31TH AUTOMATIC TRANSAXLE

TABLE OF CONTENTS

31TH AUTOMATIC TRANSAXLE

DIAGNOSIS AND TESTING - ROAD TEST

Prior to performing a road test, check the fluid level and throttle valve cable adjustments.

During the road test, the transaxle should be operated in each position to check for slipping and any variation in shifting.

If vehicle operates at high speeds, but has poor acceleration, the converter's overrunning clutch may be slipping. If acceleration is normal, but high throttle opening is needed for high speeds, the stator clutch may have seized.

Observe closely for slipping or engine speed flare-up. Slipping or flare-up in any gear usually indicates clutch, band, or overrunning clutch problems. If the condition is far advanced, an overhaul will probably be necessary to restore normal operation.

In most cases, the clutch or band that is slipping can be determined by noting the transaxle operation in all selector positions and then comparing which internal units are applied in those positions. The Elements–in–Use Chart provides a basis for road test analysis.

31TH AUTOMATIC TRANSAXLE (Continued)

LEVER POSITION	START SAFETY	PARK SPRAG	CLUTCHES				BANDS	
			FRONT	REAR	LOCKUP	OVER-RUNNING	(KICKDOWN) FRONT	LOW/REV REAR
P - PARK	X	X						
R - REVERSE			X					X
N - NEUTRAL	X							
D - DRIVE								
First				X		X		
Second				X			X	
Third			X	X	X			
2 - SECOND								
First				X		X		
Second				X			X	
1 - Low				X				X

The rear clutch is applied in both the D first gear and 1 first gear positions. Also, the overrunning clutch is applied in D first gear and the low/reverse band is applied in 1 first gear position. If the transaxle slips in D range first gear, but does not slip in 1 first gear, the overrunning clutch is slipping. Similarly, if the transaxle slips in any two forward gears, the rear clutch is slipping.

Using the same procedure, the rear clutch and front clutch are applied in D third gear. If the transaxle slips in third gear, either the front clutch or the rear clutch is slipping. By selecting another gear that does not use one of those units, the unit that is slipping can be determined. If the transaxle also slips in reverse, the front clutch is slipping. If the transaxle does not slip in reverse, the rear clutch is slipping.

The process of elimination can be used to detect any unit that slips and to confirm proper operation of good units. Road testing can usually diagnose slipping units, although the actual cause of the problem may not be detected. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Therefore, unless the condition is obvious, the transaxle should never be disassembled until hydraulic pressure tests have been performed.

DISASSEMBLY

CAUTION: If transaxle failure has occured, it is necessary to flush the transaxle oil cooler and lines to remove debris and particles that could contaminate and/or fail a new or rebuilt unit. (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE)

NOTE: This procedure does not include disassembly of final drive (differential) components. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH/FINAL DRIVE - DISASSEMBLY)

(1) Measure input shaft end play before disassembly using Tool 8266 and dial indicator C-3339 (Fig. 1):

(a) Set up tools as shown in (Fig. 1).

(b) Move input shaft in and out to obtain end play reading. End play specifications are 0.19 to 1.50 mm (0.008 to 0.060 inch).

(c) Record indicator reading for reference when reassembling the transaxle.

31TH AUTOMATIC TRANSAXLE (Continued)

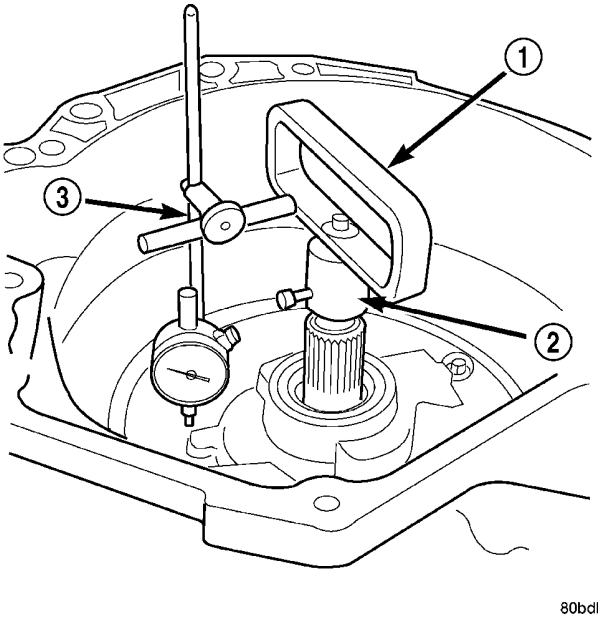


Fig. 1 Measure Input Shaft End Play using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

(2) Remove transaxle oil pan-to-case bolts (Fig. 2).

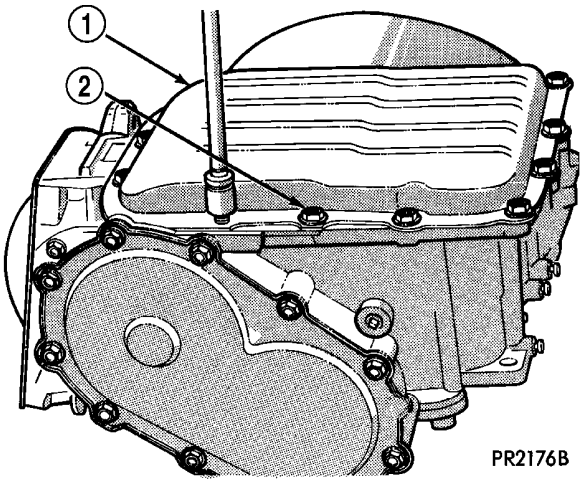


Fig. 2 Transaxle Oil Pan Bolts

1 - TRANSAXLE OIL PAN
2 - OIL PAN BOLTS

(3) Remove oil pan (Fig. 3). Clean sealing surfaces of old adhesive prior to reassembly.

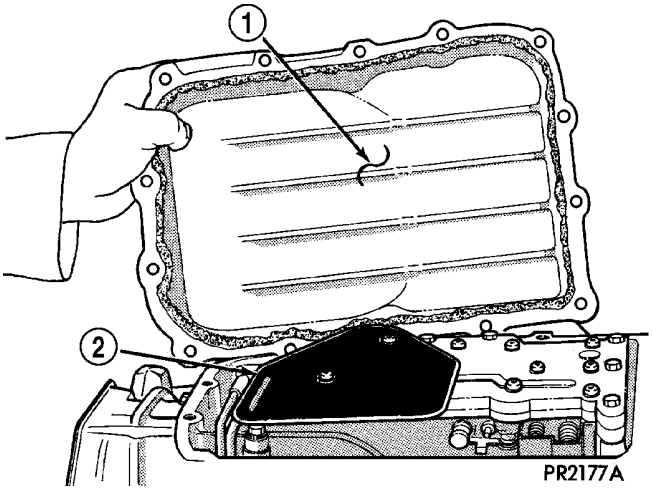


Fig. 3 Transaxle Oil Pan

1 - TRANSAXLE OIL PAN
2 - OIL FILTER

(4) Remove oil filter-to-valve body screws (Fig. 4).

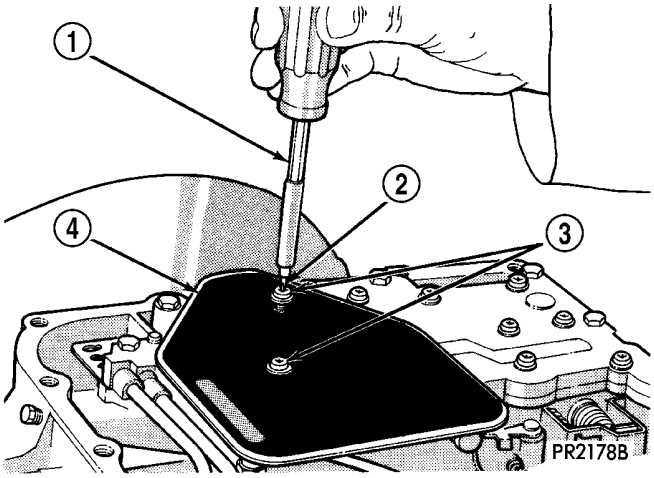


Fig. 4 Oil Filter Screws

1 - SCREWDRIVER HANDLE
2 - SPECIAL TOOL L-4553
3 - OIL FILTER SCREWS (2)
4 - OIL FILTER

31TH AUTOMATIC TRANSAXLE (Continued)

(5) Remove oil filter and gasket (Fig. 5).

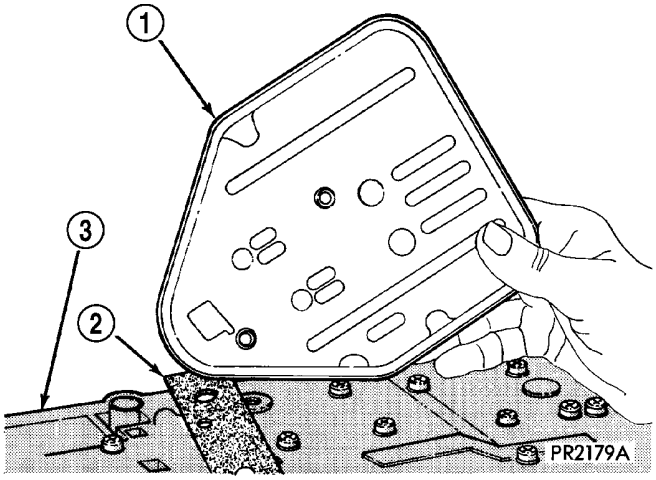


Fig. 5 Oil Filter and Gasket

1 - OIL FILTER
2 - GASKET
3 - VALVE BODY

(6) Remove neutral starting and back-up lamp switch.

(7) Remove park rod retainer e-clip (Fig. 6).

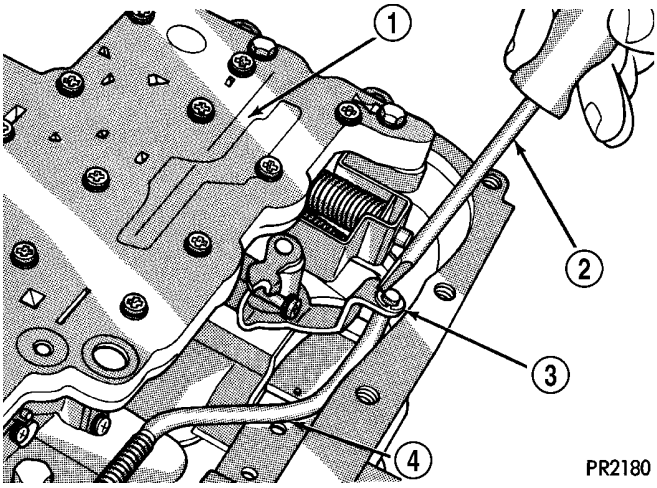


Fig. 6 Parking Rod E-Clip

1 - VALVE BODY
2 - SCREWDRIVER
3 - "E" CLIP
4 - PARKING ROD

(8) Remove park rod from transaxle (Fig. 7).

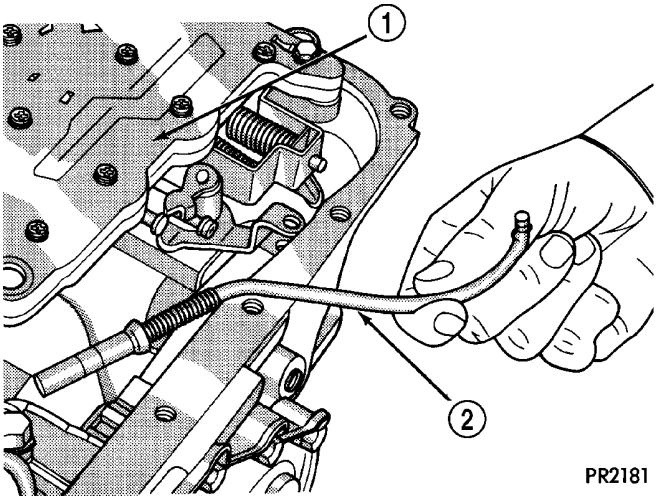


Fig. 7 Parking Rod

1 - VALVE BODY
2 - PARKING ROD

(9) Remove cooler bypass valve and seal (Fig. 8).

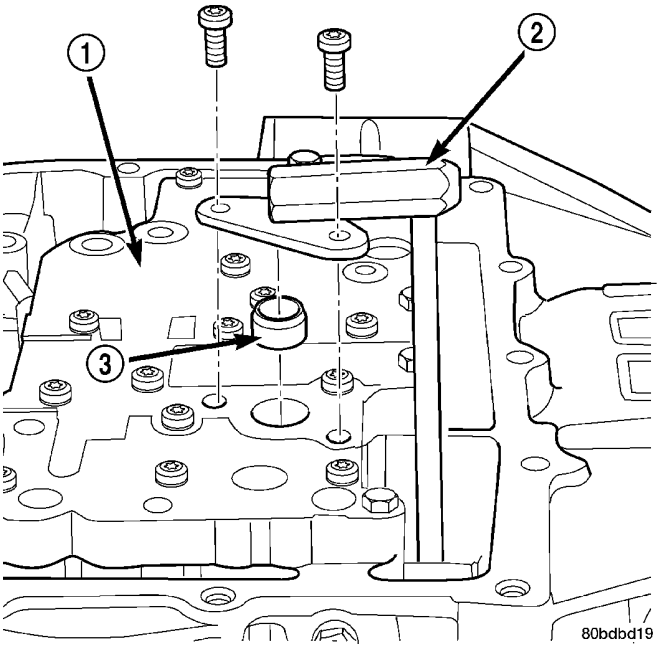


Fig. 8 Cooler Bypass Valve and Seal

1 - TRANSFER PLATE
2 - BYPASS VALVE
3 - SEAL

31TH AUTOMATIC TRANSAXLE (Continued)

(10) Remove valve body-to-transaxle bolts (Fig. 9).

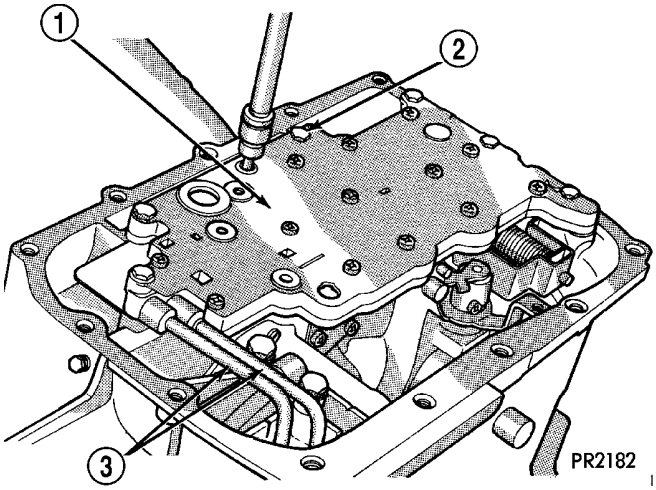


Fig. 9 Valve Body Attaching Bolts

1 - VALVE BODY
2 - VALVE BODY ATTACHING BOLTS (7)
3 - GOVERNOR TUBES

(11) Remove valve body from transaxle (Fig. 10). Note orientation and location of governor tubes.

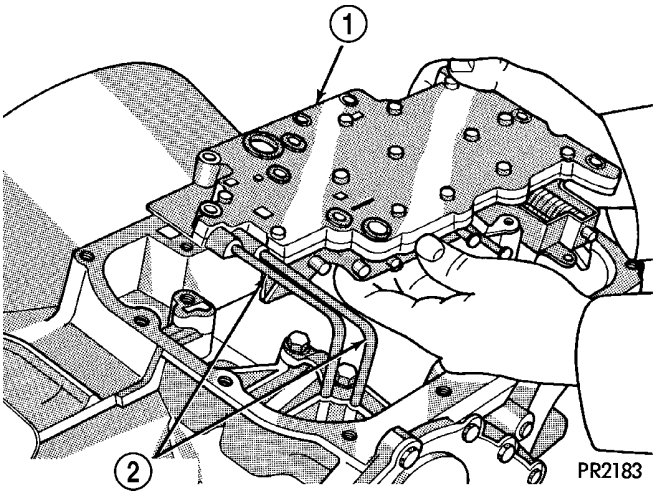


Fig. 10 Valve Body and Governor Tubes

1 - VALVE BODY ASSEMBLY
2 - GOVERNOR TUBES

(12) Loosen low/reverse band lock nut and adjusting screw to facilitate strut removal (Fig. 11).

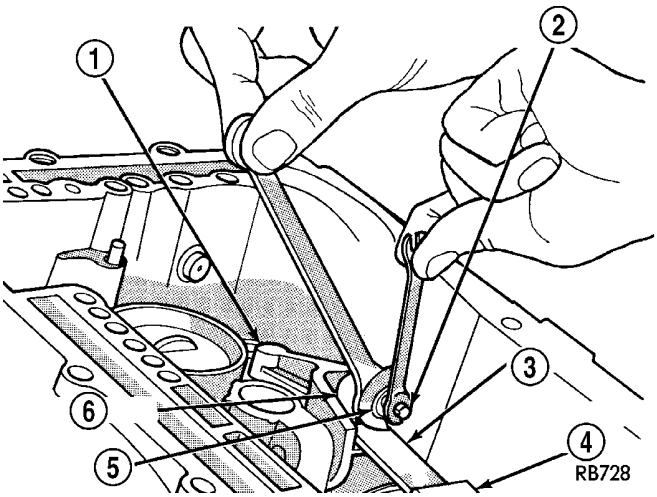


Fig. 11 Loosen Low/Reverse Band

1 - LOW-REVERSE BAND LEVER
2 - ADJUSTING SCREW
3 - STRUT
4 - LOW-REVERSE BAND
5 - LOCK NUT
6 - LEVER (SHORT)

(13) Remove low/reverse servo snap ring (Fig. 12).

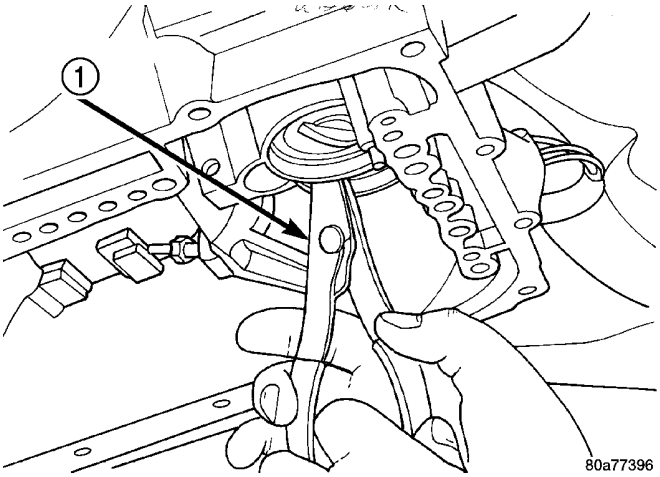


Fig. 12 Low/Reverse Servo Snap Ring

1 - SNAP-RING PLIERS

31TH AUTOMATIC TRANSAXLE (Continued)

(14) Remove low/reverse servo retainer, spring, and servo (Fig. 13).

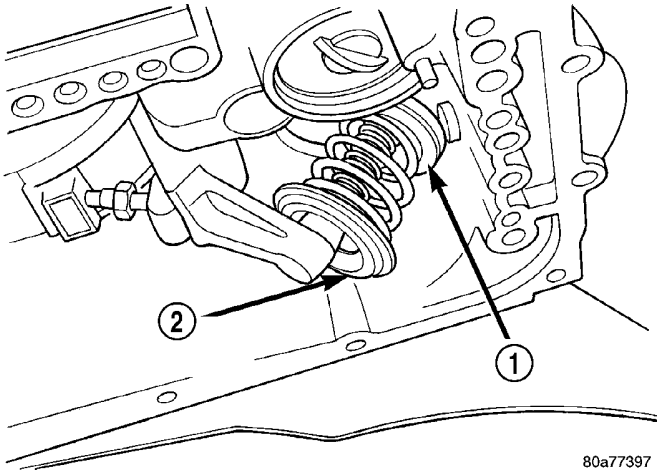


Fig. 13 Remove Retainer, Spring and Servo

1 - SERVO PISTON
2 - SPRING AND RETAINER

(15) Remove accumulator snap ring (Fig. 14).

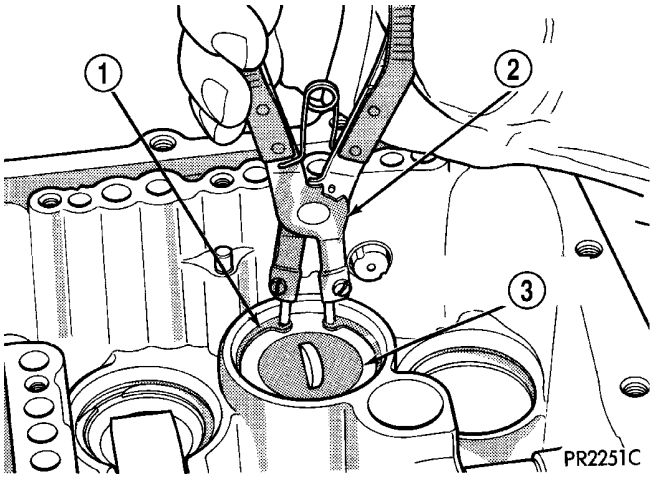


Fig. 14 Accumulator Snap Ring

1 - ACCUMULATOR PLATE SNAP RING
2 - SNAP RING PLIERS
3 - ACCUMULATOR PLATE

(16) Remove accumulator plate (Fig. 15).

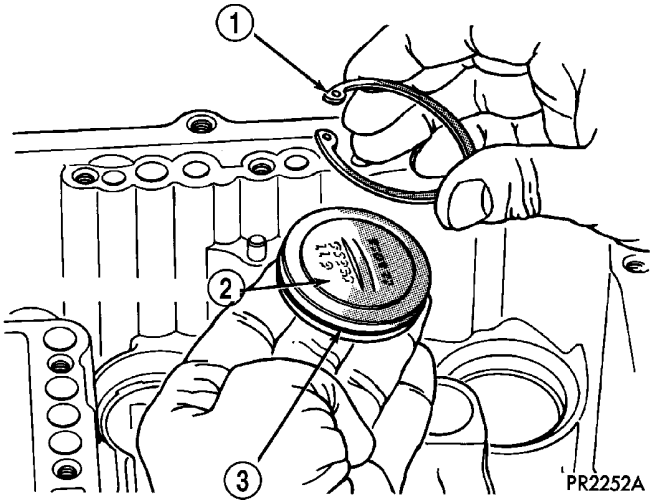


Fig. 15 Accumulator Plate and Snap Ring

1 - SNAP RING
2 - ACCUMULATOR PLATE
3 - ''O'' RING

(17) Remove accumulator spring and piston (Fig. 16).

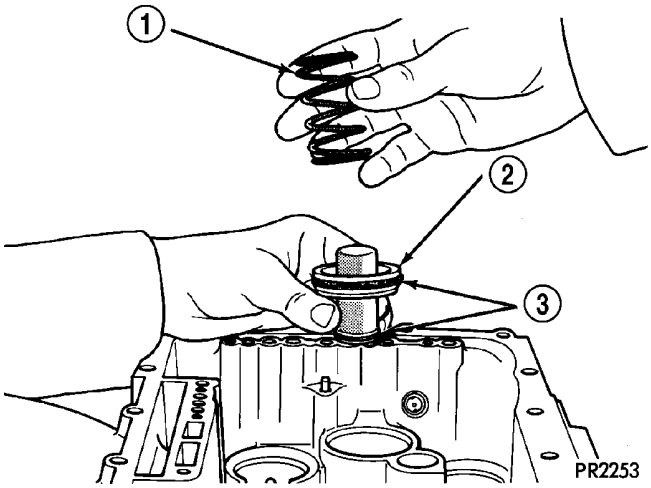


Fig. 16 Accumulator Spring and Piston

1 - ACCUMULATOR SPRING
2 - ACCUMULATOR PISTON
3 - SEAL RINGS

31TH AUTOMATIC TRANSAXLE (Continued)

(18) Loosen kickdown band adjusting screw lock nut (Fig. 17).

