

SECTION 7A-14B

HYDRA-MATIC 4L60-E

AUTOMATIC TRANSMISSION UNIT REPAIR

RPO M30

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

CONTENTS

Transmission Disassembly	7A-14B-2	Input Internal Gear and Output Shaft.....	7A-14B-23
General Service Information	7A-14B-2	Input Carrier and Sun Gear	7A-14B-24
2-4 Servo Assembly	7A-14B-2	Input Clutch Assembly	7A-14B-25
Servo Pin Length	7A-14B-3	Check Valve Retainer and Ball Assembly –	
Speed Sensor and Case Extension	7A-14B-5	Replacement Procedures	7A-14B-26
Pan and Filter Assembly	7A-14B-6	Forward Clutch Sprag Assembly	7A-14B-32
Valve Body and Wiring Harness	7A-14B-6	Forward Clutch Piston Travel	
Transmission End Play Check	7A-14B-9	Check	7A-14B-34
Oil Pump Assembly	7A-14B-9	3-4 Clutch Assembly	7A-14B-35
2-4 Band, Reverse Input Clutch,		3-4 Clutch Piston Travel Check	7A-14B-35
Input Clutch and Input Gear Set	7A-14B-10	Clutch Air Check	7A-14B-35
Reaction Gear Set	7A-14B-11	Turbine Shaft Seals	7A-14B-36
Lo and Reverse Clutch Parts	7A-14B-12	Reverse Input Clutch Assembly	7A-14B-37
Inner Manual Linkage	7A-14B-13	Reverse Input Clutch Backing Plate	
Manual Shaft Seal Replacement	7A-14B-13	Selection	7A-14B-39
Component Repair and		Reverse Input and Input Clutches	7A-14B-40
Transmission Reassembly	7A-14B-14	2-4 Band Assembly	7A-14B-41
Case Assembly	7A-14B-14	Oil Pump Assembly	7A-14B-41
Case	7A-14B-14	Oil Pump Body	7A-14B-41
Third Accumulator Retainer and		Oil Pump Cover (Disassemble)	7A-14B-42
Ball Assembly	7A-14B-15	Oil Pump Body (Assemble)	7A-14B-44
Retainer and Ball Assembly Leak		Oil Pump Cover (Assemble)	7A-14B-44
Check Procedure	7A-14B-15	Oil Pump Cover and Body	7A-14B-45
Replacement Procedure – Third Accumulator		Transmission End Play Check	7A-14B-46
Retainer and Ball Assembly	7A-14B-15	Valve Body and Associated Parts	7A-14B-49
Lo and Reverse Clutch Piston	7A-14B-16	Control Valve Assembly	7A-14B-50
Parking Pawl	7A-14B-17	2-4 Servo Assembly	7A-14B-55
Reaction Internal Gear and		Speed Sensor and Case Extension	7A-14B-58
Carrier Assembly	7A-14B-17	Torque Converter Assembly	7A-14B-59
Reaction Internal Gear and Support	7A-14B-18	Cross Section	7A-14B-61
Lo and Reverse Clutch Spacer Plate		Disassembled Views	7A-14B-62
Selection	7A-14B-18	Seal and Bearing Locations	7A-14B-71
Lo and Reverse Clutch Support		Bushing Locations	7A-14B-72
Assembly	7A-14B-21	Torque Specifications	7A-14B-73
Reaction Sun Gear and Shell	7A-14B-22	Bushing Replacement	
Input Internal Gear and		Procedure	7A-14B-74
Reaction Shaft	7A-14B-22	Special Tools	7A-14B-78
Internal Transmission Speed Sensor			
Rotor	7A-14B-23		

TRANSMISSION DISASSEMBLY

General Service Information

Figure 1

Tool Required:

J 8763-02 Holding Fixture and Base

NOTICE: It is not recommended to use air powered tools to disassemble or assemble transmissions/transaxles. Improper bolt torques can contribute to transmission repair conditions and this information, vital to diagnosis, can only be detected when using hand tools.

- **Teflon Oil Seal Rings**
If any seal rings are damaged, cut, or do not rotate freely in their groove be certain to check the ring groove for debris, burrs, or damage.
- **Thrust Washer Surfaces**
The thrust washer and thrust bearing surfaces may appear to be polished. This is a normal condition and should not be considered damage.



Clean

- Thoroughly clean the exterior of the transmission.



Remove or Disconnect

- Torque Converter (1).



Install or Connect

1. J 8763-02 onto the transmission case.
2. Holding fixture into the base.



Remove or Disconnect

- Drain the transmission fluid out case extension by rotating transmission so bell housing is up.

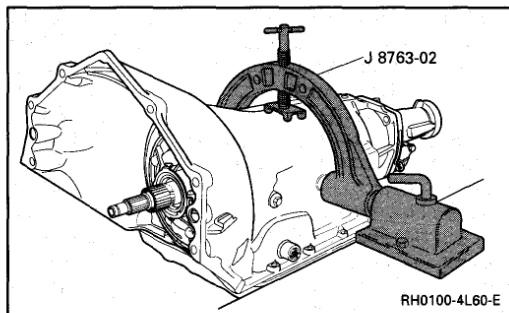


Figure 1 Holding Fixture

2-4 Servo Assembly

Figures 2 and 3

Tool Required:

J 29714 Servo Cover Compressor



Remove or Disconnect

1. Install J 29714.
2. Servo cover retaining ring (29).
3. Servo cover and O-ring seal (28 and 27).
 - If the servo cover seems to be hung up on the seal, cut and remove the O-ring seal before removing the cover.
4. 2-4 servo assembly (12-26).

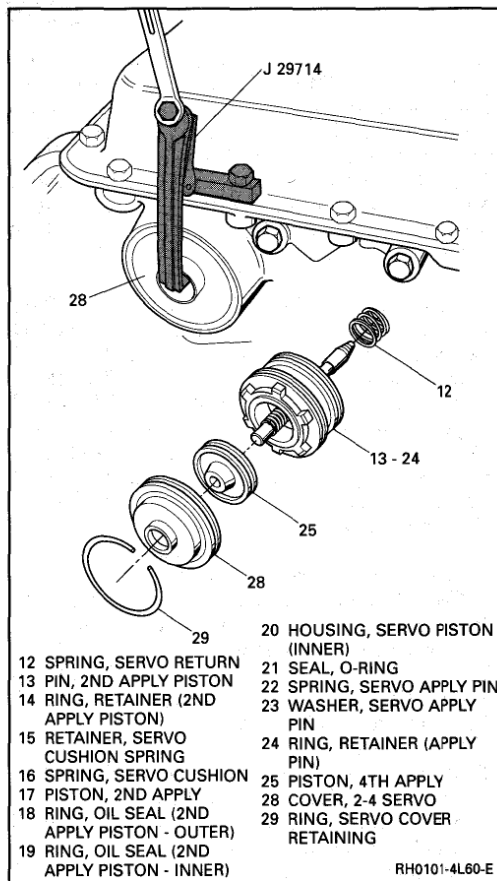


Figure 2 Servo Cover Removal

Servo Pin Length

Figures 3, 4 and 5

Tools Required:

J 33037 Band Apply Pin Tool

J 22269-01 Piston Compressor

As a diagnostic aid, the servo pin length should now be checked. If the pin length is too short or too long, be certain to inspect the 2-4 band and reverse input drum for damage or wear when disassembled.



Measure

Figure 3

1. Install J 33037 as shown with apply pin (13).
2. Install servo cover retaining ring (29) to secure tool.
3. Apply 11 N•m (98 lb. in.) torque.
4. If white line "A" appears in gage slot "B" pin length is correct.
5. Use pin selection chart to determine correct pin length if new pin is needed.

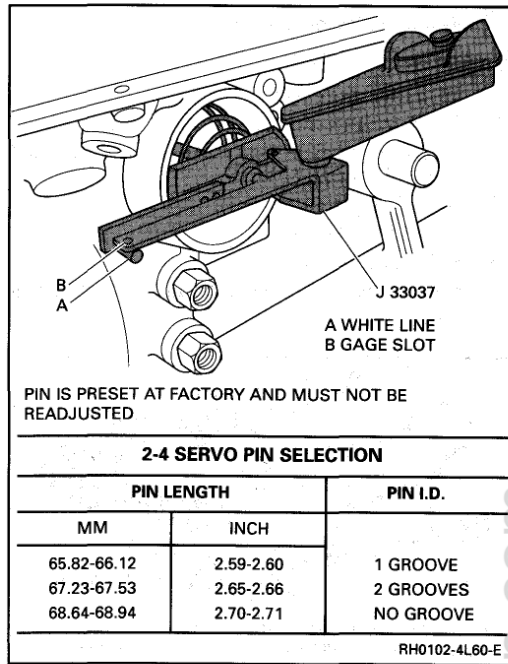


Figure 3 Servo Pin Length

 Remove or Disconnect

Figures 4 and 5

1. 4th apply piston (25).
2. Servo return spring (12).
3. Servo pin retainer ring (24), washer (23) and apply pin spring (22).
4. 2nd apply piston pin (13).
5. Install J 22269-01.
6. Retainer ring (14).
7. Cushion spring retainer (15) and cushion spring (16).

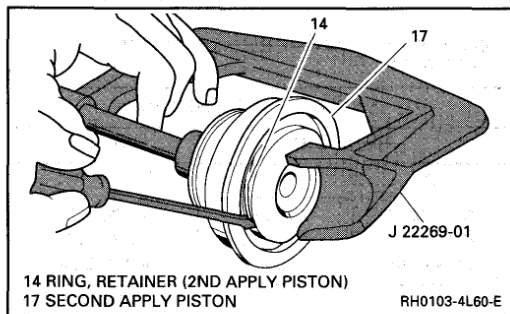
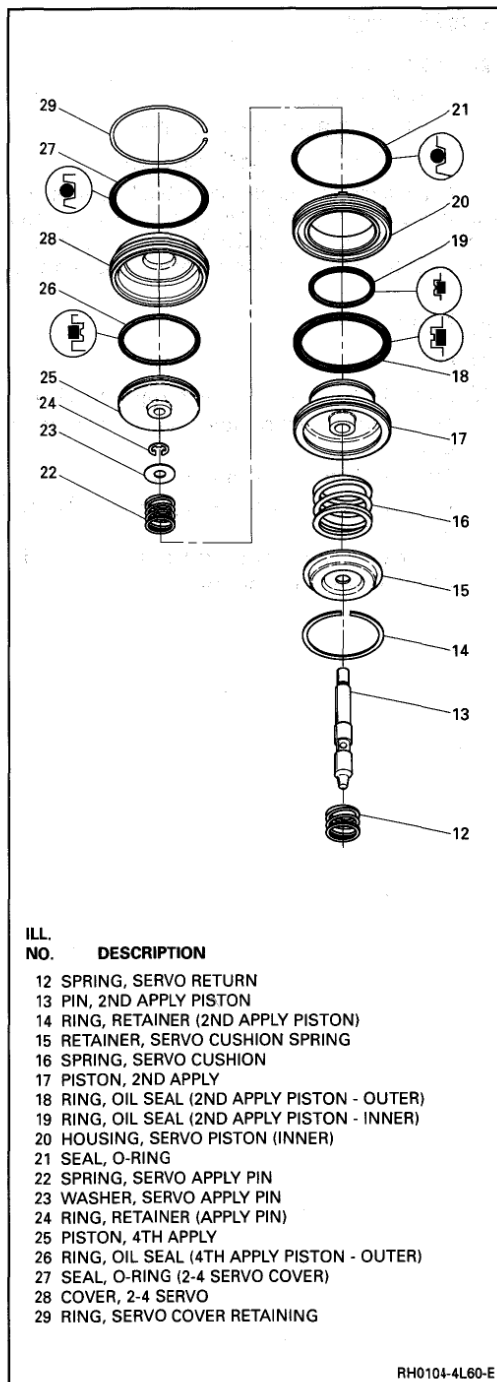


Figure 4 Second Servo Piston Retaining Ring Removal

ILL.
NO.

DESCRIPTION

- | ILL. NO. | DESCRIPTION |
|----------|---|
| 12 | SPRING, SERVO RETURN |
| 13 | PIN, 2ND APPLY PISTON |
| 14 | RING, RETAINER (2ND APPLY PISTON) |
| 15 | RETAINER, SERVO CUSHION SPRING |
| 16 | SPRING, SERVO CUSHION |
| 17 | PISTON, 2ND APPLY |
| 18 | RING, OIL SEAL (2ND APPLY PISTON - OUTER) |
| 19 | RING, OIL SEAL (2ND APPLY PISTON - INNER) |
| 20 | HOUSING, SERVO PISTON (INNER) |
| 21 | SEAL, O-RING |
| 22 | SPRING, SERVO APPLY PIN |
| 23 | WASHER, SERVO APPLY PIN |
| 24 | RING, RETAINER (APPLY PIN) |
| 25 | PISTON, 4TH APPLY |
| 26 | RING, OIL SEAL (4TH APPLY PISTON - OUTER) |
| 27 | SEAL, O-RING (2-4 SERVO COVER) |
| 28 | COVER, 2-4 SERVO |
| 29 | RING, SERVO COVER RETAINING |

RH0104-4L60-E

Figure 5 Servo Assembly

Speed Sensor and Case Extension

Figures 6 and 7

Tool Required:

J 38417 Speed Sensor Remover and Installer

1. Speed sensor retaining bolt (35).
 2. Speed sensor assembly (36) and O-ring seal (37) with J 38417.
 3. Case extension bolts (32), case extension (31) and extension seal ring (30).
 4. Output shaft sleeve (690) and output shaft O-ring seal (691).
- Not all models use an output shaft sleeve and seal.

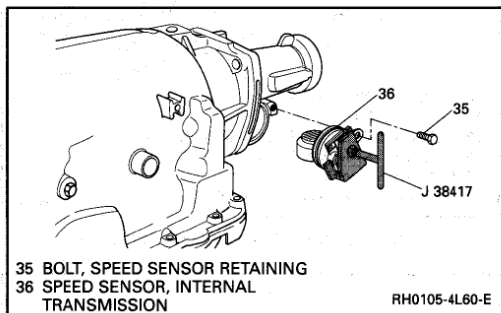


Figure 6 Speed Sensor Removal

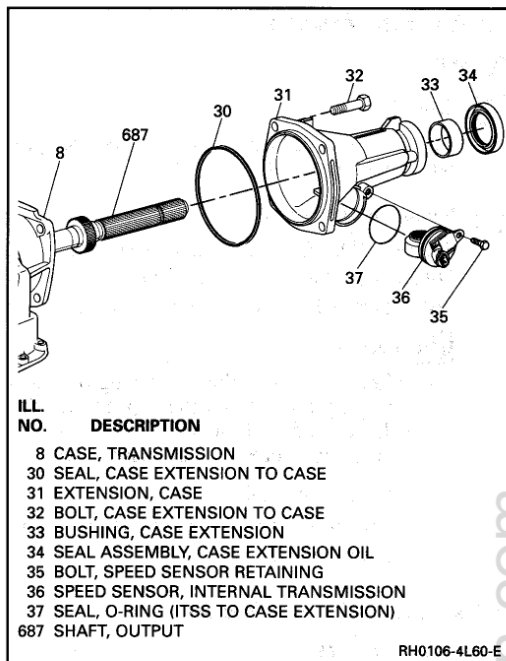


Figure 7 Extension and Associated Parts

Pan And Filter Assembly

Figure 8



Clean

- Exposed ends of bottom pan screws and spray with penetrating oil.



Remove or Disconnect

- Screws (76), oil pan (75) and gasket (73).
- Oil filter (72) and filter seal (71).
 - Filter seal may be stuck in the pump.



Inspect

- Filter (72), open filter by prying the metal crimping away from the top of the filter (black) and pull apart. The filter may contain evidence for root cause diagnosis.
 - Clutch material.
 - Bronze slivers indicating bushing wear.
 - Steel particles.

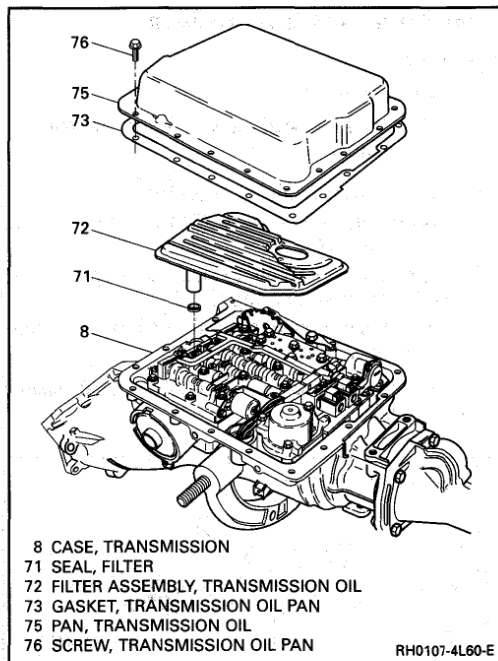


Figure 8 Pan, Filter and Seal Removal

Valve Body And Wiring Harness

Figures 9 through 14



Remove or Disconnect

Figures 9 and 10

- Electrical connections from components.
- TCC Solenoid bolts (68) and solenoid assembly (66) with O-ring seal (65) and wiring harness.
- Pressure switch assembly bolts (70) and pressure switch assembly (69).
- Accumulator cover bolts (58 and 59) and 1-2 accumulator cover and pin assembly (57).
- 1-2 accumulator piston (56) and seal (55).
- Spring (54).
- Dipstick stop bracket (93).

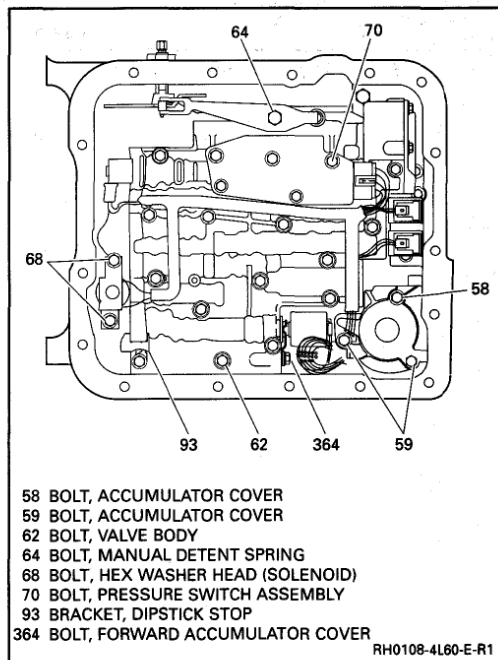


Figure 9 Valve Body Bolt Locations

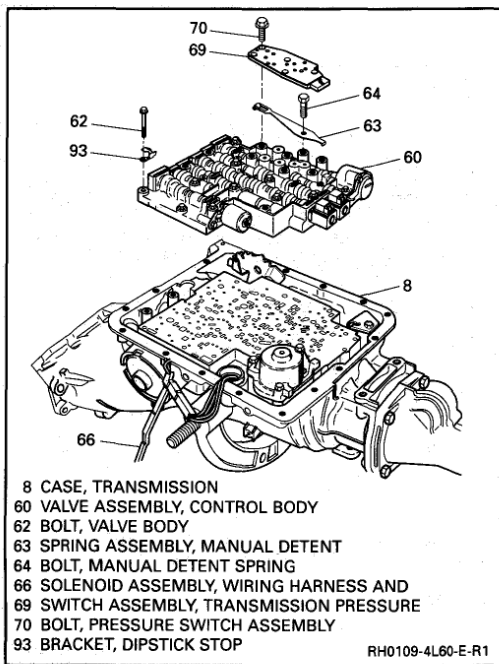


Figure 10 Control Valve and Pressure Switch Assembly

Remove or Disconnect

Figures 9, 11 and 12

1. Bolt (64) and manual detent spring assembly (63).
2. Wiring harness retaining bolts.

Remove or Disconnect

Figures 11 through 14

1. Remaining valve body bolts (62).
2. Manual valve link (89).
3. Control valve assembly (60).
4. Bolts (58 and 59), accumulator cover (57), piston (56) and spring (54).
5. Bolts (77) and plate (53).
6. Spacer plate (48) and spacer plate gaskets (47 and 52).
7. Spring (46), piston (44), and pin (43).
 - Seven checkballs are located under the valve body and one is located in the case. The large copper flash colored ball is #1 checkball (91).

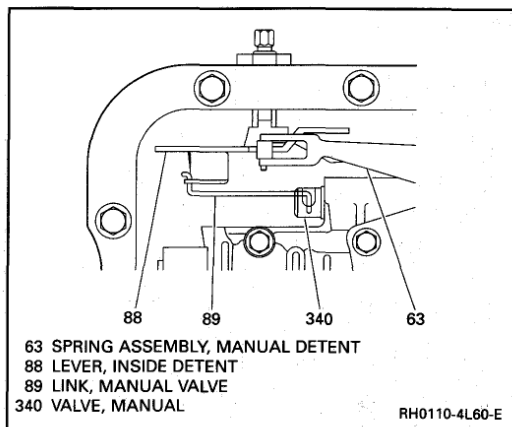


Figure 11 Manual Valve Link

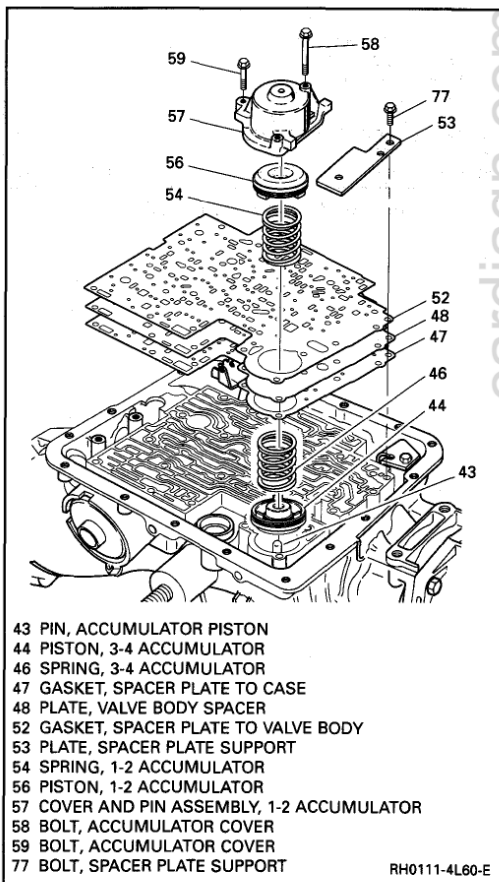


Figure 12 Accumulator Assembly, Spacer Plate and Gaskets

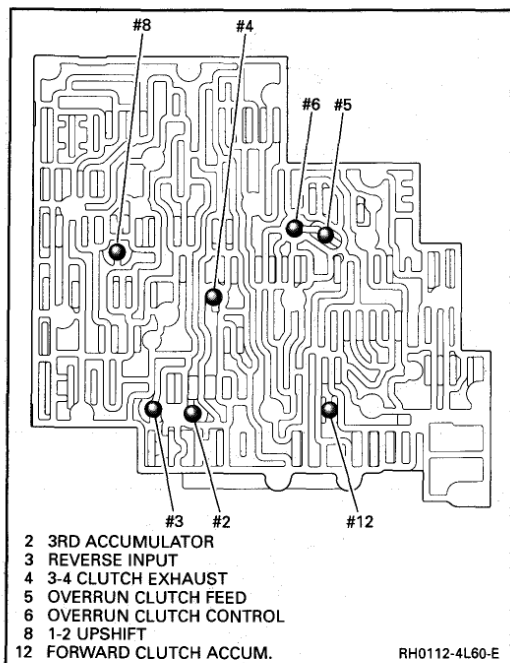


Figure 13 Valve Body Checkballs

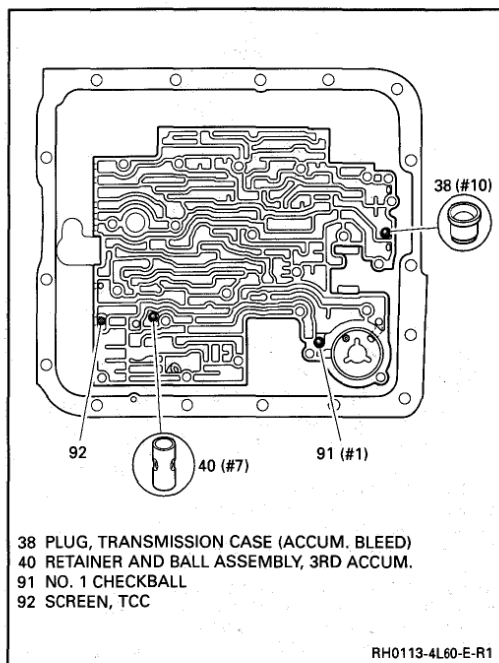


Figure 14 Case Checkballs and Filters

Transmission End Play Check

Figures 15 and 16

Tools Required:

- J 24773-A Oil Pump Remover
- J 25022-A End Play Adaptor (245 mm)
- J 34725 End Play Adaptor (298 mm)
- J 25025-7A Post
- Dial indicator

As a diagnostic aid, transmission end play should be checked prior to removing the internal parts. If the end play is not within specifications, you should watch for possible worn or misassembled parts during disassembly.

Measure

1. Remove an oil pump bolt (2) and install a 278 mm (11 inch) bolt and locknut or J 25025-7A.
2. Install J 25022-A or J 34725 as shown.
3. Install J 24773-A as shown.
4. Install dial indicator.
 - A. Set to zero.
 - B. Pull up on J 24773-A.
 - C. End play should be 0.13 to 0.92 mm (0.005 to 0.036 inch).

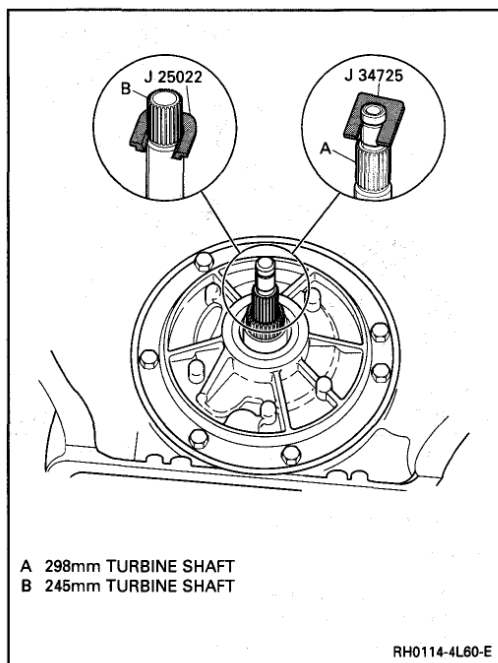


Figure 15 End Play Tool

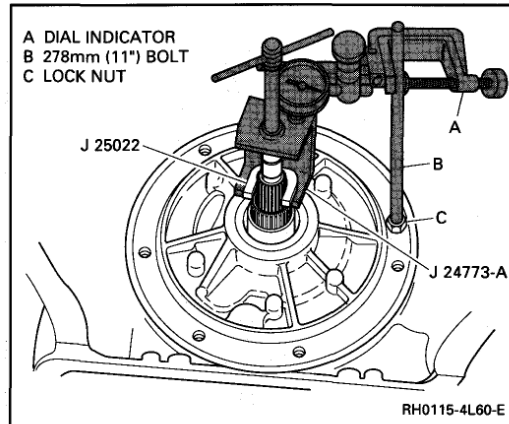


Figure 16 End Play Check

Oil Pump Assembly

Figures 17 and 18

Tools Required:

- J 37789-A Oil Pump Remover and Installer
- J 39119 Adapter

Remove or Disconnect

1. O-ring seal (618).
2. All oil pump bolts (2) and O-rings (3).
3. Slide J 39119 over stator shaft until it locks under splines.
4. Oil pump assembly (4) with J 37789-A.
5. Oil pump to case seal (5) and gasket (6).
6. Reverse input clutch to oil pump thrust washer (601).

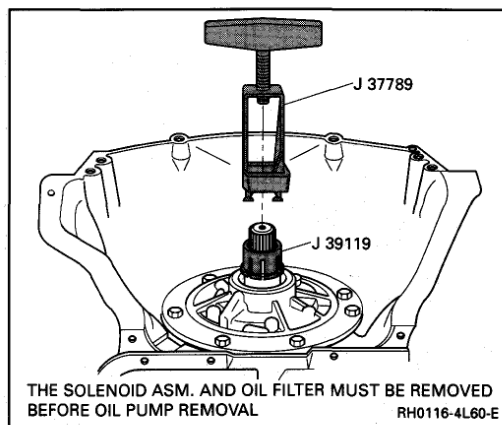
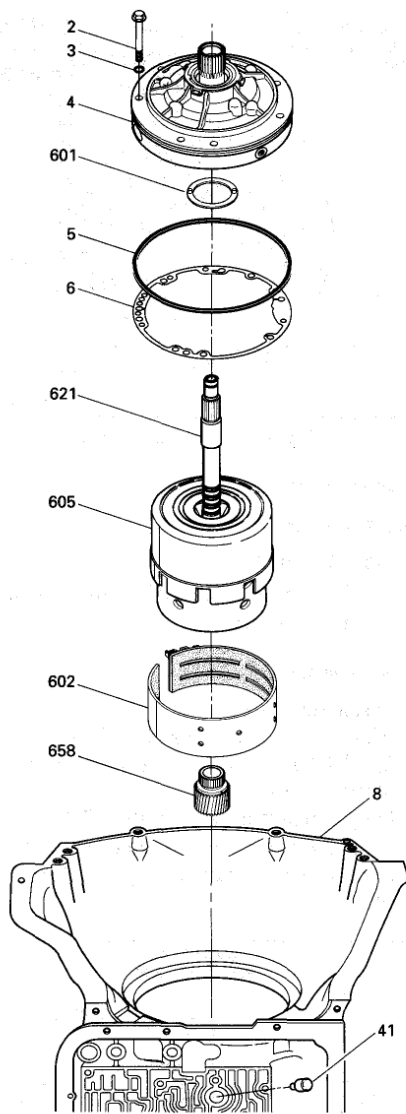


Figure 17 Oil Pump Removal



- 2 BOLT, PUMP TO CASE
 3 O-RING, PUMP TO CASE BOLT
 4 PUMP ASSEMBLY, OIL
 5 SEAL, OIL (PUMP TO CASE)
 6 GASKET, PUMP COVER TO CASE
 8 CASE, TRANSMISSION
 41 PIN, BAND ANCHOR
 601 WASHER, THRUST (PUMP TO DRUM)
 602 BAND ASSEMBLY, 2-4
 605 HOUSING AND DRUM ASSEMBLY, REVERSE INPUT CLUTCH
 621 HOUSING AND SHAFT ASSEMBLY, INPUT
 658 GEAR, INPUT SUN

RH0117-4L60-E

Figure 18 Input Clutch Removal

2-4 Band, Reverse Input Clutch, Input Clutch And Input Gear Set

Figures 18 through 20

Tools Required:

- J 29837 Output Shaft Support Fixture
- J 34627 Snap Ring Pliers

Remove or Disconnect

Figures 18 and 20

- Reverse input clutch (605) and input clutch (621) together.
 - Grasp the turbine shaft and lift.
- Band anchor pin (41).
- The 2-4 band assembly (602).
- Input sun gear (658).

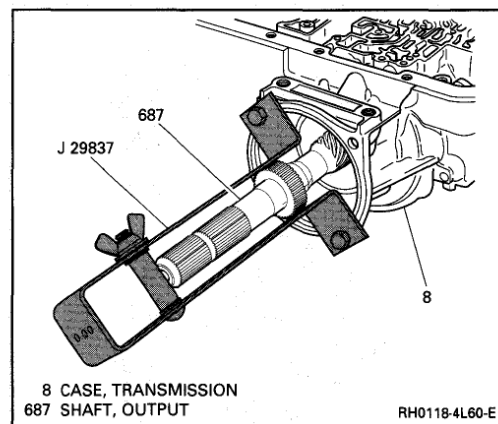
Install or Connect

Figures 19 and 20

- J 29837 as shown.

Important

- Output shaft (687) may fall free when retaining ring (661) is removed if J 29837 is not used.



8 CASE, TRANSMISSION
687 SHAFT, OUTPUT

RH0118-4L60-E

Figure 19 Output Shaft Support Fixture

Remove or Disconnect

Figure 20

- Retaining ring (661) with J 34627. Do not overexpand the ring.
- Input carrier assembly (662).

3. J 29837 and output shaft (687).

Important

- The manufacturer assembles the output shaft and reaction internal gear with adhesive for ease of assembly. If these parts have not become separated during use, the output shaft will come out later along with the reaction internal gear.

