1997-99 AUTOMATIC TRANSMISSIONS

Honda M4VA CVT Overhaul

APPLICATION

TRANSAXLE APPLICATION

Vehicle Application	Transaxle Model
Civic	M4VA

IDENTIFICATION

Transaxle model and serial number are stamped on transaxle. See **Fig. 1** . Model and serial number may be required when ordering replacement components.

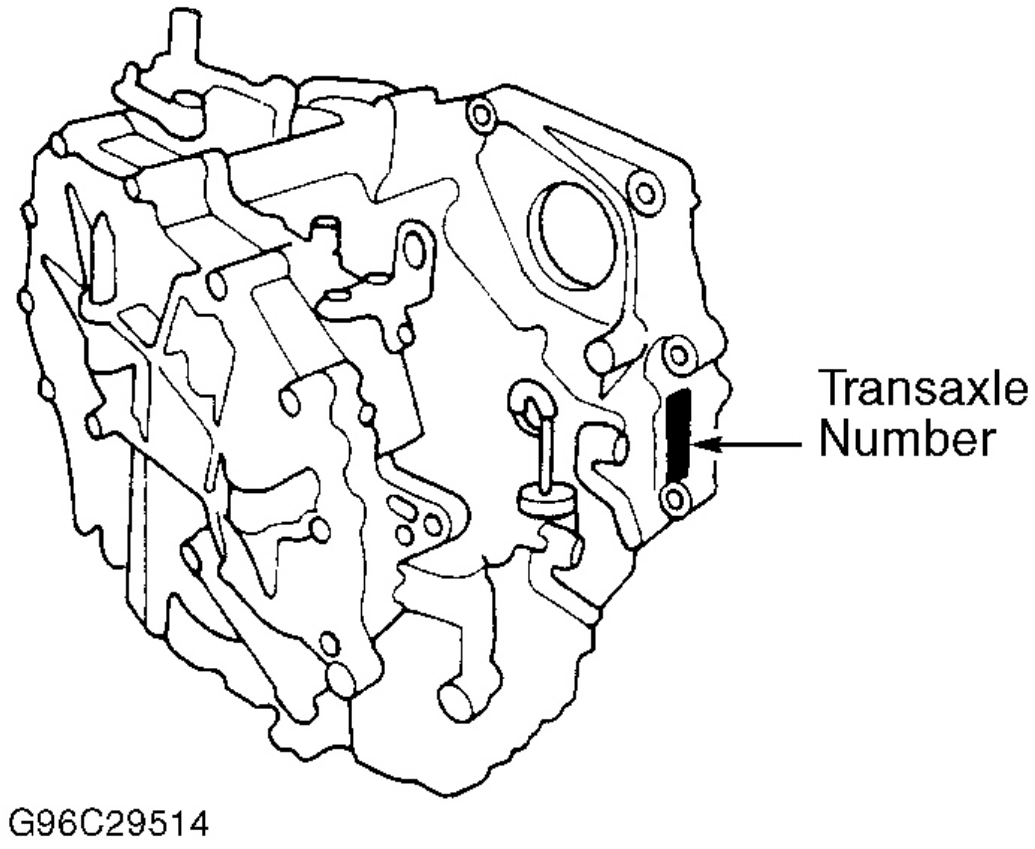

Fig. 1: Identifying Transaxle Model & Serial Number Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DESCRIPTION

Continuously Variable Transaxle (CVT) is electronically controlled and is equipped with drive and driven pulleys and a steel belt. Transaxle is not equipped with a torque converter. CVT provides non-stage speeds forward and one reverse speed. Transaxle consists of 4 parallel shafts: input shaft, drive pulley shaft, driven pulley shaft and secondary gear shaft. See **Fig. 2** . Input shaft is in line with engine crankshaft. Drive and driven pulley shafts consist of movable and fixed face pulleys. Drive and driven pulley shafts rotate in same direction. Both pulleys are linked by the steel belt. Steel belt is made up of 2 steel loops, comprised of 12 layers each, and about 280 metal elements attached between steel loops. See **Fig. 3** .

Input shaft includes sun gear. Drive pulley shaft includes forward clutch, which mounts carrier assembly on forward clutch drum. Carrier assembly includes pinion gears, which mesh with sun gear and ring gear. Ring gear has a hub-mounted reverse brake disc. See **Fig. 2** .

Driven pulley shaft includes the start clutch and secondary drive gear, which is integral with parking gear. Secondary gear shaft is positioned between secondary drive gear and final driven gear. Secondary gear shaft includes secondary driven gear, which serves to change rotation direction. When certain combinations of planetary gears in transaxle are engaged by clutches and reverse brake, power is transmitted from drive pulley shaft to driven pulley shaft to provide forward and reverse gears. Pulleys and clutches receive fluid from their respective feed pipes. Reverse brake receives fluid from internal hydraulic circuit.

Dual mass flywheel provides a damping effect that helps reduce fluctuations in driveline rotation speed. This results in smoother engine and drivetrain operation. Flywheel is a 2-piece design. One half bolts to crankshaft. Other half is splined to transaxle input shaft. Crankshaft half drives input shaft half using torsion springs, viscous damping chambers that contain grease and a friction surface. Torsion springs allow controlled movement between the 2 surfaces. Grease chambers and friction surface act as dampers.

Lower valve body assembly consists of main valve body, Pressure Low (PL) regulator valve body, shift valve body, start clutch control valve body and secondary valve body. All valve bodies are positioned on lower part of transaxle housing. Main valve body contains Pressure High (PH) control valve, lubrication valve and pitot regulator valve. Secondary valve body contains PH regulator valve, clutch reducing valve, start clutch valve accumulator and shift inhibitor valve. PL regulator valve body contains PL regulator valve and PH-PL control valve which is joined with PH-PL control linear solenoid. Inhibitor solenoid valve is bolted on PL regulator valve body.

Shift valve body contains shift valve and shift control valve, which is joined with shift control linear solenoid. Start clutch control valve body contains start clutch control valve, which is joined with start clutch control linear solenoid. Linear solenoids and inhibitor solenoid are controlled by Transaxle Control Module (TCM) or Powertrain Control Module (PCM).

Manual valve body contains manual valve and reverse inhibitor valve. Manual valve body is bolted to intermediate housing. Manual valve mechanically uncovers or covers fluid passage according to shift position. Reverse inhibitor valve is controlled by pressure. Valve intercepts hydraulic circuit to reverse brake while vehicle is moving forward at speeds over about 6 MPH.

These components control application of start clutch, forward clutch, reverse brake, pulley diameters and side pressure. Various other valves are used to modify oil pump pressure and provide fail-safe functions.

Oil pump assembly is located on transaxle housing. Pump is linked with input shaft by sprockets and sprocket chain. Pump is a gear type that is housed in a cast iron body, sitting between aluminum covers. CVT requires about twice the oil pressure of conventional automatic transaxle. To meet this demand, oil pump is a high efficiency, low friction design.

Transaxle shifting is controlled by the Transaxle Control Module (TCM) or Powertrain Control Module (PCM). TCM/PCM controls various sensors, 3 linear solenoids and inhibitor solenoid.

1. Drive Pulley
2. Reverse Brake Piston
3. Forward Clutch
4. Reverse Brake
5. Carrier Assembly
6. Ring Gear
7. Planetary Pinion Gears
8. Input Shaft
9. Sun Gear
10. Drive Pulley Shaft
11. Driven Pulley Shaft
12. Driven Pulley
13. Steel Belt
14. Secondary Drive Gear
15. Parking Gear
16. Secondary Driven Gear
17. Final Driven Gear
18. Secondary Gear Shaft
19. Final Drive Gear
20. Start Clutch
21. Oil Pump Drive Sprocket
22. Oil Pump Drive Chain
23. Drive Plate
24. Flywheel
25. Ring Gear
26. Oil Pump Driven Sprocket
27. Oil Pump

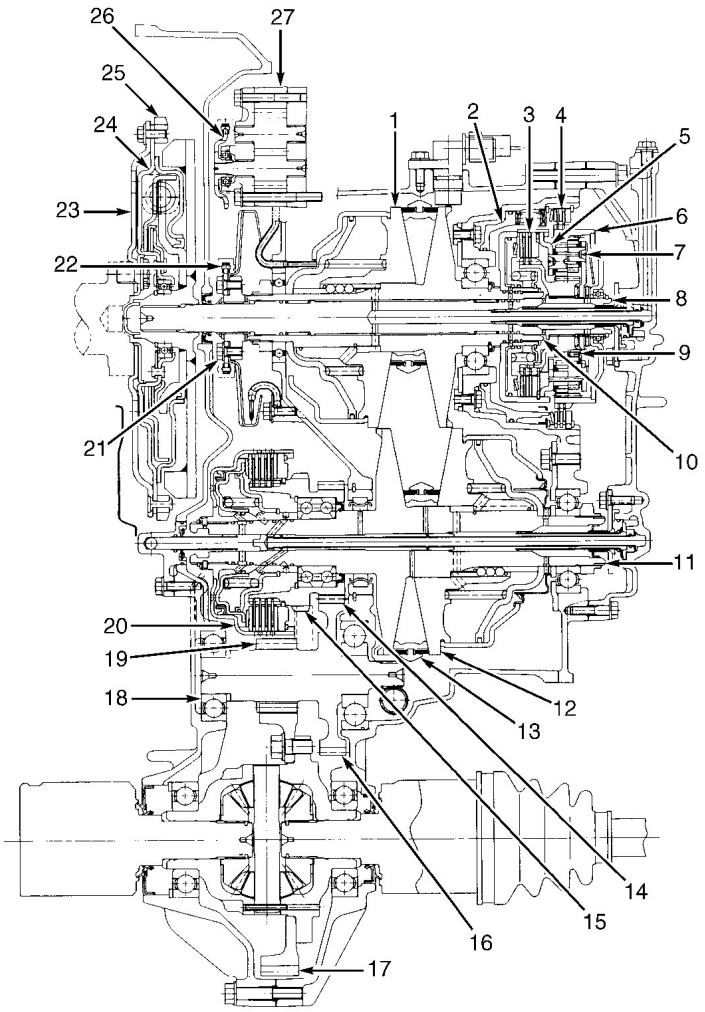

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Fig. 2: Identifying Transaxle Component Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OPERATION

CVT is designed with a fail-safe operation mode. Transaxle is driveable through purely hydraulic function in the event of electronic control failure. Drive and driven pulleys provide variable diameters for steel belt to transfer power at various ratios, and maintain optimum side pressure on steel belt. Drive pulley pushes steel

belt, driving driven pulley, which drives start clutch. Each pulley consists of a fixed surface and a movable surface. On both pulleys, springs apply pressure to movable surfaces, forcing movable surface toward fixed surface. When torque is applied to steel belt, it tries to wedge surfaces apart.

Hydraulic pressure can be applied to hydraulic control chambers to resist wedging action of steel belt. More hydraulic pressure will force pulley surfaces together, toward a larger pulley diameter. With less hydraulic pressure, wedging action of steel belt will force pulley surfaces apart, resulting in a smaller diameter pulley.

Each pulley has a cancellor chamber opposite the hydraulic control chamber. Cancellor chamber is kept full of lubrication oil. Cancellor chamber is necessary because hydraulic control chamber is always full of oil, even when no pressure is applied. As pulley spins, centrifugal force causes it to apply some pressure to movable pulley face. However, centrifugal force on oil in cancellor chamber applies pressure in opposite direction, so net force is zero. See **Fig. 3** .

Manual valve has 6 positions but there are only 4 hydraulic positions. Input from various sensors located throughout vehicle determine which linear solenoid TCM/PCM will activate. Activating shift control linear solenoid changes shift control valve pressure, causing shift valve to move. This pressurizes drive pulley pressure to drive pulley and driven pulley, which changes their effective pulley ratio. Activating start clutch control linear solenoid moves start clutch control valve. Start clutch control valve uncovers port to allow start clutch pressure to start clutch, which engages start clutch. Start clutch slips to allow engine to idle in gear when vehicle is stopped, controls slippage when starting from a stop and locks up during normal driving for maximum power transfer efficiency and fuel economy.

Reverse inhibitor solenoid is an on/off type solenoid which operates reverse inhibitor valve to prevent reverse engagement until vehicle speed is less than 6 MPH. Start clutch control solenoid controls pressure applied to start clutch. Low pressure is applied at a stop, increased pressure is applied during acceleration, or full pressure is applied during normal driving conditions. PH/PL control solenoid is used to control amount of side pressure applied to steel belt by pulleys. Under high load situations, solenoid allows high side pressure to be applied to prevent belt slippage. Under lower load situations, it reduces amount of side pressure to reduce friction and improve fuel economy. Shift control solenoid operates shift valve to determine amount of PH or PL pressure to be applied to drive and driven pulley's hydraulic control chambers. This determines exact drive ratio.

When shift lever is moved, manual valve on main valve body is moved by shift cable. Shift lever also changes position of A/T gear position switch, mounted on the shift lever. The A/T gear position switch delivers an input signal to TCM/PCM to indicate shift lever position. TCM/PCM uses this input signal to control solenoids. TCM/PCM determines appropriate shift point and activates proper solenoid for transaxle shifting.

When transaxle gear combinations are engaged by clutches and brake, power is transmitted to provide appropriate gears. Shift lever positions operate as follows:

- **"P" (Park)**

  Front wheels lock as parking pawl engages with parking gear on driven pulley shaft. All clutches are released. Neutral safety switch, incorporated in A/T gear position switch, allows engine starting in this position. All hydraulic pressure is blocked at manual valve.

- **"R" (Reverse)**

Reverse brake is engaged. Back-up light switch, incorporated in A/T gear position switch, allows back-up lights to operate. Hydraulic pressure is directed to reverse brake.

- **"N" (Neutral)**

  All clutches are released. Neutral safety switch, incorporated in A/T gear position switch, allows engine starting in this position. All hydraulic pressure is blocked at manual valve.

- **"D" (Drive)**

  Transaxle automatically adjusts gear ratio to keep engine at most efficient speed for current driving conditions. Hydraulic pressure is directed to forward clutch.

- **"S" (Second)**

  Transaxle shifts into a lower gear for better acceleration and increased engine braking. Used for rapid acceleration at highway speeds. Hydraulic pressure is directed to forward clutch.

- **"L" (Low)**

  Transaxle shifts into lowest gear for increased power on hills and for engine braking. Hydraulic pressure is directed to forward clutch.

TCM/PCM contains a self-diagnostic system, which stores a Diagnostic Trouble Code (DTC) if failure or problem exists in transaxle electronic control system. DTC can be retrieved to determine transaxle problem area. For information on electronic transaxle components, see HONDA M4VA CVT ELECTRONIC CONTROLS article.

Transaxle is equipped with shift and key interlock systems. Shift interlock system prevents shift lever from being moved from "P" position unless brake pedal is depressed and accelerator pedal is in idle position. In case of a malfunction, shift lever can be released by placing ignition key in release slot near shift lever. Key interlock system prevents ignition key from being removed from ignition switch unless shift lever is in "P" position. For additional information on shift and key interlock systems, see appropriate SHIFT INTERLOCK SYSTEMS article.

The A/T gear position indicator on instrument panel contains lights to indicate which position A/T gear position switch on shift lever is in. For information and testing of A/T gear position indicator, see appropriate SHIFT INTERLOCK SYSTEMS article.

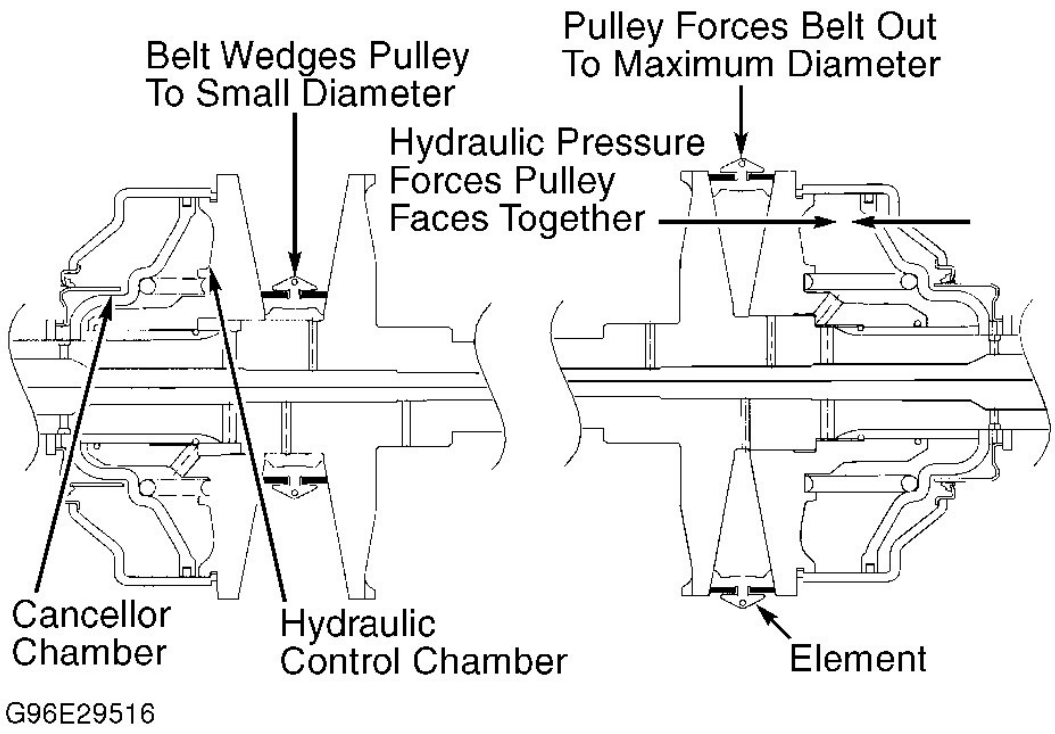


Fig. 3: Identifying Pulley Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

LUBRICATION

NOTE: See appropriate SERVICING article.

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate AXLE SHAFTS article in DRIVELINE/AXLES.

LOWER VALVE BODY ASSEMBLY

Lower valve assembly consists of main valve body, Pressure Low (PL) regulator valve body, shift valve body, start clutch control valve body and secondary valve body. See **LOWER VALVE BODY ASSEMBLY** under REMOVAL & INSTALLATION.

OIL COOLER FLUSHING

1. Attach Oil Cooler Flusher (J38405-A) to oil cooler lines. See **Fig. 4** . Fill oil cooler flusher tank 2/3 full

with Flushing Fluid (J35944-20). DO NOT use any other flushing fluid.

2. Ensure water and air valves on oil cooler flusher are off. Apply 80-120 psi (550-829 kPa) air pressure to oil cooler flusher. Turn oil cooler flusher water valve on so water flows through oil cooler for 10 seconds. Replace oil cooler if water will not flow through oil cooler. Shut water valve off.
3. Depress and hold mixing trigger on oil cooler flusher downward. Turn water valve on and flush oil cooler for 2 minutes. Turn air valve on for 5 seconds every 15-20 seconds to create a surging action.
4. Turn water valve off. Release mixing trigger. Disconnect oil cooler flusher and reverse hoses so oil cooler can be flushed in opposite direction.
5. Repeat steps **2)** and **3)** . Turn water valve off. Release mixing trigger. Turn water valve on and rinse oil cooler for at least one minute. Once oil cooler is flushed in both directions, turn water off. Turn air valve on until no moisture is visible from drain hose.

CAUTION: Ensure no moisture exists in oil cooler, as it can damage transaxle.

6. Turn air off. Disconnect oil cooler flusher. Reconnect inlet line on oil cooler. Once transaxle is installed, attach drain hose on return line and place in oil container. Ensure transaxle is in "P" position. Fill transaxle with ATF.
7. Start engine and operate for about 30 seconds or until 1.0 qt. (.9L) of ATF is discharged from return line. Shut engine off. Remove drain hose. Reinstall return line. Fill transaxle to proper level.