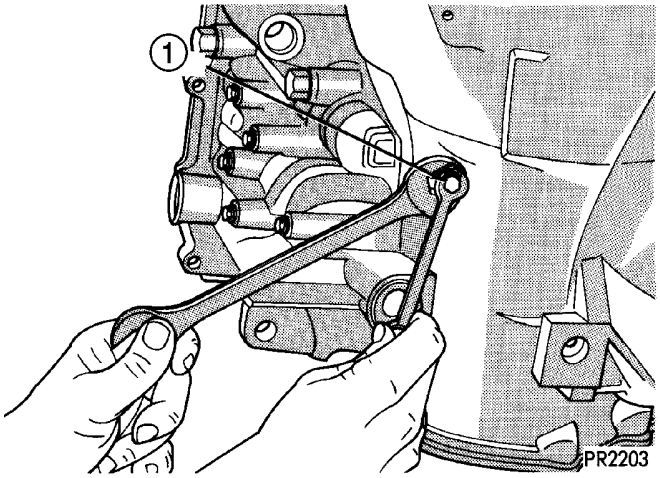


Fig. 17 Kickdown Band Adjusting Screw Lock Nut

1 - KICKDOWN BAND ADJUSTING SCREW

(19) Loosen kickdown band adjusting screw (Fig. 18) enough to facilitate strut removal.

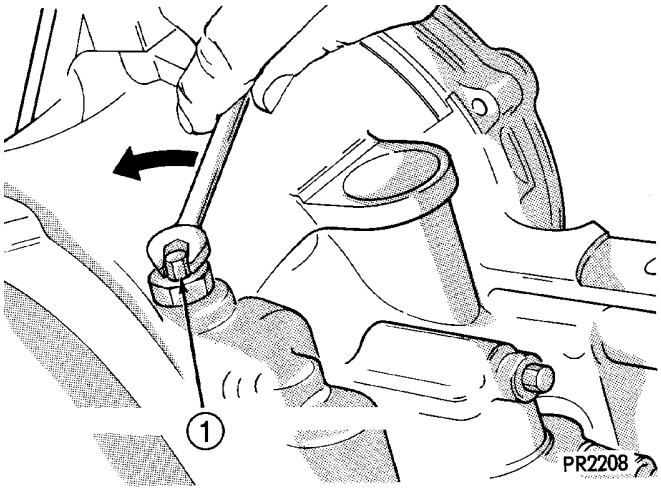


Fig. 18 Kickdown Band Adjusting Screw

1 - KICKDOWN BAND ADJUSTING SCREW

(20) Remove kickdown servo snap ring (Fig. 19).

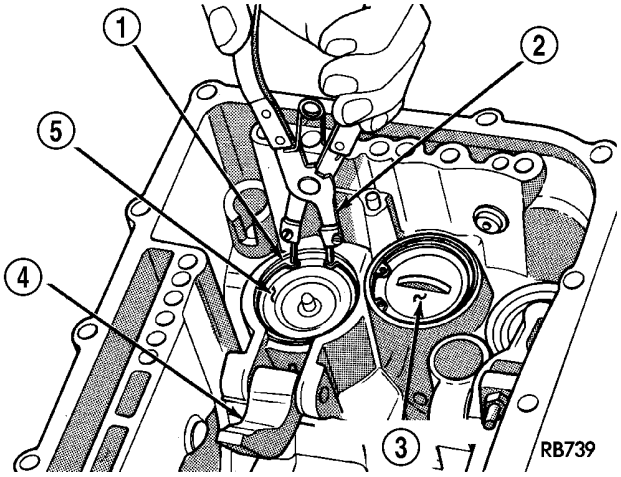


Fig. 19 Kickdown Servo Snap Ring

1 - SNAP RING
2 - SNAP RING PLIERS
3 - ACCUMULATOR PLATE
4 - KICKDOWN LEVER
5 - KICKDOWN PISTON ROD GUIDE

(21) Remove kickdown servo guide (Fig. 20).

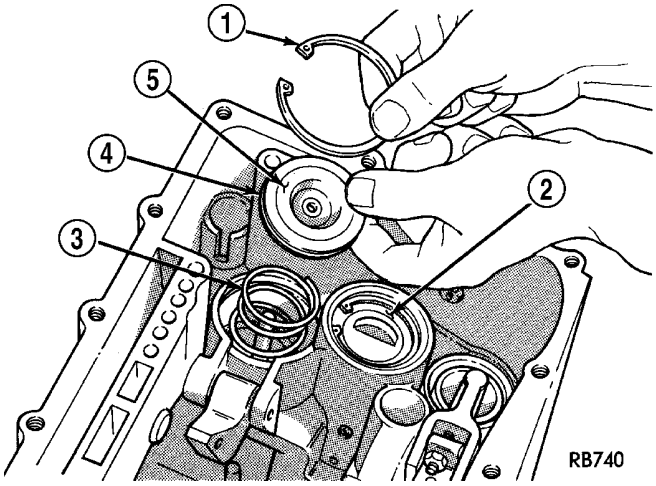


Fig. 20 Kickdown Servo Rod Guide and Snap Ring

1 - SNAP RING
2 - ACCUMULATOR PLATE
3 - RETURN SPRING
4 - O-RING
5 - PISTON ROD GUIDE

31TH AUTOMATIC TRANSAXLE (Continued)

(22) Remove kickdown servo spring and piston (Fig. 21). Disassemble kickdown servo assembly as shown in (Fig. 22).

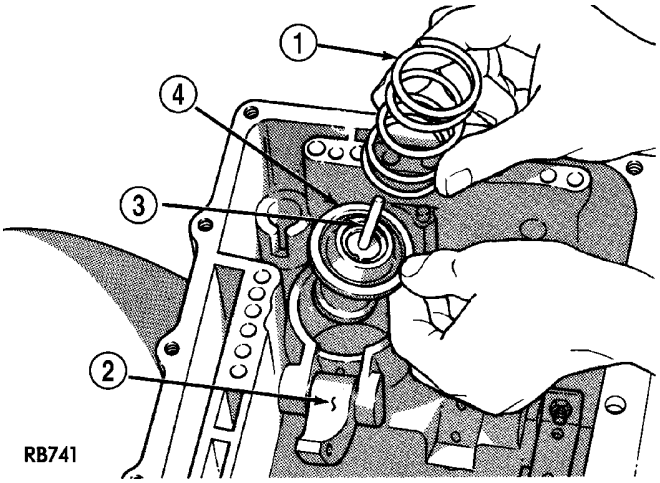


Fig. 21 Kickdown Piston Return Spring and Piston

1 - RETURN SPRING
2 - KICKDOWN LEVER
3 - PISTON ROD
4 - KICKDOWN SERVO PISTON

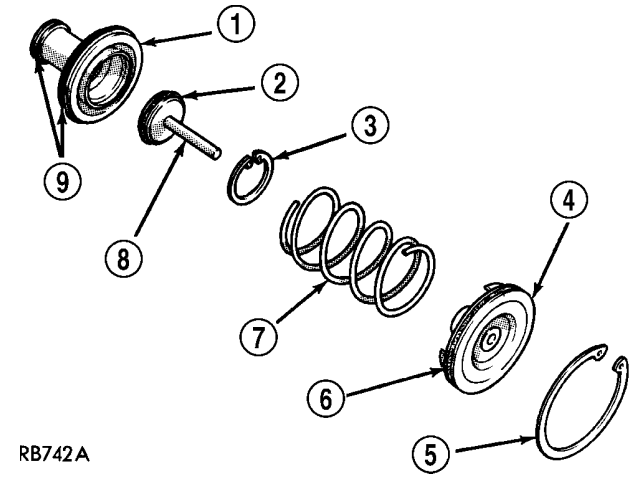


Fig. 22 Controlled Load Kickdown Servo

1 - KICKDOWN PISTON
2 - O-RING
3 - SNAP RING
4 - PISTON ROD GUIDE
5 - SNAP RING
6 - O-RING
7 - PISTON RETURN SPRING
8 - PISTON ROD
9 - SEAL RINGS

(23) Remove park sprag rod support-to-case bolts (Fig. 23).

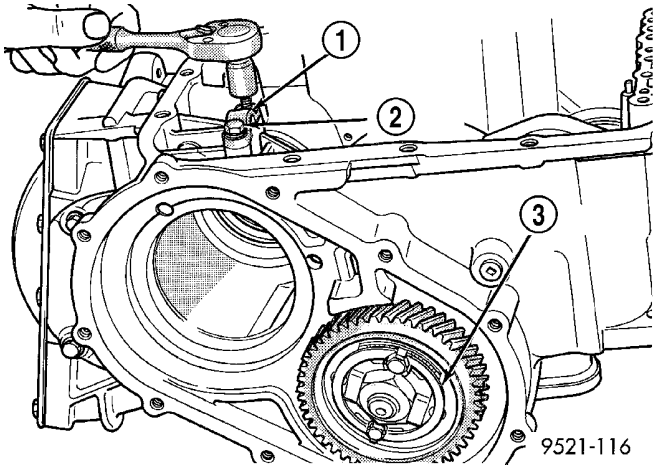


Fig. 23 Parking Sprag Rod Support

1 - PARKING SPRAG ROD SUPPORT
2 - BOLT (2)
3 - OUTPUT SHAFT GEAR

(24) Remove support and bolts (Fig. 24).

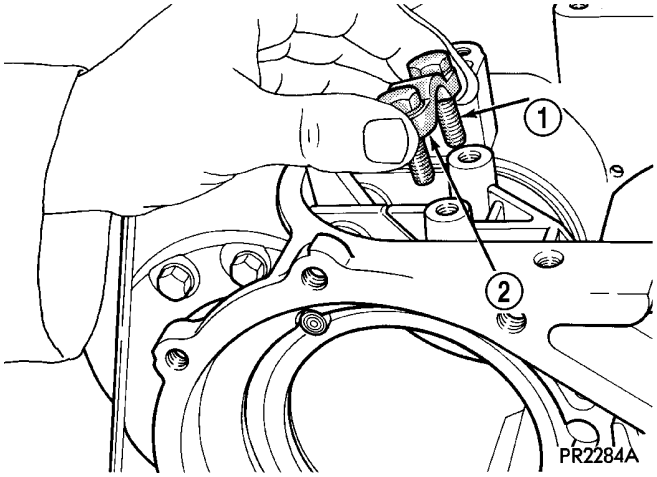


Fig. 24 Support and Bolts

1 - BOLT (2)
2 - PARKING SPRAG ROD SUPPORT

31TH AUTOMATIC TRANSAXLE (Continued)

NOTE: To remove pawl, spring, and pivot shaft, the governor support retainer must be removed. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH/TRANSFER SYSTEM - REMOVAL)

(25) Remove park pawl, spring, and pivot shaft (Fig. 25).

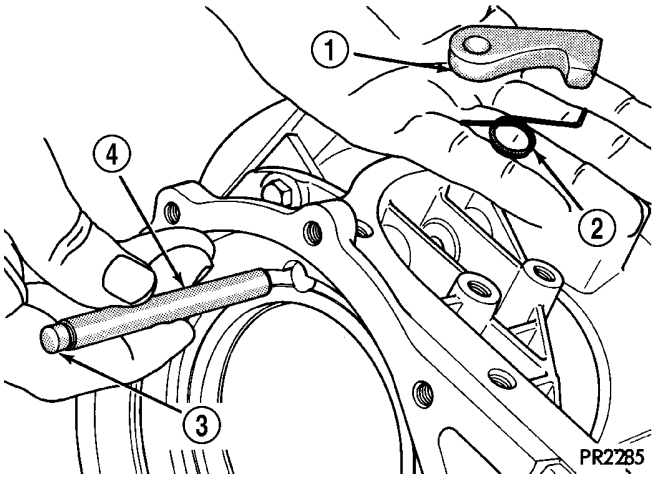


Fig. 25 Parking Pawl, Return Spring, and Pivot Shaft

1 - PARK PAWL
2 - RETURN SPRING
3 - NOTE: SMALL DIAMETER TO REAR
4 - PIVOT SHAFT

(26) Remove oil pump-to-transaxle case bolts (Fig. 26).

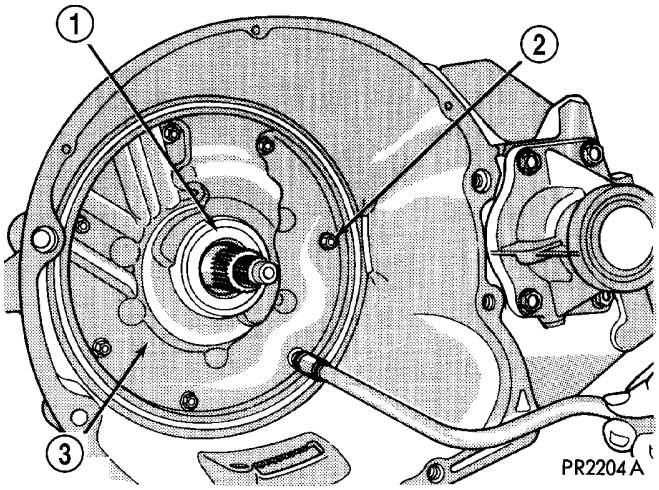


Fig. 26 Oil Pump Attaching Bolts

1 - SEAL
2 - PUMP ATTACHING BOLTS (7)
3 - PUMP HOUSING

(27) Install Tool C-3752 and adapters L-4437 as shown in (Fig. 27).

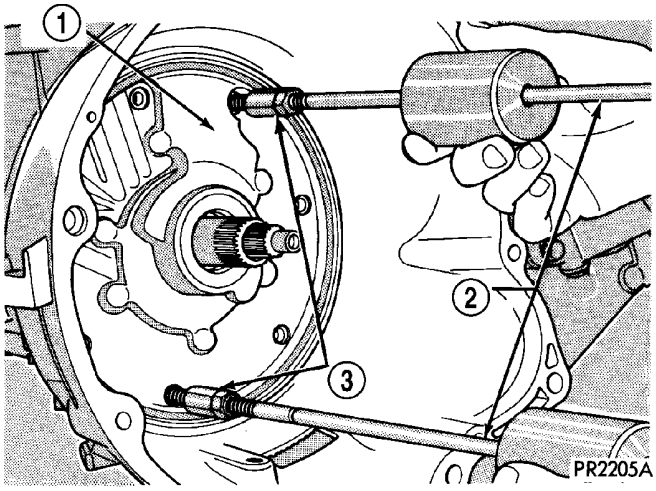


Fig. 27 Install Tool C-3752 with Adapters L-4437

1 - PUMP
2 - PULLERS TOOL C-3752
3 - ADAPTERS TOOL L-4437

(28) Remove oil pump with slide hammer setup (Fig. 28). Inspect #1 thrust washer.

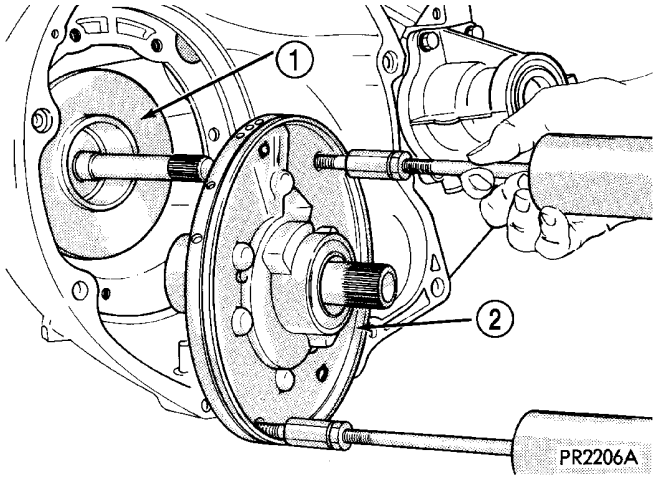


Fig. 28 Oil Pump Removal

1 - FRONT CLUTCH
2 - OIL PUMP ASSEMBLY

31TH AUTOMATIC TRANSAXLE (Continued)

(29) Remove oil pump gasket (Fig. 29).

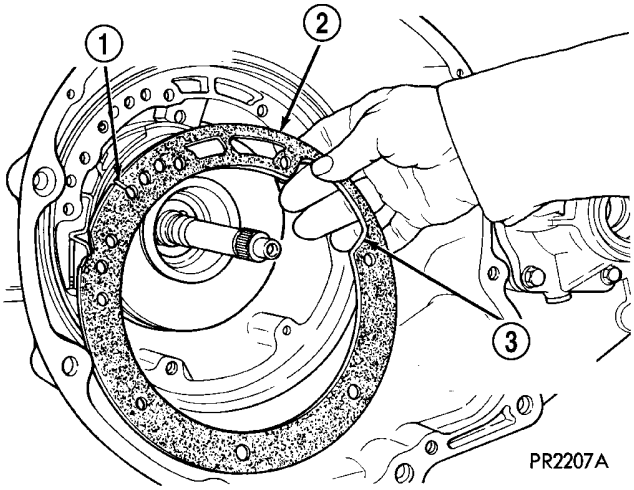


Fig. 29 Oil Pump Gasket

1 - SPLIT IN GASKET (DIFFERENTIAL OIL FEED)
2 - PUMP GASKET
3 - PUMP GASKET DIFFERENTIAL OIL FEED CUTOUT

(30) Remove kickdown band and strut (Fig. 30).

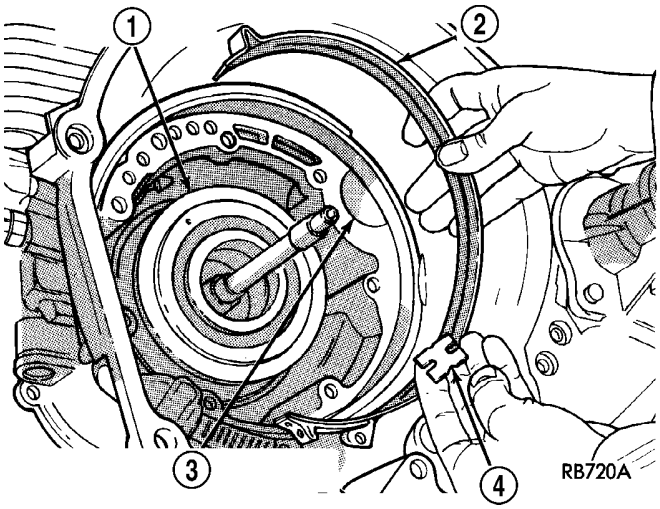


Fig. 30 Kickdown Band and Strut

1 - FRONT CLUTCH
2 - KICKDOWN BAND
3 - OIL RETURN AND FEED HOLE TO DIFFERENTIAL
4 - STRUT

(31) Remove front clutch assembly (Fig. 31).

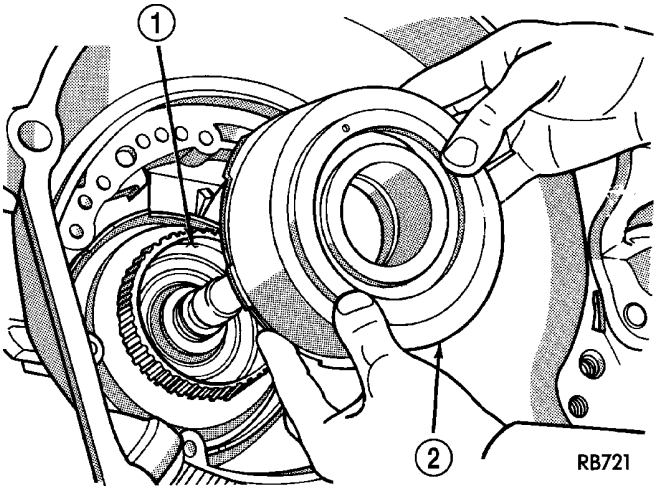


Fig. 31 Front Clutch Assembly

1 - REAR CLUTCH ASSEMBLY
2 - FRONT CLUTCH ASSEMBLY

(32) Remove rear clutch assembly (Fig. 32). Inspect #2 thrust washer.

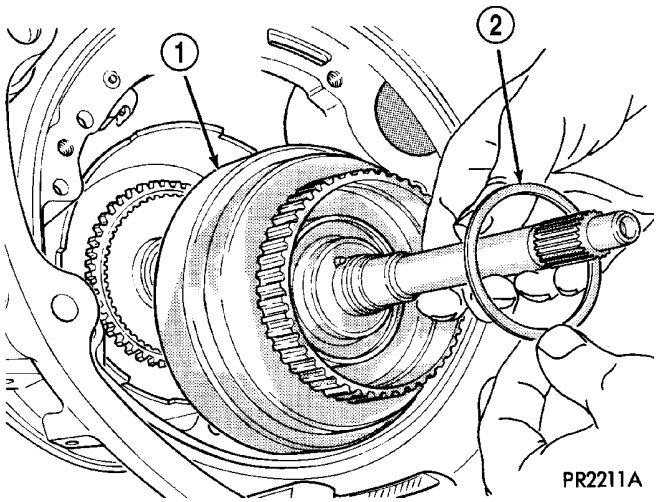


Fig. 32 No. 2 Thrust Washer and Rear Clutch

1 - REAR CLUTCH ASSEMBLY
2 - #2 THRUST WASHER

31TH AUTOMATIC TRANSAXLE (Continued)

(33) Remove #3 thrust washer (Fig. 33).

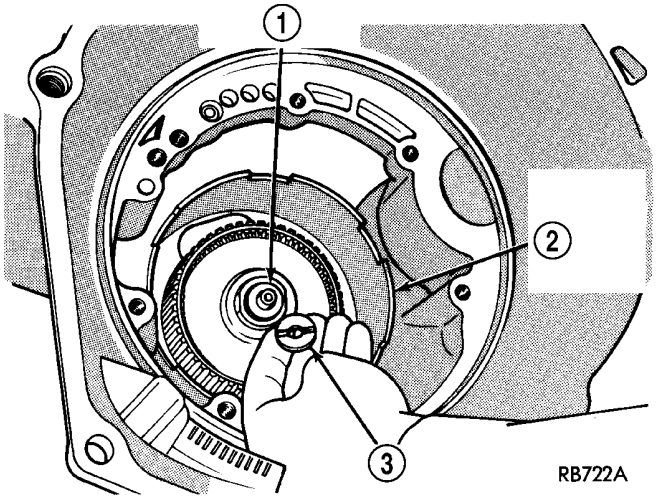


Fig. 33 No. 3 Thrust Washer

1 - OUTPUT SHAFT
2 - SUN GEAR DRIVING SHELL
3 - #3 THRUST WASHER (SELECT FIT)

(34) Remove front planetary gear-to-output shaft snap ring (Fig. 34).

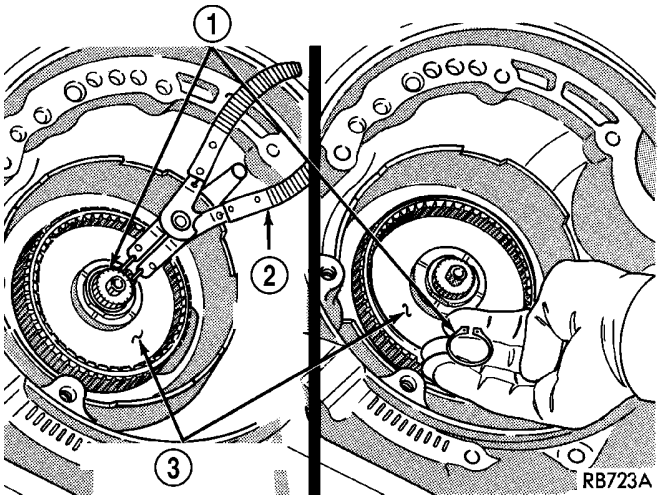


Fig. 34 Front Planetary Gear Snap Ring

1 - FRONT PLANETARY GEAR SNAP RING
2 - SNAP RING PLIERS
3 - FRONT PLANETARY GEAR ASSEMBLY

(35) Remove front planetary gear assembly from output shaft (Fig. 35).

(36) Remove #6 thrust washer from sun gear driving shell (Fig. 35).