4. Thrust bearing assembly (663).

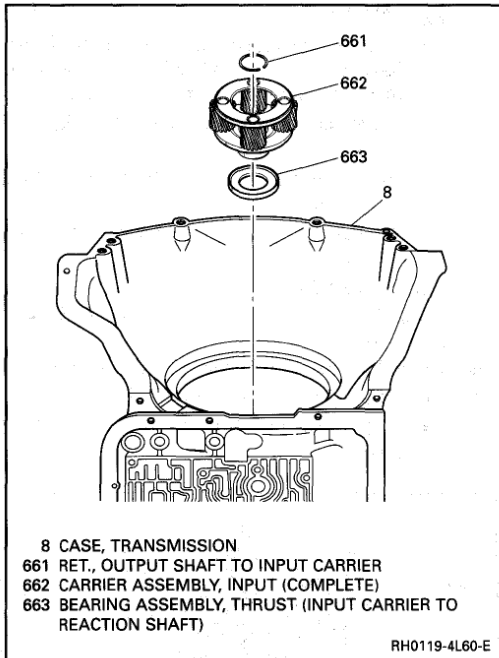


Figure 20 Input Carrier Removal

Reaction Gear Set

Figure 21

Remove or Disconnect

1. Input internal gear (664) and reaction carrier (666).
2. Reaction sun shell (670) and thrust washer (669).
3. Reaction sun shell to inner race thrust washer (674).
4. Lo and reverse support to case retainer ring (676).
5. Lo and reverse clutch support retainer spring (680).
6. Reaction sun gear (673).
7. Lo and reverse inner race (675), roller assembly (678), support assembly (679) and reaction carrier assembly (681).
8. Lo and reverse clutch plates (682).
9. Reaction internal gear (684) and thrust bearing assembly (683).
10. Reaction gear support to case bearing (692).

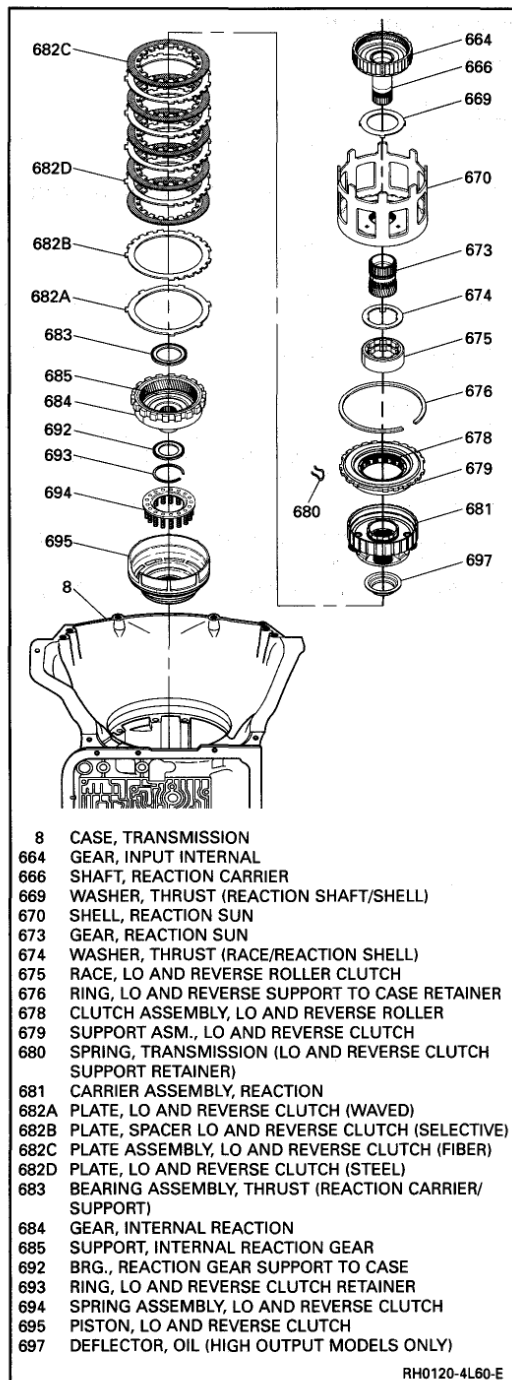


Figure 21 Reaction Gear Set Removal

Lo And Reverse Clutch Parts

Figures 22, 23 and 25

Tools Required:

J 34627 Snap Ring Remover/Installer

J 23327 Clutch Spring Compressor



Remove or Disconnect

1. Bolts (715) and parking lock bracket (710).



Important

- Due to interference, the parking pawl may have to be removed before removing or installing the low and reverse piston.
 - A. Parking pawl shaft plug (78) with a #4 screw extractor.
 - B. Parking pawl pivot shaft (79) with a magnet.
 - C. Parking pawl (81) and return spring (80).
2. Install tool J 23327.
 3. Lo and reverse clutch retainer ring (693) with J 34627.
 4. Lo and reverse clutch spring assembly (694).
 5. Lo and reverse clutch piston (695).
 - Apply air pressure in the case apply passage.

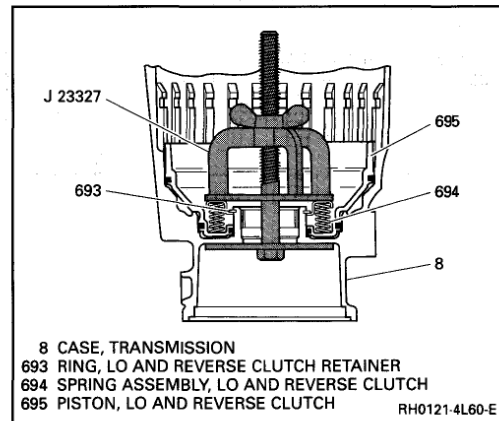


Figure 22 Lo and Reverse Snap Ring Removal

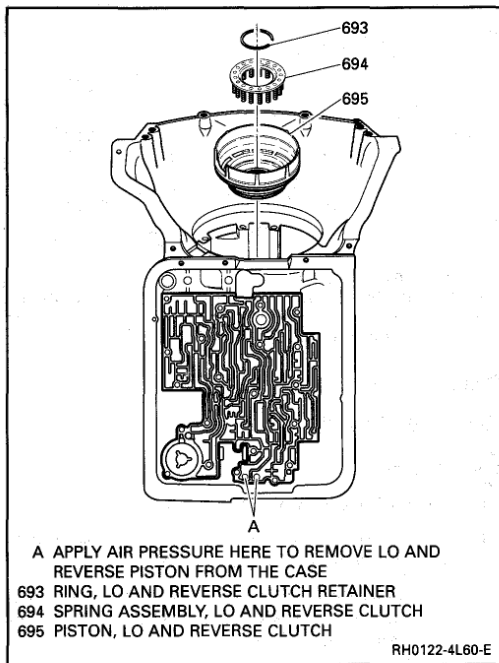


Figure 23 Lo and Reverse Piston Removal

Inner Manual Linkage

Figure 24

Remove or Disconnect

1. Inside manual shaft nut (90).
2. Manual shaft (84) and manual shaft retainer (83).
3. Parking lock actuator assembly (85) and inside detent lever (88).

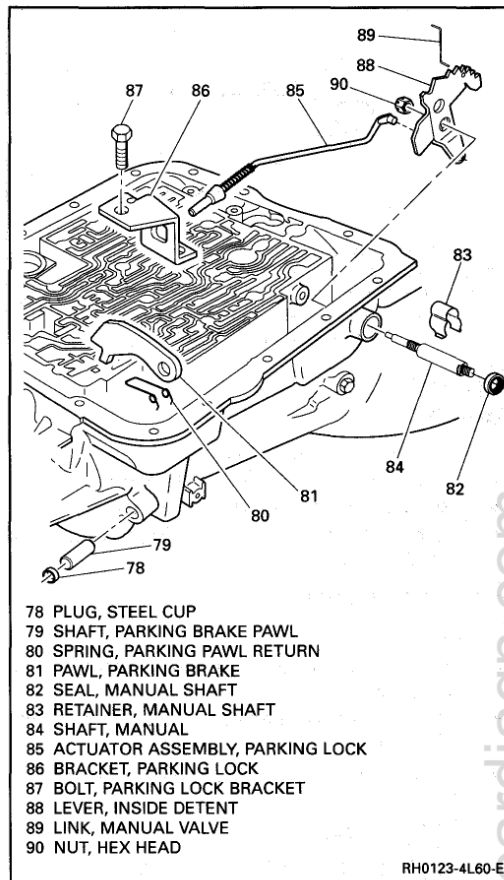


Figure 24 Parking Linkage

Manual Shaft Seal Replacement

Figure 25

Remove or Disconnect

- Manual shaft seal (82).
 - Pry out with a screwdriver.

Install or Connect

- New manual shaft seal (82).
 - Tap into place using a 14 mm socket.

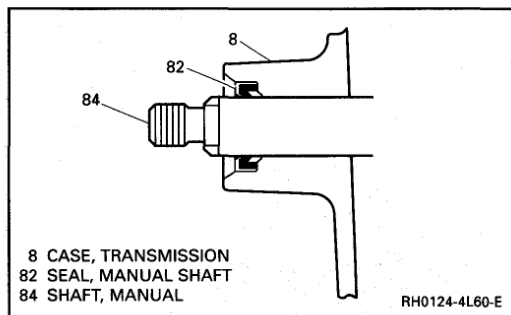


Figure 25 Manual Shaft Seal

Inspect

Figure 24

- Actuator rod (85) for damage.
- Inside detent lever (88) for damage or cracks.
- Manual shaft (84) for damage or burrs.
- Manual detent spring assembly (63) for roller freeness or damage.

Install or Connect

Figure 24

- Parking lock actuator (85) onto inside detent lever (88).
- Manual shaft (84) into case (8) and inside detent lever (88).
- Inside manual shaft nut (90) onto manual shaft (84).

Tighten

- Nut (90) to 31 N•m (23 lb. ft.)
- Manual shaft retainer (83) onto manual shaft (84).

COMPONENT REPAIR AND TRANSMISSION REASSEMBLY

The assembly of some components will require use of an assembly lube. It is recommended that Transjel™ J 36850 or equivalent be used during assembly.

NOTICE: Do not use any type of grease to retain parts during assembly of this unit. Greases other than the recommended assembly lube will change transmission fluid characteristics and cause undesirable shift conditions and/or filter clogging.

Case Assembly

Clean

- Thoroughly with solvent.
- Air dry.
 - Do not wipe with cloth.

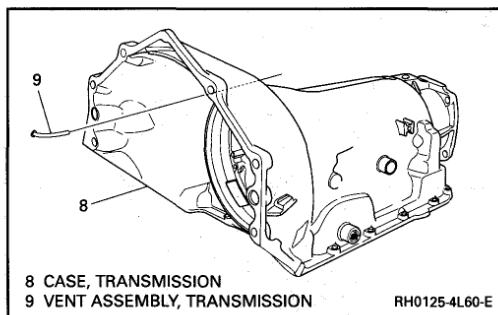


Figure 26 Case Vent Assembly

Case

Figures 26, 27 and 28

Inspect

- Case (8) exterior for cracks or porosity.
- Case to valve body face for damage, interconnected oil passages and flatness.
 - Face flatness can be checked by inspecting the spacer plate to case gasket for proper land impressions.
- Vent assembly (9) for damage.
- Air check all oil passages.
 - See diagnosis section for oil passage identification.
- 2-4 servo bore for:
 - Damage, porosity, or burrs.
 - Any sharp edges (i.e. – oil passages, slots for retaining ring removal – remove if found).
- Orifice cup plug (11) in servo bore for debris or damage.
- Third accumulator bore for:
 - Porosity, damage, or burrs.
 - Pin damage (43).
 - Orifice cup plug (42) damaged or plugged.
- Speed sensor bore for:
 - Damage.
 - Sharp edges.
 - Porosity.
- All bolt holes for thread damage
 - Heli-coil to repair.
- Cooler connectors (10) for:
 - Damage.
 - Proper torque 38 N•m (28 lb. ft.).

- Case interior for:
 - Damaged ring grooves or casting flash.
 - Clutch plate lugs worn or damaged.
 - Bushing (33) scored, worn, or damaged (see Bushing Replacement).

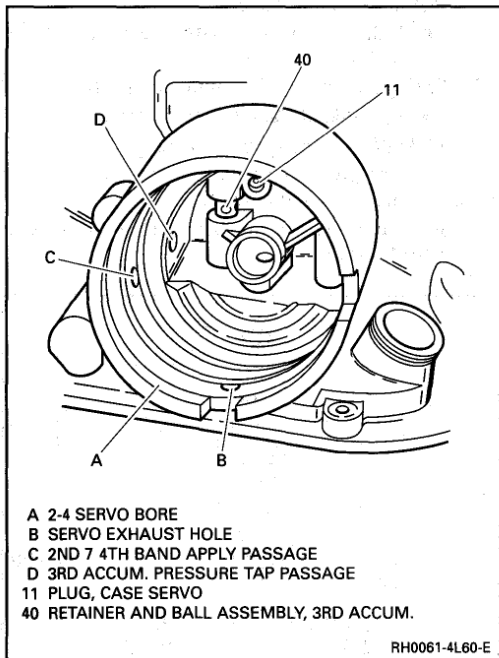


Figure 27 2-4 Servo Bore

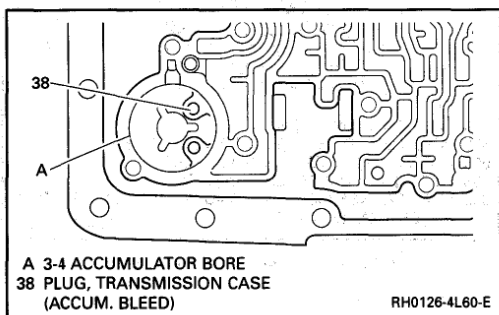


Figure 28 Third Accumulator Bore

Third Accumulator Retainer and Ball Assembly

Figure 29



Inspect

- Ball for:
 - Presence.
 - Sticking or leaking.
- Retainer for:
 - Presence.
 - Loose.
 - Incorrect seating.
 - Restricted feed slots.

Retainer and Ball Assembly Leak Check Procedure

Figure 29

1. Install the servo assembly (12-26) into the servo bore.
2. Install the servo cover (28) and retainer (29).
3. Pour a suitable solvent into the accumulator bore.



Inspect

- Watch for leakage inside the case.
- If leakage is observed, replace the third accumulator retainer and ball assembly.

Replacement Procedure – Third Accumulator Retainer and Ball Assembly

Figures 29 and 30

Tools Required:

- 6.3 mm (#4) Screw Extractor
- 9.5 mm (3/8 inch) diameter metal rod



Remove or Disconnect

- Third accumulator retainer and ball assembly (40).
 - Use 6.3 mm (#4) screw extractor.



Install or Connect

Figures 29 and 30

- A new third accumulator retainer and ball assembly.
 - Oil feed slots in the retainer must line up with oil passage in the servo bore. To be certain of correct installation depth, scribe a mark at 42.0 mm (1.653 inch) on the 9.5 mm (3/8 inch) diameter metal rod. Use it to seat the third accumulator and ball assembly as shown. When the scribed line is flush with the case face, installation depth is correct.

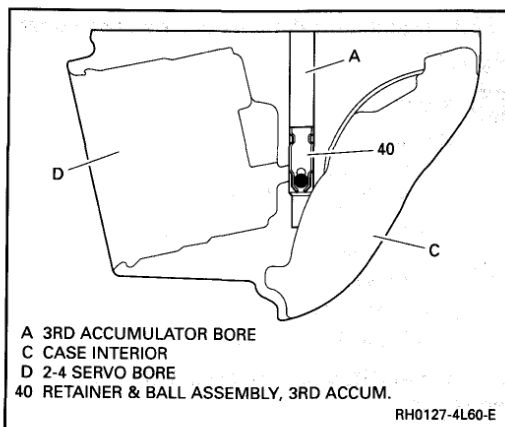


Figure 29 Leak Check - 3rd Accumulator

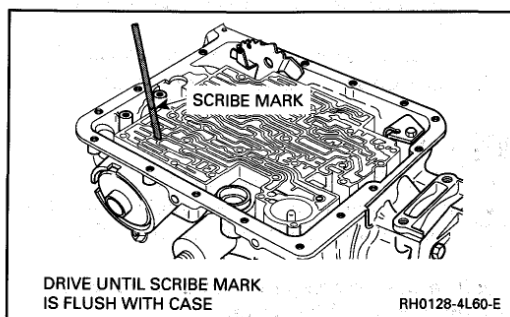


Figure 30 Third Accumulator Retainer and Ball Asm. - Installation

Lo and Reverse Clutch Piston**Figures 31 and 32**

Tools Required:

J 34627 Snap Ring Remover/Installer

J 23327 Clutch Spring Compressor

Inspect**Figure 31**

- Lo and reverse piston (695) for:
 - Porosity or damage.
 - Ring groove damage.
- Piston seals (696) for nicks or cuts.
- Spring assembly (694) for damage.
- Retainer ring (693) overstressed.

Install or Connect**Figure 32**

- Piston seals (696) onto the piston (695).
 - Lubricate with Transjel™ J 36850 or equivalent.
- Piston (695) into the case.
 - Index the piston with the notch in the bottom of the case.
- Spring assembly (694) onto the piston.
 - Flat side of the retainer upward.
- J 23327 over the spring assembly.
 - Compress the spring assembly past the ring groove in the case hub.
- Retainer ring (693) into the case hub ring groove with J 34627.

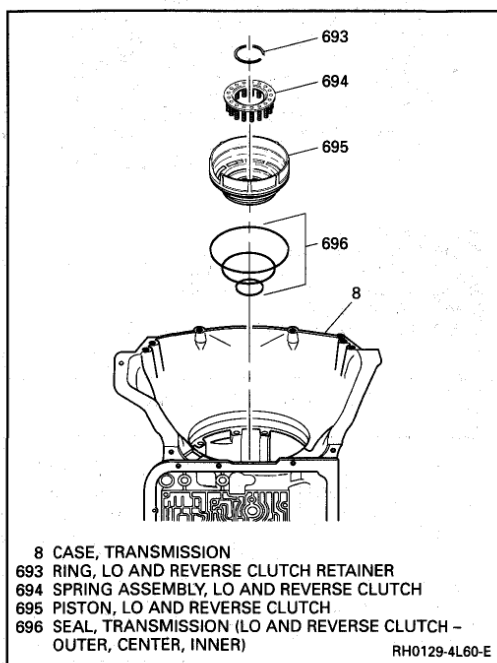


Figure 31 Lo and Reverse Piston

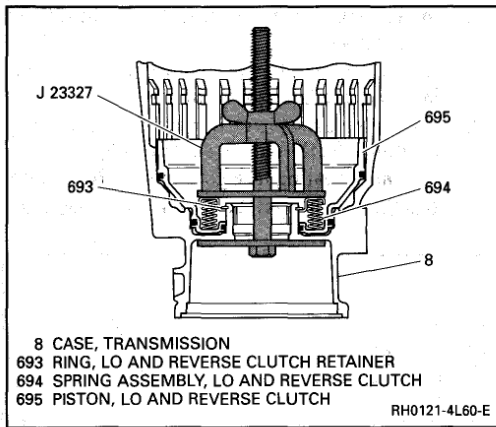


Figure 32 Installing Lo and Reverse Snap Ring

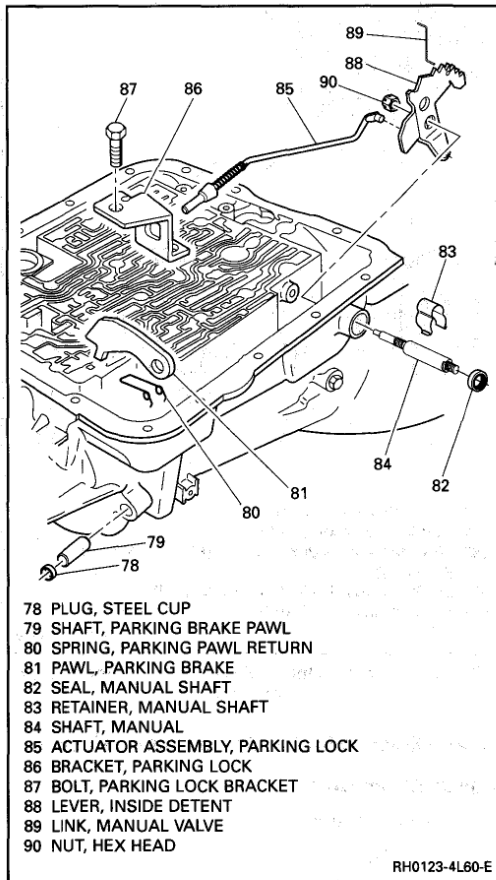


Figure 33 Parking Pawl Installation

Parking Pawl

Figure 33

Inspect

- Parking pawl (81) for cracks, burrs, or damage.
- Parking pawl return spring (80) for distortion or damage.
- Parking pawl pivot shaft (79) for damage and freeness of fit with the parking pawl.

Install or Connect

Figure 33

1. Parking pawl (81) and parking pawl return spring (80) into the case.
2. Parking pawl pivot shaft (79) into the parking pawl (81) and the case.
 - Check for proper operation.
3. Retaining plug (78) into the case.
 - Coat the plug with Loctite® sealant or equivalent and install it with a hammer and punch.

Reaction Internal Gear and Carrier Assembly

Figures 34, 35 and 36

Inspect

- Reaction internal gear (684) and support (685) for:
 - Proper assembly.
 - Stripped splines.
 - Cracks.
 - Teeth or lug damage.
 - Thrust bearing assemblies (683 and 692) for damage.
- Lo and reverse clutch plates (682) for:
 - Composition material wear, heat damage, or delamination.
 - Heat damage or surface finish damage to steel plates.
- Reaction carrier assembly (681) for:
 - Pinion gear damage.
 - Excessive pinion washer wear.
 - End play exceeding 0.61 mm (0.024 inch).
 - Proper pinion staking.
 - Keystoned pinion gears (pinions must turn freely).
 - Damaged or worn thrust bearing.
 - To check the captive thrust bearing in the carrier for wear, place a bushing or an output shaft sleeve on the bearing race (do not contact the pinion gears) and turn it with the palm of your hand. Any imperfections will be felt through the bushing.

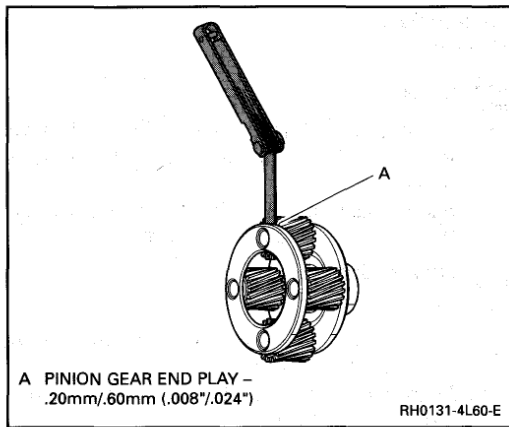


Figure 34 Pinion End Play Check

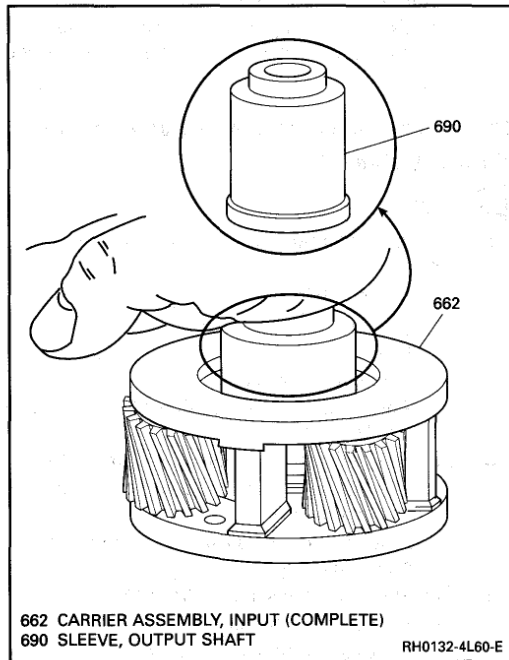


Figure 35 Captive Thrust Bearing Check

Reaction Internal Gear and Support

Figure 41



Install or Connect

1. Reaction gear support to case bearing (692) onto the case hub as shown.
 - Outside bearing race goes toward case hub.

- Retain with Transjell™ J 36850 or equivalent.
2. Reaction internal gear and support (684 and 685) onto the bearing as shown.
 3. Reaction carrier to support thrust bearing assembly (683) onto the support (685).
 - Outer bearing race goes toward the support.
 4. Reaction carrier (681) onto the thrust bearing.

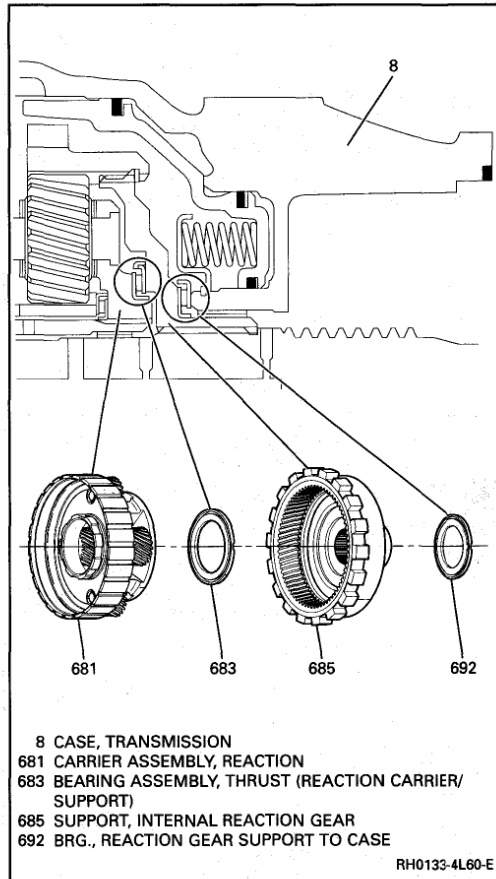


Figure 36 Reaction Internal Gear and Carrier Bearing Locations

Lo and Reverse Clutch Spacer Plate Selection

Figures 37 through 40

Tools Required:
Scale
Straight edge

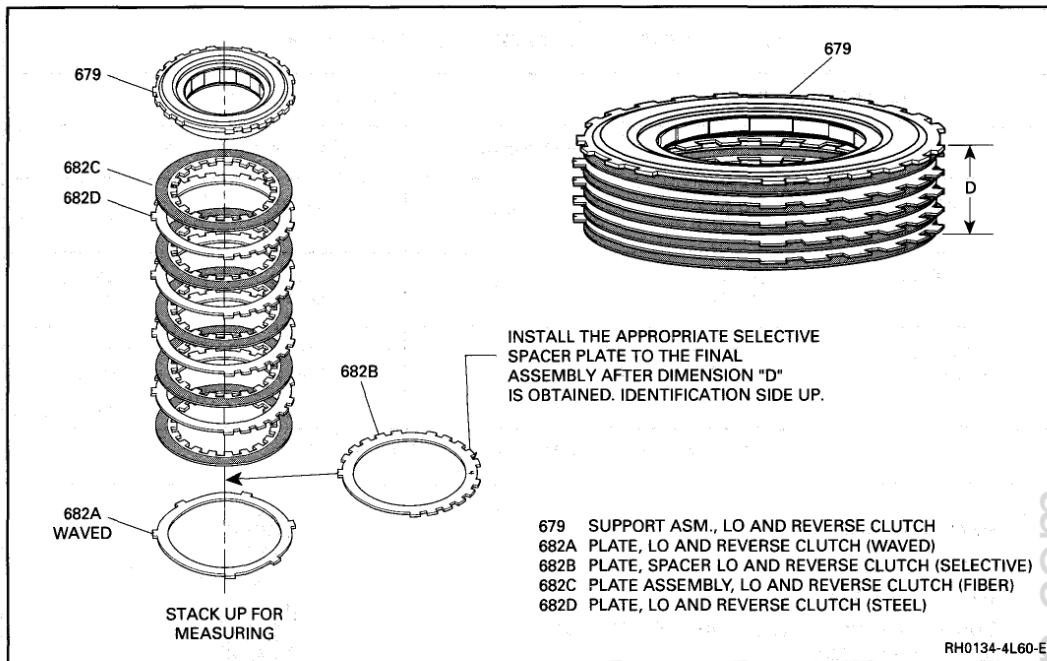


Figure 37 Measuring For Spacer Plate Selection

Measure

Figures 37, 38 and 39

- To measure for proper selective spacer plate, stack the lo and reverse assembly on a flat surface in the following order:
 - One waved plate (682B).
 - Five composition and four steel plates (682), starting with one composition plate and alternating with steel.
 - Lo and reverse clutch support (679).
- Apply an evenly distributed load to the top of the lo and reverse support assembly (679). Light pressure (approximately 22 N or 5 lbs.) on the lo and reverse support assembly (679) will provide the correct dimension for measurement.
- Measure the height of the clutch pack from the work surface to the top of the lo and reverse clutch support (dimension D).
- Use dimension D to select the proper thickness of the selective spacer plate for assembly.
- Install the proper selective spacer plate between the wave plate and the first composition clutch plate with the identification side up.
- The overall height for dimension D with the selective spacer plate included should be 29.22 to 29.90 mm (1.20 to 1.24 inch).

NOTICE: Excessive pressure will start to flatten the wave plate resulting in an inaccurate measurement.

LO AND REVERSE CLUTCH		
	QTY.	THICKNESS
PLATE - WAVED	1	2.42mm (.096")
PLATE - SELECTIVE	1	SEE FIG. 39
PLATE - COMP. FACED	5	2.25mm (.088")
PLATE - FLAT STEEL	5	1.75mm (.069")

RH0135-4L60-E

Figure 38 Lo and Reverse Clutch Plate Chart

LO AND REVERSE CLUTCH SPACER PLATE SELECTION CHART				
IF GAGE DIMENSION "D" IS		USE THIS SELECTIVE PLATE		
FROM	TO	IDENTIFICATION	PLATE THICKNESS	
28.065mm (1.102")	27.545mm (1.081")	NONE	1.684mm (.066")	1.829mm (.072")
28.586mm (1.122")	28.066mm (1.102")	0	1.314mm (.052")	1.168mm (.046")
27.544mm (1.081")	27.026mm (1.061")	1	2.198mm (.087")	2.344mm (.092")

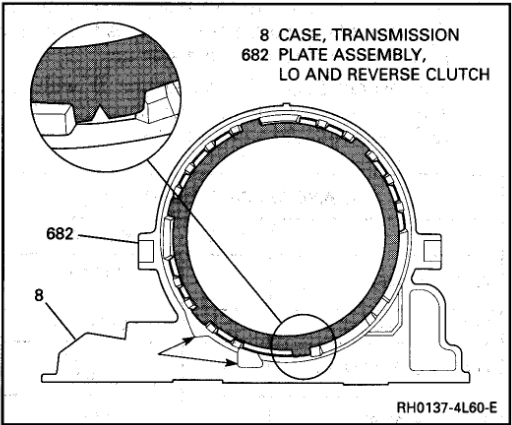
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Figure 39 Lo and Reverse Spacer Plate Selection Chart

Install or Connect

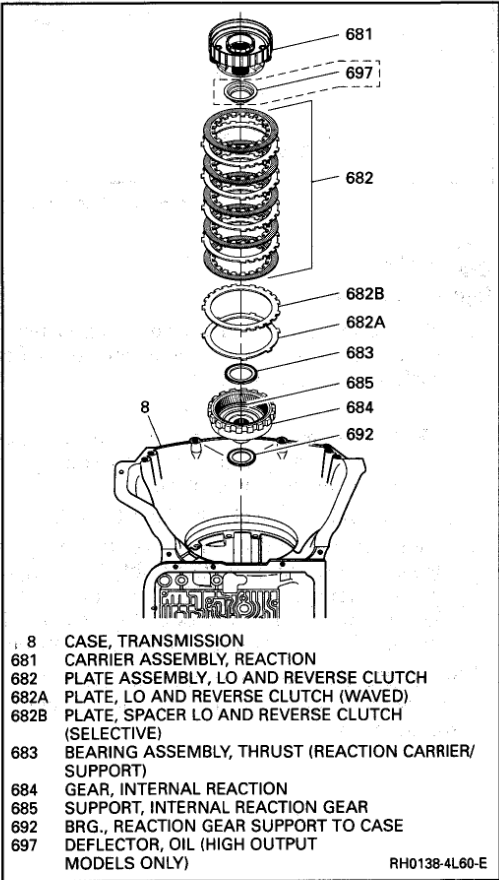
Figures 38 and 40

1. Waved plate (682A).
2. Correct selective spacer plate (682B), from selection procedure.
3. Lo and reverse clutch plates (682) into case lugs.
 - Start with a composition plate and alternate with steel.
 - Index with the splines of the reaction carrier and the case as shown.



