1996 AUTOMATIC TRANSMISSIONS

M5DA Overhaul

APPLICATION

TRANSAXLE APPLICATION

Application	Transaxle Model
3.5RL	M5DA

IDENTIFICATION

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

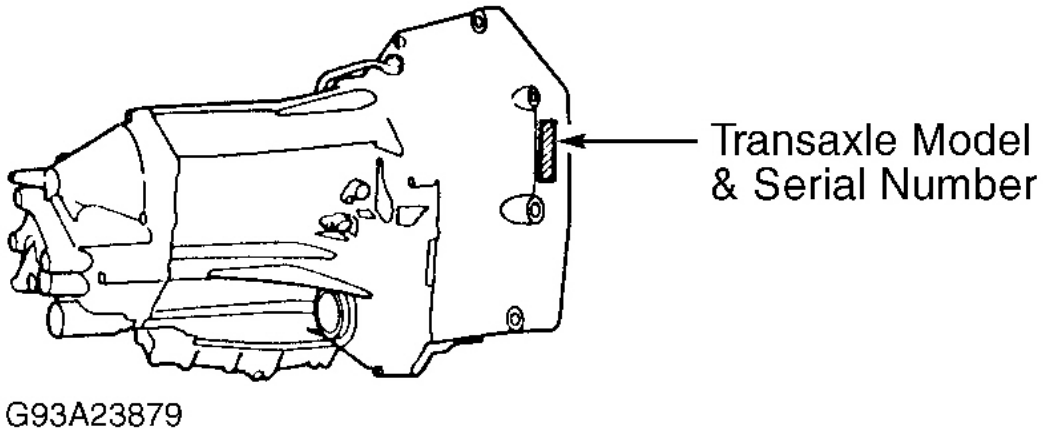


Fig. 1: Identifying Transaxle Model & Serial Number Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DESCRIPTION

Automatic transaxle is electronically controlled with 4 forward speeds and one reverse speed. Transaxle consists of clutches, mainshaft, countershaft, shift control solenoid valves, lock-up control solenoid valves, linear solenoid and lock-up torque converter. Transaxle has a differential assembly bolted to the transaxle. Power is delivered from transaxle to the differential assembly by the extension shaft. See **Fig. 2** .

Lower valve body assembly consists of main valve body, secondary valve body, throttle valve body, linear solenoid, shift control solenoid valves and oil pass body. Lower valve body is bolted to transaxle housing. Other valve bodies used are regulator valve body, oil pump body and accumulator body. These valve bodies are bolted to torque converter housing.

Transaxle shifting and torque converter lock-up are controlled by the Powertrain Control Module (PCM). Transaxle shifting is related to engine torque through the linear solenoid used to operate the throttle valve. The PCM controls the linear solenoid located on the throttle valve body. The PCM determines appropriate shift point and activates proper shift control solenoid valve for transaxle shifting.

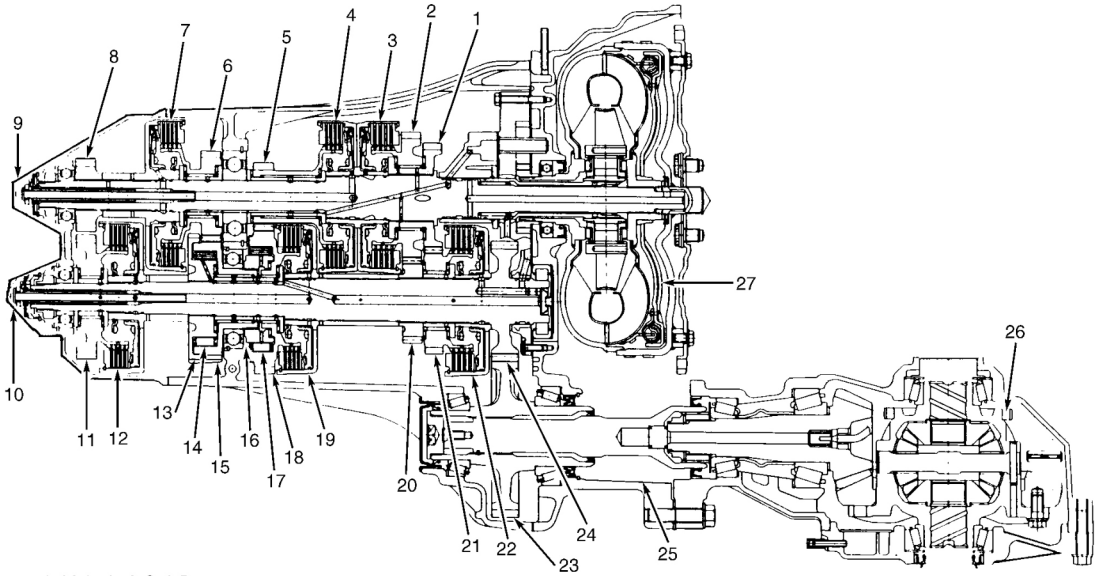


Fig. 2: Identifying Transaxle Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OPERATION

Shift lever has 7 positions. When shift lever is moved, manual valve on main valve body is moved by the 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 the PCM to indicate shift lever position. The PCM uses this input signal to control shift control solenoid valves. The PCM determines appropriate shift point and activates proper shift control solenoid valve for transaxle shifting.

When transaxle gear combinations are engaged by clutches, power is transmitted from mainshaft to countershaft to provide different gears. Shift lever positions operate as follows:

- **"P" (Park)**

  Front wheels lock as parking pawl engages with parking gear on countershaft. All clutches are released. Neutral position switch, incorporated in A/T gear position switch, allows engine starting in this position.

- **"R" (Reverse)**

  Reverse clutch is engaged. Back-up light switch, incorporated in A/T gear position switch, allows back-up lights to operate.

- **"N" (Neutral)**

  All clutches are released. Neutral position switch, incorporated in A/T gear position switch allows engine starting in this position.

- **"D4" (Drive)**

  Transaxle starts in 1st gear and upshifts automatically to 2nd, 3rd and then 4th gear. Transaxle will downshift through 3rd, 2nd and 1st gears until vehicle stops. When in 2nd, 3rd or 4th gear in this range, PCM sends a signal to operate torque converter lock-up.

- **"D" (Drive)**

  Transaxle starts in 1st gear and upshifts automatically to 2nd gear and then 3rd gear. Transaxle will downshift through all gears on deceleration.

- **"2" (Second)**

  Transaxle starts off and remains in 2nd gear for engine braking and better traction.

- **"1" (First)**

  Transaxle starts off and remains in 1st gear for engine braking.

When in "D4", 2nd, 3rd and 4th gears, torque converter lock-up exists and transaxle mainshaft rotates at same speed as engine crankshaft. Under certain conditions, torque converter lock-up clutch is applied during deceleration in 3rd and 4th gears. Torque converter lock-up is controlled by the PCM. The PCM receives various input signals and operates lock-up control solenoid valves. Operation of lock-up control solenoid valves controls the modulator pressure.

The PCM contains a self-diagnostic system, which stores a fault code if failure or problem exists in transaxle electronic control system. Fault code can be retrieved to determine transaxle problem area. For information on electronic transaxle components, see **M5DA 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 **M5DA ELECTRONIC CONTROLS** 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 **M5DA ELECTRONIC CONTROLS** article.

LUBRICATION & ADJUSTMENTS

See **SERVICING** article.

ON-VEHICLE SERVICE

AXLE SHAFTS

See **FWD AXLE SHAFTS** article in DRIVELINE/AXLES.

DIFFERENTIAL ASSEMBLY

Differential assembly may be removed from vehicle with transaxle in the vehicle. See **DIFFERENTIAL ASSEMBLY** under REMOVAL & INSTALLATION.

LOWER VALVE BODY ASSEMBLY

Lower valve body assembly consists of main valve body, secondary valve body, throttle valve body, linear solenoid, shift control solenoid valves and oil pass 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. 3** . 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 Dexron-II ATF.
7. Start engine and operate for approximately 30 seconds or until one quart (.9L) of ATF is discharged from return line. Shut engine off. Remove drain hose. Reinstall return line. Fill transaxle to proper level.

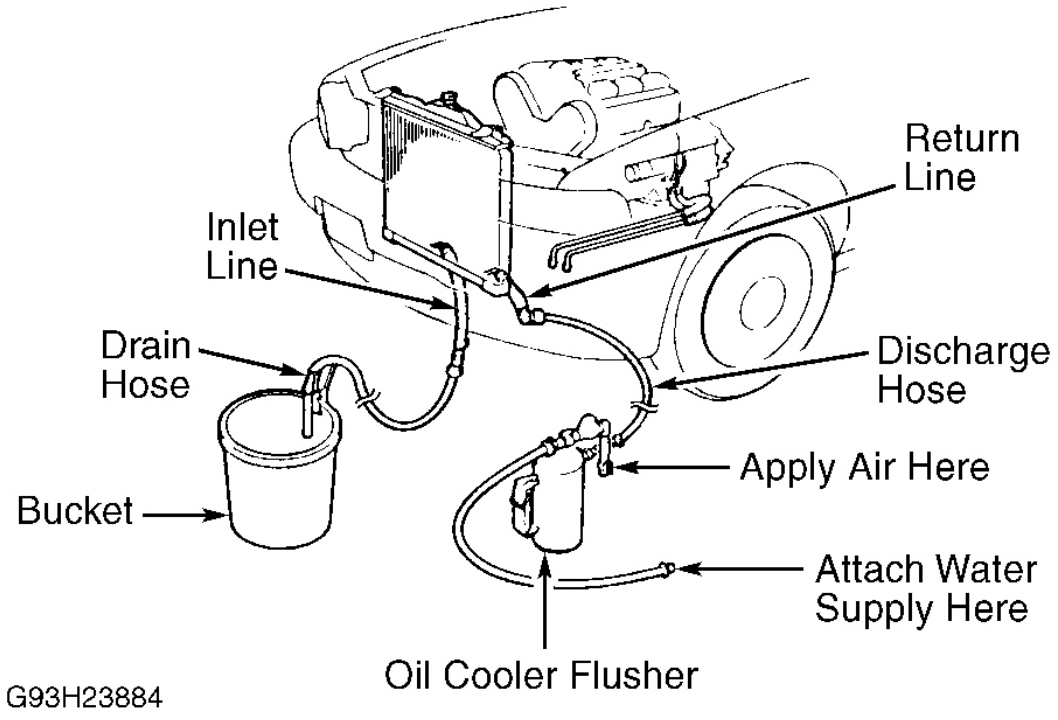


Fig. 3: Installing Oil Cooler Flusher
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Excessive Drag In Transaxle

- Binding Oil Pump

Excessive Idle Vibration

- Defective Torque Converter Or Oil Pump
- Incorrect Idle RPM
- Lock-Up Shift Valve Stuck

Excessive Vibration (RPM Related)

- Torque Converter Not Fully Seated In Oil Pump

Flares On 1-2 Upshift

- Defective Linear Solenoid
- Defective One-Way Clutch
- Defective 2nd Accumulator
- Incorrect Throttle Valve Adjustment
- Throttle Valve Stuck
- 1-2 Shift Valve Stuck

Flares On 2-3 Upshift

- Defective Linear Solenoid
- Defective One-Way Clutch
- Defective 3rd Accumulator
- Feedpipe "O" Ring Damaged
- Incorrect Throttle Valve Adjustment
- Throttle Valve Stuck
- 2-3 Shift Valve Stuck

Flares On 3-4 Upshift

- Defective Linear Solenoid
- Defective 4th Accumulator
- Feedpipe "O" Ring Damaged
- Incorrect Throttle Valve Adjustment
- Throttle Valve Stuck
- 3-4 Orifice Control Valve Stuck
- 3-4 Shift Valve Stuck

Gear Whine That Changes With Shifts

- Defective 1st Clutch
- Defective 3rd Gears

Gear Whine That Changes With Speed

- Defective Differential Assembly Or Secondary Gears

Harsh Downshift At Closed Throttle

- Throttle Valve Stuck

Harsh Kickdown Shifts

- Clutch Pressure Control Valve Stuck
- Defective Linear Solenoid
- Incorrect Throttle Valve Adjustment
- 4-3 Kickdown Valve Stuck
- 4-3 Shift Timing Valve Stuck

Harsh Shift When Manually Shifting To "1"

- Defective 1st-Hold Accumulator

Harsh Upshifts & Downshifts

- Check Balls Missing
- Clutch Pressure Control Valve Stuck
- Defective Linear Solenoid
- Incorrect Throttle Valve Adjustment
- Incorrect ATF Type
- Incorrect Clutch Clearance
- 4-3 Kickdown Valve Stuck
- 4-3 Shift Timing Valve Stuck
- Throttle Valve Stuck

Harsh 1-2 Upshift

- Defective 2nd Clutch
- Incorrect Throttle Valve Adjustment

Harsh 2-1 Kickdown Shift

- Defective One-Way Clutch
- Defective 1st Clutch
- 3-4 Orifice Control Valve Stuck

Harsh 2-3 Upshift

- Clutch Pressure Control Valve Stuck
- Defective 3rd Clutch
- Incorrect Throttle Valve Adjustment
- 4-3 Shift Timing Valve Stuck

Harsh 3-4 Upshift

- Clutch Pressure Control Valve Stuck
- Defective 4th Clutch
- Incorrect Throttle Valve Adjustment
- 3-4 Orifice Control Valve Stuck

Lock-Up Clutch Does Not Lock Up Smoothly

- Defective Torque Converter
- Lock-Up Control Valve Stuck
- Lock-Up Shift Valve Stuck

Lock-Up Clutch Does Not Operate Properly

- Defective Linear Solenoid
- Incorrect Throttle Valve Adjustment
- Lock-Up Control Valve Stuck
- Lock-Up Shift Valve Stuck
- Lock-Up Timing Valve Stuck
- Throttle Valve Stuck
- Torque Converter Check Valve Stuck

No Engine Braking In "1"

- Defective 1st Or 1st-Hold Clutch

No Engine Braking In "2"

- Defective 1st-Hold Or 2nd Clutch
- Defective One-Way Clutch

Noise From Transaxle In All Gears

- Defective Oil Pump
- Defective Torque Converter

Noise From Transaxle With Wheels Rolling

- Damaged Reverse Gears
- Defective Differential Assembly Or Secondary Gears

Popping Noise When Taking Off In "R"

- Damaged Reverse Gears

- Worn Reverse Clutch

Ratcheting Noise When Shifting To "R"

- Damaged Reverse Gears
- Defective Oil Pump
- Pressure Regulator Stuck
- Worn Reverse Clutch

Ratcheting Noise When Shifting From "R" To "P" Or "N"

- Damaged Reverse Gears
- Worn Reverse Clutch

Shifts Erratically

- Incorrectly Installed Springs Or Valves
- Modulator Valve Stuck
- 4-3 Shift Timing Valve Stuck

Slips In All Gears

- Defective Oil Pump
- Fluid Strainer Clogged
- Pressure Regulator Stuck

Slips In Reverse

- Defective Reverse Accumulator
- Defective Reverse Clutch
- Worn Reverse Gears

Slips In 1st Gear

- Defective One-Way Clutch
- Defective 1st Clutch Or 1st Accumulator
- Feedpipe "O" Ring Damaged

Slips In 2nd Gear

- Clutch Pressure Control Valve Stuck
- Defective One-Way Clutch
- Defective Seal Rings Or Guide
- Defective 2nd Clutch Or 2nd Accumulator

- 2-3 Shift Valve Stuck

Slips In 3rd Gear

- Clutch Pressure Control Valve Stuck
- Defective 3rd Clutch Or 3rd Accumulator
- Feedpipe "O" Ring Damaged
- 3-4 Shift Valve Stuck

Slips In 4th Gear

- Clutch Pressure Control Valve Stuck
- Defective 4th Clutch Or 4th Accumulator

Upshifts Late

- Modulator Valve Stuck

Vehicle Moves In All Gears Except "R"

- Defective Or Incorrectly Adjusted Shift Cable
- Defective Or Worn Reverse Gears
- Worn Reverse Clutch

Vehicle Moves In All Gears Except "2"

- Defective One-Way Clutch
- Defective Or Incorrectly Adjusted Shift Cable
- Defective Seal Rings Or Guide
- Defective 2nd Clutch Or 2nd Accumulator

Vehicle Moves In "N"

- Defective Or Incorrectly Adjusted Shift Cable
- Defective 1st, 2nd, 3rd Or 4th Clutch
- Incorrect Gear Or Clutch Clearance

Vehicle Moves In "2" But Not In "D" Or "D4"

- Defective One-Way Clutch
- Defective Or Incorrectly Adjusted Shift Cable
- Defective 1st Clutch Or 1st Accumulator
- Feedpipe "O" Ring Damaged

Vehicle Will Not Move

- Defective Differential Assembly Or Secondary Gears
- Defective Extension Shaft
- Defective Oil Pump
- Defective Or Incorrectly Adjusted Shift Cable
- Fluid Strainer Clogged
- Pressure Regulator Stuck

Vehicle Will Not Move In "D" Or "D4"

- One-Way Clutch Installed Upside-Down

Will Not Downshift To Low Gear

- Defective 1st-Hold Clutch
- 1-2 Shift Valve Stuck

Will Not Shift Into 4th Gear When In "D4"

- Defective Or Incorrectly Adjusted Shift Cable
- Defective 4th Accumulator
- 3-4 Shift Valve Stuck
- 3-4 Orifice Control Valve Stuck

Will Not Upshift (Stays In Low Gear)

- Clutch Pressure Control Valve Stuck
- Modulator Valve Stuck
- 1-2 Shift Valve Stuck

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 M5DA ELECTRONIC CONTROLS article.

1. Warm engine to normal operating temperature. Apply parking brake and block wheels. Start engine. Move shift lever to "D4" position while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat step 1) with shift lever in "D" position. Ensure engine does not stall. Manufacturer recommends monitoring of Throttle Position (TP) sensor voltage when performing road test to ensure proper throttle

opening for verifying shift points and lock-up of torque converter.

3. Remove door sill molding and lower dash panel on passenger's side and remove small cover on passenger's side kick panel. Pull carpet back for access to the Powertrain Control Module (PCM), located on passenger's side, below carpet. See **Fig. 4** .
4. Remove PCM cover located above PCM. Ensure ignition is off.

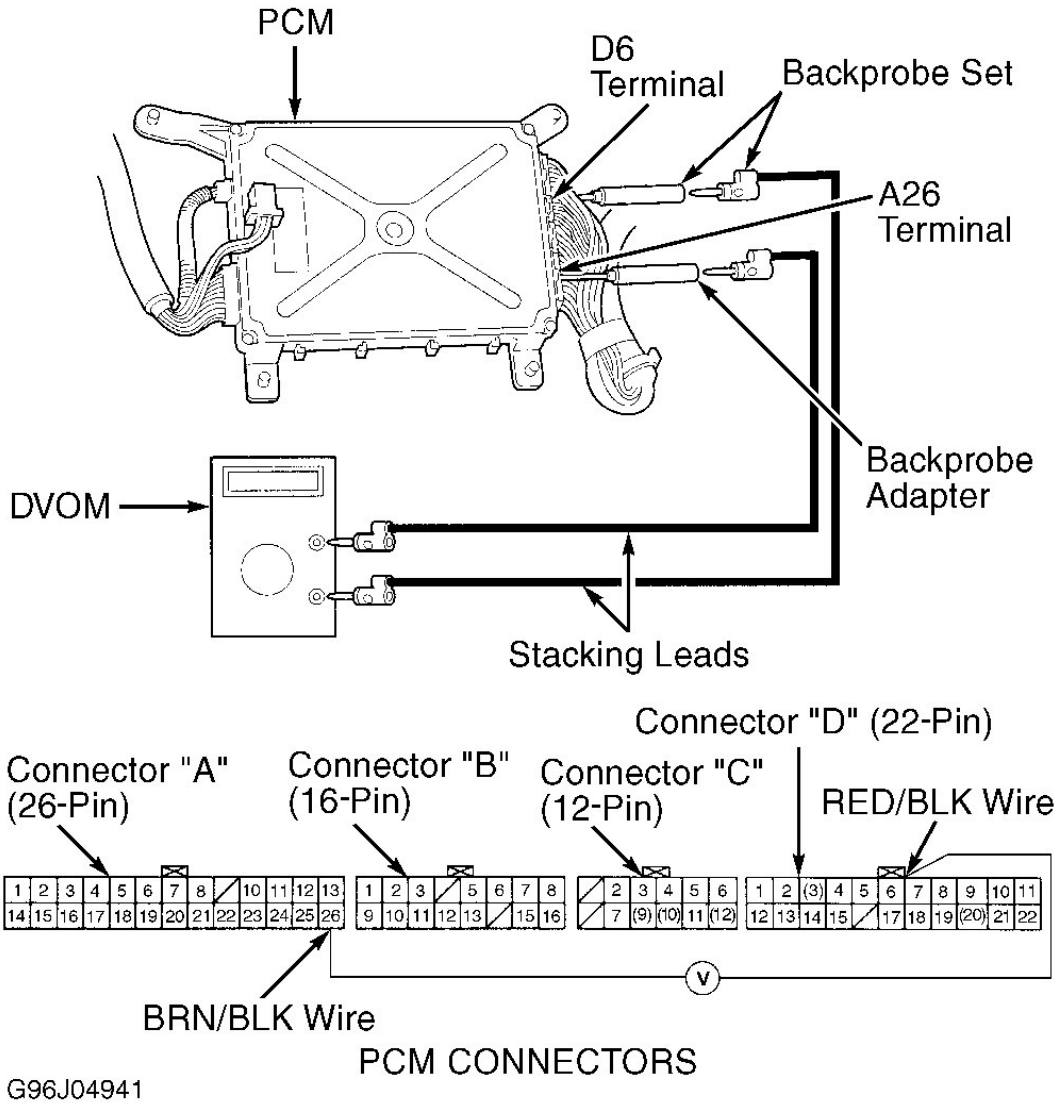


Fig. 4: Measuring TP Sensor Voltage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install Backprobe Test Set (07SAZ-001000A) or equivalent between PCM and DVOM leads. See **Fig. 4** . Using DVOM, with positive lead at terminal D6 and negative lead at terminal A26. See **Fig. 4** . Ensure digital volt-ohmmeter is set for measuring voltage.

6. Road test vehicle and check for abnormal noise and clutch slippage. See **CLUTCH APPLICATION** table for clutch engagement.
7. Ensure upshift and downshift points and torque converter lock-up are correct in relation to throttle position sensor voltage or throttle opening and vehicle speed with shift lever in "D4" position. See **TRANSAXLE UPSHIFT SPECIFICATIONS** and **TRANSAXLE DOWNSHIFT SPECIFICATIONS** tables.
8. With shift lever in "D4" position, accelerate to about 35 MPH so transaxle is in 4th gear. Move shift lever to "2" position. Ensure engine braking occurs.

CAUTION: DO NOT shift from "D4" to "2" at speeds over 62 MPH or transaxle may be damaged.

9. Place shift lever in "1" position. Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage. Upshifts and downshifts should not occur in this shift lever position.
10. Place shift lever in "2" position. Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage. Upshifts and downshifts should not occur in this shift lever position.
11. Place shift lever in "R" position. Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage.
12. Park vehicle on a slope. Apply parking brake. Place shift lever in "P" position. Release parking brake. Ensure vehicle does not move. If vehicle moves, check for defective shift cable or parking components.
13. Ensure ignition is off. Remove test harness and reinstall electrical connectors, PCM cover, carpet and door sill molding.

CLUTCH APPLICATION

Shift Lever Position	Elements In Use
"P" & "N"	No Clutches Applied
"R"	Reverse Clutch
"D4"	
1st Gear	1st Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(2) 3rd Clutch
4th Gear	(2) 4th Clutch
"D"	
1st Gear	1st Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(2) 3rd Clutch
"2"	1st-Hold Clutch, 2nd Clutch
"1"	1st-Hold Clutch, 1st Clutch

(1) The 1st clutch engages, but driving power is not transmitted, as 1st gear one-way clutch slips.

(2) The 1st and 2nd clutches engage, but driving power is not transmitted, as 2nd gear one-way clutch slips.

TRANSAXLE UPSHIFT SPECIFICATIONS

"D4" Position & Condition	1st-2nd Gear	2nd-3rd Gear	3rd-4th Gear	Lock-Up Clutch On
Throttle Position Sensor Voltage Is .822-.878 Volt & Coasting Downhill From Stop	10-13 MPH	21-24 MPH	32-37 MPH	21-25 MPH
Throttle Position Sensor Voltage Is 2.175-2.325 Volts & Accelerating From Stop	25-29 MPH	48-53 MPH	73-79 MPH	91-97 MPH
Full Throttle & Accelerating From Stop	38-44 MPH	70-78 MPH	103-114 MPH	95-106 MPH

TRANSAXLE DOWNSHIFT SPECIFICATIONS

"D4" Position & Condition	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
TPS Voltage Is .822-.878v & Coasting Or Braking To A Stop (1)	21-25 MPH	N/A	16-19 MPH	6-9 MPH
TPS Volts: 2.175-2.325v & Vehicle Slowed By Grade Or Load	72-78 MPH	N/A	N/A	N/A
Full Throttle & Vehicle Slowed By Grade/Load	93-104 MPH	92-103 MPH	59-66 MPH	28-33 MPH
(1) Throttle Position Sensor Voltage is .725-.775 for lock-up.				

TORQUE CONVERTER STALL SPEED TEST

CAUTION: DO NOT perform torque converter stall speed test for more than 10 seconds or transaxle may be damaged. DO NOT move shift lever while increasing engine speed.

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 "2" position.
2. Fully depress brake pedal. Fully depress accelerator for 6-8 seconds and note engine speed. This is torque converter stall speed.
3. Allow transaxle to cool for 2 minutes. Repeat test procedure in "D4", "1" and "R" positions.
4. Torque converter stall speed should be the same in "D4", "2", "1" and "R" positions. Torque converter stall speed should be 2100-2400. If torque converter stall speed is not within specification, see **TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING** table for possible causes.

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Stall Speed Test Results	Probable Cause
RPM High in "D4", "2", "1" & "R"	Low Fluid Level, Low Oil Pump Output, Clogged Fluid Strainer, Pressure Regulator Valve Stuck Closed, Slipping

	Clutch
RPM High In "R"	Slipping Reverse Clutch
RPM High In "D4"	Slipping 1st Or 2nd Clutch, Defective 1st Gear Or 2nd Gear One-Way Clutch
RPM High In "2"	Slipping 1st-Hold Or 2nd Clutch, Defective 2nd Gear One-Way Clutch
RPM High In "1"	Slipping 1st Or 1st-Hold Clutch, Defective 1st Gear One-Way Clutch
RPM Low In "D4", "2", "1" & "R"	Engine Output Low, Torque Converter One-Way Clutch Slipping

HYDRAULIC PRESSURE TEST

Pressure Test Preparation

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.

