SECTION 200-4R

MW9

AUTOMATIC TRANSMISSION UNIT REPAIR

CONTENTS

TRANSMISSION DISASSEMBLY

GENERAL SERVICE INFORMATION

- OIL SEAL RINGS
  - If any seal rings are damaged, cut, or do not rotate in their groove, be certain to check the ring groove for debris or damage.
- THRUST WASHERS
  - Thrust washers and bearing surfaces may appear to be polished. This is a normal condition and should not be considered damage.
- SNAP RINGS
  - Do not over extend snap rings when removing or installing.

DISASSEMBLY

Clean

- Thoroughly clean the exterior of the transmission.

Remove or Disconnect

- Torque converter.

Install or Connect

Tools Required
J-8763-02 Holding Fixture
J-3289-20 Base

1. J-8763-02 onto the transmission.
2. Holding fixture into J-3289-20.

Remove or Disconnect

- Drain the transmission through the rear of the transmission.

Valve Body and Wiring Harness

Remove or Disconnect (Figures 3 and 4)

1. Bolts (64), oil pan (65), and gasket (66).
2. Oil filter (68) and "O" ring seal (67).
3. Electrical connections.
4. Bolts (80) and clips (82 and 79).
5. Bolts (54), solenoid (53), and "O" ring seal (52).

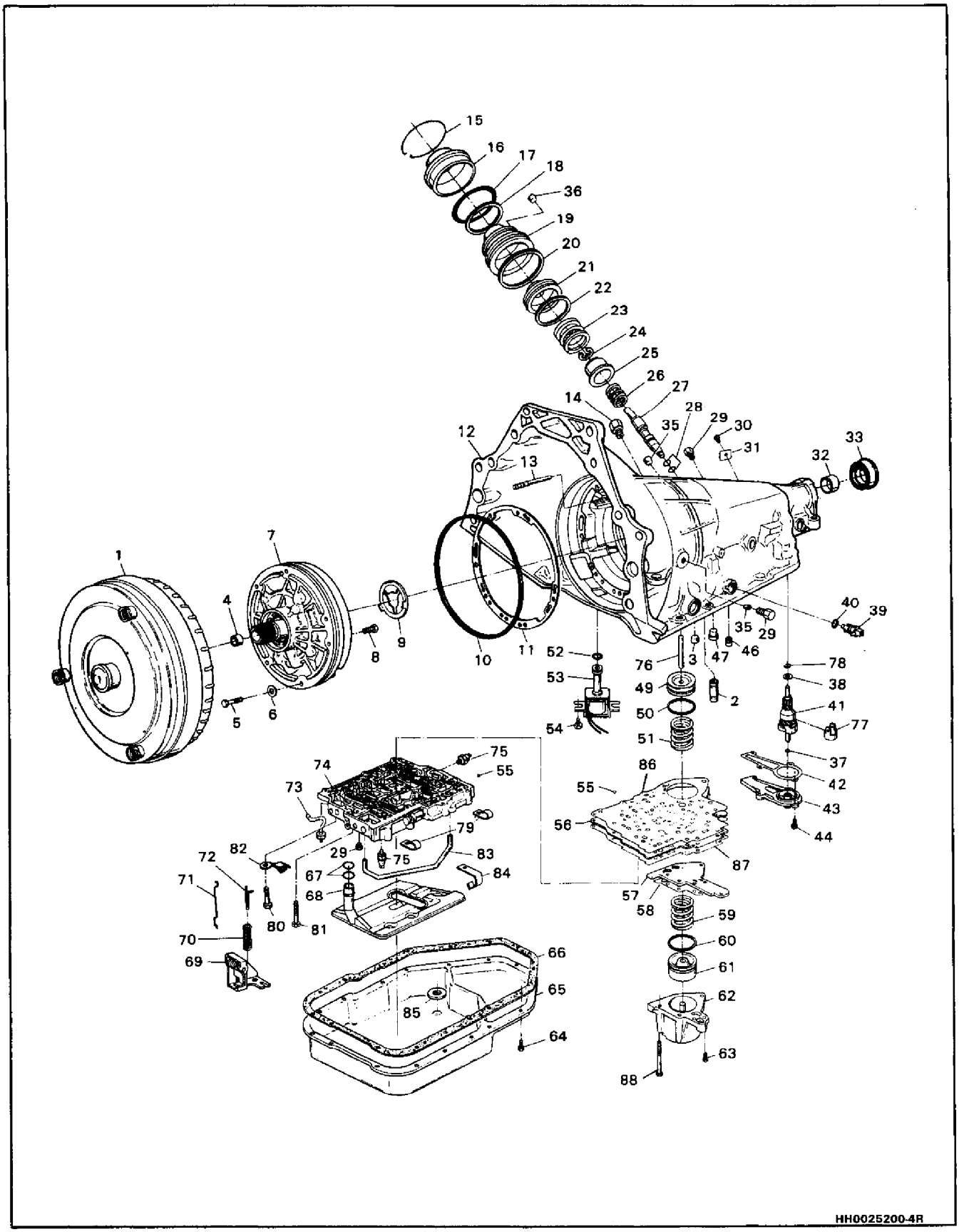

Figure 1 Case and External Parts

ILL. NO.	DESCRIPTION
1	CONVERTER ASSEMBLY, COMPLETE
2	RETAINER & BALL ASSEMBLY, 3RD ACCUMULATOR
3	PLUG, CUP (LUBE HOLE) (8.05 DIA.)
4	BUSHING, STATOR SHAFT
5	BOLTS, M8 X 1.25 X 62
6	WASHER, PUMP TO CASE BOLTS
7	PUMP ASSEMBLY, COMPLETE
8	BOLT, PUMP COVER TO BODY
9	WASHER, THRUST (HOUSING TO PUMP)
10	SEAL, RING (PUMP TO CASE)
11	GASKET, PUMP COVER TO CASE
12	CASE & BUSHING ASSEMBLY
13	PIPE, VENT
14	CONNECTOR, INVERTED FLARE (BRASS)
15	RING, SERVO COVER RETAINING
16	COVER, INTERMEDIATE SERVO
17	SEAL, "O" RING (INTERMEDIATE SERVO COVER)
18	RING, OIL SEAL (INNER)
19	PISTON, INTERMEDIATE SERVO (OUTER)
20	RING, OIL SEAL (OUTER)
21	PISTON, INTERMEDIATE SERVO (INNER)
22	RING, OIL SEAL PISTON (INNER)
23	SPRING, INTERMEDIATE SERVO CUSHION
24	RING, SNAP (APPLY PIN/RETAINER)
25	RETAINER, SERVO SPRING
26	SPRING, INTERMEDIATE SERVO (INNER)
27	PIN, INTERMEDIATE BAND APPLY (SELECTIVE)
28	RING, OIL SEAL (INTERMEDIATE BAND APPLY PIN)
29	PLUG, HEX HEAD 1/8" PIPE (2)
30	SCREW, TRUSS HEAD DRIVE (NAMEPLATE)
31	NAMEPLATE
32	BUSHING, CASE REAR
33	SEAL ASSEMBLY, REAR OIL
34	GEAR, SPEEDO DRIVEN (GOVERNOR)
35	PLUG, CUP (4TH ACCUMULATOR OR SERVO) (2)
36	PLUG, CUP (ORIFICE)
37	RING, OIL SEAL
38	WASHER, THRUST (GOVERNOR DRIVEN GEAR/CASE)
39	CONNECTOR, ELECTRICAL
40	SEAL, "O" RING (ELECTRICAL CONNECTOR)
41	GOVERNOR ASSEMBLY, COMPLETE
42	GASKET, GOVERNOR COVER
43	COVER ASSEMBLY, GOVERNOR
44	SCREW, GOVERNOR COVER
46	SEAL, REVERSE OIL (CASE TO HOUSING)
47	PIN, BAND ANCHOR
49	PISTON, 3-4 ACCUMULATOR
50	RING, OIL SEAL (3-4 ACCUMULATOR PISTON)
51	SPRING, 3-4 ACCUMULATOR
52	SEAL, "O" RING (SOLENOID)
53	SOLENOID ASSEMBLY
54	BOLTS, HEX WASHER HEAD M6 X 1 X 12.0
55	BALL, .25 DIAMETER
56	PLATE, VALVE BODY SPACER
57	PLATE, ACCUMULATOR
58	GASKET, ACCUMULATOR HSG. TO ACCUM. PLATE
59	SPRING, 1-2 ACCUMULATOR PISTON
60	RING, OIL SEAL (1-2 ACCUMULATOR PISTON)
61	PISTON, 1-2 ACCUMULATOR
62	HOUSING & PIN ASSEMBLY, 1-2 ACCUMULATOR
63	BOLT, ACCUMULATOR HOUSING
64	SCREW, CONICAL WASHER ASSEMBLY
65	PAN, TRANSMISSION OIL
66	GASKET, PAN
67	SEAL, "O" RING (FILTER)
68	FILTER ASSEMBLY, TRANSMISSION OIL
69	LEVER & BRACKET ASSEMBLY, THROTTLE
70	SPRING, LIFTER (T.V. EXHAUST VALVE)
71	LINK, THROTTLE LEVER TO CABLE
72	LIFTER, T.V. EXHAUST
73	SWITCH, PRESSURE 4-3
74	VALVE ASSEMBLY, CONTROL
75	SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
76	PIN, ACCUMULATOR PISTON
77	CLIP, SPEEDO DRIVE GEAR
78	RING, GOVERNOR GEAR RETAINER
79	CLIP, SOLENOID WIRE (2)
80	BOLT, M6 X 1 X 45
81	BOLT, M6 X 1 X 60
82	CLIP, FILTER RETAINER
83	PIPE, SIGNAL OIL
84	RETAINER, SIGNAL OIL PIPE
85	MAGNET, CHIP COLLECTOR
86	GASKET, SPACER PLATE TO CASE
87	GASKET, VALVE BODY TO SPACER PLATE
88	BOLT, ACCUMULATOR HOUSING

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Figure 1L Legend

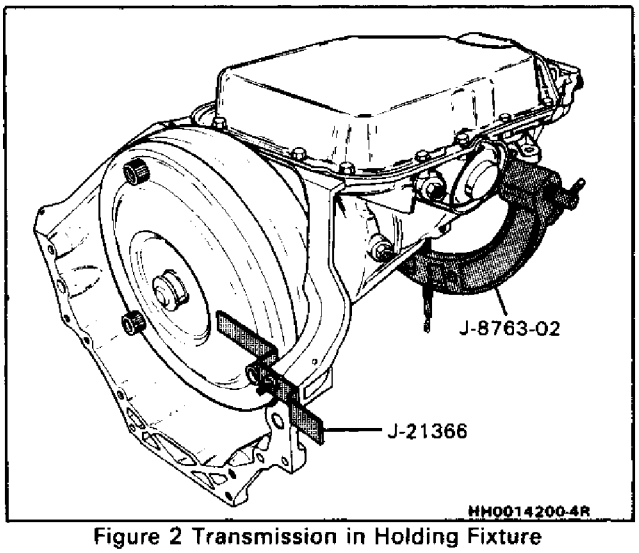


Figure 2 Transmission in Holding Fixture

6. Case electrical connector (39) and "O" ring seal (40).

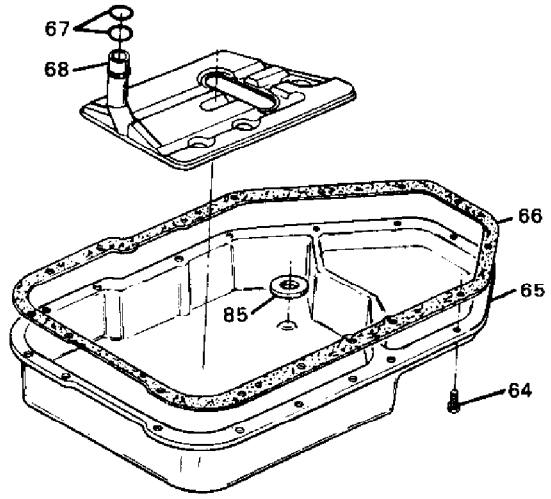
Remove or Disconnect

1. Throttle lever and bracket assembly (69) and throttle lever to cable link (71).
2. T.V. exhaust valve lifter (72) and spring (70).
3. Manual detent roller and spring assembly (708), signal oil pipe retainer (84), and signal pipe (83).
4. NON-C-3 MODELS ONLY.Pressure switch (73).
5. Remaining valve body bolts (80).
6. Control valve (74) and manual valve (345).
7. (3) Check balls (55).

1-2 Accumulator, 3-4 Accumulator Piston Assembly

Remove or Disconnect (Figure 6)

1. Bolts (63), 1-2 accumulator housing (62), spring (59), plate (57), and gasket (58).
2. 1-2 Accumulator piston (61).
   - apply low air pressure (3 psi) to orifice in housing (62).



ILL. NO.	DESCRIPTION
64	SCREW, CONICAL WASHER ASSEMBLY
65	PAN, TRANSMISSION OIL
66	GASKET, PAN
67	SEAL, "O" RING (FILTER)
68	FILTER ASSEMBLY, TRANSMISSION OIL
85	MAGNET, CHIP COLLECTOR

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Figure 3 Oil Pan and Filter

3. 1-2 Accumulator piston seal ring (60).
4. Spacer plate and gaskets (56).
5. 3-4 Accumulator piston (49), spring (51), and pin (76).

Important

Note position of spring (51) and piston (49). Parts must be installed in the same position as removed.

6. Piston seal ring (50).
7. (8) Check balls (55).

Governor Assembly

Remove or Disconnect (Figure 7)

1. Bolts (44), governor cover (43), and gasket (42).
2. Governor assembly (41).
3. Speedometer assembly.

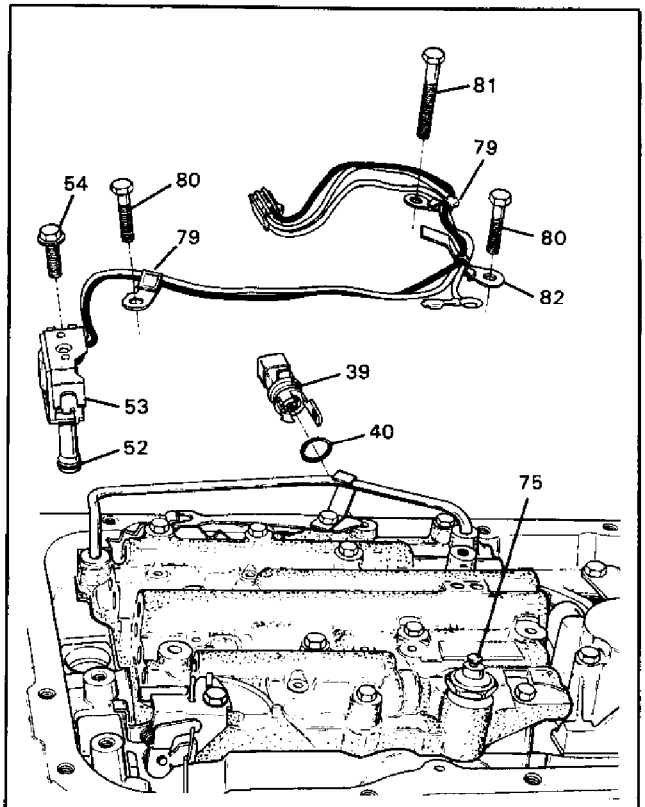
Intermediate Servo Assembly

Remove or Disconnect (Figures 8 and 9)

Tools Required

J-29714 Servo Cover Depressor

1. Install oil pan, retain with two bolts.
2. Install J-29714.
3. Retaining ring (15).
4. Servo cover (16) and "O" ring seal (17).
5. Servo piston (19) and band apply pin (27).
6. Remove J-29714.



39	CONNECTOR, ELECTRICAL
40	SEAL, "O" RING (ELECTRICAL CONNECTOR)
52	SEAL, "O" RING (SOLENOID)
53	SOLENOID ASSEMBLY
54	BOLTS, HEX WASHER HEAD M6 X 1 X 12.0
75	SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
79	CLIP, SOLENOID WIRE (2)
80	BOLT, M6 X 1 X 45
81	BOLT, M6 X 1 X 60
82	CLIP, FILTER RETAINER

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Figure 4 Solenoid and Electrical Connector

Servo Pin Length

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 intermediate band and drum for damage or wear when disassembled.

Measure (Figures 10 and 11)

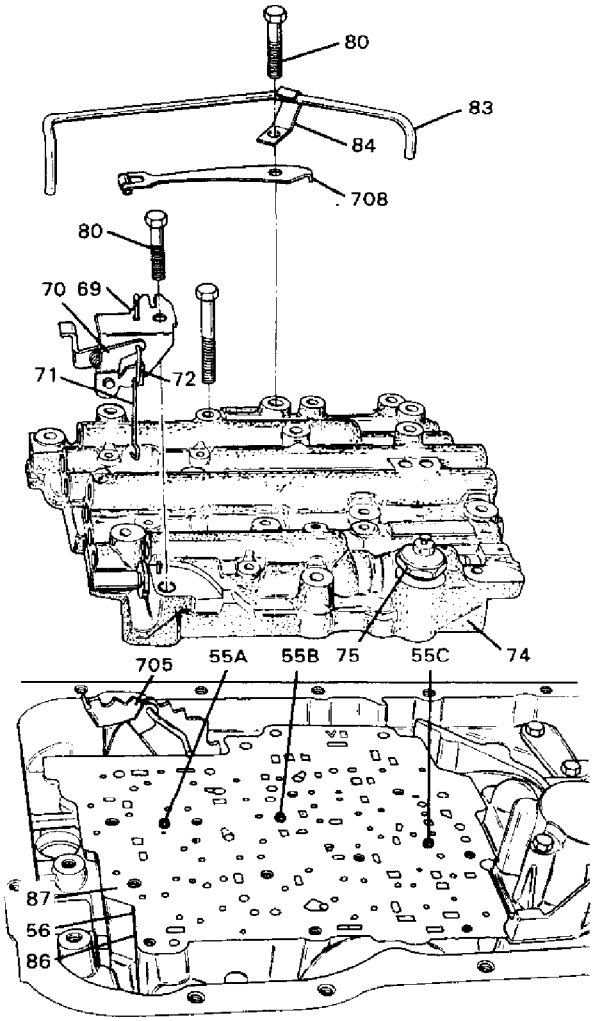
Tools Required

J-25014-1 Intermediate Band Apply Pin Gage

J-25014-2 Intermediate Band Apply Pin Gage

J-8001 Dial Indicator

1. Install J-25014-2 in the intermediate servo bore. Align retaining ring with case slot.
2. Insert J-25014-1 into J-25014-2.
   - Make sure tapered end of J-25014-1 is properly located against the band apply pin.
   - Make sure the band apply pin is located in the case.
3. Install J-8001. Position dial indicator stem against the zero post. Zero indicator.



ILL. NO.	DESCRIPTION
55A	CHECK BALL #11
55B	CHECK BALL #8
55C	CHECK BALL #12
56	PLATE, VALVE BODY SPACER
69	LEVER & BRACKET ASSEMBLY, THROTTLE
70	SPRING, LIFTER (T.V. EXHAUST VALVE)
71	LINK, THROTTLE LEVER TO CABLE
72	LIFTER, T.V. EXHAUST
75	SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
74	VALVE ASSEMBLY, CONTROL
80	BOLT, M6 X 1 X 45
83	PIPE, SIGNAL OIL
84	RETAINER, SIGNAL OIL PIPE
86	GASKET, SPACER PLATE TO CASE
87	GASKET, VALVE BODY TO SPACER PLATE
705	LINK, INSIDE DETENT (LEVER TO VALVE)
708	MANUAL DETENT ROLLER & SPRING ASSEMBLY

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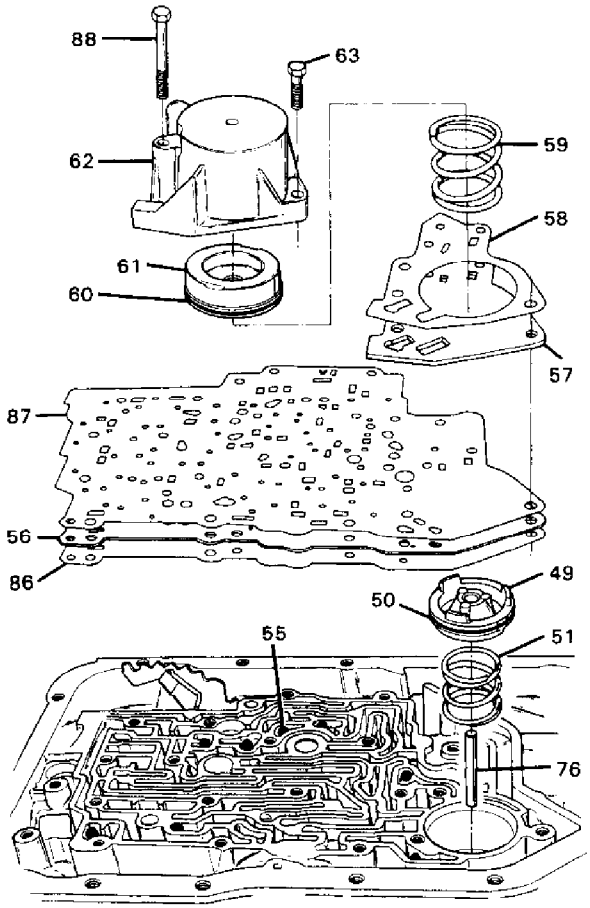
Figure 5 Removing Control Valve Assembly



ILL. NO.	DESCRIPTION
49	PISTON, 3-4 ACCUMULATOR
50	RING, OIL SEAL (3-4 ACCUMULATOR PISTON)
51	SPRING, 3-4 ACCUMULATOR
55	BALL, .25 DIAMETER
56	PLATE, VALVE BODY SPACER
57	PLATE, ACCUMULATOR
58	GASKET, ACCUMULATOR HSG. TO ACCUM. PLATE
59	SPRING, 1-2 ACCUMULATOR PISTON
60	RING, OIL SEAL (1-2 ACCUMULATOR PISTON)
61	PISTON, 1-2 ACCUMULATOR
62	HOUSING & PIN ASSEMBLY, 1-2 ACCUMULATOR
63	BOLT, ACCUMULATOR HOUSING
86	GASKET, SPACER PLATE TO CASE
87	GASKET, VALVE BODY TO SPACER PLATE
88	BOLT, ACCUMULATOR HOUSING

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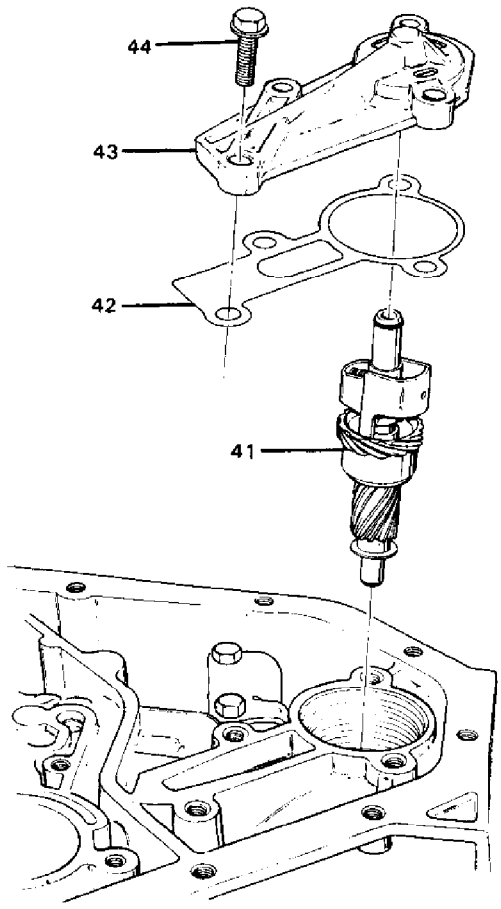
Figure 6 1-2 and 3-4 Accumulator Assembly



ILL. NO. DESCRIPTION

41 GOVERNOR ASSEMBLY, COMPLETE
42 GASKET, GOVERNOR COVER
43 COVER ASSEMBLY, GOVERNOR
44 SCREW, GOVERNOR COVER

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Figure 7 Removing Governor Assembly

J-25014-2 MUST SEAT SQUARELY AGAINST THE RETAINING RING.

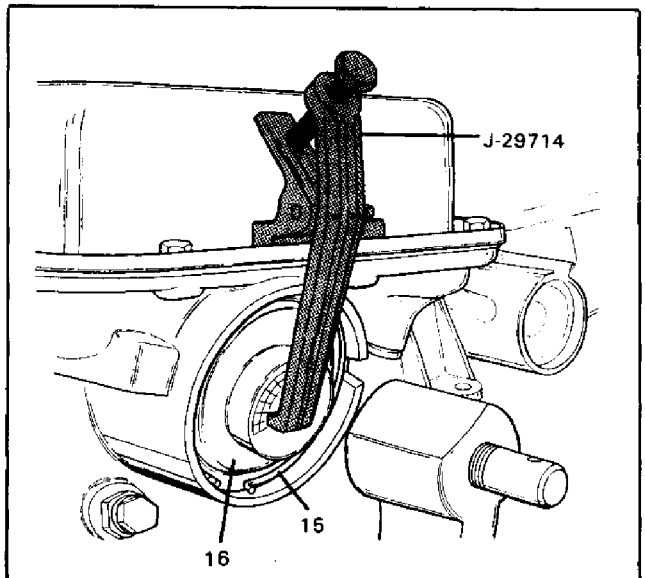
4. Align the stepped side of pin J-25014-1 with torquing arm of J-25014-2.
5. Apply 12 N·m (100 LBS.-IN.) of torque.
6. Position dial indicator stem over J-25014-1. Read dial indicator. See chart for proper servo pin.

Important

Dial indicator travel is reversed, making the indicator read backwards. On an indicator that ranges from 0-100, a .5 mm (0.020) travel will read .2mm (0.080"). A 1.5mm (0.060") travel will read 1mm (0.040").

Inspect (Figure 12)

- Third accumulator check valve assembly for:
  - missing check ball
  - binding or stuck check ball
  - oil feed slot missing or restricted
  - not seated in case



ILL. NO. DESCRIPTION

15 RING, SERVO COVER RETAINING
16 COVER, INTERMEDIATE SERVO

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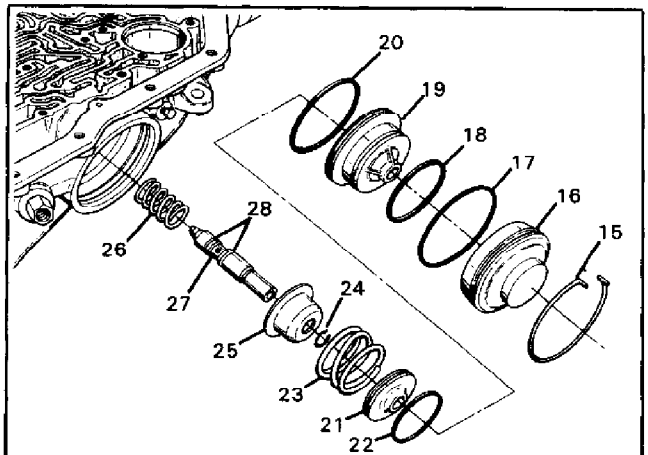
Figure 8 Removing Servo Cover



15 RING, SERVO COVER RETAINING
16 COVER, INTERMEDIATE SERVO
17 SEAL, "O" RING (INTERMEDIATE SERVO COVER)
18 RING, OIL SEAL (INNER)
19 PISTON, INTERMEDIATE SERVO (OUTER)
20 RING, OIL SEAL (OUTER)
21 PISTON, INTERMEDIATE SERVO (INNER)
22 RING, OIL SEAL PISTON (INNER)
23 SPRING, INTERMEDIATE SERVO CUSHION
24 RING, SNAP (APPLY PIN/RETAINER)
25 RETAINER, SERVO SPRING
26 SPRING, INTERMEDIATE SERVO (INNER)
27 PIN, INTERMEDIATE BAND APPLY (SELECTIVE)
28 RING, OIL SEAL (INTERMEDIATE BAND APPLY PIN)

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Figure 9 Intermediate Servo Assembly

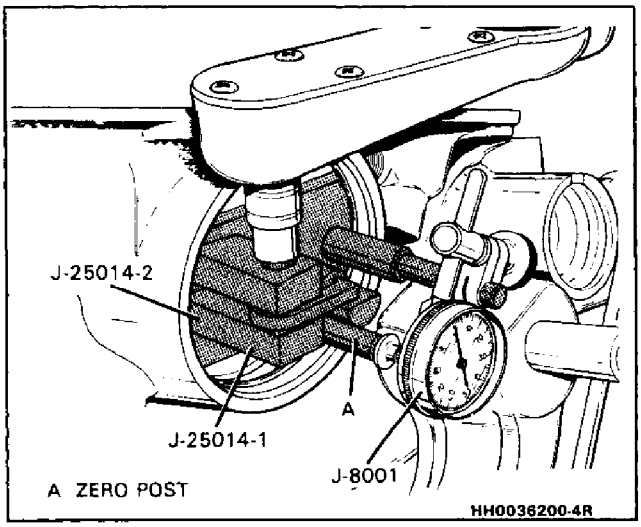

Figure 10 Checking for Proper Intermediate Band Apply Pin

INTERMEDIATE BAND APPLY PIN SELECTION CHART

DIAL INDICATOR TRAVEL		APPLY PIN IDENTIFICATION
.0 - .72mm	(.0" - .029")	1 GROOVE
.72 - 1.44mm	(.029" - .057")	2 GROOVES
1.44 - 2.16mm	(.057" - .086")	3 GROOVES
2.16 - 2.88mm	(.086" - .114")	NONE

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Figure 11 Intermediate Band Apply Pin Selection Chart

Third Accumulator Check Valve Removal

REMOVE THE THIRD ACCUMULATOR CHECK VALVE ONLY IF DAMAGED

Remove or Disconnect (Figure 13)

Tools Required

6.3 mm (#4) Easy Out Tap Handle

1. Insert easy out into third accumulator check valve assembly.
2. Pull straight out while turning tap handle.

Install or Connect (Figure 14)

Tools Required

9.5 mm (3/8") Metal Rod

1. Insert check valve (2) small end first, oil feed slot facing servo cover (16).
2. Seat check valve (2). Use a 9.5 mm (3/8") rod metal rod.

Overdrive Unit End Play Check

As a diagnostic aid, overdrive unit 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.

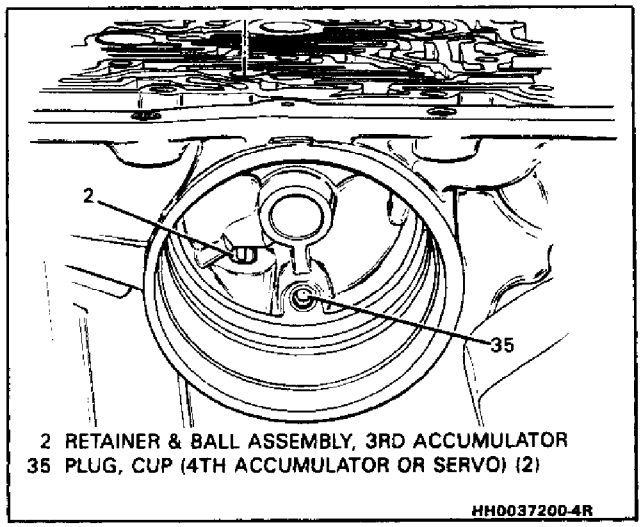

Figure 12 Third Accumulator Retainer and Ball Assembly

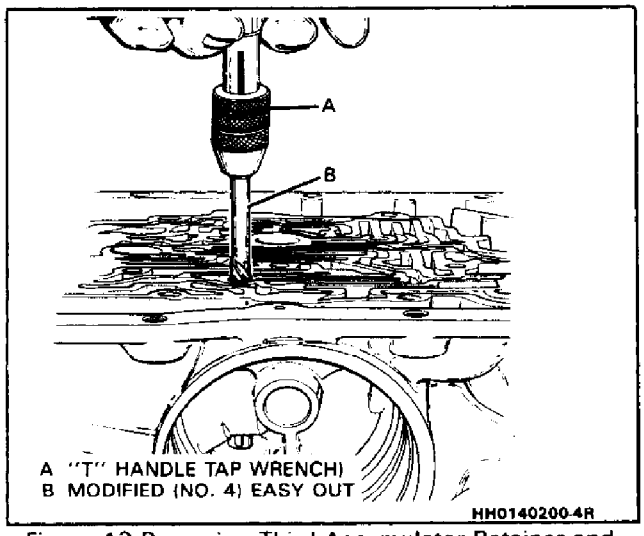

Figure 13 Removing Third Accumulator Retainer and Ball Assembly

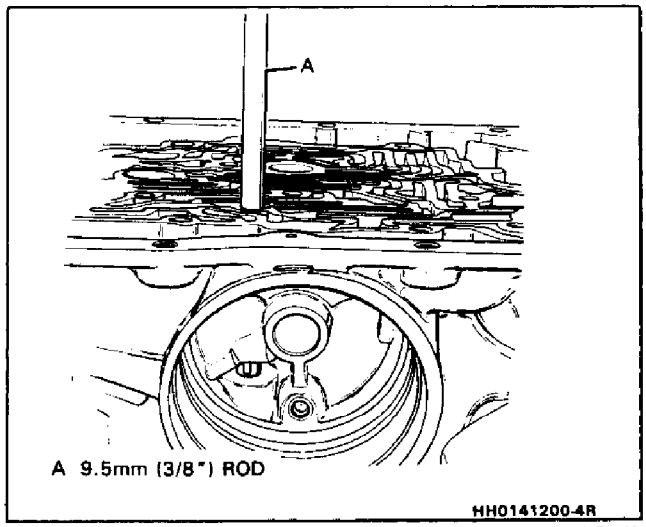

Figure 14 Installing Third Accumulator Retainer and Ball Assembly

Measure (Figures 15 and 16)

Tools required
J-8001 Dial Indicator
J-24773-A Oil Pump Remover and End Play Checking Fixture
J-25013-1 Output Shaft and Rear Unit Support Fixture
J-25022 End Play Fixture Adapter
J-25025-7A Post
J-29332 Output Shaft Support Fixture

1. Remove an oil pump bolt (5) and install 25025-7A.
2. Install J-25013-1 and J-29332-1 as shown.
3. Install J-25022 and J-24773-A as shown.
4. Install dial indicator
   - maintain approximately 3 lbs. of lifting force.
   - set indicator to zero.
   - increase lifting force to approximately 20 lbs.
   - end play should be 0.010-0.81 mm (.004"-.027")

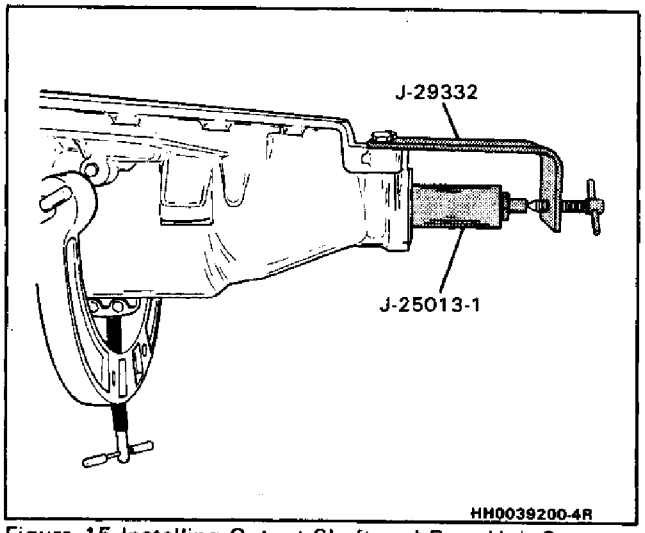

Figure 15 Installing Output Shaft and Rear Unit Support Fixture

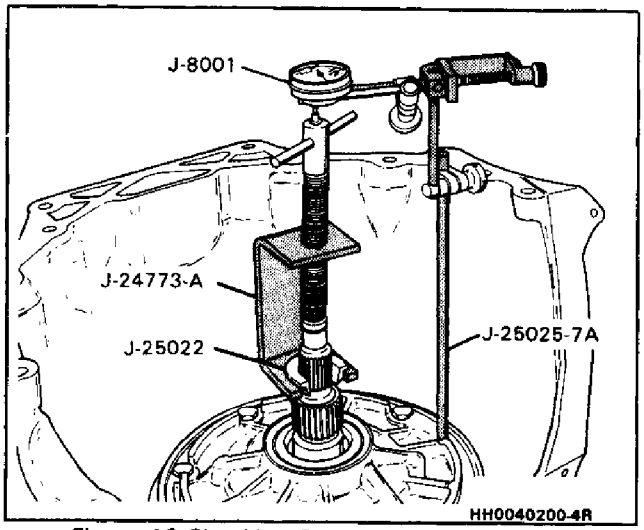

Figure 16 Checking Overdrive Unit End Play

OVERDRIVE UNIT END PLAY WASHER THICKNESS CHART

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
4.25-4.36mm	(0.167"-0.171")	0 - SCARLET
4.36-4.48mm	(0.172"-0.176")	1 - WHITE
4.49-4.60mm	(0.177"-0.180")	2 - COCOA BROWN
4.61-4.72mm	(0.181"-0.185")	3 - GRAY
4.73-4.84mm	(0.186"-0.190")	4 - YELLOW
4.85-4.96mm	(0.191"-0.195")	5 - LIGHT BLUE
4.97-5.08mm	(0.196"-0.200")	6 - PURPLE
5.09-5.20mm	(0.201"-0.204")	7 - ORANGE
5.21-5.32mm	(0.205"-0.209")	8 - GREEN

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Figure 17 Overdrive Unit Washer Thickness Chart

Remove or Disconnect (Figures 18 and 19)

Tools Required
J-24773-A Oil Pump Remover and End Play Checking Fixture

1. Oil Pump seal (201).
2. Bolts (5) and washers (6).
3. Install J-24773-A.
4. Oil Pump (7), seal ring (10), and gasket (11).
5. Oil deflector plate (542).

