
7. Check for fruid leaks between the masting faces of the transfer assembly and transmission.
8. If there is a leak, remove the transfer assembly, and replace the O-ring. Also check for fluid leaks between the mating faces of the transfer housing and transfer cover. If there is a leak, remove the transfer cover, and replace the O-ring.
9. Check for leaks between the transfer companion flange and transfer oil seal.
10. If there is a leak, remove the transfer assembly from the transmission, and replace the transfer oil seal and O-ring on the transfer driven gear shaft. If oil seal and O-ring replacement is required, you will need to check and adjust the transfer gear tooth contact, transfer gear backlash, the tapered roller bearing starting torque, and the total starting torque (see page 14-281). Do not replace the oil seal with the transfer assembly on the transmission.

Transfer Assembly Removal

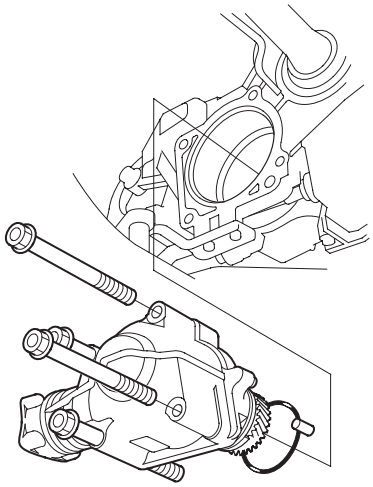
1. Raise the vehicle, and make sure it is supported securely.
2. Remove the drain plug (A), and drain the automatic transmission fluid (ATF). Reinstall the drain plug with a new sealing washer (B).



3. Make a reference mark (A) across the propeller shaft (B) and the transfer companion flange (C).

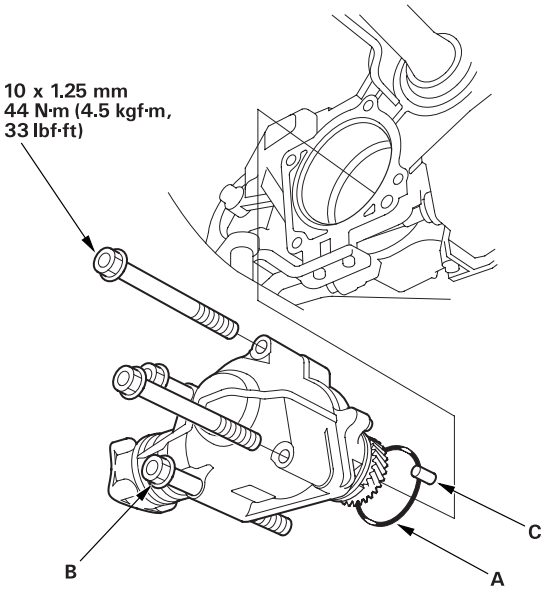


4. Separate the propeller shaft form the transfer assembly.
5. Remove the transfer assembly.

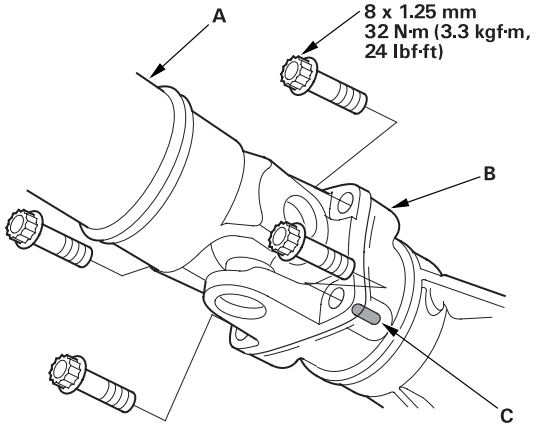


Transfer Assembly Installation

1. Clean the area where the trainer assembly contacts the transmission with solvent or carburetor cleaner, and dry with compressed air. Then apply transmission fluid to the contact areas. When installing the transfer assembly, be sure not to allow dust or other foreign particles to enter the transmission.
2. Install the new O-ring (A) on the transfer.



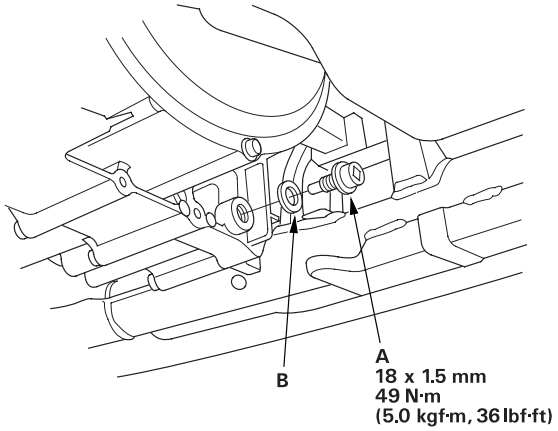
3. Insert the two bolts in the rear of the transfer housing, then install the transfer assembly (B) with the dowel pin (C).
4. Install the propeller shaft (A) to the transfer companion flange (B) by aligning the reference mark (C).



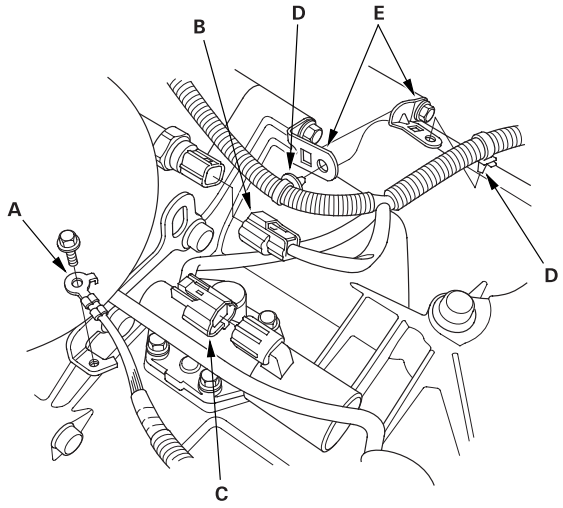
5. Refill the transmission fluid (see page 14-131).
6. Start the engine, and run it to normal operating temperature (the radiator fan comes on). Turn the engine off, and check the fluid level (see page 14-130).

Transmission Removal

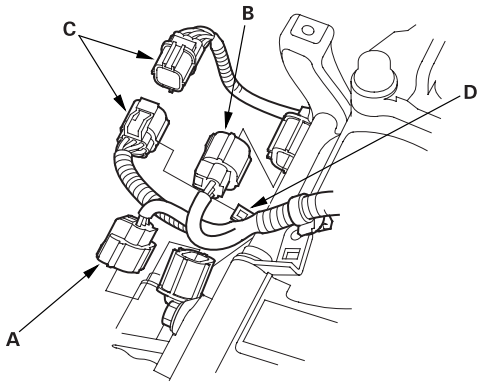
1. Raise the vehicle, and make sure it is securely supported.
2. Remove the splash shield.
3. Remove the drain plug (A), and drain the automatic transmission fluid (ATF). Reinstall the drain plug with a new sealing washer (B).



4. Disconnect the battery negative terminal, then disconnect the battery positive terminal.
5. Remove the air cleaner housing and the intake air duct.
6. Remove the battery hold-down bracket, then remove the battery and battery tray.
7. Remove the harness clamp from the battery base, then remove the battery base.
8. Remove the transmission ground terminal (A).



9. Disconnect the 2nd clutch pressure switch connector (B) and A/T clutch pressure control solenoid valve A connector (C), and remove the harness clamps (D) from the clamp brackets (E).
10. Disconnect the countershaft speed sensor connector (A) and mainshaft speed sensor (B).



11. Remove the transmission range switch connector (C) from its bracket (D), then disconnect it.

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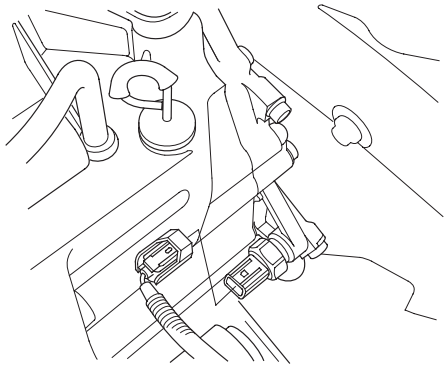
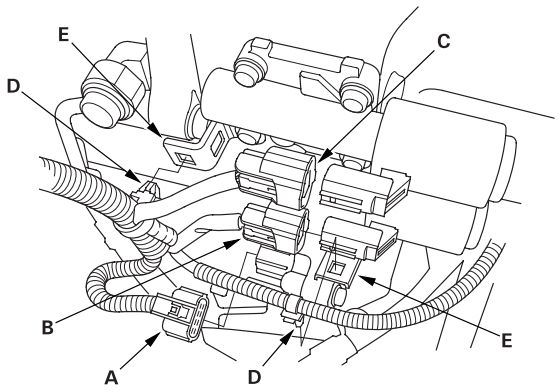
Transmission Removal (cont'd)

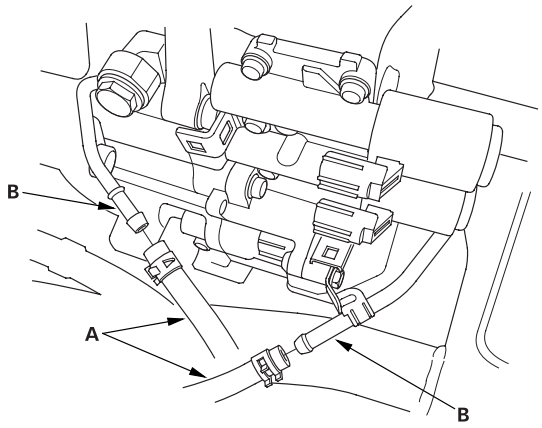
12. Disconnect the 3rd clutch pressure switch connector.



13. Disconnect the shift solenoid harness connector (A), A/T clutch pressure control solenoid valve B connector, and solenoid valve C connector, then remove the harness clamps (D) from the clamp brackets (E).

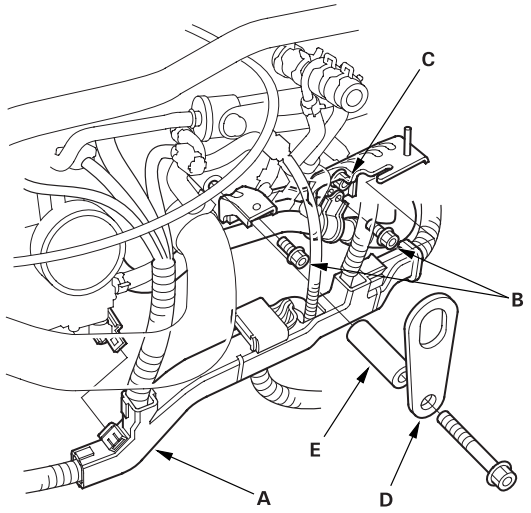


14. Remove the ATF cooler hoses (A) from the ATF cooler lines (B). Turn the ends of the ATF cooler hoses up to prevent ATF from flowing out, then plug the ATF cooler hoses and lines.



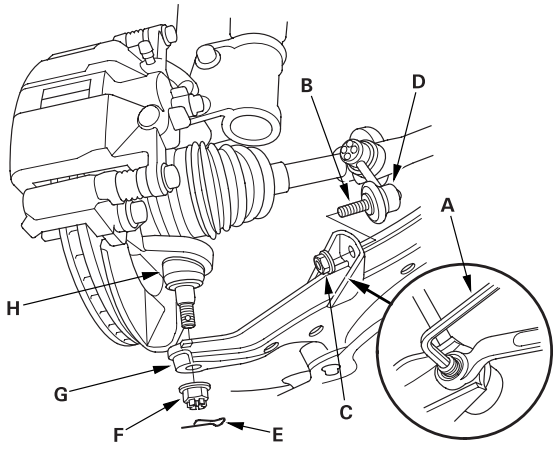
15. Check for any signs of leakage at the hose joints.

16. Remove the harness cover (A) and water pipe bolts (B). Loosen the air cleaner housing mounting bracket bolt (C), then lower the water pipe.



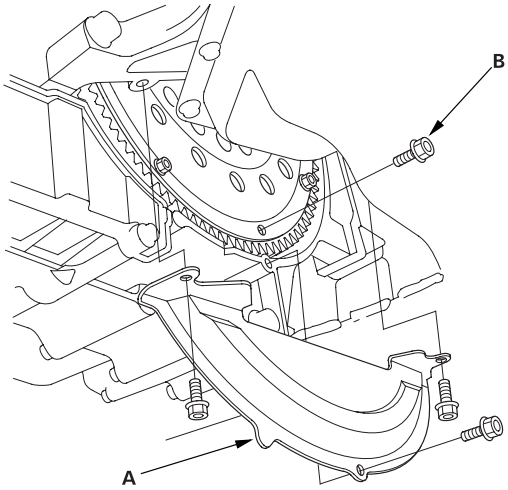
17. Attach a hoisting bracket (D) with a collar (E) to the hose clamp bracket bolt hole on the engine cylinder block, and lift the engine.

18. Insert a 5 mm Allen wrench (A) in the top of the ball joint pin (B), and remove the nut (C), then separate the stabilizer link (D) from the lower arm.



19. Remove the spring clips (E) and castle nuts (F), and separate the lower arms (G) from the knuckles (H) (see page 18-10).

20. Remove the torque converter cover (A), and remove the eight drive plate bolts (B) while rotating the crankshaft pulley.

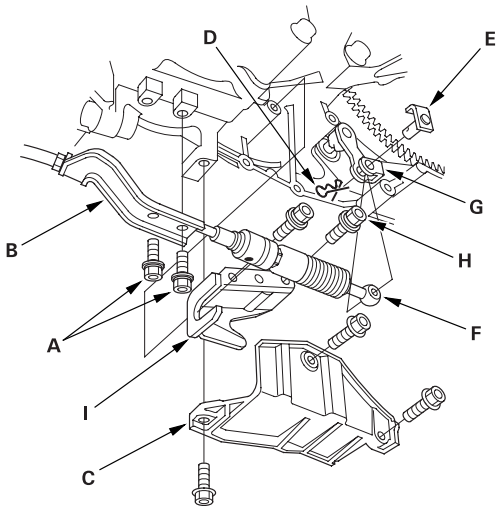


21. Remove the shift cable for 4WD model.

1 Remove the bolts (A) securing the shift cable bracket (B), then remove the shift cable cover (C).

2 Remove the spring clip (D) and control pin (E), then separate the shift cable (F) from the control lever (G). Do not bend the shift cable excessively.

3 Remove the bolts (H) securing the shift cable bracket (I), then remove the shift cable bracket (I) from the shift cable.



(cont'd)

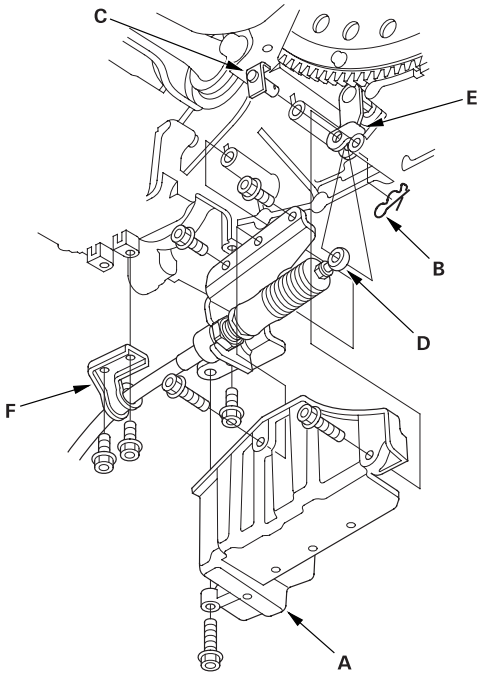
Transmission Removal (cont'd)

22. Remove the shift cable for 2WD model.

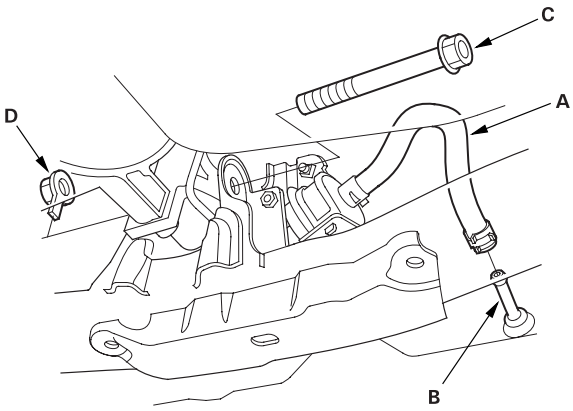
1 Remove the shift cable cover (A).

2 Remove the spring clip (B) and control pin (C), then separate the shift cable (D) from the control lever (E).

3 Remove the bolts securing the shift cable bracket (F). Do not bend the shift cable excessively.

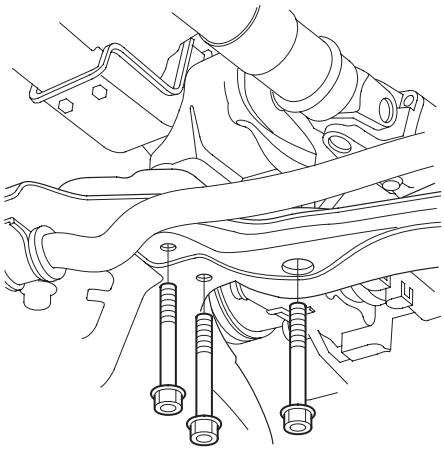


23. Disconnect the ATF cooler hose (A) from the ATF cooler line (B), then plug the end of the hose.

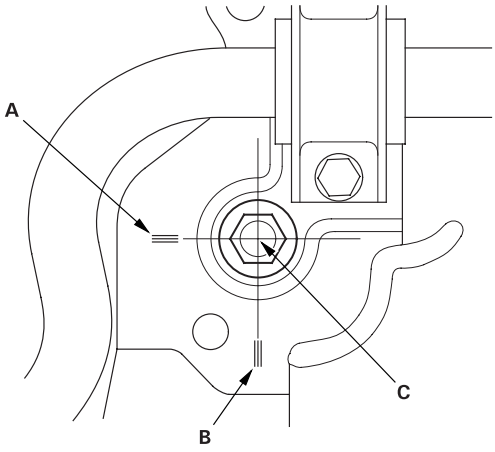


24. Remove the front mount bolt (C) and nut (D).

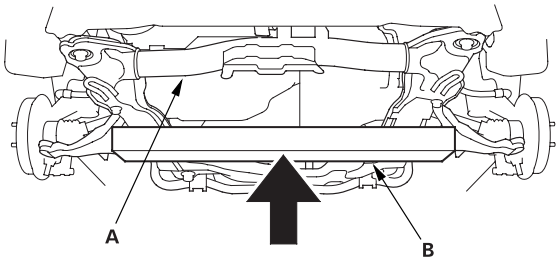
25. Remove the rear mount bolts.



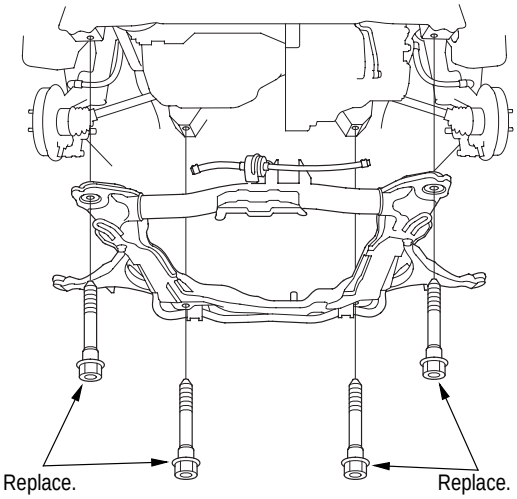
26. Make the appropriate reference lines at positions A and B that line up with the center of the sub-frame mounting bolts (C).



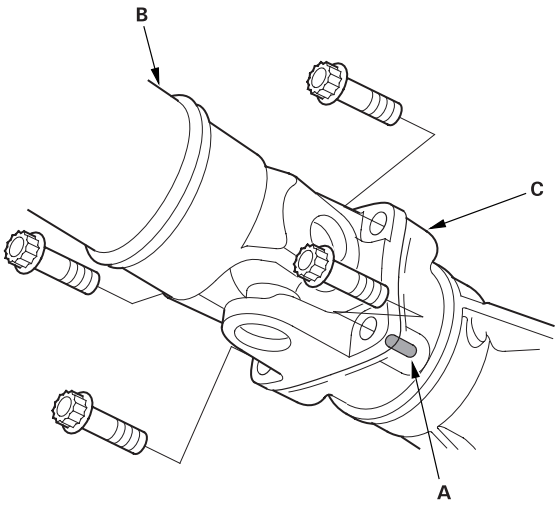
27. Support the sub-frame (A) with a 4 x 4 x 40 in. piece of wood (B) and a jack.



28. Remove the four sub-frame mounting bolts, then lower the sub-frame.



29. For 4WD model; Make a reference mark (A) across the propeller shaft (B) and the transfer companion flange (C), then separate the propeller shaft from the transfer assembly.

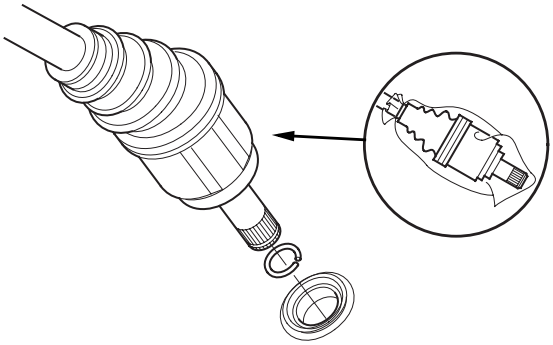


(cont'd)

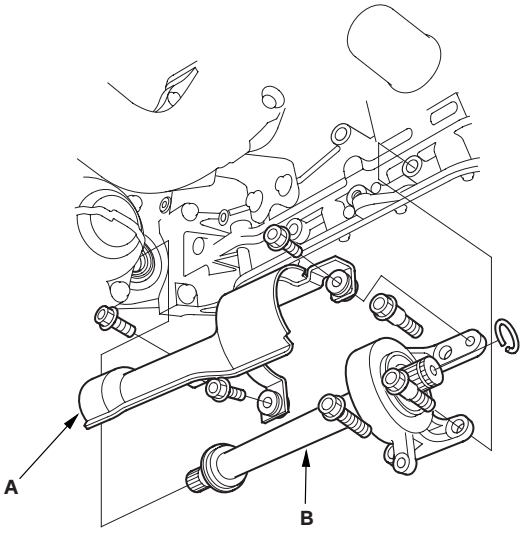
Transmission Removal (cont'd)

30. Pry the left driveshaft out of the differential (see page 16-3).

31. Remove the driveshafts from the differential and intermediate shaft.



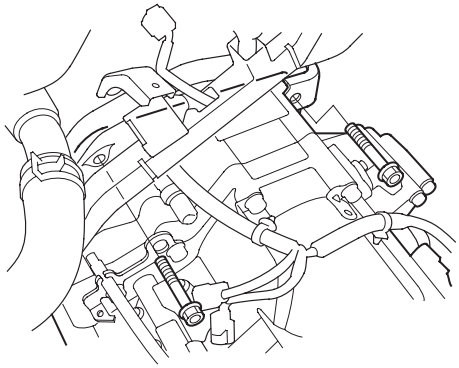
32. Remove the intermediate shaft cover (A).



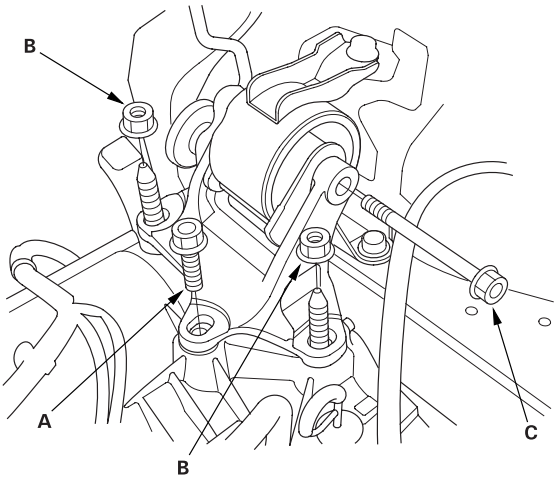
33. Remove the intermediate shaft (B). Coat all precision finished surfaces with clean engine oil, then tie plastic bags over the driveshaft and intermediate shaft ends.

34. Place a jack under the transmission.

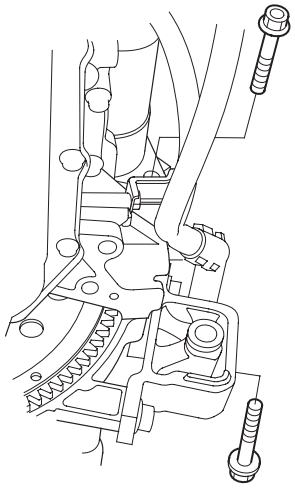
35. Remove the transmission housing mounting bolts.



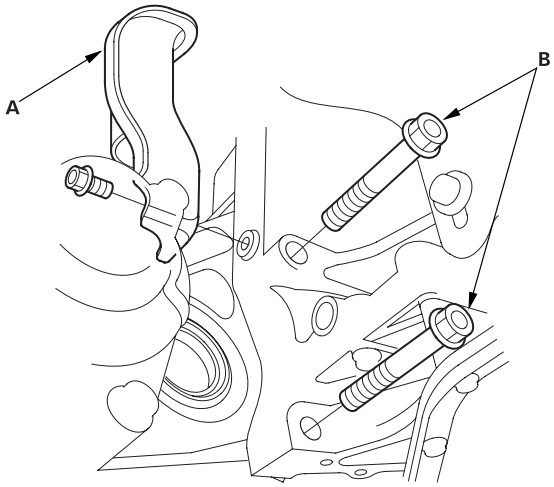
36. Remove the transmission mount bracket bolt (A) and nuts (B), then remove the transmission mount bolt (C).



37. Remove the transmission housing mounting bolts located on front lower of the transmission.

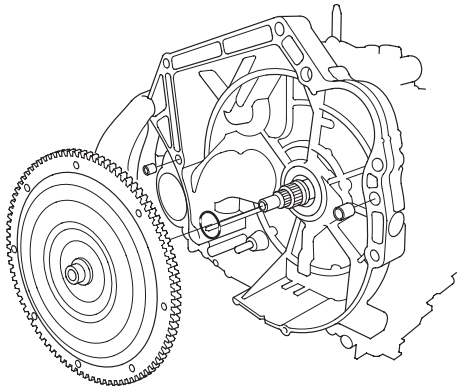


38. Remove the stiffener (A), then remove the transmission housing mounting bolts (B) located on rear lower of the transmission.

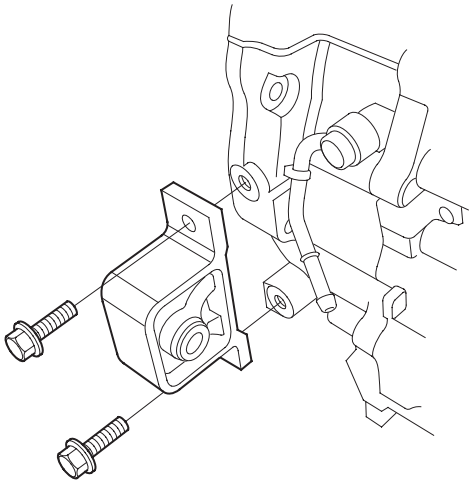


39. Slide the transmission away from the engine to remove it from the vehicle.

40. Remove the torque converter assembly.



41. Remove the front mount.

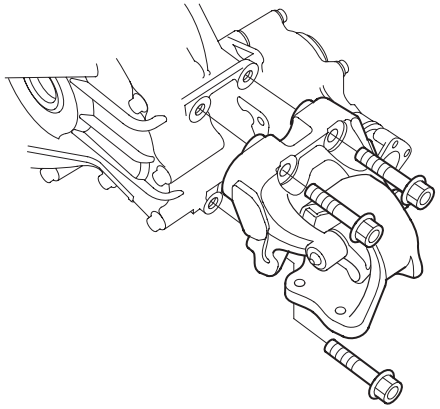


(cont'd)

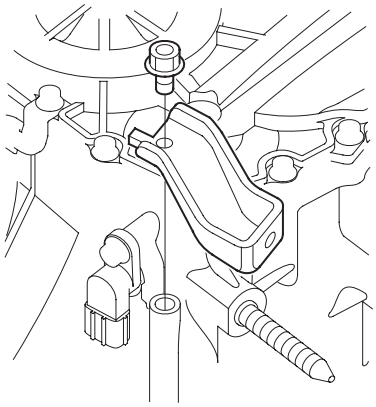
Transmission Removal (cont'd)

42. Remove the rear mount/bracket.

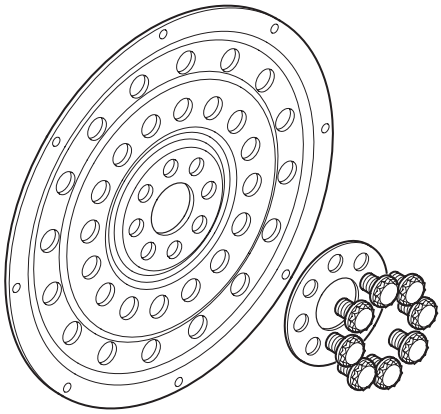
NOTE: The illustration shows the 4WD model; 2WD model is similar.



43. Remove the air cleaner housing mounting bracket.

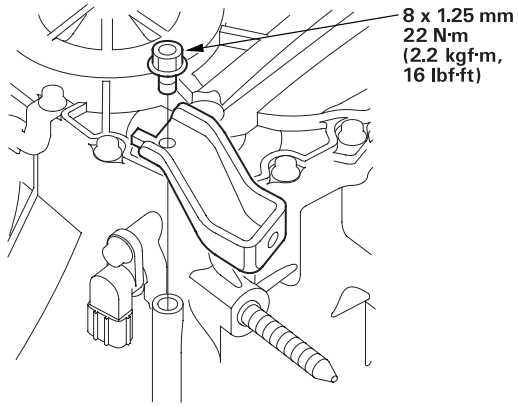


44. Inspect the drive plate, and replace it if it's damaged.

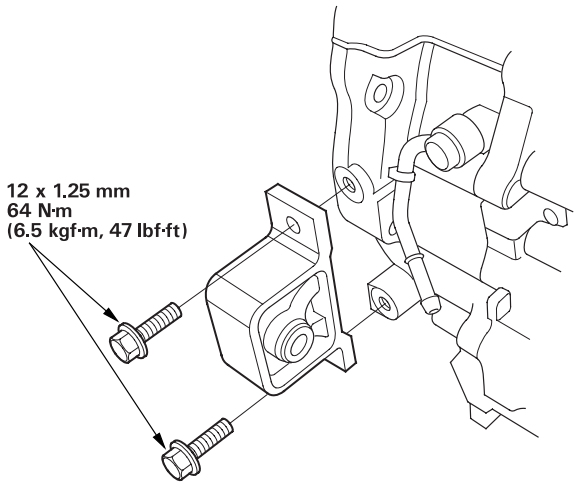


Transmission Installation

1. Install the air cleaner housing mounting bracket.

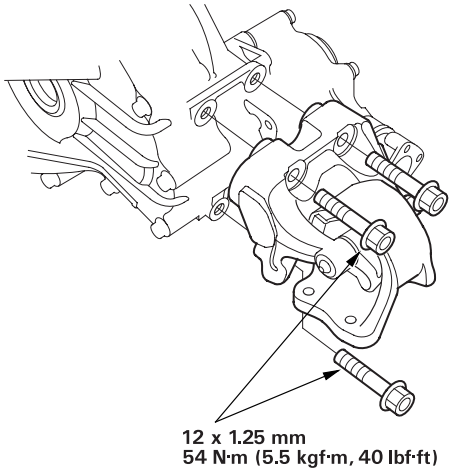


2. Install the front mount.

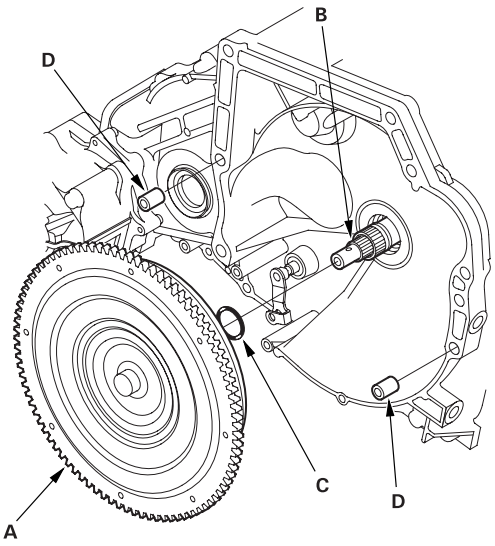


3. Install the rear mount/bracket.

NOTE: The illustration shows the 4WD model; 2WD model is similar.



4. Install the torque converter assembly (A) on the mainshaft (B) with the new O-ring (C).



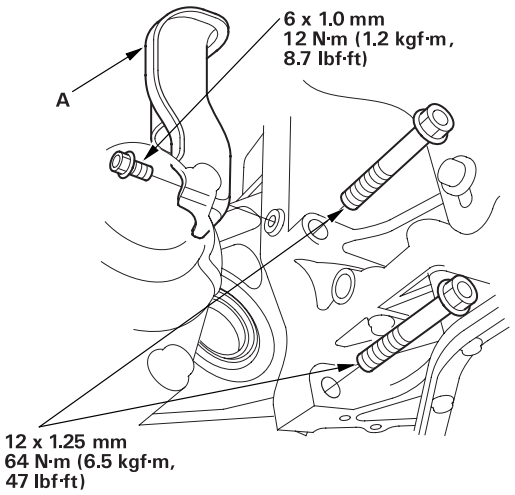
5. Install the 14 x 20 mm dowel pins (D) in the torque converter housing.

(cont'd)

Transmission Installation (cont'd)

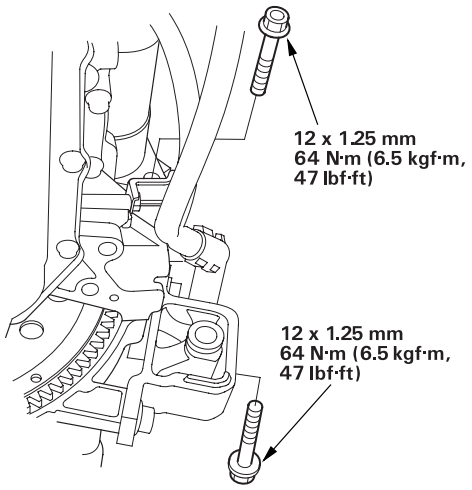
6. Place the transmission on a jack, and raise the transmission to the engine level.

7. Attach the transmission to the engine, then install the transmission housin mounting bolts.

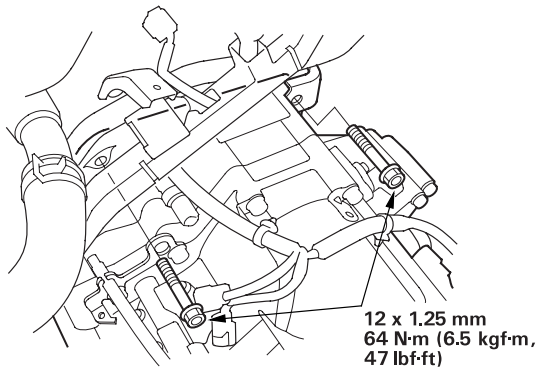


8. Install the stiffener (A).

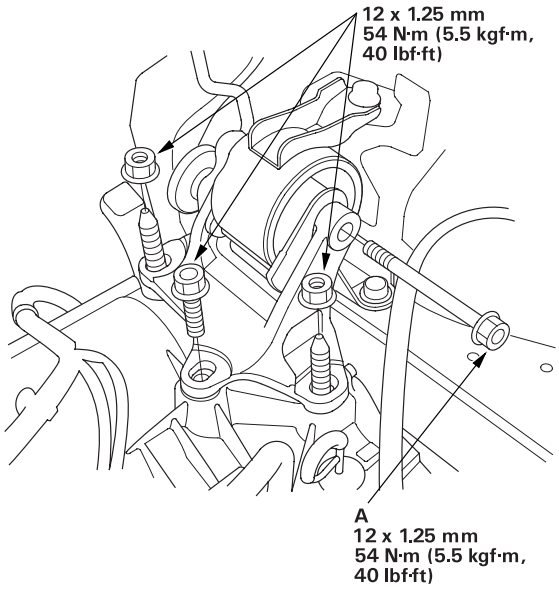
9. Install the transmission housing mounting bolts.



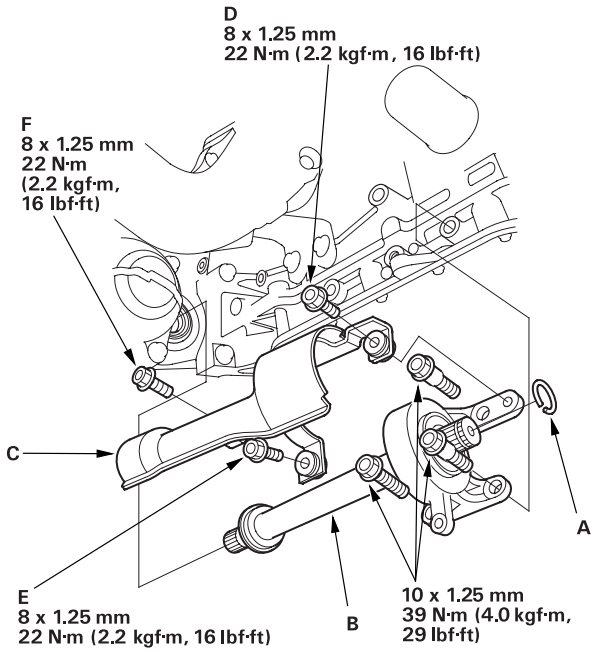
10. Install the transmission housing mounting bolts.



11. Install the transmission mount bracket. Tighten the mount bolt (A) loosely, and tighten the transmission mount bracket bolt and nuts to the specified torque, then tighten the mount bolt to the specified torque.



12. Install the new set ring (A) on the intermediate shaft (B).

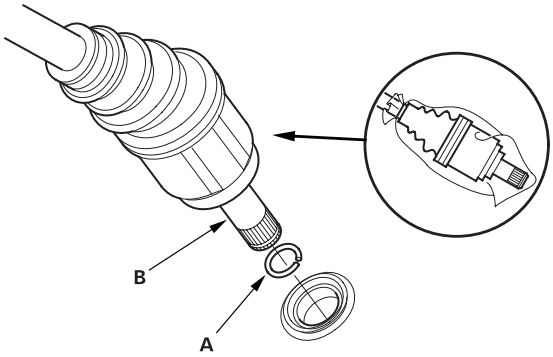


13. Clean the areas where the intermediate shaft contacts the transmission (differential) with solvent or carburetor cleaner, and dry with compressed air. Then install the intermediate shaft in the differential. While installing the intermediate shaft, be sure not to allow dust or other foreign particles to enter the transmission.

14. Install the intermediate shaft cover (C) with installing the mounting bolts loosely.

15. First tighten the right upper bolt (D) on the cover, then right lower bolt (E), and lastly the left bolt (F).

16. Install the new set ring (A) on the left driveshaft (B).



17. Install the right and left driveshaft (see page 16-17). While installing the left driveshaft in the differential, be sure not to allow dust or other foreign particles to enter the transmission.

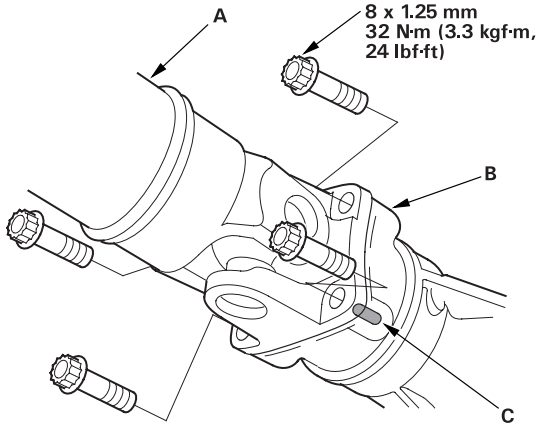
NOTE:

- Clean the areas where the left driveshaft contacts the transmission (differential) with solvent or carburetor cleaner, and dry with compressed air.
- Turn the right and left steering knuckle fully outward, and slide the left driveshaft into the differential until you feel its set ring engages the side gear. Slide the right driveshaft over the intermediate shaft splines until you feel the driveshaft engages the intermediate shaft set ring.

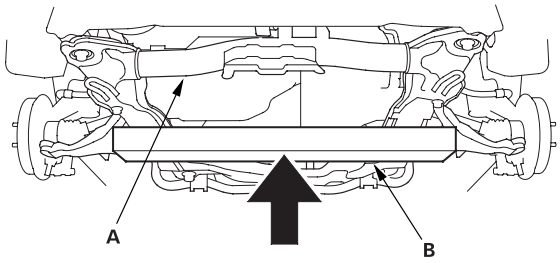
(cont'd)

Transmission Installation (cont'd)

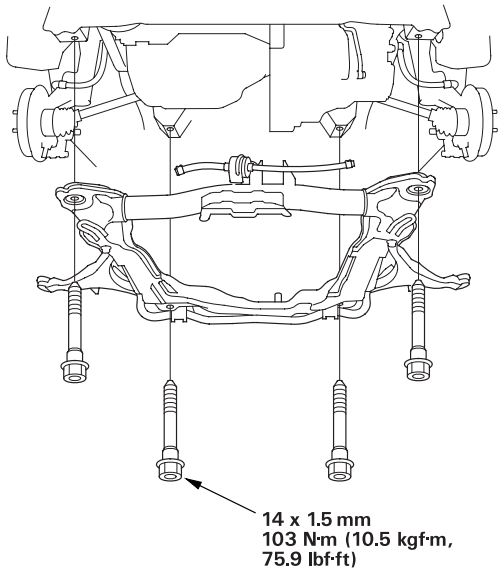
18. Install the propeller shaft (A) to the transfer companion flange (B) by aligning the reference mark (C).



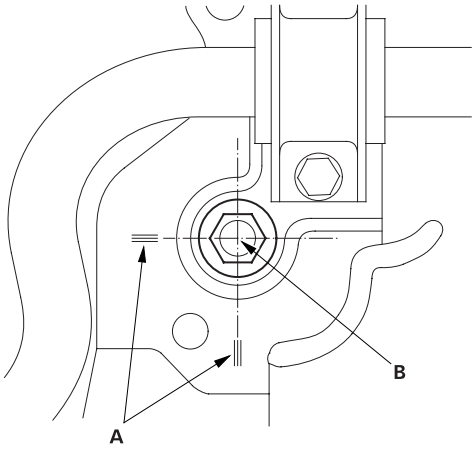
19. Support the sub-frame (A) with a 4 x 4 x 40 in. piece of wood (B), and lift it up to body.



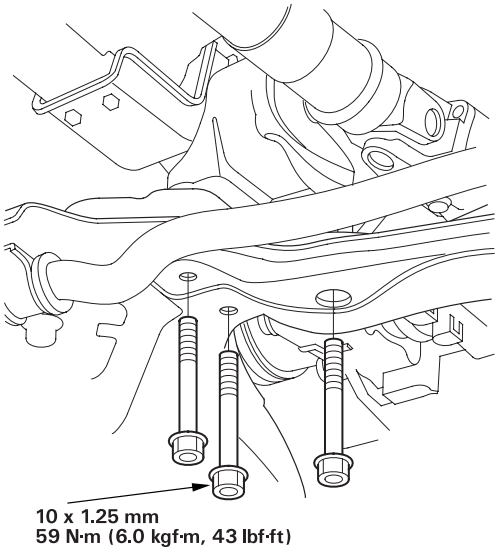
20. Loosely install the new sub-frame mounting bolts.



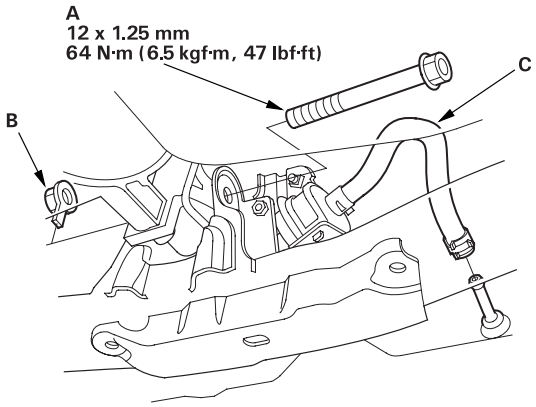
21. Align the reference marks (A) with the center of the sub-frame mounting bolts (B), then tighten the bolts to the specified torque.



22. Install the rear mount bolts.



23. Install the front mount bolt (A) and nut (B), connect the ATF cooler hose (C) to the ATF cooler line, then secure the hose with the clip (see page 14-151).



24. Install the shift cable for 4WD model.

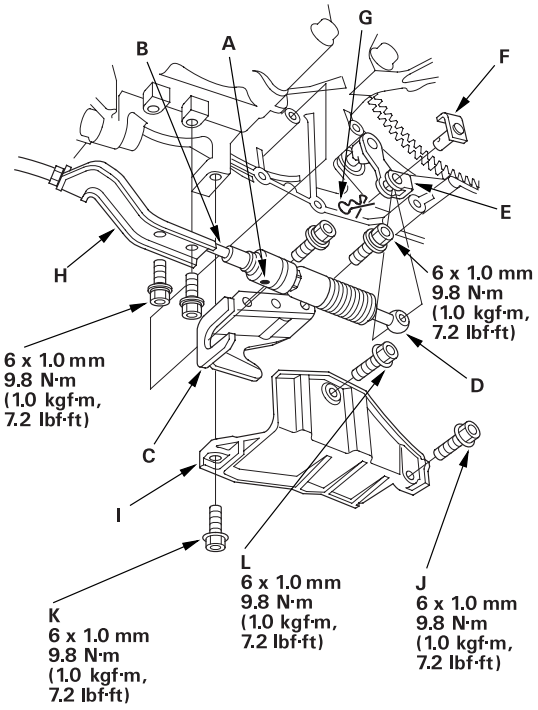
1 Face the dot (A) on the shift cable (B) down, then install the shift cable bracket (C) on the shift cable.

2 Attach the shift cable end (D) to the control lever (E), then insert the control pin (F) into the control lever hole through the shift cable end.

3 Secure the control pin with the spring clip (G). Do not bend the shift cable excessively.

4 Secure the shift cable bracket (H) with the bolts, and install the shift cable cover (I) with installing the mounting bolts loosely.

5 First tighten the front bolt (J) on the cover, then lower bolt (K), and lastly the middle bolt (L).



(cont'd)

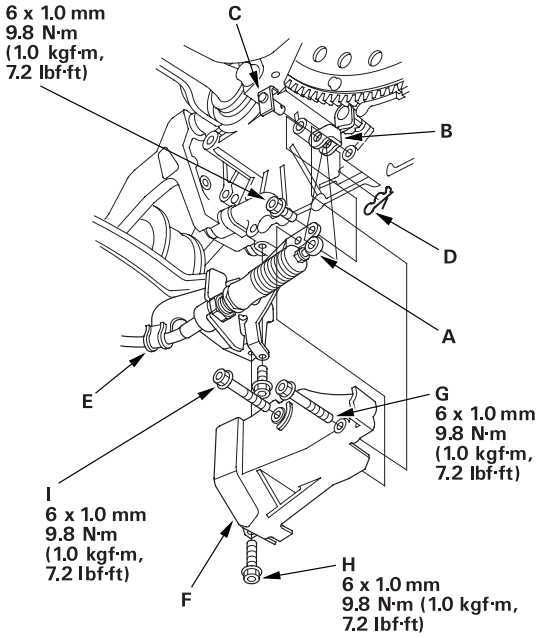
Transmission Installation (cont'd)

25. Install the shift cable for 2WD model.

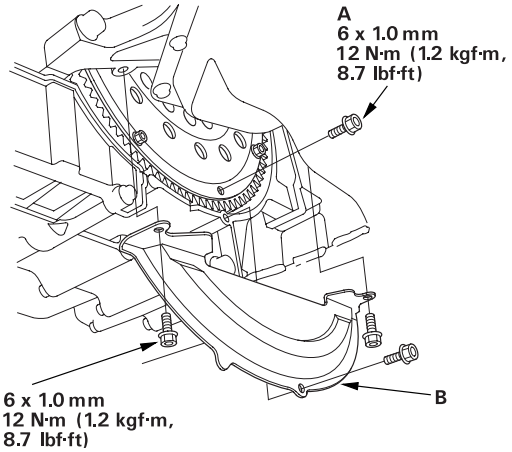
1 Attach the shift cable end (A) to the control lever (B), then insert the control pin (C) into the control lever hole through the shift cable end, and secure the control pin with the spring clip (D). Do not bend the shift cable excessively.

2 Secure the shift cable bracket (E) with the bolt, and install the shift cable cover (F) with installing the mounting bolts loosely.

3 First tighten the front bolt (G) on the cover, then lower bolt (H), and lastly the middle bolt (I).

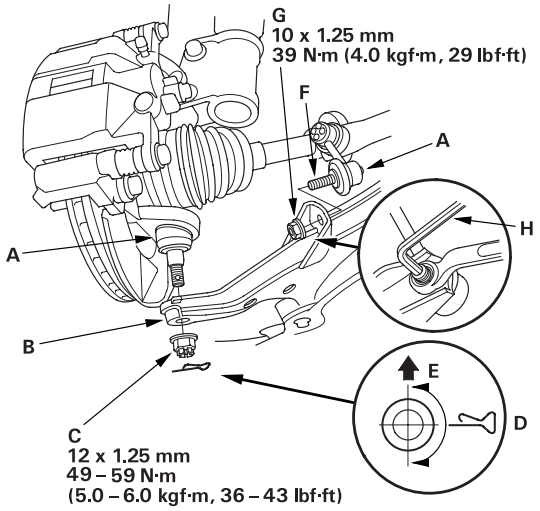


26. Attach the torque converter to the drive plate with eight bolt (A). Rotate the crankshaft pulley as necessary to tighten the bolts to 1/2 of the specified torque, then to the final torque, in a crisscross pattern. After tightening the last bolt, check that the crankshaft rotates freely.



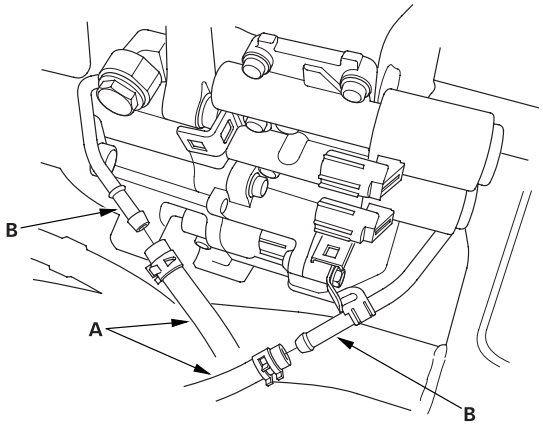
27. Install the torque converter cover (B).

28. Connect the ball joints (A) to the lower arms (B), and install the castle nuts (C) and spring clips (D). Install the spring clips from the inside of the vehicle, and its hooked side facing the front (E) of the vehicle in the range of the insertion direction shown.

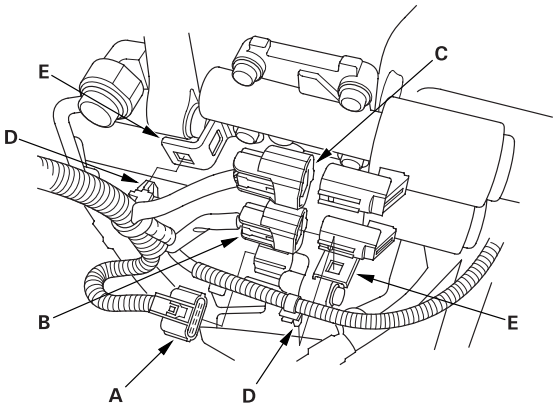


29. Connect the ball joints (F) to the lower arms, and install the nuts (G). Insert a 5 mm Allen wrench (H) in the top of the ball joint pins, and tighten the nuts.

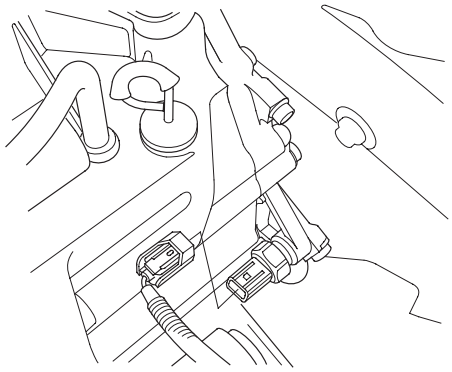
30. Connect the ATF cooler hoses (A) to the ATF cooler lines (B) (see page 14-151).



31. Connect the shift solenoid harness connector (A), A/T clutch pressure control solenoid valve B connector, and solenoid valve C connector. Install the harness clamps (D) on the clamp brackets (E).

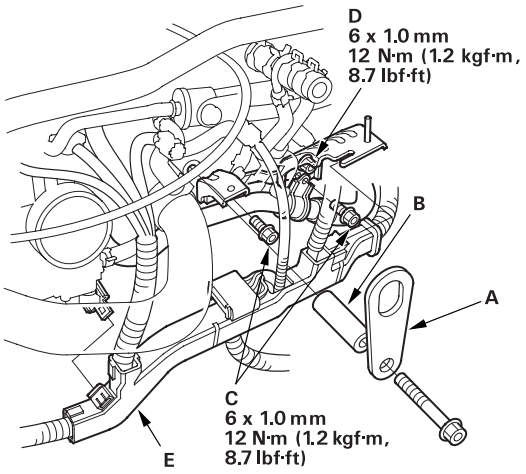


32. Connect the 3rd clutch pressure switch connector.



33. Install the splash shield.

34. Remove the hoist from the hoisting bracket (A), and remove the hoisting bracket and collar (B) (if installed) from the engine.

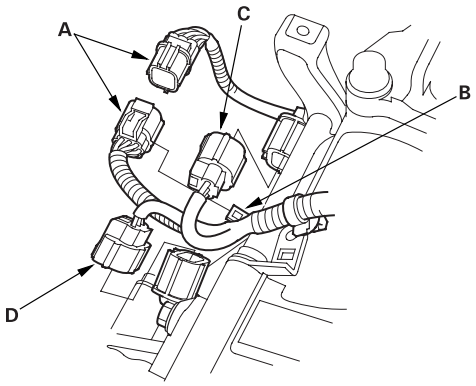


35. Install the water pipe bolts (C), and tighten the air cleaner housing mounting bracket bolt (D). Install harness cover (E).

(cont'd)

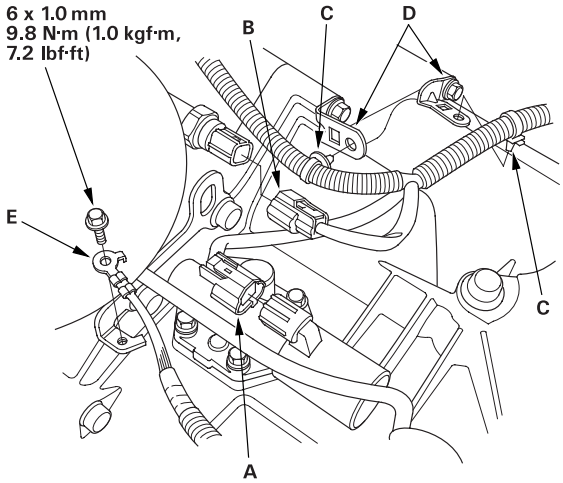
Transmission Installation (cont'd)

36. Connect the transmission range switch connector (A), and install it on its bracket (B).



37. Connect the connectors to the mainshaft speed sensor (C) and countershaft speed sensor (D).

38. Connect the A/T clutch pressure control solenoid valve A connector and 2nd clutch pressure switch connector (B), and install the harness clamps (C) on the clamp brackets (D).



39. Install the transmission ground terminal (E).

40. Install the battery base, then install the harness clamp on the clamp bracket on the base.

41. Refill the transmission with ATF (see page 14-131).

42. Install the intake air duct and air cleaner housing.

43. Install the battery tray and battery, then secure the battery with its hold-down bracket.

44. Connect the battery positive terminal, then connect the negative terminal.

45. Set the parking brake. Start the engine, and shift the transmission through all gears three times.

46. Check the shift lever operation, A/T gear position indicator operation, and shift cable adjustment.

47. Check and adjust the front wheel alignment (see page 18-4).

48. Start the engine and let it idle reach normal operating temperature (the radiator fan comes on) with the transmission in [P] or [N] position, then turn if off and check the ATF level (see page 14-130).

49. Perform the road test (see page 14-107).

50. Loosen the bolts of the front, rear and transmission mounts after the road test.

51. Retighten the transmission mount bolt.

NOTE: Be sure to tighten the mount bolts following sequence.

Torque: **54 N·m (5.5 kgf·m, 40 lbf·ft)**

52. Retighten the rear mount bolt.

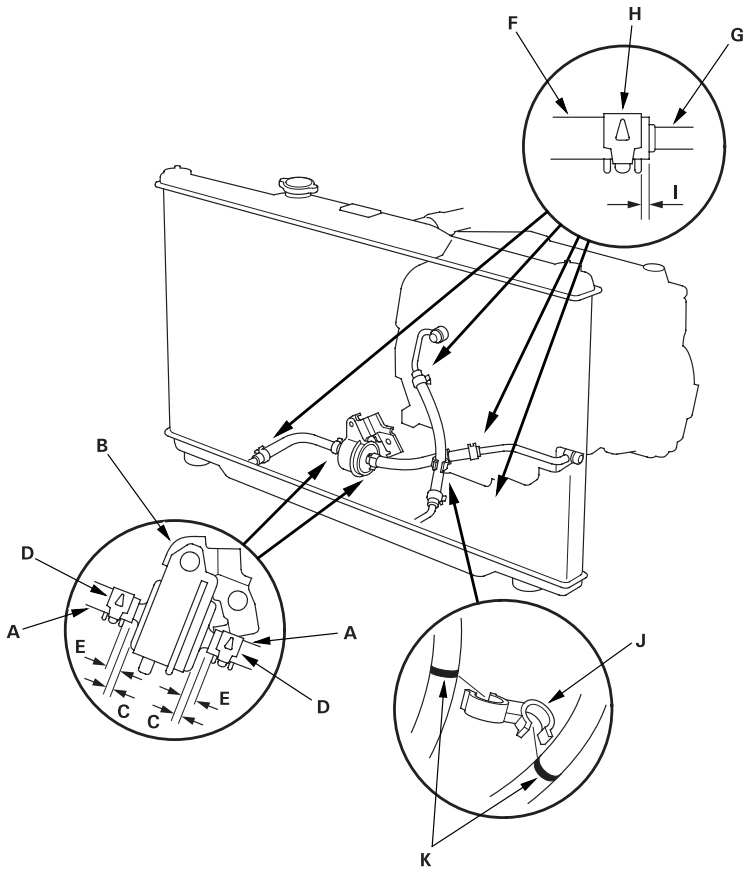
Torque: **64 N·m (6.5 kgf·m, 47 lbf·ft)**

53. Retighten the front mount bolt.

Torque: **64 N·m (6.5 kgf·m, 47 lbf·ft)**

ATF Cooler Hoses Replacement

1. Insert the ATF cooler hoses (A) to the ATF filter (B) at 5 - 6 mm (0.20 - 0.24 in.) (C) away from the ATF filter surfaces.
2. Secure the hoses with the clips (D) at 10 - 12 mm (0.4 - 0.5 in.) (E) away from the ATF filter surfaces.

