

1991 AUTOMATIC TRANSMISSIONS

ML4A Overhaul (2WD)

APPLICATION

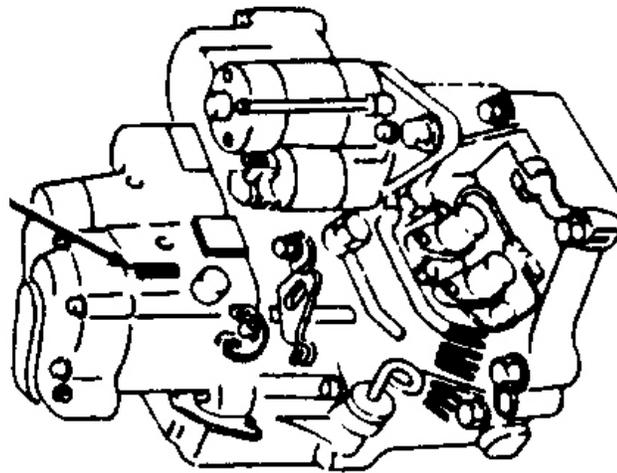
TRANSAXLE APPLICATION

Application	Transaxle Model
Civic, Civic CRX & Civic 2WD Wagon	ML4A

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.

Transaxle Model
& Serial Number



93C23277

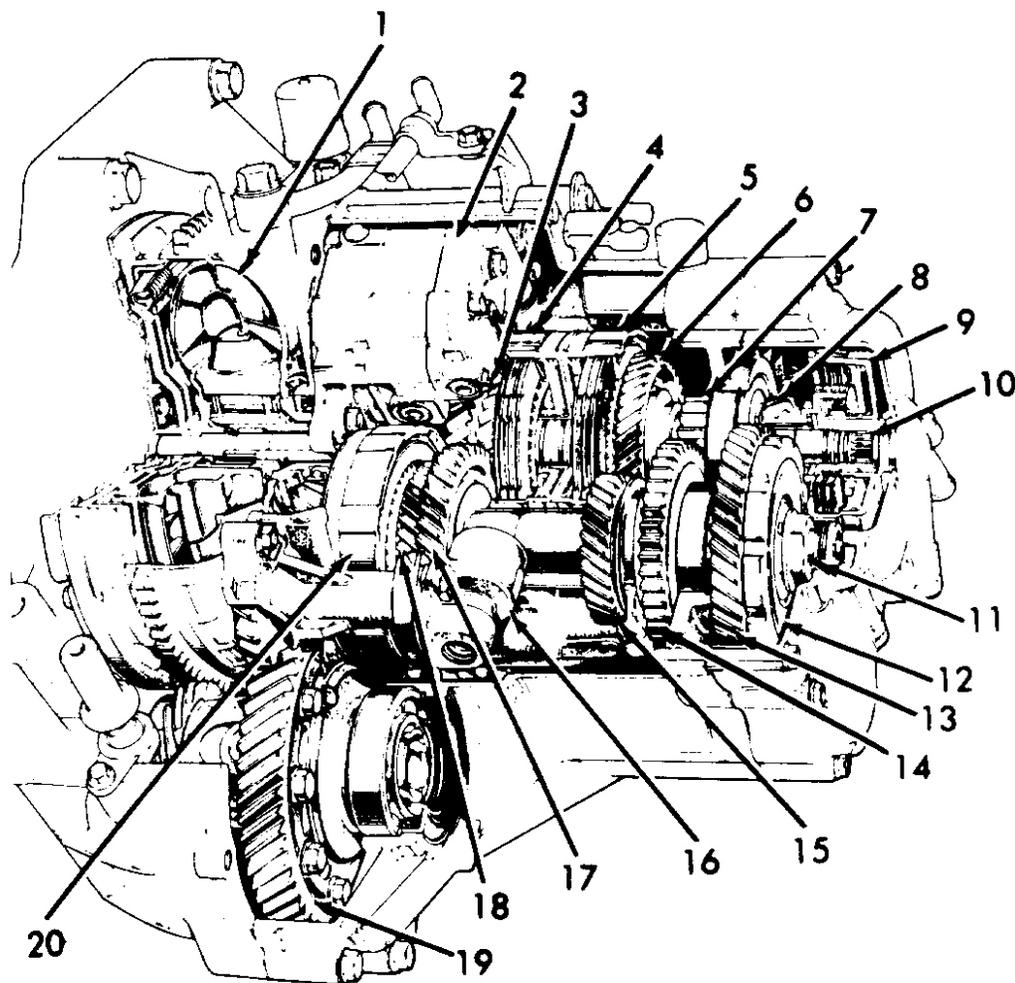
Fig. 1: Identifying Transaxle Model & Serial Number Location

Courtesy of AMERICAN HONDA MOTOR CO., INC.

DESCRIPTION

Automatic transaxle provides 4 forward speeds and one reverse speed. Transaxle consists of clutches, mainshaft, countershaft, lock-up control solenoid valves and lock-up torque converter. See **Fig. 2** .

Valve assembly consists of main valve body, secondary valve body, servo valve body, modulator valve body, lock-up valve body, regulator valve body and governor. Torque converter lock-up is controlled by the PGM-FI Electronic Control Unit (ECU). This is the ECU used for controlling the fuel injection system.



- | | |
|---------------------------|-------------------------------|
| 1. Torque Converter | 10. Mainshaft |
| 2. Valve Assembly | 11. Countershaft |
| 3. Mainshaft 2nd Gear | 12. Parking Gear |
| 4. 2nd Clutch | 13. Countershaft 1st Gear |
| 5. 4th Clutch | 14. Countershaft Reverse Gear |
| 6. Mainshaft 4th Gear | 15. Countershaft 4th Gear |
| 7. Mainshaft Reverse Gear | 16. Governor Valve |
| 8. Mainshaft 1st Gear | 17. Countershaft 2nd Gear |
| 9. 1st Clutch | 18. Countershaft 3rd Gear |
| | 19. Differential Assembly |
| | 20. 3rd Clutch |

93D23278

Fig. 2: Identifying Transaxle Components

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OPERATION

Shift lever has 6 positions. When shift lever is moved, manual valve on main valve body is moved by the shift

cable. When certain transaxle gear combinations are engaged by clutches, power is transmitted from the mainshaft to the countershaft 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 safety switch incorporated in shift position console switch allows starting in this position.

"R" (Reverse)

Reverse selector engages with countershaft reverse gear and 4th gear clutch is applied. Back-up light switch incorporated in shift position console switch allows back-up lights to operate.

"N" (Neutral)

All clutches released. Neutral safety switch incorporated in shift position console switch allows starting in this position.

"D4" (Drive/4th)

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. Torque converter lock-up will operate when in this gear by signal delivered from PGM-FI ECU when transaxle is in 3rd or 4th gear.

"D" (Drive/3rd)

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

"2" (Second)

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

The PGM-FI ECU contains a self-diagnostic system which will store a fault code if a failure or problem exists in lock-up control solenoid valve or wiring circuit. Fault code can be retrieved to determine transaxle problem area. For information on lock-up control solenoid valve controls, see **ML4A ELECTRONIC CONTROLS (2WD)** article.

When in "D4", 3rd and 4th gears, torque converter lock-up exists and transaxle mainshaft rotates same speed as engine crankshaft. Torque converter lock-up is controlled by the PGM-FI ECU. The PGM-FI ECU receives various input signals and operates lock-up control solenoid valve. Operation of lock-up control solenoid valve controls the modulator pressure.

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 **ML4A ELECTRONIC CONTROLS (2WD)**

article.

LUBRICATION & ADJUSTMENTS

See SERVICING article.

ON-VEHICLE SERVICE

AXLE SHAFTS

See FWD 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 (5.6-8.4 kg/cm²) air pressure to oil cooler flusher. Turn oil cooler flusher water valve on so water will flow through oil cooler for 10 seconds. Shut water valve off. Replace oil cooler if water will not flow through oil cooler.
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 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. 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.

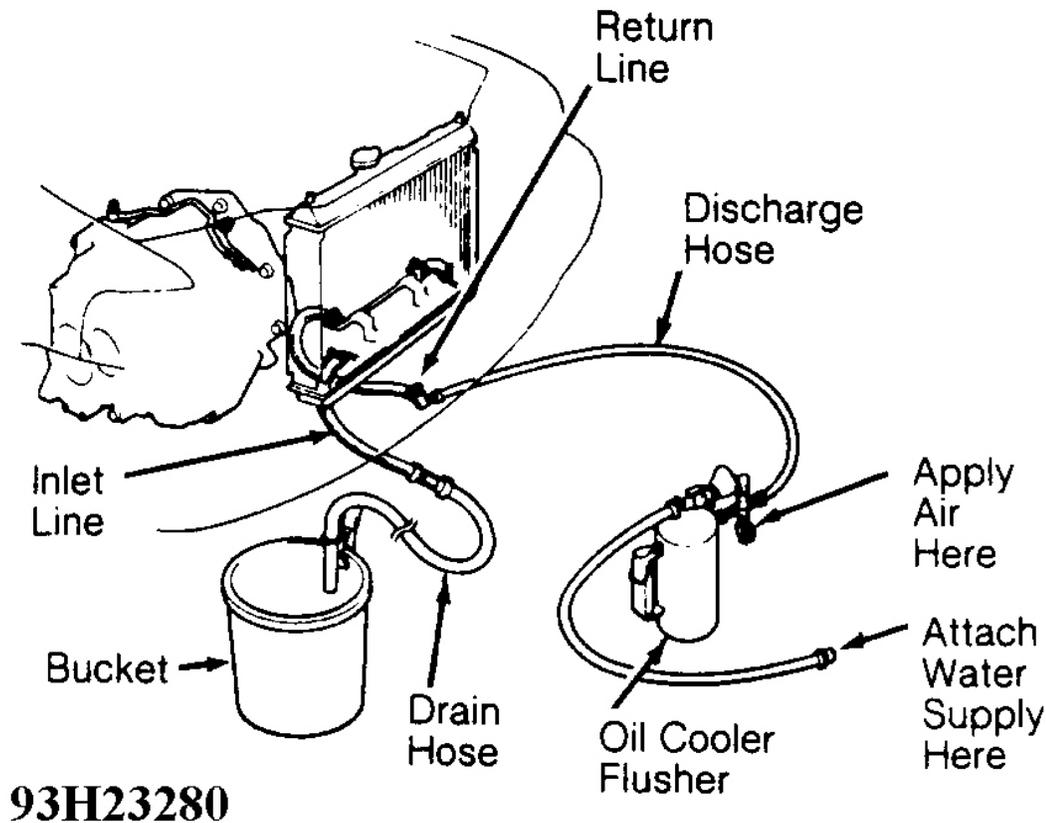


Fig. 3: Installing Oil Cooler Flusher

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

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

SYMPTOM DIAGNOSIS

Engine Stalls On Sudden Stops With Shift Lever In "D4"

- Lock-Up Clutch Cut Valve Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short

Excessive Drag In Transaxle

- Binding Oil Pump

Excessive Idle Vibration

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

Excessive Vibration (RPM Related)

- Torque Converter Not Fully Seated In Oil Pump

Gear Whine That Changes With RPM & Shifts

- Damaged Mainshaft Or Countershaft
- Defective Oil Pump
- Defective 3rd Gears

Gear Whine That Changes With Speed

- Defective Differential Gears
- Defective Reverse Gears

Harsh 3-2 Downshift At Closed Throttle

- Throttle Valve "B" Stuck
- Improperly Adjusted Throttle Valve (T.V.) Cable

Harsh Kickdown Shifts

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

Harsh Upshifts & Downshifts

- Check Balls Missing
- Clutch Pressure Control Valve Stuck
- Improper Type ATF
- Incorrect Clutch Clearance
- Kickdown Valve Stuck
- Orifice Control Valve Stuck

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

Harsh 1-2 Upshift

- Defective 2nd Clutch
- Throttle Valve (T.V.) Cable Adjusted Too Short

Harsh 2-1 Kickdown Shift

- Incorrect Clutch Clearance

Harsh 2-3 Upshift

- Clutch Pressure Control Valve Stuck
- Defective 3rd Clutch
- 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 (T.V.) Cable Adjusted Too Short

Lock-Up Clutch Does Not Lock-Up Smoothly

- Defective Torque Converter
- Lock-Up Clutch Control Valve Stuck
- Lock-Up Clutch Timing Valve "B" Stuck

Lock-Up Clutch Does Not Operate Properly

- Defective Lock-Up Control Solenoid Valve
- Governor Valve Stuck
- Improperly Adjusted Throttle Valve (T.V.) Cable
- Lock-Up Clutch Control Valve Stuck
- Lock-Up Clutch Cut Valve Stuck
- Lock-Up Clutch Shift Valve Stuck
- Lock-Up Clutch Timing Valve "A" Or "B" Stuck
- Throttle Valve "B" Stuck

- Torque Converter Check Valve Stuck

Noise From Transaxle In All Gears

- Defective Oil Pump
- Defective Torque Converter

Noise From Transaxle With Wheels Rolling

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

Popping Noise When Starting 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

- Modulator Valve Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short
- 3-2 Timing Valve Stuck

Slips In All Gears

- Defective Oil Pump
- Fluid Strainer Clogged

- Pressure Regulator Stuck

Slips In Reverse

- Defective 4th Clutch Or 4th Accumulator

Slips In 1st Gear

- Defective One-Way Clutch
- Defective 1st Clutch Or 1st Accumulator
- Feedpipe "O" Ring Damaged
- Servo Valve Check Valve Loose

Slips In 2nd Gear

- Clutch Pressure Control Valve Stuck
- Defective Seal Rings Or Guide
- Defective 2nd Clutch Or 2nd Accumulator
- Servo Valve Check Valve Loose
- 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
- Feedpipe "O" Ring Damaged
- Servo Valve Check Valve Loose
- 3-4 Shift Valve Stuck

Slips In 4th Gear

- Clutch Pressure Control Valve Stuck
- Defective 4th Clutch Or 4th Accumulator
- Servo Valve Check Valve Loose

Slips On 2-3 Upshift

- Throttle Valve "B" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Long
- 2nd Orifice Control Valve Stuck

Slips On 3-4 Upshift

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

Upshifts Early

- Modulator Valve Stuck
- Throttle Valve "A" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Long

Upshifts Late

- Governor Valve Stuck
- Modulator Valve Stuck
- Throttle Valve "A" Stuck
- Throttle Valve (T.V.) Cable Adjusted Too Short

Vehicle Locks In "R"

- Parking Brake Lever Installed Upside-Down

Vehicle Moves In All Gears Except "R"

- Defective Or Improperly Adjusted Shift Cable
- Defective Or Worn Reverse Gears
- Defective 4th Clutch
- Governor Valve Stuck
- Reverse Control 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 Starts Off In 2nd Gear With**Shift Lever In "D" Or "D4"**

- Governor Shaft Feedpipe Missing

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 Low Gear

- Governor Valve Stuck
- 1-2 Shift Valve Stuck

Will Not Upshift (Stays In Low Gear)

- Clutch Pressure Control Valve Stuck
- Governor Valve Stuck
- Modulator Valve Stuck
- Throttle Valve "A" Stuck
- 1-2 Shift Valve Stuck

Will Not Upshift To 4th Gear In "D4"

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

TESTING**ROAD TEST**

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NOTE: If shift lever cannot be moved from "P" with brake pedal depressed and accelerator at idle position, check shift interlock system. See **ML4A ELECTRONIC CONTROLS (2WD)** article.

1. Warm engine to normal operating temperature. Apply parking brake and block wheels. Start engine and move shift lever to "D4" while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat step 1 in "D" and ensure engine does not stall. Road test vehicle and check for abnormal noise and clutch slippage. Specified clutch is applied in designated gears. See **CLUTCH APPLICATION** table.
3. Ensure shift points are within specification. See **TRANSAXLE UPSHIFT SPECIFICATIONS (MPH)** and **TRANSAXLE DOWNSHIFT SPECIFICATIONS (MPH)** tables.
4. With shift lever in "D4", accelerate to about 35 MPH so transaxle is in 4th gear. Move shift lever to "2" position and ensure engine braking occurs.

CAUTION: DO NOT shift from "D4" or "D" to "2" at speeds over 63 MPH or transaxle may be damaged.

5. Place shift lever in "2". Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage. Upshifts and downshifts should not occur in this range.
6. Place shift lever in "R". Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage.
7. Park vehicle on a slope. Apply parking brake and place shift lever in "P". Release parking brake and ensure vehicle does not move. If vehicle moves, check for defective shift cable or parking components.

CLUTCH APPLICATION

Shift Lever Position	Elements In Use
Park & Neutral	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"	2nd Clutch
(1) The 1st clutch engages, but driving power is not transmitted, as one-way clutch slips.	

TRANSAXLE UPSHIFT SPECIFICATIONS (MPH)

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Shift Lever Position & Condition	1st-2nd Gear	2nd-3rd Gear	3rd-4th Gear	Lock-Up Clutch On
"D3" Or "D4" Range 1/8 Throttle Coasting Downhill From Stop	12-14	22-24	31-35	28-38
1/2 Throttle Accelerating From Stop	19-22	38-44	53-59	(1)
Full Throttle Accelerating From Stop	31-35	58-64	90-96	89-97

(1) Specification not available from manufacturer.

TRANSAXLE DOWNSHIFT SPECIFICATIONS (MPH)

Shift Lever Position & Condition	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
"D3" Or "D4" Range 1/8 Throttle Coasting Or Braking To A Stop	(1)	18-20	(1)	7-9
Full Throttle Vehicle Slowing By Grade Or Load	73-80	(1)	55-59	23-25

(1) This gear downshift does not occur.

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 front wheels. Connect tachometer and start engine. Warm engine to normal operating temperature. Ensure A/C is off. Place shift lever in "D".
2. Fully depress brake pedal. Fully depress accelerator for 6-8 seconds and note engine speed. This is the torque converter stall speed.
3. Place transmission in neutral and allow transaxle to cool for 2 minutes. Repeat test procedure in "D4", "2", and "R".
4. Torque converter stall speed should be the same in "D4", "D", "2" and "R" and within specification. 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 problem areas.