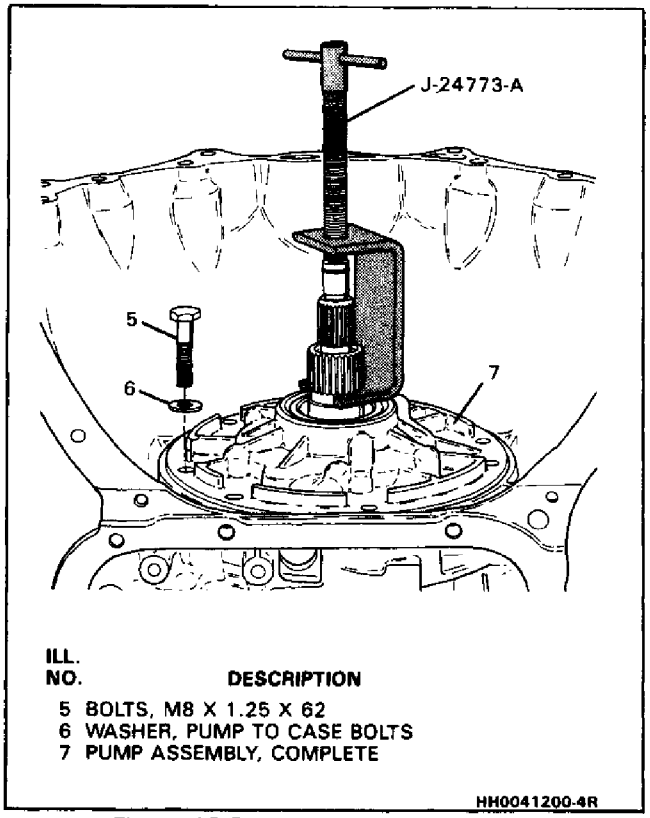
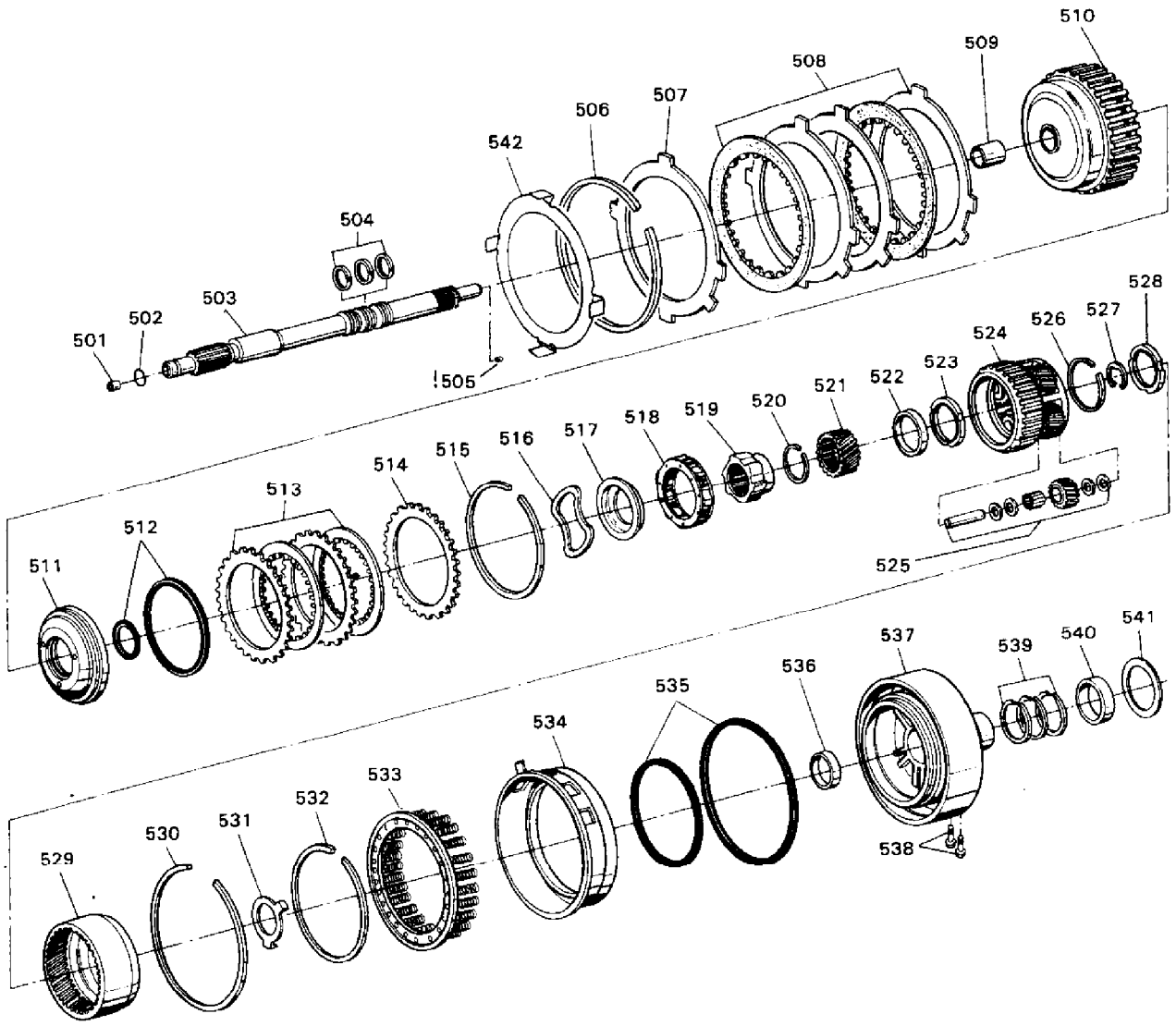


Figure 18 Removing Pump Assembly



ILL. NO.	DESCRIPTION
501	RETAINER & BALL ASSEMBLY, CHECK VALVE
502	SEAL, "O" RING (TURBINE SHAFT/SELECTIVE WASHER)
503	SHAFT, TURBINE
504	RING, OIL SEAL (TURBINE SHAFT)
505	PLUG, TURBINE SHAFT (4.80 DIA.)
506	RING, SNAP (4TH CLUTCH RETAINER IN CASE)
507	PLATE, 4TH CLUTCH BACKING
508	PLATE ASSEMBLY, 4TH CLUTCH
509	BUSHING, OVERRUN CLUTCH
510	HOUSING, OVERRUN CLUTCH ASSEMBLY
511	PISTON ASSEMBLY, OVERRUN CLUTCH
512	SEALS, OVERRUN CLUTCH (INNER/OUTER)
513	PLATE ASSEMBLY, OVERRUN CLUTCH
514	PLATE, OVERRUN CLUTCH BACKING
515	RING, SNAP (OVERRUN CLUTCH HOUSING)
516	SPRING, WAVE (OVERRUN CLUTCH RELEASE)
517	RETAINER, OVERRUN CLUTCH RELEASE SPRING
518	ROLLER ASSEMBLY, OVERDRIVE CLUTCH
519	CAM, OVERDRIVE ROLLER CLUTCH
520	RING, SNAP (OVERRUN CLUTCH HUB)
521	GEAR, OVERDRIVE SUN
522	BUSHING, OVERDRIVE CARRIER
523	BEARING ASSEMBLY, THRUST (CARRIER/SUN)
524	CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)
525	PINION ASSEMBLY, OVERDRIVE CARRIER
526	RING, SNAP (OVERDRIVE CARRIER)
527	RING, SNAP (TURBINE SHAFT/CARRIER)
528	BEARING ASM., THRUST (CARRIER/INTERNAL GEAR)
529	GEAR, OVERDRIVE INTERNAL
530	RING, SNAP (CENTER SUPPORT TO CASE)
531	WASHER, THRUST (INTERNAL GEAR/SUPPORT)
532	RING, SNAP (SUPPORT/4TH CLUTCH SPRING)
533	RETAINER & SPRING ASSEMBLY, 4TH CLUTCH
534	PISTON, 4TH CLUTCH
535	SEALS, 4TH CLUTCH (INNER & OUTER)
536	BUSHING, CENTER SUPPORT (29.8 O.D. X 11.0)
537	SUPPORT, CENTER
538	SCREW, FLANGED (MOD) M10 X 1.5 X 23.0
539	RING, OIL SEAL (CENTER SUPPORT)
540	BUSHING, CENTER SUPPORT (33.8 O.D. X 11)
541	WASHER, THRUST (SUPPORT/DIRECT CLUTCH)
542	PLATE, OIL DEFLECTOR

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Figure 19 Internal Components

Fourth Clutch Assembly

Remove or Disconnect (Figures 19 and 20)

1. Snap ring (506).
2. Overdrive (524) and fourth clutch plates (508) grasp turbine shaft (503) and lift.
3. Thrust bearing (528).
4. Overdrive internal gear (529).
5. Thrust washer (531).

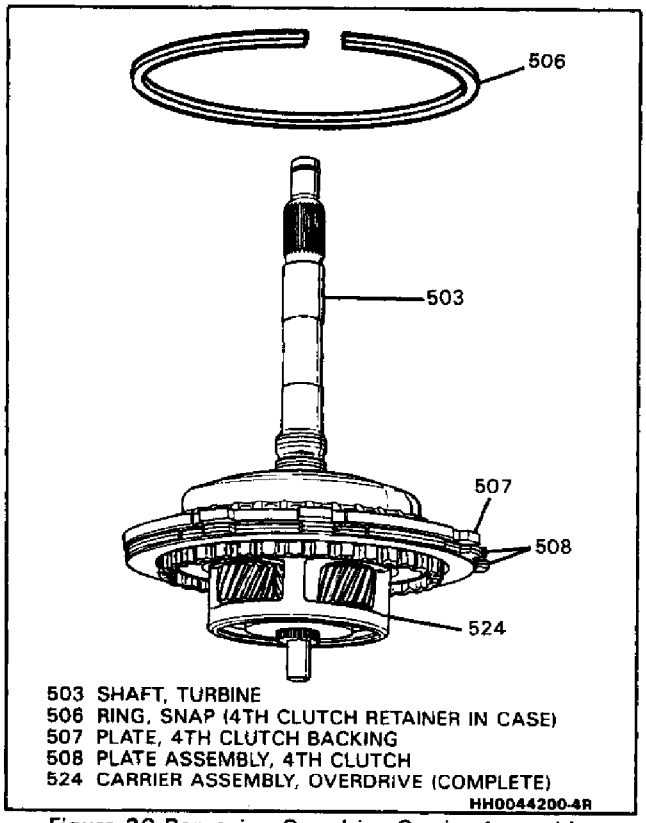

Figure 20 Removing Overdrive Carrier Assembly

Remove or Disconnect (Figure 21)

Tools Required
J-29334 Fourth Clutch Compressor

1. Install J-29334-1 on the fourth clutch spring and retainer(533).
2. Install J-29334-2 on the case.
3. Compress the fourth clutch spring and retainer(533).
4. Snap ring (532).
5. Remove J-29334.
6. Fourth clutch piston (534).

Forward Clutch Shaft End Play Check

As a diagnostic aid a forward clutch shaft end play should be made prior to removing. If the end play is not within specifications, inspect for possible worn or missassembled parts during disassembly.

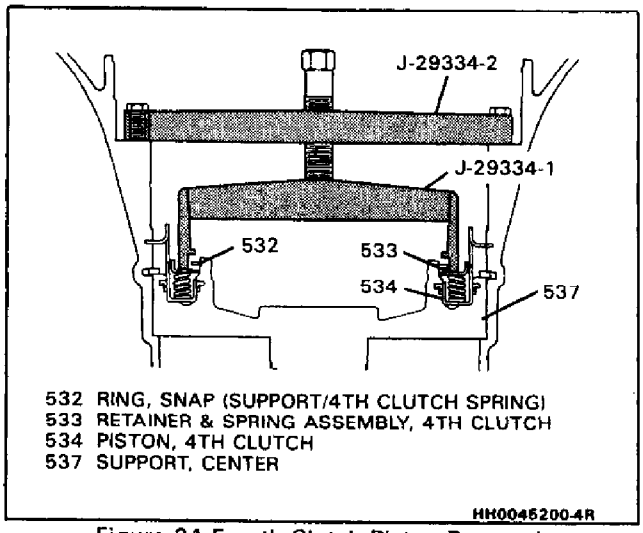

Figure 21 Fourth Clutch Piston Removal

Measure (Figure 22)

Tools Required
J-8001 Dial Indicator
J-25013 Output Shaft and Rear Unit Support Fixture
J-29332 Output Shaft Support Fixture
J-25025-7A Post
J-29337 Forward and Direct End Play Checking Devise

1. Push forward clutch shaft (618) down.
2. Install J-25013 and J-29332 as shown.
3. Install J-29337, J-25025-7A, and J-8001 as shown.
4. Turn adjusting screw on J-29332 until white/scribe line on J-25013-1 begins to disappear.
5. Zero dial indicator
   - lift on J-29337
   - end play should be 0.56mm-1.30mm(.022"-.051")
6. Remove J-8001, J-29337 and J-25025-7A.
   - Do not remove J-25013/J-29332

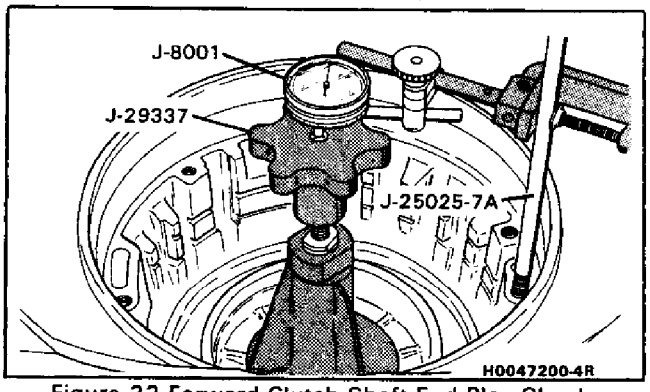

Figure 22 Forward Clutch Shaft End Play Check

Remove or Disconnect (Figures 24, 25, 26)

Tools Required
J-7004 Slide Hammer
J-29334 Center Support Remover

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
1.66-1.77mm	(0.065"-0.070")	1 - —
1.79-1.90mm	(0.070"-0.075")	2 - —
1.92-2.03mm	(0.076"-0.080")	3 - BLACK
2.05-2.16mm	(0.081"-0.085")	4 - LIGHT GREEN
2.18-2.29mm	(0.086"-0.090")	5 - SCARLET
2.31-2.42mm	(0.091"-0.095")	6 - PURPLE
2.44-2.55mm	(0.096"-0.100")	7 - COCOA BROWN
2.57-2.68mm	(0.101"-0.106")	8 - ORANGE
2.70-2.81mm	(0.106"-0.111")	9 - YELLOW
2.83-2.94mm	(0.111"-0.116")	10 - LIGHT BLUE
2.96-3.07mm	(0.117"-0.121")	11 - —
3.09-3.20mm	(0.122"-0.126")	12 - —
3.22-3.33mm	(0.127"-0.131")	13 - PINK
3.35-3.46mm	(0.132"-0.136")	14 - GREEN
3.48-3.59mm	(0.137"-0.141")	15 - GRAY

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Figure 23 Front Unit End Play Washer Thickness Chart

1. (2) Bolts (538).
2. Snap ring (530).
3. Install J-29334/J-7004. Use snap ring (532).
4. Center support (537).
5. Thrust washer (541).

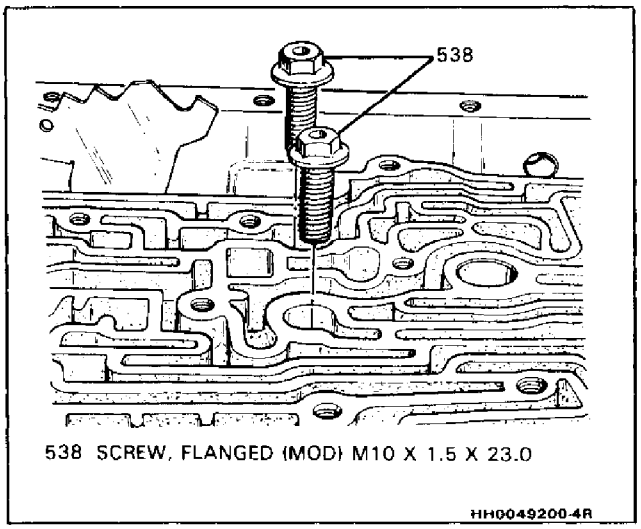

Figure 24 Removing Center Support Bolts

Forward and Direct Clutch Disassembly

Remove or Disconnect (Figures 27, 28, 29)

Tools Required

J-29337 Forward and Direct Clutch End Play Checking Device

1. Install J-29337 as shown.
2. Direct and Forward clutch assembly (604 and 618).
3. Direct clutch (604) from forward clutch (618).
4. Thrust washer (617).
5. Intermediate band assembly (602).
6. Band anchor pin (47).
7. Thrust washer (629).

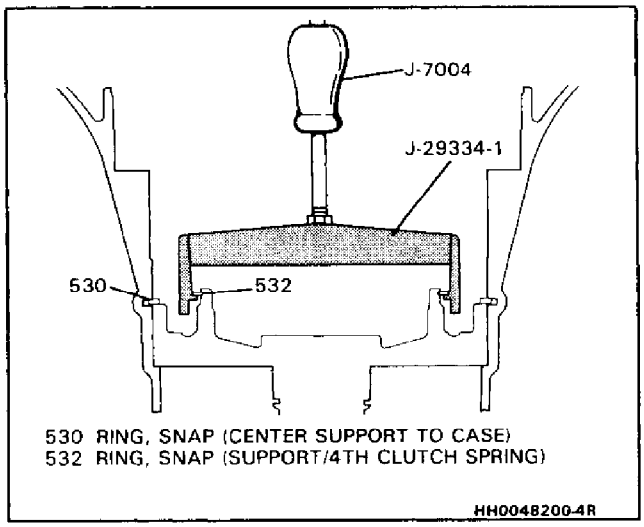

Figure 25 Removing Center Support

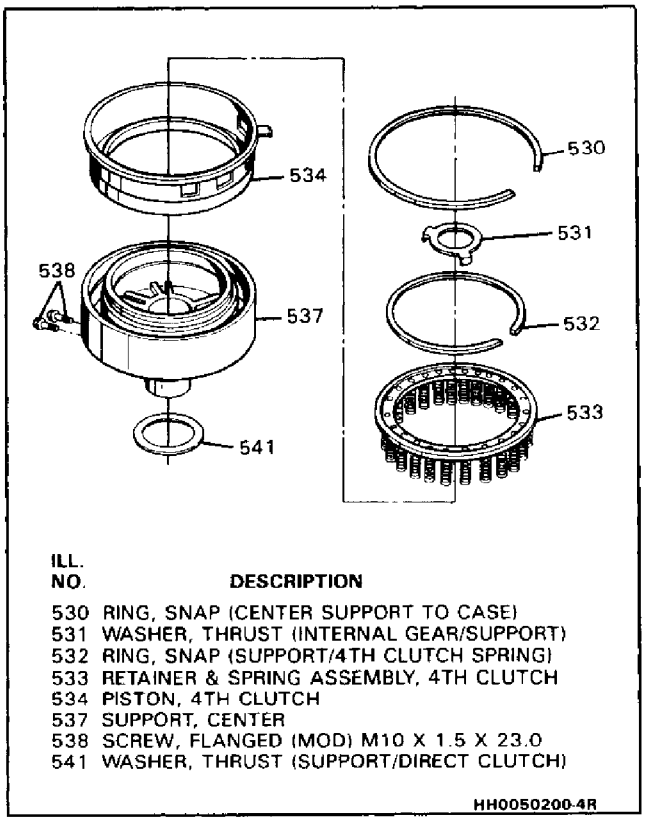

Figure 26 Center Support Assembly

Front Internal Gear to Output Shaft End Play

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

Measure (Figures 30 and 31)

Tools Required

J-8001 Dial Indicator
J-7057 Plunger Extension
J-25013 Output Shaft and Rear Unit Support Fixture
J-29332 Output Shaft Support Fixture Clamp

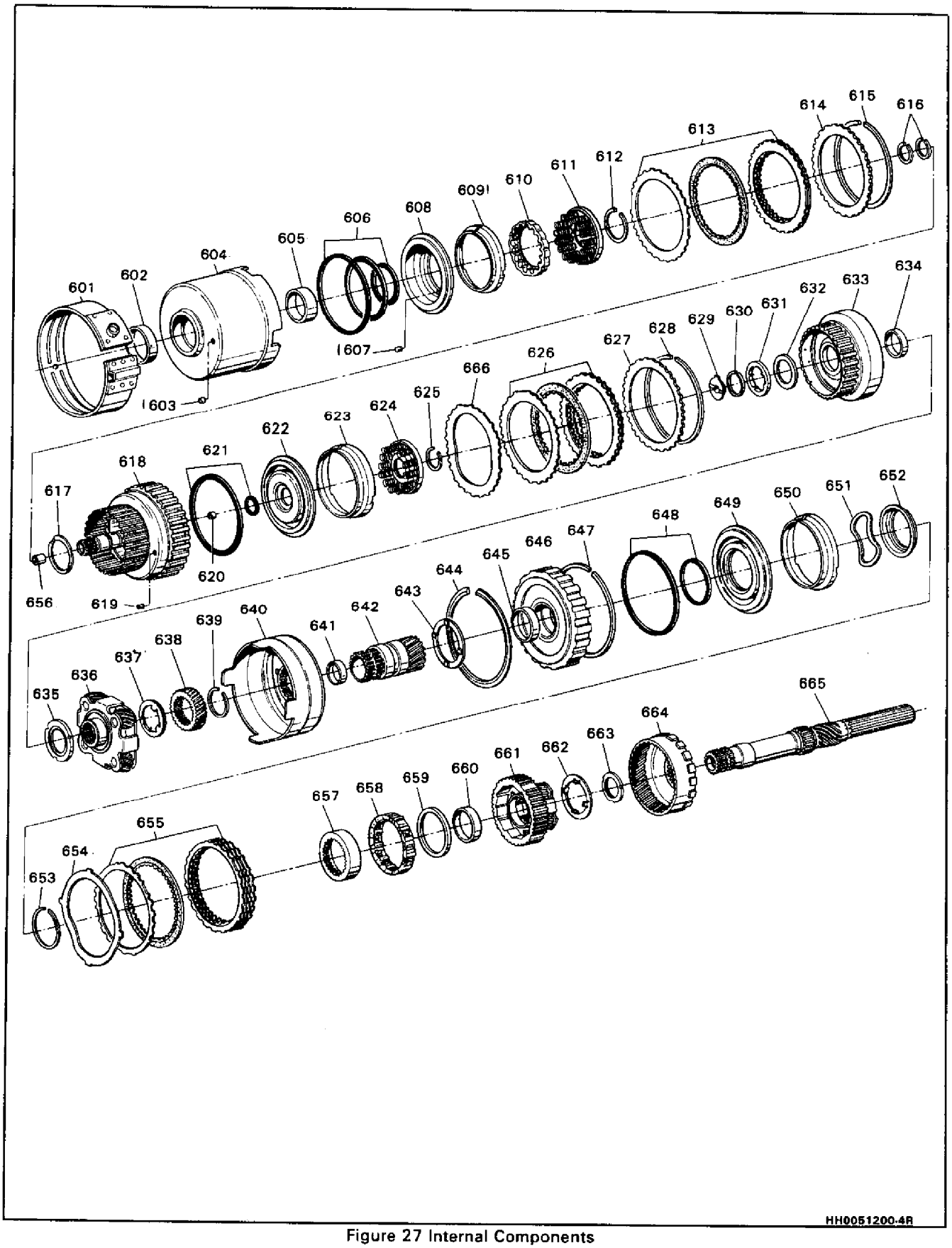

Figure 27 Internal Components

ILL. NO.	DESCRIPTION
601	BAND ASSEMBLY, INTERMEDIATE
602	BUSHING, DIRECT CLUTCH (FRONT)
603	RETAINER & BALL ASSEMBLY, CHECK VALVE
604	HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
605	BUSHING, DIRECT CLUTCH (REAR)
606	SEALS, DIRECT CLUTCH PISTON
607	RETAINER & BALL ASSEMBLY, CHECK VALVE
608	PISTON ASSEMBLY, DIRECT CLUTCH
609	RING, CLUTCH APPLY (DIRECT)
610	GUIDE, RELEASE SPRING
611	RETAINER & SPRING ASSEMBLY, DIRECT CLUTCH
612	RING, SNAP (SPRING RETAINER)
613	PLATE ASSEMBLY, DIRECT CLUTCH
614	PLATE, CLUTCH BACKING
615	RING, SNAP (DIRECT CLUTCH HOUSING)
616	SEALS, RING (FORWARD CLUTCH SHAFT) TEF
617	WASHER, THRUST (DIRECT/FORWARD CLUTCH)
618	HOUSING ASSEMBLY, FORWARD CLUTCH
619	RETAINER & BALL ASSEMBLY, CHECK VALVE
620	PLUG, CUP (4.8 DIAMETER)
621	SEALS, FORWARD CLUTCH PISTON (PACKAGE)
622	PISTON ASSEMBLY, FORWARD CLUTCH
623	RING, CLUTCH APPLY (FORWARD)
624	RETAINER & SPRING ASSEMBLY, FORWARD
625	RING, SNAP (FORWARD SPRING RETAINER)
626	PLATE, FORWARD CLUTCH (FLAT)
627	PLATE, CLUTCH BACKING
628	RING, SNAP (FORWARD CLUTCH HOUSING)
629	WASHER, THRUST (FORWARD CL./OUTPUT) (SEL.)
630	RING, SNAP (OUTPUT SHAFT)
631	WASHER, THRUST (SELECTIVE REAR)
632	WASHER, THRUST (INTERNAL GEAR/REAR SEL.)
633	GEAR, FRONT INTERNAL
634	BUSHING, FRONT INTERNAL GEAR
635	BEARING ASM., ROLLER (INTERNAL GEAR/CARRIER)
636	CARRIER ASSEMBLY, FRONT (COMPLETE)
637	BEARING ASSEMBLY, THRUST (FRT. CARRIER/SUN)
638	GEAR, FRONT SUN
639	RING, SNAP (INPUT DRUM/REAR SUN)
640	DRUM, INPUT
641	BUSHING, REAR SUN GEAR
642	GEAR, REAR SUN
643	WASHER, THRUST (INPUT DRUM/HOUSING)
644	RING, SNAP (HOUSING/CASE)
645	BUSHING, LO & REVERSE HOUSING
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
647	SPACER, HOUSING TO CASE
648	SEALS, LO & REVERSE PISTON (INNER/OUTER)
649	PISTON ASSEMBLY, LO & REVERSE CLUTCH
650	RING, CLUTCH APPLY (13.13mm)
651	SPRING, WAVE (REVERSE CLUTCH RELEASE)
652	RETAINER, LO & REVERSE CLUTCH SPRING
653	RING, SNAP (RETAINER/HOUSING)
654	PLATE, LO & REVERSE CLUTCH (WAVE)
655	PLATE, LO & REVERSE CLUTCH (1.969 MST)
656	BUSHING, FORWARD CLUTCH HOUSING
657	RACE, LO ROLLER CLUTCH
658	ROLLER ASSEMBLY, LO CLUTCH
659	BEARING, THRUST (REAR CAM/LO RACE)
660	BUSHING, REAR CARRIER (53.13 X 9.53)
661	CARRIER ASSEMBLY, REAR (COMPLETE)
662	WASHER, THRUST (REAR CARRIER/INTERNAL GEAR)
663	BEARING ASSEMBLY, ROLLER THRUST (SUN/INT.)
664	GEAR, REAR INTERNAL
665	SHAFT, OUTPUT
666	PLATE, CLUTCH 1.585 (WAVED)

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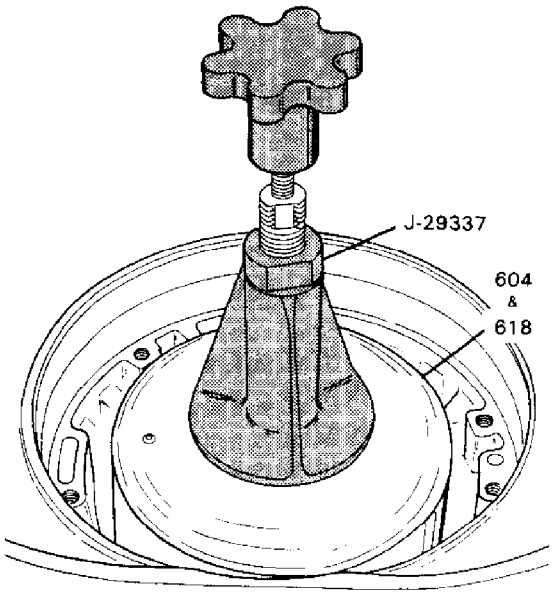
Figure 27L Legend



ILL. NO.	DESCRIPTION
604	HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
618	HOUSING ASSEMBLY, FORWARD CLUTCH

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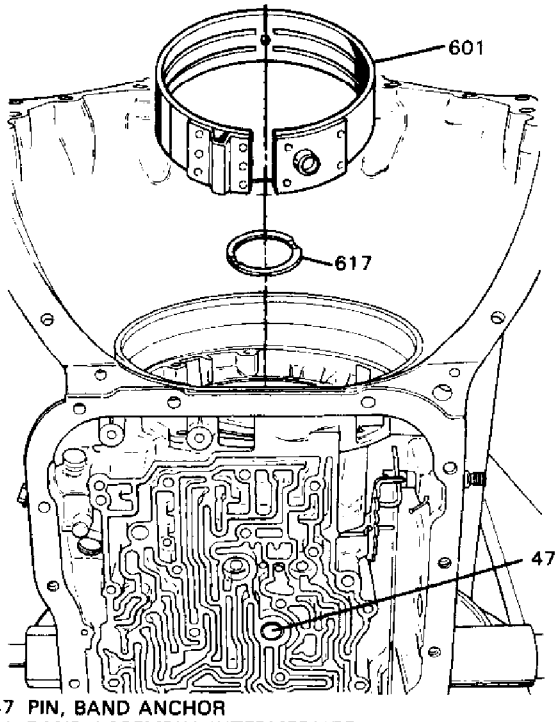
Figure 28 Removing Forward and Direct Clutch Housing



47 PIN, BAND ANCHOR
601 BAND ASSEMBLY, INTERMEDIATE
617 WASHER, THRUST

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Figure 29 Removing Intermediate Band

1. Install clamp, J-7057, and J-8001 as shown.
2. Position J-7057 against the output shaft (665).
   - Zero dial indicator.
3. Turn the adjusting screw on J-29332 until white/scrib line begins to disappear.
4. Read dial indicator.
   End play should be 0.10mm-0.51mm(.004"-.025").

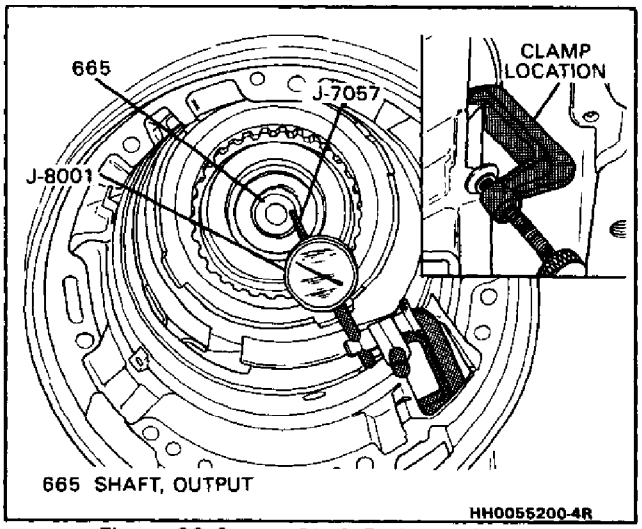

Figure 30 Output Shaft End Play Check

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
2.90-3.01mm	(0.114"-0.119")	1 - ORANGE
3.08-3.19mm	(0.121"-0.126")	2 - WHITE
3.26-3.37mm	(0.128"-0.133")	3 - YELLOW
3.44-3.55mm	(0.135"-0.140")	4 - BLUE
3.62-3.73mm	(0.143"-0.147")	5 - RED
3.80-3.91mm	(0.150"-0.154")	6 - BROWN
3.98-4.09mm	(0.157"-0.161")	7 - GREEN
4.16-4.27mm	(0.164"-0.168")	8 - BLACK
4.34-4.45mm	(0.171"-0.175")	9 - PURPLE

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Figure 31 Rear Unit End Play Washer Thickness Chart

Remove or Disconnect (Figure 32)

1. Snap ring (630), selective washer (631), and thrust washer (632).
2. Front internal gear (633).
3. Front carrier (636) and roller bearing (635).
4. Front sun gear (638) and thrust bearing (637).
   - Thrust bearing (637) has only one thrust race.
5. Input drum (640) and rear sun gear (642).
6. Tanged thrust washer (643).

Remove or Disconnect (Figures 33 and 34)

Tools Required

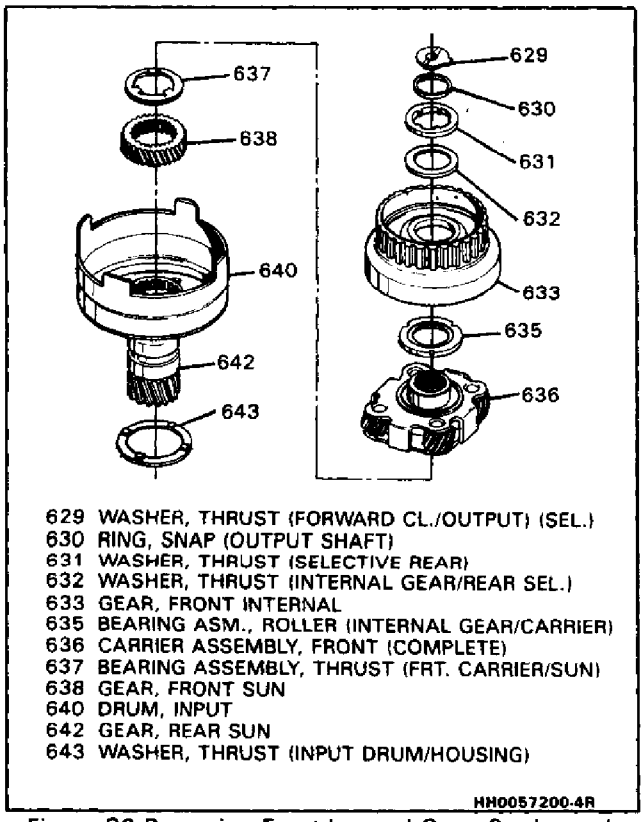


Figure 32 Removing Front Internal Gear, Carrier and Input Drum

#4 Easy out
"T" Handle Tap Wrench
J-28542 Reverse Clutch Housing Remover and Installer

1. Modify 6.3mm (#4) easy out as follows:
   - Grind approximately 20mm (3/4") from the end.
2. Insert the easy out into the case cup plug (46).
3. Case cup plug (46).

