

1997-99 AUTOMATIC TRANSMISSIONS**Honda A4RA, B4RA & M4RA Overhaul****APPLICATION****TRANSAXLE APPLICATION**

Vehicle Model	Transaxle Application
Civic (1997)	A4RA, B4RA & M4RA
Civic (1998)	B4RA & M4RA
Civic (1999)	B4RA & M4RA

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.

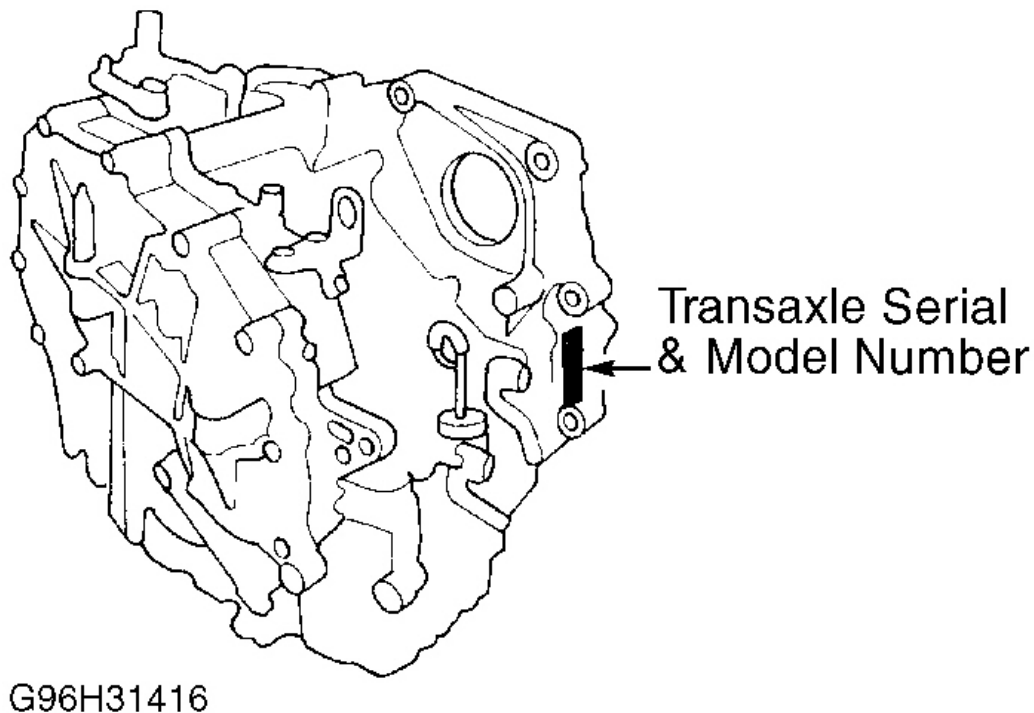


Fig. 1: Locating Transaxle Model & Serial Number
Courtesy of AMERICAN HONDA MOTOR CO., INC.

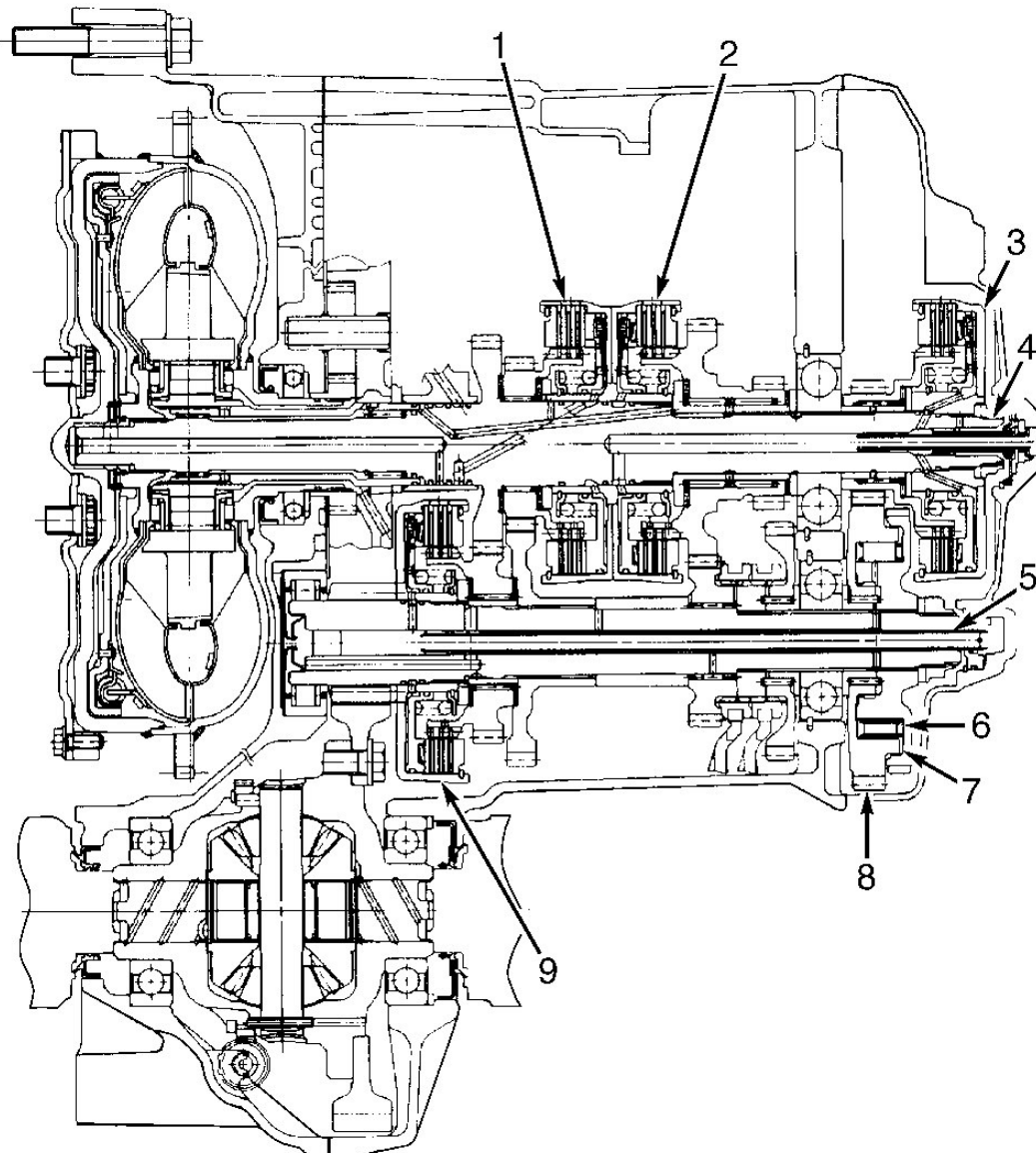
DESCRIPTION

Automatic transaxle is electronically controlled with 4 forward speeds and one reverse speed. Transaxle consists of clutches, mainshaft, countershaft, shift control solenoid valves, lock-up control solenoid valves, linear solenoid and a 3-element lock-up torque converter. See **Fig. 2** .

Valve bodies include; main valve body, secondary valve body, regulator valve body, servo body and lock-up valve body. Main valve body assembly consists of manual valve, 1-2 shift valve, 2nd orifice control valve, Clutch Pressure Back-up (CPB) valve, modulator valve, servo control valve, relief valve and ATF pump gears. Secondary valve body consists of 2-3 and 3-4 shift valves, 3-4 orifice control valve, 4th exhaust valve and Clutch Pressure Control (CPC) valve. Regulator valve body consists of pressure regulator valve, torque converter check valve, cooler relief valve and lock-up control valve. Servo body consists of servo valve and incorporates accumulators. Lock-up valve body consists of lock-up shift valve and lock-up timing valve.

The linear solenoid and shift control solenoid valve A/B are bolted to transaxle housing. Lock-up control solenoid valve A/B is bolted to torque converter housing.

Transaxle shifting and torque converter lock-up are controlled by the Powertrain Control Module (PCM) which receives input signals from various sensors. The PCM determines appropriate shift point and activates appropriate shift control solenoid valve, lock-up control solenoid valves or linear solenoid.



- | | |
|-----------------|--------------------------|
| 1. 2nd Clutch | 6. One-Way Clutch |
| 2. 4th Clutch | 7. Parking Gear |
| 3. 1st Clutch | 8. Countershaft 1st Gear |
| 4. Mainshaft | 9. 3rd Clutch |
| 5. Countershaft | |

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

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

- **"P" (Park)**

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

- **"R" (Reverse)**

Reverse selector is engaged with countershaft reverse gear and 4th clutch is applied. Back-up light switch, incorporated in A/T gear position switch, operates back-up lights.

- **"N" (Neutral)**

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

- **"D4" (Drive)**

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

- **"D" (Drive)**

Transaxle starts in 1st gear and upshifts automatically to 2nd gear and then 3rd gear. Transaxle will downshift through all gears on deceleration. When in 3rd gear in this range, PCM sends signal to operate torque converter lock-up.

- **"2" (Second)**

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

When in "D" position in 3rd gear or "D4" position in 3rd or 4th gear, torque converter lock-up exists and transaxle mainshaft rotates at the same speed as engine crankshaft. Torque converter lock-up is controlled by the PCM. The PCM receives various input signals and operates lock-up control solenoid valves.

The PCM contains a grade logic control system which controls transaxle shifting while vehicle is ascending or descending on a slope or reducing vehicle speed. For more information on grade logic control system, see HONDA A4RA, B4RA & M4RA ELECTRONIC CONTROLS article.

The PCM contains a self-diagnostic system, which stores a fault code if a 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 HONDA A4RA, B4RA & M4RA ELECTRONIC CONTROLS article.

Transaxle is equipped with shift and key interlock systems. Shift interlock system prevents shift lever from being moved from "P" position unless brake pedal is depressed and accelerator pedal is in idle position. 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 ACURA/HONDA SHIFT INTERLOCK SYSTEMS article.

The A/T gear position indicator on instrument panel contains lights to indicate which position A/T gear position switch on shift lever is in. For information and testing of A/T gear position indicator, see HONDA A4RA, B4RA & M4RA ELECTRONIC CONTROLS article.

LUBRICATION & ADJUSTMENTS

See appropriate SERVICING article.

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate AXLE SHAFTS article in DRIVELINE/AXLES.

OIL COOLER FLUSHING

NOTE: Oil cooler flushing should be preformed before reinstalling transaxle.

1. Attach Oil Cooler Flusher (J38405-A) to oil cooler lines. See **Fig. 3** . Fill oil cooler flusher tank 2/3 full with Flushing Fluid (J35944-20). DO NOT use any other flushing fluid.
2. Ensure water and air valves on oil cooler flusher are off. Apply 80-120 psi (550-829 kPa) air pressure to oil cooler flusher. Turn oil cooler flusher water valve on so water will flow through oil cooler for 10 seconds. Replace oil cooler if water will not flow through oil cooler. Shut water valve off.
3. Depress and hold mixing trigger on oil cooler flusher downward. Turn water valve on and flush oil cooler for 2 minutes. Turn air valve on for 5 seconds every 15-20 seconds to create a surging action.
4. Turn water valve off. Release mixing trigger. Disconnect oil cooler flusher and reverse hoses so oil cooler can be flushed in the opposite direction.
5. Repeat steps 2) and 3) . Turn water valve off. Release mixing trigger. Turn water valve on. 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.

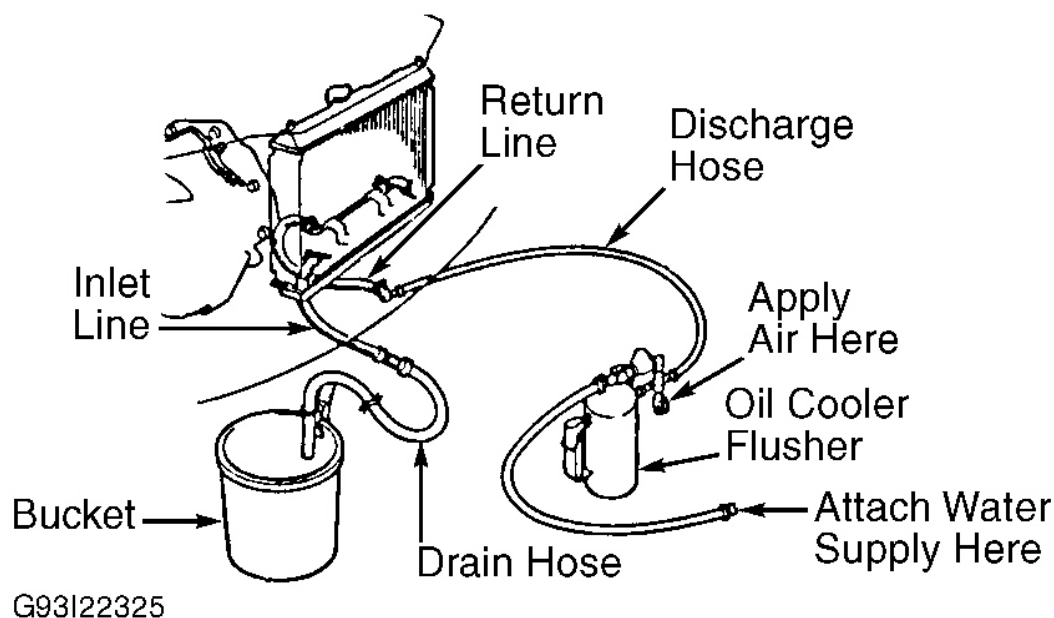


Fig. 3: Installing Oil Cooler Flusher

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TROUBLE SHOOTING

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**. Refer to the following symptoms and check the specified components:

SYMPTOM DIAGNOSIS

Delayed Shift From "N" To "D" Or "D4"

- 1st clutch defective.
- Foreign material in 1st orifice.

Delayed Shift From "N" To "R"

- Servo valve stuck.
- 1-2 shift valve stuck.
- 4th clutch defective.
- Servo control valve stuck.

Engine Runs But Vehicle Does Not Move In Any Gear

- Low fluid.
- ATF pump worn or binding.
- Regulator valve stuck.
- Mainshaft worn or damaged.
- Shift cable broken or out of adjustment.
- Final drive gears worn or damaged.
- Flexplate defective.
- ATF strainer clogged.

Erratic Upshift, All Shifts

- Engine throttle cable out of adjustment.
- PCM defective.
- Countershaft speed sensor defective.

Erratic 1-2 Upshift

- 1-2 shift valve stuck.
- Shift control solenoid valve "A" defective.
- PCM defective.

Erratic 2-3 Upshift

- 2-3 shift valve stuck.
- Shift control solenoid valve "B" defective.
- PCM defective.

Erratic 3-4 Upshift

- 3-4 shift valve stuck.
- Shift control solenoid valve "A" defective.
- PCM defective.

Excessive Idle Vibration

- Low fluid.

- ATF pump worn or binding.
- Linear solenoid assembly defective.
- Engine output low.
- Flexplate defective.
- Lock-up shift valve stuck.
- Lock-up piston defective.
- Shift control solenoid valve "A" defective.
- PCM defective.

Flare On Start From "D", Stall RPM High In "D4", "D3" & "2"

- Low fluid.
- ATF pump worn or binding.
- Regulator valve stuck.
- Shift cable broken or out of adjustment.
- ATF strainer clogged.
- Converter check valve stuck.

Flare On Start From "D", Stall RPM High In "D4", "D3" & "2"

- Shift cable broken or out of adjustment.
- One way clutch worn or damaged.
- 1st clutch defective.

Flare On Start From "D", Stall RPM High In "2"

- Shift cable broken or out of adjustment.
- 2nd clutch defective.

Flare On Start From "D", Stall RPM Is Within Specification

- 4th clutch defective.

Flare On Start From "D", Stall RPM Is Low

- Torque converter one-way clutch defective.
- Engine throttle cable out of adjustment.
- Engine output low.
- Lock-up shift valve stuck.
- Lock-up piston defective.
- Shift control solenoid valve "A" defective.
- PCM defective.

Flare On 2-3 Upshift

- 3rd clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- 2nd accumulator stuck.
- 2nd orifice control valve stuck.
- Lock-up control solenoid valve "B" defective.
- PCM defective.

Flare On 3-4 Upshift

- 4th clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- 3rd accumulator stuck.
- Lock-up control solenoid valve "B" defective.
- PCM defective.

Harsh 1-2 Upshift

- 2nd clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- Foreign material in main orifice.

Harsh 2-3 Upshift

- 3rd clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- 2nd accumulator stuck.
- 2nd orifice control valve stuck.
- Foreign material in main orifice.
- Lock-up control solenoid valve "A" defective.
- Lock-up control solenoid valve "B" defective.
- PCM defective.
- Mainshaft speed sensor defective.
- Countershaft speed sensor defective.

Harsh 3-4 Upshift

- 4th clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- 3rd accumulator stuck.
- 3-4 orifice control valve stuck.
- Foreign material in main orifice.
- Lock-up control solenoid valve "A" defective.
- Lock-up control solenoid valve "B" defective.
- PCM defective.
- Mainshaft speed sensor defective.
- Countershaft speed sensor defective.

Harsh 2-1 Downshifts

- Linear solenoid assembly defective.
- CPC valve stuck.
- 2nd accumulator stuck.
- CPB valve stuck.
- PCM defective.
- Foreign material in 2nd exhaust orifice.
- Mainshaft speed sensor defective.
- Countershaft speed sensor defective.

Harsh 3-2 Downshifts

- 2nd clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.
- 3rd accumulator defective.
- CPB valve stuck.
- PCM defective.
- Foreign material in 3rd exhaust orifice.
- Mainshaft speed sensor defective.
- Countershaft speed sensor defective.

Harsh 4-3 Downshifts

- 3rd clutch defective.
- Linear solenoid assembly defective.
- CPC valve stuck.

- 4th accumulator defective.
- CPB valve stuck.
- PCM defective.
- Foreign material in 4th exhaust orifice.
- Mainshaft speed sensor defective.
- Countershaft speed sensor defective.

Lock-Up Clutch Does Not Disengage

- Linear solenoid assembly defective.
- Lock-up timing valve stuck.
- Lock-up shift valve stuck.
- Lock-up control valve stuck.
- Lock-up piston defective.
- Lock-up control solenoid valve "A" defective.
- Lock-up control solenoid valve "B" defective.
- Countershaft speed sensor defective.

Lock-Up Clutch Not Smooth

- Linear solenoid assembly defective.
- Converter check valve stuck.
- Lock-up timing valve stuck.
- Lock-up shift valve stuck.
- Lock-up control valve stuck.
- Lock-up piston defective.
- Lock-up control solenoid valve "A" defective.
- Lock-up control solenoid valve "B" defective.
- Countershaft speed sensor defective.

Lock-Up Clutch Does Not Engage

- Linear solenoid assembly defective.
- Converter check valve stuck.
- Lock-up timing valve stuck.
- Lock-up shift valve stuck.
- Lock-up control valve stuck.
- Lock-up piston defective.
- Lock-up control solenoid valve "A" defective.
- Lock-up control solenoid valve "B" defective.

- Countershaft speed sensor defective.

No Shift

- Linear solenoid assembly defective.
- CPC valve stuck.
- Modulator valve stuck.
- Shift control solenoid valve "A" defective.
- Shift control solenoid valve "B" defective.
- PCM defective.

No Shift, Stuck In 4th Gear

- Shift control solenoid valve "A" defective.
- Shift control solenoid valve "B" defective.
- PCM defective.

No 1-3 Upshift From "D"

- 2-3 shift valve stuck.
- Shift control solenoid valve "B" defective.
- PCM defective.

No 1-4 Upshift From "D4"

- 2-3 shift valve stuck.
- 3-4 shift valve stuck.
- Shift control solenoid valve "A" defective.
- PCM defective.

Noise From Transaxle In All Gears

- ATF pump worn or binding.
- Case ball bearing worn or damaged.

Shift Lever Operation Not Smooth

- Shift cable broken or out of adjustment.
- Shift cable problem.

Stall RPM High, All Clutch Pressures Okay

- Converter check valve stuck.

Vehicle Moves In All Gears Except "2"

- Shift cable broken or out of adjustment.
- 2nd clutch defective.
- 2nd gears worn or damaged.
- 2nd accumulator defective.