RH0137-4L60-E

Figure 40 Lo and Reverse Clutch Plates Properly Installed



- 8 CASE, TRANSMISSION
- 681 CARRIER ASSEMBLY, REACTION
- 682 PLATE ASSEMBLY, LO AND REVERSE CLUTCH
- 682A PLATE, LO AND REVERSE CLUTCH (WAVED)
- 682B PLATE, SPACER LO AND REVERSE CLUTCH (SELECTIVE)
- 683 BEARING ASSEMBLY, THRUST (REACTION CARRIER/ SUPPORT)
- 684 GEAR, INTERNAL REACTION
- 685 SUPPORT, INTERNAL REACTION GEAR
- 692 BRG., REACTION GEAR SUPPORT TO CASE
- 697 DEFLECTOR, OIL (HIGH OUTPUT MODELS ONLY)

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Figure 41 Reaction Internal Gear and Carrier Assembly Installation

Lo and Reverse Clutch Support Assembly

Figures 42, 43 and 44



Remove or Disconnect

Figure 42

1. Inner race (675) from the support assembly.
2. One retainer ring (677).
3. Roller clutch assembly (678).

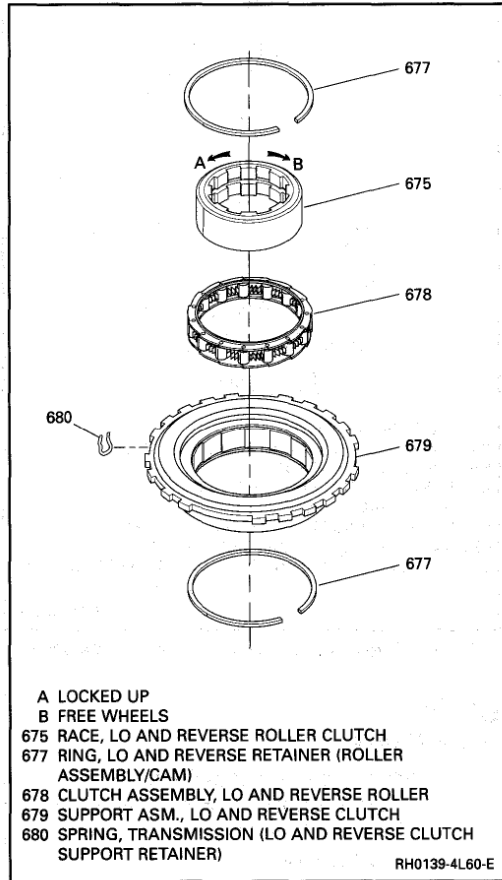


Figure 42 Lo and Reverse Clutch Support Assembly



Inspect

Figure 42

- Inner race (675) for damage and surface finish.
- Roller clutch assembly (678) for:
 - Damaged rollers.
 - Broken springs.
- Cam for:
 - Loose cam.
 - Surface finish.

- Support assembly for:
 - Cracks or damaged lugs.



Install or Connect

Figures 42, 43 and 44

1. Roller clutch assembly (678) into the cam and support assembly (679).
2. Support and roller assembly into the case with the hub down.
3. Inner race (675) into the roller assembly.
 - Turn inner race (675) while inserting.
 - A. Push down for full engagement.
 - B. Bottom tangs will be flush with carrier hub when properly installed.
 - C. Check for proper operation by rotating the inner race as shown in Figure 42.
4. Support retainer spring (680) into the case.
 - Insert between the case lug and the one open notch in the support.

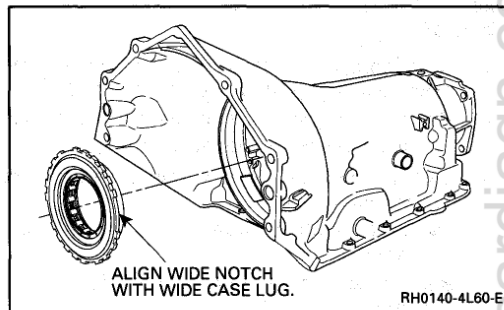


Figure 43 Lo and Reverse Support and Roller Asm. Installation

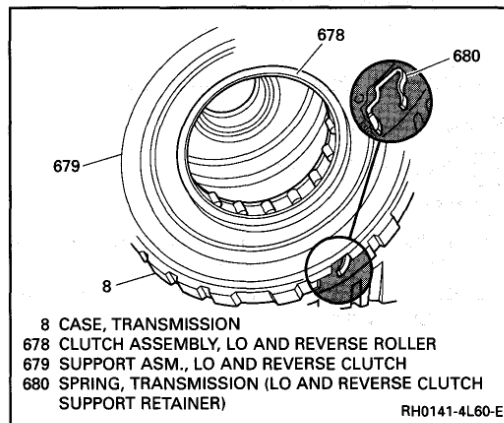


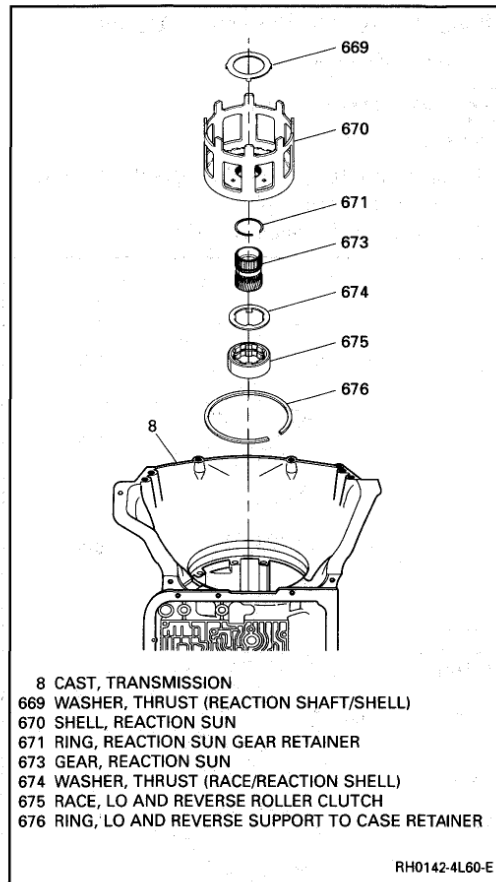
Figure 44 Support Spring - Installed

Reaction Sun Gear and Shell**Figure 45****Inspect**

- Reaction sun gear (673) for:
 - Nicked, scored, or worn bushing (See Bushing Replacement).
 - Damaged spline or teeth.
 - Loose or weak retaining ring (do not remove this ring, except to replace it.).
- Reaction sun shell (670) for:
 - Stripped or worn splines.
 - Broken hub.
 - Bent tangs.
- Lo and reverse inner race to reaction sun gear shell thrust washer (674) for wear or damage.
- Reaction shaft to reaction sun gear shell bronze thrust washer (669) for wear or damage.

Install or Connect**Figure 45**

1. Reaction sun gear retainer ring (671) onto the reaction sun gear, if previously removed.
2. Reaction sun gear (673) into the reaction carrier.
 - Index the teeth with the pinion gears.
3. Thrust washer (674) onto the lo and reverse support inner race.
 - Index the four locating ears into the inner race.
4. Reaction sun gear shell (670) onto the reaction sun gear.
5. Bronze thrust washer (669) onto the reaction sun gear shell.
 - Index tangs into the shell.

**Figure 45 Reaction Sun Gear and Shell Installation****Inspect****Figures 46 and 47**

- Reaction carrier shaft (666) for:
 - Scored, damaged, or worn bushings (see Bushing Replacement).
 - Cracked shaft.
 - Damaged spline or gear teeth.
 - Under cut around the shaft from interference with the sun gear.

Input Internal Gear and Reaction Shaft**Figures 46 and 47****Remove or Disconnect****Figure 46**

1. Retainer ring (668) from input internal gear (664).
2. Reaction carrier shaft (666) from the input internal gear.

- Input internal gear (664) for:
 - Cracks.
 - Damaged spline or gear teeth.
- Input carrier to reaction shaft thrust bearing (663) for wear or damage.
- Output shaft (687) for:
 - Plugged or restricted lube passages.
 - Damaged splines or ring groove.
 - Damaged governor drive gear teeth.
 - Burrs or damage to the front of the shaft at seal area. (Polish with crocus cloth if necessary).
 - Burrs or damage to bearing journals.

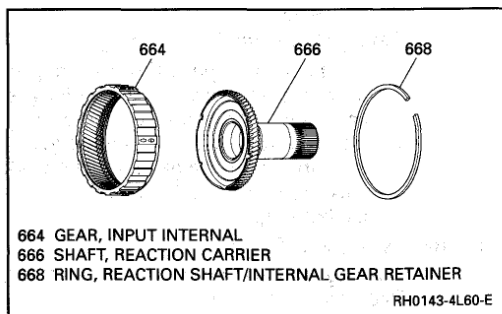


Figure 46 Input Internal Gear and Reaction Shaft

Transmission Output Speed Sensor Rotor

Figure 47

Tools Required:

- J 21427-01 Speedometer Gear Puller Adapter
- J 8433 Speedometer Gear Puller
- J 36352-6 "C" Washer
- J 36352-4 Rotor Installer
- Mechanical press

Inspect

Figure 47

- Speed sensor rotor on output shaft for tooth damage.

Important

- If rotor is damaged, replace it. Do not reuse a rotor that has been removed.

Remove or Disconnect

Figure 47

- Install J 21427 with J 8433 and remove rotor.

Install or Connect

Figure 47

1. Place new rotor over output shaft.
2. Place J 36352-4 in groove on output shaft.
3. Place J 36352-6 on shaft and press to make contact with J 36352-4.

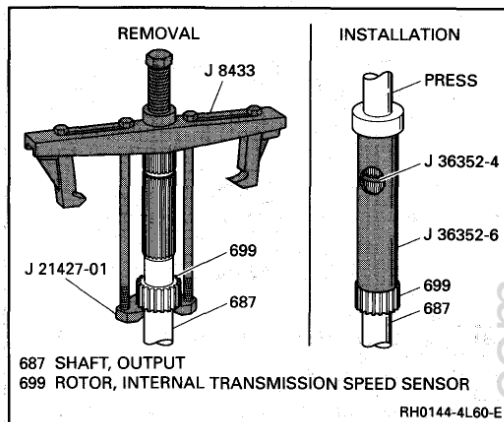


Figure 47 Transmission Output Speed Sensor Rotor

Input Internal Gear and Output Shaft

Figures 48 and 49

Tool Required:

- J 29837 Output Shaft Support Fixture

Install or Connect

1. Reaction shaft (666) into the input internal gear (664).
2. Retainer ring (668) into the input internal gear.
3. Input internal gear and shaft assembly into the sun gear shell.
 - Index the shaft spline into the reaction carrier.
4. Thrust bearing (663) onto the reaction carrier shaft.
 - Outer race goes toward the reaction carrier shaft.
5. Output shaft (687) into the transmission.
 - Index the splines with the mating parts.
6. J 29837 onto the case.
 - Position upwards as far as possible to support the output shaft.

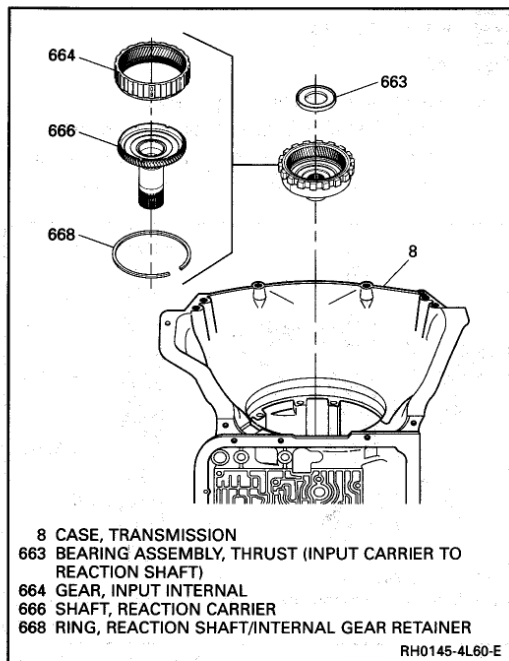


Figure 48 Input Internal Gear Installation

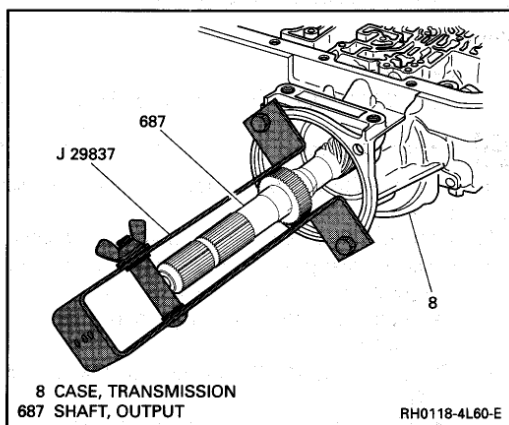


Figure 49 Output Shaft - Installation

Input Carrier and Sun Gear

Figure 50

Tool Required:

J 34627 Snap Ring Pliers

Inspect

- Input carrier assembly (662) for:
 - Pinion gear damage.
 - Excessive pinion washer wear – end play should be 0.20 to 0.61 mm (0.008 to 0.024 inch).
 - Proper pin stake.
 - Keystoned pinion gears (pinion gears must rotate freely).
 - Damaged or worn thrust bearing.
 - To check the captive thrust bearing in the carrier for wear, place a bushing or an output shaft sleeve on the bearing race (do not contact the pinion gears) and turn it with the palm of your hand. Any imperfections will be felt through the bushing.
- Input sun gear (658) for:
 - Bushing damage or wear (see Bushing Replacement Procedure).
 - Cracks.
 - Damaged spline or gear teeth.

Install or Connect

Figure 50

1. Input carrier assembly (662) onto the output shaft.
2. Retainer ring (661) into the output shaft ring groove.
 - Use care not to overexpand the ring during installation.
 - Do not reuse the old retainer ring if it has been overexpanded.
3. Remove J 29837.
4. Input sun gear (658) into the input carrier.
 - Rotate the sun gear teeth into the pinion gear teeth.

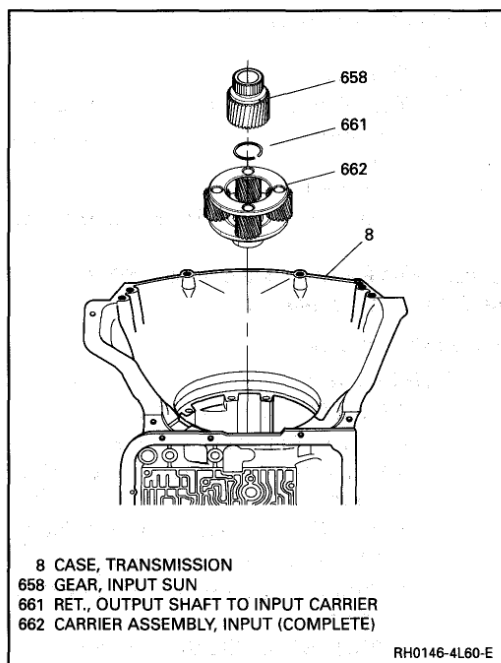


Figure 50 Input Carrier and Sun Gear – Installation

Input Clutch Assembly

Figures 51 through 55

Tools Required:

- J 23456 Clutch Spring Compressor Press
- J 23327-1 Clutch Spring Compressor
- J 25018-A Clutch Spring Compressor Adaptor

Remove or Disconnect

Figures 51 and 53

- Reverse input clutch assembly (605) from the input clutch assembly (621).
- Oil pump to selective washer thrust bearing (615).
- Selective washer (616).

Disassemble

Figures 52 and 53

1. Place the input clutch assembly (621) on the bench with the turbine shaft through the bench hole.
2. The 3-4 clutch plate retainer ring (656) and the backing plate (655).

3. The 3-4 clutch plates (654).
4. Five 3-4 clutch boost spring assemblies (600).
5. The 3-4 clutch apply plate (653).
6. The 3-4 clutch ring retainer plate (652).
7. Forward clutch backing plate retainer ring (651) and backing plate (650).
8. Forward clutch sprag assembly (638-648).

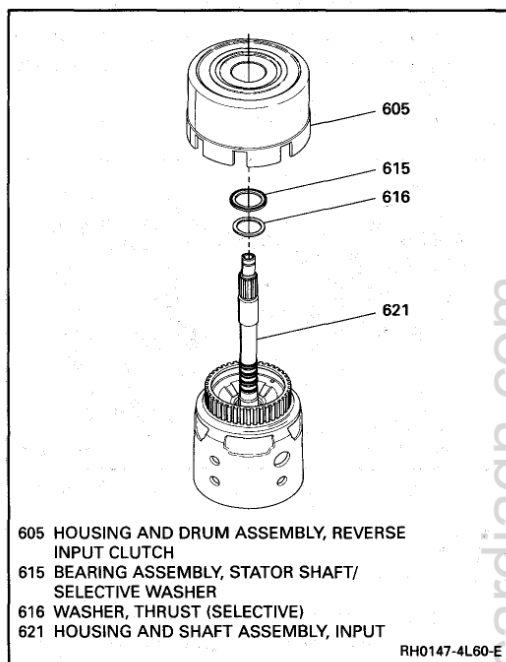


Figure 51 Reverse Input and Input Clutches

Disassemble

Figure 53

1. Input sun gear bearing assembly (637).
2. Input housing to output shaft lip seal (636).
3. Forward clutch plates (649).
4. Forward wave plate (648).
5. Forward clutch apply plate (646).
6. Overrun clutch plates (645).

Disassemble

Figure 53

1. Install J 23456 and J 23327-1 with J 25018-A.
 - Compress overrun clutch spring assembly (634).
2. Overrun clutch retainer ring (635).

3. Overrun clutch spring assembly (634).
4. Overrun clutch piston (632).
 - Inner and outer lip seals (631).
5. Forward clutch piston assembly (630).
 - Inner and outer lip seals (629).
6. Forward clutch housing (628).
7. The 3-4 clutch spring assembly (626).
8. The 3-4 clutch apply ring (625) and piston (623).
 - Inner and outer lip seals (624) from piston.
9. Forward clutch to input housing O-ring seal (622).
10. Four turbine shaft oil seal rings (619).

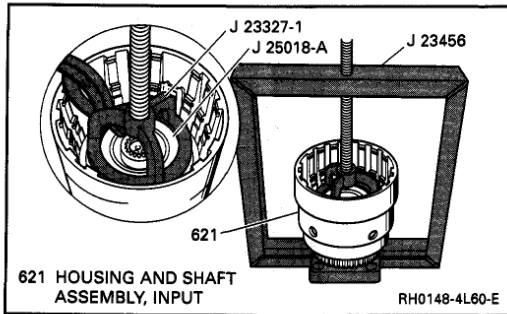


Figure 52 Overrun Clutch Retainer Ring - Removal

**Inspect****Figures 54 and 55**

- Input housing for porosity or damage
- Input housing and shaft assembly (621) for:
 - Spline wear or damage.
 - Three turbine shaft checkballs.
 - A. The balls must **not** be loose or leaking.
 - B. The open hole is the lube oil passage which feeds the output shaft.
- Presence of orificed cup plug (698).
- Cracks at lube holes.
- Four turbine shaft oil seal ring grooves for damage or burrs.
 - Seals must fit freely into the ring grooves.

- Check valve retainer and ball assembly (617) for:
 - Damage.
 - The ball must move freely in the retainer.
 - The retainer must be tight in the turbine shaft.
- Feed passages for:
 - Obstructions – blow air through passages.

Check Valve Retainer and Ball Assembly - Replacement Procedures**Figures 53 through 64****Tools Required:**

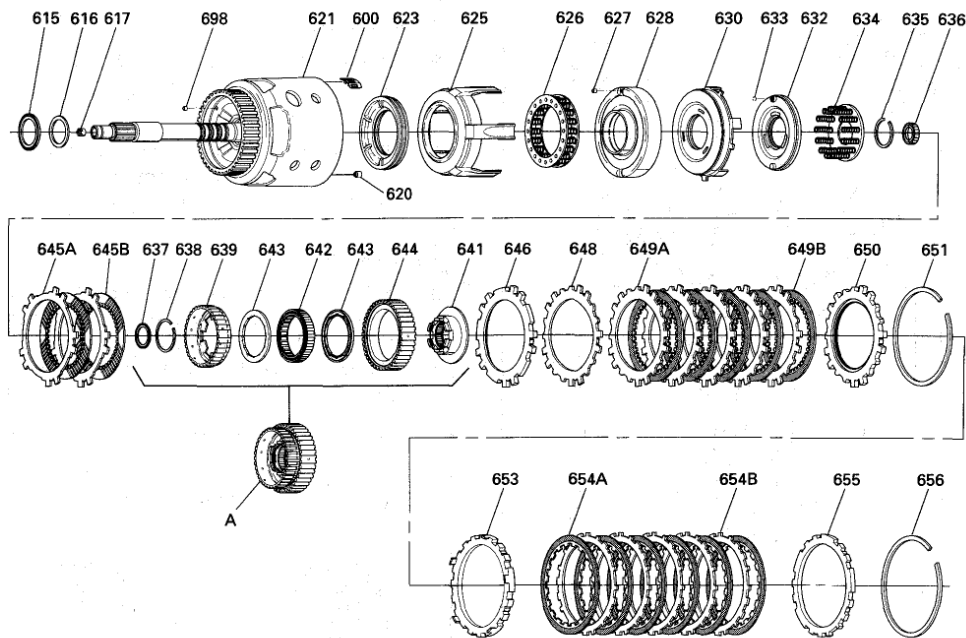
- 6.3 mm (#4) Screw extractor
- 9.5 mm (3/8 inch) diameter metal rod
- 6.35 mm (1/4 inch) diameter rod or drift hammer
- J 23456 Clutch Spring Compressor Press
- J 23327-1 Clutch Spring Compressor
- J 25018-A Clutch Spring Compressor Adaptor
- J 29882 Overrun Clutch Inner Seal Protector
- J 29883 Forward Clutch Inner Seal Protector

**Remove or Disconnect****Figure 55**

1. Straighten the tangs of the retainer and remove the ball.
2. Check valve retainer.
 - Use 6.3 mm (#4) Screw extractor.

**Install or Connect****Figure 55**

- New check valve retainer and ball assembly (617).
 - A. Use the 9.5 mm (3/8 inch) metal rod.
 - B. Seat the retainer 3.0 mm (1/8 inch) below top surface of the turbine shaft.
 - C. Be certain the ball is loose.


**ILL.
NO.**
DESCRIPTION

- 600 SPRING ASM., 3-4 CLUTCH BOOST (5)
 615 BEARING ASSEMBLY, STATOR SHAFT/ SELECTIVE WASHER
 616 WASHER, THRUST (SELECTIVE)
 617 RETAINER AND BALL ASM., CHECK VALVE
 620 RETAINER AND CHECKBALL ASSEMBLY
 621 HOUSING AND SHAFT ASSEMBLY, INPUT
 623 PISTON, 3RD AND 4TH CLUTCH
 625 RING, 3RD AND 4TH CLUTCH (APPLY)
 626 SPRING ASSEMBLY, 3RD AND 4TH CLUTCH
 627 RETAINER AND BALL ASSEMBLY, FORWARD CLUTCH HOUSING
 628 HOUSING, FORWARD CLUTCH
 630 PISTON, FORWARD CLUTCH
 632 PISTON, OVERRUN CLUTCH
 633 BALL, OVERRUN CLUTCH
 634 SPRING ASSEMBLY, OVERRUN CLUTCH
 635 SNAP RING, OVERRUN CLUTCH SPRING RETAINER
 636 SEAL, INPUT HOUSING TO OUTPUT SHAFT
 645A PLATE ASSEMBLY, OVERRUN CLUTCH (STEEL)
 645B PLATE, OVERRUN CLUTCH (FIBER)
 A FORWARD CLUTCH SPRAG ASSEMBLY
 637 BEARING ASSEMBLY, INPUT SUN GEAR
 638 SNAP RING, OVERRUN CL. HUB RETAINING
 639 HUB, OVERRUN CLUTCH
 641 RETAINER AND RACE ASSEMBLY, SPRAG
 642 FORWARD SPRAG ASSEMBLY
 643 RETAINER RINGS, SPRAG ASSEMBLY
 644 RACE, FORWARD CLUTCH (OUTER)

**ILL.
NO.**
DESCRIPTION

- 646 PLATE, FORWARD CLUTCH (APPLY)
 648 PLATE, FORWARD CLUTCH (WAVED)
 649A PLATE ASSEMBLY, FORWARD CLUTCH (STEEL)
 649B PLATE, FORWARD CLUTCH (FIBER)
 650 PLATE, FORWARD CLUTCH BACKING (SEL.)
 651 RING, FORWARD CLUTCH BACKING PLATE RETAINER
 653 PLATE, 3RD AND 4TH CLUTCH APPLY (STEPPED)
 654A PLATE ASSEMBLY, 3RD AND 4TH CLUTCH (FIBER)
 654B PLATE, 3RD AND 4TH CLUTCH (STEEL)
 655 PLATE, 3RD AND 4TH CLUTCH BACKING (SEL.)
 656 RING, 3RD AND 4TH CLUTCH BACKING PLATE RETAINER
 698 PLUG, ORIFICED CUP

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Figure 53 Input Clutch Assembly

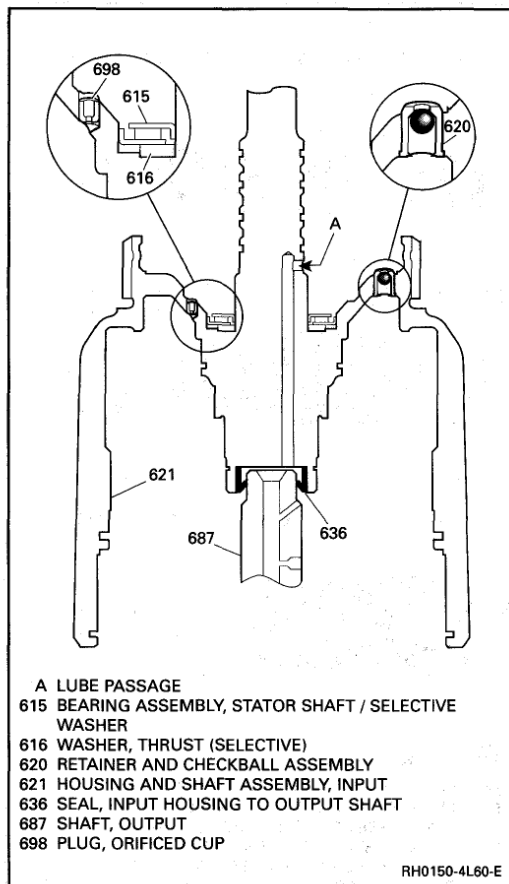


Figure 54 Input Housing Check Valve Ball

Inspect

Figures 54 and 56

- Turbine shaft O-ring seal (618) for:
 - Damage.
 - Nicks or cuts.
- Input housing check valve ball (620):
 - The ball must move freely.
 - Leak check the ball with solvent.

Important

- If the 3-4 clutch plates are burned or worn and a cause is not found during diagnosis or disassembly, replacement of the retainer and checkball assembly may be required (Figure 54).

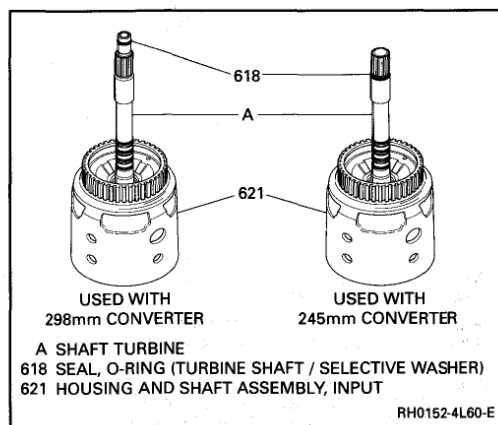


Figure 56 Views of the Input Housing

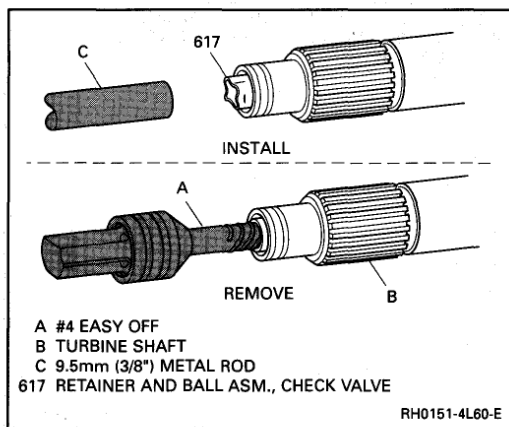


Figure 55 Retainer and Ball Assembly - Replacement

Remove or Disconnect

Figure 57

- Tap out retainer and ball assembly.

Install or Connect

Figures 55 and 57

- Using same tools, tap in retainer and ball assembly until shoulder is seated in housing.

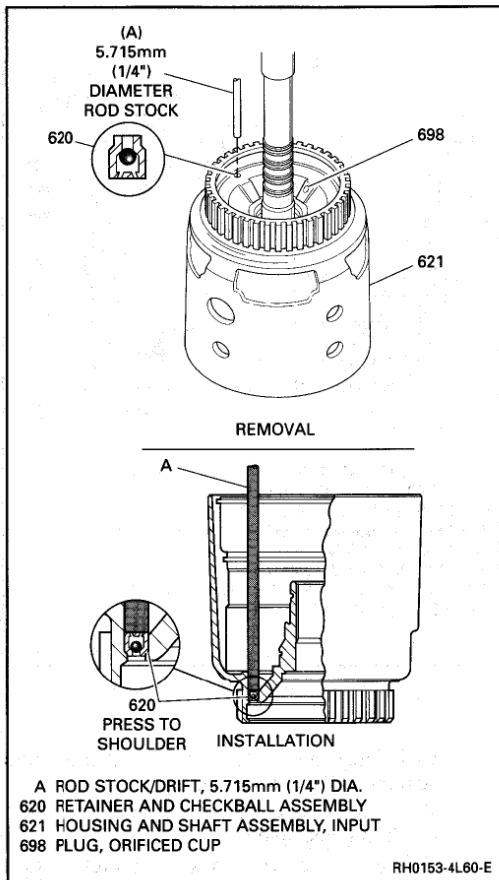


Figure 57 Retainer and Checkball Removal/Installation

Inspect

Figure 53

- The 3-4 clutch piston (623) for damage or porosity.
- The 3-4 clutch apply ring (625) for:
 - Bent tangs.
- The 3-4 clutch spring assembly (626) for damage or distortion.
- The 3-4 clutch boost spring assemblies (600) for damage or distortion.

Assemble

Figure 58

Position the input housing and shaft assembly on the bench with the turbine shaft through a bench hole.

1. Inner and outer 3-4 clutch lip seals (624) on the 3-4 clutch piston.
 - Seal lips must face away from the piston hub.
 - Lubricate the seals with Transjell™ J 36850 or equivalent.
2. The 3-4 clutch piston (623) into the input housing as shown.
 - Use care not to damage the seals.

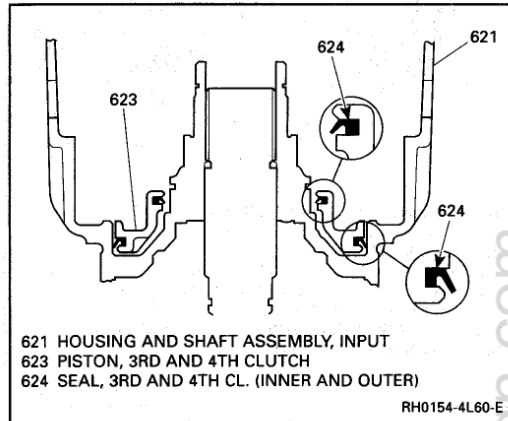


Figure 58 Input Housing and 3-4 Piston

Inspect

Figures 59 and 60

- Forward clutch housing (628) for:
 - Proper checkball operation.
 - Damage or distortion.
 - Burrs in seal areas.
 - Cracks.
- Forward clutch piston (630) and overrun clutch piston (632) for:
 - Porosity or damage.
 - Ring groove damage.
 - Apply leg damage.
- Overrun spring assembly (634) for damage or distortion.
- Input housing to output shaft lip seal (636) for damage or wear.

Assemble

Figures 59 and 60

1. Forward clutch housing to input clutch housing O-ring seal (622) as shown.
 - Lubricate with Transjell™ J 36850 or equivalent.

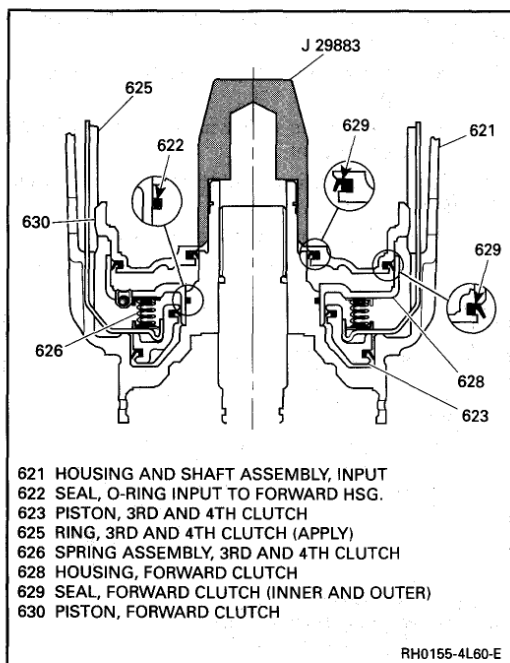


Figure 59 Forward Clutch and 3-4 Apply Ring - Installed

2. Inner and outer seals (629) on forward clutch piston.
 - Seal lips must face away from the piston tangs as shown.
 - Lubricate with Transjell™ J 36850 or equivalent.
3. Forward clutch piston (630) into the forward clutch housing.
 - Use care not to damage the outer lip seal.
4. The 3-4 clutch spring assembly (626) onto the 3-4 clutch apply ring.
5. Forward clutch assembly onto the 3-4 clutch spring assembly.
 - The forward clutch piston apply legs must be indexed with the 3-4 clutch apply ring legs.
6. J 29883 on the input housing as shown.