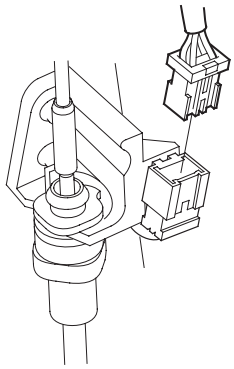


3. Insert the ATF cooler hoses (F) over the ATF cooler lines (G), then secure the hoses with the clips (H) at 2 - 4 mm (0.1 - 0.2 in.) (I) from hose end.
4. Install the hose clamp (J) on the marks (K) on the ATF cooler hoses.

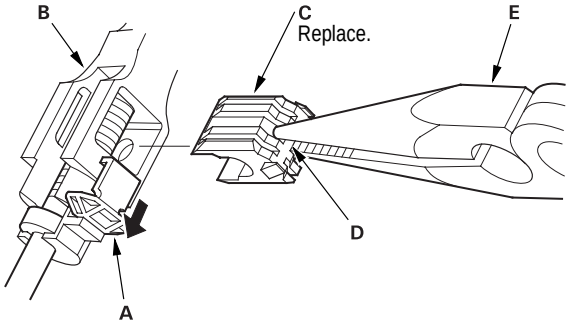
Shift Lever Removal

1. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
2. Disconnect the O/D switch/shift lock solenoid/park pin switch connector.

   NOTE: The illustration shows LHD model; RHD is symmetrical.



3. Shift the shift lever to [R] position.
4. Slide the lock tab (A) down on the shift cable end holder (B).

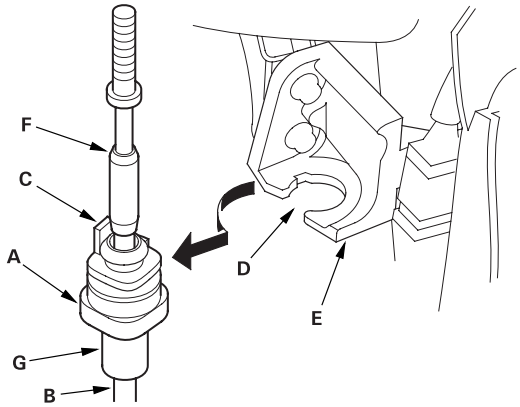


5. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cable end holder.

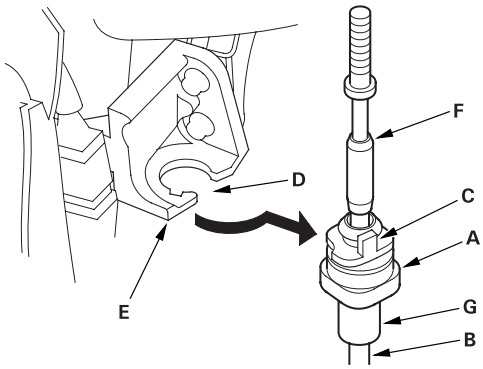
   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.
6. Separate the shift cable end from the shift cable end holder.
7. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

   NOTE: Do not remove the shift cable by twisting the shift cable guide (F) and damper (G).

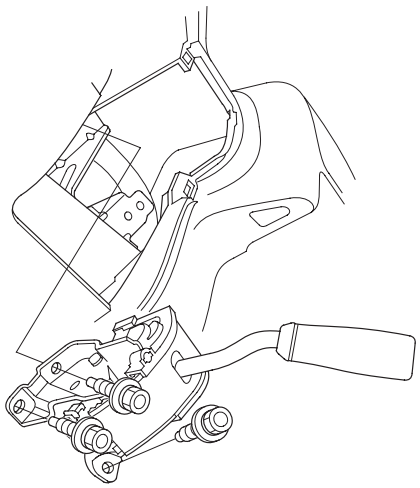
LHD Model:



RHD Model:



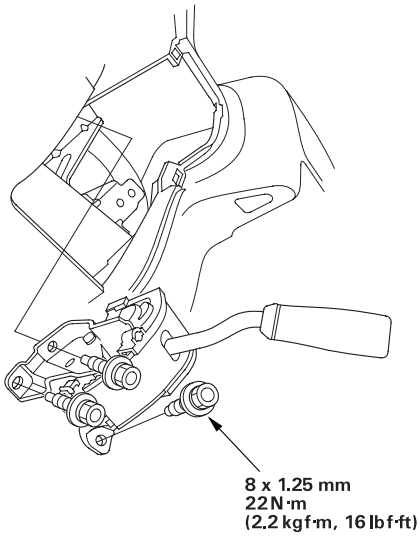
8. Remove the shift lever assembly.
NOTE: The illustration shows LHD model; RHD is symmetrical.



Shift Lever Installation

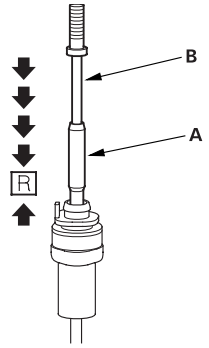
1. Install the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



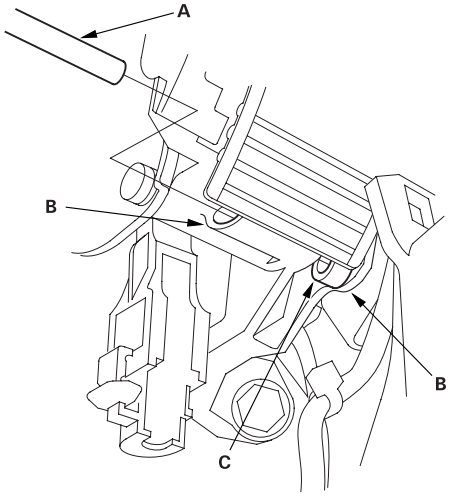
2. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.

3. If necessary, push the shift cable until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).



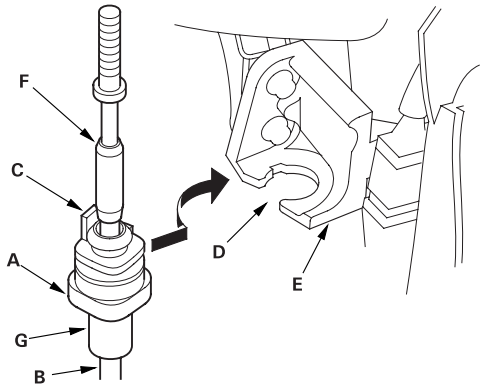
4. Turn the ignition switch OFF.

5. Insert a 6.0 mm (0,24 in.) pin (A) into the positioning hole (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

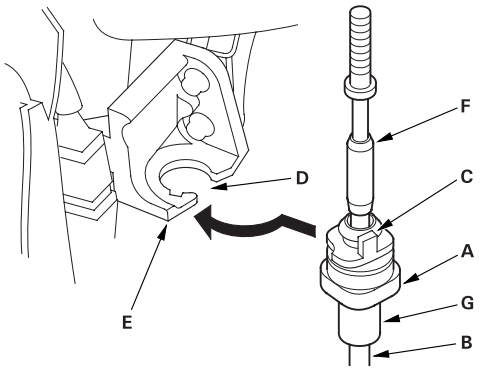


6. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

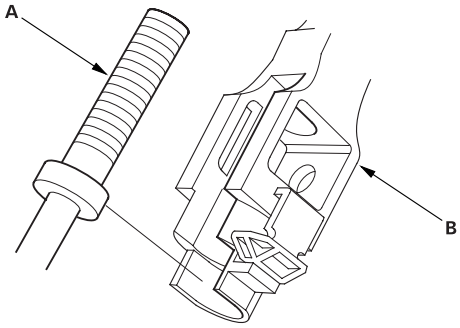
LHD Model:



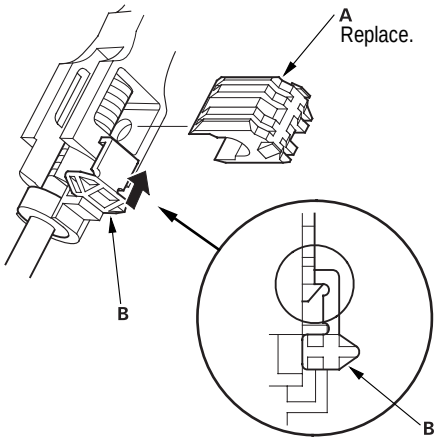
RHD Model:



7. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



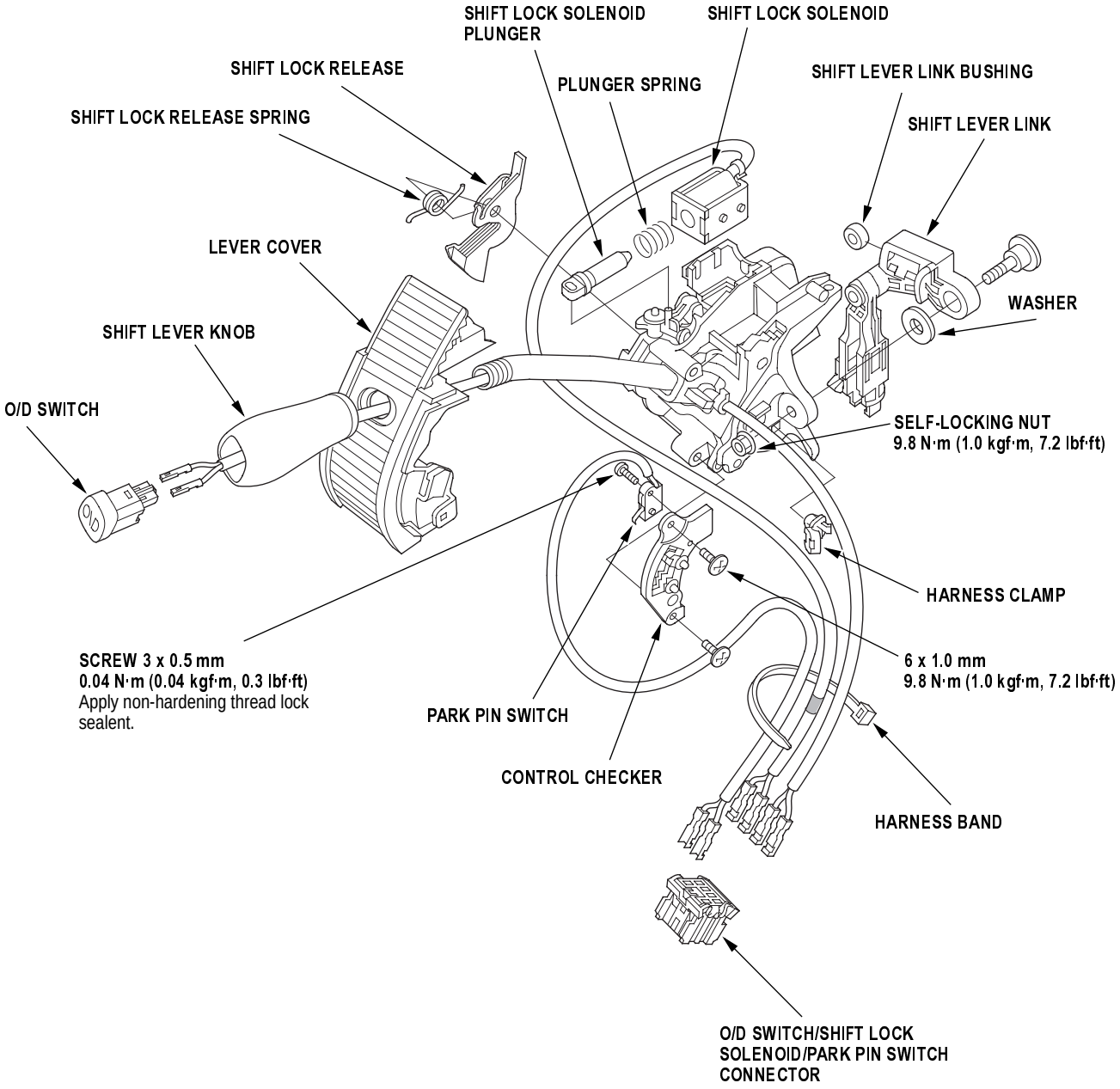
8. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up unitil it stops to lock the joint.



9. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.
10. Connect the O/D switch/shift lock solenoid/park pin switch connector.
11. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.
12. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboard lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

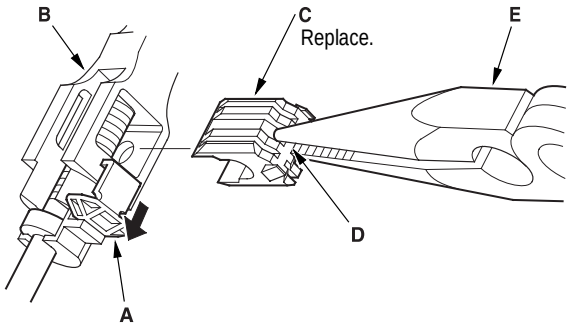
Shift Lever Disassembly/Reassembly

NOTE: The illustration shows the LHD model: RHD is symmetrical.



Shift Cable Replacement

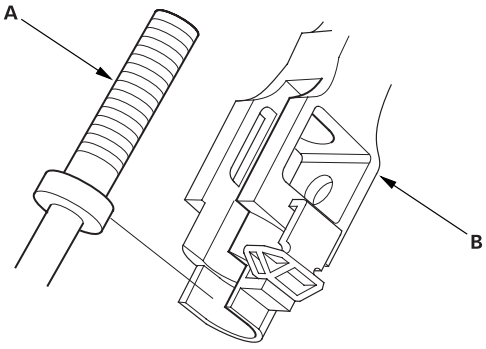
1. Raise the front of the vehicle, and make sure it is securely supported, or lift the vehicle up.
2. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
3. Shift the shift lever to [R] position.
4. Slide the lock tab (A) down on the shift cable end holder (B).



5. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cable end holder.

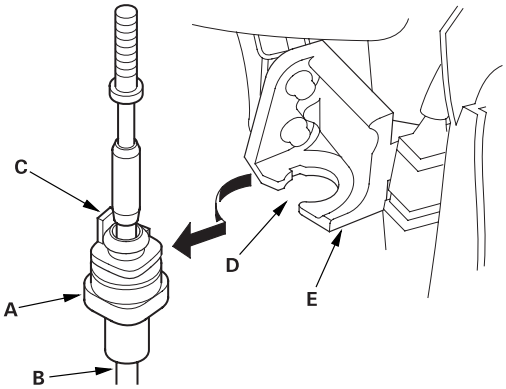
   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.

6. Separate the shift cable end (A) from the shift cable holder (B).

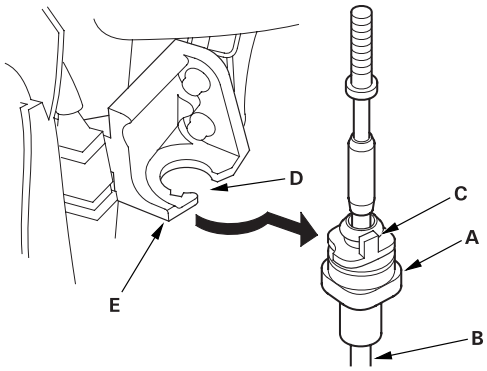


7. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

LHD Model:



RHD Model:

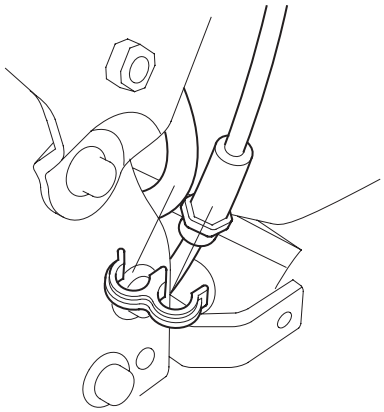


(cont'd)

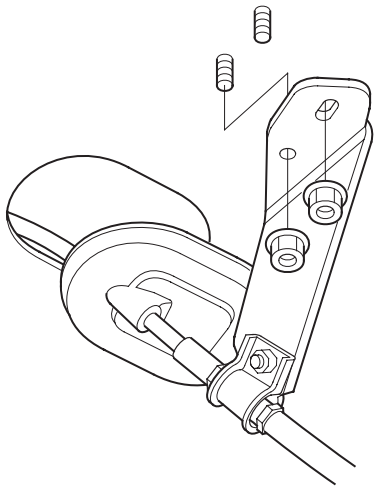
Shift Cable Replacement (cont'd)

8. For RHD model; Remove the shift cable from the clamp.

NOTE: The LHD model doesn't have shift cable clamp.



9. Remove the grommet under the body, and pull out the shift cable.



10. Replace the shift cable for 4WD model.

1 Remove the bolts (A) securing the shift cable bracket (B), then remove the shift cable cover (C).

2 Remove the spring clip (D) and control pin (E), then separate the shift cable (F) from the control lever (G).

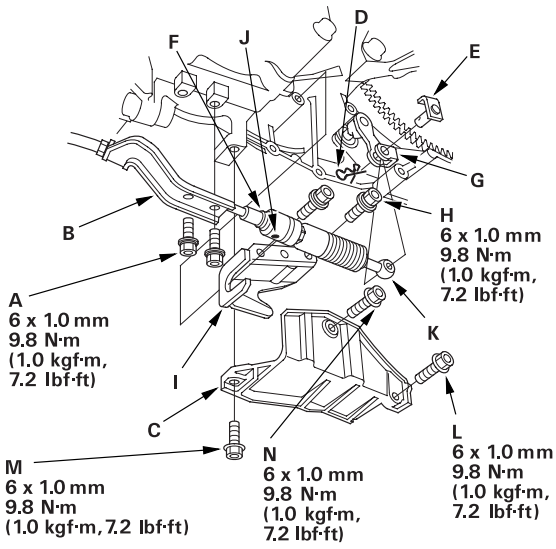
3 Remove the bolts (H) securing the shift cable bracket (I), then remove the shift cable bracket (I) from the shift cable.

4 Replace the shift cable, and insert it through the grommet hole. Do not bend the shift cable excessively. Face the dot (J) on the shift cable (F) down, then install the shift cable bracket (I) on the shift cable.

5 Attach the shift cable end (K) to the control lever (G), then insert the control pin (E) into the control lever hole through the shift cable end. Secure the control pin with the spring clip (D).

6 Secure the shift cable bracket (B) with the bolts (A), and install the shift cable cover (C) with installing the mounting bolts loosey.

7 First tighten the front bolt (L) on the cover, then lower bolt (M), and lastly the middle bolt (N).



11. Replace the shift cable for 2WD model.

1 Remove the shift cable cover (A).

2 Remove the spring clip (B) and control pin (C), then separate the shift cable (D) from the control lever (E).

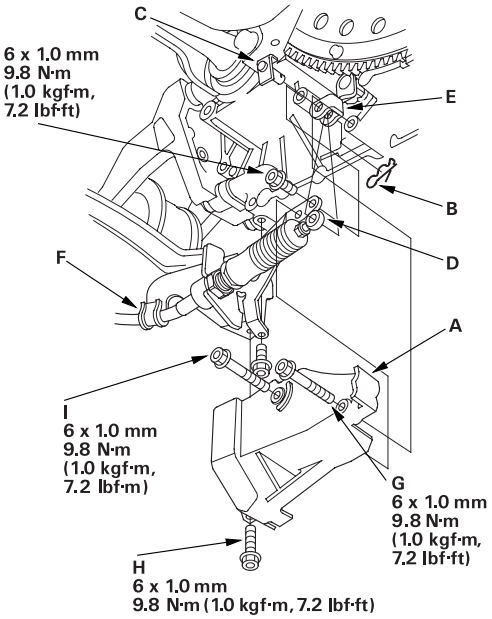
3 Remove the bolts securing the shift cable bracket (F).

4 Replace the shift cable, and insert it through the grommet hole. Do not bend the shift cable excessively.

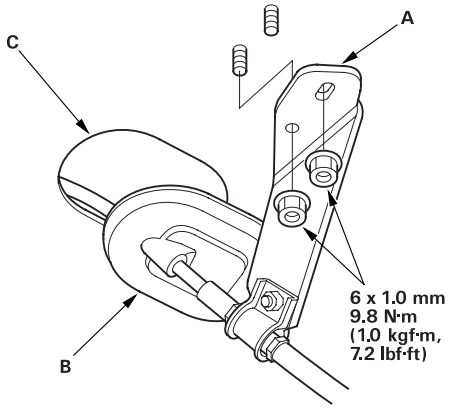
5 Attach the shift cable end (D) to the control lever (E), then insert the control pin (C) into the control lever hole through the shift cable end, and secure the control pin with the spring clip (B).

6 Secure the shift cable bracket (F) with the bolt, and install the shift cable cover (A) with installing the mounting bolts loosey.

7 First tighten the front bolt (G) on the cover, then lower bolt (H), and lastly the middle bolt (I).

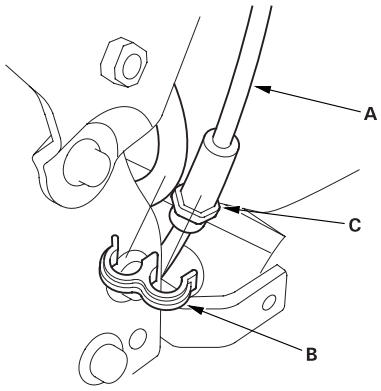


12. Install the shift cable bracket (A) on the body, then install the grommet (B) in its hole (C).



13. For RHD model; Install the shift cable (A) on its clamp (B) at the crimped ring (C).

NOTE: The LHD model doesn't have shift cable clamp.

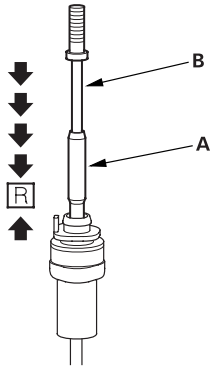


(cont'd)

Shift Cable Replacement (cont'd)

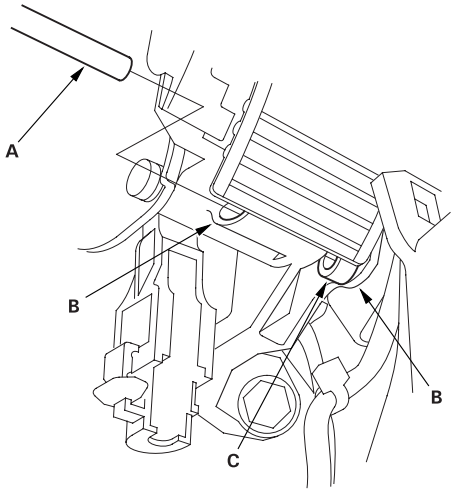
14. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.

15. If necessary, push the shift cable until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).



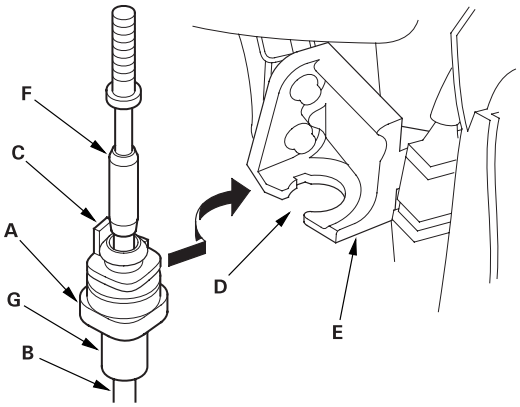
16. Turn the ignition switch OFF.

17. Insert a 6.0 mm (0.24 in.) pin (A) into the positioning holes (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

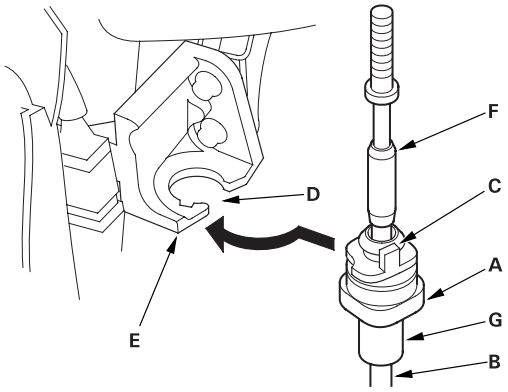


18. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening in the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

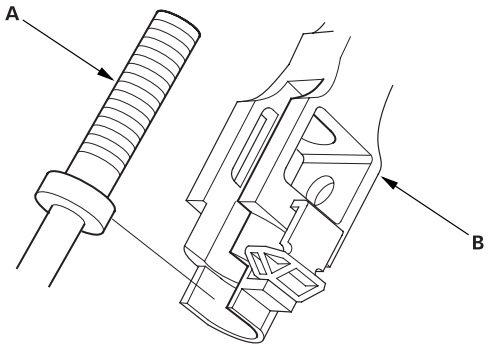
LHD Model:



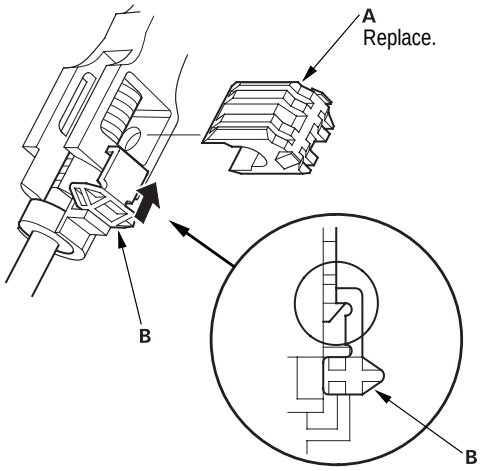
RHD Model:



19. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



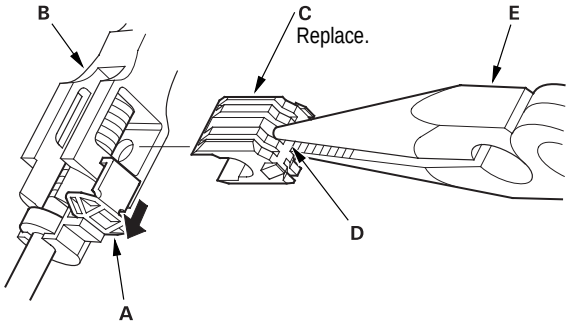
20. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up until it stops to lock the joint.



21. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.
22. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.
23. Allow the wheels to rotate freely.
24. Start the engine, and check the shift lever operation in all gears.
25. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboad lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

Shift Cable Adjustment

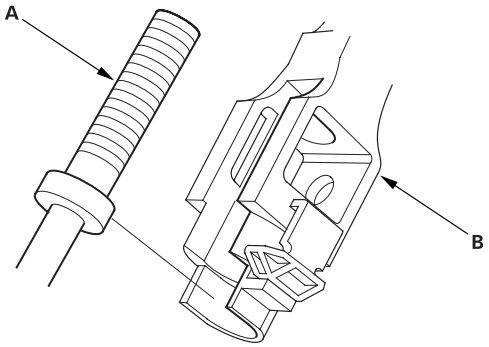
1. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
2. Shift the shift lever to [R] position.
3. Slide the lock tab (A) down on the shift cable end holder (B).



4. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cable end holder.

   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.

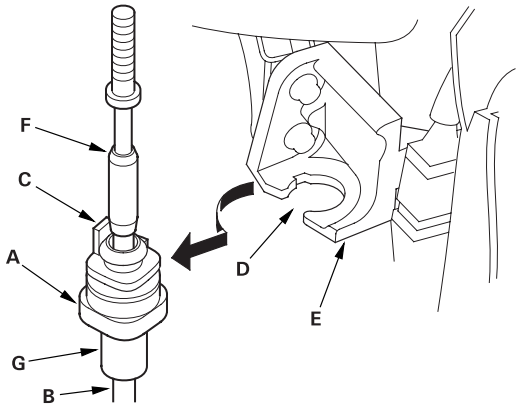
5. Separate the shift cable end (A) from the shift cable end holder (B).



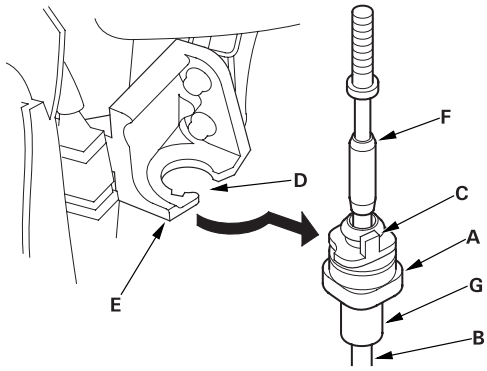
6. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

   NOTE: Do not remove the shift cable by twisting the shift cable guide (F) and damper (G).

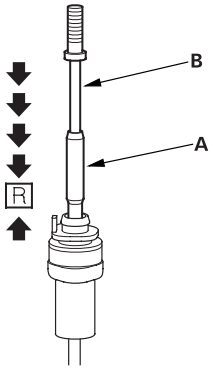
LHD Model:



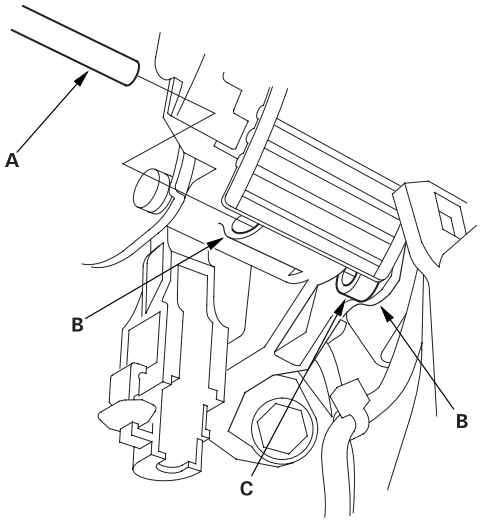
RHD Model:



7. Push the shift cable down until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).

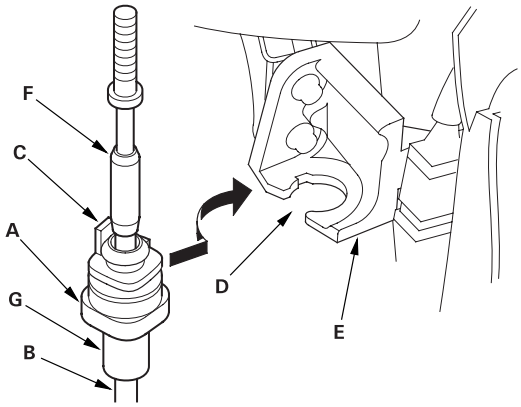


8. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.
9. Turn the ignition switch OFF.
10. Insert a 6.0 mm (0.24 in.) pin (A) into the positioning hole (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

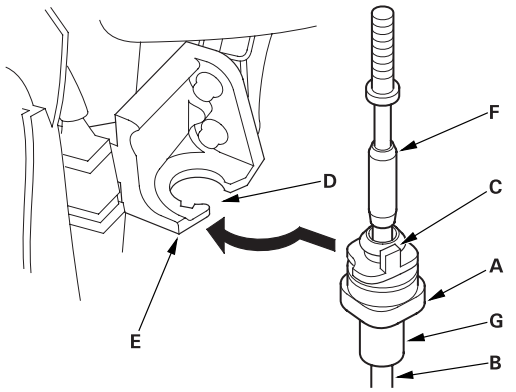


11. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening in the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

LHD Model:



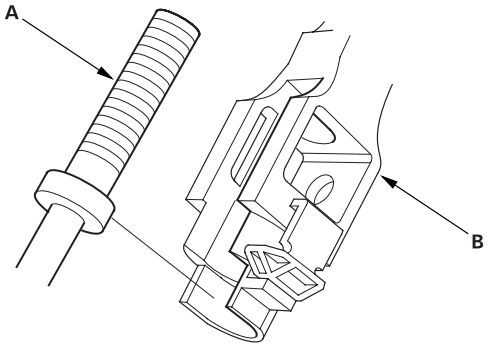
RHD Model:



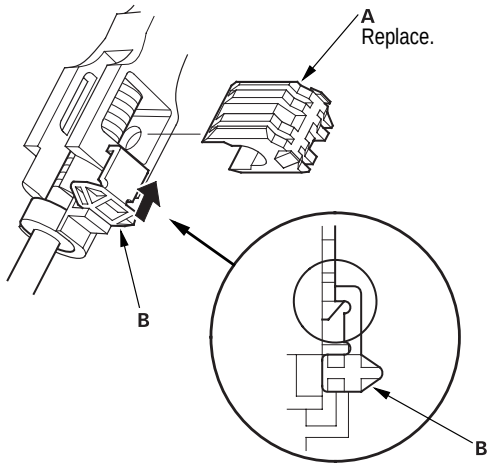
(cont'd)

Shift Cable Adjustment (cont'd)

12. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



13. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up until it stops to lock the joint.



14. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.

15. Connect the O/D switch/shift lock solenoid/park pin switch connector.

16. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.

17. Allow the wheels to rotate freely.

18. Start the engine, and check the shift lever operation in all gears.

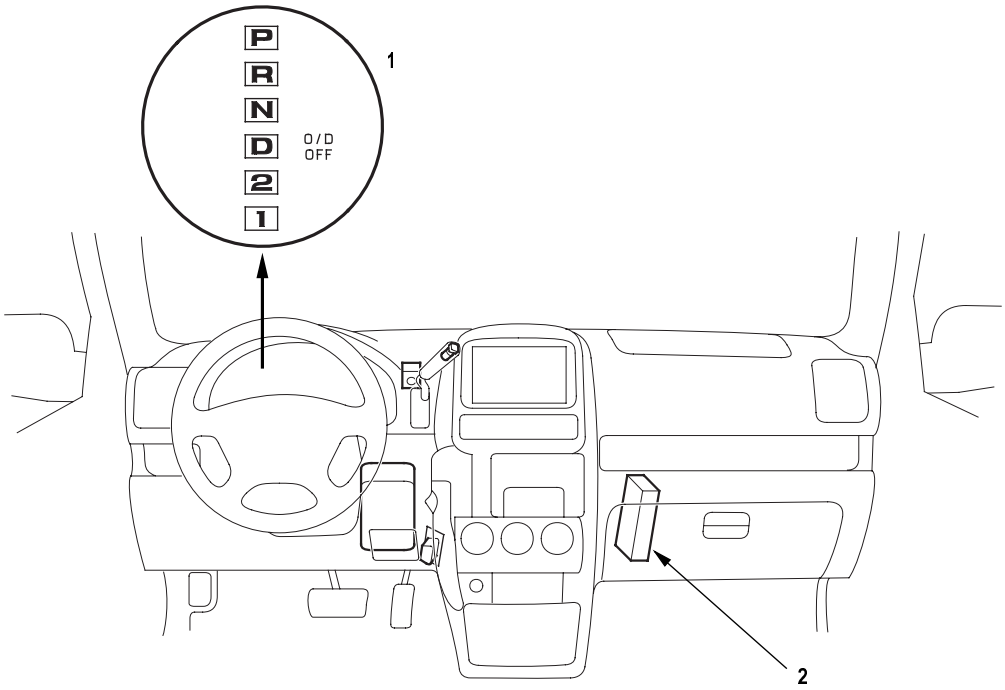
19. Turn the engine off. Push the shift lock release, and verify that the shift lever releases.

20. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboard lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

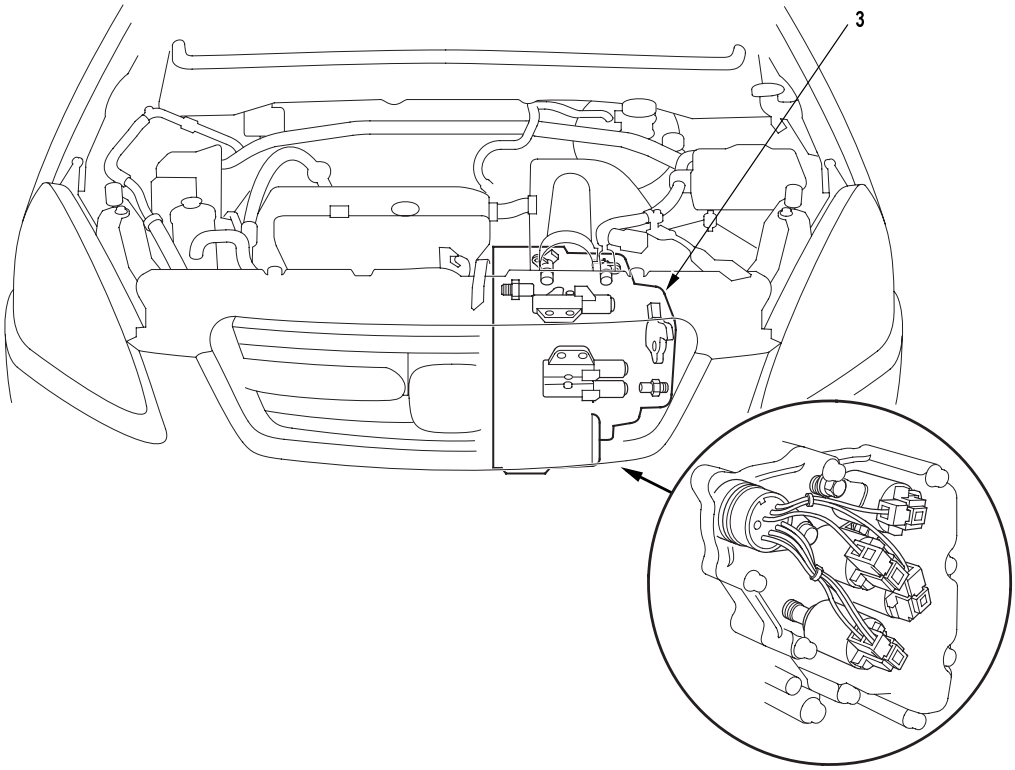
A/T Gear Position Indicator

Component Location Index

NOTE: The illustration shows the LHD model; RHD is symmetrical.



NOTE: The illustration shows the LHD model; RHD is similar.

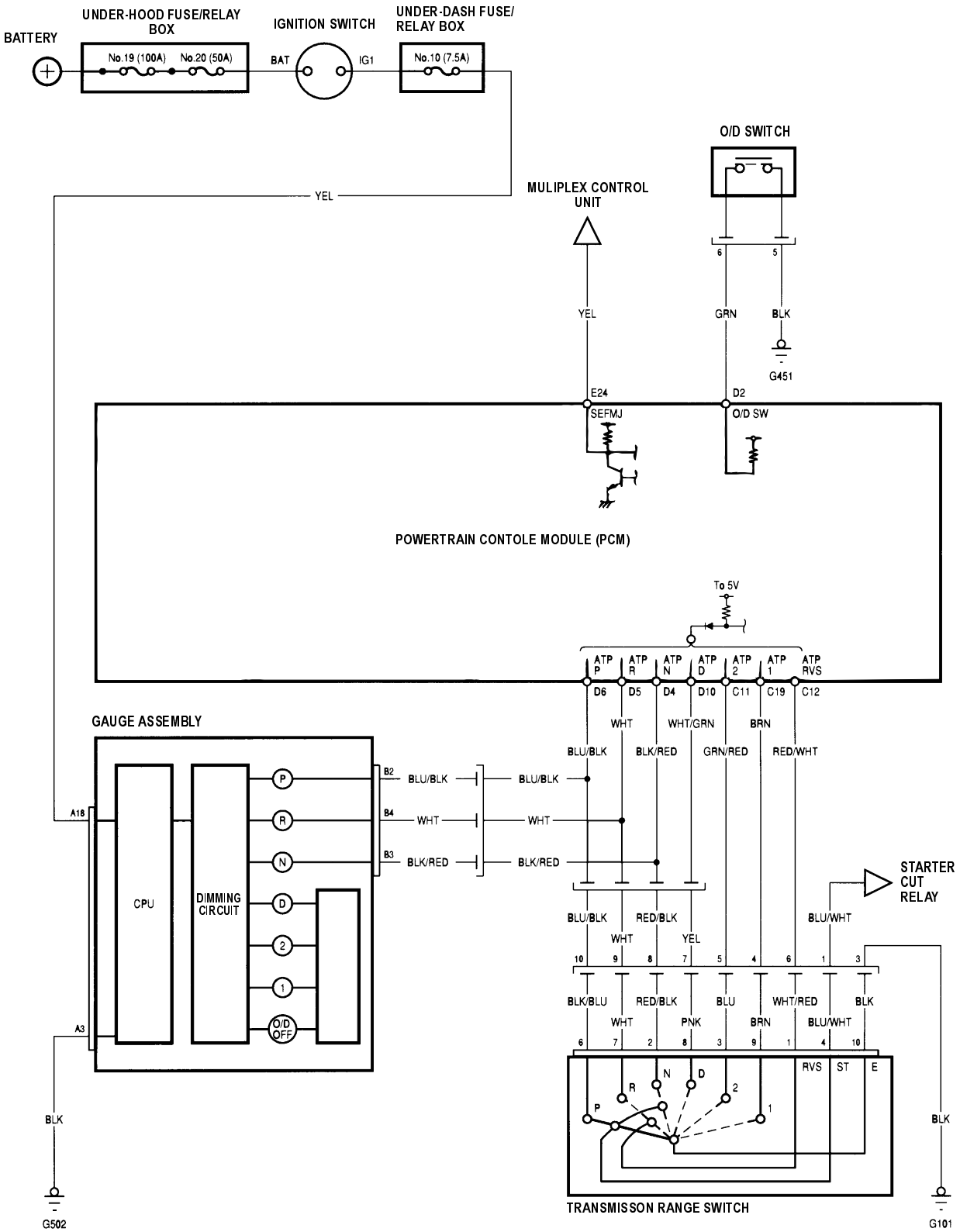


1 A/T GEAR POSITION INDICATOR Indicator Input test, page 14-167; Indicator Bulb Replacement, page 14-171

2 POWERTRAIN CONTROL MODULE (PCM)

2 TRANSMISSION RANGE SWITCH Test, page 14-168; Replacement, page 14-169

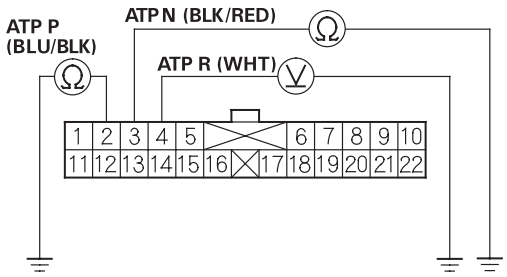
Circuit Diagram



Indicator Input Test

1. If the MIL has been reported, check for a DTC, and repair the system as indicated by DTC.
2. If the MIL does not come on, and the A/T gear position indicator [P], [N], or [R] does not come on, remove the gauge assembly from the dashboard, then disconnect gauge assembly connector A (22P) and B (22P).
3. Inspect the connectors and connector terminals to be sure they are making good contact.
4. If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
5. Turn the ignition switch ON (II).
6. Shift to [P] position, and check for continuity between B2 terminal (BLU/BLK) and ground.
   There should be continuity in [P] position and no continuity in any other shift lever position. If the test results are different, check for a faulty transmission range switch or an open in the wire.
   NOTE: The illustration shows example of connector terminal arrangement; connector terminal arrangement varies with models.

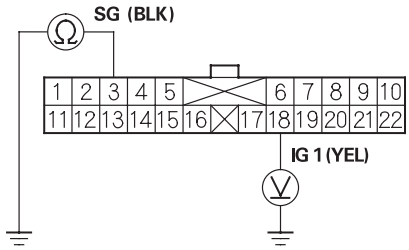
GAUGE ASSEMBLY CONNECTOR B (22P)



Wire side of female terminals

7. Shift to [R] position, and check for voltage between B4 terminal (WHT) and ground.
   There should be 0 V in [R] position. There should be battery voltage in any other shift lever position. If the test results are different, check for a faulty transmission range switch or an open in the wire.
8. Shift to [N] position, and check for continuity between B3 terminal (BLK/RED) and ground.
   There should be continuity in [N] position and no continuity in any other shift lever position. If the test results are different, check for faulty transmission range switch or an open in the wire.
9. Check for voltage A18 terminal (YEL) and ground with the ignition switch ON (II).
   There should be battery voltage. If the test result is different, check for a blown No. 10 (7.5A) fuse in the under-dash fuse/relay box or an open in the wire.
   NOTE: The illustration shows example of connector terminal arrangement; connector terminal arrangement varies with models.

GAUGE ASSEMBLY CONNECTOR A (22P)

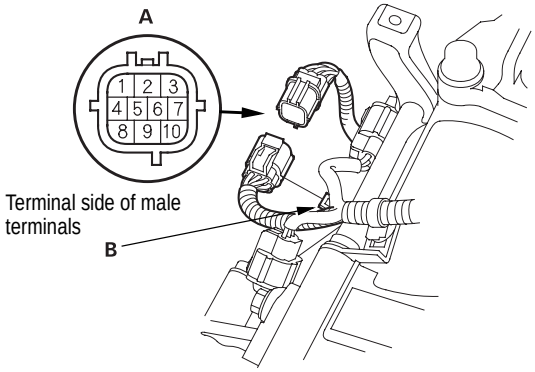


Wire side of female terminals

10. Turn the ignition switch OFF, and check for continuity between A3 terminal (BLK) and ground under all conditions.
    There should be continuity. If the test result is different, check for a poor ground (G502) or an open in the wire.
11. If a input test prove OK, but the indicator is faulty, replace the printed circuit board.

Transmission Range Switch Test

1. Remove the transmission range switch harness connector (A) from the connector bracket (B), then disconnect the connector.



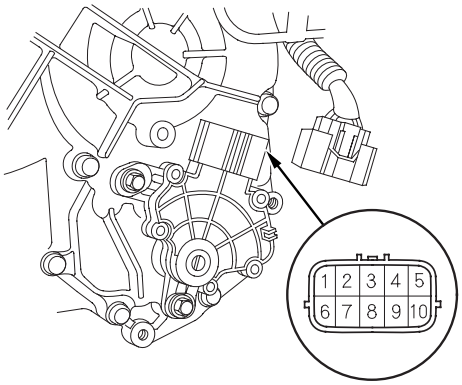
Connector Terminal Specification

Terminal	Signal	Terminal	Signal
1	ATP NP (ST)	6	ATP RVS
2	——	7	[D]
3	Ground (E)	8	[N]
4	[1]	9	[R]
5	[2]	10	[P]

2. Check for continuity between terminals at the harness connector. There should be continuity between the terminals in the following table for each switch position.

Position	Connector Terminal									
	1	2	3	4	5	6	7	8	9	10
P	○		○							○
R			○			○			○	
N	○		○					○		
D			○				○			
2			○		○					
1			○	○						

3. If there is no continuity between any terminals, remove the transmission range switch cover, and disconnect the connect at the switch.



Connector Terminal Specification

Terminal	Signal	Terminal	Signal
1	ATP RVS	6	[P]
2	[N]	7	[R]
3	[2]	8	[D]
4	ATP NP (ST)	9	[1]
5	——	10	Ground (E)

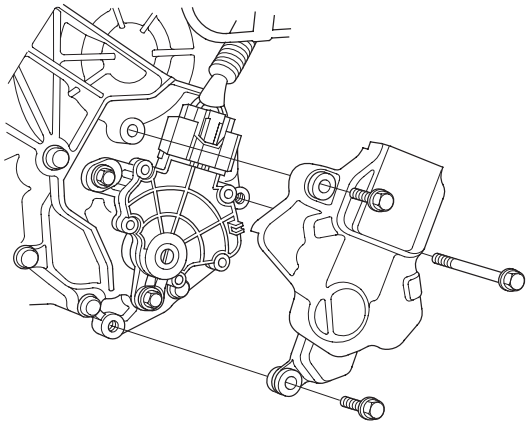
4. Check for continuity between terminals at the switch connector. There should be continuity between the terminals in the following table for each switch position.

Position	Connector Terminal									
	1	2	3	4	5	6	7	8	9	10
P				○		○				○
R	○						○			○
N		○		○						○
D								○		○
2			○							○
1									○	○

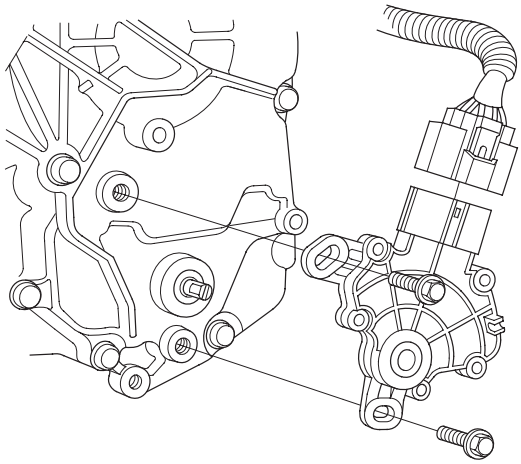
5. If there is no continuity between any terminals, check the transmission range switch installation. If the transmission range switch installation is OK, replace the switch.
If the transmission range switch continuity check was OK, replace the faulty transmission range switch harness.

Transmission Range Switch Replacement

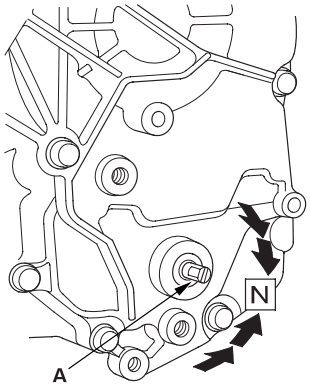
1. Raise the vehicle, and make sure it is securely supported.
2. Shift to [N] position.
3. Remove the transmission range switch cover.



4. Disconnect the transmission range switch connector.

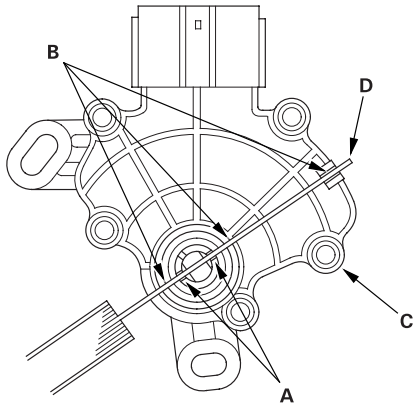


5. Remove the old transmission range switch, and install the new switch.
6. Make sure that the control shaft is in [N] position. If necessary, move the shift lever to [N] position.



7. Align the cutout (A) on the rotary-frame with the neutral positioning cutouts (B) on the transmission range switch (C), then put a 2.0 mm (0.08 in.) feeler gauge blade (D) in the cutouts to hold it in the [N] position.

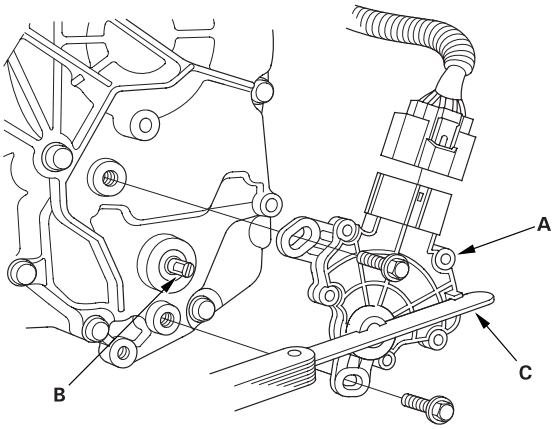
   NOTE: Be sure to use a 2.0 mm (0.08 in.) blade or equivalent to hold the switch in the [N] position.



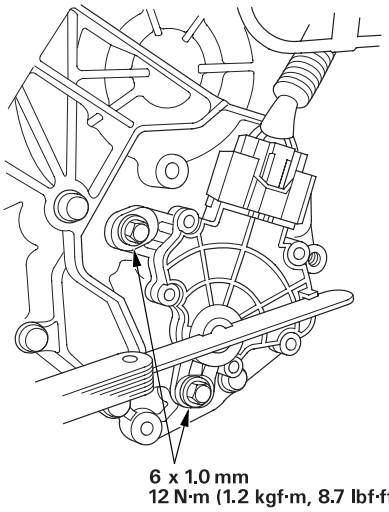
(cont'd)

Transmission Range Switch Replacement (cont'd)

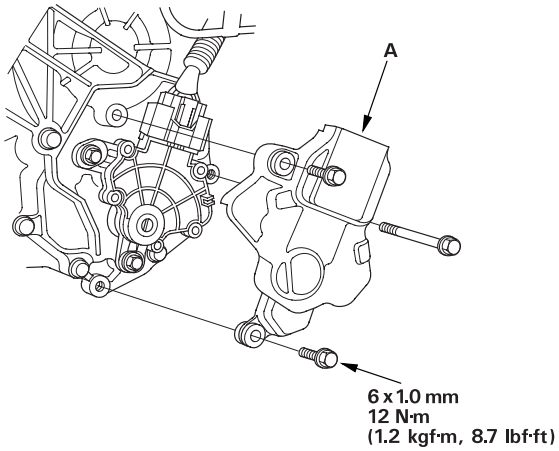
8. Install the transmission range switch (A) gently on the control shaft (B) with holding the [N] position with the 2.0 mm (0.08 in.) blade (C).



9. Tighten the bolts on the transmission range switch while you continue to hold the [N] position. Do not move the transmission range switch when tightening the bolts. Remove the feeler gauge.



10. Connect the connector securely, then install the transmission range switch cover (A).



11. Turn the ignition switch ON (II). Move the shift lever through all gear positions, and check the transmission range switch synchronization with the A/T gear position indicator.

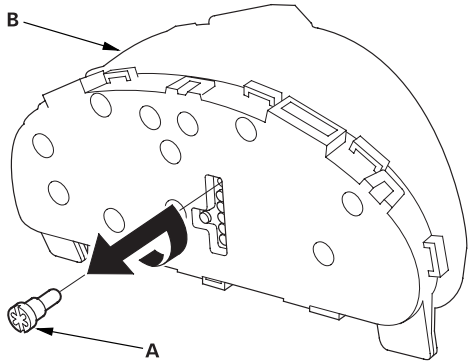
12. Check that the engine can start in [P] and [N] positions, and cannot start in any other shift lever position.