Vehicle Moves In All Gears Except "R"

- Servo valve stuck.
- Shift cable broken or out of adjustment.
- 4th clutch defective.
- Reverse gears worn or damaged.

Vehicle Moves In "R" & "2" Only

- Shift cable broken or out of adjustment.
- One way clutch worn or damaged.
- 1st gears worn or damaged.
- 1st clutch defective.
- Foreign material in 1st orifice.
- 1st accumulator defective.

Vehicle Moves In "N"

- 1st clutch defective.
- 2nd clutch defective.
- 3rd clutch defective.
- 4th clutch defective.
- Too much fluid.
- Foreign material in main orifice.
- Needle bearing worn or damaged.
- Thrust washer worn or damaged.
- Clutch clearance incorrect.

Vehicle Will Not Accelerate To A Speed Greater Than 31 MPH

- Torque converter one-way clutch defective.

Vibration In All Gears

- Flexplate defective.

Will Not Shift Into "P" Position

- Shift cable broken or out of adjustment.
- Shift cable problem.

TESTING**ROAD TEST**

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

CAUTION: Vehicle is equipped with an air bag system (Supplemental Restraint System (SRS). All wires have Yellow insulation and are located underdash or in instrument panel area. To avoid injury from accidental deployment, read and carefully follow all **SERVICE PRECAUTIONS** in appropriate **AIR BAG DEACTIVATION PROCEDURES** article in **GENERAL INFORMATION**.

1. Warm engine to normal operating temperature. Apply parking brake and block wheels. Start engine. Move shift lever to "D4" position while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat step 1 in "D3" position. Ensure engine does not stall. Manufacturer recommends monitoring of throttle position sensor voltage when performing road test to ensure proper throttle opening for verifying shift points.
3. Ensure ignition is off. Remove passenger side kick panel. Remove PCM bracket and remove PCM from bracket. Install Backprobe Test Set (07SAZ-001000A) or equivalent between PCM and Digital Volt-Ohmmeter (DVOM) leads. See [Fig. 4](#).
4. Using DVOM, with positive lead at terminal D1 and negative lead at terminal A9 or A22. See [Fig. 4](#). Ensure digital volt-ohmmeter is set for measuring voltage.
5. Road test vehicle and check for abnormal noise and clutch slippage. Specified clutch is applied in designated gears. See **CLUTCH APPLICATION** table.
6. Note that shift points and lock-up clutch operation are within specification in accordance with throttle position sensor voltage. See **TRANSAXLE UPSHIFT SPECIFICATIONS** and **TRANSAXLE DOWNSHIFT SPECIFICATIONS** tables.
7. With shift lever in "D4" position, accelerate to about 35 MPH so transaxle is in 4th gear. Move shift lever to "2" position. Ensure engine braking occurs.

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

8. Place shift lever in "2" position. Accelerate from a stop at full throttle. Check for abnormal noise or clutch slippage. Upshifts and downshifts should not occur in this range.
9. Place shift lever in "R" position. Accelerate from a stop at full throttle. Check for abnormal noise or

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

clutch slippage.

10. Park vehicle on a slope. Apply parking brake and place shift lever in "P" position. Release parking brake. Ensure vehicle does not move. If vehicle moves, check for defective shift cable or parking components.
11. Ensure ignition is off. Reinstall electrical connectors, PCM bracket and PCM.

CLUTCH APPLICATION

Shift Lever Position	Elements In Use
"P" & "N"	No Clutches Are Applied
"R"	4th Clutch
"D4"	
1st Gear	1st Clutch
2nd Gear	(1) 1st clutch, 2nd Clutch
3rd Gear	(1) 1st clutch, 3rd Clutch
4th Gear	(1) 1st clutch, 4th Clutch
"D3"	
1st Gear	1st Clutch
2nd Gear	(1) 1st clutch, 2nd Clutch
3rd Gear	(1) 1st clutch, 3rd Clutch
"2"	(1) 1st clutch, 2nd Clutch
(1) The 1st clutch engages, but driving power is not transmitted, as one-way clutch slips.	

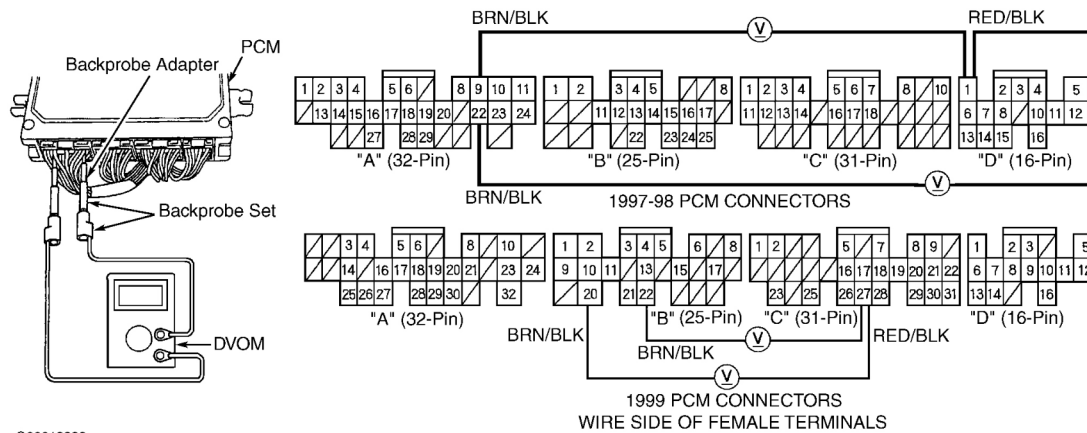


Fig. 4: Installing Backprobe Test Set
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE UPSHIFT SPECIFICATIONS (EXCEPT VTEC)

"D4" Position & Condition	1st-2nd	2nd-3rd	3rd-4th	Lock-Up Clutch On
TPS Voltage .75	9-12 MPH	20-23 MPH	28-32 MPH	21-24 MPH

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

Volt				
TPS Voltage 2.25 Volts	212-256 MPH	40-45 MPH	59-65 MPH	621-67 MPH
TPS Voltage 4.5 Volts (Full Throttle)	33-38 MPH	63-71 MPH	101-112 MPH	99-109 MPH

TRANSAXLE DOWNSHIFT SPECIFICATIONS (EXCEPT VTEC)

"D4" Position & Condition	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
TPS Voltage .50 Volt	19-22 MPH	17-20 MPH	(1)	(2) 6-9 MPH
TPS Voltage 4.5 Volts (Full Throttle)	95-105 MPH	85-95 MPH	54-61 MPH	25-30 MPH

(1) Specification not available from manufacturer.

(2) Downshift from 3rd to 1st gear.

TRANSAXLE UPSHIFT SPECIFICATIONS (VTEC)

"D4" Position & Condition	1st-2nd Gear	2nd-3rd Gear	3rd-4th Gear	Lock-Up Clutch On
TPS Voltage .75 Volt	9-12 MPH	20-23 MPH	28-32 MPH	21-24 MPH
TPS Voltage 2.25 Volts	21-25 MPH	40-45 MPH	59-65 MPH	62-67 MPH
TPS Voltage 4.5 Volts (Full Throttle)	32-37 MPH	62-70 MPH	96-107 MPH	95-106 MPH

TRANSAXLE DOWNSHIFT SPECIFICATIONS (VTEC)

"D4" Position & Condition	Lock-Up Clutch Off	4th-3rd Gear	3rd-2nd Gear	2nd-1st Gear
TPS Voltage .50 Volt	19-22 MPH	17-20	(1)	(2) 6-9 MPH
TPS Voltage 4.5 Volts (Full Throttle)	91-101 MPH	85-95 MPH	54-61 MPH	25-30 MPH

(1) Specification not available from manufacturer.

(2) Downshift from 3rd to 1st gear.

TORQUE CONVERTER STALL SPEED TEST

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

1. Apply parking brake and block all wheels. Connect tachometer. Start engine. Ensure A/C is off. Warm engine to normal operating temperature. Place shift lever in "2" position.
2. Fully depress brake pedal. Fully depress accelerator for 6-8 seconds and note engine speed. This is the torque converter stall speed.
3. Allow transaxle to cool for 2 minutes at idle in "N" or "P". Repeat test procedure in "D4", "2" and "R" positions.
4. Torque converter stall speed should be the same in "D4", "2" and "R" positions. Torque converter stall speed should be 2550-2850 RPM. If torque converter stall speed is not within specification, see **TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING** table for possible causes.

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Torque Converter Stall Speed Test Results	Probable Cause
Stall Speed RPM High In "D4", "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 "2"	Slipping 2nd Clutch
Stall Speed RPM High In "D4"	Slipping 1st Clutch Or 1st Gear One-Way Clutch
Stall Speed RPM Low In "D4", "2" & "R"	Engine Output Low, Torque Converter One-Way Clutch Slipping

HYDRAULIC PRESSURE TEST

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. Attach tachometer.

Pressure Testing

1. With engine off, remove pressure tap plug from appropriate pressure tap on transaxle. See **Fig. 5** . Attach pressure gauge to appropriate pressure tap using NEW washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
2. Start and operate engine at 2000 RPM for all pressure readings. Measure line pressure, 1st clutch, 2nd clutch, 3rd clutch and 4th clutch in order. With shift lever in appropriate position, measure each line pressure.
3. Line pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table. If line pressure is not within specification, see **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING** table.
4. For 2nd, 3rd or 4th clutch measurement, disconnect linear solenoid connector. See **Fig. 6** . Apply battery voltage to linear solenoid connector terminals. With shift lever in appropriate position, measure each line pressure at 2000 RPM. 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.
5. Remove pressure gauge set. Using NEW seal washer, install and tighten pressure tap plug to

1999 Honda Civic EX

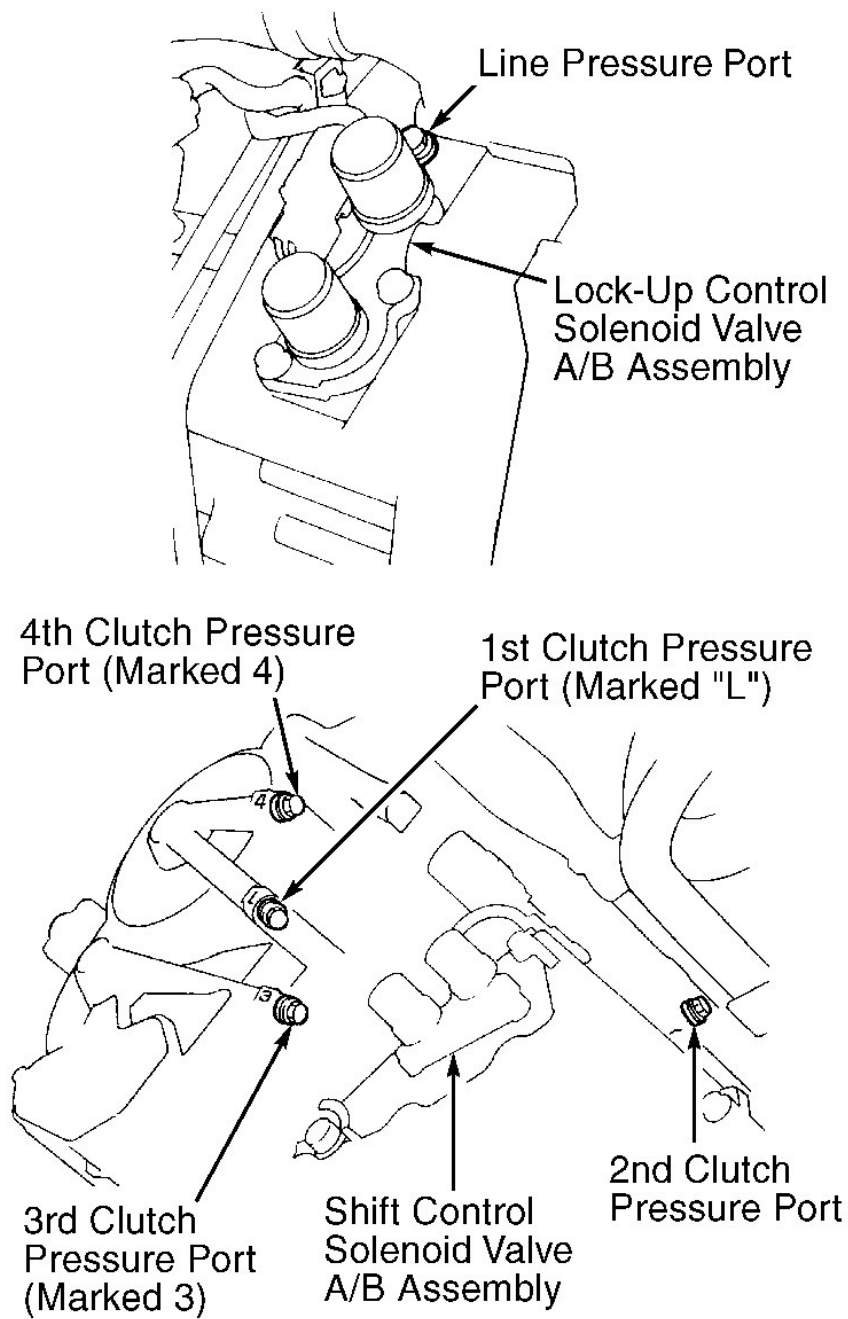
1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

specification. See **TORQUE SPECIFICATIONS**.**HYDRAULIC PRESSURE TEST SPECIFICATIONS**

Application	Shift Lever Position	psi. (kPa)
Line Pressure	"P" Or "N"	120-128 (830-880)
Clutch Pressure		
No Voltage At Linear Solenoid		
1st Clutch	"D4"	120-128 (830-880)
2nd	"D4"	116-123 (800-850)
3rd & 4th Clutch	"D4"& "R"	117-125 (810-860)
With Voltage Applied To Linear Solenoid		
1st, 2nd, 3rd & 4th Clutch	"D4" & "R"	0-21 (0-150)

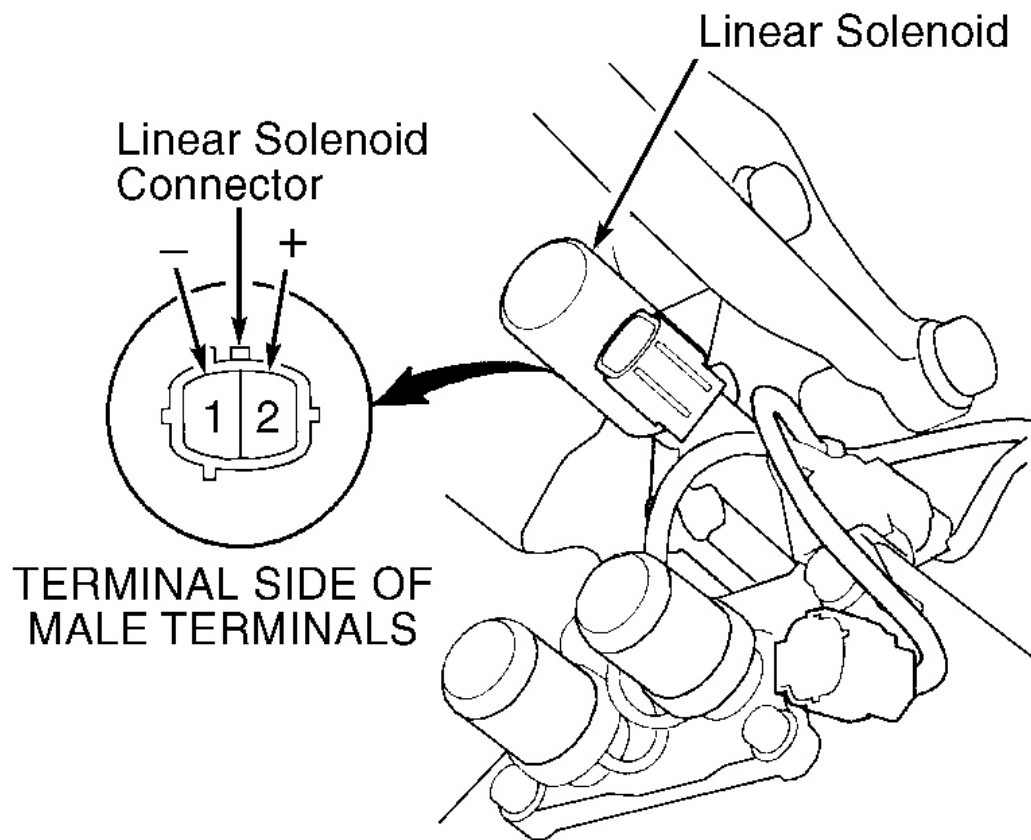
HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

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



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Fig. 5: Identifying Transaxle Pressure Taps
Courtesy of AMERICAN HONDA MOTOR CO., INC.



G96D31420

Fig. 6: Identifying Linear Solenoid 2-Pin Connector
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

ELECTRICAL COMPONENTS

See HONDA A4RA, B4RA & M4RA ELECTRONIC CONTROLS article.

TRANSAXLE

See appropriate 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

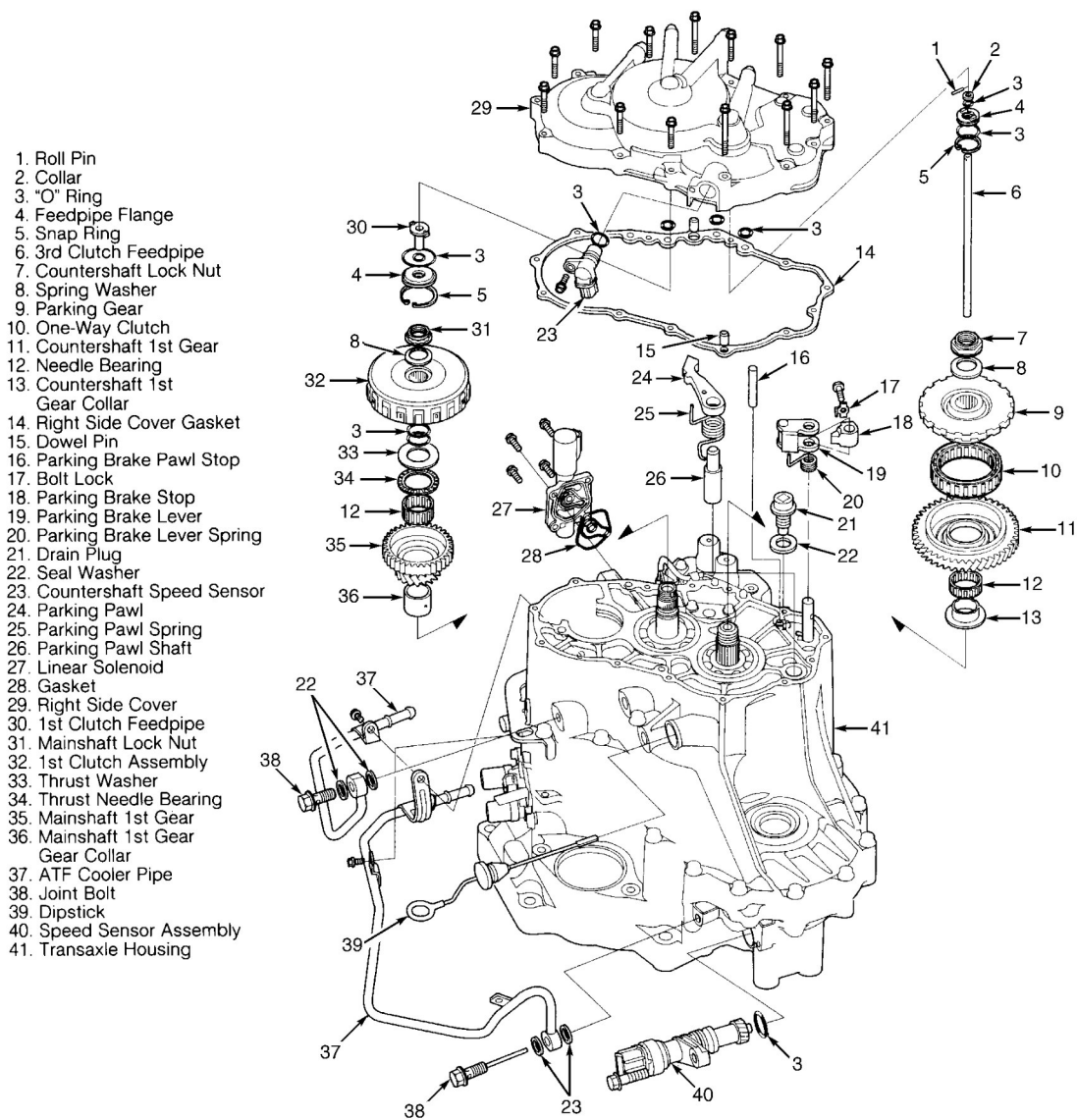
1. Remove bolts, right side cover and gasket. See Fig. 7 . Install Mainshaft Holder (07GAB-PF50101) on mainshaft to secure mainshaft from rotating. See Fig. 8 .

