

AUTOMATIC TRANSMISSIONS

MP1A Overhaul

APPLICATION

TRANSAXLE APPLICATION

Application	Transaxle Model
Prelude	MP1A

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.

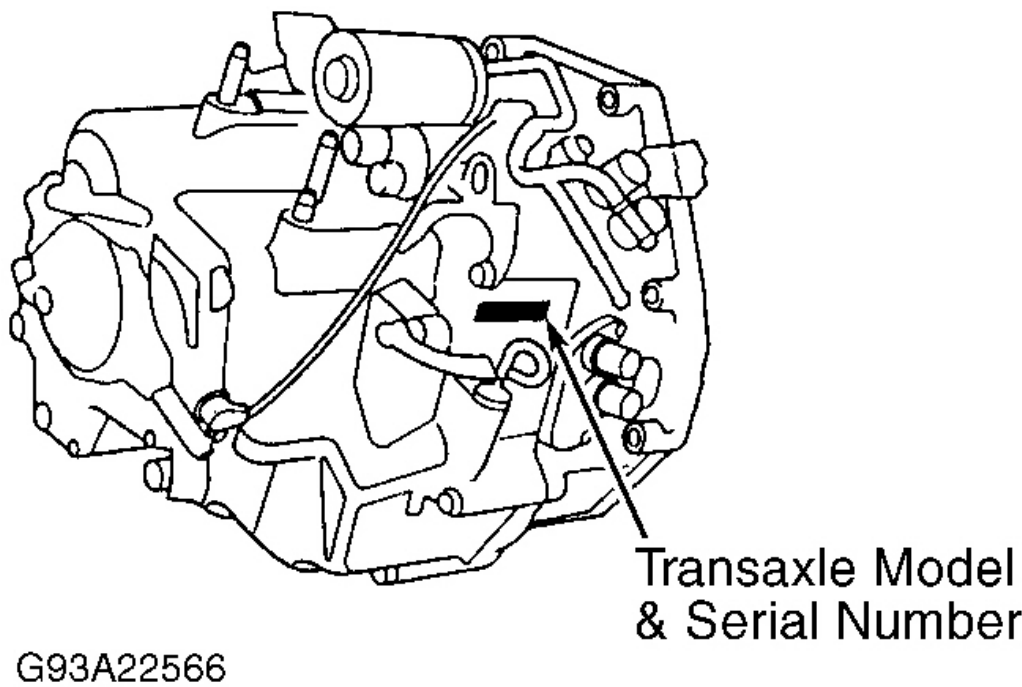


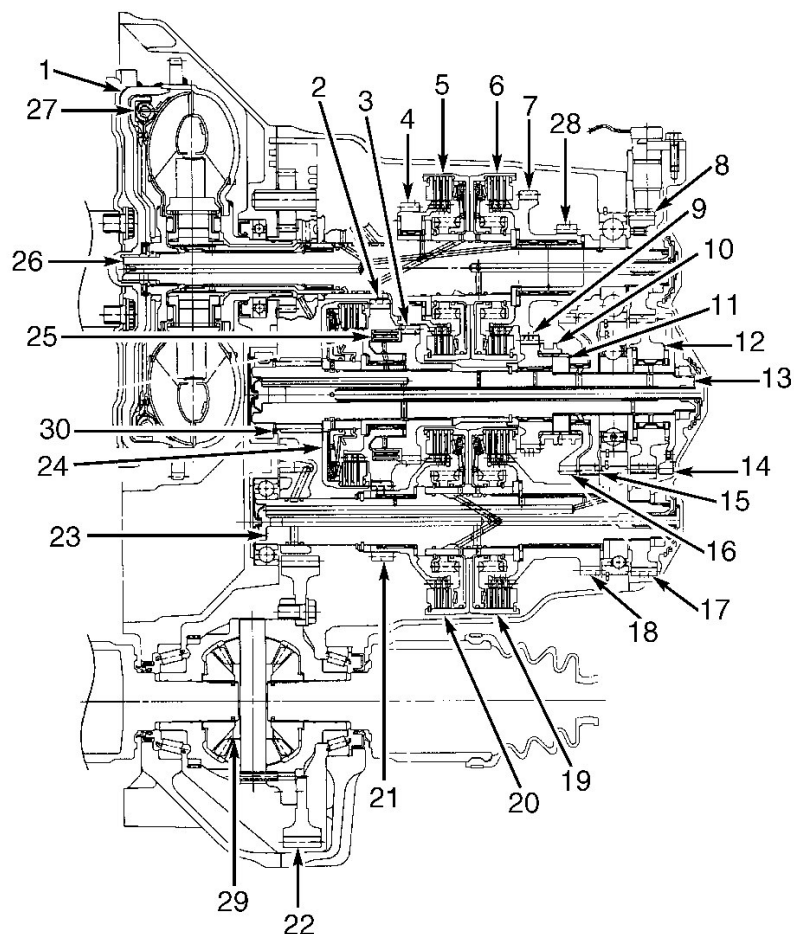
Fig. 1: Identifying Transaxle Model & Serial Number Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DESCRIPTION

Automatic transaxle is an electronically controlled transaxle with 4 forward speeds and one reverse speed.

Transaxle consists of clutches, mainshaft, countershaft, secondary shaft, shift control solenoid valves, lock-up control solenoid valves and lock-up torque converter. See **Fig. 2** .

Valve body assemblies consists of main valve body, secondary valve body, servo body, regulator valve body and throttle valve body. Transaxle shifting and torque converter lock-up are controlled by the Transmission Control Module (TCM).



- | | |
|-----------------------------|--------------------------------|
| 1. Torque Converter | 16. Countershaft Reverse Gear |
| 2. Countershaft 1st Gear | 17. Secondary Shaft Idler Gear |
| 3. Countershaft 3rd Gear | 18. Secondary Shaft 2nd Gear |
| 4. Mainshaft 3rd Gear | 19. 2nd Clutch |
| 5. 3rd Clutch | 20. 1st Clutch |
| 6. 4th Clutch | 21. Secondary Shaft 1st Gear |
| 7. Mainshaft 4th Gear | 22. Ring Gear |
| 8. Mainshaft Idler Gear | 23. Secondary Shaft |
| 9. Countershaft 4th Gear | 24. 1st-Hold Clutch |
| 10. Reverse Selector | 25. One-Way Clutch |
| 11. Selector Hub | 26. Mainshaft |
| 12. Countershaft Idler Gear | 27. Lock-Up Piston |
| 13. Countershaft | 28. Mainshaft Reverse Gear |
| 14. Parking Gear | 29. Differential |
| 15. Countershaft 2nd Gear | 30. Final Drive Gear |

96J30980

Fig. 2: Identifying Transaxle Components

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OPERATION

SHIFT LEVER

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 the A/T gear position switch, mounted near shift lever. The A/T gear position switch delivers an input signal to the TCM to indicate shift lever position. The TCM uses input signal and operates shift control solenoid valves to control transaxle shifting.

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

- "P" (Park) Front wheels locked 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 selector engages with countershaft reverse gear and 4th clutch is applied. 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 then 4th gears. Transaxle will downshift through 3rd, 2nd and 1st gears until vehicle stops. When in 2nd, 3rd or 4th gear in "D4" position, TCM sends a signal to operate torque converter lock-up.
- "D" (Drive) Transaxle starts off in 1st gear and upshifts automatically to 2nd and then 3rd gear. Transaxle will downshift through 2nd to 1st gear on deceleration. When in 3rd gear in "D" position, TCM sends a signal to operate torque converter lock-up.
- "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" position, 2nd, 3rd and 4th gears, or "D" position 3rd gear, torque converter lock-up exists and transaxle mainshaft rotates at the same speed as engine crankshaft. Under certain conditions, torque converter lock-up clutch is applied during deceleration when in 3rd and 4th gears. Torque converter lock-up is controlled by the TCM. The TCM receives various input signals and operates lock-up control solenoid valves. Operating lock-up control solenoid valves controls modulator pressure.

The TCM contains a self-diagnostic system, which will store a fault code if a failure or problem exists in the transaxle electronic control system. Fault code can be retrieved to identify transaxle problem area. For information on electronic transaxle components, see **MP1A 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 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 **MP1A 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 **MP1A ELECTRONIC CONTROLS** article.

LUBRICATION & ADJUSTMENTS

See appropriate SERVICING article.

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate AXLE SHAFTS article in DRIVELINE/AXLES.

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 (560-840 kPa) air pressure to oil cooler flusher. Turn oil cooler flusher water valve on so water will flow 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 the opposite direction.
5. Repeat steps 2) and 3). Turn water valve off and 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 for 2 minutes or until no moisture is visible from drain hose.

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

6. Turn air off. Disconnect oil cooler flusher. Reconnect inlet line on oil cooler. Once transaxle is installed, attach drain hose on return line and place in oil container. Ensure transaxle is in "P" position. Fill transaxle with ATF.
7. Start engine and operate for 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.

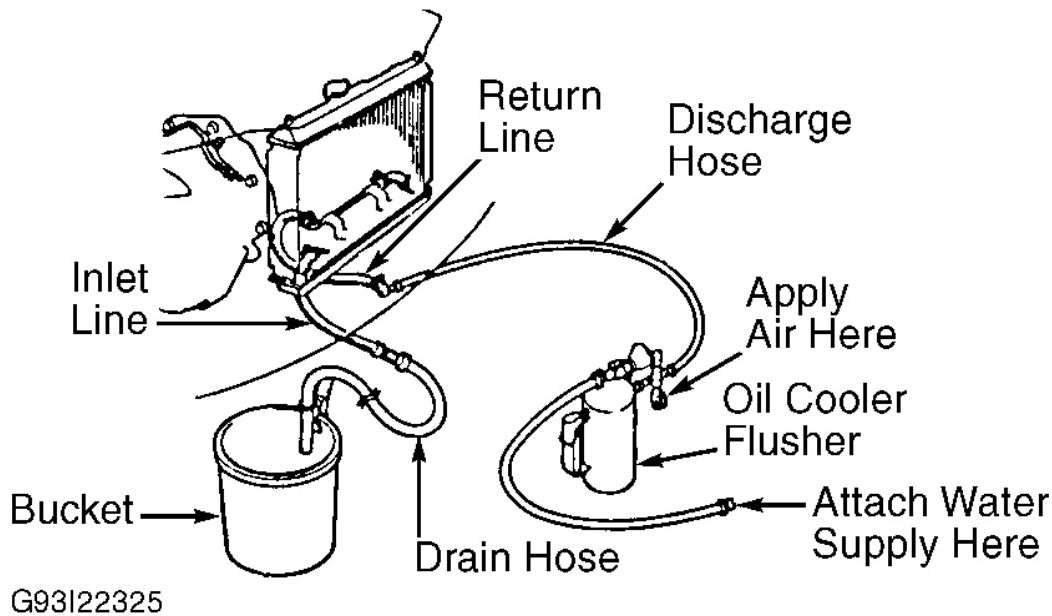


Fig. 3: Installing Oil Cooler Flusher

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, perform several tests on transaxle. See **TESTING**.

SYMPTOM DIAGNOSIS

Excessive Drag

- Binding Oil Pump

Excessive Idle Vibration

- Defective Torque Converter
- Incorrect Idle RPM

Excessive Vibration (RPM Related)

- Torque Converter Not Fully Seated In Oil Pump

Flares On 1-2 Upshift

- Clutch Pressure Control Valve Stuck
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Long

Flares On 2-3 Upshift

- Clutch Pressure Control Valve Stuck
- Defective Seal Rings Or Guide
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Long
- 2nd Orifice Control Valve Stuck

Flares On 3-4 Upshift

- Clutch Pressure Control Valve Stuck
- Defective Seal Rings Or Guide
- Orifice Control Valve Stuck
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Long

Gear Whine That Changes With RPM & Shifts

- Damaged Mainshaft Or Countershaft
- Damaged Secondary Shaft Idler Gears
- Defective 1st Clutch
- Defective 3rd Gears

Gear Whine That Changes With Speed

- Defective Differential Gears
- Shift Fork Bent

Harsh Downshift At Closed Throttle

- Clutch Pressure Control Valve Stuck
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short

Harsh Kickdown Shifts

- Clutch Pressure Control Valve Stuck
- Throttle Valve "B" Stuck

- Throttle Valve (T.V.) Cable Adjusted Too Short
- 3rd Kickdown Valve Stuck
- 3-2 Kickdown Valve Stuck
- 4th Exhaust Valve Stuck

Harsh Shift When Manually Shifting To "1"

- Defective 1st-Hold Accumulator

Harsh Upshifts & Downshifts

- Clutch Pressure Control Valve Stuck
- Improper ATF Type
- Incorrect Clutch Clearance
- Orifice Control Valve Stuck
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short
- 2nd Orifice Control Valve Stuck
- 3rd Kickdown Valve Stuck
- 3-2 Kickdown Valve Stuck

Harsh 1-2 Upshift

- Clutch Pressure Control Valve Stuck
- Defective 2nd Clutch
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short

Harsh 2-1 Kickdown Shift

- Defective One-Way Clutch

Harsh 2-3 Upshift

- Clutch Pressure Control Valve Stuck
- Defective 3rd Clutch
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short
- 2nd Orifice Control Valve Stuck

Harsh 3-4 Upshift

- Clutch Pressure Control Valve Stuck

- Defective 4th Clutch
- Orifice Control Valve Stuck
- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short

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

- Improperly Adjusted Throttle Valve (T.V.) Cable
- Lock-Up Control Valve Stuck
- Lock-Up Shift Valve Stuck
- Lock-Up Timing Valve Stuck
- Throttle Valve "B" Stuck
- Torque Converter Check Valve Stuck

No Engine Braking In "1"

- Defective 1st-Hold Clutch

Noise From Transaxle In All Gears

- Defective Oil Pump
- Defective Torque Converter

Noise From Transaxle When Wheels Rolling

- Damaged Reverse Gears
- Defective Differential Gears
- Reverse Selector Hub Installed Upside Down

Popping Noise When Taking Off In "R"

- Damaged Reverse Gears
- Shift Fork Bent
- Worn Reverse Selector

Ratcheting Noise When Shifting To "R"

- Damaged Reverse Gears

- Defective Oil Pump
- Pressure Regulator Stuck
- Shift Fork Bent
- Worn Reverse Selector

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

- Damaged Reverse Gears
- Damaged 4th Gears
- Shift Fork Bent
- Worn Reverse Selector

Shifts Erratically

- Improperly Installed Valves Or Springs
- Modulator Valve Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short
- 3-2 Kickdown Valve Stuck

Slips In All Gears

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

Slips In Reverse

- Defective 4th Clutch Or 4th Accumulator
- Feedpipe "O" Ring Damaged
- Servo Valve Stuck

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 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 Seal Rings Or Guide
- Defective 3rd Clutch Or 3rd Accumulator
- 3-4 Shift Valve Stuck

Slips In 4th Gear

- Clutch Pressure Control Valve Stuck
- Defective 4th Clutch Or 4th Accumulator
- Feedpipe "O" Ring Damaged

Upshifts Late

- Modulator Valve Stuck

Vehicle Locks In "R"

- Parking Brake Lever Installed Upside Down
- Shift Fork Retaining Bolt Not Installed

Vehicle Moves In All Gears Except "R"

- Defective Or Improperly Adjusted Shift Cable
- Defective Or Worn Reverse Gears
- Defective 4th Clutch
- Servo Control Valve Stuck
- Servo Valve Stuck
- Shift Fork Bent
- Worn Reverse Selector

Vehicle Moves In All Gears Except "2"

- Defective Seal Rings Or Guide
- Defective 2nd Clutch Or 2nd Accumulator

Vehicle Moves In "N"

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

Vehicle Moves In "R" & "2" Only

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

Vehicle Will Not Move

- Defective Oil Pump
- Defective Or Improperly 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 1st Gear

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

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

- Defective Or Improperly Adjusted Shift Cable
- Defective 4th Accumulator
- 3-4 Shift Valve Stuck
- 4th Exhaust Valve Stuck

Will Not Upshift (Stays In Low Gear)

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

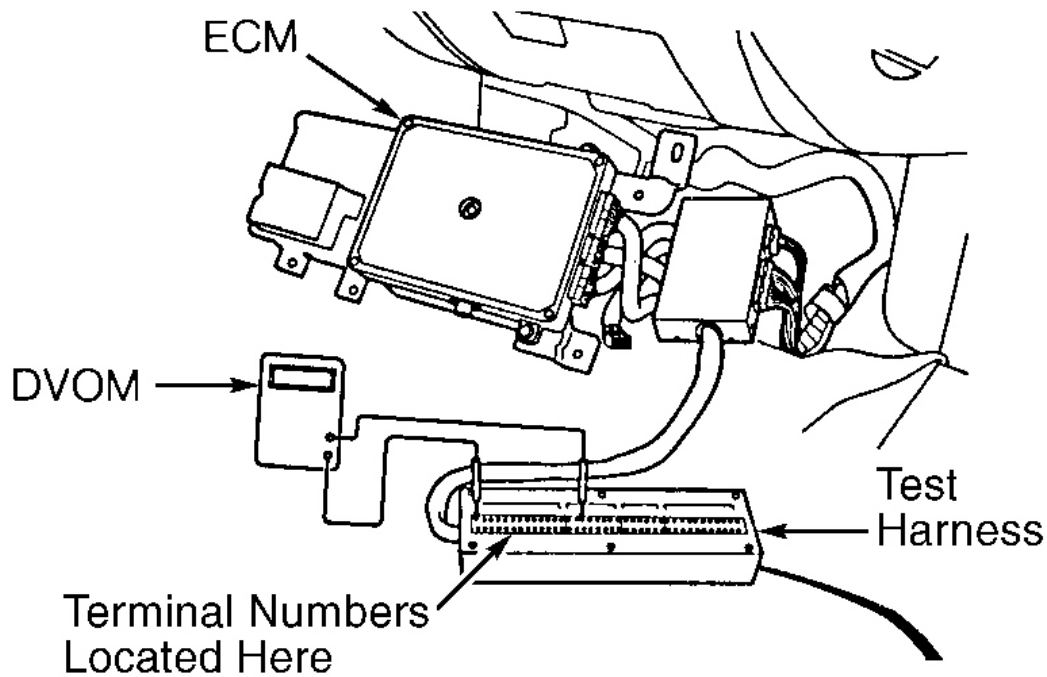
TESTING

ROAD TEST

NOTE: If shift lever cannot be moved from "P" position with brake pedal depressed and accelerator at idle position, check shift interlock system. See **MP1A ELECTRONIC CONTROLS** article.

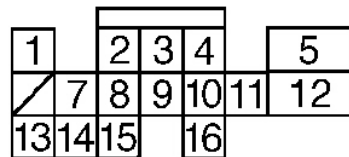
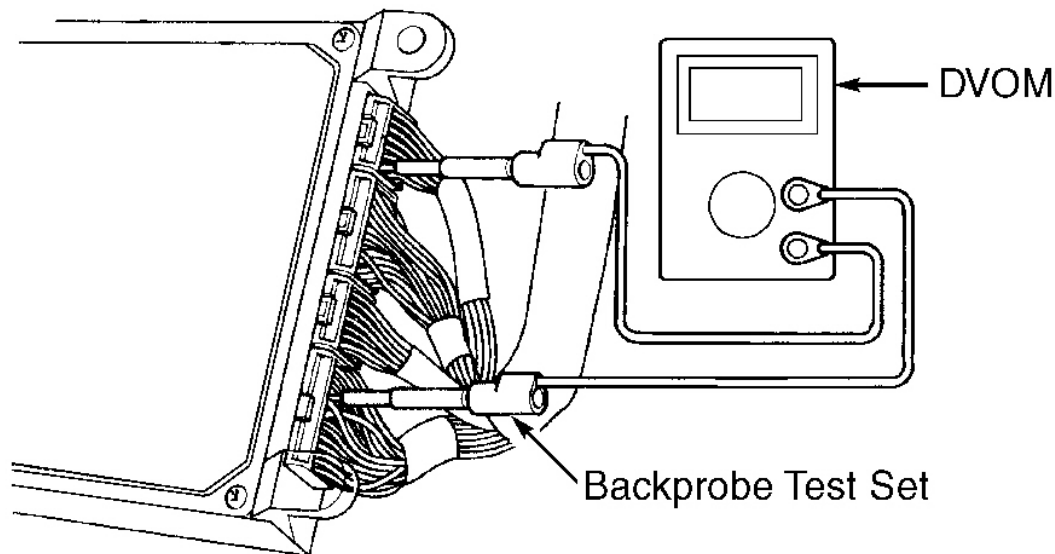
1. Warm engine to normal operating temperature. Apply parking brake and block wheels. Start engine. Move shift lever to "D4" position while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.