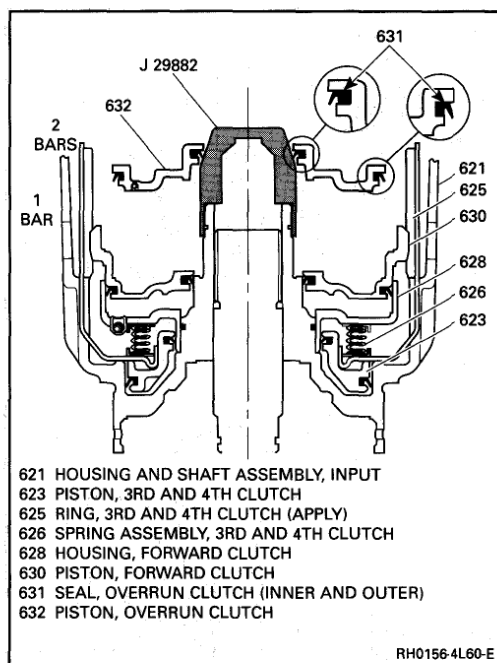


Figure 60 Overrun Piston - Installed

7. Apply ring and forward clutch assembly into the input housing as shown.
 - A. Hold the assembly by the apply ring legs during installation.
 - B. Do not let the forward clutch piston separate from the housing.
 - C. Firmly seat the assembly.
8. J 29882 on the input housing as shown.
9. Overrun clutch piston (632).
 - Hub facing upward as shown.
 - If all parts are properly seated to this point, the overrun piston hub will be approximately 4.7 mm (3/16 in.) below the top of the snap ring groove in the input housing hub.

Assemble

Figures 61 and 62

1. Overrun clutch spring assembly (634) onto the overrun clutch piston.
 - Locate the springs on the piston tabs.
2. J 23456 and J 23327-1 with J 25018-A onto the overrun spring assembly.
 - Compress springs (Do not over-compress).
3. Retainer snap ring (635) into the snap ring groove.
4. Input housing to output shaft lip seal (636).

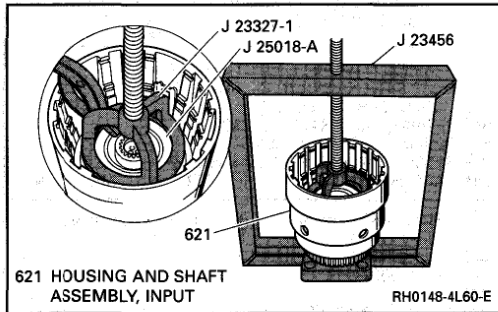


Figure 61 Overrun Clutch Retaining Ring - Installed

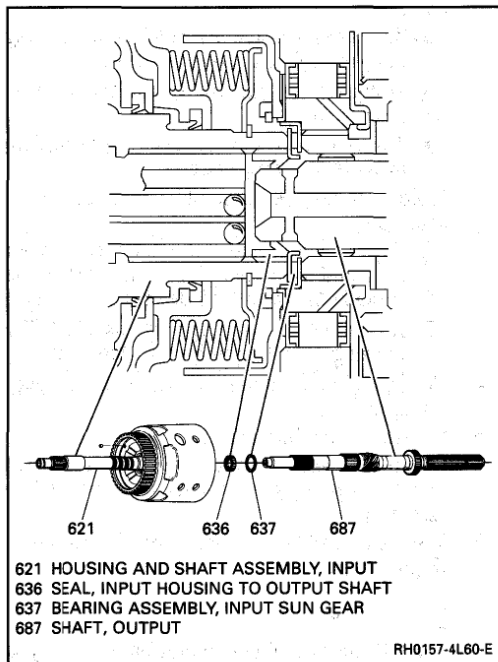


Figure 62 Input Hsg. to Output Shaft Lip Seal

Inspect

- Overrun clutch plates (645) for:
 - Composition plate damaged tangs, delamination, or excessive wear.
 - Steel plate damaged tangs, wear, or heat damage.
- Input sun gear bearing assembly (637) for:
 - Wear.
 - Flatness.
 - Damaged.

Assemble

Figures 63 and 64

1. Overrun clutch plates (645) into the input housing.
 - Overrun clutch plates are the smallest of the three sets of plates in the input housing.
 - Index the plates as shown starting with a steel plate and alternate with composition.
2. Thrust bearing assembly (637) onto the input clutch hub.
 - The inside race must face the input housing hub.
 - Retain with Transjel™ J 36850 or equivalent.
3. Align the tangs on the two composition overrun clutch plates.

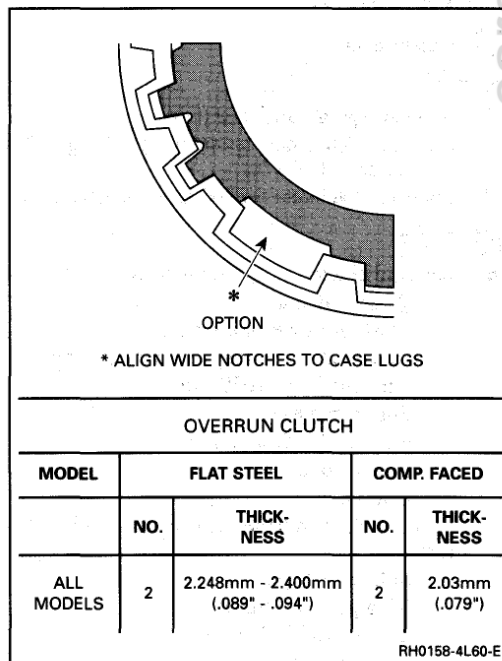


Figure 63 Overrun Clutch Plate Chart

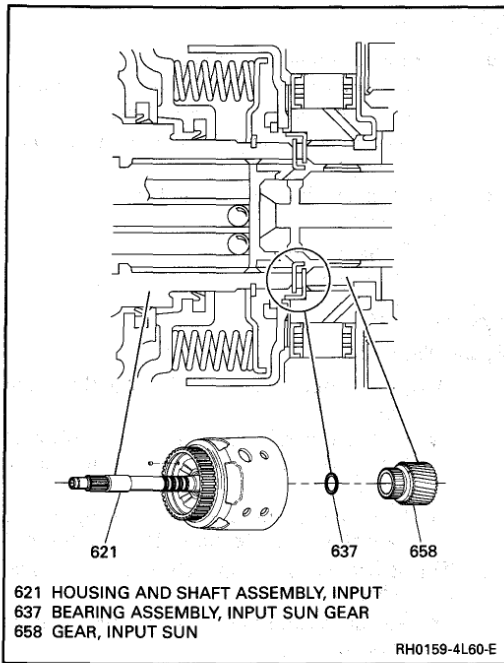


Figure 64 Input Sun Gear Thrust Bearing

Forward Clutch Sprag Assembly

Figures 65 through 71

**Disassemble**

Figure 65

1. Forward sprag outer race (644).
2. Overrun clutch hub retaining snap ring (638) and clutch hub (639).
3. Forward clutch retainer and race assembly (641).

**Inspect**

- Forward clutch sprag assembly (642) for:
 - Wear or damage.
 - Weak or broken springs.
 - Damaged or missing retainer caps (brass).
- Overrun clutch hub (639) for:
 - Spline damage.
 - Plugged lubrication holes.
 - Damaged tangs.
 - Cracks.
- Forward clutch retainer and race assembly (641) for:
 - Spline damage.
 - Ring groove damage.
 - Surface finish damage.
 - Loose retainer.

- Forward sprag outer race (644) for:
 - Spline damage.
 - Surface finish damage.
 - Plugged lubrication holes.

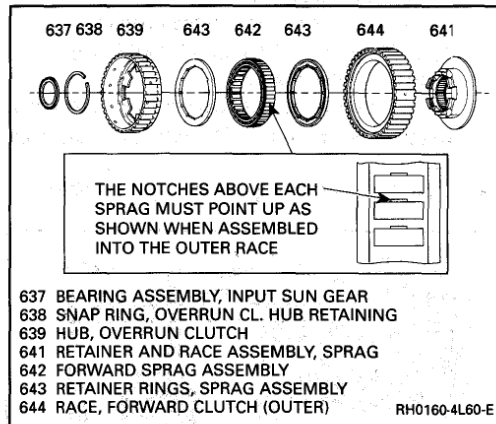


Figure 65 Forward Clutch Sprag Assembly

**Assemble**

Figures 66, 67 and 68

1. Forward clutch sprag assembly (642) into the outer race.
 - To correctly install, the notches in the sprag cage must face upward as shown.
2. One sprag retainer ring (643) onto the race and retainer assembly.
 - The flange on the retainer ring must face away from the retainer.
3. Race and retainer assembly into the sprag assembly.
 - A. To assemble, hold the outer race in your left hand with your fingers supporting the sprag at the recessed side of the outer race.
 - B. Insert the race and retainer assembly by pushing in and turning to the left.
4. The remaining retainer ring onto the sprag assembly.
5. Overrun clutch hub (639).
6. Overrun clutch hub retaining snap ring (638) into the snap ring groove of the race and retainer assembly.
7. Test the assembly for proper operation as shown (Figure 68).

**Important**

- If the assembly operates backwards, you have installed the sprag backwards. Reassemble correctly.

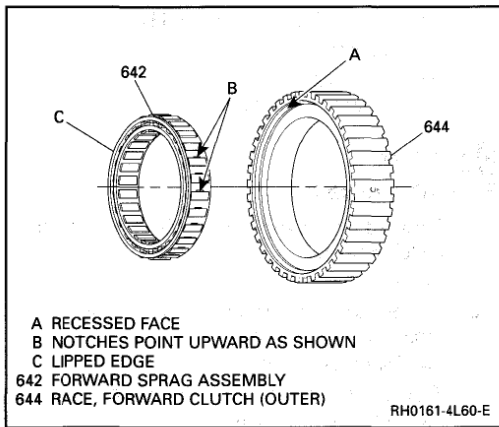


Figure 66 Sprag Assembly Procedure

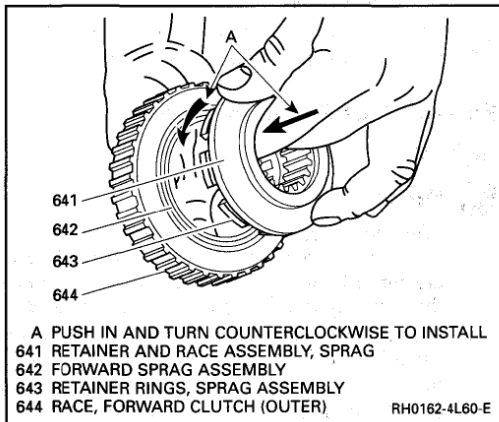


Figure 67 Sprag Race and Retainer Assembly Procedure

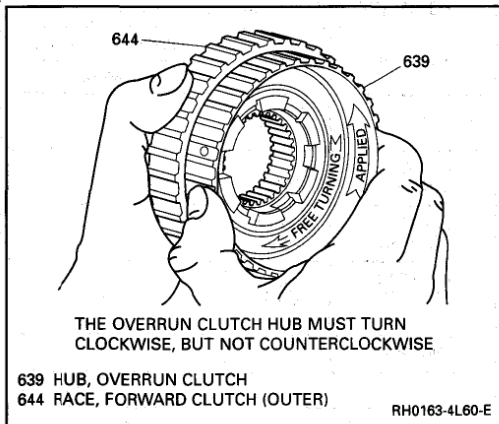


Figure 68 Sprag Operation Check

Assemble

- Forward clutch sprag assembly into the input clutch housing.
 - Index the overrun clutch hub into the overrun clutch plates.

Inspect

Figures 69 and 70

- Forward (649) and 3-4 clutch plates (654) for:
 - Composition plate damaged tangs, delamination, or wear.
 - Steel plate damaged tangs, wear, or heat damage.
- Forward (650) and 3-4 clutch backing plates (655) for:
 - Flatness.
 - Surface finish damage.
 - Burrs or nicks.
- Forward clutch apply plate (646) and spacer plate (647) for:
 - Flatness.
 - Surface finish damage.
 - Burrs or nicks.

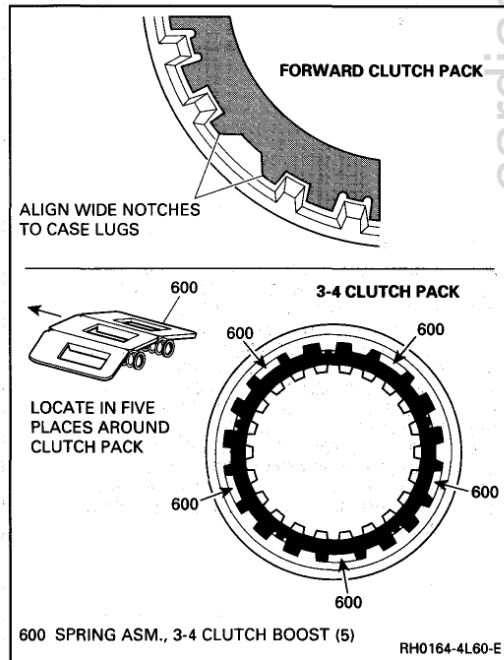


Figure 69 Forward and 3-4 Clutch Plates - Installed

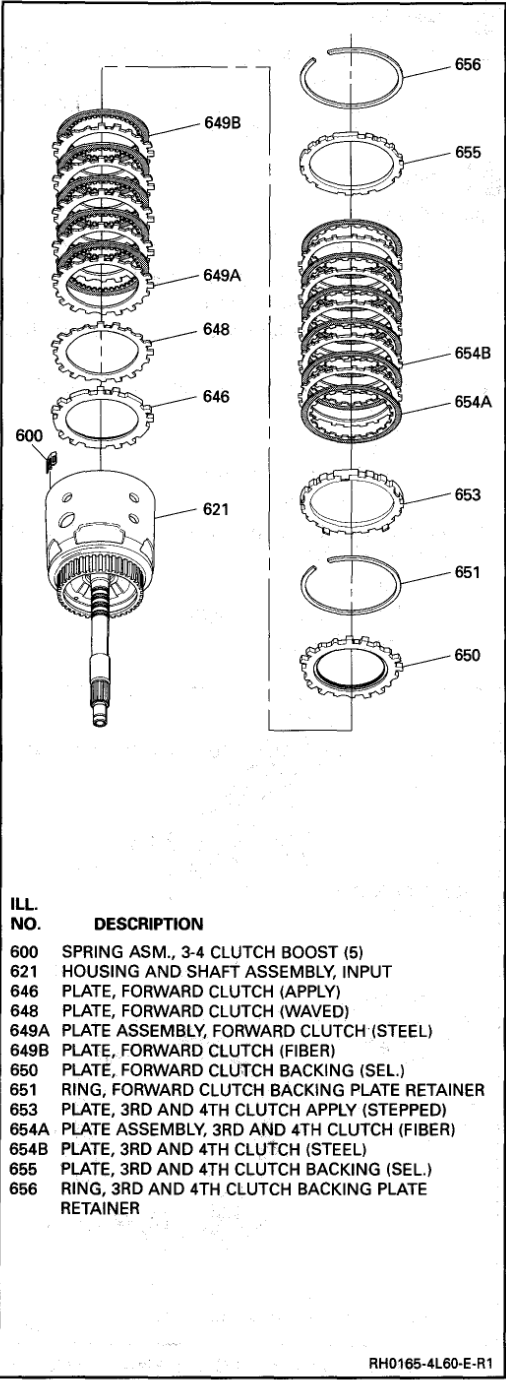


Figure 70 Input Housing with Forward and 3-4 Clutch Plates

- The 3-4 clutch apply plate (653) for:
 - Flatness.
 - Bent tangs.
 - Surface finish damage.

Assemble

Figures 69 through 72

1. Forward clutch apply plate (646) into the input clutch housing.
 - Index as shown.
2. Waved steel forward clutch plate (648) into the input clutch housing.
 - Index as shown.
3. The remaining forward clutch plates (649) into the input clutch housing.
 - Start with a steel plate and alternate with composition.
4. Forward clutch selective backing plate (650).
5. Forward clutch retaining ring (651).

Forward Clutch Piston Travel Check

Figure 72

Measure

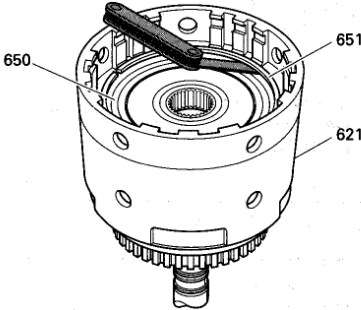
1. With the overrun clutch and forward clutch fully assembled in the Input Housing, check the end clearance between the backing plate (650) and the retaining ring (651) with two feeler gages.
2. Proper forward clutch backing plate travel should be 0.75 to 1.60 mm (0.030 to 0.063 inch).
3. Select the proper backing plate from the chart to obtain the correct clearance.

FORWARD CLUTCH INFORMATION CHART		
PLATE TYPE	THICKNESS	QUANTITY REQUIRED
		ALL MODELS
APPLY PLATE	4.30mm (.169")	1
WAVED STEEL CLUTCH PLATE	1.79mm (.070")	1
FLAT STEEL CLUTCH PLATE	2.29mm (.090")	5
COMPOSITION FACED CLUTCH PLATES	1.78mm (.070")	5
BACKING PLATE	SELECTIVE	1

RH0166-4L60-E

Figure 71 Forward Clutch Plate Chart

FORWARD CLUTCH BACKING PLATE SELECTION	
ALL MODELS	
BACKING PLATE TRAVEL = .75mm - 1.60mm (.030" - .063")	
PLATE THICKNESS	IDENTIFICATION
6.97mm - 7.07mm (.274" - .278")	A
6.38mm - 6.48mm (.250" - .255")	B
5.79mm - 5.89mm (.227" - .232")	C
5.20mm - 5.30mm (.205" - .208")	D
4.61mm - 4.71mm (.180" - .185")	E



621 HOUSING AND SHAFT ASSEMBLY, INPUT
650 PLATE, FORWARD CLUTCH BACKING (SEL.)
651 RING, FORWARD CLUTCH BACKING PLATE RETAINER

RH0167-4L60-E

Figure 72 Forward Clutch Backing Plate Travel

3-4 Clutch Assembly

Figures 73 and 77



Assemble

- The 3-4 clutch apply plate (653).
 - Index each leg into the apply ring legs.
- The 3-4 clutch plates (654).
 - Start with steel and alternate with composition as shown in (Figure 77).
 - First steel plate has the same spline configuration as apply plate.
- The 3-4 boost springs (600).
- The 3-4 clutch backing plate (655) and retainer ring (656).
 - Chamfered side up.

3-4 CLUTCH INFORMATION CHART		
PLATE TYPE	THICKNESS	QUANTITY REQUIRED
		ALL MODELS
STEPPED APPLY PLATE	5.60mm (.220")	1
† FLAT STEEL CLUTCH PLATES	1.78mm (.070")	1
FLAT STEEL CLUTCH PLATE	2.71mm (.107")	5
COMPOSITION FACED CLUTCH PLATES	2.03mm (0.79")	6
BACKING PLATE	SELECTIVE	1

† SAME SPLINE CONFIGURATION AS APPLY PLATE

RH0168-4L60-E-R1

Figure 73 3-4 Clutch Plate Chart

3-4 Clutch Piston Travel Check

Figure 74



Measure

- Check the end clearance between the backing plate (655) and the first composition plate with a feeler gage.
- Select the proper backing plate from the chart to obtain the correct clearance for model you are working on.

Clutch Air Check

Figure 75

Air check the 3-4, forward and overrun clutches by applying air pressure at the feed holes in the turbine shaft. (When the overrun clutch is checked, the air will blow by the forward clutch piston lip seals and exit out the forward clutch feed hole in the turbine shaft.)

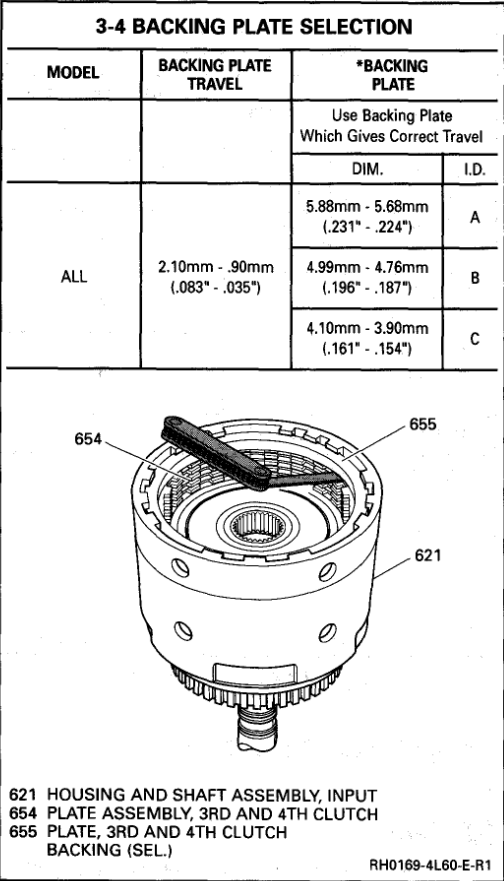


Figure 74 3-4 Backing Plate Selection Chart

Turbine Shaft Seals

Figure 76

- Tools Required:
- J 36418-1 Seal Installer
 - J 36418-2A Seal Sizer

Assemble

- Install four turbine shaft oil seal rings (619) using J-36418-1.

Adjust

- Adjust screw to obtain proper height.
- Use J 36418-2A to size the seals after installation.

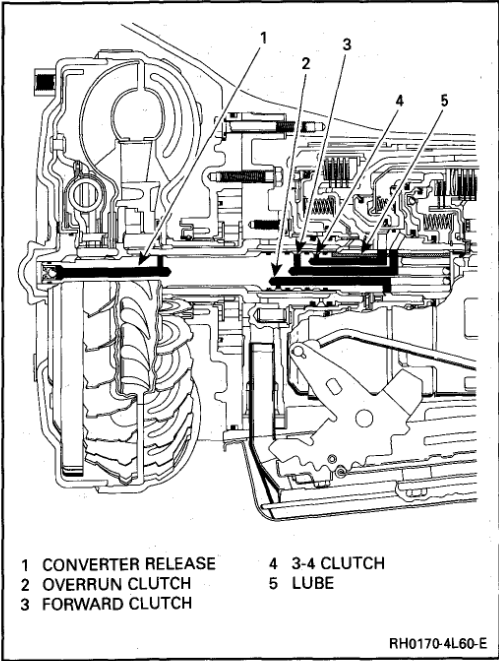


Figure 75 Turbine Shaft Fluid Passages

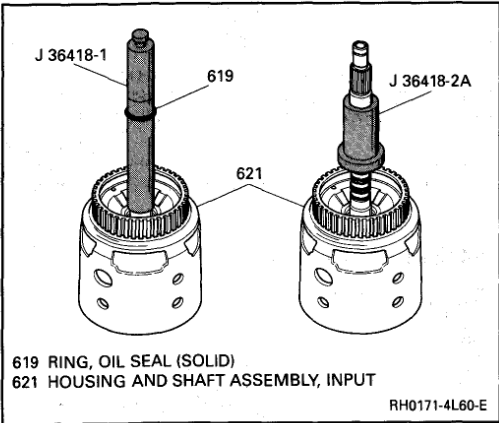


Figure 76 Turbine Shaft Oil Seal Rings

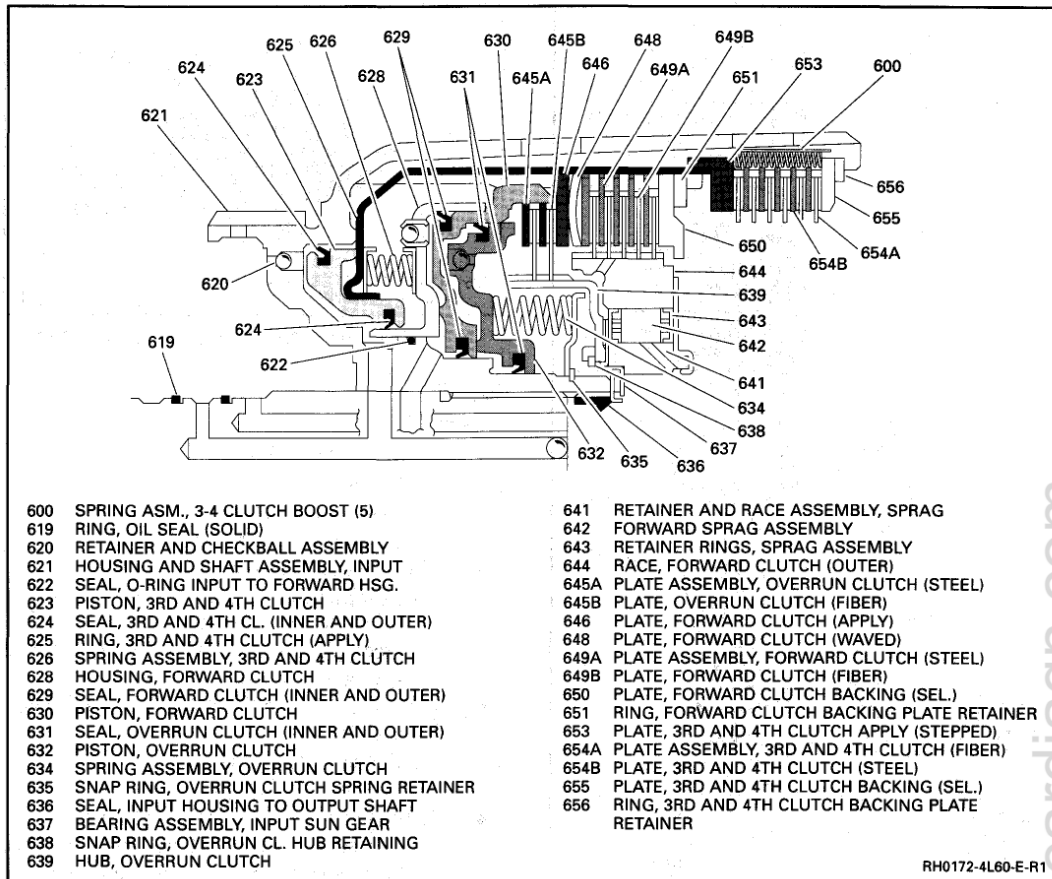


Figure 77 Input Clutch Assembly

Reverse Input Clutch Assembly

Figures 78 through 83

Tools Required:

J 23327-1 Clutch Spring Compressor

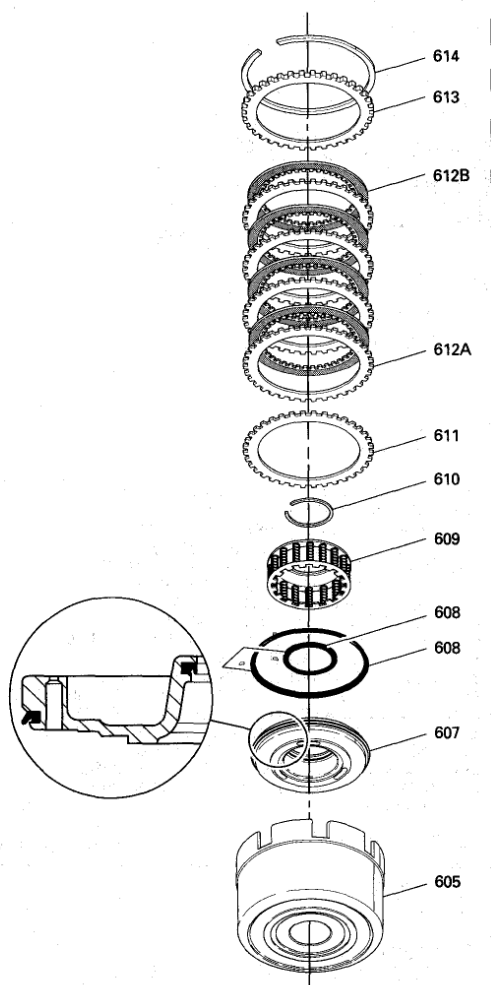
J 25018-A Clutch Spring Compressor
Adaptor

Disassemble

Figures 78 and 79

1. Retaining ring (614) from reverse input housing.

2. Backing plate (613).
3. Clutch plates (612) and Belleville steel plate (611).
4. Install J 23327-1 and J 25018-A.
 - Compress the spring assembly.
5. Spring assembly retainer ring (610) and spring assembly (609).
6. Reverse input clutch piston (607).
 - Inner and outer lip seals (608).



ILL. NO.	DESCRIPTION
605	HOUSING AND DRUM ASSEMBLY, REVERSE INPUT CLUTCH
607	PISTON ASM., REVERSE INPUT CLUTCH
608	SEALS, REVERSE INPUT CLUTCH (INNER AND OUTER)
609	SPRING ASM., REVERSE INPUT CLUTCH
610	RING, REVERSE INPUT CLUTCH SPRING RETAINER
611	PLATE, REVERSE INPUT CLUTCH (BELLEVILLE)
612A	PLATE ASM., REVERSE INPUT CLUTCH (STEEL)
612B	PLATE, REVERSE INPUT CLUTCH (FIBER)
613	PLATE, REVERSE INPUT CLUTCH BACKING (SELECTIVE)
614	RING, REVERSE INPUT CL. RETAINING

RH0173-4L60-E

Figure 78 Reverse Input Clutch Assembly

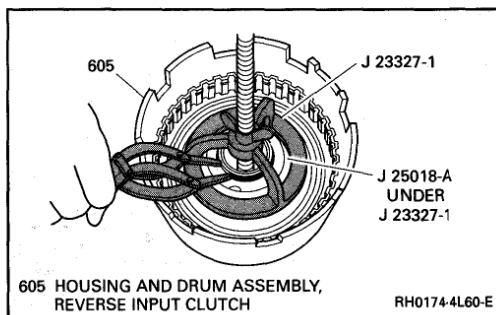


Figure 79 Reverse Input Retainer Ring - Removal

Inspect

Figures 78 and 80

- Backing plate (613) for:
 - Damage.
 - Distortion or flatness.
 - Burrs or surface finish damage.
- Clutch Plates (612) for:
 - Composition plate tang damage, delamination, or wear.
 - Steel plate tang damage, wear, or heat damage.
- Spring assembly (609) for distortion or damage.
- Piston (607) for:
 - Damage or porosity.
 - Ring groove damage.
- Housing and drum assembly (605) for:
 - Damaged or worn bushings (603 and 606).
 - Surface on the hub and outer housing.
 - Leak at the weld.

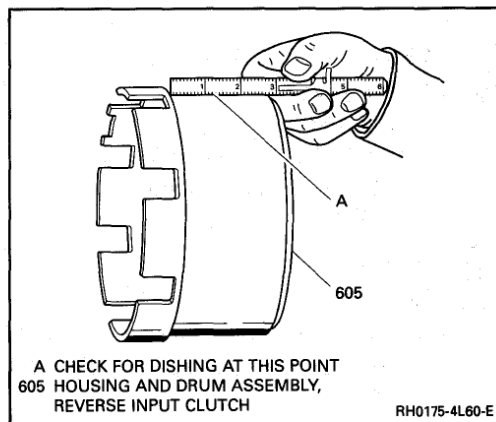


Figure 80 Check Reverse Input Housing For Dishing

**Assemble****Figures 78, 79, 81, 82 and 83**

1. Inner and outer seals (608) on the piston.
 - Lips must face away from the hub as shown.
 - Lubricate with transmission fluid.
2. Piston (607) into the housing and drum assembly.
 - Use an 8 mm feeler gage to position the lip seals.
 - Use care not to damage the seals.
3. Spring assembly (609).
 - Large opening in the assembly goes towards the piston.
4. Install J 23327-1 and J 25018-A.
 - A. Compress the spring assembly.
 - B. Install the retainer ring (610).
5. Belleville steel clutch plate (611).
6. Clutch plates (612). (4 steel and 4 composition plates required).
 - Start with a steel and alternate with composition.