DO NOT REUSE CASE CUP PLUG

4. Snap ring (644).
   - Beveled side should be facing up.
5. Install J-28542 as shown.
6. Lo and reverse clutch housing (646).
7. Spacer (647).

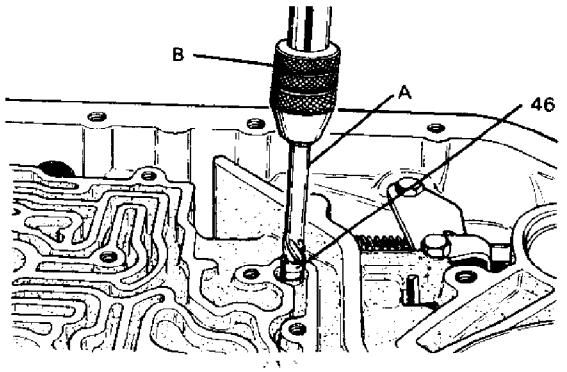
Rear Carrier Removal

Remove or Disconnect (Figures 35 and 36)

1. Output shaft assembly (665).
2. Roller clutch (657/658) and rear carrier (661).
3. Thrust washer (662).
4. Wave plate (654) and Lo-reverse clutch plates (655).
5. Thrust washer (663).

NOTICE: The internal gear is pressed onto the output shaft. DO NOT REMOVE.

6. Rear internal gear (664).
7. Output shaft seal (33), if necessary.



A MODIFIED (NO. 4) EASY-OUT
B "T" HANDLE TAP WRENCH
46 SEAL, REVERSE OIL (CASE TO HOUSING)

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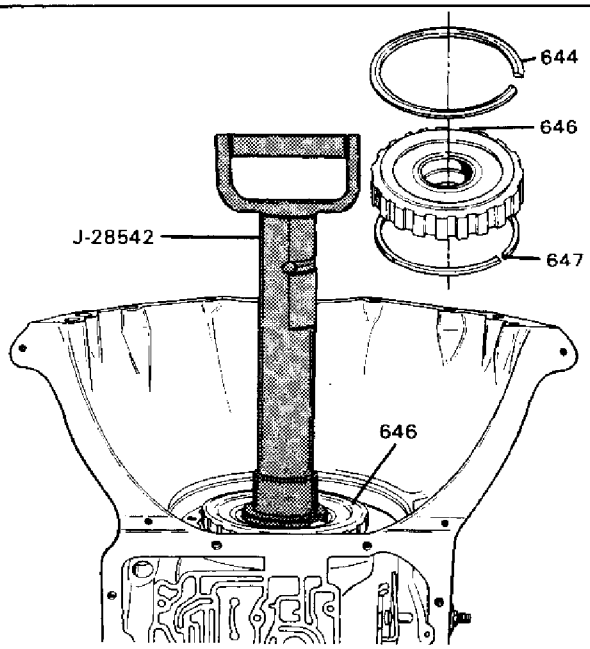
Figure 33 Removing Reverse Oil Seal



ILL. NO.	DESCRIPTION
644	RING, SNAP (HOUSING/CASE)
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
647	SPACER, HOUSING TO CASE

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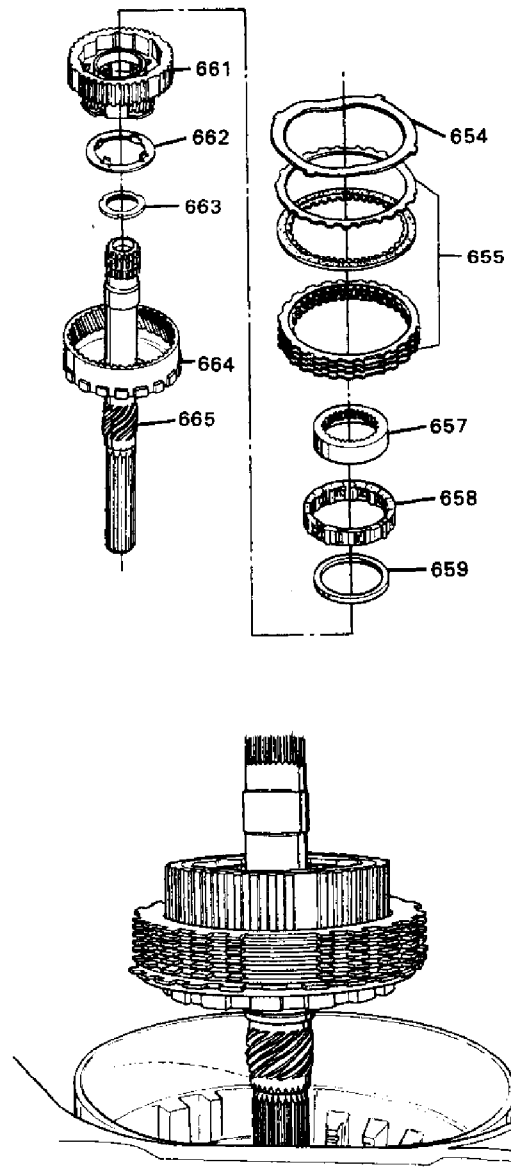
Figure 34 Removing Lo and Reverse Clutch Housing

Manual Shaft and Parking Pawl

Remove or Disconnect (Figures 37 and 38)

1. Hex nut (707) and inside detent lever (704).
2. Parking Brake actuator rod assembly (709) and inside detent lever (704).
3. Retaining pin (703).
4. Manual shaft (702).
5. Manual valve link (705) and clip (706), if necessary.
6. Manual shaft seal (701).



ILL. NO.	DESCRIPTION
654	PLATE, LO & REVERSE CLUTCH (WAVE)
655	PLATE, LO & REVERSE CLUTCH (1.969 MST)
657	RACE, LO ROLLER CLUTCH
658	ROLLER ASSEMBLY, LO CLUTCH
659	BEARING, THRUST (REAR CAM/LO RACE)
661	CARRIER ASSEMBLY, REAR (COMPLETE)
662	WASHER, THRUST (REAR CARRIER/INTERNAL GEAR)
663	BEARING ASSEMBLY, ROLLER THRUST (SUN/INT.)
664	GEAR, REAR INTERNAL
665	SHAFT, OUTPUT

HH0060200-4R

Figure 35 Removing Output Shaft, Rear Internal Gear and Carrier Assemblies

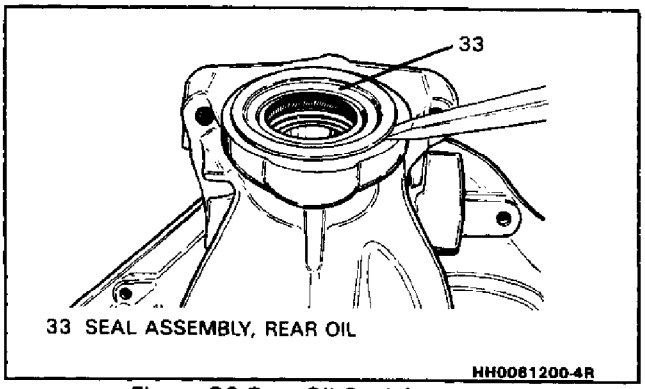
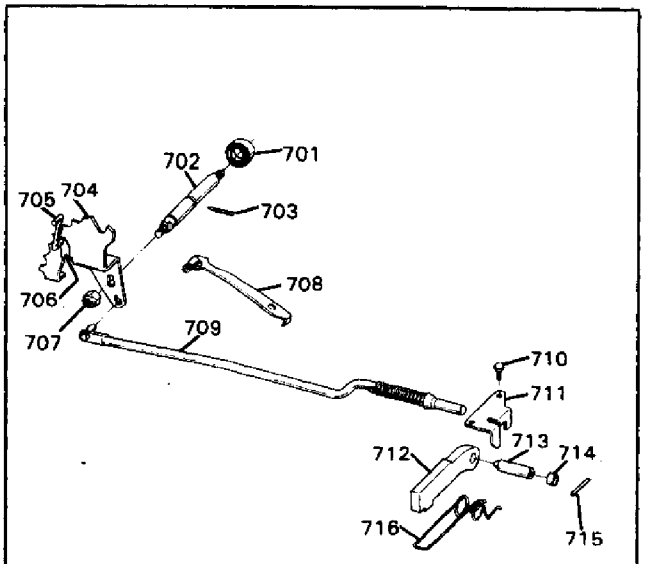


Figure 36 Rear Oil Seal Assembly



ILL. NO.	DESCRIPTION
701	SEAL, MANUAL SHAFT
702	SHAFT, MANUAL
703	PIN, RETAINING (MANUAL SHAFT TO CASE)
704	LEVER, INSIDE DETENT
705	LINK, INSIDE DETENT (LEVER TO VALVE)
706	CLIP, LINK TO DETENT LEVER
707	NUT, HEX
708	MANUAL DETENT ROLLER & SPRING ASSEMBLY
709	ROD ASSEMBLY, PARKING LOCK
710	BOLT, PARK BRAKE BRACKET TO CASE (M8 X 1.25 X 20)
711	BRACKET, PARKING BRAKE
712	PAWL, PARKING BRAKE
713	SHAFT, PARKING BRAKE PAWL
714	PLUG, STEEL CUP (.38 DIAMETER)
715	PIN, SLOTTED SPRING
716	SPRING, PARKING PAWL RETURN

HH0062200-4R

Figure 37 Manual Shaft and Detent Lever Assemblies

Remove or Disconnect (Figures 37 and 39)

Tools Required

Modified #4 Easy Out

1. Modify #4 easy out as follows:
   - grind off appromxiately 20mm (3/4") from the end.

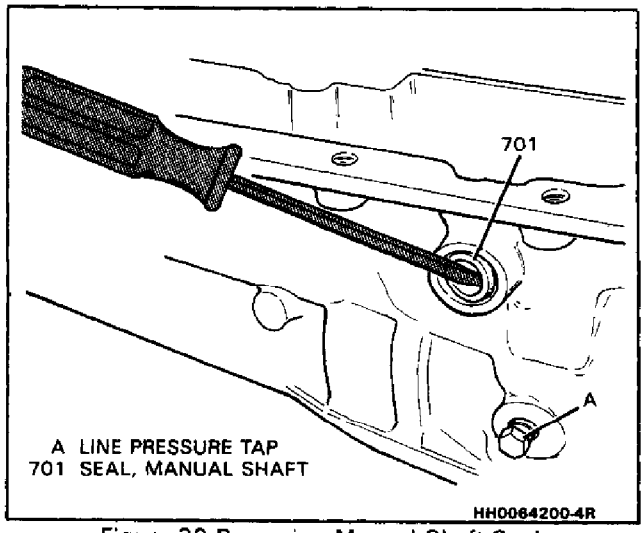
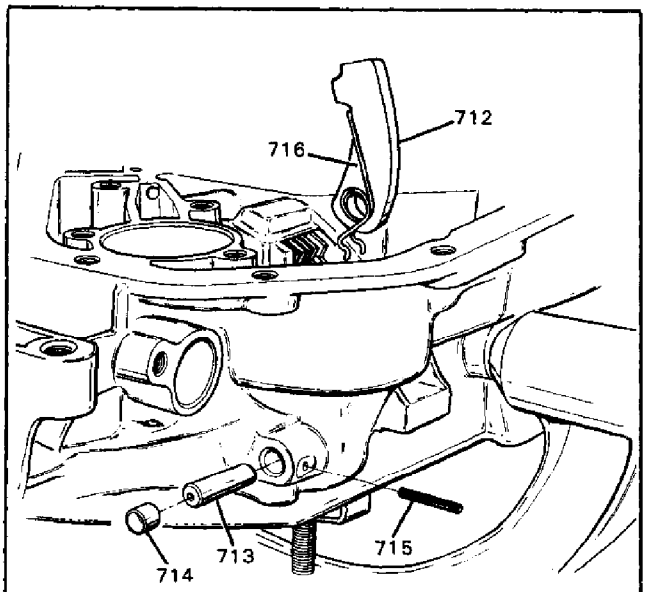


Figure 38 Removing Manual Shaft Seal

2. Bolts (710) and parking brake bracket (711).
3. Retaining pin (715) and cup plug (714). Use modified #4 easy out.
4. Parking pawl shaft (713).Use modified #4 easy out.
5. Parking pawl (712) and spring (716).



ILL. NO.	DESCRIPTION
712	PAWL, PARKING BRAKE
713	SHAFT, PARKING BRAKE PAWL
714	PLUG, STEEL CUP (.38 DIAMETER)
715	PIN, SLOTTED SPRING
716	SPRING, PARKING PAWL RETURN

HH0063200-4R

Figure 39 Removing Parking Pawl

Component Repair and Transmission Assembly

Inspect

- Case (12) exterior for cracks or porosity

- Case to valve body face for interconnected oil passages or damage
- Air check all oil passages
- 3-4 accumulator bore for:
  - sharp edges
  - porosity
  - damage
- Intermediate servo bore for:
  - sharp edges
  - damage
  - porosity
  - orifice for debris
- Governor bore for:
  - sharp edges
  - porosity
  - damage
- Speedometer bore for:
  - sharp edges
  - damage
- All bolt hole threads for damage
  - heli-coil to repair
- Case interior for:
  - damaged ring grooves or casting flash
  - clutch plate lugs worn or damaged
  - Bushing scored, worn, or damaged (see Bushing Replacement)

Manual Shaft and Parking Pawl

Inspect

- Actuator rod (709) for damage
- Inside detent lever (704) for damage or cracks
- Manual shaft (702) for damage or burrs

Install or Connect (Figures 40 and 41)

1. Parking pawl (712) and spring (716).
2. Parking pawl shaft (713) into case (12) and parking pawl (712).
3. Retaining pin (715) and cap plug (714).
   - CHECK FOR PROPER OPERATION
4. Bolts (710) and parking brake bracket (711).
   - Torque to 24 N·m (18 lbs.-ft.)
5. Actuator rod (709) and inside detent lever (704).

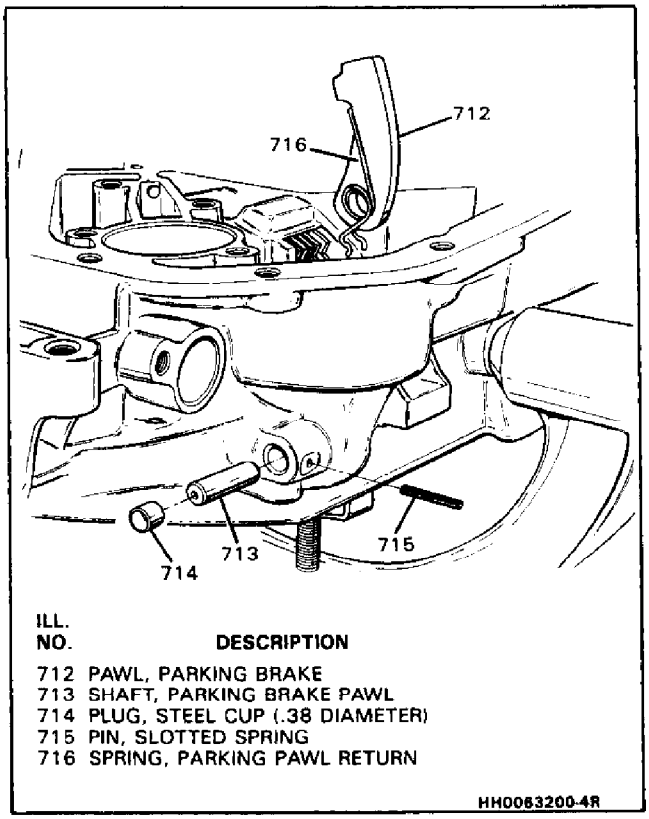
Install or Connect (Figures 40 and 41)

1. Manual shaft seal (701). Lubricate seal lip.
2. Manual shaft (702), identification ring groove first.
3. Retaining pin (703) and hex nut (707).
   - Torque to 31 N·m (23 lbs.-ft.)

Rear Carrier

Inspect

- Journals and snap ring grooves for wear or damage
- Lubrication passages for restrictions
- Splines for damage



ILL. NO.	DESCRIPTION
712	PAWL, PARKING BRAKE
713	SHAFT, PARKING BRAKE PAWL
714	PLUG, STEEL CUP (.38 DIAMETER)
715	PIN, SLOTTED SPRING
716	SPRING, PARKING PAWL RETURN

HH0063200-4R

Figure 40 Installing Parking Pawl

- Governor drive gear for chipped or cracked teeth

Install or Connect (Figure 42)

Tools Required

J-21426 Seal Installer

Rear Internal Gear

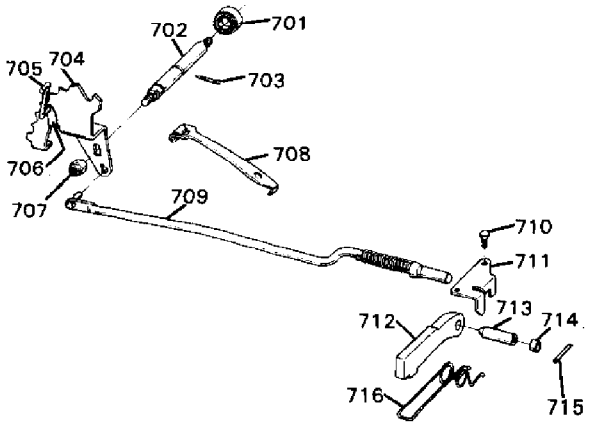
The rear internal gear is pressed onto the output shaft and is not removed. These units are serviced as an assembly.

Inspect

- Rear internal gear for:
  - worn or damaged splines
  - worn or scored bearing surfaces
  - worn or damaged parking pawl lugs
- Rear internal gear for:
  - worn or damaged splines
  - worn or scored bearing surfaces
  - worn or damaged parking pawl lugs
- Rear internal gear to rear sun gear thrust washer for:
  - pitting
  - scoring
  - damage

Assemble (Figure 43)

1. Rear internal gear (664) pressed onto the output shaft (665).



ILL. NO.	DESCRIPTION
701	SEAL, MANUAL SHAFT
702	SHAFT, MANUAL
703	PIN, RETAINING (MANUAL SHAFT TO CASE)
704	LEVER, INSIDE DETENT
705	LINK, INSIDE DETENT (LEVER TO VALVE)
706	CLIP, LINK TO DETENT LEVER
707	NUT, HEX
708	MANUAL DETENT ROLLER & SPRING ASSEMBLY
709	ROD ASSEMBLY, PARKING LOCK
710	BOLT, PARK BRAKE BRACKET TO CASE (M8 X 1.25 X 20)
711	BRACKET, PARKING BRAKE
712	PAWL, PARKING BRAKE
713	SHAFT, PARKING BRAKE PAWL
714	PLUG, STEEL CUP (.38 DIAMETER)
715	PIN, SLOTTED SPRING
716	SPRING, PARKING PAWL RETURN

HH0062200-4R

Figure 41 Manual Shaft and Detent Lever Assemblies

2. Thrust bearing (663). Inside diameter of race against gear.

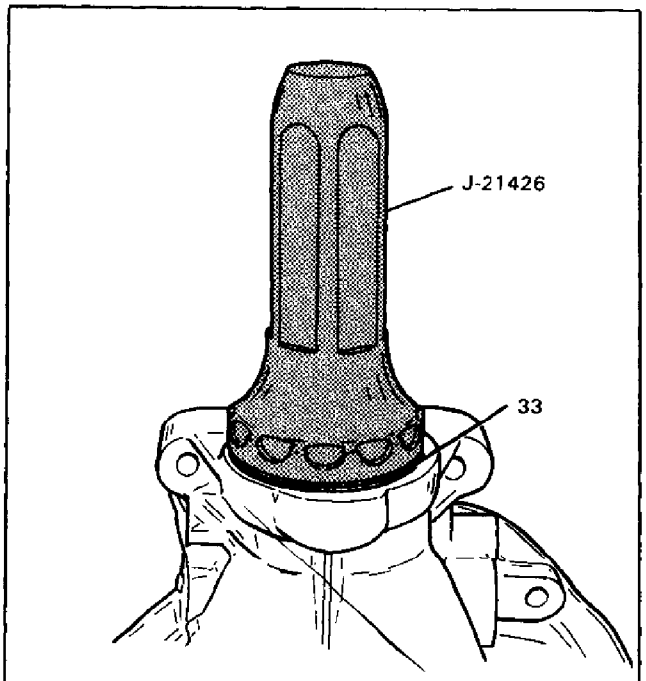
Roller Clutch and Rear Carrier

Disassemble

1. Roller clutch race (657).
2. Roller clutch (658).
3. Thrust washer (659).

Inspect

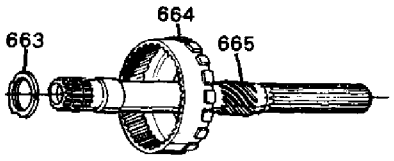
- Roller clutch for:
  - pitting
  - scoring
  - heat damage
- Roller clutch for:
  - missing rollers or springs
  - wear or damage
- Thrust washer for:
  - scoring
  - pitting
  - damage



ILL. NO.	DESCRIPTION
33	SEAL ASSEMBLY, REAR OIL

HH0065200-4R

Figure 42 Installing Rear Output Seal



ILL. NO.	DESCRIPTION
663	BEARING ASSEMBLY, ROLLER THRUST (SUN/INT.)
664	GEAR, REAR INTERNAL
665	SHAFT, OUTPUT

HH0066200-4R

Figure 43 Rear Internal Gear and Output Shaft Assembly

- Tanged thrust washer for:
  - pitting
  - scoring
  - damage
- Bushing for scoring or damage (See Bushing Replacement)

Measure

- Check pinion clearance as shown. End play should be .024mm-0.060mm (.009"-.024").

Inspect

- Pinions for:
  - rough bearings
  - cracked or chipped teeth

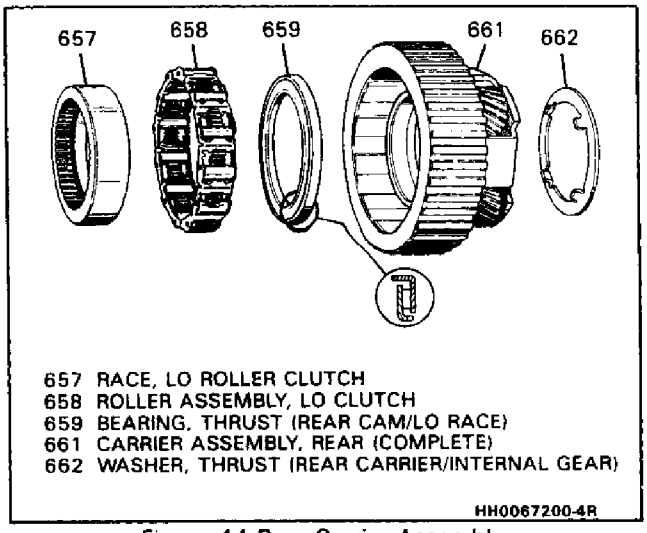


Figure 44 Rear Carrier Assembly

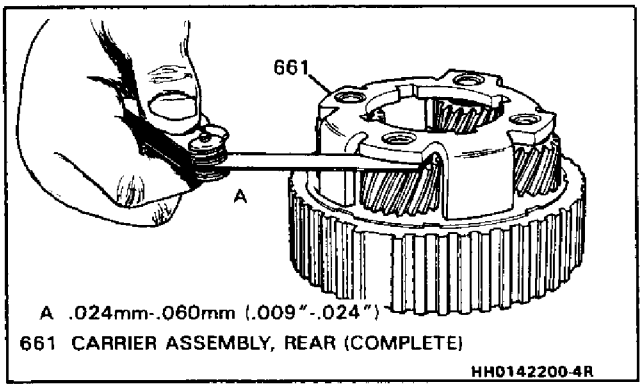


Figure 45 Checking Rear Carrier Pinion End Play

Assemble (Figure 46)

1. Thrust bearing (663).
2. .Compress spring with forefinger and install roller.
3. Roller clutch (658) into rear carrier (661).
4. Roller clutch race (657) with splines facing up.
5. Tanged thrust washer (662). Use petrolatum to retain in position.
6. Rear carrier assembly (661) into the rear internal gear (664).

Assemble (Figures 47 and 48)

Tools Required

J-25013 Output Shaft and Rear Unit Support Fixture

J-29332 Output Support Fixture

1. Install J-25013 and J-29332 as shown.
2. Output shaft assembly (665) into case(12).
3. Align parking pawl (712) and parking pawl lugs.
4. Use J-29332 to align internal gear parking lugs flush with the parking pawl (712).

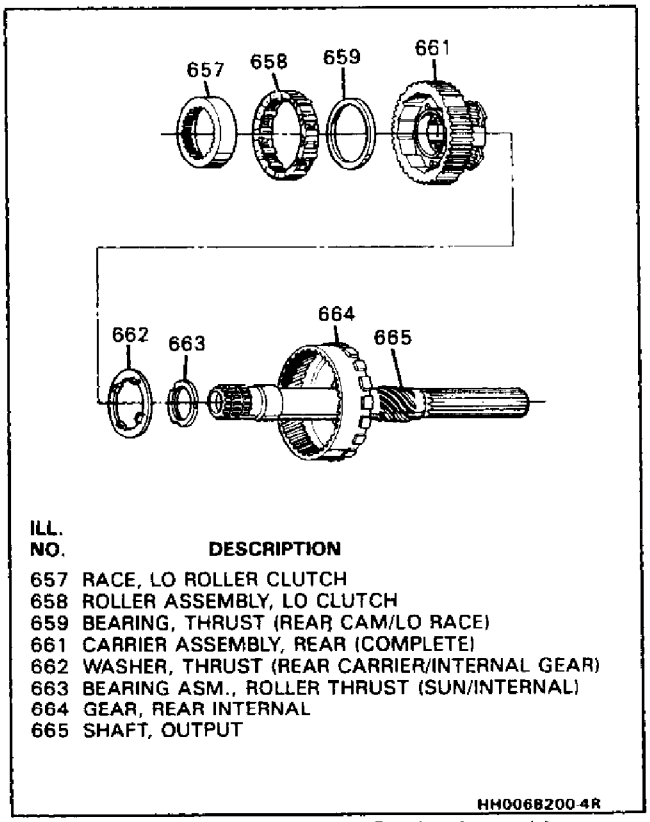


Figure 46 Installing Rear Carrier Assembly

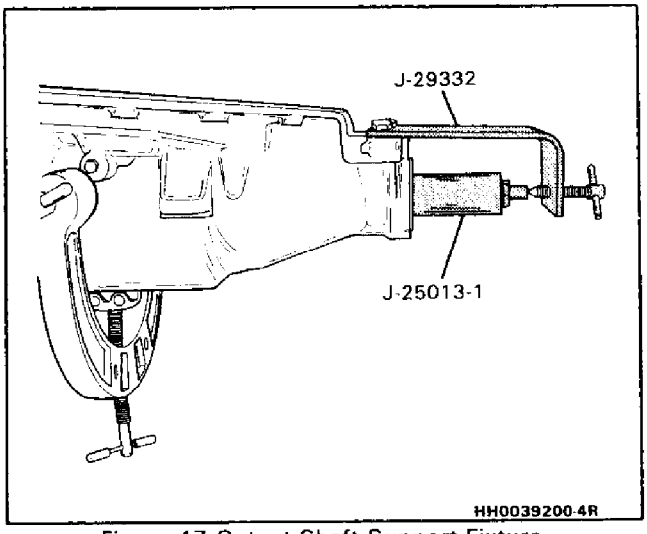


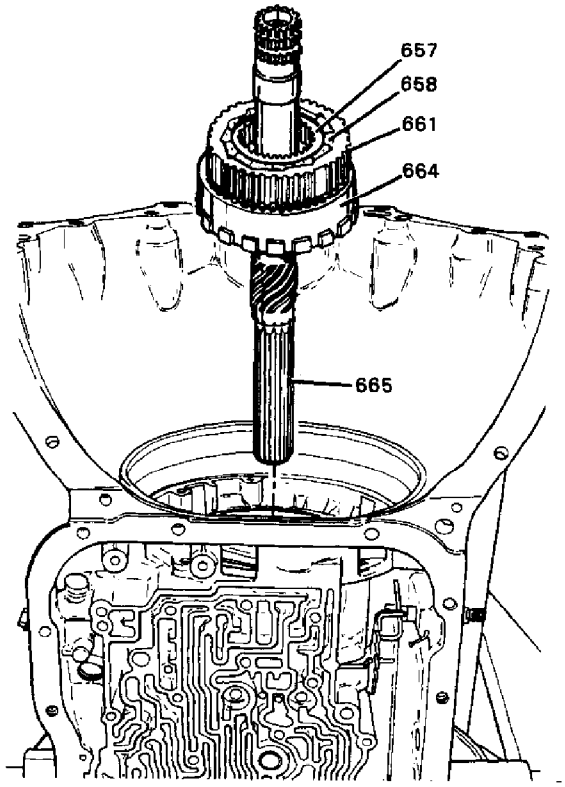
Figure 47 Output Shaft Support Fixture

Lo and Reverse Clutch Housing

Disassemble (Figure 49)

1. Compress Lo and reverse clutch spring retainer (652).

   Remove snap ring (653) and retainer (652).
2. Waved spring (651).
3. Lo and reverse clutch piston (649).
4. Inner and outer piston seals (648).
5. Clutch apply ring (650).



ILL. NO.	DESCRIPTION
657	RACE, LO ROLLER CLUTCH
658	ROLLER ASSEMBLY, LO CLUTCH
661	CARRIER ASSEMBLY, REAR (COMPLETE)
664	GEAR, REAR INTERNAL
665	SHAFT, OUTPUT
712	PAWL, PARKING BRAKE

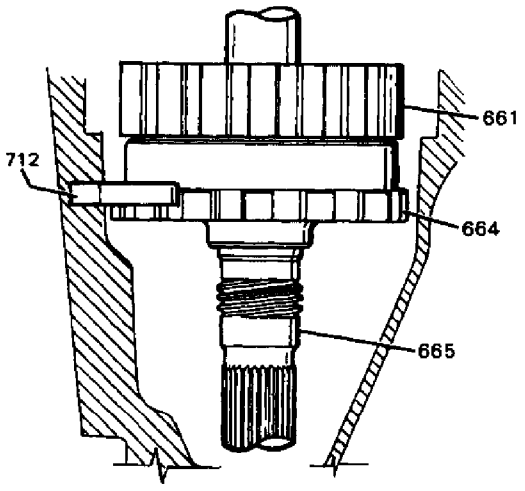


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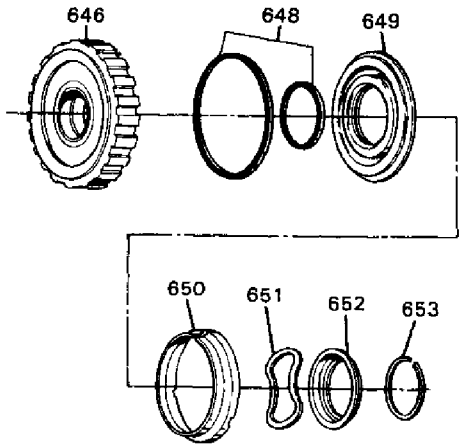
Figure 48 Installing Output Shaft



ILL. NO.	DESCRIPTION
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
648	SEALS, LO & REVERSE PISTON (INNER/OUTER)
649	PISTON ASSEMBLY, LO & REVERSE CLUTCH
650	RING, CLUTCH APPLY (13.13mm)
651	SPRING, WAVE (REVERSE CLUTCH RELEASE)
652	RETAINER, LO & REVERSE CLUTCH SPRING
653	RING, SNAP (RETAINER/HOUSING)

HH0069200-4R

Figure 49 Lo and Reverse Clutch Housing Assembly

Inspect

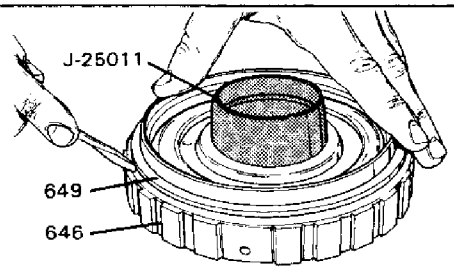
- Lo and Reverse clutch housing for:
  - plugged or damaged feed hole
  - bushing for scoring or damage
  - worn or chipped clutch splines
- Clutch apply ring (650) for cracks or distortion
- Piston (649) for wear, cracks, or damage
- Spring retainer (652) for damage
- Clutch plates (626):
  - composition plates for tang damage, delamination, or wear
  - steel plates for tang damage, wear, or heat damage

Assemble (Figures 50 and 51)

Tools Required

J-25011 Lo-Reverse Clutch Seal Protector
J-26744 Universal Seal Installer

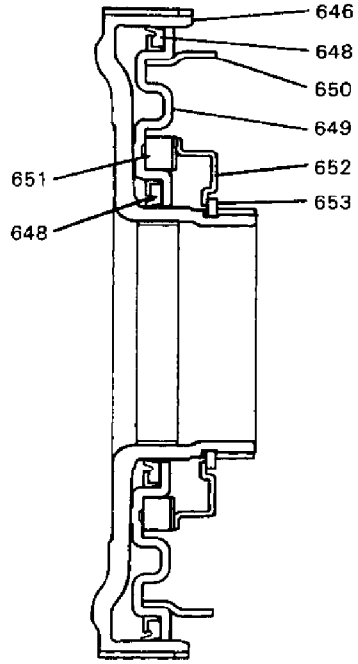
1. Clutch apply ring (650).
2. Inner and outer piston seals (648).
   - seal lips face up. Lubricate seals with transmission fluid.
3. Install J-25011.
4. Lo and reverse piston (649). Use J-26744.
5. Remove J-25011.
6. Waved release spring (651).
7. Retainer (652), cup facing down.
8. Compress retainer (652) and install snap ring (653).



646 HOUSING ASSEMBLY, LO & REVERSE CLUTCH
649 PISTON ASSEMBLY, LO & REVERSE CLUTCH

HH0071200-4R

Figure 50 Installing - Lo and Reverse Clutch Piston



ILL. NO.	DESCRIPTION
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
648	SEALS, LO & REVERSE PISTON (INNER/OUTER)
649	PISTON ASSEMBLY, LO & REVERSE CLUTCH
650	RING, CLUTCH APPLY (13.13mm)
651	SPRING, WAVE (REVERSE CLUTCH RELEASE)
652	RETAINER, LO & REVERSE CLUTCH SPRING
653	RING, SNAP (RETAINER/HOUSING)

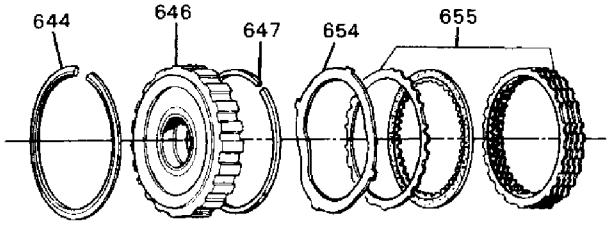
HH0070200-4R

Figure 51 Cross Section - Lo and Reverse Clutch Housing

Assemble (Figure 52, 53 and 54)

Tools Required
J-28542 Reverse Clutch Housing Installer/Remover

1. Clutch plates (655).
   - start with steel, alternate with composition plates.
2. Waved steel plate (654).
3. Snap ring (647).
4. Lo and reverse clutch housing (646).
   - align clutch housing feed hole with case feed passage
5. If clutch housing does not seat past case snap ring:
   - remove J-28542.
   - install rear sun gear (642) and input drum (640)
   - rotate input drum (640) to align roller clutch and clutch hub splines
6. Snap ring (644). Bevel side up,ring opening opposite parking brake actuator rod (709).
   - It may be necessary to loosen J-29332.
7. Oil seal (46). Seat seal against clutch housing (646).