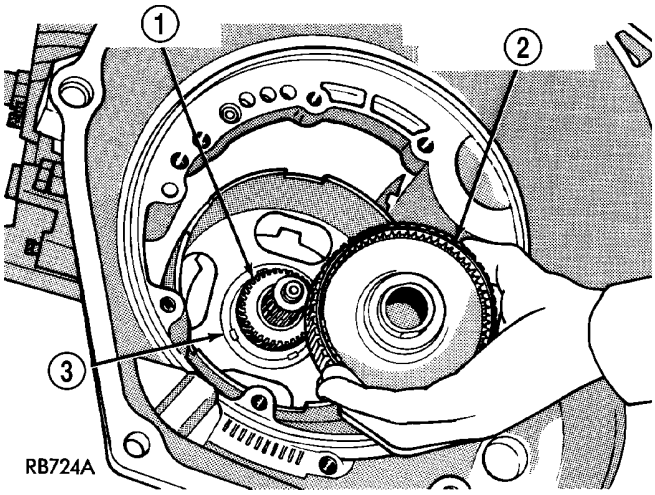


Fig. 35 Front Planetary Gear Assembly

1 - SUN GEAR
2 - FRONT PLANETARY GEAR ASSEMBLY
3 - #6 THRUST WASHER

(37) Remove sun gear driving shell (Fig. 36) (Fig. 37).

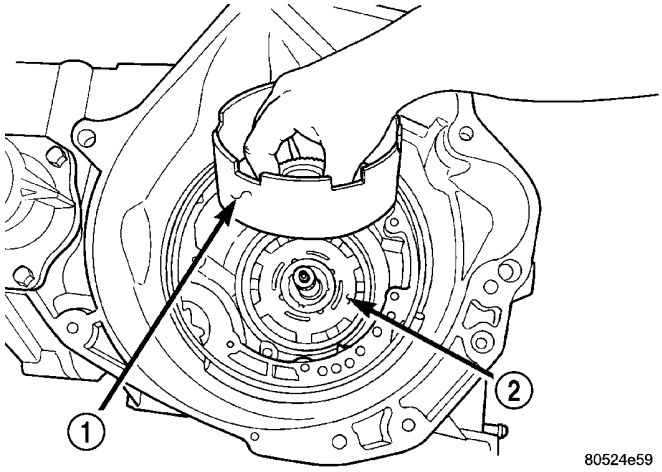


Fig. 36 Sun Gear Driving Shell

1 - SUN GEAR DRIVING SHELL
2 - REAR PLANETARY GEAR

31TH AUTOMATIC TRANSAXLE (Continued)

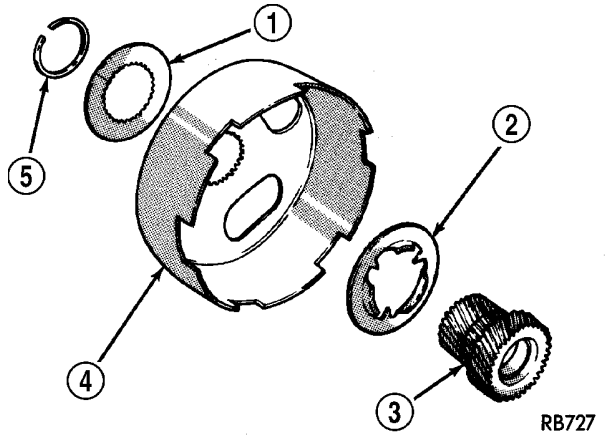


Fig. 37 Sun Gear Driving Shell Components

1 - #8 THRUST WASHER (STEEL)
2 - #7 SPACER (STEEL)
3 - SUN GEAR
4 - SUN GEAR DRIVING SHELL
5 - SNAP RING

(38) Remove #9 thrust washer from rear planetary gear assembly (Fig. 38).

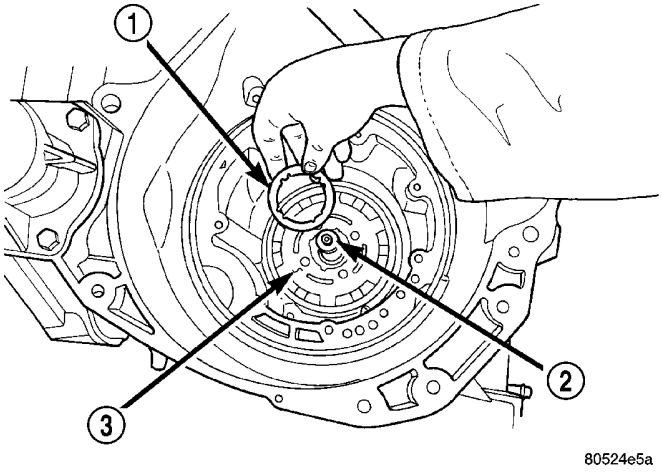


Fig. 38 No. 9 Thrust Washer

1 - #9 THRUST WASHER
2 - OUTPUT SHAFT
3 - REAR PLANETARY GEAR ASSEMBLY

(39) Remove rear planetary gear assembly (Fig. 39).

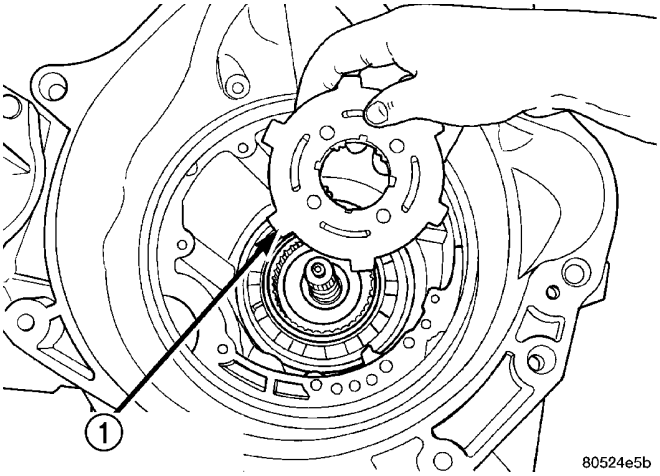


Fig. 39 Rear Planetary Gear Assembly

1 - REAR PLANETARY GEAR ASSEMBLY

(40) Remove #10 thrust washer (Fig. 40).

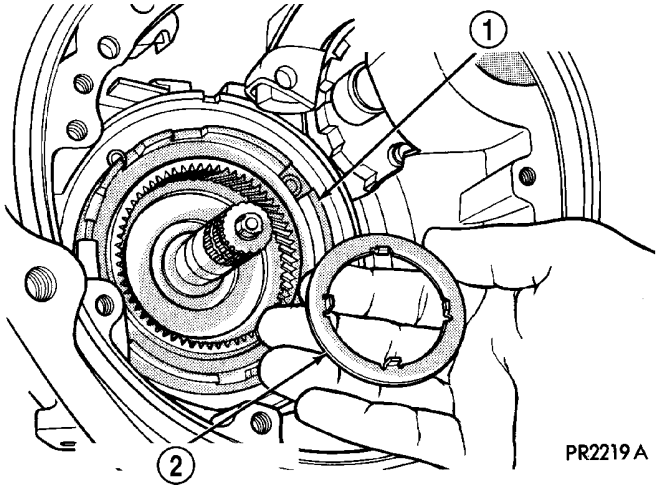


Fig. 40 No. 10 Thrust Washer

1 - OVERRUNNING CLUTCH CAM ASSEMBLY
2 - #10 THRUST WASHER

31TH AUTOMATIC TRANSAXLE (Continued)

(41) Remove overrunning clutch cam assembly (Fig. 41). Collect eight rollers and eight springs from rear of case (Fig. 42).

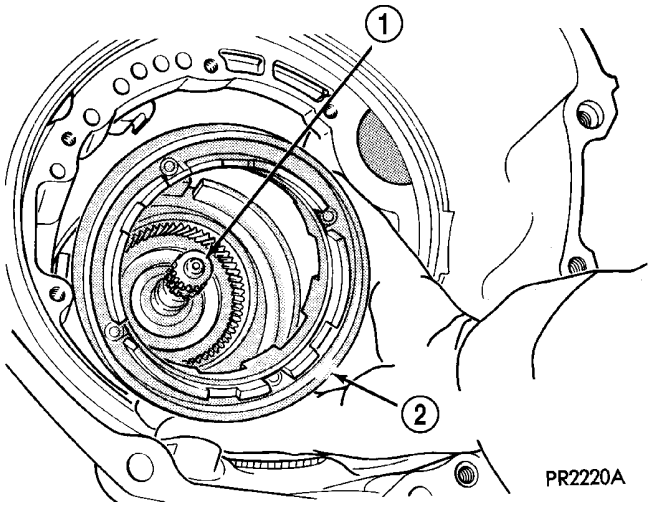


Fig. 41 Overrunning Clutch Cam Assembly

1 - OUTPUT SHAFT
2 - OVERRUNNING CLUTCH CAM ASSEMBLY

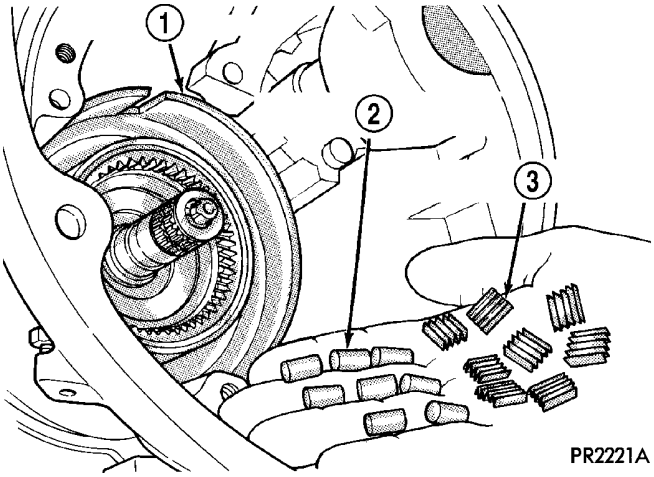


Fig. 42 Overrunning Clutch Rollers and Spring

1 - LOW-REVERSE BAND
2 - OVERRUNNING CLUTCH ROLLERS (8)
3 - OVERRUNNING CLUTCH SPRINGS (8)

(42) Remove low/reverse band (Fig. 43).

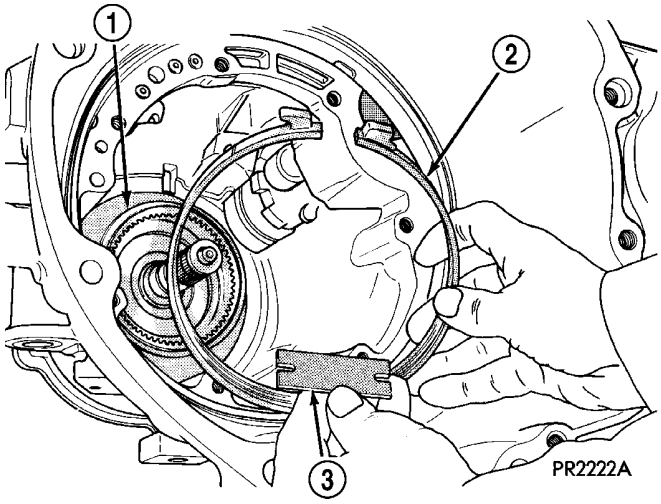


Fig. 43 Low/Reverse Band and Strut

1 - #11 THRUST WASHER
2 - LOW-REVERSE BAND
3 - STRUT

(43) Remove and inspect #11 thrust washer (Fig. 44).

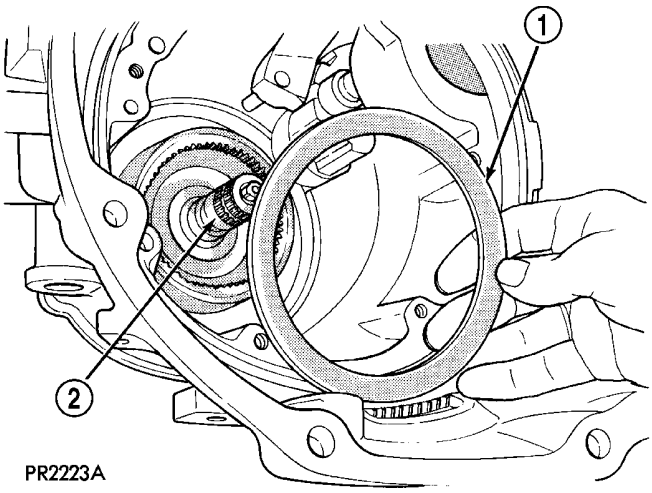


Fig. 44 No. 11 Thrust Washer

1 - #11 THRUST WASHER
2 - OUTPUT SHAFT

31TH AUTOMATIC TRANSAXLE (Continued)

ASSEMBLY

CAUTION: If transaxle failure has occurred, it is necessary to flush the transaxle oil cooler and lines to remove debris and particles that could contaminate and/or fail a new or rebuilt unit. (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE)

NOTE: This procedure does not include assembly of final drive (differential) components. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH/FINAL DRIVE - ASSEMBLY)

NOTE: This procedure does not include assembly of transfer system (transfer shaft and output shaft) components. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH/TRANSFER SYSTEM - INSTALLATION)

(1) Install #11 thrust washer (Fig. 45).

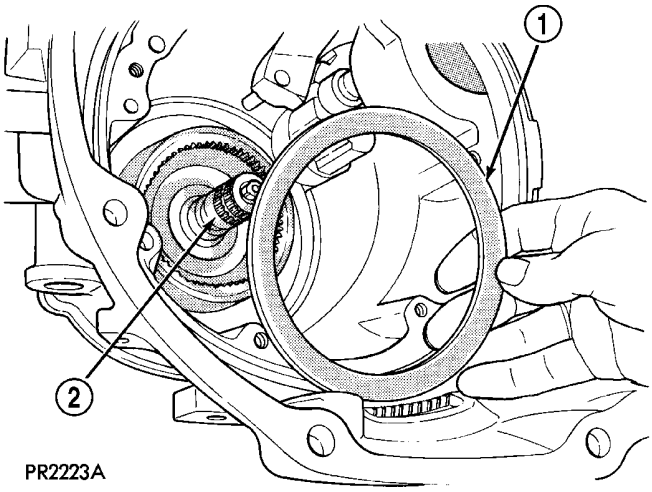


Fig. 45 No. 11 Thrust Washer

1 - #11 THRUST WASHER
2 - OUTPUT SHAFT

(2) Install low/reverse band (Fig. 46). Do not install strut or adjust at this time.

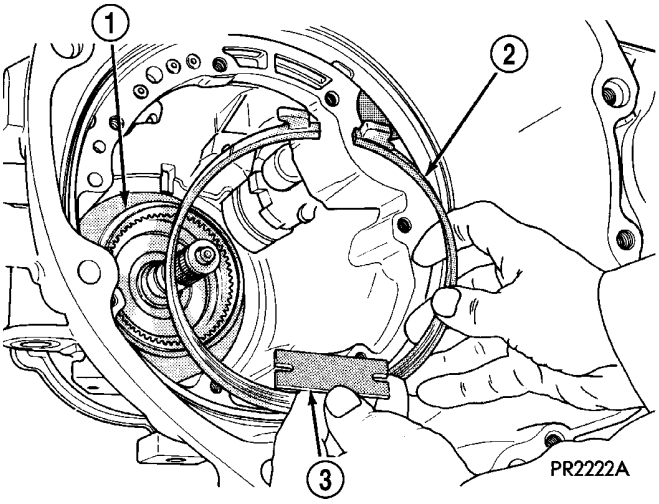


Fig. 46 Low/Reverse Band and Strut

1 - #11 THRUST WASHER
2 - LOW-REVERSE BAND
3 - STRUT

(3) Assemble Tool L-4440 to overrunning clutch as shown in (Fig. 47).

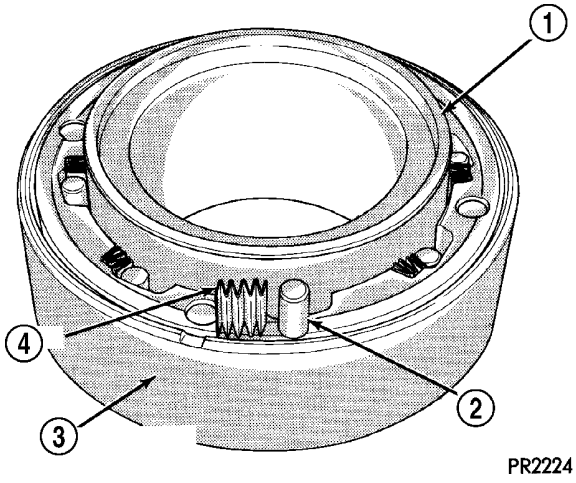


Fig. 47 Install Overrunning Clutch Rollers and Springs

1 - TOOL L-4440
2 - ROLLER (8)
3 - OVERRUNNING CLUTCH CAM ASSEMBLY
4 - SPRING (8)

31TH AUTOMATIC TRANSAXLE (Continued)

(4) Orient springs as shown on left side of (Fig. 48).

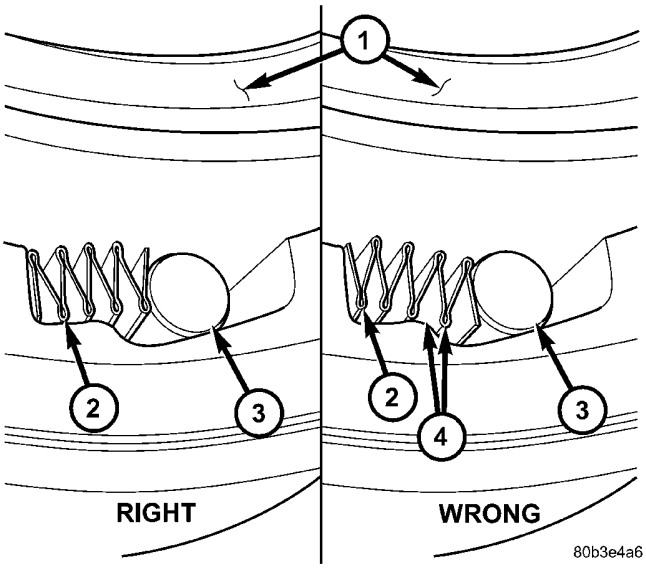


Fig. 48 Proper Spring/Roller Orientation

1 - TOOL L-4440
2 - SPRING
3 - ROLLER
4 - CONTACT AREA

(5) Install overrunning clutch/tool assembly to transaxle and remove Tool L-4440.

(6) Install #10 thrust washer to rear of rear planetary gear assembly. Use petrolatum to retain and secure during installation.

(7) Install rear planetary gear assembly (Fig. 49).

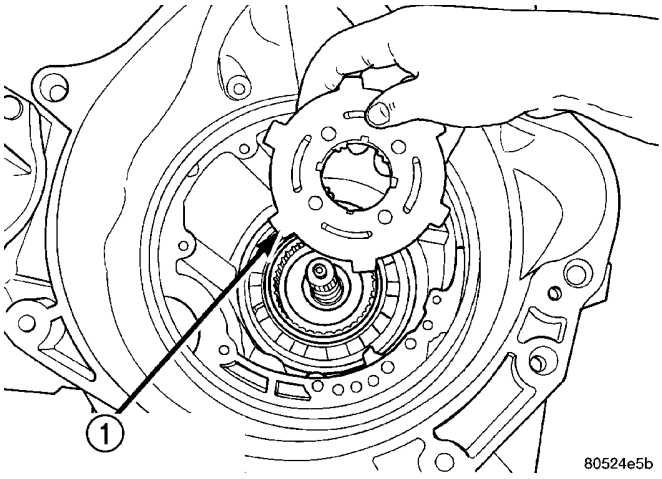


Fig. 49 Rear Planetary Gear Assembly

1 - REAR PLANETARY GEAR ASSEMBLY

(8) Install #9 thrust washer (Fig. 50). Use petrolatum to secure.

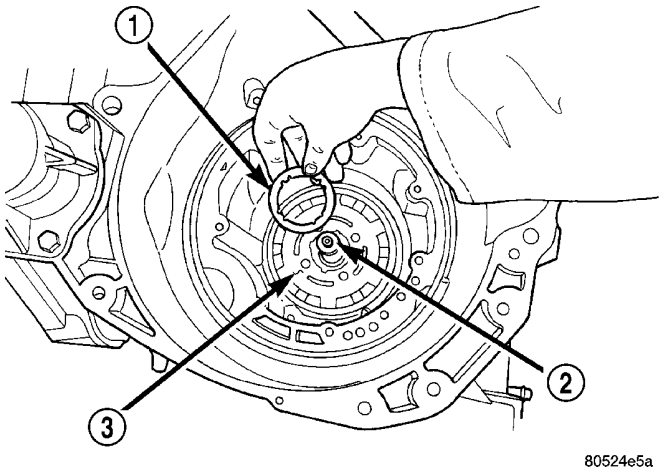


Fig. 50 No. 9 Thrust Washer

1 - #9 THRUST WASHER
2 - OUTPUT SHAFT
3 - REAR PLANETARY GEAR ASSEMBLY

(9) Install sun gear driving shell (Fig. 51).

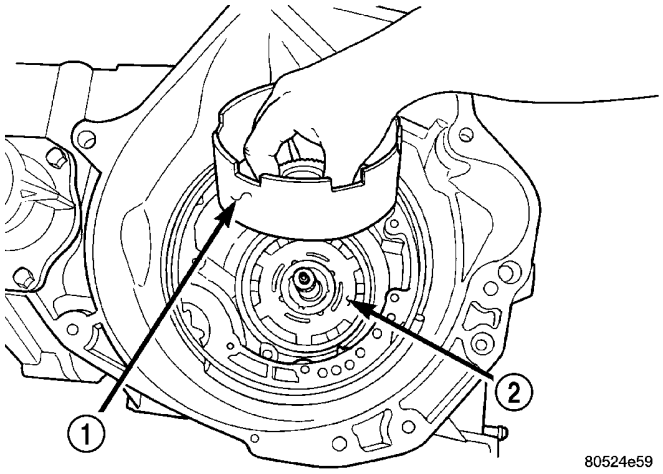


Fig. 51 Sun Gear Driving Shell

1 - SUN GEAR DRIVING SHELL
2 - REAR PLANETARY GEAR

31TH AUTOMATIC TRANSAXLE (Continued)

(10) Install front planetary gear assembly (Fig. 52).

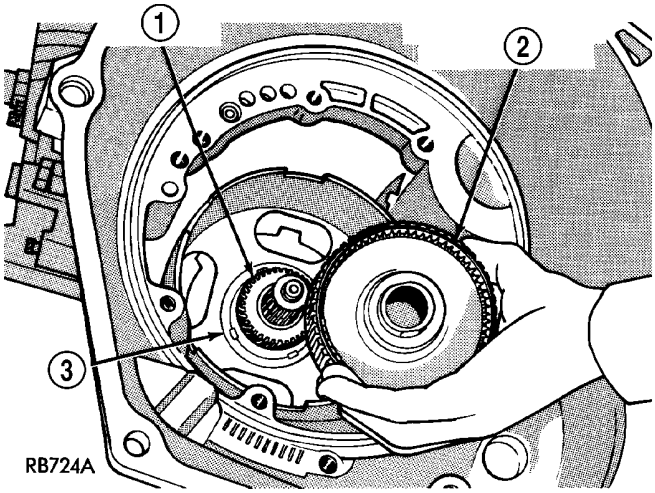


Fig. 52 Front Planetary Gear Assembly

1 - SUN GEAR
2 - FRONT PLANETARY GEAR ASSEMBLY
3 - #6 THRUST WASHER

(11) Install front planetary gear snap ring (Fig. 53).

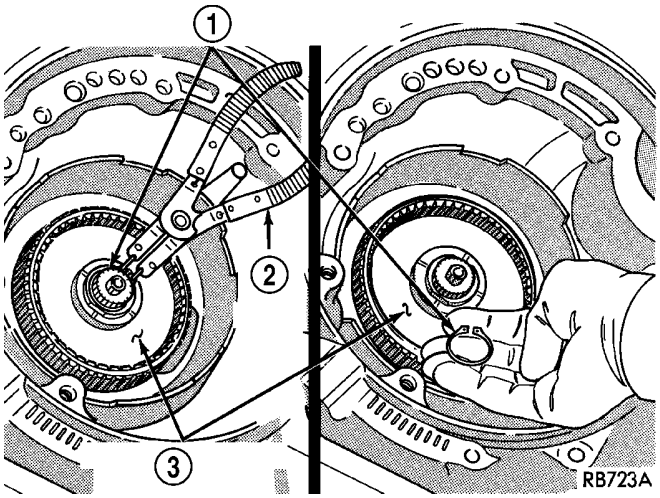


Fig. 53 Front Planetary Gear Snap Ring

1 - FRONT PLANETARY GEAR SNAP RING
2 - SNAP RING PLIERS
3 - FRONT PLANETARY GEAR ASSEMBLY

(12) Install #3 thrust washer (Fig. 54). Refer to end play specification recorded during transaxle disassembly to determine whether or not replacement is necessary.

