

1990 AUTOMATIC TRANSMISSIONS

RO Overhaul

APPLICATION

TRANSAXLE APPLICATION

Application	Transaxle Model
Integra	RO

IDENTIFICATION

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

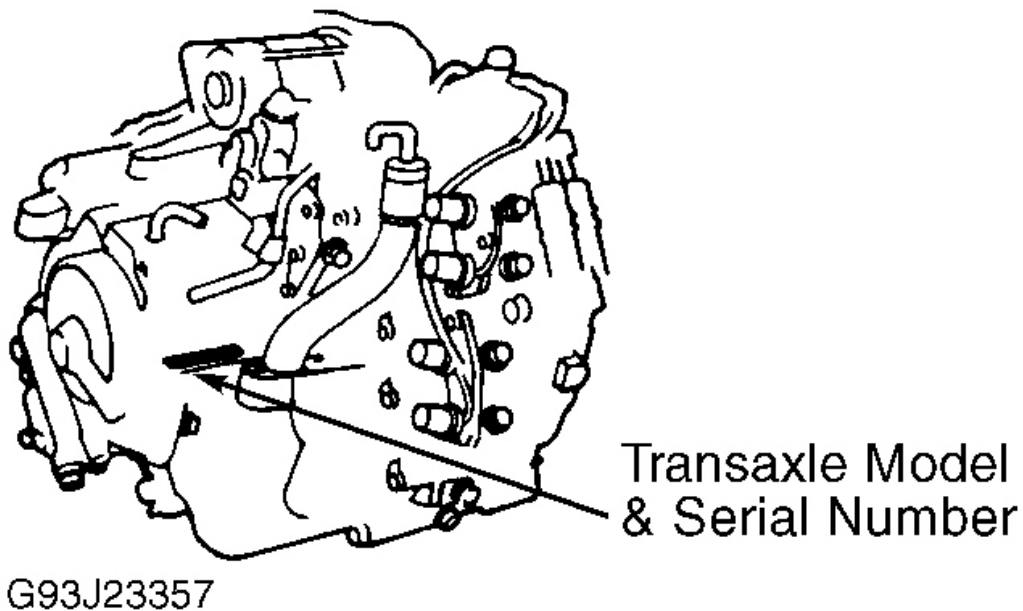


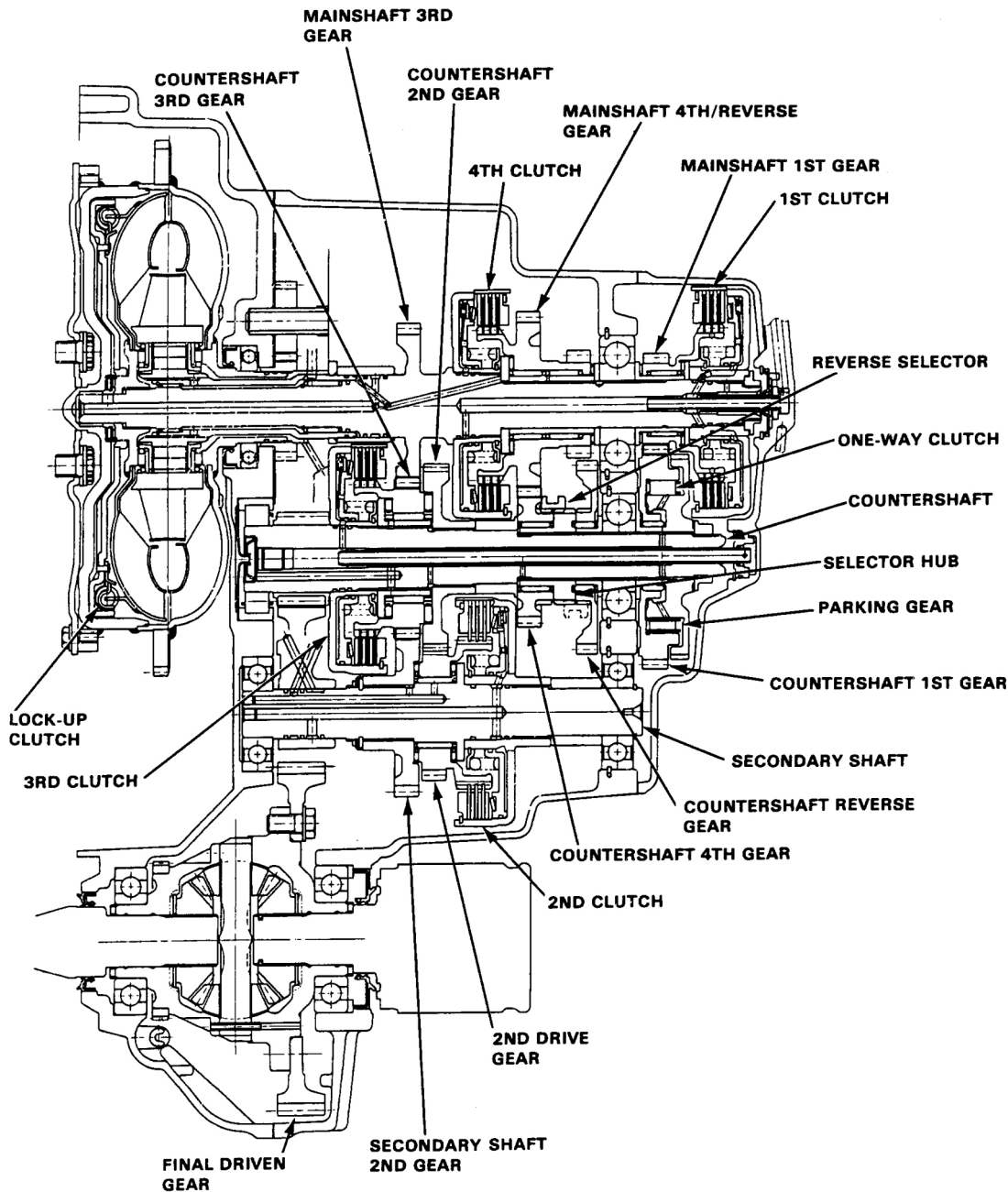
Fig. 1: Identifying Transaxle Model & Serial Number Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DESCRIPTION

Automatic transaxle is electronically controlled with 4 forward speeds and one reverse speed. Transaxle consists of clutches, mainshaft, countershaft, secondary shaft, shift control solenoid valves, 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 and regulator valve body. Transaxle shifting and torque converter lock-up are controlled by the Automatic Transaxle Control Unit (ATCU).

An "S4" switch is mounted on the shift lever in the vehicle. With "S4" switch depressed (ON position), transaxle will shift into 4th gear ("S4") range when shift lever is in the "S" position, and "S4" light on the instrument panel will come on. With "S4" switch released (OFF position), transaxle will shift into 3rd gear, "S4" light will go off, and "S" light on instrument panel will come on. If shift lever is moved to any position other than "S" position, "S4" switch will be released automatically.



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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. Shift lever also changes position of the shift position console switch, mounted near shift lever. Shift position console switch delivers an input signal to the ATCU to indicate shift lever position. The ATCU uses

input signal to operate shift control solenoid valves and control transaxle shifting.

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

"P" (Park)

Front wheels lock as parking pawl engages with parking gear on countershaft. All clutches are released. Neutral safety switch, incorporated in shift position console switch, allows starting in this position.

"R" (Reverse)

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

"N" (Neutral)

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

"D" (Drive)

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

"S" (Sport)

Transaxle starts in 1st gear and upshifts automatically to 2nd gear and then 3rd gear. When "S4" switch is depressed (ON position), transaxle will shift into 4th gear ("S4") range. When in "S4" range, ATCU sends signal to operate torque converter lock-up. Transaxle will downshift through all gears on deceleration.

"2" (Second)

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

When in "S4" range or "D4", 2nd, 3rd and 4th gears, torque converter lock-up exists and transaxle mainshaft rotates at same speed as engine crankshaft. Under certain conditions, torque converter lock-up clutch is applied during deceleration. Torque converter lock-up is controlled by the ATCU. The ATCU receives various input signals and operates lock-up control solenoid valves. Operation of lock-up control solenoid valves controls the modulator pressure.

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

Transaxle is equipped with a shift and key interlock systems. The shift interlock system prevents the shift lever from being moved from "P" position unless the brake pedal is depressed and the accelerator pedal is in idle

position. In case of a malfunction, shift lever can be released by placing the ignition key in the 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 more information on interlock systems, see **RO ELECTRONIC CONTROLS** 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 off. Release mixing trigger. Turn water valve on, and rinse oil cooler for at least one minute. Once oil cooler is flushed in both directions, turn water off. Turn air valve on for 2 minutes or until no moisture is visible from drain hose.

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

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

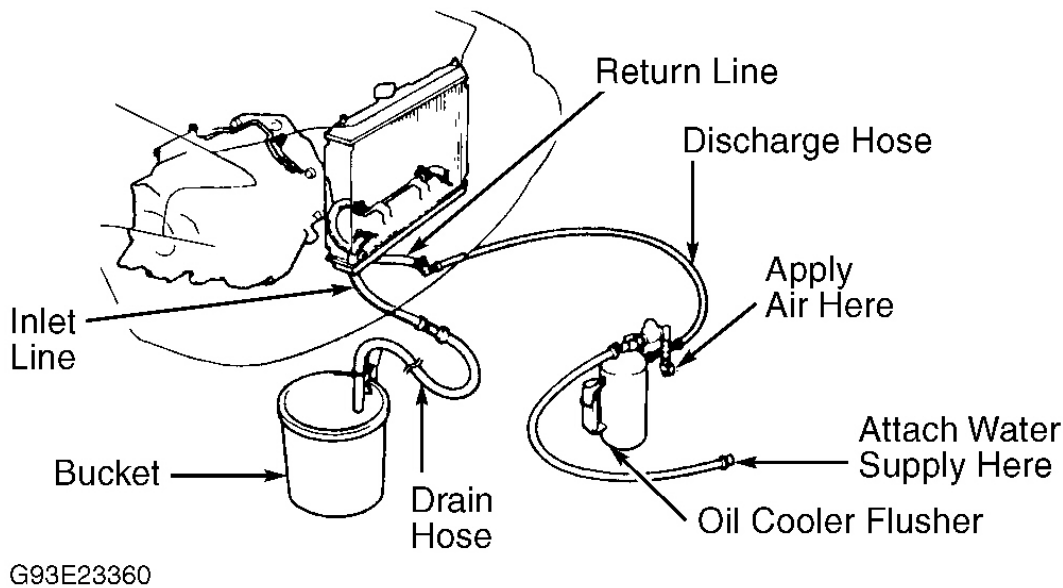


Fig. 3: Installing Oil Cooler Flusher
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Excessive Drag In Transaxle

- Binding Oil Pump

Excessive Idle Vibration

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

Excessive Vibration (RPM Related)

- Torque Converter Not Fully Seated In Oil Pump

Flares On 1-2 Upshift

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

Flares On 2-3 Upshift

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

Flares On 3-4 Upshift

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

Gear Whine That Changes With RPM & Shifts

- Defective 1st Clutch
- Defective 3rd Gears

Gear Whine That Changes With Speed

- Defective Differential Gears
- Shift Fork Bent

Harsh Downshift At Closed Throttle

- Throttle Valve "B" Stuck

Harsh Kickdown Shifts

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

Harsh Upshifts & Downshifts

- Check Balls Missing

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

Harsh 1-2 Upshift

- Defective 2nd Clutch
- 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 (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 Shift Valve Stuck

Lock-Up Clutch Does Not Operate Properly

- Improperly Adjusted Throttle Valve (T.V.) Cable
- Lock-Up Clutch Control Valve Stuck
- Lock-Up Clutch Shift Valve Stuck
- Lock-Up Clutch Timing Valve 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 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

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

Slips In 4th Gear

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

Upshifts Late

- Modulator Valve Stuck

Vehicle 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 "S"

- One-Way Clutch Installed Upside Down

Will Not Downshift To Low Gear

- 1-2 Shift Valve Stuck

Will Not Shift Into 4th Gear When In "S" Or "D"

- Defective Or Improperly Adjusted Shift Cable
- 3-4 Shift Valve Stuck
- 4th Accumulator 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" with brake pedal depressed and accelerator at idle position, check shift interlock system. See RO ELECTRONIC CONTROLS article.

1. Warm engine to normal operating temperature. Apply parking brake, and block wheels. Start engine, and move shift lever to "D" while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat step 1 with shift lever in "S", and ensure engine does not stall. Road test vehicle, and check for abnormal noise and clutch slippage. See CLUTCH APPLICATION table for clutch engagement specification.
3. Ensure shift points are correct. See UPSHIFT SPECIFICATIONS (MPH) and DOWNSHIFT SPECIFICATIONS (MPH) tables.
4. With shift lever in "D", 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 "D" or "S" to "2" at speeds greater than 62.5 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
"S4" Or "D"	
1st Gear	1st Clutch, One-Way Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(1) 3rd Clutch

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4th Gear	(1) 4th Clutch
"S"	
1st Gear	1st Clutch, One-Way Clutch
2nd Gear	(1) 2nd Clutch
3rd Gear	(1) 3rd Clutch
"2"	(1) 2nd Clutch
"R"	4th Clutch
Park & Neutral	No Clutches Are Applied
(1) The 1st clutch engages but driving power is not transmitted, as one-way clutch slips.	

UPSHIFT SPECIFICATIONS (MPH)

Shift Lever Position	1st-2nd	2nd-3rd	3rd-4th	Lock-Up On
"D" Position				
1/8 Throttle, Coasting Downhill From Stop	8-11	20-23	25-30	38-41
1/2 Throttle, Accelerating From Stop	18-22	35-41	55-61	65-69
Full Throttle, Accelerating From Stop	31-37	60-69	97-108	86-92
"S" Position With "S4" Switch On ⁽¹⁾				
1/8 Throttle, Coasting Downhill From Stop	8-11	20-23	30-35	43-50
1/2 Throttle, Accelerating From Stop	18-22	41-47	67-73	74-78
Full Throttle, Accelerating From Stop	31-37	60-69	97-108	86-92
(1) Place "S4" switch, mounted on shift lever, in the ON position (depressed).				

DOWNSHIFT SPECIFICATIONS (MPH)

Shift Lever Position	Lock-Up Off	4th-3rd	3rd-2nd	2nd-1st
"D" Position				
1/8 Throttle, Coasting Or Braking To A Stop	35-38	(1)	18-21	7-10
1/2 Throttle, Slowed By Grade/Load	57-61	(1)	(1)	(1)
Full Throttle, Slowed By Grade Or Load	84-90	83-94	55-62	27-33
"S" Position With "S4" Switch On ⁽²⁾				
1/8 Throttle, Coasting Or Braking To A Stop	43-46	(1)	18-21	7-10
1/2 Throttle, Slowed By Grade	56-61	(1)	(1)	(1)

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Or Load				
Full Throttle, Slowed By Grade Or Load	84-90	83-94	55-62	27-33
(1) Specification is not available from manufacturer.				
(2) Place "S4" switch, mounted on shift lever, in the ON position (depressed).				

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. Place shift lever in "2".
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 in "D", "S" and "R".
4. Torque converter stall speed should be the same in "D", "S", "2" and "R". Ensure torque converter stall speed is within specification. See **TORQUE CONVERTER STALL SPEED** table. If the torque converter stall speed is not within specification, see **TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING** table for possible causes.

TORQUE CONVERTER STALL SPEED

Application	Engine RPM
Standard	2600
Service Limit	2450-2750

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Stall Speed Test Results (RPM)	Probable Cause
High In "D", "S", "2" & "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 "D" & "S"	Slipping 1st Clutch, Defective One-Way Clutch
High In "2"	Slipping 2nd Clutch
Low In "D", "S", "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.

Throttle Valve "B" Pressure Test

1. With engine off, remove plug from throttle valve "B" pressure tap on transaxle. See **Fig. 4** .
2. Attach Pressure Gauge Set (07406-0020003) to throttle valve "B" pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
3. Disconnect vacuum hose from top of vacuum modulator valve located on top of transaxle. See **Fig. 4** . Connect vacuum pump to vacuum hose port on top of vacuum modulator valve.
4. Start and operate engine at 2000 RPM. Place shift lever in "S" or "D" position. Note throttle valve "B" pressure with no vacuum applied to vacuum modulator valve. Apply 20-23 in. Hg of vacuum to vacuum modulator valve and note throttle valve "B" pressure.
5. Throttle valve "B" pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If throttle valve "B" pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set. Install plug and vacuum hose.

Line Pressure Test

1. Before testing line pressure, ensure throttle valve "B" pressure is within specification. See **THROTTLE VALVE "B" PRESSURE TEST** .
2. 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).
3. Disconnect vacuum hose from top of vacuum modulator valve located on top of transaxle. See **Fig. 4** . Connect vacuum pump to vacuum hose port on top of vacuum modulator valve.
4. With shift lever in "P" or "N", start and operate engine at 2000 RPM. Note line pressure with no vacuum applied to vacuum modulator valve. Apply 20-23 in. Hg of vacuum to vacuum modulator valve, and note line pressure.
5. Line pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If line pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set. Install plug and vacuum hose.

NOTE: Check clutch pressure at each clutch pressure tap on transaxle. See **Fig. 4** . Ensure shift lever is in proper position when checking clutch pressures.

Clutch Pressure Test

1. Before testing clutch pressure, ensure throttle valve "B" pressure is within specification. See **THROTTLE VALVE "B" PRESSURE TEST** .
2. 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).
3. Disconnect vacuum hose from top of vacuum modulator valve located on top of transaxle. See **Fig. 4** .

Connect vacuum pump to vacuum hose port on top of vacuum modulator valve.

4. Start and operate engine at 2000 RPM. Place the shift lever in the correct position for the clutch pressure being tested. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
5. Note clutch pressure with no vacuum applied to vacuum modulator valve. Apply 20-23 in. Hg of vacuum to vacuum modulator valve, and note clutch pressure.
6. Clutch pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If clutch pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set. Install plug and vacuum hose.

