

2011 AUTOMATIC TRANSMISSION**545RFE - Service Information - Grand Cherokee****DESCRIPTION****DESCRIPTION**

The 545RFE automatic transmission is a sophisticated, multi-range, electronically controlled transmission which combines optimized gear ratios for responsive performance, state of the art efficiency features and low NVH. Other features include driver adaptive shifting and three planetary gear sets to provide wide ratio capability with precise ratio steps for optimum driveability. The three planetary gear sets also make available a unique alternate second gear ratio. The primary 2nd gear ratio fits between 1st and 3rd gears for normal through-gear accelerations. The alternate second gear ratio (2 prime) allows smoother 4-2 kickdowns at high speeds to provide 2nd gear passing performance over a wider highway cruising range.

The hydraulic portion of the transmission consists of the transmission fluid, fluid passages, hydraulic valves, and various line pressure control components.

The primary mechanical components of the transmission consist of the following:

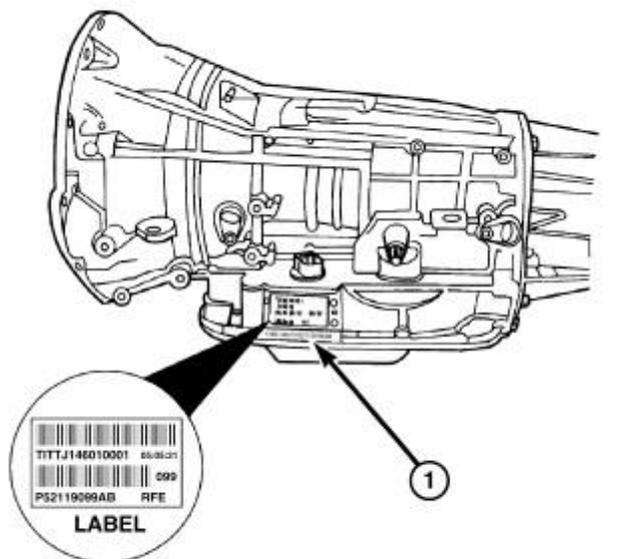
- Three multiple disc input clutches
- Three multiple disc holding clutches
- Five hydraulic accumulators
- Three planetary gear sets
- Dual Stage Hydraulic oil pump
- Valve body
- Solenoid pack

The Transmission Control Module (TCM) is the "heart" or "brain" of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. Depending on the vehicle configuration, the TCM may be a standalone module or it may be housed along with the Powertrain Control Module (PCM) in a single module. With this information, the TCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

TRANSMISSION IDENTIFICATION

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Fig. 1: Trans Identification Number
Courtesy of CHRYSLER LLC

1 - IDENTIFICATION NUMBERS (STAMPED)

Transmission identification numbers are stamped (1) on the left side of the case just above the oil pan sealing surface. Refer to **Fig. 1**. Refer to this information when ordering replacement parts. A label is attached to the transmission case above the stamped numbers. The label gives additional information which may also be necessary for identification purposes.

GEAR RATIOS

The 545RFE gear ratios are:

1st

3.00:1

2nd

1.67:1

2nd Prime

1.50:1

3rd

1.00:1

4th

0.75:1

5th

0.67:1

Reverse

3.00:1

OPERATION**OPERATION**

The 545RFE transmission offers full electronic control of all automatic up and downshifts, and features real-time adaptive closed-loop shift and pressure control. Electronic shift and torque converter clutch controls help protect the transmission from damage due to high temperatures, which can occur under severe operating conditions. By altering shift schedules, line pressure, and converter clutch control, these controls reduce heat generation and increase transmission cooling.

To help reduce efficiency-robbing parasitic losses, the transmissions includes a dual-stage transmission fluid pump with electronic output pressure control. Under most driving conditions, pump output capacity greatly exceeds that which is needed to keep the clutches applied. The 545RFE pump-pressure control system monitors input torque and adjusts the pump pressure accordingly. The primary stage of the pump works continuously; the second stage is bypassed when demand is low. The control system also monitors input and output speed and, if incipient clutch slip is observed, the pressure control solenoid duty cycle is varied, increasing pressure in proportion to demand.

A high-travel torque converter damper assembly allows earlier torque converter clutch engagement to reduce slippage. Needle-type thrust bearings reduce internal friction. The 545RFE is packaged in a one-piece die-cast aluminum case. To reduce NVH, the case has high lateral, vertical and torsional stiffness. It is also designed to maximize the benefit of the structural dust cover that connects the bottom of the bell housing to the engine bedplate, enhancing overall power train stiffness. Dual filters protect the pump and other components. A cooler return filter is added to the customary main sump filter. Independent lubrication and cooler circuits assure ample pressure for normal transmission operation even if the cooler is obstructed or the fluid cannot flow due to extremely low temperatures.

NOTE: Note that vehicles (such as the WK, WH, XK, XH) equipped with ERS (Electronic Range Select) do not provide 2nd gear in limp-in, because the shift lever has no "2" or "1" position.

The hydraulic control system design (without electronic assist) provides the transmission with PARK, REVERSE, NEUTRAL, SECOND, and THIRD gears, based solely on driver shift lever selection. This design

allows the vehicle to be driven (in "limp-in" mode) in the event of a electronic control system failure, or a situation that the Transmission Control Module (TCM) recognizes as potentially damaging to the transmission.

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC's, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the appropriate scan tool.

DIAGNOSIS AND TESTING

AUTOMATIC TRANSMISSION

CAUTION: Before attempting any repair on a RFE automatic transmission, check for Diagnostic Trouble Codes with the scan tool.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary. If the problem persists after the preliminary tests and corrections are completed, hydraulic pressure checks should be performed.

PRELIMINARY

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVABLE

1. Record all DTCs and the accompanying DTC Event Data.
2. Check for an appropriate Technical Service Bulletin that applies to the customer complaint.
3. Check fluid level and condition.
4. Road test and note how transmission upshifts, downshifts, and engages.
5. If the complaint was related to shift quality, perform the Quick Learn and Drive Learn Procedure. Refer to **MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE** . .
6. If the shift complaint still exists, compare actual line pressure (sensor reading, using the scan tool) to the Desired Line Pressure reading, in Park, Drive, and Reverse at 1500 RPM. Check that the LP sensor reads 30 psi (the minimum it should ever display) with key on / engine off.
7. Perform air-pressure test to check clutch operation. Refer to **AIR CHECKING TRANSMISSION**

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CLUTCH OPERATION.

8. Replace the Transmission Solenoid/TRS Assembly and perform the Quick Learn and Drive Learn procedures again. Refer to **MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE**.
9. If the complaint still exists, remove, inspect, and repair the transmission as necessary

VEHICLE IS DISABLED

1. Record all DTCs and the accompanying DTC Event Data.
2. With engine running, place transmission in gear and verify correct PRNDL reading. Observe the Input and Output speeds using the scan tool. If output RPM is greater than zero but vehicle does not move, check for transfer case in Neutral (or failed internally), failed propshaft, or failed / disconnected drive axle. If output RPM is zero and input RPM is greater than zero, internal transmission slippage is indicated. Run clutch slip tests using the scan tool, check oil pan for debris, and air check the various clutch circuits.
3. Shift the transmission into neutral, if both input and output speeds are zero, check flexplate bolts, torque converter, and transmission input shaft.
4. Compare actual line pressure (sensor reading, using the scan tool) to the Desired Line Pressure reading, in Park, Drive, and Reverse at 1500 RPM. Check that the LP sensor reads 30 psi (the minimum it should ever display) with key on / engine off. If line pressure is incorrect, check fluid level and condition.
5. Remove, inspect, and repair the transmission as necessary

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that all diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, overrunning clutch, or line pressure problems.

A slipping clutch can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch Application charts provide a basis for analyzing road test results.

NOTE: Vehicles equipped with ERS will actually display as if the transmission were a six speed (ERS second prime as third, third as fourth, fourth as fifth etc.)

545RFE CLUTCH APPLICATION CHART

SLP	UD	OD	R	2C	4C	L/R	OVERRUNNING
P-PARK						ON	
R-REVERSE			ON			ON	
N-NEUTRAL						ON	

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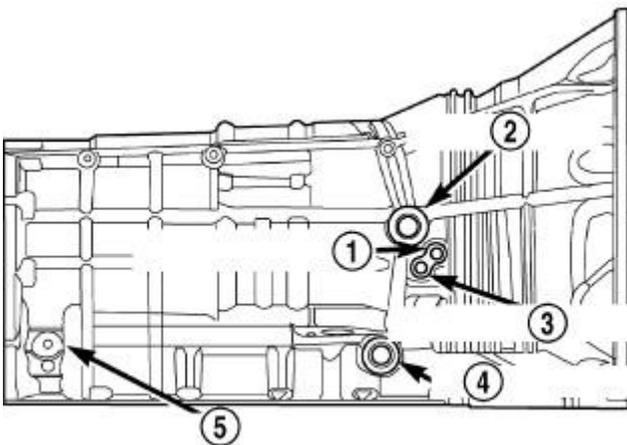
D-FIRST (ERS one)	ON					ON*	ON
D-SECOND (ERS two)	ON			ON			
D-SECOND PRIME (ERS third)	ON				ON		
D-THIRD (ERS fourth)	ON	ON					
D-FOURTH (ERS fifth)		ON			ON		
D-FIFTH (ERS drive)		ON		ON			
D-LIMP-IN	ON	ON					
2-FIRST	ON					ON*	ON
2-SECOND	ON			ON			
2-LIMP-IN	ON			ON			
1-LOW	ON					ON	ON

*L/R clutch is on only with the output shaft speed below 150 rpm.

HYDRAULIC PRESSURE TEST

An accurate tachometer and pressure test gauges are required. Oil Pressure Gauge (special tool #C-3293-SP, Gauge, Pressure 0-300 P.S.I.) has a 300 psi range and is used at all locations where pressures exceed 100 psi.

PRESSURE TEST PORT LOCATIONS



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Fig. 2: Pressure Test Port Locations
Courtesy of CHRYSLER LLC

- | |
|-----------------|
| 1 - TCC RELEASE |
| 2 - TO COOLER |

- | |
|--------------------------|
| 3 - TCC APPLY |
| 4 - FROM COOLER |
| 5 - LINE PRESSURE SENSOR |

Only two pressure ports are supplied on the transmission case. The torque converter clutch apply (3) and release (1) ports are located on the right side of the transmission case. Refer to **Fig. 2**.

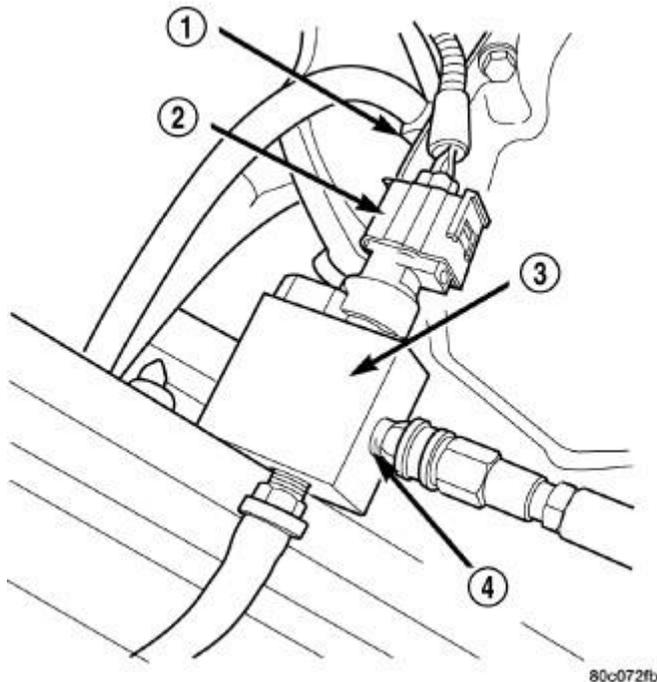


Fig. 3: Identifying Torque Converter Clutch Apply And Release Ports
 Courtesy of CHRYSLER LLC

- | |
|-------------------------------|
| 1 - LINE PRESSURE SENSOR PORT |
| 2 - LINE PRESSURE SENSOR |
| 3 - TOOL 8259 |
| 4 - PRESSURE TAP |

To determine the line pressure, there are two available methods. The scan tool can be used to read line pressure from the line pressure sensor. The second method is to install Line Pressure Adapter (special tool #8259, Adapter, Pressure Test) (3) into the transmission case and then install the pressure gauge and the original sensor (2) into the adapter. Refer to **Fig. 3**. This will allow a comparison of the scan tool readings and the gauge reading to determine the accuracy of the line pressure sensor. The scan tool line pressure reading should match the gauge reading within ± 10 psi.

TEST PROCEDURE

All pressure readings should be taken with the transmission fluid level full, transmission oil at the normal operating temperature, and the engine at 1500 rpm. Check the transmission for proper operation in each gear position that is in question or if a specific element is in question, check the pressure readings in at least two gear

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positions that employ that element. Refer to **HYDRAULIC SCHEMATICS** to determine the correct pressures for each element in a given gear position.

NOTE: The 545RFE utilizes closed loop control of pump line pressure. The pressure readings may therefore vary greatly but should always follow line pressure.

Some common pressures that can be measured to evaluate pump and clutch performance are the upshift/downshift pressures, garage shift pressures, and TCC pressure. The upshift/downshift pressure for all shifts are shown in **UPSHIFT PRESSURES** and **DOWNSHIFT PRESSURES**. In-gear maximum pressure for each gear position is shown in **IN-GEAR PRESSURES**. The garage shift pressure when performing a N-R shift is 220 psi for 4.7L equipped vehicles and 250 psi for 5.7L equipped vehicles. The garage shift pressure for the R-N shift is 120 psi. The garage shift pressure for the N-1 shift is 135 psi for 4.7L equipped vehicles and 165 psi for 5.7L equipped vehicles. Torque converter lock-up pressure is 120 psi for 4.7L equipped vehicles and 125 psi for 5.7L equipped vehicles.

UPSHIFT PRESSURES

ENGINE	1-2	2-3	2prime-3	3-4	2prime-4	2-5	3-5	4-5
5.7L	150	125	125	135	135	135	135	135
4.7L	120	120	120	120	120	120	120	130

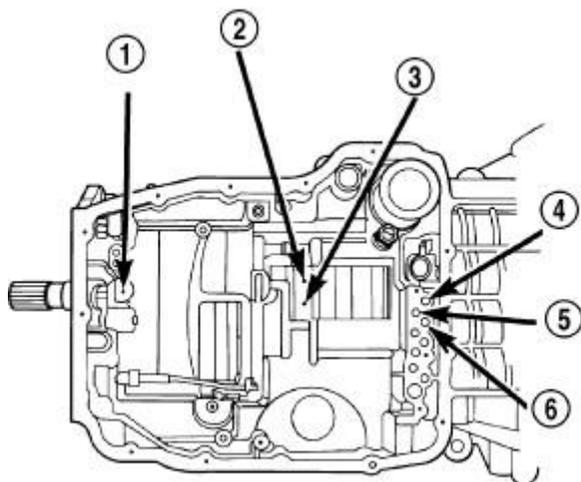
DOWNSHIFT PRESSURES

ENGINE	5-4	5-3	5-2	4-3	4-2prime	3-2	3-2prime	2prime-1	2-1	3-1
5.7L	135	135	135	135	135	135	135	135	135	135
4.7L	120	120	120	120	120	120	120	120	120	120

IN-GEAR PRESSURES

ENGINE	1	2	2prime	3	4	5	NEUTRAL	REVERSE
5.7L	160	135	135	135	135	135	120	250
4.7L	135	120	120	120	120	120	120	220

AIR CHECKING TRANSMISSION CLUTCH OPERATION



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Fig. 4: Identifying Air Pressure Test Passages
 Courtesy of CHRYSLER LLC

1 - LOW REVERSE CLUTCH
2 - 4TH CLUTCH
3 - 2ND CLUTCH
4 - OVERDRIVE CLUTCH
5 - UNDERDRIVE CLUTCH
6 - REVERSE CLUTCH

Air-pressure testing can be used to check transmission clutch operation. The test can be conducted with the transmission either in the vehicle or on the work bench, as a final check.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission. The clutch apply passages are shown in the Air Pressure Test Passages graphic. Refer to **Fig. 4**.

NOTE: The air supply which is used must be free of moisture and dirt. Use a pressure of 30 psi to test clutch operation.

Apply air pressure at each port. If the clutch is functioning, a soft thump will be heard as the clutch is applied. The clutch application can also be felt by touching the appropriate element while applying air pressure. As the air pressure is released, the clutch should also release.

CONVERTER HOUSING FLUID LEAK

When diagnosing converter housing fluid leaks, two conditions must be established before repair.

1. Verify that a leak condition actually exists.
2. Determined the true source of the leak.

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair. Torque converter seal leaks tend to move along the drive hub and onto the rear of the converter. Pump cover seal leaks tend to run down the cover and the inside surface of the bellhousing.

Some leaks, or suspected leaks, may be particularly difficult to locate. If necessary, a Mopar® approved dye should be used to locate and confirm a leak.

TORQUE CONVERTER LEAK POINTS

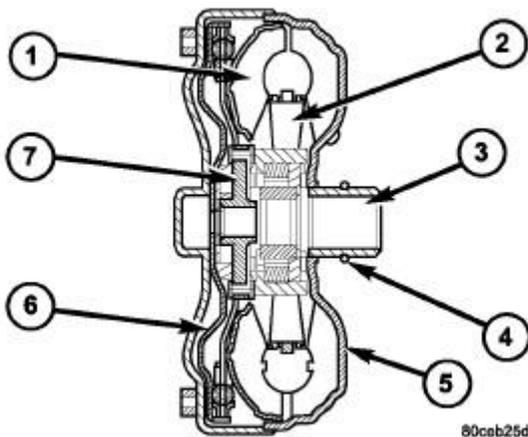


Fig. 5: Torque Converter Assembly
 Courtesy of CHRYSLER LLC

1 - TURBINE ASSEMBLY	5 - IMPELLER ASSEMBLY
2 - STATOR	6 - CONVERTER CLUTCH PISTON
3 - CONVERTER HUB	7 - TURBINE HUB
4 - O-RING	

Possible sources of converter leaks are:

1. Leaks at the weld joint around the outside diameter weld. Refer to **Fig. 5**.
2. Leaks at the converter hub weld. Refer to **Fig. 5**.

In most cases, a torque converter which is wet from transmission fluid indicates a leak at one of these areas.

STANDARD PROCEDURE

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-

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Coils™, or equivalent. This repair consists of drilling out the worn-out damaged threads. Then tap the hole with a special Heli-Coil™ tap, or equivalent, and installing a Heli-Coil™ insert, or equivalent, into the hole. This brings the hole back to its original thread size.

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

SPECIFICATIONS

SPECIFICATIONS

GENERAL

Component	mm	in.
Output Shaft End Play	0.22-0.55	0.009-0.021
Input Shaft End Play	0.46-0.89	0.018-0.035.
2C Clutch Pack Clearance	0.455-1.335	0.018-0.053.
4C Clutch Pack Clearance	0.770-1.390	0.030-0.055
L/R Clutch Pack Clearance	1.00-1.74	0.039-0.069
OD Clutch Pack Clearance	1.103-1.856	0.043-0.073
UD Clutch Pack Clearance	0.84-1.54	0.033-0.061
Reverse Clutch Pack Clearance	0.81-1.24	0.032-0.049
Recommended fluid	Mopar® ATF +4	

GEAR RATIOS

Gear	Gear Ratio
1ST	3.00:1
2ND	1.67:1
2ND PRIME	1.50:1
3RD	1.00:1
4TH	0.75:1
5TH	0.67:1
REVERSE	3.00:1

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Nut, Output Shaft Flange (2WD Models equipped with flange)	149	110	-
Fitting, cooler line at trans	17.5	-	155
Bolt, torque converter housing to engine upper four	41	30	-
Bolt, torque converter housing to engine lower	54	40	-

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four			
Bolts, transmission collar	68	50	-
Bolt, torque converter to driveplate	31	23	270
For rear mount specifications, refer to appropriate TORQUE SPECIFICATIONS in appropriate Engine Service Information article .			
Bolt, driveplate to crankshaft	75	55	-
Bolt, converter housing	68	50	-
Bolt, oil pan	12	-	105
Screw, primary fluid filter	4.5	-	40
Nuts, transfer case	35	26	-
Oil Filter, Cooler Return	9.5		84
Bolt, oil pump	28	-	250
Bolt, oil pump body to cover	4.5	-	40
Screw, plate to oil pump body	4.5	-	40
Bolt, valve body to case	12	-	105
Plug, pressure test port	5	-	45
Bolt, reaction shaft support	12	-	105
Screw, valve body to transfer plate	5.5	-	50
Screw, solenoid module to transfer plate	6	-	50
Screw, accumulator cover	7	-	60
Screw, detent spring	4.5	-	40
Bolt, input speed sensor	12	-	105
Bolt, output speed sensor	12	-	105
Bolt, line pressure sensor	12	-	105
Bolt, extension housing	54	40	-
Screw, manual valve cam retaining	4.5	-	40
Screw, manual selector shaft retaining	28	-	250
Cross-bolt, manual selector shaft	16	-	140

SCHEMATICS AND DIAGRAMS

HYDRAULIC SCHEMATICS

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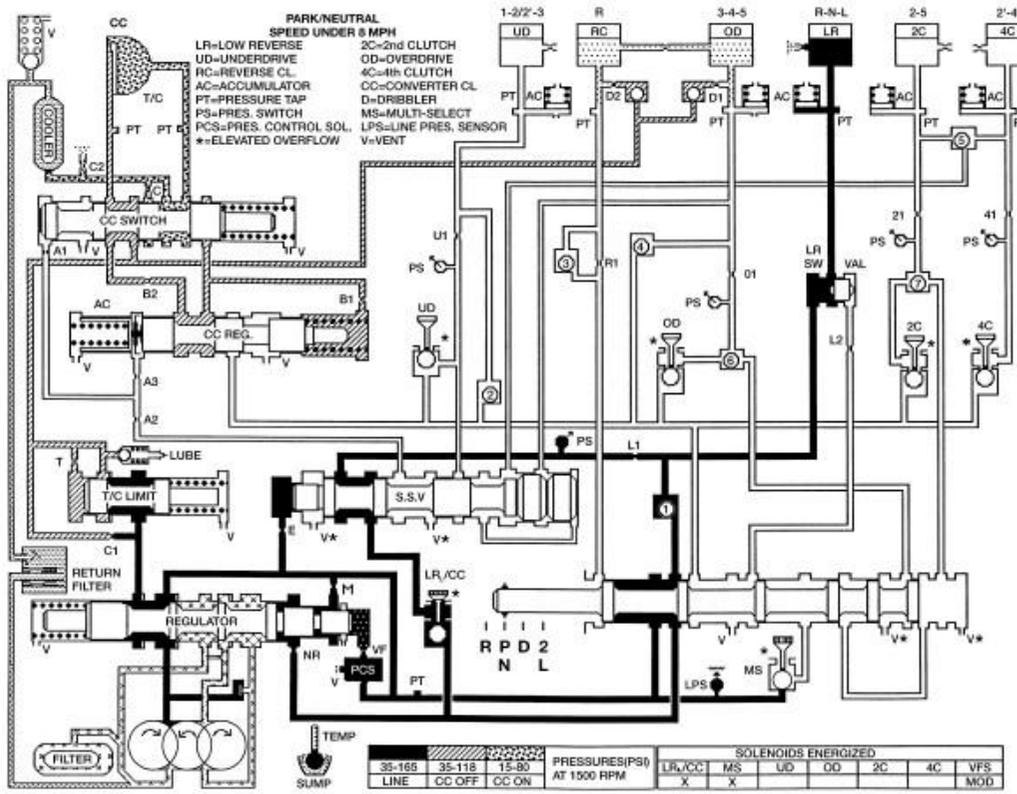


Fig. 6: Hydraulic Flow In Park/Neutral
 Courtesy of CHRYSLER LLC

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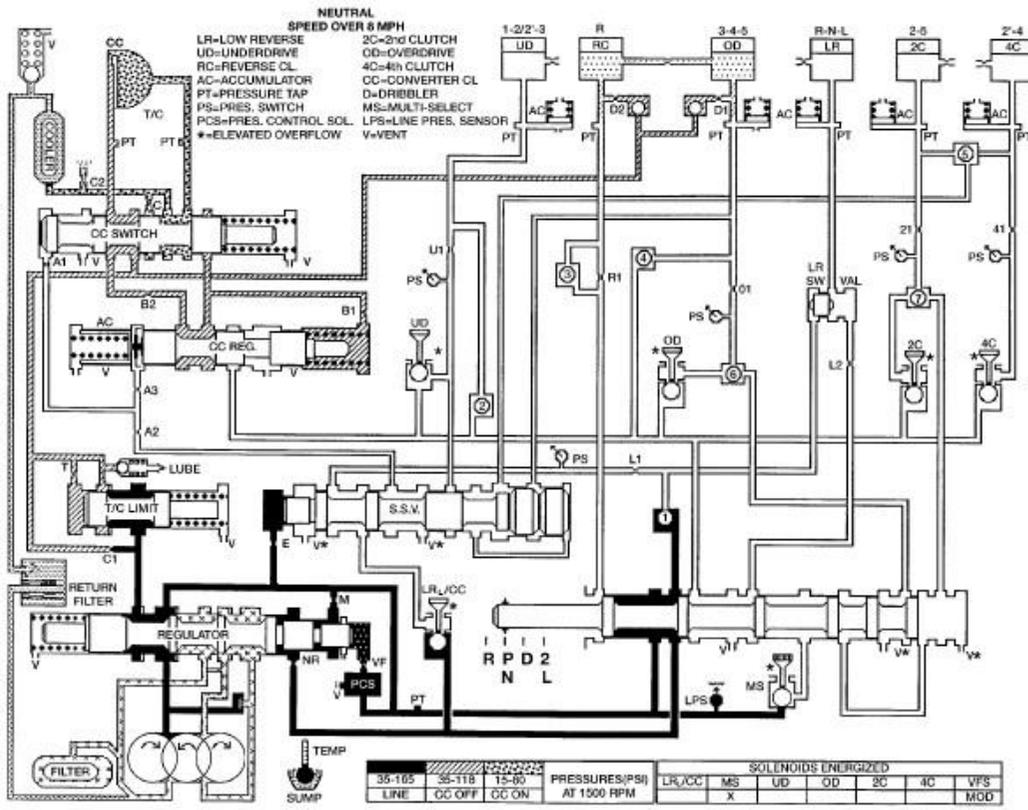


Fig. 7: Hydraulic Flow In Neutral Over 8mph
 Courtesy of CHRYSLER LLC

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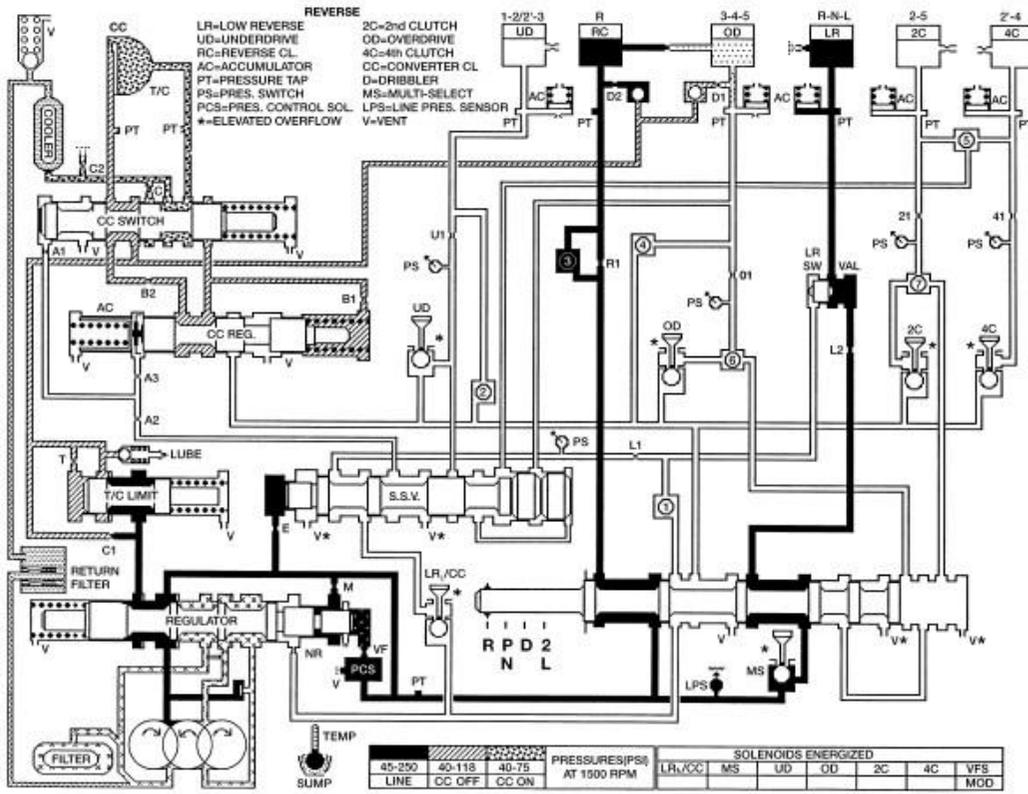


Fig. 8: Hydraulic Flow In Reverse
 Courtesy of CHRYSLER LLC

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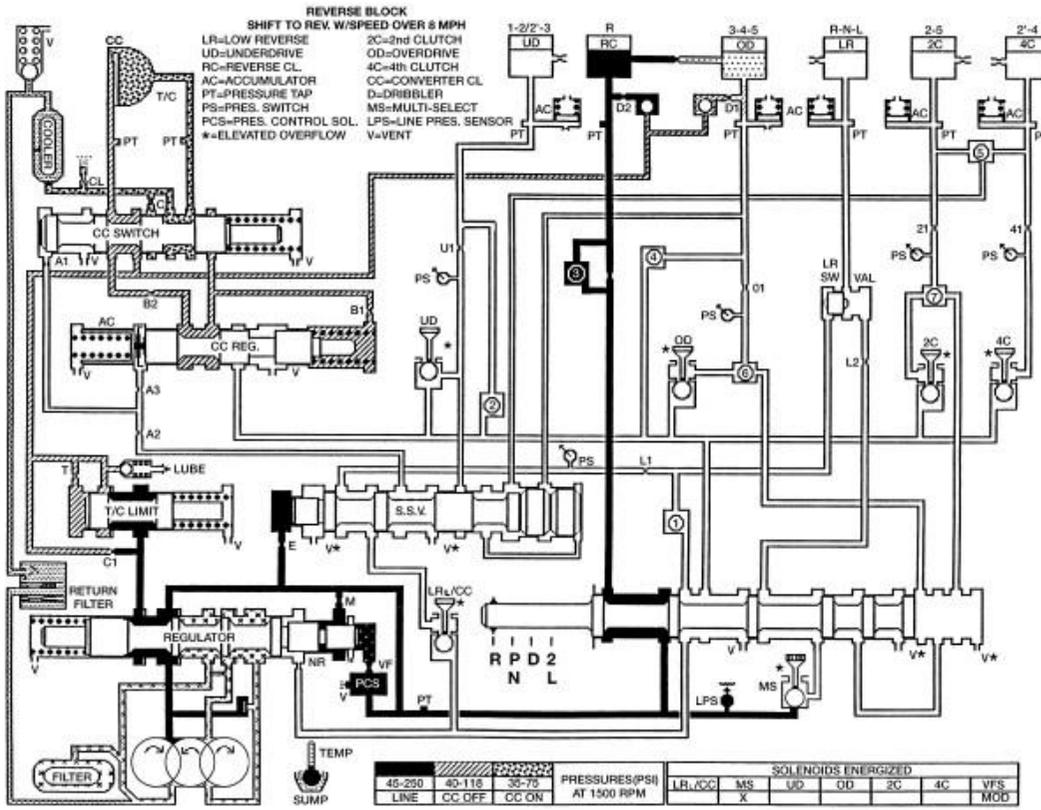
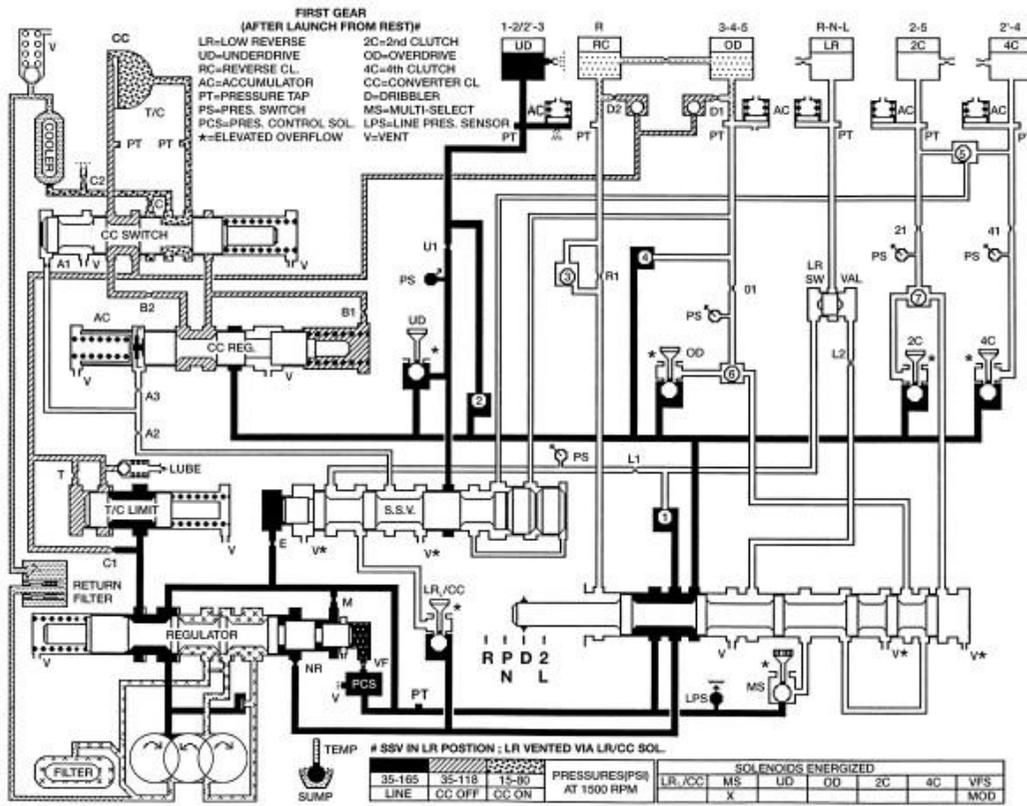


Fig. 9: Hydraulic Flow In Reverse Block
Courtesy of CHRYSLER LLC

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Fig. 11: Hydraulic Flow In First Gear (After Launch From Rest)
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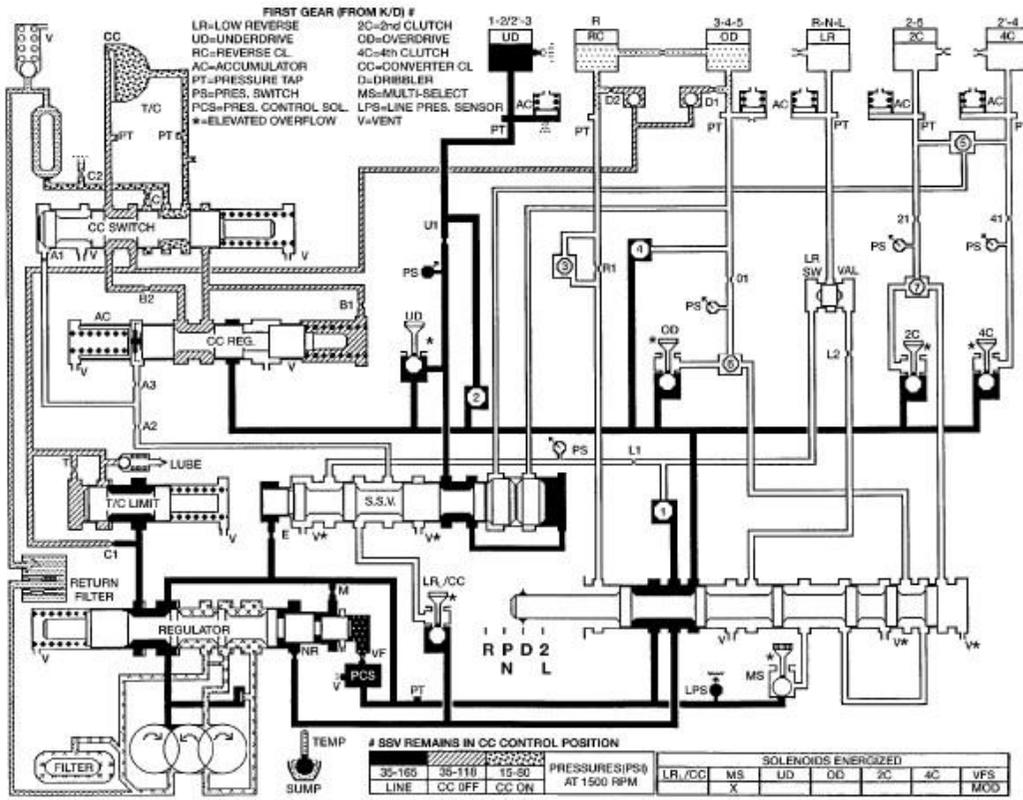


Fig. 12: Hydraulic Flow In First Gear (From K/D)
 Courtesy of CHRYSLER LLC

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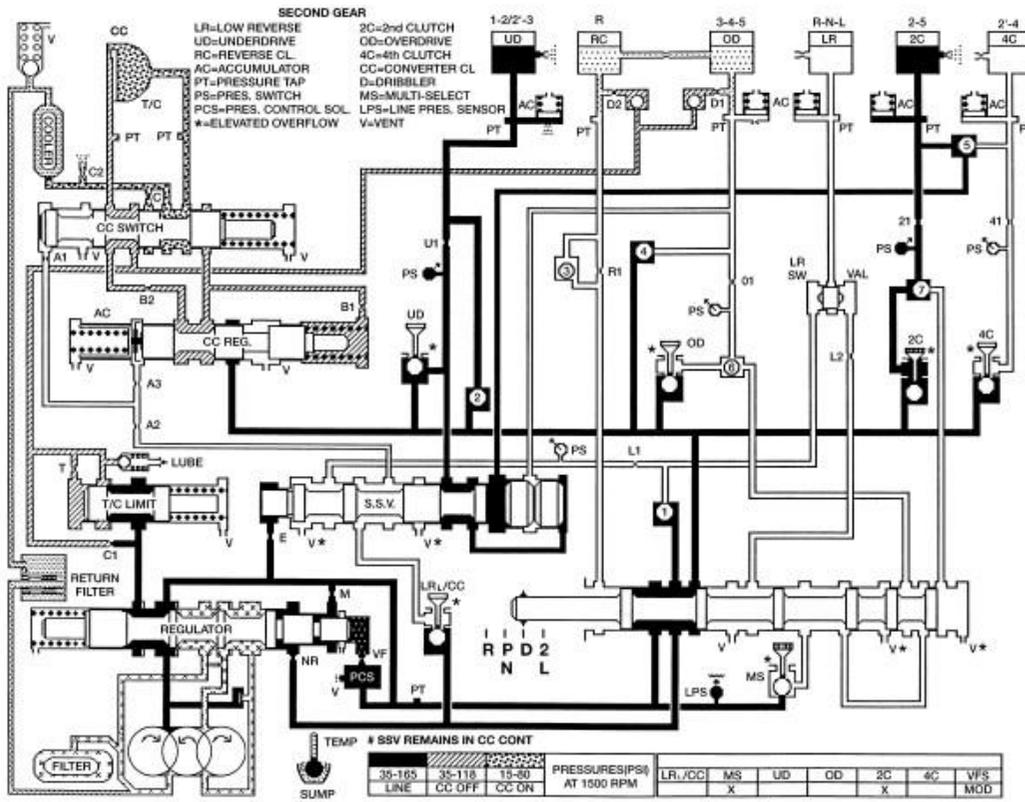


Fig. 13: Hydraulic Flow In Second Gear
 Courtesy of CHRYSLER LLC

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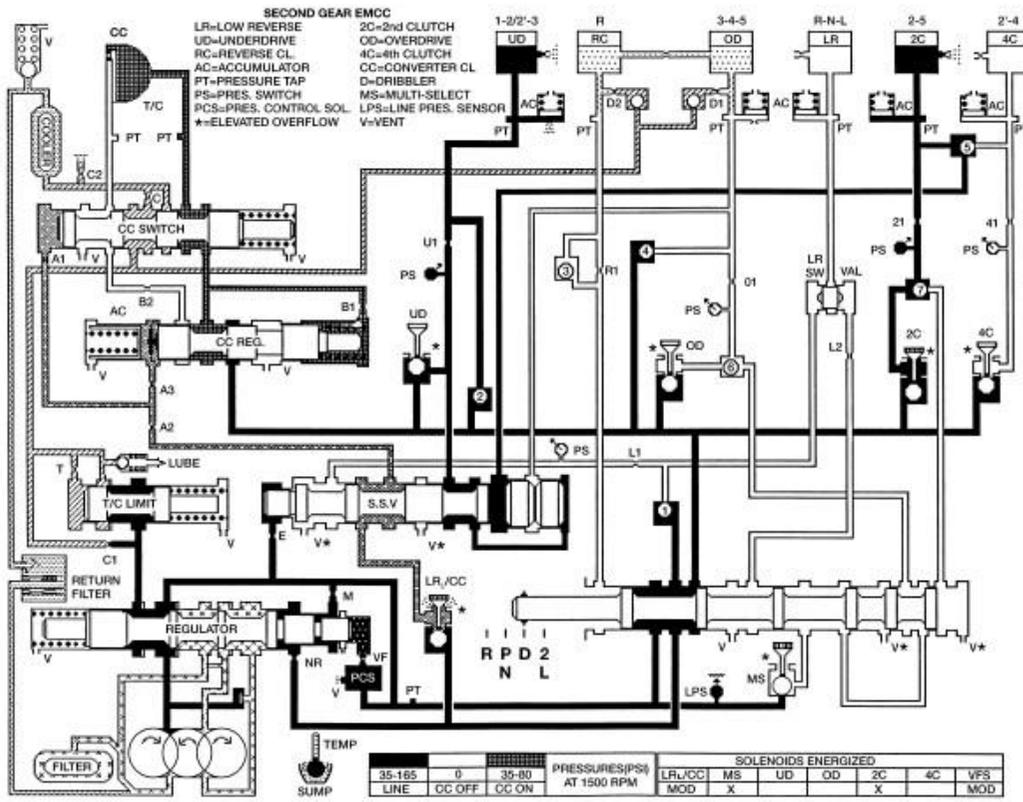
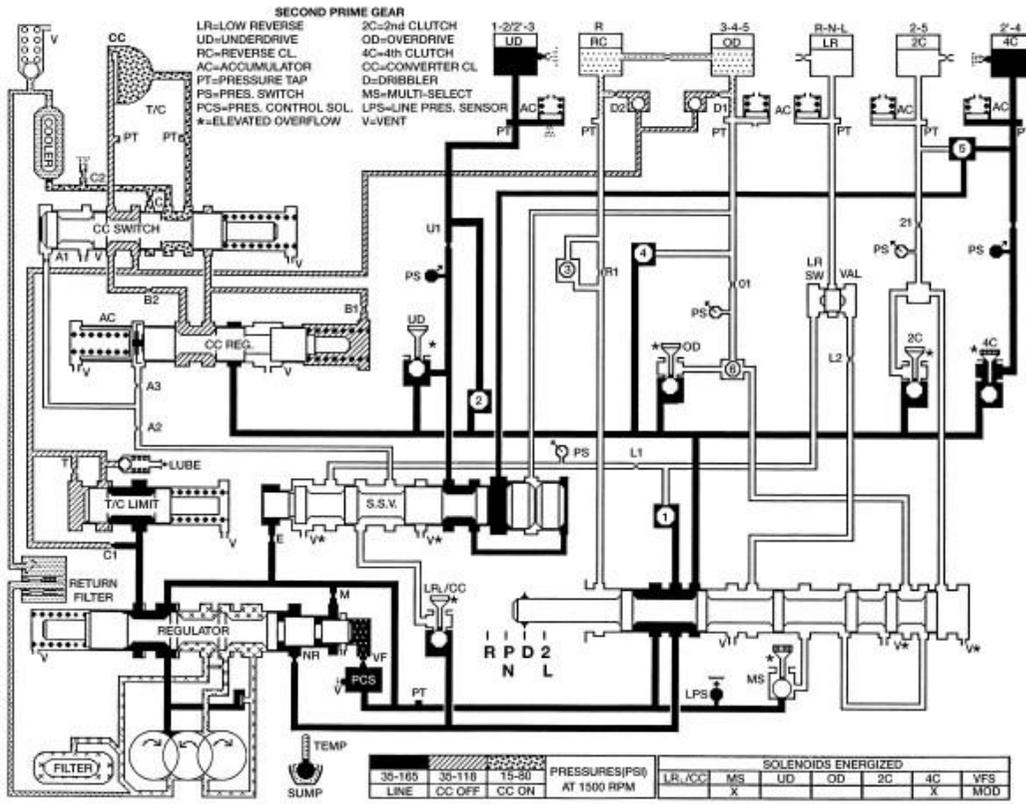


Fig. 14: Hydraulic Flow In Second Gear EMCC
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Fig. 15: Hydraulic Flow In Second Prime Gear
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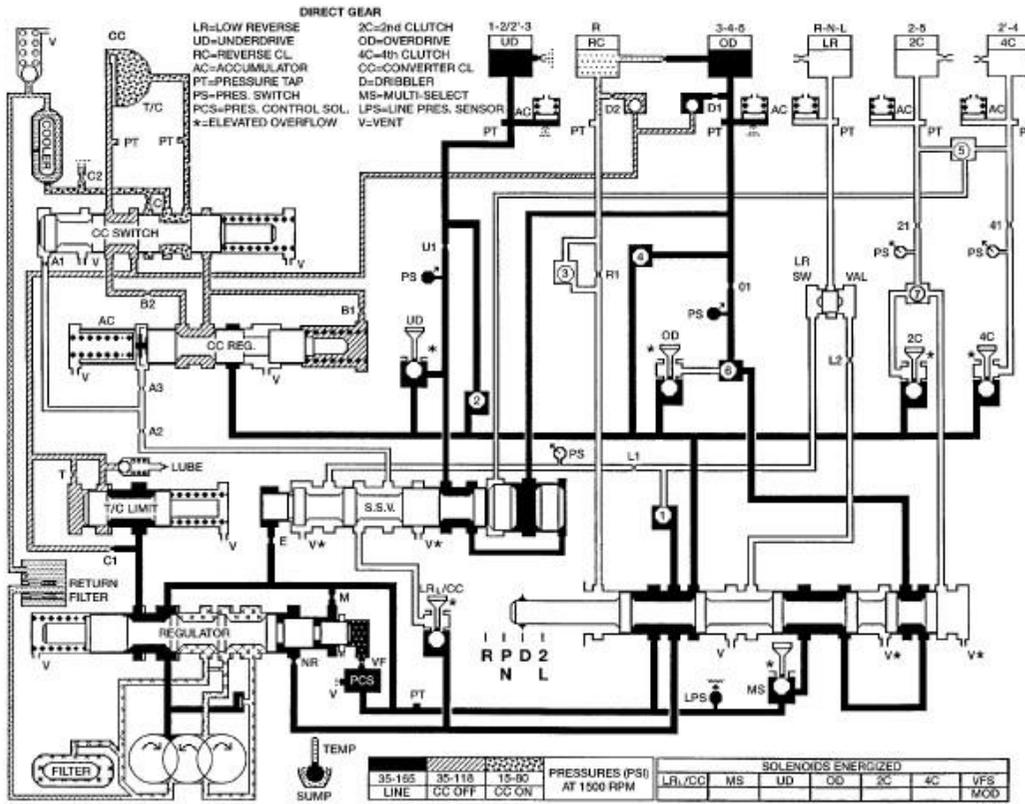


Fig. 17: Hydraulic Flow In Direct Gear
Courtesy of CHRYSLER LLC

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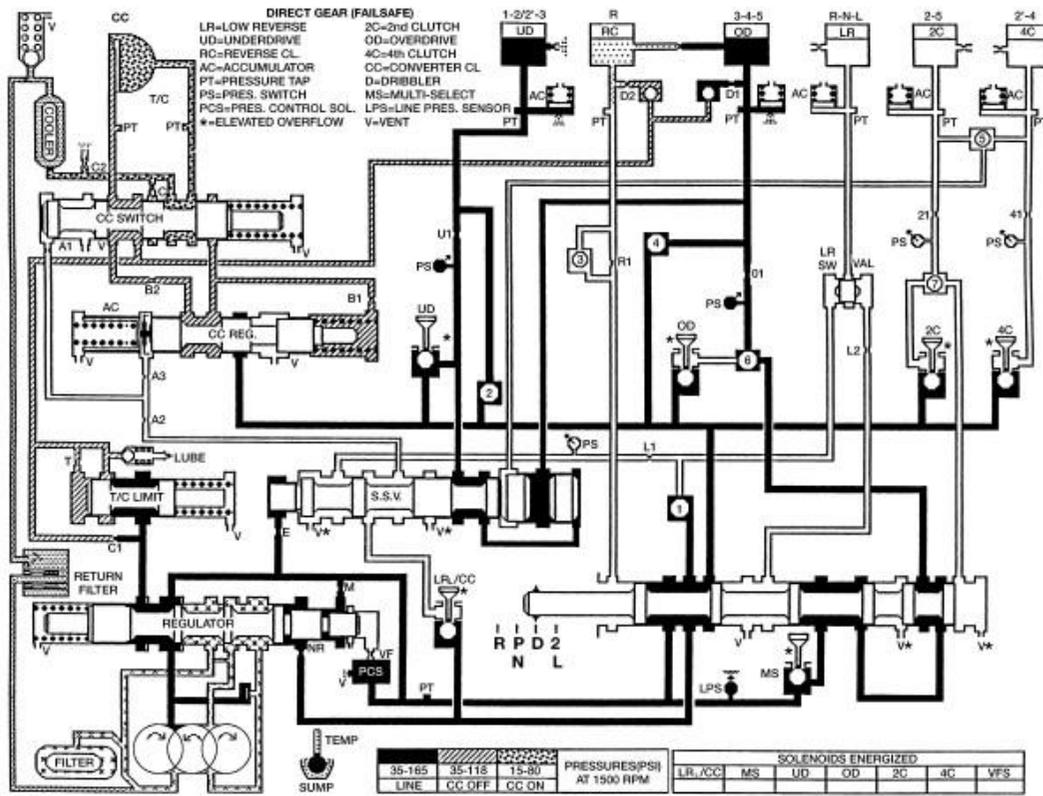


Fig. 18: Hydraulic Flow In Direct Gear (Failsafe)
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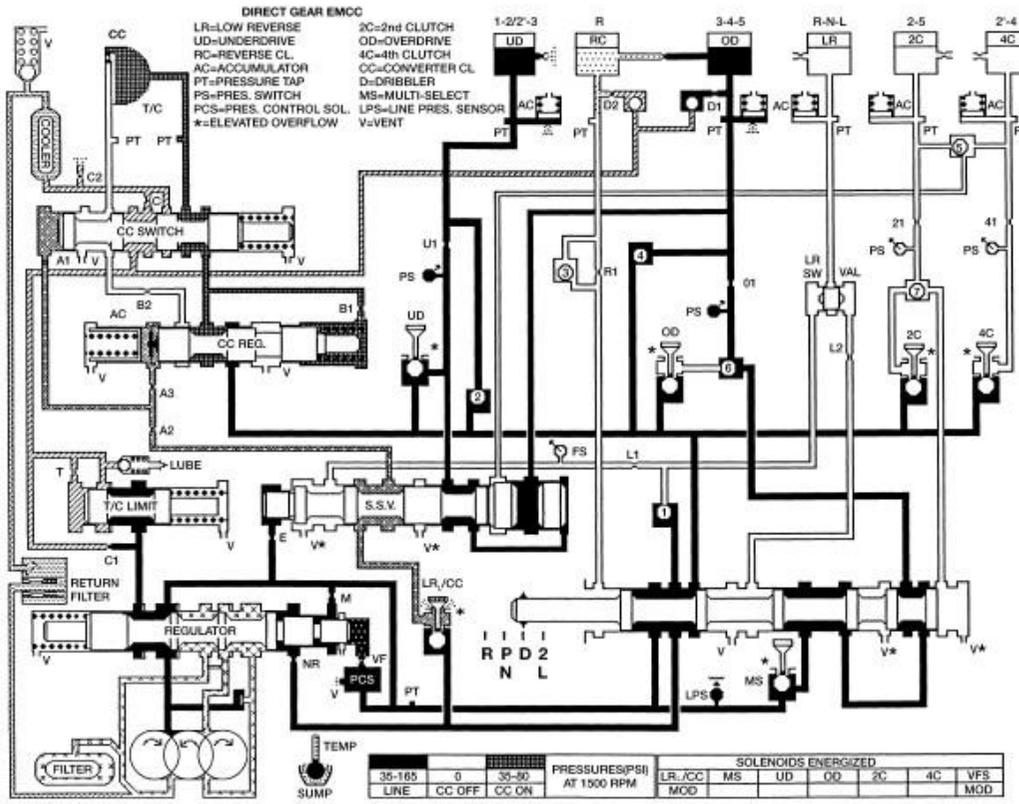


Fig. 19: Hydraulic Flow In Direct Gear EMCC
 Courtesy of CHRYSLER LLC

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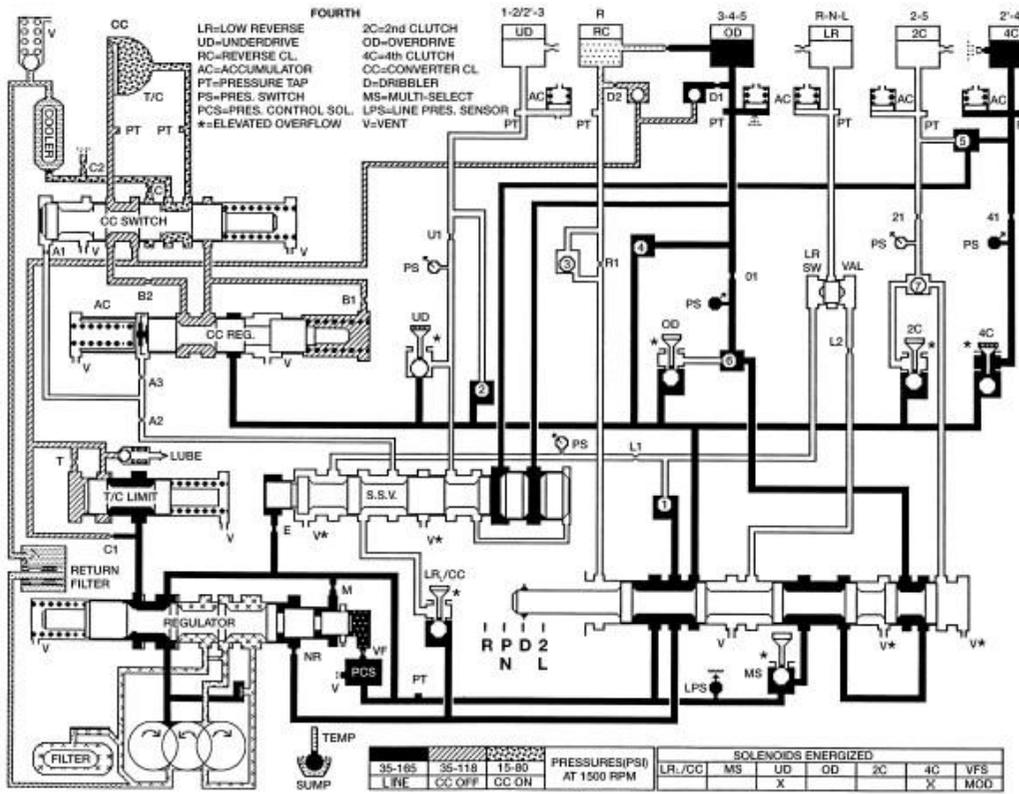


Fig. 20: Hydraulic Flow In Fourth
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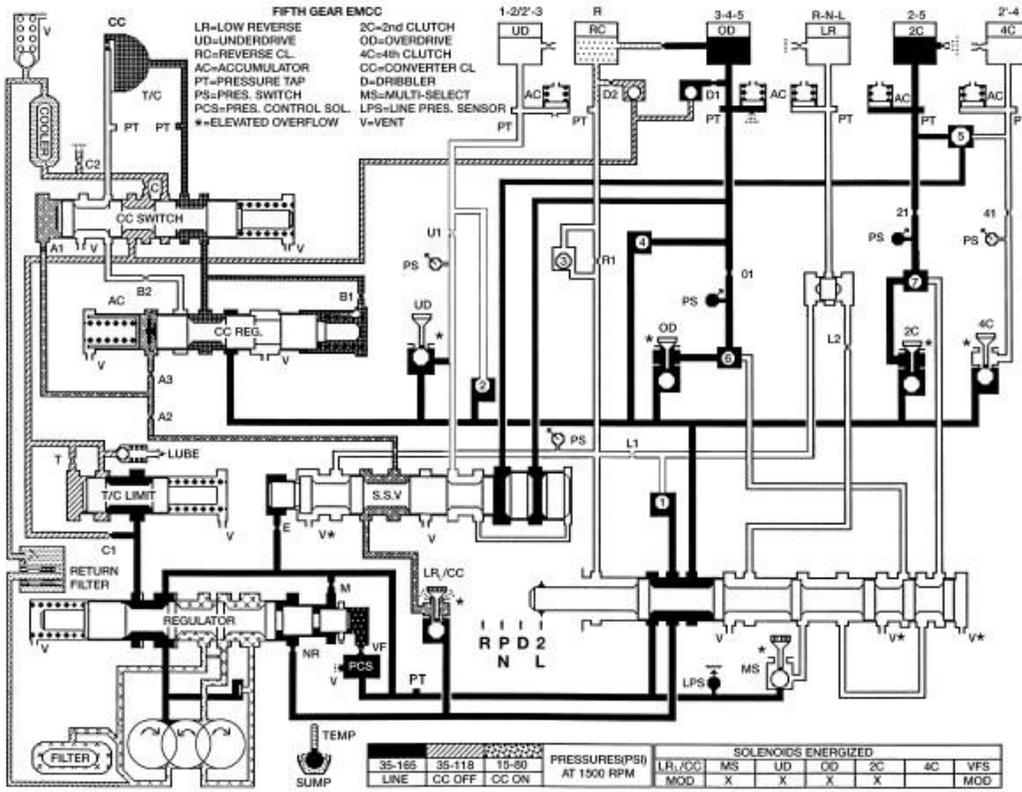
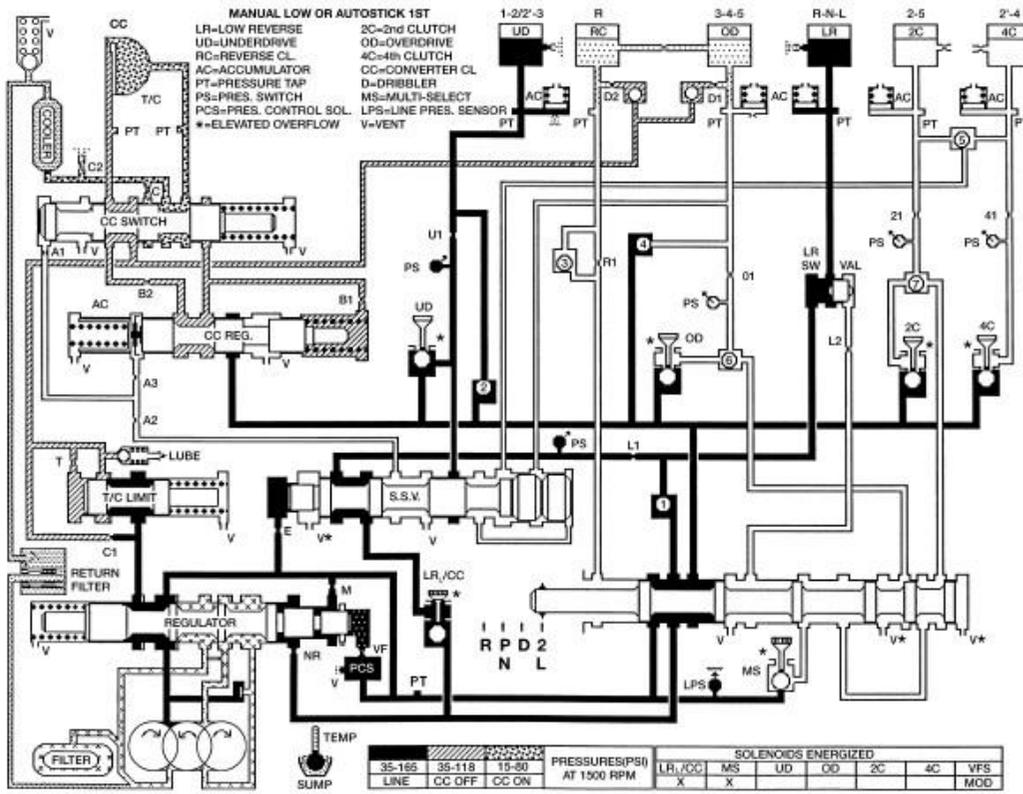


Fig. 23: Hydraulic Flow In Fifth EMCC
 Courtesy of CHRYSLER LLC

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Fig. 24: Hydraulic Flow In Manual Low Or Autostick 1st
 Courtesy of CHRYSLER LLC

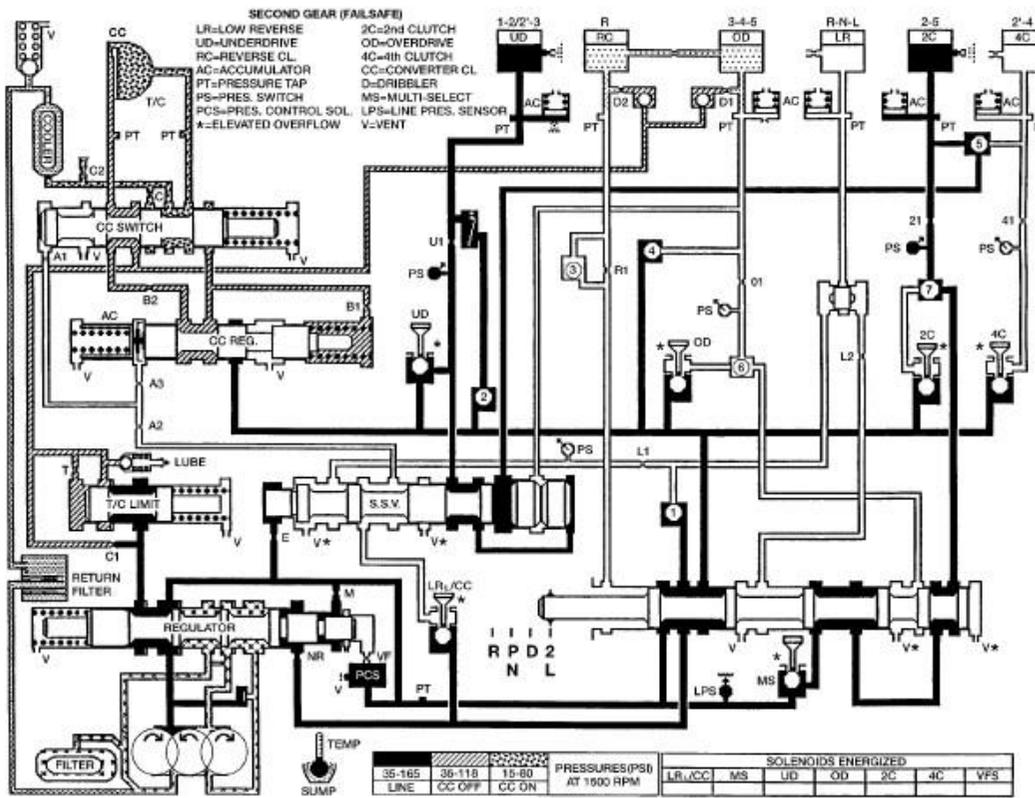


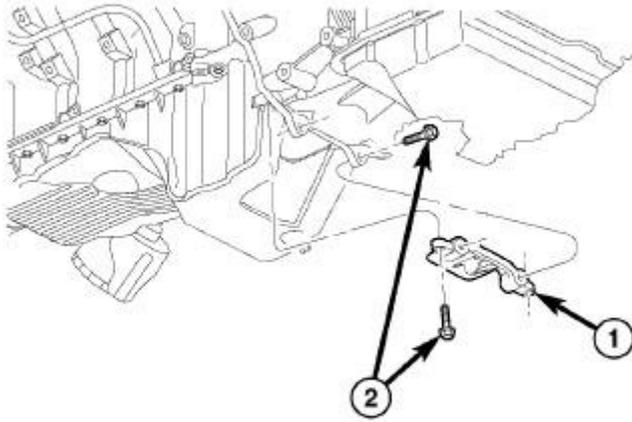
Fig. 26: Hydraulic Flow In Manual Second (Failsafe)

Courtesy of CHRYSLER LLC

REMOVAL

REMOVAL

CAUTION: The transmission and torque converter must be removed as an assembly to avoid component damage. The converter driveplate, oil pump, or oil seal can be damaged if the converter is left attached to the driveplate during removal. Be sure to remove the transmission and converter as an assembly.



815006aa

Fig. 27: Structural Dust Cover
Courtesy of CHRYSLER LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle
3. Remove the rear propeller shaft. Refer to **SHAFT, DRIVE, REAR, REMOVAL** .
4. Remove the front propeller shaft. Refer to **SHAFT, DRIVE, FRONT, REMOVAL** .
5. Remove the engine to transmission structural cover (1), 5.7L shown in illustration. Refer to **COVER, STRUCTURAL DUST, REMOVAL, 5.7L** .

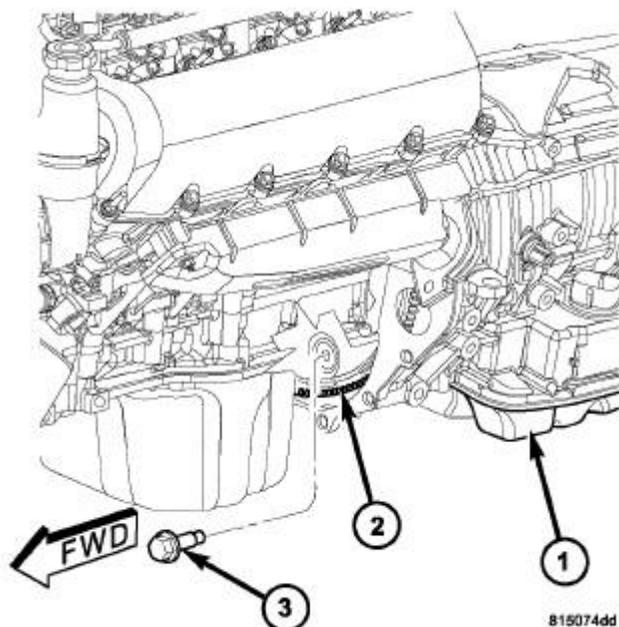


Fig. 28: Transmission, Driveplate & Torque Converter Bolts
Courtesy of CHRYSLER LLC

6. Remove the torque converter bolts (3).

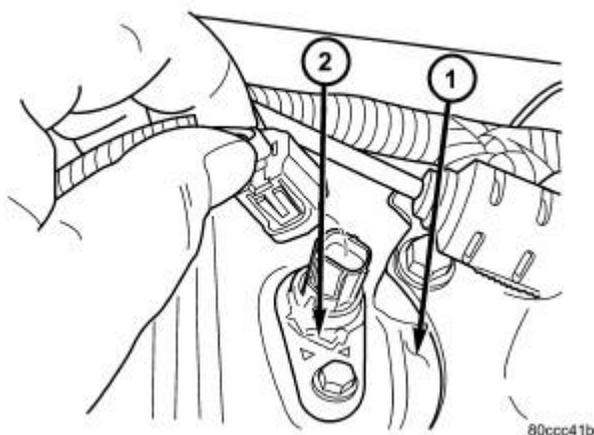


Fig. 29: Locating Input Speed Sensor
Courtesy of CHRYSLER LLC

7. Remove the exhaust support bracket from the rear of the transmission.
8. Disconnect and lower or remove any necessary exhaust components.
9. Remove the starter motor.
10. Rotate crankshaft in clockwise direction until converter bolts are accessible. Then remove bolts one at a time. Rotate crankshaft with socket wrench on dampener bolt.

11. Disconnect the input speed sensor (2) connector.

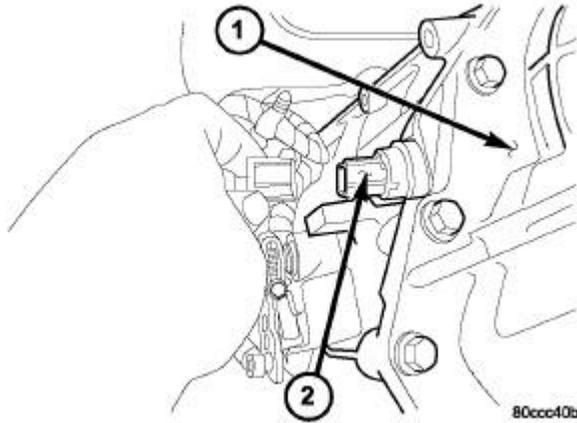


Fig. 30: Locating Output Speed Sensor
Courtesy of CHRYSLER LLC

12. Disconnect the output speed sensor (2) connector.

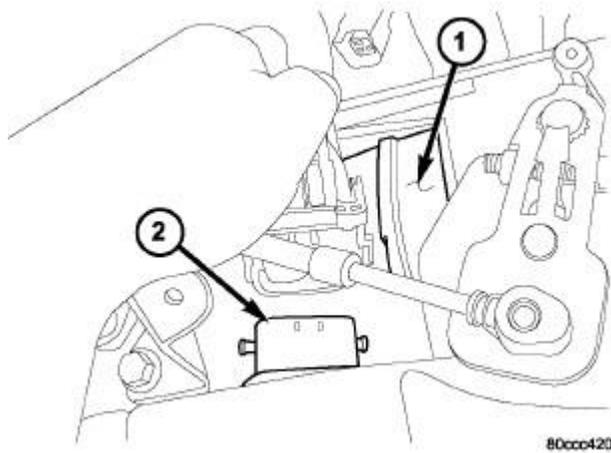


Fig. 31: Transmission Solenoid/TRS Assembly
Courtesy of CHRYSLER LLC

13. Disconnect the solenoid and pressure switch assembly (2) connector.

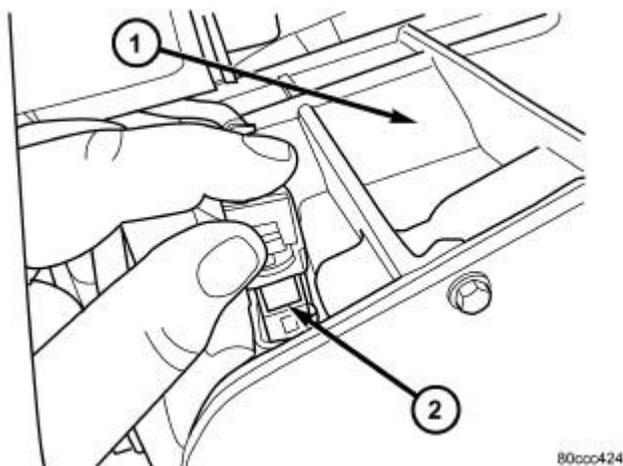


Fig. 32: Locating Line Pressure Sensor
Courtesy of CHRYSLER LLC

14. Disconnect the line pressure sensor (2) connector.

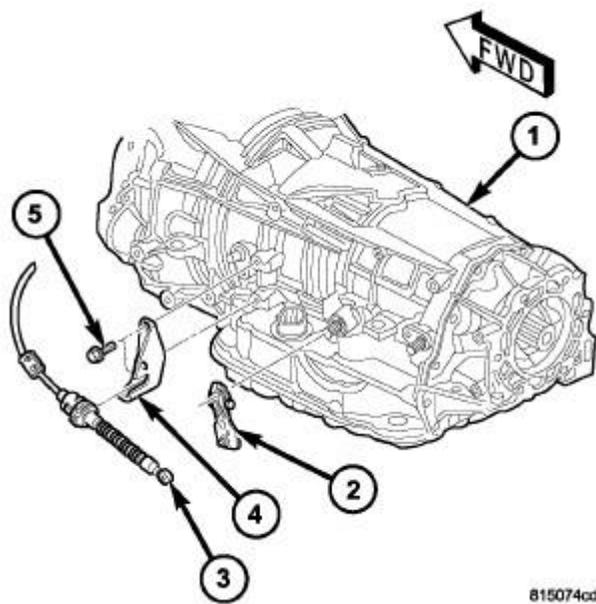
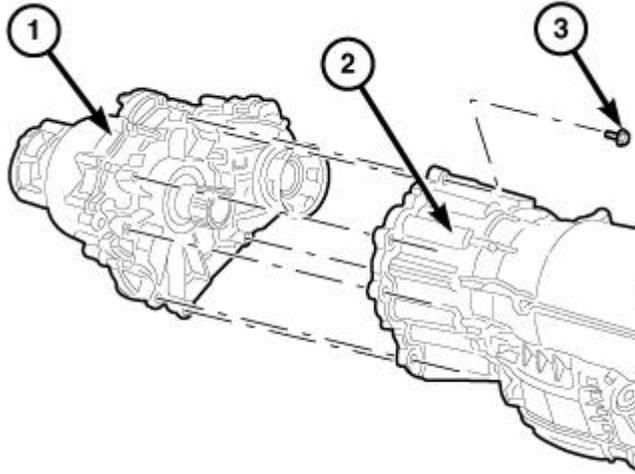


Fig. 33: Removing/Installing Shift Cable & Bracket
Courtesy of CHRYSLER LLC

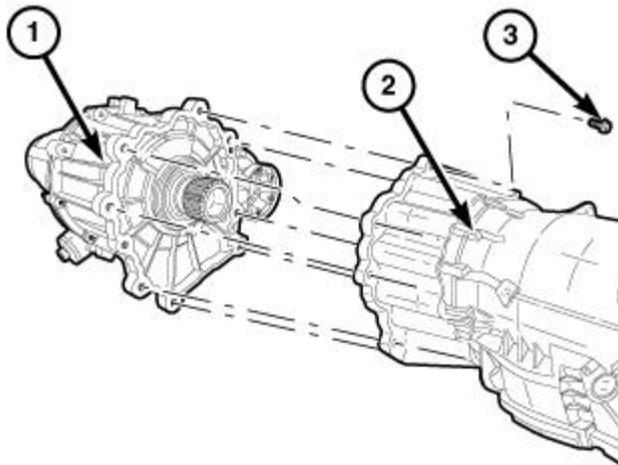
15. Disconnect gearshift cable (3) from transmission manual valve lever (2) and shift cable bracket (4).



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Fig. 34: MP2010 Transfer Case, Transmission & Bolts
Courtesy of CHRYSLER LLC

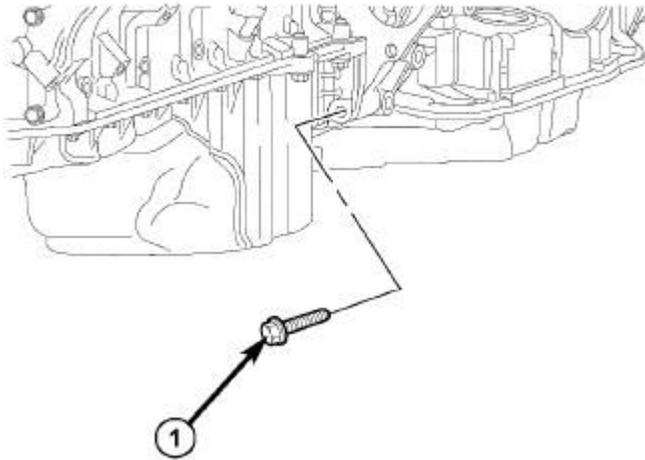
16. If necessary, remove the MP2010 transfer case (1) from the transmission (2). Refer to **REMOVAL** .



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Fig. 35: MP3023 Transfer Case, Transmission & Bolts
Courtesy of CHRYSLER LLC

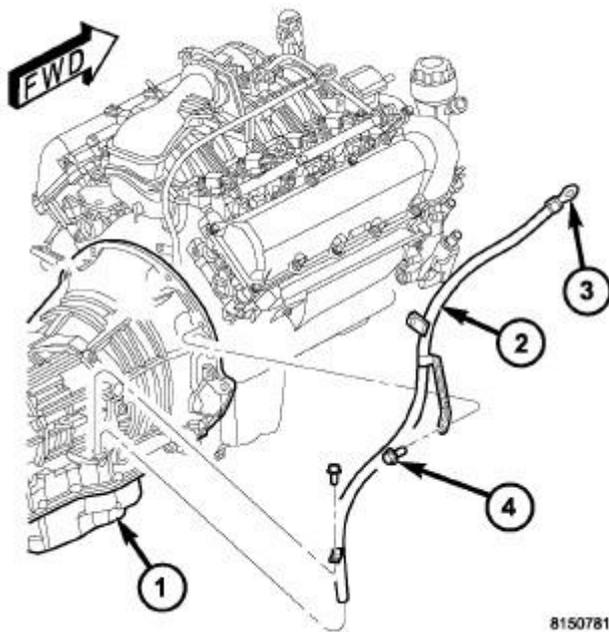
17. If necessary, remove the MP3023 transfer case (1) from the transmission (2). Refer to **REMOVAL** .



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Fig. 36: Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

18. Remove the engine oil pan to transmission bolts (1), 5.7L only.



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Fig. 37: Transmission Fill Tube
Courtesy of CHRYSLER LLC

- Remove the bolt (4) holding the transmission fill tube (2) to the transmission (1) and remove the fill tube.

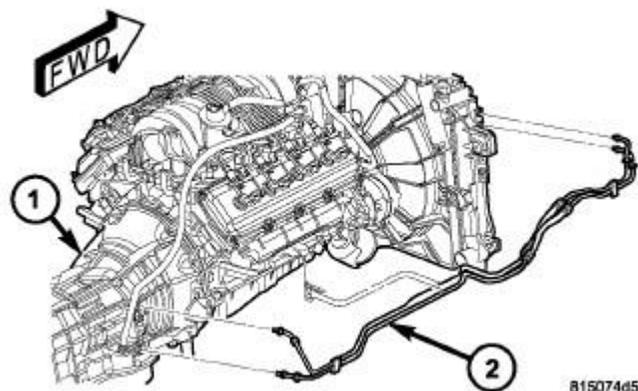


Fig. 38: Transmission & Transmission Fluid Cooler Lines
Courtesy of CHRYSLER LLC

- Disconnect transmission fluid cooler lines (2) at transmission (1) fittings and clips.

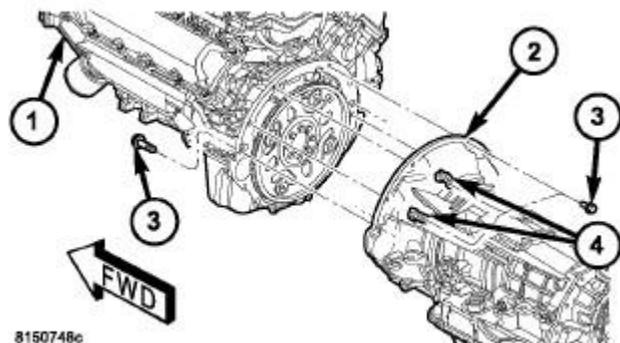


Fig. 39: Removing/Installing Transmission To Engine Bolts
Courtesy of CHRYSLER LLC

- Disconnect the transmission vent hose from the transmission.
- Support rear of engine with safety stand or jack.
- Raise transmission slightly with service jack to relieve load on crossmember and supports.
- Remove bolts attaching crossmember to frame and remove crossmember.
- Remove all remaining transmission (2) to engine (1) bolts (3).

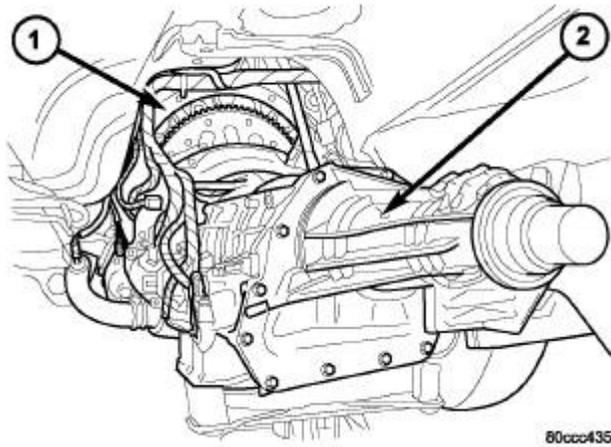
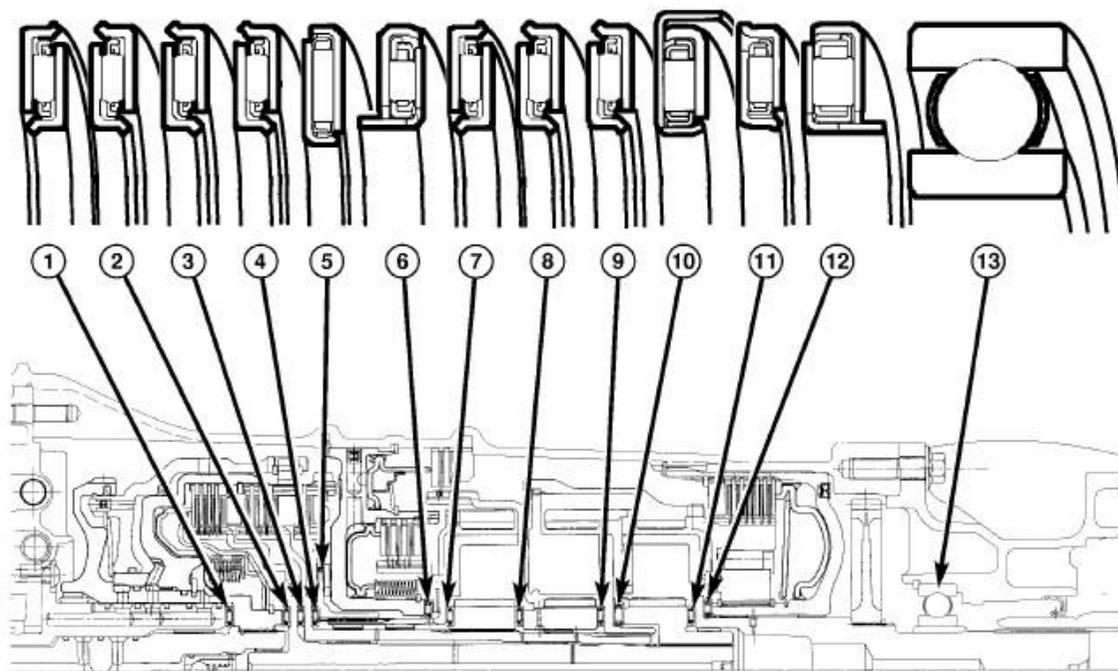


Fig. 40: Identifying Transmission
Courtesy of CHRYSLER LLC

26. Carefully work transmission (2) and torque converter assembly rearward off engine (1) block dowels.
27. Hold torque converter in place during transmission removal.
28. Lower transmission and remove assembly from under the vehicle.
29. To remove torque converter, carefully slide torque converter out of the transmission.

DISASSEMBLY

DISASSEMBLY



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Fig. 41: 545RFE Bearing Orientation

Courtesy of CHRYSLER LLC

1 - THRUST BEARING NO. 1
2 - THRUST BEARING NO. 2
3 - THRUST BEARING NO. 3
4 - THRUST BEARING NO. 4
5 - THRUST BEARING NO. 5
6 - THRUST BEARING NO. 6
7 - THRUST BEARING NO. 7

8 - THRUST BEARING NO. 8
9 - THRUST BEARING NO. 9
10 - THRUST BEARING NO. 10
11 - THRUST BEARING NO. 11
12 - THRUST BEARING NO. 12
13 - OUTPUT SHAFT BEARING

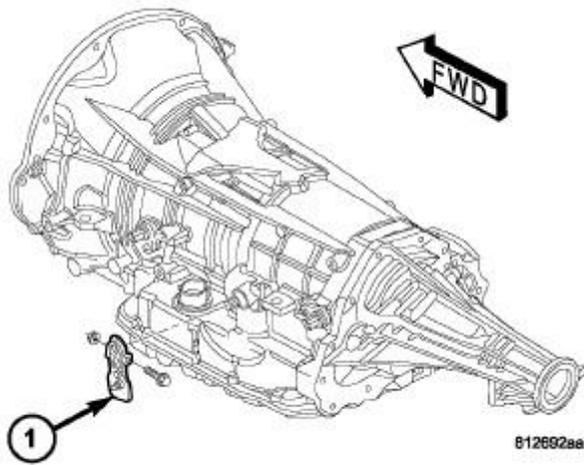


Fig. 42: Identifying Manual Shaft Lever
 Courtesy of CHRYSLER LLC

1 - MANUAL SHAFT LEVER

1. Drain fluid from transmission.
2. Clean exterior of transmission with suitable solvent or pressure washer.
3. Remove the torque converter from the transmission.
4. Remove the manual shift lever (1) from the transmission. Refer to **Fig. 42**.

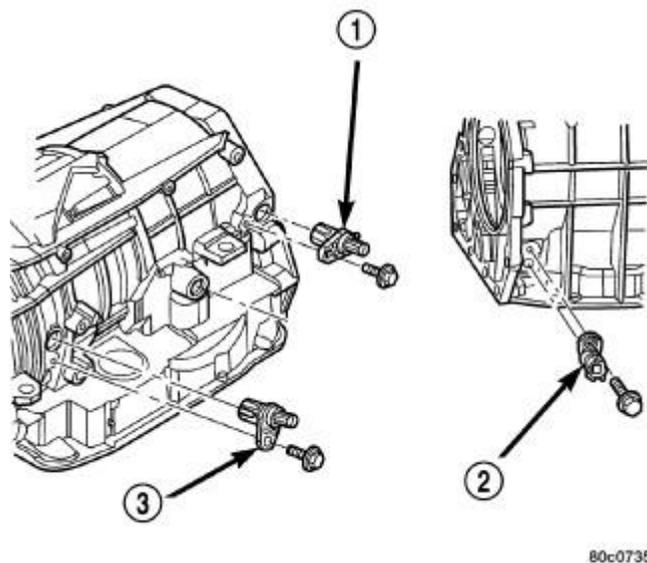


Fig. 43: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

2011 Jeep Grand Cherokee

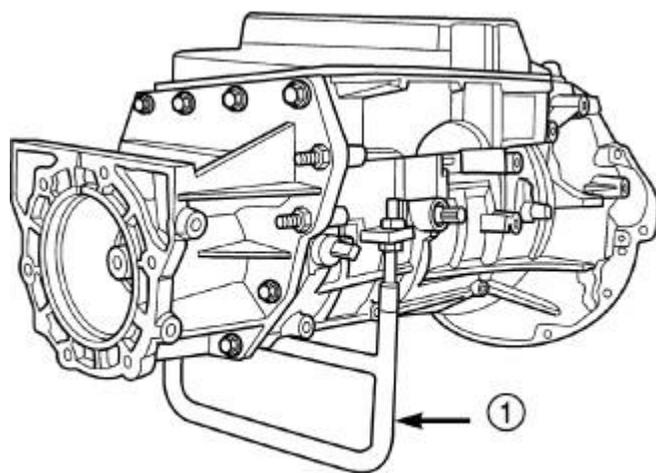
2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

1 - OUTPUT SPEED SENSOR

2 - LINE PRESSURE SENSOR

3 - INPUT SPEED SENSOR

5. Remove the input (3), output (1), and line pressure sensors (2) from the transmission case. Refer to **Fig. 43**.
6. Inspect the ends of the sensors for debris, which may indicate the nature of the transmission failure.



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Fig. 44: Install Support Stand - Tool 8257

Courtesy of CHRYSLER LLC

1 - TOOL 8257

7. Install Support Stand (special tool #8257, Support, Transmission) (1) onto the transmission case. Refer to **Fig. 44**.

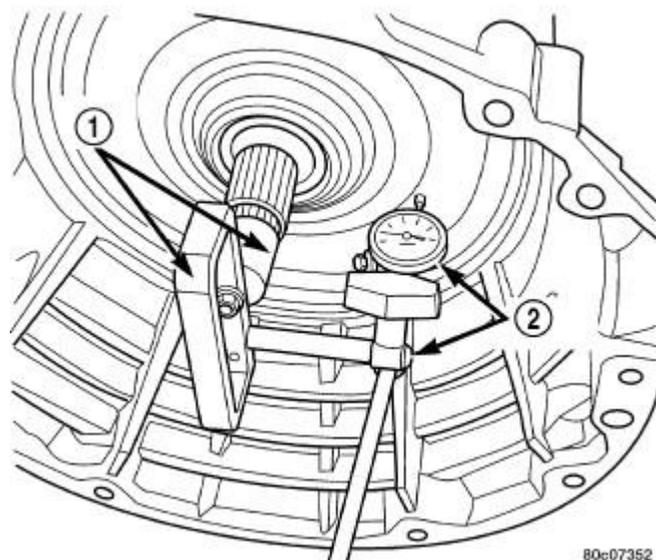


Fig. 45: Measuring Input Shaft End-play
Courtesy of CHRYSLER LLC

1 - TOOL 8266A
2 - TOOL C-3339A

8. Using Adapter (special tool #8266-1, Spline Tool, RFE Input) from End-Play Tool Set (special tool #8266B, End Play Socket Set) (1) and Dial Indicator (special tool #C-3339A, Set, Dial Indicator) (2), measure and record the input shaft end-play. Refer to **Fig. 45**.

NOTE: When measuring the input shaft end-play, two "stops" will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first "stop" felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading.

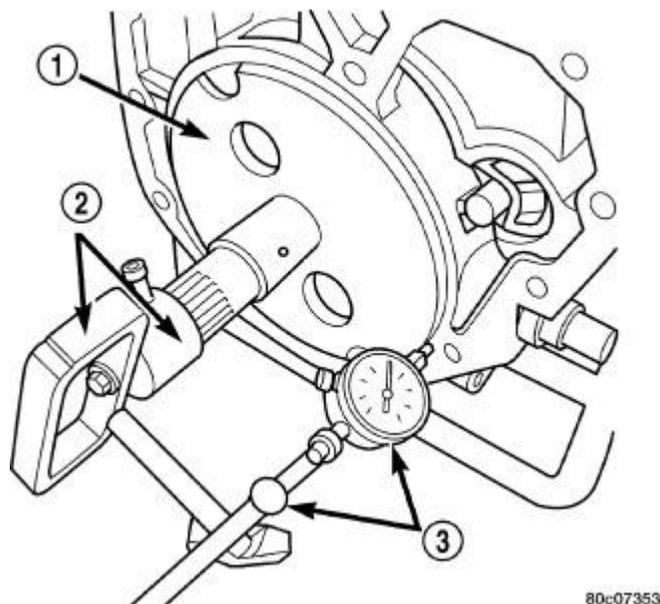
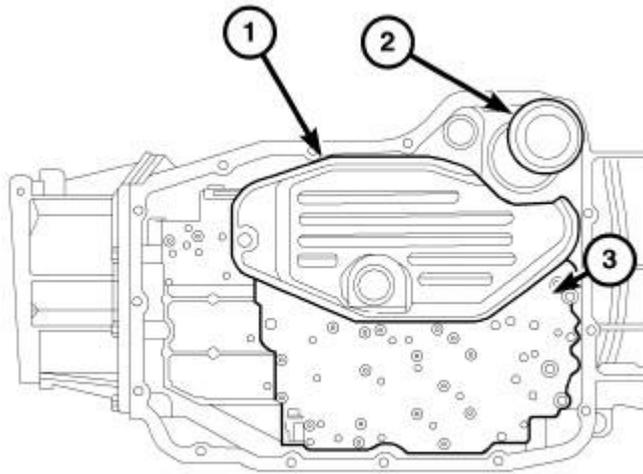


Fig. 46: Measuring Output Shaft End-play
Courtesy of CHRYSLER LLC

- | |
|------------------|
| 1 - TOOL 10065 |
| 2 - TOOL 8266-20 |
| 3 - TOOL C-3339A |

9. Remove the bolts holding the transmission extension/adaptor housing to the transmission case.
10. Remove the extension/adaptor housing from the transmission case.
11. Using Alignment Plate (special tool #8261, Plate, Alignment) (1), Adapter (special tool #8266-17, Spline Tool, RFE Output) from End-Play Tool Set (special tool #8266B, End Play Socket Set) (2) and Dial Indicator (special tool #C-3339A, Set, Dial Indicator) (3), measure and record the output shaft end-play. Refer to **Fig. 46**.

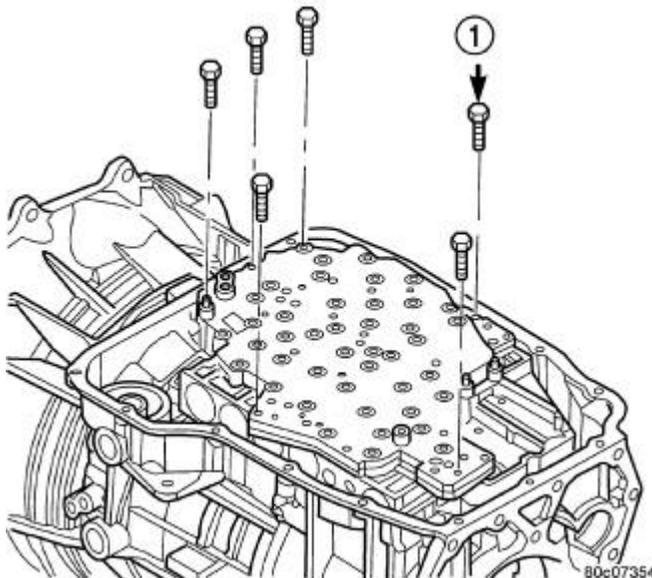


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Fig. 47: Primary Oil Filter & Oil Cooler Return Filter
Courtesy of CHRYSLER LLC

- 1 - PRIMARY OIL FILTER
- 2 - COOLER RETURN FILTER
- 3 - VALVE BODY

12. Remove the bolts holding the transmission oil pan to the transmission case.
13. Remove the transmission oil pan from the transmission case.
14. Remove the primary oil filter (1) and the oil cooler return filter (2).



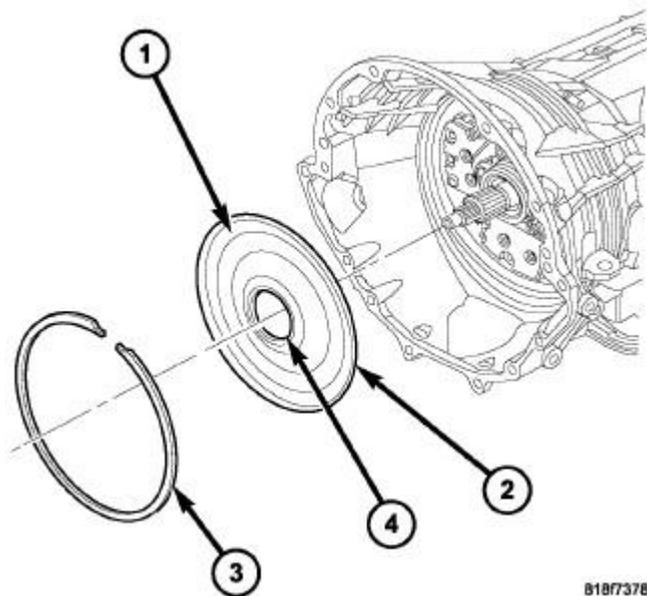
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Fig. 48: Valve Body Bolts

Courtesy of CHRYSLER LLC

1 - VALVE BODY TO CASE BOLT (6)

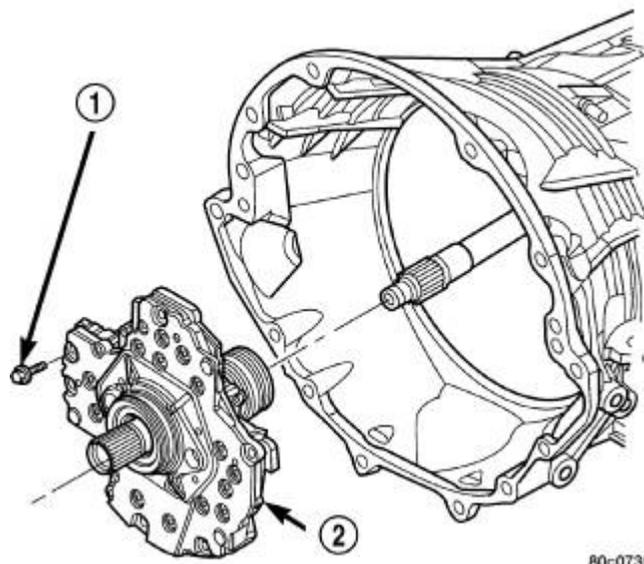
15. Remove the bolts (1) holding the valve body to the transmission case. Refer to **Fig. 48**.
16. Remove the valve body from the transmission case.

**Fig. 49: Front Cover**

Courtesy of CHRYSLER LLC

1 - Front Cover
 2 - Front Cover O-Ring
 3 - Snap Ring
 4 - Front Cover Seal

17. Remove the outer snap-ring (3) securing the transmission front cover (1) into the transmission case. Refer to **Fig. 49**.
18. Reaching through a case opening in the valve body area with a long blunted tool, remove the transmission front cover (1) from the transmission case. Refer to **Fig. 49**.



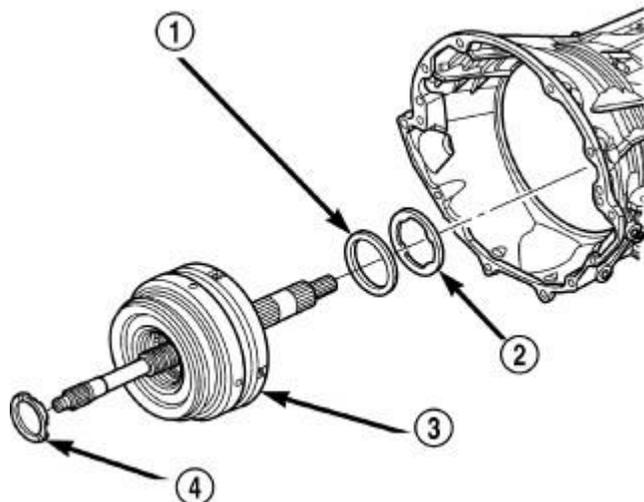
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Fig. 50: Oil Pump & Bolts
 Courtesy of CHRYSLER LLC

- | |
|-------------------------------|
| 1 - OIL PUMP TO CASE BOLT (6) |
| 2 - OIL PUMP |

19. Remove the bolts (1) holding the oil pump into the transmission case. Refer to **Fig. 50**.
20. Remove the oil pump (2). Hold inward on the input shaft to prevent pulling the input clutch assembly with the oil pump. Refer to **Fig. 50**.

CAUTION: If the input shaft is not held during oil pump removal, the input clutch assembly will attempt to move forward with the oil pump and the numbers 2, 3, or 4 bearings inside the input clutch assembly may become dislodged.



80c-07357

Fig. 51: Thrust Bearings, Thrust Plate & Input Clutch Assembly
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 5
2 - THRUST PLATE (SELECT)
3 - INPUT CLUTCH ASSEMBLY
4 - THRUST BEARING NUMBER 1

21. Remove the number 1 thrust bearing (4) from the input clutch assembly. Refer to **Fig. 51**.
22. Remove the input clutch assembly (3) from the transmission case. Refer to **Fig. 51**.
23. Remove the number 5 thrust bearing (1) and selective thrust plate (2) from the input clutch assembly (3), or the 4C clutch retainer/bulkhead. Refer to **Fig. 51**.

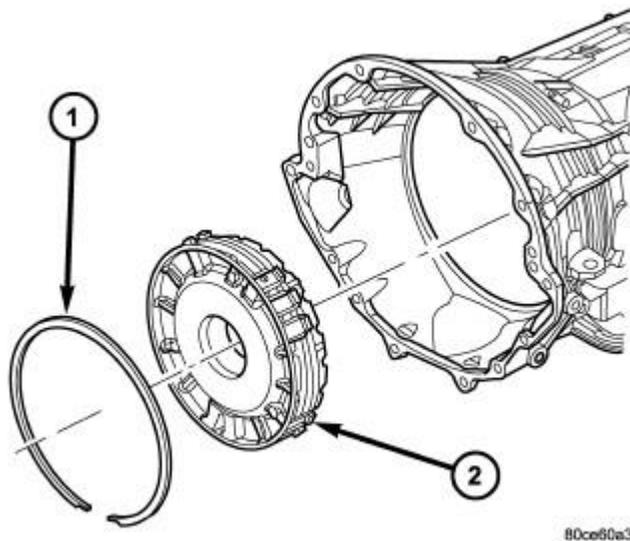
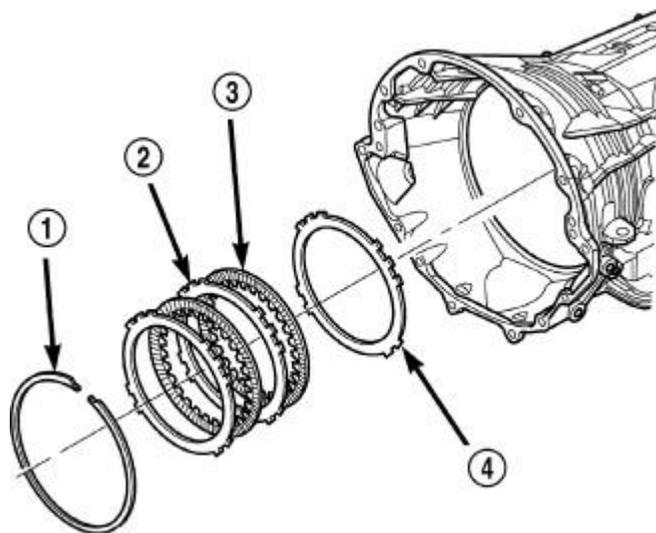


Fig. 52: 4C Clutch Retainer/Bulkhead & Snap-Ring
 Courtesy of CHRYSLER LLC

1 - SNAP-RING
2 - 4C CLUTCH RETAINER/BULKHEAD

24. Remove the 4C clutch retainer/bulkhead tapered snap-ring (1) from the transmission case. Refer to **Fig. 52**.
25. Remove the 4C clutch retainer/bulkhead (2) from the transmission case. Refer to **Fig. 52**.

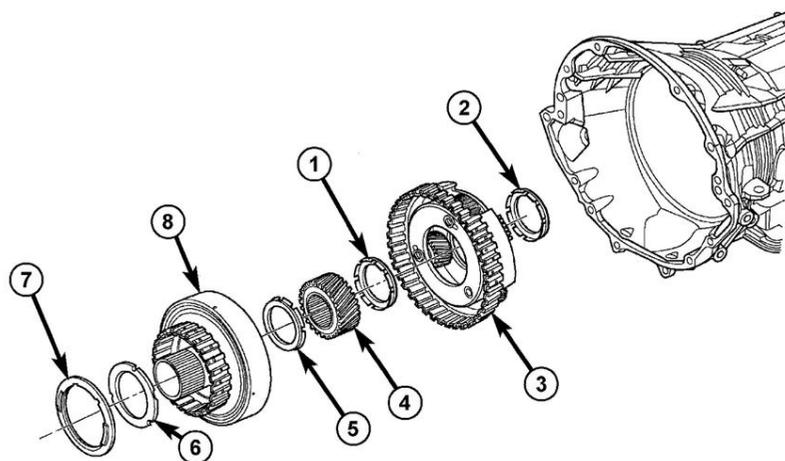


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Fig. 53: 2C Clutch Pack & Snap-Ring
Courtesy of CHRYSLER LLC

1 - SNAP-RING
2 - PLATE
3 - DISC
4 - REACTION PLATE

26. Remove the front 2C clutch pack snap-ring (1) from the transmission case. Refer to **Fig. 53**.
27. Remove the 2C clutch pack (2, 3, 4) from the transmission case. Refer to **Fig. 53**.



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Fig. 54: Thrust Bearings, Thrust Plate, Planetary Carrier, Sun Gear & Annulus
Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 8	5 - THRUST BEARING NUMBER 7
2 - THRUST BEARING NUMBER 9	6 - THRUST PLATE (SELECT)

3 - REACTION PLANETARY CARRIER	7 - THRUST BEARING NUMBER 6
4 - REACTION SUN GEAR	8 - REACTION ANNULUS

28. Remove the rear selective thrust plate (6) and number 6 thrust bearing (7) from the reaction annulus (8). Refer to **Fig. 54**.
29. Remove the reaction annulus (8) from the reaction planetary carrier (3). Refer to **Fig. 54**.
30. Remove the number 7 thrust bearing (5). Refer to **Fig. 54**.
31. Remove the reaction sun gear (4). Refer to **Fig. 54**.
32. Remove the number 8 thrust bearing (1) from the reaction planetary carrier (3). Refer to **Fig. 54**.
33. Remove the reaction planetary carrier (3). Refer to **Fig. 54**. Note that this planetary gear set has three pinion gears.
34. Remove the number 9 thrust bearing (2) from the reverse planetary gear set. Refer to **Fig. 54**.

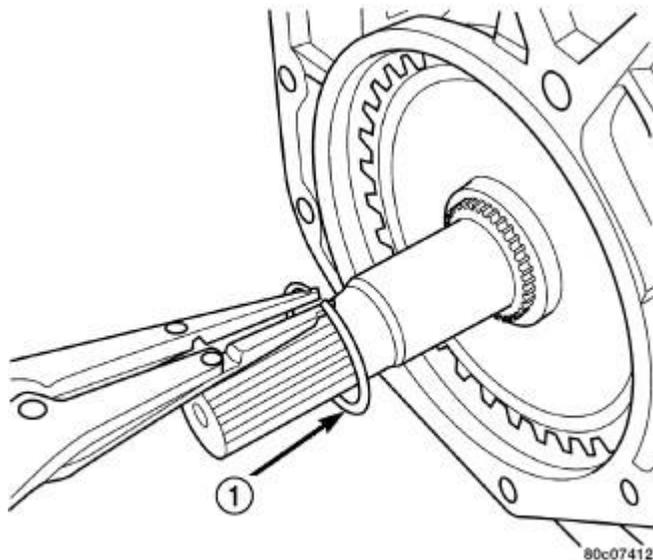
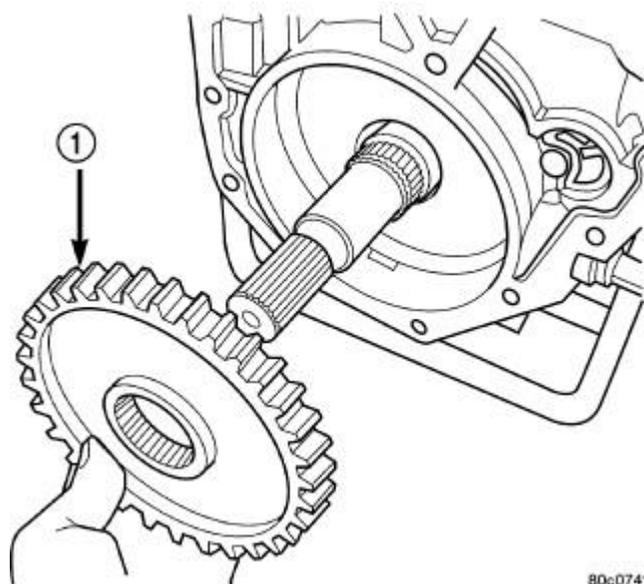


Fig. 55: Park Sprag Gear Snap-Ring
 Courtesy of CHRYSLER LLC

1 - SNAP-RING

35. Remove the snap-ring (1) holding the park sprag gear onto the output shaft. Refer to **Fig. 55**.

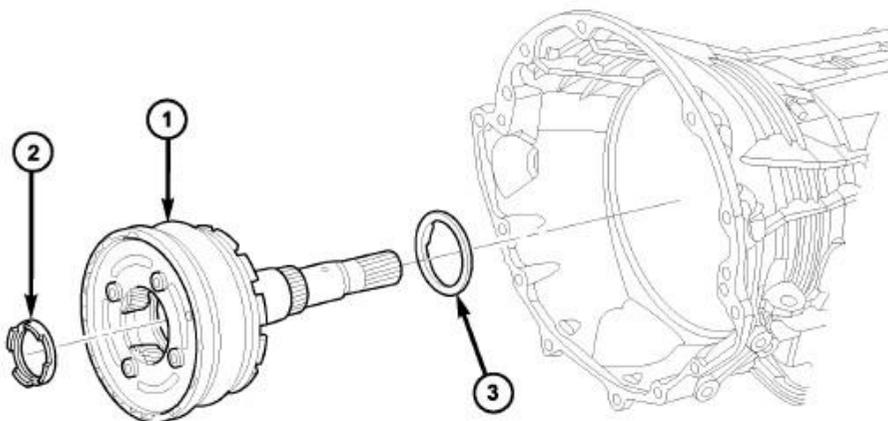


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Fig. 56: Park Sprag Gear
Courtesy of CHRYSLER LLC

1 - PARK SPRAG GEAR

36. Remove the park sprag gear (1) from the output shaft. Refer to **Fig. 56**.



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Fig. 57: Identifying Input/Reverse Planetary Assembly
Courtesy of CHRYSLER LLC

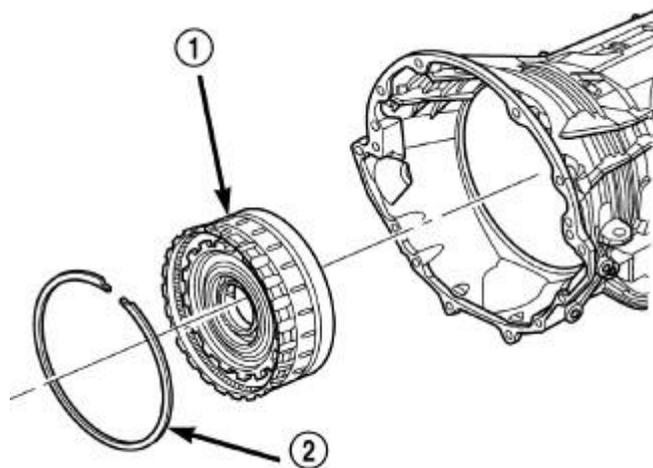
1 - INPUT/REVERSE PLANETARY ASSEMBLY

2 - BEARING NUMBER 9

3 - BEARING NUMBER 12

37. Remove the input/reverse planetary assembly (1). Refer to **Fig. 57**.

38. Remove the number 12 thrust bearing (3) from the input/reverse planetary assembly (1). Refer to **Fig. 57**.

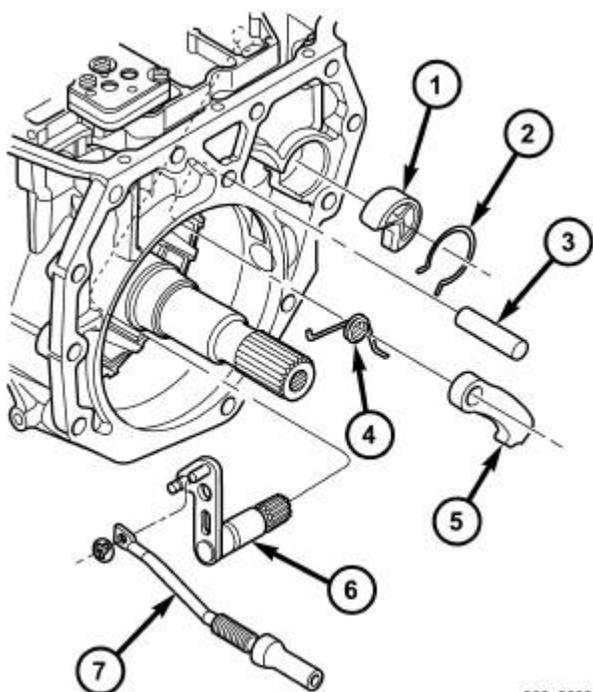


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Fig. 58: Identifying Low/Reverse Clutch Assembly
 Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - LOW/REVERSE OVERRUNNING CLUTCH ASSEMBLY |
| 2 - SNAP-RING |

39. Remove the snap-ring (2) holding the low/reverse clutch retainer (1) into the transmission case. Refer to **Fig. 58**.
40. Remove the low/reverse clutch retainer (1) from the transmission case. Refer to **Fig. 58**.



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Fig. 59: Manual Shaft/Park Lock Components
 Courtesy of CHRYSLER LLC

1 - GUIDE
2 - SNAP-RING
3 - SHAFT
4 - SPRING
5 - PARK PAWL
6 - MANUAL SHAFT/LEVER
7 - PARK ROD

41. Remove the park rod (7) and e-clip. Refer to **Fig. 59**.
42. Remove the park rod guide snap-ring (2). Refer to **Fig. 59**.
43. Remove the park rod guide (1). Refer to **Fig. 59**.
44. Remove the park pawl pivot shaft (3), park pawl (5), and spring (4). Refer to **Fig. 59**.
45. Remove the manual selector shaft (6). Refer to **Fig. 59**.
46. Remove the manual selector shaft seal.
47. Remove the dipstick tube seal.

CLEANING

CLEANING

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on shafts, or valves, use extreme care to avoid rounding off sharp edges. Sharp edges are vital as they prevent foreign matter from getting between the valve and valve bore.

Do not reuse oil seals, gaskets, seal rings, or O-rings during overhaul. Replace these parts as a matter of course. Also do not reuse snap rings or E-clips that are bent or distorted. Replace these parts as well.

Lubricate transmission parts with Mopar® ATF +4, Automatic Transmission Fluid, during overhaul and assembly. Use petroleum jelly, Mopar® Door Ease, or Ru-Glyde to prelubricate seals, O-rings, and thrust washers. Petroleum jelly can also be used to hold parts in place during reassembly.

Clean the case in a solvent tank. Flush the case bores and fluid passages thoroughly with solvent. Dry the case and all fluid passages with compressed air. Be sure all solvent is removed from the case and that all fluid passages are clear.

NOTE: Do not use shop towels or rags to dry the case (or any other transmission component) unless they are made from lint-free materials. Lint will stick to case surfaces and transmission components and circulate throughout the transmission after assembly. A sufficient quantity of lint can block fluid passages and interfere with valve body operation.

INSPECTION

INSPECTION

Inspect the case for cracks, porous spots, worn bores, or damaged threads. Damaged threads can be repaired with Helicoil® thread inserts. However, the case will have to be replaced if it exhibits any type of damage or wear.

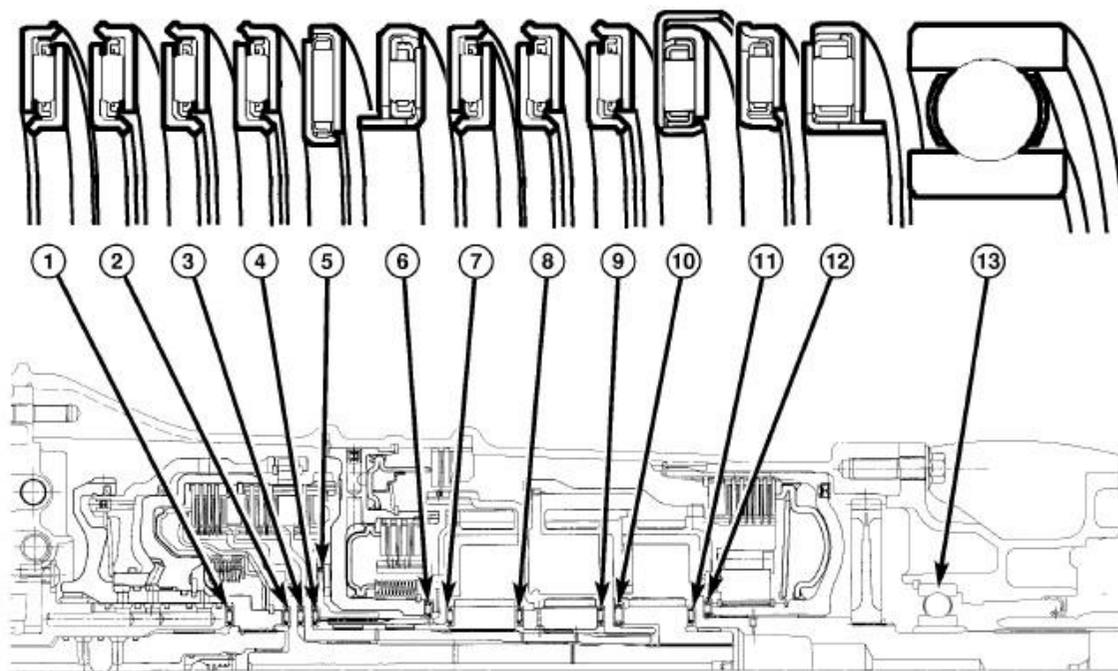
ASSEMBLY

ASSEMBLY

NOTE: Apply trans jell or petroleum jelly to all slide portions, rolling contacts surfaces, thrust surfaces etc. to prevent burnout during initial operation. Lubricate O-rings and O-ring seals with MOPAR® ATF+4. Soak all friction disks in MOPAR® ATF+4 for at least two hours before assembly of clutch packs.

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

NOTE: If the transmission assembly is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the Quick Learn Procedure using the scan tool. Refer to MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE .



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Fig. 60: 545RFE Bearing Orientation

Courtesy of CHRYSLER LLC

- | | |
|--------------------------|----------------------------|
| 1 - THRUST BEARING NO. 1 | 8 - THRUST BEARING NO. 8 |
| 2 - THRUST BEARING NO. 2 | 9 - THRUST BEARING NO. 9 |
| 3 - THRUST BEARING NO. 3 | 10 - THRUST BEARING NO. 10 |
| 4 - THRUST BEARING NO. 4 | 11 - THRUST BEARING NO. 11 |
| 5 - THRUST BEARING NO. 5 | 12 - THRUST BEARING NO. 12 |
| 6 - THRUST BEARING NO. 6 | 13 - OUTPUT SHAFT BEARING |
| 7 - THRUST BEARING NO. 7 | |

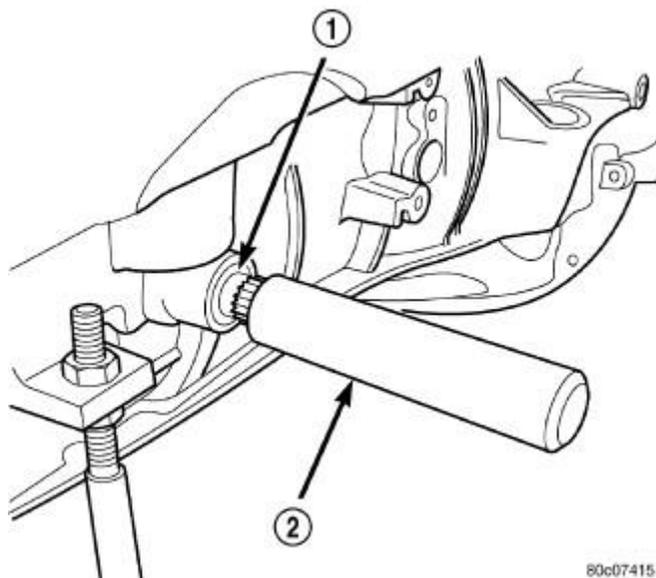


Fig. 61: Installing New Selector Shaft Seal
Courtesy of CHRYSLER LLC

- | |
|---------------|
| 1 - SEAL |
| 2 - TOOL 8253 |

1. Install a new selector shaft seal (1) using Seal Installer (special tool #8253, Installer, Seal) (2). Refer to **Fig. 61**.

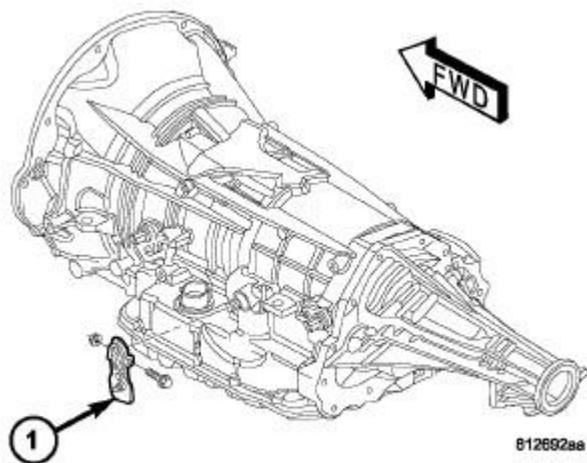
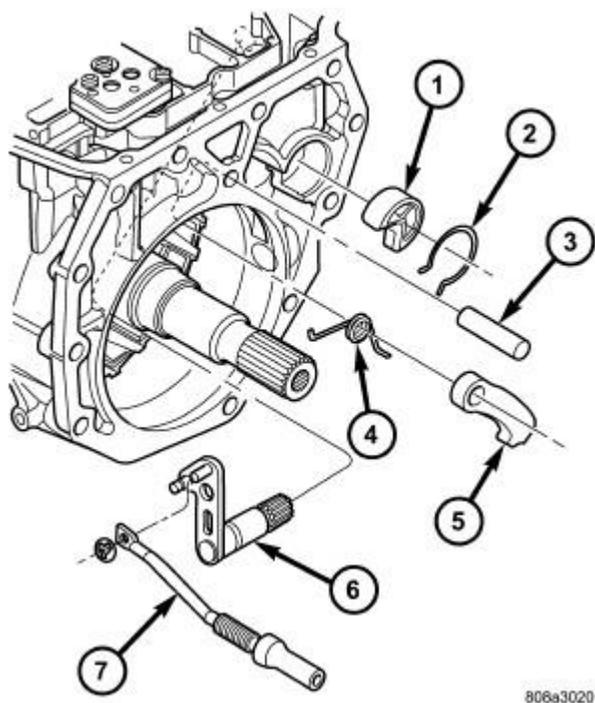


Fig. 62: Identifying Manual Shaft Lever
Courtesy of CHRYSLER LLC

- | |
|------------------------|
| 1 - MANUAL SHAFT LEVER |
|------------------------|

2. Install the manual selector shaft and retaining screw. Tighten the manual selector shaft retaining screw to 28 N.m (250 in.lbs.).
3. Install the manual shift lever (1) onto the manual selector shaft. Refer to **Fig. 62**. Tighten the retaining cross-bolt to 16 N.m (140 in.lbs.).



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Fig. 63: Manual Shaft/Park Lock Components
 Courtesy of CHRYSLER LLC

1 - GUIDE
2 - SNAP-RING
3 - SHAFT
4 - SPRING
5 - PARK PAWL
6 - MANUAL SHAFT/LEVER
7 - PARK ROD

4. Install the park pawl (5), spring (4), and shaft (3). Refer to **Fig. 63**.
5. Install the park rod (7) and e-clip. Refer to **Fig. 63**.
6. Install the park rod guide (1) and snap-ring (2). Refer to **Fig. 63**.

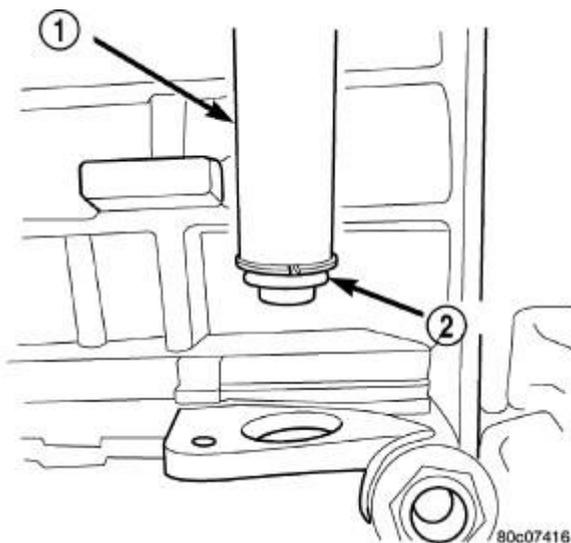


Fig. 64: Installing New Dipstick Tube Seal
 Courtesy of CHRYSLER LLC

- | |
|---------------|
| 1 - TOOL 8254 |
| 2 - SEAL |

7. Install a new fill tube seal (2) using Seal Installer (special tool #8254, Installer, Grommet) (1). Refer to **Fig. 64**.