Line Pressure Test

1. With engine off, remove pressure tap plug from line pressure tap on transaxle. See **Fig. 5** . Attach pressure gauge to line pressure tap using NEW sealing washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
2. Disconnect transaxle sub-harness 14-pin connector, located near top of transaxle on driver's side. See **Fig. 6** . With shift lever in "P" position, start and operate engine at 2000 RPM. Note line pressure. Place shift lever in "N" position and note line pressure.
3. Line pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If line pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table.
4. Allow engine to idle. Connect positive battery terminal to Red wire and negative battery terminal to White wire of transaxle sub-harness connector. See **Fig. 6** . This will energize the linear solenoid.
5. Note fully closed throttle line pressure with sub-harness disconnected and voltage applied. Line pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If Line pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Reconnect transaxle sub-harness 14-pin connector, if disconnected. Remove pressure gauge set.
6. Using NEW sealing washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** .

NOTE: Clutch pressure should be checked at each clutch pressure tap on transaxle. See Fig. 5 .

Clutch Pressure Test

1. With engine off, remove pressure tap plug from appropriate clutch pressure tap on transaxle. See **Fig. 5** .

Attach pressure gauge to appropriate pressure tap using NEW sealing washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).

NOTE: Clutch pressure on some applications may vary with position of the throttle. Clutch pressure may be need to be checked with throttle closed or with engine at 2000 RPM. Ensure shift lever is in proper position when checking clutch pressures.

2. Start engine. Note clutch pressure in relation to throttle setting or engine RPM with shift lever in proper location to check appropriate clutch. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
3. Clutch pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If clutch pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set.
4. Using NEW sealing washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** .

Clutch Low-High Pressure Test

1. Clutch low-high pressure is tested at 2nd, 3rd and 4th clutch pressure taps on transaxle. See **Fig. 5** .
2. With engine off, remove pressure tap plug from appropriate clutch pressure tap on transaxle. Attach pressure gauge to appropriate pressure tap using NEW sealing washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
3. Start engine and allow to idle. Place shift lever in "D4". Slowly increase engine speed until pressure is indicated on pressure gauge. Release throttle, allowing engine to idle and note low pressure reading. This is the clutch low pressure.
4. With engine idling, gradually increase engine speed and note highest pressure reading. This is clutch high pressure.
5. Repeat procedure on remaining clutches. Ensure clutch low-high pressure is within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
6. If clutch pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set.
7. Using NEW sealing washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** .

Throttle "B" Pressure Test

1. With engine off, remove pressure plug from throttle "B" pressure tap on transaxle. See **Fig. 5** .
2. Attach pressure gauge to throttle "B" pressure tap using NEW sealing washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).

NOTE: Throttle "B" pressure will be checked with transaxle sub-harness connector disconnected and again with battery voltage applied to linear solenoid.

3. Disconnect transaxle sub-harness connector, located near top of transaxle on driver's side. See **Fig. 6** .

4. Start and operate engine at 1000 RPM. Place shift lever in "D4" position. Note fully opened throttle "B" pressure with sub-harness disconnected and no voltage applied.
5. Throttle "B" pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If throttle "B" pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table.
6. Allow engine to idle. Connect positive battery terminal to Red wire and negative battery terminal to White wire of transaxle sub-harness connector. See **Fig. 6** . This will energize the linear solenoid.
7. Increase engine speed to 1000 RPM with shift lever in "D4" position. Note fully closed throttle "B" pressure with sub-harness disconnected and voltage applied.
8. Throttle "B" pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If throttle "B" pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set.
9. Using NEW sealing washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** . Reconnect transaxle sub-harness connector.

HYDRAULIC PRESSURE TEST SPECIFICATIONS

Application/Engine RPM	Shift Lever Position	psi (kPa)
Line Pressure		
With Engine At 2000 RPM	"P" Or "N"	116-132 (800-910)
With Throttle Closed	"D4"	71-75 (490-520)
Clutch Pressure		
Reverse Clutch		
With Throttle Closed	"R"	107-123 (740-850)
1st Clutch		
With Throttle Closed	"1", "D3" Or "D4"	74-86 (510-590)
1st-Hold Clutch		
With Throttle Closed	"1" Or "2"	74-86 (510-590)
2nd Clutch		
With Throttle Closed	"2"	74-86 (510-590)
3rd Clutch		
With Throttle Closed	"D3"	74-86 (510-590)
4th Clutch		
With Throttle Closed	"D4"	74-86 (510-590)
Throttle "B" Pressure		
With Transaxle Sub-Harness Disconnected & No Voltage Applied to Harness At 2000 RPM	"D4"	74-86 (510-590)
With Transaxle Sub-Harness Disconnected & Voltage Applied to Harness With Throttle Fully Closed	"D4"	0-2 (0-15)

HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

Application	Probable Cause
Line Pressure	
Low Or No Line Pressure	Defective Torque Converter, Defective Torque Converter Check Valve, Defective Oil Pump Pressure Regulator, Defective Oil Pump
Clutch Pressure	
Low Or No 1st Clutch Pressure	Defective 1st Clutch
Low Or No 1st-Hold Clutch Pressure	Defective 1st-Hold Clutch
Low Or No 2nd Clutch Pressure	Defective 2nd Clutch
Low Or No 3rd Clutch Pressure	Defective 3rd Clutch
Low Or No 4th Clutch Pressure	Defective 4th Clutch, Defective Servo Valve
Clutch Low-High Pressure	
Low Or No 2nd Clutch Pressure	Defective 2nd Clutch
Low Or No 3rd Clutch Pressure	Defective 3rd Clutch
Low Or No 4th Clutch Pressure	Defective 4th Clutch
Throttle "B" Pressure	
Low Or No Throttle "B" Pressure With No Voltage Applied	Defective Throttle Valve Body
High Throttle "B" Pressure With Voltage Applied	Defective Throttle Valve Body

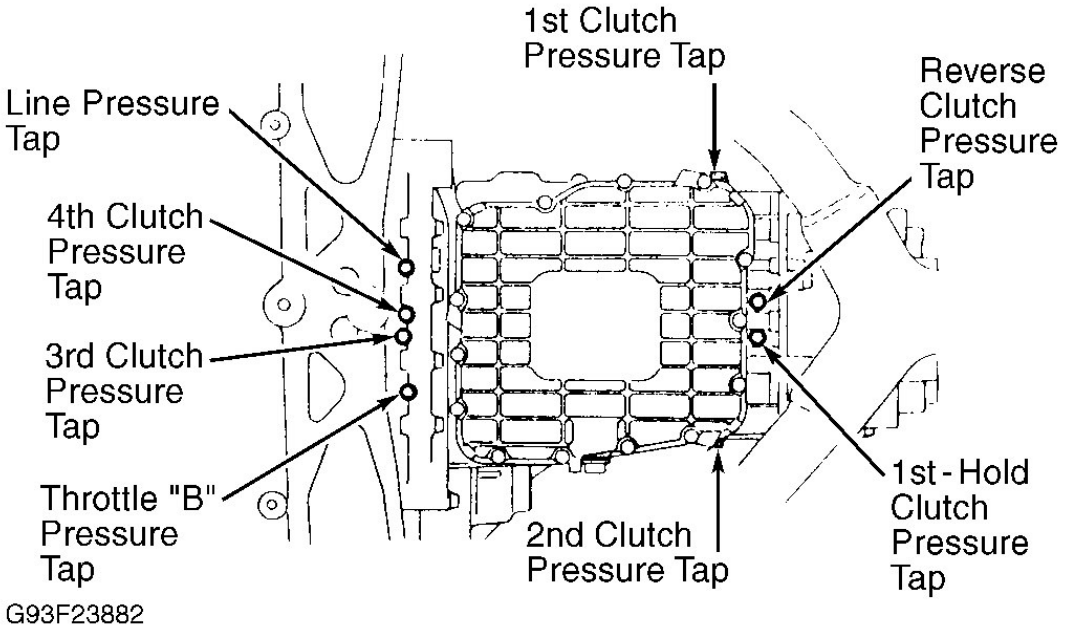


Fig. 5: Identifying Transaxle Pressure Taps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

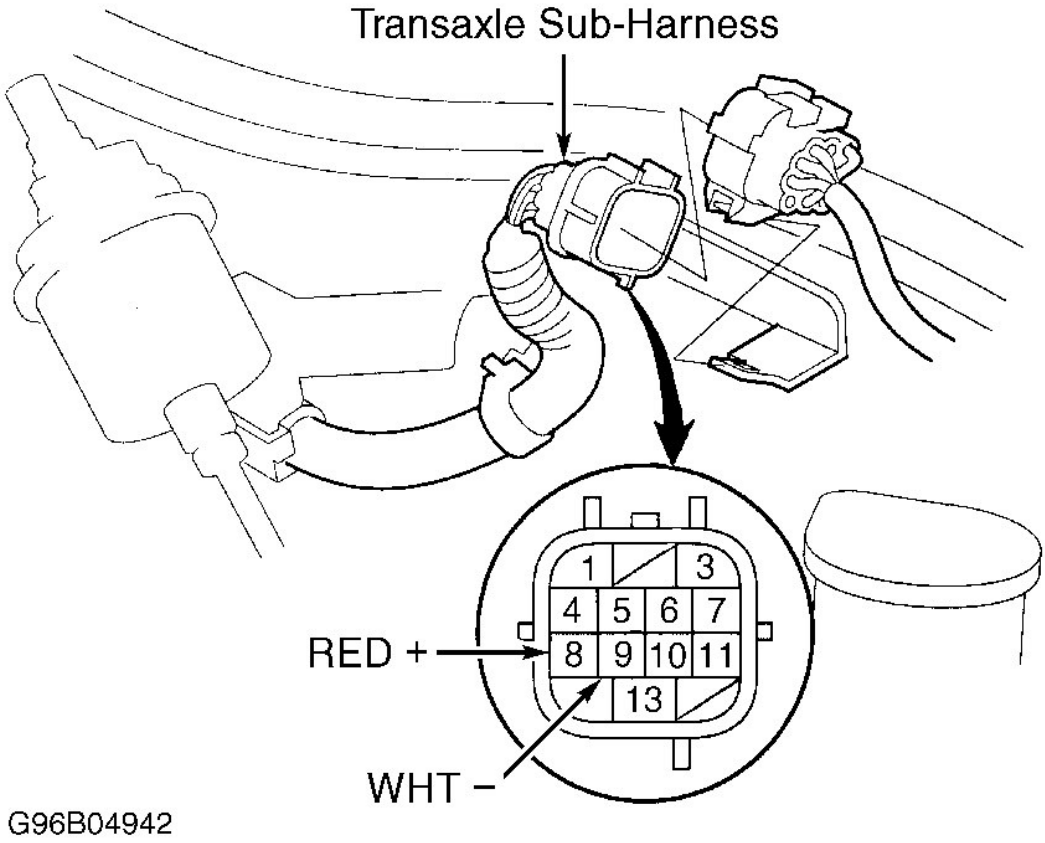


Fig. 6: Identifying Transaxle Sub-Harness Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

DIFFERENTIAL ASSEMBLY

NOTE: Before disconnecting negative battery cable, ensure radio anti-theft code is obtained from customer. Radio anti-theft code must be re-entered into radio for radio operation.

Removal

1. Obtain radio anti-theft code from customer. Disconnect negative battery cable. Raise and support vehicle. Drain differential assembly gear oil. Drain cooling system.
2. Remove axle shafts and intermediate shaft. See **FWD AXLE SHAFTS** article in DRIVELINE/AXLES.

Remove extension shaft sealing bolt. Place shift lever in "P" to lock secondary gear. Using Puller (07LAC-PW50100 or 101), disconnect extension shaft. See **Fig. 7** .

3. Remove splash shield. Remove bolts and lower plate, located below differential assembly. See **Fig. 8** . Reinstall bolts to hold steering gear in place, as bolts must be removed for lower plate removal.
4. Disconnect Vehicle Speed Sensor (VSS) connector, remove bolt, speed sensor assembly and "O" ring from differential assembly. Speed sensor assembly contains the VSS and power steering speed sensor. DO NOT disconnect the 2 hoses for the power steering at speed sensor assembly.
5. Remove air cleaner housing. Remove power steering pump leaving hoses attached. Disconnect breather tube from clamp and remove right exhaust manifold cover.
6. Remove 2 lower engine stop mount bolts. Support engine with chain hoist. Remove right and left upper engine mount brackets.
7. Remove differential assembly mounting bolts, shim and differential assembly. See **Fig. 9** .

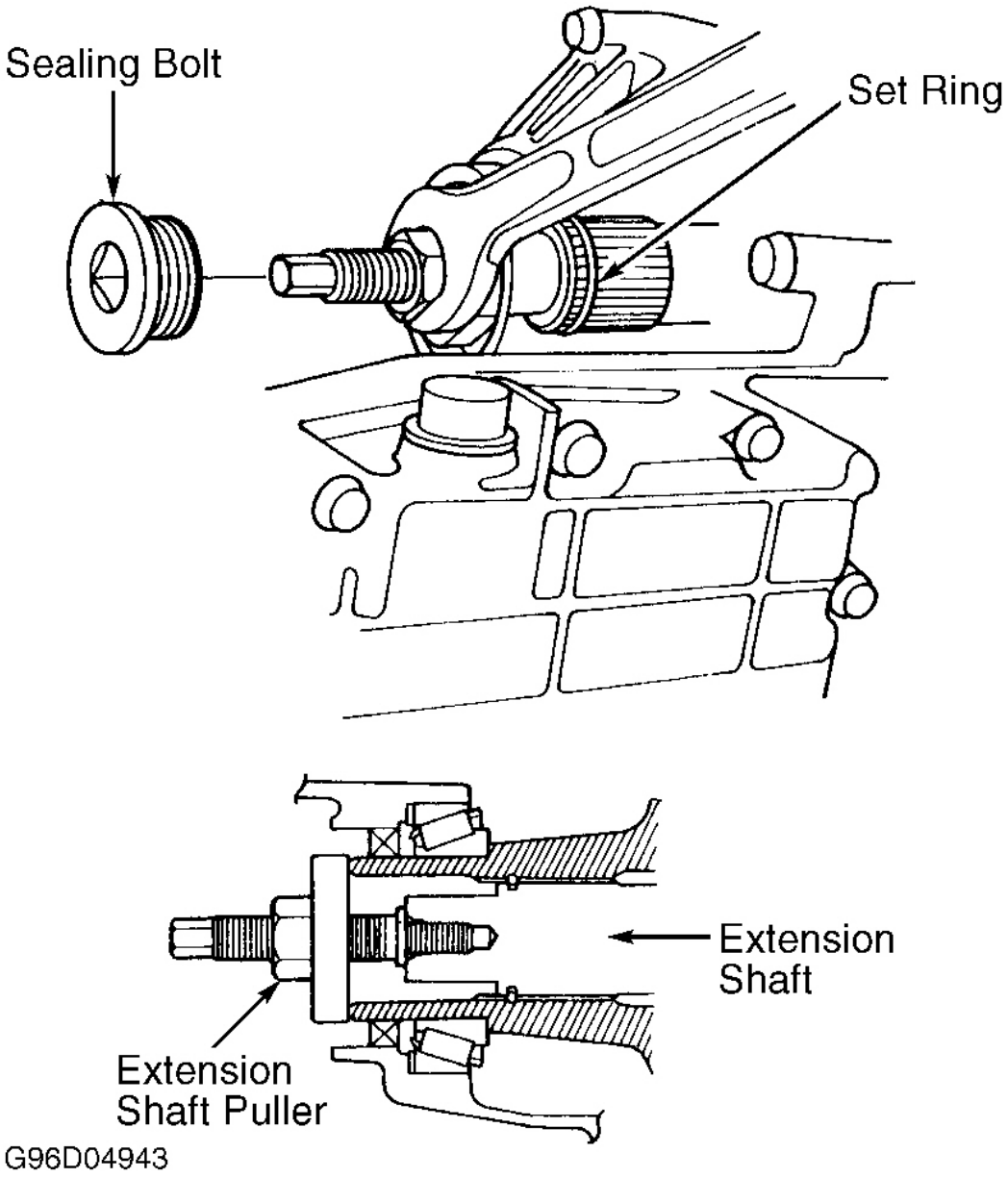


Fig. 7: Removing Extension Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

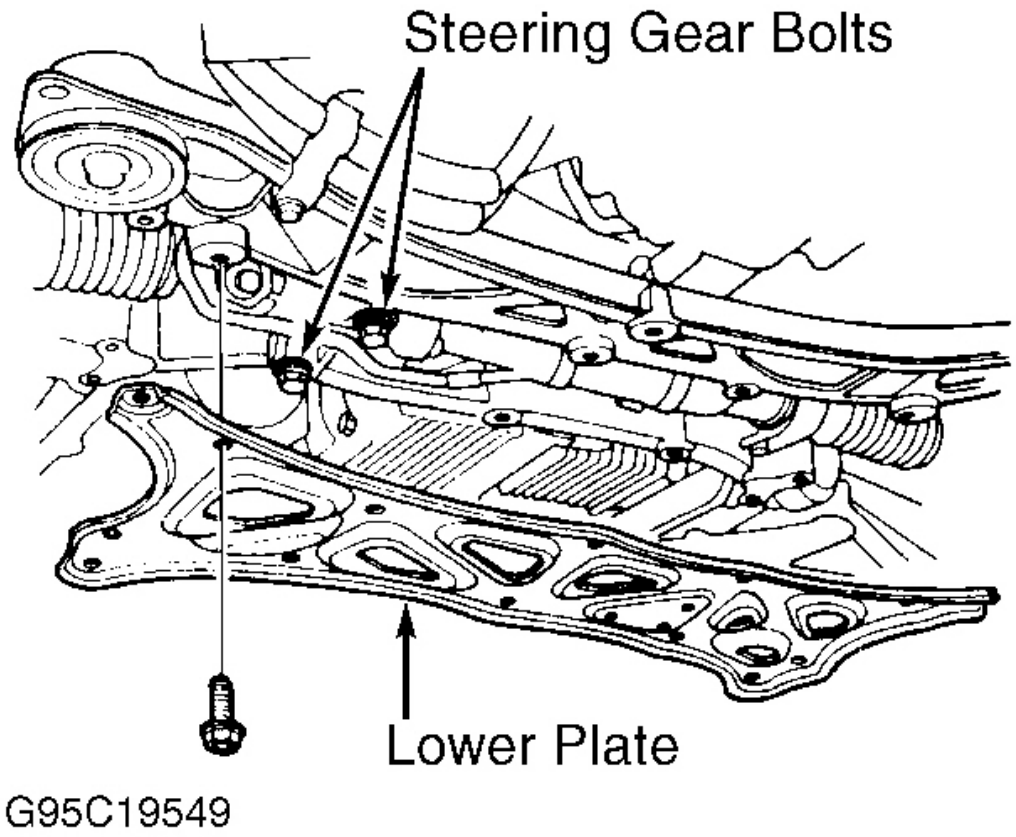


Fig. 8: Identifying Lower Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

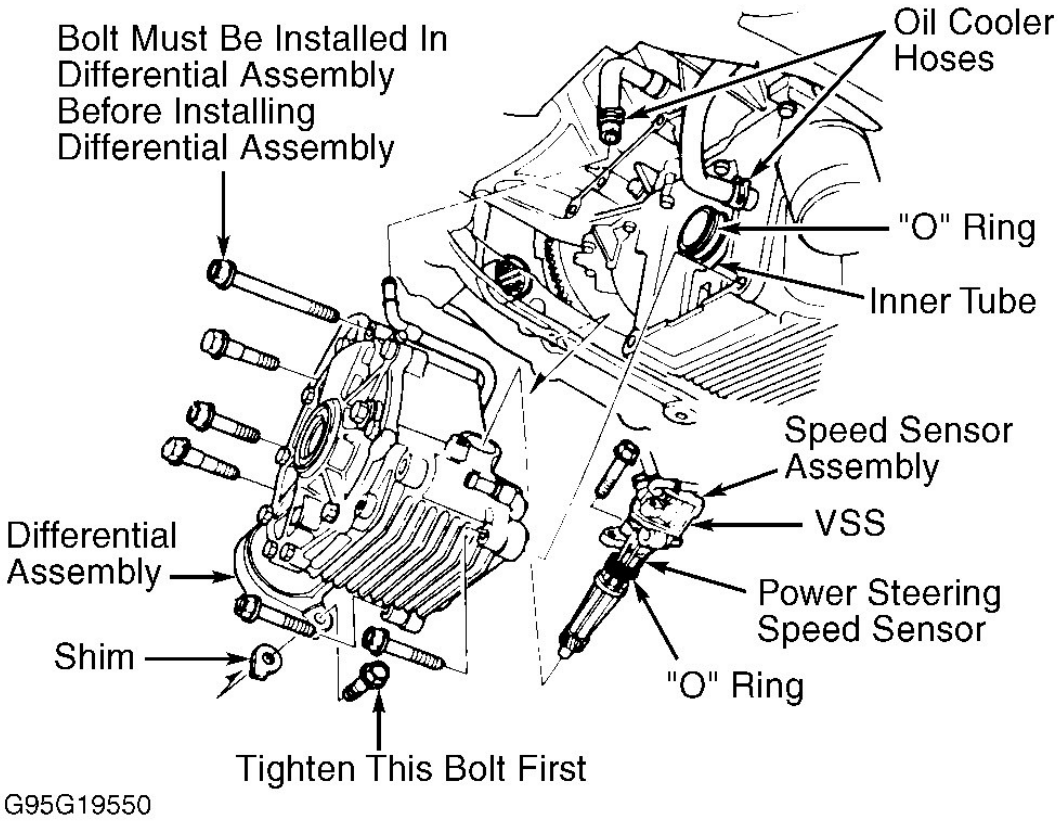


Fig. 9: Identifying Differential Assembly, Oil Cooler Hoses & Speed Sensor Assembly (Typical)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

NOTE: Differential shim must be checked and adjusted if differential is replaced. See Fig. 9 . If differential case has not been replaced, start installation procedure with step 4 .

Installation

1. Install differential assembly. Ensure upper mounting bolt is installed on differential assembly, as bolt must be installed before installing differential assembly. See **Fig. 9** . Install and tighten differential assembly mounting bolts to specification. See **TORQUE SPECIFICATIONS** .
2. Using feeler gauge, measure clearance between differential case and torque converter housing at shim location. See **Fig. 10** .
3. Select a shim equal to measured dimension. Shims are available in .1 mm increments ranging from 1.9 mm to 3.0 mm. Remove differential assembly.

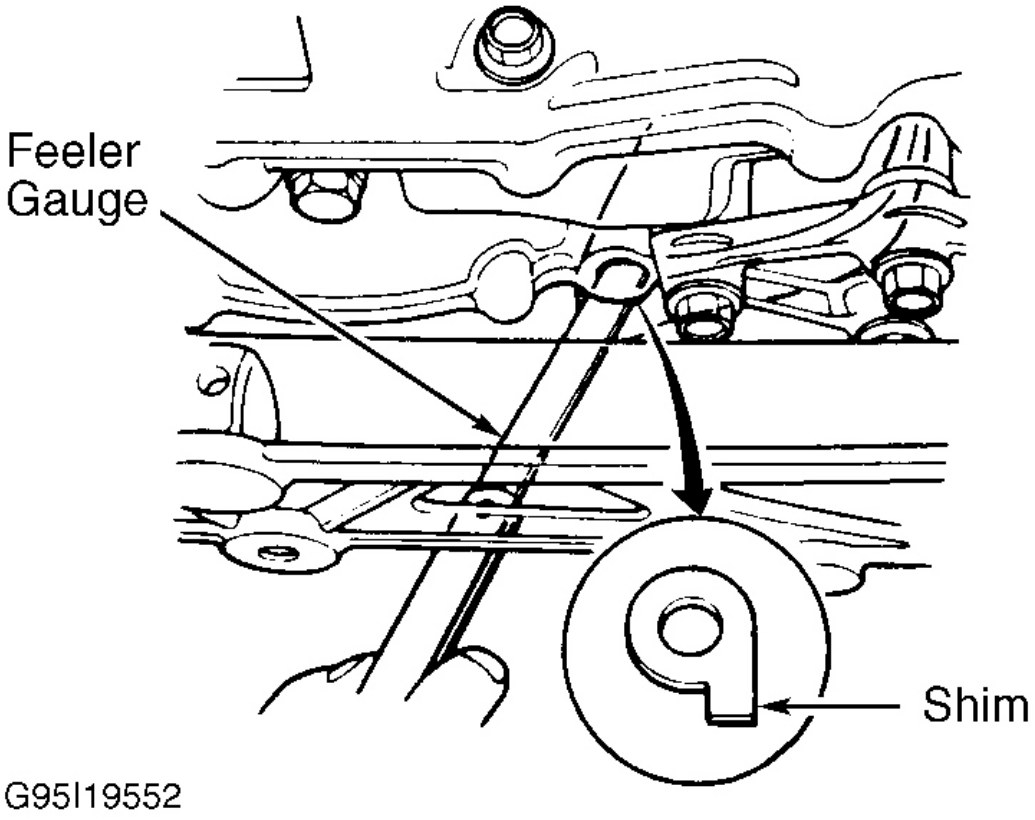


Fig. 10: Determining Shim Thickness
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Ensure upper mounting bolt is installed on differential assembly. Bolt must be installed before installing differential assembly. See **Fig. 9** . Install differential assembly using NEW "O" ring on end of inner tube at the oil pan.
5. Install shim and differential assembly mounting bolts. Tighten differential assembly mounting bolt at the shim area first. Tighten all differential assembly mounting bolts to specification.
6. Install mount brackets and remove chain hoist. Install lower engine mount stop bolts. Apply high-temperature grease on splines on extension shaft. Install NEW set ring on end of extension shaft so ends of set ring are at 12 o'clock position.
7. Using Extension Shaft Installer (07MAF-PY40100), install extension shaft. See **Fig. 11** . Ensure extension shaft locks into the secondary gear. Fill cavity on secondary gear around extension shaft with high-temperature grease.
8. Apply thread sealant on threads of sealing bolt. Install and tighten sealing bolt to specification. Install secondary cover.
9. Install breather tube in clamp and install right exhaust manifold cover. Install power steering pump. Install air cleaner housing. Using NEW "O" ring, install speed sensor assembly. Install and tighten speed

sensor assembly bolt to specification. Reconnect speed sensor assembly connector.