CAUTION: DO NOT use impact wrench to remove lock nuts from countershaft, mainshaft and secondary shaft.

2. Engage parking pawl with parking gear. Using hammer and chisel, cut lock tabs on countershaft and mainshaft lock nuts. Remove lock nuts and spring washers. See Fig. 7 .

NOTE: Mainshaft and countershaft lock nut has left-hand thread.

3. Remove mainshaft holder once lock nuts are removed. Remove 1st clutch, mainshaft 1st gear assembly and mainshaft 1st gear collar from mainshaft. Remove parking pawl, parking pawl spring and parking pawl shaft. Remove parking brake lever from control shaft.
4. Using puller, remove parking gear, one-way clutch and countershaft 1st gear from countershaft. Using puller, remove idler gears from mainshaft and secondary shaft.
5. Remove needle bearing and countershaft 1st gear collar from countershaft. Remove ATF cooler lines and dipstick.
6. Remove mainshaft speed sensor. Remove transaxle housing bolts and hanger. Align spring pin with groove in transaxle housing by rotating control shaft. Using Puller (07HAC-PK4010A), remove transaxle housing. See Fig. 9 .



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

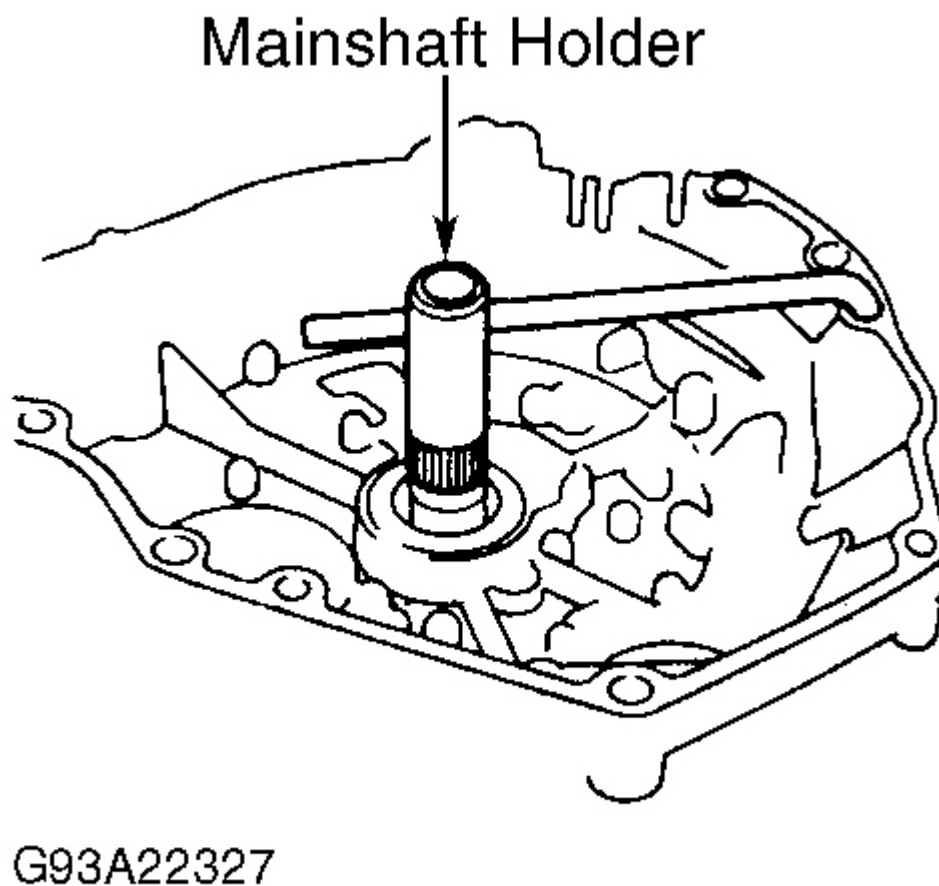
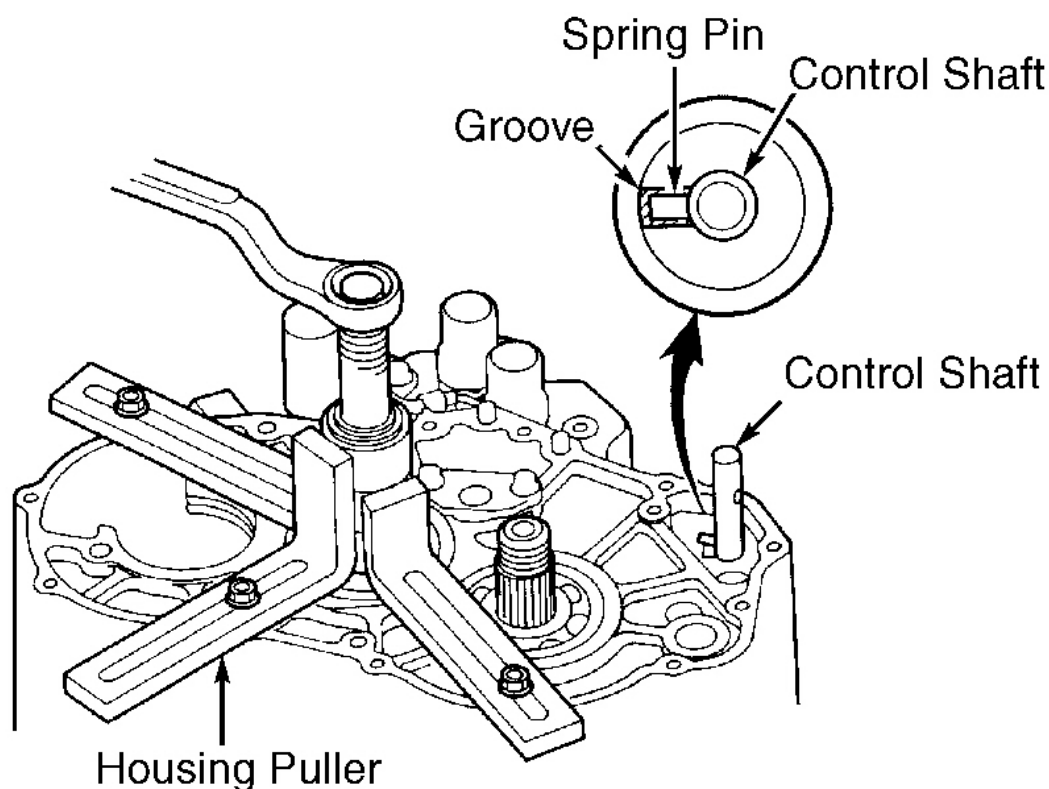


Fig. 8: Installing Mainshaft Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 9: Aligning Spring Pin & Removing Transaxle Housing

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove countershaft reverse gear, collar and needle bearing. See **Fig. 10** . Remove bolt, lock washer, shift fork and reverse selector.
8. Remove mainshaft and countershaft assemblies at same time. Remove differential assembly from torque converter housing.
9. Remove oil feedpipes from servo body, secondary valve body and main valve body. Remove bolts and fluid strainer. Remove bolt and servo detent base. See **Fig. 11** . Remove bolts, servo body and servo separator plate.
10. Remove secondary valve body, stop shaft and secondary separator plate. Remove bolts, lock-up valve body and separator plate.
11. Remove bolt and regulator valve body. Remove stop shaft, "O" ring and stator shaft. Disconnect detent spring from detent arm. Remove control shaft from torque converter housing. Remove detent arm shaft and detent arm from main valve body.
12. Remove bolts and main valve body. Use care not to lose 8 check balls in main valve body. Remove oil pump driven gear shaft, oil pump driven gear and oil pump drive gear. Remove main separator plate and

dowel pins.

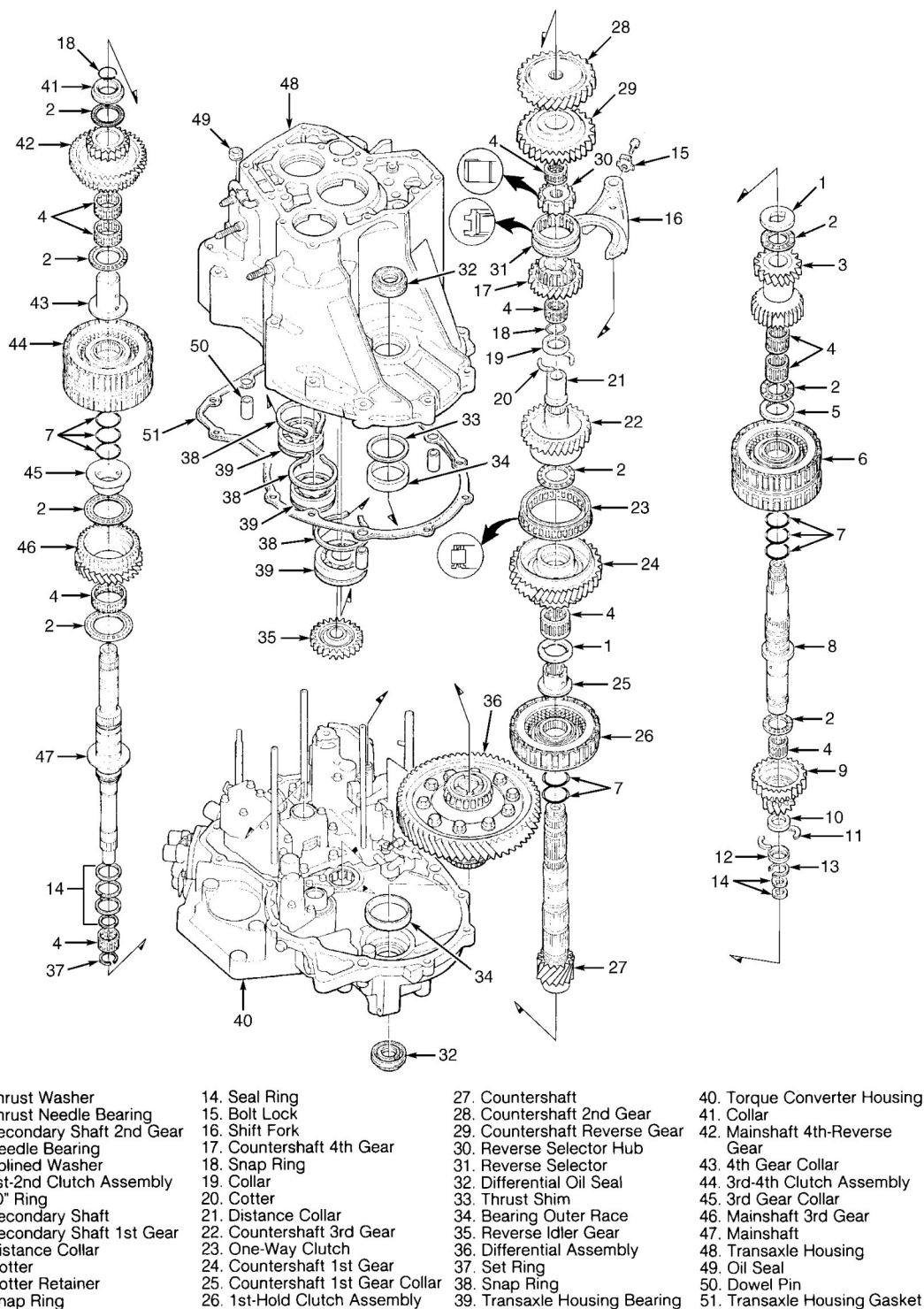


Fig. 10: Exploded View Of Transaxle Housing & Components

Courtesy of AMERICAN HONDA MOTOR CO., INC.

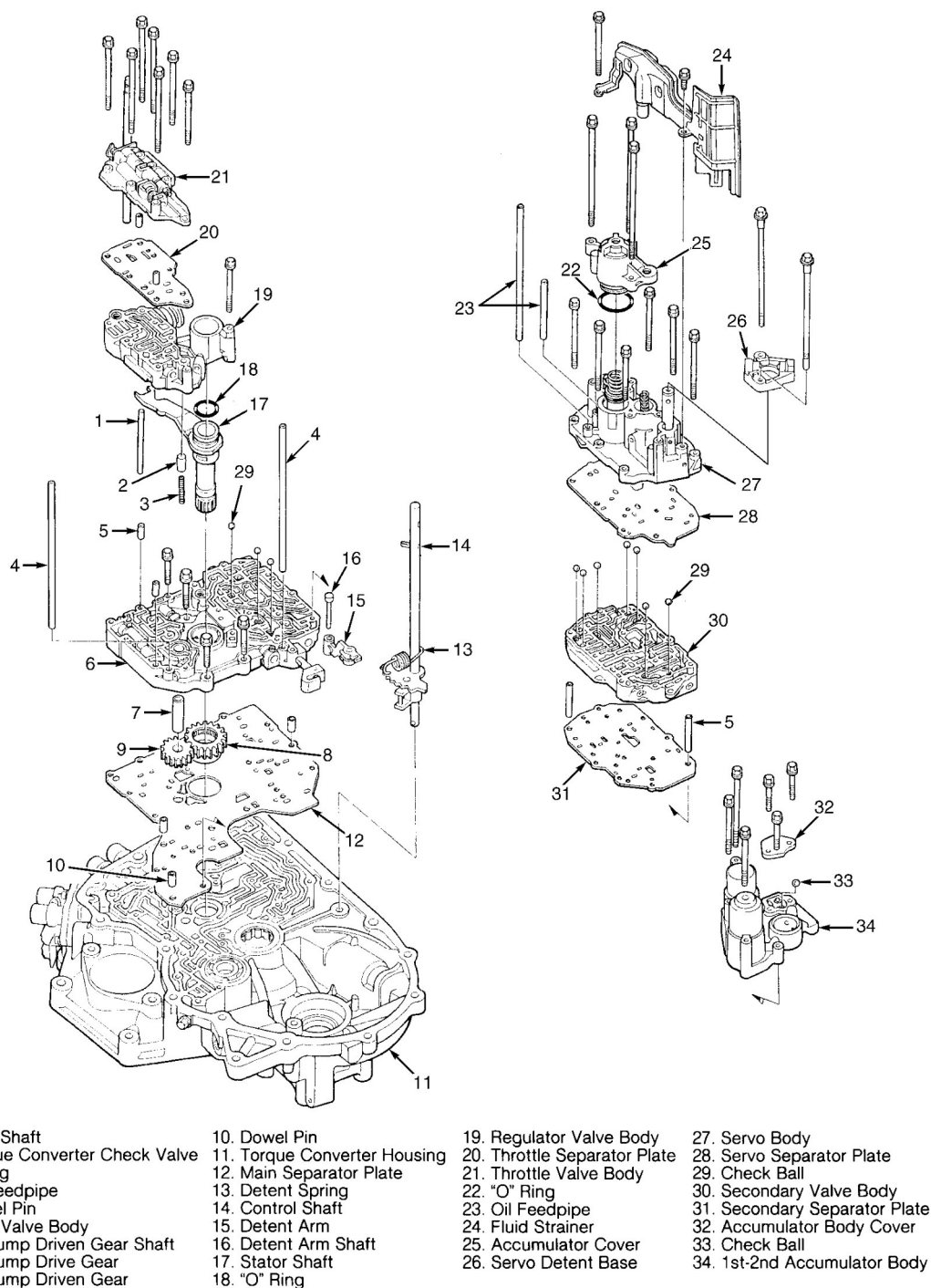


Fig. 11: Exploded View Of Torque Converter Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

MAIN VALVE BODY

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

Disassembly

Disassemble main valve body. See **Fig. 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 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 for 30 minutes in ATF. Thoroughly clean main valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table. Replace springs if not within specification.

NOTE: 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. Ensure all components are installed in correct location. See **Fig. 12** .

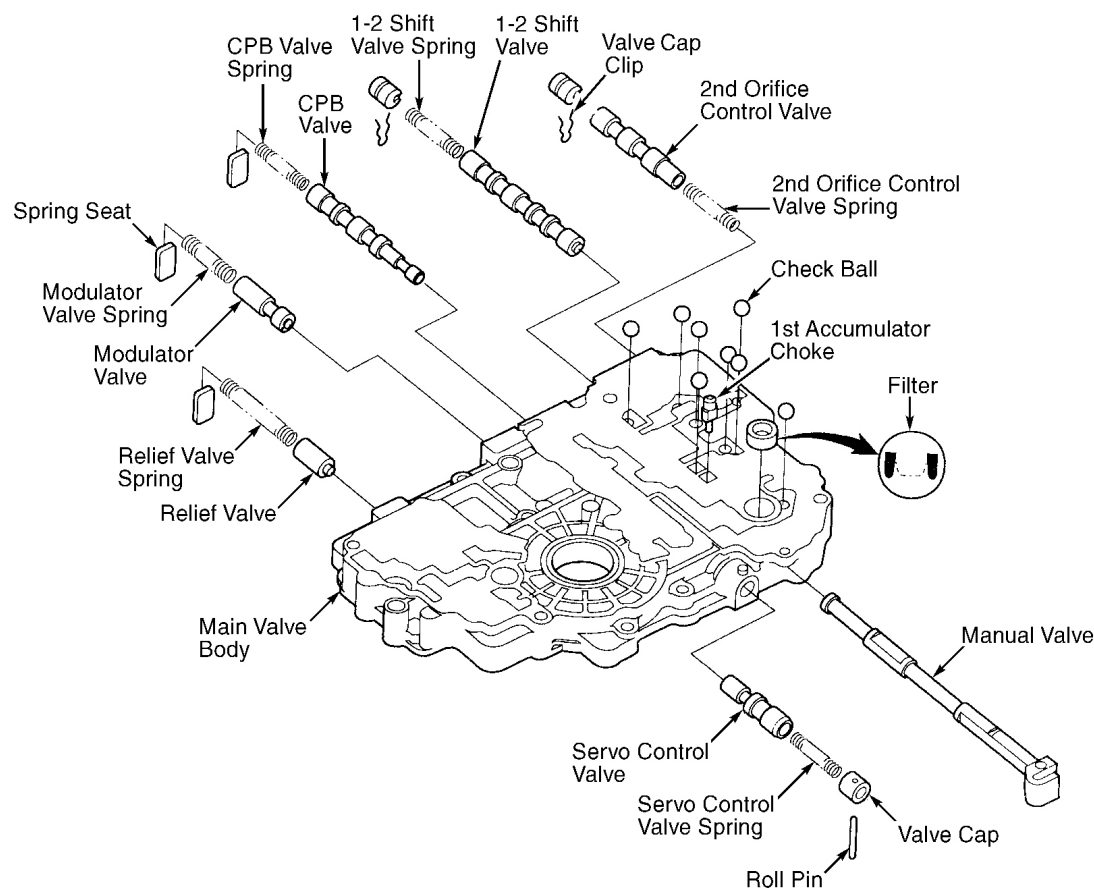
SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
Main Valve Body	
Clutch Pressure Back-Up Valve Spring	1.858 (47.20)
Modulator Valve Spring	1.378 (35.00)
Relief Valve Spring	1.461 (37.10)
Servo Control Valve Spring	2.051 (52.10)
1-2 Shift Valve Spring	1.626 (41.30)
2nd Orifice Control Valve Spring	1.370 (34.80)
Regulator Valve Body	
Cooler Relief Valve Spring	1.331 (33.80)
Lock-Up Timing Valve Spring	1.496 (38.00)

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

Regulator Valve Spring "A"	3.457 (87.80)
Regulator Valve Spring "B"	1.732 (44.00)
Stator Reaction Spring	1.193 (30.30)
Torque Converter Check Valve Spring	1.331 (33.80)
Secondary Valve Body	
2-3 Shift Valve Spring	2.244 (57.00)
3-4 Orifice Control Valve Spring	1.476 (37.50)
3-4 Shift Valve Spring	2.244 (57.00)
4th Exhaust Valve Spring	1.433 (36.40)
Servo Body	
1st Accumulator Spring	3.508 (89.10)
2nd Accumulator Spring "A"	1.535 (39.00)
2nd Accumulator Spring "B"	.815 (20.70)
2nd Accumulator Spring "C"	2.677 (68.00)
3rd Accumulator Spring "A"	3.516 (89.30)
3rd Accumulator Spring "B"	1.382 (35.10)
4th Accumulator Spring "A"	3.425 (87.00)
4th Accumulator Spring "B"	2.031 (51.60)
Lock-Up Valve Body	
Lock-Up Shift Valve Spring	2.902 (73.70)
Lock-Up Timing Valve Spring	3.177 (80.70)



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Fig. 12: Exploded View Of Main Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP

Disassembly

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

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Inspect components and replace if damaged.
2. Install oil pump gears and oil pump driven gear shaft in main valve body. Ensure chamfered and grooved side of oil pump driven gear is facing upward (toward separator plate side of main valve body).
3. Using feeler gauge, measure side clearance of both gears between tip of gear teeth and main valve body. See **Fig. 13**. Replace oil pump gears and/or main valve body if side clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.
4. Remove oil pump driven gear shaft. Place straightedge across main valve body surface. Using feeler

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

gauge, measure thrust clearance between oil pump gears and straightedge. Replace oil pump gears and/or main valve body if thrust clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.