13. Check that the back-up lights come on when the shift lever is in [R] position.

14. Allow the wheels to rotate freely, then start the engine, and check the shift lever operation.

Indicator Bulb Replacement

1. Remove the gauge assembly.
2. Replace the bulb (A) at the gauge assembly (B).



A/T Interlock System

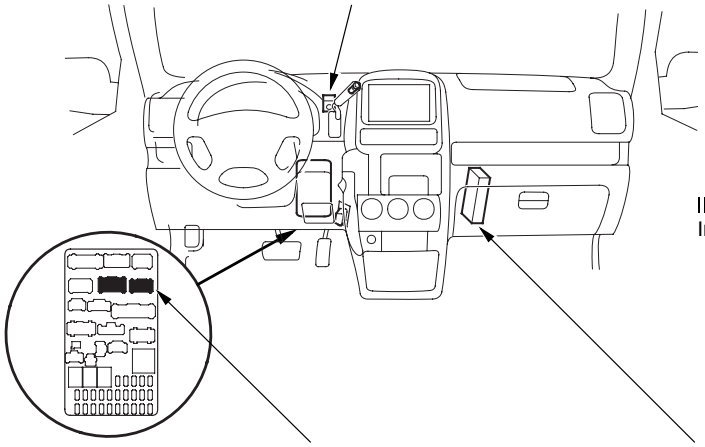
Component Location Index

LHD Model:

STEERING LOCK ASSEMBLY KEY INTERLOCK SOLENOID
System circuit troubleshooting, page 14-179
Test, page 14-181

PARK PIN SWITCH
Test/Replacement, page 14-187

SHIFT LOCK SOLENOID
System circuit troubleshooting, page 14-175
Test/Replacement, page 14-182



INTERLOCK CONTROL UNIT (KS) MODEL
Input test, page 14-180

UNDER-DASH FUSE/RELAY BOX MULTIPLEX CONTROL UNIT

No. 10 CONNECTOR (13P)

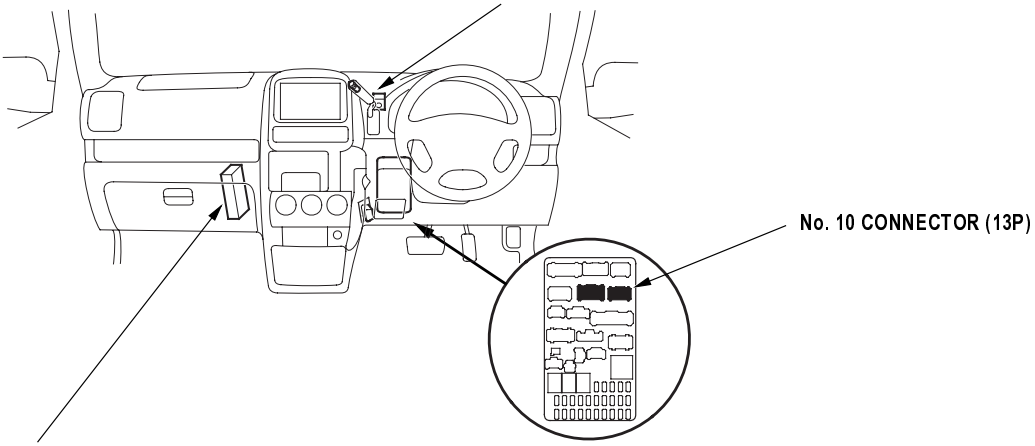
POWERTRAIN CONTROL MODULE (PCM)

RHD Model:

STEERING LOCK ASSEMBLY KEY INTERLOCK SOLENOID
System circuit troubleshooting, page 14-179
Test, page 14-181

PARK PIN SWITCH
Test/Replacement, page 14-187

SHIFT LOCK SOLENOID
System circuit troubleshooting, page 14-175
Test/Replacement, page 14-182



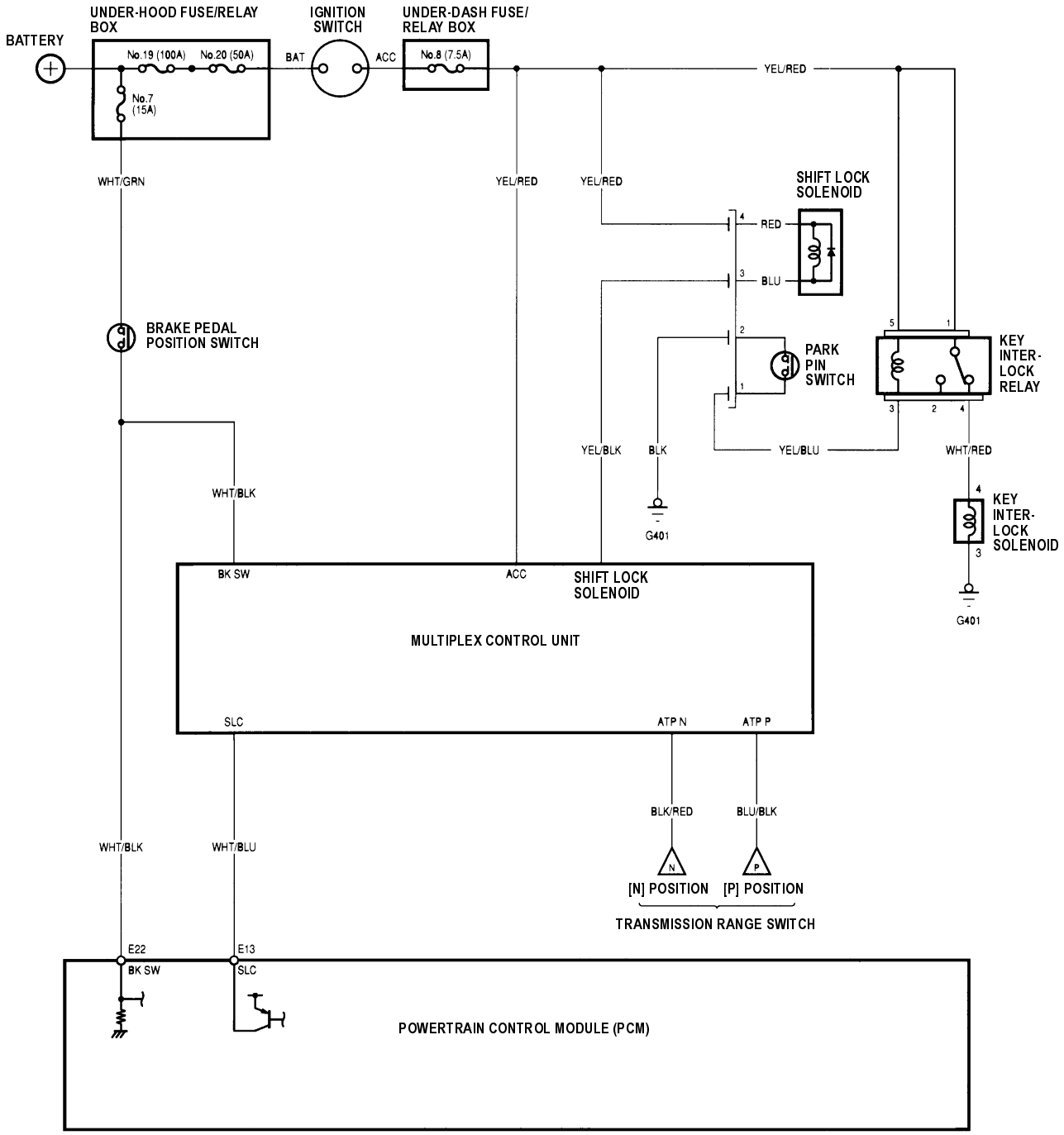
No. 10 CONNECTOR (13P)

POWERTRAIN CONTROL MODULE (PCM)

UNDER-DASH FUSE/RELAY BOX MULTIPLEX CONTROL UNIT

Circuit Diagram

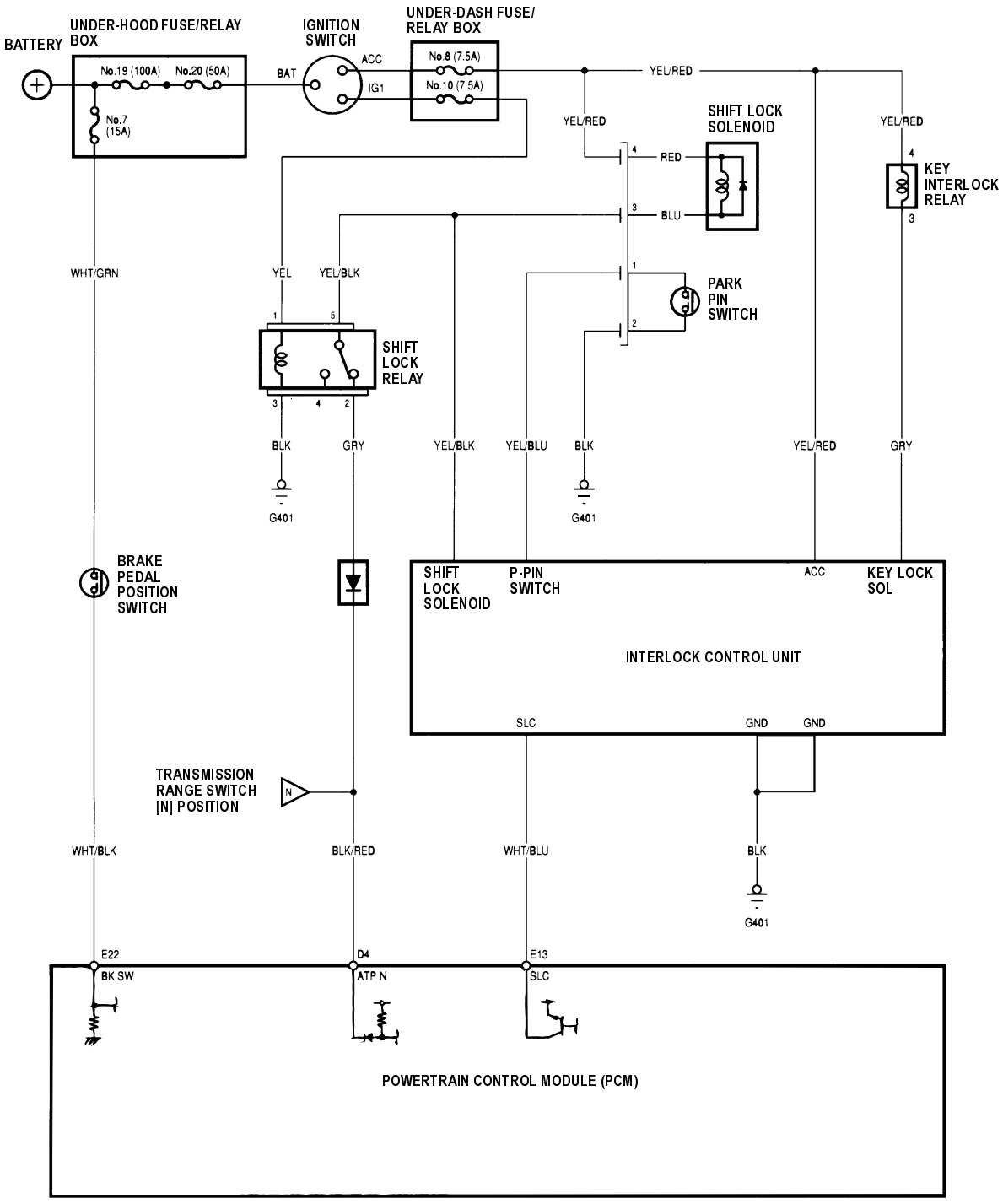
Except KS Model



(cont'd)

Circuit Diagram (cont'd)

KS Model



Shift Lock System Circuit Troubleshooting

1. Press the brake pedal.

Are the brake lights ON?

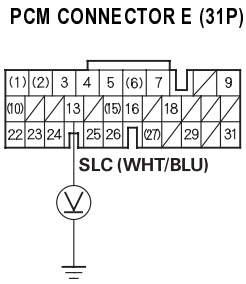
Yes Go to step 2.

No Repair faulty brake light circuit.■

2. Turn the ignition switch ON (II).

3. With the accelerator pedal released, press the brake pedal.

4. Measure the voltage between PCM connector terminal E13 and body ground.



Wire side of female terminals

Is there battery voltage?

Yes Check for an open in the wire between PCM connector terminal E13 and the multiplex control unit (except KS model) or interlock control unit (KS model). If the wire is OK, check for a loose terminal fit in the multiplex control unit (except KS model) or interlock control unit (KS model) connectors. If necessary, substitute a known-good multiplex control unit (except KS model) or interlock control unit (KS model) and recheck.■

No Go to step 5.

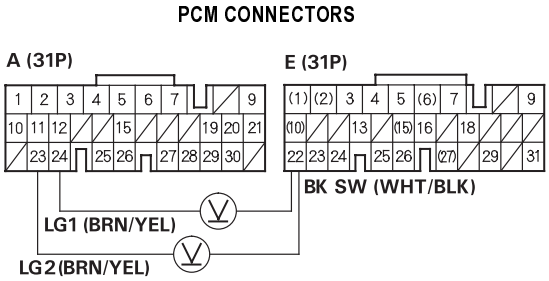
5. Turn the ignition switch OFF.

6. Disconnect the battery negative terminal.

7. Disconnect PCM connectors A (31P) and E (31P).

8. Reconnect the battery negative terminal.

9. Press the brake pedal, and measure the voltage between PCM connector terminals E22 and A23 or A24.



Wire side of female terminals

Is there battery voltage?

Yes Release the brake pedal, and go to step 10 except for KS model; for KS model, go to step 12.

No Repair open in the wire between PCM connector terminal E22 and the brake pedal position switch.■

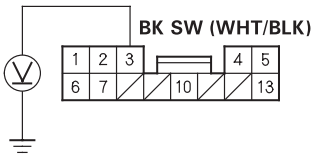
(cont'd)

Shift Lock System Circuit Troubleshooting (cont'd)

10. Remove the under-dash fuse/relay box, and disconnect the No. 10 connector (13P) from the fuse/relay box.

11. Measure the voltage between the No. 3 terminal of the No. 10 connector (13P) and body ground while pressing the brake pedal.

UNDER-DASH FUSE/RELAY BOX No. 10 CONNECTOR (13P)



Wire side of female terminals

Is there battery voltage?

Yes Release the brake pedal, and go to step 12.

No Repair open or short in the wire between the multiplex control unit and the brake pedal position switch via the No. 3 terminal of the No. 10 connector (13P).■

12. Disconnect the battery negative terminal.

13. Connect PCM connectors A (31P) and E (31P).

14. Connect the No. 10 connector (13P) except for KS model.

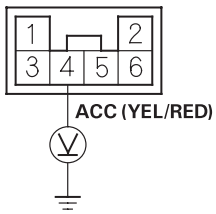
15. Reconnect the battery negative terminal.

16. Disconnect the O/D switch/shift lock solenoid/park pin switch connector (see page 14-152).

17. Turn the ignition switch ON (II).

18. With the accelerator pedal released, press the brake pedal, and measure the voltage between the No. 4 terminal of the O/D switch/shift lock solenoid/park pin switch connector and body ground.

O/D SWITCH/SHIFT LOCK SOLENOID/PARK PIN SWITCH CONNECTOR



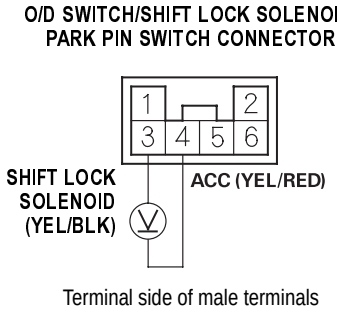
Terminal side of male terminals

Is there battery voltage?

Yes Go to step 19.

No Repair open or short in the wire between the O/D switch/shift lock solenoid/park pin switch connector and under-dash fuse/relay box.■

19. Measure the voltage between the No. 3 and No. 4 terminals of the O/D switch/shift lock solenoid/park pin switch connector while pressing the brake pedal.



Terminal side of male terminals

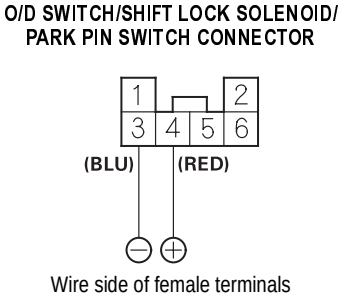
Is there battery voltage?

Yes Go to step 20.

No Repair open in the wire between the O/D switch/shift lock solenoid/park pin switch connector and the multiplex control unit (except KS model) or interlock control unit (KS model).■

20. Connect the battery positive terminal to the No. 4 terminal of the O/D switch/shift lock solenoid/park pin switch connector, and connect the battery negative terminal to the No. 3 terminal. Check that the shift lock solenoid operates.

NOTE: Do not connect the battery positive terminal to the No. 3 terminal or you will damage the diode inside the shift lock solenoid.



Wire side of female terminals

Does the shift lock solenoid operate properly?

Yes Check that the shift lock mechanism works properly. If the mechanism does not work, repair or replace the shift lever assembly. If necessary, substitute a known-good multiplex control unit (except KS model) or interlock control unit (KS model) and recheck.■

No Replace the shift lock solenoid.■

Reverse Lock System Circuit Troubleshooting

1. Check whether the DTC 1705 or 1706 is indicated.
   Is either DTC indicated?
   - **Yes** Perform the Troubleshooting Flowchart for the indicated Code(s).■
   - **No** Go to step 2.
2. Turn the ignition switch OFF.
3. Shift the shift lever to the [P] position while pushing the shift lock release.
4. Turn the ignition switch ON (II).
5. Press the brake pedal and release the accelerator, shift the shift lever out of the [P] position, and check that the shift lock solenoid operates.
   Does the shift lock solenoid operate properly?
   - **Yes** Check the reverse lock mechanism. If the mechanism does not work, repair or replace the shift lever assembly.■
   - **No** Perform the Shift Lock System Circuit Troubleshooting (see page 14-175).■

Key Interlock System Circuit Troubleshooting

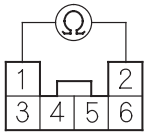
1. Disconnect the steering lock assembly connector.
2. Check if the ignition key can be turned to LOCK (0) position, and removed from the key cylinder.

   Is the ignition key able to turn to LOCK (0) position, and remove from key cylinder?

   Yes Go to step 3.

   No Replace the ignition key cylinder/steering lock assembly.■
3. Disconnect the O/D switchshift lock solenoid/park pin switch connector (see page 14-187).
4. Check for continuity between the No. 1 and No. 2 terminals of the O/D switch/shift lock solenoid/park pin switch connector while the shift lever is in [P] position, and when shift lever out of [P].

   O/D SWITCH/SHIFT LOCK SOLENOID/
   PARK PIN SWITCH CONNECTOR

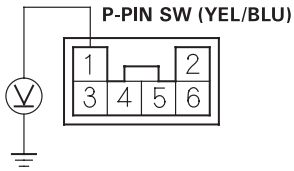
   Wire side of female terminals

   Is there continuity while the shift lever is in [P] *position, and no continuity when the shift lever out of* [P]*?*

   Yes Go to step 5.

   No Faulty park switch, replace it.■
5. Connect the steering lock assembly connector.
6. Turn the ignition switch to ACC (I).
7. Measure the voltage between the No. 1 terminal of the O/D switch/shift lock solenoid/park pin switch connector and body ground.

   O/D SWITCH/SHIFT LOCK SOLENOID/
   PARK PIN SWITCH CONNECTOR

   Terminal side of male terminals

   Is there voltage?

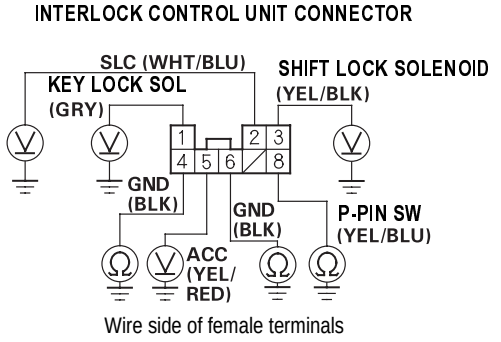
   Yes Repair open in the wire between the park pin switch and ground (G401), or repair poor ground (G401).■

   No Except KS model: Check for an open in the wire between the park pin switch connector and the under-dash fuse/relay box via the key interlock relay. If the wire is OK, replace the key interlock relay, and recheck.■
   KS model: Check for an open in the wire between the park pin switch connector and the interlock control unit. If the wire is OK, check for loose terminal fit in the interlock control unit connector. If necessary, substitute a known-good interlock control unit and recheck.■

Interlock Control Unit Input Test

KS Model

1. Disconnect interlock control unit connector.
2. Inspect the connector and connector terminals to be sure they are making good contact.
3. If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
4. Turn the ignition switch ACC (I).
5. Measure the voltage between interlock control unit connector terminal No. 1 and body ground. There should be voltage. If there is no voltage, check for a blown No. 8 (7.5A) fuse in the under-dash fuse/relay box, a key lock solenoid defect, or an open or a short in the wire.

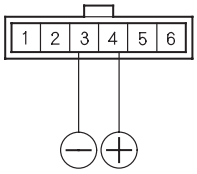


6. Measure the voltage between interlock control unit connector terminal No. 3 and body ground. There should be voltage. If there is no voltage, check for a blown No. 8 (7.5A) fuse, a shift lock solenoid defect, or an open or a short in the wire.
7. Measure the voltage between interlock control unit connector terminal No. 5 and body ground. There should be battery voltage. If there is no voltage, check for a blown No. 8 (7.5A) fuse or an open or a short in the wire.
8. Turn the ignition switch ON (II), and shift the shift lever in [P] position.
9. Press the brake pedal, release the accelerator pedal, and measure the voltage between interlock control unit connector terminal No. 2 and body ground. There should be battery voltage. If there is no voltage, check for an open or short in the wire.
10. Check for continuity between interlock control unit connector terminal No. 8 and body ground while shift lever in [P] position, and when shift lever out of [P]. There should be continuity while shift lever in [P] position, and there should be no continuity when shift lever out of [P]. If the test results are different, a park pin switch defect, and check for an open in the wire.
11. Check for continuity between interlock control unit connector terminals No. 4 and body ground, and between No. 6 and body ground. There should be continuity to ground under all conditions. If there is no continuity, check for an open in the wires, or poor ground (G401).

Key Interlock Solenoid Test

1. Remove the driver's dashboard lower cover and lower steering column cover.
2. Disconnect steering lock assembly connector.
3. Insert the ignition key in the key cylinder, then turn the ignition key to ACC (I).
4. Connect the battery positive terminal to steering lock assembly connector terminal No. 4, and connect the battery negative terminal to No. 3 terminal. Make sure that the ignition key cannot be turned to LOCK (0) position. Release the battery terminals, and make sure that the key can be turned to LOCK (0) position and removed from cylinder.
5. If the key interlock solenoid works improperly, replace the ignition key cylinder/steering lock assembly.

STEERING LOCK ASSEMBLY CONNECTOR

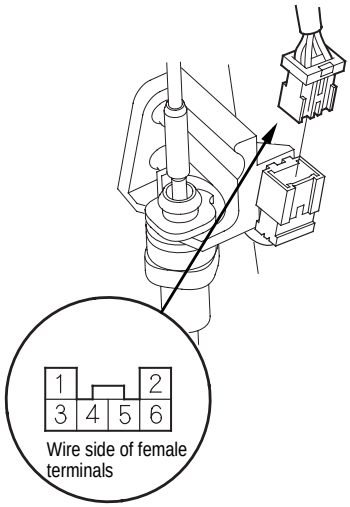


Terminal side of male terminals

Shift Lock Solenoid Test/Replacement

1. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
2. Disconnect the O/D switch/shift lock solenoid/park pin switch connector.

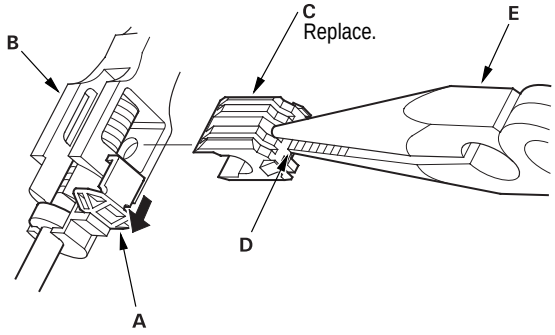
   NOTE: The illustration shows LHD model; RHD is symmetrical.



O/D SWITCH/SHIFT LOCK SOLENOID/ PARK PIN SWITCH CONNECTOR

3. Connect the battery positive terminal to the No. 4 terminal of the O/D switch/shift lock solenoid/park pin switch connector, and connect the battery negative terminal to the No. 3 terminal.

   NOTE: Do not connect the battery negative terminal to the No. 3 terminal or you will damage the diode inside the solenoid.
4. Check that the shift lever can be moved from [P] position. Release the battery terminals, move the shift lever back to the [P], and make sure it locks. If the shift lock solenoid works properly, connect the connector and install the removed parts.
   If the shift lock solenoid is faulty, go to step 5 for replacement.
5. Shift the shift lever to [R] position.
6. Slide the lock tab (A) down on the shift cable end holder (B).



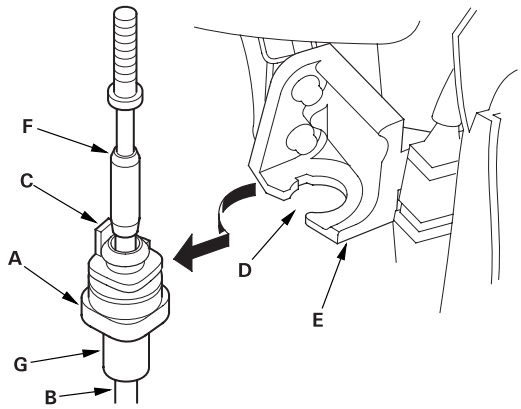
7. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cabel end holder.

   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.
8. Separate the shift cable end from the shift cable end holder.

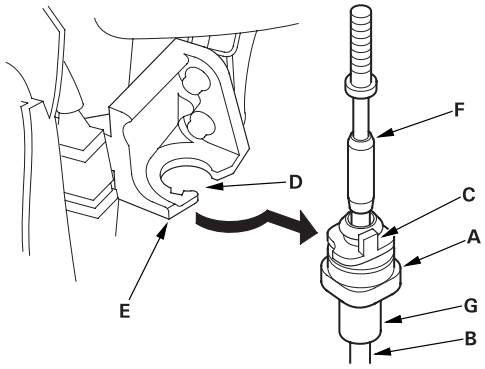
9. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

NOTE: Do not remove the shift cable by twisting the shift cable guide (F) and damper (G).

LHD Model:

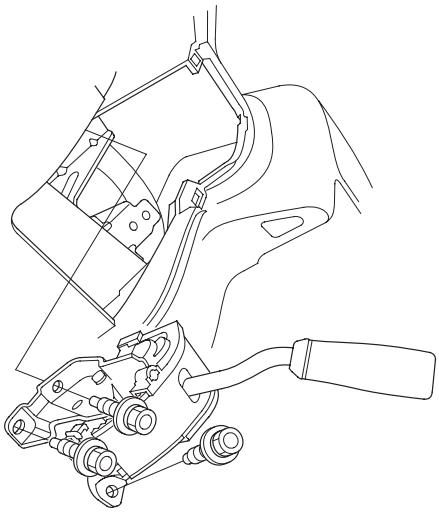


RHD Model:



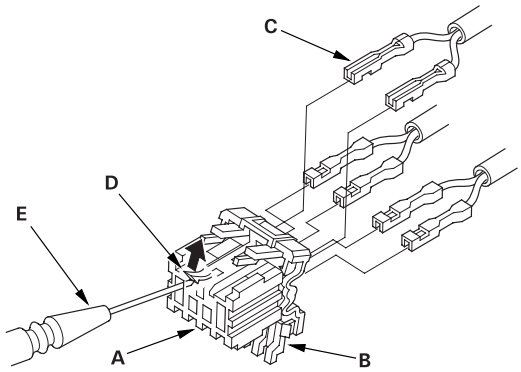
10. Remove the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



11. Remove the harness from the harness clamp on the shift lever bracket base, and remove the harness band from the harness.

12. Pry the lock tabs on the back of the O/D switch/shift lock solenoid/park pin switch connector (A), and remove the back cover (B).



13. Remove the terminal (C) from the connector by pushing the lock tab (D) up in the connector using a thin blade screwdriver (E). Remove all six terminals.

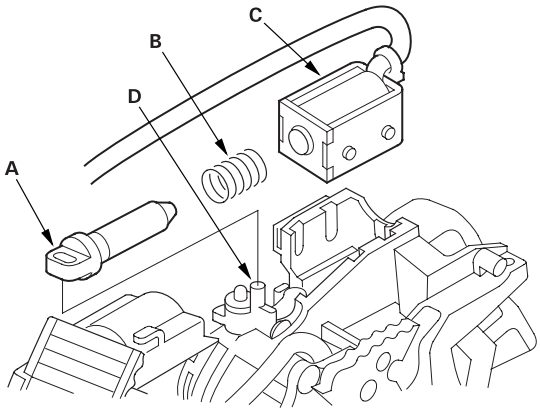
(cont'd)

Shift Lock Solenoid Test/Replacement (cont'd)

14. Remove the shift lever cover.

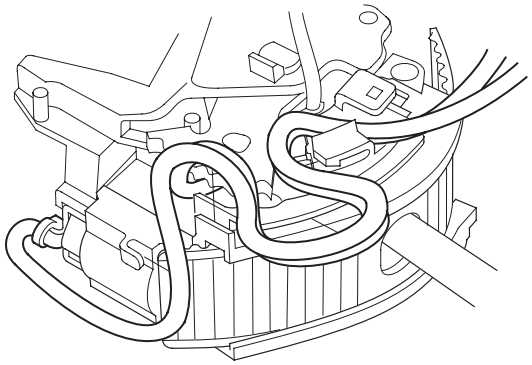
15. Remove the shift lock solenoid.

16. Install the shift lock solenoid plunger (A) and plunger spring (B) in the new shift lock solenoid (C).

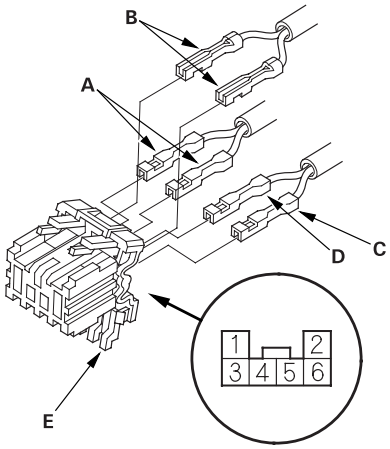


17. Install the shift lock solenoid by aligning the joint of the shift lock solenoid plunger with the tip of the shift lock stop (D).

18. Route the harnesses, and clamp them as shown.



19. Install the O/D switch harness terminals (A) in the No. 5 and No. 6 cavities. Both of O/D switch harness terminals can be installed in No. 5 and No. 6 cavities.

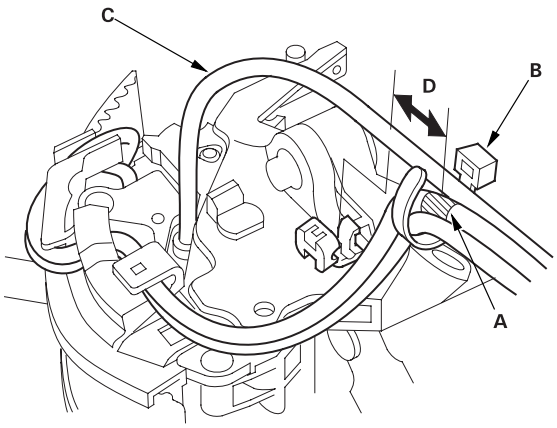


Wire side of female terminals

20. Install the park pin switch harness terminals (B) in the No. 1 and No. 2 cavities. Both of park pin switch harness terminals can be installed in No. 1 and No. 2 cavities.

21. Install BLU harness terminal (C) of the shift lock solenoid in the No. 3 cavity, and RED harness terminal (D) in the No. 4 cavity. Make sure that the all six terminals lock securely, then install the back cover (E) locked securely in place.

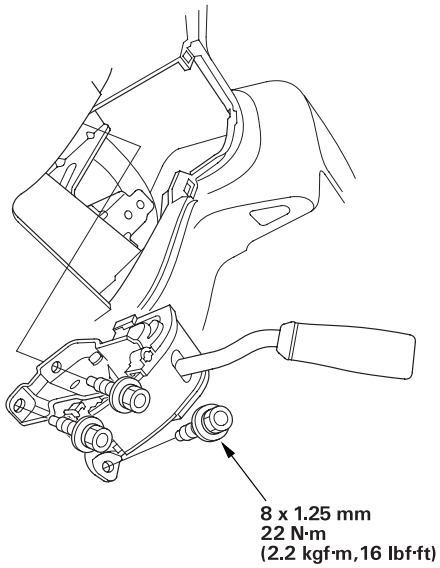
22. Align the marks (A) on the harnesses, and tie the harness band (B) over the marks. Clamp the O/D switch harness (C) at 15 mm (0.6 in.) (D) from the harness band.



23. Install the shift lever cover.

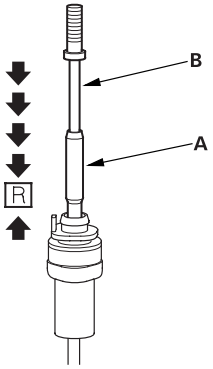
24. Install the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



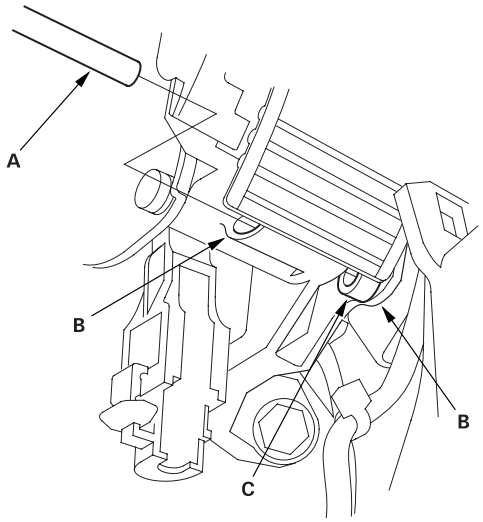
25. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.

26. If necessary, push the shift cable until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).



27. Turn the ignition switch OFF.

28. Insert a 6.0 mm (0.24 in.) pin (A) into the positioning holes (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

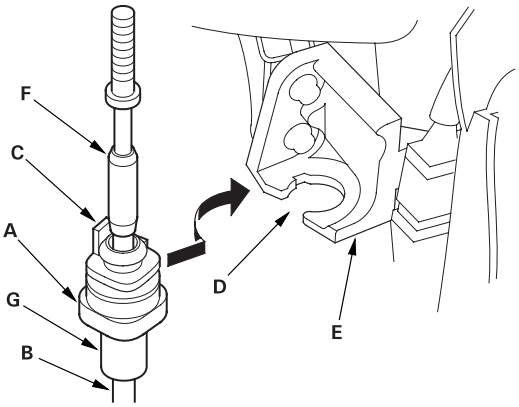


(cont'd)

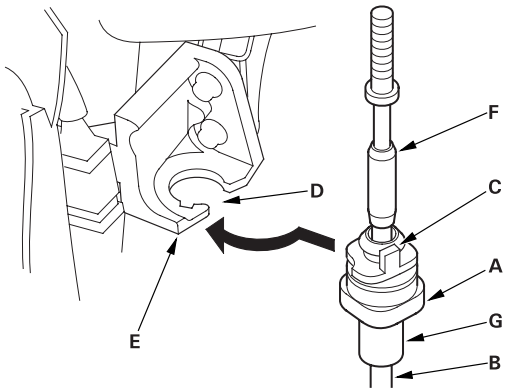
Shift Lock Solenoid Test/Replacement (cont'd)

29. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening in the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

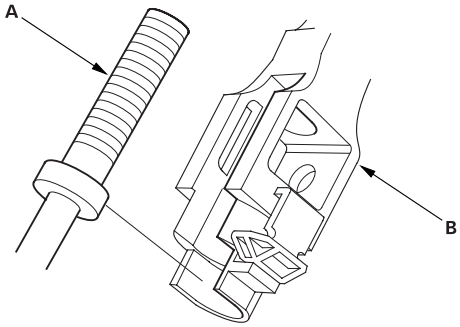
LHD Model:



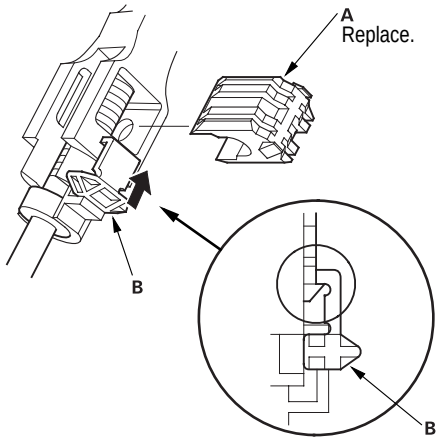
RHD Model:



30. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



31. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up until it stops to lock the joint.



32. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.

33. Connect the O/D switch/shift lock solenoid/park pin switch connector.

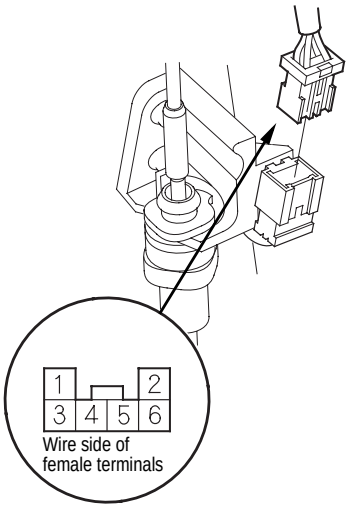
34. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.

35. Check that the shift lock solenoid operates.

36. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboard lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

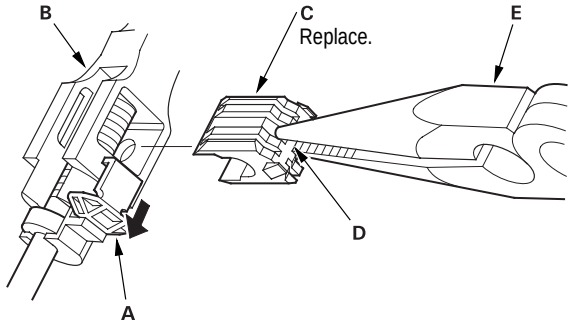
Park Pin Switch Test/Replacement

1. Remove the ash tray, front console box, heater control panel (see page 20-91), driver's dashboard lower cover (see page 20-88), and dashboard gauge assembly cover (see page 20-87).
2. Disconnect the O/D switch/shift lock solenoid/park pin switch connector.
   NOTE: The illustration shows LHD model; RHD is symmetrical.



O/D SWITCH/SHIFT LOCK SOLENOID/
PARK PIN SWITCH CONNECTOR

3. Check for continuity between the No. 1 and No. 2 terminals of the O/D switch/shift lock solenoid/park pin switch connector while the shift lever is in [P] position, and when shift lever out of [P]. If the park pin switch is OK, connect the connector and install the removed parts.
   If the park pin switch is faulty, go to step 4 for replacement.
4. Shift the shift lever to [R] position.
5. Slide the lock tab (A) down on the shift cable end holder (B).



6. Remove the shift cable lock (C) with holding at the middle (D) of it using needle-nose pliers (E) from the shift cable end and shift cabel end holder.
   NOTE: Do not pry the shift cable lock with a screwdriver, it may damage the shift cable end holder.
7. Separate the shift cable end from the shift cable end holder.

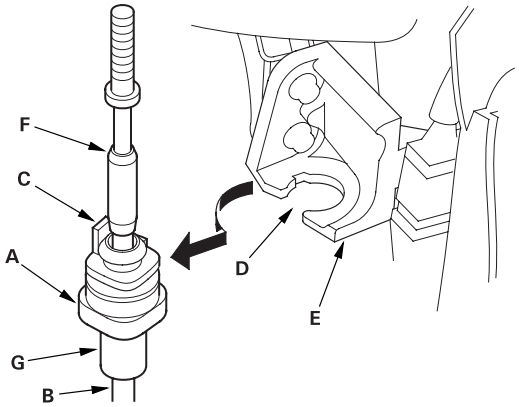
(cont'd)

Park Pin Switch Test/Replacement (cont'd)

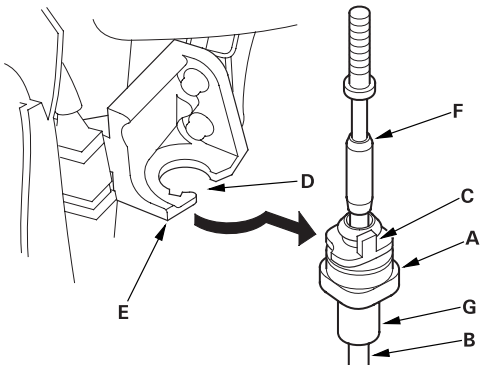
8. Rotate the socket holder (A) on the shift cable (B) a quarter turn; the tab (C) on the socket holder will be in the opening (D) of the socket holder bracket (E). Then slide the holder to remove the shift cable from the socket holder bracket.

NOTE: Do not remove the shift cable by twisting the shift cable guide (F) and damper (G).

LHD Model:

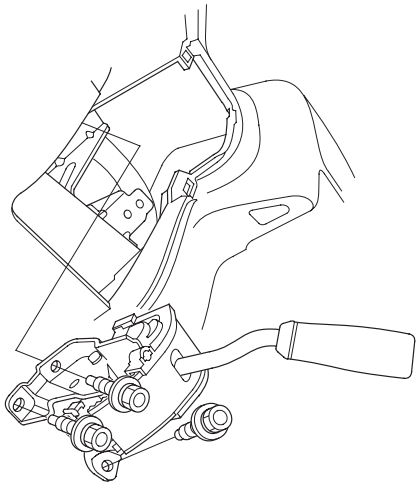


RHD Model:



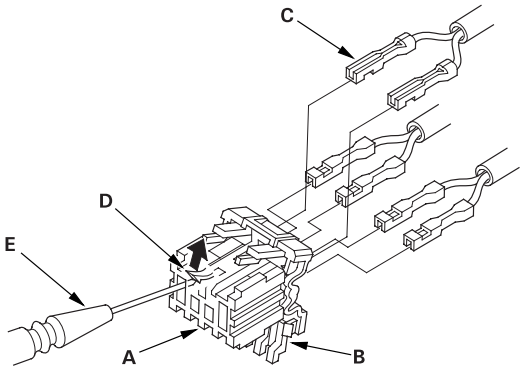
9. Remove the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



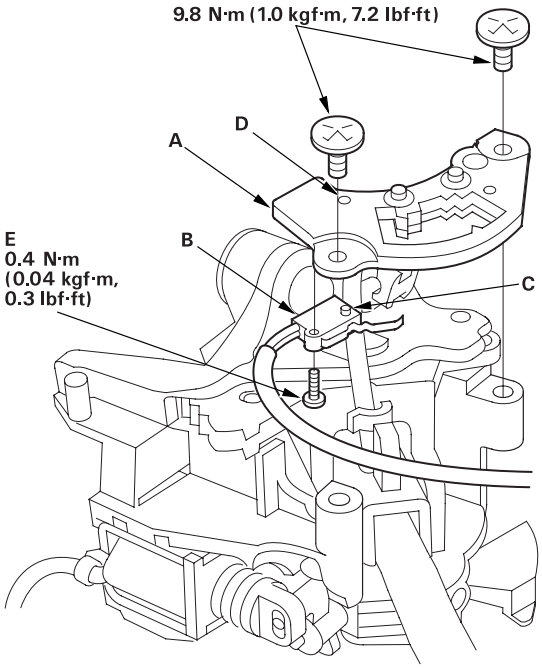
10. Remove the harness from the harness clamp on the shift lever bracket base, and remove the harness band from the harness.

11. Pry the lock tabs on the back of the O/D switch/shift lock solenoid/park pin switch connector (A), and remove the back cover (B).

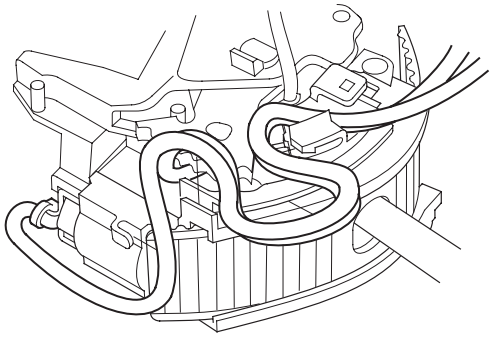


12. Remove the terminal (C) from the connetor by pushing the lock tab (D) up in the connector using a thin blade screwdriver (E). Remove all six terminals.

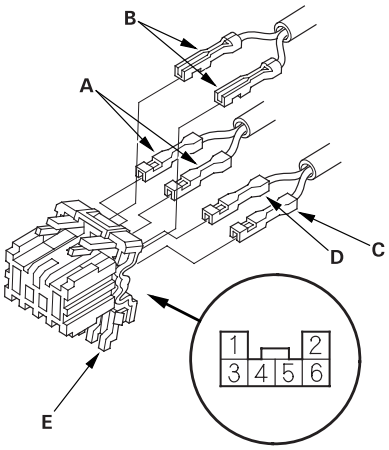
13. Remove the shift lever cover.
14. Remove the control checker (A) from the shift lever, and remove the park pin switch from the control checker.



15. Install the new park pin switch (B) by aligning its tab (C) with the positioning hole (D) on the control checker. Apply non-hardening thread lock sealant to the screw (E), then secure the park pin switch with the screw.
16. Install the control checker on the shift lever.
17. Route the harnesses, and clamp them as shown.



18. Install the O/D switch harness terminals (A) in the No. 5 and No. 6 cavities. Both of O/D switch harness terminals can be installed in No. 5 and No. 6 cavities.



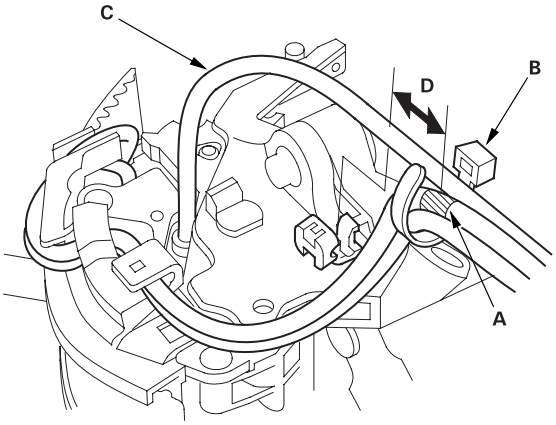
Wire side of female terminals

19. Install the park pin switch harness terminals (B) in the No. 1 and No. 2 cavities. Both of park pin switch harness terminals can be installed in No. 1 and No. 2 cavities.
20. Install BLU harness terminal (C) of the shift lock solenoid in the No. 3 cavity, and RED harness terminal (D) in the No. 4 cavity. Make sure that the all six terminals lock securely, then install the back cover (E) locked securely in place.

(cont'd)

Park Pin Switch Test/Replacement (cont'd)

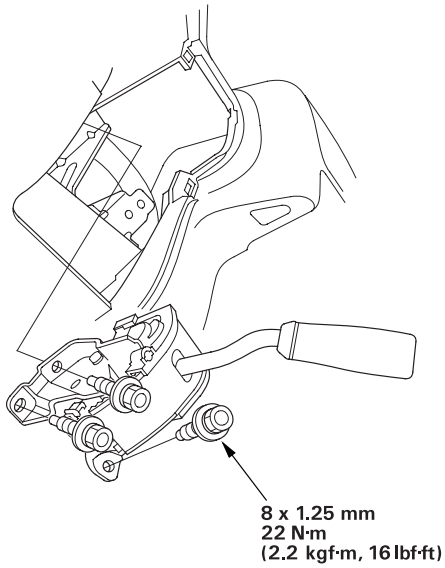
21. Align the marks (A) on the harnesses, and tie the harness band (B) over the marks. Clamp the O/D switch harness (C) at 15 mm (0.6 in.) (D) from the harness band.



22. Install the shift lever cover.

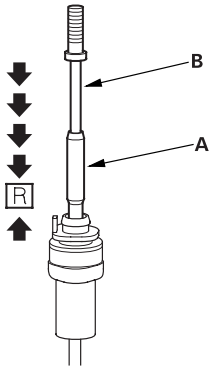
23. Install the shift lever assembly.

NOTE: The illustration shows LHD model; RHD is symmetrical.



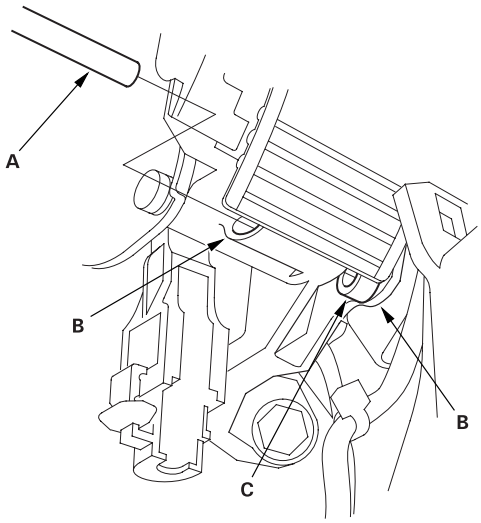
24. Turn the ignition switch ON (II), and verify that the [R] position indicator comes on.

25. If necessary, push the shift cable until it stops, then release it. Pull the shift cable back one step so that the shift cable is in [R]. Do not hold the shift cable guide (A) to adjust the shift cable (B).



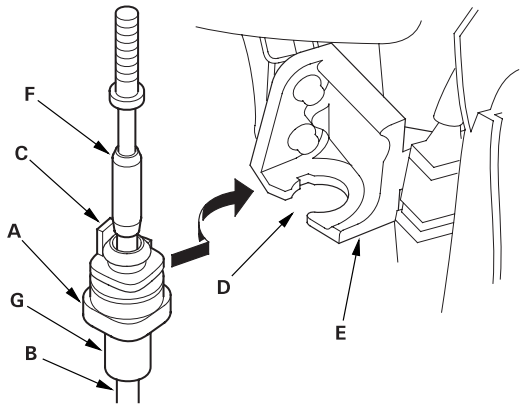
26. Turn the ignition switch OFF.

27. Insert a 6.0 mm (0.24 in.) pin (A) into the positioning holes (B) on the shift lever bracket base through the positioning hole (C) on the shift lever. The shift lever is secured in [R] position.

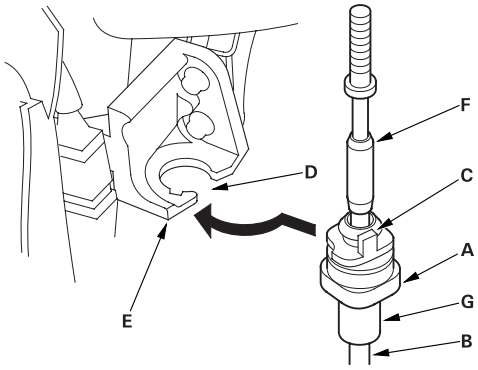


28. Rotate the socket holder (A) on the shift cable (B) to face the tab (C) on the holder opposite to the opening (D) in the socket holder bracket (E). Align the holder with the opening in the bracket, then slide the holder into the bracket. Rotate the holder a quarter turn to secure the shift cable. Do not install the shift cable by twisting the shift cable guide (F) and damper (G).

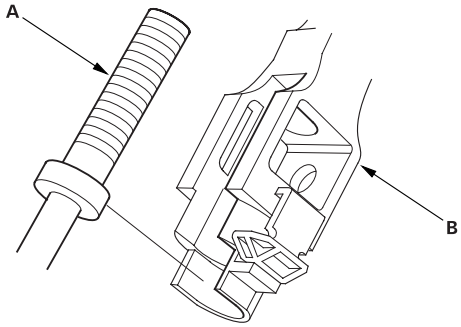
LHD Model:



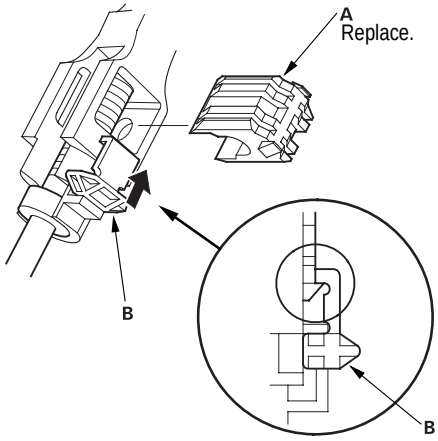
RHD Model:



29. Install the shift cable end (A) in the shift cable end holder (B). Keep the shift cable end and end holder free of grease.



30. Install the new shift cable lock (A) to secure the shift cable end and shift cable end holder, then push the lock tab (B) up until it stops to lock the joint.



31. Remove the 6.0 mm (0.24 in.) pin that was installed to hold the shift lever.

32. Connect the O/D switch/shift lock solenoid/park pin switch connector.

33. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.

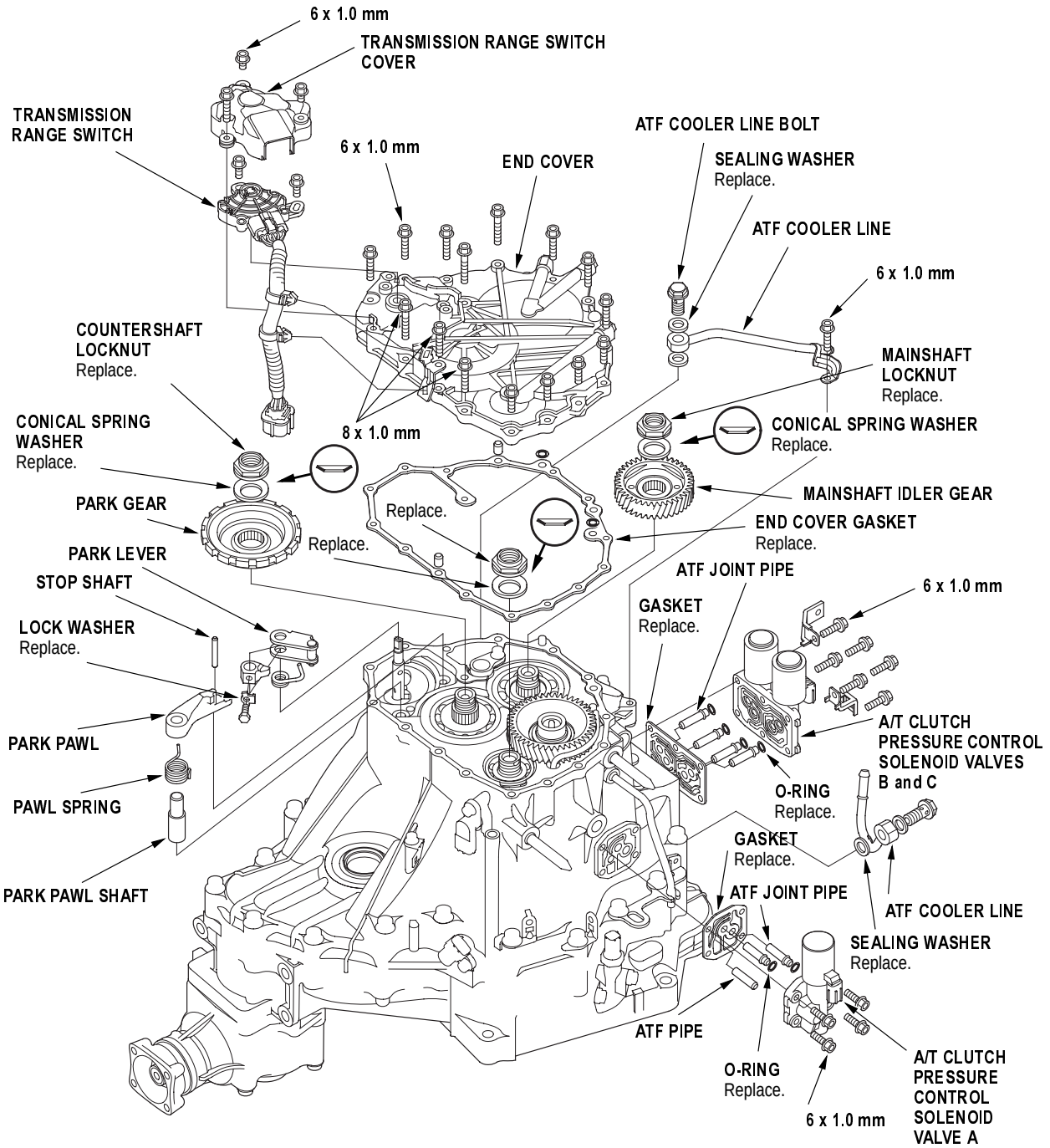
34. Check that the park pin switch operates.

35. Install the dashboard gauge assembly cover (see page 20-87), driver's dashboard lower cover (see page 20-88), heater control panel (see page 20-91), front console box, and ash tray.

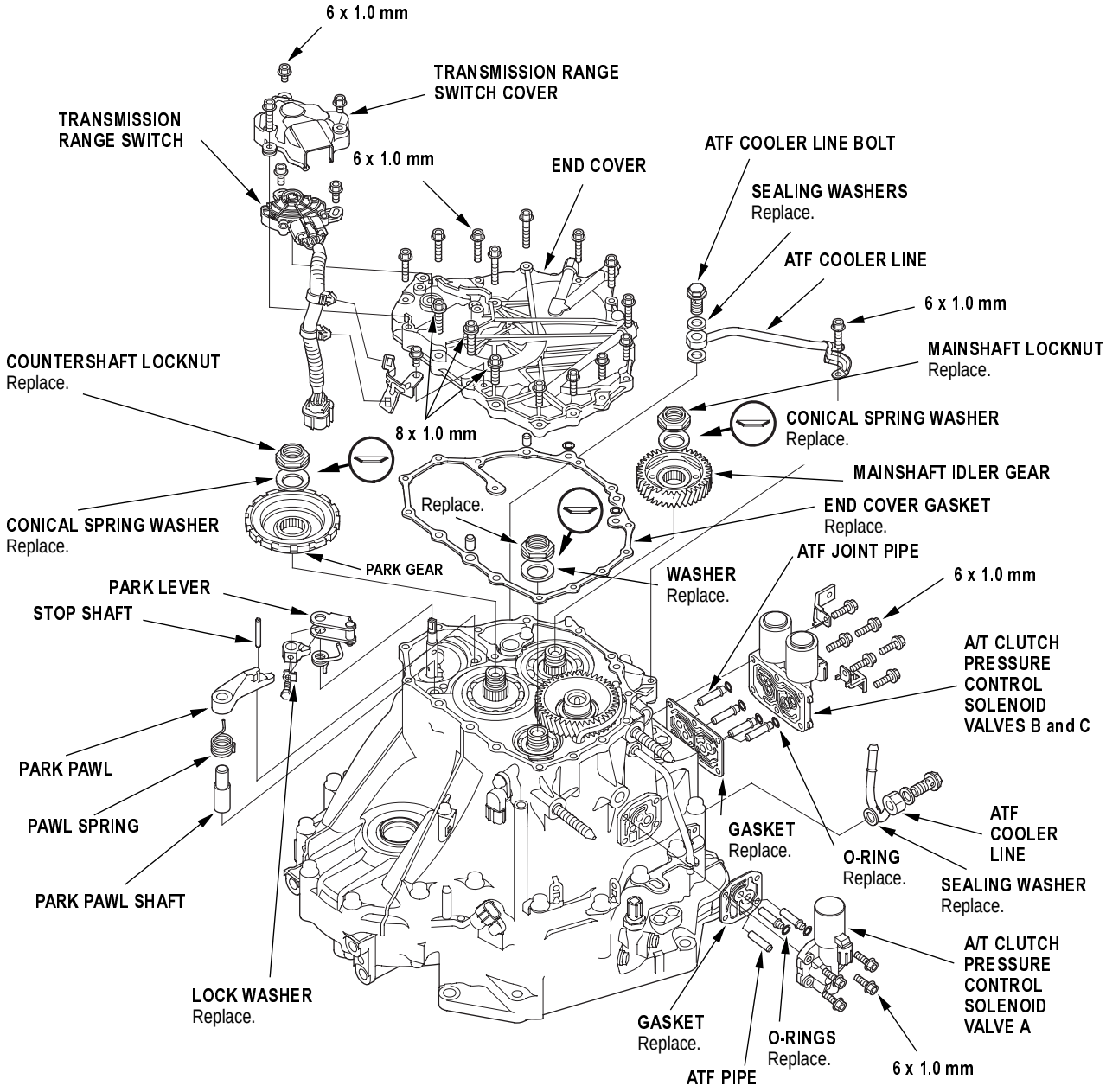
Transmission End Cover

End Cover Removal

Exploded View -4WD



Exploded View -2WD



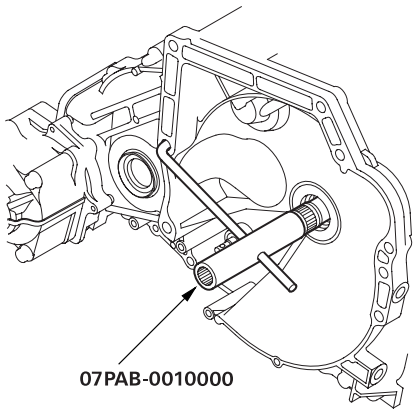
(cont'd)

End Cover Removal (cont'd)

Special Tools Required
Mainshaft holder set 07PAB-0010000

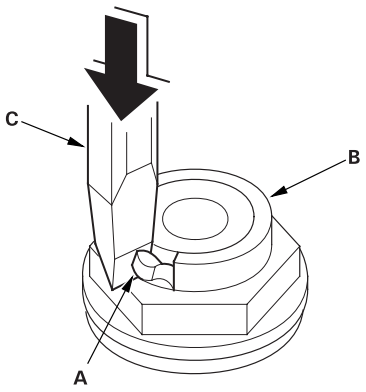
NOTE: Refer to the Exploded View as needed during the following procedure.

1. Remove the ATF cooler lines.
2. Remove the A/T clutch pressure control solenoid valve A, then remove the ATF pipe, ATF joint pipes, and gasket.
3. Remove the A/T clutch pressure control solenoid valves B and C, then remove the ATF joint pipes and gasket.
4. Remove the transmission range switch cover.
5. Remove the transmission range switch harness clamps from the clamp brackets, then remove the transmission range switch.
6. Remove the end cover.
7. Slip the special tool onto the mainshaft.



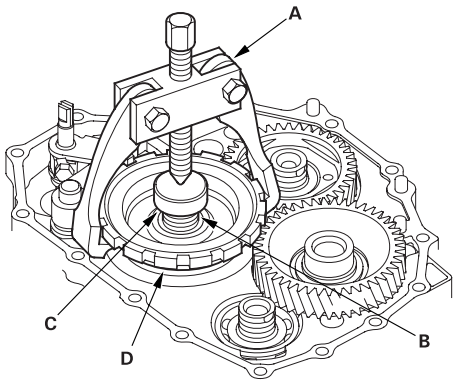
8. Engage the park pawl with the park gear.
9. Cut the lock tab (A) of the each shaft locknut (B) using a chisel (C). Then remove the locknuts and conical spring washers from each shaft.

   NOTE:
   - Countershaft and secondary shaft locknuts have left-hand threads.
   - Keep all of the chiseled particles out of the transmission.
   - Clean the old mainshaft and countershaft locknuts; they are used to install the press fit idler gear on the mainshaft, and park gear on the countershaft.