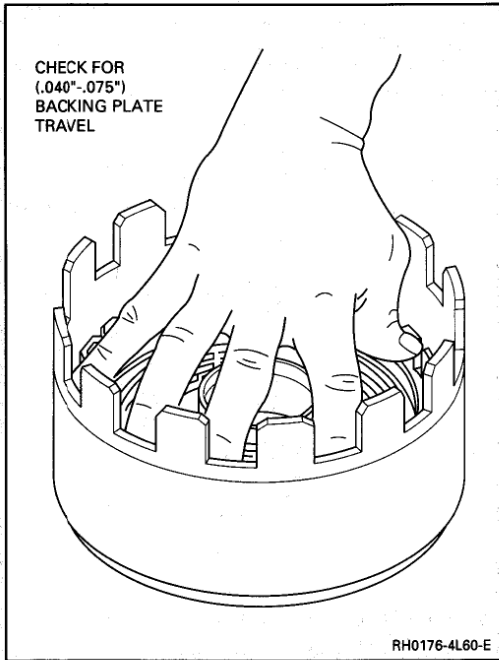


Figure 81 Reverse Input Backing Plate Selection

7. Backing plate (613).
 - Chamfered side up
8. Retaining ring (614).

Reverse Input Clutch Backing Plate Selection**Figures 81, 82 and 83****Measure**

1. With the reverse input clutch fully assembled, apply an evenly distributed load to the clutch pack in the direction shown in Figure 81. Medium pressure (approximately 89 N or 20 lbs.) on the backing plate applied by hand on five evenly distributed points will obtain the backing plate travel for measurement.

NOTICE: Excessive pressure will distort the Belleville plate resulting in an inaccurate measurement.

2. Using a feeler gage, measure between the snap ring and the backing plate. Backing plate travel should be 1.02 to 1.94 mm (0.040 to 0.076 inch).
3. Select the proper backing plate to obtain the specified travel.

REVERSE INPUT CLUTCH		
	NO.	THICKNESS
BELLEVILLE PLATE	1	2.311mm (.091") 2.210mm (.087")
FLAT STEEL CLUTCH PLATE	4	2.045mm (0.81") 1.892mm (0.75")
COMPOSITION FACED CLUTCH PLATE	4	1.880mm (.074") 1.730mm (.068")
BACKING PLATE	1	SELECTIVE

RH0177-4L60-E

Figure 82 Reverse Input Clutch Plate Chart

REVERSE INPUT CLUTCH BACKING PLATE SELECTION	
ALL MODELS	
BACKING PLATE TRAVEL = 1.02mm - 1.94mm (0.40" - .076")	
PLATE THICKNESS	IDENTIFICATION
7.249mm - 7.409mm (.285" - .292")	2
6.678mm - 6.519mm (.263" - .257")	3
5.947mm - 5.787mm (.234" - .228")	4

RH0178-4L60-E

Figure 83 Reverse Input Backing Plate Selection Chart

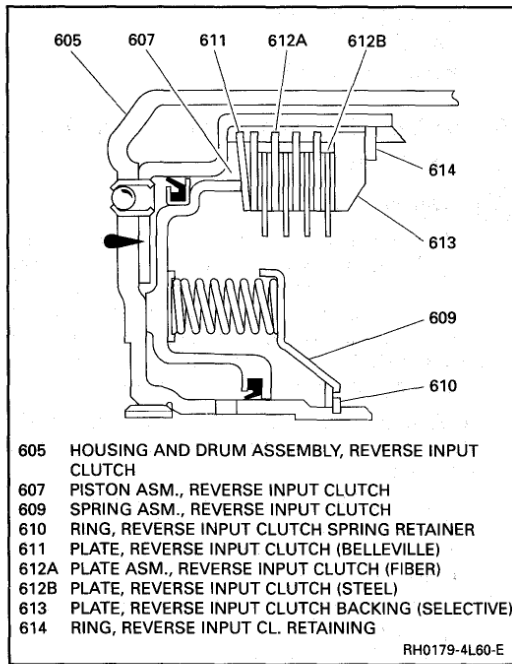


Figure 84 Reverse Input Clutch

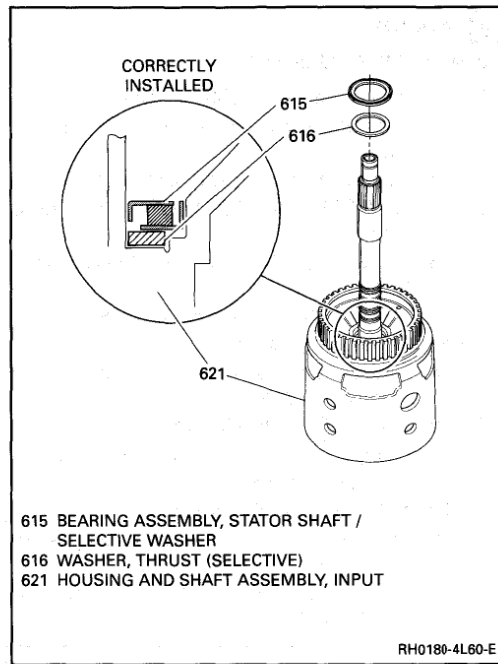


Figure 85 Thrust Bearing and Selective Washer Location

Reverse Input and Input Clutches

Figures 85, 86 and 87



Assemble

Figures 85 and 86

1. Selective thrust washer (616) onto the input housing.
2. Bearing assembly (615).
 - Inside (black race) goes toward the oil pump.
3. Reverse input clutch assembly (605) onto the input clutch assembly.
 - Index the reverse input clutch plates with the input clutch hub.
 - Make certain all clutch plates are fully engaged.

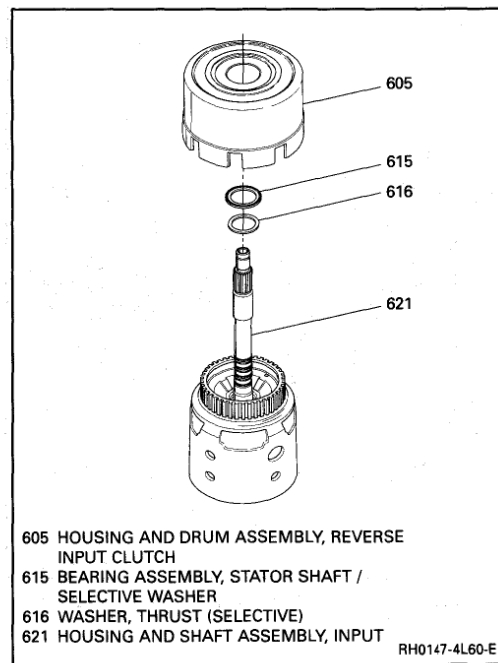
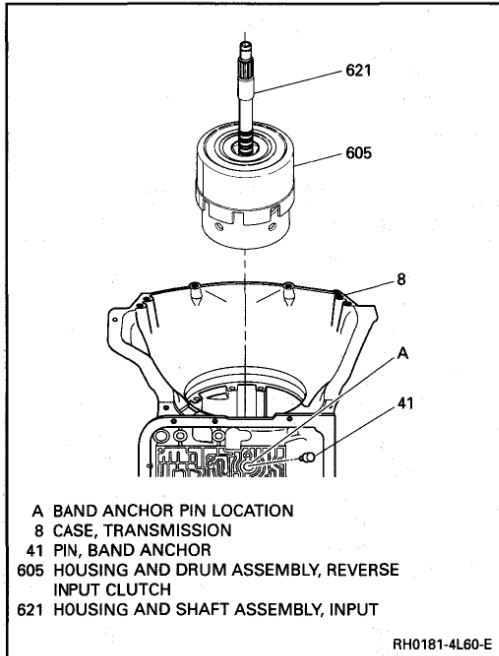


Figure 86 Reverse Input and Input Clutches

**Assemble****Figure 87**

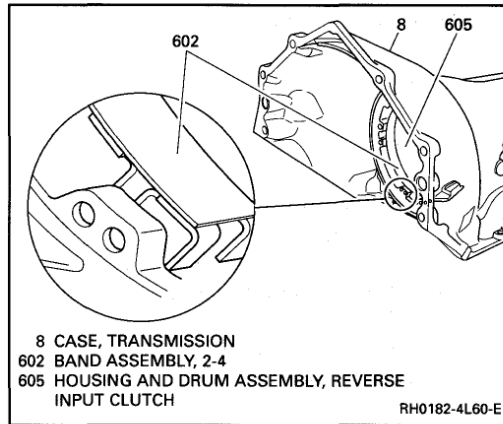
- Reverse input and input clutch assembly into the transmission case.
 - A. Index the 3-4 clutch plates with the input internal gear.
 - B. Make sure all clutch plates are fully engaged.
 - C. When properly assembled, the reverse input clutch housing will be located just below the case oil pump face.

**Figure 87 Installing Input Clutch****2-4 Band Assembly****Figures 87 and 88****Inspect**

- 2-4 band assembly (602) for damage or wear.

**Assemble****Figures 87 and 88**

1. Align the band anchor pin end with the case pin hole.
2. Band anchor pin (41) into the case.
 - Index the pin into the 2-4 band.

**Figure 88 2-4 Band Assembly - Installed****Oil Pump Assembly****Figures 89 and 91****Remove or Disconnect**

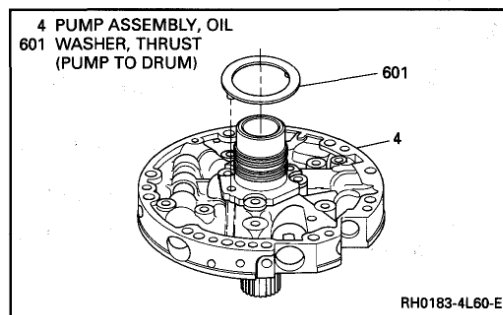
1. Thrust washer (601).
2. Pump cover to case gasket (6).
3. Pump to case oil seal (5).
4. Pump cover bolts (233).
5. Pump cover (215) from pump body (200).

Oil Pump Body**Figure 91****Disassemble**

1. Pump slide springs (206 and 207).

CAUTION: Springs are under very high pressure. Place covering over spring to prevent possible injury.

- A. Compress with needle nose pliers.
- B. Pull straight out.

**Figure 89 Oil Pump Thrust Washer Location**

2. From the pump pocket:
 - Pump guide rings (210)
 - Pump vanes (213)
 - Pump rotor (212)
 - Pump guide (211)
 - Slide (209)
 - Slide seal (201)
 - Seal support (208)
 - Pivot slide pin (205) and spring (204)
 - Slide seal ring (201) and slide back up seal (202)
3. Retainer (94), oil seal assembly (2).
 - Pry out with a screwdriver.

Oil Pump Cover

Figures 90, 91 and 94

Tool Required:

One inch micrometer



Disassemble

Figures 91 and 94

1. Converter clutch apply valve train.
 - A. Compress converter clutch stop valve (223) with a screwdriver.
 - B. Remove retaining ring (222).
 - C. Slowly release the spring tension.
 - D. Stop valve (223), converter clutch apply valve (224) and two converter clutch valve springs.
2. Pressure relief ball (228).
 - Ball is under strong spring pressure.
 - Cover the ball with a cloth when removed.
3. Pressure regulator assembly (216-221).
 - Follow the same procedure used to remove the converter clutch valve.



Inspect

Figure 91

- Pressure regulator valve assembly (216-221) and converter clutch apply valve assembly (222-226) for:
 - Chips, burrs, distortion, plugged oil passage and free movement in bore.
 - Remove burrs with lapping compound.
- Pressure relief assembly (227-229) for damage or distortion.

- Pump cover (215) and pump body (200) for:
 - Worn or damaged bushings (see Bushing Replacement Procedure).
 - Foreign material or debris.
 - Porosity.
 - Scored or irregular mating faces.
 - Cross channel leaks.
 - Ring groove damage.
- Rotor (212) and slide (203) for cracks.
- Oil seal assembly for damage or wear.



Clean

- Wash and air dry all parts.



Important

- Do not wipe dry with a cloth.

OIL PUMP ROTOR SELECTION CHART	
THICKNESS (mm)	THICKNESS (in.)
17.948 - 17.961	0.7066 - 0.7071
17.961 - 17.974	0.7071 - 0.7076
17.974 - 17.987	0.7076 - 0.7081
17.987 - 18.000	0.7081 - 0.7086
18.000 - 18.013	0.7086 - 0.7091
OIL PUMP SLIDE SELECTION CHART	
THICKNESS (mm)	THICKNESS (in.)
17.948 - 17.961	0.7066 - 0.7071
17.961 - 17.974	0.7071 - 0.7076
17.974 - 17.987	0.7076 - 0.7081
17.987 - 18.000	0.7081 - 0.7086
18.000 - 18.013	0.7086 - 0.7091

212 203

203 SLIDE, PUMP
212 ROTOR, OIL PUMP

RH0184-4L60-E

Figure 90 Oil Pump Rotor and Slide Selection

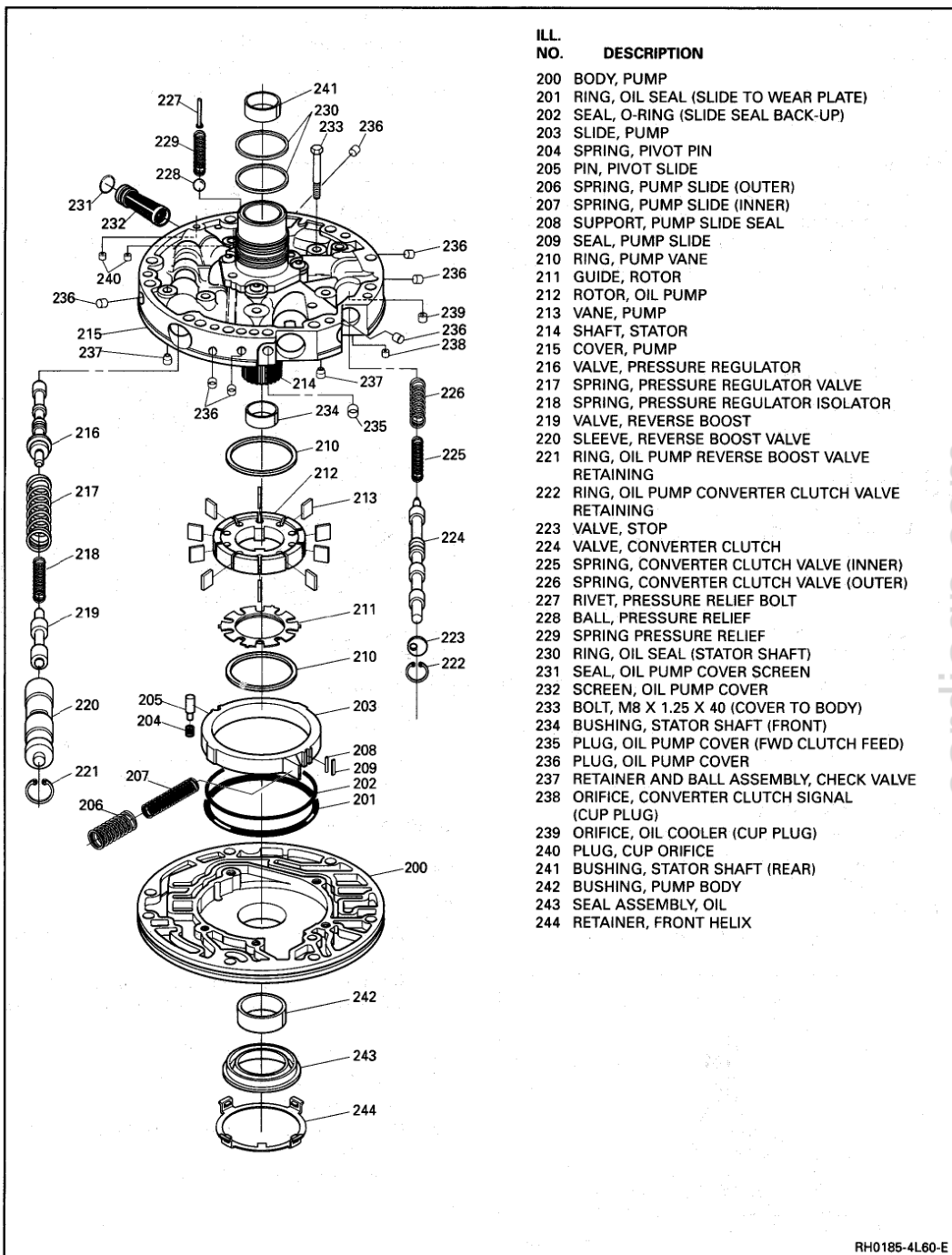


Figure 91 Oil Pump Assembly

RH0185-4L60-E

**Measure****Figure 90**

- Oil pump rotor (212) thickness.
- Oil pump slide (203) thickness.

**Important**

- Measurement of rotor/slide must be made on undamaged surfaces. Select similar size replacements. Lightly hone both sides of replacement rotor or slide to remove any nicks or burrs.

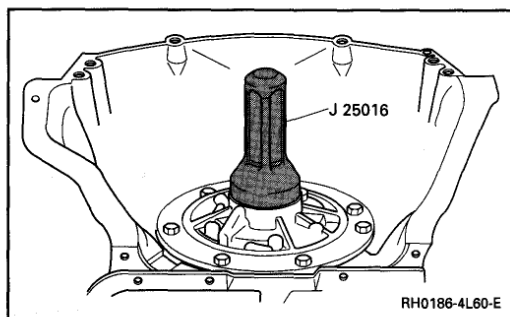
Oil Pump Body**Figures 91, 92 and 93**

Tool Required:

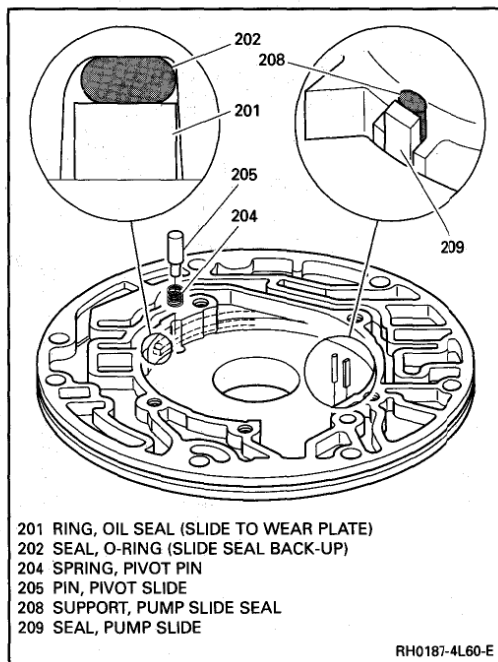
J 25016 Seal Installer

**Assemble**

1. O-ring seal (202) and oil seal ring (201) into the groove on the back side of the slide.
 - Retain with Transjel™ J 36850 or equivalent.
2. Pivot pin spring (204) and pivot pin (205) into the pump body.
3. Slide (203).
 - Index the notch in the slide with the pivot pin.
 - The oil seal ring must face downward into the pump pocket.
4. Slide seal (209) and support (208).
5. Vane guide ring (210).
6. Rotor guide (211) onto the rotor.
 - Retain with Transjel™ J 36850 or equivalent.
7. Rotor (212).
 - With guide toward the pump pocket.

**Figure 92 HYDRA-MATIC 4L60-E - Oil Pump Seal**

8. Vanes (213).
9. Vane guide ring (210).
10. Pump slide spring (206 and 207).
11. Oil seal assembly (2), retainer (94).
 - Use J 25016.

**Figure 93 Slide Back Up and Slide Seal****Oil Pump Cover****Figure 91****Assemble**

1. Pressure relief ball (228), spring (229) and rivet (227).
2. Inner (225) and outer (226) converter clutch valve springs into the converter clutch valve bore.
3. Converter clutch valve (224).
4. Stop valve (223).
5. Retaining ring (222).
6. Pressure regulator valve (216) into the pressure regulator bore.
7. Pressure regulator valve spring (217).

8. Reverse boost valve (219) into the reverse boost valve sleeve.
- Small end of the valve first
 - Retain with Transjel™ J 36850 or equivalent.
9. Reverse boost valve sleeve (220) into the pressure regulator bore.
10. Retainer ring (221).

Oil Pump Cover and Body

Figures 91 and 95 through 98

Tools Required:

J 21368 Oil Pump Body and Cover Alignment Band

J 25025-1 Alignment Pins



Assemble

Figures 91, 95, 96 and 97

1. Oil pump cover (215) onto oil pump body.
 - Stator shaft through a bench hole
2. Pump cover bolts (233).
- Leave finger tight.
3. Align pump cover and pump body with J 21368.
 - Place a screwdriver through a bolt hole and into a hole in the bench.



Tighten

- Attaching bolts to 24 N•m (18 lb. ft.).
 - Retain with Transjel™ J 36850 or equivalent.
4. Install two oil seal rings (233) using J38735-3 and J 39855-1.



Adjust

- Adjust screw to obtain proper height.
5. Use J 39855-2 to size seals after installation.

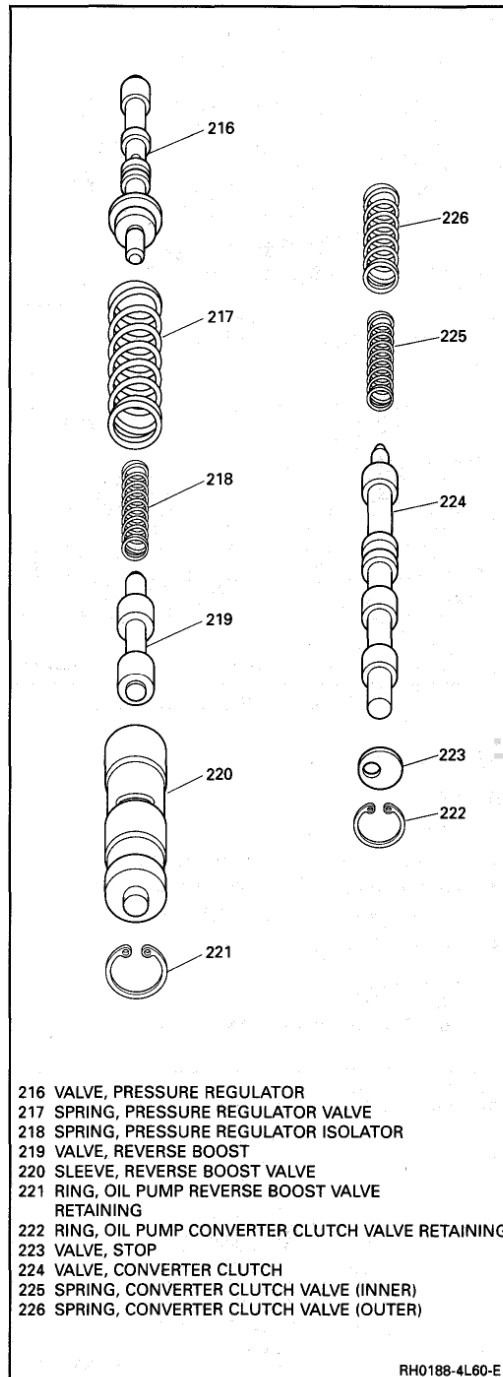


Figure 94 Pressure Regulator and Converter Clutch Apply Valve Trains

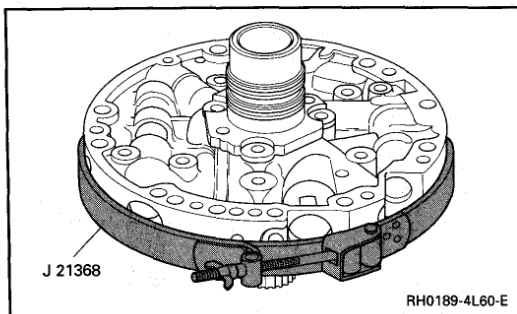


Figure 95 Oil Pump Alignment Band

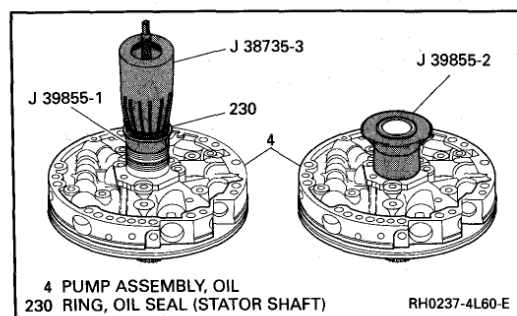


Figure 96 Install and Size Oil Seal Rings

Install or Connect

Figure 98

1. Thrust washer (601).
2. J 25025-1 into the case as shown.
3. Oil pump assembly into the case.
 - Align all holes properly.
4. Bolts and O-rings (2 and 3).

Tighten

- Bolts to 24 N•m (18 lb. ft.).

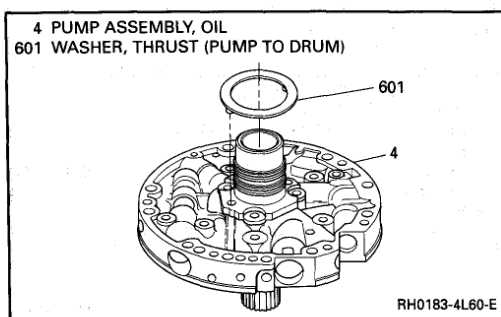


Figure 97 Oil Pump Thrust Washer

Important

- Rotate the transmission to a horizontal position. If the transmission is assembled properly the turbine shaft should turn by hand. If not identify and correct the misassembly now.

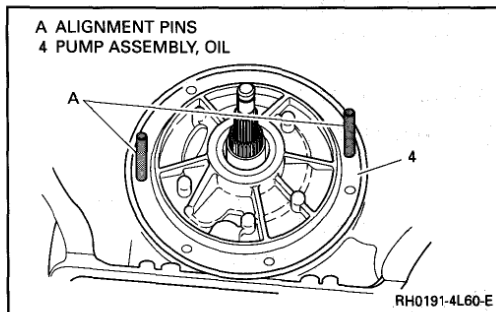


Figure 98 Oil Pump and Case

Transmission End Play Check

Figures 99 through 103 and 106, 107 and 108

Tools Required:

- J 24773-A End Play Checking Fixture
- J 25022 End Play Checking Fixture Adaptor (245 mm)
- J 34725 End Play Checking Fixture Adaptor (298 mm)
- J 25025-7A Post or 278 mm (11 inch) Bolt and Nut
- Dial indicator

Measure

Figures 99 through 102

1. Remove an oil pump to case bolt and install a 278 mm (11 inch) bolt and lock nut or J 25025-7A.
2. Install J 25022-A or J 34725 as shown.
3. Install J 24773-A as shown.
4. Install a dial indicator.
 - Set to zero.
5. Pull up on J 24773-A.
 - End play should be 0.13 to 0.92 mm (0.005 to 0.036 inch).

The selective washer which controls end play is located between the input housing and the thrust bearing on the oil pump hub. If more or less end play is required, select the proper washer from the chart and install. If dial indicator shows no end play, the selective washer and thrust bearing have been misassembled.

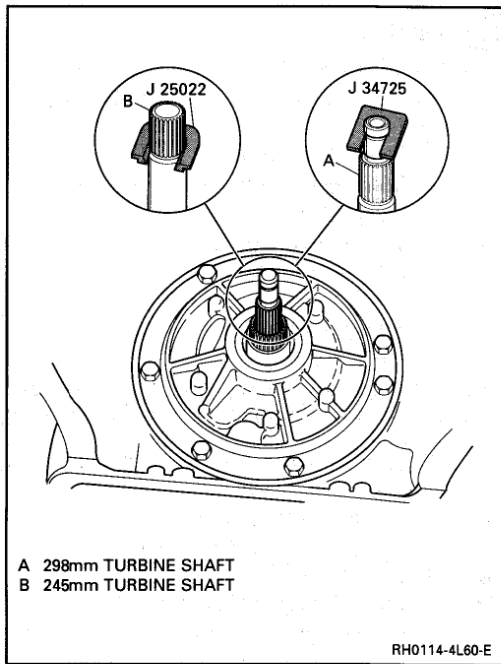


Figure 99 End Play Tool

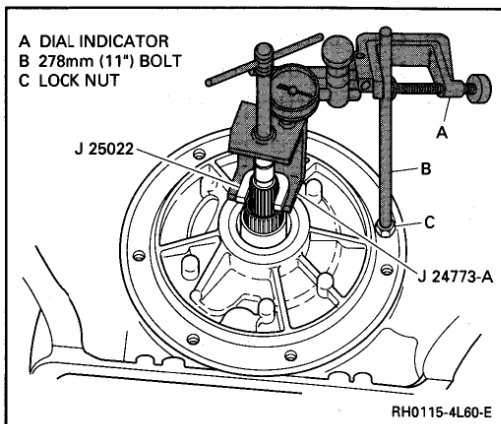


Figure 100 J 25022-A Installed

TRANSMISSION END PLAY WASHER SELECTION CHART		
WASHER THICKNESS		I.D.
1.87 - 1.97 mm	(.074" - .078")	67
2.04 - 2.14 mm	(.080" - .084")	68
2.21 - 2.31 mm	(.087" - .091")	69
2.38 - 2.48 mm	(.094" - .098")	70
2.55 - 2.65 mm	(.100" - .104")	71
2.72 - 2.82 mm	(.107" - .111")	72
2.89 - 2.99 mm	(.113" - .118")	73
3.06 - 3.16 mm	(.120" - .124")	74

RH0192-4L60-E

Figure 101 End Play Chart

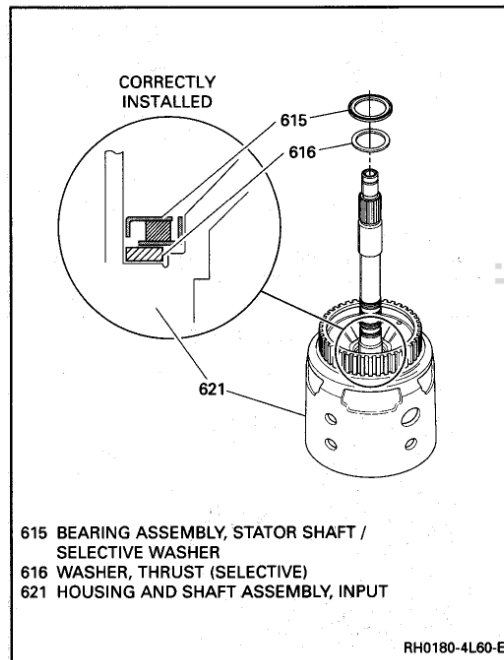


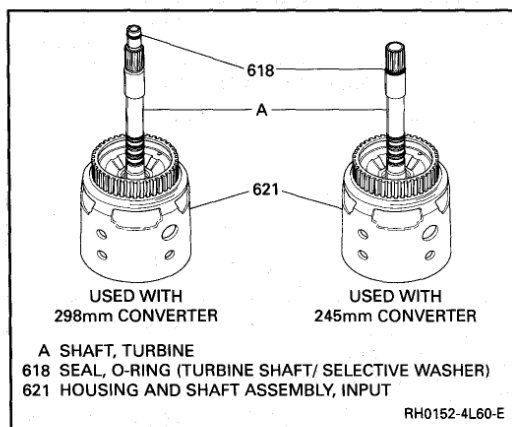
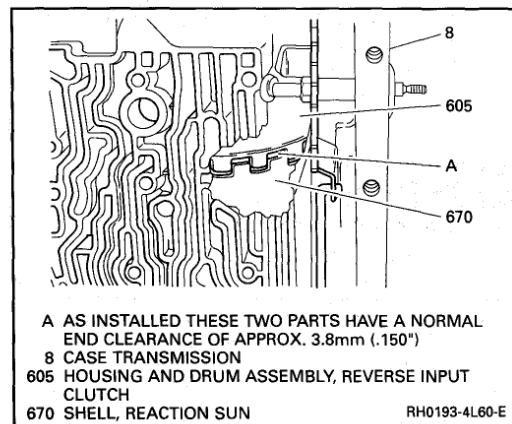
Figure 102 Selective Washer and Thrust Bearing Properly Installed

**Assemble****Figure 103**

- O-ring seal (618) into the groove in the end of the turbine shaft.

**Important**

- There should be clearance between the reverse input clutch and the reaction sun gear shell. This clearance can be observed at the point shown in Figure 105. **Do not** try to shim the internal parts because of this clearance (Figure 104).

**Figure 103 Turbine Shaft O-Ring Seal****Figure 104 Clearance Between Reverse Input Clutch and Sun Gear Shell****Inspect****Figures 105, 106 and 107**

- The 1-2 accumulator cover and pin assembly (57) for:
 - Porosity or damage.
 - Scored piston wall.
 - Plugged oil passage.
- 1-2 accumulator piston (56) and the 3-4 accumulator piston (44) for:
 - Porosity.
 - Ring groove damage.
 - Pin hole damage.
- 1-2 accumulator spring (54) and 3-4 accumulator spring (46) for distortion or damage.
- Spacer plate (48) and gaskets (47 and 52) for damage.
- Checkballs (61) for damage.
- Manual detent spring (63) for damage.
- Oil filter (72) for:
 - Cut or damaged filter seal (71).
 - Cracks in the neck or body.
 - Casting flash in the neck.
- Solenoid assembly (66) for:
 - Damage.
 - Cut or pinched wires.
 - Damaged connectors.
 - Cut or damaged O-ring (65).