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TORQUE CONVERTER STALL SPEED SPECIFICATIONS

Application	Engine RPM
Standard	2750
Service Limit	2300-2900

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Torque Converter Stall Speed Test Results	Probable Cause
Stall Speed RPM High In "D4", "D", "2" & "R"	Low Fluid Level, Low Oil Pump Output, Clogged Fluid Strainer, Pressure Regulator Valve Stuck Closed, Slipping Clutch
Stall Speed RPM High In "R"	Slipping 4th Clutch
Stall Speed RPM High In "D4" & "D"	Slipping 1st Clutch, Defective One-Way Clutch
Stall Speed RPM High In "2"	Slipping 2nd Clutch
Stall Speed RPM Low In "D4", "D", "2" & "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 and block rear wheels. Raise and support vehicle so front wheels can rotate.

Line Pressure Test

1. With engine off, remove plug from line pressure tap on transaxle. See **Fig. 4** . Attach Pressure Gauge Set (07406-0020003) to line pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
2. With shift lever in "P", start and operate engine at 2000 RPM. Note line pressure. Place shift lever in "N" 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. Shut engine off. Remove pressure gauge set and install plug.

NOTE: Clutch pressure should be checked at each clutch pressure tap on transaxle. See **Fig. 4** .

Clutch Pressure Test

1. With engine off, remove plug from appropriate clutch pressure tap on transaxle. See **Fig. 4** . Attach Pressure Gauge Set (07406-0020003) 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 the 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 and note clutch pressure reading 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 and install plug.

Low-High Pressure Test

1. The low-high pressure is tested at 2nd, 3rd and 4th clutch pressure taps on transaxle. See Fig. 4 . 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 plug from appropriate clutch pressure tap on transaxle. Attach Pressure Gauge Set (07406-0020003) 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 "D" or "D4" position to check 2nd or 3rd clutch or "D4" position to check 4th clutch. 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 about 1/2 of lever travel distance. Increase engine speed and note highest pressure reading. This is high pressure.
5. Repeat procedure on 2nd, 3rd and 4th clutches. Low-high pressure should be within specification. See HYDRAULIC PRESSURE TEST SPECIFICATIONS table. If low-high pressure is not within specification, see HYDRAULIC PRESSURE TEST TROUBLE SHOOTING table.
6. Shut engine off. Remove pressure gauge set and install plug. Reconnect T.V. cable.

Throttle Valve Pressure Test

1. Throttle valve pressure should be checked at throttle valve "A" and "B" pressure taps on transaxle. 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 plug from appropriate throttle valve pressure tap. See Fig. 4 . Attach Pressure Gauge Set (07406-0020003) to throttle valve pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
3. Start engine and operate at 1000 RPM. Place shift lever in "D" or "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 pressure reading.
4. Throttle valve pressure should be within specification. See appropriate HYDRAULIC PRESSURE

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TEST SPECIFICATIONS table. If pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set and install plug. Reconnect T.V. cable.

Governor Pressure Test

1. With engine off, remove plug from governor pressure tap on transaxle. See **Fig. 4** . Attach Pressure Gauge Set (07406-0020003) to pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
2. Start engine. Place shift lever in "D" or "D4" position. No pressure should be indicated when wheels are not rotating. Accelerate to 38 and note governor pressure.
3. Governor pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If governor pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set and install plug.

HYDRAULIC PRESSURE TEST SPECIFICATIONS

Application	Shift Lever Position	psi (kg/cm ²)
Line Pressure		
With Engine At 2000 RPM	"P" Or "N"	107-121 (7.5-8.5)
Clutch Pressure		
1st Clutch With Engine At 2000 RPM	"D" Or "D4"	103-117 (7.3-8.3)
2nd Clutch With Engine At 2000 RPM	"2"	103-117 (7.3-8.3)
With Transaxle T.V. Lever Fully Closed ⁽¹⁾	"D" Or "D4"	53-60 (3.7-4.2)
With Transaxle T.V. Lever Open More Than 1/4 ⁽²⁾	"D" Or "D4"	103-117 (7.3-8.3)
3rd Clutch With Transaxle T.V. Lever Fully Closed ⁽¹⁾	"D"	53-60 (3.7-4.2)
With Transaxle T.V. Lever Open More Than 1/4 ⁽²⁾	"D"	103-117 (7.3-8.3)
4th Clutch With Engine At 2000 RPM	"R"	103-117 (7.3-8.3)
With Transaxle T.V. Lever Fully Closed ⁽¹⁾	"D4"	53-60 (3.7-4.2)
With Transaxle T.V. Lever Open More Than 1/4 ⁽²⁾	"D4"	103-117 (7.3-8.3)
Low Pressure		
With Transaxle T.V. Lever Fully Closed ⁽¹⁾ 2nd Or 3rd Clutch	"D" Or "D4"	53-60 (3.7-4.2)
4th Clutch	"D4"	53-60 (3.7-4.2)
High Pressure		
With Transaxle T.V. Lever Lifted Upward 1/2 Distance Of T.V. Lever Travel 2nd Or 3rd Clutch	"D" Or "D4"	103-117 (7.3-8.3)
With Transaxle T.V. Lever Lifted Upward 1/2 Distance Of T.V. Lever Travel 4th Clutch	"D4"	103-117 (7.3-8.3)
Throttle Valve "A" Pressure With Transaxle T.V. Lever Fully Open ⁽³⁾	"D" Or "D4"	73-75 (5.1-5.3)
Throttle Valve "B" Pressure With Transaxle T.V. Lever	"D" Or "D4"	103-117 (7.3-8.3)

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Fully Open ⁽³⁾		
Governor Pressure With Vehicle At 38 MPH	"D" Or "D4"	29-31 (2.0-2.2)
<p>(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.</p> <p>(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 1/4 of lever travel distance.</p> <p>(3) Pressure is checked with engine at 1000 RPM. Open position is with transaxle T.V. lever being pulled fully upward.</p>		

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 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 Pressure	
Low Or No Throttle Valve "A" Pressure	Defective Throttle Valve "A", Defective Throttle Modulator Valve Low Or No Throttle Valve
"B" Pressure	Defective Throttle Valve "B"
Governor Pressure	
Low Or No Governor Pressure	Defective Governor Valve

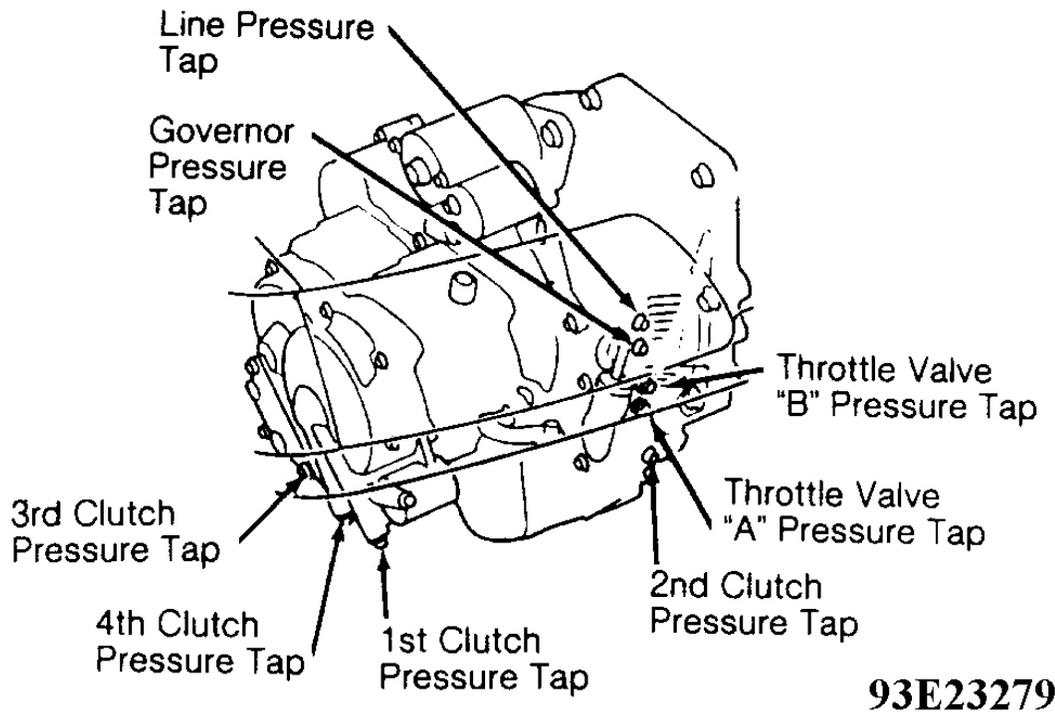


Fig. 4: Identifying Pressure Tap Locations

Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

TRANSAXLE

For transaxle removal procedure, see [REMOVAL & INSTALLATION](#) article.

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. Remove bolts, right side cover, gasket and "O" rings. See [Fig. 5](#) . Install Mainshaft Holder (07923-

6890202) on mainshaft to secure mainshaft. See **Fig. 6** . Engage parking pawl with parking gear.

2. Pry staked area of lock nut from shaft or parking gear on mainshaft and countershaft lock nuts. Remove lock nut from mainshaft and countershaft. See **Fig. 5** .

NOTE: Mainshaft has left-hand threads.

3. Remove mainshaft holder once all lock nuts are removed. Remove 1st clutch, thrust washer, thrust needle bearing and needle bearing. See **Fig. 5** .
4. Remove mainshaft 1st gear, thrust washer, collar and "O" rings from mainshaft. See **Fig. 5** . Remove parking pawl, parking pawl spring, parking pawl shaft and stop pin. See **Fig. 5** .
5. Using puller, remove parking gear and countershaft 1st gear from countershaft. Remove needle bearing and collar from countershaft. See **Fig. 5** . Remove bolts, reverse idler gear holder, steel ball, spring and needle bearing. See **Fig. 5** .

NOTE: When removing reverse idler gear holder, use care not to lose steel ball and spring.

6. Remove bolt and bolt lock from parking brake stopper. Remove parking brake stopper, parking shift arm and parking brake spring. See **Fig. 5** . Remove bolt, bolt lock, throttle control lever and throttle control lever spring.
7. Remove transaxle housing bolts. Align spring pin with cutout area in transaxle housing by rotating the control shaft. Using Puller (07HAC-PK4010A), remove transaxle housing and gasket. See **Fig. 7** . Remove reverse idler gear from transaxle housing and speed sensor (if necessary).
8. Remove collar, needle bearing and countershaft reverse gear from countershaft. See **Fig. 8** . Remove bolt, bolt lock, reverse shift fork, reverse selector and selector hub. Remove countershaft 4th gear, needle bearing and distance collar. See **Fig. 8** . Remove mainshaft and countershaft together as an assembly.

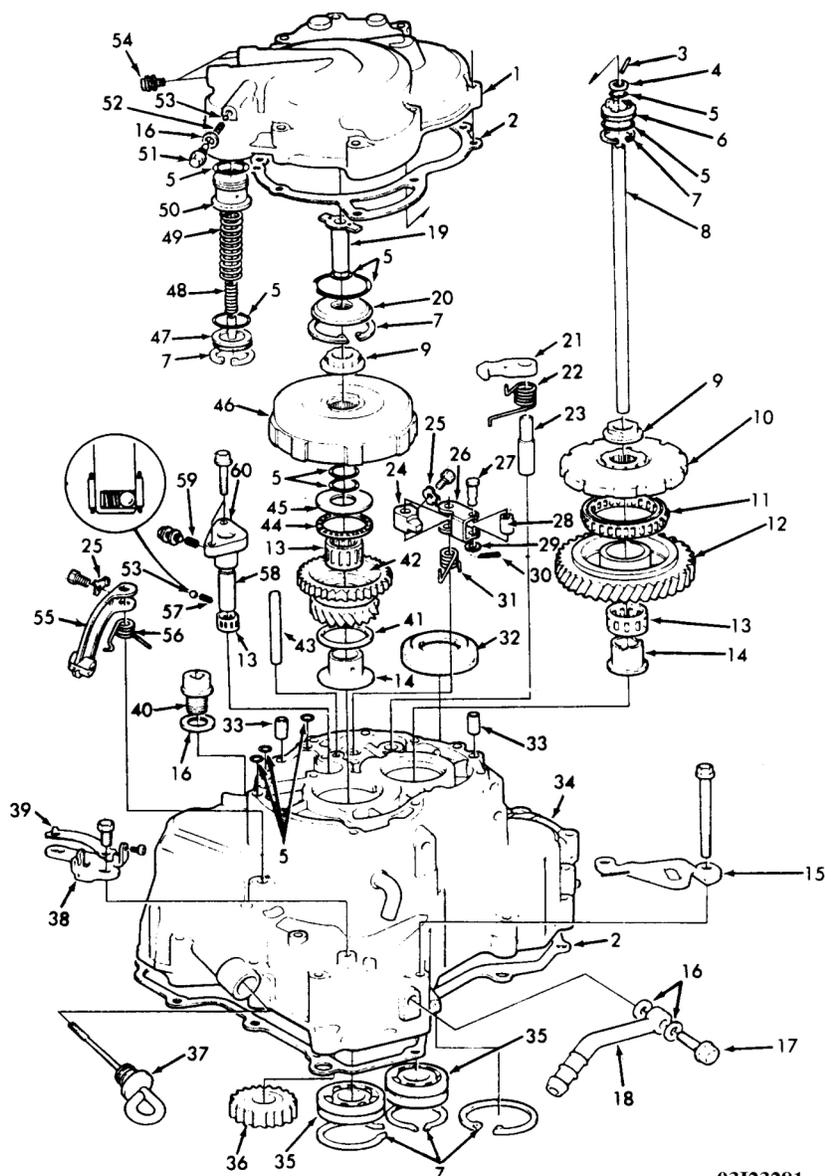
NOTE: Pull countershaft upward at slight angle to clear governor.

9. Remove bolts, bolt locks and governor. See **Fig. 8** . Remove by-pass body and separator plate. See **Fig. 8** . Remove modulator valve body and separator plate.
10. Remove suction pipe. Remove bolts, bolt locks and servo valve holder. See **Fig. 8** . Remove clutch feed pipes and accumulator cover. Remove servo valve body. Remove clip and throttle control shaft.
11. Remove separator plate from top of main valve body. Remove secondary valve body, dowel pins and separator plate. Use care not to lose check balls from secondary valve body.
12. Remove lock-up valve body and separator plate. See **Fig. 8** . Remove dowel pins, torque converter check valve and spring from regulator valve body. Remove regulator valve body.
13. Remove stator shaft, "O" ring and stop pin. Remove check balls, filter, check valve, spring and dowel pins from main valve body. Remove cotter pin, washer and pin from control shaft at main valve body. See **Fig. 8** .
14. Remove main valve body. Remove oil pump drive gear, oil pump driven gear shaft and oil pump driven gear. See **Fig. 8** . Remove dowel pins and separator plate for main valve body.
15. Remove fluid strainer and differential assembly. Remove speed sensor and lock-up control solenoid valve (if necessary).

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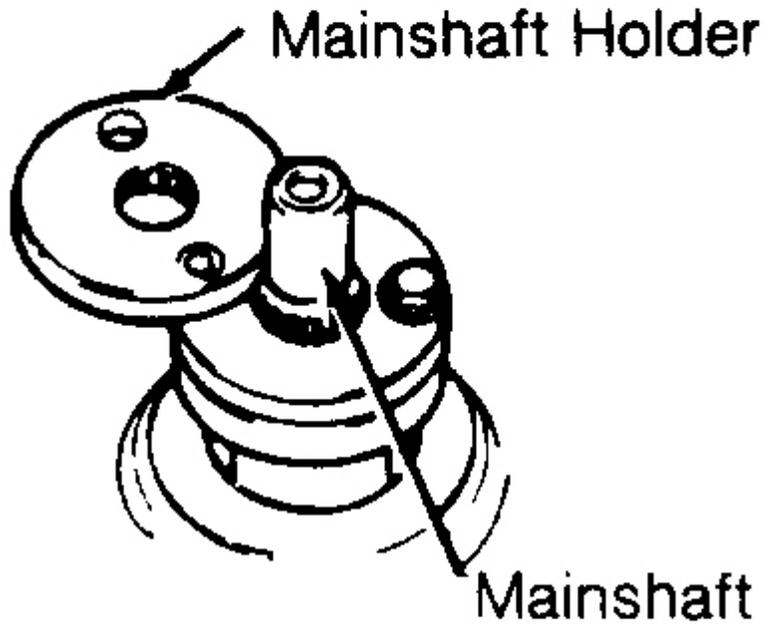
1991 AUTOMATIC TRANSMISSIONS ML4A Overhaul (2WD)

1. Right Side Cover
2. Gasket
3. Pin
4. Washer
5. "O" Ring
6. Feedpipe Flange
7. Snap Ring
8. 3rd Clutch Feedpipe
9. Lock Nut
10. Parking Gear
11. One-Way Clutch
12. Countershaft 1st Gear
13. Needle Bearing
14. Collar
15. Hanger
16. Seal Washer
17. Joint Bolt
18. Cooler Pipe
19. 1st Clutch Feedpipe
20. Feedpipe Guide
21. Parking Pawl
22. Parking Pawl Spring
23. Parking Pawl Shaft
24. Parking Brake Stopper
25. Bolt Lock
26. Parking Shift Arm
27. Roller Pin
28. Roller
29. Washer
30. Cotter Pin
31. Parking Brake Spring
32. Oil Seal
33. Dowel Pin
34. Transaxle Housing
35. Ball Bearing
36. Reverse Idler Gear
37. Dipstick
38. Cable Bracket
39. Bolt Lock Plate
40. Drain Plug
41. Thrust Washer
42. Mainshaft 1st Gear
43. Stop Pin
44. Thrust Needle Bearing
45. Thrust Washer
46. 1st Clutch
47. 1st Accumulator Cover
48. Inner Spring
49. Outer Spring
50. 1st Accumulator Piston
51. Sealing Bolt
52. Ball Spring
53. Steel Ball
54. Pressure Tap Plug
55. Throttle Control Lever
56. Throttle Control Lever Spring
57. Spring
58. Shaft
59. Shaft Spring
60. Reverse Idle Gear Holder