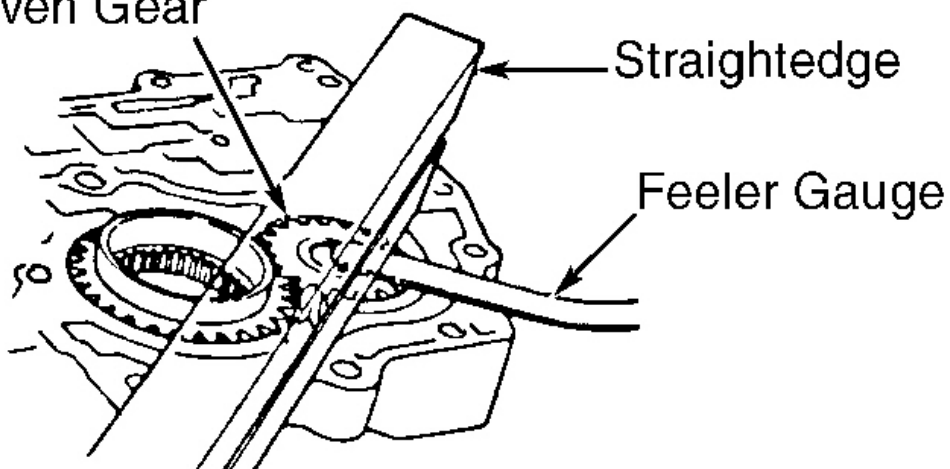
OIL PUMP SPECIFICATIONS

Application	In. (mm)
Side Clearance	
Oil Pump Drive Gear	.0041-.0052 (.105-.133)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Thrust Clearance	
Standard	.001-.002 (.03-.05)
Wear Limit	.003 (.07)

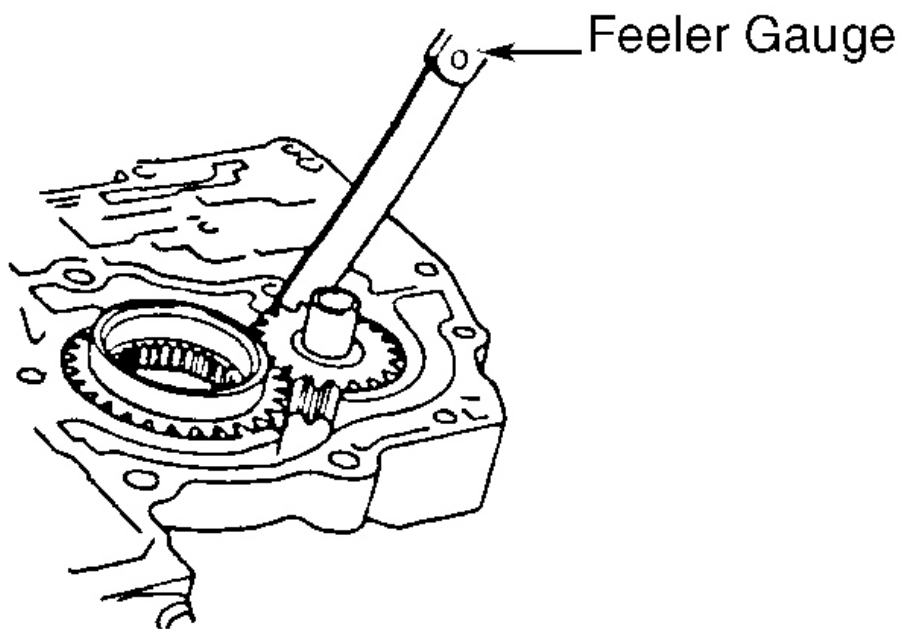
Reassembly

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

Oil Pump
Driven Gear



CHECKING THRUST CLEARANCE



CHECKING SIDE CLEARANCE

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Fig. 13: Measuring Oil Pump Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY VALVE BODY

CAUTION: Clutch Pressure Control (CPC) valve is installed in secondary valve body, behind lock bolt. See Fig. 14 . DO NOT remove lock bolt. If CPC valve becomes frozen, replace secondary valve body assembly.

Disassembly

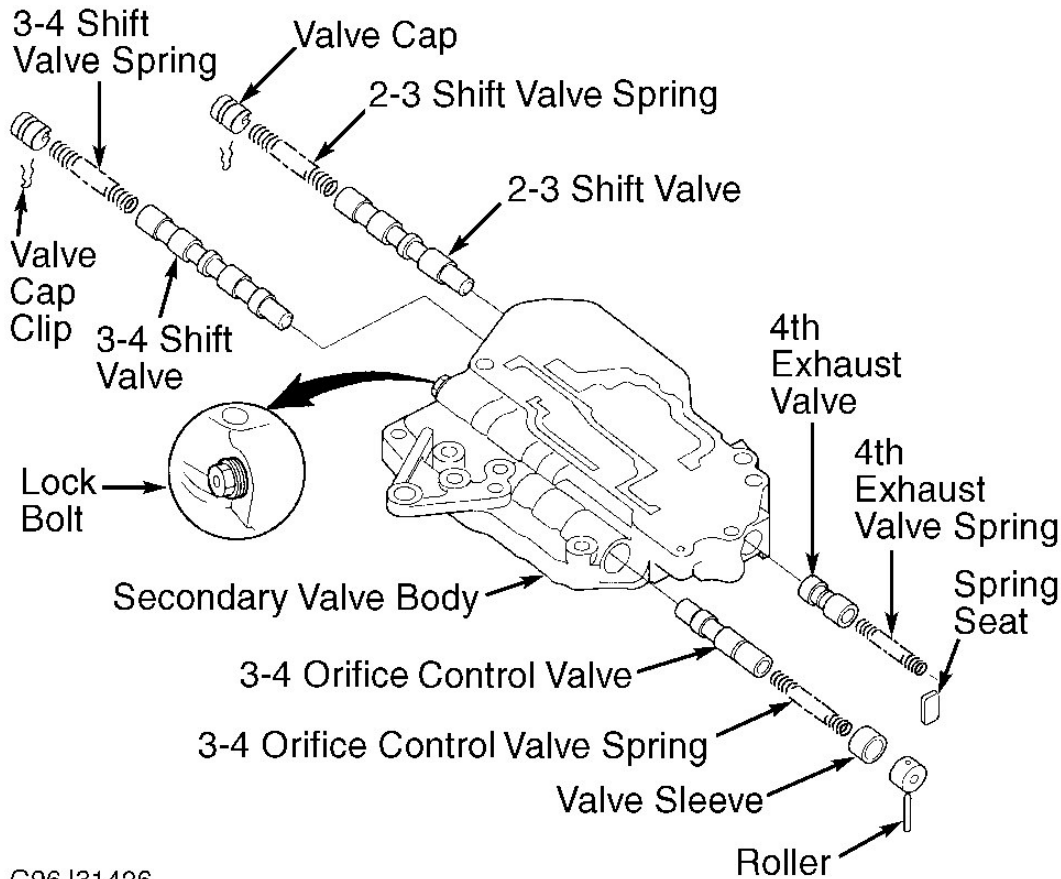
When disassembling secondary valve body, place secondary valve body components in order, and mark spring locations for reassembly reference. DO NOT use force to remove components. DO NOT use magnet to remove check balls, as check balls may become magnetized. Note direction of valve cap installation before removing from secondary valve body. See Fig. 14 . Use care when removing valve caps, sleeves 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 for 30 minutes in ATF. Sandpaper can be rolled into a tube shape for deburring valve bores. Thoroughly clean secondary valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table under MAIN VALVE BODY. Replace springs if not within specification.

Reassembly

Coat all components and bores with Dexron-II ATF. To reassemble, reverse disassembly procedure. Ensure all components are installed in correct location. See Fig. 14 .



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Fig. 14: 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 stop bolt.

Disassembly

Hold regulator spring cap downward. Remove stop bolt. Slowly remove regulator spring cap and components from regulator valve body. See **Fig. 15**.

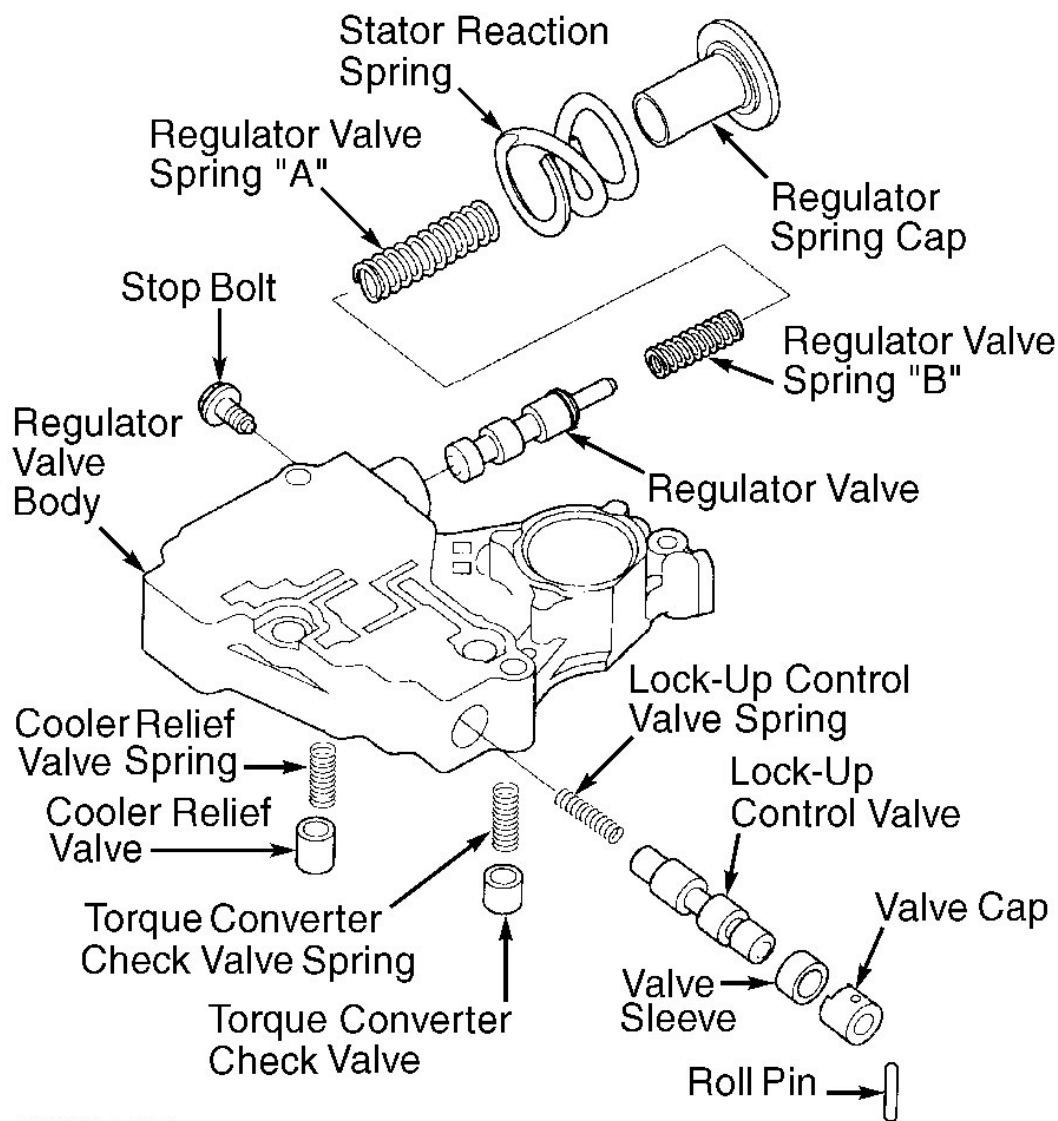
Cleaning & Inspection

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 sandpaper soaked for 30 minutes in ATF. Sandpaper can be rolled into a tube shape for deburring valve bores. Thoroughly clean regulator valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table under MAIN VALVE BODY. Replace springs if not within specification.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. Align hole in regulator spring cap with hole in valve body, then press spring cap into valve body. Tighten stop bolt to specification. See **TORQUE SPECIFICATIONS** . Ensure all components are installed in correct location. See **Fig. 15** .



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

SERVO BODY

Disassembly

Disassemble servo body. See **Fig. 16** . Use care when removing accumulator piston snap rings, as they are under spring pressure.

Cleaning & Inspection

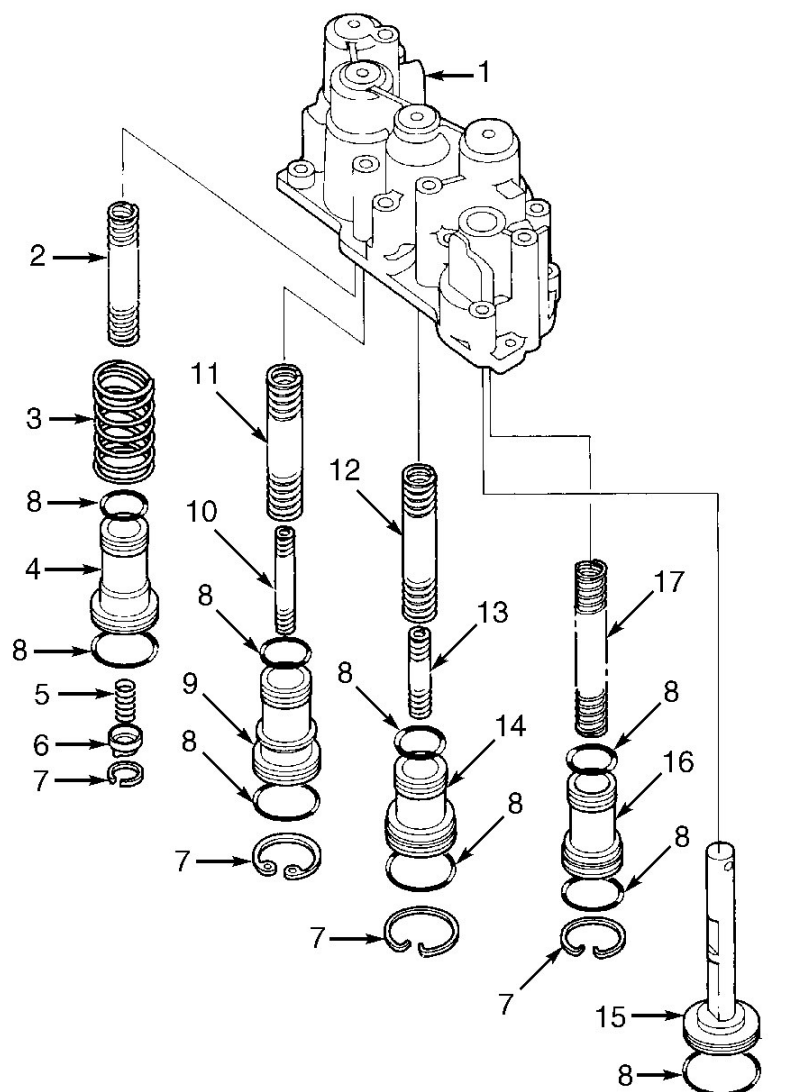
1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

1. Clean components with solvent and dry with compressed air. Inspect for wear, scratches or scoring. Replace components if worn or damaged.
2. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table under MAIN VALVE BODY. Replace springs if not within specification.

Reassembly

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



- | | |
|-------------------------------|----------------------------------|
| 1. Servo Body | 10. 3rd Accumulator Spring "B" |
| 2. 2nd Accumulator Spring "C" | 11. 3rd Accumulator Spring "A" |
| 3. 2nd Accumulator Spring "A" | 12. 4th Accumulator Spring "A" |
| 4. 2nd Accumulator Piston | 13. 4th Accumulator Spring "B" |
| 5. 2nd Accumulator Spring "B" | 14. 4th Accumulator Piston |
| 6. Spring Retainer | 15. Servo Valve Shift Fork Shaft |
| 7. Snap Ring | 16. 1st Accumulator Piston |
| 8. "O" Ring | 17. 1st Accumulator Spring |
| 9. 3rd Accumulator Piston | |

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Fig. 16: Exploded View Of Servo Body

Courtesy of AMERICAN HONDA MOTOR CO., INC.

LOCK-UP VALVE BODY

Disassembly

Disassemble lock-up valve body. See **Fig. 17** . Place lock-up valve body components in order, and mark spring locations for reassembly reference. DO NOT use force to remove components. Note direction of valve cap installation before removing from secondary valve body.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace lock-up valve body if any parts are worn or damaged.
2. Ensure all valves slide freely in the bore. If valves do not slide freely, polish burrs or rough areas using No. 600 sandpaper soaked for 30 minutes in ATF. Sandpaper can be rolled into a tube shape for deburring valve bores. Thoroughly clean lock-up valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SPRING SPECIFICATIONS** table under MAIN VALVE BODY. 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. 17** .

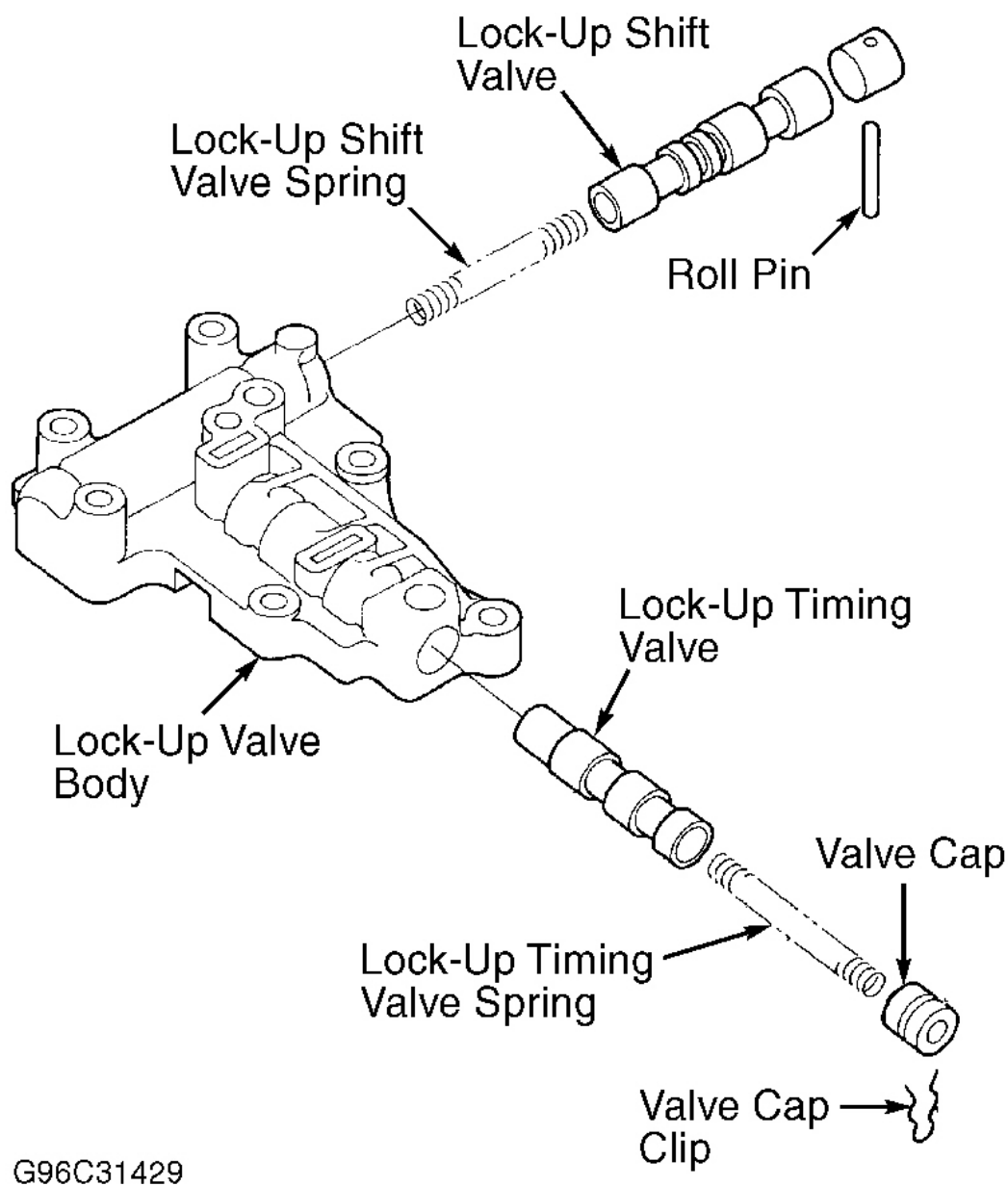


Fig. 17: Exploded View Of Lock-Up Valve Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

NOTE: Mainshaft lock nut has left hand threads.