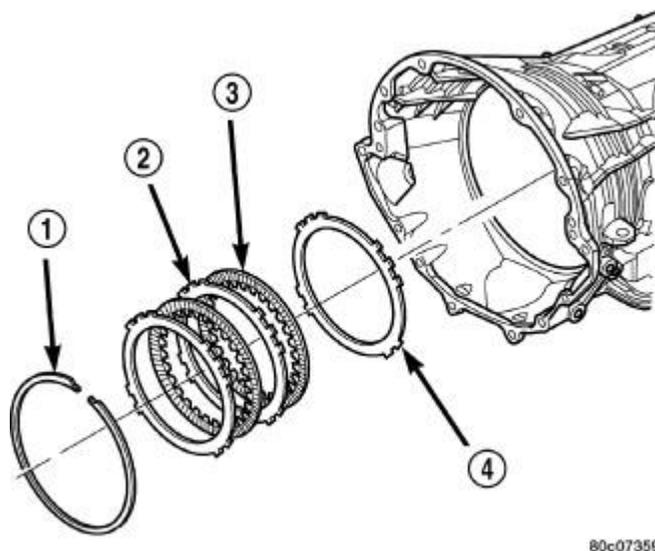


Fig. 65: 2C Clutch Pack & Snap-Ring
 Courtesy of CHRYSLER LLC

- | |
|---------------|
| 1 - SNAP-RING |
| 2 - PLATE |
| 3 - DISC |

4 - REACTION PLATE

NOTE: Before final assembly of transmission centerline, the 2C/4C clutch components should be installed into position and measured as follows:

8. Install the 2C reaction plate (4) with the beveled edge down (rearward) into the transmission case. Refer to **Fig. 65**.
9. Install the 2C clutch pack (2, 3) into the transmission case. Refer to **Fig. 65**.
10. Install the flat 2C clutch snap-ring (1) into the transmission case. Refer to **Fig. 65**.

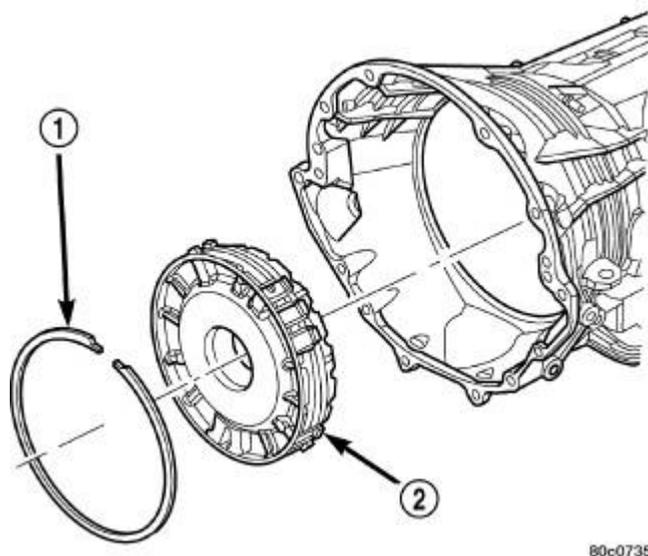
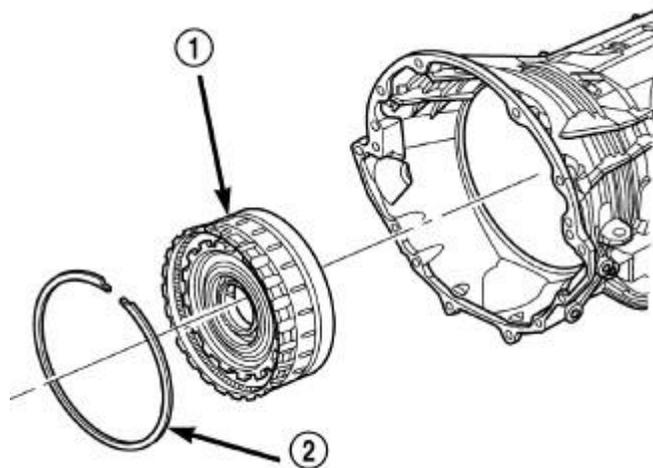


Fig. 66: 4C Clutch Retainer/Bulkhead & Snap-Ring
Courtesy of CHRYSLER LLC

1 - SNAP-RING

2 - 4C CLUTCH RETAINER/BULKHEAD

11. Install the 4C retainer/bulkhead (2) into the transmission case. Refer to **Fig. 66**. Make sure that the oil feed holes are pointing toward the valve body area.
12. Install the 4C retainer/bulkhead tapered snap-ring (1) into the transmission case. Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.
13. Using a feeler gauge through the opening in the rear of the transmission case, measure the 2C clutch pack clearance between the 2C reaction plate and the transmission case at four different points. The average of these measurements is the 2C clutch pack clearance. The correct clutch clearance is 0.455-1.335 mm (0.018-0.053 in.). The reaction plate is not selective. If the clutch pack clearance is not within specification, the reaction plate, all the friction discs, and steels must be replaced.
14. Remove the 4C retainer/bulkhead and all of the 2C clutch components from the transmission case.

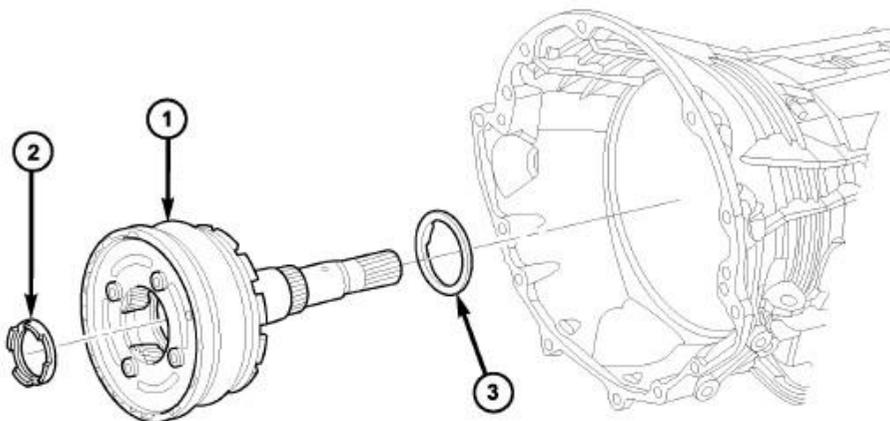


80c07411

Fig. 67: Identifying Low/Reverse Clutch Assembly
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - LOW/REVERSE OVERRUNNING CLUTCH ASSEMBLY |
| 2 - SNAP-RING |

15. Install the low/reverse clutch assembly (1). Make sure that the oil feed hole points toward the valve body area and that the bleed orifice is aligned with the notch in the rear of the transmission case.
16. Install the snap-ring (2) to hold the low/reverse clutch retainer into the transmission case. Refer to **Fig. 67**. The snap-ring is tapered and must be installed with the tapered side forward. Once installed, verify that the snap-ring is fully seated in the snap-ring groove.
17. Air check the low/reverse clutch and verify correct overrunning clutch operation.



808a301b

Fig. 68: Identifying Input/Reverse Planetary Assembly
Courtesy of CHRYSLER LLC

- | |
|--------------------------------------|
| 1 - INPUT/REVERSE PLANETARY ASSEMBLY |
| 2 - BEARING NUMBER 9 |

3 - BEARING NUMBER 12

18. Install the number 12 thrust bearing (3) over the output shaft and against the rear planetary gear set. The flat side of the bearing goes toward the planetary gearset and the raised tabs on the inner race should face the rear of the transmission.
19. Install the reverse/input planetary assembly (1) through the low/reverse clutch assembly. Refer to **Fig. 68**.

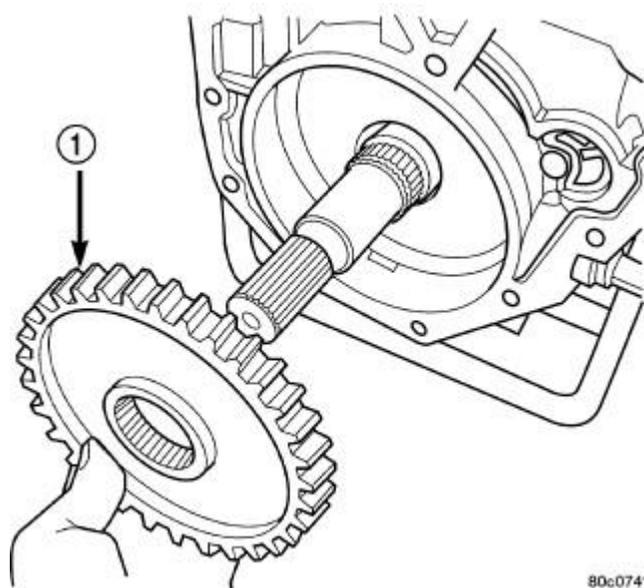


Fig. 69: Park Sprag Gear
Courtesy of CHRYSLER LLC

1 - PARK SPRAG GEAR

20. Install the park sprag gear (1) onto the output shaft. Refer to **Fig. 69**.

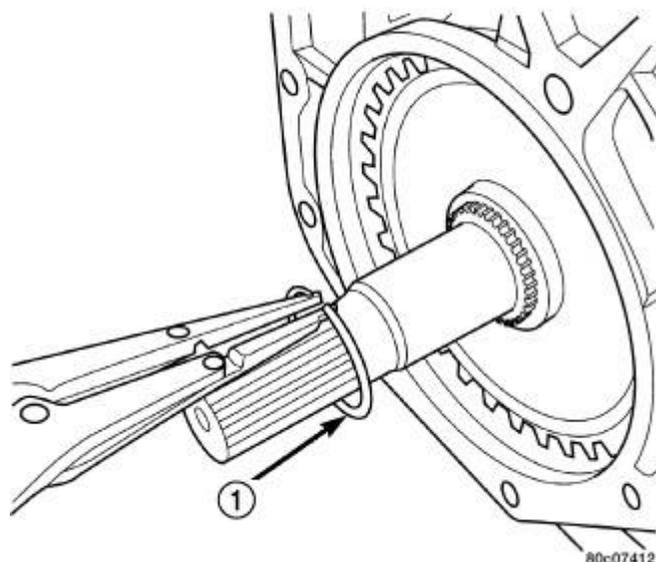


Fig. 70: Park Sprag Gear Snap-Ring
Courtesy of CHRYSLER LLC

1 - SNAP-RING

21. Install the snap-ring (1) to hold the park sprag onto the output shaft. Refer to **Fig. 70**.

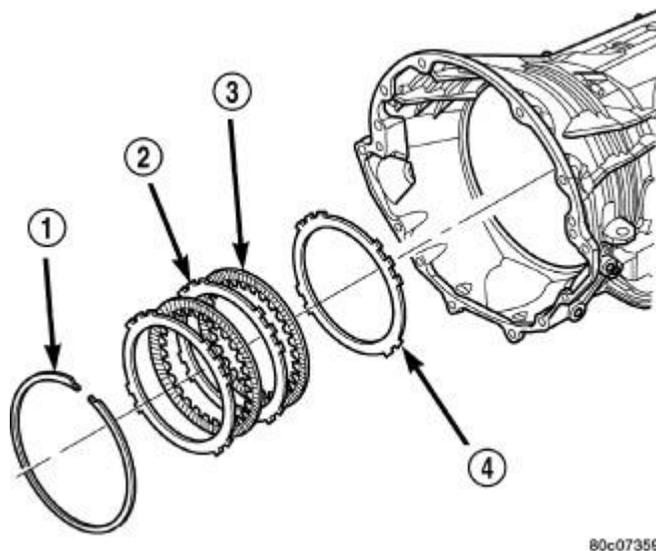


Fig. 71: 2C Clutch Pack & Snap-Ring
Courtesy of CHRYSLER LLC

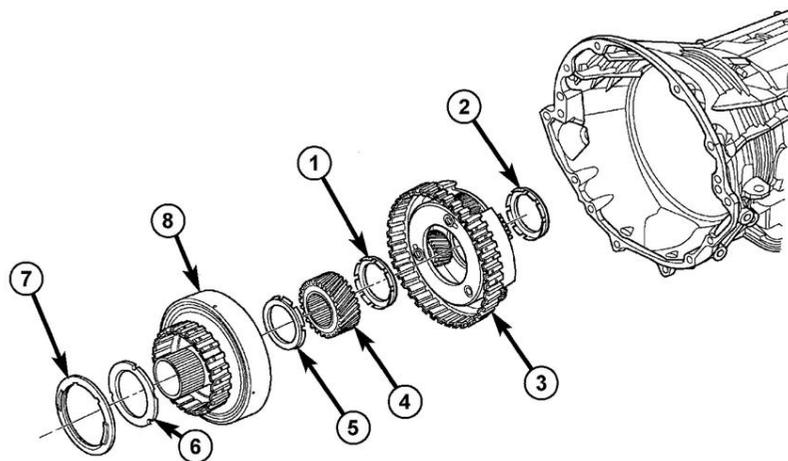
1 - SNAP-RING

2 - PLATE

3 - DISC

4 - REACTION PLATE

22. Install the 2C reaction plate (4) with the beveled edge down (rearward) into the transmission case. Refer to **Fig. 71**.
23. Install the 2C clutch pack (2, 3, 4) into the transmission case. Refer to **Fig. 71**.

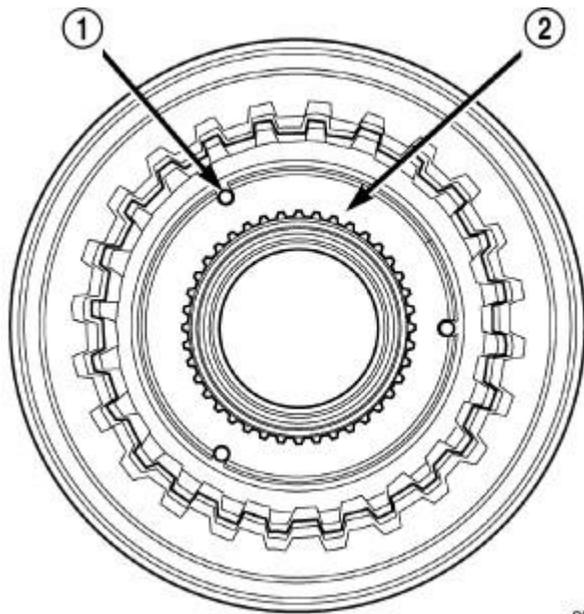


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Fig. 72: Thrust Bearings, Thrust Plate, Planetary Carrier, Sun Gear & Annulus
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 8	5 - THRUST BEARING NUMBER 7
2 - THRUST BEARING NUMBER 9	6 - THRUST PLATE (SELECT)
3 - REACTION PLANETARY CARRIER	7 - THRUST BEARING NUMBER 6
4 - REACTION SUN GEAR	8 - REACTION ANNULUS

24. Install the number 8 thrust bearing (1) inside the reaction carrier with the outer race against the reaction planetary carrier (3).
25. Install the reaction planetary gear set and the number 9 thrust bearing (2), with the inner race against the reaction planetary carrier (3), into the transmission case. Refer to **Fig. 72**.
26. Install the flat 2C clutch snap-ring into the transmission case. Refer to **Fig. 71**.
27. Install the reaction sun gear (4) into the reaction planetary gear set. **Make sure** the small shoulder is facing the front of the transmission. Refer to **Fig. 72**.
28. Install the number 7 thrust bearing (5) onto the reaction sun gear (4) with the inner race against the sun gear. Refer to **Fig. 72**.

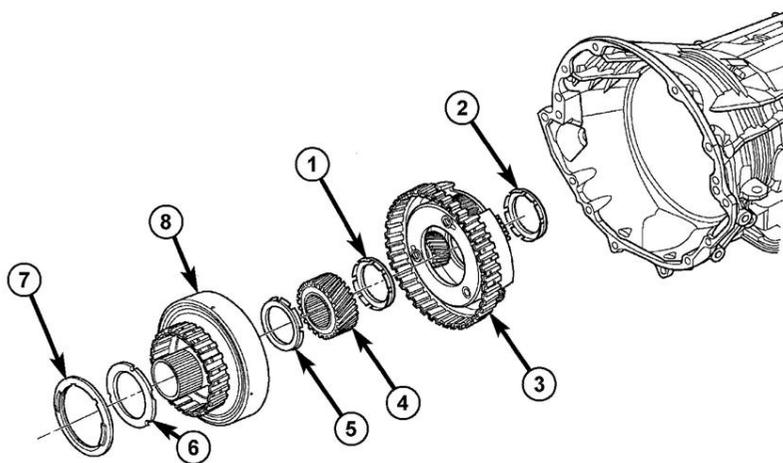


80c07425

Fig. 73: Installing Output Shaft Selective Thrust Plate Onto Reaction Annulus
 Courtesy of CHRYSLER LLC

- | |
|----------------------|
| 1 - LOCATING LUG (3) |
| 2 - THRUST PLATE |

29. Install the output shaft selective thrust plate (2) onto the reaction annulus with the oil grooves facing the annulus gear and the lugs (1) and notches aligned as shown in illustration. Refer to **Fig. 73**.



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Fig. 74: Thrust Bearings, Thrust Plate, Planetary Carrier, Sun Gear & Annulus
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 8	5 - THRUST BEARING NUMBER 7
2 - THRUST BEARING NUMBER 9	6 - THRUST PLATE (SELECT)
3 - REACTION PLANETARY CARRIER	7 - THRUST BEARING NUMBER 6
4 - REACTION SUN GEAR	8 - REACTION ANNULUS

30. Install the number 6 thrust bearing (7) against the output shaft selective thrust plate (6) with the flat side against the thrust plate and the raised tabs on the inner race facing the front of the transmission. Refer to [Fig. 74](#).
31. Install the reaction annulus (8) into the reaction planetary gear set. Refer to [Fig. 74](#).

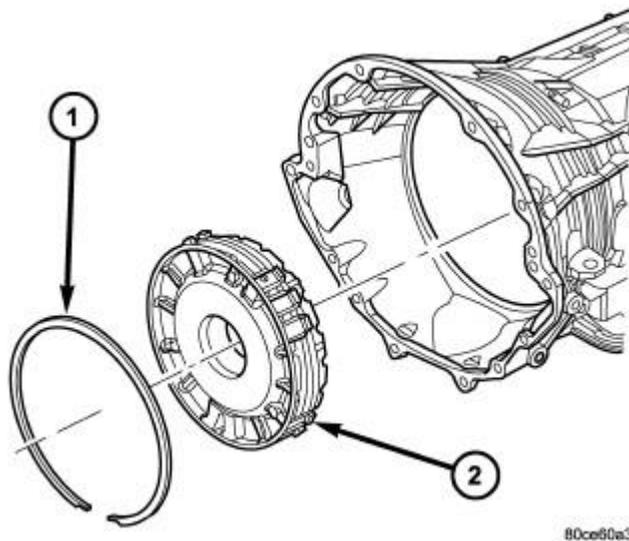
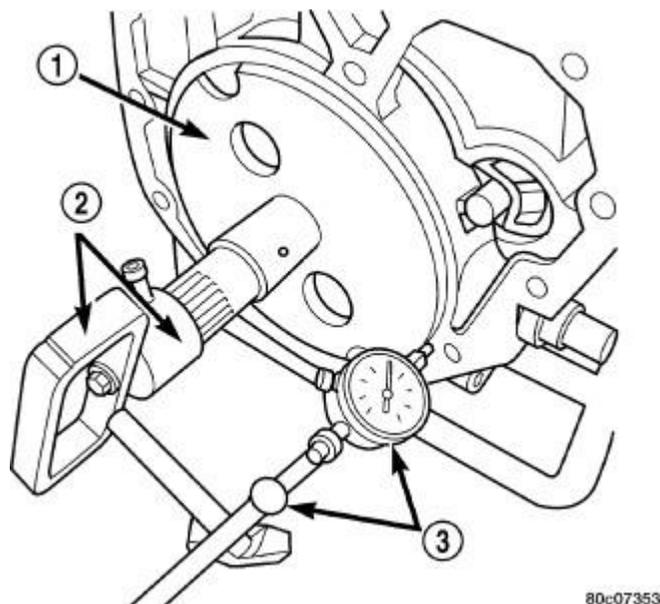


Fig. 75: 4C Clutch Retainer/Bulkhead & Snap-Ring
Courtesy of CHRYSLER LLC

1 - SNAP-RING

2 - 4C CLUTCH RETAINER/BULKHEAD

32. Install the 4C retainer/bulkhead (2) into the transmission case. Make sure that the oil feed holes are pointing toward the valve body area. Rotate the reaction annulus during the installation of the 4C retainer/bulkhead to ease installation.
33. Install the 4C retainer/bulkhead tapered snap-ring (1) into the transmission case with the taper toward the front of the case. Refer to [Fig. 75](#). Make sure that the open ends of the snap-ring are located in the case opening toward the valve body area.
34. Air check the 2C and 4C clutch operation.



80c07353

Fig. 76: Measuring Output Shaft End-play
Courtesy of CHRYSLER LLC

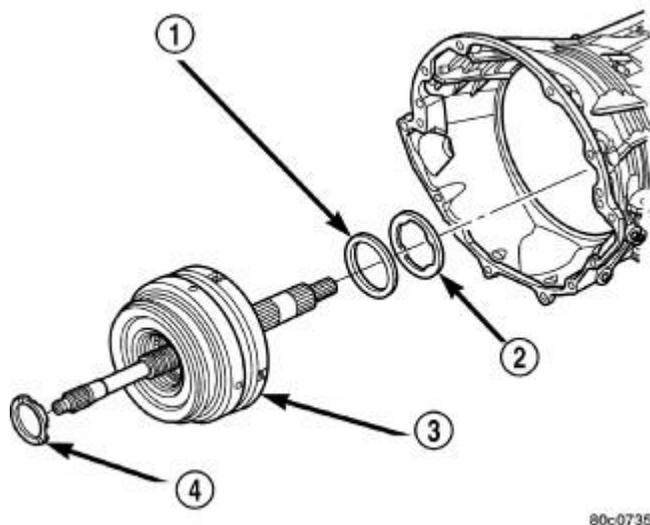
1 - TOOL 10065
2 - TOOL 8266-20
3 - TOOL C-3339A

35. Using Alignment Plate (special tool #8261, Plate, Alignment) (1), Adapter (special tool #8266-17, Spline Tool, RFE Output) from End-Play Tool Set (special tool #8266B, End Play Socket Set) (2) and Dial Indicator (special tool #C-3339A, Set, Dial Indicator) (3), measure and record the output shaft end-play. Refer to **Fig. 76**. The correct output shaft end-play is 0.22-0.55 mm (0.009-0.021 in.). Adjust as necessary. Install the chosen output shaft selective thrust plate and re-measure end-play to verify selection.

Output Shaft End Play Selectable Bearing Spacer Thickness

- 09 = 2.18 mm (0.086 in.)
- 10 = 2.33 mm (0.092 in.)
- 11 = 2.48 mm (0.098 in.)
- 12 = 2.63 mm (0.103 in.)
- 13 = 2.78 mm (0.109 in.)
- 14 = 2.69 mm (0.115 in.)
- 43 = 3.08 mm (0.121 in.)
- 16 = 3.23 mm (0.127 in.)
- 17 = 3.38 mm (0.133 in.)
- 18 = 3.53 mm (0.139 in.)
- 19 = 3.68 mm (0.145 in.)

36. Apply a bead of RTV silicone and install the extension/adaptor housing onto the transmission case.
37. Install and torque the bolts to hold the extension/adaptor housing onto the transmission case. The correct torque is 54 N.m (40 ft.lbs.).

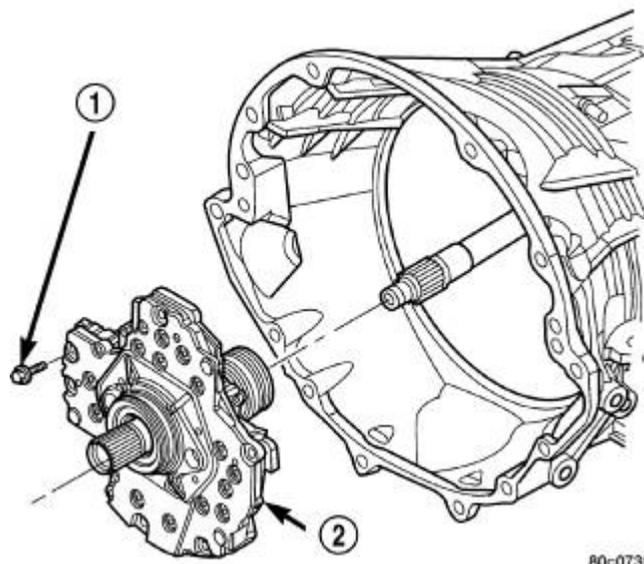


80c07357

Fig. 77: Thrust Bearings, Thrust Plate & Input Clutch Assembly
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 5
2 - THRUST PLATE (SELECT)
3 - INPUT CLUTCH ASSEMBLY
4 - THRUST BEARING NUMBER 1

38. Install the number 5 thrust bearing (1) and selective thrust plate (2) onto the 4C retainer/bulkhead. Refer to **Fig. 77**. Be sure that the outer race of the bearing is against the thrust plate.
39. Install the input clutch assembly (3) into the transmission case. Refer to **Fig. 77**. Make sure that the input clutch assembly is fully installed by performing a visual inspection through the input speed sensor hole. If the tone wheel teeth on the input clutch assembly are centered in the hole, the assembly is fully installed.
40. Install the number 1 thrust bearing (4) with the outer race up in the pocket of the input clutch assembly. Refer to **Fig. 77**.

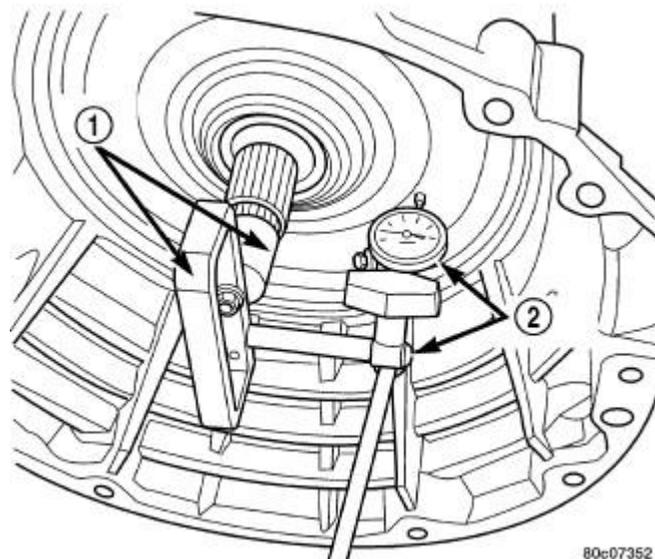


80c-07356

Fig. 78: Oil Pump & Bolts
 Courtesy of CHRYSLER LLC

- | |
|-------------------------------|
| 1 - OIL PUMP TO CASE BOLT (6) |
| 2 - OIL PUMP |

41. Install the oil pump (2) into the transmission case making certain the oil pump is flush with the transmission case. Refer to **Fig. 78**.
42. Install the bolts (1) to hold the oil pump into the transmission case. Tighten the oil pump bolts to 28 N.m (250 in.lbs.).



80c-07352

Fig. 79: Measuring Input Shaft End-play
 Courtesy of CHRYSLER LLC

1 - TOOL 8266A

2 - TOOL C-3339A

NOTE: When measuring the input shaft end-play, two "stops" will be felt. When the input shaft is pushed inward and the dial indicator zeroed, the first "stop" felt when the input shaft is pulled outward is the movement of the input shaft in the input clutch housing hub. This value should not be included in the end-play measured value and therefore must be recorded and subtracted from the dial indicator reading. If NO input shaft end play is noted, disassemble the input clutch assembly and check for the #2, #3, or #4 thrust bearing fallen out of position or cracked. Replace any cracked thrust bearing and reassemble using trans jell or petroleum jelly to retain the thrust bearings.

43. Using Adapter (special tool #8266-1, Spline Tool, RFE Input) from End-Play Tool Set (special tool #8266B, End Play Socket Set) (1) and Dial Indicator (special tool #C-3339A, Set, Dial Indicator) (2), measure and record the input shaft end-play. Refer to **Fig. 79**. The correct end-play is 0.46-0.89 mm (0.018-0.035 in.). Adjust as necessary. Install the chosen thrust plate on the number 5 thrust bearing and re-measure end-play to verify selection.

Input Shaft End Play Selectable Bearing Spacer Thickness

- 27 = 1.57 mm (0.062 in.)
- 28 = 1.71 mm (0.067 in.)
- 29 = 1.85 mm (0.073 in.)
- 30 = 1.99 mm (0.078 in.)
- 31 = 2.13 mm (0.084 in.)
- 32 = 2.27 mm (0.089 in.)
- 33 = 2.41 mm (0.095 in.)
- 34 = 2.55 mm (0.100 in.)
- 35 = 2.69 mm (0.106 in.)
- 36 = 2.83 mm (0.111 in.)
- 37 = 2.97 mm (0.117 in.)
- 38 = 3.11 mm (0.122 in.)
- 39 = 3.25 mm (0.128 in.)
- 40 = 3.39 mm (0.133 in.)
- 41 = 3.67 mm (0.144 in.)
-

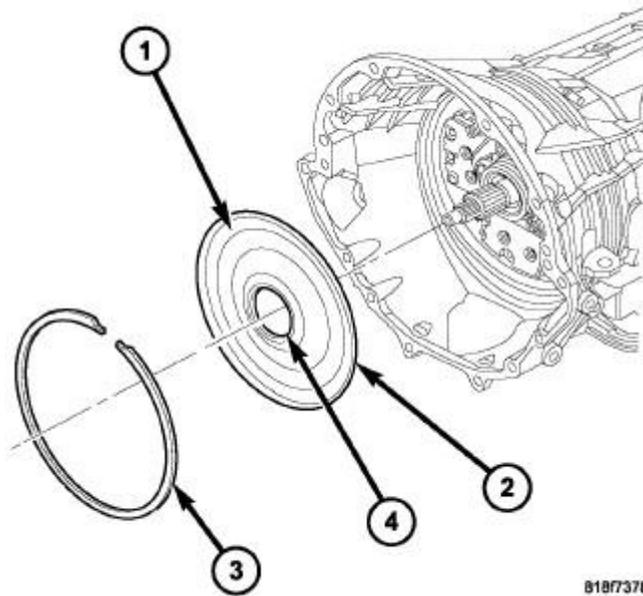


Fig. 80: Front Cover

Courtesy of CHRYSLER LLC

- 1 - Front Cover
- 2 - Front Cover O-Ring
- 3 - Snap Ring
- 4 - Front Cover Seal

NOTE: To avoid contamination and garter spring dislodgement, do not handle the front cover seal when installing the front cover into the transmission case.

44. Position the new front cover (1) onto transmission case.

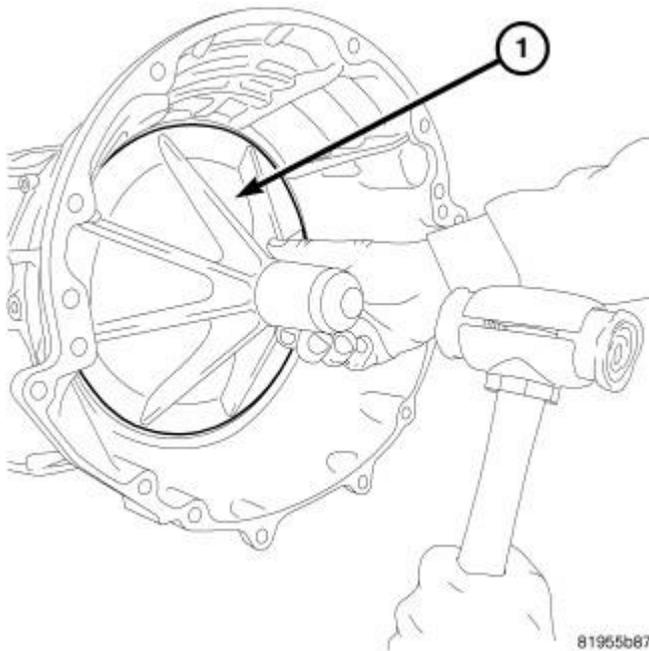


Fig. 81: Front Cover Installation Tool
Courtesy of CHRYSLER LLC

1 - Front Cover installation Tool 9955

45. Using a dead-blow mallet and the Front Cover installation tool (special tool #9955, Installer, Front Cover), install the front cover into the transmission case.
46. Install the snap ring into the transmission case.

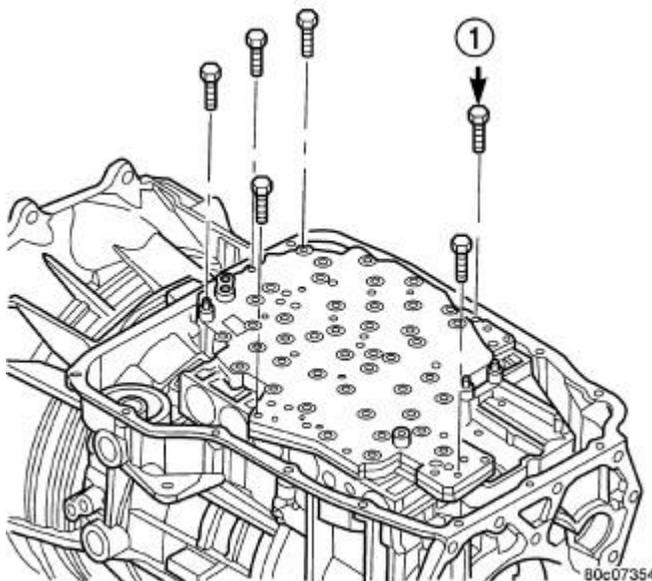
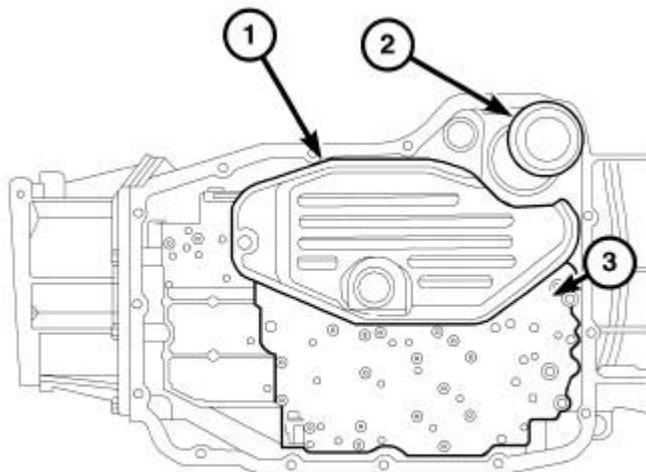


Fig. 82: Valve Body Bolts
Courtesy of CHRYSLER LLC

1 - VALVE BODY TO CASE BOLT (6)

47. Install the valve body. Verify that the pin on the manual lever has properly engaged the TRS selector plate. Tighten the valve body to transmission case bolts (1) to 12 N.m (105 in. Refer to **Fig. 82**.lbs.).



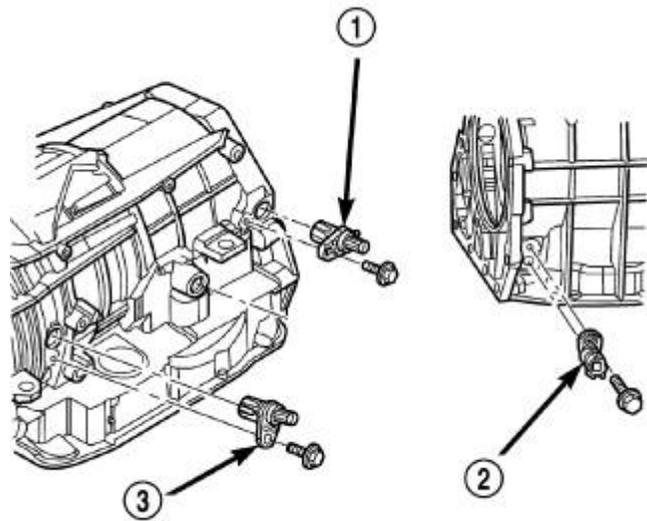
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Fig. 83: Primary Oil Filter & Oil Cooler Return Filter
 Courtesy of CHRYSLER LLC

- 1 - PRIMARY OIL FILTER
 2 - COOLER RETURN FILTER
 3 - VALVE BODY

CAUTION: The primary oil filter seal **MUST** be fully installed flush against the oil pump body. **DO NOT** install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

48. Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.
49. Install the primary oil filter (1) and the oil cooler return filter (2). Tighten the screw to hold the primary oil filter to the valve body to 4.5 N.m (40 in.lbs.). Using Filter Wrench (special tool #8321, Wrench, Oil Filter), tighten the cooler return oil filter to the transmission case to 9.5 N.m (84 in.lbs.).
50. Apply RTV silicone to the oil pan and install the transmission oil pan. Tighten the bolts to 12 N.m (105 in.lbs.).



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Fig. 84: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

- | |
|--------------------------|
| 1 - OUTPUT SPEED SENSOR |
| 2 - LINE PRESSURE SENSOR |
| 3 - INPUT SPEED SENSOR |

51. Install the input (3), output (1), and line pressure sensors (2). Refer to **Fig. 84**. Tighten the bolts to 12 N.m (105 in.lbs.).

INSTALLATION

INSTALLATION

1. Check torque converter hub and hub drive flats for sharp edges burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper and crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free of any debris. The hub must be smooth to avoid damaging pump seal at installation.
2. If a replacement transmission is being installed, transfer any components necessary, such as the manual shift lever and shift cable bracket, from the original transmission onto the replacement transmission.
3. Lubricate oil pump seal lip with transmission fluid.
4. Align converter and oil pump.
5. Carefully insert converter in oil pump. Then rotate converter back and forth until fully seated in pump gears.
6. Check converter seating with steel scale and straightedge. Surface of converter lugs should be at least 13 mm (1/2 in.) to rear of straightedge when converter is fully seated.
7. Temporarily secure converter with C-clamp.

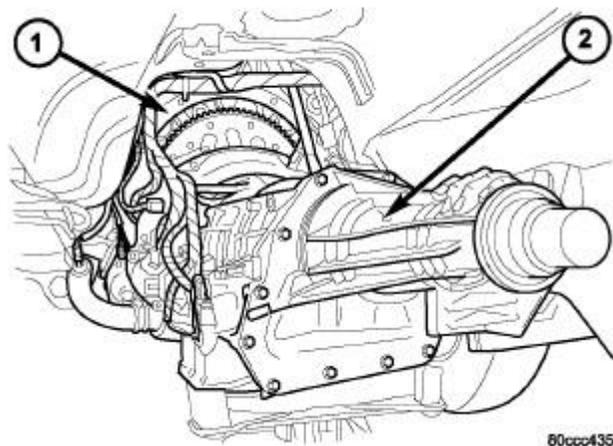


Fig. 85: Identifying Transmission
 Courtesy of CHRYSLER LLC

8. Position transmission on jack and secure it with chains.
9. Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**
10. Apply a light coating of Mopar® High Temp Grease to the torque converter hub pocket in the rear pocket of the engine's crankshaft.
11. Raise transmission and align the torque converter with the drive plate and the transmission converter housing with the engine block.

NOTE: Before aligning the transmission to the engine block fit the transmission fill tube to the vehicle.

12. Move transmission forward. Then raise, lower, or tilt transmission (2) to align the converter housing with the engine (1) block dowels.
13. Carefully work transmission forward and over engine block dowels until converter hub is seated in crankshaft. Verify that no wires, or the transmission vent hose, have become trapped between the engine block and the transmission.

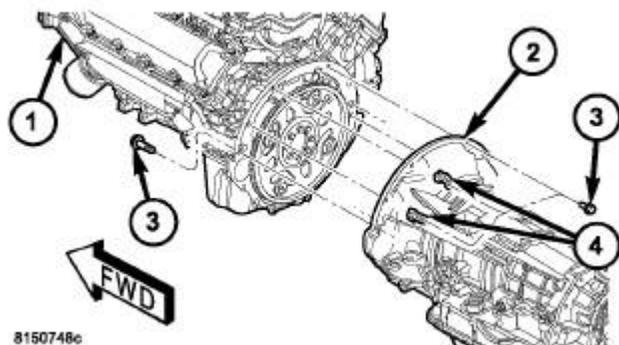
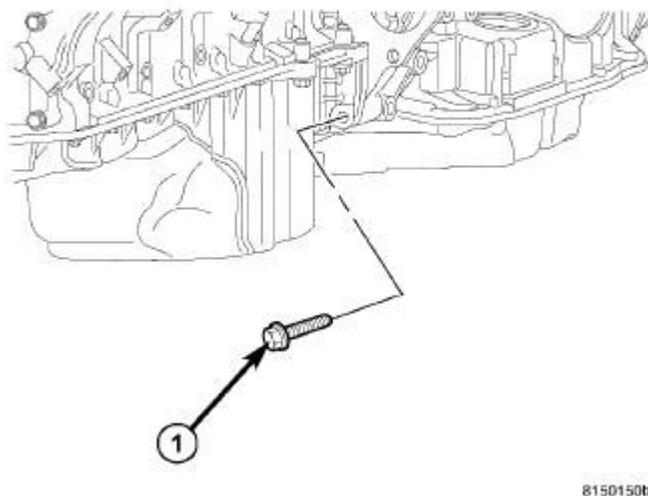


Fig. 86: Removing/Installing Transmission To Engine Bolts
Courtesy of CHRYSLER LLC

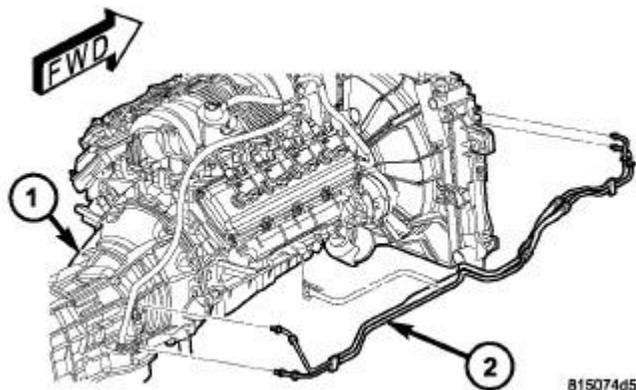
14. Install two bolts (3) to attach the transmission (2) to the engine (1).
15. Install remaining torque converter housing to engine bolts. Tighten to 68 N.m (50 ft.lbs.).



8150150b

Fig. 87: Oil Pan To Transmission Bolts
Courtesy of CHRYSLER LLC

16. Install both the left and right side oil pan to transmission bolts (1), 5.7L only. Torque the bolts to 54 N.m (40 ft. lbs.).



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Fig. 88: Transmission & Transmission Fluid Cooler Lines
Courtesy of CHRYSLER LLC

17. Connect cooler lines (2) to transmission (1).

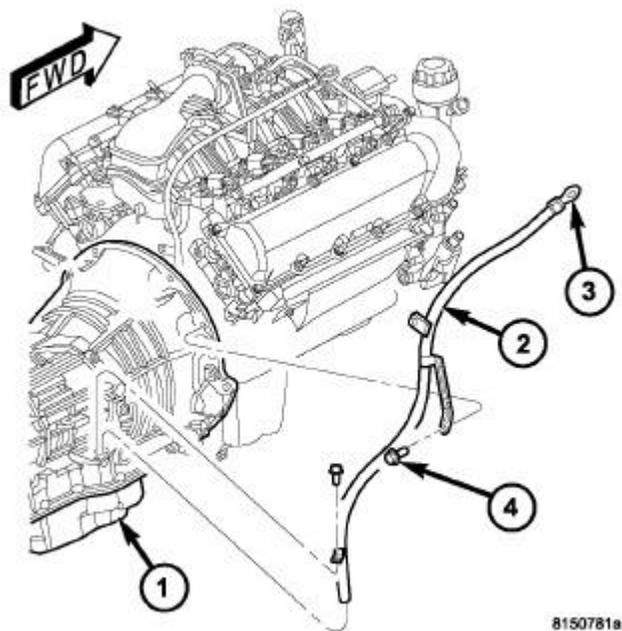


Fig. 89: Transmission Fill Tube
Courtesy of CHRYSLER LLC

18. Install transmission fill tube (2) to the transmission (1).

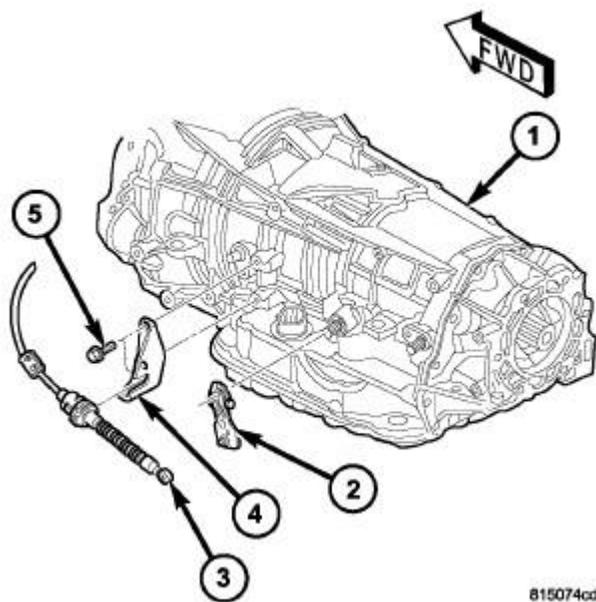


Fig. 90: Removing/Installing Shift Cable & Bracket

Courtesy of CHRYSLER LLC

19. Install rear transmission crossmember. Tighten crossmember to frame bolts to 68 N.m (50 ft.lbs.).
20. Install rear support to transmission. Tighten bolts to 47 N.m (35 ft.lbs.).
21. Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember. Tighten clevis bracket to crossmember bolts to 47 N.m (35 ft.lbs.). Tighten the clevis bracket to rear support bolt to 68 N.m (50 ft.lbs.).
22. Remove engine support fixture.
23. Install new plastic retainer grommet on any shift cable that was disconnected. Grommets should not be reused. Use pry tool to remove rod from grommet and cut away old grommet. Use pliers to snap new grommet into cable and to snap grommet onto lever.
24. Connect gearshift cable (3) to the shift cable bracket (4) and the transmission manual lever (2).

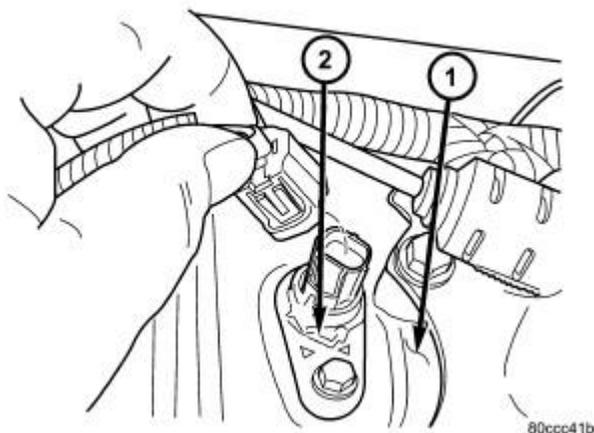


Fig. 91: Locating Input Speed Sensor
Courtesy of CHRYSLER LLC

25. Connect wires to the input speed sensor (2). Be sure transmission harnesses are properly routed.

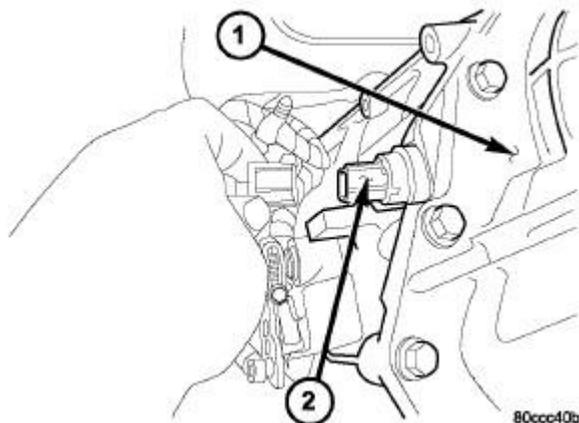


Fig. 92: Locating Output Speed Sensor
Courtesy of CHRYSLER LLC

26. Connect wires to the output speed sensor (2). Be sure transmission harnesses are properly routed.

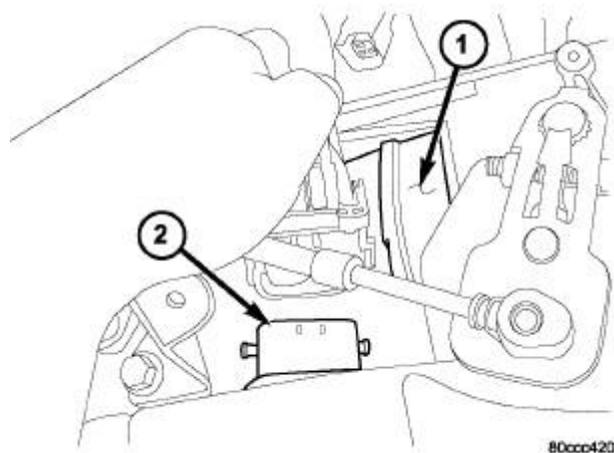


Fig. 93: Transmission Solenoid/TRS Assembly
Courtesy of CHRYSLER LLC

27. Connect wires to the transmission solenoid/TRS assembly (2). Be sure transmission harnesses are properly routed.

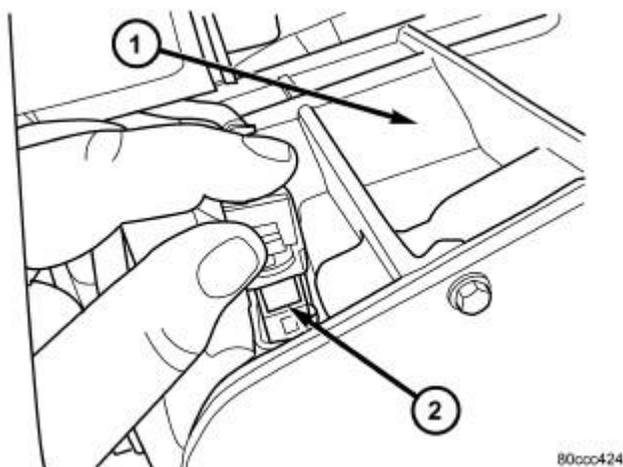


Fig. 94: Locating Line Pressure Sensor
Courtesy of CHRYSLER LLC

28. Connect wires to the line pressure sensor (2). Be sure transmission harnesses are properly routed.

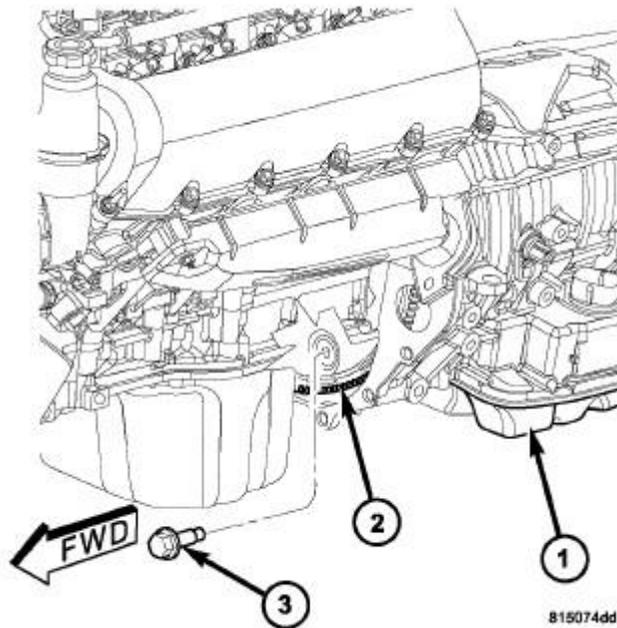
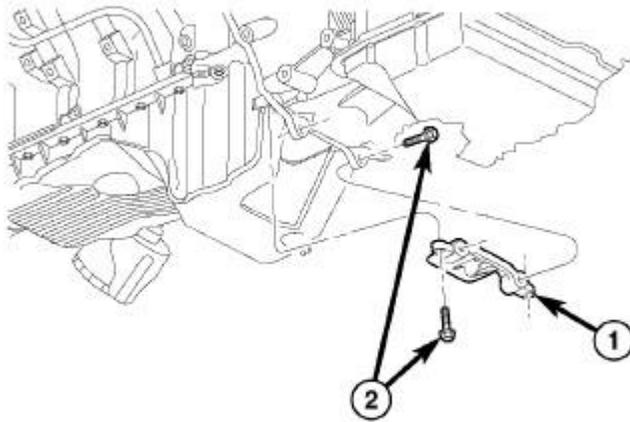


Fig. 95: Transmission, Driveplate & Torque Converter Bolts
Courtesy of CHRYSLER LLC

CAUTION: It is essential that the correct length bolts are used to attach the converter to the flexplate. Bolts that are too long will damage the clutch surface inside the torque converter.

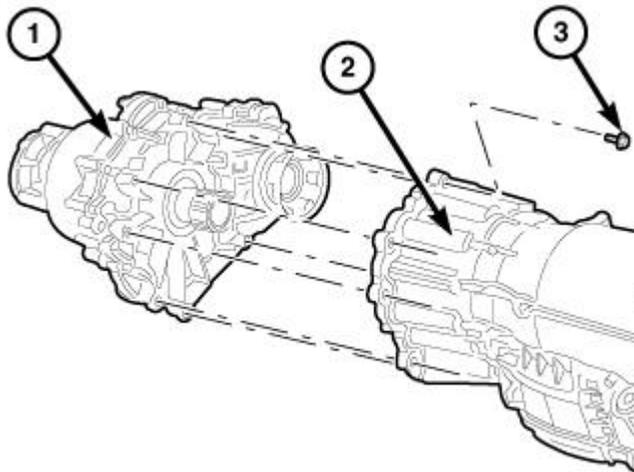
29. Install all torque converter-to-driveplate bolts (3) by hand.
30. Verify that the torque converter is pulled flush to the driveplate. Tighten bolts to 31 N.m (270 in. lbs.).



815006aa

Fig. 96: Structural Dust Cover
Courtesy of CHRYSLER LLC

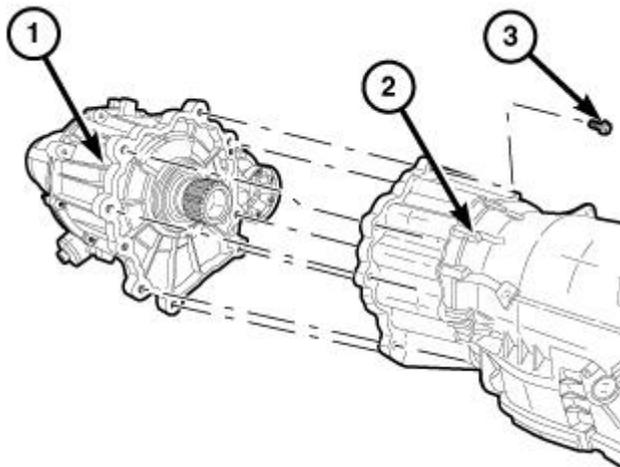
31. Install the structural cover (1), 5.7L shown in illustration. Refer to **COVER, STRUCTURAL DUST, INSTALLATION, 5.7L** .



2969270

Fig. 97: MP2010 Transfer Case, Transmission & Bolts
Courtesy of CHRYSLER LLC

32. If necessary, install the MP2010 transfer case (1). Refer to **INSTALLATION** .



2943842

Fig. 98: MP3023 Transfer Case, Transmission & Bolts
 Courtesy of CHRYSLER LLC

33. If necessary, install the MP3023 transfer case (1). Refer to **INSTALLATION** .
34. Install starter motor. Refer to **STARTER, INSTALLATION** .
35. Install exhaust components.
36. Align and connect propeller shaft(s). Refer to **SHAFT, DRIVE, FRONT, INSTALLATION** and **SHAFT, DRIVE, REAR, INSTALLATION** .
37. Adjust gearshift cable if necessary. Refer to **CABLE, SHIFT, ADJUSTMENTS**.
38. Lower vehicle.
39. Fill transmission with appropriate fluid. Refer to **CAPACITIES AND RECOMMENDED FLUIDS, DESCRIPTION** .

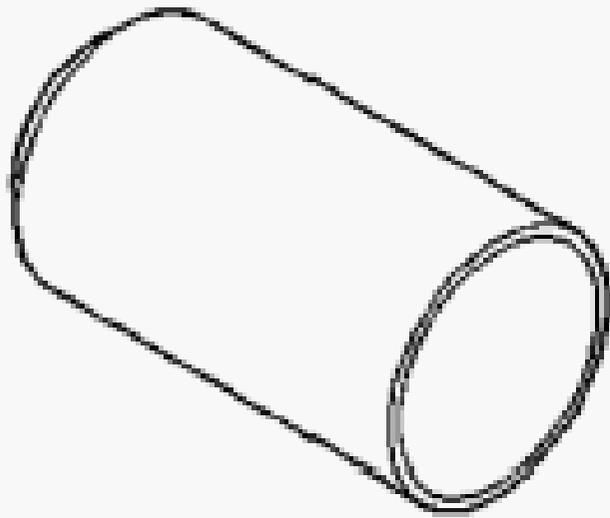
SPECIAL TOOLS

SPECIAL TOOLS

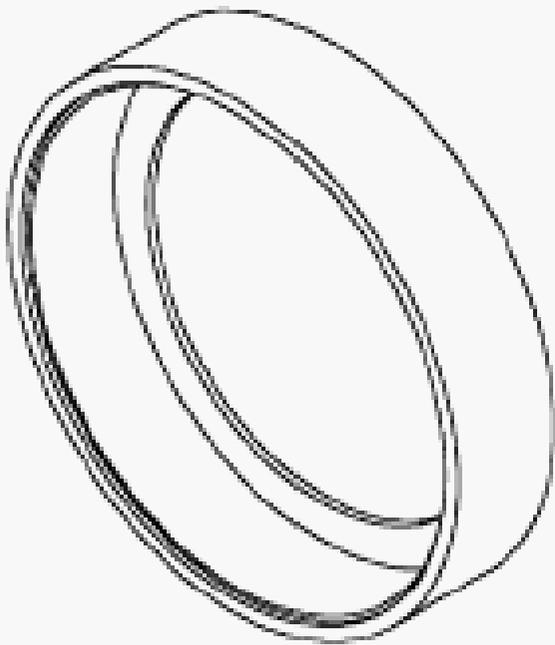
	6756 - Receiver, Ball Joint (Originally Shipped In Kit Number(s) 6745, 6809.)
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2011 Jeep Grand Cherokee

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8249 - Compressor, Spring
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)



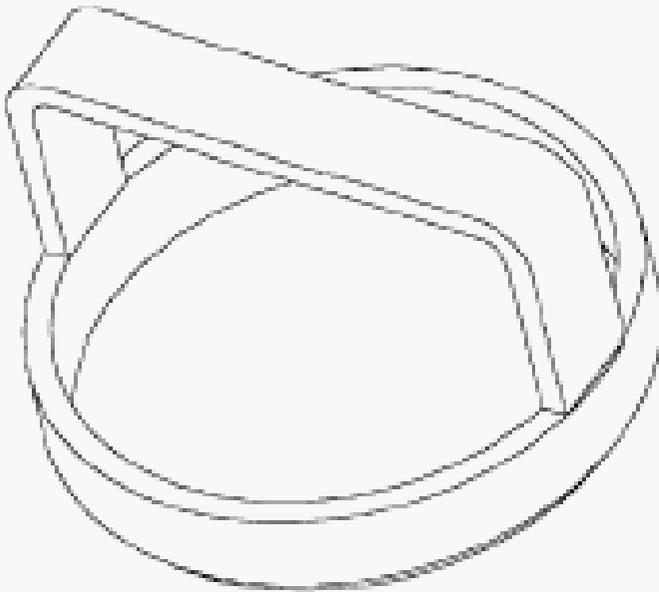
8250 - Compressor, Spring
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

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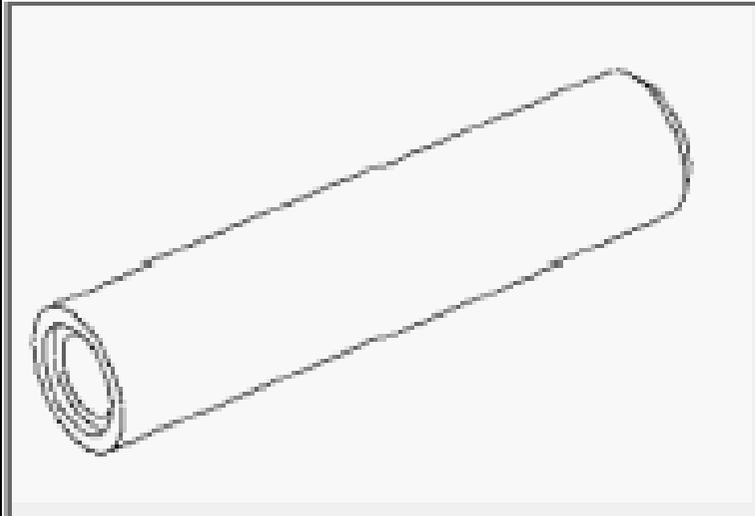
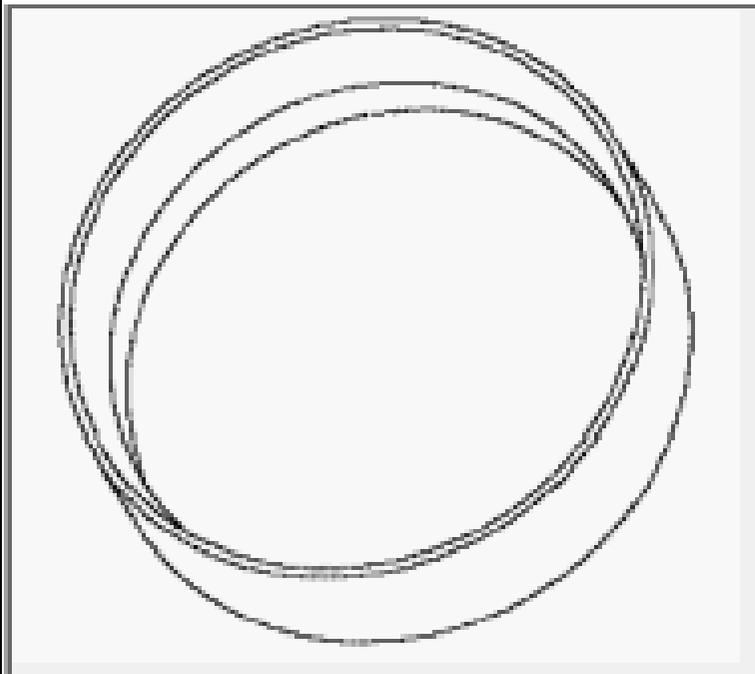
8251 - Compressor, Spring
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)



8252 - Installer
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

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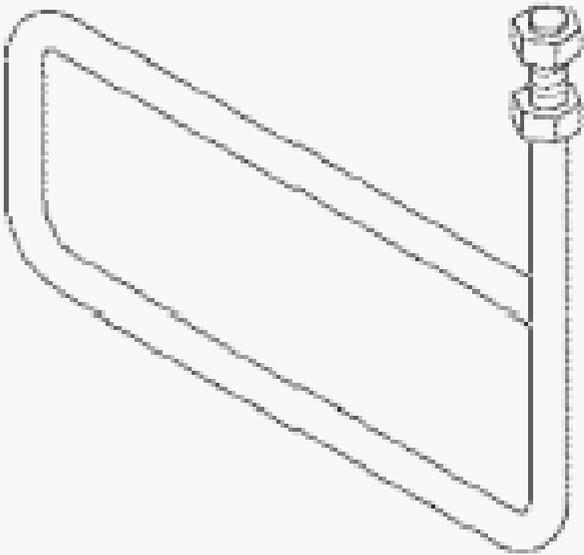
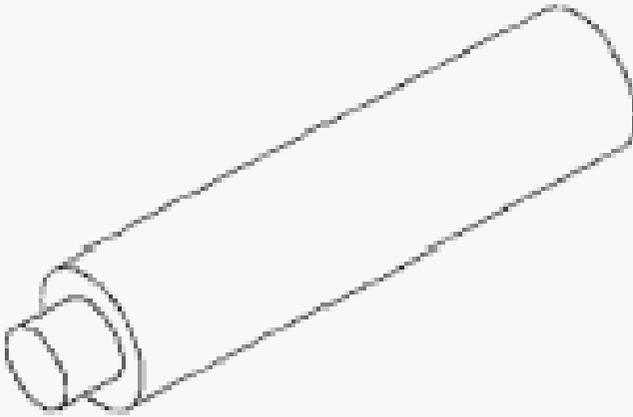


8253 - Installer, Seal
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

8254 - Installer, Grommet
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

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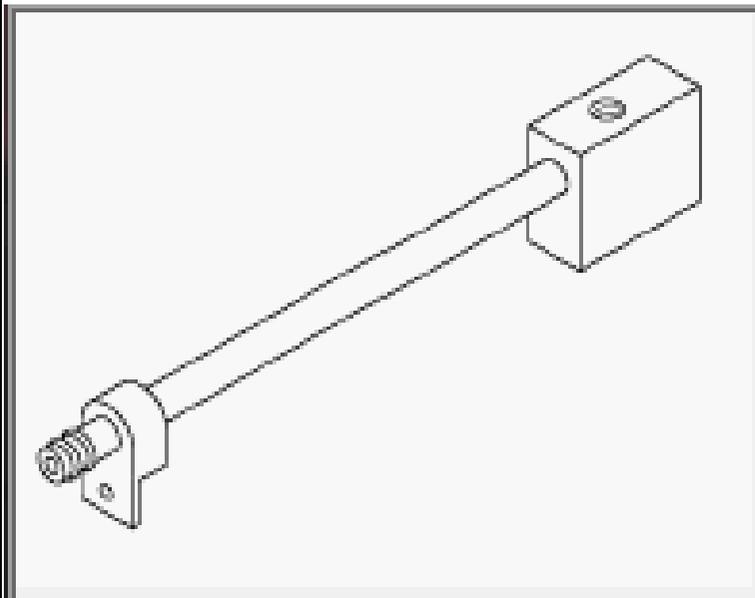


8257 - Support, Transmission
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

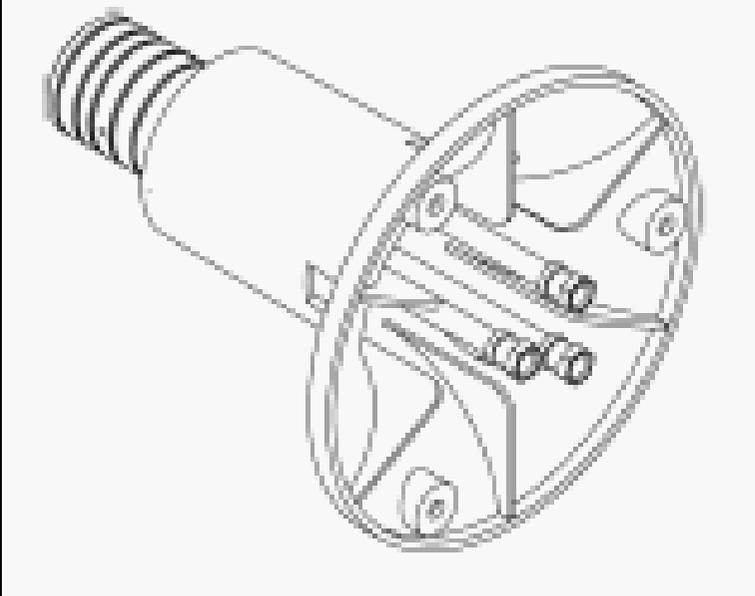
8259 - Adapter, Pressure Test
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

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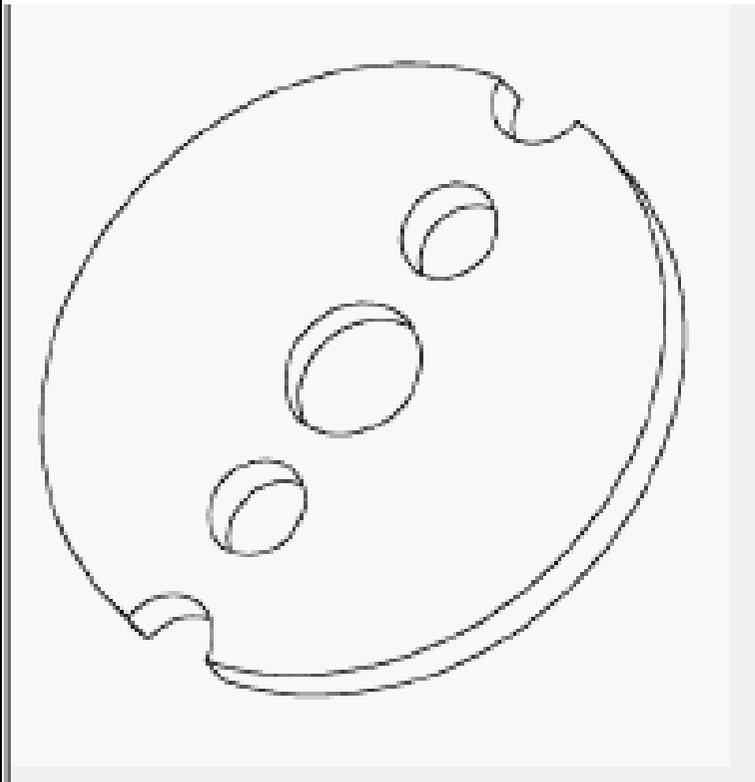
8260A - Fixture, Input Clutch
(Originally Shipped In Kit Number(s)
8260A.)



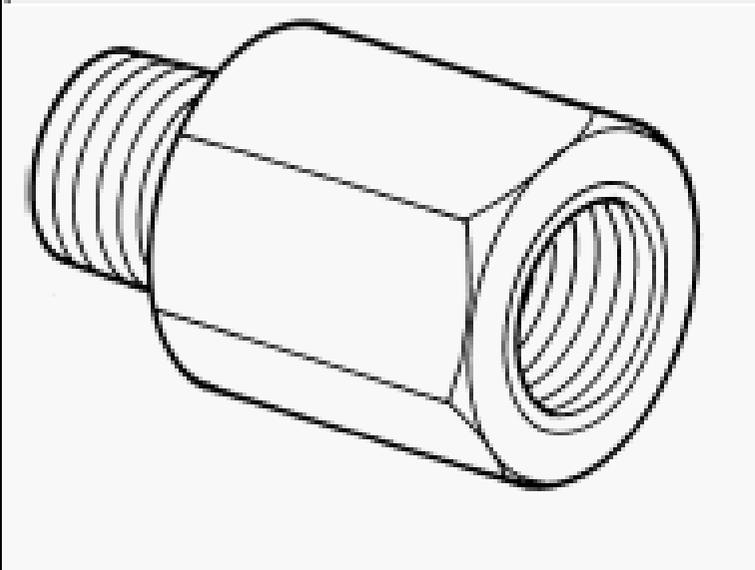
8261 - Plate, Alignment
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

2011 Jeep Grand Cherokee

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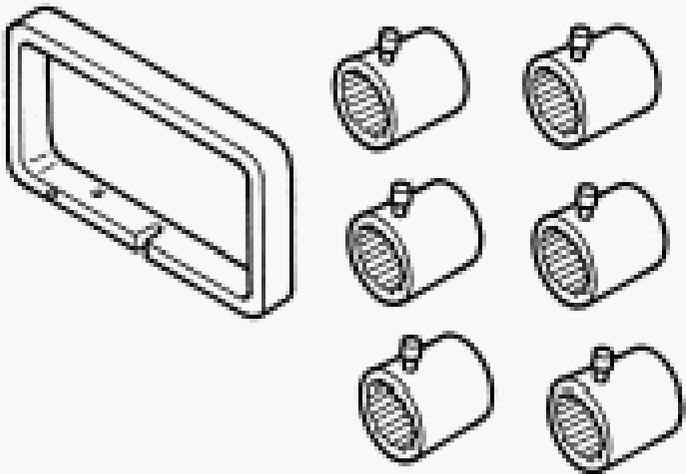
8266-1 - Spline Tool, RFE Input



8266-17 - Spline Tool, RFE Output
(Originally Shipped In Kit Number(s) 8283,
8527, 8575.)

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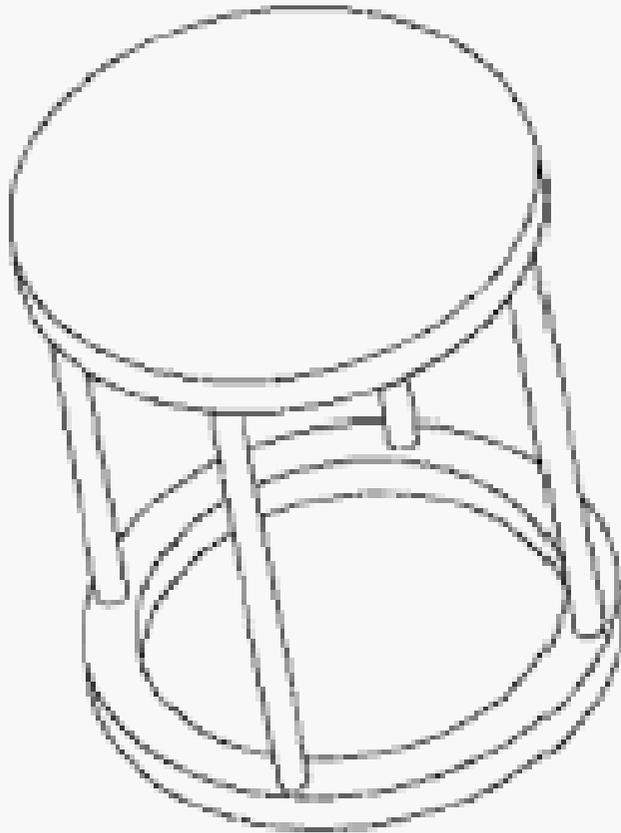


8266B - End Play Socket Set
(Originally Shipped In Kit Number(s) 8283,
8527, 8575, 8575CC.)

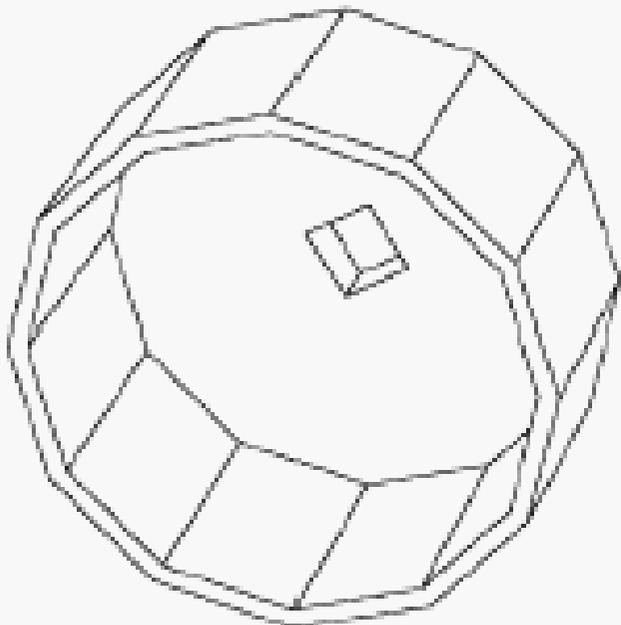
8285 - Compressor, Spring
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)

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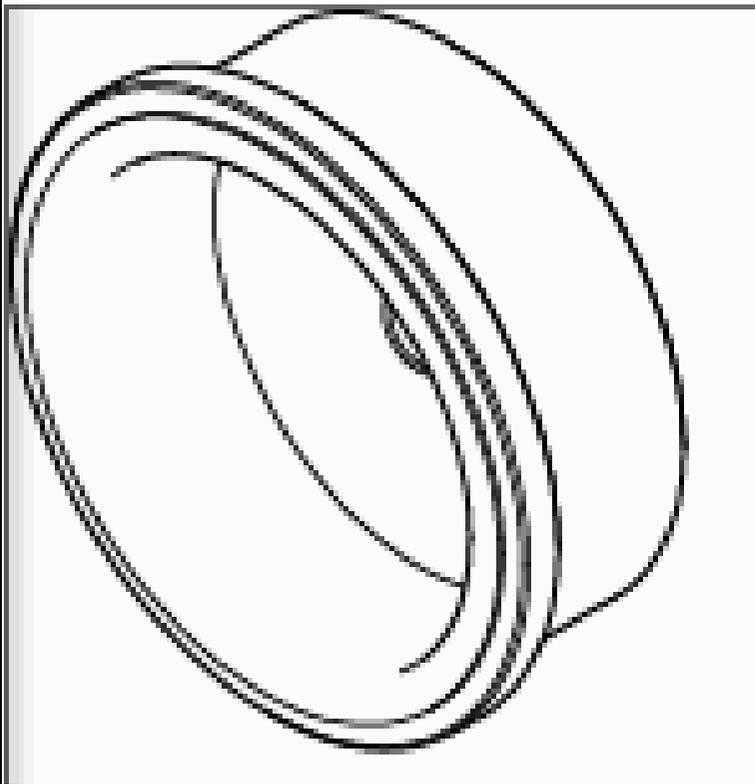
8321 - Wrench, Oil Filter
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)



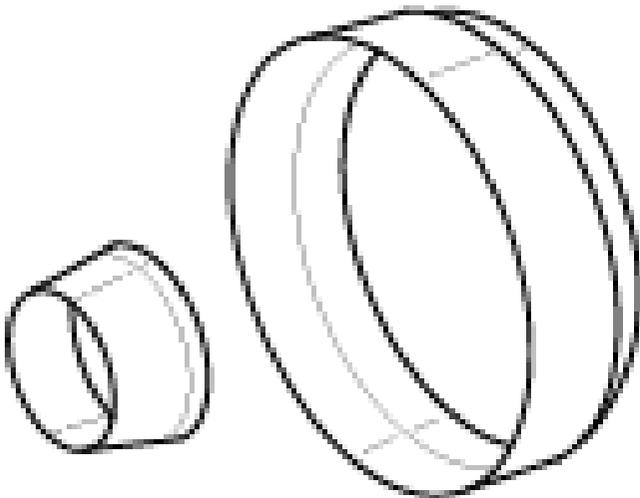
8349-1 - Installer Crank Seal
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC.)

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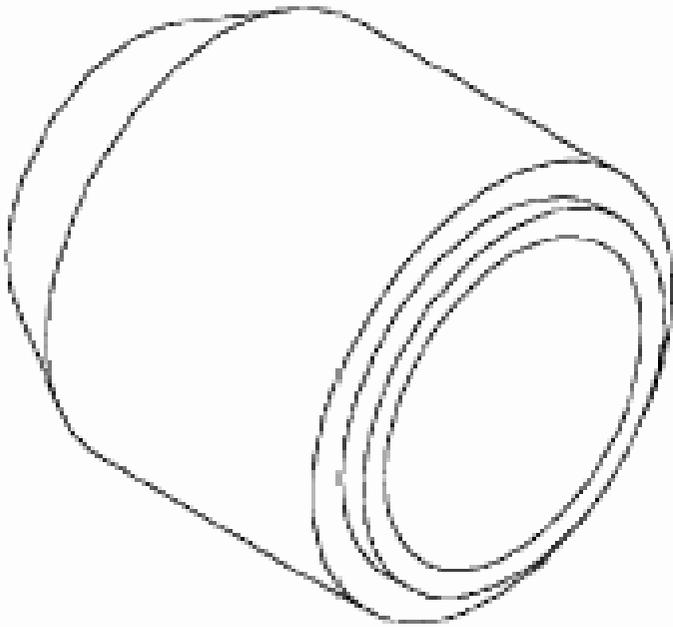
8504 - Installer
(Originally Shipped In Kit Number(s) 8283,
8283CC, 8527, 8527CC, 8575, 8575CC,
9975.)



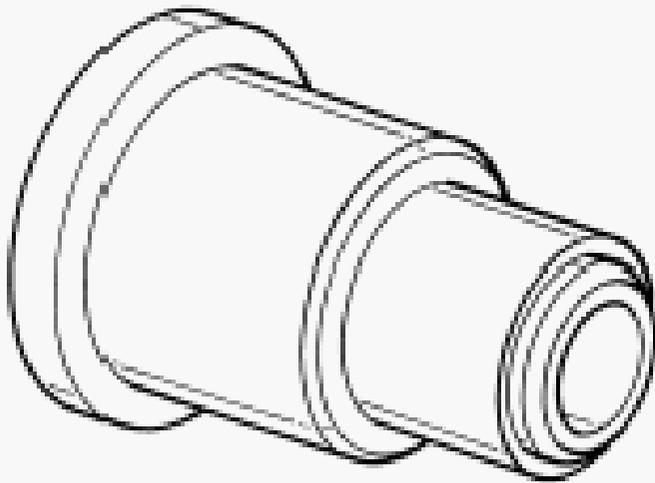
8695 - Installer, Seal
(Originally Shipped In Kit Number(s) 8685,
8685CC, 8712, 8837.)

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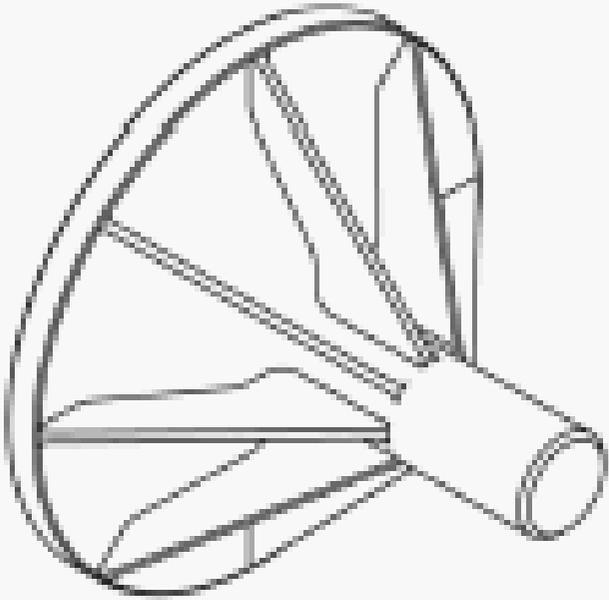
9045 - Installer, Plug
(Originally Shipped In Kit Number(s) 8847,
8850, 8850CC, 8853, 8854, 8854CC.)



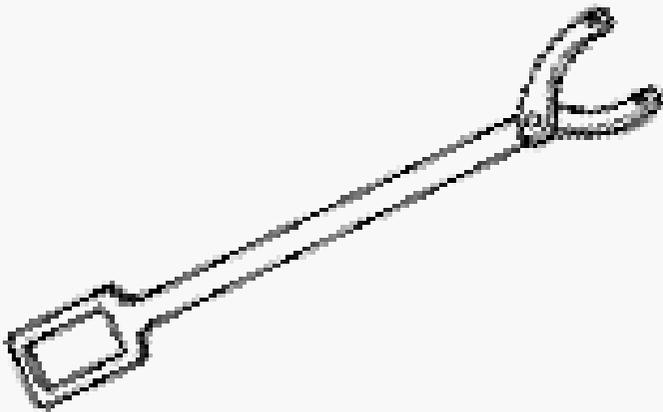
9955 - Installer, Front Cover
(Originally Shipped In Kit Number(s) 9955.)

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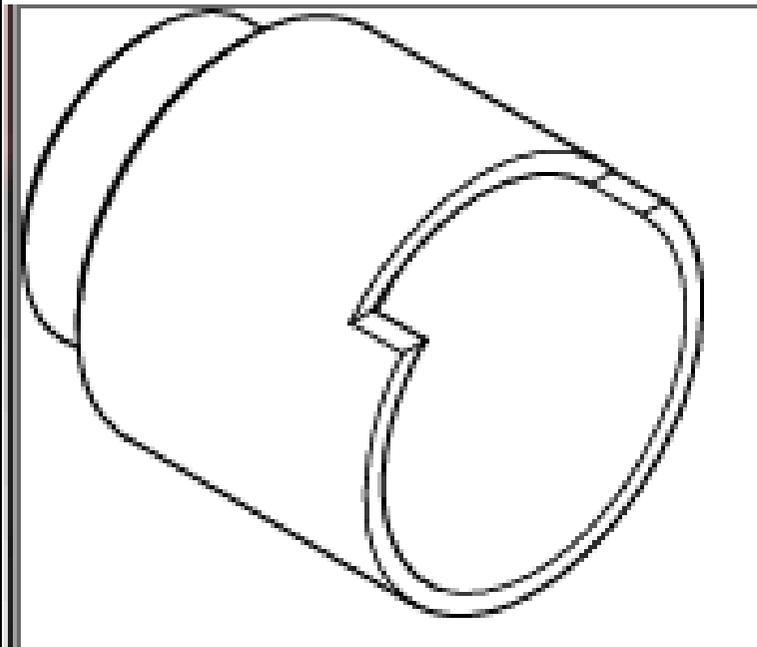
C-3281 - Holder, Flange
(Originally Shipped In Kit Number(s) 9202,
9202A-CAN, 9202CC, 9299, 9299CC,
9299CC, 9300A-CAN.)



C-3293-SP - Gauge, Pressure 0-300 P.S.I.

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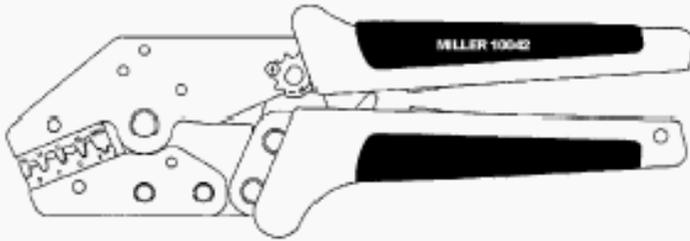
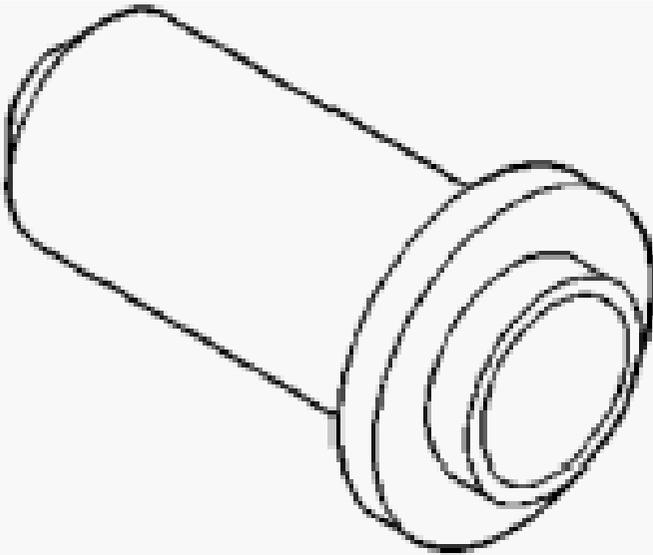
C-3339A - Set, Dial Indicator
(Originally Shipped In Kit Number(s) 9202.)



C-3860-A - Installer, Seal
(Originally Shipped In Kit Number(s) 9695.)

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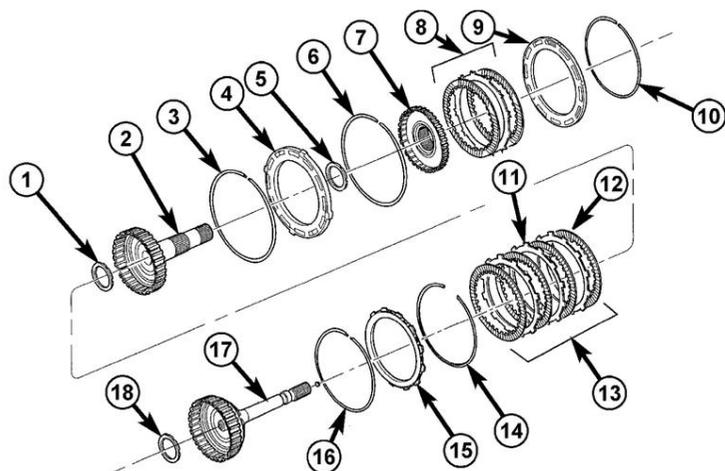


C-4171 - Driver Handle, Universal
(Originally Shipped In Kit Number(s) 9202,
9202A-CAN, 9202CC, 9299, 9299CC,
9299CC, 9300A-CAN.)

ASSEMBLY, INPUT CLUTCH

DESCRIPTION

DESCRIPTION



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Fig. 99: Exploded View of Input Clutch Assembly (1 Of 2)
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH
5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly. Refer to **Fig. 99**.

The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

OPERATION

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, second prime, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the input sun gear.

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct), fourth, and fifth gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the reverse carrier/input annulus assembly.

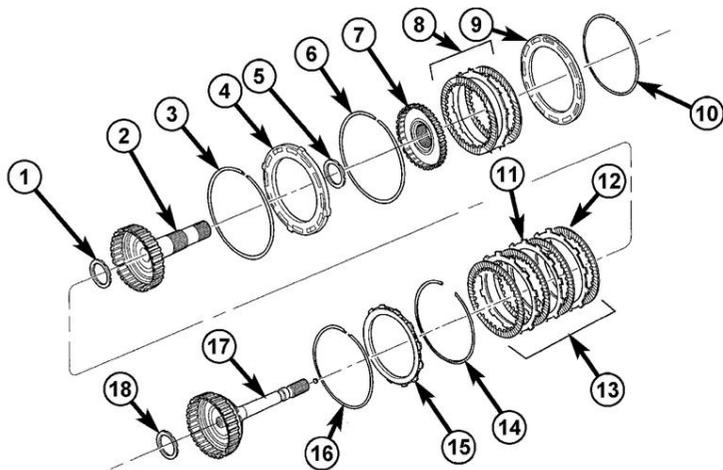
REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the reaction annulus gear is driven.

DISASSEMBLY

DISASSEMBLY

NOTE: If the input clutch assembly is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the Quick Learn Procedure using the scan tool. Refer to MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE .



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Fig. 100: Exploded View of Input Clutch Assembly (1 Of 2)
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH

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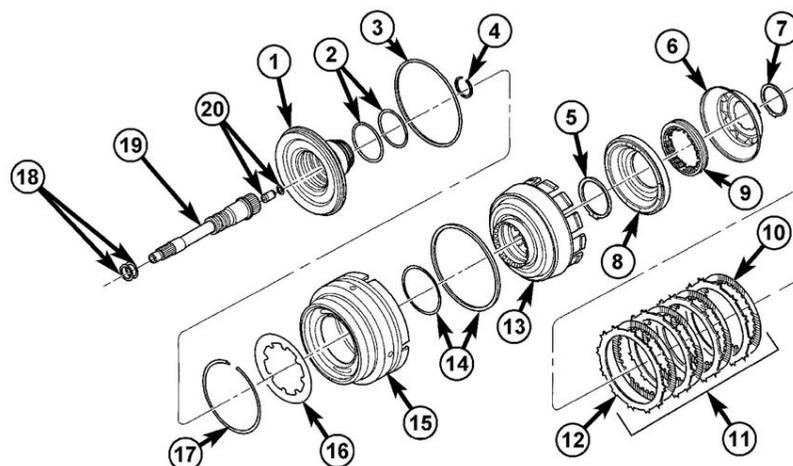
2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

1. Remove the reverse reaction plate selective snap-ring (10) from the input clutch retainer. Refer to **Fig. 100**.
2. Remove the reverse reaction plate (9) from the input clutch retainer.
3. Remove the reverse hub (7) and reverse clutch pack (8) from the input clutch retainer.
4. Remove the number 4 thrust bearing (5) from the overdrive hub (2).
5. Remove the overdrive hub (2) from the input clutch retainer. Refer to **Fig. 100**.
6. Remove the number 3 thrust bearing (1) from the underdrive hub (17).
7. Remove the OD/reverse pressure plate snap-ring (6) from the from the OD/reverse piston.
8. Remove the underdrive hub (17), overdrive clutch (13), and overdrive reaction plate (15) from the input clutch retainer. Refer to **Fig. 100**.

NOTE: The overdrive friction discs and steel discs are thicker than the matching components in the underdrive and reverse clutches.

9. Remove the number 2 thrust bearing (18) from the input clutch hub.
10. Remove the overdrive clutch wave snap-ring (3) from the from the OD/reverse piston.
11. Remove the UD/OD reaction plate tapered snap-ring (14) from the input clutch retainer (13).
12. Remove the UD/OD reaction plate (15) from the input clutch retainer.
13. Remove the UD/OD reaction plate flat snap-ring (16) from the input clutch retainer. Refer to **Fig. 100**.



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Fig. 101: Exploded View of Input Clutch Assembly (2 Of 2)
Courtesy of CHRYSLER LLC

1 - INPUT CLUTCH HUB

11 - UD CLUTCH

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2 - O-RING SEALS	12 - PLATE
3 - SEAL	13 - CLUTCH RETAINER
4 - SNAP-RING	14 - SEAL
5 - SNAP-RING	15 - OD/REV PISTON
6 - UD BALANCE PISTON	16 - BELLEVILLE SPRING
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING

14. Remove the underdrive clutch pack (11) from the input clutch retainer (13). Refer to **Fig. 101**.

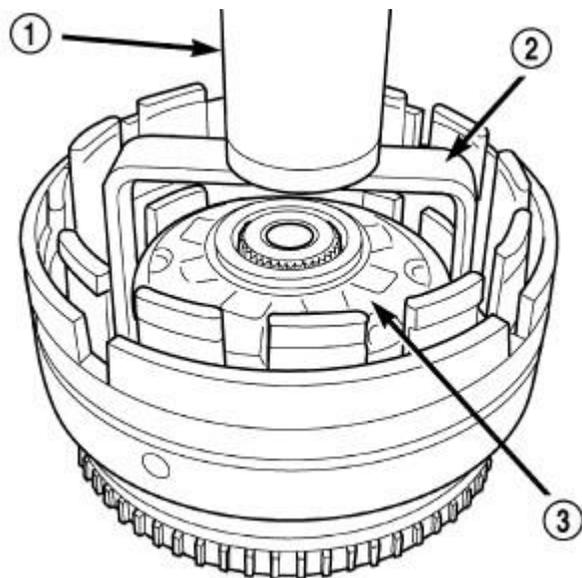
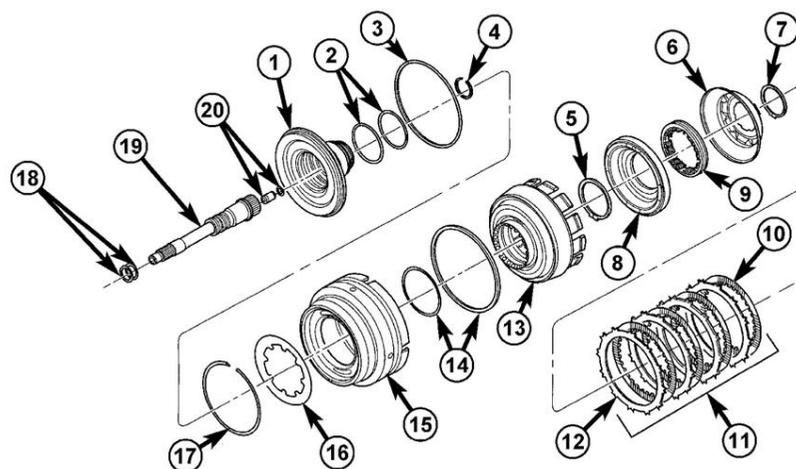


Fig. 102: Compressing UD Balance Piston
Courtesy of CHRYSLER LLC

1 - PRESS
2 - TOOL 8251
3 - BALANCE PISTON

15. Using Spring Compressor (special tool #8251, Compressor, Spring) (2), compress the UD balance piston (3) and remove the snap-ring from the input clutch hub. Refer to **Fig. 102**.



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Fig. 103: Exploded View of Input Clutch Assembly (2 Of 2)
 Courtesy of CHRYSLER LLC

1 - INPUT CLUTCH HUB	11 - UD CLUTCH
2 - O-RING SEALS	12 - PLATE
3 - SEAL	13 - CLUTCH RETAINER
4 - SNAP-RING	14 - SEAL
5 - SNAP-RING	15 - OD/REV PISTON
6 - UD BALANCE PISTON	16 - BELLEVILLE SPRING
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING

16. Remove the UD balance piston (6) and piston return spring (9) from the input clutch retainer (13). Refer to **Fig. 103**.
17. Remove the underdrive piston (8) from the input clutch retainer (13). Refer to **Fig. 103**.

NOTE: Both the UD balance piston and the underdrive piston have seals molded onto them. If the seal is damaged, do not attempt to install a new seal onto the piston. The piston/seal must be replaced as an assembly.

18. Remove the input clutch retainer tapered snap-ring (5).
19. Separate input clutch retainer (13) from input clutch hub (1).
20. Separate OD/reverse piston (15) from input clutch hub retainer (13).

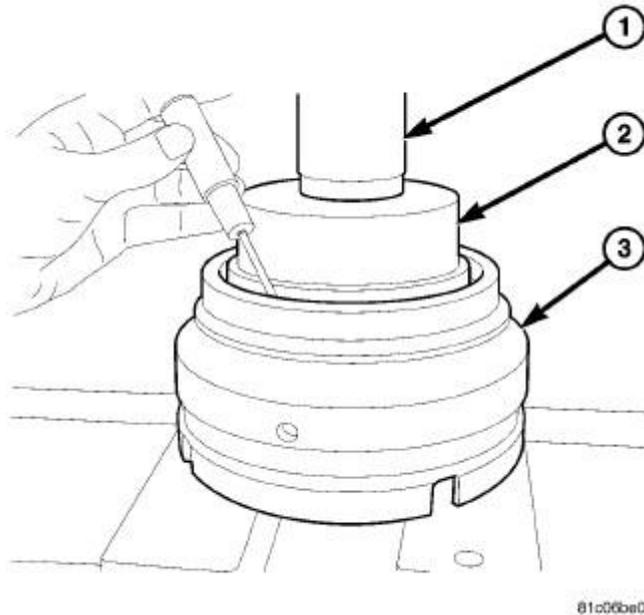


Fig. 104: Press, Special Tool & OD/Reverse Piston
Courtesy of CHRYSLER LLC

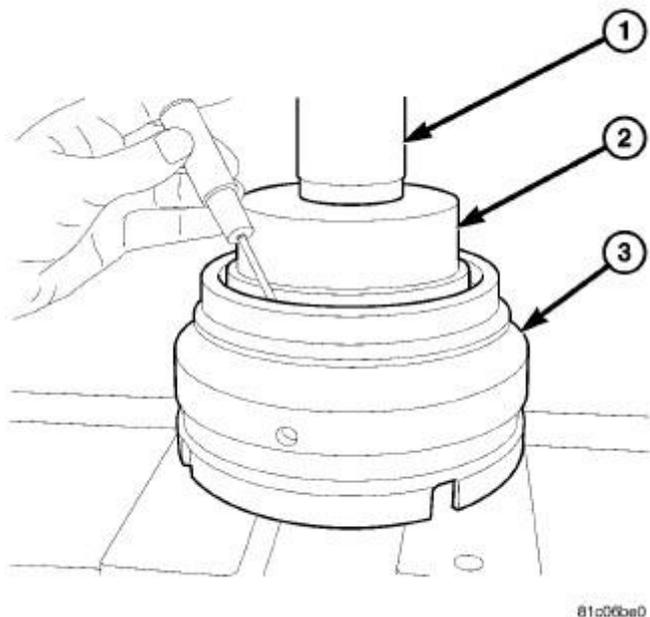
- | |
|---|
| 1 - ARBOR PRESS
2 - TOOL 8349-1
3 - OD / REVERSE PISTON |
|---|

21. Using Arbor Press (1) and tool (special tool #8349-1, Installer Crank Seal) (2) compress the OD / Reverse belleville spring just enough to remove the snap ring.
22. Remove the belleville spring and snap ring from the OD / Reverse piston (3).
23. Remove all seals and o-rings from the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to make note of which o-ring belongs in which location.

ASSEMBLY

ASSEMBLY

- NOTE:** When installing the OD / Reverse piston belleville spring, orientate it such that it contacts a new surface on the piston.

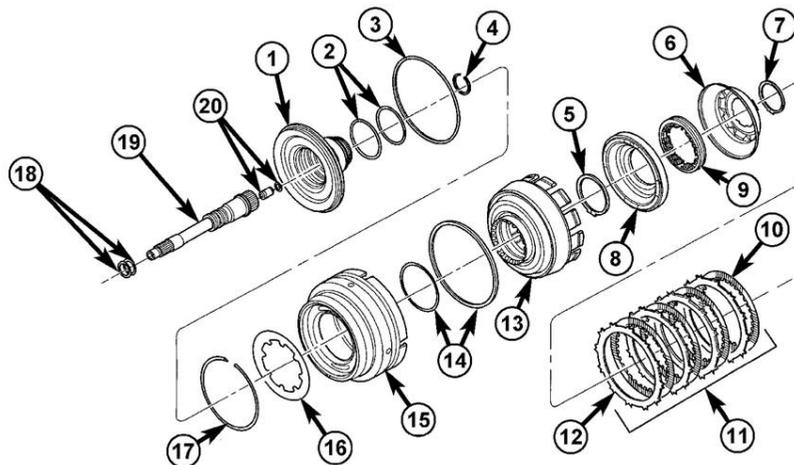


81c06be0

Fig. 105: Press, Special Tool & OD/Reverse Piston
 Courtesy of CHRYSLER LLC

- 1 - ARBOR PRESS
- 2 - TOOL 8349-1
- 3 - OD / REVERSE PISTON

1. Install the belleville spring and snap ring loosely onto the OD / Reverse piston (3).
2. Using an Arbor Press (1) and tool (special tool #8349-1, Installer Crank Seal) (2) compress the belleville spring just enough to install the snap ring.



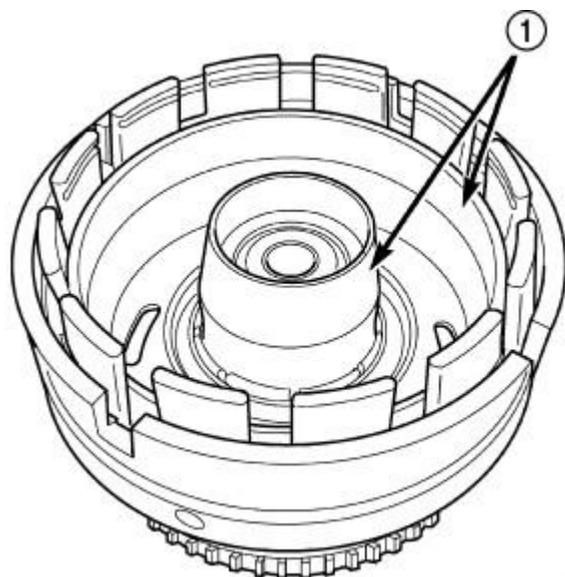
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Fig. 106: Exploded View of Input Clutch Assembly (2 Of 2)
 Courtesy of CHRYSLER LLC

1 - INPUT CLUTCH HUB	11 - UD CLUTCH
2 - O-RING SEALS	12 - PLATE
3 - SEAL	13 - CLUTCH RETAINER
4 - SNAP-RING	14 - SEAL
5 - SNAP-RING	15 - OD/REV PISTON
6 - UD BALANCE PISTON	16 - BELLEVILLE SPRING
7 - SNAP-RING	17 - SNAP-RING
8 - UD PISTON	18 - SEAL RINGS
9 - SPRING	19 - INPUT SHAFT
10 - DISC	20 - LUBRICATION CHECK VALVE AND SNAP-RING

NOTE: Install all new seals and o-rings onto the input shaft and input hub. The o-rings on the input hub are color coded. Be sure to install the correct o-ring in the correct location.

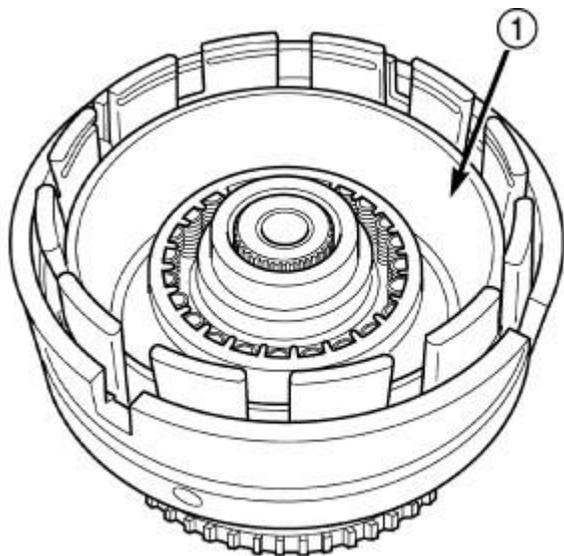
3. Check the transmission lubrication check valve (20) located in the input shaft using shop air. The valve should only allow air flow in one direction. If the valve allows no air flow, or air flow in both directions, the valve will need to be replaced.
4. Lubricate all seals with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.
5. Assemble the OD/reverse piston (15) onto the input clutch hub (1). Refer to **Fig. 106**.
6. Assemble the input clutch retainer (13) onto the input clutch hub (1).
7. Install the input clutch retainer tapered snap-ring (5) with tapered side up onto the input clutch hub (1).



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Fig. 107: Install Underdrive Piston Using Tool 8504
Courtesy of CHRYSLER LLC

8. Install Piston Installer (special tool #8504, Installer) (1) into the input clutch retainer and onto the input clutch hub to guide the inner and outer underdrive piston seals into position. Refer to **Fig. 107**.
9. Install the underdrive piston into the input clutch retainer and over the input clutch hub.

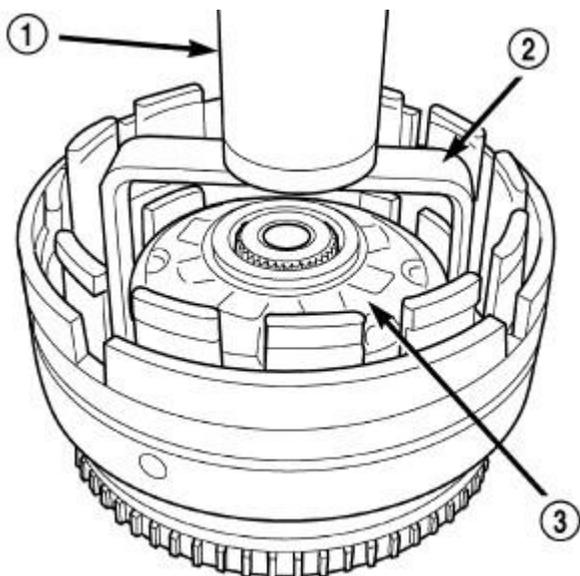


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Fig. 108: Installing UD Balance Piston Seal
 Courtesy of CHRYSLER LLC

1 - TOOL 8252

10. Install the UD balance piston return spring pack into the input clutch retainer.
11. Install Piston Installer (special tool #8252, Installer) (1) into the input clutch retainer to guide the UD balance piston seal into position inside the underdrive piston. Refer to **Fig. 108**.



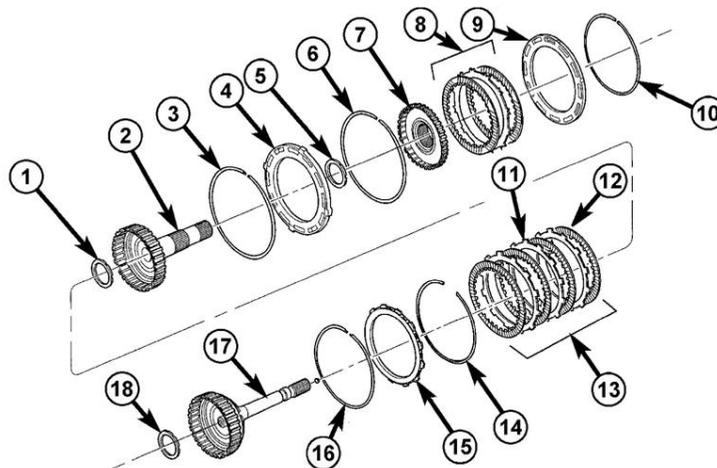
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Fig. 109: Compressing UD Balance Piston
 Courtesy of CHRYSLER LLC

1 - PRESS
2 - TOOL 8251
3 - BALANCE PISTON

NOTE: The UD clutch discs can be identified by their cross-hatched groove pattern (two sets of parallel grooves at 90 degrees to each other). The UD separator plates can be identified by semi-circular cutouts on the edges of the teeth. The reverse clutch and UD clutch use common separator plates.

12. Install the UD balance piston (3) into the input clutch retainer and the underdrive piston.
13. Using Spring Compressor (special tool #8251, Compressor, Spring) (2), compress the UD return spring pack and secure the piston in place with the snap-ring. Refer to **Fig. 109**.
14. Install the underdrive clutch pack into the input clutch retainer.



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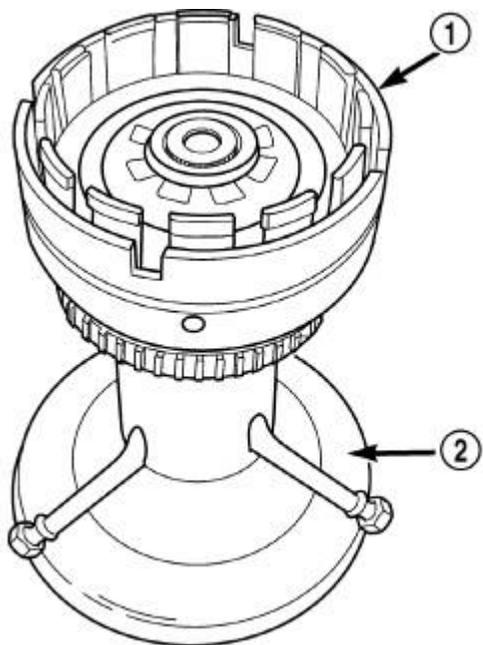
Fig. 110: Exploded View of Input Clutch Assembly (1 Of 2)
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH
5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

15. Install the UD reaction plate lower flat snap-ring (16). Refer to **Fig. 110**. The correct snap-ring can be

identified by the two tabbed ears.

16. Install the UD reaction plate (15) into the input clutch retainer. The reaction plate is to be installed with the big step down.
17. Install the UD reaction plate upper tapered snap-ring (14) with tapered side up.

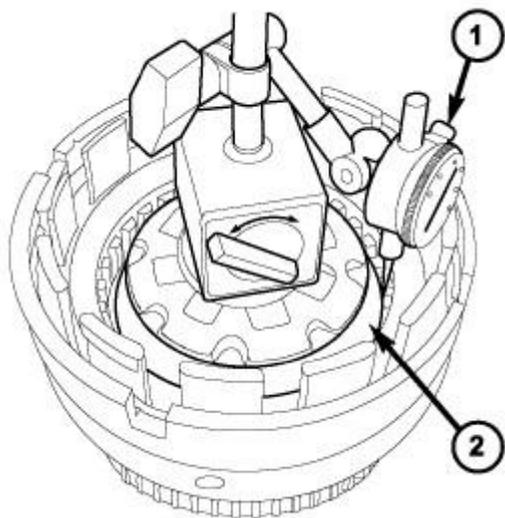


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Fig. 111: Input Clutch Assembly Mounted On Tool 8260
Courtesy of CHRYSLER LLC

1 - INPUT CLUTCH ASSEMBLY
2 - TOOL 8260A

18. Install the input clutch assembly into Input Clutch Pressure Fixture (special tool #8260A, Fixture, Input Clutch) (2). Refer to **Fig. 111**.



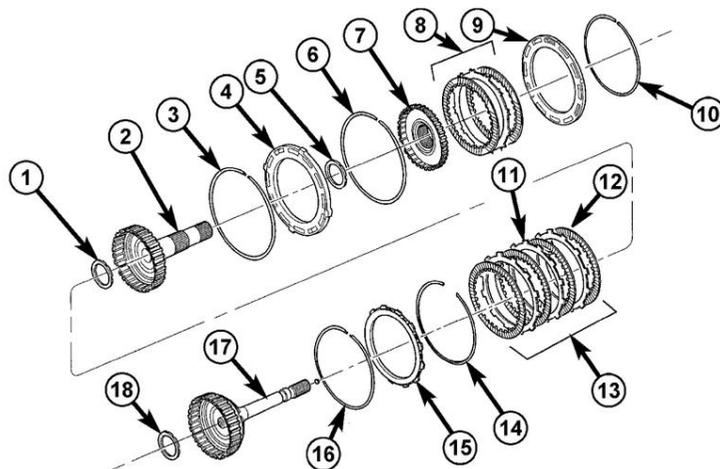
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Fig. 112: Measuring UD Clutch Clearance
 Courtesy of CHRYSLER LLC

1 - TOOL C-3339

2 - UNDERDRIVE CLUTCH PACK

19. Mount a dial indicator (special tool #C-3339A, Set, Dial Indicator) (1) on the input clutch hub. Push down on the UD clutch discs and zero the indicator against the underdrive clutch discs. Refer to **Fig. 112**. Apply 20 psi of air pressure to the underdrive clutch and record the dial indicator reading. Measure and record UD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with UD clutch pack clearance specification. The correct clutch clearance is 0.84-1.54 mm (0.033-0.061 in.). The reaction plate is not selective. If the clutch clearance is not within specification, replace the reaction plate along with all the friction and steel discs.



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Fig. 113: Exploded View of Input Clutch Assembly (1 Of 2)
 Courtesy of CHRYSLER LLC

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1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH
5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

20. Install the overdrive clutch pack (13) into the input clutch retainer. Refer to **Fig. 113**. The overdrive steel separator plates can be identified by the lack of the half-moon cuts in the locating tabs. The OD clutch discs can be identified by their radial groove pattern. The OD clutch discs can be identified by their radial groove pattern.
21. Install the overdrive clutch wavy snap-ring (3) with the two tabbed ears into the OD/reverse piston. Refer to **Fig. 113**.
22. Install the OD/reverse pressure plate (4) into the input clutch retainer. Refer to **Fig. 113**. The pressure plate is non-directional.
23. Install the OD/reverse reaction plate flat snap-ring (6) into the OD/reverse piston.

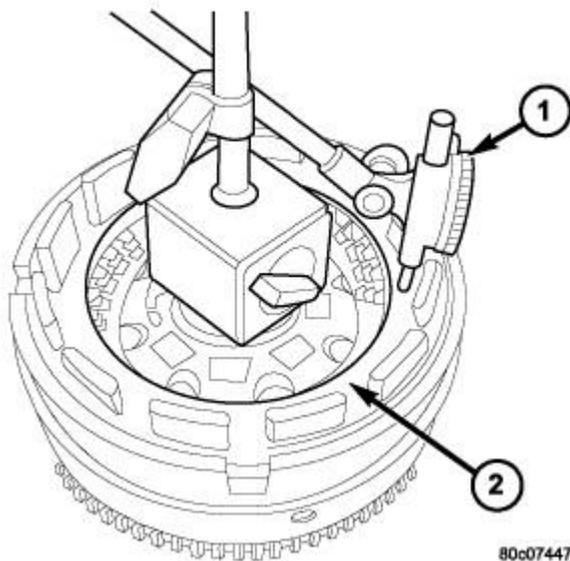


Fig. 114: Measuring OD Clutch Clearance
Courtesy of CHRYSLER LLC

1 - TOOL C-3339
2 - OD/REV REACTION PLATE

24. Mount a dial indicator (special tool #C-3339A, Set, Dial Indicator) (1) on the input clutch hub and zero the indicator against the OD/reverse pressure plate (2). Refer to **Fig. 114**. Apply 20 psi of air pressure to

the overdrive clutch and record the dial indicator reading. Measure and record OD clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with OD clutch pack clearance specification. Verify that the clutch clearance is 1.103-1.856 mm (0.043-0.073 in.). The pressure plate is not selective. If the clutch clearance is not within specification, replace the pressure plate along with all the friction and steel discs.

25. Install the reverse clutch pack into the input clutch retainer. Refer to **Fig. 110**.
26. Install the reverse reaction plate into the input clutch retainer.
27. Install the reverse reaction plate selective snap-ring into the input clutch retainer.

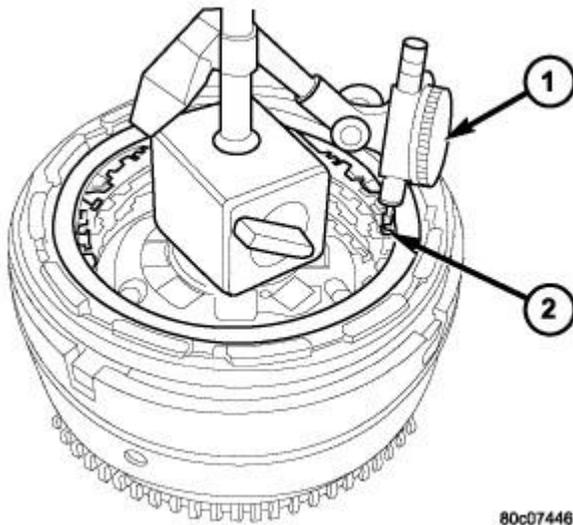


Fig. 115: Measuring Reverse Clutch Clearance
Courtesy of CHRYSLER LLC

1 - TOOL C-3339

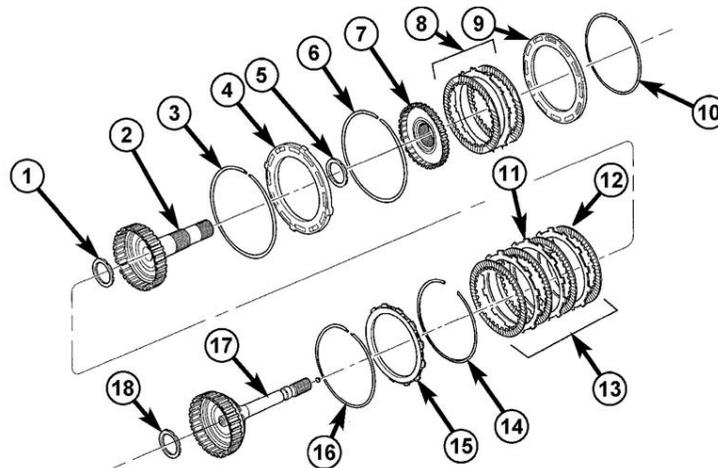
2 - REVERSE CLUTCH PACK

28. Mount a dial indicator to the assembly, push down on the clutch discs, pull up on the reaction plate to ensure the plate is properly seated and zero the indicator against the reverse clutch discs (2). Refer to **Fig. 115**. Apply 20 psi of air pressure to the reverse clutch and record the dial indicator reading. Measure and record Reverse clutch pack measurement in four (4) places, 90° apart. Take average of four measurements and compare with Reverse clutch pack clearance specification. The correct clutch clearance is 0.81-1.24 mm (0.032-0.049 in.). Adjust as necessary. Install the chosen snap-ring and re-measure to verify selection.

NOTE: The 545RFE uses one of three (3) different selective snap rings. They are identified by the end cuts (either straight [square] cut or "butterfly" [S-curved] cut):

SELECTABLE END PLAY SNAP RINGS

- One Square End, One Buttery Fly End = 1.55 mm (0.061 in.)
- Both Ends Square Cut = 1.85 mm (0.073 in.)
- Both Ends Buttery Fly Cut = 2.2 mm (0.087 in.)



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Fig. 116: Exploded View of Input Clutch Assembly (1 Of 2)
 Courtesy of CHRYSLER LLC

1 - THRUST BEARING NUMBER 3	10 - SNAP-RING (SELECT)
2 - OD HUB/SHAFT	11 - PLATE
3 - SNAP-RING (WAVE)	12 - DISC
4 - REV/OD REACTION PLATE	13 - OD CLUTCH
5 - THRUST BEARING NUMBER 4	14 - SNAP-RING (TAPERED)
6 - SNAP-RING (FLAT)	15 - UD/OD REACTION PLATE
7 - REVERSE HUB/SHAFT	16 - SNAP-RING (FLAT)
8 - REVERSE CLUTCH	17 - UD HUB/SHAFT
9 - REVERSE REACTION PLATE	18 - THRUST BEARING NUMBER 2

- Remove the reverse clutch pack (8) from the input clutch retainer. Refer to **Fig. 116**.
- Install the number 2 thrust bearing (18) onto the underdrive hub (17) with outer race against the hub with petroleum jelly.
- Install the underdrive hub (17) into the input clutch retainer.
- Install the number 3 thrust bearing (1) into the overdrive hub (2) with the outer race against the hub with petroleum jelly. Refer to **Fig. 116**.
- Install the overdrive hub (2) into the input clutch retainer.
- Install the number 4 thrust bearing (5) into the reverse hub with outer race against the hub with petroleum jelly.
- Install the reverse hub (7) into the input clutch retainer.
- Install the complete reverse clutch pack (8).
- Install the reverse reaction plate (9) and snap-ring (10).
- Push up on reaction plate to allow reverse clutch to move freely.

ASSEMBLY, TRANSMISSION SOLENOID AND TRS

DESCRIPTION

DESCRIPTION

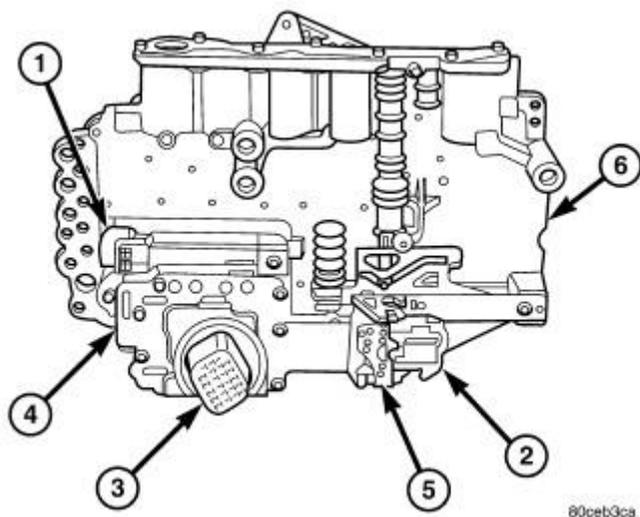


Fig. 117: Transmission Solenoid/TRS Assembly
Courtesy of CHRYSLER LLC

1 - PRESSURE CONTROL SOLENOID
2 - TRANSMISSION RANGE SELECTOR PLATE
3 - 23-WAY CONNECTOR
4 - SOLENOID PACK
5 - TRANSMISSION RANGE SENSOR
6 - VALVE BODY

The transmission solenoid/TRS assembly is internal to the transmission and mounted on the valve body assembly. Refer to **Fig. 117**. The assembly consists of six solenoids that control hydraulic pressure to the six friction elements (transmission clutches), and the torque converter clutch. The pressure control solenoid is located on the side of the solenoid/TRS assembly. The solenoid/TRS assembly also contains the Transmission Range Sensor (TRS) and five pressure switches that feed information to the TCM.

OPERATION

OPERATION

SOLENOIDS

Solenoids are used to control the L/R, 2C, 4C, OD, and UD friction elements. The reverse clutch is controlled by line pressure and the position of the manual valve in the valve body. All the solenoids are contained within

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the Solenoid and Pressure Switch Assembly. The solenoid and pressure switch assembly contains one additional solenoid, Multi-Select (MS), which serves primarily to provide 2nd and 3rd gear limp-in operation.