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Fig. 5: Right Side Cover & Transaxle Housing Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 6: Installing Mainshaft Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

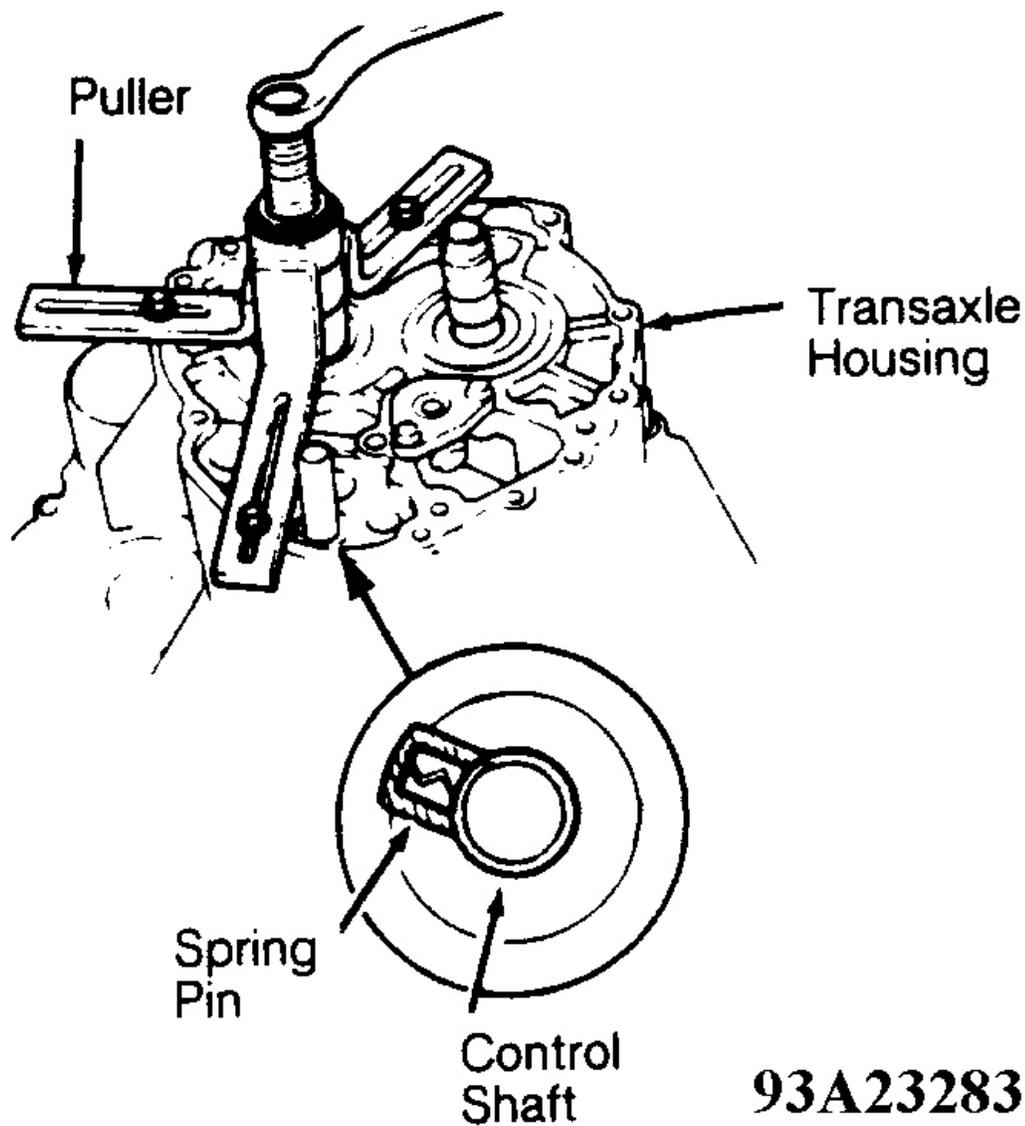
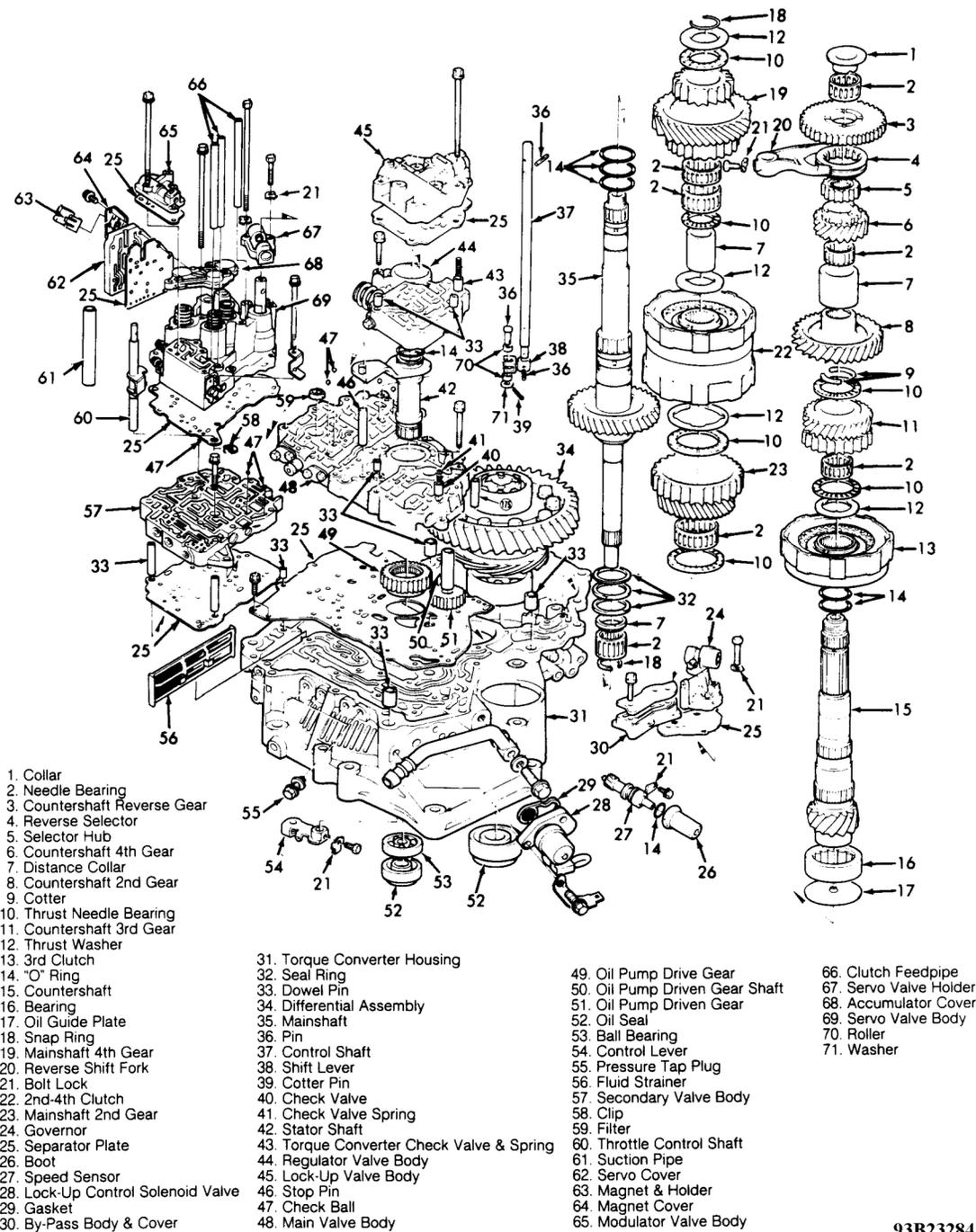


Fig. 7: Aligning Spring Pin & Removing Transaxle Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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

COMPONENT DISASSEMBLY & REASSEMBLY

MAIN VALVE BODY

CAUTION: Place main valve body components in order and mark spring locations for reassembly reference when disassembling main valve body. DO NOT use force to remove components. DO NOT use magnet to remove check balls or steel balls, as check balls or steel balls may become magnetized.

Disassembly

Disassemble main valve body. See **Fig. 9** . Use care when removing valve caps or spring seats, as they are under spring pressure. When removing sleeve, use care to prevent losing steel balls and ball springs. See **Fig. 9** .

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 .

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. Install NEW filter so filter is facing proper direction. Ensure all components are installed in correct location and ball spring is installed between both steel balls on shift valve. See **Fig. 9** .

SPRING SPECIFICATIONS

Application	Free Length In. (mm)
Lock-Up Valve Body	
Lock-Up Shift Valve Spring	1.752 (44.50)
Lock-Up Timing Valve "B" Spring	2.189 (55.60)
Main Valve Body	
Relief Valve Spring	2.047 (52.00)
Torque Converter Check Valve Spring	1.433 (36.40)
1-2 Shift Ball Spring	.500 (12.70)
1-2 Shift Valve Spring	1.858 (47.20)
2-3 Shift Ball Spring	.567 (14.40)
2-3 Shift Valve Spring	1.756 (44.60)
2nd Orifice Control Valve Spring	1.724 (43.80)
3-4 Shift Ball Spring	.445 (11.30)
3-4 Shift Valve Spring	1.280 (32.50)
Modulator Valve Body	

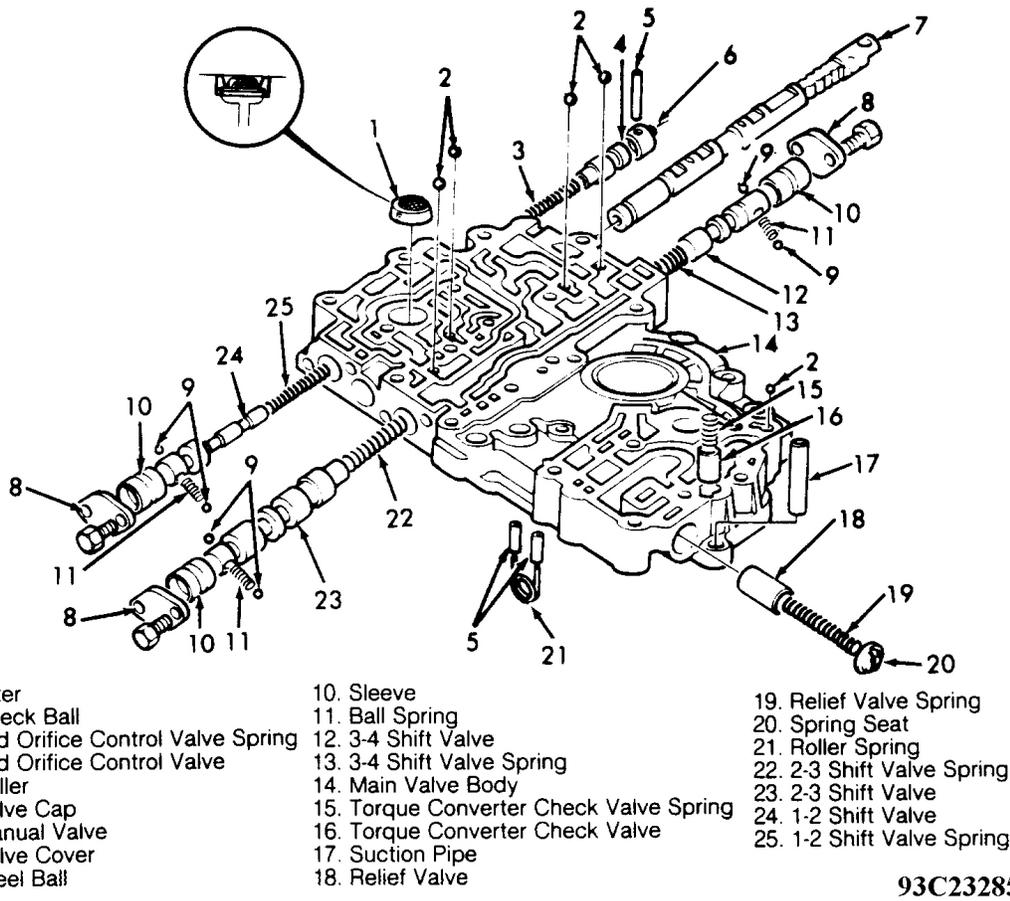
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Modulator Valve Spring	(1)
Regulator Valve Body	
Cooler Relief Valve Spring	1.433 (36.40)
Lock-Up Control Valve Spring	1.390 (35.30)
Regulator Valve Spring "A"	3.350 (85.10)
Regulator Valve Spring "B"	1.732 (44.00)
Stator Reaction Spring	1.193 (30.30)
Secondary Valve Body	
Clutch Pressure Control Valve Spring	1.244 (31.60)
Kickdown Valve Spring	1.606 (40.80)
Lock-Up Cut Valve Spring	1.142 (29.00)
Reverse Control Valve Spring	1.465 (37.20)
Shift Timing Valve Spring	1.689 (42.90)
3rd Orifice Control Valve Spring	1.413 (35.90)
3-2 Timing Valve Spring	1.776 (45.10)
4th Exhaust Valve Spring	1.720 (43.70)
Servo Valve Body	
Reverse Timing Valve Spring	1.724 (43.80)
Servo Control Valve Spring	1.732 (44.00)
Throttle Valve "A" Adjusting Spring	1.063 (27.00)
Throttle Valve "B" Adjusting Spring	1.181 (30.00)
Throttle Valve "A" Spring	(2)
Throttle Valve "B" Spring	1.626 (41.30)
2nd Accumulator Spring	2.961 (75.20)
3rd Accumulator Spring	3.150 (80.00)
4th Accumulator Spring	3.083 (78.30)

(1) Spring free length may be 1.071" (27.20 mm) or 1.035" (26.30 mm).

(2) Spring free length may be .874" (22.20 mm) or .870" (22.10 mm).



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Fig. 9: 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 for damage. Replace components if damaged.
2. Install oil pump gears and oil pump driven gear shaft in main valve body. Ensure chamfered side of oil pump driven gear is facing upward (toward separator plate side of main valve body). Place straightedge across main valve body surface.
3. Using feeler gauge, measure thrust clearance of oil pump driven gear between oil pump driven gear and straightedge. See **Fig. 10** . Replace oil pump gears and/or main valve body if thrust clearance is not

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within specification. See **OIL PUMP SPECIFICATIONS** table.

- Using feeler gauge, measure side clearance between tip of gear teeth and main valve body on both gears. See **Fig. 10** . Replace oil pump gears and/or main valve body if side clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Side Clearance	
Oil Pump Drive Gear	.0094-.0105 (.240-.266)
Oil Pump Driven Gear	.0025-.0035 (.002-.089)
Thrust Clearance	
Standard	.001-.002 (.03-.05)
Wear Limit	.0028 (.070)

Reassembly

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

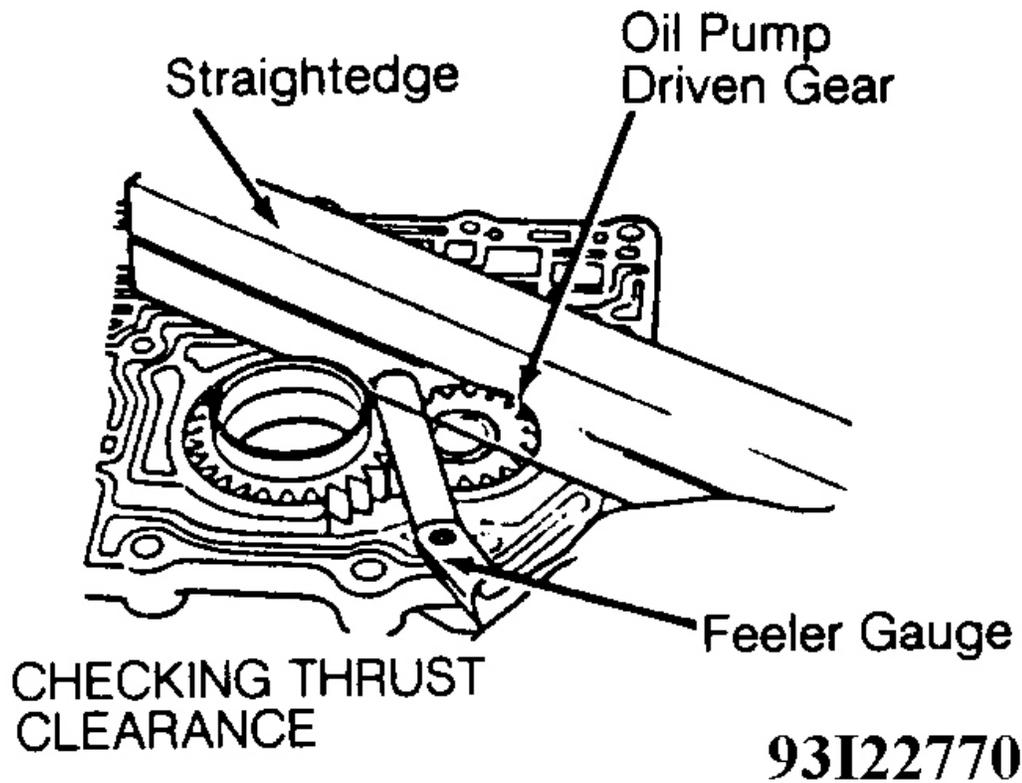


Fig. 10: Measuring Oil Pump Clearances (1 of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

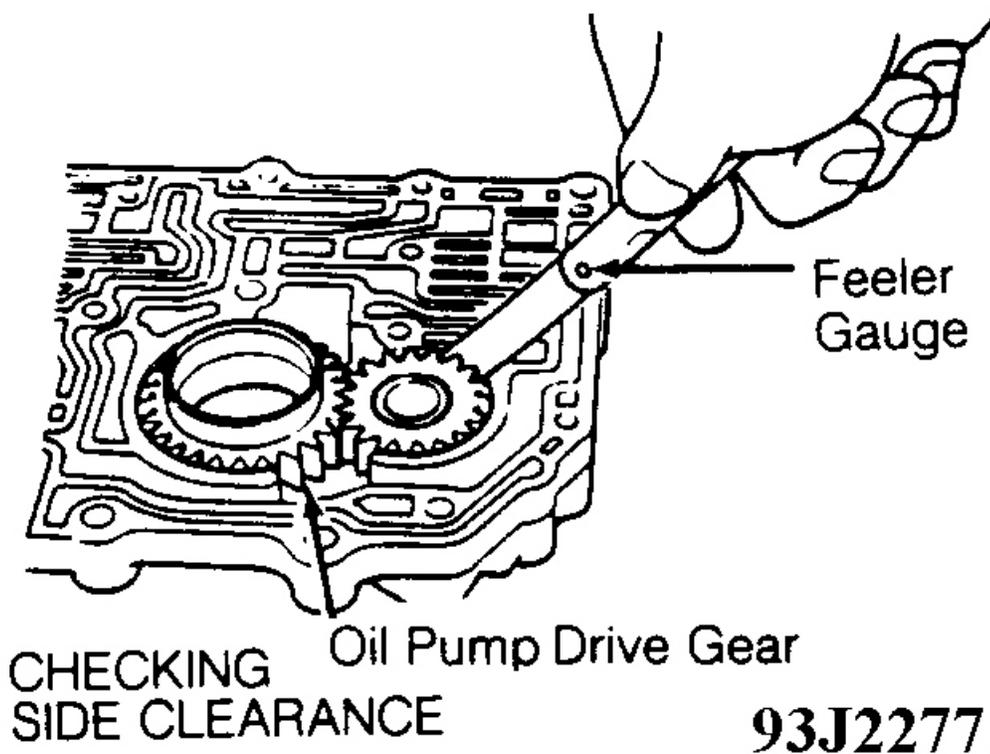


Fig. 11: Measuring Oil Pump Clearances (2 of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY VALVE BODY

CAUTION: Place secondary valve body components in order and mark spring locations for reassembly reference when disassembling secondary valve body. **DO NOT** use force to remove components. **DO NOT** use magnet to remove check balls, as check balls may become magnetized.