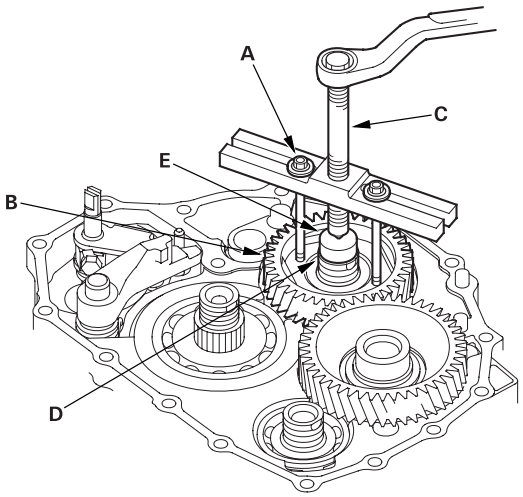


10. Remove the special tool from the mainshaft.

11. Set a two-jaw (or three-jaw) puller (A) on the countershaft (B) with putting a collar (C) between the puller and countershaft, then remove the park gear (D).



12. Install 6 x 1.0 mm bolts (A) on the mainshaft idler gear (B). Set a puller (C) on the mainshaft (D) with putting a collar (E) between the puller and mainshaft, then remove the mainshaft idler gear.



13. Remove the park pawl, park pawl spring, park pawl shaft, and stop shaft.

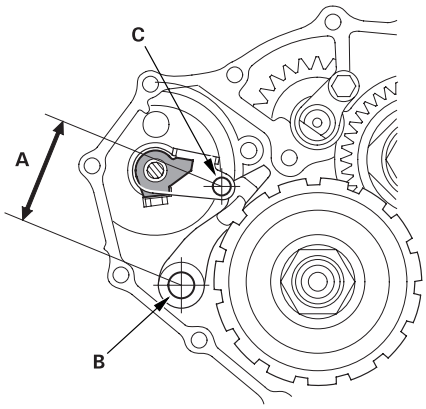
14. Remove the park lever from the control shaft.

Park Lever Stop Inspection and Adjustment

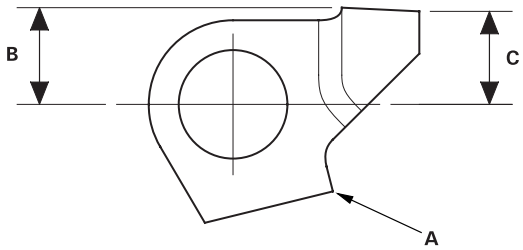
1. Set the park lever in the [P] position.

2. Measure the distance (A) between the park pawl shaft (B) and the park lever roller pin (C).

STANDARD: 57.7 - 58.7 mm (2.27 - 2.31 in.)



3. If the measurement is out of standard, select and install the appropriate park lever stop (A) from the table below.



PARK LEVER STOP

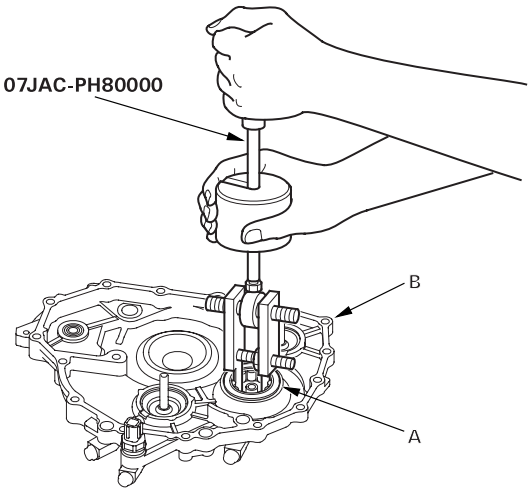
Mark	Part Number	B	C
1	24537-PA9-003	11.00 mm (0.433 in.)	11.00 mm (0.433 in.)
2	24538-PA9-003	10.80 mm (0.425 in.)	10.65 mm (0.419 in.)
2	24539-PA9-003	10.60 mm (0.417 in.)	10.30 mm (0.406 in.)

4. After replacing the park lever stop, make sure the distance is within tolerance.

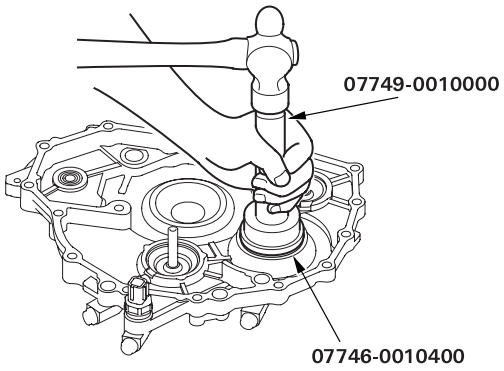
Idler Gear Shaft Bearing Replacement

Special Tools Required
- Adjustable bearing remover set 07JAC-PH80000
- Handle driver 07749-0010000
- Driver attachment, 52 x 55 mm 07746-0010400

1. Remove the idler gear shaft bearing (A) from the end cover (B) with the special tool.



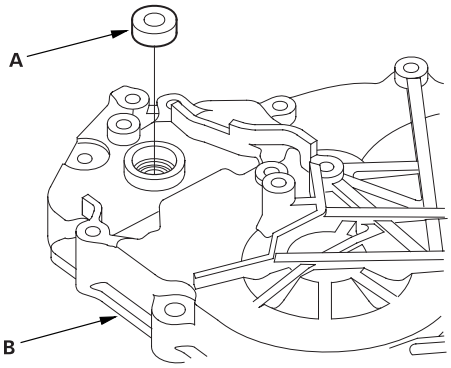
2. Install the new bearing in the end cover with the special tools.



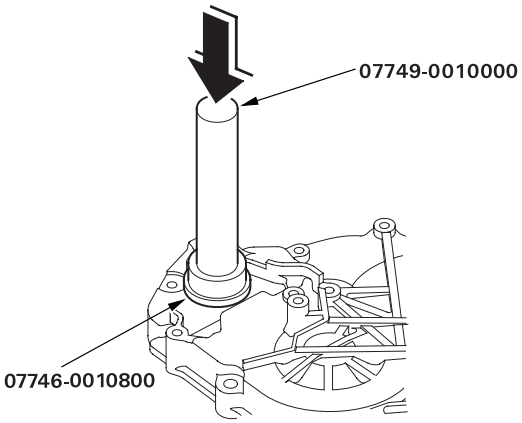
Control Shaft Oil Seal Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 22 x 24 mm 07746-0010800

1. Remove the oil seal (A) from the end cover (B).



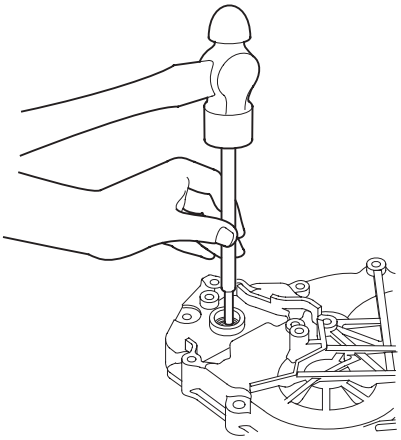
2. Install the new oil seal flush to the end cover with the special tools.



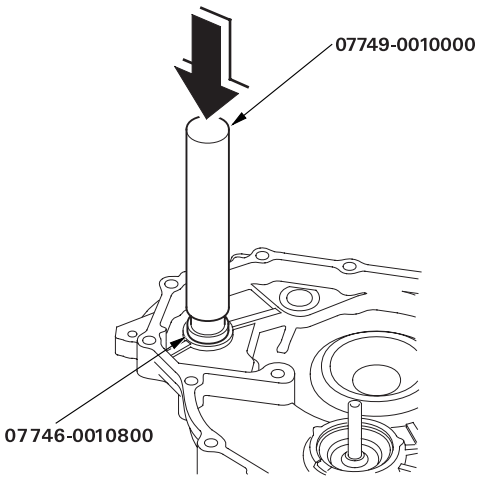
Control Shaft Bearing Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 22 x 24 mm 07746-0010800

1. Remove the oil seal from the end cover, then remove the bearing.



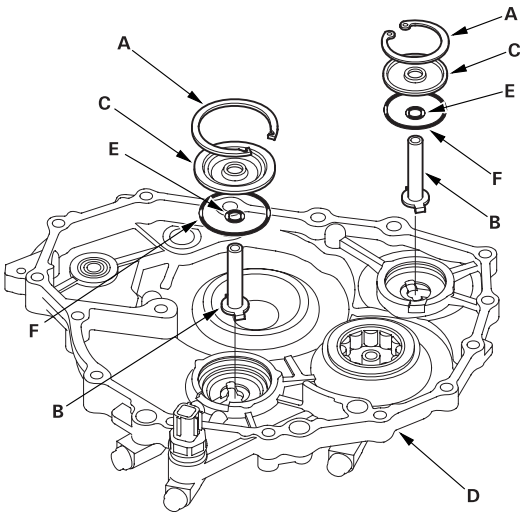
2. Install the new bearing flush to the end cover with the special tools.



3. Install the new oil seal (see page 14-196).

ATF Feed Pipes Replacement

1. Remove the snap rings (A), ATF feed pipes (B) and feed pipe flanges (C) from the end cover (D).

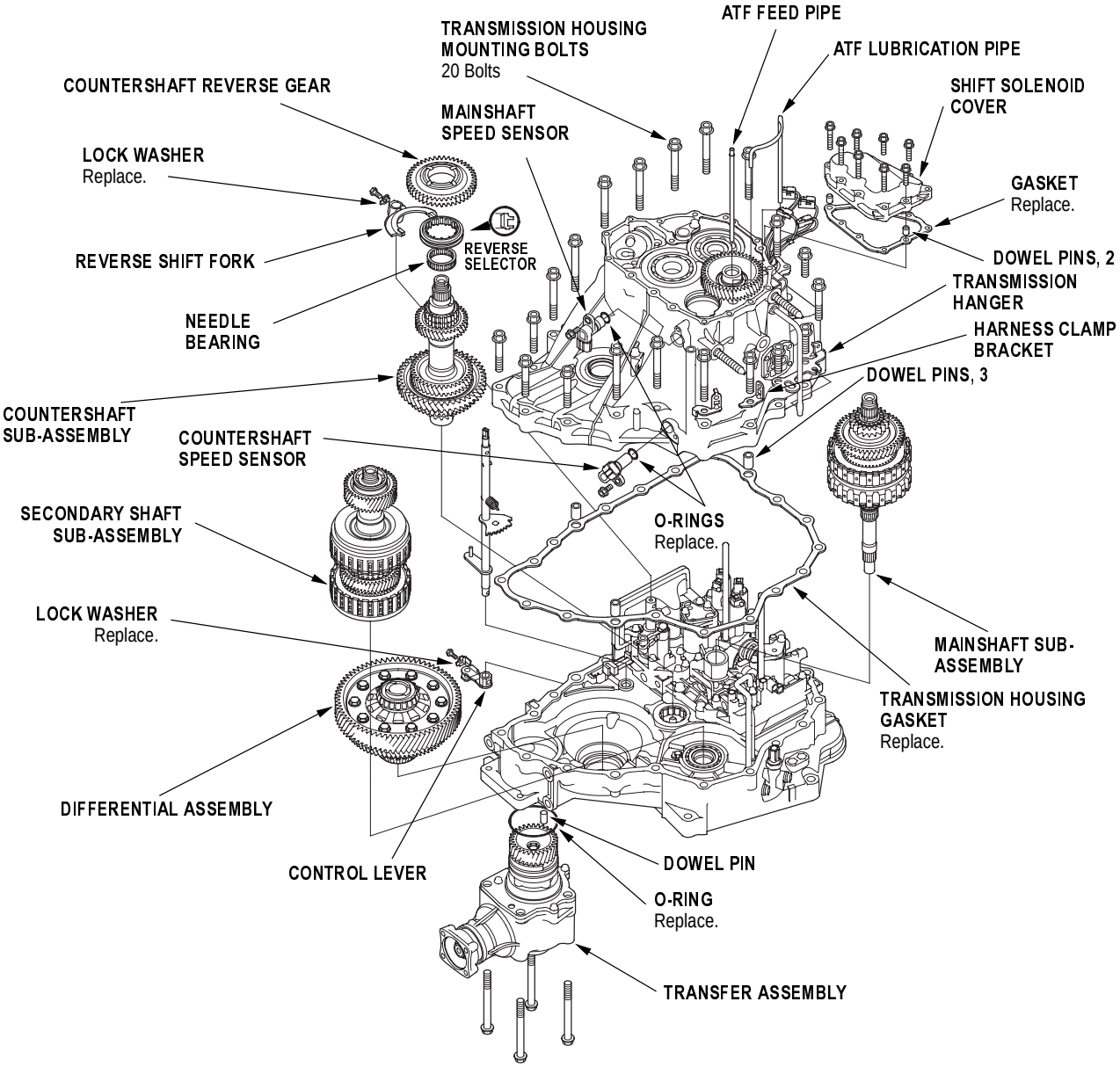


2. Install the new O-ring (E) over the ATF feed pipe.
3. Install the ATF feed pipe in the end cover with aligning the feed pipe tabs with the indentations in the end cover.
4. Install the new O-ring (F) in the end cover, then install the feed pipe flange over the ATF feed pipe and O-ring.
5. Secure the ATF feed pipe and feed pipe flange with the snap ring.

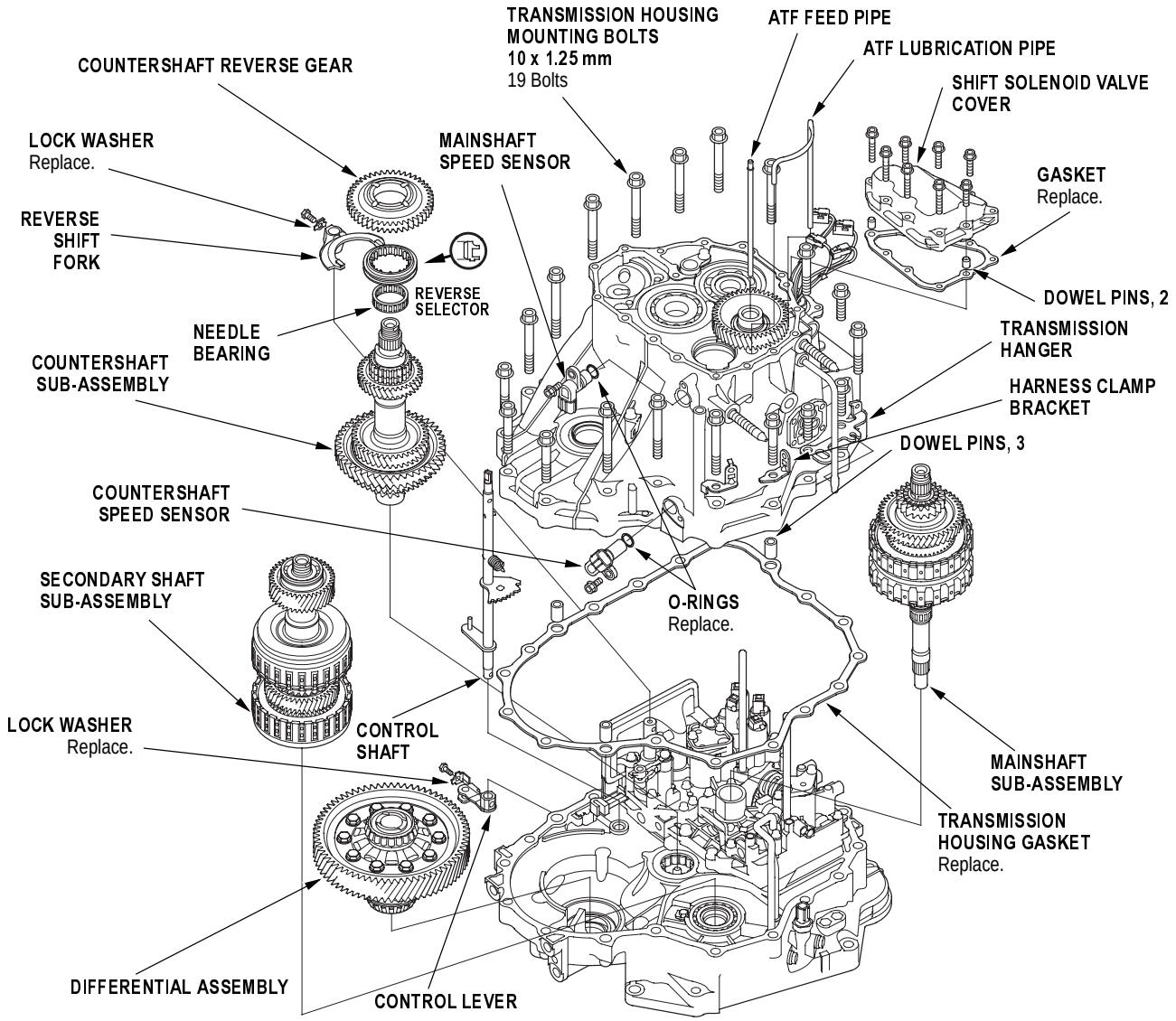
Transmission Housing

Housing and Shaft Assemblies Removal

Exploded View -4WD



Exploded View -2WD



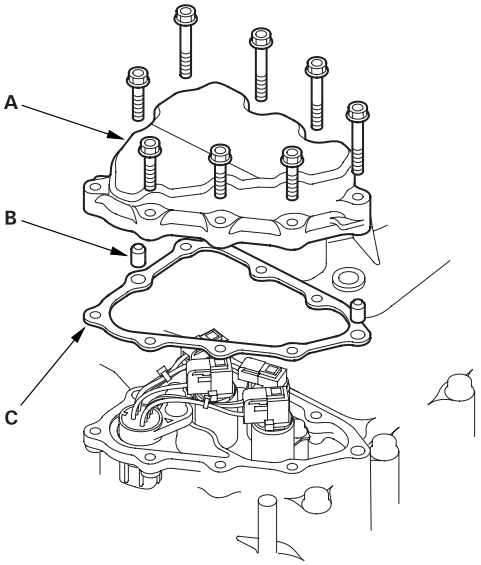
(cont'd)

Housing and Shaft Assemblies Removal (cont'd)

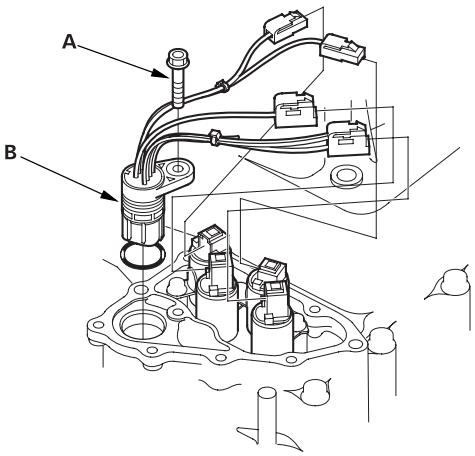
Special Tools Required
- Housing puller 07HAC-PK40102
- Snap ring pliers 07LGC-0010100

NOTE: Refer to the Exploded View as needed during the following procedure.

1. Remove the ATF feed pipe from the idler gear shaft, and the ATF lubrication pipe from the transmission housing.
2. Remove the shift solenoid valve cover (A), dowel pins (B), and gasket (C).

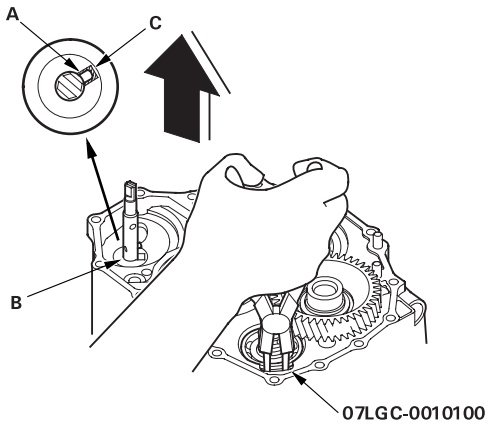


3. Remove the bolt (A) securing the solenoid harness connector (B), and remove the connector.



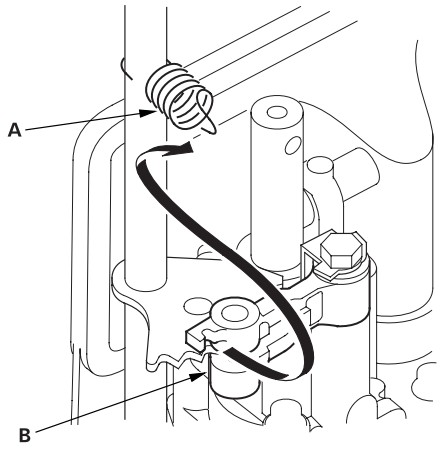
4. Disconnect the connectors from the shift solenoid valves.
5. Remove the mainshaft and countershaft speed sensors.
6. Remove the transmission housing mounting bolts, hanger, and harness clamp brackets.
7. Align the spring pin (A) on the control shaft (B) with the transmission housing groove (C) by turning the control shaft.

   NOTE: Do not squeeze the end of the control shaft tips together when turning the shaft. If the tips are squeezed together it will cause a faulty signal or position due to the play between the control shaft and the switch.

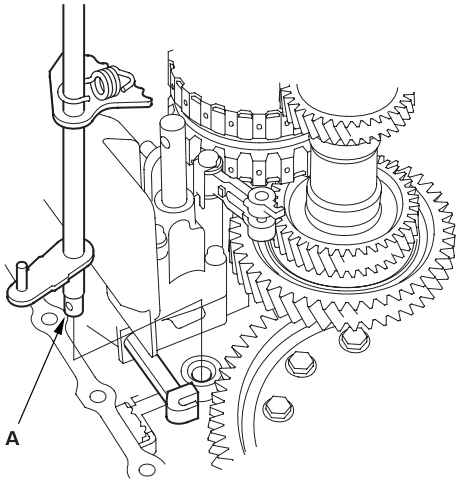


8. With expanding the snap ring of the secondary shaft bearing using the snap ring pliers, lift the transmission housing. Release the snap ring pliers, and remove the transmission housing.
9. Remove the countershaft reverse gear and needle bearing.
10. Remove the lock bolt securing the shift fork, then remove the shift fork with the reverse selector together.
11. Remove the control lever from the control shaft.

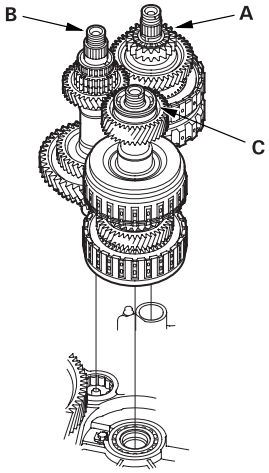
12. Unhook the detent spring (A) from the detent arm (B).



13. Remove the control shaft (A).



14. Remove the mainshaft sub-assembly (A), countershaft sub-assembly (B), and secondary shaft sub-assembly (C) together.



15. Remove the differential assembly.

16. Remove the transfer assembly for 4WD model.

Bearing Removal

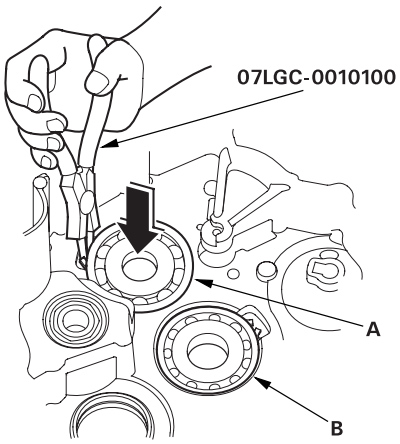
Special Tools Required
- Snap ring pliers 07LGC-0010100
- Driver attachment, 78 x 90 mm 07GAD-SD40101
- Handle driver 07749-0010000
- Driver attachment, 42 x 47 mm 07746-0010300

1. Remove the idler gear shaft when removing the mainshaft bearing and idler gear shaft bearing.

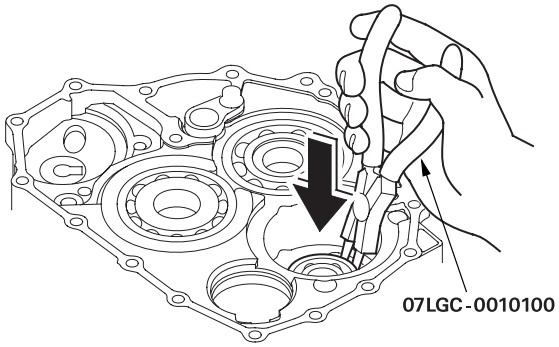
NOTE: If you are only removing the countershaft bearing, idler gear shaft removal is not needed.

2. To remove the mainshaft bearing (A) and countershaft bearing (B) from the transmission housing, expand each snap ring with the snap ring pliers, then push the bearing out.

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



3. Expand the snap ring of the idler gear shaft bearing with the snap ring pliers, then push the bearing out.

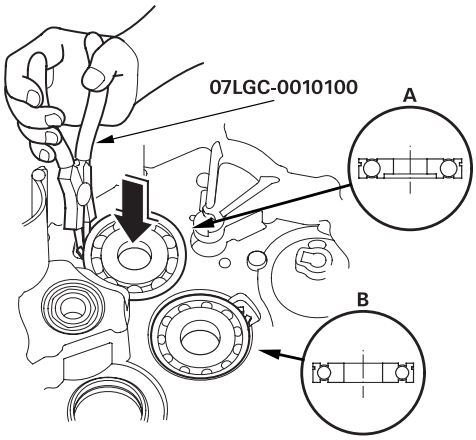


Bearing Installation

Special Tools Required
- Snap ring pliers 07LGC-0010100
- Driver attachment, 78 x 90 mm 07GAD-SD40101
- Handle driver 07749-0010000
- Driver attachment, 42 x 47 mm 07746-0010300

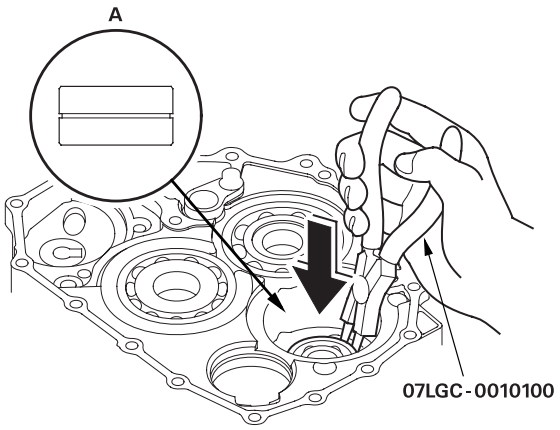
1. Install the bearings in the direction shown.

2. Expand each snap ring with the snap ring pliers, and install the mainshaft bearing (A) and countershaft bearing (B) part-way into the housing.



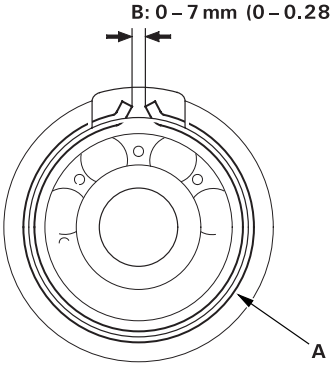
3. Release the pliers, then push the bearing down into the housing until the snap ring snaps in place around it.

4. Expand the snap ring of the idler gear shaft (A) with the snap ring pliers, and install the bearing part-way into the housing.



5. Release the pliers, then push the bearing down into the housing until the snap ring snaps in place around it.

6. After installing the bearings verify that the snap rings (A) are seated in the bearing and housing grooves, and that the ring end gaps (B) are correct.

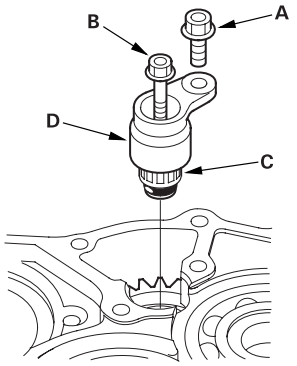


7. Install the idler shaft.

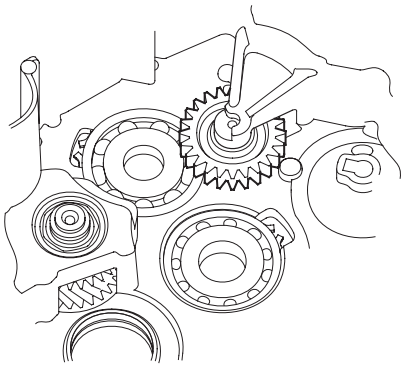
Reverse Idler Gear Removal and Installation

Removal

1. Remove the bolt (A) securing the reverse idler gear shaft holder.

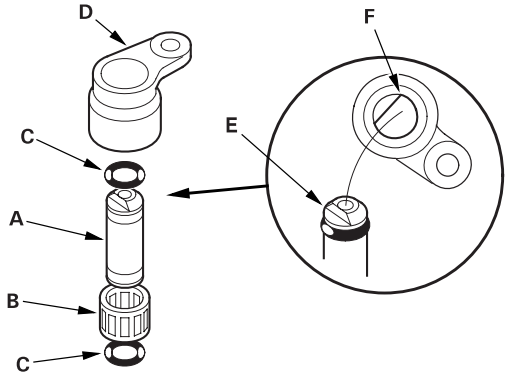


2. Install a 5 x 0.8 mm bolt (B) in the reverse idler gear shaft, and pull it to remove the reverse idler gear shaft (C) and gear shaft holder (D) together.
3. Remove the reverse idler gear.

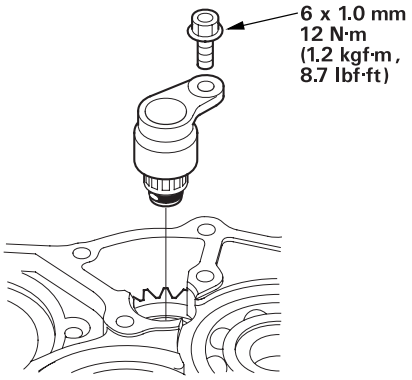


Installation

1. Install the reverse idler gear in the transmission housing.
2. Coat the reverse idler gear shaft (A), needle bearing (B), and new O-rings (C) with lithium grease lightly.



3. Assemble the new O-rings and needle bearing on the reverse idler gear shaft, then install the reverse idler gear shaft in the reverse idler gear shaft holder (D). Align the D-shaped cut out (E) of the shaft with the D-shaped area (F) of the holder.
4. Install the reverse idler gear shaft/holder assembly on the transmission housing.

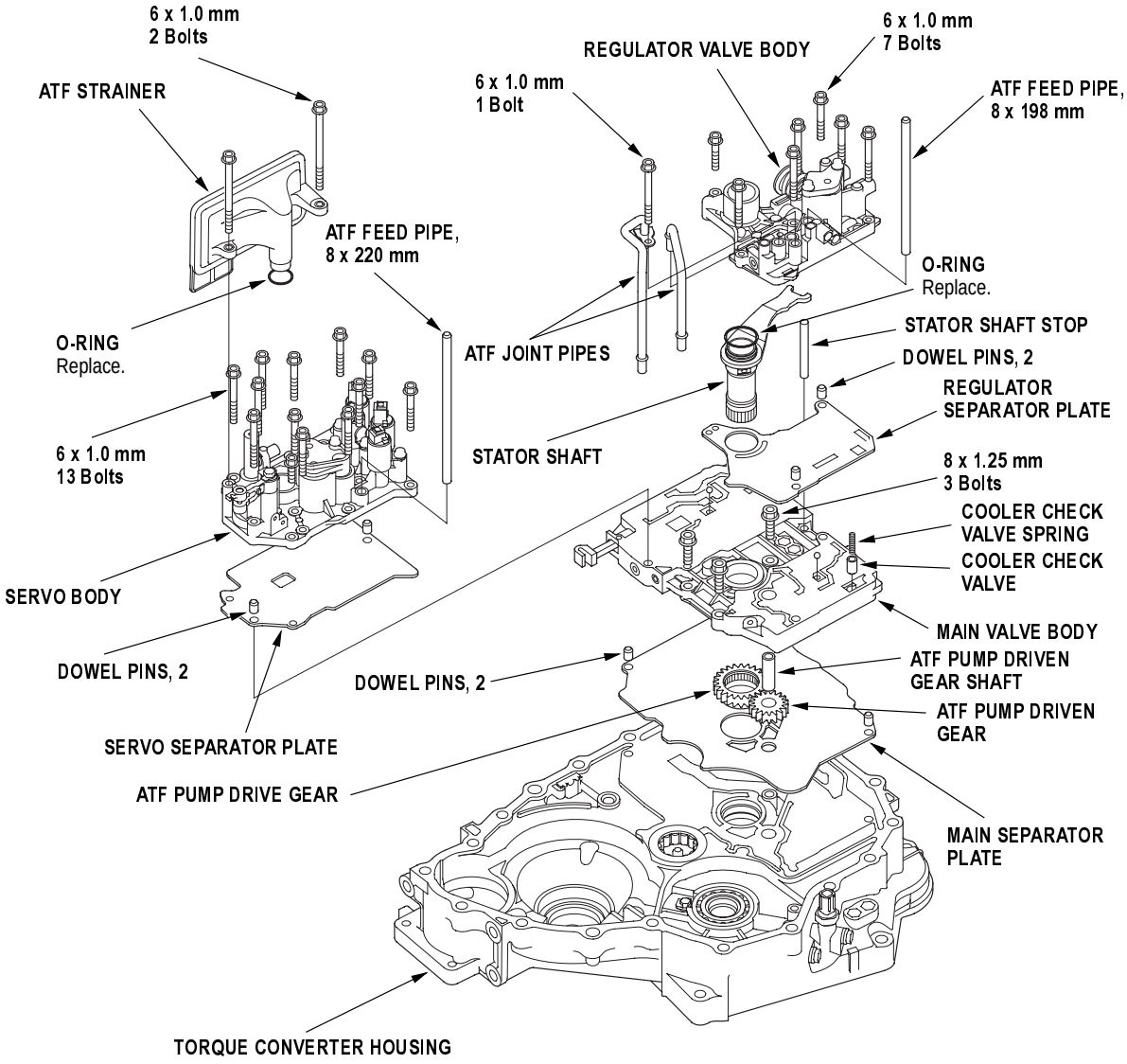


Valve Body

Valve Bodies and ATF Strainer Removal

Exploded View

NOTE: The illustration shows the 4WD transmission; the 2WD is similar.

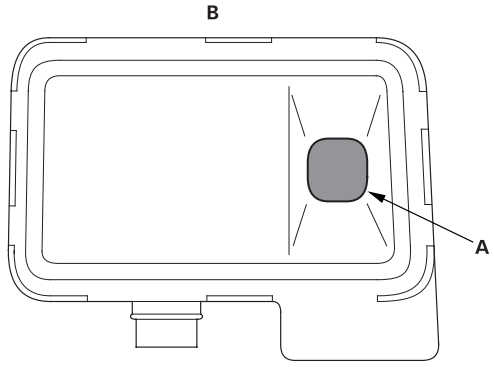


(cont'd)

Valve Bodies and ATF Strainer Removal (cont'd)

NOTE: Refer to the Exploded View as needed during the following procedure.

1. Remove the ATF feed pipes from the regulator valve body, and servo body.
2. Remove the ATF strainer (two bolts).
3. Remove the servo body (13 bolts), then remove the separator plate and dowel pins (two).
4. Remove the ATF joint pipes (one bolt) from the regulator valve body.
5. Remove the regulator valve body (seven bolts).
6. Remove the stator shaft and stator shaft stop.
7. Remove the regulator separator plate and dowel pins (two).
8. Remove the cooler check valve spring and valve from the main valve body, then remove the main valve body (three bolts). Do not let the check balls fall out.
9. Remove the ATF pump driven gear shaft, then remove the ATF pump gears.
10. Remove the main separator plate and dowel pins (two).
11. Clean the inlet opening (A) of the ATF strainer (B) thoroughly with compressed air, then check that it is in good condition and that the inlet opening is not clogged.



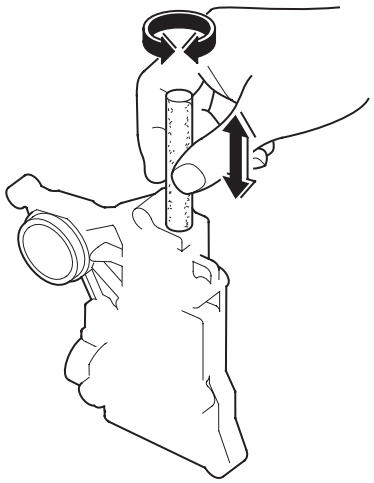
12. Test the ATF strainer by pouring clean ATF through the inlet opening, and replace it if it is clogged or damaged.

Valve Body Repair

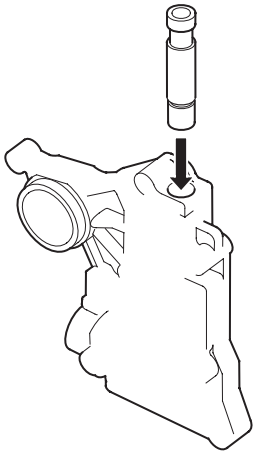
NOTE: This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. Use this procedure to free the valves.

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. 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 #600 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.

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



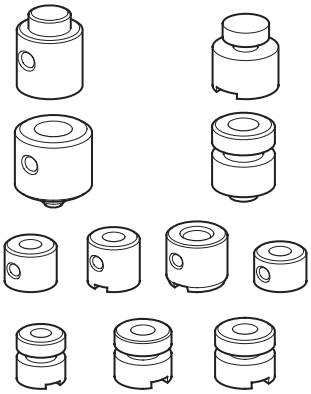
5. Remove the #600 paper. Thoroughly wash the entire valve body in solvent, then dry it with compressed air.
6. Coat the valve with ATF, then drop it into its bore. It should drop to the bottom of the bore under its own weight. If not, repeat step 4, then retest. If the valve still sticks, replace the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



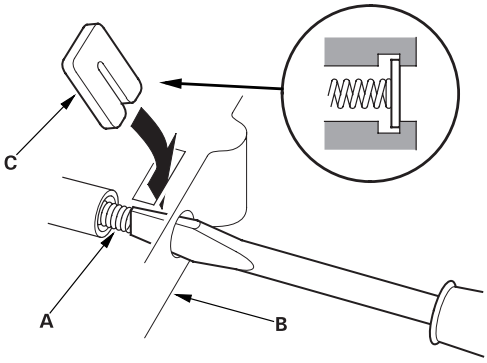
7. Remove the valve, and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.

Valve Body Valve Installation

1. Coat all parts with ATF before assembly.
2. Install the valves and springs in the sequence shown for the main valve body (see page 14-209), regulator valve body (see page 14-211), and servo body (see page 14-212). Refer to the following valve cap illustrations, and install each valve cap so the end shown facing up will be facing the outside of the valve body.

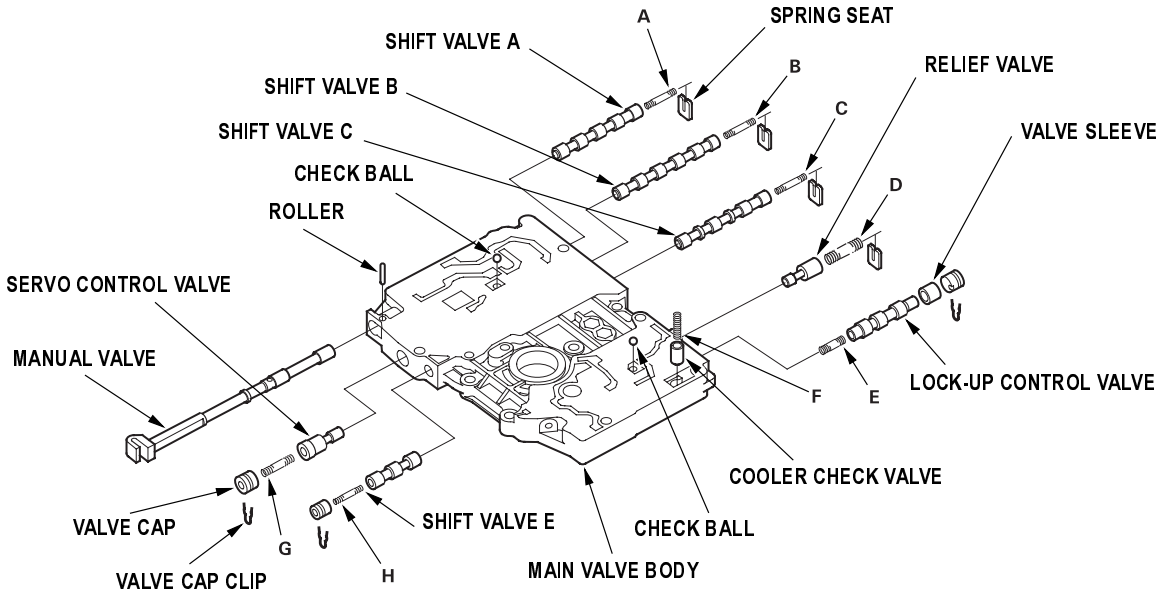


3. Install all the springs and seats. Insert the spring (A) in the valve, then install the valve in the valve body (B). Push the spring in with a screwdriver, then install the spring seat (C).



Main Valve Body Disassembly, Inspection, and Reassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air. Blow out all passages.
2. Do not use a magnet to remove the check balls, it may magnetize the balls.
3. Inspect the valbe body for scoring and damage.
4. Check all valves for free movement. If any fail to slide freely, refer to Valve Body Repair (see page 14-207).
5. Coat all parts with ATF during assembly.

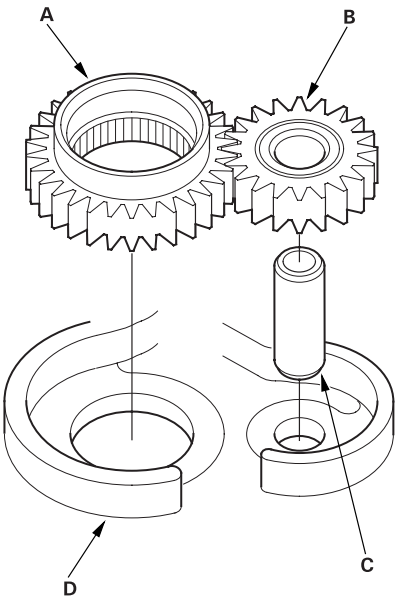


SPRING SPECIFICATIONS

Springs		Standard (New)-Unit: mm (in.)			
		Wire Diameter	O.D.	Free Length	No. of Coils
A	Shift valve A spring	0.8 (0.031)	5.6 (0.220)	28.1 (1.106)	15.9
B	Shift valve B spring	0.8 (0.031)	5.6 (0.220)	28.1 (1.106)	15.9
C	Shift valve C spring	0.8 (0.031)	5.6 (0.220)	28.1 (1.106)	15.9
D	Relief valve spring	1.0 (0.039)	9.6 (0.378)	34.1 (1.343)	10.2
E	Lock-up control valve spring	0.65 (0.026)	7.1 (0.280)	23.1 (0.909)	12.7
F	Cooler check valve spring	0.9 (0.035)	6.6 (0.260)	26.5 (1.043)	12.6
G	Servo control valve spring	0.7 (0.028)	6.6 (0.260)	35.7 (1.406)	17.2
H	Shift valve E spring	0.8 (0.031)	5.6 (0.220)	28.1 (1.106)	15.9

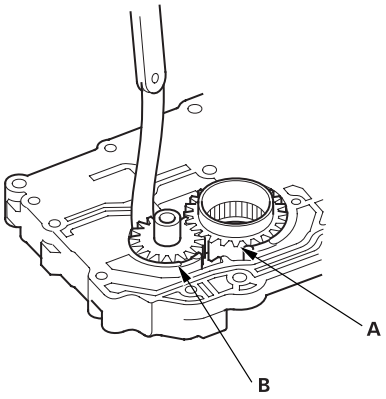
ATF Pump Inspection

1. Install the ATF pump drive gear (A), driven gear (B) and ATF pump driven gear shaft (C) in the main valve body (D). Lubricate all parts with ATF, and install the ATF pump driven gear with its grooved and chamfered side facing up.



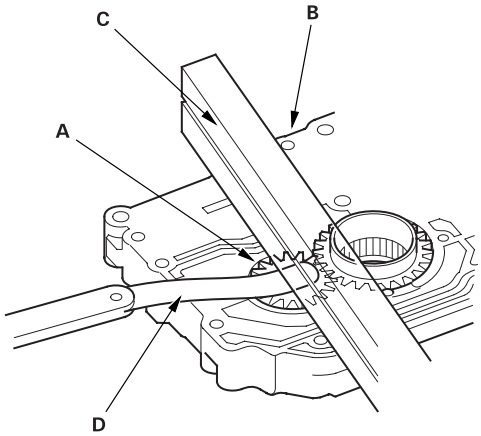
2. Measure the side clearance of the ATF pump drive gear (A) and driven gear (B).

ATF Pump Gears Side (Radial) Clearance:
Standard (New):
ATF Pump Drive Gear
0.210 - 0.265 mm (0.0083 - 0.0104 in.)
ATF Pump Driven Gear
0.070 - 0.125 mm (0.0028 - 0.0049 in.)



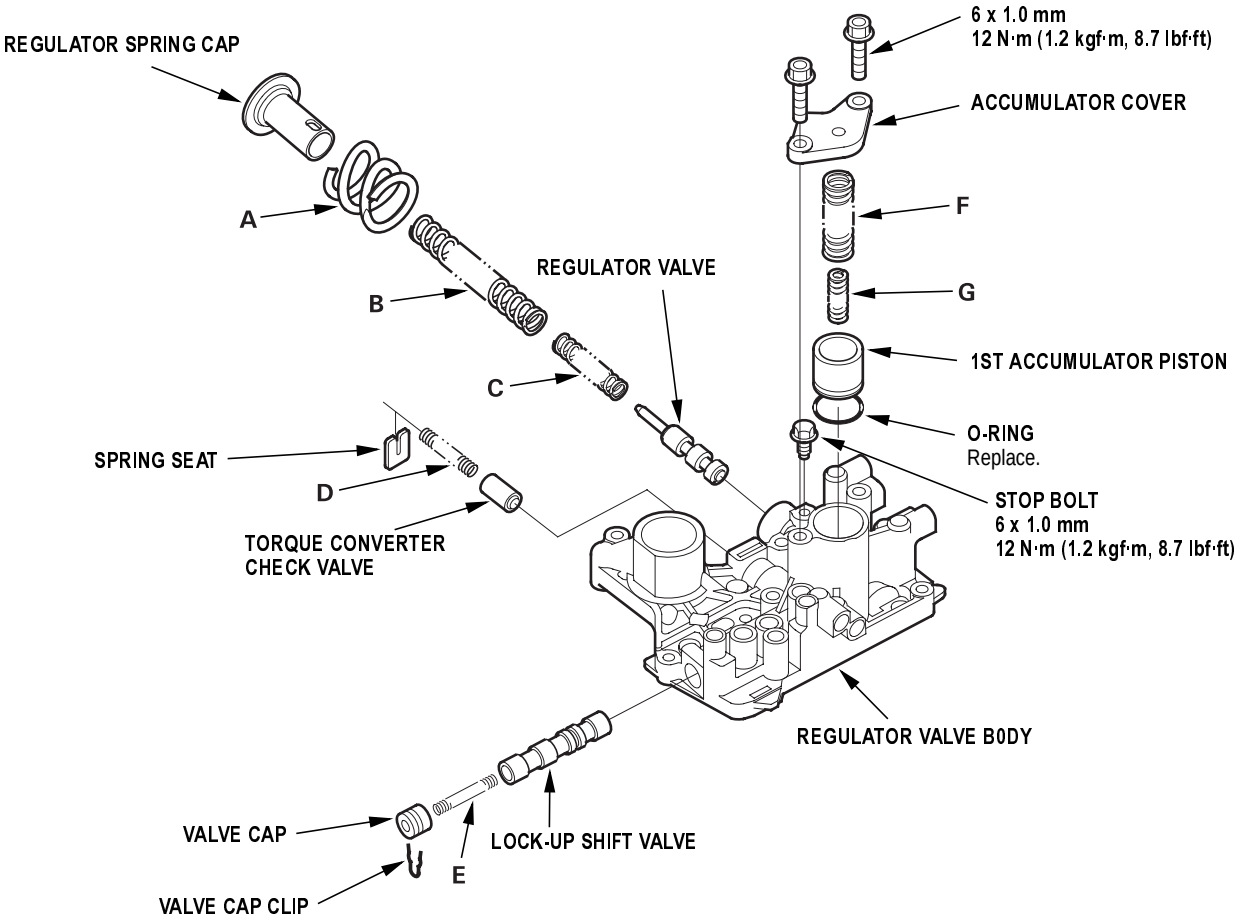
3. Remove the ATF pump driven gear shaft. Measure the thrust clearance between the ATF pump driven gear (A) and the valve body (B) with a straight edge (C) and a feeler gauge (D).

ATF Pump Drive/Driven Gear Thrust (Axial) Clearance:
Standard (New):
0.03 - 0.05 mm (0.001 - 0.002 in.)
Service Limit:
0.07 mm (0.003 in.)



Regulator Valve Body Disassembly, Inspection, and Reassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air. Blow out all passages.
2. Inspect the valve body for scoring and damage.
3. Check all valves for free movement. If any fail to slide freely, refer to Valve Body Repair (see page 14-207).
4. Hold the regulator spring cap in place while removing the stop bolt. The regulator spring cap is spring loaded. Once the stop bolt is removed, release the spring cap slowly so it does not pop out.
5. Coat all parts with ATF during assembly.
6. When reassembling the valve body, align the hole in the regulator spring cap with the hole in the valve body, then press the spring cap into the valve body, and tighten the stop bolt.

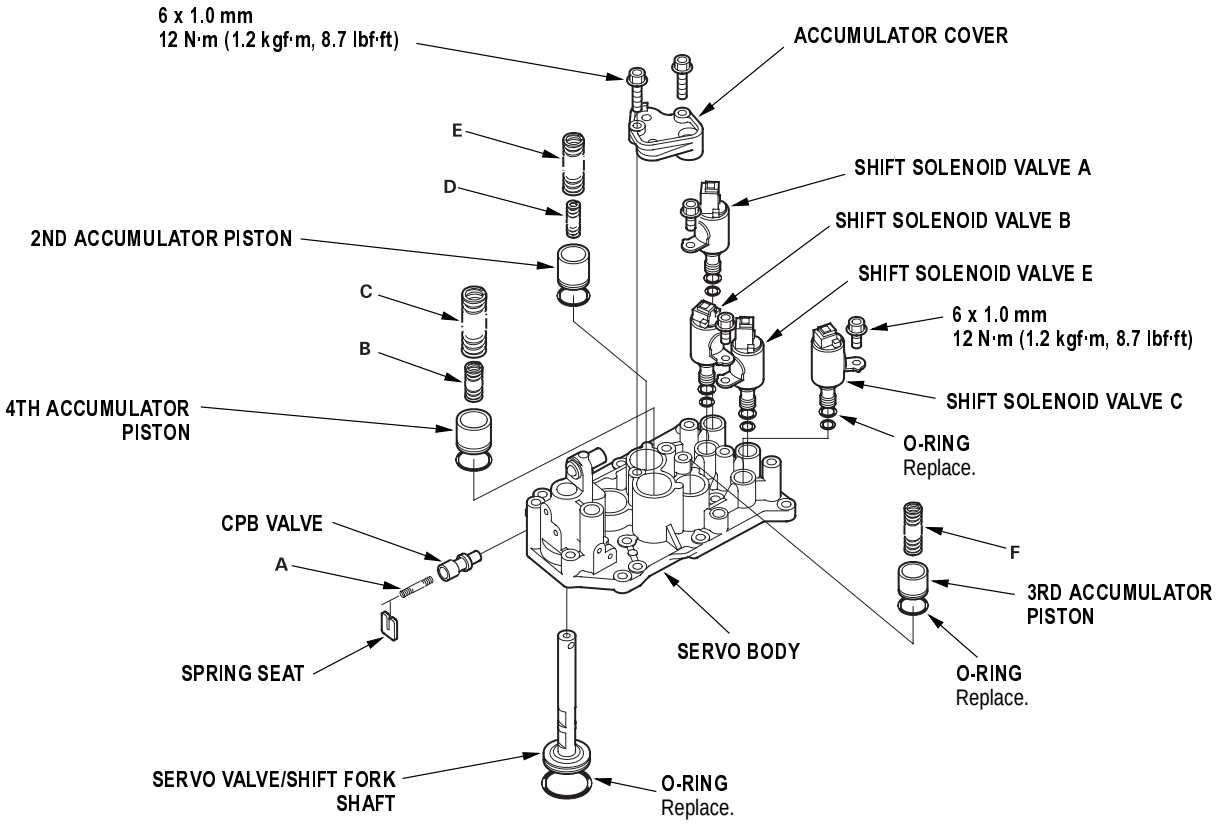


SPRING SPECIFICATIONS

Springs		Standard (New)-Unit: mm (in.)			
		Wire Diameter	O.D.	Free Length	No. of Coils
A	Stator reaction spring	4.5 (0.177)	35.4 (1.394)	30.3 (1.193)	1.92
B	Regulator valve spring A	1.9 (0.075)	14.7 (0.579)	80.6 (3.173)	16.1
C	Regulator valve spring B	1.6 (0.063)	9.2 (0.362)	44.0 (1.732)	12.5
D	Torque converter check valve spring	1.2 (0.047)	8.6 (0.339)	33.8 (1.331)	12.2
E	Lock-up shift valve spring	1.0 (0.039)	6.6 (0.260)	35.5 (1.398)	18.2
F	1st accumulator spring A	2.4 (0.094)	18.6 (0.732)	49.0 (1.929)	7.1
G	1st accumulator spring B	2.3 (0.091)	12.2 (0.480)	31.5 (1.240)	6.6

Servo Body Disassembly, Inspection, and Reassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry them with compressed air. Blow out all passages.
2. Inspect the valve body for scoring and damage.
3. Check CPB valve for free movement. If any fail to slide freely, refer to Valve Body Repair (see page 14-207).
4. Do not hold the shift solenoid valve connector to remove and install it. Be sure to hold the shift solenoid valve body. When installing the shift solenoid vales, refer to Shift Solenoid Valves Installation (see page 14-213).
5. Coat all parts with ATF during assembly.
6. Replace the O-rings with new one.



SPRING SPECIFICATIONS

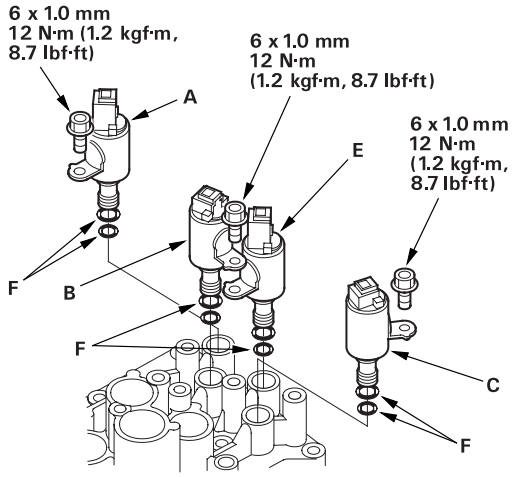
Springs		Standard (New)-Unit: mm (in.)			
		Wire Diameter	O.D.	Free Length	No. of Coils
A	CPB valve spring	0.7 (0.028)	9.1 (0.358)	32.3 (1.272)	8.6
B	4th accumulator spring B	2.3 (0.091)	12.2 (0.480)	31.5 (1.240)	6.6
C	4th accumulator spring A	2.4 (0.094)	18.6 (0.732)	49.0 (1.929)	7.1
D	2nd accumulator spring B	2.0 (0.079)	10.6 (0.417)	34.0 (1.339)	8.0
E	2nd accumulator spring A	2.2 (0.087)	16.6 (0.654)	48.2 (1.898)	8.5
F	3rd accumulator spring	2.5 (0.098)	14.6 (0.575)	29.9 (1.177)	4.9

Shift Solenoid Valves Installation

NOTE:
- Do not install the shift solenoid valve B before installing the shift solenoid valve E. If solenoid valve B is installed before solenoid valves E, it may damage to hydraulic control system.
- Do not hold the shift solenoid valve connector to install it. Be sure to hold the shift solenoid valve body.

1. Install the new O-rings (F) on each shift solenoid valves.

NOTE: The new shift solenoid valve is equipped with the new O-rings. If you install the new shift solenoid valve, it is no need to replace the new O-rings on it.



2. Install the shift solenoid valve A with holding the shift solenoid valve body, be sure to install the solenoid valve A until its mounting bolt bracket contacts to the servo body.

3. Install the shift solenoid valve E with holding the shift solenoid valve body, be sure to install the solenoid valve E until its mounting bolt bracket contacts to the servo body.

4. Install the shift solenoid valve B with holding the shift solenoid valve body, be sure to install the solenoid valve B until its mounting bolt bracket contacts to the bracket of the shift solenoid valve E.

5. Install the shift solenoid valve C with holding the shift solenoid valve body, be sure to install the solenoid valve C until its mounting bolt bracket contacts to the servo body.

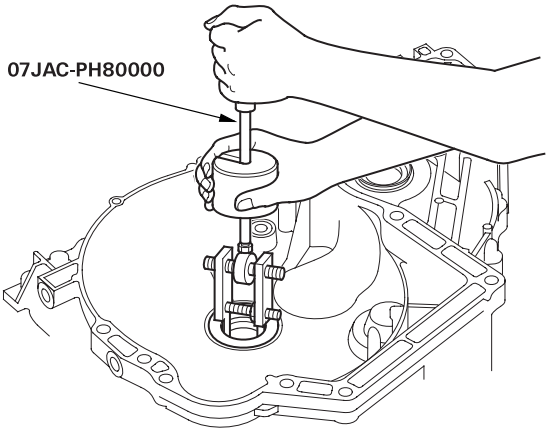
Torque Converter Housing

Mainshaft Bearing and Oil Seal Replacement

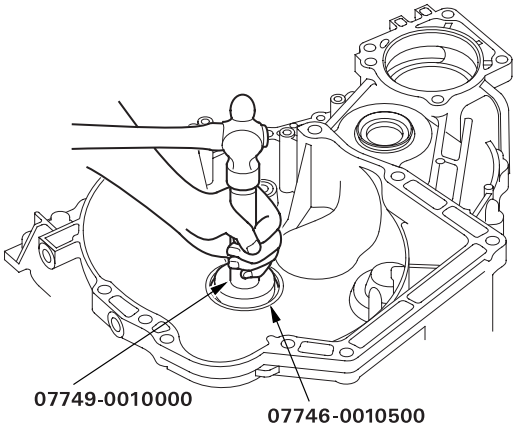
Special Tools Required

- Adjustable bearing remover set 07JAC-PH80000
- Handle driver 07749-0010000
- Driver attachment, 62 x 68 mm 07746-0010500
- Driver attachment, 72 x 75 mm 07746-0010600

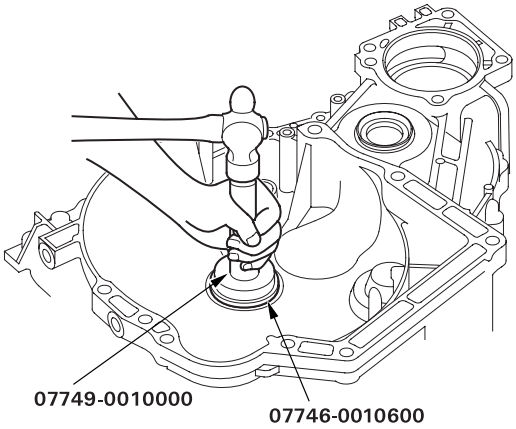
1. Remove the mainshaft bearing and oil seal with the special tool.



