2000 AUTOMATIC TRANSMISSIONS

Acura SKWA Overhaul

APPLICATION

AUTOMATIC TRANSAXLE APPLICATIONS

Application	Transaxle Model
Integra	SKWA

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.

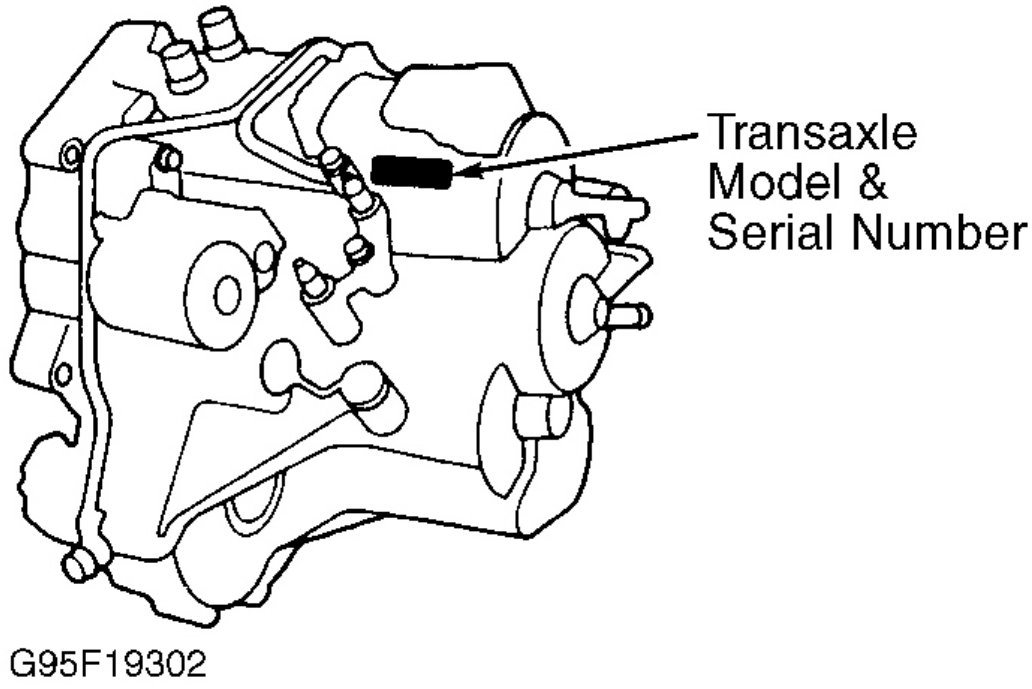


Fig. 1: Identifying Transaxle Model & Serial Number Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

GEAR RATIOS

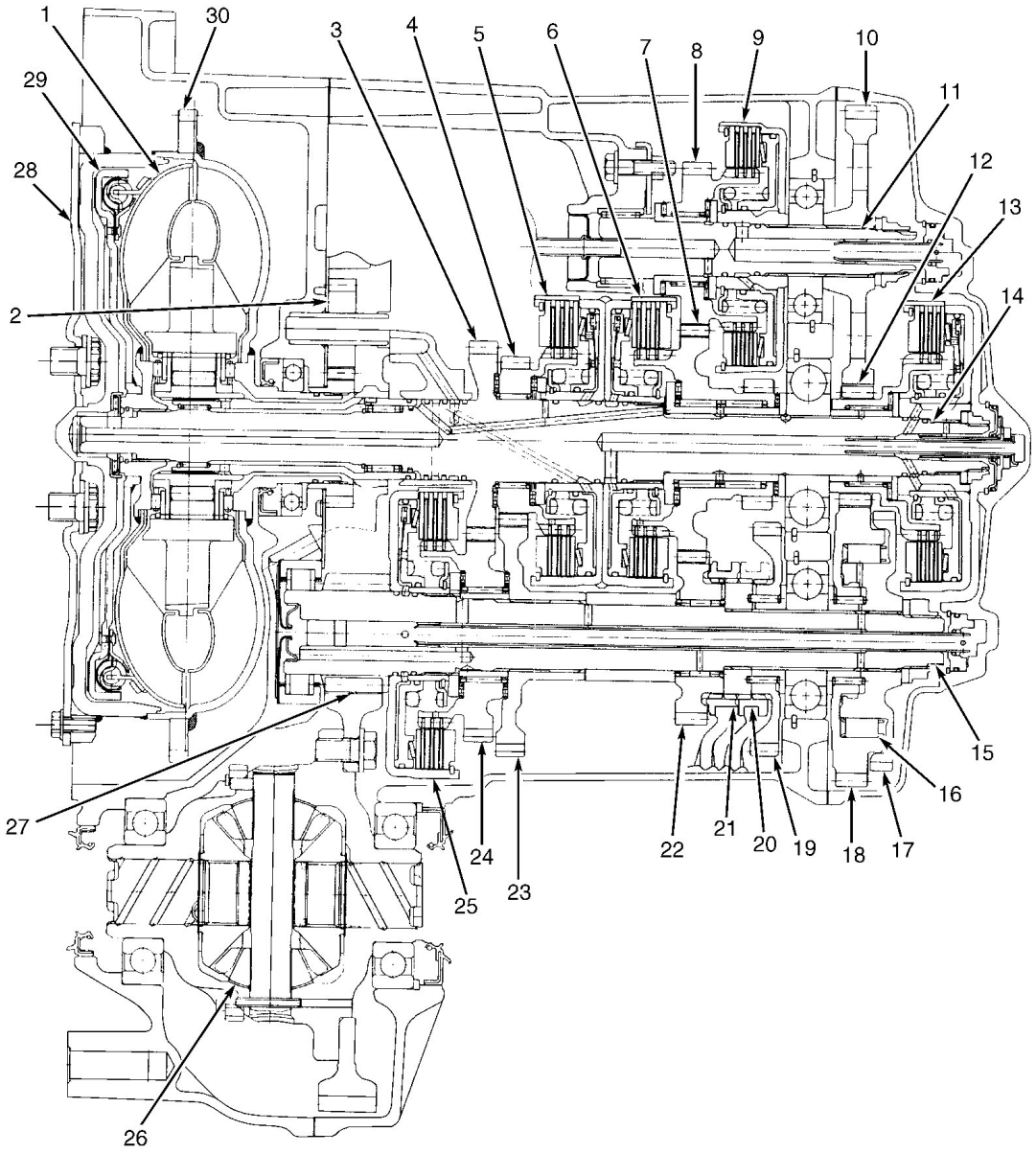
TRANSAXLE GEAR RATIOS

Gear Range	Gear Ratio
1st	2.722:1
2nd	1.516:1
3rd	1.079:1
4th	0.711:1
Reverse	1.955:1

DESCRIPTION

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

Valve bodies consists of main valve body, secondary valve body, servo body, lock-up valve body and regulator valve body. Valve bodies are attached to torque converter housing. Transaxle shifting and torque converter lock-up are controlled by the Powertrain Control Module (PCM).



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

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

OPERATION

With selector lever in "D3" position operating in 3rd gear or "D4" position operating in 2nd, 3rd or 4th gear, torque converter lock-up exists and transaxle mainshaft rotates at equal speed compared to engine crankshaft. Under certain conditions, torque converter lock-up clutch is applied during deceleration when in 3rd and 4th gears. Torque converter lock-up is controlled by PCM. The PCM receives various input signals and operates lock-up control solenoid valves. Operation of lock-up control solenoid valves controls the modulator pressure.

The PCM contains a 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 ACURA SKWA ELECTRONIC CONTROLS article.

The PCM contains self-diagnostic system, which stores a Diagnostic Trouble Code (DTC) if failure or problem exists in transaxle electronic control system. The DTC can be retrieved to determine transaxle problem area. For information on electronic transaxle components, see ACURA SKWA ELECTRONIC CONTROLS article.

Transaxle is equipped with shift and key interlock systems. Shift interlock system prevents selector lever from being moved from "P" position unless brake pedal is depressed and accelerator pedal is in idle position. In case of a malfunction, selector lever can be released by placing ignition key in release slot near selector lever. Key interlock system prevents ignition key from being removed from ignition switch unless selector lever is in "P" position. For additional information on interlock systems, see ACURA/HONDA SHIFT INTERLOCK SYSTEMS article.

The A/T gear position indicator contains lights that illuminate to indicate selector lever position input from A/T gear position switch. For information and testing of A/T gear position indicator, see ACURA SKWA ELECTRONIC CONTROLS article.

Shift lever has 7 positions. When shift lever is moved, manual valve on main valve body is moved by shift cable. When certain transaxle gear combinations are engaged by clutches, power is transmitted from the mainshaft to the countershaft through the sub-shaft to provide different gears.

LUBRICATION

For additional information, see appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING.

RECOMMENDED FLUID

Transaxle uses only Honda Premium Formula Automatic Transmission Fluid (ATF).

FLUID CAPACITIES

Transaxle fluid capacities in **TRANSAXLE FLUID CAPACITIES** table are approximate system quantities. Correct fluid level should be determined using dipstick.

TRANSAXLE FLUID CAPACITIES (1)

Application	Drain & Refill (2) - Qts. (L)	Overhaul - Qts. (L)
SKWA	2.9 (2.7)	6.2 (5.9)

(1) Fluid capacities listed are approximate. Always fill to specified area on dipstick (if equipped).

(2) Drain and refill capacity does not include torque converter.

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate article in DRIVE 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 (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. 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. Transaxle damage may occur if moisture enters unit.

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 shift lever is in "P" position. Fill transaxle with ATF.
7. Start engine and operate for about 30 seconds or until one quart (.9L) of ATF is discharged from return line. Turn engine off. Remove drain hose. Reinstall return line. Fill transaxle to proper level.

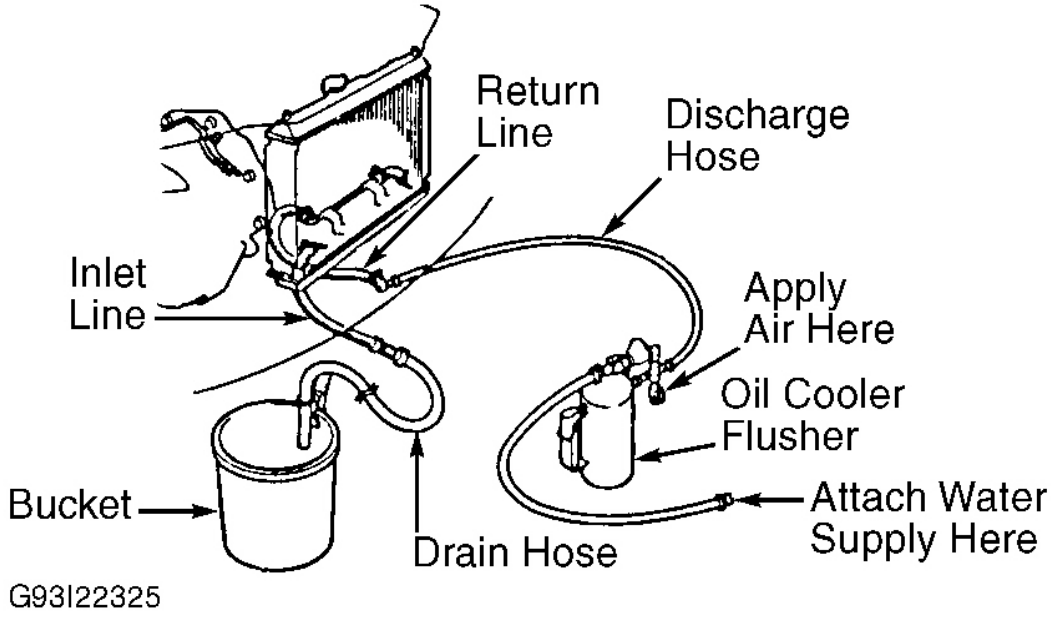

Fig. 3: Installing Oil Cooler Flusher
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 **PERFORMANCE TESTS** .

SYMPTOM DIAGNOSIS

Excessive Drag In Transaxle

Possible cause: binding oil pump.

Excessive Idle Vibration

Possible cause: low ATF level, worn oil pump, defective linear solenoid, defective drive plate, lock-up shift valve stuck, lock-up clutch piston defective or shift control solenoid "A" defective.

Excessive Shock On 2-3 Upshift

Possible cause: 3rd clutch defective, linear solenoid defective, CPC valve stuck, 2nd accumulator defective, 2nd orifice control valve stuck, CPB valve stuck, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "B" defective or countershaft speed sensor defective.

Excessive Vibration (RPM Related)

Possible cause: torque converter not fully seated in oil pump or defective drive plate.

Flares On 2-3 Upshift

Possible cause: 3rd clutch defective, linear solenoid assembly defective, CPC valve stuck, 2nd accumulator defective, 2nd orifice control valve stuck or lock-up control solenoid valve "B" defective.

Flares On 3-4 Upshift

Possible cause: 4th clutch defective, linear solenoid assembly defective, CPC valve stuck, 3rd accumulator defective, 3-4 orifice control valve stuck or lock-up control solenoid valve "B" defective.

Harsh 1-2 Upshift

Possible cause: defective 2nd clutch, linear solenoid defective, CPC valve stuck, main orifice partially clogged, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "A" defective, mainshaft speed sensor defective or countershaft speed sensor defective.

Harsh 2-3 Upshift

Possible cause: defective 3rd clutch, linear solenoid defective, CPC valve stuck, 2nd accumulator defective, 2nd orifice control valve stuck, main orifice partially clogged, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "A" defective, mainshaft speed sensor defective or countershaft speed sensor defective.

Harsh 3-4 Upshift

Possible cause: defective 4th clutch, linear solenoid defective, CPC valve stuck, 3rd accumulator defective, 3-4 orifice control valve stuck, main orifice partially clogged, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "A" defective, mainshaft speed sensor defective or countershaft speed sensor defective.

Harsh 2-1 Downshift

Possible cause: linear solenoid defective, CPC valve stuck, 2nd accumulator defective, CPB valve stuck, 2nd exhaust valve partially clogged, mainshaft speed sensor defective or countershaft speed sensor defective.

Harsh 3-2 Downshift

Possible cause: 2nd clutch defective, linear solenoid defective, CPC valve stuck, 3rd accumulator defective, separator plate partially clogged, CPB valve stuck, 3rd exhaust valve partially clogged, mainshaft speed sensor defective, countershaft speed sensor defective or 3rd sub accumulator defective.

Harsh 4-3 Downshift

Possible cause: 2nd clutch defective, linear solenoid defective, CPC valve stuck, 4th accumulator defective, separator plate partially clogged, CPB valve stuck, 4th exhaust valve partially clogged, mainshaft speed sensor defective or countershaft speed sensor defective.

Lock-Up Clutch Does Not Disengage

Possible cause: linear solenoid assembly defective, lock-up timing valve stuck, lock-up shift valve stuck, lock-up control valve stuck, lock-up clutch piston defective, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "B" defective or countershaft speed sensor defective.

Lock-Up Clutch Does Not Lock-Up Smoothly

Possible cause: linear solenoid assembly defective, torque converter check valve stuck, lock-up timing valve stuck, lock-up shift valve stuck, lock-up control valve stuck, lock-up clutch piston defective, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "B" defective or countershaft speed sensor defective.

Lock-Up Clutch Does Not Operate Properly

Possible cause: linear solenoid assembly defective, torque converter check valve stuck, lock-up timing valve stuck, lock-up shift valve stuck, lock-up control valve stuck, lock-up clutch piston defective, lock-up control solenoid valve "A" defective, lock-up control solenoid valve "B" defective, mainshaft speed sensor defective or countershaft speed sensor defective.

No Engine Braking In "1"

Possible cause: defective 1st-hold clutch.

Noise From Transaxle In All Gears

Possible cause: defective oil pump or torque converter.

Noise From Transaxle With Wheels Rolling

Possible cause: reverse selector hub installed upside down.

Stuck In 4th Gear

Possible cause: linear solenoid assembly defective, shift control solenoid valve "A" defective or shift control solenoid valve "B" defective.

Vehicle Locks In "R"

Possible cause: parking brake lever installed upside down or shift fork retaining bolt not installed.

Vehicle Moves In All Gears Except "R"

Possible cause: defective or improperly adjusted shift cable, defective or worn reverse gears, defective 4th

clutch or servo control valve stuck.

Vehicle Moves In All Gears Except "2"

Possible cause: defective 2nd clutch or 2nd accumulator.

Vehicle Moves In "N"

Possible cause: defective or improperly adjusted shift cable, defective 1st, 2nd, 3rd or 4th clutch, excessive ATF, partially clogged main orifice, or incorrect gear or clutch clearance.

Vehicle Moves In "R" & "2" Only

Possible cause: defective one-way clutch, defective 1st clutch or 1st accumulator.