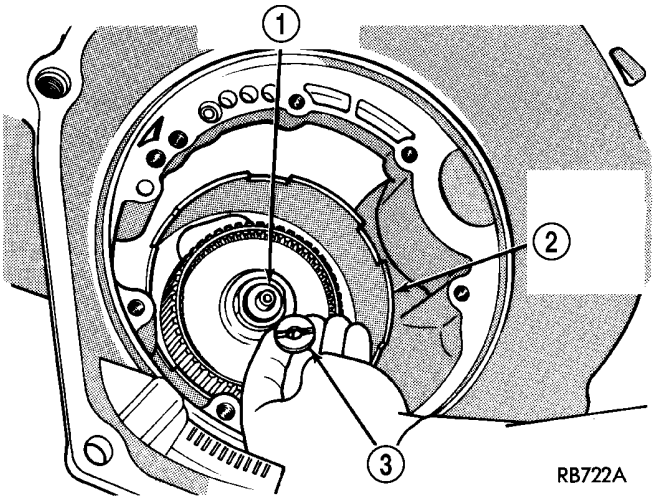


Fig. 54 No. 3 Thrust Washer

1 - OUTPUT SHAFT
2 - SUN GEAR DRIVING SHELL
3 - #3 THRUST WASHER (SELECT FIT)

(13) Install rear clutch assembly (Fig. 55). Ensure that all clutch discs are engaged to front planetary gear splines or transaxle failure will result.

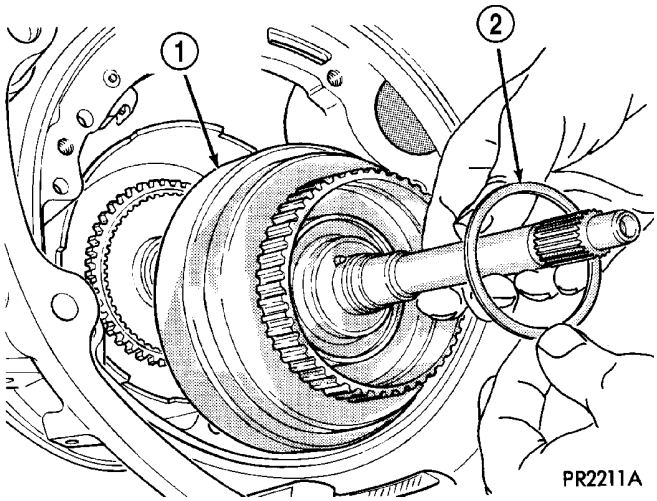


Fig. 55 No. 2 Thrust Washer and Rear Clutch

1 - REAR CLUTCH ASSEMBLY
2 - #2 THRUST WASHER

31TH AUTOMATIC TRANSAXLE (Continued)

(14) Install #2 thrust washer (Fig. 55).

(15) Install front clutch assembly (Fig. 56). Ensure that all clutch discs are engaged to rear clutch retainer splines or transaxle failure will result.

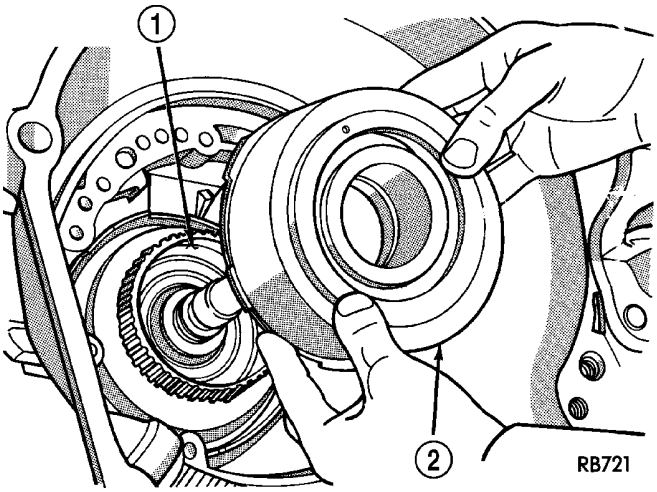


Fig. 56 Front Clutch Assembly

1 - REAR CLUTCH ASSEMBLY
2 - FRONT CLUTCH ASSEMBLY

(16) Install kickdown band (Fig. 57). Do not install strut or adjust at this time.

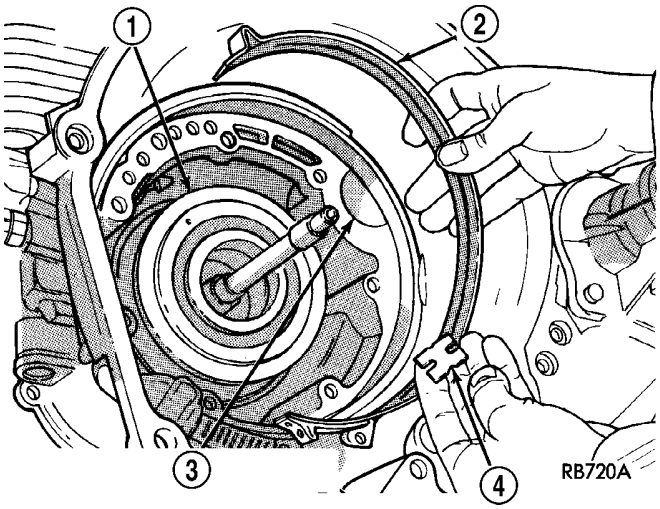


Fig. 57 Kickdown Band and Strut

1 - FRONT CLUTCH
2 - KICKDOWN BAND
3 - OIL RETURN AND FEED HOLE TO DIFFERENTIAL
4 - STRUT

(17) Install oil pump gasket (Fig. 58).

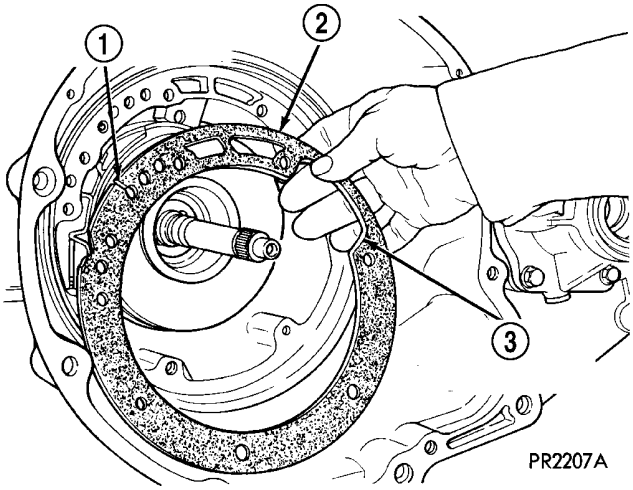


Fig. 58 Oil Pump Gasket

1 - SPLIT IN GASKET (DIFFERENTIAL OIL FEED)
2 - PUMP GASKET
3 - PUMP GASKET DIFFERENTIAL OIL FEED CUTOUT

(18) Inspect #1 thrust washer (on reaction support) and replace as necessary.

(19) Install oil pump to transaxle (Fig. 59). Torque bolts to 31 N·m (275 in. lbs.).

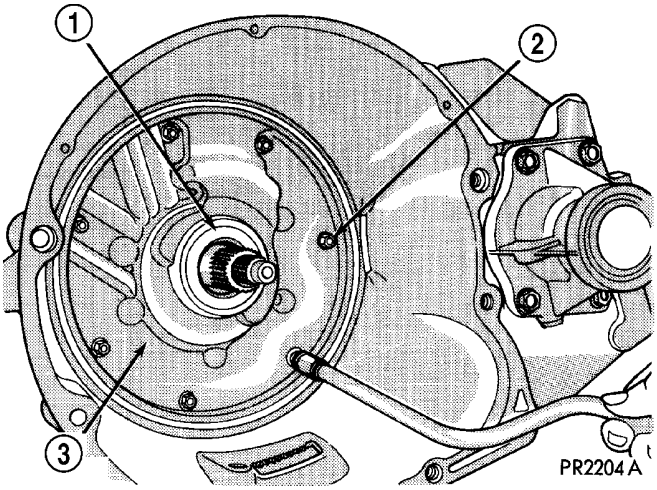


Fig. 59 Oil Pump Attaching Bolts

1 - SEAL
2 - PUMP ATTACHING BOLTS (7)
3 - PUMP HOUSING

31TH AUTOMATIC TRANSAXLE (Continued)

(20) Set up tools as shown in (Fig. 60) to measure input shaft end play. Input shaft end play should be within 0.19-1.50mm (0.008-0.060 in.).

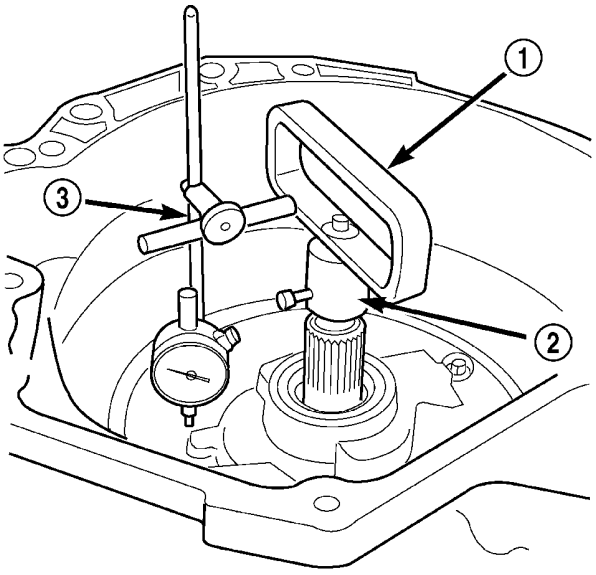


Fig. 60 Measure Input Shaft End Play using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

(21) Install park pawl, spring, and pivot shaft (Fig. 61)

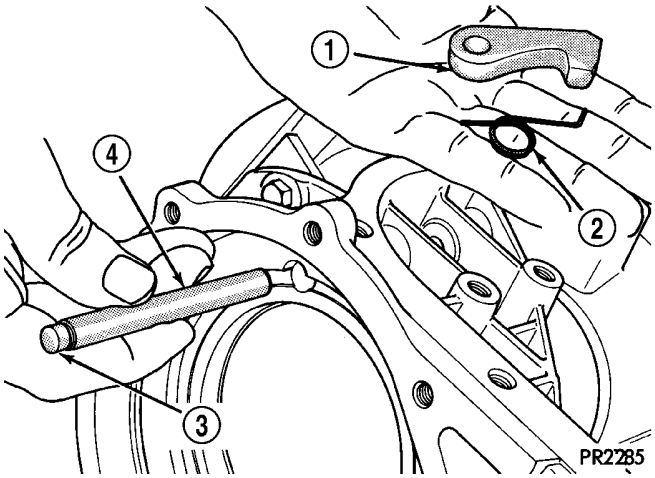


Fig. 61 Parking Pawl, Return Spring, and Pivot Shaft

1 - PARK PAWL
2 - RETURN SPRING
3 - NOTE: SMALL DIAMETER TO REAR
4 - PIVOT SHAFT

(22) Install rod support and bolts (Fig. 62). Torque bolts to 28 N·m (250 in. lbs.). (Fig. 63).

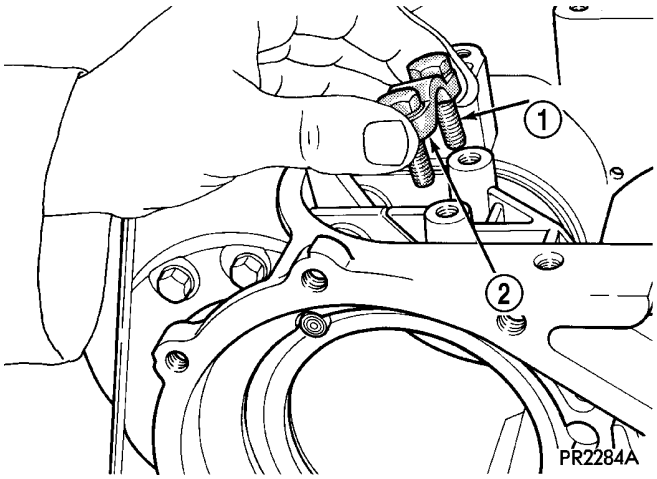


Fig. 62 Support and Bolts

1 - BOLT (2)
2 - PARKING SPRAG ROD SUPPORT

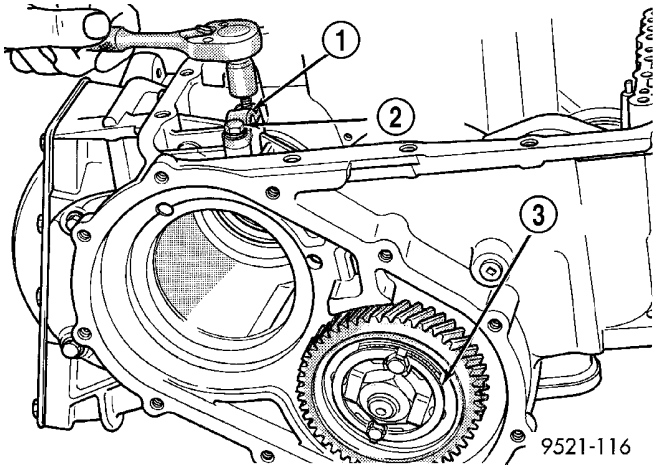


Fig. 63 Parking Sprag Rod Support

1 - PARKING SPRAG ROD SUPPORT
2 - BOLT (2)
3 - OUTPUT SHAFT GEAR

31TH AUTOMATIC TRANSAXLE (Continued)

(23) Assemble kickdown servo as shown in (Fig. 64).

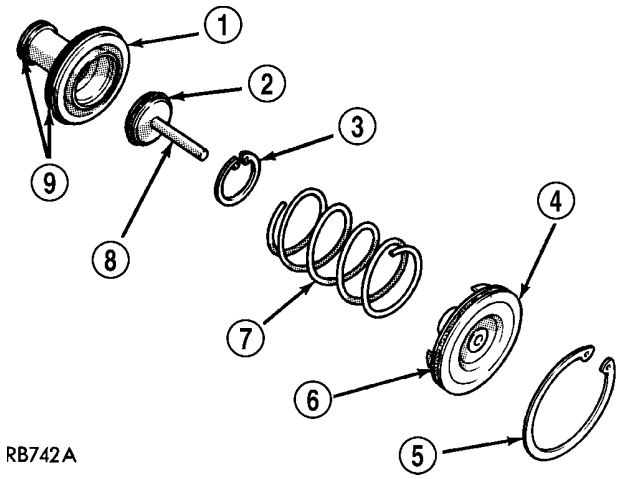


Fig. 64 Controlled Load Kickdown Servo

1 - KICKDOWN PISTON
2 - O-RING
3 - SNAP RING
4 - PISTON ROD GUIDE
5 - SNAP RING
6 - O-RING
7 - PISTON RETURN SPRING
8 - PISTON ROD
9 - SEAL RINGS

(24) Install kickdown servo piston assembly and return spring (Fig. 65).

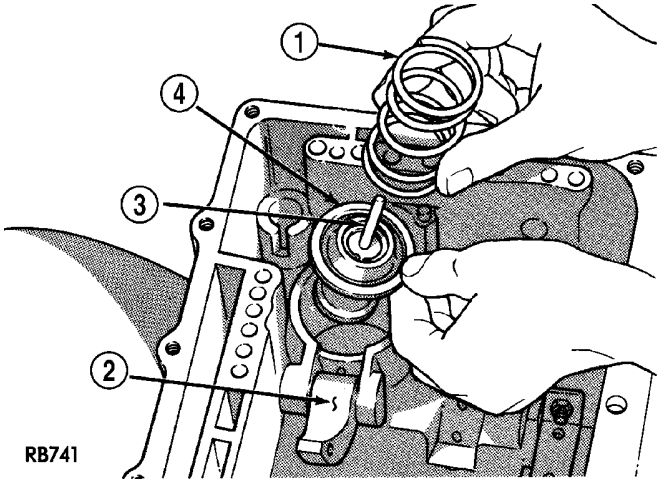


Fig. 65 Kickdown Piston Return Spring and Piston

1 - RETURN SPRING
2 - KICKDOWN LEVER
3 - PISTON ROD
4 - KICKDOWN SERVO PISTON

(25) Install kickdown servo rod guide (Fig. 66). Place snap ring into position for installation.

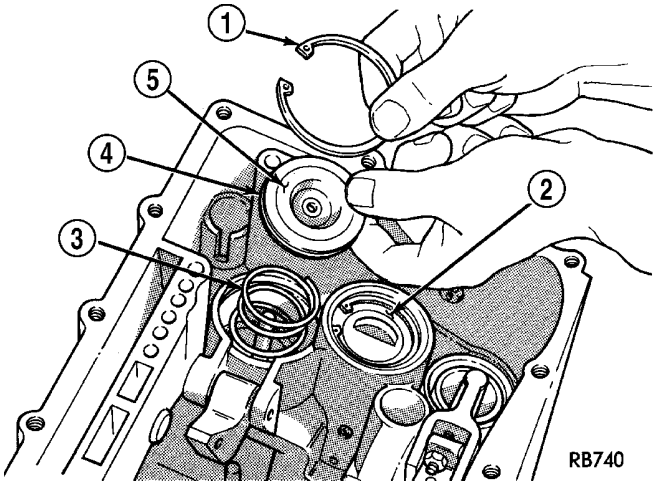


Fig. 66 Kickdown Servo Rod Guide and Snap Ring

1 - SNAP RING
2 - ACCUMULATOR PLATE
3 - RETURN SPRING
4 - O-RING
5 - PISTON ROD GUIDE

(26) Install snap ring (Fig. 67).

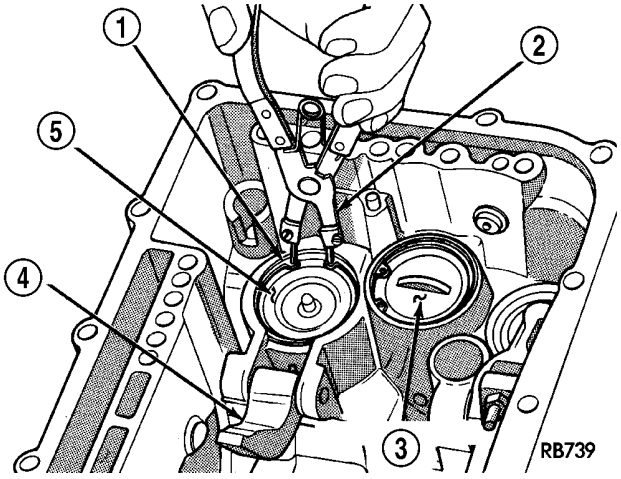


Fig. 67 Kickdown Servo Snap Ring

1 - SNAP RING
2 - SNAP RING PLIERS
3 - ACCUMULATOR PLATE
4 - KICKDOWN LEVER
5 - KICKDOWN PISTON ROD GUIDE

31TH AUTOMATIC TRANSAXLE (Continued)

(27) Install kickdown band strut.

(28) Torque kickdown band adjusting screw (Fig. 68) to 8 N·m (72 in. lbs.) torque. Back off adjusting screw 2¼ turns. Torque lock nut to 47 N·m (35 ft. lbs.).

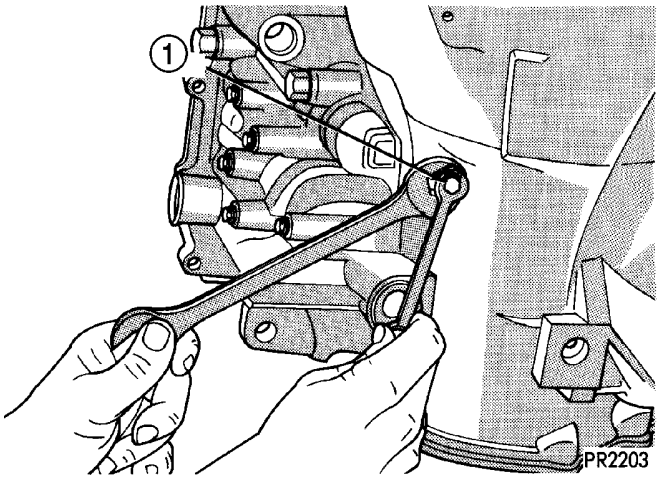


Fig. 68 Adjust Kickdown Band

1 - KICKDOWN BAND ADJUSTING SCREW

(29) Install accumulator piston and spring (Fig. 69).

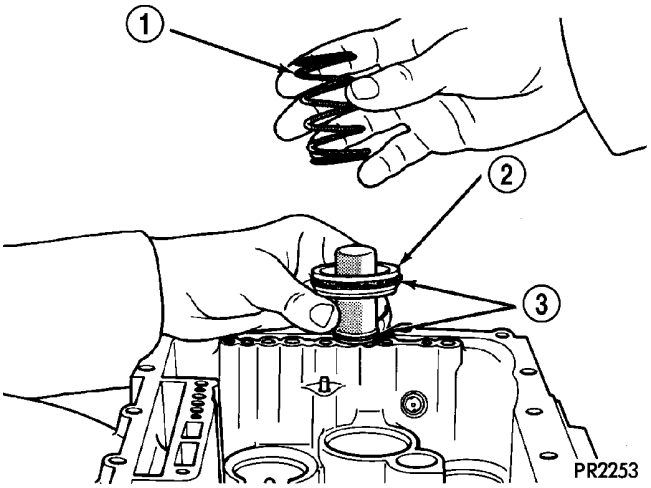


Fig. 69 Accumulator Spring and Piston

1 - ACCUMULATOR SPRING
2 - ACCUMULATOR PISTON
3 - SEAL RINGS

(30) Install accumulator plate (Fig. 70) and place snap ring into position for installation.

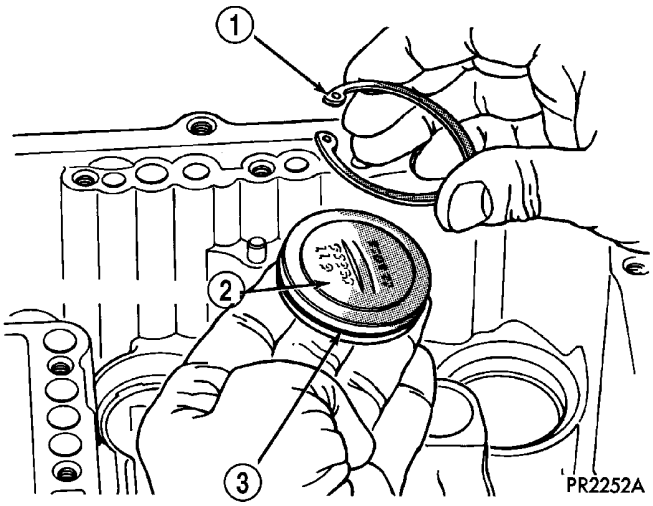


Fig. 70 Accumulator Plate and Snap Ring

1 - SNAP RING
2 - ACCUMULATOR PLATE
3 - ''O'' RING

(31) Install accumulator snap ring (Fig. 71).