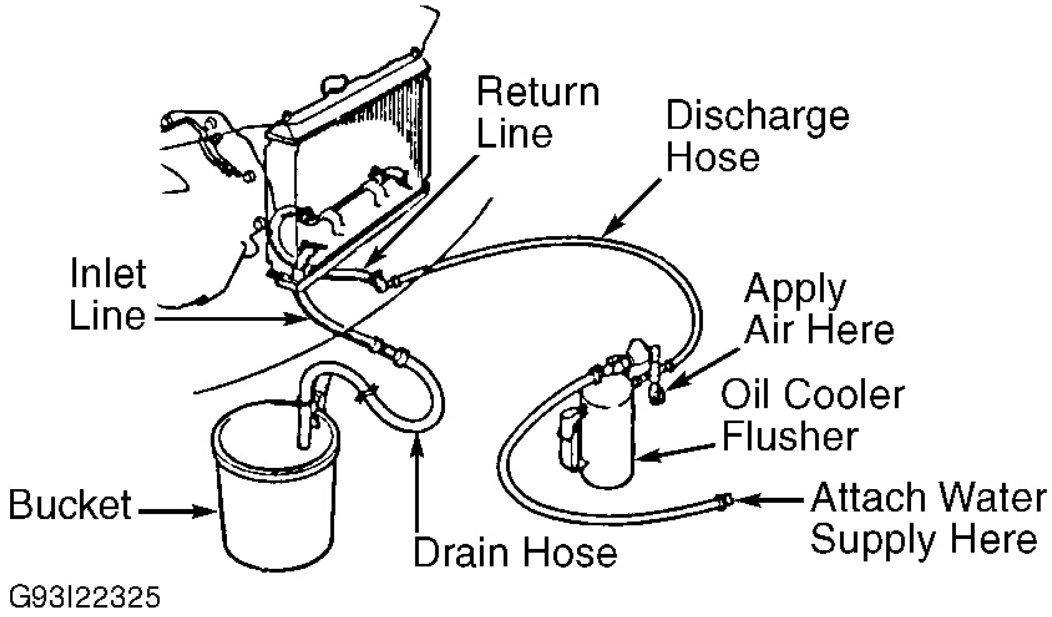


Fig. 4: Installing Oil Cooler Flusher
Courtesy of AMERICAN HONDA MOTOR CO., INC.

START CLUTCH CALIBRATION PROCEDURE

NOTE: When TCM/PCM, transaxle assembly, start clutch assembly, lower valve body assembly or engine assembly are replaced, TCM/PCM must memorize feedback signal for start clutch control. Perform following procedure to calibrate start clutch.

1. Start engine and warm to normal operating temperature (radiator fan comes on).
2. Shift transaxle to "D" position.
3. Turn off all electrical systems.
4. Road test vehicle up to 37 MPH (60 km/h). After speed reaches 37 MPH (60 km/h), release accelerator for 5 seconds. TCM/PCM will memorize feedback signal.

NOTE: TCM/PCM will not store feedback signal when fluid temperature is less than 104° F (40° C) even if engine coolant temperature reaches normal operating temperature. Repeat these procedures until start clutch calibration is completed.

TROUBLE SHOOTING

Transaxle malfunctions may be caused by poor engine performance, improper adjustments or failure of hydraulic, mechanical or electronic components. Always begin by checking fluid level, fluid condition and cable adjustments. Perform road test to determine if problem has been corrected. If problem still exists, several tests must be performed on transaxle. See **TESTING** .

SYMPTOM DIAGNOSIS

Engine Runs But Vehicle Does Not Move In Any Gear Position

- Low Fluid Level
- Worn Oil Pump
- Worn Or Damaged Oil Pump Chain Or Sprocket
- Worn Or Damaged Input Shaft
- Worn Or Damaged Sun Gear
- Worn Or Damaged Final Driven Gear
- Worn Or Damaged Secondary Drive Or Driven Gear
- Worn Or Damaged Flywheel Or Drive Plate
- Worn Or Damaged Intermediate Housing Assembly
- Defective Forward Clutch
- Defective Start Clutch
- Plugged Oil Filter Or Strainer
- Defective Lower Valve Body Assembly

- Defective PL Regulator Valve Body Assembly
- Defective Start Clutch Control Valve Body
- Worn Or Damaged Manual Valve Body

Vehicle Does Not Move In "D", "L" Or "S" Position

- Defective Forward Clutch
- Broken Or Out Of Adjustment Shift Cable
- Worn Manual Lever Pin
- Defective Start Clutch
- Worn Or Damaged Manual Valve Body

Vehicle Does Not Move In "R" Position

- Worn Or Damaged Sun Gear
- Defective Forward Clutch
- Broken Or Out Of Adjustment Shift Cable
- Worn Manual Lever Pin
- Defective Reverse Brake
- Worn Or Damaged Reverse Brake Piston
- Worn Or Damaged Planetary Gear
- Defective Start Clutch
- Worn Or Damaged Manual Valve Body
- Defective Inhibitor Solenoid

No Shift To Higher Ratio

- Worn Or Damaged Intermediate Housing Assembly
- Worn Or Damaged Pulley Pressure Oil Feed Pipe
- Defective Drive Or Driven Pulley Speed Sensor
- Defective Vehicle Speed Sensor
- Defective TCM/PCM
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body
- Worn Or Damaged Solenoid Harness

Poor Acceleration

- Worn Or Damaged Intermediate Housing Assembly
- Worn Or Damaged Pulley Pressure Oil Feed Pipe
- Defective Drive Or Driven Pulley Speed Sensor

- Defective Vehicle Speed Sensor
- Defective TCM/PCM
- Defective Start Clutch
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body
- Defective Start Clutch Control Valve Body
- Worn Or Damaged Solenoid Harness

Flares On Moving

- Worn Or Damaged Intermediate Housing Assembly
- Defective Forward Clutch
- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Lower Valve Body Assembly
- Defective PL Regulator Valve Body Assembly
- Defective Start Clutch Control Valve Body
- Worn Or Damaged Solenoid Harness

Excessive Shock When Depressing & Releasing Accelerator Pedal

- Worn Or Damaged Intermediate Housing Assembly
- Defective Forward Clutch
- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Lower Valve Body Assembly
- Defective PL Regulator Valve Body Assembly
- Defective Start Clutch Control Valve Body

No Engine Braking

- Worn Or Damaged Intermediate Housing Assembly
- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Lower Valve Body Assembly
- Defective PL Regulator Valve Body Assembly
- Defective Start Clutch Control Valve Body

Vehicle Does Not Accelerate In "R" Position

- Worn Or Damaged Intermediate Housing Assembly

- Defective Reverse Brake
- Worn Or Damaged Reverse Brake Piston
- Worn Or Damaged Planetary Gear
- Defective Start Clutch
- Defective Lower Valve Body Assembly
- Defective PL Regulator Valve Body Assembly
- Defective Start Clutch Control Valve Body

Vehicle Moves In "N" Position (Shift Cable Adjustment Is Okay)

- Defective Forward Clutch
- Incorrect Clutch/Reverse Brake Clearance
- Worn Or Damaged Reverse Brake Return Spring/Retainer

Late Shift From "N" To "D" Or "D" To "N" Position

- Defective Forward Clutch
- Broken Or Out Of Adjustment Shift Cable
- Worn Manual Lever Pin
- Worn Or Damaged Manual Valve Body
- Incorrect Clutch/Reverse Brake Clearance

Late Shift From "N" To "R" Or "R" To "N" Position

- Broken Or Out Of Adjustment Shift Cable
- Worn Manual Lever Pin
- Defective Reverse Brake
- Worn Or Damaged Reverse Brake Piston
- Worn Or Damaged Manual Valve Body
- Incorrect Clutch/Reverse Brake Clearance

Engine Stops When Shifted From "N" To "D" Position

- Worn Or Damaged Intermediate Housing Assembly
- Defective Forward Clutch
- Defective Start Clutch
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body
- Defective Start Clutch Control Valve Body

Engine Stops When Shifted From "N" To "R" Position

- Worn Or Damaged Intermediate Housing Assembly
- Worn Or Damaged Reverse Brake Piston
- Worn Or Damaged Planetary Gear
- Defective Start Clutch
- Worn Or Damaged Carrier Thrust Needle Bearing
- Worn Or Damaged Carrier Thrust Washer
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body
- Defective Start Clutch Control Valve Body

Noise From Transaxle In "R" Position

- Worn Or Damaged Sun Gear
- Defective Reverse Brake
- Worn Or Damaged Reverse Brake Piston
- Worn Or Damaged Planetary Gear
- Worn Or Damaged Carrier Thrust Needle Bearing
- Worn Or Damaged Carrier Thrust Washer

Excessive Idle Vibration

- Worn Oil Pump
- Worn Or Damaged Oil Pump Chain Or Sprocket
- Worn Or Damaged Drive Plate Or Flywheel
- Low Engine Output
- Defective Flywheel

Noise From Transaxle In "N" Or "P" Position

- Worn Or Damaged Oil Pump
- Worn Or Damaged Oil Pump Chain Or Sprocket
- Worn Or Damaged Planetary Gear
- Worn Or Damaged Input Shaft Needle Bearing
- Worn Or Damaged Carrier Thrust Needle Bearing
- Defective Flywheel Assembly

Hunting Engine Speed

- Defective TCM/PCM
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body

- Defective Start Clutch Control Valve Body

Vibration In All Positions

- Worn Or Damaged Drive Plate or Flywheel
- Defective Flywheel

Shift Lever Does Not Operate Smoothly

- Out Of Adjustment Or Broken Shift Cable
- Worn Or Damaged Control Lever
- Worn Or Damaged Manual Valve Body

Transaxle Will Not Shift Out Of Or Into "P" Position

- Out Of Adjustment Or Broken Shift Cable
- Worn Or Damaged Control Lever
- Worn Or Damaged Parking Pawl Or Shaft
- Worn Or Damaged Detent Lever
- Worn Or Damaged Parking Rod Assembly
- Worn Or Damaged Parking Gear
- Worn Or Damaged Parking Pawl Spring

Vehicle Does Not Accelerate To More Than A Certain Speed

- Worn Or Damaged Intermediate Housing Assembly
- Defective Start Clutch
- Defective Forward Clutch
- Defective Drive Or Driven Pulley Speed Sensor
- Defective Vehicle Speed Sensor
- Defective TCM/PCM
- Defective Lower Valve Body Assembly
- Defective Shift Valve Body

Excessive Shock On Start Off

- Defective Start Clutch Control Valve Body

Flares When Accelerating At Low Speed

- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Start Clutch Control Valve Body

Excessive Vibration In "D", "L", "S" & "R" Positions

- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Start Clutch Control Valve Body

Low Engine Speed In "D", "L", "S" & "R" Positions

- Defective Start Clutch
- Worn Or Damaged Start Clutch Pressure Oil Feed Pipe
- Defective Start Clutch Control Valve Body

Stall Speed High

- Defective Start Clutch
- Defective Forward Clutch
- Defective Start Clutch Control Valve Body

Stall Speed Low

- Worn Or Damaged Intermediate Housing Assembly
- Defective Start Clutch
- Low Engine Output
- Defective Shift Valve Body
- Defective Start Clutch Control Valve Body

Shudder On Starting Off

- Defective Start Clutch
- Fluid Deteriorated

TESTING

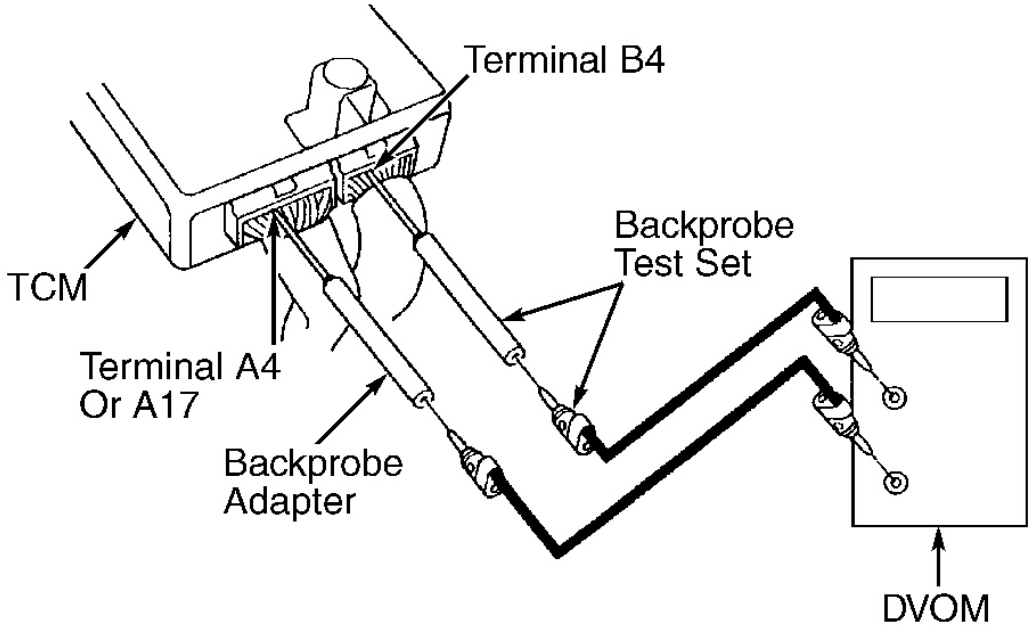
ROAD TEST

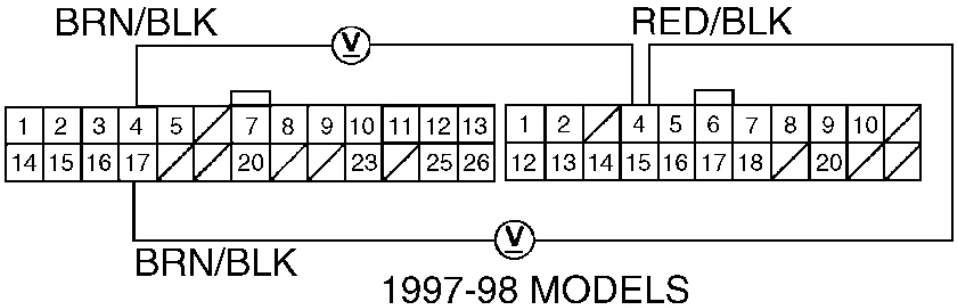
NOTE: If shift lever cannot be moved from "P" position with brake pedal depressed and accelerator pedal at idle position, check shift interlock system. See appropriate SHIFT INTERLOCK SYSTEMS article.

1. Warm engine to normal operating temperature. Apply parking brake and block wheels. Start engine. Move shift lever to "D" position while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall. Park vehicle on slope and apply parking brake. Ensure shift lever is in "P" position. Release parking brake. Ensure vehicle does not move forward.
2. Manufacturer recommends monitoring of Throttle Position (TP) sensor voltage when performing road test

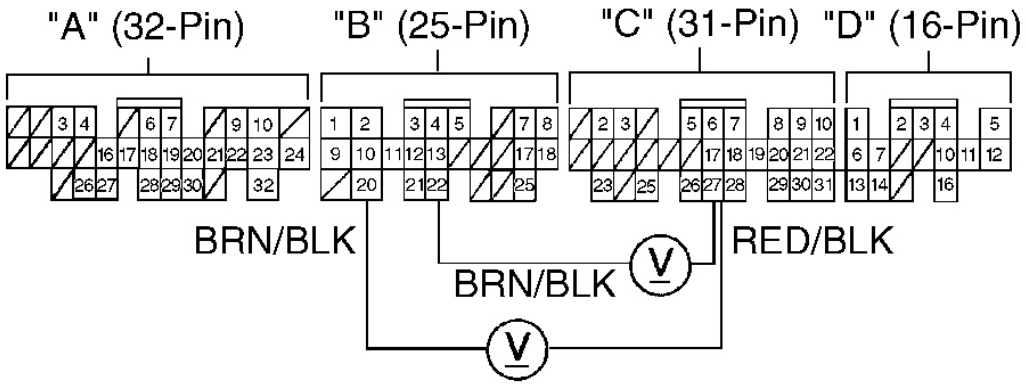
to ensure proper throttle opening for verifying vehicle speed and engine RPM. TP sensor voltage may be monitored using appropriate scan tool. If scan tool is not available, go to next step.

3. On '97-'98 models, remove driver's side kick panel. Unbolt TCM. Ensure ignition is off. Connect Backprobe Test Set (07SAZ-001000A) or equivalent between TCM harness connectors and Digital Volt-Ohmmeter (DVOM). Connect backprobe adapters with positive lead at terminal B4 and negative lead at terminals A4 or A17 to monitor throttle position sensor voltage. On '99 models, remove passenger side kick panel. Unbolt BCM. Connect Backprobe Test Set (07SAZ-001000A) or equivalent between BCM harness connectors and Digital Volt-Ohmmeter (DVOM). Connect backprobe adapters with positive lead at terminal C27 and negative lead at terminals B20 or B22 to monitor throttle position sensor voltage. Ensure ignition is off. See **Fig. 5** .
4. On all vehicles, test drive vehicle on flat highway in specified gear position and at specified throttle angle opening and vehicle speed. Ensure engine RPM is as specified at specified MPH. See **ENGINE RPM-TO-VEHICLE SPEED SPECIFICATIONS** table.





1997-98 MODELS
TCM CONNECTORS
WIRE SIDE OF FEMALE TERMINALS



1999 MODELS
PCM CONNECTORS
WIRE SIDE OF FEMALE TERMINALS

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Fig. 5: Measuring TP Sensor Voltage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE RPM-TO-VEHICLE SPEED SPECIFICATIONS

TP Sensor Voltage (Throttle Angle)	Gear Pos.	RPM At 25 MPH	RPM At 37 MPH	RPM At 62 MPH
.75 Volt (1/4 Throttle)	Drive	1250-1650	N/A	N/A
2.25 Volts (1/2 Throttle)	Drive	2500-3100	2650-3250	2700-3300
4.50 Volts (Full Throttle)	Drive	3950-4550	4650-5250	5200-5800
.75 Volt (1/4 Throttle)	2nd	1800-2200	2200-2800	3550-4150
2.25 Volts (1/2 Throttle)	2nd	2950-3550	3250-3850	4050-4650
4.50 Volts (Full Throttle)	2nd	4100-4700	5100-5700	5900-6500
0.75 Volt (1/4 Throttle)	Low	3100-3700	3650-4250	4450-5050
2.25 Volts (1/2 Throttle)	Low	3500-4100	4050-4650	4800-5400
4.50 Volts (Full Throttle)	Low	4100-4700	5100-5700	5900-6500

STALL SPEED TEST

CAUTION: DO NOT perform stall speed test for more than 10 seconds or transaxle may be damaged. DO NOT move shift lever while increasing engine speed. Ensure pressure gauge is removed prior to stall speed testing.

1. Apply parking brake and block all wheels. Connect tachometer and start engine. Ensure A/C is off. Warm engine to normal operating temperature. Place shift lever in "D" position.
2. Fully depress brake pedal. Fully depress accelerator for 6-8 seconds and note engine speed.
3. Allow transaxle to cool for 2 minutes. Repeat test procedure in "S", "L" and "R" positions.
4. Stall speed should be 2800-3100 RPM in "S", "L" and "R" positions. Stall speed should be 2350-2650 RPM in "D" position. If stall speed in not within specification, see **STALL SPEED TROUBLE SHOOTING** table for possible causes.

STALL SPEED TROUBLE SHOOTING

Stall Speed Gear Positions	Possible Causes
Stall Speed RPM High In "D", "S", "L" & "R"	Low Fluid Level, Low Oil Pump Output, Clogged Fluid Strainer, PH Regulator Valve Stuck Closed, Slipping Forward Clutch, Defective Start Clutch
Stall Speed RPM High In "R"	Slipping Reverse Brake, Defective Start Clutch
Stall Speed RPM Low In "D", "S", "L" & "R"	Engine Output Low, Faulty Start Clutch, Stuck Shift Valve

HYDRAULIC PRESSURE TEST

CAUTION: When measuring drive and driven pulley pressure when "D" indicator light indicates a problem, an oil pressure gauge that measures 711 psi (4902 kPa) or more must be used.

NOTE: Drive pulley pressure may be above 498 psi (3434 kPa) when there is a transaxle problem that causes TCM/PCM to go into fail-safe mode.

1. Ensure transaxle fluid level is correct. Warm engine to normal operating temperature. Apply parking brake. Block rear wheels. Raise and support vehicle so front wheels can rotate.
2. With engine off, remove pressure plug from appropriate pressure port on transaxle. Connect appropriate pressure gauge to appropriate pressure port. See **Fig. 6** . Tighten fitting to 13 ft. lbs. (18 N.m).