2. Install the new mainshaft bearing until it bottoms in the housing with the special tools.



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

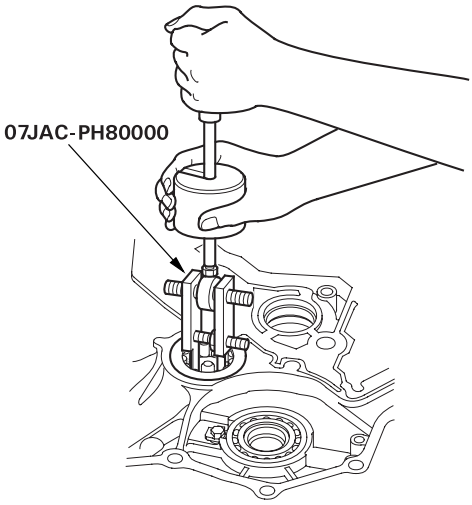


Countershaft Bearing Replacement

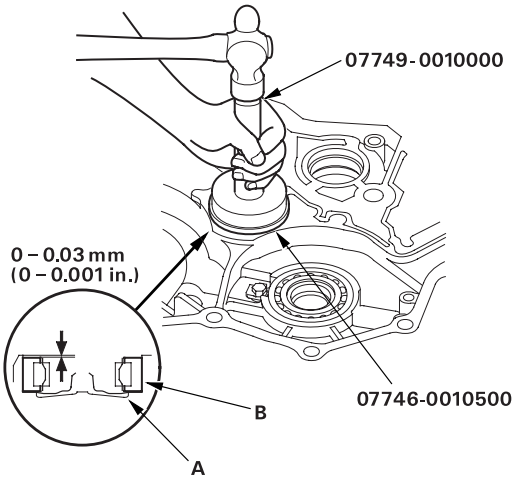
Special Tools Required

- Adjustable bearing remover set 07JAC-PH80000
- Handle driver 07749-0010000
- Driver attachment, 62 x 68 mm 07746-0010500

1. Remove the countershaft bearing with the special tool.



2. Install the ATF guide plate (A).

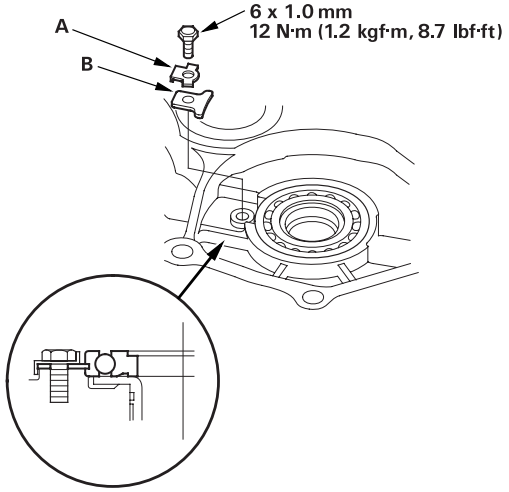


3. Install the new countershaft bearing (B) in the housing with the special tools.

Secondary Shaft Bearing Replacement

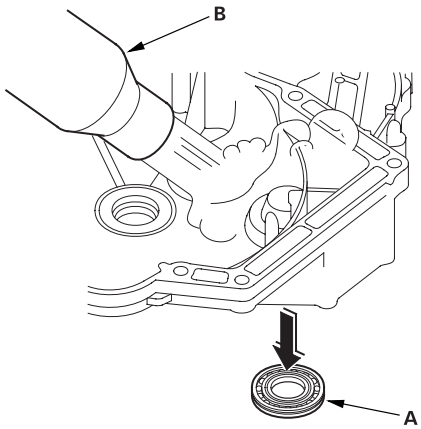
Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 62 x 68 mm 07746-0010500

1. Remove the bolt, then remove the lock washer (A) and bearing set plate (B).

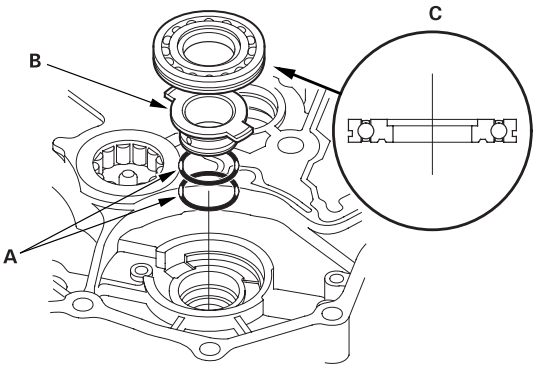


2. Remove the secondary shaft bearing (A) by heating the housing to about 212 °F (100 °C) with a heat gun (B). Do not heat the housing in excess of 212 °F (100 °C).

   NOTE: Let the housing cool to normal temperature before installing the bearing.

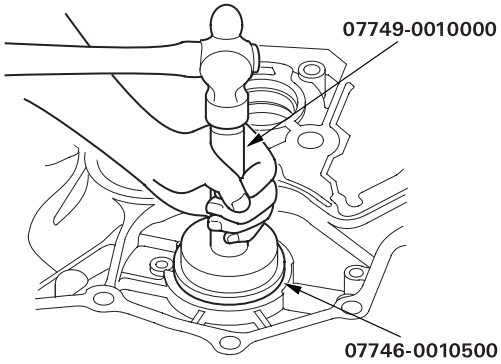


3. Install the new O-rings (A) on the ATF guide collar (B), then install the ATF guide collar in the housing.



4. Install the new secondary shaft bearing (C) in the direction shown.

5. Drive the secondary shaft bearing with the special tools, and install it securely in the housing.



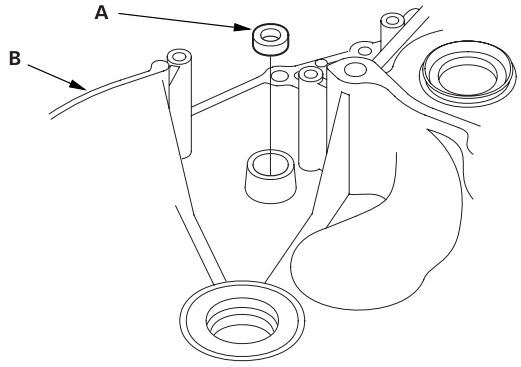
6. Check that the bearing groove aligns with the housing surface, then install the bearing set plate with aligning the bearing groove.

7. Install the new lock washer and bolt, then bend the lock tab of the lock washer against the bolt head.

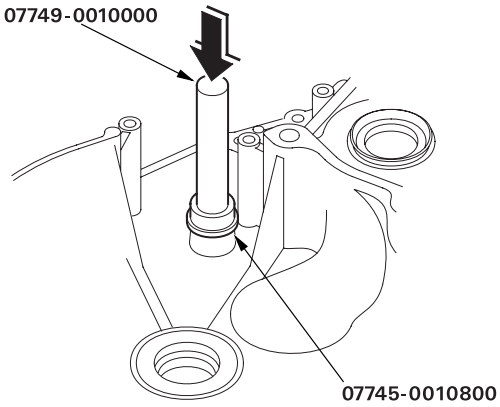
Control Shaft Oil Seal Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 22 x 24 mm 07746-0010800

1. Remove the oil seal (A) from the torque converter housing (B).



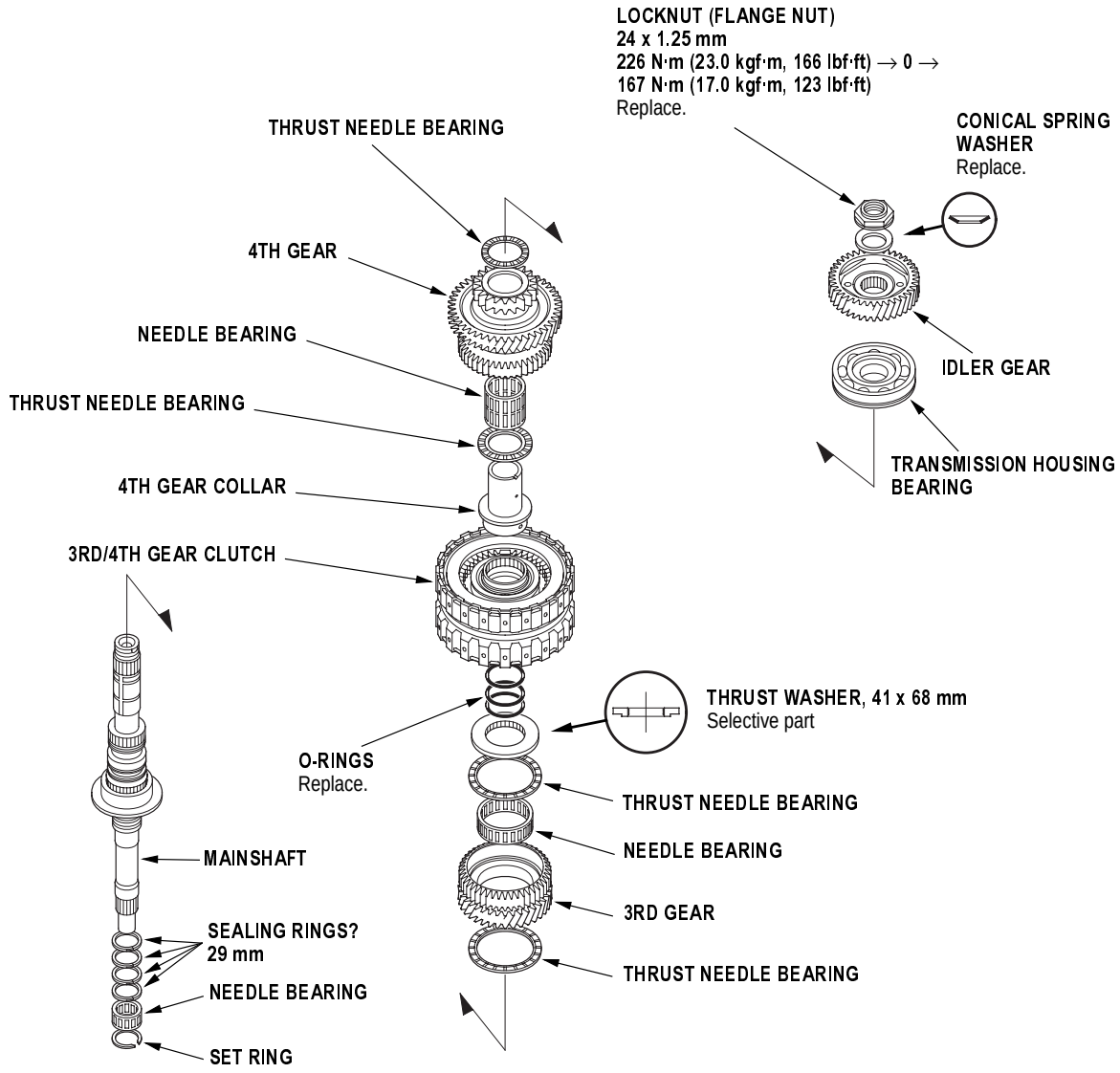
2. Install the new oil seal flush to the torque converter housing with the special tools.



Shafts and Clutches

Mainshaft Disassembly, Inspection and Reassembly

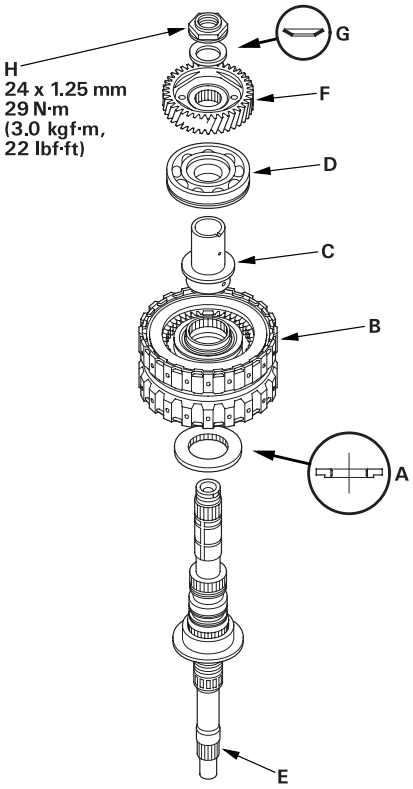
1. Inspect the thrust needle bearing and the needle bearing for galling and rough movement.



2. Inspect the splines for excessive wear and damage.
3. Check shaft bearing surface for scoring and excessive wear.
4. Before installing the O-rings, wrap the shaft splines with tape to prevent O-ring damage.
5. Lubricate all parts with ATF during assembly.
6. Install the conical spring washer, 41 x 68 mm thrust washer in the direction shown.
7. Replace the locknut and conical spring washer with new ones when assembling the transmission.
8. Check the clearance of the 3rd gear.

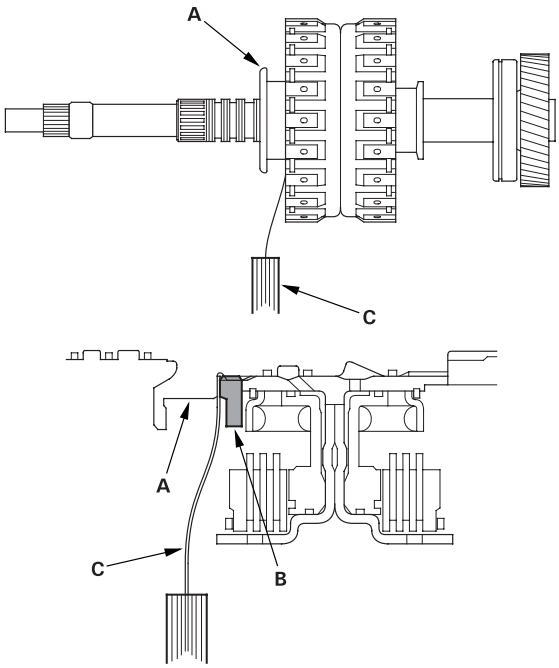
Mainshaft 3rd Gear Clearance Inspection

1. Remove the mainshaft transmission housing bearing (see page 14-202).
2. Assemble 41 x 68 mm thrust washer (A), 3rd/4th clutch (B), 4th gear collar (C), and transmission housing bearing (D) on the mainshaft (E). Do not install the O-rings during inspection.



3. Install the idler gear (F) on the mainshaft by a press, then install the conical spring washer (G) and locknut (H).
4. Tighten the locknut to 29 N·m (3.0 kgf·m, 22 lbf·ft).
5. Measure the clearance between the mainshaft flange (A) and 41 x 68 mm thrust washer (B) with a feeler gauge (C), in at least three places. Use the average as the actual clearance.

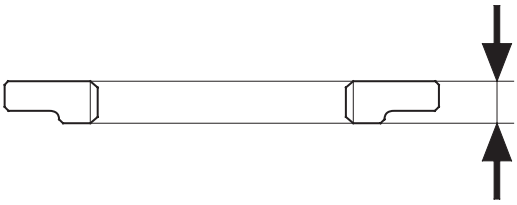
STANDARD: 0.03 - 0.11 mm (0.001 - 0.004 in.)



(cont'd)

Mainshaft 3rd Gear Clearance Inspection (cont'd)

6. If the clearance is out of standard, remove the 41 x 68 mm thrust washer and measure its thickness.



7. Select and install a new thrust washer, then recheck.

THRUST WASHER, 41 x 68 mm

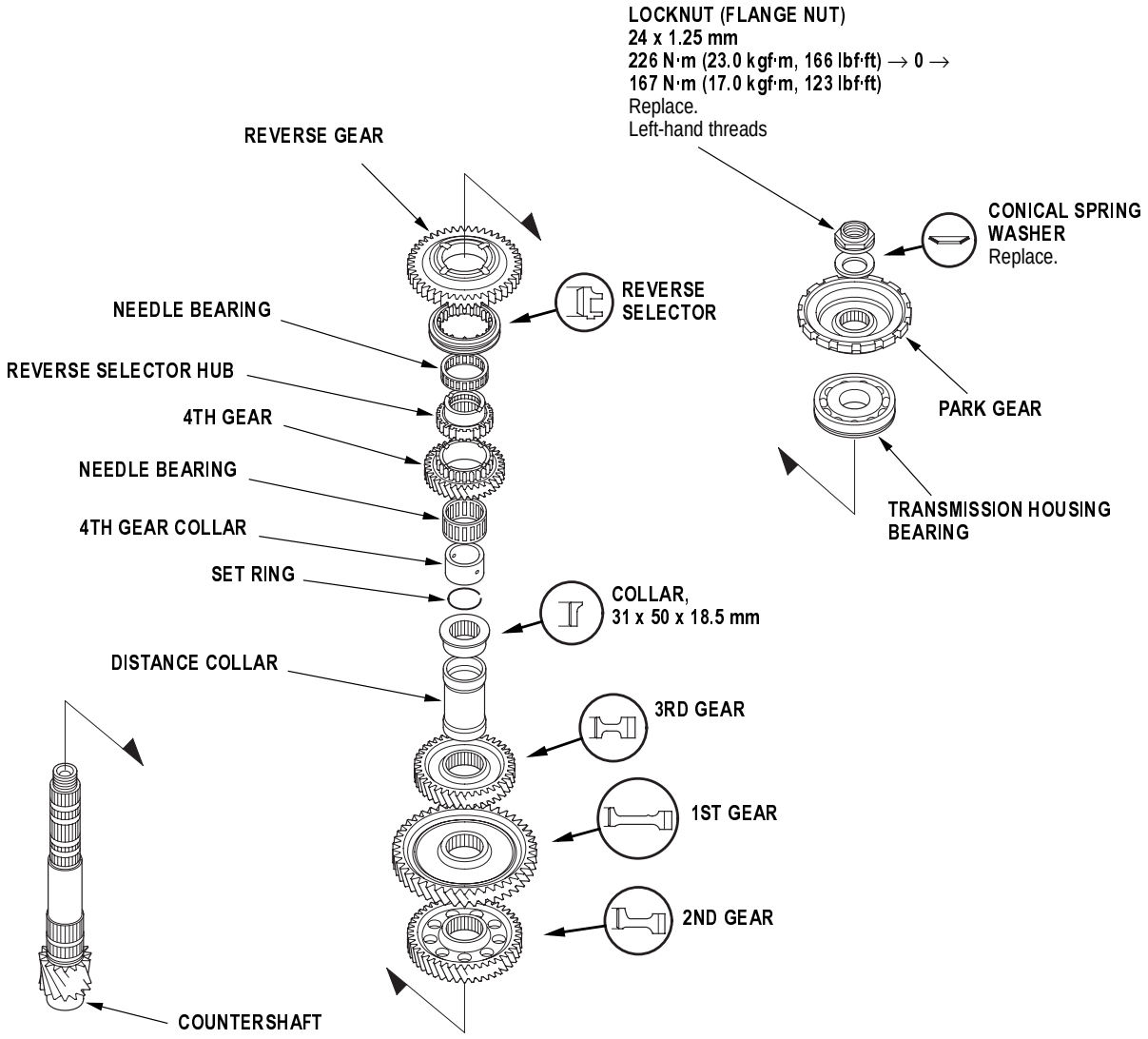
No.	Part Number	Thickness
1	90414-PRP-000	6.35 mm (0.250 in.)
2	90415-PRP-000	6.40 mm (0.252 in.)
3	90416-PRP-000	6.45 mm (0.254 in.)
4	90417-PRP-000	6.50 mm (0.256 in.)
5	90418-PRP-000	6.55 mm (0.258 in.)
6	90419-PRP-000	6.60 mm (0.260 in.)

8. After replacing the thrust washer, make sure the clearance is within standard.
9. Disassemble the shaft and gears.
10. Reinstall the bearing in the transmission housing (see page 14-203).

Countershaft Disassembly, Inspection and Reassembly

K20A4 and K20A5 Engine Models

1. Inspect the thrust needle bearing and the needle bearing for galling and rough movement.

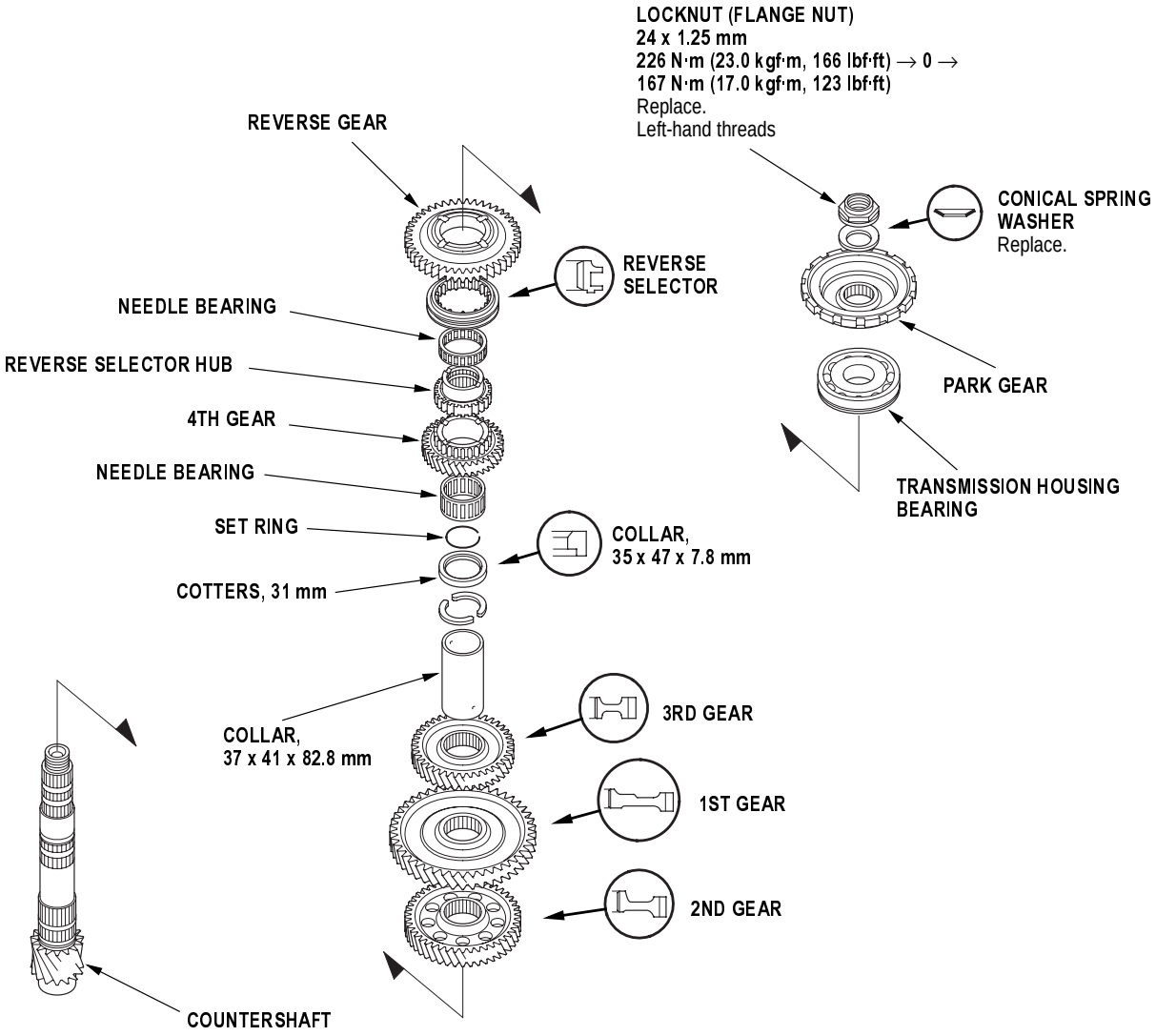


2. Inspect the splines for excessive wear and damage.
3. Check shaft bearing surface for scoring and excessive wear.
4. Lubricate all parts with ATF during assembly.
5. Install the conical spring washer, reverse selector, 31 x 50 x 18.5 mm collar, 3rd gear, 1st gear, and 2nd gear in the direction shown.
6. Countershaft locknut has left-hand threads.
7. Replace the locknut and conical spring washer with new ones when assembling the transmission.
8. Some reverse selector hubs and 4th gear collars are press-fitted to the countershaft; special tools are needed to remove them (see page 14-223) and install them (see page 14-224).

Countershaft Disassembly, Inspection and Reassembly (cont'd)

K24A1 Engine Model

1. Inspect the thrust needle bearing and the needle bearing for galling and rough movement.



2. Inspect the splines for excessive wear and damage.
3. Check shaft bearing surface for scoring and excessive wear.
4. Lubricate all parts with ATF during assembly.
5. Install the conical spring washer, reverse selector, 31 x 47 x 7.8 mm collar, 3rd gear, 1st gear, and 2nd gear in the direction shown.
6. Countershaft locknut has left-hand threads.
7. Replace the locknut and conical spring washer with new ones when assembling the transmission.
8. Some reverse selector hubs are press-fitted to the countershaft; special tools are needed to remove them (see page 14-225) and install them (see page 14-226).

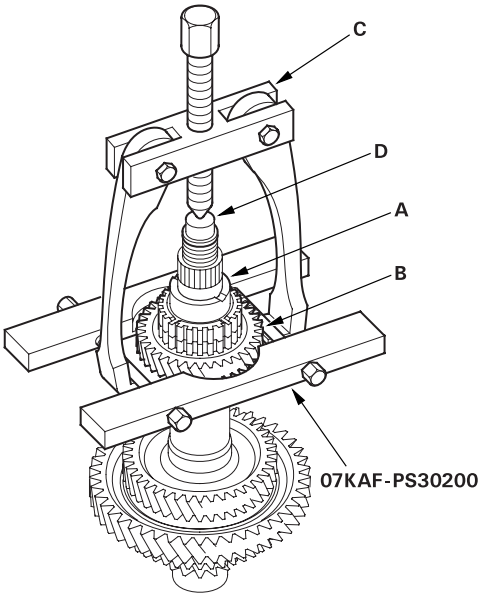
Selector Hub and 4th Gear Collar Removal

Special Tools Required
Bearing separator 07KAF-PS30200

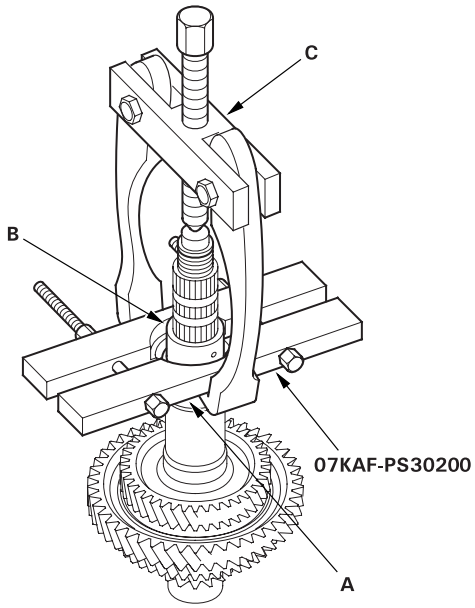
K20A4 and K20A5 Engine Models

NOTE:
- Some reverse selector hubs and 4th gear collars are not press-fitted, and can be removed without using the special tool and a puller.
- Place a shaft protector between the countershaft and a puller to prevent damaging the countershaft.

1. Remove the reverse selector hub (A) and 4th gear (B) with the special tool, a two-jaw (or three-jaw) puller (C), and a shaft protector (D).



2. Install the special tool with inserting it to the opening between 31 x 50 x 18.5 mm collar (A) and 4th gear collar (B). Set the puller (C) to the special tool, then remove the 4th gear collar.



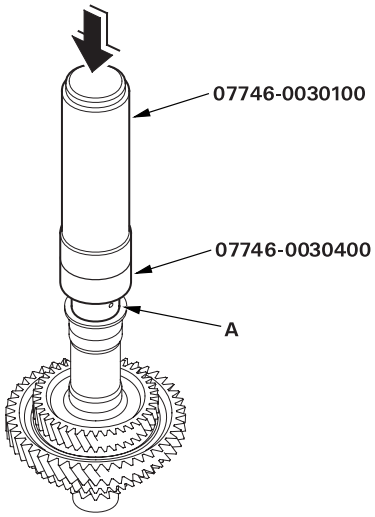
Selector Hub and 4th Gear Collar Installation

Special Tools Required
- Driver 40 mm I.D. 07746-0030100
- Driver attachment, 35 mm I.D. 07746-0030400

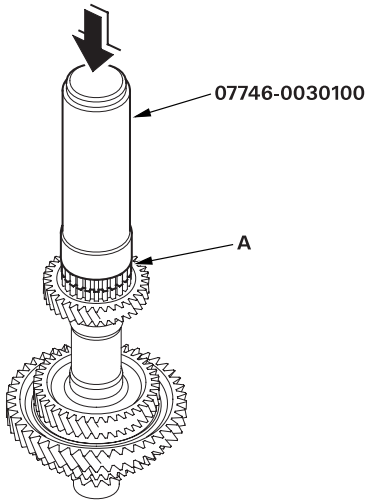
K20A4 and K20A5 Engine Models

NOTE: Some reverse selector hubs and 4th gear collars are not press-fitted, and can be installed without using the special tools and a press.

1. Assemble the 2nd gear, 1st gear, 3rd gear, distance collar, and 31 x 50 x 18.5 mm collar on the countershaft, and secure them with the set ring (see page 14-221).
2. Install the 4th gear collar (A) with the special tools and a press.



3. Install the needle bearing and 4th gear.
4. Install the reverse selector hub (A) with the special tool and a press.

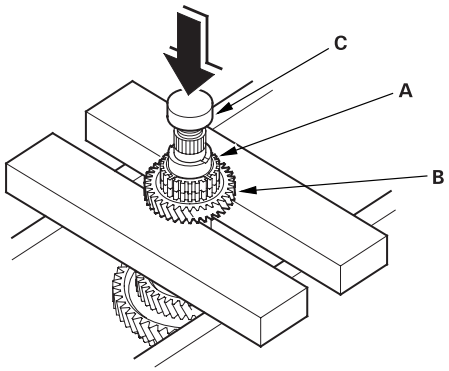


Reverse Selector Hub and 1st Gear Removal

K24A1 Engine Model

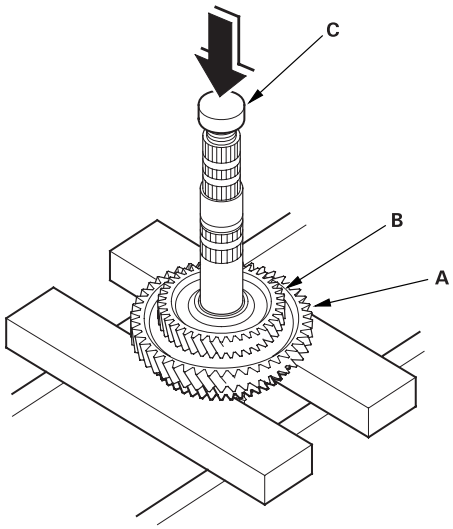
1. Remove the reverse selector hub (A) and the 4th gear (B) from the countershaft with a press. Place a shaft protector (C) between the countershaft and press to prevent damaging the countershaft.

   NOTE: Some reverse selector hubs are not press-fitted, and can be removed without using a press.



2. Remove the needle bearing, set ring, 35 x 47 x 7.8 mm collar, 31 mm cotters, and 37 x 41 x 82.8 mm collar from the countershaft.

3. Remove the 1st gear (A) and 3rd gear (B) from the countershaft with a press. Place a shaft protector (C) between the countershaft and press to prevent damaging the countershaft.



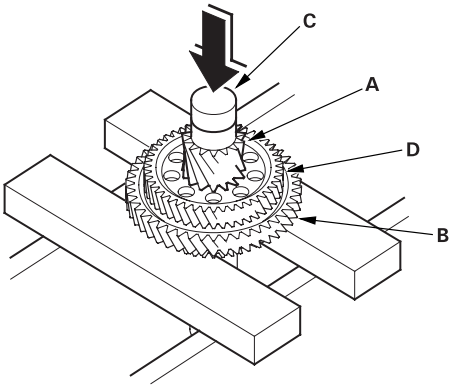
4. Remove the 2nd gear from the countershaft by hand.

Reverse Selector Hub and 1st Gear Installation

Special Tools Required
Driver 40 mm I.D. 07746-0030100

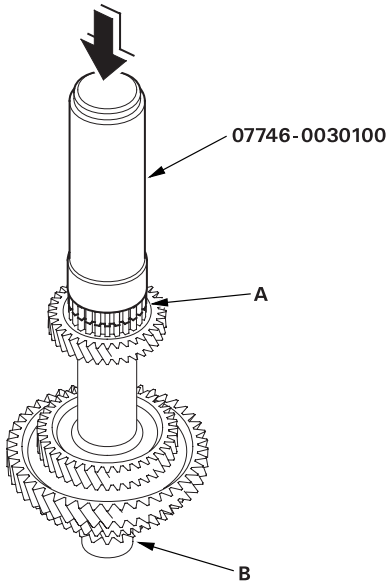
K24A1 Engine Model

1. Apply ATF to the parts.
2. Install the 2nd gear to the countershaft by hand.
3. Align the shaft splines with those on 1st gear, then press the countershaft (A) into the 1st gear (B) with a press. Place a shaft protector (C) between the countershaft and press to prevent damaging the contershaft.



4. Stop pressing the countershaft when the 1st gear contacts the 2nd gear (D).
5. Install the 3rd gear, 37 x 41 x 82.8 mm collar, 31 mm cotters, 35 x 47 x 7.8 mm collar, set ring, needle bearing, and 4th gear on the countershaft.
6. Slide the reverse selector hub (A) over the countershaft (B), then press it in place with the special tool and a press.

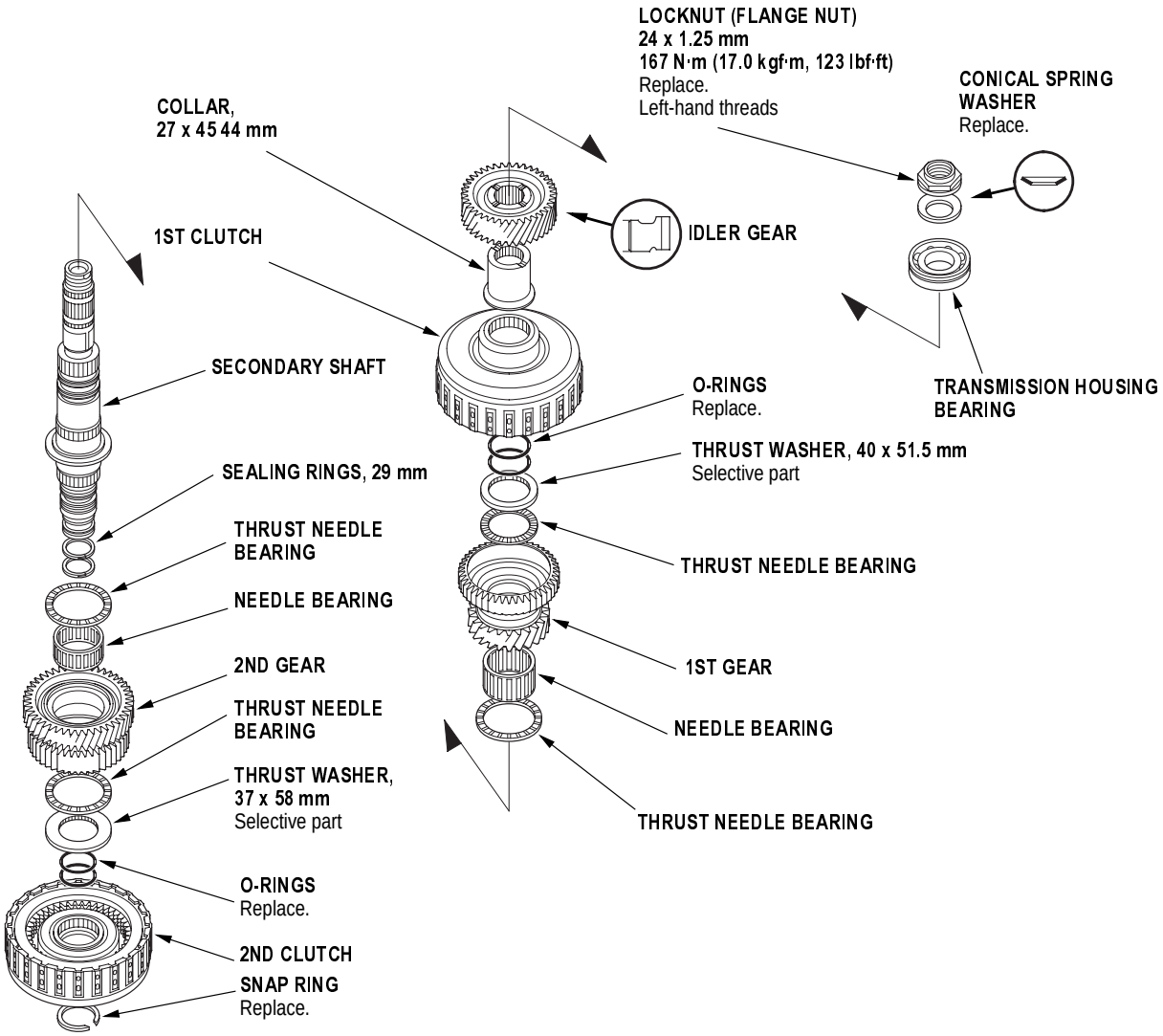
   NOTE: Some reverse selector hubs are not press-fitted, and can be installed without using the special tool and a press.



Secondary Shaft Disassembly, Inspection and Reassembly

NOTE: The illustration shows the K20A4 and K20A5 engine models; the K24A1 engine model is similar.

1. Inspect the thrust needle bearing and the needle bearing for galling and rough movement.



2. Inspect the splines for excessive wear and damage.

3. Check shaft bearing surface for scoring and excessive wear.

4. Before installing the O-rings, wrap the shaft splines with tape to prevent O-ring damage.

5. Lubricate all parts with ATF during assembly.

6. Install the conical spring washer, idler gear in the direction shown.

7. Secondary shaft locknut has left-hand threads.

8. Replace the locknut and conical spring washer with new ones when assembling the transmission.

9. Check the clearance of the 2nd and 1st gears.

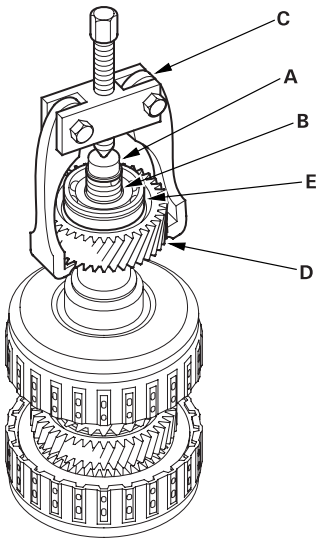
Secondary Shaft Ball Bearing, Idler Gear Removal and Installation

Special Tools Required
Driver attachment, 42 mm I.D. 07QAD-P0A0100

NOTE: The illustration shows the K20A4 and K20A5 engine models; the K24A1 engine model is similar.

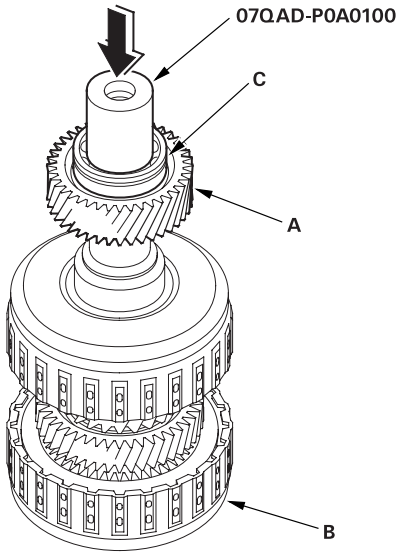
Removal

1. Place a shaft protector (A) on the secondary shaft (B), and set the puller (C) to the idler gear (D), then remove the idler gear and ball bearing (E).



Installation

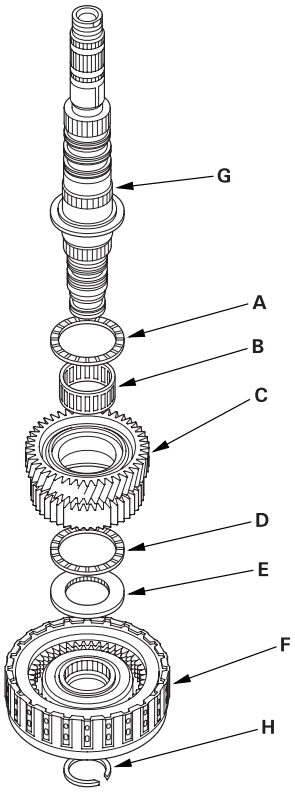
1. Install the idler gear (A) on the secondary shaft (B), and install the ball bearing (C) over the idler gear with the special tool and a press.



Secondary Shaft 2nd Gear Clearance Inspection

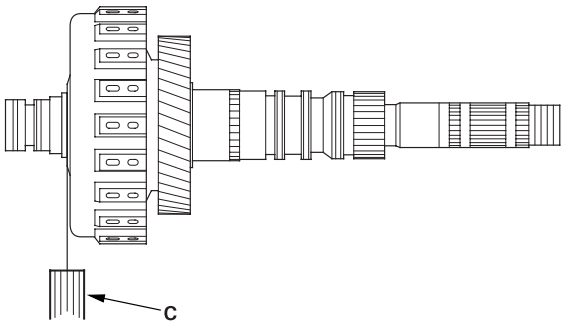
NOTE: The illustration shows the K20A4 and K20A5 engine models; the K24A1 engine model is similar.

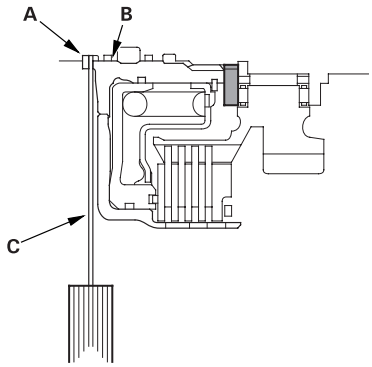
1. Install the thrust needle bearing (A), needle bearing (B), 2nd gear (C), thrust needle bearing (D), 37 x 58 mm thrust washer (E), and 2nd clutch (F) on the secondary shaft (G), then secure them with the snap ring (H).



2. Measure the clearance between the snap ring (A) and the 2nd clutch guide (B) with a feeler gauge (C), in at least three places. Use the average as the actual clearance.

STANDARD: 0.04 - 0.12 mm (0.002 - 0.005 in.)





(cont'd)

Secondary Shaft 2nd Gear Clearance Inspection (cont'd)

3. If the clearance is out of standard, remove the 37 x 58 mm thrust washer and measure its thickness.

4. Select and install a new thrust washer, then recheck.

THRUST WASHER, 37 x 58 mm

No.	Part Number	Thickness
1	90511-PRP-010	3.900 mm (0.154 in.)
2	90512-PRP-010	3.925 mm (0.155 in.)
3	90513-PRP-010	3.950 mm (0.156 in.)
4	90514-PRP-010	3.975 mm (0.156 in.)
5	90515-PRP-010	4.000 mm (0.157 in.)
6	90516-PRP-010	4.025 mm (0.158 in.)
7	90517-PRP-010	4.050 mm (0.159 in.)
8	90518-PRP-010	4.075 mm (0.160 in.)
9	90519-PRP-010	4.100 mm (0.161 in.)
10	90520-PRP-010	4.125 mm (0.162 in.)
11	90521-PRP-010	4.150 mm (0.163 in.)
12	90522-PRP-010	4.175 mm (0.164 in.)
13	90523-PRP-000	4.200 mm (0.165 in.)
14	90524-PRP-000	4.225 mm (0.166 in.)
15	90525-PRP-000	4.250 mm (0.167 in.)
16	90526-PRP-000	4.275 mm (0.168 in.)
17	90527-PRP-000	4.300 mm (0.169 in.)
18	90528-PRP-000	4.325 mm (0.170 in.)
19	90529-PRP-000	4.350 mm (0.171 in.)
20	90530-PRP-000	4.375 mm (0.172 in.)

5. After replacing the thrust washer, make sure the clearance is within standard.

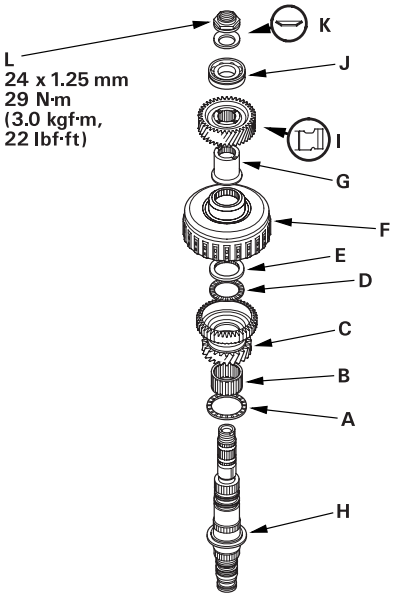
6. Disassemble the shaft and gears.

Secondary Shaft 1st Gear Clearance Inspection

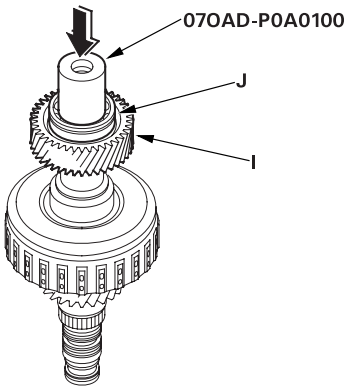
Special Tools Required
Driver attachment, 42 mm I.D. 07QAD-P0A0100

NOTE: The illustration shows the K20A4 and K20A5 engine models; the K24A1 engine model is similar.

1. Install the thrust needle bearing (A), needle bearing (B), 1st gear (C), thrust needle bearing (D), 40 x 51.5 mm thrust washer (E), 1st clutch (F), and 27 x 45 x 44 mm collar (G) on the secondary shaft (H).

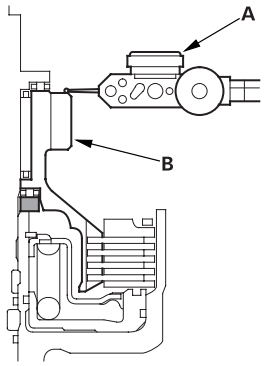


2. Install the idler gear (I), then install the ball bearing (J) on the idler gear with the special tool and a press.



3. Install the conical spring washer (K) and locknut (L), then tighten the locknut to 29 N·m (3.0 kgf·m, 22 lbf·ft).

4. Turn the secondary shaft assembly upside down, and set the dial indicator (A) on the 1st gear (B).

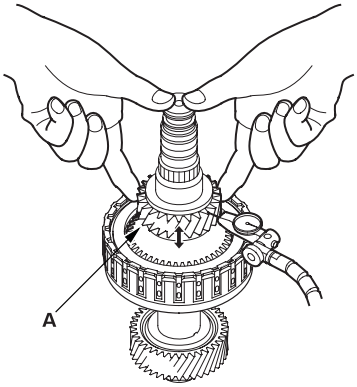


(cont'd)

Secondary Shaft 1st Gear Clearance Inspection (cont'd)

5. Hold the secondary shaft, and measure the 1st gear axial clearance in at least three places while moving the 1st gear (A). Use the average as the actual clearance.

STANDARD: 0.04 - 0.12 mm (0.002 - 0.005 in.)



6. If the clearance is out of standard, remove the 40 x 51.5 mm thrust washer and measure its thickness.

7. Select and install a new thrust washer, then recheck.

THRUST WASHER, 40 x 51.5 mm

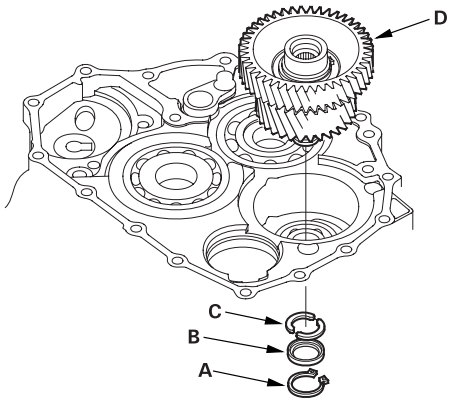
No.	Part Number	Thickness
1	90503-PRP-000	4.80 mm (0.189 in.)
2	90504-PRP-000	4.85 mm (0.191 in.)
3	90505-PRP-000	4.90 mm (0.193 in.)
4	90506-PRP-000	4.95 mm (0.195 in.)
5	90507-PRP-000	5.00 mm (0.197 in.)
6	90508-PRP-000	5.05 mm (0.199 in.)

8. After replacing the thrust washer, make sure the clearance is within standard.

9. Disassemble the shaft and gears.

Idler Gear Shaft Removal and Installation

1. Remove the snap ring (A), cotter retainer (B), and cotter keys (C). Do not distort the snap ring.

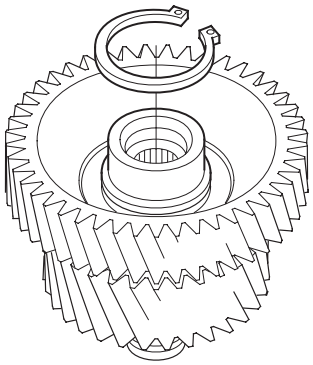


2. Remove the idler gear shaft/idler gear assembly (D) from the transmission housing.
3. Check the snap rings and cotter retainer for wear and damage. Replace them if they are worn, distorted, or damaged.
4. Install the idler gear and shaft in the reverse order of removal.

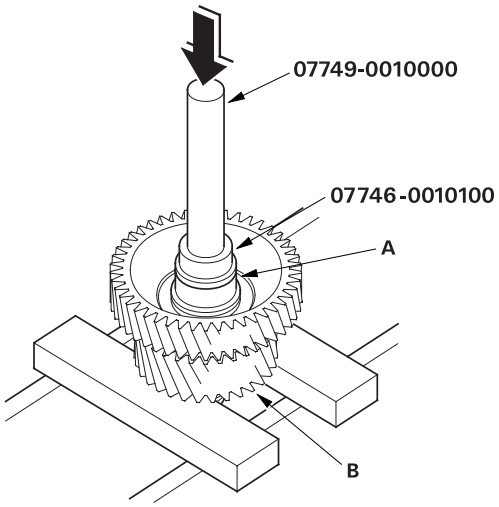
Idler Gear/Idler Gear Shaft Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 32 x 35 mm 07746-0010100

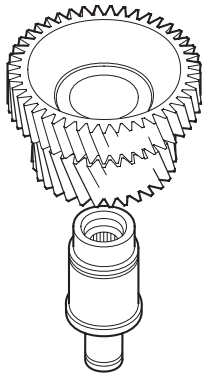
1. Remove the snap ring from the idler gear/idler shaft assembly.



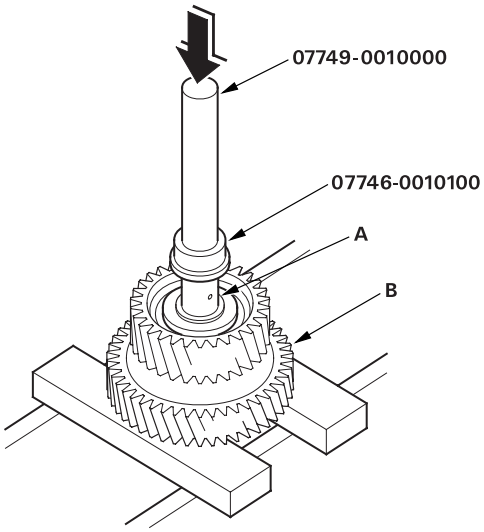
2. Remove the idler gear shaft (A) from the idler gear (B) with the special tools and a press.



3. Replace the idler gear or idler gear shaft, and attach the idler gear shaft to the idler gear.



4. Install the idler gear shaft (A) in the idler gear (B) with the special tools and a press.



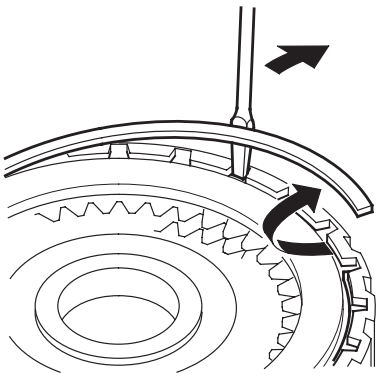
5. Install the snap ring.

Clutch Disassembly

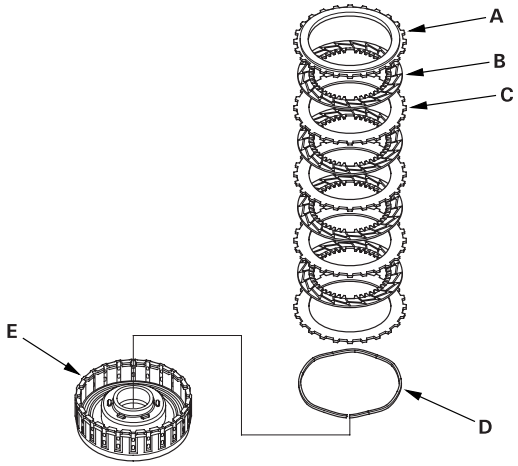
Special Tools Required

- Clutch spring compressor set 07LAE-PX40000
  - Clutch spring compressor attachment 07LAE-PX40100
  - Clutch spring compressor attachment 07HAE-PL50100
  - Clutch spring compressor bolt assembly 07GAE-PG40200
- Snap ring pliers 07LGC-0010100

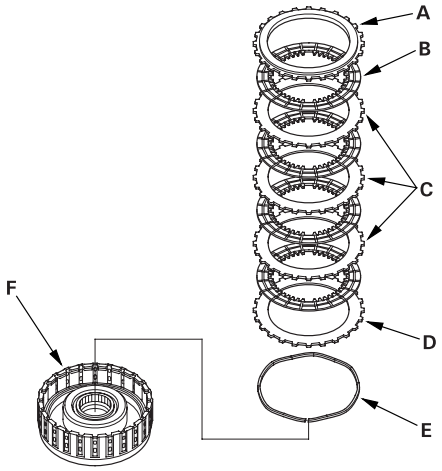
1. Remove the snap ring with a screwdriver.



2. Disassemble the 1st clutch of K20A4 and K20A5 engine models: Remove the clutch end plate (A), clutch discs (4) (B), clutch waved-plates (4) (C), and waved spring (D) from the 1st clutch drum (E).



3. Disassemble the 2nd clutch of K20A4 and K20A5 engine models: Remove the clutch end plate (A), clutch discs (4) (B), clutch waved-plates (3) (C), clutch flat-plate (D), and waved spring (E) from the 2nd clutch drum (F).

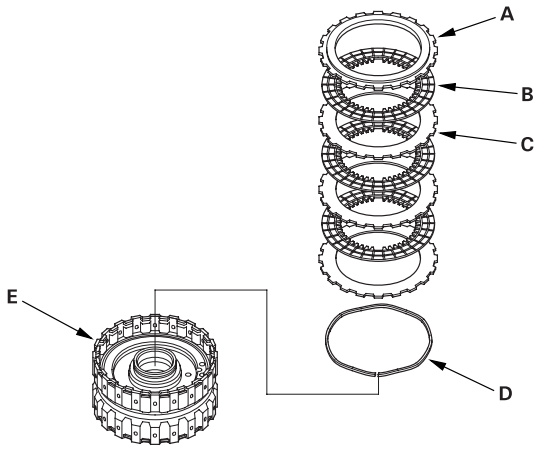


4. Make a reference mark on the clutch flat plate (D).

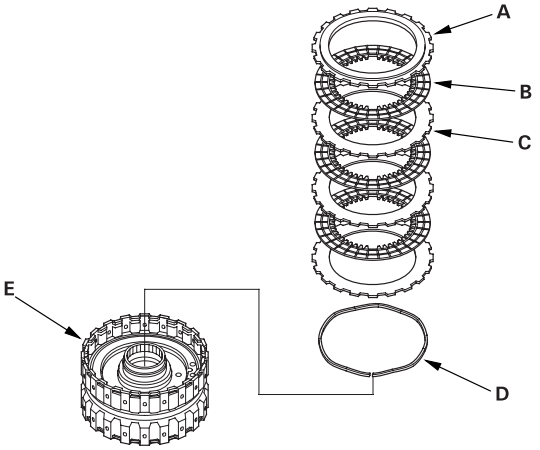
(cont'd)

Clutch Disassembly (cont'd)

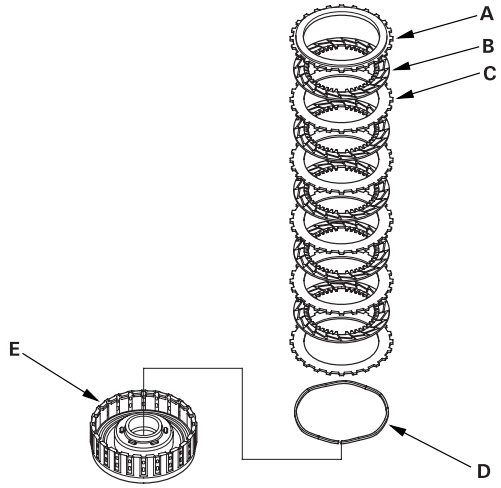
5. Disassemble the 3rd clutch of K20A4 and K20A5 engine models: Remove the clutch end plate (A), clutch discs (3) (B), clutch waved-plates (3) (C), and waved spring (D) from the 3rd clutch drum (E).



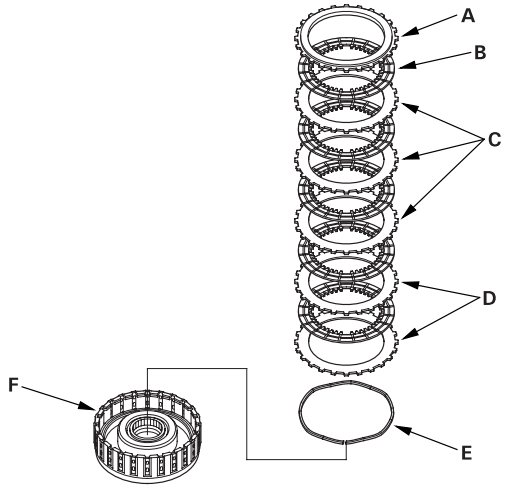
6. Disassemble the 4th clutch of K20A4 and K20A5 engine models: Remove the clutch end plate (A), clutch discs (3) (B), clutch waved-plates (3) (C), and waved spring (D) from the 4th clutch drum (E).



7. Disassemble the 1st clutch of K24A1 engine model: Remove the clutch end plate (A), clutch discs (5) (B), clutch waved-pates (5) (C), and waved spring (D) from the 1st clutch drum (E).

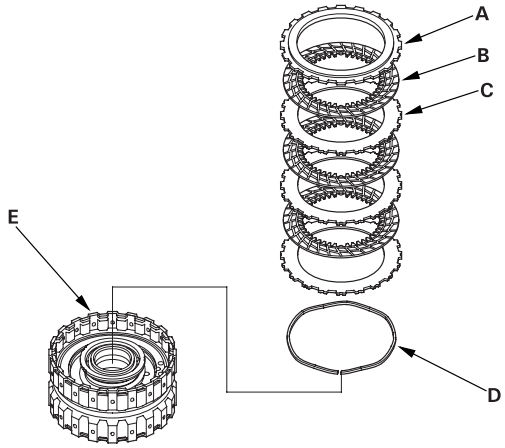


8. Disassemble the 2nd clutch of K24A1 engine model: Remove the clutch end plate (A), clutch discs (5) (B), clutch waved-plates (3) (C), clutch flat-plates (2) (D), and waved spring (E) from the 2nd clutch drum (F).