Vehicle Will Not Move

Possible cause: defective oil pump, regulator valve stuck, regulator valve spring worn, defective or improperly adjusted shift cable, fluid strainer clogged, final drive gears damaged, drive plate defective or transaxle incorrectly assembled.

Vehicle Will Not Accelerate To More Than 31 MPH

Possible cause: torque converter one-way clutch defective.

Vehicle Will Not Move In "D3" Or "D4"

Possible cause: one-way clutch installed upside down.

Will Not Shift Into Park

Possible cause: shift cable broken or out of adjustment, shift cable mount broken or park mechanism defective.

Will Not Downshift To 1st Gear

Possible cause: defective 1st-hold clutch or 1-2 shift valve stuck.

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

Possible cause: defective or improperly adjusted shift cable, 3-4 shift valve stuck, 4th accumulator stuck or 4th exhaust valve stuck.

Will Not Upshift (Remains In 1st Gear)

Possible cause: clutch pressure control valve stuck, modulator valve stuck or 1-2 shift valve stuck.

CLUTCH APPLICATION

CLUTCH APPLICATION

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

PERFORMANCE TESTS

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 and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in AIR BAG DEACTIVATION PROCEDURES article in GENERAL INFORMATION.

ROAD TEST

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

1. Warm engine to normal operating temperature. Apply parking brake, and block wheels. Start engine. Move shift lever to "D4" position while depressing brake pedal. Depress accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat step 1 with shift lever in "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 and lock-up of torque converter.
3. Using Backprobe Adapter Set (07SAZ-001000A), connect DVOM to PCM harness connector. Connect positive lead to terminal C27 and negative lead to terminal B20 or B22. See **Fig. 4** .

4. Road test vehicle on a flat road surface with transaxle in "D4" position. Ensure shift points occur at approximate speeds. Check for abnormal noise and clutch slippage. See **CLUTCH APPLICATION** under TROUBLE SHOOTING for clutch engagement. Ensure upshift and downshift points, and lock-up of torque converter are correct in relation to TP sensor voltage or throttle opening and vehicle speed. See **Fig. 5** .

CAUTION: DO NOT downshift from "D4" or "D3" to "2" or "1" position at speeds greater than 100 MPH. Transaxle damage will occur.

5. Place transaxle in "D4" position. Accelerate to about 35 MPH so transaxle is in 4th gear, then shift from "D4" to "2" position. Vehicle should immediately begin slowing down from engine braking.
6. Place shift lever in "1" position. Accelerate from a full stop at full throttle. Check for abnormal noise or clutch slippage. Upshifts should not occur with shift lever in this position.
7. Place shift lever in "2" position. Accelerate from a full stop at full throttle. Check for abnormal noise or clutch slippage. Upshift or downshifts should not occur with shift lever in this position.
8. Place shift lever in "R" position. Accelerate from full stop at full throttle. Check for abnormal noise or clutch slippage.
9. Position vehicle on a slope. Apply parking brakes. Place shift lever in "P" position. Release parking brake. Vehicle should not move. If vehicle moves, check for defective shift cable or parking components.

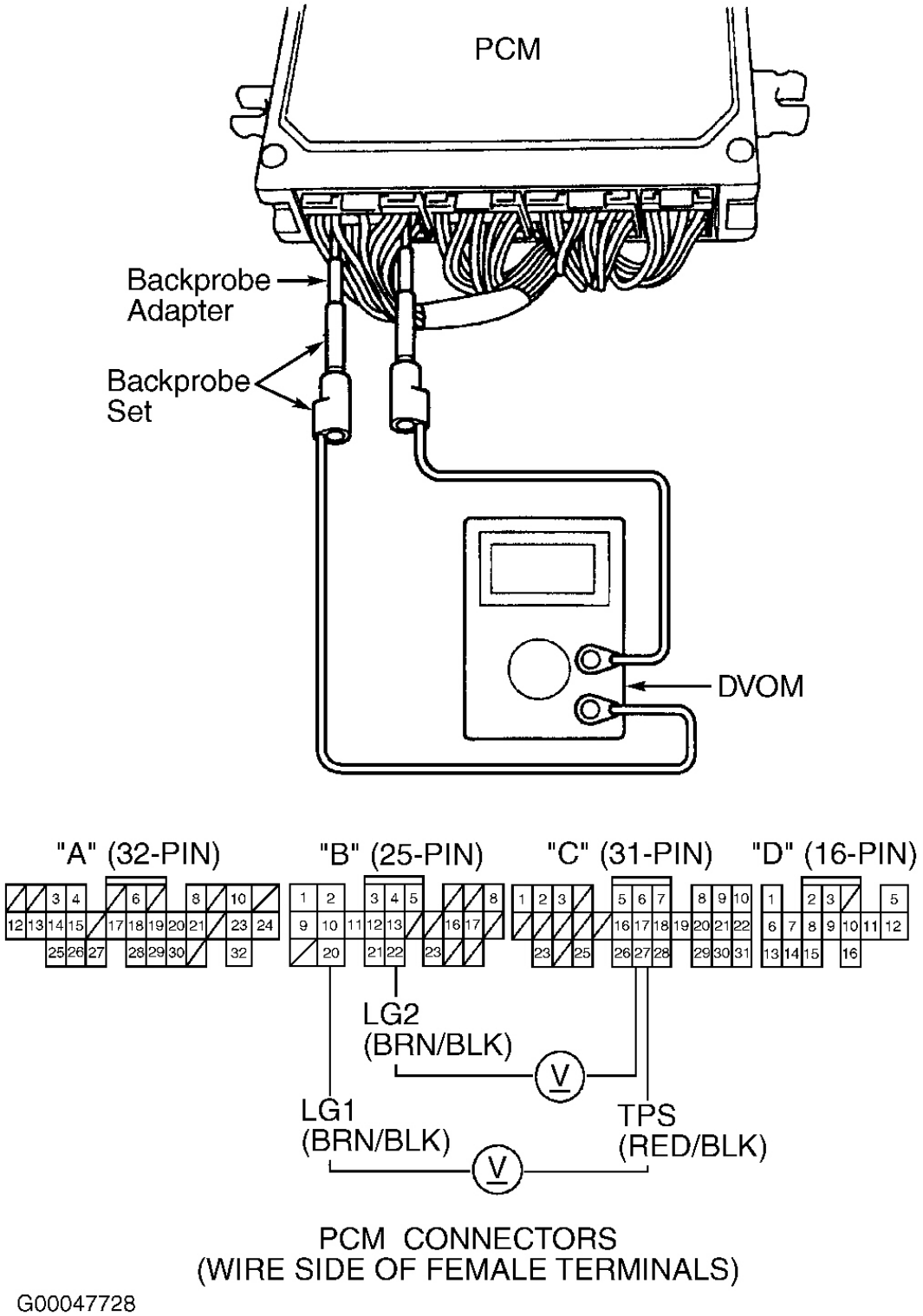

Fig. 4: Installing DVOM To PCM Using Backprobe Adapter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

UPSHIFT

Throttle Opening	Unit of speed	1st → 2nd	2nd → 3rd	3rd → 4th	Lock-up ON
Throttle position sensor voltage: 0.75 V	mph	9 – 12	20 – 23	28 – 33	21 – 24
	km/h	15 – 19	32 – 37	45 – 53	34 – 39
Throttle position sensor voltage: 2.25 V	mph	20 – 24	37 – 43	54 – 60	60 – 66
	km/h	32 – 38	60 – 70	87 – 97	97 – 106
Fully-opened throttle, Throttle position sensor voltage: 4.5 V	mph	35 – 41	70 – 79	108 – 119	90 – 101
	km/h	56 – 65	113 – 126	174 – 192	145 – 163

DOWNSHIFT

Throttle Opening	Unit of speed	Lock-up OFF	4th → 3rd	3rd → 2nd	2nd → 1st
Fully-closed throttle, Throttle position sensor voltage: 0.5 V	mph	18 – 22	18 – 22	6 – 9 (3rd → 1st)	
	km/h	28 – 35	28 – 35	9 – 14 (3rd → 1st)	
Fully-opened throttle, Throttle position sensor voltage: 4.5 V	mph	87 – 98	85 – 96	54 – 61	23 – 29
	km/h	140 – 157	137 – 154	87 – 98	37 – 46

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Fig. 5: Upshift & Downshift Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

TORQUE CONVERTER STALL SPEED SPECIFICATIONS

Application	RPM
Standard Specification	2550
Service Limit	2400-2700

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Stall Speed Test Results	Probable Cause
RPM High In "D4", "2", "1" & "R"	Low Fluid Level, Low Oil Pump Output, Clogged Fluid Strainer, Pressure Regulator Valve Stuck Closed, Slipping Clutch
RPM High In "R"	Slipping 4th Clutch
RPM High In "D4"	Slipping 1st Clutch, Defective One-Way Clutch
RPM High In "2"	Slipping 2nd Clutch
RPM High In "1"	Slipping 1st-Hold Or 1st Clutch, Defective One-Way Clutch
RPM Low In "D4", "2", "1" & "R"	Engine Output Low, Torque Converter One-Way Clutch Slipping

HYDRAULIC PRESSURE TESTS

Pressure Test Preparation

Ensure transaxle fluid level is correct. Warm engine to normal operating temperature. Apply parking brake, and block rear wheels. Raise and support vehicle so front wheels can rotate.

Line Pressure Test

1. With engine off, remove pressure tap plug from line pressure tap on transaxle. See **Fig. 6** . Attach Pressure Gauge Set (07406-0020400) to line pressure tap using NEW seal washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
2. With shift lever in "P" or "N" position, start and operate engine at 2000 RPM. Note line pressure. Line pressure should be within specification. See **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
3. If line pressure is not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off.
4. Using NEW seal washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** .

Clutch Pressure Test

1. Clutch pressure should be checked at each clutch pressure tap on transaxle. See **Fig. 6** .
2. With engine off, remove pressure plug from appropriate clutch pressure tap on transaxle. See **Fig. 6** . Attach Pressure Gauge Set (07406-0020400) to appropriate pressure tap using NEW seal washer. Tighten hose fitting to 13 ft. lbs. (18 N.m).
3. Start and operate engine at 2000 RPM. Note clutch pressure reading with shift lever in proper location. Refer to specifications in **HYDRAULIC PRESSURE TEST SPECIFICATIONS** table.
4. Clutch pressure should be within specification. If not within specification, see **HYDRAULIC PRESSURE TROUBLE SHOOTING** table. Shut engine off.
5. Using NEW seal washer, install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS** .

HYDRAULIC PRESSURE TEST SPECIFICATIONS (1)

Application	Shift Lever Position	Pressure psi (kPa)
Line Pressure	"P" Or "N"	120-128 (830-880)
Clutch Pressure		
1st Clutch	"D4"	116-123 (800-850)
1st-Hold Clutch	"1"	116-123 (800-850)
2nd Clutch	"2"	116-123 (800-850)
3rd Clutch	"D3"	116-123 (800-850)
4th Clutch	"D4" Or "R"	116-123 (800-850)
(1) Engine speed at 2000 RPM.		

HYDRAULIC PRESSURE TROUBLE SHOOTING

Application	Probable Cause
Line Pressure	
Low Or No Line Pressure	Defective Torque Converter, Defective Torque Converter Check Valve, Defective Oil Pump Pressure Regulator, Defective Oil Pump
Clutch Pressure	
Low Or No 1st Clutch Pressure	Defective 1st Clutch
Low Or No 1st-Hold Clutch Pressure	Defective 1st-Hold Clutch
Low Or No 2nd Clutch Pressure	Defective 2nd Clutch
Low Or No 3rd Clutch Pressure	Defective 3rd Clutch
Low Or No 4th Clutch Pressure	Defective 4th Clutch, (1) Defective Servo Valve Or 4th Clutch
(1) With selector lever in "R" position.	

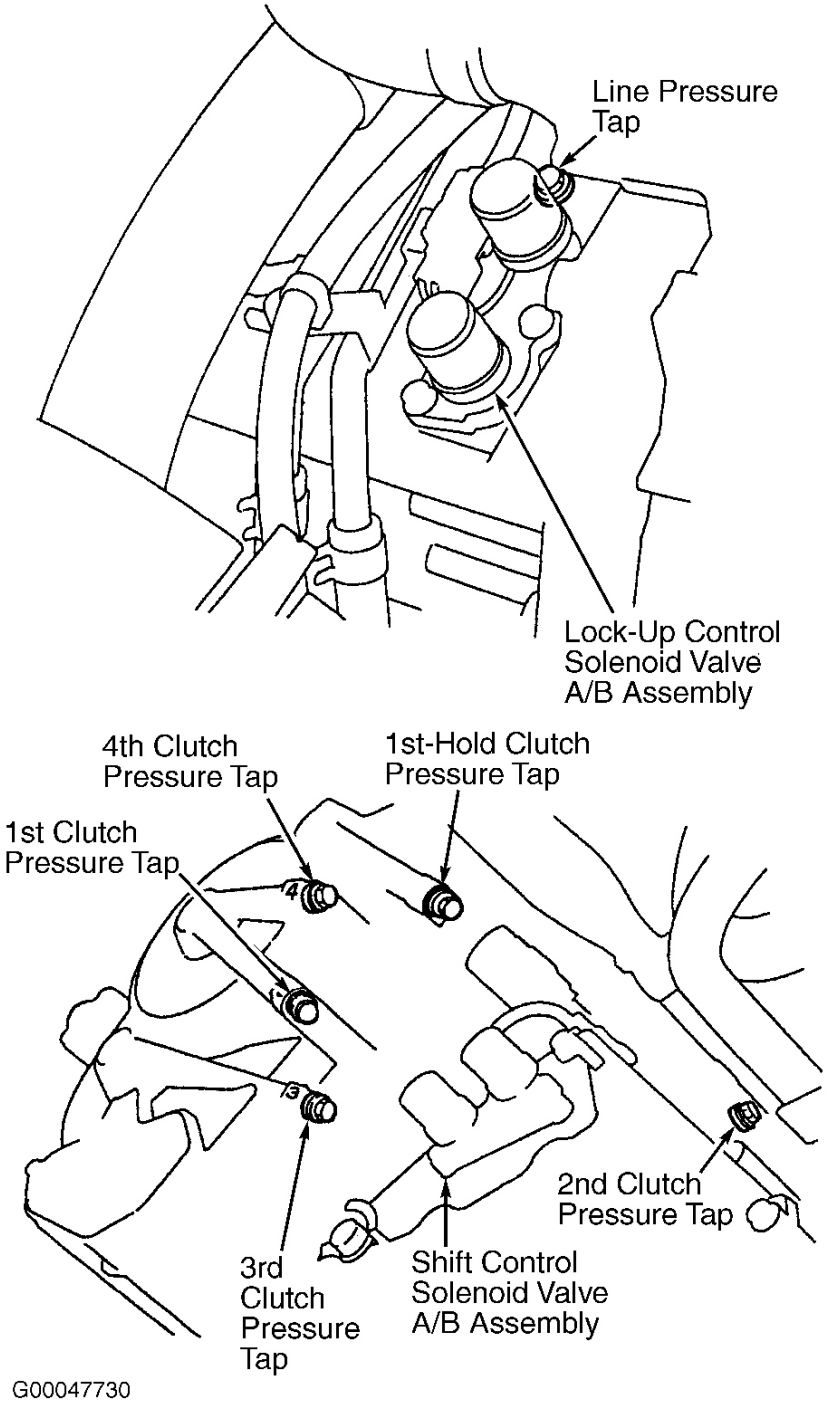


Fig. 6: Identifying Transaxle Pressure Taps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT TESTS

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 under PERFORMANCE TESTS.

REMOVAL & INSTALLATION

TRANSAXLE

See appropriate AUTOMATIC TRANSMISSION REMOVAL article in TRANSMISSION SERVICING.