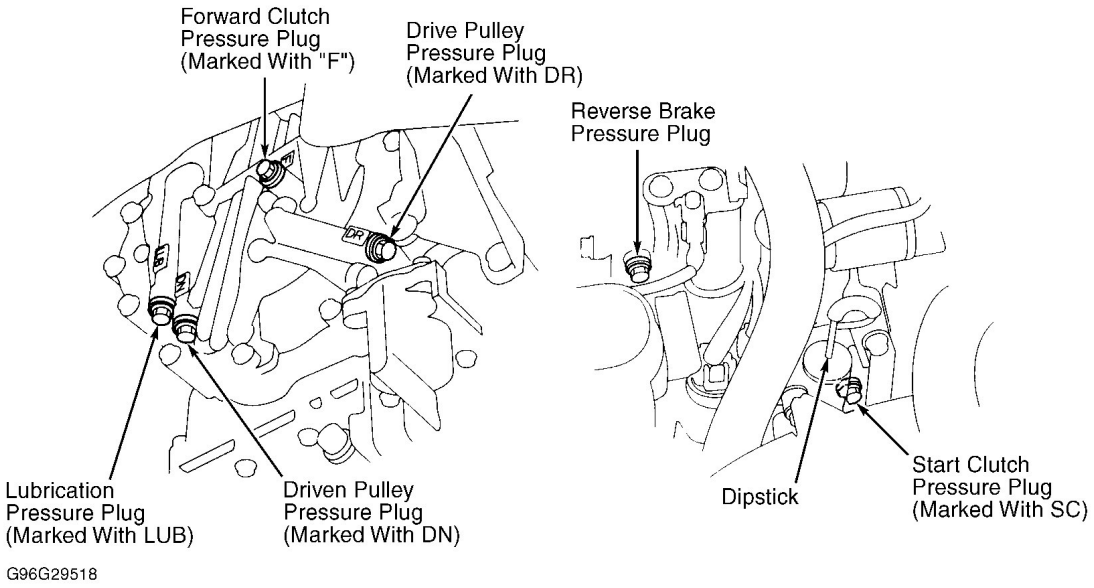


Fig. 6: Identifying Transaxle Pressure Plug Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. With shift lever in "D" position, start and operate engine at 1500 RPM. With pressure gauge connected to "F" pressure port, note hydraulic pressure reading for forward clutch.
4. Shift transaxle into "R" position. With pressure gauge connected to reverse brake pressure port, note hydraulic pressure reading for reverse brake.
5. Shift transaxle into "N". With pressure gauge connected to "DR" or "DN" pressure port, note hydraulic pressure reading for drive pulley and driven pulley.
6. With transaxle still in "N" position, measure lubrication pressure at 3000 RPM with pressure gauge connected to LUB pressure port.
7. All hydraulic pressures should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If hydraulic pressures are not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Install pressure plug into pressure port using NEW sealing washer. Tighten plug to 13 ft. lbs. (18 N.m).

HYDRAULIC PRESSURE TEST SPECIFICATIONS

Application	Gear Position	psi (kPa)
Forward Clutch		

W/Engine at 1500 RPM	"D"	203-253 (1400-1744)
Reverse Brake		
W/Engine At 1500 RPM	"R"	203-253 (1400-1744)
Drive Pulley		
W/Engine At 1500 RPM	"N"	28-101 (193-696)
Driven Pulley		
W/Engine At 1500 RPM	"N"	218-334 (1503-2303)
Lubrication		
W/Engine At 3000 RPM	"N"	30 (207)

HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

Pressure Symptom	Probable Cause
Low Or No Forward Clutch	Forward Clutch
Low Or No Reverse Brake	Reverse Brake
Low Or No Drive Pulley	Oil Pump, Shift Valve, PH Or PL Regulator Valve
Drive Pulley Pressure Too High	PH Or PL Regulator Valve, Shift Valve, Shift Control Solenoid
Low Or No Driven Pulley	Oil Pump, PH Regulator Valve, Shift Valve, Shift Control Solenoid
Driven Pulley Pressure Too High	PH Regulator Valve
Low Or No Lubrication	Oil Pump, Lubrication Valve

REMOVAL & INSTALLATION

ELECTRICAL COMPONENTS

See HONDA M4VA CVT ELECTRONIC CONTROLS article.

TRANSAXLE ASSEMBLY

See appropriate REMOVAL & INSTALLATION article.

LOWER VALVE BODY ASSEMBLY

NOTE: Lower valve body assembly consists of main valve body, Pressure Low (PL) regulator valve body, shift valve body, start clutch control valve body and secondary valve body.

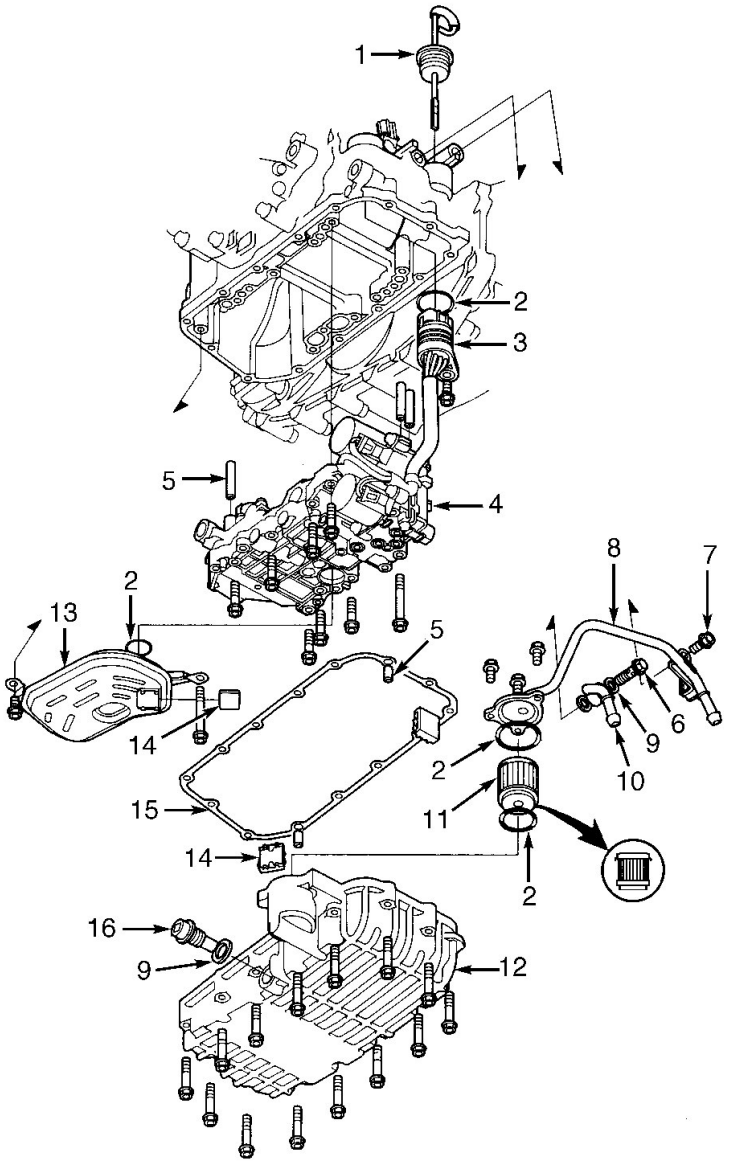
Removal

1. Raise and support vehicle. Drain fluid by removing drain plug and sealing washer from rear of transaxle. See **Fig. 7** . Disconnect 8-pin connector from solenoid harness connector.
2. Remove oil cooler hoses at oil cooler pipes. Turn ends of oil cooler hoses up and plug to prevent oil loss. Remove right front mount/bracket. Remove oil cooler outlet pipe, bracket bolt and 14 oil pan bolts. Remove oil strainer. Remove bolt securing solenoid harness connector. Remove 8 bolts and lower valve body assembly. See **Fig. 7** .

NOTE: If necessary to disassemble lower valve body assembly, see LOWER VALVE BODY ASSEMBLY under COMPONENT DISASSEMBLY & REASSEMBLY.

Installation

To install, reverse removal procedure using NEW "O" rings, gasket and sealing washers. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS** . Tighten drain plug to specification. Perform **START CLUTCH CALIBRATION PROCEDURE** under ON-VEHICLE SERVICE.



1. Dipstick
2. "O" Ring
3. Solenoid Harness Connector
4. Lower Valve Body Assembly
5. Dowel Pin
6. Joint Bolt
7. Oil Cooler Inlet Pipe Bracket Bolt
8. Oil Cooler Inlet Pipe Assembly
9. Sealing Washer
10. Oil Cooler Outlet Pipe
11. Oil Filter
12. Oil Pan
13. Oil Strainer
14. Magnet
15. Oil Pan Gasket
16. Drain Plug

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Fig. 7: Identifying Lower Valve Body Assembly & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE DISASSEMBLY

DISASSEMBLY PROCEDURE

1. Remove oil passage pipe holder assembly. Remove 20 bolts and flywheel housing. Remove oil pump drive sprocket, then remove oil pump drive chain. See **Fig. 8** . Move pitot flange toward its cutout, then remove pitot flange. See **Fig. 9** .
2. Remove snap ring securing oil pump drive sprocket hub. Remove thrust shim, oil pump drive sprocket hub and thrust washers. Remove differential assembly and secondary gear shaft. Remove parking pawl shaft, parking pawl spring and parking pawl. See **Fig. 10** . Remove snap ring securing start clutch. Remove cotter retainer and cotters. See **Fig. 8** .
3. Set Start Clutch Remover (07TAE-P4V0120) on start clutch. Attach pawl of remover to parking gear. See **Fig. 11** . Remove start clutch and secondary drive gear assembly.

CAUTION: DO NOT place pawl of remover on start clutch guide. If pawl of remover contacts start clutch guide, start clutch guide may be damaged.

4. Remove 14 right side cover bolts and remove cover. Remove manual valve body pipes. Remove snap ring securing ring gear. Remove thrust shim and ring gear. Remove snap ring securing reverse brake discs and plates. Remove reverse brake end plate, discs, plates and spring. See **Fig. 12** .
5. Remove carrier assembly with thrust washers and thrust needle bearing from forward clutch. Remove sun gear with thrust washer and thrust needle bearing. Remove input shaft by pulling upward. Remove snap ring securing forward clutch. Remove snap ring securing forward clutch end plate. Remove end plate.
6. Reinstall carrier assembly on forward clutch. Secure carrier with forward clutch end plate snap ring. Remove forward clutch and carrier assembly together. Install Reverse Brake Spring Compressor (07TAE-P4V0110) on reverse brake. Compress reverse brake return spring and remove snap ring. See **Fig. 13** .

CAUTION: If spring retainer tab is on reverse brake piston, spring retainer may be damaged. Ensure spring retainer tab is not on piston. See Fig. 14 .

7. Remove spring compressor and remove spring retainer/return spring assembly. Remove reverse brake pressure plug. See **Fig. 6** . Apply compressed air to pressure port and remove reverse brake piston.
8. Remove snap ring retainer from driven pulley shaft. Remove 5 bolts and remove manual valve body. Remove roller and push control shaft assembly toward outside of transaxle housing. Remove 4 bolts and intermediate housing. See **Fig. 12** .

1. "O" Ring
2. Oil Seal
3. Flywheel Housing
4. Flywheel Housing Gasket
5. Differential Assembly
6. Oil Passage Pipe Assembly
7. Dowel Pin
8. Oil Pump Assembly
9. Oil Pump Drive Chain
10. Snap Ring
11. Thrust Shim (Selective)
12. Oil Pump Drive Sprocket
13. Pitot Flange
14. Oil Pump Drive Sprocket Hub
15. Thrust Washers
16. Pitot Pipe Bracket
17. Pitot Lubrication Pipe
18. Pitot Pipe
19. Set Ring (Selective)
20. Oil Passage Pipe Holder Assembly
21. Start Clutch Oil Feed Pipe
22. Feed Pipe Flange
23. Connector Bracket
24. Ball Bearing
25. Cotter Retainer
26. Cotters (Selective)
27. Start Clutch Assembly
28. Secondary Drive Gear Assembly
29. Differential Cover
30. Secondary Gear Shaft
31. Parking Pawl Shaft
32. Parking Pawl Spring
33. Parking Pawl
34. Tongued Washer
35. Parking Pawl Rod Holder
36. Vehicle Speed Sensor
37. Transaxle Housing

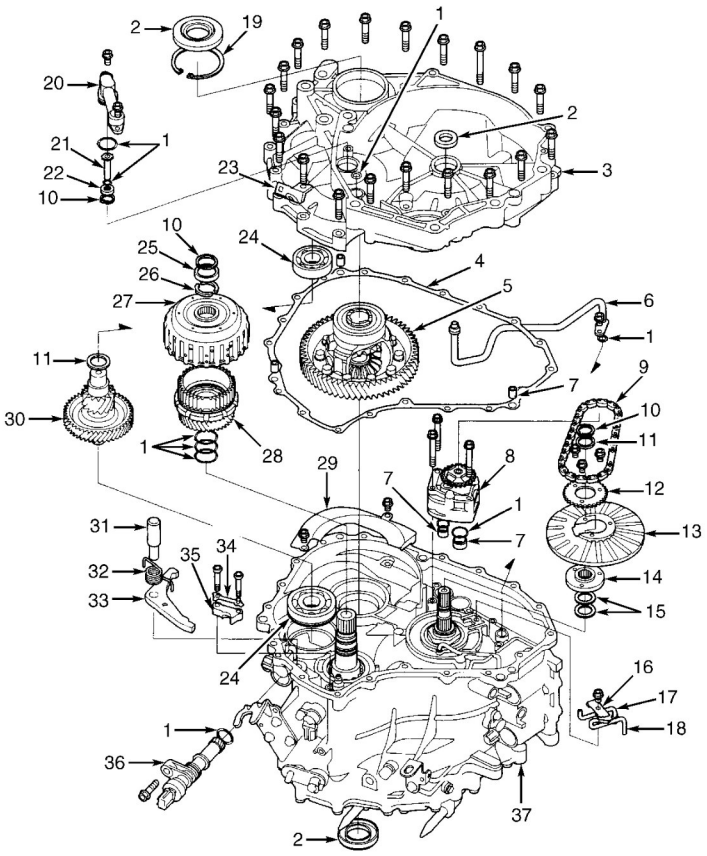

Fig. 8: Exploded View Of Flywheel & Transaxle Housing Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

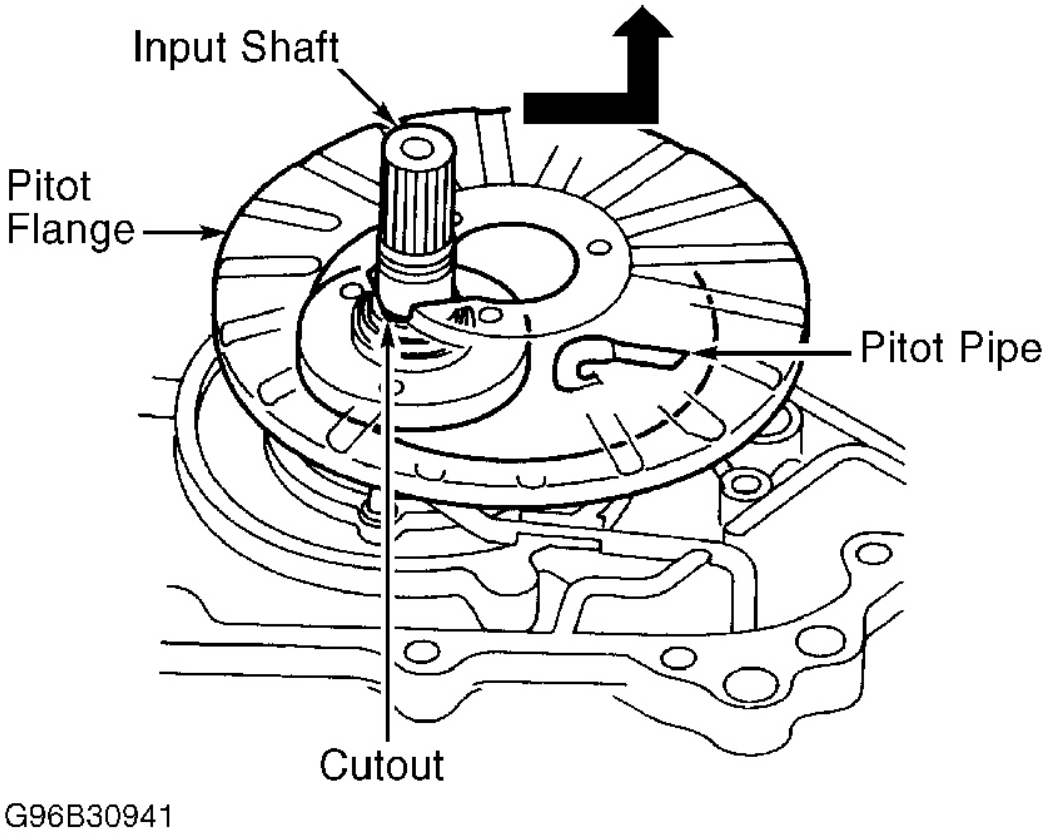

Fig. 9: Removing & Installing Pitot Flange
Courtesy of AMERICAN HONDA MOTOR CO., INC.