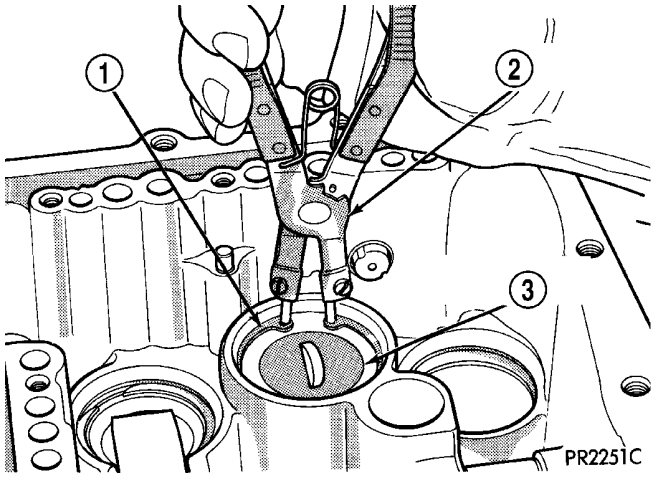


Fig. 71 Accumulator Snap Ring

1 - ACCUMULATOR PLATE SNAP RING
2 - SNAP RING PLIERS
3 - ACCUMULATOR PLATE

31TH AUTOMATIC TRANSAXLE (Continued)

(32) Install low/reverse servo piston, spring, and retainer (Fig. 72).

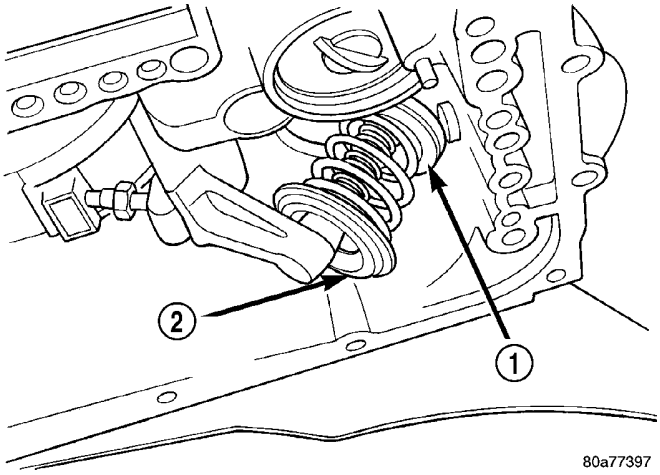


Fig. 72 Install Retainer, Spring and Servo

1 - SERVO PISTON
2 - SPRING AND RETAINER

(33) Install low/reverse piston snap ring (Fig. 73).

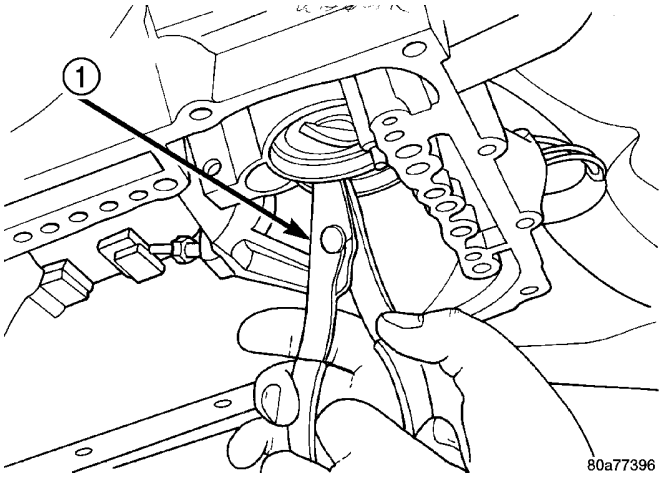


Fig. 73 Low/Reverse Servo Snap Ring

1 - SNAP-RING PLIERS

(34) Install low/reverse band strut.

(35) Adjust low/reverse band. Tighten adjusting nut (Fig. 74) to 5 N·m (41 in. lbs.) torque. Back off adjusting nut 3½ turns. Torque lock nut to 14 N·m (125 in. lbs.).

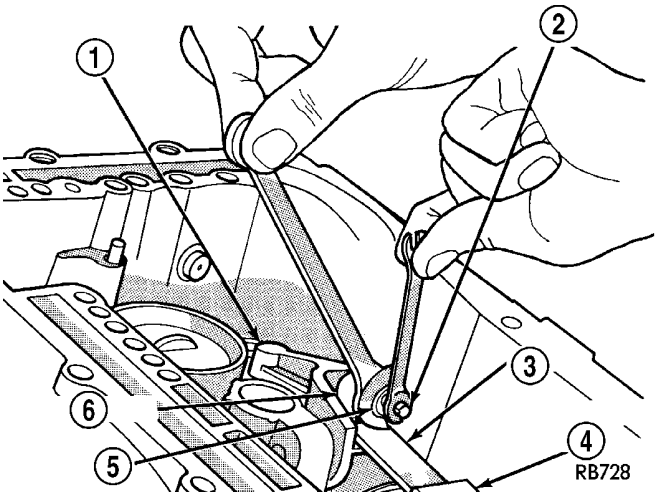


Fig. 74 Adjust Low/Reverse Band

1 - LOW-REVERSE BAND LEVER
2 - ADJUSTING SCREW
3 - STRUT
4 - LOW-REVERSE BAND
5 - LOCK NUT
6 - LEVER (SHORT)

(36) Install valve body assembly (Fig. 75). Make sure governor tubes are properly engaged to the transaxle case and valve body.

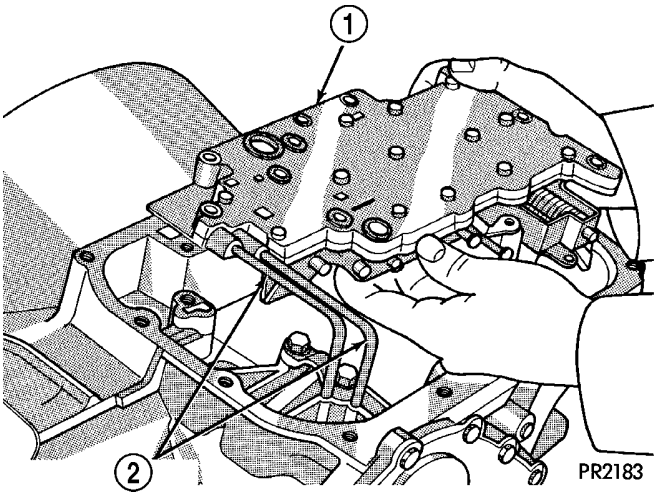


Fig. 75 Valve Body and Governor Tubes

1 - VALVE BODY ASSEMBLY
2 - GOVERNOR TUBES

31TH AUTOMATIC TRANSAXLE (Continued)

(37) Install and torque valve body-to-transaxle case bolts (Fig. 76) to 12 N·m (105 in. lbs.) torque.

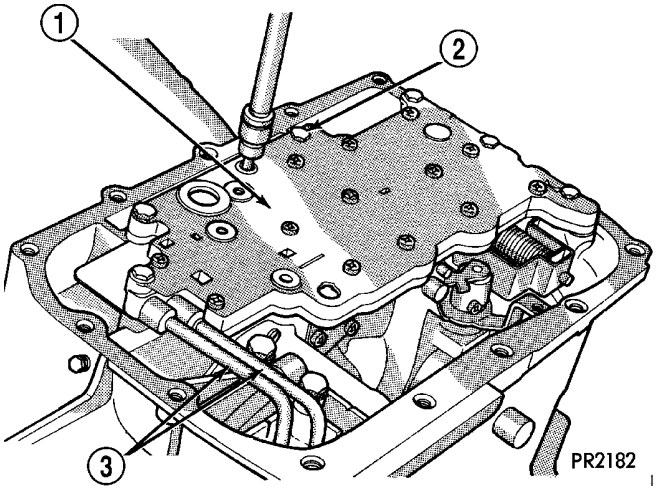


Fig. 76 Valve Body Attaching Bolts

1 - VALVE BODY
2 - VALVE BODY ATTACHING BOLTS (7)
3 - GOVERNOR TUBES

(38) Install cooler bypass valve and seal (Fig. 77). Torque bolts to 5 N·m (40 in. lbs.)..

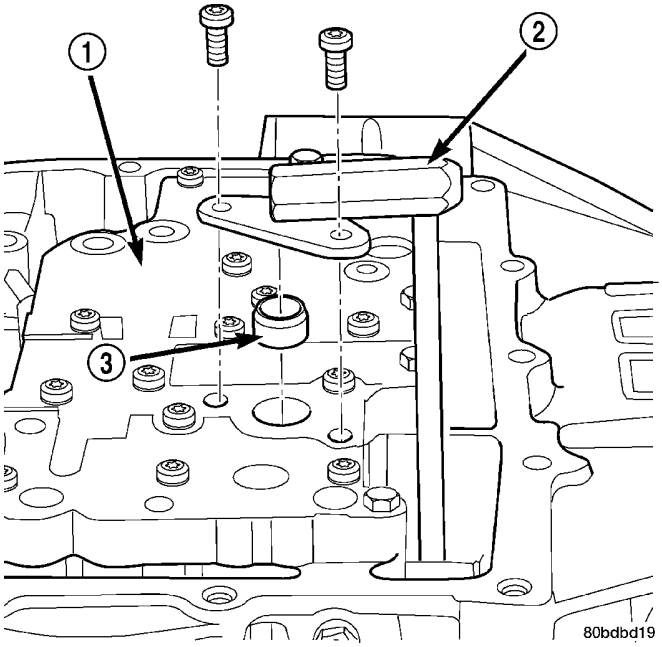


Fig. 77 Cooler Bypass Valve and Seal

1 - TRANSFER PLATE
2 - BYPASS VALVE
3 - SEAL

(39) Install park rod into position and retain with e-clip (Fig. 78).

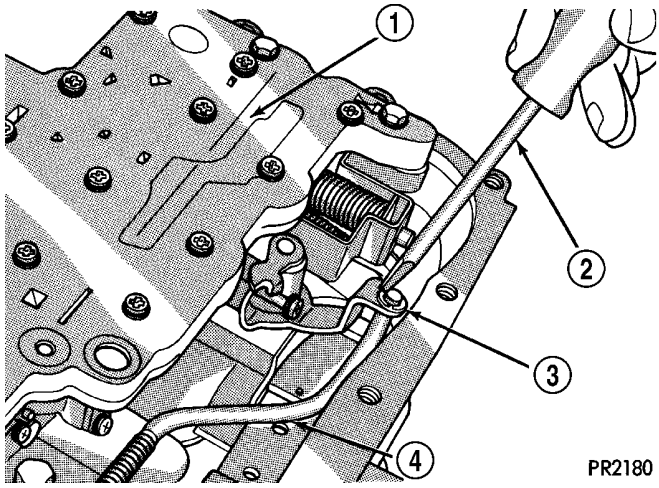


Fig. 78 Parking Rod E-Clip

1 - VALVE BODY
2 - SCREWDRIVER
3 - "E" CLIP
4 - PARKING ROD

(40) Install oil filter and gasket into position (Fig. 79).

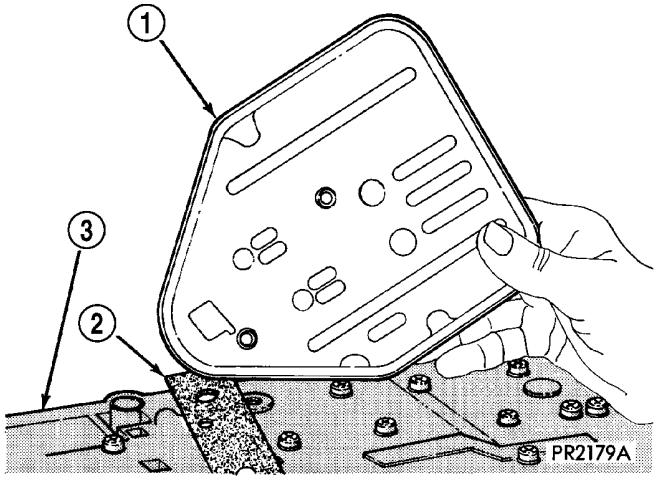


Fig. 79 Oil Filter and Gasket

1 - OIL FILTER
2 - GASKET
3 - VALVE BODY

31TH AUTOMATIC TRANSAXLE (Continued)

(41) Install oil filter-to-valve body screws (Fig. 80) and torque to 5 N·m (45 in. lbs.) torque.

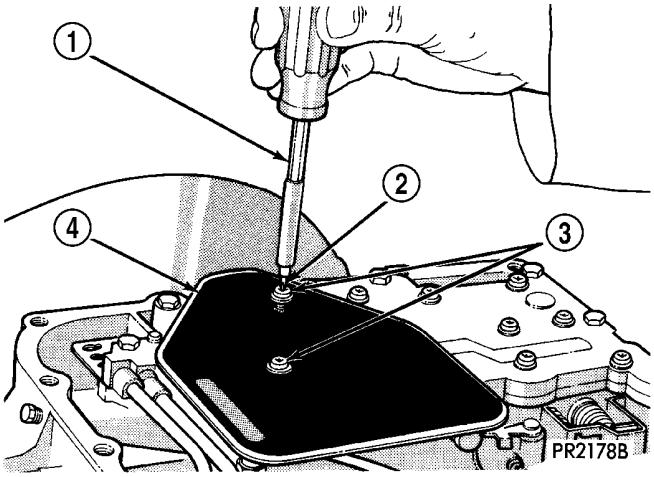


Fig. 80 Oil Filter Screws

1 - SCREWDRIVER HANDLE
2 - SPECIAL TOOL L-4553
3 - OIL FILTER SCREWS (2)
4 - OIL FILTER

(42) Install an 1/8” bead of Mopar® Silicone Rubber Adhesive Sealant to the transaxle oil pan (Fig. 81). Install oil pan to case and immediately install and torque oil pan-to-case bolts (Fig. 82) to 19 N·m (165 in. lbs.) torque.

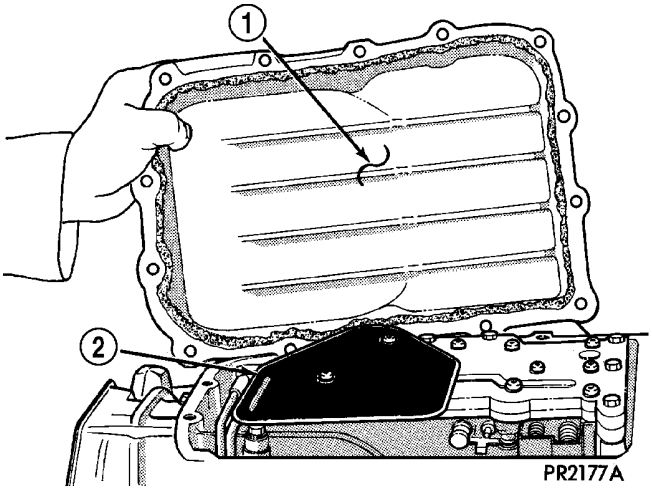


Fig. 81 Transaxle Oil Pan

1 - TRANSAXLE OIL PAN
2 - OIL FILTER

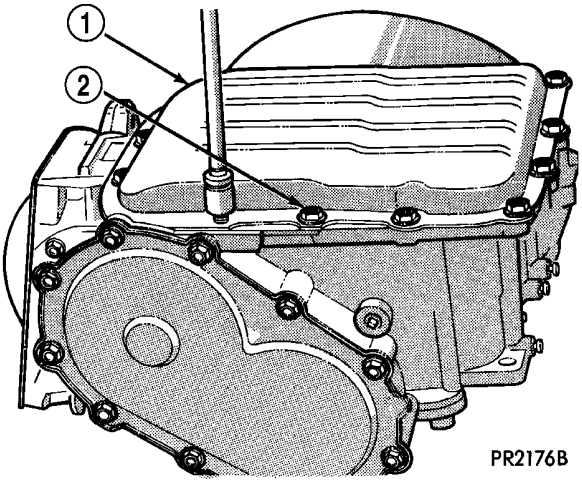


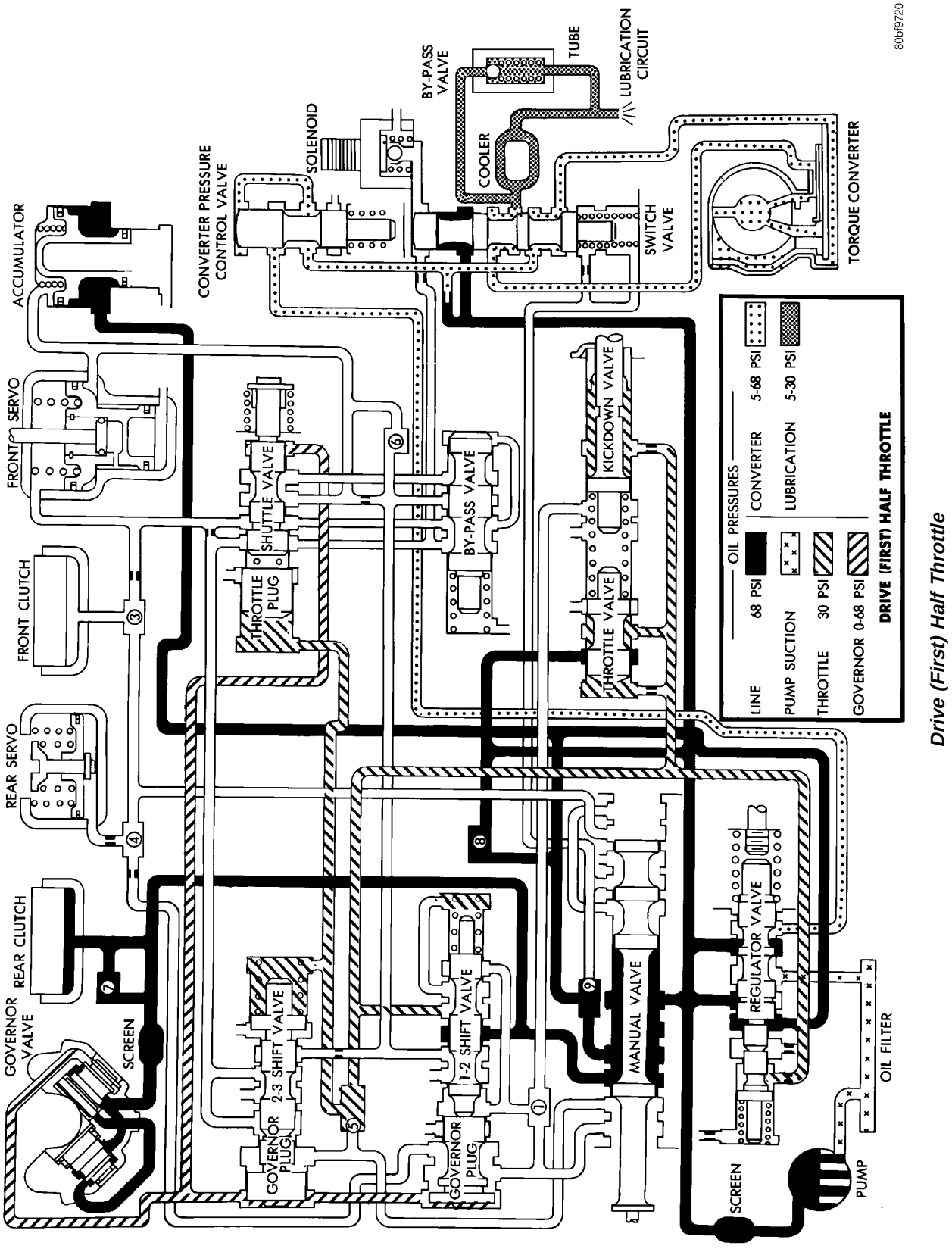
Fig. 82 Transaxle Oil Pan Bolts

1 - TRANSAXLE OIL PAN
2 - OIL PAN BOLTS

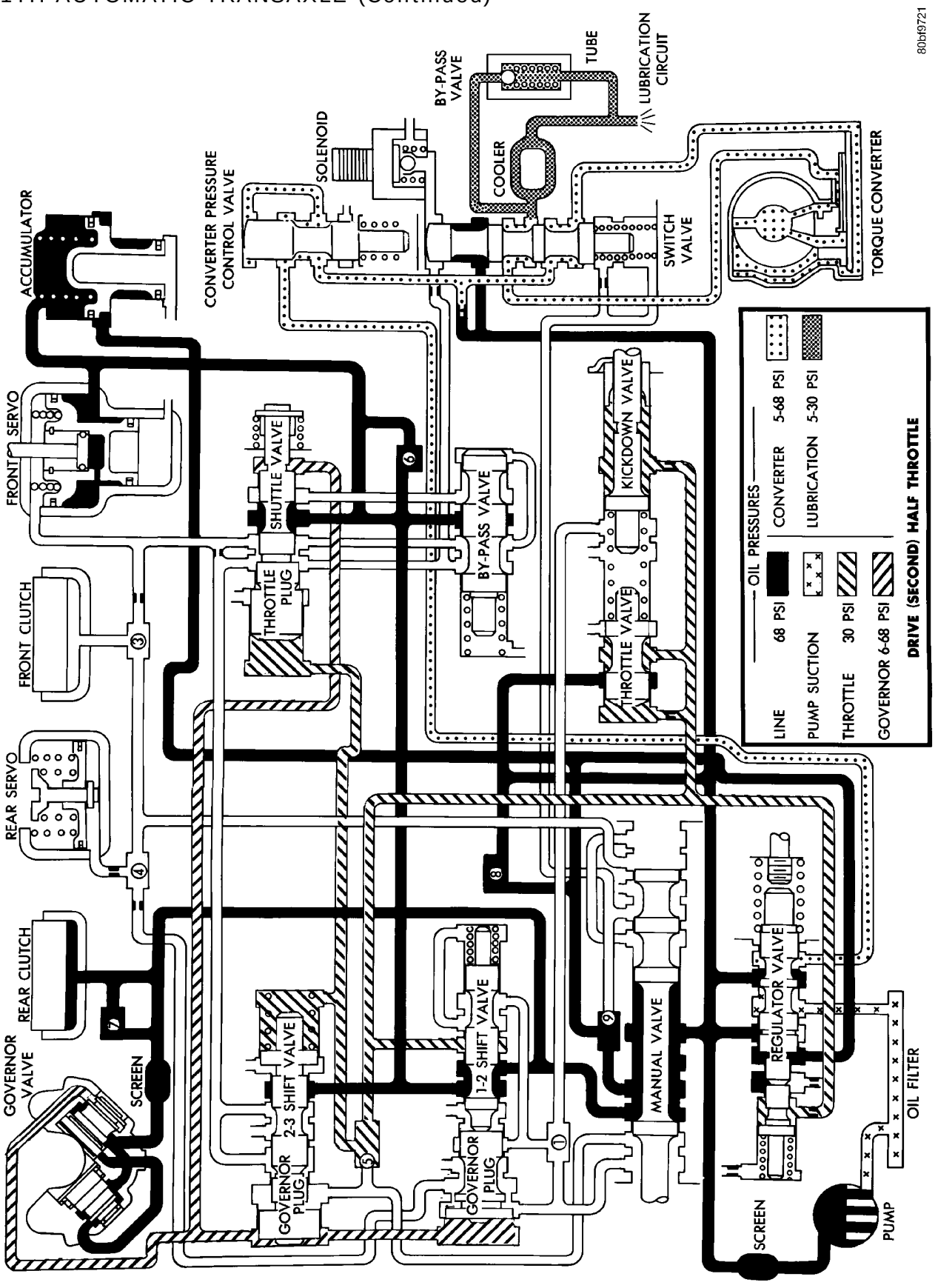
31TH AUTOMATIC TRANSAXLE (Continued)