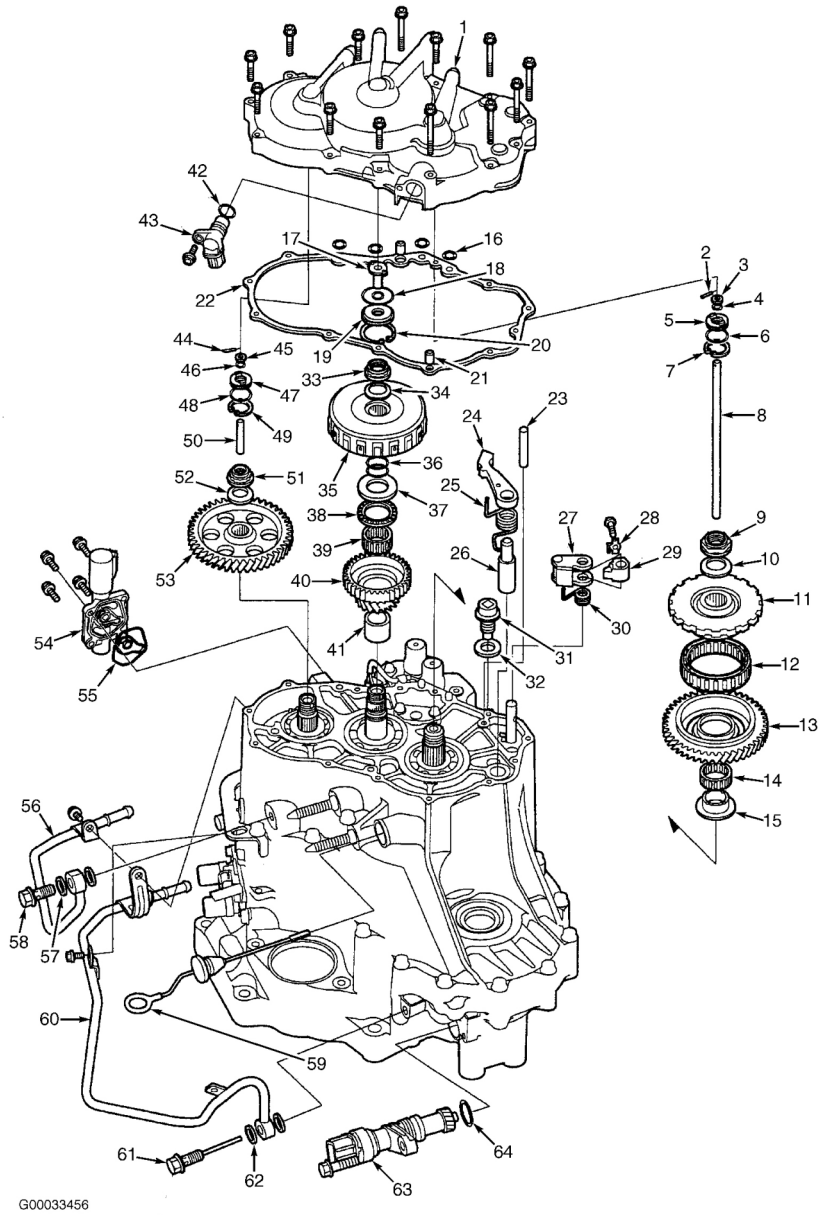
TRANSAXLE DISASSEMBLY

1. Remove bolts, end cover and gasket. See **Fig. 7** . Secure mainshaft with Holder (07GAB-PF50101). See **Fig. 8** . Engage parking pawl with parking gear. Using hammer and chisel, cut lock tabs on countershaft and sub-shaft lock nuts. Pry lock tabs on mainshaft lock nut upward.

   NOTE: Mainshaft and countershaft lock nuts contain left-hand threads.

2. Align hole in sub-shaft 1st gear with hole in transaxle housing. Install pin in sub-shaft 1st gear and transaxle housing to prevent gear from rotating. See **Fig. 9** . Remove all lock nuts and spring washers from countershaft, mainshaft and sub-shaft. See **Fig. 9** .
3. Remove mainshaft holder. Remove pin securing sub-shaft 1st gear. Remove 1st clutch assembly, mainshaft 1st gear, thrust washer and mainshaft 1st gear collar from mainshaft. See **Fig. 7** .
4. Remove sub-shaft 1st gear. Remove parking pawl. Using puller, remove parking gear, one-way clutch and countershaft 1st gear from countershaft. Remove needle bearing and countershaft 1st gear collar from countershaft. See Fig. 7 .
5. Remove parking brake lever and parking brake lever spring from control shaft. See **Fig. 7** . Remove dipstick, vehicle speed sensor, joint bolts and cooler pipes. Remove mount bracket from transaxle housing. See **Fig. 11** . Remove transaxle housing bolts and transaxle hanger.
6. Align spring pin on control shaft with groove in transaxle housing by rotating control shaft. Using Puller (07HAC-PK4010A), remove transaxle housing. See **Fig. 10** . Remove gasket for transaxle housing.
7. Remove countershaft reverse gear collar, needle bearing and countershaft reverse gear from countershaft. See **Fig. 11** . Remove bolt and bolt lock from reverse shift fork. Remove reverse shift fork with reverse selector from countershaft.
8. Remove countershaft and mainshaft together from torque converter housing. Remove differential assembly. Remove bolts, reverse idler gear shaft holder, reverse idler gear and needle bearing from transaxle housing (if necessary).
9. Remove oil feed pipes from servo body, secondary valve body, lock-up valve body and main valve body. Remove fluid strainer. See **Fig. 12** . Remove servo body and separator plate. See **Fig. 12** . Remove secondary valve body with stop shaft bracket and separator plate.

10. Remove lubrication plate, lock-up valve body and separator plate. Remove regulator valve body. Remove stop shaft and stator shaft. Remove detent spring from detent arm. Remove control shaft from torque converter housing.
11. Remove detent arm shaft and detent arm from main valve body. Remove bolts and main valve body. DO NOT lose check balls (8) in main valve body. See **Fig. 12** .
12. Remove oil pump driven gear shaft and oil pump gears. See **Fig. 12** . Remove separator plate for main valve body and dowel pins. Remove magnet. Remove lock-up control solenoid valve assembly (if necessary).



1. End Cover
2. Roller
3. Collar
4. "O" Ring
5. Feed Pipe Flange
6. "O" Ring
7. Snap Ring
8. 3rd Clutch Feed Pipe
9. Countershaft Lock Nut
10. Conical Spring Washer
11. Park Gear
12. One-Way Clutch
13. Countershaft 1st Gear
14. Needle Bearing
15. Countershaft 1st Gear Collar
16. "O" Rings
17. 1st Clutch Feed Pipe
18. "O" Rings
19. Feed Pipe Flange
20. Snap Ring
21. Dowel Pin
22. End Cover Gasket
23. Park Pawl Stop
24. Park Pawl
25. Park Pawl Spring
26. Park Pawl Shaft
27. Park Lever
28. Lock Washer
29. Park Lever Stop
30. Park Lever Spring
31. Drain Plug
32. Sealing Washer
33. Mainshaft Lock Nut
34. Conical Spring Washer
35. 1st Clutch Assembly
36. "O" Ring
37. Thrust Washer
38. Thrust Needle Bearing
39. Needle Bearing
40. Mainshaft 1st Gear
41. Mainshaft 1st Gear Collar
42. "O" Ring
43. Countershaft Speed Sensor
44. Roller
45. Collar
46. "O" Ring
47. Feed Pipe Flange
48. "O" Ring
49. Snap Ring
50. 1st-Hold Clutch Feed Pipe
51. Sub-Shaft Lock Nut
52. Conical Spring Washer
53. Sub-Shaft 1st Gear
54. Linear Solenoid Assembly
55. Linear Solenoid Assembly Gasket
56. Cooler Line
57. Sealing Washers
58. Line Bolt
59. Dipstick
60. Cooler Line
61. Line Bolt
62. Sealing Washers
63. Vehicle Speed Sensor
64. "O" Ring

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

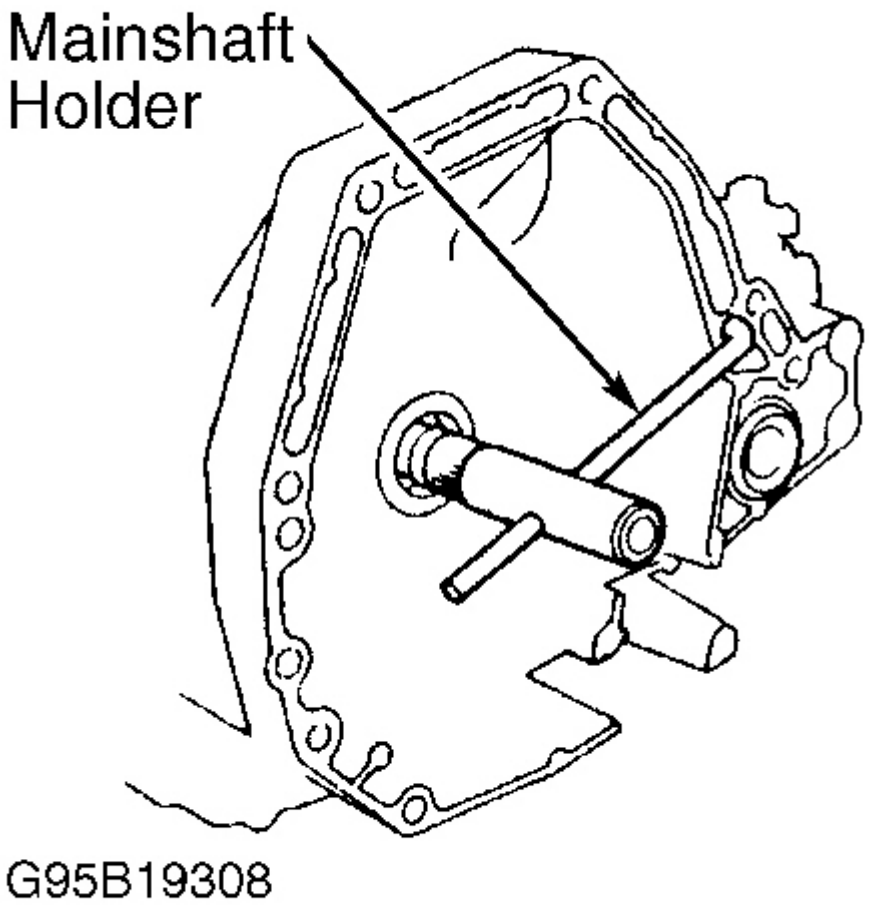


Fig. 8: Installing Mainshaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

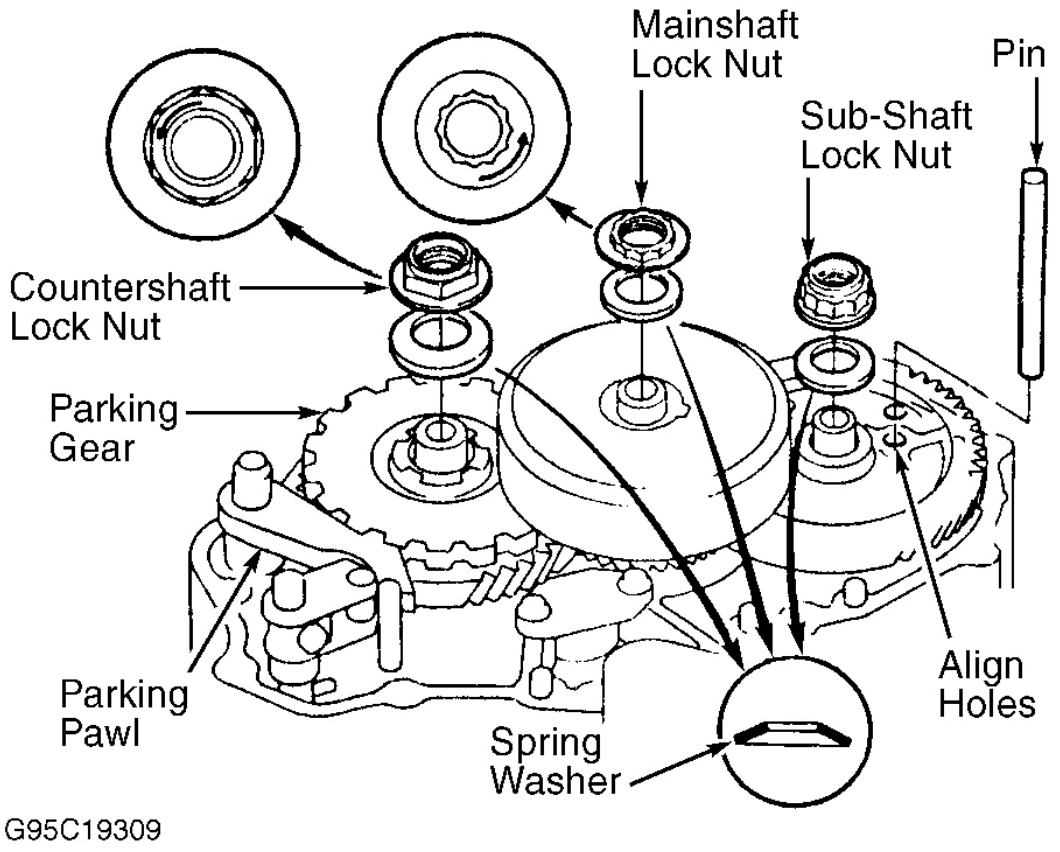


Fig. 9: Securing Sub-Shaft 1st Gear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

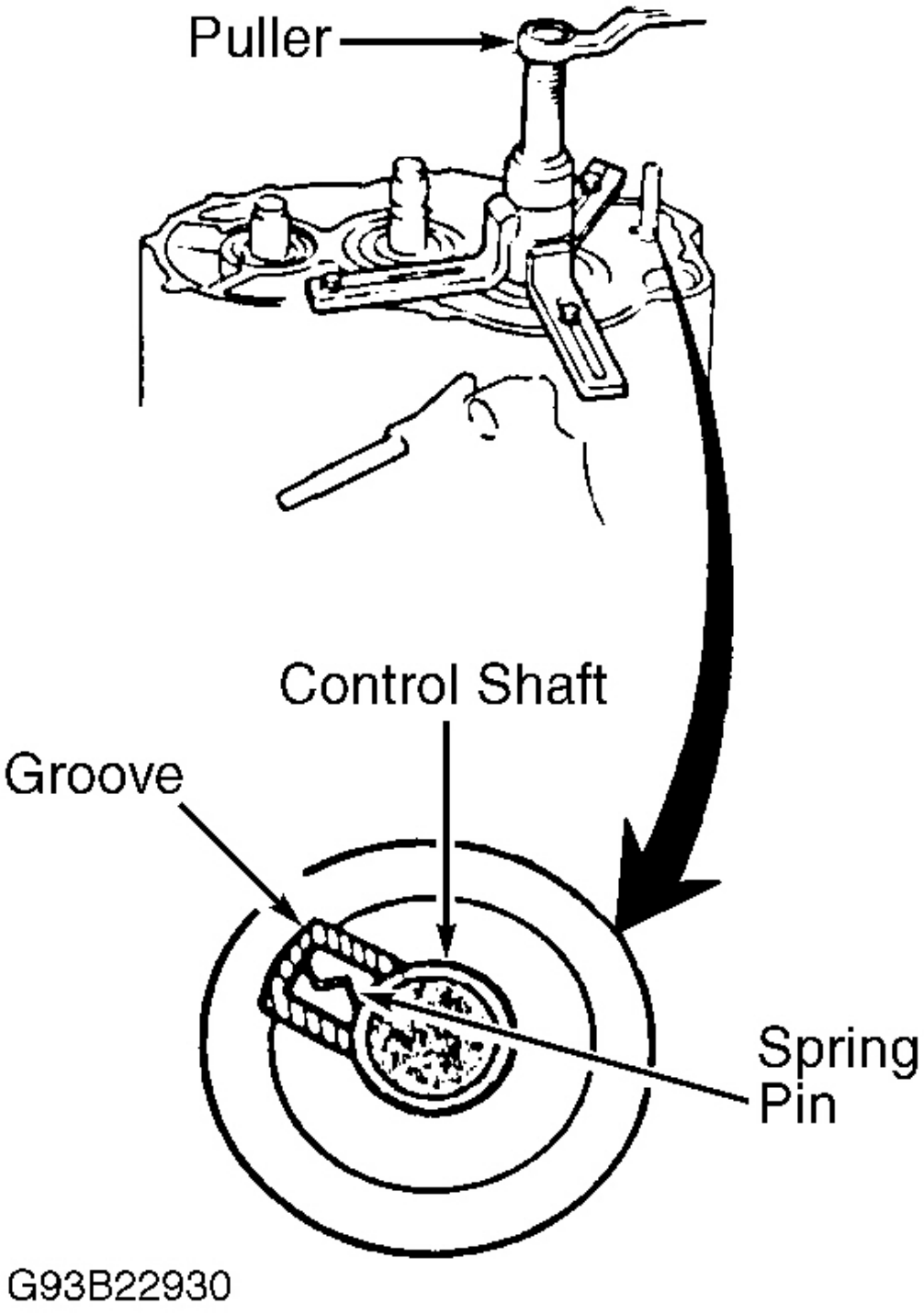


Fig. 10: Aligning Spring Pin & Removing Transaxle Housing

Courtesy of AMERICAN HONDA MOTOR CO., INC.