Disassembly

Note location of mainshaft components. See **Fig. 10** . Remove mainshaft components.

Cleaning & Inspection

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

Adjustments

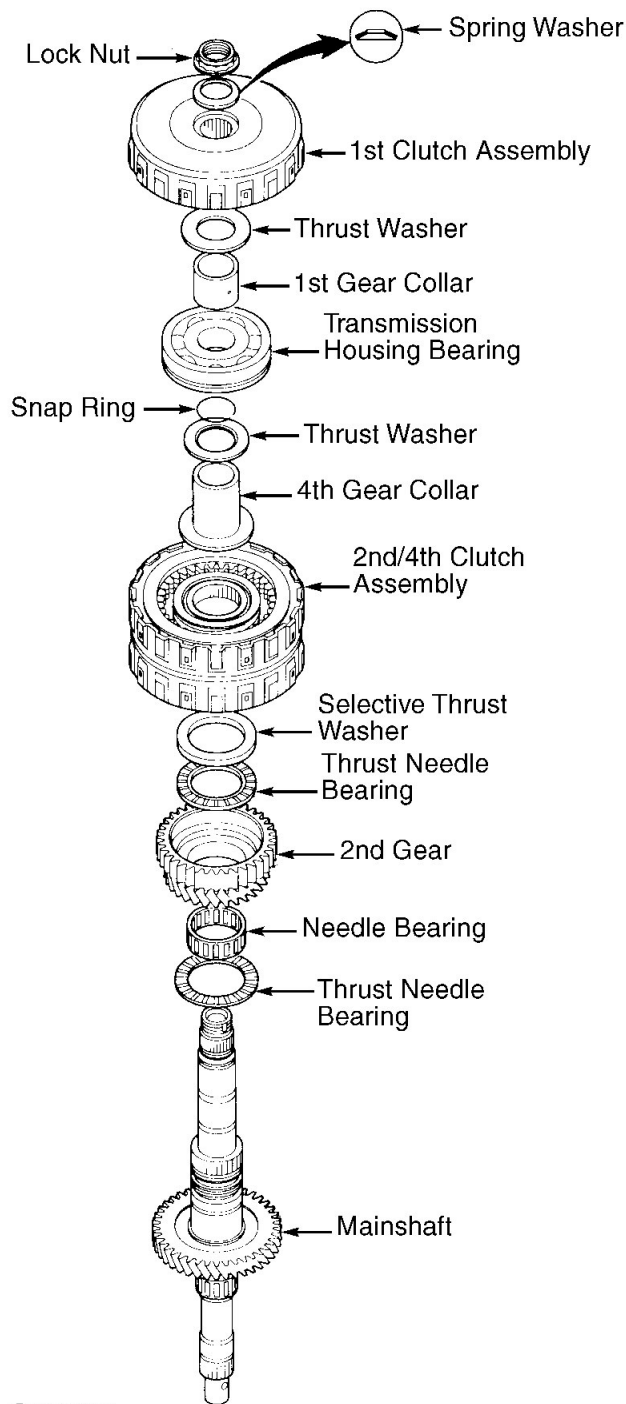
1. Lubricate all components with ATF. Reassemble mainshaft components in illustration without "O" rings. See **Fig. 18** . Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.
2. Remove transaxle housing bearing for mainshaft from transaxle housing. Install transaxle housing bearing for mainshaft on mainshaft. Tighten mainshaft lock nut to 22 ft. lbs. (30 N.m).
3. Push 2nd gear in towards 2nd clutch. Using a feeler gauge, measure clearance thrust between 2nd and 3rd gear. See **Fig. 19** . Check mainshaft clearance at 3 places. Average the 3 readings to obtain mainshaft clearance.
4. Ensure mainshaft clearance is .002-.005" (.05-.13 mm). If clearance is not as specified, replace selective thrust washer with appropriate washer. See **SELECTIVE THRUST WASHER SPECIFICATIONS** table. After replacing selective thrust washer, recheck clearance.

SELECTIVE THRUST WASHER SPECIFICATIONS

Washer No.	Part No.	Thickness - In. (mm)
1	90441-P4P-010	.157 (4.00)
2	90442-P4P-010	.159 (4.05)
3	90443-P4P-010	.161 (4.10)
4	90444-P4P-010	.163 (4.15)
5	90445-P4P-010	.165 (4.20)
6	90446-P4P-010	.167 (4.25)
7	90447-P4P-010	.169 (4.30)
8	90448-P4P-010	.171 (4.35)
9	90449-P4P-010	.173 (4.40)
10	90450-P4P-000	.175 (4.45)

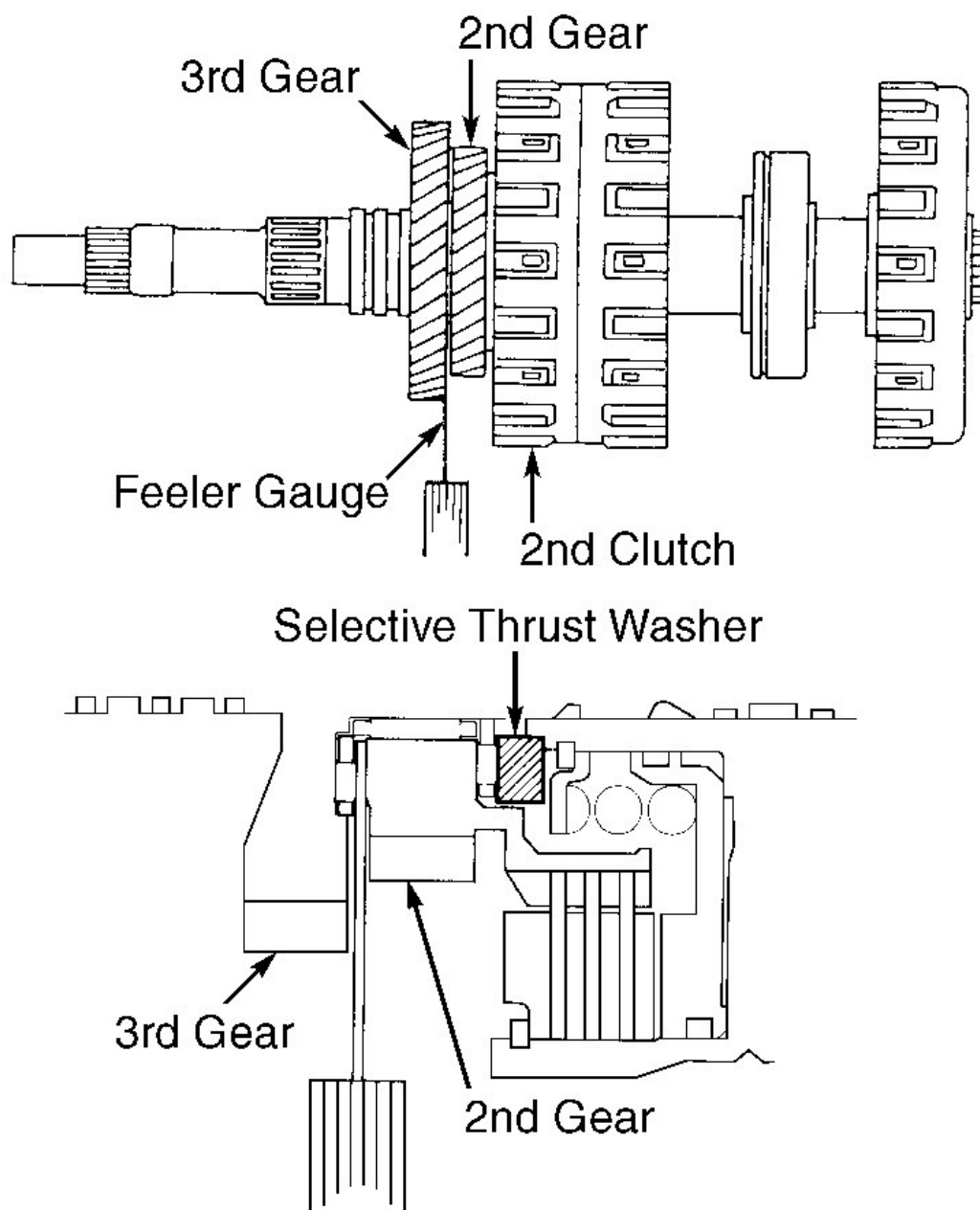
Reassembly

Lubricate all components with ATF. Reassemble mainshaft. See **Fig. 10** . Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Before installing NEW "O" rings on mainshaft, wrap splines on mainshaft with tape to prevent damage to "O" rings.



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Fig. 18: Identifying Mainshaft Components For Clearance Measurement
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 19: Checking Mainshaft Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT

NOTE: Countershaft lock nut has left hand threads.

Disassembly

1. Note location of countershaft components. See **Fig. 20** and **Fig. 21** . Remove countershaft components down to reverse selector hub.
2. Place countershaft in hydraulic press while supporting 4th gear. Press countershaft from countershaft 4th gear. Disassemble remainder of countershaft assembly.

Cleaning & Inspection

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

Adjustments

1. Lubricate all components with ATF. Reassemble countershaft components in illustration without "O" rings. See **Fig. 20** . Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Using hydraulic press, install reverse selector hub.
2. Remove transaxle housing bearing for countershaft from transaxle housing. Install transaxle housing bearing for countershaft on countershaft with remaining components. See **Fig. 21** . Tighten countershaft lock nut to 22 ft. lbs. (30 N.m).
3. Using a feeler gauge, measure clearance between 2nd gear and distance collar. See **Fig. 22** . Check countershaft clearance at 3 places. Average the 3 readings to obtain countershaft clearance.
4. Ensure countershaft clearance is .004-.007" (.10-.18 mm). If clearance is not as specified, replace distance collar with appropriate collar. See **DISTANCE COLLAR SPECIFICATIONS** table. After replacing distance collar, recheck clearance.

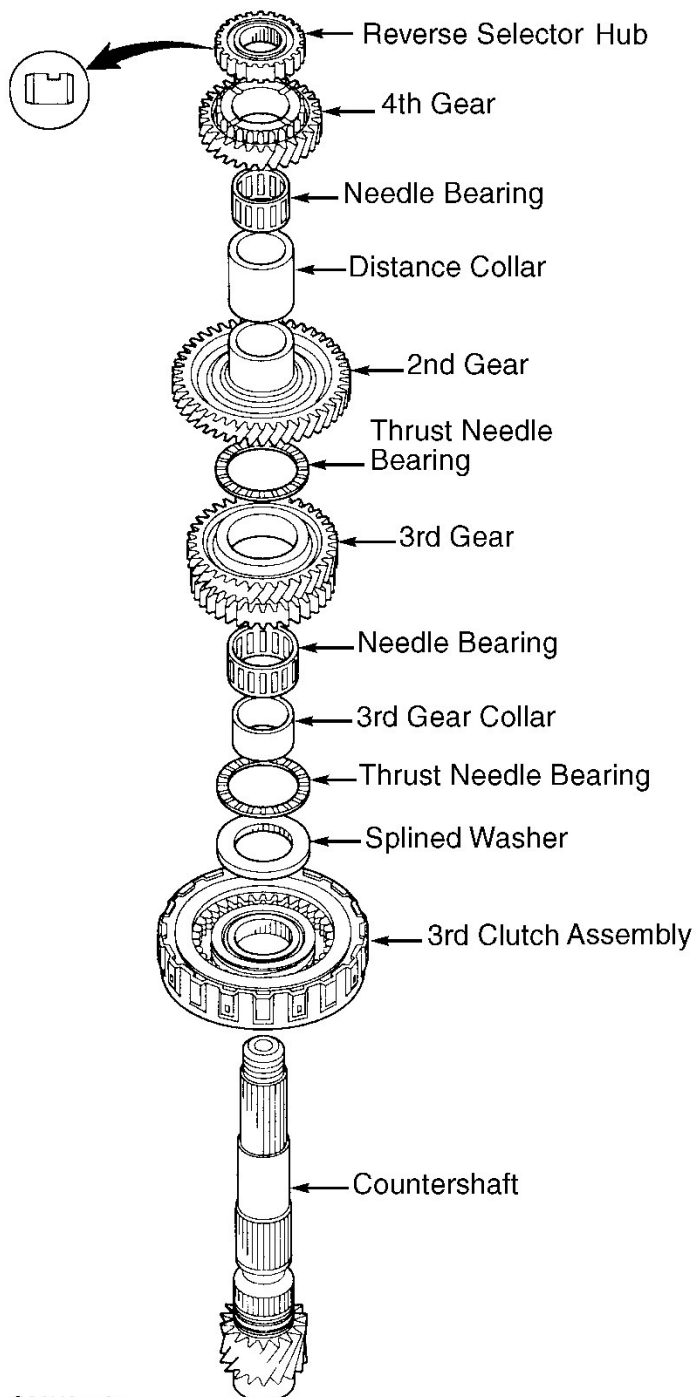
DISTANCE COLLAR SPECIFICATIONS

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)
6	90509-PC9-000	1.541 (39.15)
7	90510-PC9-000	1.545 (39.25)
8	90511-PC9-000	1.531 (38.90)
9	90512-PC9-000	1.533 (38.95)

Reassembly

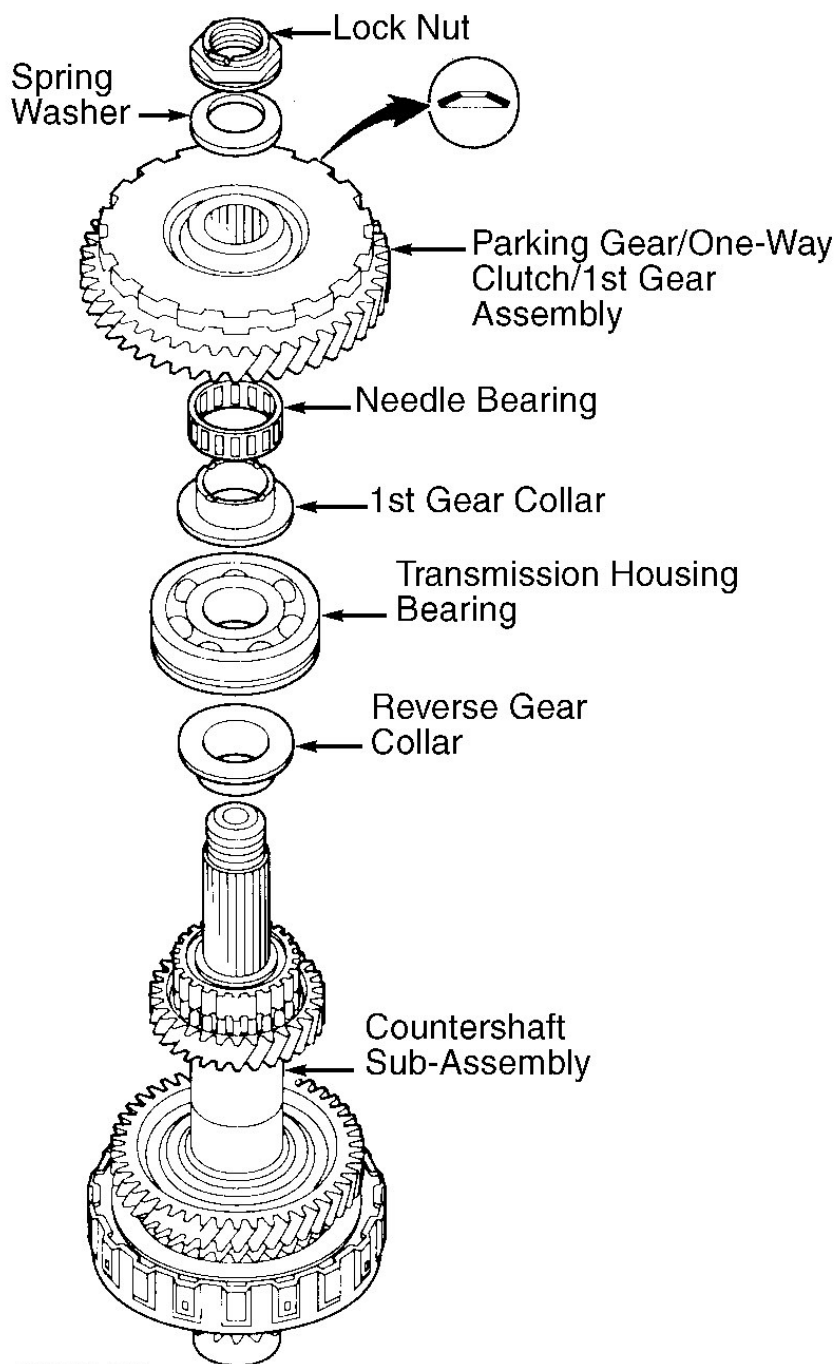
1. Lubricate all components with ATF. Install all components from 3rd clutch assembly through 4th gear. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer.
2. Before installing NEW "O" rings on mainshaft, wrap splines on countershaft with tape to prevent damage

to "O" rings. Using hydraulic press, install reverse selector hub.