ILL. NO.	DESCRIPTION
644	RING, SNAP (HOUSING/CASE)
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
647	SPACER, HOUSING TO CASE
654	PLATE, LO & REVERSE CLUTCH (WAVE)
655	PLATE, LO & REVERSE CLUTCH (1.969 MST)

HH0072200-4R

Figure 52 Lo and Reverse Clutch Assembly

Front Gear Components

Disassemble (Figure 54)

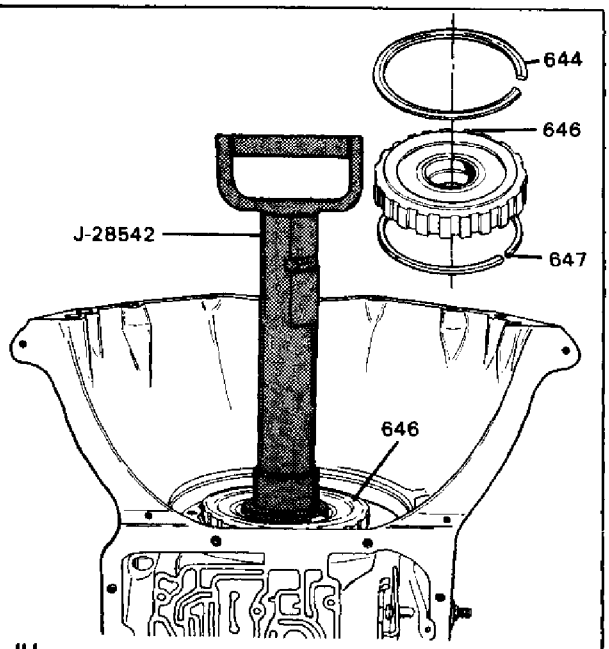
1. Snap ring (639).
2. Rear sun gear (642) from input drum (640).

Inspect

- Rear sun gear for:
  - cracks
  - worn, cracked, or damaged splines
  - chipped, cracked, or damaged gear teeth
  - plugged lubrication passages
  - bushing for scoring, wear, or damage
- Input drum for:
  - cracks or damage
  - worn splines
- Thrust washer for scoring or damaged tangs

Assemble (Figure 54)

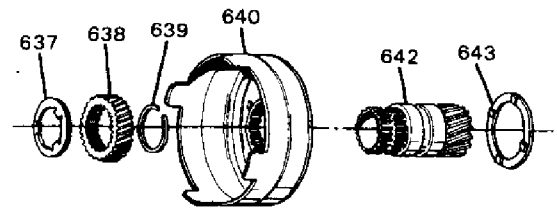
1. Rear sun gear (642) into input drum (640).
2. Snap ring (639).



ILL. NO.	DESCRIPTION
644	RING, SNAP (HOUSING/CASE)
646	HOUSING ASSEMBLY, LO & REVERSE CLUTCH
647	SPACER, HOUSING TO CASE

HH0059200-4R

Figure 53 Installing Lo and Reverse Clutch



ILL. NO.	DESCRIPTION
637	BEARING ASSEMBLY, THRUST (FRT. CARRIER/SUN)
638	GEAR, FRONT SUN
639	RING, SNAP (INPUT DRUM/REAR SUN)
640	DRUM, INPUT
642	GEAR, REAR SUN
643	WASHER, THRUST (INPUT DRUM/HOUSING)

HH0073200-4R

Figure 54 Installing Front Sun Gear and Input Drum

3. Tanged thrust washer (643). Retain with petrolatum.
4. Input drum (640) and rear sun gear (642).

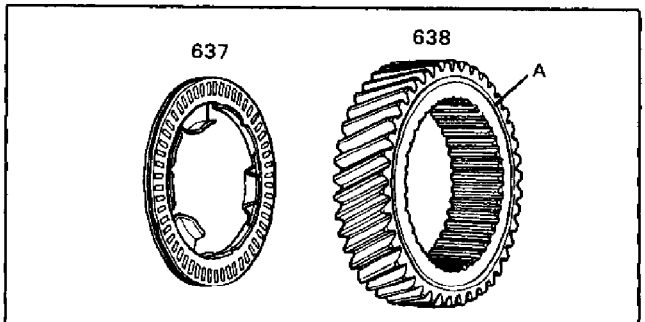
Front Sun Gear

Inspect (Figure 55)

- Front sun gear (638) for:
  - wear or damaged splines
  - chipped or cracked gear teeth
  - scored, pitted, or damaged bearing surface
- Thrust bearing for pitting or roughness

Assemble

1. Front sun gear (638).
   - identification groove against snap ring (639)
2. Thrust bearing (637). This thrust bearing requires only one race.
   - needle bearings against gear (638)



ILL. NO.	DESCRIPTION
A	IDENTIFICATION GROOVE
637	BEARING ASSEMBLY, THRUST (FRT. CARRIER/SUN)
638	GEAR, FRONT SUN

HH0074200-4R

Figure 55 Front Sun Gear

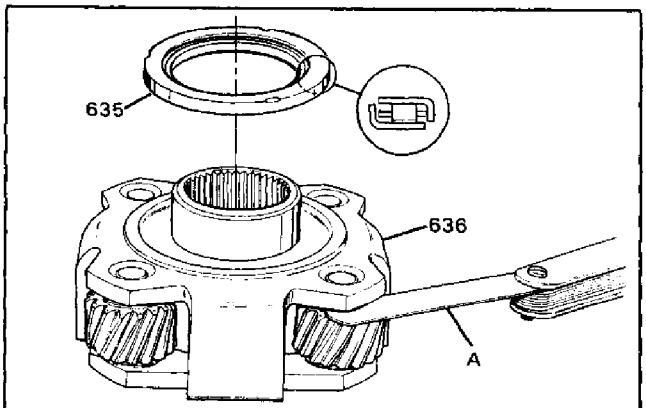
Front Carrier Assembly

Inspect (Figure 56)

- Pinions for chipped or cracked gears
- Bearings for roughness
- Thrust washer (635) for scoring, pitting, or damage

Measure

- Check pinion end play as shown. Clearance should be 0.24mm-.060mm (.009"-.024").



A	.024mm-.060mm (.009"-.024")
635	BEARING ASM., ROLLER (INTERNAL GEAR/CARRIER)
636	CARRIER ASSEMBLY, FRONT (COMPLETE)

HH0075200-4R

Figure 56 Front Carrier Assembly

Assemble (Figure 56)

1. Thrust bearing (635). Retain with petrolatum.
   - inside diameter against carrier
2. Front carrier (636).

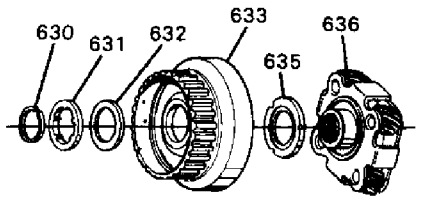
Front Internal Gear

Inspect (Figure 57)

- Front internal gear (633) hub for:
  - worn or damaged splines
  - restricted lubrication passages
- Internal gear for cracks or chips
- Gear teeth for cracks or chips
- Bushing for scoring or damage
- Thrust washer (632) for scoring or damage
- Selective washer (631) for scoring, pitting, or damage

Assemble (Figure 57)

1. Internal gear (633).
2. Thrust washer (632).
3. Selective washer (631).
   - identification number faces up
4. Snap ring (630).
   - make sure snap ring is seated



ILL. NO.	DESCRIPTION
630	RING, SNAP (OUTPUT SHAFT)
631	WASHER, THRUST (SELECTIVE REAR)
632	WASHER, THRUST (INTERNAL GEAR/REAR)
633	GEAR, FRONT INTERNAL
635	BEARING ASM., ROLLER (INTERNAL GEAR/CARRIER)
636	CARRIER ASSEMBLY, FRONT (COMPLETE)

HH0076200-4R

Figure 57 Front Internal Gear Assembly

Front Internal Gear to Outpur Shaft End Play Check

Measure (Figures 57, 58 and 59)

Tools Required
J-8001 Dial Indicator
J-7057 Plunger Extension

1. Loosen J-29332. Push output shaft (665) down.
2. Install clamp, J-7057, and J-8001 as shown.
3. Position J-7057 against output shaft (665).
   - Zero dial indicator
4. Turn adjusting screw until scribe/white line on J-25013 begins to disappear.
   - Read dial indicator
   - End play should be 0.10mm-0.64mm (.004"-.025")
5. If end play is not within specifications, refer to chart to select proper selective washer (631).
6. Remove J-8001, J-7057, and clamp.
7. Loosen J-25013.

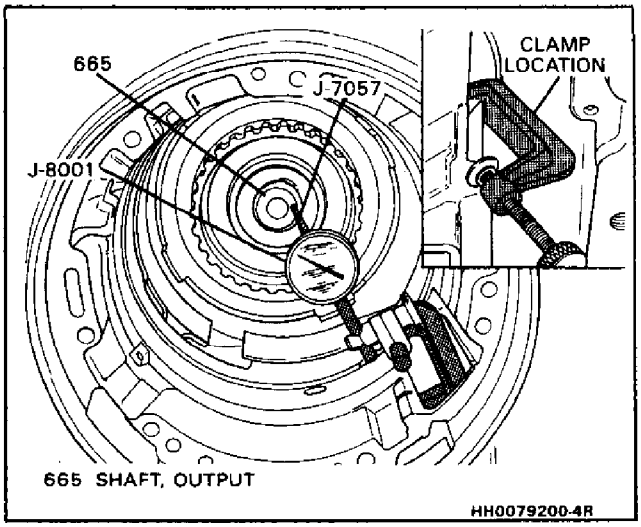


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Figure 58 Rear Selective Washer End Play Check

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
2.90-3.01mm	(0.114"-0.119")	1 - ORANGE
3.08-3.19mm	(0.121"-0.126")	2 - WHITE
3.26-3.37mm	(0.128"-0.133")	3 - YELLOW
3.44-3.55mm	(0.135"-0.140")	4 - BLUE
3.62-3.73mm	(0.143"-0.147")	5 - RED
3.80-3.91mm	(0.150"-0.154")	6 - BROWN
3.98-4.09mm	(0.157"-0.161")	7 - GREEN
4.16-4.27mm	(0.164"-0.168")	8 - BLACK
4.34-4.45mm	(0.171"-0.175")	9 - PURPLE

HH0056200-4R

Figure 59 Rear Unit End Play Washer Thickness Chart

Direct Clutch Assembly

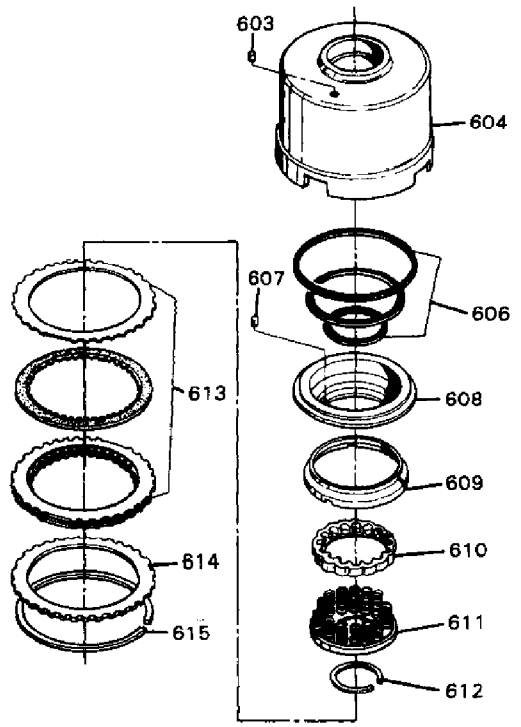
Disassemble (Figure 60 and 61)

Tools Required
J-23327 Clutch Spring Compressor

1. Snap ring (615).
2. Clutch backing plate (614).
3. Direct clutch plates (613).
   - Keep separate from forward clutch plates.
4. Compress retainer and spring assembly (611). Remove snap ring (612).
5. Remove J-23327.

Disassemble (Figure 60)

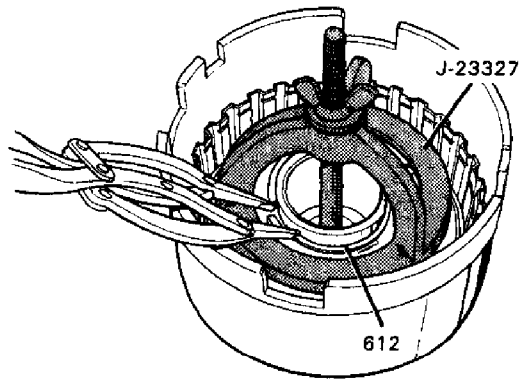
1. Retainer and spring assembly (611).
2. Spring guide (610).
3. Direct piston (608).



603 RETAINER & BALL ASSEMBLY, CHECK VALVE
604 HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
606 SEALS, DIRECT CLUTCH PISTON
607 RETAINER & BALL ASSEMBLY, CHECK VALVE
608 PISTON ASSEMBLY, DIRECT CLUTCH
609 RING, CLUTCH APPLY (DIRECT)
610 GUIDE, RELEASE SPRING
611 RETAINER & SPRING ASSEMBLY, DIRECT CLUTCH
612 RING, SNAP (SPRING RETAINER)
613 PLATE ASSEMBLY, DIRECT CLUTCH
614 PLATE, CLUTCH BACKING
615 RING, SNAP (DIRECT CLUTCH HOUSING)

HH0080200-4R

Figure 60 Direct Clutch Housing and Drum Assembly



612 RING, SNAP (SPRING RETAINER)

HH0081200-4R

Figure 61 Installing J-23327

4. Inner and outer piston seal rings (606).

Important

Do not remove clutch apply ring (609) unless damaged or clutch piston is being replaced.

Inspect

- Direct clutch housing (604) for:
  - cracks
  - worn or damaged clutch lugs
  - snap ring grooves for damage
  - bushing for scoring or damage
- Clutch backing plate (614)
  - scoring or heat damage
- Clutch plates (613)
  - composition plates for tang damage, delamination, or wear
  - steel plates for tang damage, wear, or heat damage
- Retainer and spring assembly (611)
  - collapsed springs
  - distorted or collapsed retainer
- Spring guide for damage
- Piston (608)
  - cracks or damage
- Piston and housing check valves (603 and 607)
  - the ball must move freely
  - leak test check ball with solvent

Remove or Disconnect

Tools Required
10mm (3/8") Diameter Rod or Drift

1. Tap out check valve assembly (603 and 607).

Install or Connect (Figure 62)

1. Using same tools, tap in check valve (603 and 607) until seated.

Assemble (Figures 60 and 63)

Tools Required
J-25010 Seal Protector

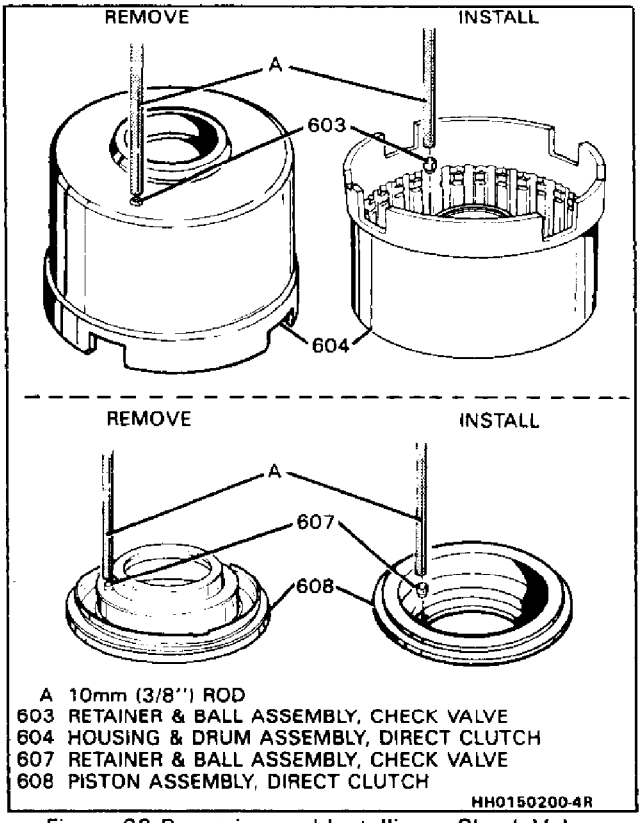
1. Clutch apply ring (609), if necessary.
2. Inner and outer piston seals (606).
   - lips face away from apply ring side.
3. Center seal (606).
4. Lubricate piston seals with transmission fluid.
5. Install J-25010.

NOTICE: Use care when installing piston seals Snap ring groove could cut outer piston seal.

Assemble (Figures 60, 61, 64, 65)

Tools Required
J-26744-A Universal Seal Installer
J-23327 Clutch Spring Compressor

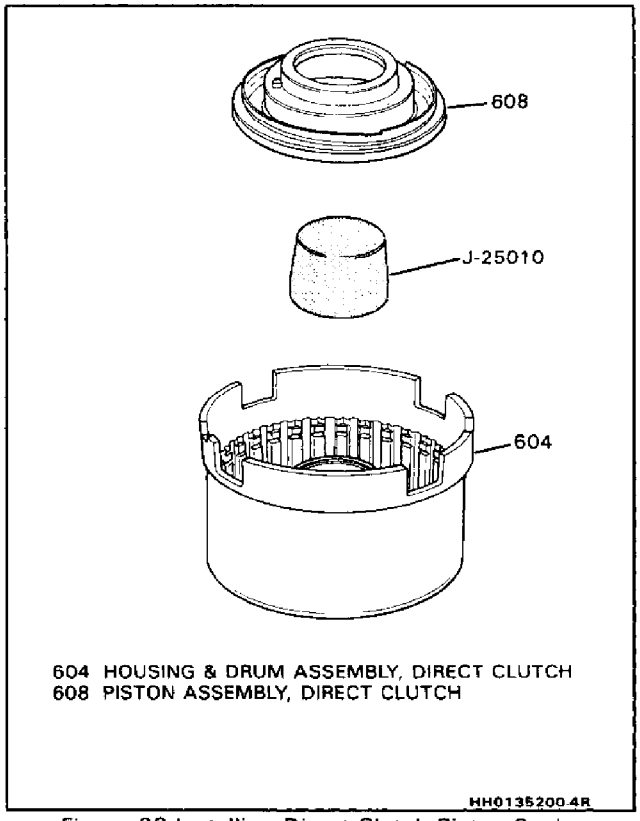
1. Piston (608). Use J-26744-A to compress lip o seal while pushing down on piston.
2. Remove J-25010.
3. Spring guide (610).



A 10mm (3/8") ROD
603 RETAINER & BALL ASSEMBLY, CHECK VALVE
604 HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
607 RETAINER & BALL ASSEMBLY, CHECK VALVE
608 PISTON ASSEMBLY, DIRECT CLUTCH

HH0150200-4R

Figure 62 Removing and Installing a Check Valve Retainer and Ball Assembly



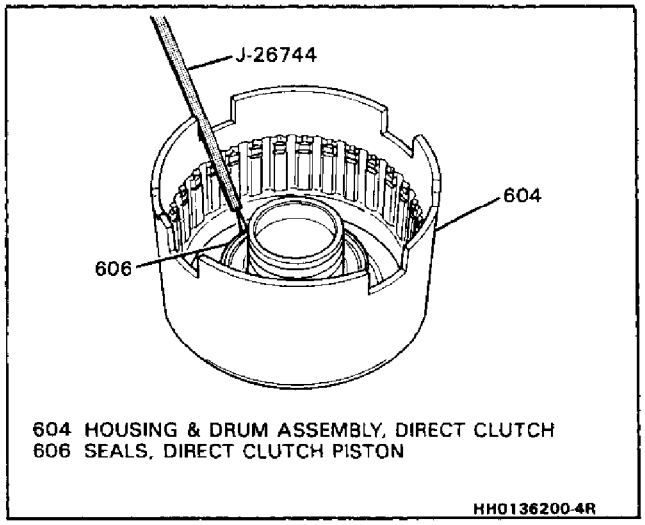
604 HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
608 PISTON ASSEMBLY, DIRECT CLUTCH

HH0135200-4R

Figure 63 Installing Direct Clutch Piston Seals

- Align omitted rib with check valve(607).

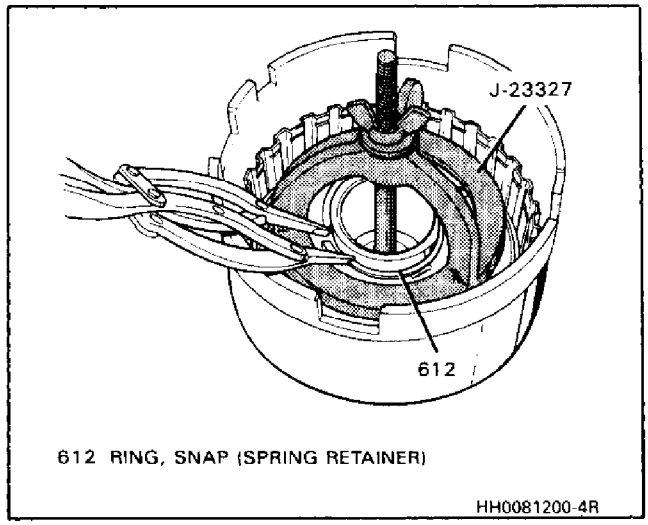
4. Retainer and spring assembly (611).
   - Do not let retainer catch on snap ring groove.
5. Compress retainer (611). Use J-23327.
6. Snap ring (612).
7. Remove J-23327.



604 HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
606 SEALS, DIRECT CLUTCH PISTON

HH0136200-4R

Figure 64 Installing Piston Seals



612 RING, SNAP (SPRING RETAINER)

HH0081200-4R

Figure 65 Installing Snap Ring in Direct Clutch Housing

Assemble (Figures 66 and 67)

1. Clutch plates (613).
   - Soak in transmission fluid
   - start with steel and alternate with composition
2. Backing plate (614).
   - micro finish down
3. Snap ring (615).
   - composition plates must rotate freely.

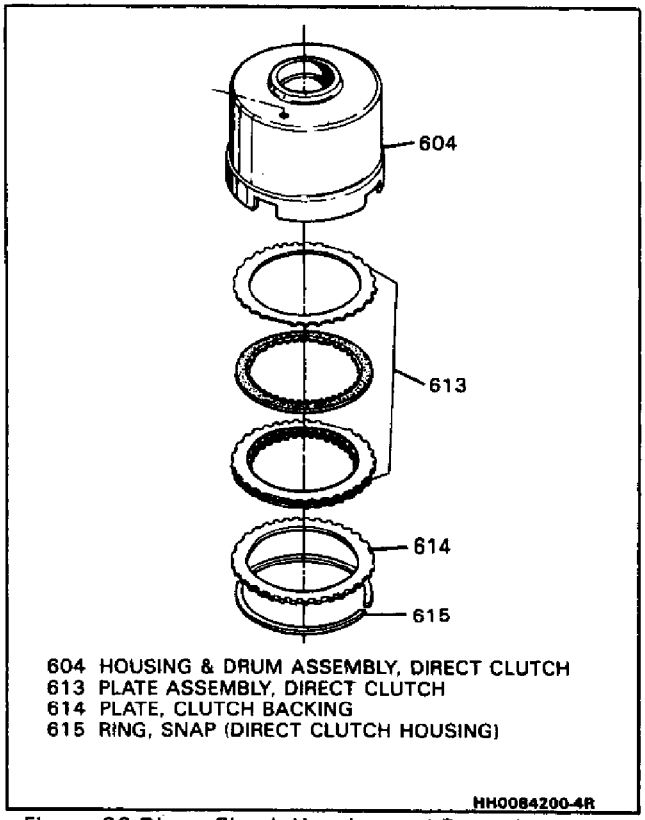


Figure 66 Direct Clutch Housing and Drum Assembly

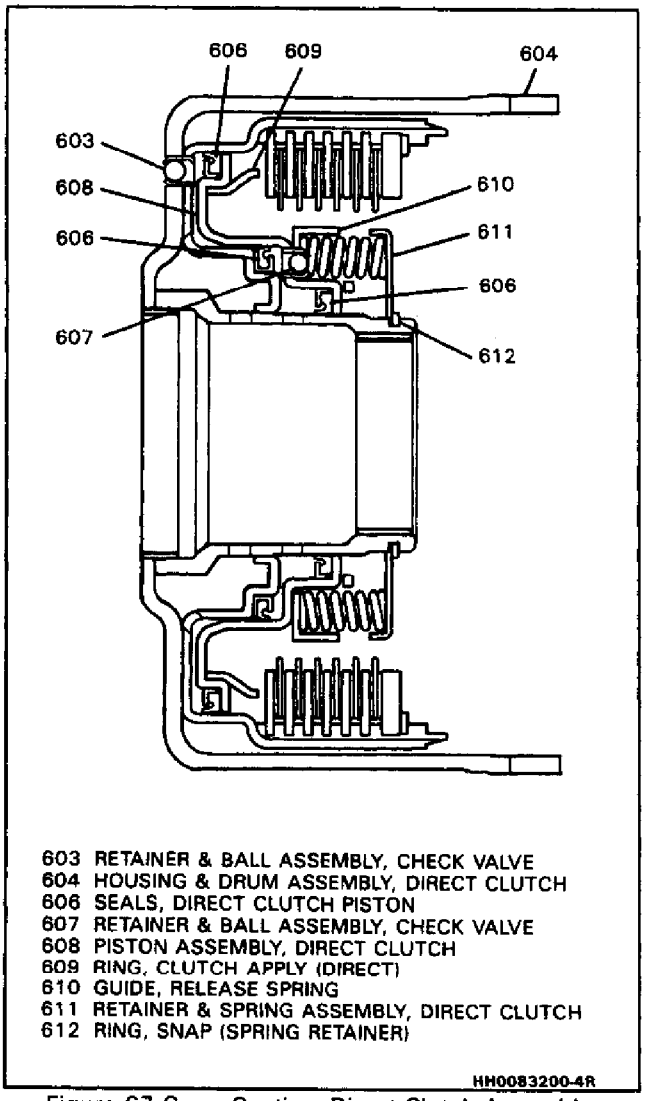


Figure 67 Cross-Section, Direct Clutch Assembly

Forward Clutch Assembly

Disassemble (Figure 68)

1. Position forward clutch (618) as shown.
2. Snap ring (628).
3. Backing plate (627).
4. Clutch plates (626).
5. Waved plate (666).

Disassemble (Figures 68 and 69)

Tools Required
- J-23327 Clutch Spring Compressor
- J-25018 Forward Clutch Adapter
- J-25024 Forward Clutch Spring Compressor

1. Install J-23327, J-25018, and J-25024.
2. Compress retainer (624).
3. Snap ring (625).
4. Retainer and spring assembly (624).
5. Forward clutch piston (622).
6. Inner and outer piston seals (621).

Important

Do not remove clutch apply ring (623) unless damaged or piston (622) is being replaced.

Inspect

- Forward clutch shaft teflon seals (616)
  - Do not remove unless replacing
- Retainer and spring assembly (611)
  - collapsed springs
  - distorted retainer
- Piston (622) and clutch apply ring (623)
  - cracks or damage
- Forward clutch housing (618)
  - worn or damaged clutch lugs
  - snap ring grooves for damage
- Forward clutch shaft
  - restricted oil passages
  - journals at both ends for damage
- Cup plug (620) for damage

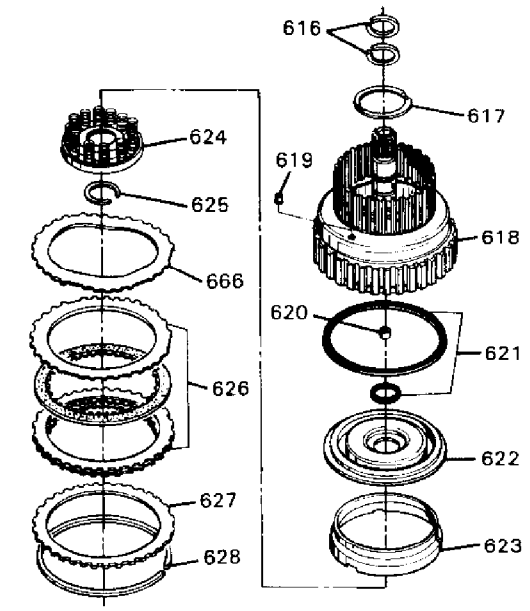
Remove or Disconnect (Figure 70)

Tools Required
- #3 Screw Extractor (grind to fit)

1. Cup plug (620). Use #3 screw extractor.

Install or Connect (Figure 70)

1. Seat cup plug (620) to 1.0mm (.039") below shaft



ILL. NO.	DESCRIPTION
616	SEALS, RING (FORWARD CLUTCH SHAFT) TEF
617	WASHER, THRUST (DIRECT/FORWARD CLUTCH)
618	HOUSING ASSEMBLY, FORWARD CLUTCH
619	RETAINER & BALL ASSEMBLY, CHECK VALVE
620	PLUG, CUP (4.8 DIAMETER)
621	SEALS, FORWARD CLUTCH PISTON (PACKAGE)
622	PISTON ASSEMBLY, FORWARD CLUTCH
623	RING, CLUTCH APPLY (FORWARD)
624	RETAINER & SPRING ASSEMBLY, FORWARD
625	RING, SNAP (FORWARD SPRING RETAINER)
626	PLATE, FORWARD CLUTCH (FLAT)
627	PLATE, CLUTCH BACKING
628	RING, SNAP (FORWARD CLUTCH HOUSING)
666	PLATE, CLUTCH 1.585 (WAVED)

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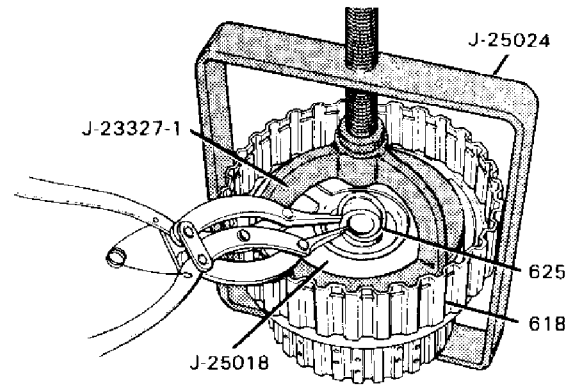
Figure 68 Forward Clutch Housing Assembly



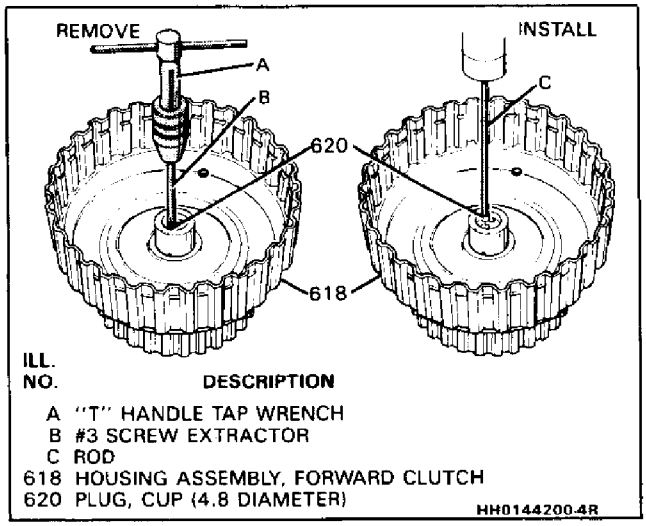
618 HOUSING ASSEMBLY, FORWARD CLUTCH
625 RING, SNAP (FORWARD SPRING RETAINER)

HH0085200-4R

Figure 69 Removing Forward Clutch Snap Ring

Inspect (Figure 71)

- Check valve (619)
  - ball must move freely
  - leak test with solvent



ILL. NO.	DESCRIPTION
A	"T" HANDLE TAP WRENCH
B	#3 SCREW EXTRACTOR
C	ROD
618	HOUSING ASSEMBLY, FORWARD CLUTCH
620	PLUG, CUP (4.8 DIAMETER)

HH0144200-4R

Figure 70 Removing and Installing Cup Plug

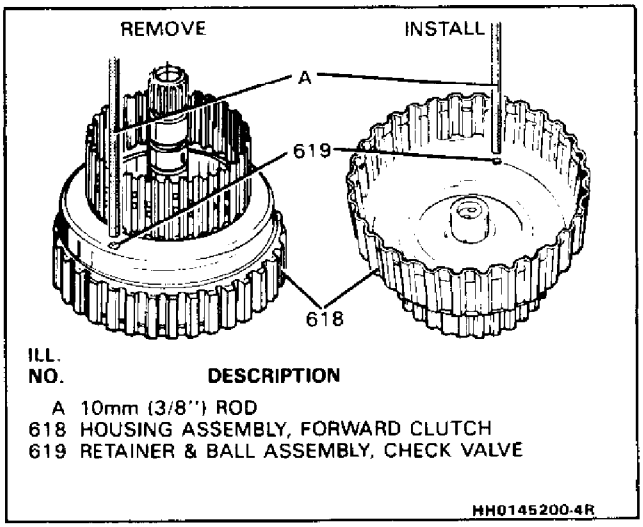
Remove or Disconnect (Figure 71)

Tools Required
10mm (3/8") Rod

1. Tap out check valve (619). Use 10mm (3/8") rod.

Install or Connect (Figure 71)

1. Using same tools, tap in check valve (619) until seated.



ILL. NO.	DESCRIPTION
A	10mm (3/8") ROD
618	HOUSING ASSEMBLY, FORWARD CLUTCH
619	RETAINER & BALL ASSEMBLY, CHECK VALVE

HH0145200-4R

Figure 71 Removing and Installing Check Valve

Assemble (Figure 72)

Tools Required
J-26744 Universal Seal Installer

1. Inner and outer piston seals (621).
   - lips face away from clutch apply ring
2. Lubricate seal with transmission fluid.
3. Piston (622). Use J-26744 while pushing down on piston.
4. Retainer and spring assembly (624).