2. Repeat step 1) with shift lever in "D" position. Ensure engine does not stall. Shut engine off. 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 on passenger's side and remove small cover on passenger's side kick panel. Pull carpet back for access to Engine Control Module (ECM), located on passenger's side, below carpet. See **Fig. 4** or **Fig. 5**.
4. Remove ECM cover located above ECM. Ensure ignition is off. On 1995 models, install Test Harness (07LAJ-PT3010A) between ECM and ECM electrical connectors. See **Fig. 4** or **Fig. 5**. Install Digital Volt-Ohmmeter (DVOM) on test harness with positive lead at terminal D11 and negative lead at terminal D22 for monitoring of throttle position sensor voltage. Terminal numbers are on top of test harness. See **Fig. 4** or **Fig. 5**.



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Fig. 4: Measuring TP Sensor Voltage 1995 Models
Courtesy of AMERICAN HONDA MOTOR CO., INC.



"D" Connector (16-Pin)

96A30981

Fig. 5: Measuring TP Sensor Voltage 1996 Models
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

- On 1996 models, install Backprobe Test Set (07SAZ-001000A) or equivalent between PCM and DVOM leads. See **Fig. 4** or **Fig. 5**. Using DVOM, with positive lead at terminal D1 and negative lead at terminal D11. See **Fig. 4** or **Fig. 5**. Ensure DVOM is set for measuring voltage.
- On all models, road test vehicle and check for abnormal noise and clutch slippage. Specified clutch is applied in designated gear. See **CLUTCH APPLICATION** table.
- Ensure upshift and downshift points and lock-up of torque converter are correct in relation to throttle position sensor voltage or throttle opening and vehicle speed with shift lever in "D4" position. See appropriate tables under **TRANSAXLE UPSHIFT SPECIFICATIONS** and **TRANSAXLE DOWNSHIFT SPECIFICATIONS**.
- 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 63 MPH or transaxle may be damaged.

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul**

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, ECM cover, carpet and door sill molding.

CLUTCH APPLICATION

Shift Lever Position	Elements In Use
"P" & "N"	No Clutches Are Applied
"R"	4th Clutch
"D4"	
1st Gear	1st Clutch, One-Way Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(1) 3rd Clutch
4th Gear	(1) 4th Clutch
"D"	
1st Gear	1st Clutch, One-Way Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(1) 3rd Clutch
"2"	(1) 2nd Clutch
"1"	1st-Hold Clutch, 1st Clutch, One-Way Clutch
(1) The 1st clutch engages but driving power is not transmitted, as one-way clutch slips.	

TRANSAXLE UPSHIFT SPECIFICATIONS**TRANSAXLE UPSHIFT SPECIFICATIONS (2.2L SOHC)**

Application ⁽¹⁾	1st-2nd Gear	2nd-3rd Gear	3rd-4th Gear	Lock-Up Clutch On
Throttle Position Sensor Voltage .83 Volt Coasting Downhill From Stop	13-15 MPH	26-28 MPH	36-40 MPH	14-17 MPH
Throttle Position Sensor Voltage 2.18 Volts Accelerating From Stop	17-21 MPH	37-41 MPH	57-63 MPH	61-67 MPH
Full Throttle Accelerating From Stop	29-34 MPH	60-65 MPH	88-94 MPH	81-86 MPH
(1) Shift lever in "D4" position.				

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul****TRANSAXLE UPSHIFT SPECIFICATIONS (2.3L DOHC)**

Application (1)	1st-2nd Gear	2nd-3rd Gear	3rd-4th Gear	Lock-Up Clutch On
Throttle Position Sensor Voltage .83 Volt Coasting Downhill From Stop	13-15 MPH	26-28 MPH	36-40 MPH	14-17 MPH
Throttle Position Sensor Voltage 2.18 Volts Accelerating From Stop	18-22 MPH	36-40 MPH	54-60 MPH	58-64 MPH
Full Throttle Accelerating From Stop	29-34 MPH	57-62 MPH	83-88 MPH	80-85 MPH

(1) Shift lever in "D4" position.

TRANSAXLE DOWNSHIFT SPECIFICATIONS**TRANSAXLE DOWNSHIFT SPECIFICATIONS (2.2L SOHC)**

Application (1)	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
Throttle Position Sensor Voltage .83 Volt, Coasting Or Braking To A Stop	13-16 MPH	(2)	18-22 MPH	6-10 MPH
Throttle Position Sensor Voltage 2.18 Volts, Vehicle Slowing By Grade Or Load	53-59 MPH	(2)	(2)	(2)
Full Throttle, Vehicle Slowing By Grade Or Load	77-82 MPH	76-82 MPH	52-57 MPH	21-26 MPH

(1) Shift lever in "D4" position.

(2) Specification is not available.

TRANSAXLE DOWNSHIFT SPECIFICATIONS (2.3L DOHC)

Application (1)	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
Throttle Position Sensor Voltage .83 Volt, Coasting Or Braking To A Stop	13-16 MPH	(2) MPH	18-22 MPH	6-10 MPH
Throttle Position Sensor Voltage 2.18 Volts, Vehicle Slowing By Grade Or Load	48-54 MPH	(2)	(2)	(2)
Full Throttle, Vehicle Slowing By Grade Or Load	73-80 MPH	73-79 MPH	51-56 MPH	24-29 MPH

(1) Shift lever in "D4" position.

(2) Specification is not available.

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.

1995 Honda Prelude S

AUTOMATIC TRANSMISSIONS MP1A Overhaul

1. Apply parking brake. Block front 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 the torque converter stall speed.
3. Allow transaxle to cool for 2 minutes. Repeat test procedure with shift lever in "D4", "1" and "R" positions.
4. Ensure torque converter stall speed is within specification. Torque converter stall speed should be the same in "D4", "2", "1" and "R" positions. See **TORQUE CONVERTER STALL SPEED SPECIFICATIONS** table. If torque converter stall speed is not within specification, see **TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING** table for possible causes.

TORQUE CONVERTER STALL SPEED SPECIFICATIONS

Application	Engine RPM
2.2L SOHC	
Standard	2500
Service Limit	2350-2650
2.3L DOHC	
Standard	2750
Service Limit	2600-2900

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Stall Speed Test Results (RPM)	Probable Cause
High In "D4", "2", "1" & "R"	Low Fluid Level, Low Oil Pump Output, Clogged Fluid Strainer, Pressure Regulator Valve Stuck Closed, Slipping Clutch
High In "R"	Slipping 4th Clutch
High In "D4"	Slipping Clutch
High In "2"	Slipping 2nd Clutch
High In "1"	Slipping 1st-Hold Or 1st Clutch, Defective One-Way Clutch
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. 6** . Attach pressure gauge to line pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).

2. 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 with engine at 2000 RPM.
3. Line pressure should be within specification. See appropriate table under **HYDRAULIC PRESSURE TESTINGS** . If line pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off.
4. Remove pressure gauge set. Using NEW aluminum seal washer, install and tighten pressure tap plug to specification. Refer to **TORQUE SPECIFICATIONS** table.

NOTE: Check clutch pressure at each clutch pressure tap on transaxle. See **Fig. 6** .

Clutch Pressure Test

1. With engine off, remove pressure tap plug from appropriate clutch pressure tap on transaxle. See **Fig. 6** . Attach pressure gauge to appropriate pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).

NOTE: Clutch pressure on some applications may vary with position of Throttle Valve (T.V.) lever on transaxle. The T.V. cable must be disconnected for some tests. Ensure shift lever is in proper position when checking clutch pressures.

2. Start and operate engine at 2000 RPM. Note clutch pressure reading with shift lever in appropriate position. See appropriate table under **HYDRAULIC PRESSURE TESTINGS** .
3. Ensure clutch pressure is within specification. If clutch pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off.
4. Remove pressure gauge set. Using NEW aluminum seal washer, install and tighten pressure tap plug to specification. Refer to **TORQUE SPECIFICATIONS** .

Low/High Pressure Test

1. The low/high pressure is tested at 2nd, 3rd and 4th clutch pressure taps on transaxle. See **Fig. 6** . Disconnect Throttle Valve (T.V.) cable from transaxle T.V. lever.

NOTE: When disconnecting T.V. cable, unhook cable from transaxle T.V. lever. DO NOT loosen lock nuts used for cable adjustment.

2. With engine off, remove pressure tap plug from appropriate clutch pressure tap on transaxle. Attach pressure gauge to appropriate pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
3. Start engine and allow to idle. Move shift lever to "D4" position. Slowly increase engine speed until pressure is indicated on pressure gauge. Release throttle, allowing engine to idle and note low pressure reading.
4. With engine idling, lift transaxle T.V. lever upward approximately half the distance of lever travel. Increase engine speed and note highest pressure reading.
5. Repeat procedure(s) for the remaining clutches. Ensure low/high pressure is within specification. Refer to

the appropriate table under **HYDRAULIC PRESSURE TESTINGS** . If low/high pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table.

- Shut engine off. Remove pressure gauge set. Using NEW aluminum seal washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** . Reconnect T.V. cable.

Throttle Valve "B" Pressure Test

- Disconnect T.V. cable from transaxle T.V. lever. With engine off, remove pressure tap plug from throttle valve "B" pressure tap. See **Fig. 6** .

NOTE: When disconnecting T.V. cable, unhook cable from transaxle T.V. lever. DO NOT loosen lock nuts used for cable adjustment.

- Attach pressure gauge to throttle valve "B" pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
- Start engine and operate at 1000 RPM with shift lever in "D4" position. No pressure should exist with transaxle T.V. lever released (closed position).
- Lift transaxle T.V. lever fully upward (open position). Note throttle valve "B" pressure reading.
- Ensure throttle valve "B" pressure is within specification. See appropriate HYDRAULIC PRESSURE TEST SPECIFICATIONS table under **HYDRAULIC PRESSURE TESTINGS** . If pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off.
- Remove pressure gauge set. Using NEW aluminum seal washer, install and tighten pressure tap plug to specification. Refer to the **TORQUE SPECIFICATIONS** table. Reconnect T.V. cable.

HYDRAULIC PRESSURE TESTINGS

HYDRAULIC PRESSURE TEST SPECIFICATIONS (2.2L SOHC)

Application	Lever Position	psi (kPa)
Line Pressure At 2000 RPM	"P" Or "N"	107-121 (750-850)
Clutch Pressure		
1st Clutch At 2000 RPM	"1" Or "D4"	107-121 (750-850)
1st-Hold Clutch At 2000 RPM	"1"	107-121 (750-850)
2nd Clutch		
At 2000 RPM	"2"	107-121 (750-850)
T.V. Lever Fully Closed ⁽¹⁾	"D4"	64-71 (450-500)
T.V. Lever Open 3/16+ ⁽²⁾	"D4"	107-121 (750-850)
3rd Clutch		
T.V. Lever Fully Closed ⁽¹⁾	"D4"	64-71 (450-500)
T.V. Lever Open 3/16+ ⁽²⁾	"D4"	107-121 (750-850)
4th Clutch		
At 2000 RPM	"R"	107-121 (750-850)
T.V. Lever Fully Closed ⁽¹⁾	"D4"	68-75 (480-530)

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul**

T.V. Lever Open 3/16+ ⁽²⁾	"D4"	107-121 (750-850)
Low Pressure T.V. Lever Fully Closed ⁽¹⁾		
2nd Or 3rd Clutch	"D4"	64-71 (450-500)
4th Clutch	"D4"	68-75 (480-530)
High Pressure T.V. Lever Lifted Up 1/2 Distance Of T.V. Lever Travel 2nd, 3rd Or 4th Clutch	"D4"	107-121 (750-850)
Throttle Valve "B" Pressure With T.V. Lever Fully Open ⁽³⁾	"D4"	107-121 (750-850)
(1) Pressure is checked with engine at 2000 RPM. The T.V. cable must be disconnected. Fully closed position is with transaxle T.V. lever in released position and not being pulled upward by the T.V. cable. (2) Pressure is checked with engine at 2000 RPM. The T.V. cable must be disconnected. Open position is with transaxle T.V. lever being pulled upward 3/16 of lever travel distance. (3) Pressure is checked with engine at 1000 RPM. Open position is with transaxle T.V. lever being pulled fully upward.		

HYDRAULIC PRESSURE TEST SPECIFICATIONS (2.3L DOHC)

Application	Lever Position	psi (kPa)
Line Pressure At 2000 RPM	"P" Or "N"	114-128 (800-900)
Clutch Pressure		
1st Clutch At 2000 RPM	"1" Or "D4"	114-128 (800-900)
1st-Hold Clutch At 2000 RPM	"1"	114-128 (800-900)
2nd Clutch		
At 2000 RPM	"2"	114-128 (800-900)
T.V. Lever Fully Closed ⁽¹⁾	"D4"	64-71 (450-500)
T.V. Lever Open 3/16+ ⁽²⁾	"D4"	114-128 (800-900)
3rd Clutch		
T.V. Lever Fully Closed ⁽¹⁾	"D4"	64-71 (450-500)
T.V. Lever Open 3/16+ ⁽²⁾	"D4"	114-128 (800-900)
4th Clutch		
At 2000 RPM	"R"	114-128 (800-900)
T.V. Lever Fully Closed ⁽¹⁾	"D4"	68-75 (480-530)
T.V. Lever Open 3/16+ ⁽²⁾	"D4"	114-128 (800-900)
Low Pressure T.V. Lever Fully Closed ⁽¹⁾		
2nd Or 3rd Clutch	"D4"	64-71 (450-500)
4th Clutch	"D4"	68-75 (480-530)
High Pressure T.V. Lever Lifted 1/2 Distance Of T.V. Lever Travel 2nd, 3rd Or 4th Clutch	"D4"	114-128 (800-900)

1995 Honda Prelude S

AUTOMATIC TRANSMISSIONS MP1A Overhaul

Throttle Valve "B" Pressure With T.V. Lever Fully Open ⁽³⁾	"D4"	114-128 (800-900)
---	------	-------------------

- (1) Clutch pressure is checked with engine at 2000 RPM. T.V. cable must be disconnected. Fully closed position is with transaxle T.V. lever in released position and not being pulled upward by the T.V. cable.
- (2) Clutch pressure is checked with engine at 2000 RPM. T.V. cable must be disconnected. Open position is with transaxle T.V. lever being pulled upward 3/16 of lever travel distance.
- (3) Pressure is checked with engine at 1000 RPM. Open position is with transaxle T.V. lever being pulled fully upward.

HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

Application	Probable Cause
Line Pressure Low Or No Line Pressure	Defective Torque Converter, Defective Torque Converter Check Valve, Defective 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 On 4th 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 Valve "B" Pressure Low Or No Pressure	Defective Throttle Valve "B"

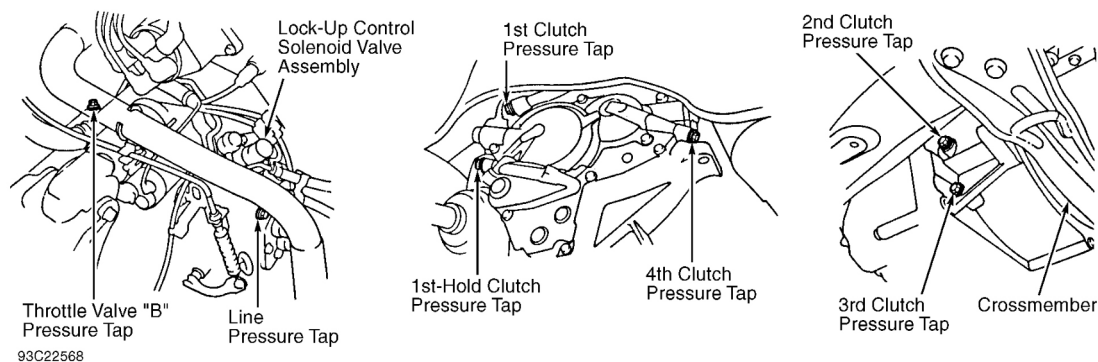


Fig. 6: Identifying Transaxle Pressure Taps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

ELECTRICAL COMPONENTS

See MP1A ELECTRONIC CONTROLS article.

TRANSAXLE

See REMOVAL & INSTALLATION article.

TORQUE CONVERTER

Torque converter consists of pump, turbine and stator, which are 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. Remove bolts, protector (if equipped), right side cover and gasket. See Fig. 7 . Install Mainshaft Holder (07GAB-PF50100 or 07GAB-PF50101) on mainshaft to secure mainshaft from rotating. See Fig. 8 .
2. Engage parking pawl with parking gear. Using hammer and chisel, cut lock tabs on countershaft, mainshaft and secondary shaft lock nuts. Remove lock nuts and spring washers. See Fig. 7 .

NOTE: Mainshaft lock nut has left-hand threads.

3. Remove mainshaft holder once all lock nuts are removed. Using puller, remove parking gear from countershaft. Using puller, remove idler gears from mainshaft and secondary shaft.
4. Remove thrust needle bearing, countershaft idler gear, needle bearing, thrust needle bearing and thrust washer from countershaft. Remove parking pawl, parking pawl spring, parking pawl shaft and parking pawl stopper.
5. Remove throttle control lever and throttle control lever spring from throttle control shaft. See Fig. 7 . Remove ATF cooler pipe-to-hanger bolt. Remove transaxle housing bolts.
6. Remove bolts from reverse idler gear shaft holder. Screw bolt into center of shaft on reverse idler gear shaft holder. See Fig. 9 .
7. Pull reverse idler gear shaft holder with shaft and needle bearing from transaxle housing. Separate shaft with "O" rings and needle bearing from reverse idler gear shaft holder.

NOTE: Transaxle housing will not separate from torque converter housing if reverse idler gear shaft holder is not removed and reverse idler gear repositioned.

8. Move reverse idler gear to disengage from countershaft reverse gear. See Fig. 10 . Align spring pin on control shaft with groove in transaxle housing by rotating control shaft. Using Puller (07HAC-PK4010A),

remove transaxle housing. See **Fig. 11** .