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The TCM energizes or operates the solenoids individually by grounding the return wire of the solenoid as necessary. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The MS and UD solenoids are normally applied to allow transmission limp-in in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the TCM during this test. If no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The TCM relies on five pressure switches to monitor fluid pressure in the L/R, 2C, 4C, UD, and OD hydraulic circuits. The primary purpose of these switches is to help the TCM detect when clutch circuit hydraulic failures occur. The switches close at approximately 23 psi and open at approximately 11 psi, and simply indicate whether or not pressure exists. The switches are continuously monitored by the TCM for the correct states (open or closed) in each gear as shown in the following chart:

GEAR	L/R	2C	4C	UD	OD
R	OP	OP	OP	OP	OP
P/N	CL	OP	OP	OP	OP
1ST	CL*	OP	OP	CL	OP
2ND	OP	CL	OP	CL	OP
2ND PRIME (ERS 3RD)	OP	OP	CL	CL	OP
3RD (ERS 4TH)	OP	OP	OP	CL	CL
4TH (ERS 5TH)	OP	OP	CL	OP	CL
5TH (ERS D)	OP	CL	OP	OP	CL

*L/R is closed if output speed is below 100 rpm in Drive and Manual 2. L/R is open in Manual 1.

A Diagnostic Trouble Code (DTC) will set if the TCM senses any switch open or closed at the wrong time in a given gear.

REMOVAL

REMOVAL

NOTE: If the Transmission Solenoid/TRS Assembly is being replaced, the Quick Learn Procedure must be performed. Refer to **MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE** .

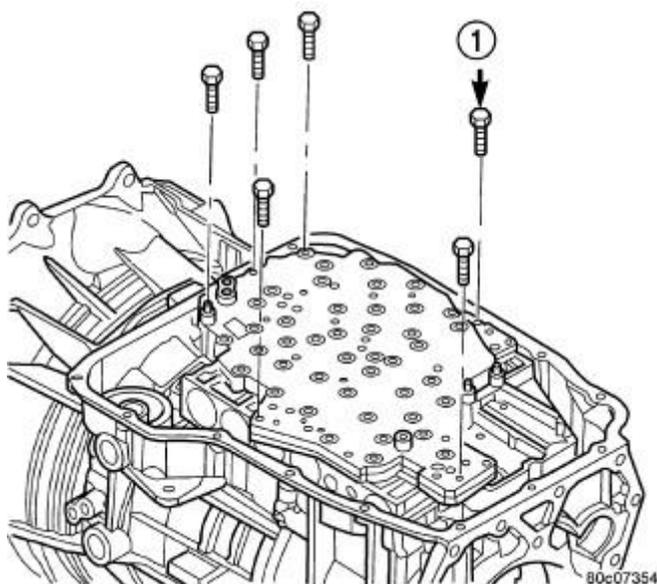


Fig. 118: Valve Body Bolts
Courtesy of CHRYSLER LLC

1 - VALVE BODY TO CASE BOLT (6)

1. Remove the valve body from the transmission. Refer to **Fig. 118** and **VALVE BODY, REMOVAL**.

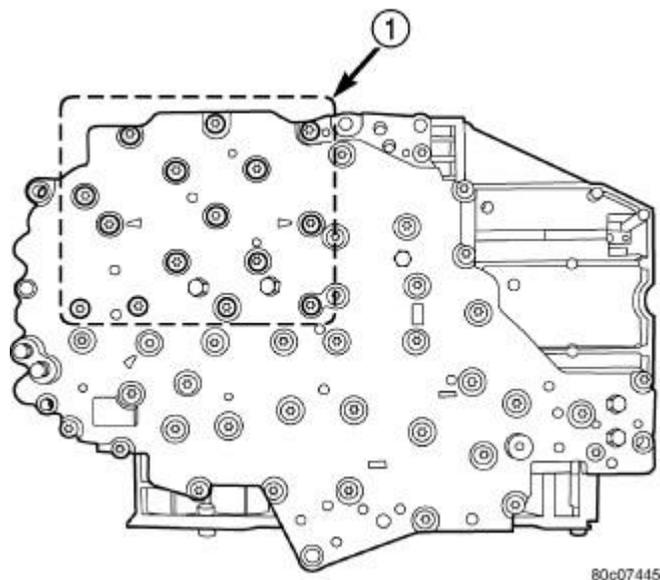


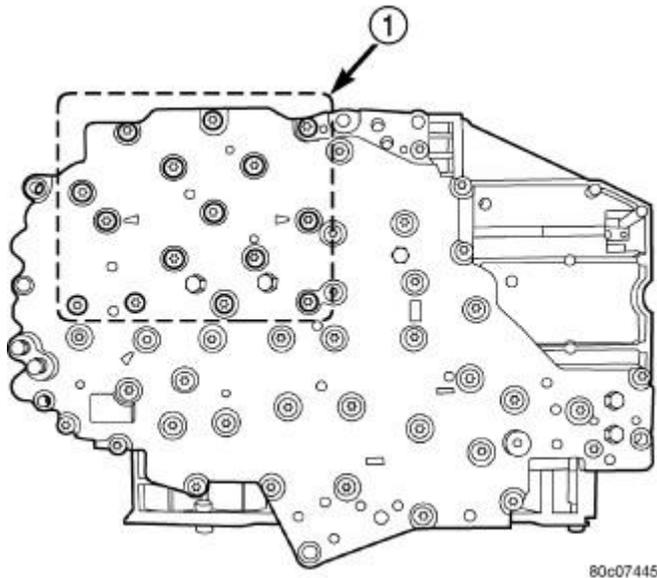
Fig. 119: Solenoid Pack Bolts
Courtesy of CHRYSLER LLC

1 - SOLENOID PACK BOLTS (15)

2. Remove the bolts (1) holding the transmission solenoid/TRS assembly onto the valve body. Refer to **Fig.**

119.

3. Separate the transmission solenoid/TRS assembly from the valve body.

INSTALLATION**INSTALLATION**

80c07445

Fig. 120: Solenoid Pack Bolts
 Courtesy of CHRYSLER LLC

1 - SOLENOID PACK BOLTS (15)

1. Place TRS selector plate in the PARK position.
2. Position the transmission solenoid/TRS assembly onto the valve body. Be sure that both alignment dowels are fully seated in the valve body and that the TRS switch contacts are properly positioned in the selector plate
3. Install the bolts (1) to hold the transmission solenoid/TRS assembly onto the valve body. Refer to **Fig. 120**.
4. Tighten the solenoid assembly screws adjacent to the arrows cast into the bottom of the valve body first. Tighten the screws to 6 N.m (50 in.lbs.).
5. Tighten the remainder of the solenoid assembly screws to 6 N.m (50 in.lbs.).
6. Install the valve body into the transmission.

CABLE, SHIFT**DIAGNOSIS AND TESTING****GEARSHIFT CABLE**

1. The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
2. Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
3. With floor shift lever handle push-button not depressed and lever in in:
 1. PARK position - Apply forward force on center of handle and remove pressure. Engine starts must be possible.
 2. PARK position - Apply rearward force on center of handle and remove pressure. Engine starts must be possible.
 3. NEUTRAL position - Normal position. Engine starts must be possible.
 4. NEUTRAL position - Engine running and brakes applied, apply forward force on center of shift handle. Transmission shall not be able to shift from NEUTRAL to REVERSE.

ADJUSTMENTS

ADJUSTMENTS

Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the park/neutral position contact may be faulty.

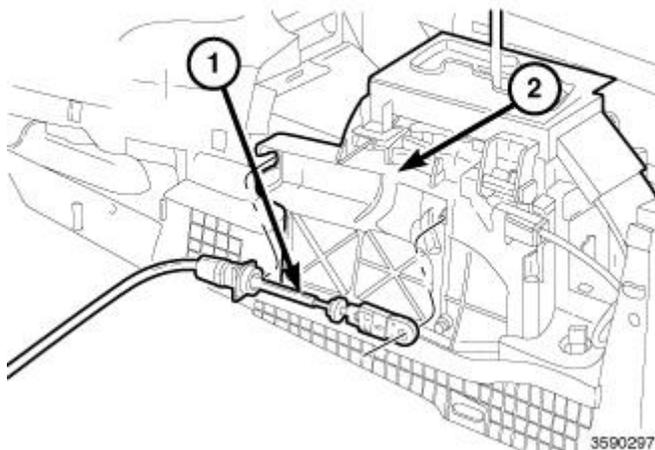


Fig. 121: Transmission Shift Cable
Courtesy of CHRYSLER LLC

1. Shift transmission into PARK.
2. Remove floor console as necessary for access to the shift cable adjustment. Refer to **CONSOLE, FLOOR, REMOVAL** .
3. Loosen the shift cable adjustment nut.
4. Raise vehicle.

5. Unsnap cable eyelet from transmission shift lever.
6. Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
7. Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
8. Snap cable eyelet onto transmission shift lever.

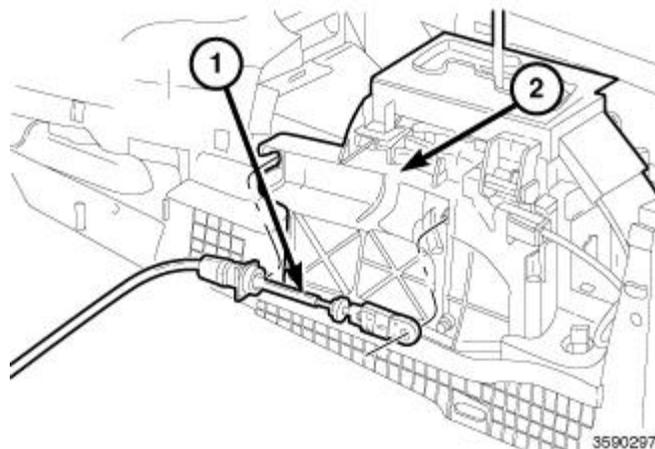


Fig. 122: Transmission Shift Cable
Courtesy of CHRYSLER LLC

9. Lower vehicle
10. Tighten the shift cable adjustment nut to 30 N.m (265 in.lbs.).
11. Verify correct operation.
12. Install any floor console components removed for access. Refer to **CONSOLE, FLOOR, INSTALLATION**.

REMOVAL

REMOVAL

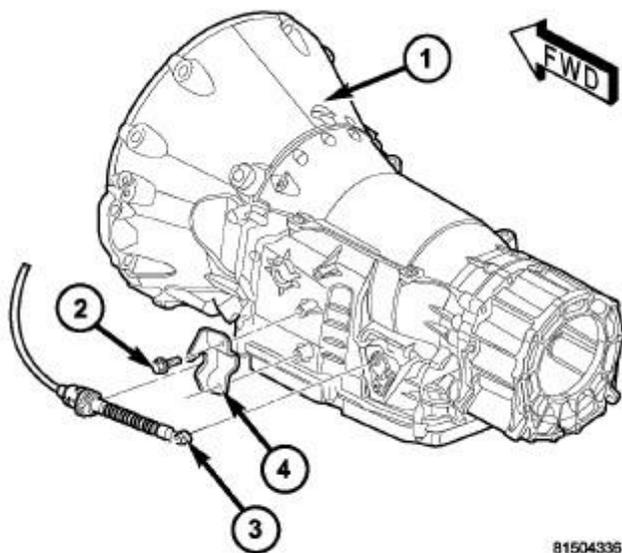


Fig. 123: Removing/Installing Shift Cable & Bracket
Courtesy of CHRYSLER LLC

1. Shift transmission into PARK.
2. Raise vehicle.
3. Disengage the gearshift cable (3) eyelet at transmission manual shift lever and pull cable out of the mounting bracket (4).

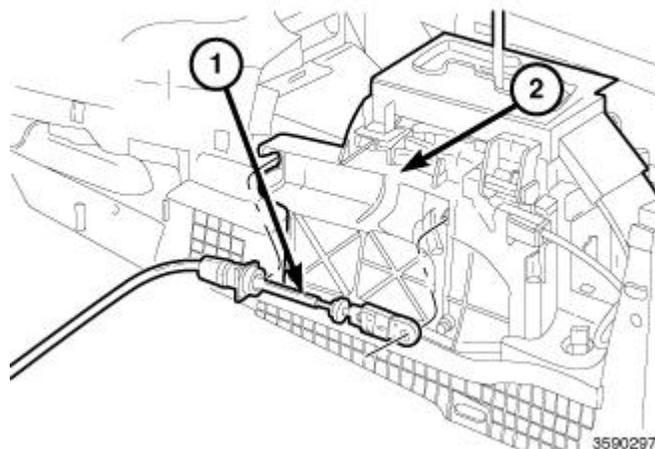


Fig. 124: Transmission Shift Cable
Courtesy of CHRYSLER LLC

4. Lower the vehicle.

5. Remove the floor console as necessary to access the shift mechanism and cables. Refer to **CONSOLE, FLOOR, REMOVAL**.
6. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
7. Remove the gearshift cable (1) from the shift lever pin.
8. Remove the gearshift cable retainer from the notch in the shifter assembly.
9. From under the hood, remove the shift cable grommet from the dash panel.
10. Remove gearshift cable from vehicle.

INSTALLATION

INSTALLATION

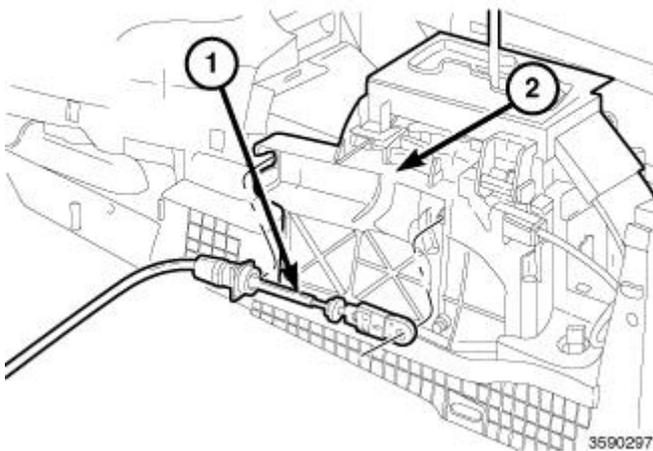


Fig. 125: Transmission Shift Cable
Courtesy of CHRYSLER LLC

1. From under the hood, route the gearshift cable (1) through the dash panel and toward the shifter assembly.
2. From under the hood, install the grommet to the dash panel.
3. Engage the gearshift cable retainer into the notch in the shifter assembly (2).
4. Install the gearshift cable (1) onto the shift lever pin.
5. Loosen the cable adjustment nut, if necessary.

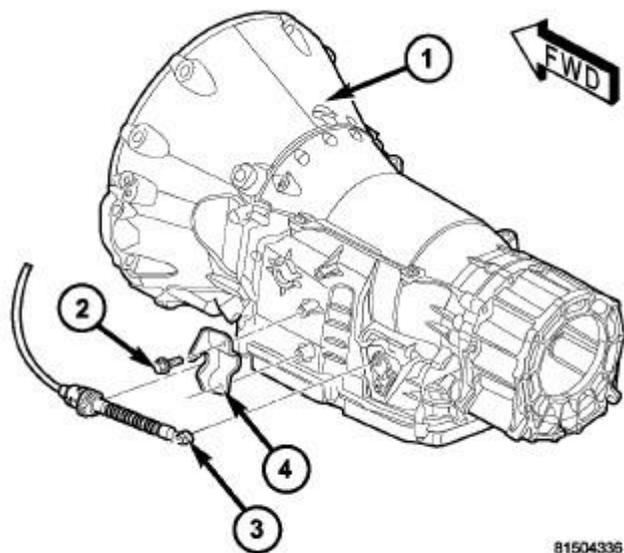


Fig. 126: Removing/Installing Shift Cable & Bracket
 Courtesy of CHRYSLER LLC

6. Raise vehicle.
7. Verify that the transmission is in the PARK position by trying to rotate the propeller shaft. If the propeller shaft rotates, move the transmission manual shift lever to the full rearward position and turn the propeller shaft until the PARK system is engaged.
8. Route the gearshift cable (3) through the mounting bracket (4).
9. Engage the gearshift cable (3) eyelet onto the transmission manual shift lever.

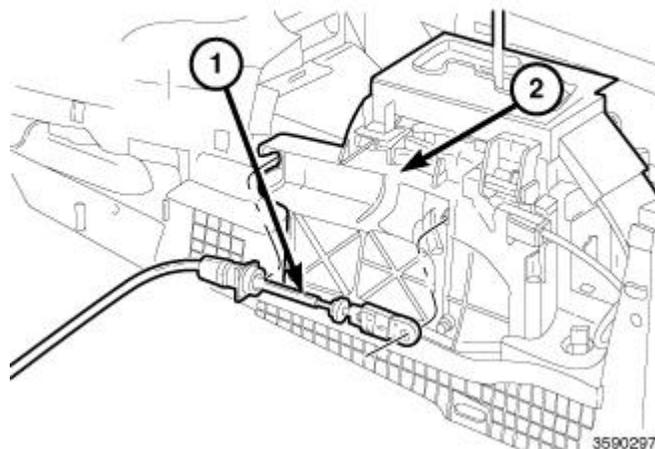


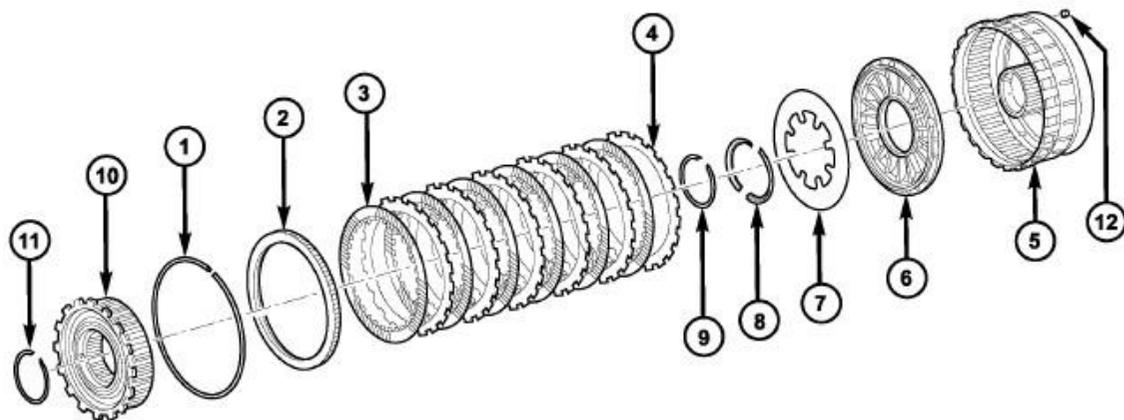
Fig. 127: Transmission Shift Cable
 Courtesy of CHRYSLER LLC

10. Lower vehicle.
11. Verify that the shifter is in the PARK position.
12. Tighten the adjustment nut to 30 N.m (265 in.lbs.).
13. Verify correct shifter operation.
14. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
15. Install the floor console, lower instrument panel components. Refer to **CONSOLE, FLOOR, INSTALLATION** and **PANEL, INSTRUMENT, INSTALLATION** .

CLUTCH, LOW AND REVERSE

DISASSEMBLY

DISASSEMBLY



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Fig. 128: Exploded View Of Low/Reverse Clutch
 Courtesy of CHRYSLER LLC

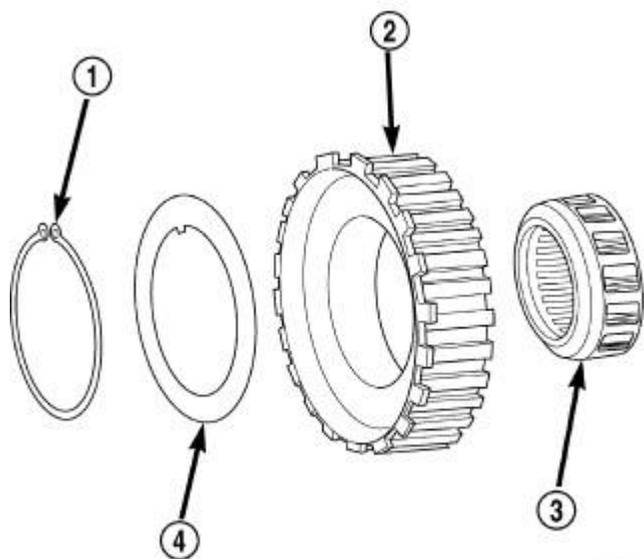
1 - SNAP-RING (SELECT)	8 - RETAINER
2 - REACTION PLATE	9 - SNAP-RING
3 - DISC	10 - OVERRUNNING CLUTCH
4 - PLATE	11 - SNAP-RING
5 - L/R CLUTCH RETAINER	12 - BLEED ORIFICE

6 - PISTON

7 - BELLEVILLE SPRING

1. Remove the inner overrunning clutch snap-ring (11) from the low/reverse clutch retainer (5).
2. Remove the outer low/reverse reaction plate flat snap-ring (1).
3. Remove the low/reverse clutch (3, 4) and the overrunning clutch (10) from the low/reverse clutch retainer (5) as an assembly.
4. Separate the low/reverse clutch (3, 4) from the overrunning clutch (10).

NOTE: The ORC is no longer serviced, it is sold an assembly only. Be certain that the outer race will rotate in one direction but not both relative to the inner race



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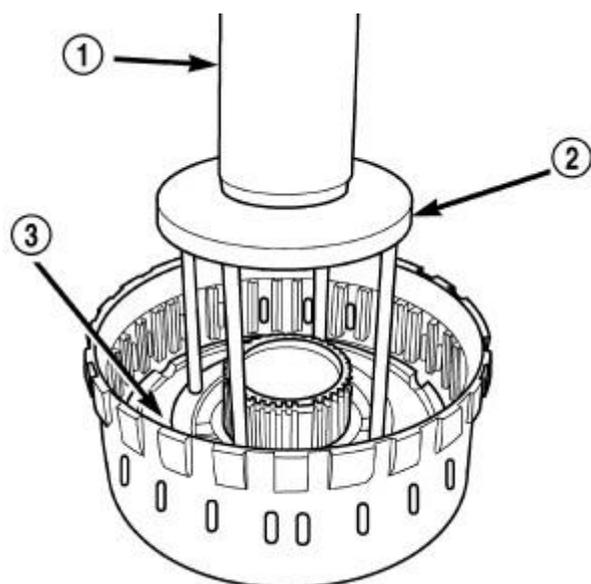
Fig. 129: Overrunning Clutch
 Courtesy of CHRYSLER LLC

1 - SNAP-RING

2 - OUTER RACE

3 - OVERRUNNING CLUTCH

4 - SPACER



80c07420

Fig. 130: Compressing Low/Reverse Belleville Spring
Courtesy of CHRYSLER LLC

1 - PRESS
2 - TOOL 8285
3 - BELLEVILLE SPRING

- Using Spring Compressor (special tool #8285, Compressor, Spring) (2) and a suitable shop press (1), compress the low/reverse Belleville spring (3) and remove the split retaining ring holding the Belleville spring into the low/reverse clutch retainer. Refer to **Fig. 130**.
- Remove the low/reverse Belleville spring (3) and piston from the low/reverse clutch retainer. Use 20 psi of air pressure to remove the piston if necessary.

CLEANING

CLEANING

Clean the overrunning clutch assembly, clutch cam, and low-reverse clutch retainer. Dry them with compressed air after cleaning.

INSPECTION

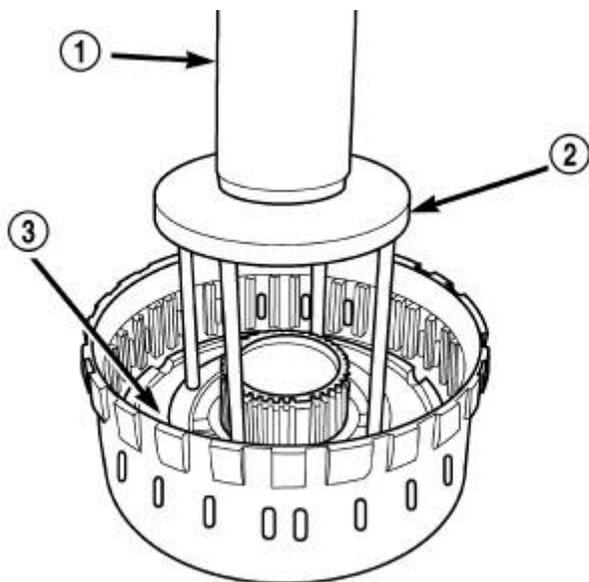
INSPECTION

Inspect condition of each clutch part after cleaning. Replace the overrunning clutch roller and spring assembly if any rollers or springs are worn or damaged, or if the roller cage is distorted, or damaged. Replace the cam if worn, cracked or damaged.

Replace the LR clutch retainer if the piston bores or ID bushings are scored or damaged.

ASSEMBLY

ASSEMBLY

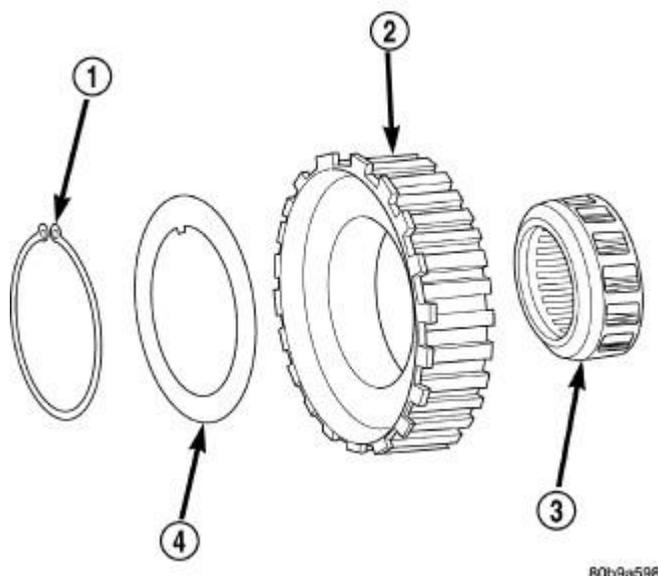


80c07420

Fig. 131: Compressing Low/Reverse Belleville Spring
Courtesy of CHRYSLER LLC

1 - PRESS
2 - TOOL 8285
3 - BELLEVILLE SPRING

1. Check the bleed orifice to ensure that it is not plugged or restricted.
2. Lubricate the seals with Mopar® ATF +4, Automatic Transmission Fluid, prior to installation.
3. Install the low/reverse piston into the low/reverse clutch retainer.
4. Position the low/reverse Belleville spring (3) on the low/reverse piston.
5. Using Spring Compressor (special tool #8285, Compressor, Spring) (2) and a suitable shop press (1), compress the low/reverse Belleville spring (3) and install the split retaining ring to hold the Belleville spring into the low/reverse clutch retainer. Refer to **Fig. 131**.

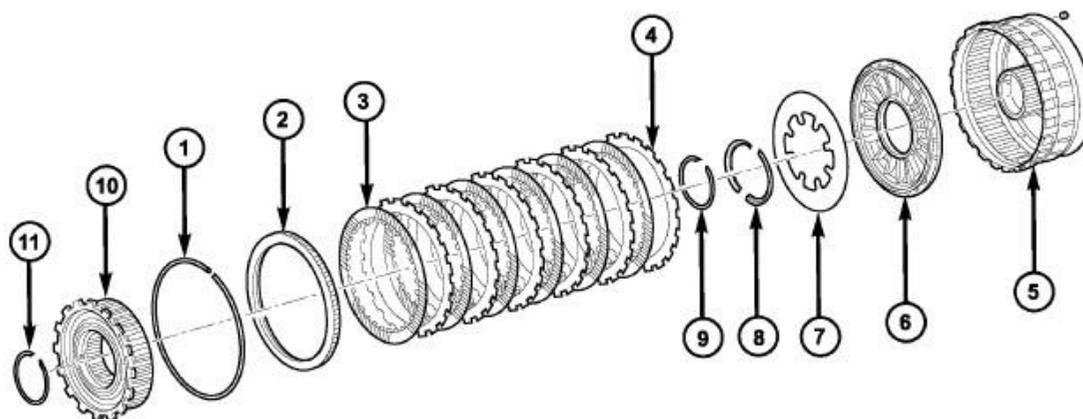


80b9a598

Fig. 132: Overrunning Clutch
Courtesy of CHRYSLER LLC

1 - SNAP-RING
2 - OUTER RACE
3 - OVERRUNNING CLUTCH
4 - SPACER

6. Install the lower overrunning clutch snap-ring. Refer to **Fig. 132**.
7. Assemble the inner and outer races (2) of the overrunning clutch (3). Refer to **Fig. 132**.
8. Position the overrunning clutch spacer (4) on the overrunning clutch (3).
9. Install the upper overrunning clutch snap-ring (1). Refer to **Fig. 132**.



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Fig. 133: Exploded View Of Low/Reverse Clutch
Courtesy of CHRYSLER LLC

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

1 - SNAP-RING (SELECT)
2 - REACTION PLATE
3 - DISC
4 - PLATE
5 - L/R CLUTCH RETAINER
6 - PISTON
7 - BELLEVILLE SPRING

8 - RETAINER
9 - SNAP-RING
10 - OVERRUNNING CLUTCH
11 - SNAP-RING

10. Assemble and install the low/reverse clutch pack (3, 4) into the low/reverse clutch retainer (5).
11. Install the low/reverse reaction plate (2) into the low/reverse clutch retainer (5). The reaction plate is directional and must be installed with the flat side down.
12. Install the low/reverse clutch pack snap-ring (1). The snap-ring is selectable and should be chosen to give the correct clutch pack clearance.
13. Measure the low/reverse clutch pack clearance and adjust as necessary. The correct clutch clearance is 1.00-1.74 mm (0.039-0.069 in.).

NOTE: **When installing the overrunning clutch be certain the steps on the gear face upward.**

14. Install the overrunning clutch (10) into the low/reverse clutch retainer (5) making sure that the index splines are aligned with the retainer.
15. Install the overrunning clutch inner snap-ring (11).

COVER, OIL PUMP

REMOVAL

REMOVAL

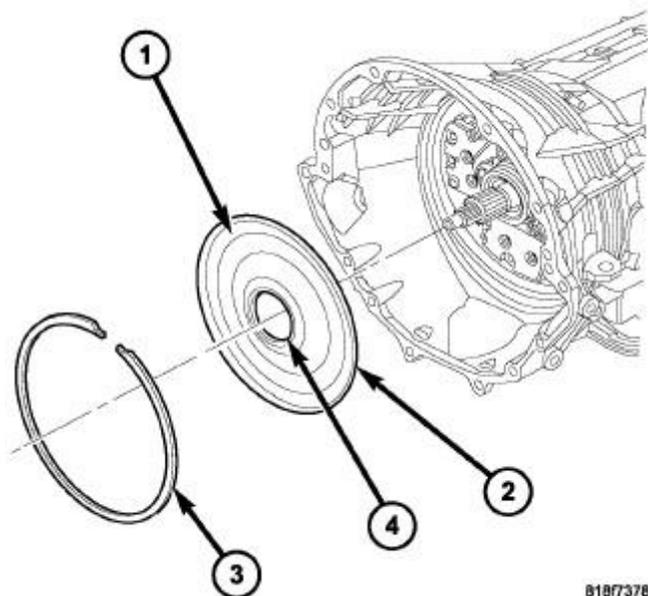


Fig. 134: Front Cover

Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - FRONT COVER
2 - O-RING
3 - SNAP RING
4 - FRONT COVER SEAL |
|--|

1. Remove the bolts holding the transmission oil pan to the transmission case.
2. Remove the transmission oil pan from the transmission case.
3. Remove the snap ring (3) from the transmission case. Refer to **Fig. 134**.
4. Reaching through a case opening in the valve body area with a long blunted tool, remove the transmission front cover (1) from the transmission case. Refer to **Fig. 134**.

INSTALLATION

INSTALLATION

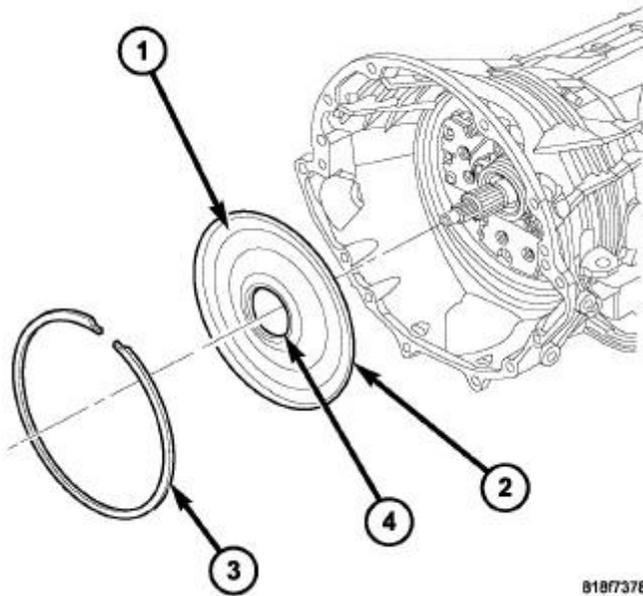


Fig. 135: Front Cover

Courtesy of CHRYSLER LLC

- 1 - FRONT COVER
- 2 - O-RING
- 3 - SNAP RING
- 4 - FRONT COVER SEAL

NOTE: To avoid contamination and garter spring dislodgement, do not handle the front cover seal (4) when positioning the front cover into the transmission case.

1. Position a new front cover (1) into the transmission case.

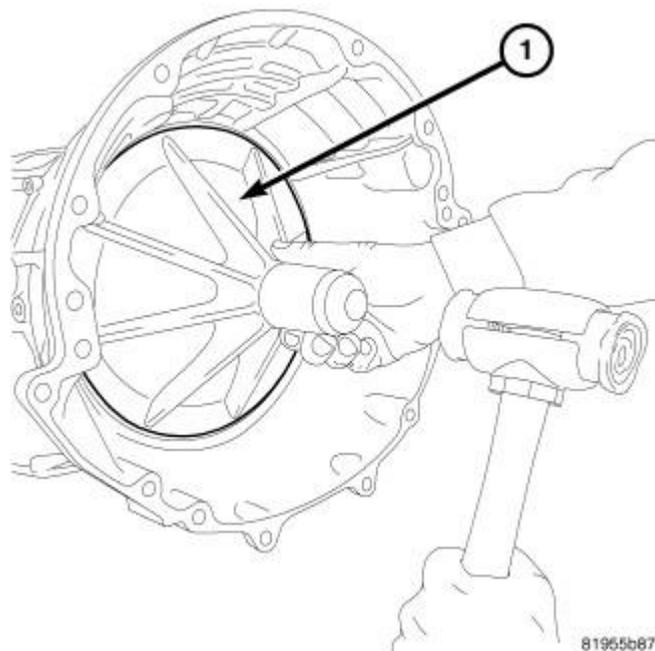


Fig. 136: Front Cover Installation Tool
Courtesy of CHRYSLER LLC

1 - Front Cover installation Tool 9955

2. Using the front cover installation tool (special tool #9955, Installer, Front Cover) (1) and a dead-blow mallet, install the front cover into transmission case.

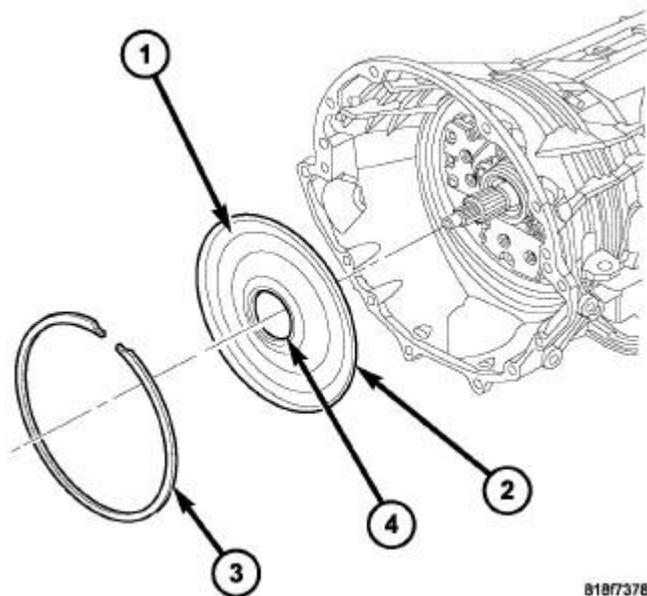


Fig. 137: Front Cover

Courtesy of CHRYSLER LLC

1 - FRONT COVER
2 - O-RING
3 - SNAP RING
4 - FRONT COVER SEAL

3. Install the snap ring (3) into the transmission case.
4. Apply RTV silicone to the oil pan and install the transmission oil pan.
5. Tighten the bolts to 12 N.m (105 in. lbs.).

FLUID AND FILTER

DIAGNOSIS AND TESTING

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation, and varnish buildup which interferes with valve and clutch operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has three primary causes.

1. Internal clutch slippage, usually caused by low line pressure, inadequate clutch apply pressure, or clutch seal failure.
2. A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged oil cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.
3. Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid

- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to replace contaminated converter after repair

The use of non-recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission, an overhaul is necessary.

The torque converter should be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

STANDARD PROCEDURE

FLUID LEVEL CHECK

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

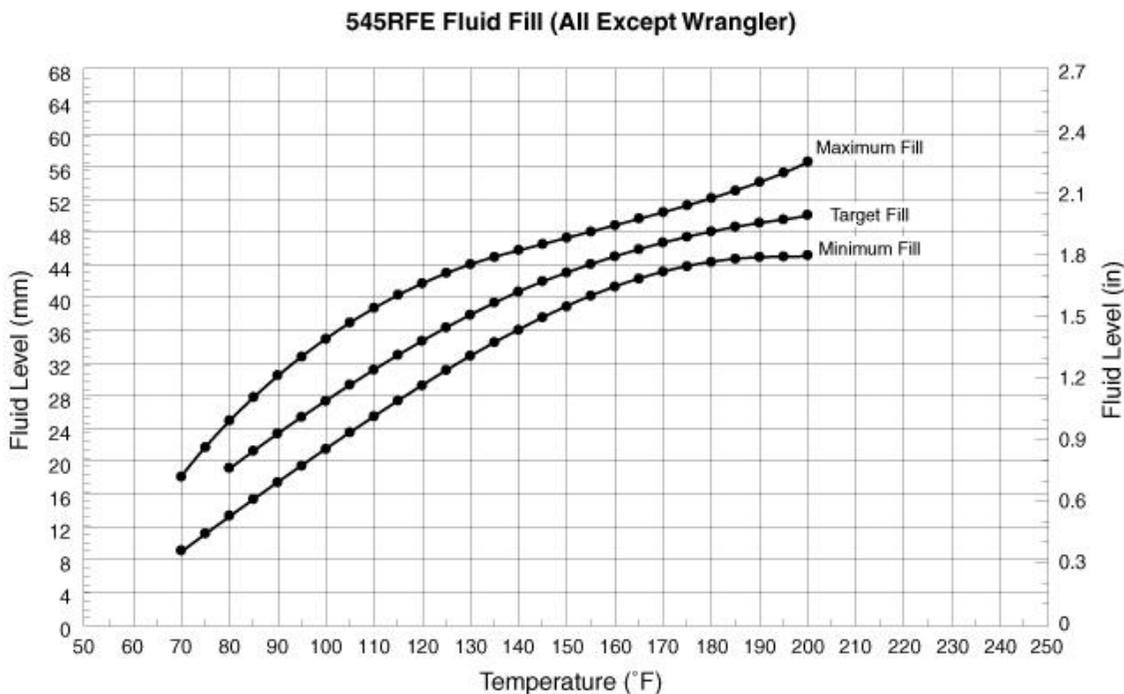
Improper filling can also raise the fluid level too high. When the transmission has too much fluid, the geartrain churns up foam and cause the same conditions which occur with a low fluid level.

In either case, air bubbles can cause overheating and/or fluid oxidation, and varnishing. This can interfere with normal valve, clutch, and accumulator operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a leak.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

The transmission has a dipstick to check oil level. It is located on the right side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

The torque converter fills in both the P (PARK) and N (NEUTRAL) positions. Place the selector lever in P (PARK) to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature (approximately 82 C. or 180 F.), the fluid level is correct if it is in the HOT region (cross-hatched area) on the oil level indicator. The fluid level will be approximately at the upper COLD hole of the dipstick at 70° F fluid temperature.



2102465

Fig. 138: Transmission Fluid Temperature Chart
 Courtesy of CHRYSLER LLC

NOTE: Engine and Transmission should be at normal operating temperature before performing this procedure.

1. Start engine and apply parking brake.
2. Shift the transmission into DRIVE for approximately 2 seconds.
3. Shift the transmission into REVERSE for approximately 2 seconds.
4. Shift the transmission into PARK.
5. Hook up the scan tool and select transmission.
6. Select sensors.
7. Read the transmission temperature value.
8. Compare the fluid temperature value with the chart.
9. Adjust transmission fluid level shown on the dipstick according to the Transmission Fluid Temperature Chart.

NOTE: After adding any fluid to the transmission, wait a minimum of 2 minutes for the oil to fully drain from the fill tube into the transmission before rechecking the fluid level.

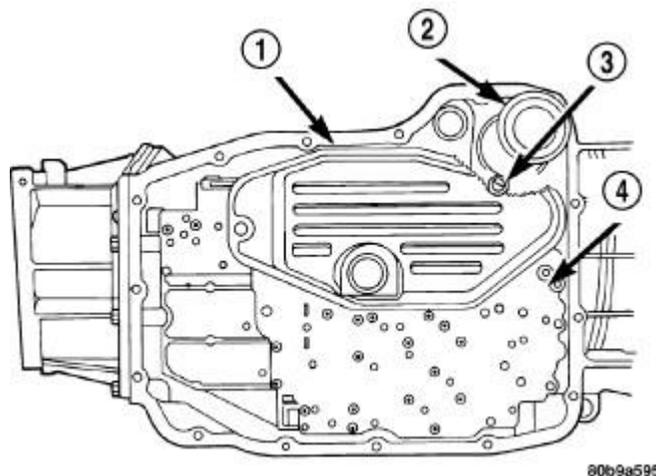
10. Check transmission for leaks.

FLUID AND FILTER REPLACEMENT

For proper service intervals. Refer to **MAINTENANCE SCHEDULES, DESCRIPTION** .

REMOVAL

1. Hoist and support vehicle on safety stands.
2. Place a large diameter shallow drain pan beneath the transmission pan.
3. Remove bolts holding front and sides of pan to transmission.
4. Loosen bolts holding rear of pan to transmission.
5. Slowly separate front of pan away from transmission allowing the fluid to drain into drain pan.
6. Hold up pan and remove remaining bolts holding pan to transmission.
7. While holding pan level, lower pan away from transmission.
8. Pour remaining fluid in pan into drain pan.



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Fig. 139: Primary Oil Filter & Oil Cooler Return Filter
 Courtesy of CHRYSLER LLC

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

9. Remove the screw holding the primary oil filter (1) to valve body. Refer to **Fig. 139**.
10. Separate filter from valve body and oil pump and pour fluid in filter into drain pan.
11. Inspect the oil filter seal in the bottom of the oil pump. If the seal is not installed completely in the oil pump, or is otherwise damaged, then remove and discard the oil filter seal from the bottom of the oil pump. If the seal is installed correctly and is in good condition, it can be reused.
12. If replacing the cooler return filter (2), use Oil Filter Wrench (special tool #8321, Wrench, Oil Filter) to remove the filter from the transmission.

13. Dispose of used trans fluid and filter(s) properly.

INSPECTION

Inspect bottom of pan and magnet for excessive amounts of metal. A light coating of clutch material on the bottom of the pan does not indicate a problem unless accompanied by a slipping condition or shift lag. If fluid and pan are contaminated with excessive amounts of debris, refer to **DIAGNOSIS AND TESTING**.

CLEANING

1. Using a suitable solvent, clean pan and magnet.
2. Using a suitable gasket scraper, clean original sealing material from surface of transmission case and the transmission pan.

INSTALLATION

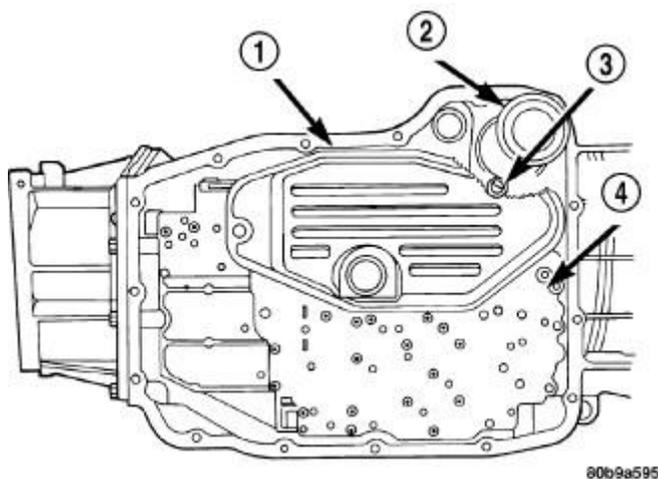


Fig. 140: Primary Oil Filter & Oil Cooler Return Filter
 Courtesy of CHRYSLER LLC

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

CAUTION: The primary oil filter seal **MUST** be fully installed flush against the oil pump body. **DO NOT** install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

1. If necessary, install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with a suitable tool (appropriately sized drift or socket, the butt end of a hammer, or other suitable tool).
2. Place replacement filter in position on valve body and into the oil pump.

3. Install screw to hold the primary oil filter (1) to valve body. Refer to **Fig. 140**. Tighten screw to 4.5 N.m (40 in. lbs.) torque.
4. Install new cooler return filter (2) onto the transmission, if necessary. Torque the filter to 9.5 N.m (7 ft.lbs.).
5. Place bead of Mopar® RTV sealant onto the transmission case sealing surface.
6. Place pan in position on transmission.
7. Install bolts to hold pan to transmission. Tighten bolts to 12 N.m (105 in. lbs.) torque.
8. Lower vehicle and fill transmission with Mopar® ATF +4.

TRANSMISSION FILL

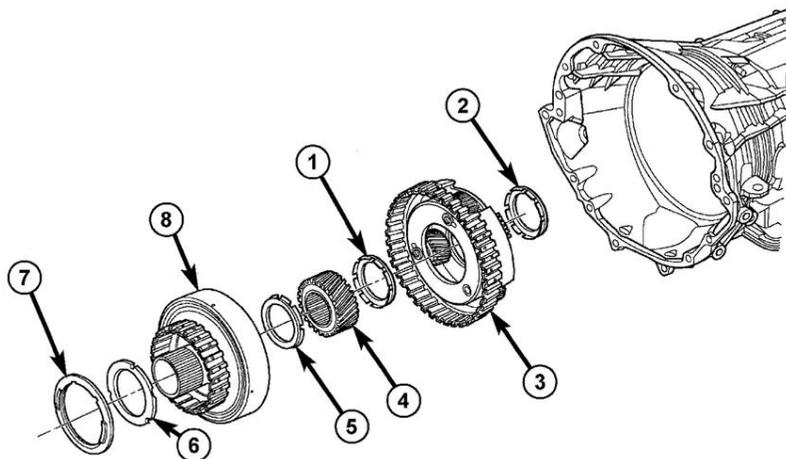
To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

1. Remove dipstick (if equipped) and insert clean funnel in transmission fill tube.
2. Add following initial quantity of Mopar® ATF +4 to transmission:
 1. If only fluid and filter were changed, add **10 pints (5 quarts)** of ATF +4 to transmission.
 2. If transmission was completely overhauled and the torque converter was replaced or drained, add **24 pints (12 quarts)** of ATF +4 to transmission.
3. Check the transmission fluid and adjust as required. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

GEARTRAIN, PLANETARY

DESCRIPTION

DESCRIPTION



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Fig. 141: Thrust Bearings, Thrust Plate, Planetary Carrier, Sun Gear & Annulus
 Courtesy of CHRYSLER LLC

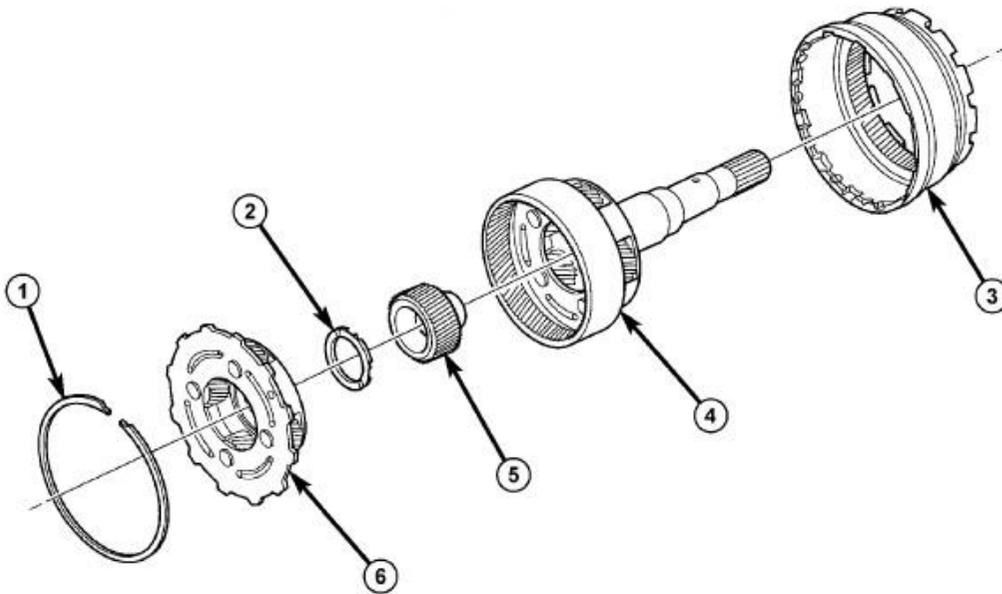
1 - THRUST BEARING NUMBER 8	5 - THRUST BEARING NUMBER 7
-----------------------------	-----------------------------

cardiagn.com

2 - THRUST BEARING NUMBER 9	6 - THRUST PLATE (SELECT)
3 - REACTION PLANETARY CARRIER	7 - THRUST BEARING NUMBER 6
4 - REACTION SUN GEAR	8 - REACTION ANNULUS

The planetary geartrain is located behind the 4C retainer/bulkhead, toward the rear of the transmission. The planetary geartrain consists of three primary assemblies:

- Reaction (3, 4, 8).



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Fig. 142: Reverse/Input Carrier
 Courtesy of CHRYSLER LLC

1. Snap Ring	4. Input Planetary Carrier
2. Thrust Bearing No. 10	5. input Sun Gear
3. Input Annulus	6. Reverse Carrier

- Reverse (6).
- Input (3, 4, 5).

OPERATION

OPERATION

REACTION PLANETARY GEARSET

The reaction planetary carrier and reverse sun gear of the reaction planetary gearset are a single component which is held by the 2C clutch when required. The reaction annulus gear is a stand alone component that can be driven by the reverse clutch or held by the 4C clutch. The reaction sun gear is driven by the overdrive clutch.

REVERSE PLANETARY GEARSET

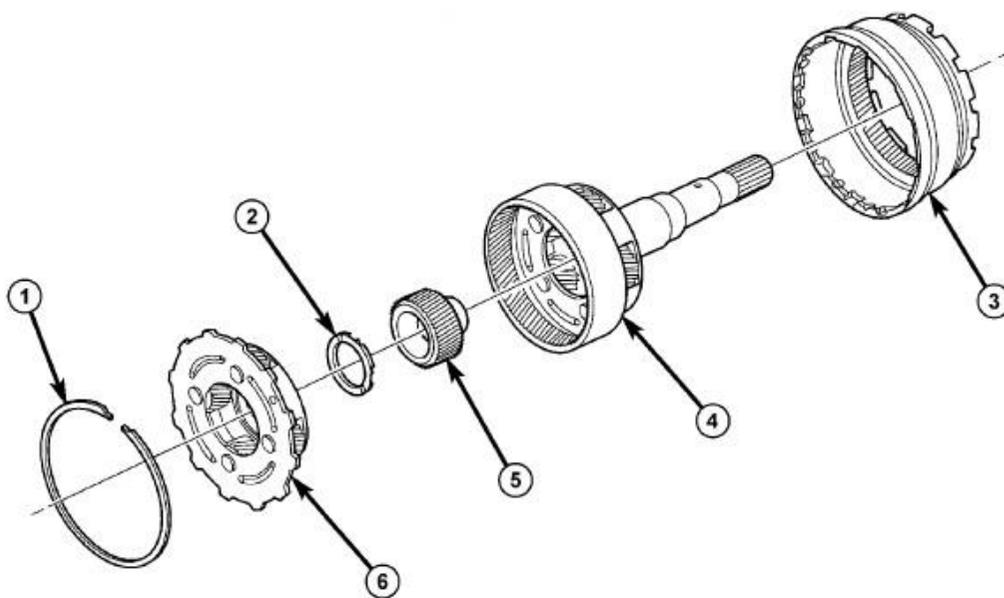
The reverse planetary gearset is the middle of the three planetary sets. The reverse planetary carrier can be driven by the overdrive clutch as required. The reverse planetary carrier is also splined to the input annulus gear, which can be held by the low/reverse clutch. The reverse planetary annulus, input planetary carrier, and output shaft are all one piece.

INPUT PLANETARY GEARSET

The input sun gear of the input planetary gearset is driven by the underdrive clutch.

DISASSEMBLY

DISASSEMBLY



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Fig. 143: Reverse/Input Carrier
 Courtesy of CHRYSLER LLC

1. Snap Ring	4. Input Planetary Carrier
2. Thrust Bearing No. 10	5. input Sun Gear
3. Input Annulus	6. Reverse Carrier

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

1. Remove the snap-ring (1) holding the input annulus (3) into the input carrier (4).
2. Remove the input annulus (3) from the input carrier (4).
3. Remove the reverse planetary gear carrier (6).
4. Remove the number 10 thrust bearing (2) from the input sun gear (5).
5. Remove the input sun gear (5) from the input carrier (4).

CLEANING

CLEANING

Clean the planetary components in solvent and dry them with compressed air.

INSPECTION

INSPECTION

Inspect each planetary carrier assembly for damage. Check that each pinion gear rotates freely and smoothly on its shaft. Check that the tabbed thrust washer on each side of each pinion gear is in place. Check that the outer ends of the pinion shafts are not discolored from overheating. Replace the carrier assembly if jammed or sticky pinion gears, spun or missing tabbed washers, or blackened pinion shafts are found.

Check sun gear and driving shell condition. Replace the gear if damaged or if the bushings are scored or worn. The bushings are not serviceable. Replace the driving shell if worn, cracked or damaged.

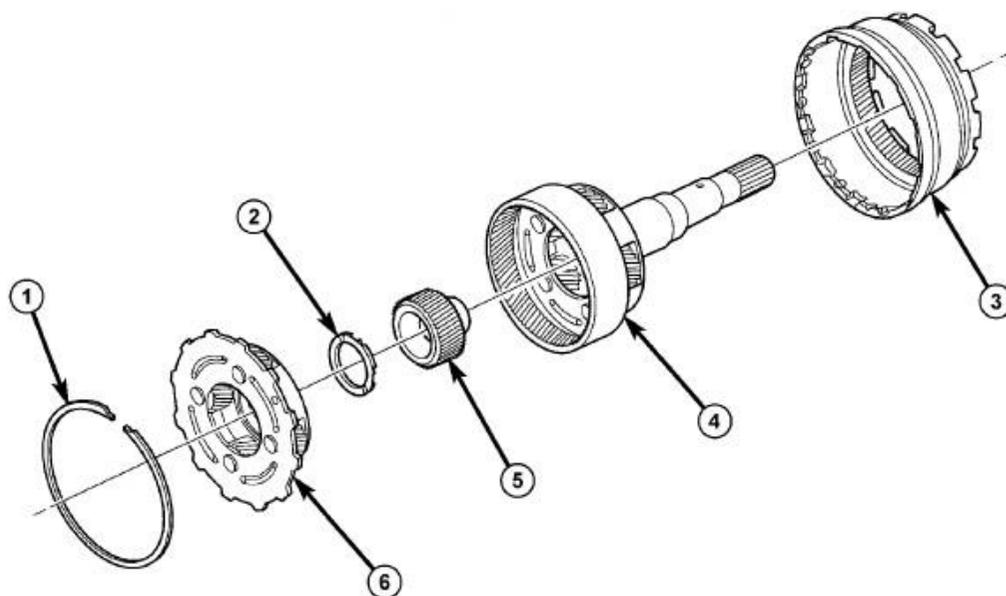
Replace planetary gear sets if gears, pinion pins, or carrier are damaged in any way. Replace the annulus gears and supports if either component is worn or damaged.

Replace the output shaft if the machined surfaces are scored, pitted, or damaged in any way. Also replace the shaft if the splines are damaged, or exhibits cracks at any location.

ASSEMBLY

ASSEMBLY

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.



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Fig. 144: Reverse/Input Carrier
 Courtesy of CHRYSLER LLC

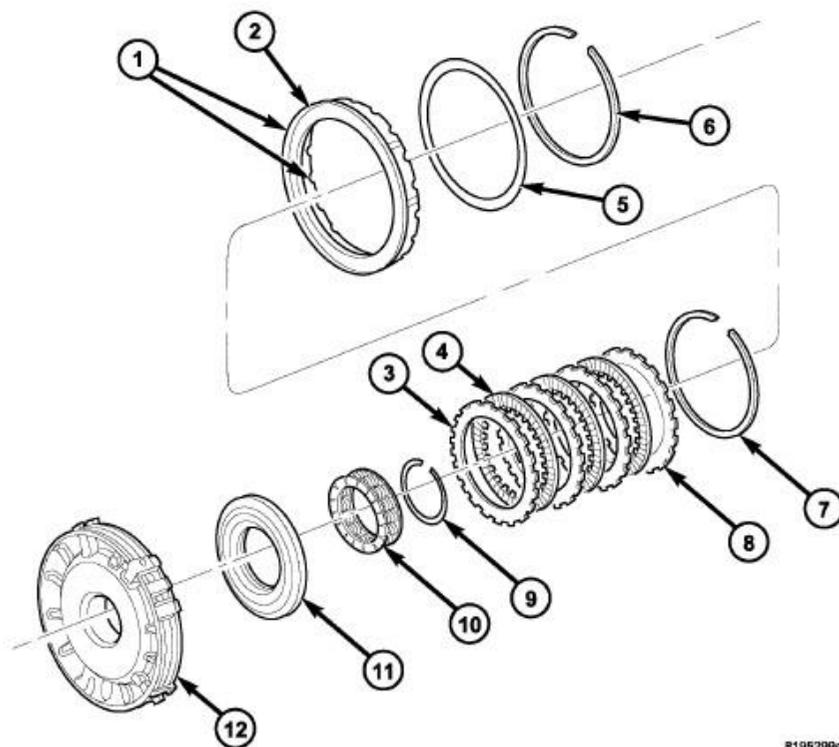
1. Snap Ring	4. Input Planetary Carrier
2. Thrust Bearing No. 10	5. Input Sun Gear
3. Input Annulus	6. Reverse Carrier

1. Install the input sun gear (5) into the input carrier (4).
2. Install the number 10 thrust bearing (2) onto the rear of the reverse planetary carrier (6) with the inner race toward the carrier.
3. Install the reverse planetary gear carrier (6) into the input carrier (4).
4. Install the input annulus gear (3) into the input carrier (4).
5. Install the snap-ring (1) to hold the input annulus gear (3) into the input carrier (4).

HOLDING CLUTCHES

DESCRIPTION

DESCRIPTION

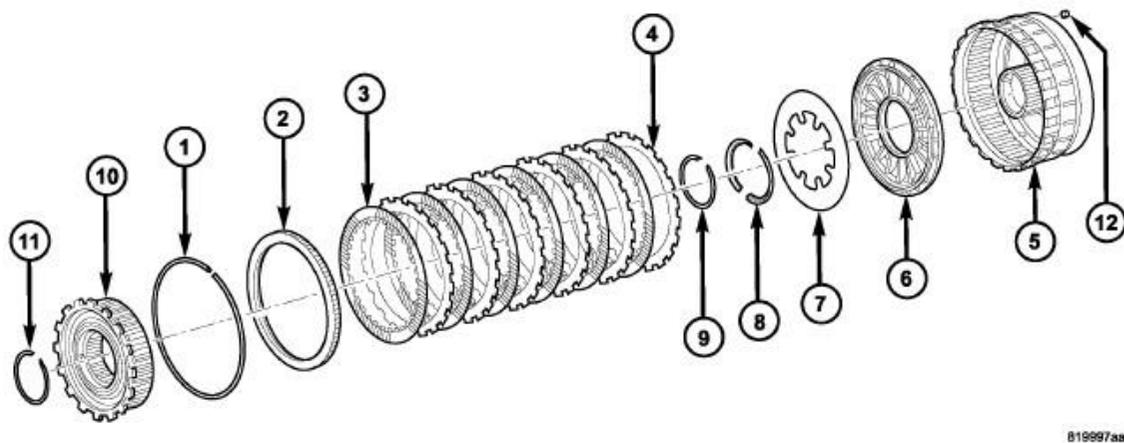


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Fig. 145: Holding Clutches

Courtesy of CHRYSLER LLC

- | | |
|--------------------------|---------------------------|
| 1 - SEALS | 8 - REACTION PLATE |
| 2 - 2C PISTON | 9 - SNAP-RING |
| 3 - 4C PLATE | 10 - RETURN SPRING |
| 4 - 4C DISC | 11 - 4C PISTON |
| 5 - 2C BELLEVILLE SPRING | 12 - 4C RETAINER/BULKHEAD |
| 6 - SNAP-RING | |
| 7 - SNAP-RING (SELECT) | |



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Fig. 146: Exploded View Of Low/Reverse Clutch
 Courtesy of CHRYSLER LLC

- | | |
|-------------------------|-------------------------|
| 1 - SNAP-RING (SELECT) | 8 - RETAINER |
| 2 - REACTION PLATE | 9 - SNAP-RING |
| 3 - DISC | 10 - OVERRUNNING CLUTCH |
| 4 - PLATE | 11 - SNAP-RING |
| 5 - L/R CLUTCH RETAINER | 12 - BLEED ORIFICE |
| 6 - PISTON | |
| 7 - BELLEVILLE SPRING | |

Three hydraulically applied multi-disc clutches are used to hold some planetary geartrain components stationary while the input clutches drive others. The 2C, 4C, and Low/Reverse clutches are considered holding clutches. The 2C and 4C clutches are located in the 4C retainer/bulkhead (12).

The Low/Reverse clutch is located at the rear of the transmission case.

OPERATION

OPERATION

2C CLUTCH

The 2C clutch is hydraulically applied in second and fifth gear by pressurized fluid against the 2C piston. When the 2C clutch is applied, the reverse sun gear assembly is held or grounded to the transmission case by holding

the reaction planetary carrier.

4C CLUTCH

The 4C clutch is hydraulically applied in second prime and fourth gear by pressurized fluid against the 4C clutch piston. When the 4C clutch is applied, the reaction annulus gear is held or grounded to the transmission case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gear, only at low speeds, by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the input annulus assembly is held or grounded to the transmission case.

HOUSING, TRANSMISSION, REAR EXTENSION

REMOVAL

REMOVAL

1. Apply an alignment mark on the drive shaft to output flange and remove the rear drive shaft. Refer to **SHAFT, DRIVE, REAR, REMOVAL** .

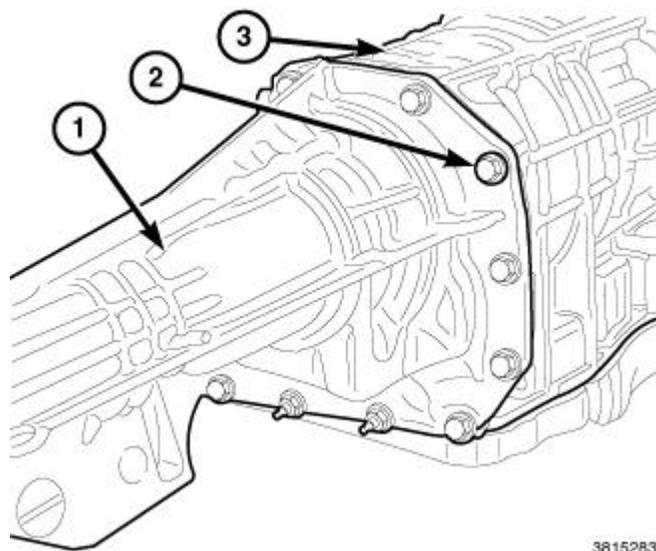
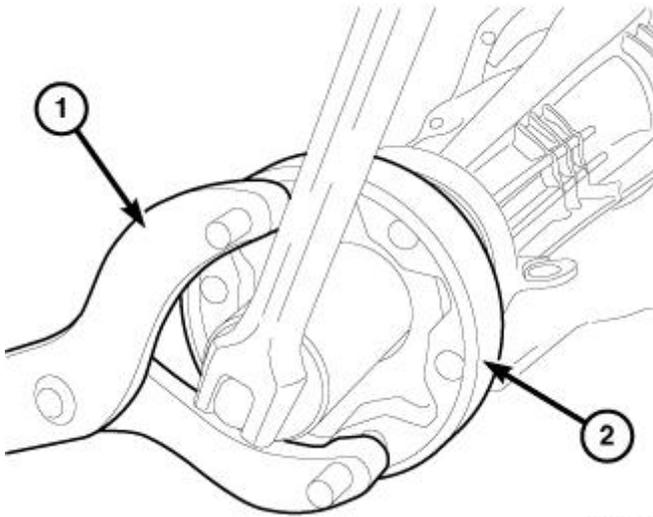


Fig. 147: Identifying Extension Housing And Bolts
Courtesy of CHRYSLER LLC

2. Remove extension housing bolts (2).
3. Remove extension housing (1) from the transmission (3).

DISASSEMBLY

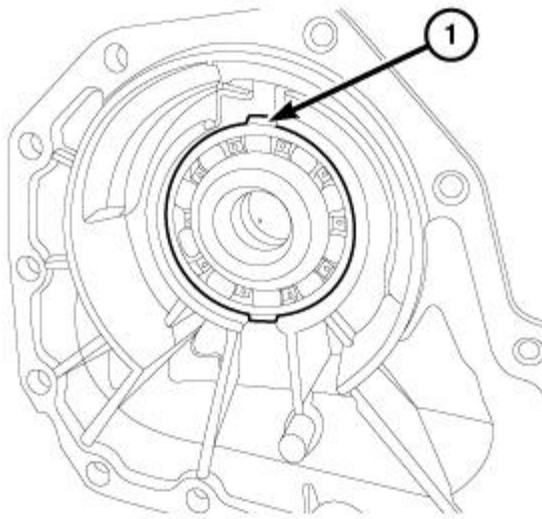
DISASSEMBLY



3815631

Fig. 148: Holder & Flange
Courtesy of CHRYSLER LLC

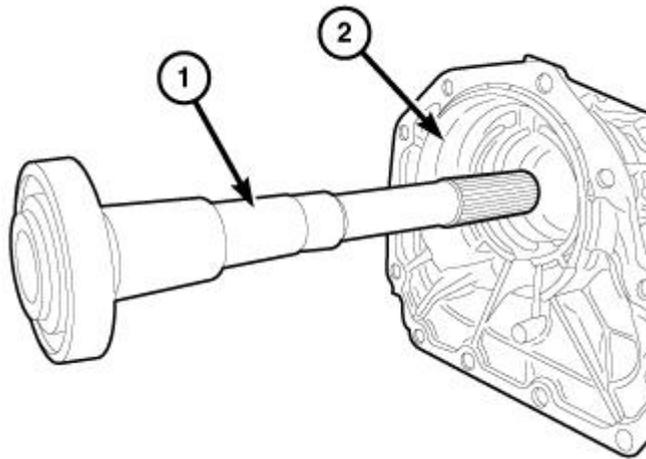
1. Using (special tool #C-3281, Holder, Flange) (1) remove flange nut and flange (2).



3815356

Fig. 149: Identifying Bearing Snap-Ring
Courtesy of CHRYSLER LLC

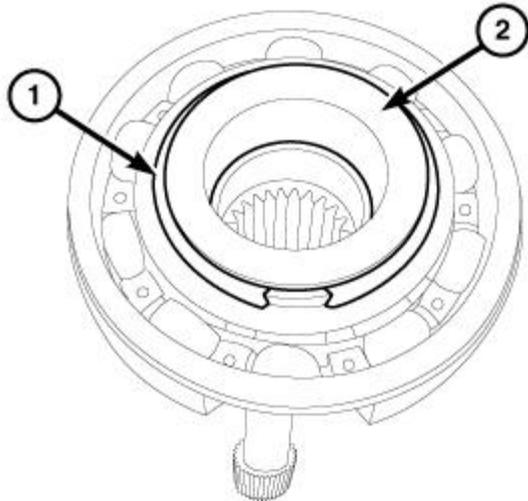
2. Remove the bearing snap-ring (1) from the extension housing.



3815401

Fig. 150: Identifying Shaft And Extension Housing
Courtesy of CHRYSLER LLC

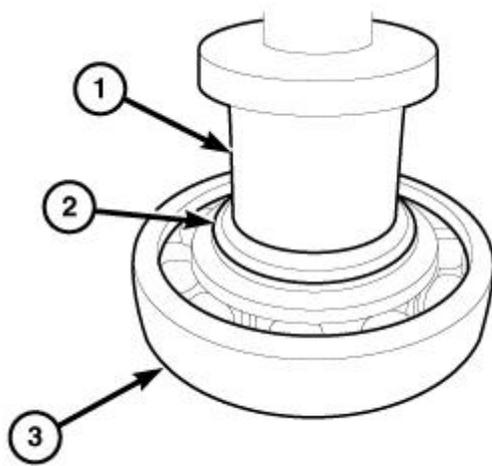
3. Remove the shaft (1) from the extension housing (2).



3817662

Fig. 151: Snap-Ring And Shaft
Courtesy of CHRYSLER LLC

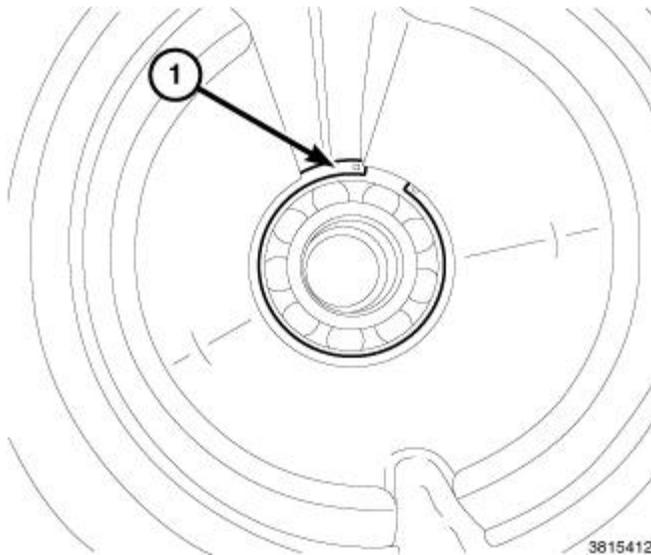
4. Remove snap ring (1) from shaft (2).



3817787

Fig. 152: Identifying STS 9045, Bearing And Shaft
Courtesy of CHRYSLER LLC

5. Using (special tool #9045, Installer, Plug) (1) and press, remove bearing (3) from shaft (2).



3815412

Fig. 153: Identifying Center Bearing Snap-Ring
Courtesy of CHRYSLER LLC

6. Remove the center bearing snap ring (1) and spacer (if equipped).

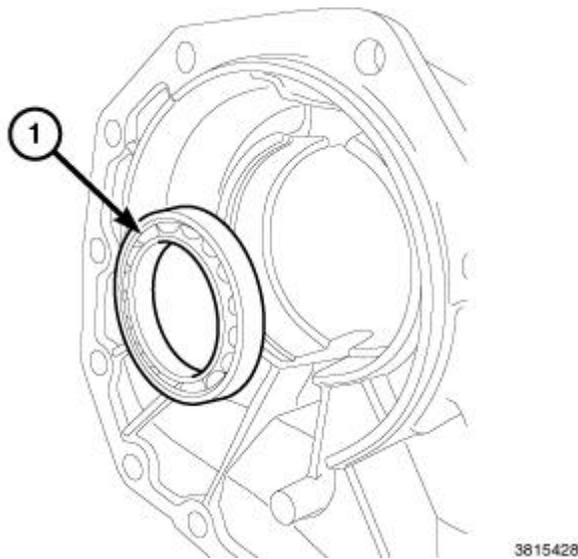


Fig. 154: Center Bearing
Courtesy of CHRYSLER LLC

7. Remove the center bearing (1).
8. Using a seal removal tool, remove rear extension housing output shaft seal.

ASSEMBLY

ASSEMBLY

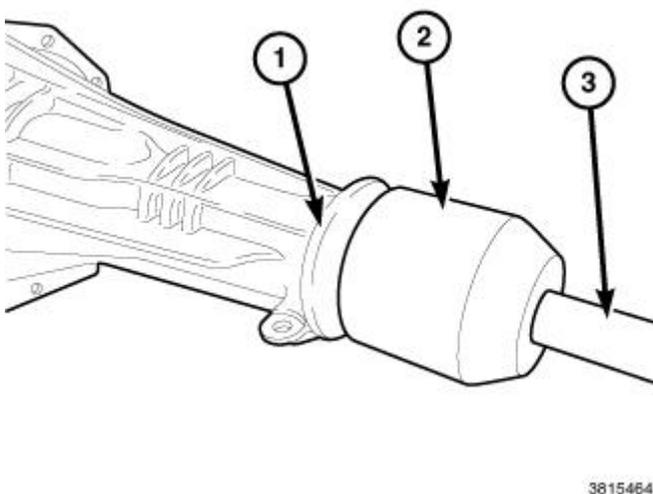


Fig. 155: Identifying Extension Housing, Installer, & Driver Handle
Courtesy of CHRYSLER LLC

1. Clean the extension housing seal bore in the extension housing of any residue or particles remaining from the original seal.
2. Install new oil seal in the extension housing (1) using (special tool #8695, Installer, Seal) (2) and (special

tool #C-4171, Driver Handle, Universal) (3).

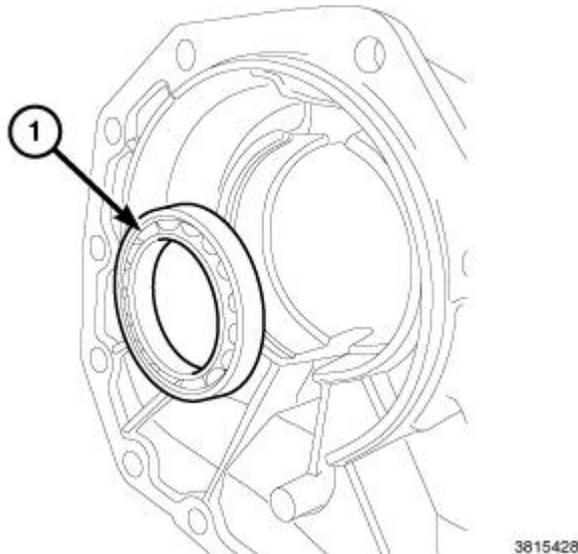


Fig. 156: Center Bearing
Courtesy of CHRYSLER LLC

3. Install the center bearing (1).

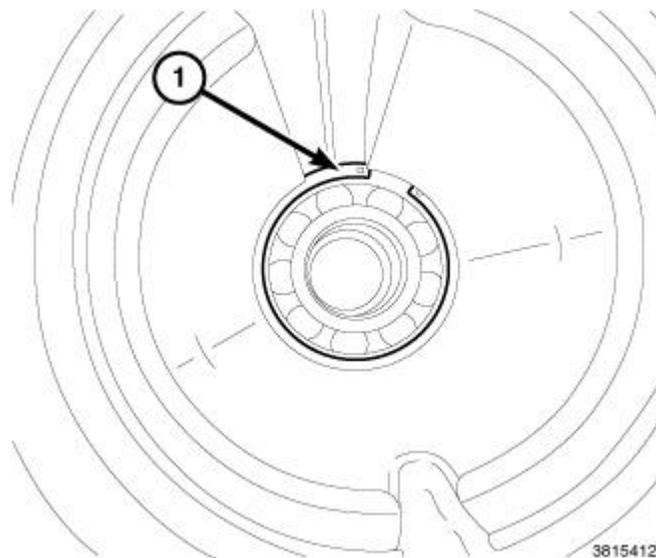
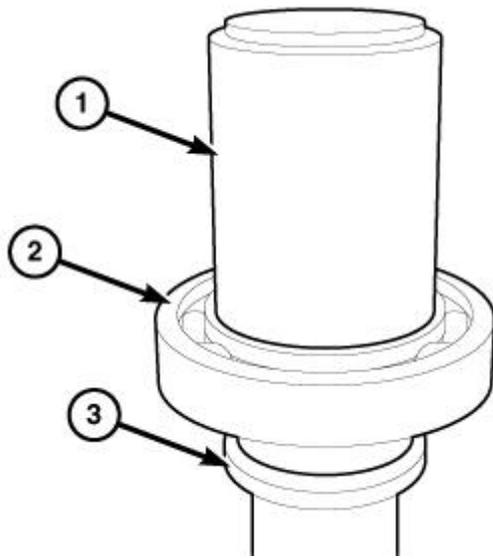


Fig. 157: Identifying Center Bearing Snap-Ring
Courtesy of CHRYSLER LLC

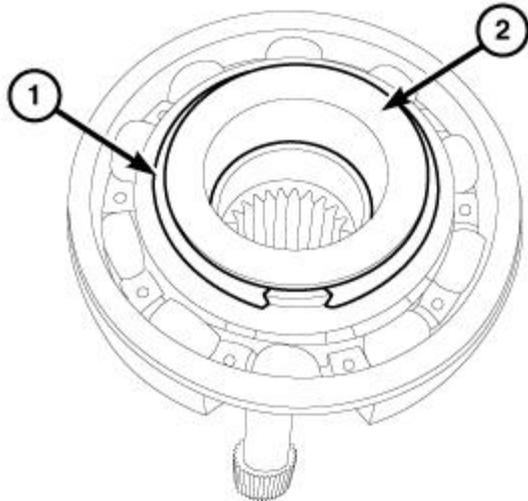
4. Install the spacer (if equipped) and center bearing snap ring (1).



3817740

Fig. 158: Install Bearing On Shaft
Courtesy of CHRYSLER LLC

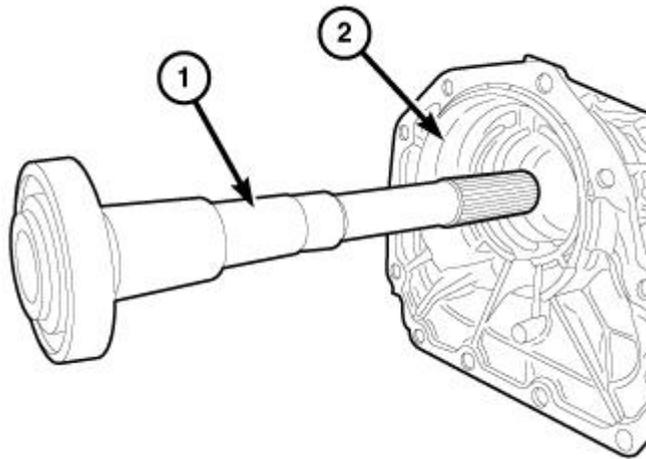
5. Using (special tool #6756, Receiver, Ball Joint) (1) and press, install the bearing (2) onto the shaft (3).



3817662

Fig. 159: Snap-Ring & Shaft
Courtesy of CHRYSLER LLC

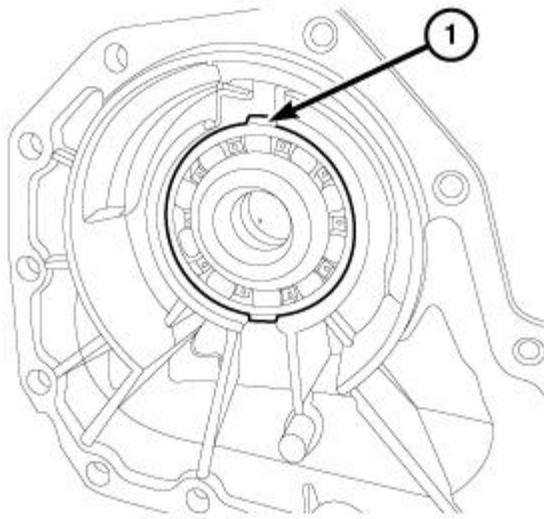
6. Install snap ring (1) on shaft (2).



3815401

Fig. 160: Identifying Shaft & Extension Housing
Courtesy of CHRYSLER LLC

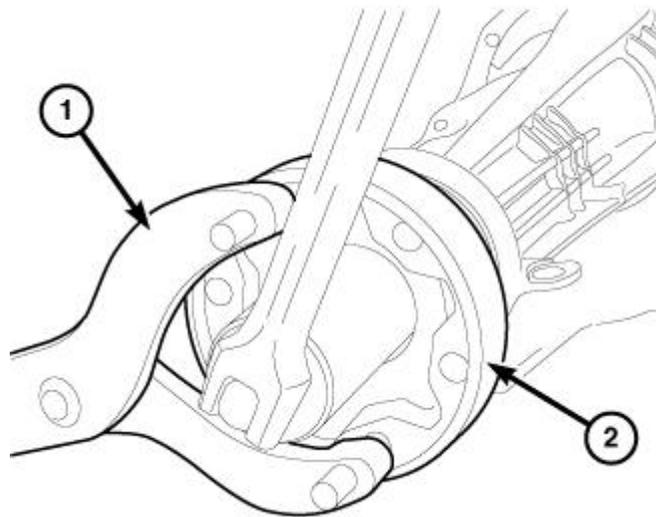
7. Install the shaft (1) into the extension housing (2).



3815356

Fig. 161: Identifying Bearing Snap-Ring
Courtesy of CHRYSLER LLC

8. Install the bearing snap-ring (1) into the extension housing.



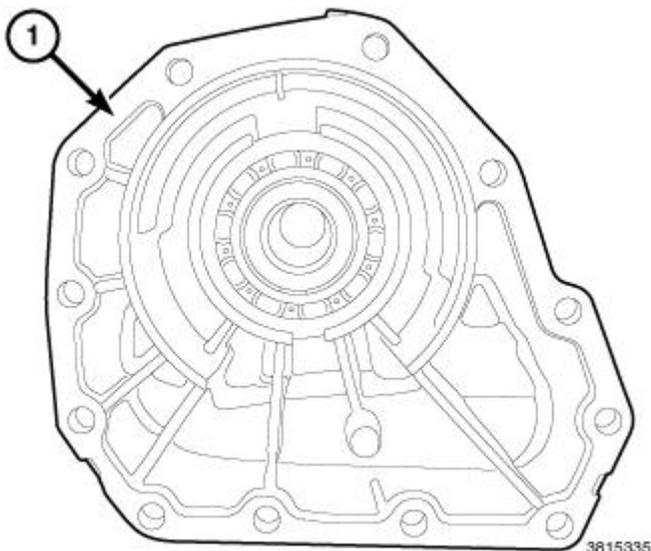
3815631

Fig. 162: Holder & Flange
Courtesy of CHRYSLER LLC

9. Install flange (2) and using (special tool #C-3281, Holder, Flange) (1) install flange nut and tighten to 149 N.m (110 ft. lbs.).

INSTALLATION

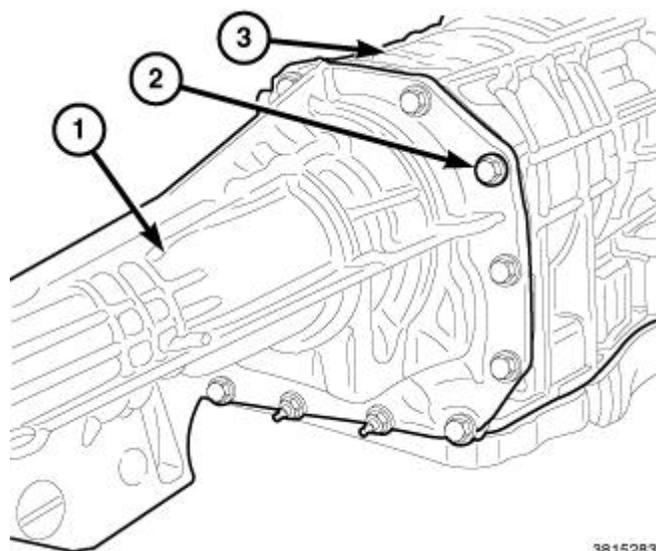
INSTALLATION



3815335

Fig. 163: RTV Application Area
Courtesy of CHRYSLER LLC

1. Apply a bead of RTV silicone to the extension housing.



3815283

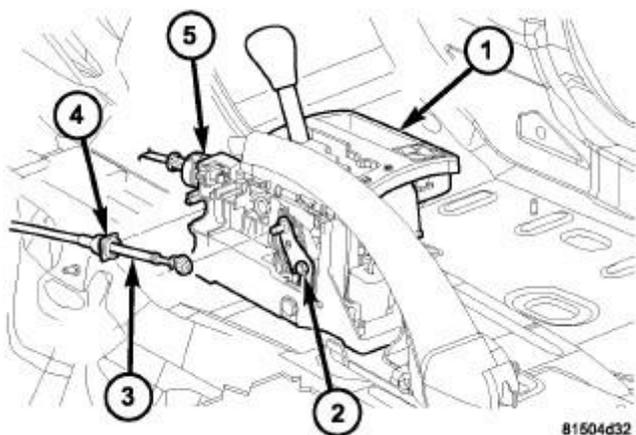
Fig. 164: Identifying Extension Housing And Bolts
 Courtesy of CHRYSLER LLC

2. Install the extension housing (1) on the transmission (3).
3. Install the extension housing bolts (2) and tighten to 54 N.m (40 ft. lbs.).
4. Align marks and install rear drive shaft. Refer to **SHAFT, DRIVE, REAR, INSTALLATION**.

MECHANISM, BRAKE TRANSMISSION SHIFT INTERLOCK

DESCRIPTION

DESCRIPTION



81504d32

Fig. 165: Gearshift And Park Lock Cable At Shifter Assembly
 Courtesy of CHRYSLER LLC

1 - SHIFTER ASSEMBLY

2 - ADJUSTMENT NUT

3 - SHIFT CABLE

4 - SHIFT CABLE ATTACHMENT

5 - PARK LOCK CABLE

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable operated system that prevents the transmission gear shifter from being moved out of PARK without the proper driver inputs. The system also contains a solenoid that is integral to the shifter assembly. The solenoid works in conjunction with the park lock cable (5) to permit shifter movement out of PARK when the brake is depressed. Refer to **Fig. 165**.

OPERATION

OPERATION

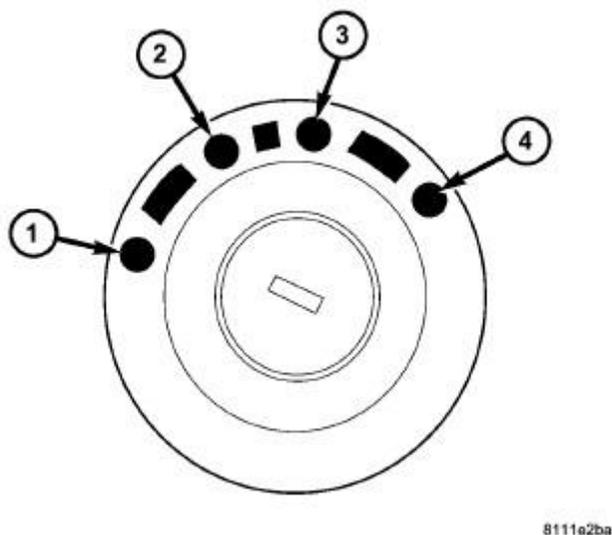


Fig. 166: Ignition Key/Switch Positions

Courtesy of CHRYSLER LLC

1 - LOCK

2 - ACC

3 - ON

4 - START

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK (1) position. Refer to **Fig. 166**. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A solenoid in the shifter assembly is de-energized when the ignition is in the ON position and the brake pedal is depressed. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.

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The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the "ACC" position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON" position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear, except "PARK", and try to return key to the "LOCK" position.	4. Key cannot be returned to the "LOCK" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, and the brake depressed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".

NOTE: Any failure to meet these expected responses requires system adjustment or repair.

DIAGNOSIS AND TESTING

BRAKE TRANSMISSION SHIFT INTERLOCK

SYSTEM VERIFICATION

1. Verify that the key can only be removed in the PARK position
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely from ACC to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.

DIAGNOSTIC CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
KEY WILL NOT ROTATE TO THE LOCK POSITION.	1. Misadjusted Park Lock cable.	1. Adjust Park Lock cable.
	2. Misadjusted gearshift cable.	2. Adjust gearshift cable.
	3. Burrs on ignition key.	3. Remove burrs and cycle key several times to verify operation.

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	4. Binding or broken components.	4. Inspect system components and repair/replace components as necessary.
VEHICLE WILL NOT START UNLESS SHIFTER IS HELD FORWARD, OR REARWARD, OF THE PARK POSITION.	1. Misadjusted gearshift cable.	1. Adjust gearshift cable.

ADJUSTMENTS

ADJUSTMENTS

The park interlock cable is part of the brake/shift lever interlock system. Correct cable adjustment is important to proper interlock operation. The gear shift and park lock cables must both be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

1. Remove floor console as necessary for access to the park lock cable. Refer to **CONSOLE, FLOOR, REMOVAL**.
2. Shift the transmission into the PARK position.
3. Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

NOTE: If the key will not turn to the LOCK position, pull up on the cable lock button and manually move the cable in and out until the key can be turned to the LOCK position.

4. Pull cable lock button up to release cable, if necessary.
5. Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.
6. Push lock button down until it snaps in place. The lock should be flush to the surface of the cylindrical portion of the cable adjustment housing.

BTSI FUNCTION CHECK

1. Verify removal of ignition key allowed in PARK position only.
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely LOCK position. When the shifter is in any other position, the ignition key should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.

6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.
7. The floor shifter lever and gate positions should be in alignment with all transmission detent positions.
8. Engine starts must be possible with shifter lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gate positions other than PARK or NEUTRAL.
9. With the shifter lever handle in the:
 - PARK position- apply forward force on center of handle and remove pressure. Engine start must be possible.
 - PARK position- apply rearward force on center of handle and remove pressure. Engine start must be possible.
 - NEUTRAL position- engine start must be possible.
 - NEUTRAL position, engine running and brakes applied- Apply forward force on center of shift handle. Transmission should not be able to shift into REVERSE detent.

PUMP, TRANSMISSION OIL

DESCRIPTION

DESCRIPTION

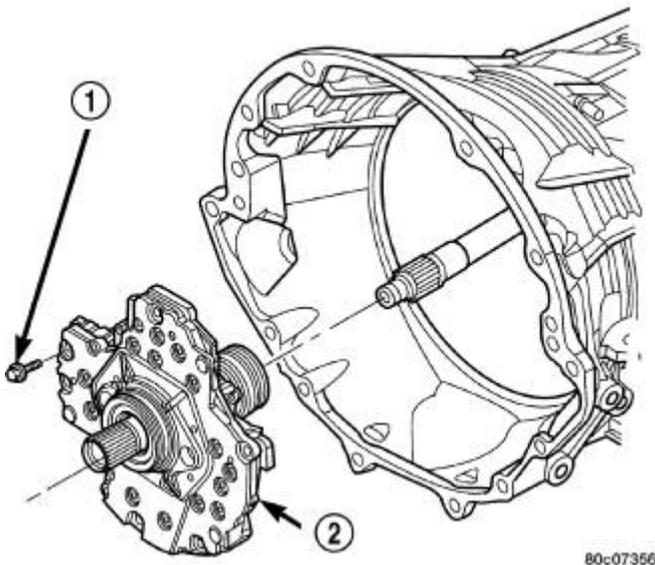
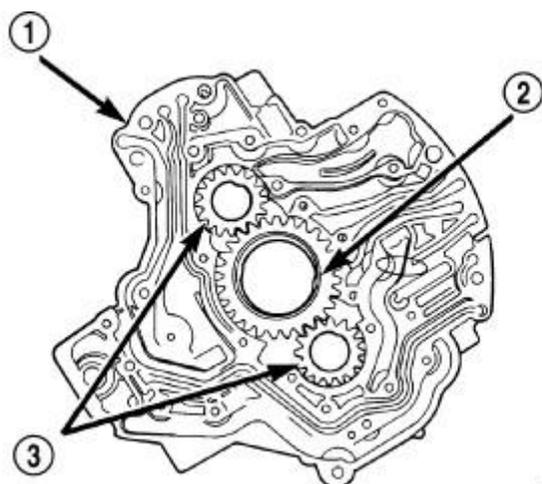


Fig. 167: Oil Pump & Bolts
 Courtesy of CHRYSLER LLC

1 - OIL PUMP TO CASE BOLT (6)
2 - OIL PUMP

The oil pump (2) is located at the front of the transmission inside the bell housing and behind the transmission front cover. Refer to **Fig. 167**.

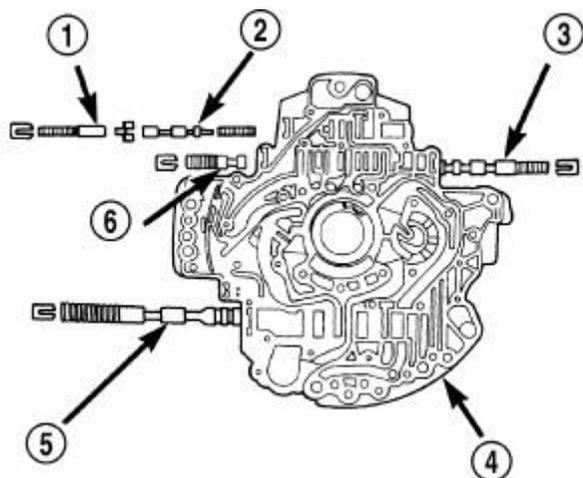


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Fig. 168: Oil Pump Gears
Courtesy of CHRYSLER LLC

- | |
|------------------|
| 1 - PUMP HOUSING |
| 2 - DRIVE GEAR |
| 3 - DRIVEN GEARS |

The oil pump consists of two independent pumps. Refer to **Fig. 168**.

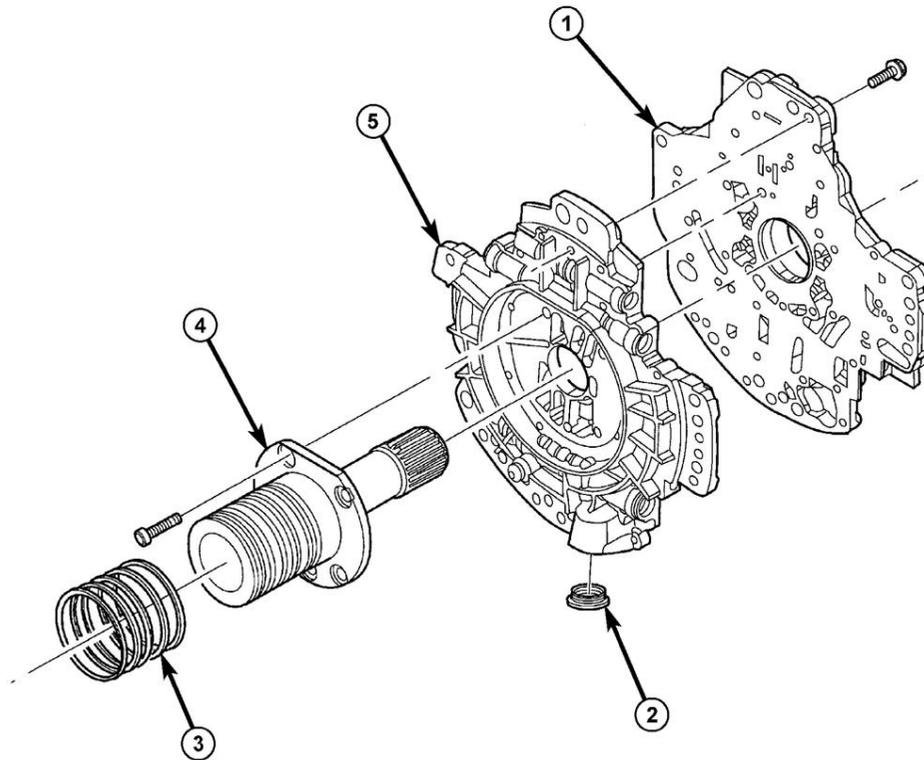


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Fig. 169: Identifying Pump Valves
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - TORQUE CONVERTER CLUTCH ACCUMULATOR VALVE |
| 2 - TORQUE CONVERTER CLUTCH CONTROL VALVE |
| 3 - TORQUE CONVERTER CLUTCH SWITCH VALVE |
| 4 - PUMP VALVE BODY |
| 5 - PRESSURE REGULATOR VALVE |
| 6 - TORQUE CONVERTER CLUTCH LIMIT VALVE |

The oil pump also contains a number of valves. The converter clutch switch (3) and control valves (2), pressure regulator valve (5), and converter pressure limit valve (6) are all located in the oil pump valve body. Refer to [Fig. 169](#).



808a2e46

Fig. 170: Oil Pump Reaction Shaft
Courtesy of CHRYSLER LLC

1 - PUMP HOUSING	4 - REACTION SHAFT SUPPORT
2 - OIL FILTER SEAL	5 - PUMP VALVE BODY
3 - SEAL RING (5)	

A filter seal (2), and a bolt on reaction shaft (4) complete the oil pump assembly.

OPERATION

OPERATION

As the torque converter rotates, the converter hub rotates the oil pump drive gear. As the drive gear rotates both driven gears, a vacuum is created when the gear teeth come out of mesh. This suction draws fluid through the pump inlet from the oil pan. As the gear teeth come back into mesh, pressurized fluid is forced into the pump outlet and to the oil pump valves.

At low speeds, both sides of the pump supply fluid to the transmission. As the speed of the torque converter increases, the flow from both sides increases until the flow from the primary side alone is sufficient to meet system demands. At this point, the check valve located between the two pumps closes. The secondary side is

shut down and the primary side supplies all the fluid to the transmission.

CONVERTER CLUTCH SWITCH VALVE

The converter clutch switch valve is used to control the direction of oil flow to the torque converter. When the converter clutch is released (CC switch valve downshifted), hydraulic pressure is supplied to the front (OFF) side of the torque converter clutch. When the converter clutch is applied (CC switch valve upshifted), regulated oil pressure is supplied to the back (ON) side of the converter clutch.

CONVERTER CLUTCH REGULATOR VALVE

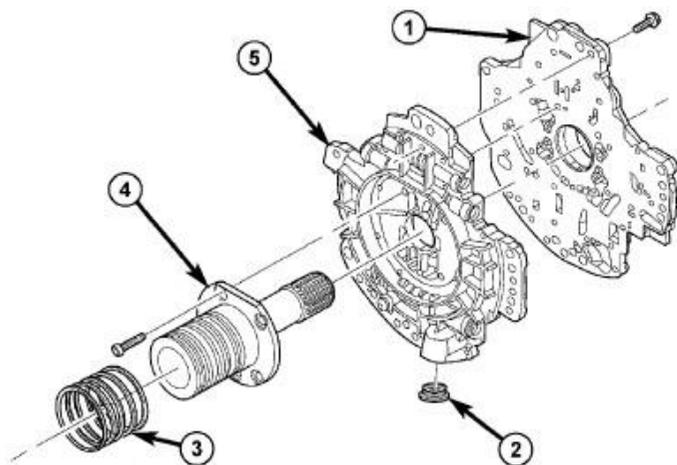
The converter clutch regulator valve is used to control the hydraulic pressure supplied to the back (ON) side of the torque converter clutch.

TORQUE CONVERTER LIMIT VALVE

The torque converter limit valve serves to limit the available line pressure to the torque converter clutch.

DISASSEMBLY

DISASSEMBLY



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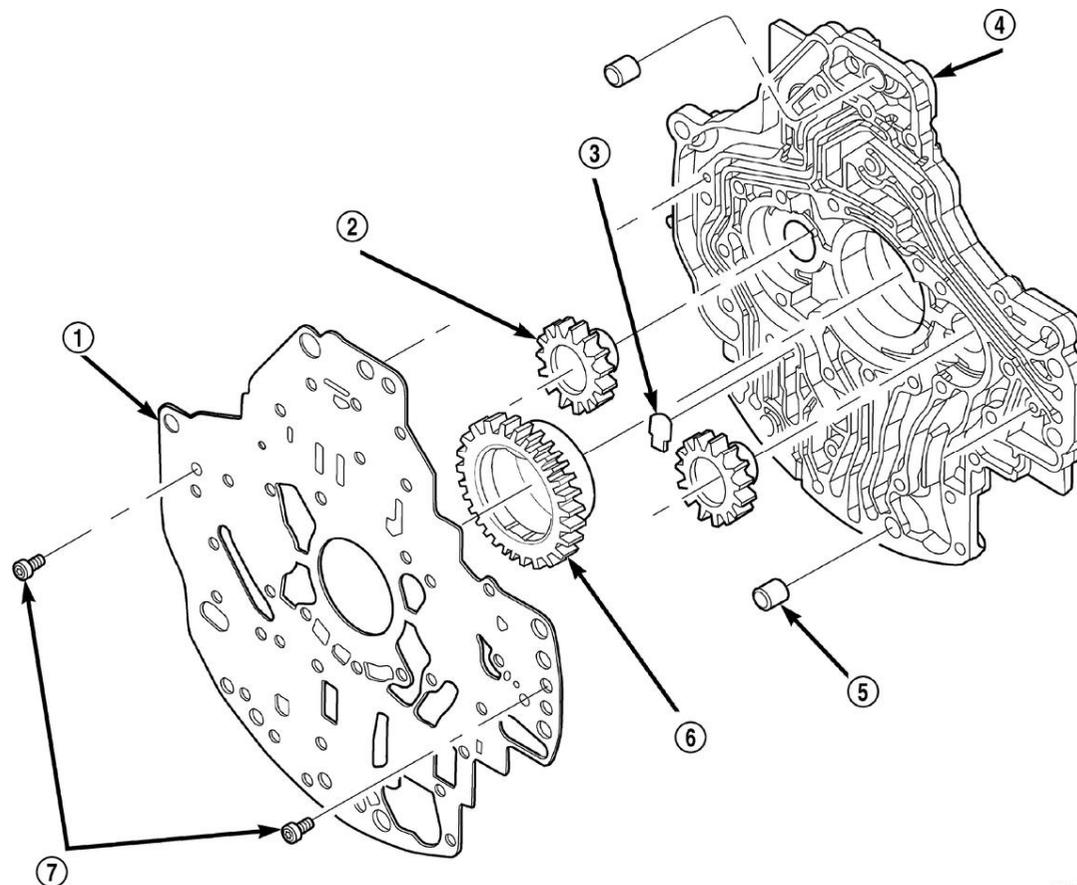
Fig. 171: Oil Pump Reaction Shaft
 Courtesy of CHRYSLER LLC

1 - PUMP HOUSING	4 - REACTION SHAFT SUPPORT
2 - OIL FILTER SEAL	5 - PUMP VALVE BODY
3 - SEAL RING (5)	

1. Remove the bolts holding the reaction shaft support (4) to the oil pump. Refer to **Fig. 171**.
2. Remove the reaction shaft support (4) from the oil pump. Refer to **Fig. 171**.
3. Remove all bolts holding the oil pump halves together. Refer to **Fig. 171**.
4. Using suitable prying tools, separate the oil pump sections by inserting the tools in the supplied areas and

prying the halves apart.

NOTE: The oil pump halves are aligned to each other through the use of two dowels. Be sure to pry upward evenly to prevent damage to the oil pump components.



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Fig. 172: Oil Pump Housing & Gears
 Courtesy of CHRYSLER LLC

1 - SEPARATOR PLATE	5 - DOWEL (2)
2 - DRIVEN GEAR (2)	6 - DRIVE GEAR
3 - FLAPPER VALVE	7 - SCREW
4 - PUMP HOUSING	

5. Remove the screws (7) holding the separator plate (1) onto the oil pump housing (4). Refer to **Fig. 172**.
6. Remove the separator plate (1) from the oil pump housing (4). Refer to **Fig. 172**.
7. Mark all gears for location. The gears are select fit and if the oil pump is to be reused, the gears must be returned to their original locations.
8. Remove the oil pump flapper valve (3) from its pocket in the pump housing.
9. Remove the oil pump gears (2, 6) from the oil pump housing (4). Refer to **Fig. 172**.

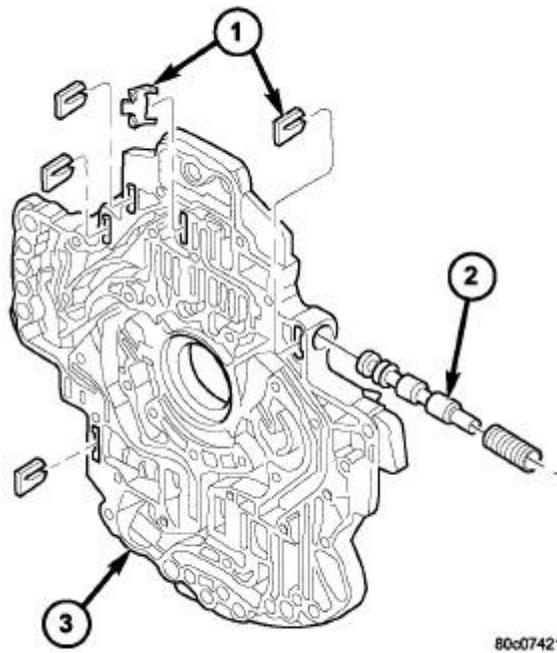


Fig. 173: Oil Pump Valve Retainers & T/C Switch Valve
Courtesy of CHRYSLER LLC

1 - RETAINER
2 - T/C SWITCH VALVE
3 - OIL PUMP VALVE BODY

10. Remove the oil pump valve retainers (1) and associated valve (2) and spring one at a time. Refer to **Fig. 173**. Mark the combination of components as a group and tag them as to the location from which they were removed.

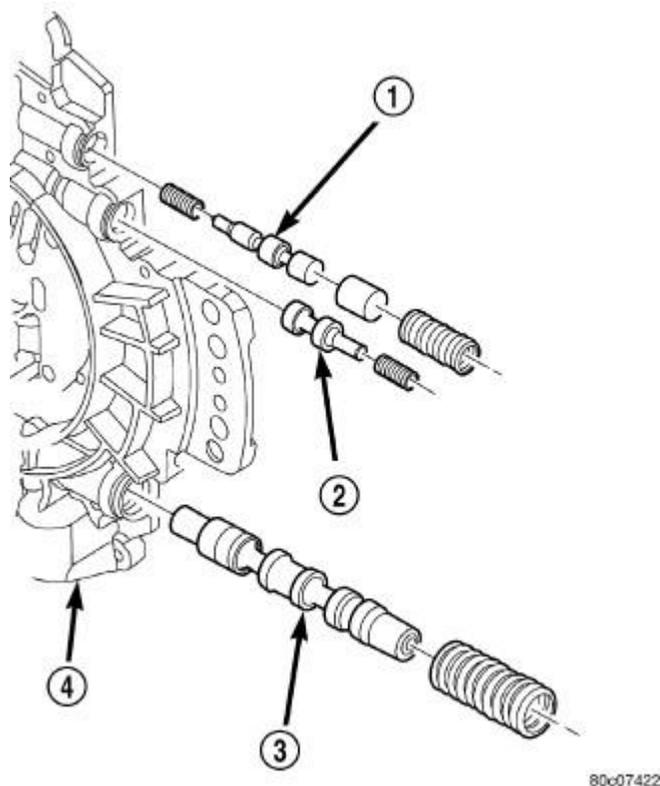


Fig. 174: T/C Regulator Valve, T/C Limit Valve & Regulator Valve
 Courtesy of CHRYSLER LLC

1 - T/C REGULATOR VALVE
2 - T/C LIMIT VALVE
3 - MAIN REGULATOR VALVE
4 - OIL PUMP VALVE BODY

11. Remove the T/C regulator valve (1), T/C limit valve (2), and regulator valve (3). Refer to **Fig. 174**.

CLEANING

CLEANING

Clean pump and support components with solvent and dry them with compressed air.

INSPECTION

INSPECTION

Check condition of the seal rings and thrust washer on the reaction shaft support. The seal rings do not need to be replaced unless cracked, broken, or severely worn.

Inspect the pump and support components. Replace the pump or support if the seal ring grooves or machined surfaces are worn, scored, pitted, or damaged. Replace the pump gears if pitted, worn chipped, or damaged.

2011 Jeep Grand Cherokee

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Inspect the pump reaction shaft support bushings. Replace either bushing only if heavily worn, scored or damaged. It is not necessary to replace the bushings unless they are actually damaged.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands.** Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

Inspect all the valve and plug bores in the oil pump valve body. Use a penlight to view the bore interiors. Replace the oil pump if any bores are distorted or scored. Inspect all of the valve springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores. Tip the pump valve body back and forth and check to see that each valve slides freely in its bore under its own weight (without pushing or prying).

ASSEMBLY

ASSEMBLY

NOTE: Clean and inspect all components. Make sure that all passages are thoroughly cleaned and are free from dirt or debris. Make sure that all valves move freely in their proper bore. Make sure that all gear pockets and bushings are free from excessive wear and scoring. Replace the oil pump if any excessive wear or scoring is found.

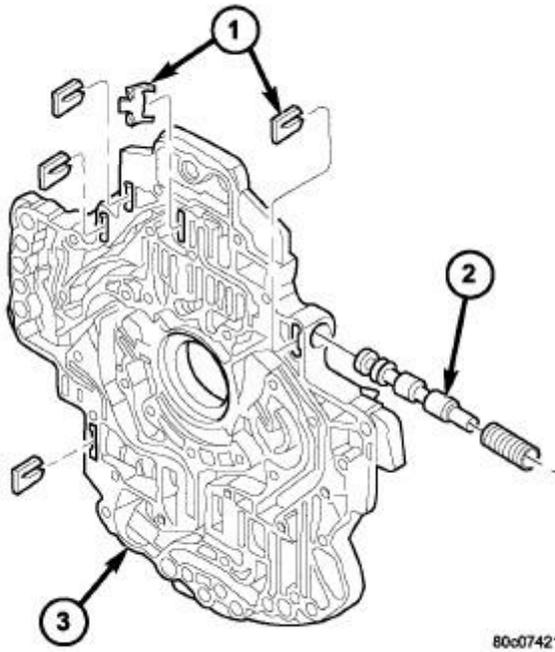
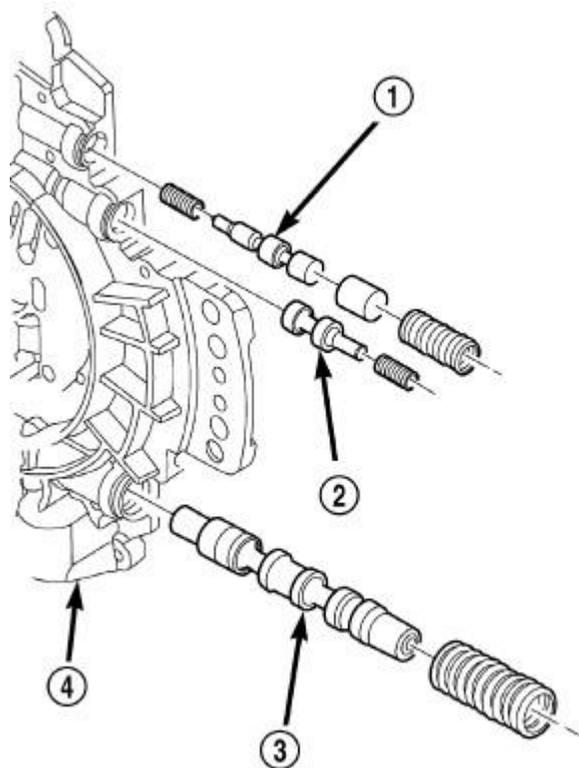


Fig. 175: Oil Pump Valve Retainers & T/C Switch Valve
 Courtesy of CHRYSLER LLC

1 - RETAINER
2 - T/C SWITCH VALVE
3 - OIL PUMP VALVE BODY

1. Lubricate the oil pump valves with Mopar® ATF +4 and install the valve (2), spring, and retainer (1) into the appropriate oil pump valve body (3) bore. Refer to **Fig. 175**.



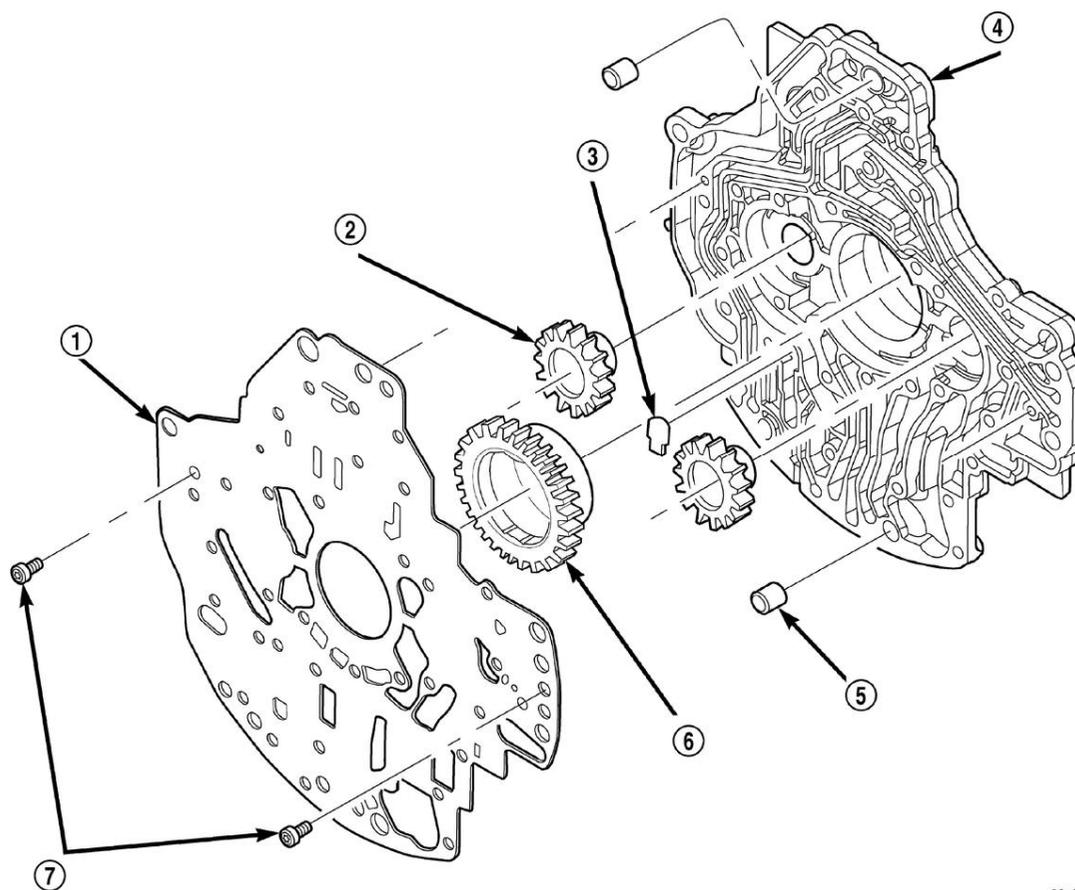
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Fig. 176: T/C Regulator Valve, T/C Limit Valve & Regulator Valve
 Courtesy of CHRYSLER LLC

1 - T/C REGULATOR VALVE
2 - T/C LIMIT VALVE
3 - MAIN REGULATOR VALVE
4 - OIL PUMP VALVE BODY

2. Install the T/C regulator valve (1), T/C limit valve (2), and regulator valve (3). Refer to **Fig. 176**.

NOTE: The pump separator plate is heat treated and therefore may exhibit a blue color or other discoloration in some areas. This is normal.

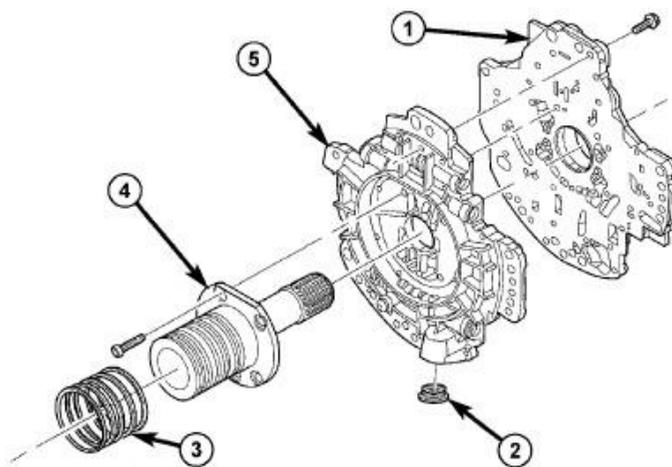


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Fig. 177: Oil Pump Housing & Gears
 Courtesy of CHRYSLER LLC

1 - SEPARATOR PLATE	5 - DOWEL (2)
2 - DRIVEN GEAR (2)	6 - DRIVE GEAR
3 - FLAPPER VALVE	7 - SCREW
4 - PUMP HOUSING	

3. Coat the gears (2, 6) with Mopar® ATF +4 and install into their original locations.
4. Place the oil pump flapper valve (3) into its pocket in the pump housing, with the rounded edges facing down.
5. Place the separator plate (1) onto the oil pump housing (4). Refer to **Fig. 177**.
6. Install the screws (7) to hold the separator plate (1) onto the oil pump housing (4). Refer to **Fig. 177**. Tighten the screws to 4.5 N.m (40 in.lbs.).



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Fig. 178: Oil Pump Reaction Shaft
Courtesy of CHRYSLER LLC

1 - PUMP HOUSING	4 - REACTION SHAFT SUPPORT
2 - OIL FILTER SEAL	5 - PUMP VALVE BODY
3 - SEAL RING (5)	

7. Position the oil pump valve body (5) onto the locating dowels.
8. Seat the two oil pump halves together and install all bolts finger tight.
9. Torque all bolts down slowly starting in the center and working outward. The correct torque is 4.5 N.m (40 in.lbs.).
10. Verify that the oil pump gears rotate freely and smoothly.
11. Position the reaction shaft support (4) onto the oil pump valve body (6).
12. Install and tighten the bolts to hold the reaction shaft support (4) to the oil pump valve body (5). The correct torque is 12 N.m (105 in.lbs.).

RELAY, TRANSMISSION CONTROL

DESCRIPTION

DESCRIPTION

NOTE: Due to different power control configurations, the Transmission Control Relay (if equipped) may be referred to as a PCM relay.

The relay is supplied fused B+ voltage, energized by the TCM, and is used to supply power to the solenoid pack when the transmission is in normal operating mode.

OPERATION

OPERATION

NOTE: Due to different power control configurations, the Transmission Control Relay (if equipped) may be referred to as a PCM relay.

When the relay is "off", no power is supplied to the solenoid pack and the transmission is in "limp-in" mode. After a controller reset, the TCM energizes the relay. Prior to this, the TCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the TCM monitors the terminals to verify that the voltage is greater than 3 volts.

RETAINER, TRANSMISSION 2ND AND 4TH CLUTCH PISTON

DISASSEMBLY

DISASSEMBLY

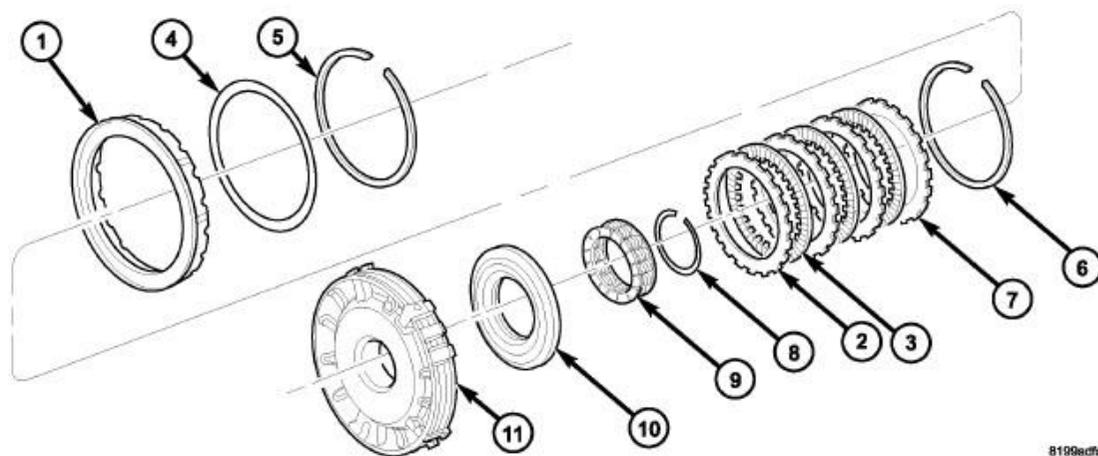
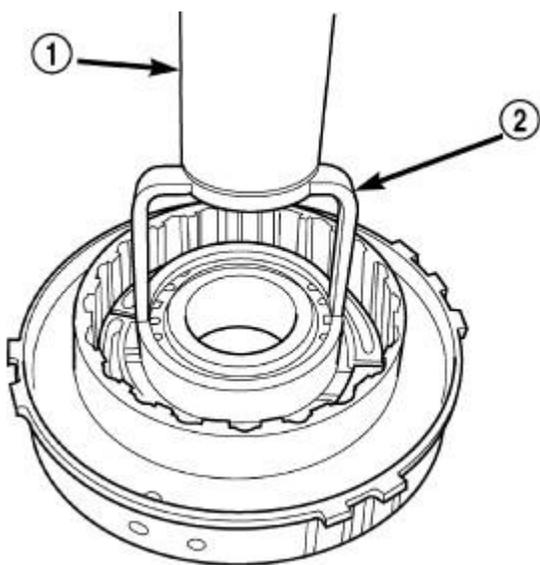


Fig. 179: 2nd And 4th Clutches
Courtesy of CHRYSLER LLC

1 - 2C PISTON	8 - SNAP-RING
2 - 4C PLATE	9 - RETURN SPRING
3 - 4C DISC	10 - 4C PISTON
4 - 2C BELLEVILLE SPRING	11 - 4C RETAINER/BULKHEAD
5 - SNAP-RING	
6 - SNAP-RING (SELECT)	
7 - REACTION PLATE	

1. Remove the 2C piston Belleville spring snap-ring (5) from the 4C retainer/bulkhead (12).
2. Remove the 2C piston Belleville spring (4) from the retainer/bulkhead (11).
3. Remove the 2C piston (1) from the retainer/bulkhead (11). Use 20 psi of air pressure to remove the piston if necessary.
4. Remove the 4C clutch snap-ring (6) from the retainer/bulkhead (11)
5. Remove the 4C clutch pack (2, 3, 7) from the retainer/bulkhead (11).

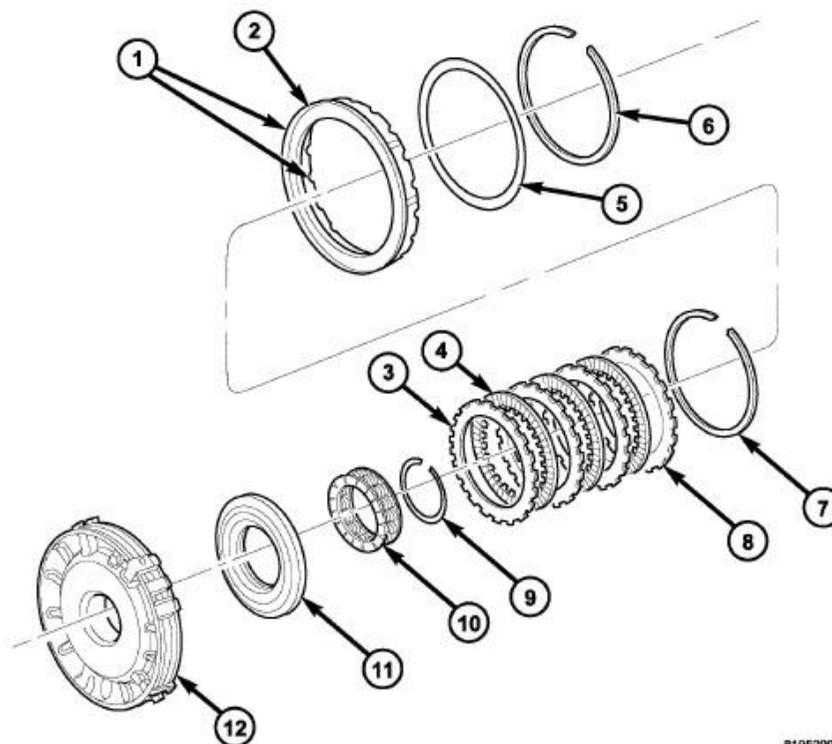


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Fig. 180: Compressing 4C Piston Return Spring
 Courtesy of CHRYSLER LLC

- | |
|---------------|
| 1 - PRESS |
| 2 - TOOL 8250 |

- Using Spring Compressor (special tool #8250, Compressor, Spring) (2) and a suitable shop press (1), compress the 4C piston return spring and remove the snap-ring.