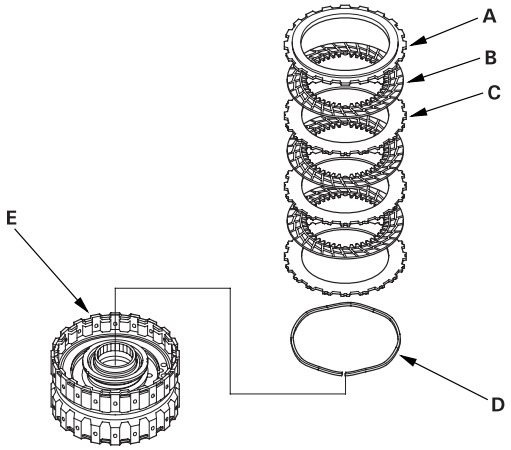


9. Make reference marks on the clutch flat-plates (D).

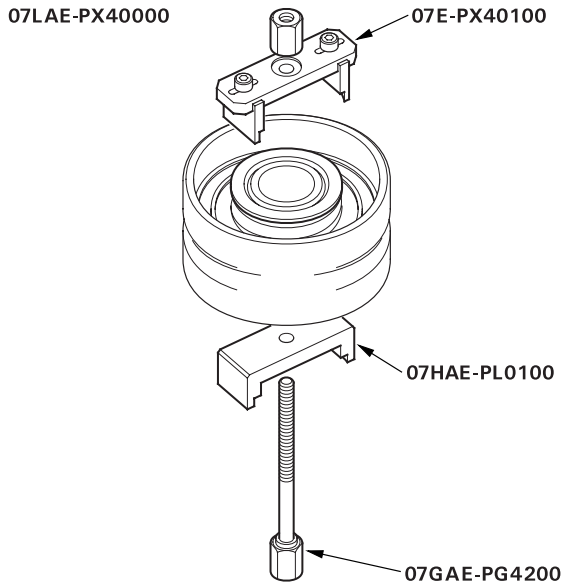
10. Disassemble the 3rd clutch of K24A1 engine model: Remove the clutch end plate (A), clutch discs (3) (B), clutch waved-plates (3) (C), and waved spring (D) from the 3rd clutch drum (E).



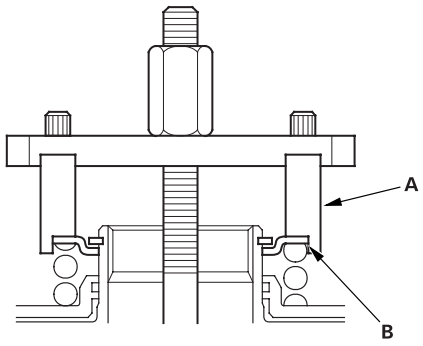
11. Disassemble the 4th clutch of K24A1 engine model: Remove the clutch end plate (A), clutch discs (3) (B), clutch waved-plates (3) (C), and waved spring (D) from the 4th clutch drum (E).



12. Install the special tools.



13. Be sure the special tool (A) is adjusted to have full contact with the spring retainer (B) on the 3rd and 4th clutches.



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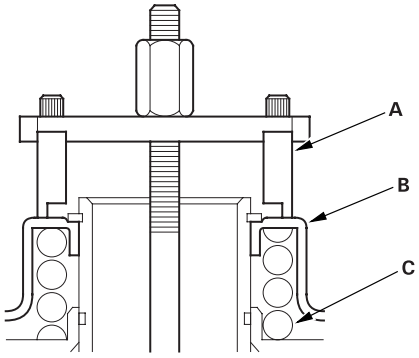
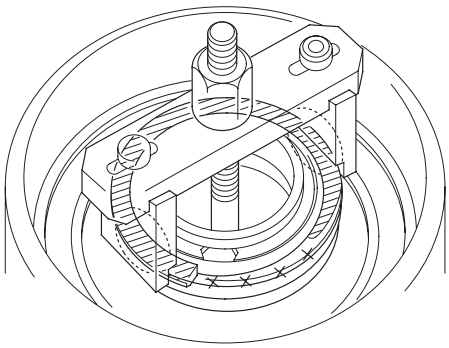
Clutch Disassembly (cont'd)

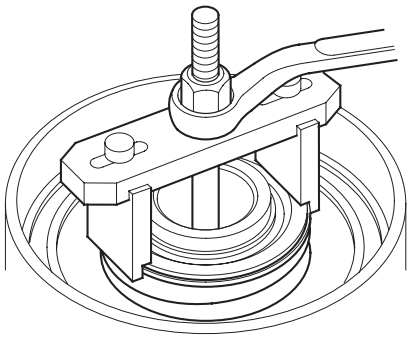
14. Set the special tool (A) on the spring retainer (B) of the 1st and 2nd clutches in such a way that the special tool works on the clutch return spring (C).



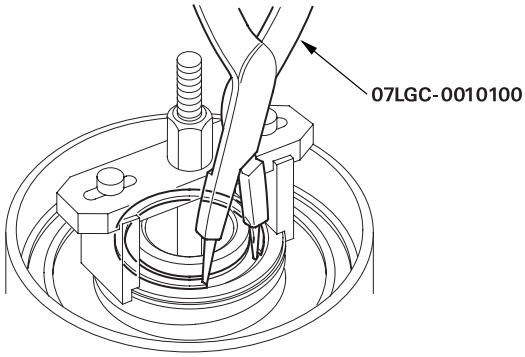
15. If either end of the special tool is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged.



16. Compress the return spring until the snap ring can be removed.

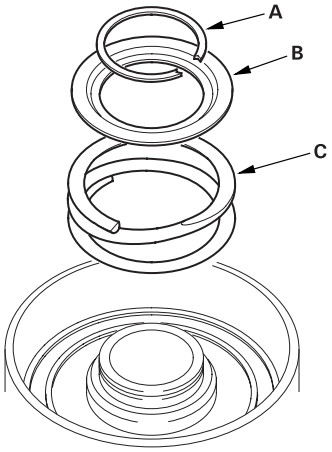


17. Remove the snap ring with snap ring pliers.

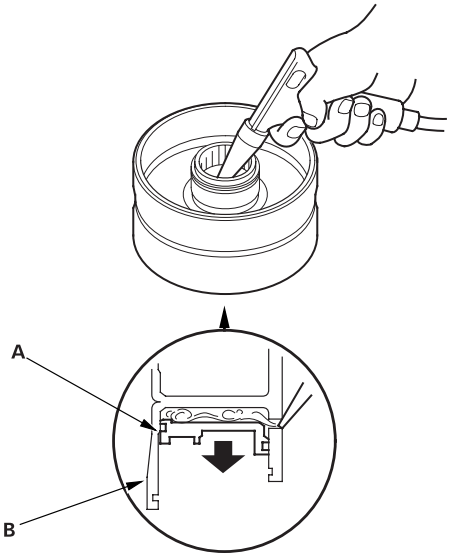


18. Remove the special tools.

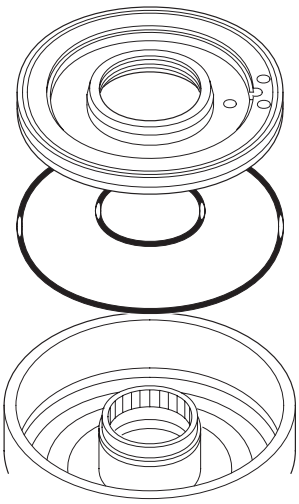
19. Remove the snap ring (A), spring retainer (B), and return spring (C).



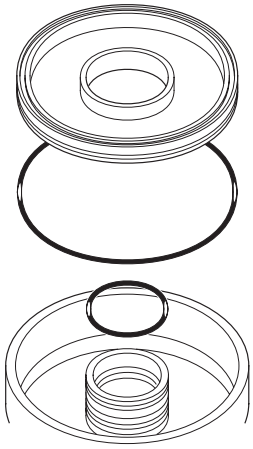
20. Wrap a shop rag around the clutch drum (A), and apply air pressure to the fluid passage to remove the piston (B). Place a finger tip on the other passage while applying air pressure.



21. Remove the piston, then remove the O-rings from the 3rd and 4th clutch pistons.

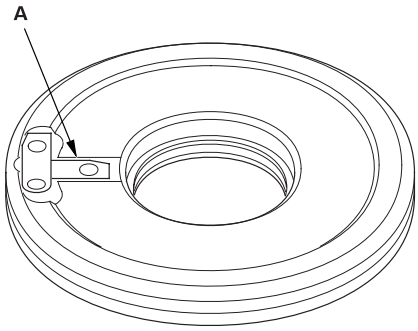


22. Remove the piston, then remove the O-ring from the 1st and 2nd clutch drum, and remove the O-ring from each clutch piston.

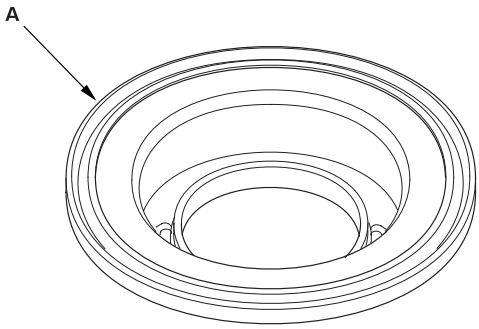


Clutch Inspection

1. Inspect the 3rd and 4th clutch pistons and clutch piston check valves.



2. If the clutch piston check valve is loose or damaged, replace the clutch piston.
3. Check the spring retainer for wear and damage.
4. Check the oil seal on the spring retainer of the 1st and 2nd clutches for wear, damage, and peeling.



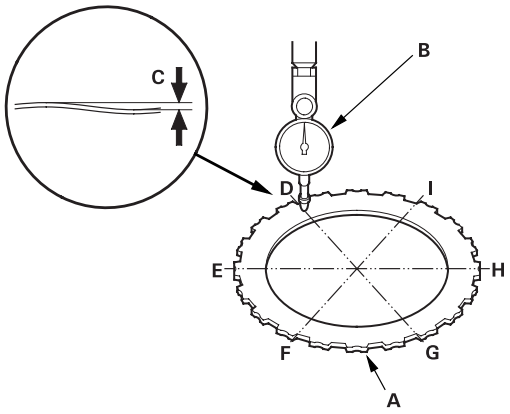
5. If the oil seal is worn, damaged, or peeling, replace the spring retainer.
6. Inspect the clutch discs, clutch plates, and clutch end plate for wear, damage, and discoloration.

Standard Thickness
Clutch Discs: 1.94 mm (0.076 in.)
Clutch Plates:
K20A4 and K20A5 engines
All plates: 2.00 mm (0.079 in.)
K24A1 engine
1st clutch plates: 1.6 mm (0.063 in.)
2nd clutch plates: 2.0 mm (0.079 in.)
3rd and 4th clutch plates: 2.3 mm (0.091 in.)

7. If the clutch discs are worn or damaged, replace them as a set. If the clutch discs are replaced, inspect the clutch end plate-to-top disc clearance.
8. If any plate is worn, damaged, or discolored, replace the damaged plate with the new plate, and inspect the other waved-plates for a phase difference. If the clutch plate is replaced, inspect the clutch end plate-to-top disc clearance.
9. If the clutch end plate is worn, damaged, or discolored, inspect the clutch end plate-to-top disc clearance, then replace the clutch end plate.

Clutch Waved-plate Phase Difference Inspection

1. Place the clutch waved-plate (A) on a surface plate, and set a dial indicator (B) on the waved-plate.



2. Find the bottom (D) of a phase difference of the waved-plate, zero the dial indicator and make a reference mark on the bottom of the waved-plate.
3. Rotate the 1st (K24A1 engine model) and 2nd clutch waved-plate about 60-degree apart from the bottom with holding the waved-plate by its circumference, and rotate the 1st (K20A4 and K20A5 engine models), 3rd, and 4th clutch waved-plate about 72-degree or 54-degree apart from the bottom. There will be presented a top (E) of a phase difference. Do not rotate the waved-plate with holding its surface, always rotate it with holding its circumference.
4. Read the dial indicator. The dial indicator reads the phase difference (C) of the waved-plate between bottom and top.

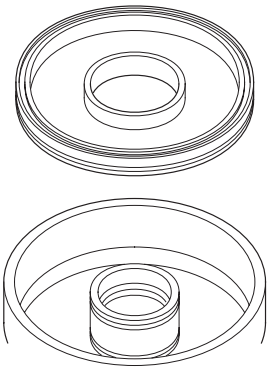
   Standard: 0.05 mm (0.002 in.) minimum

5. Rotate the 1st (K24A1 engine model) and 2nd clutch waved-plate about 60-degree apart from the top, and rotate the 1st (K20A4 and K20A5 engine models), 3rd, and 4th clutch waved-plate 54-degree or 72-degree apart from the top. The dial indicator should be at the bottom of a phase difference (F and H), and zero the dial indicator.
6. Measure the phase difference at the other two tops (G and I) of the waved-plate by following steps 3 thru 5.
7. If the two values of the three measurements are within the standard, the waved-plate is OK. If the two values of the three measurements are out of the standard, replace the waved-plate.

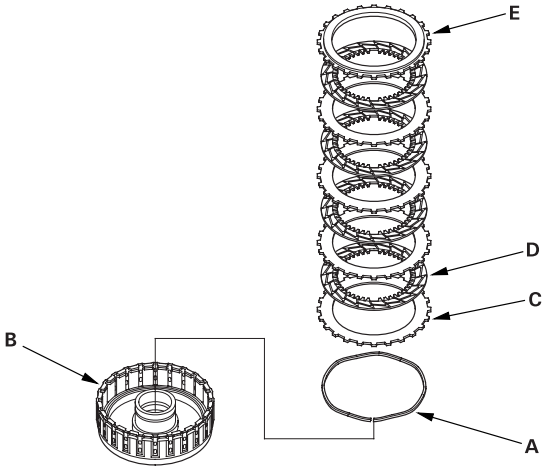
Clutch Clearance Inspection

Special Tools Required
Clutch compressor attachment 07ZAE-PRP0100

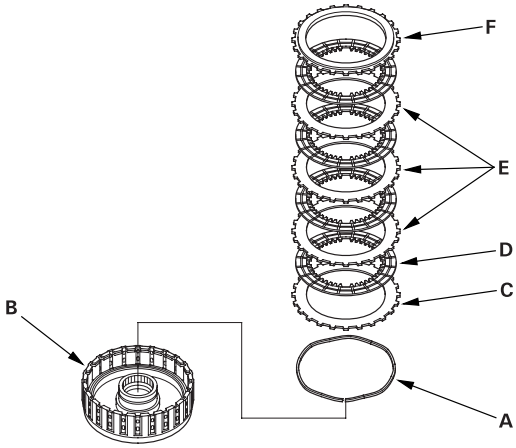
1. Inspect the clutch piston, discs, plates, and end plate for wear and damage (see page 14-240), and inspect clutch waved-plate phase difference (see page 14-241), if necessary.
2. Install the clutch piston in the clutch drum. Do not install the O-rings during inspection.



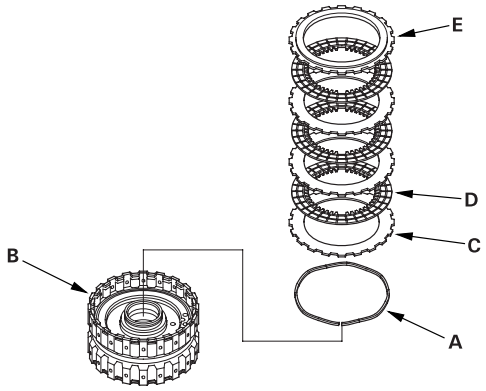
3. Assemble the 1st clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 1st clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (4) (C) and discs (4) (D), then install the clutch end plate (E) with the flat side toward the disc.



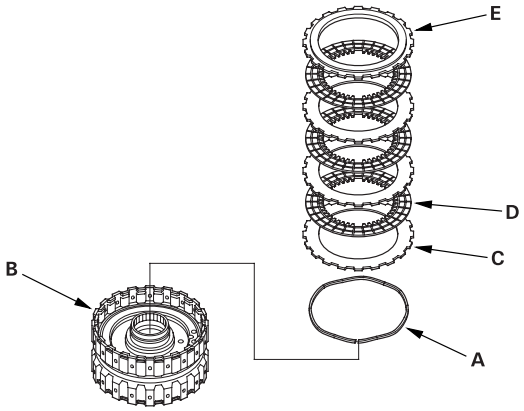
4. Assemble the 2nd clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 2nd clutch drum (B). Install the clutch flat-plate (C), then starting with the clutch disc, alternately install the clutch discs (4) (D) and waved-plates (3) (E), then install the clutch end plate (F) with the flat side toward the disc.



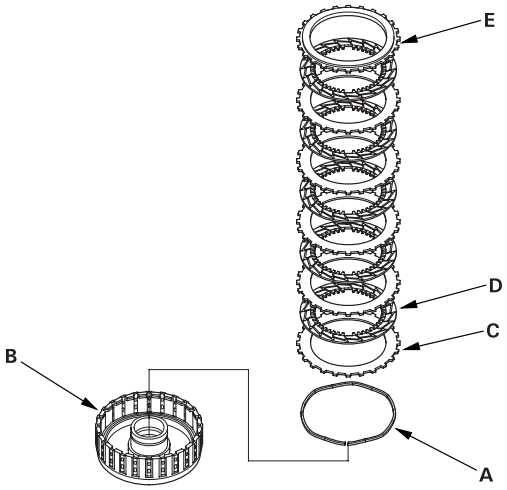
5. Assemble the 3rd clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 3rd clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



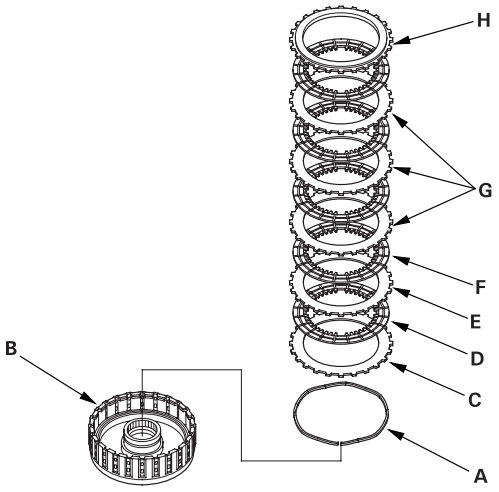
6. Assemble the 4th clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 4th clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



7. Assemble the 1st clutch of K24A1 engine model: Install the waved spring (A) in the 1st clutch drum (B). Starting with the clutch waved-pate, alternately install the clutch plates (5) (C) and discs (5) (D), then install the clutch end plate (E) with the flat side toward the disc.



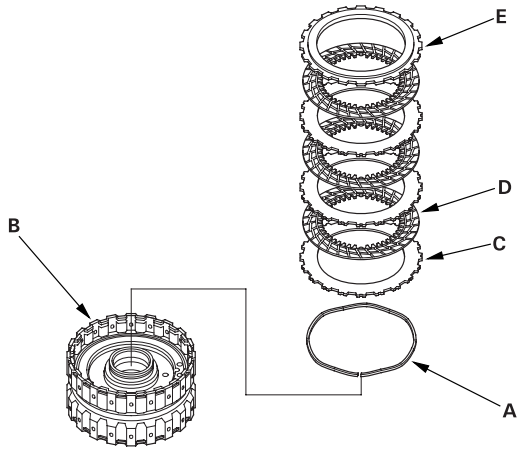
8. Assemble the 2nd clutch of K24A1 engine model: Install the waved spring (A) in the 2nd clutch drum (B). Install the clutch flat-plate (C), clutch disc (D), and clutch flat-plate (E). Starting with the clutch disc, alternately install the clutch discs (4) (F) and clutch waved-pates (3) (G), then install the clutch end plate (H) with the flat side toward the disc.



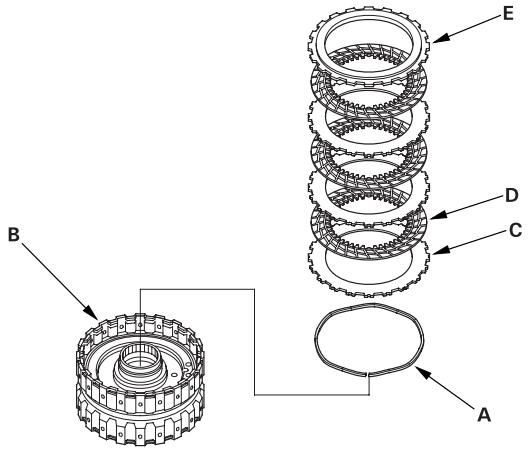
(cont'd)

Clutch Clearance Inspection (cont'd)

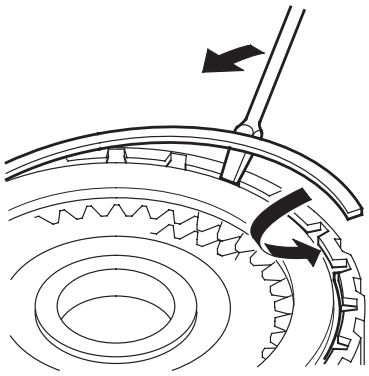
9. Assemble the 3rd clutch of K24A1 engine model: Install the waved spring (A) in the 3rd clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



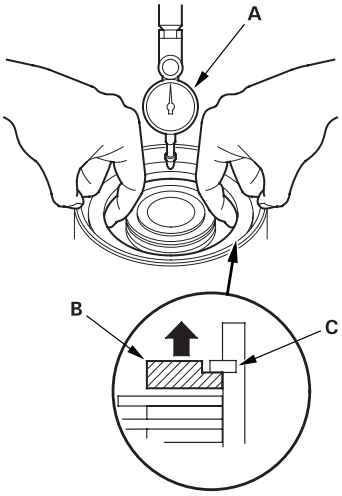
10. Assemble the 4th clutch of K24A1 engine model: Install the waved spring (A) in the 4th clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



11. Install the snap ring with a screwdriver.

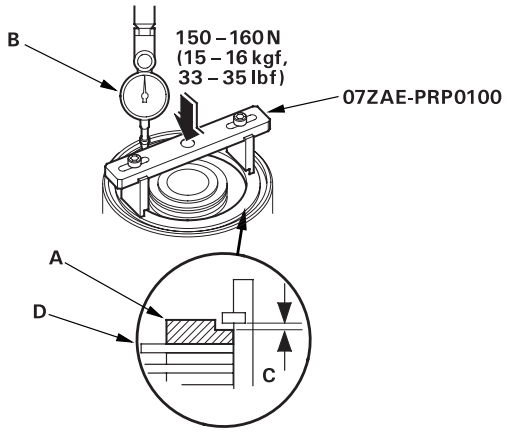


12. Set a dial indicator (A) on the clutch end plate (B).



13. Zero the dial indicator with the clutch end plate lifted up to the snap ring (C).

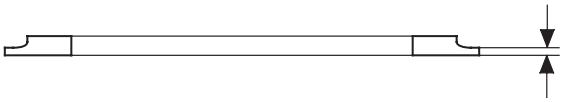
14. Release the clutch end plate to lower the clutch end plate, then put the special tool on the end plate (A).



15. Press the special tool down with 150 - 160 N (15 - 16 kgf, 33 - 35 lbf) using a force gauge, and read the dial indicator (B). The dial indicator reads the clearance (C) between the clutch end plate and top disc (D). Take measurements in at least three places, and use the average as the actual clearance.

Clutch End Plate-to-Top Disc Clearance
Service Limit:
K20A4 and K20A5 engine models
1st Clutch: 1.23 - 1.43 mm (0.048 - 0.056 in.)
2nd Clutch: 0.75 - 0.95 mm (0.030 - 0.037 in.)
3rd Clutch: 0.73 - 0.93 mm (0.029 - 0.037 in.)
4th Clutch: 0.73 - 0.93 mm (0.029 - 0.037 in.)
K24A1 engine model
1st Clutch: 1.28 - 1.48 mm (0.050 - 0.058 in.)
2nd Clutch: 0.85 - 1.05 mm (0.033 - 0.041 in.)
3rd Clutch: 0.73 - 0.93 mm (0.029 - 0.037 in.)
4th Clutch: 0.73 - 0.93 mm (0.029 - 0.037 in.)

16. If the clearance is out of the service limit, select a new clutch end plate from the following table.



CLUTCH END PLATES

K20A4 and K20A5 Engine Models:

For 1st clutch

Plate No.	Part Number	Thickness
1	22551-PRP-003	2.3 mm (0.091 in.)
2	22552-PRP-003	2.4 mm (0.094 in.)
3	22553-PRP-003	2.5 mm (0.098 in.)
4	22554-PRP-003	2.6 mm (0.102 in.)
5	22555-PRP-003	2.7 mm (0.106 in.)
6	22556-PRP-003	2.8 mm (0.110 in.)
7	22557-PRP-003	2.9 mm (0.114 in.)
8	22558-PRP-003	3.0 mm (0.118 in.)
9	22559-PRP-003	3.1 mm (0.122 in.)
10	22560-PRP-003	3.2 mm (0.126 in.)
11	22561-PRP-003	3.3 mm (0.130 in.)
12	22562-PRP-003	3.4 mm (0.134 in.)

For 2nd clutch

Plate No.	Part Number	Thickness
1	22571-PRP-003	2.6 mm (0.102 in.)
2	22572-PRP-003	2.7 mm (0.106 in.)
3	22573-PRP-003	2.8 mm (0.110 in.)
4	22574-PRP-003	2.9 mm (0.114 in.)
5	22575-PRP-003	3.0 mm (0.118 in.)
6	22576-PRP-003	3.1 mm (0.122 in.)
7	22577-PRP-003	3.2 mm (0.126 in.)
8	22578-PRP-003	3.3 mm (0.130 in.)
9	22579-PRP-003	3.4 mm (0.134 in.)

For 3rd and 4th clutches

Plate No.	Part Number	Thickness
11	22581-PRP-003	3.1 mm (0.122 in.)
12	22582-PRP-003	3.2 mm (0.126 in.)
13	22583-PRP-003	3.3 mm (0.130 in.)
14	22584-PRP-003	3.4 mm (0.134 in.)
15	22585-PRP-003	3.5 mm (0.138 in.)
16	22586-PRP-003	3.6 mm (0.142 in.)
17	22587-PRP-003	3.7 mm (0.146 in.)
18	22588-PRP-003	3.8 mm (0.150 in.)
19	22589-PRP-003	3.9 mm (0.154 in.)

(cont'd)

Clutch Clearance Inspection (cont'd)

CLUTCH END PLATES

K24A1 Engine Model:

For 1st clutch

Plate No.	Part Number	Thickness
1	22551-PPV-003	2.6 mm (0.102 in.)
2	22552-PPV-003	2.7 mm (0.106 in.)
3	22553-PPV-003	2.8 mm (0.110 in.)
4	22554-PPV-003	2.9 mm (0.114 in.)
5	22555-PPV-003	3.0 mm (0.118 in.)
6	22556-PPV-003	3.1 mm (0.112 in.)
7	22557-PPV-003	3.2 mm (0.126 in.)
8	22558-PPV-003	3.3 mm (0.130 in.)
9	22559-PPV-003	3.4 mm (0.134 in.)

For 2nd clutch

Plate No.	Part Number	Thickness
1	22571-PRP-003	2.6 mm (0.102 in.)
2	22572-PRP-003	2.7 mm (0.106 in.)
3	22573-PRP-003	2.8 mm (0.110 in.)
4	22574-PRP-003	2.9 mm (0.114 in.)
5	22575-PRP-003	3.0 mm (0.118 in.)
6	22576-PRP-003	3.1 mm (0.122 in.)
7	22577-PRP-003	3.2 mm (0.126 in.)
8	22578-PRP-003	3.3 mm (0.130 in.)
9	22579-PRP-003	3.4 mm (0.134 in.)

For 3rd and 4th clutches

Plate No.	Part Number	Thickness
1	22571-PPV-A01	2.1 mm (0.083 in.)
2	22572-PPV-A01	2.2 mm (0.087 in.)
3	22573-PPV-A01	2.3 mm (0.091 in.)
4	22574-PPV-A01	2.4 mm (0.094 in.)
5	22575-PPV-A01	2.5 mm (0.098 in.)
6	22576-PPV-A01	2.6 mm (0.102 in.)
7	22577-PPV-A01	2.7 mm (0.106 in.)
8	22578-PPV-A01	2.8 mm (0.110 in.)
9	22579-PPV-A01	2.9 mm (0.114 in.)

17. Install the new clutch end plate, then recheck the clearance.

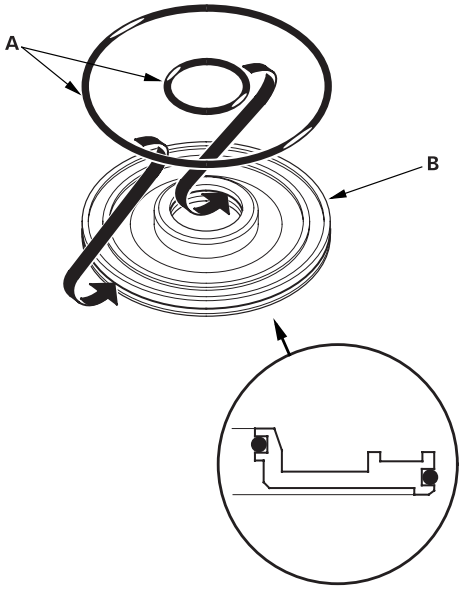
NOTE: If the thickest clutch end plate is installed, but the clearance is still over the service limit, replace the clutch discs and plates.

Clutch Reassembly

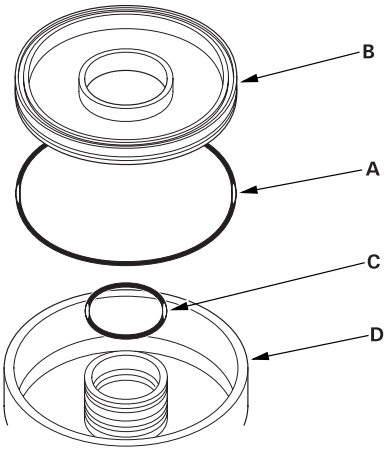
Special Tools Required

- Clutch spring compressor set 07LAE-PX40000
  - Clutch spring compressor attachment 07LAE-PX40100
  - Clutch spring compressor attachment 07HAE-PL50100
  - Clutch spring compressor bolt assembly 07GAE-PG40200
- Snap ring pliers 07LGC-0010100

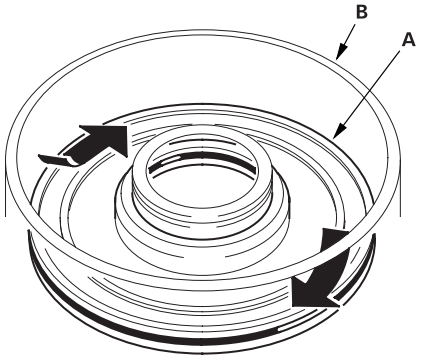
1. Soak the clutch discs thoroughly in ATF for a minimum of 30 minutes.
2. Install the new O-rings (A) on the 3rd and 4th clutch piston (B).



3. Install the new O-ring (A) in the 1st, 2nd clutch pistons (B), and install the new O-ring (C) on the clutch drums (D).



4. Install the clutch piston (A) in the clutch drum (B). Apply pressure and rotate to ensure proper seating. Lubricate the piston O-ring with ATF before installing. Do not pinch the O-ring by installing the piston with to much force.



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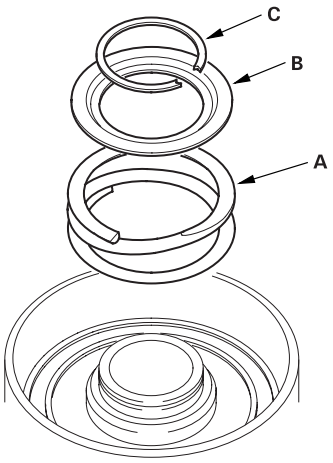
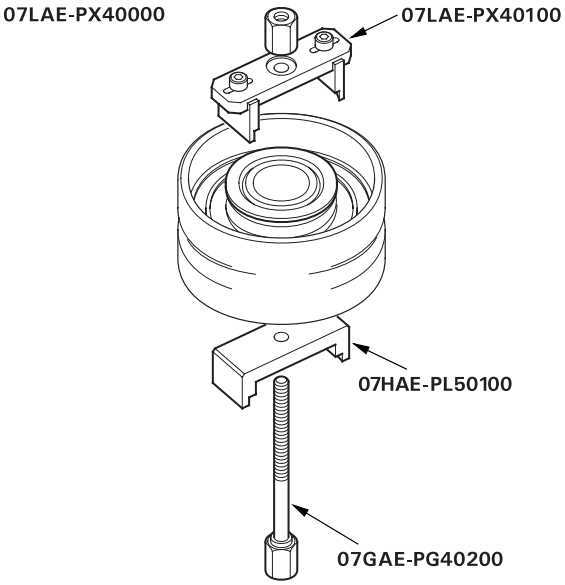
Clutch Reassembly (cont'd)

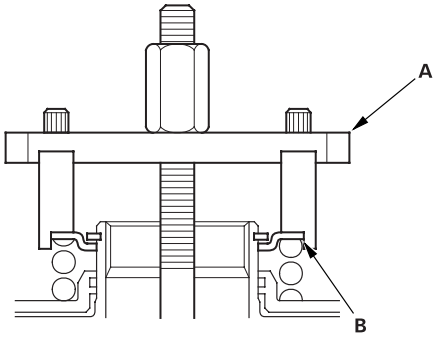
5. Install the return spring (A) and spring retainer (B), and position the snap ring (C) on the retainer.



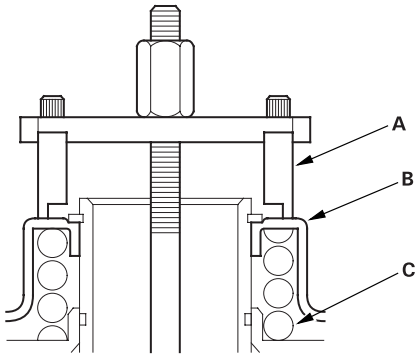
6. Install the special tools.



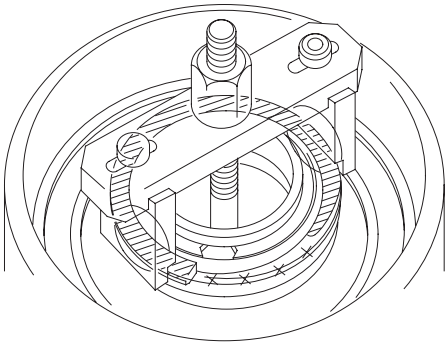
7. Be sure the special tool (A) is adjusted to have full contact with the spring retainer (B) on the 3rd and 4th clutches.



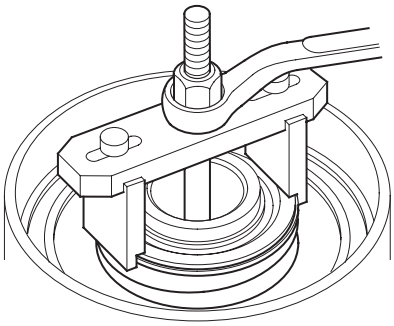
8. Set the special tool (A) on the spring retainer (B) of the 1st and 2nd clutches in such a way that the special tool works on the clutch return spring (C).



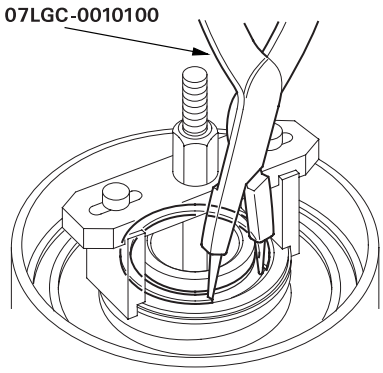
9. If either end of the special tool is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged.



10. Compress the return spring.

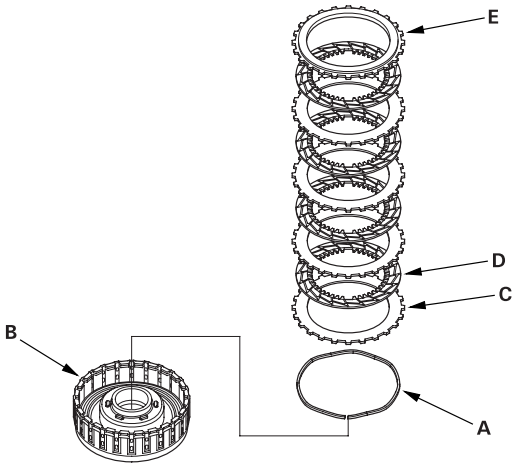


11. Install the snap ring with snap ring pliers.



12. Remove the special tools.

13. Assemble the 1st clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 1st clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (4) (C) and discs (4) (D), then install the clutch end plate (E) with the flat side toward the disc.



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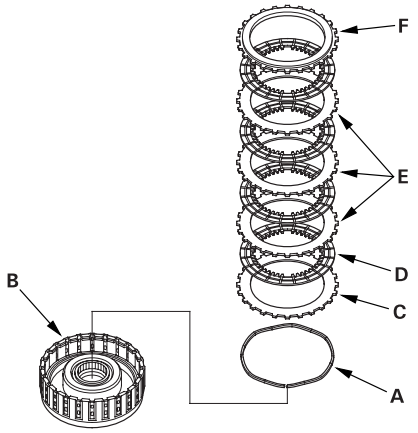
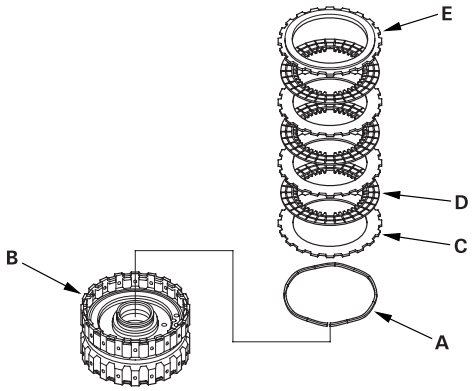
Clutch Reassembly (cont'd)

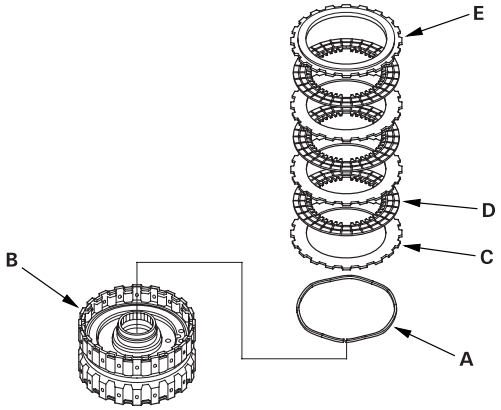
14. Assemble the 2nd clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 2nd clutch drum (B). Install the clutch flat-plate (C), then starting with the clutch disc, alternately install the clutch discs (4) (D) and waved-plates (3) (E), then install the clutch end plate (F) with the flat side toward the disc.



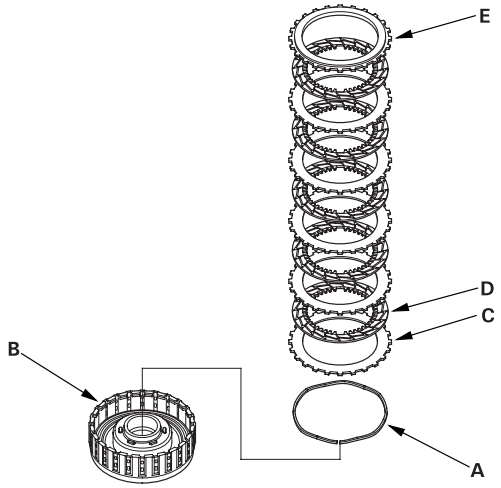
15. Assemble the 3rd clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 3rd clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



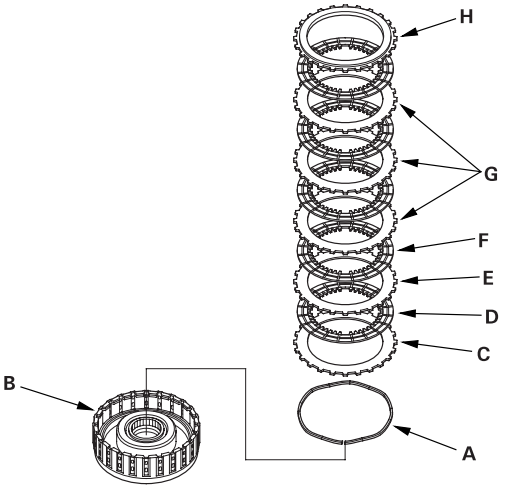
16. Assemble the 4th clutch of K20A4 and K20A5 engine models: Install the waved spring (A) in the 4th clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



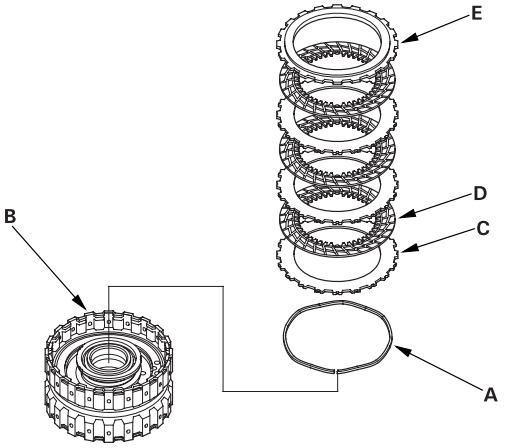
17. Assemble the 1st clutch of K24A1 engine model: Install the waved spring (A) in the 1st clutch drum (B). Starting with the clutch waved-pate, alternately install the clutch plates (5) (C) and discs (5) (D), then install the clutch end plate (E) with the flat side toward the disc.



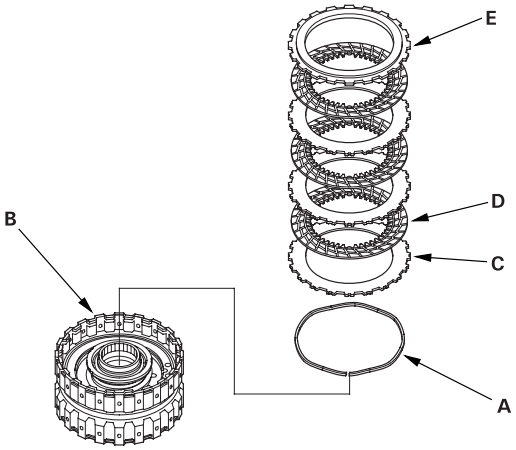
18. Assemble the 2nd clutch of K24A1 engine model: Install the waved spring (A) in the 2nd clutch drum (B). Install the clutch flat-plate (C), clutch disc (D), and clutch flat-plate (E). Starting with the clutch disc, alternately install the clutch discs (4) (F) and clutch waved-pates (3) (G), then install the clutch end plate (H) with the flat side toward the disc.



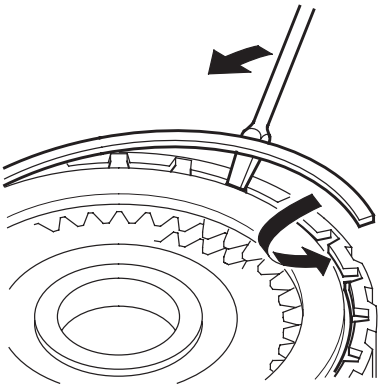
19. Assemble the 3rd clutch of K24A1 engine model: Install the waved spring (A) in the 3rd clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



20. Assemble the 4th clutch of K24A1 engine model: Install the waved spring (A) in the 4th clutch drum (B). Starting with the clutch waved-plate, alternately install the clutch plates (3) (C) and discs (3) (D), then install the clutch end plate (E) with the flat side toward the disc.



21. Install the snap ring with a screwdriver.



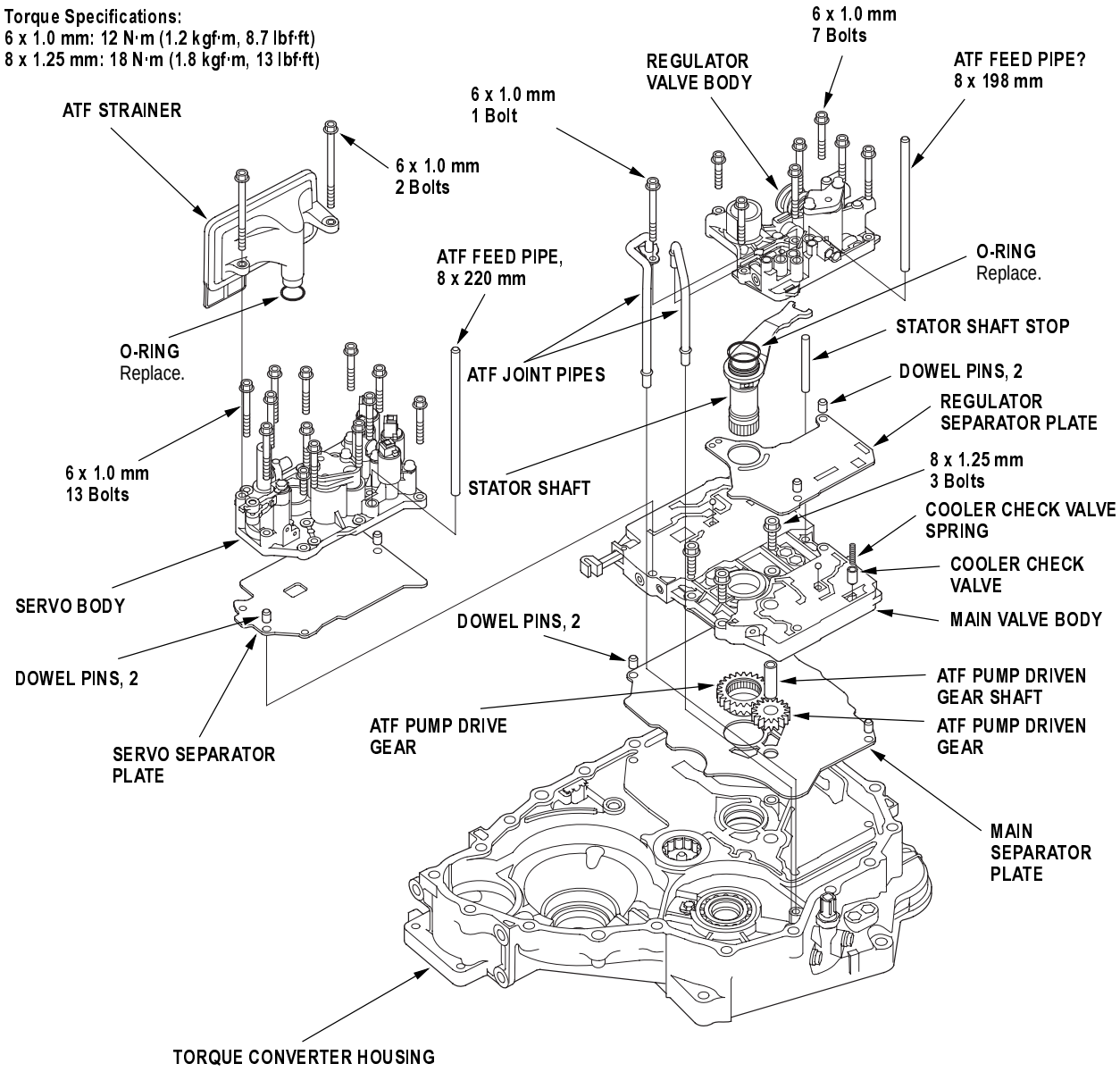
22. Check that the clutch piston moves by applying air pressure into fluid passage.

Valve Body

Valve Bodies and ATF Strainer Installation

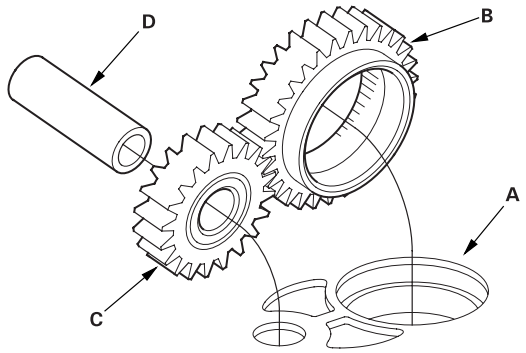
Exploded View

NOTE: The illustration shows the 4WD transmission; the 2WD is similar.

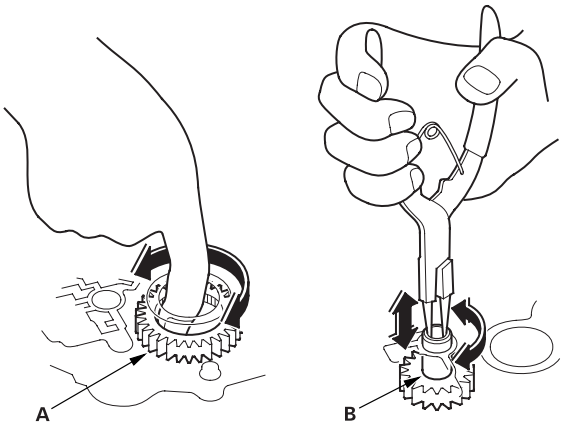


NOTE: Refer to the Exploded View as needed during the following procedure.

1. Install the main separator plate (A) and two dowel pins on the torque converter housing. Then install the ATF pump drive gear (B), driven gear (C), and ATF pump driven gear shaft (D). Install the ATF pump driven gear with its grooved and chamfered side facing down.



2. Install the main valve body.
3. Make sure the ATF pump drive gear (A) rotates smoothly in the normal operating direction, and the ATF pump driven gear shaft (B) moves smoothly in the axial and normal operating direction.

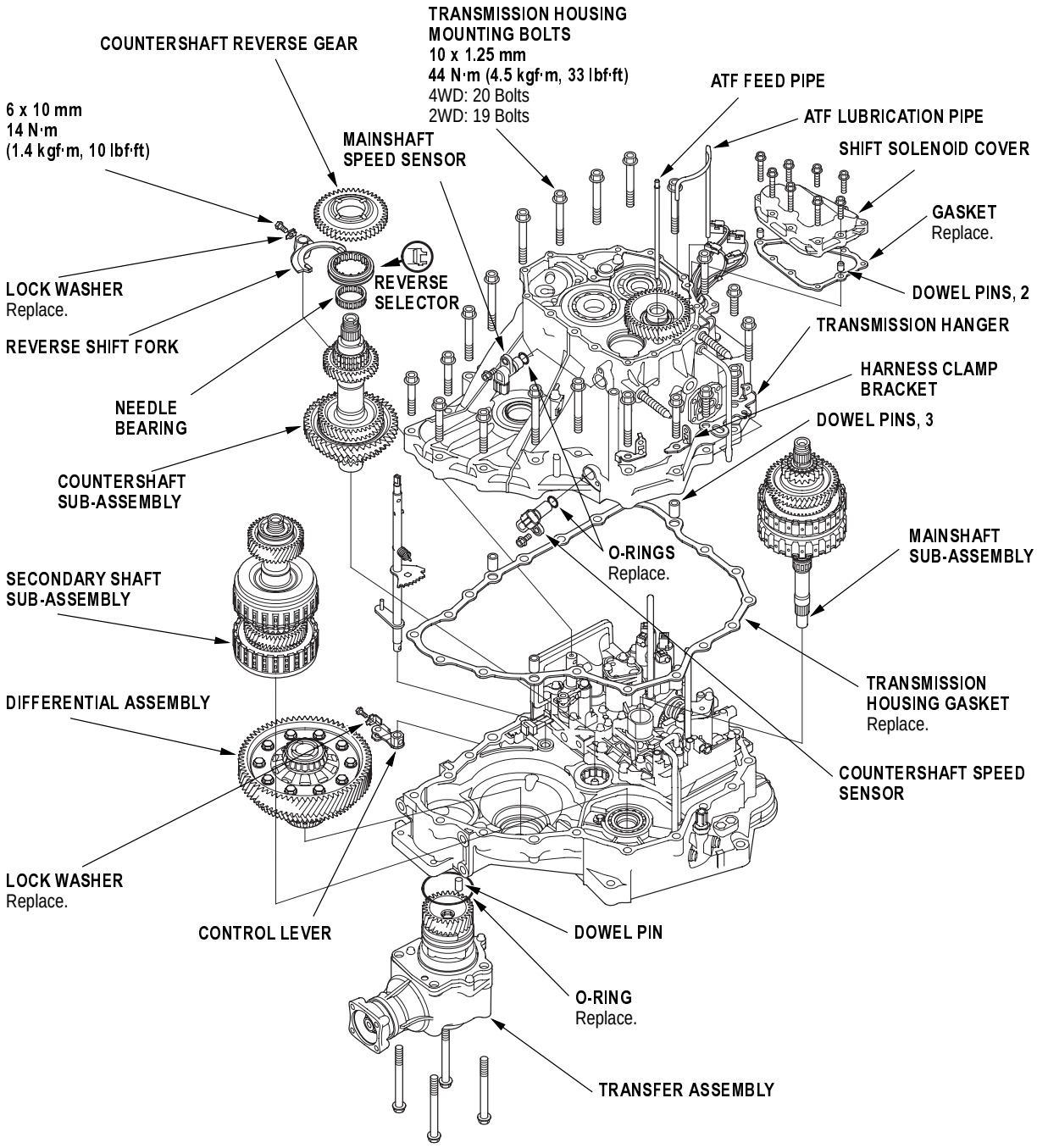


4. If the ATF pump drive gear and ATF pump driven gear shaft do not move smoothly, loosen the main valve body bolts. Realign the ATF pump driven gear shaft, and retighten the bolts to the specified torque, then recheck. Failure to align the ATF pump driven gear shaft correctly will result in a seized ATF pump drive gear or ATF pump driven gear shaft.
5. Make sure that the check balls (two) are in the main valve body, and install the cooler check valve spring and the cooler check valve.
6. Install the regulator separator plate and dowel pins (two) on the main valve body.
7. Install the stator shaft and stator shaft stop.
8. Install the regulator valve body (seven bolts).
9. Install the servo separator plate and dowel pins (two) on the main valve body.
10. Install the servo body (13 bolts).
11. Install the ATF strainer (two bolts).
12. Install the ATF joint pipes (one bolt).
13. Install the ATF feed pipes in the regulator valve body and servo body.

Transmission Housing

Shaft Assemblies and Housing Installation

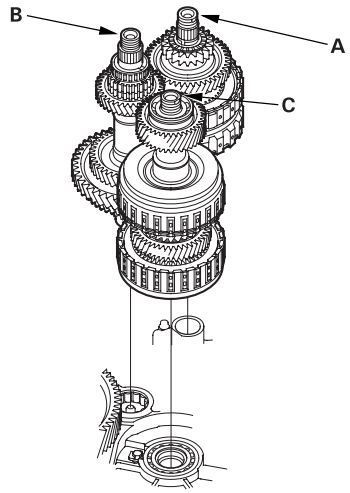
Exploded View



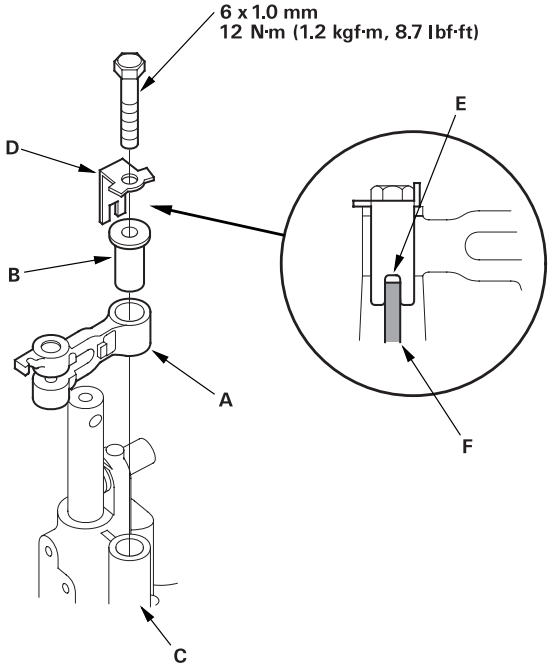
Special Tools Required
Snap ring pliers 07LGC-0010100

NOTE: Refer to the Exploded View as needed during the following procedure. The Exploded View on previous page shows the 4WD transmission model; the 2WD transmission is similar.

1. Install the differential assembly in the torque converter housing.
2. Assemble the mainshaft, countershaft, and secondary shaft.
3. Join the mainshaft sub-assembly (A), countershaft sub-assembly (B), and secondary shaft sub-assembly (C) together, and install them in the torque converter housing.



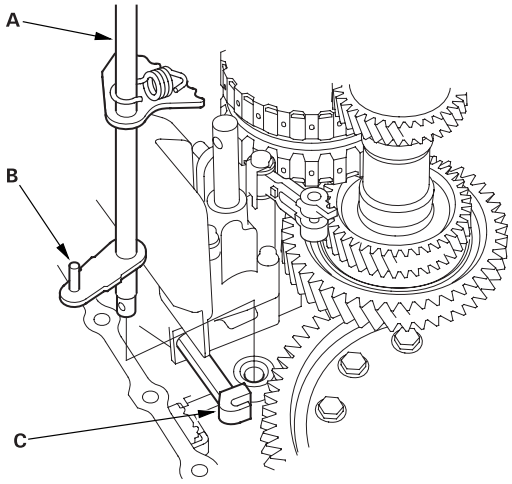
4. If the detent arm was removed, install the detent arm (A) with arm collar (B) on the servo body (C), and install the new lock washer (D) with aligning its cutout (E) with the projection (F) of the servo body. Install and tighten the bolt, then bend the lock tab of the lock washer against the bolt head.



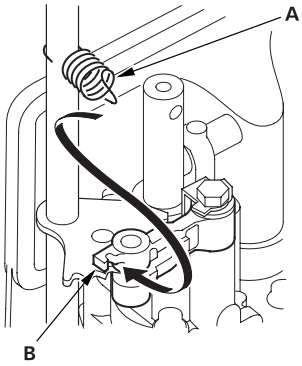
(cont'd)

Shaft Assemblies and Housing Installation (cont'd)

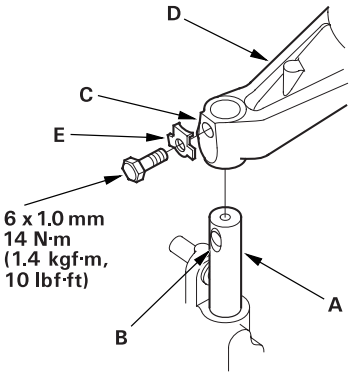
5. Install the control shaft (A) in the torque converter housing aligning the manual valve lever pin (B) on the control shaft with the guide of the manual valve (C). Pull the manual valve gently when aligning the manual valve with the control shaft.