Low/High Pressure Test

1. Before testing low/high pressure, ensure throttle valve "B" pressure is within specification. See **THROTTLE VALVE "B" PRESSURE TEST** . The low/high pressure is tested at 2nd, 3rd and 4th clutch pressure taps on transaxle. See **Fig. 4** .
2. Ensure vacuum hose is connected to vacuum modulator valve located on top of transaxle. See **Fig. 4** . 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. Place the shift lever in the correct position for the clutch pressure being tested. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
4. Slowly increase engine speed until pressure is indicated on pressure gauge. Release throttle, allowing engine to idle, and note low pressure reading.
5. With engine idling, disconnect vacuum hose from top of vacuum modulator valve. Increase engine speed, and note highest pressure reading.

NOTE: **DO NOT increase engine speed excessively when checking 3rd or 4th clutch, as transaxle will not upshift in these ranges regardless of engine speed.**

6. Repeat procedure on remaining clutches. Ensure low/high pressure is within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If low/high pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set. Install plug and vacuum hose.

Control Solenoid Valve Pressure Test

1. Before testing control solenoid valve pressure, ensure line pressure is within specification. See **LINE PRESSURE TEST** .

NOTE: **Control solenoid valve pressure is tested at lock-up control solenoid valve "A" and "B" pressure taps and shift control solenoid valve "A" and "B" pressure taps on transaxle. See Fig. 4 .**

2. With engine off, remove plug from appropriate control solenoid valve pressure tap on transaxle. Attach

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Pressure Gauge Set (07406-0020003) to appropriate pressure tap using NEW aluminum washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).

- Start and operate engine at 2000 RPM. Place shift lever in "P" or "N" position, and note pressure reading.
- Control solenoid valve pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If control solenoid valve pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off. Remove pressure gauge set, and install plug.

HYDRAULIC PRESSURE TEST SPECIFICATIONS

Application	Lever Position	psi (kg/cm ²)
Throttle Valve "B" Pressure		
2000 RPM & 20-23 In. Hg Vacuum Applied To Vacuum Modulator Valve	"S" Or "D"	0 (0)
2000 RPM & No Vacuum At Vacuum Modulator Valve	"S" Or "D"	104-118 (7.3-8.3)
Line Pressure		
2000 RPM & 20-23 In. Hg Vacuum Applied To Vacuum Modulator Valve	"P" Or "N"	64-85 (4.5-6.0)
2000 RPM & No Vacuum At Vacuum Modulator Valve	"P" Or "N"	104-118 (7.3-8.3)
Clutch Pressure		
1st Clutch		
2000 RPM & 20-23 In. Hg Vacuum Applied To Modulator Valve	"S" Or "D"	64-85 (4.5-6.0)
2000 RPM & No Vacuum To Vacuum Modulator Valve	"S" Or "D"	105-119 (7.4-8.4)
2nd Clutch		
2000 RPM & 20-23 In. Hg Vacuum Applied To Vacuum Modulator Valve	"2"	104-125 (7.3-8.8)
2000 RPM & No Vacuum At Vacuum Modulator Valve	"2"	148-162 (10.4-11.4)
3rd Clutch		
2000 RPM & 20-23 In. Hg Vacuum Applied To Vacuum Modulator Valve	(1) "S"	64-85 (4.5-6.0)
2000 RPM & No Vacuum At Vacuum Modulator Valve	(1) "S"	105-119 (7.4-8.4)
4th Clutch		
2000 RPM & 20-23 In. Hg Vacuum Applied To Modulator Valve	(2) "S" Or "D"	64-85 (4.5-6.0)
2000 RPM & No Vacuum At Vacuum Modulator Valve	(2) "S" Or "D"	105-119 (7.4-8.4)
4th Clutch		
2000 RPM & 20-23 In. Hg Vacuum Applied To Vacuum Modulator Valve	"R"	64-85 (4.5-6.0)

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2000 RPM & No Vacuum At Vacuum Modulator Valve	"R"	105-119 (7.4-8.4)
Low Pressure		
2nd Clutch	"S" Or "D"	64-71 (4.5-5.0)
3rd Clutch	(1) "S"	64-71 (4.5-5.0)
4th Clutch	(2) "S" Or "D"	64-71 (4.5-5.0)
High Pressure		
2nd Clutch	"S" Or "D"	104-119 (7.3-8.4)
3rd Clutch	(1) "S"	104-119 (7.3-8.4)
4th Clutch	(2) "S" Or "D"	104-119 (7.3-8.4)
Control Solenoid Valve Pressure		
Solenoid Valve "A" Or "B"	"P" Or "N"	64-80 (4.5-5.6)
(1) Pressure is checked with "S4" switch on shift lever in OFF position (released).		
(2) Pressure is checked with "S4" switch on shift lever in ON position (depressed) when shift lever is in "S" position.		

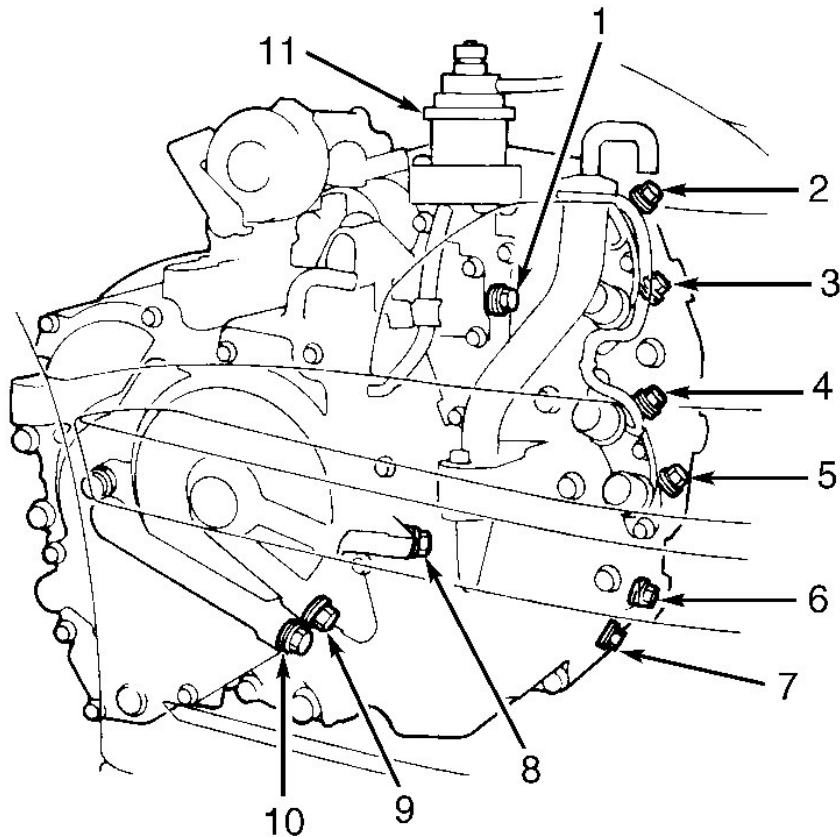
HYDRAULIC PRESSURE TROUBLE SHOOTING

Application	Probable Cause
Throttle Valve "B" Pressure	
High With Vacuum Applied	Defective Vacuum Modulator Or Hose
Low Or No Pressure With No Vacuum Applied	Defective Vacuum Modulator
Line Pressure	
High With Vacuum Applied	Defective Vacuum Modulator, Stuck Regulator Valve
Low Or No Pressure With No Vacuum Applied	Low Fluid Level, Defective Vacuum Modulator, Defective Torque Converter, Defective Torque Converter Check Valve, Defective Pressure Regulator, Clogged Fluid Strainer
Clutch Pressure	
Low Or No 1st Clutch Pressure	Defective 1st Clutch Or "O" Ring
Low Or No 2nd Clutch Pressure With Vacuum Applied	Defective 2nd Clutch, Defective 2nd Modulator Valve
High 2nd Clutch Pressure With Vacuum Applied	Defective 2nd Modulator Valve
Low Or No 2nd Clutch Pressure With No Vacuum Applied	Defective 2nd Clutch
High 2nd Clutch Pressure With No Vacuum Applied	Defective 2nd Modulator Valve
Low Or No 3rd Clutch Pressure	Defective 3rd Clutch Or "O" Ring

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Low Or No 4th Clutch Pressure	Defective 4th Clutch, "O" Ring, Defective Servo Valve
Low/High Pressure	
Low Or No 2nd Clutch Pressure	Defective 2nd Clutch Or "O" Ring
Low Or No 3rd Clutch Pressure	Defective 3rd Clutch Or "O" Ring
Low Or No 4th Clutch Pressure	Defective 4th Clutch Or "O" Ring
Control Solenoid Valve Pressure	
Low Or High Pressure On All Valves	Defective Modulator Valve
Low Or No Pressure On Certain Valves	Defective Control Solenoid Valve



- | | |
|-----------------------------|-----------------------------|
| 1. Line Pressure Tap | 6. Throttle Valve "B" |
| 2. Lock-Up Control Solenoid | Pressure Tap |
| 3. Lock-Up Control Solenoid | 7. 2nd Clutch Pressure Tap |
| Valve "B" Pressure Tap | 8. 4th Clutch Pressure Tap |
| 4. Shift Control Solenoid | 9. 1st Clutch Pressure Tap |
| Valve "B" Pressure Tap | 10. 3rd Clutch Pressure Tap |
| 5. Shift Control Solenoid | 11. Vacuum Modulator Valve |
| Valve "A" Pressure Tap | |

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Fig. 4: Identifying Transaxle Pressure Taps & Modulator Valve
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VACUUM MODULATOR VALVE

1. Ensure lower hose on vacuum modulator is not restricted. This is the hose vented to the atmosphere. Replace hose, if necessary, and go to next step.
2. Disconnect vacuum hose from top of vacuum modulator valve, located on top of transaxle. See **Fig. 4**.

Connect vacuum pump to vacuum hose port on top of vacuum modulator valve.

3. Apply 20-23 in. Hg of vacuum to vacuum modulator valve. Check if vacuum is retained. Vacuum modulator valve is okay if vacuum is retained. Replace vacuum modulator valve if vacuum is not retained. Remove vacuum pump, and reconnect vacuum hose.

REMOVAL & INSTALLATION

ELECTRICAL COMPONENTS

See RO ELECTRONIC CONTROLS article.

TRANSAXLE

See REMOVAL & INSTALLATION article.

VACUUM MODULATOR VALVE

Removal & Installation

1. Disconnect vacuum hoses from vacuum modulator valve. Remove bolts, vacuum modulator valve, gasket and "O" ring.
2. To install, reverse removal procedure using NEW gasket and NEW "O" ring. Tighten retaining bolts to specification. See TORQUE SPECIFICATIONS .

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 TESTING .

TRANSAXLE DISASSEMBLY

VALVE BODIES & INTERNAL COMPONENTS

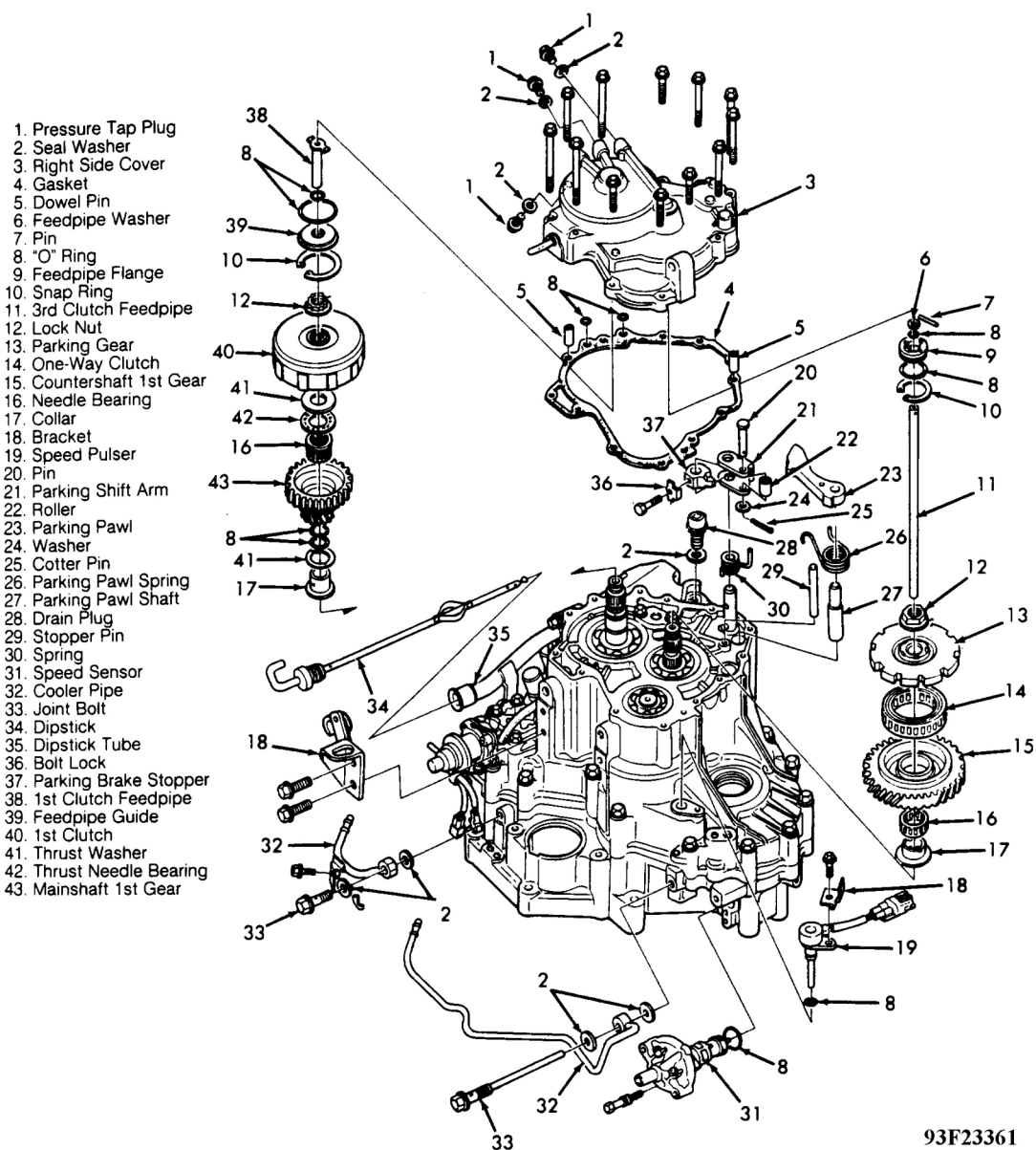
1. Remove retaining bolts, right side cover and gasket. See Fig. 5 . Remove joint bolts, seal washers, cooler pipes and dipstick. Install Mainshaft Holder (07GAB-PF50100) on mainshaft to secure mainshaft. See Fig. 6 .
2. Engage parking pawl with parking gear. Using hammer and chisel, cut lock tabs on countershaft and mainshaft lock nuts. Remove lock nut from countershaft and mainshaft. See Fig. 5 .

NOTE: Mainshaft lock nut has left-hand threads.

3. Remove mainshaft holder once all lock nuts are removed. Remove 1st clutch, thrust washer, thrust needle bearing, needle bearing, mainshaft 1st gear, thrust washer and collar from mainshaft. See Fig. 5 .

4. Using puller, remove parking gear, one-way clutch and countershaft 1st gear as an assembly from countershaft. Remove needle bearing and collar from countershaft.
5. Remove parking pawl, parking pawl spring, parking pawl shaft and stopper pin. See **Fig. 5** . Remove bolt, bolt lock, parking brake stopper, parking shift arm and spring.
6. Remove speed sensor and speed pulser (if necessary). Remove secondary shaft snap ring. See **Fig. 7** . Remove vacuum modulator valve assembly, gasket, "O" ring and dowel pins.
7. Remove transaxle housing bolts. Align spring pin with groove in transaxle housing by rotating control shaft. Using Puller (07HAC-PK4010A), remove transaxle housing. See **Fig. 8** . Remove gasket and dowel pins.
8. Remove bolts and reverse idler gear shaft holder. See **Fig. 7** . Remove reverse idler gear from transaxle housing (if necessary).

CAUTION: Use care when removing reverse idler gear shaft holder from reverse idler gear, as a steel ball and spring are located behind needle bearing at bottom of shaft. See Fig. 7 .