Disassembly

Disassemble secondary valve body. See **Fig. 12** . Use care when removing valve caps or spring seats, as they are under spring pressure.

Cleaning & Inspection

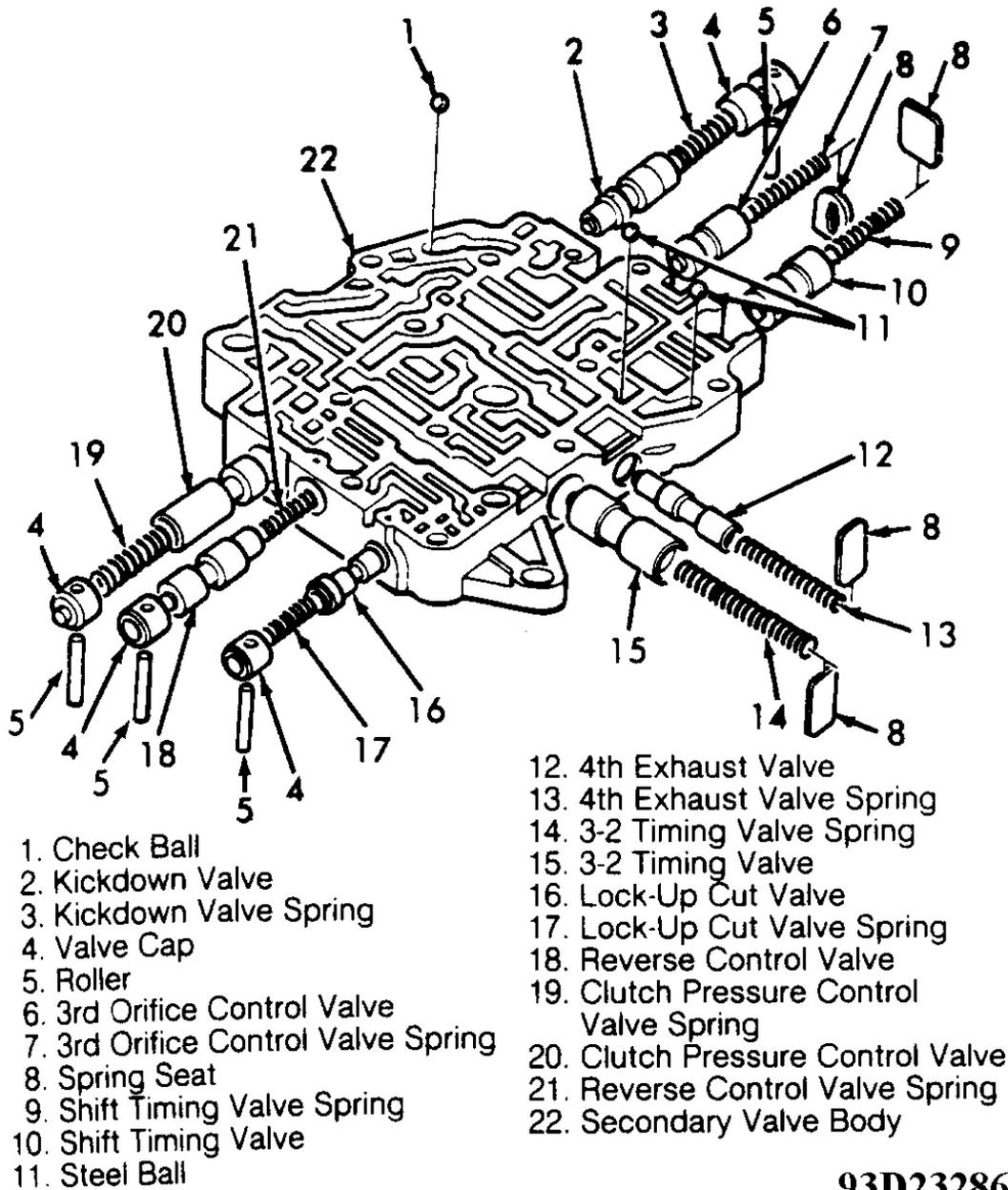
1. Clean components with solvent and dry with compressed air. Replace secondary valve body as an assembly if any parts are worn or damaged.
2. Ensure all valves slide freely in bores. If valves do not slide freely, polish burrs or rough areas using No.

600 sandpaper soaked in ATF for at least 30 minutes. Thoroughly clean 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. 12** .



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Fig. 12: 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

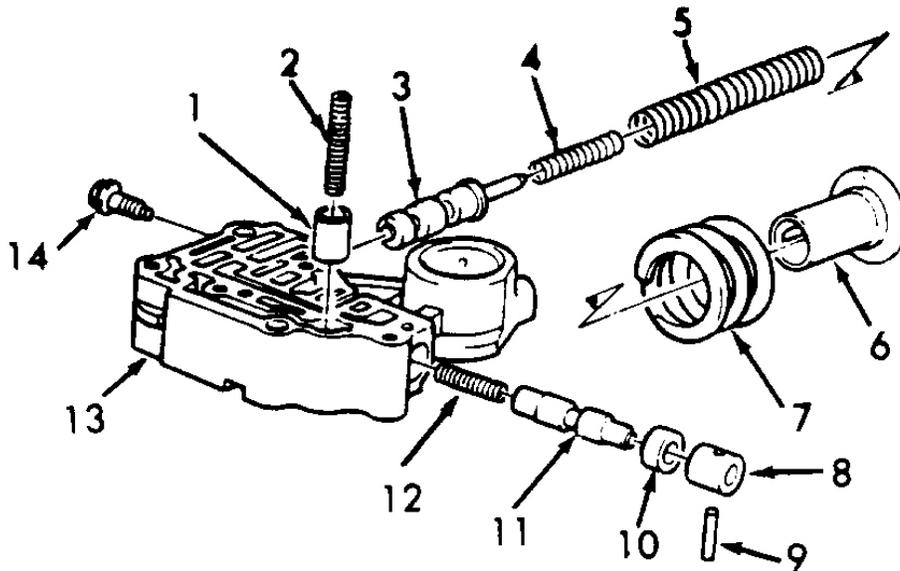
Hold regulator spring cap downward and remove stopper bolt. Slowly remove regulator spring cap and components from regulator valve body. See **Fig. 13** .

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 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 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. Ensure all components are installed in correct location. See **Fig. 13** . Ensure hole in regulator spring cap is aligned with hole in valve body before installing stopper bolt. Install and tighten stopper bolt to specification. See **TORQUE SPECIFICATIONS** .



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

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Fig. 13: Exploded View Of Regulator Valve Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

LOCK-UP VALVE BODY

Disassembly

Disassemble lock-up valve body. See **Fig. 14** . Use care when valve caps, as valve caps are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace components if 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 lock-up 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.

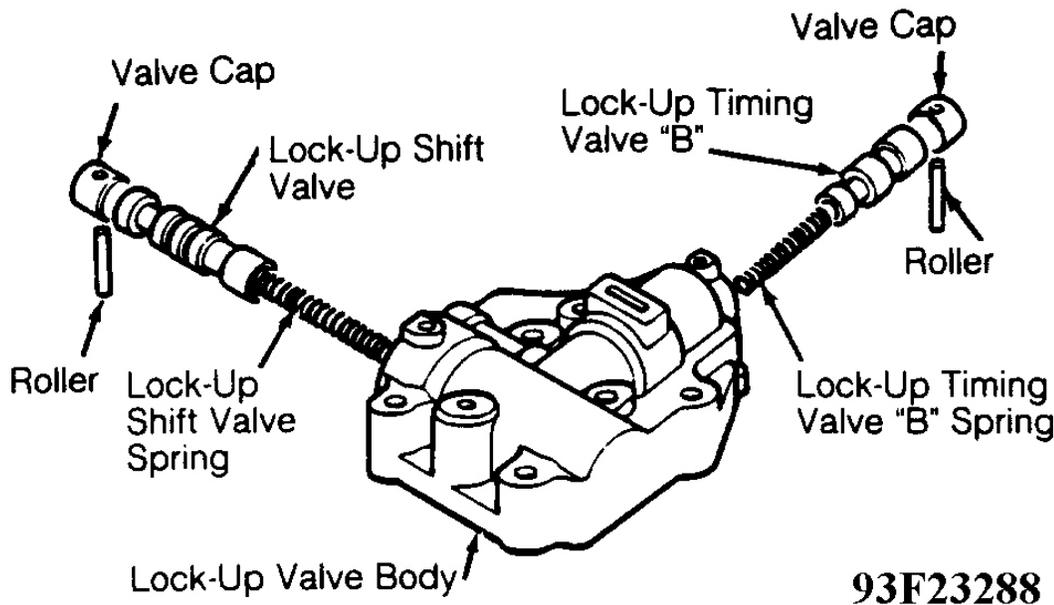


Fig. 14: Exploded View Of Lock-Up Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SERVO VALVE BODY & MODULATOR VALVE BODY**Disassembly**

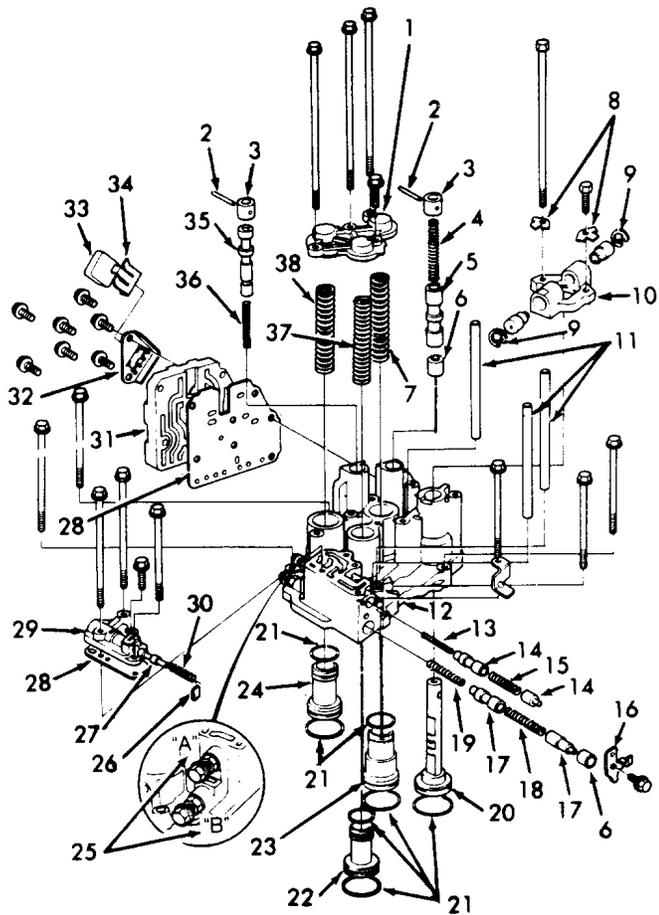
Disassemble servo valve body and modulator valve body. See **Fig. 15**.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace components if 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 servo valve body or modulator valve body and components if polishing was needed.
3. Ensure shift fork shaft is not bent. 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, magnet and magnet holder. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS**.



- | | |
|--------------------------------------------|--------------------------------------------------------------------|
| 1. Accumulator Cover | 20. Shift Fork Shaft |
| 2. Pin | 21. "O" Ring |
| 3. Valve Cap | 22. 3rd Accumulator Piston |
| 4. Servo Control Valve Spring | 23. 4th Accumulator Piston |
| 5. Servo Control Valve | 24. 2nd Accumulator Piston |
| 6. Sleeve | 25. Throttle Pressure Adjusting Bolts
(DO NOT Loosen Or Remove) |
| 7. 4th Accumulator Spring | 26. Spring Seat |
| 8. Bolt Lock | 27. Modulator Valve |
| 9. Retaining Clip | 28. Separator Plate |
| 10. Servo Valve Holder | 29. Modulator Valve Body |
| 11. Clutch Feedpipe | 30. Modulator Valve Spring |
| 12. Servo Valve Body | 31. Servo Cover |
| 13. Throttle Valve "A" Adjusting
Spring | 32. Magnet Cover |
| 14. Throttle Valve "A" | 33. Magnet |
| 15. Throttle Valve "A" Spring | 34. Magnet Holder |
| 16. Valve Retainer | 35. Reverse Timing Valve |
| 17. Throttle Valve "B" | 36. Reverse Timing Valve Spring |
| 18. Throttle Valve "B" Spring | 37. 3rd Accumulator Spring |
| 19. Throttle Valve "B" Adjusting
Spring | 38. 2nd Accumulator Spring |

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Fig. 15: Exploded View Of Servo Valve Body & Modulator Valve Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

GOVERNOR

Disassembly

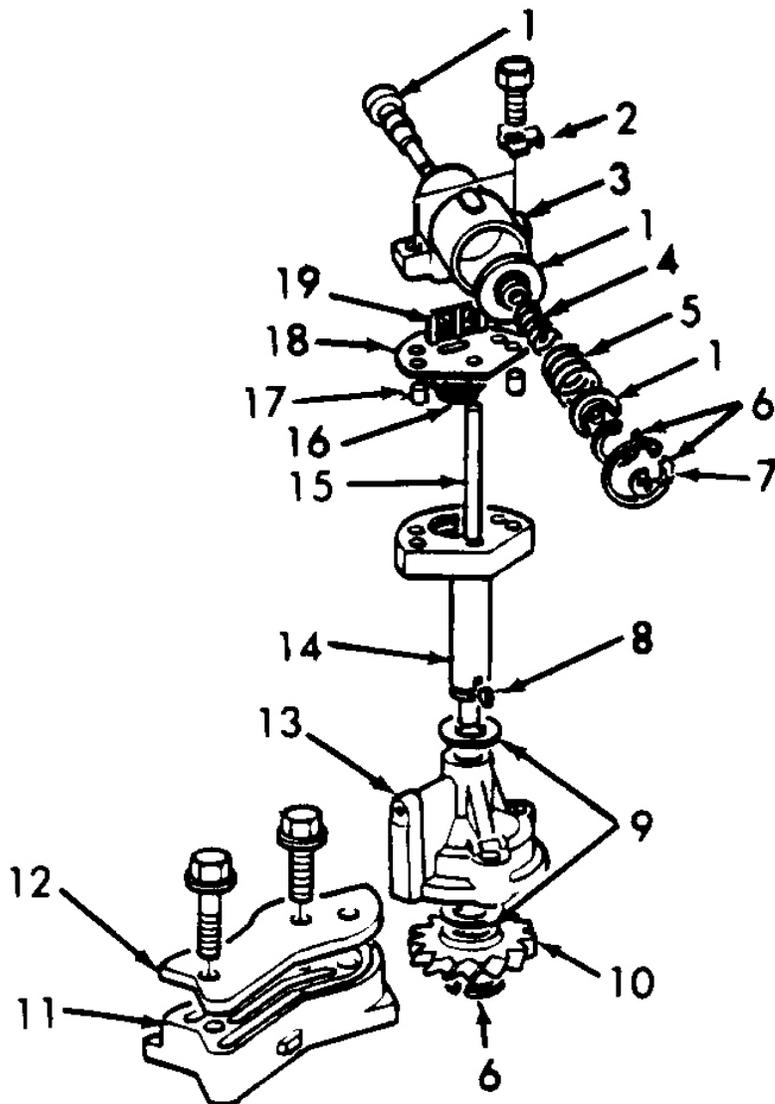
Disassemble governor and components. See **Fig. 16** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Ensure governor components operate freely.
2. Ensure spring free length of governor valve spring "A" is 1.500" (38.10 mm) and governor valve spring "B" is 1.094" (27.80 mm). See **Fig. 16** . Replace components if worn, damaged, not within specification or if governor fails to operate freely.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure using NEW bolt locks. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS** . Bend over tabs on bolt locks.



- | | |
|------------------------------|------------------------|
| 1. Governor Valve Assembly | 11. By-Pass Body |
| 2. Bolt Lock | 12. By-Pass Body Cover |
| 3. Governor Housing | 13. Body |
| 4. Governor Valve Spring "B" | 14. Shaft |
| 5. Governor Valve Spring "A" | 15. Pipe |
| 6. Retaining Ring | 16. Filter |
| 7. Clip | 17. Dowel Pin |
| 8. Key | 18. Plate |
| 9. Thrust Washer | 19. Filter |
| 10. Gear | |

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Fig. 16: Exploded View Of Governor

Courtesy of AMERICAN HONDA MOTOR CO., INC.