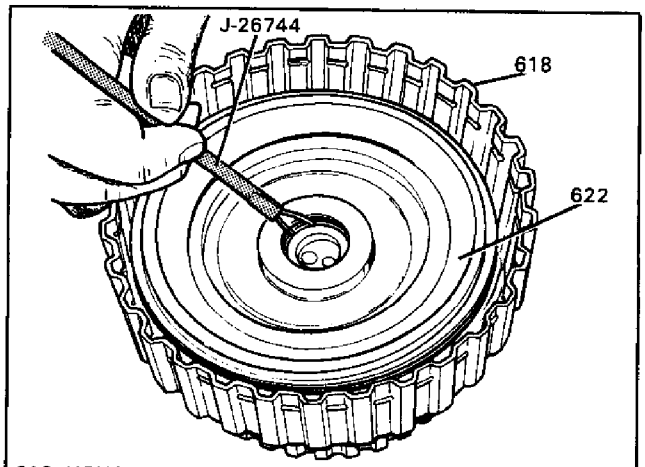


Figure 72 Installing Seals Onto Forward Clutch Piston

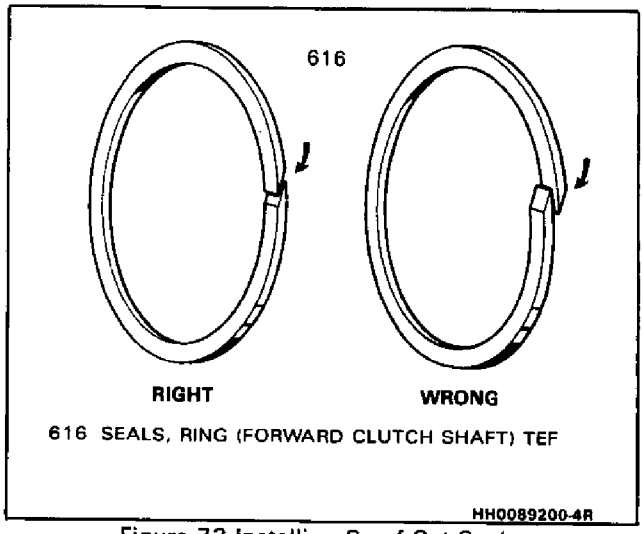


Figure 73 Installing Scarf Cut Seals

Assemble (Figures 68, 69 and 73)

Tools Required
- J-23327 Clutch Spring Compressor
- J-25018 Forward Clutch Adapter
- J-25024 Forward Clutch Spring Compressor

1. Install J-23327, J-25018,and J-25024.
2. Compress retainer (624).
   - do not let retainer catch on snap ring groove
3. Remove J-23327, J-25018, and J-25024.
4. Waved steel plate (666).
5. Clutch plates (626)
   - soak in transmission fluid
   - start with composition plate and alternate with steel plates
6. Backing plate (627).
   - micro finish down
7. Snap ring (628)
   - composition plates must rotate freely.

Assemble (Figure 73)

1. Forward clutch shaft seal rings (616), if necessary.
   - make sure cut ends are assembled as shown
   - retain with petrolatum

Intermediate Band

Inspect (Figure 75)

- Intermediate band (601) for:
  - burning
  - flaking
  - cracks

Install or Connect (Figure 75)

1. Intermediate band (601).
2. Band anchor pin (47).

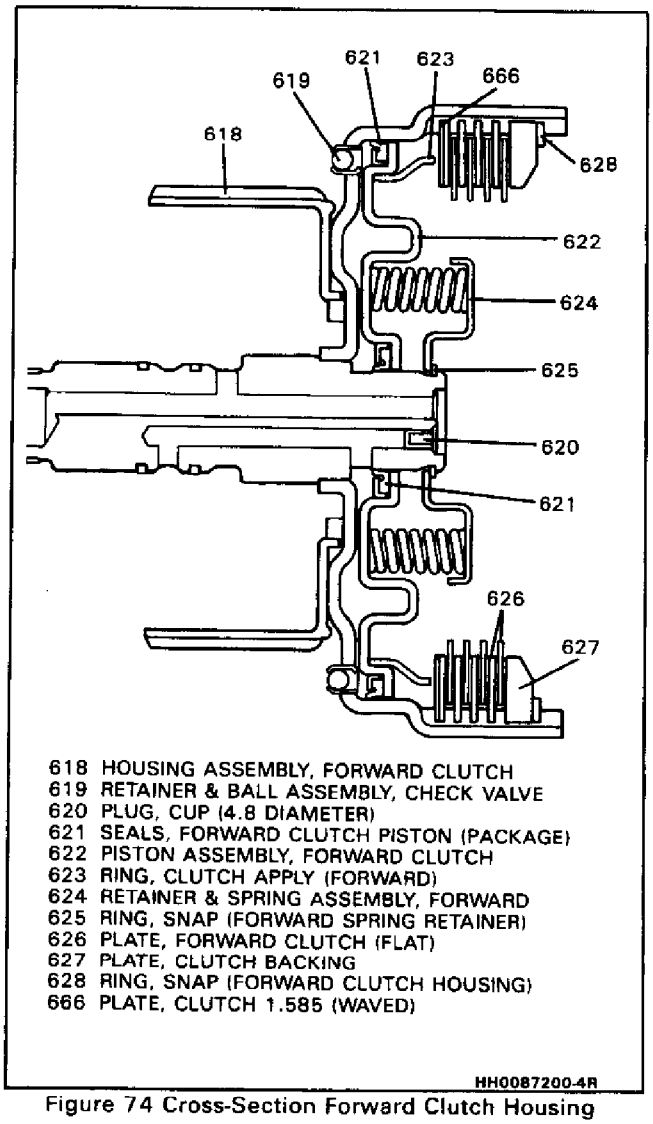


Figure 74 Cross-Section Forward Clutch Housing

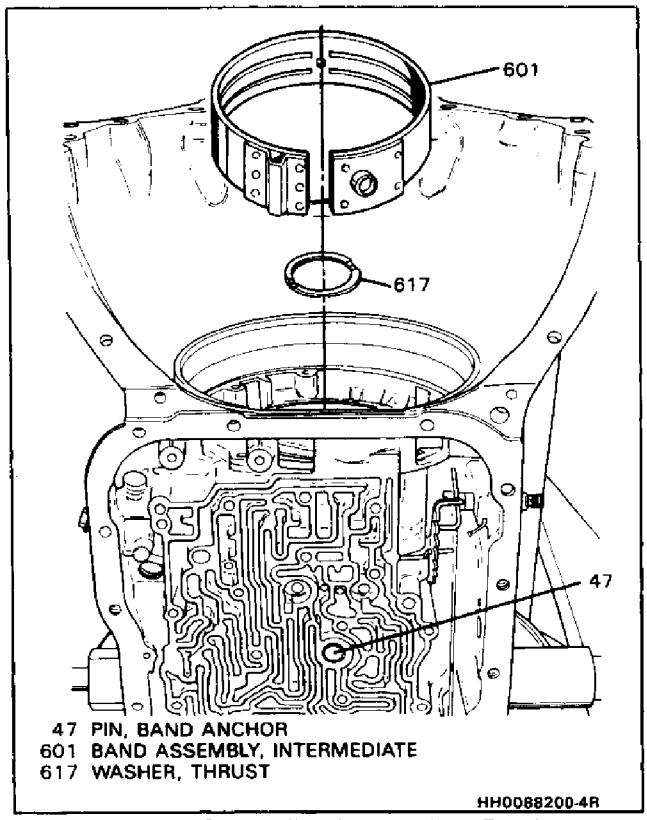


Figure 75 Installing Intermediate Band

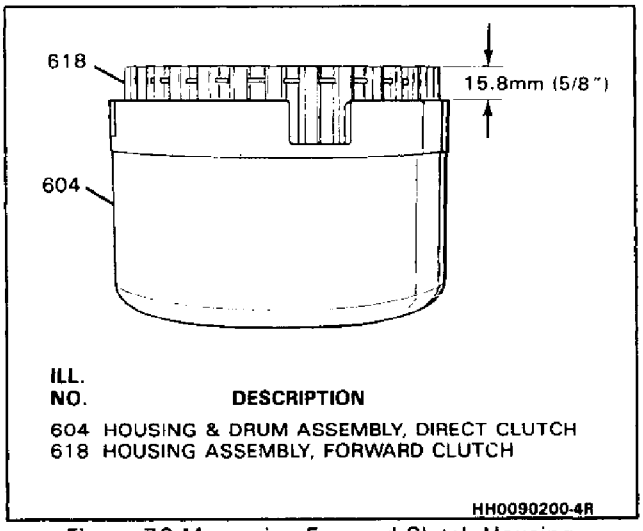


Figure 76 Measuring Forward Clutch Housing

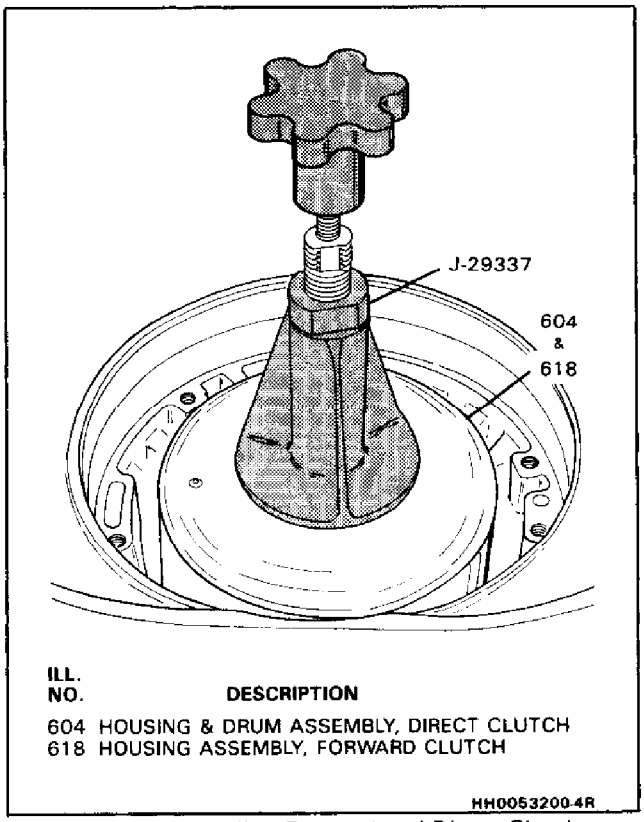


Figure 77 Installing Forward and Direct Clutch Assemblies

Forward and Direct Clutch

Install or Connect (Figures 76, 77, 78)

Tools Required

J-29337 Forward and Direct Clutch and End Play Checking Fixture

1. Align clutch plates.
2. Position direct clutch housing (604) as shown.
3. Forward clutch (618).
   - when seated, the forward clutch housing (618) protrude approximately 15.8mm (5/8") from direct clutch housing (604).
4. Preventing separation, position direct and forward clutch assembly (604/618) with forward clutch shaft facing up.
5. Install J-29337.
6. Direct and forward clutch assembly (604/618).
   - direct clutch housing will be approximately 105mm (4-1/8") from pump face surface of case when seated properly
7. Remove J-29337.

Center Support

Disassemble (Figure 79)

1. Fourth clutch inner and outer seal rings (535).
2. (3) Oil seal rings (539).

Inspect

- Center support (537) for:
  - sharp edges
  - burrs
  - cracks
  - porosity
- Oil ring grooves for:
  - nicks or damage
- Piston seal surfaces for:
  - scratches
  - nicks
- Air check all oil passages
- Bushing (540) for:

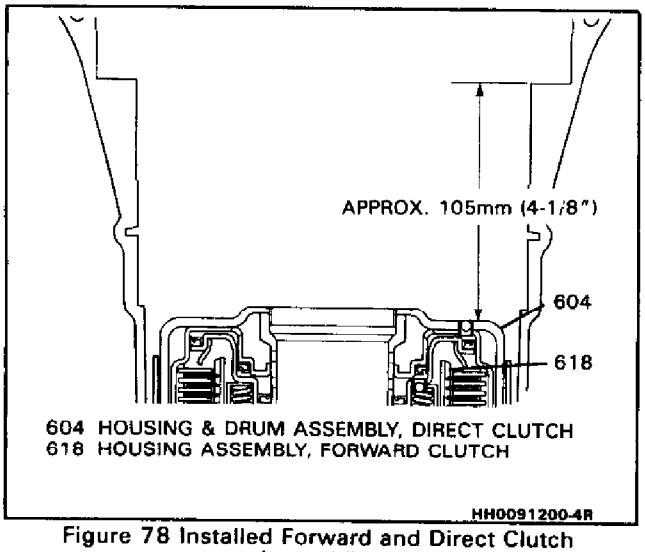


Figure 78 Installed Forward and Direct Clutch Assemblies

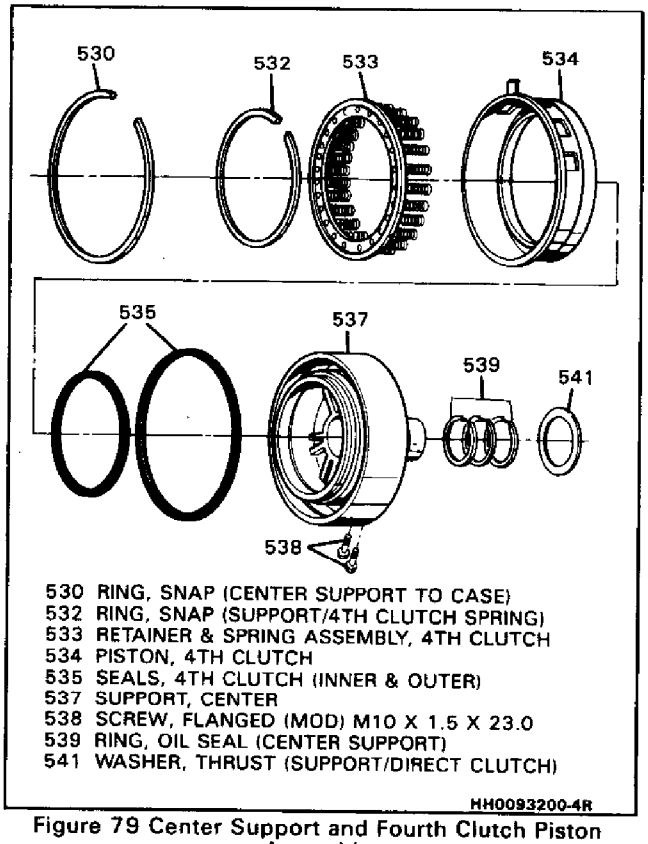


Figure 79 Center Support and Fourth Clutch Piston Assembly

- scoring
- galling
- wear

Assemble (Figures 79, 80, and 81)

1. (3) Oil seal rings (539).
   - apply petrolatum to rings
2. Fourth clutch inner and outer seal rings (535).
   - lips face down
3. Thrust washer (541).
   - retain with petrolatum
4. Center support (537).
   - align bolt holes
5. (2) Bolts (538).
   - do not tighten
6. Snap ring (530).
   - beveled side up
7. Torque bolts to 24 N·m (18 lbs.-ft.).

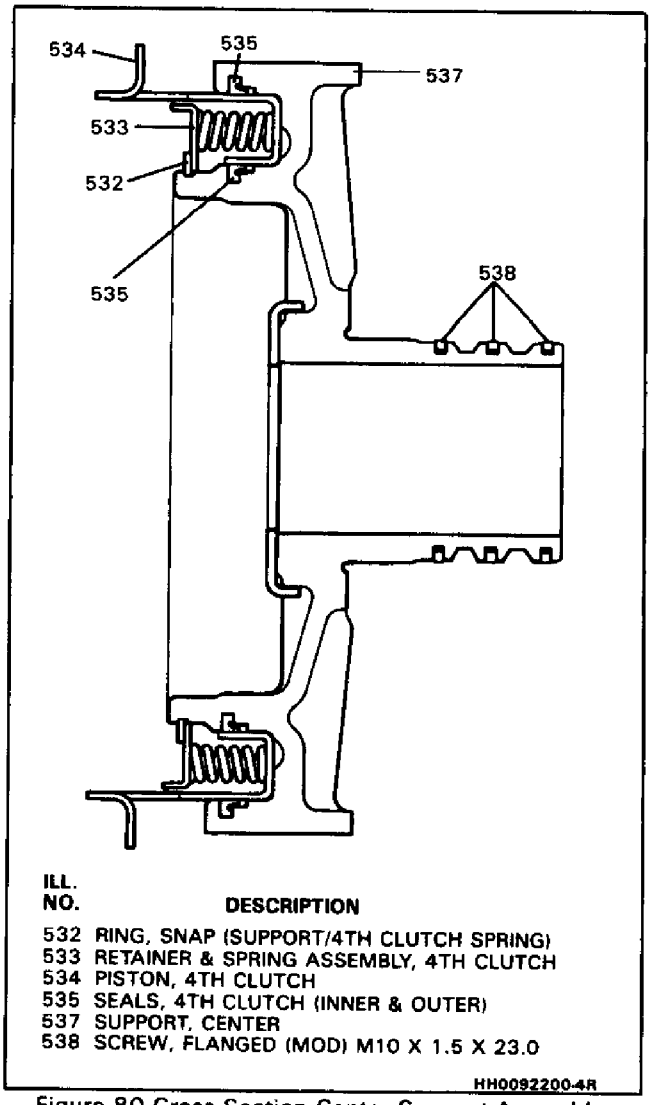


Figure 80 Cross Section Center Support Assembly

Forward Clutch Shaft End Play Check

Measure (Figures 82, 83 and 84)

Tools Required

J-8001 Dial Indicator

J-29337 Forward and Direct Clutch End Play Checking Device

J-25013 Rear Unit Support

J-29332 Output Shaft Loading Fixture Adapter

1. Push forward clutch shaft (518) downward.
2. Install J-29337.
3. Install clamp and J-8001 as shown.

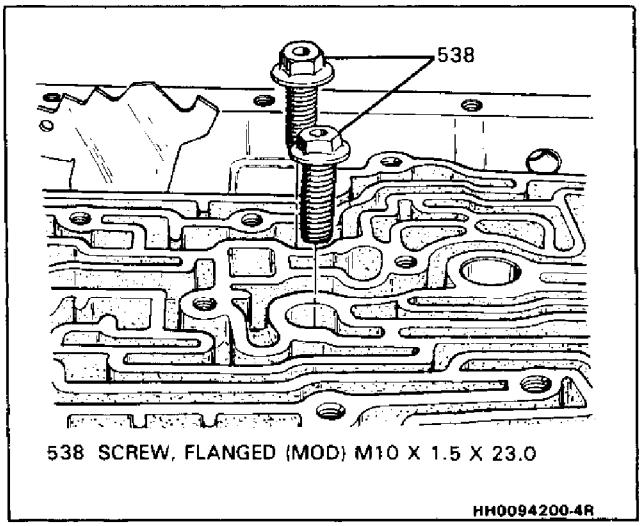


Figure 81 Center Support Attaching Screws

4. Turn J-29332 until white/scribed line on J-25013-1 begins to disappear.
5. Zero dial indicator.
6. Pull upward on J-29337.
   - Read dial indicator
   - End play should be 0.56mm-1.30mm (.022"-.051")
   - Selective washer controling end play is located between the output shaft (665) and the forward clutch shaft.
   - If clearance is not within specifications, use chart to select proper selective washer (617).

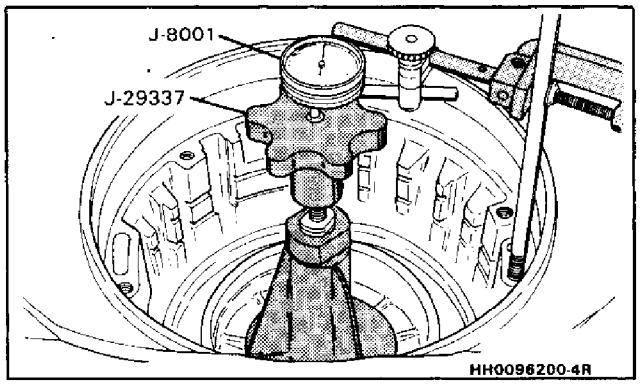


Figure 82 Forward Clutch Shaft End Play Check

Inspect (Figure 79)

- Snap ring (532) for damage.
- Fourth clutch piston (534) for:
  - cracks
  - damage
- Release springs and retainer (533) for:
  - distortion
  - collapsed springs

Assemble (Figure 85)

Tools Required
J-29334-2 Fourth Clutch Compressor and Center Support Remover

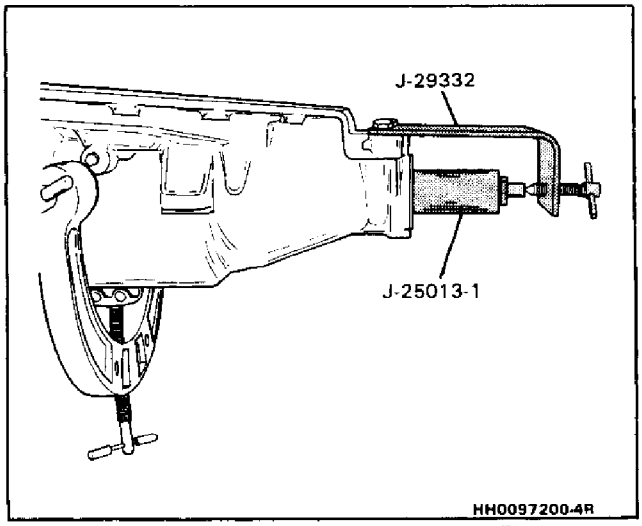


Figure 83 Installing Rear Unit Support Fixture

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
1.66-1.77mm	(0.065"-0.070")	1 - –
1.79-1.90mm	(0.070"-0.075")	2 - –
1.92-2.03mm	(0.076"-0.080")	3 - BLACK
2.05-2.16mm	(0.081"-0.085")	4 - LIGHT GREEN
2.18-2.29mm	(0.086"-0.090")	5 - SCARLET
2.31-2.42mm	(0.091"-0.095")	6 - PURPLE
2.44-2.55mm	(0.096"-0.100")	7 - COCOA BROWN
2.57-2.68mm	(0.101"-0.106")	8 - ORANGE
2.70-2.81mm	(0.106"-0.111")	9 - YELLOW
2.83-2.94mm	(0.111"-0.116")	10 - LIGHT BLUE
2.96-3.07mm	(0.117"-0.121")	11 - –
3.09-3.20mm	(0.122"-0.126")	12 - –
3.22-3.33mm	(0.127"-0.131")	13 - PINK
3.35-3.46mm	(0.132"-0.136")	14 - GREEN
3.48-3.59mm	(0.137"-0.141")	15 - GRAY

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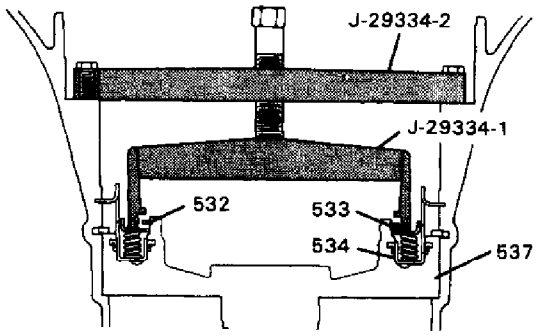
Figure 84 Front Unit End Play Washer Thickness Chart

1. Fourth clutch piston (534).
   - align tang with case spline
2. Spring and retainer (533).
3. Install J-29334-2.
4. Snap ring (532).
5. Remove J-29334-2.

Overdrive Internal Gear

Inspect (Figure 86)

- Thrust washer (531) for:
  - tang damage
  - scoring
- Internal gear (529) for:
  - chipped or cracked teeth
  - worn splines
  - worn or damaged bearing surface
- Thrust bearing (528) for:
  - pitting or roughness



532 RING, SNAP (SUPPORT/4TH CLUTCH SPRING)
533 RETAINER & SPRING ASSEMBLY, 4TH CLUTCH
534 PISTON, 4TH CLUTCH
537 SUPPORT, CENTER

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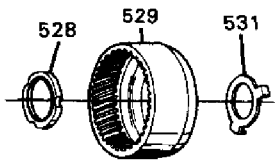
Figure 85 Installing Fourth Clutch Snap Ring

Assemble

1. Thrust washer (531).
   - tangs face down
2. Internal gear (529).
3. Thrust bearing (528).
   - large diameter against internal gear



ILL. NO. DESCRIPTION

528 BEARING ASM., THRUST (CARRIER/INTERNAL GEAR)
529 GEAR, OVERDRIVE INTERNAL
531 WASHER, THRUST (INTERNAL GEAR/SUPPORT)

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Figure 86 Overdrive Internal Gear

Overrun Clutch and Overdrive Carrier Assembly

Disassemble (Figure 87)

1. Snap ring (527).
2. Turbine shaft (503).
3. Overdrive assembly (524).
4. Overdrive sun gear (521).
5. Snap ring (515).
6. Overrun clutch backing plate (514).
7. Clutch plates (513).

Disassemble (Figure 87)

1. Snap ring (520).
2. Overdrive roller clutch cam assembly (518/519).
3. Roller assembly (518).
4. Retainer (517) and waved spring (516).
5. Overrun piston (511).
6. Inner and outer piston seals (512).

Inspect

- Clutch plates (513) :
  - composition plates for damaged tangs, delamination, or wear.
  - steel plates for damaged tangs, wear, or heat damage.
- Roller clutch cam (519) for:
  - damaged or missing rollers
  - damaged or missing energizing springs
- Retainer (517) for distortion or damage.
- Overrun clutch piston (511) for:
  - cracks
  - damage
- Overrun clutch housing (510) for:
  - cracks
  - open oil passages
  - damaged or worn snap ring grooves

Assemble (Figures 87, 88 and 89)

Tools Required
J-29335 Seal Protector
J-26744-A Univerasl Seal Installer

1. Inner and outer piston seals (512).
   - lips face away from clutch apply ring
   - lubricate with transmission fluid
2. Install J-29335.
3. Overrun clutch piston (511). Use J-26744-A while pushing down on piston.
4. Remove J-29335.
5. Waved spring (516).
6. Spring retainer (517)
   - cupped face down

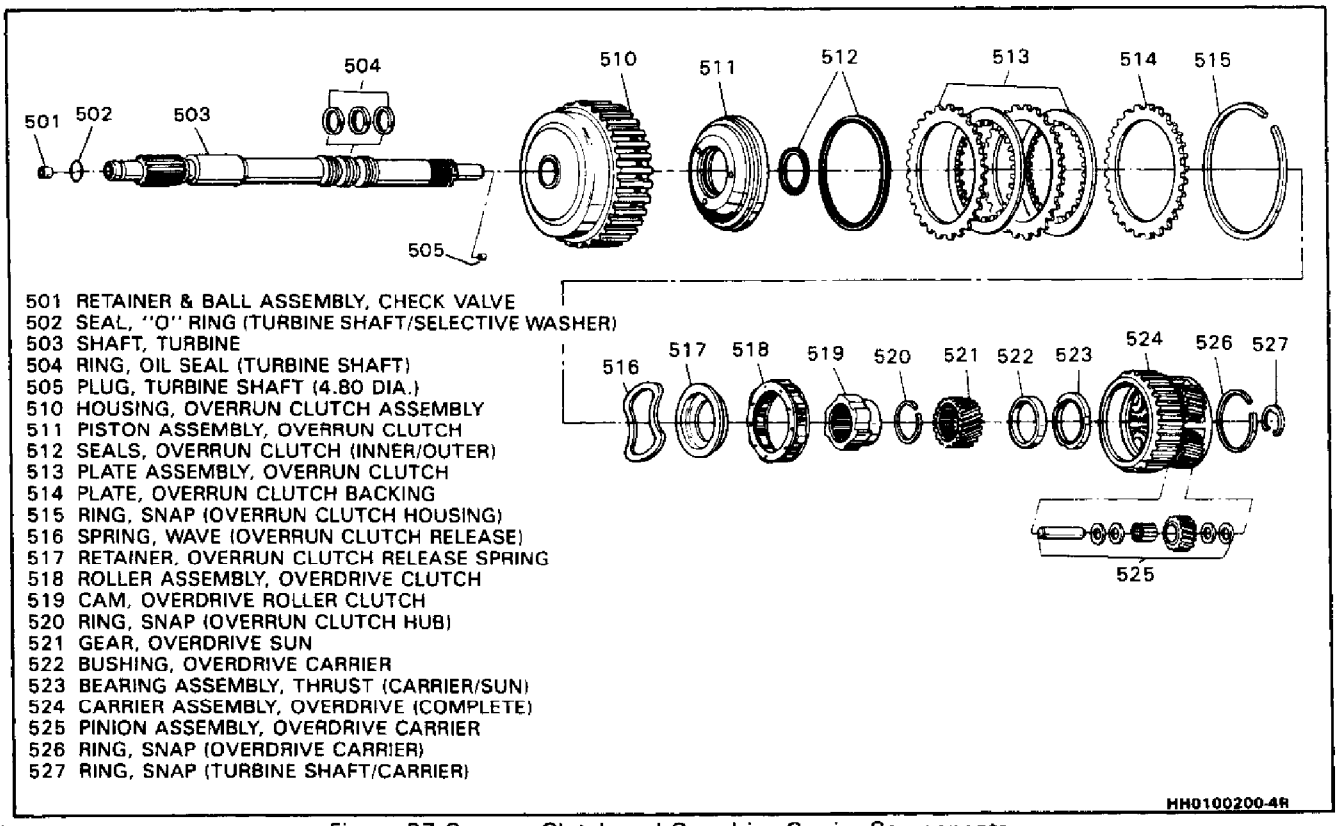
Assemble (Figure 87 and 89)

1. Roller assembly (518) onto roller clutch cam (519).
   - roller assembly locator tangs must set on clutch cam (519)
2. Roller clutch assembly (518/519).
3. Compress retainer (517).
   - install snap ring (520)
4. Clutch plates (513).
   - soak in transmission fluid
   - start with steel plates and alternate with composition plate
5. Backing plate (514).
   - chamfered side up
6. Snap ring (515).
   - composition plates must rotate freely

Overdrive Carrier

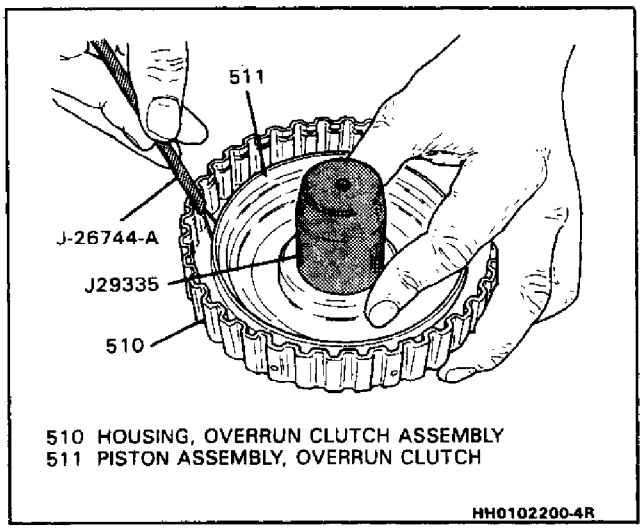
Disassemble (Figure 90)

1. Snap ring (526).
2. (4) Overdrive pinion pins.
3. (4) pinions, (16) thrust washers, and needle bearings.
4. Thrust bearing (523).



501 RETAINER & BALL ASSEMBLY, CHECK VALVE
502 SEAL, "O" RING (TURBINE SHAFT/SELECTIVE WASHER)
503 SHAFT, TURBINE
504 RING, OIL SEAL (TURBINE SHAFT)
505 PLUG, TURBINE SHAFT (4.80 DIA.)
510 HOUSING, OVERRUN CLUTCH ASSEMBLY
511 PISTON ASSEMBLY, OVERRUN CLUTCH
512 SEALS, OVERRUN CLUTCH (INNER/OUTER)
513 PLATE ASSEMBLY, OVERRUN CLUTCH
514 PLATE, OVERRUN CLUTCH BACKING
515 RING, SNAP (OVERRUN CLUTCH HOUSING)
516 SPRING, WAVE (OVERRUN CLUTCH RELEASE)
517 RETAINER, OVERRUN CLUTCH RELEASE SPRING
518 ROLLER ASSEMBLY, OVERDRIVE CLUTCH
519 CAM, OVERDRIVE ROLLER CLUTCH
520 RING, SNAP (OVERRUN CLUTCH HUB)
521 GEAR, OVERDRIVE SUN
522 BUSHING, OVERDRIVE CARRIER
523 BEARING ASSEMBLY, THRUST (CARRIER/SUN)
524 CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)
525 PINION ASSEMBLY, OVERDRIVE CARRIER
526 RING, SNAP (OVERDRIVE CARRIER)
527 RING, SNAP (TURBINE SHAFT/CARRIER)

Figure 87 Overrun Clutch and Overdrive Carrier Components



510 HOUSING, OVERRUN CLUTCH ASSEMBLY
511 PISTON ASSEMBLY, OVERRUN CLUTCH

Figure 88 Installing Overrun Clutch Piston

Inspect

- Overdrive carrier (524) for:
  - damaged or worn splines
  - roller clutch race for damage or wear
  - housing for cracks
- Pinions for:
  - cracked or chipped teeth
  - bearing surface damage
- Pinion thrust washers for scoring or damage.
- Thrust bearing (523) for pitting or roughness.

Assemble (Figure 90)

1. Thrust bearing (523).
   - small diameter faces down
   - retain with petrolatum
2. (19) Needle bearings into each pinion.
   - retain with petrolatum
3. Position steel and bronze thrust washers on each end of pinion.
   - retain with petrolatum
4. Position pinion and thrust washers into carrier (524).
5. Insert pinion pins through carrier, thrust washers,and pinions.
6. Snap ring (526).

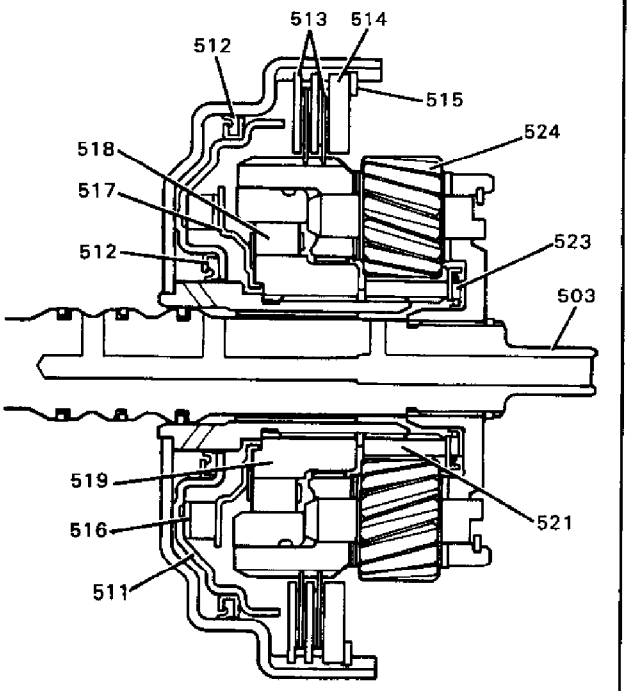
Measure (Figure 91)

- Check pinion end play.
- Clearance is 0.24mm-0.060mm (.009"-.024").

Turbine Shaft

Inspect (Figure 92)

- Turbine shaft seal rings (504) for nicks, cuts, or damage.
- Presence of cup plug (505).
- Snap ring grooves for nicks, wear, or damage.
- Check valve retainer and ball assembly (501)
  - ball must move freely
  - retainer must be tight in turbine shaft



503 SHAFT, TURBINE
511 PISTON ASSEMBLY, OVERRUN CLUTCH
512 SEALS, OVERRUN CLUTCH (INNER/OUTER)
513 PLATE ASSEMBLY, OVERRUN CLUTCH
514 PLATE, OVERRUN CLUTCH BACKING
515 RING, SNAP (OVERRUN CLUTCH HOUSING)
516 SPRING, WAVE (OVERRUN CLUTCH RELEASE)
517 RETAINER, OVERRUN CLUTCH RELEASE SPRING
518 ROLLER ASSEMBLY, OVERDRIVE CLUTCH
519 CAM, OVERDRIVE ROLLER CLUTCH
521 GEAR, OVERDRIVE SUN
523 BEARING ASSEMBLY, THRUST (CARRIER/SUN)
524 CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)

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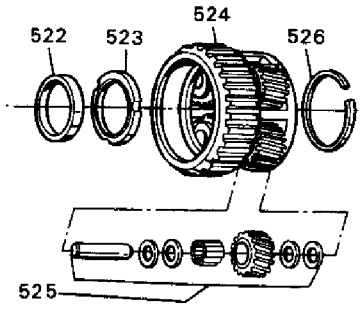
Figure 89 Overrun Clutch and Overdrive Carrier Assemblies



522 BUSHING, OVERDRIVE CARRIER
523 BEARING ASSEMBLY, THRUST (CARRIER/SUN)
524 CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)
525 PINION ASSEMBLY, OVERDRIVE CARRIER
526 RING, SNAP (OVERDRIVE CARRIER)

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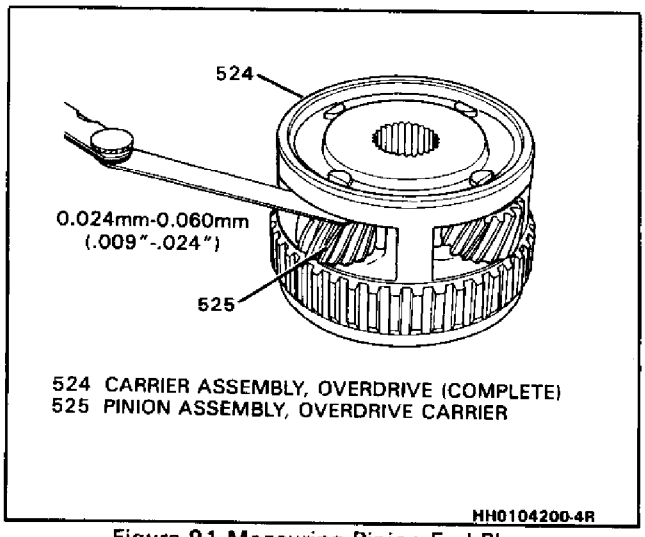
Figure 90 Overdrive Carrier Assembly

Check Valve Assembly and Seal Ring Replacement Procedure



524 CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)
525 PINION ASSEMBLY, OVERDRIVE CARRIER

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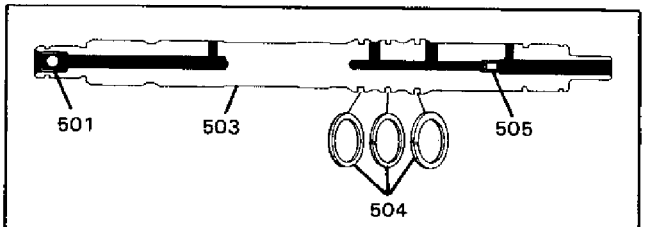
Figure 91 Measuring Pinion End Play



501 RETAINER & BALL ASSEMBLY, CHECK VALVE
503 SHAFT, TURBINE
504 RING, OIL SEAL (TURBINE SHAFT)
505 PLUG, TURBINE SHAFT (4.80 DIA.)

