

1997 Acura NSX

1997-2004 AUTOMATIC TRANSMISSIONS MR9A Overhaul

1997-2004 AUTOMATIC TRANSMISSIONS

MR9A Overhaul

APPLICATION

CAUTION: Flush oil cooler and oil cooler lines prior to transmission installation. Oil cooling system contamination may cause premature transmission failure. For additional information, see appropriate **SERVICING** article.

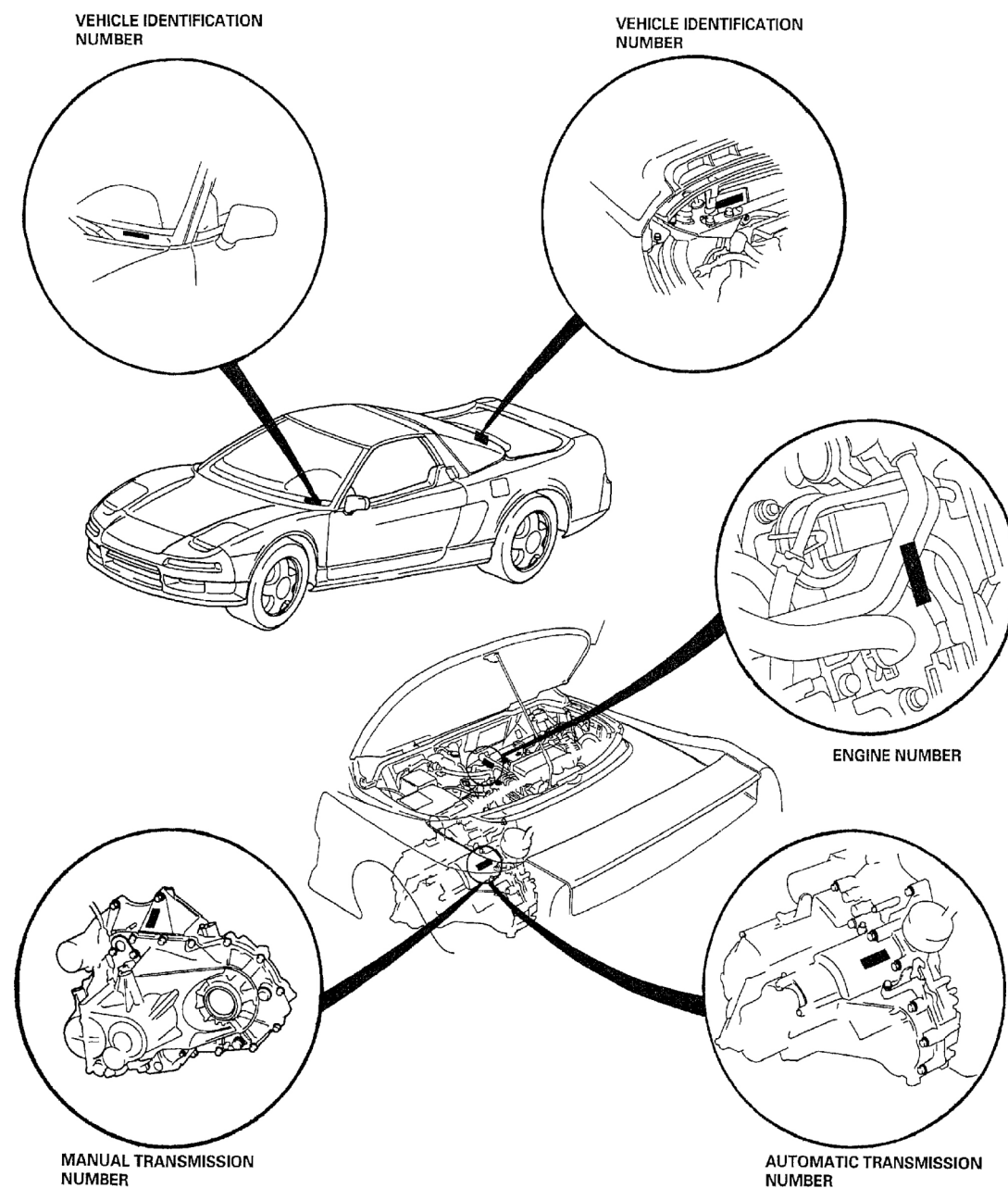
TRANSAXLE APPLICATION

Application	Transaxle Model
NSX & NSX-T	MR9A

IDENTIFICATION

TRANSAXLE

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



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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	2.611:1

2nd	1.551:1
3rd	1.025:1
4th	0.684:1
Reverse	1.909:1
Final Drive	4.428:1

DESCRIPTION & OPERATION

INTRODUCTION

The automatic transaxle is a combination of a 3-element torque converter and a triple-shaft electronically controlled automatic transaxle which provides 4 speeds forward and 1 speed reverse. See **Fig. 2** . The entire unit is positioned in line with the engine.

Torque Converter, Gears & Clutches

The torque converter consists of a pump, turbine, and stator, assembled in a single unit. They are connected to the engine crankshaft so they turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is being started. The entire torque converter assembly serves as a flywheel while transmitting power to the transaxle mainshaft. The transaxle has three parallel shafts: the mainshaft, the countershaft, and the secondary shaft. The mainshaft is in line with the engine crankshaft. The mainshaft includes the 1st and 4th clutches, and gears for 3rd, 4th, reverse, and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with 4th gear). The countershaft includes the 1st-hold and 3rd clutches, and gears for 2nd, 3rd, 4th, reverse, 1st, and parking. The secondary shaft includes the 2nd clutch and gears for 2nd and 3rd. The 4th and reverse gears can be locked to the countershaft at its center, providing 4th gear or reverse, depending on which way the selector is moved. The gears on the mainshaft and secondary shaft are in constant mesh with those on the countershaft. When certain combinations of gears in the transaxle are engaged by clutches, power is transmitted from the mainshaft to the countershaft to provide "1", "2", "3/M", "D" and "R" positions.

Electronic Control

The electronic control system consists of the Transmission Control Module (TCM), sensors, a linear solenoid, a shift switch, and 4 solenoid valves. Shifting and lock-up are electronically controlled for comfortable driving under all conditions. The TCM is located on the insulator center bulkhead, behind the driver's seat.

Hydraulic Control

The valve bodies include the main valve body, secondary valve body, servo body, regulator valve body, throttle valve body, lock-up valve body, and the 2nd accumulator body. They are bolted to the torque converter housing as an assembly. The main valve body contains the manual valve, 1-2 shift valve, 2-3 shift valve, 3-4 shift valve, relief valve, one-way relief valve, and oil pump gears. The secondary valve body contains the 3-2 kickdown valve, Clutch Pressure Control (CPC) valve, 2nd orifice control valve, 3rd orifice control valve, modulator valve, 4th exhaust valve, servo control valve, 2nd exhaust valve, and 4-3 kickdown valve. The servo body contains the accumulator pistons and servo valve. The throttle valve body includes the throttle valve "B" which is bolted to the servo body. The regulator valve body contains the pressure regulator valve, lock-up control valve, and cooler relief valve. Fluid from the regulator passes through the manual valve to the various control

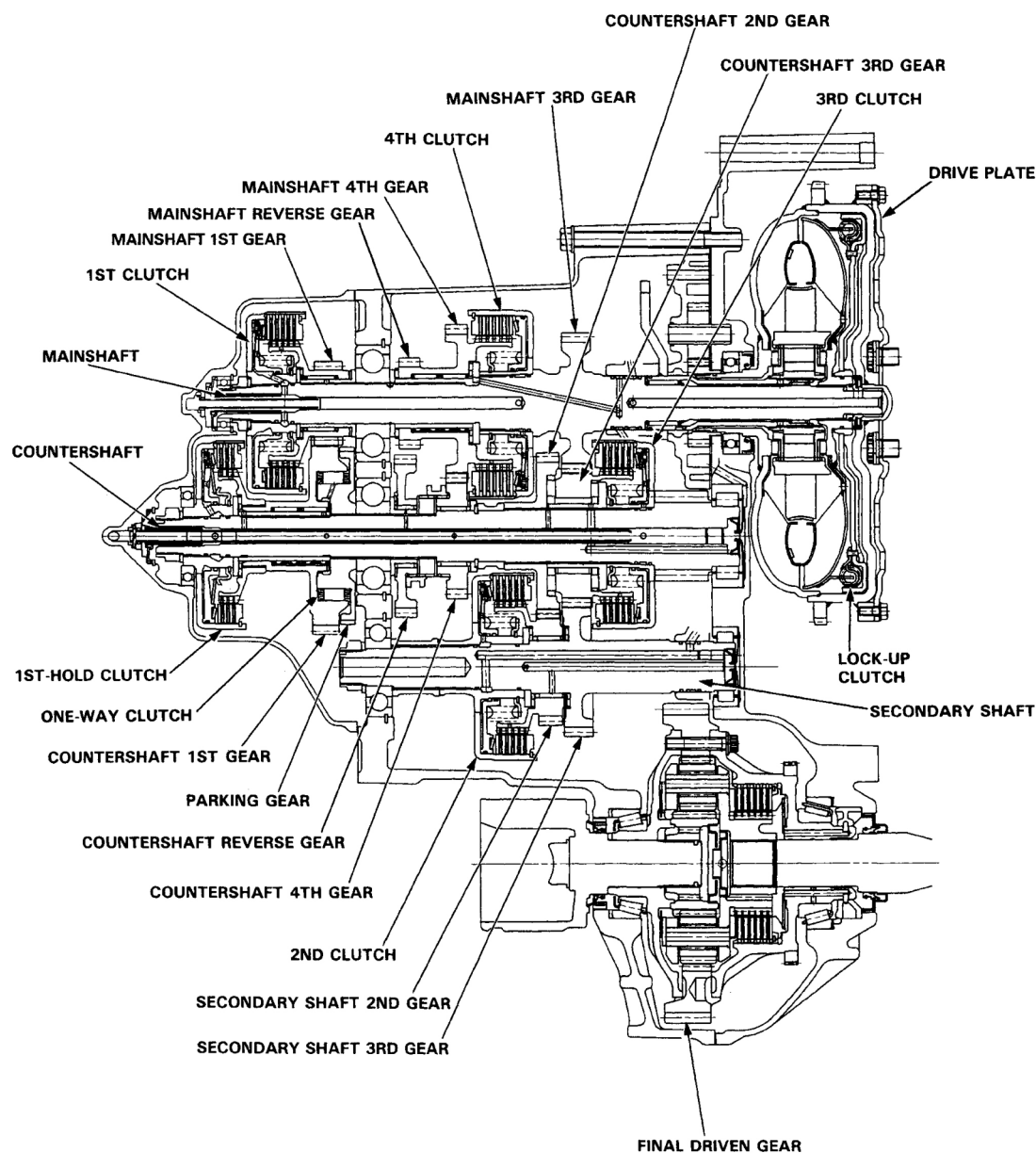
valves. The lock-up valve body contains the lock-up timing "B" valve and lock-up shift valve. The 2nd accumulator body contains the accumulator pistons and limited slip differential relief valve. The torque converter check valve is located in the torque converter housing, under the main valve body. The 1st, 1st-hold, 3rd, and 4th clutches receive fluid from their respective feed pipes and the 2nd clutch receives fluid from the internal hydraulic circuit.

Shift Control Mechanism

Input from various sensors located throughout the vehicle determines which shift control solenoid valve the TCM will activate. Activating a shift control solenoid valve changes modulator pressure, causing a shift valve to move. This pressurizes a line to one of the clutches, engaging that clutch and its corresponding gear.

Lock-Up Mechanism

In "3/M" position and "D" position in 2nd, 3rd, and 4th, pressurized fluid is drained from the back of the torque converter through a fluid passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, the TCM optimizes the timing of the lock-up mechanism. The lock-up valves control the range of lock-up according to lock-up control solenoid valves "A" and "B", and throttle valve "B". When lock-up control solenoid valves "A" and "B" activate, modulator pressure changes. The lock-up control solenoid valves "A" and "B" are mounted on the torque converter housing, and are controlled by the TCM.



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Fig. 2: Cut-Away View Of MR9A Transaxle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

LUBRICATION

NOTE: See SERVICING - ACURA (NSX & NSX-T) article.

TROUBLE SHOOTING

NOTE: Transmission malfunctions may be caused by poor engine performance,

improper adjustments, fluid condition or failure of hydraulic, mechanical or electronic components. Ensure all concerns have been properly checked prior to transmission overhaul. See MR9A DIAGNOSIS article.

TRANSAXLE DISASSEMBLY

LEFT SIDE COVER

NOTE: The following tool is required for disassembly procedure:

- Mainshaft holder (07924-PJ4010A).

NOTE: To assist in disassembly of transaxle, refer to illustrations. See Fig. 3 and Fig. 4.

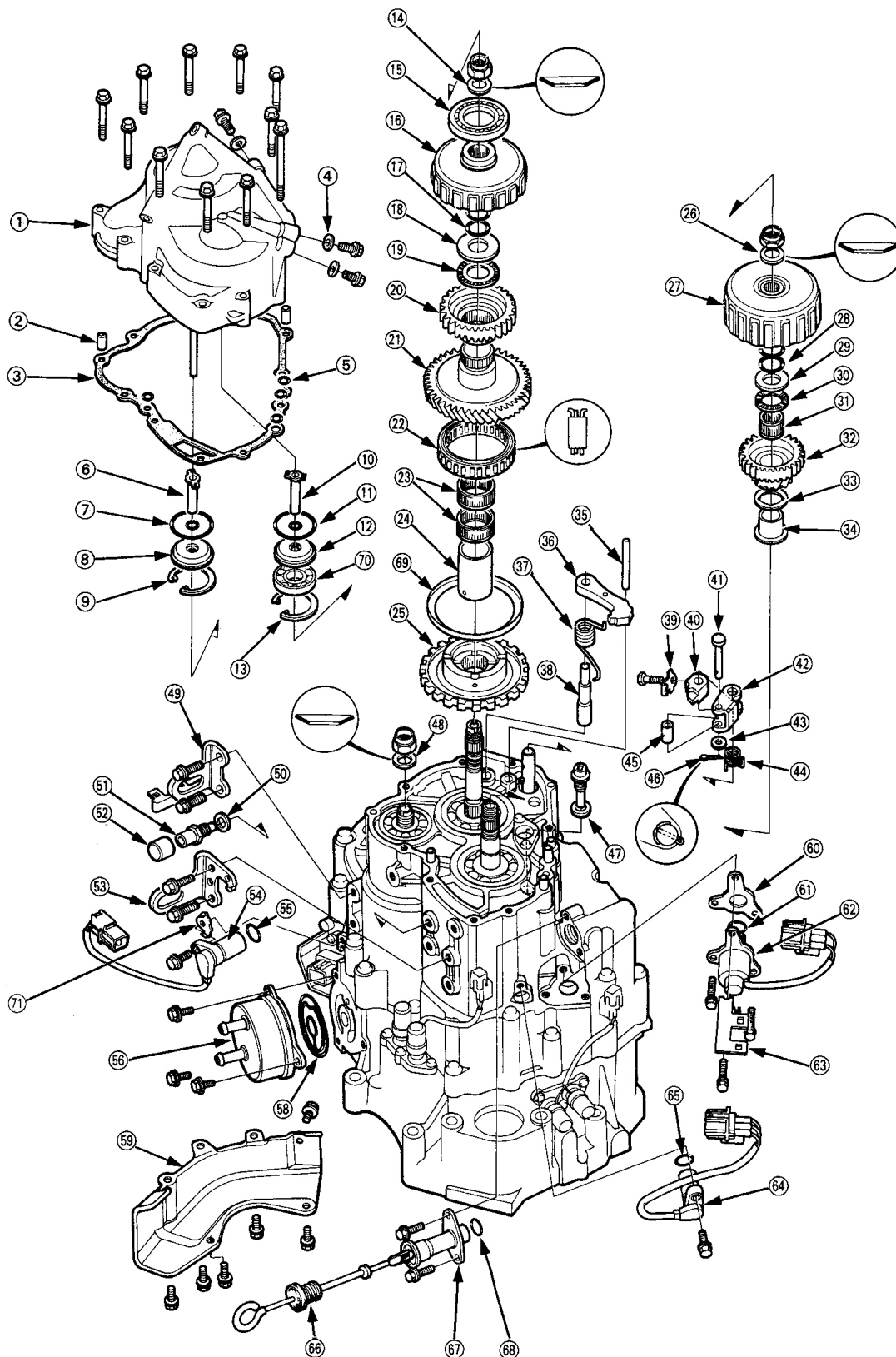
1. Remove vehicle speed sensor cover, then reinstall 3 bolts around the driveshaft oil seal.
2. Slip the holder onto mainshaft, and engage the parking brake pawl with the parking gear. See Fig. 5.
3. Remove the transaxle left side cover in the following numbered sequence. See Fig. 6.

NOTE: Countershaft lock nut has left-hand threads.

4. Cut the lock tabs of each shaft lock nut using a chisel, then remove the lock nuts and conical spring washers. See Fig. 7.
5. Remove holder from mainshaft after removing the lock nuts.

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Fig. 3: Exploded View Of Left Side Cover & Exterior Components (1 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

- | | |
|----------------------------------|---|
| ① LEFT SIDE COVER | ③⑥ PARKING BRAKE PAWL |
| ② DOWEL PIN | ③⑦ PARKING BRAKE PAWL SPRING |
| ③ GASKET Replace. | ③⑧ PARKING BRAKE PAWL SHAFT |
| ④ SEALING WASHER Replace. | ③⑨ LOCK WASHER Replace. |
| ⑤ O-RING Replace. | ④① PARKING BRAKE STOPPER Selective part |
| ⑥ 1ST-HOLD CLUTCH FEED PIPE | ④② ROLLER PIN |
| ⑦ O-RING Replace. | ④③ PARKING BRAKE LEVER |
| ⑧ FEED PIPE FLANGE | ④④ WASHER |
| ⑨ SNAP RING | ④⑤ PARKING BRAKE SPRING |
| ⑩ 1ST CLUTCH FEED PIPE | ④⑥ ROLLER |
| ⑪ O-RING Replace. | ④⑦ COTTER PIN Replace. |
| ⑫ FEED PIPE FLANGE | ④⑧ SEALING WASHER Replace. |
| ⑬ SNAP RING | ④⑨ CONICAL SPRING WASHER Replace. |
| ⑭ CONICAL SPRING WASHER Replace. | ④⑩ TRANSMISSION HANGER/CONNECTOR STAY |
| ⑮ BALL BEARING | ⑤① SEALING WASHER Replace. |
| ⑯ 1ST-HOLD CLUTCH ASSEMBLY | ⑤② BREATHER JOINT |
| ⑰ O-RING Replace. | ⑤③ BREATHER CAP |
| ⑱ THRUST WASHER | ⑤④ TRANSMISSION HANGER |
| ⑲ THRUST NEEDLE BEARING | ⑤⑤ COUNTERSHAFT SPEED SENSOR |
| ⑳ 1ST-HOLD CLUTCH HUB | ⑤⑥ O-RING Replace. |
| ㉑ COUNTERSHAFT 1ST GEAR | ⑤⑦ ATF COOLER |
| ㉒ ONE-WAY CLUTCH | ⑤⑧ ATF COOLER FILTER/GASKET Replace. |
| ㉓ NEEDLE BEARINGS | ⑤⑨ SPEED SENSOR COVER |
| ㉔ COUNTERSHAFT 1ST GEAR COLLAR | ⑥① LINEAR SOLENOID SHIM Selective part |
| Selective part | ⑥② O-RING Replace. |
| ㉕ PARKING GEAR | ⑥③ LINEAR SOLENOID |
| ㉖ CONICAL SPRING WASHER Replace. | ⑥④ CONNECTOR STAY |
| ㉗ 1ST CLUTCH ASSEMBLY | ⑥⑤ MAINSHAFT SPEED SENSOR |
| ㉘ O-RING Replace. | ⑥⑥ O-RING Replace. |
| ㉙ THRUST WASHER | ⑥⑦ ATF DIPSTICK |
| ㉚ THRUST NEEDLE BEARING | ⑥⑧ ATF DIPSTICK PIPE |
| ㉛ NEEDLE BEARING | ⑥⑨ O-RING Replace. |
| ㉜ MAINSHAFT 1ST GEAR | ⑦① RETAINER PLATE |
| ㉝ THRUST WASHER | ⑦② BALL BEARING |
| ㉞ MAINSHAFT 1ST GEAR COLLAR | ⑦③ COUNTERSHAFT SPEED SENSOR WASHER |
| ㉟ PARKING BRAKE PAWL STOPPER | |

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Fig. 4: Exploded View Of Left Side Cover & Exterior Components (2 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

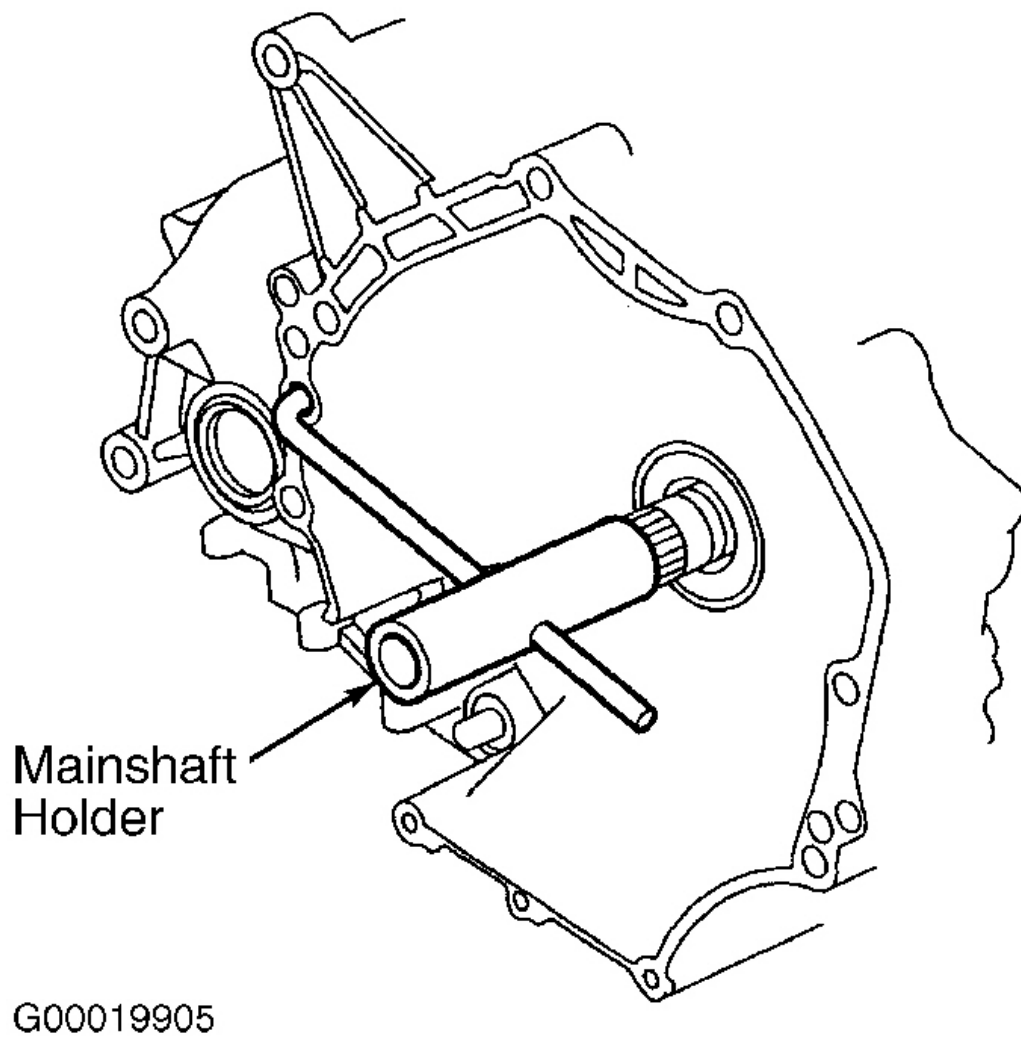
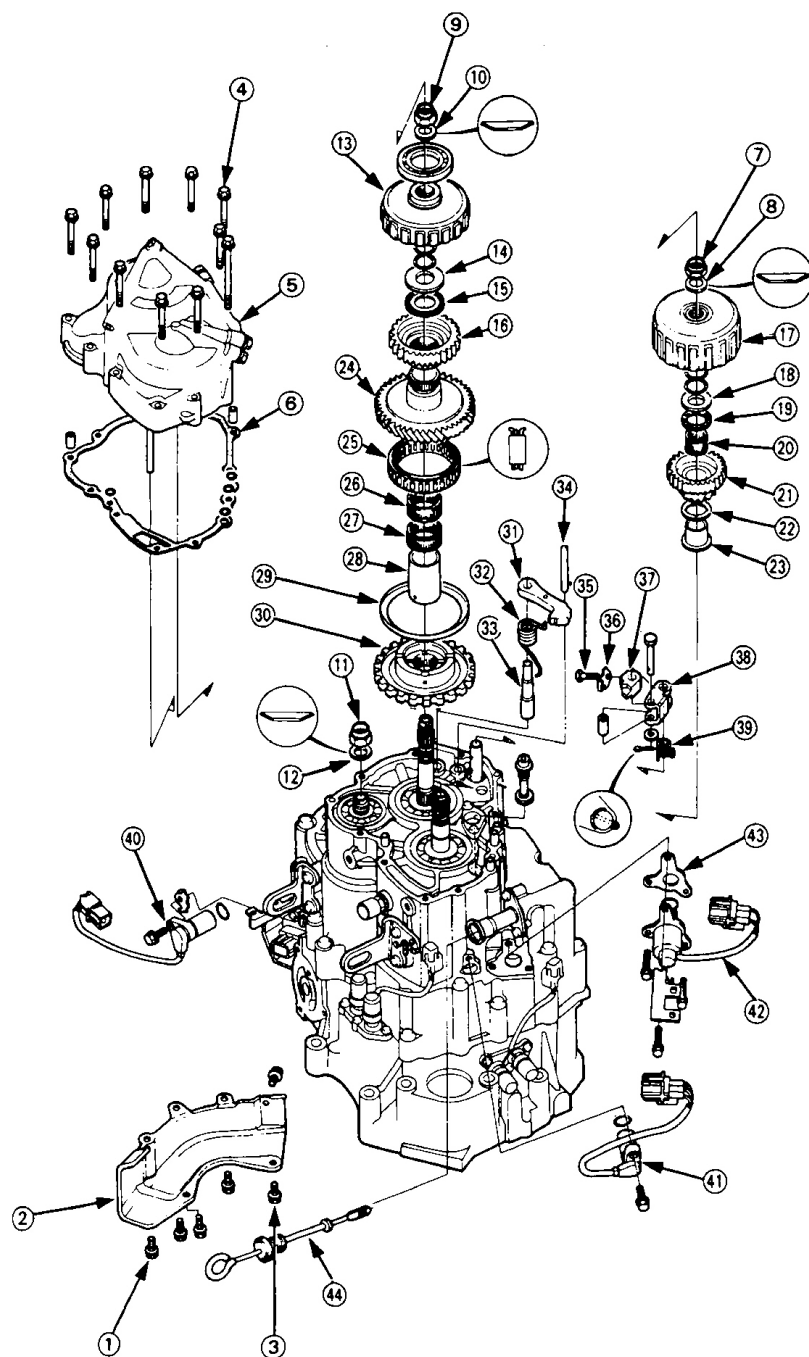


Fig. 5: Securing Mainshaft With Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.



Reinstall 3 bolts around
the driveshaft oil seal.