8195200a

Fig. 181: Holding Clutches

Courtesy of CHRYSLER LLC

- | | |
|--------------------------|---------------------------|
| 1 - SEALS | 8 - REACTION PLATE |
| 2 - 2C PISTON | 9 - SNAP-RING |
| 3 - 4C PLATE | 10 - RETURN SPRING |
| 4 - 4C DISC | 11 - 4C PISTON |
| 5 - 2C BELLEVILLE SPRING | 12 - 4C RETAINER/BULKHEAD |
| 6 - SNAP-RING | |
| 7 - SNAP-RING (SELECT) | |

7. Remove the 4C piston return spring (10) and piston (11) from the retainer/bulkhead (12). Use 20 psi of air pressure to remove the piston if necessary.

ASSEMBLY

ASSEMBLY

NOTE: Clean and inspect all components. Replace any components which show evidence of excessive wear or scoring.

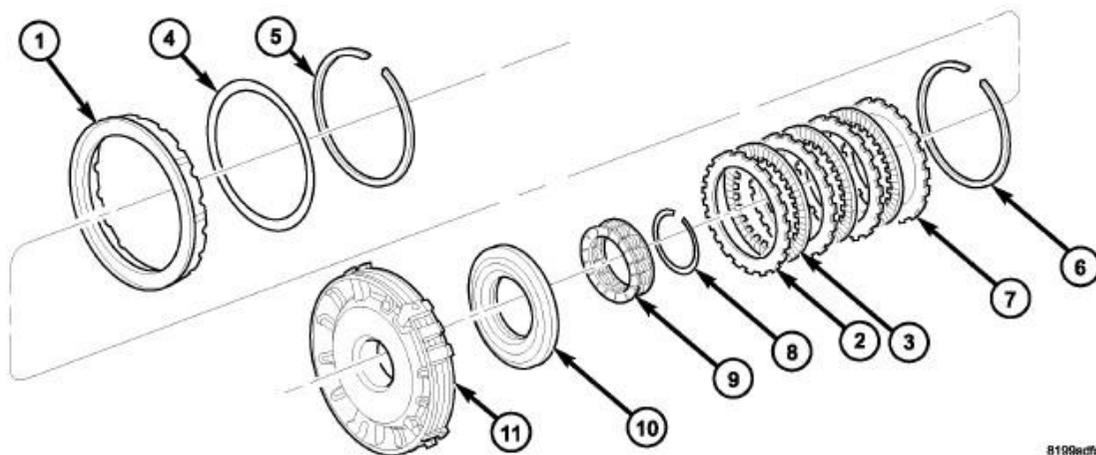


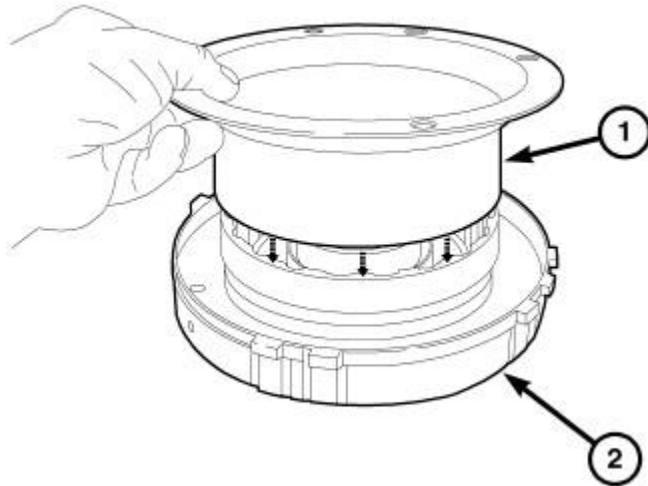
Fig. 182: 2nd And 4th Clutches

Courtesy of CHRYSLER LLC

- | | |
|--------------------------|---------------------------|
| 1 - 2C PISTON | 8 - SNAP-RING |
| 2 - 4C PLATE | 9 - RETURN SPRING |
| 3 - 4C DISC | 10 - 4C PISTON |
| 4 - 2C BELLEVILLE SPRING | 11 - 4C RETAINER/BULKHEAD |
| 5 - SNAP-RING | |
| 6 - SNAP-RING (SELECT) | |
| 7 - REACTION PLATE | |

1. Lubricate all seals with Mopar® ATF +4 prior to installation.

NOTE: The 4C piston installation aid is only available with procurement of a new 4C piston.

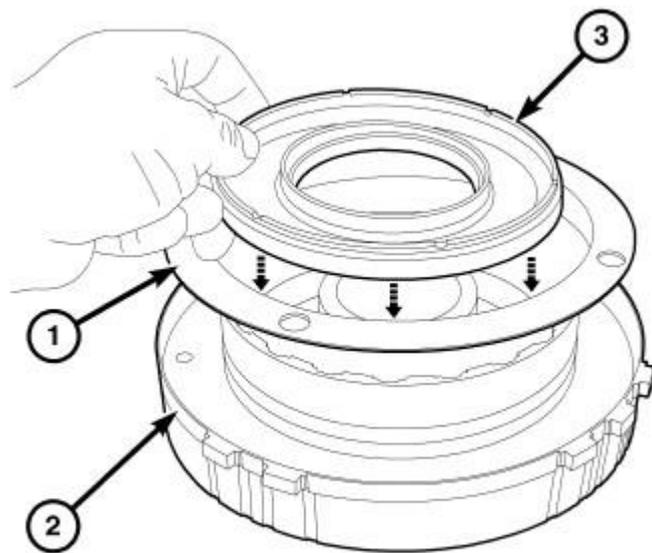


8195322c

Fig. 183: Installation Aid
Courtesy of CHRYSLER LLC

1 -INSTALLATION AID
2 -4C RETAINER

2. Insert the installation aid (1) into the 4C retainer / bulkhead (2).

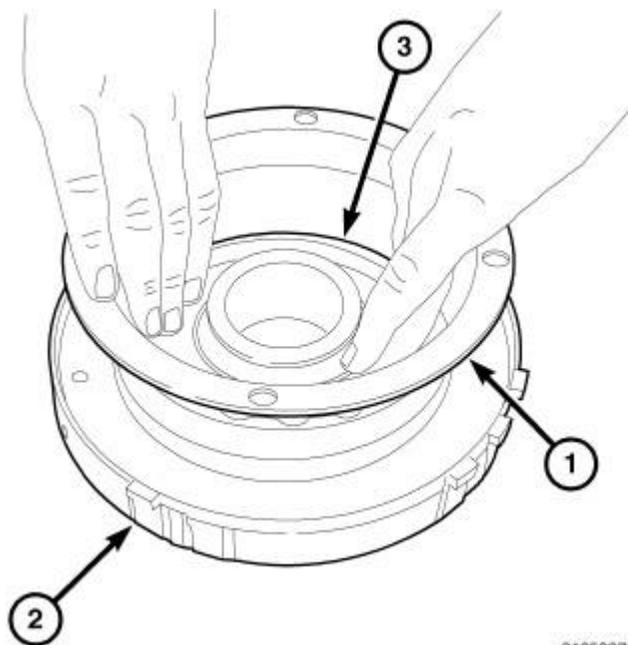


8195325e

Fig. 184: 4C Piston Installation
Courtesy of CHRYSLER LLC

- | |
|----------------------|
| 1 - INSTALLATION AID |
| 2 - 4C RETAINER |
| 3 - 4C PISTON |

3. Lubricate the inner and outer 4C piston seals (3) with MOPAR® ATF+ 4.
4. Install the 4C piston (3) into the installation aid (1).



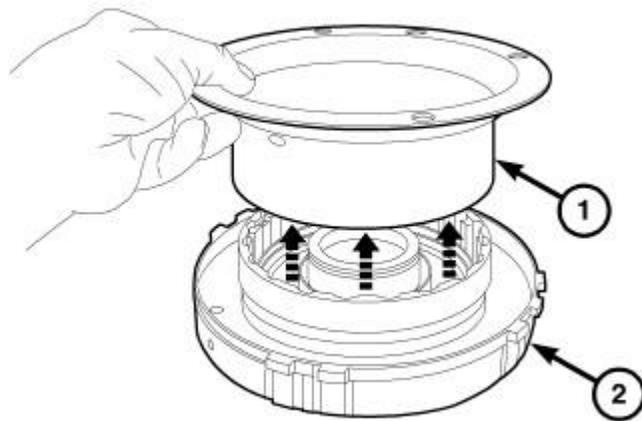
81953270

Fig. 185: Seating 4C Piston

Courtesy of CHRYSLER LLC

- | |
|---------------------|
| 1 -INSTALLATION AID |
| 2 -4C RETAINER |
| 3 - 4C PISTON |

5. Push the 4C piston (3) down evenly until it is seated in the 4C retainer / bulkhead (2).



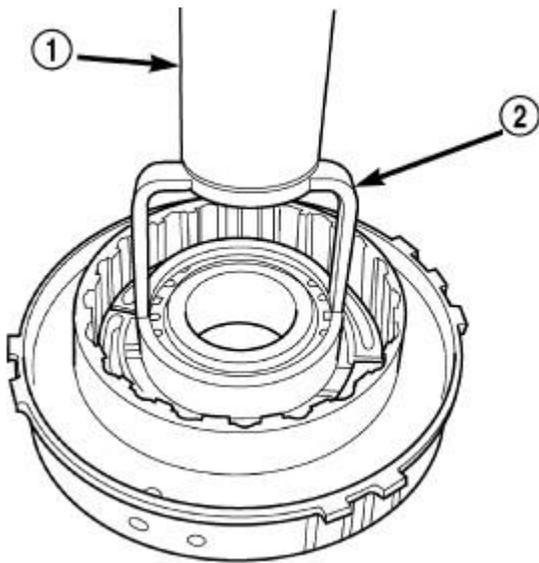
819531bc

Fig. 186: Installation Aide Removal

Courtesy of CHRYSLER LLC

- | |
|---------------------|
| 1 -INSTALLATION AID |
| 2 -4C RETAINER |
| 3 - 4C PISTON |

6. Remove the installation aid (1) from the 4C retainer / bulkhead (2).

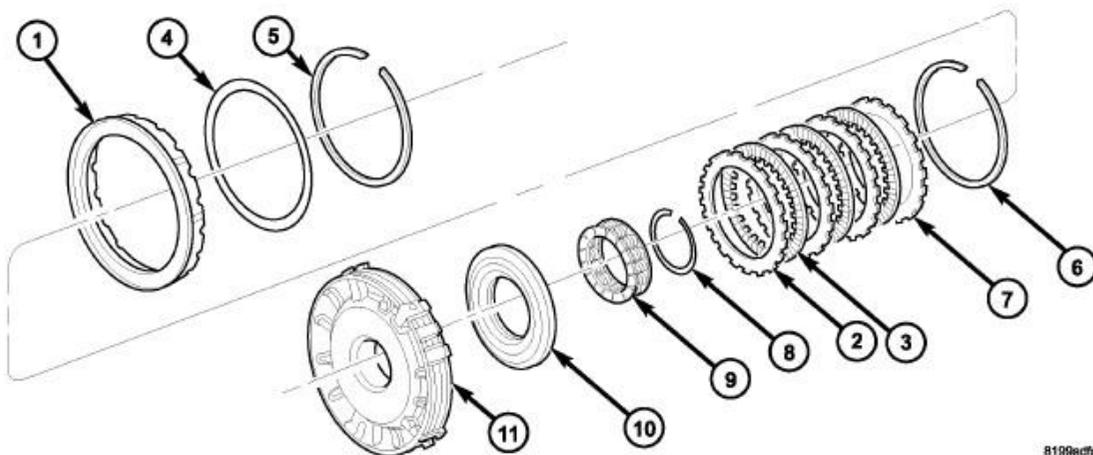


80c07419

Fig. 187: Compressing 4C Piston Return Spring
 Courtesy of CHRYSLER LLC

- | |
|---------------|
| 1 - PRESS |
| 2 - TOOL 8250 |

- Position the 4C piston return spring onto the 4C piston.
- Using Spring Compressor (special tool #8250, Compressor, Spring) (2) and a suitable shop press (1), compress the 4C piston return spring and install the snap-ring.



8199acffa

Fig. 188: 2nd And 4th Clutches
 Courtesy of CHRYSLER LLC

- | | |
|---------------|-------------------|
| 1 - 2C PISTON | 8 - SNAP-RING |
| 2 - 4C PLATE | 9 - RETURN SPRING |
| 3 - 4C DISC | 10 - 4C PISTON |

4 - 2C BELLEVILLE SPRING
 5 - SNAP-RING
 6 - SNAP-RING (SELECT)
 7 - REACTION PLATE

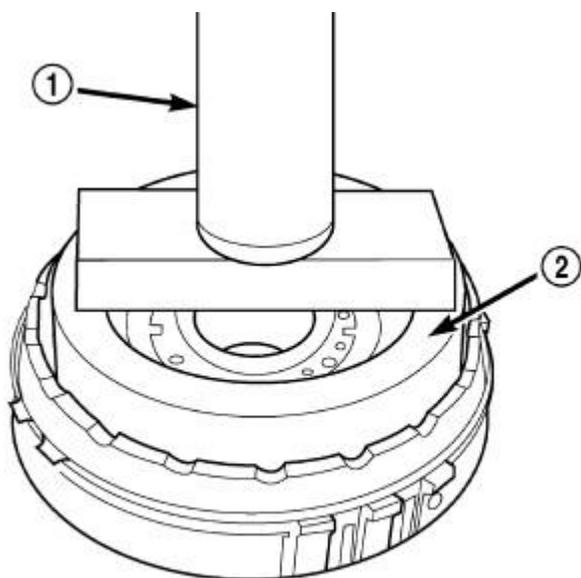
11 - 4C RETAINER/BULKHEAD

9. Assemble and install the 4C clutch pack (2, 3) into the retainer/bulkhead (11) with a steel separator plate against the piston.
10. Install the 4C reaction plate (7) and snap-ring (6) into the retainer/bulkhead (11). The 4C reaction plate is non-directional.
11. Measure the 4C clutch clearance. The correct clutch clearance is 0.770-1.390 mm (0.030-0.055 in.). The snap-ring (6) is selectable. Install the chosen snap-ring and re-measure to verify the selection.

The 4C selectable snap ring thickness are as follows:

4C SELECTABLE SNAP RING THICKNESS

- One Butterfly End, One Square End = 1.79 mm (0.070 in.).
 - Both Ends Butterfly Fly Cut = 2.20 mm (0.087 in.).
 - One Butterfly End, One Inverted Butterfly End = 2.61 mm (0.103 in.).
12. Install the 2C piston (1) into the retainer/bulkhead (11).
 13. Position the 2C Belleville spring (5) onto the 2C piston (2).
 14. Position the 2C Belleville spring snap-ring (6) onto the 2C Belleville spring (5).



80c07418

Fig. 189: Compressing Belleville Spring
 Courtesy of CHRYSLER LLC

1 - PRESS
 2 - TOOL 8249

- Using Spring Compressor (special tool #8249, Compressor, Spring) (2) and a suitable shop press (1), compress the Belleville spring until the snap-ring is engaged with the snap-ring groove in the retainer/bulkhead.

SEAL, ADAPTER HOUSING

REMOVAL

REMOVAL

- Remove the transfer case from the transmission.
- Using a screw mounted on a slide hammer, remove the adapter housing seal.

INSTALLATION

INSTALLATION

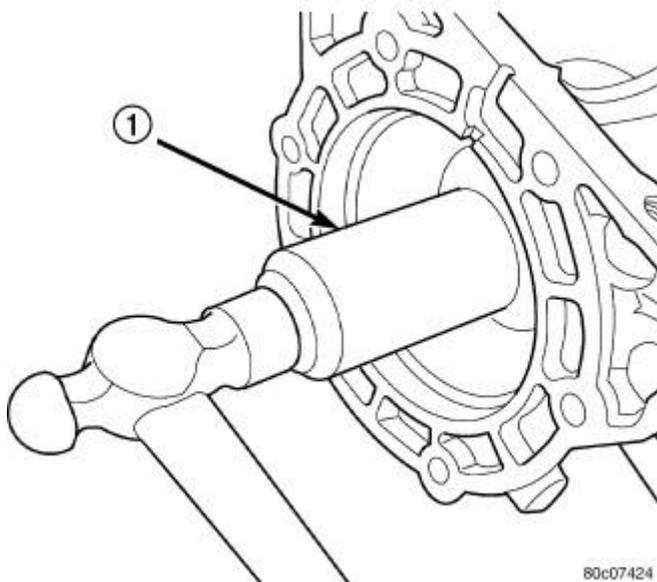


Fig. 190: Installing New Oil Seal In Adapter Housing
Courtesy of CHRYSLER LLC

1 - TOOL C-3860-A

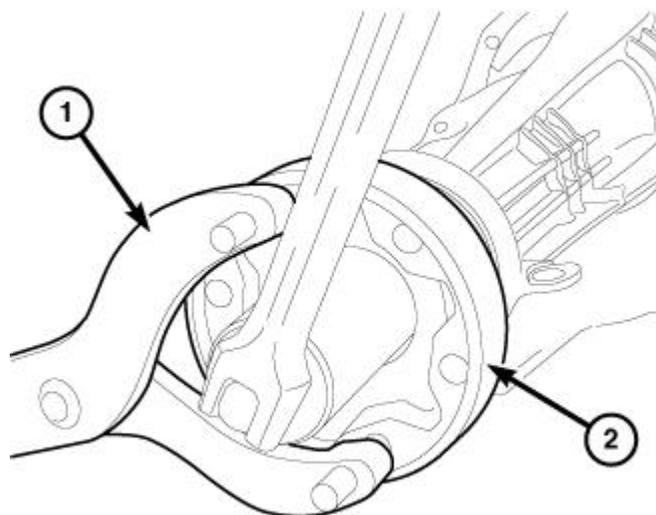
- Clean the adapter seal bore in the adapter housing of any residue or particles remaining from the original seal.
- Install new oil seal in the adapter housing using Seal Installer (special tool #C-3860-A, Installer, Seal) (1). Refer to **Fig. 190**. A properly installed seal is flush to the face of the seal bore.
- Install the transfer case onto the transmission.

SEAL, OUTPUT SHAFT

REMOVAL

REMOVAL

1. Apply an alignment mark on the drive shaft to output flange and remove the rear drive shaft. Refer to **SHAFT, DRIVE, REAR, REMOVAL** .



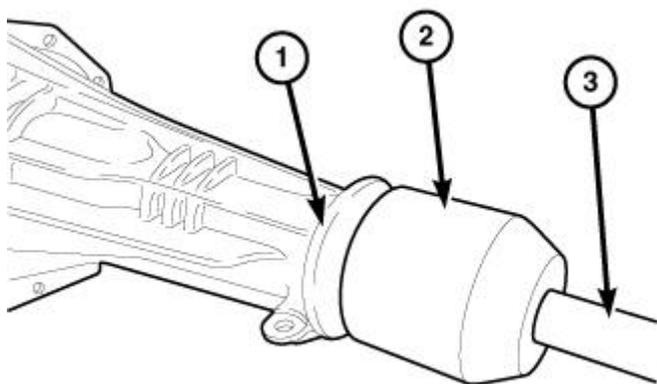
3815631

Fig. 191: Holder & Flange
 Courtesy of CHRYSLER LLC

2. Using (special tool #C-3281, Holder, Flange) (1) remove flange nut and flange (2).
3. Using a seal removal tool, remove rear extension housing output shaft seal.

INSTALLATION

INSTALLATION



3815464

Fig. 192: Identifying Extension Housing, Installer, & Driver Handle
 Courtesy of CHRYSLER LLC

1. Clean the extension housing seal bore in the extension housing of any residue or particles remaining from the original seal.
2. Install new oil seal in the extension housing (1) using (special tool #8695, Installer, Seal) (2) and (special tool #C-4171, Driver Handle, Universal) (3).

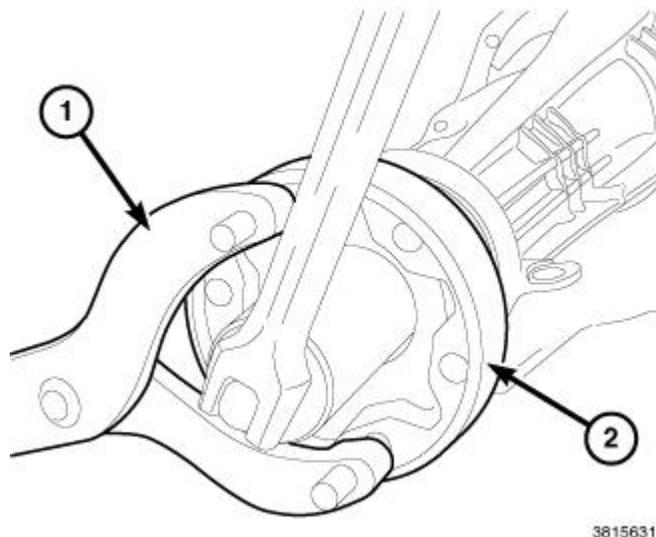


Fig. 193: Holder & Flange
 Courtesy of CHRYSLER LLC

3. Install flange (2) and using (special tool #C-3281, Holder, Flange) (1) install flange nut and tighten to 149 N.m (110 ft. lbs.).
4. Align marks and install rear drive shaft. Refer to **SHAFT, DRIVE, REAR, INSTALLATION**.

SENSOR, SPEED, INPUT

DESCRIPTION

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this

information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the park gear teeth. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

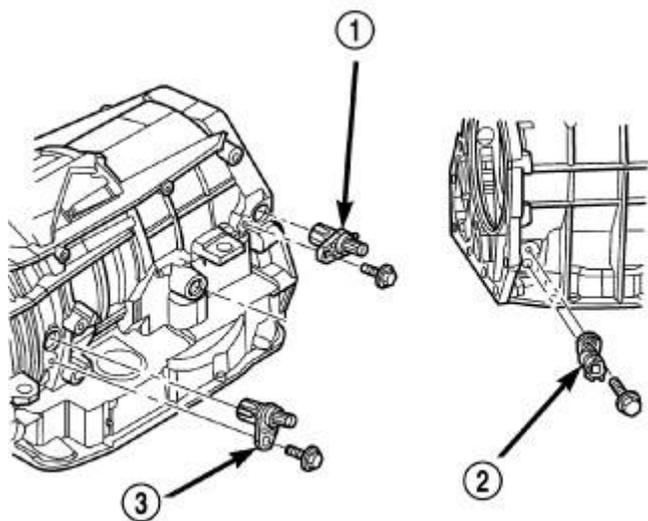
- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

REMOVAL

REMOVAL



80c07350

Fig. 194: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

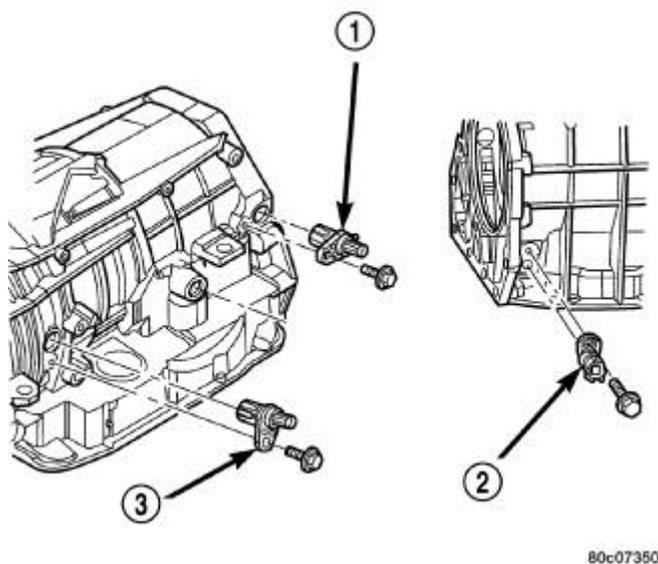
- | |
|--------------------------|
| 1 - OUTPUT SPEED SENSOR |
| 2 - LINE PRESSURE SENSOR |
| 3 - INPUT SPEED SENSOR |

1. Raise vehicle.
2. Place a suitable fluid catch pan under the transmission.

3. Remove the wiring connector from the input speed sensor (3). Refer to **Fig. 194**.
4. Remove the bolt holding the input speed sensor to the transmission case.
5. Remove the input speed sensor (3) from the transmission case.

INSTALLATION

INSTALLATION



80c07350

Fig. 195: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

1. Install the input speed sensor (3) into the transmission case. Refer to **Fig. 195**.
2. Install the bolt to hold the input speed sensor (3) into the transmission case. Tighten the bolt to 12 N.m (105 in.lbs.).
3. Install the wiring connector onto the input speed sensor.
4. Verify the transmission fluid level. Add fluid as necessary.
5. Lower vehicle.

SENSOR, SPEED, OUTPUT

DESCRIPTION

DESCRIPTION

The Input and Output Speed Sensors are two-wire magnetic pickup devices that generate AC signals as rotation

occurs. They are mounted in the left side of the transmission case and are considered primary inputs to the Transmission Control Module (TCM).

OPERATION

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil, an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

The Output Speed Sensor generates an AC signal in a similar fashion, though its coil is excited by rotation of the park gear teeth. The TCM interprets this information as output shaft rpm.

The TCM compares the input and output speed signals to determine the following:

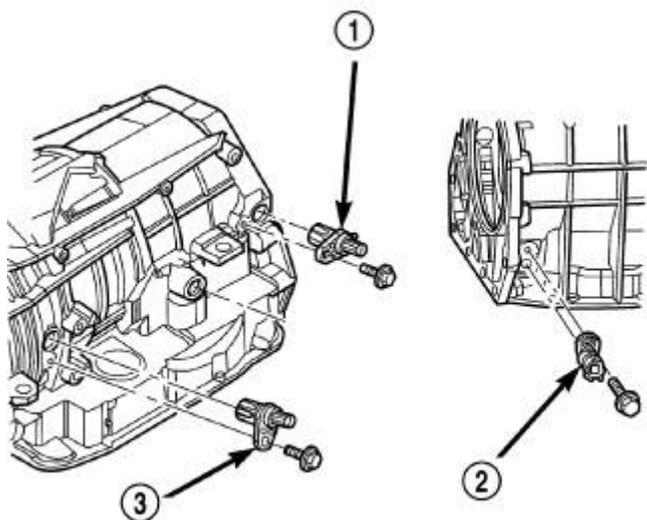
- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

REMOVAL

REMOVAL



80c-07350

Fig. 196: Input, Output, & Line Pressure Sensors
Courtesy of CHRYSLER LLC

1 - OUTPUT SPEED SENSOR

2 - LINE PRESSURE SENSOR

3 - INPUT SPEED SENSOR

1. Raise vehicle.
2. Remove transfer case skid plate (if equipped).
3. Place a suitable fluid catch pan under the transmission.
4. Remove the wiring connector from the output speed sensor (1). Refer to **Fig. 196**.
5. Remove the bolt holding the output speed sensor (1) to the transmission case.
6. Remove the output speed sensor (1) from the transmission case.

INSTALLATION

INSTALLATION

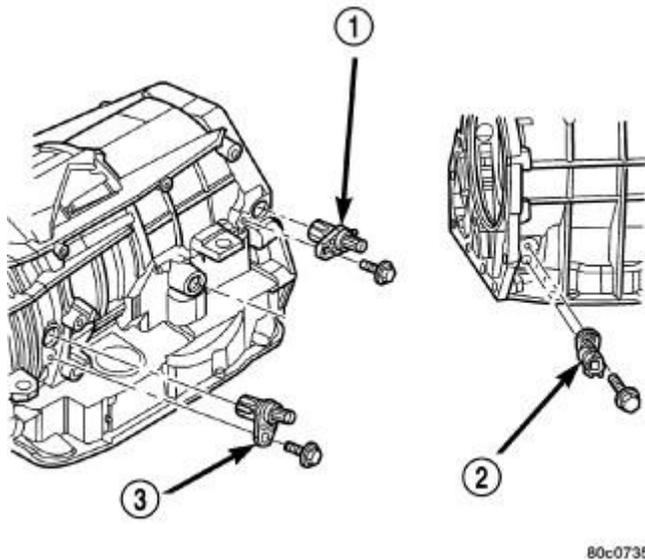


Fig. 197: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

1 - OUTPUT SPEED SENSOR

2 - LINE PRESSURE SENSOR

3 - INPUT SPEED SENSOR

1. Install the output speed sensor (1) into the transmission case. Refer to **Fig. 197**.
2. Install the bolt to hold the output speed sensor (1) into the transmission case. Tighten the bolt to 12 N.m (105 in.lbs.).
3. Install the wiring connector onto the output speed sensor (1).
4. install the transfer case skid plate (if equipped).
5. Verify the transmission fluid level. Add fluid as necessary.

6. Lower vehicle.

SENSOR, TRANSMISSION OIL TEMPERATURE

DESCRIPTION

DESCRIPTION

The transmission temperature sensor is a thermistor that is integral to the Transmission Range Sensor (TRS).

OPERATION

OPERATION

The transmission temperature sensor is used by the TCM to sense the temperature of the fluid in the sump. Since fluid temperature can affect transmission shift quality and convertor lock up, the TCM requires this information to determine which shift schedule to operate in.

CALCULATED TEMPERATURE

A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a predicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature
- Engine coolant temperature
- In-gear run time since start-up

SENSOR, TRANSMISSION RANGE

DESCRIPTION

DESCRIPTION

The Transmission Range Sensor (TRS) is part of the solenoid module, which is mounted to the top of the valve body inside the transmission.

The Transmission Range Sensor (TRS) has five switch contact pins that:

- Determine shift lever position
- Supply ground to the Starter Relay in Park and Neutral only.
- Supply +12 V to the backup lamps in Reverse only.

The TRS also has an integrated temperature sensor (thermistor) that communicates transmission temperature to the TCM and PCM.

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

OPERATION

OPERATION

The Transmission Range Sensor (TRS) communicates shift lever position to the TCM as a combination of open and closed switches. Each shift lever position has an assigned combination of switch states (open/closed) that the TCM receives from four sense circuits. The TCM interprets this information and determines the appropriate transmission gear position and shift schedule.

There are many possible combinations of open and closed switches (codes). Seven of these possible codes are related to gear position and five are recognized as "between gear" codes. This results in many codes which should **never occur**. These are called "invalid" codes. An invalid code will result in a DTC, and the TCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

GEAR	C5	C4	C3	C2	C1
Park	CL	OP	OP	CL	CL
Temp 1	CL	OP	OP	CL	OP
Reverse	OP	OP	OP	CL	OP
Temp 2	OP	OP	CL	CL	OP
Neutral 1	OP	OP	CL	CL	CL
Neutral 2	OP	CL	CL	CL	CL
Temp 3	OP	CL	CL	CL	OP
Drive	OP	CL	CL	OP	OP
Temp 4	OP	CL	OP	OP	OP
Manual 2	CL	CL	OP	OP	OP
Temp 5	CL	OP	OP	OP	OP
Manual 1	CL	OP	CL	OP	OP

SENSOR, VARIABLE LINE PRESSURE

DESCRIPTION

DESCRIPTION

The TCM utilizes a closed-loop system to control transmission line pressure. The system contains a variable force style solenoid, the Pressure Control Solenoid, which is part of the pressure switch assembly. The solenoid is duty cycle controlled by the TCM to vent the unnecessary line pressure supplied by the oil pump back to the pump inlet. The system contains a Line Pressure Sensor, which is a direct input to the TCM. The line pressure sensor monitors the transmission line pressure and completes the feedback loop to the TCM. The TCM uses this information to adjust its control of the pressure control solenoid to achieve the desired line pressure.

OPERATION

OPERATION

The TCM calculates the desired line pressure based upon inputs from the transmission and engine. The TCM calculates the torque input to the transmission and uses that information as the primary input to the calculation. The line pressure is set to a predetermined value during shifts, to ensure consistent shift quality. During all other operation, the desired line pressure value is adjusted based on torque level and other transmission requirements.

REMOVAL

REMOVAL

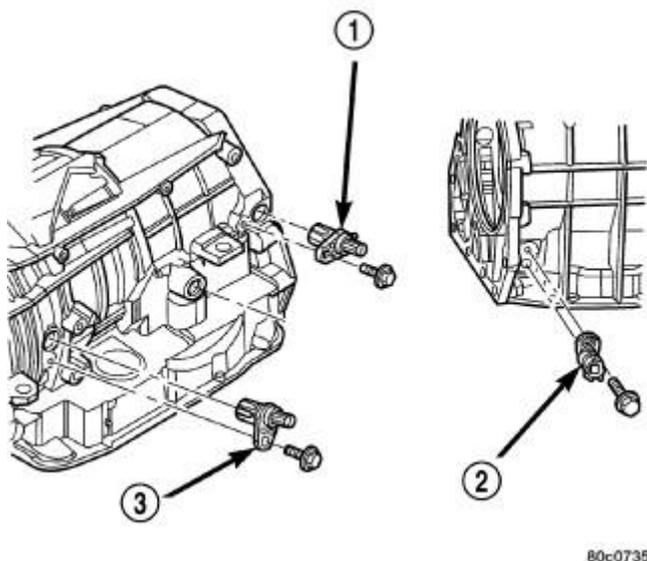


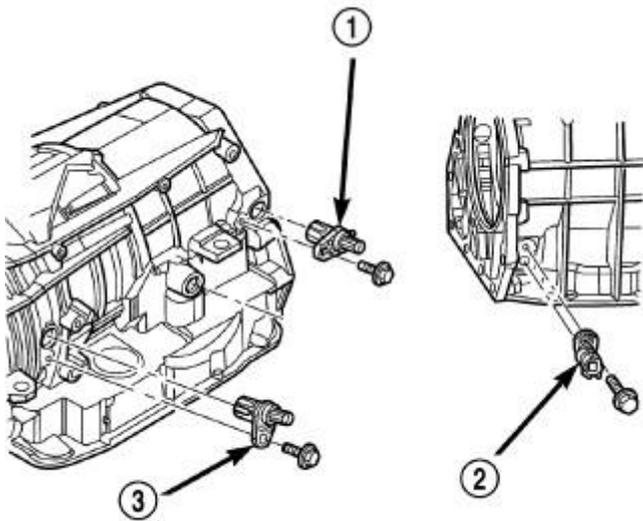
Fig. 198: Input, Output, & Line Pressure Sensors
Courtesy of CHRYSLER LLC

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

1. Raise vehicle.
2. Place a suitable fluid catch pan under the transmission.
3. Remove the wiring connector from the line pressure sensor (2). Refer to **Fig. 198**.
4. Remove the bolt holding the line pressure sensor (2) to the transmission case.
5. Remove the line pressure sensor (2) from the transmission case.

INSTALLATION

INSTALLATION



80c07350

Fig. 199: Input, Output, & Line Pressure Sensors
 Courtesy of CHRYSLER LLC

1 - OUTPUT SPEED SENSOR
2 - LINE PRESSURE SENSOR
3 - INPUT SPEED SENSOR

1. Install the line pressure sensor (2) into the transmission case. Refer to **Fig. 199**.
2. Install the bolt to hold the line pressure sensor (2) into the transmission case. Tighten the bolt to 12 N.m (105 in.lbs.).
3. Install the wiring connector onto the line pressure sensor (2).
4. Verify the transmission fluid level. Add fluid as necessary.
5. Lower vehicle.

SHIFTER, TRANSMISSION

DESCRIPTION

DESCRIPTION

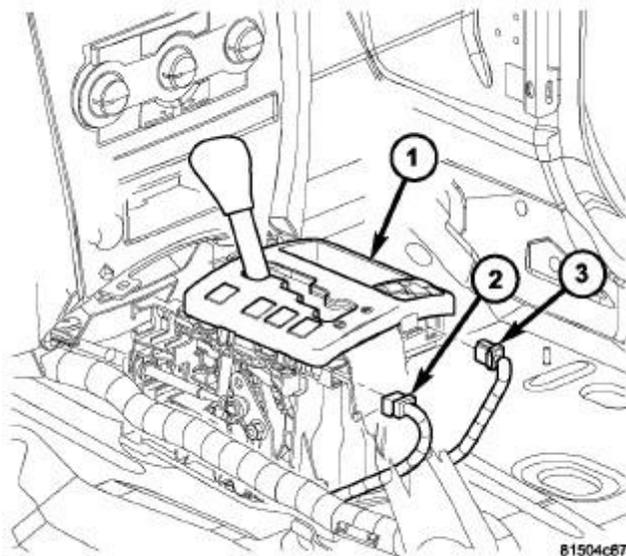


Fig. 200: Shift Lever Assembly & Connectors
Courtesy of CHRYSLER LLC

The automatic transmission is operated with the help of a shift lever assembly (SLA) (1) located in the floor console. There are four positions to which the selection lever can be shifted: P, R, N, D. In addition, the selector lever can be moved sideways (+/-) in position "D" to adjust the shift range.

All selector lever positions are identified by the SLA and transmitted by a shift cable to the selector shaft in the transmission.

The SLA is comprised of the following functions:

- **Park lock:** The selector lever is not released from position "P" until the brake pedal has been applied and the ignition key is in "ACC" or ON" positions. Shift lock is controlled by the brake light switch in conjunction with a locking solenoid in the SLA. As soon as the brake pedal is applied firmly, the locking solenoid is de-energized to unlock the selector lever.

OPERATION

OPERATION

With the selector lever in position "D", the transmission control module (TCM) automatically shifts the gears that are best-suited to the current operating situation. This means that shifting of gears is continuously adjusted to current driving and operating conditions in line with the selected shift range and the accelerator pedal position. Starting off is always performed in 1st gear.

The current selector lever position or, if the shift range has been limited, the current shift range is indicated in the instrument cluster display.

The permissible shifter positions and transmission operating ranges are:

- P = Parking lock and engine starting.
- R = Reverse.
- N = Neutral and engine starting (no power is transmitted to the axles).
- D = The shift range includes all forward gears.

The shift range can be adjusted to the current operating conditions by tipping the selector lever to the left-hand side ("-") or the right-hand side ("+") when in position "D". If the shift range is limited, the display in the instrument cluster indicates the selected shift range and not the currently engaged gear.

- 5= Shift range is limited to overdrive
- 4= Shift range is limited to 4th gear.
- 3= Shift range is limited to 3rd gear.
- 2= Shift range is limited to 2nd gear.
- 1= Shift range is limited to 1st gear.

Tipping the shift lever will have the following results:

- **Tipping the selector lever toward "-" one time after another:** The shift range is reduced in descending sequence by one gear each time, i.e., from D - 4 - 3 - 2 - 1. If the selected limitation of the shift range would result in a downshift causing excessive engine speed, the shifting is not executed and the engaged gear as well as the shift range remain unchanged. This is to prevent the engine from overspeeding. Engine retardation is low with the selector lever in position "D". To make use of the full braking power of the engine, "manual" downshifting by tipping the lever towards the left-hand side is recommended. If this has been done, subsequent upshifting must be carried out manually as well.
- **Tipping the selector lever toward "-" and holding it in this position:** The currently engaged gear in range "D" is indicated in the instrument cluster display and the shift range is limited to this gear.
- **Tipping the selector lever toward "+" one time after another:** The shift range is increased by one gear each time and the increased shift range is displayed in the instrument cluster; possibly, the transmission upshifts to a faster gear.
- **Tipping the selector lever toward "+" several times:** The shift range is increased by one gear each time the lever is tipped until the shift range ends up in "D".
- **Tipping the selector lever toward "+" and holding it in this position:** The shift range is extended immediately to "D", shift ranges are indicated in ascending sequence; possibly, the transmission upshifts to a faster gear due to the extension of the shift range.

REMOVAL

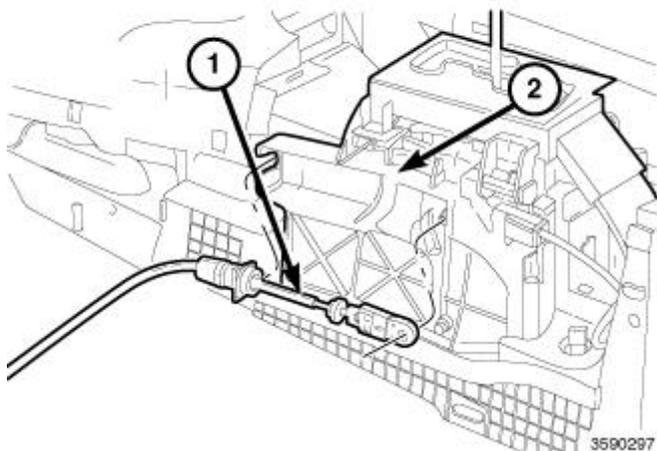


Fig. 201: Transmission Shift Cable & Shifter Assembly
Courtesy of CHRYSLER LLC

1. Remove any necessary console parts for access to shift lever assembly and shifter cables. For shifter knob and bezel removal, refer to **BEZEL, SHIFTER** . For console components, refer to **CONSOLE, FLOOR** .
2. Shift transmission into PARK.
3. Disconnect the transmission shift cable (1) at shifter assembly (2).
4. Remove the shift cable retainer from the notch in the shifter assembly.
5. Disengage all wiring connectors from the shifter assembly (2).

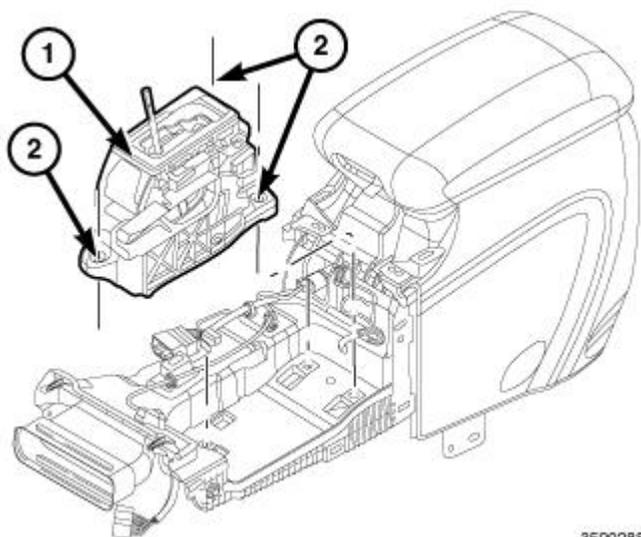
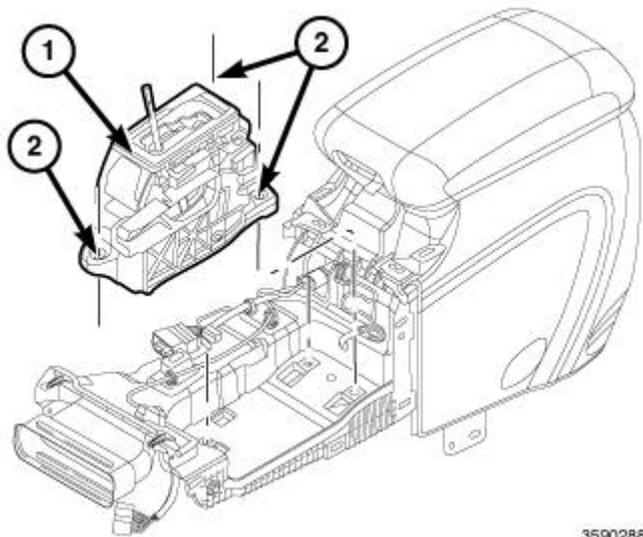


Fig. 202: Shifter Assembly & Bolts
Courtesy of CHRYSLER LLC

6. Remove all bolts (2) holding the shifter assembly (1) to the floor pan.

7. Remove the shifter assembly (1) from the vehicle.

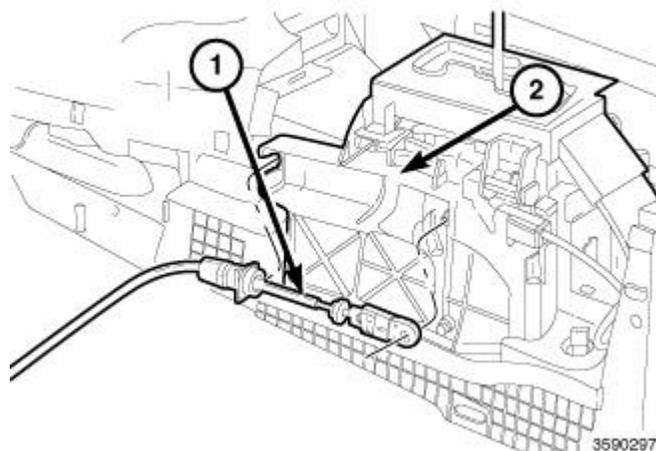
INSTALLATION



3590288

Fig. 203: Shifter Assembly & Bolts
Courtesy of CHRYSLER LLC

1. Install shifter assembly (1) in position on the floor pan.
2. Install the bolts (2) to hold the shifter assembly (1) onto the floor pan. Tighten bolts to 12 N.m (105 in.lbs.).



3590297

Fig. 204: Transmission Shift Cable & Shifter Assembly
Courtesy of CHRYSLER LLC

3. Place the floor shifter lever in PARK position.
4. Install the gearshift cable (1) to the shift lever pin.

5. Install the wiring harness connectors to the shifter assembly (2).
6. Verify that the shift lever is in the PARK position.
7. Tighten the adjustment screw to 30 N.m (265 in.lbs.).
8. Verify correct shifter, park lock, and BTSI operation.
9. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
10. Install any console parts removed for access to shift lever assembly and shift cables. Refer to **INSTALLATION**.

SWITCH, OVERDRIVE LOCKOUT, TOW AND HAUL

DESCRIPTION

DESCRIPTION

The tow/haul overdrive OFF (control) switch is located in the lower portion of the center instrument panel switch cluster. The switch is a momentary contact device that signals the PCM to toggle current status of the overdrive function.

OPERATION

OPERATION

At key-on, overdrive operation is allowed. Pressing the switch once causes the tow/haul overdrive OFF mode to be entered and the Tow/Haul lamp to be illuminated. Pressing the switch a second time causes normal overdrive operation to be restored and the tow/haul lamp to be turned off. The tow/haul overdrive OFF mode defaults to ON after the ignition switch is cycled OFF and ON. The normal position for the control switch is the ON position. The switch must be in this position to energize the solenoid and allow a 3-4 upshift. The control switch indicator light illuminates only when the tow/haul overdrive switch is turned to the OFF position, or when illuminated by the transmission control module.

TORQUE CONVERTER

DESCRIPTION

DESCRIPTION

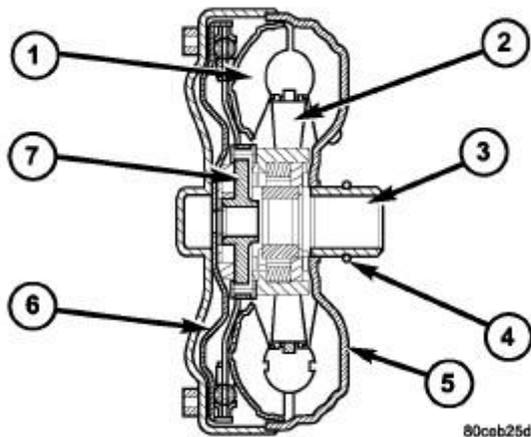


Fig. 205: Torque Converter Assembly
Courtesy of CHRYSLER LLC

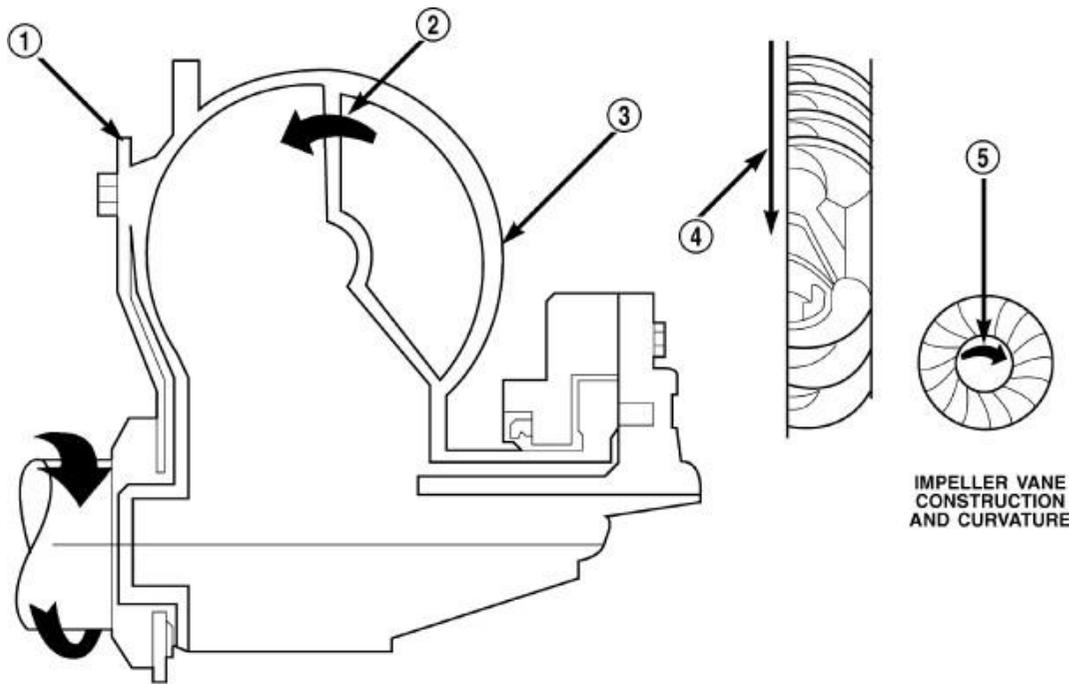
1 - TURBINE ASSEMBLY	5 - IMPELLER ASSEMBLY
2 - STATOR	6 - CONVERTER CLUTCH PISTON
3 - CONVERTER HUB	7 - TURBINE HUB
4 - O-RING	

The torque converter is a hydraulic device that couples the engine crankshaft to the transmission. Refer to **Fig. 205**. The torque converter consists of an outer shell with an internal turbine (1), a stator (2), an overrunning clutch, an impeller (5), and an electronically applied converter clutch (6). The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The torque converter hub (3) drives the transmission oil (fluid) pump and contains an o-ring seal (4) to better control oil flow.

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.

IMPELLER



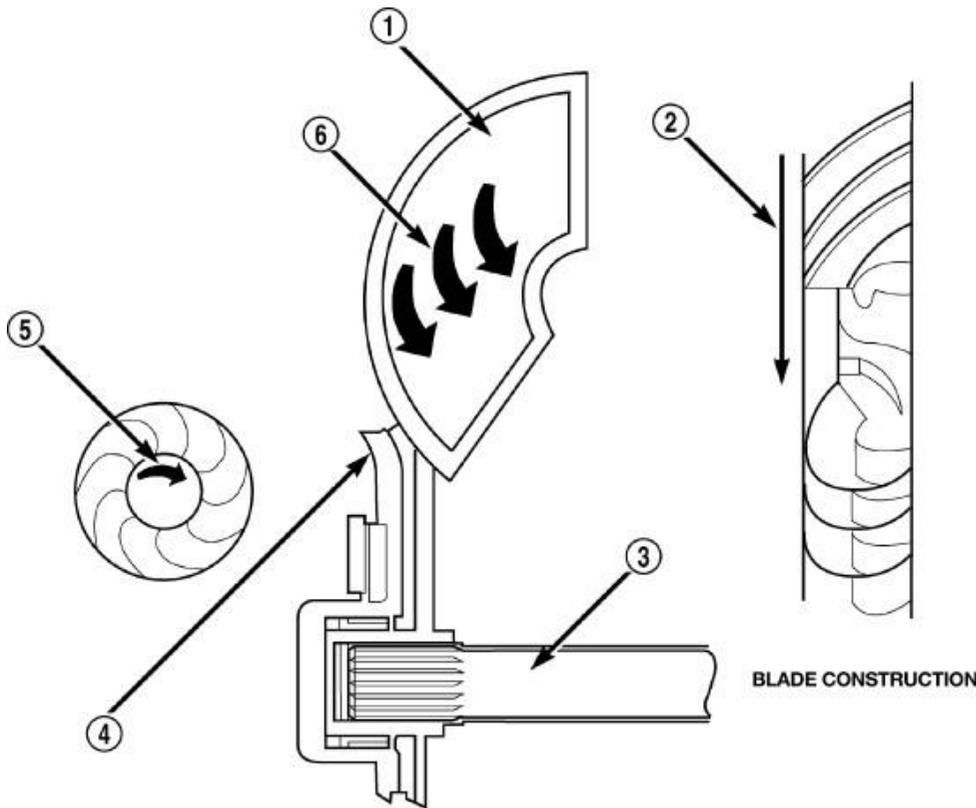
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Fig. 206: Identifying Impeller
 Courtesy of CHRYSLER LLC

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

The impeller is an integral part of the converter housing. Refer to **Fig. 206**. 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 members of the system.

TURBINE



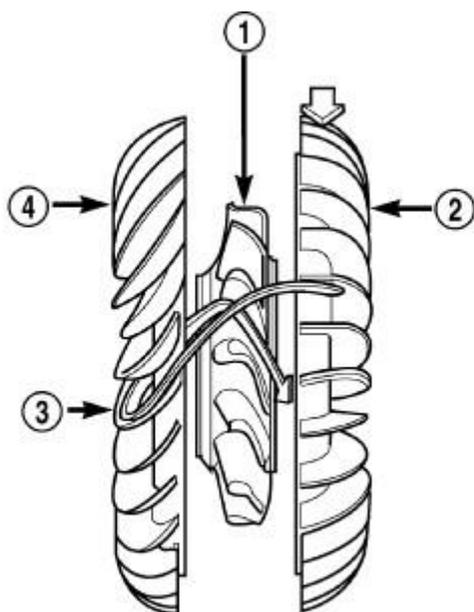
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Fig. 207: Identifying Turbine
 Courtesy of CHRYSLER LLC

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

The turbine is the output, or driven, member of the converter. Refer to **Fig. 207**. 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.

STATOR



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Fig. 208: Identifying Stator Components

Courtesy of CHRYSLER LLC

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

The stator assembly is mounted on a stationary shaft which is an integral part of the oil pump. Refer to **Fig. 208**. The stator (1) is located between the impeller (2) and the turbine (4) within the torque converter case.

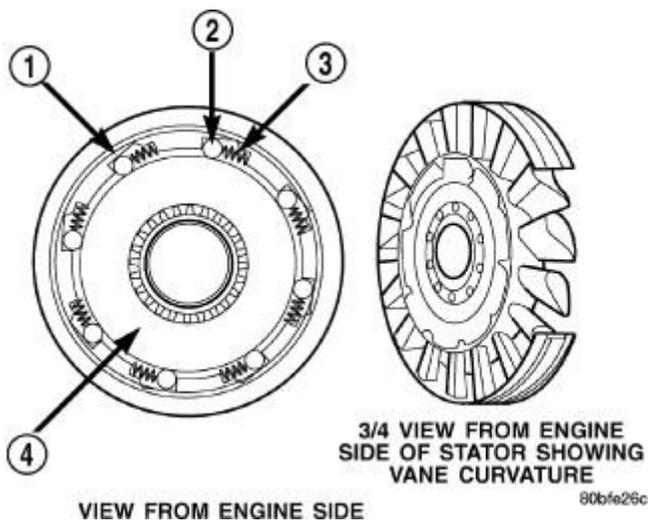


Fig. 209: Identifying Over-Running Clutch

Courtesy of CHRYSLER LLC

1 - CAM (OUTER RACE)

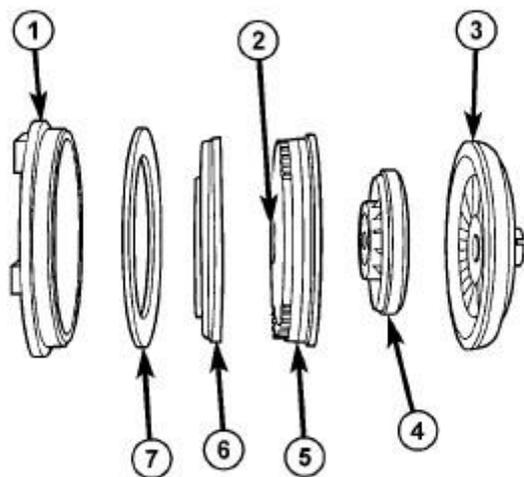
2 - ROLLER

3 - SPRING

4 - INNER RACE

The stator contains an over-running clutch (1-4), which allows the stator to rotate only in a clockwise direction. Refer to **Fig. 209**. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

TORQUE CONVERTER CLUTCH (TCC)



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Fig. 210: Torque Converter Clutch (TCC) Components

Courtesy of CHRYSLER LLC

1 - IMPELLER FRONT COVER

2 - THRUST WASHER ASSEMBLY

3 - IMPELLER

4 - STATOR

5 - TURBINE

6 - PISTON

7 - FRICTION DISC

The TCC was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Refer to **Fig. 210**. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller (3) and turbine (5) were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston (6) with friction material (7) was added to the

turbine assembly (5) to provide this mechanical lock-up.

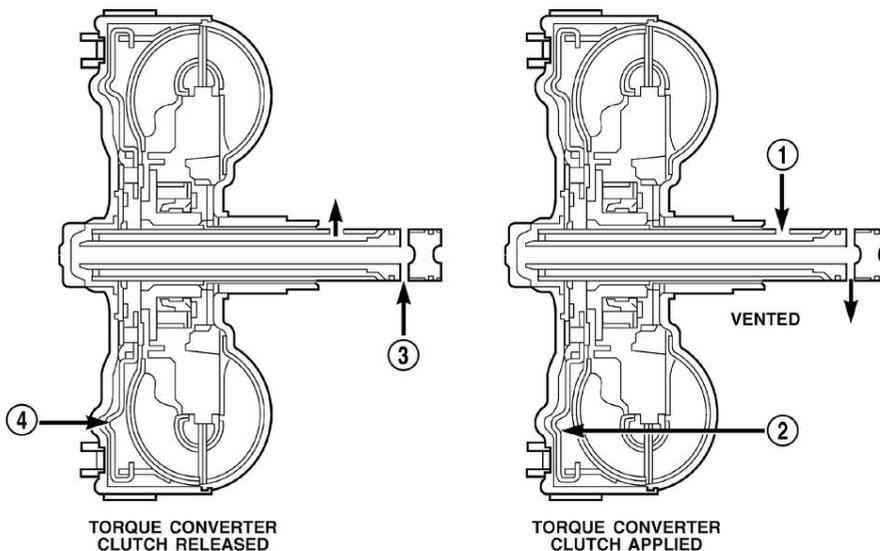
In order to reduce heat build-up in the transmission and buffer the powertrain against torsional vibrations, the TCM can duty cycle the L/R-CC Solenoid to achieve a smooth application of the torque converter clutch. This function, referred to as Electronically Modulated Converter Clutch (EMCC) can occur at various times depending on the following variables:

- Shift lever position
- Current gear range
- Transmission fluid temperature
- Engine coolant temperature
- Input speed
- Throttle angle
- Engine speed

OPERATION

OPERATION

The converter impeller (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. Refer to **Fig. 211**. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.



80bfe276

Fig. 211: Identifying Torque Converter Fluid Operation

Courtesy of CHRYSLER LLC

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

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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. Refer to **Fig. 212**. 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 counterclockwise 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 a 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.

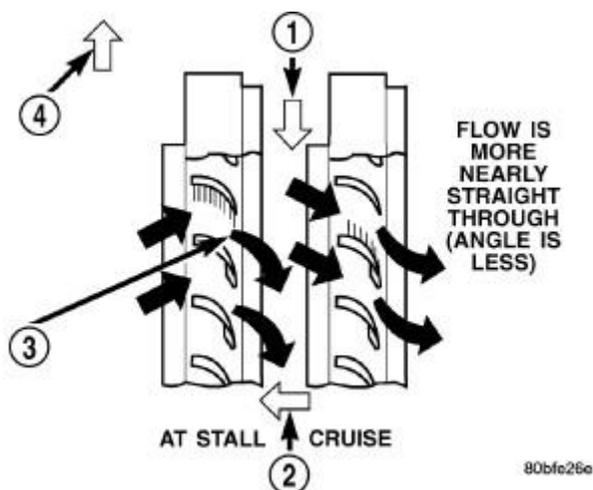


Fig. 212: Identifying Stator Operation
Courtesy of CHRYSLER LLC

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 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 and friction material to the front cover, 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 clutch can be engaged in second, third, fourth, and fifth gear ranges depending on overdrive control switch position. If the overdrive control switch is in the normal ON position, the clutch will engage after the shift to fourth gear, and above approximately 72 km/h (45 mph). If the control switch is in the OFF position, the clutch will engage after the shift to third gear, at approximately 56 km/h (35 mph) at light throttle.

The TCM controls the torque converter by way of internal logic software. The programming of the software provides the TCM with control over the L/R-CC Solenoid. There are four output logic states that can be applied as follows:

- No EMCC
- Partial EMCC
- Full EMCC
- Gradual-to-no EMCC

NO EMCC

Under No EMCC conditions, the L/R Solenoid is OFF. There are several conditions that can result in NO EMCC operations. No EMCC can be initiated due to a fault in the transmission or because the TCM does not see the need for EMCC under current driving conditions.

PARTIAL EMCC

Partial EMCC operation modulates the L/R Solenoid (duty cycle) to obtain partial torque converter clutch application. Partial EMCC operation is maintained until Full EMCC is called for and actuated. During Partial EMCC some slip does occur. Partial EMCC will usually occur at low speeds, low load and light throttle situations.

FULL EMCC

During Full EMCC operation, the TCM increases the L/R Solenoid duty cycle to full ON after Partial EMCC control brings the engine speed within the desired slip range of transmission input speed relative to engine rpm.

GRADUAL-TO-NO EMCC

This operation is to soften the change from Full or Partial EMCC to No EMCC. This is done at mid-throttle by decreasing the L/R Solenoid duty cycle.

REMOVAL

REMOVAL

1. Remove transmission and torque converter from vehicle.
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

INSTALLATION

NOTE: Check converter hub and drive flats for sharp edges, burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper or crocus cloth if necessary. Verify that the converter hub o-ring is properly installed and is free from debris. The hub must be smooth to avoid damaging the pump seal at installation.

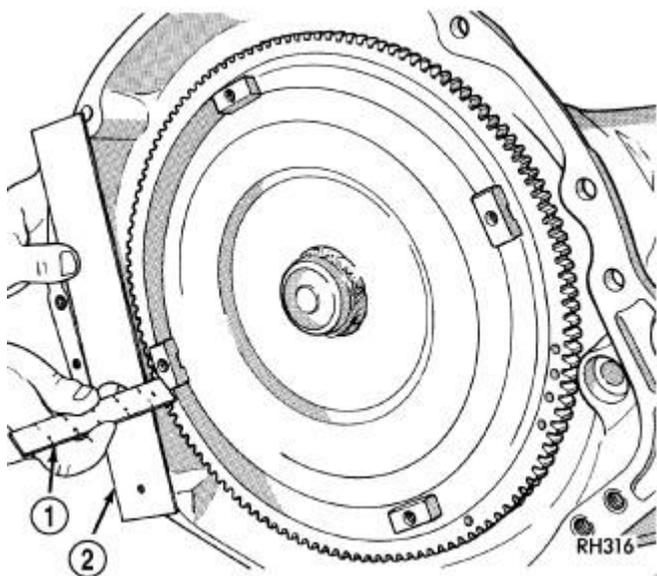


Fig. 213: Checking Torque Converter Seating
Courtesy of CHRYSLER LLC

1 - SCALE

2 - STRAIGHTEDGE

1. Lubricate oil pump seal lip with transmission fluid.
2. Place torque converter in position on transmission.

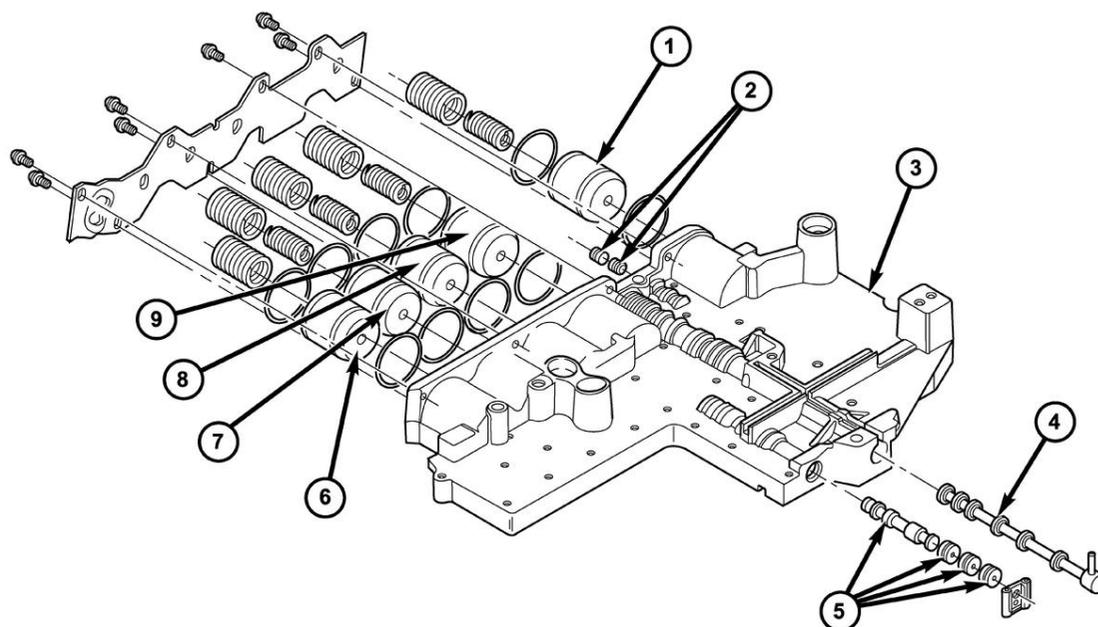
CAUTION: Do not damage oil pump seal or converter hub o-ring while inserting torque converter into the front of the transmission.

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 (1) and straightedge (2). Refer to **Fig. 213**. Surface of converter lugs should be at least 13 mm (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.
9. Fill the transmission with the recommended fluid.

VALVE BODY

DESCRIPTION

DESCRIPTION



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Fig. 214: Valve Body Components

Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

The valve body consists of a cast aluminum valve body, a separator plate, and a transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch and frictional clutches. The valve body contains the following components:

- Solenoid switch valve
- Manual valve
- Low/reverse shuttle valve
- 5 Accumulators

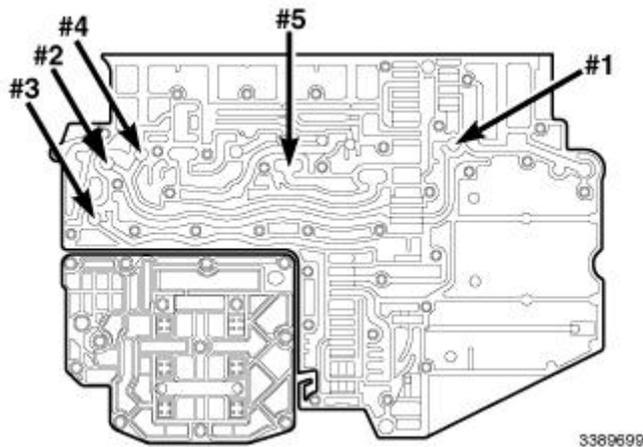


Fig. 215: Check Ball Locations
Courtesy of CHRYSLER LLC

- 5 check balls

OPERATION

OPERATION

NOTE: Refer to **HYDRAULIC SCHEMATICS** for a visual aid in determining valve location, operation and design.

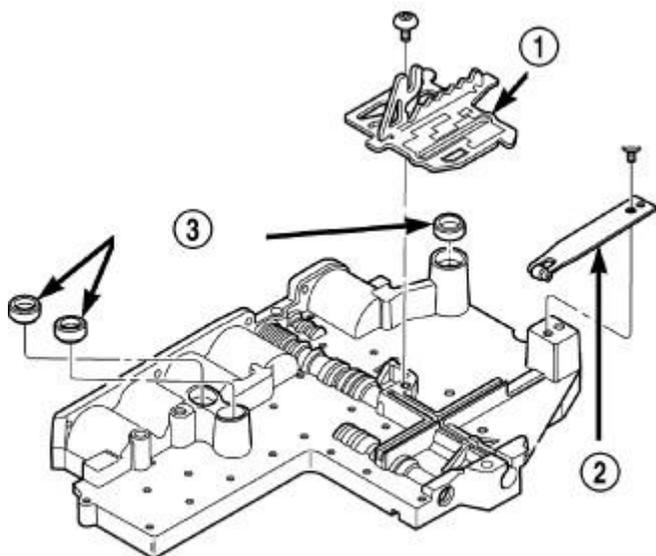
SOLENOID SWITCH VALVE

The Solenoid Switch Valve (SSV) controls the direction of the transmission fluid when the L/R-TCC solenoid is energized.

The Solenoid Switch Valve controls line pressure from the LR-TCC solenoid. In 1st gear, the SSV will be in the downshifted position, thus directing fluid to the L/R clutch circuit. In 2nd, 3rd, 4th, and fifth gears, the solenoid switch valve will be in the upshifted position and directs the fluid into the torque converter clutch (TCC) circuit.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

MANUAL VALVE



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Fig. 216: Identifying Manual Valve Components

Courtesy of CHRYSLER LLC

1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

The manual valve is a relay valve. The purpose of the manual valve is to direct fluid to the correct circuit needed for a specific gear or driving range. The manual valve, as the name implies, is manually operated by the driver with a lever located on the top of the valve body. The valve is connected mechanically by a cable to the gearshift mechanism. The valve is held in each of its positions by a roller detent spring (2) that engages the roostercomb of the TRS selector plate (1). Refer to **Fig. 216**.

LOW/REVERSE SWITCH VALVE

The low/reverse switch valve allows the low/reverse clutch to be operated by either the LR/CC solenoid or the MS solenoid.

REMOVAL

REMOVAL

NOTE: The valve body can be removed for service without having to remove the transmission assembly. The valve body can be disassembled for cleaning and inspection of the individual components. Refer to **VALVE BODY, DISASSEMBLY**.

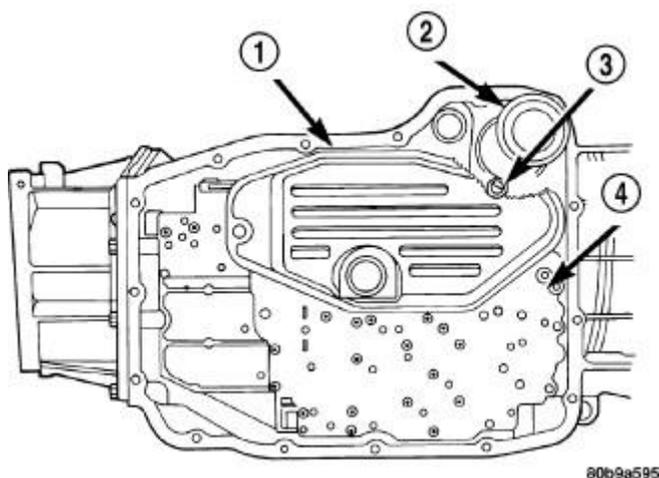


Fig. 217: Primary Oil Filter & Oil Cooler Return Filter
 Courtesy of CHRYSLER LLC

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

1. Shift transmission into PARK.
2. Raise vehicle.
3. Disconnect wires at the solenoid and pressure switch assembly 23 pin electrical connector.
4. Position drain pan under transmission oil pan.
5. Remove transmission oil pan.
6. Remove the primary oil filter (1) from valve body.

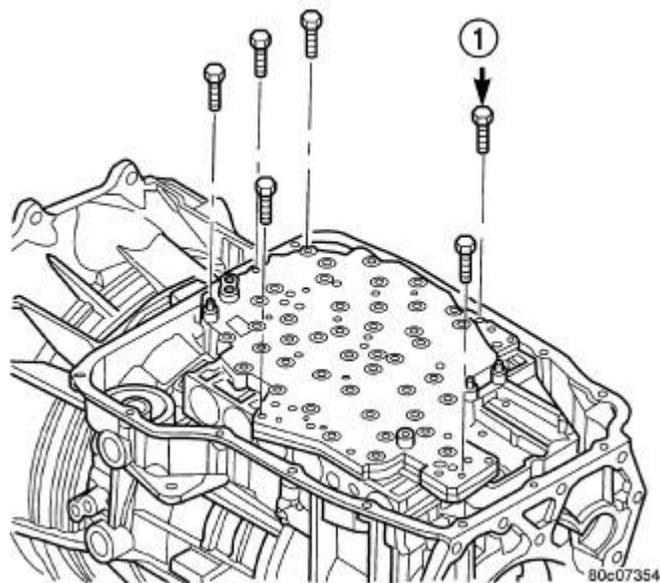


Fig. 218: Valve Body Bolts

Courtesy of CHRYSLER LLC

1 - VALVE BODY TO CASE BOLT (6)

7. Remove bolts (1) attaching valve body to transmission case.
8. Lower the valve body and work the electrical connector out of transmission case.
9. Separate the valve body from the transmission.

DISASSEMBLY

DISASSEMBLY

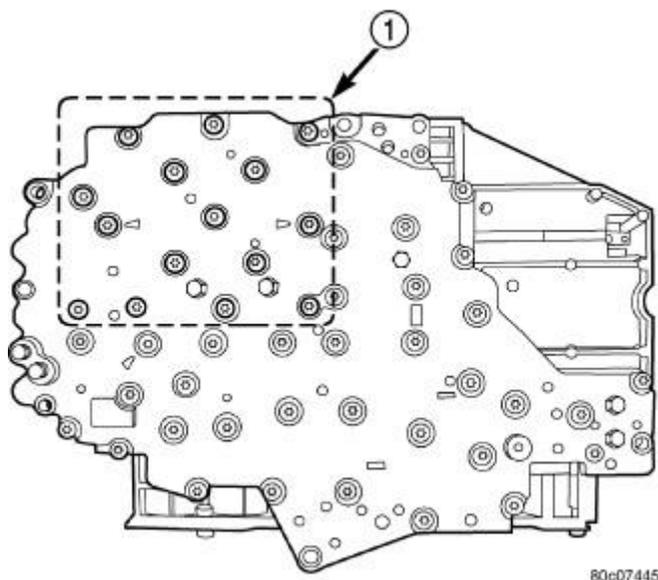
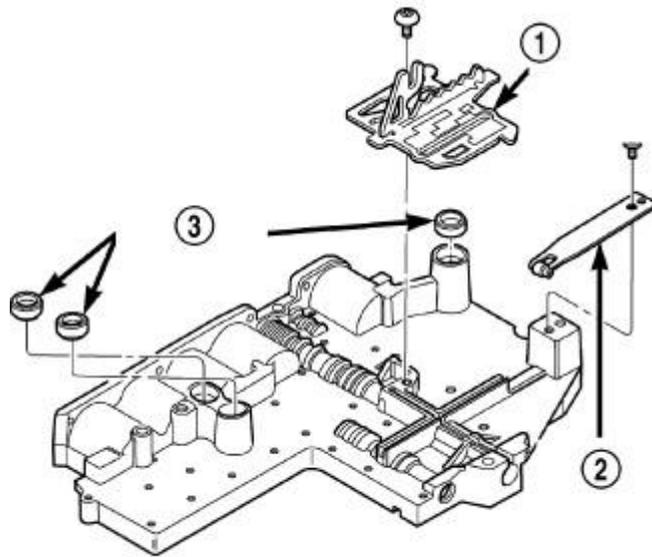


Fig. 219: Solenoid Pack Bolts

Courtesy of CHRYSLER LLC

1 - SOLENOID PACK BOLTS (15)

1. Remove the bolts (1) holding the solenoid and pressure switch assembly to the valve body. Do not remove the screws on the top of the solenoid and pressure switch assembly.
2. Separate the solenoid and pressure switch assembly from the valve body.



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Fig. 220: Identifying Manual Valve Components

Courtesy of CHRYSLER LLC

- | |
|--------------------------|
| 1 - TRS SELECTOR PLATE |
| 2 - DETENT SPRING |
| 3 - CLUTCH PASSAGE SEALS |

3. Remove the screw holding the detent spring (2) onto the valve body.
4. Remove the detent spring (2) from the valve body.
5. Remove the TRS selector plate (1) from the valve body and the manual valve.
6. Remove the clutch passage seals (3) from the valve body, if necessary.

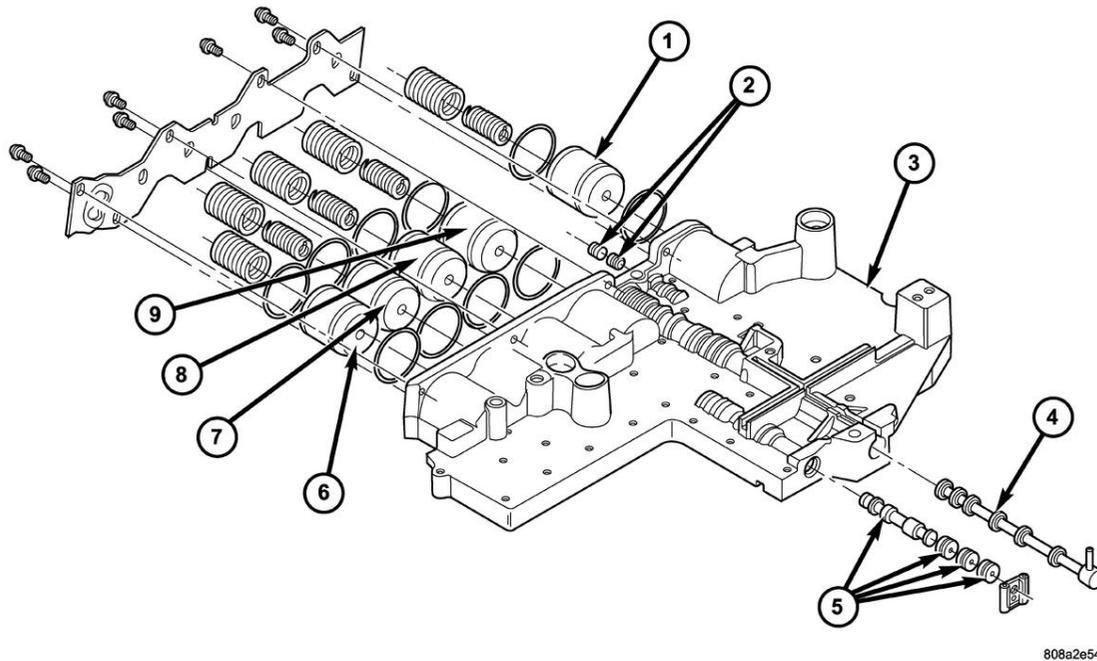


Fig. 221: Valve Body Components
 Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

7. Remove the screws holding the accumulator cover onto the valve body.
8. Remove the accumulator springs and pistons (1, 6-9) from the valve body. Note which accumulator piston and spring belong in each location.

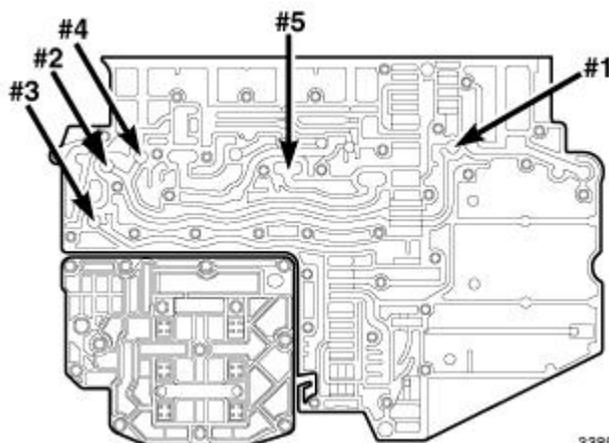
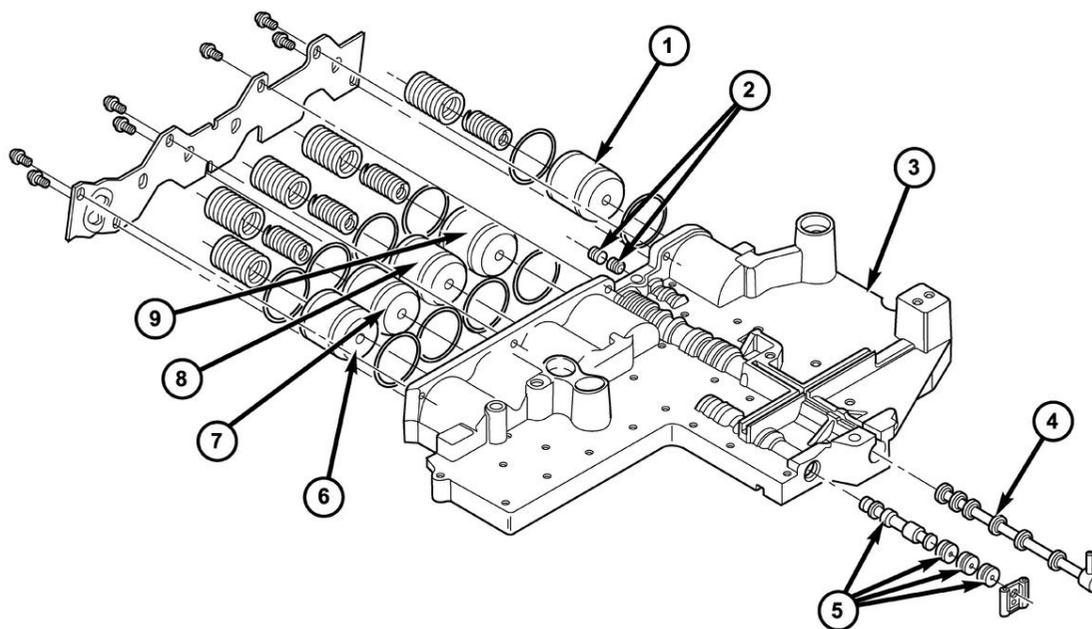


Fig. 222: Check Ball Locations
 Courtesy of CHRYSLER LLC

9. Place the valve body on the bench with the transfer plate upward.

NOTE: The valve body contains five check balls. The transfer plate must be placed upward to prevent losing the check balls when the transfer plate is removed from the valve body.

10. Remove the screws holding the valve body to the valve body transfer plate.
11. Remove the transfer plate from the valve body. Note the location of all check balls.
12. Remove the check balls from the valve body.



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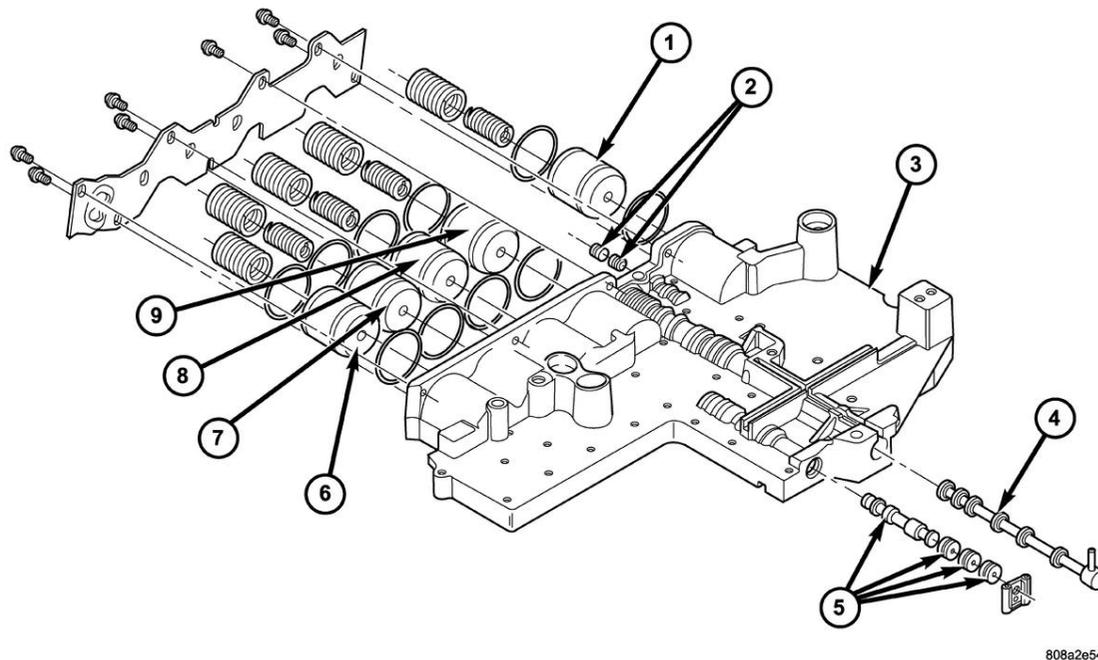
Fig. 223: Valve Body Components
 Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

13. Remove the retainer securing the solenoid switch valve (5) from the valve body. Remove the solenoid switch valve and plugs (5), the manual valve (4) and low reverse shuttle valve and plug (2). Tag each valve and plug combination with location information to aid in assembly.

CLEANING

CLEANING



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Fig. 224: Valve Body Components
 Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

Clean the valve housings, valves, plugs, springs, and separator plate with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Do not immerse any of the electrical components in cleaning solution. Clean the electrical components by wiping them off with dry shop towels only.

Dry all except the electrical parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials can stick to valve body parts, interfere with valve operation, and clog filters and fluid passages.**

INSPECTION

INSPECTION

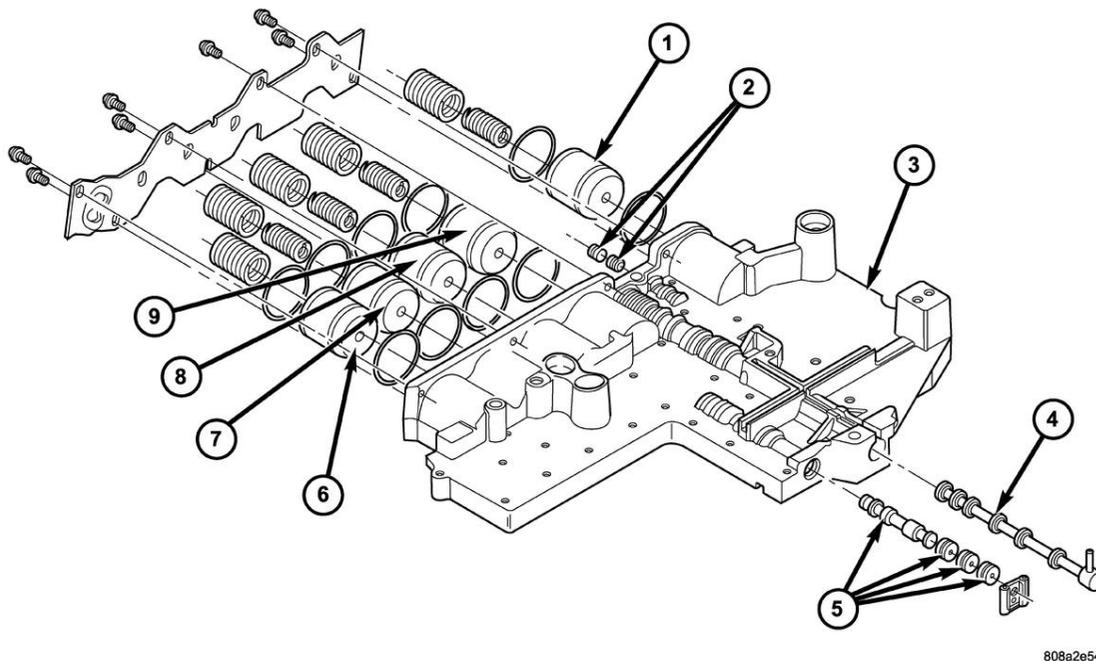


Fig. 225: Valve Body Components
 Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

NOTE: Only the **INNER** accumulator seal ring actually seals the pressure in the bore. The outer seal ring only serves to guide the piston in the bore. Gouges which do not extend past the inner seal ring (and have no raised edges, which could damage the guide ring) are acceptable. The machined accumulator bores often have a tiger-striped appearance. This is **NORMAL** and does **NOT** require replacement, as long as the bores are smooth in the inner seal ring area.

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straightedge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Refer to **Fig. 225**. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands**. Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging

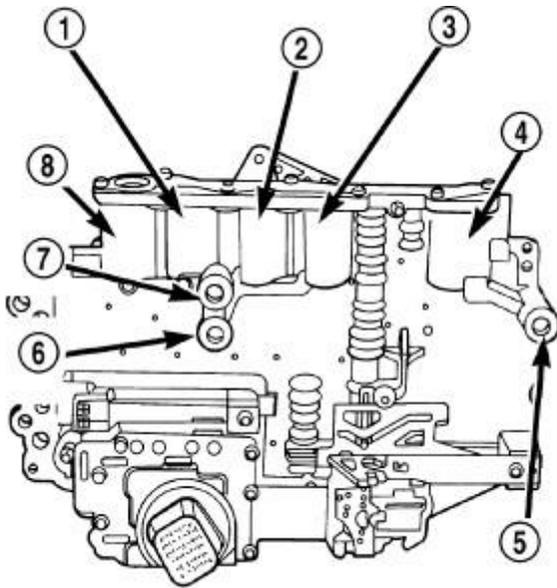
between the valves and plugs and the bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

Inspect all the accumulator bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the accumulator springs. The springs must be free of distortion, warpage or broken coils.



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Fig. 226: Valve Body Seals

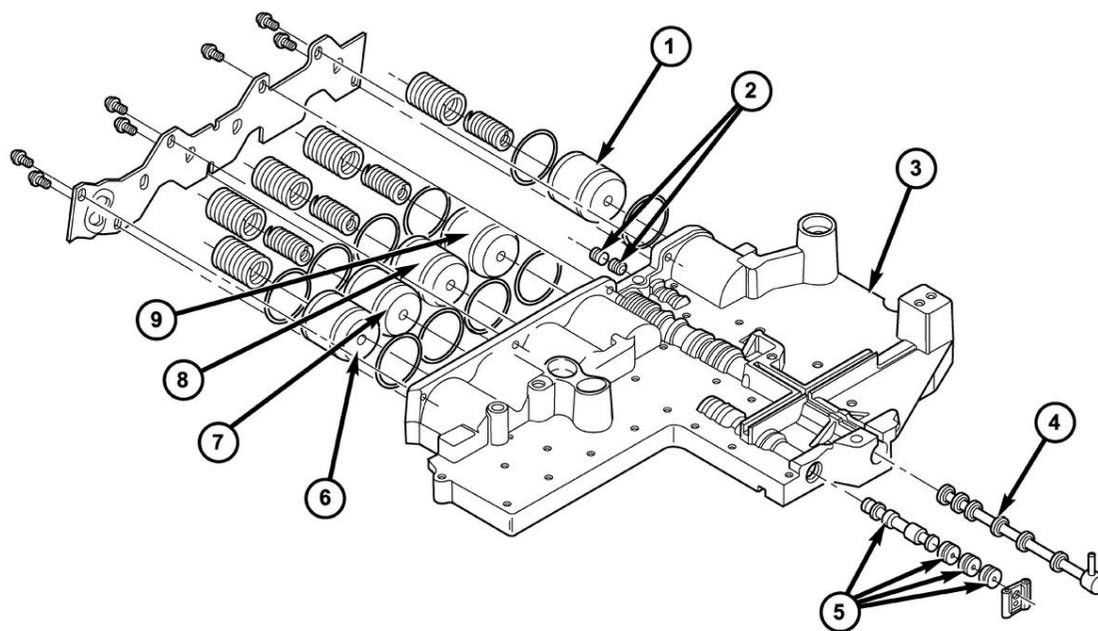
Courtesy of CHRYSLER LLC

1 - UNDERDRIVE ACCUMULATOR (2 SPRINGS)
2 - 4TH CLUTCH ACCUMULATOR (2 SPRINGS)
3 - 2ND CLUTCH ACCUMULATOR (2 SPRINGS)
4 - LOW REVERSE ACCUMULATOR (2 SPRINGS)
5 - LOW/REVERSE PASSAGE SEAL
6 - 2ND CLUTCH PASSAGE SEAL
7 - 4TH CLUTCH PASSAGE SEAL
8 - OVERDRIVE ACCUMULATOR (1 SPRING)

Inspect all the fluid seals on the valve body. Replace any seals that are cracked, distorted, or damaged in any way. These seals pass fluid pressure directly to the clutches. Any pressure leak at these points, may cause transmission performance problems.

ASSEMBLY

ASSEMBLY



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Fig. 227: Valve Body Components
 Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR
4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

1. Lubricate valves and the housing valve bores with clean transmission fluid.
2. Install solenoid switch valve and plugs (5) and manual valve (4) into the valve body.
3. Install the retainers to hold each valve into the valve body.

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION 545RFE - Service Information - Grand Cherokee

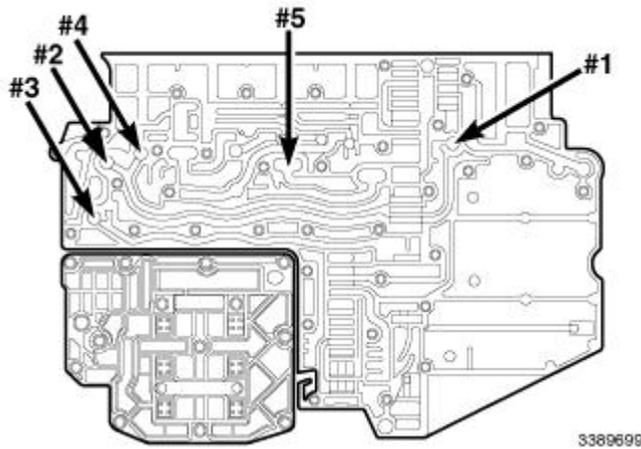


Fig. 228: Check Ball Locations
Courtesy of CHRYSLER LLC

4. Install the valve body check balls into their proper locations.
5. Position the separator and transfer plate onto the valve body.
6. Install the screws to hold the transfer plate to the valve body. Tighten the screws to 6 N.m (50 in. lbs.).

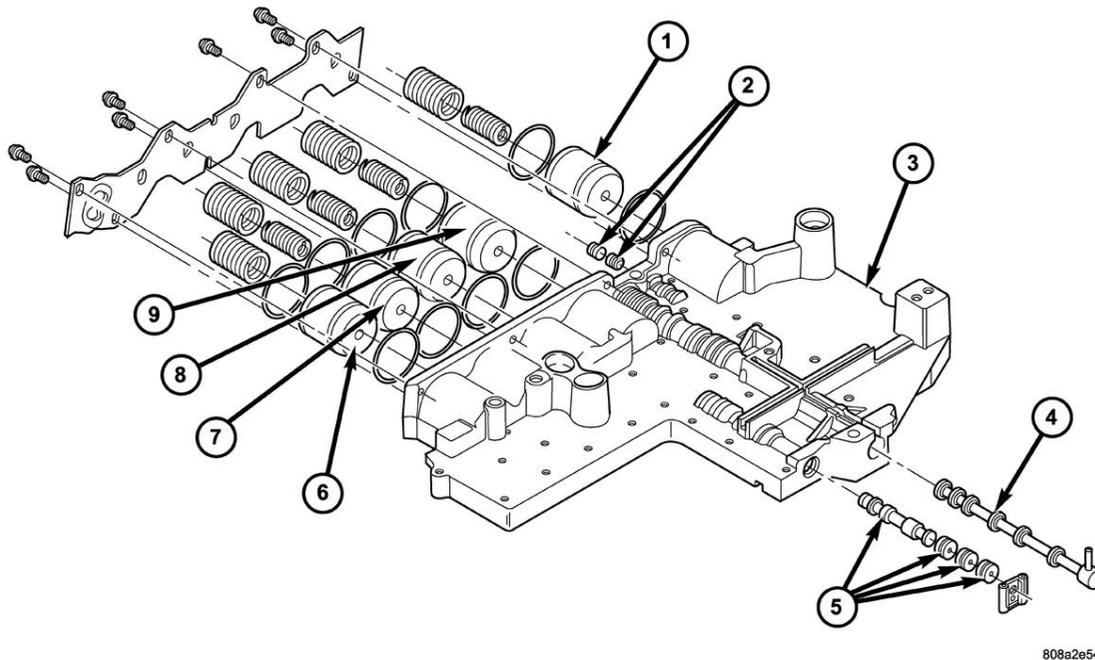
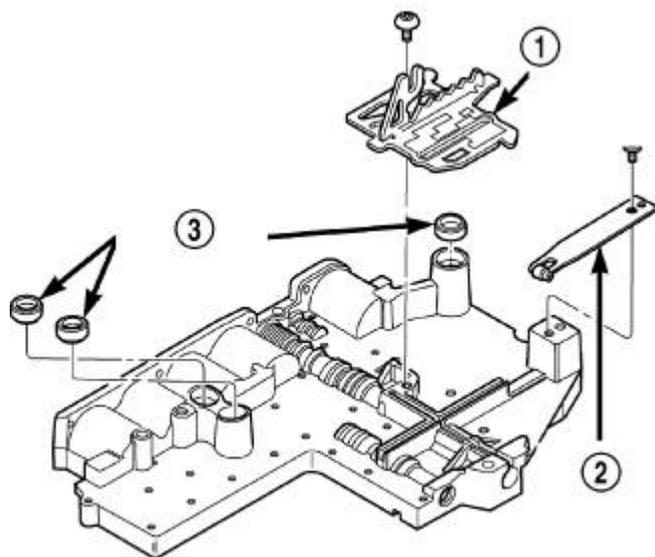


Fig. 229: Valve Body Components
Courtesy of CHRYSLER LLC

1 - LOW/REVERSE ACCUMULATOR	6 - OVERDRIVE ACCUMULATOR
2 - LOW/REVERSE SHUTTLE VALVE AND PLUG	7 - UNDERDRIVE ACCUMULATOR
3 - UPPER VALVE BODY	8 - 4C ACCUMULATOR

4 - MANUAL VALVE	9 - 2C ACCUMULATOR
5 - SOLENOID SWITCH VALVE AND PLUGS	

7. Install the accumulator pistons (1, 6-9) and springs into the valve body in the location from which they were removed. Note that all accumulators except the overdrive have two springs. The overdrive accumulator piston (6) has only one spring.
8. Install the Low / Reverse shuttle valve, plug and retainer (2) into the valve body housing.
9. Position the accumulator cover onto the valve body.
10. Install the screws to hold the accumulator cover onto the valve body. Tighten the screws to 7 N.m (60 in. lbs.).



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Fig. 230: Identifying Manual Valve Components
 Courtesy of CHRYSLER LLC

1 - TRS SELECTOR PLATE
2 - DETENT SPRING
3 - CLUTCH PASSAGE SEALS

11. Install the TRS selector plate (1) onto the valve body and the manual valve.
12. Position the detent spring (2) onto the valve body.
13. Install the screw to hold the detent spring (2) onto the valve body. Tighten the screw to 4.5 N.m (40 in. lbs.).
14. Install new clutch passage seals (3) onto the valve body, if necessary.

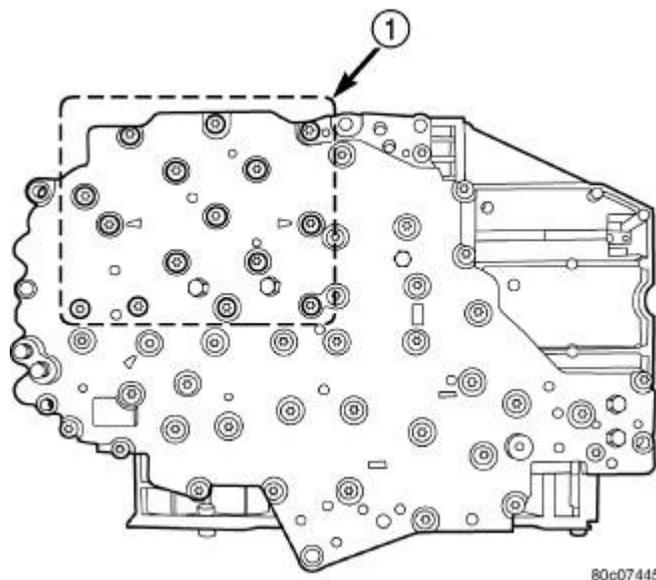


Fig. 231: Solenoid Pack Bolts
Courtesy of CHRYSLER LLC

1 - SOLENOID PACK BOLTS (15)

15. Install the solenoid and pressure switch assembly onto the valve body.
16. Install the bolts (1) to hold the solenoid and pressure switch assembly onto the valve body. Tighten the bolts to 6 N.m (50 in. lbs.). Tighten the bolts adjacent to the arrows cast into the bottom of the transfer plate first.

INSTALLATION

INSTALLATION

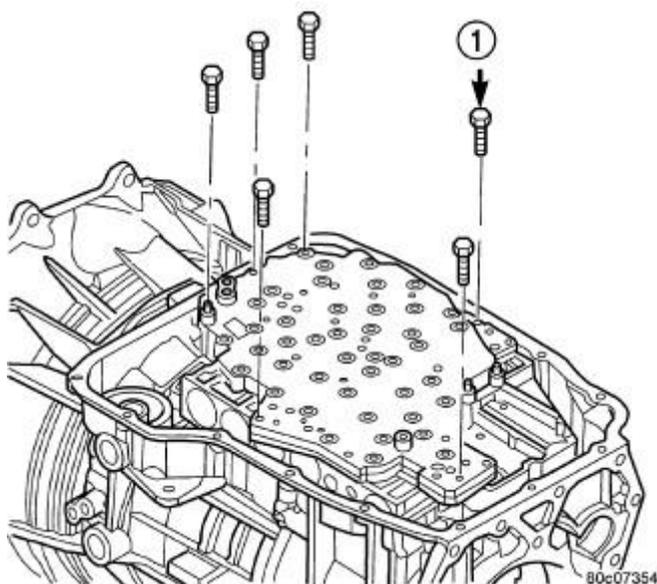
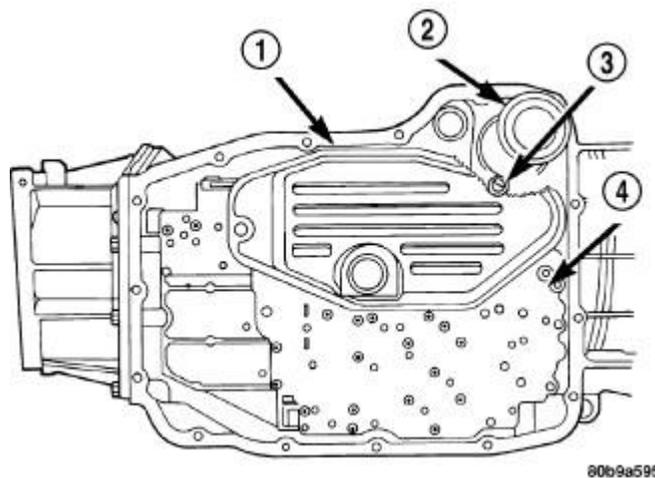


Fig. 232: Valve Body Bolts
Courtesy of CHRYSLER LLC

1 - VALVE BODY TO CASE BOLT (6)

1. Check condition of seals on valve body and the solenoid and pressure switch assembly. Replace seals if cut or worn.
2. Place TRS selector plate in the PARK position.
3. Place the transmission in the PARK position.
4. Lubricate seal on the solenoid and pressure switch assembly connector with petroleum jelly.
5. Position valve body in transmission and align the manual lever on the valve body to the pin on the transmission manual shift lever. Refer to **Fig. 232**.
6. Seat valve body in case and install one or two bolts to hold valve body in place.
7. Tighten valve body bolts alternately and evenly to 12 N.m (105 in. lbs.) torque.
8. Operate the external manual shift lever and ensure that the TRS selector plate moves correctly into all gear range positions.



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Fig. 233: Primary Oil Filter & Oil Cooler Return Filter
 Courtesy of CHRYSLER LLC

1 - PRIMARY OIL FILTER
2 - COOLER RETURN FILTER
3 - COOLER RETURN FILTER BYPASS VALVE
4 - VALVE BODY

CAUTION: The primary oil filter seal **MUST** be fully installed flush against the oil pump body. **DO NOT** install the seal onto the filter neck and attempt to install the filter and seal as an assembly. Damage to the transmission will result.

9. Install a new primary oil filter seal in the oil pump inlet bore. Seat the seal in the bore with the butt end of a hammer, or other suitable tool.
10. Place replacement filter (1) in position on valve body and into the oil pump. Refer to **Fig. 233**.
11. Install screw to hold filter to valve body. Tighten screw to 4.5 N.m (40 in. lbs.) torque.
12. Connect the solenoid and pressure switch 23 pin electrical assembly connector.
13. Install oil pan using silicone gasket sealer. Tighten pan bolts to 12 N.m (105 in. lbs.) torque.
14. Lower vehicle and fill transmission with Mopar® ATF +4.
15. Check and adjust gearshift cable, if necessary.

VALVE, SOLENOID SWITCH

DESCRIPTION

DESCRIPTION

The Solenoid Switch Valve (SSV) is located in the main valve body and directs the output from the L/R-TCC solenoid to either the L/R clutch or the TCC control valves

OPERATION

OPERATION

The Solenoid Switch Valve controls line pressure from the LR-TCC solenoid. In 1st gear, the SSV will be in the downshifted position, thus directing fluid to the L/R clutch circuit. In 2nd, 3rd, 4th, and 5th gears, the solenoid switch valve will be in the upshifted position and directs the fluid into the torque converter clutch (TCC) circuit.

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L/R pressure switch is monitored to confirm SSV movement. If the movement is not confirmed (the L/R pressure switch does not close), 2nd gear is substituted for 1st. A DTC will be set after three unsuccessful attempts are made to get into 1st gear in one given key start.

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DESCRIPTION

DESCRIPTION

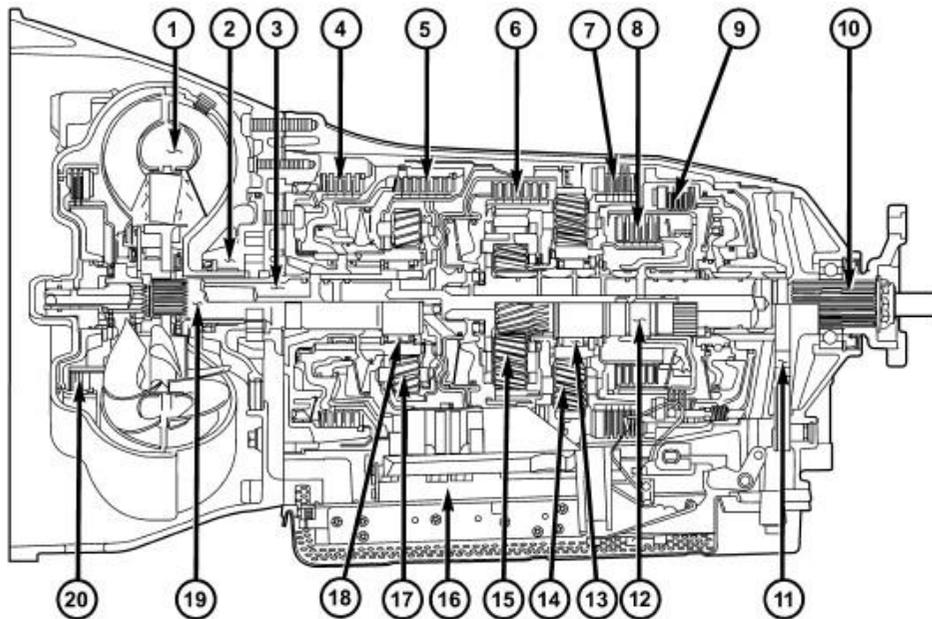


Fig. 1: NAG1 Automatic Transmission Components
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER	11 - PARKING LOCK GEAR
2 - OIL PUMP	12 - INTERMEDIATE SHAFT
3 - DRIVESHAFT	13 - FREEWHEEL F2
4 - MULTI-DISC HOLDING CLUTCH B1	14 - REAR PLANETARY GEAR SET
5 - DRIVING CLUTCH K1	15 - CENTER PLANETARY GEAR SET
6 - DRIVING CLUTCH K2	16 - ELECTROHYDRAULIC CONTROL UNIT
7 - MULTI-DISC HOLDING CLUTCH B3	17 - FRONT PLANETARY GEAR SET
8 - DRIVING CLUTCH K3	18 - FREEWHEEL F1
9 - MULTI-DISC HOLDING CLUTCH B2	19 - STATOR SHAFT
10 - OUTPUT SHAFT	20 - TORQUE CONVERTER LOCK-UP CLUTCH

The NAG1 automatic transmission is an electronically controlled 5-speed transmission with a lock-up clutch in the torque converter. Refer to **Fig. 1**. The ratios for the gear stages are obtained by 3 planetary gear sets. Fifth gear is designed as an overdrive with a high-speed ratio.

NAG1 identifies a family of transmissions and means "N"ew "A"utomatic "G"earbox, generation 1. Various marketing names are associated with the NAG1 family of transmissions, depending on the transmission

variation being used in a specific vehicle. Some examples of the marketing names are: W5A300, W5A380, and W5A580. The marketing name can be interpreted as follows:

- W = A transmission using a hydraulic torque converter.
- 5 = 5 forward gears.
- A = Automatic Transmission.
- 580 = Maximum input torque capacity in Newton meters.

The gears are actuated electronically/hydraulically. The gears are shifted by means of an appropriate combination of three multi-disc holding clutches, three multi-disc driving clutches, and two freewheeling clutches.

Electronic transmission control enables precise adaptation of pressures to the respective operating conditions and to the engine output during the shift phase which results in a significant improvement in shift quality.

Furthermore, it offers the advantage of a flexible adaptation to various vehicle and engines.

Basically, the automatic transmission with electronic control offers the following advantages:

- Reduces fuel consumption.
- Improved shift comfort.
- More favorable step-up through the five gears.
- Increased service life and reliability.
- Lower maintenance costs.

TRANSMISSION IDENTIFICATION

The transmission can be generically identified visually by the presence of a round 13-way connector located near the front corner of the transmission oil pan, on the right side. Specific transmission information can be found stamped into a pad on the left side of the transmission, above the oil pan rail.

TRANSMISSION GEAR RATIOS

The gear ratios for the NAG1 automatic transmission are as follows:

1st Gear

3.59:1

2nd Gear

2.19:1

3rd Gear

1.41:1

4th Gear

1.00:1

5th Gear

0.83:1

Reverse

3.16:1

Reverse (In 4WD low Range)

1.93:1

TRANSMISSION HOUSING

The converter housing and transmission are made from a light alloy. These are bolted together and centered via the outer multi-disc carrier of multi-disc holding clutch, B1. A coated intermediate plate provides the sealing. The oil pump and the outer multi-disc carrier of the multi-disc holding clutch, B1, are bolted to the converter housing. The stator shaft is pressed into it and prevented from rotating by splines. The electrohydraulic unit is bolted to the transmission housing from underneath. A sheet metal steel oil pan forms the closure.

MECHANICAL SECTION

The mechanical section consists of a input shaft, output shaft, a sun gear shaft, and three planetary gear sets which are coupled to each other. The planetary gear sets each have four planetary pinion gears. The oil pressure for the torque converter lock-up clutch and clutch K2 is supplied through bores in the input shaft. The oil pressure to clutch K3 is transmitted through the output shaft. The lubricating oil is distributed through additional bores in both shafts. All the bearing points of the gear sets, as well as the freewheeling clutches and actuators, are supplied with lubricating oil. The parking lock gear is connected to the output shaft via splines.

Freewheeling clutches F1 and F2 are used to optimize the shifts. The front freewheel, F1, is supported on the extension of the stator shaft on the transmission side and, in the locking direction, connects the sun gear of the front planetary gear set to the transmission housing. In the locking direction, the rear freewheeling clutch, F2, connects the sun gear of the center planetary gear set to the sun gear of the rear planetary gear set.

ELECTROHYDRAULIC CONTROL UNIT

The electrohydraulic control unit comprises the shift plate made from light alloy for the hydraulic control and an electrical control unit. The electrical control unit comprises of a supporting body made of plastic, into which the electrical components are assembled. The supporting body is mounted on the shift plate and screwed to it.

Strip conductors inserted into the supporting body make the connection between the electrical components and a plug connector. The connection to the wiring harness on the vehicle and the transmission control module (TCM) is produced via this 13-pin plug connector with a bayonet lock.

SHIFT GROUPS

The hydraulic control components (including actuators) which are responsible for the pressure distribution before, during, and after a gear change are described as a shift group. Each shift group contains a command valve, a holding pressure shift valve, a shift pressure shift valve, overlap regulating valve, and a solenoid.

The hydraulic system contains three shift groups: 1-2/4-5, 2-3, and 3-4. Each shift group can also be described as being in one of two possible states. The active shift group is described as being in the shift phase when it is actively engaging/disengaging a clutch combination. The 1-2/4-5 shift group control the B1 and K1 clutches. The 2-3 shift group controls the K2 and K3 clutches. The 3-4 shift group controls the K3 and B2 clutches.

OPERATION

OPERATION

The transmission control is divided into the electronic and hydraulic transmission control functions. While the electronic transmission control is responsible for gear selection and for matching the pressures to the torque to be transmitted, the transmission's power supply control occurs via hydraulic elements in the electrohydraulic control module. The oil supply to the hydraulic elements, such as the hydrodynamic torque converter, the shift elements and the hydraulic transmission control, is provided by way of an oil pump connected with the torque converter.

The Transmission Control Module (TCM) allows for the precise adaptation of pressures to the corresponding operating conditions and to the engine output during the gearshift phase, resulting in a noticeable improvement in shift quality. The engine speed limit can be reached in the individual gears at full throttle and kickdown. The shift range can be changed in the forward gears while driving, but the TCM employs a downshift safeguard to prevent over-revving the engine. The system offers the additional advantage of flexible adaptation to different vehicle and engine variants.

EMERGENCY RUNNING FUNCTION

In order to ensure a safe driving state and to prevent damage to the automatic transmission, the TCM control module switches to limp-home mode in the event of critical faults. A DTC assigned to the fault is stored in memory. All solenoid and regulating valves are thus de-energized.

The net effect is:

- The last engaged gear remains engaged.
- The modulating pressure and shift pressures rise to the maximum levels.
- The torque converter lockup clutch is deactivated.

In order to preserve the operability of the vehicle to some extent, the hydraulic control can be used to engage 2nd gear or reverse using the following procedure:

- Stop the vehicle.
- Move selector lever to "P".

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- Switch off engine.
- Wait at least 10 seconds.
- Start engine.
- Move selector lever to D: 2nd gear.
- Move selector lever to R: Reverse gear.

The limp-home function remains active until the DTC is rectified or the stored DTC is erased with a scan tool. Sporadic faults can be reset via ignition OFF/ON.

CLUTCH APPLICATION

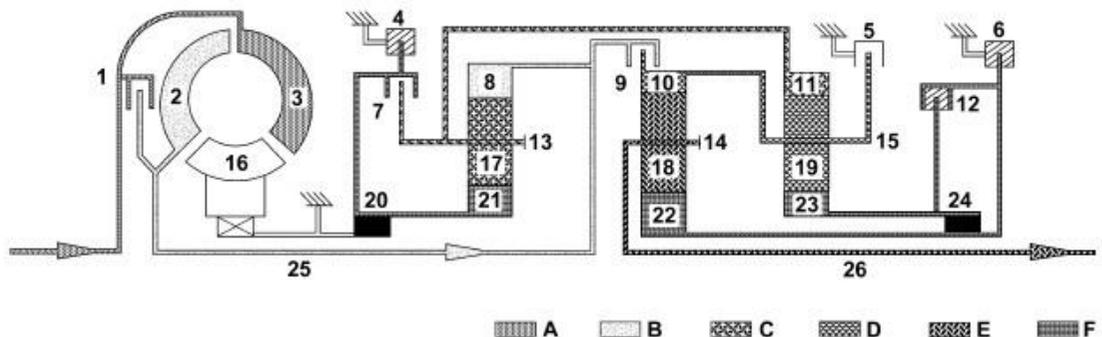
for which shift elements are applied in each gear position. Refer to CLUTCH APPLICATION.

CLUTCH APPLICATION

GEAR	RATIO	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	X*	X				X*	X	X
2	2.19		X		X		X*		X
3	1.41		X		X	X			
4	1.00				X	X	X		
5	0.83	X*				X	X	X	
N	X						X		
R	3.16	X*		X			X	X	
R (4WD Low or Limp-in)	1.93			X	X		X		

* = The shift components required during coast.

FIRST GEAR POWERFLOW



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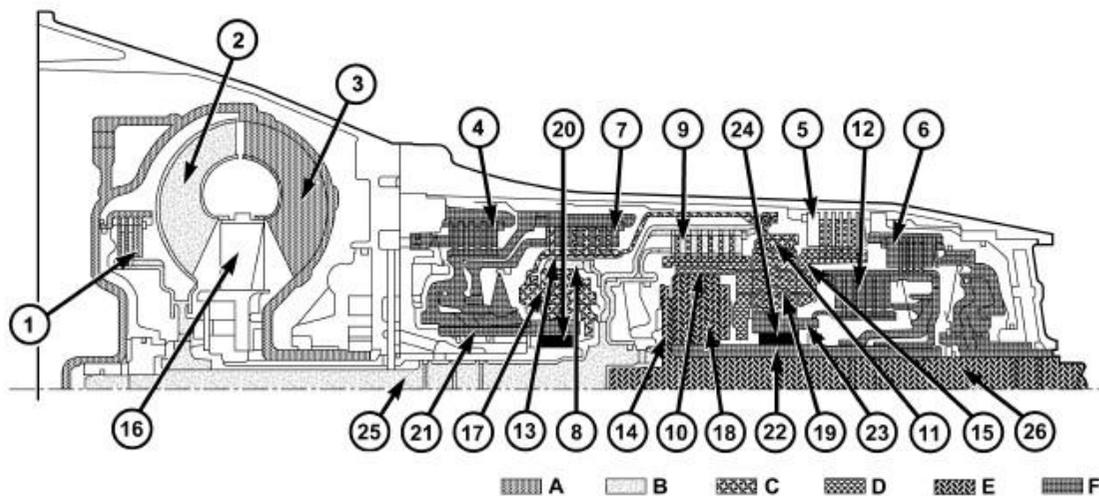
Fig. 2: First Gear Powerflow (1 Of 2)
 Courtesy of CHRYSLER LLC

cardiagn.com

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1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS



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Fig. 3: First Gear Powerflow (2 Of 2)
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS

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7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred to the output shaft (26). Refer to **Fig. 3** and **Fig. 2**.

FRONT PLANETARY GEAR SET

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

REAR PLANETARY GEAR SET

The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (13). The sun gear (23) is held against the housing by the engaged multiple-disc holding clutch B2 (6), by the locked freewheel F2 (24) during acceleration and by the engaged multiple-disc clutch K3 (12) during deceleration. The planetary gears (19) turn on the fixed sun gear (23) and increase the torque from the annulus gear (11) to the planetary carrier (15). The planetary carrier (15) moves at a reduced speed in the running direction of the engine.

CENTER PLANETARY GEAR SET

The annulus gear (10) is driven at the same speed as the rear planetary carrier (15) as a result of a mechanical connection. The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

SECOND GEAR POWERFLOW

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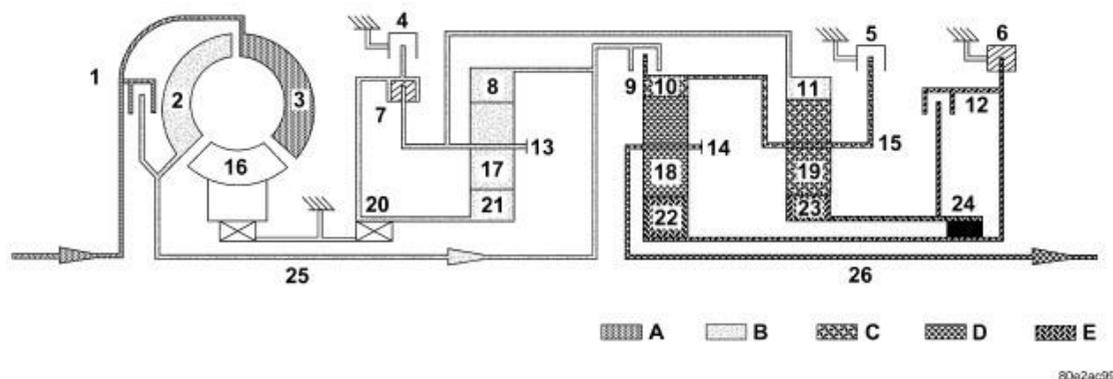


Fig. 4: Second Gear Powerflow (1 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - FIXED PARTS
C - FIRST GEAR RATIO	

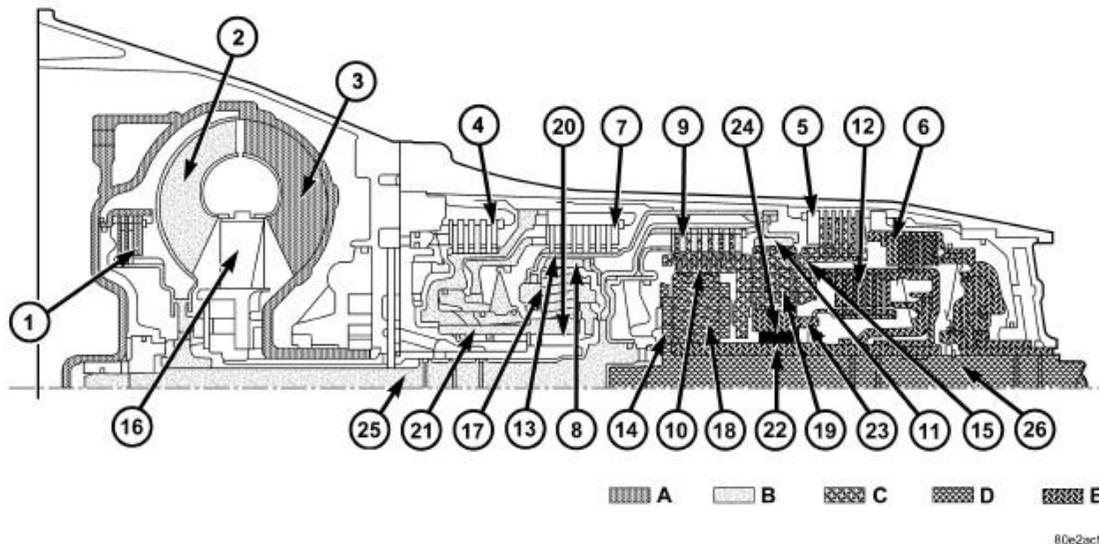


Fig. 5: Second Gear Powerflow (2 Of 2)
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - FIXED PARTS
C - FIRST GEAR RATIO	

Torque from the torque converter is increased via the input shaft (25) and the center and rear planetary gearset and transferred to the output shaft (26). Refer to **Fig. 5** and **Fig. 4**.

FRONT PLANETARY GEAR SET

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore blocked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and input shaft.

REAR PLANETARY GEAR SET

The annulus gear (11) turns at the input speed as a result of the mechanical connection to the front planetary carrier (13). The sun gear (23) is held against the housing by the engaged multiple-disc holding clutch B2 (6), by the locked freewheel F2 (24) during acceleration and by the engaged multiple-disc clutch K3 (12) during deceleration. The planetary pinion gears (19) turn on the fixed sun gear (23) and increase the torque from the annulus gear (11) to the planetary carrier (15). The planetary carrier (15) moves at a reduced speed in the running direction of the engine.