HH0107200-4R

Figure 92 Turbine Shaft Seals

Remove or Disconnect (Figure 93)

Tools Required
#4 Screw Extractor

1. Straighten the tangs of retainer and remove the ball.
2. Check ball retainer. Use #4 screw extractor.

Install or Connect (Figure 93)

Tools Required
9.5mm (3/8") diameter

- Install check valve (501):
  - Use 9.5mm (3/8") metal rod
  - seat check valve 3.0mm (1/8") below top of turbine shaft
  - be certain ball moves freely

Assemble (Figure 94)

Tools Required
J-29696-1 Turbine Shaft Seal Installer

1. Lubricate seals (504) with transmission fluid.
   - Install solid seal.Use J-29696-1.
   - scarf cut seals.
   - Lubricate seals (504). Size seals using J-29696-2.

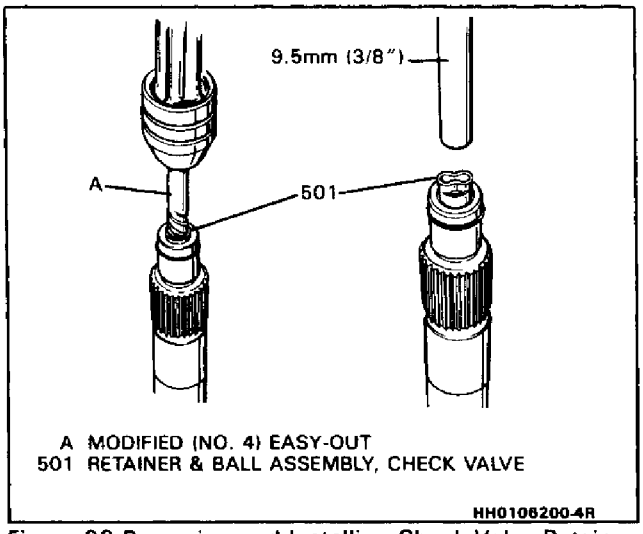


Figure 93 Removing and Installing Check Valve Retainer and Ball Assembly

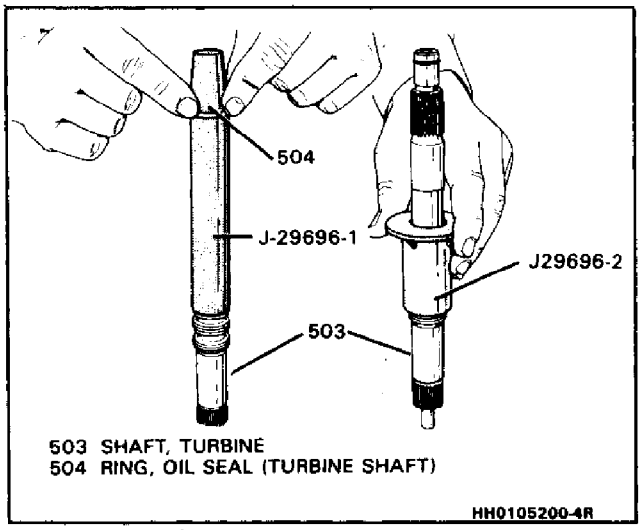


Figure 94 Installing Turbine Shaft Seals

Assemble (Figure 95)

1. Overdrive sun gear (521).
   - chamfered side up
2. Align clutch plates (513).
3. Overdrive carrier assembly (524) into overrun clutch assembly (510).
4. Position overrun clutch assembly (510) and overdrive carrier (524) as shown.
5. Turbine shaft (503).
6. Snap ring (527).
7. Overrun clutch and overdrive carrier assembly (510/524).

Inspect

- Clutch Plates (508)
  - composition plates for damaged tangs, delamination or wear
  - steel plates for damaged tangs, wear or heat damage
- Backing Plate (507) For:
  - scratches
  - damage

Assemble (Figure 95 and 96)

1. Fourth clutch plates (508):
   - soak in transmission fluid
   - install in the following order:
     - steel plate
     - composition plate
     - (2) steel plates
     - composition plate
2. Backing plate (507).
3. Snap ring (506).
   - composition plates must rotate freely
4. Oil deflector (542).
   - tangs face up
5. Overdrive unit.

Oil Pump Assembly

Remove or Disconnect (Figure 97)

1. Selective thrust washer (9).
2. Pump cover bolts (8).
3. Pump cover (217) from pump body (203).

Pump Body

Disassemble (Figure 98)

1. Pump slide spring (209).
   - compress with needle nose pliers
   - pull straight out

   CAUTION: Spring is under very high pressure. Place covering over spring to prevent injury.
2. From the pump pocket:
   - pump guide rings (212)
   - pump vanes (215)
   - pump rotor (214)
   - pump guide (213)
   - slide (206)
   - slide seal (211)
   - seal support (210)
   - pivot slide pin (208) and spring (207)
   - slide seal ring (204) and slide back up seal (205)

Oil Pump Cover

Disassemble (Figures 99 and 100)

1. Converter clutch apply valve train
   - compress converter clutch apply valve spring (228/229)
   - remove retaining ring (225)
   - slowly release spring tension
   - stop valve (226), converter clutch valve (227), and (2) converter clutch valve springs (228/229)
2. Pressure relief ball (231)
   - ball is under strong spring pressure

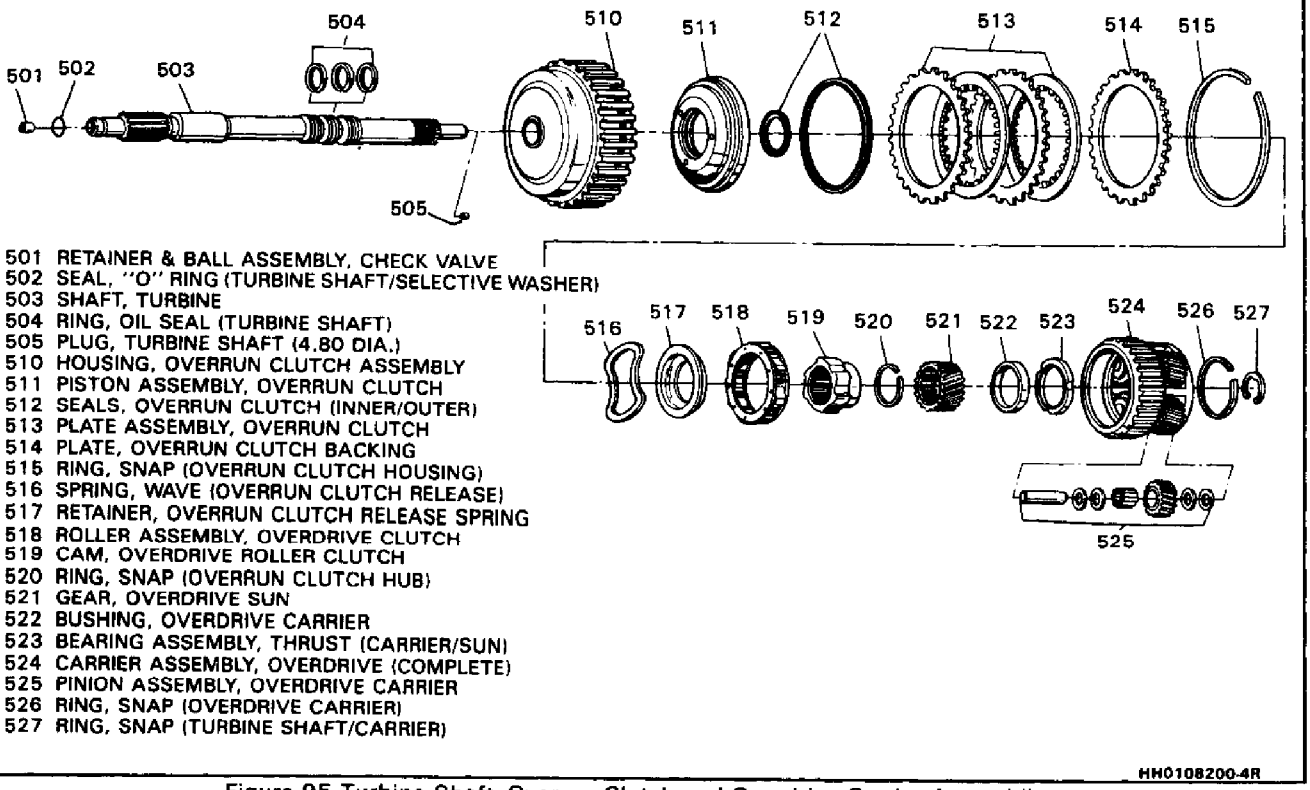


Figure 95 Turbine Shaft, Overrun Clutch and Overdrive Carrier Assemblies

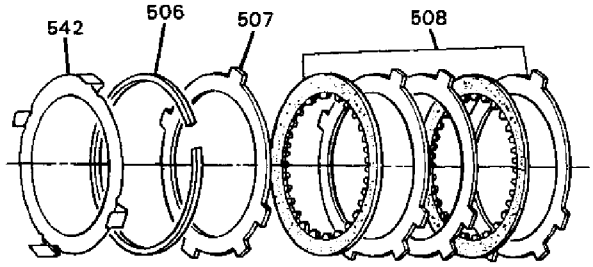


Figure 96 Installing Fourth Clutch Plates

- cover with a cloth when removing

3. Pressure regulator assembly (218-224)
   - follow the same procedure used to remove the converter clutch valve.

Inspect

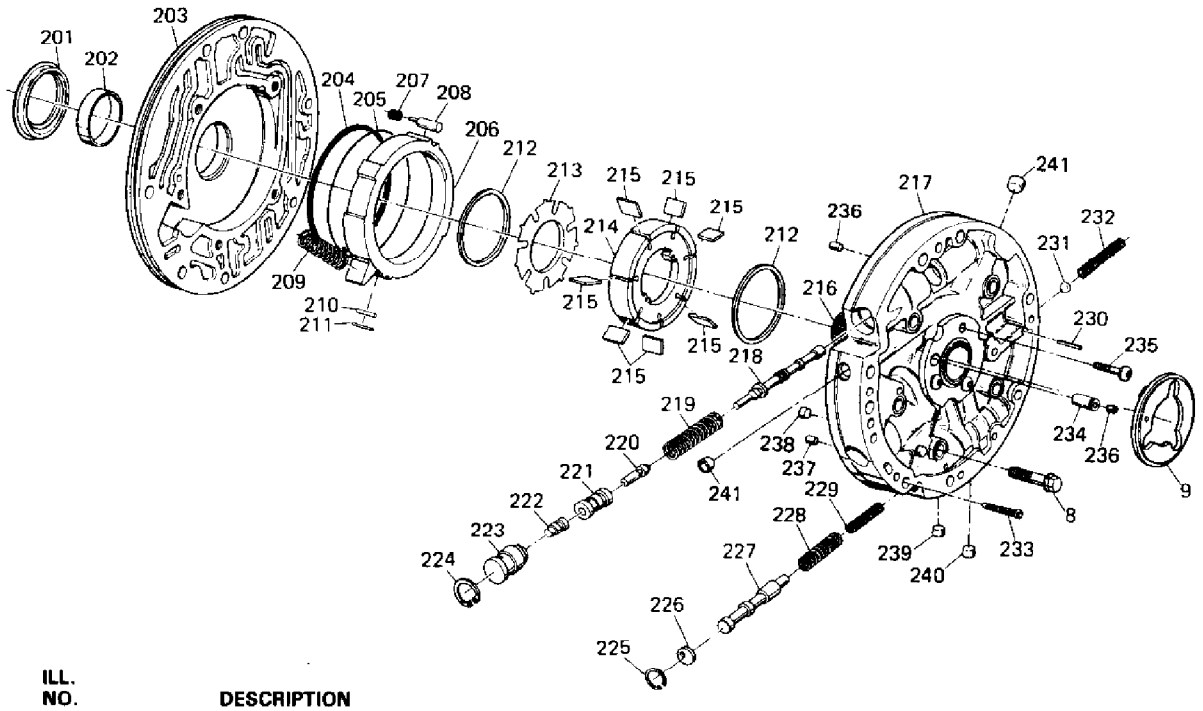
- Pressure regulator assembly (218-224) and converter clutch apply valve assembly (225-229) for:
  - chips, burrs, distortion, plugged oil passages, and free movement in bore
  - remove burrs with crocus cloth
- Pressure relief assembly (231-232) for damage or distortion
- Pump cover (217) and pump body (203) for:
  - worn or damaged bushing (see Bushing Replacement Procedures)
  - foreign material or debris
  - scored or irregular mating surface
  - cross channel leaks
  - ring groove damage
- Rotor (214) and slide (206) for cracks
- Oil seal assembly for damage or wear

Clean

- Wash and air dry all parts
  - do not wipe dry with a cloth

Inspect

- Stator shaft and Flange assembly (216) for:



ILL. NO.	DESCRIPTION
8	BOLT, PUMP COVER TO BODY
9	WASHER, THRUST (HOUSING TO PUMP)
201	SEAL, HELIX (PUMP BODY) (FRONT)
202	BUSHING, PUMP BODY
203	BODY, PUMP
204	RING, OIL SEAL (SLIDE TO WEAR PLATE)
205	SEAL, "O" RING (SLIDE SEAL BACK-UP)
206	SLIDE, PUMP
207	SPRING, PIVOT PIN
208	PIN, PIVOT SLIDE
209	SPRING, PUMP SLIDE (INNER/OUTER)
210	SUPPORT, PUMP SLIDE SEAL
211	SEAL, PUMP SLIDE
212	RING, PUMP VANE
213	GUIDE, ROTOR
214	ROTOR, OIL PUMP
215	VANE, PUMP
216	SHAFT & FLANGE ASSEMBLY, STATOR
217	COVER, PUMP
218	VALVE, PRESSURE REGULATOR
219	SPRING, PRESSURE REGULATOR VALVE
220	VALVE, REVERSE BOOST
221	BUSHING, REVERSE BOOST VALVE
222	VALVE, T.V. BOOST
223	BUSHING, T.V. BOOST VALVE
224	RING, SNAP PRESSURE REGULATOR CASE
225	RING, SNAP (CONVERTER CL. PUMP VALVE RET.)
226	STOP, VALVE (CONVERTER CLUTCH)
227	VALVE, CONVERTER CLUTCH
228	SPRING, CONVERTER CLUTCH VALVE (OUTER)
229	SPRING, CONVERTER CLUTCH VALVE (INNER)
230	RIVET, FLAT HEAD (.156 X 1.0)
231	BALL, PRESSURE RELIEF
232	SPRING, PRESSURE RELIEF
233	SCREEN ASSEMBLY, GOVERNOR
234	PIN, DOWEL (PUMP COVER)
235	SCREW, SOCKET BUTTON HEAD (M6 X 1 X 16)
236	PLUG, CUP (SELECTIVE WASHER LUBE) (2)
237	PLUG, ORIFICE (CONV. CLUTCH SIGNAL) 4.84 DIA.
238	PLUG, ORIFICE (COOLER FEED) 6.84 DIA.
239	PLUG, CUP (COOLER FEED) 6.8 DIA.
240	PLUG, CUP (CLUTCH RELEASE) 6.8 DIA.
241	PLUG, CUP (LINE/CASE) .511 DIA. (2)

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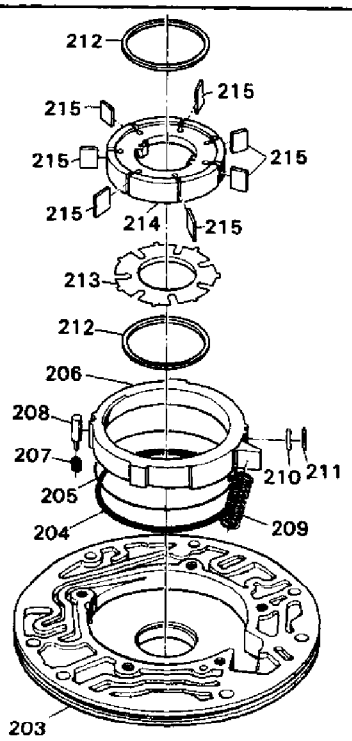
Figure 97 Oil Pump Assembly



ILL. NO.	DESCRIPTION
203	BODY, PUMP
204	RING, OIL SEAL (SLIDE TO WEAR PLATE)
205	SEAL, "O" RING (SLIDE SEAL BACK-UP)
206	SLIDE, PUMP
207	SPRING, PIVOT PIN
208	PIN, PIVOT SLIDE
209	SPRING, PUMP SLIDE (INNER/OUTER)
210	SUPPORT, PUMP SLIDE SEAL
211	SEAL, PUMP SLIDE
212	RING, PUMP VANE
213	GUIDE, ROTOR
214	ROTOR, OIL PUMP
215	VANE, PUMP

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Figure 98 Pump Body Assembly

- damaged splines
- damaged or missing orifice cup plug (236)

Do Not Remove Unless Damaged

STATOR SHAFT AND FLANGE ASSEMBLY IS PRESSED INTO THE PUMP BODY. DO NOT REMOVE UNLESS DAMAGED.

Disassemble (Figures 100 and 101)

Tools Required

#27 TORX Drive Bit

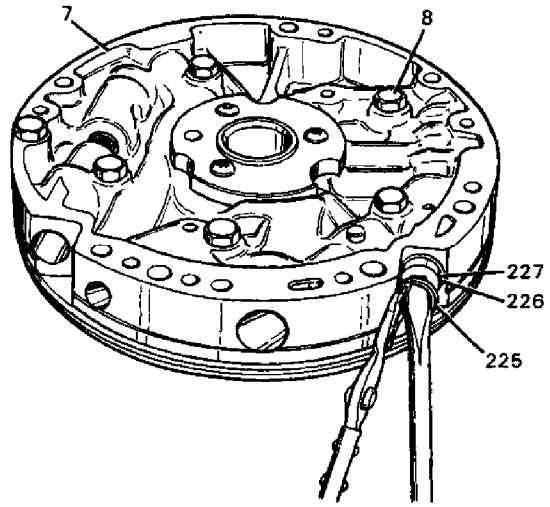
1. Screws (235).
2. Press the stator shaft (216) from pump cover.

Assemble (Figures 100 and 101)

Tools Required

J-25359-3 #27 TORX Drive Bit

1. Align stator shaft (216) with dowel pin (234).
2. Press stator shaft until seated on pump cover (217).
3. Screws (235).



ILL. NO.	DESCRIPTION
7	PUMP ASSEMBLY, COMPLETE
8	BOLT, PUMP COVER TO BODY
225	RING, SNAP (CONVERTER CL. PUMP VALVE RET.) (FLAT SIDE OUT)
226	STOP, VALVE (CONVERTER CLUTCH)
227	VALVE, CONVERTER CLUTCH

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Figure 99 Removing Converter Clutch Valve Train

- torque screws (235) to 12 N·m (9 lbs.-ft.)

Measure (Figure 102)

Tools Required

One-inch Micrometer

- Oil pump rotor (214) thickness.
- Oil pump slide (206) 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 burrs or nicks.

Pump Body

Assemble (Figures 103 and 104)

Tools Required

J-25016 Seal Installer

1. Oil seal (201). Use J-25016.
2. "O" ring back-up seal (205) and oil seal ring (204) into the groove on the back side of slide.
3. Slide (206).
   - seal side down.
   - index the notch in the slide with the pivot pin
4. Slide seal (211) and support (210).
5. Pivot pin spring (207) and pin (208).
6. Vane guide ring (212) into the pump pocket.

ILL. NO.	DESCRIPTION
8	BOLT, PUMP COVER TO BODY
9	WASHER, THRUST (HOUSING TO PUMP)
216	SHAFT & FLANGE ASSEMBLY, STATOR
217	COVER, PUMP
218	VALVE, PRESSURE REGULATOR
219	SPRING, PRESSURE REGULATOR VALVE
220	VALVE, REVERSE BOOST
221	BUSHING, REVERSE BOOST VALVE
222	VALVE, T.V. BOOST
223	BUSHING, T.V. BOOST VALVE
224	RING, SNAP PRESSURE REGULATOR CASE
225	RING, SNAP (CONVERTER CL. PUMP VALVE RET.)
226	STOP, VALVE (CONVERTER CLUTCH)
227	VALVE, CONVERTER CLUTCH
228	SPRING, CONVERTER CLUTCH VALVE (OUTER)
229	SPRING, CONVERTER CLUTCH VALVE (INNER)
230	RIVET, FLAT HEAD (.156 X 1.0)
231	BALL, PRESSURE RELIEF
232	SPRING, PRESSURE RELIEF
233	SCREEN ASSEMBLY, GOVERNOR
234	PIN, DOWEL (PUMP COVER)
235	SCREW, SOCKET BUTTON HEAD (M6 X 1 X 16)
236	PLUG, CUP (SELECTIVE WASHER LUBE) (2)
237	PLUG, ORIFICE (CONV. CLUTCH SIGNAL) 4.84 DIA.
238	PLUG, ORIFICE (COOLER FEED) 6.84 DIA.
239	PLUG, CUP (COOLER FEED) 6.8 DIA.
240	PLUG, CUP (CLUTCH RELEASE) 6.8 DIA.
241	PLUG, CUP (LINE/CASE) .511 DIA. (2)

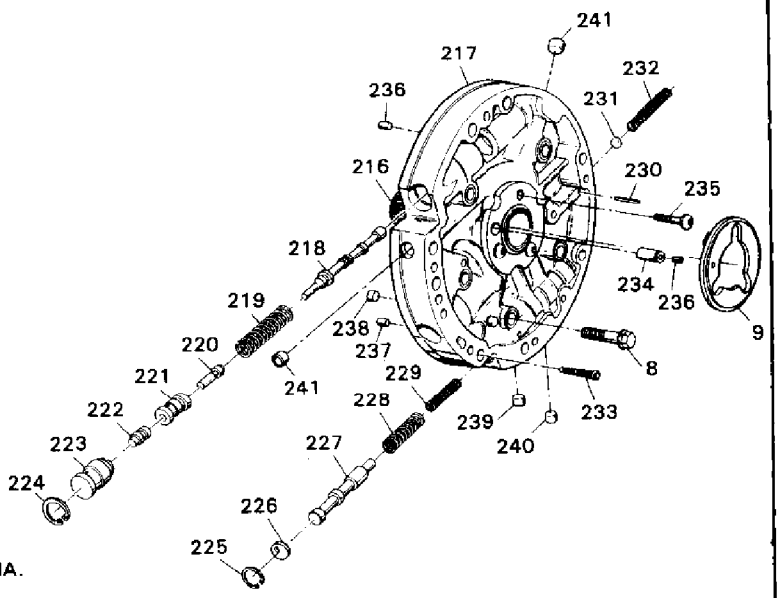


Figure 100 Pump Cover Assembly

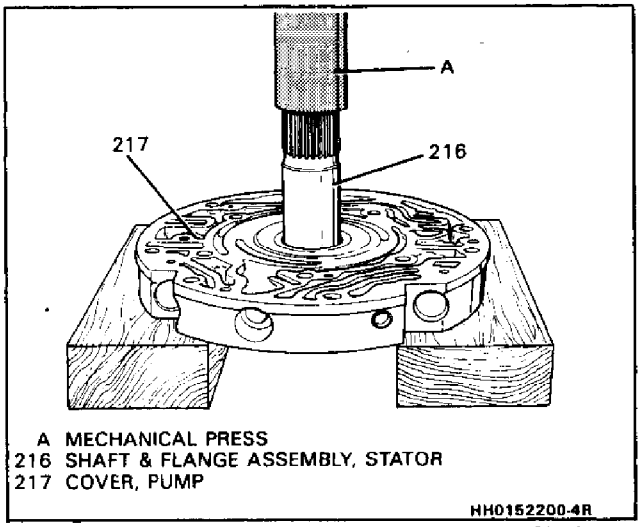


Figure 101 Removing and Installing Stator Shaft

Assemble

1. Rotor guide (213) onto rotor (214)
   - retain with petrolatum
2. Rotor (214).
3. Vanes (215).
4. Vane guide ring (212).
5. Pump slide spring (209).
6. Vane guide ring (212).

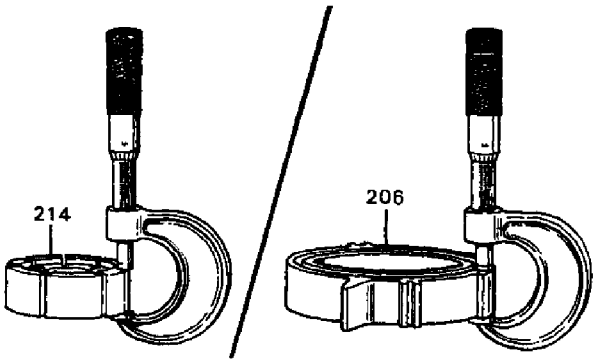
Pump Cover

Assemble (Figure 105)

1. Pressure relief ball (231), spring (232), and rivet (230).
2. Inner (229) and outer (228) converter clutch valve springs.
3. Conveter clutch valve (227).
4. Stop valve (226).
5. Retaining ring (225).

Assemble

1. Pressure regulator valve (218) into the pressure regulator bore.
2. Pressure regulator spring (219).
3. T.V. boost valve (222) into the T.V. bushing
   - long land of the valve into the large hole of the bushing
   - retain with petrolatum.
4. Reverse boost valve (220) into the reverse boost bushing (221).
   - small end first
   - retain with petrolatum
5. Reverse boost valve sleeve (221) into the pressure regulator bore.
6. T.V. boost valve sleeve (223) into the pressure regulator bore.
7. Retaining ring (224).



206 SLIDE, PUMP
214 ROTOR, OIL PUMP

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

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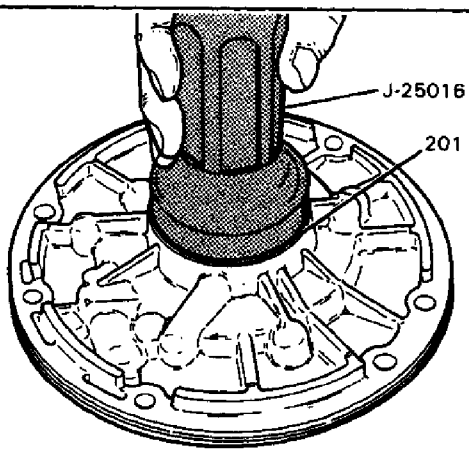
Figure 102 Measuring Oil Pump Rotor



201 SEAL, HELIX (PUMP BODY) FRONT

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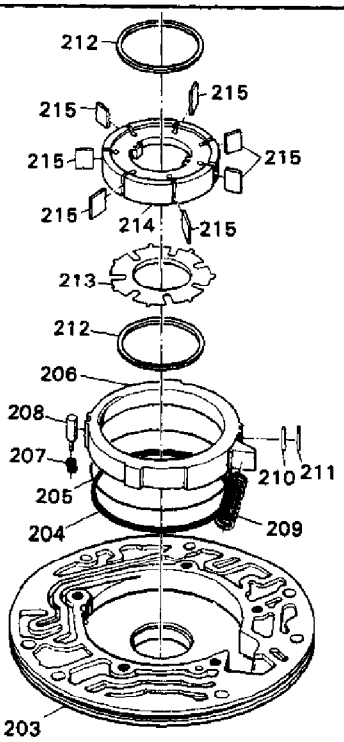
Figure 103 Installing Front Helix Seal



ILL. NO. DESCRIPTION

203 BODY, PUMP
204 RING, OIL SEAL (SLIDE TO WEAR PLATE)
205 SEAL, "O" RING (SLIDE SEAL BACK-UP)
206 SLIDE, PUMP
207 SPRING, PIVOT PIN
208 PIN, PIVOT SLIDE
209 SPRING, PUMP SLIDE (INNER/OUTER)
210 SUPPORT, PUMP SLIDE SEAL
211 SEAL, PUMP SLIDE
212 RING, PUMP VANE
213 GUIDE, ROTOR
214 ROTOR, OIL PUMP
215 VANE, PUMP

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Figure 104 Pump Body Assembly

Oil Pump Cover and Body

Assemble (Figures 106 and 107)

Tools Required

J-25015 Oil Pump Body and Cover Alignment Band

1. Oil pump cover (217) onto oil pump body (203)
   - stator shaft through a bench hole.
2. Pump cover bolts (8)
   - leave finger tight.
3. Align pump cover and pump body with J-25015.
4. Torque bolts (8) to 24N·m (18 lbs.-ft.).
5. Remove J-25025.
6. "O" ring seal (10)
   - chamfered side out
   - do not twist seal
   - lubricate with transmission fluid
7. Thrust washer (9)
   - retain with petrolatum

ILL. NO.	DESCRIPTION
8	BOLT, PUMP COVER TO BODY
9	WASHER, THRUST (HOUSING TO PUMP)
216	SHAFT & FLANGE ASSEMBLY, STATOR
217	COVER, PUMP
218	VALVE, PRESSURE REGULATOR
219	SPRING, PRESSURE REGULATOR VALVE
220	VALVE, REVERSE BOOST
221	BUSHING, REVERSE BOOST VALVE
222	VALVE, T.V. BOOST
223	BUSHING, T.V. BOOST VALVE
224	RING, SNAP PRESSURE REGULATOR CASE
225	RING, SNAP (CONVERTER CL. PUMP VALVE RET.)
226	STOP, VALVE (CONVERTER CLUTCH)
227	VALVE, CONVERTER CLUTCH
228	SPRING, CONVERTER CLUTCH VALVE (OUTER)
229	SPRING, CONVERTER CLUTCH VALVE (INNER)
230	RIVET, FLAT HEAD (.156 X 1.0)
231	BALL, PRESSURE RELIEF
232	SPRING, PRESSURE RELIEF
233	SCREEN ASSEMBLY, GOVERNOR
234	PIN, DOWEL (PUMP COVER)
235	SCREW, SOCKET BUTTON HEAD (M6 X 1 X 16)
236	PLUG, CUP (SELECTIVE WASHER LUBE) (2)
237	PLUG, ORIFICE (CONV. CLUTCH SIGNAL) 4.84 DIA.
238	PLUG, ORIFICE (COOLER FEED) 6.84 DIA.
239	PLUG, CUP (COOLER FEED) 6.8 DIA.
240	PLUG, CUP (CLUTCH RELEASE) 6.8 DIA.
241	PLUG, CUP (LINE/CASE) .511 DIA. (2)

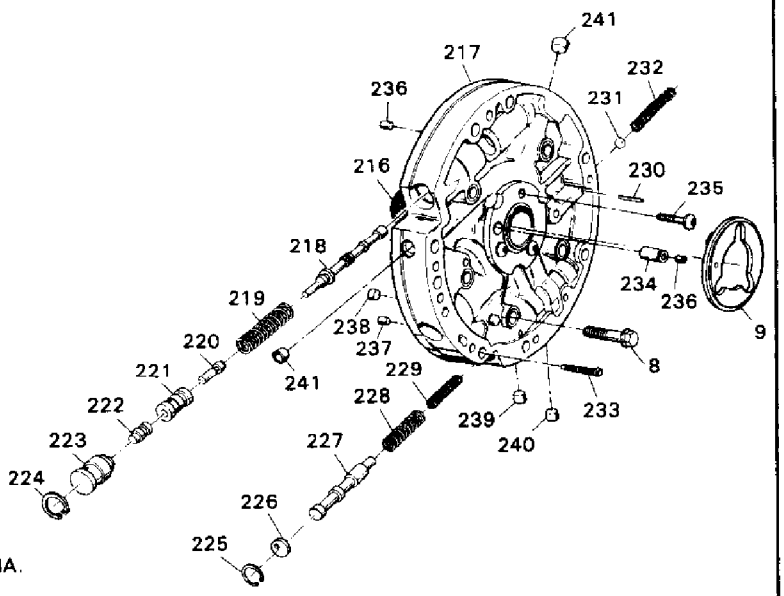
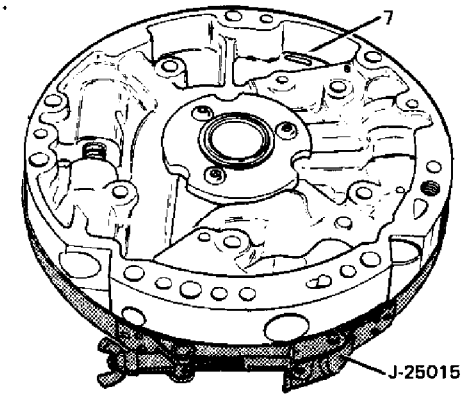


Figure 105 Pump Cover Assembly



ILL. NO.	DESCRIPTION
7	PUMP ASSEMBLY, COMPLETE

HH0153200-4R

Figure 106 Aligning Pump Body and Pump Cover

Install or Connect (Figure 108)

Tools Required

J-25025-1 Alignment Pins

1. J-25025-1 into case as shown.
2. Gasket (11).
3. Oil pump assembly into the case
   - align all holes properly.
4. Bolts (5) and washers (6)
   - torque to 24 N·m (18 lbs.-ft.)

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 misassembly now.

Overdrive Unit End Play Check

Measure (Figures 109 and 110)

Tools Required

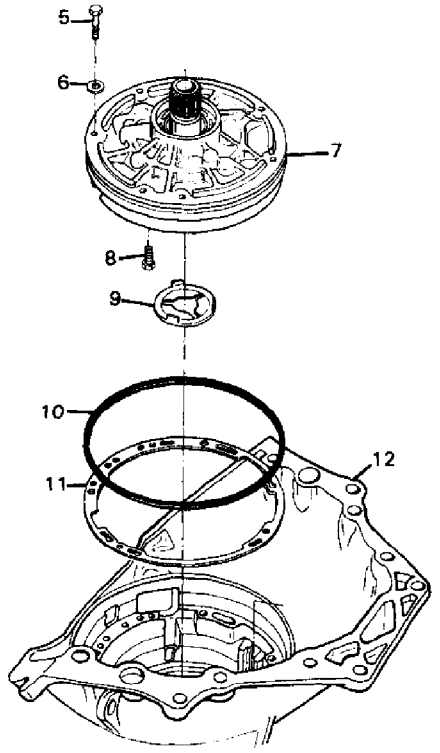
J-8001 Dial Indicator

J-24773-A Oil Pump Remover and End Play Checking Fixture

J-25022 End Play Fixture Adapter

J-25025-7A Post

1. Remove an oil pump to case bolt and install J-25025-7A and locknut.
2. Install J-24773,J-25022,and J-8001 as shown.
   - position dial indicator as shown.
3. Lift up on J-24773-5 with approximately 3 lbs. of force.
   - zero dial indicator
4. Increase lifting force to 20 lbs.
   - overdrive end play is 0.10mm-0.81mm (.004"-.027")
   - the selective washer that controls end play is located between the pump and the overrun clutch housing. If more or less end play is required, select the proper washer from the chart and install.