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Fig. 6: Identifying Sequential Disassembly Of Left Side Cover & Exterior Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

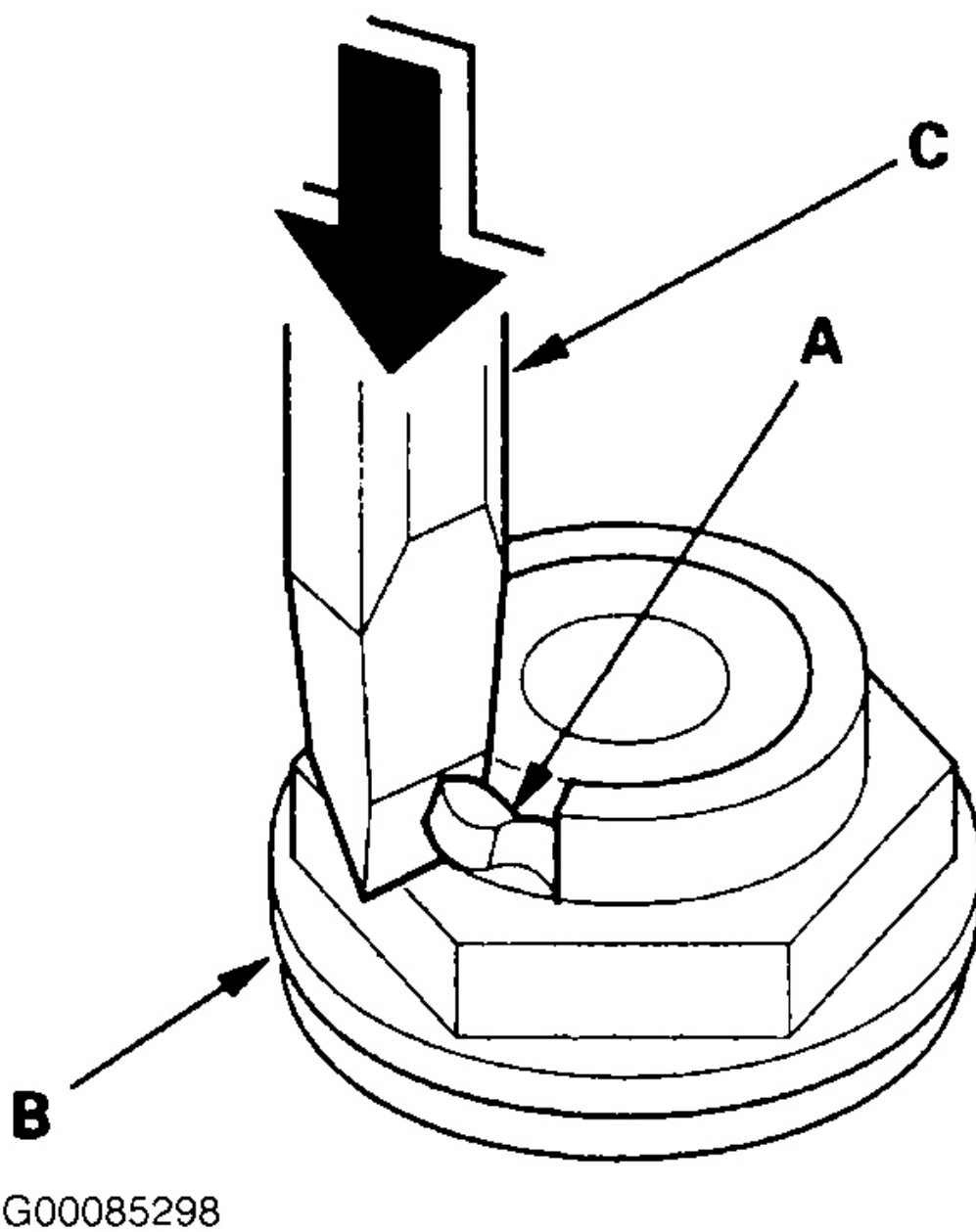


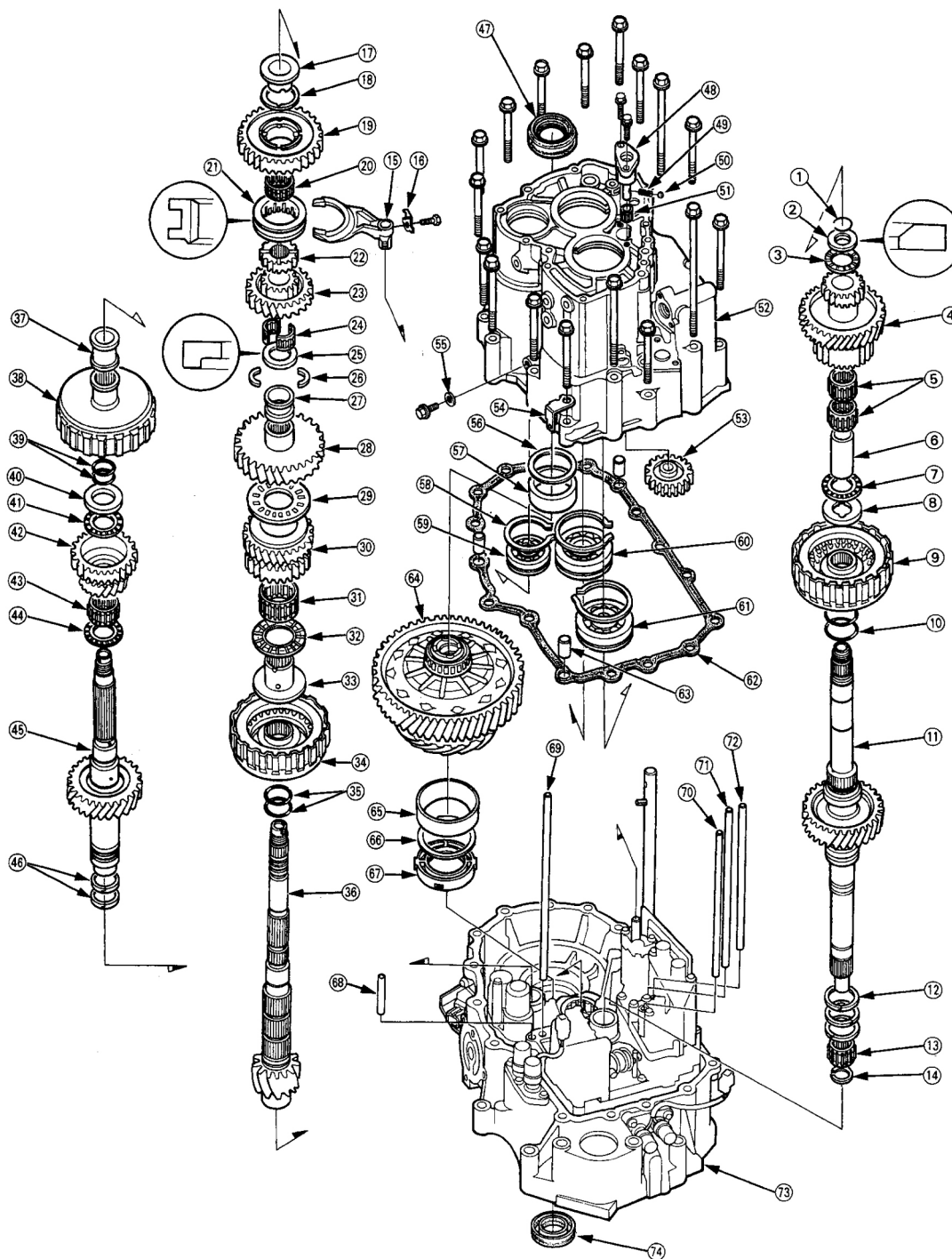
Fig. 7: Cutting Lock Nut Lock Tabs

Courtesy of AMERICAN HONDA MOTOR CO., INC.

HOUSING & SHAFT ASSEMBLIES

NOTE: To assist in disassembly of components, refer to illustration. See Fig. 8 and Fig. 9.

1. Remove the transaxle housing and shaft assemblies in the following numbered sequence. See Fig. 10.
2. Mount Housing Puller (07HAC-PK4010A) with appropriate bolts. See Fig. 11. Ensure control shaft spring pin is aligned with groove in transaxle housing.
3. Remove mainshaft, countershaft and secondary shaft together.



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Fig. 8: Exploded View Of Housing & Shaft Assemblies (1 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

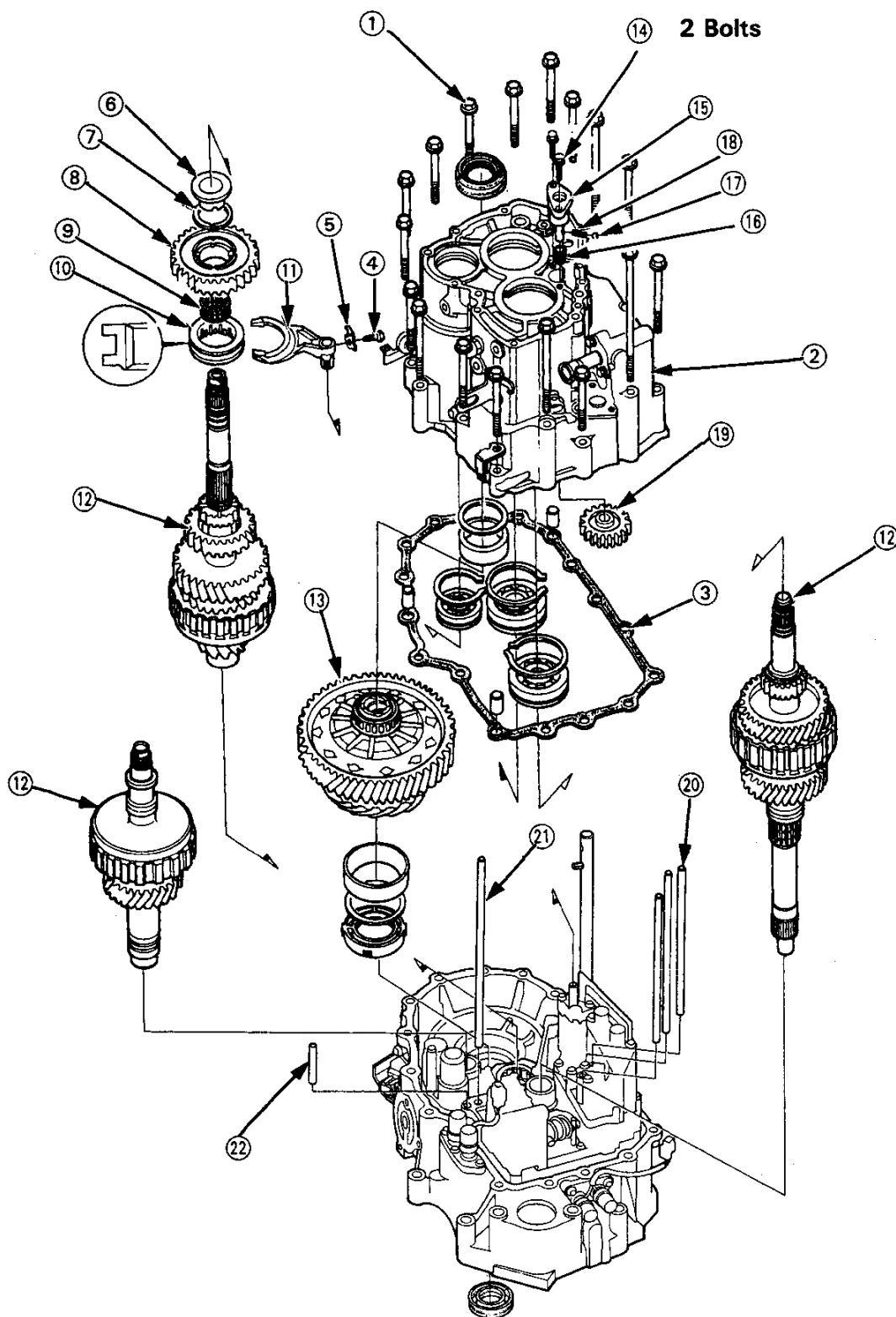
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- | | |
|------------------------------------|------------------------------------|
| ① SNAP RING | ③⑧ 2ND CLUTCH ASSEMBLY |
| ② WASHER | ③⑨ O-RINGS Replace. |
| ③ THRUST NEEDLE BEARING | ④① THRUST WASHER |
| ④ MAINSHAFT 4TH GEAR | ④② THRUST NEEDLE BEARING |
| ⑤ NEEDLE BEARINGS | ④③ SECONDARY SHAFT 2ND GEAR |
| ⑥ MAINSHAFT 4TH GEAR COLLAR | ④④ NEEDLE BEARING |
| ⑦ THRUST NEEDLE BEARING | ④⑤ THRUST NEEDLE BEARING |
| ⑧ THRUST WASHER | ④⑥ SECONDARY SHAFT |
| ⑨ 4TH CLUTCH ASSEMBLY | ④⑦ SEALING RINGS 35 mm |
| ⑩ O-RING Replace. | ④⑧ DIFFERENTIAL OIL SEAL Replace. |
| ⑪ MAINSHAFT | ④⑨ REVERSE IDLER GEAR SHAFT/HOLDER |
| ⑫ SEALING RING 37 mm | ④⑩ REVERSE IDLER GEAR SHAFT SPRING |
| ⑬ NEEDLE BEARING | ⑤① STEEL BALL (7/32) #7 |
| ⑭ SET RING | ⑤② NEEDLE BEARING |
| ⑮ REVERSE SHIFT FORK | ⑤③ TRANSMISSION HOUSING |
| ⑯ LOCK WASHER Replace. | ⑤④ REVERSE IDLER GEAR |
| ⑰ COUNTERSHAFT REVERSE GEAR COLLAR | ⑤⑤ CONNECTOR STAY |
| ⑱ THRUST WASHER | ⑤⑥ SEALING WASHER Replace. |
| ⑲ COUNTERSHAFT REVERSE GEAR | ⑤⑦ THRUST SHIM |
| ⑳ NEEDLE BEARING | ⑤⑧ BEARING OUTER RACE |
| ㉑ REVERSE SELECTOR | ⑤⑨ SNAP RING |
| ㉒ REVERSE SELECTOR HUB | ⑤⑩ SECONDARY SHAFT BALL BEARING |
| ㉓ COUNTERSHAFT 4TH GEAR | ⑤⑪ COUNTERSHAFT BALL BEARING |
| ㉔ NEEDLE BEARING (Separate type) | ⑤⑫ MAINSHAFT BALL BEARING |
| ㉕ COTTER RETAINER | ⑤⑬ GASKET Replace. |
| ㉖ COTTERS | ⑤⑭ DOWEL PIN |
| ㉗ COUNTERSHAFT 2ND GEAR SPACER | ⑤⑮ DIFFERENTIAL ASSEMBLY |
| ㉘ COUNTERSHAFT 2ND GEAR | ⑤⑯ BEARING OUTER RACE |
| ㉙ THRUST NEEDLE BEARING | ⑤⑰ THRUST SHIM |
| ㉚ COUNTERSHAFT 3RD GEAR | ⑤⑱ DIFFERENTIAL ATF GUIDE RING |
| ㉛ NEEDLE BEARING | ⑤⑲ 2ND CLUTCH FEED PIPE |
| ㉜ THRUST NEEDLE BEARING | ⑤⑳ 1ST-HOLD CLUTCH FEED PIPE |
| ㉝ COUNTERSHAFT 3RD GEAR COLLAR | ⑤㉑ 4TH CLUTCH FEED PIPE |
| ㉞ 3RD CLUTCH ASSEMBLY | ⑤㉒ 1ST CLUTCH FEED PIPE |
| ㉟ O-RINGS Replace. | ⑤㉓ 3RD CLUTCH FEED PIPE |
| ㊱ COUNTERSHAFT | ⑤㉔ TORQUE CONVERTER HOUSING |
| ㊲ SPACER 31 mm | ⑤㉕ DRIVESHAFT OIL SEAL Replace. |

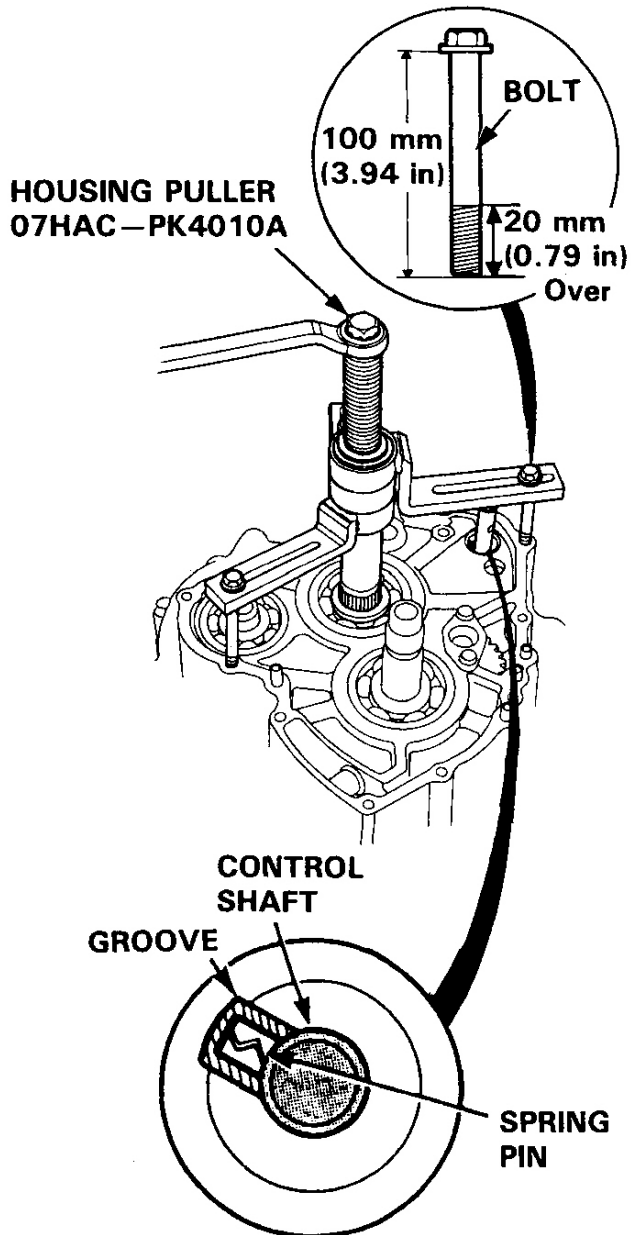
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Fig. 9: Exploded View Of Housing & Shaft Assemblies (2 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 10: Identifying Sequential Disassembly Of Housing & Shaft Assemblies
Courtesy of AMERICAN HONDA MOTOR CO., INC.



NOTE: Align the control shaft spring pin with the groove in the transmission housing.

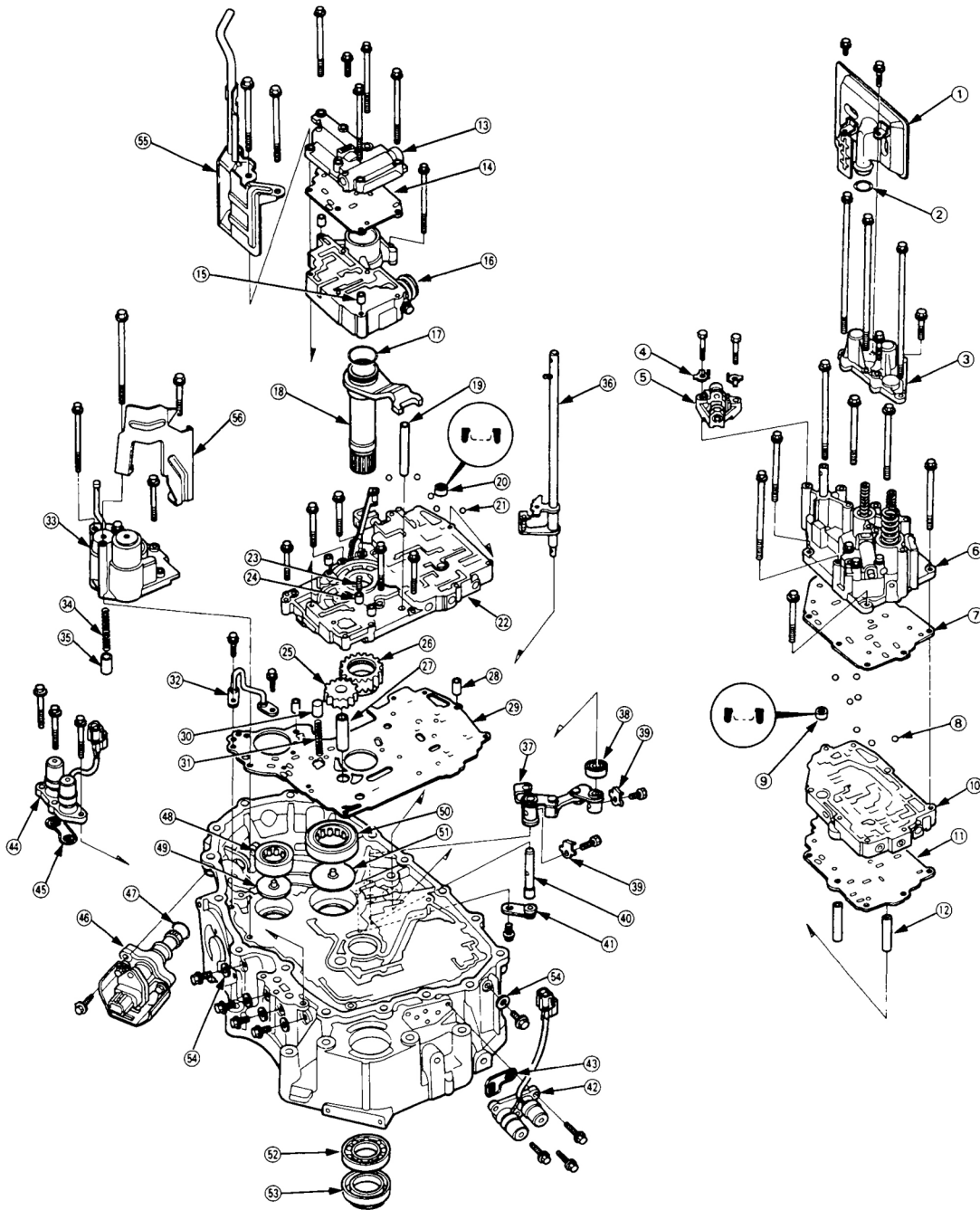
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Fig. 11: Removing Transaxle Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE BODY

NOTE: To assist in disassembly of components, refer to illustrations. See Fig. 12 and Fig. 13.

Remove the valve body assembly in the following numbered sequence. See Fig. 14.



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Fig. 12: Exploded View Of Valve Body Assembly (1 Of 2)

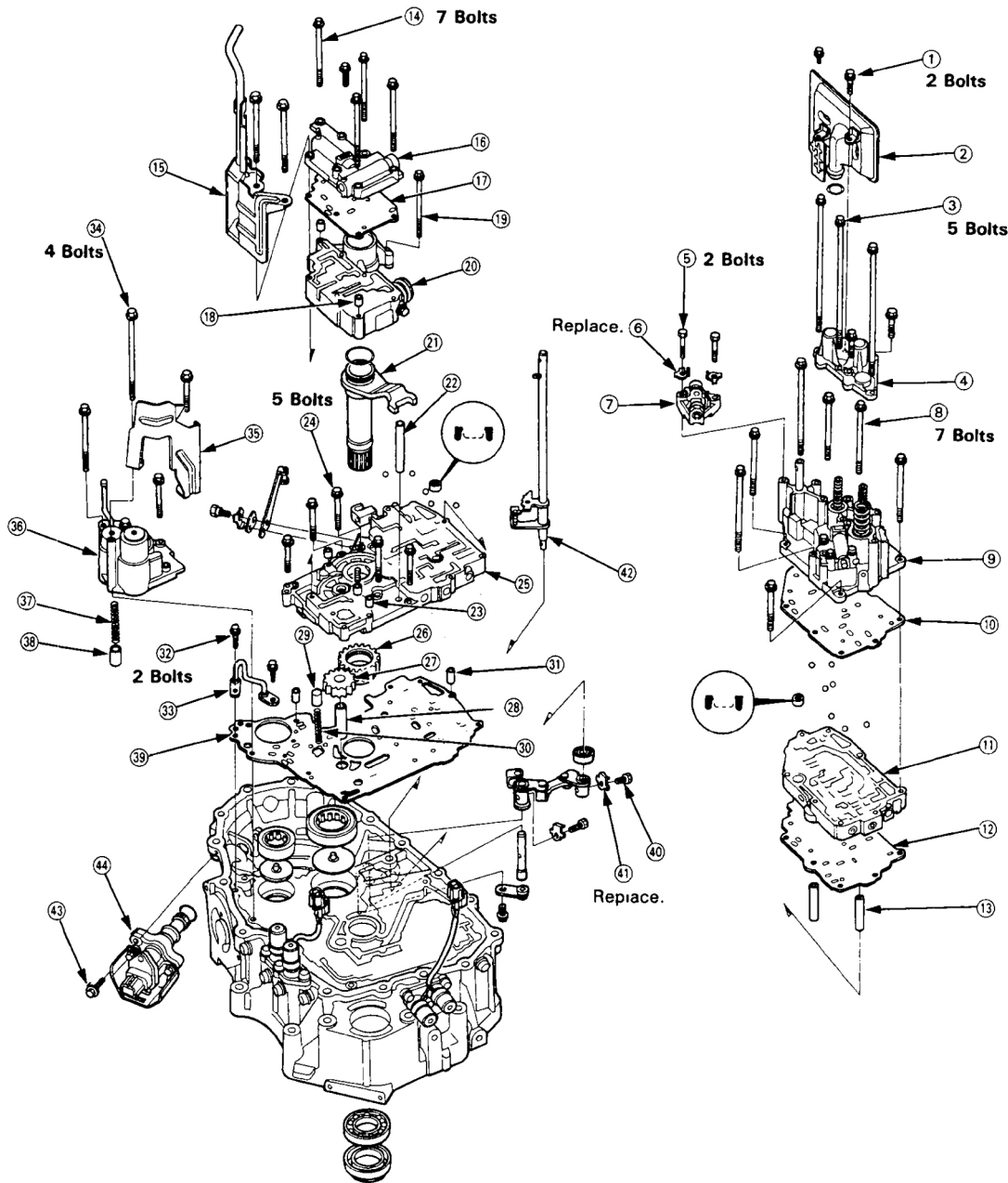
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- | | |
|--|---|
| ① ATF STRAINER | ②⑨ MAIN SEPARATOR PLATE |
| ② O-RING Replace. | ③⑩ TORQUE CONVERTER CHECK VALVE |
| ③ ACCUMULATOR COVER | ④⑪ TORQUE CONVERTER CHECK VALVE SPRING |
| ④ LOCK WASHER Replace. | ⑤⑫ ATF LUBRICATION PIPE |
| ⑤ SERVO DETENT BASE | ⑥⑬ 2ND ACCUMULATOR BODY |
| ⑥ SERVO BODY | ⑦⑭ LSD RELIEF VALVE SPRING |
| ⑦ SERVO SEPARATOR PLATE | ⑧⑮ LSD RELIEF VALVE |
| ⑧ CHECK BALLS (7/32) #7 | ⑨⑯ CONTROL SHAFT |
| ⑨ SECONDARY VALVE BODY FILTER Replace. | ⑩⑰ CONTROL LEVER |
| ⑩ SECONDARY VALVE BODY | ⑪⑱ OIL SEAL Replace. |
| ⑪ SECONDARY SEPARATOR PLATE | ⑫⑲ LOCK WASHER Replace. |
| ⑫ DOWEL PIN | ⑬⑳ CHANGE SHAFT |
| ⑬ LOCK-UP VALVE BODY | ⑭⑴① CHANGE SHAFT CAP |
| ⑭ LOCK-UP SEPARATOR PLATE | ⑮⑴② SHIFT CONTROL SOLENOID VALVE ASSEMBLY |
| ⑮ DOWEL PIN | ⑯⑴③ SHIFT CONTROL SOLENOID FILTER/GASKET Replace. |
| ⑮⑴④ REGULATOR VALVE BODY | ⑰⑴④ LOCK-UP CONTROL SOLENOID VALVE ASSEMBLY |
| ⑰⑴⑤ O-RING Replace. | ⑱⑴⑤ LOCK-UP CONTROL SOLENOID FILTER/GASKET Replace. |
| ⑰⑴⑥ STATOR SHAFT ASSEMBLY | ⑲⑴⑥ VEHICLE SPEED SENSOR ASSEMBLY |
| ⑰⑴⑦ STOPPER PIN | ⑲⑴⑦ O-RING Replace. |
| ⑲⑴⑧ MAIN VALVE BODY FILTER Replace. | ⑲⑴⑧ SECONDARY SHAFT NEEDLE BEARING Replace. |
| ⑲⑴⑨ CHECK BALLS (7/32) #7 | ⑲⑴⑨ ATF GUIDE PLATE Replace. |
| ⑲⑴⑩ MAIN VALVE BODY | ⑲⑴⑩ COUNTERSHAFT NEEDLE BEARING Replace. |
| ⑲⑴⑪ ONE-WAY RELIEF VALVE SPRING | ⑲⑴⑪ ATF GUIDE PLATE Replace. |
| ⑲⑴⑫ ONE-WAY RELIEF VALVE | ⑲⑴⑫ MAINSHAFT BALL BEARING Replace. |
| ⑲⑴⑬ ATF PUMP DRIVEN GEAR | ⑲⑴⑬ MAINSHAFT OIL SEAL Replace. |
| ⑲⑴⑭ ATF PUMP DRIVE GEAR | ⑲⑴⑭ SEALING WASHER Replace. |
| ⑲⑴⑮ ATF PUMP DRIVEN GEAR SHAFT | ⑲⑴⑮ 4TH ATF GUIDE PLATE/PIPE |
| ⑲⑴⑯ DOWEL PIN | ⑲⑴⑯ 3RD ATF GUIDE PLATE |

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Fig. 13: Exploded View Of Valve Body Assembly (2 Of 2)

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 14: Identifying Sequential Disassembly Of Valve Body Assemblies
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT DISASSEMBLY & REASSEMBLY

MANUAL VALVE DETENT SPRING

Replacement & Adjustment

NOTE: Select the appropriate manual valve detent spring when these parts are replaced:

- Manual valve.
- Manual valve detent spring.
- Manual valve lever of control shaft.

1. Install the main valve body, including the ATF pump gears, onto the torque converter housing. Tighten the main valve body bolts to 106 INCH lbs. (12 N.m). See **VALVE BODY** under TRANSMISSION REASSEMBLY.
2. Install the control shaft.
3. Install the manual valve detent spring on the main valve body and tighten the spring bolt to 10 ft. lbs. (14 N.m).
4. Set the manual valve to the "N" position.
5. Measure the distance between the main valve body and manual valve as shown. See **Fig. 15** . Distance standard is 1.102-1.142" (28.0-29.0 mm).
6. If the measurement is out of tolerance, select the appropriate manual valve detent spring. Spring lengths available are 4.07" (103.5 mm), 4.09" (104.0 mm) and 4.11" (104.5 mm). Install spring and recheck it.