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Fig. 5: Exploded View Of Right Side Cover & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

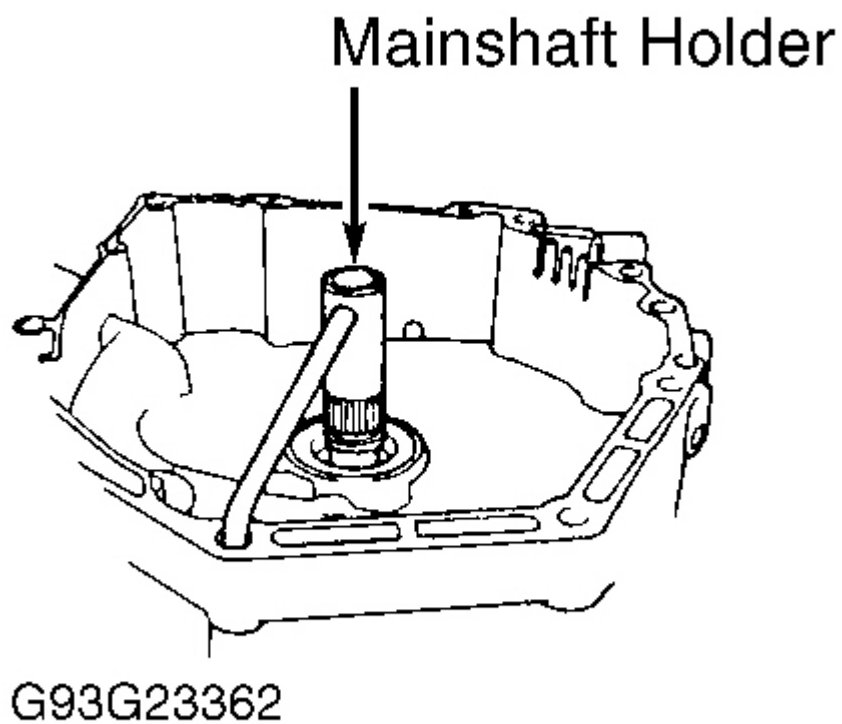
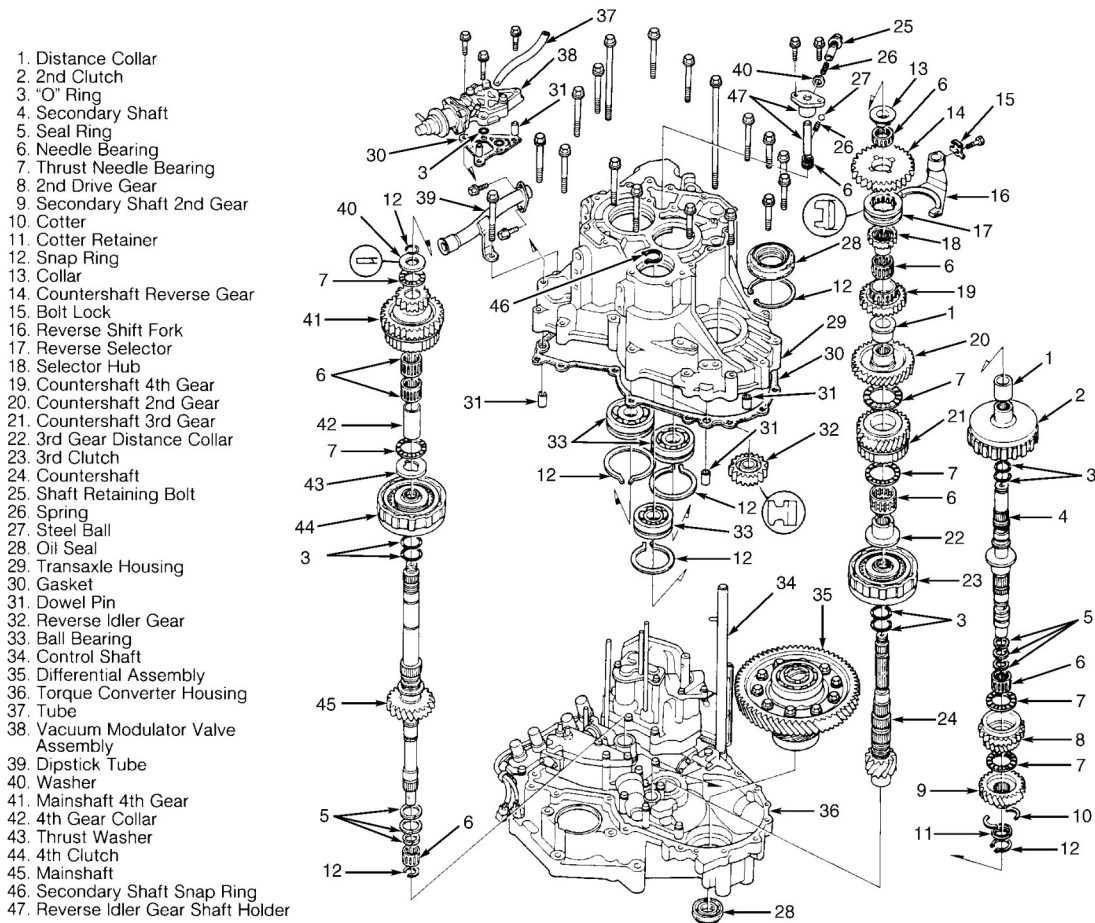


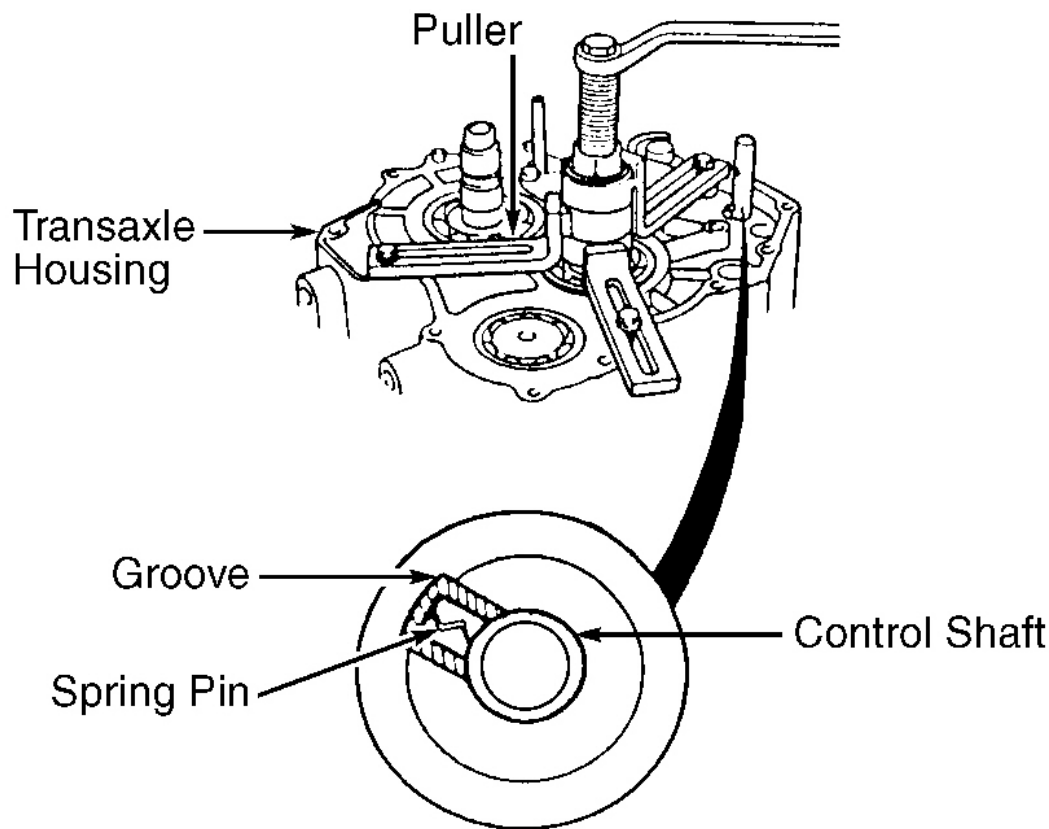
Fig. 6: Installing Mainshaft Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 7: Exploded View Of Transaxle Housing & Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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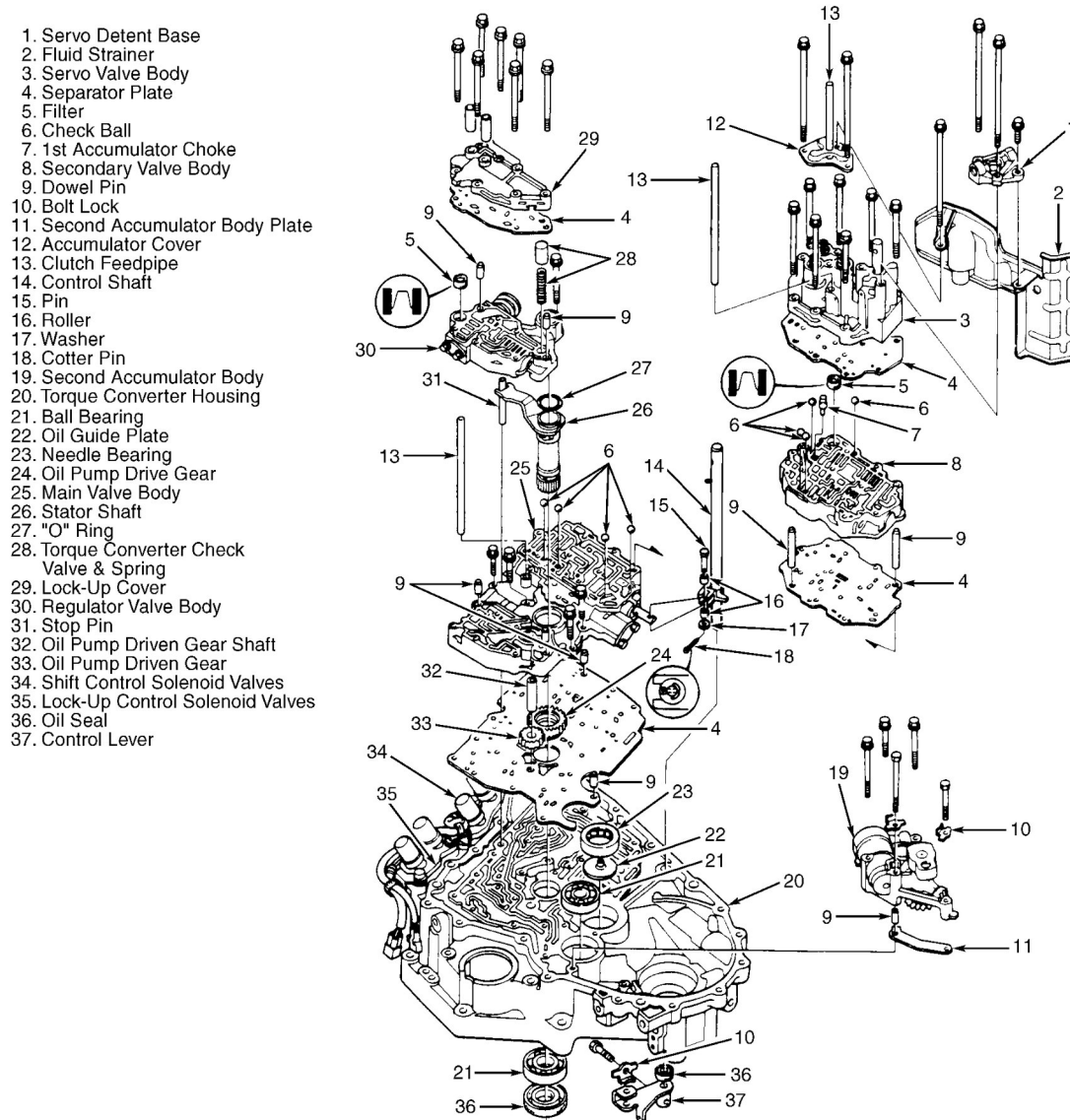
Fig. 8: Aligning Spring Pin & Removing Transaxle Housing
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove collar, needle bearing and countershaft reverse gear from countershaft. See **Fig. 7** . Remove bolt, bolt lock, reverse shift fork and reverse selector.
10. Remove selector hub, needle bearing, countershaft 4th gear and distance collar from countershaft. See **Fig. 7** . Remove mainshaft, countershaft and secondary shaft as an assembly from torque converter housing.
11. Remove differential assembly from torque converter housing. Remove bolt, bolt lock and control lever. See **Fig. 9** .
12. Remove clutch feedpipes from servo valve body. Remove accumulator cover, fluid strainer and servo detent base. See **Fig. 9** . Remove servo valve body and separator plate.
13. Remove secondary valve body, separator plate and dowel pins. Use care not to lose check balls, filter and 1st accumulator choke from secondary valve body.

CAUTION: DO NOT use magnet to remove check balls from secondary valve body, as check balls may become magnetized.

14. Remove bolts, bolts locks, secondary accumulator body, dowel pins and secondary accumulator body plate. Remove lock-up cover and separator plate.
15. Remove regulator valve body, "O" ring, stator shaft and stop pin. See **Fig. 9** . Remove clutch feedpipe from main valve body. Remove control shaft.
16. Remove main valve body. Use care not to lose check balls from main valve body. Remove oil pump driven gear shaft, oil pump driven and drive gears, separator plate and dowel pins.

CAUTION: DO NOT use magnet to remove check balls from main valve body, as check balls may become magnetized.



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Fig. 9: 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 re-assembly reference. **DO NOT** use force to remove components. **DO NOT** use magnet to remove check balls, as check balls may become magnetized.

Disassembly

Disassemble main valve body. See **Fig. 10** . Use care when removing valve caps or spring seats, as they are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace main valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in their 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. Ensure all components are installed in correct location. See **Fig. 10** . Tighten valve cover bolts to specification. See **TORQUE SPECIFICATIONS** .

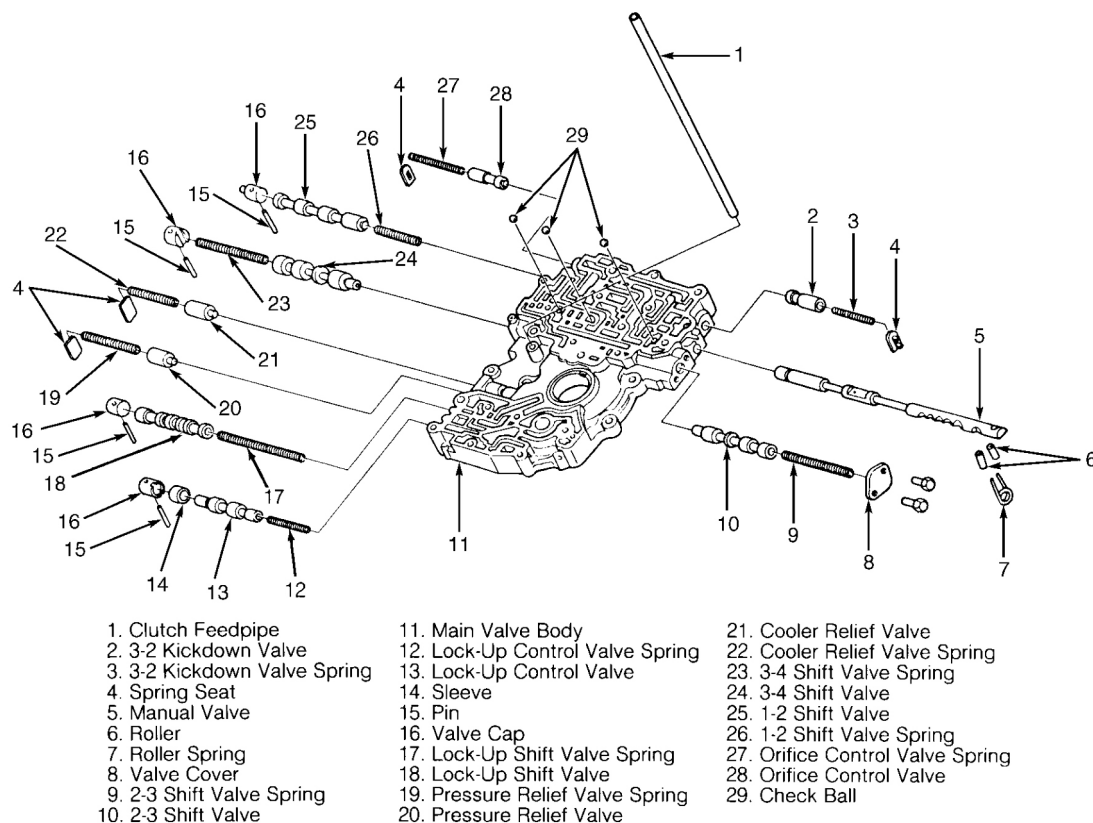
SPRING SPECIFICATIONS

Application	Free Length: In. (mm)
Main Valve Body	
Cooler Relief Valve Spring	1.843 (46.80)
Lock-Up Control Valve Spring	1.496 (38.00)
Lock-Up Shift Valve Spring	2.902 (73.70)
Orifice Control Valve Spring	1.646 (41.80)
Pressure Relief Valve Spring	2.047 (52.00)
1-2 Shift Valve Spring	1.591 (40.40)
2-3 Shift Valve Spring	2.000 (50.80)

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3-2 Kickdown Valve Spring	1.224 (31.10)
3-4 Shift Valve Spring	2.000 (50.80)
Regulator Valve Body	
Lock-Up Timing Valve Spring	2.626 (66.70)
Regulator Valve Spring "A"	3.059 (77.70)
Regulator Valve Spring "B"	1.732 (44.00)
Stator Reaction Spring	1.193 (30.30)
Secondary Valve Body	
Modulator Valve Spring	1.205 (30.60)
Servo Control Valve Spring	2.941 (74.70)
2nd Orifice Control Valve Spring	2.240 (56.90)
3rd Kickdown Valve Spring	2.181 (55.40)
4th Exhaust Valve Spring	2.134 (54.20)
Servo Valve Body	
1st Accumulator Spring	3.177 (80.70)
3rd Accumulator Spring	3.106 (78.90)
4th Accumulator Spring	3.091 (78.50)



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Fig. 10: 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

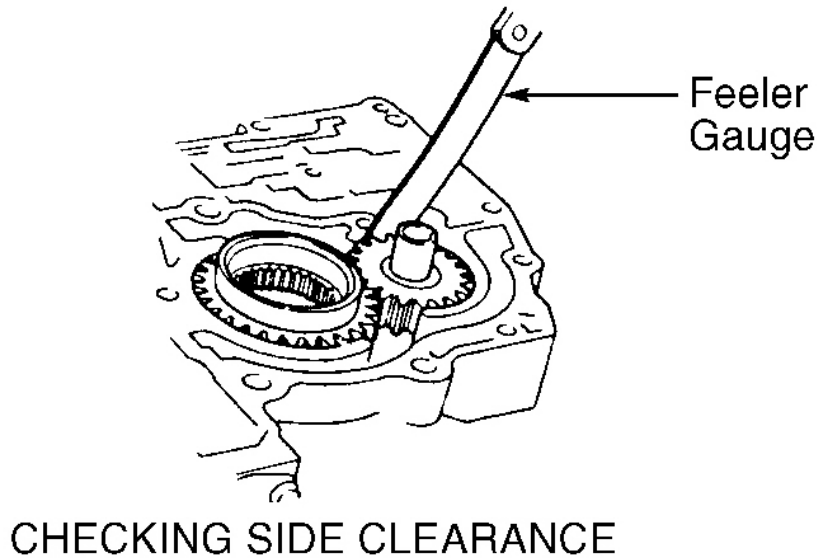
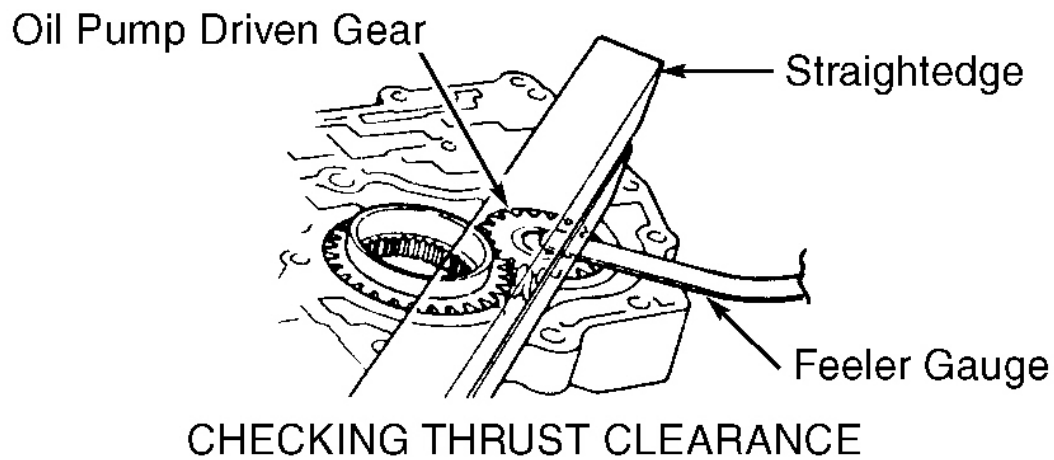
1. Clean components with solvent and dry with compressed air. Inspect components and replace if damaged.
2. Install oil pump gears and oil pump driven gear shaft in main valve body. Ensure chamfered side of oil pump driven gear is facing upward (toward separator plate side of main valve body). Place straightedge across main valve body surface.
3. Using feeler gauge, measure thrust clearance between oil pump driven gear and straightedge. See **Fig. 11** . Replace oil pump gears and/or main valve body if thrust clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.
4. Using feeler gauge, measure side clearance of both gears between tip of gear teeth and main valve body. See **Fig. 11** . 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	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
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 faces upward (toward separator plate side of main valve body).