10. Install lower plate. Install and tighten lower plate and steering gear bolts to specification.
11. Install axle shafts and intermediate shaft using proper procedure. See **FWD AXLE SHAFTS** article in DRIVELINE/AXLES.
12. Fill differential assembly with 80W-90 (API GL5) hypoid gear oil. Use NEW seal washer when installing differential assembly oil filler plug. Tighten differential assembly oil filler plug to specification.

NOTE: A break in step numbering sequence occurs at this point. Procedure skips from step 12) to step 14). No procedures have been omitted.

13. Reconnect negative battery cable. To enter radio anti-theft code, turn radio on. When "CODE" is displayed on radio, re-enter anti-theft code by using the radio station preset buttons.

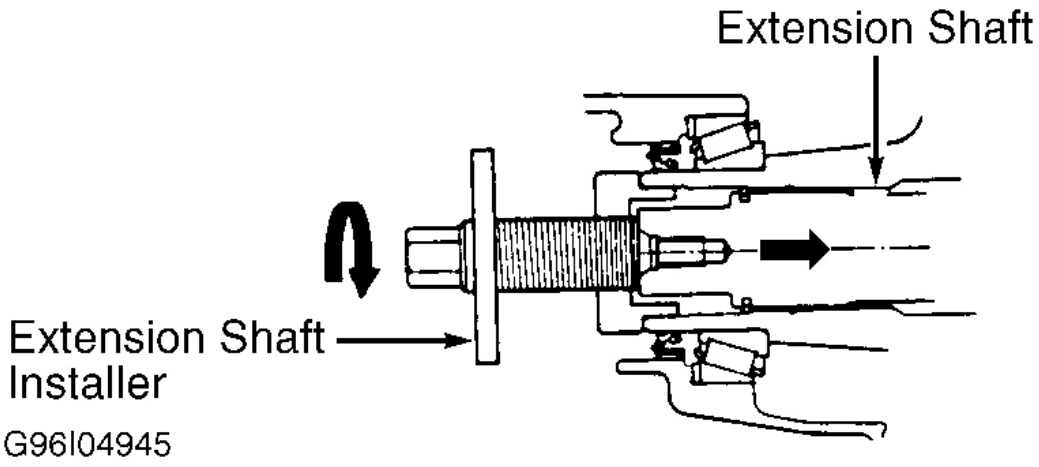


Fig. 11: Installing Extension Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ELECTRICAL COMPONENTS

See **M5DA ELECTRONIC CONTROLS** article.

TRANSAXLE ASSEMBLY

See **REMOVAL & INSTALLATION - 3.5RL** article.

LOWER VALVE BODY ASSEMBLY

NOTE: Lower valve body assembly consists of main valve body, secondary valve body, throttle valve body, linear solenoid, shift control solenoid valves and oil pass

body.

Removal

1. Raise and support vehicle. Drain fluid by removing drain plug and seal washer from rear of transaxle. See **Fig. 12** .
2. Remove cable cover. Remove control lever from control shaft. Remove bolt and connector stopper. Disconnect electrical connector from transaxle sub-harness.
3. Remove bolts, oil pan, gasket, fluid strainer and "O" ring. Remove lower valve body assembly-to-transaxle case bolts. Remove lower valve body assembly.

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

Installation

1. To install, reverse removal procedure using NEW "O" ring, gasket and bolt lock. Ensure manual valve engages with control shaft.
2. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS** . Bend tabs over on bolt lock on control lever. Install NEW seal washer on drain plug. Tighten drain plug to specification.

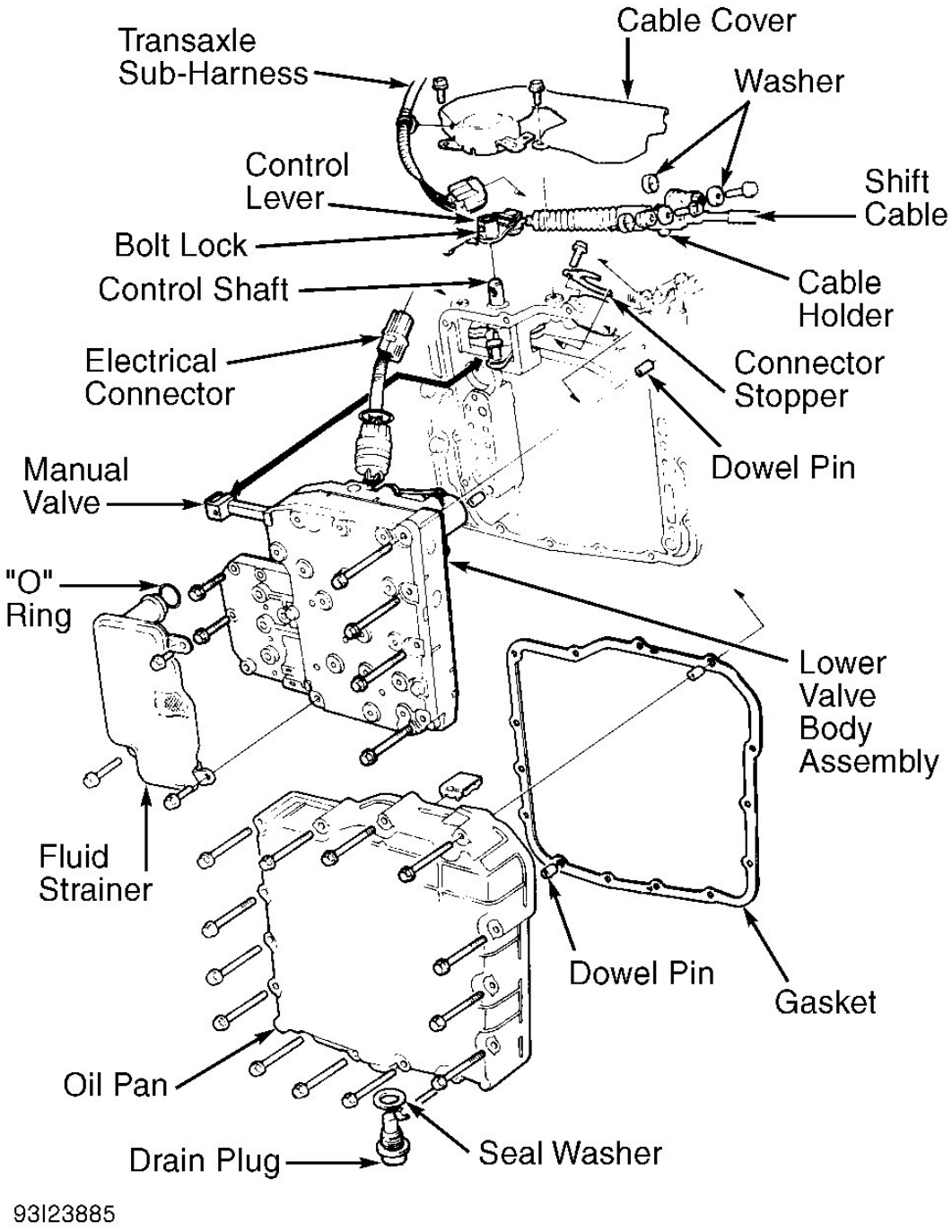


Fig. 12: Identifying Lower Valve Body Assembly & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER

Torque converter consists of pump, turbine and stator assembled as a unit. Torque converter cannot be serviced and must be replaced if defective.

NOTE: For torque converter stall speed test, see TORQUE CONVERTER STALL SPEED TEST under TESTING.

TRANSAXLE DISASSEMBLY

VALVE BODIES & INTERNAL COMPONENTS

1. Disconnect electrical connector from transaxle sub-harness. Remove control lever from control shaft. Remove bolt and connector stopper. See **Fig. 12** .
2. Remove bolts, oil pan, gasket, fluid strainer and "O" ring. Remove bolts and lower valve body assembly. Remove transaxle sub-harness, joint bolts, seal washer and cooler pipes. See **Fig. 14** .
3. Remove sealing bolt from rear cover. Remove snap ring from ball bearing on end of countershaft.
4. Remove rear cover, oil pipes, "O" rings and gasket. Install Mainshaft Holder (07924-PJ4010A) on mainshaft to secure mainshaft. See **Fig. 13** . Engage parking pawl with parking gear.
5. Using hammer and chisel, cut lock tabs on countershaft and mainshaft lock nuts and pry lock tab upward. Remove countershaft and mainshaft lock nuts and washers.

NOTE: Countershaft lock nut has left-hand thread.

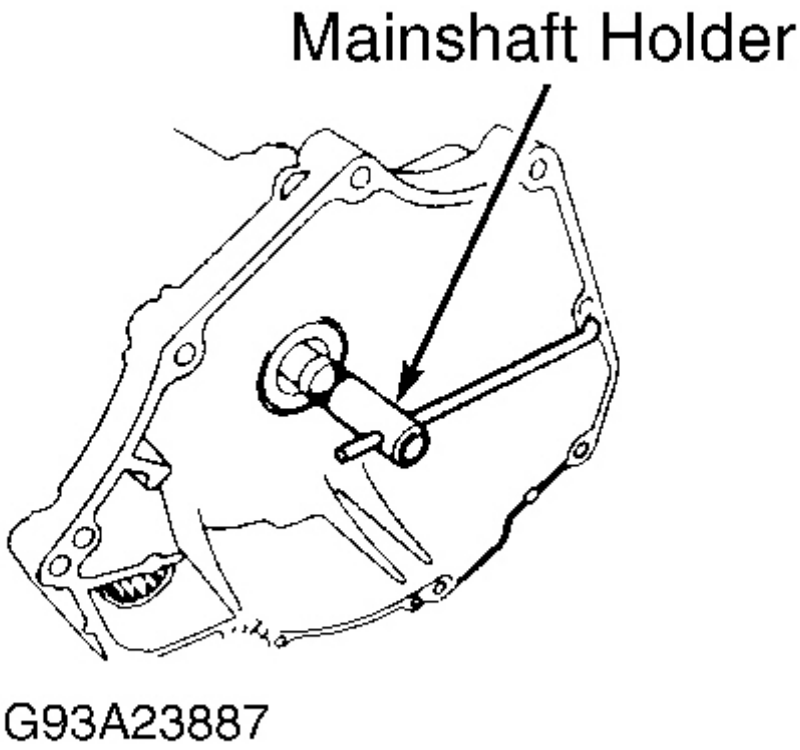
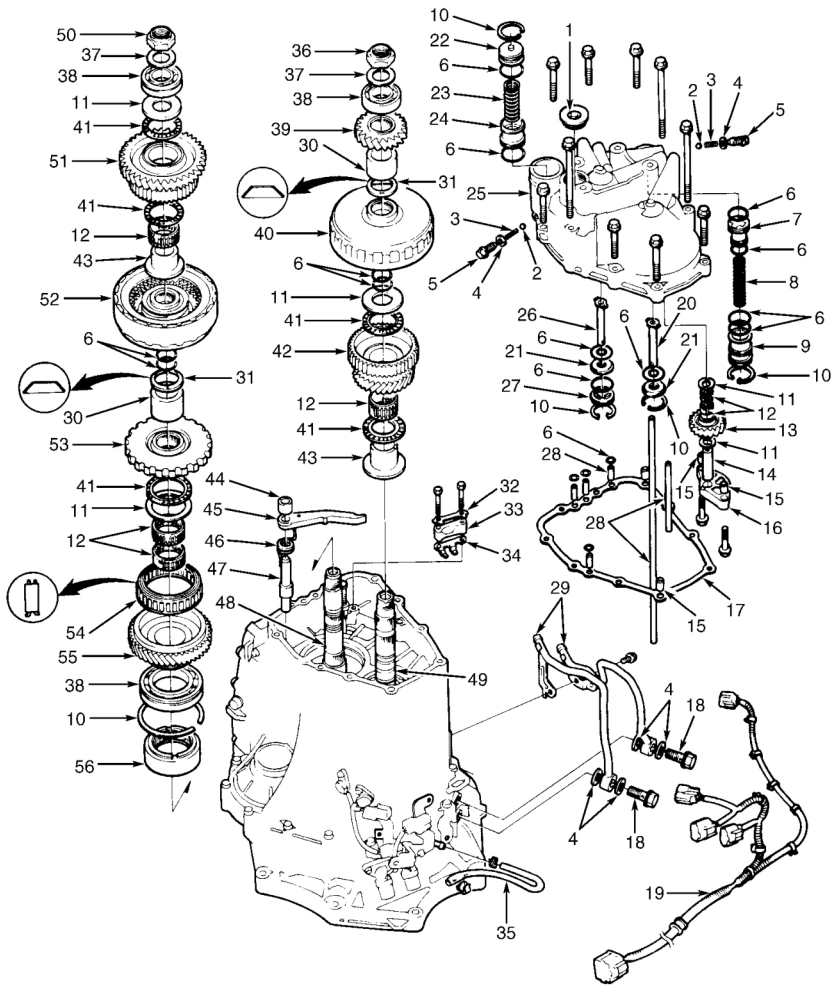


Fig. 13: Installing Mainshaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.



1. Sealing Bolt
2. Steel Ball
3. Ball Spring
4. Seal Washer
5. Ball Retaining Bolt
6. "O" Ring
7. Reverse Accumulator Piston
8. Reverse Accumulator Spring
9. Reverse Accumulator Sleeve
10. Snap Ring
11. Thrust Washer
12. Needle Bearing
13. Reverse Idler Gear
14. Reverse Idler Gear Shaft
15. Dowel Pin
16. Reverse Idler Gear Shaft Holder
17. Gasket
18. Joint Bolt
19. Transaxle Sub-Harness
20. 2nd Clutch Feedpipe
21. Feedpipe Guide
22. 1st-Hold Accumulator Sleeve
23. 1st-Hold Accumulator Spring
24. 1st-Hold Accumulator Piston
25. Rear Cover
26. Reverse Clutch Feedpipe
27. Oil Feed Guide
28. Oil Pipe
29. Cooler Pipe
30. Distance Collar
31. Disc Spring
32. Lock Plate
33. Parking Brake Rod Holder
34. Parking Brake Rod Guide
35. Breather Pipe
36. Mainshaft Lock Nut
37. Washer
38. Ball Bearing
39. Mainshaft Reverse Gear
40. 2nd Clutch
41. Thrust Needle Bearing
42. Mainshaft 2nd Gear
43. Gear Collar
44. Parking Pawl Shaft Sleeve
45. Parking Pawl
46. Parking Pawl Spring
47. Parking Pawl Shaft
48. Countershaft
49. Mainshaft
50. Countershaft Lock Nut
51. Countershaft Reverse Gear
52. Reverse Clutch
53. Parking Gear
54. 2nd Gear One-Way Clutch
55. Countershaft 2nd Gear
56. One-Way Clutch Hub

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Fig. 14: Exploded View Of Rear Cover & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove mainshaft holder. Remove washer, ball bearing, mainshaft reverse gear, distance collar, disc spring from mainshaft. Remove washer, ball bearing, thrust washer, thrust needle bearing and countershaft reverse gear from countershaft. Remove thrust needle bearing, needle bearing, gear collar, reverse clutch, disc spring and distance collar from countershaft. See **Fig. 14** .
7. Remove 2nd clutch assembly from mainshaft. Remove parking pawl shaft sleeve, parking pawl, parking pawl spring and parking pawl shaft. Remove parking gear from countershaft.

8. Remove thrust washer, thrust needle bearing and mainshaft 2nd gear as an assembly from mainshaft. See **Fig. 14** . Remove thrust needle bearing, thrust washer, 2nd gear one-way clutch and countershaft 2nd gear as an assembly from countershaft.
9. Remove needle bearing, thrust needle bearing and gear collar from mainshaft. Remove bolt, countershaft speed sensor, mainshaft speed sensor, speed sensor washer(s) and "O" rings from transaxle housing. See **Fig. 15** .

NOTE: Speed sensor washer is used on countershaft and mainshaft speed sensors.

CAUTION: Ensure countershaft and mainshaft speed sensors are removed from transaxle housing before removing transaxle housing from torque converter housing.

10. Remove transaxle housing-to-torque converter housing bolts. Using puller, pull transaxle housing from torque converter housing. See **Fig. 16** . Remove gasket and dowel pins from torque converter housing.
11. Remove countershaft and mainshaft as an assembly from torque converter housing. Use care not to damage regulator valve body during countershaft and mainshaft removal. Remove secondary gear and extension shaft as an assembly from torque converter housing. See **Fig. 15** .
12. Remove bolts, regulator valve body, "O" ring, stator shaft, stopper pin, separator plate and dowel pins from torque converter housing. See **Fig. 17** .
13. Remove bolts, oil pump body, torque converter check valve and spring from torque converter housing. Remove oil pump drive and driven gears, and oil pump driven gear shaft.

CAUTION: Ensure accumulator cover is held downward when removing accumulator cover bolts, as accumulator cover is under spring pressure.

14. Hold accumulator cover downward and remove accumulator cover bolts in a crisscross pattern. Remove accumulator cover and dowel pins. Remove oil pipes from accumulator body.
15. Remove bolts, accumulator body, separator plate and dowel pins. Remove lock-up control solenoid valve assembly and filter-gasket.

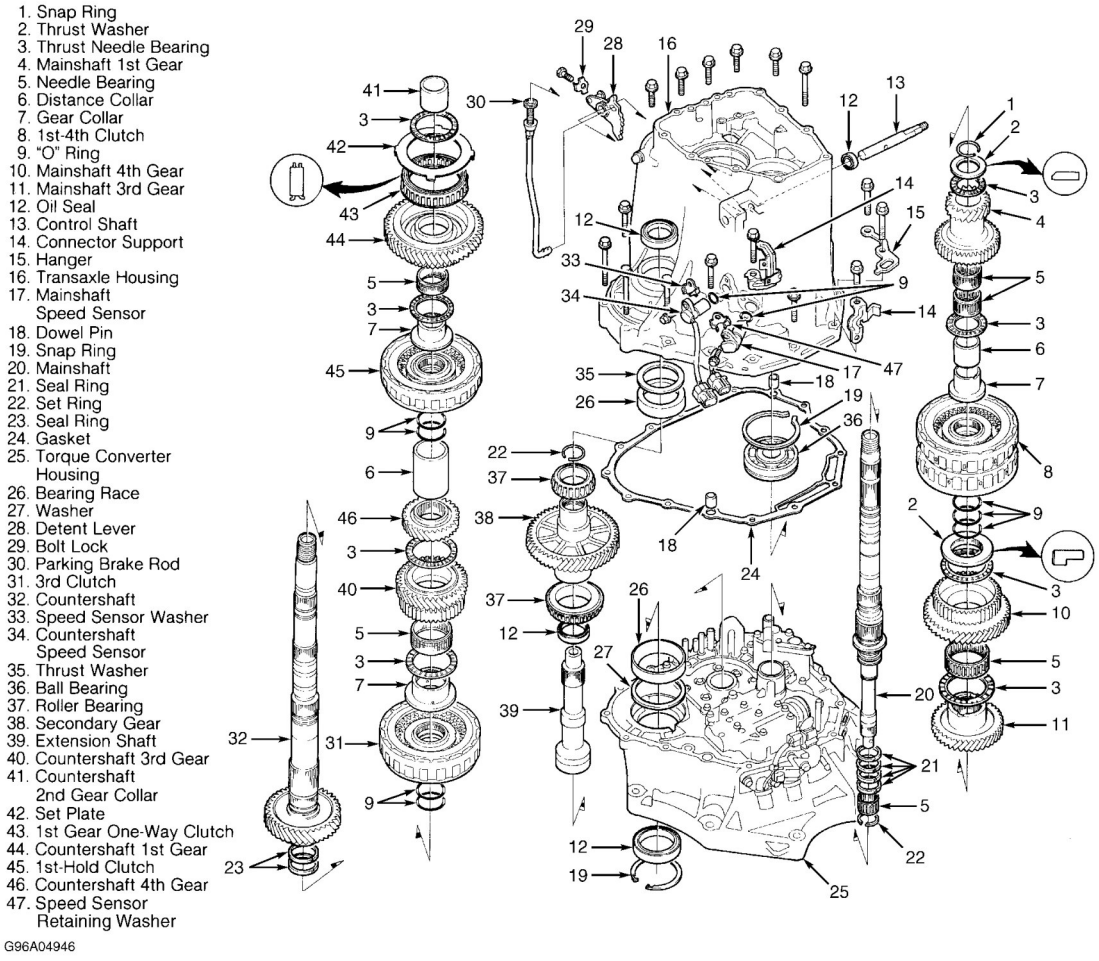


Fig. 15: Exploded View Of Transaxle Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

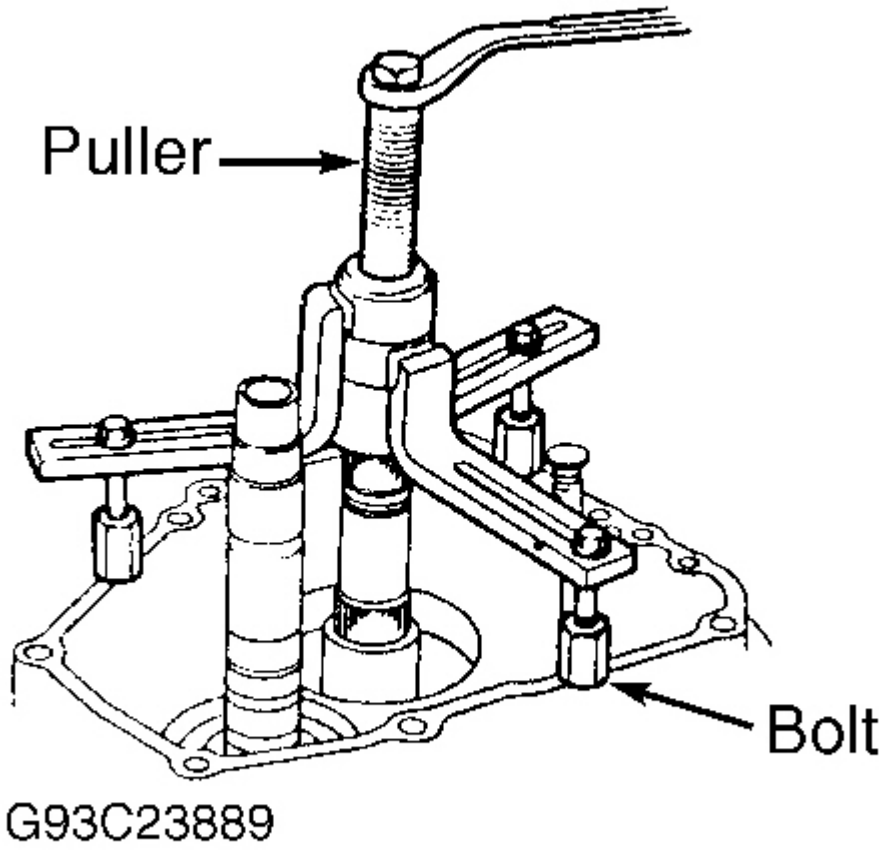
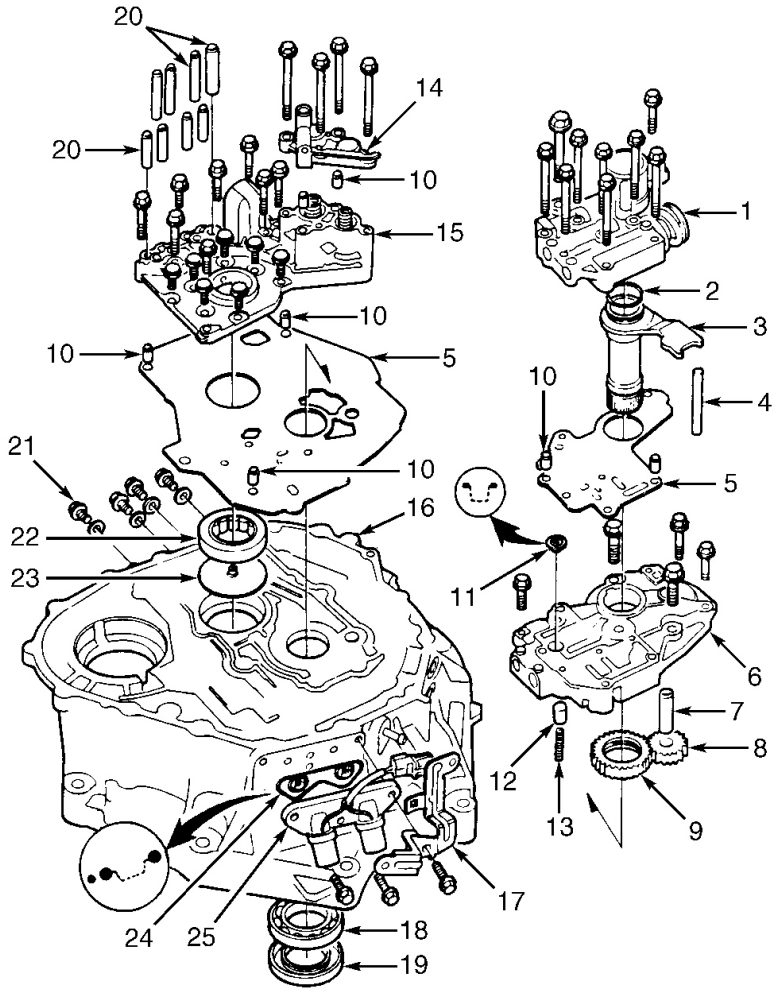


Fig. 16: Removing Transaxle Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.