6. Hook the detent arm spring (A) to the detent arm (B).



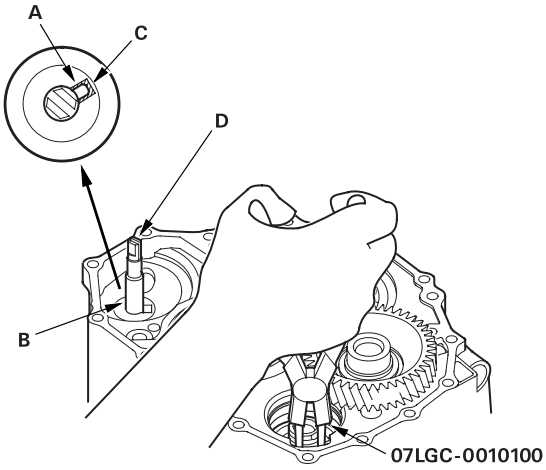
7. Turn the shift fork shaft (A) so the large chamfered hole (B) is facing the fork bolt hole (C) of the shift fork (D).



8. Install the shift fork and reverse selector together on the shift fork shaft and countershaft. Secure the shift fork to the shift fork shaft with the lock bolt and a new lock washer (E), then bend the lock tab of the lock washer against the bolt head.
9. Install the needle bearing and countershaft reverse gear on the countershaft.
10. Install the reverse idler gear in the transmission housing (see page 14-204).
11. Install the idler gear shaft (see page 14-233), if it was removed.
12. Install the three dowel pins and a new gasket on the torque converter housing.

13. Align the spring pin (A) on the control shaft (B) with the transmission housing groove (C) by turning the control shaft.

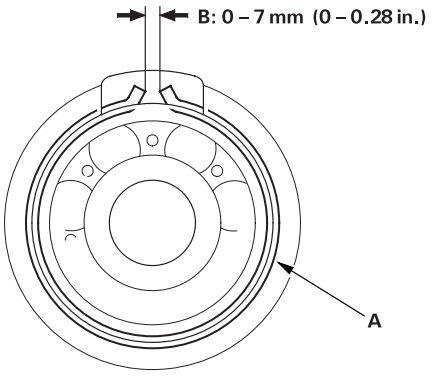
NOTE: Do not squeeze the end (D) of the control shaft tips together when turning the shaft. If the tips are squeezed together will cause a faulty signal or position due to the play between the control shaft and the switch.



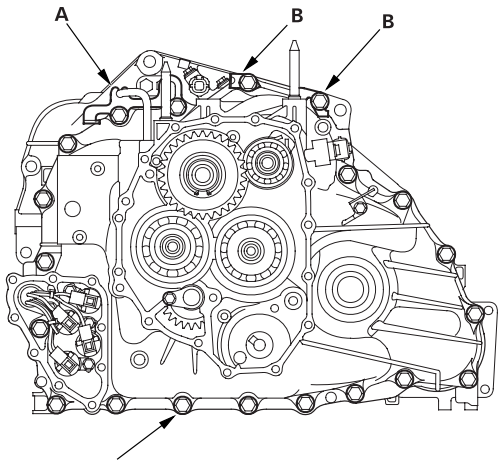
14. Place the transmission housing on the torque converter housing. Do not install the mainshaft and countershaft speed sensors before installing the transmission housing on the torque converter housing.

15. With expanding the snap ring of the secondary shaft bearing using the snap ring pliers, install the transmission housing as the bearing part-way into the housing. Then release the pliers, and push down the housing until it bottoms and until the snap ring snaps in place around the transmission housing snap ring groove.

16. Verify that the secondary shaft bearing snap ring (A) is seated in the bearing and housing groove, and that the ring end gap (B) is correct.



17. Install the transmission housing mounting bolts along with the transmission hanger (A) and harness clamp brackets (B), tighten the bolts in two or three steps in a criss-cross pattern.



TRANSMISSION HOUSING MOUNTING BOLTS

10 x 1.25 mm

44 N·m (4.5 kgf·m, 33 lbf·ft)

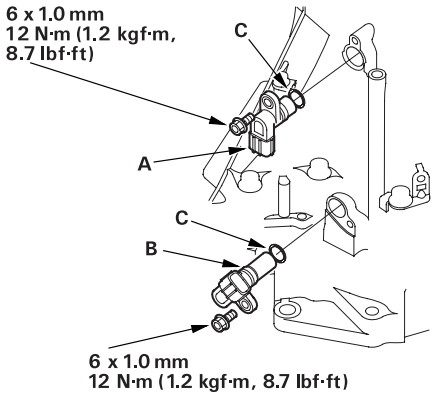
4WD: 20 Bolts

2WD: 19 Bolts

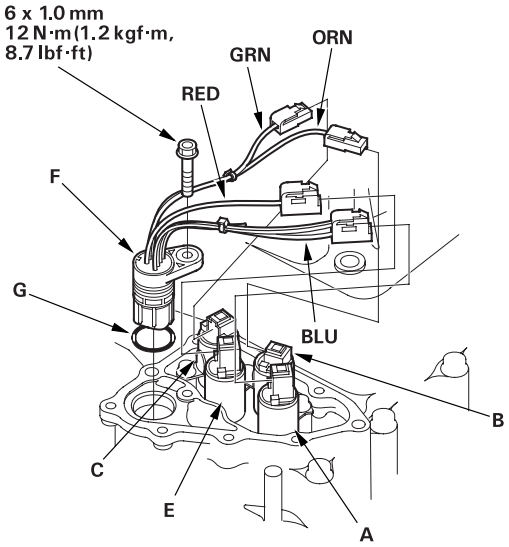
(cont'd)

Shaft Assemblies and Housing Installation (cont'd)

18. Install the mainshaft speed sensor (A) and countershaft speed sensor (B) with new O-rings (C).



19. Install the shift solenoid harness connector (F) in the transmission housing with the new O-ring (G).

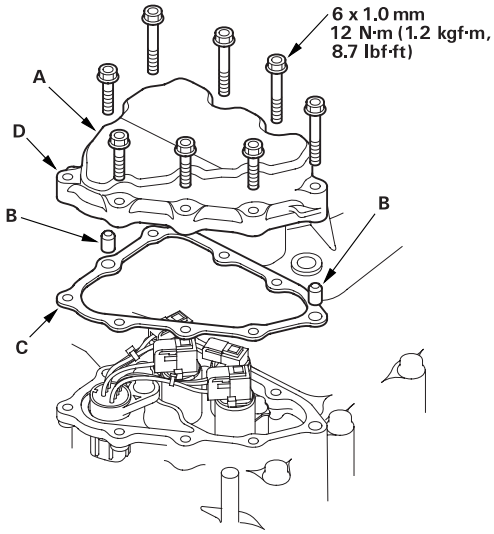


20. Connect the connector (BLU, WHT and WHT wires) to the shift solenoid valve A.

21. Connect the connectors to respective solenoid valves:

- ORN wire to shift solenoid valve B.
- GRN wire to shift solenoid valve C.
- RED wire to shift solenoid valve E.

22. Install the shift solenoid valve cover (A) with the two dowel pins (B) and the new gasket (C), and tighten the bolts (eight). Install the one bolt with the bracket for the ATF cooler line in the bolt hole (D) in step 34 in End Cover Installation (see step 34 on page 14-263).

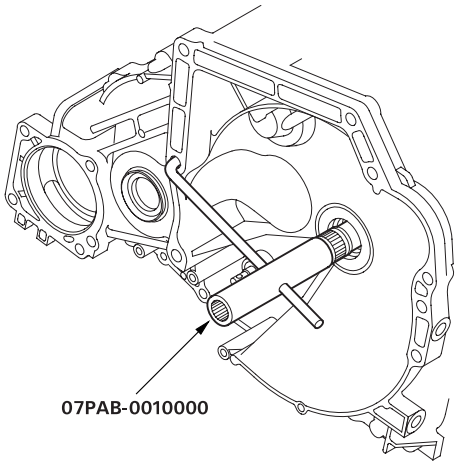


Transmission End Cover

End Cover Installation

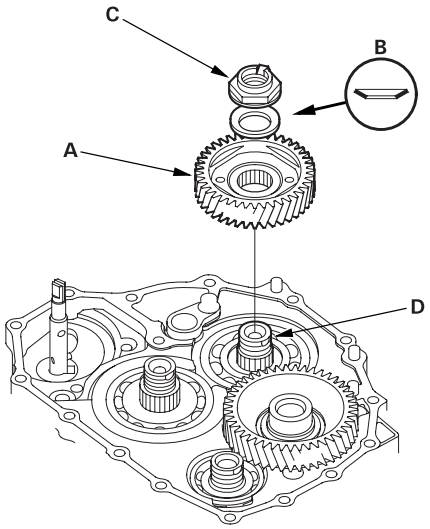
Special Tools Required
Mainshaft holder set 07PAB-0010000

1. Install the special tool onto the mainshaft.

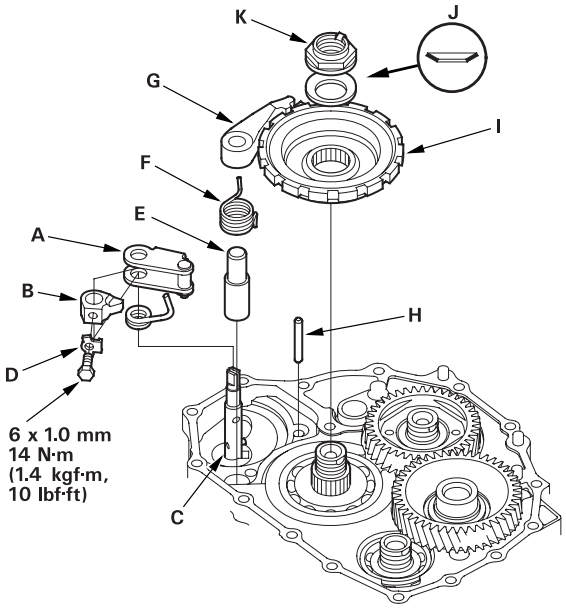


2. Lubricate the following parts with ATF:
   - Splines and threads of the mainshaft.
   - Splines of the mainshaft idler gear.
   - Old conical spring washer and old locknut.
3. Install the mainshaft idler gear (A), old conical spring washer (B), and old locknut (C) on the mainshaft (D), and tighten the locknut to 226 N·m (23.0 kgf·m, 166 lbf·ft).

   NOTE:
   - Do not tap the idler gear to install.
   - Use a torque wrench to tighten the locknut. Do not use an impact wrench.



4. Install the park lever (A) and park lever stop (B) on the control shaft (C), then install the lock bolt with the new lock washer (D). Do not bend the lock tab of the lock washer until step 18.



5. Install the park pawl shaft (E), park pawl spring (F), park pawl (G), and stop shaft (H) on the transmission housing.
6. Lubricate the following parts with ATF:
   - Threads and splines of the countershaft.
   - Old conical spring washer and old locknut.
   - Areas where the park gear contacts the conical spring washer.
7. Install the park gear (I), old conical spring washer (J), and old locknut (K) on the countershaft.
8. Lift the park pawl up, and engage it with the park gear, then tighten the locknut to 226 N·m (23.0 kgf·m, 166 lbf·ft).

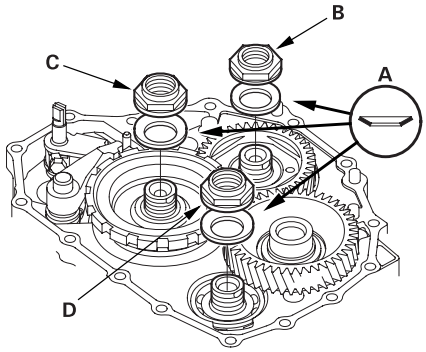
   NOTE:
   - Do not tap the park gear to install.
   - Use a torque wrench to tighten the locknut. Do not use an impact wrench.
   - Countershaft locknut has left-hand threads.
9. Remove the locknuts and conical spring washers from the mainshaft and countershaft.

(cont'd)

End Cover Installation (cont'd)

10. Lubricate the threads of the shafts, the new locknuts and the new conical spring washers with ATF.

11. Install the new conical spring washers (A) with facing stamped mark side up in the direction shown, and install the new mainshaft locknut (B), the new countershaft locknut (C), and the new secondary shaft locknut (D).

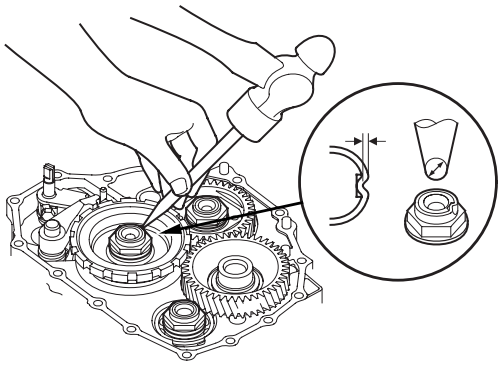


12. Tighten the locknuts to 167 N·m (17.0 kgf·m, 123 lbf·ft).

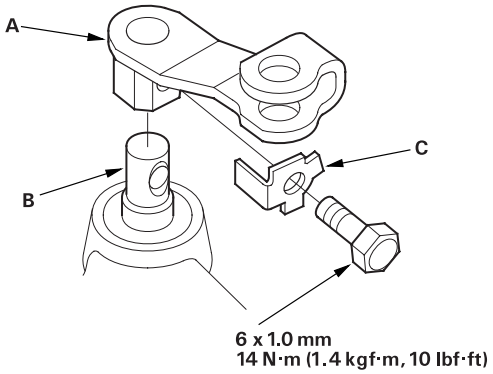
NOTE:
- Be sure to install the conical spring washers in the direction shown.
- Use a torque wrench to tighten the locknut. Do not use an impact wrench.
- Countershaft and secondary shaft locknuts have left-hand threads.

13. Remove the special tool from the mainshaft.

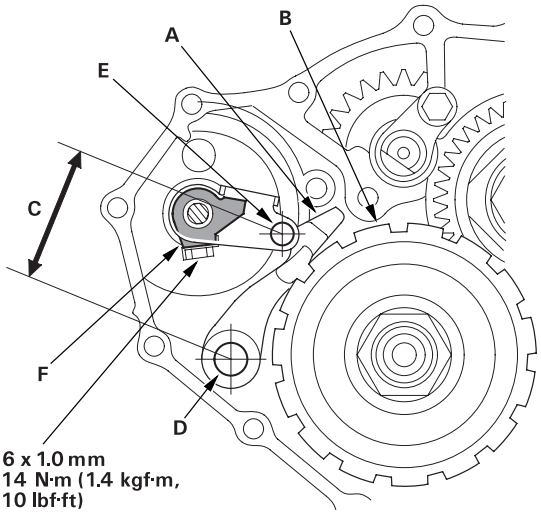
14. Stake the locknuts into the shafts with a punch.



15. Install the control level (A) on the control shaft (B), and install the bolt with the new lock washer (C), then bend the lock tab of the lock washer against the bolt head.



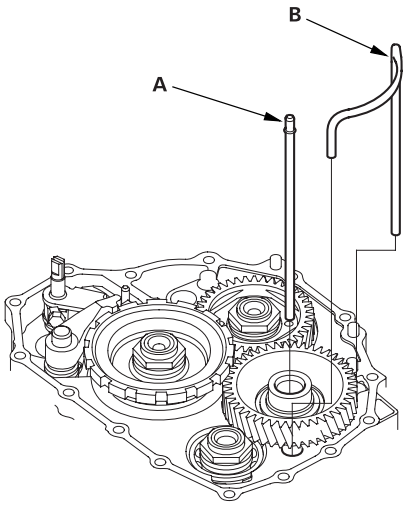
16. Set the park lever in the [P] position, then verify that the park pawl (A) engages the park gear (B).



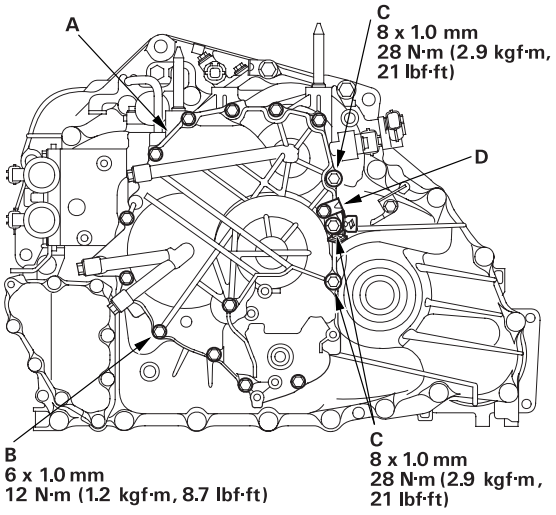
17. If the park pawl does not engage fully, check the distance (C) between the pawl shaft (D) and the park lever roller pin (E) (see page 14-195).

18. Tighten the lock bolt, and bend the lock tab of the lock washer (F) against the bolt head.

19. Install the ATF feed pipe (A) into the idler gear shaft, and install the ATF lubrication pipe (B) into the transmission housing.



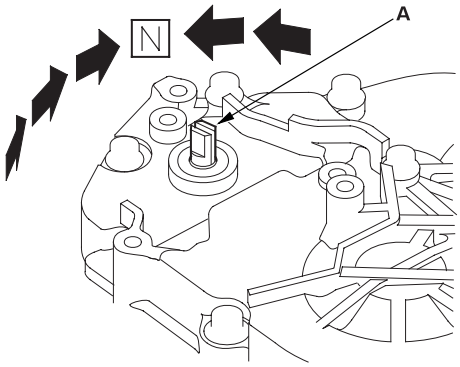
20. Install the end cover (A) with the two dowel pins, new O-rings, and new gasket. Tighten the 6 x 1.0 mm bolts (12) (B) and 8 x 1.0 mm bolts (3) (C).



21. Install the harness clamp bracket (D).

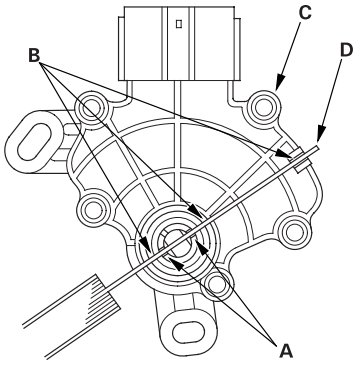
22. Set the control shaft (A) to [N] position by turning the control lever on the torque converter side.

NOTE: Do not squeeze the end of the control shaft tips together when turning the shaft. If the tips are squeezed together it will cause a faulty signal or position due to the play between the control shaft and the switch.



23. Align the cutouts (A) on the rotary-frame with the neutral positioning cutouts (B) on the transmission range switch (C), then put a 2.0 mm (0.08 in.) feeler gauge blade (D) in the cutouts to hold in the [N] position.

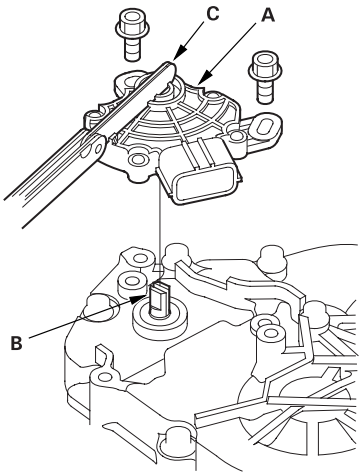
NOTE: Be sure to use a 2.0 mm (0.08 in.) blade or equivalent to hold the switch in the [N] position.



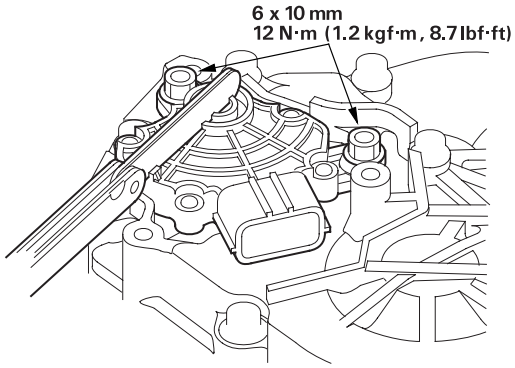
(cont'd)

End Cover Installation (cont'd)

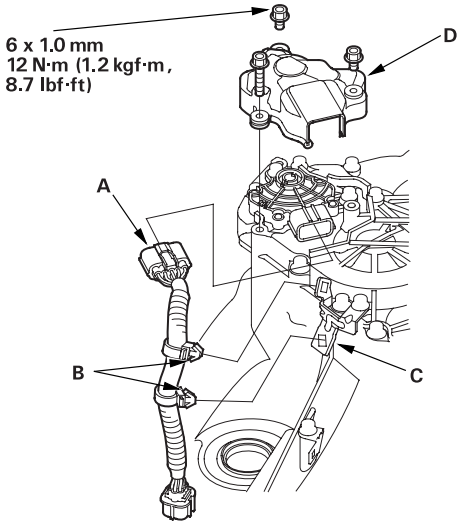
24. Install the transmission range switch (A) gently on the control shaft (B) with holding the [N] position with the 2.0 mm (0.08 in.) blade (C).



25. Tighten the bolts on the transmission range switch while you continue to hold the [N] position. Do not move the transmission range switch when tightening the bolts. Remove the feeler gauge.

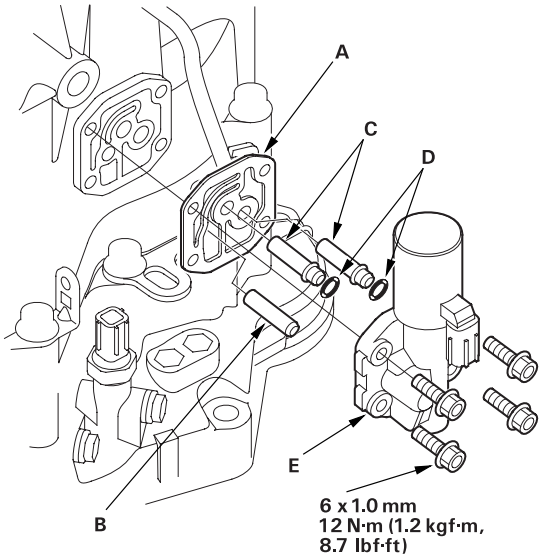


26. Connect the transmission range switch connector (A) securely, then install the harness clamps (B) on the clamp bracket (C).



27. Install the transmission range switch cover (D).

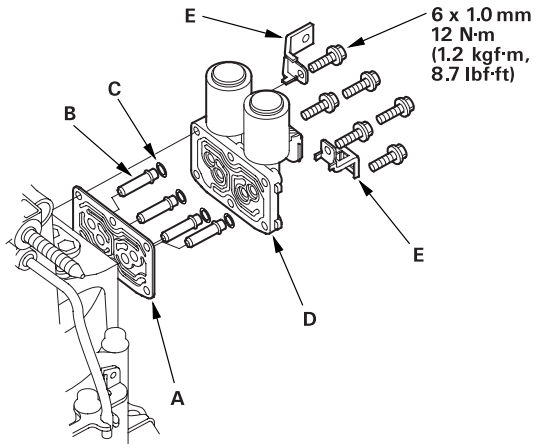
28. Install the new gasket (A) on the transmission housing, and install the ATF pipe (B) and ATF joint pipes (C).



29. Install the new O-rings (D) over the ATF joint pipes.

30. Install the A/T clutch pressure control solenoid valve A (E).

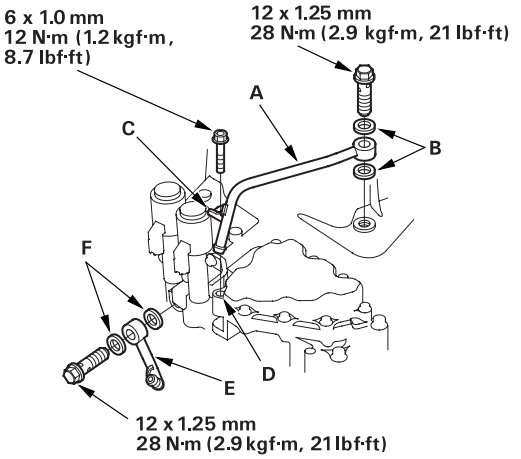
31. Install the new gasket (A) on the transmission housing, and install the ATF joint pipes (B).



32. Install the new O-rings (C) over the ATF joint pipes.

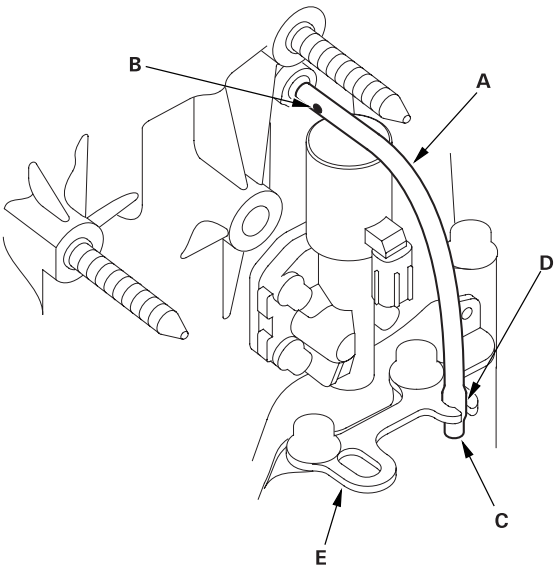
33. Install the A/T clutch pressure control solenoid valves B and C (D), and harness clamp brackets (E).

34. Install the ATF cooler inlet line (A) with the new sealing washers (B), and install the bracket (C) of the ATF cooler inlet line on the shift solenoid valve cover hole (D) (described in step 22 (see page 14-258) in Shaft Assemblies and ATF Strainer Installation).

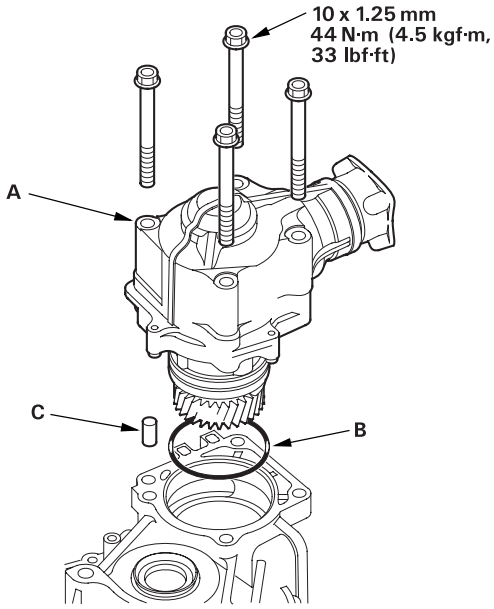


35. Install the ATF cooler outlet line (E) with the new sealing washers (F).

36. Install the breather tube (A) with facing the dot (B) on the tube in a rearward position (differential side), then install the other end (C) in the slot (D) of the transmission hanger (E).



37. For 4WD model: Install the transfer assembly (A) with the new O-ring (B) and dowel pin (C).

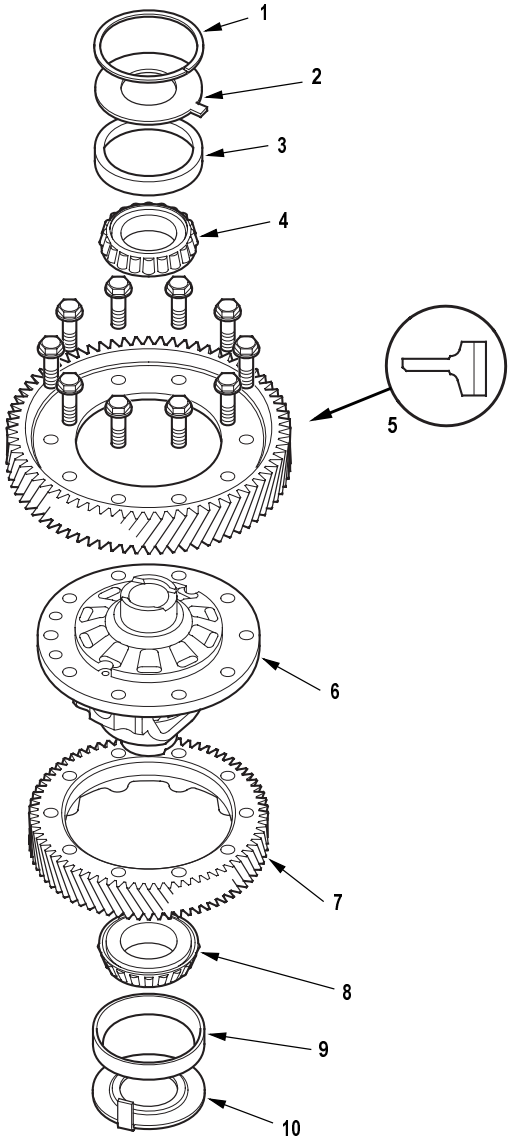


38. Install the ATF dipstick.

A/T Differential

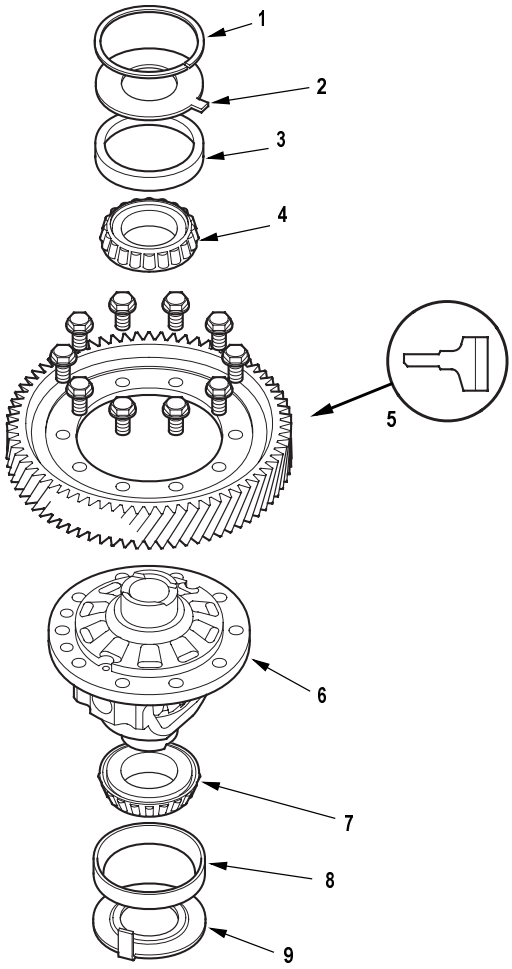
Component Location Index

4WD:



1	THRUST SHIM, 75 mm	Preload Inspection, page 14-270
2	THRUST WASHER, 76.2 mm	
3	BEARING OUTER RACE	Replacement, page 14-268
4	CARRIER BEARING	Replacement, page 14-265
5	FINAL DRIVEN GEAR	Replacement, page 14-266
6	DIFFERENTIAL CARRIER	Backlash Inspection, page 14-265 Replacement, page 14-266
7	TRANSFER DRIVE GEAR	Replacement, page 14-266
8	CARRIER BEARING	Replacement, page 14-265
9	BEARING OUTER RACE	Replacement, page 14-268
10	THRUST WASHER, 80 mm	

2WD:

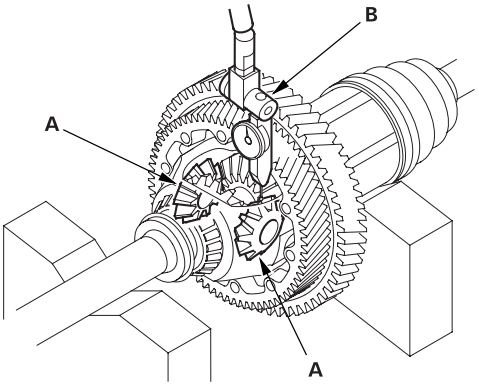


1	THRUST SHIM, 76 mm	Preload Inspection, page 14-270
2	THRUST WASHER, 76.2 mm	
3	BEARING OUTER RACE	Replacement, page 14-268
4	CARRIER BEARING	Replacement, page 14-265
5	FINAL DRIVEN GEAR	Replacement, page 14-266
6	DIFFERENTIAL CARRIER	Backlash Inspection, page 14-265 Replacement, page 14-266
7	CARRIER BEARING	Replacement, page 14-265
8	BEARING OUTER RACE	Replacement, page 14-268
9	THRUST WASHER, 80 mm	

Backlash Inspection

NOTE: The illustration shows the 4WD model; 2WD is similar.

1. Install the driveshaft and intermediate shaft on the differential, then place the axles on V-blocks.



2. Check the backlash of the pinion gears (A) with a dial indicator (B).

   STANDARD: 0.05 - 0.15 mm (0.002 - 0.006 in.)

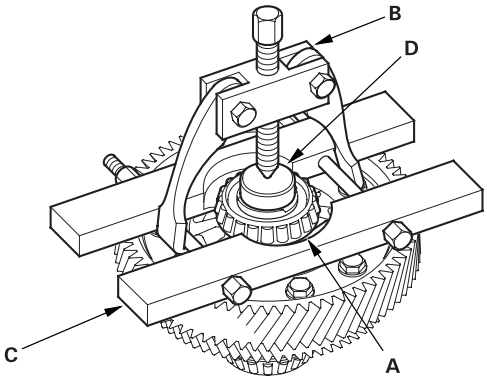
3. If the backlash is out of standard, replace the differential carrier.

Carrier Bearing Replacement

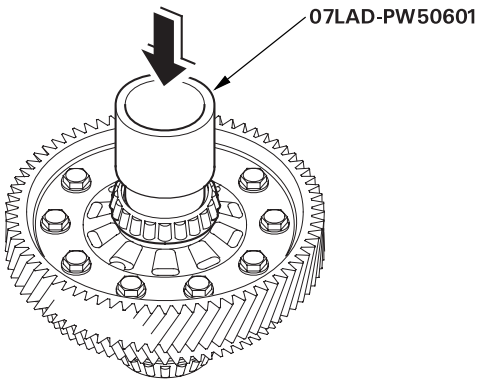
Special Tools Required
Attachment, 40 x 50 mm 07LAD-PW50601

NOTE:
- The bearing and bearing outer race should be replaced as a set.
- Inspect and adjust the carrier bearing preload whenever bearing is replaced.
- Check the bearing for wear and rough rotation. If the bearing is OK, removal is not necessary.
- The illustration shows the 4WD model; 2WD is similar.

1. Remove the carrier bearing (A) with a commercially available puller (B), bearing separator (C), and stepper adapter (D).



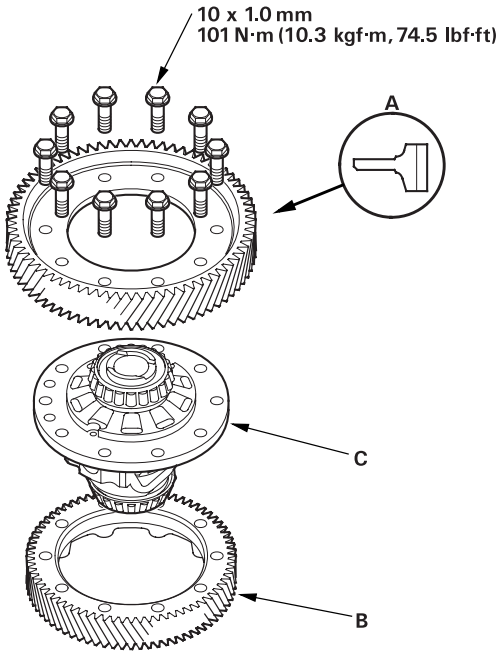
2. Install the new bearings with the special tool and a press. Press the bearing on securely so there is no clearance between the bearing and the differential carrier.



Differential Carrier/Final Driven Gear Replacement

4WD:

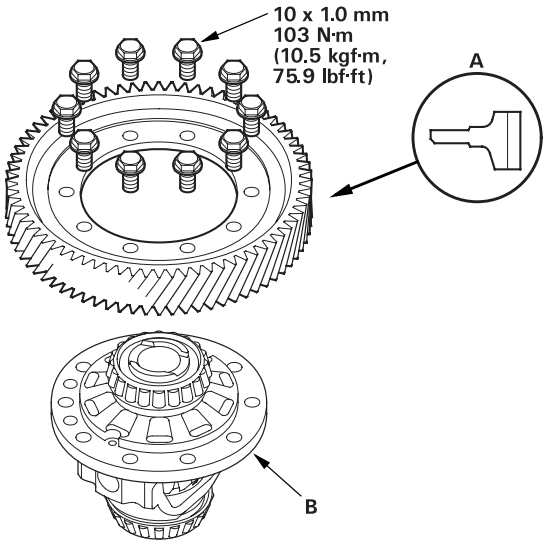
1. Remove the final driven gear (A) and transfer drive gear (B) from the differential carrier (C).
   NOTE: The final driven gear bolts have left-hand threads.



2. Install the final driven gear with the chamfered side on the inner bore facing the differential carrier.
3. Tighten the bolts to the specified torque in a crisscross pattern.

2WD:

1. Remove the final driven gear from the differential carrier, and replace the differential carrier or final driven gear.
2. Install the final driven gear (A) in the direction shown on the differential carrier (B).
   NOTE: Differential carrier bolts have left-hand threads.

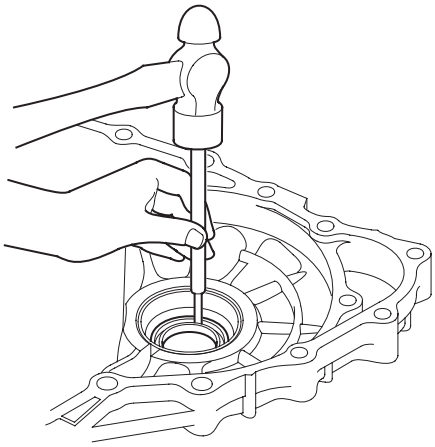


Oil Seal Replacement

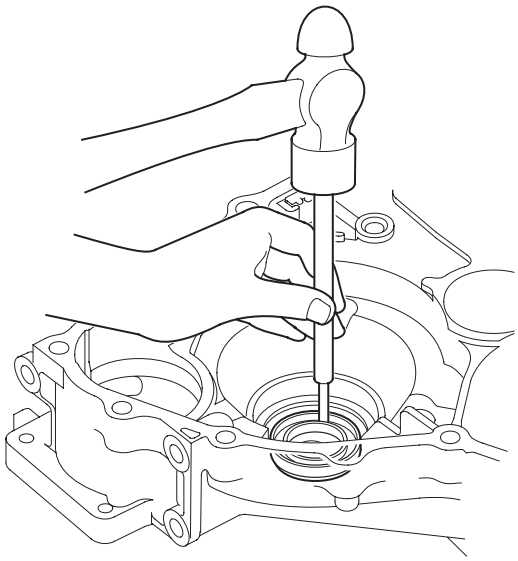
Special Tools Required
- Handle driver 07749-0010000
- Oil seal driver attachment 07947-SD90101
- Oil seal driver attachment 07JAD-PH80101

NOTE: The illustration shows the 4WD model; 2WD is similar.

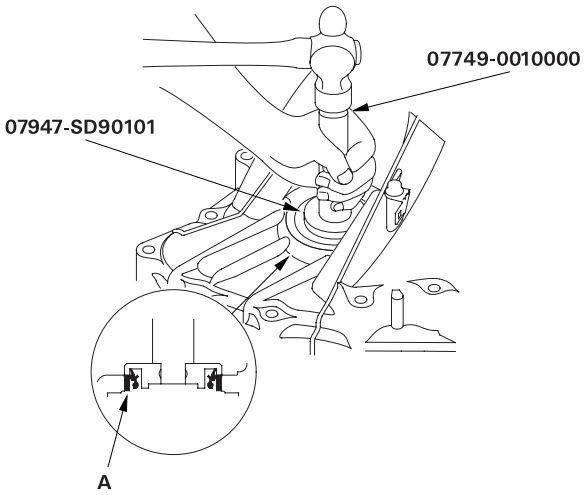
1. Remove the oil seal from the transmission housing.



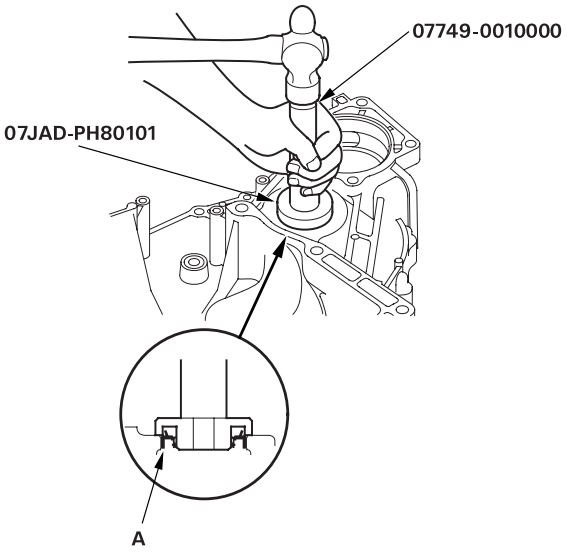
2. Remove the oil seal from the torque converter housing.



3. Install the new oil seal (A) in the transmission housing with the special tools.



4. Install the new oil seal (A) in the torque converter housing with the special tools.



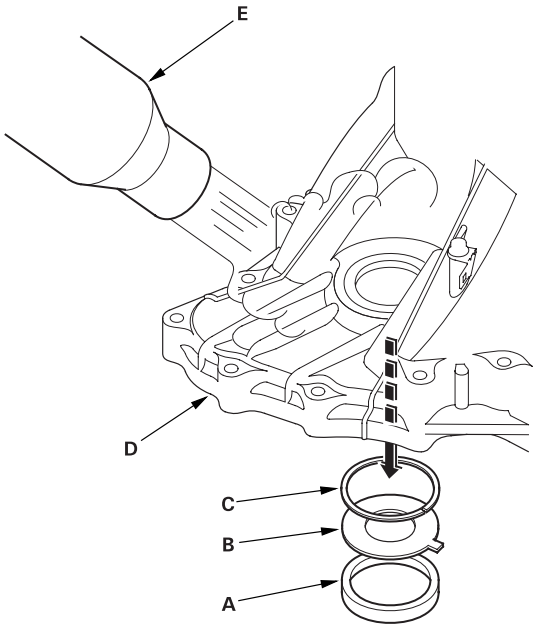
Carrier Bearing Outer Race Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 78 x 90 mm 07GAD-SD40101
- Driver attachment, 72 x 75 mm 07746-0010600

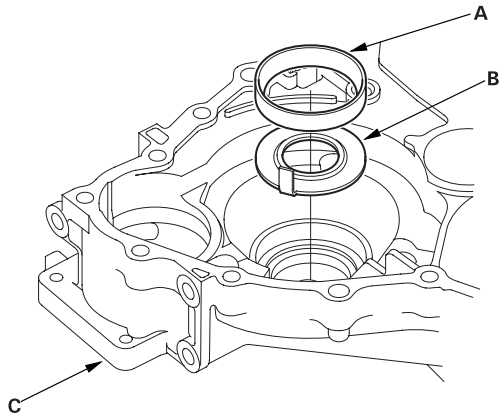
NOTE:
- The bearing and bearing outer race should be replaced as a set.
- Replace the bearing with a new one whenever the outer race is replaced.
- Do not use the thrust shim on the torque converter housing.
- Adjust bearing preload after replacing the bearing and outer race.
- Coat all parts with ATF during installation.
- The illustration shows the 4WD model; 2WD is similar.

1. Remove the bearing outer race (A), 76.2 mm thrust washer (B), and 76 mm thrust shim (C) from the transmission housing (D) by heating the housing to about 212°F (100°C) with heat gun (E). Do not heat the housing in excess of 212°F (100°C).

NOTE: Let the transmission housing cool to room temperature before installing the bearing outer race.

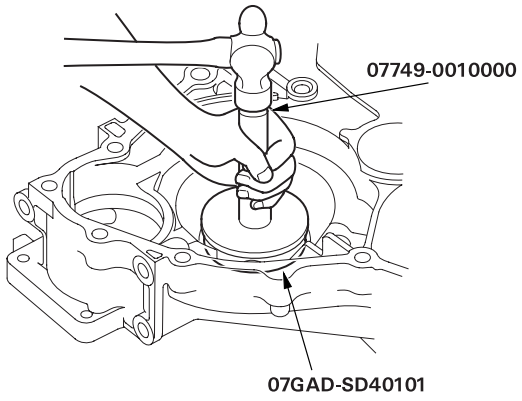


2. Remove the bearing outer race (A) and 80 mm thrust washer (B) from the torque converter housing (C).

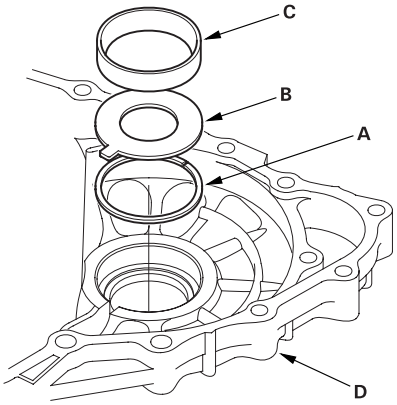


3. Install the 80 mm thrust washer and the new bearing outer race in the torque converter housing.

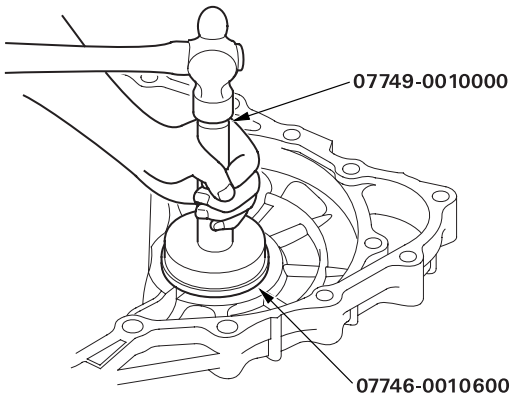
4. Drive the bearing outer race to install securely in the housing with the special tools.



5. Install the 76 mm thrust shim (A), 76.2 mm thrust washer (B), and the new bearing outer race (C) in the transmission housing (D).



6. Drive the bearing outer race to install securely so there is no clearance between the outer race, thrust washer, shim and housing with the special tools.



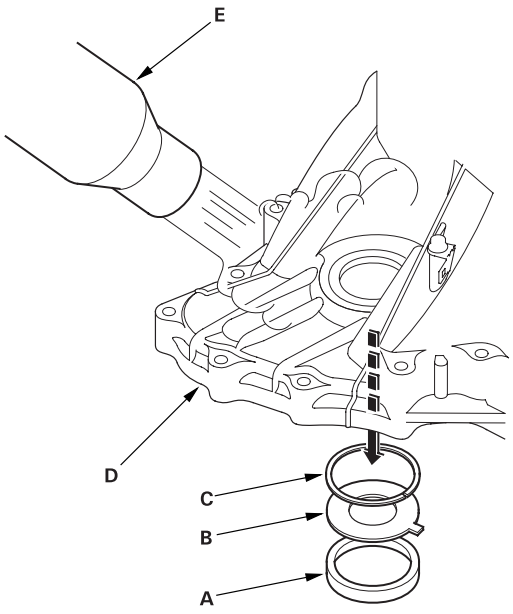
Carrier Bearing Preload Inspection

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 72 x 75 mm 07746-0010600
- Preload inspection tool 07HAJ-PK40201

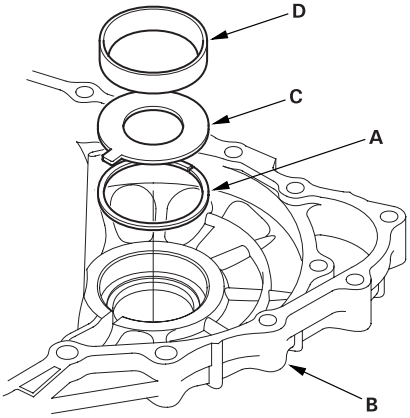
NOTE:
- If the transmission housing, torque converter housing, differential carrier, carrier bearing and outer race, or thrust shim were replaced, the bearing preload must be adjusted.
- Coat all parts with ATF during installation.
- Do not use the thrust shim in the torque converter housing.
- The illustration shows the 4WD model; 2WD is similar.

1. Remove the bearing outer race (A), 76.2 mm thrust washer (B), and 76 mm thrust shim (C) from the transmission housing (D) by heating the housing to about 212°F (100)°C) with heat gun (E). Do not heat the housing in excess of 212°F (100°C).

NOTE: Let the transmission housing cool to room temperature before adjusting the bearing preload.

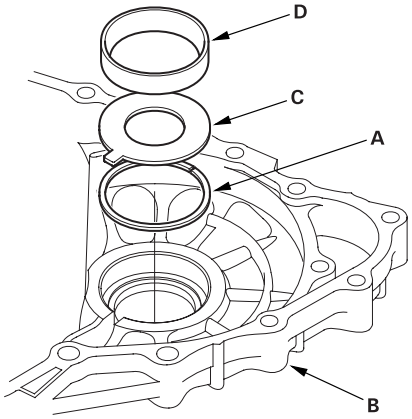


2. Install the 76 mm thrust shim (A) in the transmission housing (B).
If you replace the 76 mm thrust shim with new one, use the same thickness shim as the old one.

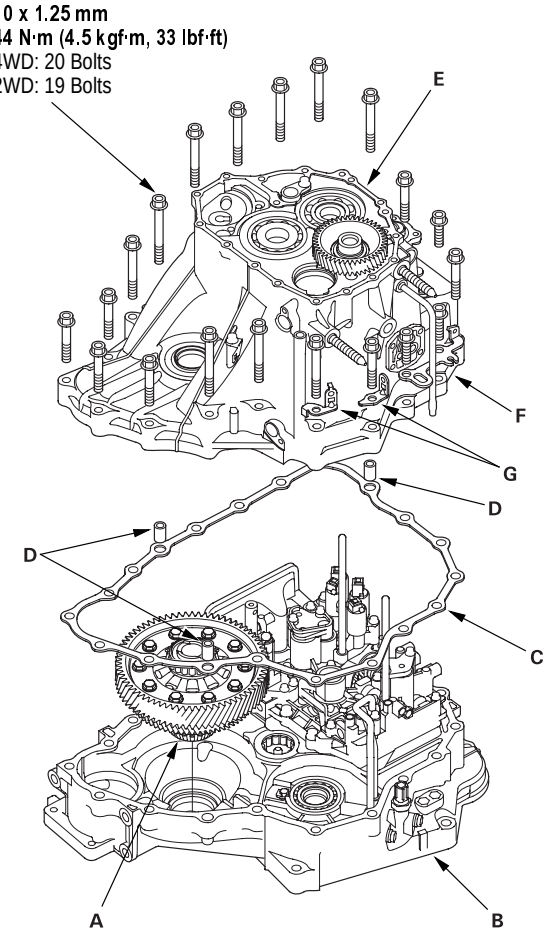


3. Install the 76.2 mm thrust washer (C) and the bearing outer race (D) in the transmission housing.

4. Drive the bearing outer race to install securely so there is no clearance between the outer race, thrust washer, shim and housing with the special tools.



5. Install the differential assembly (A) in the torque converter housing (B), and install the gasket (C) and dowel pins (D) on the housing.



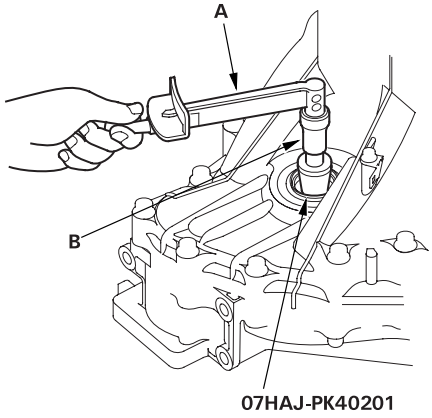
6. Install the transmission housing (E) with the transmission hanger (F) and harness clamp brackets (G), then tighten the bolts.

7. Rotate the differential assembly in both directions to seat the bearings.

8. Measure the starting torque of the differential assembly with the special tool, a torque wrench (A) and socket (B). Measure the starting torque at normal room temperature in both directions.

STANDARD:

New Bearing:	**2.7 - 3.9 N·m (28 - 40 kgf·cm, 24 - 35 lbf·in)**
Reused Bearing:	**2.5 - 3.6 N·m (25 - 37 kgf·cm, 22 - 32 lbf·in)**



(cont'd)

Carrier Bearing Preload Inspection (cont'd)

9. If the measurement is out of standard, remove the thrust shim and select the thrust shim from table below. Install the new thrust shim and recheck. To increase the starting torque, increase the thickness of the thrust shim. To decrease the starting torque, decrease the thickness of the shim. Changing the shim to the next size will increase or decrease starting torque about 0.3 - 0.4 N·m (3 - 4 kgf·cm, 3 - 3 lbf·in).

THRUST SHIM, 76 mm

No.	Part Number	Thickness
S	41438-PX4-700	2.05 mm (0.080 in.)
T	41439-PX4-700	2.10 mm (0.082 in.)
U	41440-PX4-700	2.15 mm (0.084 in.)
A	41441-PK4-000	2.20 mm (0.086 in.)
B	41442-PK4-000	2.25 mm (0.088 in.)
C	41443-PK4-000	2.30 mm (0.090 in.)
D	41444-PK4-000	2.35 mm (0.092 in.)
E	41445-PK4-000	2.40 mm (0.094 in.)
F	41446-PK4-000	2.45 mm (0.096 in.)
G	41447-PK4-000	2.50 mm (0.098 in.)
H	41448-PK4-000	2.55 mm (0.099 in.)
I	41449-PK4-000	2.60 mm (0.101 in.)
J	41450-PK4-000	2.65 mm (0.103 in.)
K	41451-PK4-000	2.70 mm (0.105 in.)
L	41452-PK4-000	2.75 mm (0.107 in.)
M	41453-PK4-000	2.80 mm (0.109 in.)
N	41454-PK4-000	2.85 mm (0.111 in.)
O	41455-PK4-000	2.90 mm (0.113 in.)
P	41456-PK4-000	2.95 mm (0.115 in.)
Q	41457-PK4-000	3.00 mm (0.117 in.)
R	41458-PK4-000	3.05 mm (0.119 in.)
0A	41428-PRP-000	1.55 mm (0.061 in.)
0B	41429-PRP-000	1.60 mm (0.063 in.)
0C	41430-PRP-000	1.65 mm (0.065 in.)
0D	41431-PRP-000	1.70 mm (0.067 in.)
0E	41432-PRP-000	1.75 mm (0.069 in.)
0F	41433-PRP-000	1.80 mm (0.071 in.)
0G	41434-PRP-000	1.85 mm (0.073 in.)
0H	41435-PRP-000	1.90 mm (0.075 in.)
0I	41436-PRP-000	1.95 mm (0.077 in.)
0J	41437-PRP-000	2.00 mm (0.079 in.)

(cont'd)

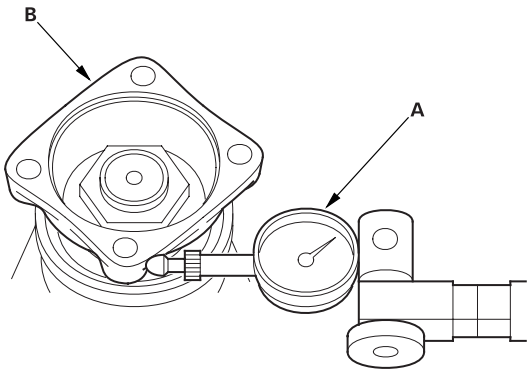
THRUST SHIM, 76 mm (cont'd)

No.	Part Number	Thickness
A	41428-PAX-000	1.575 mm (0.062 in.)
B	41429-PAX-000	1.625 mm (0.064 in.)
C	41430-PAX-000	1.675 mm (0.066 in.)
D	41431-PAX-000	1.725 mm (0.068 in.)
E	41432-PAX-000	1.775 mm (0.070 in.)
F	41433-PAX-000	1.825 mm (0.072 in.)
G	41434-PAX-000	1.875 mm (0.074 in.)
H	41435-PAX-000	1.925 mm (0.076 in.)
I	41436-PAX-000	1.975 mm (0.078 in.)
J	41437-PAX-000	2.025 mm (0.080 in.)
K	41438-PAX-000	2.075 mm (0.082 in.)
L	41439-PAX-000	2.125 mm (0.084 in.)
M	41440-PAX-000	2.175 mm (0.086 in.)
N	41441-PAX-000	2.225 mm (0.088 in.)
O	41442-PAX-000	2.275 mm (0.090 in.)
P	41443-PAX-000	2.325 mm (0.092 in.)
Q	41444-PAX-000	2.375 mm (0.094 in.)
R	41445-PAX-000	2.425 mm (0.095 in.)
S	41446-PAX-000	2.475 mm (0.097 in.)
T	41447-PAX-000	2.525 mm (0.099 in.)
U	41448-PAX-000	2.575 mm (0.101 in.)
V	41449-PAX-000	2.625 mm (0.103 in.)
W	41450-PAX-000	2.675 mm (0.105 in.)
X	41451-PAX-000	2.725 mm (0.107 in.)
Y	41452-PAX-000	2.775 mm (0.109 in.)
Z	41453-PAX-000	2.825 mm (0.111 in.)
0A	41454-PAX-000	2.875 mm (0.113 in.)
0B	41455-PAX-000	2.925 mm (0.115 in.)
0C	41456-PAX-000	2.975 mm (0.117 in.)
0D	41457-PAX-000	3.025 mm (0.119 in.)

Transfer Assembly

Inspection

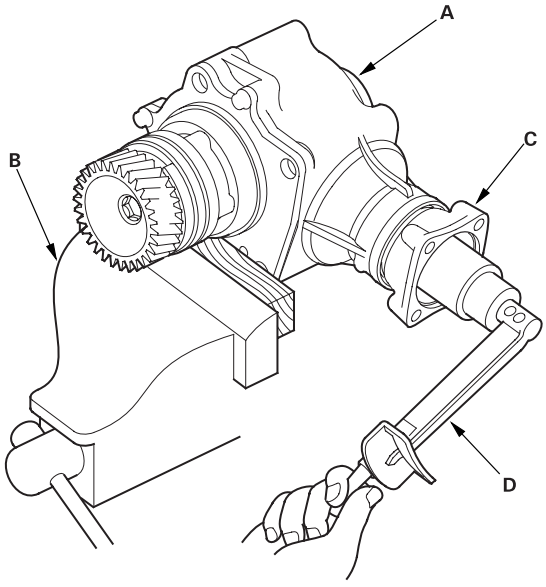
1. Set a dial indicator (A) on the companion flange (B).



2. Measure the transfer gear backlash.

   STANDARD: 0.06 - 0.16 mm (0.02 - 0.06 in.)

3. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer and the vise.



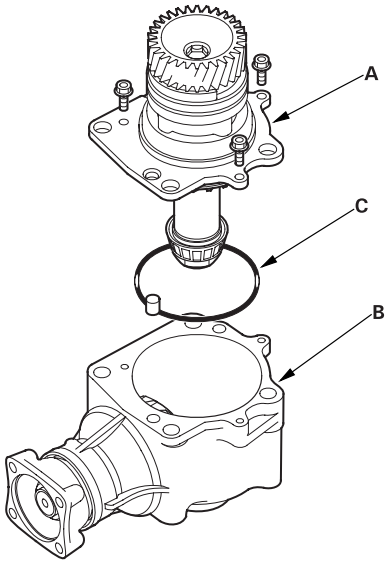
4. Rotate the companion flange several times to seat the tapered roller bearings.