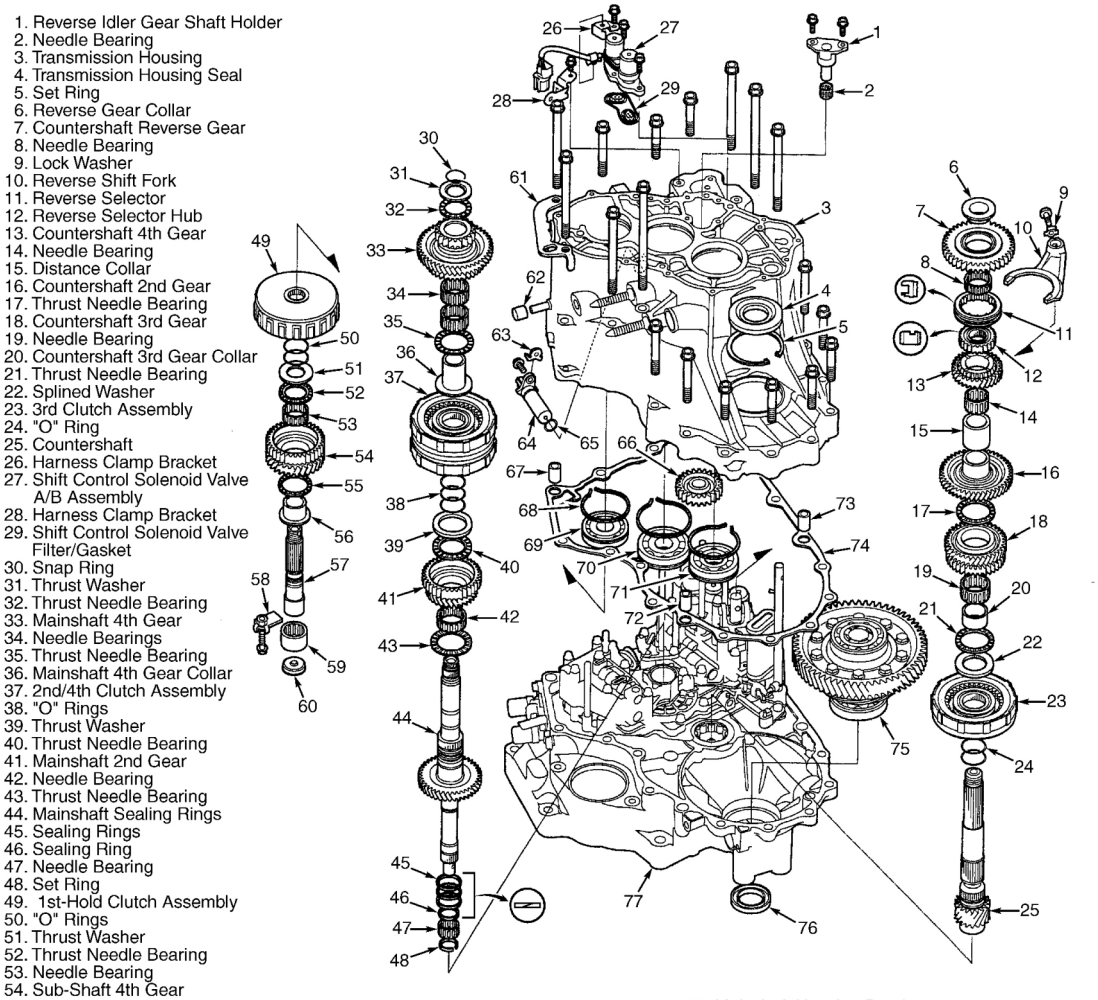


Fig. 11: Exploded View Of Transaxle Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

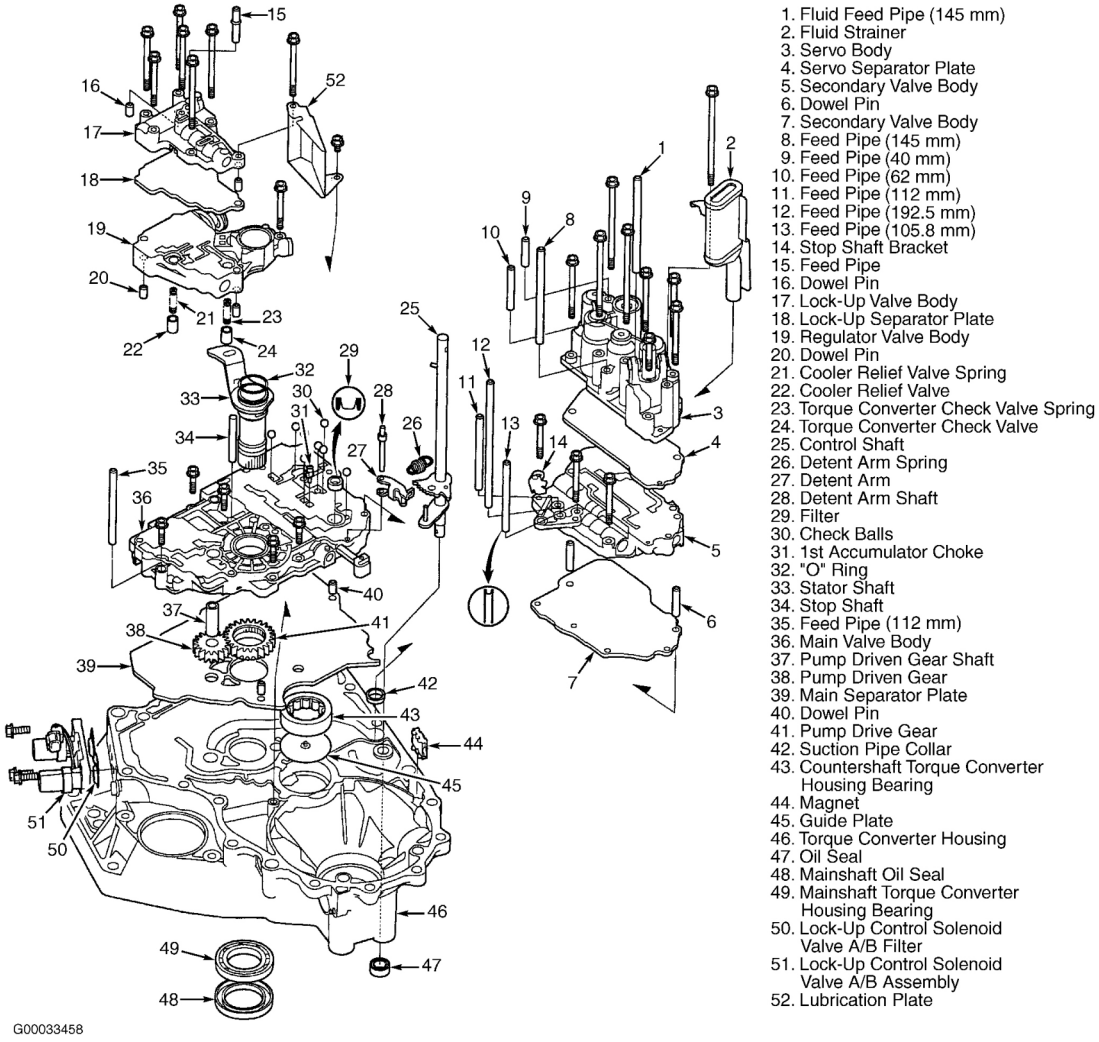


Fig. 12: Exploded View Of Torque Converter Housing & Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 13** . Use care when removing valve caps or spring seat, which 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 **MAIN VALVE BODY 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. 13** .

MAIN VALVE BODY SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
CPB 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)

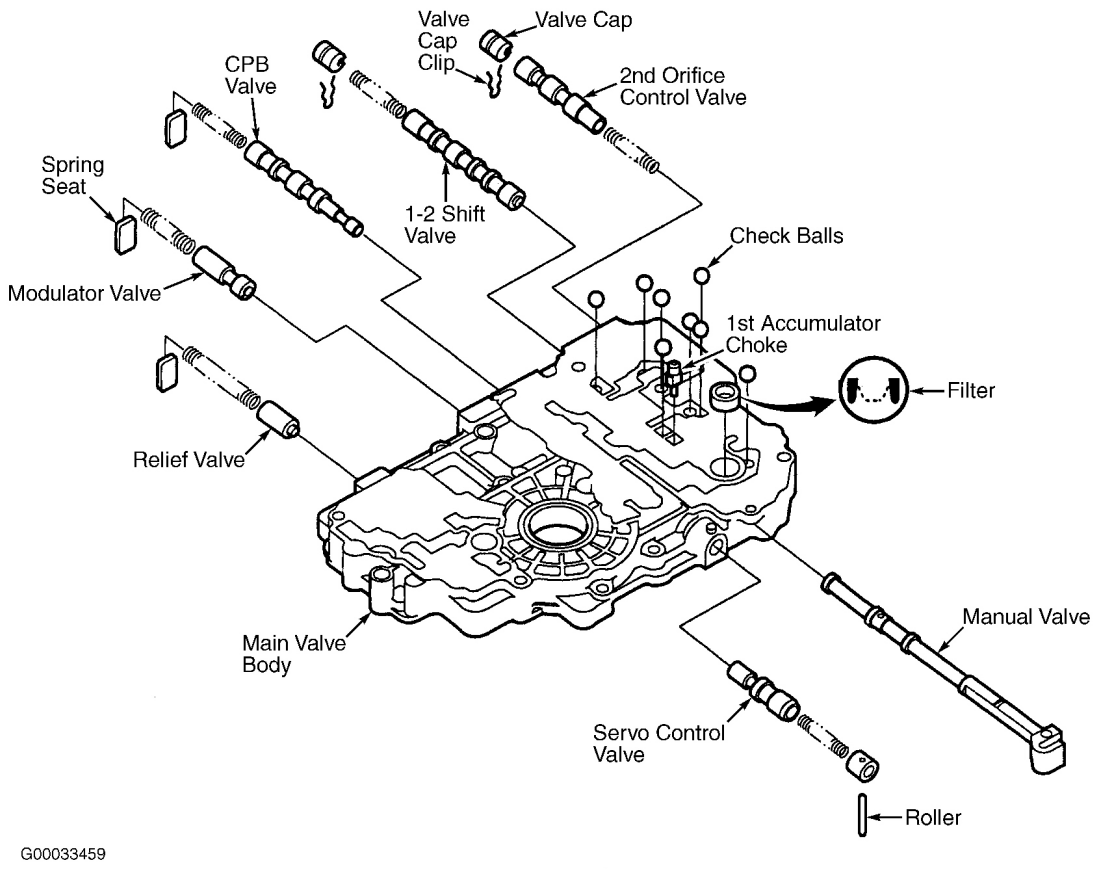


Fig. 13: Exploded View Of Main Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 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. Place straightedge across main valve body surface. Using feeler gauge, measure thrust clearance between oil pump driven gear and straightedge. See **Fig. 14** . Replace oil pump gears and/or main valve body if thrust clearance is not within specification. See **OIL PUMP SPECIFICATIONS** table.
4. Install oil pump driven gear shaft in oil pump driven gear. Using feeler gauge, measure side clearance of both gears between tip of gear teeth and main valve body. See **Fig. 14** . 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	.0028-.0049 (.070-.125)
Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)

Reassembly

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

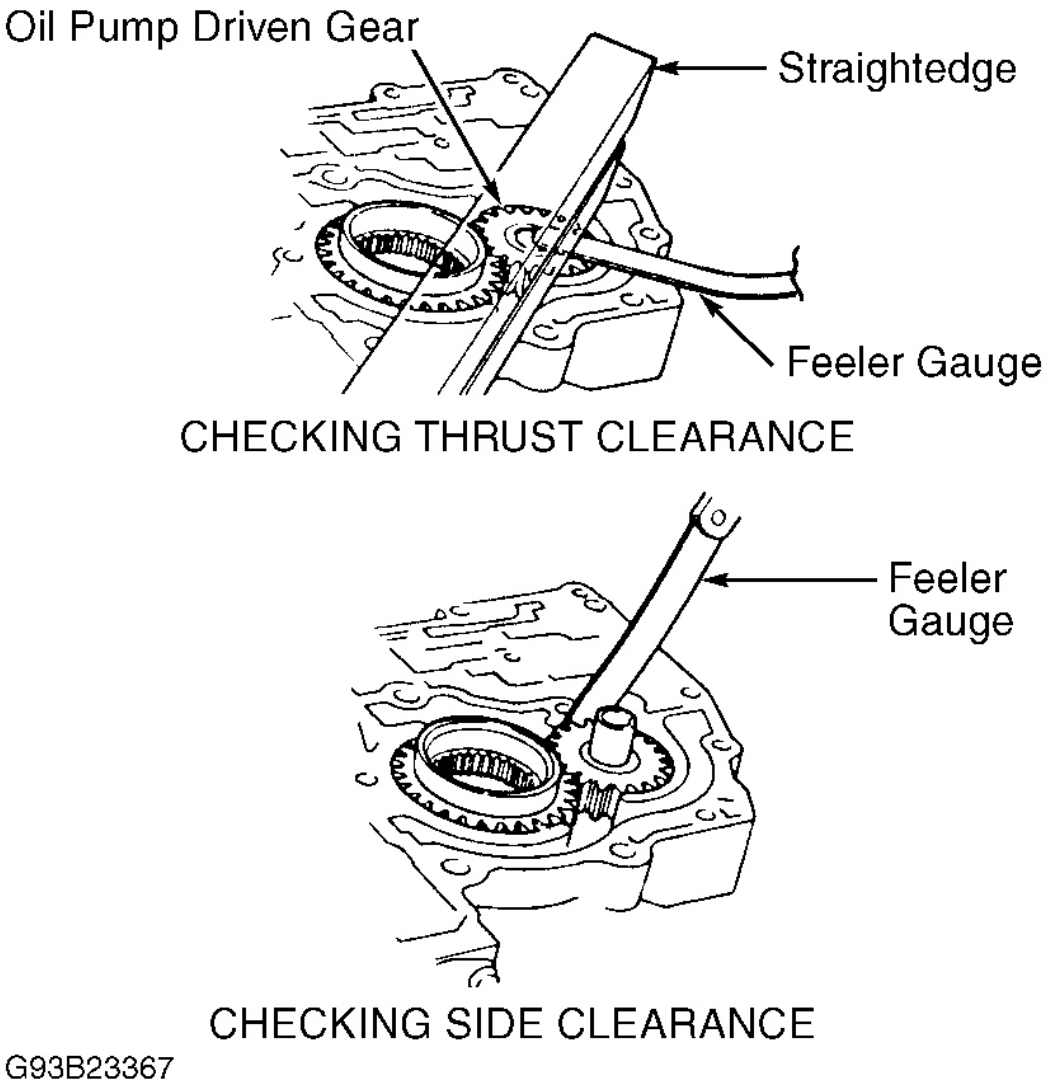


Fig. 14: Checking Oil Pump Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REGULATOR VALVE BODY

CAUTION: Regulator spring cap is under spring pressure. Ensure regulator spring cap is held down when removing stopper bolt. Use care when removing valve cap which is under spring pressure.

Disassembly

Note direction of valve cap installation before removing from regulator valve body. Hold regulator spring cap

down, and remove stopper 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 assembly 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 regulator valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **REGULATOR VALVE BODY 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. 15** . Tighten stopper bolt to specification. See **TORQUE SPECIFICATIONS** .