SCHEMATICS AND DIAGRAMS

31TH TRANSAXLE HYDRAULIC SCHEMATICS

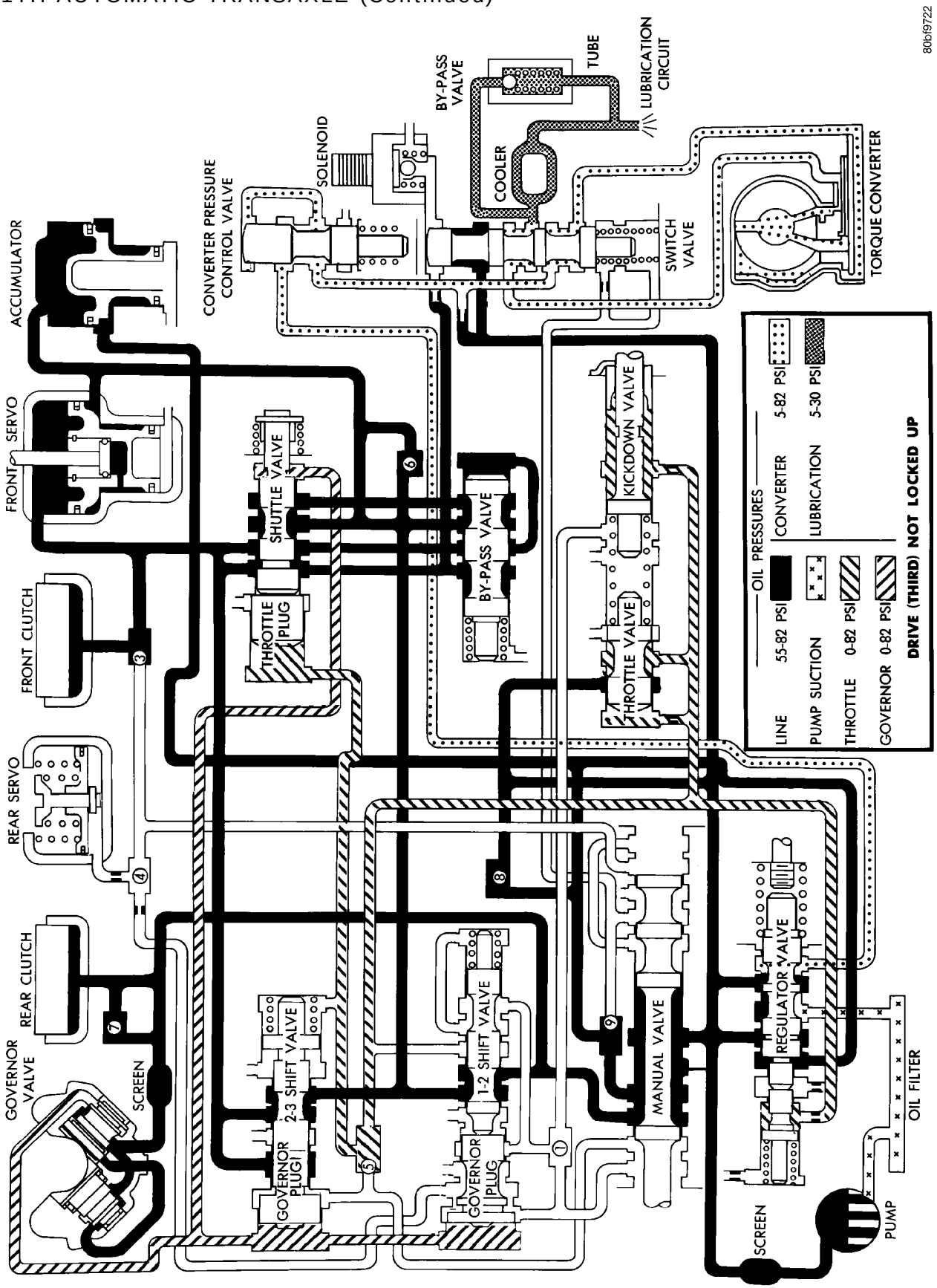


31TH AUTOMATIC TRANSAXLE (Continued)



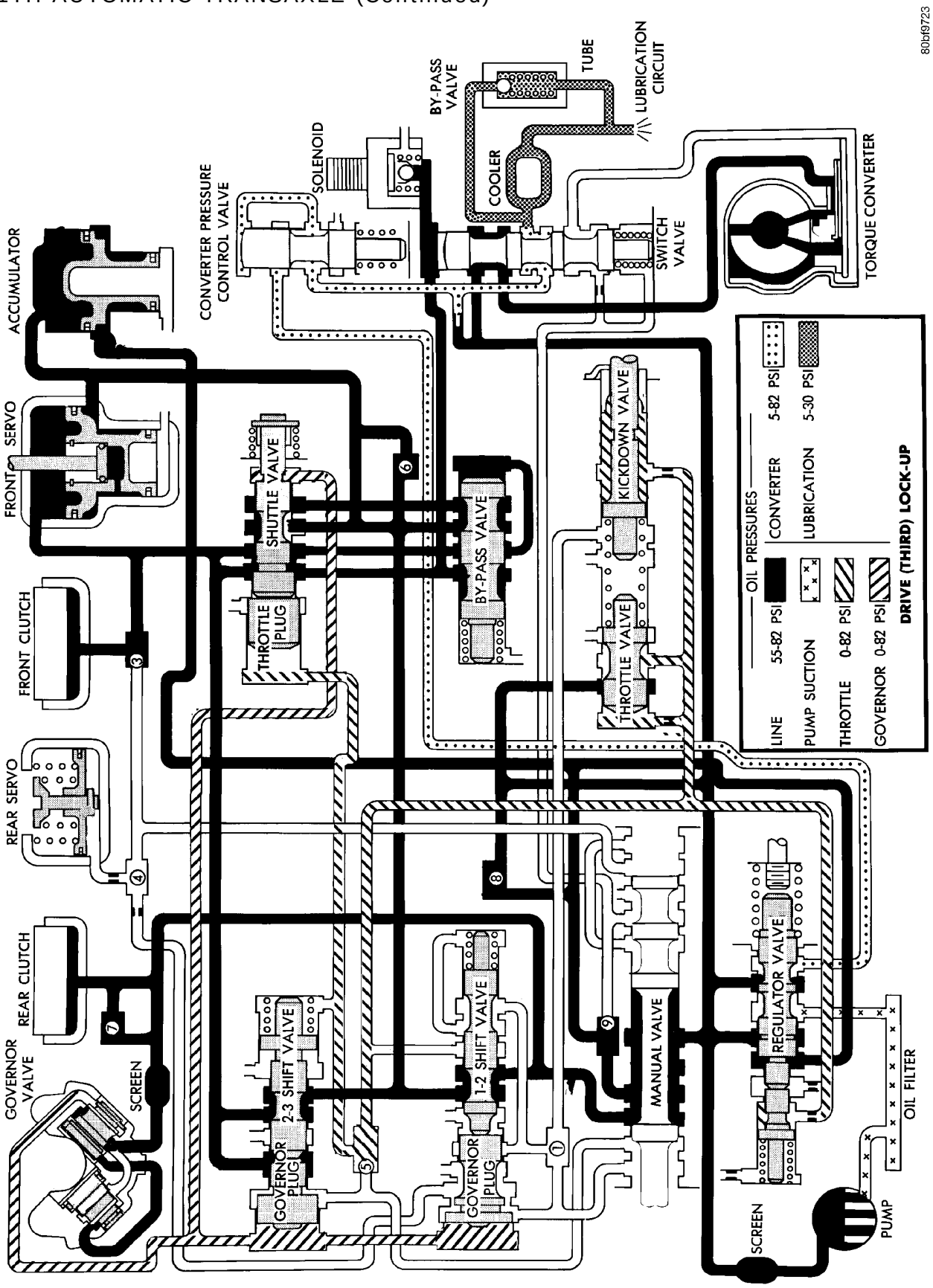
Drive (Second) Half Throttle

31TH AUTOMATIC TRANSAXLE (Continued)



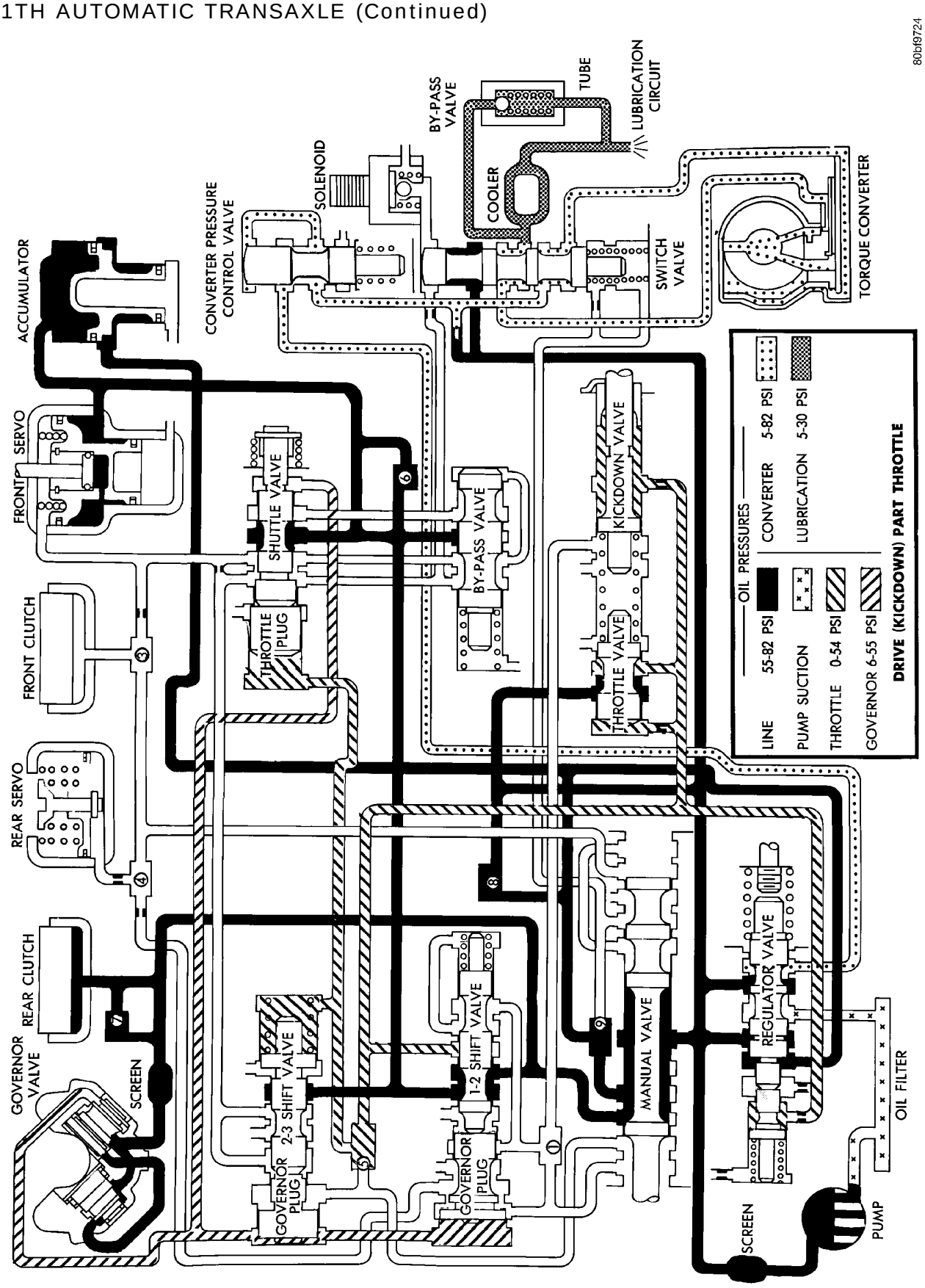
Drive (Third) Not Locked Up

31TH AUTOMATIC TRANSAXLE (Continued)



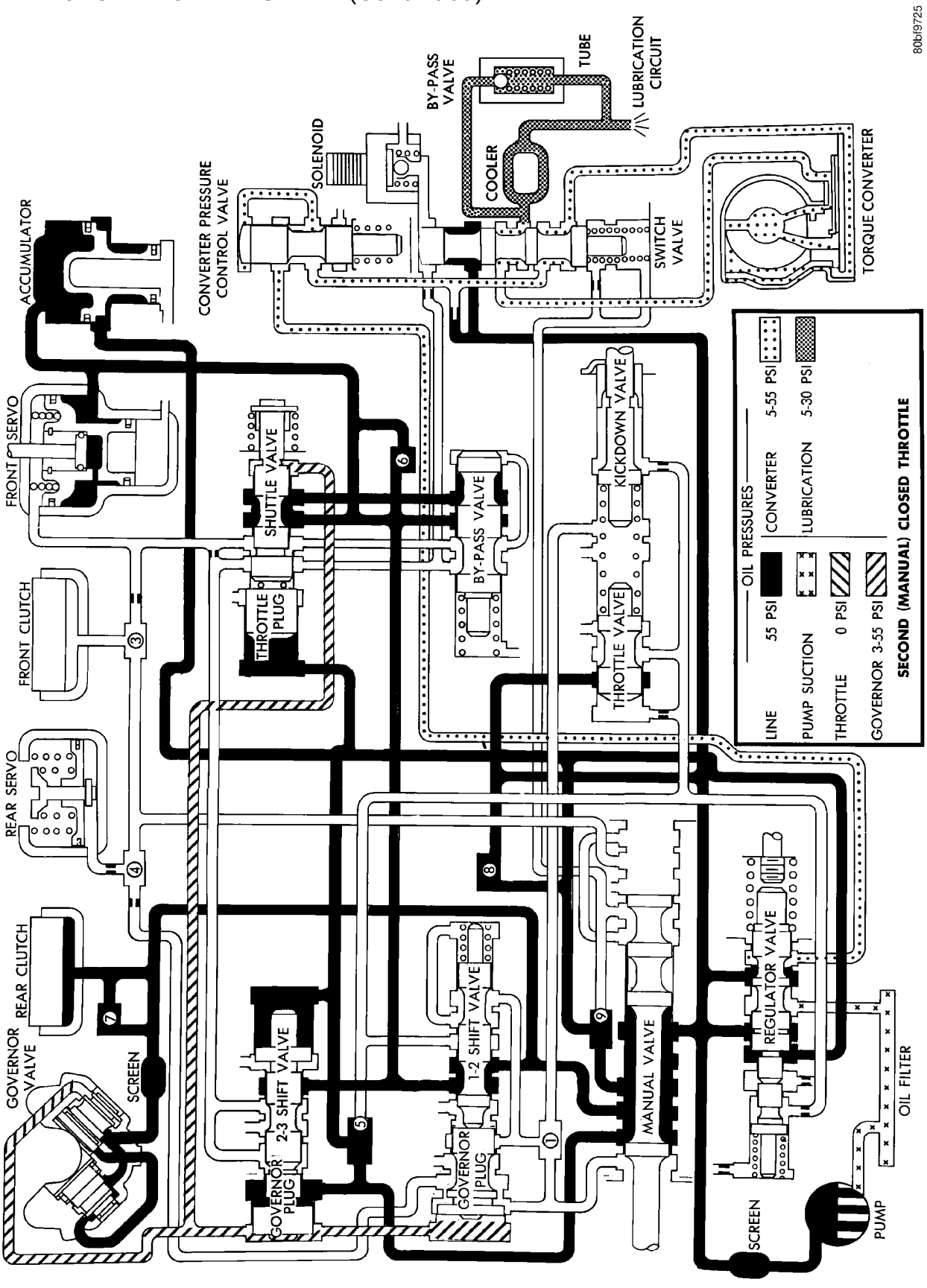
Drive (Third) Lock-Up

31TH AUTOMATIC TRANSAXLE (Continued)



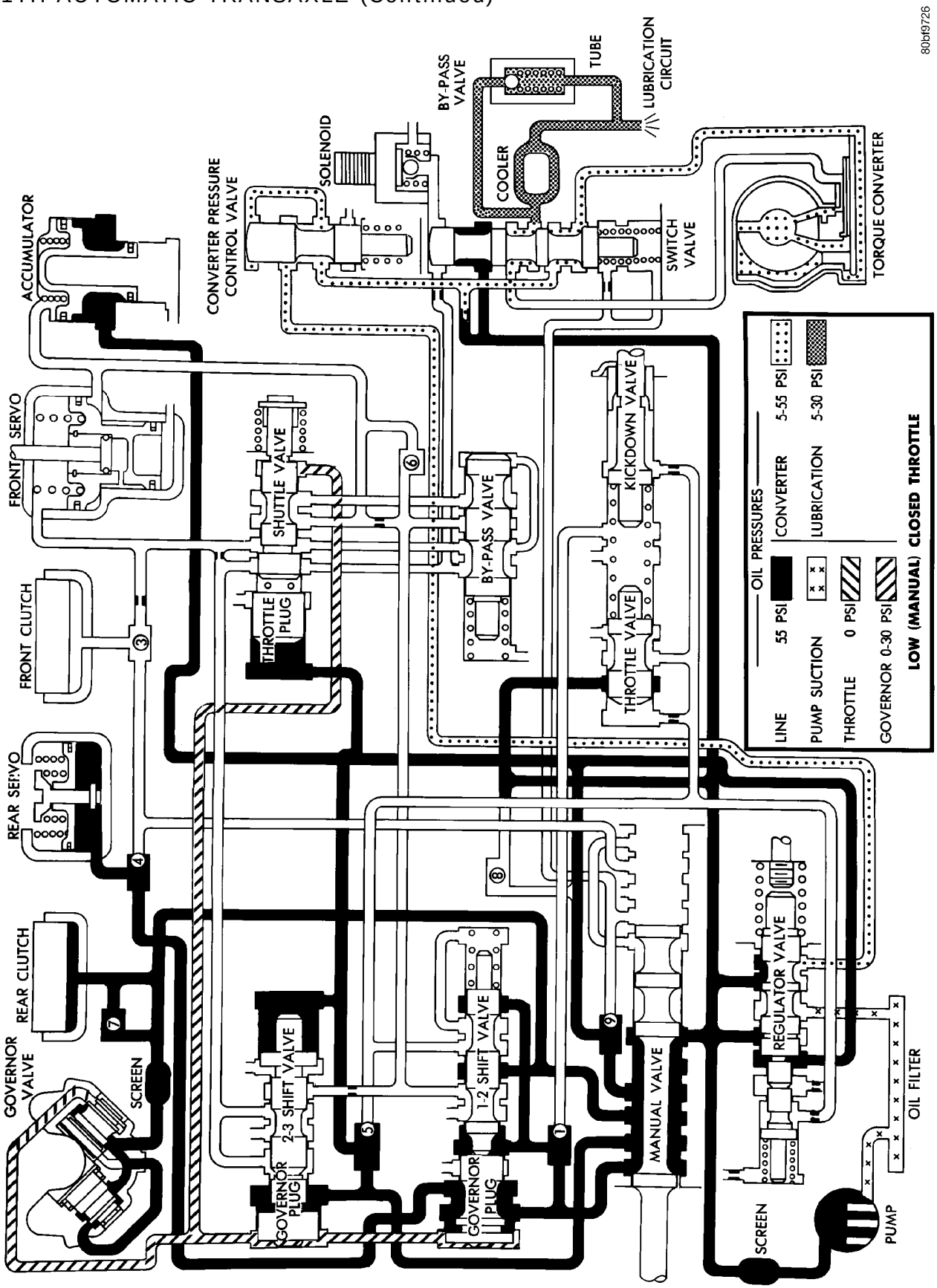
Drive (Kickdown) Part Throttle

31TH AUTOMATIC TRANSAXLE (Continued)



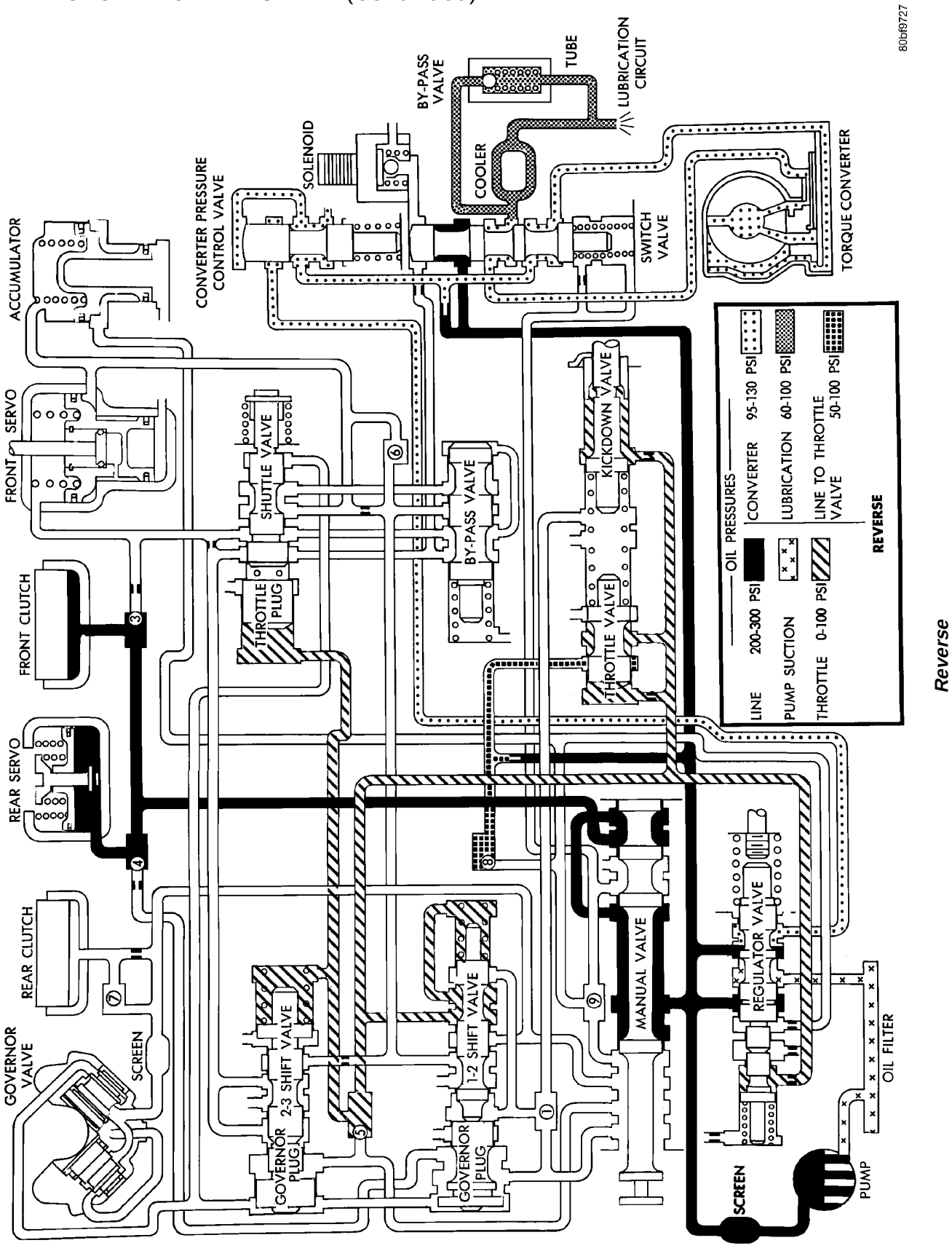
Second (Manual) Closed Throttle

31TH AUTOMATIC TRANSAXLE (Continued)



Low (Manual) Closed Throttle

31TH AUTOMATIC TRANSAXLE (Continued)



31TH AUTOMATIC TRANSAXLE (Continued)

SPECIFICATIONS

31TH AUTOMATIC TRANSAXLE

GENERAL SPECIFICATIONS

Transaxle Type	Three speed automatic with torque converter and integral differential
Cooling Method	Water to oil heat exchanger
Lubrication Method	Pump (internal-external gear-type)

GEAR RATIOS

1st Gear	2.69
2nd Gear	1.55
3rd Gear	1.00
Reverse Gear	2.10

BAND ADJUSTMENT

Kickdown (Front)—Backed Off From 8 N m (72 in. lbs.)	2¼ turns
Low-Reverse (Rear)—Backed Off From 5 N m (41 in. lbs.)	3½ Turns

BEARING SETTINGS (END PLAY & TURNING TORQUE)

Description	Metric	Standard
Differential Assembly	0.7-1.4 N·m	6-12 in. lbs.
Output Shaft	0-0.3 N·m	0-3 in. lbs.
Transfer Shaft	0.051-0.254 mm	0.002-0.010 in. (end play)
Overall Drag At Output Hub	0.03-1.8 N·m	3-16 in. lbs.

CLUTCH CLEARANCES

Description	Metric	Standard
Front Clutch (Not Adjustable)	1.27-2.79 mm	0.050-0.110 in.
Rear Clutch	0.71-1.10 mm	0.028-0.043 in.

END PLAY

Description	Metric	Standard
Input Shaft	0.19-1.50 mm	0.008-0.060 in.
Front Clutch Retainer	0.76-2.69 mm	0.030-0.106 in.
Front Carrier	0.89-1.45 mm	0.007-0.057 in.
Front Annulus Gear	0.09-0.50 mm	0.0035-0.020 in.
Planet Pinion	0.15-0.59 mm	0.006-0.023 in.
Reverse Drum	0.76-3.36 mm	0.030-0.132 in.