5. Measure the staring torque at the companion flange (C) using a torque wrench (D).

   STANDARD: 2.16 - 3.57 N·m (22.0 - 36.4 kgf·cm, 19.1 - 31.6 lbf·in)

6. Remove the transfer from the vise.

7. Remove the transfer holder (A) from the transfer housing (B), then remove the O-ring (C) from the transfer holder.

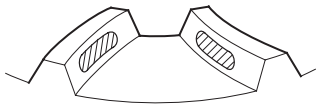


8. Apply Prussian Blue to both sides of the transfer drive gear teeth lightly and evenly.

9. Install the transfer holder, and tighten the bolts. Do not install the O-ring on the transfer holder.

10. Rotate the companion flange in both directions until the transfer gear rotate one full turn in both directions.

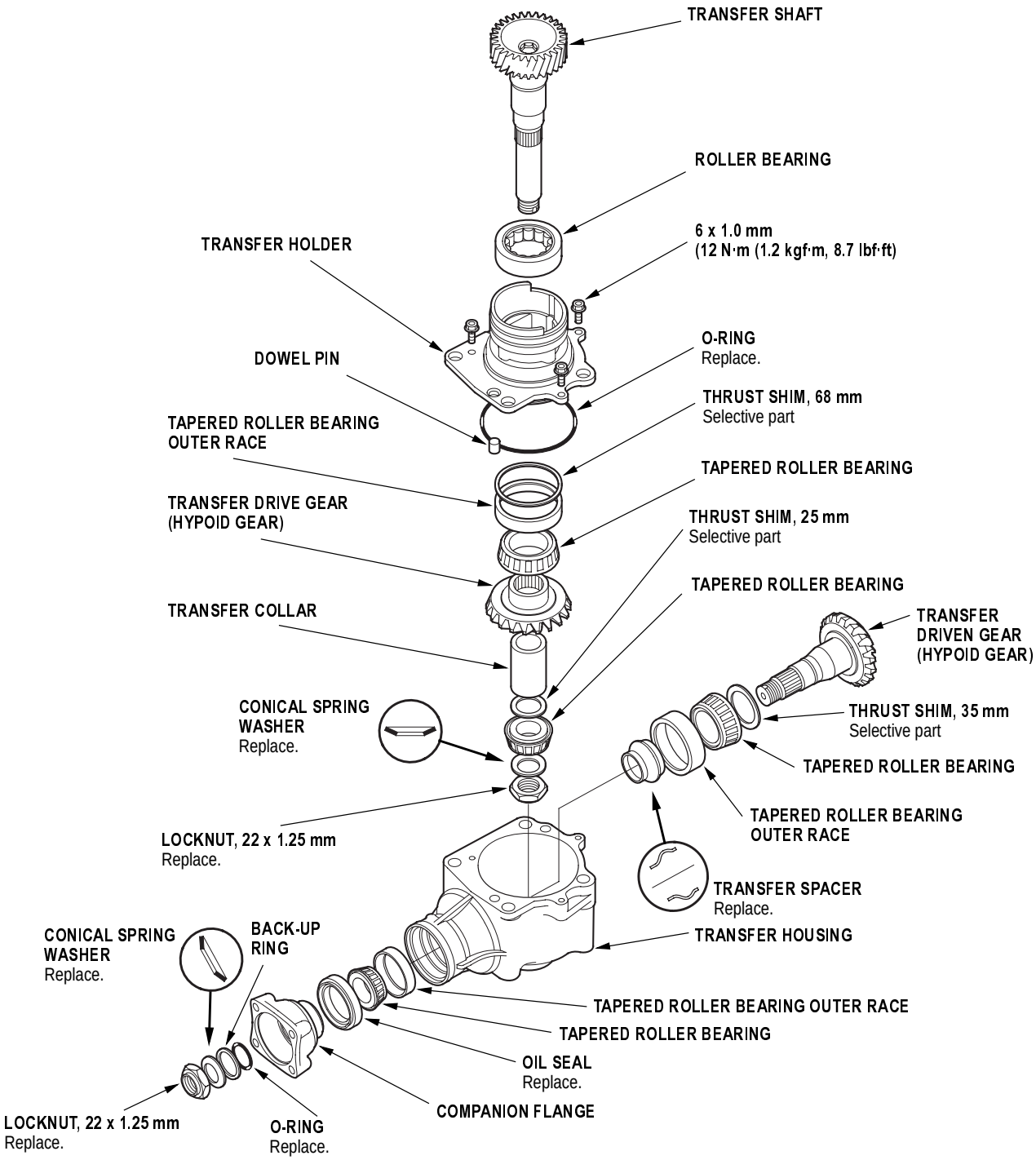
11. Remove the transfer holder, and check the transfer drive gear tooth contact pattern. The pattern should be centered on the gear teeth as shown.



12. If the measurements are out of standard or the tooth contact pattern are incorrect, disassemble the transfer assembly and repair it.

Disassembly

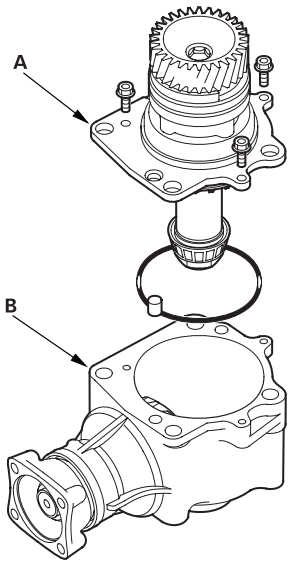
Exploded View



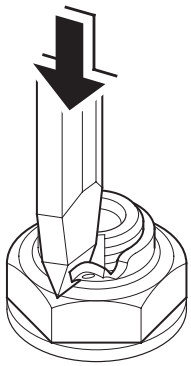
Special Tools Required
Companion flange holder 07PAB-0020000

NOTE: Refer to the Exploded View as needed during the following procedure.

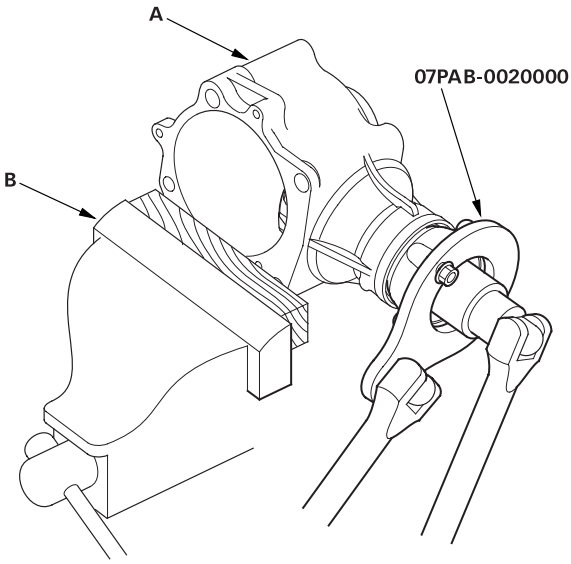
1. Remove the transfer holder (A) from the transfer housing (B).



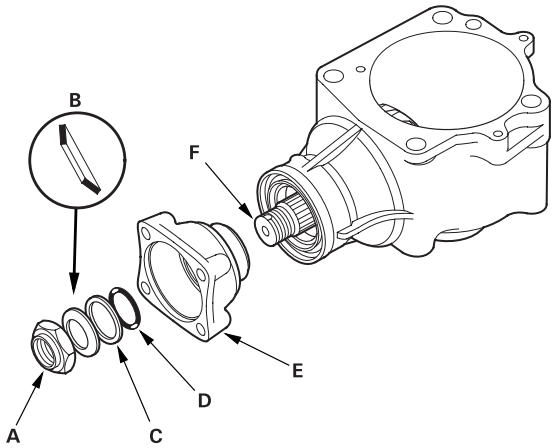
2. Cut the lock tab on the locknut using a chisel.



3. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.



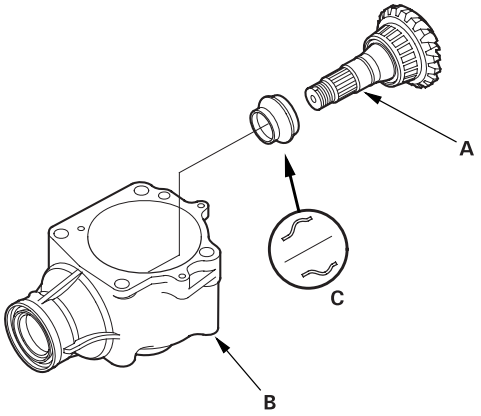
4. Install the special tool on the companion flange, then loosen the locknut.
5. Remove the special tool.
6. Remove the locknut (A), conical spring washer (B), back-up ring (C), O-ring (D), and companion flange (E) from the transfer driven gear (F).



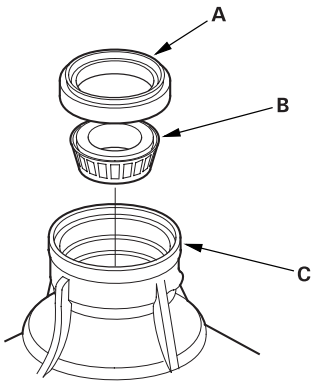
(cont'd)

Disassembly (cont'd)

7. Remove the transfer driven gear (A) from the transfer housing (B), then remove the transfer spacer (C) from the transfer driven gear.

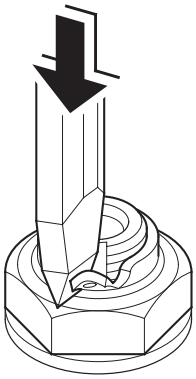


8. Remove the oil seal (A) and tapered roller bearing (B) from the transfer housing (C).

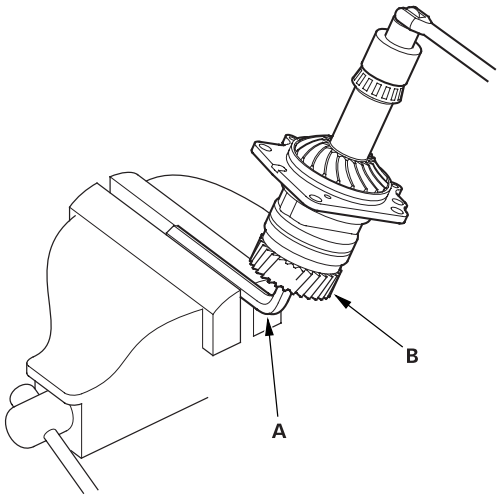


Transfer Holder Disassembly

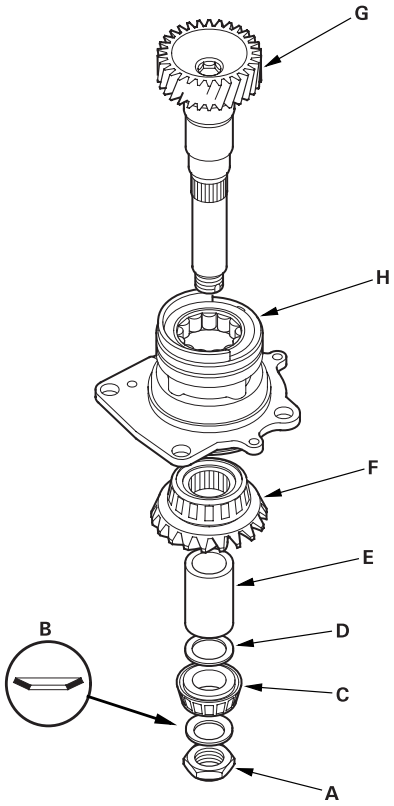
1. Cut the lock tab on the locknut of the transfer shaft using a chisel.



2. Put a 14 mm Allen wrench (A) in the transfer shaft (B), then secure the Allen wrench in a bench vise.



3. Remove the locknut (A) and conical spring washer (B).

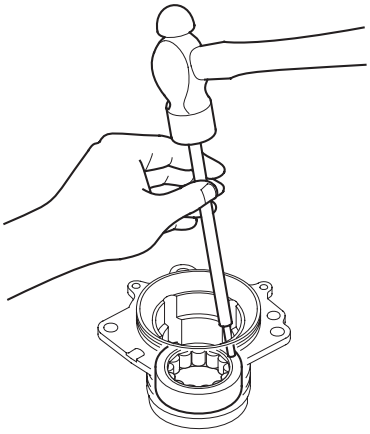


4. Remove the tapered roller bearing (C), 25 mm thrust shim (D), transfer collar (E), transfer drive gear (F), and transfer shaft (G) from the transfer holder (H).

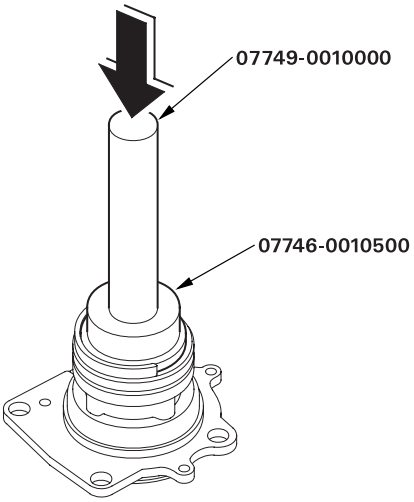
Transfer Holder Roller Bearing Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 62 x 68 mm 07746-0010500

1. Remove the roller bearing from the transfer holder.



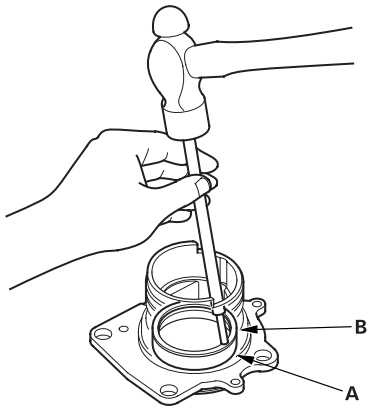
2. Install the new roller bearing in the transfer holder with the special tools.



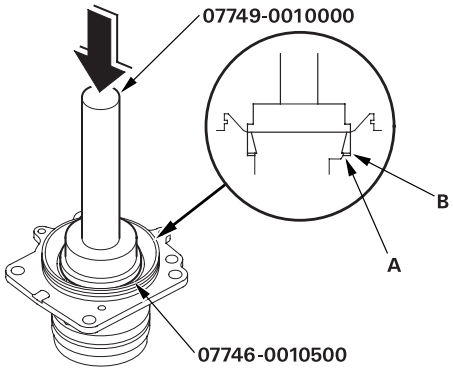
Transfer Holder Tapered Roller Bearing Outer Race Removal/Installation

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 62 x 68 mm 07746-0010500

1. Remove the tapered roller bearing outer race (A) and 68 mm thrust shim (B) form the transfer holder.



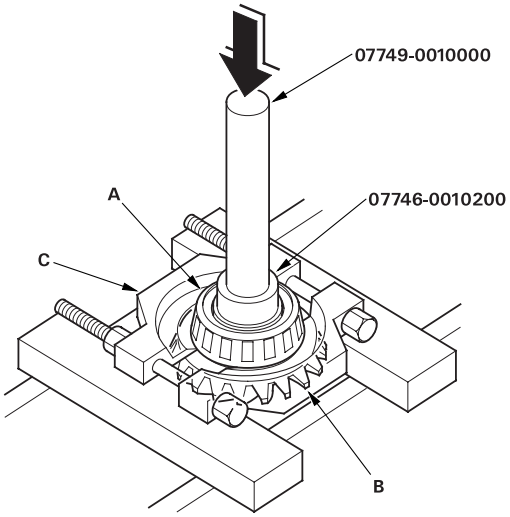
2. Install the 68 mm thrust shim (A) in the transfer holder, then install the tapered roller bearing outer race (B) with the special tools.



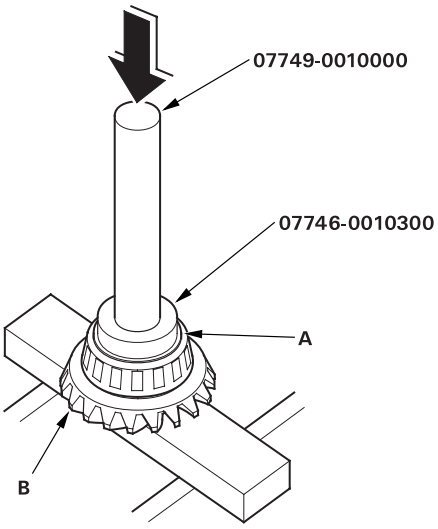
Transfer Drive Gear Bearing Replacement

Special Tools Required
- Handle driver 07749-0010000
- Driver attachment, 37 x 40 mm 07746-0010200
- Driver attachment, 42 x 47 mm 07746-0010300

1. Remove the tapered roller bearing (A) from the transfer drive gear (B) with the special tools, bearing separator (C) and a press.



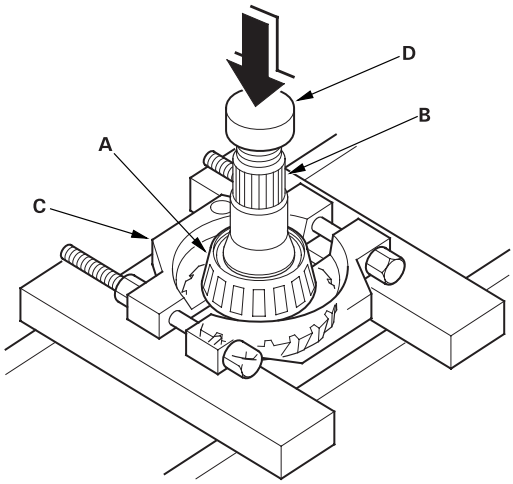
2. Install the new tapered roller bearing (A) on the transfer drive gear (B) with the special tools and a press.



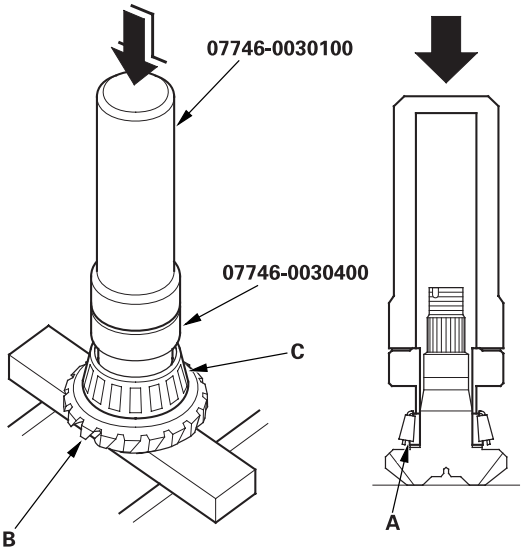
Transfer Driven Gear Bearing Removal/ Installation

Special Tools Required
- Driver 40 mm I.D. 07746-0030100
- Driver attachment, 35 mm I.D. 07746-0030400

1. Remove the tapered roller bearing (A) from the transfer driven gear (B) with a bearing separator (C) and a press. Place a shaft protector (D) between the transfer driven gear and a press to prevent damaging the transfer driven gear.



2. Install the 35 mm thrust shim (A) on the transfer driven gear (B).
3. Install the tapered roller bearing (C) on the transfer driven gear with the special tools and a press.



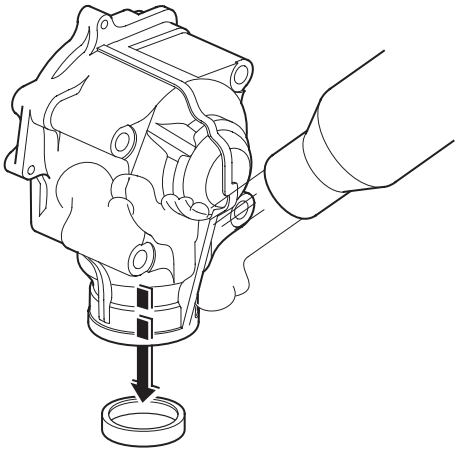
Transfer Housing Tapered Roller Bearing Outer Race Replacement

Special Tools Required
- Handle driver 07749-0010000
- Oil seal driver attachment 07947-SD90101
- Bearing installer attachment 07KAF-PS30120
- Bearing installer attachment 07LAF-PZ70110
- Installer shaft 14 x 165 mm 07JAF-SJ80110
- Installer nuts 14 mm 07JAF-SJ80120

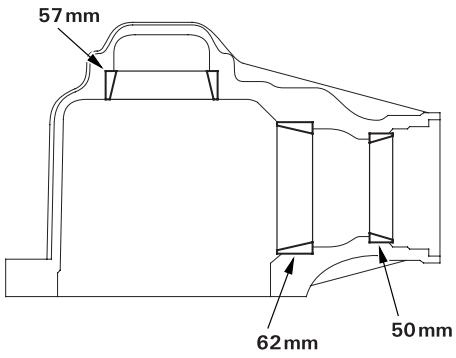
NOTE: Replace the bearing with a new one whenever the outer race is replaced.

1. Remove the bearing outer races from the transfer housing by heating the housing to about 212°F (100°C) with a heat gun. Do not heat the housing more than 212°F (100°C).

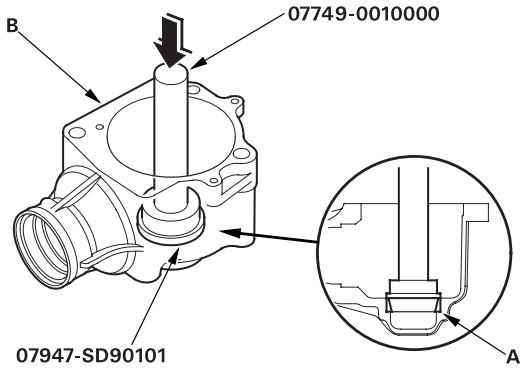
NOTE: Some 57 mm bearing outer races are not press-fitted, and can be removed without heating the housing.



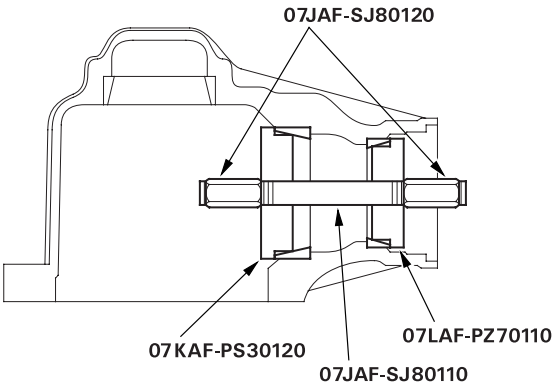
Bearing Outer Race Locations



2. Install the 57 mm bearing outer race (A) in the housing (B) with the special tools.



3. Install the 62 mm bearing outer race and 50 mm bearing outer race in the housing with the special tools.



Reassembly

Special Tools Required

- Driver 40 mm I.D. 07746-0030100
- Driver attachment, 35 mm I.D. 07746-0030400
- Handle driver 07749-0010000
- Oil seal driver attachment 07JAD-PH80101
- Companion flange holder 07PAB-002000
- Driver attachment, 62 x 68 mm 07746-0010500

NOTE:

- While reassembling the transfer assembly:
  - Check and adjust the transfer gear tooth contact.
  - Measure and adjust the transfer gear backlash.
  - Check and adjust the tapered roller bearing starting torque.
- Coat all parts with ATF during reassembly.
- Replace the tapered roller bearing and the bearing outer race as a set if either part is replaced.
- Replace the transfer drive gear and the transfer driven gear as a set if either part is replaced.

1. Select the 35 mm thrust shim if the transfer driven gear is replaced. Calculate the thickness of the 35 mm thrust shim using the formula below, and select the shim from the table below.

NOTE: The number on the transfer driven gear is shown in 1/100 mm.

$$\text{FORMULA: } X = \frac{A}{100} - \frac{B}{100} + C$$

A: Number on the existing transfer driven gear

B: Number on the replacement transfer driven gear

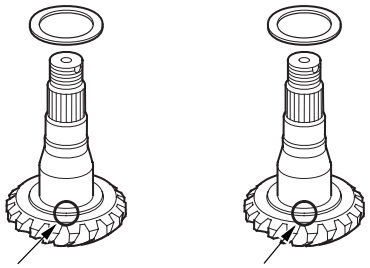
C: Thickness of the existing 35 mm thrust shim

X: Thickness needed for the replacement 35 mm thrust shim

Example:

C: EXISTING 35 mm THRUST SHIM Thickness: C = 1.05 mm

X: REPLACEMENT 35 mm THRUST SHIM Thickness: X = ? ? mm



A: EXISTING TRANSFER DRIVEN GEAR Number: A = + 2

A: REPLACEMENT TRANSFER DRIVEN GEAR Number: B = - 1

$$X = \frac{A}{100} - \frac{B}{100} + C = \frac{2}{100} - \frac{-1}{100} + 1.05$$

$$= 0.02 + 0.01 + 1.05 = 1.08 \text{ mm}$$

Select No. M 35 mm thrust shim of 1.08 mm in this case.

THRUST SHIM, 35 mm

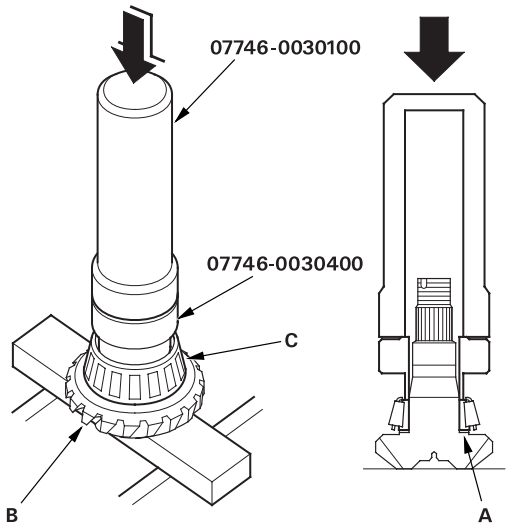
Shim No.	Part Number	Thickness
A	41361-PS3-000	0.72 mm (0.028 in.)
B	41362-PS3-000	0.75 mm (0.030 in.)
C	41363-PS3-000	0.78 mm (0.031 in.)
D	41364-PS3-000	0.81 mm (0.032 in.)
E	41365-PS3-000	0.84 mm (0.033 in.)
F	41366-PS3-000	0.87 mm (0.034 in.)
G	41367-PS3-000	0.90 mm (0.035 in.)
H	41368-PS3-000	0.93 mm (0.037 in.)
I	41369-PS3-000	0.96 mm (0.038 in.)
J	41370-PS3-000	0.99 mm (0.039 in.)
K	41371-PS3-000	1.02 mm (0.040 in.)
L	41372-PS3-000	1.05 mm (0.041 in.)
M	41373-PS3-000	1.08 mm (0.043 in.)
N	41374-PS3-000	1.11 mm (0.044 in.)

2. Select the 35 mm thrust shim if the tapered roller bearing on the transfer driven gear is replaced. Measure the thickness of the replacement bearing and the existing bearing, and calculate the difference of the bearing thickness. Adjust the thickness of the existing 35 mm thrust shim by the amount of the difference in bearing thickness, and select the replacement 35 mm thrust shim from the above table.

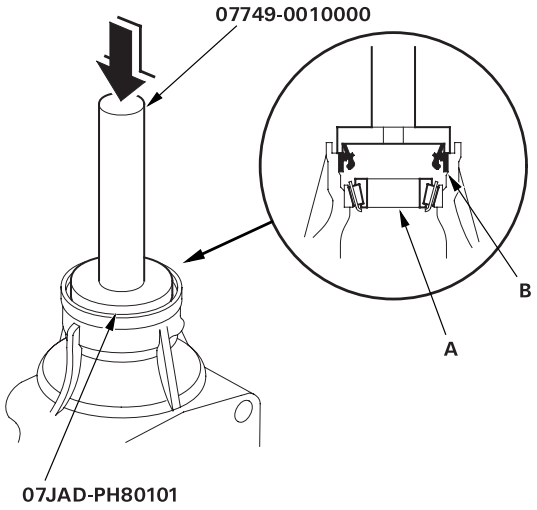
(cont'd)

Reassembly (cont'd)

3. Install the 35 mm thrust shim (A) on the transfer driven gear (B), then install the tapered roller bearing (C) with the special tools and a press.

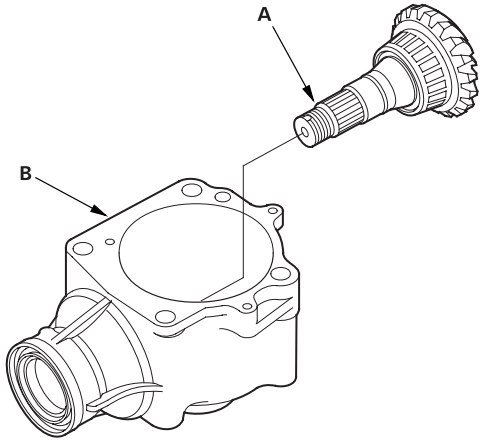


4. Place the tapered roller bearing (A) on the bearing outer race of the companion flange side of the transfer housing.

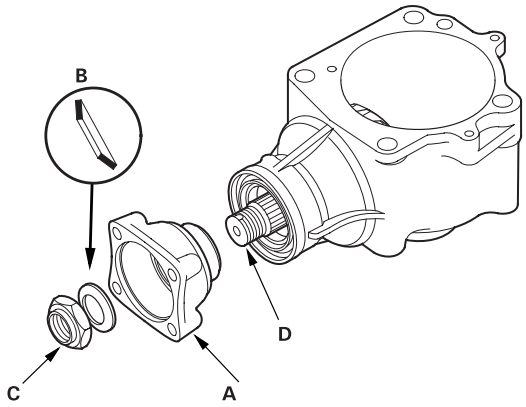


5. Install the new oil seal (B) on the transfer housing with the special tools and a press.

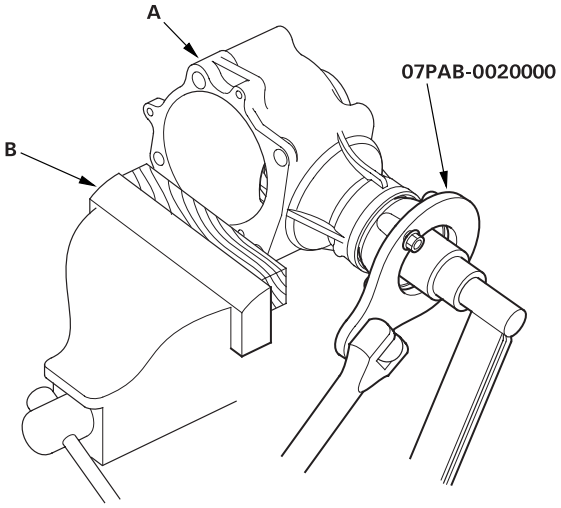
6. Install the transfer driven gear (A) in the transfer housing (B). Do not install the transfer spacer on the transfer driven gear.



7. Install the companion flange (A), conical spring washer (B), and locknut (C) on the transfer driven gear (D). Do not install the O-ring and back-up ring.



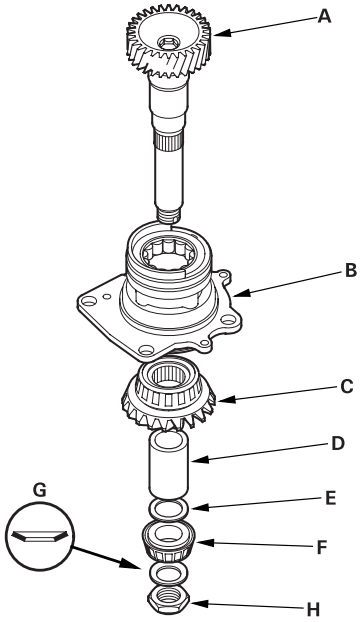
8. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.



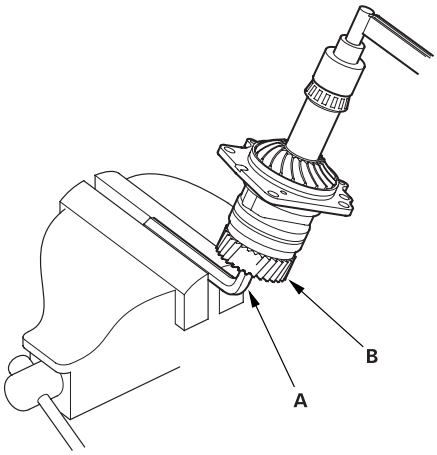
9. Install the special tool on the companion flange.

10. Tighten the locknut while measuring the starting torque so the starting torque is within 0.98 - 1.39 N·m (10.0 - 14.2 kgf·cm, 8.7 - 12.3 lbf·in). Do not stake the locknut in this step.

11. Install the transfer shaft (A) in the transfer holder (B), and install the transfer drive gear (C), transfer collar (D), 25 mm thrust shim (E), tapered roller bearing (F), conical spring washer (G), and locknut (H).



12. Put a 14 mm Allen wrench (A) in the transfer shaft (B), then secure the Allen wrench in a bench vise.



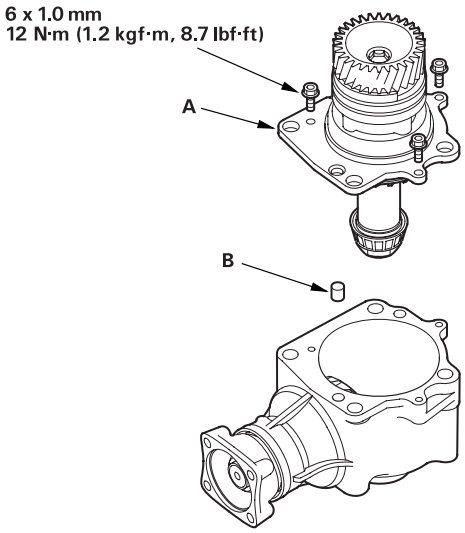
13. Tighten the locknut 118 N·m (12.0 kgf·m, 86.8 lbf·ft). Do not stake the locknut in this step.

(cont'd)

Reassembly (cont'd)

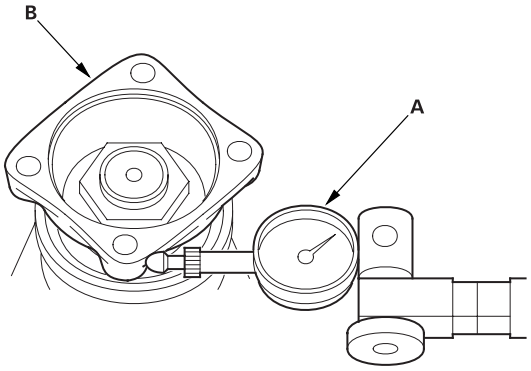
14. Apply Prussian Blue to both sides of the transfer drive gear teeth lightly and evenly.

15. Temporarily install the transfer holder (A) and dowel pin (B) without O-ring, and tighten the bolts.



16. Rotate the companion flange in both directions until the transfer gear rotate one full turn in both directions.

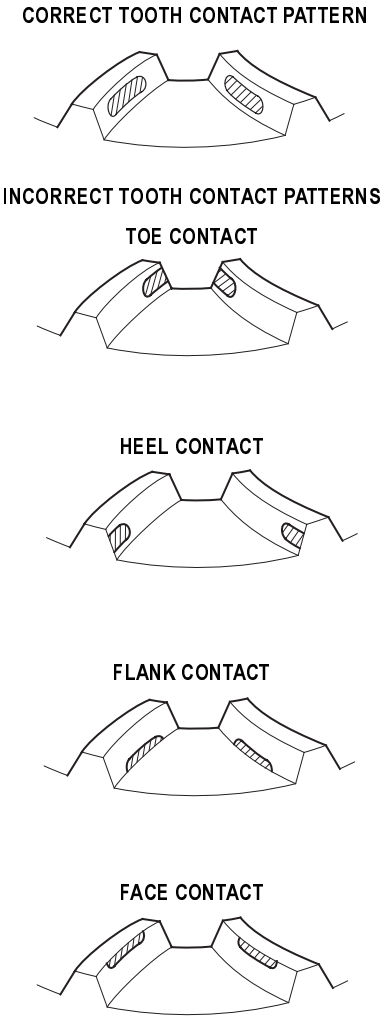
17. Set a dial indicator (A) on the companion flange (B).



18. Measure the transfer gear backlash.

STANDARD: 0.06 - 0.16 mm (0.02 - 0.06 in.)

19. Remove the transfer holder, and check the transfer drive gear tooth contact pattern.



20. If the measurement of the backlash is out of standard, adjust the transfer gear backlash with the 35 mm thrust shim and recheck. Do not use more than two 35 mm thrust shims to adjust the transfer gear backlash.

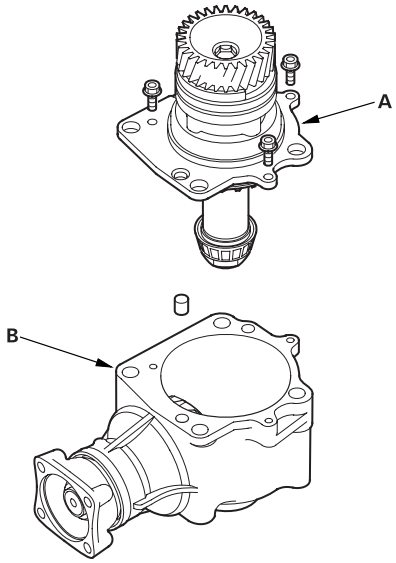
21. If the transfer gear tooth contact is incorrect, adjust the transfer gear tooth contact with the 25 mm or 35 mm thrust shim. Do not use more than two shims of each thrust shim to adjust the tooth contact.

- **Toe Contact**
  Use a thicker 35 mm thrust shim to move the transfer driven gear toward the transfer drive gear. Because this movement causes the transfer gear backlash to change, move the transfer drive gear away from the transfer driven gear to adjust the transfer gear backlash as follows:
  – Increase the thickness of the 25 mm thrust shim.
  – Reduce the thickness of the 68 mm thrust shim by the amount of increase of the 25 mm thrust shim.
- **Heel Contact**
  Use a thinner 35 mm thrust shim to move the transfer driven gear away from the transfer drive gear. Because this movement causes the transfer gear backlash to change, move the transfer drive gear toward the transfer driven gear to adjust the transfer gear backlash as follows:
  – Reduce the thickness of the 25 mm thrust shim.
  – Increase the thickness of the 68 mm thrust shim by amount of reduce thickness of the 25 mm thrust shim.
- **Flank Contact**
  Use a thinner thrust shim to move the transfer drive gear toward the transfer driven gear. Flank contact must be adjusted within the limits of the transfer gear backlash. If the backlash exceeds the limits, adjust as described under Heel Contact.
- **Face Contact**
  Use a thicker thrust shim to move the transfer drive gear away from the transfer driven gear. Face contact must be adjusted within the limits of the transfer gear backlash. If the backlash exceeds the limits, adjust as described under Toe Contact.

THRUST SHIM, 25 mm

Shim No.	Part Number	Thickness
1.70	29411-P1C-000	1.70 mm (0.067 in.)
1.73	29412-P1C-000	1.73 mm (0.068 in.)
1.76	29413-P1C-000	1.76 mm (0.069 in.)
1.79	29414-P1C-000	1.79 mm (0.070 in.)
1.82	29415-P1C-000	1.82 mm (0.072 in.)
1.85	29416-P1C-000	1.85 mm (0.073 in.)
1.88	29417-P1C-000	1.88 mm (0.074 in.)
1.91	29418-P1C-000	1.91 mm (0.075 in.)
1.94	29419-P1C-000	1.94 mm (0.076 in.)
1.97	29420-P1C-000	1.97 mm (0.078 in.)
2.00	29421-P1C-000	2.00 mm (0.079 in.)
2.03	29422-P1C-000	2.03 mm (0.080 in.)
2.06	29423-P1C-000	2.06 mm (0.081 in.)
2.09	29424-P1C-000	2.09 mm (0.082 in.)
2.12	29425-P1C-000	2.12 mm (0.083 in.)
2.15	29426-P1C-000	2.15 mm (0.085 in.)
2.18	29427-P1C-000	2.18 mm (0.086 in.)
2.21	29428-P1C-000	2.21 mm (0.087 in.)
2.24	29429-P1C-000	2.24 mm (0.088 in.)

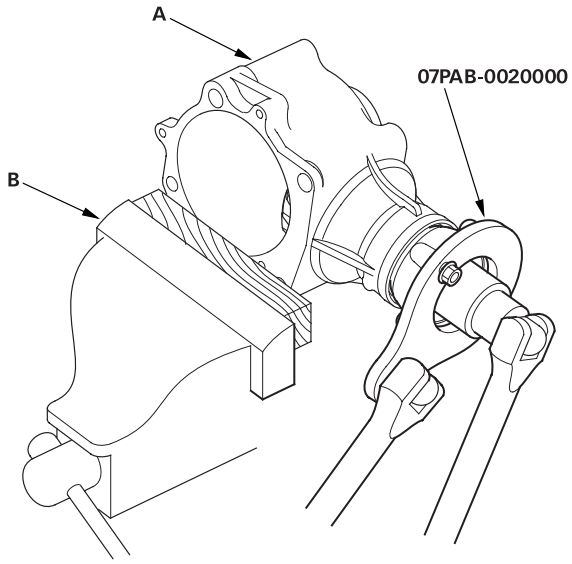
22. Remove the transfer holder (A) from the transfer housing (B) after adjusting the transfer gear backlash or transfer gear tooth contact.



(cont'd)

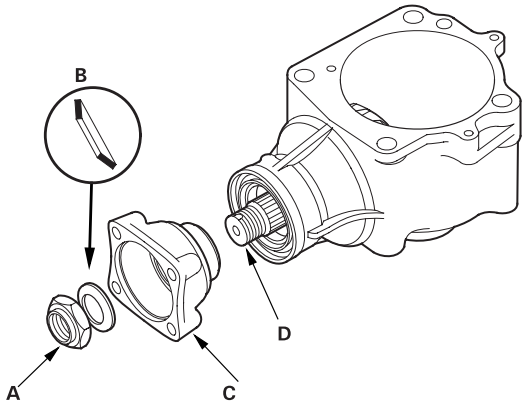
Reassembly (cont'd)

23. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.

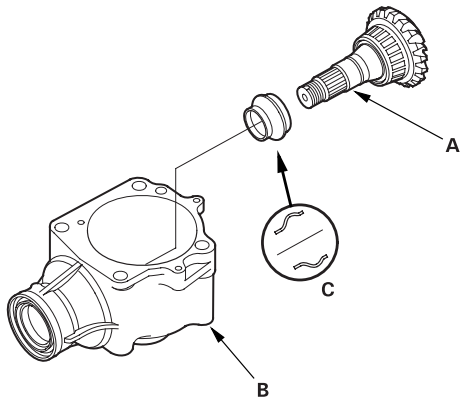


24. Install the special tool on the companion flange, then loosen the locknut.

25. Remove the locknut (A), conical spring washer (B), and companion flange (C) from the transfer driven gear (D).



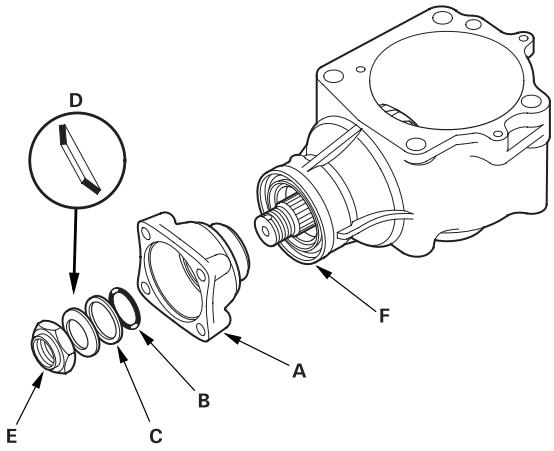
26. Remove the transfer driven gear (A) from the transfer housing (B).



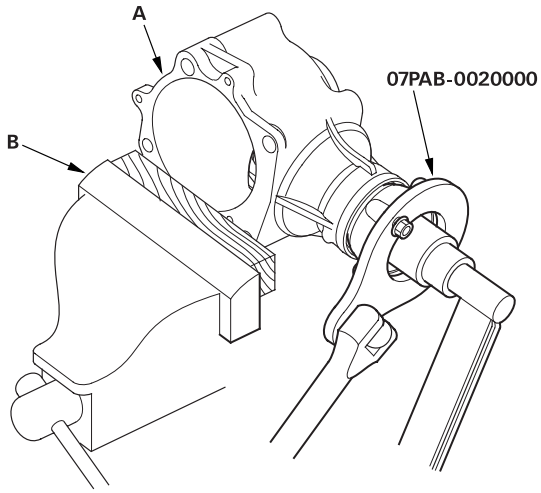
27. Install the new transfer spacer (C) on the transfer driven gear in the direction shown, and install them in the transfer housing.

28. Coat the threads of the locknut and transfer driven gear with ATF.

29. Install the companion flange (A), new O-ring (B), back-up ring (C), new conical spring washer (D), and new locknut (E) on the transfer driven gear (F). Install the conical spring washer in the direction shown.



30. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer housing and the vise.



31. Install the special tool on the companion flange.

32. Tighten the locknut while measuring the starting torque of the transfer driven gear.

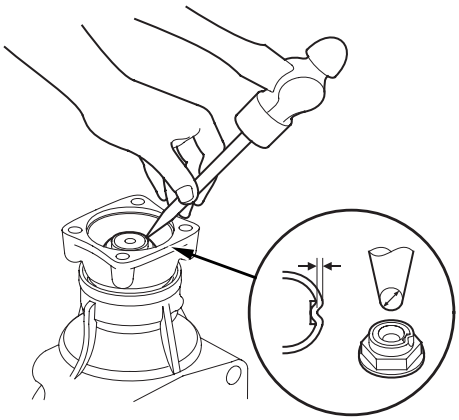
STARTING TORQUE:
0.98 - 1.39 N·m (10.0 - 14.2 kgf·cm, 8.7 - 12.3 lbf·in)

TIGHTENING TORQUE:
132 - 260 N·m (13.5 - 26.5 kgf·m, 97.6 - 192 lbf·ft)

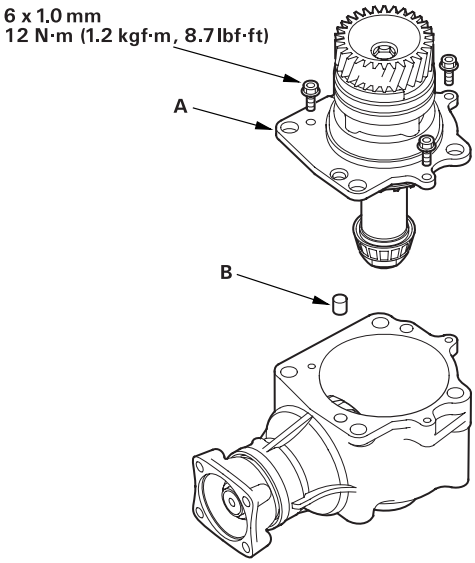
NOTE:
- Rotate the companion flange several turns to seat the tapered roller bearings, then measure the starting torque.
- If the starting torque exceeds 1.39 N·m (14.2 kgf·cm, 12.3 lbf·in), replace the transfer spacer and reassemble the parts. Do not adjust the starting torque with the locknut loose.
- If the tightening torque exceeds 260 N·m (26.5 kgf·m, 192 lbf·ft), replace the transfer spacer and reassemble the parts.

33. Remove the special tool.

34. Stake the locknut using a 3.5 mm punch.



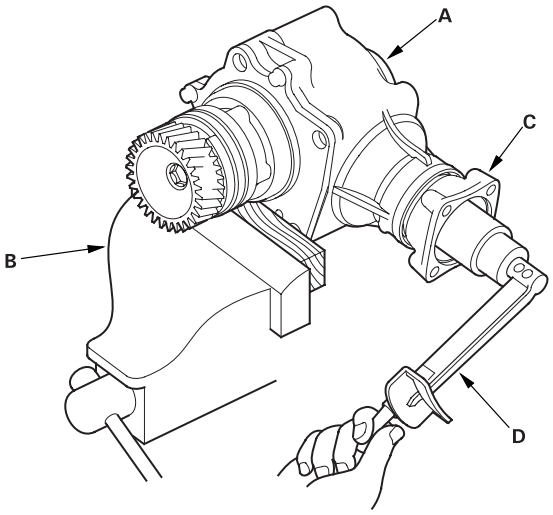
35. Temporarily install the transfer holder (A) and dowel pin (B) without the O-ring, and tighten the bolts.



(cont'd)

Reassembly (cont'd)

36. Secure the transfer housing (A) in a bench vise (B) with soft jaws. To prevent damage to the transfer housing, always use soft jaws or equivalent materials between the transfer and the vise.



37. Rotate the companion flange several times to seat the tapered roller bearings.

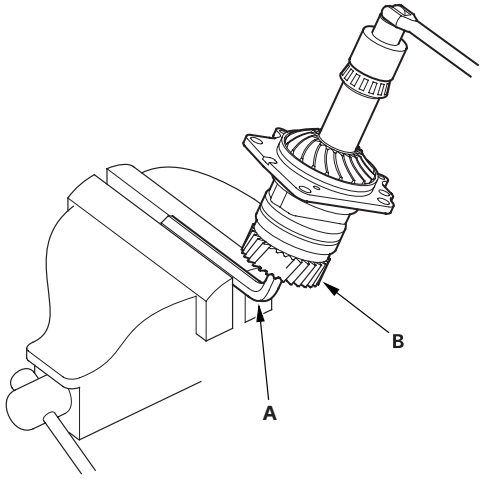
38. Measure the staring torque at the companion flange (C) using a torque wrench (D).

STANDARD: 2.16 - 3.57 N·m (22.0 - 36.4 kgf·cm, 19.1 - 31.6 lbf·in)

39. Remove the transfer holder from the transfer housing.

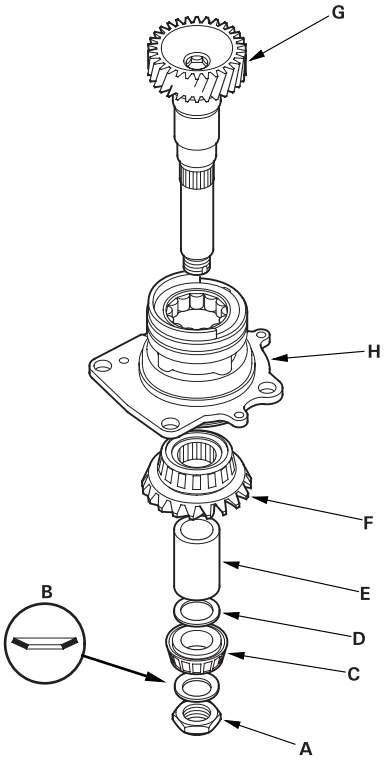
40. If the measurement is within the standard, go to step 53.

41. If the measurement is out of standard, put a 14 mm Allen wrench (A) in the transfer shaft (B), then secure the Allen wrench in a bench vise.



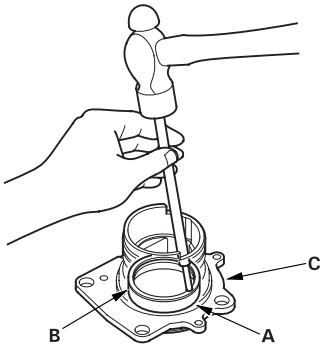
42. Loosen the locknut.

43. Remove the locknut (A) and conical spring washer (B).



44. Remove the tapered roller bearing (C), 25 mm thrust shim (D), transfer collar (E), transfer drive gear (F), and transfer shaft (G) from the transfer holder (H).

45. Remove the tapered roller bearing outer race (A) and the 68 mm thrust shim (B) from the transfer holder (C).



46. Measure the thickness of the 68 mm thrust shim, and select the new 68 mm thrust shim.

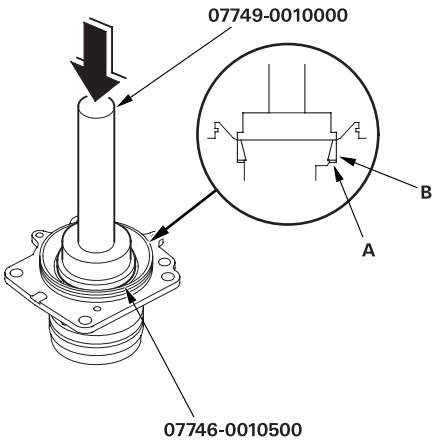
THRUST SHIM, 68 mm

Shim No.	Part Number	Thickness
ZV	23974-P1C-020	1.41 mm (0.056 in.)
ZW	23975-P1C-020	1.44 mm (0.057 in.)
ZX	23976-P1C-020	1.47 mm (0.058 in.)
ZY	23977-P1C-020	1.50 mm (0.060 in.)
ZZ	23978-P1C-020	1.53 mm (0.060 in.)
A	23941-PW5-000	1.56 mm (0.061 in.)
B	23942-PW5-000	1.59 mm (0.063 in.)
C	23943-PW5-000	1.62 mm (0.064 in.)
D	23944-PW5-000	1.65 mm (0.065 in.)
E	23945-PW5-000	1.68 mm (0.066 in.)
F	23946-PW5-000	1.71 mm (0.067 in.)
G	23947-PW5-000	1.74 mm (0.069 in.)
H	23948-PW5-000	1.77 mm (0.070 in.)
I	23949-PW5-000	1.80 mm (0.071 in.)
J	23950-PW5-000	1.83 mm (0.072 in.)
K	23951-PW5-000	1.86 mm (0.073 in.)
L	23952-PW5-000	1.89 mm (0.074 in.)
M	23953-PW5-000	1.92 mm (0.076 in.)
N	23954-PW5-000	1.95 mm (0.077 in.)
O	23955-PW5-000	1.98 mm (0.078 in.)
P	23956-PW5-000	2.01 mm (0.079 in.)
Q	23957-PW5-000	2.04 mm (0.080 in.)
R	23958-PW5-000	2.07 mm (0.081 in.)
S	23959-PW5-000	2.10 mm (0.083 in.)
T	23960-PW5-000	2.13 mm (0.084 in.)
U	23961-PW5-000	2.16 mm (0.085 in.)
V	23962-PW5-000	2.19 mm (0.086 in.)
W	23963-PW5-000	2.22 mm (0.087 in.)
X	23964-PW5-000	2.25 mm (0.089 in.)
Y	23965-PW5-000	2.28 mm (0.090 in.)
Z	23966-PW5-000	2.31 mm (0.091 in.)
AA	23967-PW5-000	2.34 mm (0.092 in.)
AB	23968-PW5-000	2.37 mm (0.093 in.)
AC	23969-PW5-000	2.40 mm (0.094 in.)
AD	23970-PW5-000	2.43 mm (0.096 in.)
AZ	23941-PW8-000	2.46 mm (0.097 in.)
BZ	23942-PW8-000	2.49 mm (0.098 in.)
CZ	23943-PW8-000	2.52 mm (0.099 in.)
DZ	23944-PW8-000	2.55 mm (0.100 in.)
EZ	23945-PW8-000	2.58 mm (0.102 in.)

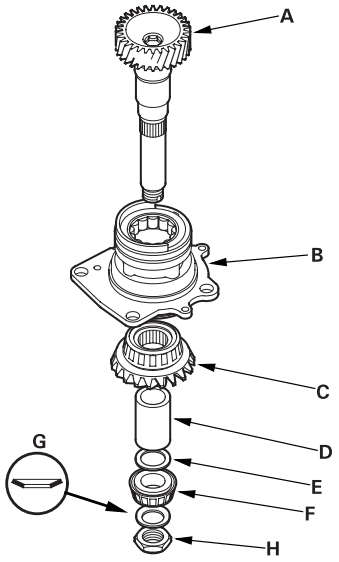
(cont'd)

Reassembly (cont'd)

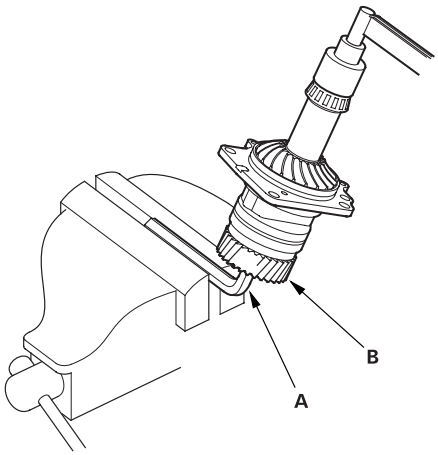
47. Install the new 68 mm thrust shim (A) in the transfer holder, then install the tapered roller bearing outer race (B) with the special tools.



48. Install the transfer shaft (A) in the transfer holder (B), and install the transfer drive gear (C), transfer collar (D), 25 mm thrust shim (E), tapered roller bearing (F), conical spring washer (G), and locknut (H). Install the conical spring washer in the direction shown.

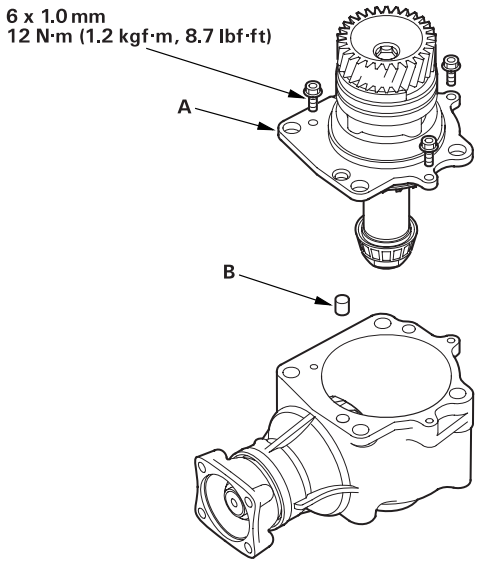


49. Put a 14 mm Allen wrench (A) in the transfer shaft (B), then secure the Allen wrench in a bench vise.



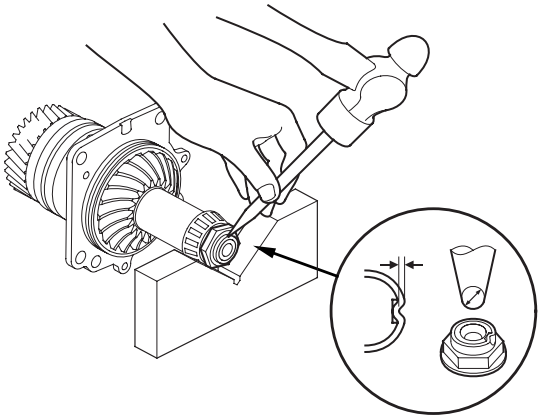
50. Tighten the locknut 118 N·m (12.0 kgf·m, 86.8 lbf·ft). Do not stake the locknut in this step.

51. Temporarily install the transfer holder (A) and dowel pin (B) without the O-ring, and tighten the bolts.



52. Rotate the companion flange several turns to seat the tapered roller bearings, and recheck the starting torque. Remove the transfer holder after adjusting the starting torque.

53. Stake the locknut of the transfer shaft using a 3.5 mm punch.



54. Install the new O-ring (A) on the transfer holder (B), then install the transfer holder with the dowel pin (C) on the transfer housing (D).