REGULATOR VALVE BODY SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
Cooler Relief Valve Spring	1.331 (33.80)
Lock-Up Control Valve Spring	1.496 (38.00)
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	1.276 (32.40)

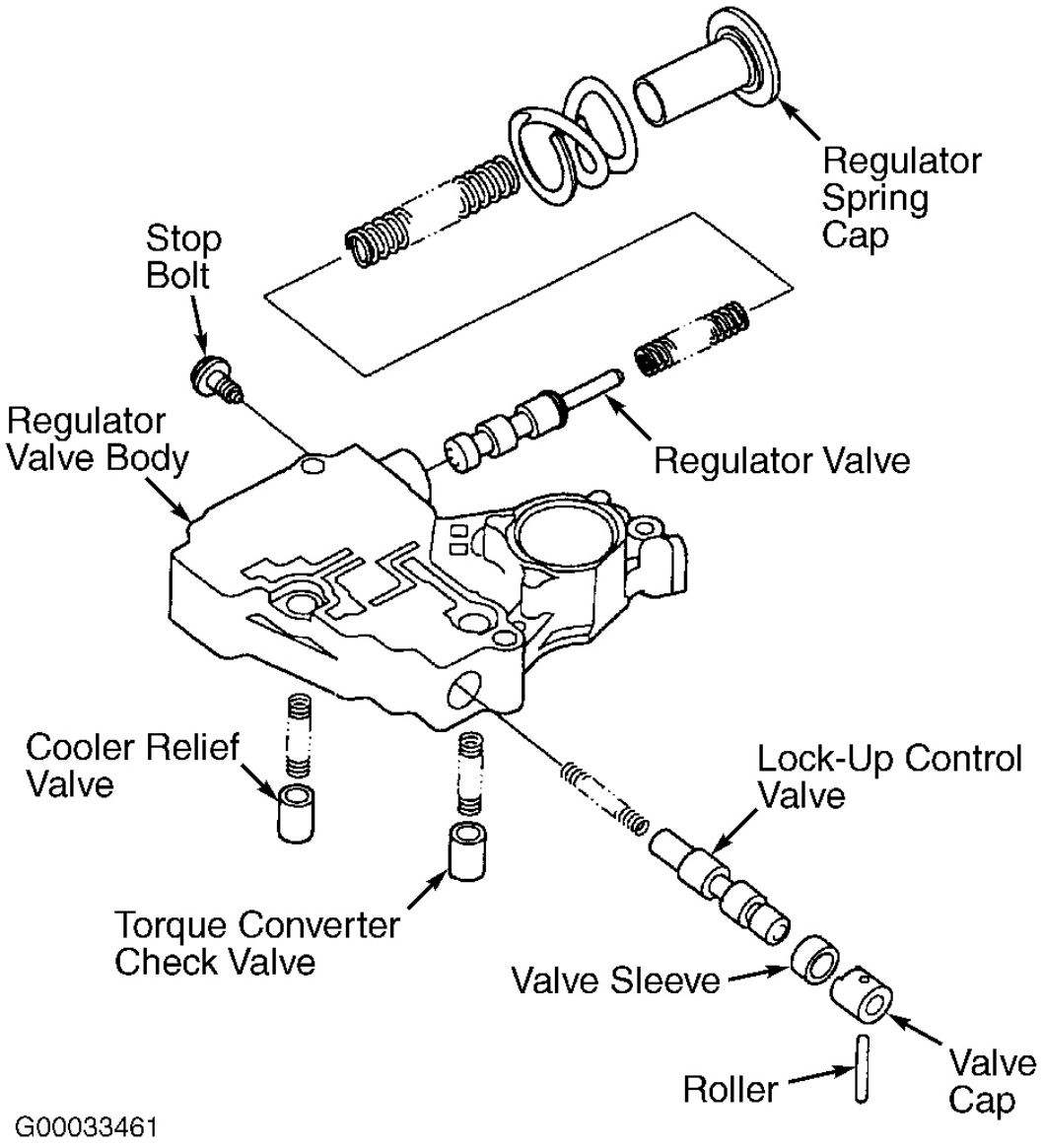


Fig. 15: Exploded View Of Regulator Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

LOCK-UP VALVE BODY

Disassembly

Note direction of valve cap installation before removing from lock-up valve body. Disassemble lock-up valve body. See **Fig. 16** . Use care when removing valve caps which are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace lock-up valve body assembly 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 lock-up valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **LOCK-UP VALVE BODY SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. See **Fig. 16** .

LOCK-UP VALVE BODY SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
Lock-Up Shift Valve Spring	2.902 (73.70)
Lock-Up Timing Valve Spring	3.205 (81.40)

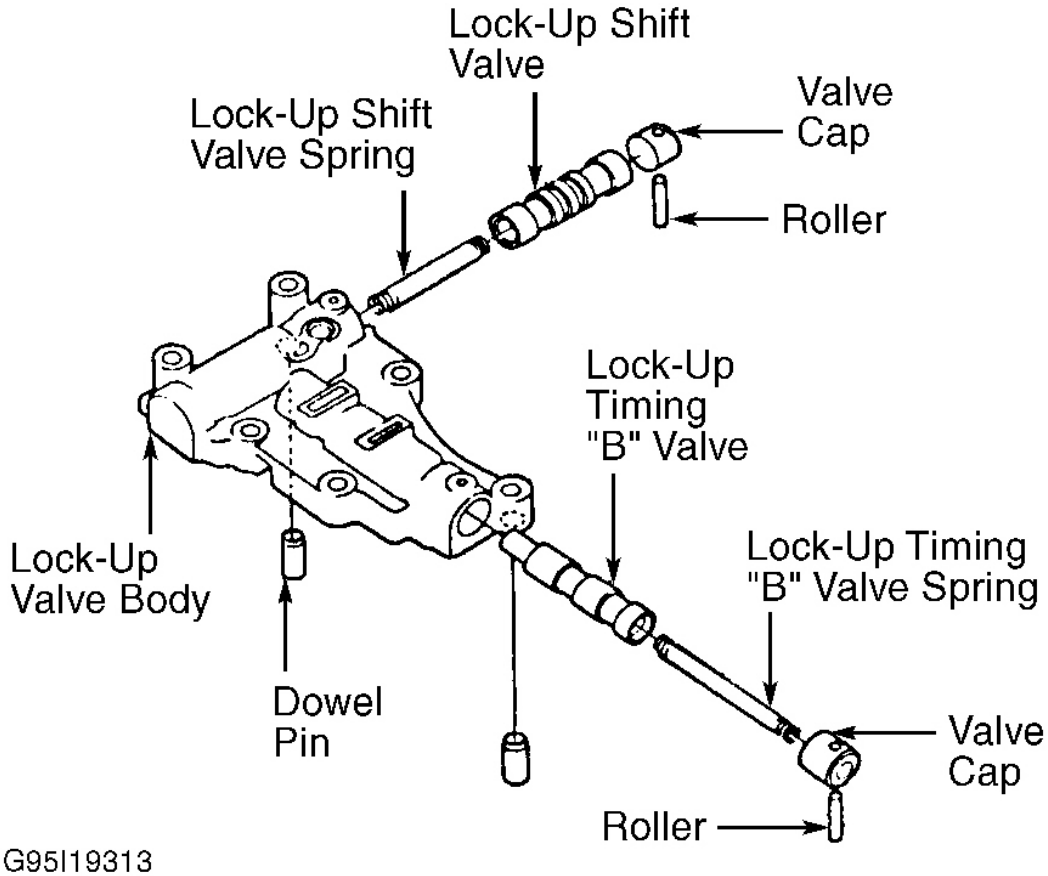


Fig. 16: Exploded View Of Lock-Up Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. Note direction of valve cap installation before removing from secondary valve body.

Disassembly

Disassemble secondary valve body. See **Fig. 17** . Use care when removing valve caps or spring seats which are under spring pressure.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace secondary valve body assembly 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 secondary valve body and components if polishing was needed.
3. Ensure spring free length is within specification. See **SECONDARY VALVE BODY SPRING SPECIFICATIONS** table. Replace springs if not within specification.

Reassembly

Coat all components and bores with ATF. To reassemble, reverse disassembly procedure. Install NEW filter. Ensure all components are installed in correct location. See **Fig. 17** .

SECONDARY VALVE BODY SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
3-4 Orifice Control Valve Spring	1.492 (37.90)
2-3 Shift Valve Spring	2.244 (57.00)
3-4 Shift Valve Spring	2.244 (57.00)
4th Exhaust Valve Spring	1.433 (36.40)

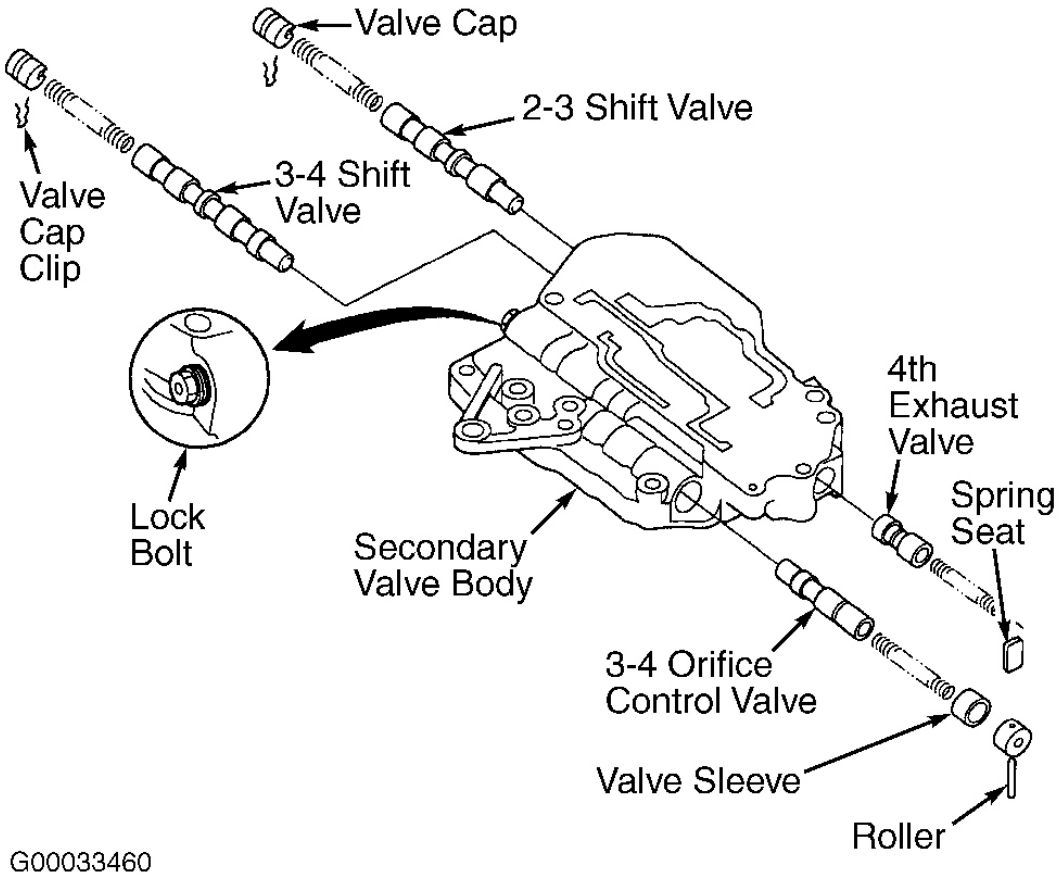


Fig. 17: Exploded View Of Secondary Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SERVO BODY

Disassembly

Disassemble servo body. See **Fig. 18** .

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Replace servo body assembly if any parts are worn or damaged. Ensure all valves slide freely in their bores.
2. Ensure spring free length is within specification. See **SERVO BODY 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.

Tighten throttle cam stopper bolt to specification. See **TORQUE SPECIFICATIONS** .

SERVO BODY SPRING SPECIFICATIONS

Application	Free Length - In. (mm)
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"	3.713 (94.30)
3rd Accumulator Spring "B"	1.504 (38.20)
3rd Sub Accumulator Spring	1.535 (39.00)
4th Accumulator Spring "A"	3.480 (88.40)
4th Accumulator Spring "B"	2.031 (51.60)

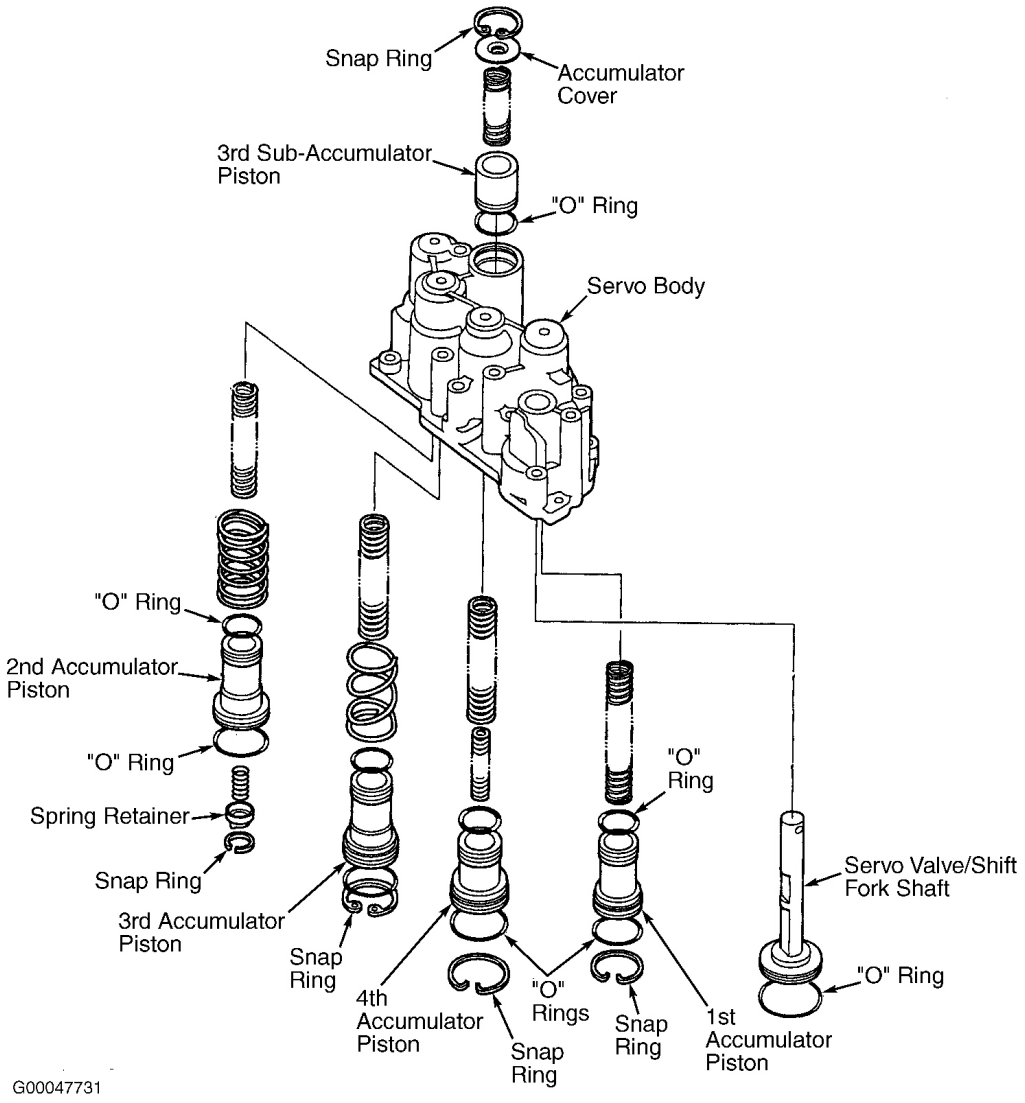


Fig. 18: Exploded View Of Servo Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

Disassembly

Note location of mainshaft components. See **Fig. 11** . Remove mainshaft components.

Cleaning & Inspection

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

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

Reassembly

1. To check mainshaft 2nd gear-to-3rd gear clearance, install proper components, except "O" rings and mainshaft 4th gear on mainshaft. Install used mainshaft lock nut on mainshaft. Tighten mainshaft lock nut to 22 ft. lbs. (30 N.m). Hold mainshaft 2nd gear against 2nd clutch.
2. Using feeler gauge, measure clearance between mainshaft 2nd and 3rd gears. See **Fig. 19** . If mainshaft 2nd gear-to-3rd gear clearance is not .002-.005" (.05-.13 mm), replace thrust washer. Thrust washer is located between mainshaft 2nd gear and 2nd clutch. Washers range in thickness from .157" (4.00 mm) to .175" (4.45 mm) in increments of .002" (.05 mm). Replace as needed and recheck mainshaft 2nd gear-to-3rd gear clearance.
3. Lubricate all components with ATF. Reassemble mainshaft. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. See **Fig. 11** . Before installing NEW "O" rings on mainshaft, wrap splines with tape.

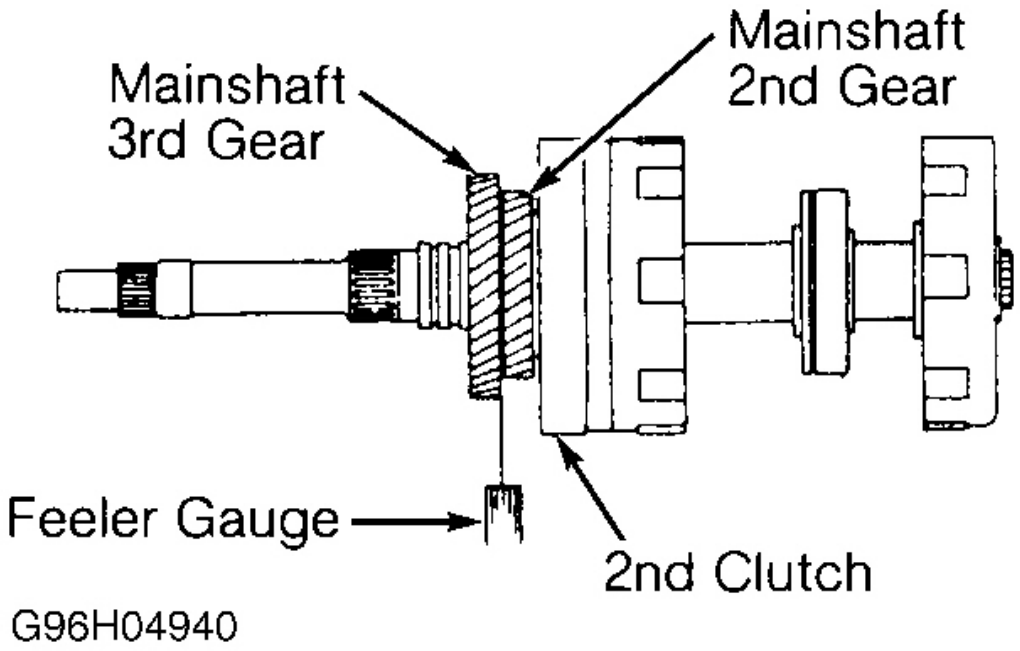


Fig. 19: Measuring Mainshaft 2nd Gear-To-3rd Gear Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COUNTERSHAFT

NOTE: Reverse selector hub is press-fit on countershaft. Countershaft must be

pressed from reverse selector hub.