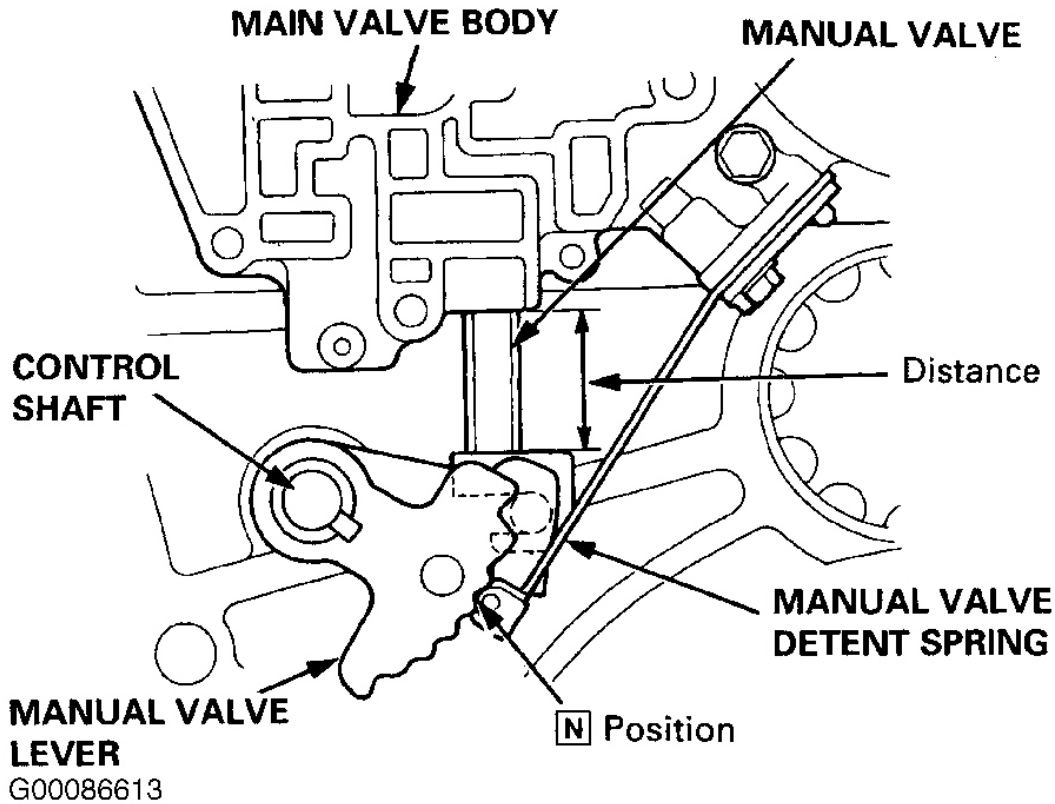


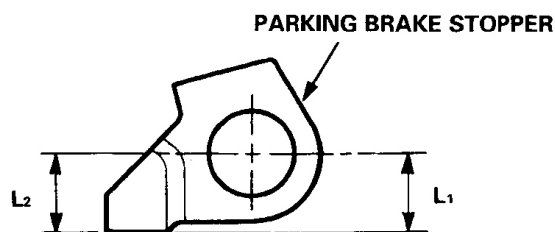
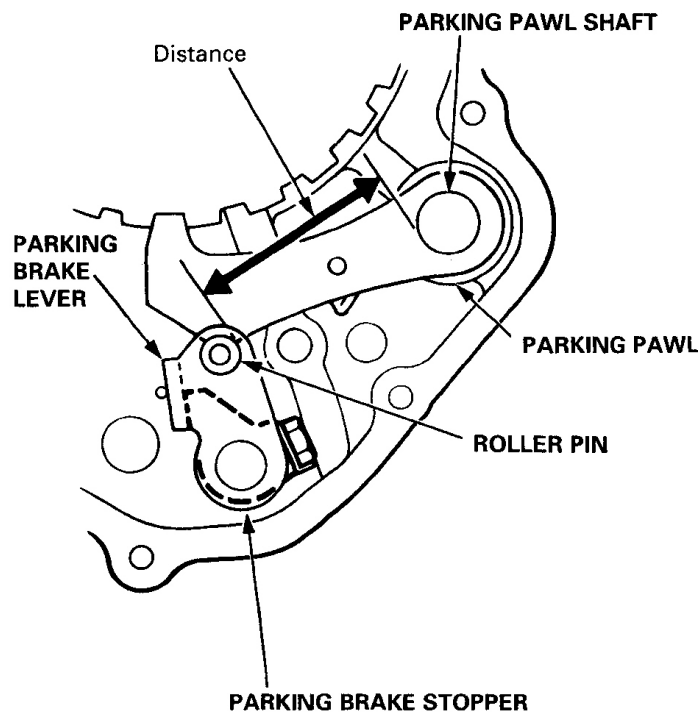
Fig. 15: Measuring Valve Body-To-Manual Lever Distance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

PARKING BRAKE STOP

Inspection & Adjustment

1. Set the parking brake lever in the "P" position.
2. Measure the distance between the face of the parking pawl shaft and face of the parking shift arm roller pin as shown. See **Fig. 16** . Distance standard is 2.051- 2.091" (52.1- 53.1 mm).
3. If the measurement is out of tolerance, select and install the appropriate parking brake stopper.
4. After replacing the parking brake stopper, make sure the distance is within tolerance.



Mark	Part Number	L ₁	L ₂
1	24537 - PA9 - 003	11.00 mm (0.433 in)	11.00 mm (0.433 in)
2	24538 - PA9 - 003	10.80 mm (0.425 in)	10.65 mm (0.419 in)
3	24539 - PA9 - 003	10.60 mm (0.417 in)	10.30 mm (0.406 in)

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Fig. 16: Measuring Park Brake Stop Distance & Park Brake Stop
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAIN VALVE BODY

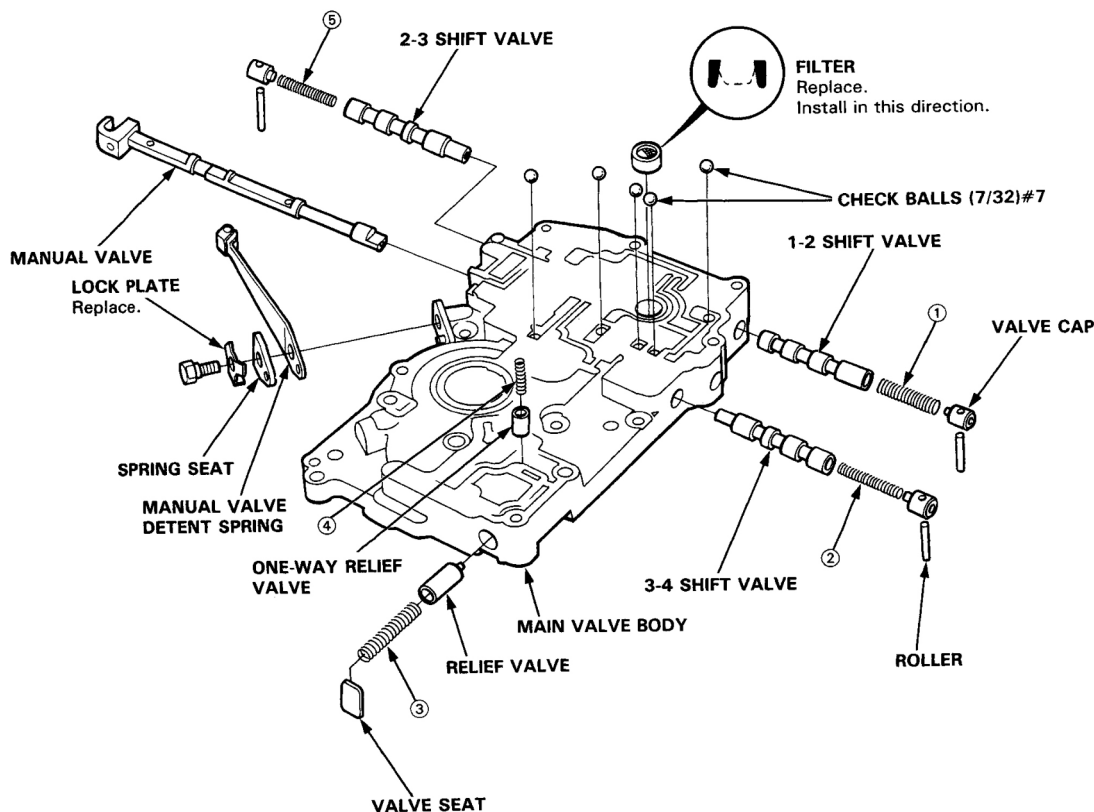
CAUTION: When disassembling main valve body, place main valve body components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from main valve body.

NOTE: To assist in disassembly of component, see Fig. 17 .

NOTE: Do not use a magnet to remove the check balls, they may become magnetized.

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See Fig. 18 .
4. Check all valves for free movement. If any fail to slide freely, see VALVE BODY REPAIR PROCEDURES .
5. Coat all parts with ATF before reassembly.
6. Adjust and select the manual valve detent spring when the manual valve or manual valve detent spring is replaced. See MANUAL VALVE DETENT SPRING .



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Fig. 17: Exploded View Of Main Valve Body

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	1-2 shift spring	0.9 (0.035)	8.6 (0.339)	40.4 (1.591)	14.5
②	3-4 shift spring	0.8 (0.031)	7.0 (0.276)	43.7 (1.720)	21.2
③	Relief valve spring	1.1 (0.043)	8.4 (0.331)	44.4 (1.748)	19.5
④	One-way relief valve spring	0.9 (0.035)	6.4 (0.252)	25.1 (0.988)	11.9
⑤	2-3 shift spring	0.8 (0.031)	7.0 (0.276)	43.7 (1.720)	21.2
⑥	Torque converter check valve spring	1.1 (0.043)	8.4 (0.331)	41.8 (1.646)	15.7

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Fig. 18: Main Valve Body Spring Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

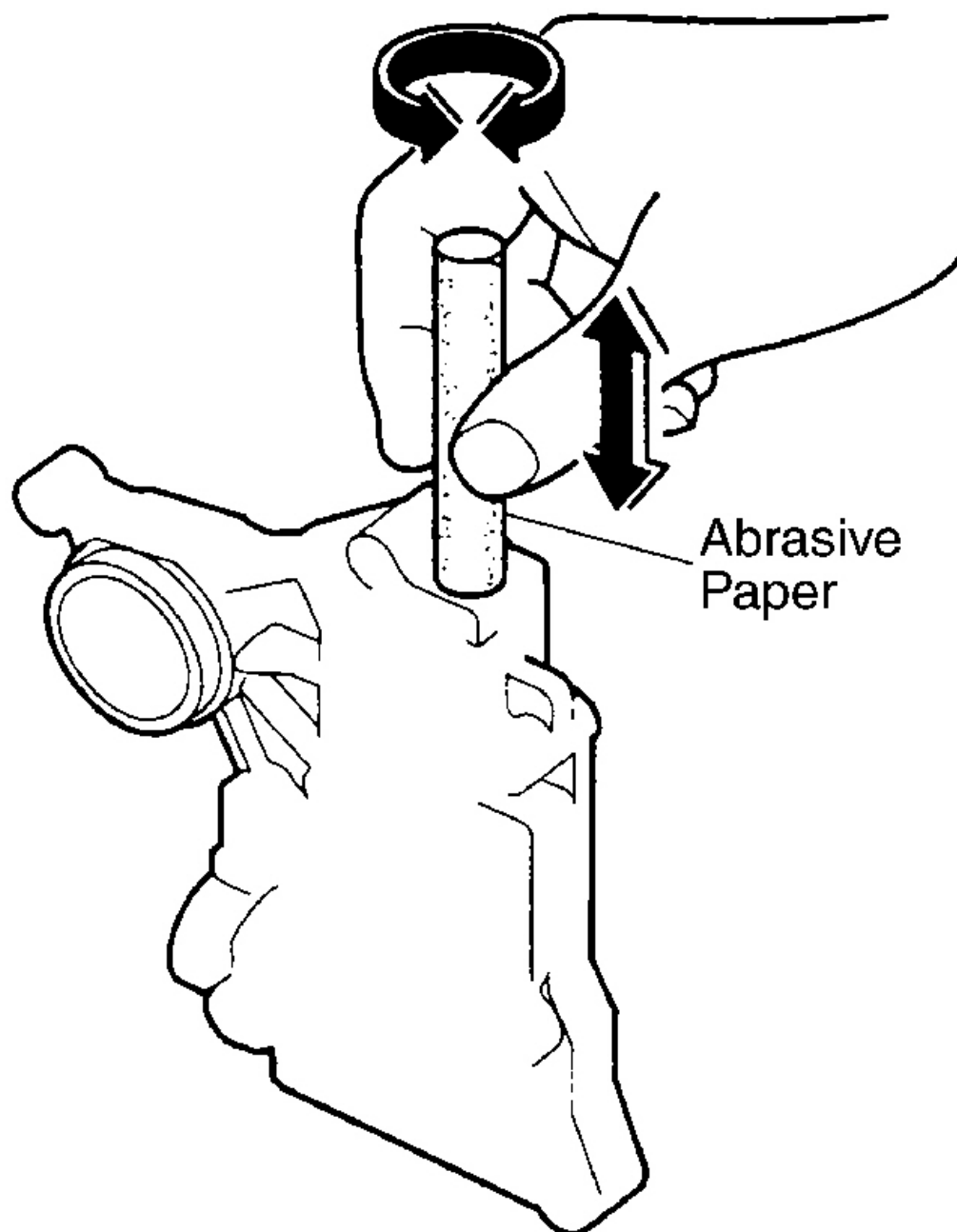
Valve Body Repair Procedures

NOTE: This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. Use this procedure to free the valves.

1. Soak a sheet of No. 600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore. It may be necessary to use a small screwdriver to pry the valve free. Be careful not to scratch the bore with the screwdriver.
3. Inspect the valve for any scuff marks. Use the ATF-soaked No. 600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked No. 600 paper and insert it in the valve bore of the sticking valve. See **Fig. 19** . Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

NOTE: The valve body is aluminum and doesn't require much polishing to remove any burrs.

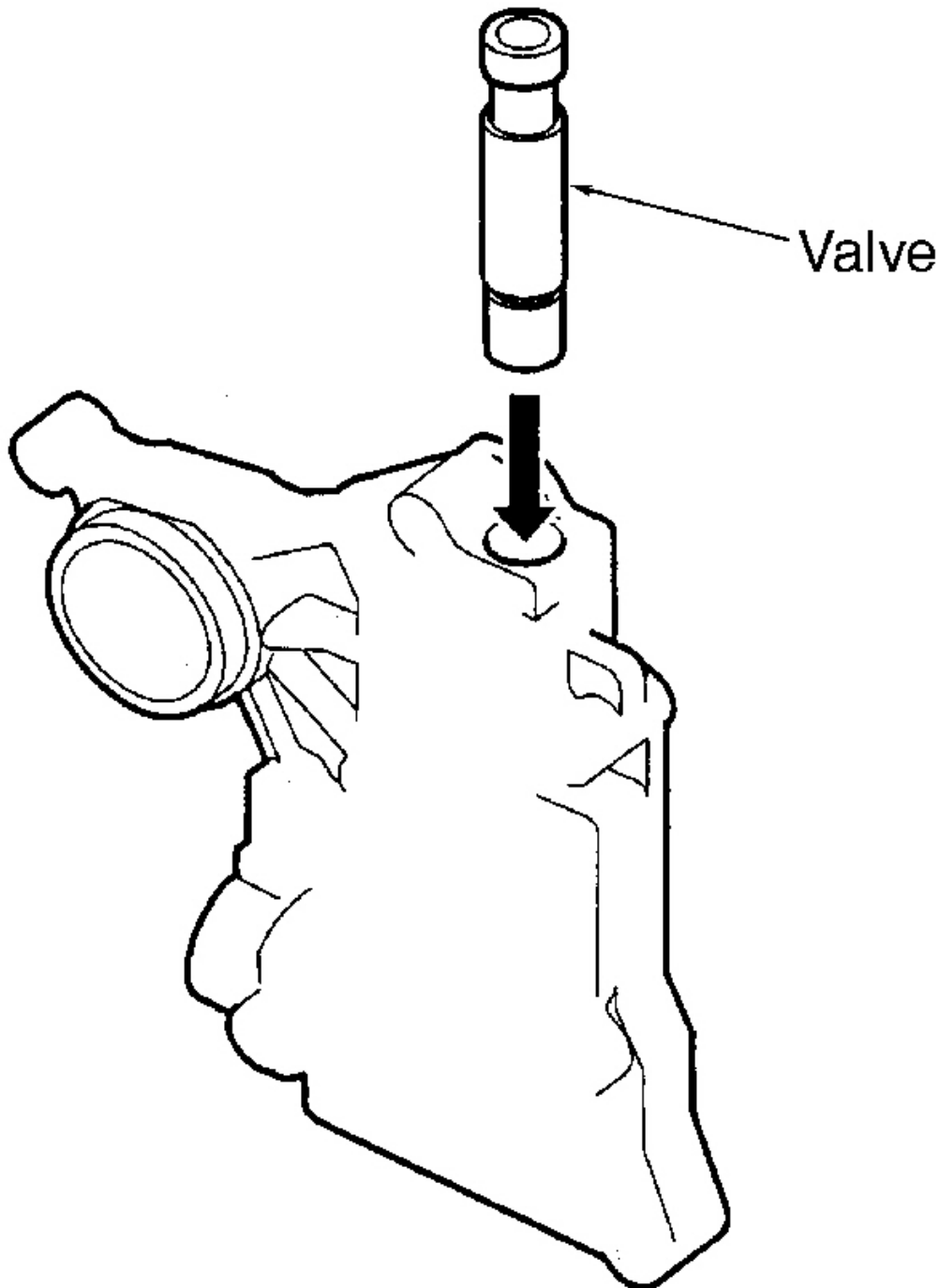
5. Remove the No. 600 paper. Thoroughly wash the entire valve body in solvent, then dry it with compressed air.
6. Coat the valve with ATF, then drop it into its bore. See **Fig. 20** . It should drop to the bottom of the bore under its own weight. If not, repeat steps 4 and 5 , then retest. If the valve still sticks, replace the valve body.
7. Remove the valve, and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.



G00085260

Fig. 19: Polishing Valve Body Bore

Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00085261

Fig. 20: Installing Valve In Bore

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Reassembly

Assemble valve body in reverse order of disassembly.

SECONDARY VALVE BODY

CAUTION: When disassembling valve body, place components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from valve body.

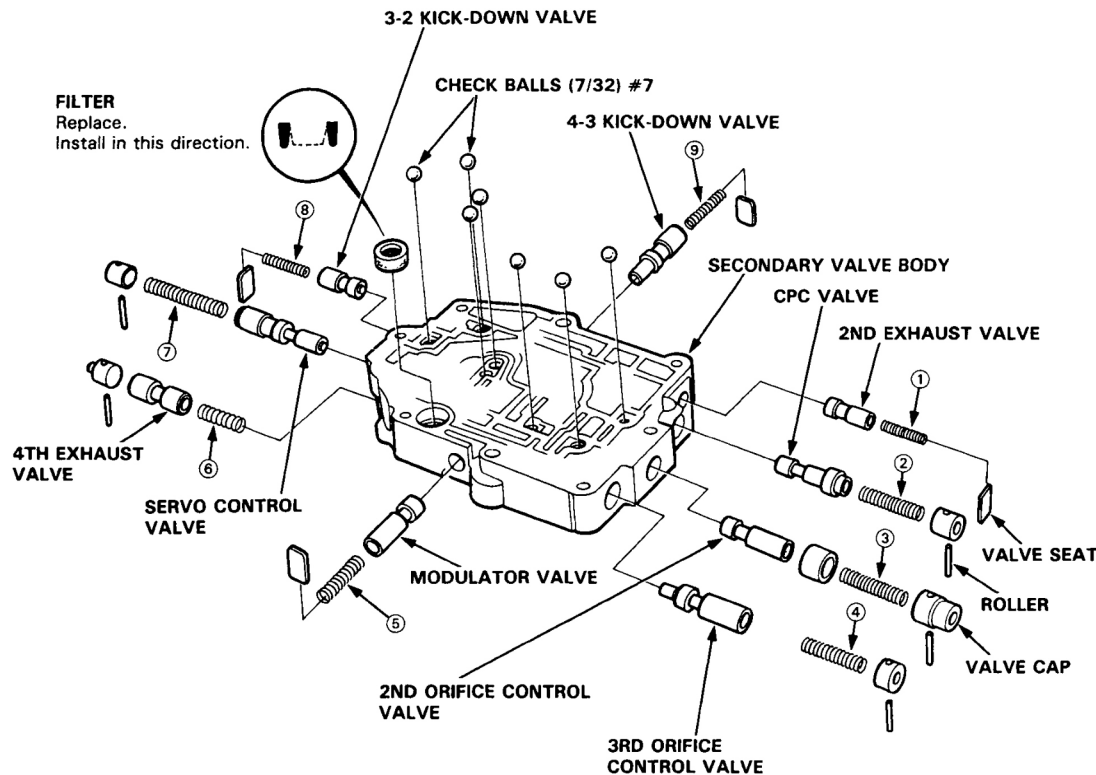
NOTE: To assist in disassembly of component, see Fig. 21 .

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See Fig. 22 .
4. Check all valves for free movement. If any fail to slide freely, see VALVE BODY REPAIR PROCEDURES .
5. Coat all parts with ATF before reassembly.

Reassembly

Assemble valve body in reverse order of disassembly.



G00086579

Fig. 21: Exploded View Of Secondary Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	2nd exhaust valve spring	1.0 (0.039)	6.1 (0.240)	27.1 (1.067)	13.4
②	CPC valve spring	1.0 (0.039)	6.8 (0.268)	32.1 (1.264)	15.6
③	2nd orifice control valve spring	0.8 (0.031)	8.1 (0.319)	47.9 (1.886)	16.0
④	3rd orifice control valve spring	0.9 (0.035)	8.6 (0.339)	48.3 (1.902)	16.6
⑤	Modulator valve spring	1.4 (0.055)	9.4 (0.370)	33.0 (1.299)	10.5
⑥	4th exhaust valve spring	0.6 (0.024)	7.6 (0.299)	24.4 (0.961)	7.9
⑦	Servo control valve spring	1.0 (0.039)	8.1 (0.319)	53.5 (2.106)	20.8
⑧	3 - 2 kick-down valve spring	1.0 (0.039)	6.1 (0.240)	27.1 (1.067)	13.4
⑨	4 - 3 kick-down valve spring	0.9 (0.035)	6.6 (0.260)	30.7 (1.209)	12.9

G00086580

Fig. 22: Secondary Valve Body Spring Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SERVO BODY

CAUTION: When disassembling valve body, place components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from valve body.

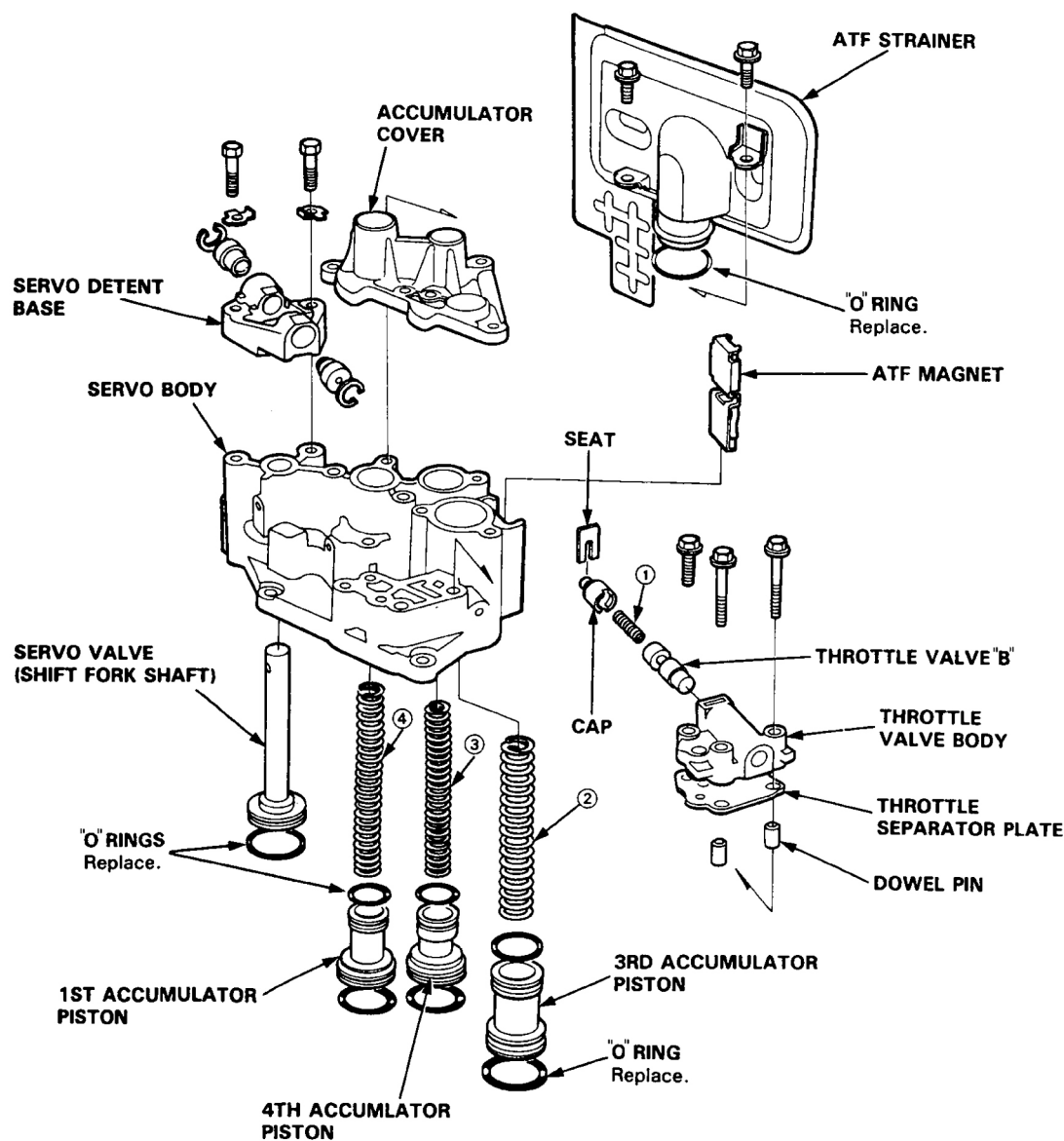
NOTE: To assist in disassembly of component, see **Fig. 23** .

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See **Fig. 24** .
4. Check all valves for free movement. If any fail to slide freely, see **VALVE BODY REPAIR PROCEDURES** .
5. Coat all parts with ATF before reassembly.
6. Replace "O" rings.

Reassembly

Assemble valve body in reverse order of disassembly.



G00086581

Fig. 23: Exploded View Of Servo Body
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Throttle valve B spring	0.9 (0.035)	7.1 (0.280)	29.0 (1.142)	12.6
②	3rd accumulator spring	3.2 (0.126)	19.0 (0.748)	88.6 (3.488)	14.3
③	4th accumulator spring	3.0 (0.118)	18.0 (0.709)	84.5 (3.327)	12.8
④	1st accumulator spring	2.3 (0.091)	20.0 (0.787)	104.6 (4.118)	14.8

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Fig. 24: Servo Body Spring Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

REGULATOR VALVE BODY

CAUTION: When disassembling valve body, place components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from valve body.

NOTE: To assist in disassembly of component, see **Fig. 25** .

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See **Fig. 26** .
4. Check all valves for free movement. If any fail to slide freely, see **VALVE BODY REPAIR PROCEDURES** .
5. Coat all parts with ATF before reassembly.

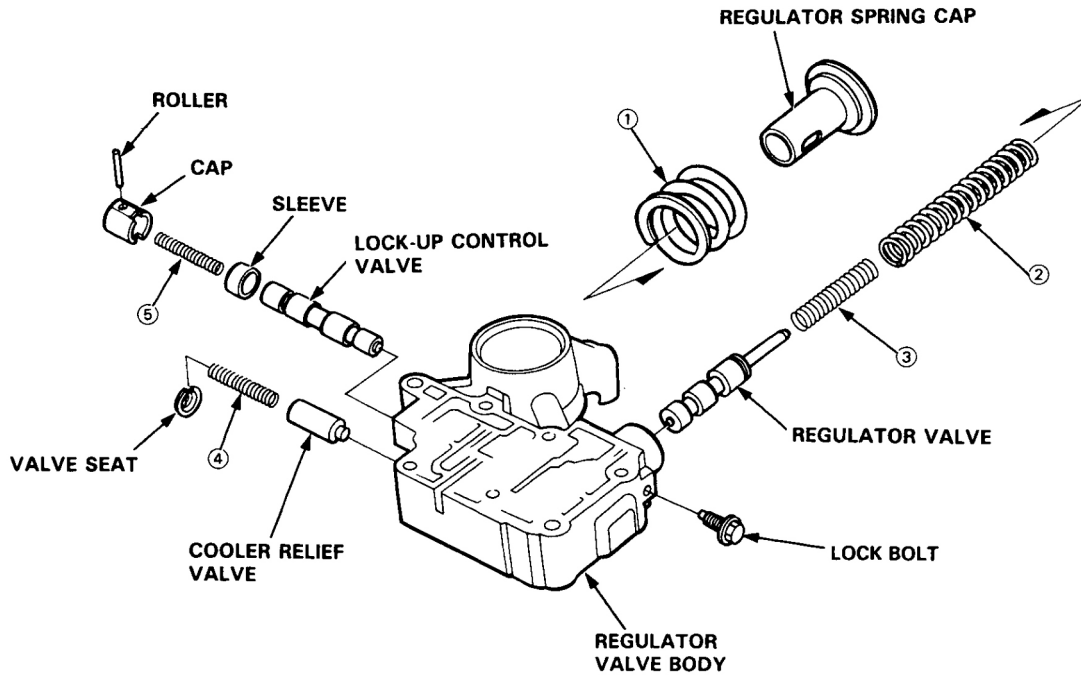
NOTE: The regulator spring cap can pop out when the lock bolt is removed.

6. Hold regulator spring cap in place while removing the lock bolt. Once the bolt is removed, release the spring cap slowly.

Reassembly

NOTE: Align the hole in the regulator spring cap with the hole in the valve body. Press the spring cap into the body and tighten the lock bolt.

Assemble valve body in reverse order of disassembly.