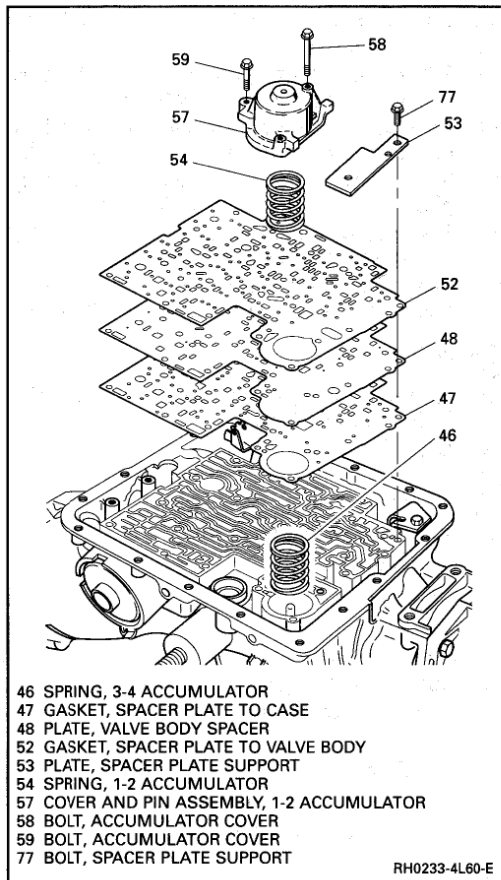


Figure 105 Accumulator Assembly, Spacer Plate and Gaskets

Valve Body and Associated Parts

Figures 105 and 107

Tool Required:

J 25025-5 Guide Pins

NOTICE: The use of a honing stone, fine sandpaper or crocus cloth is not recommended for servicing stuck valves. All valve lands have sharply machined corners that are necessary for "cleaning" the bore. If these corners are rounded, foreign material could wedge between the valve and bore causing the valve to stick.

If it is found necessary to clean a valve, "micro fine" lapping compound 900 grit or finer should be used.

Too much "lapping" of a valve will cause excessive clearances and increase the chance of a valve not operating.

1993 MODELS	1-2 ACCUMULATOR SPRING COLOR	3-4 ACCUMULATOR SPRING COLOR
CHD, CJD, KCD	ORANGE, LT. GREEN, WHITE OR PLAIN	VIOLET
CAD, CBD, KAD, MJD, MND	ORANGE, LT. GREEN, WHITE OR PLAIN	DK. GREEN
CCD, CFD, KBD	ORANGE, LT. GREEN, WHITE OR PLAIN	RED
SHD, TLD	DK. GREEN	LT. BLUE
CKD, CLD, KDD, MDD, MSD, TAD, TBD	ORANGE, LT. GREEN, WHITE OR PLAIN	YELLOW

RH0194-4L60-E

Figure 106 1-2 and 3-4 Accumulator Spring Chart

Install or Connect

1. The wiring harness pass-thru connector into the case.
2. The 3-4 accumulator pin (43) into the case.
3. The 3-4 accumulator piston seal (45) onto the 3-4 accumulator piston.
4. The 3-4 accumulator piston (44) onto the pin.
 - The end with three legs must face the valve body.
5. The 3-4 accumulator piston spring (46).

Install or Connect

1. Torque converter clutch oil screen (92).
2. Checkball (91) into case as shown.
 - Retain with Transjel™ J 36850 or equivalent.
3. J 25025-5 into the case.
4. Screens onto spacer plate as shown.
5. Spacer plate to case gasket (47) and spacer plate to valve body gasket (52) onto the spacer plate (48).
 - Gasket (47) identified by a "C".
 - Gasket (52) identified by a "V".
 - Retain with Transjel™ J 36850 or equivalent.

6. Spacer plate and gaskets onto the case.

 Important

- Be careful not to damage screens when installing the spacer plate and gaskets.

7. Spacer plate support (53) and bolts (77).

 Tighten

- Bolts to 11 N•m (8 lb. ft.)

Control Valve Body



Clean

- Control valve assembly thoroughly in clean solvent.
 - A. Move the valves with a pick or small screwdriver to dislodge any dirt or debris that may have accumulated.
 - B. Air dry



Remove or Disconnect

 Important

- Some valves are under pressure - cover the bores while removing roll pins and retainer clips.
 - Valves, springs and bushings must be laid out on a clean surface in the exact sequence they are removed.
1. Pressure control solenoid retainer bolt (364) retainer (378) and solenoid.
 2. Bore plug retainer clip (395), bore plug (376) and valve train (374 and 375).
 3. 2-3 shift solenoid retainer (379), solenoid (367) and valve train (368 and 369).
 4. 1-2 shift solenoid retainer (379), solenoid (367) and valve train (365 and 366).
 5. Accumulator valve train retainer pin (360), bore plug (373) and valve train (370 and 371).
 6. Forward accumulator cover bolts (364) and cover (363).
 7. Forward accumulator spring (356), piston (354) and pin (355).
 8. Lo overrun valve spring (362) and valve (361).
 9. Retainer pin (360), bore plug (359) and forward abuse valve train (357 and 358).
 10. Manual valve (340).
 11. 3-2 control solenoid retainer clip (379) and solenoid (394).

12. Bore plug retainer (395), bore plug (381) and 3-2 control valve train (391 - 393).
13. 3-2 downshift bore plug retainer (395), bore plug (381) and valve train (389 - 390).
14. Reverse abuse bore plug retainer pin (360), bore plug (359) and valve train (387 - 388).
15. 3-4 shift valve bore plug retainer (395), bore plug (381) and valve train (385 - 386).
16. 3-4 relay bore plug retainer (395), bore plug (381) and valve train (382 - 384).
17. Torque converter clutch signal valve bore plug retainer (395), bore plug (381) and valve (380).



Clean

- All valves, springs, bushings and control valve body in clean solvent.
- Dry using compressed air



Inspect

- All valves and bushings for:
 - Porosity
 - Scoring
 - Nicks
 - Scratches
- Springs for damaged or distorted coils.
- Valve body casting for:
 - Porosity
 - Cracks
 - Interconnected oil passages
 - Damaged machined surfaces



Assemble

- Control valve assembly (350) exactly as shown.
 - Notice the position of the valve lands and bushing passages.
 - Position the pressure control solenoid so the connector tabs face outward.



Install or Connect

1. Checkballs into the valve body assembly (350).
 - Retain with Transjel™ J 36850 or equivalent.
2. Valve body assembly (350).
 - Connect the manual valve link (89) to the inside detent lever (88).
 - Be careful not to damage screens when installing the valve body assembly.

3. Wiring harness (66), manual spring assembly (63), pressure switch assembly (69), dipstick stop bracket (93) and all remaining valve body bolts.

NOTICE: Torque valve body bolts in a spiral pattern starting from the center. If bolts are torqued at random, valve bores may be distorted and inhibit valve operation.

4. TCC solenoid (66) and bolts (68).

Tighten

- Bolts to 11 N•m (8 lb. ft.)

Install or Connect

- Wiring harness connections to electrical components.

To correctly hook up the wires, see the wiring diagram in the HYDRA-MATIC 4L60-E Diagnosis Section.

The pressure control solenoid (377) has two different colored connectors. The black connector should be installed on the tab farthest from the valve body.

Install or Connect

1. Parking bracket (86).

Tighten

- Bolts to 31 N•m (23 lb. ft.)

2. The 1-2 accumulator piston seal (55) onto the 1-2 accumulator piston (56).
3. The 1-2 accumulator piston (56) into the 1-2 accumulator cover and pin assembly (57).
 - The three legs on the piston must face toward the case when installed.
4. The 1-2 accumulator spring (54) onto the piston (56).
5. The 1-2 accumulator cover and pin assembly (57) onto the case.

Tighten

- Torque to 11 N•m (8 lb. ft.)

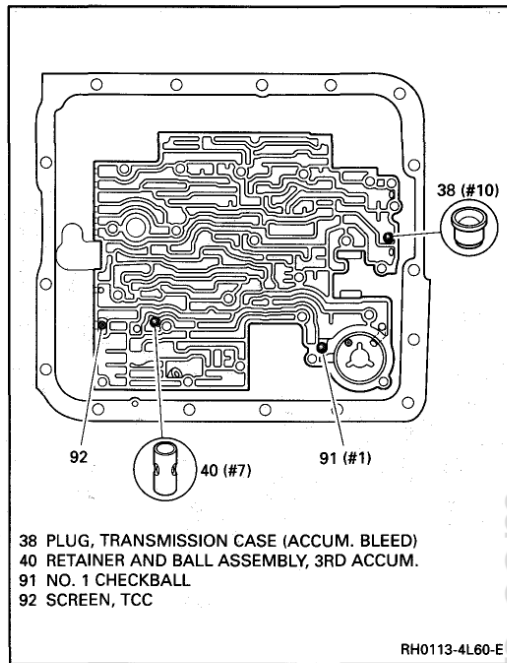


Figure 107 Case Checkballs and Oil Screens – Location

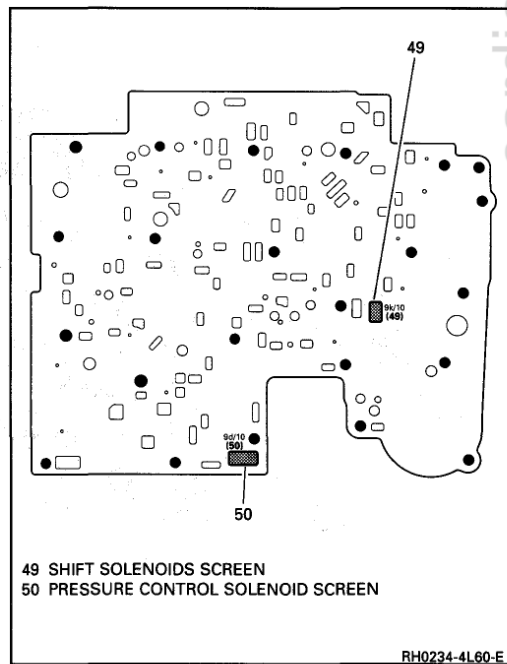


Figure 108 Filter Screen – Locations

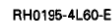


Figure 109 Control Valve Assembly

340 VALVE, MANUAL
350 VALVE ASSEMBLY, CONTROL BODY
353 SEAL, FORWARD ACCUMULATOR OIL
354 PISTON, FORWARD ACCUMULATOR
355 PIN, FORWARD ACCUMULATOR
356 SPRING, FORWARD ACCUMULATOR
357 VALVE, FORWARD ABUSE
358 SPRING, FORWARD ABUSE VALVE
359 PLUG, BORE
360 PIN, COILED SPRING
361 VALVE, LOW OVERRUN
362 SPRING, LOW OVERRUN VALVE
363 COVER, FORWARD ACCUMULATOR
364 BOLT, FORWARD ACCUMULATOR COVER
365 SPRING, 1-2 SHIFT VALVE
366 VALVE, 1-2 SHIFT
367A 1-2 SHIFT SOLENOID (A)
367B 2-3 SHIFT SOLENOID (B)
368 VALVE, 2-3 SHIFT
369 VALVE, 2-3 SHUTTLE
370 SPRING, 1-2 ACCUMULATOR VALVE
371 VALVE, 1-2 ACCUMULATOR
372 SLEEVE, 1-2 ACCUMULATOR VALVE
373 PLUG, BORE
374 VALVE, ACTUATOR FEED LIMIT
375 SPRING, ACTUATOR FEED LIMIT VALVE
376 PLUG, BORE
377 PRESSURE CONTROL SOLENOID
378 RETAINER, PRESSURE CONTROL SOLENOID
379 RETAINER, SOLENOID
380 VALVE, CONVERTER CLUTCH SIGNAL
381 PLUG, BORE
382 SPRING, 4-3 SEQUENCE VALVE
383 VALVE, 4-3 SEQUENCE
384 VALVE, 3-4 RELAY
385 VALVE, 3-4 SHIFT
386 SPRING, 3-4 SHIFT VALVE
387 VALVE, REVERSE ABUSE
388 SPRING, REVERSE ABUSE VALVE
389 VALVE, 3-2 DOWNSHIFT
390 SPRING, 3-2 DOWNSHIFT VALVE
391 VALVE, 3-2 CONTROL
392 SPRING, 3-2 CONTROL VALVE
393 SPRING, BORE PLUG
394 3-2 CONTROL SOLENOID
395 RETAINER, BORE PLUG

RH0196-4L60-E

Figure 110 Control Valve Assembly – Legend

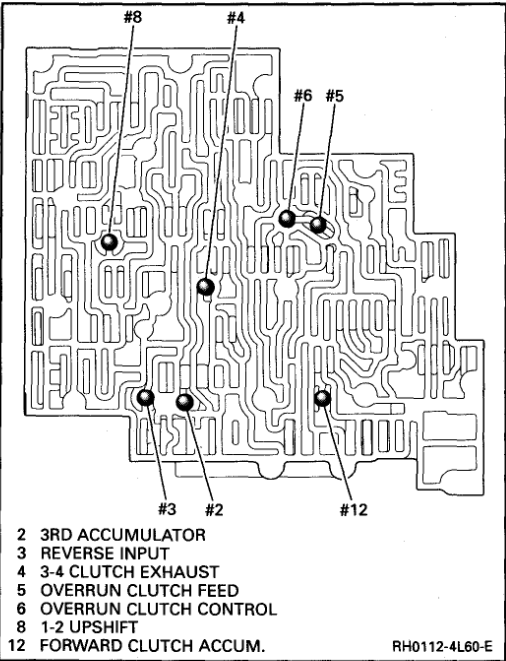


Figure 111 Valve Body Checkball Locations

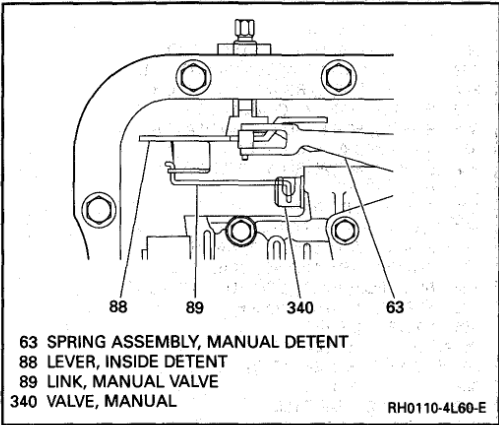


Figure 112 Manual Valve Link

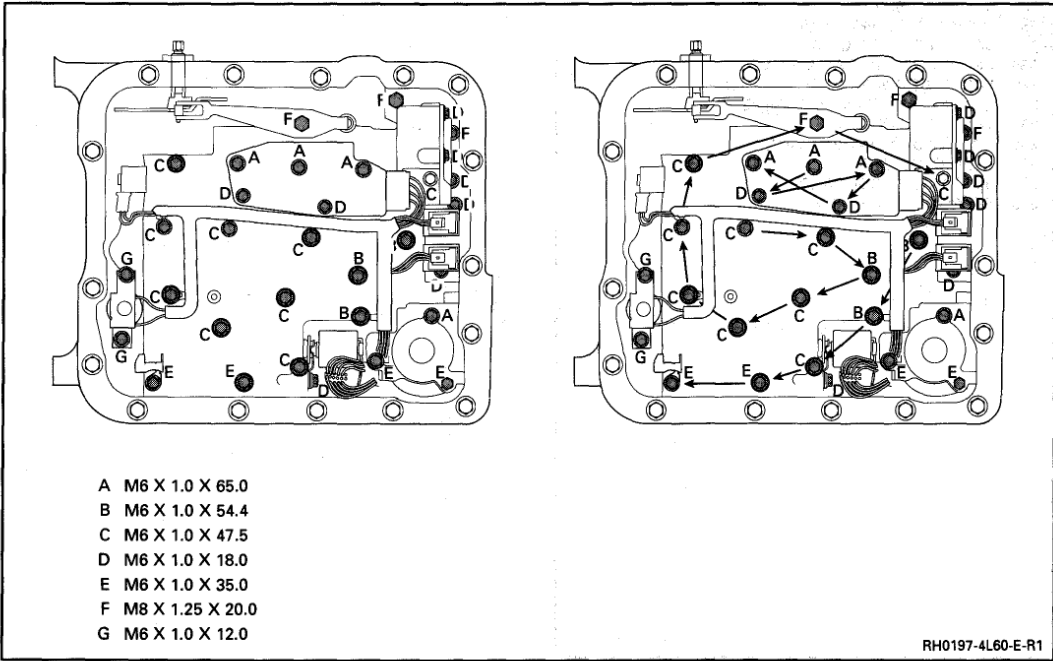
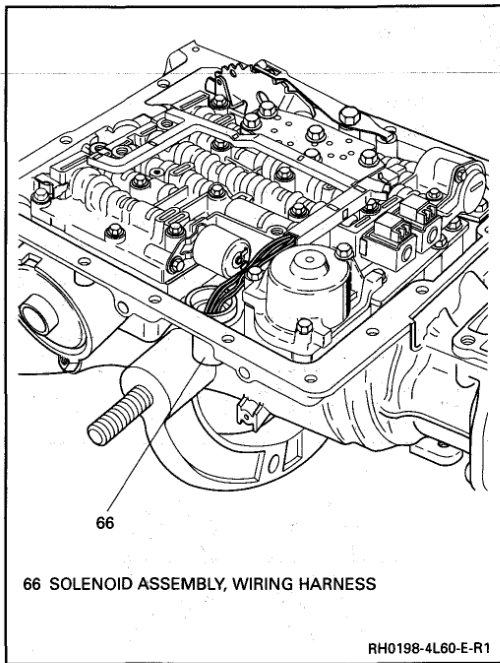


Figure 113 Valve Body Bolt Locations



66 SOLENOID ASSEMBLY, WIRING HARNESS

RH0198-4L60-E-R1

Figure 114 Outside Electrical Connector

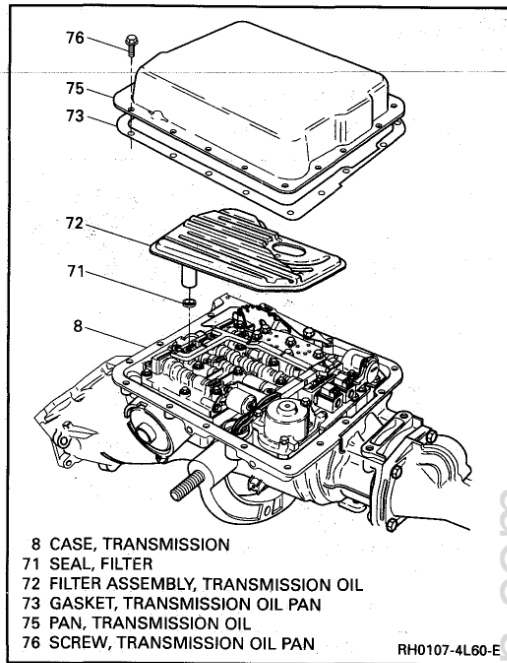
Install or Connect

Figure 115

1. Filter seal (71) onto the oil filter.
 - Lubricate with Transjel™ J 36850 or equivalent.
2. Oil filter (72).
3. Oil pan gasket (73).
4. Chip magnet (74) onto oil pan (75).
5. Oil pan (75) and bolts (76).

Tighten

- Torque to 12 N•m (9 lb. ft.)



8 CASE, TRANSMISSION
 71 SEAL, FILTER
 72 FILTER ASSEMBLY, TRANSMISSION OIL
 73 GASKET, TRANSMISSION OIL PAN
 75 PAN, TRANSMISSION OIL
 76 SCREW, TRANSMISSION OIL PAN

RH0107-4L60-E

Figure 115 Case, Pan and Filter Assembly

2-4 Servo Assembly

Figures 116 through 120

Tools Required:

- J 33037 Band Apply Pin Tool
- Vernier calipers
- Scale
- J 22269-01 Piston Compressor
- J 29714 Servo Cover Compressor

Measure

Figure 116

1. Install J 33037 as shown with apply pin (13).
2. Install servo cover retaining ring (29) to secure tool.
3. Apply 11 N•m (98 lb. in.) torque.
4. If white line "A" appears in the gage slot "B", pin length is correct.
5. Use pin selection chart to determine the correct pin length if new pin is needed.

 Inspect

- Pistons for:
 - Porosity or damage.
 - Ring groove damage.

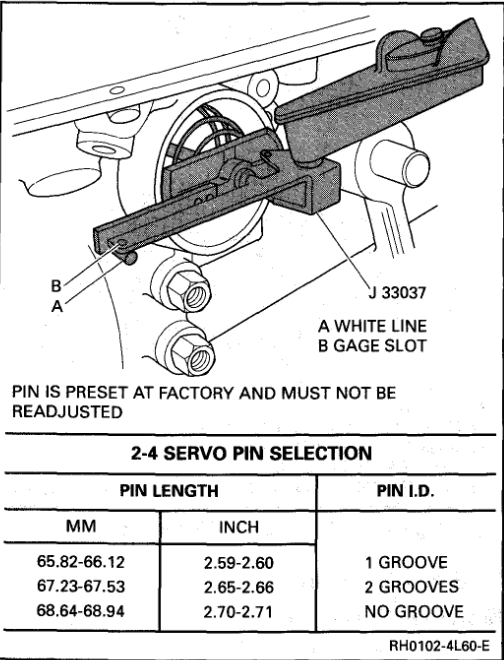


Figure 116 Servo Pin Length

- Cover (28) for porosity or damage.
- Seals for:
 - Nicks or cuts.
 - Freeness in the seal groove.
- Springs for distortion.
- Pin for wear or burrs.

 Important

- Check servo bore in the case for any wear which may cut the servo seals.

 Measure

Figure 117

1. Measure piston (17) dimension *A.
2. Measure housing (20) dimension **B.
3. Check model application.

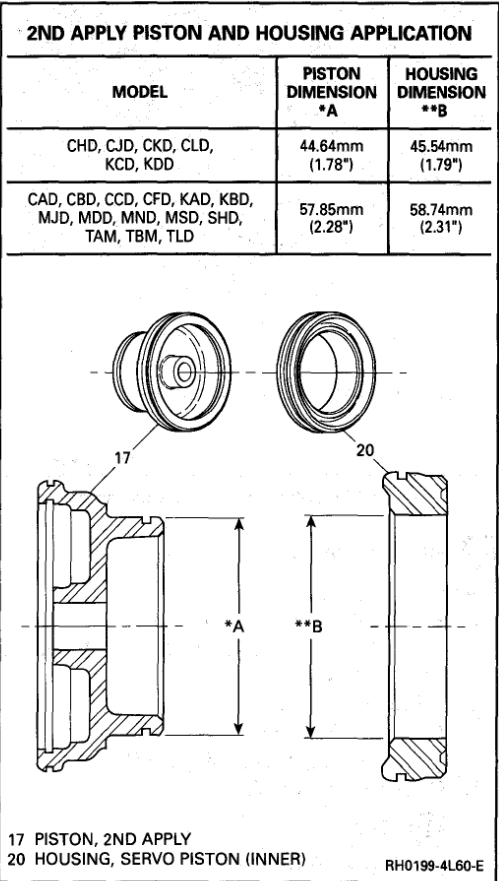


Figure 117 2nd Apply Piston and Housing Measurement

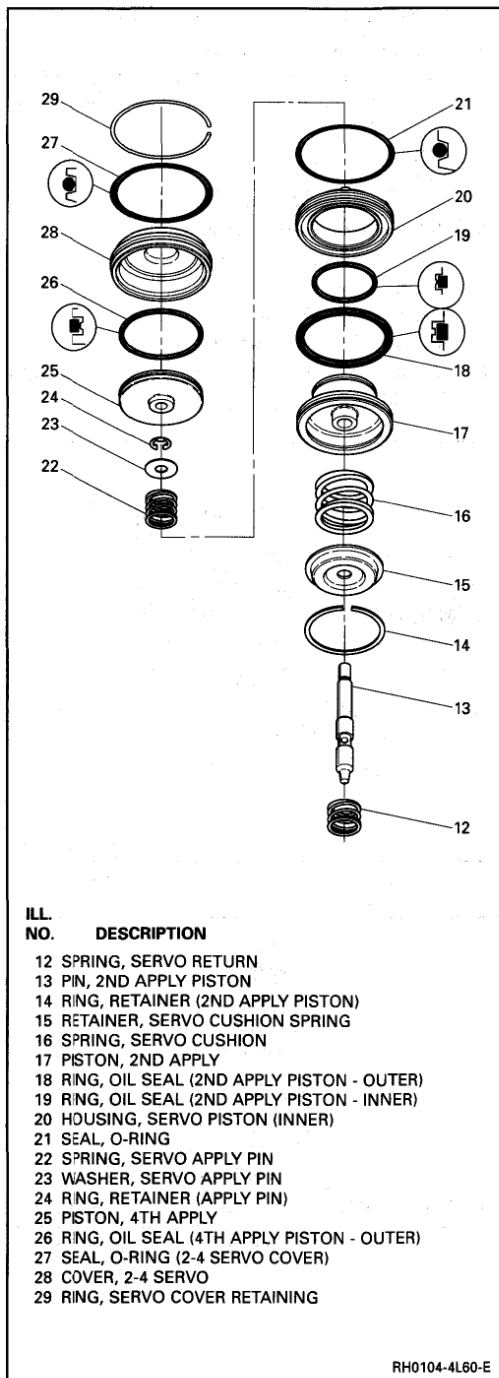


Figure 118 2-4 Servo Assembly

**Assemble****Figures 118 through 120**

1. Cushion spring (16) into the 2nd apply piston (17).
2. Cushion spring retainer (15) on the cushion spring.
3. Install J 22269-01.
 - A. Compress the retainer past the snap ring groove in the 2nd apply piston.
 - B. Install the retainer ring (14).
4. The 2nd apply piston (17) onto the apply pin (13)
 - Retainer goes toward the shoulder of the pin.
5. Servo apply pin spring (22) on the pin.
6. Servo apply pin washer (23) and retaining clip (24).
7. Inner (19) and outer (18) seals on the 2nd apply piston (17).
 - Retain with Transjel™ J 36850 or equivalent.
8. O-ring seal (21) on servo piston housing.
9. Servo piston inner housing (20) on the 2nd apply piston.
10. Seal ring (26) onto the 4th apply piston.
11. The 4th apply piston (25) onto the apply pin.
12. Return spring (12) on the pin.
13. Servo piston assembly into the servo bore.
14. O-ring seal (21) on the servo cover.
 - Lubricate the seal with Transjel™ J 36850 or equivalent.
15. Servo cover (28) into the servo bore.
16. Install J 29714.
 - A. Compress the servo cover.
 - B. Install the retainer ring (29).

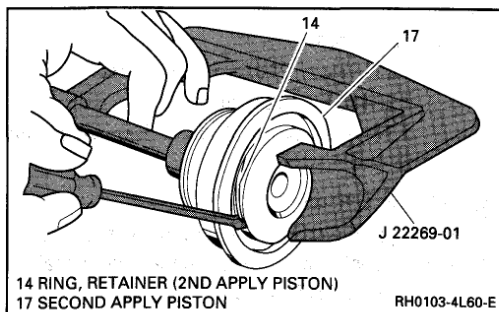


Figure 119 2nd Servo Piston - Assembly

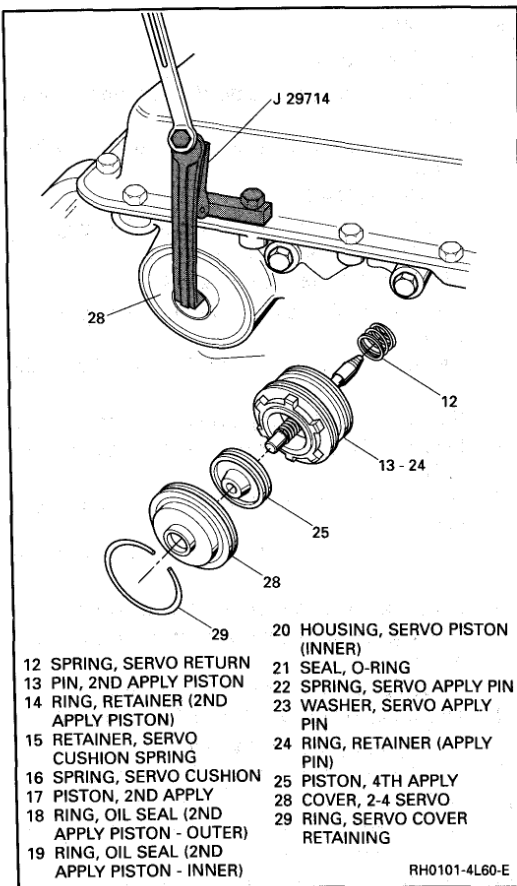


Figure 120 2-4 Servo Bore

Speed Sensor and Case Extension**Figures 123****Tools Required:**

- J 23103 or J 25016 Seal Installer
- J 21426 Seal Installer
- J 38417 Speed Sensor Remover and Installer

Install or Connect

1. O-ring seal (691) on the output shaft sleeve.
2. Output shaft sleeve (690) on the output shaft.
 - Use J 25016 or J 23103.
 - Do not push the sleeve past the machined surface on the output shaft.

3. Seal ring (37) on the case extension.
4. Case extension (31) and bolts (32).
 - Position extension so the speed sensor bore is on the gear selector lever side of the case.
- Tighten**
 - Torque to 35 N•m (26 lb. ft.).
5. Remove case extension oil seal (34).
 - A. Pry out with a screwdriver.
 - B. Install new seal with J 21426.
6. Speed sensor (36) with J 38417.
7. Retainer, bolt and washer (34).
8. Outside electrical connector, gear selector lever and nut.

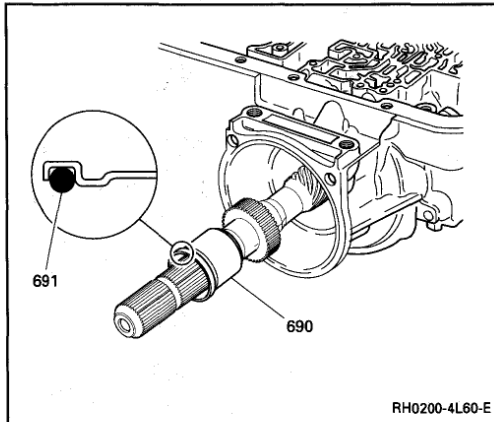


Figure 121 Output Shaft Sleeve and Seal

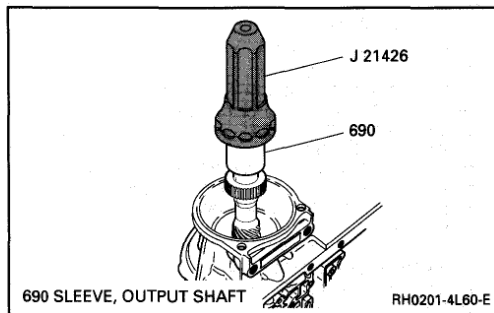


Figure 122 Output Shaft Sleeve - Installation

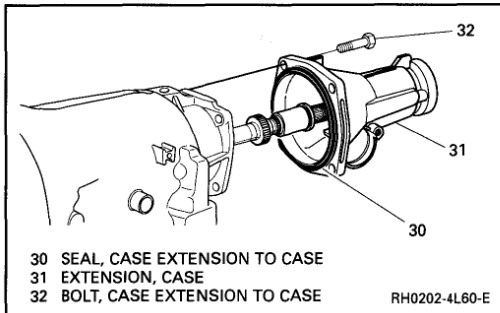


Figure 123 Case Extension and Seal

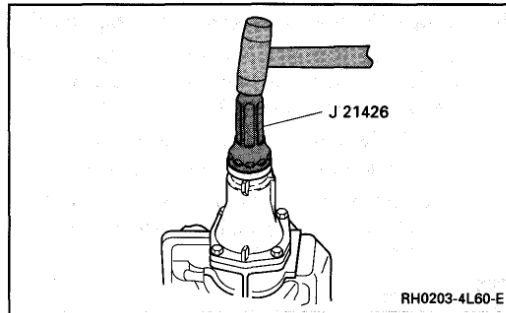


Figure 125 Case Extension Oil Seal Assembly

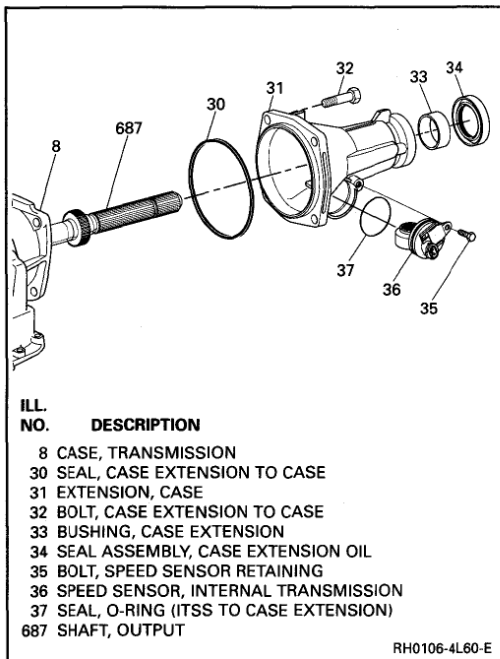


Figure 124 Case Extension and Associated Parts

Torque Converter Assembly

Figure 126

Tool Required:

J 35138 Torque Converter End Play Checking Tool

Inspect

The torque converter assembly must be replaced for any of the following conditions:

- Evidence of damage to the pump assembly.
- Metal particles are found after flushing the cooler and cooler lines.
- External leaks in hub weld area.
- Converter pilot is broken, damaged or poor fit into crankshaft.
- Converter hub is scored or damaged.
- Internal damage to stator.
- Contamination from engine coolant.
- Excess end play.