1ST ACCUMULATOR**Disassembly**

Remove sealing bolt, seal washer, ball spring and steel ball from right side cover. See **Fig. 5** . Remove snap ring, 1st accumulator cover, inner and outer springs, 1st accumulator piston and "O" ring from right side cover. See **Fig. 5** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Ensure components are not worn or damaged.
2. Ensure spring free length of inner spring is 1.575" (40.00 mm), outer spring is 2.626" (66.7 mm) and ball spring is .551" (14.00 mm). Replace components if worn, damaged or not within specification.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure using NEW "O" rings and seal washer. Tighten sealing bolt to specification. See **TORQUE SPECIFICATIONS** .

MAINSHAFT**Disassembly**

Note location of mainshaft components. See **Fig. 8** . Remove mainshaft components.

Cleaning & Inspection

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

NOTE: Mainshaft 2nd-3rd gear clearance must be checked during reassembly.

Reassembly

1. To check mainshaft 2nd-3rd gear clearance, install all components on mainshaft without installing "O" rings on mainshaft. See **Fig. 8** .
2. Remove ball bearing for mainshaft from transaxle housing and install on mainshaft. Install collar, thrust washer and mainshaft 1st gear on mainshaft. See **Fig. 5** .
3. Install needle bearing, thrust needle bearing, thrust washer and 1st clutch on mainshaft. See **Fig. 5** . Install used lock nut on mainshaft. Tighten lock nut to 22 ft. lbs. (30 N.m). Hold mainshaft 2nd gear against 2nd clutch.
4. Using feeler gauge, measure clearance between mainshaft 2nd gear and mainshaft 3rd gear. See **Fig. 17** . Replace thrust washer located between mainshaft 2nd gear and 2nd clutch if mainshaft 2nd-3rd gear

clearance is not within .003-.006" (.07-.15 mm).

5. Different thickness thrust washers are available. See **MAINSHAFT THRUST WASHER SPECIFICATIONS** table. Replace thrust washer and recheck 2nd-3rd gear clearance.
6. Once correct thrust washer is obtained, lubricate all components with ATF. Reassemble mainshaft. Before installing NEW "O" rings on mainshaft, wrap splines with tape and then install "O" rings.

MAINSHAFT THRUST WASHER SPECIFICATIONS

Washer I.D. Letter	Part Number	Thickness In. (mm)
"A"	90441-PC9-010	.137-.138 (3.47-3.50)
"B"	90442-PC9-010	.139-.140 (3.52-3.55)
"C"	90443-PC9-010	.141-.142 (3.57-3.60)
"D"	90444-PC9-010	.143-.144 (3.62-3.65)
"E"	90445-PC9-010	.145-.146 (3.67-3.70)
"F"	90446-PC9-010	.147-.148 (3.72-3.75)
"G"	90447-PC9-010	.149-.150 (3.77-3.80)
"H"	90448-PC9-010	.151-.152 (3.82-3.85)
"I"	90449-PC9-010	.153-.154 (3.87-3.90)

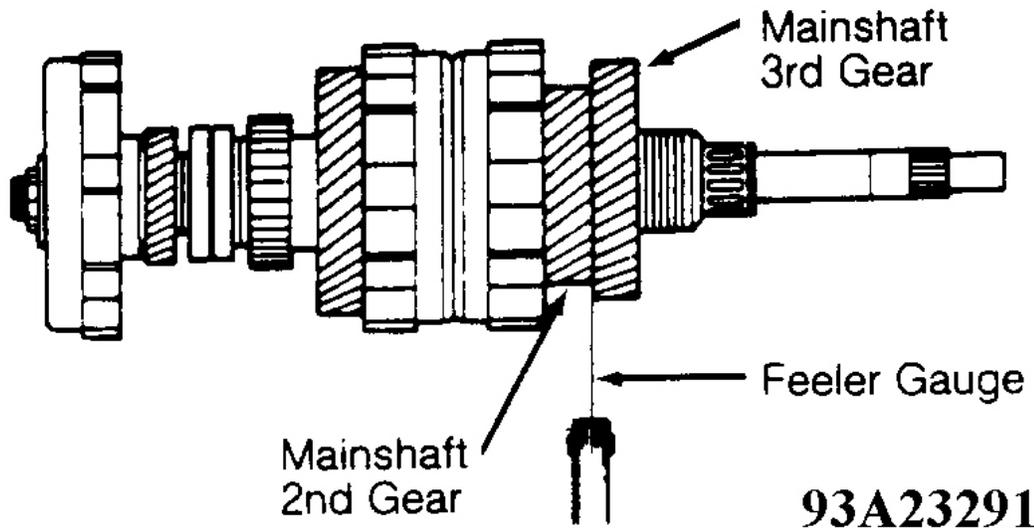


Fig. 17: Checking Mainshaft 2nd-3rd Gear Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT

Disassembly

Note location of countershaft components. See **Fig. 8** . Remove countershaft components.

Cleaning & Inspection

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

NOTE: Countershaft 2nd-3rd gear and 4th gear clearance must be checked during reassembly.

Reassembly

1. To check countershaft gear clearances, install components on countershaft without installing "O" rings on countershaft. See **Fig. 8** .
2. Remove ball bearing for countershaft from transaxle housing and install on countershaft. Install collar, needle bearing, countershaft 1st gear, one-way clutch and parking gear on countershaft. See **Fig. 5** .
3. Install used lock nut on countershaft. Tighten lock nut to 22 ft. lbs. (30 N.m).
4. To check countershaft 4th gear clearance, use feeler gauge and measure clearance between shoulder on selector hub and shoulder on countershaft 4th gear. See **Fig. 18** .
5. To check countershaft 2nd-3rd gear clearance, leave feeler gauge installed between shoulder on selector hub and shoulder on countershaft 4th gear. See **Fig. 18** . Slide countershaft 3rd gear fully outward (away from countershaft 2nd gear).
6. Using feeler gauge, measure clearance between countershaft 2nd and 3rd gears. See **Fig. 18** . Slide countershaft 3rd gear fully inward (toward countershaft 2nd gear). Measure clearance between countershaft 2nd and 3rd gears. Calculate difference between both measurements to determine countershaft 2nd-3rd gear clearance. Remove feeler gauges.
7. Replace distance collar if countershaft 4th gear clearance is not .003-.006" (.07-.15 mm). Different length distance collars are available. See **DISTANCE COLLAR SPECIFICATIONS** table. Replace distance collar and recheck countershaft 4th gear clearance.
8. Replace thrust washer between 3rd clutch and countershaft 3rd gear if countershaft 2nd-3rd gear clearance is not .003-.006" (.07-.15 mm). Different thickness thrust washers are available. See **COUNTERSHAFT THRUST WASHER SPECIFICATIONS** table. Replace thrust washer and recheck countershaft 2nd-3rd gear clearance.
9. Once correct gear clearances are obtained, lubricate all components with ATF. Reassemble countershaft. Use NEW "O" rings on countershaft. Before installing "O" rings on countershaft, wrap splines with tape and then install "O" rings.

DISTANCE COLLAR SPECIFICATIONS

Collar Number	Part Number	Thickness In. (mm)
1	90503-PC9-000	1.535 (39.00)
2	90504-PC9-000	1.539 (39.10)
3	90505-PC9-000	1.543 (39.20)
4	90507-PC9-000	1.547 (39.30)
5	90508-PC9-000	1.537 (39.05)

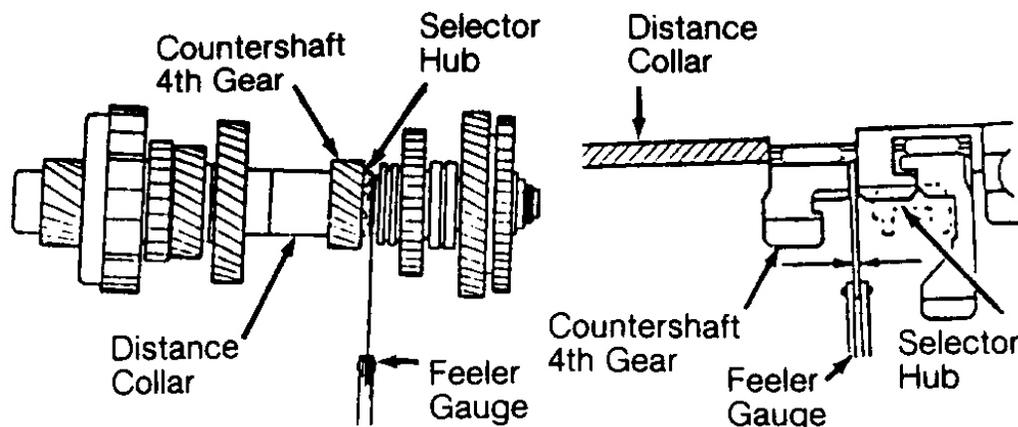
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6	90509-PC9-000	1.541 (39.15)
7	90510-PC9-000	1.545 (39.25)

COUNTERSHAFT THRUST WASHER SPECIFICATIONS

Washer Part Number	Thickness - In. (mm)
90411-PA9-010	.117-.118 (2.97-3.00)
90412-PA9-010	.119-.120 (3.02-3.05)
90413-PA9-010	.121-.122 (3.07-3.10)
90414-PA9-010	.123-.124 (3.12-3.15)
90415-PA9-010	.125-.126 (3.17-3.20)
90418-PA9-010	.127-.128 (3.22-3.25)
90419-PA9-010	.129-.130 (3.27-3.30)
90420-PA9-010	.131-.132 (3.32-3.35)
90421-PA9-010	.133-.134 (3.37-3.40)



CHECKING COUNTERSHAFT 4TH GEAR CLEARANCE

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Fig. 18: Countershaft 2nd-3rd Gear & 4th Gear Clearances (1 of 2)

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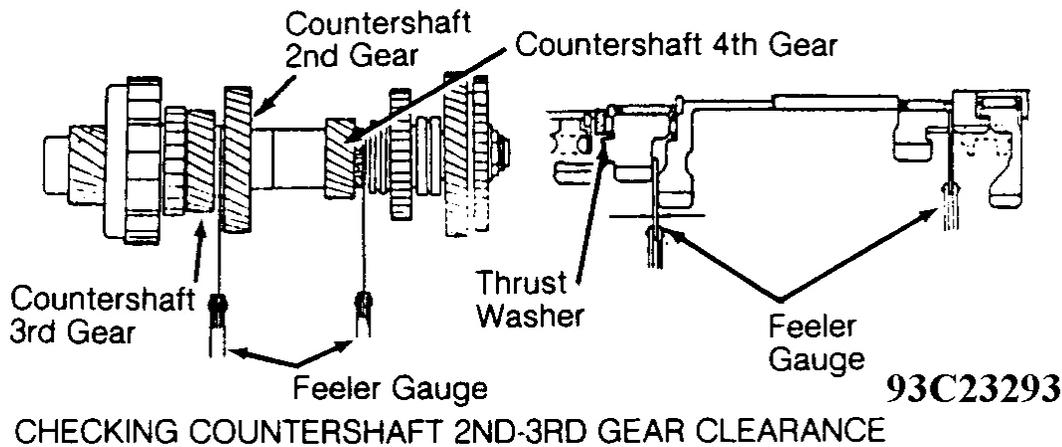


Fig. 19: Countershaft 2nd-3rd Gear & 4th Gear Clearances (2 of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

PARKING GEAR & ONE-WAY CLUTCH

Disassembly

1. To separate parking gear from countershaft 1st gear, hold countershaft 1st gear and rotate parking gear counterclockwise. Remove parking gear.
2. Note direction of one-way clutch installation in countershaft 1st gear. Using screwdriver, gently pry one-way clutch from countershaft 1st gear.

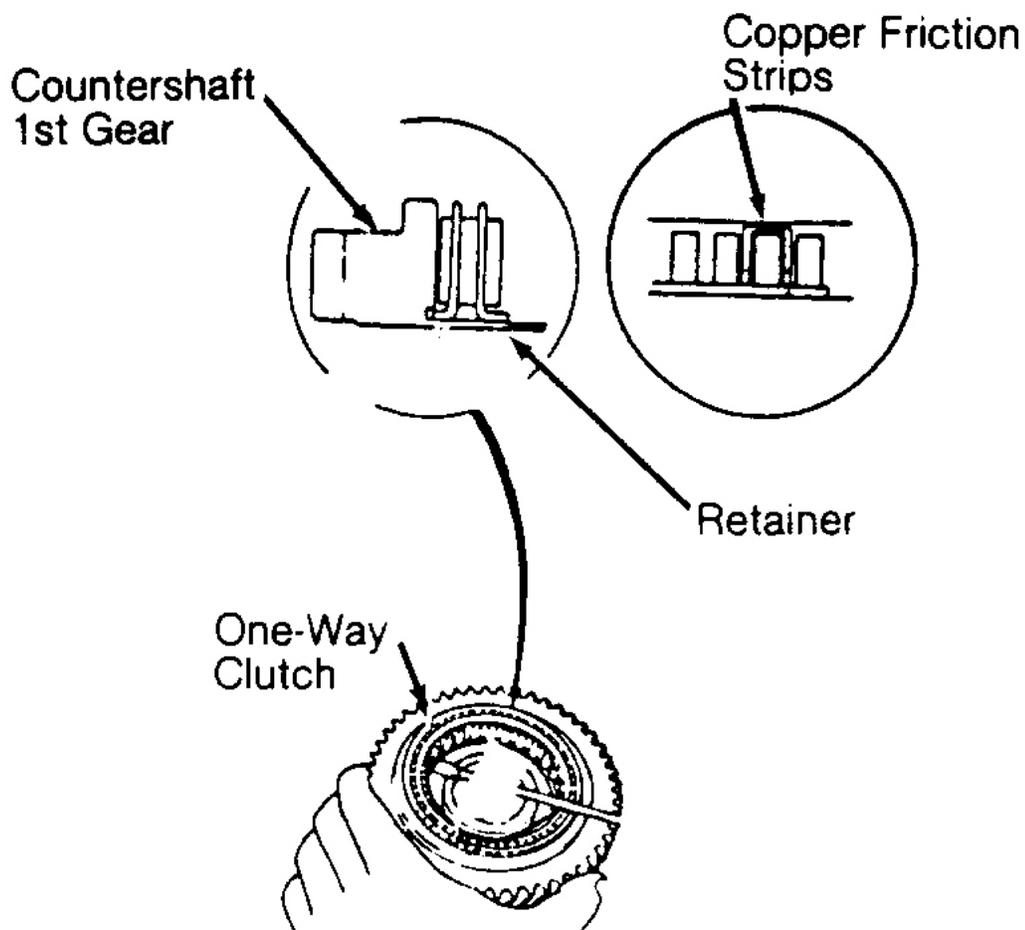
CAUTION: DO NOT pry on Copper friction strips on one-way clutch during removal or one-way clutch will be damaged.

Cleaning & Inspection

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

Reassembly

Lubricate all components with ATF. Install one-way clutch with retainer toward countershaft 1st gear. See [Fig. 20](#) . Install parking gear. Ensure parking gear rotates counterclockwise when holding countershaft 1st gear.



INSTALLING ONE-WAY CLUTCH

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Fig. 20: Installing One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

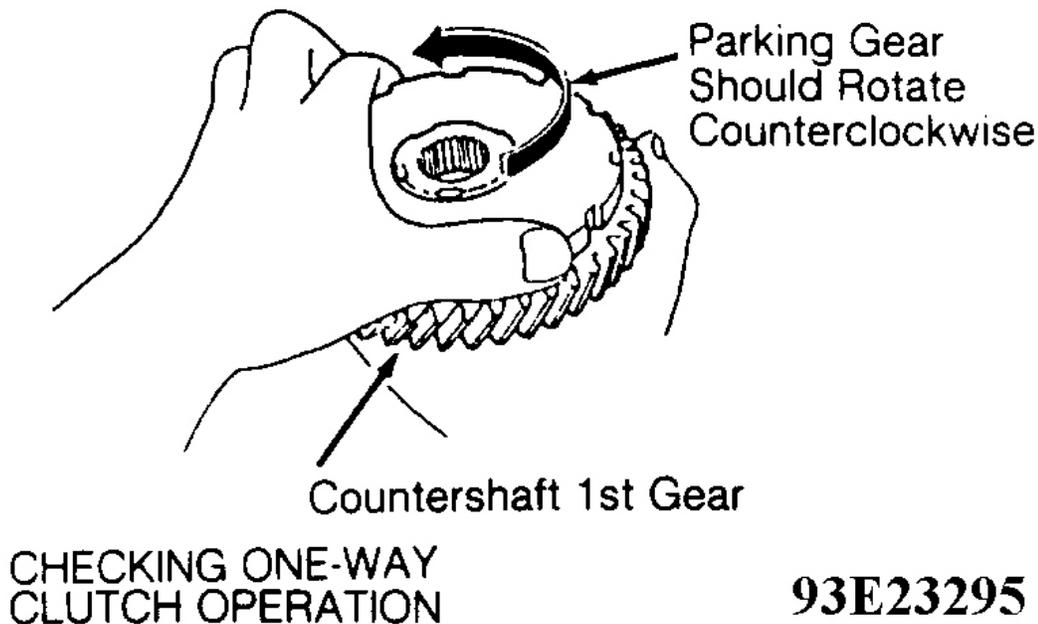


Fig. 21: Checking One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CLUTCH ASSEMBLIES

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 22** . On 2nd clutch, note direction of disc spring installation. Remove disc spring.

CAUTION: Ensure adapter is centered over area of spring retainer which is supported by return spring. Spring retainer may be damaged if not supported by return spring.

2. On all clutches, use Spring Compressor (07HAE-PL50100), Adapter (07960-6120100) and Bolt (07GAE-PG40200) to compress return spring. See **Fig. 23** .
3. Remove circlip. Release and remove spring compressor components. 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

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piston is thoroughly cleaned.

2. Inspect components for damage. Replace as necessary. Ensure no rough edges exist on "O" ring sealing areas. On 1st, 3rd and 4th clutches, ensure disc spring is securely staked to rear of 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: Use care when installing clutch piston in drums to avoid "O" ring damage.