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

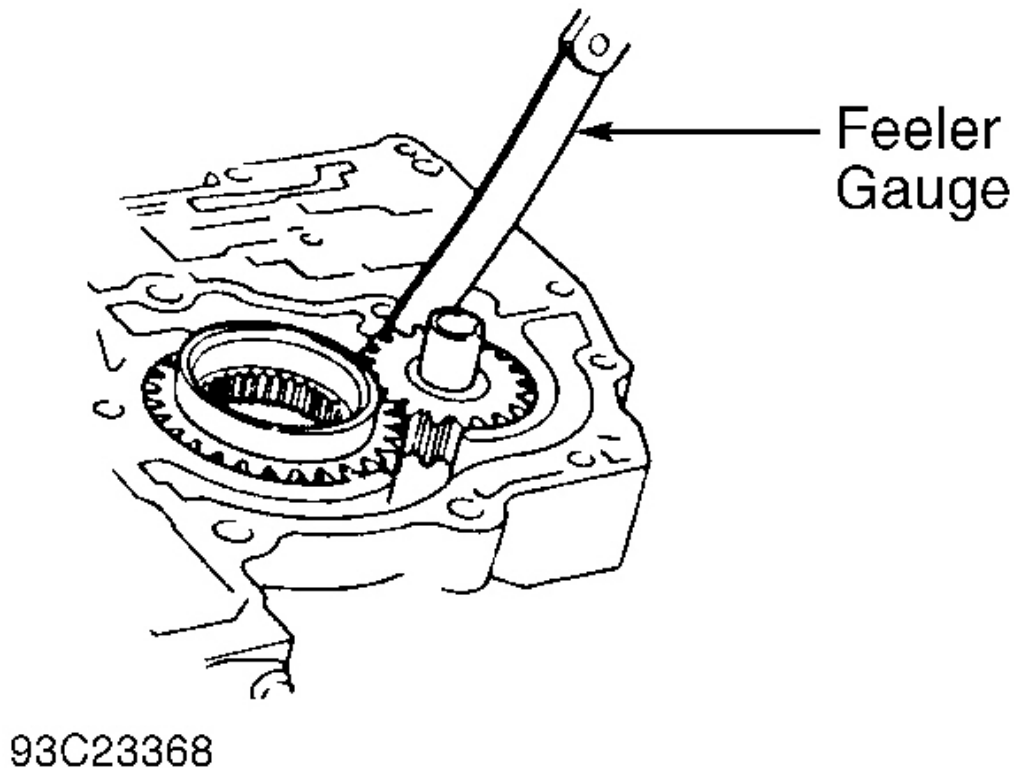


Fig. 12: Measuring Oil Pump Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REGULATOR VALVE BODY

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

Disassembly

Hold regulator spring cap down, and remove lock bolt. Slowly remove regulator spring cap and components from regulator valve body. See **Fig. 13**.

Cleaning & Inspection

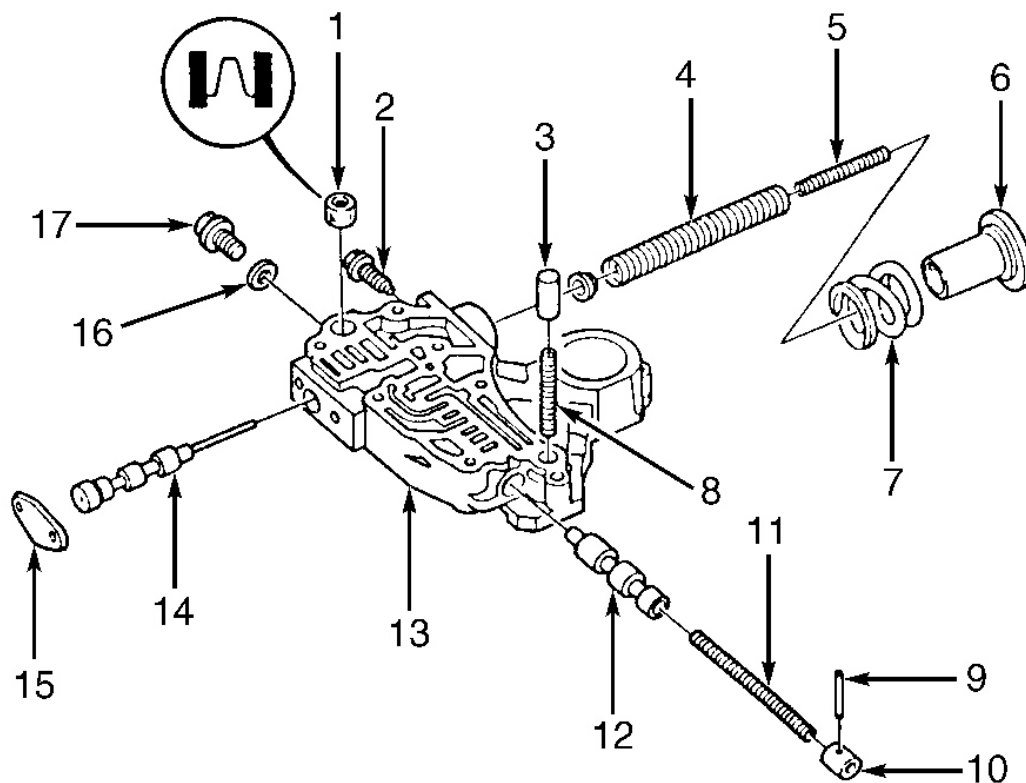
1. Clean components with solvent and dry with compressed air. Replace regulator valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in their bores. If valves do not slide freely, polish burrs or rough areas using

No. 600 sand-paper 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. 13** . Ensure hole in regulator spring cap aligns with hole for lock bolt in valve body before tightening lock bolt. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS** .



- | | |
|--|---------------------------------|
| 1. Filter | 10. Valve Cap |
| 2. Lock Bolt | 11. Lock-Up Timing Valve Spring |
| 3. Torque Converter Check Valve | 12. Lock-Up Timing Valve |
| 4. Regulator Valve Spring "A" | 13. Regulator Valve Body |
| 5. Regulator Valve Spring "B" | 14. Regulator Valve |
| 6. Regulator Spring Cap | 15. Valve Cover |
| 7. Stator Reaction Spring | 16. Sealing Washer |
| 8. Torque Converter Check Valve Spring | 17. Stopper Bolt |
| 9. Roller | |

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Fig. 13: Exploded View Of Regulator Valve Body
 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.

Disassembly

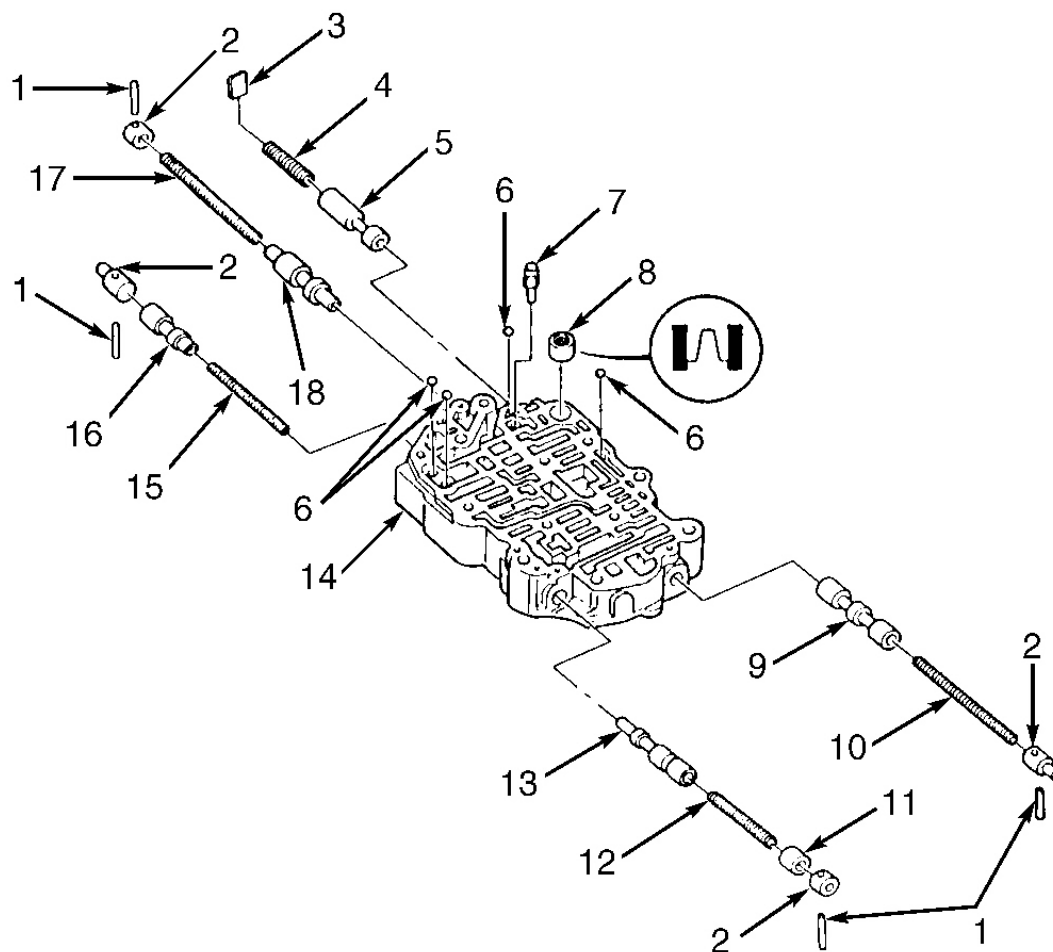
Disassemble secondary valve body. See **Fig. 14** . Use care when removing valve caps or spring seats, as they are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace secondary valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in their 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. 14** .



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

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

SERVO VALVE BODY

Disassembly

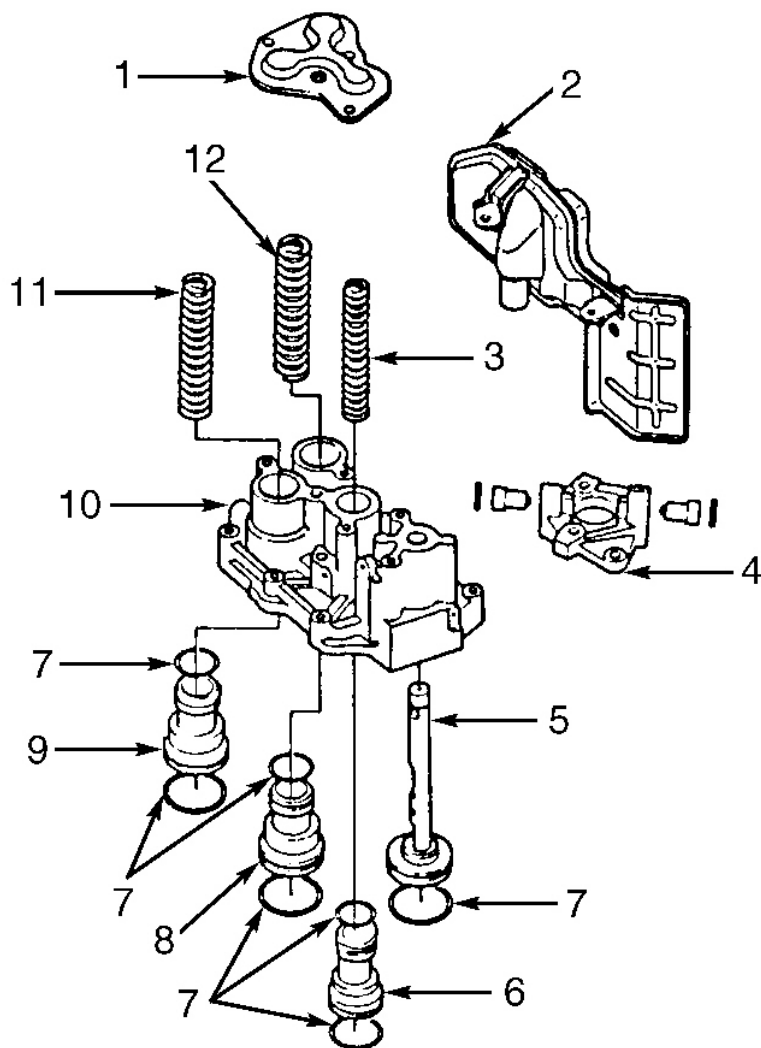
Disassemble servo valve body. See **Fig. 15** . Use care when removing accumulator cover, as it is under spring pressure.

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. 15** .



- | | |
|---------------------------|----------------------------|
| 1. Accumulator Cover | 7. "O" Ring |
| 2. Fluid Strainer | 8. 1st Accumulator Piston |
| 3. 3rd Accumulator Spring | 9. 4th Accumulator Piston |
| 4. Servo Detent Base | 10. Servo Valve Body |
| 5. Shift Fork Shaft | 11. 4th Accumulator Spring |
| 6. 3rd Accumulator Piston | 12. 1st Accumulator Spring |

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

2ND ACCUMULATOR BODY

Disassembly

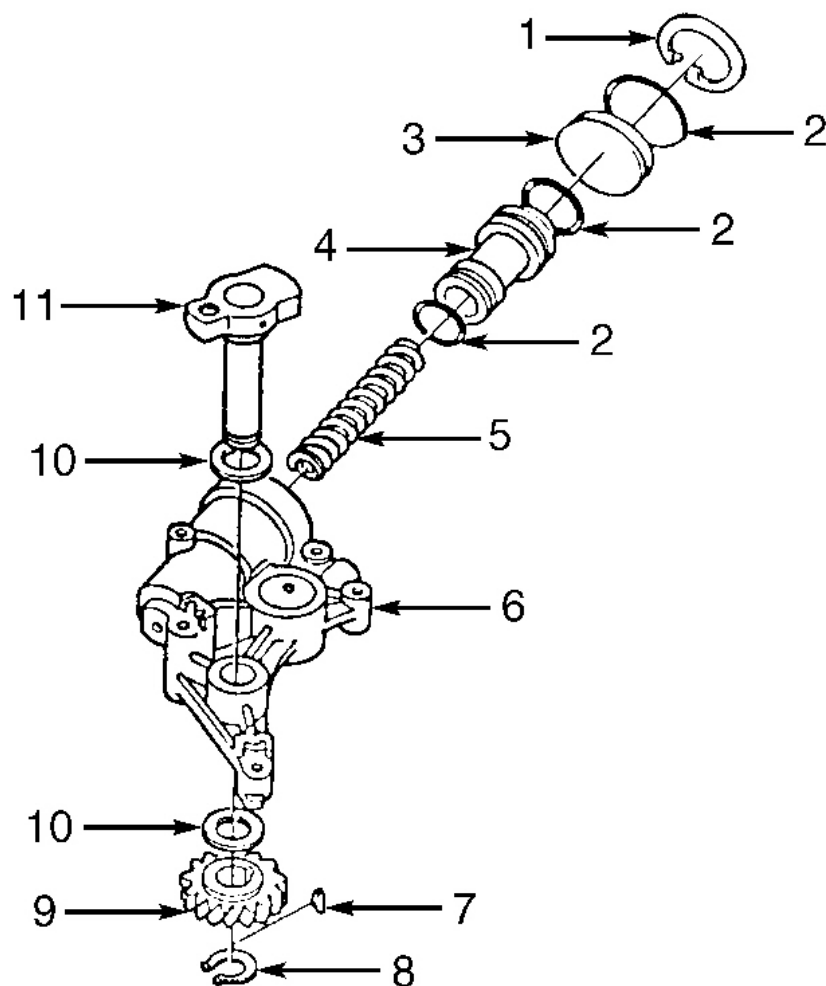
Disassemble 2nd accumulator body. See **Fig. 16** . Use care when removing snap ring, as it is under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace components if worn or damaged.
2. Ensure 2nd accumulator spring free length is 3.051" (77.50 mm). Replace spring if not within specification.