1. Regulator Valve Body
2. "O" Ring
3. Stator Shaft
4. Stopper Pin
5. Separator Plate
6. Oil Pump Body
7. Oil Pump Driven Gear Shaft
8. Oil Pump Driven Gear
9. Oil Pump Drive Gear
10. Dowel Pin
11. Filter
12. Torque Converter Check Valve
13. Torque Converter Check Valve Spring
14. Accumulator Cover
15. Accumulator Body
16. Torque Converter Housing
17. Connector Holder
18. Ball Bearing
19. Oil Seal
20. Oil Pipe
21. Pressure Tap Plug & Seal Washer
22. Needle Bearing
23. Oil Guide Plate
24. Filter-Gasket
25. Lock-Up Control Solenoid Valve Assembly

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Fig. 17: Exploded View Of Torque Converter Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

LOWER VALVE BODY ASSEMBLY

Disassembly

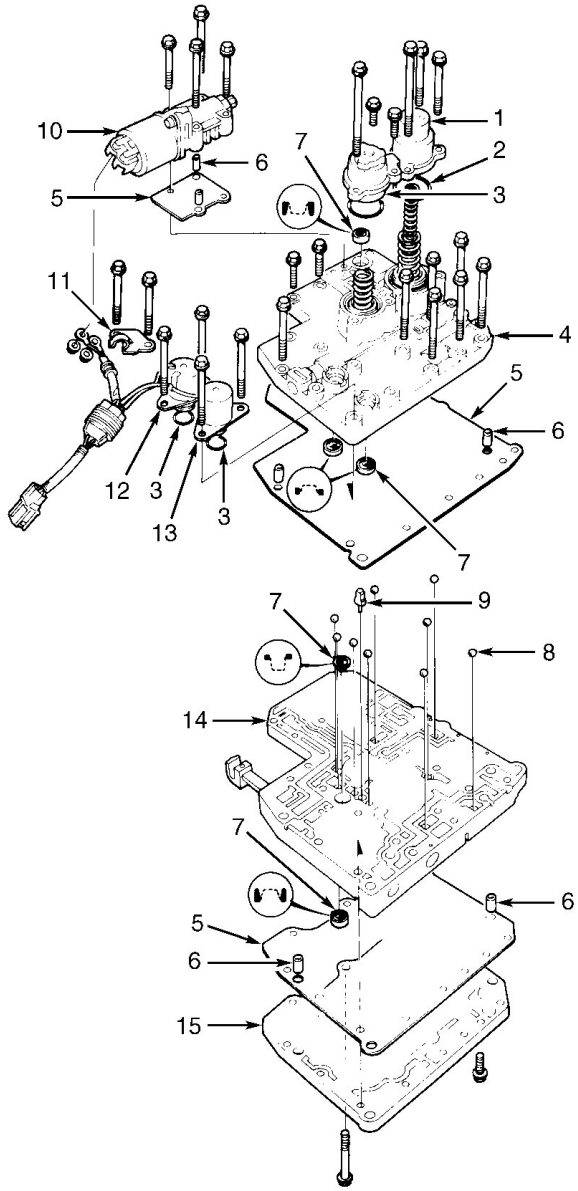
1. Remove flange nuts and disconnect wiring harness from linear solenoid. Remove throttle valve body with linear solenoid, separator plate, dowel pins and filter. See **Fig. 18** .
2. Remove wiring harness clamp. Remove shift control solenoid valves and "O" rings. Remove 1st and 2nd accumulator covers, "O" rings and springs. Mark spring location for reassembly reference.
3. Remove secondary valve body, filters, separator plate and dowel pins from main valve body. Use care not to lose check balls from main valve body. Remove oil pass body, separator plate and dowel pins from main valve body.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components if necessary. For testing of linear solenoid, see **THROTTLE VALVE BODY** under COMPONENT DISASSEMBLY & REASSEMBLY. For testing of shift control solenoid valves, see **M5DA ELECTRONIC CONTROLS** article.

Reassembly

1. Coat all components with Dexron-II ATF. To reassemble, reverse disassembly procedure using NEW filters and NEW "O" rings.
2. Ensure check balls are installed in proper areas of main valve body. See **Fig. 18** . Ensure all filters are installed in proper direction.
3. Ensure proper length bolts are installed in designated areas. See **Fig. 19** . Tighten all bolts and flange nuts to specification. See **TORQUE SPECIFICATIONS** .



1. 2nd Accumulator Cover
2. "O" Ring
3. 1st Accumulator Cover
4. Secondary Valve Body
5. Separator Plate
6. Dowel Pin
7. Filter
8. Check Ball
9. Choke
10. Throttle Valve Body & Linear Solenoid
11. Wiring Harness Clamp
12. Shift Control Solenoid Valve "B"
13. Shift Control Solenoid Valve "A"
14. Main Valve Body
15. Oil Pass Body

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Fig. 18: Exploded View Of Lower Valve Body Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

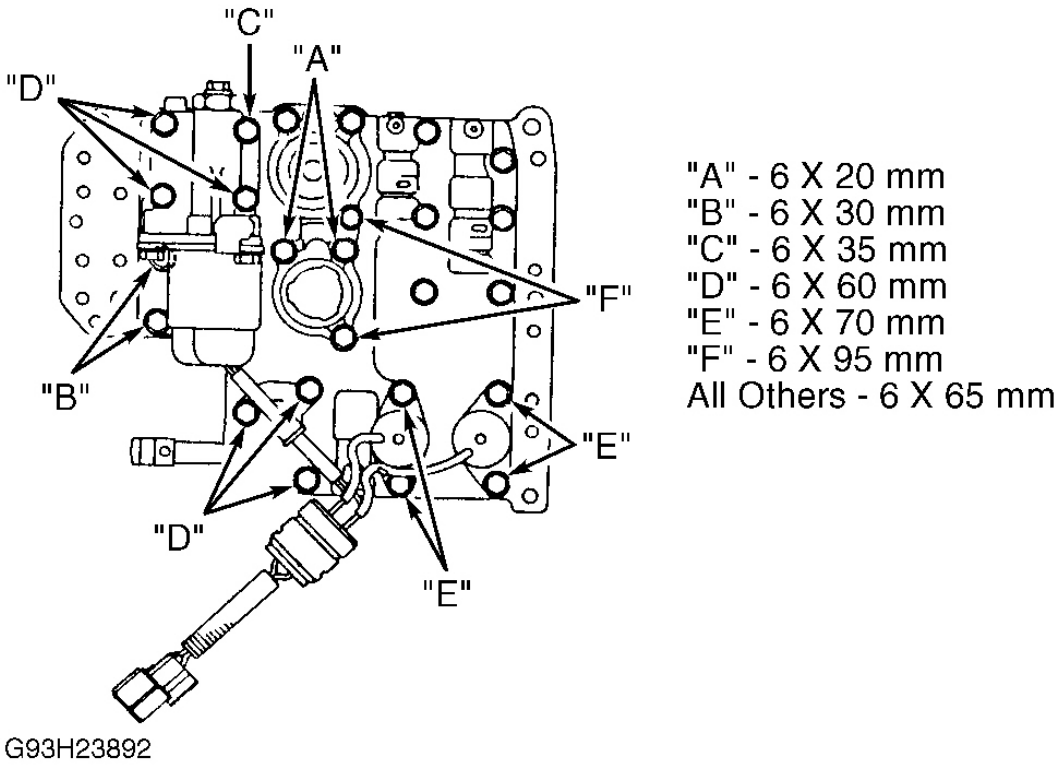


Fig. 19: Identifying Lower Valve Body Assembly Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY VALVE BODY

CAUTION: When disassembling secondary valve body, place valve body components in order and mark spring locations for reassembly reference. DO NOT use force to remove components. Note direction of valve cap installation before removing valve cap from secondary valve body.

Disassembly

Disassemble secondary valve body. See **Fig. 18** . Use care when removing valve caps or spring seats, as they are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace secondary valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in bores. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF. Thoroughly clean secondary valve body and components if polishing was needed.

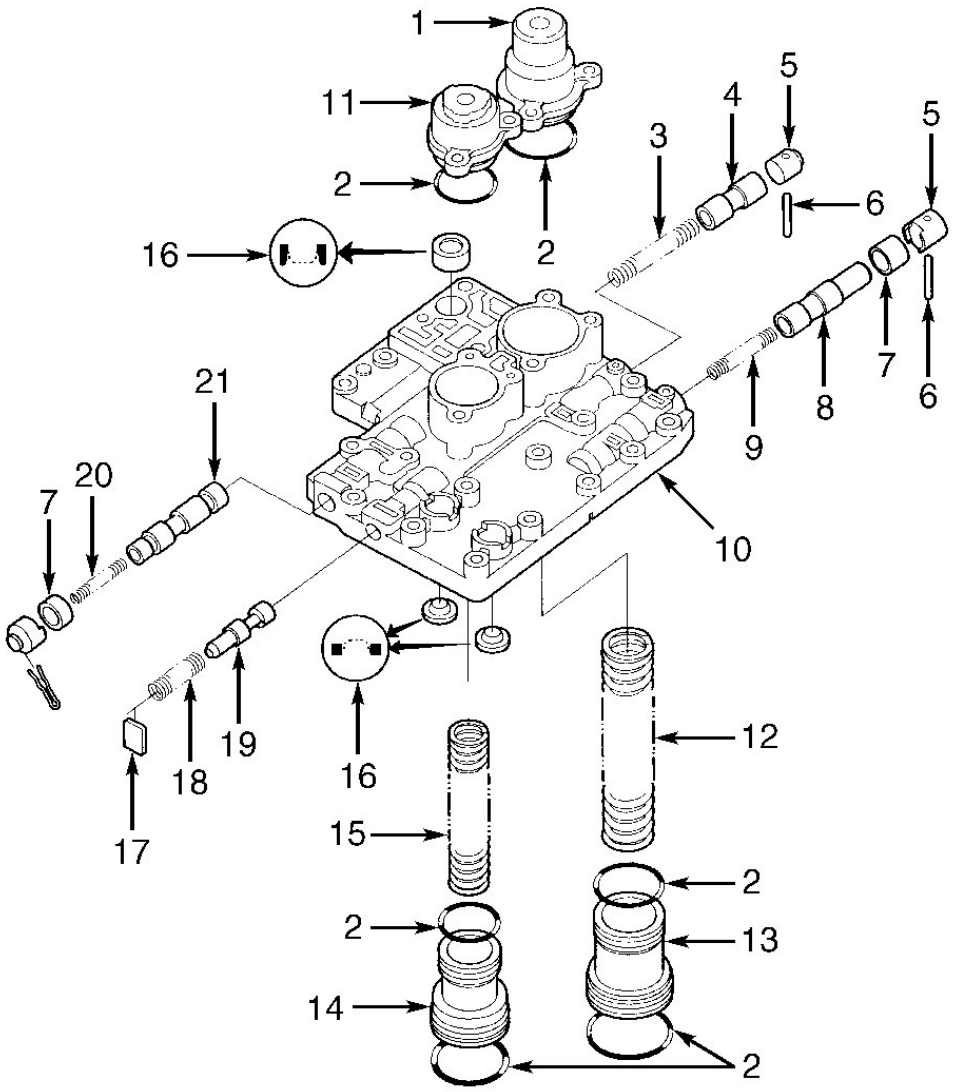
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

Coat all components and bores with Dexron-II ATF. To reassemble, reverse disassembly procedure using NEW "O" rings and NEW filters. Ensure all components are installed in correct location and filters are installed in proper direction. See **Fig. 20** .

SPRING SPECIFICATIONS

Application	Free Length In. (mm)
Accumulator Body	
3rd Accumulator Spring	2.854 (72.50)
4th Accumulator Spring	2.661 (67.60)
Main Valve Body	
Main Orifice Control Valve Spring	1.681 (42.70)
1-2 Shift Valve Spring	2.185 (55.50)
2-3 Shift Valve Spring	1.657 (42.10)
3-4 Shift Valve Spring	1.657 (42.10)
4-3 Kickdown Valve Spring	1.756 (44.60)
Oil Pump Body	
Lock-Up Control Valve Spring	(1)
Lock-Up Timing Valve Spring	2.409 (61.20)
Relief Valve Spring	2.224 (56.50)
Torque Converter Check Valve Spring	1.406 (35.70)
Regulator Valve Body	
Cooler Relief Valve Spring	1.331 (33.80)
Lock-Up Shift Valve Spring	2.902 (73.70)
Regulator Valve Spring "A"	3.224 (81.90)
Regulator Valve Spring "B"	1.693 (43.00)
Stator Reaction Spring	1.193 (30.30)
Secondary Valve Body	
Line Pressure Control Valve Spring	.949 (24.10)
Modulator Valve Spring	1.087 (27.60)
1st Accumulator Spring	3.280 (83.30)
2nd Accumulator Spring "A"	3.441 (87.40)
3-4 Orifice Control Valve Spring	1.878 (47.70)
4-3 Shift Timing Valve Spring	1.378 (35.00)
(1) Spring free length may be 1.520" (38.60 mm), 1.547" (39.30 mm) or 1.575" (40.00 mm).	



1. 2nd Accumulator Cover
2. "O" Ring
3. 3-4 Orifice Control Valve Spring
4. 3-4 Orifice Control Valve
5. Valve Cap
6. Roller
7. Valve Sleeve
8. 4-3 Shift Timing Valve
9. 4-3 Shift Timing Valve Spring
10. Secondary Valve Body
11. 1st Accumulator Cover
12. 2nd Accumulator Spring "A"
13. 2nd Accumulator Piston
14. 1st Accumulator Piston
15. 1st Accumulator Spring
16. Filter
17. Spring Seat
18. Modulator Valve Spring
19. Modulator Valve
20. Line Pressure Control Valve Spring
21. Line Pressure Control Valve

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Fig. 20: Exploded View Of Secondary Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAIN VALVE BODY

CAUTION: When disassembling main valve body, place valve body components in order and mark spring locations for reassembly reference. DO NOT use force to remove components. DO NOT use magnet to remove check balls, as check balls may become magnetized. Note direction of valve cap installation before removing valve cap from main valve body.

Disassembly

Disassemble main valve body. See **Fig. 21** . Use care when removing valve caps or spring seats, as they are under spring pressure.

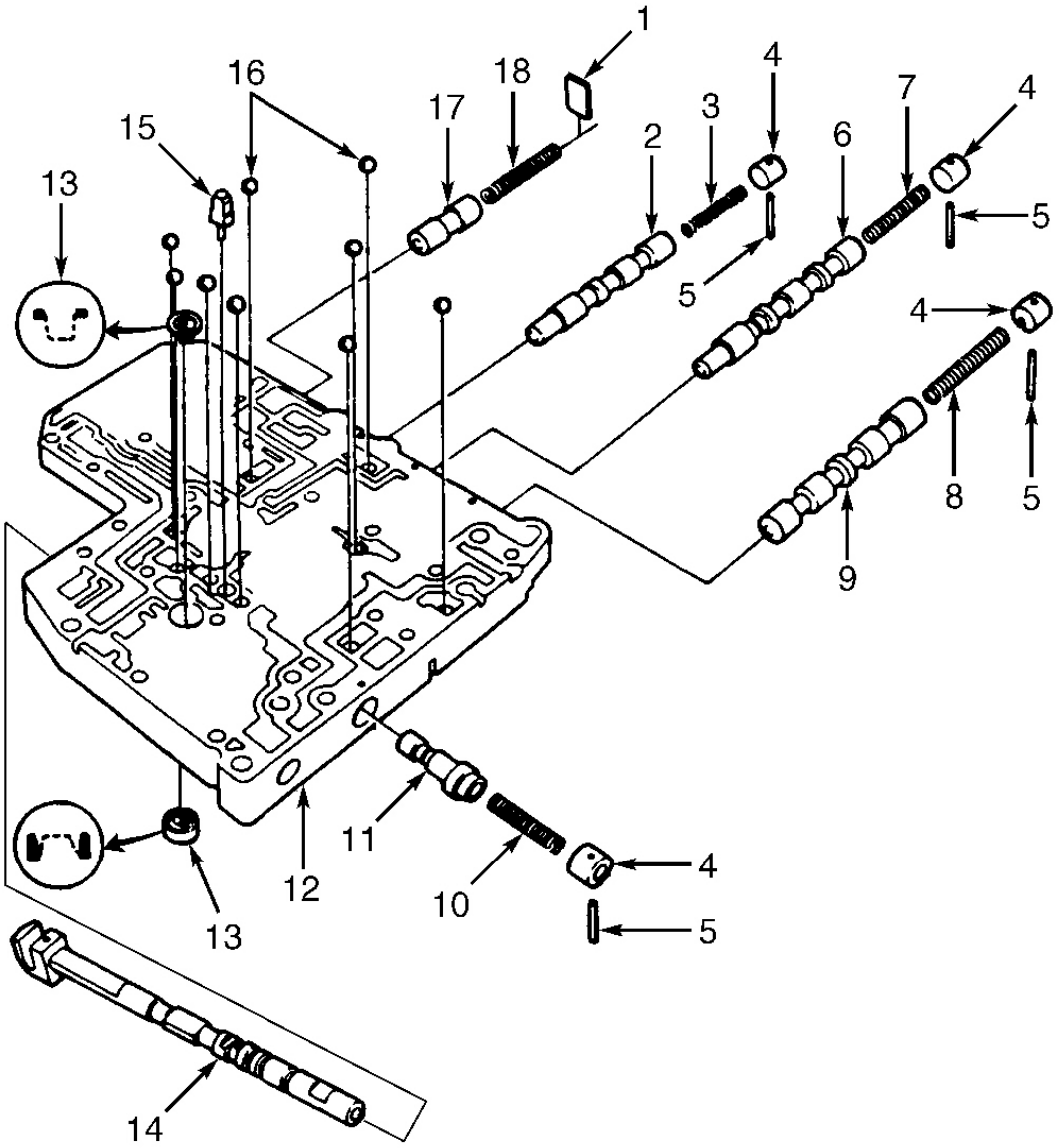
Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace main valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in bores. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF. Thoroughly clean main valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.

NOTE: The clutch pressure control valve is referred to as the main orifice control valve. The main orifice control valve uses a spring seat instead of a valve cap.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure using NEW filters. Ensure all components are installed in correct location and filters are installed in proper direction. See **Fig. 21** .



1. Spring Seat
2. 3-4 Shift Valve
3. 3-4 Shift Valve Spring
4. Valve Cap
5. Roller
6. 2-3 Shift Valve
7. 2-3 Shift Valve Spring
8. 1-2 Shift Valve Spring
9. 1-2 Shift Valve
10. Clutch Pressure Or Main Orifice Control Valve Spring
11. Clutch Pressure Or Main Orifice Control Valve
12. Main Valve Body
13. Filter
14. Manual Valve
15. Choke
16. Check Ball
17. 4-3 Kickdown Valve
18. 4-3 Kickdown Valve Spring

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Fig. 21: Exploded View Of Main Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REGULATOR VALVE BODY

CAUTION: Regulator spring cap is under spring pressure. Ensure regulator spring cap is held downward when removing regulator valve body lock bolt.

Disassembly

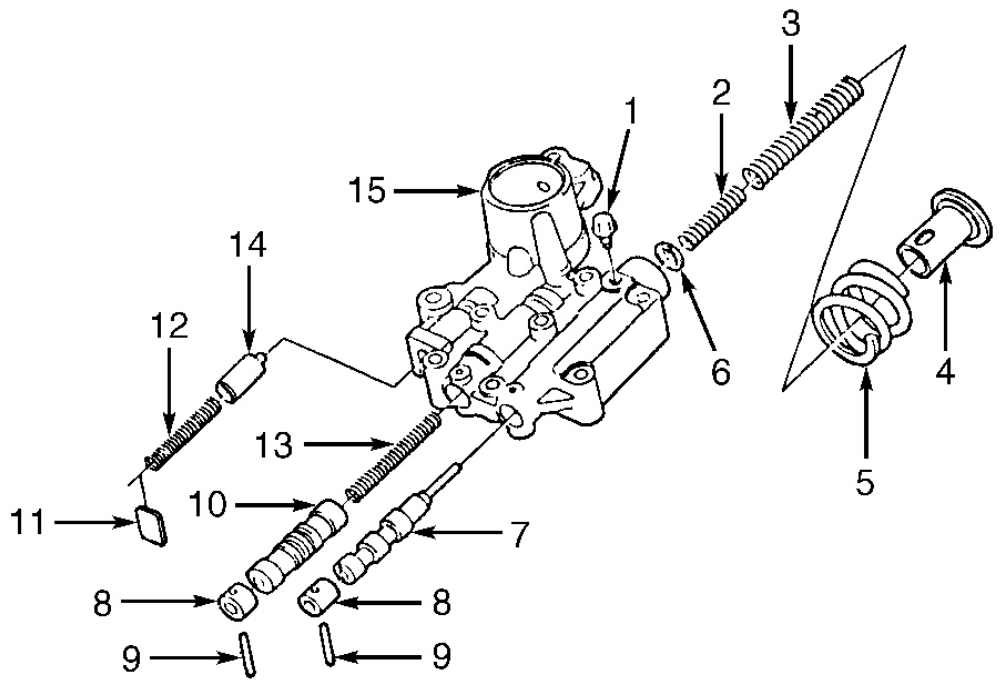
Hold regulator spring cap downward. Remove regulator valve body lock bolt. Slowly remove regulator spring cap and components from regulator valve body. See **Fig. 22** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace regulator valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in bores. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF. Thoroughly clean regulator valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

1. Coat all components and bores with Dexron-II ATF. To reassemble, reverse disassembly procedure. Ensure all components are installed in correct location. See **Fig. 22** .
2. Ensure hole in regulator spring cap aligns with hole for regulator valve body lock bolt before tightening lock bolt. Tighten regulator valve body lock bolt to specification. See **TORQUE SPECIFICATIONS** .



1. Regulator Valve Body Lock Bolt
2. Regulator Valve Spring "B"
3. Regulator Valve Spring "A"
4. Regulator Spring Cap
5. Stator Reaction Spring
6. Regulator Spring Seat
7. Regulator Valve
8. Valve Cap
9. Roller
10. Lock-Up Shift Valve
11. Spring Seat
12. Cooler Relief Valve Spring
13. Lock-Up Shift Valve Spring
14. Cooler Relief Valve
15. Regulator Valve Body

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Fig. 22: Exploded View Of Regulator Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ACCUMULATOR BODY

NOTE: 3rd and 4th accumulator have the same diameter pistons. 3rd accumulator piston has a spring in bottom of piston.

Disassembly

Disassemble accumulator body. See **Fig. 23** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace accumulator body if any parts are worn or damaged.
2. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure using NEW "O" rings.

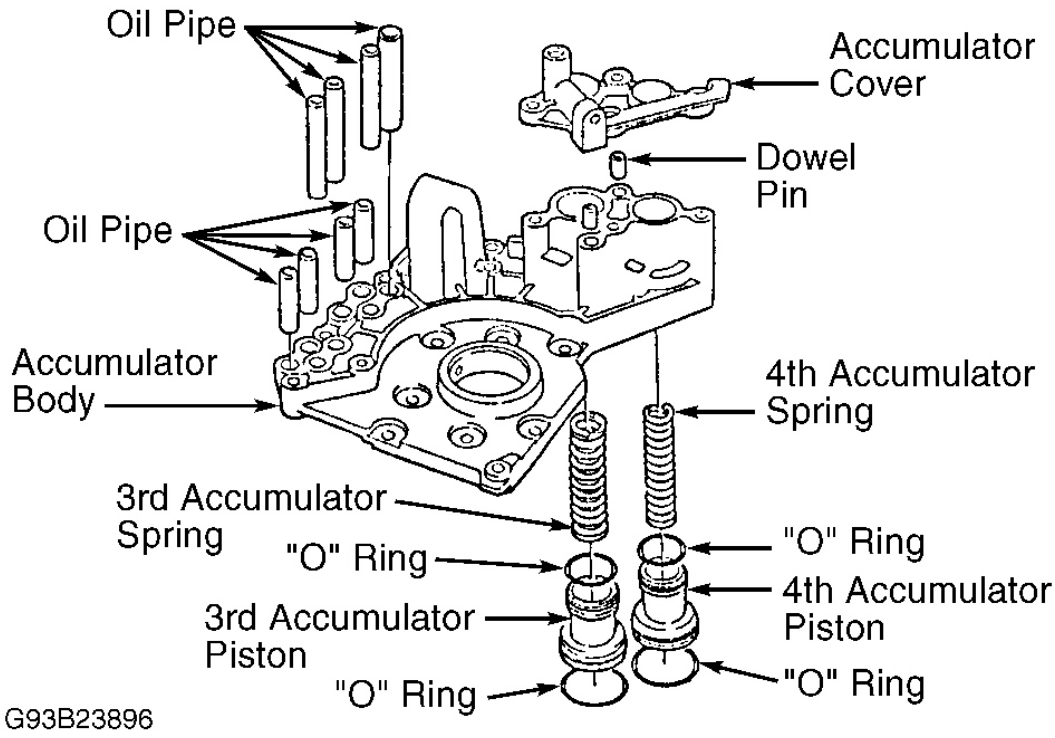


Fig. 23: Exploded View Of Accumulator Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP BODY

CAUTION: When disassembling oil pump body, place components in order and mark spring locations for reassembly reference. DO NOT use force to remove components. Note direction of valve cap installation before removing valve cap from oil pump body.

Disassembly

Disassemble oil pump body. See **Fig. 24** . Use care when removing valve caps or spring seats, as they are under

spring pressure.

Cleaning & Inspection

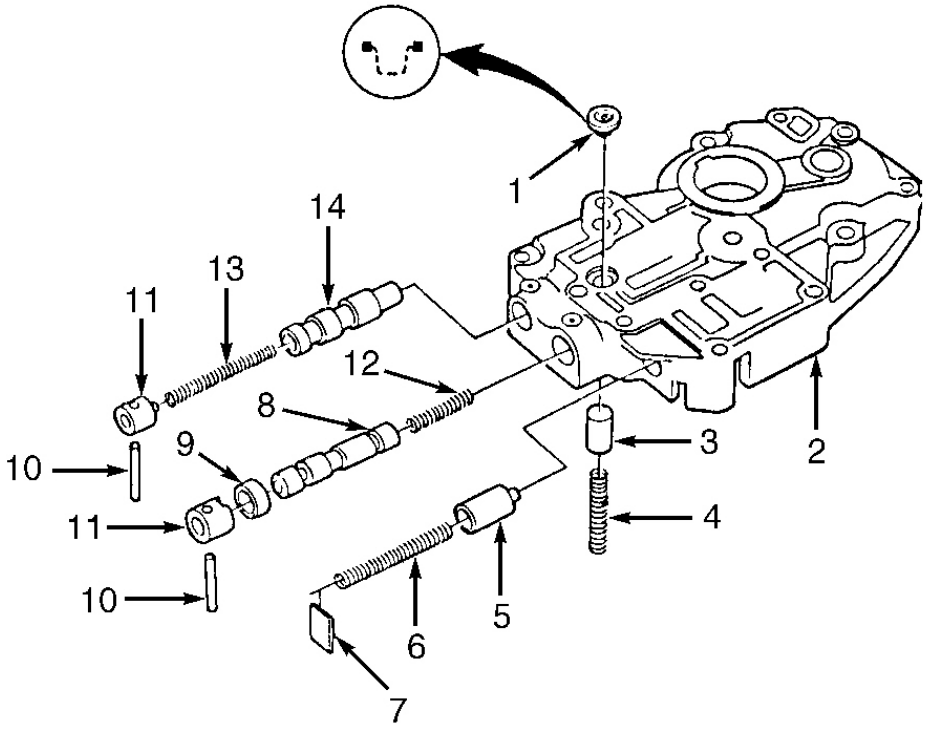
1. Clean components with solvent and dry with compressed air. Replace oil pump body if any parts are worn or damaged.
2. Ensure all valves slide freely in bores. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF. Thoroughly clean oil pump body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.
4. Install oil pump gears and oil pump driven gear shaft in oil pump body. Ensure chamfered and grooved side of oil pump driven gear is facing upward (toward separator plate side of oil pump body).
5. Using feeler gauge, measure side clearance of both gears between tip of gear teeth and oil pump valve body. See **Fig. 25** . Replace oil pump gears and/or oil pump body if side clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.
6. Remove oil pump driven gear shaft. Place straightedge across oil pump body surface. Using feeler gauge, measure thrust clearance between oil pump gear and straightedge. Replace oil pump gears and/or oil pump body if thrust clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Side Clearance	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0028-.0049 (.070-.125)
Thrust Clearance	
Standard	.001-.002 (.03-.05)
Wear Limit	.0028 (.070)

Reassembly

Coat components with Dexron-II ATF. To reassemble, reverse disassembly procedure using NEW filter. Ensure chamfered and grooved side of oil pump driven gear faces upward (toward separator plate side of oil pump body). Ensure filter is installed in proper direction. See **Fig. 24** .