31TH AUTOMATIC TRANSAXLE (Continued)

OIL PUMP CLEARANCE

Description	Metric	Standard
Outer Gear-to-Pocket	0.045-0.141mm	0.0018-0.0056 in.
Outer Gear Side Clearance	0.020-0.046mm	0.0008-0.0018 in.
Inner Gear Side Clearance	0.020-0.046mm	0.0008-0.0018 in.

THRUST WASHERS

Description	Metric	Standard
Reaction Shaft Support (No. 1)	1.55-1.60 mm	0.061-0.063 in.
Rear Clutch Retainer (No. 2)	1.55-1.60 mm	0.061-0.063 in.
Output Shaft (No. 3) (Select)	1.98-2.03 mm	0.077-0.080 in
Output Shaft (No. 3) (Select)	2.15-2.22 mm	0.085-0.087 in.
Output Shaft (No. 3) (Select)	2.34-2.41 mm	0.092-0.095 in.
Front Annulus (No. 4)	2.95-3.05 mm	0.116-0.120 in.
Front Carrier (Nos. 5&6)	1.22-1.28 mm	0.0948-0.050 in.
Sun Gear-Front (No. 7)	0.85-0.91 mm	0.033-0.036 in
Sun Gear-Rear (No. 8)	0.85-0.91 mm	0.033-0.036 in.
Rear Carrier (Nos. 9&10)	1.22-1.28 mm	0.0948-0.050 in.
Rev. Drum (No. 11)	1.55-1.60 mm	0.061-0.063 in.

TORQUE SPECIFICATIONS

Description	N·m	Ft. Lbs.	In. Lbs.
Bolt, Differential Bearing Retainer-to-Case	34	—	300
Bolt, Differential Cover-to-Case	19	—	165
Bolt, Differential Ring Gear-to-Case	95	70	—
Bolt, Extension Housing-to-Case	28	—	250
Bolt, Drive Plate-to-Crankshaft	95	70	—
Bolt, Drive Plate-to-Torque Converter	68	50	—
Bolt, Governor-to-Support	7	—	60
Bolt, Output Gear Strap	23	17	—
Bolt, Oil Pan-to-Case	19	—	165
Bolt, Oil Pump-to-Case	31	—	275
Bolt, Park Rod Support-to-Case	28	—	250
Bolt, Reaction Support-to-Pump Body	28	—	250
Bolt, Sprag Retainer-to-Case	28	—	250

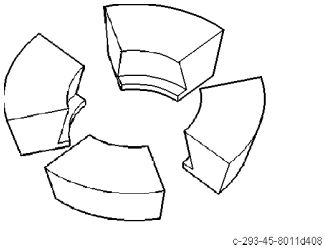
31TH AUTOMATIC TRANSAXLE (Continued)

Description	N·m	Ft. Lbs.	In. Lbs.
Bolt, Starter Motor-to-Transaxle	54	40	—
Bolt, Transaxle Case-to-Engine Block	95	70	—
Bolt, Transfer Gear Cover-to-Case	19	—	165
Bolt, Transfer Gear Strap	23	17	—
Bolt, Valve Body-to-Case	12	—	105
Fitting, Transaxle Oil Cooler-to-Case	7	—	60
Screw, Fluid Filter	5	—	45
Screw, Cooler Bypass Valve-to-Transfer Plate	5	—	40
Screw, Governor Counterweight	28	—	250
Screw, Manual Valve Lever-to-Shaft	12	—	105
Screw, Speedo Adapter-to-Extension Housing	7	—	60
Screw, Valve Body-to-Transfer Plate	5	—	45
Nut, Kickdown Band Adjuster Lock	47	35	—
Nut, Output Gear-to-Shaft	271	200	—
Nut, Reverse Band Adjuster Lock	14	—	125
Nut, Transfer Gear-to-Shaft	271	200	—
Plug, Pressure Tap	5	—	45
Plug, Rear Band Lever Pivot Shaft	7	—	60
Switch, Park/Neutral	34	25	—

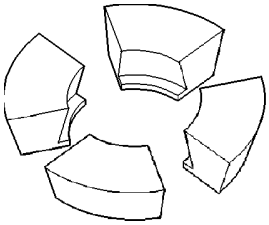
31TH AUTOMATIC TRANSAXLE (Continued)

SPECIAL TOOLS

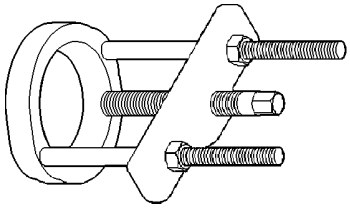
31TH AUTOMATIC TRANSAXLE



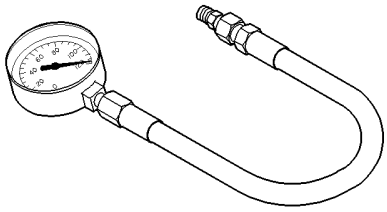
Adapter Blocks C-293–45



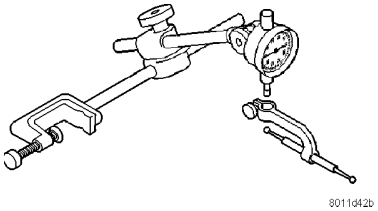
Adapter Blocks C-293–52



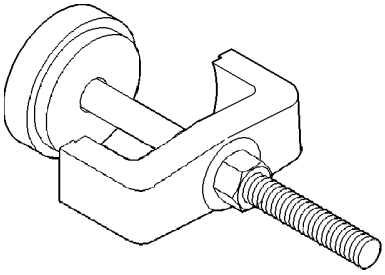
Puller Press C-293–PA



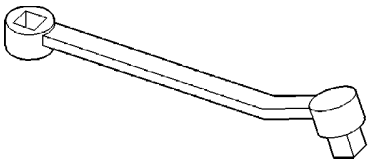
Pressure Gauge (High) C-3293SP



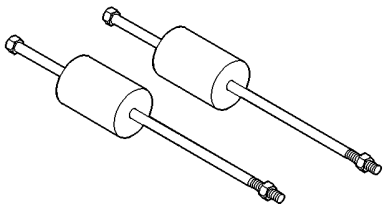
Dial Indicator C-3339



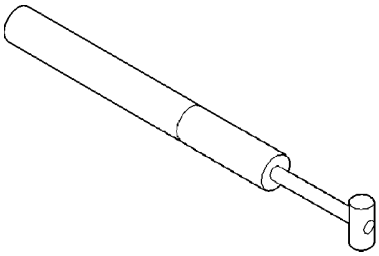
Spring Compressor C-3575-A



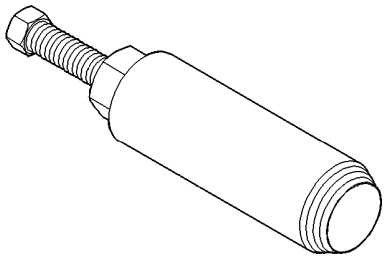
Band Adjusting Adapter C-3705



Oil Pump Puller C-3752

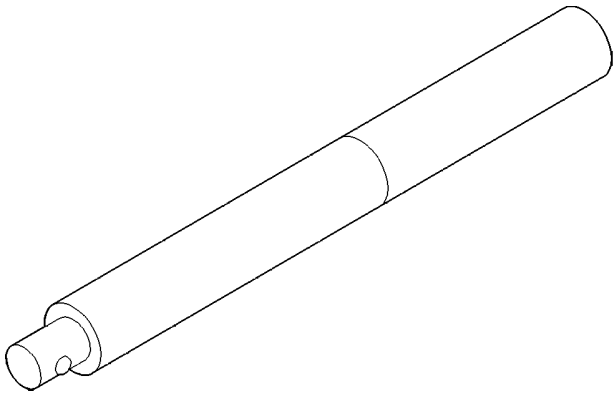


Throttle Setting Gauge C-3763

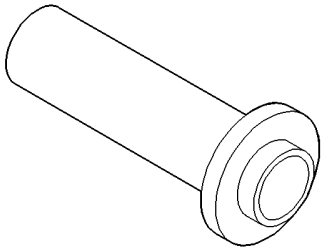


Seal Puller C-3981B

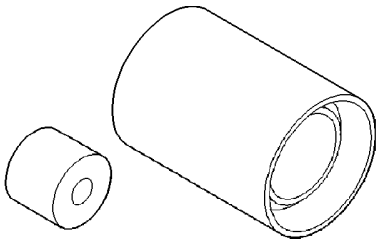
31TH AUTOMATIC TRANSAXLE (Continued)



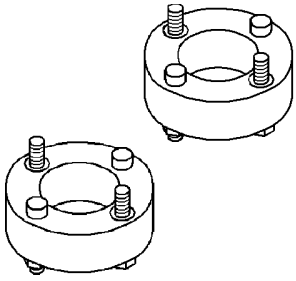
Universal Handle C-4171



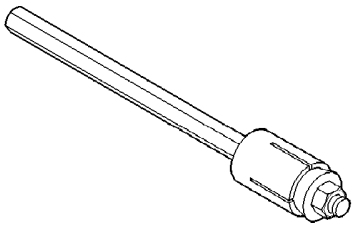
Seal Installer C-4193A



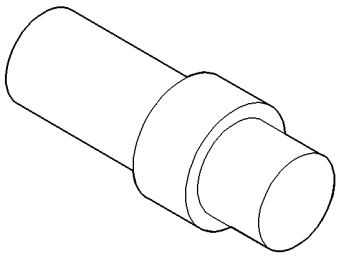
Bearing Installer C-4637



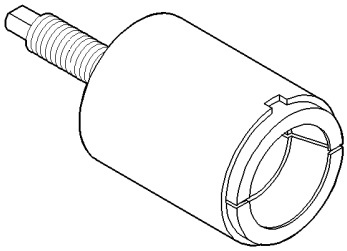
Adapter C-4658



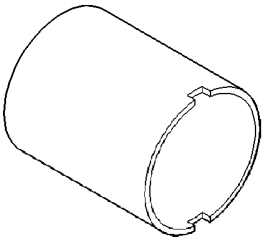
Torque Tool C-4995



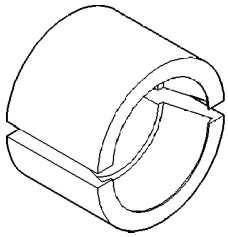
Adapter C-4996



Remover Kit L-4406

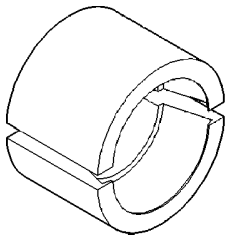


Bearing Remover Cup L-4406–1

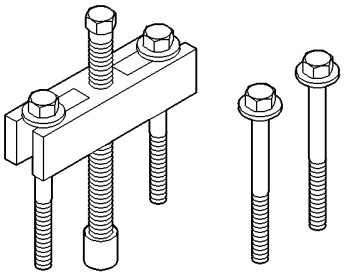


Bearing Remover Jaws L-4406–2

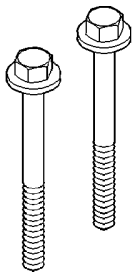
31TH AUTOMATIC TRANSAXLE (Continued)



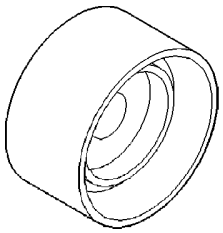
Adapter L-4406–3



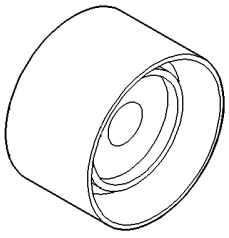
Gear Puller L-4407A



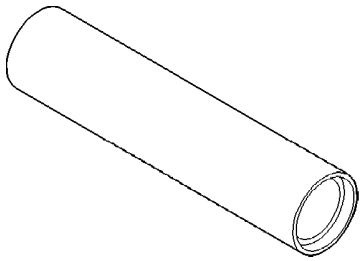
Puller L-4407–6



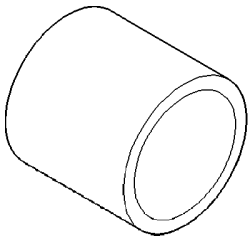
Bearing Installer L-4408



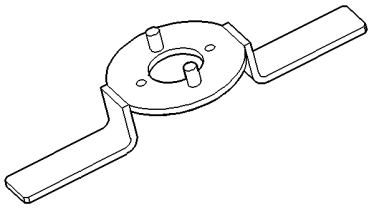
Bearing Installer L-4410



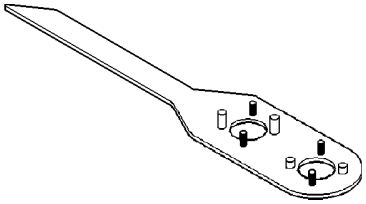
Bearing Installer L-4411



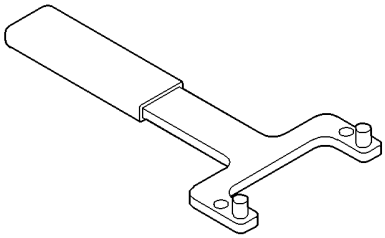
Installer Adapter L-4429-3



Gear Checking Plate L-4432

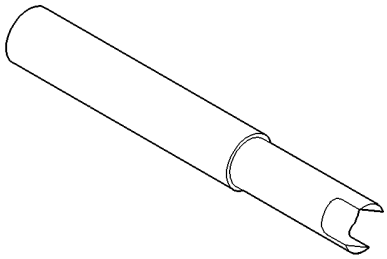


Gear Removing Plate L-4434

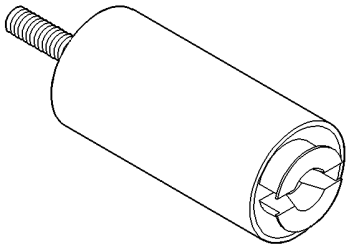


Bearing Puller L-4435

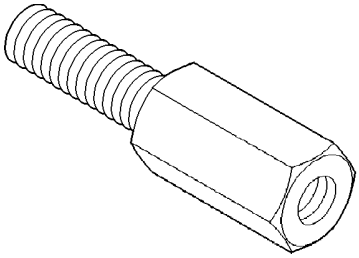
31TH AUTOMATIC TRANSAXLE (Continued)



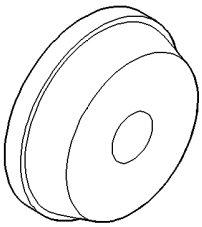
Differential Tool L-4436A



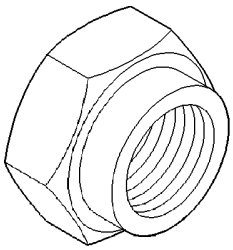
Special Jaw Set L-4518



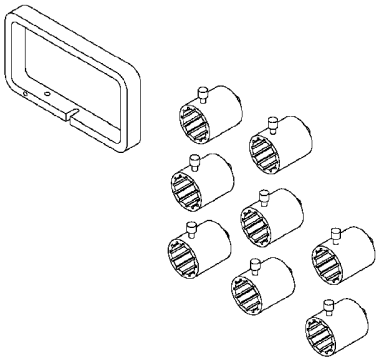
Housing Remover Adapter L-4437



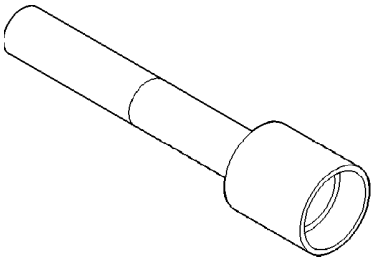
Installer L-4520



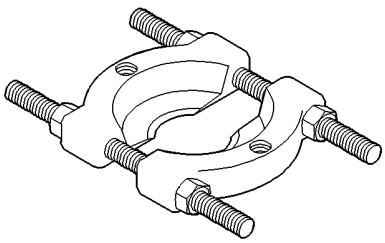
Starter Nut L-4439



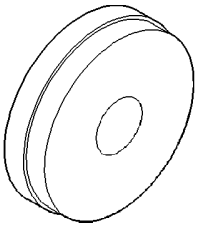
End Play Socket Set 8266



Transfer Shaft Remover-Installer L-4512



Bearing Splitter P-334



Bearing Cup Remover L-4517

BANDS

KICKDOWN (FRONT) BAND

DESCRIPTION

The kickdown, or “front”, band (Fig. 83) holds the common sun gear of the planetary gear sets. The front (kickdown) band is made of steel, and faced on its inner circumference with a friction-type lining. One end of the band is anchored to the transmission case, and the other is acted on with a pushing force by a servo piston. The front band is a single-wrap design (the band does not completely encompass/ wrap the drum that it holds).

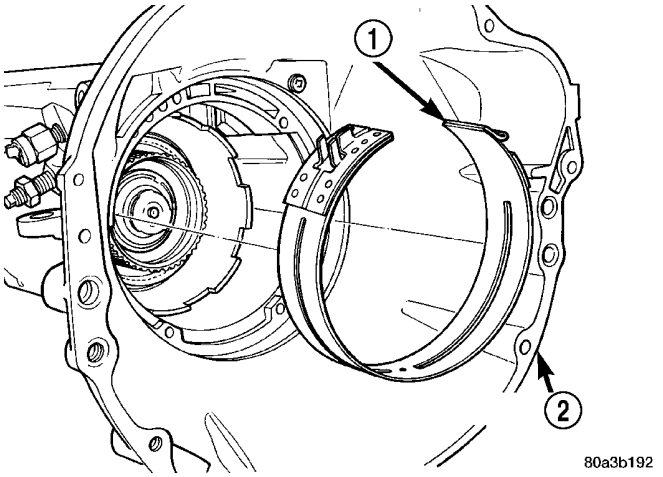


Fig. 83 Front Band—Typical

1 - FRONT BAND
2 - TRANSMISSION HOUSING

OPERATION

The kickdown band holds the common sun gear of the planetary gear sets by applying and holding the front clutch retainer, which is splined to the sun gear driving shell, and in turn splined directly to the sun gear. The application of the band by the servo is typically done by an apply lever and link bar.

LOW/REVERSE (REAR) BAND

DESCRIPTION

The low/reverse band, or “rear”, band (Fig. 84) is similar in appearance and operation to the front band. The rear band is also a single-wrap design (the band does not completely encompass/wrap the drum that it holds).

OPERATION

The rear band holds the rear planet carrier stationary by being mounted around and applied to the low/reverse drum.

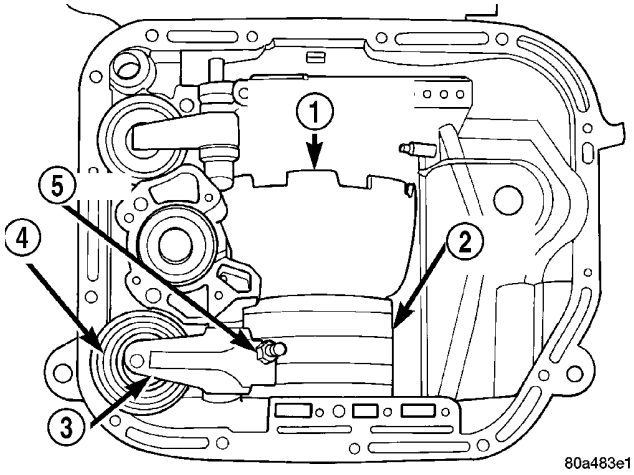


Fig. 84 Rear Band

1 - PLANETARY GEARTRAIN
2 - REAR BAND
3 - LEVER
4 - SERVO
5 - ADJUSTER

ACCUMULATOR

DESCRIPTION

The accumulator (Fig. 85) is a hydraulic device that has the sole purpose of cushioning the application of a band or clutch. The accumulator consists of a dual-land piston and a spring located in a bore in the transmission case.

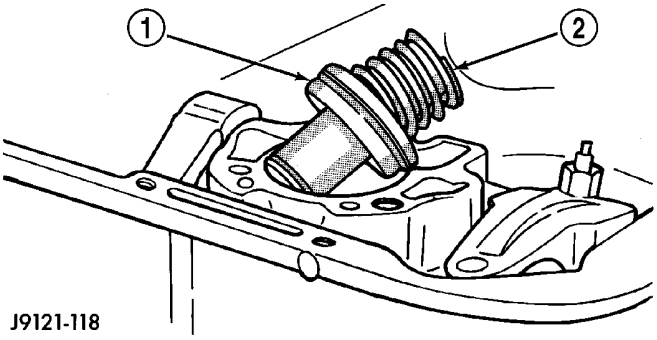


Fig. 85 Accumulator

1 - ACCUMULATOR PISTON
2 - PISTON SPRING

OPERATION

Line pressure is directed between the lands of the piston (Fig. 86), bottoming it against the accumulator plate. The accumulator stays in this position after the transmission is placed into a Drive position. When the 1-2 upshift occurs (Fig. 87), line pressure is directed to the large end of the piston and then to the kickdown servo. As the line pressure reaches the

ACCUMULATOR (Continued)

accumulator, the combination of spring pressure and line pressure forces the piston away from the accumulator plate. This causes a balanced pressure situation, which results in a cushioned band application. After the kickdown servo has become immovable, line pressure will finish pushing the accumulator up into its bore. When the large end of the accumulator piston is seated in its bore, the band or clutch is fully applied.

NOTE: The accumulator is shown in the inverted position for illustrative purposes.

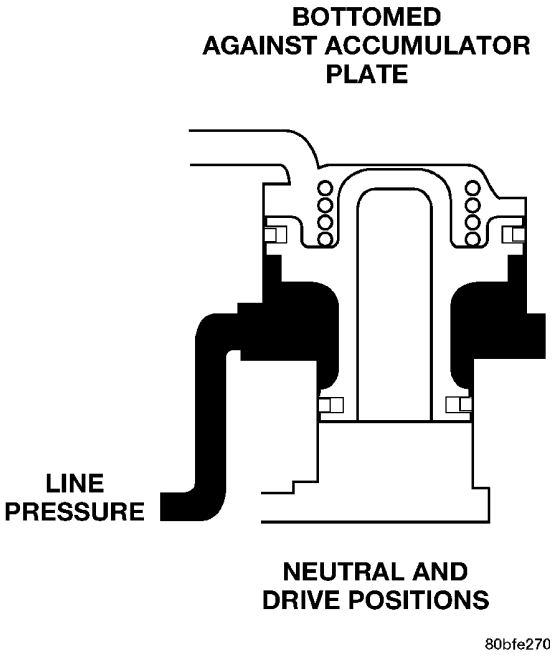


Fig. 86 Accumulator in Neutral and Drive Positions

FINAL DRIVE

ADJUSTMENT - DIFFERENTIAL BEARING

NOTE: Transfer shaft MUST be removed from transaxle to obtain an accurate differential turning torque measurement.

Differential turning torque should be measured and adjusted during any transaxle or differential teardown/assembly, or if any of the following parts are replaced:

- Transaxle case
- Differential carrier
- Differential bearing retainer
- Extension housing
- Differential bearing cups and cones

(1) Position the transaxle assembly vertically on the support stand, differential bearing retainer side up.

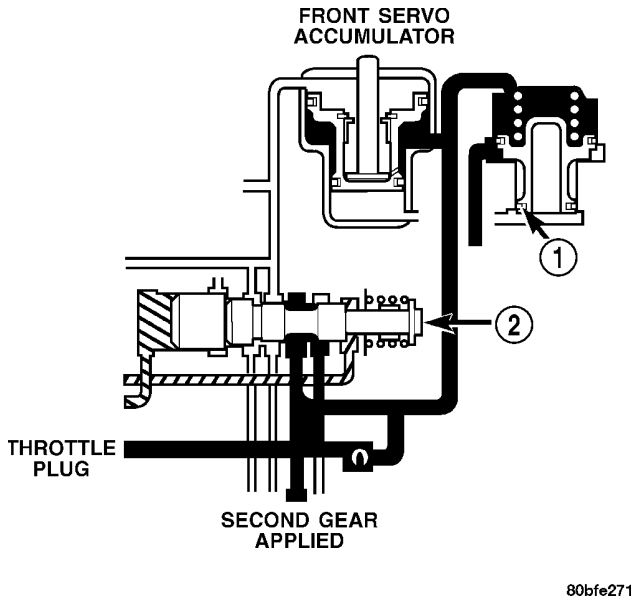


Fig. 87 Accumulator in Second Gear Position

1 - BOTTOM IN BORE
2 - SHUTTLE VALVE

(2) Install Tool L-4436A into the differential and onto the pinion mate shaft (Fig. 88).