Reassembly

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



- | | |
|---------------------------|------------------------|
| 1. Snap Ring | 7. Key |
| 2. "O" Ring | 8. Circlip |
| 3. 2nd Accumulator Cover | 9. Drive Gear |
| 4. 2nd Accumulator Piston | 10. Washer |
| 5. 2nd Accumulator Spring | 11. Speed Pulser Rotor |
| 6. 2nd Accumulator Body | |

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Fig. 16: Exploded View Of 2nd Accumulator Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

Disassembly

Note location of mainshaft components. See **Fig. 7** . 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

1. Lubricate all components with ATF. Reassemble mainshaft. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.
2. Before installing NEW "O" rings on mainshaft, wrap splines with tape. Ensure washer is installed on end of mainshaft with chamfered side on inside of washer toward snap ring. See **Fig. 7** . Install NEW snap ring on end of mainshaft.

PARKING GEAR & ONE-WAY CLUTCH**Disassembly**

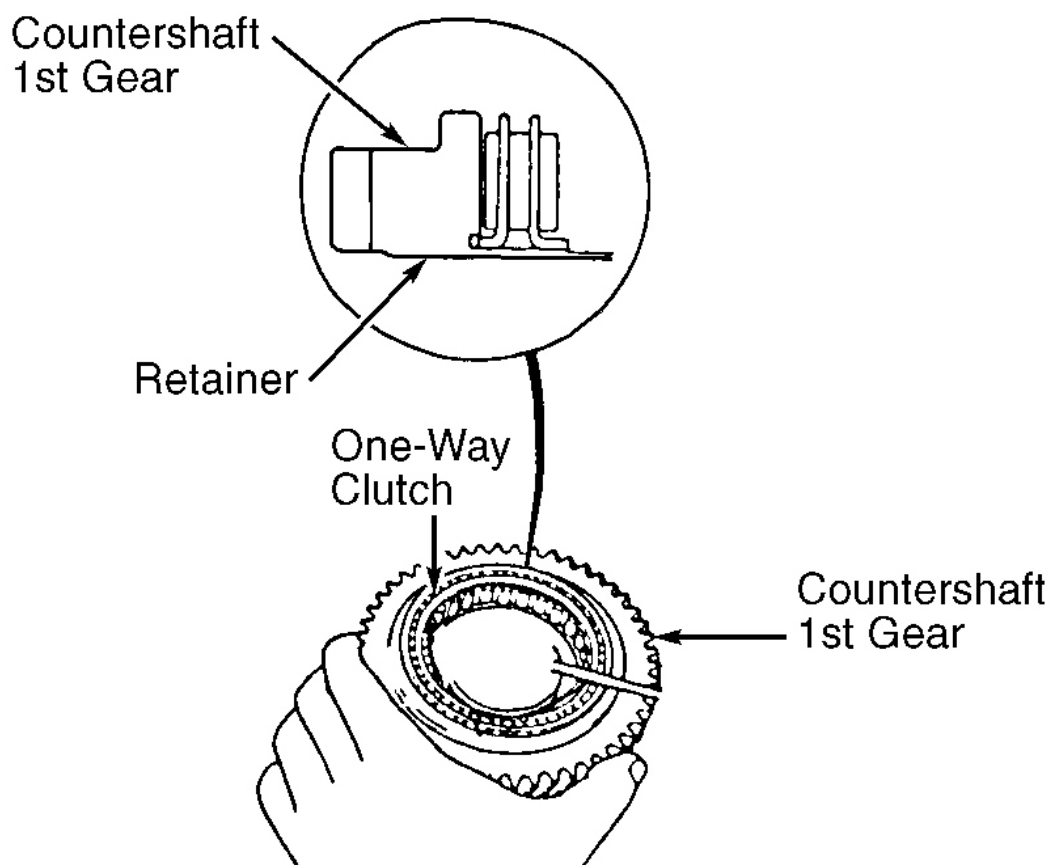
1. To separate parking gear from countershaft 1st gear, hold countershaft 1st gear and rotate parking gear counterclockwise. Remove parking gear.
2. Note direction of one-way clutch installation in countershaft 1st gear. Using screwdriver, gently pry one-way clutch from countershaft 1st gear.

Cleaning & Inspection

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

Reassembly

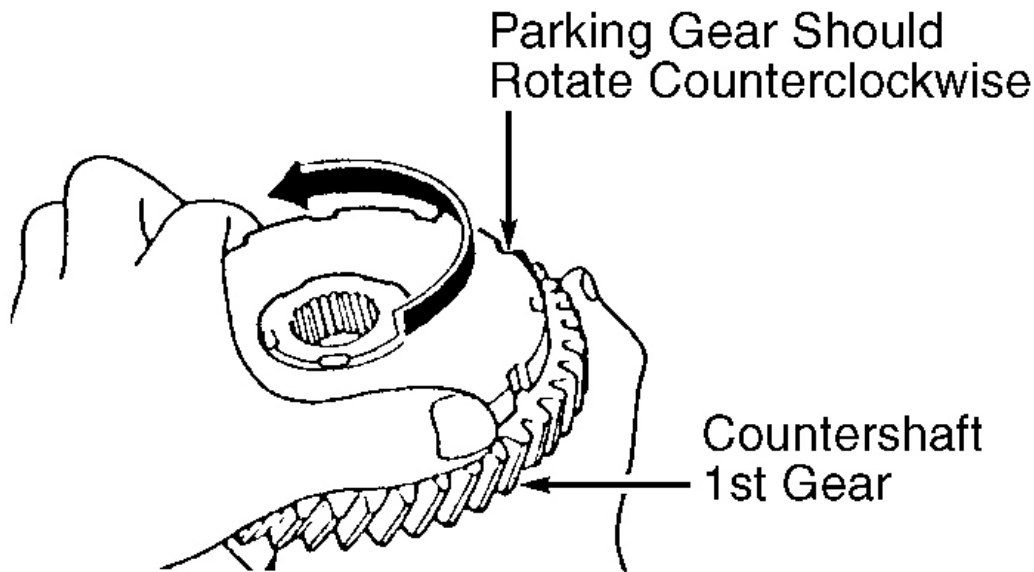
Lubricate all components with ATF. Install one-way clutch with retainer toward countershaft 1st gear. See **Fig. 17** . Install parking gear. Hold countershaft 1st gear, and ensure parking gear rotates counterclockwise. See **Fig. 18** .



INSTALLING ONE-WAY CLUTCH

G93J23373

Fig. 17: Installing & Checking One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.



CHECKING ONE-WAY CLUTCH OPERATION

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Fig. 18: Installing & Checking One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT

NOTE: Countershaft 2nd gear is press-fit on countershaft. Countershaft must be pressed from countershaft 2nd gear.

Disassembly

1. Note location of countershaft components. See **Fig. 7** . Remove all components from countershaft down to the countershaft 2nd gear.
2. Place countershaft in hydraulic press while supporting 3rd clutch. Threaded end of countershaft must be facing upward (toward ram of press). Place a protective cap between hydraulic press and countershaft to prevent damage to countershaft.
3. Press countershaft from countershaft 2nd gear and 3rd clutch. Separate all components for countershaft. See **Fig. 7** .

Cleaning & Inspection

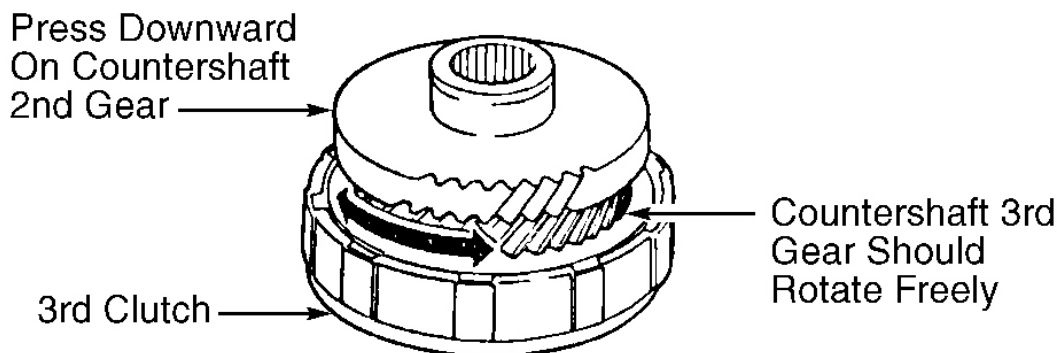
Clean components with solvent and dry with compressed air. Inspect splines for excessive wear. Check bearing

surfaces for scoring or wear. Inspect all needle bearings for galling and rough movement.

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

Reassembly

1. Countershaft 3rd gear clearance must be checked. Proper length 3rd gear distance collar must be installed to obtain correct countershaft 3rd gear clearance.
2. Assemble 3rd gear distance collar, needle bearing, thrust needle bearing, countershaft 3rd gear, thrust needle bearing and countershaft 2nd gear on 3rd clutch. See **Fig. 7**.
3. Hold 3rd clutch stationary. Press countershaft 2nd gear against 3rd clutch with 12 lbs. (10 kg) of force. Ensure countershaft 3rd gear rotates manually without binding, and no up-and-down movement exists on countershaft 3rd gear. See **Fig. 19**.
4. If binding exists, install longer 3rd gear distance collar. If up-and-down movement exists, install shorter 3rd gear distance collar. See **3RD GEAR DISTANCE COLLAR SPECIFICATIONS** table. If proper operation of countershaft 3rd gear cannot be obtained by changing length of distance collar, check components for wear.



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Fig. 19: Checking Countershaft 3rd Gear Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Once correct 3rd gear distance collar is obtained, lubricate all components with ATF. Wrap splines of countershaft with tape. Install NEW "O" rings on countershaft.
6. Assemble 3rd gear distance collar, needle bearing, thrust needle bearing, countershaft 3rd gear, thrust needle bearing and countershaft 2nd gear on 3rd clutch. See **Fig. 7**.

NOTE: Ensure thrust needle bearings and needle bearings are installed with unrolled edge of bearing retainer facing washer.

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7. Install 3rd clutch and components on countershaft. Ensure splines on countershaft align with splines of countershaft 2nd gear and 3rd clutch.
8. Place assembly in hydraulic press while supporting 3rd clutch. Press countershaft into 3rd clutch until final drive gear on countershaft contacts 3rd clutch.
9. To check countershaft 2nd gear clearance, install all components, except "O" rings, on countershaft. See **Fig. 7**.
10. Install transaxle housing bearing, collar, needle bearing, countershaft 1st gear, one-way clutch and parking gear on countershaft. See **Fig. 5**.
11. Install used lock nut on countershaft. Tighten lock nut to 22 ft. lbs. (30 N.m). To check countershaft 2nd gear clearance, hold selector hub against countershaft 4th gear.
12. Install feeler gauge between countershaft reverse gear and selector hub to hold selector hub against countershaft 4th gear. See **Fig. 20**.
13. Using feeler gauge, measure countershaft 2nd gear clearance between distance collar and countershaft 2nd gear. See **Fig. 20**. Measure countershaft 2nd gear clearance in 3 areas, and take average of measurements. Countershaft 2nd gear clearance should be 0-.0016" (0-.040 mm).
14. If clearance is not within specification, install different length distance collar between countershaft 2nd gear and countershaft 4th gear. See **2ND GEAR DISTANCE COLLAR SPECIFICATIONS** table. If shortest distance collar is installed and clearance still exceeds specification, check components for wear.

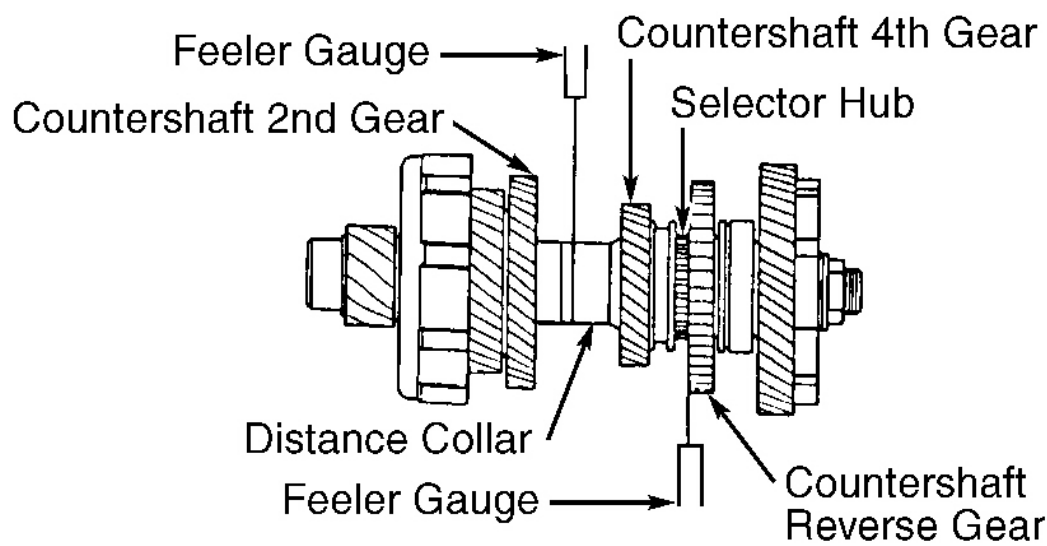
3RD GEAR DISTANCE COLLAR SPECIFICATIONS

Collar No.	Part Number	Length In. (mm)
1	90498-PR9-000	1.0218-1.0224 (25.955-25.970)
2	90499-PR9-000	1.0224-1.0230 (25.970-25.985)
3	90500-PR9-000	1.0230-1.0236 (25.985-26.000)
4	90501-PR9-000	1.0236-1.0242 (26.000-26.015)
5	90511-PR9-000	1.0242-1.0248 (26.015-26.030)
6	90512-PR9-000	1.0248-1.0254 (26.030-26.045)

2ND GEAR DISTANCE COLLAR SPECIFICATIONS

Collar No.	Part Number	Length In. (mm)
1	90503-PRO-030	.9087-.9094 (23.080-23.100)
2	90504-PRO-030	.9094-.9102 (23.100-23.120)
3	90505-PRO-030	.9102-.9110 (23.120-23.140)
4	90506-PRO-030	.9110-.9118 (23.140-23.160)
5	90507-PRO-030	.9118-.9126 (23.160-23.180)
6	90508-PRO-030	.9126-.9134 (23.180-23.200)
7	90509-PRO-030	.9134-.9142 (23.200-23.220)
8	90531-PRO-010	.9142-.9150 (23.220-23.240)
9	90532-PRO-010	.9150-.9157 (23.240-23.260)
10	90533-PRO-010	.9157-.9165 (23.260-23.280)
11	90534-PRO-010	.9165-.9173 (23.280-23.300)
12	90535-PRO-010	.9173-.9181 (23.300-23.320)

13	90536-PRO-010	.9181-.9189 (23.320-23.340)
14	90537-PRO-010	.9189-.9197 (23.340-23.360)
15	90538-PRO-010	.9197-.9205 (23.360-23.380)
16	90539-PRO-010	.9205-.9213 (23.380-23.400)



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Fig. 20: Checking Countershaft 2nd Gear Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY SHAFT

Disassembly

Note location of secondary shaft components. See [Fig. 7](#) . 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.

NOTE: Secondary shaft 2nd gear clearance and secondary shaft clearance must be checked during reassembly.

Reassembly

1. To check secondary shaft 2nd gear clearance, install needle bearing, thrust needle bearing, 2nd drive gear,

thrust needle bearing and secondary shaft 2nd gear on secondary shaft. See **Fig. 7** .

2. Install cotters on secondary shaft. Ensure cotters fully engage with groove in secondary shaft. Using feeler gauge, measure secondary shaft 2nd gear clearance between cotters and secondary shaft 2nd gear. See **Fig. 21** .
3. Measure secondary shaft 2nd gear clearance in 3 areas, and take average of measurements. Secondary shaft 2nd gear clearance should be 0-.003" (0-.08 mm). If clearance is not within specification, install different thickness cotters. See **COTTER SPECIFICATIONS** table.

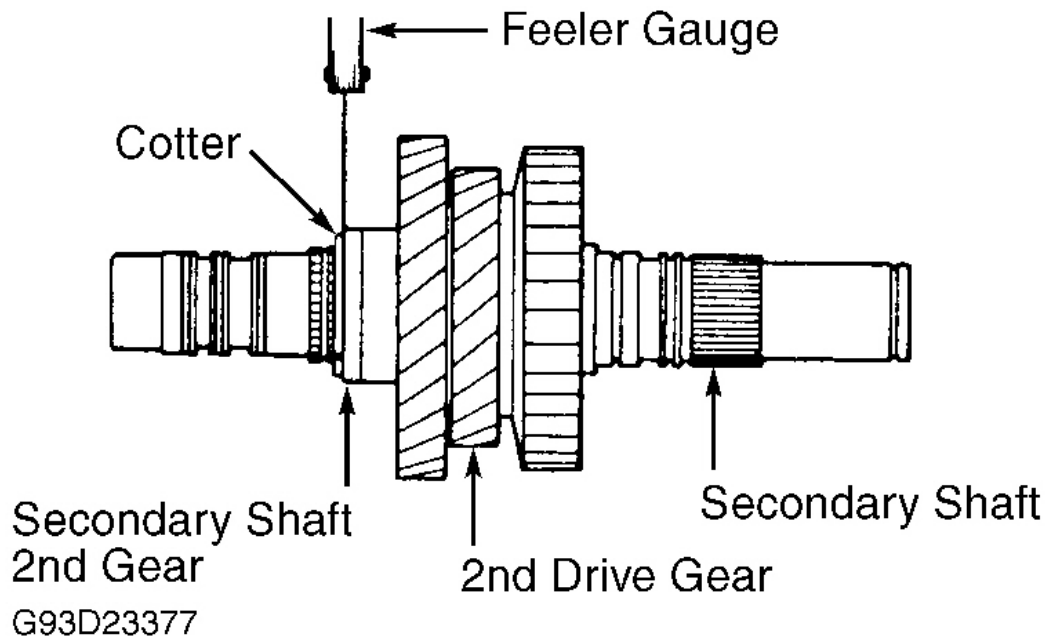


Fig. 21: Checking Secondary Shaft 2nd Gear Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. To check secondary shaft clearance, assemble all components on secondary shaft. See **Fig. 7** . Install secondary shaft in torque converter housing.
5. Install gasket and transaxle housing on torque converter housing. Install several transaxle housing bolts and tighten to 40 ft. lbs. (54 N.m). Install secondary shaft snap ring. See **Fig. 7** .
6. Position transaxle housing downward (torque converter housing upward). Using feeler gauge, check secondary shaft clearance between secondary shaft snap ring and transaxle housing. See **Fig. 22** .
7. Secondary shaft clearance should be 0-.003" (0-.08 mm). If clearance is not within specification, install different length distance collar on secondary shaft. See **SECONDARY SHAFT DISTANCE COLLAR SPECIFICATIONS** table.
8. If secondary shaft clearance exceeds specification with largest distance collar installed, inspect 2nd clutch or secondary shaft snap ring for wear or damage. Once correct distance collar is determined, remove all secondary shaft components. Lubricate components with ATF.