1. Filter
2. Oil Pump Body
3. Torque Converter Check Valve
4. Torque Converter Check Valve Spring
5. Relief Valve
6. Relief Valve Spring
7. Spring Seat
8. Lock-Up Control Valve
9. Sleeve
10. Roller
11. Valve Cap
12. Lock-Up Control Valve Spring
13. Lock-Up Timing Valve Spring
14. Lock-Up Timing Valve

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Fig. 24: Exploded View Of Oil Pump Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

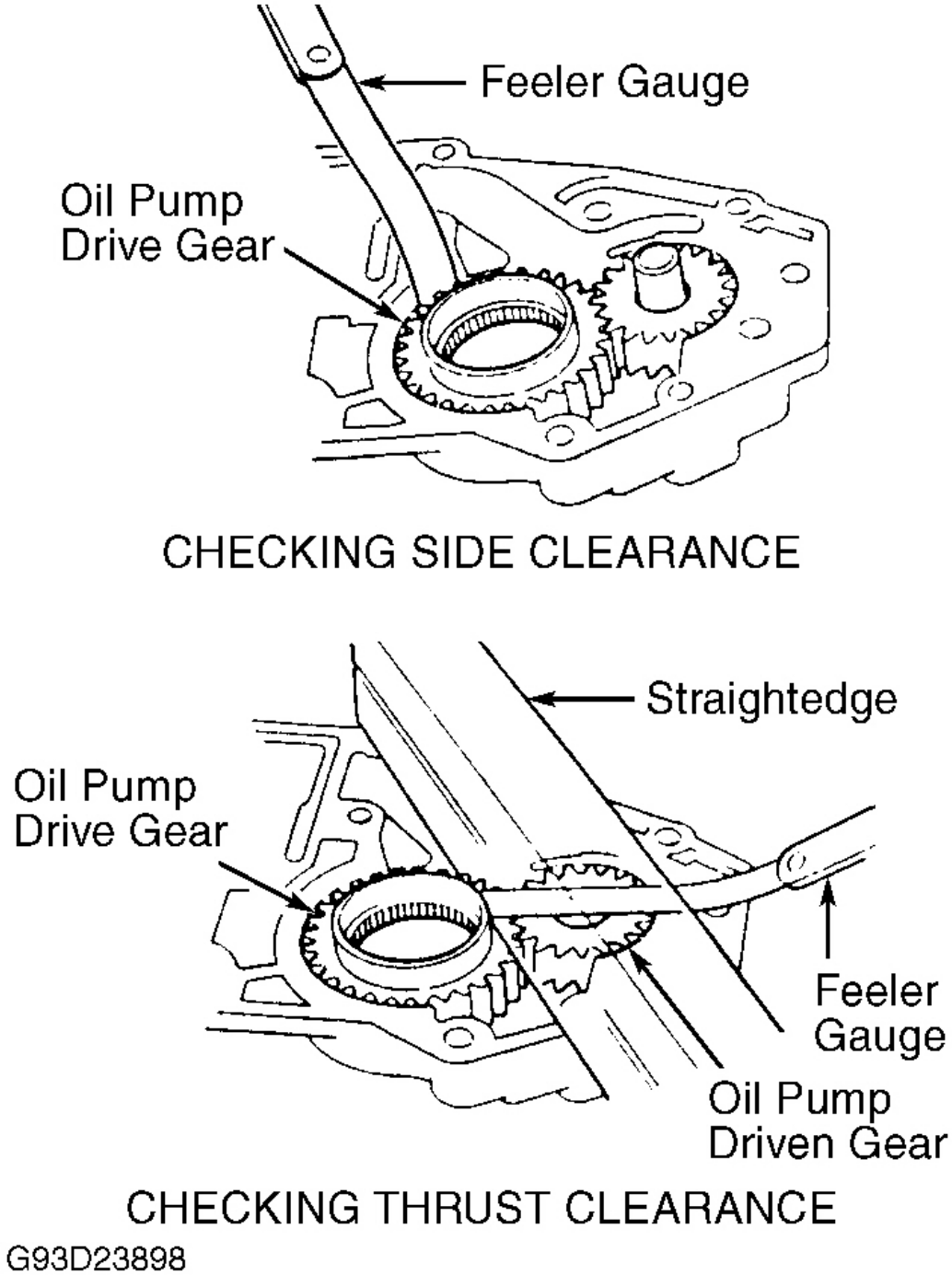


Fig. 25: Checking Oil Pump Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REVERSE & 1ST-HOLD ACCUMULATOR

Disassembly

1. Remove snap ring, accumulator sleeve and accumulator spring from appropriate accumulator. See **Fig. 26** .

NOTE: A break in step numbering sequence occurs at this point. Procedure skips from step 1) to step 3). No procedures have been omitted.

CAUTION: DO NOT place fingers over accumulator piston during removal. DO NOT apply more than 30 psi.

2. Place shop towel over accumulator piston. Apply light air pressure to oil passage in rear cover to force accumulator piston from rear cover.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace components if worn or damaged.
2. Ensure spring free length is within specification. See **REVERSE & 1ST-HOLD ACCUMULATOR SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

Coat components with ATF. To reassemble, reverse disassembly procedure using NEW "O" rings and NEW seal washer. See **Fig. 26** . Tighten ball retaining bolts to specification. See **TORQUE SPECIFICATIONS** .

REVERSE & 1ST-HOLD ACCUMULATOR SPRING SPECIFICATIONS

Application	Free Length: In. (mm)
Reverse Accumulator Spring	4.823 (122.50)
1st-hold Accumulator Spring	2.693 (68.40)
Ball Spring	.551 (14.00)

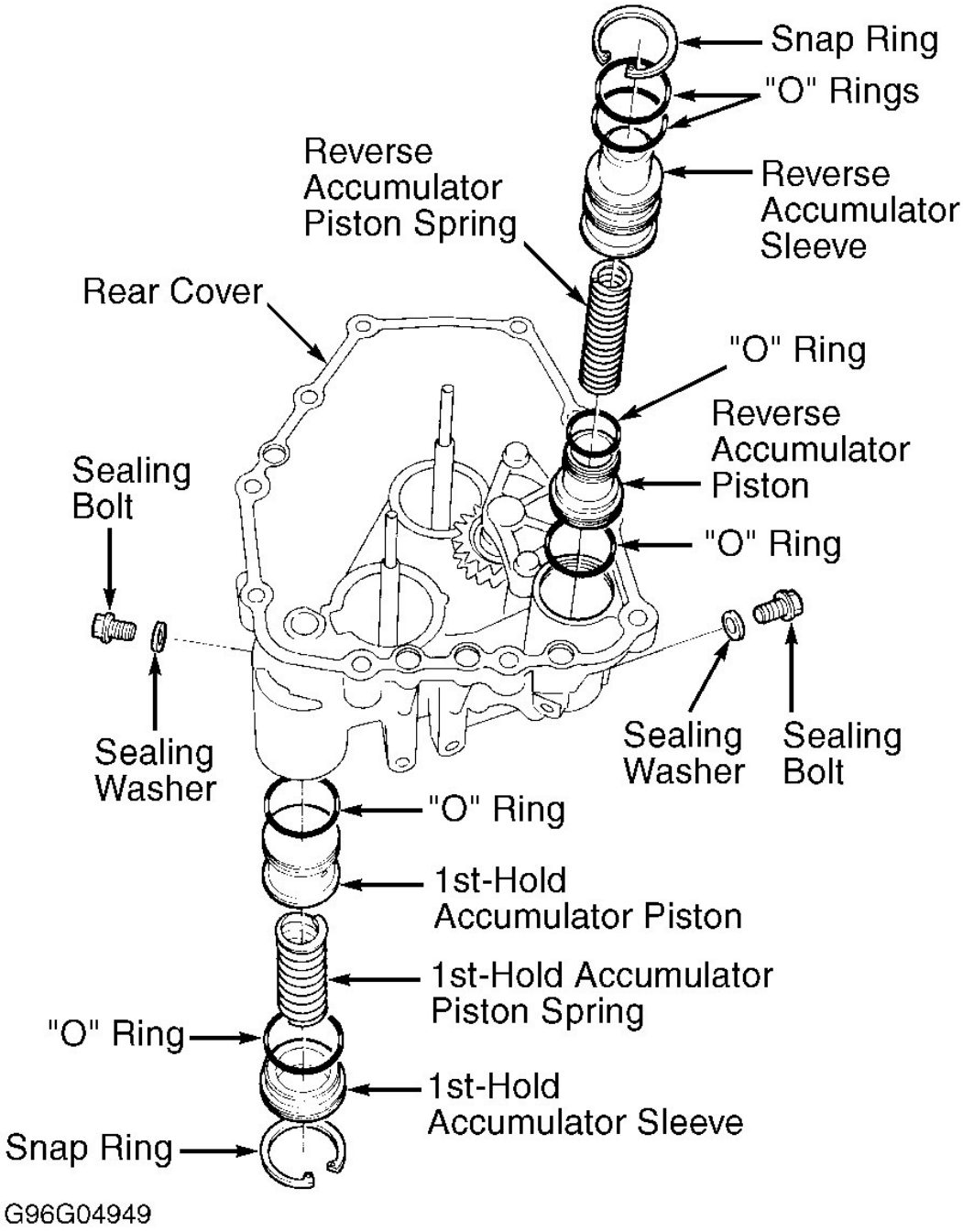


Fig. 26: Exploded View Reverse & 1st Hold Accumulator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR COVER

NOTE: Rear cover contains 2nd and reverse clutch feedpipes and reverse idler gear. See Fig. 14 .

Disassembly

1. To remove 2nd clutch feedpipe, remove snap ring, feedpipe guide, "O" rings and 2nd clutch feedpipe. See **Fig. 14** .
2. To remove reverse clutch feedpipe, remove snap ring, oil feed guide, "O" rings, feedpipe guide and reverse clutch feedpipe.
3. To remove reverse idler gear, remove bolts, reverse idle gear shaft holder and dowel pins. Remove reverse idler gear shaft, thrust washer, reverse idle gear, needle bearings and thrust washer.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Inspect needle bearings for galling or rough movement.

Reassembly

1. To reassemble reverse idler gear, coat components with Dexron-II ATF. Install thrust washers, needle bearings, reverse idler gear and reverse idler gear shaft. Ensure reverse idler gear is installed with offset area in correct direction. See **Fig. 27** .
2. Install reverse idler gear shaft holder. Install and tighten bolts to specification. See **TORQUE SPECIFICATIONS** .
3. To reassemble reverse and 2nd clutch feedpipes, reverse disassembly procedure using NEW "O" rings. Coat components with Dexron-II ATF before reassembly.

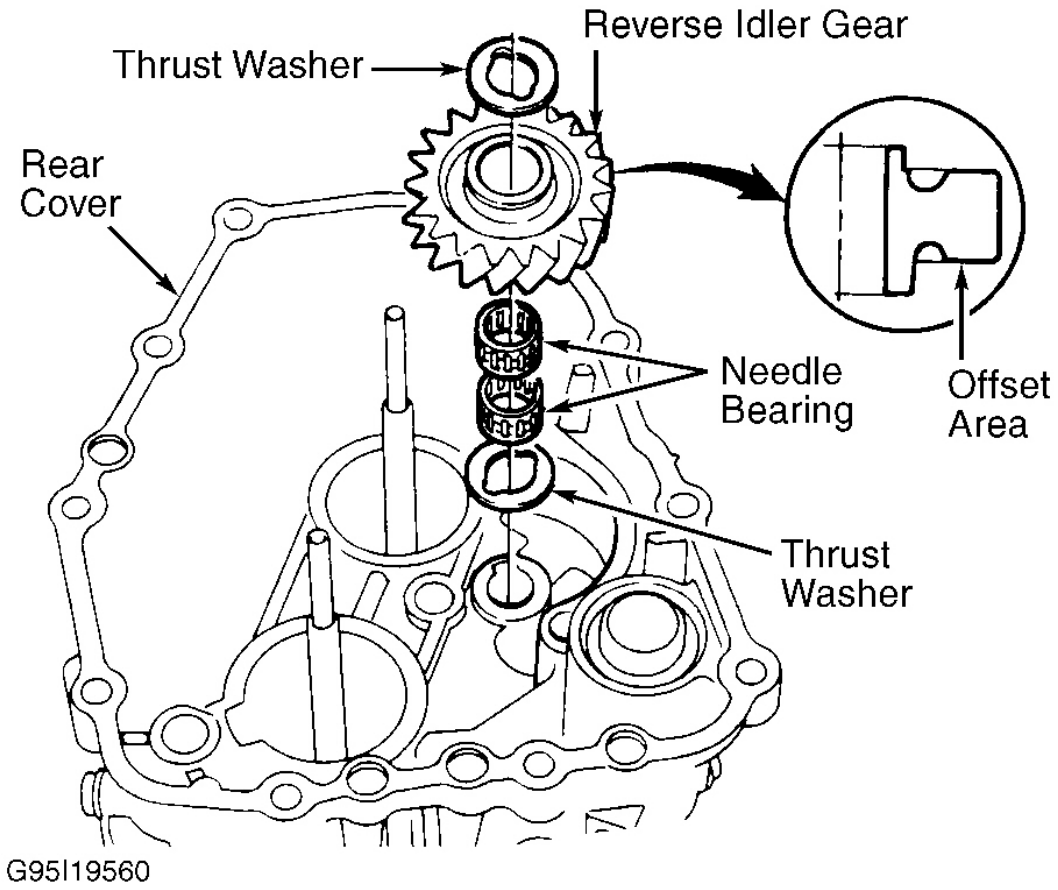


Fig. 27: Installing Reverse Idler Gear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

THROTTLE VALVE BODY

NOTE: Throttle valve body cannot be disassembled. Only linear solenoid operation may be checked. Throttle valve body and linear solenoid must be replaced as an assembly.

1. To check linear solenoid operation, connect wiring harness to linear solenoid. Tighten flange nuts to specification. See **TORQUE SPECIFICATIONS** .
2. Connect positive battery terminal to Red wire and negative battery terminal to White wire of wiring harness. See **Fig. 28** .
3. Ensure throttle valve moves downward in throttle valve body by looking through passage on throttle valve body. If throttle valve moves downward with battery connected, linear solenoid is operating.
4. If throttle valve does not move, disconnect wiring harness at linear solenoid. Connect battery directly to linear solenoid.

5. If throttle valve now moves, replace wiring harness for linear solenoid. If linear solenoid still does not operate, replace linear solenoid and throttle valve body as an assembly.

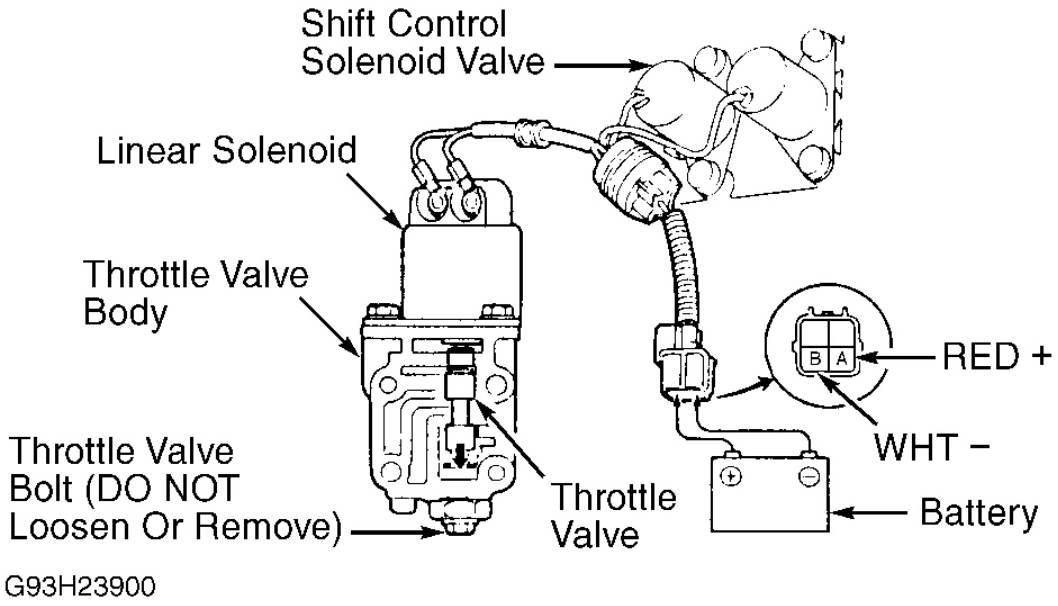


Fig. 28: Checking Linear Solenoid Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

NOTE: Mainshaft 3rd and 4th gears and thrust washer are a press-fit on the mainshaft and must be pressed from mainshaft.

Disassembly

1. Remove snap ring, thrust washer, thrust needle bearing and mainshaft 1st gear from mainshaft. See **Fig. 15** .
2. Remove needle bearing, thrust needle bearing, distance collar, gear collar and 1st-4th clutch from mainshaft. Place mainshaft in press with threaded end (lock nut) end facing upward and support using Adapter (07MAD-PR90100). See **Fig. 29** .
3. Press mainshaft from mainshaft 3rd gear, mainshaft 4th gear and thrust washer. Remove thrust needle bearings and needle bearing from mainshaft 3rd and 4th gears.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect splines for excessive wear. Check bearing surfaces for scoring or wear. Inspect all needle bearings for galling and rough movement.

NOTE: Mainshaft 4th gear clearance must be checked during reassembly.

Reassembly

1. Using press and adapter, press mainshaft 3rd gear on mainshaft. See **Fig. 29** .
2. Install thrust needle bearing and needle bearing on mainshaft. Using press and adapter, press mainshaft 4th gear and thrust washer on mainshaft.

NOTE: Replace thrust washer if washer can be installed on mainshaft by-hand.

3. Remove mainshaft from press. Ensure mainshaft 4th gear rotates freely on mainshaft.
4. Install 1st-4th clutch, gear collar, distance collar, thrust washer and snap ring on mainshaft.

NOTE: DO NOT install thrust needle bearing, needle bearings, mainshaft 1st gear and thrust needle bearing on mainshaft at this time.

5. Remove ball bearing for mainshaft from transaxle housing. Install ball bearing on mainshaft.
6. Install gear collar, thrust washer and 2nd clutch on mainshaft. See **Fig. 14** . DO NOT install thrust needle bearings, needle bearings and mainshaft 2nd gear at this time.
7. Install disc spring, distance collar, mainshaft reverse gear, ball bearing, washer and used lock nut on mainshaft. Ensure disc spring is installed with largest side against 2nd clutch. Tighten lock nut to 22 ft. lbs. (30 N.m).
8. Move 1st-4th clutch against 4th clutch collar. Using feeler gauge, measure mainshaft 4th gear clearance between gear collar and 1st-4th clutch guide. See **Fig. 30** .
9. Measure mainshaft 4th gear clearance in 3 different places. Use average reading as mainshaft 4th gear clearance. Mainshaft 4th gear clearance should be 0-.003" (0-.08 mm).
10. If clearance exceeds .003" (.08 mm), install different thickness thrust washer and recheck clearance. Thrust washer fits between mainshaft 4th gear and the 1st-4th clutch. See **MAINSHAFT 4TH GEAR THRUST WASHER SPECIFICATIONS** table for available thrust washer sizes.
11. Once correct mainshaft 4th gear clearance is obtained, disassemble mainshaft. Lubricate all components with Dexron-II ATF. Wrap splines of mainshaft with tape. Install NEW "O" rings on mainshaft. Reassemble mainshaft. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.

MAINSHAFT 4TH GEAR THRUST WASHER SPECIFICATIONS

Washer No.	Part Number	Thickness: In. (mm)
1	90431-PY4-020	.382 (9.70)
2	90432-PY4-020	.384 (9.75)
3	90433-PY4-020	.386 (9.80)
4	90434-PY4-020	.388 (9.85)
5	90435-PY4-020	.390 (9.90)
6	90436-PY4-020	.392 (9.95)
7	90437-PY4-020	.394 (10.00)

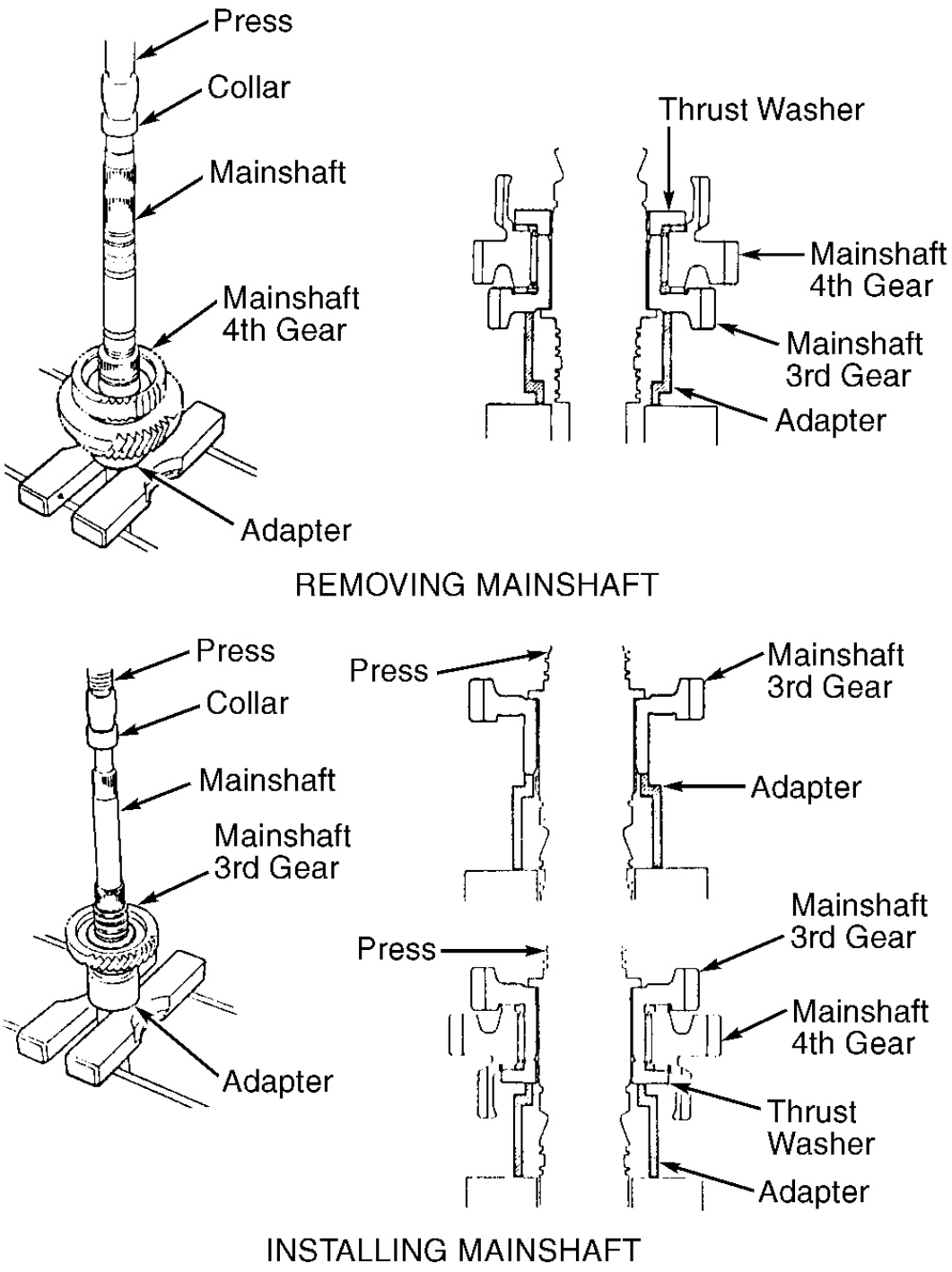


Fig. 29: Removing & Installing Mainshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

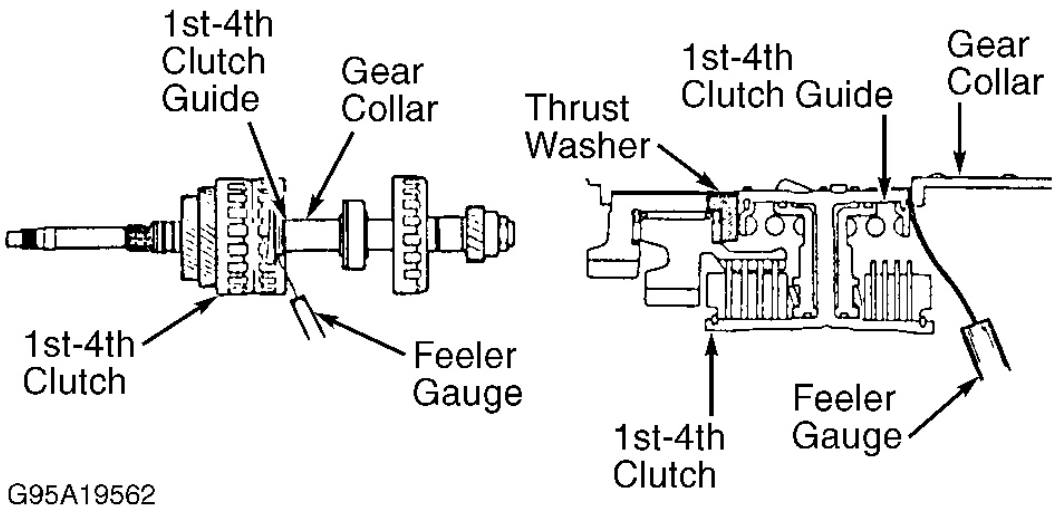


Fig. 30: Measuring Mainshaft 4th Gear Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT

Disassembly

Note location of countershaft components. See **Fig. 15** . Remove components from countershaft.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect splines for excessive wear. Check bearing surfaces for scoring or wear. Inspect all needle bearings for galling and rough movement.

NOTE: Countershaft 2nd gear and 4th gear clearance must be checked during reassembly.