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 2nd clutch. Ensure disc spring is installed in proper direction. See **Fig. 22** .

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

4. Starting with clutch plate, alternately install clutch plates and clutch discs. Install clutch end plate with flat side toward clutch disc. Install snap ring.
5. Momentarily apply air to oil passage on clutch drum and ensure clutch piston moves and clutch engages. Using dial indicator, measure clutch clearance between clutch end plate and top clutch disc. See **Fig. 23** .
6. Zero dial indicator with clutch end plate lowered and lift clutch end plate upward against snap ring. Distance measured is clutch clearance.
7. Measure clutch clearance at 3 different locations. Clutch clearance should be within specification. See **CLUTCH CLEARANCE SPECIFICATIONS** table.
8. 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	Clutch Clearance - In. (mm)
1st & 2nd Clutches	.026-.033 (.65-.85)
3rd & 4th Clutches	.016-.024 (.40-.60)

CLUTCH END PLATE SPECIFICATIONS

Plate Number	Part Number	Thickness In. (mm)
1	22551-PC9-000	.094 (2.40)
2	22552-PC9-000	.098 (2.50)
3	22553-PC9-000	.102 (2.60)

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4	22554-PC9-000	.106 (2.70)
5	22555-PC9-000	.110 (2.80)
6	22556-PC9-000	.114 (2.90)
7	22557-PC9-000	.118 (3.00)
8	22558-PC9-000	.122 (3.10)
9	22559-PC9-000	.126 (3.20)
10	22560-PC9-000	.130 (3.30)
11	22561-PC9-000	.082 (2.10)
12	22562-PC9-000	.086 (2.20)
13	22563-PC9-000	.090 (2.30)

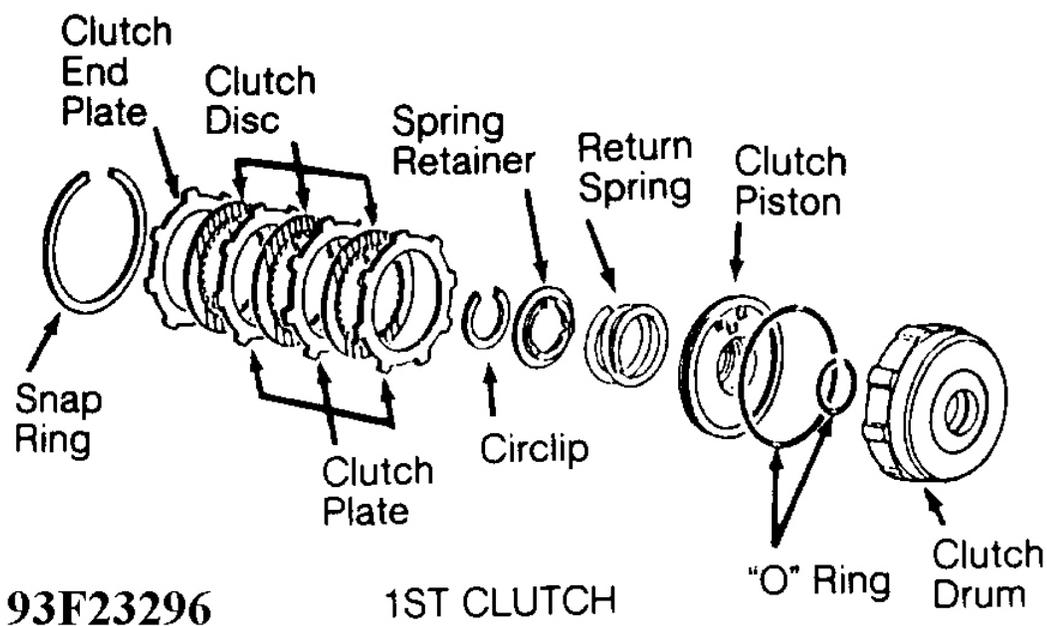


Fig. 22: Exploded View Of Clutch Assemblies (1 of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

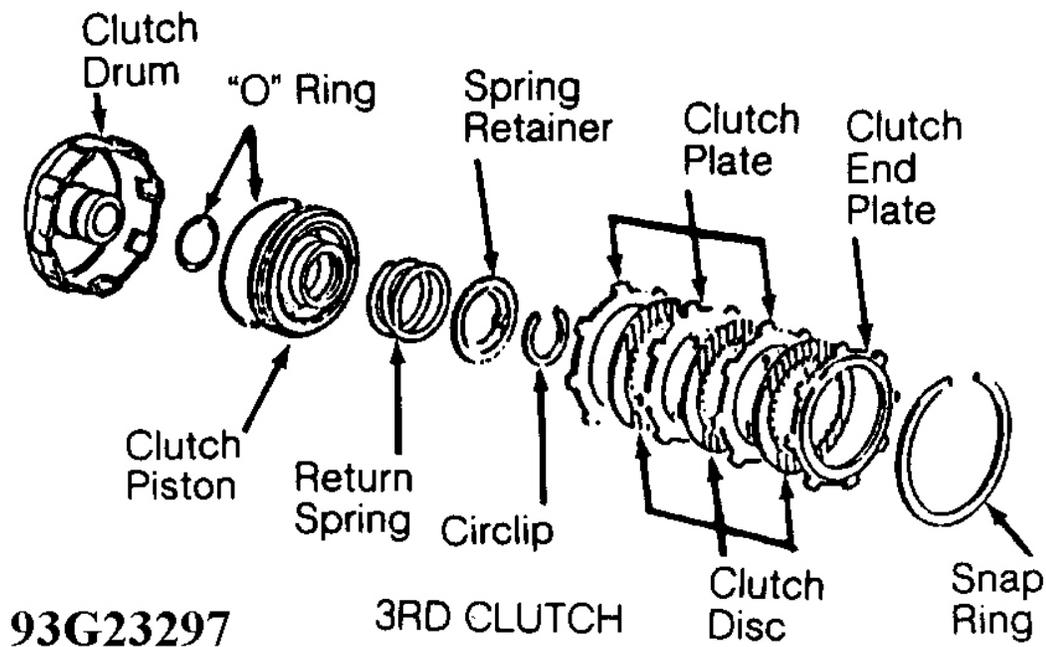


Fig. 23: Exploded View Of Clutch Assemblies (2 of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

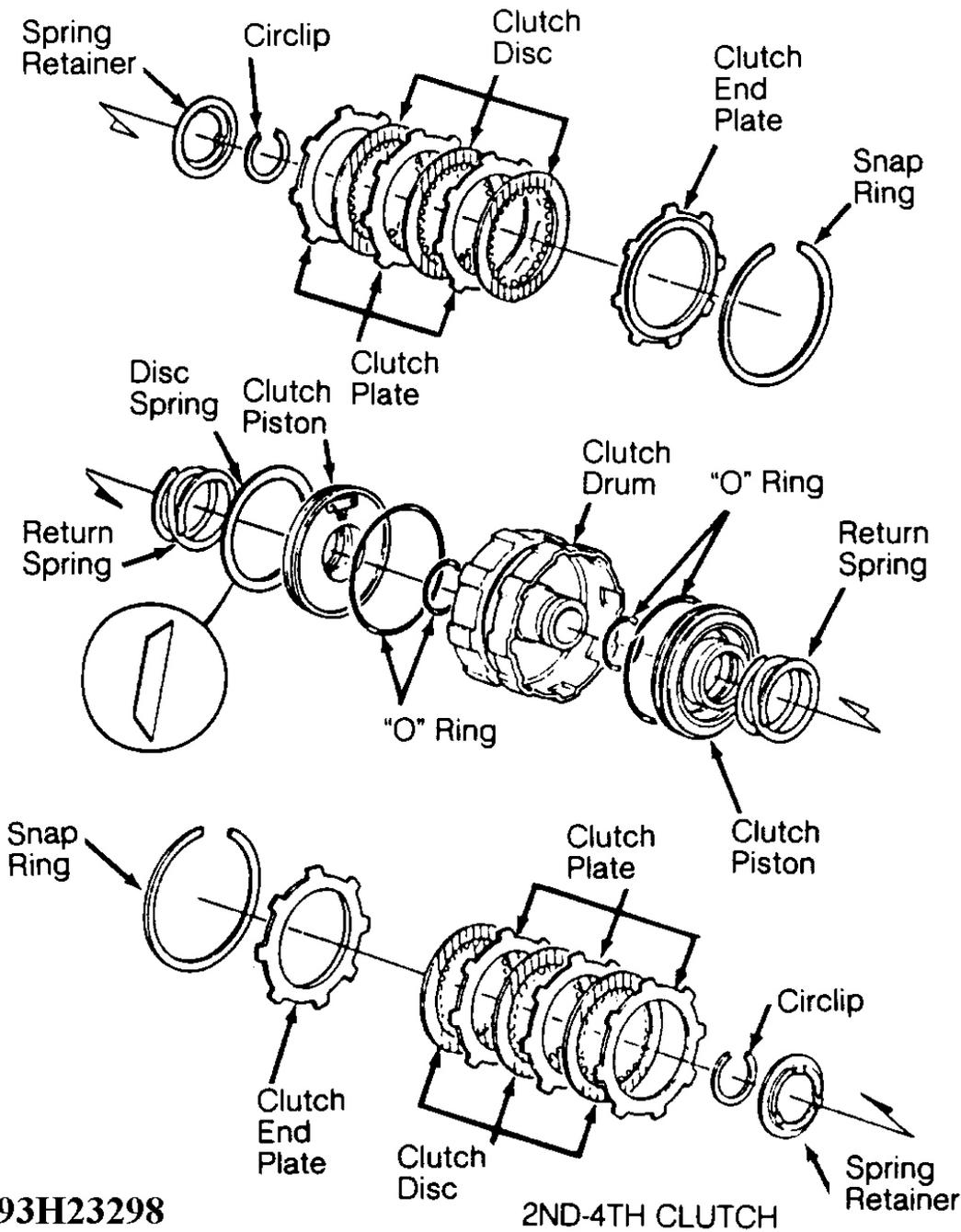


Fig. 24: Exploded View Of Clutch Assemblies (3 of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

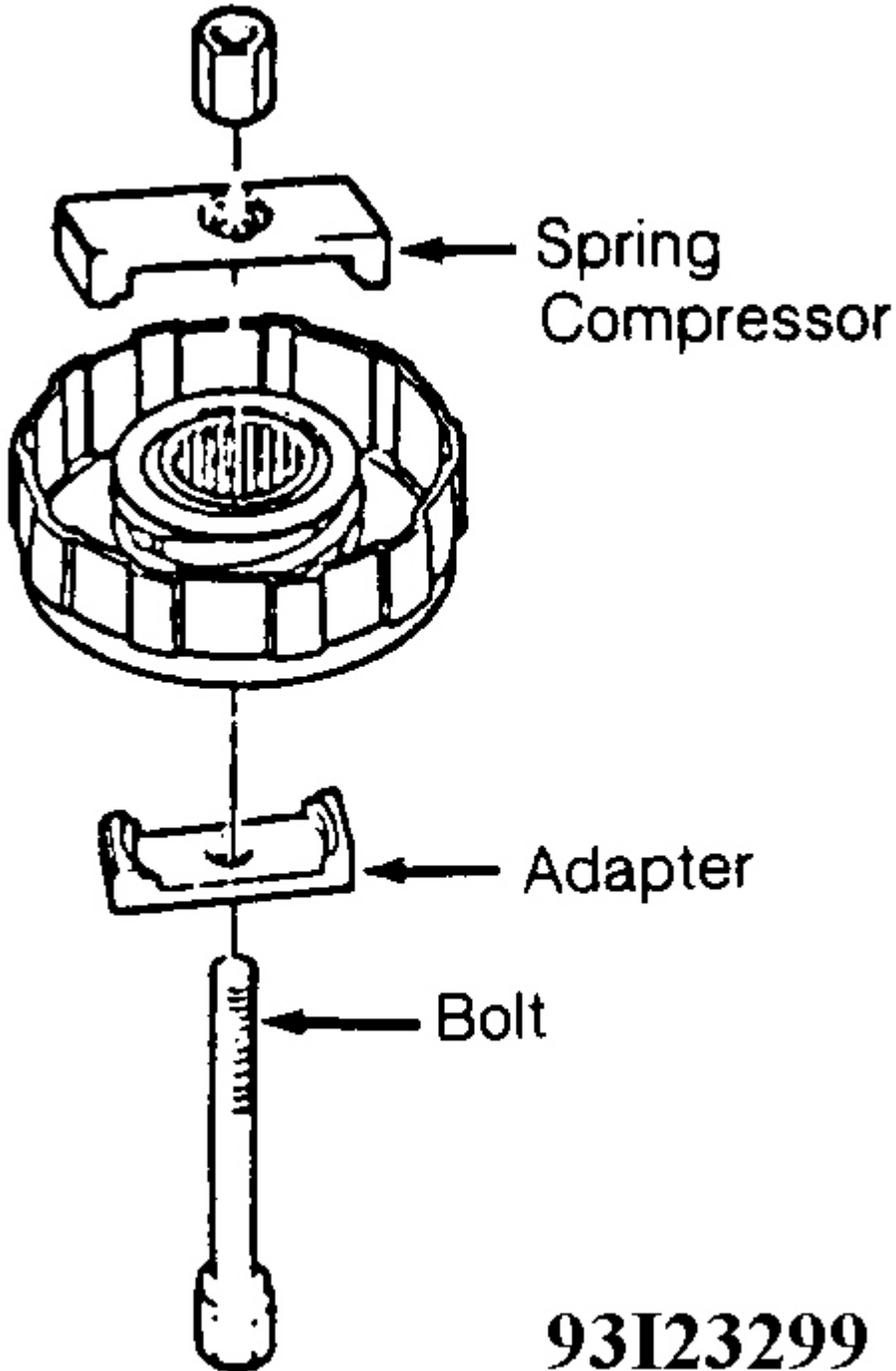


Fig. 25: Compressing Return Spring (1st Clutch Shown; Others Similar)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

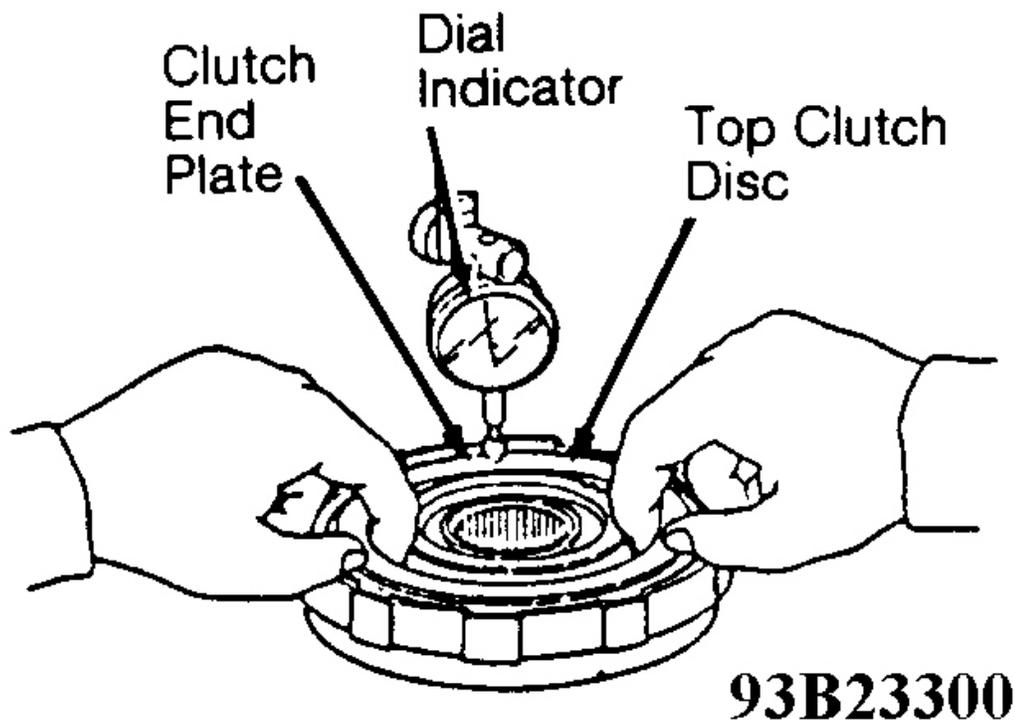


Fig. 26: Measuring Clutch Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING

Disassembly

1. Remove countershaft bearing from torque converter housing, using Bearing Remover (07736-A01000A) and slide hammer (if necessary). Remove oil guide plate from countershaft bearing bore in torque converter housing. See **Fig. 8**.
2. Remove mainshaft bearing and oil seal using hammer, Driver (07749-0010000) and Adapter (07749-6340500). 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. Lubricate components with ATF. To install mainshaft bearing, use hammer, Driver (07749-0010000) and Adapter (07746-0010500). Drive bearing in until bearing bottoms in torque converter housing.
2. Using hammer, driver and Adapter (07947-6340201), install mainshaft oil seal in torque converter housing. Oil seal should be even 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 with tab in center facing upward (away from torque converter housing surface). See **Fig. 8**. Using hammer, driver and Adapter (07746-0010500), drive countershaft bearing into torque converter housing.

CAUTION: If any differential components, transaxle housing, torque converter housing, snap rings or differential bearings are replaced, differential bearing side clearance must be checked. See DIFFERENTIAL BEARING SIDE CLEARANCE under TRANSAXLE REASSEMBLY.

4. Once differential bearing side clearance is obtained, install differential oil seal. Using driver, Adapter (07947-SD90100) and Pilot (07JAD-PH80200), drive oil seal in torque converter housing until oil seal is fully seated.

TRANSAXLE HOUSING

Disassembly

1. To remove mainshaft and countershaft ball bearings, expand snap ring retaining bearing in transaxle housing. Press bearings from transaxle housing.
2. DO NOT remove snap ring from transaxle housing unless necessary to clean groove in transaxle housing. Using hammer and drift, tap differential 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. Lubricate all components with ATF. Expand snap ring and install mainshaft or countershaft ball bearing part way into transaxle housing.

CAUTION: Ensure ball bearing is installed with groove facing toward snap ring in transaxle housing so snap ring will engage with ball bearing.