CENTER PLANETARY GEAR SET

The annulus gear (10) is driven at the same speed as the rear planetary carrier (15) as a result of a mechanical connection. The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

THIRD GEAR POWERFLOW

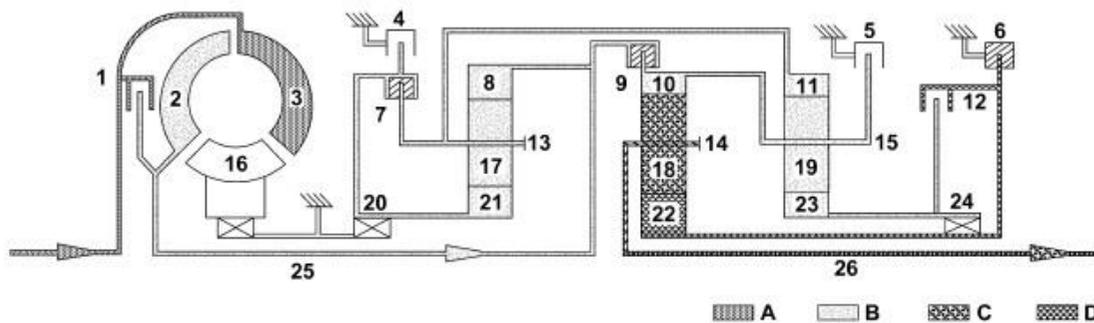


Fig. 6: Third Gear Powerflow (1 Of 2)
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2

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12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	C - FIRST GEAR RATIO
B - TRANSMISSION INPUT SPEED	D - FIXED PARTS

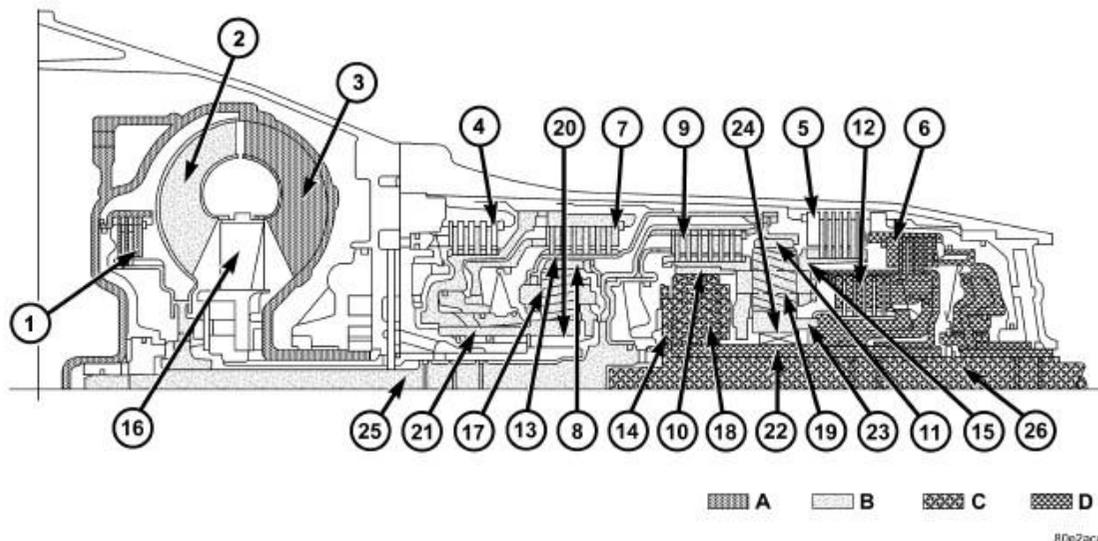


Fig. 7: Third Gear Powerflow (2 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	C - FIRST GEAR RATIO
B - TRANSMISSION INPUT SPEED	D - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and the center planetary gearset and transferred to the output shaft (26). Refer to **Fig. 7** and **Fig. 6**.

FRONT PLANETARY GEAR SET

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore locked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and input shaft (25).

REAR PLANETARY GEAR SET

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns in the same way as the planetary carrier (15) due to the mechanical connection with the locked front planetary gearset. This planetary gearset is therefore locked and turns as a closed unit.

CENTER PLANETARY GEAR SET

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The sun gear (22) is held against the housing by the multiple-disc holding clutch B2 (6). The planetary pinion gears (18) turn on the fixed sun gear (22) and increase the torque from the annulus gear (10) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the running direction of the engine.

FOURTH GEAR POWERFLOW

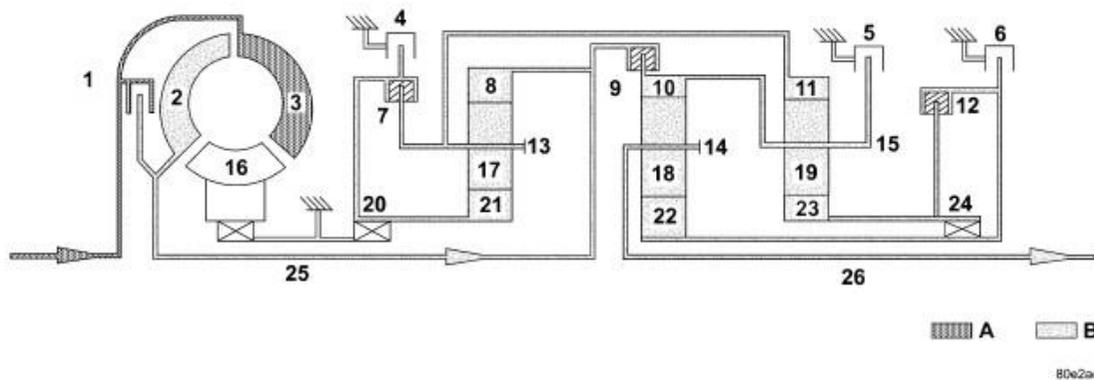


Fig. 8: Fourth Gear Powerflow (1 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR

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9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	B - TRANSMISSION INPUT SPEED

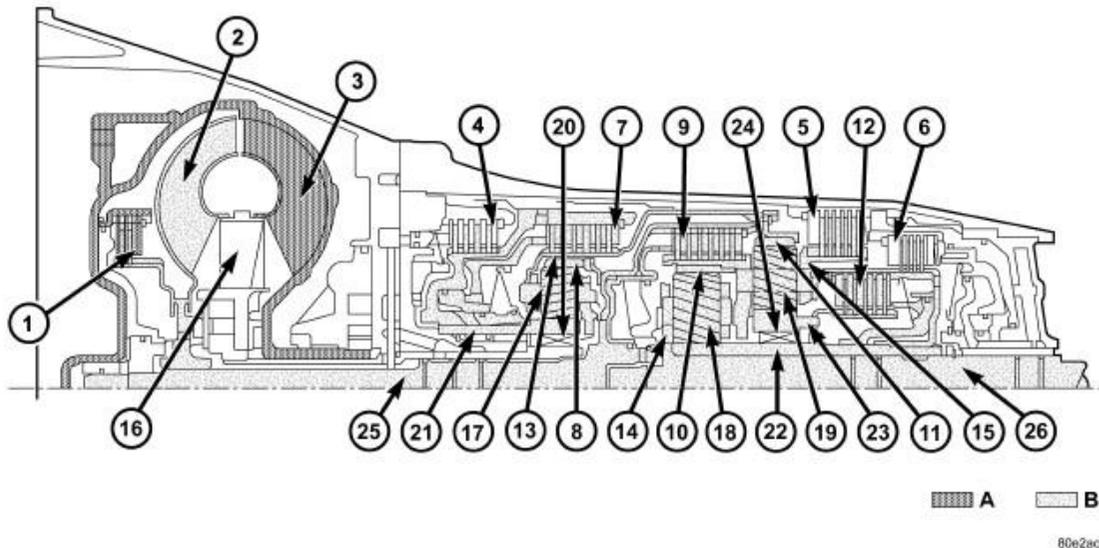


Fig. 9: Fourth Gear Powerflow (2 Of 2)
Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	B - TRANSMISSION INPUT SPEED

Speed and torque are not converted by the direct gear ratio of the 4th gear. Power is transferred from the input shaft (25) to the output shaft (26) via three locked planetary gearsets. Refer to **Fig. 9** and **Fig. 8**.

FRONT PLANETARY GEAR SET

The planetary carrier (13) and sun gear (21) are connected via the engaged multiple-disc clutch K1 (7). The planetary gearset is therefore locked and turns as a closed unit at the input speed due to the mechanical connection of the annulus gear (8) and the input shaft (25).

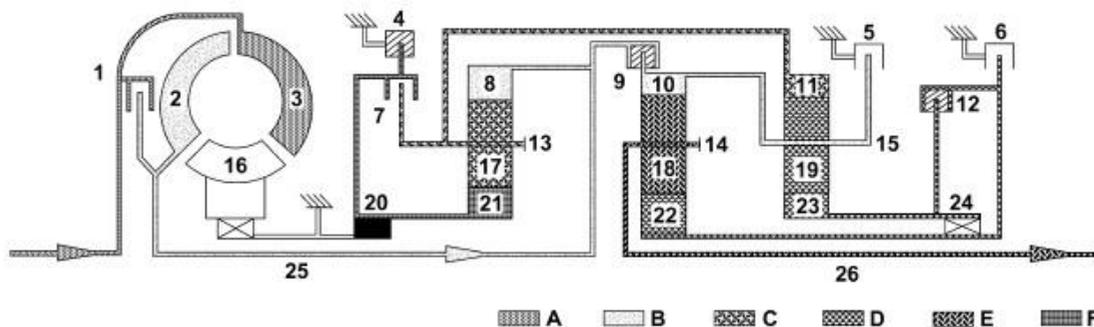
REAR PLANETARY GEAR SET

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns in the same way as the planetary carrier (15) due to the mechanical connection with the locked front planetary gearset. The planetary gearset is therefore locked and turns as a closed unit.

CENTER PLANETARY GEAR SET

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The multiple-disc clutch K3 (12) connects the sun gears (22) and (23) of the rear and center planetary gearset. The planetary gearset is locked by the same speeds of the annulus gear (10) and the sun gear (22) and it turns as a closed unit.

FIFTH GEAR POWERFLOW



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Fig. 10: Fifth Gear Powerflow (1 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR

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9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

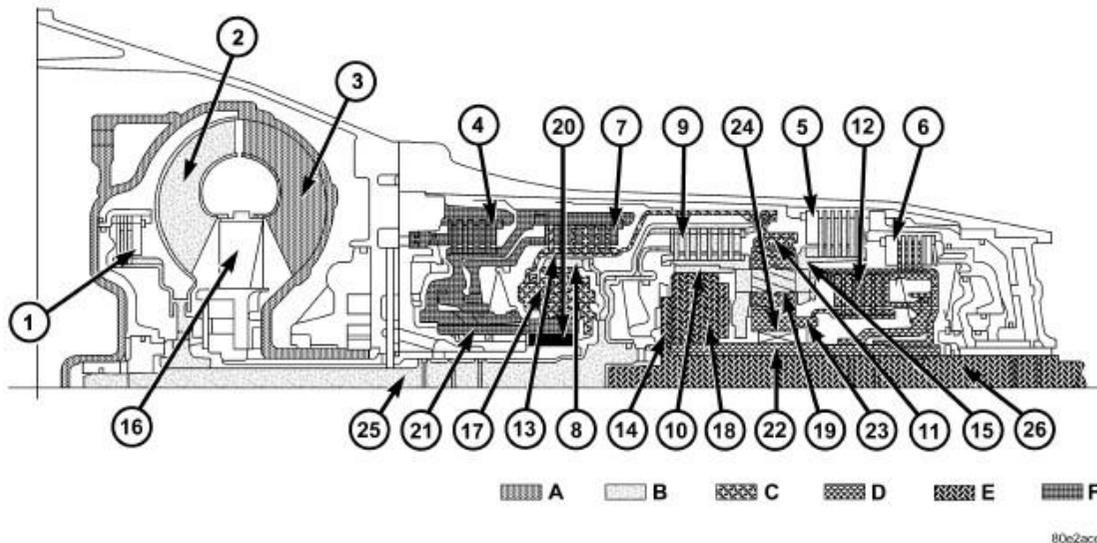


Fig. 11: Fifth Gear Powerflow (2 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO

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B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred to the output shaft (26). Refer to **Fig. 11** and **Fig. 10**.

FRONT PLANETARY GEAR SET

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

REAR PLANETARY GEAR SET

The multiple-disc clutch K2 (9) is engaged and transfers the input speed of the input shaft (25) to the planetary carrier (15) via the annulus gear (10). The annulus gear (11) turns at a reduced speed due to the mechanical connection with the front planetary carrier (13). The planetary pinion gears (19) turn between the annulus gear (11) and the sun gear (23). The sun gear (23) moves at an increased speed in the running direction of the engine.

CENTER PLANETARY GEAR SET

The annulus gear (10) turns at the input speed as a result of the engaged multiple-disc clutch K2 (9). The multiple-disc clutch K3 (12) transfers an increased speed to the sun gear (22) due to the connection with the sun gear (23). The planetary pinion gears (18) turn between the annulus gear (10) and the sun gear (22). The speed of the planetary carrier (14) and the output shaft (26) connected to the planetary carrier lies between that of the annulus gear (10) and the sun gear (22). This provides a step-up ratio.

REVERSE GEAR POWERFLOW

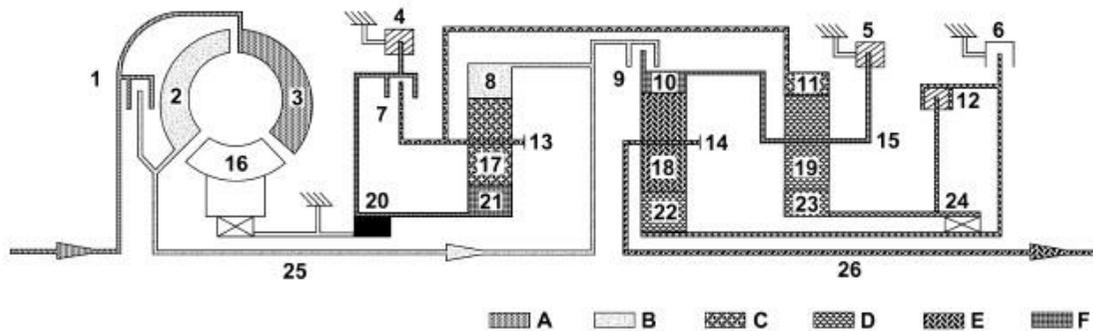


Fig. 12: Reverse Gear Powerflow (1 Of 2)
 Courtesy of CHRYSLER LLC

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1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

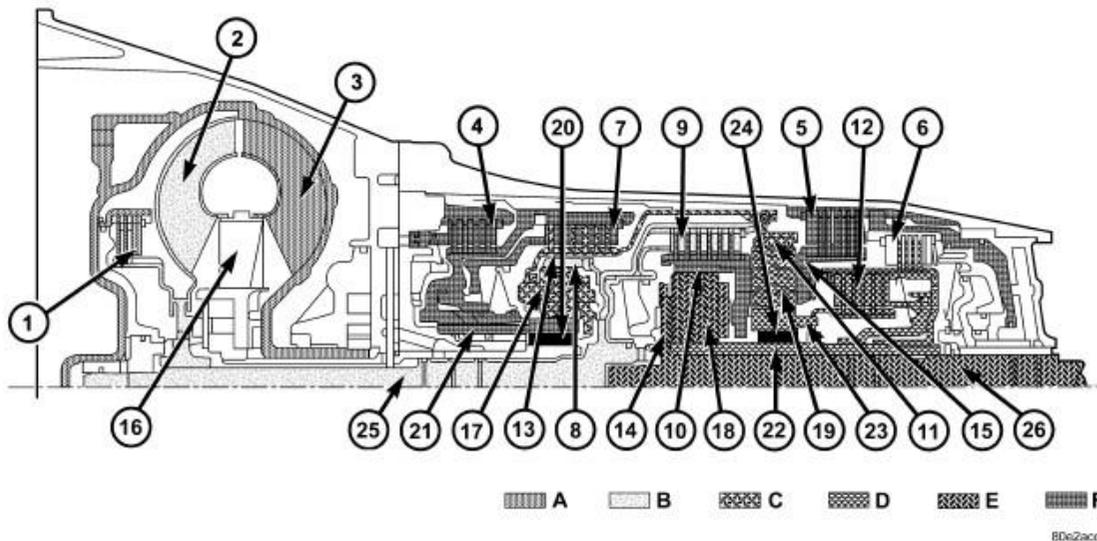


Fig. 13: Reverse Gear Powerflow (2 Of 2)
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS

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7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - THIRD GEAR RATIO
C - FIRST GEAR RATIO	F - FIXED PARTS

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred with reversed direction of rotation to the output shaft (26). Refer to **Fig. 13** and **Fig. 12**.

FRONT PLANETARY GEAR SET

The annulus gear (8) is driven by the input shaft (25). The sun gear (21) is held against the housing by the locked freewheel F1 (20) during acceleration and via the engaged multiple-disc holding clutch B1 (4) during deceleration. The planetary pinion gears (17) turn on the fixed sun gear (21) and increase the torque from the annulus gear (8) to the planetary carrier (13). The planetary carrier (13) moves at a reduced speed in the running direction of the engine.

REAR PLANETARY GEAR SET

The planetary carrier (15) is held against the housing by the engaged multiple-disc holding clutch B3 (5). The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (13). The planetary gears (19) turn between the annulus gear (11) and the sun gear (23). The direction is reversed by the held planetary carrier (15) so that the sun gear (23) turns in the opposite direction to the running direction of the engine.

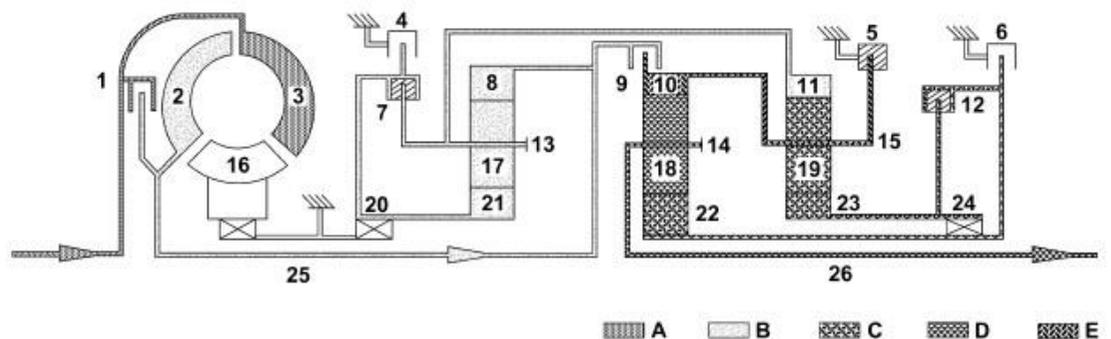
CENTER PLANETARY GEAR SET

The annulus gear (10) is held against the housing by the multiple-disc holding clutch B3 (5) via the mechanical connection to the planetary carrier (15). The sun gear (22) turns backwards due to the engaged multiple-disc clutch K3 (12). The planetary gears (18) turn on the fixed annulus gear (10) and increase the torque from the sun gear (22) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the opposite direction to the running direction of the engine.

REVERSE GEAR POWERFLOW - LIMP IN OR 4WD LOW RANGE

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Fig. 14: Reverse Gear Powerflow - Limp In Or 4WD Low Range (1 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - FIXED PARTS
C - FIRST GEAR RATIO	

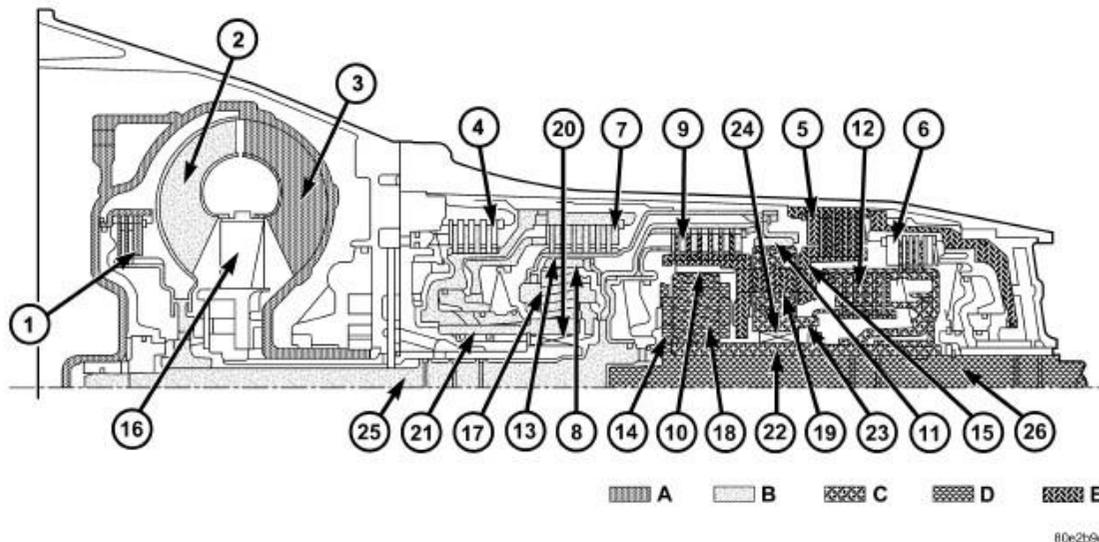


Fig. 15: Reverse Gear Powerflow - Limp In Or 4WD Low Range (2 Of 2)

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH	14 - CENTER PLANETARY CARRIER
2 - TORQUE CONVERTER TURBINE	15 - REAR PLANETARY CARRIER
3 - TORQUE CONVERTER IMPELLER	16 - TORQUE CONVERTER STATOR
4 - HOLDING CLUTCH B1	17 - FRONT PLANETARY PINION GEARS
5 - HOLDING CLUTCH B3	18 - CENTER PLANETARY PINION GEARS
6 - HOLDING CLUTCH B2	19 - REAR PLANETARY PINION GEARS
7 - DRIVING CLUTCH K1	20 - FREEWHEELING CLUTCH F1
8 - FRONT PLANETARY ANNULUS GEAR	21 - FRONT PLANETARY SUN GEAR
9 - DRIVING CLUTCH K2	22 - CENTER PLANETARY SUN GEAR
10 - CENTER PLANETARY ANNULUS GEAR	23 - REAR PLANETARY SUN GEAR
11 - REAR PLANETARY ANNULUS GEAR	24 - FREEWHEELING CLUTCH F2
12 - DRIVING CLUTCH K3	25 - INPUT SHAFT
13 - FRONT PLANETARY CARRIER	26 - OUTPUT SHAFT
A - ENGINE SPEED	D - SECOND GEAR RATIO
B - TRANSMISSION INPUT SPEED	E - FIXED PARTS
C - FIRST GEAR RATIO	

Torque from the torque converter is increased via the input shaft (25) and all three planetary gearsets and transferred with reversed direction of rotation to the output shaft (26). Refer to [Fig. 14](#) and [Fig. 15](#).

FRONT PLANETARY GEAR SET

The clutch K1 (7) is shifted. The planetary carrier (13) and sun gear (21) are connected to each other as a result. The annulus gear (8) is driven via the input shaft (25). The planetary gear set is locked and turns as a unit.

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REAR PLANETARY GEAR SET

The planetary carrier (15) is held against the housing by the engaged multiple-disc holding clutch B3 (5). The annulus gear (11) turns at a reduced speed due to the mechanical connection to the front planetary carrier (13). The planetary pinion gears (19) turn between the annulus gear (11) and the sun gear (23). The direction is reversed by the held planetary carrier (15) so that the sun gear (23) turns in the opposite direction to the running direction of the engine.

CENTER PLANETARY GEAR SET

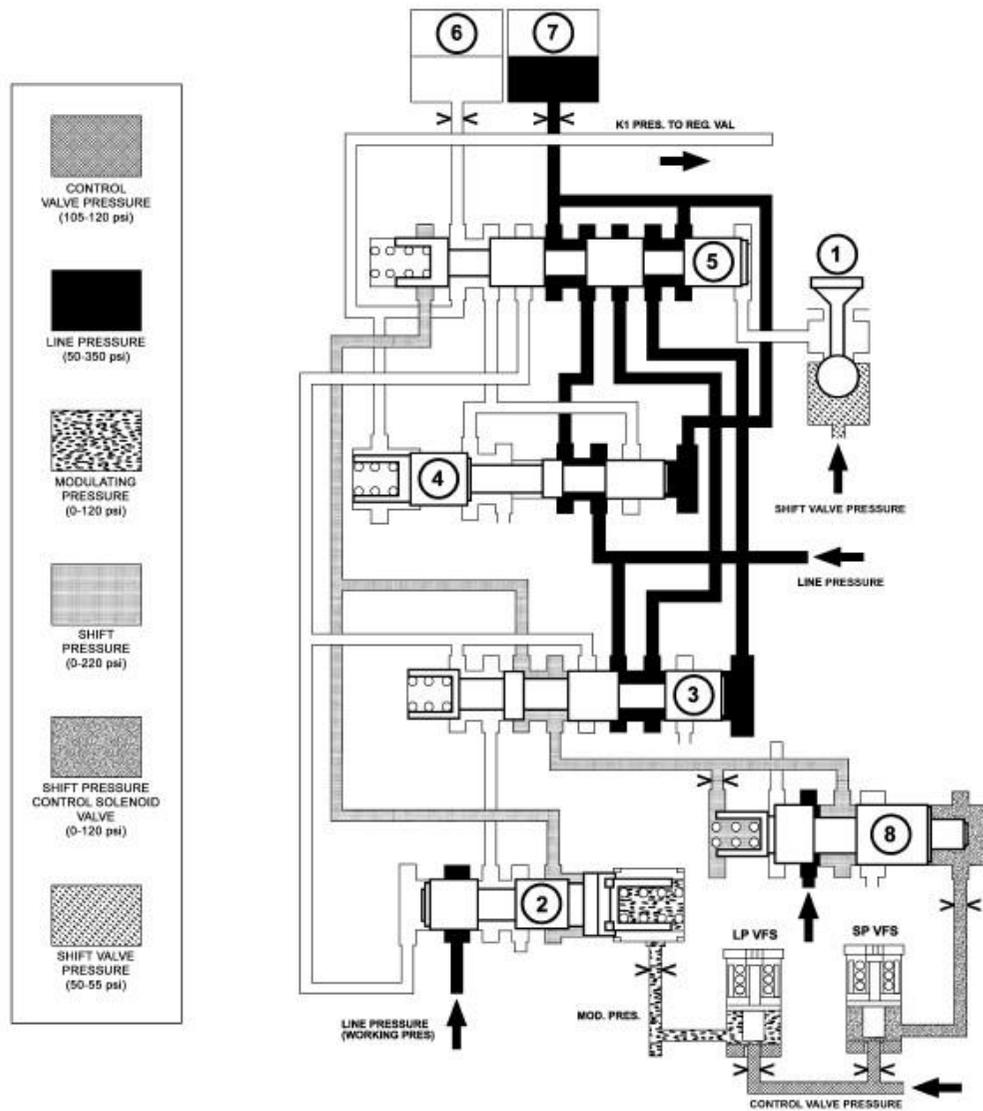
The annulus gear (10) is held against the housing by the multiple-disc holding clutch B3 (5) via the mechanical connection to the planetary carrier (15). The sun gear (22) turns backwards due to the engaged multiple-disc clutch K3 (12). The planetary gears (18) turn on the fixed annulus gear (10) and increase the torque from the sun gear (22) to the planetary carrier (14). The output shaft (26) connected to the planetary carrier (14) turns at a reduced speed in the opposite direction to the running direction of the engine.

SHIFT GROUPS/ SHIFT SEQUENCE

1-2 SHIFT - FIRST GEAR ENGAGED

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Fig. 16: First Gear Engaged Hydraulic Circuit
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	8 - SHIFT PRESSURE REGULATING VALVE

The end face of the command valve (5) is kept unpressurized via the solenoid valve for 1-2 and 4-5 shift (1). Refer to **Fig. 16**. Because of the holding pressure shift valve (4), the working pressure (p-A) is present at the multiple-disc holding clutch B1 (7). Clutch K1 (6) is unpressurized.

SHIFT PHASE - 1-2 SHIFT PHASE 1

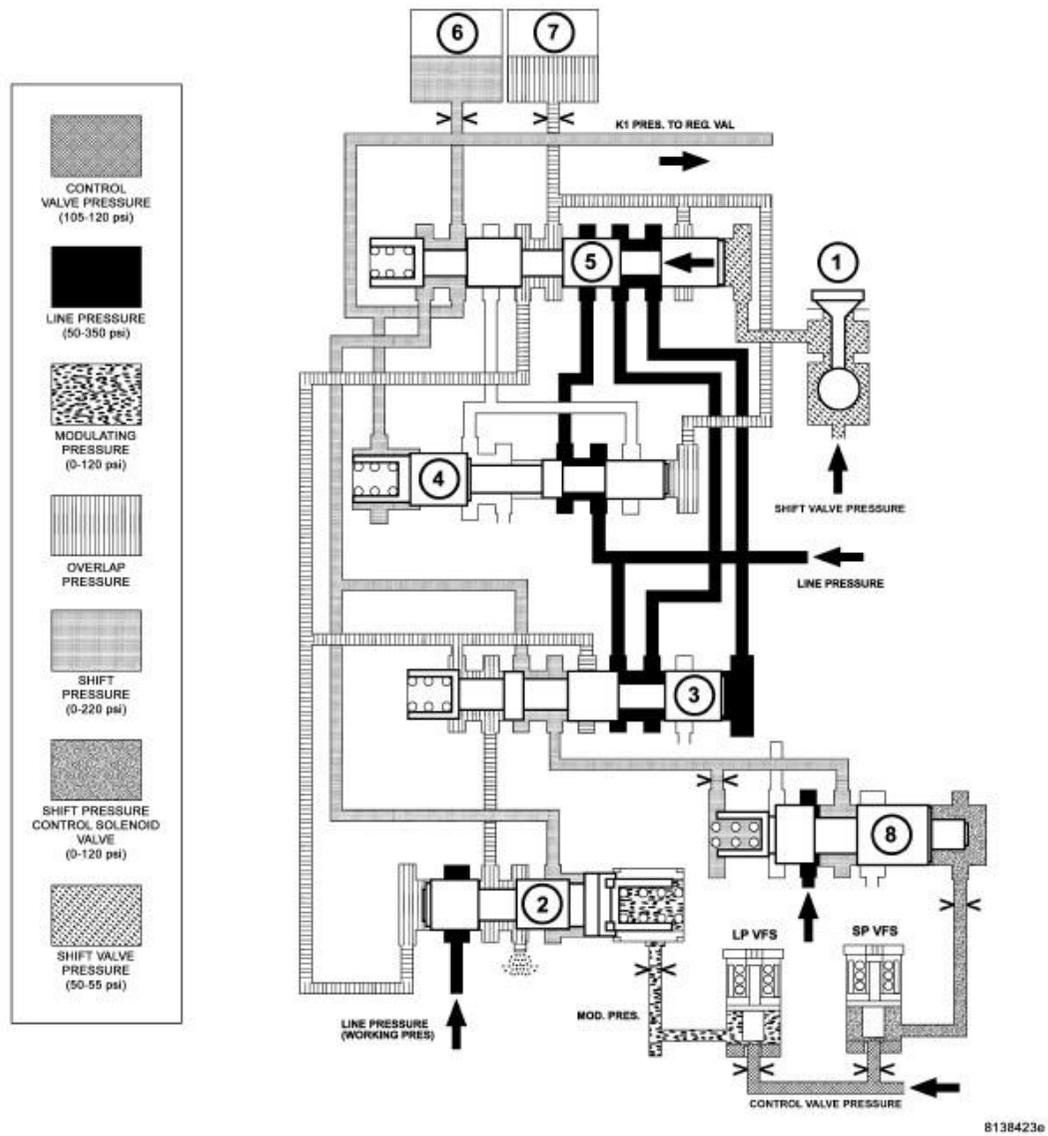


Fig. 17: Shift Phase - 1-2 Shift Phase 1
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	8 - SHIFT PRESSURE REGULATING VALVE

When the 1-2 and 4-5 shift solenoid valve (1) is turned on, the shift valve pressure (p-SV) is directed onto the end face of the command valve (5). Refer to **Fig. 17**. The command valve is moved and the shift pressure (p-S) coming from the shift pressure shift valve (3) is directed via the command valve (5) onto clutch K1 (6).

Simultaneously the clutch B1 (7) is subjected to overlap pressure by the overlap regulating valve (2). The pressure in the clutch B1 (7) as it disengages is controlled during the shift phase depending on engine load by

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the modulating pressure and the applying clutch pressure (the shift pressure in clutch K1). The controlled pressure in clutch B1 (7) is inversely proportional to the capacity of the clutch being engaged. The rising shift pressure (p-S) at clutch K1 (6) acts on the annular face of the overlap regulating valve (2) and reduces the overlap pressure regulated by the overlap regulating valve (2). When a corresponding pressure level is reached at the holding pressure shift valve (4), this valve switches over.

SHIFT PHASE - 1-2 SHIFT PHASE 2

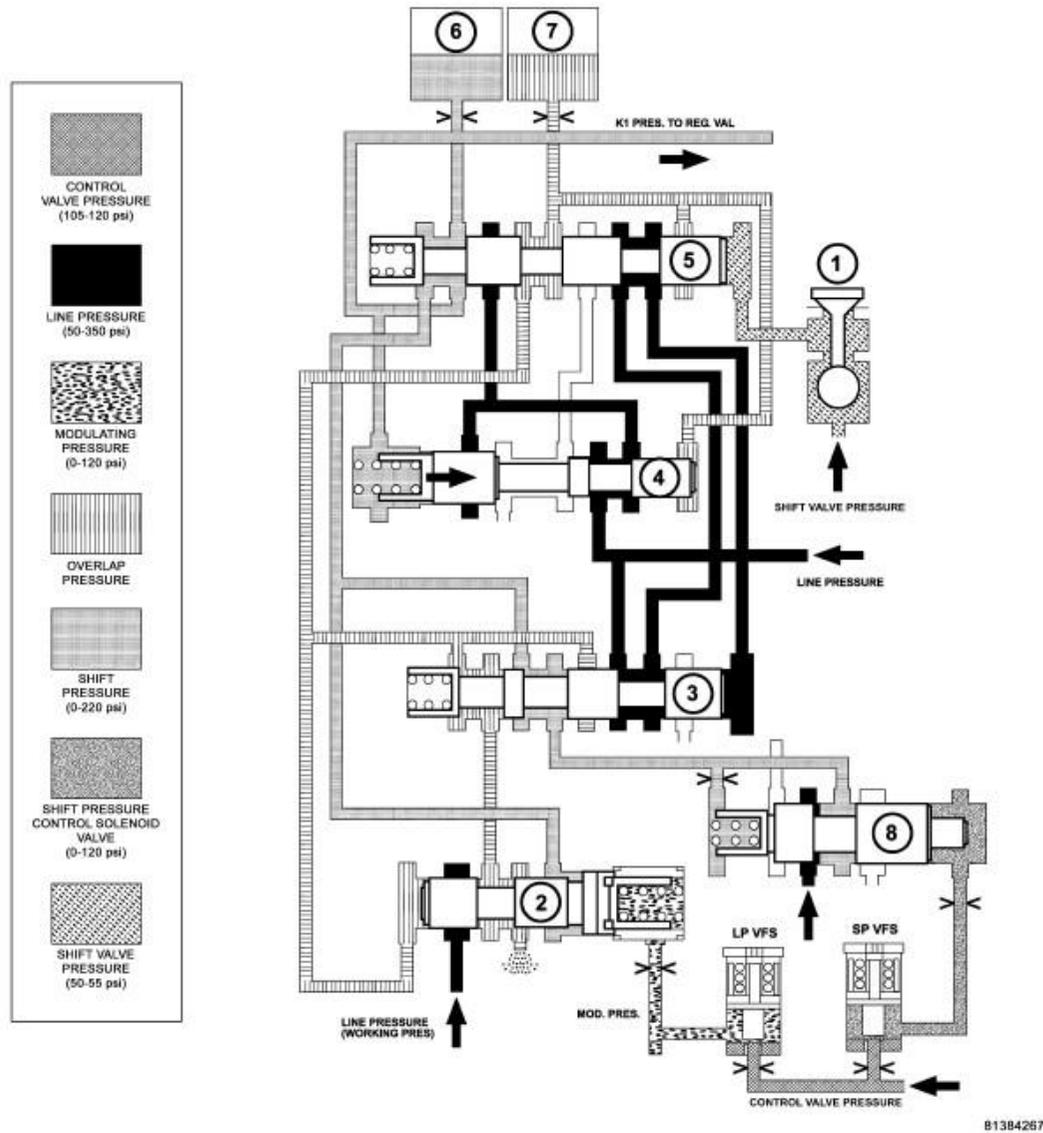


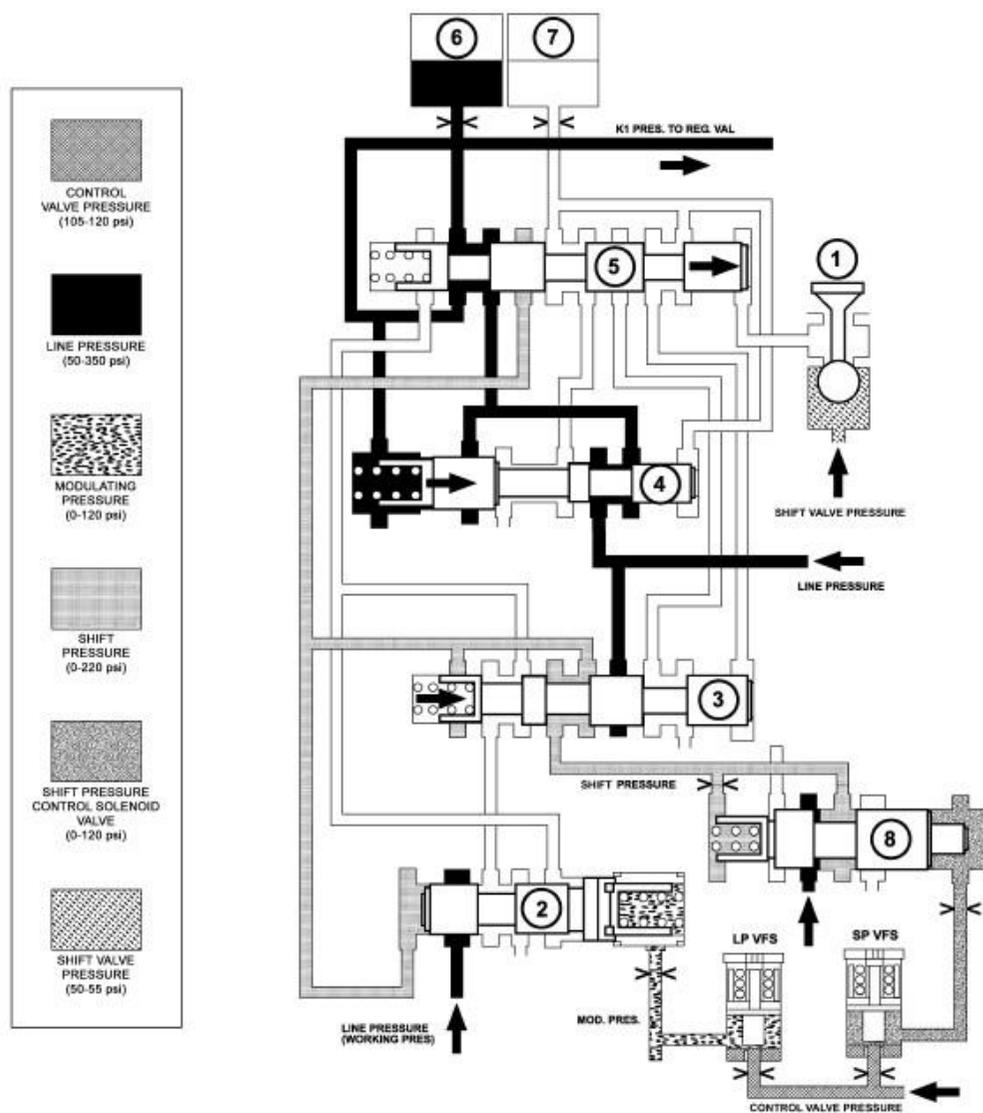
Fig. 18: Shift Phase - 1-2 Shift Phase 2
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1

4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE | 8 - SHIFT PRESSURE REGULATING VALVE

The B1 (7) pressure acting on the end face of the shift pressure shift valve (3) is replaced by the working pressure (p-A). Refer to **Fig. 18**. The shift pressure is also routed to the spring end of the holding valve (4) and the holding valve downshifts. The line pressure is then routed to the command valve (5).

SECOND GEAR ENGAGED



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Fig. 19: Second Gear Engaged
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1

4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE | 8 - SHIFT PRESSURE REGULATING VALVE

After the gear change is complete, the pressure on the end face of the command valve (5) is reduced via the 1-2 and 4-5 shift solenoid valve (1), and the command valve (5) is pushed back to its basic position. Refer to **Fig. 19**. Via the holding pressure shift valve (4) the working pressure (p-A) now passes via the command valve (5) to clutch K1 (6). The multiple-disc holding clutch B1 (7) is deactivated (unpressurized). The spring of the shift pressure shift valve (3) pushes the valve back to its basic position.

SHIFT PHASE - 2-1 SHIFT PHASE 1

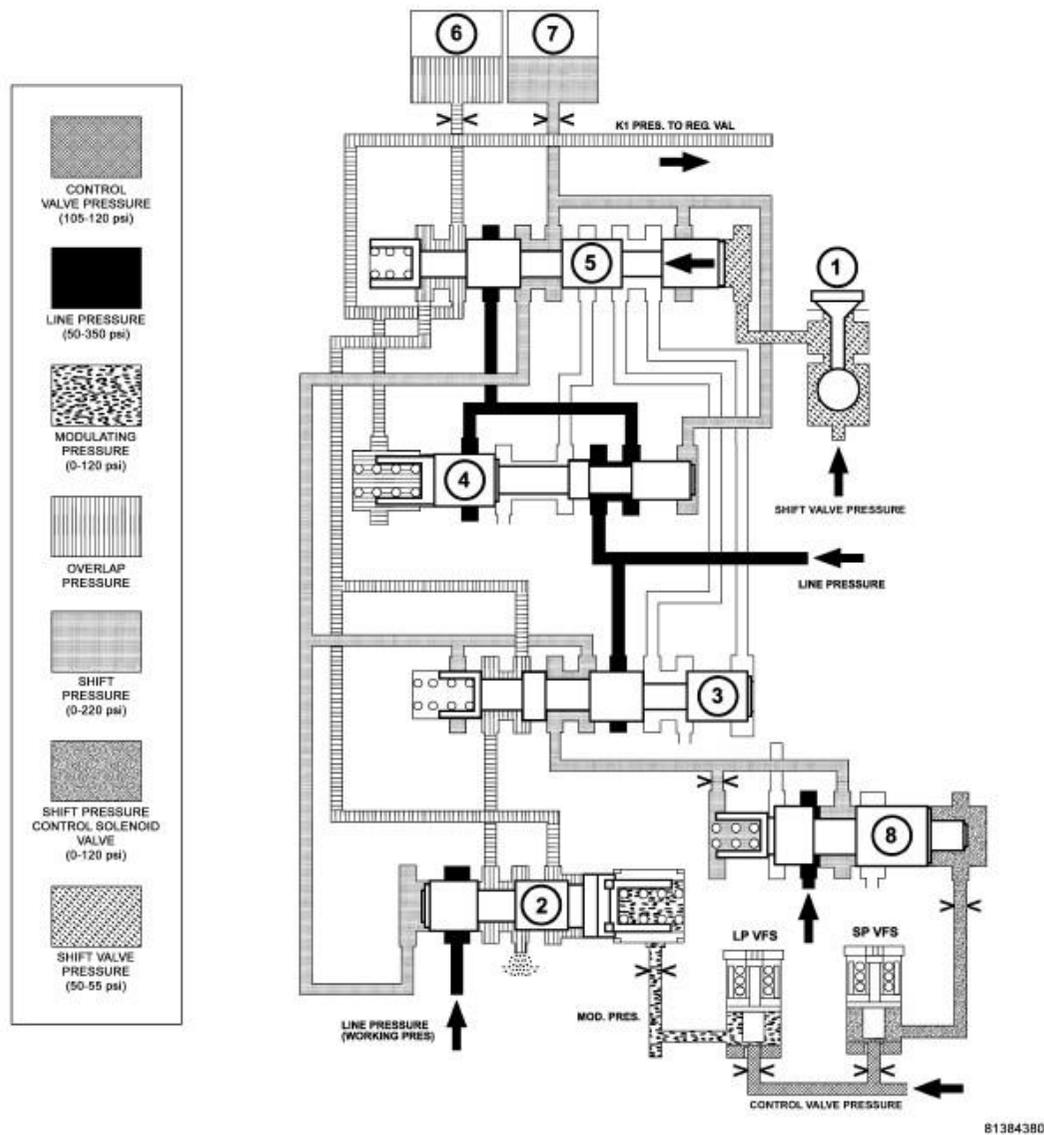


Fig. 20: Shift Phase - 2-1 Shift Phase 1
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
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2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	8 - SHIFT PRESSURE REGULATING VALVE

The 1-2/4-5 shift solenoid (1) is turned ON to apply shift pressure (p-S) to the end face of the 1-2/4-5 command valve (5). Refer to **Fig. 20**. This allows the command valve to up-shift and the shift pressure coming from the 1-2/4-5 shift valve (3) is routed to the holding clutch B1 (7) via the command valve.

Simultaneously, the pressure in the releasing clutch, K1 (6), is regulated at the 1-2/4-5 overlap valve (2). The pressure in the K1 clutch as it disengages is controlled during the shift phase depending on engine load, via the modulating pressure (p-MOD), and the shift pressure in clutch B1 (7). The increasing shift pressure in clutch B1, which also acts on the end face of the overlap valve, reduces the overlap pressure.

SHIFT PHASE - 2-1 SHIFT PHASE 2

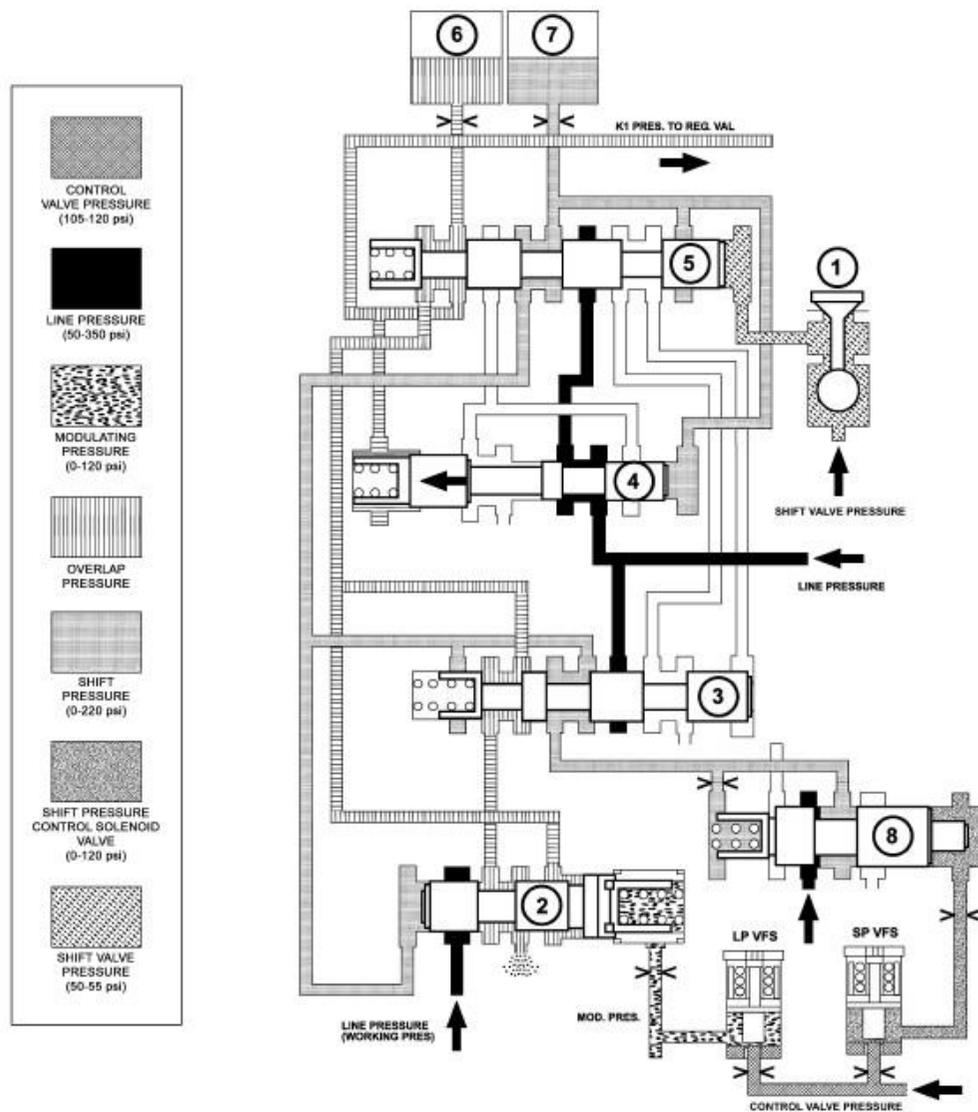


Fig. 21: Shift Phase - 2-1 Shift Phase 2

Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	8 - SHIFT PRESSURE REGULATING VALVE

The pressure in clutch B1 (7) acting on the end face of the 1-2/4-5 holding valve (4) forces the valve to up-shift against the spring pressure and allows line pressure (p-A) to pass through the command valve (5). Refer to [Fig. 21](#).

2-1 SHIFT - FIRST GEAR ENGAGED

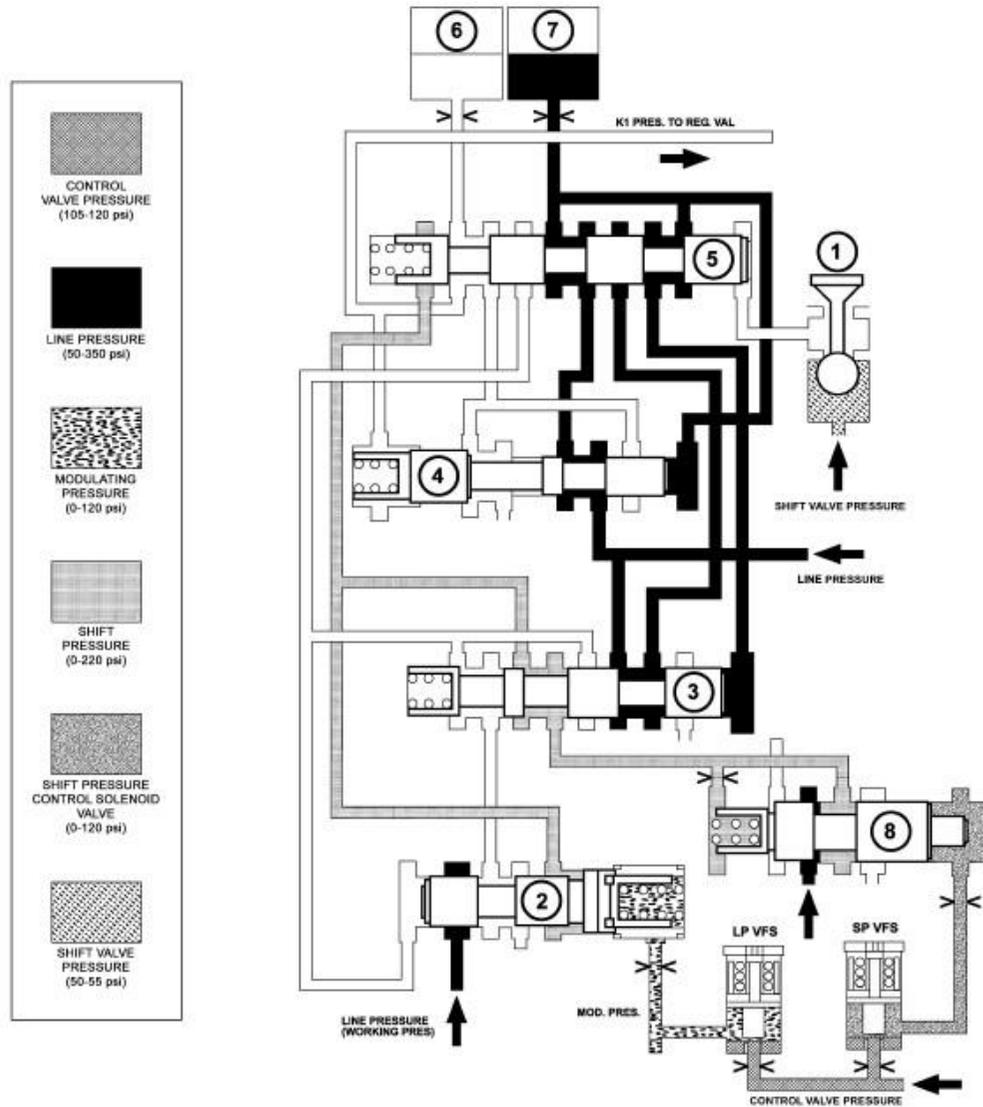


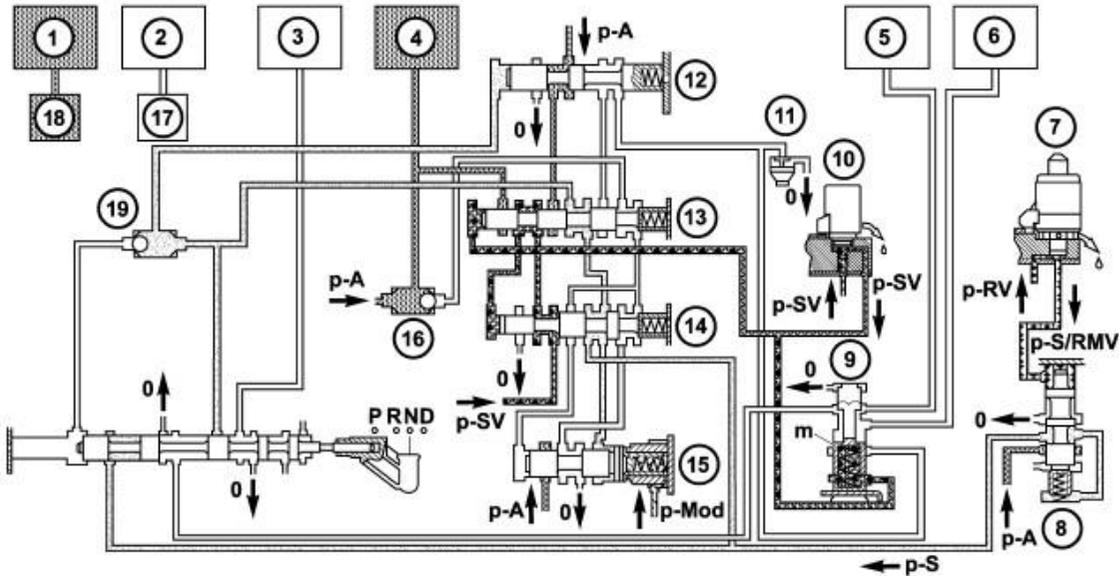
Fig. 22: First Gear Engaged Hydraulic Circuit

Courtesy of CHRYSLER LLC

1 - 1-2/4-5 SHIFT SOLENOID	5 - 1-2/4-5 COMMAND VALVE
2 - 1-2/4-5 OVERLAP VALVE	6 - DRIVING CLUTCH K1
3 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE	7 - HOLDING CLUTCH B1
4 - 1-2/4-5 HOLDING PRESSURE SHIFT VALVE	8 - SHIFT PRESSURE REGULATING VALVE

After the gear change is complete, the 1-2/4-5 shift solenoid (1) is turned off. Refer to **Fig. 22**. This reduces the pressure on the end face of the 1-2/4-5 command valve (5) to 0 psi and the spring pressure downshifts the valve to its initial position. The line pressure (p-A) is switched to the holding clutch B1 (7) and the end face of the holding valve by the downshifted command valve. The upshifted holding valve also allows the remaining pressure in clutch K1 (6) to be vented.

GEAR SHIFT N TO D (1ST GEAR) - ENGINE STARTED



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Fig. 23: Gear Shift N To D (1st Gear) - Engine Started

Courtesy of CHRYSLER LLC

1 - HOLDING CLUTCH B1	11 - PRESSURE HOLDING VALVE
2 - DRIVING CLUTCH K1	12 - 3-4 HOLDING PRESSURE SHIFT VALVE
3 - HOLDING CLUTCH B3	13 - 3-4 COMMAND VALVE

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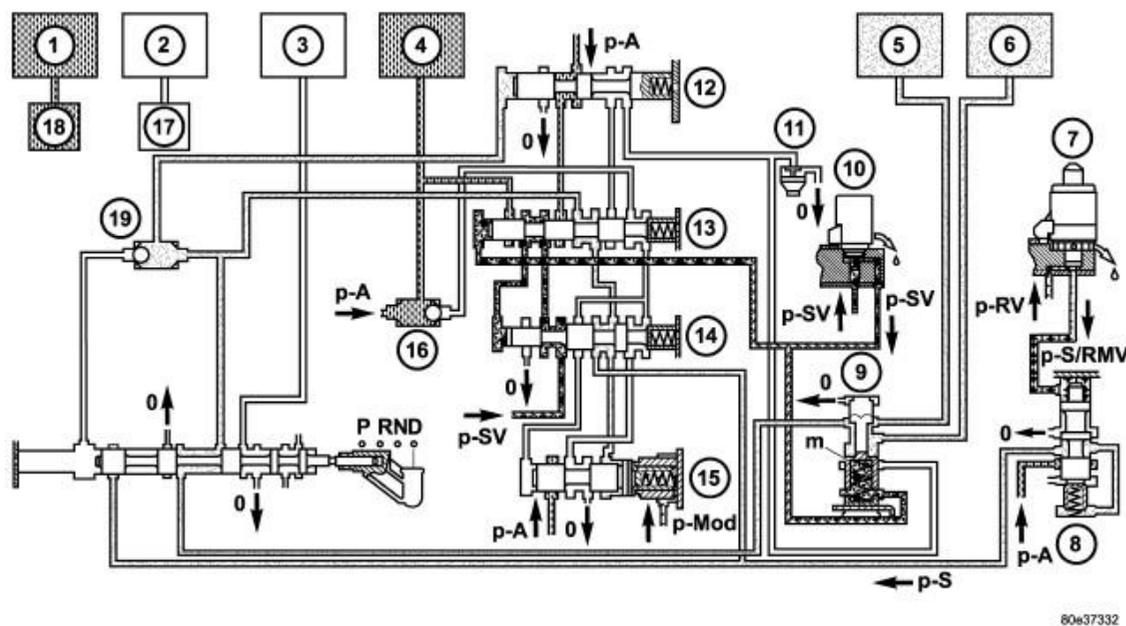
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4 - DRIVING CLUTCH K3	14 - 3-4 SHIFT PRESSURE SHIFT VALVE
5 - HOLDING CLUTCH B2 PISTON	15 - 3-4 OVERLAP REGULATING VALVE
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE	16 - BALL VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID	17 - 1-2/4-5 COMMAND VALVE
8 - SHIFT PRESSURE REGULATING VALVE	18 - 1-2/4-5 COMMAND VALVE
9 - SHIFT VALVE B2	19 - BALL VALVE
10 - 3-4 SHIFT SOLENOID	

With the engine started and the gearshift lever in the NEUTRAL or PARK positions, holding clutch B1 (1) and driving clutch K3 (4) are applied and the various valves in the 1-2/4-5 shift group are positioned to apply pressure to the holding clutch B2. Refer to **Fig. 23**.

ACTIVATION SEQUENCE



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Fig. 24: Activation Sequence

Courtesy of CHRYSLER LLC

1 - HOLDING CLUTCH B1	11 - PRESSURE HOLDING VALVE
2 - DRIVING CLUTCH K1	12 - 3-4 HOLDING PRESSURE SHIFT VALVE
3 - HOLDING CLUTCH B3	13 - 3-4 COMMAND VALVE
4 - DRIVING CLUTCH K3	14 - 3-4 SHIFT PRESSURE SHIFT VALVE
5 - HOLDING CLUTCH B2 PISTON	15 - 3-4 OVERLAP REGULATING VALVE
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE	16 - BALL VALVE

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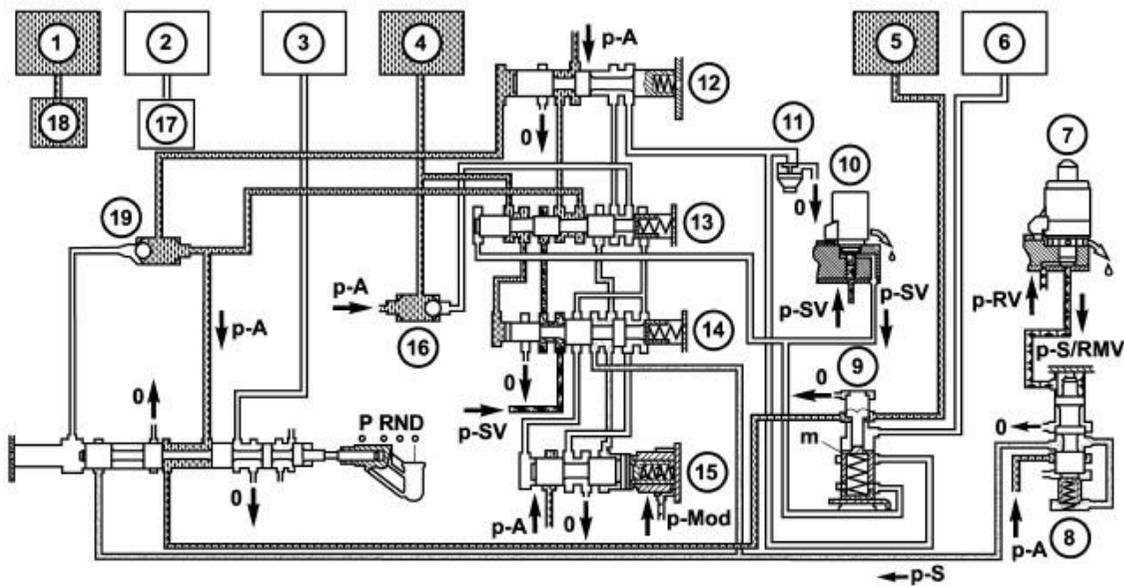
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7 - SHIFT PRESSURE REGULATING SOLENOID	17 - 1-2/4-5 COMMAND VALVE
8 - SHIFT PRESSURE REGULATING VALVE	18 - 1-2/4-5 COMMAND VALVE
9 - SHIFT VALVE B2	19 - BALL VALVE
10 - 3-4 SHIFT SOLENOID	

The selector valve opens the shift pressure (p-S) feed connection from the ball valve (19) with the shift valve B2 (9). Refer to **Fig. 24**. With the shift valve B2 (9) in the upper position, shift pressure (p-S) travels behind the piston B2 (5) and simultaneously to the opposing face of the piston B2 (6). The multiple-disc holding clutch B2 begins to close.

The pressure on the opposing face of the piston B2 (6) ensures a soft activation of the multiple-disc holding clutch B2.

FIRST GEAR ENGAGED



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Fig. 25: First Gear Engaged
Courtesy of CHRYSLER LLC

1 - HOLDING CLUTCH B1	11 - PRESSURE HOLDING VALVE
2 - DRIVING CLUTCH K1	12 - 3-4 HOLDING PRESSURE SHIFT VALVE
3 - HOLDING CLUTCH B3	13 - 3-4 COMMAND VALVE
4 - DRIVING CLUTCH K3	14 - 3-4 SHIFT PRESSURE SHIFT VALVE
5 - HOLDING CLUTCH B2 PISTON	15 - 3-4 OVERLAP REGULATING VALVE
6 - HOLDING CLUTCH B2 PISTON OPPOSING FACE	16 - BALL VALVE

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7 - SHIFT PRESSURE REGULATING SOLENOID	17 - 1-2/4-5 COMMAND VALVE
8 - SHIFT PRESSURE REGULATING VALVE	18 - 1-2/4-5 COMMAND VALVE
9 - SHIFT VALVE B2	19 - BALL VALVE
10 - 3-4 SHIFT SOLENOID	

The TCM monitors the activation sequence via the speed of the input shaft, which slows down as the frictional connection in the multiple-disc holding clutch increases. When the speed drops to the specified level, the TCM shuts off the power to the 3-4 shift solenoid valve (10). Refer to **Fig. 25**. The spring chamber of the shift valve B2 (9) is depressurized and switches downwards. This connects the line to the opposing face of the piston B2 (6) with the pressure holding valve (11). The pressure on the opposing face of the piston B2 (6) drops to a residual pressure.

The working pressure (p-A) is formed and travels via the 2-3 holding pressure shift valve, the 2-3 command valve and the ball valve (16) to multi-plate clutch K3 (4) and via the 3-4 command valve (13) to the end face of the 3-4 shift pressure shift valve (14). The 3-4 shift pressure shift valve (14) is moved against the force of the spring towards the right. At the same time the 3-4 solenoid valve (10) is energized. This allows shift valve pressure (p-SV) to enter the spring chamber of the shift valve B2 (9) and to reach the end face of the 3-4 command valve (13). The shift valve B2 (9) is held in the upper position and the 3-4 command valve (13) switches towards the right. At the end face of the 3-4 shift pressure shift valve (14) the working pressure (p-A) is replaced by shift valve pressure (p-SV).

The 3-4 command valve (13) moves to the left. Working pressure (p-A) travels via the holding pressure shift valve (12) and the 3-4 command valve (13) to the piston of multiple-disc holding clutch B2 (5).

DIAGNOSIS AND TESTING

AIR CHECKING TRANSMISSION CLUTCH OPERATION

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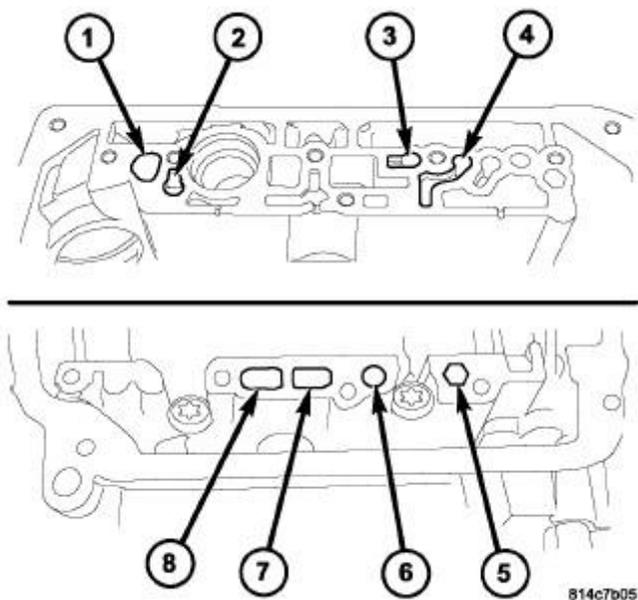
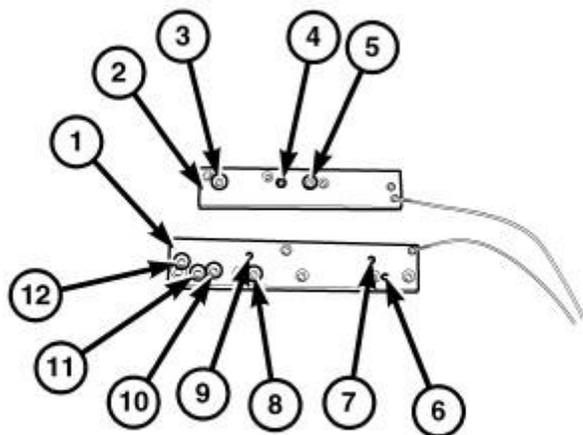


Fig. 26: NAG1 Clutch Application Ports

Courtesy of CHRYSLER LLC

1 - K1 CLUTCH APPLY PORT
2 - B1 CLUTCH APPLY PORT
3 - K2 CLUTCH APPLY PORT
4 - TORQUE CONVERTER CLUTCH APPLY PORT
5 - B3 CLUTCH APPLY PORT
6 - B2 CLUTCH COUNTER-PRESSURE PORT
7 - K3 CLUTCH APPLY PORT
8 - B2 CLUTCH APPLY PORT

The ports (1 - 8), are the clutch apply passages.



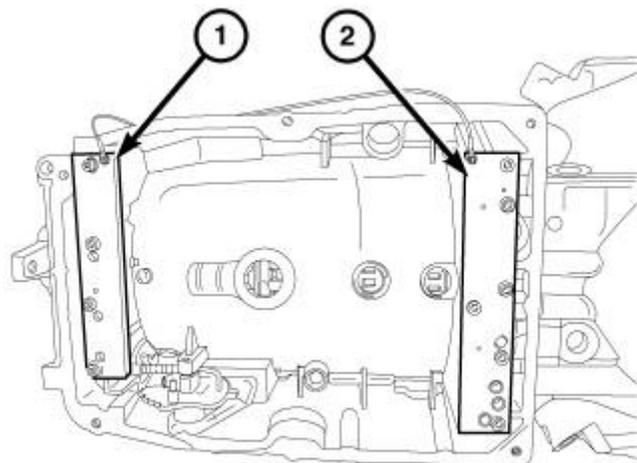
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Fig. 27: NAG1 Air Adapter Plates
 Courtesy of CHRYSLER LLC

1 - NAG1 AIR CHECK ADAPTER PLATE 10007 - 1
2 - NAG1 AIR CHECK ADAPTER PLATE 10007 - 2
3 - B3 CLUTCH PORT
4 - K3 CLUTCH PORT
5 - B2 CLUTCH PORT
6 - K1 CLUTCH PORT
7 - B1 CLUTCH PORT
8 - K2 CLUTCH PORT
9 - TORQUE CONVERTER CLUTCH LOCK - UP PORT
10 - TORQUE CONVERTER IN PORT
11 - COOLER OUT PORT
12 - TORQUE CONVERTER OUT PORT

When the adapter plates (special tool #10007, Plate, Air Pressure Test) (1&2) are placed over the ports, proper operation of the transmission clutches can be verified. Air-pressure testing can be used to check transmission clutch operation. The test can be conducted with the transmission either in the vehicle (where applicable) or on the work bench, as a final check.

Air-pressure testing requires that the oil pan and valve body be removed from the transmission.



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Fig. 28: NAG1 Transmission Adapter Plate
 Courtesy of CHRYSLER LLC

- | |
|---------------------------------|
| 1 - AIR ADAPTER PLATE 10007 - 2 |
| 2 - AIR ADAPTER PLATE 10007 - 1 |

NOTE: The air supply which is used must be free of moisture and dirt. Use a pressure of 30 psi to test clutch operation.

NOTE: When checking the K1 clutch, air must pass through numerous passages to reach the clutch it's self, therefore only a slight application will be noted.

1. Remove the oil pan.
2. Remove the valve body (electrohydraulic unit). Refer to **UNIT, ELECTROHYDRAULIC CONTROL, REMOVAL.**
3. Using the existing valve body (electrohydraulic unit) mounting bolts attach the Air Adapter Plates (special tool #10007, Plate, Air Pressure Test) (1&2). Tighten the bolt to 8 N.m (71 in. lbs.).
4. Apply 30 psi of air pressure to each port

If the clutch is functioning, a soft thump will be heard as the clutch is applied. The clutch application can also be felt by touching the appropriate element while applying air pressure. As the air pressure is released, the clutch should also release.

AUTOMATIC TRANSMISSION - GENERAL CONDITIONS

CAUTION: Before attempting any repair on an automatic transmission, check for Diagnostic Trouble Codes with the appropriate scan tool.

Transmission malfunctions may be caused by these general conditions:

- Poor engine performance.
- Improper adjustments.
- Hydraulic malfunctions.
- Mechanical malfunctions.
- Electronic malfunctions.
- Transfer case performance (if equipped).

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment (if equipped) and transmission fault codes using the appropriate scan tool. Then perform a road test to determine if the problem has been corrected or if more diagnosis is necessary.

PRELIMINARY

Two basic procedures are required. One procedure for vehicles that are drivable and an alternate procedure for disabled vehicles (will not back up or move forward).

VEHICLE IS DRIVABLE

1. Check for transmission fault codes using the appropriate scan tool.
2. Adjust gearshift cable if complaint was based on delayed, erratic, or harsh shifts.
3. Road test and note how transmission upshifts, downshifts, and engages.
4. Check fluid level and condition.

VEHICLE IS DISABLED

1. Check for broken or disconnected gearshift cable.
2. Check for cracked, leaking cooler lines, or loose or missing pressure-port plugs.
3. Check fluid level and condition.
4. Check shifter linkage: Is cable connected to lever at transmission and does the lever move with gear change on the console shifter ? If no movement, repair shift cable and or shifter.
5. With shifter in Park, attempt to rotate drive shaft(s) to ensure transmission output shaft coupler/flange is secure.
6. Check the transfer case operation (if equipped).
7. Raise and support vehicle on safety stands, start engine with transmission in Park position and allow to idle for several minutes, shift transmission into gear, and note following:
 1. If propeller shaft turns but wheels do not, problem is with differential or axle shafts.
 2. If propeller shaft does not turn and transmission is noisy, stop engine. Remove oil pan, and check for debris. If pan is clear, remove transmission and check for damaged driveplate, converter, oil pump, or input shaft.
 3. If propeller shaft does not turn and transmission is not noisy, perform hydraulic-pressure test to

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determine if problem is hydraulic or mechanical. Refer to **DIAGNOSIS AND TESTING**.

8. Air pressure test the B1, K3, and B2 clutch circuits. Refer to **DIAGNOSIS AND TESTING**.
9. Check the TCM, Wiring, Valve body, and Solenoids (Utilize fault codes to diagnose if available).
10. Remove oil pan and check filter presence and condition (not plugged and seated).
11. If debris is found in the pan, tear down transmission and inspect all hard parts, Front Annulus Gear and Gear to Retainer and Input Shaft (Shaft to Retainer) etc., and clutches. If the hard parts did not show signs of damage replace the torque converter and filter.
12. Remove valve body, disassemble, and inspect Line Pressure Regulating valve for being stuck, clean and remove debris.
13. Check pump rotor for failed inner lugs that are driven by the T/C hub.

ROAD TESTING

Before road testing, be sure the fluid level and control cable adjustments have been checked and adjusted if necessary. Verify that all diagnostic trouble codes have been resolved.

Observe engine performance during the road test. A poorly tuned engine will not allow accurate analysis of transmission operation.

Operate the transmission in all gear ranges. Check for shift variations and engine flare which indicates slippage. Note if shifts are harsh, spongy, delayed, early, or if part throttle downshifts are sensitive.

Slippage indicated by engine flare, usually means clutch, overrunning clutch, or line pressure problems.

A slipping clutch can often be determined by comparing which internal units are applied in the various gear ranges. The Clutch Application chart provides a basis for analyzing road test results. Refer to **CLUTCH APPLICATION**.

CLUTCH APPLICATION

GEAR	RATIO	B1	B2	B3	K1	K2	K3	F1	F2
1	3.59	X*	X				X*	X	X
2	2.19		X		X		X*		X
3	1.41		X		X	X			
4	1.00				X	X	X		
5	0.83	X				X	X	X*	
N	N/A	X					X		
R	3.16	X*		X			X	X	
R - Limp In or 4WD Low Range	1.93			X	X		X		

* = The shift components required during coast.

AUTOMATIC TRANSMISSION

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CONDITION	POSSIBLE CAUSES	CORRECTION
Harsh N-D Engagement or Harsh N-R Engagement	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Transmission in limp-home mode.	2. Check TCM for DTCs. Repair as needed.
	3. Driveline lash/movement.	3. Check engine mounts, transmission mount, driveshaft couplings, rear crossmember mounts, axle mounts and axle lash.
	4. Converter clutch or lock up control valve malfunction.	4. Perform converter clutch diagnostics test. Refer to <u>TORQUE CONVERTER CLUTCH (TCC)</u> . Inspect valve body for stuck or sticky lock up control valve. If valve motion is free, replace lock up solenoid and retest.
	5. Valve Body Malfunction.	5. Inspect valve body for stuck or sticky regulator valve.
	6. Clutch or planetary component damage.	6. Remove, disassemble and repair transmission as necessary.
	7. Water in Trans.	7. Perform TSB, recommend to split and clean VB if heavily contaminated.
DELAYED N-D OR N-R ENGAGEMENT	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Torque converter fluid drain back, delayed soft engagement.	2. If vehicle moves normally after 3 seconds of shifting into gear, no repair is necessary. If longer, inspect pump for worn bushing.
	3. Fluid Level Low.	3. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE</u> .
	4. Filter plugged.	4. Check TC out pressure, if < 10psi, check for plugged filter.

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		Replace if needed.
	5. Filter damaged or missing, missing o-ring.	5. Check for damaged/missing filter or cut/missing o-ring.
	6. Valve Body Malfunction.	6. Inspect valve body for stuck/sticky regulator valve or shift group valves.
	7. Oil pump gears worn/damaged.	7. Inspect pump for damage or excessive clearances. Replace if needed.
NO DRIVE OR REVERSE ENGAGEMENT (vehicle will not move)	1. Misadjusted/damaged shift cable.	1. Inspect shift system. Adjust and/or replace worn/damaged parts.
	2. Fluid level low.	2. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE.</u>
	3. Filter plugged.	3. Check TC out pressure, if < 10psi, check for plugged filter. Replace if needed.
	4. Filter damaged or missing, missing filter o-ring.	4. Check for damaged/missing filter or cut/missing o-ring.
	5 Hydraulic system-Low/no line pressure.	5. Remove Electrohydraulic Unit. Inspect or sticky/stuck regulator valve. If valve motion is free, replace line pressure solenoid and retest. If condition still exists check for worn/damaged pump. Replace pump assembly if needed.
	6. TCM in Limp Mode	6. Clear codes and reset.
	7. Stuck Pressure Regulator Valve	7. Split Electrohydraulic Unit t and inspect pressure regulator valve. Remove debris if present. Be certain all shift valves are free, if any valve can't be freed replace Electrohydraulic Unit.
	8. Broken Weld at Front Annulus	8. Replace Hard Parts as Necessary.
	9. Broken Input Shaft Weld	9. Replace Hard Parts as Necessary.
	10. Defective T/C	10. Replace T/C, make sure filter is not clogged.
	11. Broken Output Shaft Weld	11. Replace parts as necessary
	12. Broken/Missing Rear Annulus Weld.	12. Replace parts as necessary.

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	13. Unseated Rear Annulus Gear snap ring.	13. Properly install or replace snap ring.
	14. Valves not returned to their home position.	14. Split Electrohydraulic Unit and inspect 3-4 command valve as well as all other valves, being certain they move freely and are free of debris.
SHUDDER GARAGE SHIFT R-D OR D-R	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Customer applying throttle while shift is in progress.	2. Instruct customer to wait until shift is complete prior to applying throttle.
HARSH ROLLING GARAGE SHIFT R-D OR D-R	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Customer shifting into desired range with vehicle motion.	2. Instruct customer to only shift into the desired range with the vehicle stopped and the service brake applied.
	3. Transmission in limp-home mode.	3. Check TCM for DTCs. Repair as needed.
ENGINE STALLS	1. TCC Solenoid Wire in Harness.	1. Inspect for and repair any short, ground, or open.
	2. TCC Solenoid Defective, Bent Terminals or Debris Shorting Terminals.	2. Check for codes. Refer to <u>DIAGNOSIS AND TESTING</u> .
	3. Debris sticking the TCC Solenoid Open.	3. Remove the TCC Solenoid and try to blow air through it. No air should flow. If air flows freely, replace the TCC Solenoid.
	4. TCC LU Control Valve Stuck.	4. Split the Electrohydraulic Unit and inspect the TCC LU valve for any debris. Remove debris if present. If valve can't be freed replace Electrohydraulic Unit.
		1. Perform converter clutch diagnostics test. Refer to

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ENGINE STALLS WHEN TRANSMISSION IS SHIFTED INTO R OR D.	1. Converter clutch or lock up control valve malfunction.	<u>TORQUE CONVERTER CLUTCH (TCC)</u> . Inspect valve body for stuck or sticky lock up control valve. If valve motion is free, replace lock up solenoid and retest.
	2. Defective torque converter.	2. Replace torque converter.
CLUNK/CLICK NOISE DURING GARAGE SHIFT FROM R-D OR D-R	1. Stick-slip condition between output flange and output shaft nut upon torque reversal from R to D or D to R. Click on first launch.	1. Replace output flange and nut.
HARSH UPSHIFT OR DOWNSHIFT	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Electrohydraulic Unit malfunction.	2. Inspect valve body for sticky/stuck valves. Repair as needed. If valve motion is free, replace shift pressure solenoid and line pressure solenoid and retest.
	3. Damaged or misbuilt clutch.	3. Remove, disassemble and repair transmission as needed.
EMCC SHUDDER AND/OR ROUGH SHIFTS	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Fluid condition, contamination or wrong type.	2. Change fluid per service information procedures. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE</u> .
	3. Electrohydraulic Unit malfunction.	3. Remove Electrohydraulic Unit. Inspect for sticky/stuck lock up control valve. If valve motion is free, replace the lock up solenoid and retest.
	4. Defective torque converter.	4. Replace torque converter.
GRATING OR SCRAPING NOISE PROPORTIONAL TO ENGINE SPEED	1. Torque converter bolts contacting dust shield.	1. Dust shield bent. Replace if needed. Torque converter bolt backed out. Replace with new bolt and torque to proper level.
	2. Damaged/broken drive plate.	2. Inspect driveplate. Replace if

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		needed.
GRATING OR SCRAPING NOISE PROPORTIONAL TO TRANSMISSION OUTPUT SPEED	1. Driveshaft or rear axle noise.	1. Check driveshaft, center bearing and axle for noise or contact with other components.
	2. Transmission output bearing noise.	2. Replace output bearing and retest.
	3. Internal transmission damage.	3. Remove, disassemble and repair transmission as needed.
HIGH PITCHED WHINE/NOISE RELATED TO ENGINE SPEED	1. Fluid level low.	1. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE</u> .
	2. Transmission in limp-home mode.	2. Check TCM for DTCs. Repair as needed.
	3. Filter plugged.	3. Check TC out pressure, if < 10psi, check for plugged filter. Replace if needed.
	4. Filter damaged or missing.	4. Check for damaged/missing filter or cut/missing o-ring.
	5. Oil pump bushing worn/damaged.	5. Visually inspect for worn or damaged pump bushing. Replace pump assembly if needed.
	6. Oil pump gears worn/ damaged.	6. Inspect for worn or damaged pump gears. Replace pump assembly if needed.
NOISE ONLY IN 1ST OR 5TH GEAR	1. Broken Tab on K1/K2 Thrust bearing.	1. Replace K1/K2 Thrust bearing.
FLARES ON THE 1 - 2 SHIFT	1. Failed F1 ORC. Refer to <u>CLUTCH APPLICATION</u> .	1. Replace F1 ORC, B1 Retainer and K1 Retainer.
	2. Stuck 1-2 / 4-5 valve.	2. Split Electrohydraulic Unit and inspect 1-2/4-5 valves. Remove debris if present. If valve can't be freed replace Electrohydraulic Unit.
BUMPSHIFT ON 2-1 DOWNSHIFT	1. K1 belleville retainer snap ring.	1. K1 Belleville retainer snap rings may become unseated. Disassemble trans and re-seat snap ring. Verify there are no stuck 1-2/4-5 shift valves in the Electrohydraulic unit prior to removing the trans.
		1. Replace Input Shaft Assembly. This issue can be verified by making immediate

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FLARES ON THE 2-3 SHIFT	1. K2 Piston Bottomed Out.	repeated shifts between 2nd and 3rd. If the flare is eliminated on subsequent shifts to 3rd, It is likely that this is the issue.
	2. Failed F2 ORC. Refer to <u>CLUTCH APPLICATION</u> .	2. Replace F2 ORC, Rear Sun Gear and Front Sun Gear
	3. Stuck 2-3 Valves.	3. Split Electrohydraulic Unit and inspect 2-3 valves. Remove debris if present. If valve can't be freed replace Electrohydraulic Unit.
	4. K2 Clutch Slipping.	4. Inspect and if damaged replace K2 Clutch Discs and Seals.
	5. 2-3 Shift Pressure Valve Spring Deformed.	5. It is possible that when the steel cover plate was screwed to the Electrohydraulic Unit, the spring was pinched thus deforming the bore and sticking the valve. Remove the Electrohydraulic Unit and remove the steel plate covering the 2-3 shift pressure valve. If the valve can't be freely removed from the bore, the spring was pinched and the Electrohydraulic Unit requires replacement.
	6. B1 bushing missing.	6. Replace B1 retainer and input shaft.
SLIPS ON 2-3 UPSHIFT	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
	2. Fluid level low.	2. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE</u> .
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 2-3 shift pressure valve or regulator valve.
		5. Disassemble transmission,

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	5. F2 or B2 clutch damaged.	inspect for damaged F2 or B2 clutch. Repair as needed.
FLARE OR NEUTRALS ON THE 3-4 / 4-3 SHIFT	1. Debris sticking the 3-4 Holding Valve	1. Split Electrohydraulic Unit and remove the 3-4 Shift Pressure and 3-4 Holding Valves. Flush the valves and bores with a solvent such as mineral spirits. (Note: Debris can be a very small sliver unnoticeable unless flushing onto filter paper.) Only if the valve can not be freed should the Electrohydraulic Unit be replaced.
	2. Debris Sticking the 3-4 Shift Pressure Valve	2. Split Electrohydraulic Unit and remove the 3-4 Shift Pressure and 3-4 Holding Valves. Flush the valves and bores with a solvent such as mineral spirits. (Note: Debris can be a very small sliver unnoticeable unless flushing onto filter paper.) Only if the valve can not be freed should the Electrohydraulic Unit be replaced.
	3. Two Plastic Check Balls in one pocket.	3. Split the Electrohydraulic Unit and inspect and verify that there is only one plastic check ball in each of the 4 pockets. If there are two in any pocket, remove one and re-assemble.
SLIPS, BANGS INTO GEAR, DELAYED ENGAGEMENT, VENT TUBE LEAK	1. Casting Void in the Bell Housing.	1. Disassemble the transmission, remove the pump and gears from the bell housing. Inspect the pump gear face in the bell housing for a 3/16" diameter void between the pump suction and drainback circuits. If void is present, replace the bell housing.
SLIPS ON 3-4 UPSHIFT	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE</u> .
		2. Check and adjust fluid level.

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	2. Fluid level low.	Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE.</u>
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Valve body malfunction.	4. Check for sticky/stuck 3 - 4 shift pressure valve or regulator valve.
	5. K3 or B2 clutch damaged.	5. Disassemble transmission, inspect for damaged K3 or B2 clutch. Repair as needed.
SLIPS ON 4-5 UPSHIFT	1. Transmission adaptation/calibration.	1. Check for latest level TCM software. Perform the TCM adaptation procedure. Refer to <u>MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE .</u>
	2. Fluid level low.	2. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE.</u>
	3. Filter damaged or missing.	3. Check for damaged/missing filter or cut/missing o-ring.
	4. Electrohydraulic Unit malfunction.	4. Check for sticky/stuck 1 -2/4-5 shift pressure valve or regulator valve.
	5. B1 or K1 clutch damaged.	5. Disassemble transmission, inspect for damaged B1 or K1 clutch. Repair as needed.
IN-GEAR SHUDDER ON HEAVY ACCELERATION	1. Fluid level low.	1. Check and adjust fluid level. Refer to <u>FLUID AND FILTER, STANDARD PROCEDURE.</u>
	2. Filter damaged or missing.	2. Check for damaged/missing filter or cut/missing o-ring.
NO DRIVE ENGAGEMENT FOLLOWING A SHIFT TO N	1. Customer shifting into N at vehicle speeds greater than 25 mph and tipping in on the throttle.	1. Instruct the customer that they should not shift into N at vehicle speeds greater 25 mph.
	2. Shift system malfunction.	2. Inspect shift system for proper adjustment or damage. Check shifter for DTCs. Repair as needed.
REVERSE GEAR POSITION BLOCKED ENGAGEMENT WHEN MOVING SHIFT LEVER FROM D POSITION	1. Customer shifting into R at vehicle speeds greater than 7 mph.	1. Instruct customer that R shifter position is blocked at vehicle speeds greater than 7 mph.

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	2. Shift system malfunction.	2. Inspect shift system for proper adjustment or damage. Check shifter for DTCs. Repair as needed.
NO ENGINE CRANKING IN P OR N	1. Gearshift cable adjustment.	1. Adjust shift cable and retest.
	2. Shift system malfunction.	2. Check shifter DTCs. Inspect shift cable and lever assembly. Adjust and/or replace worn/damaged parts.
	3. Valve body malfunction.	3. Starter lockout contact malfunction. Remove valve body, replace lead frame assembly. Refer to <u>CONTACT, TEMPERATURE SENSOR\PARK-NEUTRAL, OPERATION.</u>
INCORRECT TRANSMISSION TEMPERATURE	1. Defective Trans Temp Sensor.	1. Verify proper temperature sensor operation.
SPEED SENSOR ERROR	1. Loose/Corroded TCM Connector (Both C1 and C2 Connectors).	1. Disconnect, inspect, and reconnect TCM connector. Make sure to check for any pushed out pins.
	2. Unlatched Electrohydraulic Unit connector.	2. Remove the Electrohydraulic Unit connector and inspect for any oil or damaged pins. (Note: There is no Electrohydraulic Unit connector pin in position #5) Re-attach the connector and insure that the locking ring tab is fully latched.
	3. Wires Shorted or Open.	3. Ohm the speed sensor wires to make sure there is not a short to another circuit or ground. Visually inspect for any chafing of the wires. Repair as necessary.
	4. TCM Defective.	4. After checking the wiring and connectors replace the TCM.
FLUID LEAK	1. Leak in area of bell housing.	1. Check bolt torque on internal bell housing bolts. If loose, replace fastener and torque to proper level. If bolts are to proper torque level, check pump outer seal and impeller seal.

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	Replace if needed.
2. Leak in area of control unit (valve body) electrical connector.	2. Check connector for damaged (cut), flattened or missing o-rings. Replace as needed.
3. Leak in area of pan gasket.	3. Check for proper torque on oil pan clamps. Check for mis-positioned or rolled gasket. Repair as needed.
4. Leak in area of park guide plug.	4. Remove park guide plug. Check for damaged (cut) or missing o-ring. If o-ring is in good condition, install new plug.
5. Leak in area of shift lever.	5. Check for damaged shift lever seal or damaged lever. Repair as needed.
6. Leak in area of output flange.	6. Check for worn/damaged slinger seal and output seal. Visually inspect output flange seal surface for damage. Repair as needed.
7. Leak in area of transmission vent.	7. Check fluid level for overfill condition. Adjust as needed. If fluid level is within specification, ride check vehicle. Monitor transmission temperature. If high operating temperatures are observed, fluid may be contaminated or cooling system malfunctioning. Change fluid per service information procedures. If needed, refer to STANDARD PROCEDURE .
8. Leak in area of transmission fill tube.	8. Inspect fill tube cap for proper installation. Inspect fill tube grommet between case and fill tube for leakage. Repair as needed.

FLUID LEAKAGE

TRANSMISSION OIL LEAK

Begin with a thorough inspection of the transmission, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

1. Clean or degrease the transmission with a water soluble solvent only.

2. Add an oil soluble dye (use as recommended by manufacturer) while the powertrain is at ambient temperature. Start the engine and let idle for approximately 15 minutes. Check the oil dip stick (if equipped) to make sure the dye is thoroughly mixed as indicated with a fluorescent color under a black light.
3. Using a black light, inspect the entire transmission for fluorescent dye, practically at the suspected area of oil leak. If the oil leak is found and identified, repair per service information instructions.
4. If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles) and repeat inspection.

TORQUE CONVERTER HOUSING AREA

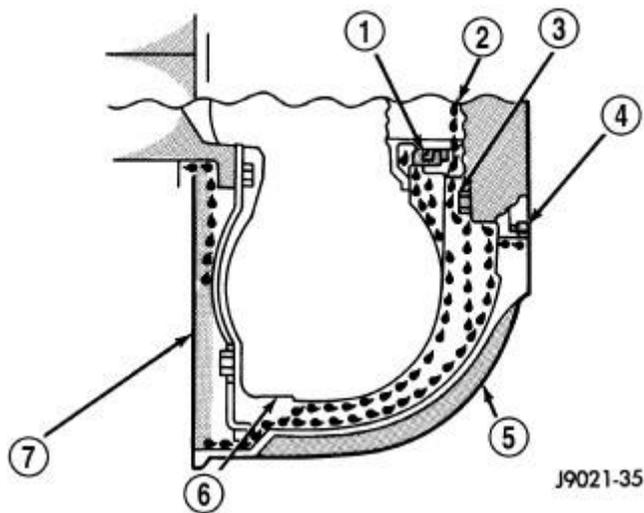


Fig. 29: Converter Housing Leak Paths
 Courtesy of CHRYSLER LLC

1 - PUMP SEAL
2 - PUMP VENT
3 - PUMP BOLT
4 - PUMP GASKET
5 - CONVERTER HOUSING
6 - CONVERTER
7 - REAR MAIN SEAL LEAK

When diagnosing converter housing (5) fluid leaks, three actions must be taken before repair:

1. Verify proper transmission fluid level.
2. Verify that the leak originates from the converter housing area and is transmission fluid.
3. Determine the true source of the leak.

Fluid leakage at or around the torque converter area may originate from an engine oil leak (7). Refer to **Fig. 29**. The area should be examined closely. Factory fill fluid is red and, therefore, can be distinguished from engine oil.

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill, or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair.

Pump seal (1) leaks tend to move along the drive hub and onto the rear of the converter. Refer to **Fig. 29**. Pump o-ring or pump body leaks follow the same path as a seal leak. Pump attaching bolt (3) leaks are generally deposited on the inside of the converter housing (5) and not on the converter itself. Pump seal (1) or gasket (4) leaks usually travel down the inside of the converter housing.

TORQUE CONVERTER LEAKAGE

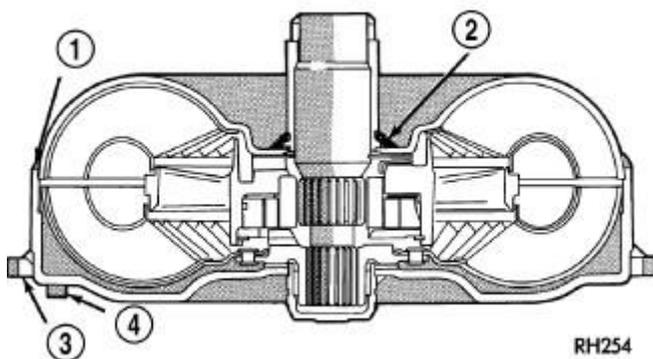


Fig. 30: Converter Leak Points - Typical
 Courtesy of CHRYSLER LLC

1 - OUTSIDE DIAMETER WELD
2 - TORQUE CONVERTER HUB WELD
3 - STARTER RING GEAR
4 - LUG

Possible sources of torque converter leakage are:

- Torque converter weld leaks at the outside diameter weld (1). Refer to **Fig. 30**.
- Torque converter hub weld (2).

STANDARD PROCEDURE

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transmission case and valve body can be repaired by the use of Heli-Coils™, or equivalent. This repair consists of drilling out the worn-out damaged threads. The hole is tapped with a special Heli-Coil tap, or equivalent, and a Heli-Coil insert, or equivalent, is installed into the hole. This brings the hole back to its original thread size.

Heli-Coil™, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

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SPECIFICATIONS

SPECIFICATIONS

GEAR RATIOS

GEAR	RATIO
1ST	3.59:1
2ND	2.19:1
3RD	1.41:1
4TH	1.00:1
5TH	0.83:1
REVERSE	3.16:1
REVERSE (In 4WD Low Range)	1.93:1

SPECIFICATIONS

COMPONENT	METRIC (mm)	INCH (in.)	
Geartrain End-play	0.3-0.5	0.012-0.020	
Geartrain End-play Shim	0.2, 0.3, 0.4, and 0.5	0.008, 0.012, 0.016, 0.020	
Rear Planetary Gear Set End-play	0.15-0.6	0.006-0.024	
Rear Planetary Gear Set Snap-rings	3.0, 3.4, and 3.7	0.118, 0.134, 0.146	
B1 Clutch Clearance - Double Sided Friction Discs	2 Disc	2.3-2.7	0.091-0.106
	3 Disc	2.7-3.1	0.106-0.122
	4 Disc	3.0-3.4	0.118-0.134
B1 Clutch Clearance - Single Sided Friction Discs	4 Disc	2.2-2.6	0.087-0.102
	6 Disc	2.4-2.8	0.095-0.110
	8 Disc	2.6-3.0	0.102-0.118
B1 Clutch Snap-rings	2.6, 2.9, 3.2, 3.5, 3.8, and 4.1	0.102, 0.114, 0.126, 0.138, 0.150, 0.162	
B2 Clutch Clearance	4 Disc	1.9-2.3	0.075-0.091
	5 Disc	2.0-2.4	0.079-0.095
B2 Clutch Snap-rings	2.9, 3.2, 3.5, 3.8, and 4.1	0.114, 0.126, 0.138, 0.150, 0.162	
B3 Clutch Clearance	1.0-1.4	0.039-0.055	
B3 Clutch Snap-rings	3.2, 3.5, 3.8, 4.1, 4.4, and 4.7	0.126, 0.138, 0.150, 0.162, 0.173, 0.185	
K1 Clutch Clearance - Double Sided Friction Discs	3 Disc	2.7-3.1	0.106-0.122
	4 Disc	3.0-3.4	0.118-0.134
	5 Disc	3.3-3.7	0.130-0.146
	6 Disc	3.6-4.0	0.142-0.158
K1 Clutch Clearance - Single Sided Friction	6 Disc	2.4-2.8	0.095-0.110
	8 Disc	2.6-3.0	0.102-0.118

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Discs	10 Disc	2.8-3.2	0.110-0.126
	12 Disc	2.9-3.3	0.114-0.130
K1 Clutch Snap-rings		2.6, 2.9, 3.2, 3.5, 3.8, and 4.1	0.102, 0.114, 0.126, 0.138, 0.150, 0.162
K2 Clutch Clearance	3 Disc	2.3-2.7	0.091-0.106
	4 Disc	2.4-2.8	0.095-0.110
	5 Disc	2.5-2.9	0.099-0.114
	6 Disc	2.7-3.1	0.106-0.122
K2 Clutch Snap-rings		2.3, 2.6, 2.9, 3.2, 3.5, and 3.8	0.091, 0.102, 0.114, 0.126, 0.138, 0.150
K3 Clutch Clearance - Double Sided Friction Discs	3 Disc	2.3-2.7	0.091-0.106
	4 Disc	2.4-2.8	0.095-0.110
	5 Disc	2.5-2.9	0.099-0.114
K3 Clutch Clearance - Single Sided Friction Discs	6 Disc	2.3-2.7	0.091-0.106
	8 Disc	2.4-2.8	0.095-0.110
	10 Disc	2.5-2.9	0.099-0.114
K3 Clutch Snap-rings		2.0, 2.3, 2.6, 2.9, 3.2, and 3.5	0.079, 0.091, 0.102, 0.114, 0.126, 0.138

TORQUE SPECIFICATIONS

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Bolt, B2 Clutch Carrier	16	-	141
Bolt, B1 Carrier to Converter Housing	10	-	89
Bolt, Oil Pump	20	-	177
Nut, Propeller Flange	200	148	-
Nut, 4X4 Adapter Shaft	200	147.5	-
Bolt, Electrohydraulic Unit	8	-	71
Bolt, Transmission Housing to Converter Housing	20	-	177
Bolts, 4X4 Adapter Housing	20	-	177
Bolts, Oil Pan	8	-	71
Screws, Valve Body/Housing Side Cover	4	-	35
Bolt, Shift Plate	8	-	71
Bolt, Solenoid Leaf Spring	8	-	71
Nut, Shifter Mechanism to Floor Pan	12	-	105

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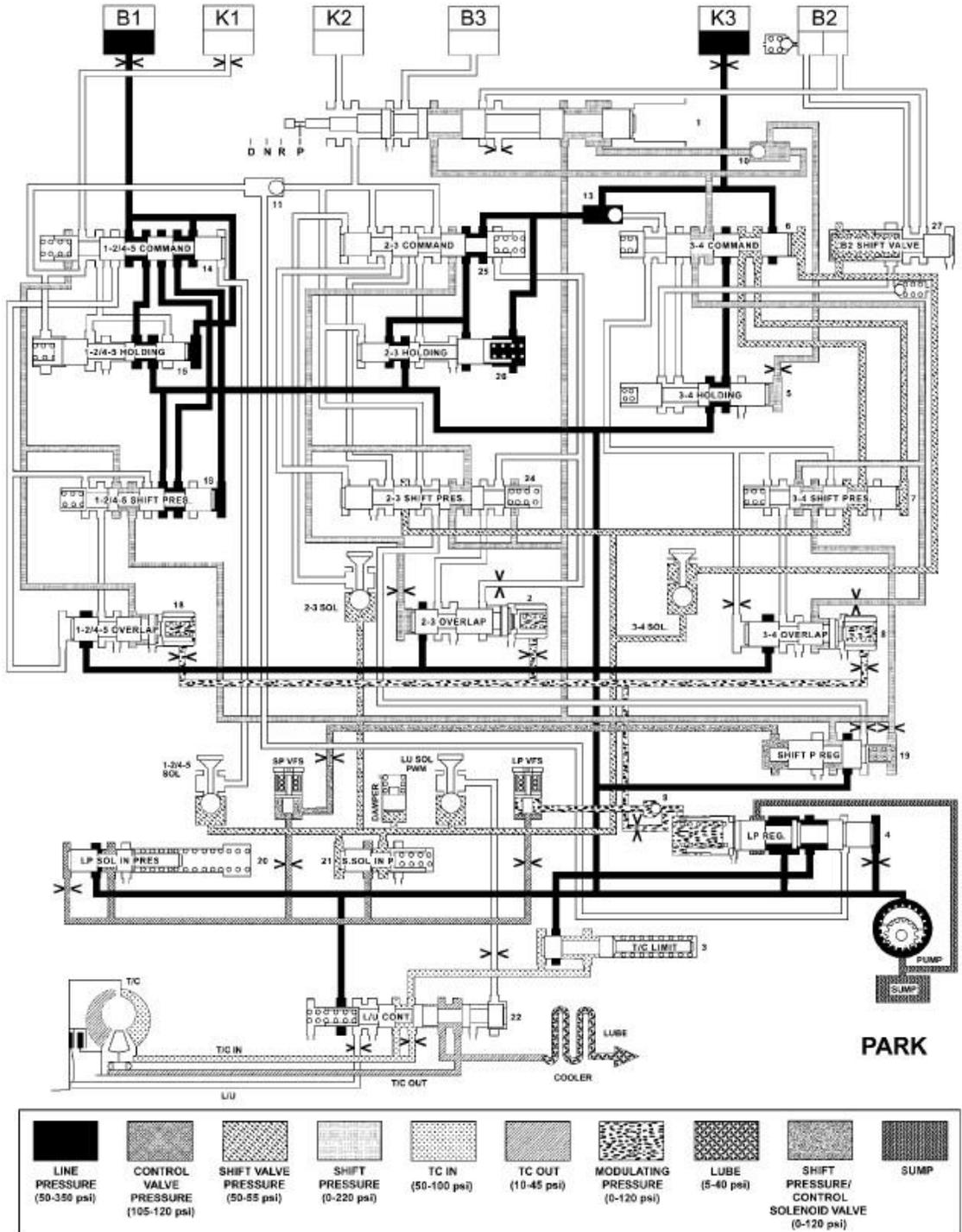
Bolt, Adapter Plug	2.5	-	22
Bolt, Transmission to Engine	39	29	-
Bolt, Crossmember to Frame	68	50	-
Bolt, Rear Support to Transmission	47	39	-
Bolt, Clevis Bracket to Crossmember	47	39	-
Bolt, Clevis Bracket to Rear Support	68	50	-
Bolt, Torque Converter	42	31	-

NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
2-3 Holding	18.8 - 19.6 mm (0.74 - 0.77 in.)	12
T/C Clutch Damper	37.5 - 38.5 mm (1.48 - 1.51 in.)	19.5
1-2 / 4-5 Overlap	20.95 - 21.65 mm (0.82 - 0.85 in.)	14.5
Shift Pressure Regulator	22.4 - 23.6 mm (0.88 - 0.93 in.)	14.5
Control Valve Pressure Regulator	79.2 - 82.4 mm (3.12 - 3.24 in.)	29
Shift Solenoid Pressure Regulating Valve	32.6 - 34.4 mm (1.28 - 1.35 in.)	15.5
T/C Clutch (LU) Regulator	22.8 - 23.6 mm (0.90 - 0.93 in.)	18.5
B2 Shift Valve	25.8 - 27.0 mm (1.01 - 1.06 in.)	16.5
3/4 Over Lap	21.0 - 20.4 mm (0.83 - 0.80 in.)	13
3-4 Holding, 1-2 / 4-5 Holding, 1-2 / 4-5 Shift Pressure	21.1 - 22.5 mm (0.83 - 0.88 in.)	14
3-4 Command, 3-4 Shift Pressure, 1-2 / 4-5 Command, 2-3 Shift Pressure, 2-3 Command	23.9 - 25.3 mm (0.94 - 1.00 in.)	11.5
Lubricating Pressure Regulating Valve	64.8 - 68.2 mm (2.55 - 2.68 in.)	24
2-3 Overlap	16.9 - 18.7 mm (0.66 - 0.74 in.)	13
Line Pressure Regulator	43.8 - 46.2 mm (1.72 - 1.82 in.)	13.5

SCHEMATICS AND DIAGRAMS

SCHEMATICS AND DIAGRAMS

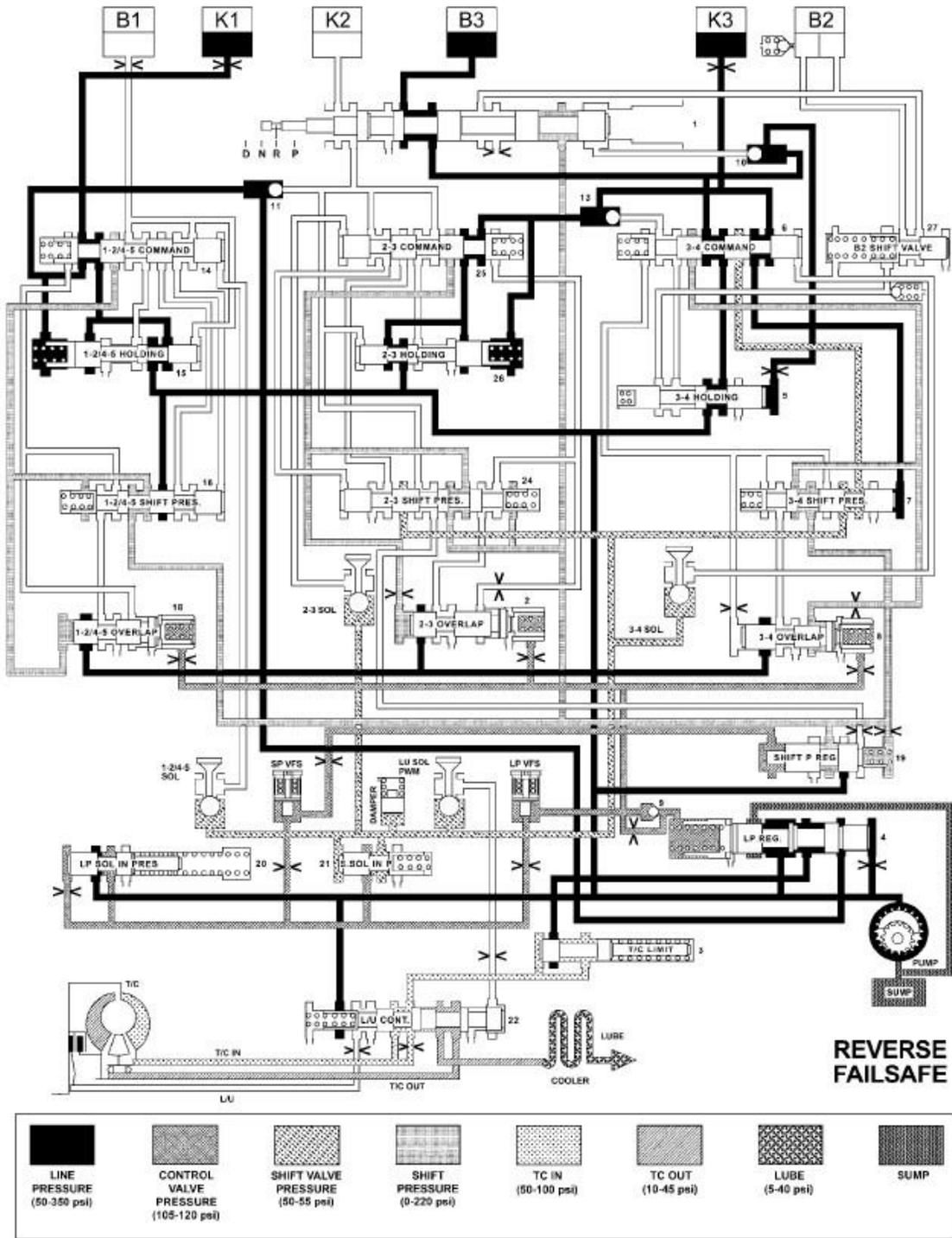


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Fig. 31: Hydraulic Flow In Park
 Courtesy of CHRYSLER LLC