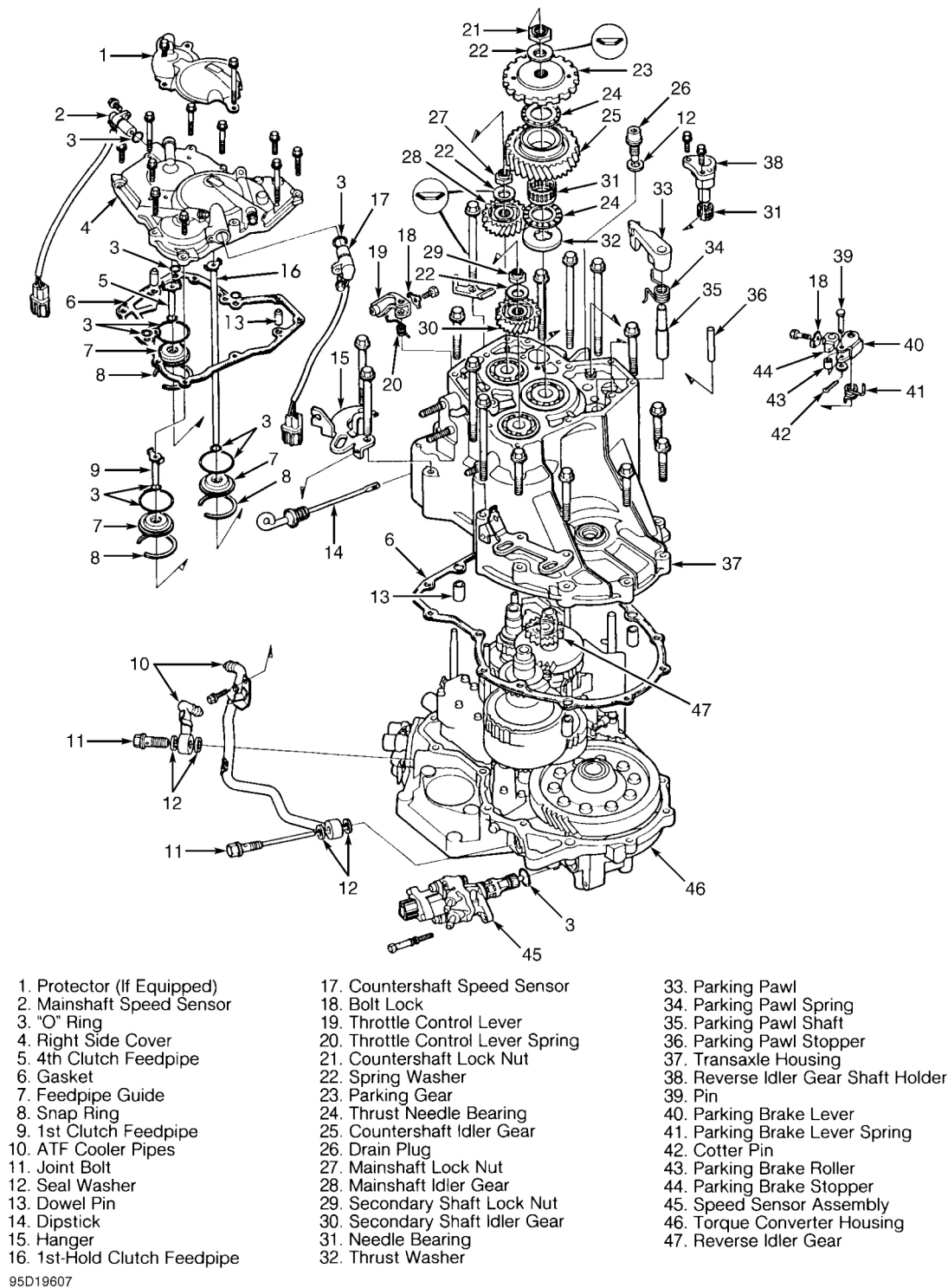


Fig. 7: Exploded View Of Typical Right Side Cover & Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

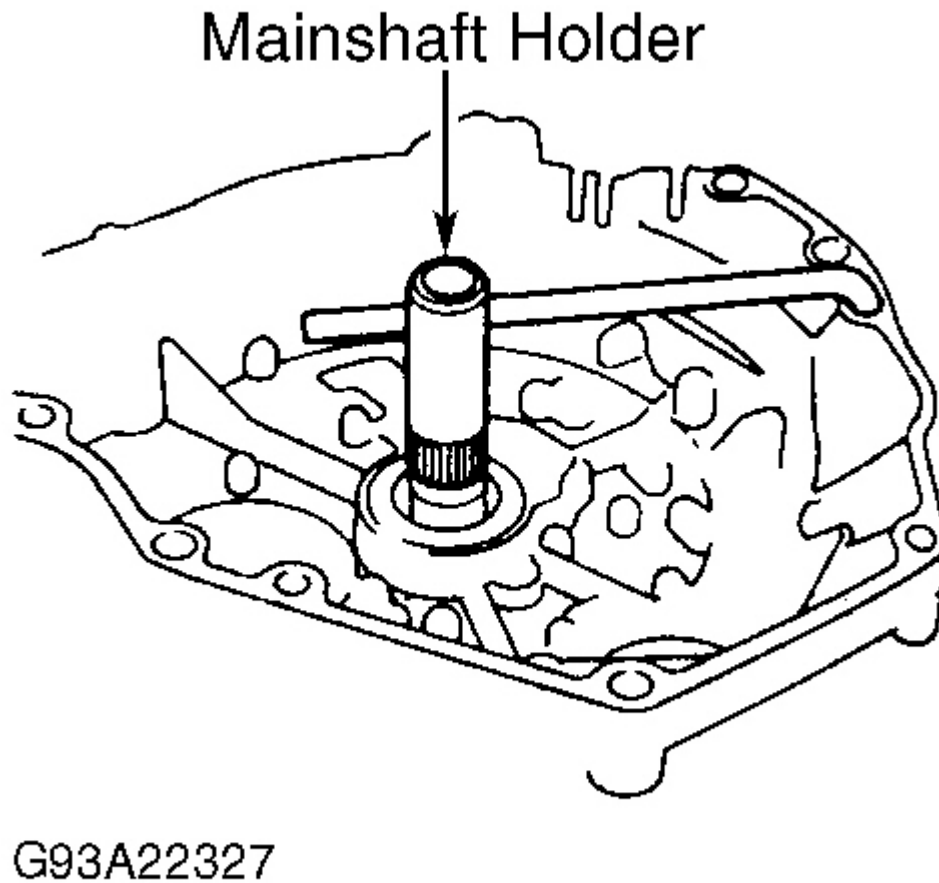
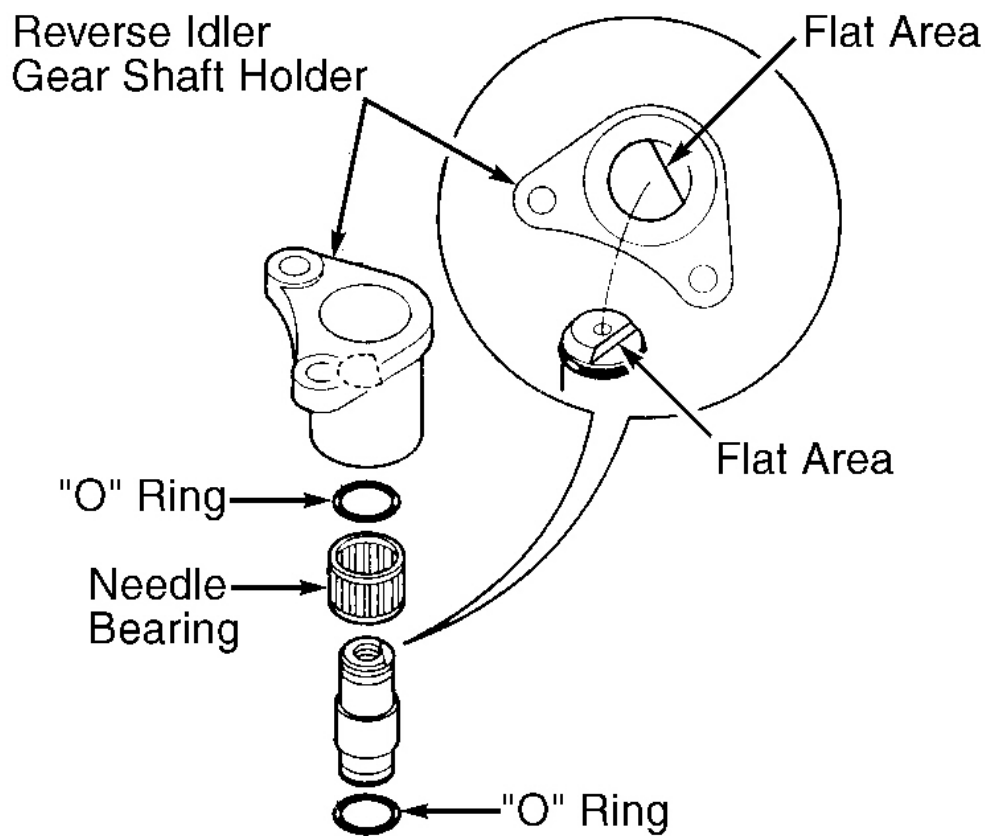
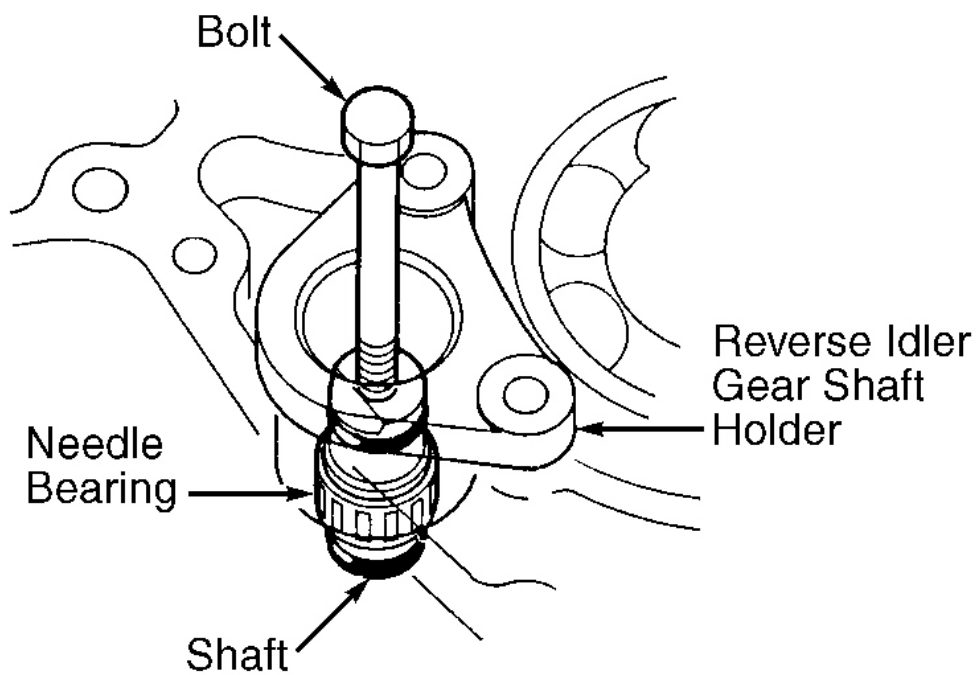


Fig. 8: Installing Mainshaft Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 9: Removing Idler Gear Shaft Holder & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

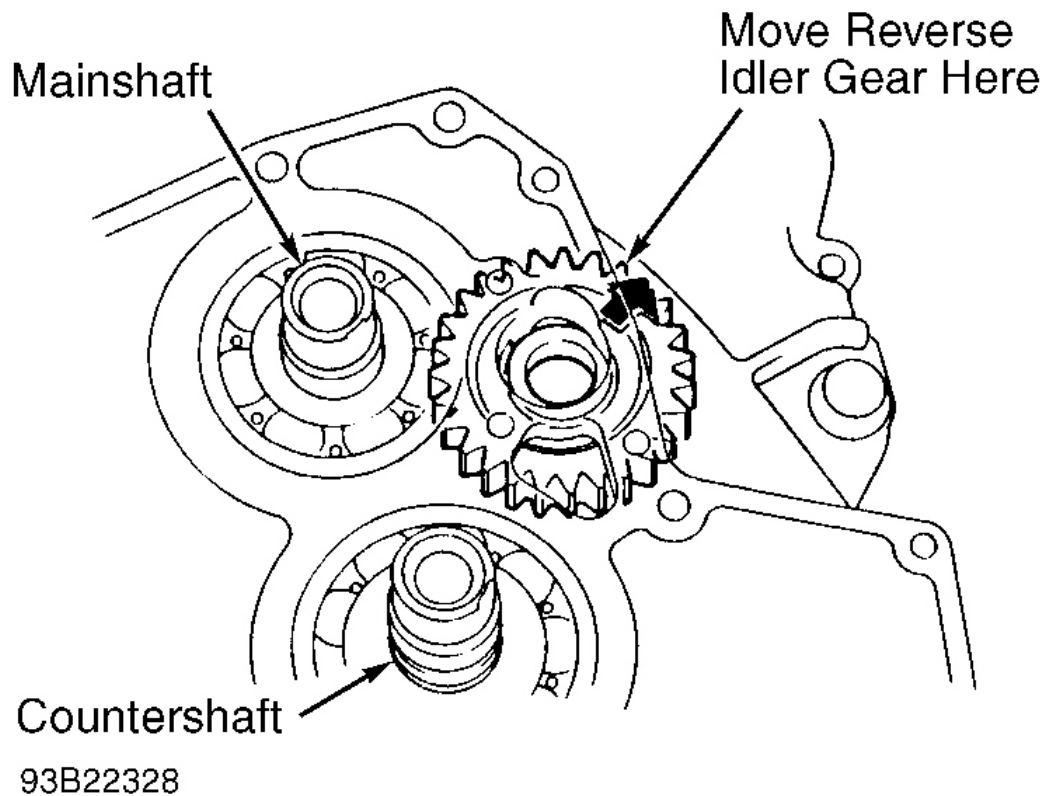


Fig. 10: Positioning Reverse Idler Gear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

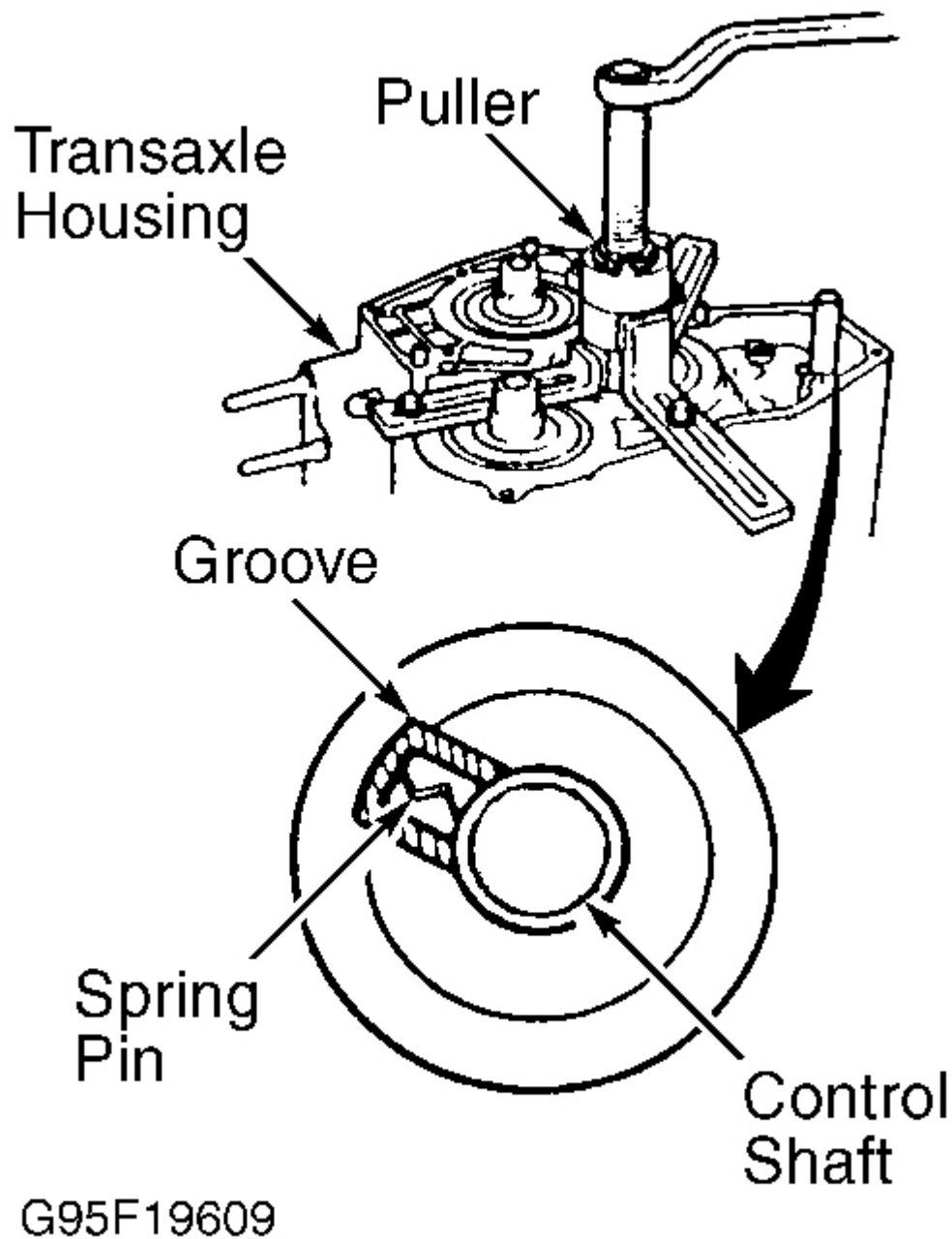


Fig. 11: Aligning Spring Pin & Removing Transaxle Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

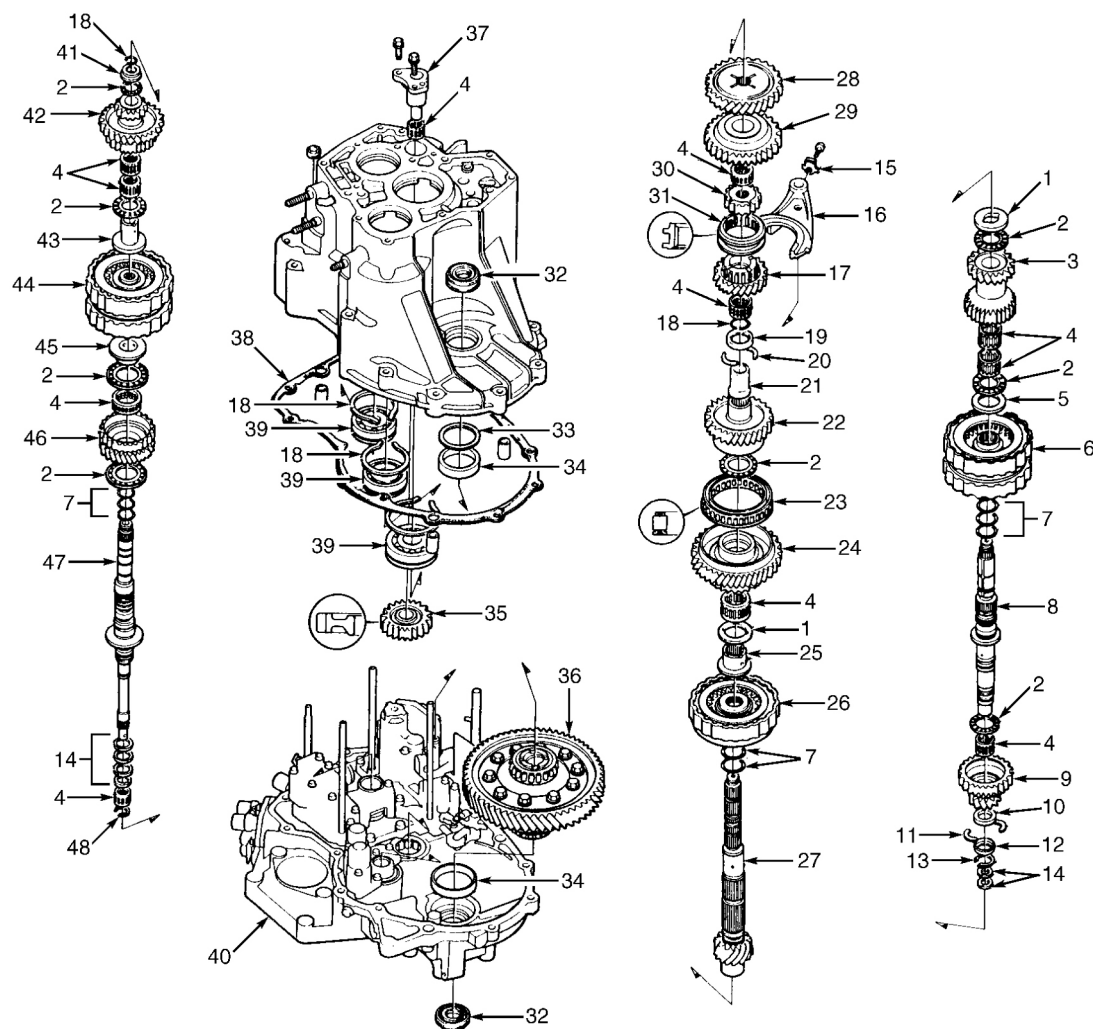
9. Remove reverse idler gear from transaxle housing. Remove countershaft 2nd gear, countershaft reverse

gear, thrust washer, thrust needle bearing and secondary shaft 2nd gear together from countershaft and secondary shaft. See **Fig. 12** .