Reassembly

1. Install components on countershaft without installing "O" rings on countershaft. See **Fig. 14** and **Fig. 15** .
2. Install used lock nut on countershaft. Tighten lock nut to 22 ft. lbs. (30 N.m). To check countershaft 4th gear clearance, hold 1st-hold clutch against reverse clutch.
3. Using feeler gauge, measure countershaft 4th gear clearance between 1st-hold clutch and 1st-hold clutch distance collar (selective fit). See **Fig. 31** .
4. Countershaft 4th gear clearance should be 0-.003" (0-.08 mm). If countershaft 4th gear clearance exceeds .003" (.08 mm), install different thickness 1st-hold clutch distance collar and recheck clearance. See **COUNTERSHAFT 1ST-HOLD CLUTCH DISTANCE COLLAR SPECIFICATIONS** table for available distance collar sizes.

COUNTERSHAFT 1ST-HOLD CLUTCH DISTANCE COLLAR SPECIFICATIONS

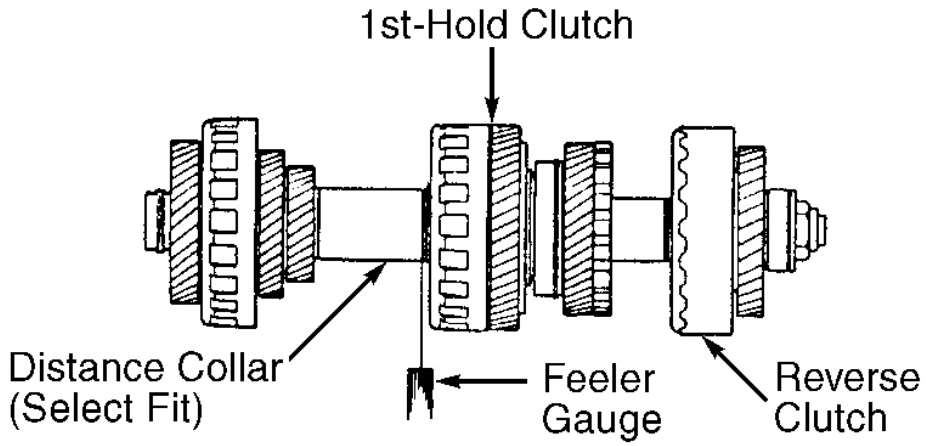
Washer No.	Part Number	Thickness: In. (mm)
1	90451-PY4-000	2.835 (72.00)
2	90452-PY4-000	2.837 (72.05)
3	90453-PY4-000	2.839 (72.10)
4	90454-PY4-000	2.841 (72.15)
5	90455-PY4-000	2.843 (72.20)
6	90456-PY4-000	2.844 (72.25)
7	90457-PY4-000	2.846 (72.30)
8	90458-PY4-000	2.848 (72.35)
9	90459-PY4-000	2.850 (72.40)
10	90460-PY4-000	2.852 (72.45)
11	90461-PY4-000	2.854 (72.50)

5. To check countershaft 2nd gear clearance, install dial indicator on countershaft so stem of dial indicator is resting against countershaft 2nd gear.
6. Measure countershaft 2nd gear clearance while holding countershaft 1st gear toward reverse clutch. Measure countershaft 2nd gear clearance in 3 different places.
7. Use average reading as countershaft 2nd gear clearance. Countershaft 2nd gear clearance should be .002-.005" (.05-.13 mm).
8. If countershaft 2nd gear clearance is not within specification, install different thickness thrust washer between countershaft 2nd gear and parking gear. Recheck countershaft 2nd gear clearance. See **COUNTERSHAFT 2ND GEAR THRUST WASHER SPECIFICATIONS** table for available thrust washer sizes.
9. Once correct gear clearances are obtained, disassemble countershaft. Lubricate all components with Dexron-II ATF. Wrap splines of countershaft with tape. Install NEW "O" rings on countershaft. Reassemble countershaft. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.

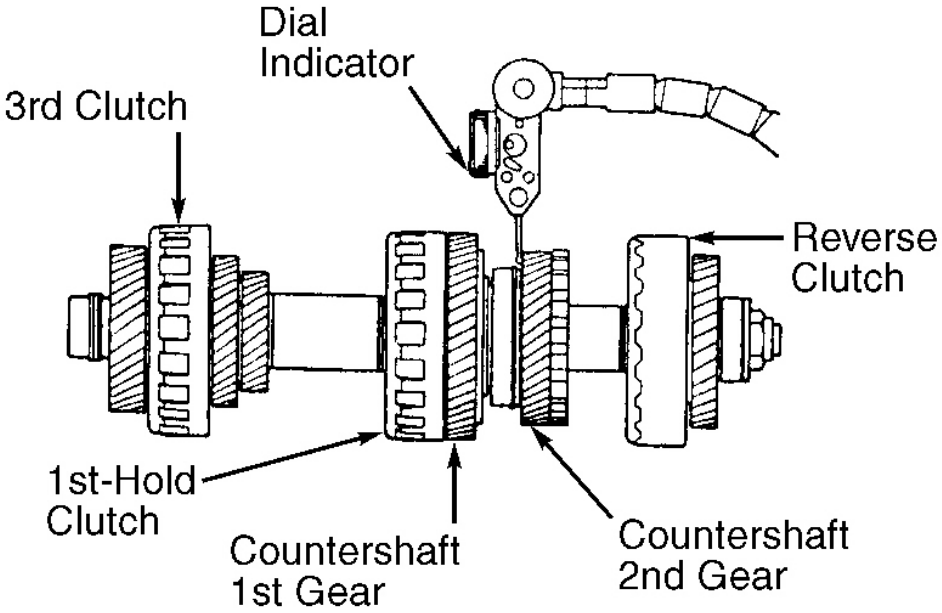
COUNTERSHAFT 2ND GEAR THRUST WASHER SPECIFICATIONS

Washer No.	Part Number	Thickness: In. (mm)
1	90411-PY4-000	.051 (1.30)
2	90412-PY4-000	.053 (1.35)
3	90413-PY4-000	.055 (1.40)
4	90414-PY4-000	.057 (1.45)
5	90415-PY4-000	.059 (1.50)
6	90416-PY4-000	.061 (1.55)
7	90417-PY4-000	.063 (1.60)
8	90418-PY4-000	.065 (1.65)
9	90419-PY4-000	.067 (1.70)
10	90420-PY4-000	.069 (1.75)
11	90421-PY4-000	.071 (1.80)

12	90422-PY4-000	.073 (1.85)
13	90423-PY4-000	.075 (1.90)



CHECKING COUNTERSHAFT 4TH GEAR CLEARANCE



CHECKING COUNTERSHAFT 2ND GEAR CLEARANCE

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Fig. 31: Measuring Countershaft 2nd & 4th Gear Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PARKING GEAR & ONE-WAY CLUTCH

Disassembly

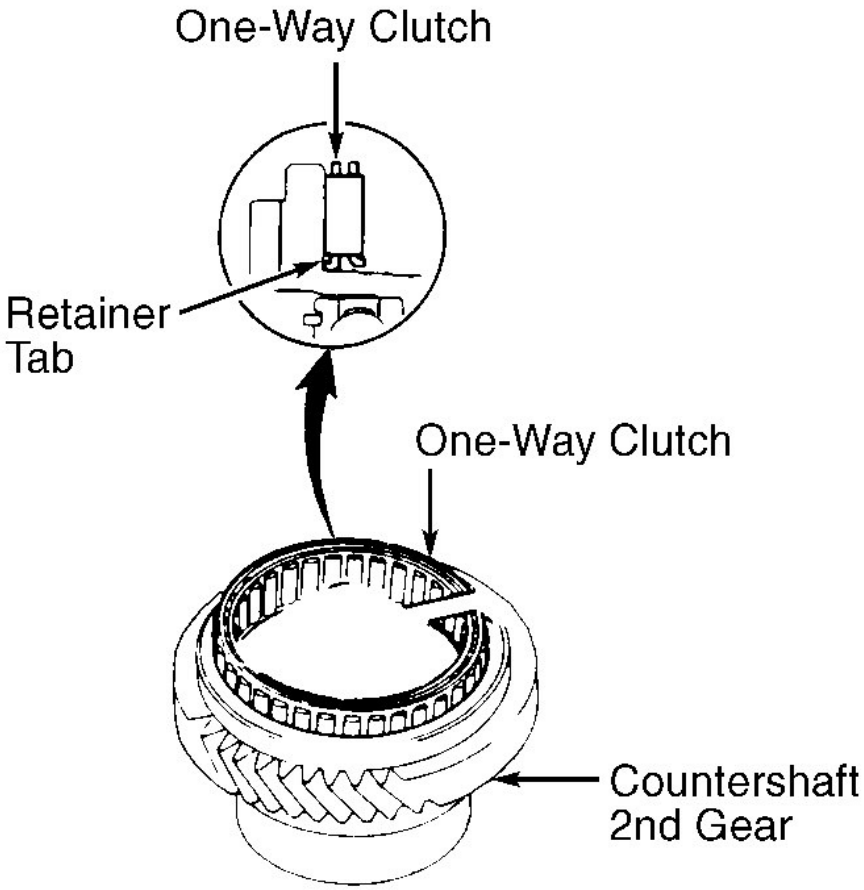
1. Separate countershaft 2nd gear from parking gear by rotating parking gear clockwise while holding countershaft 2nd gear. Remove parking gear, thrust needle bearing, thrust washer and needle bearings. See **Fig. 14** .
2. Note direction of one-way clutch installation in countershaft 2nd gear. Using screwdriver, gently pry one-way clutch from countershaft 2nd gear.

Cleaning & Inspection

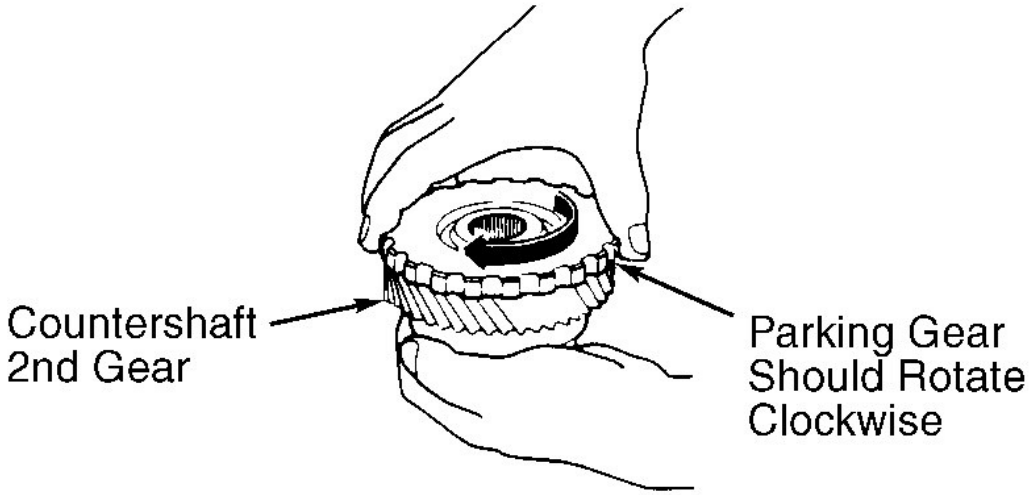
Clean components with solvent and dry with compressed air. Inspect components for damage.

Reassembly

Lubricate all components with Dexron-II ATF. Install one-way clutch with retainer tab toward countershaft 2nd gear. See **Fig. 32** . Install thrust needle bearing, thrust washer, needle bearings and parking gear. Ensure parking gear rotates clockwise when holding countershaft 2nd gear. See **Fig. 32** .



INSTALLING ONE-WAY CLUTCH



CHECKING ONE-WAY CLUTCH OPERATION

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Fig. 32: Installing & Checking Parking Gear One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT 2ND GEAR, BALL BEARING & ONE-WAY CLUTCH HUB

Disassembly

Use press and bearing splitter, press ball bearing and one-way clutch hub from countershaft 2nd gear. See **Fig. 14** .

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage.

Reassembly

Support countershaft 2nd gear in press. Using press, press ball bearing and one-way clutch hub onto countershaft 2nd gear.

COUNTERSHAFT 1ST GEAR & ONE-WAY CLUTCH

Disassembly

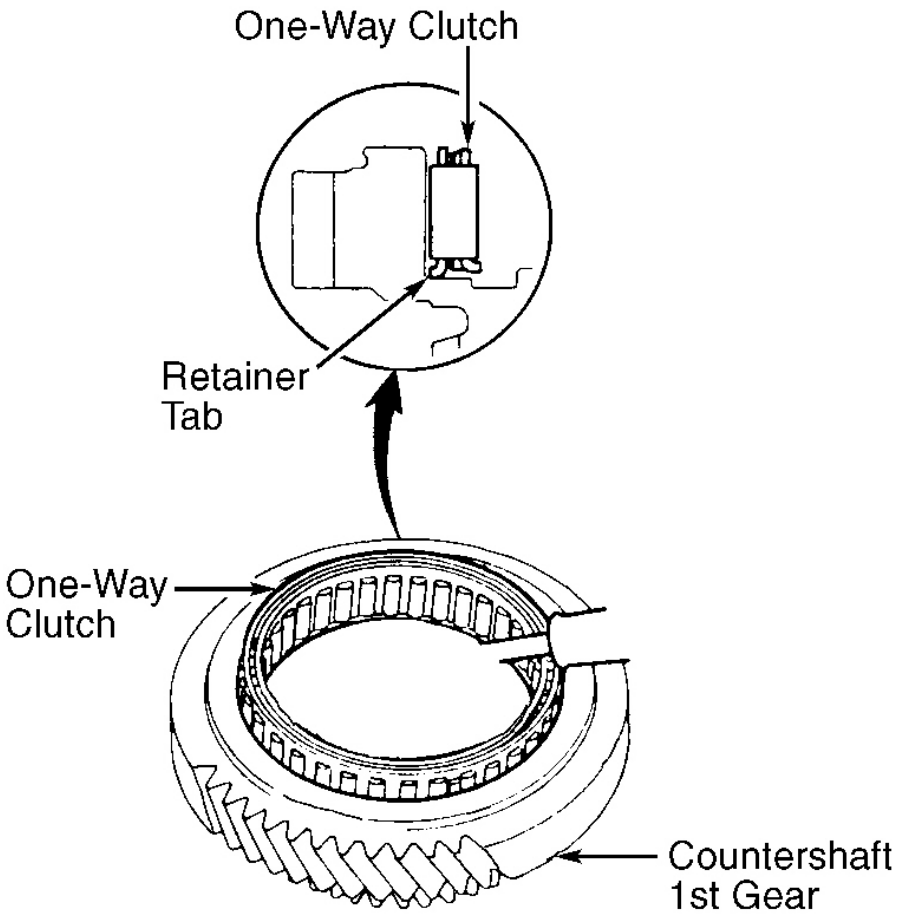
1. Remove set plate from countershaft 1st gear. See **Fig. 15** . Note direction of one-way clutch installation in countershaft 1st gear.
2. Using screwdriver, gently pry one-way clutch from countershaft 1st gear. Remove thrust needle bearing from countershaft 1st gear.

Cleaning & Inspection

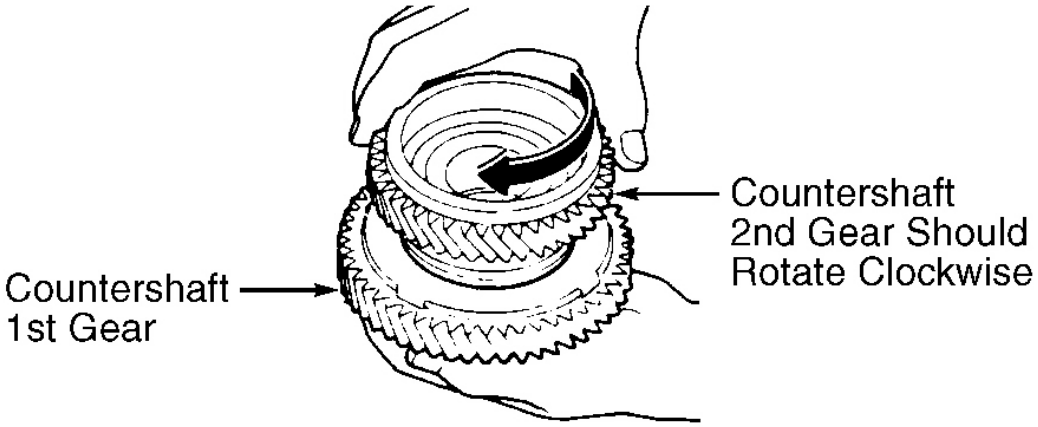
Clean components with solvent and dry with compressed air. Inspect components for damage.

Reassembly

1. Lubricate all components with Dexron-II ATF. Install one-way clutch with retainer tab toward countershaft 1st gear. Install thrust needle bearing and set plate. See **Fig. 33** .
2. Install countershaft 2nd gear into one-way clutch. Ensure countershaft 2nd gear rotates clockwise when holding countershaft 1st gear.



INSTALLING ONE-WAY CLUTCH



CHECKING ONE-WAY CLUTCH OPERATION

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Fig. 33: Installing & Checking Countershaft 1st Gear One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY GEAR & EXTENSION SHAFT

NOTE: If secondary gear, roller bearings, bearing races, thrust washer, washer, transaxle housing or torque converter housing are replaced, secondary gear bearing preload must be checked before installing secondary gear oil seal. See SECONDARY GEAR BEARING PRELOAD under TRANSAXLE REASSEMBLY.

Disassembly

1. Remove set ring and extension shaft from secondary gear. See **Fig. 15** . Using screwdriver, pry oil seal for extension shaft from secondary gear.
2. If removing roller bearing from secondary gear, support secondary gear in press using bearing remover and remove secondary gear from roller bearing.

CAUTION: DO NOT heat torque converter housing or transaxle housing to more than 212°F (100°C) or housing may be damaged.

3. If removing bearing races for secondary gear from torque converter or transaxle housing, use heat gun to heat area around bearing race to 212°F (100°C). Tap bearing race from housing.

CAUTION: When removing bearing race from housing, use care not to damage thrust washer (transaxle housing) or washer (torque converter housing) located below bearing race. See Fig. 15 .

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect splines for excessive wear. Check bearing surfaces for scoring or wear. Inspect secondary gear for damage.

Reassembly

1. To reassemble extension shaft, use hammer and oil seal installer, install NEW oil seal in secondary gear. Using press, press roller bearings onto secondary gear. Ensure roller bearing fully bottoms on secondary gear.

NOTE: Adapter contains 2 different sizes for roller bearing installation. Ensure 45-mm side of adapter is used for bearing on transaxle housing side and 55-mm side is used on torque converter housing side.

2. Install extension shaft in secondary gear. Install NEW set ring wire circlip on end of extension shaft.
3. If installing bearing race for secondary gear in transaxle housing, install thrust washer in transaxle housing. Using hammer and bearing race installer, tap bearing race into transaxle housing.

4. If installing bearing race for secondary gear in torque converter housing, install washer. Using hammer and bearing race installer, tap bearing race into transaxle housing.

NOTE: If secondary gear, roller bearings, bearing races, thrust washer, washer, transaxle housing or torque converter housing are replaced, secondary gear bearing preload must be checked. See SECONDARY GEAR BEARING PRELOAD under TRANSAXLE REASSEMBLY.

CLUTCH ASSEMBLIES

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 34** . On 1st-hold, 2nd, 3rd and 4th clutches, note direction of disc spring installation. Remove disc spring.
2. On all clutches, using spring compressor, compress return spring. Remove circlip. Release and remove spring compressor. Remove spring retainer and return spring.
3. Wrap shop towel around clutch drum. Apply light air pressure to oil passage on clutch drum to remove clutch piston. Remove "O" rings.

Cleaning & Inspection

1. Clean metal components with solvent and dry with compressed air. Ensure check valve on rear of clutch piston is thoroughly cleaned.
2. Inspect components for damage and replace if necessary. Ensure no rough edges exist on "O" ring sealing areas. On 1st and reverse clutches, ensure disc spring is securely staked to clutch piston. On all clutches, inspect for loose check valve on rear of clutch piston.

Reassembly

1. Lubricate all components with Dexron-II ATF. Install NEW "O" rings. Install clutch piston in clutch drum. Slightly rotate clutch piston back and forth during installation to prevent damaging "O" rings.

CAUTION: DO NOT apply excessive force on clutch piston or "O" rings will be damaged.

2. Install return spring and spring retainer in clutch drum. Place circlip on spring retainer. Using spring compressor, compress return spring. Install circlip and remove spring compressor.
3. Install disc spring on 1st-hold, 2nd, 3rd and 4th clutches. Ensure disc spring is installed in proper direction. See **Fig. 34** .

CAUTION: Ensure clutch discs are soaked in Dexron-II ATF for at least 30 minutes before installing.

4. Alternately install clutch plates and clutch discs starting with clutch plate. Install clutch end plate with flat side toward clutch disc. Install snap ring. Momentarily apply air to oil passage on clutch drum and ensure

clutch piston moves and clutch engages.

5. Using dial indicator, measure clutch clearance between clutch end plate and top clutch disc. See **Fig. 35** . Zero dial indicator with clutch end plate lowered and then lift clutch end plate upward against snap ring. Distance measured is clutch clearance.
6. Measure clutch clearance at 3 different locations. Ensure clutch clearance is within specification. See **CLUTCH CLEARANCE SPECIFICATIONS** table.
7. If clutch clearance is not within specification, install different thickness clutch end plate. See **CLUTCH END PLATE SPECIFICATIONS** table.

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

CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
Reverse Clutch	.030-.037 (.75-.95)
1st Clutch	.026-.033 (.65-.85)
1st-Hold Clutch	.028-.035 (.70-.90)
2nd & 3rd Clutches	.024-.031 (.60-.80)
4th Clutch	.020-.028 (.50-.70)

CLUTCH END PLATE SPECIFICATIONS

Plate No.	Part Number	Thickness: In. (mm)
Reverse Clutch		
R1	22451-PY4-003	.161 (4.10)
R2	22452-PY4-003	.165 (4.20)
R3	22453-PY4-003	.169 (4.30)
R4	22454-PY4-003	.173 (4.40)
R5	22455-PY4-003	.177 (4.50)
R6	22456-PY4-003	.181 (4.60)
R7	22457-PY4-003	.185 (4.70)
R8	22458-PY4-003	.189 (4.80)
R9	22459-PY4-003	.193 (4.90)
1st, 2nd, 3rd & 4th Clutches		
1	22551-PY4-003	.083 (2.10)
2	22552-PY4-003	.087 (2.20)
3	22553-PY4-003	.091 (2.30)
4	22554-PY4-003	.094 (2.40)
5	22555-PY4-003	.098 (2.50)
6	22556-PY4-003	.102 (2.60)
7	22557-PY4-003	.106 (2.70)
8	22558-PY4-003	.110 (2.80)
9	22559-PY4-003	.114 (2.90)

1st-Hold Clutch		
L1	22351-PY4-003	.083 (2.10)
L2	22352-PY4-003	.087 (2.20)
L3	22353-PY4-003	.091 (2.30)
L4	22354-PY4-003	.094 (2.40)
L5	22355-PY4-003	.098 (2.50)
L6	22356-PY4-003	.102 (2.60)
L7	22357-PY4-003	.106 (2.70)
L8	22358-PY4-003	.110 (2.80)
L9	22359-PY4-003	.114 (2.90)

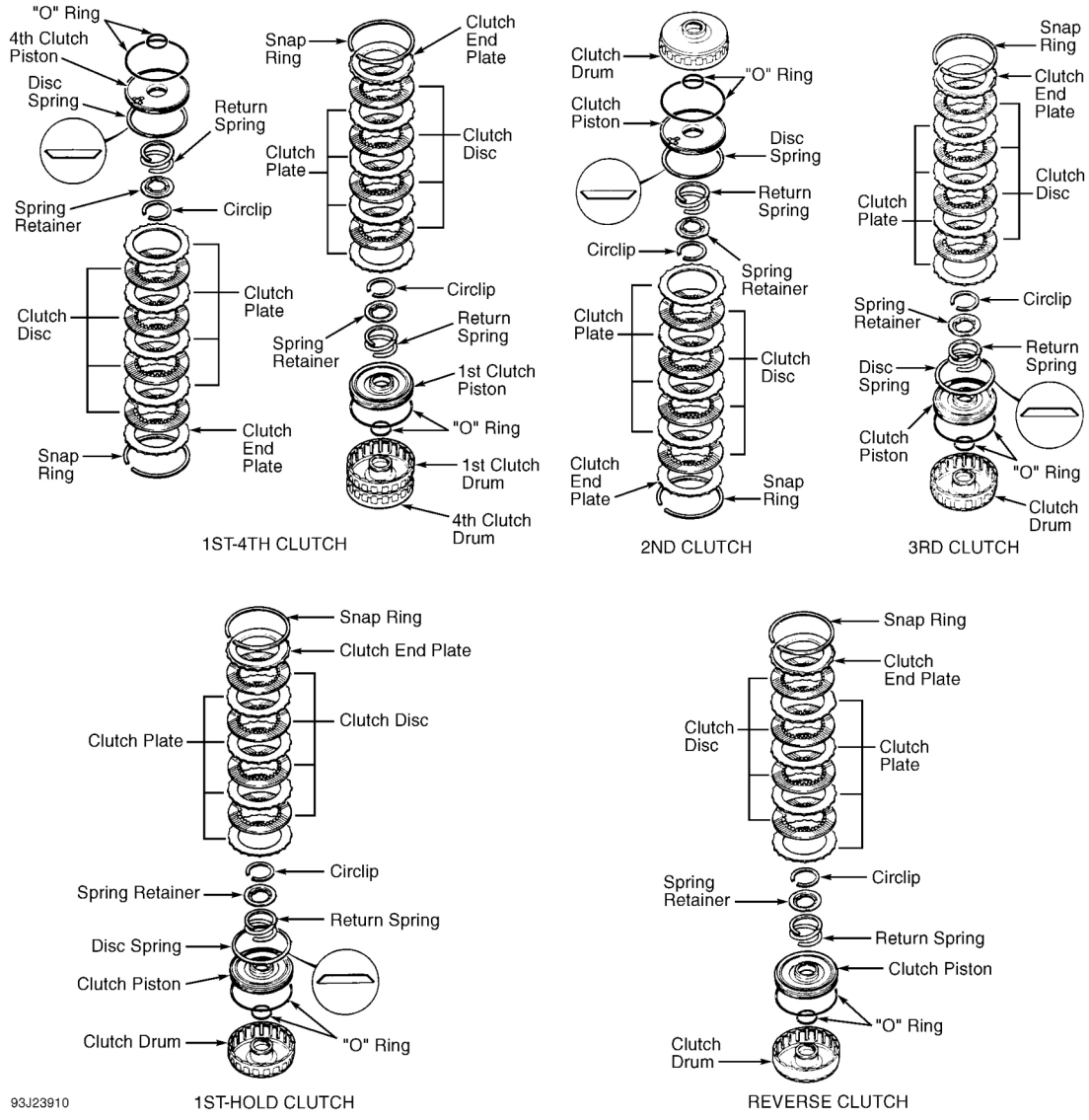


Fig. 34: Exploded View Of Clutch Assemblies

Courtesy of AMERICAN HONDA MOTOR CO., INC.