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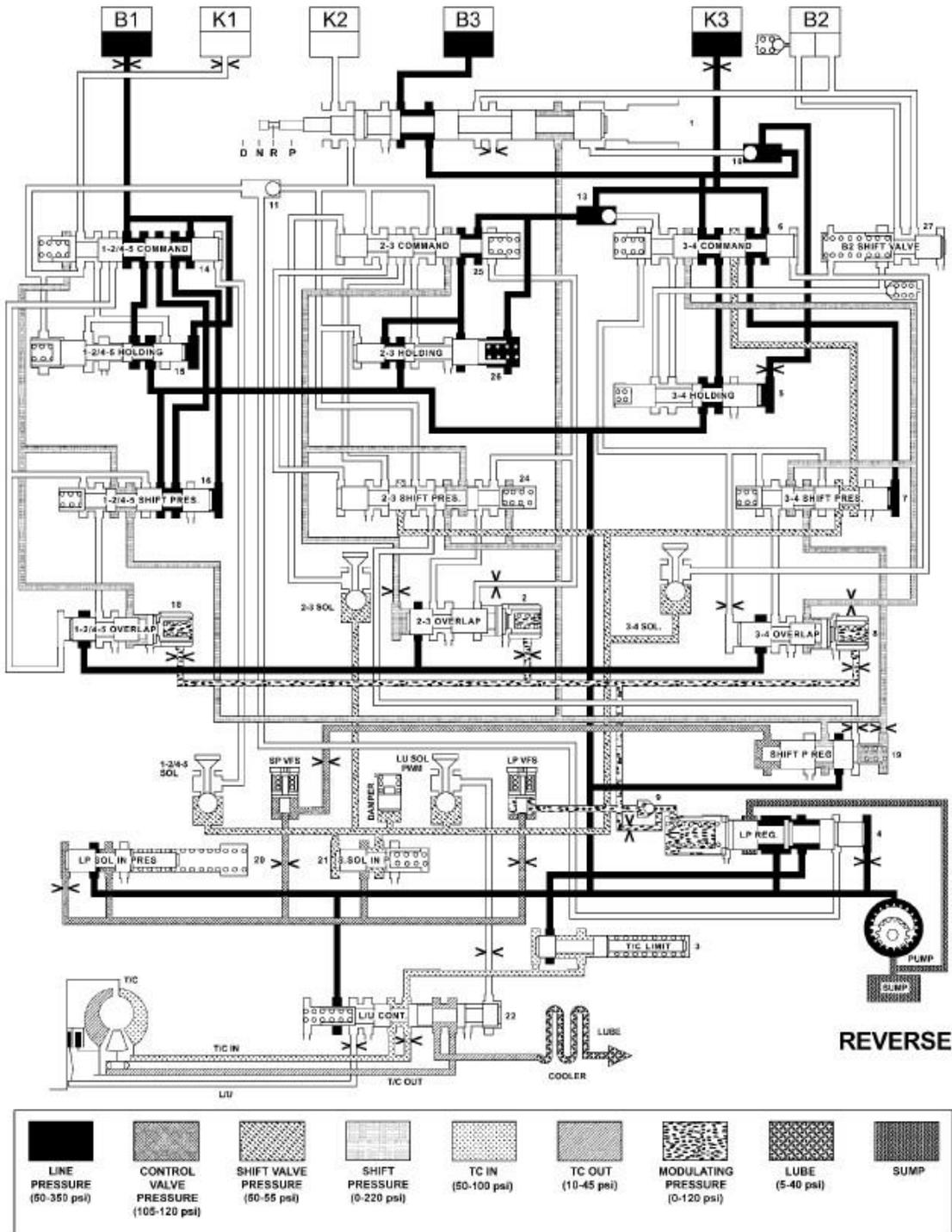
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Fig. 32: Hydraulic Flow In Reverse - Fail-safe
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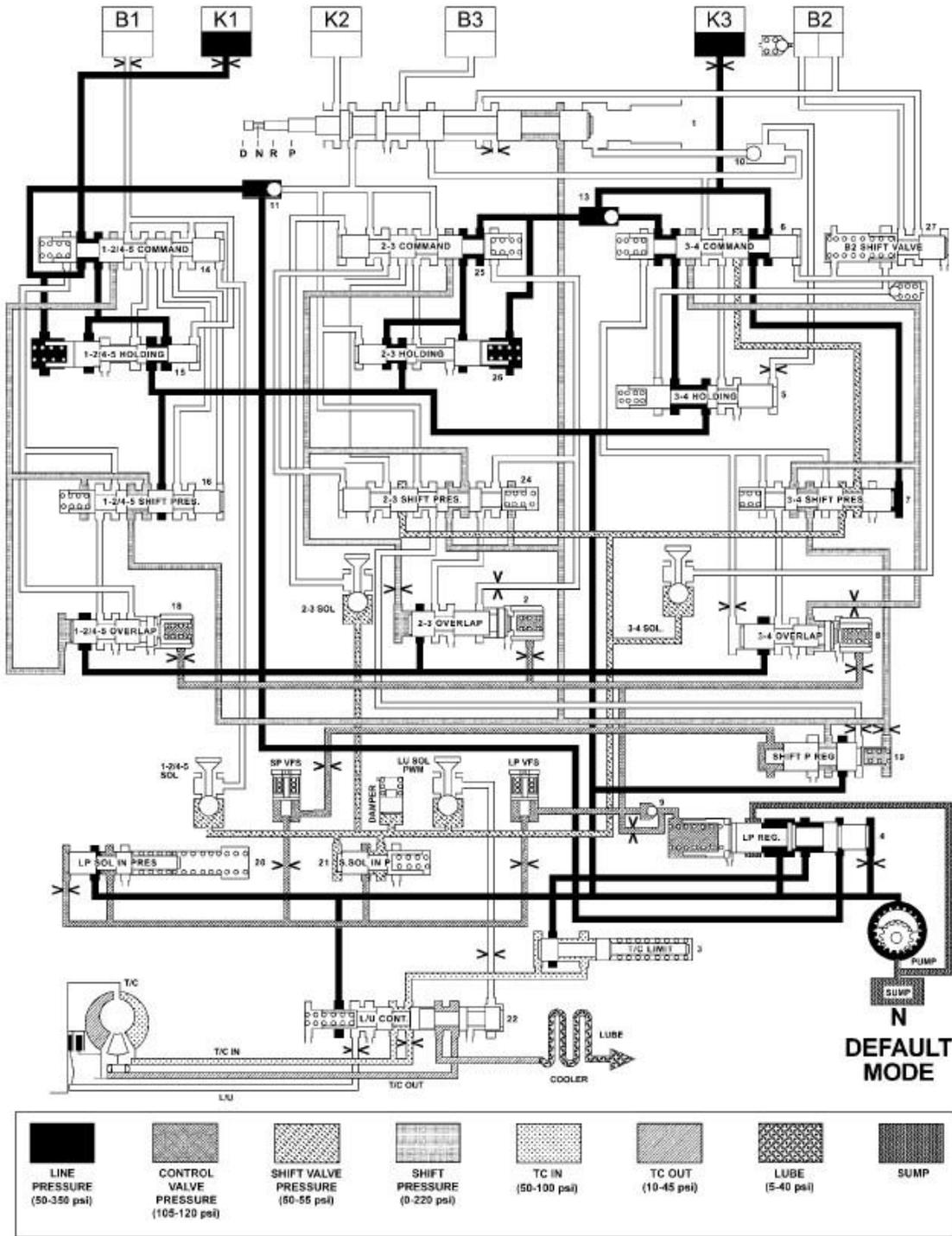
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Fig. 33: Hydraulic Flow In Reverse
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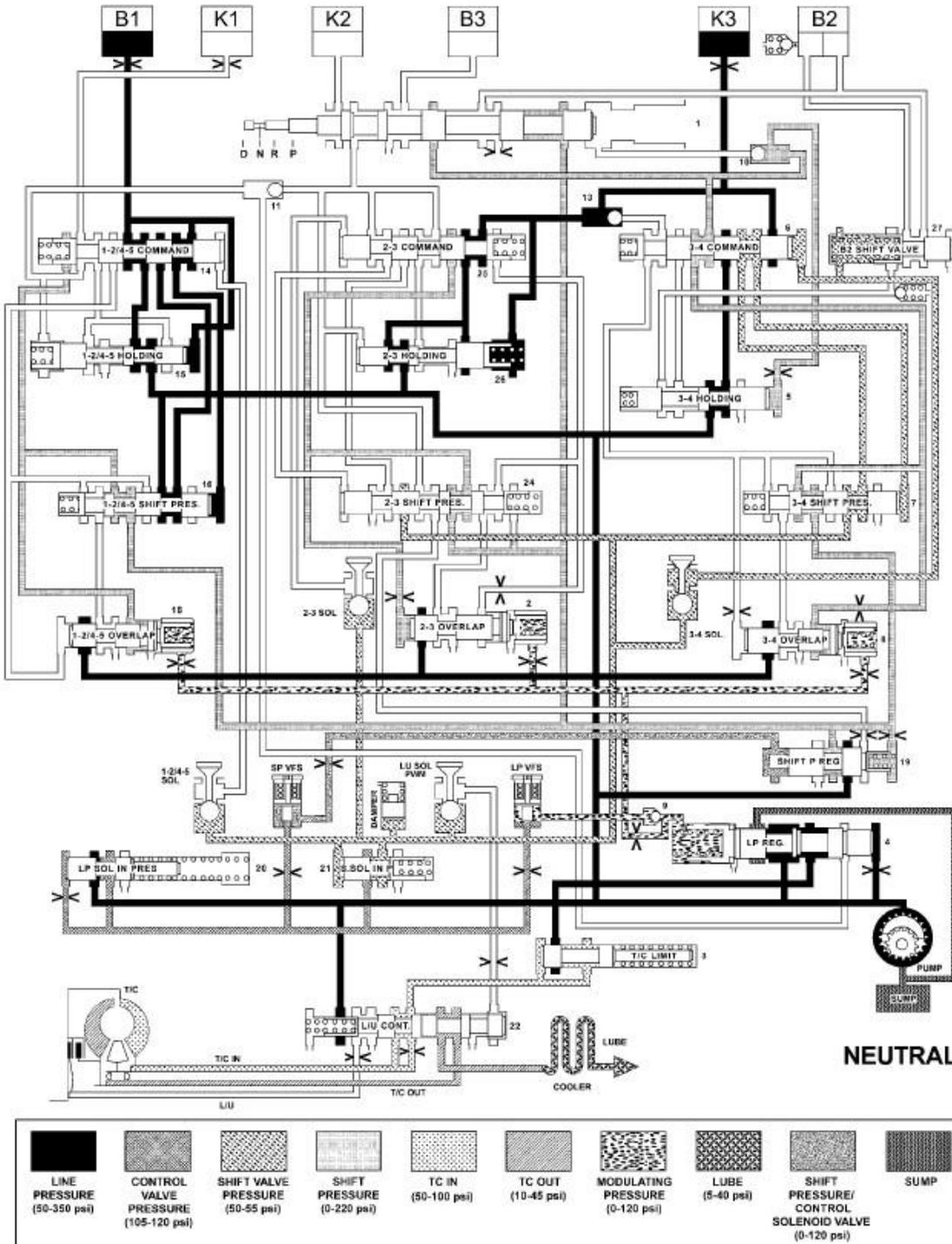
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Fig. 34: Hydraulic Flow In Neutral - Default
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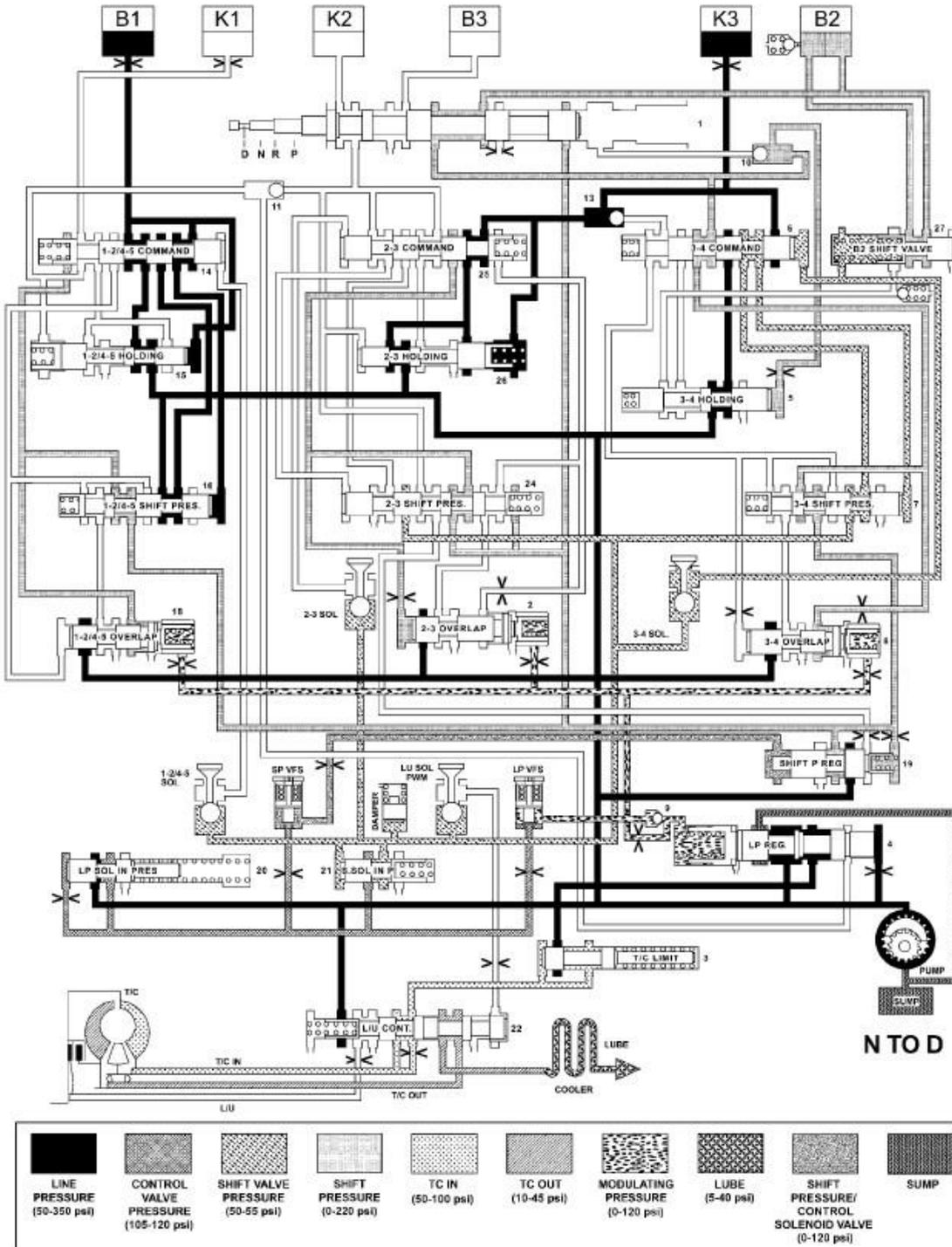
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Fig. 35: Hydraulic Flow In Neutral
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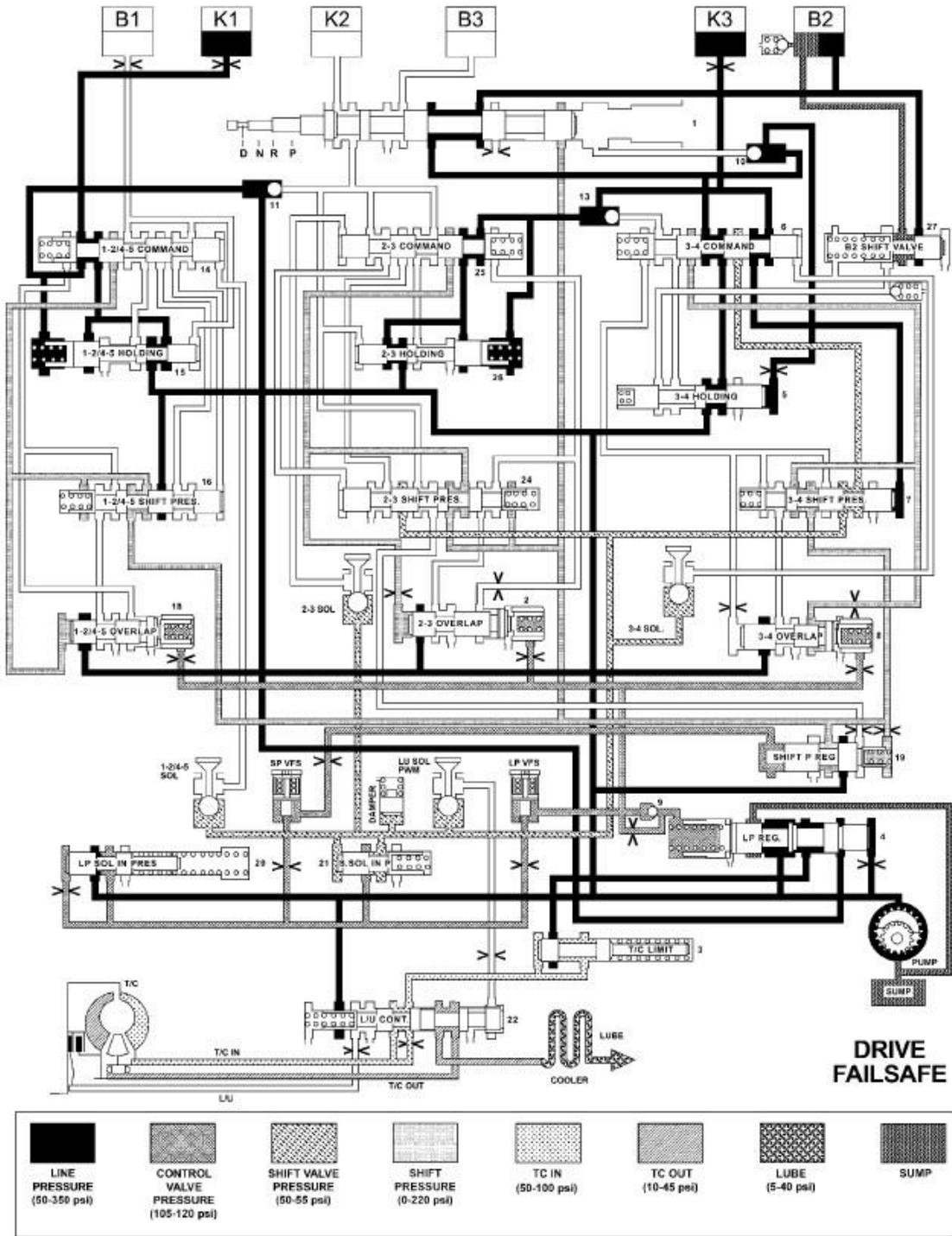
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Fig. 36: Hydraulic Flow In Neutral To Drive Transition
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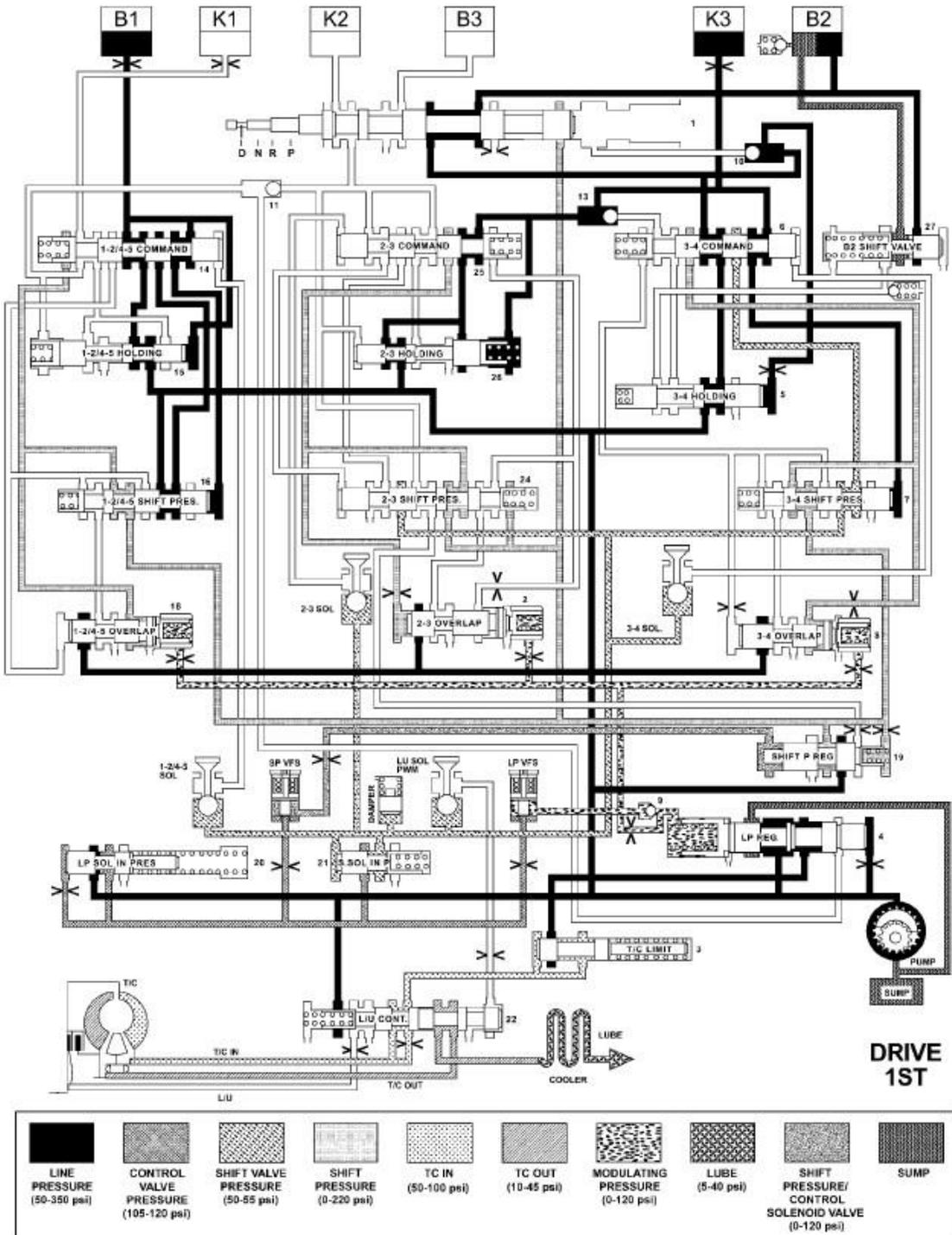
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Fig. 37: Hydraulic Flow In Drive - Fail-safe
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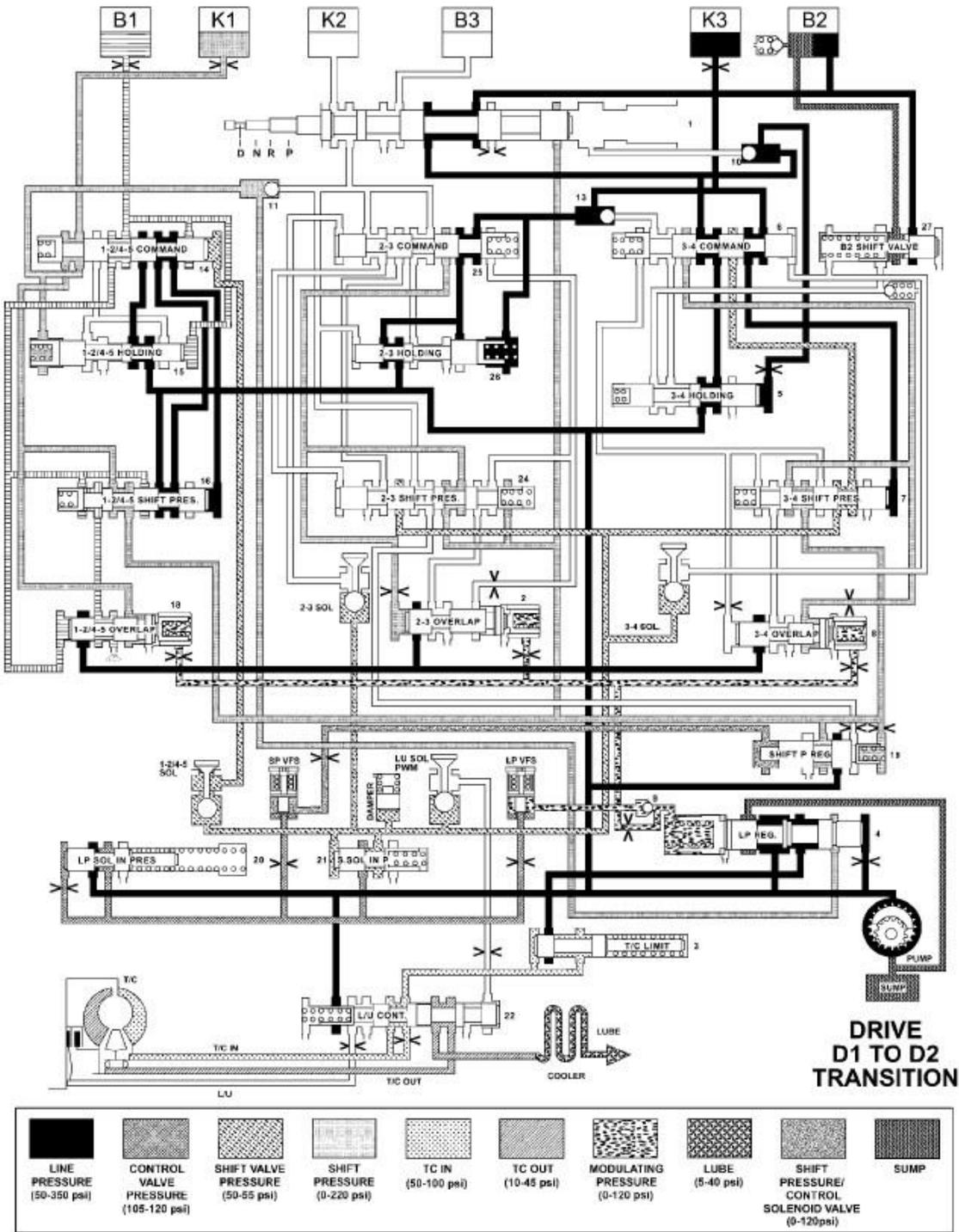
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Fig. 38: Hydraulic Flow In Drive - First Gear
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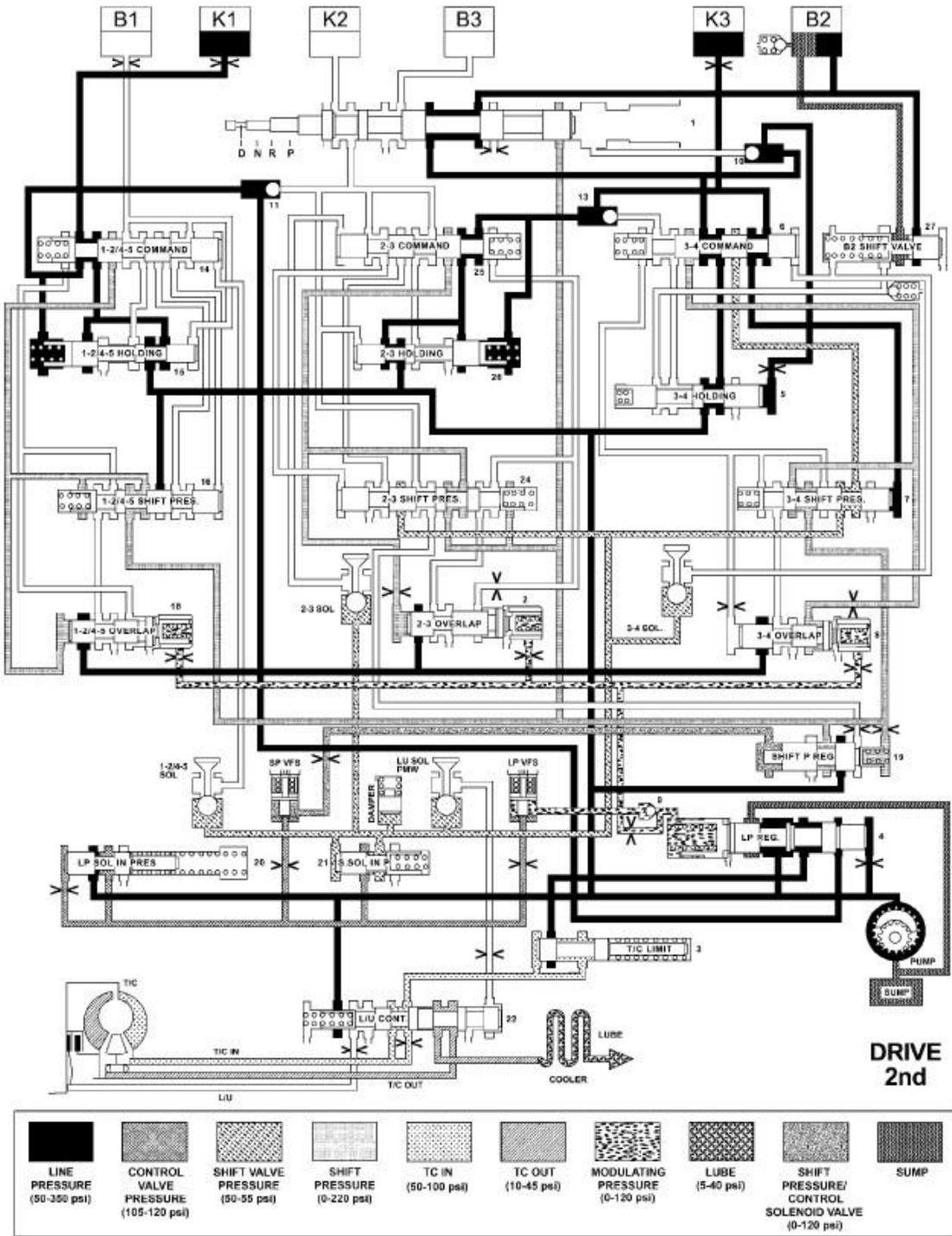


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Fig. 39: Hydraulic Flow In Drive - First To Second Gear Transition
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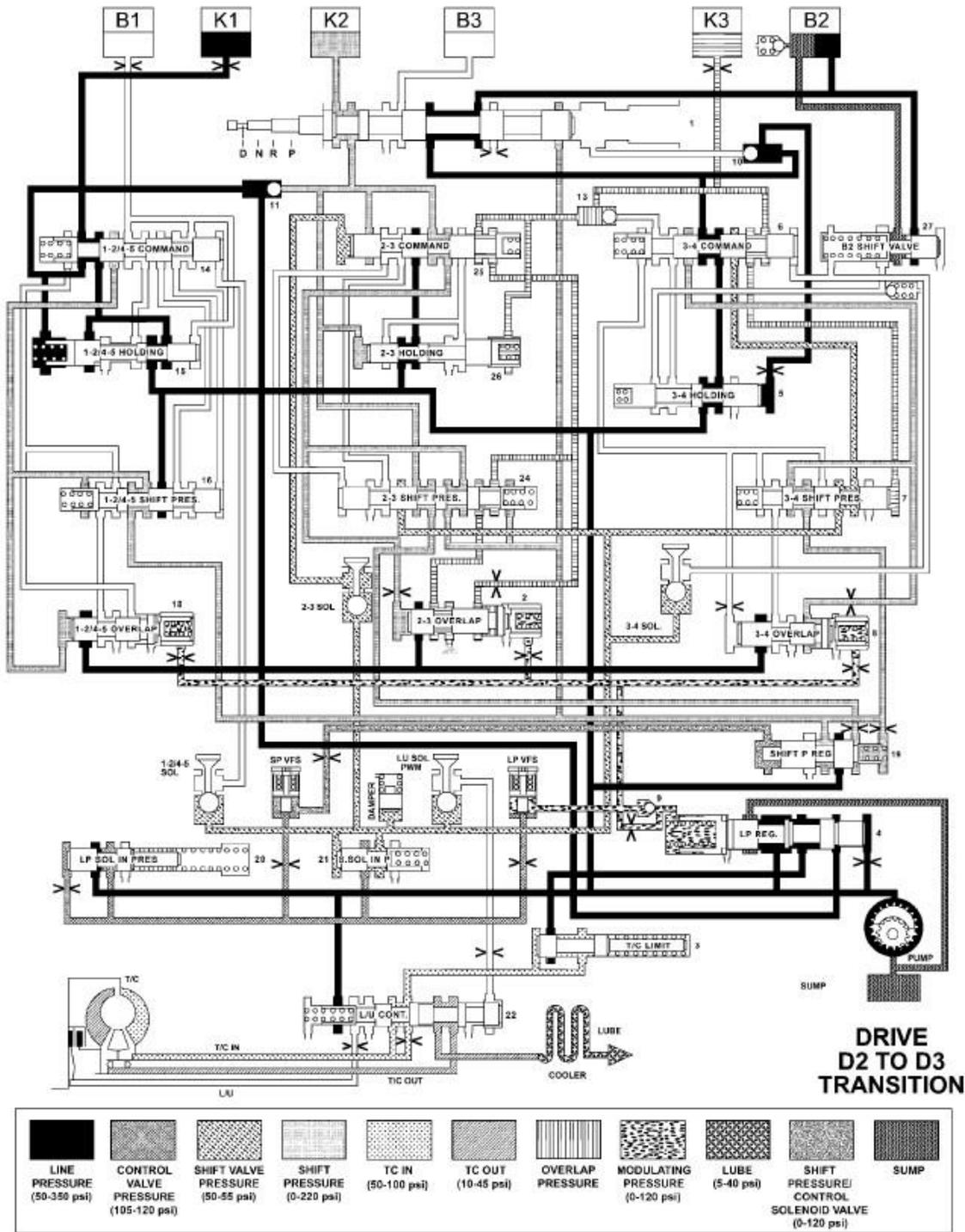
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Fig. 40: Hydraulic Flow In Drive - Second Gear
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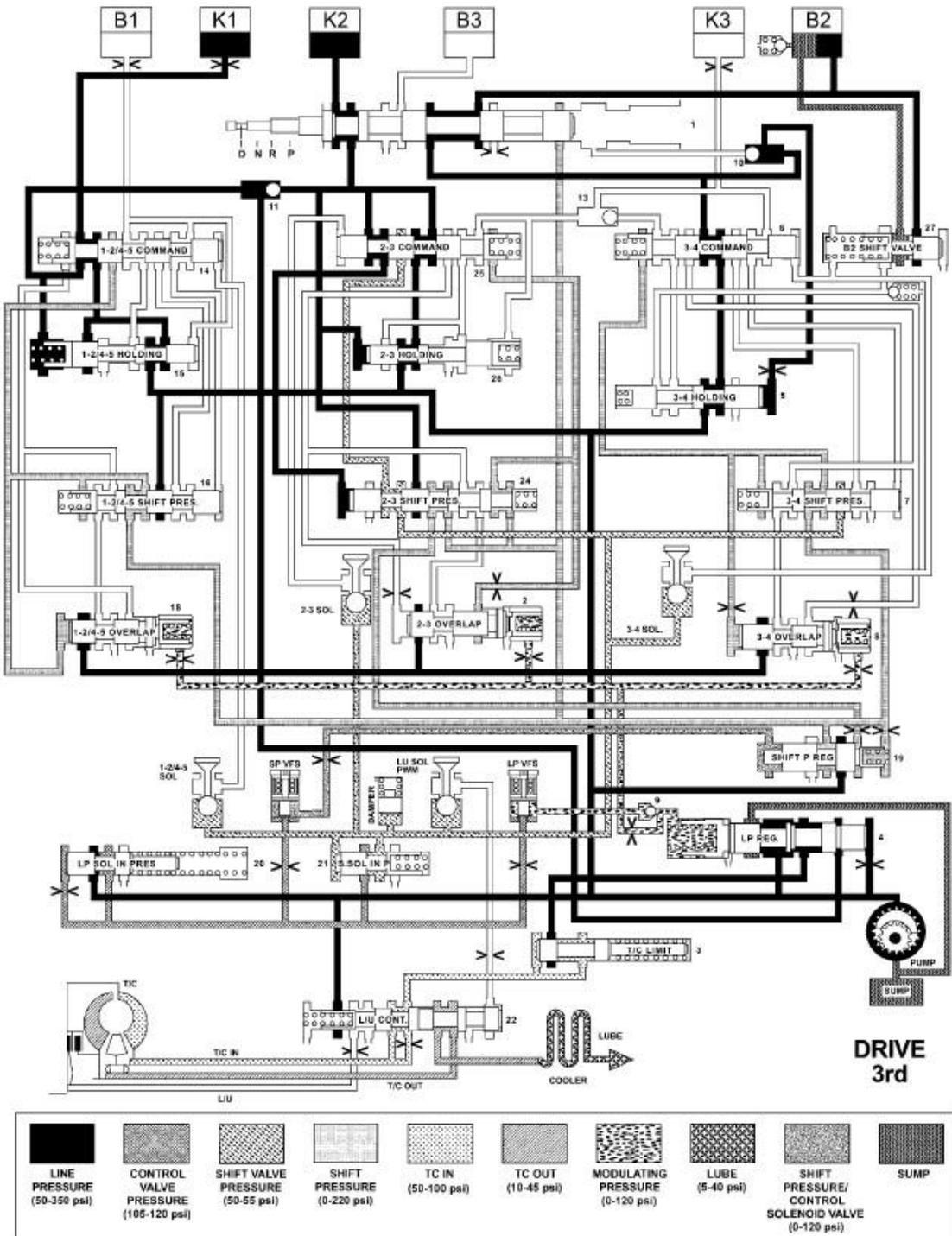
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Fig. 41: Hydraulic Flow In Drive - Second To Third Gear Transition
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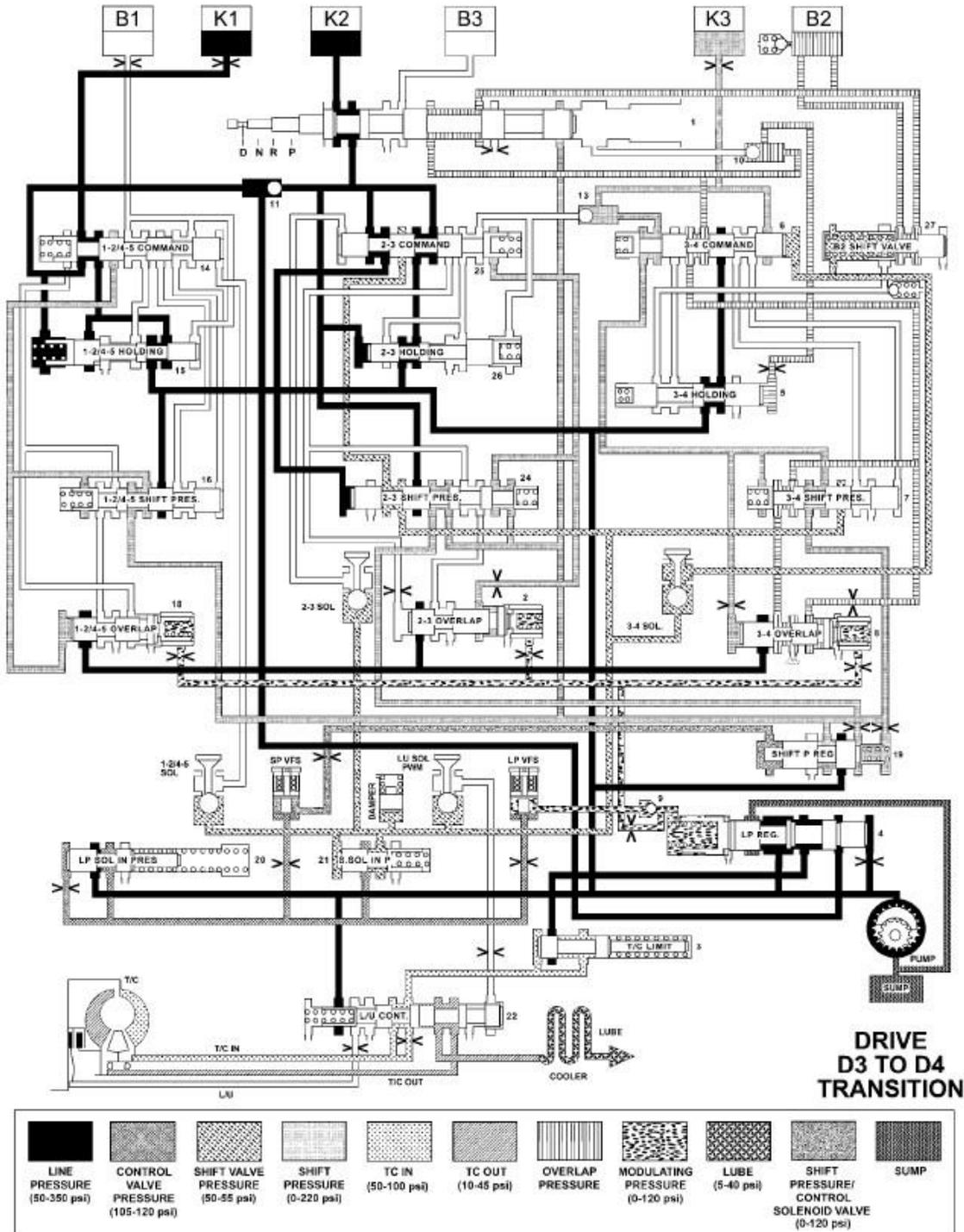
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Fig. 42: Hydraulic Flow In Drive - Third Gear
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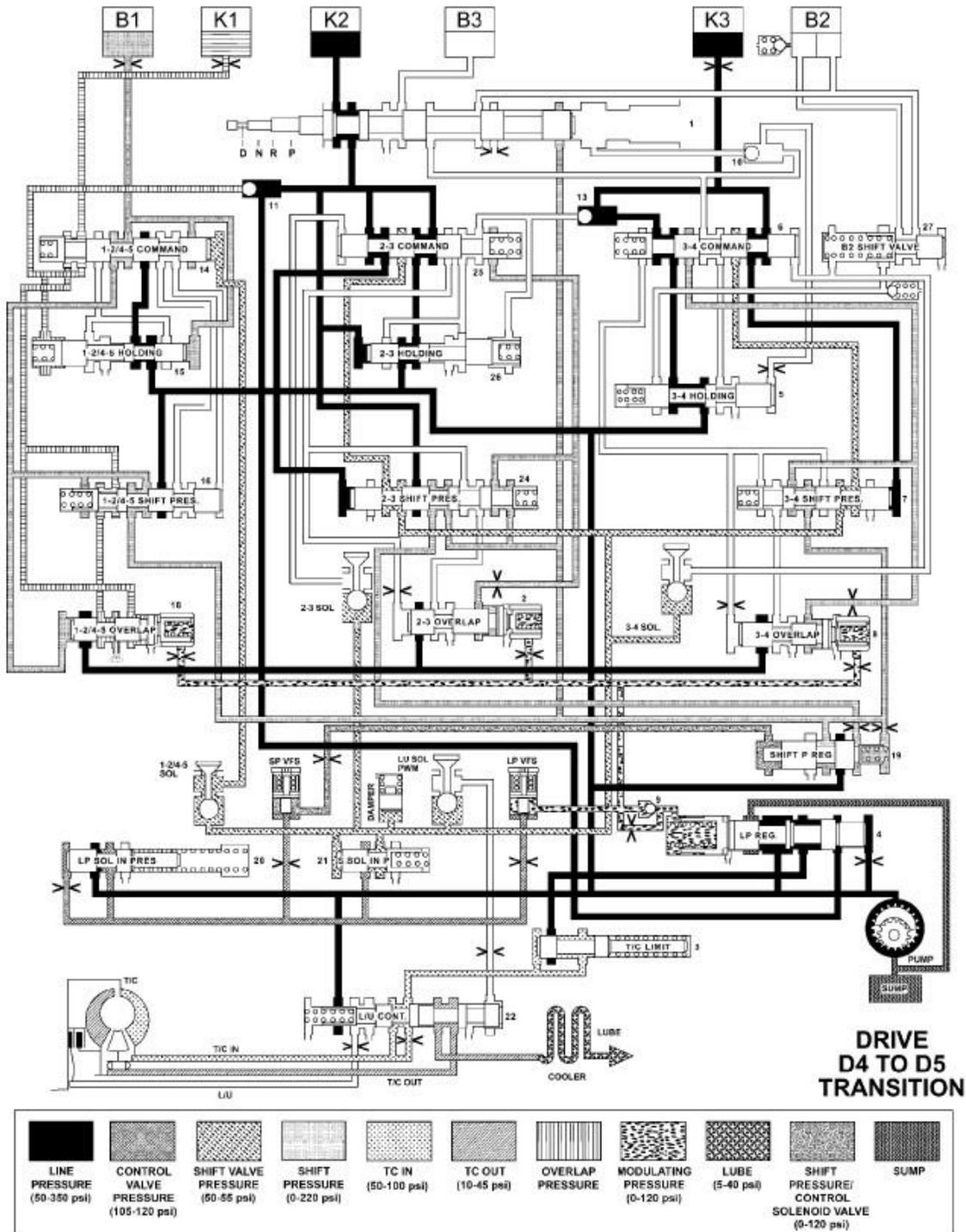
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Fig. 43: Hydraulic Flow In Drive - Third To Fourth Gear Transition
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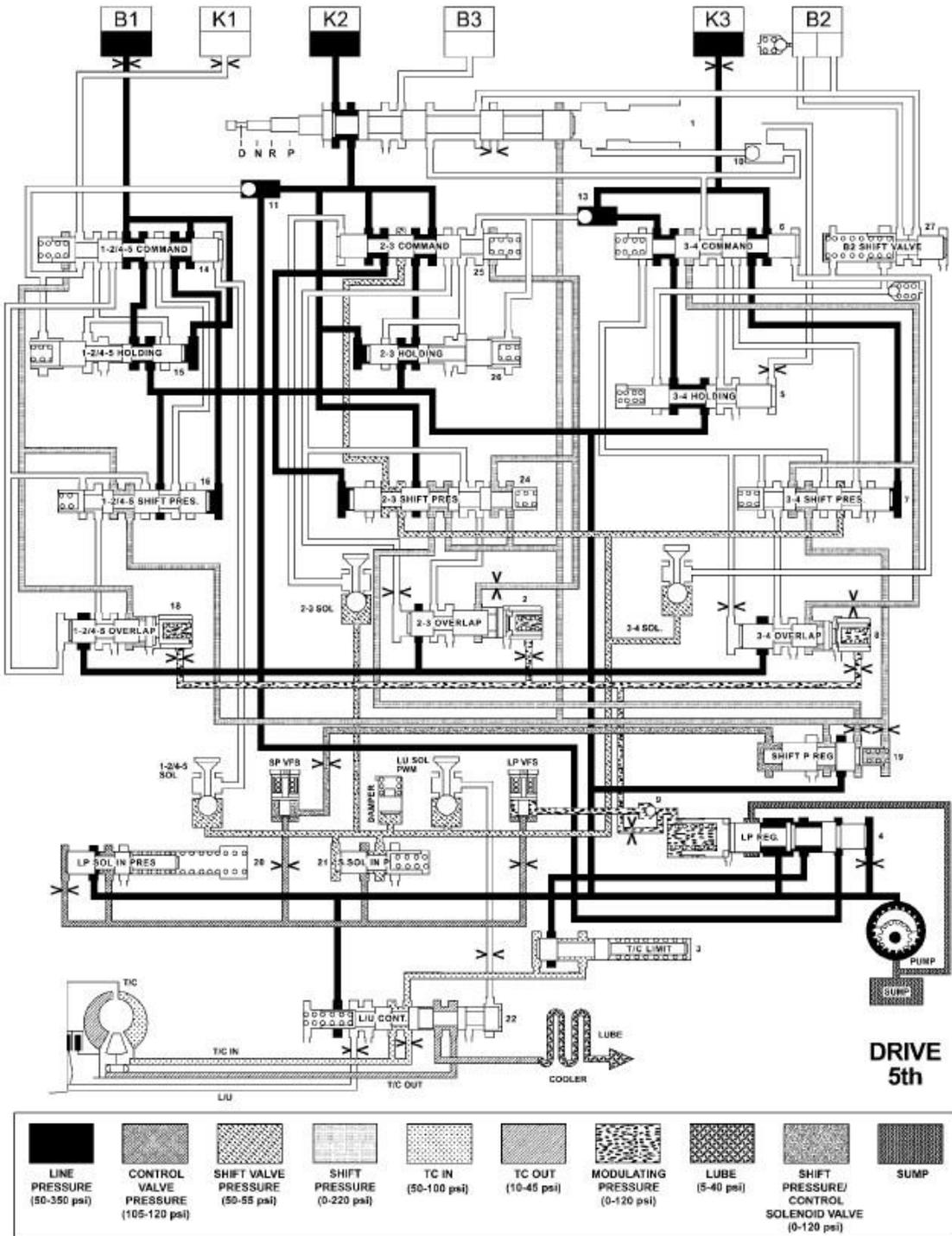
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Fig. 45: Hydraulic Flow In Drive - Fourth To Fifth Gear Transition
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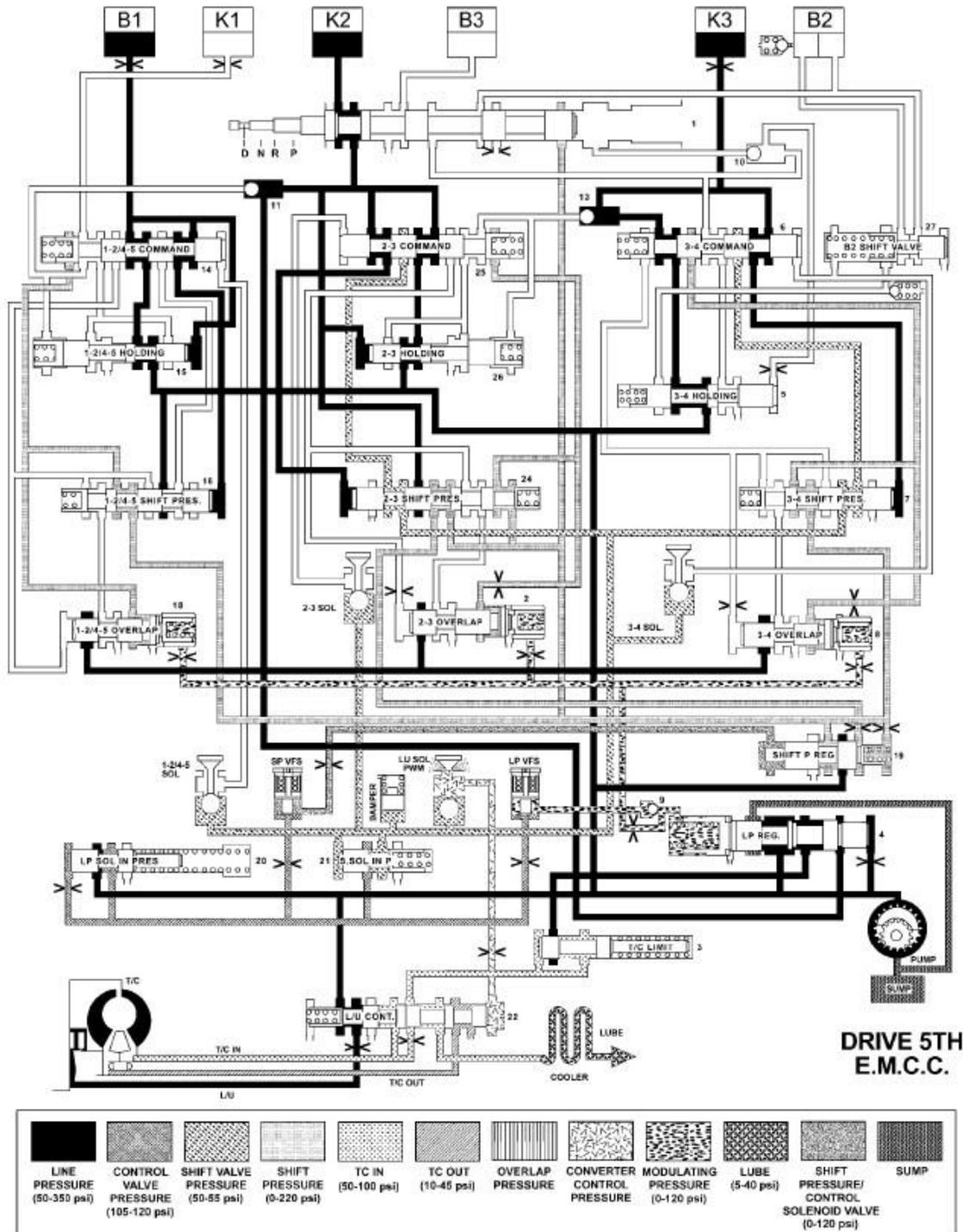
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Fig. 46: Hydraulic Flow In Drive - Fifth Gear
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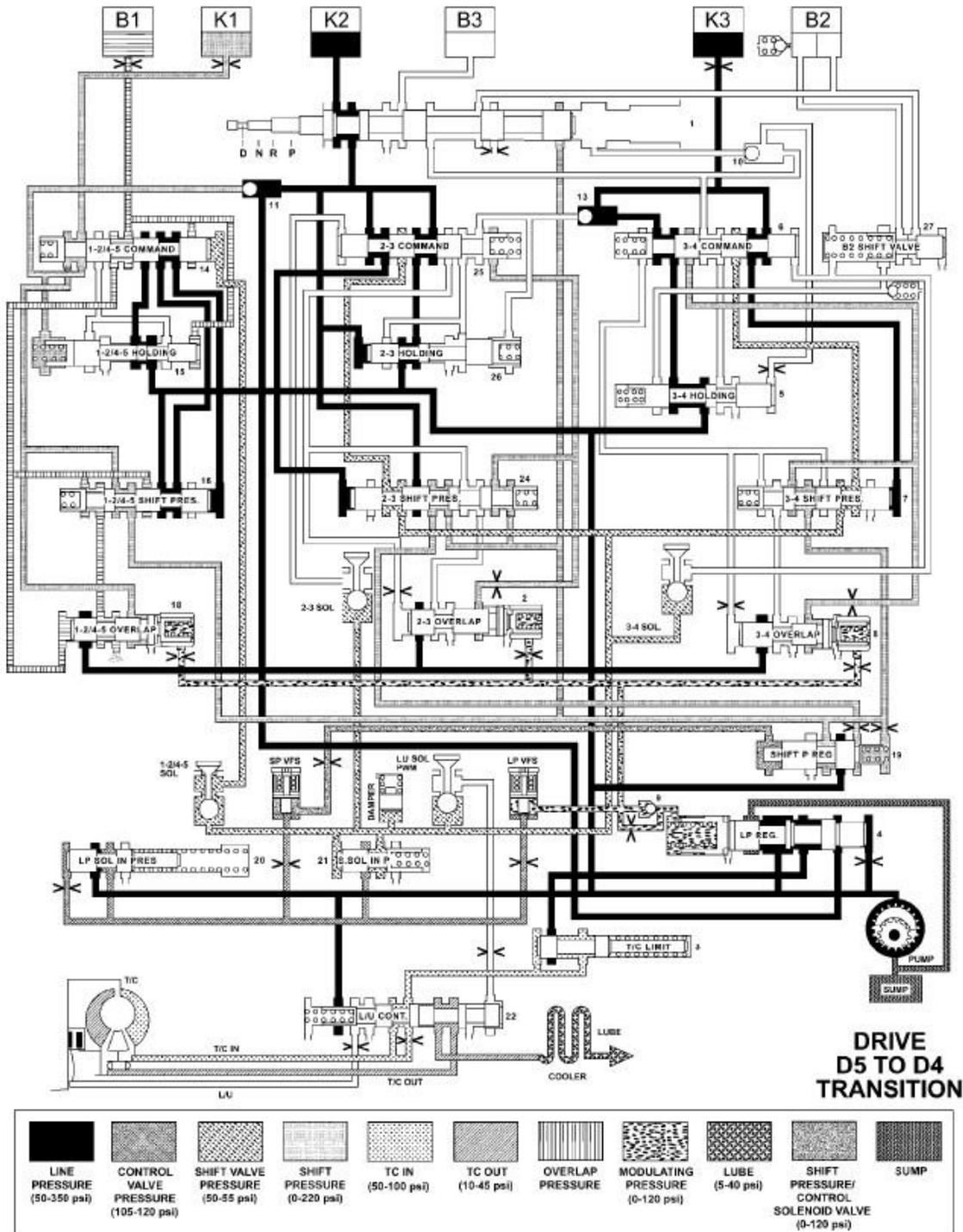
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Fig. 47: Hydraulic Flow In Drive - Fifth Gear - EMCC
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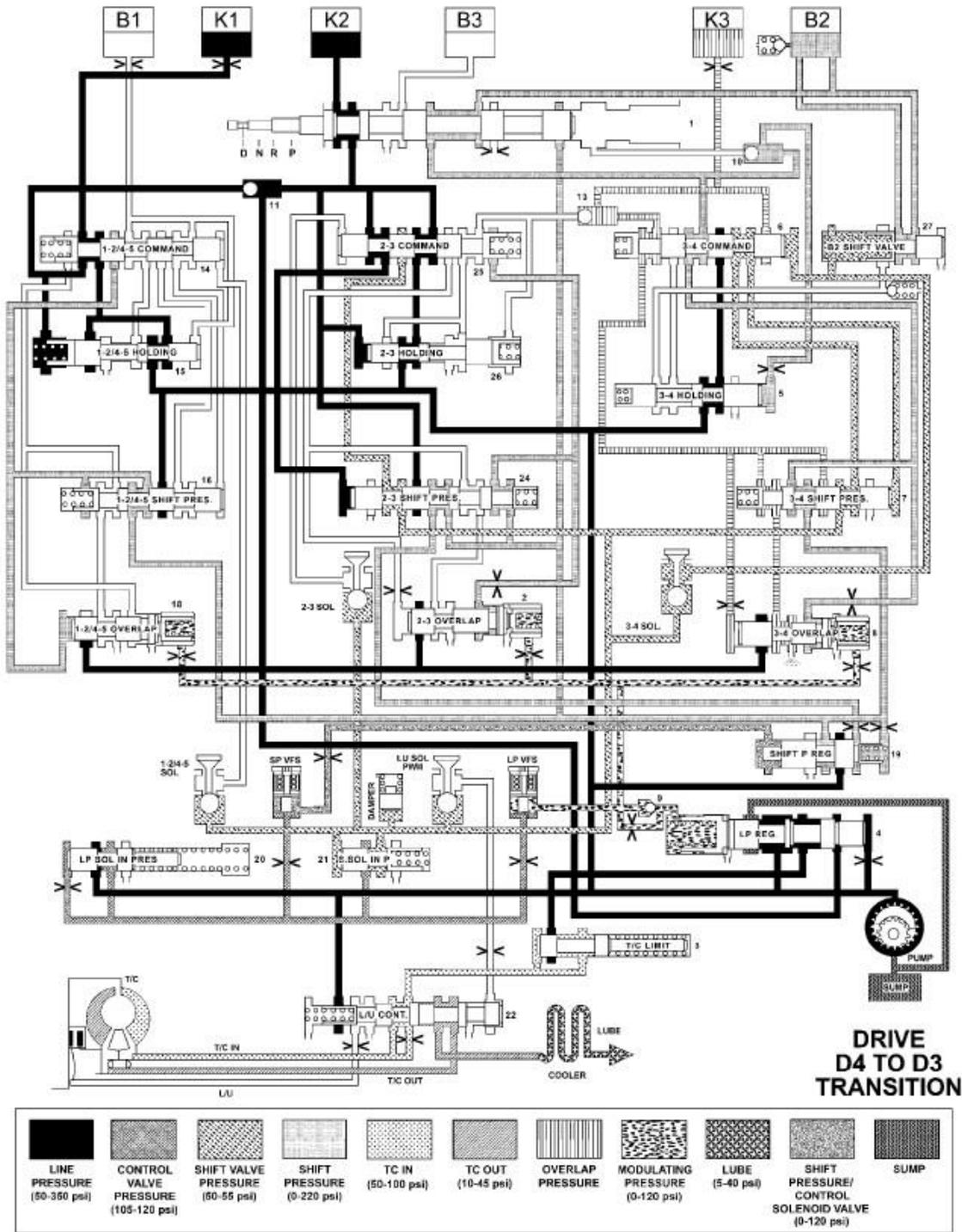
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Fig. 48: Hydraulic Flow In Drive - Fifth To Fourth Gear Transition
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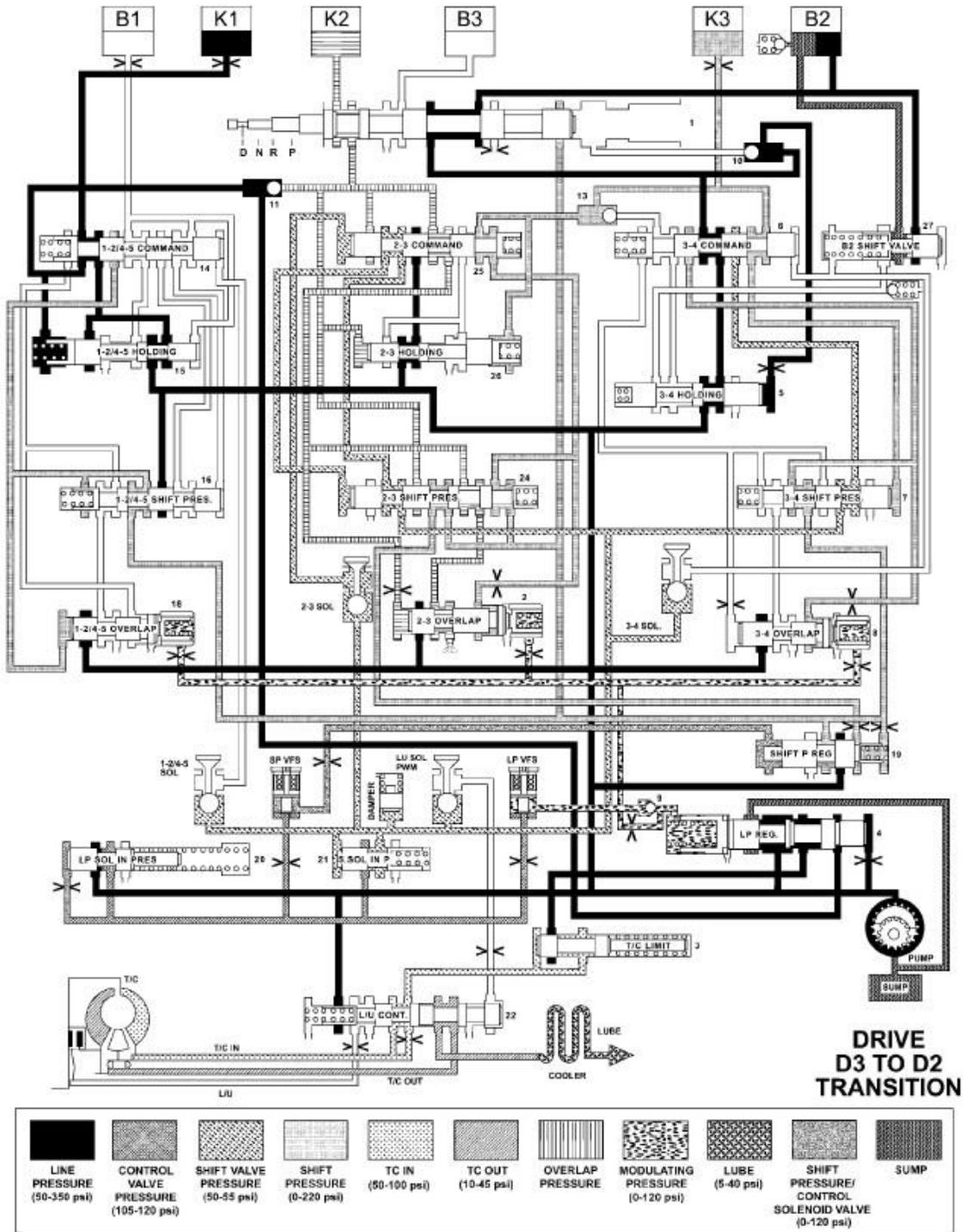


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Fig. 49: Hydraulic Flow In Drive - Fourth To Third Gear Transition
 Courtesy of CHRYSLER LLC

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee



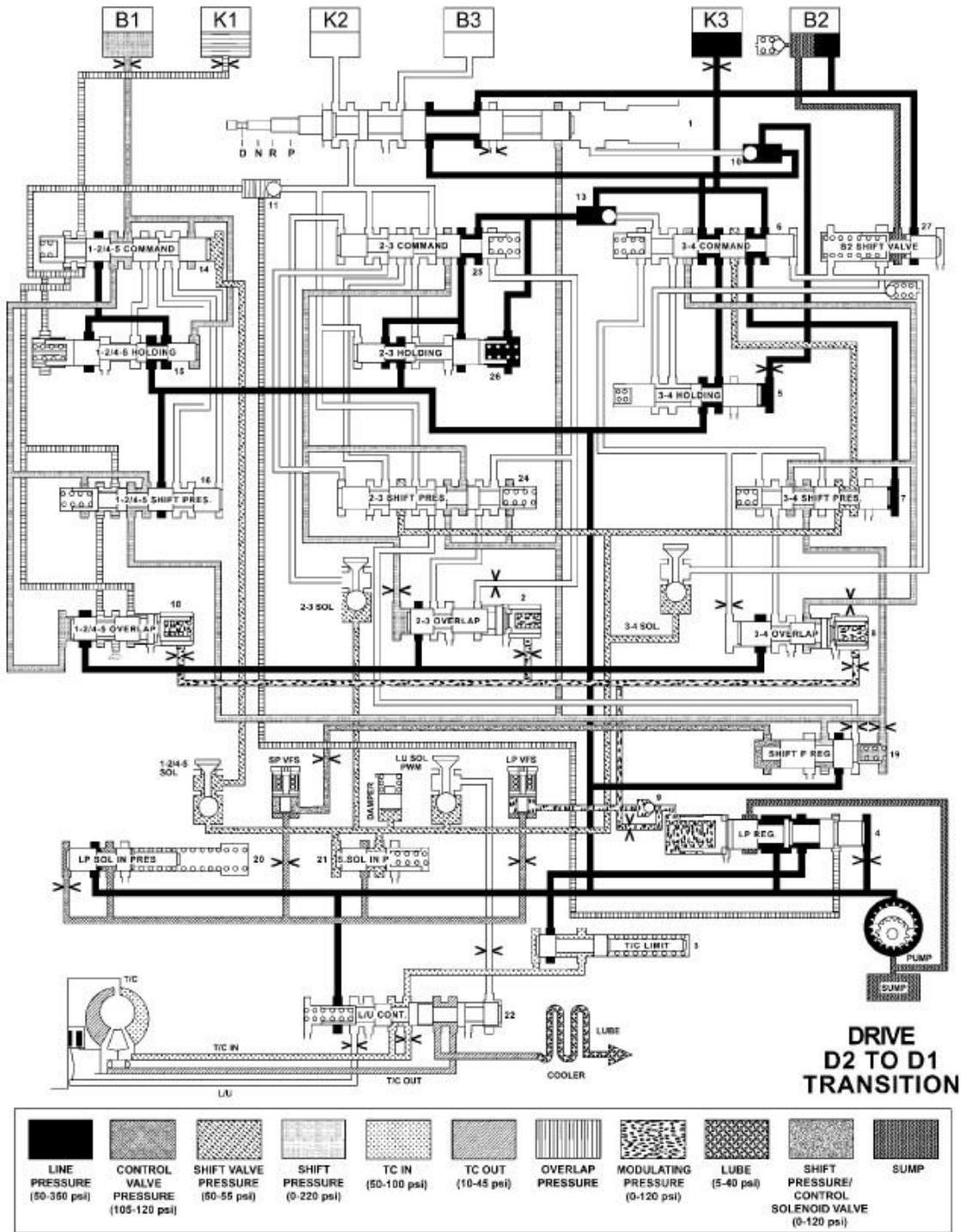
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Fig. 50: Hydraulic Flow In Drive - Third To Second Gear Transition
 Courtesy of CHRYSLER LLC

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2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee



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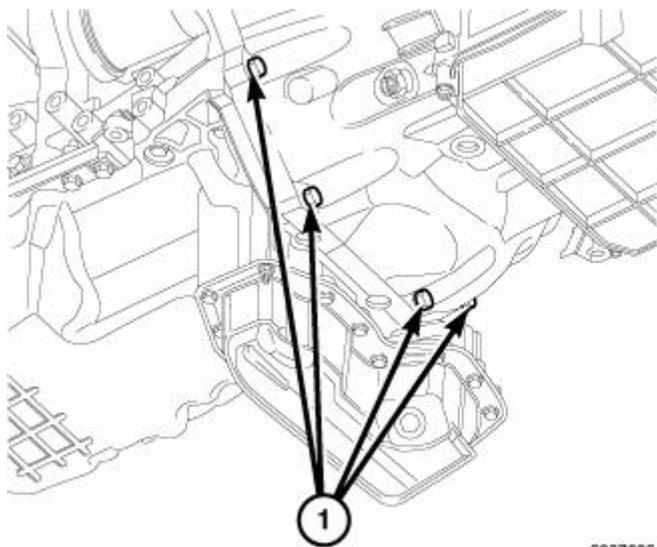
Fig. 51: Hydraulic Flow In Drive - Second To First Gear Transition
 Courtesy of CHRYSLER LLC

REMOVAL

REMOVAL

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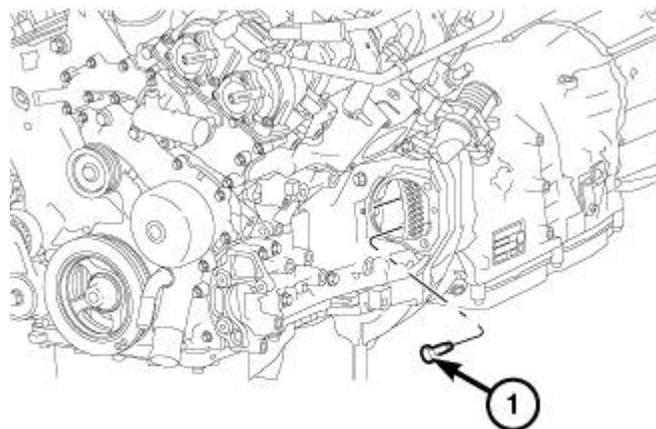
NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool. Refer to **MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE** .



2887609

Fig. 52: Identifying Lower Bolts
Courtesy of CHRYSLER LLC

1. Disconnect the negative battery cable.
2. Raise and support the vehicle.
3. Remove the propeller shafts. Refer to **SHAFT, DRIVE, FRONT, REMOVAL** and **SHAFT, DRIVE, REAR, REMOVAL** .
4. Remove the bolts holding the starter motor to the transmission. Refer to **STARTER, REMOVAL** .
5. Remove the starter from the transmission starter pocket and safely relocate.
6. Remove the lower bolts (1) holding the transmission and engine.

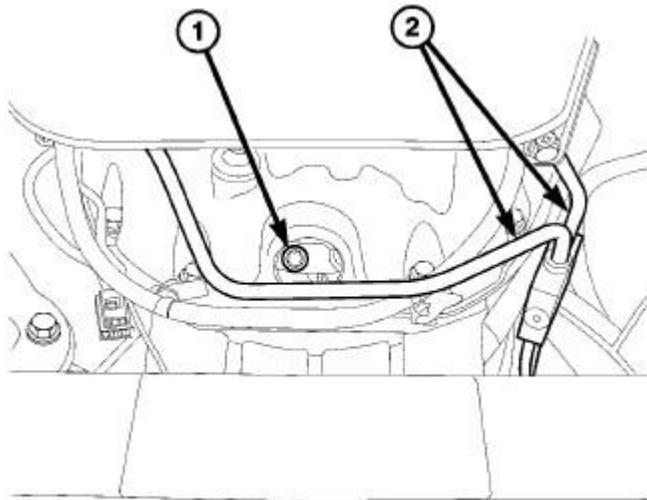


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Fig. 53: Identifying Converter Bolts

Courtesy of CHRYSLER LLC

7. For gas engines, rotate crankshaft in clockwise direction until converter bolts (1) are accessible. Then remove bolts (1) one at a time. Rotate crankshaft with socket wrench on dampener bolt.



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Fig. 54: Torque Converter To Flex Plate Bolts & Fluid Lines

Courtesy of CHRYSLER LLC

8. For diesel engines, rotate crankshaft in clockwise direction until converter bolts (1) are accessible. Then remove bolts (1) one at a time. Rotate crankshaft with socket wrench on dampener bolt.

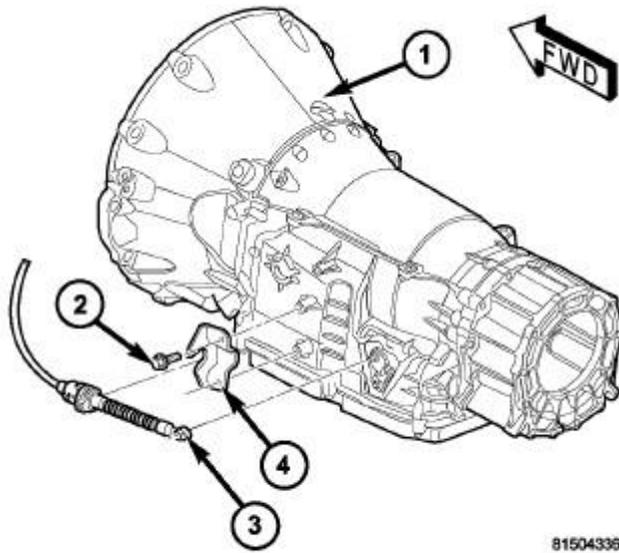


Fig. 55: Removing/Installing Shift Cable & Bracket
Courtesy of CHRYSLER LLC

9. Disconnect the gearshift cable (3) from the transmission manual valve lever.
10. Remove the shift cable (3) from the gearshift cable bracket (4).

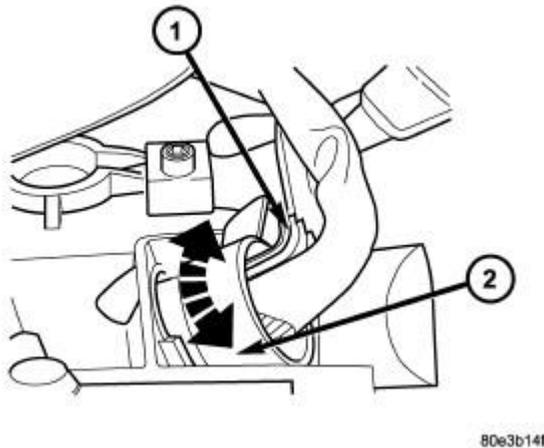
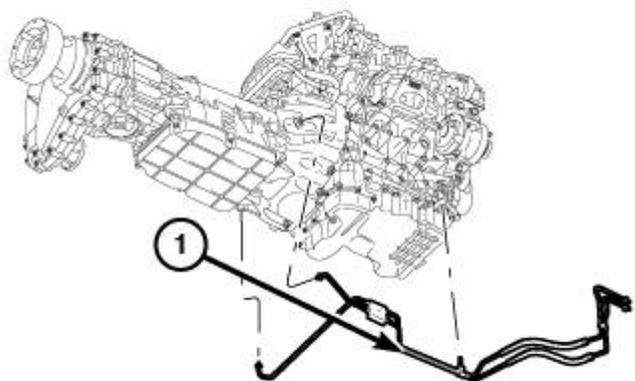


Fig. 56: Removing 13-Pin Plug Connector
Courtesy of CHRYSLER LLC

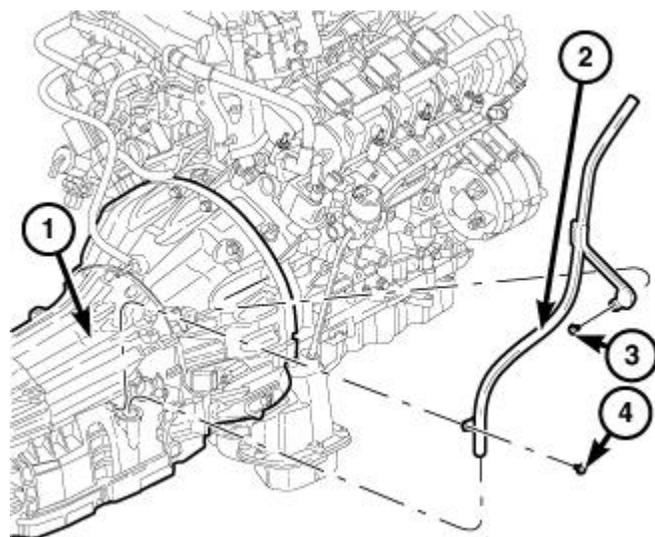
11. Disconnect 13-pin plug connector (1). Turn bayonet lock of the adapter plug (2) counter-clockwise.
12. Remove the 13-pin connector (1) from the transmission.



2887664

Fig. 57: Identifying Transmission Fluid Cooler Lines
Courtesy of CHRYSLER LLC

13. Disconnect transmission fluid cooler lines (1) at transmission.
14. Disconnect the transmission vent hose from the transmission.



2887681

Fig. 58: Identifying Transmission, Transmission Fill Tube & Bolts
Courtesy of CHRYSLER LLC

15. Remove the bolts (3, 4) holding the transmission fill tube (2) to the transmission (1).
16. Support rear of engine with safety stand or jack.
17. Raise transmission slightly with service jack to relieve load on crossmember and supports.
18. Remove bolts securing rear support and cushion to transmission crossmember.
19. Remove bolts attaching crossmember to frame and remove crossmember.

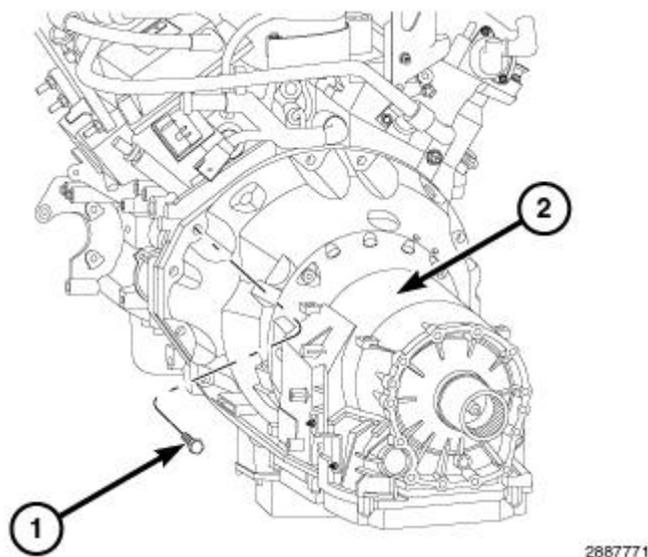


Fig. 59: Identifying Transmission & Bolts
Courtesy of CHRYSLER LLC

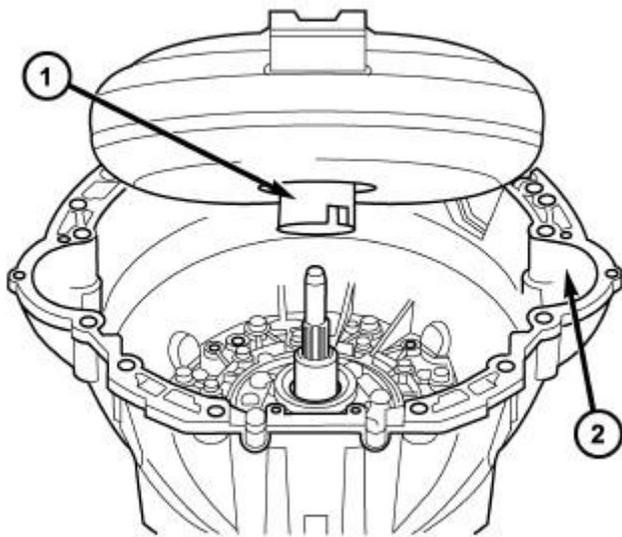
20. Remove all remaining bolts (2) holding the engine to the transmission (1). Note the location of any wiring harness clips.
21. Carefully work transmission and torque converter assembly rearward off engine block dowels.
22. Hold torque converter in place during transmission removal.
23. Lower transmission and remove assembly from under the vehicle.
24. To remove torque converter, carefully slide torque converter out of the transmission.

DISASSEMBLY

DISASSEMBLY

NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool. Refer to MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE .

NOTE: Tag all clutch pack assemblies, as they are removed, for reassembly identification.

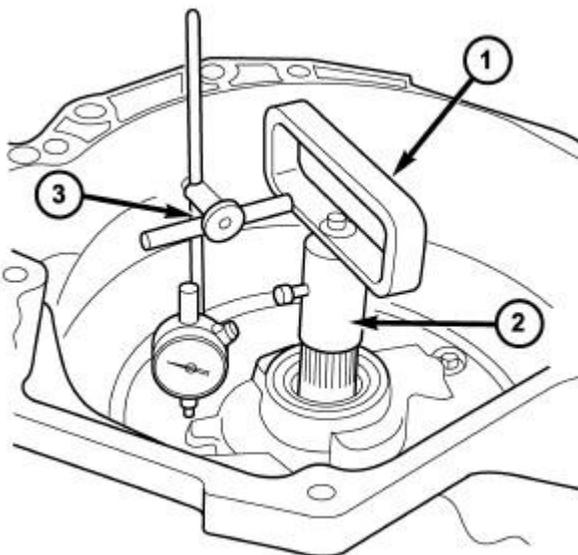


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Fig. 60: Torque Converter & Converter Housing
Courtesy of CHRYSLER LLC

- | |
|-----------------------|
| 1 - TORQUE CONVERTER |
| 2 - CONVERTER HOUSING |

1. Remove the torque converter (1). Refer to **Fig. 60**.



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Fig. 61: Checking Input Shaft End Play
 Courtesy of CHRYSLER LLC

1 - TOOL 8266-8
2 - TOOL 8266-18
3 - TOOL C-3339A

2. Place transmission in a vertical position.
3. Measure input shaft end play as follows. Refer to **Fig. 61**.
 1. Attach Adapter (special tool #8266-18, Spline Tool, NAG1) (2) to Handle (special tool #8266-8, Handle) (1).
 2. Attach dial indicator (special tool #C-3339A, Set, Dial Indicator) (3) to Handle (special tool #8266-8, Handle) (1).
 3. Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter (special tool #8266-18, Spline Tool, NAG1) (2) to secure it to the input shaft.
 4. Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.
 5. Move the input shaft in and out. Record the maximum travel for assembly reference.

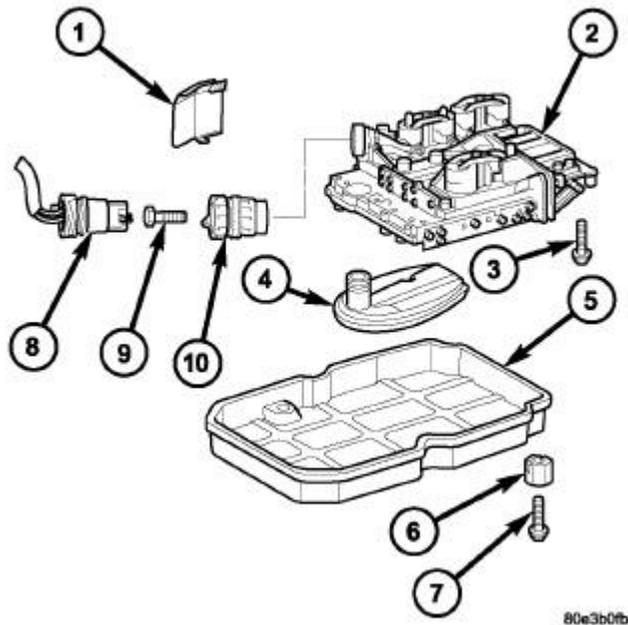


Fig. 62: Electrohydraulic Unit Components
 Courtesy of CHRYSLER LLC

1 - HEAT SHIELD
2 - ELECTROHYDRAULIC UNIT
3 - BOLT
4 - OIL FILTER

5 - OIL PAN
6 - CLAMPING ELEMENT
7 - BOLT
8 - 13-PIN PLUG CONNECTOR
9 - BOLT
10 - ADAPTER PLUG

4. Loosen adapter plug bolt (9) and remove from the adapter plug (10) from the transmission housing. Refer to **Fig. 62**.
5. Detach oil pan (5). Refer to **Fig. 62**.
6. Remove oil filter (4). Refer to **Fig. 62**.
7. Unscrew Torx® socket bolts (3) and remove electrohydraulic unit (2).
8. Air check the transmission. Refer to **DIAGNOSIS AND TESTING**.

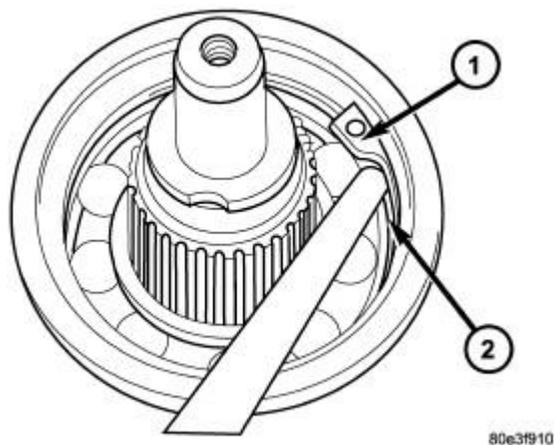


Fig. 63: Rear Output Shaft Retaining Ring
Courtesy of CHRYSLER LLC

1 - RETAINING RING
2 - OUTPUT SHAFT BEARING

9. Place the transmission in PARK to prepare for the removal of the output shaft nut.
10. Remove the nut, with a 30 mm 12 point socket, holding the propeller shaft flange to the output shaft and remove the flange.
11. Remove the transmission rear oil seal with a suitable slide hammer and screw.
12. Remove the transmission output shaft washer. Be sure to tag the washer since it is very similar to the geartrain end-play shim and they must not be interchanged.
13. Remove the transmission rear output shaft bearing retaining ring (1).

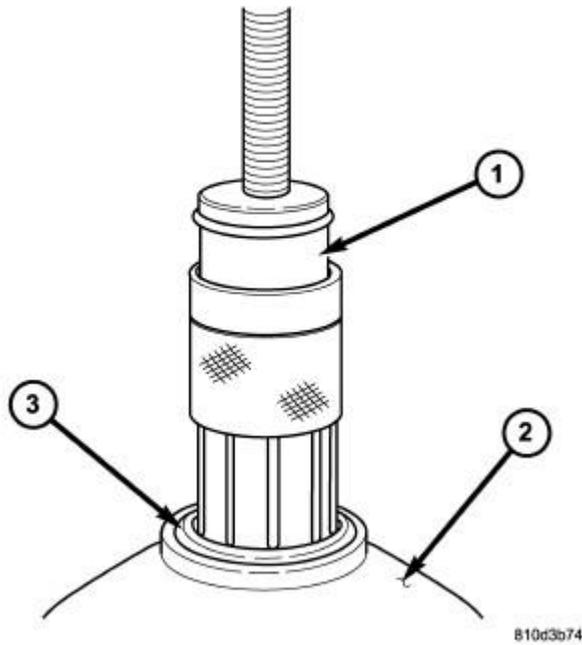


Fig. 64: Positioning Bearing Remover 9082A Over Inner Race Of Output Shaft Bearing
Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A
2 - TRANSMISSION CASE
3 - OUTPUT SHAFT BEARING

14. Position Bearing Remover (special tool #9082A, Remover, Bearing) (1) over the inner race of the output shaft bearing (3). Refer to **Fig. 64**.

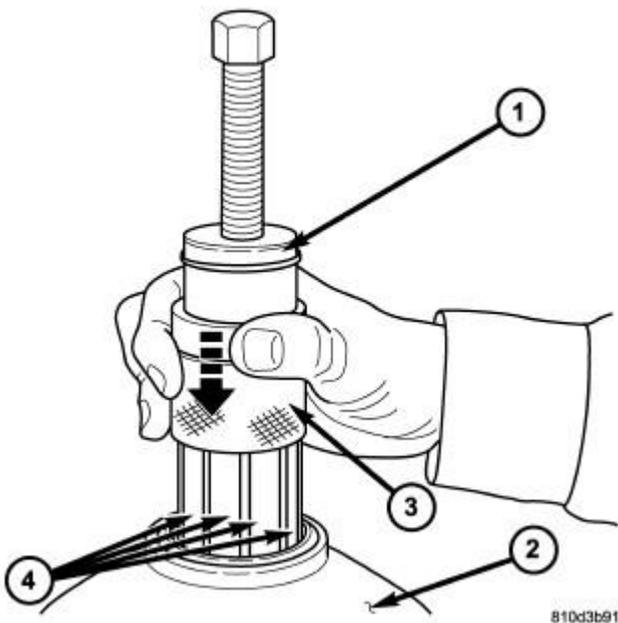


Fig. 65: Slide Remover 9082A Collar Downward
 Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A
2 - TRANSMISSION CASE
3 - COLLAR
4 - FINGERS

NOTE: Due to production variations in the bearing, it may not be possible to slide the collar fully downward. It is only necessary to slide the collar down far enough that the fingers securely grasp the inner bearing race.

- Slide the collar (3) on the Bearing Remover (special tool #9082A, Remover, Bearing) (1) downward over the fingers (4) of the tool. Refer to **Fig. 65**.

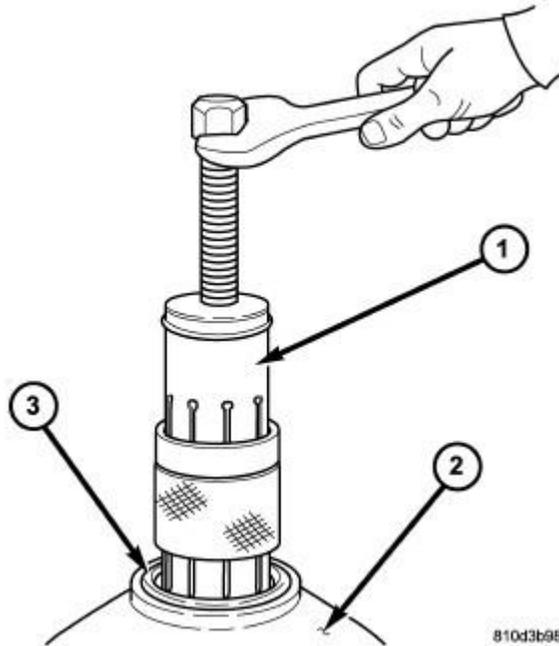
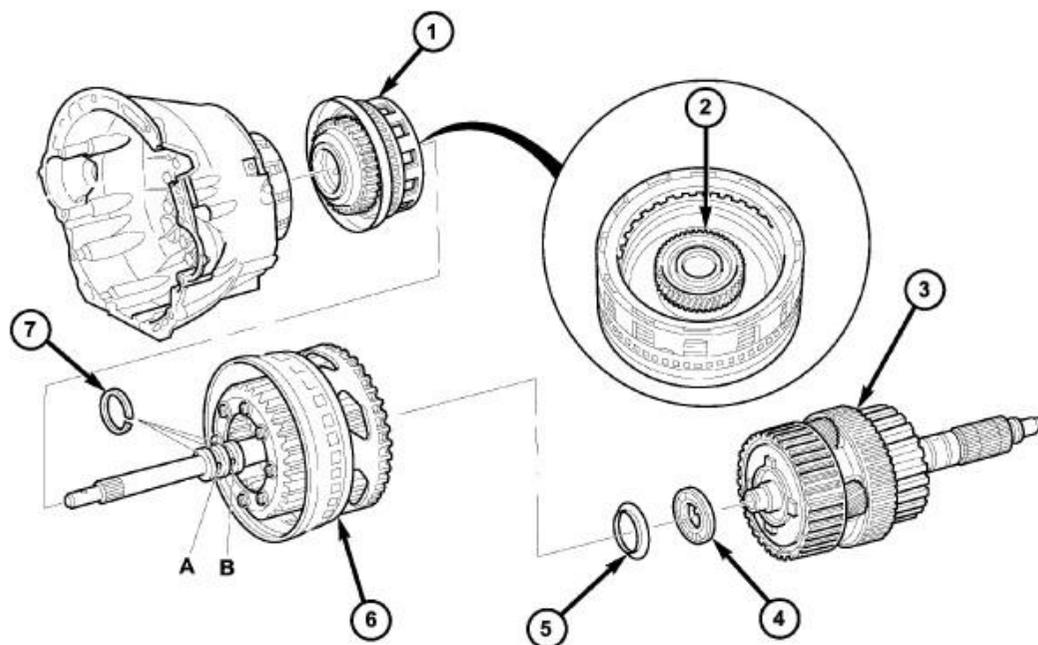


Fig. 66: Removing Output Shaft Bearing
 Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A
2 - TRANSMISSION CASE
3 - OUTPUT SHAFT BEARING

16. Remove the output shaft bearing (3). Refer to **Fig. 66**.
17. Remove the geartrain end-play shim from the output shaft. Be sure to tag the shim since it is very similar to the output shaft washer and they must not be interchanged.

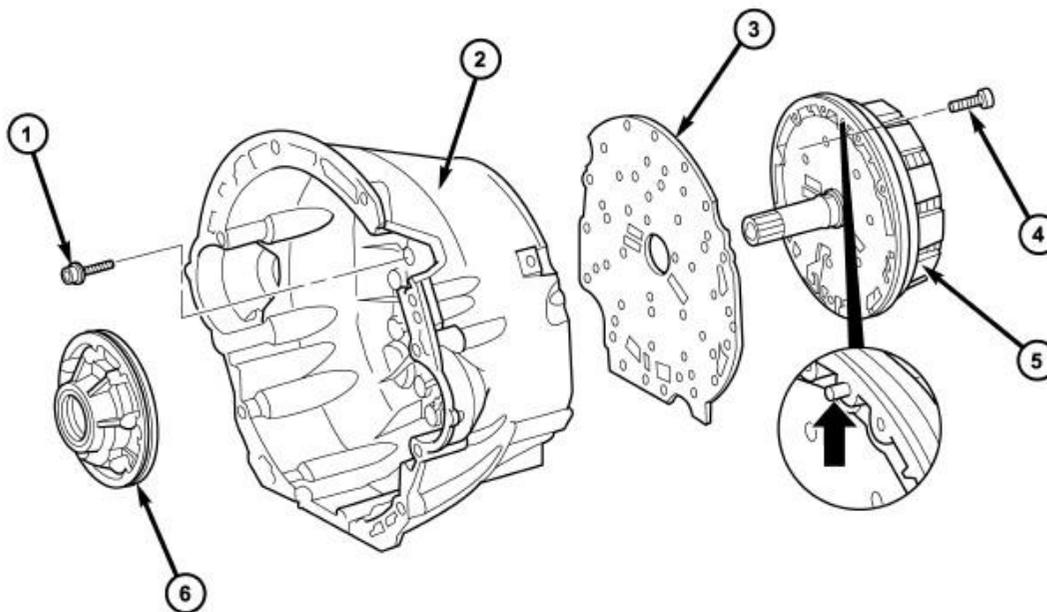


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Fig. 67: K1, K2 & K3 Clutches
 Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K1	5 - THRUST WASHER
2 - SUN GEAR OF FRONT PLANETARY GEAR SET	6 - FRONT PLANETARY GEAR SET, DRIVING CLUTCH K2, AND INPUT SHAFT
3 - DRIVING CLUTCH K3, OUTPUT SHAFT, AND CENTER AND REAR PLANETARY GEAR SETS	7 - SEALING RINGS
4 - THRUST NEEDLE BEARING	

18. Remove the bolts holding the transmission housing to the converter housing from inside the converter housing.
19. Stand the transmission upright on the converter housing.
20. Remove the remaining bolts holding the transmission housing to the converter housing.
21. Remove the transmission housing from the converter housing.
22. Remove output shaft with center and rear gear set and clutch K3 (3). Refer to **Fig. 67**.
23. Remove thrust needle bearing (4) and thrust washer (5). Refer to **Fig. 67**.
24. Remove input shaft with clutch K2 and front gear set (6).
25. Remove clutch K1 (1).

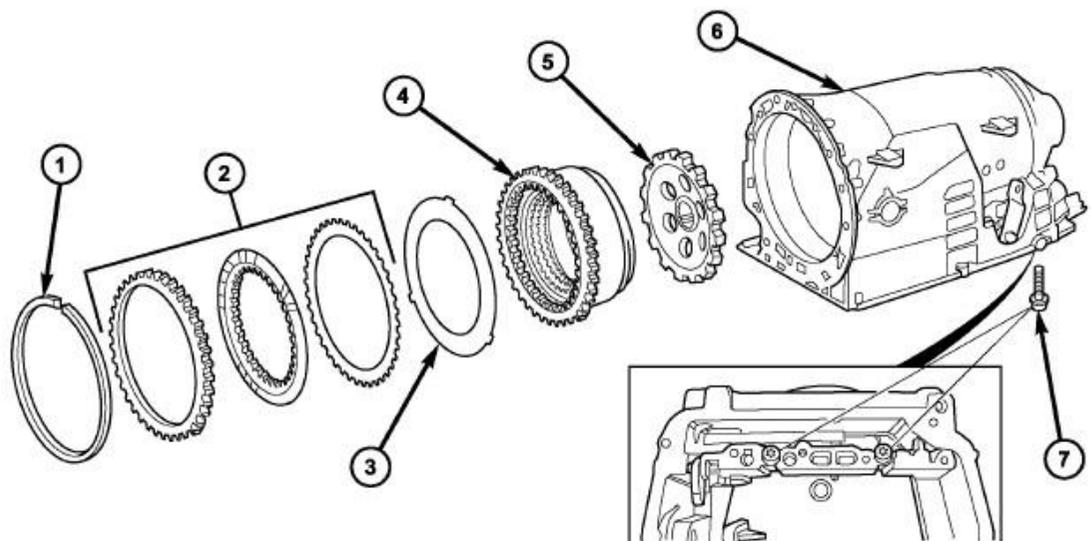


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Fig. 68: Holding Clutch B1 & Oil Pump
 Courtesy of CHRYSLER LLC

1 - BOLTS - M6X32	4 - BOLTS - M8X35
2 - CONVERTER HOUSING	5 - HOLDING CLUTCH B1
3 - INTERMEDIATE PLATE	6 - OIL PUMP

26. Unscrew Torx® socket bolts (4) and remove oil pump (6). Refer to **Fig. 68**. Screw two opposed bolts into the oil pump housing and press the oil pump out of the converter housing by applying light blows with a plastic hammer.
27. Remove and discard the torque converter hub seal and the oil pump outer o-ring seal from the oil pump.
28. Unscrew Torx® socket bolts (1) and remove multiple-disc holding clutch B1 (5) from converter housing. Refer to **Fig. 68**. Screw two opposed bolts into the multiple-disc holding clutch B1 (5) and separate from the converter housing by applying light blows with a plastic hammer.
29. Detach intermediate plate (3) from converter housing (2). Refer to **Fig. 68**.



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Fig. 69: B2, B3 & Parking Gear
Courtesy of CHRYSLER LLC

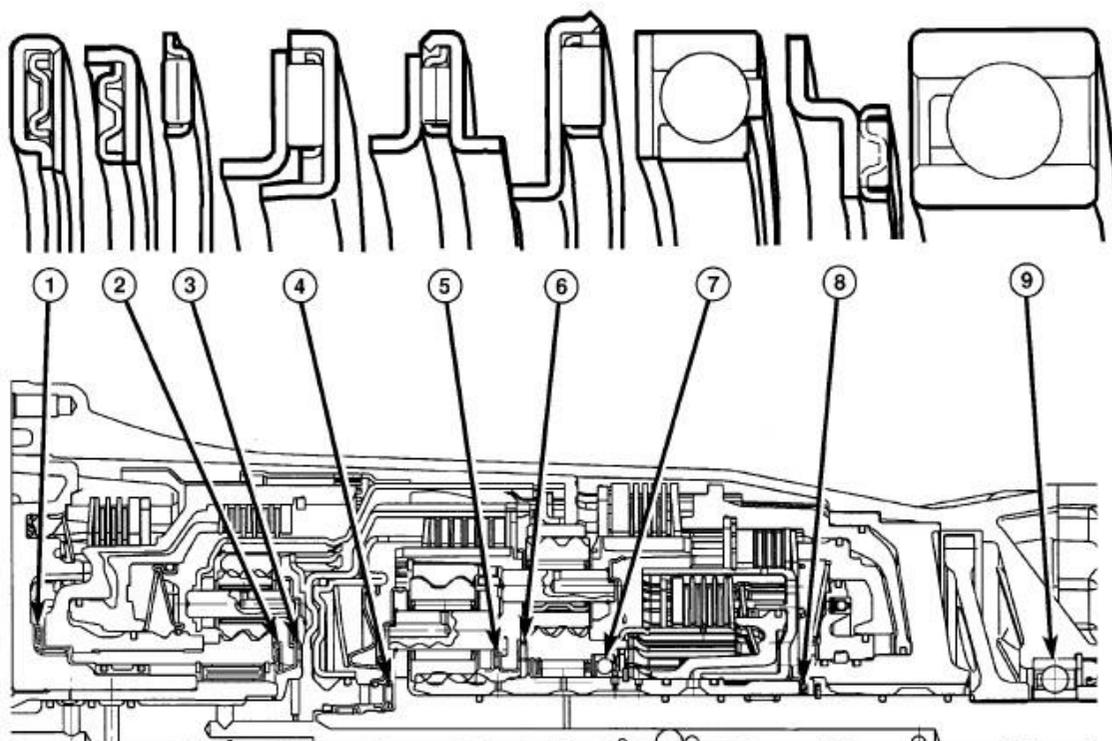
1 - SNAP-RING	5 - PARK GEAR
2 - HOLDING CLUTCH B3 DISCS	6 - TRANSMISSION HOUSING
3 - SPRING WASHER	7 - BOLTS - M8X60
4 - HOLDING CLUTCH B2	

30. Remove multiple-disc pack B3 (2) and spring washer (3) by removing snap-ring (1) in transmission housing. Refer to **Fig. 69**. To facilitate removal of the snap-ring (1), compress the multiple-disc pack B3 (2). Note which clutch disc is removed just prior to the spring washer (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring washer.
31. Unscrew Torx® socket bolts (7). Refer to **Fig. 69**.
32. Remove multiple-disc holding clutch B2 (4) from transmission housing. Refer to **Fig. 69**. The externally toothed disc carrier for multiple-disc holding clutch B2 is also the piston for multiple-disc holding clutch B3.
33. Remove parking lock gear (5). Refer to **Fig. 69**.

ASSEMBLY

ASSEMBLY

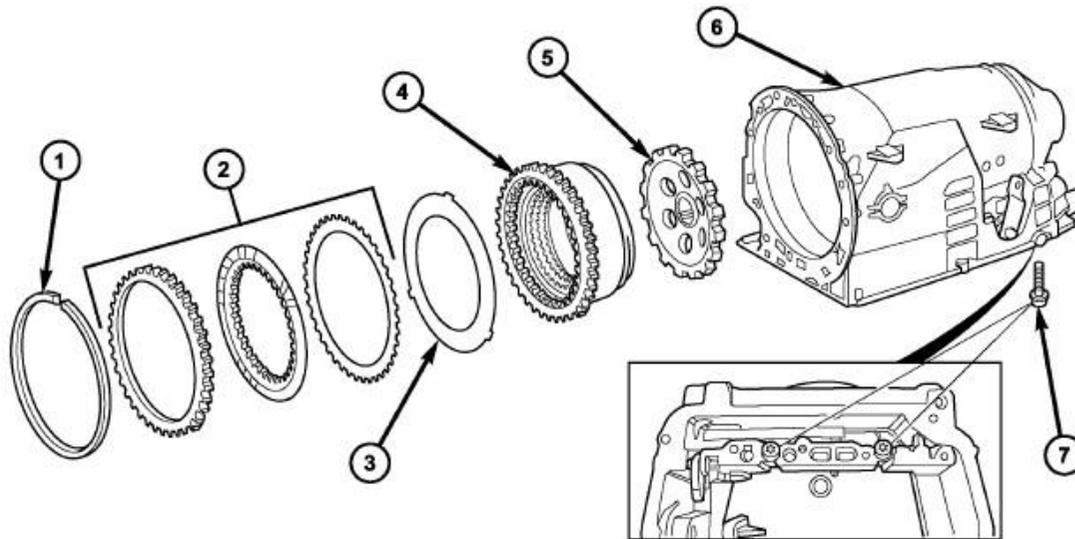
NOTE: If the transmission is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the TCM Adaptation Procedure using the scan tool. Refer to **MODULE, TRANSMISSION CONTROL, STANDARD PROCEDURE**.



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Fig. 70: NAG1 Bearing Orientation
 Courtesy of CHRYSLER LLC

- | | |
|--------------------------|--------------------------|
| 1 - THRUST BEARING NO. 1 | 6 - THRUST BEARING NO. 6 |
| 2 - THRUST BEARING NO. 2 | 7 - ROLLER BEARING NO. 7 |
| 3 - THRUST BEARING NO. 3 | 8 - THRUST BEARING NO. 8 |
| 4 - THRUST BEARING NO. 4 | 9 - ROLLER BEARING NO. 9 |
| 5 - THRUST BEARING NO. 5 | |

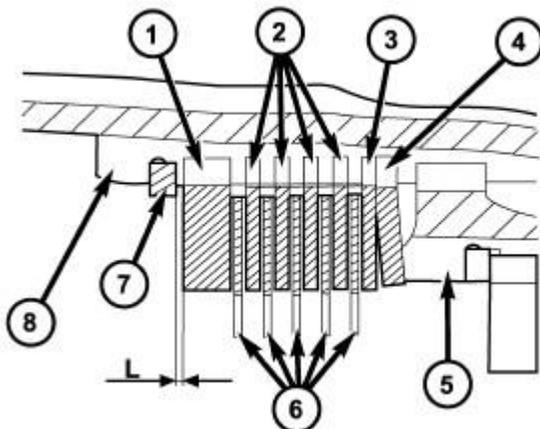


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Fig. 71: B2, B3 & Parking Gear
 Courtesy of CHRYSLER LLC

1 - SNAP-RING	5 - PARK GEAR
2 - HOLDING CLUTCH B3 DISCS	6 - TRANSMISSION HOUSING
3 - SPRING WASHER	7 - BOLTS - M8X60
4 - HOLDING CLUTCH B2	

1. Insert parking lock gear (5). Refer to **Fig. 71**.
2. Install multiple-disc holding clutch B2 (4) in transmission housing (6). Refer to **Fig. 71**.
3. Screw in both Torx® socket bolts (7). Tighten the bolts to 16 N.m (141 in.lbs.).



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Fig. 72: B3 Clutch Clearance
 Courtesy of CHRYSLER LLC

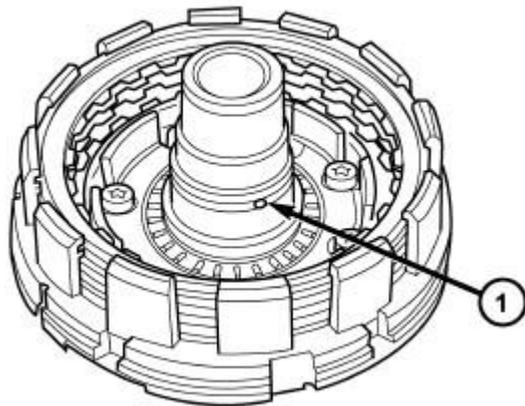
1 - OUTER DISC - 6.5 MM (0.256 IN.)	5 - PISTON
2 - OUTER DISCS - 1.8 MM (0.071 IN.)	6 - FRICTION DISCS
3 - OUTER DISCS - 1.8 MM (0.071 IN.)	7 - SNAP-RING
4 - SPRING WASHER	8 - B3 DISC CARRIER

NOTE: During the measurement the snap ring (7) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (8). Refer to [Fig. 72](#).

NOTE: Pay attention to sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the spring washer (4) to its original location. Place new friction multiple-discs in ATF fluid for one hour before installing.

CAUTION: Apply only light pressure (less than 10 N (3 lbs.) of force) to the clutch pack when measuring the clutch clearance with the feeler gauge. Applying excessive force to the clutch will give an incorrect reading and lead to a transmission failure.

4. Insert and measure spring washer (4) and multiple-disc pack B3 (2, 6). Refer to [Fig. 72](#).
 1. Put multiple-discs for multiple-disc holding clutch B3 together in the sequence shown in the illustration and insert individually.
 2. Using a feeler gauge, determine the play "L" at three points between the snap ring (7) and outer multiple-disc (1). B3 clutch clearance should be 1.0-1.4 mm (0.039-0.055 in.). Adjust the clearance as necessary.
 3. Adjust with snap-ring (7), if necessary. Snap-rings are available in thicknesses of 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), 4.1 mm (0.162 in.), 4.4 mm (0.173 in.), and 4.7 mm (0.185 in.).

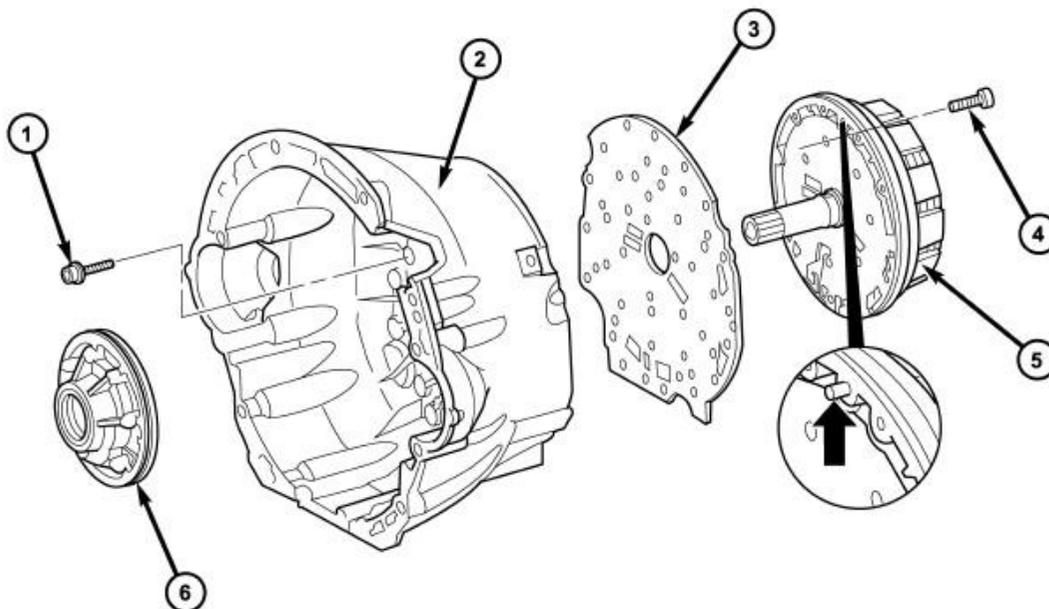


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Fig. 73: Check K1 Feed Hole
Courtesy of CHRYSLER LLC

1 - K1 CLUTCH FEED HOLE

5. Check that the K1 clutch feed hole (1) in the inner hub of clutch B1 is free before installing clutch B1. Refer to **Fig. 73**.



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Fig. 74: Holding Clutch B1 & Oil Pump
Courtesy of CHRYSLER LLC

1 - BOLTS - M6X32	4 - BOLTS - M8X35
2 - CONVERTER HOUSING	5 - HOLDING CLUTCH B1

3 - INTERMEDIATE PLATE	6 - OIL PUMP
------------------------	--------------

- Place intermediate plate (3) on converter housing (2) and align.

NOTE: The intermediate plate can generally be used several times. The plate must not be coated with additional sealant

- Install the holding clutch B1 (5) onto the converter housing and intermediate plate. Refer to **Fig. 74**. Installed position of clutch B1 in relation to converter housing is specified by a plain dowel pin in clutch B1 (arrow).
- Install the bolts to hold clutch B1 (5) to the converter housing. Refer to **Fig. 74**.
- Securely tighten multiple-disc holding clutch B1 (5) on converter housing (2) to 10 N.m (89 in.lbs.).

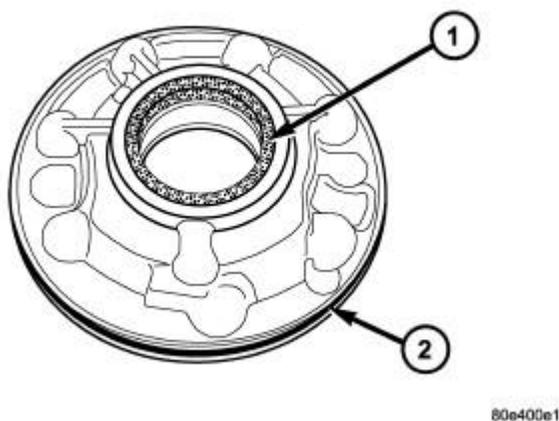
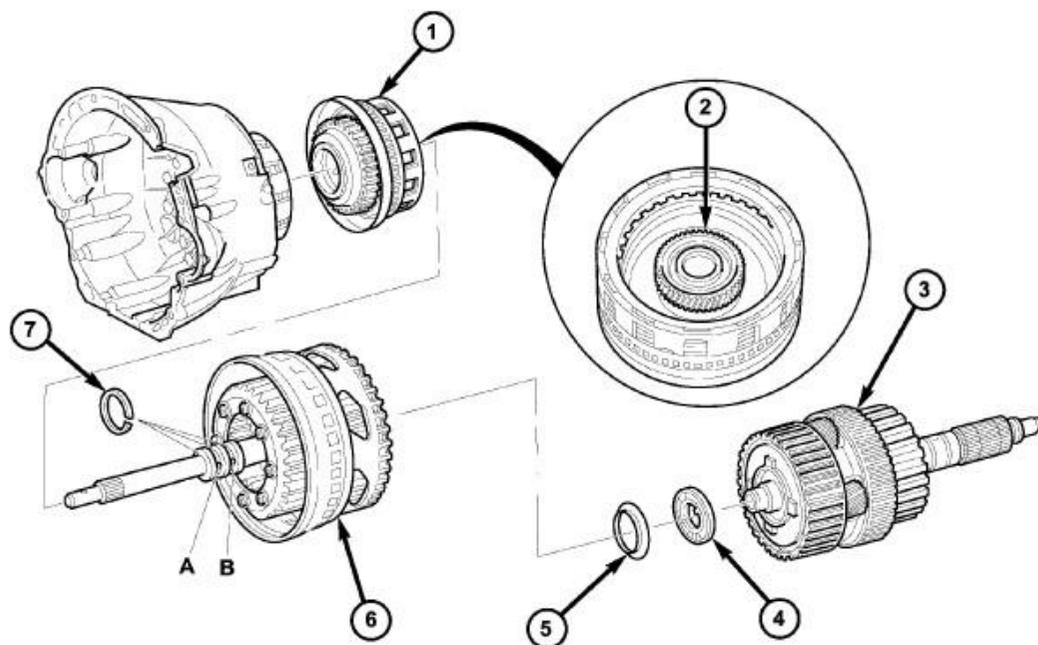


Fig. 75: Identifying Oil Pump Seals
Courtesy of CHRYSLER LLC

1 - INNER OIL SEAL
2 - OUTER OIL SEAL

- Install new torque converter hub seal (1) into the oil pump using Seal Installer (special tool #8902A, Installer, Seal). Refer to **Fig. 75**.
- Install new oil pump outer o-ring seal onto oil pump. Refer to **Fig. 75**.



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Fig. 76: K1, K2 & K3 Clutches
 Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K1	5 - THRUST WASHER
2 - SUN GEAR OF FRONT PLANETARY GEAR SET	6 - FRONT PLANETARY GEAR SET, DRIVING CLUTCH K2, AND INPUT SHAFT
3 - DRIVING CLUTCH K3, OUTPUT SHAFT, AND CENTER AND REAR PLANETARY GEAR SETS	7 - SEALING RINGS
4 - THRUST NEEDLE BEARING	

12. Install oil pump (6) and securely tighten. Tighten the oil pump bolts to 20 N.m (177 in.lbs.).
13. Using grease, insert sealing rings (7) in the groove so that the joint remains together. Refer to **Fig. 76**.
14. Install the K1 (1) clutch onto the B1 clutch. Refer to **Fig. 76**.
15. Install input shaft with clutch K2 (6) and front gear set (1). Refer to **Fig. 76**.
16. Install front washer (5) and thrust needle bearing (4). Refer to **Fig. 76**.

NOTE: Insure that the pinion gears are fully seated in the Rear Annulus (Hollow) Gear. If 50% of the pinion gear splines protrude, the Rear Annulus Gear was installed upside down in the K2 Clutch Retainer.

17. Install output shaft with center and rear gear set and clutch K3 (3). Refer to **Fig. 76**.

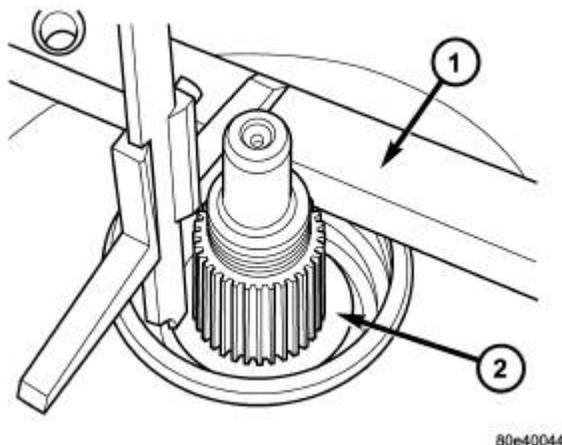


Fig. 77: Measuring From Transmission Housing To Park Gear
 Courtesy of CHRYSLER LLC

1 - GAUGE BAR 6311

2 - PARK GEAR

18. Using grease, install both Teflon rings in the groove at the rear of the output shaft so that the joint stays together.
19. Mount transmission housing on converter housing.
20. Screw in Torx® socket bolts through the transmission housing into the converter housing. Tighten the bolts to 20 N.m (177 in.lbs.).

NOTE: **Verify that there are no nicks or other irregularities in the surface of the transmission case that will cause an inaccurate measurement.**

21. Measure end-play between park pawl gear and grooved ball bearing in order to select the proper geartrain end-play shim.
22. Place Gauge Bar (special tool #6311, Gauge Bar) (1) on transmission housing. Using a depth gauge, measure from the gauge bar (1) to the parking lock gear (2). Refer to **Fig. 77**.

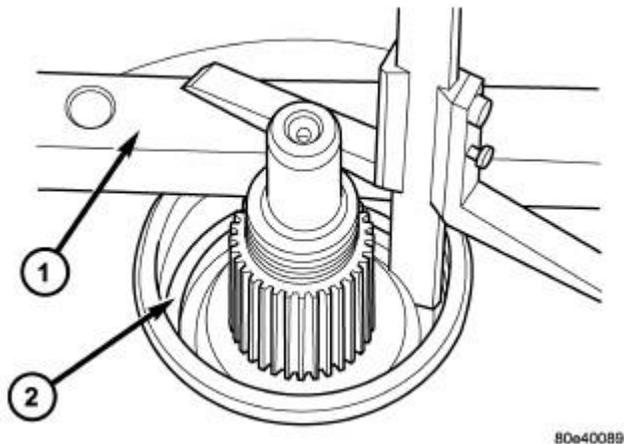


Fig. 78: Measuring From Transmission Housing To Rear Bearing Contact Surface
 Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - GAUGE BAR 6311 |
| 2 - OUTPUT SHAFT BEARING CONTACT SURFACE |

23. Using a depth gauge, measure from the Gauge Bar (special tool #6311, Gauge Bar) (1) to the contact surface of the output shaft bearing (2) in the transmission housing. Refer to **Fig. 78**.
24. Subtract the first figure from the second figure to determine the current end-play of the transmission. Select a shim or a combination of two shims such that the end-play will be 0.3-0.5 mm (0.012-0.020 in.). Shims are available in thicknesses of 0.2 mm (0.008 in.), 0.3 mm (0.012 in.), 0.4 mm (0.016 in.), and 0.5 mm (0.020 in.).
25. Install the selected end-play shim.

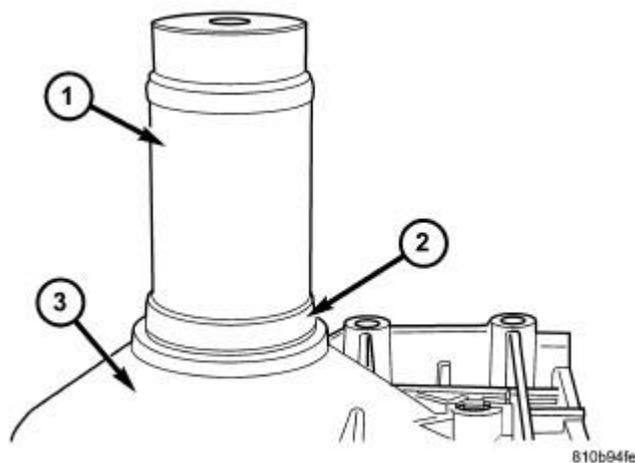


Fig. 79: Installing Output Shaft Bearing
 Courtesy of CHRYSLER LLC

- | |
|----------------------------|
| 1 - BEARING INSTALLER 9287 |
|----------------------------|

2 - BEARING

3 - TRANSMISSION CASE

26. Screw in Torx® socket bolts through the converter housing into the transmission housing. Tighten the bolts to 20 N.m (177 in.lbs.).
27. Install output shaft bearing (2) in rear transmission housing. Using Bearing Installer (special tool #9287, Installer, Bearing) (1), install the output shaft bearing (2) into the transmission housing. Refer to **Fig. 79**. **The closed side of the plastic cage must point towards the parking lock gear.**

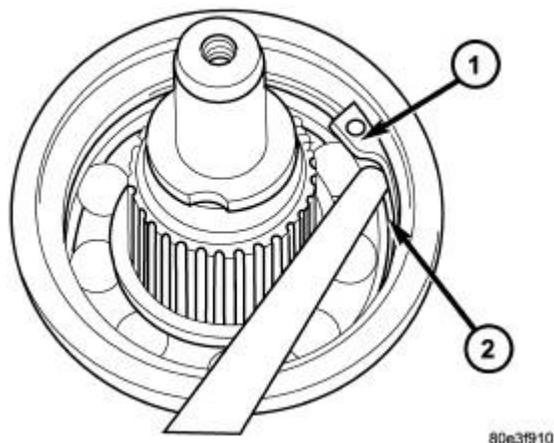
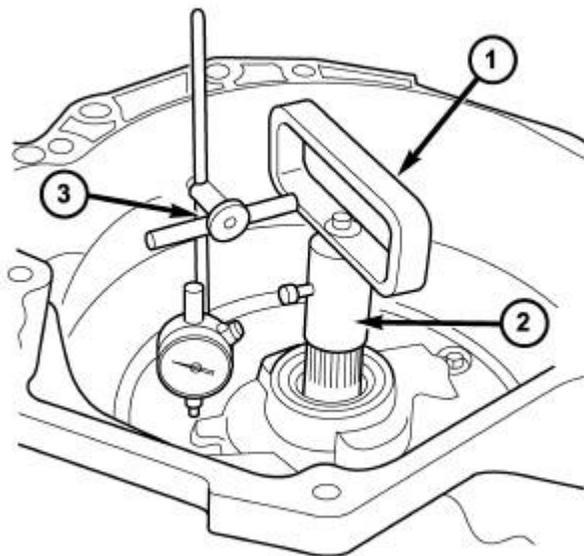


Fig. 80: Rear Output Shaft Retaining Ring
Courtesy of CHRYSLER LLC

1 - RETAINING RING

2 - OUTPUT SHAFT BEARING

28. Install the retaining ring (1). Refer to **Fig. 80**. Ensure that the retaining ring is seated correctly in the groove.
29. Check that there is no play between the bearing and the retaining ring using feeler gauge.
30. There must be no play between the retaining ring and the bearing. If the ring cannot be installed, a thinner ring must be used. If there is play between the ring and the bearing, a thicker ring must be installed. Retaining rings are available in thicknesses of 2.0 mm (0.079 in.), 2.1 mm (0.083 in.), and 2.2 mm (0.087 in.).



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Fig. 81: Checking Input Shaft End Play
 Courtesy of CHRYSLER LLC

1 - TOOL 8266-8
2 - TOOL 8266-18
3 - TOOL C-3339A

31. Rotate the transmission so that the bellhousing is pointed upward and ensuring that the output shaft is allowed to move freely.
32. Measure input shaft end-play. Refer to **Fig. 81**.

NOTE: If end-play is incorrect, transmission is incorrectly assembled, or the geartrain end-play shim is incorrect. The geartrain end-play shim is selective.

NOTE: If necessary, a combination of shims can be used to achieve the required end-play.

1. Attach Adapter (special tool #8266-18, Spline Tool, NAG1) (2) to Handle (special tool #8266-8, Handle) (1).
2. Attach dial indicator (special tool #C-3339A, Set, Dial Indicator) (3) to Handle (special tool #8266-8, Handle) (1).
3. Install the assembled tool onto the input shaft of the transmission and tighten the retaining screw on Adapter (special tool #8266-18, Spline Tool, NAG1) to secure it to the input shaft.
4. Position the dial indicator plunger against a flat spot on the oil pump and zero the dial indicator.

5. Move input shaft in and out and record reading. End play should be 0.3-0.5 mm (0.012-0.020 in.). Adjust as necessary.

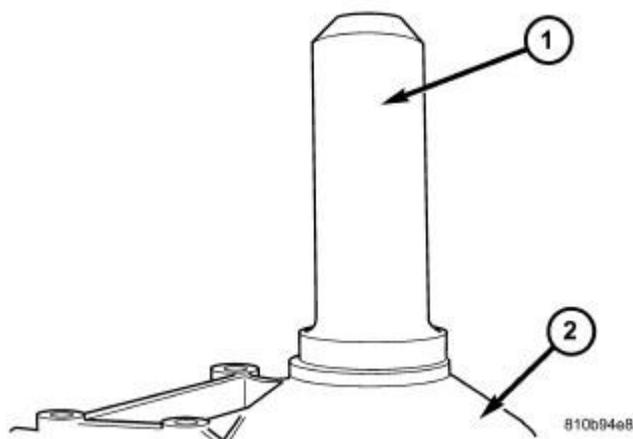


Fig. 82: Installing Output Shaft Seal
 Courtesy of CHRYSLER LLC

1 - SEAL INSTALLER 8902A

2 - TRANSMISSION CASE

NOTE: The output shaft shim should be 0.3 mm (0.012 in.). If a 0.3 mm (0.012 in.) shim is not available, use a 0.2 mm (0.008 in.) 0.4 mm (0.016 in.) or 0.5 mm (.020 in.) shim.

33. Install the output shaft shim onto the output shaft.
34. Install a new transmission rear seal into the transmission case with Seal Installer (special tool #8902A, Installer, Seal) (1). Refer to **Fig. 82**.

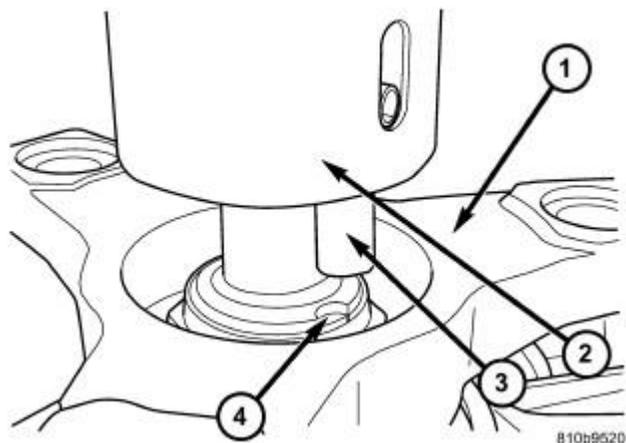


Fig. 83: Align Staking Tool

Courtesy of CHRYSLER LLC

1 - PROPELLER SHAFT FLANGE
2 - STAKING TOOL 9078
3 - ALIGNMENT PIN
4 - OUTPUT SHAFT NOTCH

35. Place the transmission in PARK to prepare for the installation of the output shaft nut.
36. Inspect the seal protector on the rear of the output shaft flange. Replace the seal protector if damaged. the seal protector can be removed using a suitable pry tool and installed with a suitable tube style tool.
37. Install the propeller shaft flange onto the output shaft and install a new flange nut. Tighten the flange nut, with a 30 mm 12 point socket, to 200 N.m (147.5 ft.lbs.).
38. Place the Staking Tool (special tool #9078, Staking Tool) (2) and Driver Handle (special tool #C-4171, Driver Handle, Universal) onto the output shaft.
39. Rotate the Staking Tool (special tool #9078, Staking Tool) (2) until the alignment pin (3) engages the output shaft notch (4). Refer to **Fig. 83**.

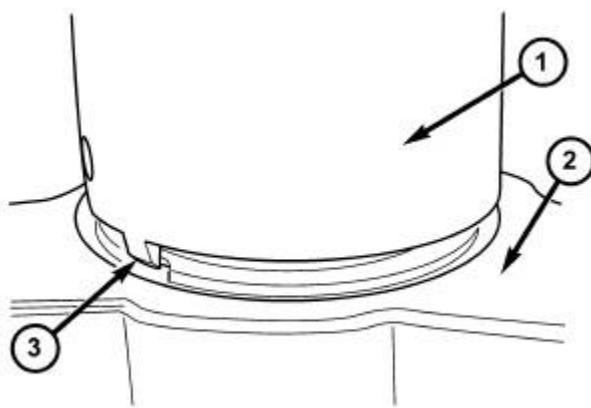


Fig. 84: Stake Output Shaft Nut
Courtesy of CHRYSLER LLC

1 - STAKING TOOL 9078
2 - PROPELLER FLANGE
3 - STAKING PIN

40. Press downward on the staking tool (1) until the staking pin (3) contacts the output shaft nut flange (2). Refer to **Fig. 84**.
41. Strike the Driver handle (special tool #C-4171, Driver Handle, Universal) with a suitable hammer until the output shaft nut is securely staked to the output shaft.

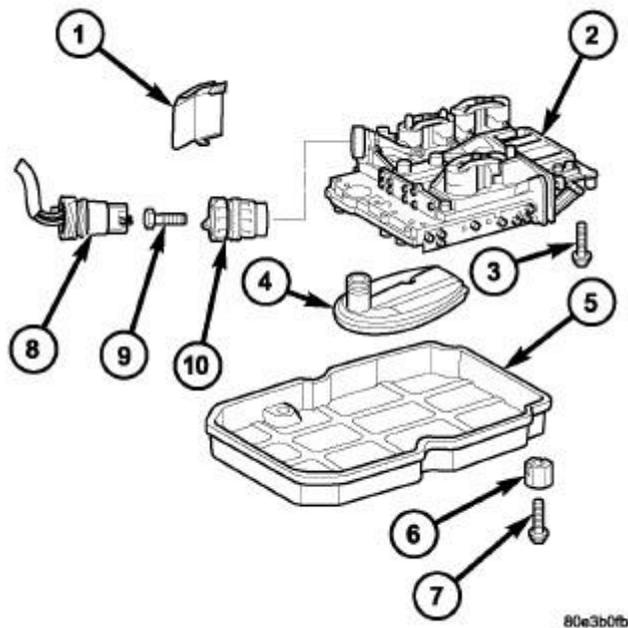
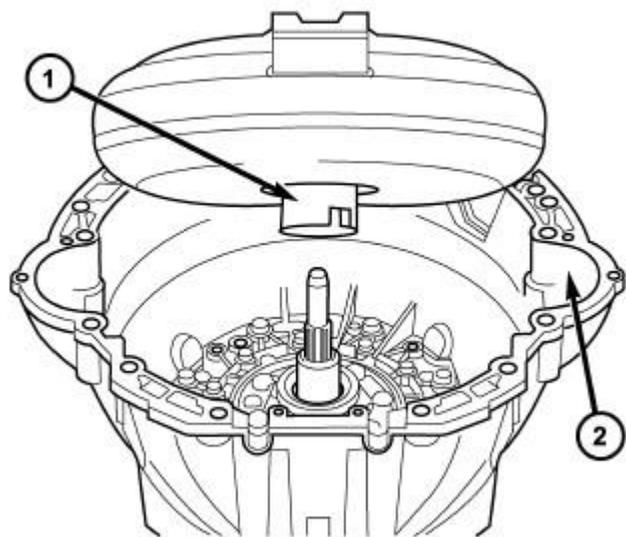


Fig. 85: Electrohydraulic Unit Components
 Courtesy of CHRYSLER LLC

1 - HEAT SHIELD
2 - ELECTROHYDRAULIC UNIT
3 - BOLT
4 - OIL FILTER
5 - OIL PAN
6 - CLAMPING ELEMENT
7 - BOLT
8 - 13-PIN PLUG CONNECTOR
9 - BOLT
10 - ADAPTER PLUG

42. Install electrohydraulic unit (2). Tighten the bolts to 8 N.m (71 in.lbs.).
43. Install oil filter (4). Refer to **Fig. 85**.
44. Install oil pan (5). Refer to **Fig. 85**. Tighten the bolts to 8 N.m (71 in.lbs.).
45. Install the adapter plug (10). Refer to **Fig. 85**. Tighten the bolt (9) to 2.5 N.m (22 in. lbs.).



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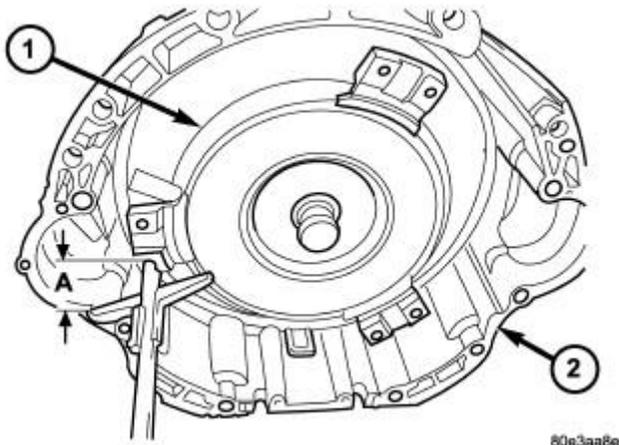
Fig. 86: Torque Converter & Converter Housing
Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER
2 - CONVERTER HOUSING

46. Install the torque converter. Refer to **Fig. 86**.

INSTALLATION

INSTALLATION



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Fig. 87: Measuring Torque Converter Installation Depth

Courtesy of CHRYSLER LLC

1. Check torque converter hub and hub drive flats for sharp edges burrs, scratches, or nicks. Polish the hub and flats with 320/400 grit paper and crocus cloth if necessary. The hub must be smooth to avoid damaging pump seal at installation.
2. If a replacement transmission is being installed, transfer any components necessary, such as the manual shift lever and shift cable bracket, from the original transmission onto the replacement transmission.
3. Lubricate oil pump seal lip with transmission fluid.
4. Place torque converter in position on transmission.

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

5. Align torque converter to oil pump seal opening.
6. Insert torque converter (1) hub into oil pump.
7. While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.
8. Check converter seating with a scale and straightedge. Surface of converter lugs should be at least 19 mm (3/4 in.) to rear of straightedge when converter is fully seated.
9. If necessary, temporarily secure converter with C-clamp attached to the converter housing.

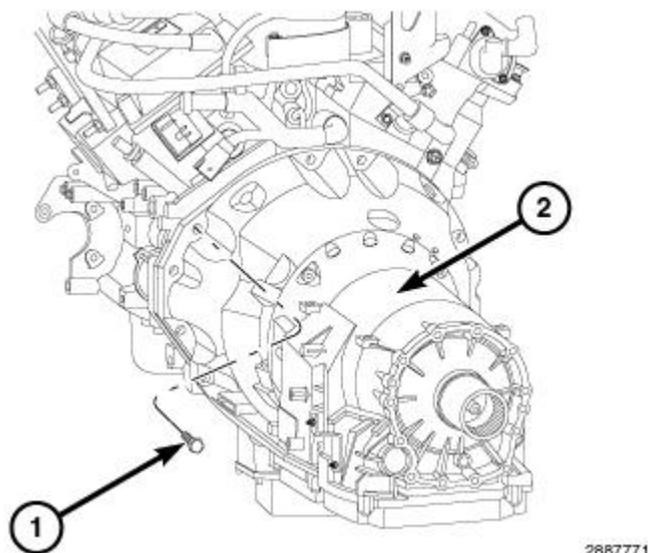
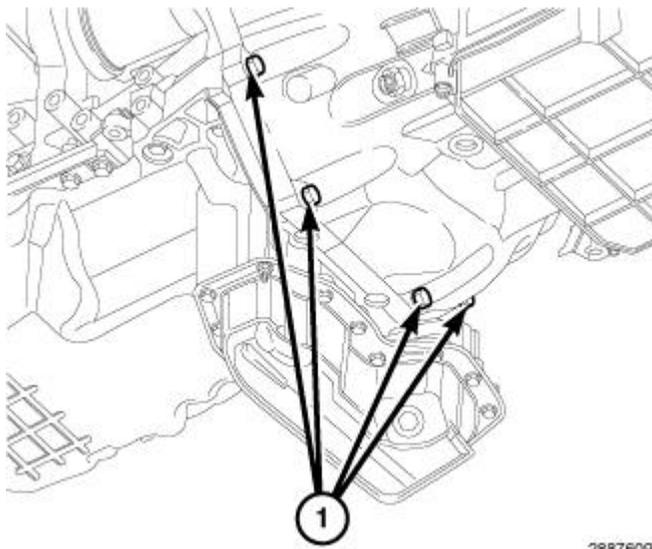


Fig. 88: Identifying Transmission & Bolts
 Courtesy of CHRYSLER LLC

10. Check condition of converter driveplate. Replace the plate if cracked, distorted or damaged. **Also be sure transmission dowel pins are seated in engine block and protrude far enough to hold transmission in alignment.**
11. Apply a light coating of Mopar® High Temp Grease to the torque converter hub pocket in the rear pocket of the engine's crankshaft.

12. Raise transmission and align the torque converter with the drive plate and the transmission converter housing with the engine block.
13. Move transmission forward. Then raise, lower, or tilt transmission to align the converter housing with the engine block dowels.
14. Carefully work transmission (2) forward and over engine block dowels until converter hub is seated in crankshaft. Verify that no wires, or the transmission vent hose, have become trapped between the engine block and the transmission.
15. Install two bolts (1) to attach the transmission to the engine.
16. Install remaining torque converter housing to engine bolts. Tighten to 39 N.m (29 ft.lbs.).



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Fig. 89: Identifying Lower Bolts
 Courtesy of CHRYSLER LLC

17. Install rear transmission crossmember. Tighten crossmember to frame bolts to 68 N.m (50 ft.lbs.).
18. Install rear support to transmission. Tighten bolts to 47 N.m (35 ft.lbs.).
19. Lower transmission onto crossmember and install bolts attaching transmission mount to crossmember. Tighten clevis bracket to crossmember bolts to 47 N.m (39 ft.lbs.). Tighten the clevis bracket to rear support bolt to 68 N.m (50 ft.lbs.).
20. Install the lower bolts (1) holding the transmission and engine. Tighten to 39 N.m (29 ft.lbs.).
21. Remove engine support fixture.