ILL. NO.	DESCRIPTION
5	BOLTS, M8 X 1.25 X 62
6	WASHER, PUMP TO CASE BOLTS
7	PUMP ASSEMBLY, COMPLETE
8	BOLT, PUMP COVER TO BODY
9	WASHER, THRUST (HOUSING TO PUMP)
10	SEAL, RING (PUMP TO CASE)
11	GASKET, PUMP COVER TO CASE
12	CASE & BUSHING ASSEMBLY

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Figure 107 Installing Pump Seal and Thrust Washer

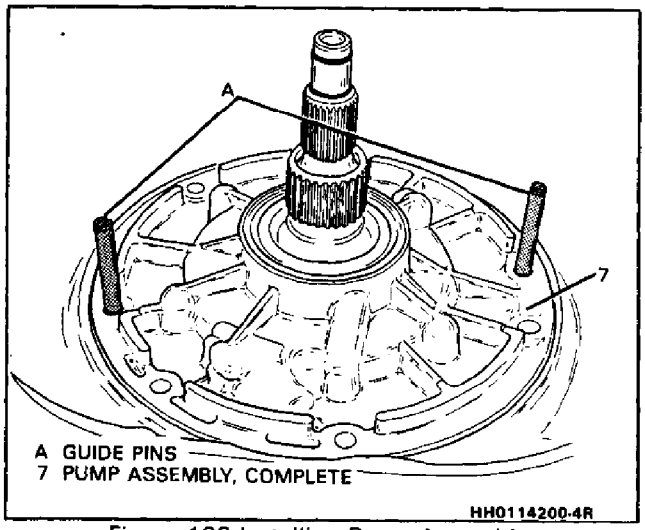

Figure 108 Installing Pump Assembly

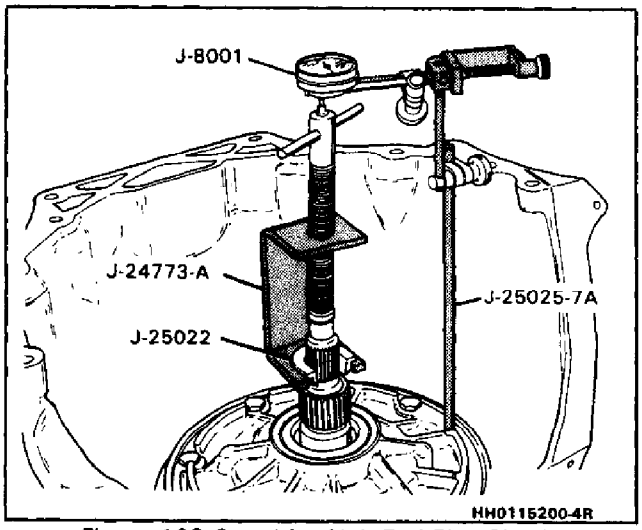

Figure 109 Overdrive Unit End Play Check

OVERDRIVE UNIT END PLAY WASHER THICKNESS CHART

THICKNESS		IDENTIFICATION NUMBER AND/OR COLOR
4.25 - 4.36mm	(0.167" - 0.171")	0 - SCARLET
4.36 - 4.48mm	(0.172" - 0.176")	1 - WHITE
4.49 - 4.60mm	(0.177" - 0.180")	2 - COCOA BROWN
4.61 - 4.72mm	(0.181" - 0.185")	3 - GRAY
4.73 - 4.84mm	(0.186" - 0.190")	4 - YELLOW
4.85 - 4.96mm	(0.191" - 0.195")	5 - LIGHT BLUE
4.97 - 5.08mm	(0.196" - 0.200")	6 - PURPLE
5.09 - 5.20mm	(0.201" - 0.204")	7 - ORANGE
5.21 - 5.32mm	(0.205" - 0.209")	8 - GREEN

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Figure 110 Overdrive Unit End Play Washer Thickness Chart

EXTERNAL PARTS

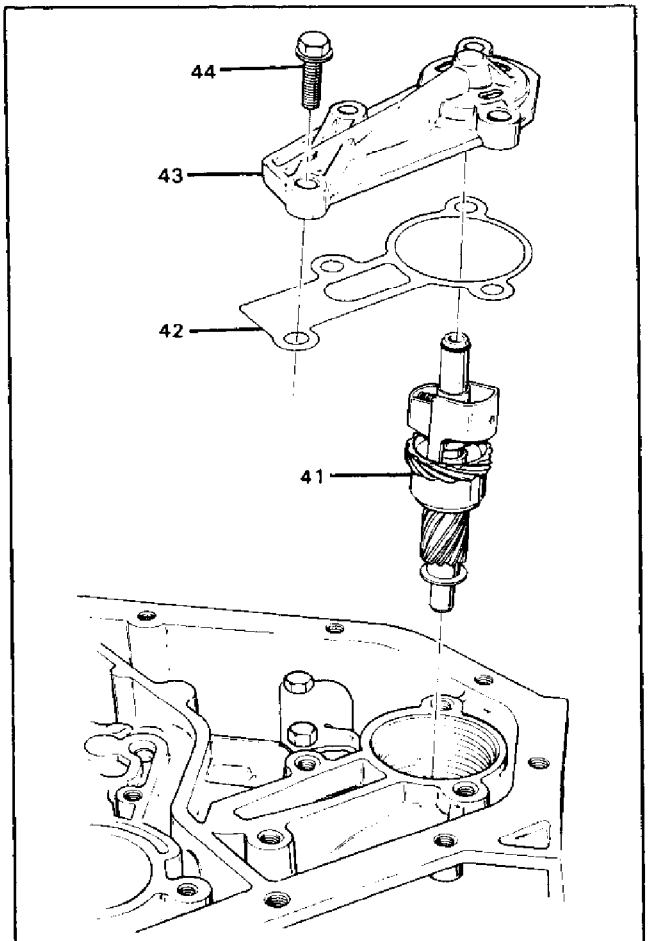
Governor Assembly

Inspect

- Governor cover (34) for:
  - worn bore
  - scoring
  - plugged oil passage
- Governor driven gear for:
  - chipped teeth
  - damage
- Free movement of governor weights

Install or Connect (Figure 111)

1. Governor assembly (41).
2. Gasket (42), governor cover (43), and bolts (44)
   - make sure governor pilot into cover.
   - torque bolts to 24 N·m (18 lbs.-ft.)



ILL. NO.	DESCRIPTION
41	GOVERNOR ASSEMBLY, COMPLETE
42	GASKET, GOVERNOR COVER
43	COVER ASSEMBLY, GOVERNOR
44	SCREW, GOVERNOR COVER

Figure 111 Installing Governor Assembly

Intermediate Servo Piston

Measure (Figures 112 and 113)

Tools Required

J-8001 Dial Indicator

J-25014-1 Intermediate Band Apply Pin Gage

J-25014-2 Intermediate Band Apply Pin Gage

1. Insatll J-25014-2 in the intermediate servo bore.
   - align retaining ring with case slot.
2. Insert J-25014-1 into J-25014-2.
   - make sure tapered end of J-25014-1 is properly located against band apply pin.
   - make sure band apply pin is located in case.
3. Install J-8001. Position dial indicator stem against the zero post.
   - zero indicator.
   - J-25014-2 MUST BE SEATED SQUARELY AGAINST RETAINING RING.
4. Align the stepped side of pin J-25024-1 with torquing arm of J-25024-2.
5. Apply 12 N·m (100 lbs.-in.).
6. Position dial indicator stem over J-25014-1.
   - read dial indicator
   - see chart.

Important

Dial indicator travel is reversed, making indicator read backwards. On an indicator that ranges from 0-100, a .5mm (.020") travel will read .2mm (.080"). A 1.5mm (.060") travel will read 1mm (.040").

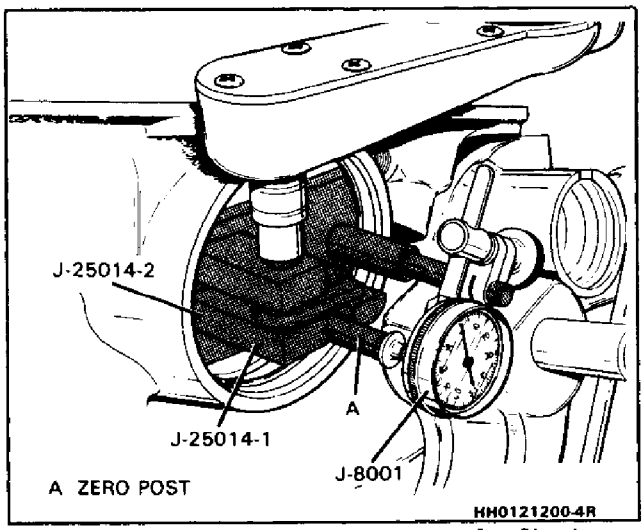


Figure 112 Intermediate Band Apply Pin Check

INTERMEDIATE BAND APPLY PIN SELECTION CHART

DIAL INDICATOR TRAVEL		APPLY PIN IDENTIFICATION
.0 - .72mm	(.0" - .029")	1 GROOVE
.72 - 1.44mm	(.029" - .057")	2 GROOVES
1.44 - 2.16mm	(.057" - .086")	3 GROOVES
2.16 - 2.88mm	(.086" - .114")	NONE

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Figure 113 Intermediate Band Apply Pin Selection Chart

Disassemble (Figure 114)

1. Outer (19) and inner (21) servo pistons and cushion spring (23).
2. Snap ring (24).
3. Spring retainer (25) and spring (26).
4. Inner (22) and outer (18 and 20) piston seals.
5. Band apply pin oil seals (28).

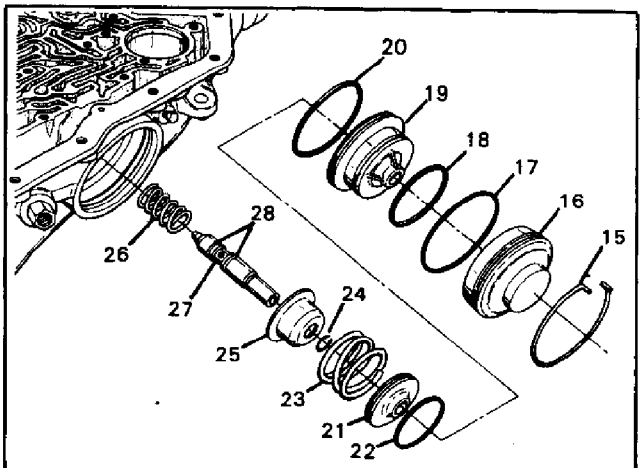
Inspect

- Band apply pins oil seals (28) for nicks or cuts

- Band apply pin (27) for:
  - proper fit in case
  - damage
  - debris in oil passages
- Piston seals (18, 20 and 22) for nicks cuts or damage

Assemble (Figure 114)

1. Spring (26) and retainer (25).
2. Snap ring (24).
3. Cushion spring (23).
4. Spring retainer (25) and outer (18 and 20) piston seals as shown.
5. Inner (21) and outer (19) servo pistons onto the band apply pin (27).
6. Compress spring (23).



15 RING, SERVO COVER RETAINING
16 COVER, INTERMEDIATE SERVO
17 SEAL, "O" RING (INTERMEDIATE SERVO COVER)
18 RING, OIL SEAL (INNER)
19 PISTON, INTERMEDIATE SERVO (OUTER)
20 RING, OIL SEAL (OUTER)
21 PISTON, INTERMEDIATE SERVO (INNER)
22 RING, OIL SEAL PISTON (INNER)
23 SPRING, INTERMEDIATE SERVO CUSHION
24 RING, SNAP (APPLY PIN/RETAINER)
25 RETAINER, SERVO SPRING
26 SPRING, INTERMEDIATE SERVO (INNER)
27 PIN, INTERMEDIATE BAND APPLY (SELECTIVE)
28 RING, OIL SEAL (INTERMEDIATE BAND APPLY PIN)

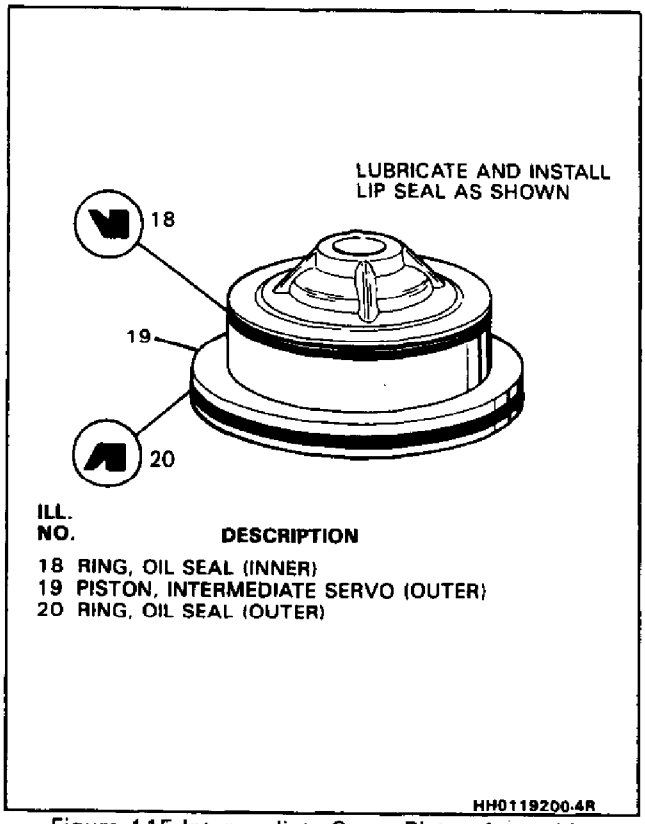
HH0118200-4R

Figure 114 Intermediate Servo Assembly

Install or Connect (Figures 115 and 116)

Tool Required
J-29714

1. Lubricate piston oil seals (18, 20, and 22) with petrolatum.
2. Intermediate servo assembly.
3. Cover "O" ring (17).
   - lubricate with petrolatum
4. Cover (16).
5. Oil pan.
   - retain with two bolts
6. J-29714.
7. Retaining ring (15).
   - align ring gap with case slot
8. Remove J-29714, bolts and oil pan.



ILL. NO. DESCRIPTION
18 RING, OIL SEAL (INNER)
19 PISTON, INTERMEDIATE SERVO (OUTER)
20 RING, OIL SEAL (OUTER)

HH0119200-4R

Figure 115 Intermediate Servo Piston Assembly

Control Valve Assembly

Clean

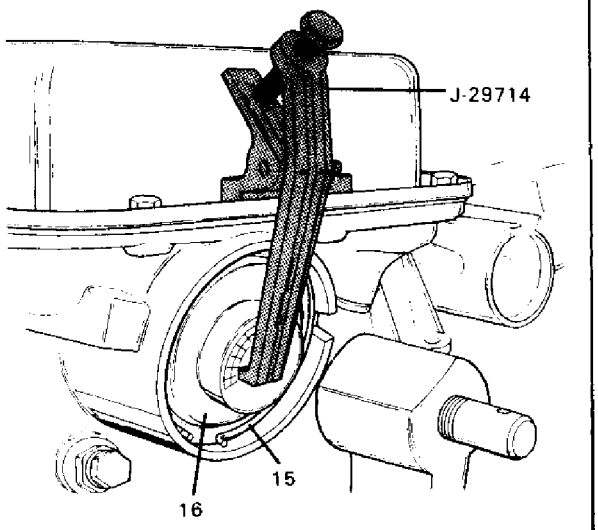
- Control valve assembly (74) throughly in solvent-move the valves with a pick or small screwdriver to dislodge any dirt or debris that may have accumulated
- Air Dry

Disassemble (Figure 117)

- Control Valve Assembly
  - Position as shown on a clean surface
  - Remove valve trains beginning with the upper left hand corner. **NOTE:** Some valves are under pressure-cover the bores while removing the roll pins
  - Remove blind hole roll pins with a modified drill bit
  - Valves, springs, and bushings must be laid out on a clean surface in the exact sequence they are removed
  - Remove pressure switches

Clean

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



ILL. NO.	DESCRIPTION
15	RING, SERVO COVER RETAINING
16	COVER, INTERMEDIATE SERVO

HH0122200-4R

Figure 116 Installing Intermediate Servo Cover

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 (Figure 117)

- Control valve assembly (74) exactly as shown.

NOTICE: The position of the valve lands and bushing passages.

3-4 Accumulator

Install or Connect (Figures 118 and 119)

1. 3-4 Accumulator piston pin (76) into case.
2. Spring (51).
3. Piston oil seal ring (50)
   - retain with petrolatum.
4. Piston (49).
5. (8) Check balls (55) into case.

Install or Connect (Figures 120, 121, 122)

Tools Required
Guide Pins (2)

1. Install (2) guide pins as shown.
2. Spacer plate-to-case gasket (86) marked "C".
3. Spacer plate (56).
4. Spacer plate-to-valve body gasket (87) marked "VB".
5. (3) Check balls (55)
   - retain with petrolatum.
6. Control valve (74)
   - position manual valve (345) and link (705) as shown.
7. Bolts (80 and 81)
   - torque to 12 N·m (9 lbs.-ft.)

Assemble (Figures 121 and 122)

1. Oil seal (60) onto 1-2 accumulator piston (61).
2. Piston (61) into housing (62).
3. Plate (57), gasket (58), spring (59), and housing (62) onto case.
4. Bolts (63)
   - torque to 12 N·m (8 lbs.-ft.)
5. Pressure switch (75) and bolt (80).

Install or Connect (Figure 123)

1. "O" ring (52) onto solenoid.
   - lubricate with petrolatum.
2. Solenoid (53) and bolts (54)
   - torque to 12 N·m (8 lbs.-ft.)
3. Signal oil pipe (83).
4. Pressure switch (73).
5. Manual detent roller and spring (708).
6. Install wire clips (79) and signal oil pipe retainer (84).
   - remove valve body bolts as necessary.
7. Case electrical connector (39) with seal (40).

Install or Connect (Figures 122, 123 and 124)

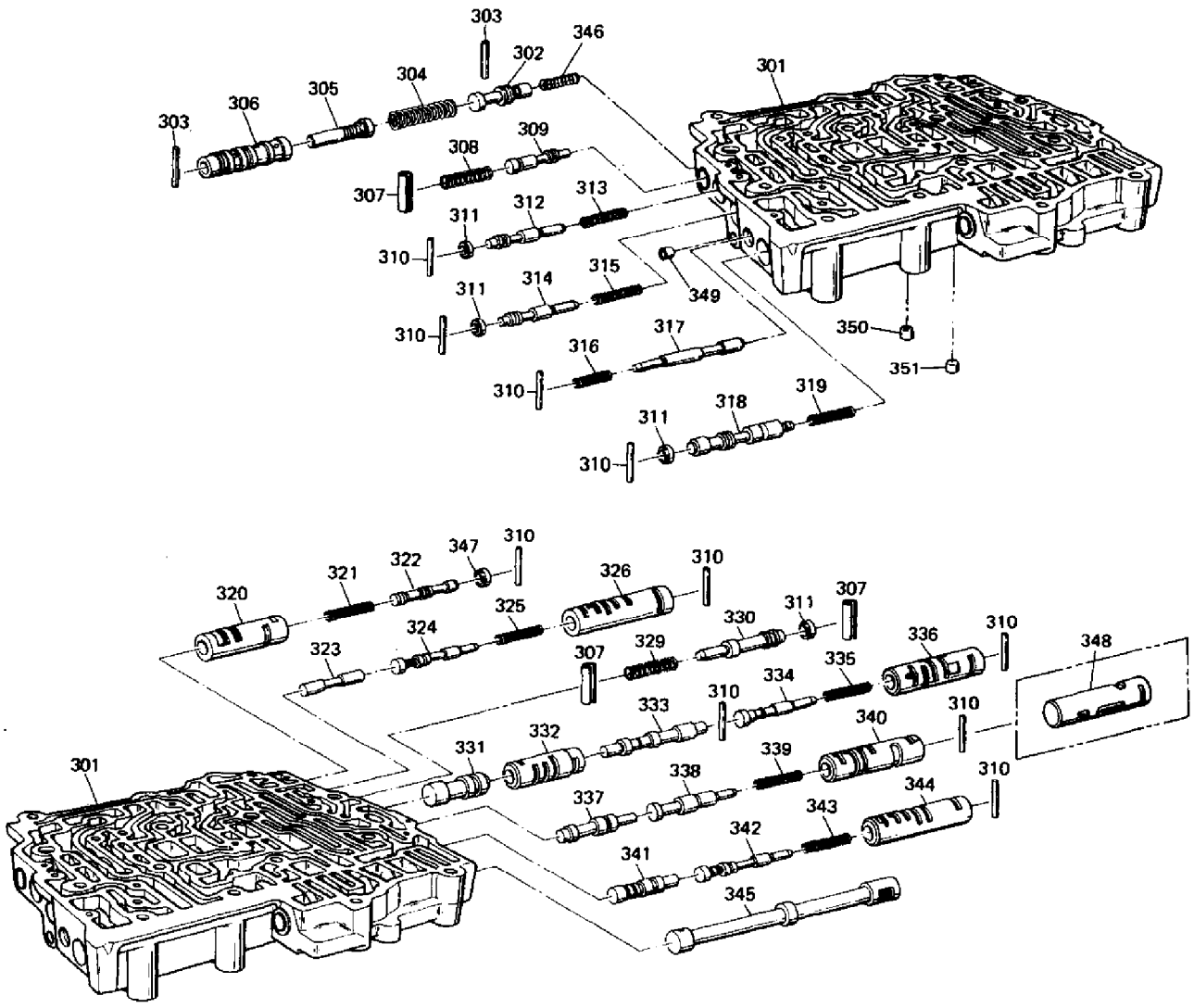
1. Throttle lever and bracket assembly:
   - install spring (70) on lifter (72)
   - lifter (72) into bracket, spring first
   - T.V. link (71) as shown
   - bracket (69) and bolt (81)
2. "O"ring (67) onto filter (68)
   - lubricate with petrolatum.
3. Position oil filter as shown.
4. Oil pan gasket (66), oil pan (65), and bolts (64).
   - torque bolts to 16 N·m (12 lbs.-ft.)

TORQUE CONVERTER ASSEMBLY

Inspect

The torque converter assembly (1) 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



301 BODY, CONTROL VALVE
302 VALVE, THROTTLE
303 PIN, COILED SPRING 2.72 X 25 (2)
304 SPRING, THROTTLE VALVE
305 PLUNGER, THROTTLE VALVE
306 BUSHING, THROTTLE VALVE PLUNGER
307 SLEEVE, SPRING RETAINING (3)
308 SPRING, T.V. LIMIT VALVE
309 VALVE, T.V. LIMIT
310 PIN, COILED SPRING 2.72 X 20 (10)
311 PLUG, VALVE BORE 12.5mm (4)
312 VALVE, T.V. MODULATOR UPSHIFT
313 SPRING, T.V. MODULATOR UPSHIFT VALVE
314 VALVE, T.V. MODULATOR DOWNSHIFT
315 SPRING, T.V. MODULATOR DOWNSHIFT VALVE
316 SPRING, 3-2 CONTROL VALVE
317 VALVE, 3-2 CONTROL
318 VALVE, LINE BIAS
319 SPRING, LINE BIAS VALVE
320 BUSHING, ACCUMULATOR VALVE
321 SPRING, ACCUMULATOR VALVE
322 VALVE, ACCUMULATOR
323 VALVE, 3-4 SHIFT
324 VALVE, 3-4 THROTTLE
325 SPRING, 3-4 THROTTLE VALVE
326 BUSHING, 3-4 THROTTLE VALVE
329 SPRING, LO OVERRUN CLUTCH VALVE
330 VALVE, LO OVERRUN CLUTCH
331 VALVE, 1-2 SHIFT
332 BUSHING, LO-1ST/DETENT VALVE
333 VALVE, LO-1ST/DETENT
334 VALVE, 1-2 THROTTLE
335 SPRING, 1-2 THROTTLE VALVE
336 BUSHING, 1-2 THROTTLE VALVE
337 VALVE, CONVERTER CLUTCH SHIFT (NON ECM)
338 VALVE, CONVERTER CLUTCH THROTTLE (NON ECM)
339 SPRING, CONV. CLUTCH THROTTLE VALVE (NON ECM)
340 BUSHING, CONV. CLUTCH THROTTLE (NON ECM)
341 VALVE, 2-3 SHIFT
342 VALVE, 2-3 THROTTLE
343 SPRING, 2-3 THROTTLE VALVE
344 BUSHING, 2-3 THROTTLE VALVE
345 VALVE, MANUAL
346 SPRING, THROTTLE VALVE BOOST
347 PLUG, VALVE BORE (.56 DIA.)
348 BUSHING, CONVERTER CLUTCH THROTTLE (DUMMY ECM CARS ONLY)
349 PLUG, CUP (7)
350 PLUG, CUP 4TH EXHAUST
351 PLUG, CUP 2-1 COASTDOWN

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Figure 117 Control Valve Assembly

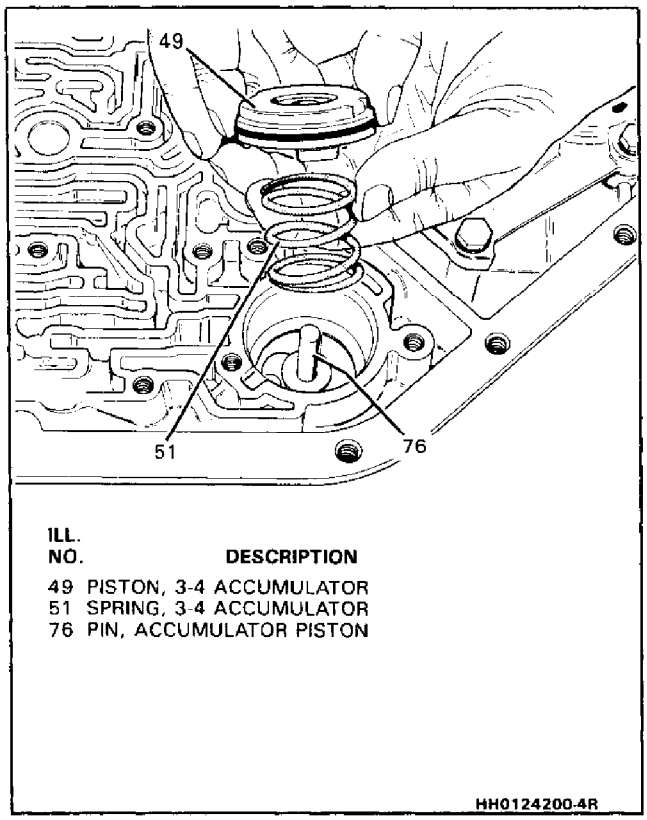


Figure 118 Installing 3-4 Accumulator Piston

- External leaks in hub weld area
- Converter pilot is broken, damaged or poor fit into crankshaft
- Converter hub is scored or damaged
- Internal failure to stator
- Contamination from engine coolant
- Excess end play

Measure (Figure 125)

Tool Required:

J-35138 Torque Converter End Play Checking Tool

- Install J-35138 and measure end play
  - 0mm - .5mm (.020") for 245mm Torque Converters
  - 0mm - .6mm (.024") for 298mm Torque Converters

The Torque Converter Should Not Be Replaced If:

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

Flushing the torque converter is not recommended.

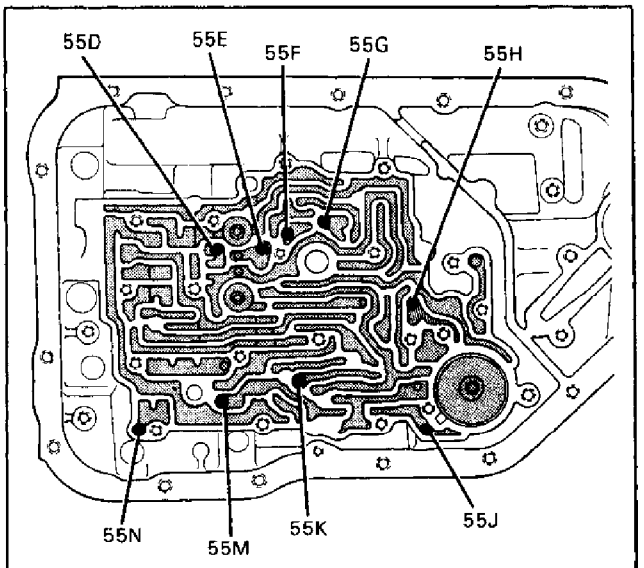


Figure 119 Check Ball Location in Case

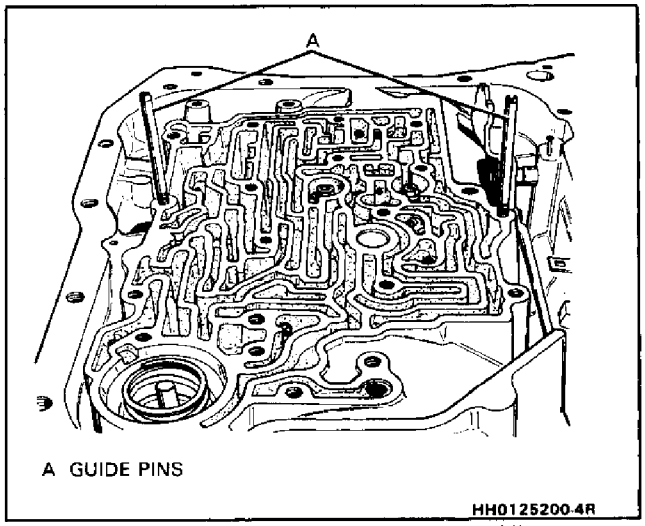
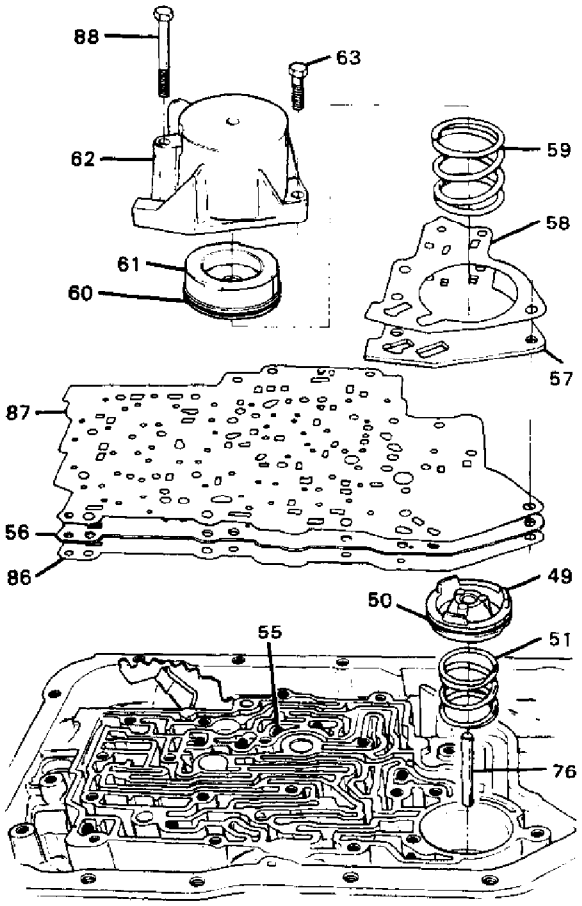


Figure 120 Spacer Plate and Valve Body Alignment

Install or Connect

1. Torque converter (1).



ILL. NO.	DESCRIPTION
49	PISTON, 3-4 ACCUMULATOR
50	RING, OIL SEAL (3-4 ACCUMULATOR PISTON)
51	SPRING, 3-4 ACCUMULATOR
55	BALL, .25 DIAMETER
56	PLATE, VALVE BODY SPACER
57	PLATE, ACCUMULATOR
58	GASKET, ACCUMULATOR HSG. TO ACCUM. PLATE
59	SPRING, 1-2 ACCUMULATOR PISTON
60	RING, OIL SEAL (1-2 ACCUMULATOR PISTON)
61	PISTON, 1-2 ACCUMULATOR
62	HOUSING & PIN ASSEMBLY, 1-2 ACCUMULATOR
63	BOLT, ACCUMULATOR HOUSING
86	GASKET, SPACER PLATE TO CASE
87	GASKET, VALVE BODY TO SPACER PLATE
88	BOLT, ACCUMULATOR HOUSING

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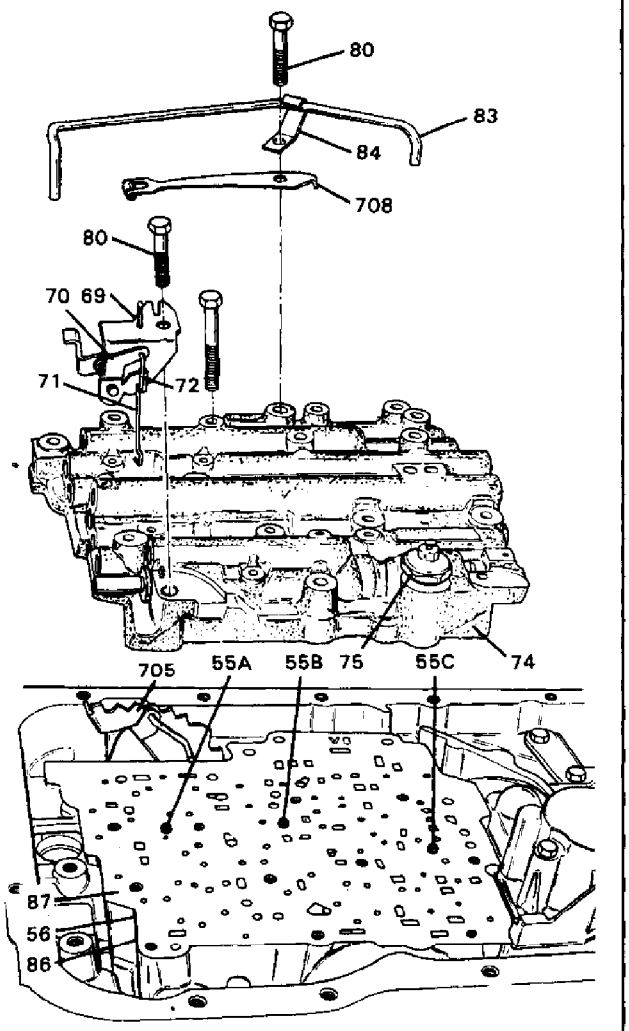
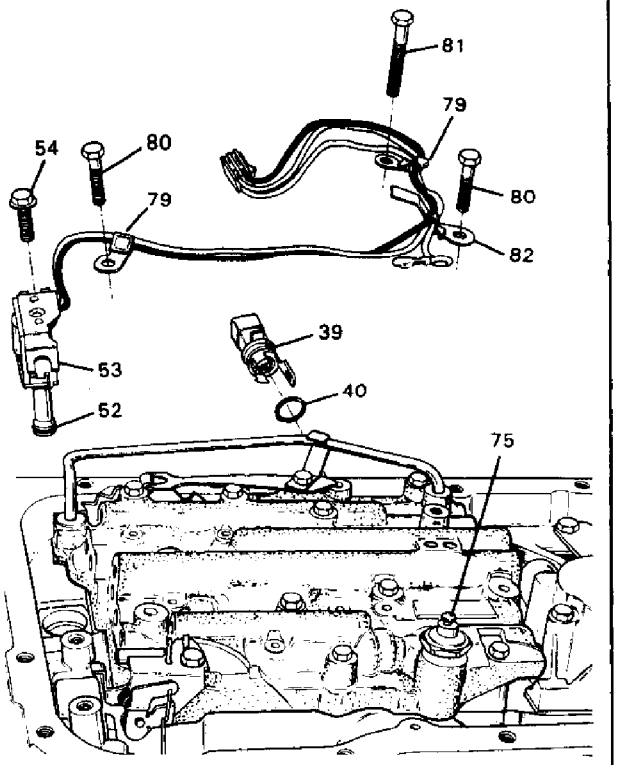
Figure 121 Installing Spacer Plate and 1-2 Accumulator Assembly