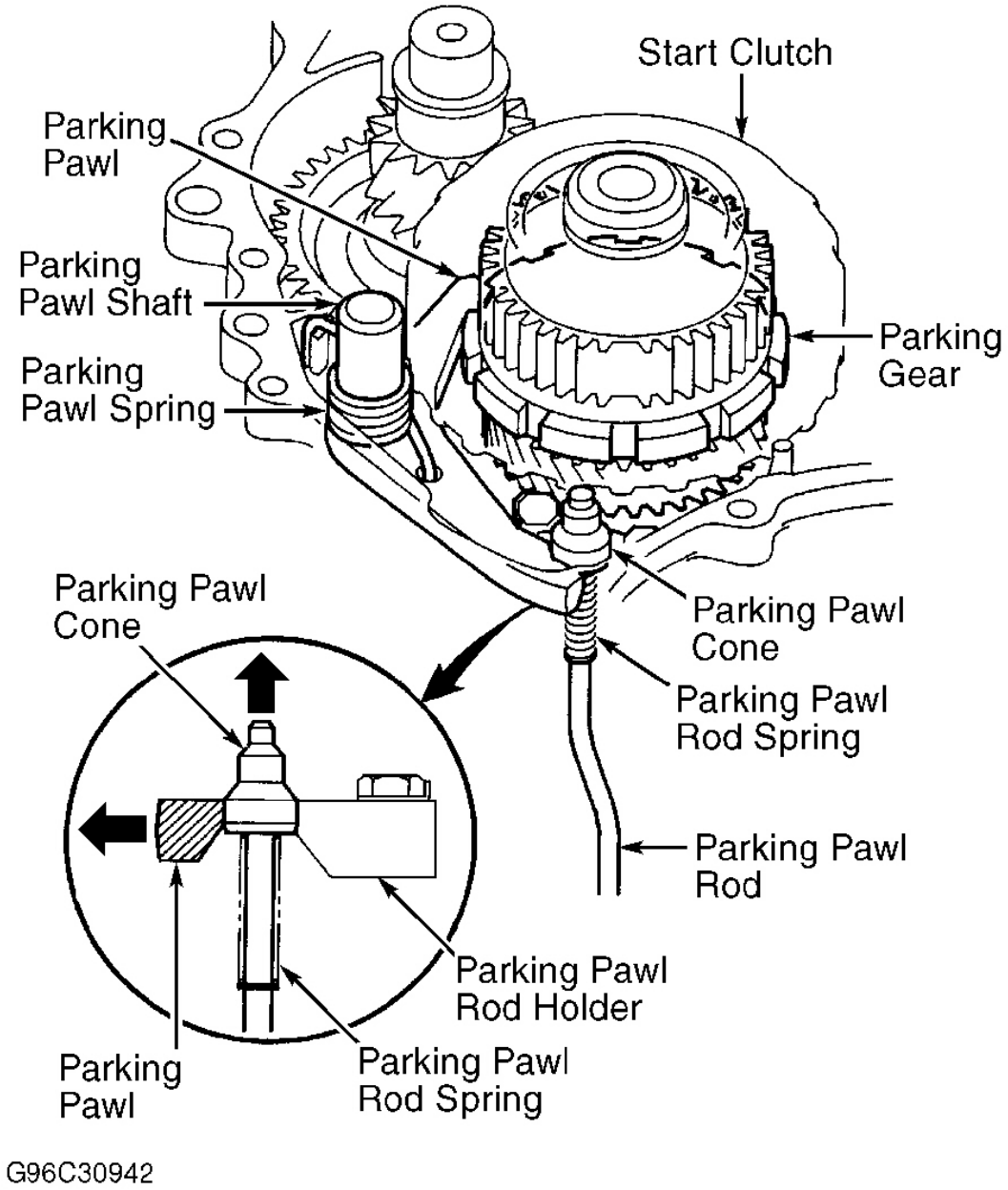

Fig. 10: Identifying Parking Pawl Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

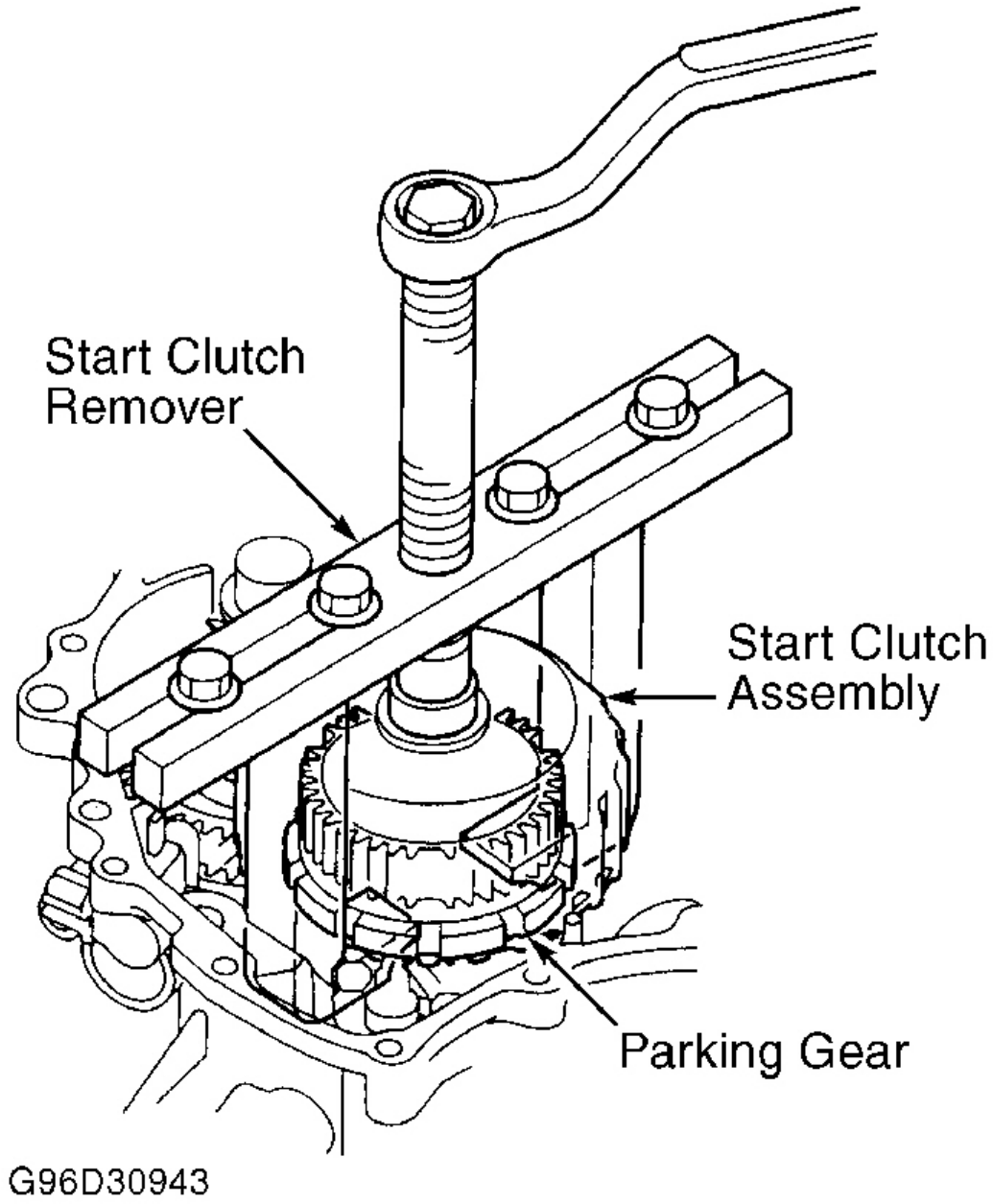

Fig. 11: Removing Start Clutch & Secondary Drive Gear Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

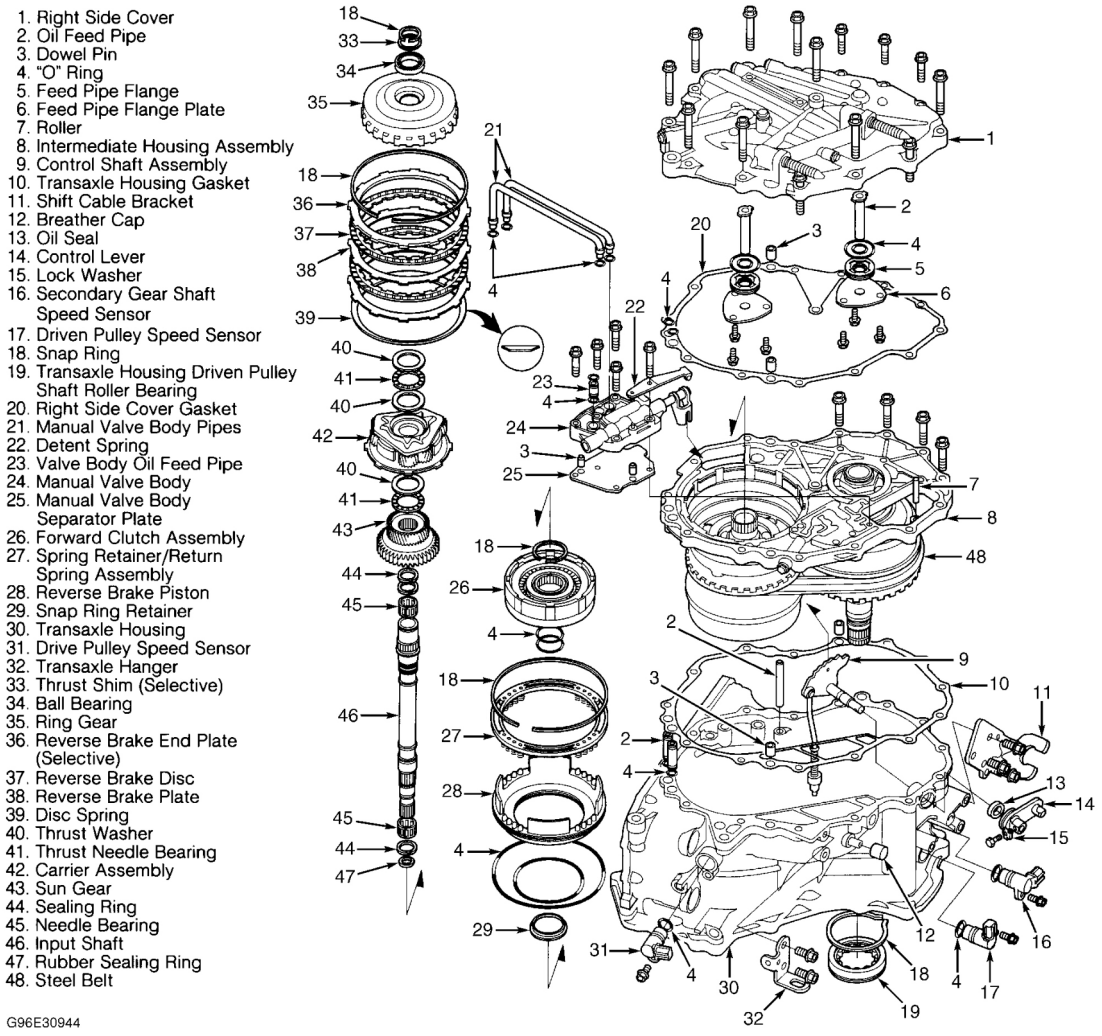

Fig. 12: Exploded View Of Right Side Cover & Intermediate Housing Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

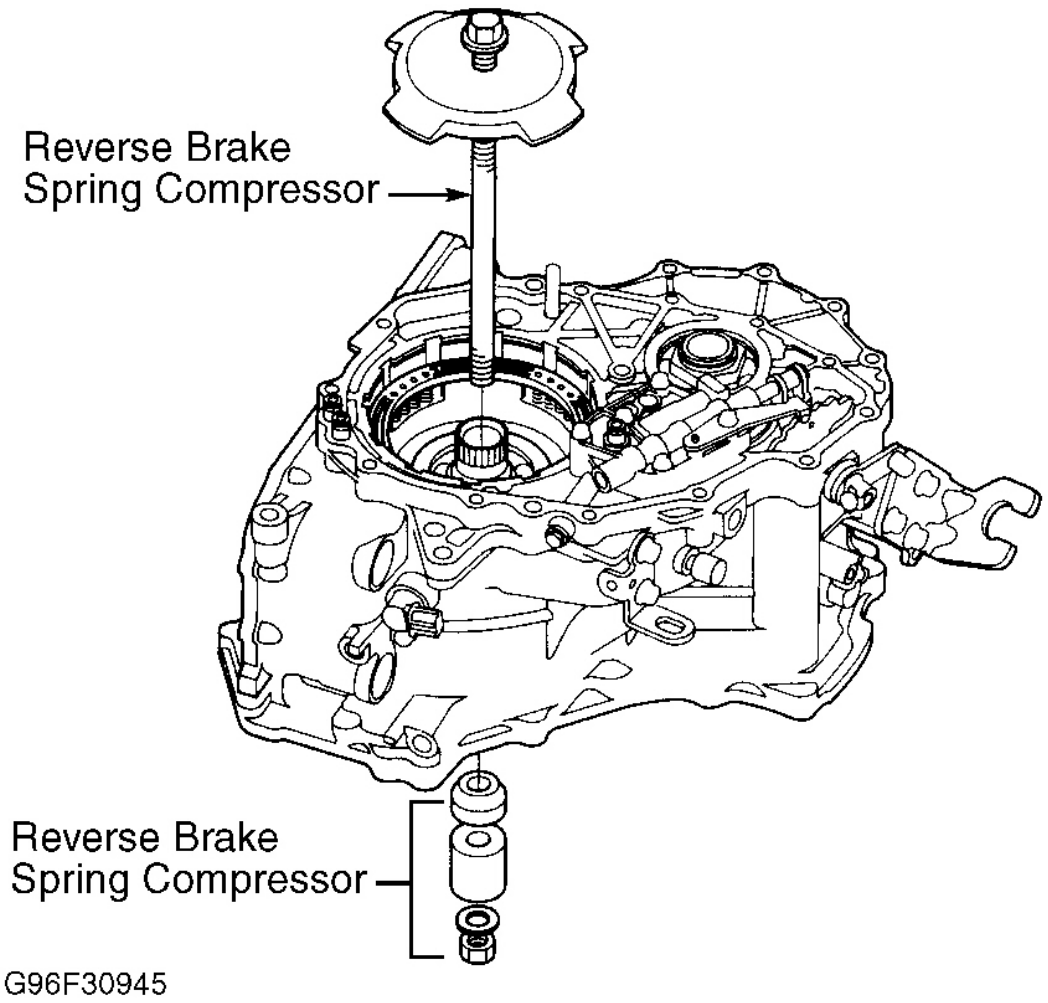

Fig. 13: Installing Reverse Brake Spring Compressor
Courtesy of AMERICAN HONDA MOTOR CO., INC.

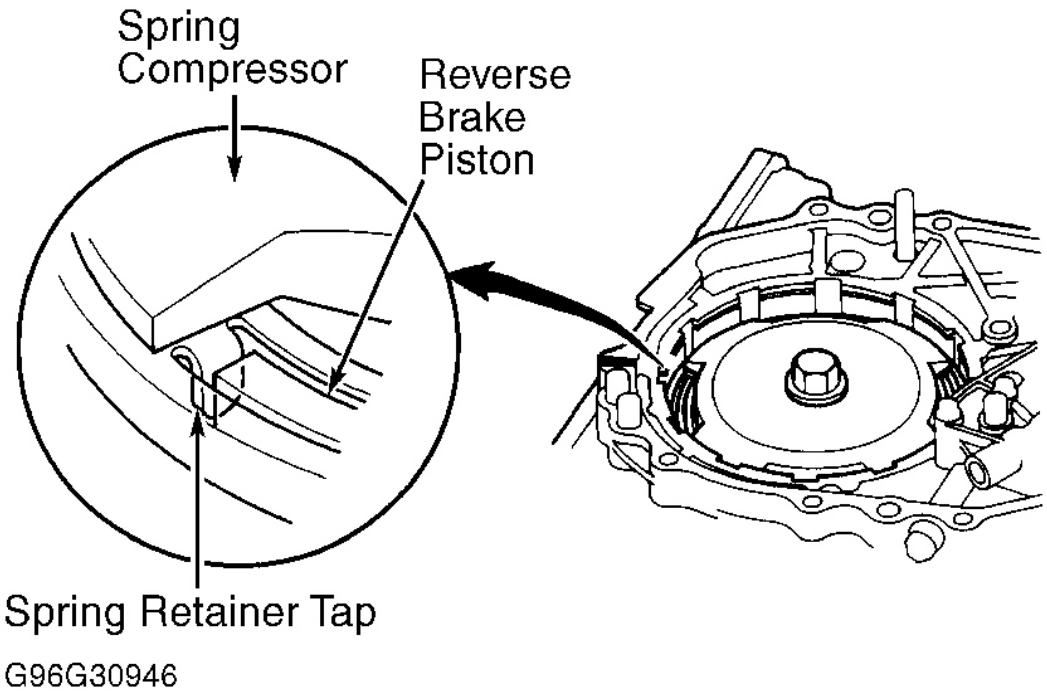

Fig. 14: Positioning Spring Retainer On Reverse Brake Piston
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

MANUAL VALVE BODY

Disassembly & Reassembly

Remove spring seat, spring and reverse inhibitor valve. Remove manual valve from valve body. Clean all parts in solvent and dry with compressed air. Blow out all passages. Inspect valve body for wear, scratches and scoring. See **Fig. 15** . To reassemble, reverse disassembly procedures.

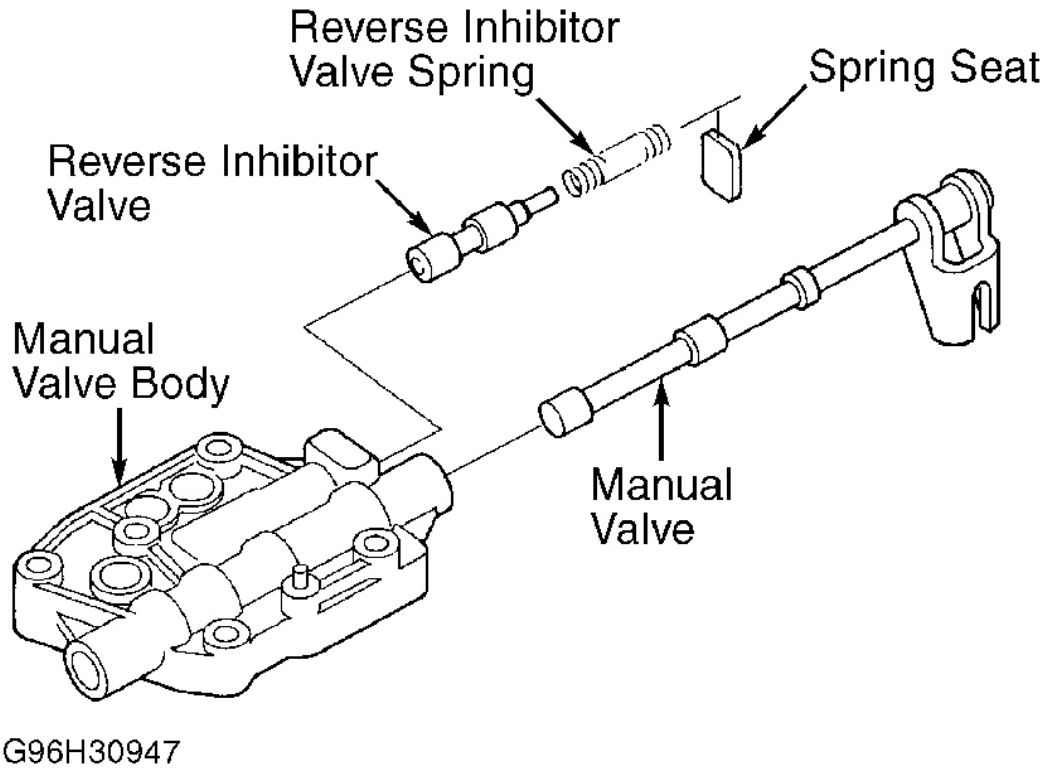

Fig. 15: Identifying Manual Valve Body Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

FORWARD CLUTCH

Disassembly

1. Remove snap ring. Remove clutch end plate, discs and plates. See **Fig. 16** . Remove disc spring. Install Clutch Spring Compressor Attachments (07LAE-PX40100 and 07HAE-PL50100) and Bolt Assembly (07GAE-PG40200) to forward clutch assembly. See **Fig. 17** .

CAUTION: If either end of compressor is set over an area of spring retainer which is not supported by return spring, retainer may be damaged. Ensure compressor is adjusted for full contact with spring retainer. See Fig. 17 .

2. Compress return spring. Remove snap ring, spring compressor components, spring retainer and return spring. See **Fig. 16** . Wrap shop towel around clutch drum. Apply compressed air to oil passage to remove piston. Place a finger tip on other end while applying air pressure. See **Fig. 18** .

Cleaning & Inspection

Clean all parts in solvent and dry with compressed air. Blow out all passages. Inspect check valve. If valve is loose, replace piston. See **Fig. 19** . Lubricate components with ATF prior to reassembly.

Reassembly

1. Install NEW "O" rings on clutch piston in correct direction. See **Fig. 20** . Install piston in clutch drum. Apply pressure and rotate to ensure proper seating. DO NOT pinch "O" ring by installing piston with too much force.
2. Install return spring and spring retainer. Position snap ring on retainer. Install clutch spring compressor on forward clutch. Compress return spring. Install snap ring and remove spring compressor.

CAUTION: If either end of compressor is set over an area of spring retainer which is not supported by return spring, retainer may be damaged. Ensure compressor is adjusted for full contact with spring retainer. See Fig. 17 .

3. Install disc spring with narrow side down. See **Fig. 16** . Soak clutch discs in ATF for a minimum of 30 minutes. Starting with clutch plate, alternately install plates and discs. Install clutch end plate with flat side toward disc.

NOTE: Prior to installing plates and discs, ensure inside of clutch drum is free of dirt or other foreign matter.

4. Install snap ring. Ensure snap ring end gap is .31" (7.9 mm). Using a dial indicator, measure clearance between clutch end plate and top disc. Zero dial indicator with clutch end plate lowered and lift plate up to snap ring. See **Fig. 21** .
5. Distance clutch end plate moves is clearance between clutch end plate and top disc. Measure clearance in at least 3 places and use average as actual measurement. Clearance should be .016-.024"(.40-.60 mm).
6. If clearance is not within specification, select a NEW clutch end plate, then recheck. End plates are available in thickness range of .138" (3.50 mm) and .185" (4.70 mm), in increments of .004" (.10 mm). See **Fig. 22** . After replacing clutch end plate, ensure clearance is within specification.