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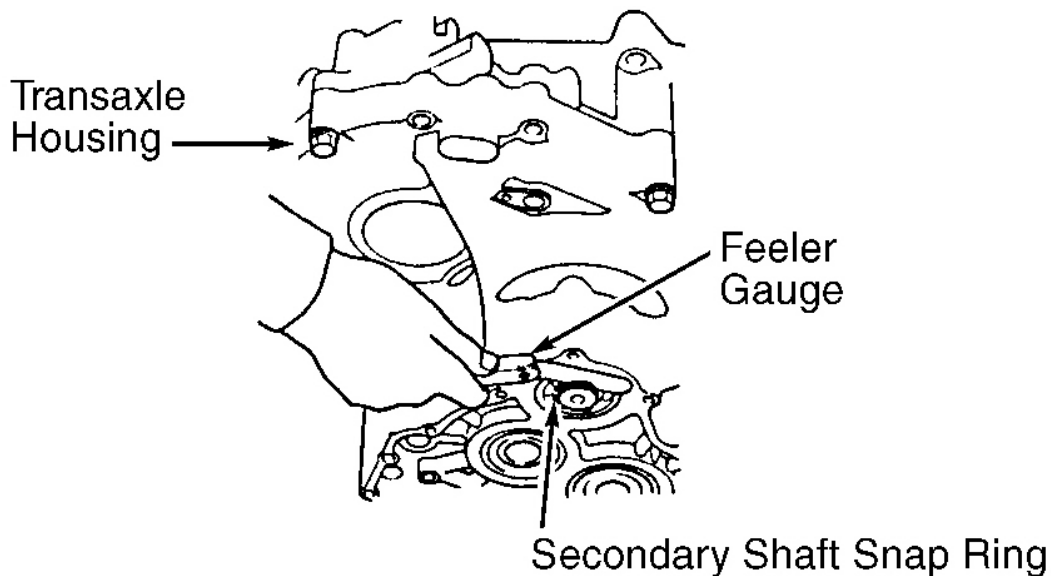
9. To reassemble, reverse disassembly procedure. Ensure thrust needle bearings and needle bearings are installed with unrolled edge of bearing retainer facing washer. Before installing NEW "O" rings on secondary shaft, wrap splines with tape.

COTTER SPECIFICATIONS

Cotter No.	Part Number	Thickness: In. (mm)
1	90428-PRO-000	.0787 (2.000)
2	90429-PRO-010	.0807 (2.050)
3	90430-PRO-010	.0827 (2.100)
4	90431-PRO-020	.0846 (2.150)

SECONDARY SHAFT DISTANCE COLLAR SPECIFICATIONS

Collar No.	Part Number	Length: In. (mm)
1	90513-PRO-850	1.136 (28.85)
2	90514-PRO-850	1.138 (28.90)
3	90515-PRO-850	1.140 (28.95)
4	90516-PRO-850	1.142 (29.00)
5	90517-PRO-850	1.144 (29.05)
6	90518-PRO-850	1.146 (29.10)
7	90519-PRO-850	1.148 (29.15)
8	90520-PRO-850	1.150 (29.20)
9	90521-PRO-850	1.152 (29.25)
10	90522-PRO-850	1.154 (29.30)



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Fig. 22: Checking Secondary Shaft Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CLUTCH ASSEMBLIES

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 23** . On 1st clutch, note direction of disc spring installation. Remove disc spring.

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

2. On all clutches, use Spring Compressor (07LAE-PX40100), Adapter (07HAE-PL50100) and Bolt (07GAE-PG40200) to compress return spring. See **Fig. 24** .
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 piston is thoroughly cleaned.

2. Inspect components for damage and replace if necessary. Ensure no rough edges exist on "O" ring sealing areas. On 2nd, 3rd and 4th clutches, 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 force on clutch piston, or "O" rings will be damaged.

2. Install return spring and spring retainer in clutch drum. Place circlip on spring retainer. Using spring compressor, compress return spring. Install circlip and remove spring compressor.
3. Install disc spring on 1st clutch. Ensure disc spring is installed in proper direction. See **Fig. 23**.

CAUTION: Ensure clutch discs are soaked 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. Momentarily apply air to oil passage on clutch drum, and ensure clutch piston moves and clutch engages.
5. Using dial indicator, measure clutch clearance between clutch end plate and top clutch disc. See **Fig. 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. Make sure clutch clearance measures within specification. See **CLUTCH CLEARANCE SPECIFICATIONS** table.
7. If clutch clearance is not within specification, install different thickness clutch end plate. See **CLUTCH END PLATE SPECIFICATIONS** table.

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

CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
1st Clutch	.026-.033 (.65-.85)
2nd Clutch	.020-.028 (.50-.70)
3rd & 4th Clutches	.016-.024 (.40-.60)

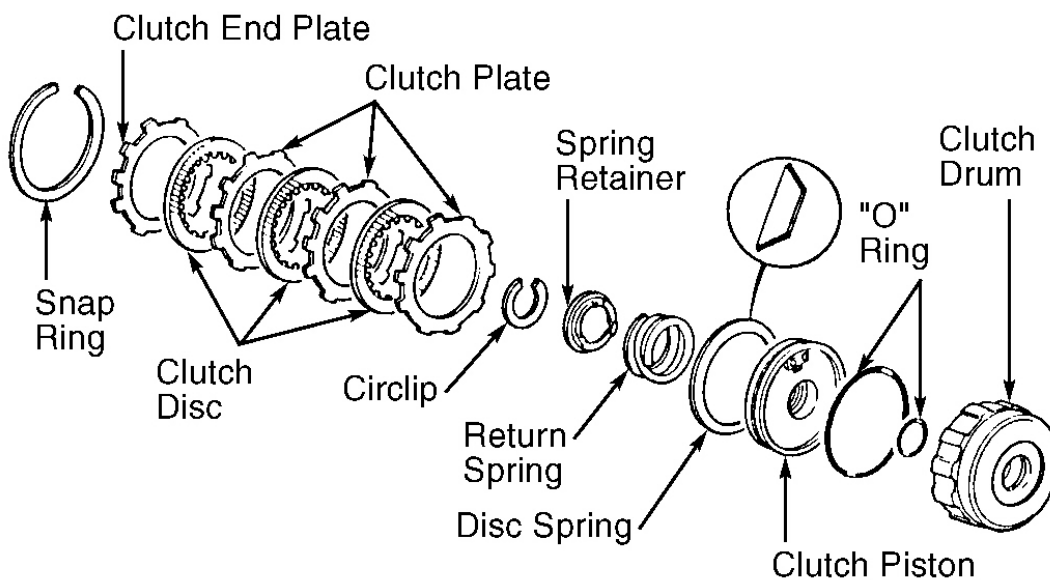
CLUTCH END PLATE SPECIFICATIONS

Plate No.	Part Number	Thickness: In. (mm)
1st, 3rd & 4th Clutch		
1	22551-PF4-000	.082 (2.10)
2	22552-PF4-000	.086 (2.20)

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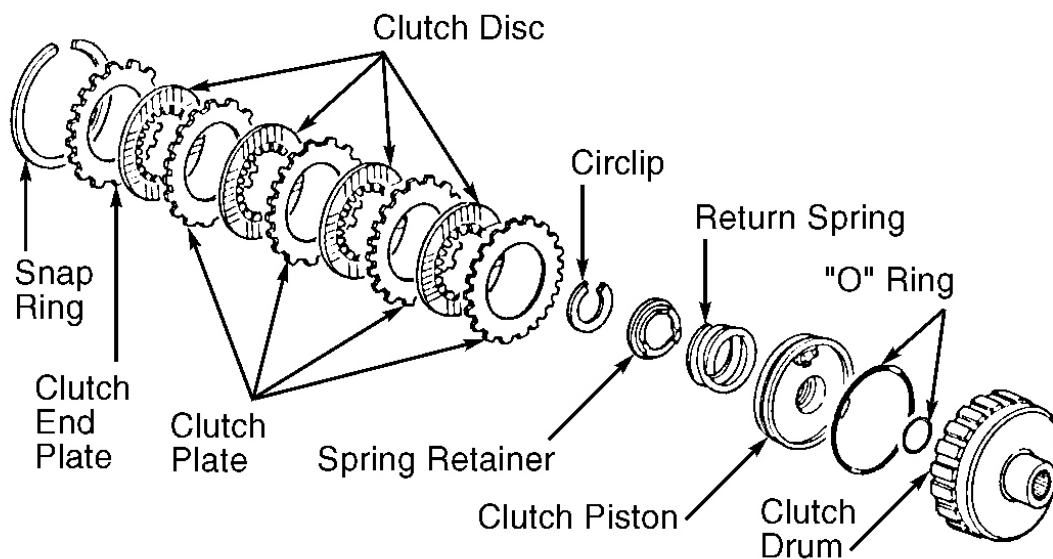
3	22553-PF4-000	.090 (2.30)
4	22554-PF4-000	.094 (2.40)
5	22555-PF4-000	.098 (2.50)
6	22556-PF4-000	.102 (2.60)
7	22557-PF4-000	.106 (2.70)
8	22558-PF4-000	.110 (2.80)
9	22559-PF4-000	.114 (2.90)
10	22560-PF4-000	.118 (3.00)
11	22561-PF4-000	.122 (3.10)
12	22562-PF4-000	.126 (3.20)
13	22563-PF4-000	.130 (3.30)
14	22564-PF4-000	.134 (3.40)
2nd Clutch		
1	22631-PR9-003	.122 (3.10)
2	22632-PR9-003	.126 (3.20)
3	22633-PR9-003	.130 (3.30)
4	22634-PR9-003	.134 (3.40)
5	22635-PR9-003	.138 (3.50)
6	22636-PR9-003	.142 (3.60)
7	22637-PR9-003	.146 (3.70)
8	22638-PR9-003	.150 (3.80)
9	22639-PR9-003	.154 (3.90)



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Fig. 23: Exploded View Of 1st Clutch Assembly

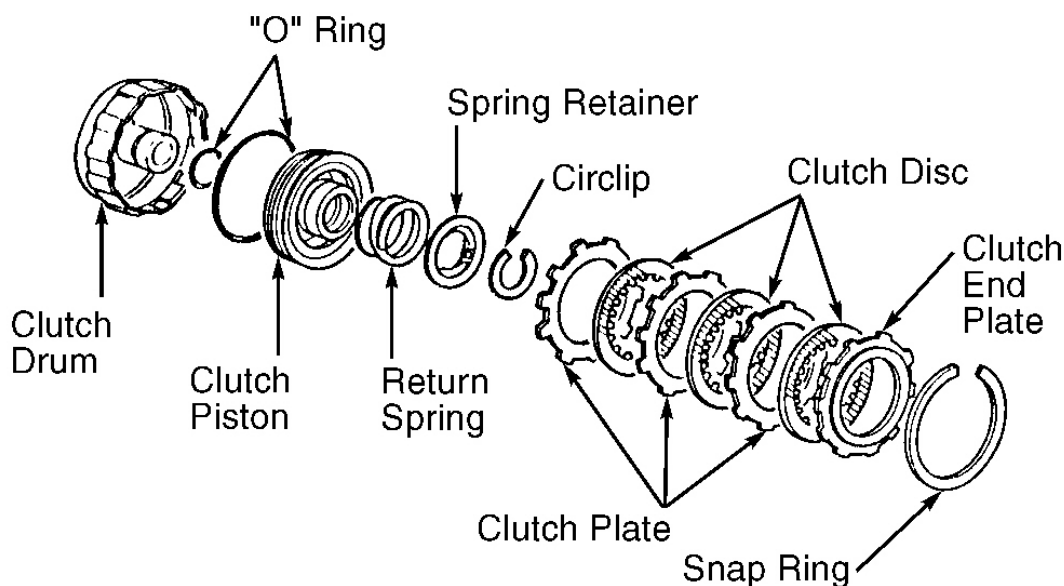
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 24: Exploded View Of 2nd Clutch Assembly

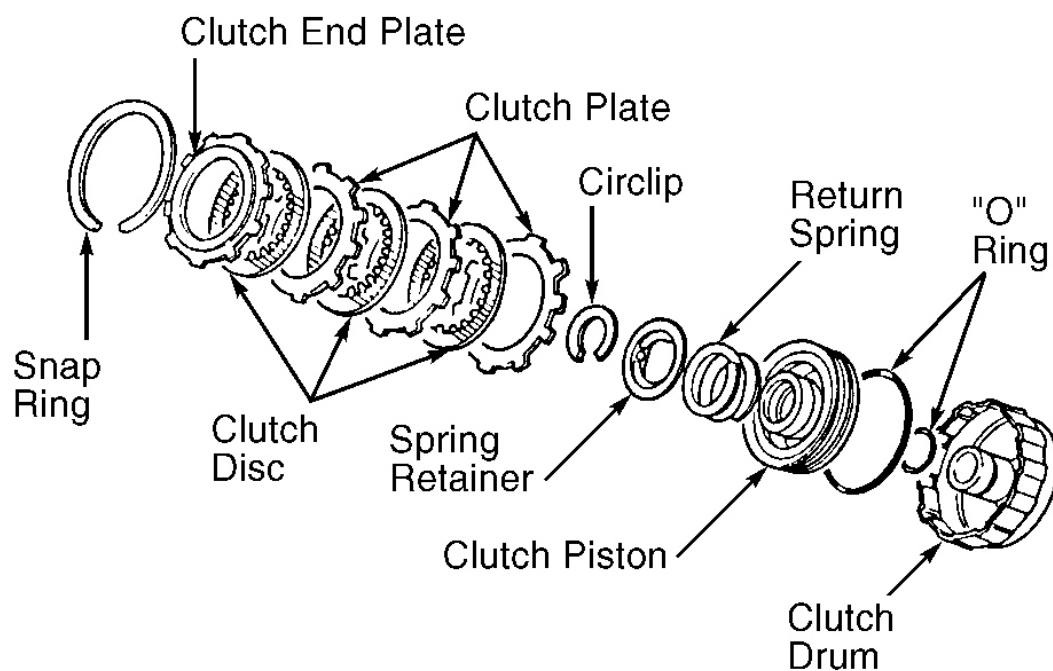
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 25: Exploded View Of 3rd Clutch Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 26: Exploded View Of 4th Clutch Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

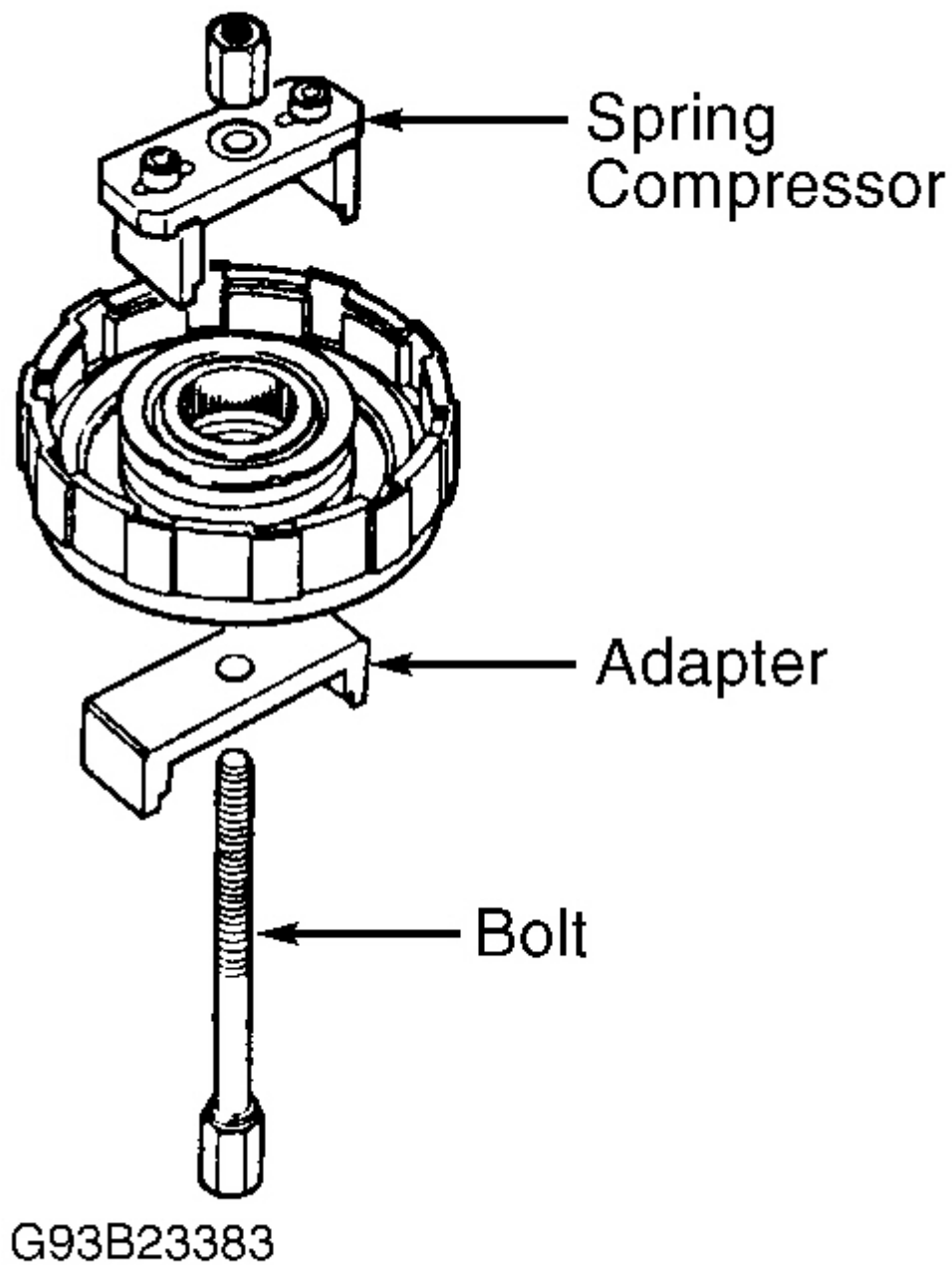
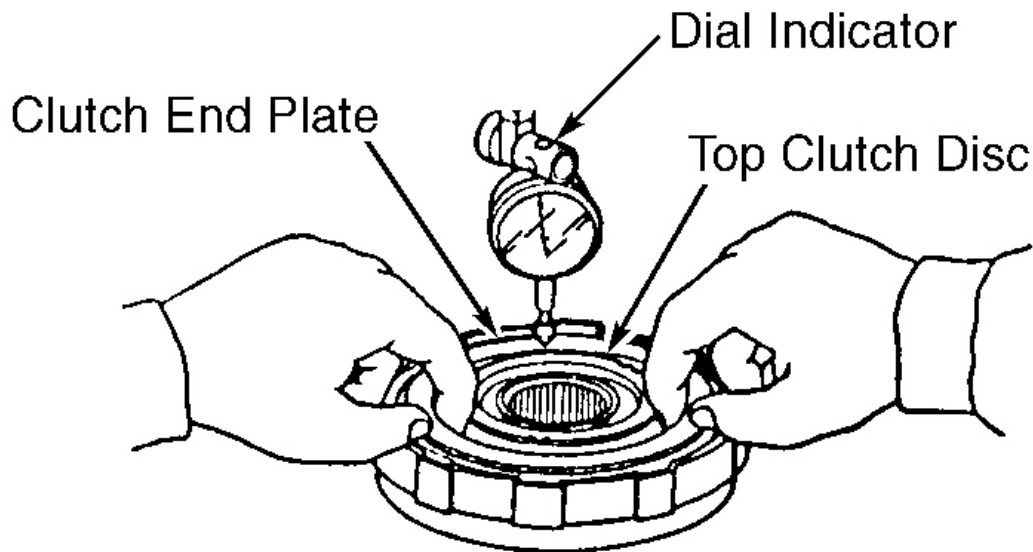


Fig. 27: Compressing Return Spring

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 28: Measuring Clutch Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING**Disassembly**

1. Remove countershaft needle bearing from torque converter housing using Bearing Remover (07736-A01000A) and slide hammer (if necessary). Remove oil guide plate. See **Fig. 9**.