ILL. NO.	DESCRIPTION
55A	CHECK BALL #11
55B	CHECK BALL #8
55C	CHECK BALL #12
56	PLATE, VALVE BODY SPACER
69	LEVER & BRACKET ASSEMBLY, THROTTLE
70	SPRING, LIFTER (T.V. EXHAUST VALVE)
71	LINK, THROTTLE LEVER TO CABLE
72	LIFTER, T.V. EXHAUST
75	SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
74	VALVE ASSEMBLY, CONTROL
80	BOLT, M6 X 1 X 45
83	PIPE, SIGNAL OIL
84	RETAINER, SIGNAL OIL PIPE
86	GASKET, SPACER PLATE TO CASE
87	GASKET, VALVE BODY TO SPACER PLATE
705	LINK, INSIDE DETENT (LEVER TO VALVE)
708	MANUAL DETENT ROLLER & SPRING ASSEMBLY

HH0127200-4R

Figure 122 Installing Control Valve and T.V. Lever and Bracket Assemblies



39 CONNECTOR, ELECTRICAL
40 SEAL, "O" RING (ELECTRICAL CONNECTOR)
52 SEAL, "O" RING (SOLENOID)
53 SOLENOID ASSEMBLY
54 BOLTS, HEX WASHER HEAD M6 X 1 X 12.0
75 SWITCH ASSEMBLY, PRESSURE (3RD OR 4TH)
79 CLIP, SOLENOID WIRE (2)
80 BOLT, M6 X 1 X 45
81 BOLT, M6 X 1 X 60
82 CLIP, FILTER RETAINER

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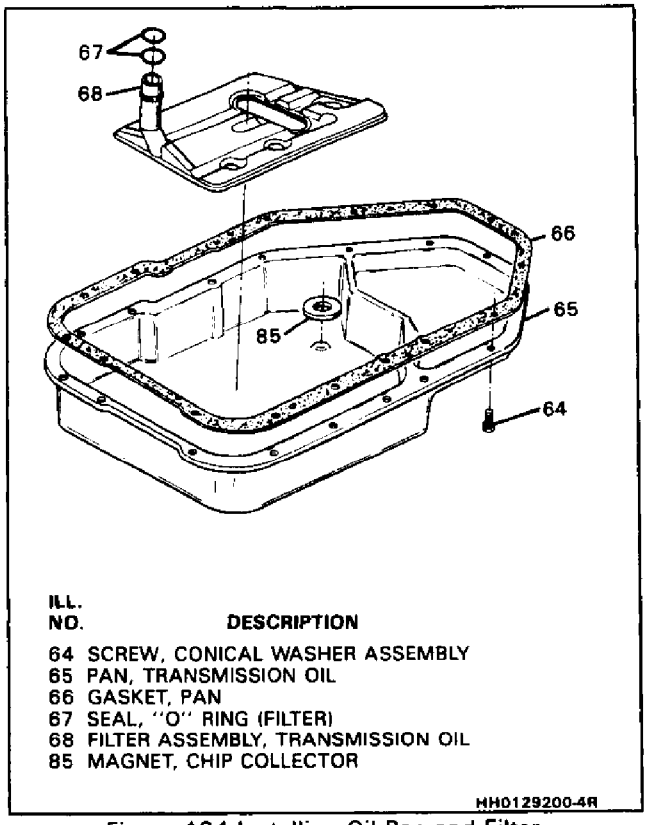
HH0128200-4R

Figure 123 Installing Electrical Connector and Solenoid Assembly

2. J-21366 converter holding strap
3. Transmission assembly into vehicle
   - Refer to Section 7A2



ILL. NO.	DESCRIPTION
64	SCREW, CONICAL WASHER ASSEMBLY
65	PAN, TRANSMISSION OIL
66	GASKET, PAN
67	SEAL, "O" RING (FILTER)
68	FILTER ASSEMBLY, TRANSMISSION OIL
85	MAGNET, CHIP COLLECTOR

HH0129200-4R

Figure 124 Installing Oil Pan and Filter

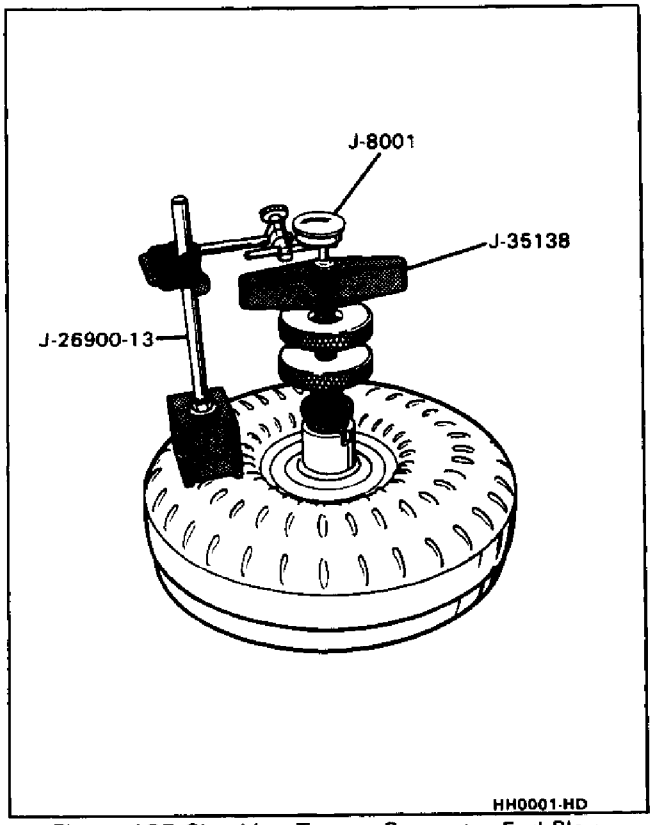


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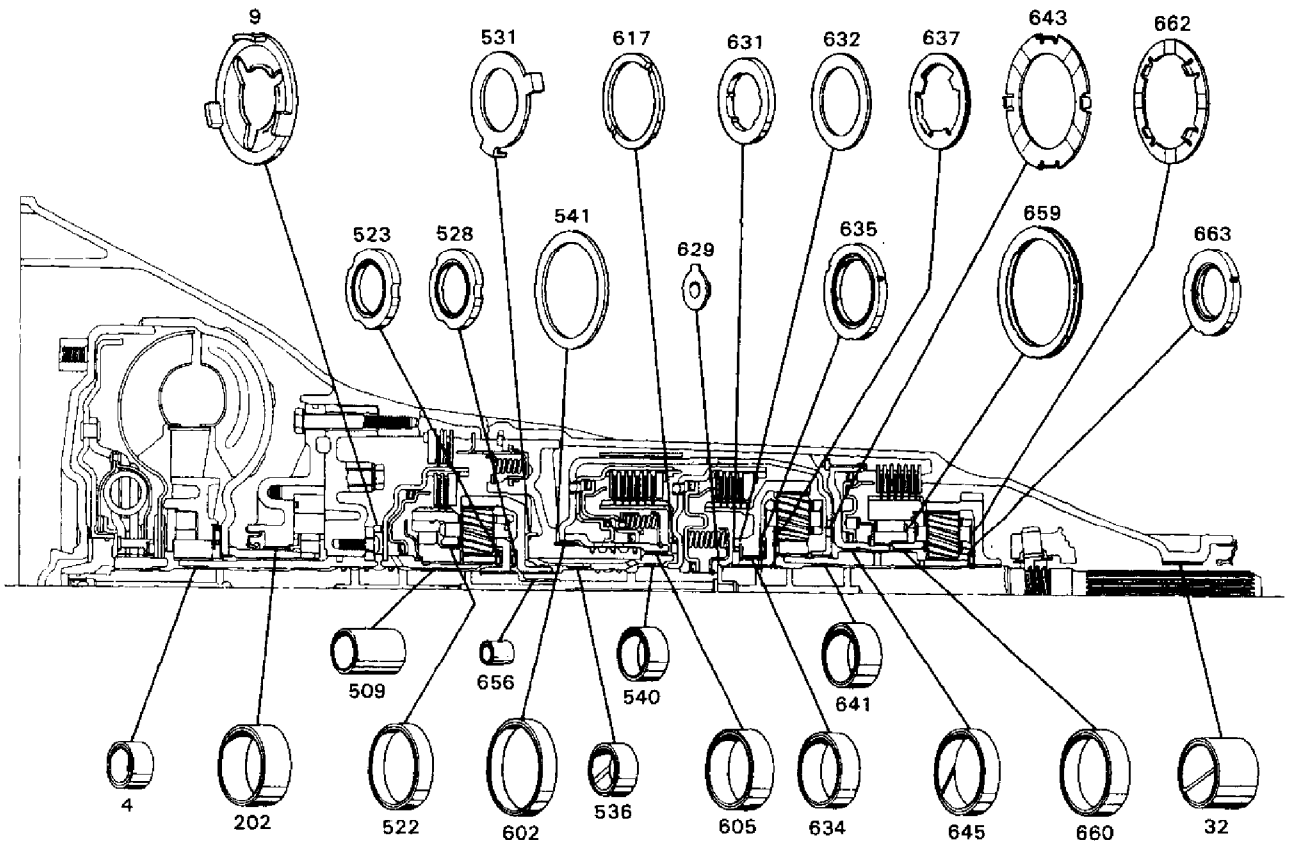
Figure 125 Checking Torque Converter End Play



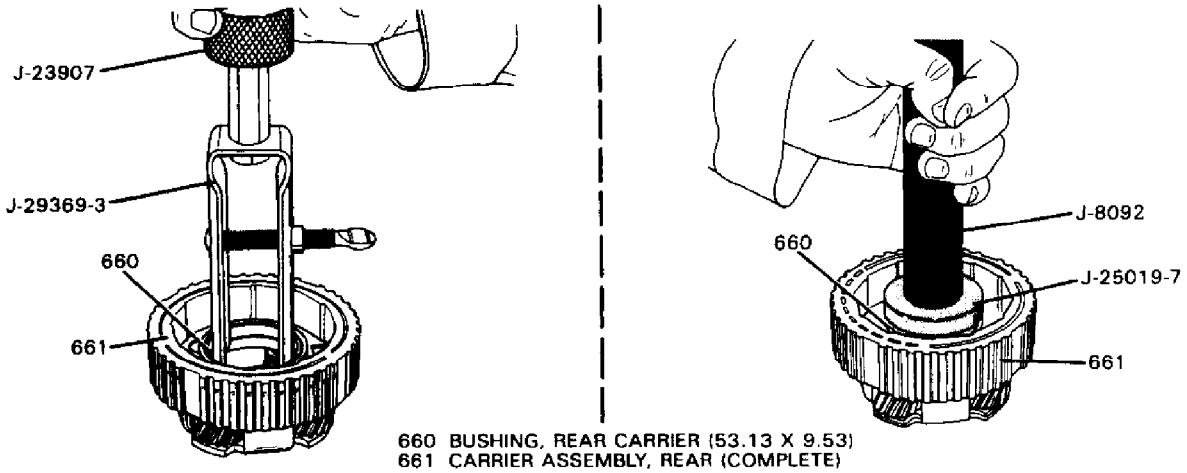
ILL. NO.	DESCRIPTION
4	BUSHING, STATOR SHAFT
9	WASHER, THRUST (HOUSING TO PUMP)
32	BUSHING, CASE REAR
202	BUSHING, PUMP BODY
509	BUSHING, OVERRUN CLUTCH
522	BUSHING, OVERDRIVE CARRIER
523	BEARING ASSEMBLY, THRUST (CARRIER/SUN)
528	BEARING ASM., THRUST (CARRIER/INTERNAL GEAR)
531	WASHER, THRUST (INTERNAL GEAR/SUPPORT)
536	BUSHING, CENTER SUPPORT (29.8 O.D. X 11.0)
540	BUSHING, CENTER SUPPORT (33.8 O.D. X 11.0)
541	WASHER, THRUST (SUPPORT/DIRECT CLUTCH)
602	BUSHING, DIRECT CLUTCH (FRONT)
605	BUSHING, DIRECT CLUTCH (REAR)
617	WASHER, THRUST (DIRECT/FORWARD CLUTCH)
629	WASHER, THRUST (FORWARD CL./OUTPUT) (SEL.)
631	WASHER, THRUST (SELECTIVE REAR)
632	WASHER, THRUST (INTERNAL GEAR/REAR SEL.)
634	BUSHING, FRONT INTERNAL GEAR
635	BEARING ASM., ROLLER (INTERNAL GEAR/CARRIER)
637	BEARING ASSEMBLY, THRUST (FRT. CARRIER/SUN)
641	BUSHING, REAR SUN GEAR
643	WASHER, THRUST (INPUT DRUM/HOUSING)
645	BUSHING, LO & REVERSE HOUSING
656	BUSHING, FORWARD CLUTCH HOUSING
659	BEARING, THRUST (REAR CAM/LO RACE)
660	BUSHING, REAR CARRIER (53.13 X 9.53)
662	WASHER, THRUST (REAR CARRIER/INTERNAL GEAR)
663	BEARING ASSEMBLY, ROLLER THRUST (SUN/INT.)

HH0130200-4R

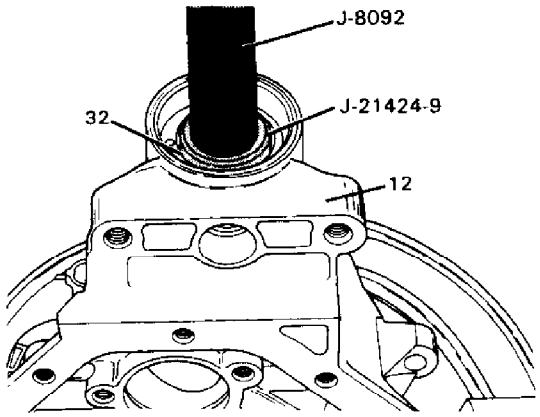
Figure 126 Thrust Washer and Bushing Location

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

REMOVE AS SHOWN	INSTALL AS SHOWN



660 BUSHING, REAR CARRIER (53.13 X 9.53)
661 CARRIER ASSEMBLY, REAR (COMPLETE)

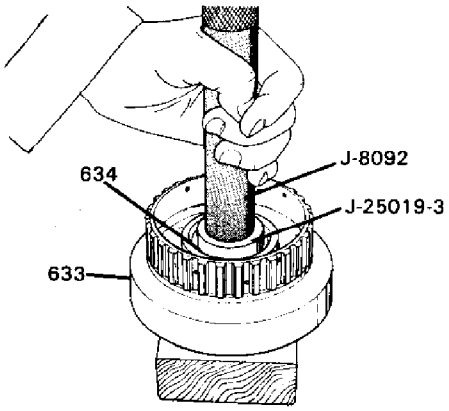
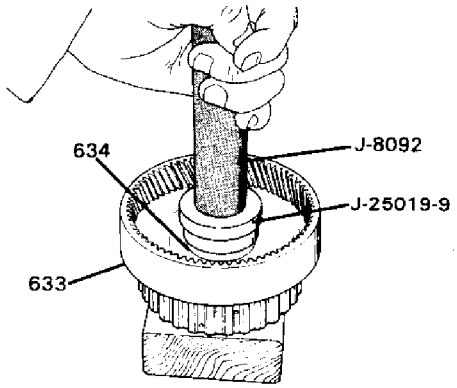
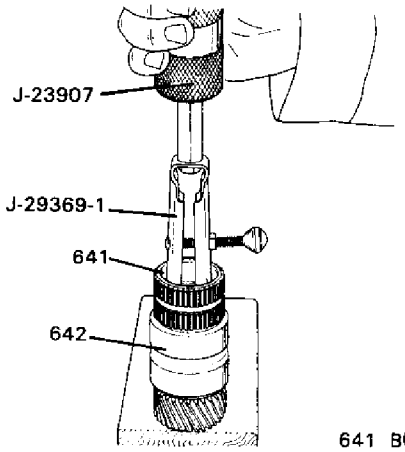
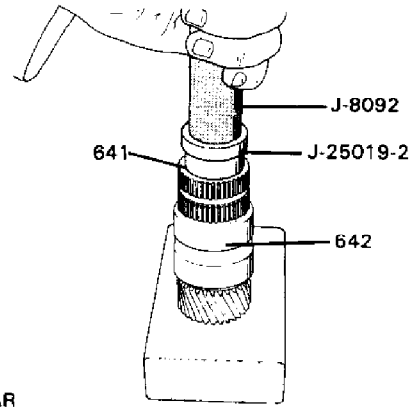
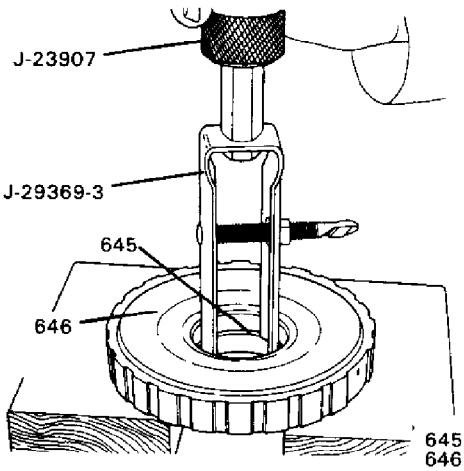
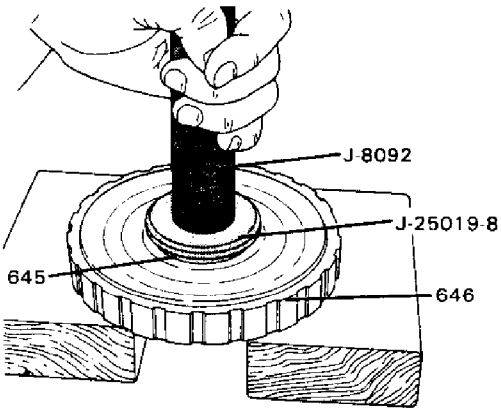


12 CASE & BUSHING ASSEMBLY
32 BUSHING, CASE REAR

HH0131200-4R

Figure 127 Bushing Replacement Procedure

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

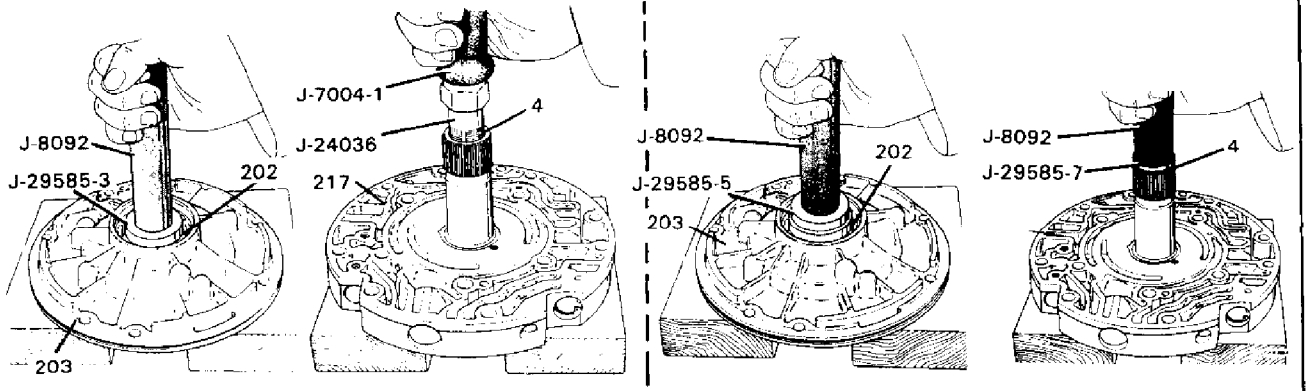
REMOVE AS SHOWN	INSTALL AS SHOWN
	
633 GEAR, FRONT INTERNAL 634 BUSHING, FRONT INTERNAL GEAR	
	
641 BUSHING, REAR SUN GEAR 642 GEAR, REAR SUN	
	
645 BUSHING, LO & REVERSE HOUSING 646 HOUSING ASSEMBLY, LO & REVERSE CLUTCH	

HH0132200-4R

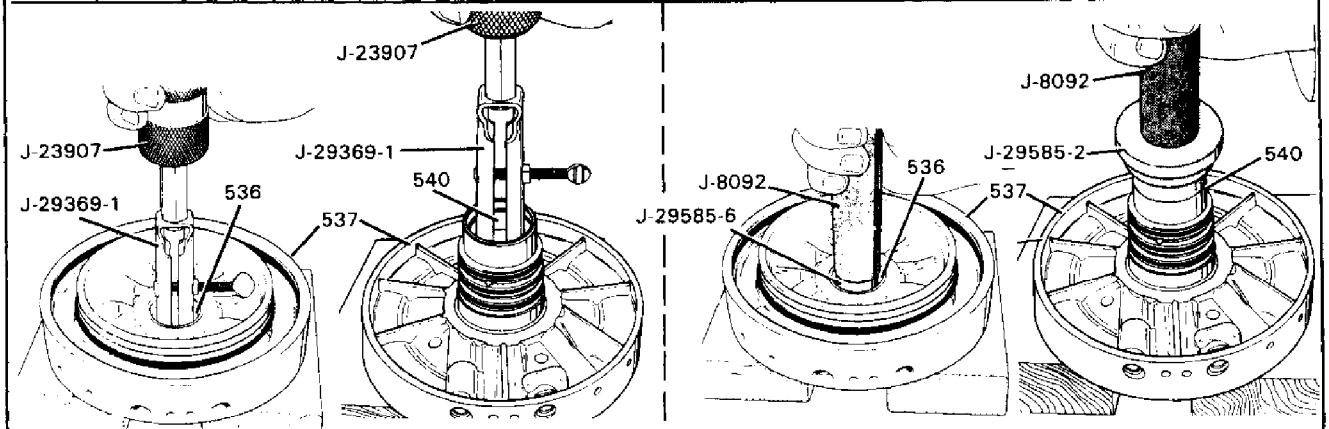
Figure 128 Bushing Replacement Procedure

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

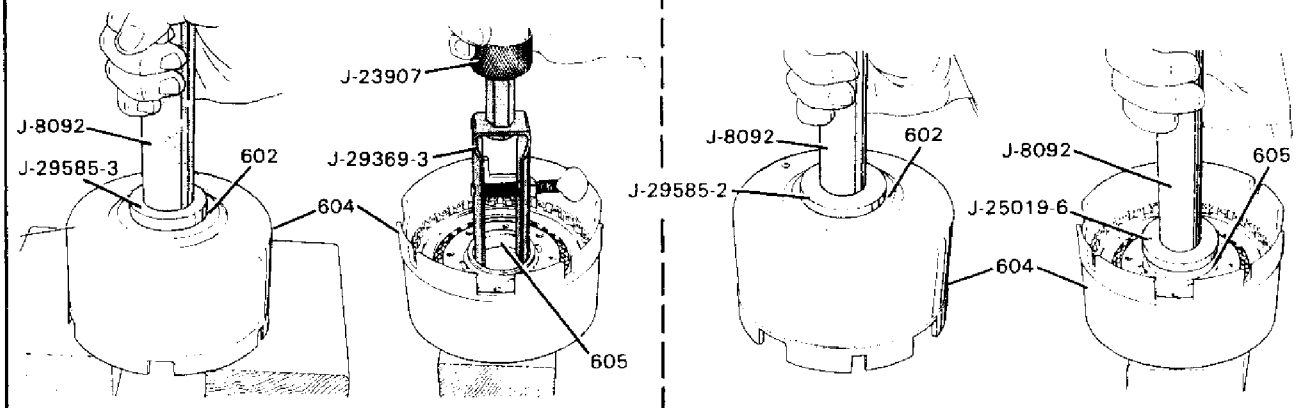
REMOVE AS SHOWN	INSTALL AS SHOWN



4 BUSHING, STATOR SHAFT
202 BUSHING, PUMP BODY
203 BODY, PUMP
217 COVER, PUMP



536 BUSHING, CENTER SUPPORT (29.8 O.D. X 11.0)
537 SUPPORT, CENTER
540 BUSHING, CENTER SUPPORT (33.8 O.D. X 11.0)



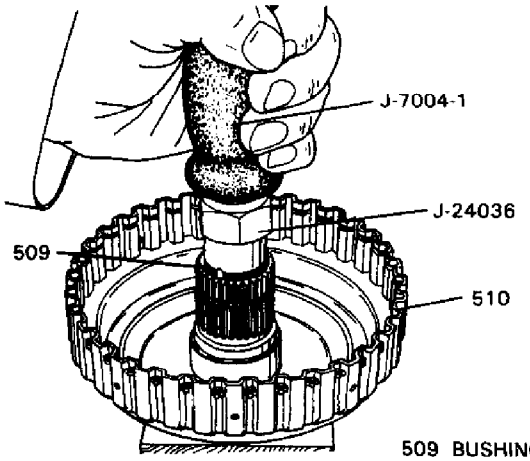
602 BUSHING, DIRECT CLUTCH (FRONT)
604 HOUSING & DRUM ASSEMBLY, DIRECT CLUTCH
605 BUSHING, DIRECT CLUTCH (REAR)

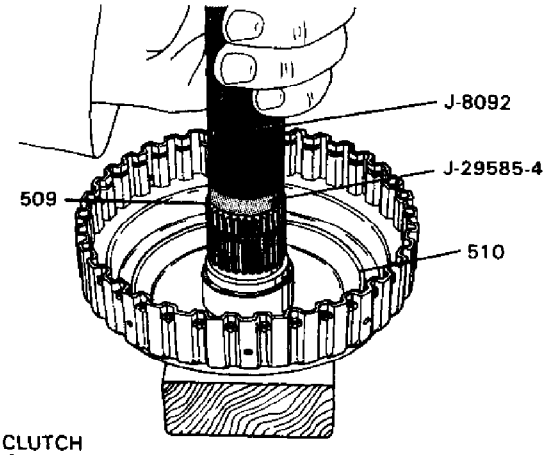
HH0133200-4R

Figure 129 Bushing Replacement Procedure

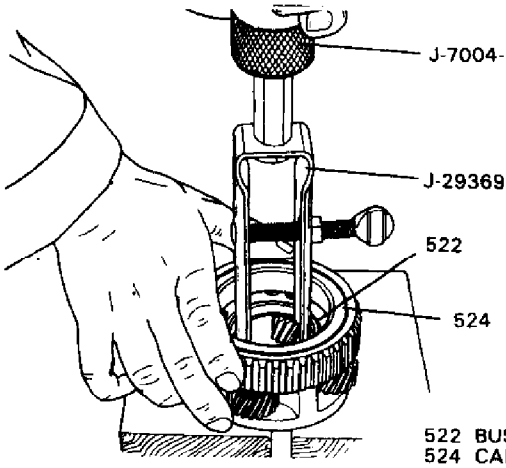
BUSHING REPLACEMENT PROCEDURE
PROTECT PARTS WITH WOOD BLOCKS
OR CLOTH AS NECESSARY

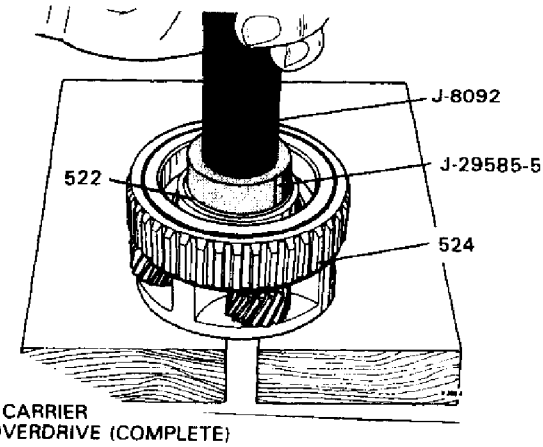
REMOVE AS SHOWN	INSTALL AS SHOWN



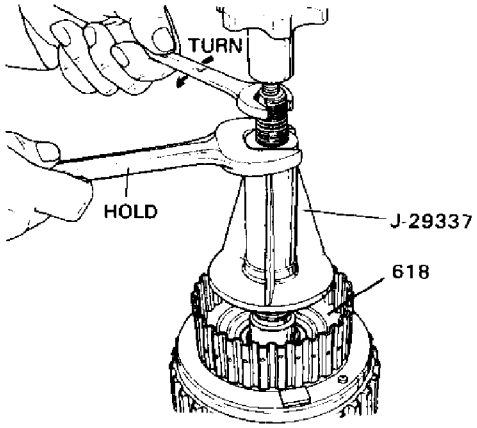


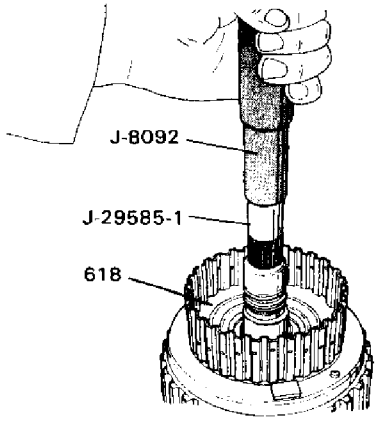
509 BUSHING, OVERRUN CLUTCH
510 HOUSING, OVERRUN CLUTCH ASSEMBLY





522 BUSHING, OVERDRIVE CARRIER
524 CARRIER ASSEMBLY, OVERDRIVE (COMPLETE)





618 HOUSING ASSEMBLY, FORWARD CLUTCH

HH0134-2004R
HH0134200-4R

Figure 130 Bushing Replacement Procedure

ALL 1987 MODELS	OVERRUN CLUTCH			FOURTH CLUTCH			DIRECT CLUTCH				
	FLAT STEEL PLATE		COMP. FACED PLATE	FLAT STEEL PLATE		COMP. FACED PLATE	FLAT STEEL PLATE		COMP. FACED PLATE	APPLY RING	
	No.	Thickness	No.	No.	Thickness	No.	No.	Thickness	No.	I.D.	Width
	2	1.969mm (.077")	2	3	1.969mm (.077")	2	6	2.324mm (.091")	6	19	12.5mm (.492")

FORWARD CLUTCH							LO & REVERSE CLUTCH						
WAVE PLATE		FLAT STEEL PLATE		COMP. FACED PLATE	APPLY RING		WAVE PLATE		FLAT STEEL PLATE		COMP. FACED PLATE	APPLY RING	
No.	Thickness	No.	Thickness	No.	I.D.	Width	No.	Thickness	No.	Thickness	No.	I.D.	Width
1	1.585mm (.062")	3	1.969mm (.077")	4	18	13.5mm (.531")	1	1.969mm (.077")	7	1.969mm (.077")	6	0	13.13mm (.516")

HH0139200-4R

Figure 131 Clutch Plate Chart

TORQUE SPECIFICATIONS

DESCRIPTION OF USAGE	QUANTITY	SIZE	TORQUE ASSEMBLY
LINE PRESSURE TAKE-OFF AND DIRECT CLUTCH PRESSURE TAKE-OFF	2	1/8-27 NPTF	7.0-14.0 N·m (5-10 ft.-lbs.)
COOLER CONNECTOR	2	1/4-18 NPSF	35.0-40.0 N·m (26-30 ft.-lbs.)
VALVE BODY ASSEMBLY TO CASE	15	M6 x 1.0	13.0-17.0 N·m (9-12 ft.-lbs.)
SPEEDO RETAINER TO CASE	1	M6 x 1.0	8.0-14.0 N·m (6-10 ft.-lbs.)
PUMP BODY TO PUMP COVER	5	M8 x 1.25	20.0-27.0 N·m (15-20 ft.-lbs.)
PUMP ASSEMBLY TO CASE	7	M8 x 1.25	20.0-27.0 N·m (15-20 ft.-lbs.)
PARKING LOCK BRACKET TO CASE	2	M8 x 1.25	20.0-27.0 N·m (15-20 ft.-lbs.)
TRANSMISSION OIL PAN TO CASE	16	M8 x 1.25	8.0-14.0 N·m (6-10 ft.-lbs.)
MANUAL SHAFT TO INSIDE DETENT LEVER (NUT)	1	M10 x 1.5	27.0-34.0 N·m (20-25 ft.-lbs.)
STATOR SHAFT TO PUMP COVER	3	M6 x 1.0	10.0-14.0 N·m (7-10 ft.-lbs.)
CASE TO CENTER SUPPORT	2	M10 x 1.5	20.0-27.0 N·m (15-20 ft.-lbs.)
SOLENOID TO CASE	2	M6 x 1.0	10.0-14.0 N·m (7-10 ft.-lbs.)
PRESSURE SWITCH	1	1/8-27 NPTF	7.0-14.0 N·m (5-10 ft.-lbs.)
ACCUMULATOR HOUSING TO CASE	5	M6 x 1.0	10.0-14.0 N·m (7-10 ft.-lbs.)
GOVERNOR COVER TO CASE	4	M8 x 1.25	20.0-27.0 N·m (15-20 ft.-lbs.)

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Figure 132 Torque Specifications

REQUIRED SPECIAL TOOLS

TOOL NO.	NAME	TOOL NO.	NAME
J-29332	OUTPUT SHAFT LOADING FIXTURE ADAPTER	J-25015	OIL PUMP BODY AND COVER ALIGNMENT BAND
J-25013-1	REAR UNIT SUPPORT	J-25016	FRONT OIL PUMP SEAL INSTALLER
J-24773-5	OIL PUMP REMOVER SCREW	J-25018-A	FORWARD CLUTCH SPRING COMPRESSOR ADAPTER
J-24773-A	OIL PUMP REMOVER & END PLAY CHECKING FIXTURE	J-25022	OIL PUMP END-PLAY CHECKING FIXTURE ADAPTER
J-29334	FOURTH CLUTCH COMPRESSOR & CENTER SUPPORT REMOVER	J-25024	FORWARD CLUTCH SPRING COMPRESSOR
J-29335	INNER OVERRUN CLUTCH PISTON SEAL PROTECTOR	J-25025-A	ALIGNMENT PIN & STUD SET
J-29337	FORWARD & DIRECT CLUTCH UNIT FIXTURE	J-28542	REVERSE CLUTCH HOUSING INSTALLER & REMOVER
J-8763-02	HOLDING FIXTURE	J-29060	TORQUE CONVERTER CLUTCH END-PLAY FIXTURE
J-3289-20	HOLDING FIXTURE BASE	J-7004	SLIDE HAMMER
J-25359-3	#27 TORX BIT	J-8001	DIAL INDICATOR SET
J-26744-A	SEAL INSTALLER	or	
J-21426	REAR OIL SEAL INSTALLER	J-26900-12	DIAL INDICATOR SET
J-23327	CLUTCH SPRING COMPRESSOR	J-8092	DRIVER HANDLE
J-25010	DIRECT CLUTCH SEAL PROTECTOR	J-29696	TURBINE SHAFT SEAL INSTALLER
J-25011	REVERSE CLUTCH SEAL PROTECTOR		
J-25014	INTERMEDIATE BAND APPLY PIN GAGE		

STANDARD TOOLS

SPEED HANDLE WRENCH, 3/8" DRIVE
10mm, 13mm & 24mm SOCKETS, 3/8" DRIVE
SMALL FLAT EDGE SCREWDRIVER & LONG FLAT EDGE SCREWDRIVER
PLASTIC OR RUBBER HAMMER
NO. 4 EASY OUT OR EQUIVALENT
"T" HANDLE TAP WRENCH
3mm (1/8"), 5mm (3/16") & 6.4mm (1/4") PUNCH
FEELER GAGE FROM 0.04mm - 2.40mm
EXPANDING TYPE SNAP RING PLIERS
CONTRACTING TYPE SNAP RING PLIERS
NEEDLE NOSE PLIERS
NEWTON METER (INCH POUND & FOOT POUND) TORQUE WRENCH
#49 DRILL
300mm (12") SCALE
PLIERS

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Figure 133 Special Tools