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Fig. 25: Exploded View Of Regulator Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Stator reaction spring	6.0 (0.236)	38.4 (1.512)	30.3 (1.193)	2.0
②	Regulator valve spring A	1.58 x 2.0 (0.062 x 0.079)	14.7 (0.579)	88.6 (3.488)	20.9
③	Regulator valve spring B	1.8 (0.071)	9.6 (0.378)	44.0 (1.732)	14.7
④	Cooler relief valve spring	1.2 (0.047)	8.4 (0.331)	35.7 (1.406)	16.5
⑤	Lock-up control spring	0.8 (0.031)	6.6 (0.260)	38.3 (1.508)	25.0

G00086584

Fig. 26: Regulator Valve Body Spring Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

LOCK-UP VALVE BODY

CAUTION: When disassembling valve body, place components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from valve body.

NOTE: To assist in disassembly of component, see [Fig. 27](#) .

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See **Fig. 28**.
4. Check all valves for free movement. If any fail to slide freely, see **VALVE BODY REPAIR PROCEDURES**.
5. Coat all parts with ATF before reassembly.

Reassembly

Assemble valve body in reverse order of disassembly.

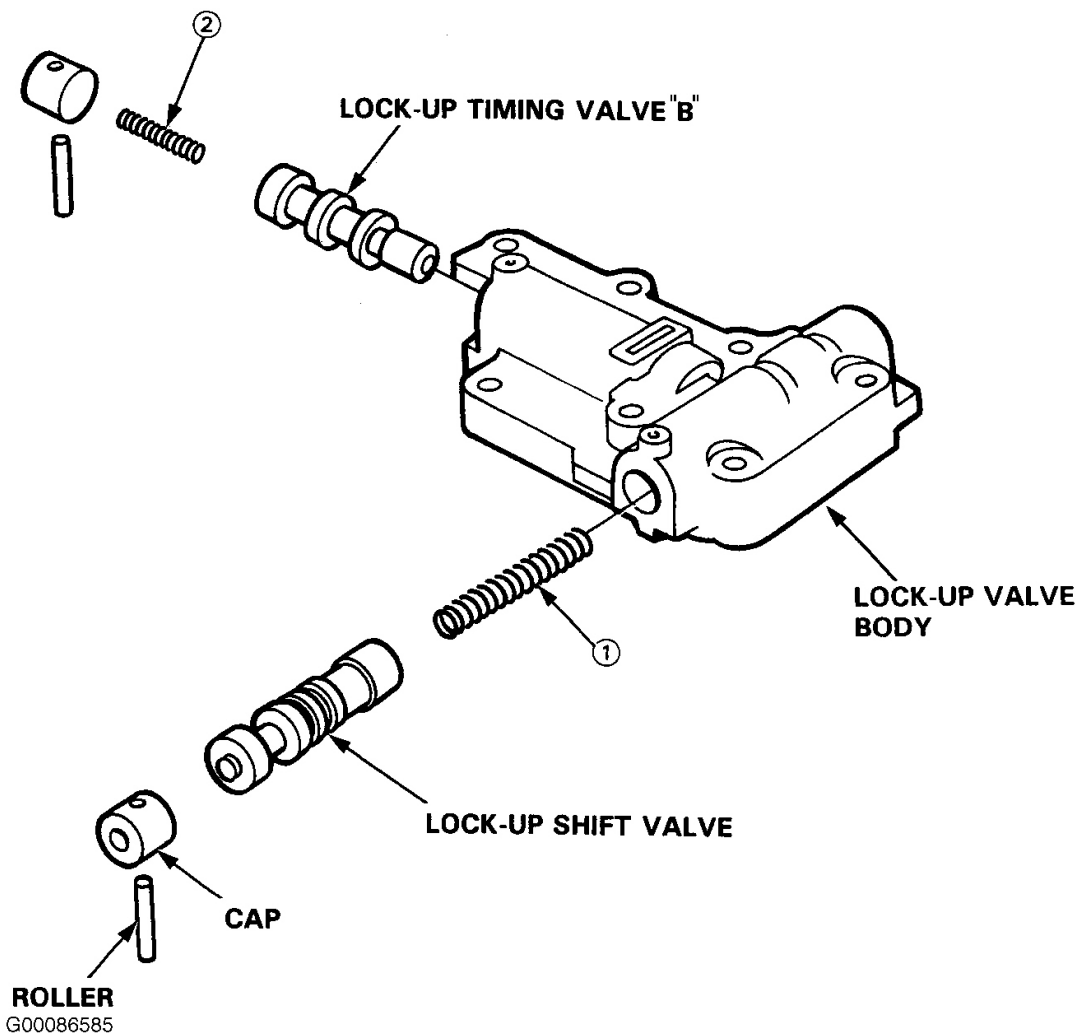


Fig. 27: Exploded View Of Lock-Up Valve Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Lock-up shift valve spring	1.0 (0.039)	8.6 (0.339)	51.3 (2.020)	19.8
②	Lock-up timing valve 'B' spring	0.8 (0.031)	5.6 (0.220)	27.8 (1.094)	16.4

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Fig. 28: Lock-Up Valve Body Spring Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2ND ACCUMULATOR BODY

CAUTION: When disassembling valve body, place components in order and mark spring locations for reassembly reference. Note direction of valve cap installation before removing from valve body.

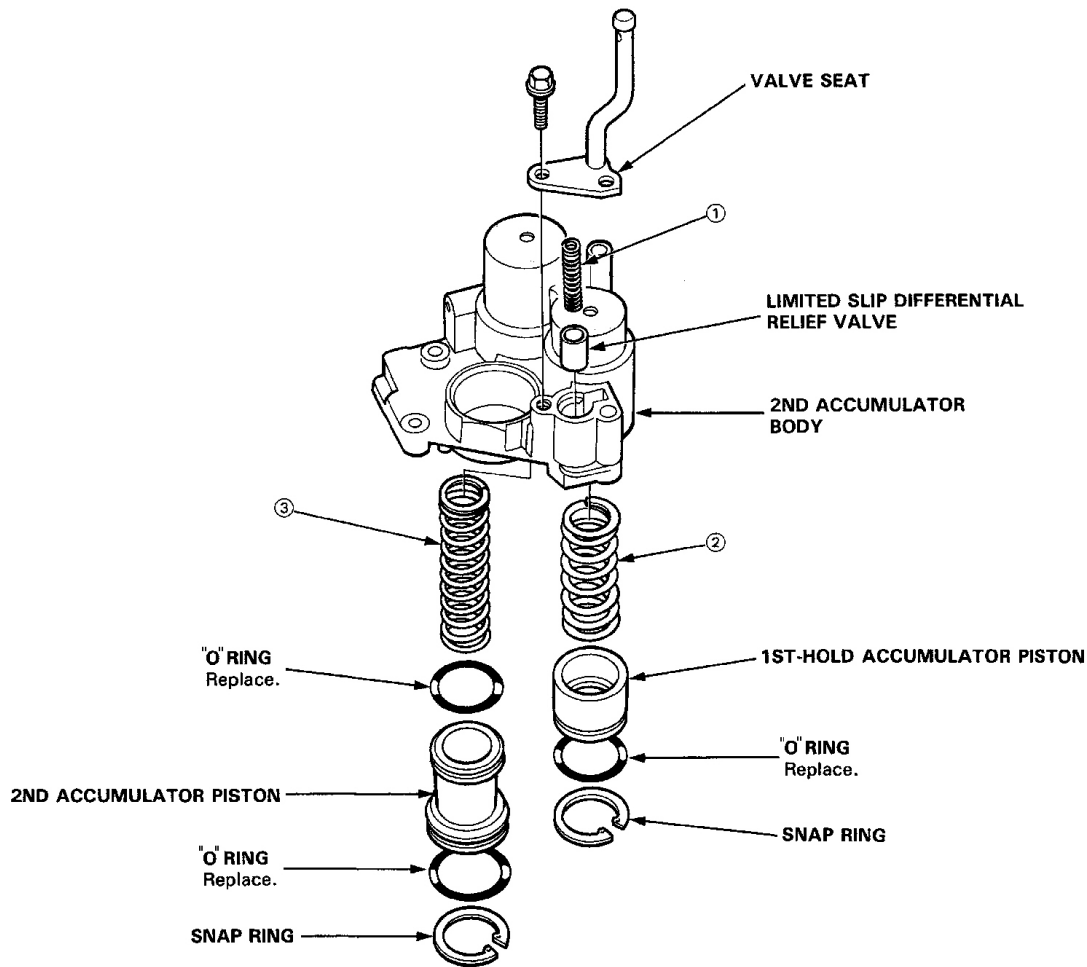
NOTE: To assist in disassembly of component, see **Fig. 29** .

Disassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Replace valve body as an assembly if any parts are worn or damaged. See **Fig. 30** .
4. Check all valves for free movement. If any fail to slide freely, see **VALVE BODY REPAIR PROCEDURES** .
5. Coat all parts with ATF before reassembly.

Reassembly

Assemble valve body in reverse order of disassembly.



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Fig. 29: Exploded View Of 2nd Accumulator Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Unit of length: mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Limited Slip Differential relief valve spring	0.8 (0.031)	8.4 (0.331)	37.3 (1.469)	12.1
②	1st-hold accumulator spring	3.4 (0.134)	24.3 (0.957)	64.7 (2.547)	6.7
③	2nd accumulator spring	3.3 (0.130)	20.2 (0.795)	78.0 (3.071)	11.8

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Fig. 30: 2nd Accumulator Body Spring Specifications
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). See **Fig. 12** .

Cleaning & Inspection

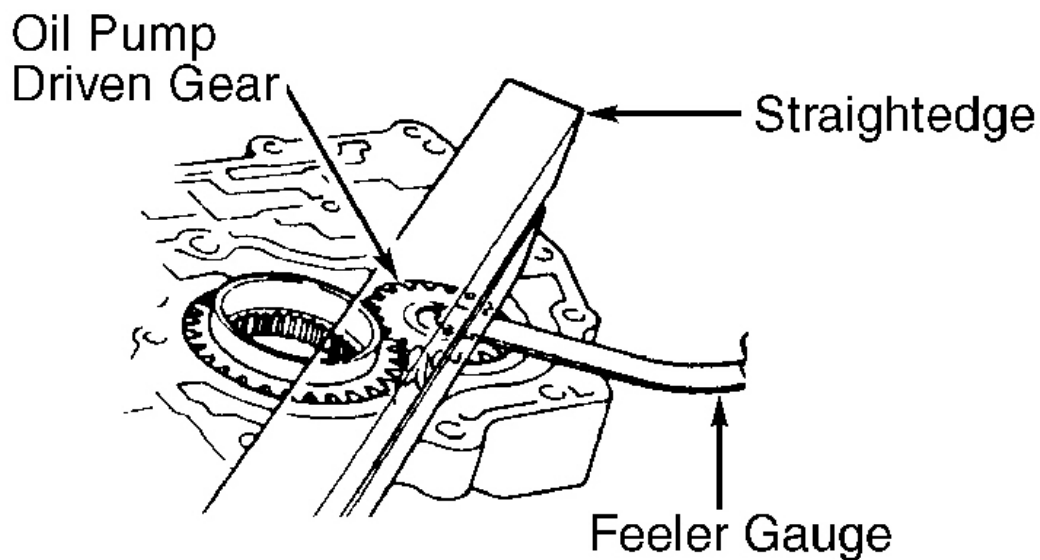
1. Install the ATF pump drive gear, driven gear, and ATF pump driven gear shaft in the main valve body. Lubricate all parts with ATF, and install the ATF, pump driven gear with its grooved and chamfered side facing up.
2. Measure the side clearance of the ATF pump drive gear and driven gear. See **Fig. 31** . See **OIL PUMP SPECIFICATIONS** table.
3. Remove the ATF pump driven gear shaft. Measure the thrust clearance between the ATF pump driven gear and the valve body with a straight edge and a feeler gauge.

OIL PUMP SPECIFICATIONS

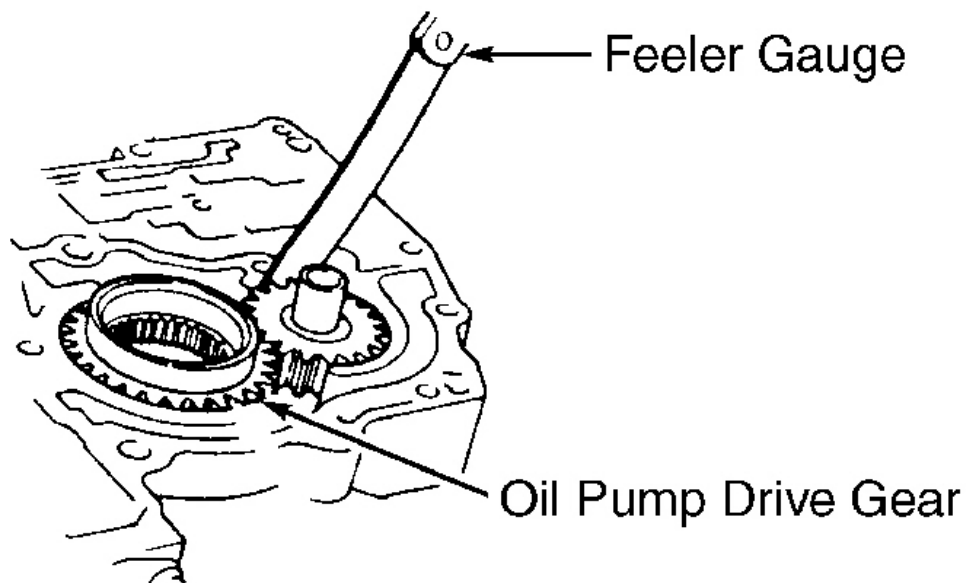
Application	In. (mm)
Side Clearance	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)

Reassembly

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



CHECKING THRUST CLEARANCE



CHECKING SIDE CLEARANCE

G95B19613

Fig. 31: Measuring Oil Pump Clearances

Courtesy of AMERICAN HONDA MOTOR CO., INC.

MAINSHAFT

Disassembly

Note location of mainshaft components. See **Fig. 32** . Remove mainshaft components.

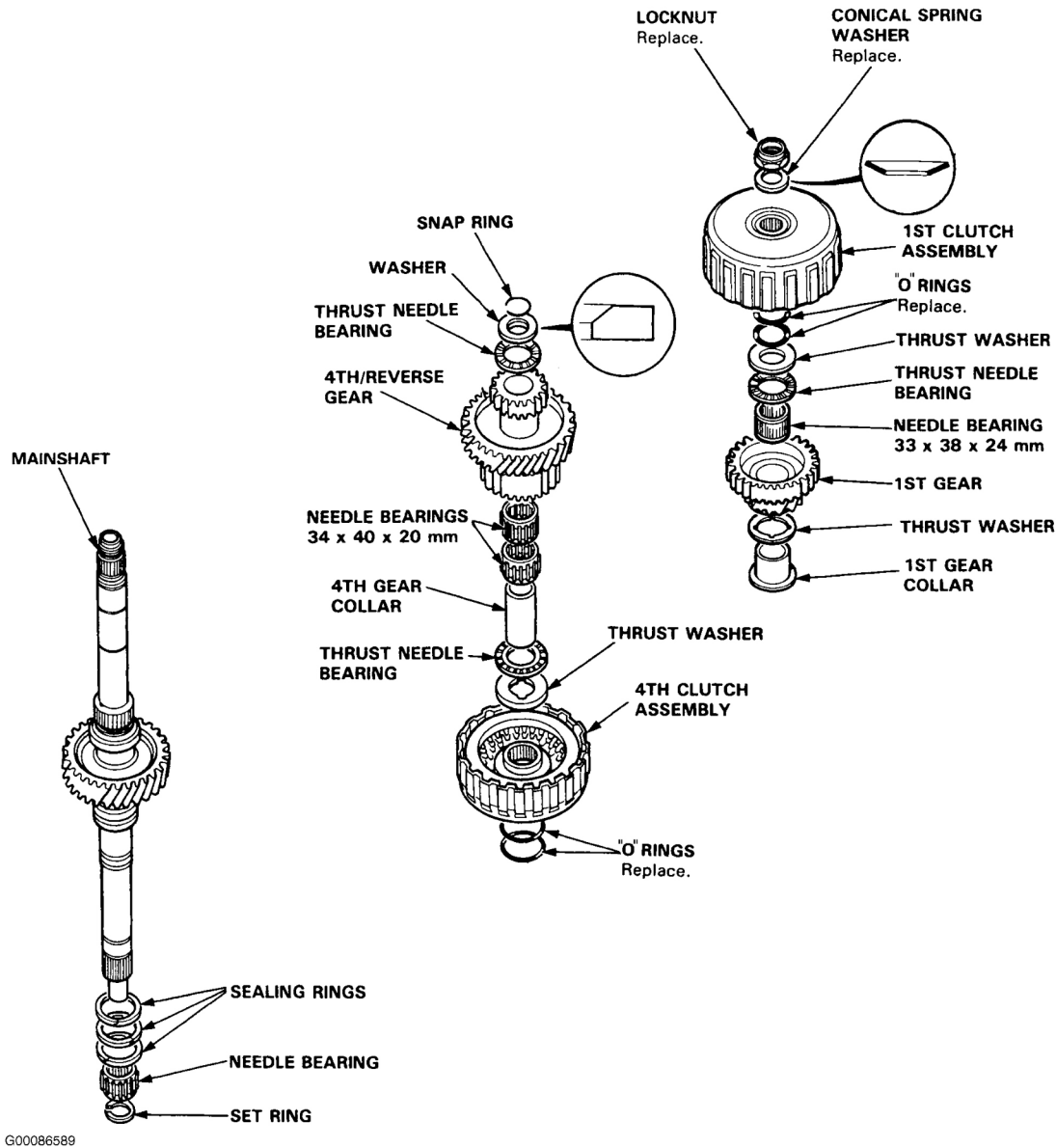


Fig. 32: Exploded View Of Mainshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection

1. Lubricate all parts with ATF during reassembly.

2. Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
3. Inspect thrust needle and needle bearings for galling and rough movement.
4. Before installing the "O" rings, wrap the shaft splines with tape to prevent damage to the "O" rings.
5. Check splines for excessive wear and damage.
6. Check bearing surface for scoring, scratches and excessive wear.

Reassembly

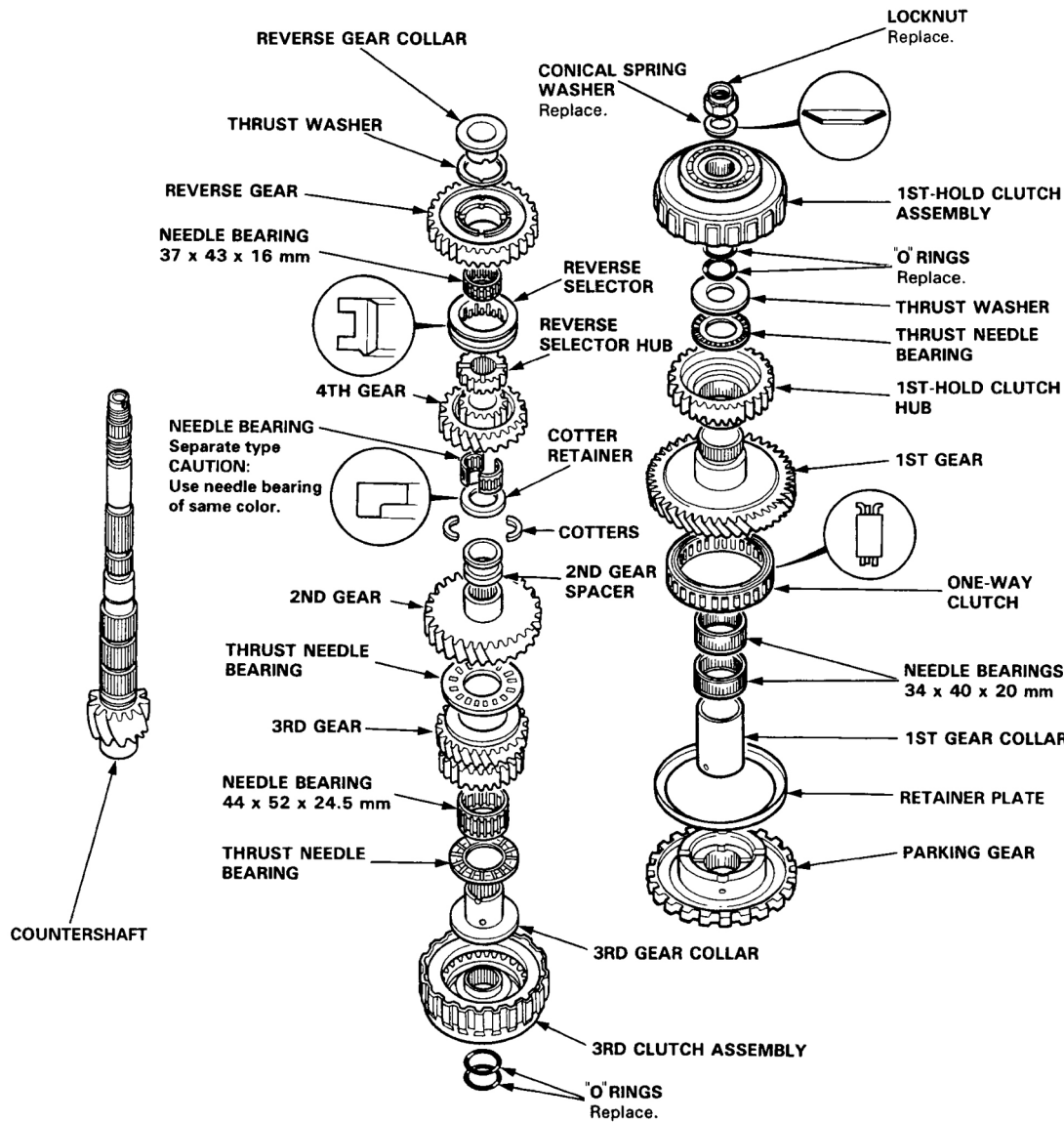
Assemble mainshaft in reverse order of disassembly.

COUNTERSHAFT

NOTE: **Lock nut has left-hand threads.**

Disassembly

Note location of countershaft components. See **Fig. 33** . Remove countershaft components.



G00086624

Fig. 33: Exploded View Of Countershaft Assembly
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Cleaning & Inspection

1. Lubricate all parts with ATF during reassembly.
2. Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
3. Inspect thrust needle and needle bearings for galling and rough movement.
4. Before installing the "O" rings, wrap the shaft splines with tape to prevent damage to the "O" rings.
5. Check splines for excessive wear and damage.
6. Check bearing surface for scoring, scratches and excessive wear.

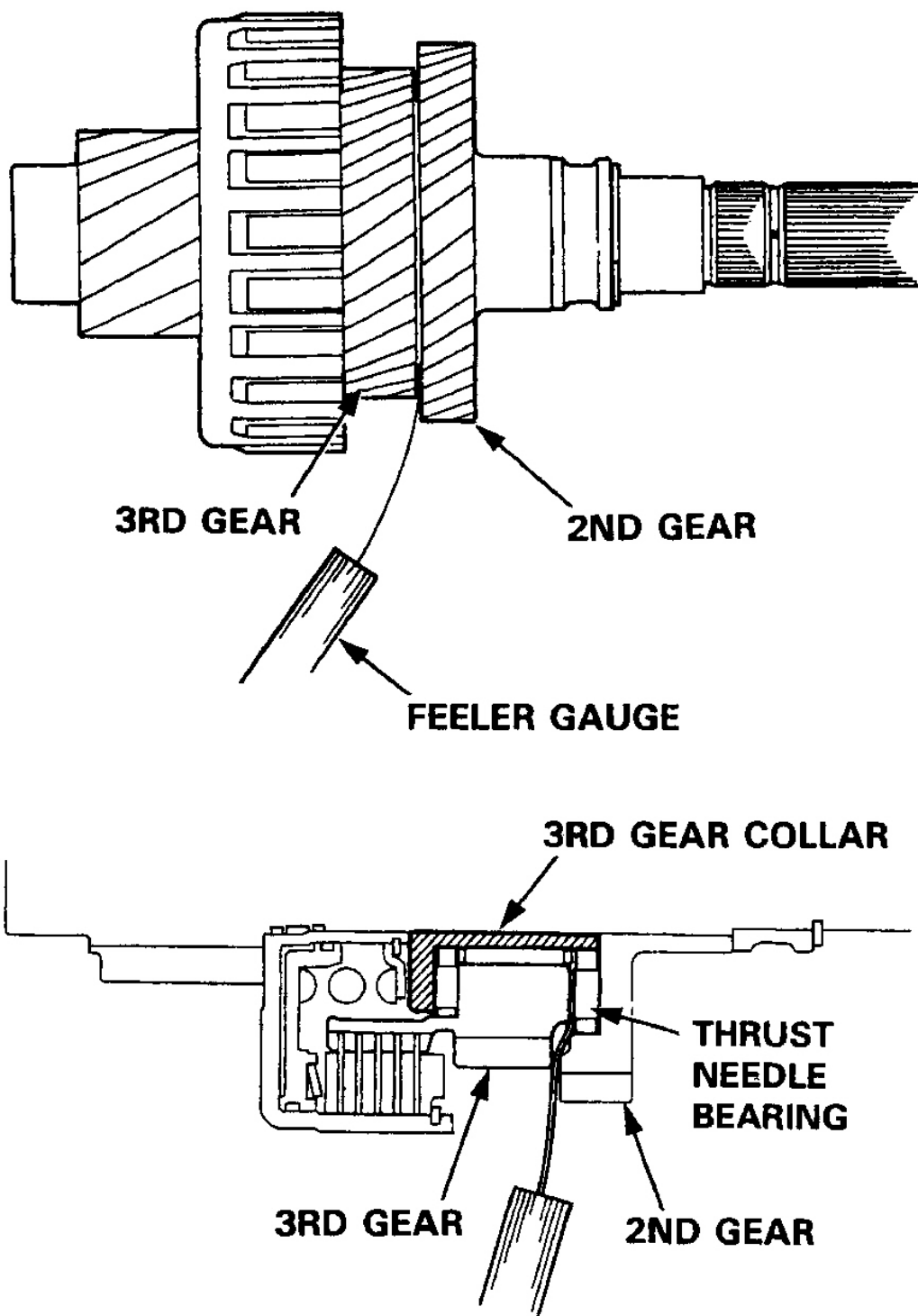
Reassembly

NOTE: Lubricate all parts with ATF during assembly.

1. Assemble components on countershaft up to cotters. See **Fig. 33** . Do not install the "O" rings.
2. Hold the 2nd gear against the 3rd gear. Measure the clearance between the 3rd gear and thrust needle bearing with a feeler gauge. Take measurements in at least three places, and take the average as the actual clearance. See **Fig. 34** . Standard is 0-.001" (0-.03 mm).

NOTE: If the clearance still exceeds the service limit even with new thrust needle bearings, check the 3rd gear, 2nd gear and 3rd gear collar for wear, and replace any worn parts. After replacing parts, make sure that the clearance is within tolerance.

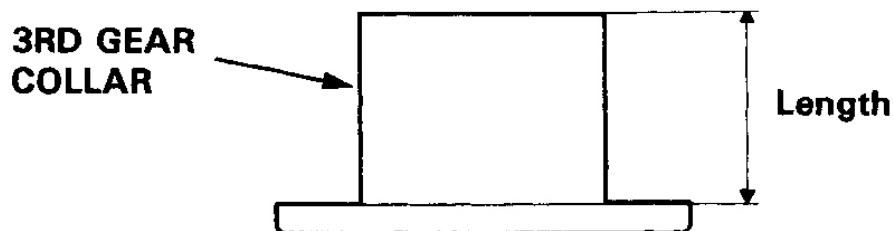
3. If the clearance is out of tolerance. Select and install a new 3rd gear collar, and recheck the clearance. See **Fig. 35** . If the clearance is still out of tolerance, replace the 2 thrust needle bearings, and recheck the clearance.
4. Hold the 2nd gear against the 3rd gear. Measure the clearance between the 2nd gear spacer and cotters with a feeler gauge. See **Fig. 36** . Take measurements in at least 3 places, and take the average as the actual clearance. Standard is 0-.002" (0-.05 mm).
5. If the clearance is out of tolerance, select and install a new cotters. See **Fig. 37** .
6. After replacing the cotters, make sure that the clearance is held within tolerance.
7. Remove the countershaft bearing from the transaxle housing.
8. Assemble the countershaft including all bearings and remaining components. See **Fig. 33** .
9. Tighten the countershaft lock nut to 22 ft. lbs. (29 N.m).
10. Measure the clearance between 4th gear and reverse selector hub with a feeler gauge. See **Fig. 38** . Take measurements in at least 3 places, and take the average as the actual clearance. Standard .002-.004" (.05-.11 mm).
11. If the clearance is out of tolerance, select and install a new cotter retainer. See **Fig. 39** and **Fig. 40** .
12. After replacing the cotter retainer, make sure that the clearance is within tolerance.
13. Measure the clearance between 1st gear and 1st-hold clutch hub with a feeler gauge. See **Fig. 41** . Take measurements in at least 3 places, and take the average as the actual clearance. Standard is .008-.012" (.20-.31 mm).
14. If the clearance is out of tolerance, select and install a new 1st gear collar. Collars are available in thicknesses of 2.461-2.463" (62.5-62.55 mm) and 2.465-2.467" (62.6-62.65 mm).
15. After replacing the 1st gear collar, make sure that the clearance is within tolerance.



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Fig. 34: Measuring 3rd Gear-To-Thrust Needle Bearing Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.