Measure

Figure 126

- Install J 35138 and measure end play.
 - 0 to 0.5 mm (0.000 to 0.020 inch) for 245 mm torque converters.
 - 0 to 0.6 mm (0.000 to 0.024 inch) for 298 mm torque converters.

The Torque Converter should not be replaced if:

- The fluid has an odor, discoloration or no evidence of metal or clutch plate material.
 - A. Drain out as much fluid as possible.
 - B. Replace the oil filter and pan gasket.
 - C. Fill to proper level (Refer to Section 7A).
- The converter bolt hole threads are damaged.
 - Correct with thread insert (Refer to Section 6A).

**Important**

- Flushing the torque converter is not recommended.

**Install or Connect**

1. Torque converter.
2. J 21366 converter holding strap.
3. Remove transmission from holding fixture.

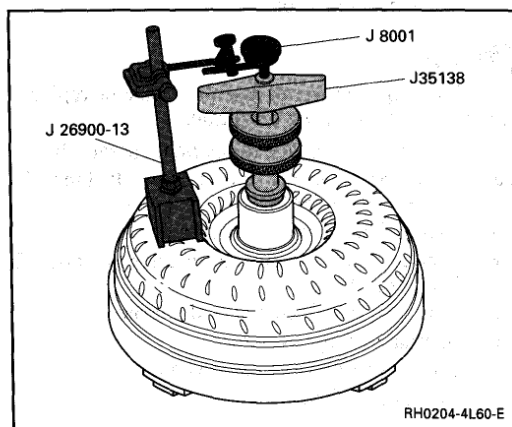


Figure 126 Checking Torque Converter End Play

HYDRA-MATIC 4L60-E

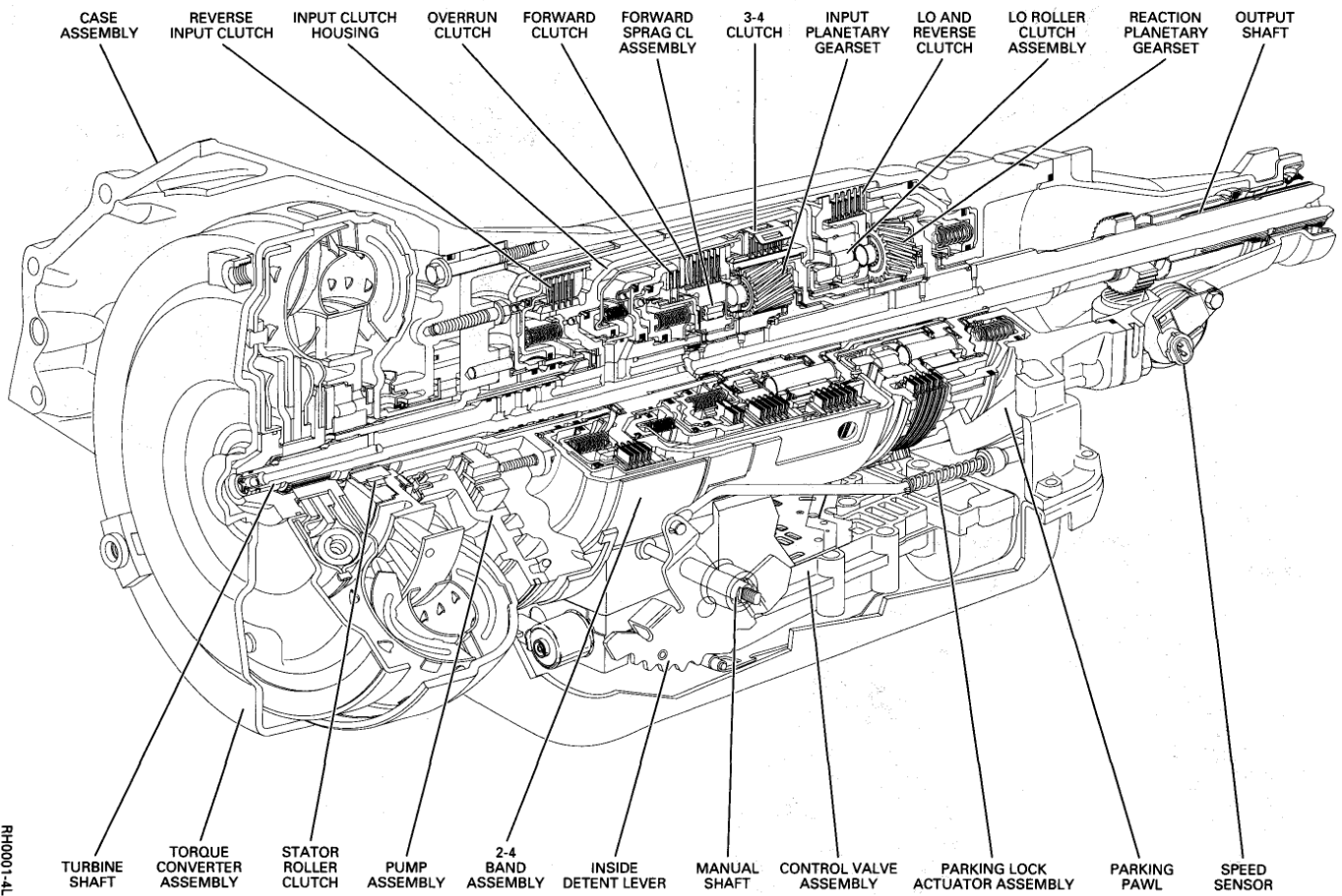
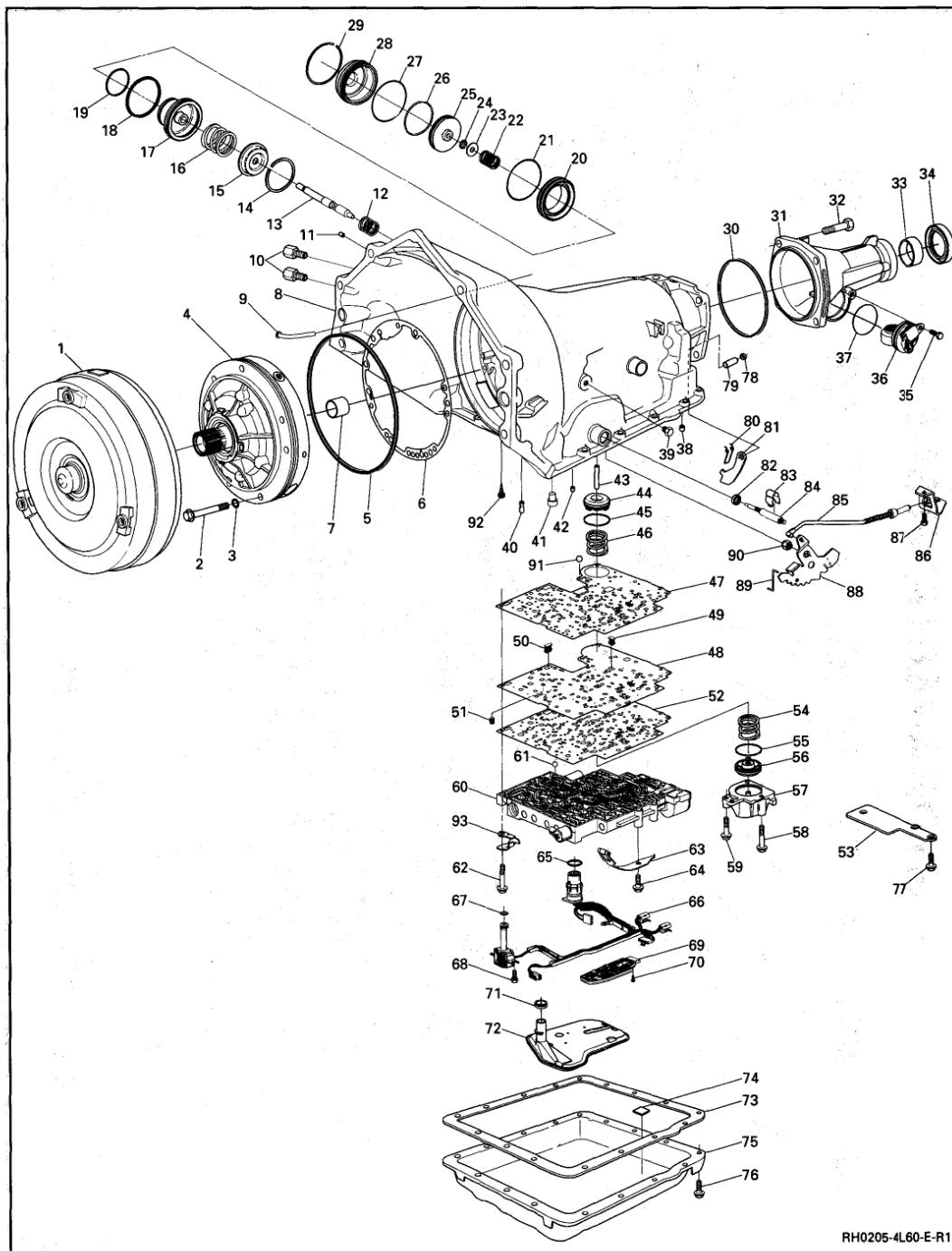


Figure 127 HYDRA-MATIC 4L60-E Transmission

RH0001-4L60-E



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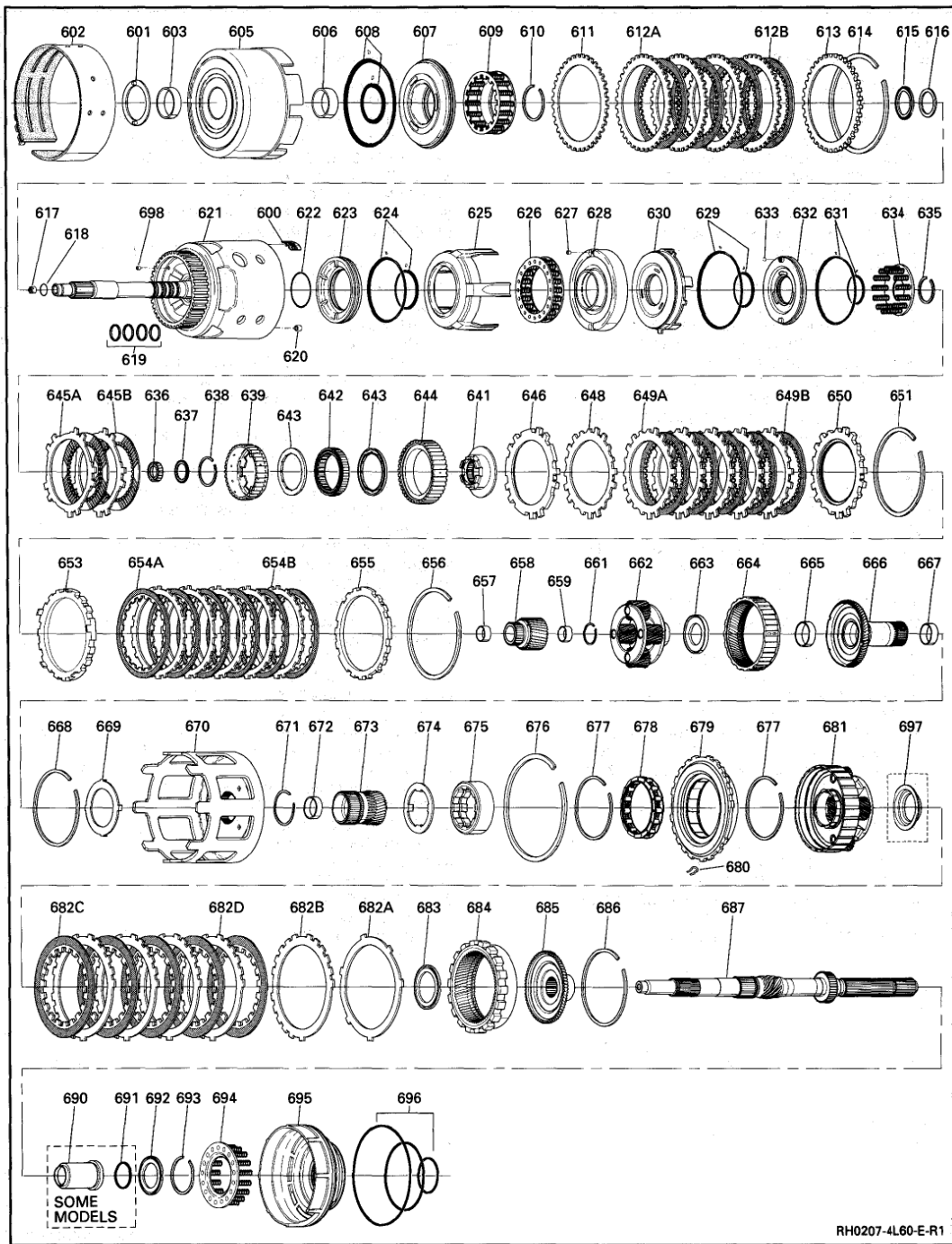
Figure 128 Case and External Parts

RH0205-4L60-E-R1

ILL. NO.	DESCRIPTION	ILL. NO.	DESCRIPTION
1	TORQUE CONVERTER ASSEMBLY	48	PLATE, VALVE BODY SPACER
2	BOLT, PUMP TO CASE	49	SCREEN, SHIFT SOLENOIDS
3	O-RING, PUMP TO CASE BOLT	50	SCREEN, PRESSURE CONTROL SOLENOID
4	PUMP ASSEMBLY, OIL	51	SCREEN, 3-2 CONTROL SOLENOID
5	SEAL, OIL (PUMP TO CASE)	52	GASKET, SPACER PLATE TO VALVE BODY
6	GASKET, PUMP COVER TO CASE	53	PLATE, SPACER PLATE SUPPORT
7	BUSHING, CASE	54	SPRING, 1-2 ACCUMULATOR
8	CASE, TRANSMISSION	55	RING, OIL SEAL (1-2 ACCUMULATOR)
9	VENT ASSEMBLY, TRANSMISSION	56	PISTON, 1-2 ACCUMULATOR
10	CONNECTOR, OIL COOLER PIPE	57	COVER AND PIN ASSEMBLY, 1-2 ACCUMULATOR
11	PLUG, CASE SERVO	58	BOLT, ACCUMULATOR COVER
12	SPRING, SERVO RETURN	59	BOLT, ACCUMULATOR COVER
13	PIN, 2ND APPLY PISTON	60	VALVE ASSEMBLY, CONTROL BODY
14	RING, RETAINER (2ND APPLY PISTON)	61	CHECKBALL
15	RETAINER, SERVO CUSHION SPRING	62	BOLT, VALVE BODY
16	SPRING, SERVO CUSHION	63	SPRING ASSEMBLY, MANUAL DETENT
17	PISTON, 2ND APPLY	64	BOLT, MANUAL DETENT SPRING
18	RING, OIL SEAL (2ND APPLY PISTON - OUTER)	65	SEAL, WIRING HARNESS PASS-THRU CONNECTOR O-RING
19	RING, OIL SEAL (2ND APPLY PISTON - INNER)	66	SOLENOID ASSEMBLY, WIRING HARNESS
20	HOUSING, SERVO PISTON (INNER)	67	SEAL, O-RING (SOLENOID)
21	SEAL, O-RING	68	BOLT, HEX WASHER HEAD (SOLENOID)
22	SPRING, SERVO APPLY PIN	69	SWITCH ASSEMBLY, TRANSMISSION PRESSURE
23	WASHER, SERVO APPLY PIN	70	BOLT, PRESSURE SWITCH ASSEMBLY
24	RING, RETAINER (APPLY PIN)	71	SEAL, FILTER
25	PISTON, 4TH APPLY	72	FILTER ASSEMBLY, TRANSMISSION OIL
26	RING, OIL SEAL (4TH APPLY PISTON - OUTER)	73	GASKET, TRANSMISSION OIL PAN
27	SEAL, O-RING (2-4 SERVO COVER)	74	MAGNET, CHIP COLLECTOR
28	COVER, 2-4 SERVO	75	PAN, TRANSMISSION OIL
29	RING, SERVO COVER RETAINING	76	SCREW, TRANSMISSION OIL PAN
30	SEAL, CASE EXTENSION TO CASE	77	BOLT, SPACER PLATE SUPPORT
31	EXTENSION, CASE	78	PLUG, STEEL CUP
32	BOLT, CASE EXTENSION TO CASE	79	SHAFT, PARKING BRAKE PAWL
33	BUSHING, CASE EXTENSION	80	SPRING, PARKING PAWL RETURN
34	SEAL ASSEMBLY, CASE EXTENSION OIL	81	PAWL, PARKING BRAKE
35	BOLT, SPEED SENSOR RETAINING	82	SEAL, MANUAL SHAFT
36	SPEED SENSOR, INTERNAL TRANSMISSION	83	RETAINER, MANUAL SHAFT
37	SEAL, O-RING (ITSS TO CASE EXTENSION)	84	SHAFT, MANUAL
38	PLUG, TRANSMISSION CASE (ACCUM. BLEED)	85	ACTUATOR ASSEMBLY, PARKING LOCK
39	PLUG, PRESSURE	86	BRACKET, PARKING LOCK
40	RETAINER AND BALL ASSEMBLY, 3RD ACCUM.	87	BOLT, PARKING LOCK BRACKET
41	PIN, BAND ANCHOR	88	LEVER, INSIDE DETENT
42	RETAINER AND BALL ASM. (DOUBLE ORIFICE)	89	LINK, MANUAL VALVE
43	PIN, ACCUMULATOR PISTON	90	NUT, HEX HEAD
44	PISTON, 3-4 ACCUMULATOR	91	NO. 10 CHECKBALL
45	RING, OIL SEAL (3-4 ACCUMULATOR PISTON)	92	SCREEN, TCC
46	SPRING, 3-4 ACCUMULATOR	93	BRACKET, DIPSTICK STOP
47	GASKET, SPACER PLATE TO CASE		

RH0206-4L60-E-R1

Figure 129 Case and External Parts – Legend



RH0207-4L60-E-R1

Figure 130 Transmission Internal Parts

ILL. NO.	DESCRIPTION	ILL. NO.	DESCRIPTION
600	SPRING ASM., 3-4 CLUTCH BOOST (5)	654A	PLATE ASSEMBLY, 3RD AND 4TH CLUTCH (FIBER)
601	WASHER, THRUST (PUMP TO DRUM)	654B	PLATE, 3RD AND 4TH CLUTCH (STEEL)
602	BAND ASSEMBLY, 2-4	655	PLATE, 3RD AND 4TH CLUTCH BACKING (SEL.)
603	BUSHING, REVERSE INPUT CL. (FRONT)	656	RING, 3RD AND 4TH CLUTCH BACKING PLATE
605	HOUSING AND DRUM ASSEMBLY, REVERSE INPUT CLUTCH		RETAINER
606	BUSHING, REVERSE INPUT CLUTCH (REAR)	657	BUSHING, INPUT SUN GEAR (FRONT)
607	PISTON ASM., REVERSE INPUT CLUTCH	658	GEAR, INPUT SUN
608	SEALS, REVERSE INPUT CLUTCH (INNER AND OUTER)	659	BUSHING, INPUT SUN GEAR (REAR)
609	SPRING ASM., REVERSE INPUT CLUTCH	661	RET., OUTPUT SHAFT TO INPUT CARRIER
610	RING, REVERSE INPUT CLUTCH SPRING RETAINER	662	CARRIER ASSEMBLY, INPUT (COMPLETE)
611	PLATE, REVERSE INPUT CLUTCH (BELLEVILLE)	663	BEARING ASSEMBLY, THRUST (INPUT CARRIER TO REACTION SHAFT)
612A	PLATE ASM., REVERSE INPUT CLUTCH (STEEL)	664	GEAR, INPUT INTERNAL
612B	PLATE, REVERSE INPUT CLUTCH (FIBER)	665	BUSHING, REACTION CARRIER SHAFT (FRONT)
613	PLATE, REVERSE INPUT CLUTCH BACKING (SELECTIVE)	666	SHAFT, REACTION CARRIER
614	RING, REVERSE INPUT CL. RETAINING	667	BUSHING, REACTION CARRIER SHAFT (REAR)
615	BEARING ASSEMBLY, STATOR SHAFT/ SELECTIVE WASHER	668	RING, REACTION SHAFT/INTERNAL GEAR RETAINER
616	WASHER, THRUST (SELECTIVE)	669	WASHER, THRUST (REACTION SHAFT/SHELL)
617	RETAINER AND BALL ASM., CHECK VALVE	670	SHELL, REACTION SUN
618	SEAL, O-RING (TURBINE SHAFT/ SELECTIVE WASHER)	671	RING, REACTION SUN GEAR RETAINER
619	RING, OIL SEAL (SOLID)	672	BUSHING, REACTION SUN
620	RETAINER AND CHECKBALL ASSEMBLY	673	GEAR, REACTION SUN
621	HOUSING AND SHAFT ASSEMBLY, INPUT	674	WASHER, THRUST (RACE/REACTION SHELL)
622	SEAL, O-RING INPUT TO FORWARD HSG.	675	RACE, LO AND REVERSE ROLLER CLUTCH
623	PISTON, 3RD AND 4TH CLUTCH	676	RING, LO AND REVERSE SUPPORT TO CASE RETAINER
624	SEAL, 3RD AND 4TH CL. (INNER AND OUTER)	677	RING, LO AND REVERSE RETAINER (ROLLER ASSEMBLY/CAM)
625	RING, 3RD AND 4TH CLUTCH (APPLY)	678	CLUTCH ASSEMBLY, LO AND REVERSE ROLLER
626	SPRING ASSEMBLY, 3RD AND 4TH CLUTCH	679	SUPPORT ASM., LO AND REVERSE CLUTCH
627	RETAINER AND BALL ASSEMBLY, FORWARD CLUTCH HOUSING	680	SPRING, TRANSMISSION (LO AND REVERSE CLUTCH SUPPORT RETAINER)
628	HOUSING, FORWARD CLUTCH	681	CARRIER ASSEMBLY, REACTION
629	SEAL, FORWARD CLUTCH (INNER AND OUTER)	682A	PLATE, LO AND REVERSE CLUTCH (WAVED)
630	PISTON, FORWARD CLUTCH	682B	PLATE, SPACER LO AND REVERSE CLUTCH (SELECTIVE)
631	SEAL, OVERRUN CLUTCH (INNER AND OUTER)	682C	PLATE ASSEMBLY, LO AND REVERSE CLUTCH (FIBER)
632	PISTON, OVERRUN CLUTCH	682D	PLATE, LO AND REVERSE CLUTCH (STEEL)
633	BALL, OVERRUN CLUTCH	683	BEARING ASSEMBLY, THRUST (REACTION CARRIER/ SUPPORT)
634	SPRING ASSEMBLY, OVERRUN CLUTCH	684	GEAR, INTERNAL REACTION
635	SNAP RING, OVERRUN CLUTCH SPRING RETAINER	685	SUPPORT, INTERNAL REACTION GEAR
636	SEAL, INPUT HOUSING TO OUTPUT SHAFT	686	RING, REACTION GEAR/SUPPORT RETAINER
637	BEARING ASSEMBLY, INPUT SUN GEAR	687	SHAFT, OUTPUT
638	SNAP RING, OVERRUN CL. HUB RETAINING	690	SLEEVE, OUTPUT SHAFT
639	HUB, OVERRUN CLUTCH	691	SEAL, OUTPUT SHAFT
641	RETAINER AND RACE ASSEMBLY, SPRAG	692	BRG., REACTION GEAR SUPPORT TO CASE
642	FORWARD SPRAG ASSEMBLY	693	RING, LO AND REVERSE CLUTCH RETAINER
643	RETAINER RINGS, SPRAG ASSEMBLY	694	SPRING ASSEMBLY, LO AND REVERSE CLUTCH
644	RACE, FORWARD CLUTCH (OUTER)	695	PISTON, LO AND REVERSE CLUTCH
645A	PLATE ASSEMBLY, OVERRUN CLUTCH (STEEL)	696	SEAL, TRANSMISSION (LO AND REVERSE CLUTCH - OUTER, CENTER, INNER)
645B	PLATE, OVERRUN CLUTCH (FIBER)	697	DEFLECTOR, OIL (HIGH OUTPUT MODELS ONLY)
646	PLATE, FORWARD CLUTCH (APPLY)	698	PLUG, ORIFICED CUP
648	PLATE, FORWARD CLUTCH (WAVED)	699	ROTOR, INTERNAL TRANSMISSION SPEED SENSOR
649A	PLATE ASSEMBLY, FORWARD CLUTCH (STEEL)		
649B	PLATE, FORWARD CLUTCH (FIBER)		
650	PLATE, FORWARD CLUTCH BACKING (SEL.)		
651	RING, FORWARD CLUTCH BACKING PLATE RETAINER		
653	PLATE, 3RD AND 4TH CLUTCH APPLY (STEPPED)		

RH0208-4L60-E-R1

Figure 131 Transmission Internal Parts – Legend

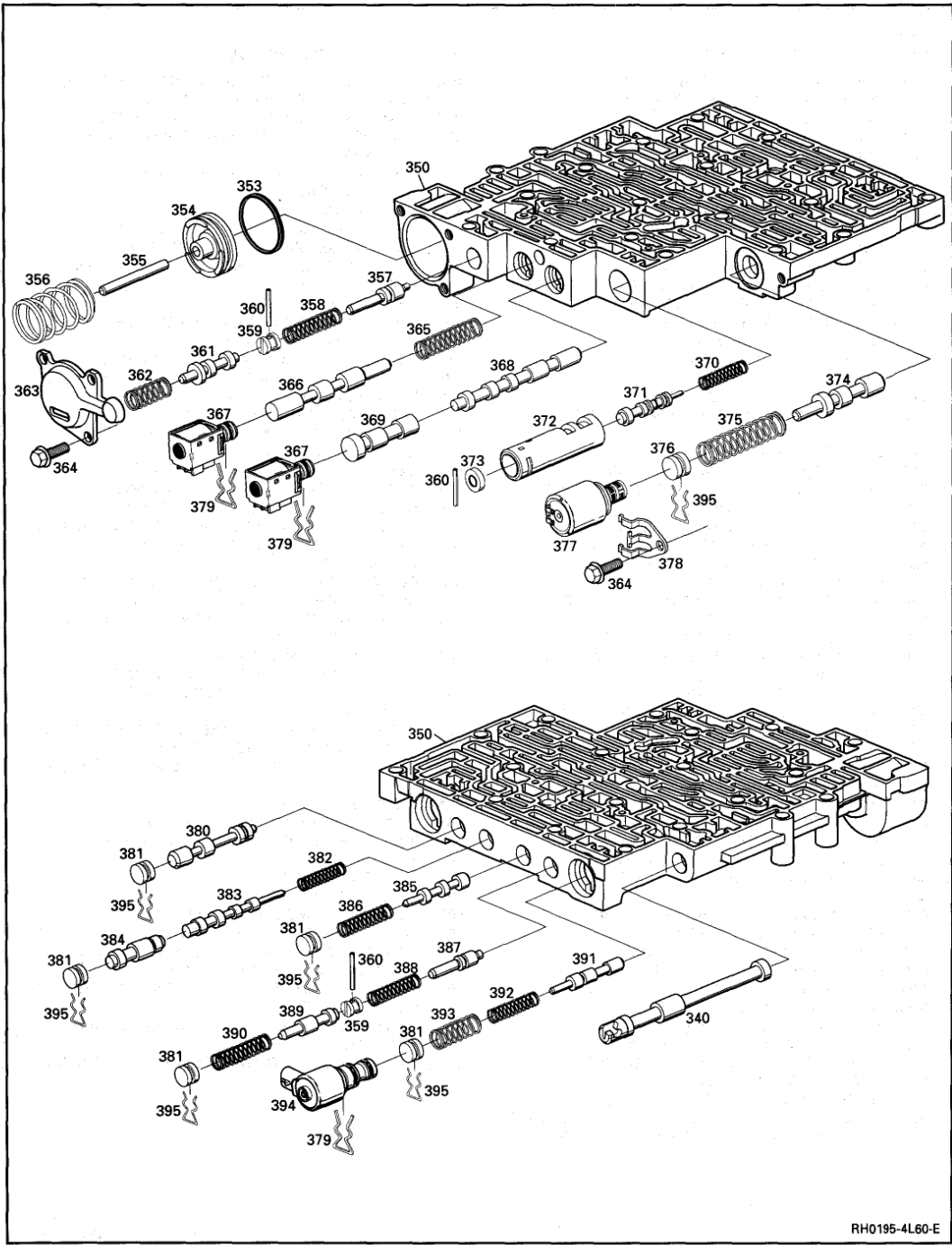


Figure 132 Control Valve Assembly

RH0195-4L60-E

340 VALVE, MANUAL
350 VALVE ASSEMBLY, CONTROL BODY
353 SEAL, FORWARD ACCUMULATOR OIL
354 PISTON, FORWARD ACCUMULATOR
355 PIN, FORWARD ACCUMULATOR
356 SPRING, FORWARD ACCUMULATOR
357 VALVE, FORWARD ABUSE
358 SPRING, FORWARD ABUSE VALVE
359 PLUG, BORE
360 PIN, COILED SPRING
361 VALVE, LOW OVERRUN
362 SPRING, LOW OVERRUN VALVE
363 COVER, FORWARD ACCUMULATOR
364 BOLT, FORWARD ACCUMULATOR COVER
365 SPRING, 1-2 SHIFT VALVE
366 VALVE, 1-2 SHIFT
367A 1-2 SHIFT SOLENOID (A)
367B 2-3 SHIFT SOLENOID (B)
368 VALVE, 2-3 SHIFT
369 VALVE, 2-3 SHUTTLE
370 SPRING, 1-2 ACCUMULATOR VALVE
371 VALVE, 1-2 ACCUMULATOR
372 SLEEVE, 1-2 ACCUMULATOR VALVE
373 PLUG, BORE
374 VALVE, ACTUATOR FEED LIMIT
375 SPRING, ACTUATOR FEED LIMIT VALVE
376 PLUG, BORE
377 PRESSURE CONTROL SOLENOID
378 RETAINER, PRESSURE CONTROL SOLENOID
379 RETAINER, SOLENOID
380 VALVE, CONVERTER CLUTCH SIGNAL
381 PLUG, BORE
382 SPRING, 4-3 SEQUENCE VALVE
383 VALVE, 4-3 SEQUENCE
384 VALVE, 3-4 RELAY
385 VALVE, 3-4 SHIFT
386 SPRING, 3-4 SHIFT VALVE
387 VALVE, REVERSE ABUSE
388 SPRING, REVERSE ABUSE VALVE
389 VALVE, 3-2 DOWNSHIFT
390 SPRING, 3-2 DOWNSHIFT VALVE
391 VALVE, 3-2 CONTROL
392 SPRING, 3-2 CONTROL VALVE
393 SPRING, BORE PLUG
394 3-2 CONTROL SOLENOID
395 RETAINER, BORE PLUG