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 mainshaft bearing and oil seal using hammer, Driver (07749-0010000) and Adapter (07947-6340500). 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. 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 (07746-0010600), install mainshaft oil seal in torque converter housing. Oil seal should be even with torque converter housing surface.
3. To install countershaft needle bearing, install NEW oil guide plate in countershaft bearing bore of torque converter housing. Install oil guide plate so tab in center faces upward (away from torque converter housing surface). See **Fig. 9** . Using hammer, driver and Adapter (07746-0010500), drive countershaft needle bearing into torque converter housing.
4. To install secondary shaft bearing, use hammer, driver and Adapter (07746-0010500) to drive secondary shaft bearing into torque converter housing. Using driver, Adapter (07GAD-PG40100) and Pilot (07JAD-PH80400), install differential oil seal into torque converter housing.

TRANSAXLE HOUSING

Disassembly

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.

Cleaning & Inspection

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

Reassembly

1. Expand snap ring, and install bearing part way into transaxle housing. Release snap ring. Press bearing into transaxle housing until snap ring engages with groove in bearing.

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

2. Using driver, Adapter (07HAD-SF10100) and Pilot (07JAD-PH80400), install differential oil seal into transaxle housing.

RIGHT SIDE COVER

Disassembly

Remove snap rings, retaining clutch feedpipes in right side cover. Remove 4th clutch feedpipe, 1st clutch feedpipe, 3rd clutch feedpipe and "O" rings from right side cover.

Cleaning & Inspection

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

Reassembly

To reassemble, reverse disassembly procedure using NEW "O" rings. Ensure lugs on clutch feedpipes engage with grooves on right side cover.

DIFFERENTIAL ASSEMBLY**Disassembly**

1. Before disassembling differential assembly, check pinion 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. 29** . Check pinion gear backlash. Pinion gear backlash should be .002-.006" (.05-.15 mm).
3. If pinion gear backlash is not within specification, install different thickness pinion gear thrust washer during reassembly. See **PINION GEAR THRUST WASHER SPECIFICATIONS** table.
4. If replacing differential bearings, use bearing puller to remove differential bearings from differential carrier. Remove bolts and ring gear. See **Fig. 30** .

NOTE: **Ring gear bolts have left-hand threads.**

5. Drive pin for pinion shaft from differential carrier. Remove pinion shaft, pinion gears, side gears and thrust washers.

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)

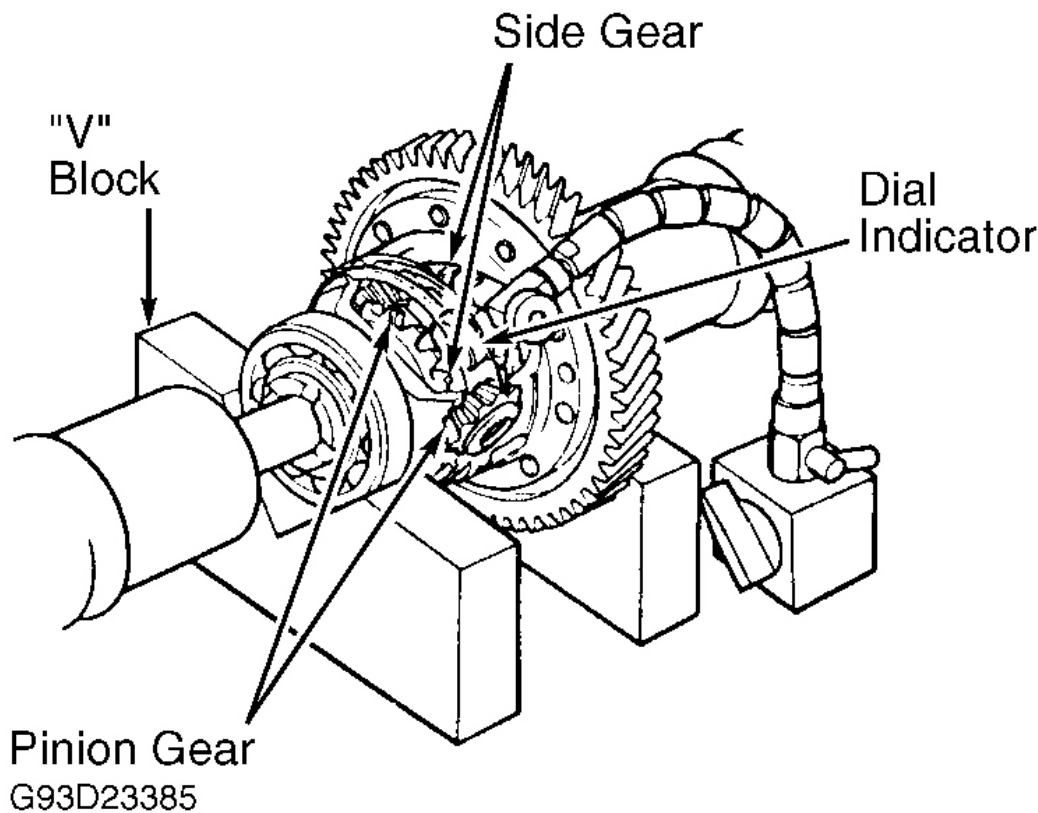


Fig. 29: Checking Pinion Gear Backlash

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

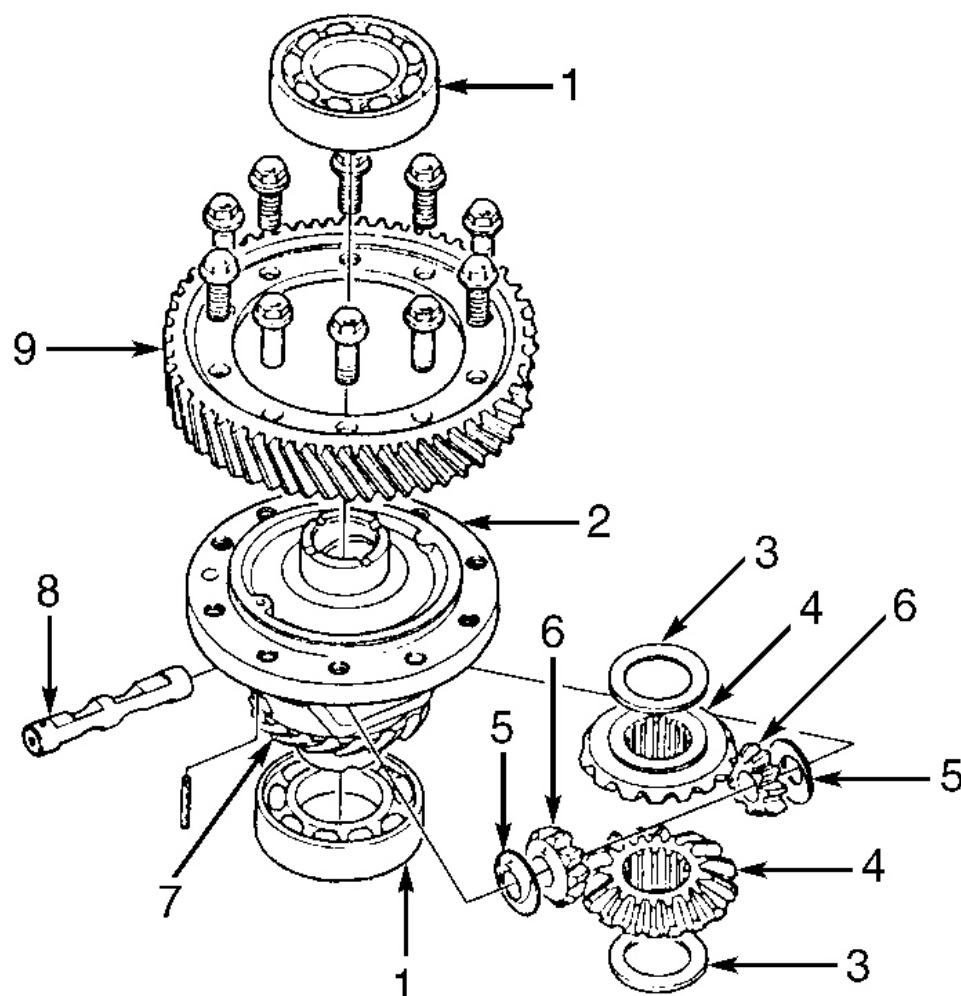
1. Coat both sides of pinion gears and side gears with grease. Install side gears and side gear thrust washers in differential carrier.
2. Install pinion gears and pinion gear thrust washers in differential carrier so they are exactly opposite each other. Rotate pinion gears until they align with pinion shaft hole in differential carrier. Install pinion shaft and NEW pin.
3. Recheck pinion gear backlash. If pinion gear backlash is not within specification, select different thickness pinion gear thrust washer. See **PINION GEAR THRUST WASHER SPECIFICATIONS** table. If pinion gear backlash is still not within specification, replace side and pinion gears.
4. Recheck pinion gear backlash. If pinion gear backlash is still not within specification, replace differential

carrier.

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

5. Install ring gear on differential carrier. Ensure chamfered side of ring gear is toward differential carrier. Install and tighten ring gear retaining bolts to specification. See **TORQUE SPECIFICATIONS**.
6. 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.**



1. Differential Bearing
2. Differential Carrier
3. Side Gear Thrust Washer
4. Side Gear
5. Pinion Gear Thrust Washer

6. Pinion Gear
7. Speedometer Drive Gear
8. Pinion Shaft
9. Ring Gear

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Fig. 30: 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 .098" (2.50 mm) thick snap ring in transaxle housing. This is the 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), tap differential assembly into torque converter housing. Perform STEP 1. See **Fig. 31** . Ensure differential bearing is fully seated on torque converter housing.
3. Install gasket and transaxle housing on torque converter housing. Install and tighten transaxle housing bolts in sequence to 40 ft. lbs. (54 N.m). See **Fig. 32** .
4. Using Driver (07746-0030100), tap on transaxle housing side of differential assembly to fully seat bearings. Perform STEP 2. See **Fig. 31** . Ensure differential bearings are fully seated in both housings.
5. Using feeler gauge, measure differential bearing side clearance between snap ring and bearing on transaxle housing. See **Fig. 32** . Replace snap ring if differential bearing side clearance exceeds .006" (.15 mm). See **SNAP RING SPECIFICATIONS** table. Recheck differential bearing side clearance. Remove transaxle housing and differential assembly.

SNAP RING SPECIFICATIONS

Part Number	Thickness: In. (mm)
90414-689-000	.098 (2.50)
90415-689-000	.102 (2.60)
90416-689-000	.106 (2.70)
90417-689-000	.110 (2.80)
90418-689-000	.114 (2.90)
90419-689-000	.118 (3.00)

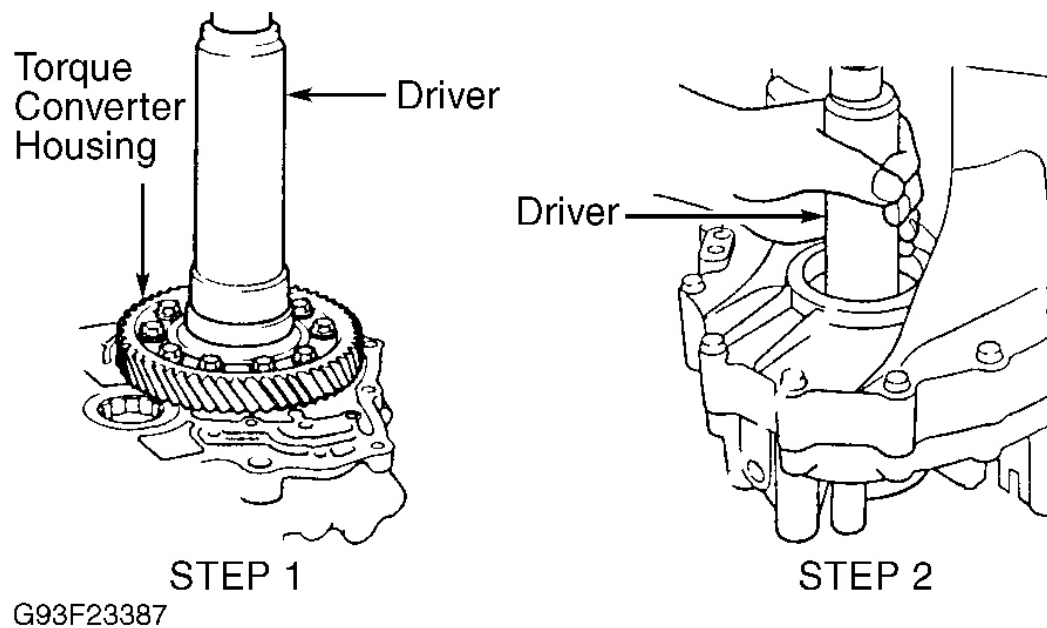
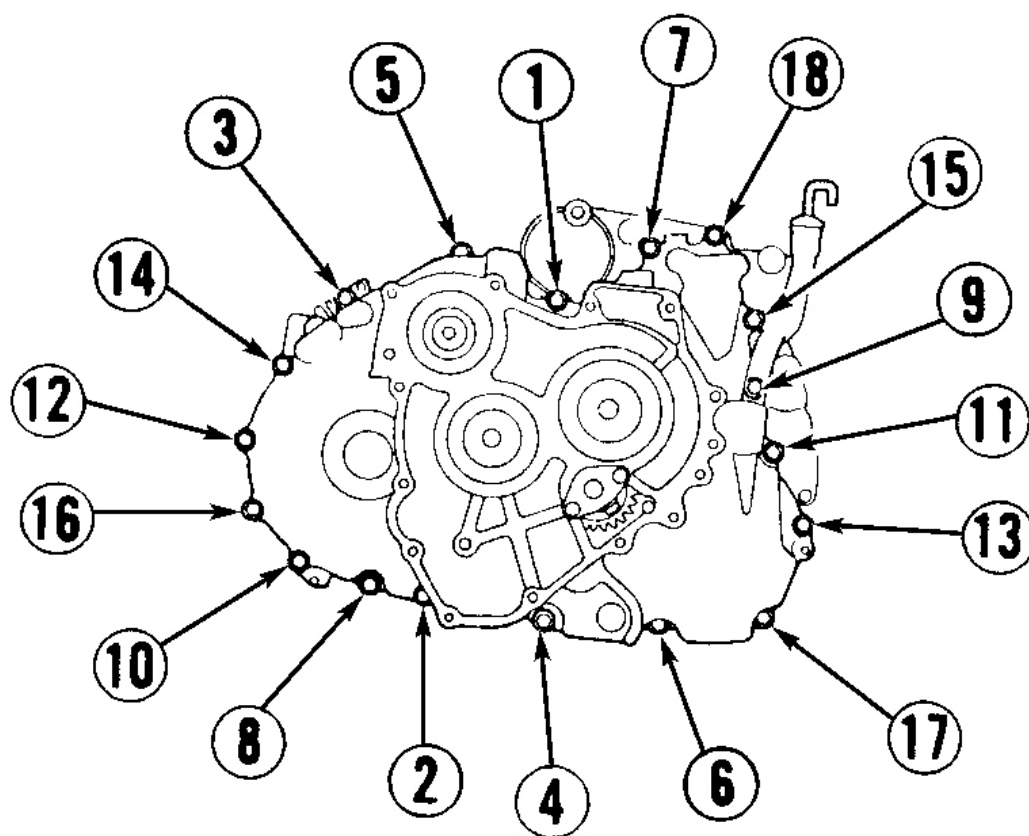
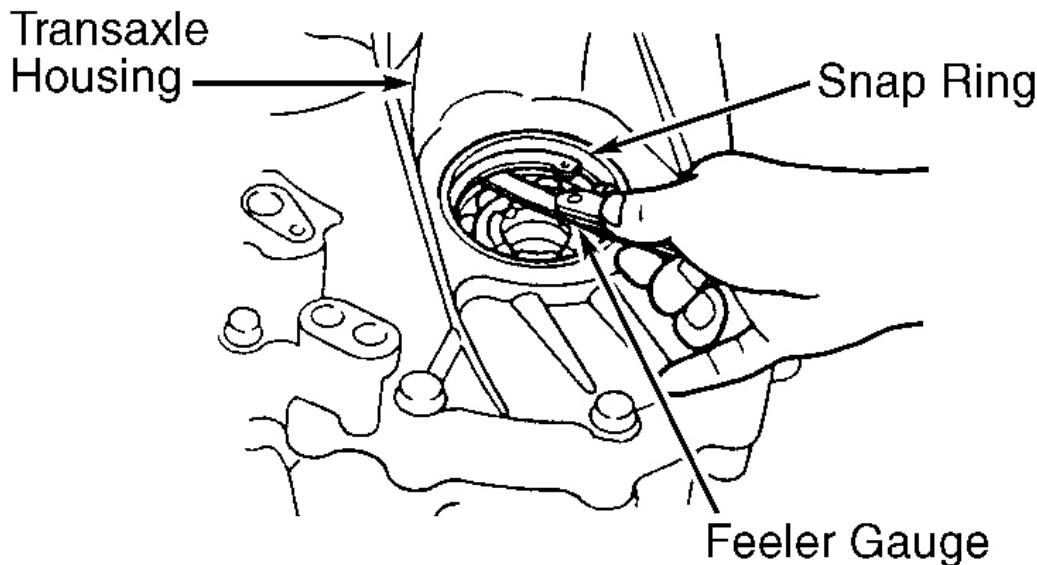


Fig. 31: Installing Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 32: Transaxle Housing Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 33: 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 under TRANSAXLE REASSEMBLY.