3RD GEAR COLLAR

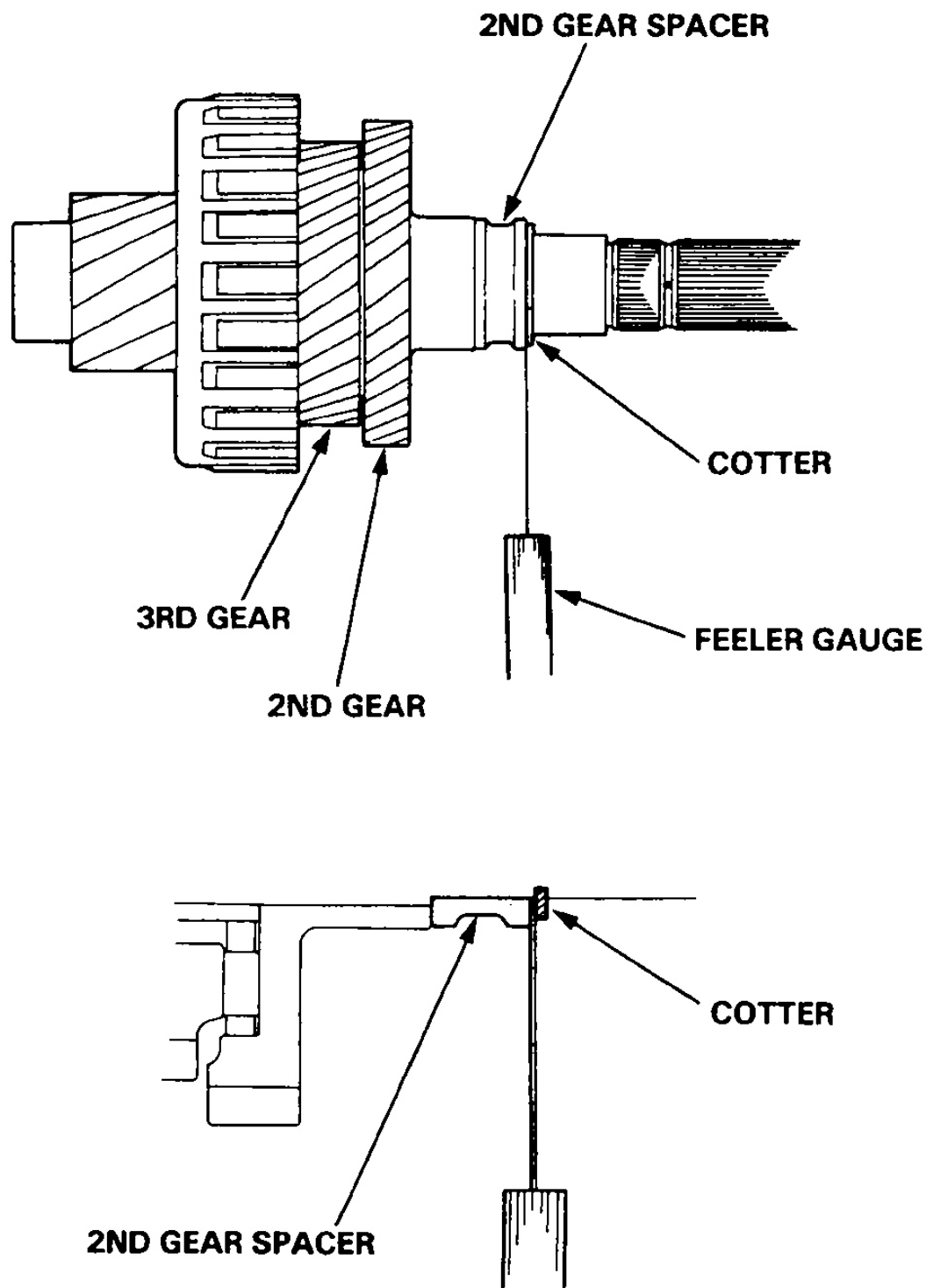
No	Part Number	Length mm (in)
1	90413-PR9-000	35.425-35.440 (1.3947-1.3952)
2	90414-PR9-000	35.440-35.455 (1.3952-1.3959)
3	90415-PR9-000	35.455-35.470 (1.3959-1.3965)
4	90416-PR9-000	35.470-35.485 (1.3965-1.3970)
5	90417-PR9-000	35.485-35.500 (1.3970-1.3976)
6	90418-PR9-000	35.500-35.515 (1.3976-1.3982)

(cont'd)

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Fig. 35: Selecting 3rd Gear Collar

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 36: Measuring 2nd Gear Spacer-To-Cotter Clearance

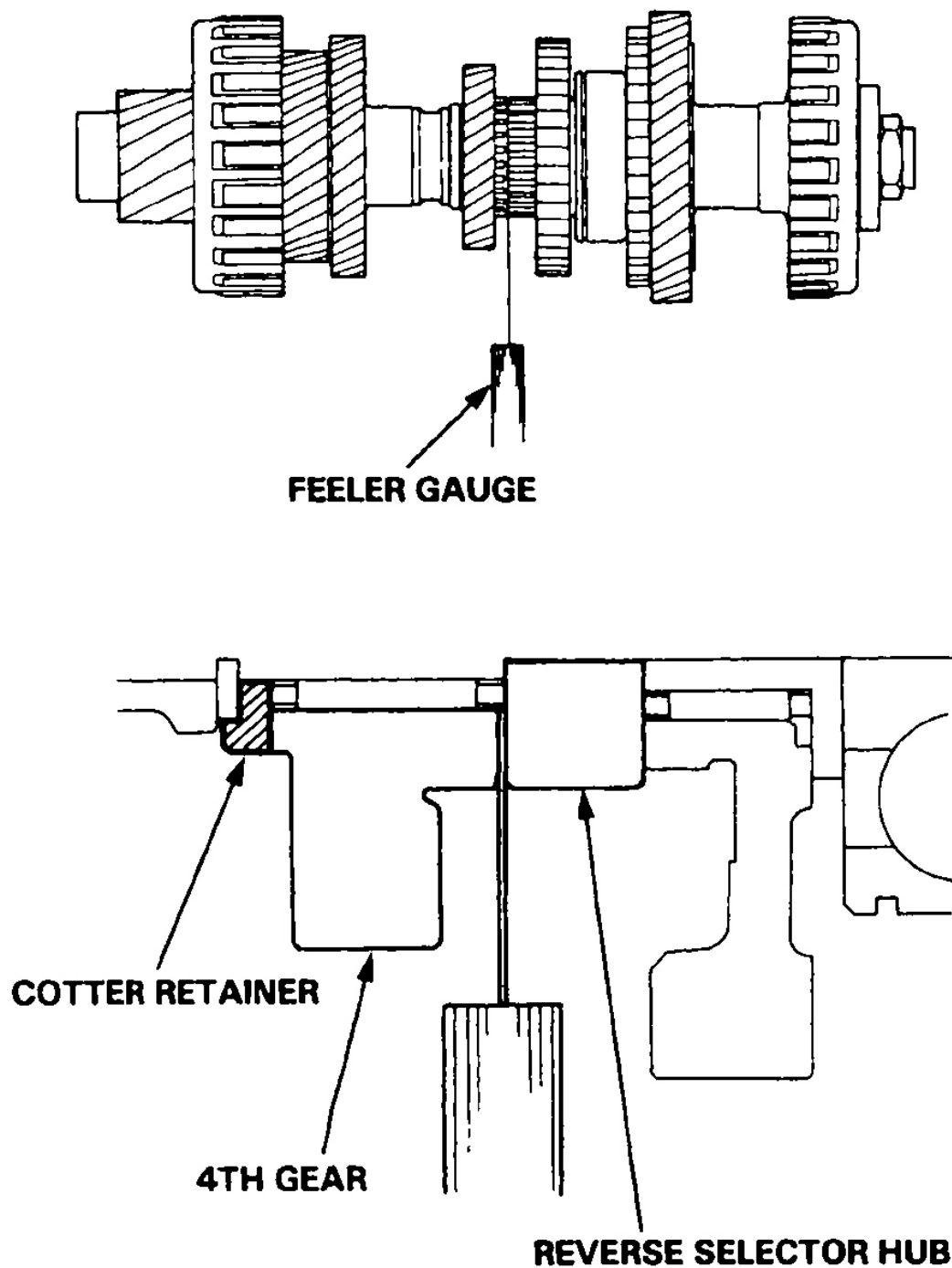
Courtesy of AMERICAN HONDA MOTOR CO., INC.

No	Part Number	Thickness mm (in)
1	90441-PR9-000	1.975-2.000 (0.078-0.079)
2	90442-PR9-000	2.000-2.025 (0.079-0.080)
3	90443-PR9-000	2.025-2.050 (0.080-0.081)
4	90444-PR9-000	2.050-2.075 (0.081-0.082)
5	90445-PR9-000	2.075-2.100 (0.082-0.083)
6	90446-PR9-000	2.100-2.125 (0.083-0.084)
7	90447-PR9-000	2.125-2.150 (0.084-0.085)
8	90448-PR9-000	2.150-2.175 (0.085-0.086)
9	90449-PR9-000	2.175-2.200 (0.086-0.087)
10	90450-PR9-000	2.200-2.225 (0.087-0.088)
11	90451-PR9-000	2.225-2.250 (0.088-0.089)
12	90452-PR9-000	2.250-2.275 (0.089-0.090)
13	90453-PR9-000	2.275-2.300 (0.090-0.091)
14	90454-PR9-000	2.300-2.325 (0.091-0.092)
15	90455-PR9-000	2.325-2.350 (0.092-0.093)
16	90456-PR9-000	2.350-2.375 (0.093-0.094)

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Fig. 37: Cotter (31.5 mm) Selection Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 38: Measuring 4th Gear-To-Reverse Selector Hub Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

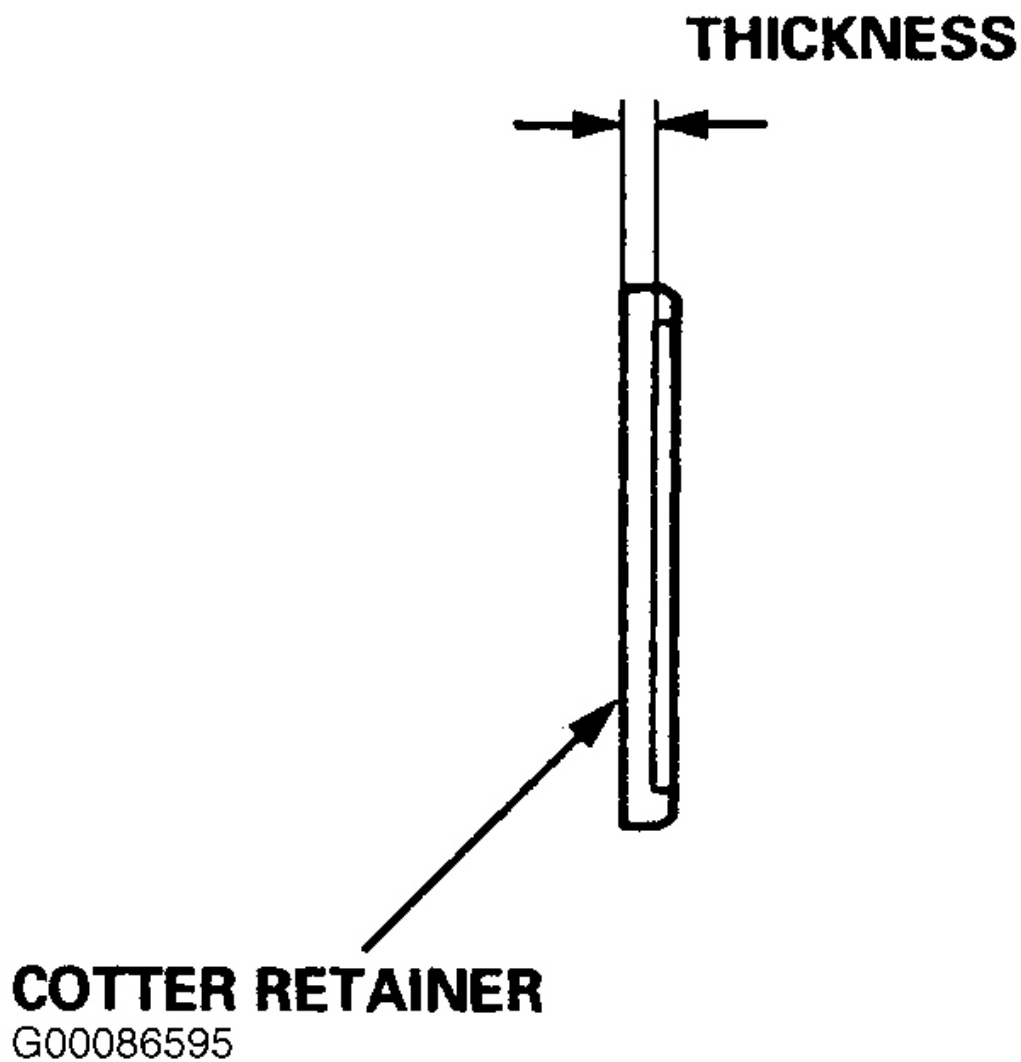
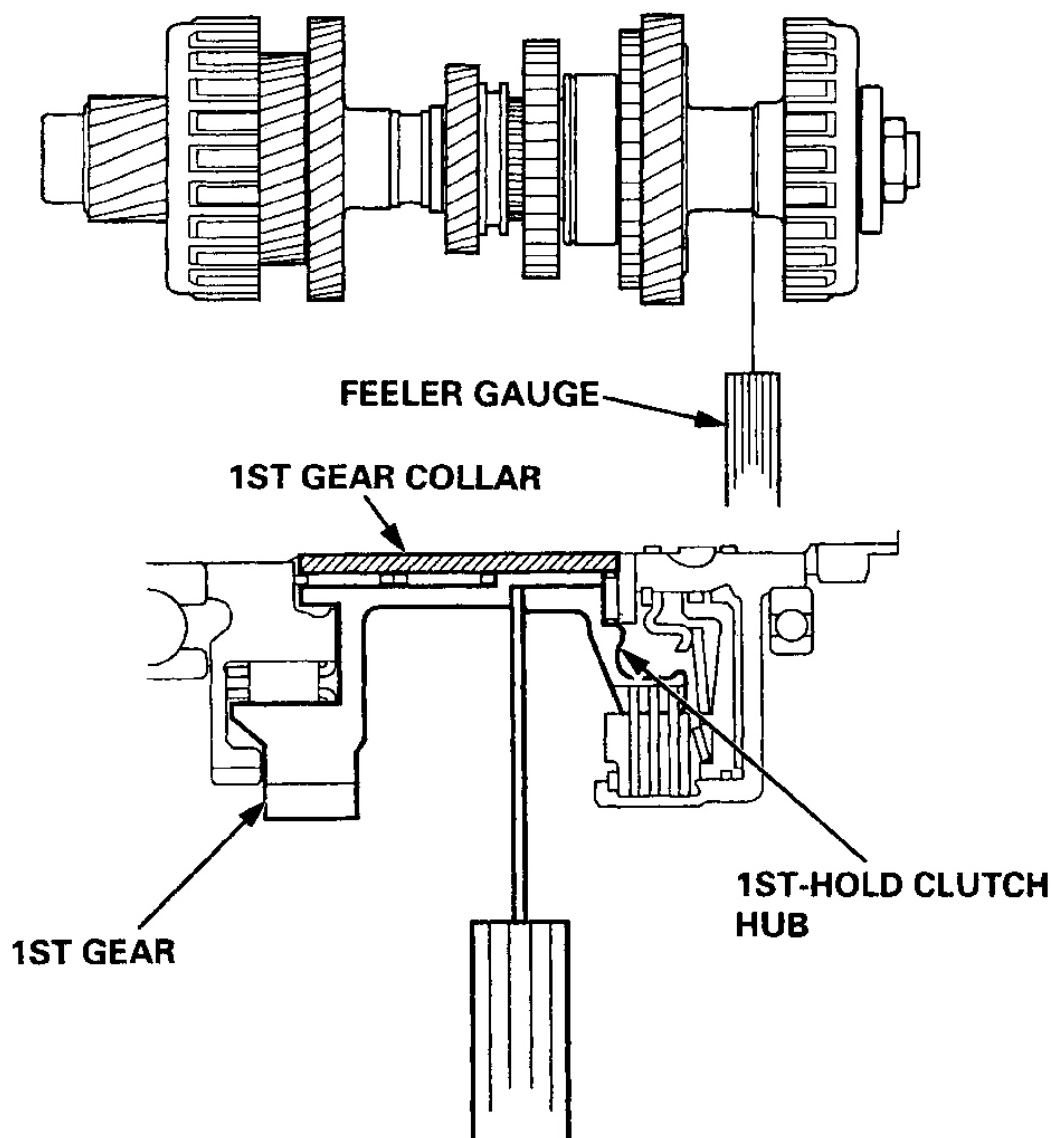


Fig. 39: Measuring Cotter Retainer Thickness
Courtesy of AMERICAN HONDA MOTOR CO., INC.

No.	Parts Number	Thickness
1	90431 – PR9 – 000	2.97 — 3.00 mm (0.117 — 0.118 in)
2	90432 – PR9 – 000	3.00 — 3.03 mm (0.118 — 0.119 in)
3	90433 – PR9 – 000	3.03 — 3.06 mm (0.119 — 0.120 in)
4	90434 – PR9 – 000	3.06 — 3.09 mm (0.120 — 0.122 in)
5	90435 – PR9 – 000	3.09 — 3.12 mm (0.122 — 0.123 in)

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Fig. 40: Cotter Retainer Selection Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 41: Measuring 1st Gear-To-1st Hold Clutch Hub Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SECONDARY SHAFT

NOTE: Lock nut has left-hand threads.

Disassembly & Inspection

1. Note location of secondary shaft components. See **Fig. 42** . Remove secondary shaft components.

2. Lubricate all parts with ATF during reassembly.
3. Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
4. Inspect thrust needle and needle bearings for galling and rough movement.
5. Check splines for excessive wear and damage. Check bearing surface for scoring, scratches and excessive wear.

Reassembly

NOTE: **Lubricate all parts with ATF during assembly. Before installing the "O" rings, wrap the shaft splines with tape to prevent damage to the "O" rings.**

1. Assemble all components on the secondary shaft except conical washer and lock nut. Install the thrust washer so that the large chamfer on the circumference faces the 2nd clutch assembly. See **Fig. 42** . Do not install the "O" rings during inspection.
2. Hold the 2nd clutch assembly against the 3rd gear. Measure the clearance between the 2nd gear and thrust needle bearing using a feeler gauge. See **Fig. 43** . Take measurements in at least 3 places, and take the average as the actual clearance. Standard is .0004-.0028" (.01-.07 mm).
3. If the clearance is out of tolerance, select and install a new thrust washer. See **Fig. 44** .
4. After replacing the thrust washer, ensure that the clearance is within tolerance.

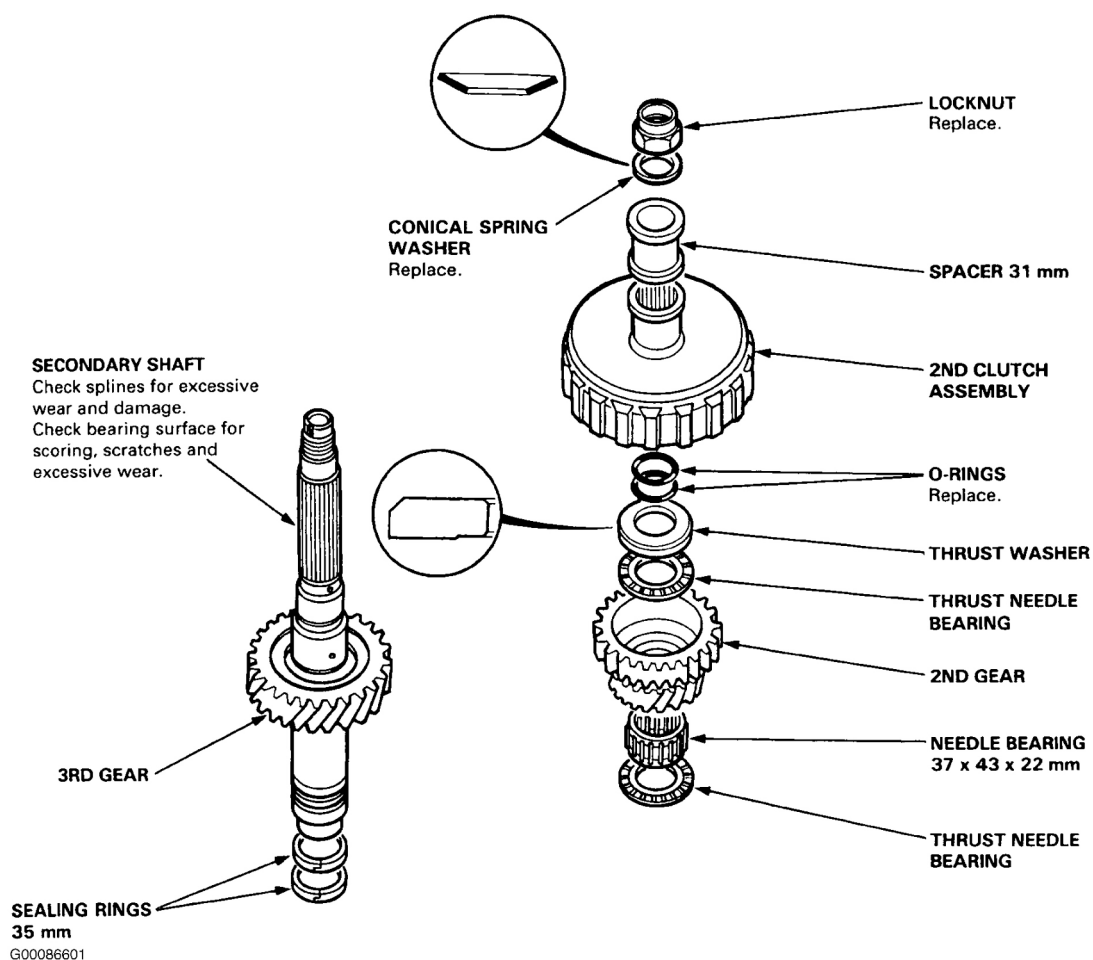
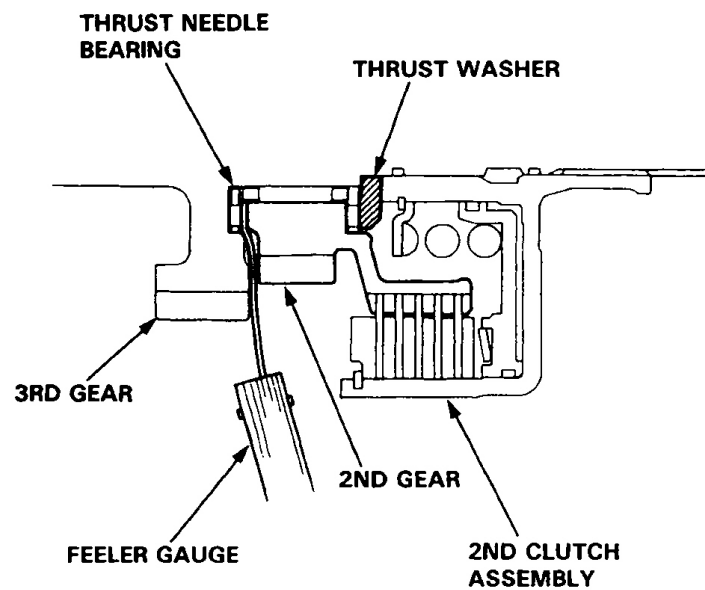
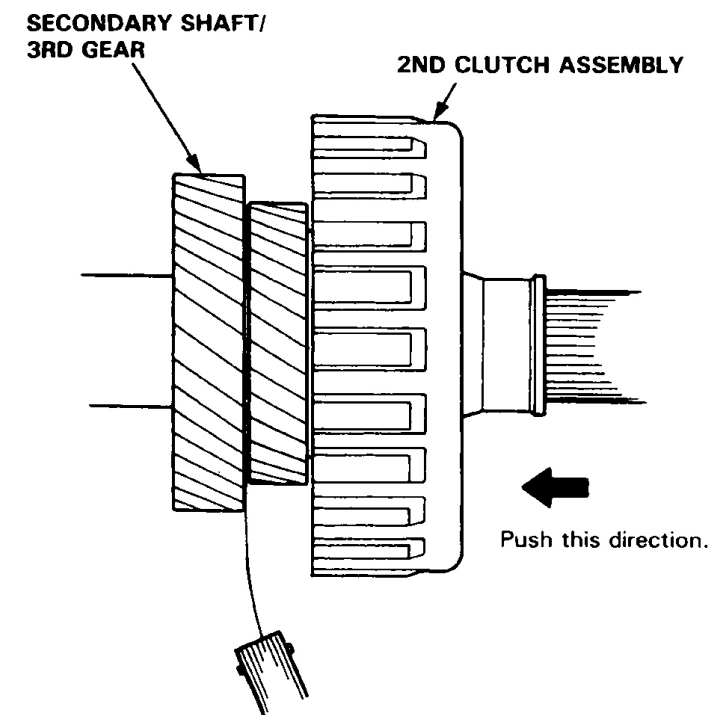
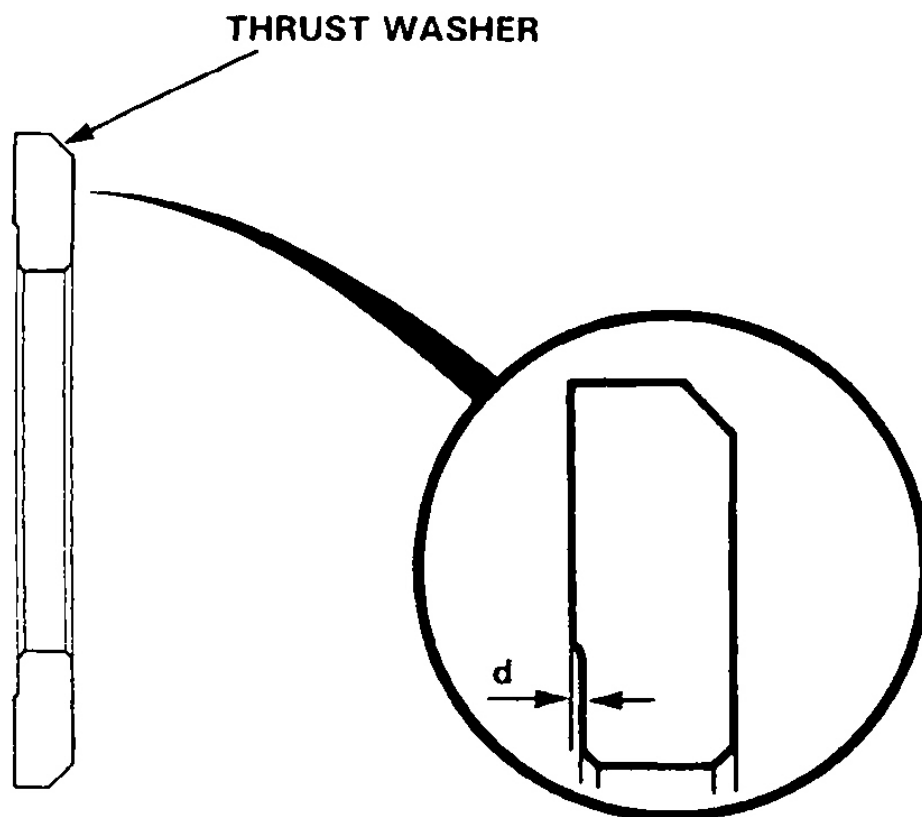


Fig. 42: Exploded View Of Secondary Shaft Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 43: Measuring 2nd Gear-To-Thrust Needle Bearing Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



THRUST WASHER

No.	Parts Number	Depth (d)
1	90408-PR9-000	0 mm (0 in)
2	90409-PR9-000	0.00-0.03 mm (0.00-0.001 in)
3	90410-PR9-000	0.03-0.06 mm (0.001-0.002 in)
4	90411-PR9-000	0.06-0.09 mm (0.002-0.004 in)
5	90412-PR9-000	0.09-0.12 mm (0.004-0.005 in)

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Fig. 44: Secondary Shaft Thrust Washer Selection Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ONE-WAY CLUTCH/PARKING GEAR

Disassembly, Inspection & Reassembly

1. Separate countershaft 1st gear from the parking gear by turning the parking gear clockwise. See **Fig. 45** .
2. Remove the one-way clutch by prying it up with the blade of a screwdriver. See **Fig. 46** .
3. Inspect components. See **Fig. 47** .
4. After the parts are assembled, hold countershaft 1st gear and turn the parking gear in the direction shown. Ensure parking gear turns freely.