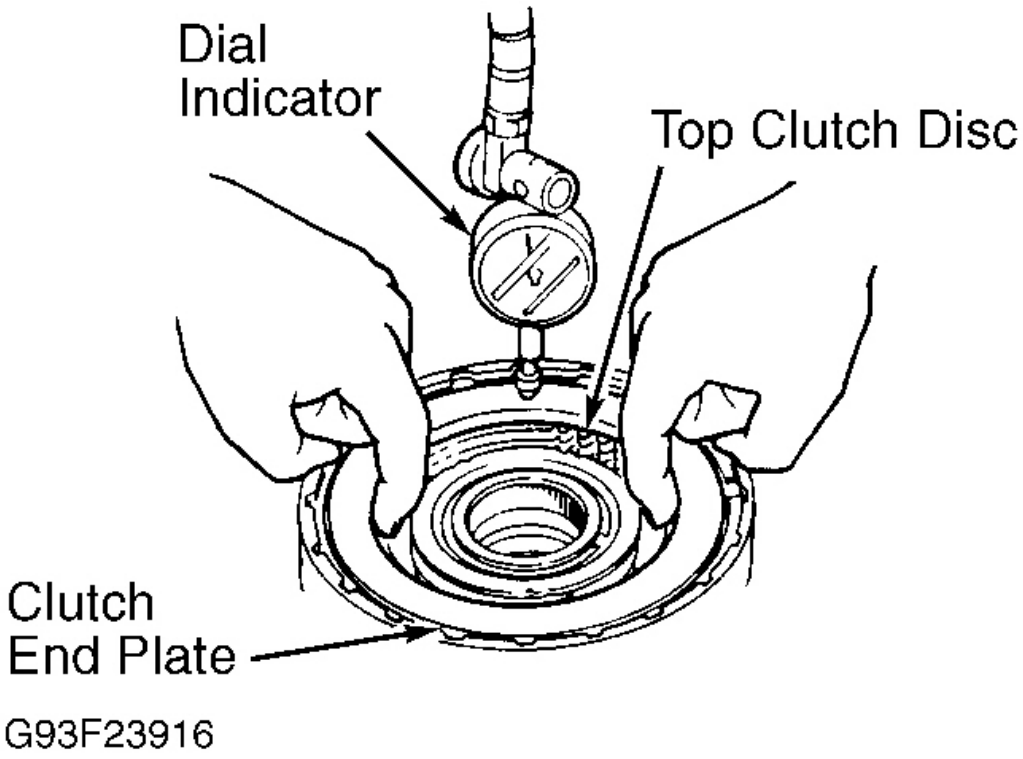


Fig. 35: Measuring Clutch Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING

Disassembly

1. Remove countershaft needle bearing from torque converter housing, using slide hammer puller. Remove oil guide plate. See **Fig. 17** .
2. Using hammer and bearing driver, remove mainshaft ball bearing and oil seal from torque converter housing. Remove snap ring retaining secondary gear oil seal in torque converter housing. Using hammer and drift, tap secondary gear oil seal from torque converter housing.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect torque converter housing for cracks and damage in bearing areas. Replace torque converter housing if damaged.

Reassembly

1. To install mainshaft ball bearing, using hammer and bearing driver, install ball bearing until bearing bottoms in torque converter housing.
2. Using hammer and oil seal installer, install NEW mainshaft oil seal in torque converter housing. Oil seal should be even with torque converter housing surface.
3. To install countershaft needle bearing, install NEW oil guide plate in countershaft bearing bore of torque converter housing. Ensure oil guide plate is installed so tab at center of oil guide plate faces upward (away from torque converter housing surface). See **Fig. 17** . Using hammer and bearing driver, drive countershaft needle bearing into torque converter housing.

NOTE: If secondary gear, roller bearings, bearing races, thrust washer, washer, transaxle housing or torque converter housing are replaced, secondary gear bearing preload must be checked before installing secondary gear oil seal. See SECONDARY GEAR BEARING PRELOAD under TRANSAXLE REASSEMBLY.

4. Install NEW secondary gear oil seal in torque converter housing. Install snap ring in torque converter housing.

TRANSAXLE HOUSING

Disassembly

Expand snap ring and press mainshaft ball bearing from transaxle housing. Using hammer and drift, tap secondary gear oil seal from transaxle housing.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect transaxle housing for cracks and damage in bearing areas. Replace transaxle housing if damaged.

Reassembly

1. Expand snap ring and install mainshaft ball bearing part way into transaxle housing. Release snap ring. Press mainshaft ball bearing into transaxle housing until snap ring engages with groove in ball bearing.
2. Using hammer and oil seal installer, install NEW secondary gear oil seal in transaxle housing.

CAUTION: Ensure mainshaft ball bearing is installed with groove of ball bearing facing inside of transaxle housing so snap ring engages in ball bearing when ball bearing is fully installed. Ensure snap ring fully engages in ball bearing.

NOTE: If secondary gear, roller bearings, bearing races, thrust washer, washer, transaxle housing or torque converter housing are replaced, secondary gear bearing preload must be checked before installing secondary gear oil seal. See

SECONDARY GEAR BEARING PRELOAD under TRANSAXLE REASSEMBLY.

PARKING BRAKE MECHANISM

Disassembly

1. Remove parking pawl shaft sleeve, parking pawl spring and parking pawl. See **Fig. 14** .
2. Remove bolt and bolt lock from detent lever. See **Fig. 15** . Remove control shaft. Remove detent lever and parking brake rod.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage.

Reassembly

To reassemble, reverse disassembly procedure using NEW bolt locks. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Bend over tabs on bolt locks.

TRANSAXLE REASSEMBLY

SECONDARY GEAR BEARING PRELOAD

NOTE: If secondary gear, roller bearings, bearing races, thrust washer, washer, transaxle housing or torque converter housing are replaced, secondary gear bearing preload must be checked.

1. Oil seals must be removed from torque converter housing and transaxle housing before checking secondary gear bearing preload. Remove snap ring retaining secondary gear oil seal in torque converter housing.
2. Using hammer and drift, tap oil seal from torque converter housing and transaxle housing. Remove set ring and extension shaft from secondary gear. See **Fig. 15** .
3. Install sealing bolt in secondary gear. See **Fig. 36** . Tighten sealing bolt to 15 ft. lbs. (20 N.m). Install secondary gear in torque converter housing. DO NOT install mainshaft and countershaft in torque converter housing.
4. Install dowel pins and gasket on torque converter housing. Install transaxle housing on torque converter housing. Install and tighten transaxle housing bolts to specification in sequence. See **Fig. 37** . See **TORQUE SPECIFICATIONS** .
5. Rotate secondary gear in both directions to fully seat roller bearings on secondary gear. Secondary gear bearing preload is determined by measuring starting torque required to rotate secondary gear in both directions.
6. Using INCH-lb. torque wrench, measure starting torque required to rotate secondary gear in both directions. See **Fig. 36** . The starting torque should be 31-40 INCH lbs. (3.5-4.5 N.m) at room temperature.
7. If starting torque is not within specification, install different thickness thrust washer below bearing race in

transaxle housing. See **Fig. 15** . See **THRUST WASHER SPECIFICATIONS** table.

THRUST WASHER SPECIFICATIONS

Washer ID Letter	Part Number	Thickness In. (mm)
A	23941-P5D-000	.061 (1.56)
B	23942-P5D-000	.063 (1.59)
C	23943-P5D-000	.064 (1.62)
D	23944-P5D-000	.065 (1.65)
E	23945-P5D-000	.066 (1.68)
F	23946-P5D-000	.067 (1.71)
G	23947-P5D-000	.069 (1.74)
H	23948-P5D-000	.070 (1.77)
I	23949-P5D-000	.071 (1.80)
J	23950-P5D-000	.072 (1.83)
K	23951-P5D-000	.073 (1.86)
L	23952-P5D-000	.074 (1.89)
M	23953-P5D-000	.076 (1.92)
N	23954-P5D-000	.077 (1.95)
O	23955-P5D-000	.078 (1.98)
P	23956-P5D-000	.079 (2.01)
Q	23957-P5D-000	.080 (2.04)
R	23958-P5D-000	.081 (2.07)
S	23959-P5D-000	.083 (2.10)
T	23960-P5D-000	.084 (2.13)
U	23961-P5D-000	.085 (2.16)
V	23962-P5D-000	.086 (2.19)
W	23963-P5D-000	.087 (2.22)
X	23964-P5D-000	.089 (2.25)
Y	23965-P5D-000	.090 (2.28)
Z	23966-P5D-000	.091 (2.31)
AA	23967-P5D-000	.092 (2.34)
AB	23968-P5D-000	.093 (2.37)
AC	23969-P5D-000	.094 (2.40)
AD	23970-P5D-000	.096 (2.43)

8. If changing thrust washer, remove transaxle housing from torque converter housing. Using heat gun, heat area around bearing race in transaxle housing to 212°F (100°C). Tap bearing race from transaxle housing. Remove thrust washer.

CAUTION: DO NOT heat transaxle housing to more than 212°F (100°C) or housing may be damaged.

9. Install thrust washer in transaxle housing. Using hammer and bearing race installer, tap bearing race into transaxle housing. Recheck secondary gear bearing preload.
10. Once correct secondary gear bearing preload is obtained, remove transaxle housing and secondary gear from torque converter housing. Using hammer and oil seal installer, install NEW secondary gear oil seal in torque converter housing. Install snap ring in torque converter housing.
11. Using hammer and oil seal installer, install NEW secondary gear oil seal in transaxle housing. Install extension shaft in secondary gear. Install NEW set ring on end of extension shaft.

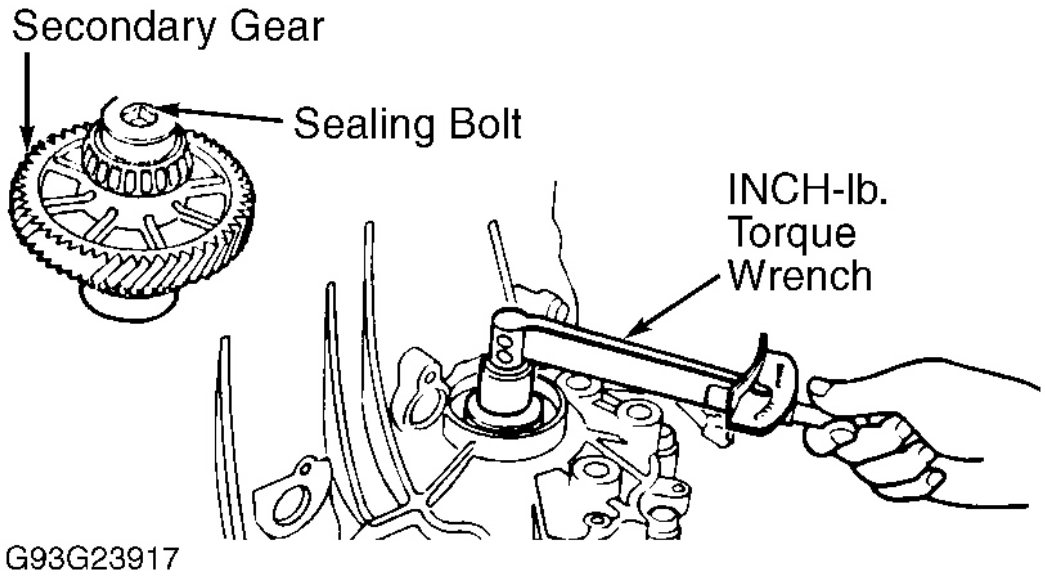


Fig. 36: Installing Sealing Bolt & Checking Starting Torque
Courtesy of AMERICAN HONDA MOTOR CO., INC.

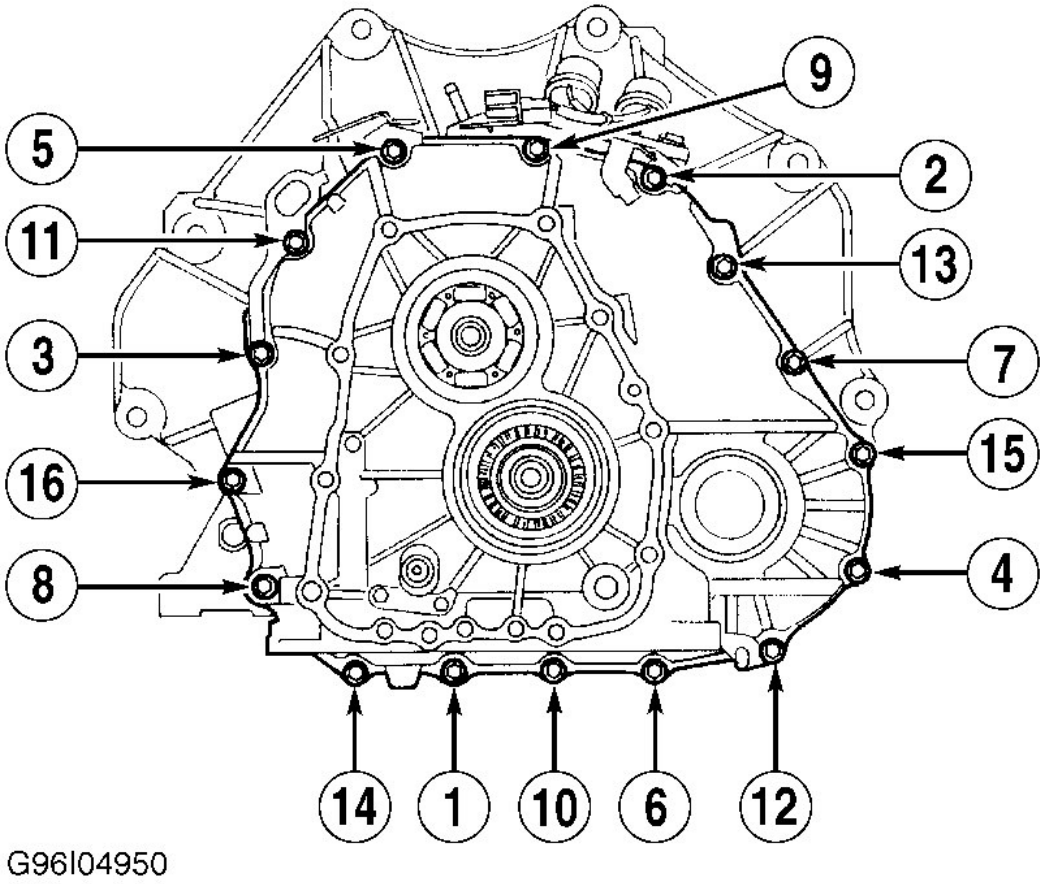


Fig. 37: Transaxle Housing Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE BODIES & INTERNAL COMPONENTS

NOTE: Coat all components with ATF before reassembly.

1. Install separator plate and dowel pins on torque converter housing. See **Fig. 17** . Install oil pump drive gear, oil pump driven gear and oil pump driven gear shaft.

CAUTION: Ensure oil pump driven gear is installed with chamfered and grooved side facing downward (toward separator plate).

2. Install torque converter check valve and spring. Install oil pump body with bolts loosely installed. Ensure oil pump gears rotate smoothly and oil pump driven gear shaft moves freely.
3. Install accumulator body. Install and tighten bolts to specification. See **TORQUE SPECIFICATIONS** .

CAUTION: Ensure accumulator cover is held downward while tightening bolts to prevent damage to bolt threads.

4. Install dowel pins and accumulator cover. Hold accumulator cover downward. Install and tighten bolts to specification. Tighten oil pump body bolts to specification.

CAUTION: Ensure oil pump gears rotate smoothly and oil pump driven gear shaft moves freely once oil pump body is installed. If components do not operate correctly, loosen oil pump body bolts and accumulator body bolts and realign oil pump gears and oil pump driven gear shaft. Failure to align oil pump driven gear shaft may result in seized oil pump gears or shaft.

5. Install NEW filter in oil pump body. Ensure filter is installed in proper direction. See **Fig. 17** .
6. Install dowel pins and separator plate on oil pump body. Install stator shaft, NEW "O" ring and stopper pin.
7. Install regulator valve body. Install and tighten bolts to specification. Install all oil pipes in accumulator body.
8. Install parking brake rod, detent lever and control shaft (if removed). See **Fig. 15** . Install bolt and NEW bolt lock on detent lever. Tighten detent lever bolt to specification. Bend over tabs on bolt lock.
9. Install secondary gear and extension shaft assembly in torque converter housing. Install mainshaft and countershaft as an assembly in torque converter housing. Install dowel pins and NEW gasket on torque converter housing.

CAUTION: Ensure countershaft and mainshaft speed sensors are not installed in transaxle housing when installing transaxle housing on torque converter housing.

10. Install transaxle housing on torque converter housing. Install and tighten transaxle housing bolts to specification in sequence using 3 steps. See **Fig. 37** .

NOTE: Speed sensor washer is used on countershaft and mainshaft speed sensors.

CAUTION: Ensure speed sensor washer is installed on countershaft speed sensor and mainshaft speed sensor during installation, if equipped. See Fig. 15 . The .08" (2.1 mm) thick speed sensor washer fits on mainshaft speed sensor, (if equipped) and .02" (.5 mm) thick speed sensor washer fits on countershaft speed sensor on all models.

11. Install NEW "O" rings on countershaft and mainshaft speed sensors. Install .08" (2.1 mm) thick speed sensor washer on mainshaft speed sensor and .02" (.5 mm) thick speed sensor washer on countershaft speed sensor.
12. Install countershaft and mainshaft speed sensors on transaxle housing. Install and tighten bolts to

specification.

13. Install countershaft 2nd gear with one-way clutch, needle bearings, thrust washer and thrust needle bearing on countershaft. See **Fig. 14** .
14. Install gear collar, thrust needle bearing and needle bearing on mainshaft. Engage mainshaft 2nd gear with teeth on parking gear. Install mainshaft 2nd gear and parking gear as an assembly onto mainshaft and countershaft.
15. Using hammer and Driver (07746-0030100), tap parking gear onto countershaft. Install parking pawl shaft, parking pawl spring, parking pawl and parking pawl shaft sleeve.
16. Install oil pipe in accumulator cover. Install distance collar and NEW disc spring on countershaft. Ensure disc spring is installed with large area toward distance collar. See **Fig. 14** . Install thrust needle bearing and thrust washer on mainshaft.
17. Wrap splines of countershaft and mainshaft with tape. Install NEW "O" rings on countershaft and mainshaft. Remove tape. Install 2nd clutch on mainshaft.
18. Install reverse clutch, gear collar, needle bearing, thrust needle bearing and countershaft reverse gear on countershaft. Install thrust needle bearing, thrust washer, ball bearing, NEW washer and NEW countershaft lock nut.
19. Install NEW disc spring on mainshaft. Ensure disc spring is installed with large area toward 2nd clutch. See **Fig. 14** . Install distance collar, mainshaft reverse gear, ball bearing, NEW washer and NEW mainshaft lock nut.
20. Install Mainshaft Holder (07924-PJ4010A) on mainshaft to secure mainshaft. See **Fig. 13** . Engage parking pawl with parking gear. Tighten mainshaft and countershaft lock nuts to specification. Stake lock nuts against the shaft.

NOTE: Ensure mainshaft and countershaft lock nuts are securely staked against the shaft.

21. Remove mainshaft holder. Install dowel pins, oil pipes, NEW "O" rings and NEW gasket for rear cover on transaxle housing.
22. Install rear cover and engage reverse gears with reverse idler gear while rotating mainshaft. Install snap ring in groove of ball bearing on end of countershaft.

NOTE: Ensure snap ring fully engages groove on ball bearing. It may be necessary to raise countershaft upward so snap ring will fully engage with ball bearing.

23. Install and tighten rear cover bolts to specification. Apply thread sealant on threads of sealing bolt for rear cover. Install sealing bolt on rear cover and tighten to specification.
24. Install dowel pins for lower valve body assembly in transaxle housing. Position electrical connector on lower valve body assembly through opening on transaxle housing.
25. Install lower valve body assembly. Ensure manual valve engages with detent lever. Install and tighten lower valve body assembly-to-transaxle housing bolts to specification.
26. Install fluid strainer using NEW "O" ring. Tighten bolts to specification. Install connector stopper on electrical connector. See **Fig. 12** . Tighten connector stopper bolt to specification.
27. Install dowel pins, NEW gasket and oil pan. Install and tighten bolts to specification. Install NEW seal

washer on drain plug. Tighten drain plug to specification.

28. Using NEW seal washers, install cooler pipes and joint bolts. Tighten joint bolts to specification. Reconnect electrical connector to transaxle sub-harness.

NOTE: If transaxle failure existed, flush oil cooler. See OIL COOLER FLUSHING under ON-VEHICLE SERVICE.

DIFFERENTIAL ASSEMBLY

OVERHAUL

NOTE: Pre-disassembly inspection should be performed before disassembly of differential assembly. This will indicate if proper thrust shims and thrust washers are used.

Pre-Disassembly Inspection

1. Ring gear backlash, total bearing preload and gear tooth contact pattern should be checked before disassembling differential assembly. Record measurements for reassembly reference.
2. To check ring gear backlash, mount differential assembly in soft-jawed vice. Remove oil filler plug and seal washer from differential case cover. Remove oil seal from differential case cover. Align inspection hole on differential carrier with oil filler plug hole.
3. Install Wrench (07HAA-SF10100) in differential assembly. See **Fig. 38** . Mount dial indicator on differential case.
4. Measure ring gear backlash on differential carrier. Ring gear backlash should be .002-.006" (.06-.14 mm).
5. If ring gear backlash is within specification, proper thickness thrust shims are installed behind bearing races for differential carrier bearings. Provided no components are changed, shim is okay. If ring gear backlash is not within specification, different thickness thrust shim must be installed during reassembly.
6. To measure total bearing preload, install a dial-type INCH-lb. torque wrench on end of drive pinion. Rotate drive pinion and note total bearing preload. Total bearing preload, with used bearings, should be 21-26 INCH-lbs. (2.4-3.0 N.m).

NOTE: If total bearing preload is not within specification, different thickness shim must be installed behind bearing race for differential carrier bearings.

7. To check gear tooth contact pattern, remove differential case cover bolts in a crisscross pattern. Remove differential case cover. See **Fig. 39** . Clean and paint both sides of ring gear teeth with Prussian Blue.
8. Install differential case cover. Install and tighten bolts in a crisscross pattern to 33 ft.lbs. (45 N.m). Install Wrench (07HAA-SF10100) in differential assembly. See **Fig. 38** .
9. Rotate ring gear both directions while applying resistance on drive pinion. Remove differential case cover and inspect ring gear tooth contact pattern. Correct gear tooth contact should be centered on the ring gear. See **GEAR TOOTH CONTACT PATTERNS** article in GENERAL INFORMATION.

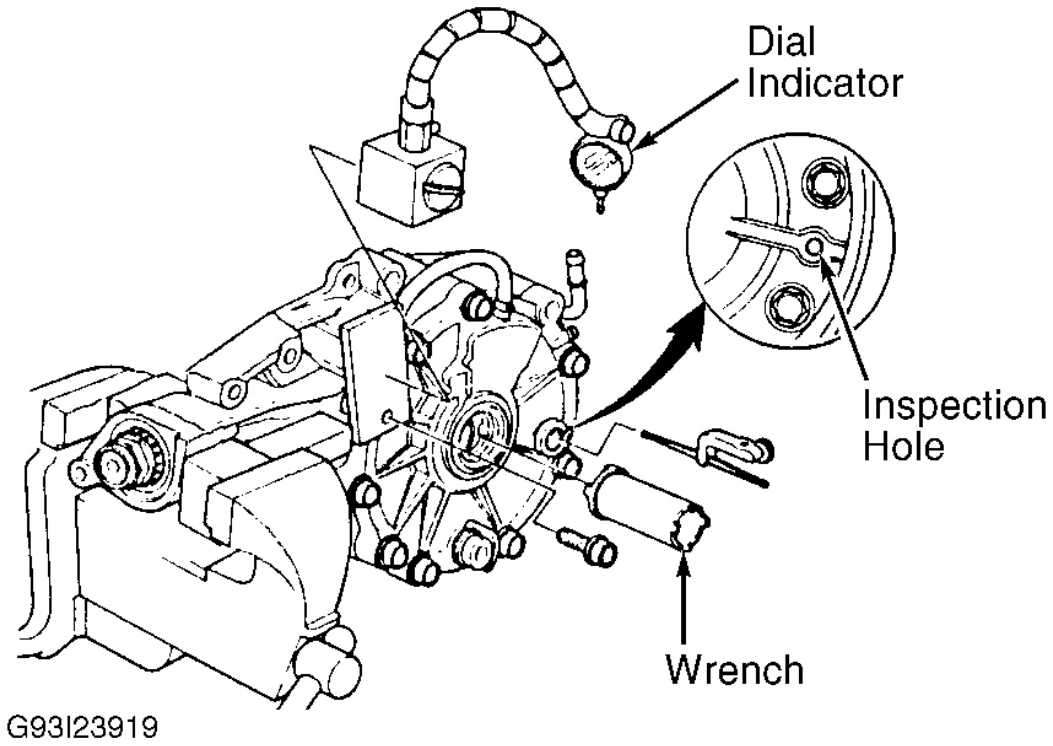


Fig. 38: Rotating Ring Gear & Checking Ring Gear Backlash
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Disassembly

1. Remove bolts, speed sensor assembly and "O" ring. Remove differential case cover bolts in a crisscross pattern. Remove differential case cover. Remove breather plate from differential case cover (if necessary). See **Fig. 39** .
2. Remove differential carrier assembly from differential case. Remove oil cooler nuts, oil cooler, "O" rings and oil guide pipe.
3. Using hammer and chisel, cut lock nut tab and pry away from drive pinion. Insert 32-mm hex bit socket into gear end of drive pinion.
4. Remove lock nut, thrust washer and drive pinion hub. Remove oil seal and thrust washer. Using soft-faced hammer, tap drive pinion from pinion bearing on front of drive pinion. Remove drive pinion, pinion spacer and thrust washers.
5. Inspect pinion bearings. If replacing pinion bearing on drive pinion, use press and bearing remover to press bearing from drive pinion. Remove drive pinion thrust shim from drive pinion.