10. Remove bolt, bolt lock, shift fork, reverse selector hub and reverse selector from countershaft. Remove needle bearings, thrust needle bearing and splined washer from secondary shaft.
11. Remove secondary shaft, mainshaft and countershaft assemblies from torque converter housing. Remove differential assembly from torque converter housing. Remove cable control lever from end of control shaft. Remove bolts, bolt locks (if equipped) and servo detent base. See **Fig. 13** . Remove bolts and fluid strainer.

CAUTION: Accumulator cover is under spring tension. Hold accumulator cover downward when removing bolts in a crisscross pattern to prevent bolt damage.

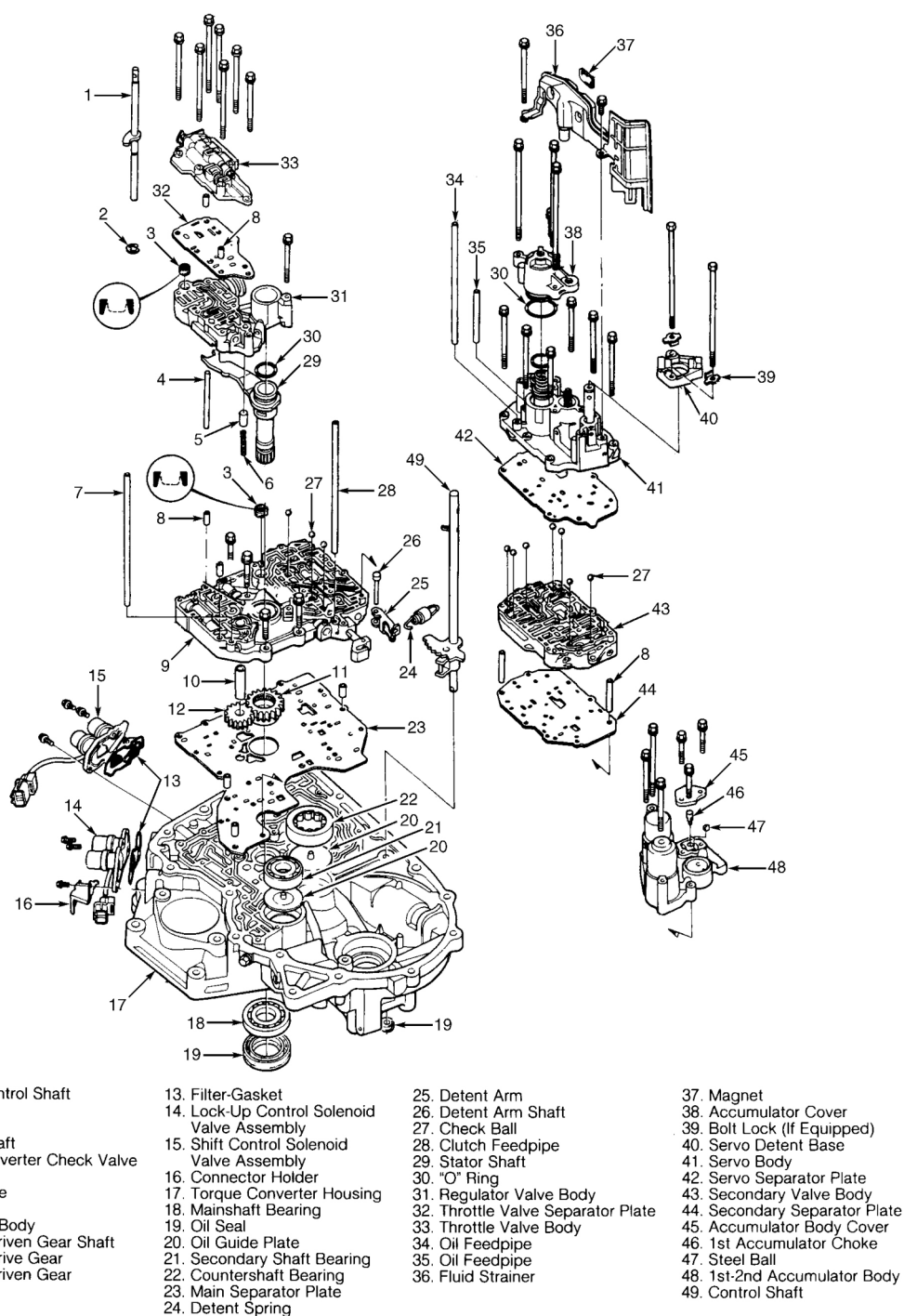
12. Using care, remove bolts, accumulator cover and "O" ring. Remove oil feedpipes from servo body and main valve body. Remove bolts, servo body and servo separator plate.
13. Remove secondary valve body and secondary separator plate. Use care not to lose check balls in secondary valve body. Remove bolts, throttle valve body and throttle valve separator plate.
14. Remove "E" clip and throttle control shaft from throttle valve body. Remove bolt and regulator valve body. Remove stopper shaft, stator shaft and "O" ring .
15. Disconnect detent spring from detent arm. Remove control shaft from torque converter housing. Remove detent arm shaft, detent arm and detent spring. See **Fig. 13** .
16. Remove bolts and main valve body. Use care not to lose check balls in main valve body. Remove bolts and 1st-2nd accumulator body.
17. Remove oil pump driven gear shaft, oil pump driven and drive gears, main separator plate and dowel pins. Remove lock-up control solenoid valve assembly and shift control solenoid valve assembly (if necessary).



- | | | |
|-----------------------------|----------------------------------|-------------------------------------|
| 1. Thrust Washer | 17. Countershaft 4th Gear | 33. Thrust Shim |
| 2. Thrust Needle Bearing | 18. Snap Ring | 34. Bearing Outer Race |
| 3. Secondary Shaft 2nd Gear | 19. Collar | 35. Reverse Idler Gear |
| 4. Needle Bearing | 20. Cotter | 36. Differential Assembly |
| 5. Splined Washer | 21. Distance Collar | 37. Reverse Idler Gear Shaft Holder |
| 6. 1st-2nd Clutch Assembly | 22. Countershaft 3rd Gear | 38. Gasket |
| 7. "O" Ring | 23. One-Way Clutch | 39. Bearing |
| 8. Secondary Shaft | 24. Countershaft 1st Gear | 40. Torque Converter Housing |
| 9. Secondary Shaft 1st Gear | 25. Countershaft 1st Gear Collar | 41. Collar |
| 10. Distance Collar | 26. 1st-Hold Clutch Assembly | 42. Mainshaft 4th-Reverse Gear |
| 11. Cotter | 27. Countershaft | 43. 4th Gear Collar |
| 12. Cotter Retainer | 28. Countershaft 2nd Gear | 44. 3rd-4th Clutch Assembly |
| 13. Circlip | 29. Countershaft Reverse Gear | 45. 3rd Gear Collar |
| 14. Seal Ring | 30. Reverse Selector Hub | 46. Mainshaft 3rd Gear |
| 15. Bolt Lock | 31. Reverse Selector | 47. Mainshaft |
| 16. Shift Fork | 32. Oil Seal | 48. Set Ring |

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Fig. 12: Exploded View Of Transaxle Housing & Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 13: Exploded View Of Torque Converter Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

MAIN VALVE BODY

CAUTION: When disassembling main valve body, place main 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 from main valve body.

Disassembly

Disassemble main valve body. See **Fig. 14** . 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 as an assembly 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 for at least 30 minutes. 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: Oil pump clearance must be checked in main valve body. See **OIL PUMP** under **COMPONENT DISASSEMBLY & REASSEMBLY**.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. Install NEW filter. Ensure all components are installed in correct location. See **Fig. 14** .

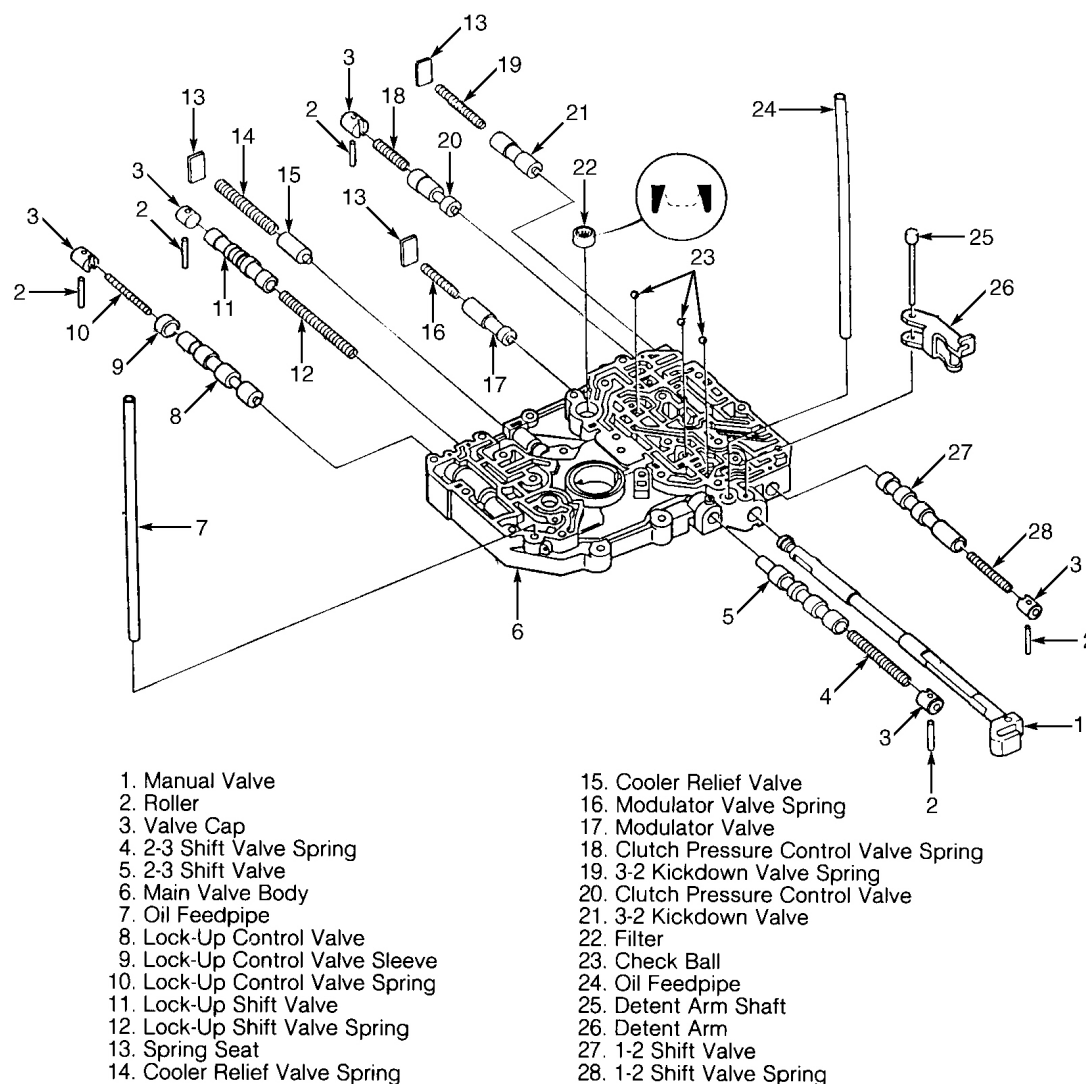
SPRING SPECIFICATIONS

Application	Free Length: In. (mm)
Main Valve Body	
Clutch Pressure Control Valve Spring	1.299 (33.00)
Cooler Relief Valve Spring	1.843 (46.81)
Lock-Up Control Valve Spring	1.496 (38.00)
Lock-Up Shift Valve Spring	2.902 (73.70)
Modulator Valve Spring	1.299 (33.00)
1-2 Shift Valve Spring	1.626 (41.30)
2-3 Shift Valve Spring	2.244 (57.00)
3-2 Kickdown Valve Spring	1.846 (46.90)
Regulator Valve Body	
Lock-Up Timing Valve Spring	2.012 (51.10)
Regulator Valve Spring "A"	
2.2L SOHC	3.362 (85.40)

1995 Honda Prelude S

AUTOMATIC TRANSMISSIONS MP1A Overhaul

2.3L DOHC	3.457 (87.80)
Regulator Valve Spring "B"	1.732 (44.00)
Stator Reaction Spring	1.193 (30.30)
Torque Converter Check Valve Spring	1.504 (38.20)
Secondary Valve Body	
Orifice Control Valve Spring	2.067 (52.50)
Servo Control Valve Spring	2.071 (52.60)
2nd Orifice Control Valve Spring	2.295 (58.30)
3rd Kickdown Valve Spring	1.902 (48.30)
3-4 Shift Valve Spring	2.244 (57.00)
4th Exhaust Valve Spring	2.394 (60.80)
Servo Body	
1st-Hold Accumulator Spring	2.547 (64.70)
3rd Accumulator Spring	3.709 (94.20)
4th Accumulator Spring	3.547 (90.10)
Throttle Valve Body	
Relief Valve Spring	1.539 (39.10)
Throttle Valve "B" Spring	(1)
Throttle Valve "B" Adjusting Spring	1.181 (30.00)
1st-2nd Accumulator Body	
1st Accumulator Spring	4.543 (115.40)
2nd Accumulator Spring	3.035 (77.10)
(1) Spring free length may be 1.634" (41.50 mm) or 1.638" (41.60 mm).	



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Fig. 14: Exploded View Of Main Valve Body

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP

Disassembly

Note direction of oil pump gear installation in main valve body. Remove oil pump driven gear shaft and oil pump gears from main valve body (if not previously removed).

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Inspect components and replace if damaged.
2. Install oil pump gears and oil pump driven gear shaft in main valve body. Ensure chamfered and grooved

side of oil pump driven gear is facing upward (toward separator plate side of main valve body).

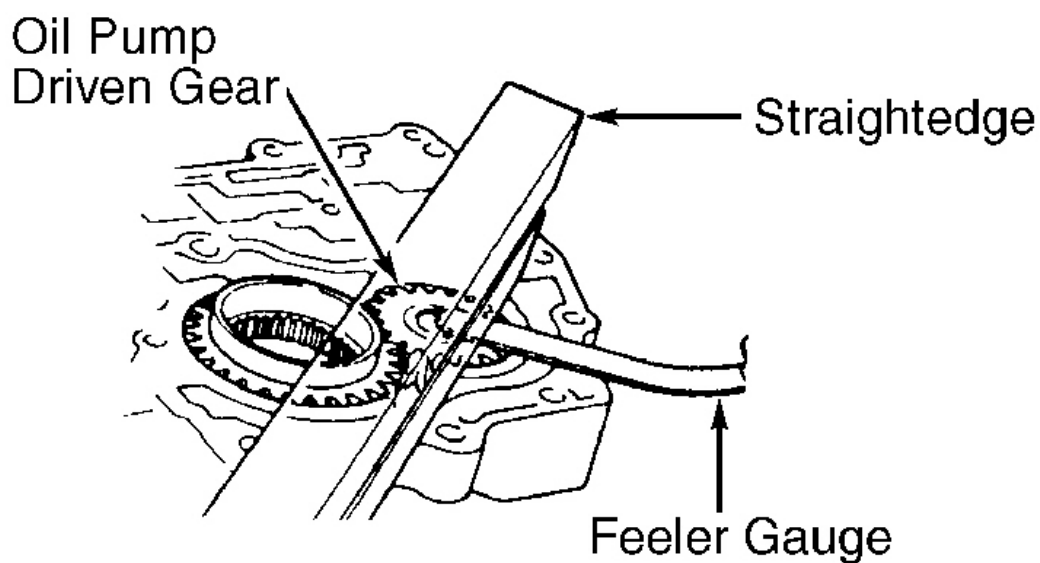
3. Using feeler gauge, measure side clearance of both gears between tip of gear teeth and main valve body. See **Fig. 15** . Replace oil pump gears and/or main valve body if side clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.
4. Remove oil pump driven gear shaft. Place straightedge across main valve body surface. Using feeler gauge, measure thrust clearance between oil pump gears and straightedge. See **Fig. 15** . Replace oil pump gears and/or main valve body if thrust clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.

OIL PUMP SPECIFICATIONS

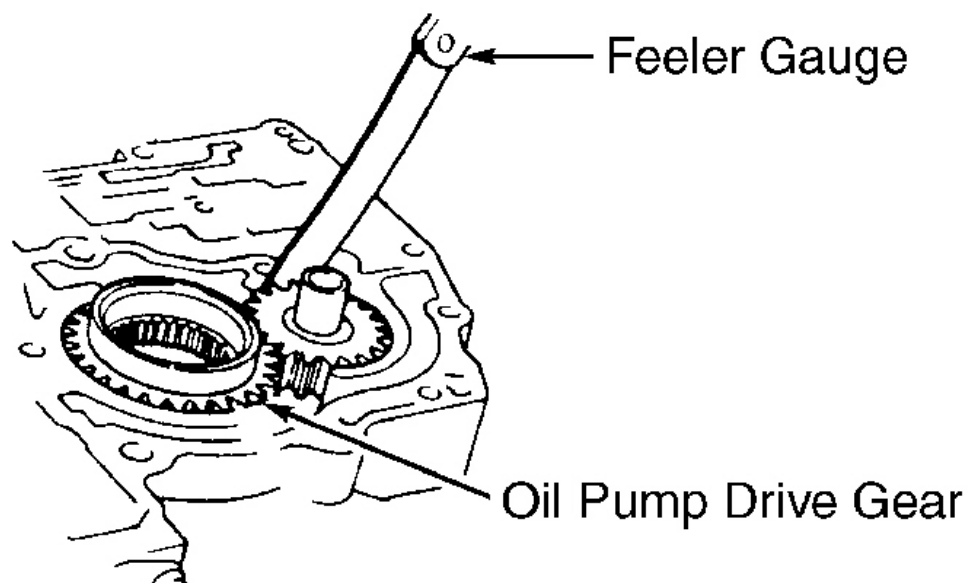
Application	In. (mm)
Side Clearance	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)

Reassembly

Coat components with ATF. To reassemble, reverse disassembly procedure. Ensure chamfered and grooved side of oil pump driven gear is facing upward (toward separator plate side of main valve body).



CHECKING THRUST CLEARANCE



CHECKING SIDE CLEARANCE

G95B19613

Fig. 15: Measuring Oil Pump Clearances

Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY VALVE BODY

CAUTION: When disassembling secondary valve body, place secondary 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 from secondary valve body.