CAUTION: If any components were changed involving the secondary shaft, secondary shaft clearance must be checked before assembling transaxle. See SECONDARY SHAFT under COMPONENT DISASSEMBLY & REASSEMBLY.

NOTE: Coat all components with ATF before reassembly.

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

housing (toward torque converter housing). See **Fig. 34** .

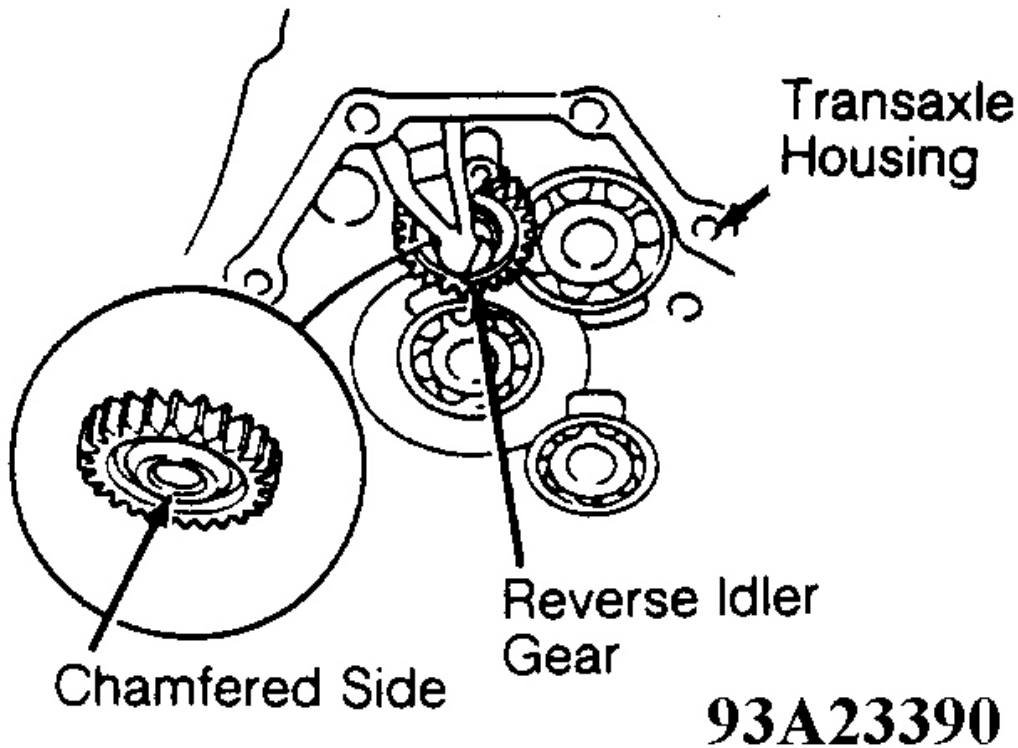


Fig. 34: Installing Reverse Idler Gear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install reverse idler gear shaft holder on transaxle housing. Install and tighten reverse idler gear shaft holder bolts to specification.
5. Install differential assembly in torque converter housing. Using Driver (07746-0030100), tap differential assembly into torque converter housing. Perform STEP 1. See **Fig. 31** . Ensure differential bearing is fully seated on torque converter housing.
6. Install dowel pins and separator plate for main valve body on torque converter housing.

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

7. 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.

8. Ensure check balls are installed in main valve body. See **Fig. 10** . Install "O" ring, stator shaft and stop pin. See **Fig. 9** . Install clutch feedpipes in main valve body.
9. Install control shaft and components. See **Fig. 9** . Install control lever on control shaft. Install NEW bolt lock and bolt. Tighten bolt to specification. Bend tabs on bolt lock over.
10. Install regulator valve body. Tighten bolts to specification. Ensure NEW filter, torque converter check valve and spring are installed in regulator valve body. See **Fig. 12** .
11. Install dowel pins, separator plate and lock-up cover. Tighten bolts to specification. Install dowel pins, separator plate and secondary valve body.
12. Ensure check balls, NEW filter and 1st accumulator choke are installed in secondary valve body. See **Fig. 13** . Install separator plate and servo valve body. Tighten bolts to specification.
13. Install servo detent base and fluid strainer. Tighten bolts to specification. Install accumulator cover. Tighten bolts to specification. Install clutch feedpipes in servo valve body.
14. Install second accumulator body plate and second accumulator body. Install NEW bolt locks and bolts. Tighten bolts to specification. Bend tabs on bolt locks over. Install mainshaft, countershaft and secondary shaft as an assembly in torque converter housing.

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

15. Install distance collar, countershaft 4th gear and selector hub on countershaft. See **Fig. 7** . Install reverse selector with flat side of reverse selector facing upward (toward threaded end of countershaft).
16. 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. 7** . Install reverse shift fork bolt and NEW bolt lock. Tighten bolt to specification. Bend tabs on bolt lock over.
17. Install countershaft reverse gear, needle bearing and collar on countershaft. See **Fig. 7** . Align spring pin on control shaft with groove on transaxle housing by rotating control shaft. See **Fig. 8** . Install dowel pins and NEW gasket on torque converter housing.
18. Install the transaxle housing on the torque converter housing. Install and tighten transaxle housing retaining bolts to specification and in sequence. See **TORQUE SPECIFICATIONS** . See **Fig. 32** .
19. Install secondary shaft snap ring. See **Fig. 7** . Install vacuum modulator valve using NEW gasket and NEW "O" ring. Tighten bolts to specification.
20. Install dipstick tube (if removed). Install collar and thrust washer for mainshaft 1st gear and NEW "O" rings on mainshaft. See **Fig. 5** .
21. Install collar, needle bearing, countershaft 1st gear with one-way clutch and parking gear on countershaft. Install NEW lock nut on countershaft.
22. Install spring, parking shift arm and parking brake stopper. Install bolt and NEW bolt lock on parking brake stopper. Tighten bolt to specification. Bend tabs on bolt lock over.

23. Install parking pawl shaft, parking pawl spring, parking pawl and stopper pin. See **Fig. 5** . Ensure parking pawl spring fits in hole on parking pawl and hole on transaxle housing. Spring force should hold parking pawl away from parking gear.
24. Install 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.

25. Install Mainshaft Holder (07GAB-PF50100) on mainshaft to secure mainshaft. See **Fig. 6** . Engage parking pawl with parking gear. Tighten mainshaft and countershaft lock nuts to specification to fully seat all components. Loosen lock nut and then retighten to specification. Remove mainshaft holder.
26. 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.

27. Place parking shift arm in "P" position and ensure parking pawl engages parking gear. Measure parking brake stopper distance between parking pawl shaft and roller pin on parking shift arm. See **Fig. 35** .
28. Parking brake stopper distance should be 2.177-2.216" (55.30-56.30 mm). If distance is not within specification, install different size parking brake stopper. Parking brake stopper is available in 3 different sizes. Consult parts department for parking brake stopper sizes.
29. Ensure all clutch feedpipes are installed in right side cover using NEW "O" rings. Install NEW gasket, dowel pins and right side cover. Tighten bolts to specification.
30. 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.

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

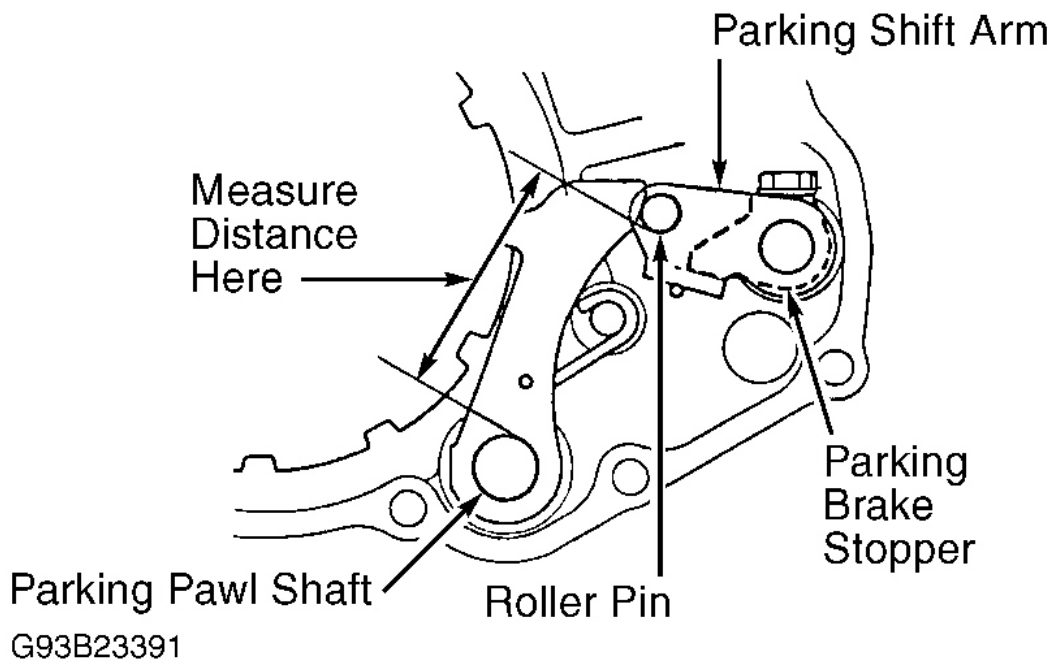


Fig. 35: Measuring Parking Brake Stopper Distance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
ATF Cooler Pipe Bolt	21 (29)
Countershaft 1st Gear Lock Nut	102 (138)
Drain Plug Bolt	29 (39)
Hydraulic Pressure Port Bolts	13 (18)
Level Gauge Pipe Bolt	13 (18)
Lock-Up Valve Cover Bolt	13 (18)
Mainshaft Lock Nut	70 (95)
Main Valve Body Bolts	
Number 1, 2 & 3	13 (18)
Number 4	9 (12)
Parking Brake Stopper Bolt	10 (14)
Reverse Idler Shaft Bolt	20 (27)
Reverse Shift Fork Bolt	10 (14)
Ring Gear Bolt	76 (103)

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Transmission Hook Bolt	20 (27)
Transmission Housing Bolt	41 (55)
Torque Converter Bolt	29 (39)
INCH Lbs. (N.m)	
Accumulator Cover Bolts	106 (12)
ATF Cooler Pipe Bracket Bolt	106 (12)
A/T Speed Pulser Bolt	106 (12)
Control Lever Bolt	106 (12)
Lock-Up Cover Bolt	106 (12)
Reverse Idler Shaft Holder Bolt	106 (12)
Right Side Cover Bolt	106 (12)
Second Accumulator Cover Bolt	106 (12)
Servo-Body Bolts	106 (12)
Servo-Detent Base Bolt	106 (12)
Speed Sensor Special Bolt	106 (12)
Throttle Control Lever Bolt	106 (12)
Vacuum Modulator Valve Assembly	106 (12)

TRANSAXLE SPECIFICATIONS**TRANSAXLE SPECIFICATIONS**

Application	In. (mm)
Clutch Clearance	
1st Clutch	.026-.033 (.65-.85)
2nd Clutch	.020-.028 (.50-.70)
3rd & 4th Clutches	.016-.024 (.40-.60)
Differential Bearing Side Clearance	⁽¹⁾ .006 (.15)
Differential Pinion Gear Backlash	.002-.006 (.05-.15)
Gear Clearances	
Countershaft 2nd Gear Clearance	0-.0016 (0-.040)
Countershaft 3rd Gear Clearance	⁽²⁾
Secondary Shaft 2nd Gear Clearance	0-.003 (0-.08)
Oil Pump Side Clearances	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Oil Pump Thrust Clearance	
Standard	.001-.002 (.03-.05)
Wear Limit	.0028 (.070)
Parking Brake Stopper Distance	2.177-2.216 (55.30-56.30)
Secondary Shaft Clearance ⁽³⁾	0-.003 (0-.08)

- (1) This is the maximum clearance. Replace snap ring with different thickness snap ring if clearance exceeds specification.
- (2) Proper procedure must be used when reassembling countershaft to check gear clearance. See **COUNTERSHAFT** under COMPONENT DISASSEMBLY & REASSEMBLY in this article.
- (3) Proper procedure must be used when checking secondary shaft clearance. See **SECONDARY SHAFT** under COMPONENT DISASSEMBLY & REASSEMBLY in this article.

WIRING DIAGRAMS

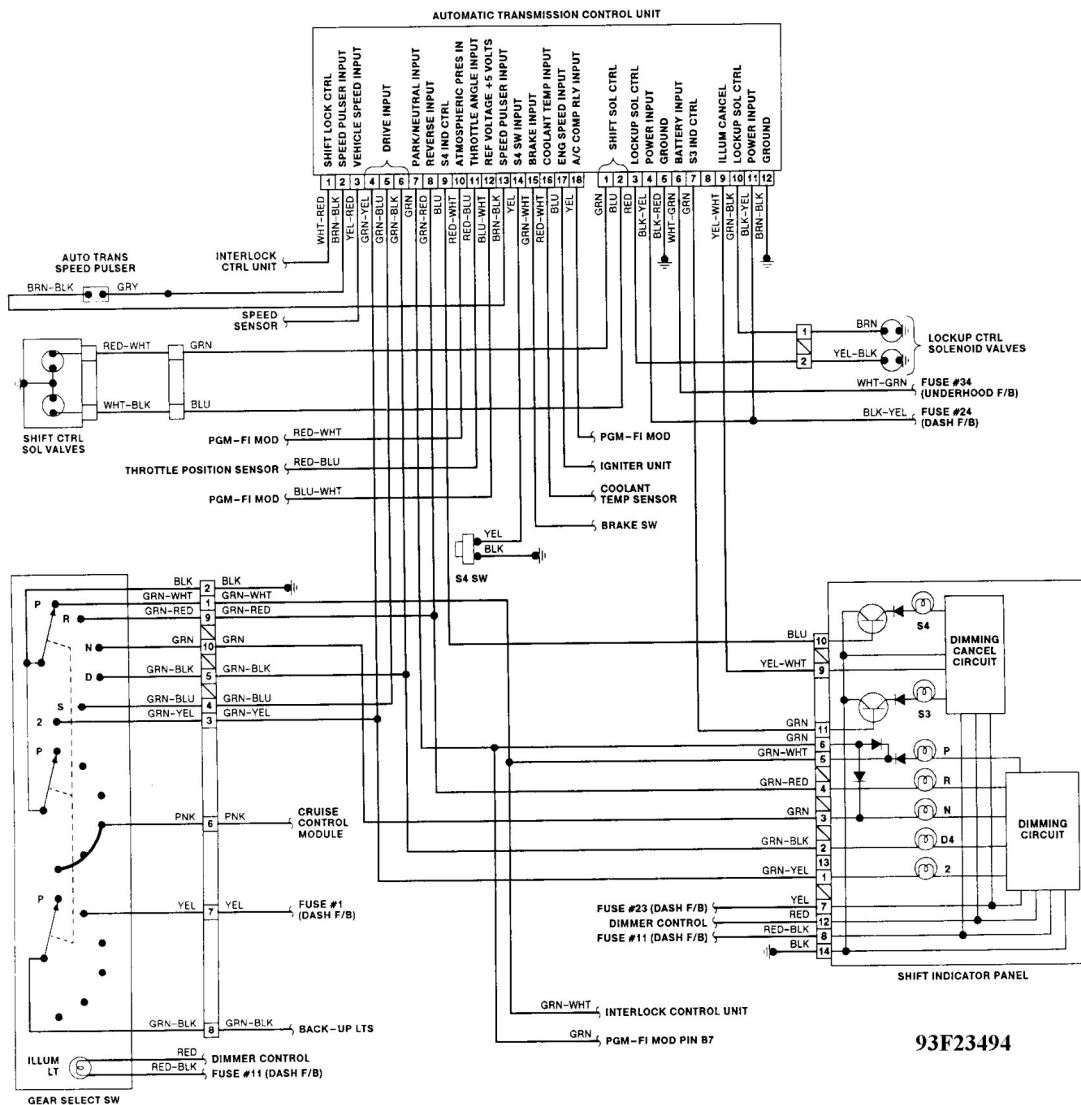


Fig. 36: Transaxle Wiring Diagram (1990 Integra - RO)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.