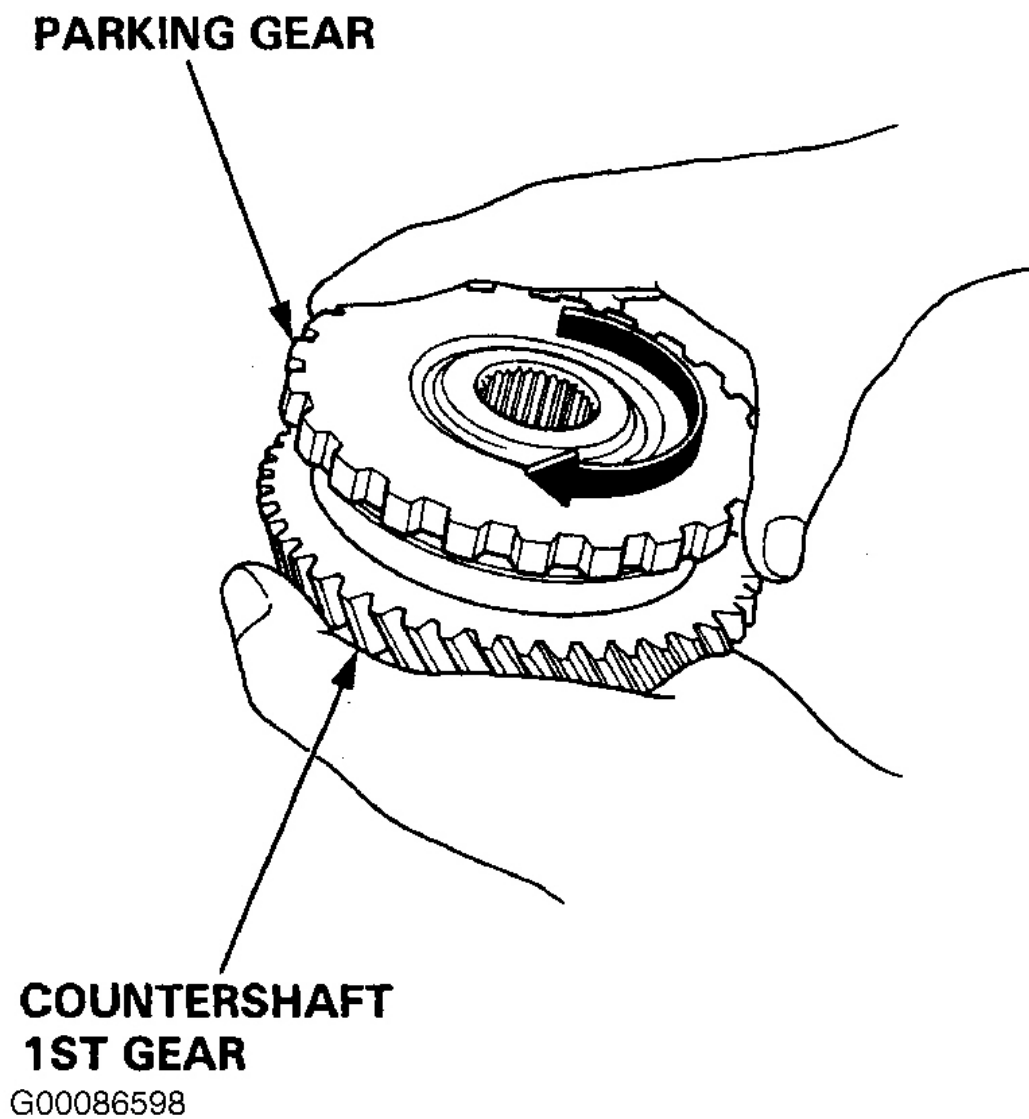
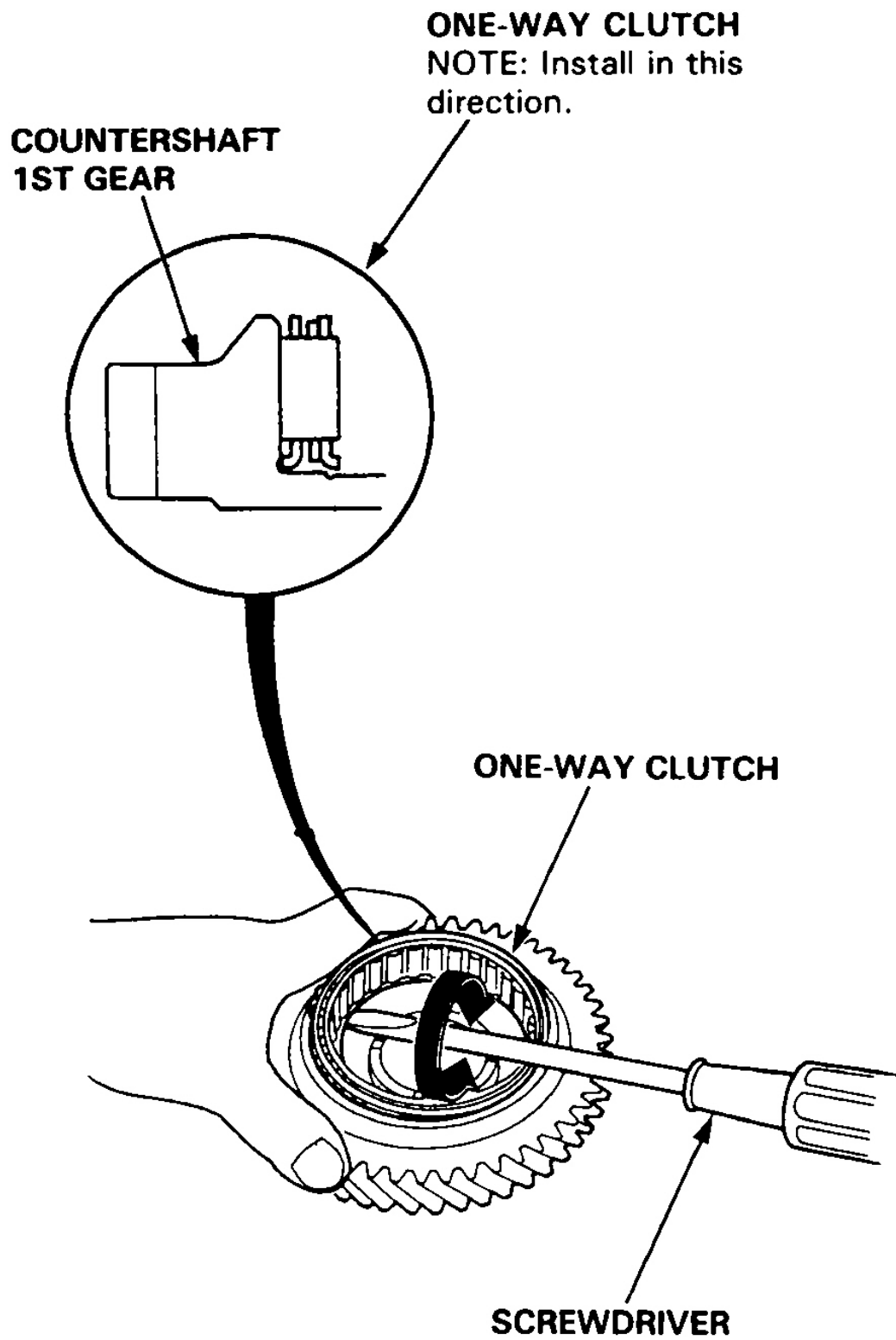


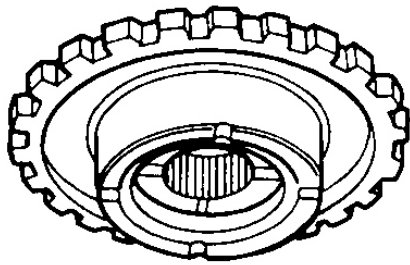
Fig. 45: Identifying One-Way Clutch Operation
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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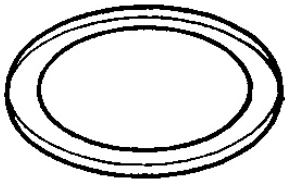
Fig. 46: Removing One-Way Clutch

Courtesy of AMERICAN HONDA MOTOR CO., INC.



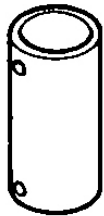
PARKING GEAR

Inspect for wear and scoring.

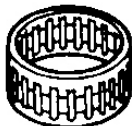


RETAINER PLATE

Inspect for wear and scoring.

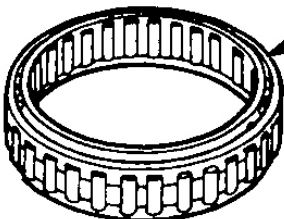


1ST GEAR COLLAR



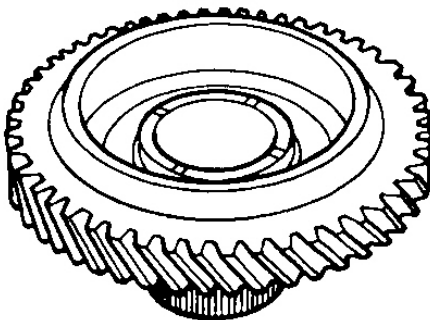
NEEDLE ROLLER BEARINGS

Inspect for galling and rough movement.



ONE-WAY CLUTCH

Inspect for damage and faulty movement.



**COUNTERSHAFT
1ST GEAR**

Inspect for wear and scoring.

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Fig. 47: Exploded View Of One-Way Clutch/Parking Gear Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CLUTCH ASSEMBLIES

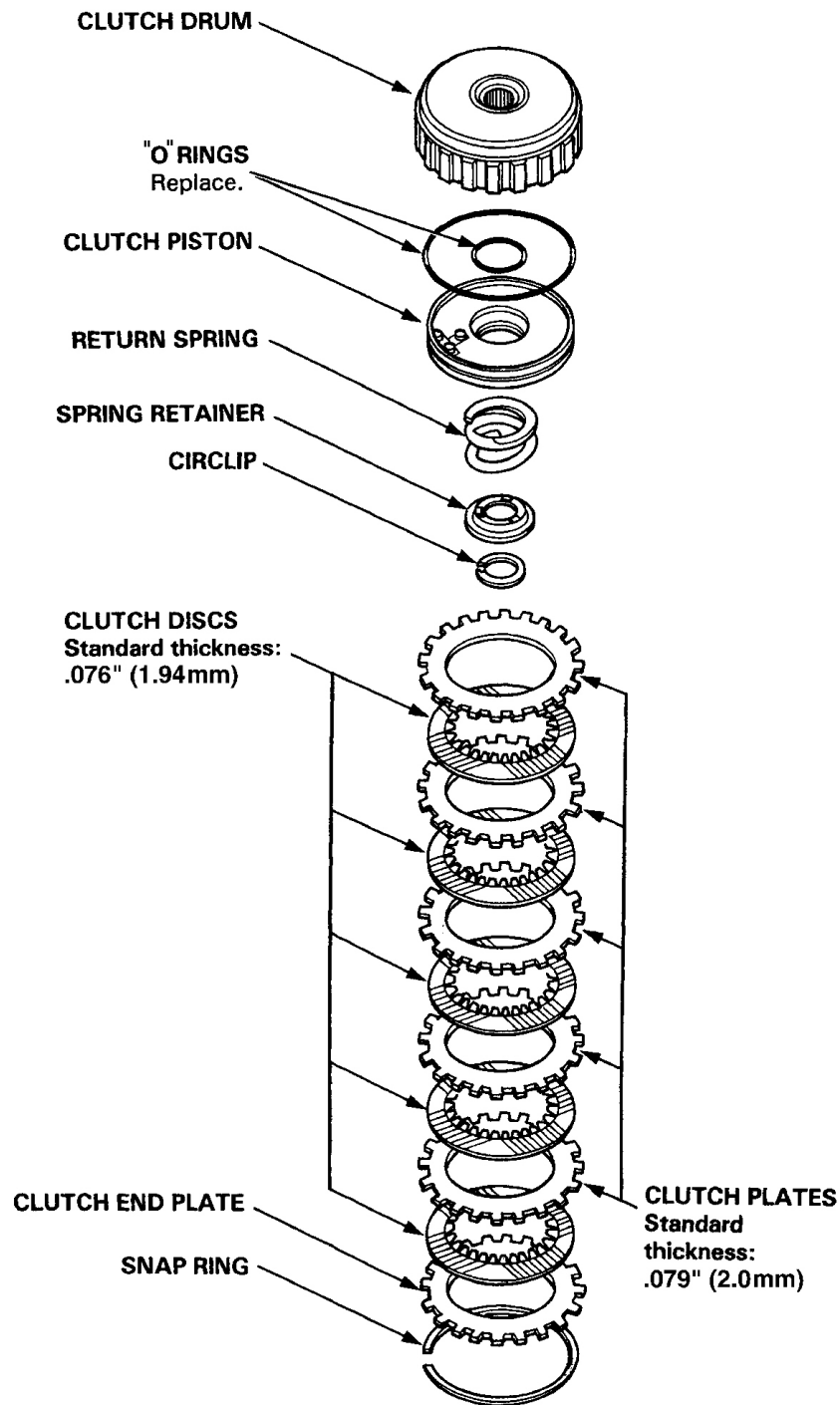
NOTE: For exploded views of clutch assemblies, see **Fig. 48 -Fig. 52** .

Disassembly

1. Remove the snap ring, then remove the clutch end plate, clutch discs and plates.
2. Remove the disc spring on 1st-hold and 2nd clutches.

CAUTION: If either end of the spring compressor is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged. Be sure the spring compressor is adjusted to have full contact with the spring retainer.

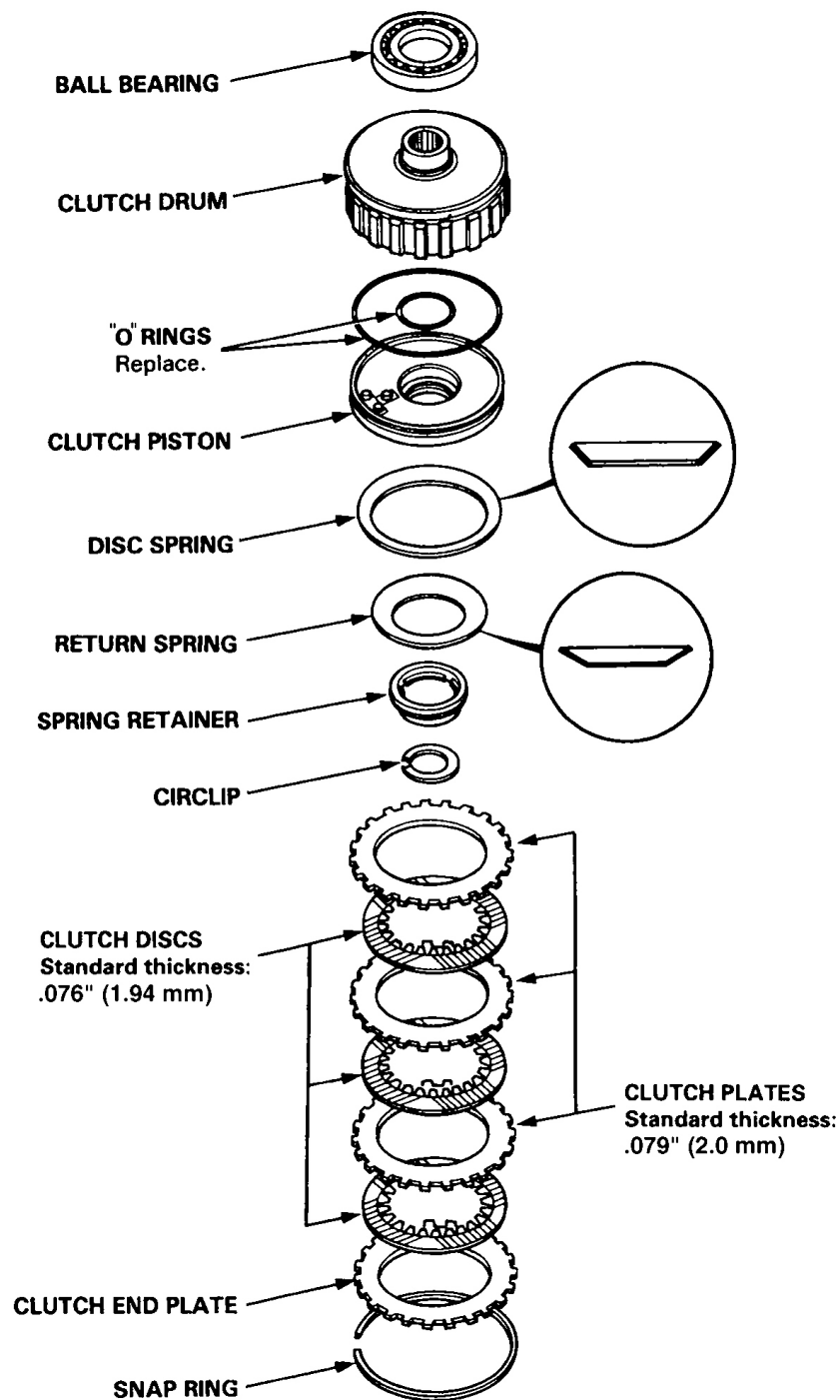
3. Install the appropriate spring compressor on clutch drum.
4. Compress the clutch return spring.
5. Remove the circlip. Then remove the spring compressor.
6. Wrap a shop rag around the clutch drum, and apply air pressure to the fluid passage to remove the piston. Place a finger tip on the other end while applying air pressure.



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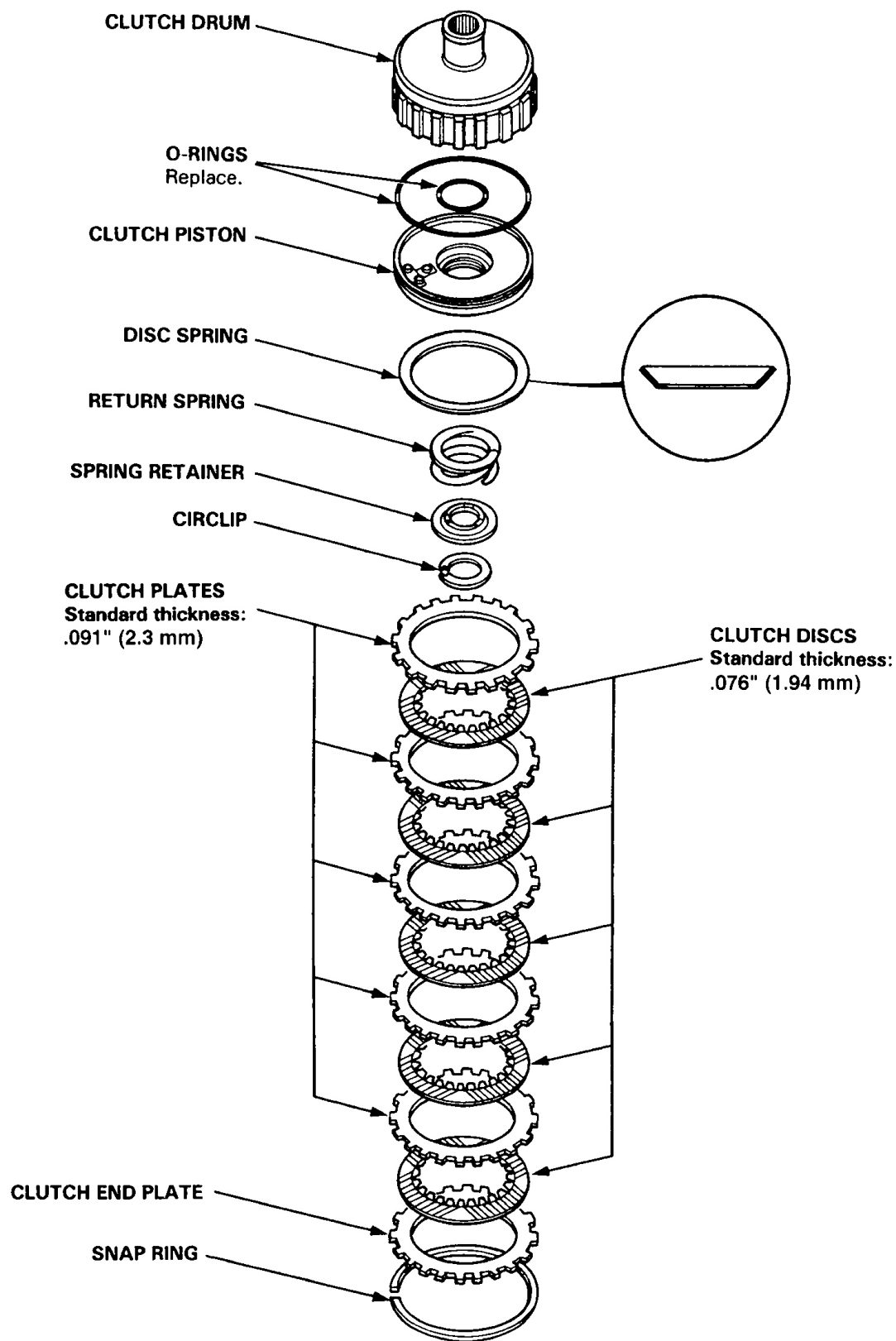
Fig. 48: Exploded View Of 1st Clutch

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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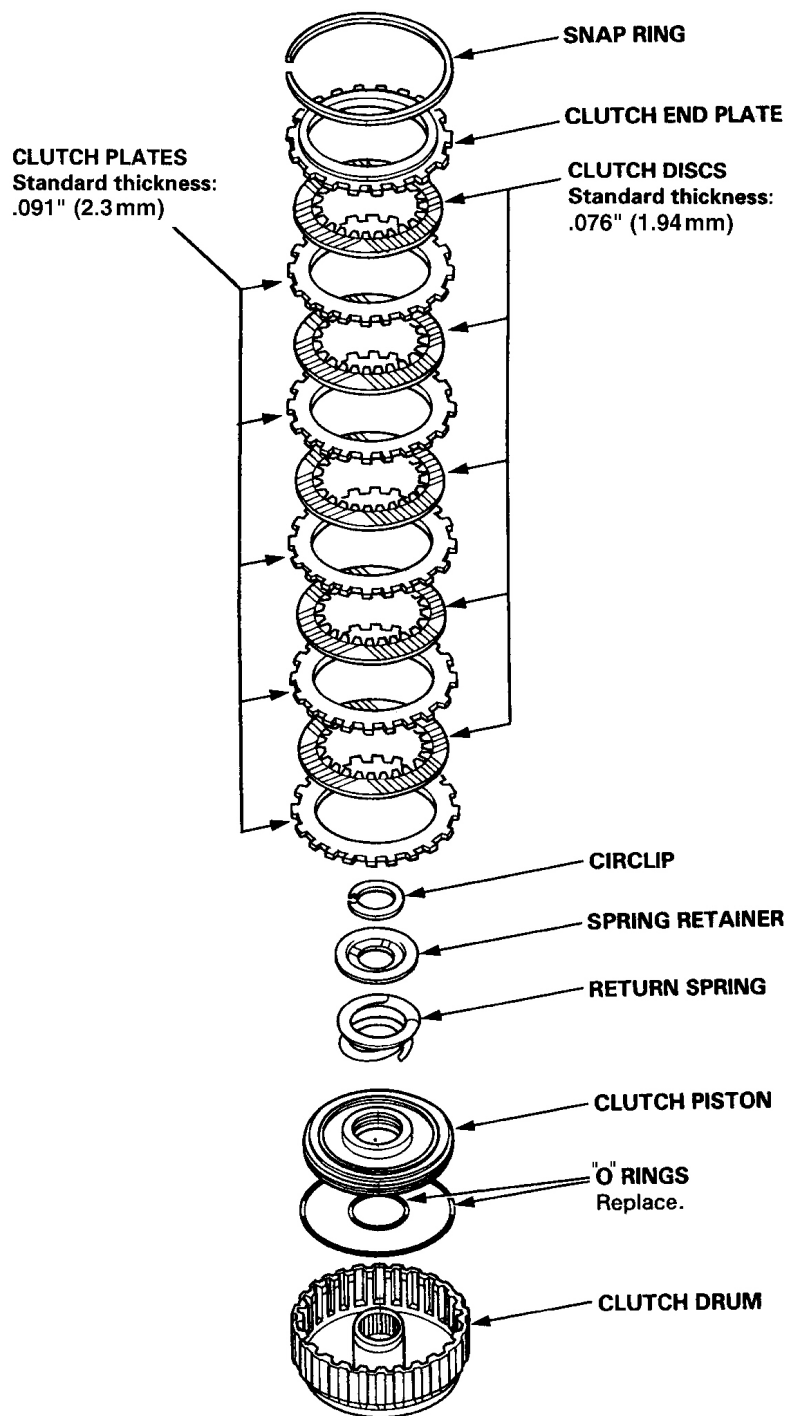
Fig. 49: Exploded View Of 1st-Hold Clutch
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 50: Exploded View Of 2nd Clutch

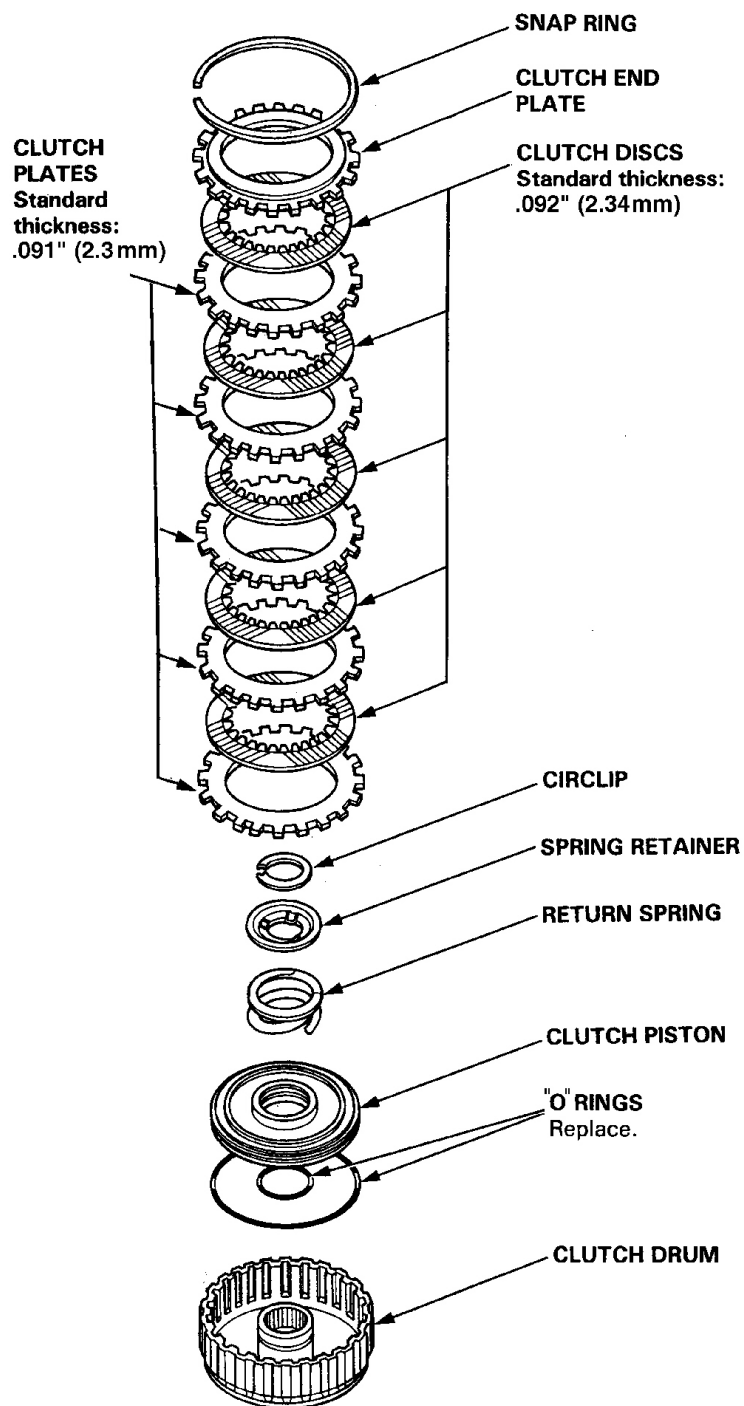
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 51: Exploded View Of 3rd Clutch

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 52: Exploded View Of 4th Clutch
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Cleaning & Inspection

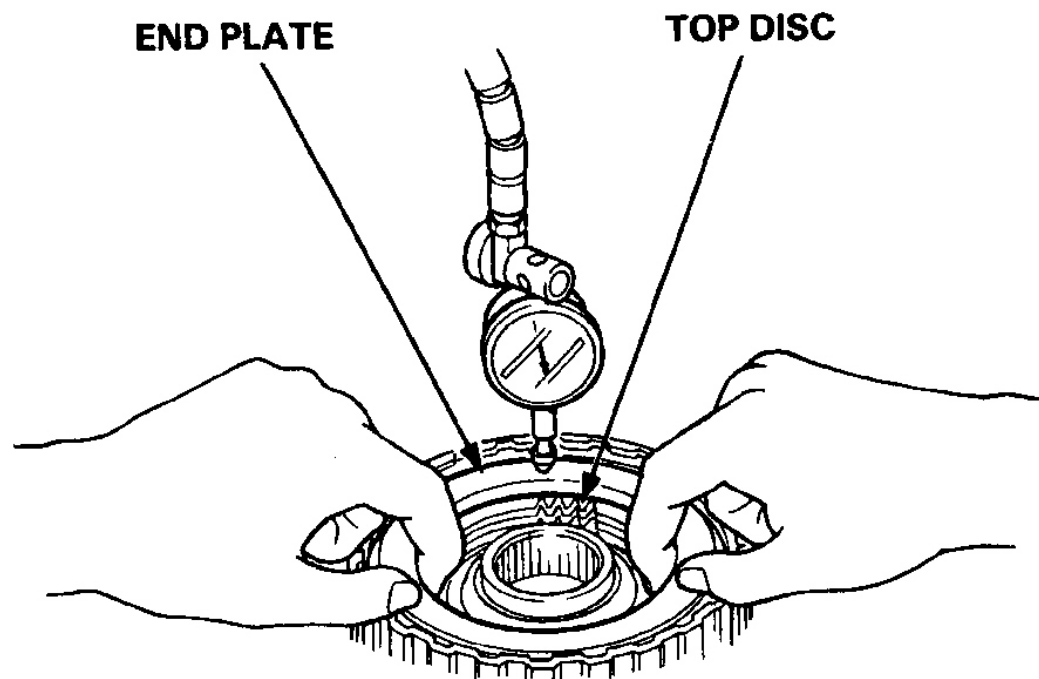
1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
2. Blow out all passages.
3. Lubricate all parts with ATF before assembly.

Reassembly

1. Inspect the check valve. If check valve, replace the piston.
2. Install a new "O" ring on the clutch piston.
3. On 1st, 3rd and 4th clutches, be sure that the disc spring is securely staked.
4. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating. Do not pinch "O" ring by installing the piston with force.
5. Install the return spring and, spring retainer, then position the circlip on the retainer.
6. Install the spring compressor.
7. Compress the clutch return spring.
8. Install the circlip.
9. Remove the spring compressor.
10. On 1st-hold and 2nd clutches, install the disc spring.
11. Soak the clutch discs thoroughly in ATF for a minimum of 30 minutes.
12. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.
13. Install the snap ring.
14. Measure the clearance between the clutch end plate and top disc with a dial indicator. Zero the dial indicator with the clutch end plate lowered, and lift it up to the snap ring. See **Fig. 53** . The distance that the clutch end plate moves is the clearance between the clutch end plate and top disc. Measure at 3 locations.