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Fig. 20: Countershaft Components For Clearance Measurement (1 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 21: Countershaft Components For Clearance Measurement (2 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

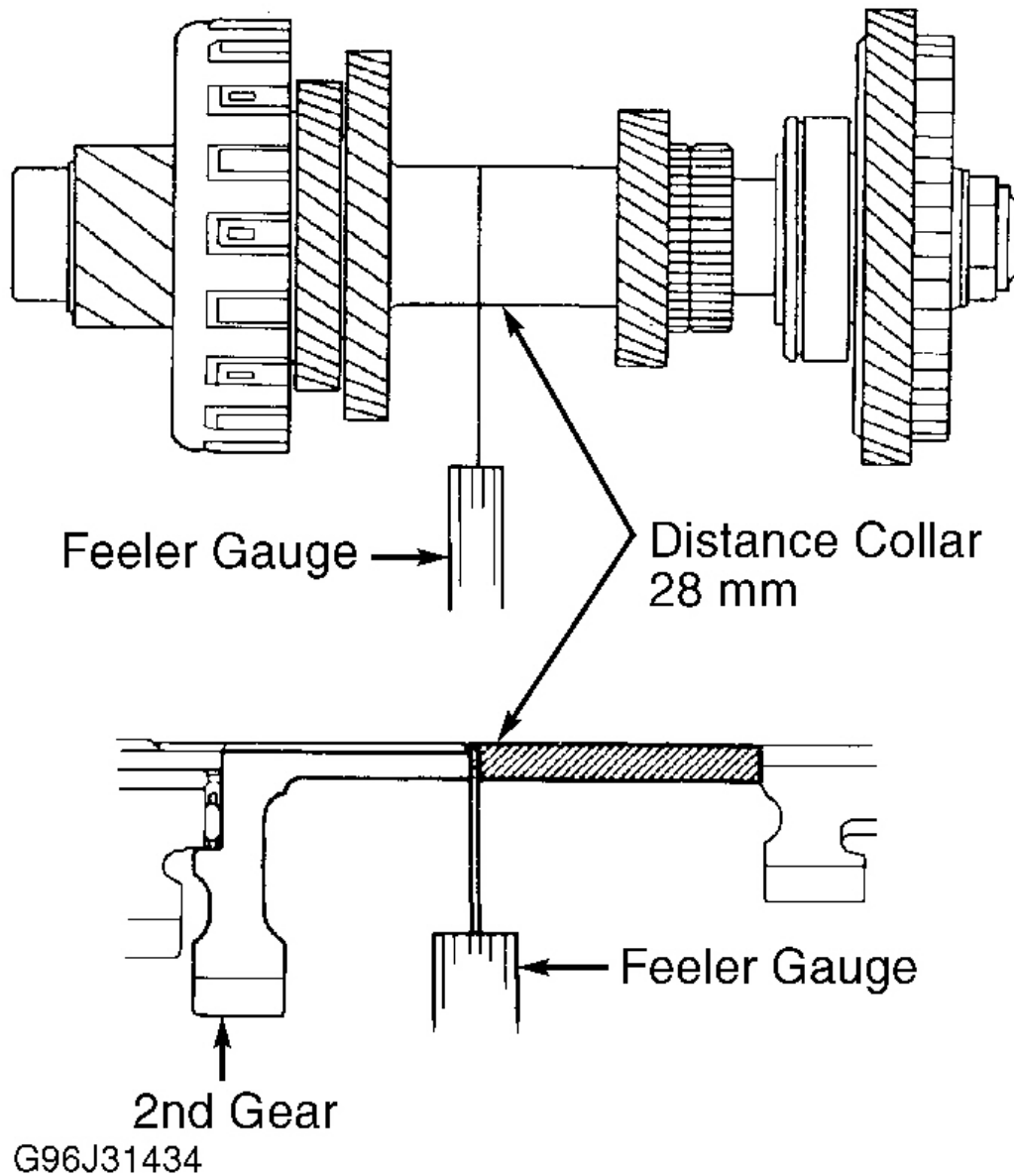


Fig. 22: Checking Countershaft Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ONE-WAY CLUTCH

Disassembly

Separate countershaft 1st gear from parking gear by rotating parking gear counterclockwise while holding countershaft 1st gear. See **Fig. 23** . Remove one-way clutch by prying up with end of screwdriver.

Inspection

Check parking gear and 1st gear for wear and scoring. Check one-way clutch for damage and movement in wrong direction. One-way clutch should only turn in direction shown. See **Fig. 23**.

Reassembly

Reverse disassembly procedure for reassembly. Ensure one-way clutch is installed correctly. See **Fig. 24**. Check one-way clutch rotation. One-way clutch is defective if parking gear will rotate clockwise. See **Fig. 23**.

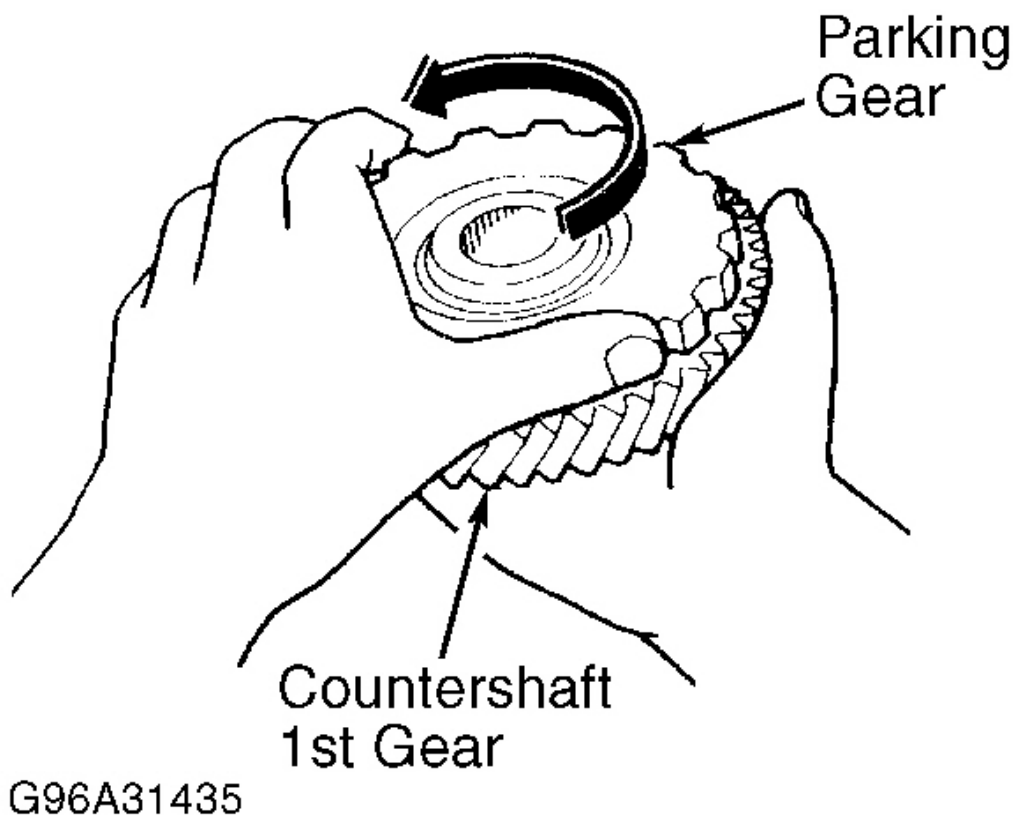
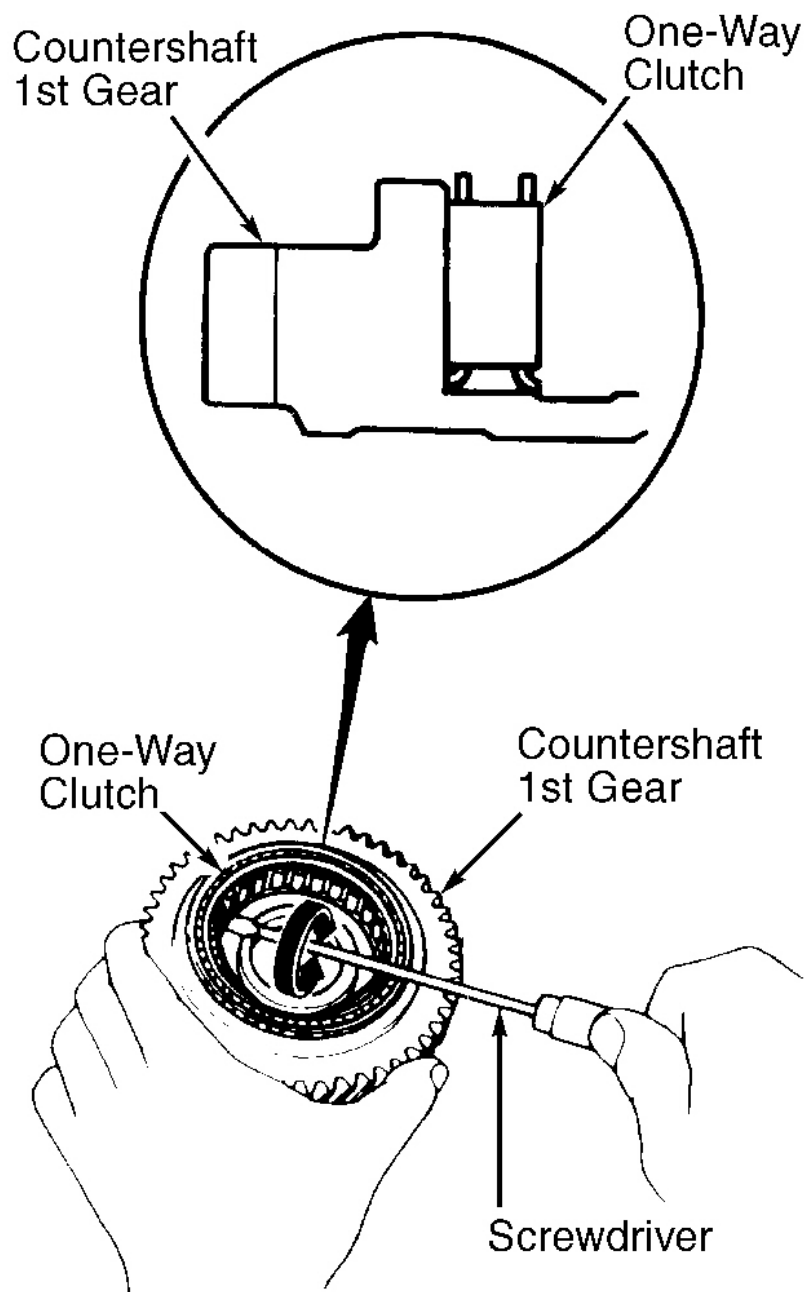


Fig. 23: Removing & Checking One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 24: Installing One-Way Clutch

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CLUTCH ASSEMBLIES

NOTE: Ensure spring compressor is making full contact with spring retainer or damage will occur.

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 25** and **Fig. 26**.
2. Note direction of disc spring installation. On all clutches except 2nd clutch, remove disc spring. The 2nd clutch is not equipped with a disc spring. Using spring compressor, compress return spring. Remove snap ring. Release and remove spring compressor. Remove spring retainer and return spring.
3. Wrap shop towel around clutch drum. Apply light air pressure to oil passage on clutch drum to remove clutch piston. Remove "O" rings.

Cleaning & Inspection

Clean metal components with solvent and dry with compressed air. Ensure check valve on rear of clutch piston is thoroughly cleaned and securely fastened on clutch piston. Inspect components for damage and replace if necessary. Ensure no rough edges exist on "O" ring sealing areas.

Reassembly

1. Lubricate all components with ATF. Install NEW "O" rings. Install clutch piston in clutch drum. Slightly rotate clutch piston during installation to prevent damaging "O" rings.

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

2. Install return spring. Install spring retainer in clutch drum. Place snap ring on spring retainer. Using spring compressor, compress return spring. Install snap ring. Release and remove spring compressor.
3. Install disc spring (except 2nd clutch). Ensure disc spring is installed in proper direction. See **Fig. 25** and **Fig. 26**.

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.
5. Using dial indicator, measure clutch clearance between clutch end plate and top clutch disc. See **Fig. 27**. Zero dial indicator with clutch end plate lowered, and then lift clutch end plate upward against snap ring. Distance measured is clutch clearance.
6. Measure clutch clearance at 3 different locations. Ensure clutch clearance is within specification. See **CLUTCH CLEARANCE SPECIFICATIONS** table.
7. If clutch clearance is not within specification, install different thickness clutch end plate. See appropriate **CLUTCH END PLATE SPECIFICATIONS** table.

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

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

CLUTCH CLEARANCE SPECIFICATIONS

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

CLUTCH END PLATE SPECIFICATIONS (A4RA & B4RA)

Plate Number	Part Number	Thickness - In. (mm)
1	22551-P4R-003	.083 (2.10)
2	22552-P4R-003	.087 (2.20)
3	22553-P4R-003	.091 (2.30)
4	22554-P4R-003	.094 (2.40)
5	22555-P4R-003	.098 (2.50)
6	22556-P4R-003	.102 (2.60)
7	22557-P4R-003	.106 (2.70)
8	22558-P4R-003	.110 (2.80)
9	22559-P4R-003	.114 (2.90)

CLUTCH END PLATE SPECIFICATIONS (M4RA)

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)
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	.083 (2.10)
12	22562-PC9-000	.087 (2.20)
13	22563-PC9-000	.091 (2.30)
14	22574-P4V-000	.134 (3.40)
15	22561-P4V-000	.138 (3.50)
16	22562-P4V-000	.142 (3.60)
17	22563-P4V-000	.146 (3.70)
18	22564-P4V-000	.150 (3.80)

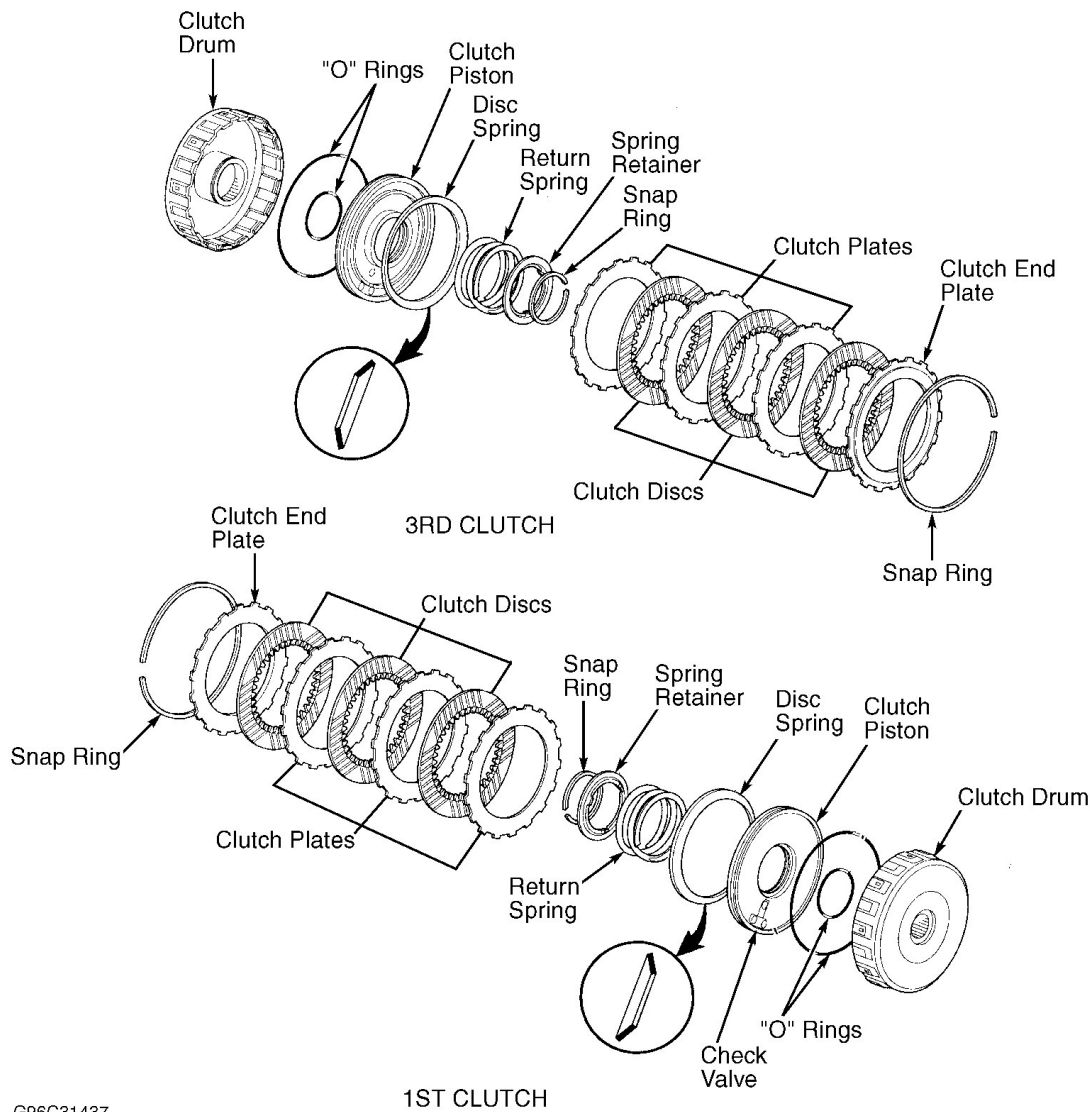
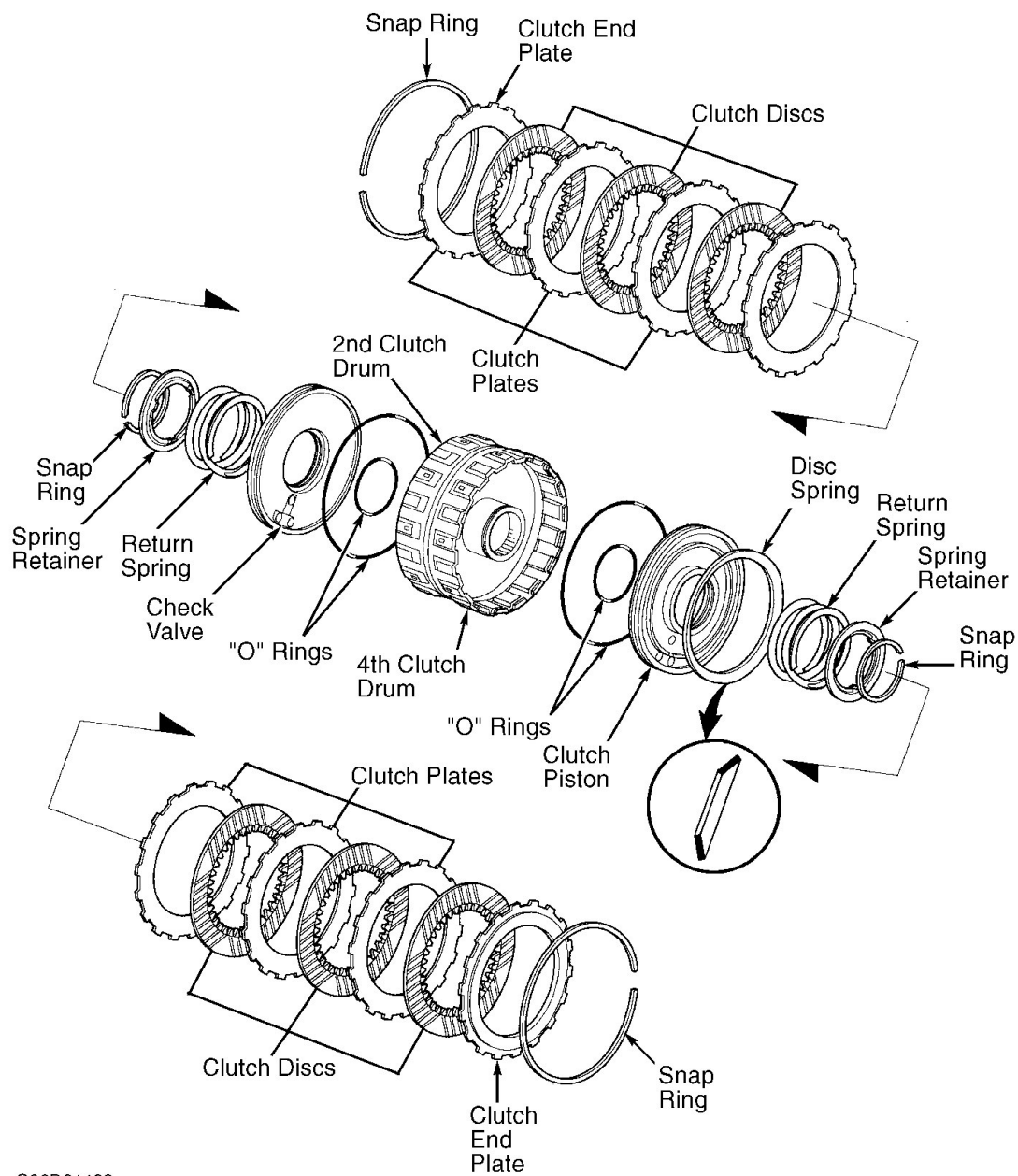
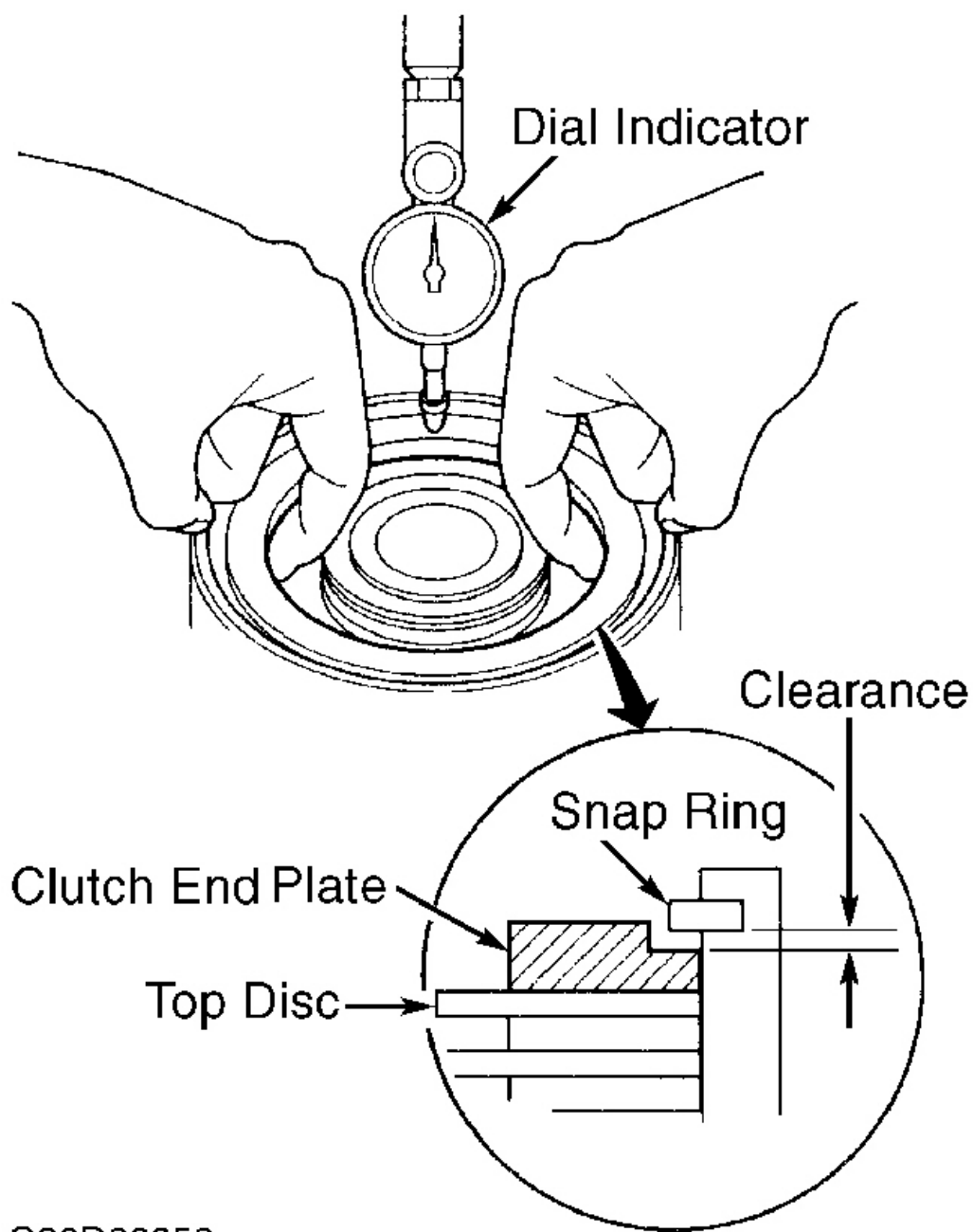