Disassembly

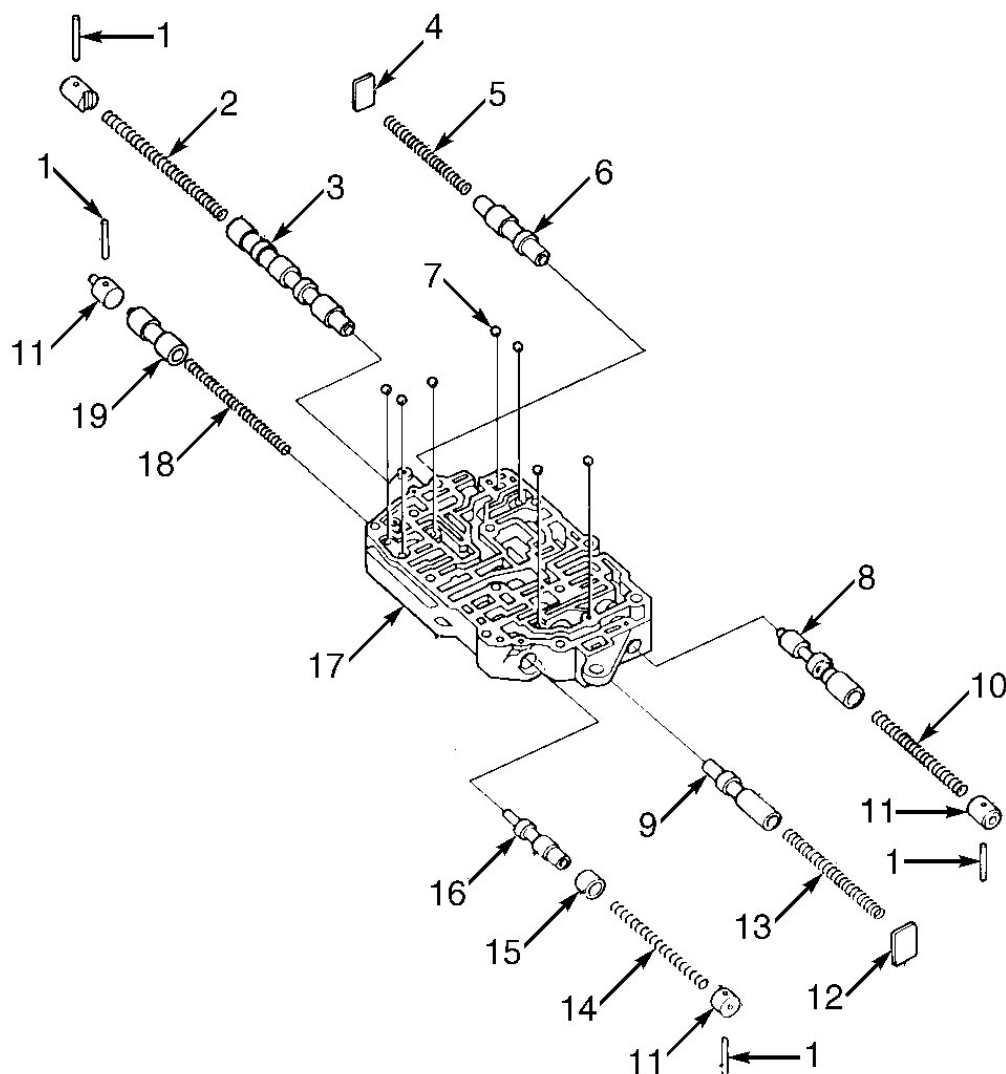
Disassemble secondary valve body. See **Fig. 16** . Use care when removing valve caps or spring seats, as they are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace secondary valve body as an assembly if any parts are worn or damaged.
2. Ensure all valves slide freely in bore. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF for at least 30 minutes. 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 ATF. To reassemble, reverse disassembly procedure. Ensure all components are installed in correct location. See **Fig. 16** .



- | | |
|--------------------------------|--------------------------------------|
| 1. Roller | 11. Valve Cap |
| 2. 3-4 Shift Valve Spring | 12. Spring Seat |
| 3. 3-4 Shift Valve | 13. Orifice Control Valve Spring |
| 4. Spring Seat | 14. 2nd Orifice Control Valve Spring |
| 5. 3rd-Kickdown Valve Spring | 15. Sleeve |
| 6. 3rd-Kickdown Valve | 16. 2nd Orifice Control Valve |
| 7. Check Ball | 17. Secondary Valve Body |
| 8. Servo Control Valve | 18. 4th Exhaust Valve Spring |
| 9. Orifice Control Valve | 19. 4th Exhaust Valve |
| 10. Servo Control Valve Spring | |

95C19614

Fig. 16: Exploded View Of Secondary 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 stopper bolt.

Disassembly

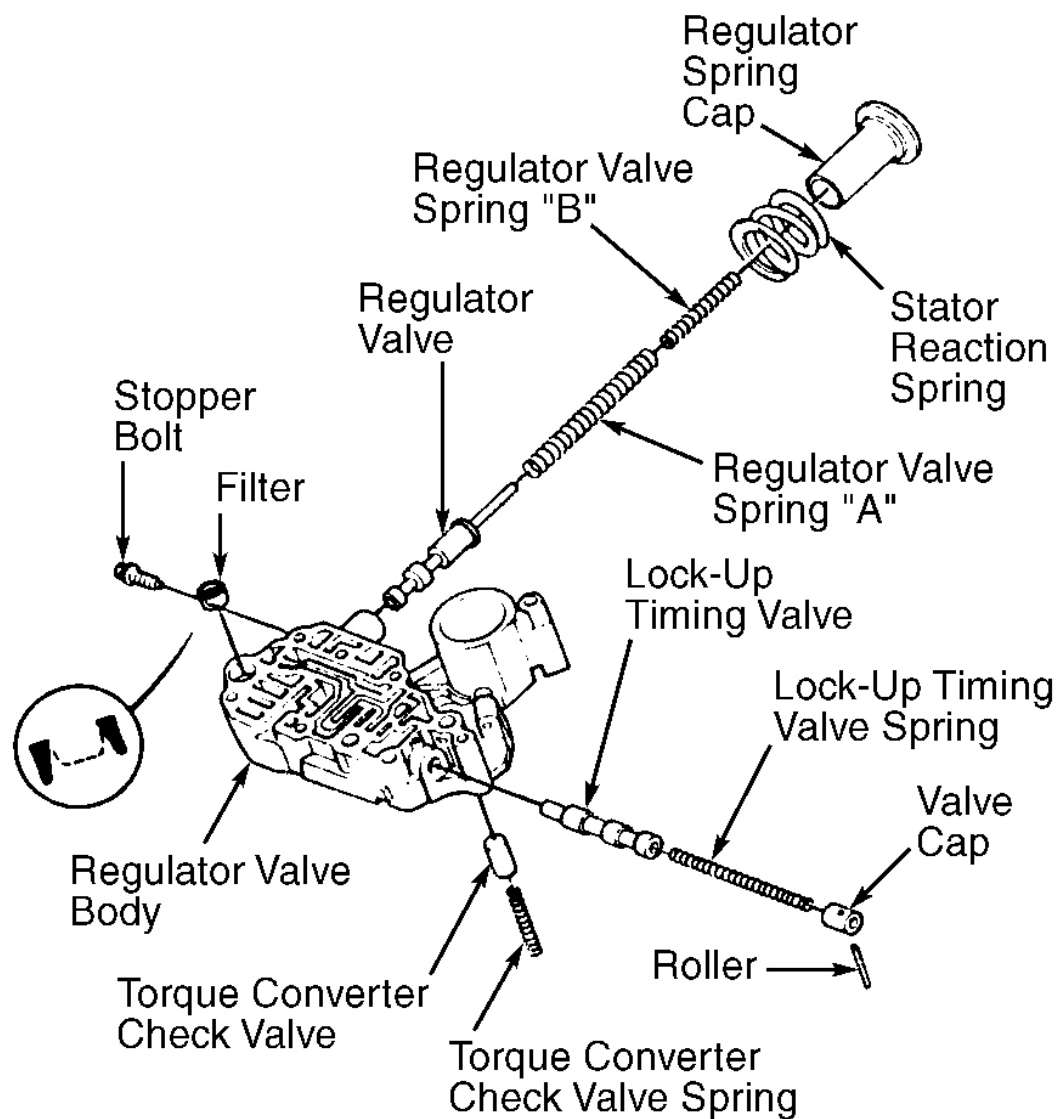
Hold regulator spring cap downward. Remove stopper bolt. Slowly remove regulator spring cap and components from regulator valve body. See **Fig. 17** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace regulator valve body as an assembly if any parts are worn or damaged.
2. Ensure all valves slide freely in bore. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF for at least 30 minutes. 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

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. Install NEW filter. Ensure all components are installed in correct location. See **Fig. 17** . Tighten stopper bolt to specification. See **TORQUE SPECIFICATIONS** .



93B22344

Fig. 17: Exploded View Of Regulator Valve Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

THROTTLE VALVE BODY

NOTE: DO NOT loosen or remove throttle adjusting bolt.

Disassembly

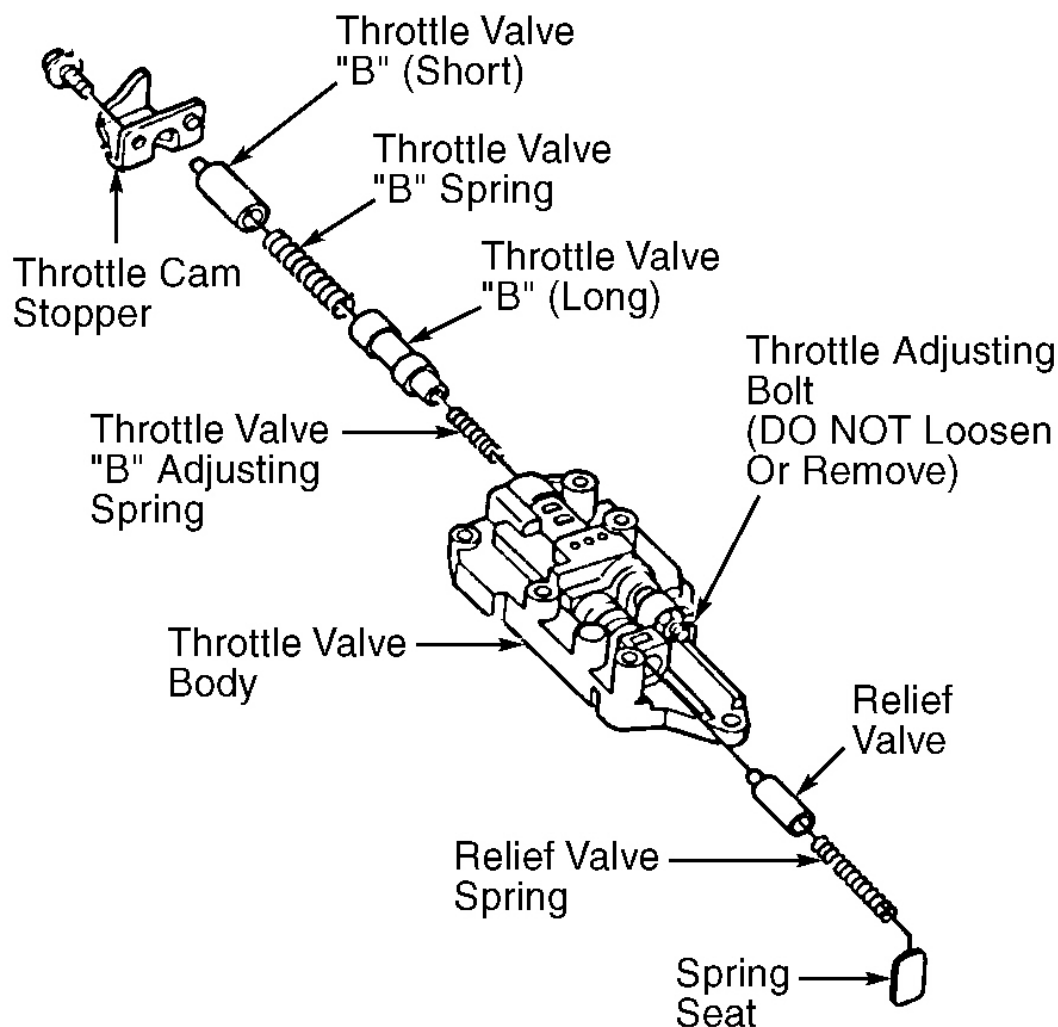
Disassemble throttle valve body. See **Fig. 18** . Use care when removing throttle cam stopper and spring seat, as they are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace throttle valve body as an assembly if any parts are worn or damaged.
2. Ensure all valves slide freely in bore. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked in ATF for at least 30 minutes. Thoroughly clean throttle 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 ATF. To reassemble, reverse disassembly procedure. Ensure all components are installed in correct location. See **Fig. 18** . Tighten throttle cam stopper bolt to specification. See **TORQUE SPECIFICATIONS** .



93C22345

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

SERVO BODY

Disassembly

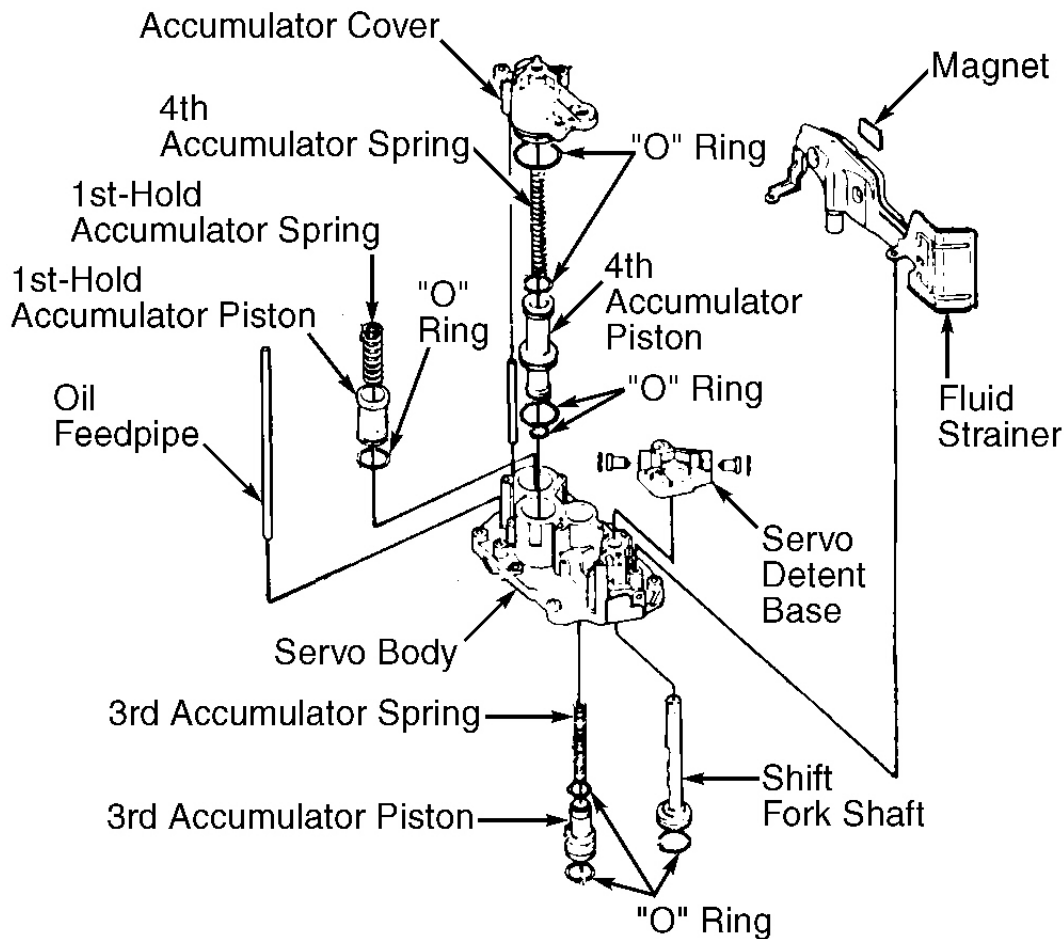
Disassemble servo body. See **Fig. 19** . Use care when removing accumulator cover, as it is under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace components if worn or damaged.
2. Replace fluid strainer if clogged. 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. See **Fig. 19** .



95D19615

Fig. 19: Exploded View Of Servo Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

1ST-2ND ACCUMULATOR BODY

Disassembly

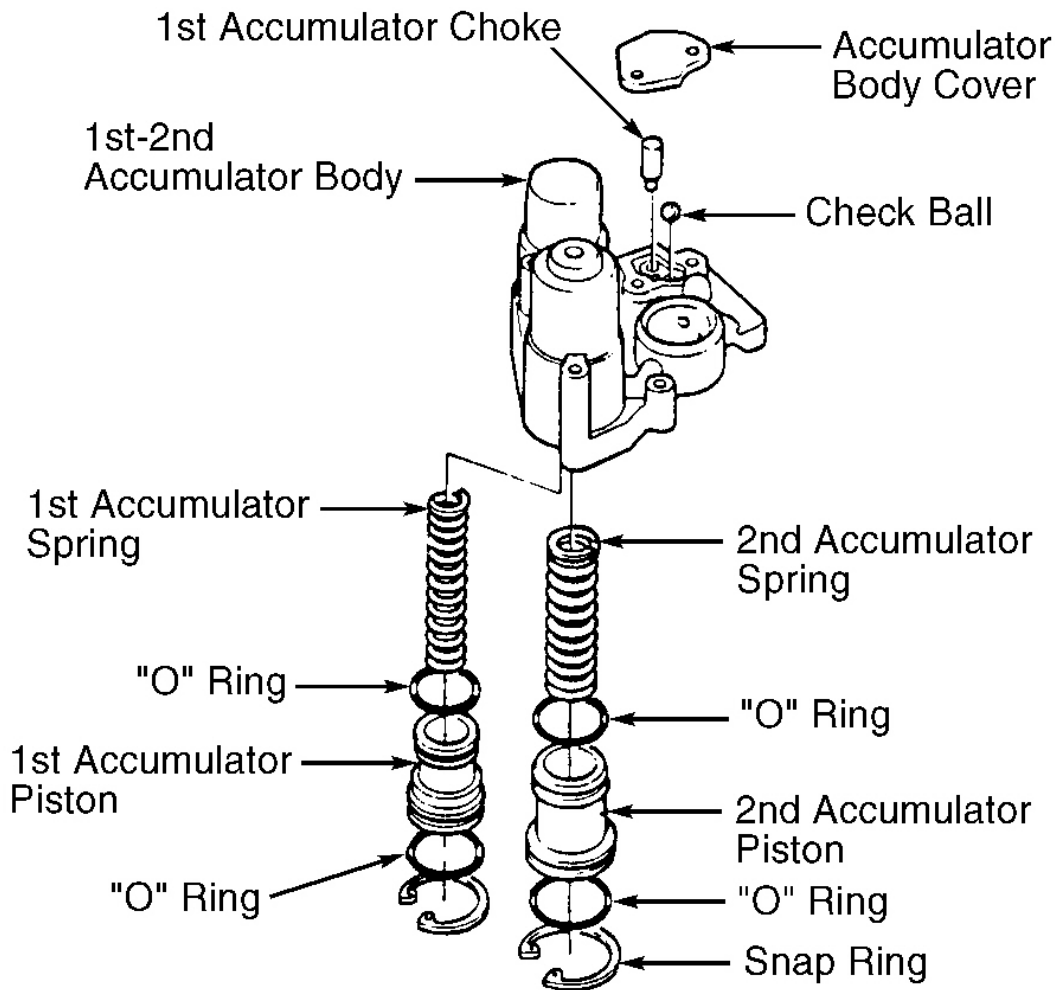
Disassemble 1st-2nd accumulator body. See **Fig. 20** . Use care when removing snap rings, as snap rings are under spring pressure. **DO NOT** use magnet to remove check ball, as check ball may become magnetized.