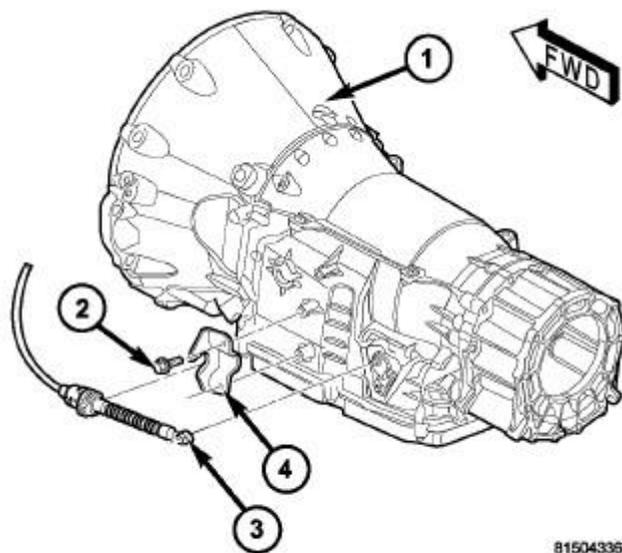


Fig. 90: Removing/Installing Shift Cable & Bracket
Courtesy of CHRYSLER LLC

22. Connect gearshift cable (3) to the gearshift cable bracket (4) and transmission (1).

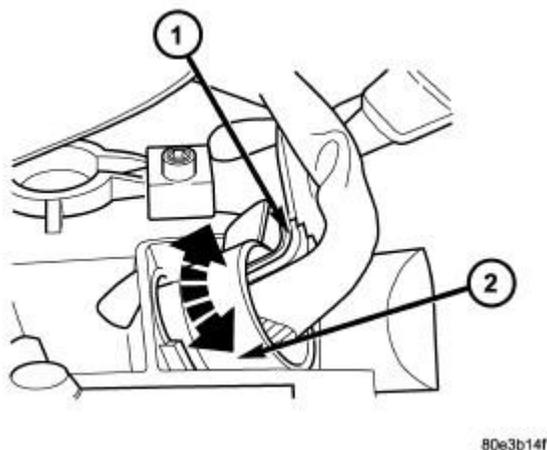
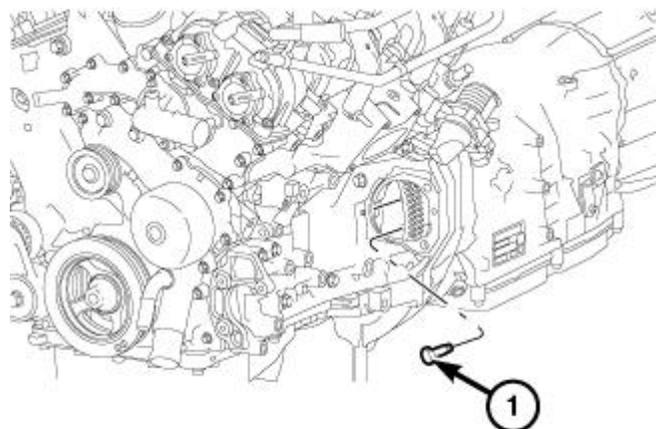


Fig. 91: Installing Plug Connector
Courtesy of CHRYSLER LLC

23. Check O-ring on plug connector (1), and replace if necessary.
24. Install the plug connector (1) into the adapter plug (2). Turn bayonet lock of the adapter plug (2) clockwise to connect plug connector (1).

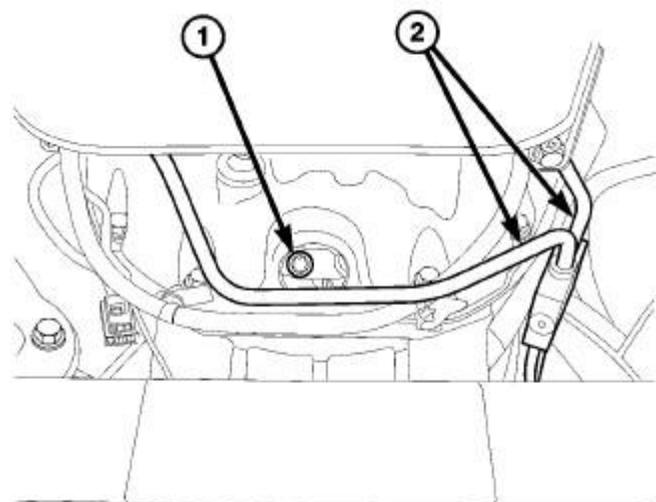


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Fig. 92: Identifying Converter Bolts
Courtesy of CHRYSLER LLC

CAUTION: It is essential that the correct length bolts are used to attach the converter to the flexplate. Bolts that are too long will damage the clutch surface inside the torque converter.

25. For gas engines, install all torque converter-to-driveplate bolts (1) by hand.
26. Verify that the torque converter is pulled flush to the driveplate. Tighten bolts to 42 N.m (31 ft. lbs.).



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Fig. 93: Torque Converter To Flex Plate Bolts & Fluid Lines
Courtesy of CHRYSLER LLC

CAUTION: It is essential that the correct length bolts are used to attach the

converter to the flexplate. Bolts that are too long will damage the clutch surface inside the torque converter.

27. For diesel engines, install all torque converter-to-driveplate bolts (1) by hand.
28. Verify that the torque converter is pulled flush to the driveplate. Tighten bolts to 42 N.m (31 ft. lbs.).

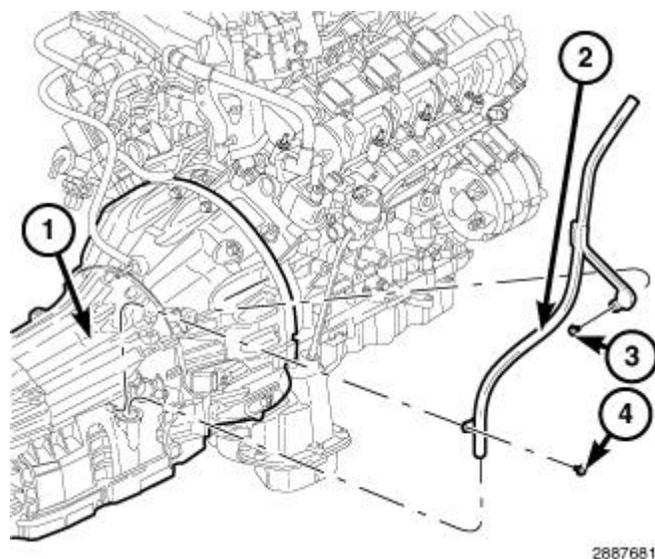


Fig. 94: Identifying Transmission, Transmission Fill Tube & Bolts
Courtesy of CHRYSLER LLC

29. Install starter motor. Refer to **STARTER, INSTALLATION** .
30. Install transmission fill tube (2).

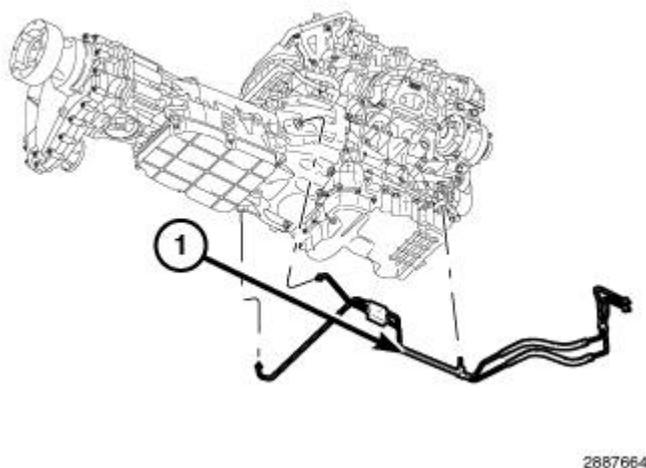


Fig. 95: Identifying Transmission Fluid Cooler Lines
Courtesy of CHRYSLER LLC

31. Connect cooler lines (1) to transmission.

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee

32. Install exhaust components.
33. Install transfer case. If necessary, refer to **REMOVAL** or **REMOVAL** .
34. Align and connect propeller shafts. Refer to **SHAFT, DRIVE, FRONT, INSTALLATION** and **SHAFT, DRIVE, REAR, INSTALLATION** .
35. Adjust gearshift cable if necessary. Refer to **CABLE, SHIFT, ADJUSTMENTS**.
36. Lower vehicle.
37. Connect negative battery cable.
38. Fill transmission with the appropriate fluid. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.
39. Verify proper operation.

SPECIAL TOOLS

SPECIAL TOOLS

10007 - Plate, Air Pressure Test (Originally Shipped In Kit Number(s) 10007.)
6311 - Gauge Bar (Originally Shipped In Kit Number(s) 6692, 9202, 9202A-CAN, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN.)
8266-18 - Spline Tool, NAG1 (Originally Shipped In Kit Number(s) 9202, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN, 9329, 9516, 9516-CAN, 9518, 9540, 9785.)
8266-8 - Handle (Originally Shipped In Kit Number(s) 9202A-CAN, 9202CC, 9299CC, 9299CC, 9300A-CAN.)
8900A - Multi Use Spring Compressor (Originally Shipped In Kit Number(s) 9202, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN, 9329-SUP, 9516-SUP, 9518-SUP, 9540-SUP, 9785-SUP.)
8901A - Pressing Tool (Originally Shipped In Kit Number(s) 8901A.)
8902A - Installer, Seal (Originally Shipped In Kit Number(s) 9202, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN, 9329, 9516, 9516-CAN, 9518, 9540, 9785.)
9078 - Staking Tool (Originally Shipped In Kit Number(s) 9202, 9202CC, 9299, 9300, 9300A-CAN, 9300-CAN, 9300-CAN, 9329, 9516, 9516-CAN, 9518, 9540, 9785.)
9082A - Remover, Bearing (Originally Shipped In Kit Number(s) 9202, 9299, 9329, 9516, 9518, 9540, 9785.)
9287 - Installer, Bearing (Originally Shipped In Kit Number(s) 9202, 9202CC, 9299, 9329, 9516, 9516-CAN, 9518, 9540, 9785.)
9336A - Dipstick (Originally Shipped In Kit Number(s) 9336A, 9541.)
9902 - Installer, Seal

(Originally Shipped In Kit Number(s) 9901.)

C-3339A - Set, Dial Indicator

(Originally Shipped In Kit Number(s) 9202.)

C-4171 - Driver Handle, Universal

(Originally Shipped In Kit Number(s) 9202, 9202A-CAN, 9202CC, 9299, 9299CC, 9299CC, 9300A-CAN.)

BEARING, OUTPUT SHAFT

REMOVAL

REMOVAL

1. Raise and support vehicle.
2. For 2WD transmissions:
 1. Remove the propeller shaft. Refer to **SHAFT, DRIVE, REAR, REMOVAL** .
 2. Remove the nut, with a 30 mm 12 point socket, holding the propeller shaft flange to the output shaft and remove the flange.
3. For 4WD transmissions:
 1. Remove the transfer case. Refer to **REMOVAL** or **REMOVAL** .
 2. Remove the bolts holding the transfer case adapter housing onto the transmission case.
 3. Remove the transfer case adapter housing from the transmission case.
 4. Remove the bolt holding the output shaft extension to the output shaft.
 5. Remove the output shaft extension from the output shaft.

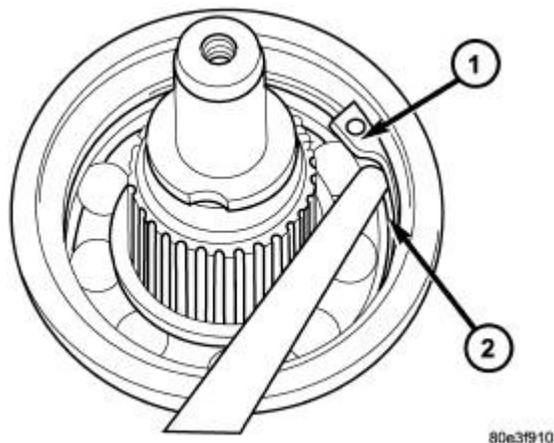


Fig. 96: Rear Output Shaft Retaining Ring
Courtesy of CHRYSLER LLC

1 - RETAINING RING

2 - OUTPUT SHAFT BEARING

4. Remove the transmission rear oil seal with a suitable slide hammer and screw.
5. Remove the transmission output shaft washer. Be sure to tag the washer since it is very similar to the geartrain end-play shim and they must not be interchanged.
6. Remove the transmission rear output shaft bearing retaining ring (1). Refer to **Fig. 96**.

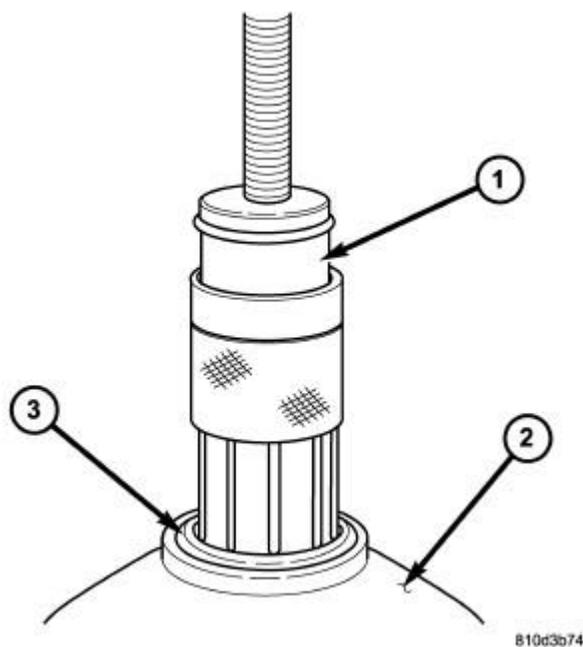


Fig. 97: Positioning Bearing Remover 9082A Over Inner Race Of Output Shaft Bearing
 Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A
2 - TRANSMISSION CASE
3 - OUTPUT SHAFT BEARING

7. Position Bearing Remover (special tool #9082A, Remover, Bearing) (1) over the inner race of the output shaft bearing (3). Refer to **Fig. 97**.

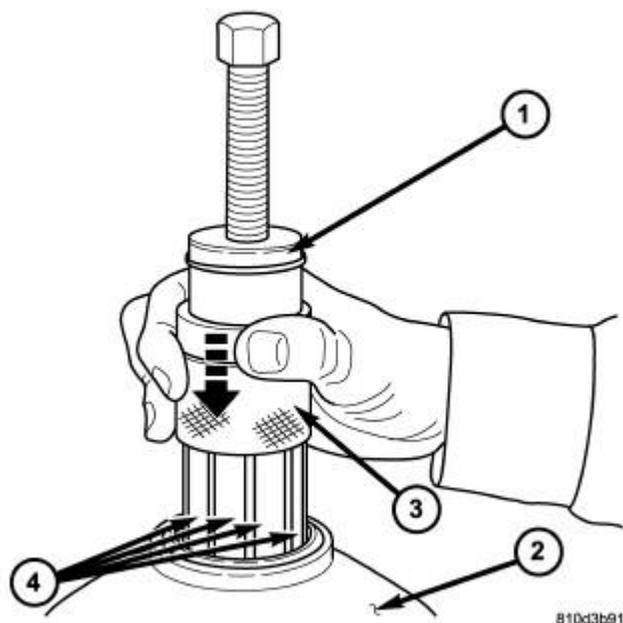


Fig. 98: Slide Remover 9082A Collar Downward
 Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A
2 - TRANSMISSION CASE
3 - COLLAR
4 - FINGERS

NOTE: Due to production variations in the bearing, it may not be possible to slide the collar fully downward. It is only necessary to slide the collar down far enough that the fingers securely grasp the inner bearing race.

- Slide the collar (3) on the Bearing Remover (special tool #9082A, Remover, Bearing) (1) downward over the fingers of the tool. Refer to **Fig. 98**.

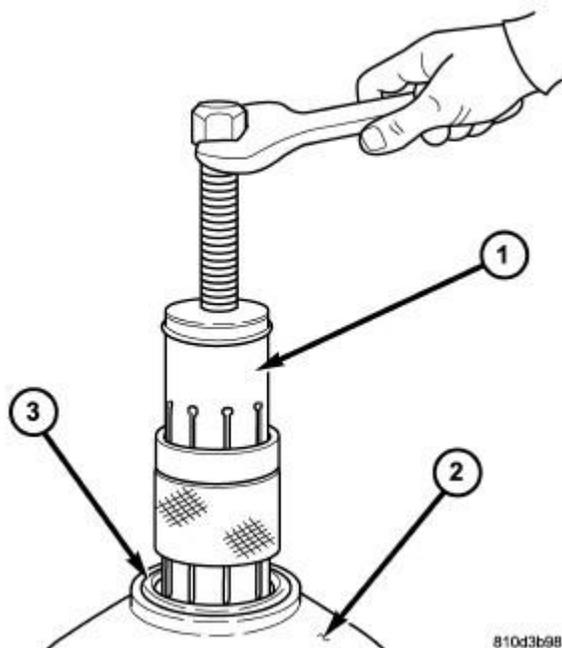


Fig. 99: Removing Output Shaft Bearing
Courtesy of CHRYSLER LLC

1 - BEARING REMOVER 9082A

2 - TRANSMISSION CASE

3 - OUTPUT SHAFT BEARING

9. Remove the output shaft bearing (3). Refer to **Fig. 99**.

CAUTION: Verify that the geartrain end-play shim has remained on the output shaft and against the park gear. The shim may be adhered to the bearing inner race. Retrieve the shim from the bearing and install over the output shaft and against the park gear.

INSTALLATION

INSTALLATION

NOTE: The output shaft shim should be 0.3 mm (0.012 in.). If a 0.3 mm (0.012 in.) shim is not available, use a 0.2 mm (0.008 in.) 0.4 mm (0.016 in.) or 0.5 mm (.020 in.) shim.

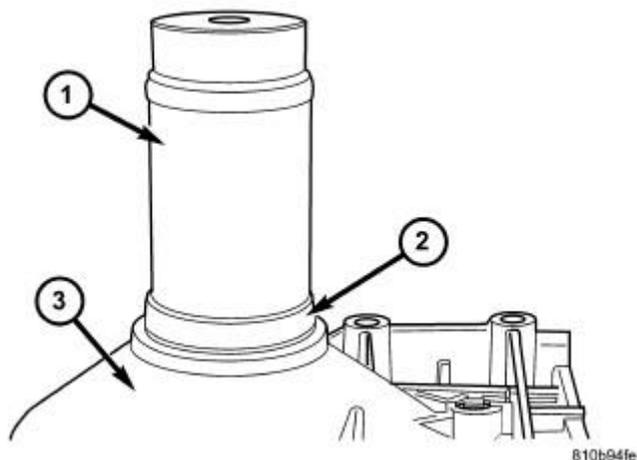


Fig. 100: Installing Output Shaft Bearing
 Courtesy of CHRYSLER LLC

1 - BEARING INSTALLER 9287

2 - BEARING

3 - TRANSMISSION CASE

CAUTION: Verify that the geartrain end-play shim is properly installed over the output shaft and against the park gear.

NOTE: The closed side of the bearing must be installed toward the parking lock gear. If the bearing is installed in the other direction, the transmission gearcase will need to be removed in order to remove the bearing.

1. Using Bearing Installer (special tool #9287, Installer, Bearing) (1), install the output shaft bearing (2) into the transmission housing (3). Refer to **Fig. 100**. The closed side of the plastic cage must point towards the parking lock gear.

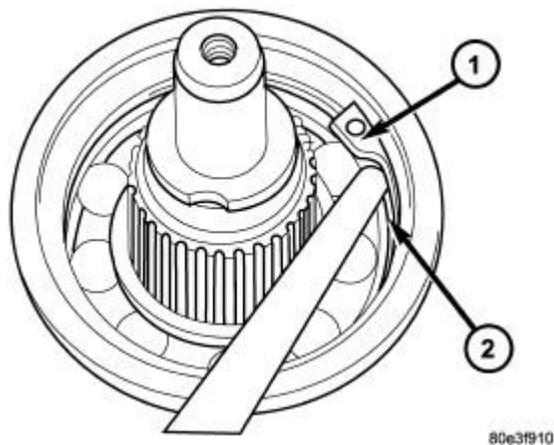


Fig. 101: Rear Output Shaft Retaining Ring
Courtesy of CHRYSLER LLC

1 - RETAINING RING

2 - OUTPUT SHAFT BEARING

2. Install the retaining ring (1). Refer to **Fig. 101**. Ensure that the retaining ring is seated correctly in the groove.
3. Check that there is no play between the bearing and the retaining ring using feeler gauge.
4. There must be no play between the retaining ring and the bearing. If the ring cannot be installed, a thinner ring must be used. If there is play between the ring and the bearing, a thicker ring must be installed. Retaining rings are available in thicknesses of 2.0 mm (0.079 in.), 2.1 mm (0.083 in.), and 2.2 mm (0.087 in.).

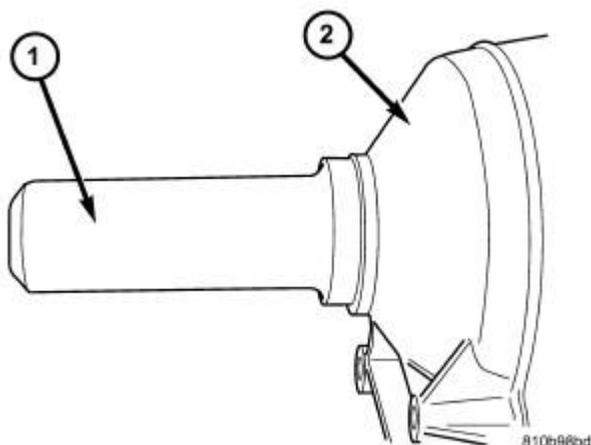


Fig. 102: Installing Output Shaft Seal
Courtesy of CHRYSLER LLC

1 - SEAL INSTALLER 8902A

2 - TRANSMISSION CASE

5. Install the output shaft washer onto the output shaft.
6. Install a new transmission rear seal into the transmission case with Seal Installer (special tool #8902A, Installer, Seal) (1). Refer to **Fig. 102**.
7. For 4WD transmissions:
 1. Install the output shaft extension onto the output shaft.
 2. Install the nut to hold the output shaft extension to the output shaft. Torque the bolt to 200 N.m (148 ft.lbs.).
 3. Install the transfer case adapter housing onto the transmission case.
 4. Install the bolts to hold the transfer case adapter housing onto the transmission case. Torque the bolt to 20 N.m (177 in.lbs.).

5. Install the transfer case. Refer to **INSTALLATION** or **INSTALLATION** .
8. For 2WD transmissions, install the propeller shaft flange onto the output shaft and install an new flange nut. Tighten the flange nut, with a 30 mm 12 point socket, to 200 N.m (148 ft.lbs.).

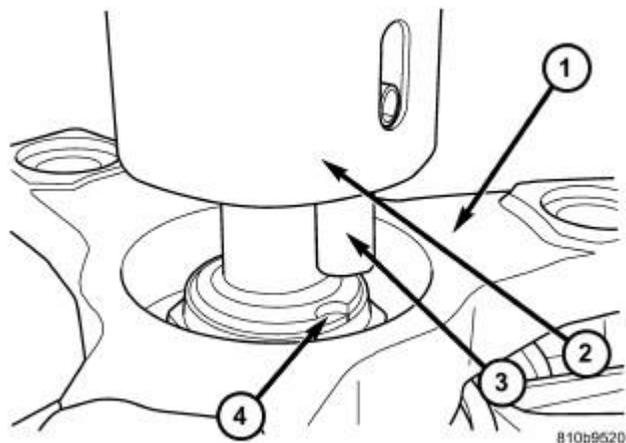


Fig. 103: Align Staking Tool
Courtesy of CHRYSLER LLC

1 - PROPELLER SHAFT FLANGE
2 - STAKING TOOL 9078
3 - ALIGNMENT PIN
4 - OUTPUT SHAFT NOTCH

NOTE: The Staking Tool - (special tool #9078, Staking Tool) has two possible locations for the beveled staking pin. The pin must be installed in the hole labeled "Transmission" for this operation. This hole is located directly across from the spring loaded alignment pin.

9. Place the Staking Tool (special tool #9078, Staking Tool) and Driver Handle (special tool #C-4171, Driver Handle, Universal) onto the output shaft.
10. Rotate the Staking Tool (special tool #9078, Staking Tool) (2) until the alignment pin (3) engages the output shaft notch (4). Refer to **Fig. 103**.

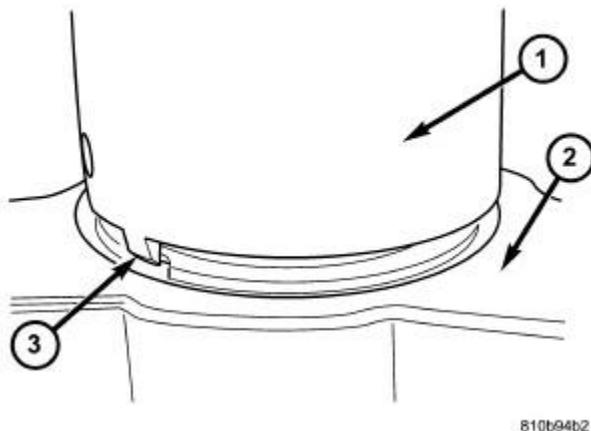


Fig. 104: Stake Output Shaft Nut
 Courtesy of CHRYSLER LLC

1 - STAKING TOOL 9078
2 - PROPELLER FLANGE
3 - STAKING PIN

11. Press downward on the staking tool until the staking pin contacts the output shaft nut flange. Refer to **Fig. 104**.
12. Strike the Driver handle (special tool #C-4171, Driver Handle, Universal) with a suitable hammer until the output shaft nut is securely staked to the output shaft.
13. For 2WD transmissions, install the propeller shaft. Refer to **SHAFT, DRIVE, REAR, INSTALLATION**.

CABLE, SHIFT

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - GEARSHIFT CABLE

1. The floor shifter lever and gate positions should be in alignment with all transmission PARK, NEUTRAL, and gear detent positions.
2. Engine starts must be possible with floor shift lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gear position.
3. With floor shift lever handle push-button not depressed and lever in:
 1. PARK position - Apply forward force on center of handle and remove pressure. Engine starts must be possible.
 2. PARK position - Apply rearward force on center of handle and remove pressure. Engine starts must be possible.
 3. NEUTRAL position - Normal position. Engine starts must be possible.
 4. NEUTRAL position - Engine running and brakes applied, apply forward force on center of shift

handle. Transmission shall not be able to shift from NEUTRAL to REVERSE.

ADJUSTMENTS

ADJUSTMENTS

Check adjustment by starting the engine in PARK and NEUTRAL. Adjustment is CORRECT if the engine starts only in these positions. Adjustment is INCORRECT if the engine starts in one but not both positions. If the engine starts in any position other than PARK or NEUTRAL, or if the engine will not start at all, the park/neutral position contact may be faulty.

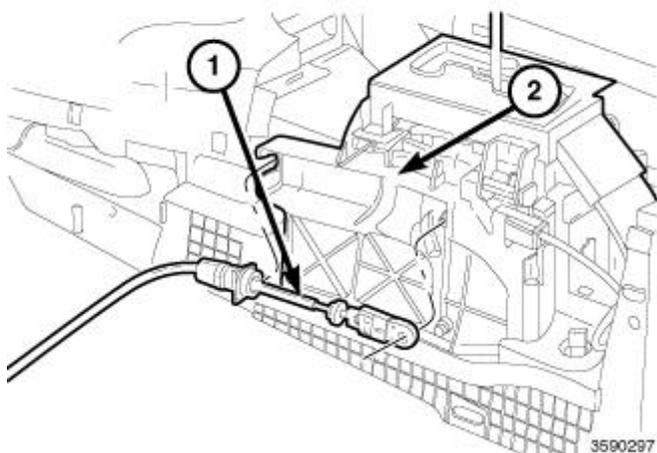


Fig. 105: Transmission Shift Cable
Courtesy of CHRYSLER LLC

1. Shift transmission into PARK.
2. Remove floor console as necessary for access to the shift cable adjustment. Refer to **CONSOLE, FLOOR, REMOVAL**.
3. Loosen the shift cable adjustment nut.
4. Raise vehicle.
5. Unsnap cable eyelet from transmission shift lever.
6. Verify transmission shift lever is in PARK detent by moving lever fully rearward. Last rearward detent is PARK position.
7. Verify positive engagement of transmission park lock by attempting to rotate propeller shaft. Shaft will not rotate when park lock is engaged.
8. Snap cable eyelet onto transmission shift lever.

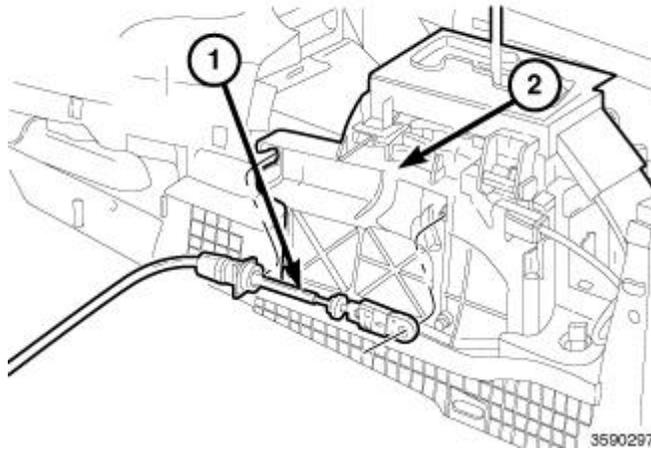


Fig. 106: Transmission Shift Cable
Courtesy of CHRYSLER LLC

9. Lower vehicle
10. Tighten the shift cable adjustment nut to 30 N.m (265 in.lbs.).
11. Verify correct operation.
12. Install any floor console components removed for access. Refer to **CONSOLE, FLOOR, INSTALLATION**.

REMOVAL

REMOVAL

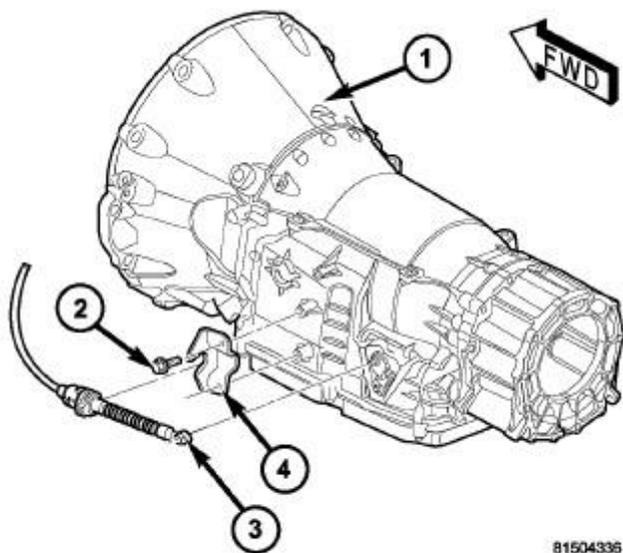


Fig. 107: Removing/Installing Shift Cable & Bracket
Courtesy of CHRYSLER LLC

1. Shift transmission into PARK.
2. Raise vehicle.
3. Disengage the gearshift cable (3) eyelet at transmission manual shift lever and pull cable out of the mounting bracket (4).

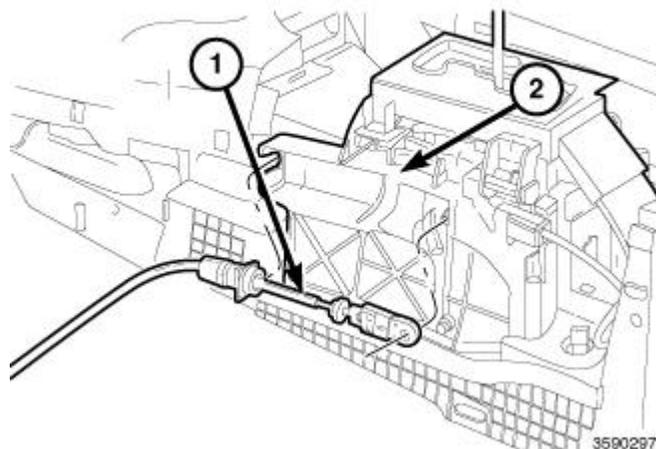


Fig. 108: Transmission Shift Cable
Courtesy of CHRYSLER LLC

4. Lower the vehicle.

5. Remove the floor console as necessary to access the shift mechanism and cables. Refer to **CONSOLE, FLOOR, REMOVAL**.
6. If necessary, remove the bolts holding the shield, covering the gearshift and park lock cables, to the shifter assembly and remove the shield.
7. Remove the gearshift cable (1) from the shift lever pin.
8. Remove the gearshift cable retainer from the notch in the shifter assembly.
9. From under the hood, remove the shift cable grommet from the dash panel.
10. Remove gearshift cable from vehicle.

INSTALLATION

INSTALLATION

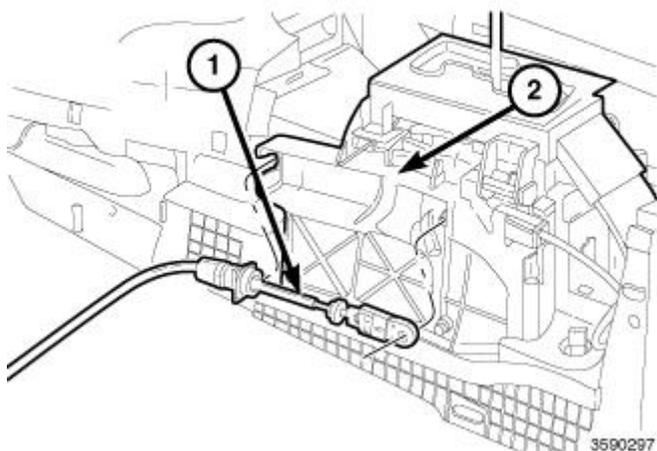


Fig. 109: Transmission Shift Cable
Courtesy of CHRYSLER LLC

1. From under the hood, route the gearshift cable (1) through the dash panel and toward the shifter assembly.
2. From under the hood, install the grommet to the dash panel.
3. Engage the gearshift cable retainer into the notch in the shifter assembly (2).
4. Install the gearshift cable (1) onto the shift lever pin.
5. Loosen the cable adjustment nut, if necessary.

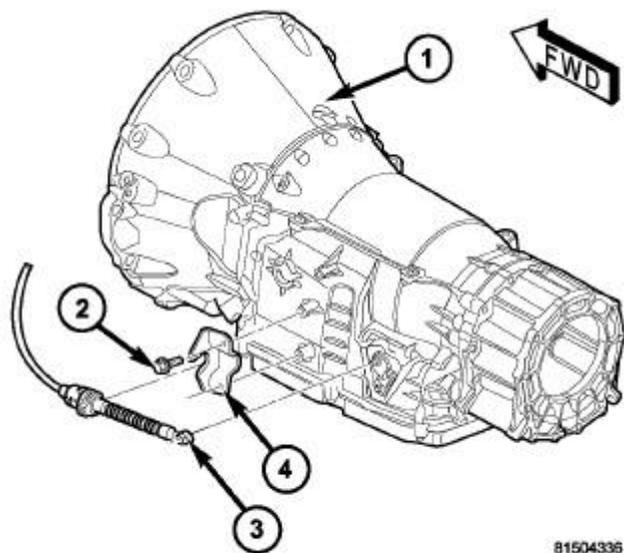


Fig. 110: Removing/Installing Shift Cable & Bracket
 Courtesy of CHRYSLER LLC

6. Raise vehicle.
7. Verify that the transmission is in the PARK position by trying to rotate the propeller shaft. If the propeller shaft rotates, move the transmission manual shift lever to the full rearward position and turn the propeller shaft until the PARK system is engaged.
8. Route the gearshift cable (3) through the mounting bracket (4).
9. Engage the gearshift cable (3) eyelet onto the transmission manual shift lever.

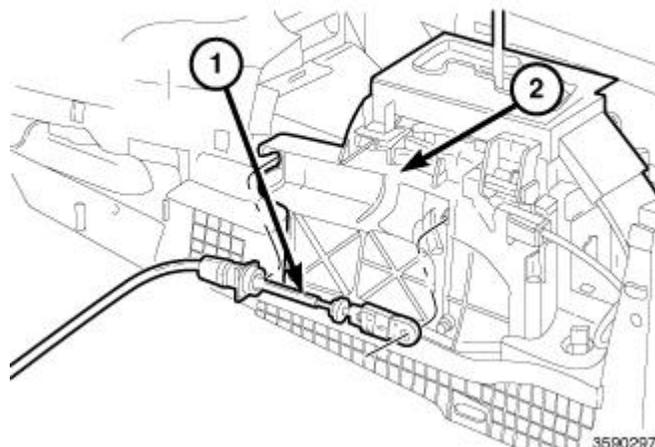


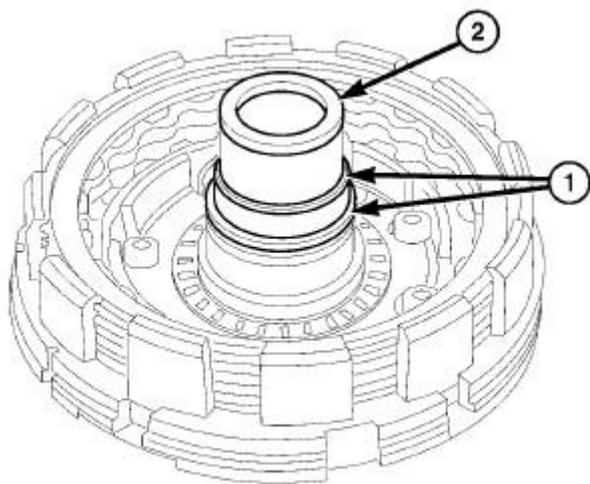
Fig. 111: Transmission Shift Cable
 Courtesy of CHRYSLER LLC

10. Lower vehicle.
11. Verify that the shifter is in the PARK position.
12. Tighten the adjustment nut to 30 N.m (265 in.lbs.).
13. Verify correct shifter operation.
14. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
15. Install the floor console, lower instrument panel components. Refer to **CONSOLE, FLOOR, INSTALLATION** and **PANEL, INSTRUMENT, INSTALLATION** .

CLUTCH, B1

DISASSEMBLY

DISASSEMBLY



812d4767

Fig. 112: Identifying Teflon Rings

Courtesy of CHRYSLER LLC

1 - TEFLON RINGS

2 - PLATE CARRIER HUB

1. Remove the teflon rings (1) from the B1 plate carrier hub (2). Refer to **Fig. 112**.

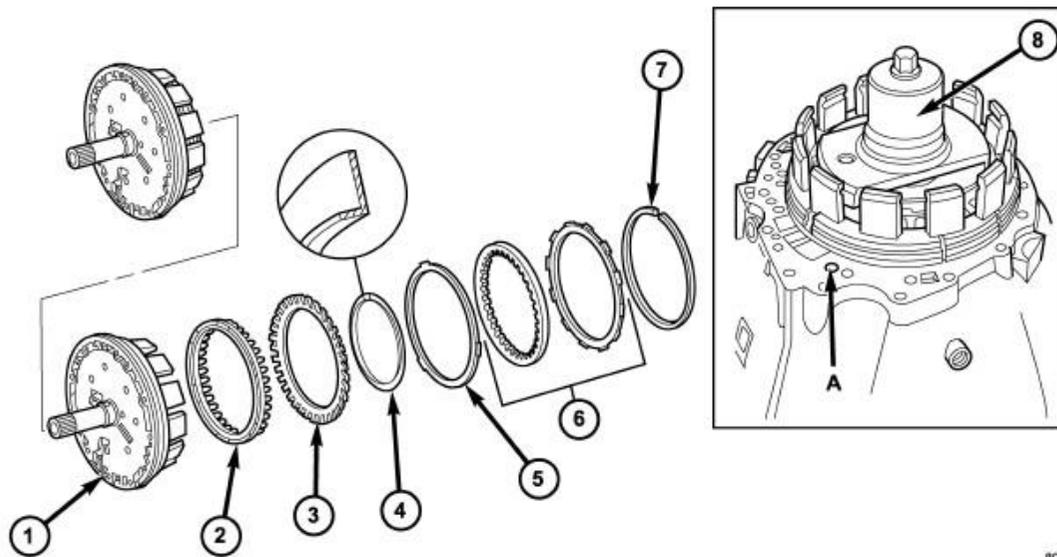


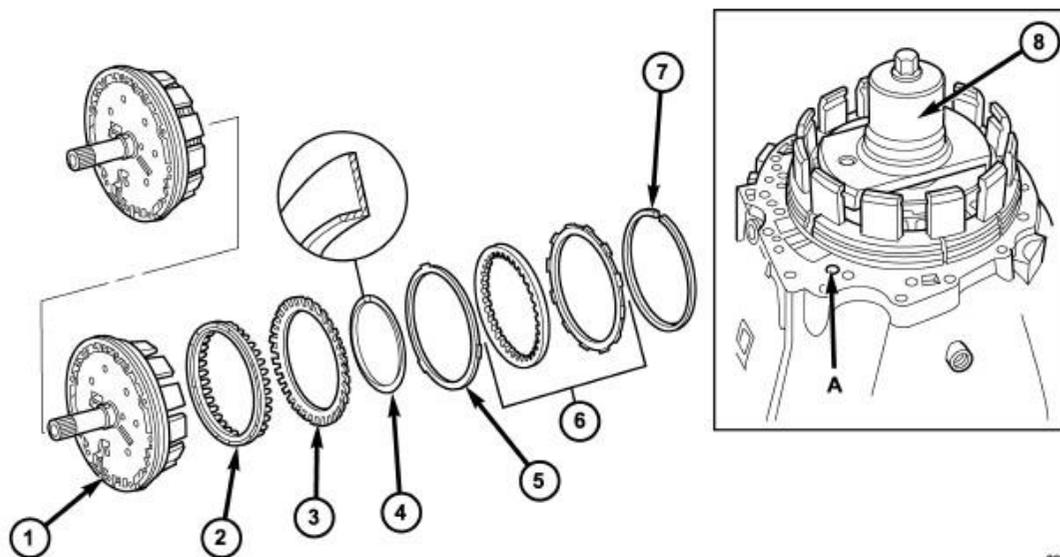
Fig. 113: Exploded View Of Holding Clutch B1
 Courtesy of CHRYSLER LLC

1 - HOLDING CLUTCH B1 OUTER CARRIER	5 - DISC SPRING
2 - PISTON	6 - MULTIPLE DISC PACK
3 - DISC SPRING	7 - SNAP-RING
4 - SNAP-RING	8 - MULTI-USE SPRING COMPRESSOR 8900

2. Remove snap-ring (7). Refer to **Fig. 113**.
3. Remove multiple-disc pack (6) and disc spring (5) from outer multiple-disc carrier. Note which clutch disc is removed just prior to the disc spring (5) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
4. Place the Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (8) on disc spring (3) and compress the spring until the snap-ring (4) is exposed. Refer to **Fig. 113**.
5. Remove snap-ring (4).
6. Remove piston (2) from the outer multiple-disc carrier by carefully blowing compressed air into the bore (A).

ASSEMBLY

ASSEMBLY



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Fig. 114: Exploded View Of Holding Clutch B1
 Courtesy of CHRYSLER LLC

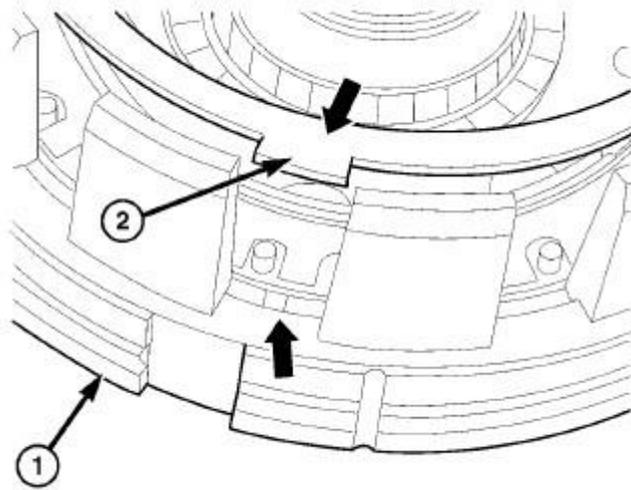
1 - HOLDING CLUTCH B1 OUTER CARRIER	5 - DISC SPRING
2 - PISTON	6 - MULTIPLE DISC PACK
3 - DISC SPRING	7 - SNAP-RING
4 - SNAP-RING	8 - MULTI-USE SPRING COMPRESSOR 8900

NOTE: Check vulcanized gasket, replace if necessary.

1. Install piston (2) in outer multiple-disc carrier (1). Refer to **Fig. 114**.
2. Place compressor (8) on disc spring (3) and compress until the groove of the snap-ring is exposed.

NOTE: The collar of the snap-ring must point towards the multiple-disc pack. After installing, check snap-ring for correct seat.

3. Insert snap-ring (4). Refer to **Fig. 114**.

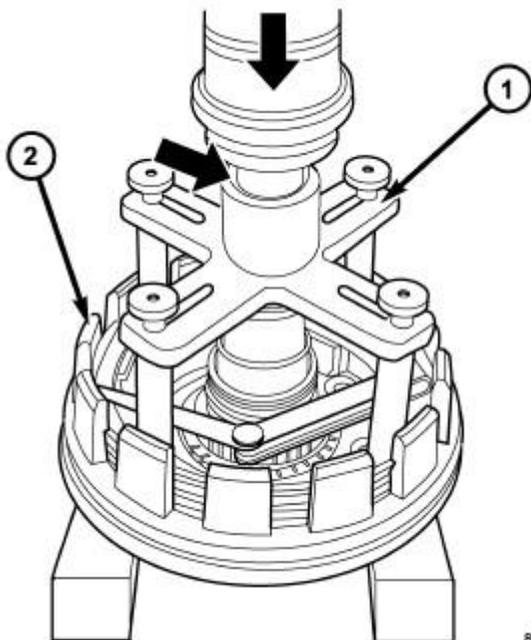


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Fig. 115: Installing The Disc Spring
 Courtesy of CHRYSLER LLC

- | |
|------------------------------|
| 1 - B1 MULTIPLE-DISC CARRIER |
| 2 - DISC SPRING |

4. Insert disc spring (2) in the outer multiple-disc carrier. Refer to **Fig. 115**. Observe the disc spring (2) installation position. The lugs of the disc spring (2) washer must align with the 3 raised pads (arrow) of the B1 multiple-disc carrier (1). The cone of the spring washer must point downwards.



80e43b13

Fig. 116: Measure B1 Clutch Clearance

Courtesy of CHRYSLER LLC

1 - PRESSING TOOL 8901A
2 - B1 CLUTCH OUTER CARRIER

5. Insert the multiple-disc pack (6) in the outer multiple-disc carrier and measure the clutch clearance.

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (5) to its original location.

CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.

6. Measure B1 clutch clearance by mounting Pressing Tool (special tool #8901A, Pressing Tool) (1) on outer multiple disc. Refer to **Fig. 116**.
7. Using a lever press, compress pressing tool to the upper most line marked 1200 N (the marking ring is still visible, see small arrow).

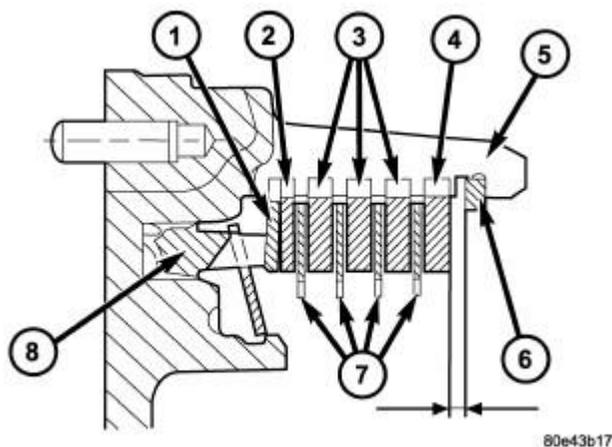


Fig. 117: B1 Clutch Stack-Up - Double Sided Discs
Courtesy of CHRYSLER LLC

1 - DISC SPRING

2 - OUTER MULTIPLE DISC - 1.8 mm (0.071 IN.)
3 - OUTER MULTIPLE DISC - 2.8 mm (0.110 IN.)
4 - OUTER MULTIPLE DISC - 4.0 mm (0.158 IN.)
5 - B1 OUTER CARRIER
6 - SNAP-RING
7 - INNER MULTIPLE DISCS
8 - PISTON

- For transmissions using double sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (6) and outer multiple-disc (4). Refer to **Fig. 117**. During the measurement, the snap-ring (6) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (5). The correct clearance for transmissions using double sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for two friction disc versions, 2.7-3.1 mm (0.106-0.122 in.) for three disc versions, and 3.0-3.4 mm (0.118-0.134 in.) for four disc versions.
- Adjust with snap-ring (6), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).

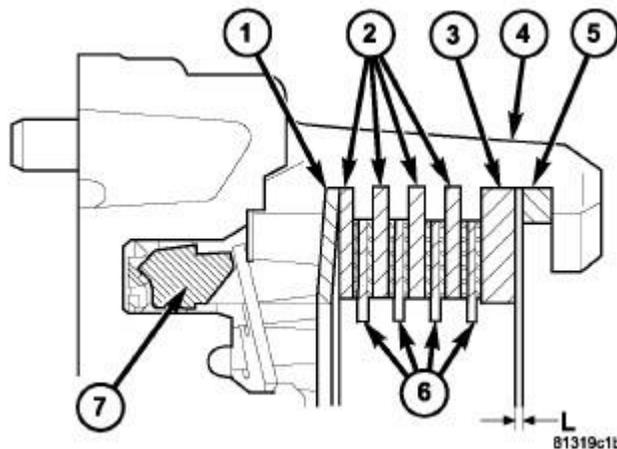
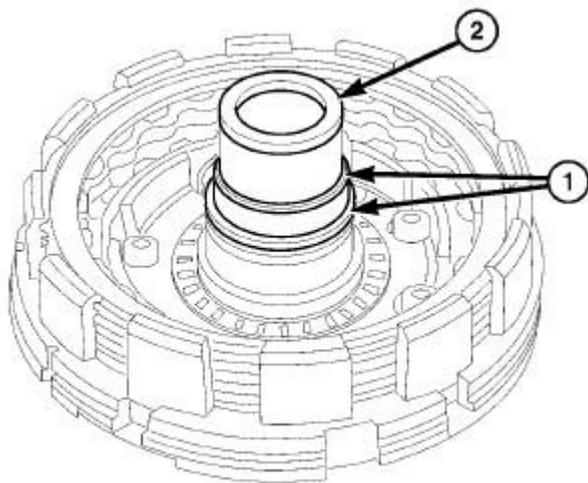


Fig. 118: B1 Clutch Stack-Up - Single Sided Discs
 Courtesy of CHRYSLER LLC

1 - DISC SPRING
2 - OUTER MULTIPLE DISC
3 - OUTER MULTIPLE DISC - 4.0 mm (0.158 IN.)
4 - B1 OUTER CARRIER
5 - SNAP-RING
6 - INNER MULTIPLE DISCS
7 - PISTON

- For transmissions using single sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (5) and outer multiple-disc (3). Refer to **Fig. 118**. During the measurement, the snap-ring (5) must contact the upper bearing surface of the groove in the outer multiple-disc carrier

- (4). The correct clearance is 2.2-2.6 mm (0.087-0.102 in.) for four friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for six disc versions, and 2.6-3.0 mm (0.102-0.118 in.) for eight disc versions.
11. Adjust with snap-ring (5), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).



812d4767

Fig. 119: Identifying Teflon Rings
 Courtesy of CHRYSLER LLC

1 - TEFLON RINGS
2 - PLATE CARRIER HUB

12. Install the teflon rings (1) onto the B1 plate carrier hub (2). Refer to **Fig. 119**.
13. Coat Teflon rings (1) lightly with grease and insert in the groove so that the joint remains together.

CLUTCH, B2

DISASSEMBLY

DISASSEMBLY

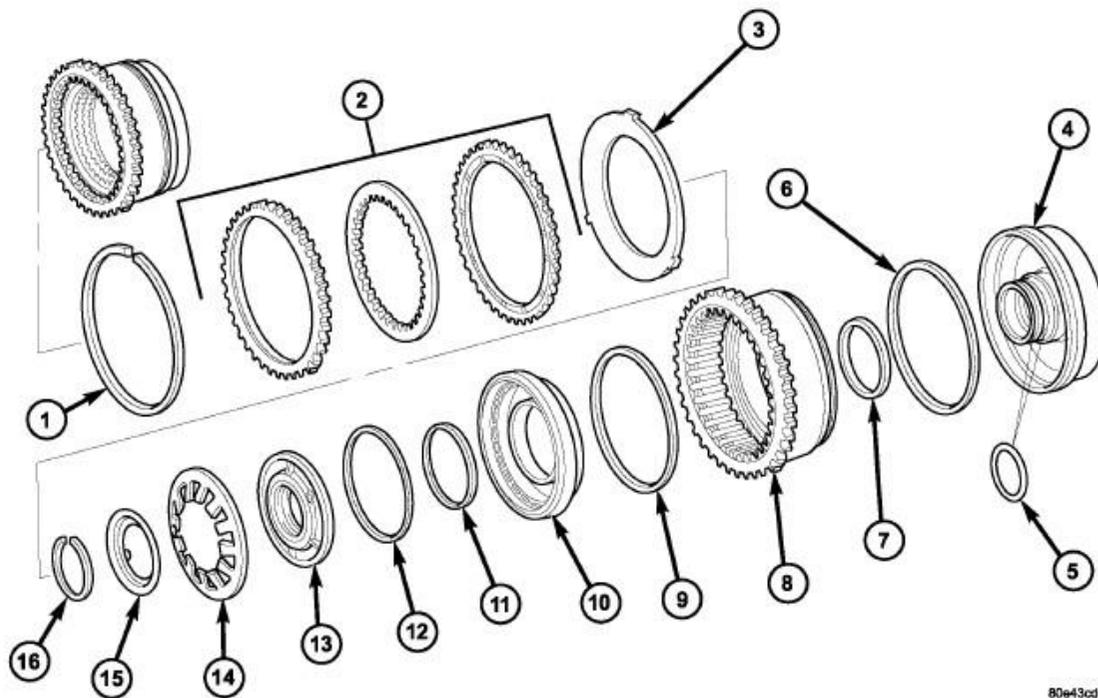


Fig. 120: Exploded View Of Holding Clutch B2
 Courtesy of CHRYSLER LLC

1 - SNAP-RING	9 - B2 PISTON SEALING RING
2 - MULTIPLE DISC PACK	10 - B2 PISTON
3 - DISC SPRING	11 - PISTON GUIDE SEALING RING
4 - B2 AND B3 PISTON GUIDE	12 - PISTON GUIDE SEALING RING
5 - O-RING	13 - PISTON GUIDE RING
6 - B3 PISTON SEALING RING	14 - PISTON BACK PRESSURE DISC SPRING
7 - B3 PISTON SEALING RING	15 - SPRING PLATE
8 - B3 PISTON/B2 OUTER DISC CARRIER	16 - SNAP-RING

1. Remove snap ring (1). Refer to **Fig. 120**.
2. Take multiple-disc pack B2 (2) and disc spring (3) out of the outer multiple-disc carrier B2 (8). The outer multiple-disc carrier for the multi-disc holding clutch B2 is the piston for the multiple-disc holding clutch B3 at the same time. Note which clutch disc is removed just prior to the disc spring (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
3. Place the Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) on the spring disc (14) and compress the spring until the groove for the snap-ring is exposed.
4. Remove snap-ring (16). Refer to **Fig. 120**.
5. Remove spring plate (15) and disc spring (14).

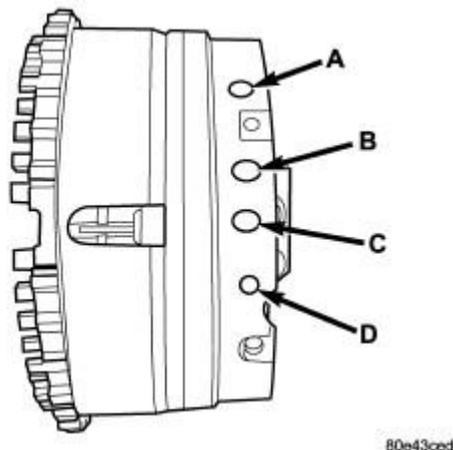


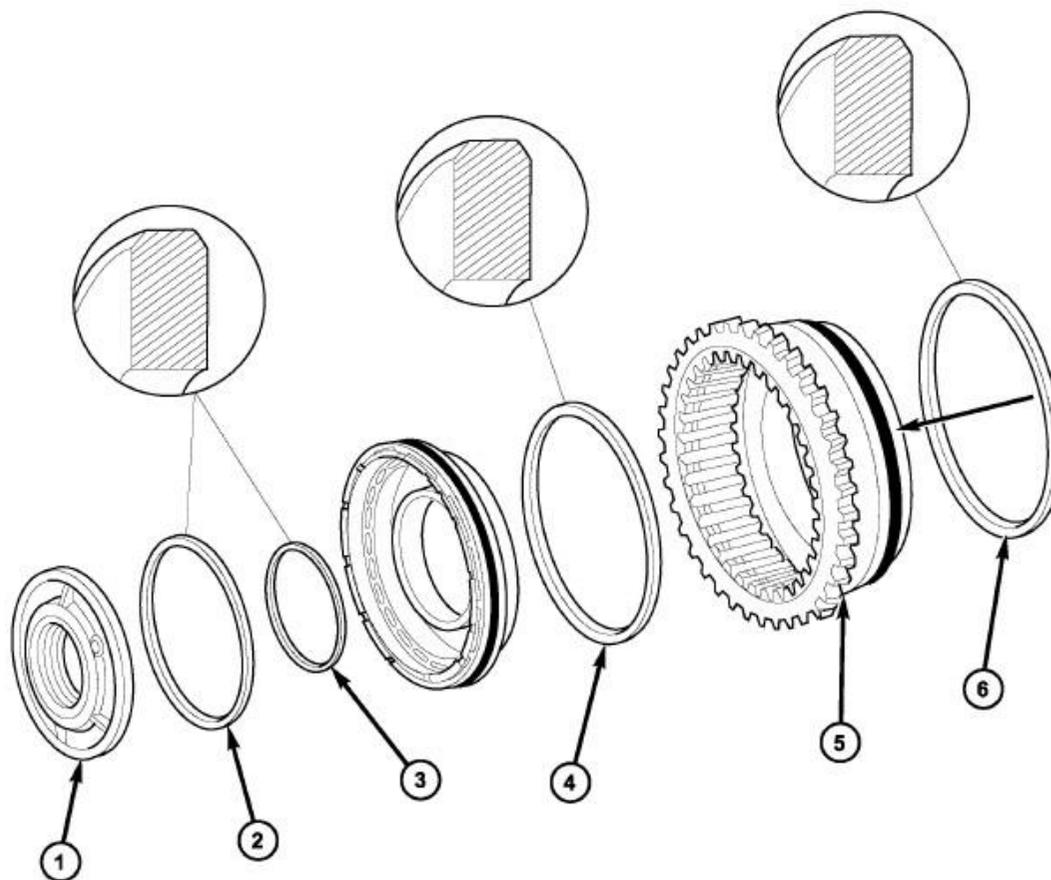
Fig. 121: B2 Clutch Oil Supply Locations
 Courtesy of CHRYSLER LLC

A - B3 PISTON
B - B2 PISTON GUIDE RING SIDE
C - K3 CLUTCH FEED
D - B2 PISTON SHIFT SIDE

6. Separate piston guide ring (13) and the B2 piston (10) from the B3 piston (8) by blowing compressed air into the bore (**D**). Refer to **Fig. 121**.
7. Press piston guide ring (13) out of the B2 piston (10).
8. Separate piston guide (4) from the B3 piston (8) by blowing compressed air into the bore (**A**). Refer to **Fig. 121**.

ASSEMBLY

ASSEMBLY



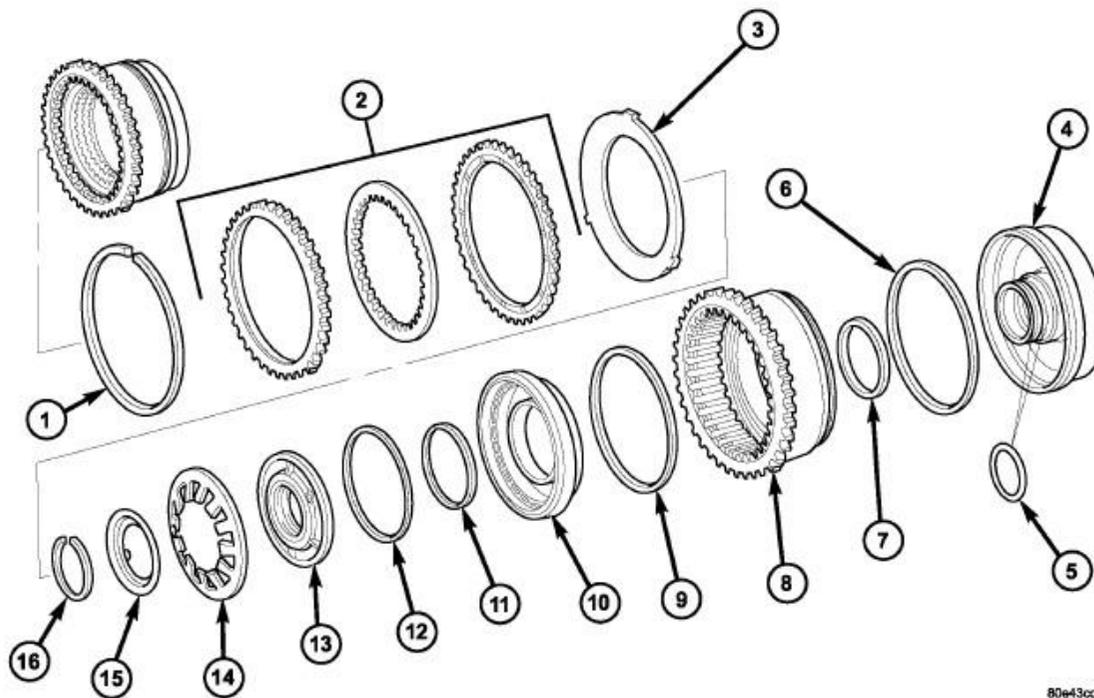
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Fig. 122: Holding Clutch B2/B3 Seals

Courtesy of CHRYSLER LLC

1 - PISTON GUIDE RING	4 - B2 PISTON SEALING RING
2 - PISTON GUIDE RING SEALING RING	5 - B3 PISTON/B2 OUTER DISC CARRIER
3 - PISTON GUIDE RING SEALING RING	6 - B3 PISTON SEALING RING

1. Check all sealing rings (2-4, 6), replace if necessary. Refer to **Fig. 122**. The rounded off edges on the sealing rings (2, 4, 6) must point outwards.



80e43cdd

Fig. 123: Exploded View Of Holding Clutch B2
 Courtesy of CHRYSLER LLC

1 - SNAP-RING	9 - B2 PISTON SEALING RING
2 - MULTIPLE DISC PACK	10 - B2 PISTON
3 - DISC SPRING	11 - PISTON GUIDE SEALING RING
4 - B2 AND B3 PISTON GUIDE	12 - PISTON GUIDE SEALING RING
5 - O-RING	13 - PISTON GUIDE RING
6 - B3 PISTON SEALING RING	14 - PISTON BACK PRESSURE DISC SPRING
7 - B3 PISTON SEALING RING	15 - SPRING PLATE
8 - B3 PISTON/B2 OUTER DISC CARRIER	16 - SNAP-RING

- Assemble piston guide (4) and B3 piston (8) in the correct position. Refer to **Fig. 123**. Verify that the missing tooth in the B3 piston/B2 outer disc carrier (8) is aligned with the centerline of the two threaded holes in the B2 and B3 piston guide (4).
- Insert B2 piston (10) in B3 piston (8). Refer to **Fig. 123**.

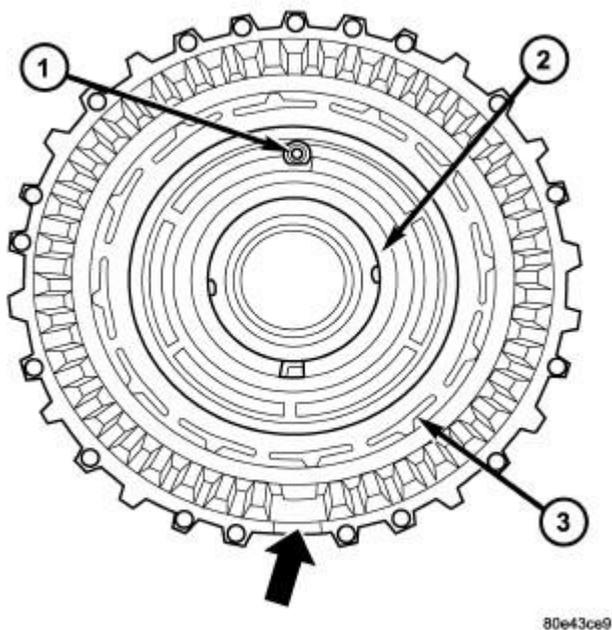


Fig. 124: B2 Piston & Piston Guide Ring
 Courtesy of CHRYSLER LLC

1 - VALVE
2 - PISTON GUIDE RING
3 - B2 PISTON

4. Insert piston guide ring (2). Refer to **Fig. 124**. The valve (1) in the piston guide ring must be on top.
5. Insert disc spring (14) and spring plate (15). Refer to **Fig. 123**. Insert disc spring with the curvature towards the spring plate
6. Place Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) on the disc spring (14) and compress the spring until the groove for the snap-ring is exposed.
7. Insert snap-ring (16).

NOTE: Pay attention to sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (3) to its original location. Place new friction multiple-discs in ATF fluid for one hour before installing.

8. Insert disc spring (3) and multiple-disc pack (2) in the B2 outer multiple-disc carrier.
9. Insert snap-ring (1).

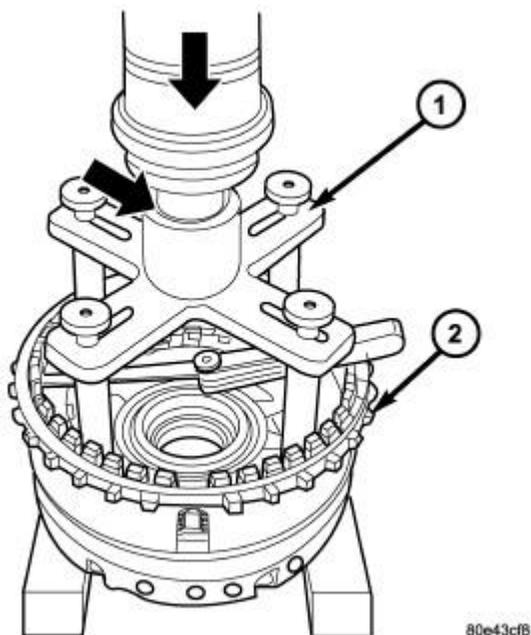


Fig. 125: Measuring B2 Clutch Clearance
Courtesy of CHRYSLER LLC

1 - PRESSING TOOL 8901A
2 - B3 PISTON / B2 OUTER DISC CARRIER

NOTE: During the measurement the snap-ring must contact the upper bearing surface of the groove in the outer multiple-disc carrier.

10. Measure the B2 clutch pack clearance by mounting the Pressing Tool 8901A (1) on outer multiple disc. Refer to **Fig. 125**.
11. Using a lever press, compress pressing tool to the upper most line marked 1200 N (the marking ring is still visible, see small arrow).

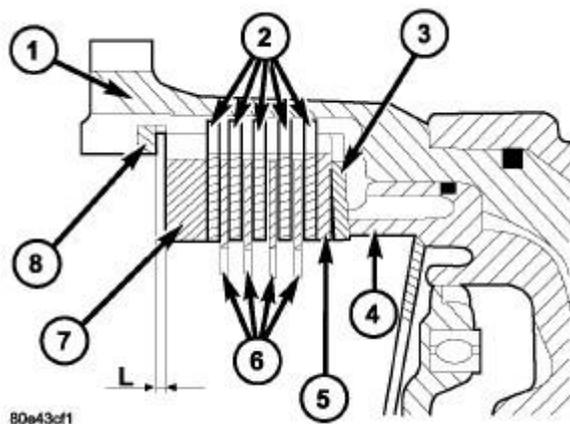


Fig. 126: B2 Clutch Stack-Up
 Courtesy of CHRYSLER LLC

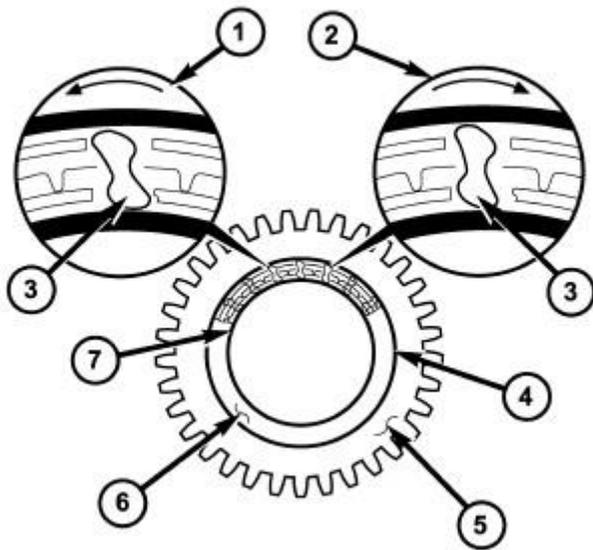
1 - B2 OUTER DISC CARRIER
2 - FRICTION DISCS
3 - DISC SPRING
4 - B2 PISTON
5 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
6 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
7 - OUTER MULTIPLE DISC - 6.5 MM (0.256 IN.)
8 - SNAP-RING

12. Using a feeler gauge, determine the play "L" at three points between the snap-ring (8) and outer multiple-disc (7). Refer to **Fig. 126**.
13. The correct clutch clearance is 1.9-2.3 mm (0.075-0.091 in.) for the four friction disc versions and 2.0-2.4 mm (0.079-0.095 in.) for the five disc versions.
14. Adjust with snap-ring (8), if necessary. Snap-rings are available in thicknesses of 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).

CLUTCH, FREEWHEELING

DESCRIPTION

DESCRIPTION



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Fig. 127: Identifying Freewheeling Clutch Components
 Courtesy of CHRYSLER LLC

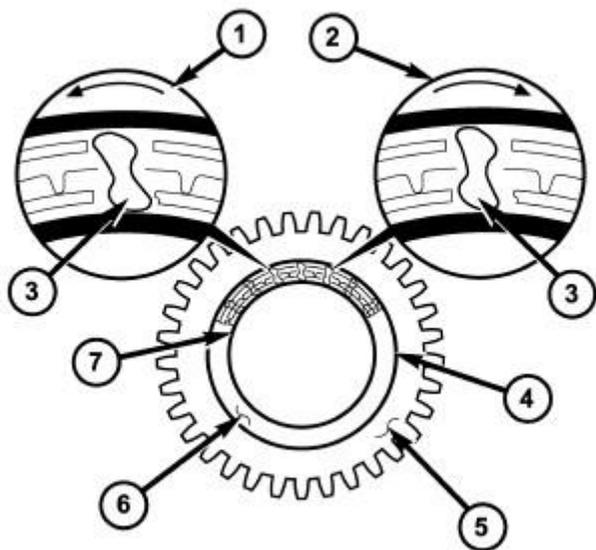
1 - ROTATION DIRECTION "A"
2 - ROTATION DIRECTION "B"
3 - LOCKING ELEMENTS
4 - OUTER RACE
5 - FRONT OR REAR SUN GEAR
6 - LOCKING ELEMENT CAGE
7 - INNER RACE

Freewheeling clutches are installed in the front planetary gear set between the sun gear and the stator shaft, and in the rear planetary gear set between the sun gear and the intermediate shaft. Refer to **Fig. 127**.

The freewheel consists of an outer race (4), an inner race (7), a number of locking elements (3) and a cage (6) for these locking elements.

OPERATION

OPERATION



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Fig. 128: Identifying Freewheeling Clutch Components

Courtesy of CHRYSLER LLC

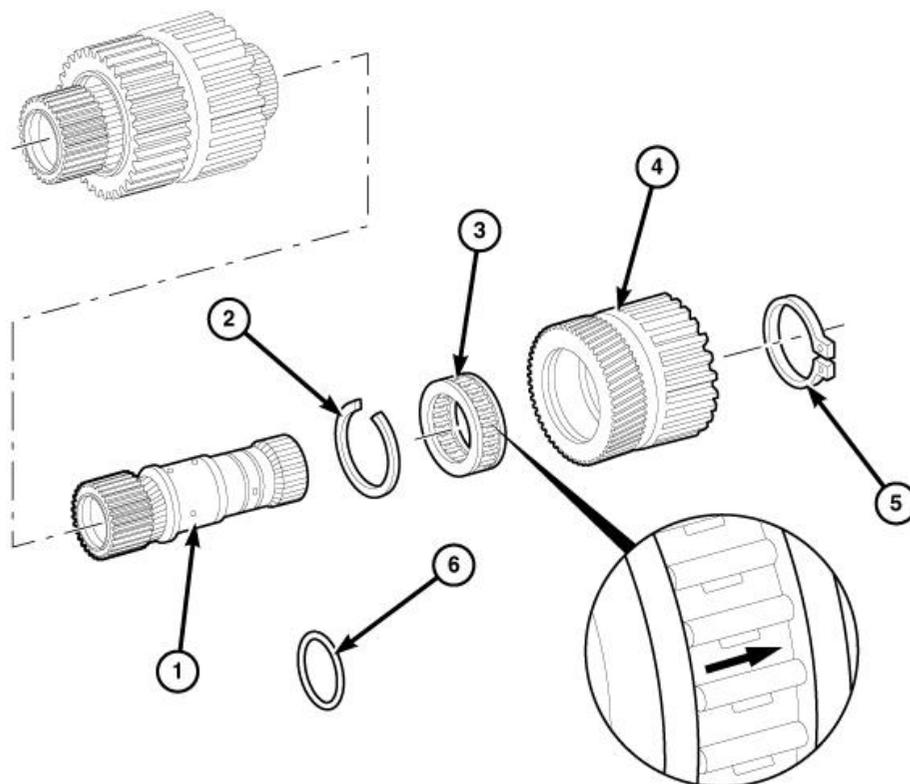
1 - ROTATION DIRECTION "A"
2 - ROTATION DIRECTION "B"
3 - LOCKING ELEMENTS
4 - OUTER RACE
5 - FRONT OR REAR SUN GEAR
6 - LOCKING ELEMENT CAGE
7 - INNER RACE

The freewheeling clutch optimizes individual gearshifts. Refer to **Fig. 128**. They lock individual elements of a planetary gear set together or against the transmission housing in one direction of rotation to allow the torque to be transmitted.

If the inner race (7) of the freewheeling clutch is locked and the outer race (4) turns counter-clockwise (1), the locking elements (3) adopt a diagonal position on account of their special contours, allowing the freewheel function. The inner race (4) slides under the locking elements (3) with minimal friction. If the rotation of the outer race (4) changes to clockwise (2), the locking elements (3) stand up and lock the outer and inner races (4, 7) together.

DISASSEMBLY

DISASSEMBLY

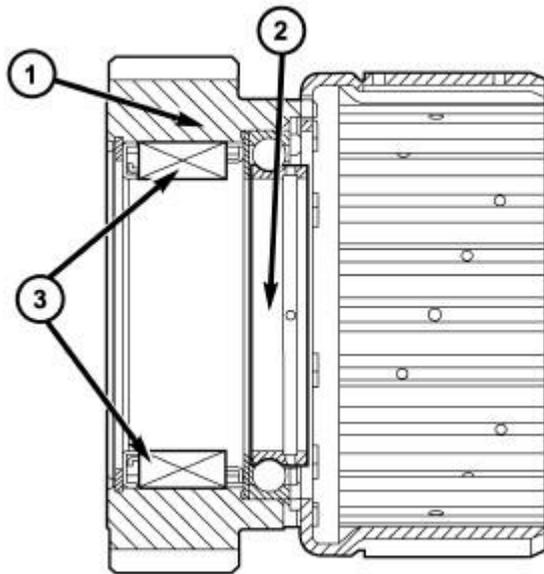


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Fig. 129: Identifying Freewheeling Clutch F2
 Courtesy of CHRYSLER LLC

1 - HOLLOW SHAFT	4 - K3 INNER DISC CARRIER AND REAR PLANETARY SUN GEAR
2 - F2 CLUTCH SNAP-RING	5 - RETAINING RING
3 - FREEWHEELING CLUTCH F2	6 - O-RINGS

1. Remove retaining ring (5) from hollow shaft (1). Refer to **Fig. 129**.
2. Remove rear sun gear (4) with the K3 internally toothed disk carrier and rear freewheeling clutch F2 (3).
3. Remove snap-ring (2) for freewheel. Refer to **Fig. 129**.
4. Press freewheeling clutch (3) out of sun gear.
5. Check O-rings (6), replace if necessary.



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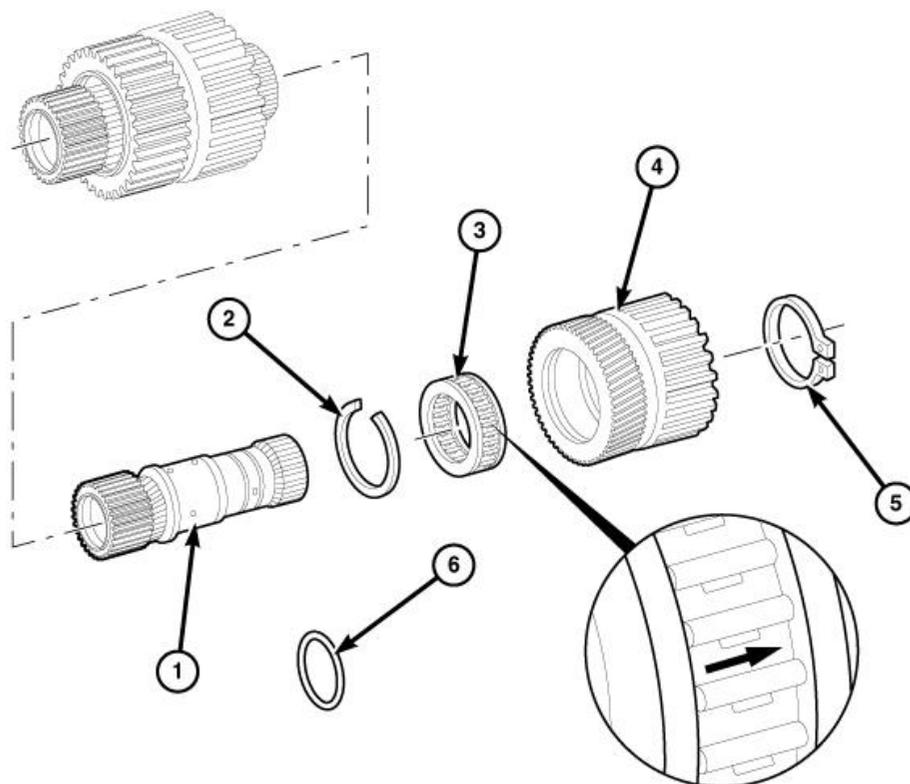
Fig. 130: Freewheeling Clutch F2 Anti-Friction Bearing
Courtesy of CHRYSLER LLC

1 - K3 INNER DISC CARRIER AND REAR PLANETARY SUN GEAR
2 - ANTI-FRICTION BEARING
3 - FREEWHEELING CLUTCH F2

6. Check the anti-friction bearing (2) in the rear planetary sun gear for damage. Refer to **Fig. 130**. Replace as necessary.

ASSEMBLY

ASSEMBLY



10705

Fig. 131: Identifying Freewheeling Clutch F2

Courtesy of CHRYSLER LLC

1 - HOLLOW SHAFT	4 - K3 INNER DISC CARRIER AND REAR PLANETARY SUN GEAR
2 - F2 CLUTCH SNAP-RING	5 - RETAINING RING
3 - FREEWHEELING CLUTCH F2	6 - O-RINGS

NOTE: On freewheeling F2 clutches (3) with metal cages, the side of the freewheeling clutch with the markings (part number, etc.) must be up when the clutch is installed in the sun gear (4). Markings will be visible when the clutch is installed before installing the snap-ring.

NOTE: On freewheeling F2 clutches (3) with plastic cages, the directional arrow on the side of the freewheeling clutch indicates the direction of installation into the sun gear (4). The brass top of the cage will be toward the snap-ring.

1. Press freewheeling clutch F2 (3) into sun gear (4).
2. Install snap-ring (2) for freewheeling clutch.
3. Check O-rings (6) on hollow shaft, replace if necessary.
4. Install rear sun gear (4) with K3 internally toothed disc carrier and rear freewheeling clutch (3) onto the hollow shaft.

5. Verify proper operation of the freewheeling clutch F2. When the assembly is held with the F2 clutch snap-ring upward, it should be possible to rotate the hollow shaft counter-clockwise.
6. Install retaining ring (5) onto hollow shaft (1).

CLUTCH, INPUT

DESCRIPTION

DESCRIPTION

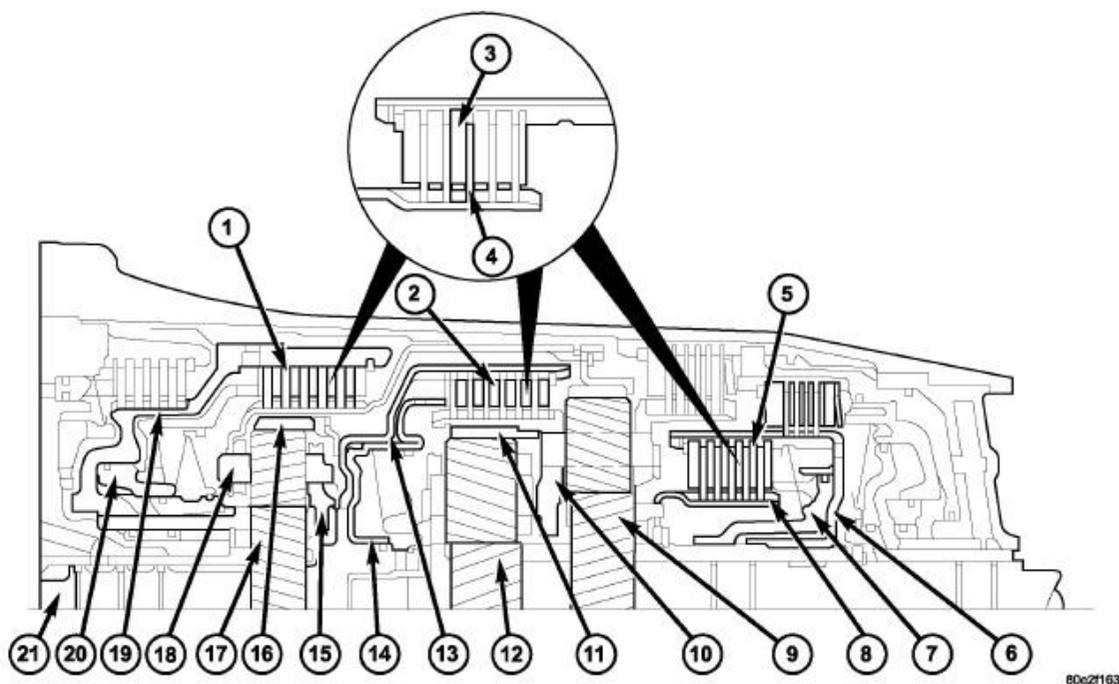


Fig. 132: Identifying Input Clutches

Courtesy of CHRYSLER LLC

1 - K1 CLUTCH	12 - CENTER PLANETARY GEARSET SUN GEAR
2 - K2 CLUTCH	13 - K2 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
3 - EXTERNALLY TOOTHED DISC	14 - K2 CLUTCH PISTON
4 - INTERNALLY TOOTHED DISC	15 - FRONT PLANETARY GEARSET PLANETARY CARRIER
5 - K3 CLUTCH	16 - FRONT PLANETARY GEARSET ANNULUS GEAR
6 - K3 CLUTCH EXTERNALLY TOOTHED DISC CARRIER	17 - FRONT PLANETARY GEARSET SUN GEAR
7 - K3 CLUTCH PISTON	18 - K1 CLUTCH INTERNALLY TOOTHED DISC CARRIER

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8 - K3 CLUTCH INTERNALLY TOOTHED DISC CARRIER	19 - K1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET SUN GEAR	20 - K1 CLUTCH PISTON
10 - CENTER PLANETARY GEARSET PLANETARY CARRIER	21 - INPUT SHAFT
11 - CENTER PLANETARY GEARSET ANNULUS GEAR	

Three multi-plate input clutches (1, 2, 5), the front, middle and rear multi-plate clutches K1 (1), K2 (2), and K3 (5), are located in the planetary gear sets in the transmission housing. Refer to **Fig. 132**.

A multi-plate input clutch consists of a number of internally toothed discs (4) on an internally toothed disc carrier and externally toothed discs (3) on an externally toothed disc carrier.

OPERATION

OPERATION

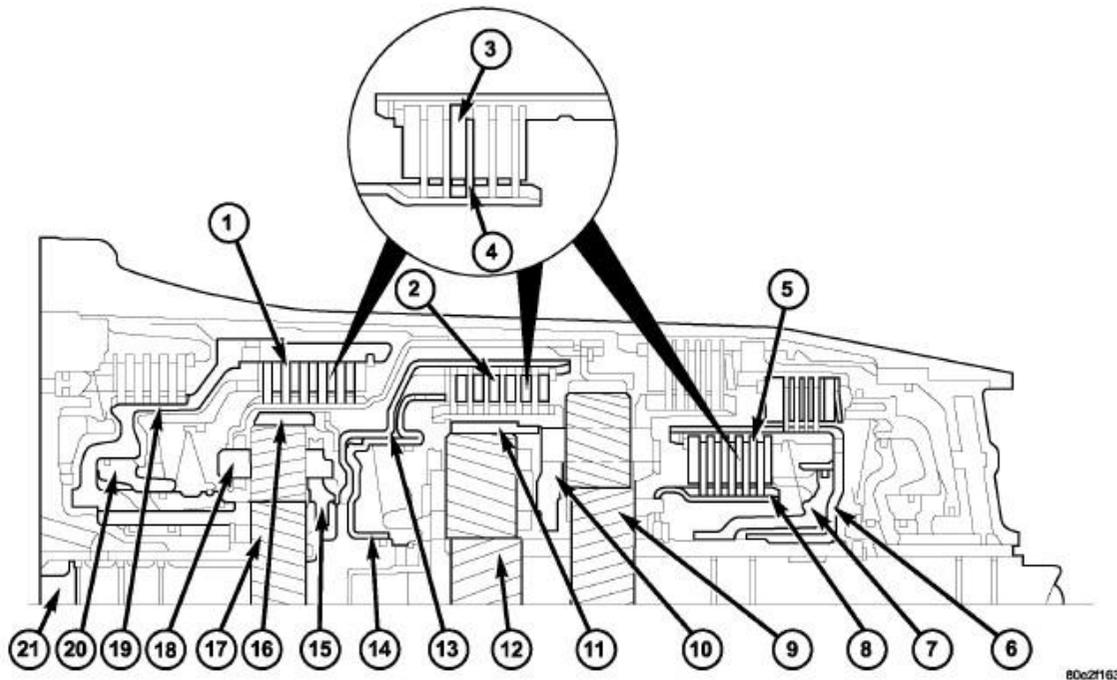


Fig. 133: Identifying Input Clutches
Courtesy of CHRYSLER LLC

1 - K1 CLUTCH	12 - CENTER PLANETARY GEARSET SUN GEAR
2 - K2 CLUTCH	13 - K2 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
3 - EXTERNALLY TOOTHED DISC	14 - K2 CLUTCH PISTON

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4 - INTERNALLY TOOTHED DISC	15 - FRONT PLANETARY GEARSET PLANETARY CARRIER
5 - K3 CLUTCH	16 - FRONT PLANETARY GEARSET ANNULUS GEAR
6 - K3 CLUTCH EXTERNALLY TOOTHED DISC CARRIER	17 - FRONT PLANETARY GEARSET SUN GEAR
7 - K3 CLUTCH PISTON	18 - K1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
8 - K3 CLUTCH INTERNALLY TOOTHED DISC CARRIER	19 - K1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET SUN GEAR	20 - K1 CLUTCH PISTON
10 - CENTER PLANETARY GEARSET PLANETARY CARRIER	21 - INPUT SHAFT
11 - CENTER PLANETARY GEARSET ANNULUS GEAR	

The input clutches produce a non-positive locking connection between two elements of a planetary gear set or between one element from each of two planetary gear sets in order to transmit the drive torque. Refer to **Fig. 133**.

If the piston (20) on multi-plate clutch K1 (1) is subjected to oil pressure, it presses the internal and external discs of the disc set together. The sun gear (17) is locked with the planetary carrier (15) via the externally toothed disc carrier (19) and the internally toothed disc carrier (18). The front planetary gear set is thus locked and turns as a closed unit.

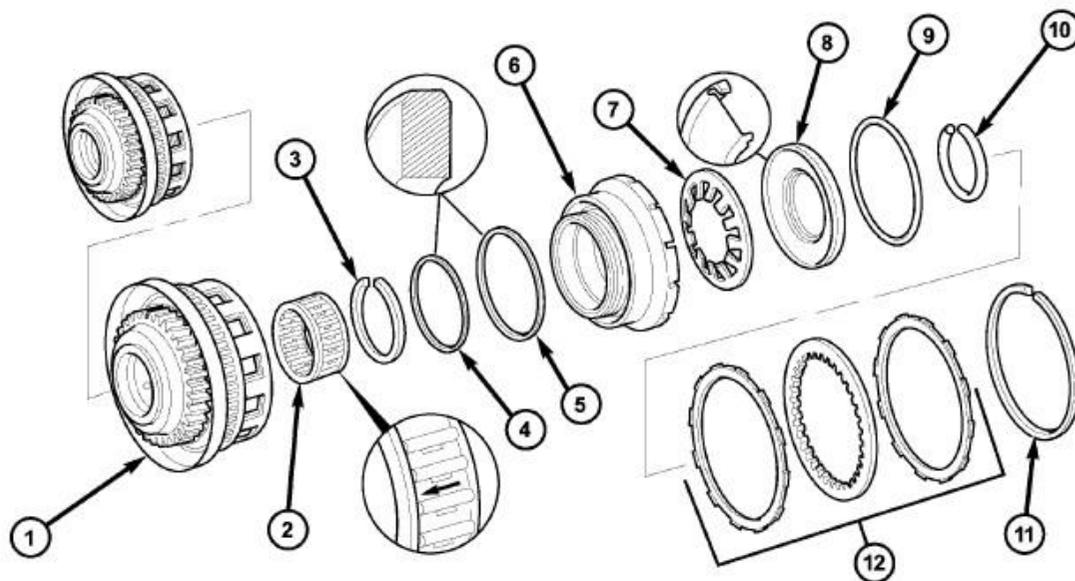
If the multi-plate clutch K2 (2) is actuated via the piston (14), the piston compresses the disc set. The annulus gear (16) of the front planetary gear set is locked with the annulus gear (11) of the center planetary gear set via the externally toothed disc carrier (13) and the center planetary carrier (10) on which the internally toothed discs are seated. Annulus gear (16) and annulus gear (11) turn at the same speed as the input shaft (21)

If the multi-plate clutch K3 (5) is actuated via the piston (7), the piston compresses the disc set. The sun gear (12) of the center planetary gear set is locked with the sun gear (9) of the rear planetary gear set via the externally toothed disc carrier (6) and the internally toothed disc carrier (8). Sun gear (12) and sun gear (9) turn at the same speed.

CLUTCH, K1

DISASSEMBLY

DISASSEMBLY

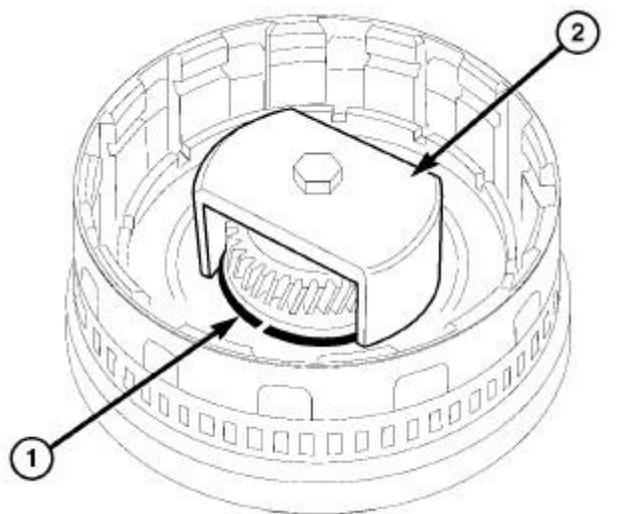


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Fig. 134: Exploded View Of Input Clutch K1 Components
 Courtesy of CHRYSLER LLC

1 - K1 OUTER DISC CARRIER	7 - DISC SPRING
2 - FREEWHEELING CLUTCH F1	8 - SPRING PLATE
3 - SNAP-RING	9 - SPRING PLATE SEALING RING
4 - OUTER DISC CARRIER SEALING RING	10 - SNAP-RING
5 - PISTON SEALING RING	11 - SNAP-RING
6 - PISTON	12 - MULTIPLE DISC PACK - REFER TO TEXT FOR CORRECT ASSEMBLY ORDER

1. Remove snap-ring (11) from outer multiple-disc carrier (1). Refer to **Fig. 134**.
2. Take multiple-disc pack (12) out of outer multiple-disc carrier (1). Note which clutch disc is removed just prior to the spring plate (8) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring plate.



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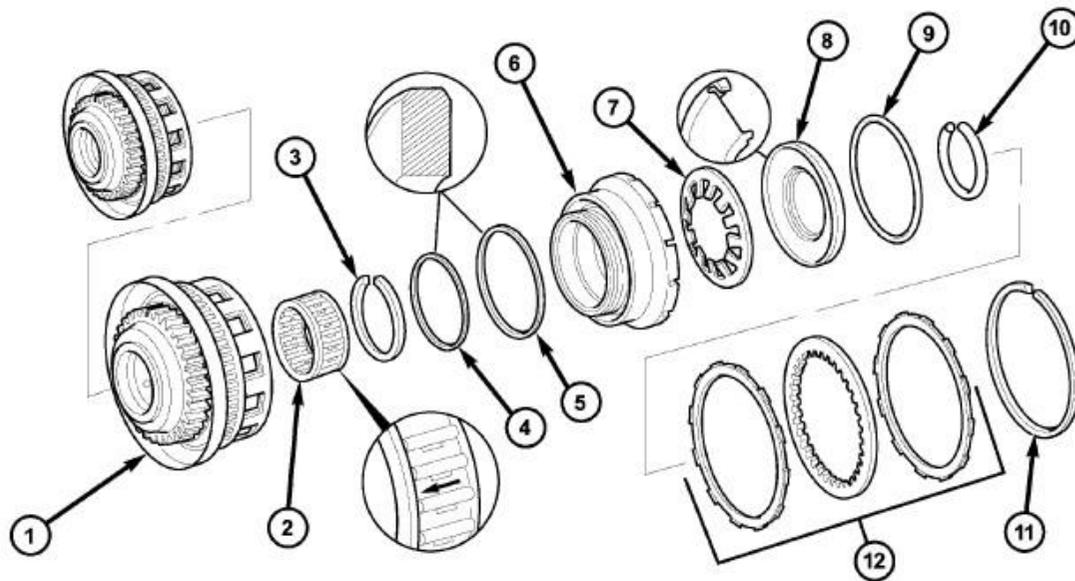
Fig. 135: Compressing Disc Spring
 Courtesy of CHRYSLER LLC

1 - SNAP-RING
2 - MULTI-USE SPRING COMPRESSOR 8900

3. Place Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (2) on the spring plate and compress the spring until the snap-ring (1) is exposed. Refer to **Fig. 135**.
4. Remove snap-ring (1).
5. Take out disc spring (7) and remove piston (6) by carefully blowing compressed air into the drilled oil feed passage.
6. Remove snap-ring (3) and take out front freewheeling clutch F1 (2). Take care when removing the F1 clutch to prevent the clutch sprags from falling out. If this occurs, the clutch must be replaced.

ASSEMBLY

ASSEMBLY

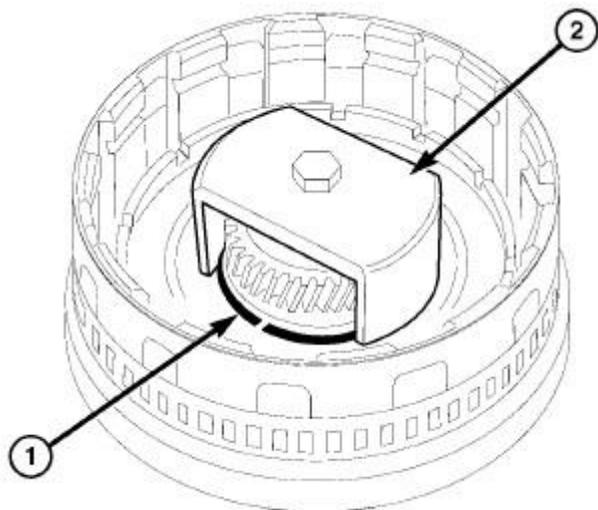


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Fig. 136: Exploded View Of Input Clutch K1 Components
 Courtesy of CHRYSLER LLC

1 - K1 OUTER DISC CARRIER	7 - DISC SPRING
2 - FREEWHEELING CLUTCH F1	8 - SPRING PLATE
3 - SNAP-RING	9 - SPRING PLATE SEALING RING
4 - OUTER DISC CARRIER SEALING RING	10 - SNAP-RING
5 - PISTON SEALING RING	11 - SNAP-RING
6 - PISTON	12 - MULTIPLE DISC PACK - REFER TO TEXT FOR CORRECT ASSEMBLY ORDER

1. Install piston (6) in the outer multiple-disc carrier (1). Refer to **Fig. 136**. Check sealing rings (4 and 5), replace if necessary. The rounded off edges of the sealing rings must point outwards.
2. Insert disc spring (7). Refer to **Fig. 136**. Insert disc spring with the curvature towards the piston.
3. Insert spring plate (8). Insert spring plate with the curvature towards the sun gear. Check sealing ring (9), replace if necessary.

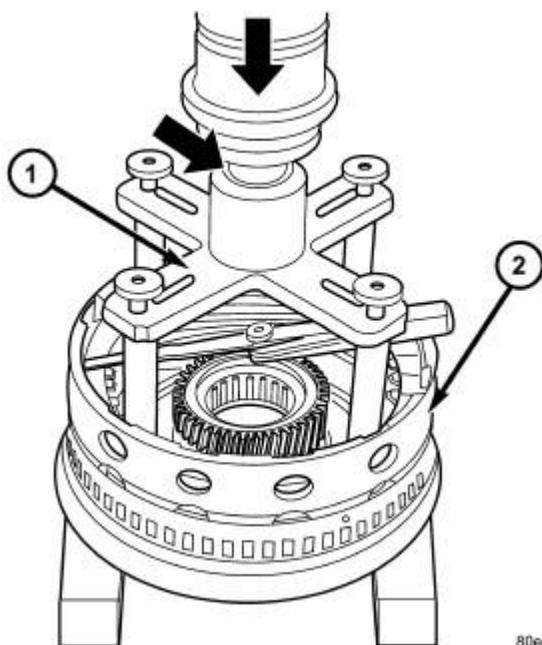


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Fig. 137: Compressing Disc Spring
 Courtesy of CHRYSLER LLC

- | |
|----------------------------|
| 1 - SNAP-RING |
| 2 - SPRING COMPRESSOR 8900 |

- Place Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (2) on spring plate and compress the spring until the groove of the snap-ring (1) is exposed. Refer to **Fig. 137**.
- Insert snap-ring (1). Refer to **Fig. 136**. After installing, check snap-ring for correct seat.



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Fig. 138: Measuring K1 Clutch Clearance
 Courtesy of CHRYSLER LLC

- | |
|---------------------------|
| 1 - PRESSING TOOL 8901A |
| 2 - K1 OUTER DISC CARRIER |

CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the spring plate (8) to its original location.

NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.

6. Insert multiple-disc pack (12) in the outer multiple-disc carrier.
7. Insert snap-ring (11).
8. Measure the K1 clutch pack clearance by mounting Pressing Tool (special tool #8901A, Pressing Tool) (1) on outer multiple disc. Refer to **Fig. 138**.
9. Using a lever press, compress pressing tool to the upper most line marked 1200 N (the marking ring is still visible, see small arrow).

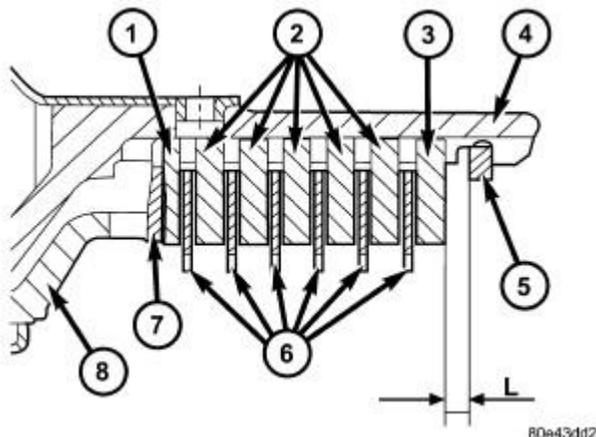


Fig. 139: Input Clutch K1 Stack-Up - Double Sided Discs
 Courtesy of CHRYSLER LLC

1 - OUTER MULTIPLE DISC - 1.8MM (0.071 IN.)
2 - OUTER MULTIPLE DISC - 2.8MM (0.110 IN.)
3 - OUTER MULTIPLE DISC - 4.0MM (0.158 IN.)
4 - K1 OUTER DISC CARRIER
5 - SNAP-RING
6 - FRICTION DISCS
7 - DISC SPRING
8 - PISTON

10. For transmissions using double sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (5) and outer multiple-disc (3). Refer to **Fig. 139**.
11. During the measurement the snap-ring (5) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (4).
12. The correct clutch clearance for transmissions with double sided friction discs is 2.7-3.1 mm (0.106-0.122 in.) for three friction disc versions, 3.0-3.4 mm (0.118-0.134 in.) for four disc versions, 3.3-3.7 mm (0.130-0.146 in.) for five disc versions, and 3.6-4.0 mm (0.142-0.158 in.) for six disc versions.
13. Adjust with snap-ring (5), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).
14. Insert front freewheeling clutch F1 (2) and fit snap-ring (3). The freewheeling clutch F1 (2) must be installed in the direction of the arrow.

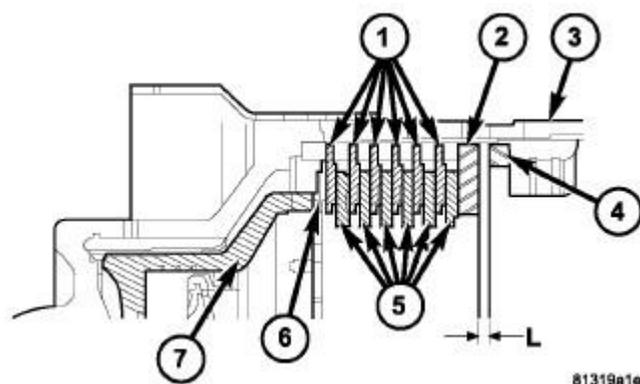


Fig. 140: Input Clutch K1 Stack-Up - Single Sided Discs
 Courtesy of CHRYSLER LLC

1 - OUTER MULTIPLE DISCS
2 - OUTER MULTIPLE DISC - 4.0MM (0.158 IN.)
3 - K1 OUTER DISC CARRIER
4 - SNAP-RING
5 - INNER MULTIPLE DISCS
6 - DISC SPRING

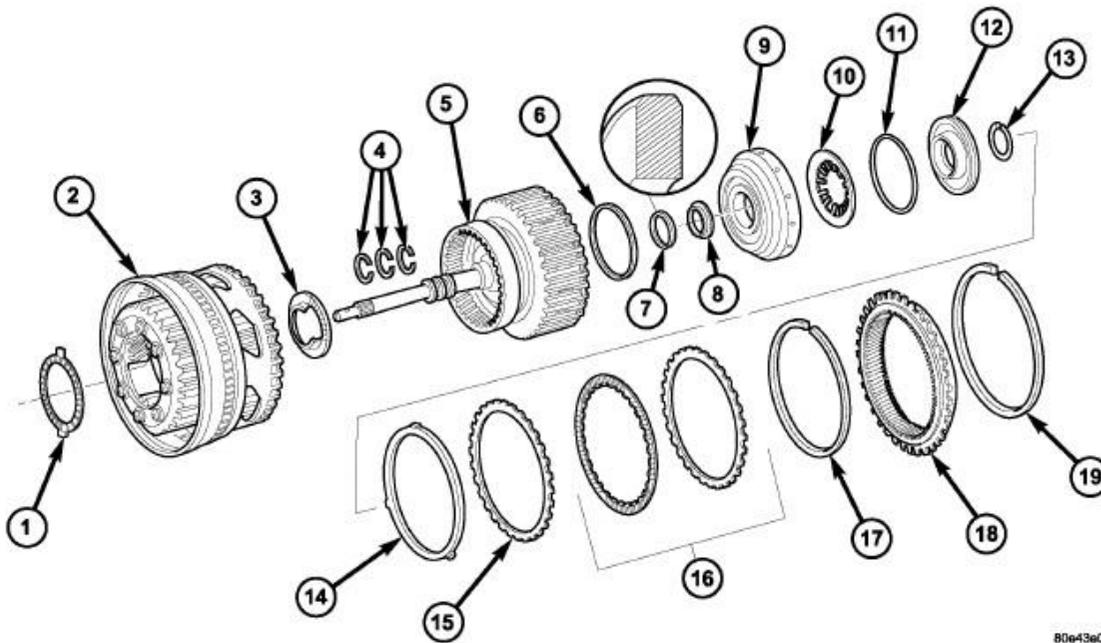
7 - PISTON

15. For transmissions using single sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (4) and outer multiple-disc (2). Refer to **Fig. 140**.
16. During the measurement the snap-ring (4) must contact the upper bearing surface of the groove in the outer multiple-disc carrier (3).
17. The correct clutch clearance for transmissions with single sided friction discs is 2.4-2.8 mm (0.095-0.110 in.) for six friction disc versions, 2.6-3.0 mm (0.102-0.118 in.) for eight disc versions, 2.8-3.2 mm (0.110-0.126 in.) for ten disc versions, and 2.9-3.3 mm (0.114-0.130 in.) for twelve disc versions.
18. Adjust with snap-ring (4), if necessary. Snap-rings are available in thicknesses of 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), 3.8 mm (0.150 in.), and 4.1 mm (0.162 in.).
19. Insert front freewheeling clutch F1 (2) and fit snap-ring (3). The freewheeling clutch F1 (2) must be installed in the direction of the arrow.

CLUTCH, K2

DISASSEMBLY

DISASSEMBLY



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Fig. 141: Exploded View Of Input Clutch K2 Components

Courtesy of CHRYSLER LLC

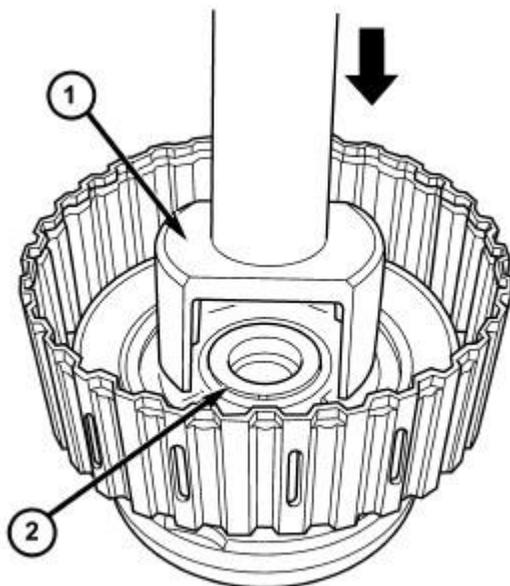
1 - NEEDLE ROLLER BEARING	11 - SPRING RETAINER SEALING - O-RING
2 - K1 INNER DISC CARRIER WITH INTEGRATED FRONT GEAR SET	12 - SPRING RETAINER

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3 - THRUST BEARING	13 - SNAP-RING
4 - TORLON SEAL RINGS	14 - DISC SPRING
5 - INPUT SHAFT AND K2 CLUTCH	15 - EXTERNALLY TOOTHED PLATE - 1.8 MM (0.071 IN.)
6 - PISTON OUTER SEAL RING - O-RING	16 - MULTIPLE DISC PACK
7 - PISTON INNER SEAL RING	17 - SNAP-RING
8 - THRUST WASHER	18 - HOLLOW GEAR
9 - PISTON	19 - SNAP-RING
10 - DISC SPRING	

1. Remove snap-ring (19) from the K1 inner multiple-disc carrier with integrated front gear set (2) and take off hollow gear (18).
2. Remove input shaft with clutch K2 (5). Refer to **Fig. 141**.
3. Remove needle thrust bearing (3).
4. Remove snap-ring (17) from K2 outer multiple-disc carrier. Refer to **Fig. 141**.
5. Take out multiple-disc pack (16). Note which clutch disc is removed just prior to the disc spring (14) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the disc spring.
6. Take out disc spring (14). Refer to **Fig. 141**.



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Fig. 142: Compressing K2 Clutch Spring
Courtesy of CHRYSLER LLC

1 - MULTI-USE SPRING COMPRESSOR 8900
2 - SNAP-RING

7. Fit Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (1) onto spring retainer (12) and press until snap-ring (2) is released. Refer to **Fig. 142**.
8. Remove snap-ring (2). Refer to **Fig. 141**.
9. Take out disc spring (10) and pull piston (9) out of outer multiple-disc carrier.

ASSEMBLY

ASSEMBLY

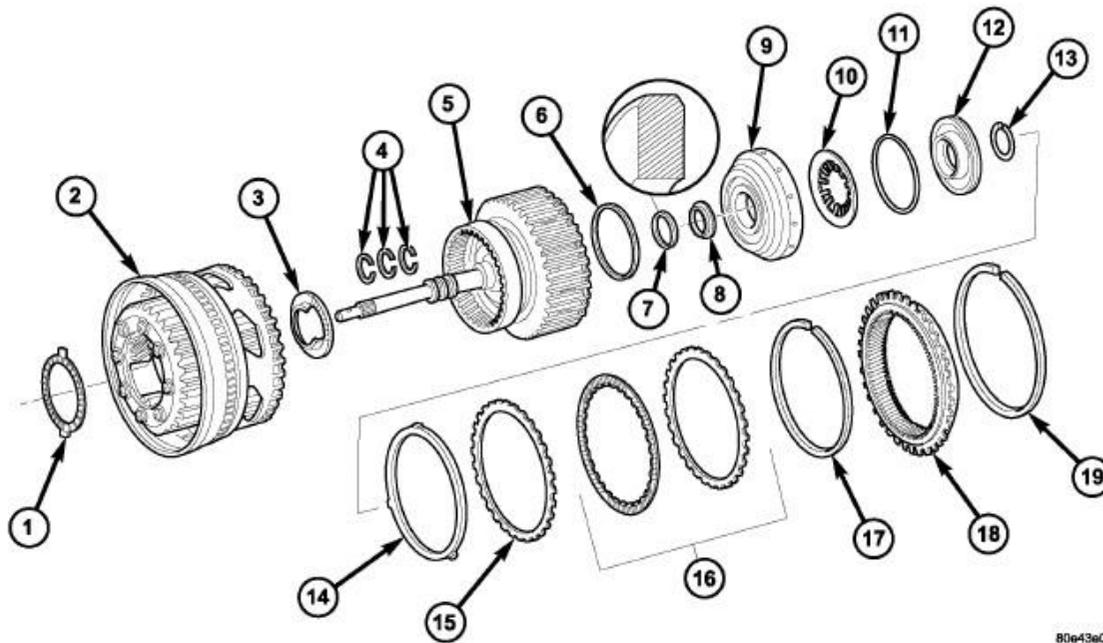


Fig. 143: Exploded View Of Input Clutch K2 Components
 Courtesy of CHRYSLER LLC

1 - NEEDLE ROLLER BEARING	11 - SPRING RETAINER SEALING - O-RING
2 - K1 INNER DISC CARRIER WITH INTEGRATED FRONT GEAR SET	12 - SPRING RETAINER
3 - THRUST BEARING	13 - SNAP-RING
4 - TORLON SEAL RINGS	14 - DISC SPRING
5 - INPUT SHAFT AND K2 CLUTCH	15 - EXTERNALLY TOOTHED PLATE - 1.8 MM (0.071 IN.)
6 - PISTON OUTER SEAL RING - O-RING	16 - MULTIPLE DISC PACK
7 - PISTON INNER SEAL RING	17 - SNAP-RING
8 - THRUST WASHER	18 - HOLLOW GEAR
9 - PISTON	19 - SNAP-RING
10 - DISC SPRING	

1. Install piston (9) in outer multiple-disc carrier. Refer to **Fig. 143**. Inspect seals (6 and 7), replace if necessary. The rounded edges of the inner piston seal (7) must point to the outside.
2. Insert disk spring (10) and spring retainer (12). Insert disk spring (10) with curved side pointing toward spring retainer (12). Inspect seal (11), replace if necessary. Refer to **Fig. 143**.

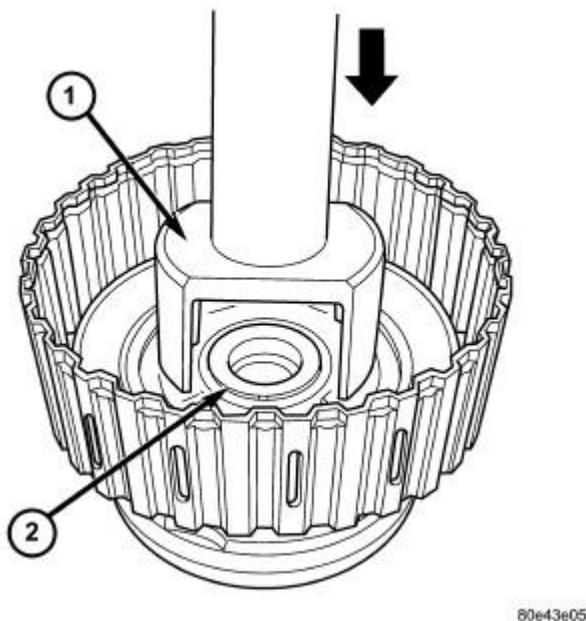


Fig. 144: Compressing K2 Clutch Spring
Courtesy of CHRYSLER LLC

1 - MULTI-USE SPRING COMPRESSOR 8900

2 - SNAP-RING

3. Place Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (1) on spring plate and press until the groove (2) of the snap-ring is exposed. Refer to **Fig. 144**.
4. Insert snap-ring.
5. Insert disk spring (14).

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging on top of the disc spring (14) to its original location.

6. Insert multiple-disk set (16) into outer multiple-disk carrier.
7. Fit snap-ring (17).

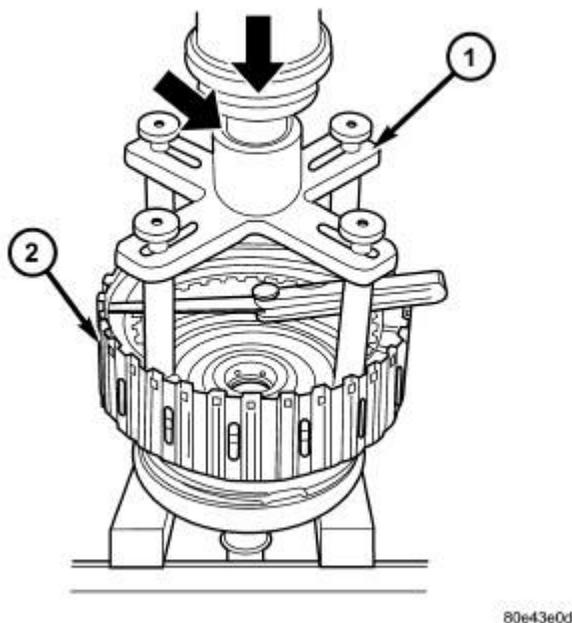


Fig. 145: Measuring K2 Clutch Clearance
 Courtesy of CHRYSLER LLC

- | |
|---------------------------|
| 1 - PRESSING TOOL 8901A |
| 2 - K1 INNER DISC CARRIER |

8. Measure K2 clutch clearance by mounting Pressing Tool 8901A (1) on outer multiple disc. Refer to **Fig. 145**.
9. Using a lever press, compress pressing tool to the upper most line marked 1200 N (the marking ring is still visible, see small arrow).

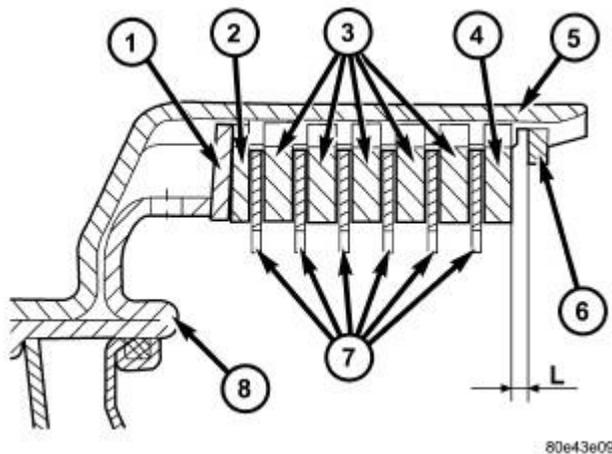
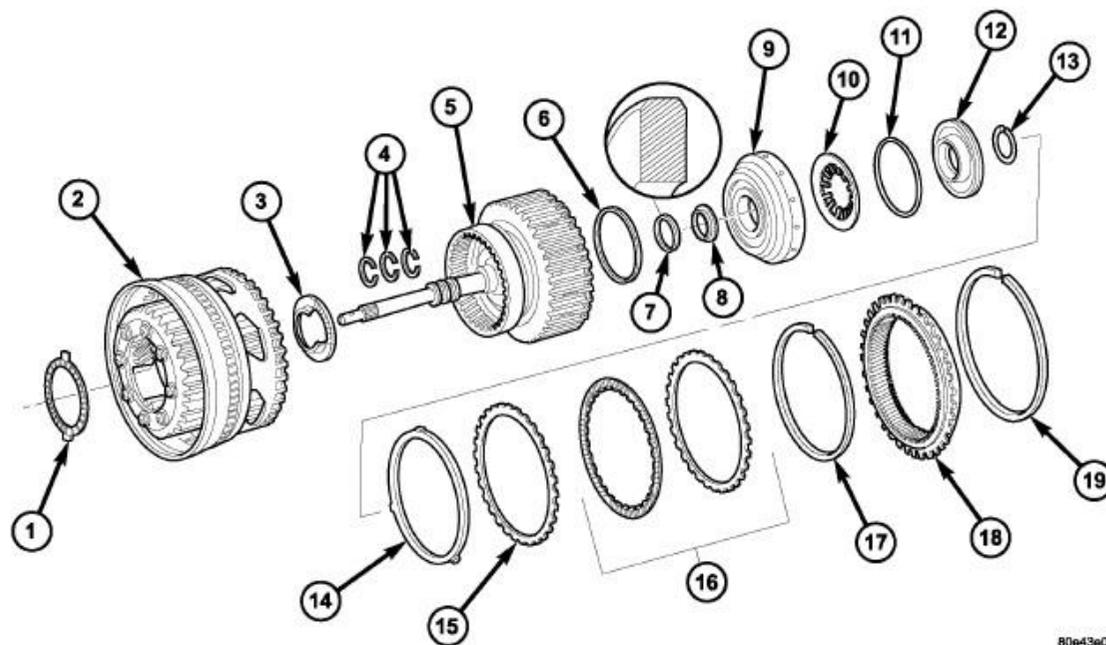


Fig. 146: Input Clutch K2 Stack-Up
 Courtesy of CHRYSLER LLC

1 - DISC SPRING
2 - OUTER MULTIPLE DISC - 1.8 MM (0.071 IN.)
3 - OUTER MULTIPLE DISC - 3.5 MM (0.138 IN.)
4 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
5 - K2 OUTER DISC CARRIER
6 - SNAP-RING
7 - FRICTION DISCS
8 - PISTON

10. Using a feeler gauge, determine the play "L" at three points between the snap-ring (6) and outer multiple-disc (4). Refer to **Fig. 146**.
11. During the measurement the snap-ring (6) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
12. The correct clutch clearance is 2.3-2.7 mm (0.091-0.106 in.) for three friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for four disc versions, 2.5-2.9 mm (0.099-0.114 in.) for five disc versions, and 2.7-3.1 mm (0.106-0.122 in.) for six disc versions.
13. Adjust with snap-ring (6), if necessary. Snap-rings are available in thicknesses of 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), 3.5 mm (0.138 in.), and 3.8 mm (0.150 in.).



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Fig. 147: Exploded View Of Input Clutch K2 Components
 Courtesy of CHRYSLER LLC

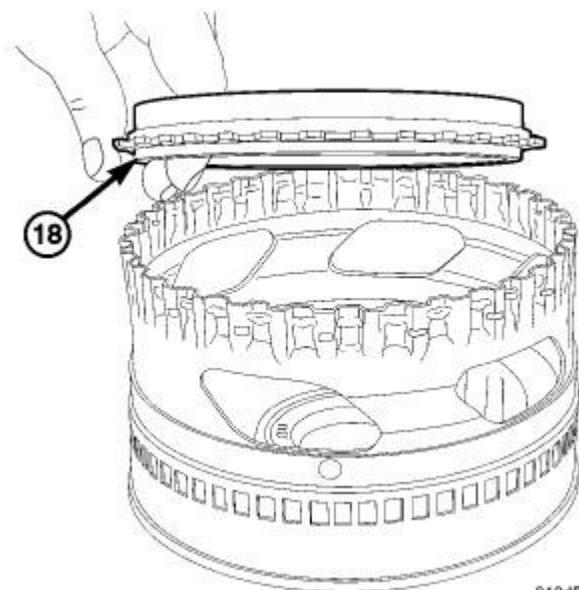
1 - NEEDLE ROLLER BEARING	11 - SPRING RETAINER SEALING - O-RING
2 - K1 INNER DISC	12 - SPRING RETAINER

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CARRIER WITH INTEGRATED FRONT GEAR SET	
3 - THRUST BEARING	13 - SNAP-RING
4 - TORLON SEAL RINGS	14 - DISC SPRING
5 - INPUT SHAFT AND K2 CLUTCH	15 - EXTERNALLY TOOTHED PLATE - 1.8 MM (0.071 IN.)
6 - PISTON OUTER SEAL RING - O-RING	16 - MULTIPLE DISC PACK
7 - PISTON INNER SEAL RING	17 - SNAP-RING
8 - THRUST WASHER	18 - HOLLOW GEAR
9 - PISTON	19 - SNAP-RING
10 - DISC SPRING	

14. Insert axial needle bearing (3) into K1 inner multiple-disk carrier. Refer to **Fig. 147**. Insert axial needle bearing (3) with a little grease to prevent it slipping.
15. Install input shaft in K1 inner multiple-disc carrier with integrated front gear set (2).