Fig. 25: Exploded View Of 1st Clutch & 3rd Clutch
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 26: Exploded View Of 2nd-4th Clutches
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 27: Measuring Clutch Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING

Disassembly

If removing countershaft bearing from torque converter housing, use slide hammer to remove countershaft bearing. Remove oil guide plate from bore in torque converter housing. See **Fig. 12** . Remove mainshaft bearing and oil seal using slide hammer.

Cleaning & Inspection

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

Reassembly

1. To install mainshaft bearing, use hammer and bearing installer. Install mainshaft bearing until mainshaft bearing fully bottoms in torque converter housing.
2. Using hammer and oil seal installer, install NEW oil seal for mainshaft in torque converter housing. Oil seal should be even with surface on torque converter housing.
3. To install countershaft bearing, install oil guide plate in countershaft bearing bore of torque converter housing. Ensure oil guide plate is installed so tab in center of oil guide plate faces upward (away from torque converter housing surface). See **Fig. 12** .
4. Using hammer and bearing installer, drive countershaft bearing into torque converter housing. Ensure oil guide is installed to a depth of 0-.001" (0-.03 mm), with zero being flush and .001" past flush (inset).

TRANSAXLE HOUSING

NOTE: **DO NOT remove snap rings for bearing replacement unless necessary for cleaning snap ring groove. Expand snap ring enough to push bearing out.**

Disassembly

1. Expand snap ring. Press transaxle housing bearings (for mainshaft and countershaft) from transaxle housing. Using hammer and drift, tap differential oil seal from transaxle housing.
2. Remove reverse idler gear shaft assembly. Slide reverse idler gear from transaxle housing. See **Fig. 28** .

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. To install transaxle housing bearing for mainshaft and countershaft, expand snap ring and install bearing part of the way into transaxle housing. Release snap ring.
2. Press bearing into transaxle housing until snap ring engages with groove on bearing. Ensure snap ring end gap is 0-.276" (0-7 mm). If snap ring end gap is not within specification, reseal or replace snap ring.

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

3. To install reverse idle gear, slide reverse idle gear into transaxle housing until it aligns with shaft hole. Install reverse idle gear shaft assembly and needle bearing. See **Fig. 28** . Tighten bolts to specifications. See **TORQUE SPECIFICATIONS** .

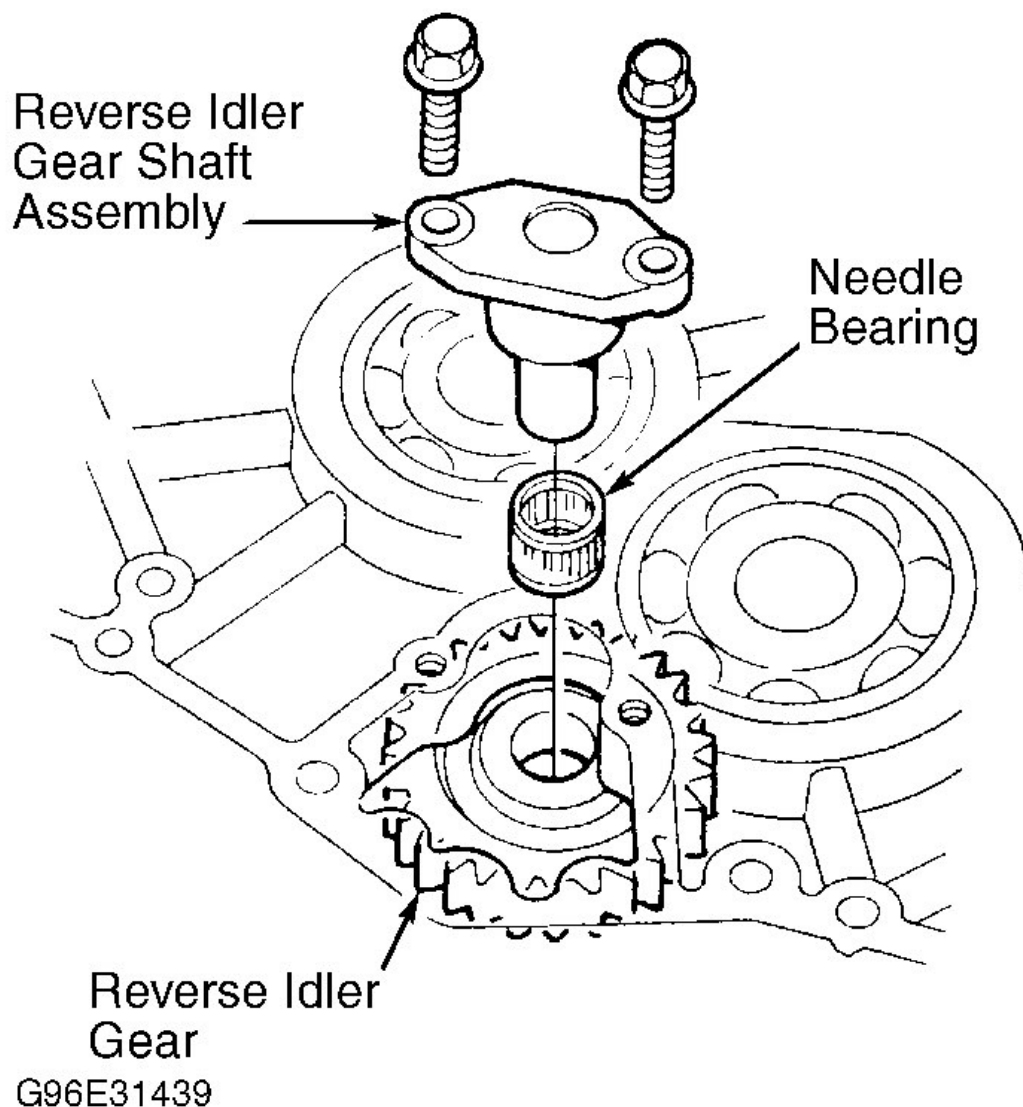


Fig. 28: Removing & Installing Idler Gear Shaft Assembly & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

DIFFERENTIAL ASSEMBLY

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.

Disassembly

1. Before disassembling differential assembly, check side gear backlash. Place differential assembly on "V" blocks with both axle shafts installed.
2. Install dial indicator with stem resting against pinion gear. See **Fig. 29** . Check side gear backlash. Side gear backlash should be .002-.006" (5-15 mm). If side gear backlash is not within specification, replace differential carrier assembly.
3. If replacing bearings, use bearing puller to remove bearings from differential carrier. To replace differential carrier assembly, remove bolts and ring gear.

NOTE: Ring gear bolts have left-hand threads.

4. Pry speedometer drive gear snap ring off differential carrier. Pull speedometer drive gear and roll pin from carrier assembly. See **Fig. 30** . Drive out differential seals from transaxle and converter housings from inside to outside. Remove set ring from transaxle housing. See **Fig. 10** .

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for wear and damage. Inspect differential bearings for rough rotation. Replace components if necessary.

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

Reassembly

1. Install speedometer drive gear roll pin. Install speedometer drive gear with chamfered side facing carrier. Align cutout in speedometer drive gear with roll pin.
2. Align speedometer drive gear snap ring hooked end with pinion shaft. See **Fig. 31** . Install snap ring in differential groove.
3. Install ring gear on differential carrier. Ensure chamfered edge on inside of ring gear is toward differential carrier. Install and tighten ring gear bolts in crisscross pattern to specification. See TORQUE SPECIFICATIONS . See **Fig. 27** .
4. Press NEW bearings on differential carrier (if removed). Install .098" (2.50 mm) set ring in transaxle housing.

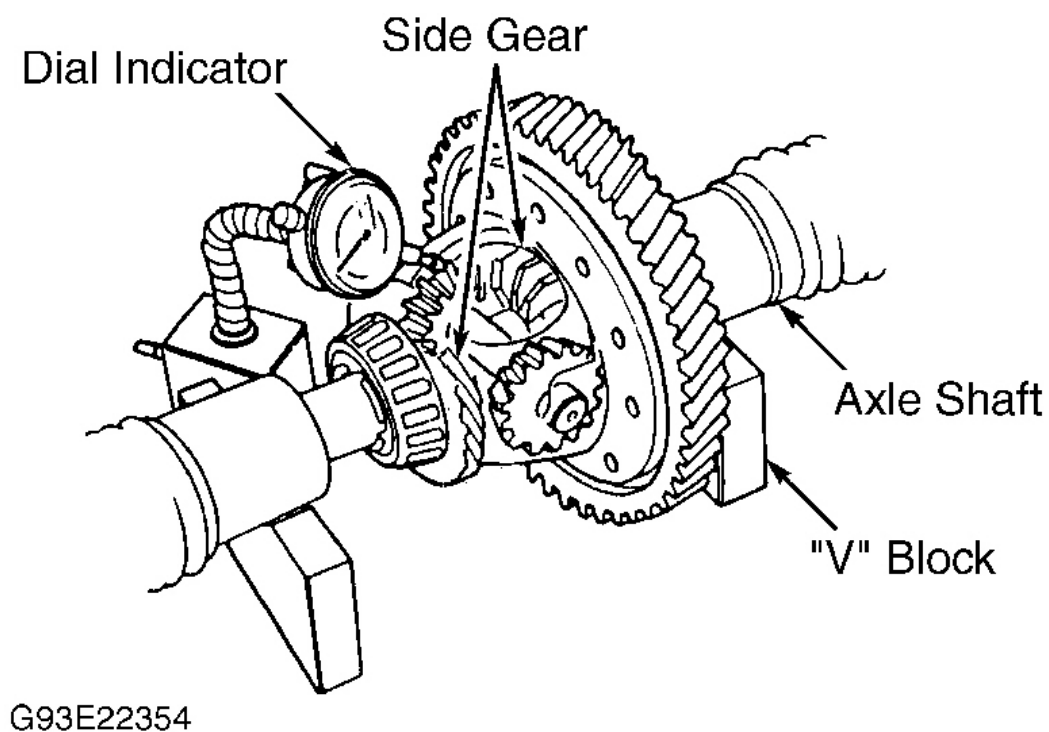
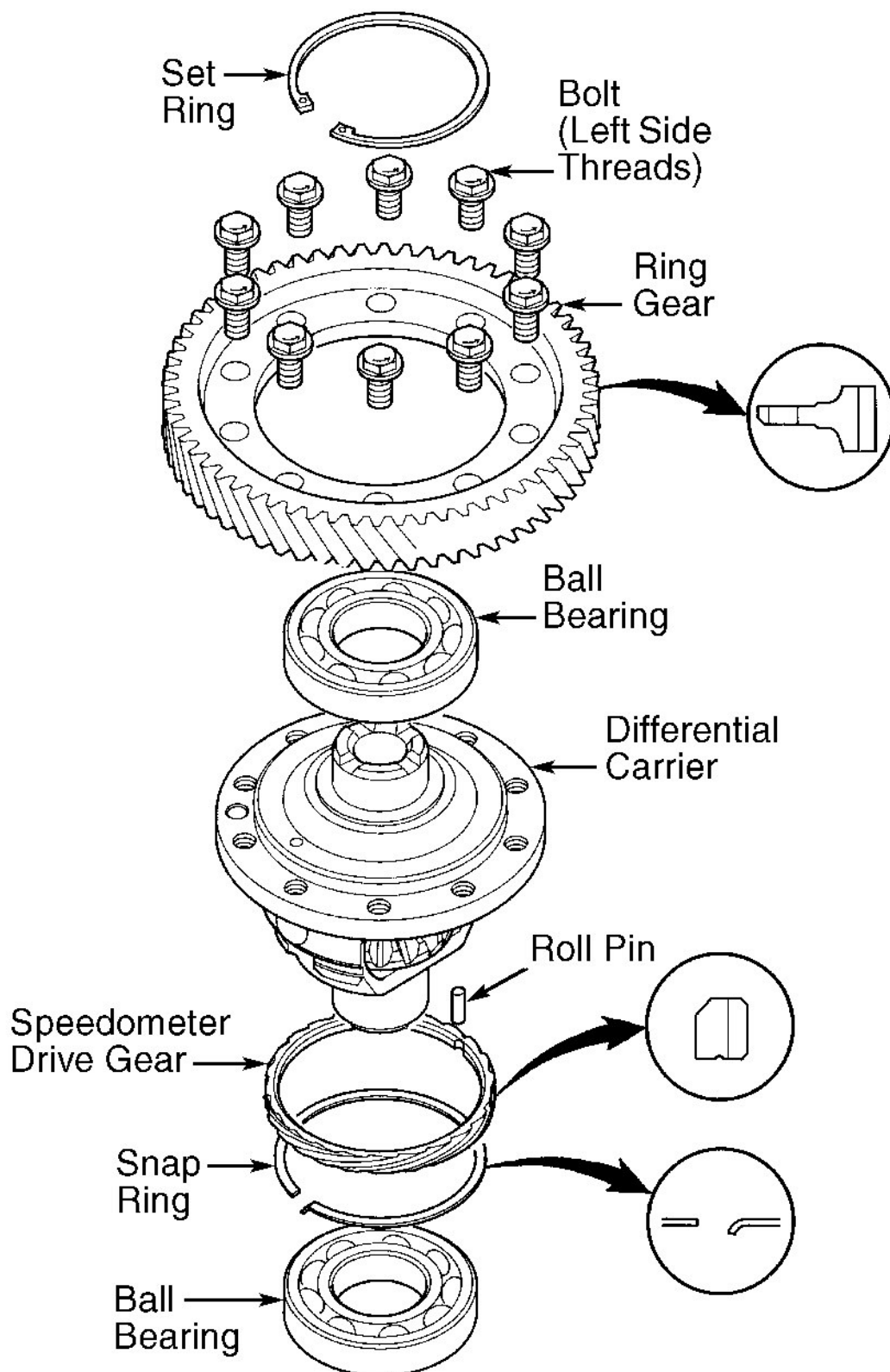


Fig. 29: Checking Side Gear Backlash

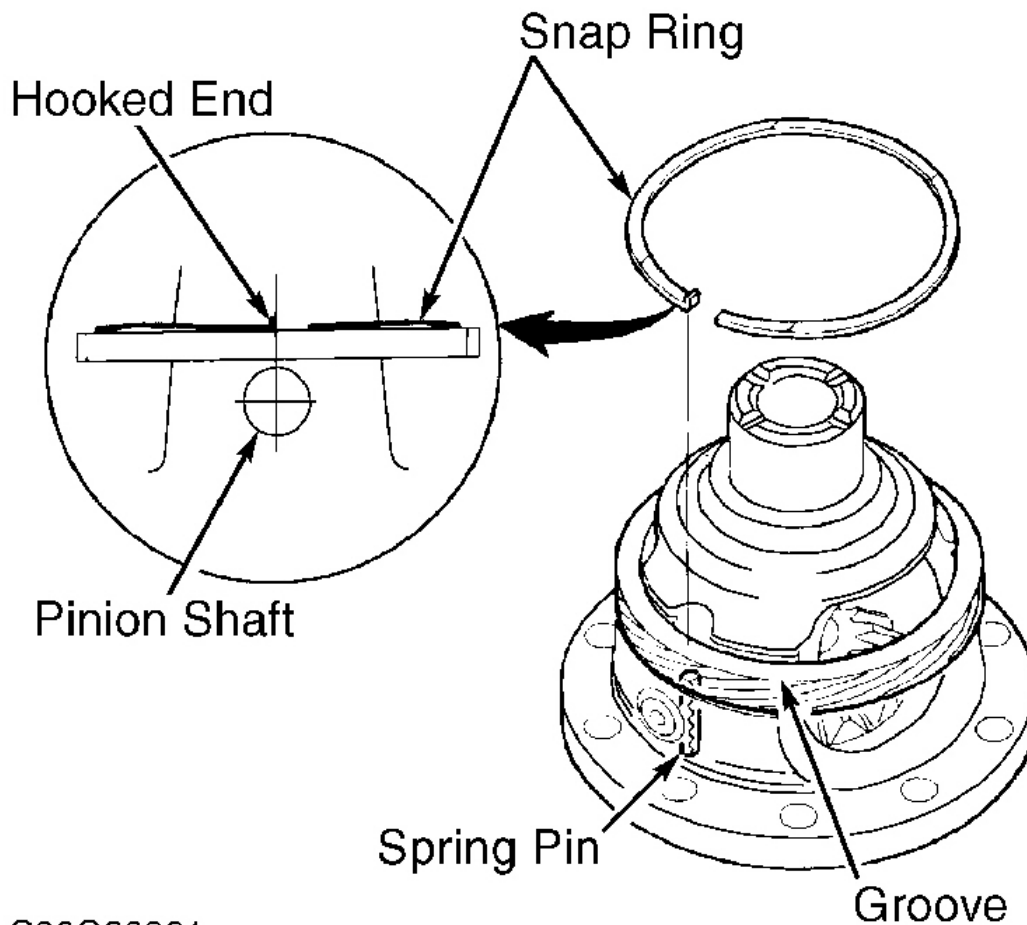
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 30: Exploded View Of Differential Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 31: Installing Speedometer Drive Gear

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 set ring in transaxle housing. This is the snap ring that differential bearing

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

seats against. Ensure set ring is fully seated.