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 **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. See **Fig. 20** .



95E19616

Fig. 20: Exploded View Of 1st-2nd Accumulator Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT & ONE-WAY CLUTCH

Disassembly

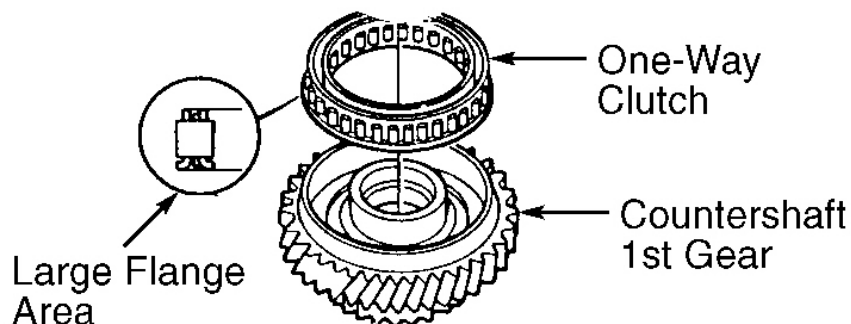
1. Note location of countershaft components. See **Fig. 12** . Remove countershaft components down to the countershaft 3rd gear.
2. Place countershaft in hydraulic press while supporting 1st-hold clutch assembly. Place a protective cap between hydraulic press and countershaft to prevent damage to shaft. Press countershaft from countershaft 3rd gear and 1st-hold clutch assembly.
3. Separate countershaft 3rd gear with countershaft 1st gear from 1st-hold clutch assembly. Remove needle bearing, thrust washer and countershaft 1st gear collar from 1st-hold clutch assembly.
4. To separate countershaft 3rd gear from countershaft 1st gear, hold countershaft 1st gear and rotate countershaft 3rd gear counterclockwise. Remove countershaft 3rd gear and thrust needle bearing from countershaft 1st gear.
5. Note direction of one-way clutch installation in countershaft 1st gear. Gently pry one-way clutch from countershaft 1st gear.

Cleaning & Inspection

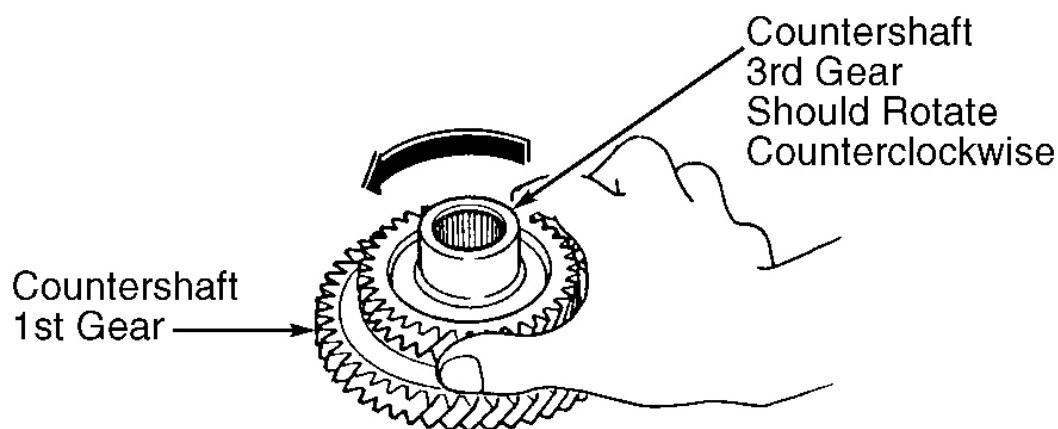
1. Clean components with solvent and dry with compressed air. Inspect splines for excessive wear. Check bearing surfaces for scoring or wear.
2. Inspect all needle bearings for galling and rough movement. Inspect one-way clutch for damage.

Reassembly

1. Lubricate all components with ATF. Install countershaft 1st gear collar, thrust washer and needle bearing on 1st-hold clutch assembly.
2. Install one-way clutch in countershaft 1st gear with large flange area toward countershaft 1st gear. See **Fig. 21** . Install thrust needle bearing on countershaft 1st gear. Install countershaft 3rd gear on countershaft 1st gear. Hold countershaft 1st gear. Ensure countershaft 3rd gear rotates counterclockwise.
3. Install countershaft 1st gear with countershaft 3rd gear on 1st-hold clutch assembly. Using press, press countershaft into countershaft 3rd gear and 1st-hold clutch assembly. Ensure all splines are aligned when installing countershaft. Ensure final drive gear on countershaft contacts 1st-hold clutch assembly.
4. Reassemble countershaft components. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Before installing NEW "O" rings on countershaft, wrap splines on countershaft with tape to prevent damage to "O" rings.



INSTALLING ONE-WAY CLUTCH



CHECKING ONE-WAY CLUTCH OPERATION

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Fig. 21: Installing & Checking One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

Disassembly

Note location of mainshaft components. See **Fig. 12** . Remove mainshaft components.

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.

Reassembly

Lubricate all components with ATF. Reassemble mainshaft. See **Fig. 12** . Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Before installing NEW "O" rings on mainshaft, wrap splines on mainshaft with tape to prevent damage to "O" rings.

SECONDARY SHAFT

Disassembly

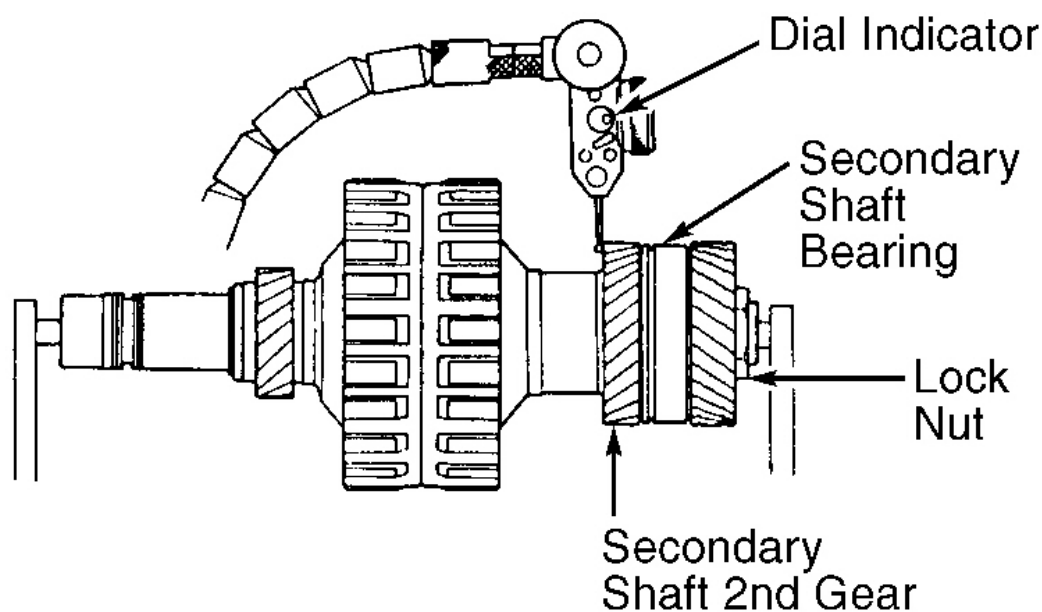
Note location of secondary shaft components. See **Fig. 12** . Remove secondary shaft components.

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.

Reassembly

1. Lubricate all components with ATF. Reassemble secondary shaft without "O" rings. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.
2. Remove secondary shaft bearing from transaxle housing. Install secondary shaft bearing, secondary shaft idler gear, spring washer and used lock nut on secondary shaft.
3. Tighten lock nut to 22 ft. lbs. (30 N.m). Attach dial indicator on secondary shaft with stem against secondary shaft 2nd gear. See **Fig. 22** . Push secondary shaft 2nd gear inward (toward 1st-2nd clutch) and zero dial indicator.
4. Pull secondary shaft 2nd gear outward and note axial clearance. This is the secondary shaft 2nd gear clearance. Check secondary shaft 2nd gear clearance at 3 places on secondary shaft 2nd gear. Average the 3 measurements to obtain secondary shaft 2nd gear clearance.
5. Replace splined washer located next to 1st-2nd clutch assembly if secondary shaft 2nd gear clearance is not .002-.005" (.04-.12 mm). Different thickness splined washers are available. See **SPLINED WASHER SPECIFICATIONS** table. Install different thickness splined washer (if necessary) and recheck clearance.
6. Remove lock nut, spring washer, secondary shaft idler gear and secondary shaft bearing. Lubricate all components with ATF.
7. Reassemble secondary shaft. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Before installing NEW "O" rings on secondary shaft, wrap splines on secondary shaft with tape to prevent damage to "O" rings.



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Fig. 22: Checking Secondary Shaft 2nd Gear Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

SPLINED WASHER SPECIFICATIONS

Washer No.	Part No.	Thickness In. (mm)
1	90406-PX4-700	.159 (4.05)
2	90407-PX4-700	.161 (4.10)
3	90408-PX4-700	.163 (4.15)
4	90409-PX4-700	.165 (4.20)
5	90410-PX4-700	.167 (4.25)
6	90411-PX4-700	.169 (4.30)
7	90412-PX4-700	.171 (4.35)
8	90413-PX4-700	.173 (4.40)
9	90414-PX4-700	.175 (4.45)

CLUTCH ASSEMBLIES

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 23** and **Fig. 24**.
2. On some 1st, 3rd and 4th clutches, disc spring may not be staked on clutch piston. Note direction of disc spring installation. Remove disc spring if disc spring is not staked on clutch piston.

3. Using spring compressor, compress return spring. Remove circlip. Release and remove spring compressor. Remove spring retainer and return spring.
4. 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 and securely fastened on clutch piston.
2. Inspect components for damage. Replace if necessary. Ensure no rough edges exist on "O" ring sealing areas.
3. On some 1st, 3rd and 4th clutches, disc spring may be staked on clutch piston. If disc spring is staked on clutch piston, ensure disc spring is securely staked to clutch piston.

Reassembly

1. Lubricate all components with 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. Remove spring compressor.
3. On 1st, 3rd and 4th clutches, install disc spring if disc spring is not staked on clutch piston. Install disc spring on 1st-hold clutch. Ensure disc spring is installed in proper direction. See **Fig. 23** and **Fig. 24**.

CAUTION: Soak clutch discs in 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.

NOTE: The 2nd clutch on 2.3L DOHC uses 4 clutch discs and 4 clutch plates, while 2nd clutch on 2.2L SOHC only uses 3 clutch discs and 3 clutch plates.

5. Using dial indicator, measure clutch clearance between clutch end plate and top clutch disc. See **Fig. 25**. 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. Clutch clearance should be 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.

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul**

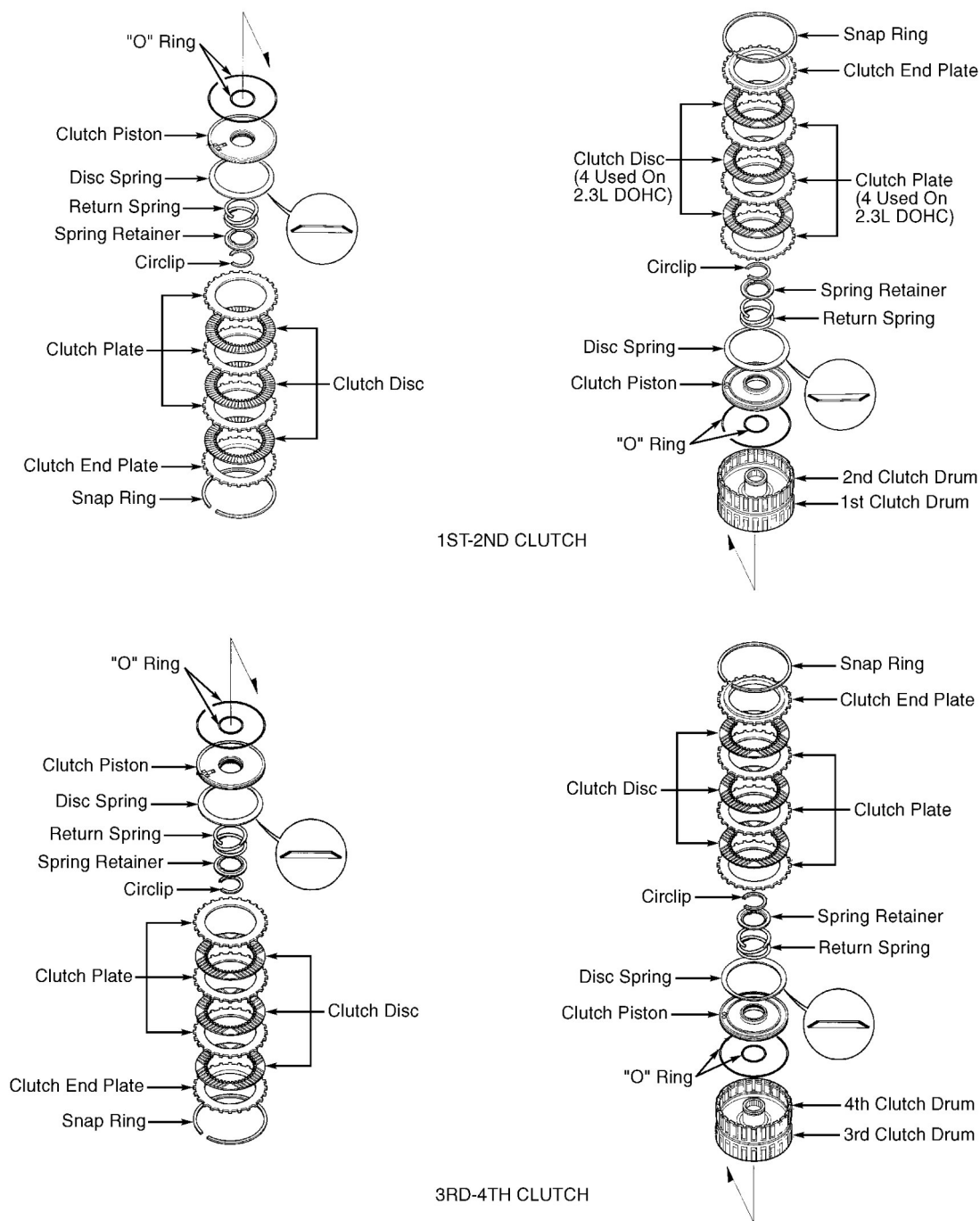
NOTE: If thickest clutch end plate is installed and clutch clearance still exceeds specification, replace clutch discs and clutch plates.

CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
1st & 2nd Clutches	.026-.033 (.65-.85)
1st-Hold Clutch	.031-.039 (.80-1.00)
3rd & 4th Clutches	.016-.024 (.40-.60)

CLUTCH END PLATE SPECIFICATIONS

Plate No.	Part No.	Thickness In. (mm)
1	22551-PX4-003	.083 (2.10)
2	22552-PX4-003	.087 (2.20)
3	22553-PX4-003	.091 (2.30)
4	22554-PX4-003	.094 (2.40)
5	22555-PX4-003	.098 (2.50)
6	22556-PX4-003	.102 (2.60)
7	22557-PX4-003	.106 (2.70)
8	22558-PX4-003	.110 (2.80)
9	22559-PX4-003	.114 (2.90)



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Fig. 23: Exploded View Of 1st-2nd & 3rd-4th Clutches
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

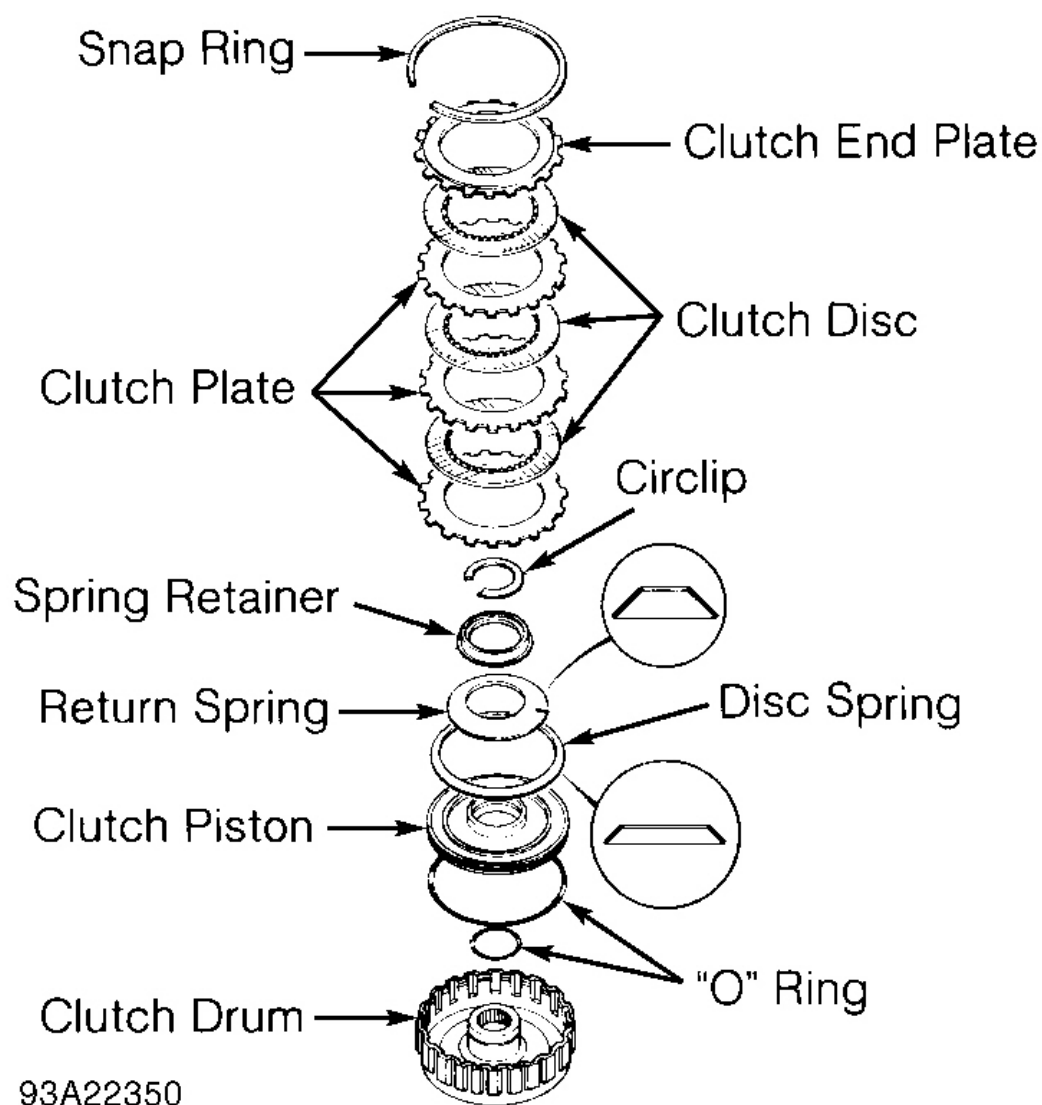
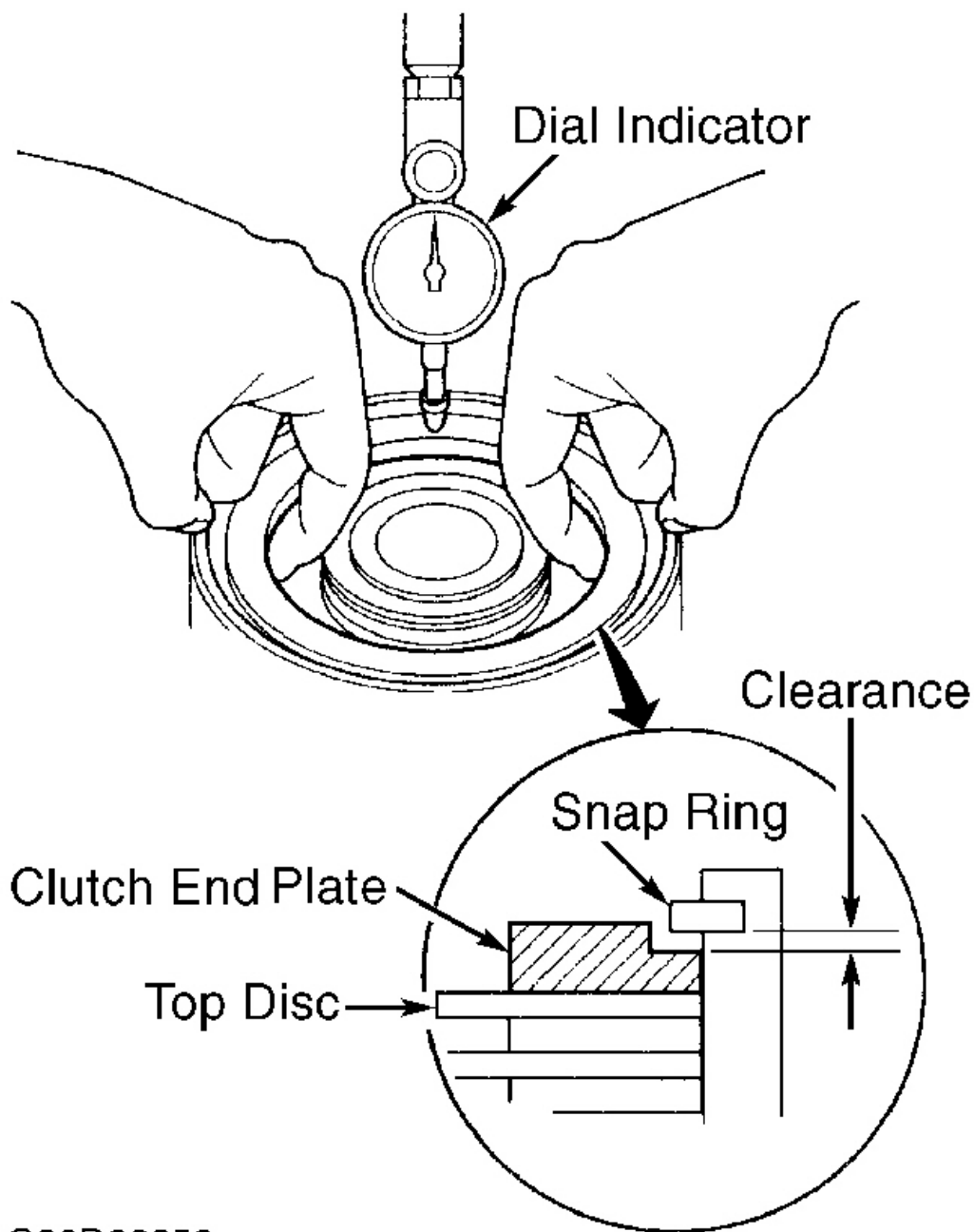