Disassembly

1. Note location of countershaft components. See **Fig. 11** . Remove all components from countershaft down to reverse selector hub.
2. Place countershaft in hydraulic press while supporting countershaft 4th gear. 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 reverse selector hub and countershaft 4th gear. Separate remaining components from countershaft. See **Fig. 11** .

Cleaning & Inspection

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

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

Reassembly

1. To check countershaft 2nd gear clearance, install all components on countershaft up to reverse selector hub. See **Fig. 11** . DO NOT install "O" rings on countershaft.
2. Install reverse selector hub on countershaft in proper direction. Support countershaft in press. Press reverse selector hub onto countershaft.
3. Install countershaft reverse gear collar on countershaft. DO NOT install reverse selector, countershaft reverse gear and needle bearing on countershaft.
4. Install transaxle housing bearing on countershaft. Install countershaft 1st gear collar, needle bearing and countershaft 1st gear with one-way clutch and parking gear on countershaft. See **Fig. 7** .
5. Install spring washer and used countershaft lock nut on countershaft. Tighten countershaft lock nut to 22 ft. lbs. (30 N.m).
6. Using feeler gauge, measure countershaft 2nd gear clearance between distance collar and countershaft 2nd gear. See **Fig. 20** . Measure clearance in 3 areas and average measurements. Countershaft 2nd gear clearance should be .004-.007" (.10-.18 mm).
7. If countershaft 2nd gear clearance is not within specification, install different length distance collar between countershaft 2nd gear and countershaft 4th gear. Distance collars range in length from 1.535" (39.00 mm) to 1.533 (38.95) in .004" (.10 mm) increments. Install selected collar and recheck clearance.
8. If shortest distance collar is installed and clearance still exceeds specification, check components for wear. During final reassembly, lubricate all components with ATF.
9. Before installing NEW "O" rings on countershaft, wrap splines with tape. Ensure NEW "O" rings are installed on countershaft.
10. Ensure reverse selector hub is installed on countershaft in proper direction. See **Fig. 11** . Ensure thrust needle bearings and needle bearings are installed with unrolled edge of bearing retainer facing washer

surface.

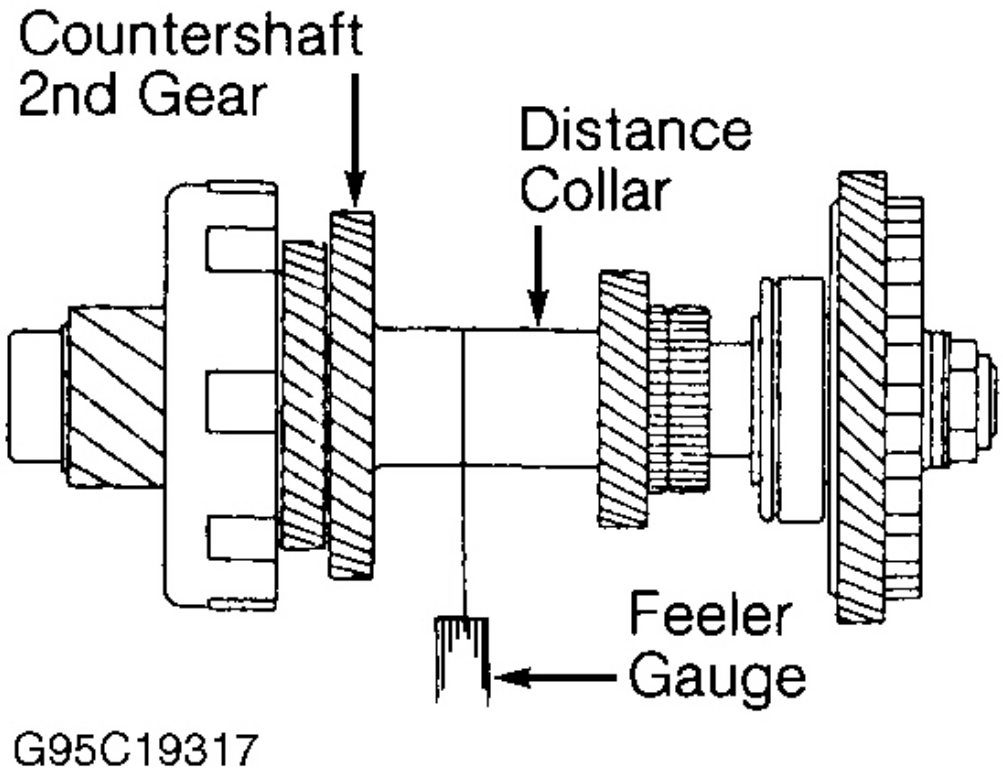


Fig. 20: Checking Countershaft 2nd Gear Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PARKING GEAR & ONE-WAY CLUTCH

Disassembly

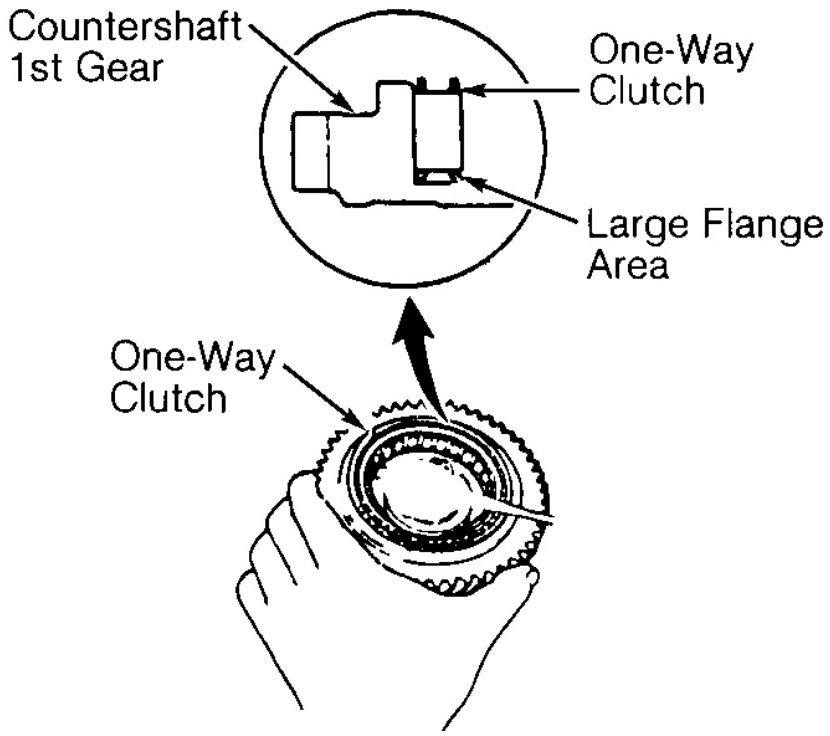
1. To separate parking gear from countershaft 1st gear, hold countershaft 1st gear with parking gear facing upward. Rotate parking gear counterclockwise and remove from countershaft 1st gear.
2. Note direction of one-way clutch installation in countershaft 1st gear. To remove one-way clutch from countershaft 1st gear, gently pry between one-way clutch and countershaft 1st gear using screwdriver.

Cleaning & Inspection

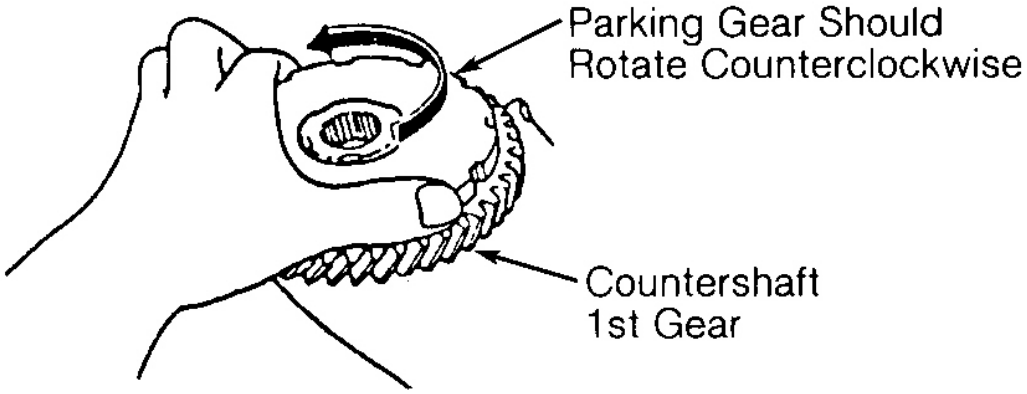
Clean components with solvent and dry with compressed air. Inspect components for damage.

Reassembly

1. Lubricate all components with ATF. Install one-way clutch in countershaft 1st gear with large flange area on one-way clutch toward countershaft 1st gear. See **Fig. 21** .
2. Install parking gear. To check one-way clutch operation, hold countershaft 1st gear with parking gear facing upward. Ensure parking gear rotates freely counterclockwise.



INSTALLING ONE-WAY CLUTCH



CHECKING ONE-WAY CLUTCH OPERATION

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

SUB-SHAFT & 1ST-HOLD CLUTCH ASSEMBLY

Disassembly

1. Note sub-shaft and components. See **Fig. 11** . Remove oil guide cap from transaxle housing by using hammer and driver and tapping on end of sub-shaft. Remove sub-shaft, sub-shaft 4th gear, 1st-hold clutch and remaining components.
2. If removing needle bearing from transaxle housing, remove needle bearing stopper bolt and needle bearing stopper. Using hammer and drift, tap needle bearing from transaxle housing.
3. If removing transaxle housing bearing, expand snap ring. Using press, press bearing from transaxle housing. Remove snap ring (if necessary).

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Inspect splines on sub-shaft for excessive wear and bearing surfaces for scoring or wear.
2. Inspect all needle bearings for galling and rough movement. Inspect sub-shaft 4th gear for damage.

Reassembly

1. Lubricate all components with ATF. If installing needle bearing in transaxle housing, use press, press needle bearing into transaxle housing.
2. Install needle bearing stopper. Tighten needle bearing stopper bolt to specification. See **TORQUE SPECIFICATIONS** .
3. If installing transaxle housing bearing in transaxle housing, expand snap ring. Using press, press bearing part way into transaxle housing.

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

4. Release snap ring. Continue pressing bearing into transaxle housing until snap ring engages in bearing. Ensure snap ring is fully seated.
5. Before installing "O" rings on sub-shaft, wrap splines with tape. Use NEW "O" rings on sub-shaft. Reassemble sub-shaft.
6. Ensure thrust needle bearings are installed with unrolled edge of bearing retainer facing washer. Install NEW oil guide cap.

CLUTCH ASSEMBLIES

Disassembly

1. Remove snap ring, clutch end plate, clutch discs and clutch plates. See **Fig. 22** . Note direction of disc

spring installation. Remove disc spring.

2. 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

1. Clean metal components with solvent and dry with compressed air. Ensure check valve on rear of clutch piston (except 1st-hold clutch) is thoroughly cleaned and secured tightly on clutch piston.
2. Inspect components for damage. Replace as 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 and spring retainer in clutch drum. Place snap ring on spring retainer. Using spring compressor, compress return spring. Install snap ring. Remove spring compressor.

CAUTION: Disc spring on 2nd clutch is opposite all other clutch assemblies. Ensure clutch discs are soaked in ATF for at least 30 minutes before installing.

3. Install disc spring. Ensure disc spring is installed in proper direction. See **Fig. 22** .
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. 23** . Zero dial indicator with clutch end plate lowered. Lift clutch end plate upward against snap ring. Distance measured is clutch clearance.
6. Measure clutch clearance at 3 different locations. Clutch clearance should be within specification. See **CLUTCH CLEARANCE SPECIFICATIONS** table.
7. If clutch clearance is not within specification, install different thickness clutch end plate. End plates for 1st, 2nd, 3rd and 4th clutches range in thickness from .083" (2.1 mm) to .146" (3.7 mm) in .004" (.10 mm) increments. End plates for 1st-hold clutch range in thickness from .083" (2.1 mm) to .106" (2.7 mm) in .004" (.10 mm) increments.

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

CLUTCH CLEARANCE SPECIFICATIONS

Application	Clearance - In. (mm)
1st Clutch	.026-.033 (.65-.85)
1st-Hold Clutch	.020-.031 (.50-.80)
2nd, 3rd & 4th Clutches	.016-.024 (.40-.60)

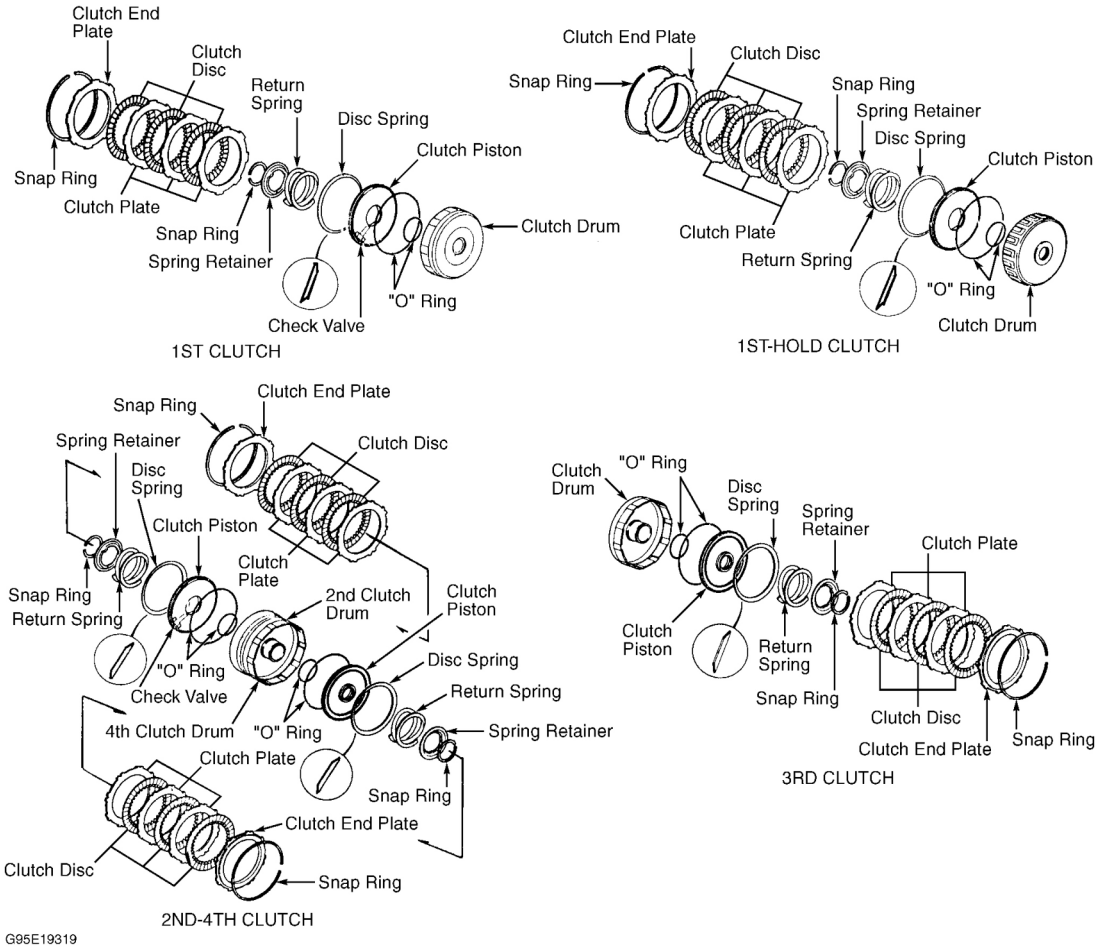

Fig. 22: Exploded View Of Clutch Assemblies
Courtesy of AMERICAN HONDA MOTOR CO., INC.