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

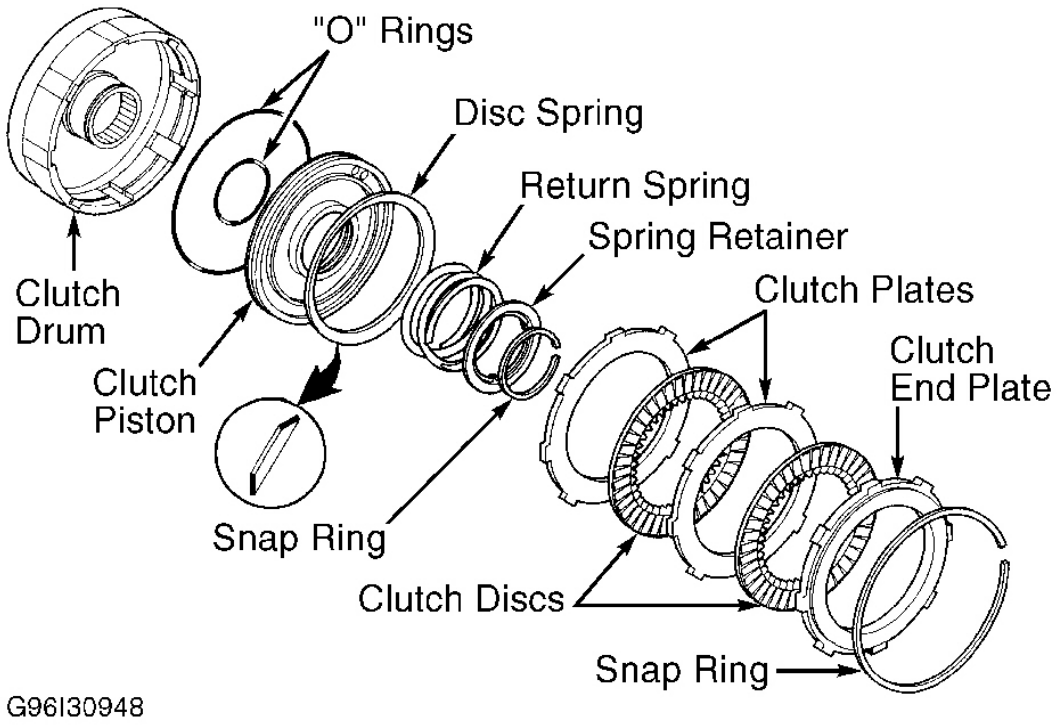

Fig. 16: Exploded View Of Forward Clutch Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

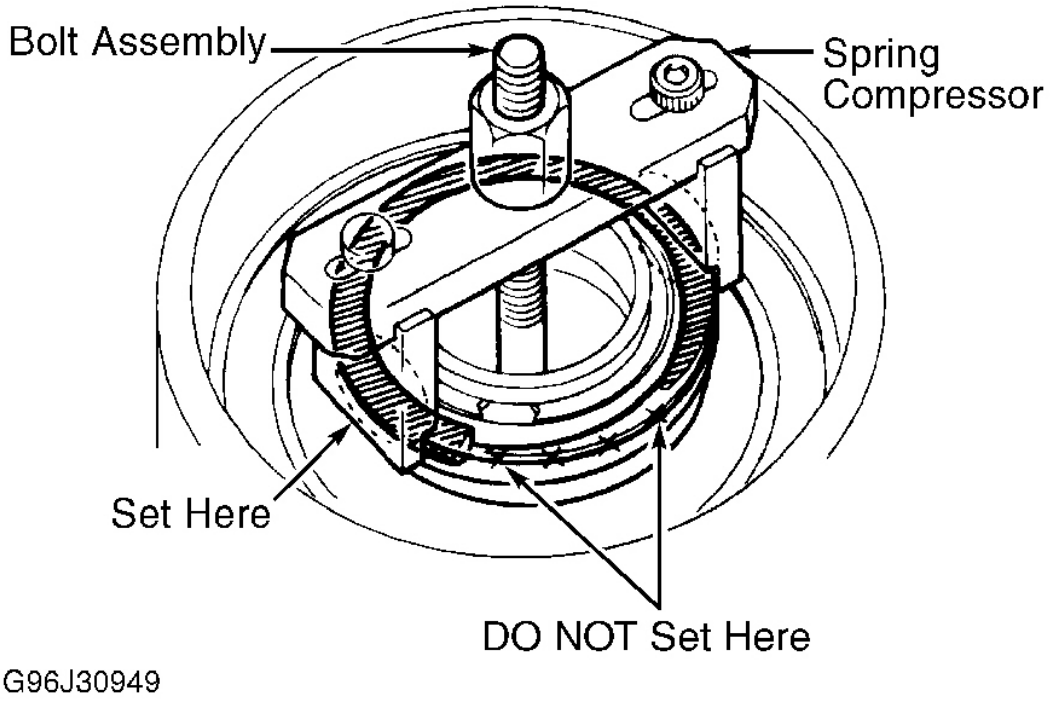

Fig. 17: Compressing Forward Clutch Return Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

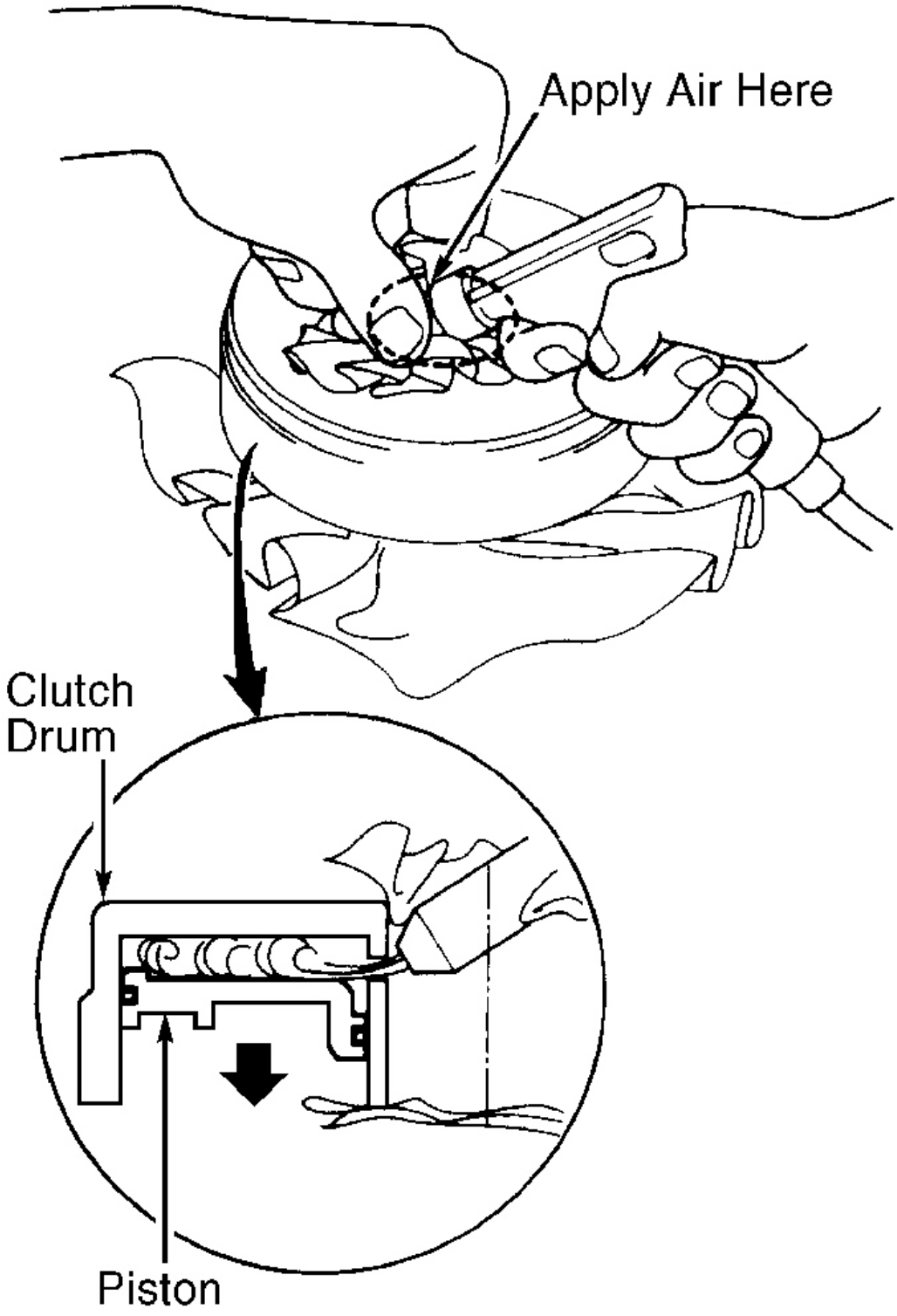

Fig. 18: Removing Forward Clutch Piston
Courtesy of AMERICAN HONDA MOTOR CO., INC.

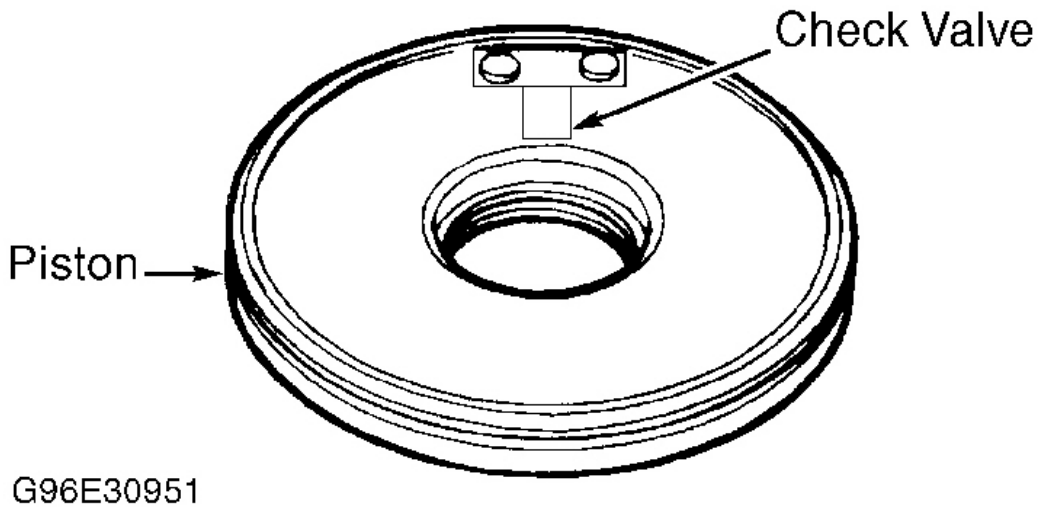

Fig. 19: Checking Forward Clutch Piston Check Valve
Courtesy of AMERICAN HONDA MOTOR CO., INC.

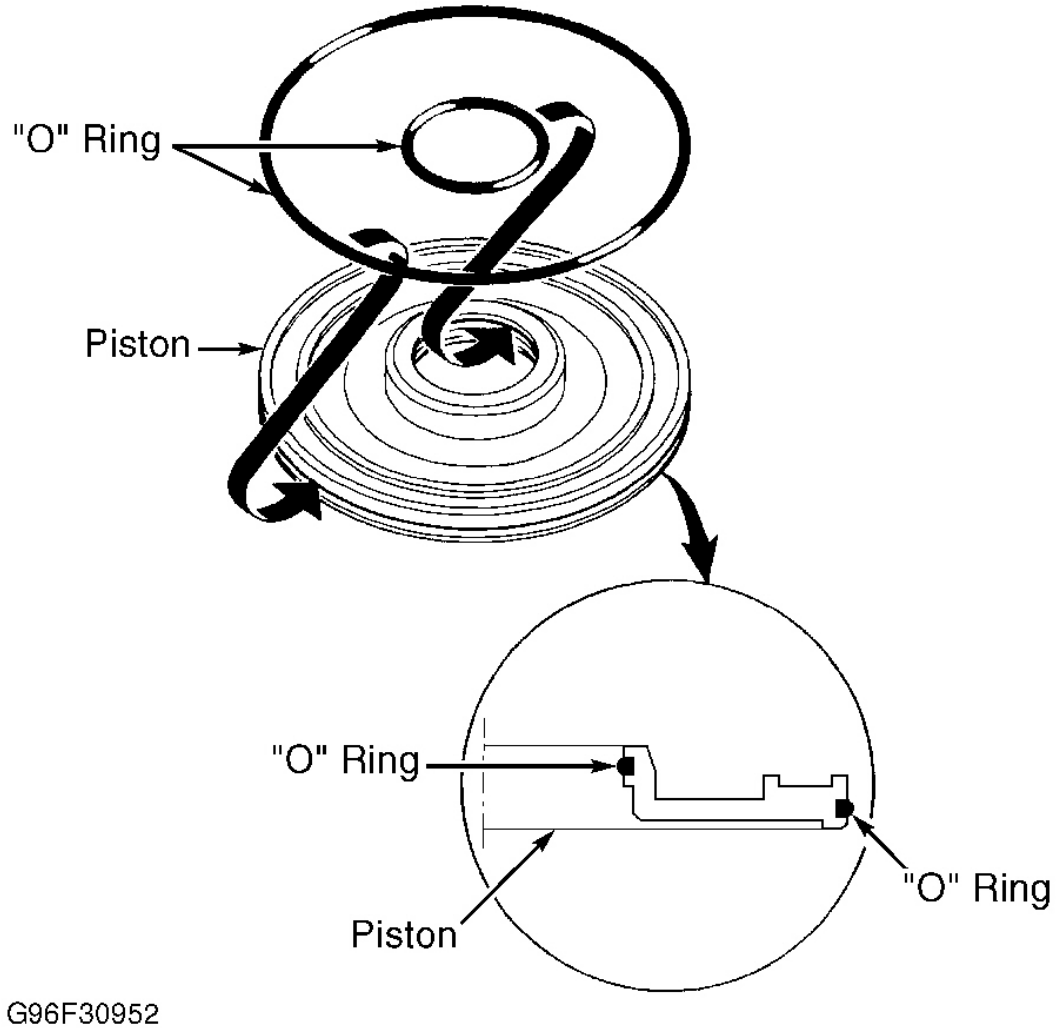

Fig. 20: Installing Forward Clutch Piston "O" Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

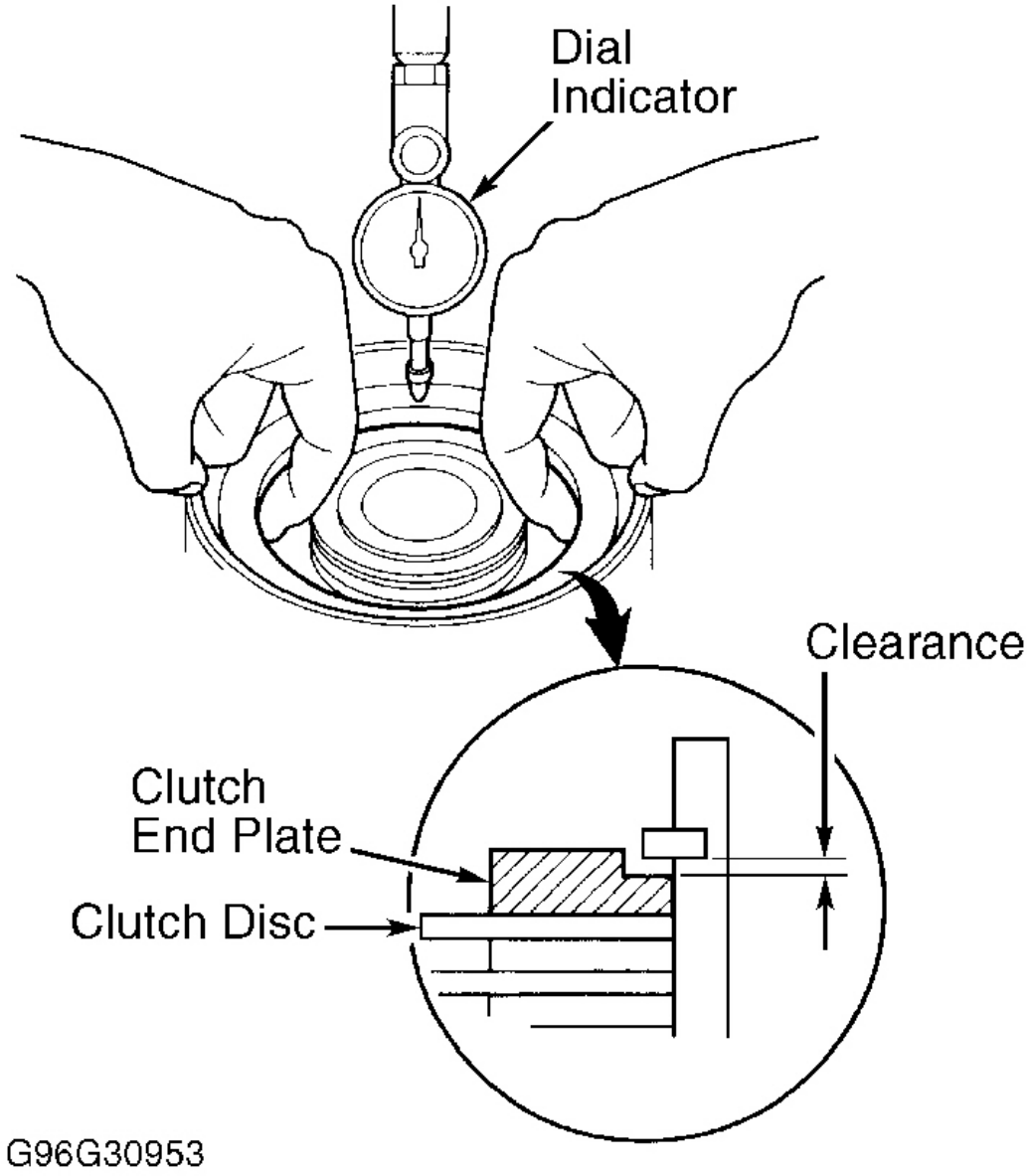

Fig. 21: Measuring Forward Clutch Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

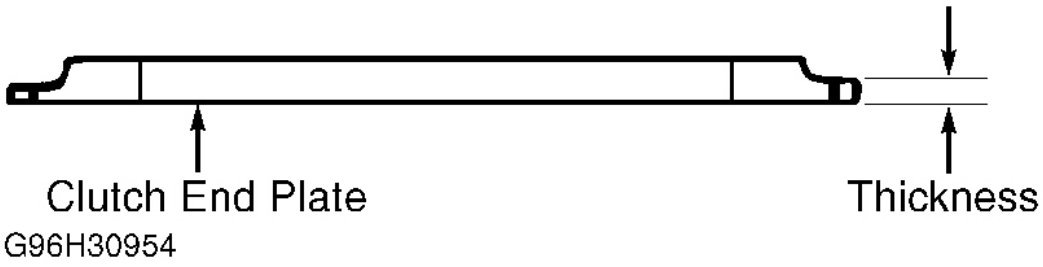

Fig. 22: Measuring Forward Clutch End Plate Thickness
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DIFFERENTIAL ASSEMBLY

Disassembly

1. Prior to disassembly, place differential assembly on "V" blocks and install both axles. Using dial indicator, measure pinion gear backlash. See **Fig. 23** . Backlash should be .002-.006" (.05-.15 mm). If backlash is not as specified, replace differential carrier.
2. Remove final driven gear from differential carrier. Final driven gear bolts have left-hand threads. Using appropriate bearing puller, remove differential carrier bearings (if necessary). See **Fig. 24** .

Cleaning & Inspection

Check bearings for wear and rough rotation. Inspect final driven gear teeth for damage. Replace components as necessary.

Reassembly

To reassemble, reverse disassembly procedure. Install NEW bearings using appropriate driver and press. Install final driven gear on differential carrier with chamfered side of gear on inner bore, facing differential carrier. Tighten bolts to 74 ft. lbs. (101 N.m).