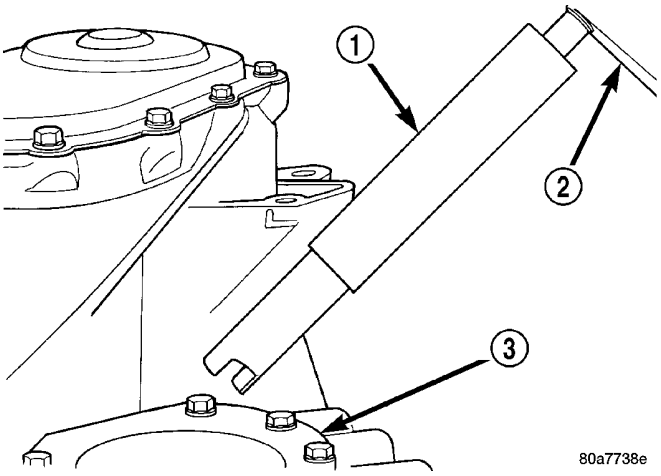


Fig. 88 Tool L-4436 and Torque Wrench

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH
3 - DIFFERENTIAL BEARING RETAINER

(3) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

(4) Using Tool L-4436A and an inch-pound torque wrench, check the turning torque of the differential (Fig. 89). Turning torque should be within 5–18 in. lbs.

FINAL DRIVE (Continued)

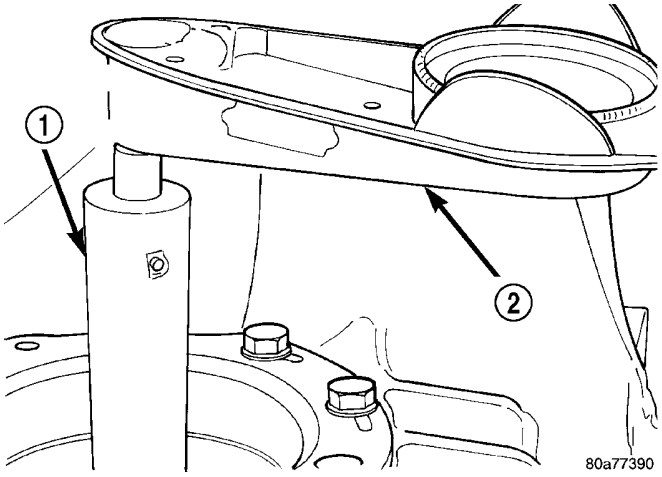


Fig. 89 Checking Differential Bearings Turning Torque

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH

(5) If the turning torque is within specifications, remove tools. Setup is complete.

(6) If turning torque is not within specifications proceed with the following steps to obtain proper shim selection:

(a) Remove differential bearing retainer from the transaxle case.

(b) Remove the bearing cup from the differential bearing retainer using Tool 6062A.

(c) Remove the existing shim from under the cup.

(d) Measure the existing shim.

NOTE: If the turning torque was too high when measured, install a 0.05 mm (0.002 inch) thinner shim. If the turning torque is was too low, install a 0.05 mm (0.002 inch) thicker shim. Repeat until 5 to 18 inch-pounds turning torque is obtained. Refer to the "Differential Bearing Shim Chart." Oil Baffle is not required when making shim selection.

(e) Install the proper shim under the bearing cup. Make sure the oil baffle is installed properly in the bearing retainer, below the bearing shim and cup.

(f) Install the differential bearing cup, shim, and oil baffle using Tool 5052 and C-4171. Seal the retainer to the housing with MOPAR® Silicone Rubber Adhesive Sealant and torque bolts to 28 N·m (250 in. lbs.).

DIFFERENTIAL BEARING SHIM CHART

SHIM THICKNESS	
MM	INCH
.980	0.0386
1.02	0.0402
1.06	0.0418
1.10	0.0434
1.14	0.0449
1.18	0.0465
1.22	0.0481
1.26	0.0497
1.30	0.0512
1.34	0.0528
1.38	0.0544
1.42	0.0560
1.46	0.0575
1.50	0.0591
1.54	0.0607
1.58	0.0623
1.62	0.0638
1.66	0.0654
1.70	0.0670
2.02	0.0796
2.06	0.0812

(7) Using Tool L-4436A and an inch-pound torque wrench, recheck differential turning torque. Turning torque should be within 5–18 in. lbs.

GOVERNOR

DESCRIPTION

The governor assembly is fastened to the transaxle transfer shaft. It consists of a governor body, weight, valve, and shaft.

OPERATION

The governor meters hydraulic pressure, and this metered pressure is used to signal the transmission when it is time for a shift to occur. It does this by balancing governor pressure on one side of a shift valve, and throttle pressure on the other. When governor pressure increases far enough to overcome the throttle pressure on the valve, a shift occurs.

With the gearshift selector in a forward driving range, line pressure flows from the manual valve and down to the governor valve. When the output shaft starts to rotate with vehicle motion, the governor

GOVERNOR (Continued)

weight assembly will start to move outward due to centrifugal force. As the weight is moved outward, it will pull the valve with it until the land of the valve uncovers the line pressure port. As the port begins to become uncovered, governor pressure is metered. As the vehicle's speed continues to increase, the weight assembly will be at a point at which governor pressure is acting on the left side of the reaction area of the valve. This produces sufficient force to compress the spring and allow the outer weight to move out against the outer governor body retaining ring. At a very high speed, the governor valve will be opened as far as possible. In this condition, it is possible for governor pressure to meet, but not to exceed, line pressure. Generally governor pressure ranges from 0-100 psi from idle to maximum speed, and rises proportionally with the increase in output shaft speed. Governor pressure and throttle pressure are acting upon the shift valves to determine when a shift will occur. Governor pressure is a direct indication of road speed, and throttle pressure is an indication of engine load. When both parameters have been met by the throttle and governor pressures, an upshift or downshift will occur.

CLEANING

Thoroughly clean all the governor parts in a suitable cleaning solution but do not use any type of caustic cleaning agents.

The governor weight components and the governor valve, must slide freely in their bores when clean and dry. Minor surface scratches and burrs can be smoothed with crocus cloth.

INSPECTION

The aluminum governor valve and outer weight have a hard coating on them. Check condition of this coating carefully. Do not reuse either part if the coating is damaged.

Inspect the governor weight spring for distortion. Replace the spring, if distorted, collapsed, or broken. Clean the filter in solvent and dry it with compressed air. Replace the filter, if damaged. Inspect the park gear for chipped or worn gear teeth or damaged ring grooves. Replace the gear, if damaged.

Check the teeth on the park gear for wear or damage. Replace the gear if necessary. Inspect the metal seal rings on the park gear hub. Replace the rings only if severely worn, or broken.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 90) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third gear. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the fluid cooler and lines.

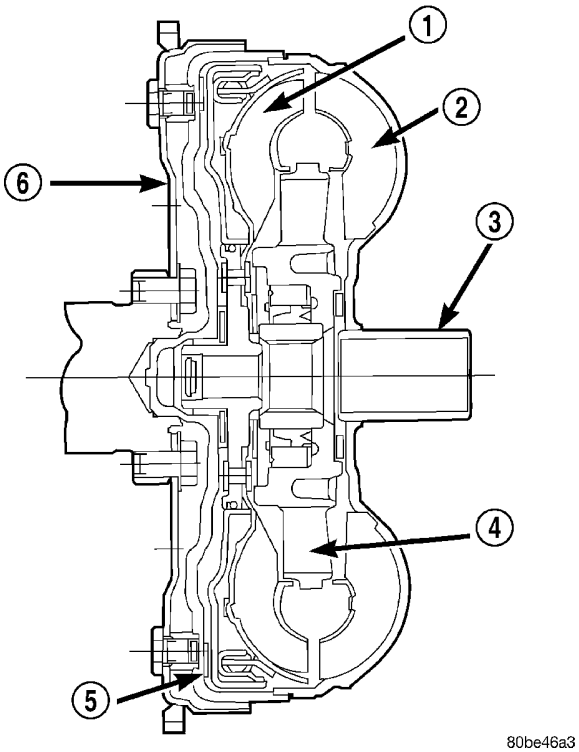


Fig. 90 Torque Converter Assembly

1 - TURBINE
2 - IMPELLER
3 - HUB
4 - STATOR
5 - CONVERTER CLUTCH DISC
6 - DRIVE PLATE

TORQUE CONVERTER (Continued)

IMPELLER

The impeller (Fig. 91) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving member of the system.

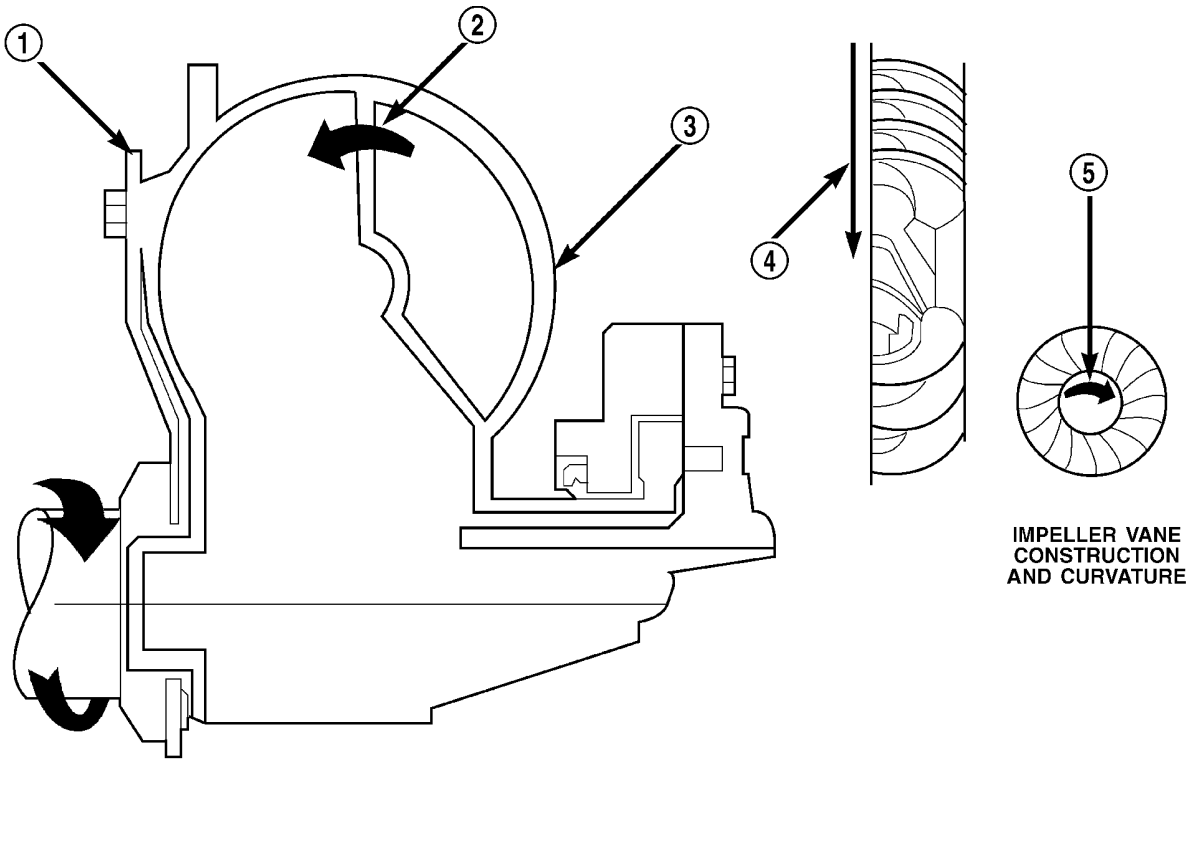


Fig. 91 Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

TORQUE CONVERTER (Continued)

TURBINE

The turbine (Fig. 92) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

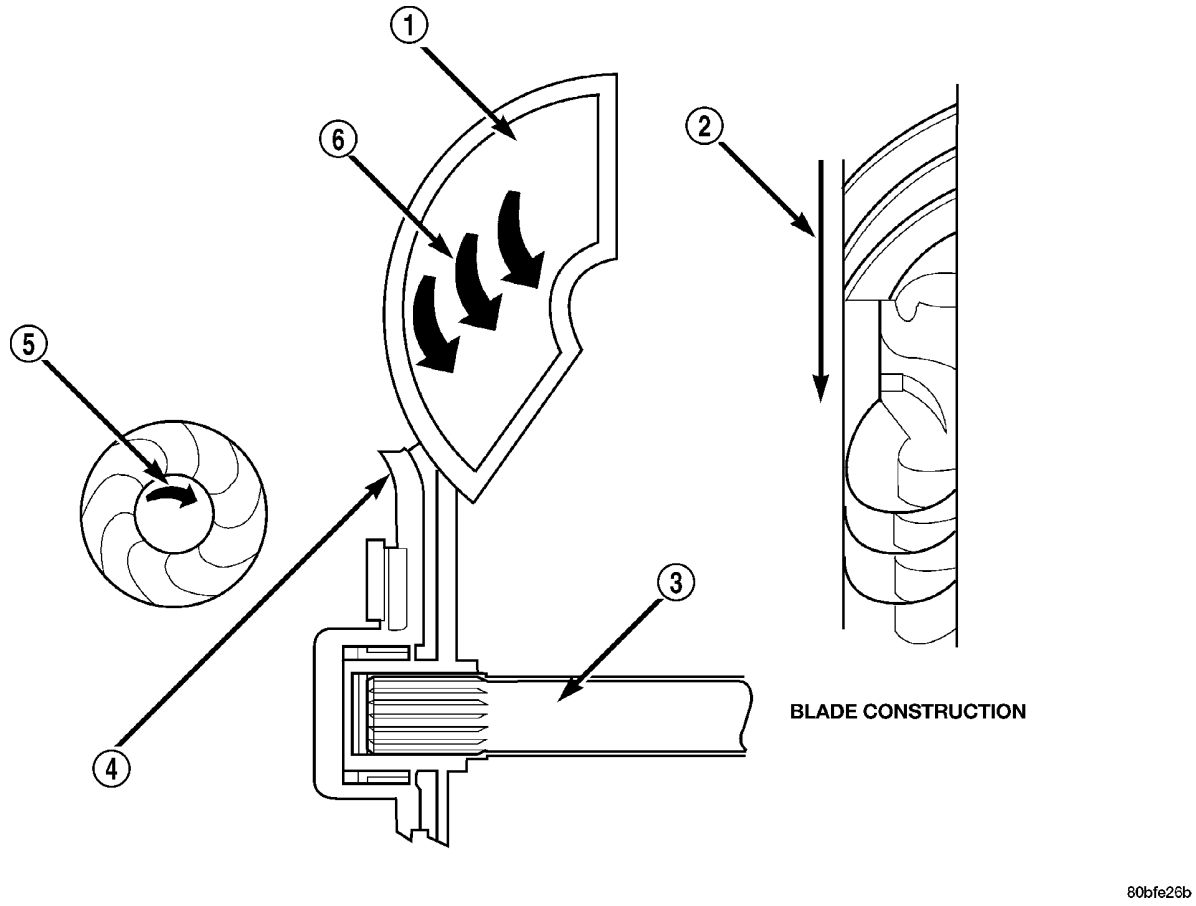


Fig. 92 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

TORQUE CONVERTER (Continued)

STATOR

The stator assembly (Fig. 93) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 94). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

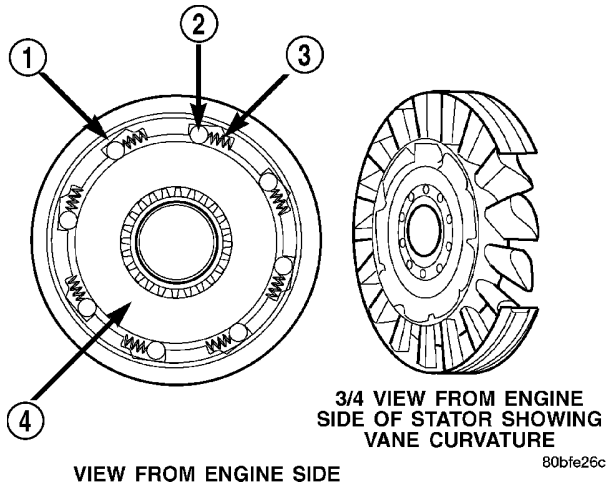


Fig. 93 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 95) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock–free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

OPERATION

The converter impeller (Fig. 96) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

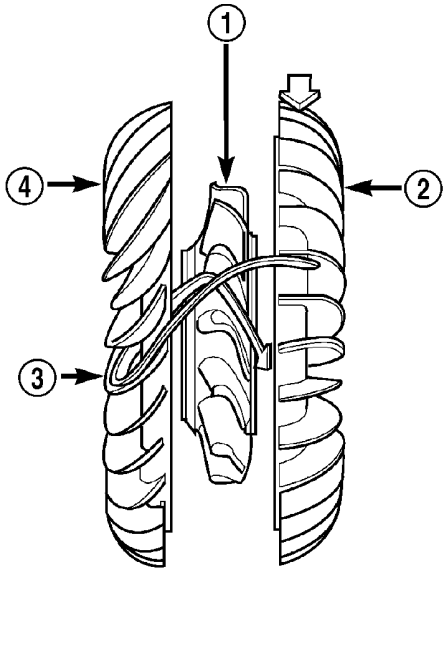


Fig. 94 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

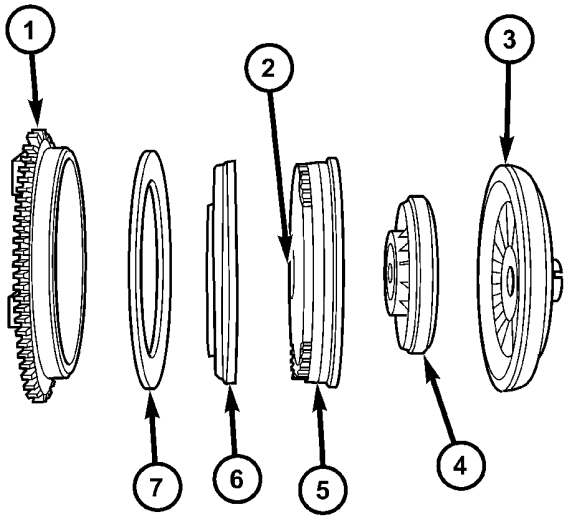


Fig. 95 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

TORQUE CONVERTER (Continued)

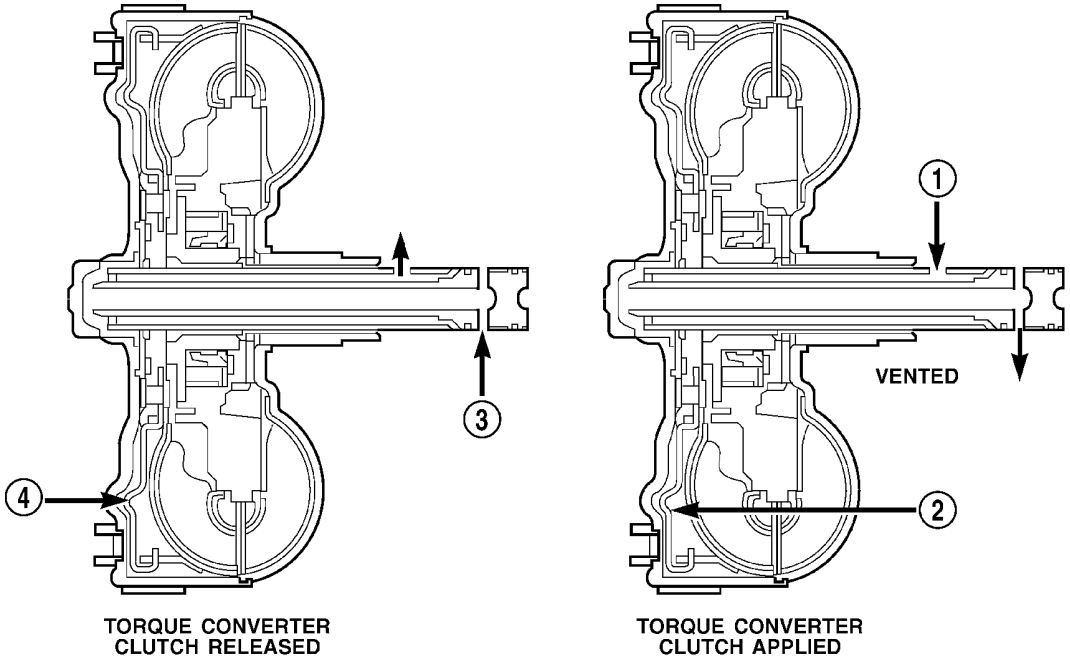


Fig. 96 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 97). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counter-clockwise direction. When this happens the over–running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock–up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

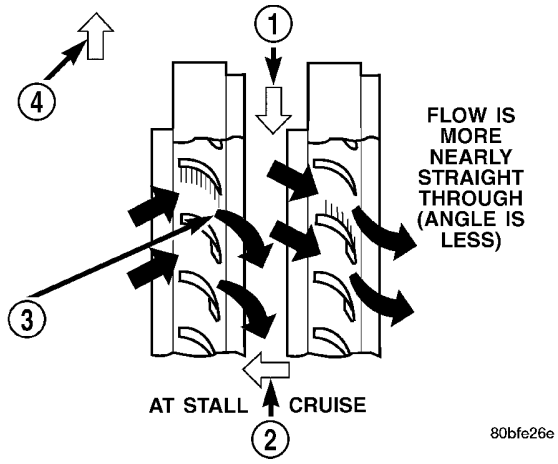


Fig. 97 Stator Operation

1 - DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 - FRONT OF ENGINE
3 - INCREASED ANGLE AS OIL STRIKES VANES
4 - DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

TORQUE CONVERTER (Continued)

TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston to the front cover's friction material, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The engagement and disengagement of the TCC are automatic and controlled by the Powertrain Control Module (PCM). The engagement cannot be activated in the lower gears because it eliminates the torque multiplication effect of the torque converter necessary for acceleration. Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch will engage at approximately 56 km/h (35 mph) with light throttle, after the shift to third gear.

REMOVAL

(1) Remove transmission and torque converter from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH - REMOVAL)

(2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

(3) Align torque converter to oil pump seal opening.

(4) Insert torque converter hub into oil pump.

(5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.

(6) Check converter seating with a scale and straightedge (Fig. 98). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

(8) Install the transmission in the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 31TH - INSTALLATION)

(9) Fill the transmission with the recommended fluid.

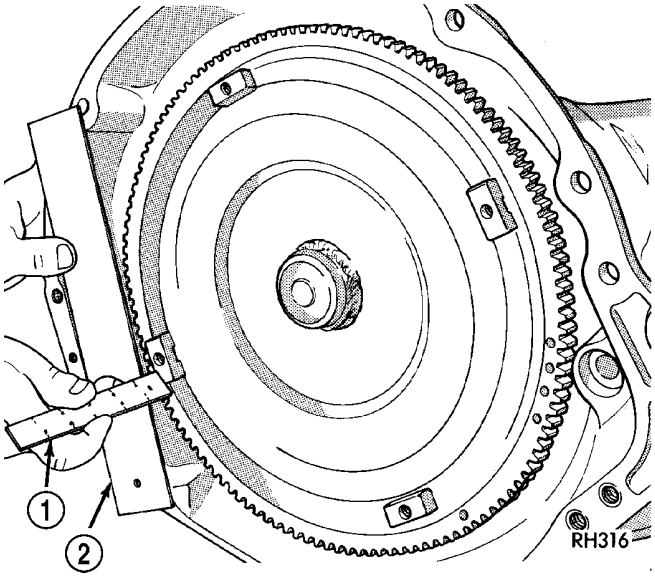


Fig. 98 Checking Torque Converter Seating

1 - SCALE
2 - STRAIGHTEDGE