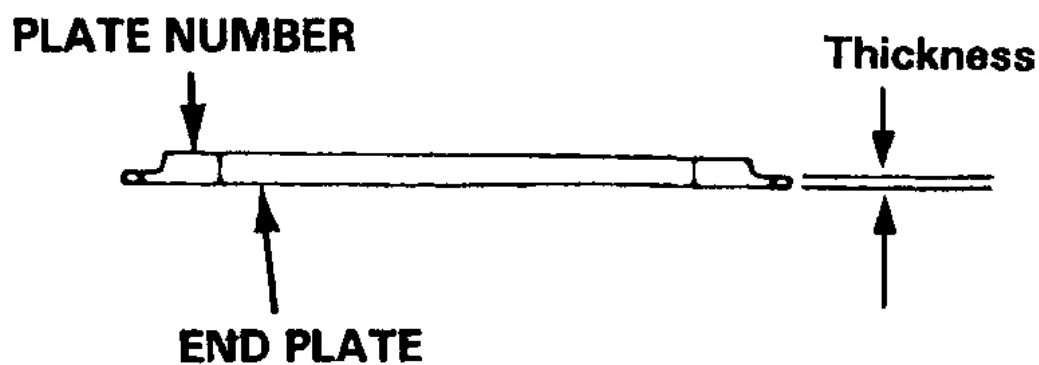
NOTE: **If the thickest clutch end plate is installed, but the clearance is still over the standard, replace the clutch discs and clutch plates.**

15. If the clearance is not within the service limits, select a new clutch end plate. See **Fig. 54** . Clutch plates range in thicknesses of .083-.114" (2.1-2.9 mm) in .04" (.1 mm) increments.



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Fig. 53: Measure Clutch End Plate-To-Top Disc Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00086610

Fig. 54: Measuring End Plate Thickness
Courtesy of AMERICAN HONDA MOTOR CO., INC.

1ST-HOLD CLUTCH BEARING

Removal & Installation

Remove the 1st-hold clutch bearing using appropriate bearing puller. Install a new bearing using the appropriate bearing driver until it is fully seated.

TRANSAXLE HOUSING BEARINGS

Removal & Installation

NOTE: Do not remove the snap rings unless it is necessary to clean the grooves in the housing.

1. To remove the mainshaft, countershaft and secondary shaft bearings from the transaxle housing, expand each snap ring with the snap ring pliers, then push the bearing out.
2. Expand each snap ring with the snap ring pliers. Insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transaxle until the ring snaps in place around it.

DIFFERENTIAL

CAUTION: Ring gear bolts have left hand threads.

Preset Torque Inspection

1. Place one inspection tool in a vise. Place the left side of the differential assembly on the inspection tool, then preset the differential with 3-5 rotations, counterclockwise. See **Fig. 55**.
2. Measure preset torque counterclockwise using a torque wrench. Standard is 43-101 ft. lbs. (59-137 N.m). Service limit is 22 ft. lbs. (30 N.m),
3. If preset torque is less than the service limit, replace the limited slip differential clutch set. Adjust the 65 mm and 112 mm shims whenever the clutch set is replaced. See **Fig. 56**.

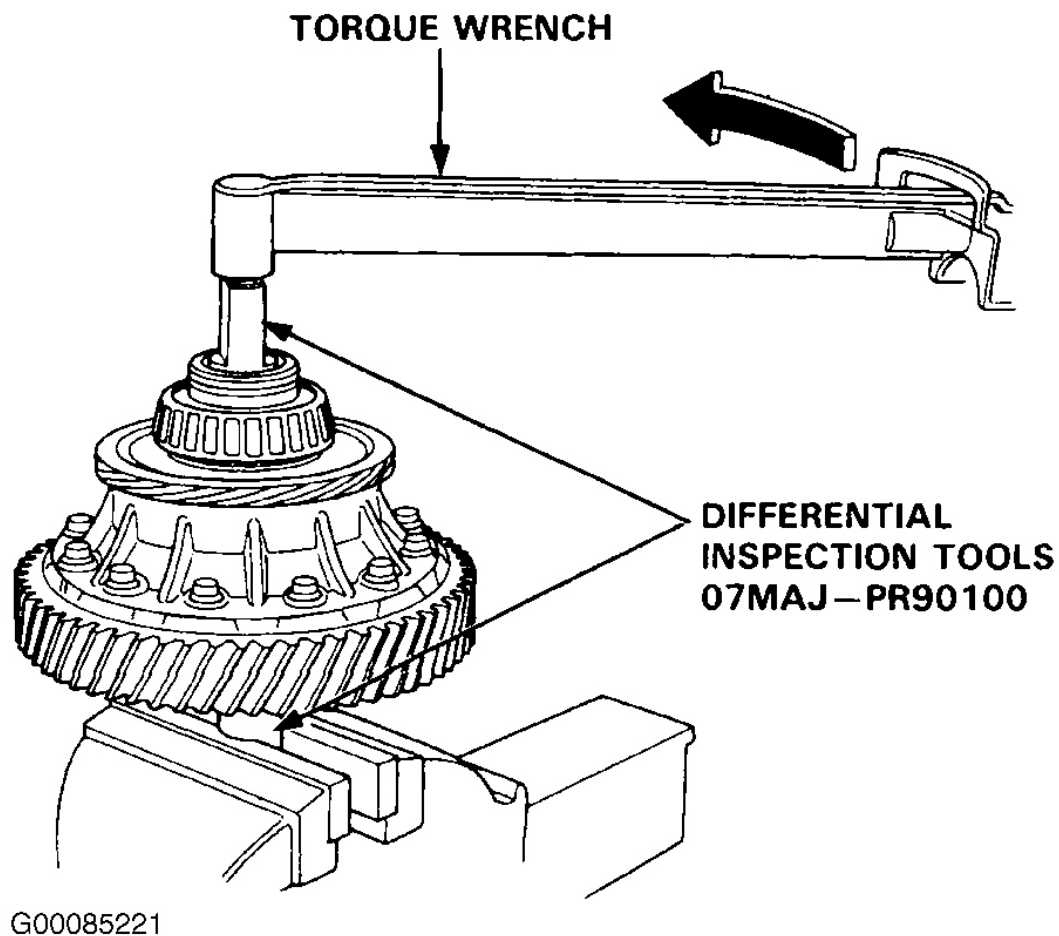
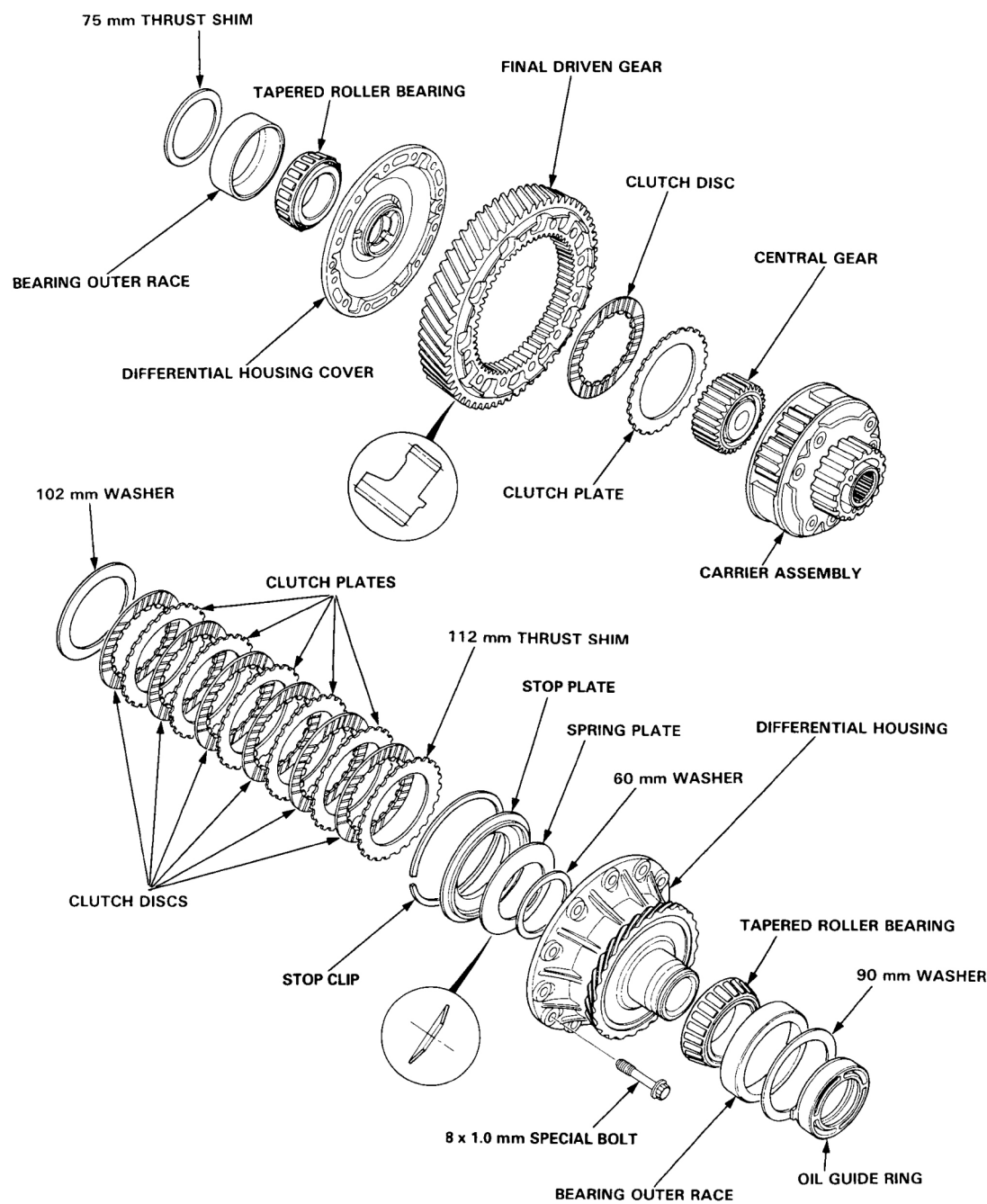


Fig. 55: Rotating Differential

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 56: Exploded View Of Differential Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Carrier Bearing Removal & Installation

NOTE: For component identification, see Fig. 56 .

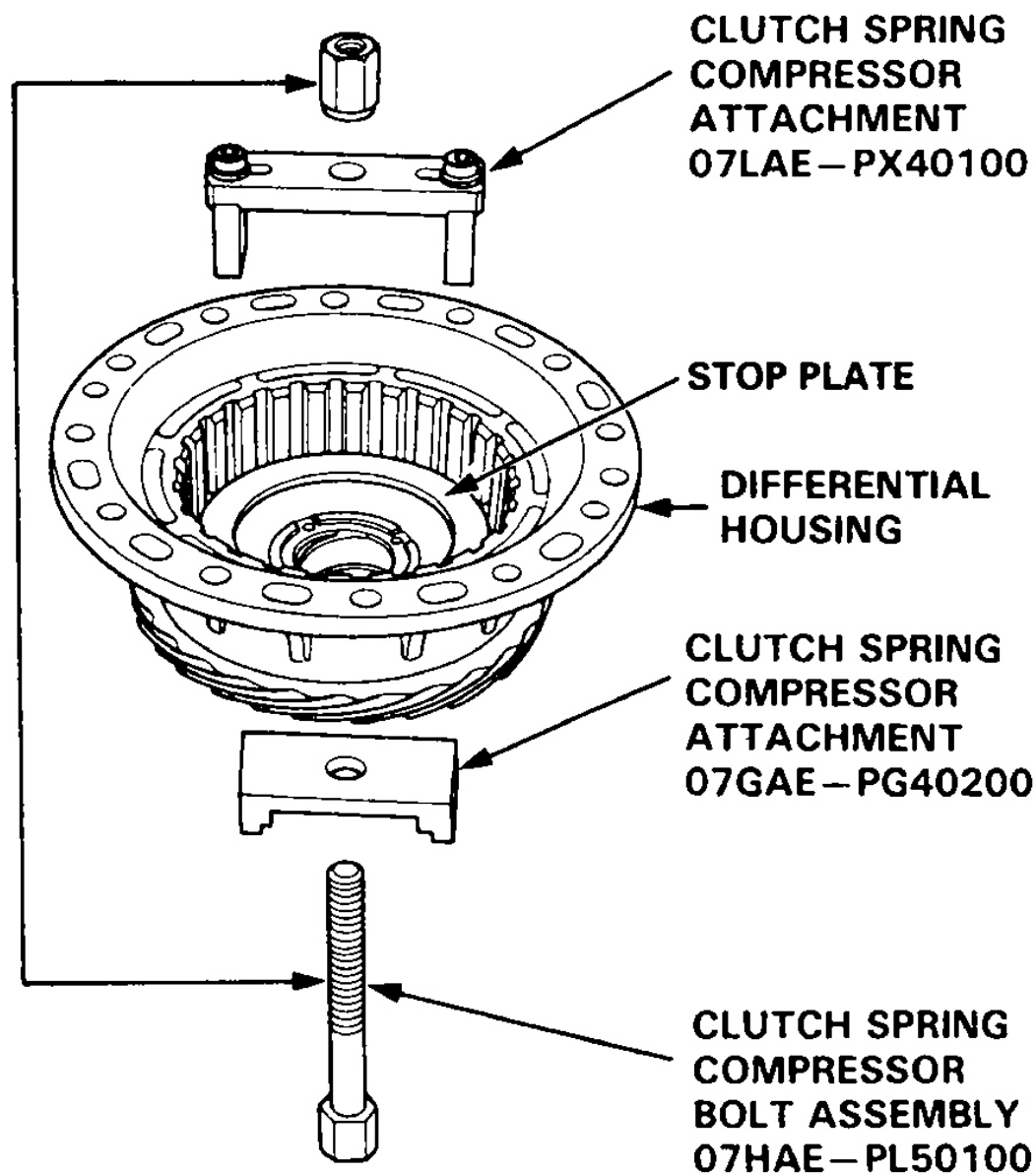
NOTE: **The bearing and outer race should be replaced as a set. Inspect and adjust the bearing preload whenever the bearings are replaced.**

1. Remove the tapered roller bearings using appropriate bearing puller.
2. Install the tapered roller bearings using a press attachment and a press. Press the tapered roller bearings squarely until they bottom against the case.

Differential Disassembly

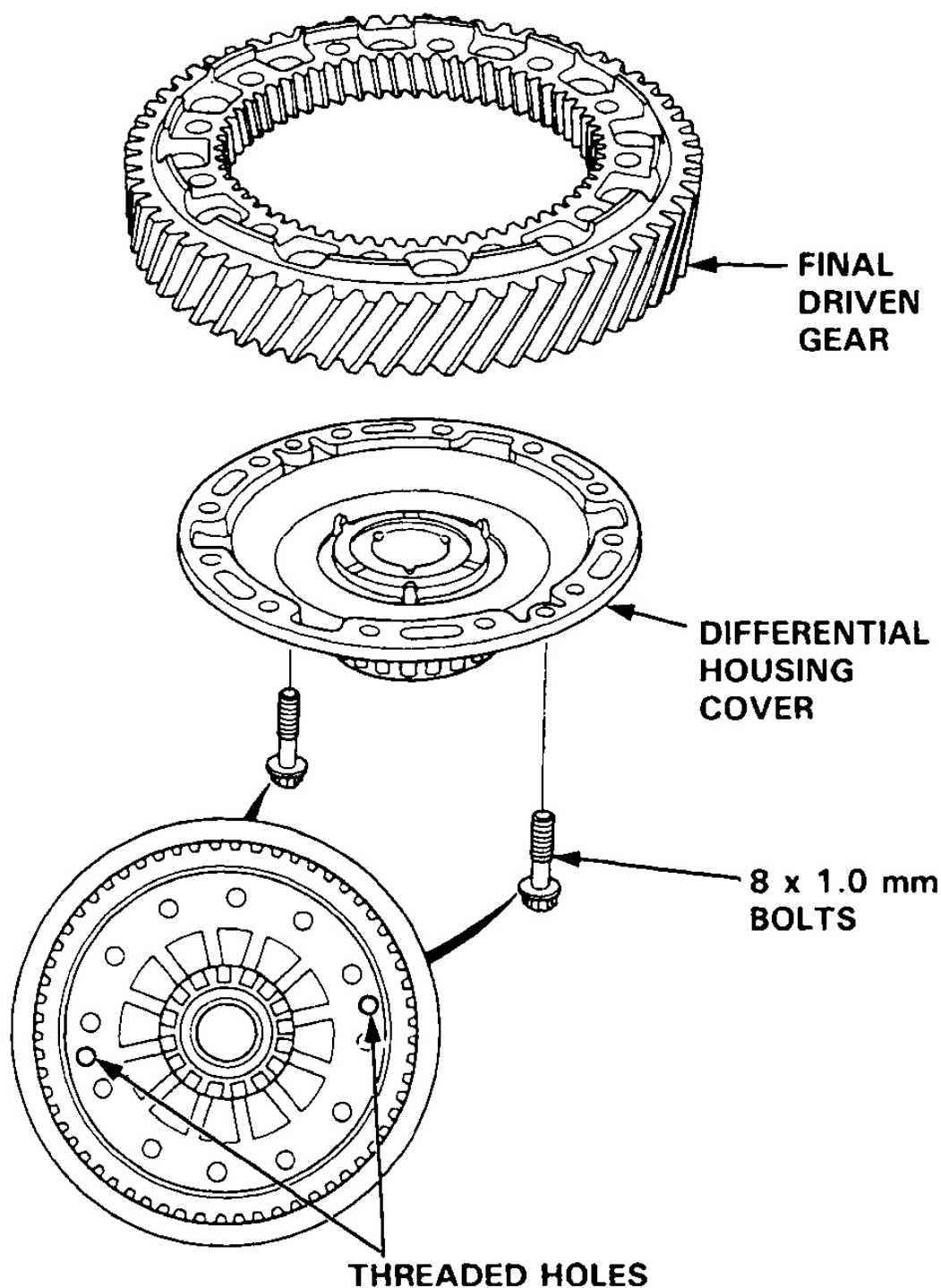
NOTE: **For component identification, see Fig. 56 .**

1. Hold the differential in a bench vise using inspection tool, then remove the differential housing mounting bolts in a crisscross pattern in several steps. See Fig. 57 .
2. Remove the differential housing, then install the spring compressor on the stop plate. See Fig. 57 .
3. Compress the spring plate.
4. Remove the stop clip.
5. Remove the spring compressor, and then remove the stop plate, spring plate, and 60 mm washer.
6. Remove the 112 mm thrust shim, clutch discs, clutch plates, and 102 mm washer.
7. Remove the carrier assembly, central gear, clutch plate, and clutch disc.
8. Screw two 8 x 1.0 mm bolts into the threaded holes in the differential housing cover to push it away from the final driven gear. See Fig. 58 . Turn each bolt two turns at a time to prevent cocking the differential housing cover excessively.



G00086622

Fig. 57: Installing Spring Compressor On Differential
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 58: Identifying Differential Housing Cover Threaded Holes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

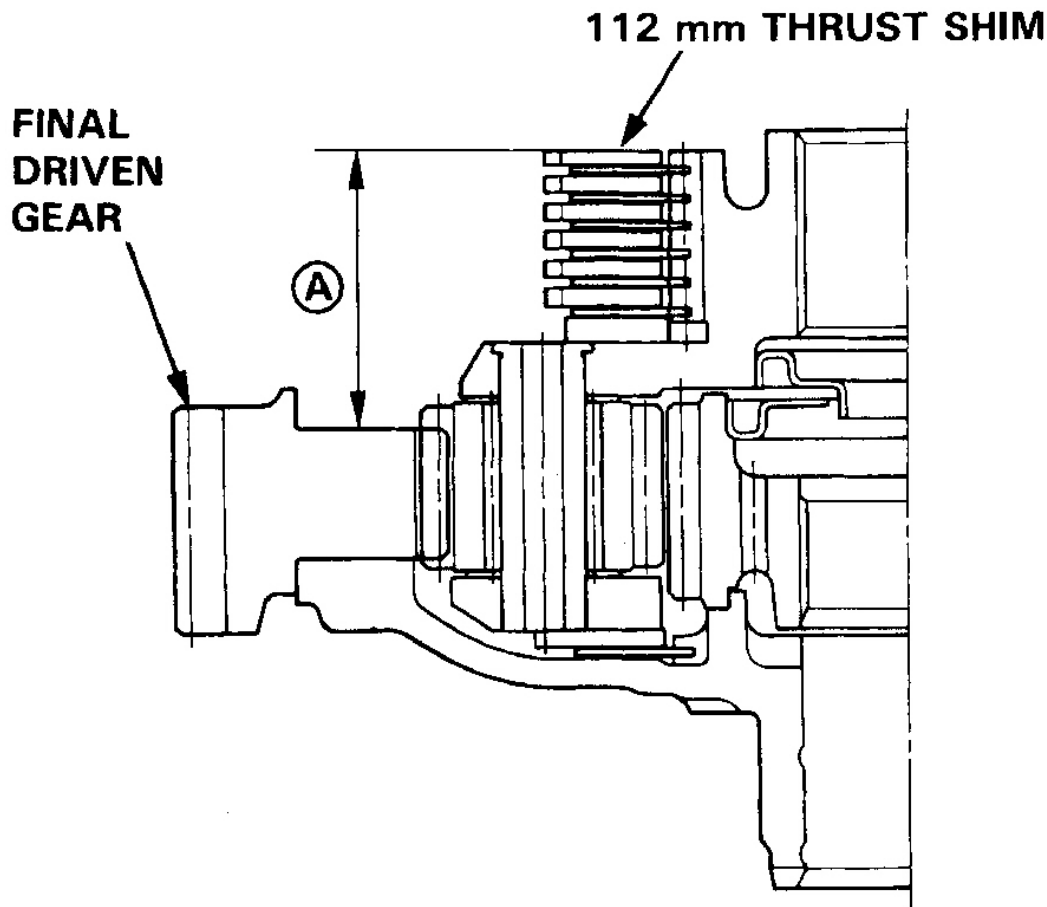
Clutch Disc & Plate Replacement

NOTE: **The clutch discs and clutch plates should be replaced as a set.**

1. Remove the clutch discs and clutch plates. See **DIFFERENTIAL DISASSEMBLY** .
2. Soak the clutch discs for five minutes in ATF.

NOTE: **Position the 112 mm thrust shim with the thickness size mark facing away from the clutch discs.**

3. Install the clutch discs, clutch plates, and a standard shim. Measure distance "A". See **Fig. 59** . Distance should be 1.642-1.650" (41.7-41.9 mm).
4. Install the differential housing. Tighten the bolts evenly in several steps, then tighten in a crisscross pattern to 29 ft. lbs. (39 N.m).
5. Make sure the preset torque is within the standard. See **PRESET TORQUE INSPECTION** .
6. If preset torque is beyond the standard, replace the 112 mm thrust shim as necessary. Shims are available in thicknesses of .047-.118" (1.2-3.0 mm) in increments of .079" (.2 mm).



G00086623

Fig. 59: Measuring Clutch Disc Height

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Reassembly**NOTE:** For component identification, see **Fig. 56** .

1. Install the clutch disc, clutch plate, central gear, and carrier assembly. Lubricate the clutch disc surface with transmission fluid.
2. Install the final driven gear. Align the mark on the differential housing cover with the mark on the final driven gear.
3. Install the 102 mm washer, clutch discs, clutch plates, and 112 mm thrust shim. Lubricate the clutch discs with transmission fluid. Position the 112 mm thrust shim with the thickness size mark facing away from the clutch discs.
4. Install the 60 mm washer, spring plate, and stop plate.

5. Install the spring compressor on the stop plate.
6. Compress the spring plate, then install the stop clip.
7. Install the differential housing. Align the fingers of the clutch plates and clutch discs.
8. Make sure the differential housing touches the final driven gear.
9. Hold the differential in a bench vise using a special tool, then install the differential housing mounting bolts. Tighten the bolts in a crisscross pattern in several steps.

TRANSAXLE ADJUSTMENTS

DIFFERENTIAL PRELOAD ADJUSTMENT

NOTE: If any of the items listed are replaced, the bearing preload must be adjusted.

- **Transaxle Housing**
- **Torque Converter Housing**
- **Differential**
- **Tapered Roller Bearing & Outer Race**
- **75 mm Thrust Shim**
- **90 mm Washer**
- **Oil Guide Ring**

1. Remove the bearing outer race and 75 mm thrust shim from the transaxle housing by prying up on the bearing outer race or by heating the housing to about 212°F (100°C).

CAUTION: Do not reuse the thrust shim if the outer race was pried out. Do not use more than one shim to adjust the bearing preload.

NOTE: If the outer race was removed by heating the case, let the transaxle cool to room temperature before adjusting the bearing preload. Do not heat the transaxle housing in excess of 212°F (100°C). Replace the bearing with a new one whenever the outer race is replaced. Repeat on the clutch side.

2. Install the standard shim and bearing outer race into the transaxle housing using appropriate race driver. See **Fig. 60**. Install the bearing outer race squarely, and check that there is no clearance between the bearing outer race, shim and transaxle housing.
3. Lubricate the tapered roller bearing with transmission oil, then install the differential.
4. Install the transaxle housing. Do not install the mainshaft, countershaft, reverse idler gear shaft and secondary shaft.
5. Rotate the differential assembly in both directions to seat bearings.
6. Measure the starting torque of the differential assembly with differential inspection tool and a torque wrench. See **Fig. 61**. Measure the bearing preload at normal room temperature in both directions. Standard is 29-39 INCH lbs. (3.3-4.5 N.m).

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7. If the bearing preload is not within the standard, select the shim that will give you the correct preload, and recheck. Changing one of the shims to the next size will increase or decrease preload about 2.6-3.5 INCH lbs. (.3-.4 N.m).

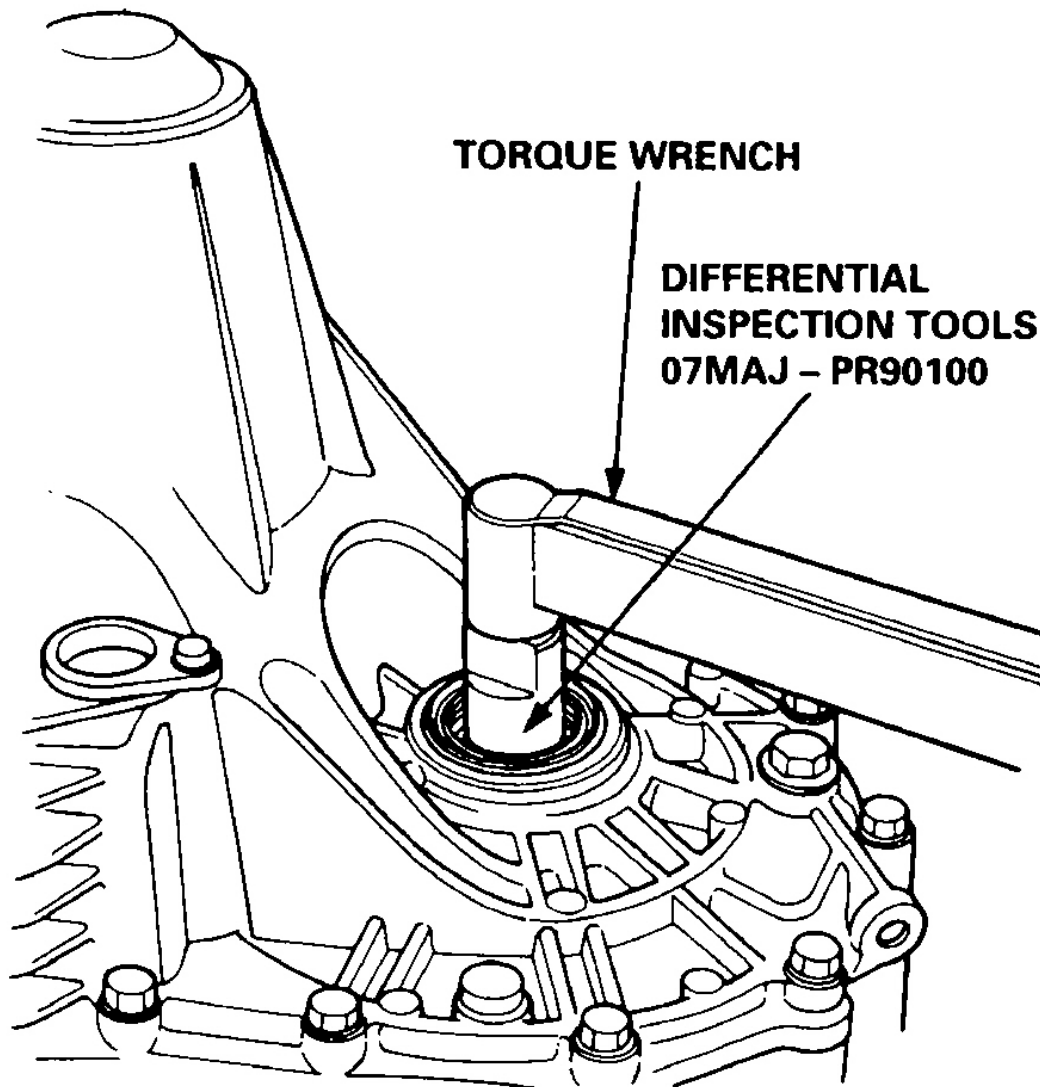
○ Standard shim

	Part Number	Thickness
A	41481-PR8-000	1.70 mm (0.0669 in)
B	41482-PR8-000	1.73 mm (0.0681 in)
C	41483-PR8-000	1.76 mm (0.0693 in)
D	41484-PR8-000	1.79 mm (0.0705 in)
E	41485-PR8-000	1.82 mm (0.0723 in)
F	41486-PR8-000	1.85 mm (0.0728 in)
G	41487-PR8-000	1.88 mm (0.0740 in)
H	41488-PR8-000	1.91 mm (0.0752 in)
I	41489-PR8-000	1.94 mm (0.0764 in)
ⓐ	41490-PR8-000	1.97 mm (0.0776 in)
K	41491-PR8-000	2.00 mm (0.0787 in)
L	41492-PR8-000	2.03 mm (0.0799 in)
M	41493-PR8-000	2.06 mm (0.0811 in)
N	41494-PR8-000	2.09 mm (0.0823 in)
O	41495-PR8-000	2.12 mm (0.0835 in)
P	41496-PR8-000	2.15 mm (0.0846 in)
Q	41497-PR8-000	2.18 mm (0.0858 in)
R	41498-PR8-000	2.21 mm (0.0870 in)
S	41499-PR8-000	2.24 mm (0.0882 in)
T	41500-PR8-000	2.27 mm (0.0894 in)
U	41501-PR9-000	2.30 mm (0.0906 in)
V	41502-PR9-000	2.33 mm (0.0917 in)
W	41503-PR9-000	2.36 mm (0.0929 in)
X	41504-PR9-000	2.39 mm (0.0941 in)
Y	41505-PR9-000	2.42 mm (0.0953 in)

G00086621

Fig. 60: 75 mm Thrust Shim Selection Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 61: Measuring Differential Starting Torque
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TRANSAXLE REASSEMBLY

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

NOTE: Coat all components with ATF before reassembly.