RH0196-4L60-E

Figure 133 Control Valve Assembly – Legend

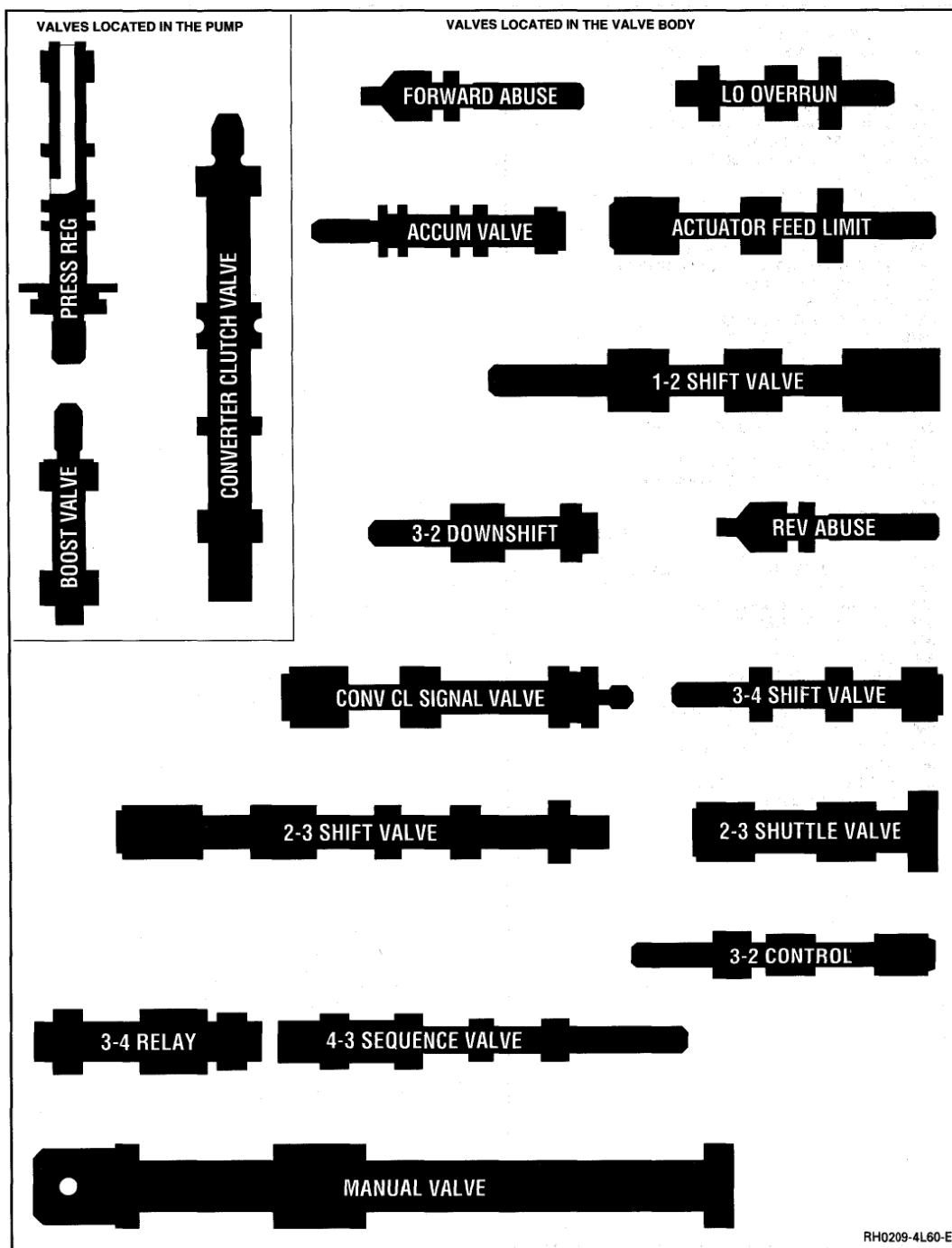


Figure 134 Control Valve Identification

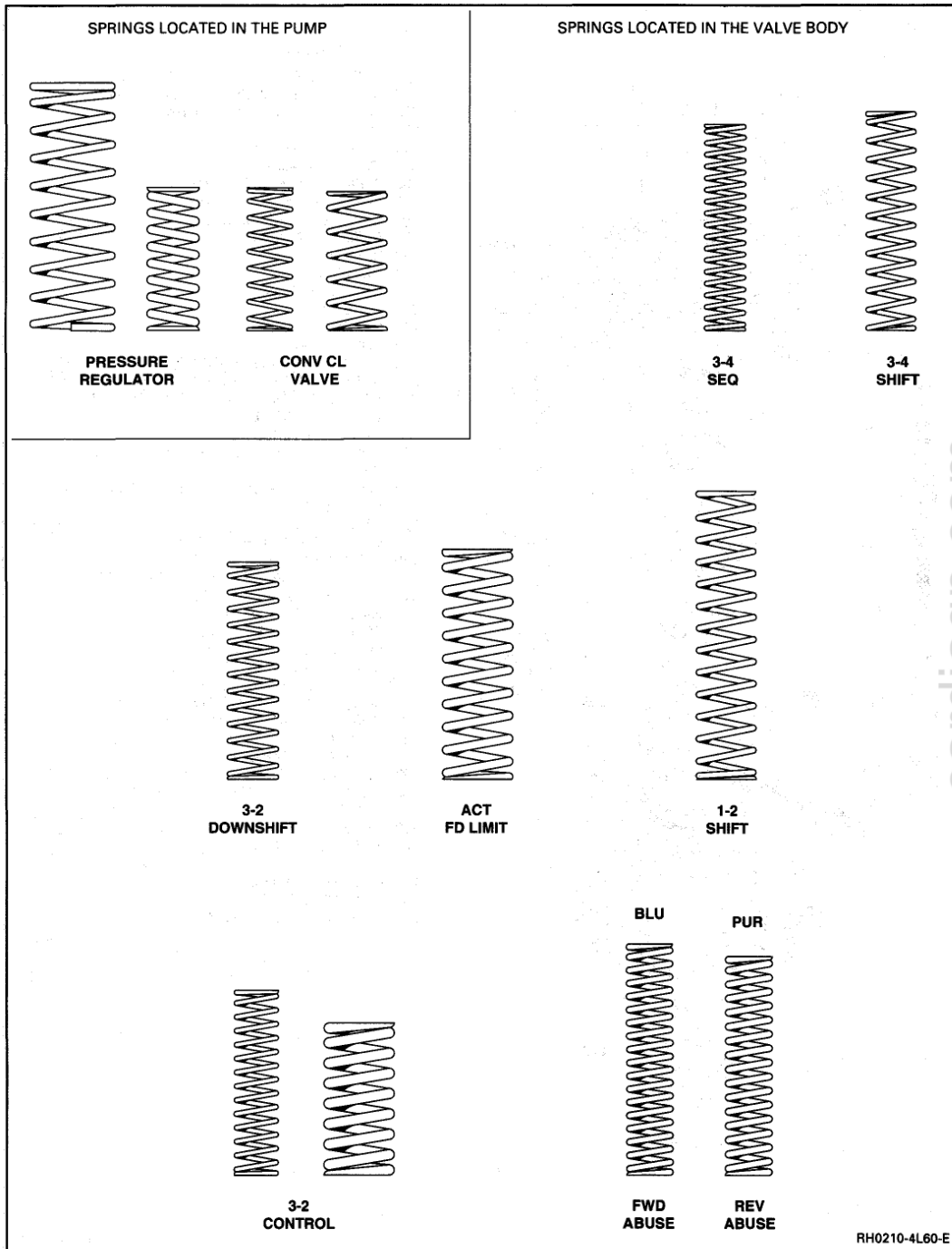
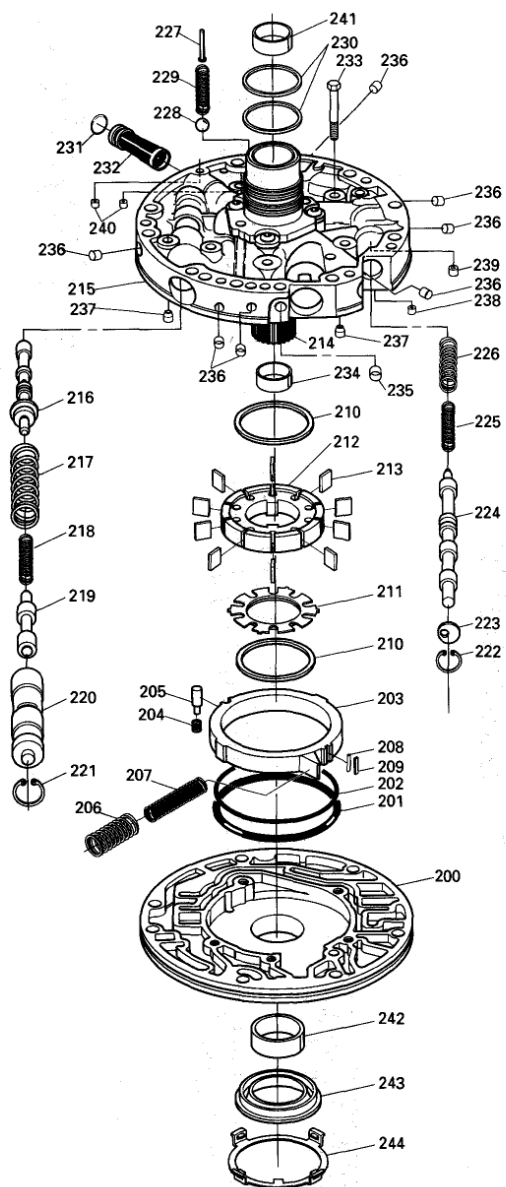


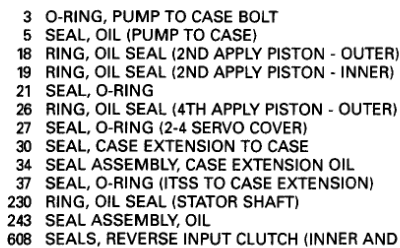
Figure 135 Control Valve Spring Identification

ILL. NO.	DESCRIPTION
200	BODY, PUMP
201	RING, OIL SEAL (SLIDE TO WEAR PLATE)
202	SEAL, O-RING (SLIDE SEAL BACK-UP)
203	SLIDE, PUMP
204	SPRING, PIVOT PIN
205	PIN, PIVOT SLIDE
206	SPRING, PUMP SLIDE (OUTER)
207	SPRING, PUMP SLIDE (INNER)
208	SUPPORT, PUMP SLIDE SEAL
209	SEAL, PUMP SLIDE
210	RING, PUMP VANE
211	GUIDE, ROTOR
212	ROTOR, OIL PUMP
213	VANE, PUMP
214	SHAFT, STATOR
215	COVER, PUMP
216	VALVE, PRESSURE REGULATOR
217	SPRING, PRESSURE REGULATOR VALVE
218	SPRING, PRESSURE REGULATOR ISOLATOR
219	VALVE, REVERSE BOOST
220	SLEEVE, REVERSE BOOST VALVE
221	RING, OIL PUMP REVERSE BOOST VALVE
222	RETAINING RING, OIL PUMP CONVERTER CLUTCH VALVE
223	VALVE, STOP
224	VALVE, CONVERTER CLUTCH
225	SPRING, CONVERTER CLUTCH VALVE (INNER)
226	SPRING, CONVERTER CLUTCH VALVE (OUTER)
227	RIVET, PRESSURE RELIEF BOLT
228	BALL, PRESSURE RELIEF
229	SPRING PRESSURE RELIEF
230	RING, OIL SEAL (STATOR SHAFT)
231	SEAL, OIL PUMP COVER SCREEN
232	SCREEN, OIL PUMP COVER
233	BOLT, M8 X 1.25 X 40 (COVER TO BODY)
234	BUSHING, STATOR SHAFT (FRONT)
235	PLUG, OIL PUMP COVER (FWD CLUTCH FEED)
236	PLUG, OIL PUMP COVER
237	RETAINER AND BALL ASSEMBLY, CHECK VALVE
238	ORIFICE, CONVERTER CLUTCH SIGNAL (CUP PLUG)
239	ORIFICE, OIL COOLER (CUP PLUG)
240	PLUG, CUP ORIFICE
241	BUSHING, STATOR SHAFT (REAR)
242	BUSHING, PUMP BODY
243	SEAL ASSEMBLY, OIL
244	RETAINER, FRONT HELIX



RH0185-4L60-E

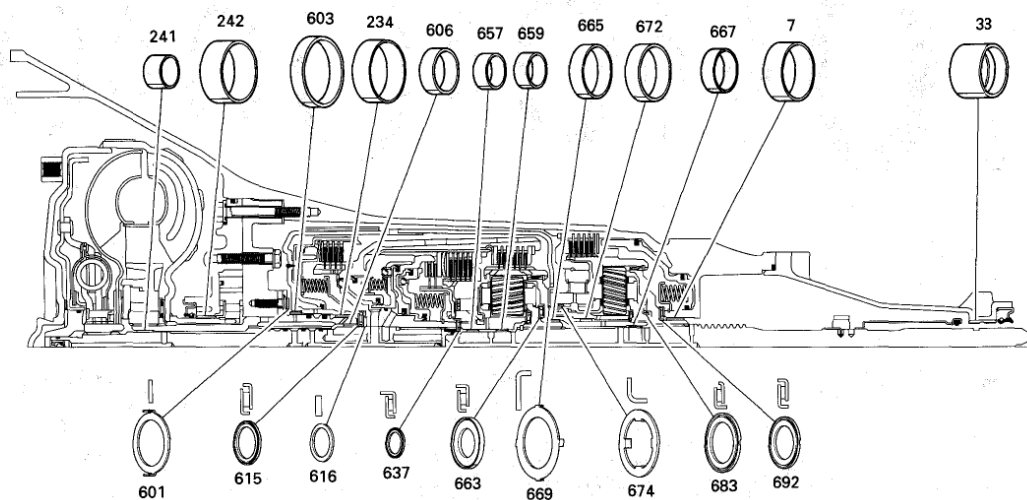
Figure 136 Oil Pump Assembly



- OUTER)
618 SEAL, O-RING (TURBINE SHAFT/ SELECTIVE
WASHER)
619 RING, OIL SEAL (SOLID)
622 SEAL, O-RING INPUT TO FORWARD HSG.
624 SEAL, 3RD AND 4TH CL. (INNER AND OUTER)
629 SEAL, FORWARD CLUTCH (INNER AND OUTER)
631 SEAL, OVERRUN CLUTCH (INNER AND OUTER)
636 SEAL, INPUT HOUSING TO OUTPUT SHAFT
691 SEAL, OUTPUT SHAFT
696 SEAL, TRANSMISSION (LO AND REVERSE
CLUTCH—OUTER, CENTER, INNER)

RH0211-4L60-E

Figure 137 Seal and Bearing Locations



- | | | | |
|-----|--|-----|--|
| 7 | BUSHING, CASE | 657 | BUSHING, INPUT SUN GEAR (FRONT) |
| 33 | BUSHING, CASE EXTENSION | 659 | BUSHING, INPUT SUN GEAR (REAR) |
| 234 | BUSHING, STATOR SHAFT (FRONT) | 663 | BEARING ASSEMBLY, THRUST (INPUT CARRIER TO REACTION SHAFT) |
| 241 | BUSHING, STATOR SHAFT (REAR) | 665 | BUSHING, REACTION CARRIER SHAFT (FRONT) |
| 242 | BUSHING, OIL PUMP BODY | 667 | BUSHING, REACTION CARRIER SHAFT (REAR) |
| 601 | WASHER, THRUST (PUMP TO DRUM) | 669 | WASHER, THRUST (REACTION SHAFT/SHELL) |
| 603 | BUSHING, REVERSE INPUT CL. (FRONT) | 672 | BUSHING, REACTION SUN |
| 606 | BUSHING, REVERSE INPUT CLUTCH (REAR) | 674 | WASHER, THRUST (RACE/REACTION SHELL) |
| 615 | BEARING ASSEMBLY, STATOR SHAFT/ SELECTIVE WASHER | 683 | BEARING ASSEMBLY, THRUST (REACTION CARRIER/ SUPPORT) |
| 616 | WASHER, THRUST (SELECTIVE) | 692 | BEARING, REACTION GEAR SUPPORT TO CASE |
| 637 | BEARING ASSEMBLY, INPUT SUN GEAR | | |

RH0212-4L60-E

Figure 138 Bushing Locations

TORQUE SPECIFICATIONS							
LOCATION	QTY.	SIZE	TORQUE	LOCATION	QTY.	SIZE	TORQUE
ACCUMULATOR COVER TO CASE	2	M6 1.0 x 35.0	11 N•m (8 LB.-FT.)	PARK BRAKE BRACKET TO CASE	2	M8 1.25 X 20.0	31 N•m (23 LB.-FT.)
ACCUMULATOR COVER TO CASE	1	M6 1.0 x 65.0	11 N•m (8 LB.-FT.)	PUMP COVER TO BODY	5	M8 1.25 X 40.0	24 N•m (18 LB.-FT.)
DETENT SPRING TO VALVE BODY	1	M8 1.25 x 20.0	24 N•m (18 LB.-FT.)	PUMP ASSEMBLY TO CASE	7	M8 1.25 X 60.0	24 N•m (18 LB.-FT.)
FWD ACCUM. COVER TO VALVE BODY	3	M6 1.0 x 17.7	11 N•m (8 LB.-FT.)	CASE EXTENSION TO CASE	4	M10 1.50 X 30.0	35 N•m (26 LB.-FT.)
SOLENOID ASSEMBLY TO CASE	2	M6 1.0 x 12.0	11 N•m (8 LB.-FT.)	MANUAL SHAFT TO INSIDE DETENT LEVER	1	M10 1.50 NUT	31 N•m (23 LB.-FT.)
TRANSMISSION OIL PAN TO CASE	16	M8 1.25 x 19.3	11 N•m (8 LB.-FT.)	LINE PRESSURE PLUG	1	1/8 - 27	11 N•m (8 LB.-FT.)
VALVE BODY TO CASE	2	M6 1.0 X 35.0	11 N•m (8 LB.-FT.)	CONNECTOR COOLER PIPE	2	1/4 - 18	38 N•m (28 LB.-FT.)
VALVE BODY TO CASE	9	M6 1.0 x 47.5	11 N•m (8 LB.-FT.)	PRESSURE SWITCH ASM. TO VALVE BODY	2	M6 1.0 X 17.7	11 N•m (8 LB.-FT.)
VALVE BODY TO CASE	3	M6 1.0 x 54.4	11 N•m (8 LB.-FT.)	VEHICLE SPEED SENSOR RETAINER	1	M6 1.0 X 21.7	11 N•m (8 LB.-FT.)
VALVE BODY TO CASE	3	M6 1.0 x 65.0	11 N•m (8 LB.-FT.)	SPACER PLATE SUPPORT TO CASE	3	M6 1.0 X 17.7	11 N•m (8 LB.-FT.)
PRESSURE CONTROL SOLENOID TO VALVE BODY	1	M6 1.0 X 17.7	11 N•m (8 LB.-FT.)				

RH0235-4L60-E

Figure 139 Torque Specifications

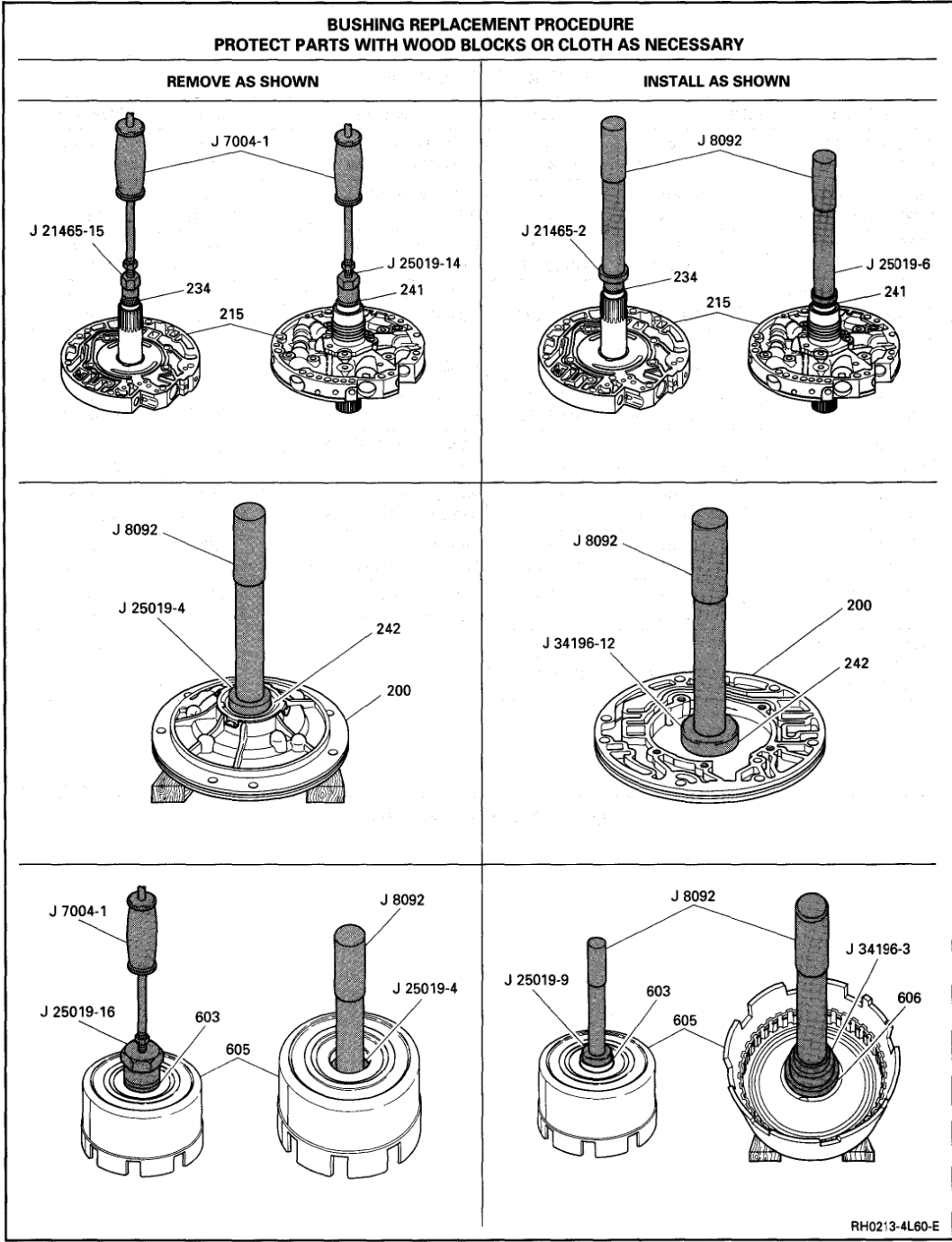


Figure 140 Bushing Replacement Procedure

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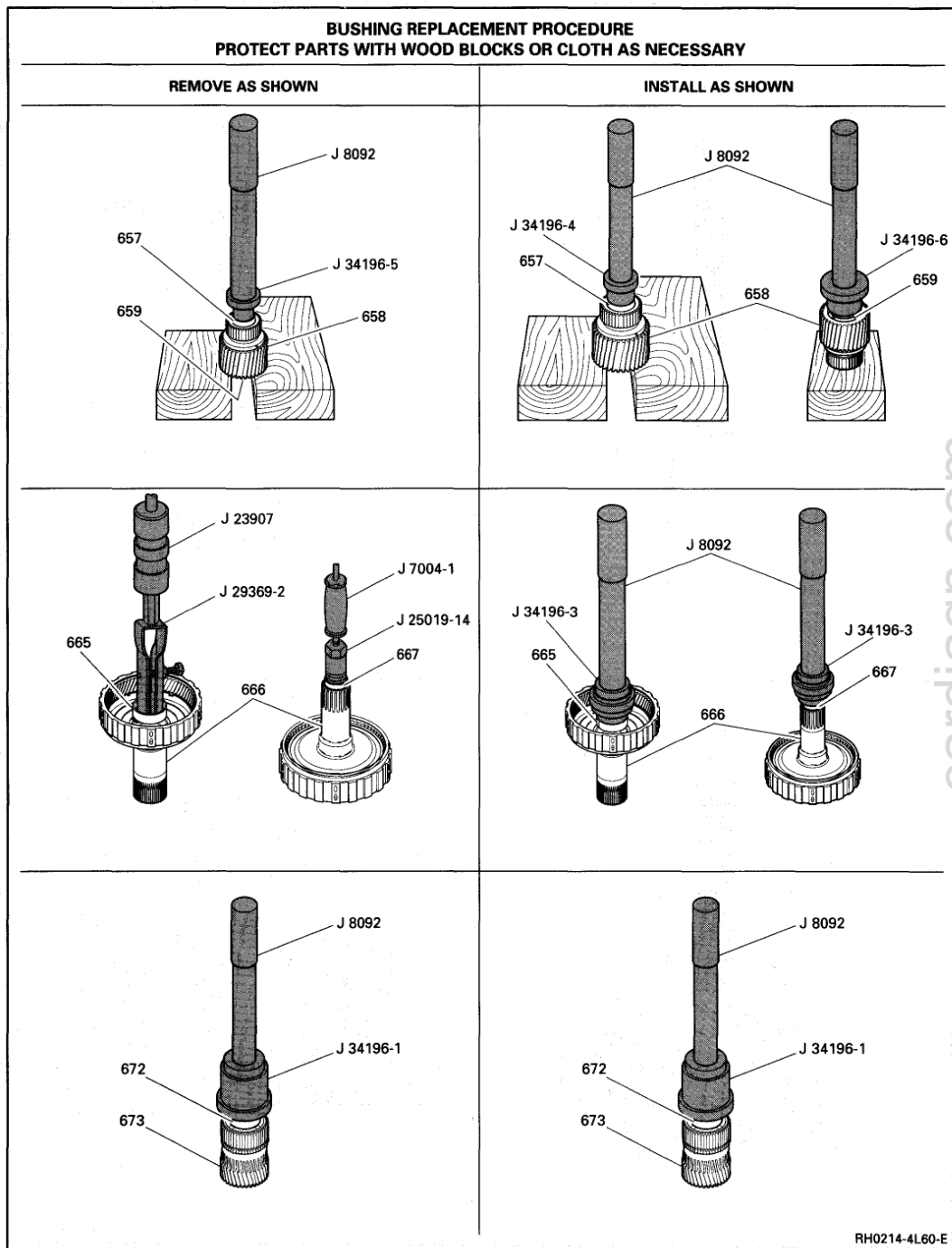
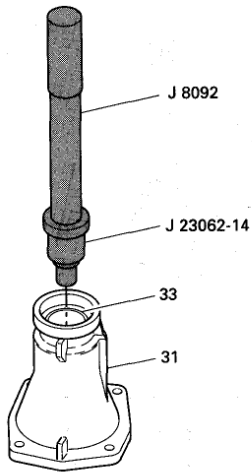


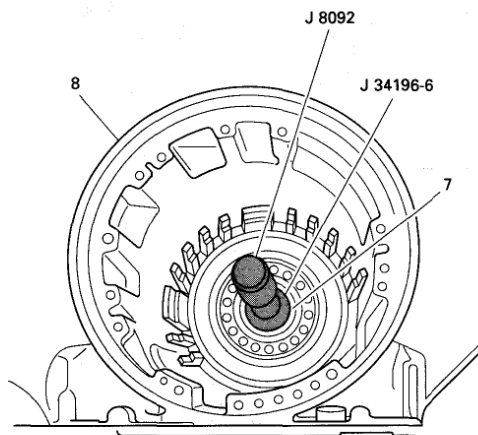
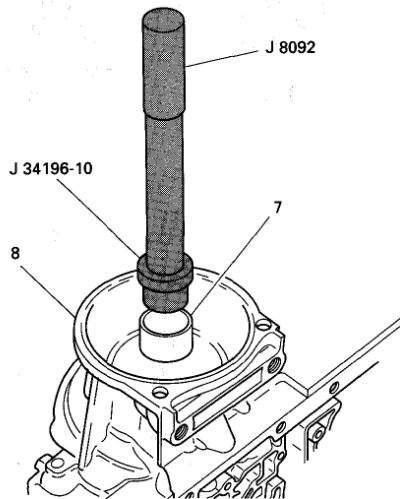
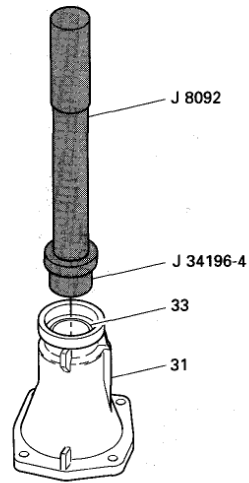
Figure 141 Bushing Replacement Procedure

BUSHING REPLACEMENT PROCEDURE
PROTECT PARTS WITH WOOD BLOCKS OR CLOTH AS NECESSARY

REMOVE AS SHOWN



INSTALL AS SHOWN



RH0215-4L60-E

Figure 142 Bushing Replacement Procedure

SPECIAL TOOLS

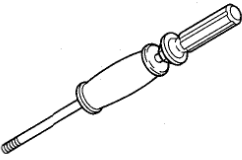
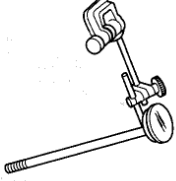
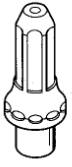
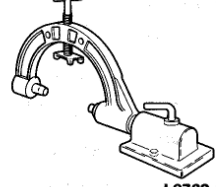
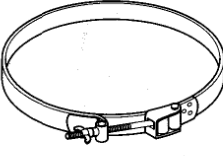
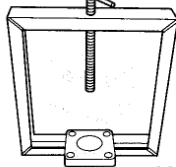
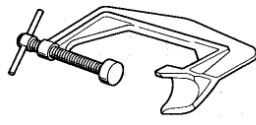
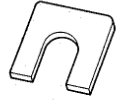
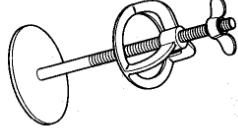
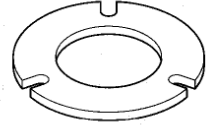
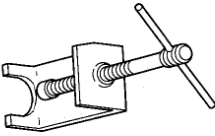
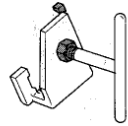
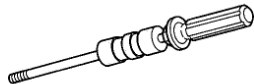
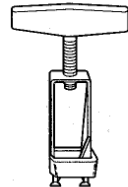
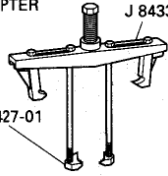
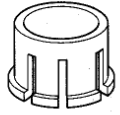
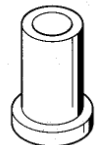
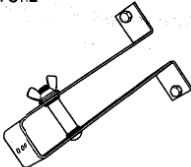
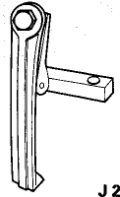
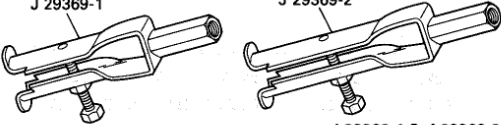
UNIVERSAL REMOVER  J 7004-1	DIAL INDICATOR SET  J 8001	REAR SEAL INSTALLER  J 21426	HOLDING FIXTURE AND BASE  J 8763-02
OIL PUMP BODY & COVER ALIGNMENT BAND  J 21368	CLUTCH SPRING COMPRESSOR PRESS  J 23456	PUMP OIL SEAL INSTALLER  J 25016	PISTON COMPRESSOR  J 22269-01
END PLAY CHECKING FIXTURE  J 25022	END PLAY FIXTURE ADAPTER  J 34725	CLUTCH SPRING COMPRESSOR  J 23327	CLUTCH SPRING COMPRESSOR ADAPTER  J 25018-A
OIL PUMP REMOVER & END PLAY CHECKING FIXTURE  J 24773-A	SPEED SENSOR REMOVER  J 38417	UNIVERSAL REMOVER  J 23907	PUMP REMOVER & INSTALLER  J 37789
SPEEDOMETER GEAR PULLER & ADAPTER  J 21427-01 & J 8433	TURBINE SHAFT SEAL INSTALLER  J 36418-1	ADAPTER  J 39119	TURBINE SHAFT SEAL SIZER  J 36418-2A
OUTPUT SHAFT SUPPORT FIXTURE  J 29837	SERVO COVER COMPRESSOR  J 29714	BUSHING & UNIVERSAL REMOVER SET  J 29369-1 & J 29369-2 RH0216-4L60-E	

Figure 143 Special Tools

SPECIAL TOOLS

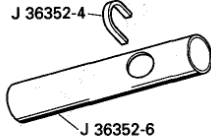
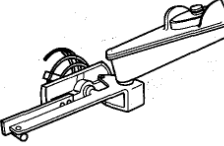
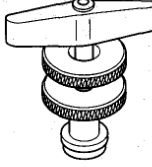
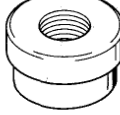
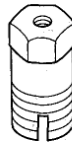
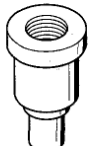
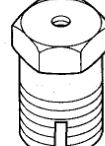
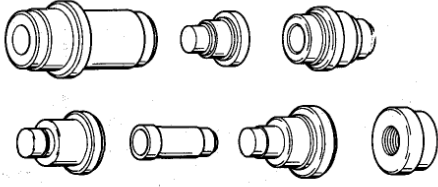
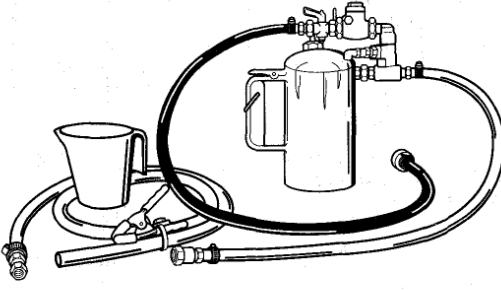
SPEED SENSOR ROTER INSTALLER  J 36352-4 & J 36352-6	SPEEDOMETER GEAR INSTALLER  J 5590	HANDLE  J 8092	INNER FORWARD CLUTCH SEAL PROTECTOR  J 29883
2-4 BAND APPLY PIN TOOL  J 33037	DIAL INDICATOR POST  J 26900-13	END PLAY CHECKING TOOL  J 35138	INNER OVERRUN CLUTCH SEAL PROTECTOR  J 29882
STATOR SHAFT SEALS INSTILLATION AND SIZING TOOLS    J 39855-1 & J 38735-3 & J 39855-2			BUSHING INSTALLERS   J 25019-9 & J 25019-12
BUSHING REMOVER  J 25019-14	BUSHING REMOVER  J 24036	BUSHING REMOVER  J 23062-14	BUSHING REMOVER  J 25019-16
BUSHING SET  J 34196		COOLER FLUSHER  J 35944 RH0236-4L60-E	
DIAL INDICATOR STAND & GUIDE PIN SET  J 25025-B			

Figure 144 Special Tools