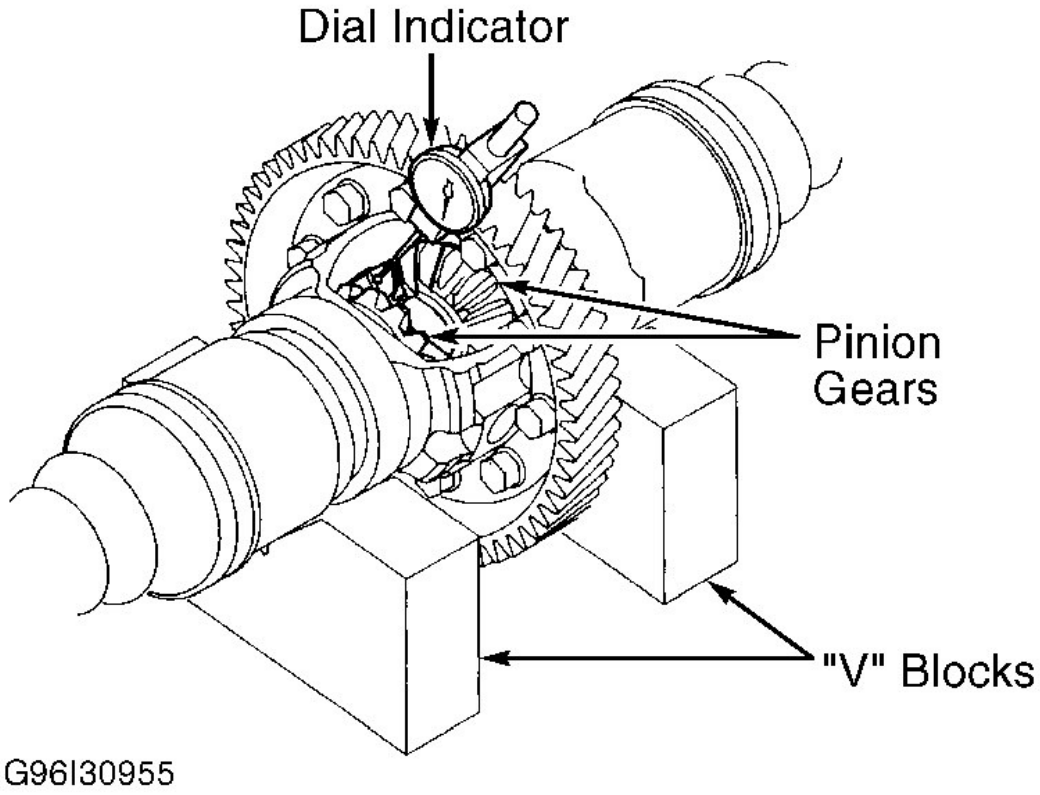

Fig. 23: Measuring Pinion Gear Backlash
Courtesy of AMERICAN HONDA MOTOR CO., INC.

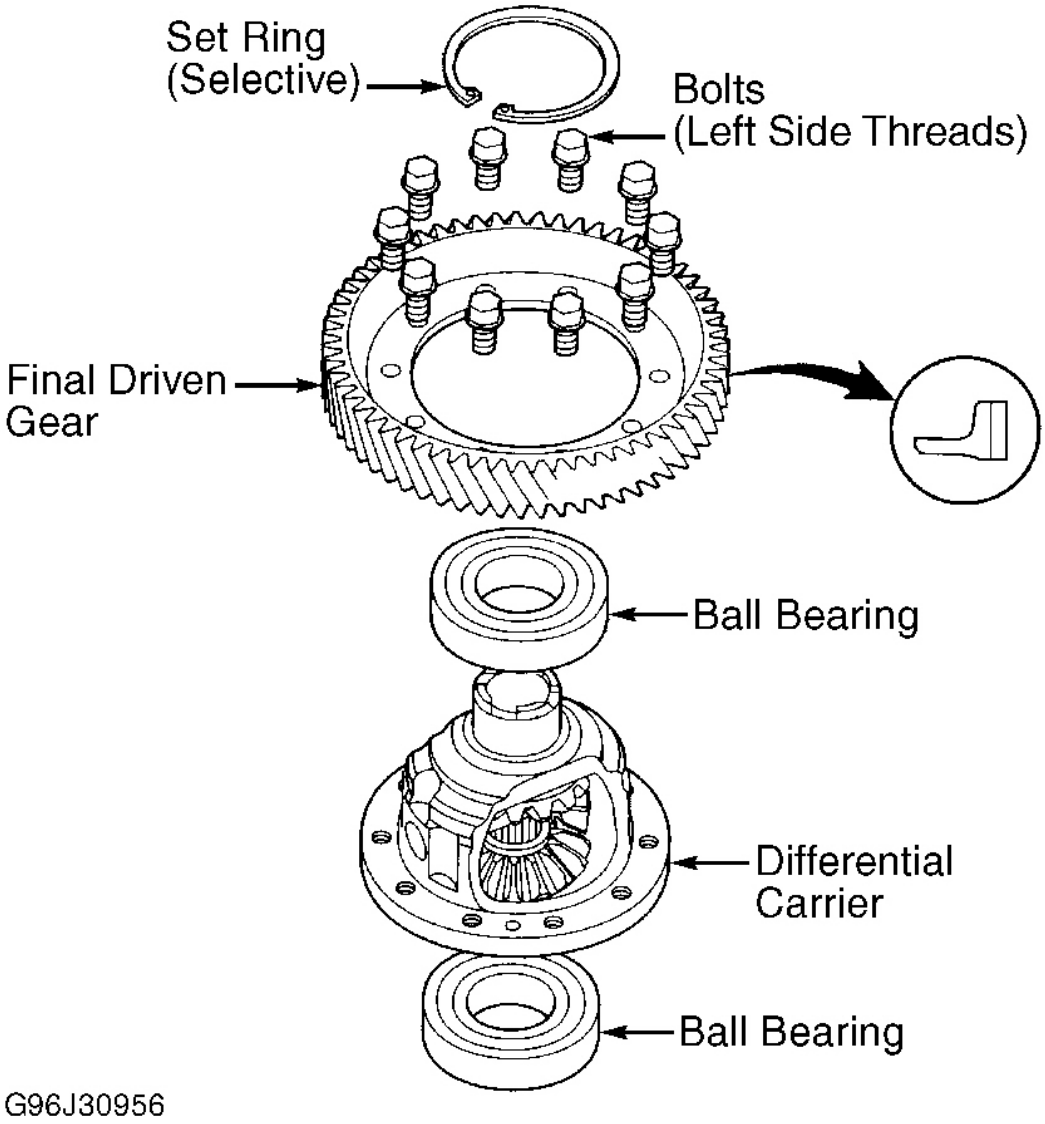

Fig. 24: Identifying Differential Assembly Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE & FLYWHEEL HOUSING OIL SEALS

Disassembly & Reassembly

1. Remove oil seal from transaxle housing and flywheel housing using pin punch and hammer. Install a 3.15" (80 mm) set ring into flywheel housing. DO NOT install oil seal. Using appropriate driver, install differential assembly into transaxle housing.
2. Install flywheel housing and tighten bolts to 21 ft. lbs. (29 N.m). Using feeler gauge, measure clearance

between 3.15" (80 mm) set ring and outer race of bearing in flywheel housing. See **Fig. 25** . Clearance should be .006" (.15 mm). If clearance is more than specified, select and install NEW set ring, then go to next step. Set ring is available in thickness range of .098" (2.50 mm) and 1.18" (3.00 mm). If set ring-to-bearing outer race clearance is less than specification, set ring does not need replacement.

3. Remove flywheel housing. Install correct thickness set ring. Install oil seal in transaxle housing and flywheel housing using appropriate driver, pilot, adapter and hammer. Ensure oil seal in flywheel housing is installed to correct depth. See **Fig. 26** .

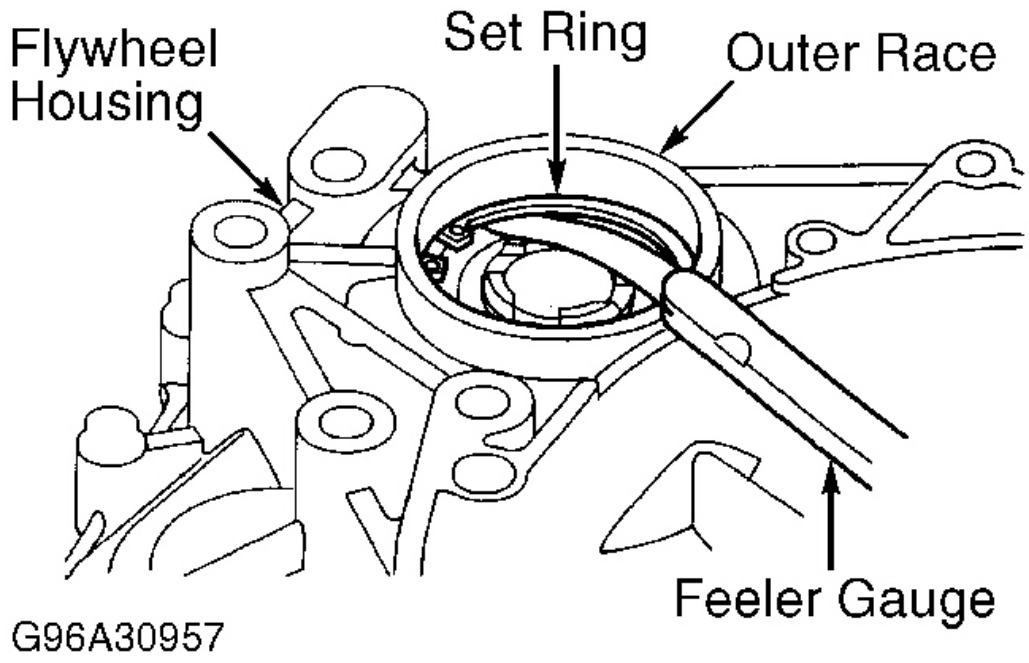

Fig. 25: Measuring Set Ring Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

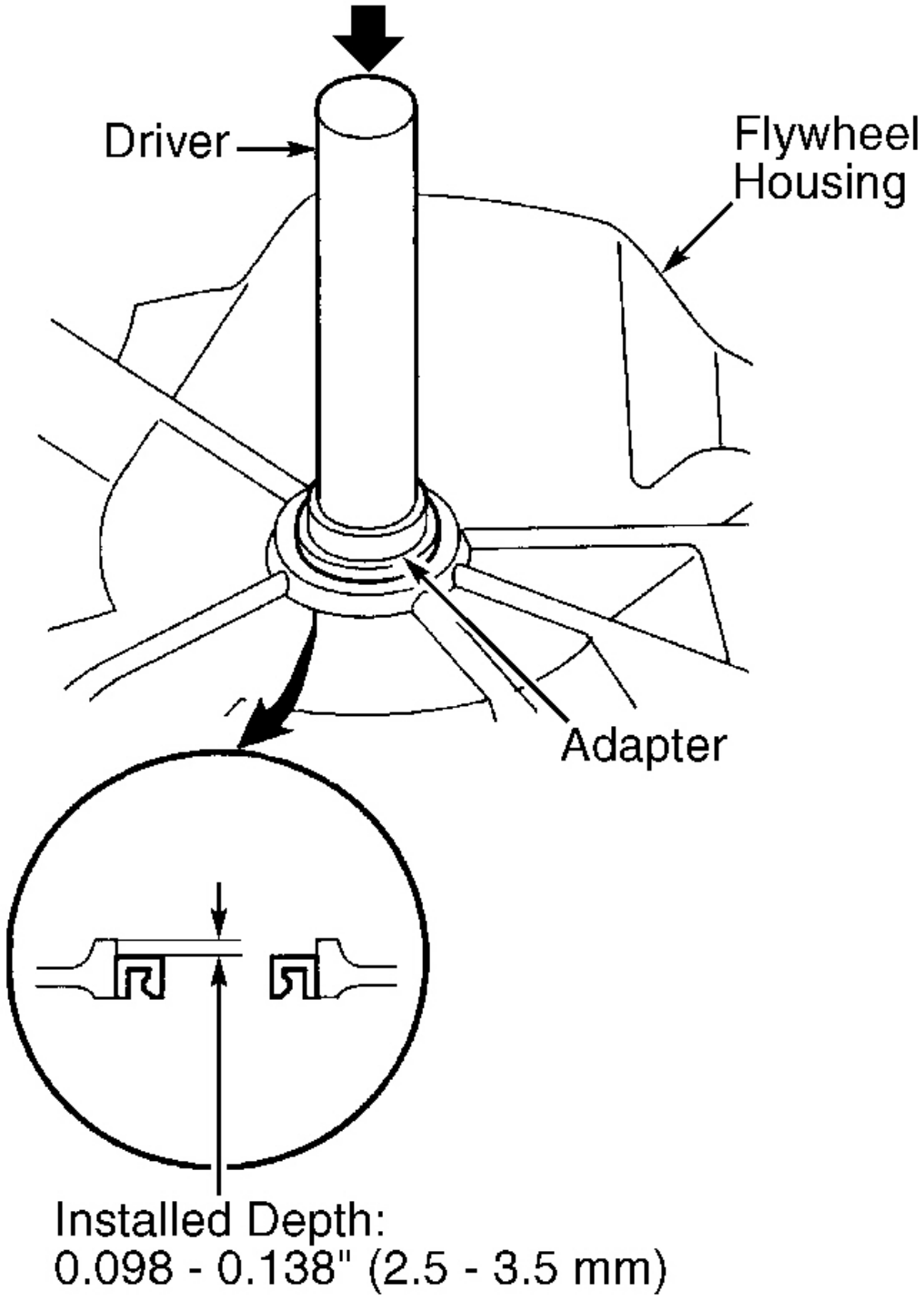

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Fig. 26: Installing Flywheel Housing Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DRIVEN PULLEY SHAFT BEARING

Disassembly & Reassembly

1. Expand snap ring with snap ring pliers, then push bearing out using driver, adapter and press. See **Fig. 27** . DO NOT remove snap ring unless it is necessary to clean groove in housing. Lubricate parts with ATF. Expand snap ring with pliers. Insert NEW bearing part way into housing using driver and adapter. Install bearing with groove facing outside housing.
2. Release pliers, then push bearing down into housing until ring snaps in place around bearing. After installing bearing, ensure snap ring is seated in bearing and housing grooves. See **Fig. 28** . Ensure snap ring operates properly and snap ring end gap is 0-.35" (0-9 mm).

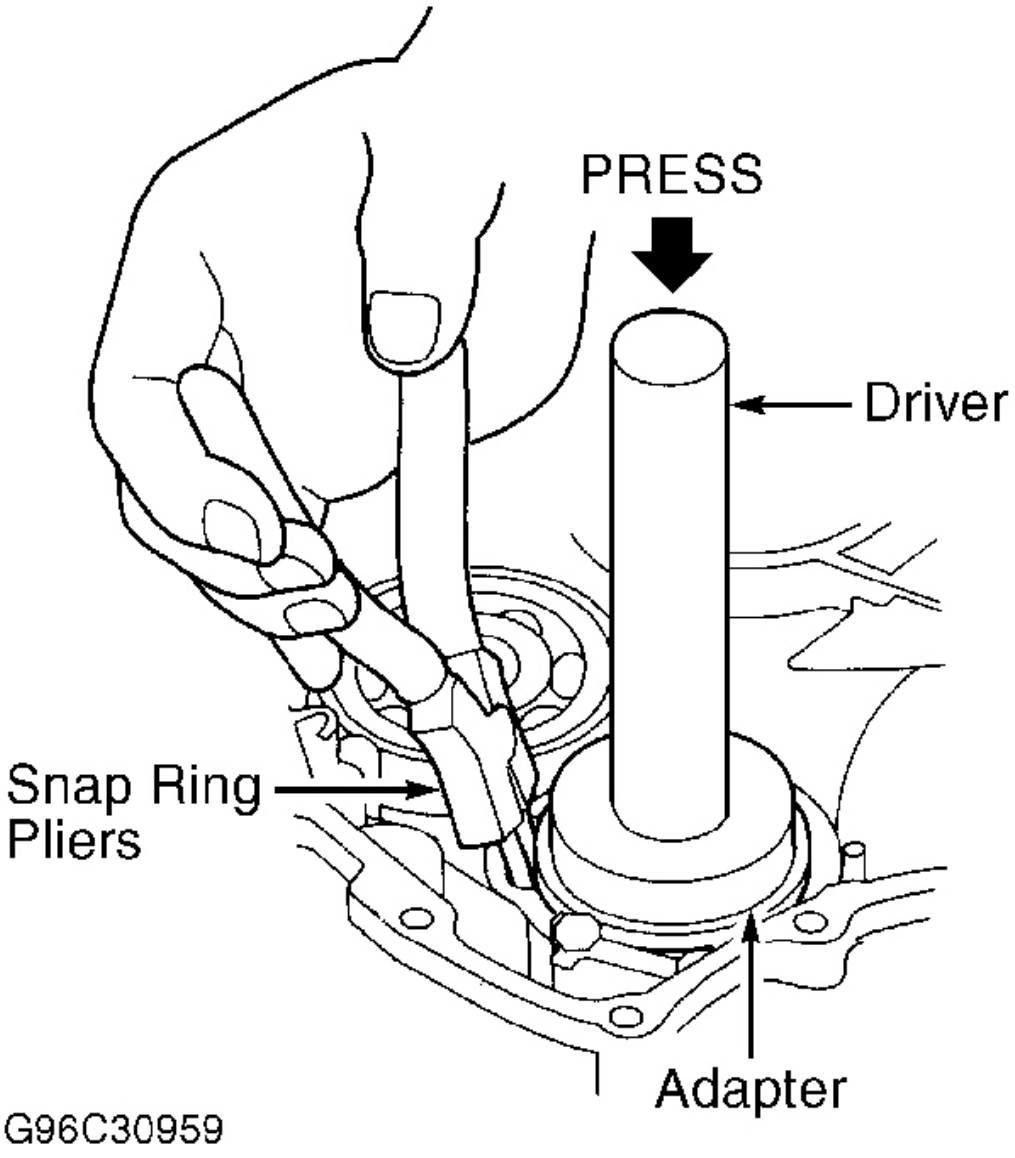

Fig. 27: Removing Driven Pulley Shaft Bearing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

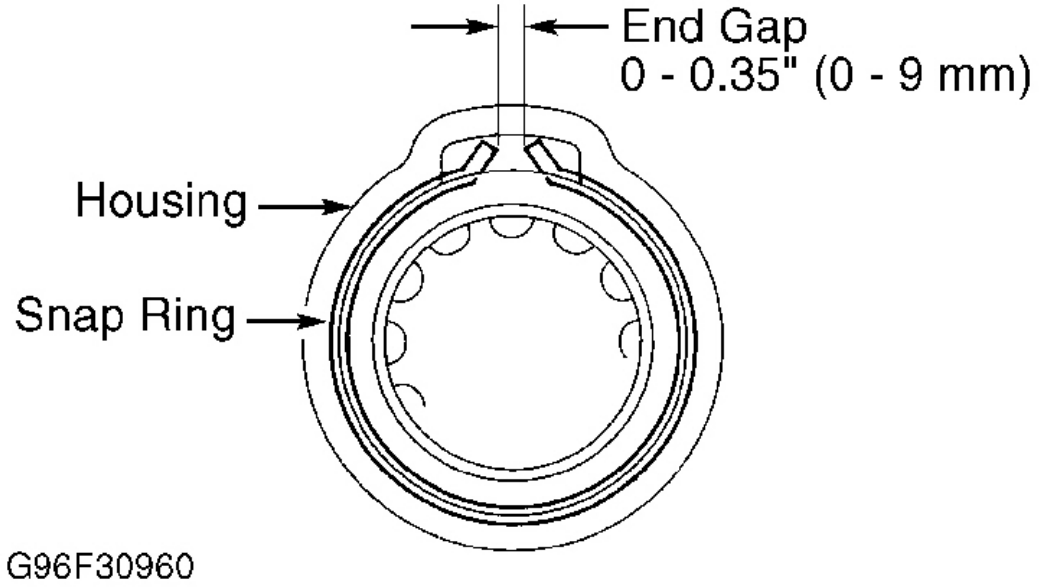

Fig. 28: Measuring Snap Ring End Gap
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY GEAR SHAFT BEARING

Disassembly & Reassembly

Using slide hammer and bearing puller, remove secondary gear shaft bearing from transaxle housing and flywheel housing. Using adapter, driver and press, install NEW secondary gear shaft bearing until it bottoms in transaxle housing or flywheel housing.

RING GEAR BEARING

Disassembly & Reassembly

Remove ring gear bearing using pin punch and hammer. Using adapter, driver and press, install NEW ring gear bearing until it bottoms in ring gear.

CONTROL SHAFT ASSEMBLY

Disassembly & Reassembly

Remove bolt and lock washer. Remove control lever from control shaft. Remove control shaft assembly. See **Fig. 12** . To reassemble, reverse disassembly procedures.