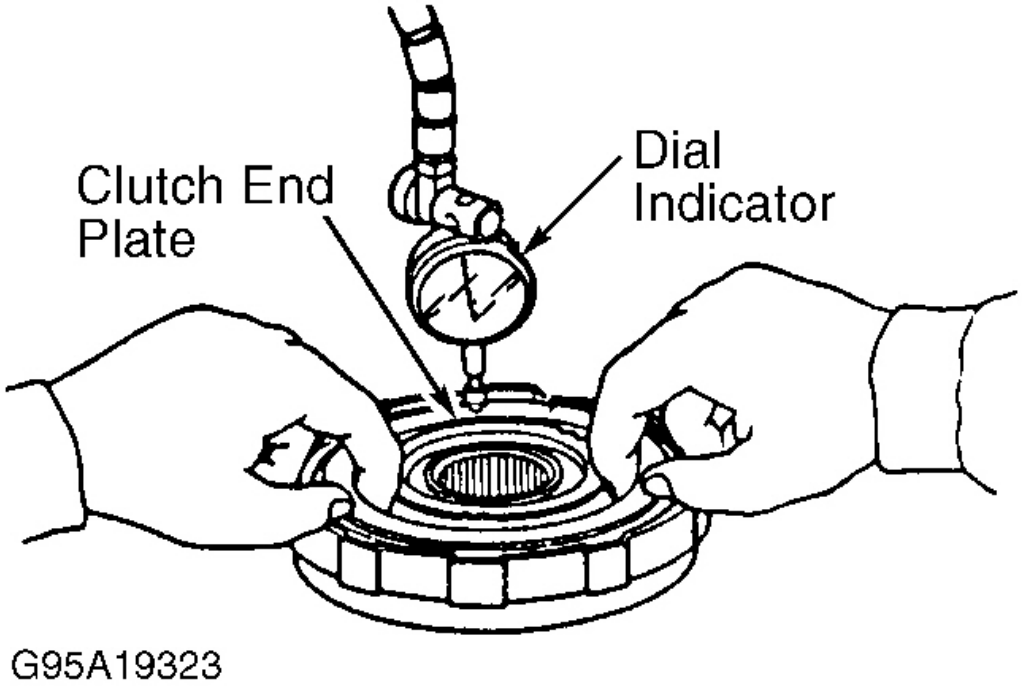

Fig. 23: Measuring Clutch Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE CONVERTER HOUSING

Disassembly

1. Remove countershaft bearing from torque converter housing using slide hammer (if necessary). Remove oil guide plate from torque converter housing. See **Fig. 12** .
2. Remove mainshaft bearing and oil seal using hammer and driver. 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. Coat components with ATF. To install mainshaft bearing, using hammer and driver, drive mainshaft bearing in torque converter housing until bearing bottoms in torque converter housing.
2. Using hammer and oil seal installer, install mainshaft oil seal in torque converter housing. Oil seal should

be flush with surface of torque converter housing.

3. To install countershaft bearing, install NEW oil guide plate in countershaft bearing bore of torque converter housing. Ensure oil guide plate is installed with tab in center facing upward (away from torque converter housing surface). See **Fig. 12** .
4. Using hammer and driver, drive countershaft bearing into torque converter housing. Ensure surface of countershaft bearing is flush with surface of torque converter housing.

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

5. Once correct differential bearing side clearance is obtained, install differential oil seal. Using hammer and oil seal installer, drive oil seal into torque converter housing until oil seal is fully seated.

TRANSAXLE HOUSING

Disassembly

1. To remove countershaft, mainshaft and sub-shaft bearings, expand snap ring retaining bearing in transaxle housing. Press bearings from transaxle housing.
2. DO NOT remove snap ring from transaxle housing unless necessary to clean groove in transaxle housing. Using hammer and drift, tap differential oil seal from transaxle housing.

Cleaning & Inspection

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

Reassembly

1. Coat components with ATF. To install bearings, expand snap ring. Using press and driver, press bearing part way into transaxle housing.

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

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

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

3. Once correct differential bearing side clearance is obtained, install differential oil seal using hammer and

oil seal installer until oil seal is fully seated.

DIFFERENTIAL ASSEMBLY

Disassembly

1. Before disassembling differential assembly, check side gear backlash. Place differential assembly on "V" blocks with both axle shafts installed.
2. Install dial indicator with stem resting against pinion gear. See **Fig. 24** . Check side gear backlash. Side gear backlash should be .002-.006" (.05-.15 mm). If side gear backlash is not within specification, replace differential carrier.
3. If replacing differential bearings, use bearing puller to remove differential bearings from differential carrier. Remove bolts and ring gear.

NOTE: Ring gear bolts have left-hand threads.

4. If removing speedometer drive gear, remove snap ring, speedometer drive gear and roller. See **Fig. 25** .

Cleaning & Inspection

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 .

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

Reassembly

1. Install roller for speedometer drive gear in differential carrier. Install speedometer drive gear with chamfered side on inside of gear toward differential carrier. See **Fig. 25** . Ensure cutout area on speedometer drive gear is aligned with roller.

CAUTION: Ensure speedometer drive gear is installed with chamfered side on inside of gear toward differential carrier.

2. Aligned hooked end of snap ring with pinion shaft on differential carrier and install snap ring. Ensure snap ring is installed so hooked end of snap ring is facing in proper direction. See **Fig. 26** .

CAUTION: Ensure ring gear is installed with chamfered side on inside of ring gear toward differential carrier.

3. Install ring gear on differential carrier with chamfered side on inside of ring gear toward differential carrier. See **Fig. 25** . Install and tighten ring gear bolts to specification. See **TORQUE**

SPECIFICATIONS . Using press, install NEW differential bearings on differential carrier (if removed).

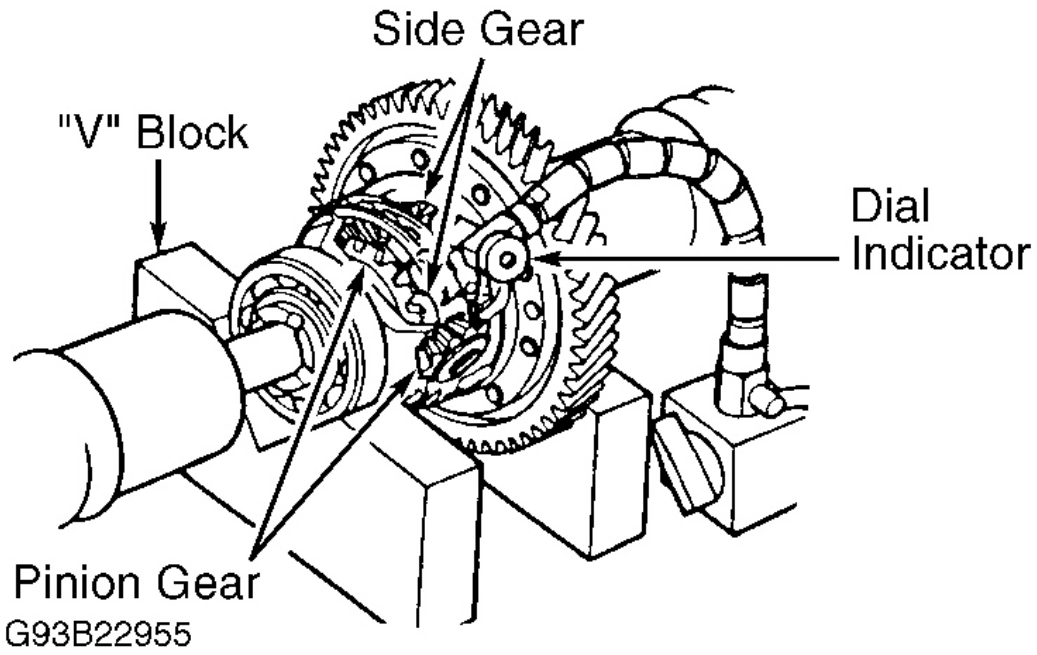

Fig. 24: Checking Side Gear Backlash
Courtesy of AMERICAN HONDA MOTOR CO., INC.

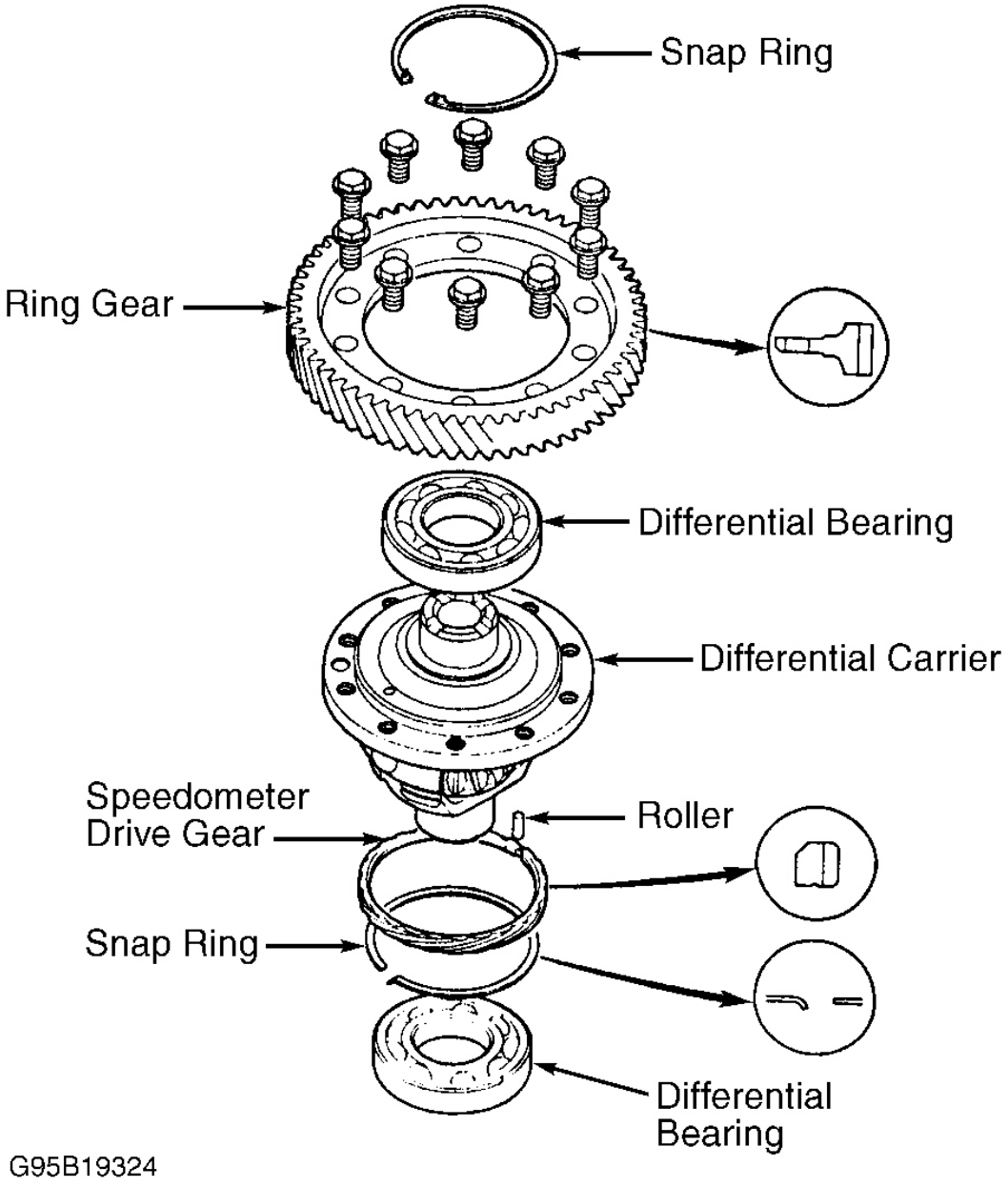

Fig. 25: Exploded View Of Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

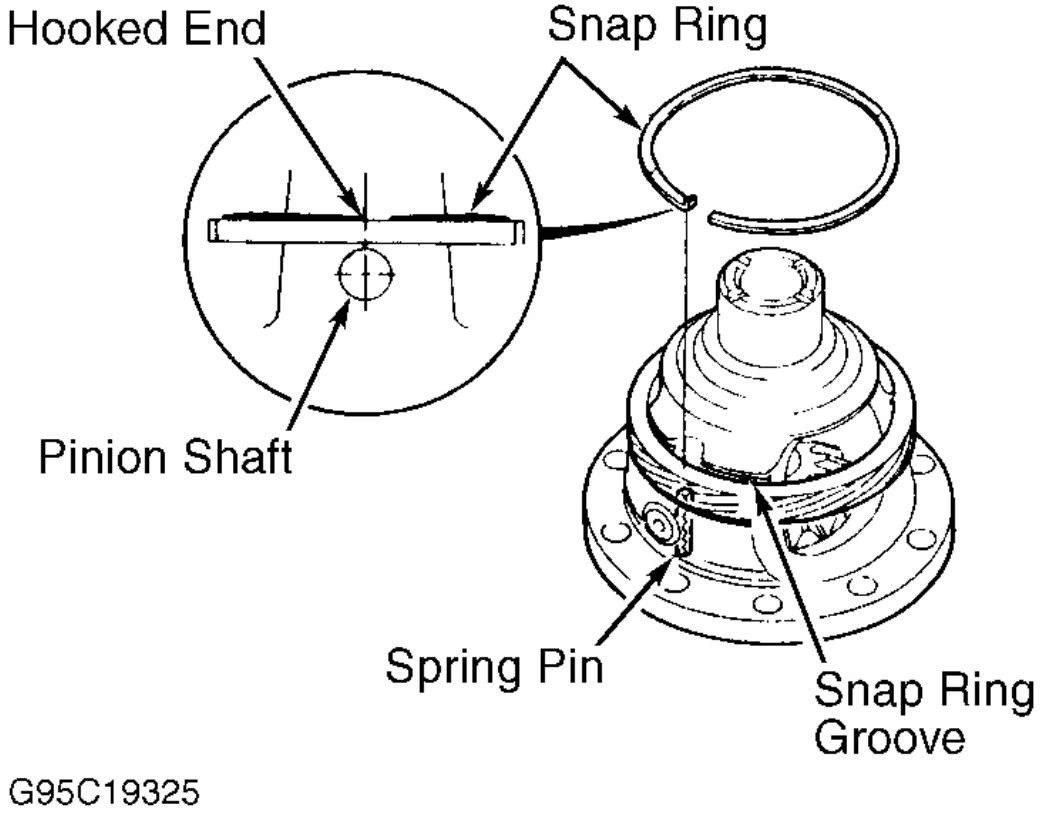

Fig. 26: Installing Speedometer Drive Gear Retaining Snap Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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) thickness snap ring in transaxle housing. Ensure snap ring is fully seated. Tap differential assembly into torque converter housing using Driver (07746-0030100). Perform STEP 1. See **Fig. 27** . Ensure differential bearing on differential carrier is fully seated on torque converter housing.
2. 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. 28** .
3. Using driver, tap on transaxle housing side of differential assembly to fully seat differential bearings. Perform STEP 2. See **Fig. 27** . Ensure differential bearings are fully seated in both housing.
4. Using feeler gauge, measure differential bearing side clearance between snap ring and bearing on the transaxle housing. See **Fig. 29** . Replace snap ring if differential bearing side clearance exceeds .006" (.15

mm). Snap rings range in thickness from .098" (2.50 mm) to .118" (3.00 mm) in .004" (.10 mm) increments. Recheck differential bearing side clearance. Remove transaxle housing and differential assembly.