2. Release snap ring. Continue pressing ball bearing into transaxle housing until snap ring engages in ball bearing. Ensure snap ring is fully seated.

CAUTION: If differential carrier, differential bearings, transaxle housing, torque converter housing or snap rings are replaced, differential bearing

side clearance must be checked. See DIFFERENTIAL BEARING SIDE CLEARANCE under TRANSAXLE REASSEMBLY.

- Once differential bearing side clearance is obtained, install differential oil seal. Using driver, Adapter (07947-6110501) and Pilot (07JAD-PH80200), drive oil seal in transaxle housing until oil seal is fully seated.

DIFFERENTIAL ASSEMBLY

Disassembly

- Before disassembling differential assembly, check pinion gear backlash. Place differential assembly on "V" blocks with both axle shafts installed.
- Install dial indicator with stem resting against pinion gear. See **Fig. 22** . Check pinion gear backlash. Pinion gear backlash should be .002-.006" (.05-.15 mm).
- If pinion gear backlash is not within specification, different thickness pinion gear thrust washer should be installed during reassembly. See **PINION GEAR THRUST WASHER SPECIFICATIONS** table.

PINION GEAR THRUST WASHER SPECIFICATIONS

Part Number	Thickness - In. (mm)
41351-689-000	.028 (.70)
41352-689-000	.031 (.80)
41353-689-000	.035 (.90)
41354-689-000	.039 (1.00)
41355-PC8-000	.030 (.75)
41356-PC8-000	.033 (.85)
41357-PC8-000	.037 (.95)

- If replacing differential bearings, use bearing puller to remove differential bearings from differential carrier. Remove bolts and ring gear. See **Fig. 23** .

NOTE: Ring gear bolts have left-hand threads.

- Drive pin for pinion shaft from differential carrier. See **Fig. 28** . Remove pinion shaft, pinion gears, side gears and thrust washers.

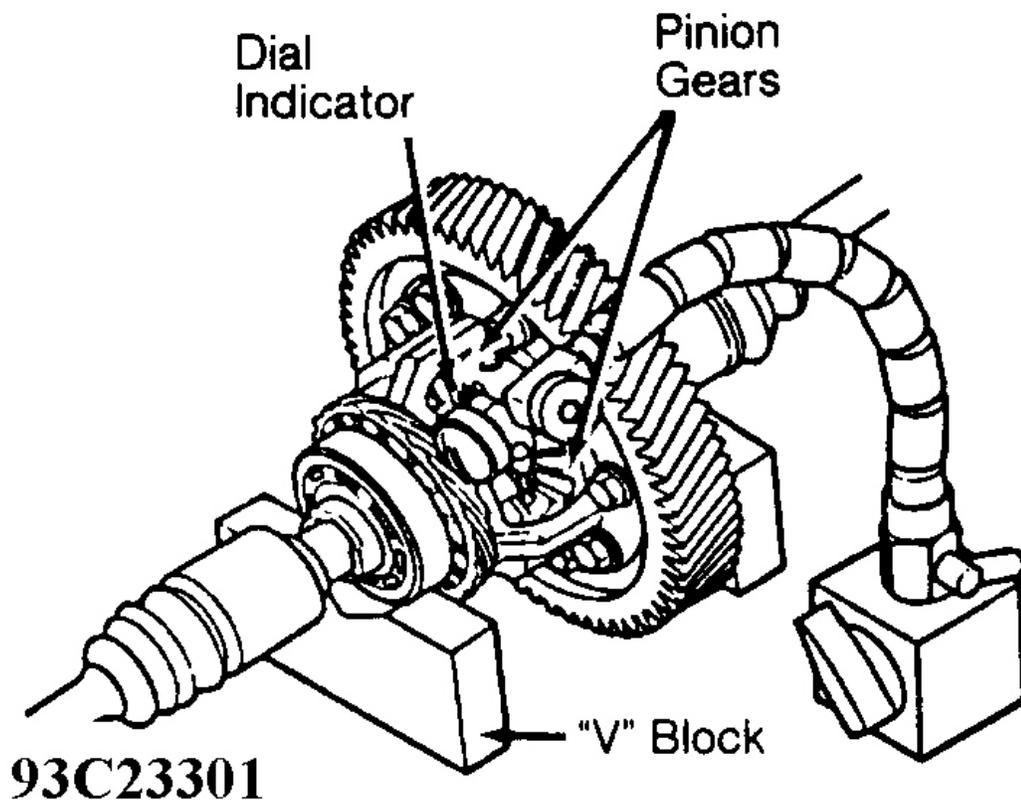


Fig. 27: Checking Pinion Gear Backlash

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for 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. Stake differential carrier in 2 places to retain pin for pinion shaft.

CAUTION: Ensure differential carrier is staked in 2 places to retain pin for pinion shaft.

3. Recheck pinion gear backlash. If pinion gear backlash is not within specification, select different thickness pinion gear thrust washer. If pinion gear backlash still is not within specification, replace side and pinion gears.
4. Recheck pinion gear backlash. If pinion gear backlash is not within specification, replace differential carrier.

CAUTION: Ring gear must be installed with chamfered side on inside of ring gear toward differential carrier.

5. Install ring gear on differential carrier. Ensure chamfered side of gear is toward differential carrier. Install and tighten ring gear bolts to specification. See **TORQUE SPECIFICATIONS** . Using Driver (07746-0030100), install differential bearings on differential carrier (if removed).

CAUTION: If differential carrier, differential bearings, transaxle housing, torque converter housing or snap rings are replaced, differential bearing side clearance must be checked. See **DIFFERENTIAL BEARING SIDE CLEARANCE under TRANSAXLE REASSEMBLY.**

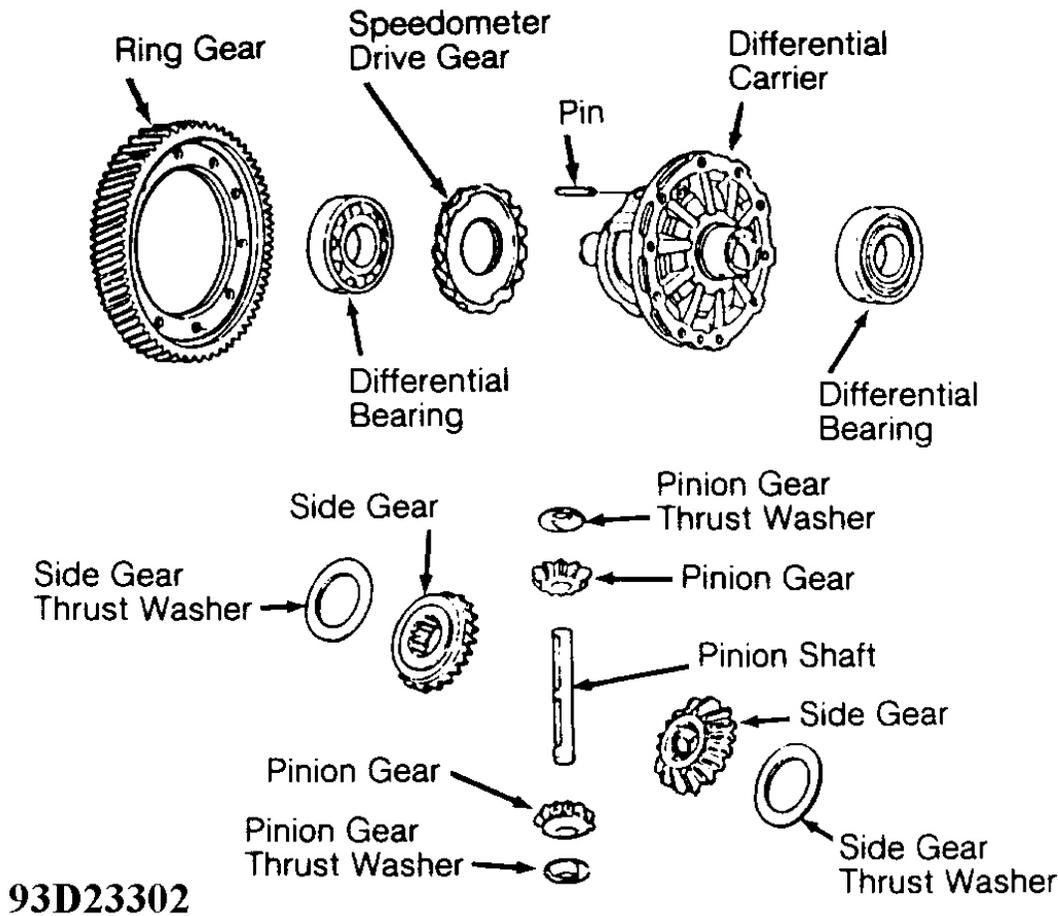


Fig. 28: Exploded View Of Differential Assembly
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE REASSEMBLY

DIFFERENTIAL BEARING SIDE CLEARANCE

CAUTION: If differential carrier, differential bearings, transaxle housing, torque converter housing or snap rings are replaced, differential bearing side clearance must be checked.

1. Install .039" (1.00 mm) thick snap ring in transaxle housing. This is snap ring that bearing on differential carrier seats against. Ensure snap ring is fully seated.
2. Install differential assembly in torque converter housing. Using Driver (07746-0030100) and Adapter (07746-0030400), tap differential assembly into torque converter housing. Perform STEP 1 as shown in **Fig. 29** . Ensure bearing on differential carrier is fully seated on torque converter housing.
3. Install gasket and transaxle housing on torque converter housing. Install and tighten transaxle housing

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bolts in sequence to 25 ft. lbs. (34 N.m). See **Fig. 30**.

- Using Driver (07749-0010000) and Adapter (07947-6340500), tap on transaxle housing side of differential assembly to fully seat the bearings. Perform STEP 2. as shown in **Fig. 29**. Ensure bearings are fully seated in both housings.
- Using feeler gauge, measure differential bearing side clearance between snap ring and bearing on transaxle housing. See **Fig. 30**. Replace snap ring in transaxle housing if differential bearing side clearance exceeds .004" (.10 mm). Different thickness snap rings are available. See SNAP RING SPECIFICATIONS table.
- Replace snap ring in transaxle housing (if necessary) and recheck differential bearing side clearance. Remove transaxle housing and differential assembly.

SNAP RING SPECIFICATIONS

Part Number	Thickness - In. (mm)
41441-PL3-A00	.039 (1.00)
41442-PL3-A00	.043 (1.10)
41443-PL3-A00	.047 (1.20)
41444-PL3-A00	.051 (1.30)
41445-PL3-A00	.055 (1.40)
41446-PL3-A00	.059 (1.50)
41447-PL3-A00	.063 (1.60)
41448-PL3-A00	.067 (1.70)
41449-PL3-A00	.071 (1.80)
41450-PL3-A00	.041 (1.05)
41451-PL3-A00	.045 (1.15)
41452-PL3-A00	.049 (1.25)
41453-PL3-A00	.053 (1.35)
41454-PL3-A00	.057 (1.45)
41455-PL3-A00	.061 (1.55)
41456-PL3-A00	.065 (1.65)
41457-PL3-A00	.069 (1.75)

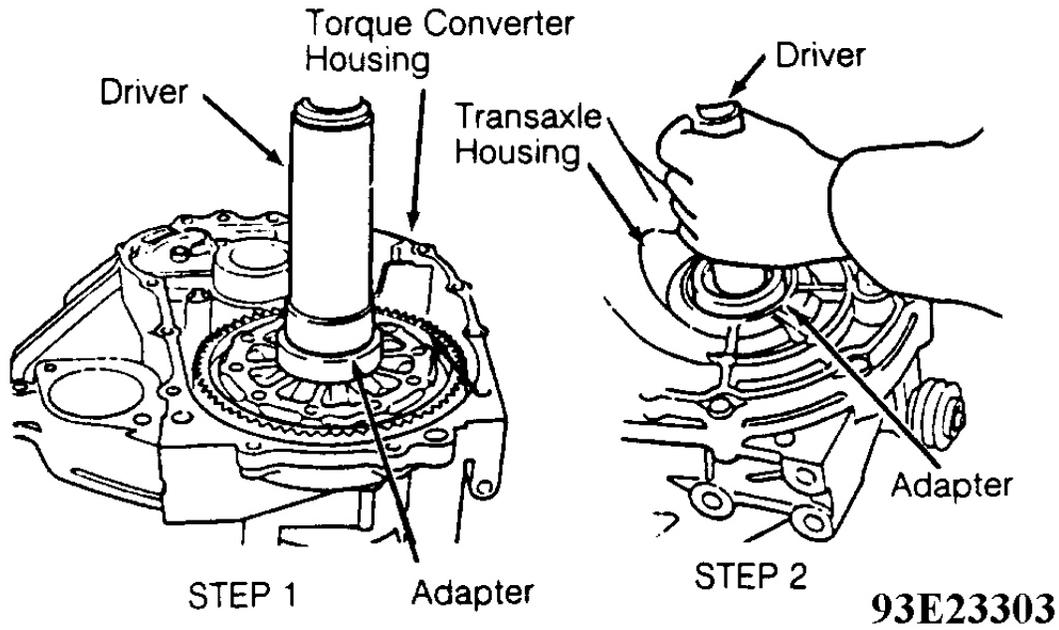


Fig. 29: Installing Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

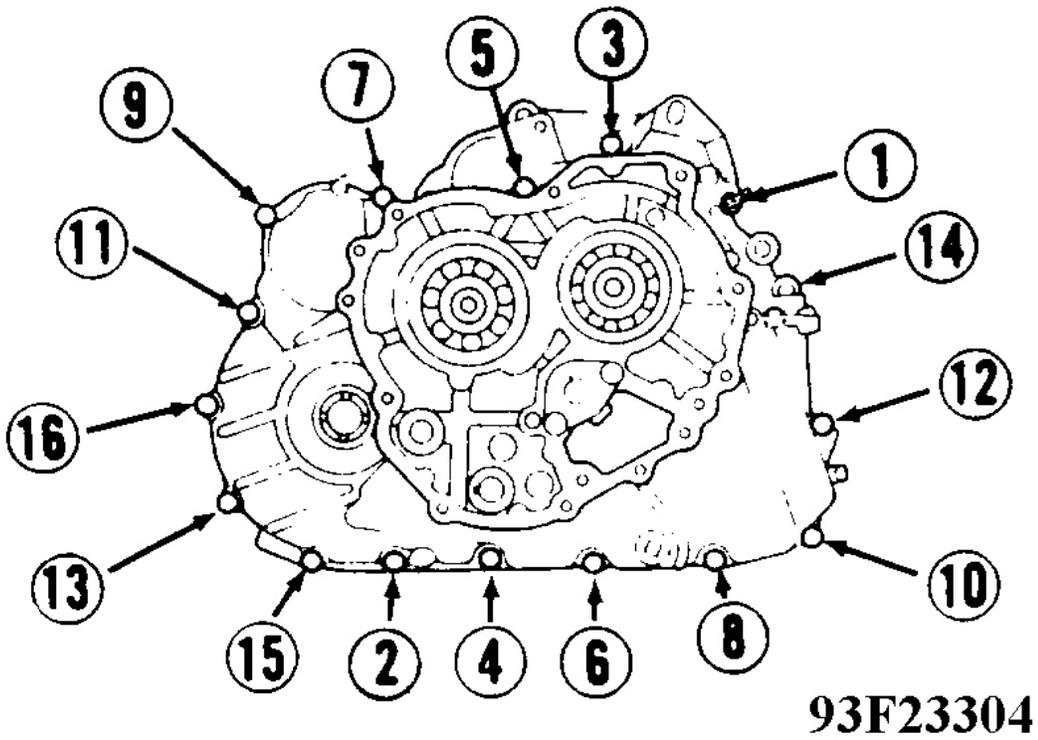


Fig. 30: Transaxle Housing Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

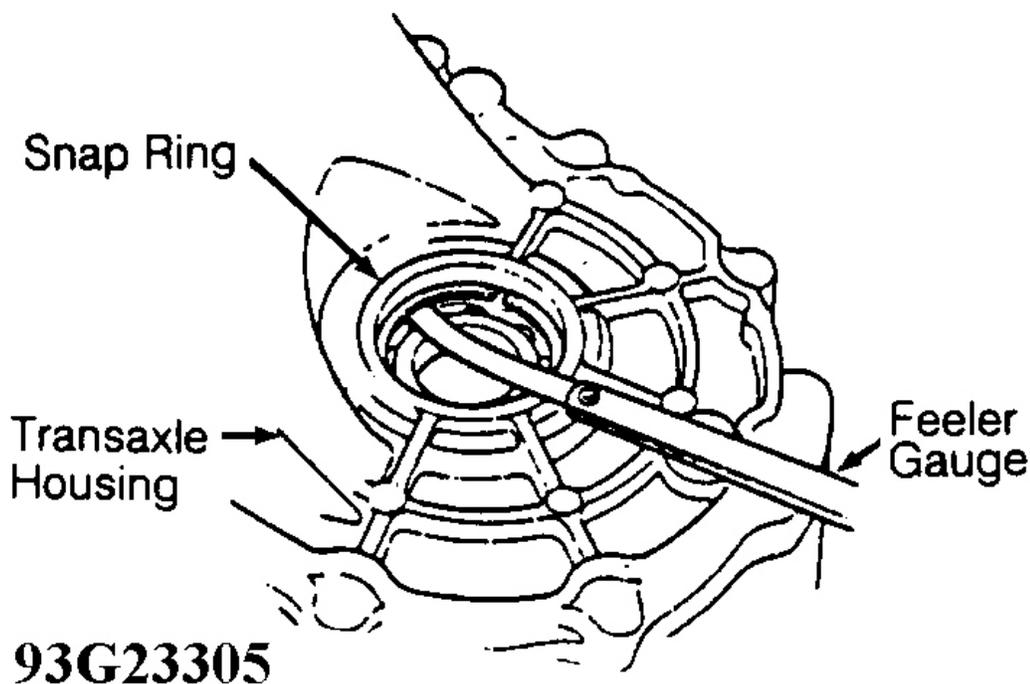


Fig. 31: Checking Differential Bearing Side Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE BODIES & INTERNAL COMPONENTS

CAUTION: If differential carrier, differential bearings, transaxle housing, torque converter housing or snap rings are replaced, differential bearing side clearance must be checked. See DIFFERENTIAL BEARING SIDE CLEARANCE .