LOWER VALVE BODY ASSEMBLY

Manufacturer does not supply exploded views, disassembly procedures or specifications for lower valve body assembly. When disassembling valve bodies, note location of all components for reassembly reference. See **Fig. 29** -**Fig. 32** . Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components as necessary. Coat all components with ATF prior to reassembly. Ensure all components are installed in correct locations. For solenoid testing, see HONDA M4VA CVT ELECTRONIC CONTROLS article.

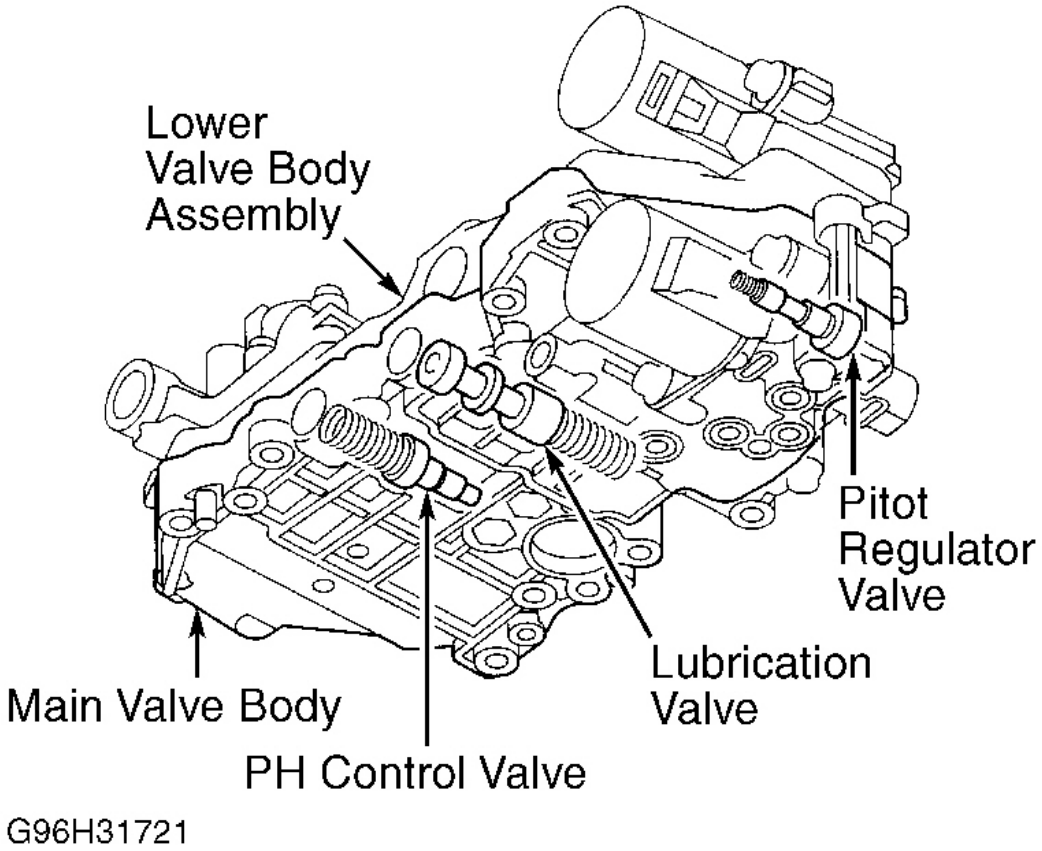

Fig. 29: Identifying Main Valve Body Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

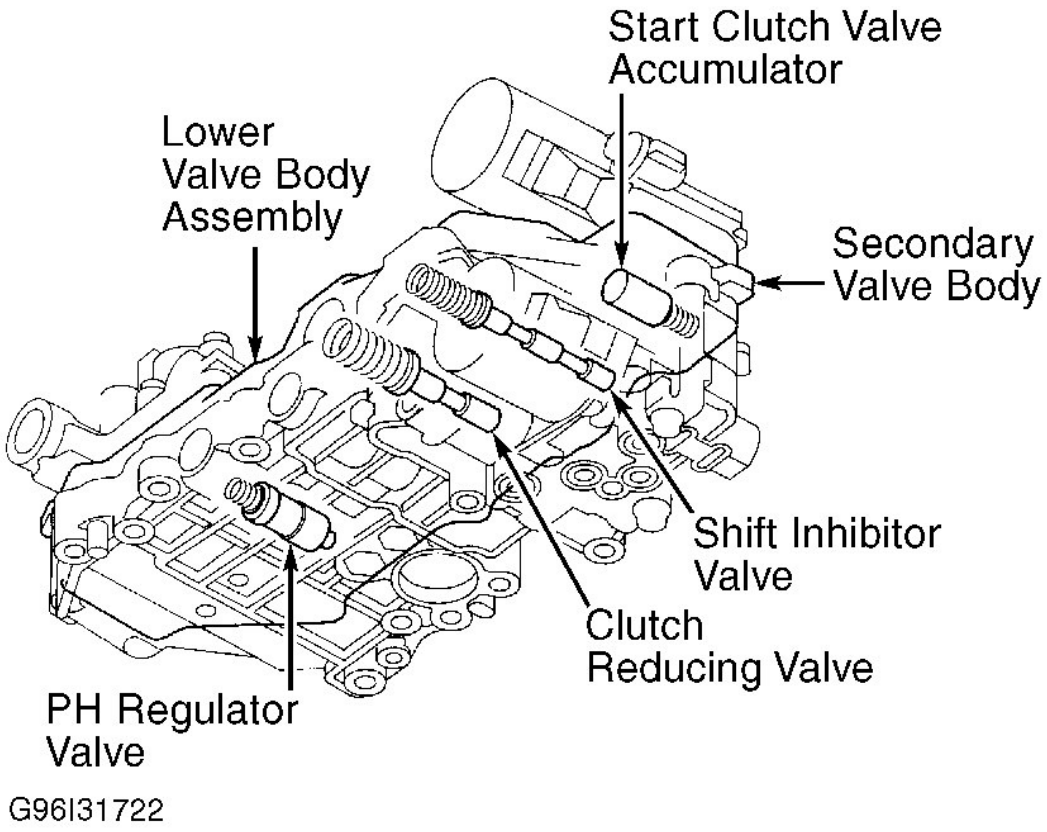

Fig. 30: Identifying Secondary Valve Body Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

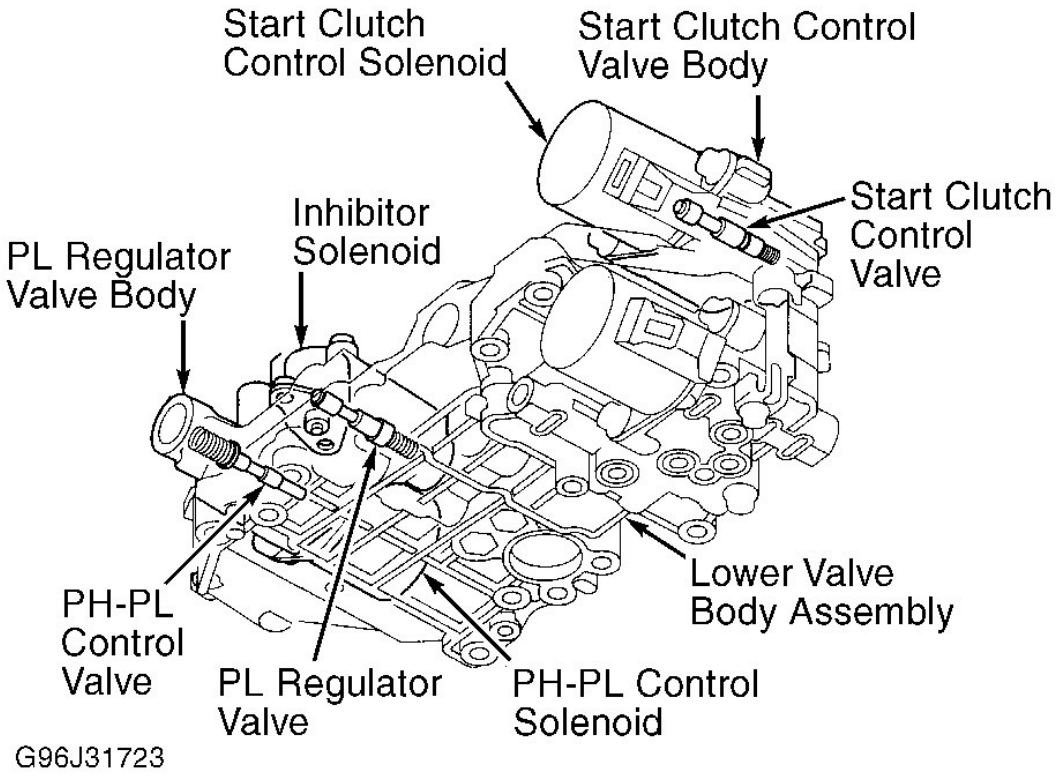

Fig. 31: PL Regulator & Start Clutch Control Valve Body Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

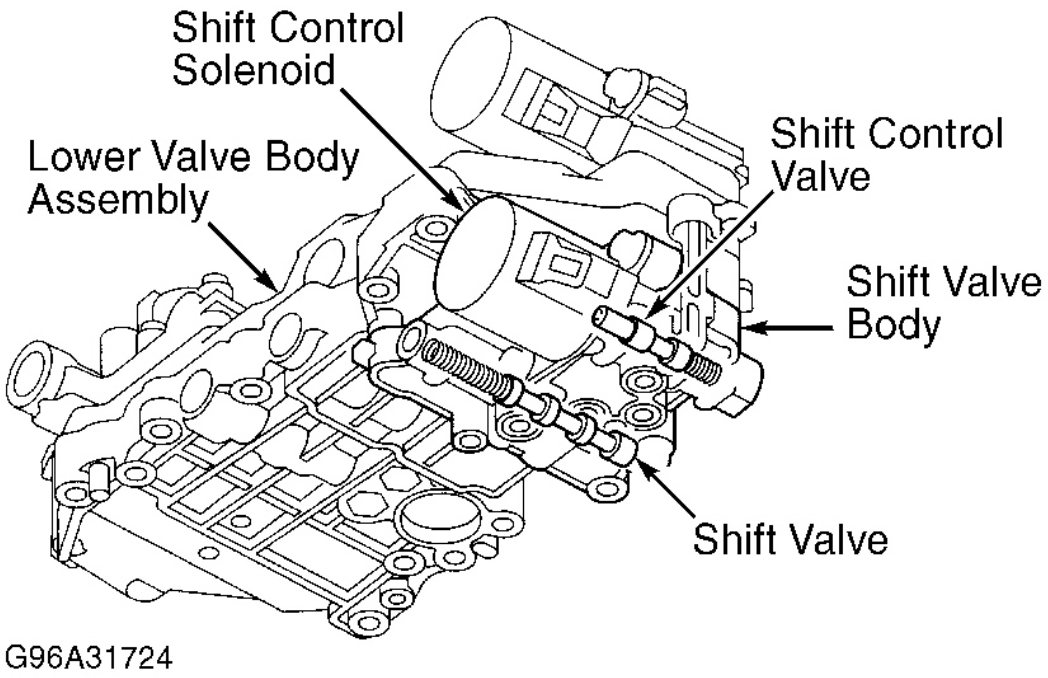

Fig. 32: Identifying Shift Valve Body Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ADJUSTMENTS

SECONDARY GEAR SHAFT THRUST SHIM SELECTION

NOTE: Perform this procedure prior to transaxle reassembly.

1. Measure distance "A" between flywheel housing surface and ball bearing. See **Fig. 33** . Install secondary gear shaft in transaxle housing. Measure distance "B" between transaxle housing surface and thrust shim washer mounting surface of secondary gear shaft. See **Fig. 33** .
2. Calculate thrust shim thickness using following formula: Measurement "A" minus measurement "B" plus flywheel housing gasket thickness of .020" (.50 mm). Shim is available in thickness range of .110" (2.80 mm) and .150" (3.80 mm) in increments of .004" (.10 mm).

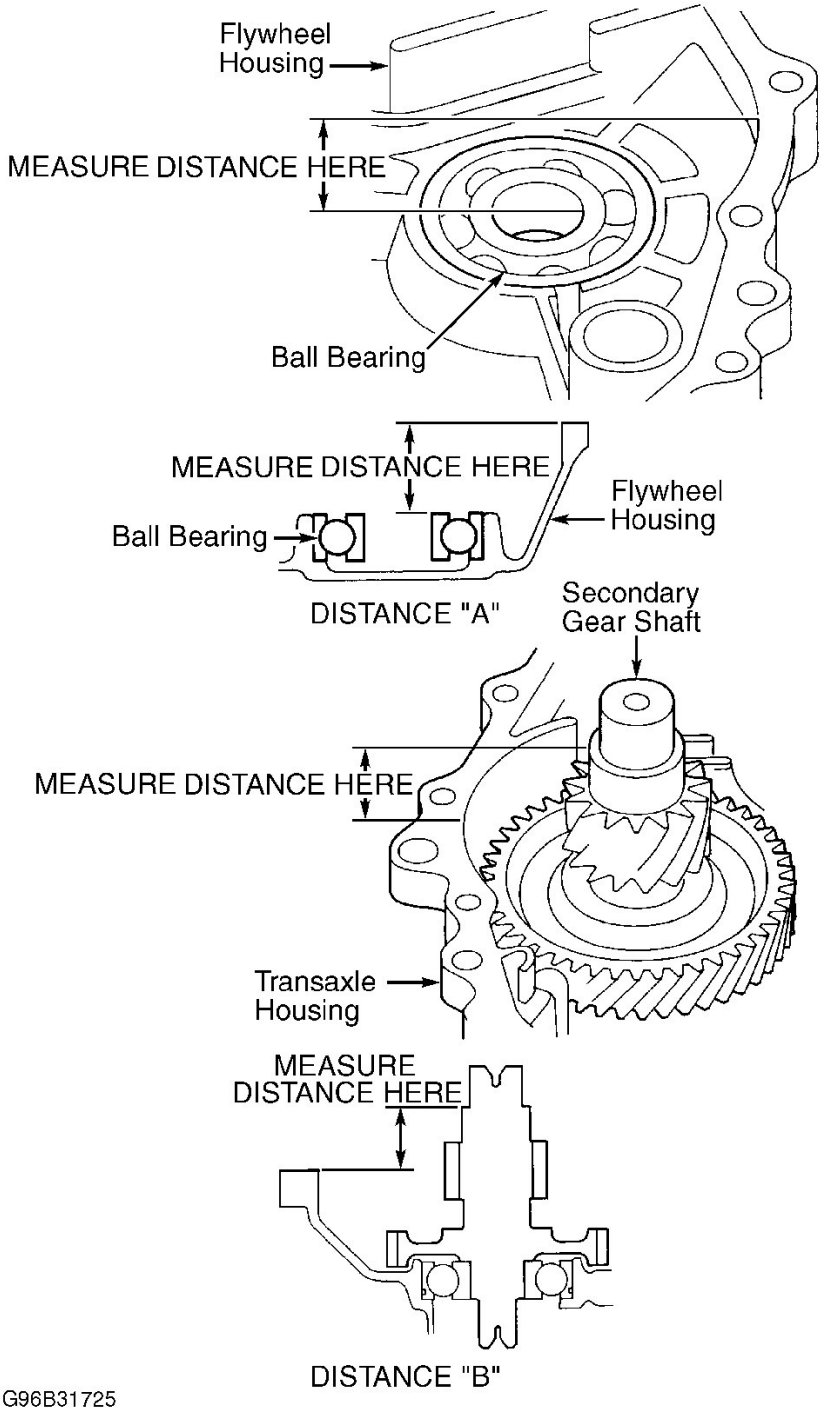

Fig. 33: Calculating Secondary Gear Shaft Thrust Shim Thickness
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSMISSION REASSEMBLY

REASSEMBLY PROCEDURE

NOTE: When TCM/PCM, transaxle assembly, start clutch assembly, lower valve body assembly or engine assembly are replaced, TCM/PCM must memorize feedback signal for start clutch control. Perform START CLUTCH CALIBRATION PROCEDURE under ON-VEHICLE SERVICE to calibrate start clutch after installing transaxle.

1. Install long oil feed pipe in transaxle housing. Install 2 oil feed pipes with NEW "O" rings in transaxle housing. Install 2 dowel pins and NEW transaxle housing gasket on transaxle housing. See **Fig. 12** . Push control shaft assembly toward outside of transaxle housing, then install intermediate housing assembly.
2. Install manual valve body separator plate and 2 dowel pins on intermediate housing. Install manual valve body with detent spring. Pull control shaft assembly back, then install roller on intermediate housing. Install reverse brake piston in intermediate housing.
3. Install spring retainer/return spring assembly on reverse brake piston. Install return springs on spring guides of reverse brake piston. Install reverse brake spring compressor on reverse brake return spring. See **Fig. 13** .

CAUTION: If spring retainer tab is on reverse brake piston, spring retainer may be damaged. Ensure spring retainer tab is not on piston. See Fig. 14 .

4. Compress return springs, then install snap ring in intermediate housing above spring retainer. Ensure snap ring end gap is a minimum of .59" (15 mm). Soak reverse brake discs in ATF for a minimum of 30 minutes. Install disc spring on reverse brake piston.
5. Starting with a reverse brake plate, alternately install reverse brake plate and discs. Install reverse brake end plate and snap ring. Using a dial indicator, measure clearance between reverse brake end plate and top disc. See **Fig. 34** .
6. Zero dial indicator with reverse brake end plate lowered. Lift end plate up toward snap ring. Take measurement in at least 3 places and use average as actual clearance. Clearance should be .018-.030" (.46-.76 mm).
7. If clearance is not as specified, remove reverse brake end plate and measure plate thickness. Select and install NEW reverse brake end plate, then recheck clearance. End plate is available in thickness range of .142" (3.61 mm) and .200" (5.08 mm) in increments of .008" (.20 mm).

NOTE: If thickest reverse brake end plate is installed, but clearance is still over specification, replace reverse brake discs and plates.

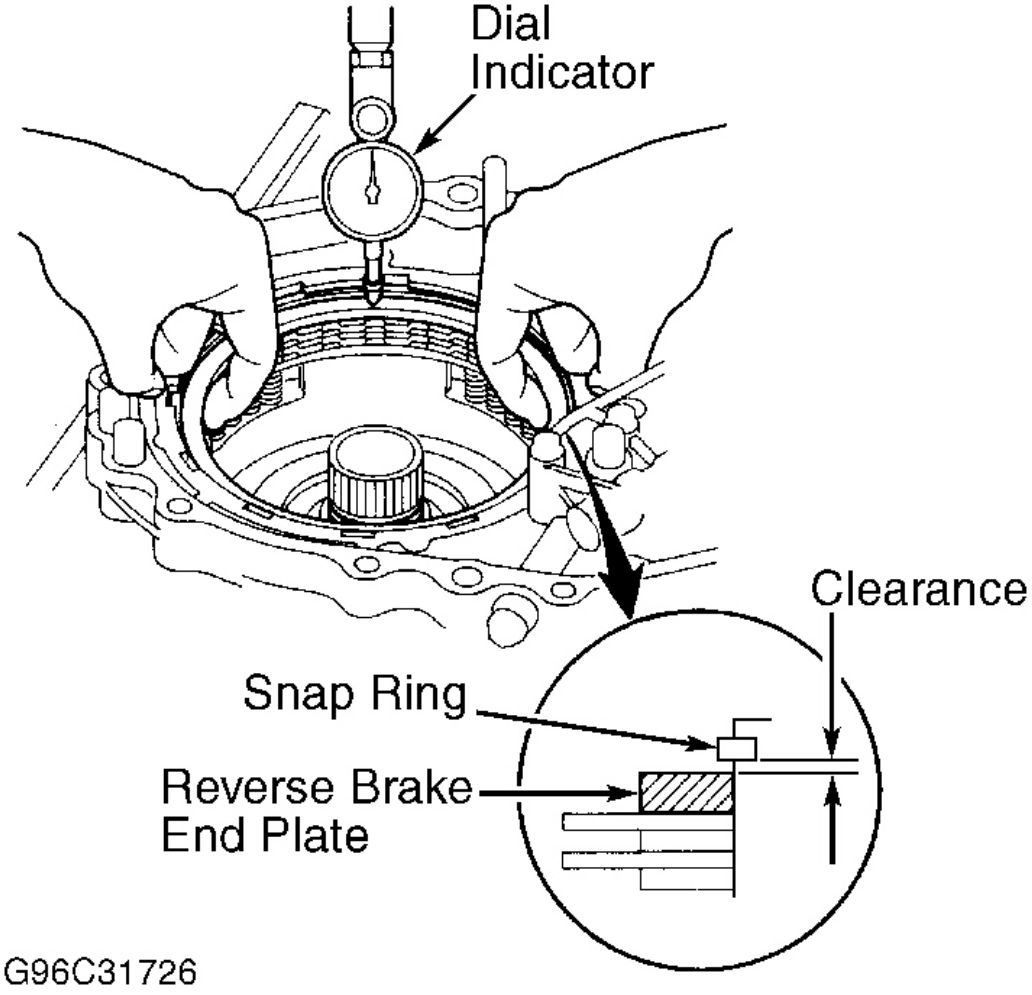

Fig. 34: Measuring Reverse Brake End Plate Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. After replacing reverse brake end plate, ensure clearance is within specification. Remove snap ring, reverse brake end plate, discs, plates and disc spring. Install snap ring retainer on drive pulley shaft.
9. Wrap drive pulley shaft splines with tape to prevent damage to "O" rings. Install NEW "O" rings. Install forward clutch assembly on drive pulley shaft. Install snap ring. Ensure outside diameter of snap ring is 1.63" (41.4 mm) maximum. Install input shaft in drive pulley shaft.
10. Install sun gear in forward clutch. See **Fig. 12** . Install thrust needle bearing and thrust washer on sun gear. Install carrier assembly on forward clutch. Install thrust washer, thrust needle bearing and thrust washer on carrier assembly. Install ring gear and thrust shim. Install snap ring.
11. Ensure outside diameter of snap ring is 1.21" (30.7 mm) maximum. Using feeler gauge, measure clearance between thrust shim and snap ring. Take measurement in at least 3 places and use average as

actual clearance. Clearance should be .0020-.0043" (.050-.110 mm). See **Fig. 35** .