2. Tap differential assembly into torque converter housing using Driver (07746-0030100). Perform STEP 1. See **Fig. 32** . Ensure differential 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 bolts to 33 ft. lbs. (45 N.m) in 2 steps using proper sequence. See **Fig. 33** .
4. Using driver, tap on transaxle housing side of differential assembly to fully seat differential bearings. Perform STEP 2. See **Fig. 32** . 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. 34** . Replace set ring if differential bearing side clearance exceeds .006" (.15 mm). Different thickness set rings are available. See **SET RING SPECIFICATIONS** table. Recheck differential bearing side clearance. Remove transaxle housing and differential assembly.

SET 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-PH8-000	.118 (3.00)

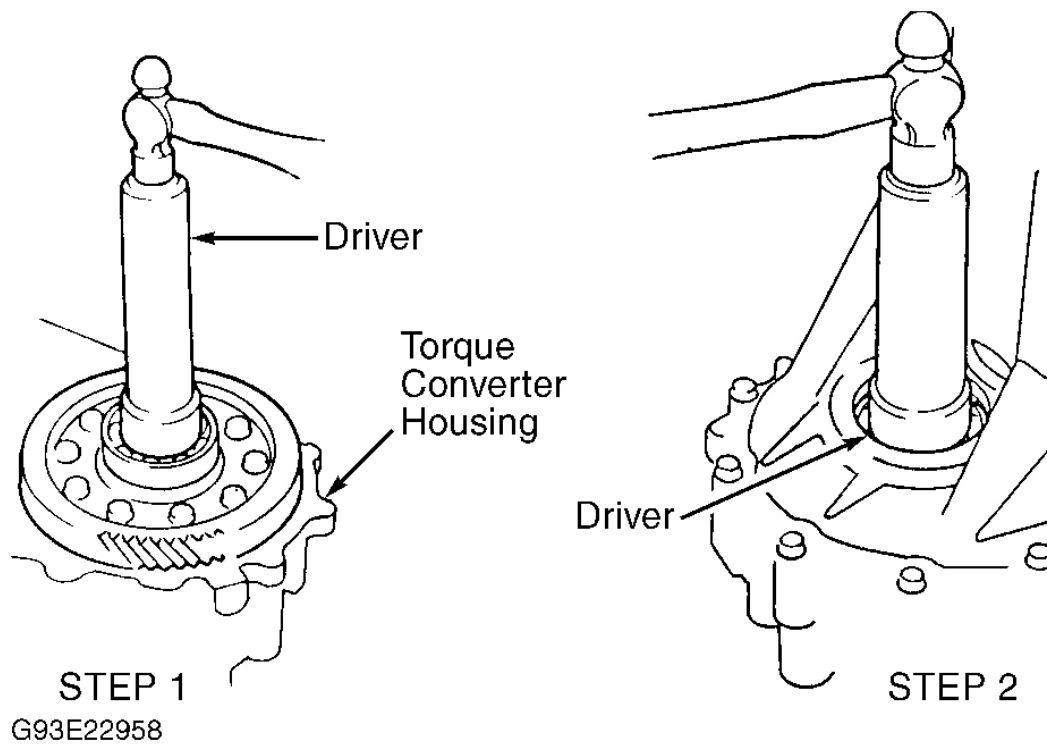
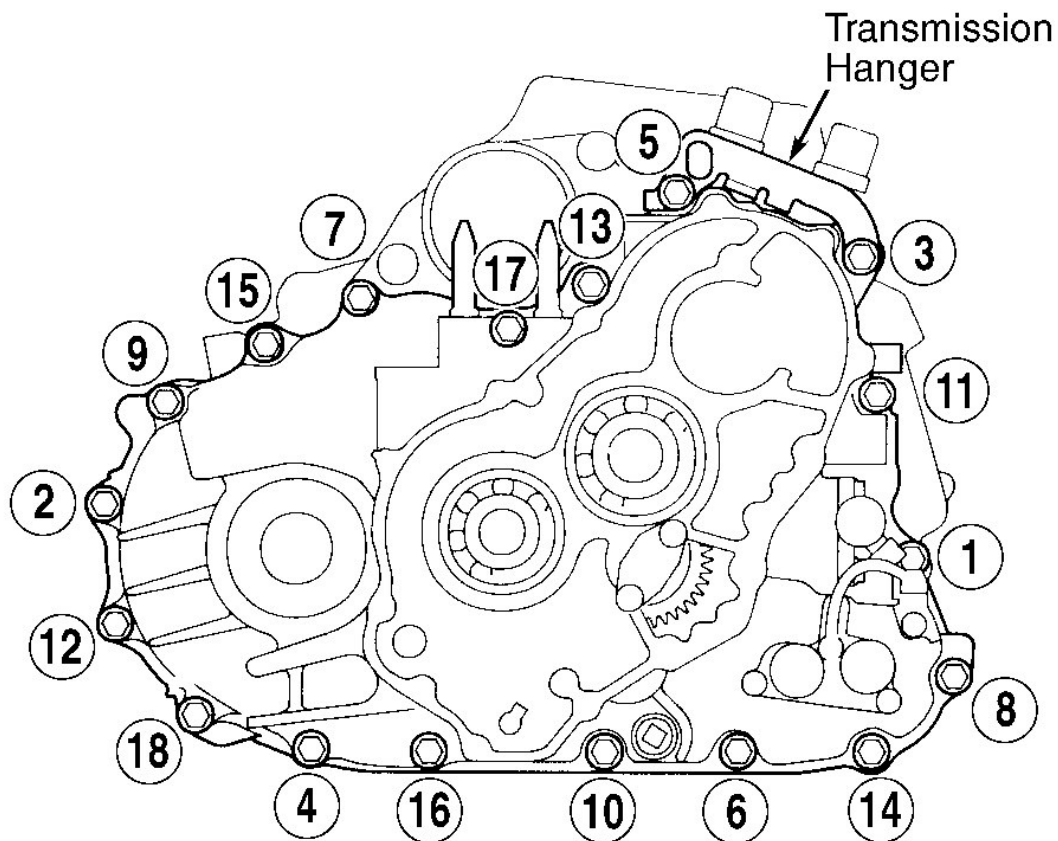
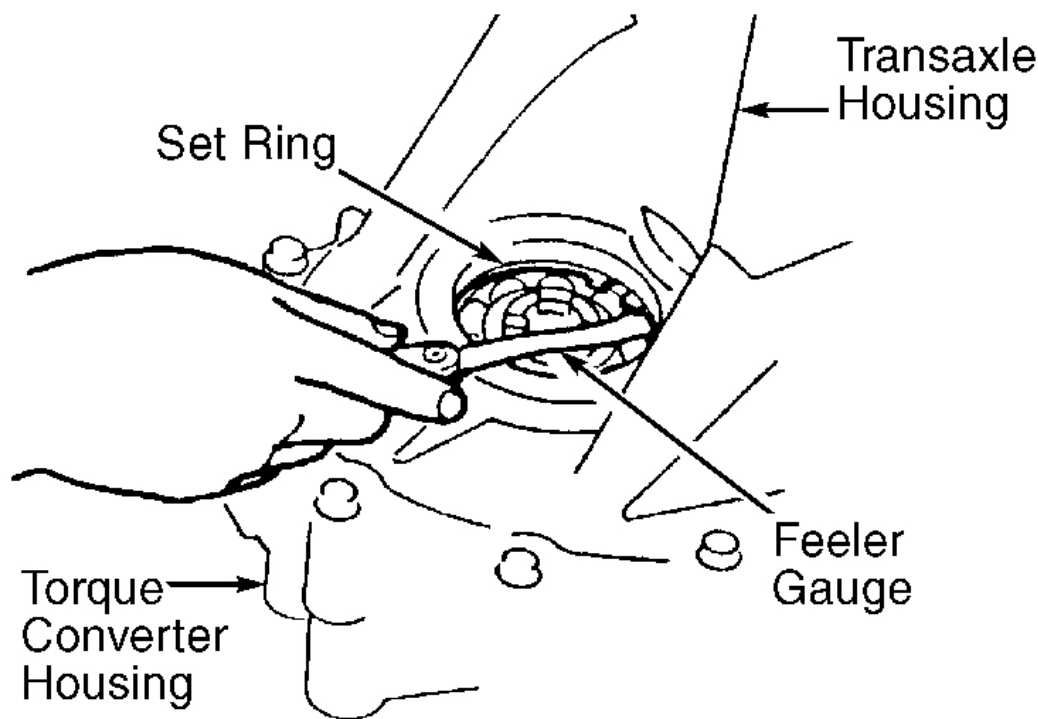


Fig. 32: Installing Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 33: Transaxle Housing Bolt Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 34: Checking Differential Bearing Side Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE BODIES & INTERNAL COMPONENTS

NOTE: If transaxle housing, torque converter housing, differential carrier, bearings, thrust shim or bearing outer races for differential assembly are replaced, differential assembly bearing side clearance must be checked. See [DIFFERENTIAL BEARING SIDE CLEARANCE](#) under TRANSAXLE REASSEMBLY.

NOTE: Coat all components with ATF before reassembly.

1. Install needle bearing on end of reverse idler gear shaft holder. Install reverse idler gear in transaxle housing (if removed). Install reverse idler gear shaft holder on transaxle housing. Install and tighten reverse idler gear shaft holder bolts to specification. See [TORQUE SPECIFICATIONS](#).
2. Install magnet and suction pipe collar on torque converter housing. See [Fig. 11](#). 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 separator plate).

3. Install oil pump drive gear, oil pump driven gear and oil pump driven gear shaft. Install main valve body. Install and loosely tighten main valve body bolts.

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 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.

4. Ensure check balls are installed in main valve body. See **Fig. 12** . Install separator plate, dowel pins and secondary valve body on main valve body. DO NOT install bolts.
5. Install control shaft on torque converter housing with control shaft and manual valve together. Install detent arm and detent arm shaft on main valve body. Hook detent spring on detent arm.
6. Install separator plate and servo body. Install and tighten bolts to specification. Install servo detent base and fluid strainer. Tighten main valve body bolts to specification. Ensure oil pump gears rotate smoothly and oil pump driven gear shaft moves freely.
7. Install stator shaft, NEW "O" ring and stop shaft. Install stop shaft support on secondary valve body. Install regulator valve body. Install and tighten bolt to specification.
8. Install lock-up valve body on regulator valve body. Install and tighten bolts to specification. Install oil feedpipes in main valve body, secondary valve body and servo body. See **Fig. 11** .
9. Install differential assembly in torque converter housing. Using Driver (07746-0030100), tap differential assembly into torque converter housing. Perform STEP 1. See **Fig. 32** . Ensure differential bearing on differential carrier is fully seated on torque converter housing.
10. Install mainshaft and countershaft as an assembly on torque converter housing. Rotate shift fork shaft so large chamfered hole aligns with hole in reverse shift fork.
11. Install reverse shift fork and reverse selector. See **Fig. 10** . Install reverse shift fork bolt and NEW bolt lock. Tighten bolt to specification. Bend over tabs on bolt lock.
12. Install countershaft reverse gear, needle bearing and countershaft reverse gear collar on countershaft. See **Fig. 10** . Align spring pin on control shaft with groove on transaxle housing by rotating control shaft. See **Fig. 9** .
13. Install dowel pins and NEW gasket on torque converter housing. Install transaxle housing with transaxle hanger on torque converter housing. See **Fig. 33** .
14. Install and tighten transaxle housing bolts to specification in 2 steps in correct sequence. Install and tighten mount bracket bolts to specification.
15. Install mainshaft holder on mainshaft. See **Fig. 8** . Install parking brake lever with parking brake stop and parking brake lever spring on control shaft. See **Fig. 9** .
16. Assemble countershaft 1st gear, parking gear and one-way clutch. See **Fig. 24** . Install countershaft 1st gear collar, needle bearing and countershaft 1st gear with one-way clutch and parking gear on countershaft.
17. Install parking pawl stop, parking pawl shaft, parking pawl spring and parking pawl on transaxle housing.

18. Engage parking pawl with parking gear. Install mainshaft 1st gear collar on mainshaft. Wrap splines on mainshaft with tape. Install NEW "O" rings on mainshaft.
19. Install thrust washer, thrust needle bearing, needle bearing and mainshaft 1st gear in 1st clutch assembly. Install assembly on mainshaft.

NOTE: Countershaft and mainshaft lock nuts have left hand threads. Ensure spring washers are installed in correct direction. See Fig. 18 and Fig. 21 .

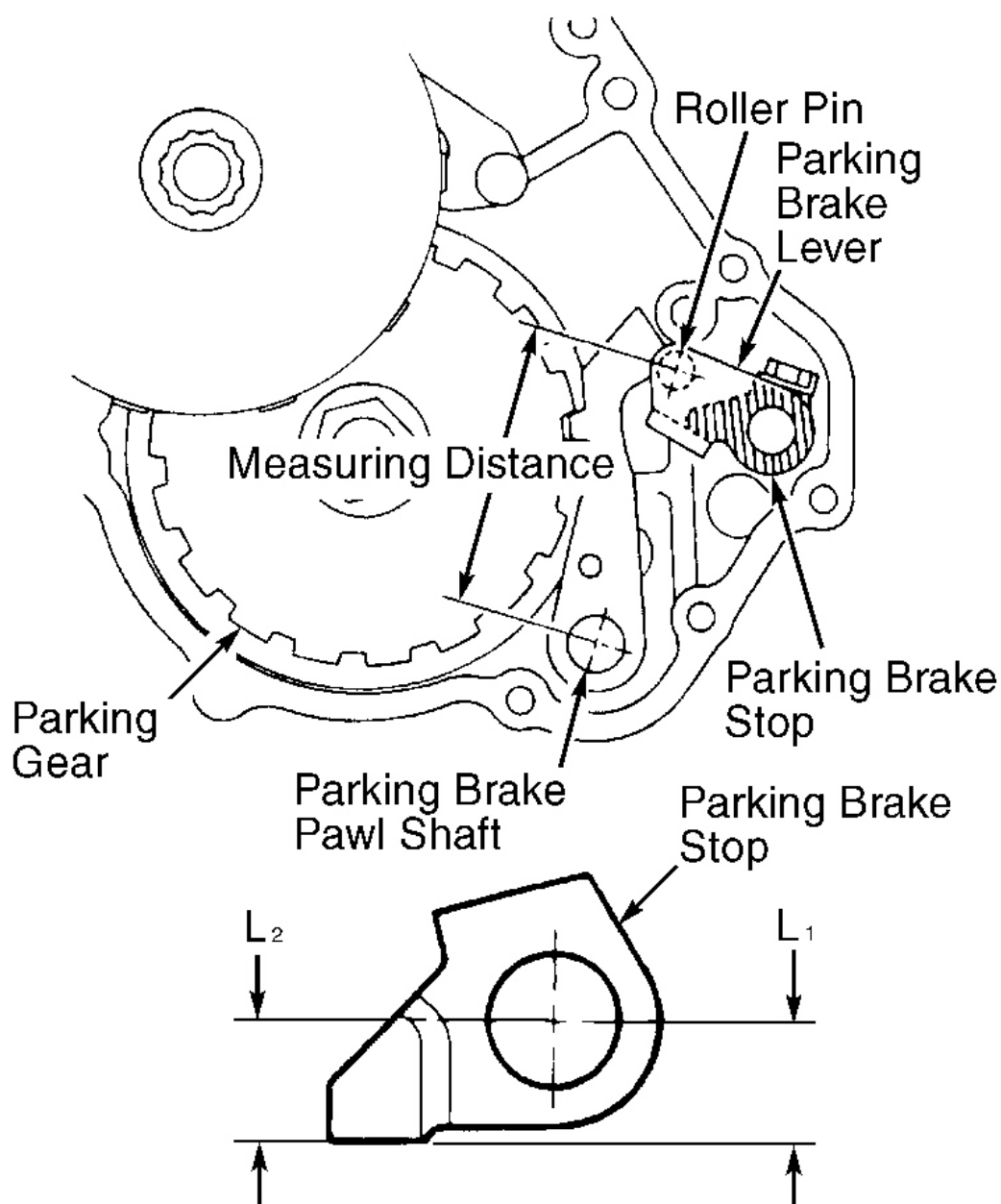
20. Install NEW spring washers and lock nuts on countershaft and mainshaft. Tighten lock nuts to specifications. See TORQUE SPECIFICATIONS . Stake thread area of lock nut against threads on mainshaft and countershaft.
21. Place parking brake lever in "P" position. Ensure parking pawl engages parking gear. Measure parking brake stop distance between parking pawl shaft and pin on parking brake lever. See Fig. 35 .
22. Parking brake stop distance should be 2.87-2.91" (72.9-73.9 mm). If parking brake stop distance is not within specification install different size parking brake stop, and recheck parking brake stop distance. Parking brake stop is available in 3 different sizes. See PARKING BRAKE STOP SPECIFICATIONS table.

PARKING BRAKE STOP SPECIFICATIONS

ID Mark	Part Number	(1) Distance "L1" - In. (mm)	(1) Distance "L2" - In. (mm)
1	24537-PA9-003	.433 (11.00)	.433 (11.00)
2	24538-PA9-003	.425 (10.80)	.419 (10.65)
3	24539-PA9-003	.417 (10.60)	.406 (10.30)
(1) Measured from center of parking brake stop. See <u>Fig. 35</u> .			

23. Once correct parking brake stop distance is obtained, tighten parking brake stop bolt to specification. Bend over tabs on bolt lock. Using NEW gasket and install right side cover. Install and tighten bolts to specification.
24. To install remaining components, reverse removal procedure. Use NEW seal washers when installing joint bolts for cooler pipes. Use NEW "O" ring when installing mainshaft or countershaft speed sensors. Tighten all fasteners to specification.

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



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Fig. 35: Measuring Parking Brake Stop Distance
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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

Application	Ft. Lbs. (N.m)
Countershaft Lock Nut	76 (103)
Drain Plug	36 (49)
Joint Bolt	21 (29)
Mainshaft Lock Nut	58 (78)
Mount Bracket Bolt	47 (64)
Parking Brake Stop Bolt	10 (14)
Pressure Tap Plug	13 (18)
Reverse Shift Fork Bolt	10 (14)
Ring Gear Bolt	74 (100)
Transaxle Housing Bolt ⁽¹⁾	33 (45)
Vehicle Speed Sensor Bolt	16 (22)
INCH Lbs. (N.m)	
Countershaft Speed Sensor Bolt	106 (12.0)
Lock-Up Valve Body Bolt	106 (12.0)
Mainshaft Speed Sensor Bolt	106 (12.0)
Main Valve Body Bolt	106 (12.0)
Needle Bearing Stop Bolt	106 (12.0)
Regulator Valve Body Bolt	106 (12.0)
Reverse Idler Gear Shaft Holder Bolt	106 (12.0)
Right Side Cover Bolt	106 (12.0)
Secondary Valve Body Bolt	106 (12.0)
Servo Body Bolt	106 (12.0)
Servo Detent Base Bolt	106 (12.0)
Stop Bolt	106 (12.0)
Throttle Cam Stop Bolt	106 (12.0)
Throttle Control Lever Bolt	69 (7.8)
(1) Tighten bolts to specification in sequence. See Fig. 33 .	

TRANSAXLE SPECIFICATIONS**TRANSAXLE SPECIFICATIONS**

Application	Specification
Clutch Clearance	
1st & 2nd Clutches	.026-.033" (.65-.85 mm)
3rd & 4th Clutches	.016-.024" (.40-.60 mm)
Differential Bearing Side Clearance	⁽¹⁾ .006" (.15 mm)
Countershaft 2nd Gear Clearance	.002-.005" (.05-.13 mm)
Mainshaft End Play	.004-.007" (.11-.18 mm)
Oil Pump Clearances	

1999 Honda Civic EX

1997-99 AUTOMATIC TRANSMISSIONS Honda A4RA, B4RA & M4RA Overhaul

Side Clearance	
Oil Pump Drive Gear	.0083-.0104" (.210-.265 mm)
Oil Pump Driven Gear	.0028-.0049" (.070-.125 mm)
Thrust Clearance	
Standard	.0010-.0020" (.030-.050 mm)
Wear Limit	.0028" (.070 mm)
Parking Brake Stop Distance	2.87-2.91" (72.9-73.9 mm)
(1) This is the maximum clearance. Replace set ring with different thickness set ring if clearance exceeds specification.	