NOTE: If pinion bearings are replaced, bearing races must also be replaced.

6. To remove pinion bearing races from differential case, pry bearing race from differential case. Bearing

race may also be removed by heating differential case to 212°F (100°C) and removing bearing race. DO NOT heat differential case to more than 212°F (100°C). Remove thrust washers, located below bearing races, from differential case.

7. Inspect differential carrier bearings. If replacing differential carrier bearings, use press and bearing remover to press bearing from differential carrier.

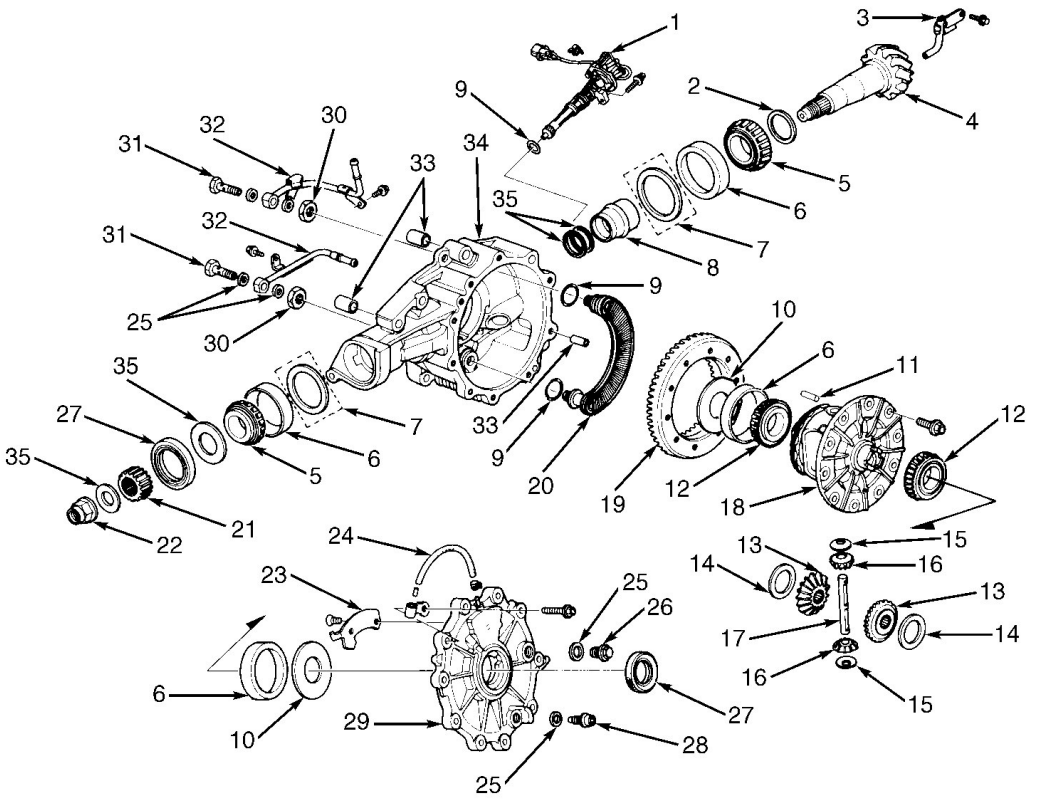
NOTE: If differential carrier bearings are replaced, bearing races must also be replaced.

8. To remove differential carrier bearing races, pry bearing race from differential case or differential case cover. Bearing race may also be removed by heating differential case or differential case cover to 212°F (100°C) and removing bearing race. DO NOT heat differential case or differential case cover to more than 212°F (100°C). Remove thrust shim(s), located below bearing races, from differential case or differential case cover.

NOTE: Thrust shim must be replaced if bearing race was removed from differential case or differential case cover.

NOTE: Pinion gear backlash must be checked to determine if differential carrier assembly must be replaced. Differential carrier bearings must be removed from differential carrier to measure pinion gear backlash.

9. Mount differential carrier in "V" blocks with axle shaft and intermediate shaft inserted into side gears. See **Fig. 40** . Using dial indicator, check pinion gear backlash. Pinion gear backlash should be .002-.012" (.05-.30 mm).
10. Replace differential carrier assembly if pinion gear backlash is not within specification. Remove ring gear (if necessary).



1. Speed Sensor Assembly
2. Drive Pinion Thrust Shim
3. Oil Guide Pipe
4. Drive Pinion
5. Pinion Bearing
6. Bearing Race
7. Thrust Washer (A/T Only)
8. Pinion Spacer
9. "O" Ring
10. Thrust Shim
11. Pin
12. Differential Carrier Bearing
13. Side Gear
14. Side Gear Thrust Washer
15. Pinion Gear Thrust Washer
16. Pinion Gear
17. Pinion Shaft
18. Differential Carrier
19. Ring Gear
20. Oil Cooler
21. Drive Pinion Hub
22. Lock Nut
23. Breather Plate
24. Breather Tube
25. Seal Washer
26. Oil Filler Plug
27. Oil Seal
28. Drain Plug
29. Differential Case Cover
30. Oil Cooler Nut
31. Coolant Pipe Joint Bolt
32. Coolant Pipe
33. Dowel Pin
34. Differential Case
35. Thrust Washer

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Fig. 39: Exploded View Of Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

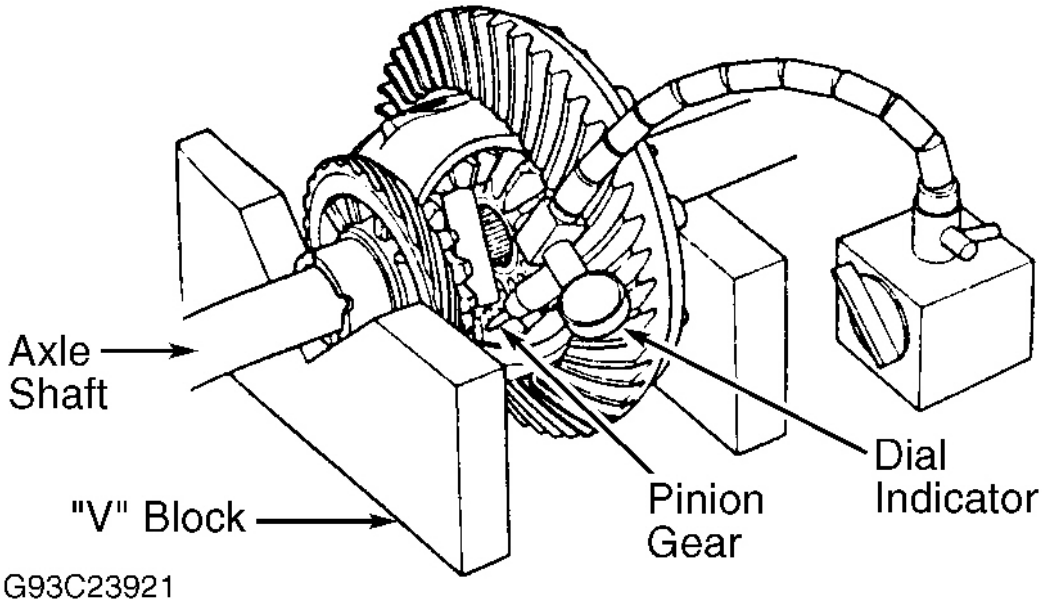

Fig. 40: Checking Pinion Gear Backlash
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components if damaged.

Reassembly

1. Install ring gear. Install and tighten ring gear bolts to specification in a crisscross pattern. See **TORQUE SPECIFICATIONS** . Using press, install differential carrier bearings on differential carrier (if removed).
2. If installing bearing races for the drive pinion in differential case, install thrust washer in differential case. Thrust washer is located behind bearing race in the differential case. See **Fig. 39** .
3. Install bearing races. See **Fig. 41** . Install drive pinion bearing races in differential case starting with outer bearing race (lock nut side) and then inner bearing race.

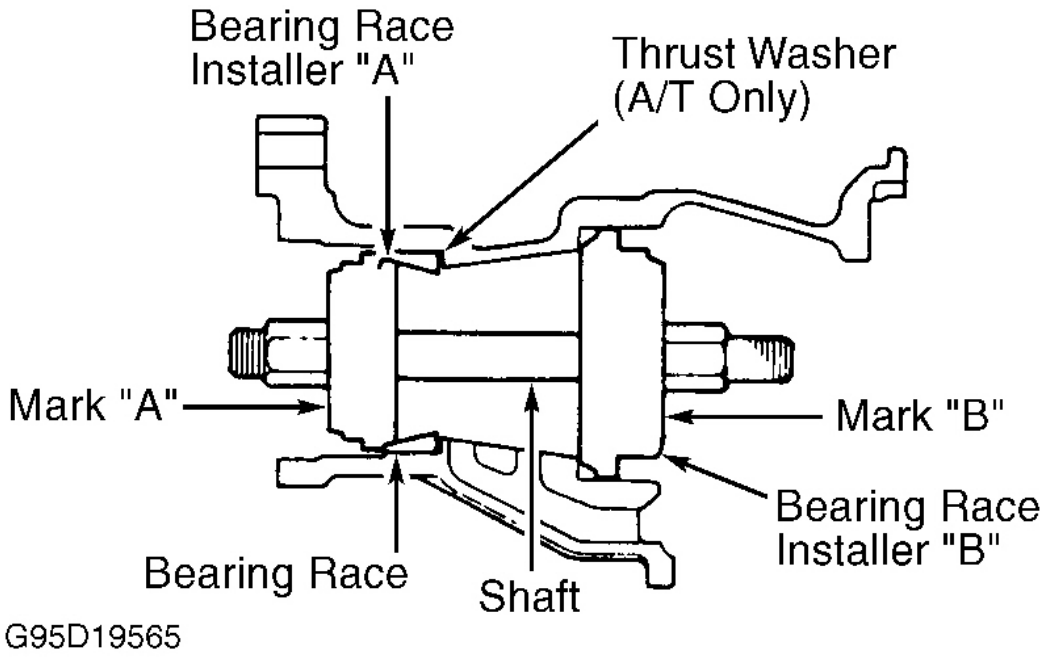

Fig. 41: Installing Bearing Race For Drive Pinion (Outer Bearing Shown; Inner Bearing Race Is Similar)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. If installing bearing races for differential carrier bearings, install NEW thrust shim(s) in differential case or differential case cover. Ensure thrust shim is the same thickness as thrust shim that was removed. Using hammer and bearing race installer, drive bearing race into differential case and differential case cover.
5. If original drive pinion and ring gear are being installed, install original thickness drive pinion thrust shim on drive pinion (if removed). If NEW drive pinion and ring gear are being installed, proper thickness drive pinion thrust shim must be determined to obtain correct drive pinion height. See **DRIVE PINION HEIGHT** under ADJUSTMENTS.
6. If installing pinion bearing on drive pinion, use press, old pinion spacer and bearing installer to press pinion bearing onto drive pinion. Lubricate all pinion bearings and threads on drive pinion with oil.
7. Install drive pinion in differential case. DO NOT install pinion spacer and thrust washers at this time. Install pinion bearing on drive pinion.
8. Using hammer and bearing installer, drive outer pinion bearing onto drive pinion while supporting drive pinion. Install thrust washer, drive pinion hub, thrust washer and lock nut.
9. Tighten lock nut to 15 ft. lbs. (20 N.m). DO NOT overtighten lock nut or pinion bearings may be damaged, as pinion spacer and thrust washers are not installed.
10. Clean drive pinion and ring teeth and coat with Prussian Blue. Lubricate differential carrier bearings with oil.

11. Install differential carrier into differential case. Install differential case cover. Install and tighten differential case cover bolts in a crisscross pattern to 33 ft.lbs. (45 N.m).
12. Install Wrench (07HAA-SF10100) in differential assembly. See **Fig. 38** . Rotate ring gear on full revolution in both directions while applying resistance on drive pinion.
13. Remove differential cover and inspect ring gear tooth contact pattern. Correct gear tooth contact should be centered on the ring gear. See **GEAR TOOTH CONTACT PATTERNS** article in GENERAL INFORMATION.
14. If gear tooth contact pattern is incorrect, drive pinion height must be changed to correct gear tooth contact pattern. Change drive pinion thrust shim located below bearing on drive pinion to adjust drive pinion height.
15. If gear tooth contact pattern is correct, remove components from drive pinion for installation of pinion spacer. Install NEW pinion spacer and thrust washers on drive pinion.
16. Install outer pinion bearing on drive pinion. Using hammer and bearing installer, drive outer pinion bearing onto drive pinion while supporting drive pinion.
17. Install thrust washer, drive pinion hub, thrust washer and NEW lock nut on drive pinion. Check pinion bearing preload. See **PINION BEARING PRELOAD** under ADJUSTMENTS.
18. Once correct pinion bearing preload is obtained, stake lock nut against drive pinion. Clean drive pinion and ring gear teeth and coat with Prussian Blue. Lubricate differential carrier bearings with oil.
19. Install differential carrier into differential case. Install differential case cover. Install and tighten differential case cover bolts in a crisscross pattern to 33 ft.lbs. (45 N.m).
20. Check TOTAL BEARING PRELOAD. See **TOTAL BEARING PRELOAD** under ADJUSTMENTS. Once correct total bearing preload is correct, check ring gear backlash. See **RING GEAR BACKLASH** under ADJUSTMENTS.
21. Once correct ring gear backlash is obtained, remove differential case cover and differential assembly. Check gear tooth contact pattern. Correct gear tooth contact should be centered on the ring gear. See **GEAR TOOTH CONTACT PATTERNS** article in GENERAL INFORMATION.
22. Install breather plate on differential case cover (if removed). Install breather plate bolts and tighten to specification. Stake heads of breather plate bolts against differential case cover.
23. Install oil guide pipe, oil cooler and NEW "O" rings. Tighten oil guide pipe bolt and oil cooler nuts to specification. Using NEW seal washers, install coolant pipes and coolant pipe joint bolts. Tighten coolant pipe joint bolts to specification.
24. Install differential assembly. Apply Liquid Gasket (08718-0001) on sealing surface of differential case cover. Install differential case cover. Install and tighten bolts to specification in a crisscross pattern.
25. Using hammer and oil seal installer, install NEW oil seal in differential case cover. Using hammer and oil seal installer, install NEW oil seal for drive pinion.
26. Oil seal must be installed so seal is below surface of differential case .61-.63" (15.5-16.0 mm). See **Fig. 42** . Using NEW "O" ring, install speed sensor assembly. Install and tighten bolt to specification.

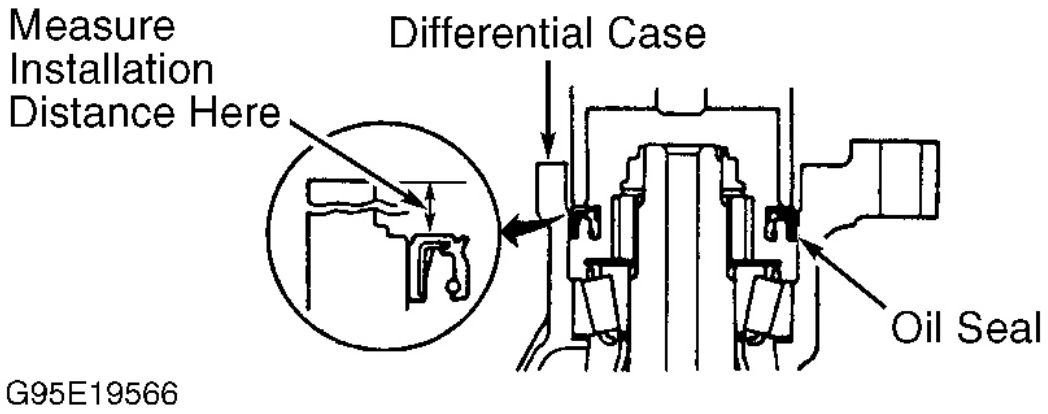

Fig. 42: Measuring Drive Pinion Oil Seal Installation Distance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ADJUSTMENTS

DRIVE PINION HEIGHT

NOTE: If drive pinion and ring gear are replaced, drive pinion height must be set. Drive pinion height may also need to be set if incorrect gear tooth contact pattern exists.

1. Drive pinion height is controlled by thickness of drive pinion thrust shim located between pinion bearing and drive pinion shaft. When installing used drive pinion and ring gear and gear tooth contact pattern is incorrect, see **GEAR TOOTH CONTACT PATTERNS** article in GENERAL INFORMATION to determine if thrust shim should be thicker or thinner.
2. When installing NEW drive pinion and ring gear, calculate drive pinion thrust shim thickness by noting etched mark located on side of drive pinion. See **Fig. 43** .
3. Etched mark is a positive (+) or negative (-) mark along with a numerical digit indicating drive pinion size. Etched mark is positive or negative in thousandths of a millimeter.

NOTE: Etched mark is indicated in thousandths of a millimeter. If etched mark is -20, this is a negative .02 mm.

4. If etched mark on old drive pinion is positive (+), add it to the old drive pinion thrust shim thickness. If etched mark on old drive pinion is negative (-), subtract it from the old drive pinion thrust shim thickness.
5. If etched mark on NEW drive pinion is positive (+), subtract it from drive pinion thrust shim thickness obtained in step 4). If etched mark on NEW drive pinion is negative (-), add it to drive pinion thrust shim thickness obtained in step 4).
6. For example, if old drive pinion thrust shim thickness is 2.00 mm and old drive pinion etched mark is +20

(.02 mm) and NEW drive pinion etched mark is -10 (.01 mm), replacement drive pinion thrust shim thickness should be 2.03 mm.

7. Select drive pinion thrust shim that is closest to but not more than the determined drive pinion thrust shim thickness. Drive pinion thrust shims are available in thicknesses of .064-.089" (1.64-2.27 mm) in .001" (.03 mm) increments. Part numbers are 41410-PY4-000 to 41431-PY4-000 in numerical sequence.

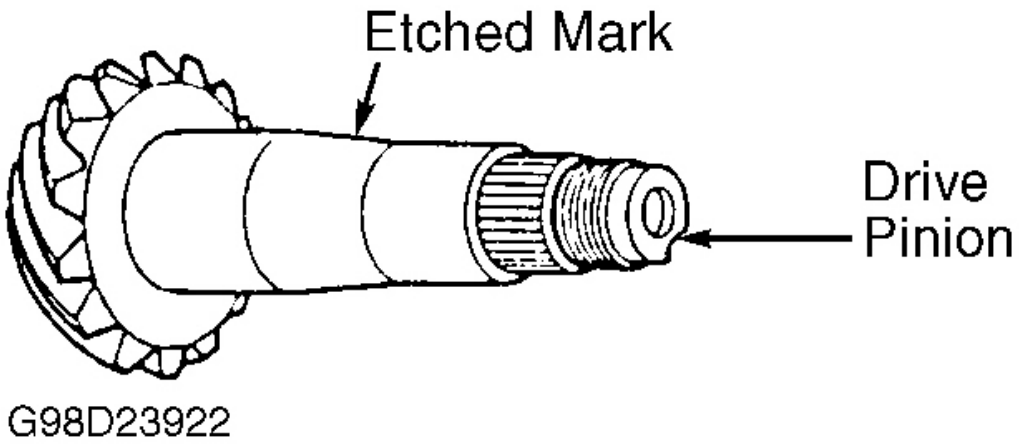

Fig. 43: Identifying Drive Pinion Etched Mark Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PINION BEARING PRELOAD

1. Tighten drive pinion lock nut to 162 ft. lbs. (220 N.m). Rotate drive pinion several revolutions to seat bearings.
2. Install a dial-type INCH-lb. torque wrench on end of drive pinion. Rotate drive pinion and note pinion bearing preload. Pinion bearing preload should be within specification. See **PINION BEARING PRELOAD SPECIFICATIONS** table.

PINION BEARING PRELOAD SPECIFICATIONS

Application	INCH Lbs. (N.m)
New Bearings	16-22 (1.8-2.5)
Used Bearings	13-17 (1.4-1.9)

3. If pinion bearing preload exceeds specification, replace pinion spacer. If pinion bearing preload is less than specified, slightly tighten lock nut until correct pinion bearing preload is obtained.

CAUTION: DO NOT tighten lock nut to more than 236 ft. lbs. (320 N.m). If pinion

bearing preload is still less than specified with lock nut tightened to 236 ft. lbs. (320 N.m), replace pinion spacer.

TOTAL BEARING PRELOAD

1. With differential fully assembled, without oil seals, install Wrench (07HAA-SF10100) in differential assembly. See **Fig. 38** .
2. Rotate ring gear one full revolution in both directions while applying resistance on drive pinion. Remove wrench from differential assembly.
3. Install a dial-type INCH-lb. torque wrench on end of drive pinion. Rotate drive pinion several times and note total bearing preload. Total bearing preload should be within specification. See **TOTAL BEARING PRELOAD SPECIFICATIONS** table.

TOTAL BEARING PRELOAD SPECIFICATIONS

Application	INCH Lbs. (N.m)
All New Bearings	25-33 (2.9-3.8)
New Differential Carrier Bearings Only	
Outer Bearing (Ring Gear Side Only)	22-28 (2.5-3.2)
Inner Bearing (Drive Pinion Side Only)	25-32 (2.8-3.6)
Used Bearings	21-26 (2.4-3.0)

4. If total bearing preload is not within specification, increase preload by increasing thickness of thrust shim located below bearing races in differential case and differential case cover. Decreasing shim thickness will decrease total bearing preload.

NOTE: Ensure thrust shim thickness is increased the same amount on both thrust shims.

RING GEAR BACKLASH

1. Mount differential assembly in soft-jawed vice. Remove oil filler plug and seal washer from differential case cover. Remove oil seal from differential case cover. Align inspection hole on differential carrier with oil filler plug hole.

2. Install Wrench (07HAA-SF10100) in differential assembly. See **Fig. 38** . Mount dial indicator on differential case cover.
3. Measure ring gear backlash on differential carrier. Ring gear backlash should be .002-.006" (.06-.14 mm).
4. If ring gear backlash is within specification, proper thickness thrust shims are installed behind bearing races for differential carrier bearings, provided no components are changed.
5. If ring gear backlash exceeds specification, decrease thickness of thrust shim located behind bearing race in differential case. Increase thickness of thrust shim in differential case cover the same amount.
6. If ring gear backlash is less than specified, increase thickness of thrust shim located behind bearing race in differential case. Decrease thickness of thrust shim in differential case cover the same amount.
7. Thrust shims are available in thicknesses of .0461-.0720" (1.170-1.830 mm) in .001" (.03 mm) increments. Part numbers are 41461-PY4-000 to 41483-PY4-000. One thrust shim is available at .0260" (.660 mm) and part number is 41460-PY4-000.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Accumulator Body Bolt	
6-mm Bolt	(1)
8-mm Bolt	13 (18)
Ball Retaining Bolt	13 (18)
Coolant Pipe Joint Bolt	21 (29)
Countershaft Lock Nut	96 (130)
Differential Assembly Mounting Bolt	47 (64)
Differential Assembly Oil Filler Plug	33 (45)
Differential Case Cover Bolt	33 (45)
Drive Pinion Lock Nut	(2)
Joint Bolt	29 (39)
Lower Plate Bolt	29 (39)
Mainshaft Lock Nut	96 (130)
Oil Cooler Nut	55 (75)
Oil Pump Body Bolt	
6-mm Bolt	(1)
8-mm Bolt	13 (18)
Pressure Tap Plug	13 (18)
Rear Cover Bolt	20 (27)
Rear Cover Sealing Bolt	59 (80)
Regulator Valve Body Bolt	
6-mm Bolt	(1)
8-mm Bolt	13 (18)
Reverse Idler Gear Shaft Holder Bolt	20 (27)

Ring Gear Bolt	88 (119)
Sealing Bolt	58 (79)
Steering Gear Bolt	44 (60)
Transaxle Drain Plug	36 (49)
Transaxle Housing Bolt (3)	25 (34)
	INCH Lbs. (N.m)
Accumulator Cover Bolt	106 (12.0)
Air Bleeder Bolt	89 (10.0)
Breather Plate Bolt	106 (12.0)
Cable Cover Bolt	106 (12.0)
Cable Holder Bolt	106 (12.0)
Connector Stopper Bolt	106 (12.0)
Control Lever Bolt	124 (14.0)
Countershaft Speed Sensor Bolt	106 (12.0)
Detent Lever Bolt	124 (14.0)
Detent Spring Plate Bolt	106 (12.0)
Flange Nut	53 (6.0)
Fluid Strainer Bolt	106 (12.0)
Lock-Up Control Solenoid Valve Bolt	106 (12.0)
Lower Valve Body Assembly Bolt	106 (12.0)
Lower Valve Body Assembly-To-Transaxle Housing Bolt	106 (12.0)
Mainshaft Speed Sensor Bolt	106 (12.0)
Oil Guide Pipe Bolt	106 (12.0)
Oil Pan Bolt	106 (12.0)
Oil Pass Body Bolt	106 (12.0)
Regulator Valve Body Lock Bolt	106 (12.0)
Secondary Valve Body Bolt	106 (12.0)
Shift Control Solenoid Valve Bolt	106 (12.0)
Speed Sensor Assembly Bolt	106 (12.0)
Throttle Valve Body Bolt	106 (12.0)
Wiring Harness Clamp Bolt	106 (12.0)
1st & 2nd Accumulator Cover Bolt	106 (12.0)

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

(2) Pinion bearing preload is adjusted when tightening lock nut. See **PINION BEARING PRELOAD** under ADJUSTMENTS for adjusting procedure.

(3) Tighten bolts to specification in sequence. See **Fig. 37** .

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	In. (mm)
Clutch Clearance	
Reverse Clutch	.030-.037 (.75-.95)
1st Clutch	.026-.033 (.65-.85)
1st-Hold Clutch	.028-.035 (.70-.90)
2nd & 3rd Clutches	.024-.031 (.60-.80)
4th Clutch	.020-.028 (.50-.70)
Differential Ring Gear Backlash	.002-.006 (.06-.14)
Gear Clearances	
Countershaft 2nd Gear Clearance	.003-.006 (.07-.15)
Countershaft 4th Gear Clearance	0-.003 (0-.08)
Mainshaft 4th Gear Clearance	0-.003 (0-.08)
Oil Pump Side Clearances	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0028-.0049 (.070-.125)
Oil Pump Thrust Clearance	
Standard	.001-.002 (.03-.05)
Wear Limit	.0028 (.070)
Pinion Gear Backlash	.002-.012 (.05-.30)
	INCH Lb. (N.m)
Secondary Gear Bearing Preload (1)	31-40 (3.5-4.5)
(1) This is the starting torque required to rotate secondary gear in both directions.	