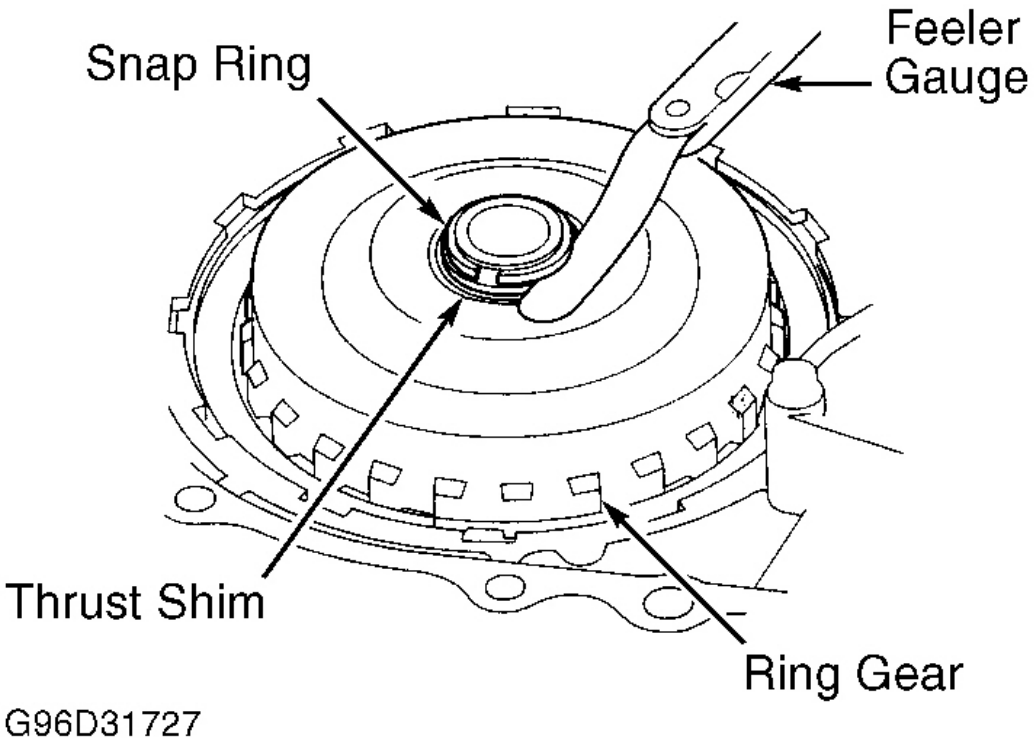

Fig. 35: Measuring Ring Gear Thrust Shim-To-Snap Ring Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. If clearance is not as specified, remove thrust shim and measure shim thickness. Select and install NEW thrust shim, then recheck clearance. Thrust shim is available in thickness range of .041" (1.05 mm) and .070" (1.785 mm) in increments of .003" (.07 mm). After replacing thrust shim, ensure clearance is within specification and snap ring outside diameter is correct.
13. Install disc spring with narrow end down. See **Fig. 12** . Starting with a reverse brake plate, alternately install reverse brake plates and discs. Install selected reverse brake plate, then install snap ring. Ensure outside diameter of snap ring is .71" (18 mm) maximum.
14. Install manual valve body pipes with NEW "O' rings on manual valve body and intermediate housing. Install 2 dowel pins and NEW right side cover gasket on intermediate housing. See **Fig. 12** . Install NEW "O" rings on oil feed pipes. Install right side cover. Install parking pawl, spring and shaft on transaxle housing. Move control lever to any gear position except "P" position.
15. Install secondary gear shaft with selected thrust shim. See **SECONDARY GEAR SHAFT THRUST SHIM SELECTION** under ADJUSTMENTS. Wrap driven pulley shaft splines with tape to prevent damage to "O" rings. Install NEW "O" rings. Assemble secondary drive gear assembly in start clutch assembly. See **Fig. 8** . Install both components on driven pulley shaft.

16. Pull handle of Start Clutch Installer (07TAE-P4V0130) up, then install tip of installer into driven pulley shaft hole. Set installer on start clutch. See **Fig. 36** . Push handle of installer, then tighten nut to seat secondary drive gear assembly on driven pulley shaft securely. See **Fig. 37** .
17. Pull handle of installer up and remove installer. Install cotters, then measure clearance between cotters and start clutch hub. See **Fig. 8** . Take measurement in at least 3 places and use average as actual clearance. Clearance should be 0-.005" (0-.13 mm).

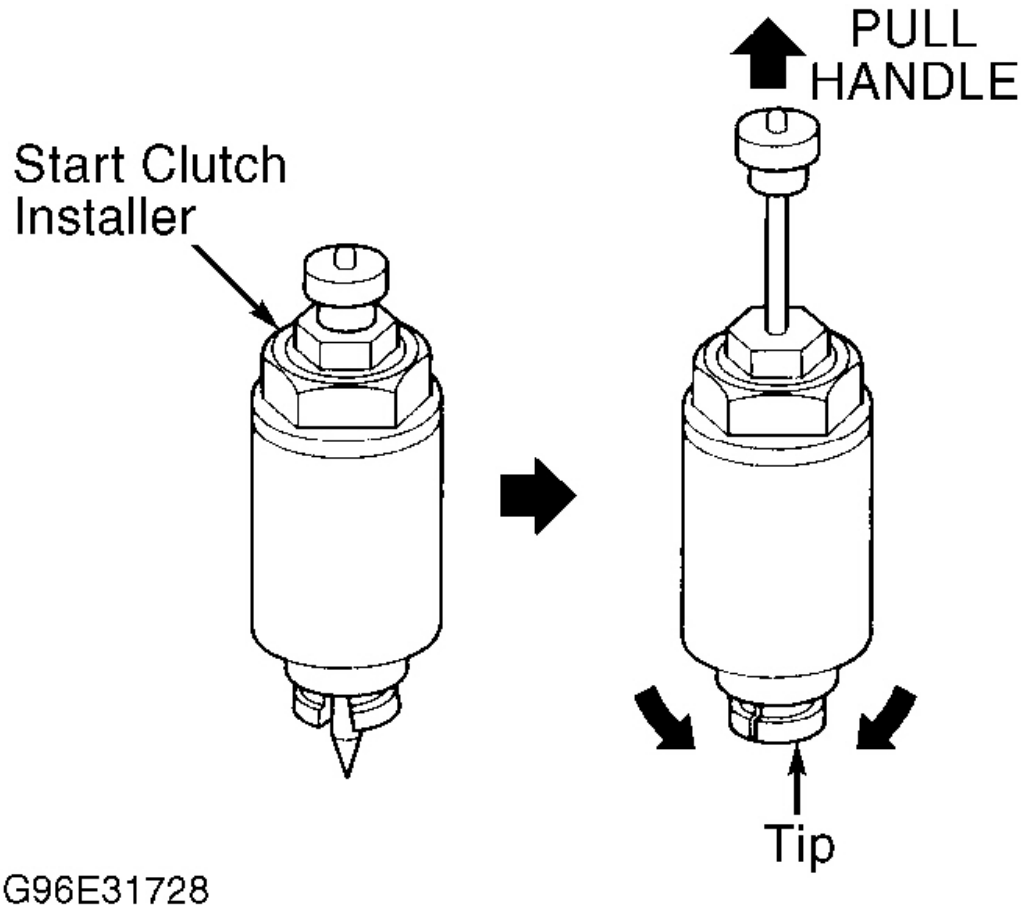

Fig. 36: Identifying Start Clutch Installer Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

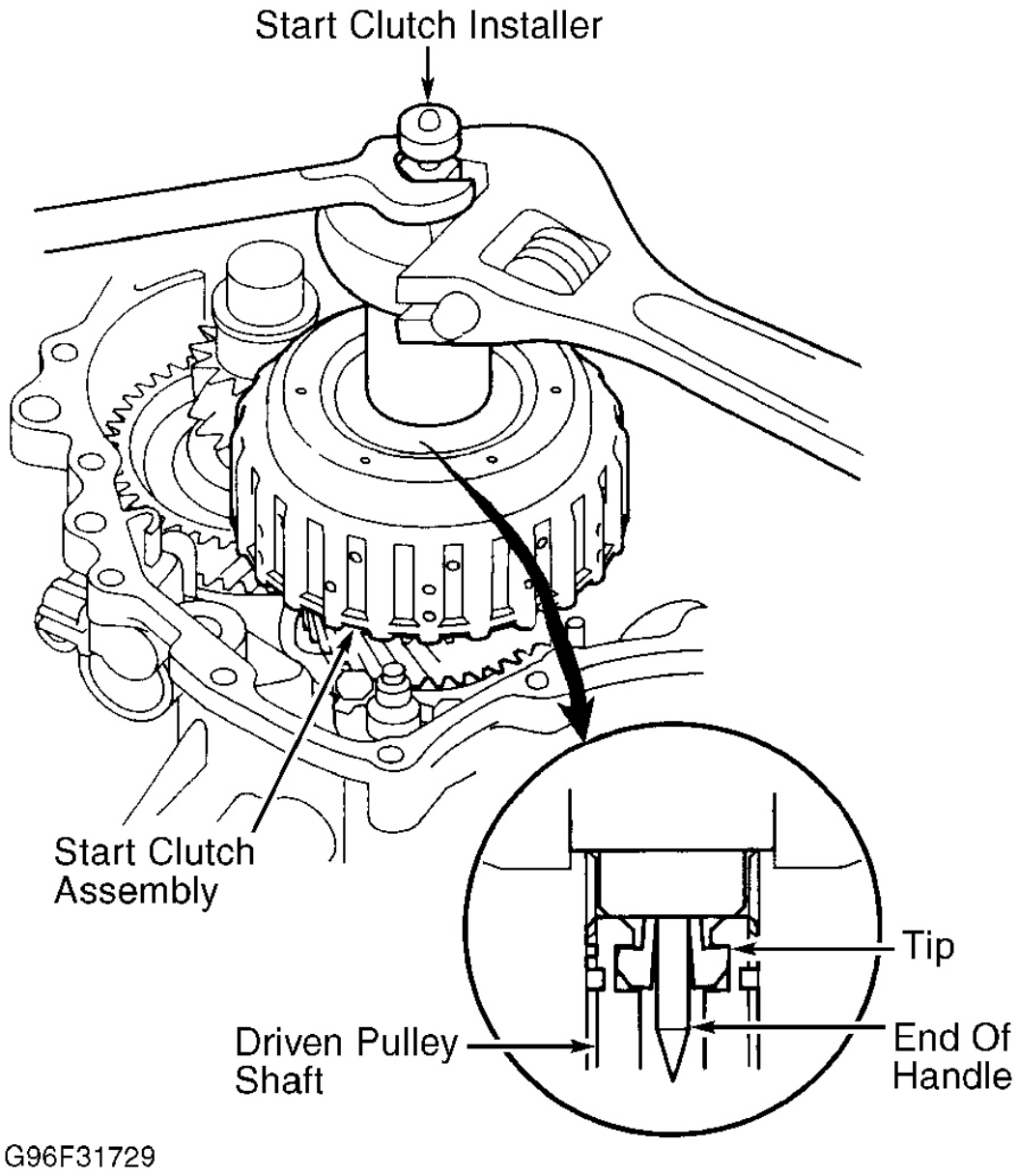

Fig. 37: Installing Start Clutch Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. If clearance is not as specified, remove cotters and measure thickness. Select and install NEW cotters, then recheck clearance. Cotters are available in thickness range of .114" (2.90 mm) and .126" (3.20 mm) in increments of .004" (.10 mm). After replacing cotters, ensure clearance is within specification.
19. Install cotter retainer and snap ring. Ensure outside diameter of snap ring is 1.33" (33.9 mm) maximum. Install thrust washers, oil pump drive sprocket hub and thrust shim on input shaft. See **Fig. 8** . Install snap ring. Ensure outside diameter of snap ring is 1.04" (26.3 mm) maximum.

20. Measure clearance between thrust shim and snap ring. See **Fig. 38** . Take measurement in at least 3 places and use average as actual clearance. Clearance should be .015-.026" (.37-.65 mm). If clearance is not as specified, remove thrust shim and measure shim thickness.
21. Select and install NEW thrust shim, then recheck clearance. Thrust shims are available in thickness range of .045" (1.15 mm) and .095" (2.40 mm) in increments of .004" (.10 mm). After replacing thrust shims, ensure clearance is within specification and snap ring outside diameter is correct.
22. Install pitot flange using cutout to clear pitot pipes. See **Fig. 9** . Install oil pump drive sprocket. Install oil pump drive chain on oil pump drive and driven sprockets. Install and tighten sprocket bolts to specification. See **TORQUE SPECIFICATIONS** . Install differential assembly. Install oil passage pipe assembly using NEW "O" rings. See **Fig. 8** .
23. Install 3 dowel pins and NEW flywheel housing gasket on transaxle housing. Install flywheel housing and connector bracket (20 bolts). Install oil passage pipe holder assembly. See **Fig. 8** .
24. Install solenoid harness connector with NEW "O" ring. Install lower valve body assembly with 3 dowel pins (8 bolts). Install oil strainer with NEW "O" ring. Assemble oil pan, oil filter and oil cooler inlet pipe. See **Fig. 7** . Install oil pan with 2 dowel pins and NEW oil pan gasket. Install oil cooler inlet pipe bracket bolt. Install oil cooler outlet pipe with joint bolt and NEW sealing washers. See **Fig. 7** .

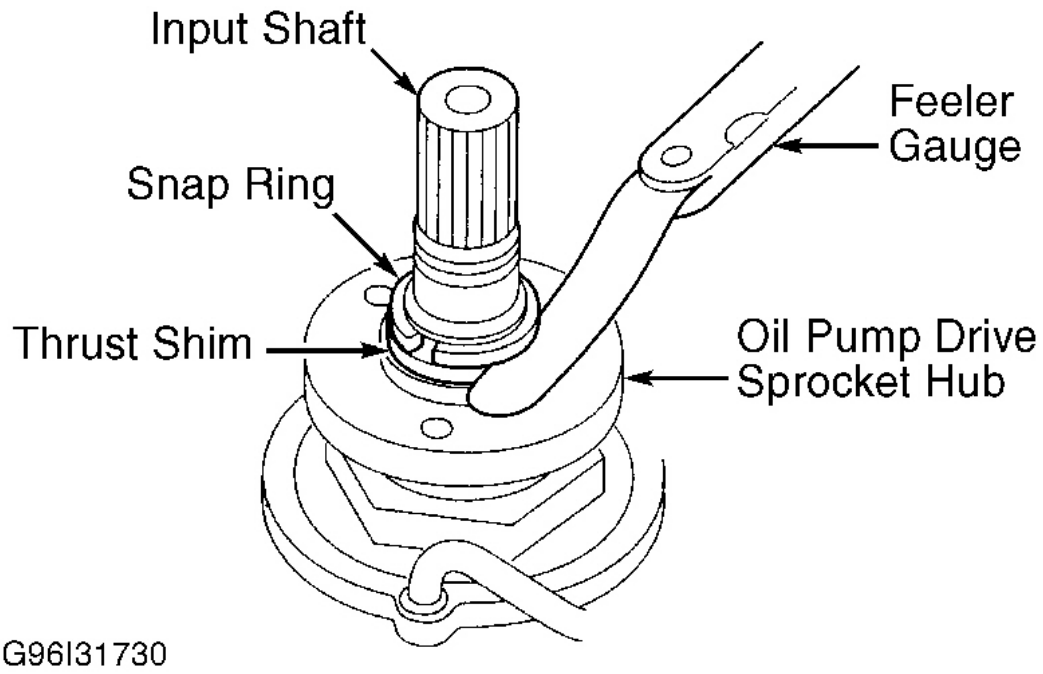

Fig. 38: Measuring Oil Pump Drive Sprocket Hub Thrust Shim-To-Snap Ring Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Control Lever Bolt	10 (14)
Flywheel Housing Bolt	21 (29)
Intermediate Housing Bolt	21 (29)
Joint Bolt	21 (29)
Oil Cooler Inlet Pipe Bracket Bolt	19 (26)
Oil Cooler Outlet Pipe Bolt	21 (29)
Oil Pan Drain Plug	36 (49)
Oil Pump Assembly Bolt	19 (26)
Pressure Plug	13 (18)
Ring Gear Bolt	72 (98)
Right Side Cover Bolt	
6-mm Bolt	(1)
8-mm Bolt	27 (37)
Shift Cable Bracket Bolt	19 (26)
Vehicle Speed Sensor Bolt	16 (22)
	INCH Lbs. (N.m)
All Other Speed Sensor Bolts	106 (12.0)
Lower Valve Body Assembly Bolt	106 (12.0)
Lower Valve Body Assembly-To-Transaxle Housing Bolt	106 (12.0)
Manual Valve Bolt	106 (12.0)
Oil Filter Bolt	106 (12.0)
Oil Pan Bolt	106 (12.0)
Oil Passage Pipe Holder Assembly Bolt	106 (12.0)
Oil Passage Pipe Assembly Bolt	106 (12.0)
Oil Pump Drive Sprocket Bolt	106 (12.0)
Oil Strainer Bolt	106 (12.0)
Solenoid Harness Bolt	106 (12.0)

(1) Tighten bolt to 106 INCH lbs. (12.0 N.m).

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	Specification - In. (mm)
Clearance	
Cotters-To-Start Clutch Hub	.005 (.13)
Forward Clutch	.016-.024 (.40-.60)
Flywheel Housing Set Ring-To-Outer Race	.006 (.15)
Oil Pump Drive Sprocket Hub	.015-.026 (.37-.65)
Reverse Brake	.018-.030 (.46-.76)

Ring Gear Thrust Shim-to-Snap Ring	.0004-.0043 (.010-.110)
Differential Pinion Gear Backlash	.002-.006 (.05-.15)
Snap Ring Diameter	
Cotter Retainer (Minimum)	1.33 (33.9)
Forward Clutch (Maximum)	1.63 (41.4)
Reverse Brake (Minimum)	.71 (18)
Ring Gear (Maximum)	1.21 (30.7)
Oil Pump Drive Sprocket Hub (Maximum)	1.04 (26.3)
Snap Ring End Gap	
Driven Pulley Shaft Bearing	0-.35 (0-9)
Reverse Brake (Minimum)	.59 (15)