Fig. 24: Exploded View Of 1st-Hold Clutch
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 25: Measuring Clutch Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING

Disassembly

1. Remove countershaft bearing from torque converter housing using slide hammer (if necessary). Remove oil guide plate from torque converter housing. See **Fig. 13**.

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

2. If removing secondary shaft bearing, use heat gun to heat torque converter housing around secondary shaft bearing to 212°F (100°C). Tap secondary shaft bearing from torque converter housing.
3. Remove oil guide plate from torque converter housing. See **Fig. 13**. Using hammer and bearing remover/installer, remove mainshaft bearing and oil seal from torque converter housing.
4. If removing differential bearing outer race from torque converter housing, use heat gun to heat torque converter housing around differential bearing outer race to 212°F (100°C).
5. Tap bearing race from torque converter housing. Using hammer and drift, tap differential 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 bearing, use hammer and bearing remover/installer, install 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 flush with torque converter housing surface.
3. To install countershaft bearing, install NEW oil guide plate in countershaft bearing bore of torque converter housing. Ensure oil guide plate is installed so tab in center of oil guide plate faces upward (away from torque converter housing surface). See **Fig. 13**.
4. Using hammer and bearing installer, install countershaft bearing into torque converter housing. To install secondary shaft bearing, install NEW oil guide plate in secondary shaft bearing bore of torque converter housing.
5. Ensure oil guide plate is installed so tab in center of oil guide plate is facing upward (away from torque converter housing surface). Ensure oil guide is installed to a depth of 0-.001" (0-.03 mm), zero being flush and .001" is past flush. See **Fig. 13**. Using hammer and bearing installer, install secondary shaft bearing into torque converter housing.
6. To install differential bearing outer race, use hammer and bearing race installer, install differential bearing outer race in torque converter housing until race is even with torque converter housing surface.

CAUTION: DO NOT install thrust shim in torque converter housing below differential bearing outer race. Thrust shim must be installed in transaxle housing.

7. To install differential oil seal, use hammer and oil seal installer, install NEW oil seal into torque converter housing until oil seal is fully seated.

TRANSAXLE HOUSING

Disassembly

1. Expand snap ring, and press mainshaft, countershaft and secondary shaft bearings from transaxle housing. Using hammer and drift, tap differential oil seal from transaxle housing.

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

2. If removing differential bearing outer race, use heat gun to heat transaxle housing around differential bearing outer race to 212°F (100°C).
3. Tap differential bearing outer race from transaxle housing. Remove thrust shim, located below differential bearing outer race 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.

NOTE: Ensure original thickness thrust shim is installed. If any components have been changed, differential assembly bearing preload must be checked. See **DIFFERENTIAL ASSEMBLY BEARING PRELOAD** under **TRANSAXLE REASSEMBLY**.

Reassembly

1. Install thrust shim. Using hammer and bearing race installer, install differential bearing outer race in transaxle housing.
2. To install mainshaft, countershaft and secondary shaft bearings, expand snap ring and install bearing part way into transaxle housing. Release snap ring.
3. Press bearing into transaxle housing until snap ring engages with groove on bearing. Ensure snap ring end gap is 0-.276" (0-7 mm). If snap ring end gap is not within specification, reseal or replace snap ring.

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

4. To install differential oil seal, use hammer and oil seal installer, install NEW oil seal into transaxle housing until oil seal is fully seated.

RIGHT SIDE COVER

Disassembly

Remove snap rings retaining clutch feedpipes in right side cover. Remove feedpipe guides, clutch feedpipes and "O" rings from right side cover. See **Fig. 7**.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for cracks or damage. Replace components as necessary.

Reassembly

To reassemble, reverse disassembly procedure using NEW "O" rings.

DIFFERENTIAL ASSEMBLY**Disassembly**

1. Before disassembling differential assembly, check side gear backlash. Place differential assembly on "V" blocks with both axle shafts installed.
2. Install dial indicator with stem resting against pinion gear. See **Fig. 26**. Check side gear backlash. Side gear backlash should be .002-.006" (.05-.15 mm).
3. If side gear backlash is not within specification, different thickness pinion gear thrust washer should be installed during reassembly. See **PINION GEAR THRUST WASHER SPECIFICATIONS** table.
4. If replacing bearings, use bearing puller to remove bearings from differential carrier. Remove bolts and ring gear.

NOTE: Ring gear bolts have left-hand threads.

5. Drive pin from differential carrier. See **Fig. 27**. Remove pinion shaft, pinion gears, side gears and thrust washers.

PINION GEAR THRUST WASHER SPECIFICATIONS

Part Number	Thickness In. (mm)
41351-PG1-000	.028 (.70)
41352-PG1-000	.029 (.75)
41353-PG1-000	.031 (.80)
41354-PG1-000	.032 (.85)
41355-PG1-000	.035 (.90)
41356-PG1-000	.036 (.95)
41357-PG1-000	.039 (1.00)
41358-PG1-000	.041 (1.05)

Cleaning & Inspection

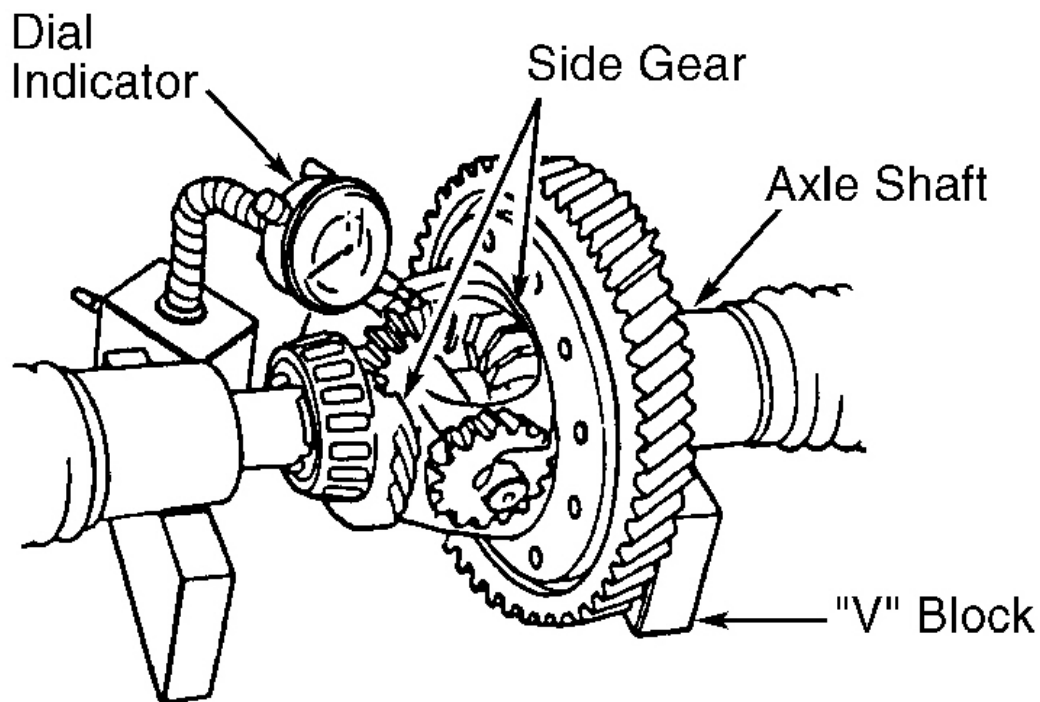
Clean components with solvent and dry with compressed air. Inspect components for wear and damage. Replace components as necessary.

Reassembly

1. Coat both sides of pinion gears and side gears with grease. Install side gears and side gear thrust washers in differential carrier.
2. Install pinion gears and pinion gear thrust washers in differential carrier so they are exactly opposite each other. Rotate pinion gears until they align with pinion shaft hole in differential carrier. Install pinion shaft and pin.
3. Recheck side gear backlash. If side gear backlash is not within specification, select different thickness pinion gear thrust washers. Ensure both pinion gear thrust washers are the same thickness.
4. If side gear backlash is still not within specification, replace side and pinion gears. Recheck side gear backlash. If side gear backlash is still not within specification, replace differential carrier.

CAUTION: Ring gear must be installed with chamfered side of ring gear toward differential carrier. See Fig. 27 . Ring gear bolts are left-hand thread.

5. Install ring gear. Install and tighten ring gear bolts to specification. See **TORQUE SPECIFICATIONS** . Using press, install NEW bearings on differential carrier (if removed). Ensure bearings are fully seated on differential carrier.



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Fig. 26: Checking Side Gear Backlash
Courtesy of AMERICAN HONDA MOTOR CO., INC.

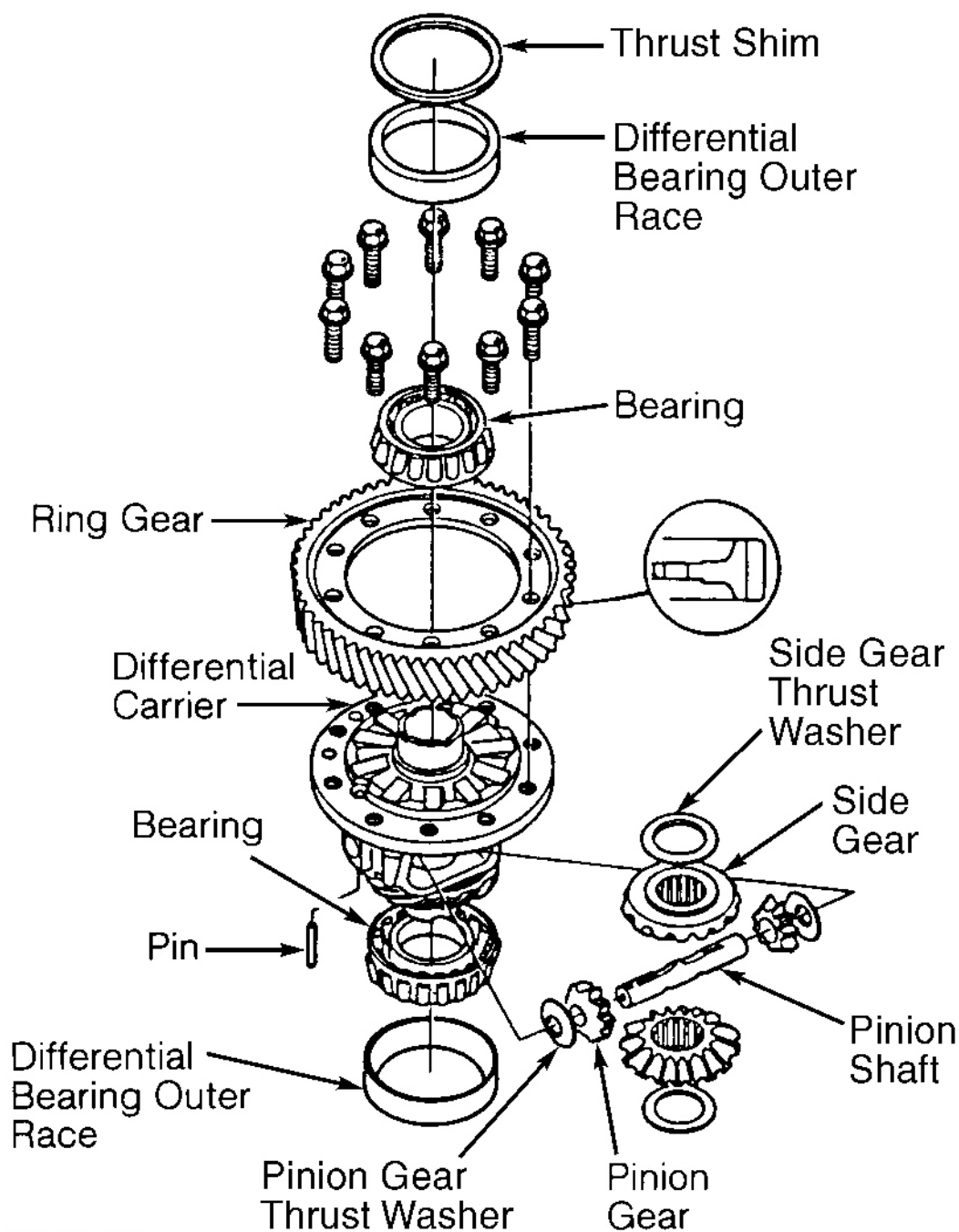


Fig. 27: Exploded View Of Differential Assembly
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE REASSEMBLY

DIFFERENTIAL ASSEMBLY BEARING PRELOAD

NOTE: If transaxle housing, torque converter housing, differential carrier, bearings, thrust shim or differential bearing outer races are replaced, differential assembly bearing preload must be checked.

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

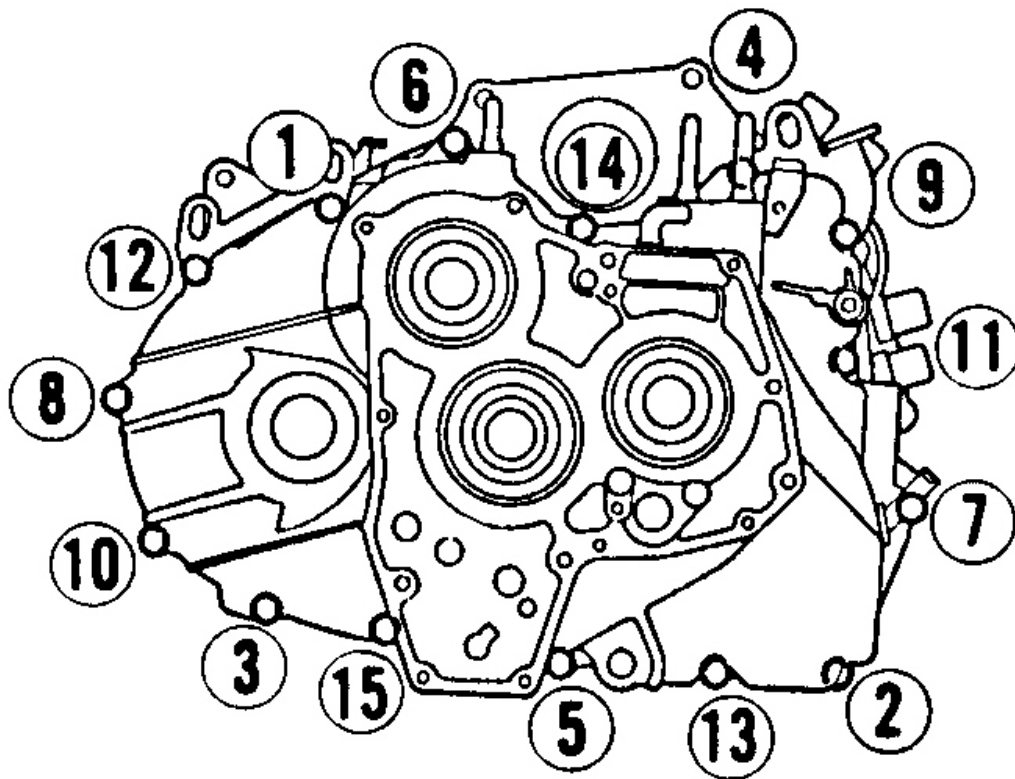
1. Using heat gun, heat transaxle housing around differential bearing outer race and thrust shim to 212°F (100°C). Tap differential bearing outer race from transaxle housing. Remove thrust shim, located below differential bearing outer race, from transaxle housing.
2. Allow transaxle housing to cool to room temperature. Select thrust shim so total thickness of thrust shim is .102" (2.60 mm). See the **THRUST SHIM SPECIFICATIONS** table.

CAUTION: DO NOT use more than 2 thrust shims when adjusting differential assembly bearing preload.

3. Install thrust shim in transaxle housing. Using hammer and bearing race installer, install differential bearing outer race in transaxle housing. Ensure differential bearing outer race is fully seated in transaxle housing.
4. Install gasket on torque converter housing. **DO NOT** apply sealer at this time. Install differential assembly in torque converter housing. Install transaxle housing on torque converter housing without mainshaft, countershaft and secondary shaft installed.

CAUTION: Ensure gasket is installed when checking differential assembly bearing preload.

5. Install and tighten transaxle housing-to-torque converter housing bolts to 40 ft. lbs. (54 N.m) in sequence. See **Fig. 28** . Rotate differential assembly several revolutions to seat bearings.