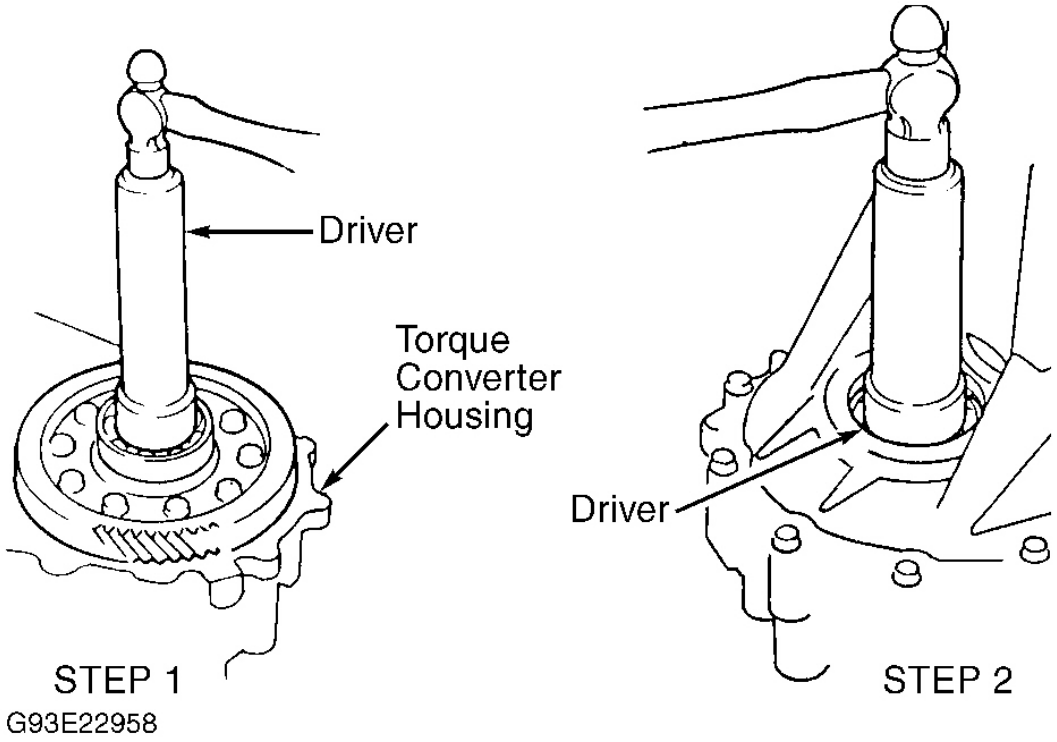

Fig. 27: Installing Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

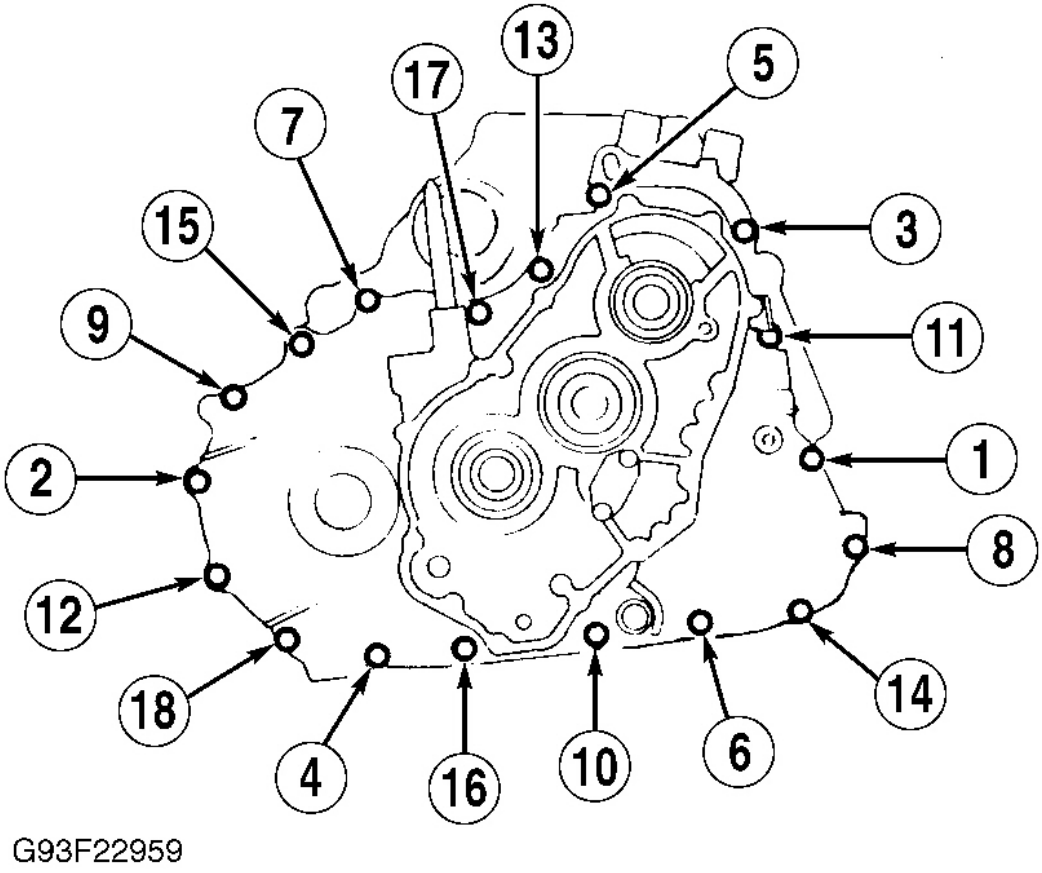

Fig. 28: Transaxle Housing Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

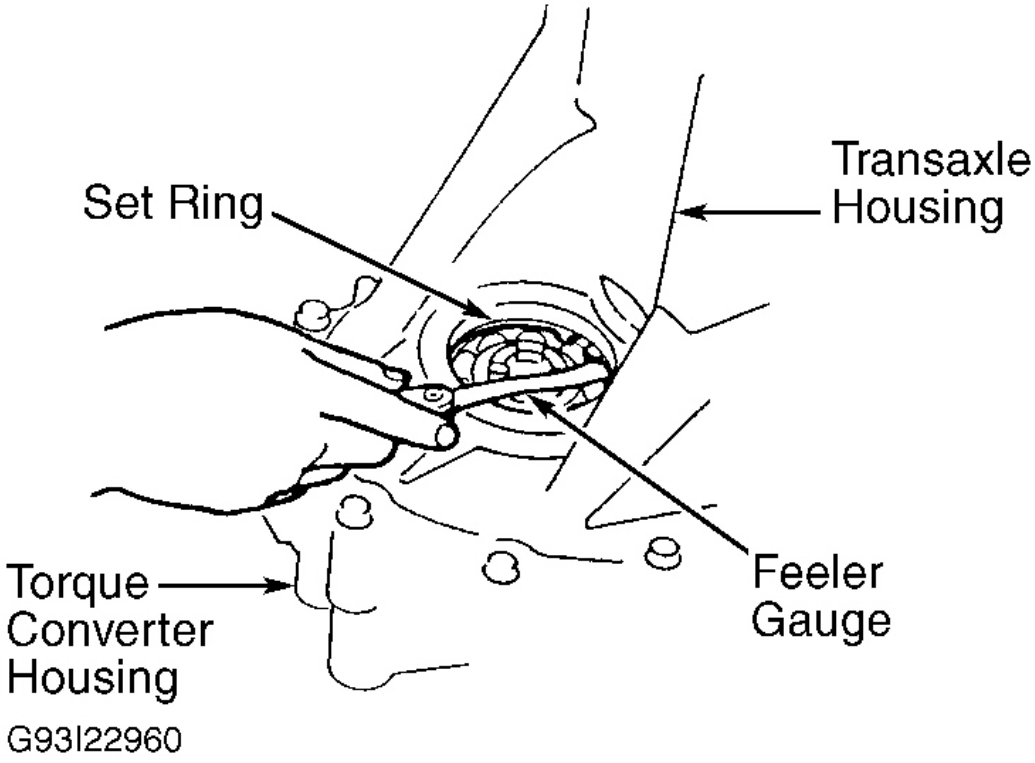

Fig. 29: Checking Differential Bearing Side Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE REASSEMBLY

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 DIFFERENTIAL ASSEMBLY.

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. 12** . Install dowel pins and separator plate for main valve on torque converter housing.

CAUTION: Ensure oil pump driven gear is installed with groove and chamfered

side facing downward (toward main separator plate).

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.

3. Install oil pump drive gear, oil pump driven gear and oil pump driven gear shaft. Install main valve body. Finger tighten main valve body bolts. Ensure check balls are installed in main valve body. Install separator plate, dowel pins and secondary valve body on main valve body. Do not install bolts.
4. Install control shaft on torque converter housing so control shaft engages manual valve on main valve body. Install detent arm and detent arm shaft on main valve body. Hook detent spring on detent arm.
5. Install separator plate and servo body. Install and tighten 8 bolts to specification. See **TORQUE SPECIFICATIONS** . Install fluid strainer. Tighten main valve body bolts to specification. Ensure oil pump gears rotate smoothly and oil pump driven gear shaft moves freely.
6. 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.
7. Install cooler relief valve and torque converter check valve and springs on regulator valve body. See **Fig. 15** . Install separator plate, dowel pins, lock-up valve body and lubrication plate on regulator valve body. Install and tighten bolts to specification.

NOTE: Install 4.17" (105.8 mm) oil feed pipe with oil filter end of pipe mounted away from secondary valve body.

8. Install oil feed pipes in secondary valve body, servo body, lock-up valve body and main valve body. See **Fig. 12** .
9. Install sub-shaft and 1st-hold clutch assembly in transaxle housing (if removed). See **SUB-SHAFT & 1ST-HOLD CLUTCH ASSEMBLY** under COMPONENT DISASSEMBLY & REASSEMBLY.
10. Install differential assembly in torque converter housing. Using Driver (07746-0030100), tap differential assembly into torque converter housing. Perform STEP 1. See **Fig. 27** . Ensure differential bearing on differential carrier is fully seated on torque converter housing.
11. Install mainshaft and countershaft as an assembly in torque converter housing. Rotate shift fork shaft on servo body so large chamfered hole aligns with hole in reverse shift fork.
12. Install reverse shift fork and reverse selector. See **Fig. 11** . Install reverse shift fork bolt and NEW bolt lock. Tighten bolt to specification. Bend over tabs on bolt lock.
13. Install countershaft reverse gear, needle bearing and countershaft reverse gear collar on countershaft. See **Fig. 11** . Install dowel pins and NEW gasket on torque converter housing.
14. Align spring pin on control shaft with groove on transaxle housing by rotating control shaft. See **Fig. 10** .

CAUTION: Ensure mainshaft speed sensor is not installed in transaxle housing. Damage to sensor will occur.

15. Install transaxle housing on torque converter housing. Install and tighten transaxle housing bolts to specification in 2 steps using proper sequence. See **Fig. 28** . Install mainshaft speed sensor.
16. Install mainshaft holder on mainshaft. See **Fig. 8** . Install parking brake lever with parking brake stopper and parking brake lever spring on control shaft. See **Fig. 7** .
17. Install mainshaft 1st gear collar and thrust washer on mainshaft. Install countershaft 1st gear collar, needle bearing and countershaft 1st gear with one-way clutch and parking gear on countershaft. Install parking pawl stopper, parking pawl shaft, parking pawl spring and parking pawl on transaxle housing.
18. Engage parking pawl with parking gear. Install old spring washer and lock nut on countershaft. Tighten nut to 76 ft. lbs. (103 N.m) to seat parking gear and countershaft 1st gear on countershaft. Remove old lock nut and spring washer from countershaft.
19. Secure mainshaft with Holder (07GAB-PF50101). Install sub-shaft 1st gear on sub-shaft. Install mainshaft 1st gear on mainshaft. See **Fig. 7** . Install needle bearing, thrust needle bearing, thrust washer. Wrap splines on mainshaft with tape. Install NEW "O" rings on mainshaft. Install 1st clutch assembly on mainshaft.
20. Align hole in sub-shaft 1st gear with hole in transaxle housing. Install pin in sub-shaft 1st gear and transaxle housing to prevent sub-shaft 1st gear from rotating. See **Fig. 9** .

CAUTION: Ensure spring washers are installed in correct direction. See Fig. 9 .

21. Install NEW spring washers and NEW lock nuts on mainshaft, countershaft and sub-shaft. Ensure spring washers are installed with large area against gear. See **Fig. 9** .

NOTE: Mainshaft and countershaft contain left-hand threads.

22. Tighten lock nuts on mainshaft, countershaft and sub-shaft to specification. Remove pin from sub-shaft 1st gear. Remove mainshaft holder.
23. Stake flange area of mainshaft lock nut against 1st clutch assembly. Stake threaded area of countershaft lock nut against threads on countershaft. Stake threaded area of sub-shaft lock nut against threads of sub-shaft.

CAUTION: Ensure all lock nuts are securely staked.

24. 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 the parking brake lever. See **Fig. 30** .
25. 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 distance. Parking brake stop is available in 3 different sizes.
26. Install NEW bolt lock on bolt for parking brake stop. Tighten bolt to specification. Bend over tabs on bolt lock. Using NEW gasket, install end cover. Install and tighten bolts to specification.
27. To install remaining components, reverse removal procedure. Use NEW seal washers when installing joint bolts for cooler pipes. Use NEW "O" ring when installing countershaft speed sensor. Tighten all

fasteners to specification.

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

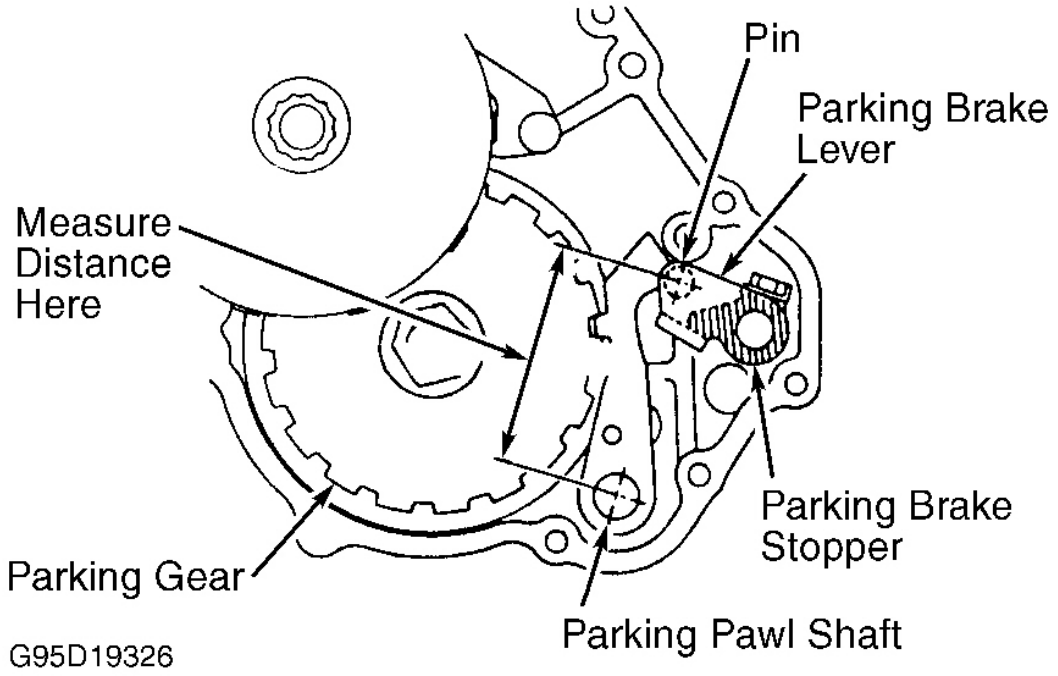

Fig. 30: Measuring Parking Brake Stopper Distance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

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)
Pressure Tap Plug	13 (18)
Ring Gear Bolt	74 (100)
Sub-Shaft Lock Nut	69 (94)
Transaxle Housing Bolt (1)	33 (45)

Vehicle Speed Sensor Bolt	16 (22)
	INCH Lbs. (N.m)
Accumulator Cover Bolt	106 (12.0)
Countershaft Speed Sensor Bolt	106 (12.0)
End Cover Bolt	106 (12.0)
Lock-Up Control Solenoid Valve Assembly 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 Stopper Bolt	106 (12.0)
Parking Brake Stopper Bolt	120 (13.6)
Regulator Valve Body Bolt	106 (12.0)
Reverse Idler Gear Shaft Holder Bolt	106 (12.0)
Reverse Shift Fork Bolt	120 (13.6)
Secondary Valve Body Bolt	106 (12.0)
Servo Body Bolt	106 (12.0)
Servo Detent Base Bolt	106 (12.0)
Shift Control Solenoid Valve Assembly Bolt	106 (12.0)
Stopper Bolt	106 (12.0)
Throttle Cam Stopper Bolt	106 (12.0)
Throttle Control Lever Bolt	69 (7.8)
(1) Tighten bolts to specification in sequence. See **Fig. 28** .	

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	Specification - In. (mm)
Clutch Clearance	
1st Clutch	.026-.033 (.65-.85)
1st-Hold Clutch	.020-.031 (.50-.80)
2nd, 3rd & 4th Clutches	.016-.024 (.40-.60)
Clutch Disc Thickness	.074-.079 (1.88-2.00)
Clutch Plate Thickness	
2nd, 3rd & 4th Clutches	.077-.081 (1.95-2.05)
1st & 1st-Hold Clutches	.061-.065 (1.55-1.65)
Differential Bearing Side Clearance	(1) .006 (.15)
Differential Side Gear Backlash	.002-.006 (.05-.15)
Gear Clearances	
Countershaft 2nd Gear	.004-.007 (.10-.18)
Mainshaft 2nd Gear-To-3rd Gear	.002-.005 (.05-.13)
Oil Pump Side Clearances	

Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0028-.0049 (.070-.125)
Oil Pump Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)
Parking Brake Stopper Distance	2.87-2.91 (72.9-73.9)

(1) This is the maximum clearance. Replace snap ring with different thickness snap ring if clearance exceeds specification.