NOTE: Coat all components with ATF before reassembly.

1. Install shaft in reverse idler gear holder. Align hole in shaft with reverse idler gear shaft bolt. Install spring, washer and reverse idler gear shaft bolt. Tighten bolt to specification. See TORQUE SPECIFICATIONS .
2. Install spring and steel ball in reverse idler gear holder. Install needle bearing on end of reverse idler gear holder. Ensure needle bearing retains steel ball and spring in reverse idler gear holder.
3. Install reverse idler gear in transaxle housing with chamfered side of gear away from transaxle housing (toward torque converter housing). See Fig. 32 .

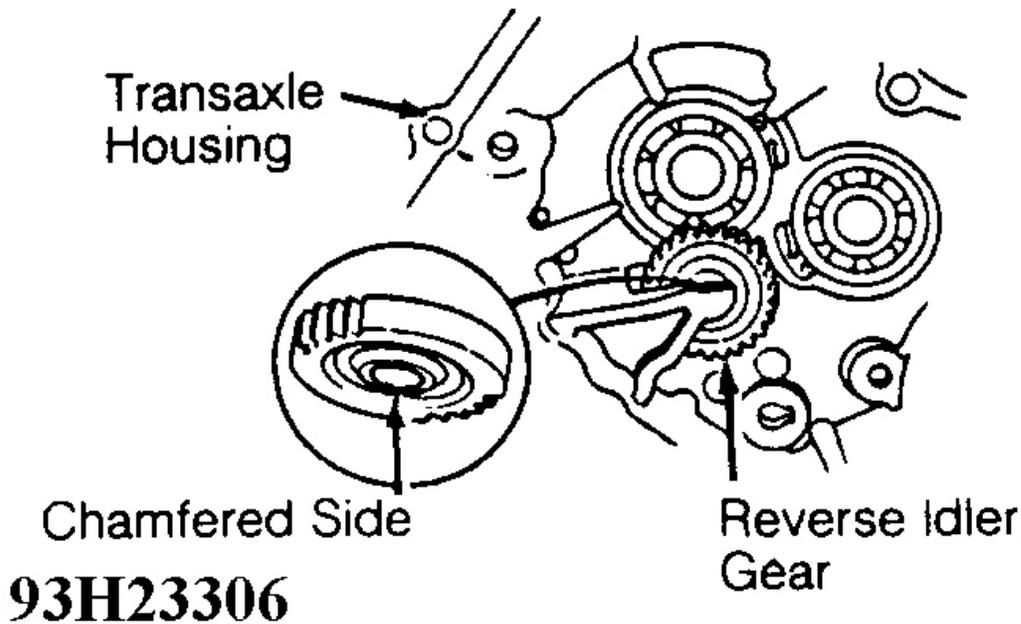


Fig. 32: Installing Reverse Idler Gear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install reverse idler gear holder on transaxle housing. Install and tighten reverse idler gear holder bolts to specification.
5. Install NEW fluid strainer on torque converter housing. See **Fig. 8** . Install differential assembly in torque converter housing. Using Driver (07746-0030100) and Adapter (07746-0030400), tap differential assembly into torque converter housing. Perform STEP 1 as shown in **Fig. 24** . Ensure bearing on differential carrier is fully seated on torque converter housing.
6. Install control shaft and components using NEW pins. See **Fig. 8** . Install control lever on end of control shaft. Install bolt and NEW bolt lock on control lever. Tighten bolt to specification. Bend tabs over on bolt lock.
7. Install dowel pins and separator plate for main valve body on torque converter housing. Install bolt in separator plate and tighten to specification.

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

8. Install oil pump drive gear, oil pump driven gear and oil pump driven gear shaft. Install main valve body. Tighten main valve body bolts to specification.

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 retaining 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.

9. Install check valve, check valve spring, filter, check balls, dowel pin and suction pipe in main valve body. See **Fig. 9** . Install NEW "O" ring, stator shaft and stop pin. See **Fig. 8** .
10. Install regulator valve body, dowel pins, torque converter check valve and spring. Install bolt in regulator valve body. Tighten bolt to specification.
11. Install separator plate and lock-up valve body. See **Fig. 8** . Install and tighten lock-up valve body bolts to specification. Install separator plate, dowel pins and secondary valve body.
12. Install and tighten secondary valve body bolts to specification. Install check balls in secondary valve body. See **Fig. 11** .
13. Install separator plate, clip, throttle control shaft and servo valve body. See **Fig. 8** . Install accumulator cover and servo valve body bolts. Hold accumulator cover downward and tighten servo valve body bolts and accumulator cover bolts to specification.

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

14. Install clutch feedpipes in servo valve body. Install separator plate and modulator valve body. See **Fig. 8** . Install and tighten modulator valve body bolts to specification.
15. Install servo valve holder, NEW bolt locks and bolts. Tighten servo valve holder bolts to specification. Bent tabs over on bolt locks.
16. Install suction pipe, separator plate, servo cover and NEW magnet and holder. See **Fig. 8** . Install and tighten servo cover bolts to specification.
17. Install separator plate, governor, NEW bolt locks and bolts. Tighten governor bolts to specification. Bent tabs over on bolt locks. Install by-pass body and cover. Install and tighten by-pass body bolts to specification.
18. Install all components and NEW "O" rings on mainshaft. See **Fig. 8** . Install NEW "O" rings and all components up to the distance collar on the countershaft . See **Fig. 8** . Install mainshaft and countershaft as an assembly in torque converter housing.

CAUTION: DO NOT tap on mainshaft or countershaft with a hammer to seat shaft assemblies in torque converter housing.

19. Install needle bearing and countershaft 4th gear on countershaft. See **Fig. 8** . Install selector hub on countershaft with groove side of selector hub toward threaded end of countershaft. See **Fig. 33** .
20. Install reverse selector with flat side of reverse selector facing upward (toward threaded end of countershaft). See **Fig. 33** .
21. Rotate shift fork shaft on servo valve body so large chamfered hole aligns with hole in reverse shift fork. Install reverse shift fork so it engages with reverse selector. See **Fig. 8** . Install reverse shift fork bolt and NEW bolt lock. Tighten bolt to specification. Bend over tabs on bolt lock.

22. Install countershaft reverse gear, needle bearing and collar on countershaft. See **Fig. 8** . Install pipe in end of mainshaft.
23. Align spring pin on control shaft with groove on transaxle housing by rotating control shaft. See **Fig. 7** . Install transaxle housing on torque converter housing.

NOTE: **Ensure reverse idler gear meshes with mainshaft and countershaft or transaxle housing will not fit on torque converter housing.**

24. Install and tighten transaxle housing bolts to specification in sequence. See **Fig. 29** . Use care when installing cable bracket with transaxle housing bolts. DO NOT bend cable bracket.
25. Install throttle control lever spring and throttle control lever. See **Fig. 5** . Install NEW bolt lock and throttle control lever bolt. Tighten bolt to specification. Bend over tabs on bolt lock.
26. Install collar and thrust washer on mainshaft. See **Fig. 5** . Install parking brake spring and parking shift arm on control shaft. See **Fig. 5** . Install parking brake stopper, bolt and NEW bolt lock. Tighten bolt to specification. Bend over tabs on bolt lock.
27. Install proper length dowel pin on torque converter housing. See **Fig. 33** . Install NEW gasket on torque converter housing.
28. Install collar, needle bearing, countershaft 1st gear with one-way clutch and parking gear on countershaft. Install NEW lock nut on countershaft. Install parking pawl shaft, parking pawl spring, parking pawl and stop pin. See **Fig. 5** .

CAUTION: **Ensure parking pawl spring fits into hole on parking pawl and hole on transaxle housing. Spring force should hold parking pawl away from parking gear.**

29. Install NEW "O" rings, mainshaft 1st gear, needle bearing, thrust needle bearing and thrust washer on mainshaft. See **Fig. 5** . Install 1st clutch and NEW lock nut on mainshaft.

NOTE: **Mainshaft has left-hand threads.**

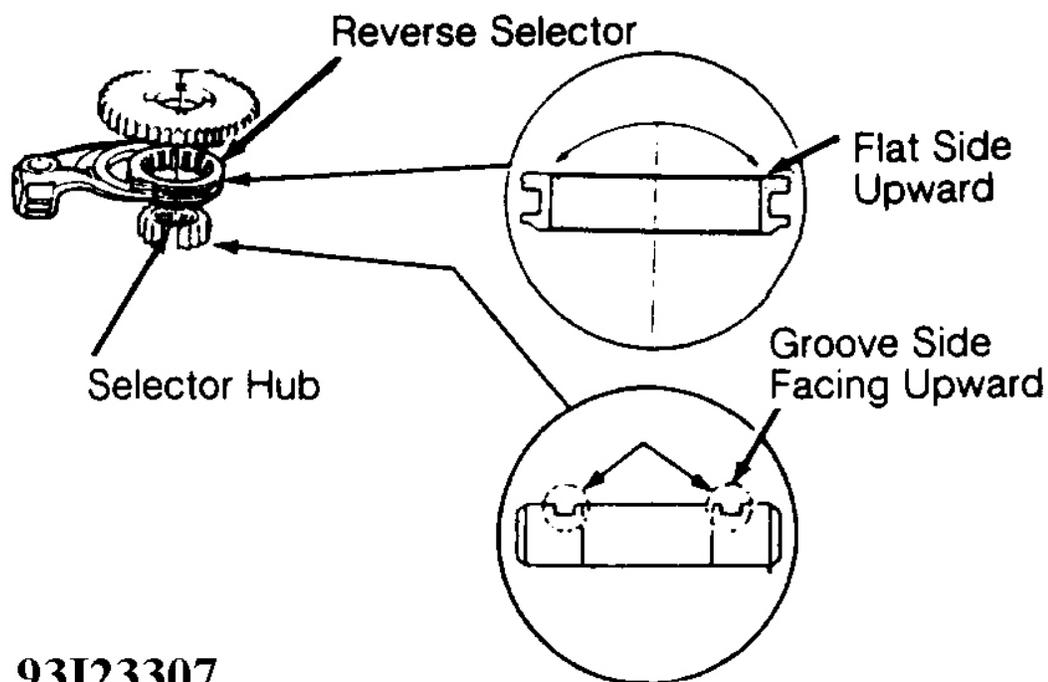
30. Install Mainshaft Holder (07923-6890202) on mainshaft to secure mainshaft. See **Fig. 6** . Engage parking pawl with parking gear. Tighten mainshaft and countershaft lock nuts to specification. Remove mainshaft holder.
31. Stake countershaft lock nut flange against grooves of parking gear in 2 places. Stake mainshaft lock nut flange against groove in 1st clutch assembly.

CAUTION: **Ensure countershaft and mainshaft lock nuts are securely staked.**

32. Place parking brake lever in "P" position so parking pawl engages parking gear. Measure distance between parking pawl shaft and roller pin on parking shift arm. See **Fig. 35** . This is parking brake stopper distance.
33. Parking brake stopper distance should be 1.209-1.248" (30.70-31.70 mm). If parking brake stopper distance is not within specification, install different size parking brake stopper. Parking brake stopper is

available in 3 sizes. Consult parts department for variable sizes of braking brake stopper.

34. Ensure all clutch feedpipes are installed in right side cover using NEW "O" rings. See **Fig. 5** . Install NEW gasket, NEW "O" rings, dowel pins and right side cover. Tighten right side cover bolts to specification using a crisscross pattern.
35. To install remaining components, reverse removal procedure. Ensure NEW seal washers are used when installing joint bolts for cooler pipes. Tighten all fasteners to specification.



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Fig. 33: Installing Selector Hub & Reverse Selector
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

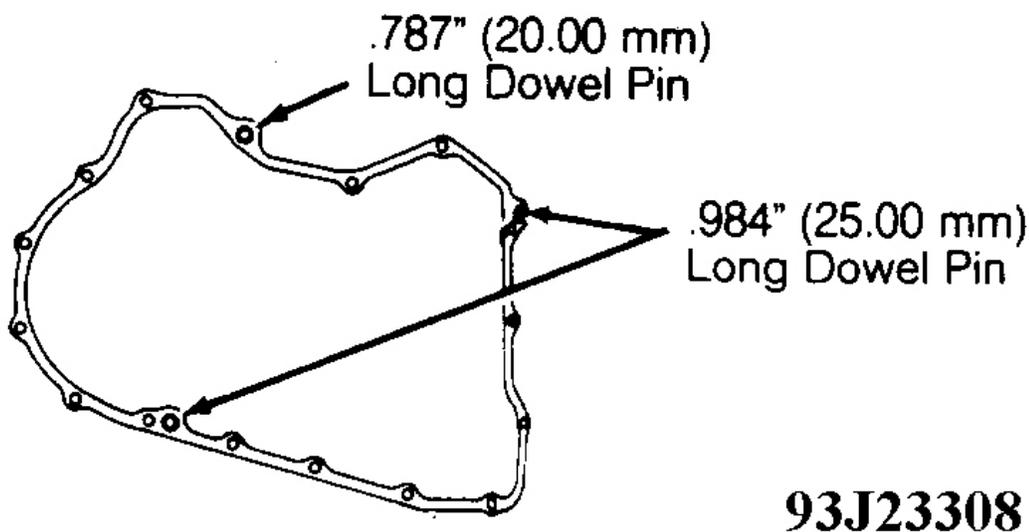


Fig. 34: Installing Dowel Pins On Torque Converter Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

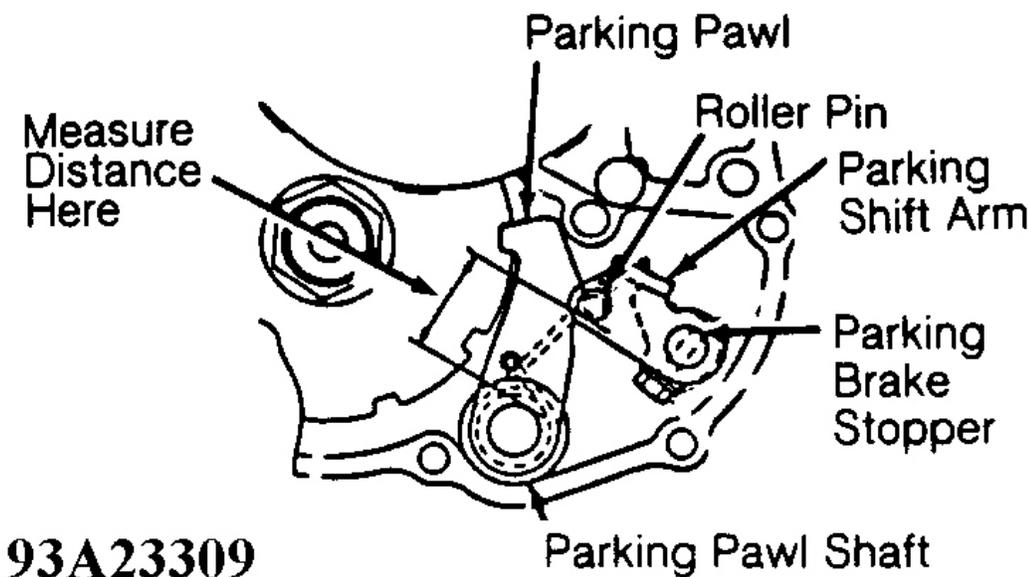


Fig. 35: Measuring Parking Brake Stopper Distance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Countershaft Lock Nut	103 (140)
Drain Plug	29 (39)
Joint Bolt	21 (29)
Mainshaft Lock Nut	70 (95)
Parking Brake Stopper Bolt	11 (15)
Reverse Idler Gear Shaft Bolt	20 (27)
Ring Gear Bolt	76 (103)
Sealing Bolt	13 (18)
Transaxle Housing-To-Torque Converter Housing Bolt (1)	25 (34)
	INCH Lbs. (N.m)
Accumulator Cover Bolt	108 (12)
By-Pass Body Bolt	108 (12)
By-Pass Body Cover Bolt	108 (12)
Control Lever Bolt	120 (14)
Governor Bolt	108 (12)
Governor Housing-To-Plate Bolt	108 (12)
Lock-Up Control Solenoid Valve Bolt	108 (12)
Lock-Up Valve Body Bolt	108 (12)
Main Valve Body Bolt	108 (12)
Main Valve Body Separator Plate Bolt	108 (12)
Modulator Valve Body Bolt	108 (12)
Regulator Valve Body Bolt	108 (12)
Reverse Idler Gear Holder Bolt	108 (12)
Reverse Shift Fork Bolt	120 (14)
Right Side Cover Bolt	108 (12)
Secondary Valve Body Bolt	108 (12)
Servo Cover Bolt	108 (12)
Servo Valve Body Bolt	108 (12)
Servo Valve Body Valve Retainer Bolt	72
Servo Valve Holder Bolt	108 (12)
Stopper Bolt	108 (12)
Throttle Control Lever Bolt	72
Tighten bolts to specification in sequence. See Fig. 30 .	

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(1)

TRANSAXLE SPECIFICATIONS**TRANSAXLE SPECIFICATIONS**

Application	In. (mm)
Clutch Clearances	
1st & 2nd Clutches	.026-.033 (.65-.85)
3rd & 4th Clutches	.016-.024 (.40-.60)
Differential Bearing Side Clearance	⁽¹⁾ .004 (.10)
Differential Pinion Gear Backlash	.002-.006 (.05-.15)
Gear Clearances	
Countershaft 2nd-3rd Gear	.003-.006 (.07-.15)
Countershaft 4th Gear	.003-.006 (.07-.15)
Mainshaft 2nd Gear	.003-.006 (.07-.15)
Oil Pump Specifications	
Side Clearance Oil Pump Drive Gear	.0094-.0105 (.240-.266)
Oil Pump Driven Gear	.0025-.0035 (.002-.089)
Thrust Clearance Standard	.001-.002 (.03-.05)
Thrust Clearance Wear Limit	.0028 (.070)
Parking Brake Stopper	
Distance	1.209-1.248 (30.70-31.70)
(1) Maximum clearance. Replace snap ring with different thickness snap ring if clearance exceeds specification.	