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Fig. 28: Transaxle Housing Bolt Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install Preload Adapter (07HAJ-PK40201) into differential assembly. See **Fig. 29** . Install INCH-lb. torque wrench on preload adapter. Measure differential assembly bearing preload by checking starting torque required to rotate differential assembly in both directions at room temperature.
7. Differential assembly bearing preload should be within specification. See **DIFFERENTIAL ASSEMBLY BEARING PRELOAD SPECIFICATIONS** table.
8. If differential assembly bearing preload is not within specification, select proper thickness thrust shim to obtain correct reading. See **THRUST SHIM SPECIFICATIONS** table.
9. Changing thrust shim to the next size will increase or decrease bearing preload about 2.60-3.50 INCH lbs. (.3-.4 N.m). Increase thrust shim thickness to increase differential assembly bearing preload. Decrease thrust shim thickness to decrease bearing preload.

CAUTION: DO NOT use more than 2 thrust shims when adjusting differential assembly bearing preload.

10. If adjusting differential assembly bearing preload, remove transaxle housing from torque converter housing. Remove differential bearing outer race from transaxle housing. Install correct thrust shim. Using hammer and bearing race installer, install differential bearing outer race in transaxle housing.
11. Reinstall transaxle housing and recheck differential assembly bearing preload. Once correct differential assembly bearing preload is obtained, remove transaxle housing, gasket and differential assembly from torque converter housing.

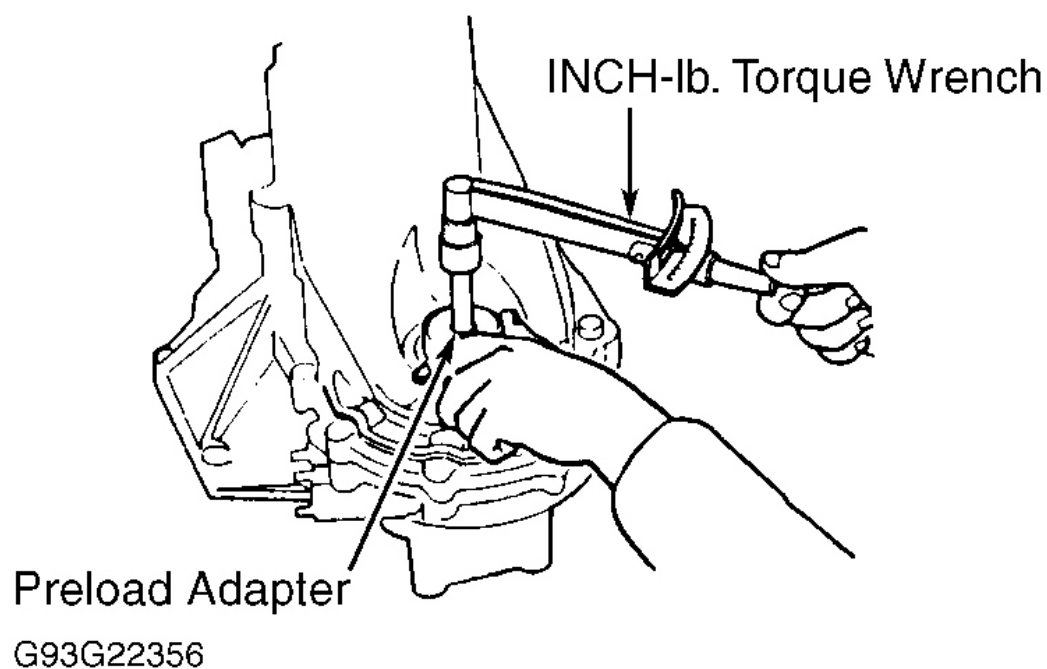


Fig. 29: Checking Differential Bearing Preload
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

THRUST SHIM SPECIFICATIONS

Shim I.D.	Part Number	Thickness In. (mm)
A	41441-PK4-000	.087 (2.20)
B	41442-PK4-000	.089 (2.25)
C	41443-PK4-000	.091 (2.30)
D	41444-PK4-000	.093 (2.35)
E	41445-PK4-000	.094 (2.40)
F	41446-PK4-000	.096 (2.45)
G	41447-PK4-000	.098 (2.50)
H	41448-PK4-000	.100 (2.55)
I (1)	41449-PK4-000	.102 (2.60)

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul**

J	41450-PK4-000	.104 (2.65)
K	41451-PK4-000	.106 (2.70)
L	41452-PK4-000	.108 (2.75)
M	41453-PK4-000	.110 (2.80)
N	41454-PK4-000	.112 (2.85)
O	41455-PK4-000	.114 (2.90)
P	41456-PK4-000	.116 (2.95)
O	41457-PK4-000	.118 (3.00)
R	41458-PK4-000	.120 (3.05)

(1) This is the standard thrust shim.

DIFFERENTIAL ASSEMBLY BEARING PRELOAD SPECIFICATIONS ⁽¹⁾

Application	INCH Lbs. (N.m)
New Bearings	24-35 (2.8-4.0)
Used Bearings	22-32 (2.5-3.7)

(1) The starting torque required to rotate differential assembly.

VALVE BODIES & INTERNAL COMPONENTS

NOTE: If transaxle housing, torque converter housing, differential carrier, bearings, thrust shim or differential bearing outer races are replaced, differential assembly bearing preload must be checked. See **DIFFERENTIAL ASSEMBLY BEARING PRELOAD** under TRANSAXLE REASSEMBLY.

NOTE: Coat all components with ATF before reassembly.

1. Install main separator plate and 3 dowel pins on torque converter housing. Install oil pump drive gear, oil pump driven gear and oil pump driven gear shaft.

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

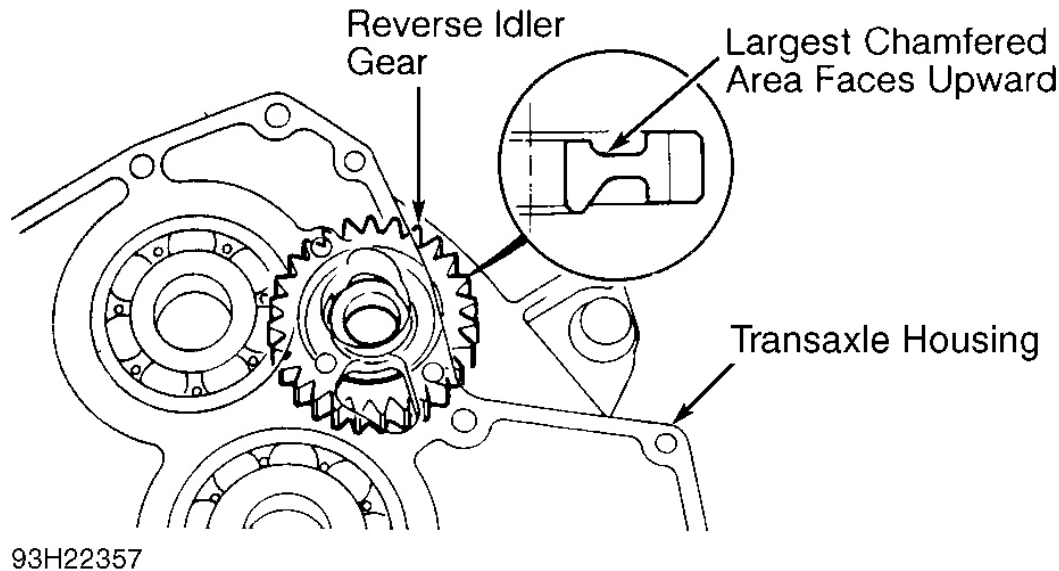
2. Install main valve body. Loosely install all main valve body bolts. Once all bolts are installed, tighten main valve body bolts to specification. See **TORQUE SPECIFICATIONS**.

CAUTION: Ensure oil pump gears rotate smoothly and oil pump driven gear shaft moves freely once main valve body is installed. If components do not operate correctly, loosen main valve 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.

3. Ensure filter and check balls are installed in main valve body. See **Fig. 14**. Install stator shaft, NEW "O"

ring and stopper shaft. Install dowel pins in main valve body. Install spring and torque converter check valve in regulator valve body.

4. Install regulator valve body and bolt on main valve body. Ensure filter is installed on regulator valve body. See **Fig. 13** . Install dowel pins and throttle valve separator plate on regulator valve body.
5. Install throttle control shaft on throttle valve body using NEW "E" clip. Install throttle valve body. Install and tighten throttle valve body and regulator valve body bolts to specification.
6. Install secondary separator plate and dowel pins on main valve body. See **Fig. 13** . Install control shaft on torque converter housing. Ensure control shaft engages with manual valve on main valve body.
7. Install detent arm and detent arm shaft on main valve body. See **Fig. 13** . Install detent spring and hook on detent arm and control shaft.
8. Install cable control lever on end of control shaft. Install secondary valve body on secondary separator plate. Ensure check balls are installed in secondary valve body. See **Fig. 16** .
9. Install servo separator plate and servo body on secondary valve body. Install and tighten servo body bolts to specification.
10. Install oil feedpipes and accumulator cover on servo body. Install and tighten accumulator cover bolts to specification.
11. Install fluid strainer. Install and tighten fluid strainer bolts to specification.
12. Install servo detent base. Install NEW bolt locks (if equipped) on servo detent base bolts. Install and tighten bolts to specification. Bend over tabs on bolt locks.
13. Install 1st-2nd accumulator body. Install and tighten bolts to specification.
14. Ensure steel ball and 1st accumulator choke is located in 1st-2nd accumulator body. See **Fig. 20** . Install accumulator body cover. Install and tighten bolts to specification.
15. Install oil and clutch feedpipes in main valve body. Install differential assembly, mainshaft, secondary shaft and countershaft in torque converter housing.
16. Install splined washer, thrust needle bearing and needle bearings on secondary shaft. See **Fig. 12** . Install needle bearing and countershaft 4th gear on countershaft.
17. Install reverse selector on countershaft. Ensure flanged side of reverse selector is facing upward (away from torque converter housing). Install shift fork and reverse selector hub.
18. Rotate shift fork shaft on servo body so large chamfered hole aligns with hole in shift fork. Install shift fork bolt and NEW bolt lock. Tighten bolt to specification. Bend over tabs on bolt lock.
19. Install secondary shaft 2nd gear, thrust needle bearing and thrust washer on secondary shaft. Install needle bearing, countershaft reverse gear and countershaft 2nd gear on countershaft.
20. Install reverse idler gear in transaxle case with largest chamfered area facing upward (away from transaxle housing). See **Fig. 30** .

**Fig. 30: Installing Reverse Idler Gear**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install dowel pins and NEW gasket on torque converter housing. Align spring pin with groove in transaxle housing by rotating control shaft. See **Fig. 11**.
22. Install transaxle housing on torque converter housing. Install and tighten bolts to specification in sequence using several steps. See **Fig. 28**. Engage reverse idler gear with countershaft reverse gear.
23. Install NEW "O" rings on shaft for reverse idler shaft holder. See **Fig. 9**. Coat shaft, needle bearing and NEW "O" rings with grease.
24. Install shaft in reverse idler gear shaft holder. Ensure flat area on shaft engages with flat area on reverse idler gear shaft holder. See **Fig. 9**.
25. Install reverse idler gear shaft holder with needle bearing on transaxle housing. Install and tighten bolts to specification.
26. Install parking brake lever spring and parking brake lever on control shaft. See **Fig. 7**. Install bolt and NEW bolt lock on parking brake lever. **DO NOT** tighten bolt at this time.

NOTE: Mainshaft lock nut has left hand threads.

27. Install Mainshaft Holder (07GAB-PF50100 or 07GAB-PF50101) on mainshaft to secure mainshaft from rotating. See **Fig. 8**. Install mainshaft idler gear on mainshaft. Install old mainshaft lock nut on mainshaft. Mainshaft has left-hand threads.
28. Tighten mainshaft lock nut to 166 ft. lbs. (230 N.m) to seat mainshaft idler gear on mainshaft. **DO NOT** use hammer to install mainshaft idler gear on mainshaft or impact wrench to tighten lock nut.
29. Install secondary shaft idler gear on secondary shaft. Install thrust washer, thrust needle bearing, needle bearing, countershaft idler gear and parking gear on countershaft. See **Fig. 7**.

30. Install old secondary shaft lock nut on secondary shaft. Tighten secondary shaft lock nut to 166 ft. lbs. (230 N.m) while holding countershaft idler gear to seat secondary shaft idler gear on secondary shaft. **DO NOT** use hammer to install secondary shaft idler gear on secondary shaft or impact wrench to tighten lock nut.
31. Place 24-mm socket at center of parking gear. Install a 10 x 1.25-mm bolt in end of countershaft. Install parking pawl shaft, parking pawl stopper, parking pawl spring and parking pawl. See **Fig. 7** . Engage parking pawl with parking gear.
32. Tighten bolt to pull parking gear onto the countershaft. **DO NOT** use hammer to install parking gear on countershaft. Remove bolt and socket. Install old countershaft lock nut on countershaft. Tighten countershaft lock nut to 166 ft. lbs. (230 N.m) to seat parking gear on countershaft. **DO NOT** use impact wrench to tighten lock nut.
33. Remove lock nuts from mainshaft, countershaft and secondary shaft. Install NEW spring washers and NEW lock nuts on mainshaft, countershaft and secondary shaft. Ensure spring washers are installed so large area of spring washer is against lock nut. See **Fig. 7** .
34. Tighten lock nuts to specification. **DO NOT** use impact wrench to tighten lock nuts. Stake lock nuts against shaft. Remove mainshaft holder.

CAUTION: Ensure all lock nuts are securely staked against the shaft.

35. Place parking brake lever in "P" position. Ensure parking pawl fully engages with parking gear. If parking pawl does not fully engage, measure parking brake stopper distance between parking pawl shaft and pin on parking brake stopper. See **Fig. 31** .
36. Parking brake stopper distance should be 2.54-2.58" (64.5-65.6 mm). If parking brake stopper distance is not within specification, install different size parking brake stopper.
37. Parking brake stopper is available in different sizes. See **Fig. 31** . See **PARKING BRAKE STOPPER SPECIFICATIONS** table.
38. Tighten parking brake lever bolt to specification. Bend over tabs on bolt lock. Using NEW gasket, install right side cover. Install and tighten bolts to specification.
39. To install remaining components, reverse removal procedure. Use NEW seal washers when installing joint bolts for ATF cooler pipes. Tighten all fasteners to specification.

PARKING BRAKE STOPPER SPECIFICATIONS ⁽¹⁾

I.D.	Part Number	Distance "A" In. (mm)	Distance "B" In. (mm)
1	24537-PA9-003	.433 (11.00)	.433 (11.00)
2	24538-PA9-003	.425 (10.80)	.419 (10.65)
3	24539-PA9-003	.417 (10.60)	.406 (10.30)

(1) Measured from center of parking brake stopper. See **Fig. 31** .

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

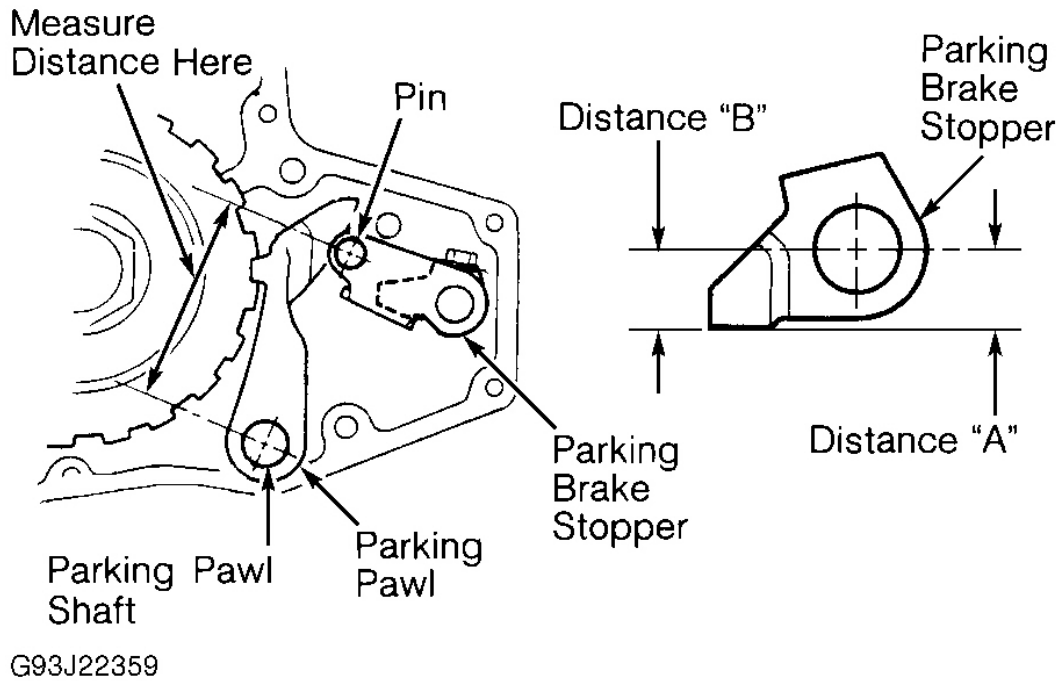


Fig. 31: Measuring Parking Brake Stopper Distance & Parking Brake Stopper
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Countershaft Lock Nut	123 (167)
Joint Bolt	21 (29)
Main Valve Body Bolt	
6-mm Bolt	(1)
8-mm Bolt	13 (18)
Mainshaft Lock Nut	123 (167)
Pressure Tap Plug	13 (18)
Ring Gear Bolt	76 (103)
Secondary Shaft Lock Nut	123 (167)
Speed Sensor Assembly Bolt	13 (18)
Transaxle Housing Bolt ⁽²⁾	40 (54)
INCH Lbs. (N.m)	
Accumulator Body Cover Bolt	106 (12.0)
Accumulator Cover Bolt	106 (12.0)

1995 Honda Prelude S**AUTOMATIC TRANSMISSIONS MP1A Overhaul**

Countershaft Speed Sensor Bolt	106 (12.0)
Fluid Strainer Bolt	106 (12.0)
Lock-Up Control Solenoid Valve Assembly Bolt	106 (12.0)
Mainshaft Speed Sensor Bolt	106 (12.0)
Parking Brake Lever Bolt	124 (14.0)
Regulator Valve Body Bolt	106 (12.0)
Reverse Idler Gear Shaft Holder Bolt	106 (12.0)
Right Side Cover Bolt	106 (12.0)
Servo Body Bolt	106 (12.0)
Servo Detent Base Bolt	106 (12.0)
Shift Control Solenoid Valve Assembly Bolt	106 (12.0)
Shift Fork Bolt	124 (14.0)
Stopper Bolt	106 (12.0)
Throttle Cam Stopper Bolt	71 (8.0)
Throttle Valve Body Bolt	106 (12.0)
1st-2nd Accumulator Body Bolt	106 (12.0)

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

(2) Tighten bolts to specification in sequence. See **Fig. 28** .

TRANSAXLE SPECIFICATIONS**TRANSAXLE SPECIFICATIONS**

Application	Specification: In. (mm)
Clutch Clearance	
1st & 2nd Clutches	.026-.033 (.65-.85)
1st-Hold Clutch	.031-.039 (.80-1.00)
3rd & 4th Clutches	.016-.024 (.40-.60)
Differential Bearing Preload ⁽¹⁾	
New Bearings	24-35 INCH lbs. (2.8-4.0 N.m)
Used Bearings	22-32 INCH lbs. (2.5-3.7 N.m)
Oil Pump Side Clearance	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Oil Pump Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)
Secondary Shaft 2nd Gear Clearance	.003-.006 (.07-.15)
Side Gear Backlash	.002-.006 (.05-.15)
Parking Brake Stopper Distance	2.54-2.58 (64.5-65.6)

(1) This is the starting torque required to rotate differential assembly.