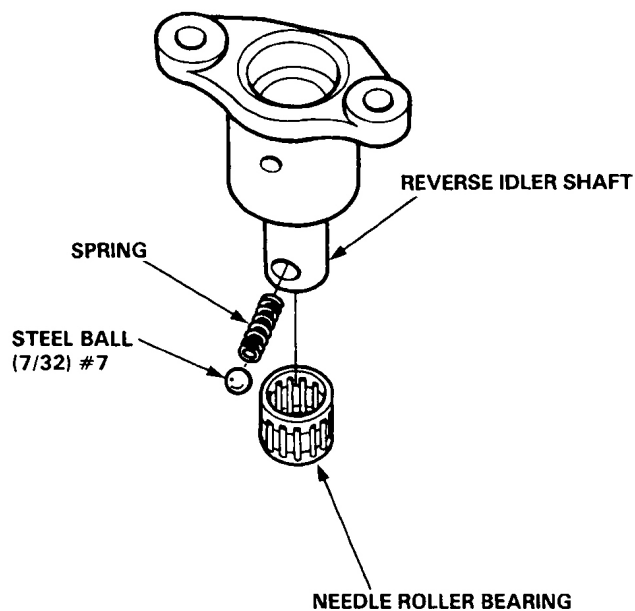
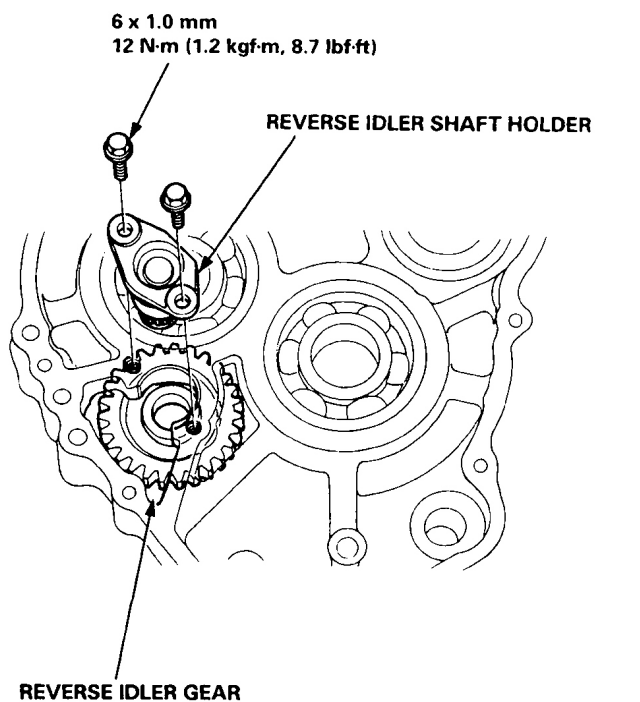
REVERSE IDLER GEAR

Installation

1. Install the reverse idler gear.

NOTE: The steel ball is under spring pressure. Take care not to let it pop out. See Fig. 62 .

2. Set the spring in the reverse idler shaft. Push the spring in with the steel ball, then install the needle bearing.
3. Install the reverse idler shaft holder into the transaxle housing, then tighten the bolts.



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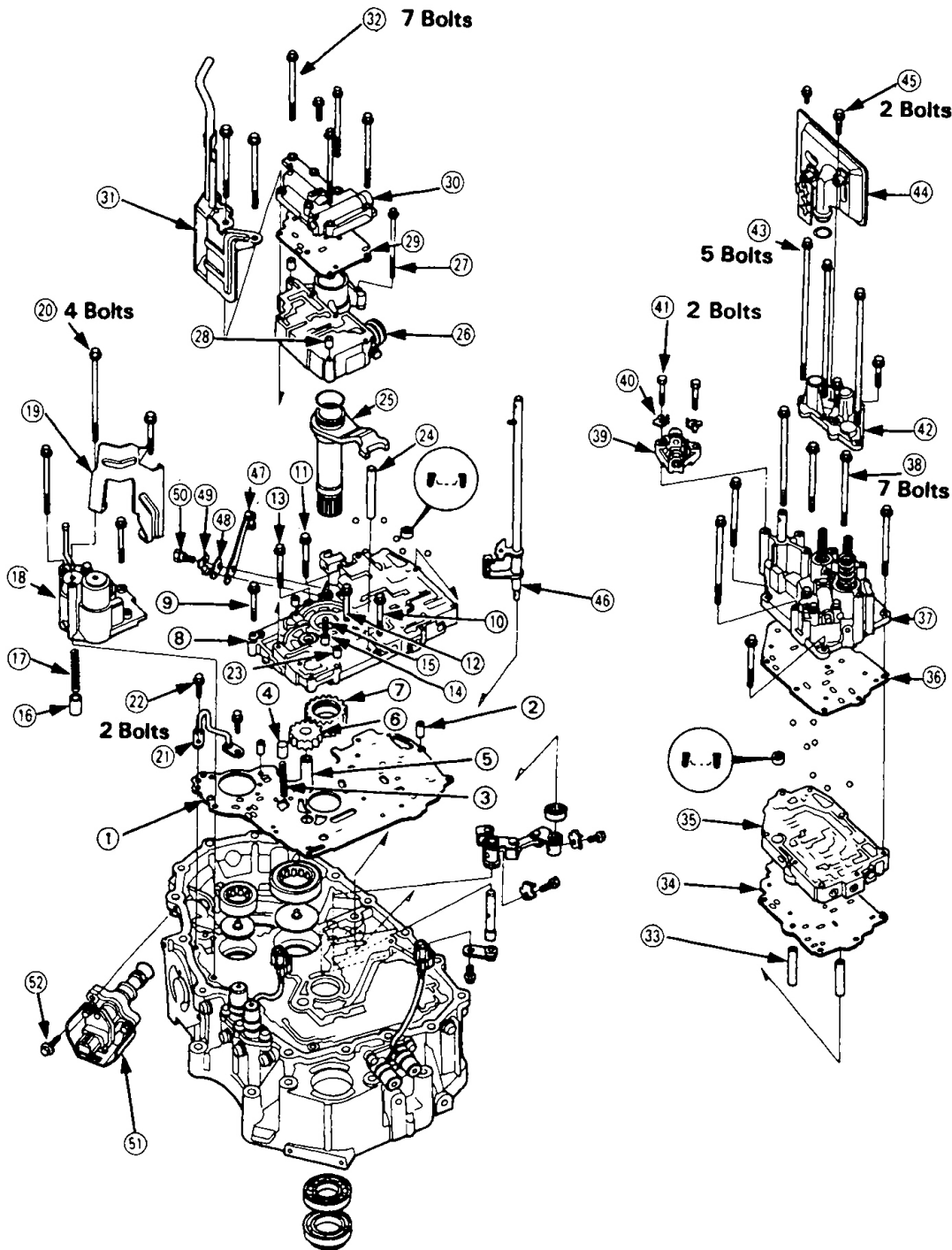
Fig. 62: Installing Idler Gear Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE BODY

CAUTION: If the pump gear and pump shaft do not move freely, loosen the valve body bolts, realign the shaft, and then retighten to the specified torque. Failure to align the pump shaft correctly will result in seized pump gear or pump shaft.

NOTE: To prevent stripping the threads, press down on the accumulator cover while installing the bolts.

Reassemble valve body components in numbered sequence. See **Fig. 63** . Ensure the pump driven gear chamfered side faces separator plate.

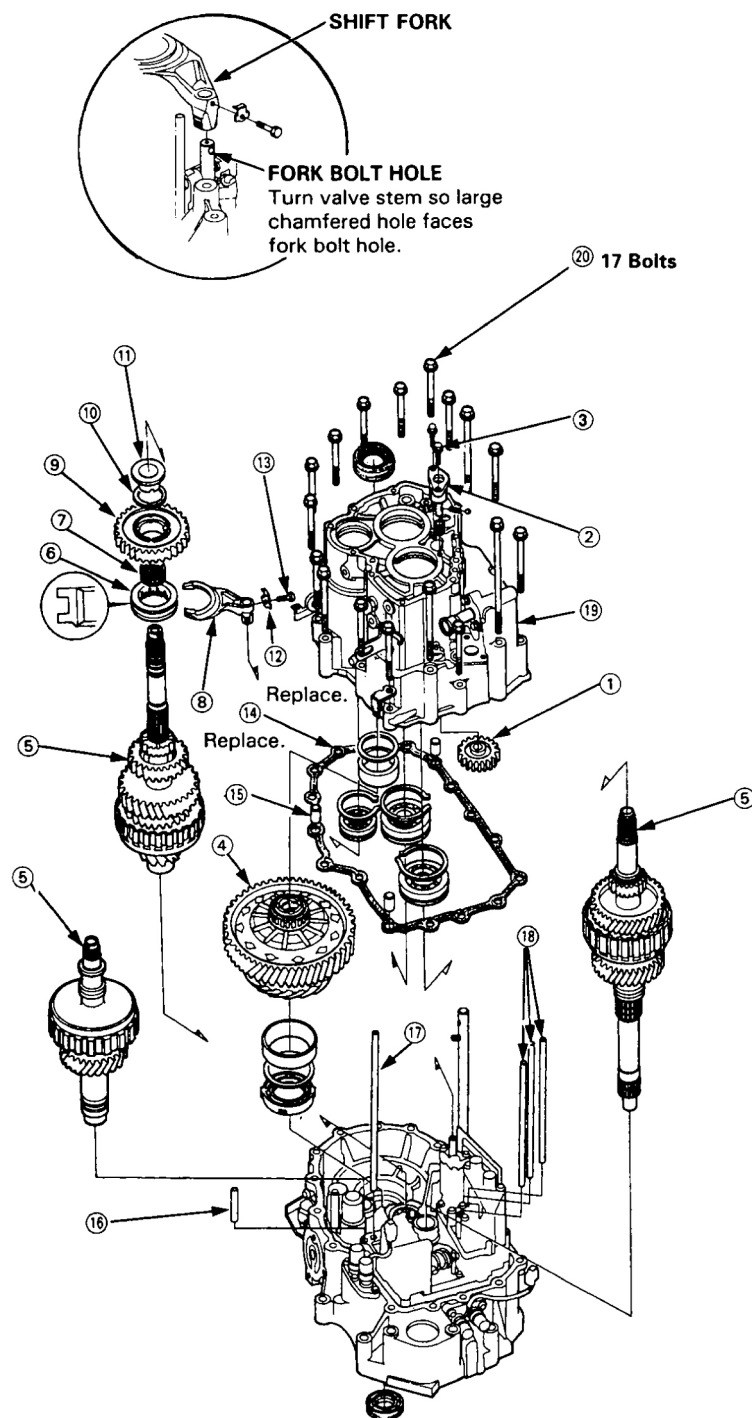


G00086614

Fig. 63: Identifying Sequential Reassembly Of Valve Body Assemblies
Courtesy of AMERICAN HONDA MOTOR CO., INC.

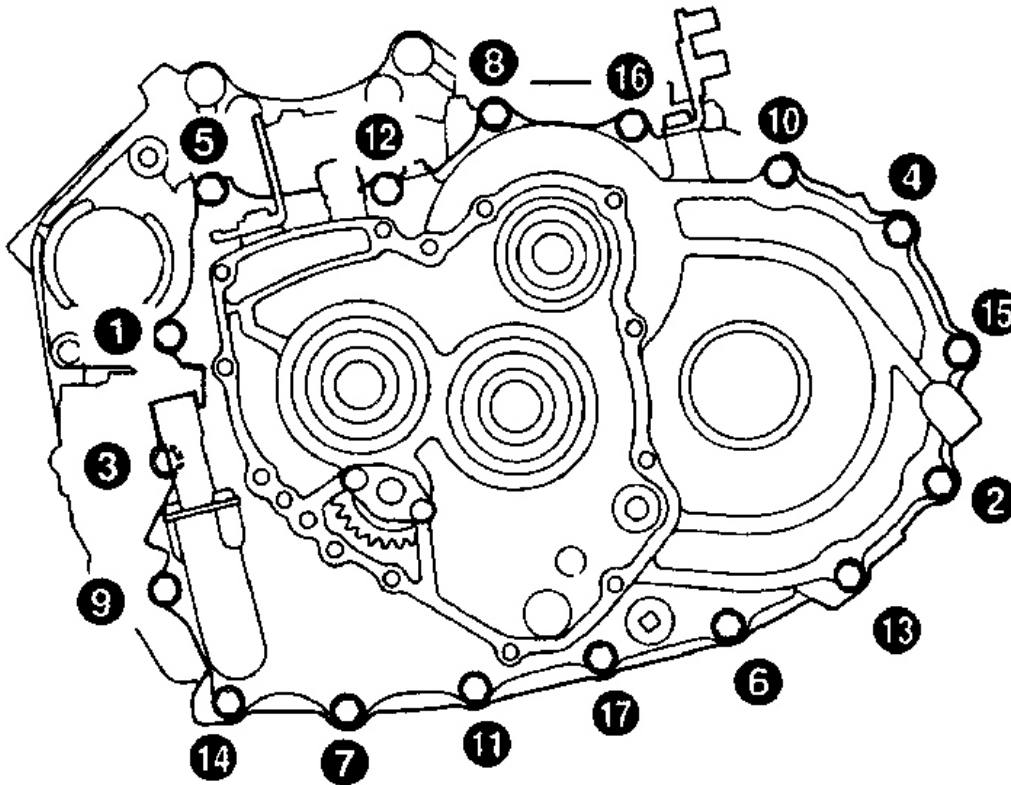
HOUSING & SHAFT ASSEMBLIES

1. Reassemble transaxle housing in following numbered sequence. See **Fig. 64** .
2. Install mainshaft, countershaft and secondary shaft.
3. Align the control shaft spring pin with the groove in the transaxle housing.
4. Tighten housing bolts in crisscross pattern. See **Fig. 65** . See **TORQUE SPECIFICATIONS** .



G00086615

Fig. 64: Identifying Sequential Reassembly Of Transaxle Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00086616

Fig. 65: Transaxle Housing Bolt Tightening Pattern
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

LEFT SIDE COVER

NOTE: To assist in reassembly of transaxle, refer to illustration. See **Fig. 3** . Letter references in parenthesis are identified in the following illustrations.

NOTE: Before installing the "O" rings, wrap the shaft splines with tape to prevent damage to the "O" rings.

1. Reassemble transaxle left side components in following numbered sequence. See **Fig. 66** .
2. Set the parking brake lever in the "P" position, then verify that the parking brake pawl engages the parking gear.
3. If the pawl does not engage fully, check the parking brake pawl stopper clearance. See **PARKING BRAKE STOP** under COMPONENT DISASSEMBLY & REASSEMBLY.
4. Tighten the lock bolt, then bend over the lock tab.

5. Install the mainshaft holder, then shift to "P" position. See **Fig. 5** .

CAUTION: Install the conical spring washers in the correct direction. See **Fig. 3** .

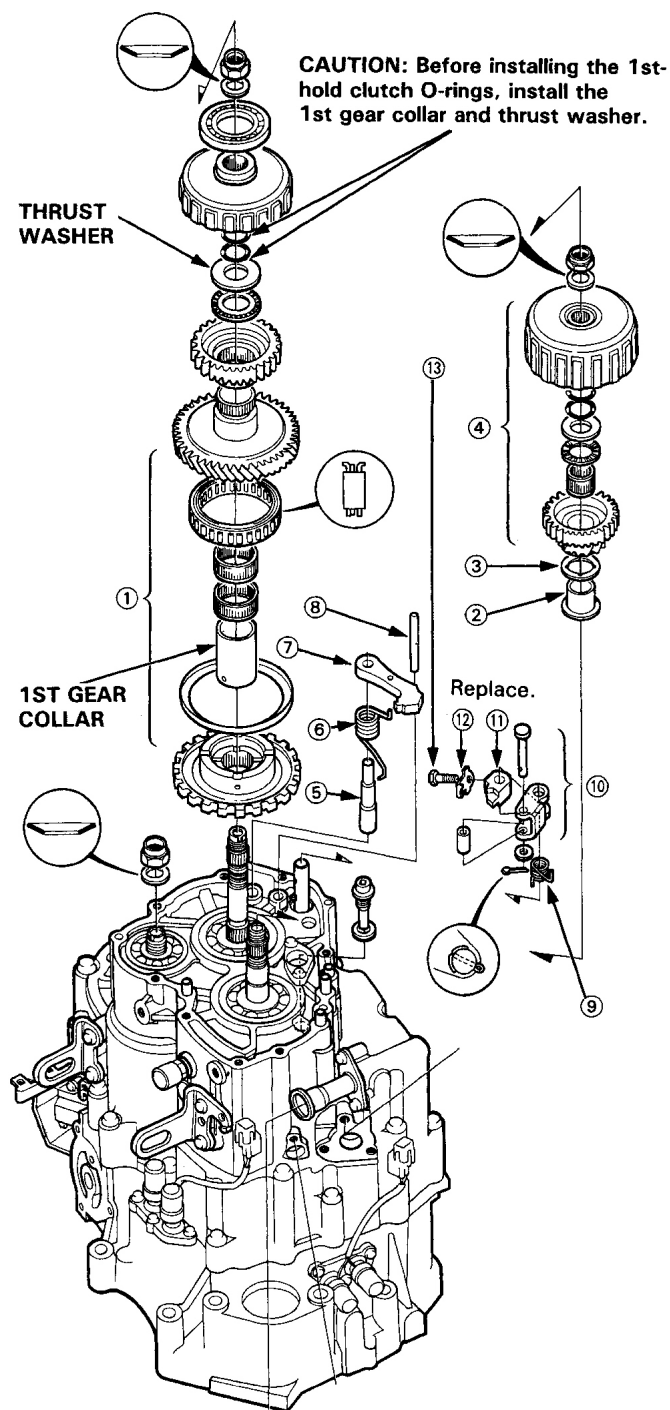
6. Install a new conical spring washer and a new lock-nut on each shaft.

NOTE: **The countershaft lock nut has left-hand threads.**

7. Tighten the lock nuts to the specified torque.
8. Stake each lock nut into shaft using a 3.5 mm punch.
9. Install the feed pipes and the ball bearing in the left side cover, aligning the lugs of the 1st and 1st-hold clutch feed pipes with the grooves in the cover. See **Fig. 67** .
10. Install the snap ring.
11. Install the left side cover.

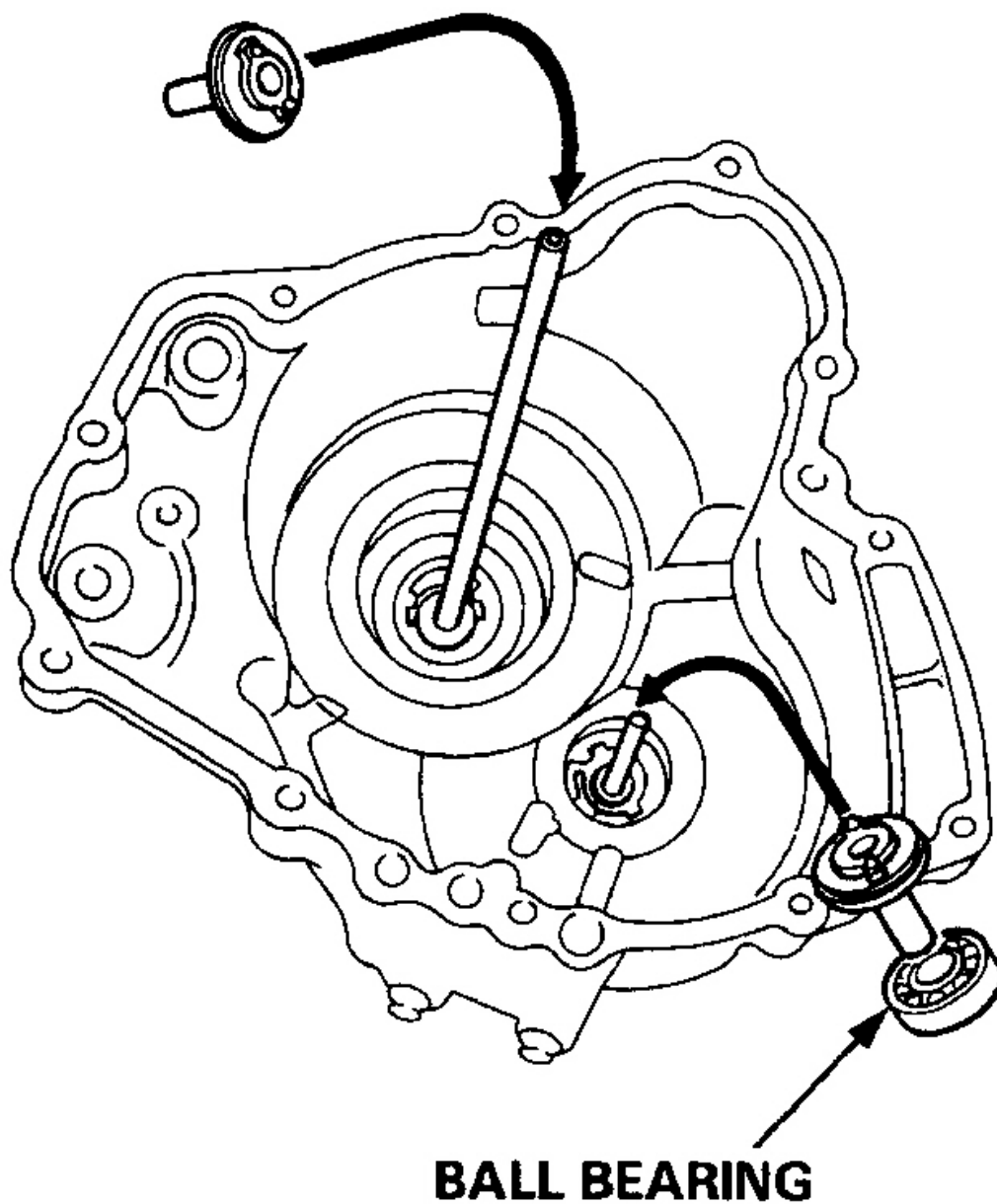
NOTE: **Install the countershaft speed sensor with the countershaft speed sensor washer. The mainshaft speed sensor has no washer when installing the linear solenoid.**

12. Install the countershaft and mainshaft speed sensors, vehicle speed sensor cover, and linear solenoid.
13. Install the control lever, new lock washers, change shaft, and change shaft cap on the other end of the control shaft. See **Fig. 68** . Tighten the bolts, then bend the tab against the bolt head.



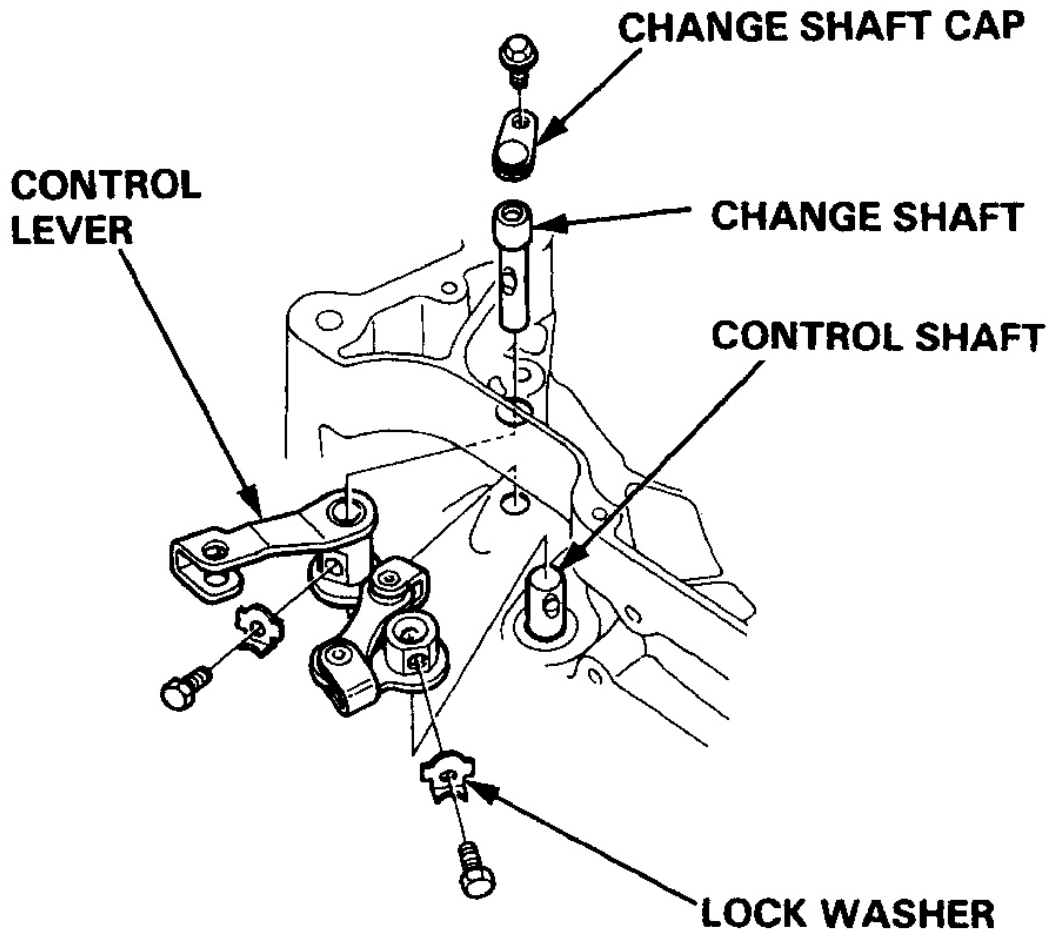
G00086617

Fig. 66: Identifying Sequential Reassembly Of Left Side Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00086618

Fig. 67: Installing Feed Pipes & Bearings In Left Side
Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00086619

Fig. 68: Installing Control Shaft Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Countershaft Lock Nut	101 (137)
Drain Plug	36 (49)
Main Valve Body Bolt	
6-mm Bolt	(1)
8-mm Bolt	13 (18)
Mainshaft Lock Nut	101 (137)
Pressure Tap Plug	13 (18)

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Ring Gear Bolt	29 (39)
Secondary Shaft Lock Nut	101 (137)
Speed Sensor Assembly Bolt	13 (18)
Transaxle Housing Bolt ⁽²⁾	40 (54)
INCH Lbs. (N.m)	
A/T Gear Position Switch	106 (12.0)
Countershaft Speed Sensor Bolt	106 (12.0)
Left Side Cover Bolt	106 (12.0)
Fluid Strainer Bolt	106 (12.0)
Linear Solenoid Bolt	89 (10.0)
Mainshaft Speed Sensor Bolt	106 (12.0)
Parking Brake Stopper Bolt	124 (14.0)
Reverse Idler Gear Shaft Holder Bolt	106 (12)
Reverse Shift Fork Bolt	124 (14.0)
(1) Tighten bolt to 106 INCH lbs. (12.0 N.m).	
(2) Tighten bolts to specification in sequence. See Fig. 65 .	

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	Specification - In. (mm)
Clutch Clearance	
1st Clutch	.026-.033 (.65-.85)
1st-Hold Clutch	.028-.035 (.70-.90)
2nd, 3rd, 4th Clutch	.030-.037 (.75-.95)
Clutch Disc Thickness	
1st, 1st-Hold, 2nd, 3rd Clutch	.076 (1.94)
4th Clutch	.092 (2.34)
Clutch Plate Thickness	
1st, 1st-Hold Clutch	.079 (2.00)
2nd, 3rd, 4th Clutch	.091 (2.30)
Mainshaft Clearance	.001-.004 (.03-.11)
Oil Pump Side Clearance	
Oil Pump Drive Gear	.0083-.0104 (.210-.265)
Oil Pump Driven Gear	.0014-.0025 (.035-.063)
Oil Pump Thrust Clearance	
Standard	.0010-.0020 (.030-.050)
Wear Limit	.0028 (.070)
Parking Brake Stopper Distance	2.27-2.31 (57.7-58.7)
Secondary Shaft 1st Gear Clearance	.002-.005 (.04-.12)

1997 Acura NSX

1997-2004 AUTOMATIC TRANSMISSIONS MR9A Overhaul

Secondary Shaft 2nd Gear Clearance	.002-.005 (.04-.12)
Side Gear Backlash	.002-.006 (.05-.15)