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Fig. 148: NAG1 Hollow Gear
Courtesy of CHRYSLER LLC

1 - Item_1

2 - Item_2

NOTE:

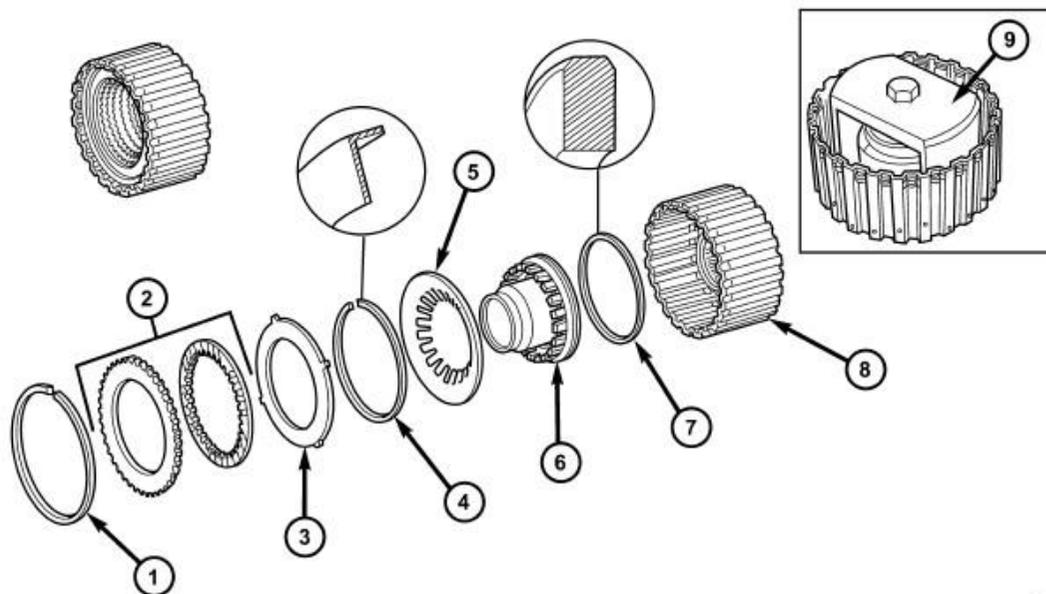
Insure that the Hollow Gear (18) is oriented during installation such it protrudes from the K2 Retainer.

16. Fit internally-gear wheel (18) and install snap-ring.

CLUTCH, K3

DISASSEMBLY

DISASSEMBLY



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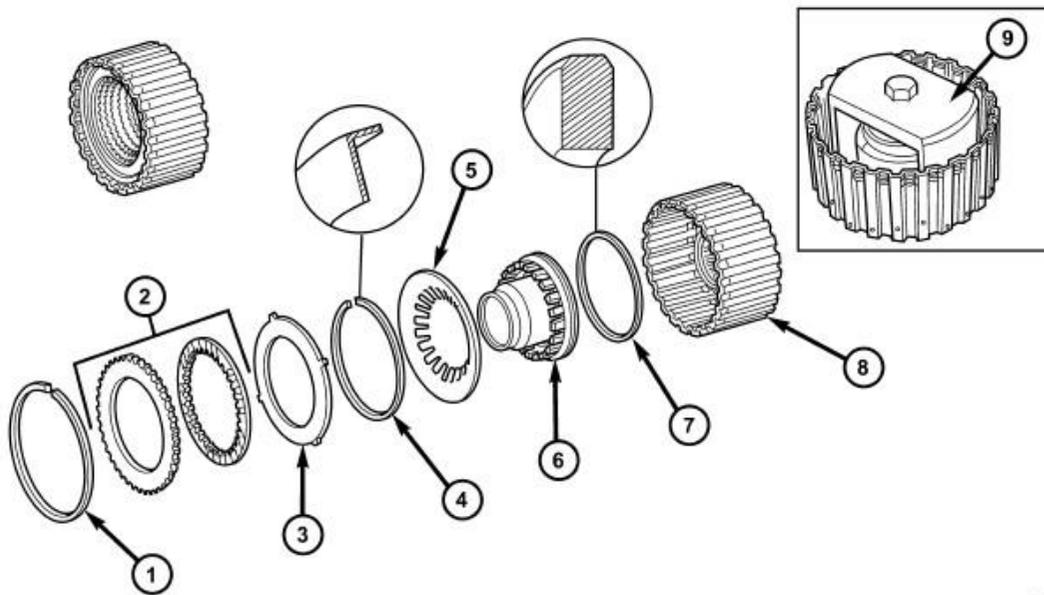
Fig. 149: Exploded View Of Input Clutch K3 Components
 Courtesy of CHRYSLER LLC

1 - SNAP-RING	6 - PISTON
2 - MULTIPLE DISC PACK	7 - SEALING RING
3 - DISK SPRING	8 - OUTER DISC CARRIER
4 - SNAP-RING	9 - MULTI-USE SPRING COMPRESSOR 8900
5 - SPRING PLATE	

1. Remove snap-ring (1) from outer multiple-disc carrier. Refer to **Fig. 149**.
2. Remove multiple-disc pack (2) and disk spring (3) from outer multiple-disc carrier. Note which clutch disc is removed just prior to the disc spring (3) for re-assembly. If the clutch discs are re-used, this disc must be returned to its original position on top of the spring plate.
3. Place Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (9) on the spring plate (5) and compress the spring until the snap-ring (4) is exposed. Refer to **Fig. 149**.
4. Remove snap-ring (4).
5. Remove spring plate (5) and piston (6) from outer multiple-disc carrier.

ASSEMBLY

ASSEMBLY



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Fig. 150: Exploded View Of Input Clutch K3 Components
 Courtesy of CHRYSLER LLC

1 - SNAP-RING	6 - PISTON
2 - MULTIPLE DISC PACK	7 - SEALING RING
3 - DISK SPRING	8 - OUTER DISC CARRIER
4 - SNAP-RING	9 - MULTI-USE SPRING COMPRESSOR 8900
5 - SPRING PLATE	

1. Install piston (6) in the outer multiple-disc carrier (8). Refer to **Fig. 150**. Check sealing ring (7), replace if necessary. The rounded off edges of the sealing ring must point outwards.
2. Insert the spring plate (5). Insert the spring plate with the curvature towards the piston.
3. Mount the Multi-use Spring Compressor (special tool #8900A, Multi Use Spring Compressor) (9) on the spring plate and clamp until the snap-ring groove is exposed.
4. Insert snap-ring (4). The collar of the snap-ring must point towards the multiple-disc pack.

CAUTION: When working with double sided friction discs, an externally lugged steel plate is installed first, followed by a friction disc, and continuing on until all the required discs are installed. When working with single sided friction discs, an externally lugged disc is installed first, followed by an internally lugged disc, and continuing on until all the required discs are installed. All single sided discs are installed with the friction side up.

NOTE: Pay attention to the sequence of discs. If the original clutch discs are reused, be sure to return the disc identified on disassembly as belonging

on top of the disk spring (3) to its original location.

NOTE: Place new friction multiple-discs in ATF fluid for one hour before installing.

5. Install disk spring (3) and multiple-disc pack (2) in outer multiple-disc carrier (8).
6. Insert snap-ring (1).

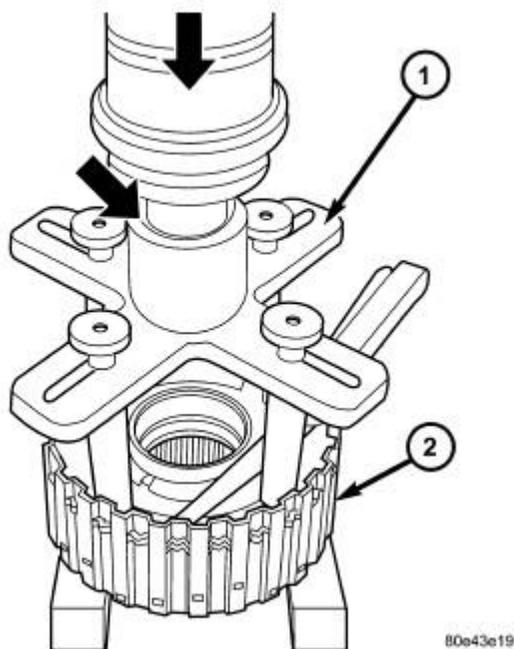


Fig. 151: Measure K3 Clutch Clearance
 Courtesy of CHRYSLER LLC

- | |
|-------------------------|
| 1 - PRESSING TOOL 8901A |
| 2 - OUTER DISC CARRIER |

7. Measure the K3 clutch clearance by mounting Pressing Tool 8901A (1) on outer multiple disc. Refer to **Fig. 151**.
8. Using a lever press, compress pressing tool to the upper most line marked 1200 N (the marking ring is still visible, see small arrow).

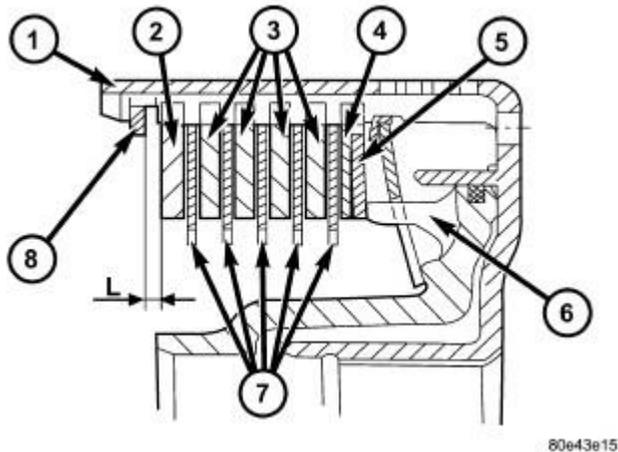


Fig. 152: Input Clutch K3 Stack-Up - Double Sided Discs
 Courtesy of CHRYSLER LLC

1 - OUTER DISC CARRIER
2 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
3 - OUTER MULTIPLE DISC - 2.8 MM (0.110 IN.)
4 - OUTER MULTIPLE DISC - 1.8 MM (0.079 IN.)
5 - DISC SPRING
6 - PISTON
7 - FRICTION DISCS - 2.1 MM (0.083 IN.)
8 - SNAP-RING

9. For transmissions using double sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (8) and outer multiple-disc (2). Refer to **Fig. 152**.
10. During the measurement the snap-ring (8) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
11. The correct clutch clearance for transmissions with double sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for three friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for four disc versions, and 2.5-2.9 mm (0.099-0.114 in.) for five disc versions.
12. Adjust with snap-ring (8), if necessary. Snap-rings are available in thicknesses of 2.0 mm (0.079 in.), 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), and 3.5 mm (0.138 in.).

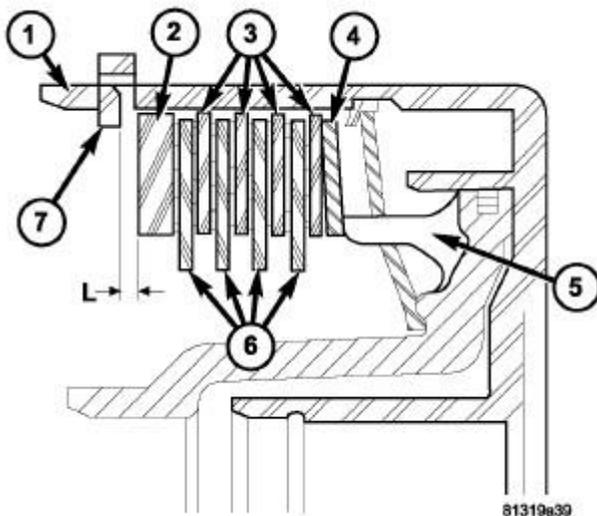


Fig. 153: Input Clutch K3 Stack-Up - Single Sided Discs
 Courtesy of CHRYSLER LLC

1 - OUTER DISC CARRIER
2 - OUTER MULTIPLE DISC - 4.0 MM (0.158 IN.)
3 - OUTER MULTIPLE DISCS
4 - DISC SPRING
5 - PISTON
6 - INNER MULTIPLE DISCS
7 - SNAP-RING

13. For transmissions using single sided friction discs, use a feeler gauge to determine the play "L" at three points between the snap-ring (7) and outer multiple-disc (2). Refer to **Fig. 153**.
14. During the measurement the snap-ring (7) must contact the upper bearing surface of the groove in the outer multiple-disc carrier.
15. The correct clutch clearance for transmissions with single sided friction discs is 2.3-2.7 mm (0.091-0.106 in.) for six friction disc versions, 2.4-2.8 mm (0.095-0.110 in.) for eight disc versions, and 2.5-2.9 mm (0.099-0.114 in.) for ten disc versions.
16. Adjust with snap-ring (7), if necessary. Snap-rings are available in thicknesses of 2.0 mm (0.079 in.), 2.3 mm (0.091 in.), 2.6 mm (0.102 in.), 2.9 mm (0.114 in.), 3.2 mm (0.126 in.), and 3.5 mm (0.138 in.).

CONTACT, TEMPERATURE SENSOR\PAK-NEUTRAL

DESCRIPTION

PARK/NEUTRAL CONTACT

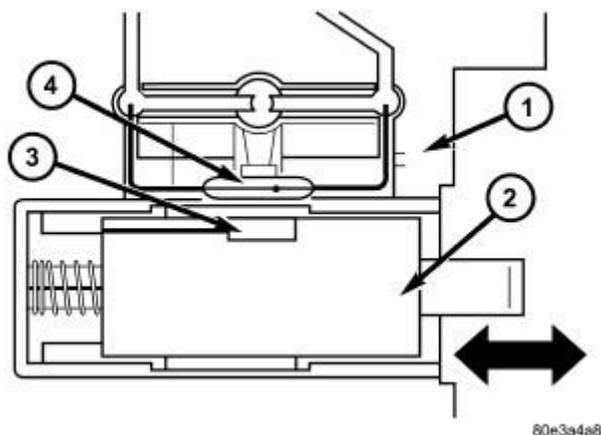


Fig. 154: Cutaway View Of Park/Neutral Contact
 Courtesy of CHRYSLER LLC

1 - SHELL OF ELECTRIC CONTROL MODULE
2 - PLUNGER
3 - PERMANENT MAGNET
4 - DRY-REED CONTACT

The park/neutral contact (4) is located in the shell of the electric control unit and is fixed to the conductor tracks. Refer to **Fig. 154**.

Its purpose is to recognize selector valve and selector lever positions "P" and "N". The park/neutral contact consists of:

- the plunger (2).
- the permanent magnet (3).
- the dry-reed contact (4).

TRANSMISSION TEMPERATURE SENSOR

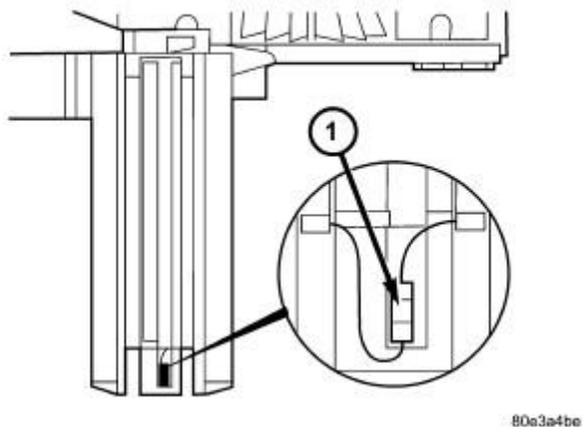


Fig. 155: Cutaway View Of Transmission Temperature Sensor
 Courtesy of CHRYSLER LLC

1 - TRANSMISSION TEMPERATURE SENSOR

The transmission oil temperature sensor (1) is located in the shell of the electric valve control unit and is fixed to the conductor tracks. Refer to **Fig. 155**.

Its purpose is to measure the temperature of the transmission oil and pass the temperature to the TCM as an input signal. It is a temperature-dependent resistor (PTC).

OPERATION

PARK/NEUTRAL CONTACT

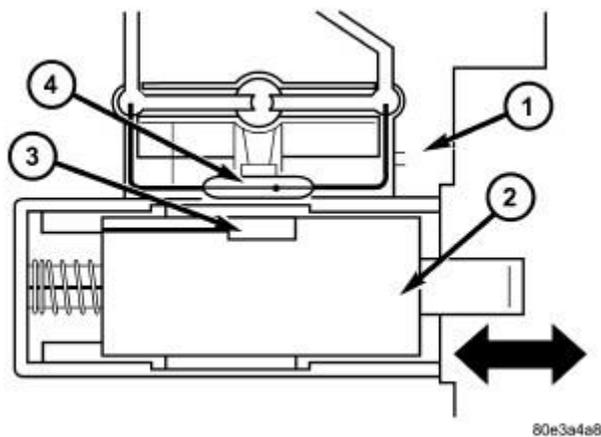


Fig. 156: Cutaway View Of Park/Neutral Contact
 Courtesy of CHRYSLER LLC

1 - SHELL OF ELECTRIC CONTROL MODULE

2 - PLUNGER

3 - PERMANENT MAGNET

4 - DRY-REED CONTACT

In selector lever positions "P" and "N" the park/neutral contact (4) is actuated by a cam track which is located on the detent plate. Refer to **Fig. 156**. The permanent magnet (3) is moved away from the dry-reed contact (4). The dry-reed contact (4) is opened. The TCM receives an electric signal. The circuit to the starter in the selector lever positions "P" and "N" is closed.

TRANSMISSION TEMPERATURE SENSOR

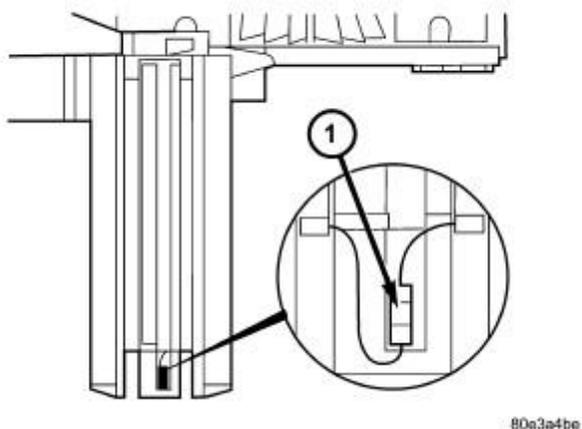


Fig. 157: Cutaway View Of Transmission Temperature Sensor
Courtesy of CHRYSLER LLC

1 - TRANSMISSION TEMPERATURE SENSOR

The temperature of the transmission oil has a considerable effect on the shifting time and therefore the shift quality. By measuring the oil temperature, shift operations can be optimized in all temperature ranges. The transmission oil temperature sensor (1) is switched in series with the park/neutral contact. Refer to **Fig. 157**. The temperature signal is transferred to the TCM only when the dry-reed contact of the park/neutral contact is closed in REVERSE or a forward gear position.

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TRANSMISSION TEMP SENSOR SPECIFICATIONS TEMPERATURE/VOLTAGE/RESISTANCE CHART

TEMPERATURE (C)	TEMPERATURE (F)	VOLTAGE	RESISTANCE
-50	-58	0.73	506.0
-45	-49	0.77	534.0
-40	-40	0.80	564.0
-35	-31	0.84	593.0
-30	-22	0.88	624.0
-25	-13	0.91	654.0
-20	-4	0.95	686.0
-15	5	0.98	718.0
-10	14	1.02	750.0
-5	23	1.05	783.0
0	32	1.09	817.0
5	41	1.12	851.0
10	50	1.16	886.0
15	59	1.19	921.0
20	68	1.23	957.0
25	77	1.26	994.0
30	86	1.30	1032.0
35	95	1.33	1070.0
40	104	1.37	1109.0
45	113	1.40	1149.0
50	122	1.44	1189.0
55	131	1.48	1231.0
60	140	1.51	1273.0
65	149	1.55	1316.0
70	158	1.58	1360.0
75	167	1.62	1405.0
80	176	1.65	1450.0
85	185	1.69	1497.0
90	194	1.72	1545.0
95	203	1.76	1594.0
100	212	1.79	1644.0
105	221	1.83	1695.0
110	230	1.86	1747.0
115	239	1.90	1800.0
120	248	1.93	1855.0
125	257	1.97	1911.0
130	266	2.00	1968.0
135	275	2.04	2027.0
140	284	2.08	2087.0
145	293	2.11	2148.0
150	302	2.15	2211.0
155	311	2.18	2276.0
160	320	2.22	2342.0
165	329	2.25	2410.0
170	338	2.29	2479.0
175	347	2.32	2551.0

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Fig. 158: Transmission Temperature Sensor Specifications
Courtesy of CHRYSLER LLC

For the Transmission Temperature Sensor Specifications table for the relationship between transmission temperature, sensor voltage, and sensor resistance. Refer to **Fig. 158**.

FLUID AND FILTER

DESCRIPTION

DESCRIPTION

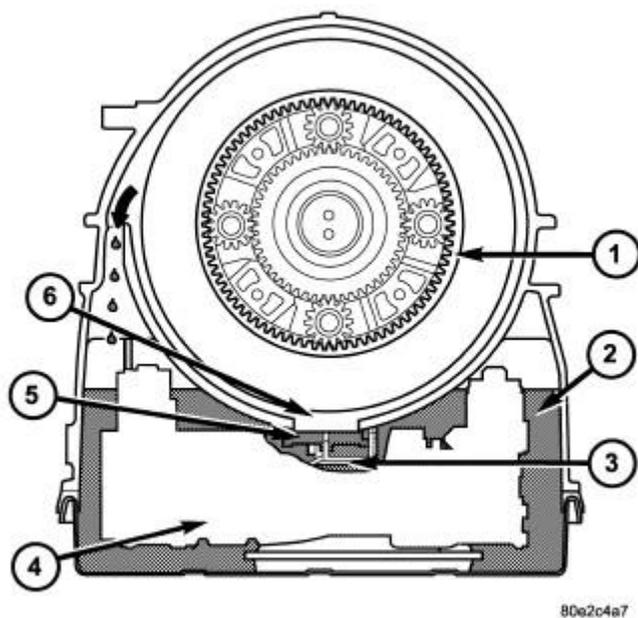


Fig. 159: Fluid Level Control
 Courtesy of CHRYSLER LLC

1 - GEARSET CHAMBER
2 - OIL GALLERY
3 - SHELL OF ELECTROHYDRAULIC UNIT
4 - ELECTROHYDRAULIC UNIT
5 - FLOAT
6 - OPENING

The oil level control is located on the electrohydraulic unit (4) and consists of the float (5) which is integrated into the electrohydraulic unit. Refer to **Fig. 159**. The float is positioned to plug the opening (6) between the oil gallery (2) and gearset chamber (1) so that the rotating gearsets do not splash about in oil as the oil level rises. The oil level control reduces power loss and prevents oil from being thrown out of the transmission housing at high oil temperatures.

OPERATION

OPERATION

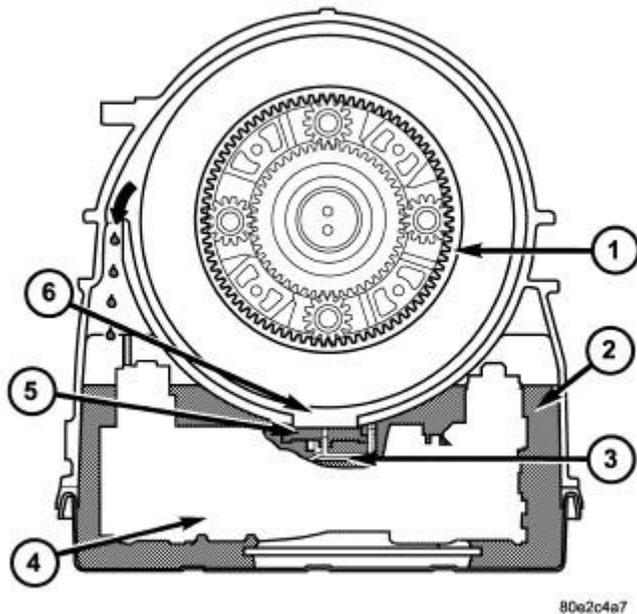


Fig. 160: Fluid Level Control
Courtesy of CHRYSLER LLC

1 - GEARSET CHAMBER
2 - OIL GALLERY
3 - SHELL OF ELECTROHYDRAULIC UNIT
4 - ELECTROHYDRAULIC UNIT
5 - FLOAT
6 - OPENING

With low oil levels, the lubricating oil which flows constantly out of the gearset, flows back to oil gallery (2) through the opening (6). If the oil level rises, the oil presses the float (5) against the housing opening (6). Refer to **Fig. 160**. The float (5) therefore separates the oil gallery (2) from the gearset chamber (1). The lubricating oil which continues to flow out of the gears is thrown against the housing wall, incorporated by the rotating parts and flows back into the oil gallery (2) through the upper opening (arrow).

DIAGNOSIS AND TESTING

EFFECTS OF INCORRECT FLUID LEVEL

A low fluid level allows the pump to take in air along with the fluid. Air in the fluid will cause fluid pressures to be low and develop slower than normal. If the transmission is overfilled, the gears churn the fluid into foam. This aerates the fluid and causing the same conditions occurring with a low level. In either case, air bubbles cause fluid overheating, oxidation, and varnish buildup which interferes with valve and clutch operation. Foaming also causes fluid expansion which can result in fluid overflow from the transmission vent or fill tube. Fluid overflow can easily be mistaken for a leak if inspection is not careful.

CAUSES OF BURNT FLUID

Burnt, discolored fluid is a result of overheating which has three primary causes.

1. Internal clutch slippage, usually caused by low line pressure, inadequate clutch apply pressure, or clutch seal failure.
2. A result of restricted fluid flow through the main and/or auxiliary cooler. This condition is usually the result of a faulty or improperly installed drainback valve, a damaged oil cooler, or severe restrictions in the coolers and lines caused by debris or kinked lines.
3. Heavy duty operation with a vehicle not properly equipped for this type of operation. Trailer towing or similar high load operation will overheat the transmission fluid if the vehicle is improperly equipped. Such vehicles should have an auxiliary transmission fluid cooler, a heavy duty cooling system, and the engine/axle ratio combination needed to handle heavy loads.

FLUID CONTAMINATION

Transmission fluid contamination is generally a result of:

- adding incorrect fluid
- failure to clean dipstick and fill tube when checking level
- engine coolant entering the fluid
- internal failure that generates debris
- overheat that generates sludge (fluid breakdown)
- failure to replace contaminated converter after repair

The use of non-recommended fluids can result in transmission failure. The usual results are erratic shifts, slippage, abnormal wear and eventual failure due to fluid breakdown and sludge formation. Avoid this condition by using recommended fluids only.

The dipstick cap and fill tube should be wiped clean before checking fluid level. Dirt, grease and other foreign material on the cap and tube could fall into the tube if not removed beforehand. Take the time to wipe the cap and tube clean before withdrawing the dipstick.

Engine coolant in the transmission fluid is generally caused by a cooler malfunction. The only remedy is to replace the radiator as the cooler in the radiator is not a serviceable part. If coolant has circulated through the transmission, an overhaul is necessary.

The torque converter should be replaced whenever a failure generates sludge and debris. This is necessary because normal converter flushing procedures will not remove all contaminants.

STANDARD PROCEDURE

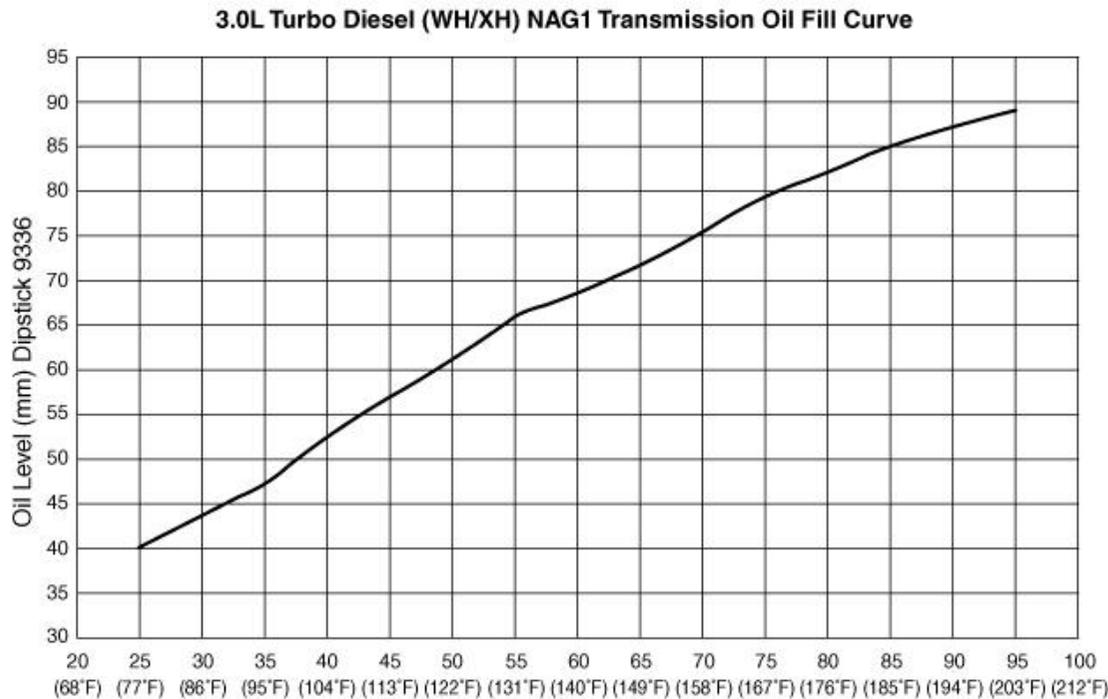
CHECK OIL LEVEL

1. Verify that the vehicle is parked on a level surface.
2. Remove the dipstick tube cap.

WARNING: Risk of accident from vehicle starting off by itself when engine running. Risk of injury from contusions and burns if you insert your hands into the engine when it is started or when it is running. Secure vehicle to prevent it from moving off by itself. Wear properly fastened and close-fitting work clothes. Do not touch hot or rotating parts.

3. Actuate the service brake. Start engine and let it run at idle speed in selector lever position "P".
4. Shift through the transmission modes several times with the vehicle stationary and the engine idling
5. Warm up the transmission, wait at least two minutes and check the oil level with the engine running. Push Oil Dipstick (special tool #9336A, Dipstick) into the transmission fill tube until the dipstick tip contacts the oil pan and pull out again, read off oil level, repeat if necessary.

NOTE: The dipstick protrudes from the fill tube when installed.



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Fig. 161: 3.0L Turbo Diesel WH/XH NAG1 Fill Chart
 Courtesy of CHRYSLER LLC

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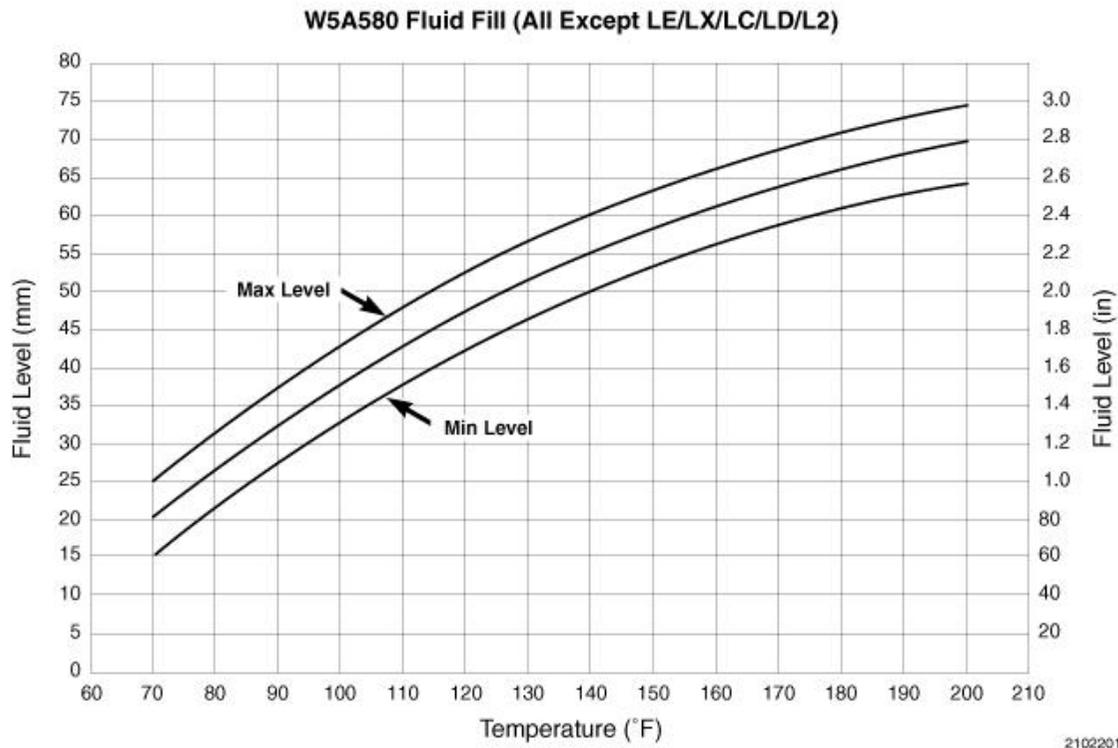


Fig. 162: NAG1 Gasoline Transmission Fill Graph
 Courtesy of CHRYSLER LLC

6. Check the transmission oil temperature using the appropriate scan tool.

NOTE: The true transmission oil temperature can only be read by a scan tool in Reverse or any forward gear position.

7. With the transmission in "P", determine the height of the oil level on the dipstick and using the height, the transmission temperature, and the Transmission Fluid Graph, determine if the transmission oil level is correct.
8. Add or remove oil as necessary and recheck the oil level.
9. Once the oil level is correct, install the dipstick tube cap.

TRANSMISSION FILL

To avoid overfilling transmission after a fluid change or overhaul, perform the following procedure:

1. Verify that the vehicle is parked on a level surface.
2. Remove the dipstick tube cap.
3. Add following initial quantity of Mopar® ATF +4, Automatic Transmission Fluid, to the transmission:
 1. If only fluid and filter were changed, add **5.0 L (10.6pts.)** of transmission fluid to transmission.
 2. If the transmission was completely overhauled or the torque converter was replaced or drained, add **7.7 L (16.3 pts.)** of transmission fluid to transmission.

4. Check the transmission fluid and adjust as required. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

FLUID/FILTER SERVICE

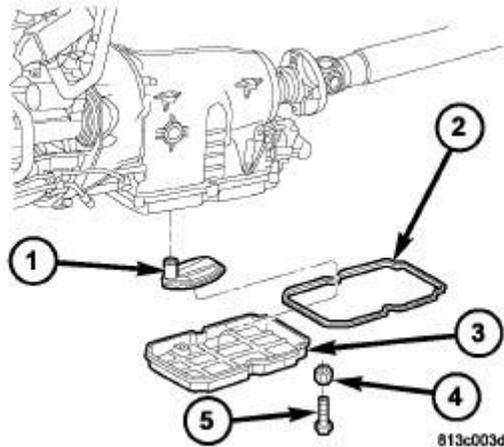


Fig. 163: Oil Pan, Gasket, Filter, Retainer & Bolt
Courtesy of CHRYSLER LLC

1 - OIL FILTER
2 - OIL PAN GASKET
3 - OIL PAN
4 - RETAINER
5 - BOLT

1. Run the engine until the transmission oil reaches operating temperature.
2. Raise and support vehicle.
3. Remove the bolts (5) and retainers (4) holding the oil pan to the transmission. Refer to **Fig. 163**.
4. Remove the transmission oil pan (3) and gasket (2) from the transmission.
5. Remove the transmission oil filter (1) and o-ring from the electrohydraulic control unit.
6. Clean the inside of the oil pan (3) of any debris. Inspect the oil pan gasket (2) and replace if necessary.
7. Install a new oil filter (1) and o-ring into the electrohydraulic control unit.
8. Install the oil pan (3) and gasket (2) onto the transmission.
9. Install the oil pan bolts (5) and retainers (4). Torque the bolts to 8 N.m (70 in.lbs.).
10. Lower the vehicle and add 5.0 L (10.6 pts.) of transmission fluid to the transmission.
11. Check the oil level. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.

GEARTRAIN, PLANETARY

DESCRIPTION

DESCRIPTION

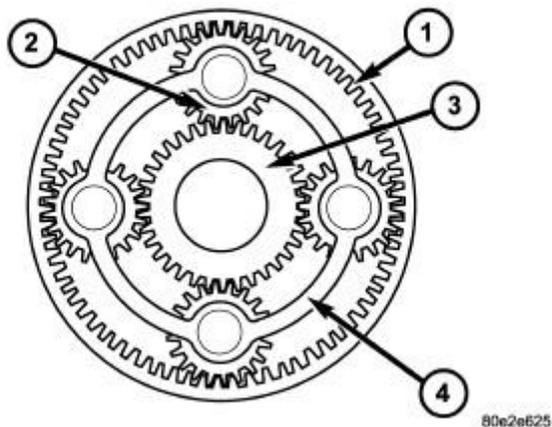


Fig. 164: Planetary Geartrain
Courtesy of CHRYSLER LLC

1 - ANNULUS GEAR

2 - PLANETARY PINION GEARS

3 - SUN GEAR

4 - PLANETARY CARRIER

Three planetary gear sets are used to produce the different gear ratios. Refer to **Fig. 164**. These are located in the mechanical part of the transmission as the front, middle and rear planetary gear sets.

OPERATION

OPERATION

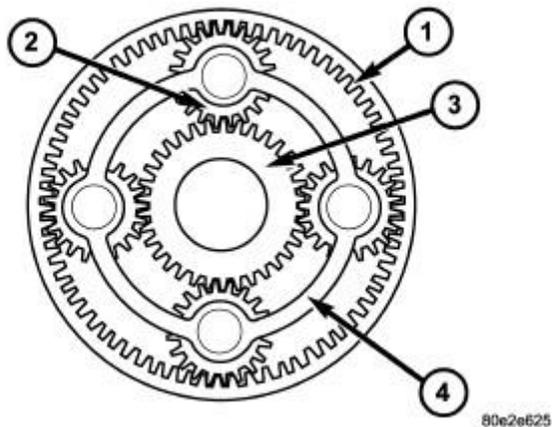


Fig. 165: Planetary Geartrain
Courtesy of CHRYSLER LLC

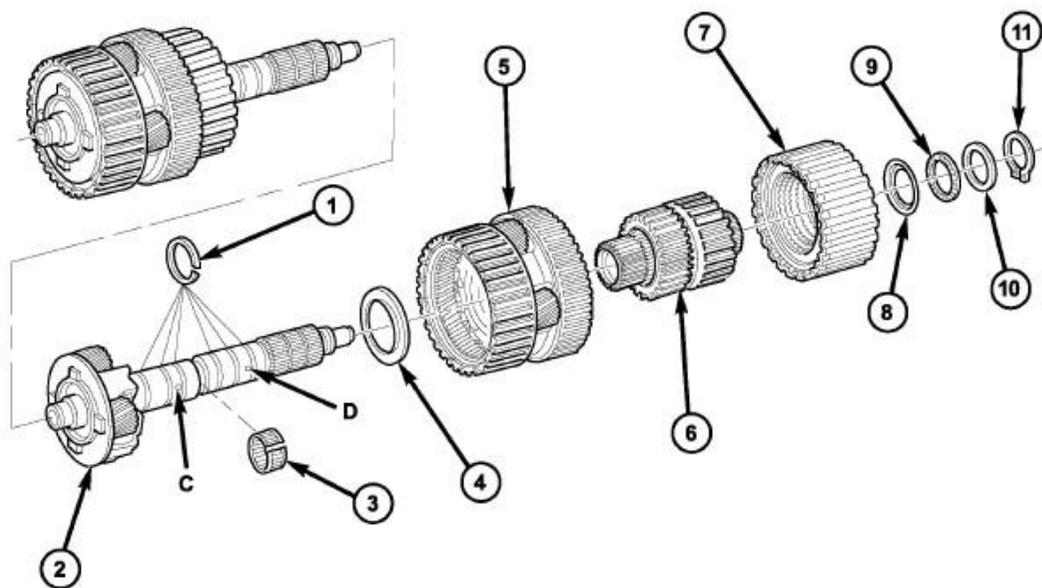
1 - ANNULUS GEAR
2 - PLANETARY PINION GEARS
3 - SUN GEAR
4 - PLANETARY CARRIER

The annulus gear (1) and sun gear (3) elements of a planetary gear system are alternately driven and braked by the actuating elements of the multi-plate clutch and multiple-disc brake. Refer to **Fig. 165**. The planetary pinion gears (2) can turn on the internal gearing of the annulus gear (1) and on the external gearing of the sun gear (3). This allows for a variety of gear ratios and the reversal of the rotation direction without the need for moving gear wheels or shift collars. When two components of the planetary gear set are locked together, the planetary gear set is locked and turns as a closed unit.

The torque and engine speed are converted according to the lever ratios and the ratio of the number of teeth on the driven gears to that on the drive gears, and is referred to as the gear ratio. The overall ratio of a number of planetary gear sets connected in series is obtained by multiplying the partial ratios.

DISASSEMBLY

DISASSEMBLY



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Fig. 166: Output Shaft With Center & Rear Planetary Geartrain
 Courtesy of CHRYSLER LLC

1 - TEFLON RINGS	7 - DRIVING CLUTCH K3
2 - OUTPUT SHAFT WITH CENTER PLANETARY CARRIER	8 - THRUST WASHER
3 - NEEDLE BEARING	9 - AXIAL NEEDLE BEARING

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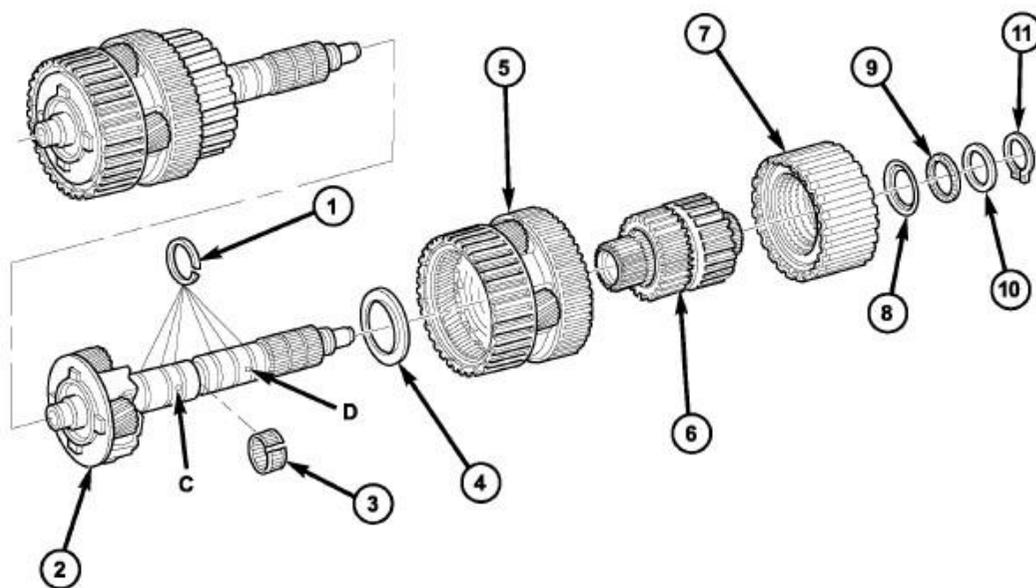
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4 - THRUST WASHER	10 - SHIM
5 - REAR PLANETARY GEAR SET	11 - RETAINING RING
6 - REAR HOLLOW SHAFT/FREEWHEELING CLUTCH F2	

1. Remove upper two visible Teflon rings (1) from output shaft. Refer to **Fig. 166**.
2. Remove retaining ring (11), shim (10), thrust needle bearing (9) and thrust washer (8) from output shaft.
3. Remove clutch K3 (7).
4. Remove rear tubular shaft/freewheeling clutch F2 (6) from output shaft. Refer to **Fig. 166**.
5. Remove rear gear set (5) with integrated tubular shaft of center gear set from output shaft.
6. Remove thrust washer (4).

ASSEMBLY

ASSEMBLY



80e432e7

Fig. 167: Output Shaft With Center & Rear Planetary Geartrain
 Courtesy of CHRYSLER LLC

1 - TEFLON RINGS	7 - DRIVING CLUTCH K3
2 - OUTPUT SHAFT WITH CENTER PLANETARY CARRIER	8 - THRUST WASHER
3 - NEEDLE BEARING	9 - AXIAL NEEDLE BEARING
4 - THRUST WASHER	10 - SHIM
5 - REAR PLANETARY GEAR SET	11 - RETAINING RING

6 - REAR HOLLOW SHAFT/FREEWHEELING CLUTCH F2

1. Mount thrust washer (4) with the collar pointing towards the planet carrier. Refer to **Fig. 167**.
2. Mount the rear gear set (5) on the rear hollow shaft (6).
3. Using grease, install lower three Teflon rings (1) in the groove so that the joint stays together. Refer to **Fig. 167**.
4. Put rear hollow shaft/freewheeling clutch F2 (6) with rear gear set (5) onto output shaft.
5. Install clutch K3 (7).
6. Mount retaining ring, shim, thrust needle bearing and thrust washer (8 - 11). Refer to **Fig. 167**.
7. Using grease, insert the upper two Teflon rings (1) in the groove so that the joint remains together.

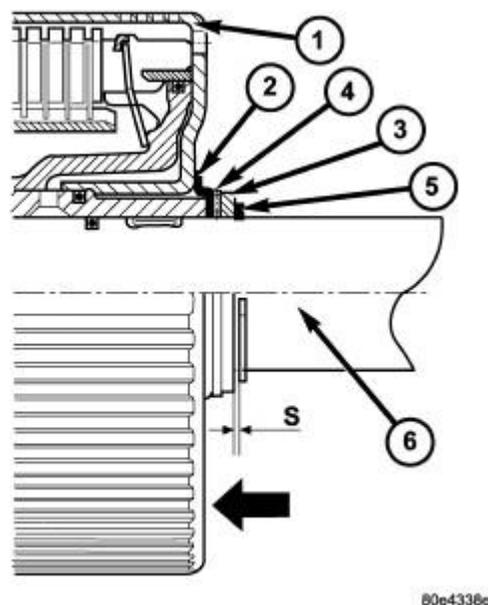


Fig. 168: Check Center & Rear Planetary End-play
Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K3
2 - THRUST WASHER
3 - SHIM
4 - AXIAL NEEDLE BEARING
5 - RETAINING RING
6 - OUTPUT SHAFT WITH CENTER PLANETARY CARRIER

NOTE: During the test, apply a contact force by hand to K3 in the direction of the arrow.

8. Inspect axial play between shim (10) and retaining ring (11). Refer to **Fig. 168**. Check axial play "S" between shim (10) and retaining ring (1) using a feeler gauge. Clearance should be 0.15-0.6 mm (0.006-0.024 in.). Shims are available in thicknesses of 3.0 mm (0.118 in.), 3.4 mm (0.134 in.), and 3.7 mm (0.146 in.). Adjust as necessary

HOLDING CLUTCHES

DESCRIPTION

DESCRIPTION

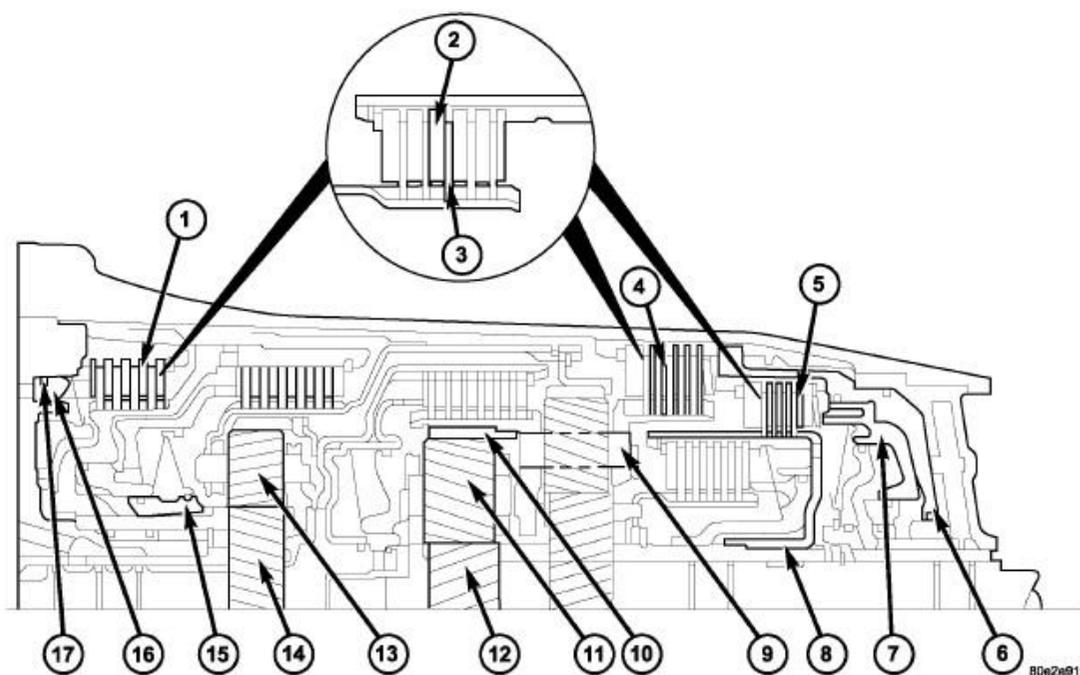


Fig. 169: Identifying Holding Clutches
 Courtesy of CHRYSLER LLC

1 - B1 CLUTCH	10 - CENTER PLANETARY GEARSET ANNULUS GEAR
2 - EXTERNALLY TOOTHED DISC	11 - CENTER PLANETARY GEARSET PINION GEARS
3 - INTERNALLY TOOTHED DISC	12 - CENTER PLANETARY GEARSET SUN GEAR
4 - B3 CLUTCH	13 - FRONT PLANETARY GEARSET PINION GEARS
5 - B2 CLUTCH	14 - FRONT PLANETARY GEARSET SUN GEAR
6 - B3 CLUTCH PISTON	15 - B1 CLUTCH INTERNALLY TOOTHED DISC CARRIER

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7 - B2 CLUTCH PISTON	16 - B1 CLUTCH PISTON
8 - B2 CLUTCH INTERNALLY TOOTHED DISC CARRIER	17 - B1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET PLANETARY CARRIER	

Three multiple-disc holding clutches, the front, B1 (1), middle, B3 (4), and rear multiple disc clutches, B2 (5), are located in the planetary gear sets in the transmission housing. Refer to **Fig. 169**.

A multiple-disc holding clutch consists of a number of internally toothed discs (3) on an internally toothed disc carrier and externally toothed discs (2) on an externally toothed disc carrier, which is rigidly connected to the transmission housing.

OPERATION

OPERATION

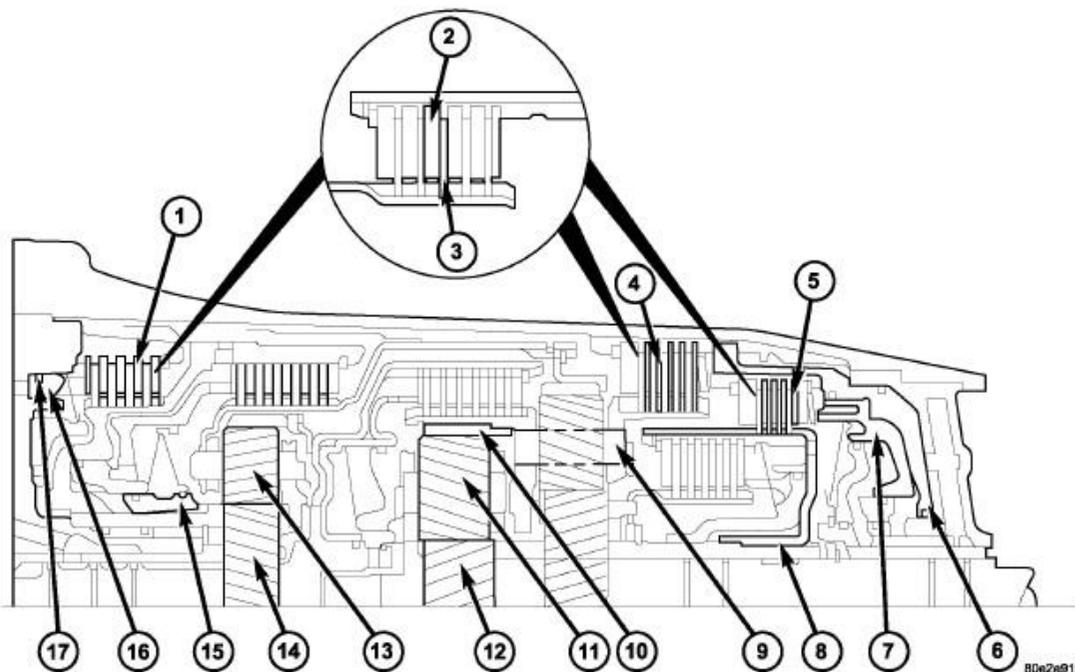


Fig. 170: Identifying Holding Clutches

Courtesy of CHRYSLER LLC

1 - B1 CLUTCH	10 - CENTER PLANETARY GEARSET ANNULUS GEAR
2 - EXTERNALLY TOOTHED DISC	11 - CENTER PLANETARY GEARSET PINION GEARS
3 - INTERNALLY TOOTHED DISC	12 - CENTER PLANETARY GEARSET SUN GEAR
4 - B3 CLUTCH	13 - FRONT PLANETARY GEARSET PINION

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	GEARS
5 - B2 CLUTCH	14 - FRONT PLANETARY GEARSET SUN GEAR
6 - B3 CLUTCH PISTON	15 - B1 CLUTCH INTERNALLY TOOTHED DISC CARRIER
7 - B2 CLUTCH PISTON	16 - B1 CLUTCH PISTON
8 - B2 CLUTCH INTERNALLY TOOTHED DISC CARRIER	17 - B1 CLUTCH EXTERNALLY TOOTHED DISC CARRIER
9 - REAR PLANETARY GEARSET PLANETARY CARRIER	

The holding clutches connect the annulus gear, sun gear, or planetary carrier of a planetary gear set against the transmission housing in order to transmit the drive torque. Refer to **Fig. 170**.

If the piston (16) on multiple-disc holding clutch B1 (1) is subjected to oil pressure, it presses the internal (3) and external discs (2) of the disc set together. The internally toothed disc carrier (15) locks the sun gear (14) against the housing. The planetary pinion gears (13) turn on the sun gear (14).

If the multiple-disc holding clutch B2 (5) is actuated via the piston (7), the piston compresses the disc set. The internally toothed disc carrier (8) locks the sun gear (12) against the housing. The planetary pinion gears (11) turn on the sun gear (12).

If the multiple-disc holding clutch B3 (4) is actuated via the piston (6), the planetary carrier (9) and the annulus gear (10) are locked. When the multiple-disc brake B3 (4) is actuated, the direction of rotation is reversed.

MECHANISM, BRAKE TRANSMISSION SHIFT INTERLOCK

DESCRIPTION

DESCRIPTION

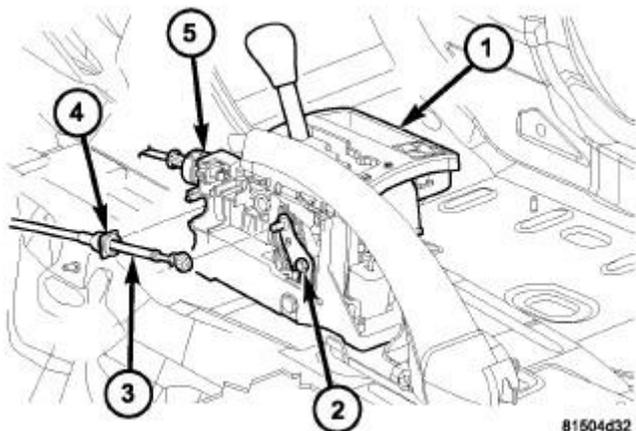


Fig. 171: Identifying Gearshift & Park Lock Cable At Shifter Assembly

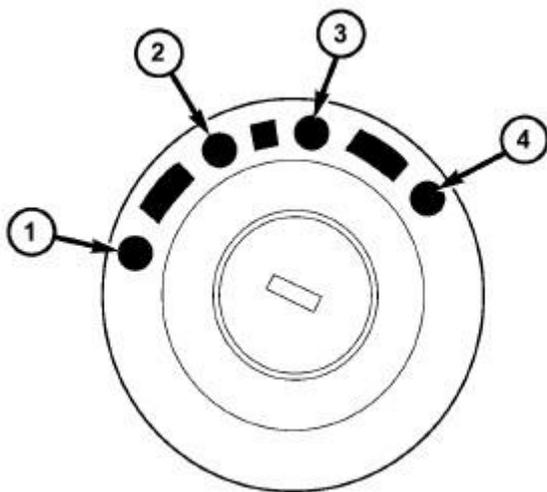
Courtesy of CHRYSLER LLC

1 - SHIFTER ASSEMBLY
2 - ADJUSTMENT NUT
3 - SHIFT CABLE
4 - SHIFT CABLE ATTACHMENT
5 -PARK LOCK CABLE

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable operated system that prevents the transmission gear shifter from being moved out of PARK without the proper driver inputs. The system also contains a solenoid that is integral to the shifter assembly. The solenoid works in conjunction with the park lock cable (5) to permit shifter movement out of PARK when the brake is depressed and prevents shifter movement into REVERSE unless a shift into REVERSE is permitted. Refer to **Fig. 171**.

OPERATION

OPERATION



8111a2ba

Fig. 172: Ignition Key/Switch Positions

Courtesy of CHRYSLER LLC

1 - LOCK
2 - ACC
3 - ON
4 - START

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK (1) position. Refer to **Fig. 172**. An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A solenoid in the shifter assembly is

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de-energized when the ignition is in the ON position and the brake pedal is depressed. When the key is in the ON position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK position, unless the shifter is in the gated PARK position.

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the "ACC" position and depress brake pedal.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON" position, with foot off of brake pedal.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear, except "PARK", and try to return key to the "LOCK" position.	4. Key cannot be returned to the "LOCK" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, and the brake depressed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".

NOTE: Any failure to meet these expected responses requires system adjustment or repair.

DIAGNOSIS AND TESTING

BRAKE TRANSMISSION SHIFT INTERLOCK

SYSTEM VERIFICATION

1. Verify that the key can only be removed in the PARK position
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely from ACC to LOCK. When the shifter is in any other gear or neutral position, the ignition key cylinder should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).
5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.

DIAGNOSTIC CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
-----------	----------------	------------

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KEY WILL NOT ROTATE TO THE LOCK POSITION.	1. Misadjusted Park Lock cable.	1. Adjust Park Lock cable.
	2. Misadjusted gearshift cable.	2. Adjust gearshift cable.
	3. Burrs on ignition key.	3. Remove burrs and cycle key several times to verify operation.
	4. Binding or broken components.	4. Inspect system components and repair/replace components as necessary.
VEHICLE WILL NOT START UNLESS SHIFTER IS HELD FORWARD, OR REARWARD, OF THE PARK POSITION.	1. Misadjusted gearshift cable.	1. Adjust gearshift cable.

ADJUSTMENTS

BRAKE TRANSMISSION SHIFT INTERLOCK

The park interlock cable is part of the brake/shift lever interlock system. Correct cable adjustment is important to proper interlock operation. The gear shift and park lock cables must both be correctly adjusted in order to shift out of PARK.

ADJUSTMENT PROCEDURE

1. Remove floor console as necessary for access to the park lock cable. Refer to **CONSOLE, FLOOR, REMOVAL**.
2. Shift the transmission into the PARK position.
3. Turn ignition switch to LOCK position. **Be sure ignition key cylinder is in the LOCK position. Cable will not adjust correctly in any other position.**

NOTE: If the key will not turn to the LOCK position, pull up on the cable lock button and manually move the cable in and out until the key can be turned to the LOCK position.

4. Pull cable lock button up to release cable, if necessary.
5. Ensure that the cable is free to self-adjust by pushing cable rearward and releasing.
6. Push lock button down until it snaps in place. The lock should be flush to the surface of the cylindrical portion of the cable adjustment housing.

BTSI FUNCTION CHECK

1. Verify removal of ignition key allowed in PARK position only.
2. When the shift lever is in PARK, the ignition key cylinder should rotate freely LOCK position. When the shifter is in any other position, the ignition key should not rotate to the LOCK position.
3. Shifting out of PARK should not be possible when the ignition key cylinder is in the ACC position and the brake pedal is not depressed.
4. Shifting out of PARK should not be possible while applying normal force on the shift lever and ignition

key cylinder is in the ACC, ON, or START positions unless the foot brake pedal is depressed approximately 1/2 inch (12mm).

5. Shifting out of PARK should not be possible when the ignition key cylinder is in the LOCK position, regardless of the brake pedal position.
6. Shifting between any gears, NEUTRAL or into PARK may be done without depressing foot brake pedal with ignition switch in ACC, ON, or START positions.
7. The floor shifter lever and gate positions should be in alignment with all transmission detent positions.
8. Engine starts must be possible with shifter lever in PARK or NEUTRAL gate positions only. Engine starts must not be possible in any other gate positions other than PARK or NEUTRAL.
9. With the shifter lever handle in the:
 - PARK position- apply forward force on center of handle and remove pressure. Engine start must be possible.
 - PARK position- apply rearward force on center of handle and remove pressure. Engine start must be possible.
 - NEUTRAL position- engine start must be possible.
 - NEUTRAL position, engine running and brakes applied- Apply forward force on center of shift handle. Transmission should not be able to shift into REVERSE detent.

PUMP, TRANSMISSION OIL

DESCRIPTION

DESCRIPTION

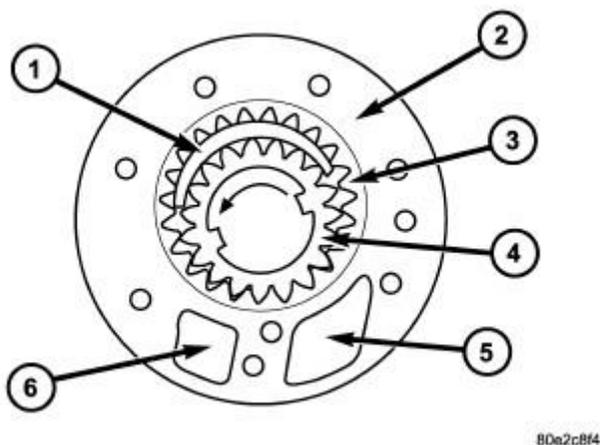


Fig. 173: Identifying Oil Pump Components
 Courtesy of CHRYSLER LLC

1 - CRESCENT
2 - OIL PUMP
3 - EXTERNAL GEAR

4 - INTERNAL GEAR

5 - INLET CHAMBER

6 - PRESSURE CHAMBER

The oil pump (2) (crescent-type pump) is installed in the bellhousing behind the torque converter and is driven by the drive flange of the torque converter. Refer to **Fig. 173**. The pump creates the oil pressure required for the hydraulic procedures.

OPERATION

OPERATION

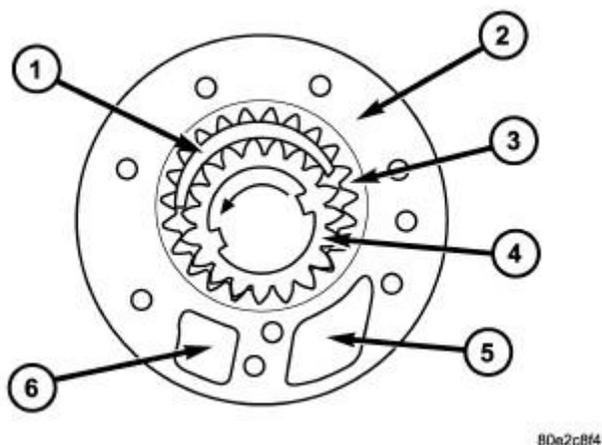


Fig. 174: Identifying Oil Pump Components
 Courtesy of CHRYSLER LLC

1 - CRESCENT

2 - OIL PUMP

3 - EXTERNAL GEAR

4 - INTERNAL GEAR

5 - INLET CHAMBER

6 - PRESSURE CHAMBER

When the engine is running, the oil is pumped through the inlet chamber (5) along the upper and lower side of the crescent (1) to the pressure chamber (6) of the housing. Refer to **Fig. 174**. The meshing of the teeth prevents oil flowing from the delivery side to the intake side. An external gear (3) is eccentrically mounted in the pump housing. The external gear is driven by the internal gear (4) which is connected to the torque converter hub.

DISASSEMBLY

DISASSEMBLY

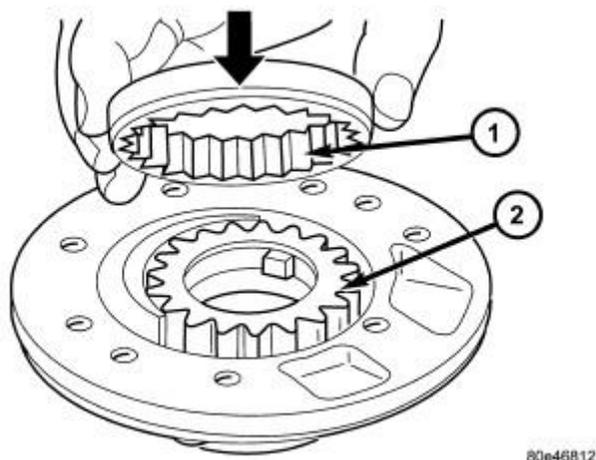


Fig. 175: Oil Pump Gears
 Courtesy of CHRYSLER LLC

- | |
|----------------------|
| 1 - OUTER PUMP ROTOR |
| 2 - INNER PUMP ROTOR |

1. Remove pump gears (1 and 2) from pump housing. Refer to **Fig. 175**.

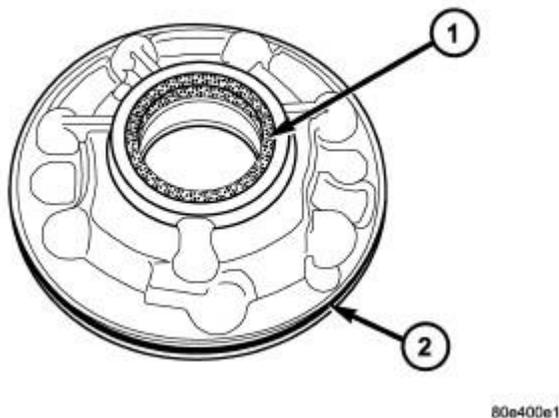


Fig. 176: Identifying Oil Pump Seals
 Courtesy of CHRYSLER LLC

- | |
|--------------------|
| 1 - INNER OIL SEAL |
| 2 - OUTER OIL SEAL |

2. Remove the inner oil pump seal (1). Refer to **Fig. 176**.
3. Replace the outer oil pump O-ring (2). Refer to **Fig. 176**.

CLEANING

CLEANING

Clean pump and support components with solvent and dry them with compressed air.

INSPECTION**INSPECTION**

Before measuring any oil pump components, perform a thorough visual inspection of all the components. If any sign of scoring, scratches, or other damage is seen, replace the oil pump as an assembly.

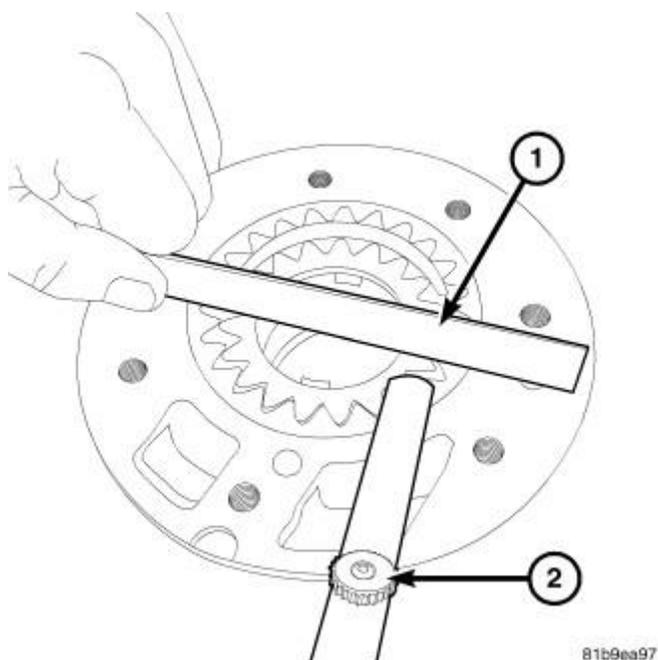
SIDE CLEARANCE

Fig. 177: Checking Oil Pump Side Clearance
Courtesy of CHRYSLER LLC

1 - FLAT PLATE

2 - FEELER GAUGE

Side clearance is the difference between the thickness of the pump gears and the depth of the pocket in the pump housing. Side clearance can be measured by laying a flat plate (1) across the mounting face of the pump housing, and measuring the distance between the plate and the gears with a feeler gauge (2).

Acceptable side clearance:

- Inner gear: 0.064 mm (0.0025 in) max
- Outer gear: 0.069 mm (0.0027 in) max

TIP CLEARANCE

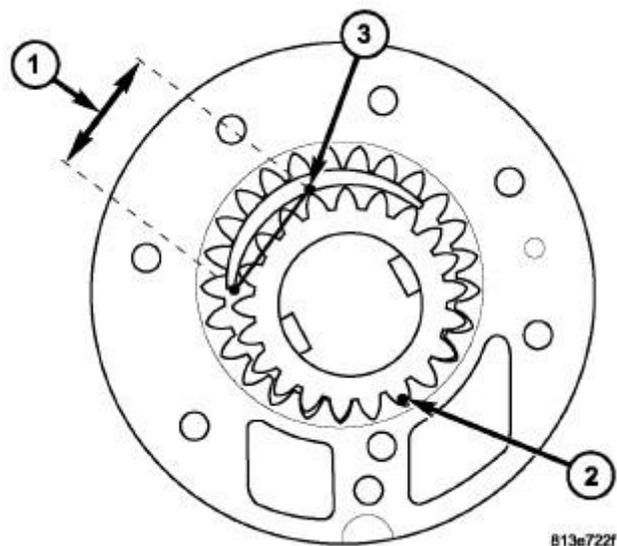


Fig. 178: Oil Pump Tip Clearance

Courtesy of CHRYSLER LLC

1 - MEASURE 37MM FROM THE CORNER OF CRESCENT
--

2 - TIGHT MESH HERE

3 - MEASURE TIP CLEARANCE HERE

Tip clearance is the difference between the tip diameters of the gear teeth and the corresponding diameters of the pocket in the pump housing.

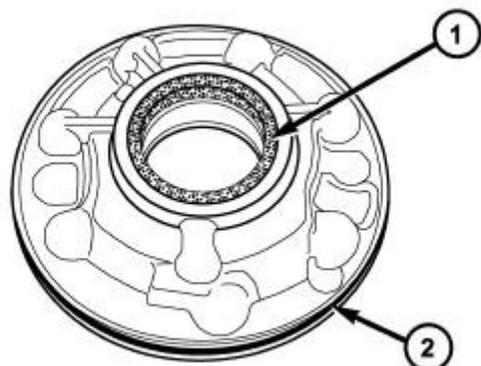
Tip clearance for the inner gear can be checked by moving the inner gear into tight mesh (2) with the outer gear as shown in illustration. Refer to **Fig. 178**. Clearance between the ID of the crescent feature of the housing and the OD of the teeth of the inner gear (3) should then be measured at a point 37 mm (1.45 in.) from the corner of the crescent (1) feature, as shown below.

Acceptable tip clearance for inner gear:

- 0.85 mm (0.033 in) max

ASSEMBLY

ASSEMBLY



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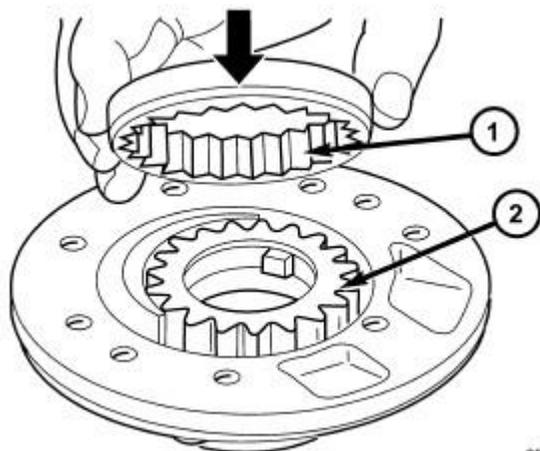
Fig. 179: Identifying Oil Pump Seals

Courtesy of CHRYSLER LLC

1 - INNER OIL SEAL

2 - OUTER OIL SEAL

1. Install new inner oil pump seal (1) with Seal Installer 8902A. Refer to **Fig. 179**.
2. Replace O-ring (2). Refer to **Fig. 179**.



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Fig. 180: Oil Pump Gears

Courtesy of CHRYSLER LLC

1 - OUTER PUMP ROTOR

2 - INNER PUMP ROTOR

3. Lubricate pump gears and place in the pump housing. Insert pump gear (1) so that the chamfer (arrow) points towards the pump housing. Refer to **Fig. 180**.

SEAL, FILL TUBE

REMOVAL

REMOVAL

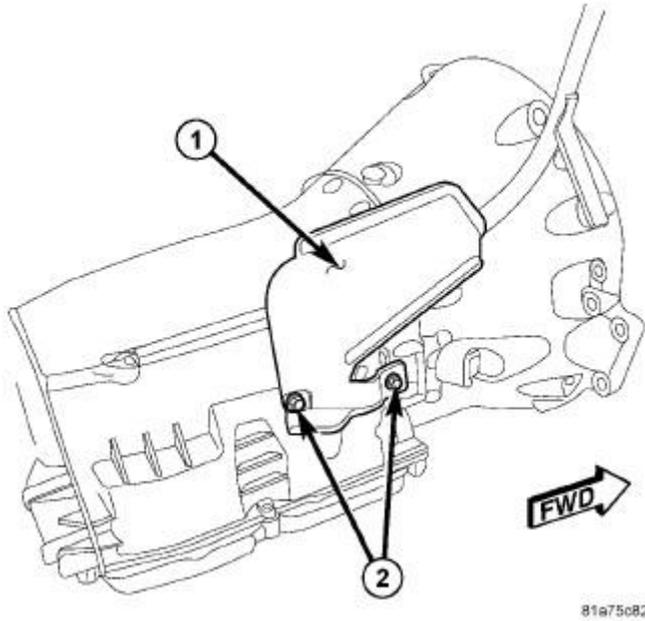


Fig. 181: Water Shield
Courtesy of CHRYSLER LLC

- | |
|------------------------|
| 1 - WATER SHIELD |
| 2 - WATER SHIELD BOLTS |

1. Lift and support the vehicle.
2. Remove water shield bolts and water shield (if equipped).

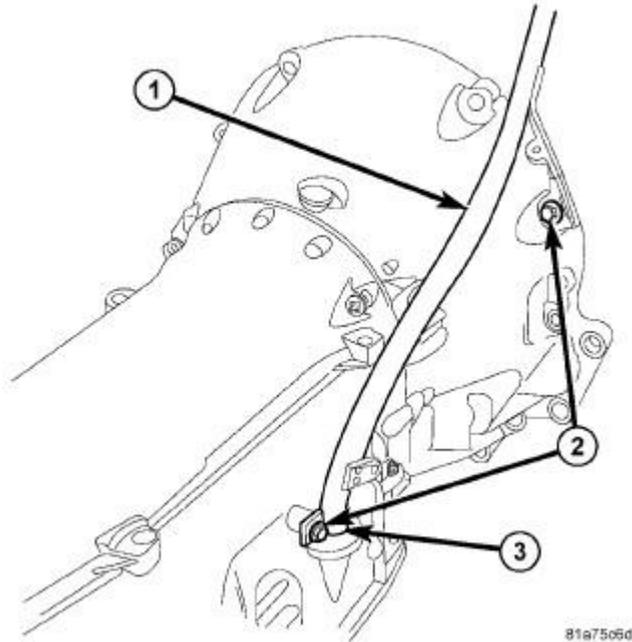


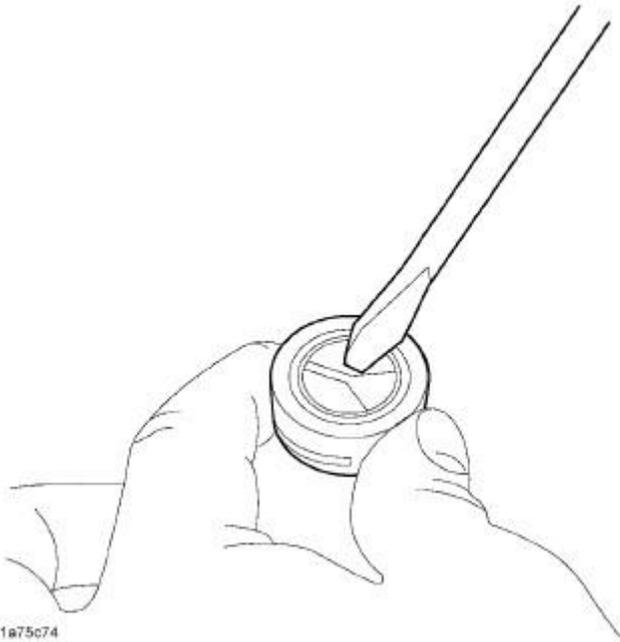
Fig. 182: Fill Tube, Bolts & Seal
Courtesy of CHRYSLER LLC

- | |
|---------------------|
| 1 - FILL TUBE |
| 2 - FILL TUBE BOLTS |
| 3 - FILL TUBE SEAL |

3. Remove the transmission fill tube bolts (2).
4. Lift the transmission fill tube out of the transmission case.
5. Using a small pry tool remove the transmission fill tube seal.

INSTALLATION

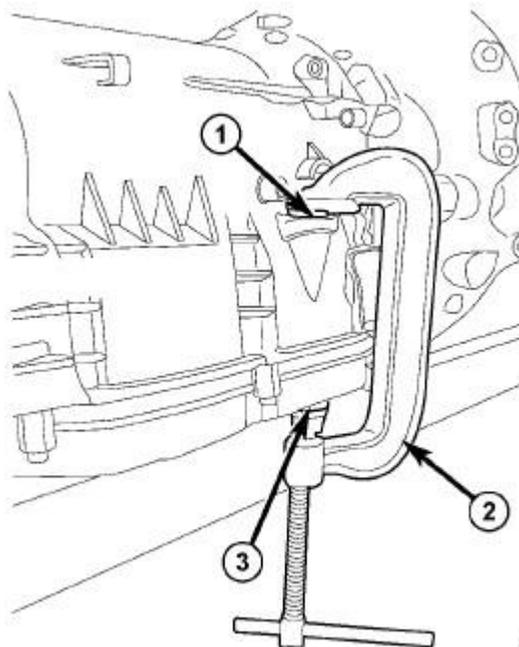
INSTALLATION



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Fig. 183: Pierce Fill Tube Seal
Courtesy of CHRYSLER LLC

1. Pierce the new transmission fill tube seal along the molded "Y" from the outside.



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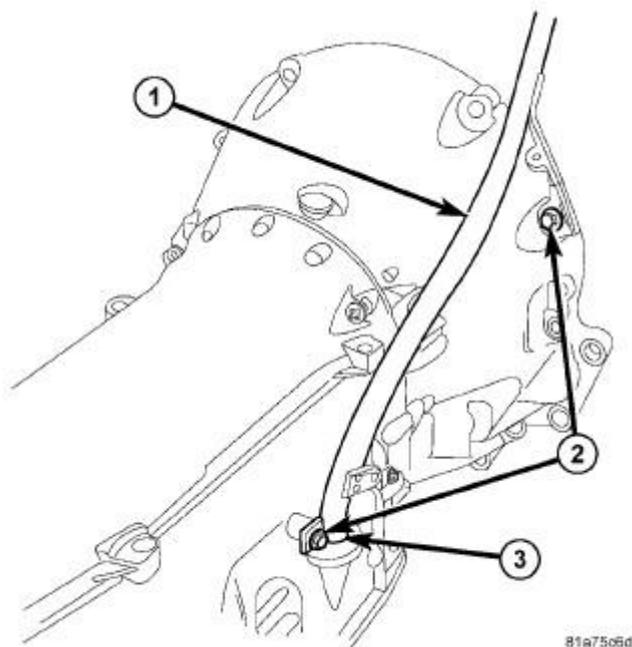
Fig. 184: C-Clamp
Courtesy of CHRYSLER LLC

- | |
|--|
| <p>1 - SEAL INSTALLER DISC 9902
 2 - "C" CLAMP
 3 - SHIM STOCK</p> |
|--|

NOTE: If the new fill tube seal can not be fully installed into the transmission case fill tube bore by hand, a "C" clamp must be used.

CAUTION: Do not over tighten the "C" clamp during fill tube oil seal installation. Transmission oil pan damage or bending may occur.

2. Lubricate the new transmission fill tube seal with MOPAR® ATF+4 ATF and install the new fill tube seal into the transmission case fill tube bore.
 1. Position seal installer disc (special tool #9902, Installer, Seal) (1) between the "C" clamp (2) and the new transmission fill tube seal
 2. Position a shim stock (3) between the "C" clamp (2) and the **edge** of the transmission oil pan.
 3. Lightly tighten the "C" clamp until the fill tube seal is fully installed into the transmission case fill tube bore.
3. Clean and lubricate the end of the transmission fill tube with MOPAR® ATF+4 ATF and install the fill tube into the transmission case fill tube bore.



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Fig. 185: Fill Tube, Bolts & Seal
 Courtesy of CHRYSLER LLC

- | |
|---|
| <p>1 - FILL TUBE
 2 - FILL TUBE BOLTS</p> |
|---|

3 - FILL TUBE SEAL

4. Loosely install the fill tube bolts (2).
5. Tighten the upper fill tube bolt to 39 N.m (29 ft.lbs.).
6. Tighten the lower fill tube bolt to 12 N.m (105 in.lbs.).

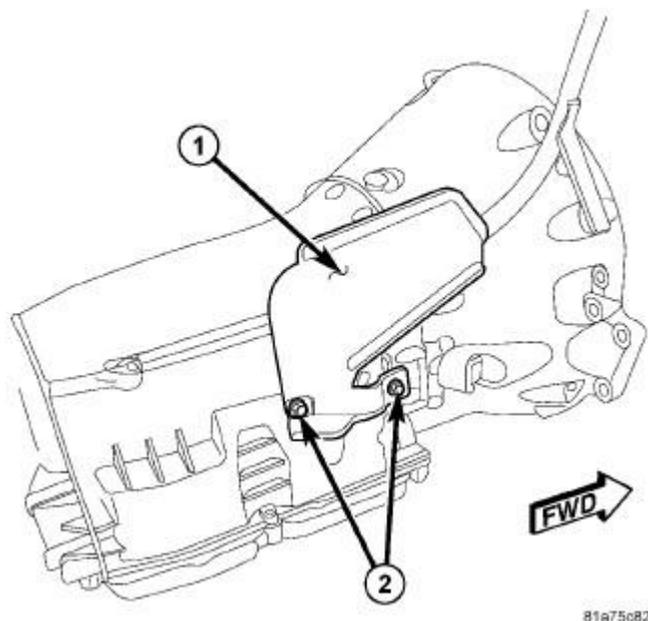


Fig. 186: Water Shield
 Courtesy of CHRYSLER LLC

- | |
|------------------------|
| 1 - WATER SHIELD |
| 2 - WATER SHIELD BOLTS |

7. Install the water shield (1) and water shield bolts (2) (if equipped).
8. Tighten the water shield bolts to 12 N.m (9 ft.lbs).
9. Lower vehicle to check and fill transmission as necessary.

SEAL, OUTPUT SHAFT

REMOVAL

REMOVAL

1. For 2WD transmissions;

NOTE: When removing the propeller shaft flange be certain the shim remains on

the output shaft.

1. Remove the propeller shaft. Refer to **SHAFT, DRIVE, REAR, REMOVAL** . Move propeller shaft to the right and tie up.
2. Remove the nut, with a 30 mm 12 point socket, holding the propeller shaft flange to the output shaft and remove the flange.
2. For 4WD transmissions:
 1. Remove the transfer case. Refer to **REMOVAL** or **REMOVAL** .
 2. Remove the bolts holding the transfer case adapter housing onto the transmission case.

NOTE: **When removing the transfer case adapter housing be certain the shim remains on the output shaft.**

3. Remove the transfer case adapter housing from the transmission case.
4. Remove the bolt holding the output shaft extension to the output shaft.
5. Remove the output shaft extension from the output shaft.
3. Remove the output shaft seal with suitable screw and slide hammer.

INSTALLATION

INSTALLATION

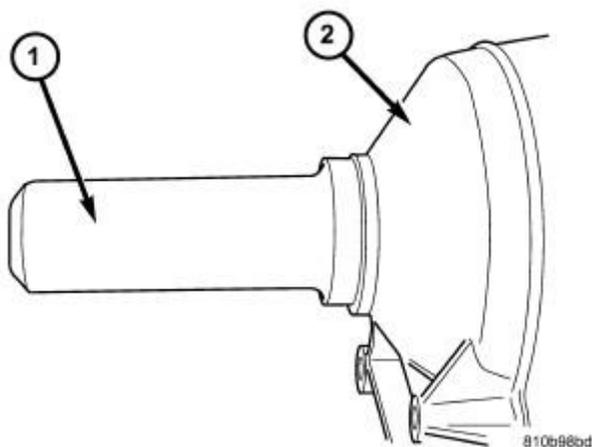


Fig. 187: Installing Output Shaft Seal
 Courtesy of CHRYSLER LLC

- | |
|--------------------------|
| 1 - SEAL INSTALLER 8902A |
| 2 - TRANSMISSION CASE |

1. Position the new output shaft seal over the output shaft and against the transmission case.
2. Use Seal Installer (special tool #8902A, Installer, Seal) (1) to install the seal. Refer to **Fig. 187**.

3. For 4WD transmissions:

NOTE: When installing the transfer case adapter housing be certain the shim remained on the output shaft.

1. Install the output shaft extension onto the output shaft.
2. Install the bolt to hold the output shaft extension to the output shaft. Torque the bolt to 200 N.m (148 ft.lbs.).
3. Install the transfer case adapter housing onto the transmission case.
4. Install the bolts to hold the transfer case adapter housing onto the transmission case. Torque the bolt to 20 N.m (177 in.lbs.).
5. Install the transfer case. Refer to INSTALLATION or INSTALLATION .

NOTE: When installing the propeller shaft flange be certain the shim remained on the output shaft.

4. For 2WD transmissions, install the propeller shaft flange onto the output shaft and install an new flange nut. Tighten the flange nut, with a 30 mm 12 point socket, to 200 N.m (148 ft.lbs.).

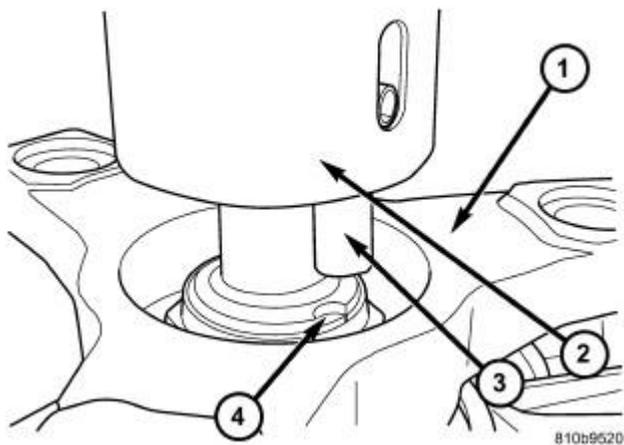


Fig. 188: Align Staking Tool
Courtesy of CHRYSLER LLC

1 - PROPELLER SHAFT FLANGE
2 - STAKING TOOL 9078
3 - ALIGNMENT PIN
4 - OUTPUT SHAFT NOTCH

5. Place the Staking Tool (special tool #9078, Staking Tool) and Driver Handle (special tool #C-4171, Driver Handle, Universal) onto the output shaft.
6. Rotate the Staking Tool (special tool #9078, Staking Tool) (2) until the alignment pin (3) engages the

output shaft notch (4). Refer to **Fig. 188**.

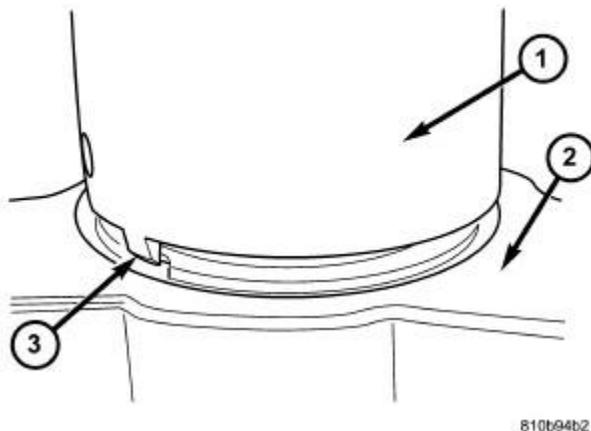


Fig. 189: Stake Output Shaft Nut
Courtesy of CHRYSLER LLC

1 - STAKING TOOL 9078
2 - PROPELLER FLANGE
3 - STAKING PIN

7. Press downward on the staking tool until the staking pin contacts the output shaft nut flange. Refer to **Fig. 189**.
8. Strike the Driver handle (special tool #C-4171, Driver Handle, Universal) with a suitable hammer until the output shaft nut is securely staked to the output shaft.
9. For 2WD transmissions, install the propeller shaft. Refer to **SHAFT, DRIVE, REAR, INSTALLATION**.

SEAL, TORQUE CONVERTER HUB

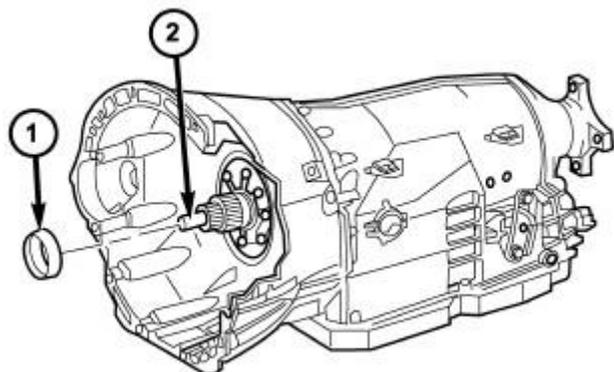
REMOVAL

REMOVAL

1. Remove the torque converter. Refer to **TORQUE CONVERTER, REMOVAL**.
2. Remove the torque converter hub seal with suitable screw and slide hammer.

INSTALLATION

INSTALLATION

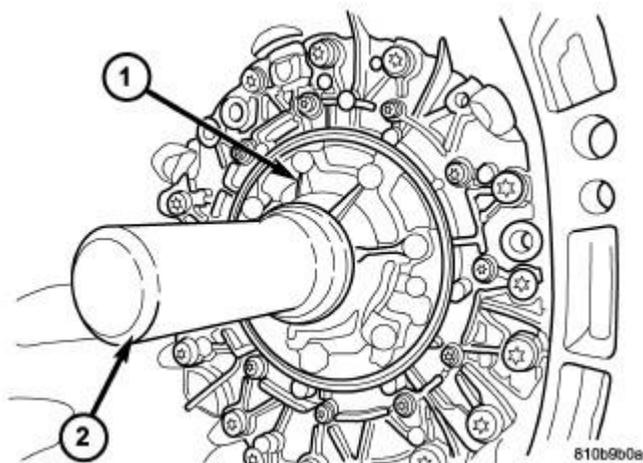


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Fig. 190: Position Torque Converter Hub Seal
 Courtesy of CHRYSLER LLC

- | |
|-------------------------------|
| 1 - TORQUE CONVERTER HUB SEAL |
| 2 - INPUT SHAFT |

1. Position the torque converter hub seal (1) over the input shaft and against the transmission oil pump. Refer to **Fig. 190**.



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Fig. 191: Install Torque Converter Hub Seal
 Courtesy of CHRYSLER LLC

- | |
|--------------------------|
| 1 - OIL PUMP |
| 2 - SEAL INSTALLER 8902A |

2. Using Seal Installer (special tool #8902A, Installer, Seal) (2), install a new torque converter hub seal. Refer to **Fig. 191**.
3. Install the torque converter. Refer to **TORQUE CONVERTER, INSTALLATION**.

SENSOR, SPEED

DESCRIPTION

DESCRIPTION

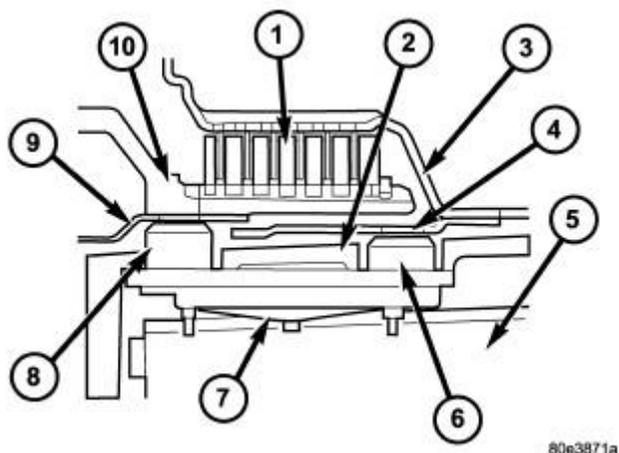


Fig. 192: Transmissions Speed Sensors N2 & N3
Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K1
2 - TRANSMISSION HOUSING
3 - DRIVING CLUTCH K1 INTERNALLY TOOTHED DISC
4 - EXCITER RING
5 - VALVE HOUSING OF SHIFT PLATE
6 - N2 SPEED SENSOR
7 - SPRING
8 - N3 SPEED SENSOR
9 - EXCITER RING
10 - DRIVING CLUTCH K1 EXTERNALLY TOOTHED DISC

The speed sensors, N2 and N3, (6, 8) are fixed to the shell of the electrohydraulic control unit's leadframe via contact blades. Refer to **Fig. 192**. The speed sensors are pressed against the transmission housing (2) by a spring (7) which is held against the valve housing of the shift plate (5). This ensures a defined distance between the speed sensors and the exciter ring (4).

OPERATION

OPERATION

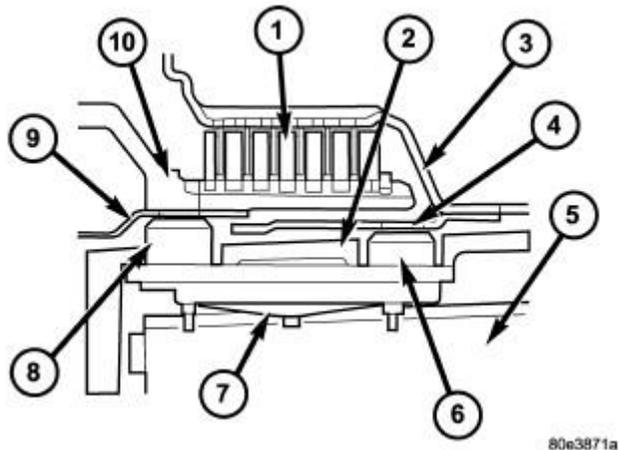


Fig. 193: Transmissions Speed Sensors N2 & N3
 Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K1
2 - TRANSMISSION HOUSING
3 - DRIVING CLUTCH K1 INTERNALLY TOOTHED DISC
4 - EXCITER RING
5 - VALVE HOUSING OF SHIFT PLATE
6 - N2 SPEED SENSOR
7 - SPRING
8 - N3 SPEED SENSOR
9 - EXCITER RING
10 - DRIVING CLUTCH K1 EXTERNALLY TOOTHED DISC

Signals from the speed sensors, N2 and N3, (6, 8) are recorded in the transmission control module (TCM), together with the wheel and engine speeds and other information, and are processed into an input signal for electronic control. Refer to **Fig. 193**.

Speed sensor N2 (6) records the speed of the front planetary rear annulus assembly (10). Speed sensor N3 (8) records the speed of the K1 clutch (3).

RELATIVE SPEED SENSOR READINGS - NAG 1 TRANSMISSION

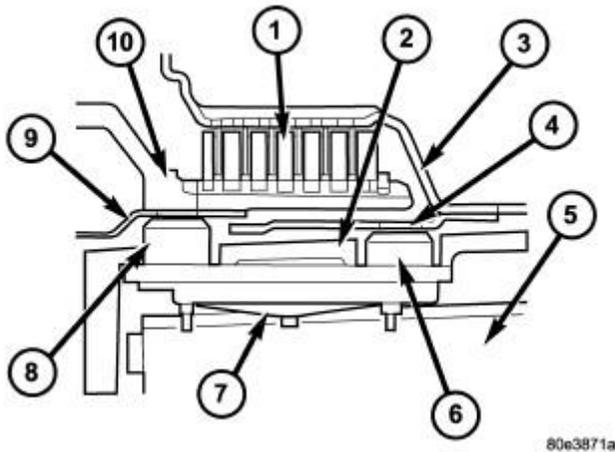


Fig. 194: Transmissions Speed Sensors N2 & N3
 Courtesy of CHRYSLER LLC

1 - DRIVING CLUTCH K1
2 - TRANSMISSION HOUSING
3 - DRIVING CLUTCH K1 INTERNALLY TOOTHED DISC
4 - EXCITER RING
5 - VALVE HOUSING OF SHIFT PLATE
6 - N2 SPEED SENSOR
7 - SPRING
8 - N3 SPEED SENSOR
9 - EXCITER RING
10 - DRIVING CLUTCH K1 EXTERNALLY TOOTHED DISC

There are several things to note regarding the function of the N2 and N3 speed sensors.

- K1 clutch (N3 speed sensor) will show no rotation whenever the B1 Brake is applied. N3 = Zero in 1st, 5th and Reverse.
- With the vehicle moving forward or reverse, N2 speed sensor reading will be greater than zero in all gears
- Whenever the K1 clutch is applied (2nd, 3rd, and 4th) N2 will be equal to N3.
- There is no speed sensor internal to the transmission that directly measures input shaft speed. However, when K1 is applied N2 equals input shaft/turbine speed.
- The engine speed is fed to the TCM via can bus thus providing impeller speed.
- There is no speed sensor internal to the transmission that directly measures output shaft speed. ABS wheel sensors provide output shaft speed.
- K1 clutch (N3 speed sensor) will show no rotation whenever the B1 Brake is applied. N3 is equal to zero in 1st, 5th and Reverse gears.
- With the vehicle moving forward or reverse, N2 speed sensor reading will be greater than zero in all gears.
- Whenever the K1 clutch is applied (2nd, 3rd, and 4th) N2 will be equal to N3.

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee

- There is no speed sensor internal to the transmission that directly measures input shaft speed. However, when K1 is applied N2 equals input shaft/turbine speed.
- The engine speed is fed to the TCM via the vehicle's communication bus thus providing impeller speed.
- There is no speed sensor internal to the transmission that directly measures output shaft speed. ABS wheel sensors provide output shaft speed.

NOTE: N2 sensor, N3 sensor, output shaft speed sensor are speeds relative to the input shaft turbine speed.

GEAR	INPUT SHAFT/TURBINE SPEED	N2 SENSOR	N3 SENSOR	OUTPUT SHAFT SPEED	OVERALL RATIO
1ST	1.0000	0.6081	0.0000	0.2782	3.59
2ND	1.0000	1.0000	1.0000	0.4574	2.19
3RD	1.0000	1.0000	1.0000	0.7115	1.41
4TH	1.0000	1.0000	1.0000	1.0000	1.00
5TH	1.0000	0.6081	0.0000	1.2035	0.83
REVERSE (S)	1.0000	0.6081	0.0000	-0.3157	-3.17

Based on the preceding chart, it appears that N3 sensor is redundant and provides no additional information. However, the TCM needs to know Input Shaft/Turbine speed. Since the N2 sensor is not directly tied to the Input Shaft, the N3 sensor is required to inform the TCM to divide the N2 value by 0.6081 or 1.0000 to calculate actual Turbine speed.

SHIFTER, TRANSMISSION

DESCRIPTION

DESCRIPTION

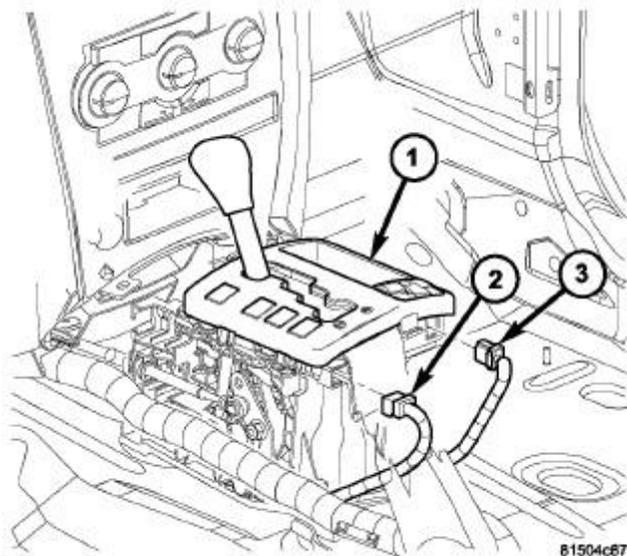


Fig. 195: Shift Lever Assembly & Connectors
 Courtesy of CHRYSLER LLC

The automatic transmission is operated with the help of a shift lever assembly (SLA) (1) located in the floor console. There are four positions to which the selection lever can be shifted: P, R, N, D. In addition, the selector lever can be moved sideways (+/-) in position "D" to adjust the shift range.

All selector lever positions, as well as selected shift ranges in position "D", are identified by the SLA. The information is then sent to the transmission control module (TCM) via a hardwire connection. At the same time, the selector lever positions "P", "R", "N" and "D" are transmitted by a shift cable to the selector shaft in the transmission.

The SLA contains a control module that is able to be flash programmed and is capable of communicating the shifter status and position over the vehicle's communication bus.

The SLA is comprised of the following functions:

- **Park lock:** The selector lever is not released from position "P" until the brake pedal has been applied and the ignition key is in "ACC" or ON" positions. Shift lock is controlled by the brake light switch in conjunction with a locking solenoid in the SLA. As soon as the brake pedal is applied firmly, the locking solenoid is de-energized to unlock the selector lever.
- **Reverse inhibitor:** As soon as the vehicle speed exceeds approximately 4-7 mph, it is no longer possible to move the selector lever from position "N" to position "R". The reverse inhibit functionality is controlled by the TCM and the same solenoid as the park lock. As the vehicle accelerates past the calibrated speed threshold, the solenoid is energized to block the motion of the shift lever necessary to move from NEUTRAL to REVERSE. The reverse inhibit is not released until the vehicle speed falls below approximately 4-7 mph and the shifter is moved out of the "D" shifter position.

OPERATION

OPERATION

With the selector lever in position "D", the transmission control module (TCM) automatically shifts the gears that are best-suited to the current operating situation. This means that shifting of gears is continuously adjusted to current driving and operating conditions in line with the selected shift range and the accelerator pedal position. Starting off is always performed in 1st gear.

The selector lever positions are determined by a sensor assembly internal to the shift lever assembly (SLA). The sensor assembly identifies the various positions of the SLA according to the following table.

Shift Lever Position	Bit 0	Bit 1	Bit 2	Bit 3
Default	0	0	0	0
"D"	1	0	1	0
"N"	0	1	1	0
"R"	1	1	1	0
"P"	0	0	0	1
"+"	1	0	0	1
"_"	0	1	0	1
"ND"	1	1	0	1
"RN"	0	0	1	1
"PR"	1	0	1	1
Implausible	1	1	1	1

The current selector lever position or, if the shift range has been limited, the current shift range is indicated in the instrument cluster display.

The permissible shifter positions and transmission operating ranges are:

- P = Parking lock and engine starting.
- R = Reverse.
- N = Neutral and engine starting (no power is transmitted to the axles).
- D = The shift range includes all forward gears.

The shift range can be adjusted to the current operating conditions by tipping the selector lever to the left-hand side ("-") or the right-hand side ("+") when in position "D". If the shift range is limited, the display in the instrument cluster indicates the selected shift range and not the currently engaged gear.

- 4= Shift range is limited to gears 1 to 4.
- 3= Shift range is limited to gears 1 to 3.
- 2= Shift range is limited to gears 1 to 2.
- 1= Shift range is limited to the 1st gear.

Tipping the shift lever will have the following results:

- **Tipping the selector lever toward "-" one time after another:** The shift range is reduced in descending sequence by one gear each time, i.e., from D - 4 - 3 - 2 - 1. If the selected limitation of the shift range would result in a downshift causing excessive engine speed, the shifting is not executed and the engaged gear as well as the shift range remain unchanged. This is to prevent the engine from overspeeding. Engine retardation is low with the selector lever in position "D". To make use of the full braking power of the engine, "manual" downshifting by tipping the lever towards the left-hand side is recommended. If this has been done, subsequent upshifting must be carried out manually as well.
- **Tipping the selector lever toward "-" and holding it in this position:** The currently engaged gear in range "D" is indicated in the instrument cluster display and the shift range is limited to this gear.
- **Tipping the selector lever toward "+" one time after another:** The shift range is increased by one gear each time and the increased shift range is displayed in the instrument cluster; possibly, the transmission upshifts to a faster gear.
- **Tipping the selector lever toward "+" several times:** The shift range is increased by one gear each time the lever is tipped until the shift range ends up in "D".
- **Tipping the selector lever toward "+" and holding it in this position:** The shift range is extended immediately to "D", shift ranges are indicated in ascending sequence; possibly, the transmission upshifts to a faster gear due to the extension of the shift range.

REMOVAL

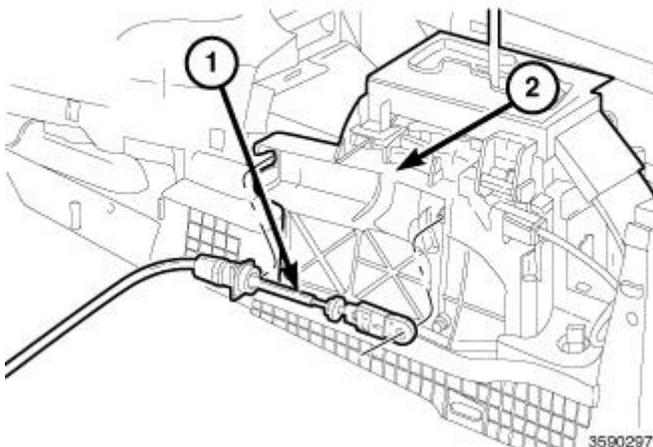


Fig. 196: Transmission Shift Cable & Shifter Assembly
Courtesy of CHRYSLER LLC

1. Remove any necessary console parts for access to shift lever assembly and shifter cables. For shifter knob and bezel removal, refer to **BEZEL, SHIFTER** . For console components, refer to **CONSOLE, FLOOR** .
2. Shift transmission into PARK
3. Disconnect the transmission shift cable (1) at shifter assembly (2).

4. Remove the shift cable retainer from the notch in the shifter assembly.
5. Disengage all wiring connectors from the shifter assembly (2).

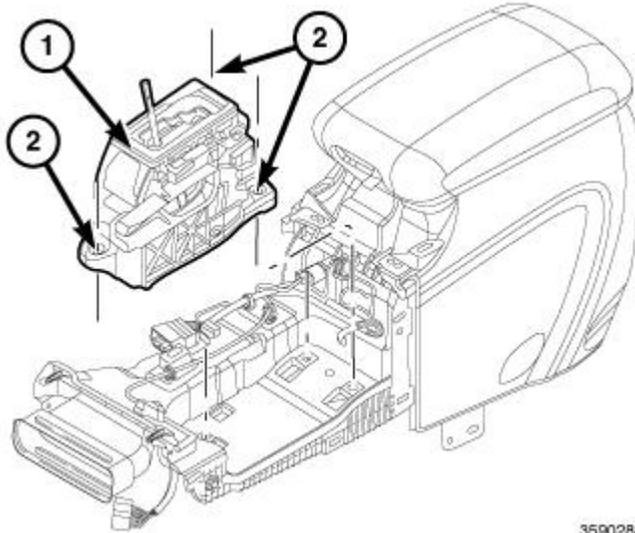


Fig. 197: Shifter Assembly & Bolts
Courtesy of CHRYSLER LLC

6. Remove all bolts (2) holding the shifter assembly (1) to the floor pan.
7. Remove the shifter assembly (1) from the vehicle.

INSTALLATION

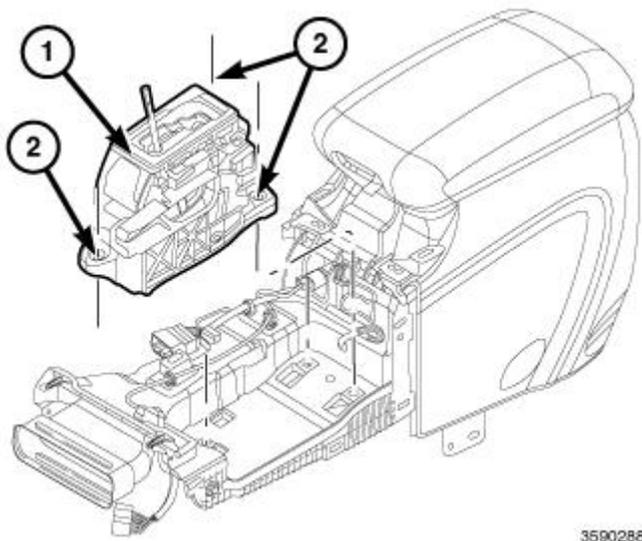


Fig. 198: Shifter Assembly & Bolts
Courtesy of CHRYSLER LLC

1. Install shifter assembly (1) in position on the floor pan.

2. Install the bolts (2) to hold the shifter assembly (1) onto the floor pan. Tighten bolts to 12 N.m (105 in.lbs.).

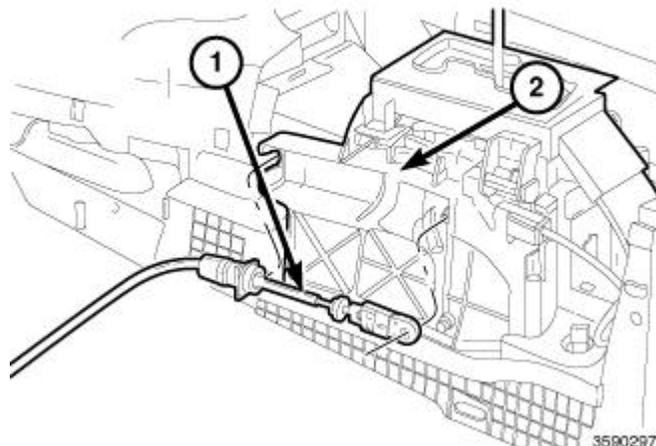


Fig. 199: Transmission Shift Cable & Shifter Assembly
Courtesy of CHRYSLER LLC

3. Place the floor shifter lever in PARK position.
4. Install the gearshift cable (1) to the shift lever pin.
5. Install the wiring harness connectors to the shifter assembly (2).
6. Verify that the shift lever is in the PARK position
7. Tighten the adjustment screw to 30 N.m (265 in.lbs.).
8. Verify correct shifter, park lock, and BTSI operation.
9. If necessary, install the shield, covering the gearshift and park lock cables, to the shifter assembly and install the bolts to hold the shield to the shifter assembly.
10. Install any console parts removed for access to shift lever assembly and shift cables. refer to **INSTALLATION**.

SOLENOID, TRANSMISSION

DESCRIPTION

DESCRIPTION

The typical electrical solenoid used in automotive applications is a linear actuator. It is a device that produces motion in a straight line. This straight line motion can be either forward or backward in direction, and short or long distance.

A solenoid is an electromechanical device that uses a magnetic force to perform work. It consists of a coil of wire, wrapped around a magnetic core made from steel or iron, and a spring loaded, movable plunger, which performs the work, or straight line motion. The shift valves (solenoids) are On-Off solenoids and are powered

up by the TCM with a 12-volt power source and are internally grounded in the transmission. The Torque Converter Clutch (TCC) and Pressure Control (PC) solenoids are also powered up by the TCM and internally grounded in the transmission but are pulse with modulated (PWM). PWM measurable voltage varies depending on percentage of modulation requested by the TCM.

The solenoids used in transmission applications are attached to valves which can be classified as **normally open** or **normally closed**. The **normally open** solenoid valve is defined as a valve which allows hydraulic flow when no current or voltage is applied to the solenoid. The **normally closed** solenoid valve is defined as a valve which does not allow hydraulic flow when no current or voltage is applied to the solenoid. These valves perform hydraulic control functions for the transmission and must therefore be durable and tolerant of dirt particles. For these reasons, the valves have hardened steel poppets and ball valves. The solenoids operate the valves directly, which means that the solenoids must have very high outputs to close the valves against the sizable flow areas and line pressures found in current transmissions. Fast response time is also necessary to ensure accurate control of the transmission.

The strength of the magnetic field is the primary force that determines the speed of operation in a particular solenoid design. A stronger magnetic field will cause the plunger to move at a greater speed than a weaker one. There are basically two ways to increase the force of the magnetic field:

1. Increase the amount of current applied to the coil or
2. Increase the number of turns of wire in the coil.

The most common practice is to increase the number of turns by using thin wire that can completely fill the available space within the solenoid housing. The strength of the spring and the length of the plunger also contribute to the response speed possible by a particular solenoid design.

A solenoid can also be described by the method by which it is controlled. Some of the possibilities include variable force, pulse-width modulated, constant ON, or duty cycle. The variable force and pulse-width modulated versions utilize similar methods to control the current flow through the solenoid to position the solenoid plunger at a desired position somewhere between full ON and full OFF. The constant ON and duty cycled versions control the voltage across the solenoid to allow either full flow or no flow through the solenoid's valve.

UPSHIFT/DOWNSHIFT SOLENOID VALVES

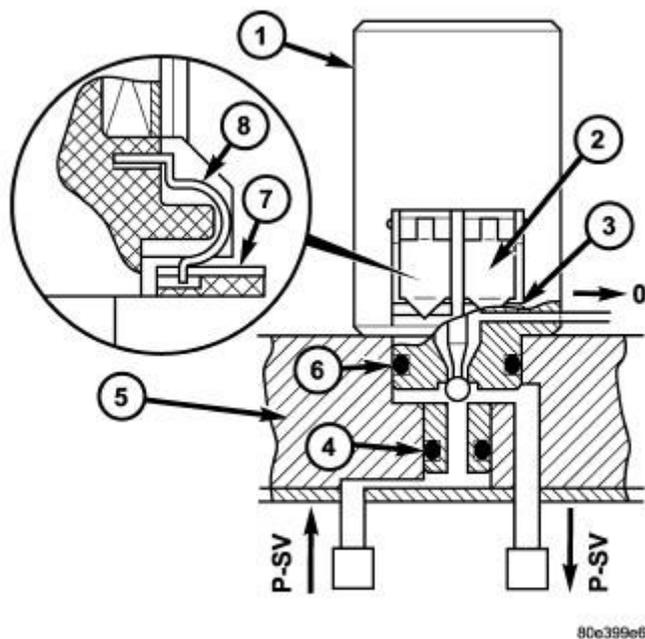


Fig. 200: Cutaway View Of Upshift/Downshift Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - UPSHIFT/DOWNSHIFT SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - O-RING
5 - VALVE HOUSING OF SHIFT PLATE
6 - O-RING
7 - CONDUCTOR TRACK
8 - CONTACT SPRING

The solenoid valves (1) for upshifts and downshifts are located in the shell of the electric control unit and pressed against the shift plate with a spring. Refer to **Fig. 200**.

The solenoid valves (1) initiate the upshift and downshift procedures in the shift plate.

The solenoid valves (1) are sealed off from the valve housing of the shift plate (5) by two O-rings (4, 6). The contact springs (8) at the solenoid valve engage in a slot in the conductor tracks (7). The force of the contact spring (8) ensures safe contacts.

MODULATING PRESSURE CONTROL SOLENOID VALVE

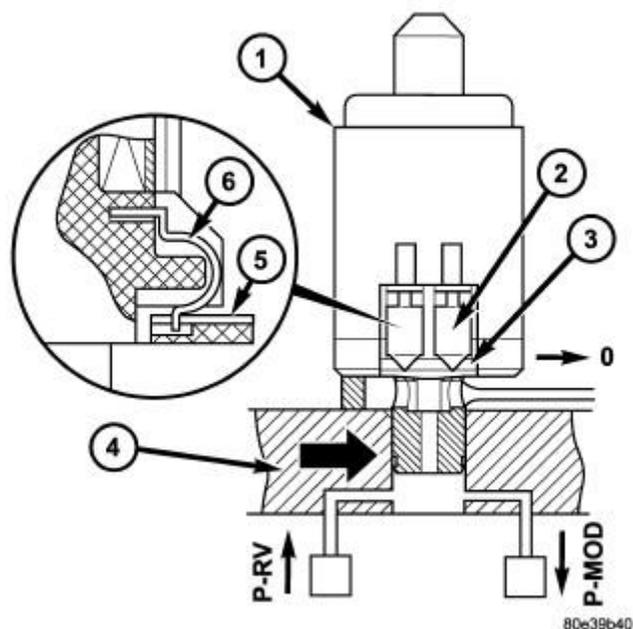


Fig. 201: Cutaway View Of Modulating Pressure Control Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - MODULATING PRESSURE CONTROL SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING SHIFT PLATE
5 - CONDUCTOR TRACK
6 - CONTACT SPRING

The modulating pressure control solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring. Refer to **Fig. 201**.

Its purpose is control the modulating pressure depending on the continuously changing operating conditions, such as load and gear change.

The modulating pressure regulating solenoid valve (1) has an interference fit and is sealed off to the valve body of the shift plate (4) by a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.

TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE

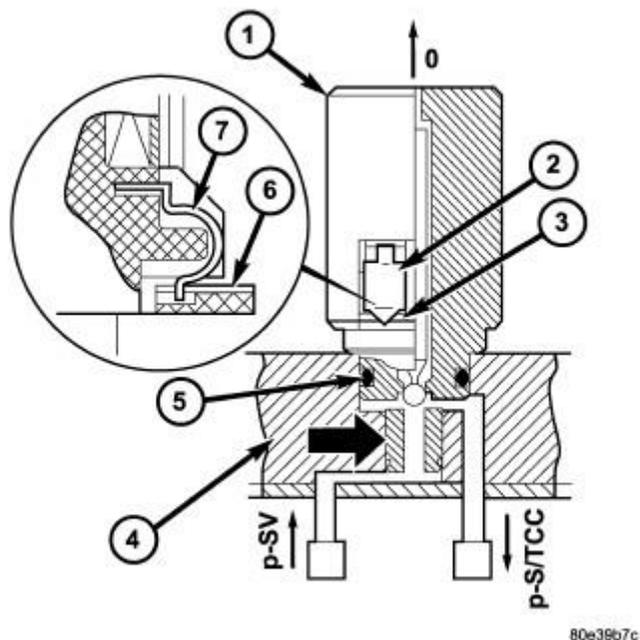


Fig. 202: Cutaway View Of Torque Converter Lockup Clutch PWM Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING OF SHIFT PLATE
5 - O-RING
6 - CONDUCTOR TRACK
7 - CONTACT SPRING

The torque converter lockup clutch PWM solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring. Refer to **Fig. 202**.

The PWM solenoid valve (1) for the torque converter lockup controls the pressure for the torque converter lockup clutch.

The torque converter lockup PWM solenoid valve (1) is sealed off to the valve body of the shift plate (4) by an O-ring (5) and a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.

SHIFT PRESSURE CONTROL SOLENOID VALVE

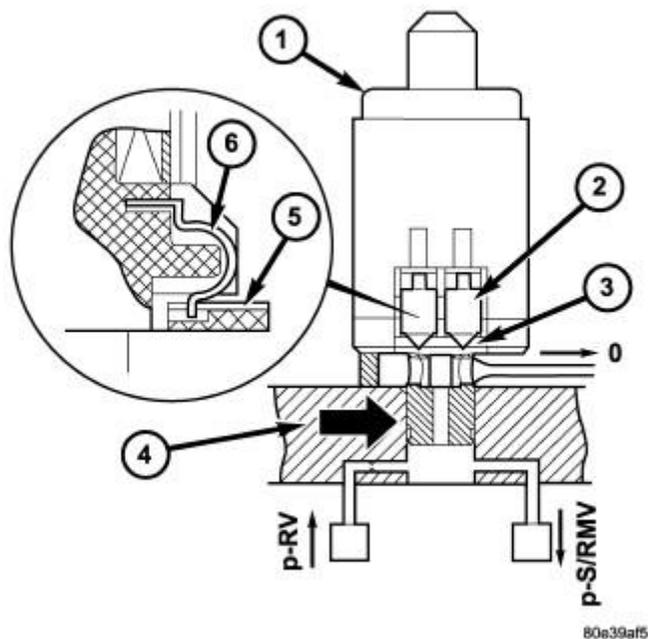


Fig. 203: Cutaway View Of Shift Pressure Control Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - SHIFT PRESSURE CONTROL SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING SHIFT PLATE
5 - CONDUCTOR TRACK
6 - CONTACT SPRING

The shift pressure control solenoid valve (1) is located in the shell of the electric valve control unit and pressed against the shift plate by a spring. Refer to **Fig. 203**.

Its purpose is to control the shift pressure depending on the continuously changing operating conditions, such as load and gear change.

The shift pressure regulating solenoid valve (1) has an interference fit and is sealed off to the valve body of the shift plate (4) by a seal (arrow). The contact springs (2) at the solenoid valve engage in a slot in the conductor tracks (3). The force of the contact springs (2) ensures secure contacts.

OPERATION

OPERATION

NOTE: A scan tool can only display an estimated pressure based on the current fed to the solenoid. Therefore if there's a stuck Line Pressure Regulating valve and the

transmission has insufficient pressure, the scan tool will still display estimated MOD and Shift pressures because the solenoids are being fed the correct amount of current.

The solenoids are fed a 12-volt source from the TCM (Transmission Control Module). When an electrical current is applied to the solenoid coil, a magnetic field is created which produces an attraction to the plunger, causing the plunger to move and work against the spring pressure and the load applied by the fluid the valve is controlling. The plunger is normally directly attached to the valve which it is to operate. When the current is removed from the coil, the attraction is removed and the plunger will return to its original position due to spring pressure.

The plunger is made of a conductive material and accomplishes this movement by providing a path for the magnetic field to flow. By keeping the air gap between the plunger and the coil to the minimum necessary to allow free movement of the plunger, the magnetic field is maximized.

UPSHIFT/DOWNSHIFT SOLENOID VALVES

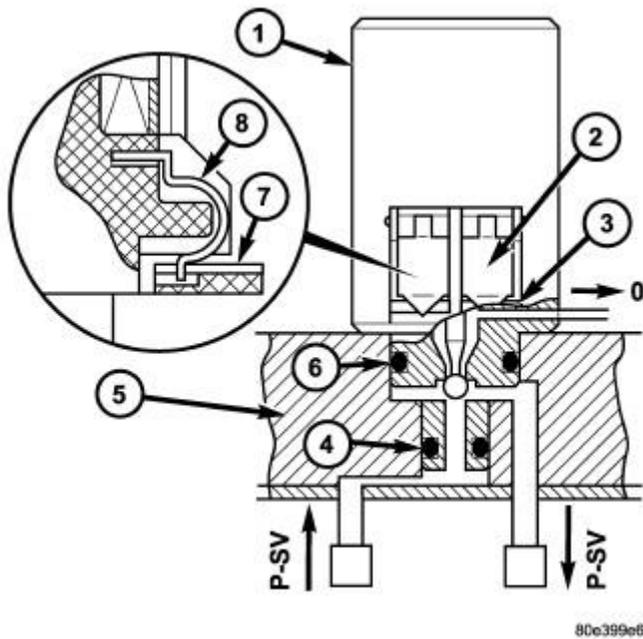


Fig. 204: Cutaway View Of Upshift/Downshift Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - UPSHIFT/DOWNSHIFT SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - O-RING
5 - VALVE HOUSING OF SHIFT PLATE
6 - O-RING

7 - CONDUCTOR TRACK

8 - CONTACT SPRING

If a solenoid valve (1) is actuated by the TCM, it opens and guides the control pressure (p-SV) to the assigned command valve. Refer to **Fig. 204**. The solenoid valve remains actuated and therefore open until the shifting process is complete. The shift pressure (p-SV) to the command valve is reduced to zero as soon as the power supply to the solenoid valve is interrupted.

MODULATING PRESSURE CONTROL SOLENOID VALVE

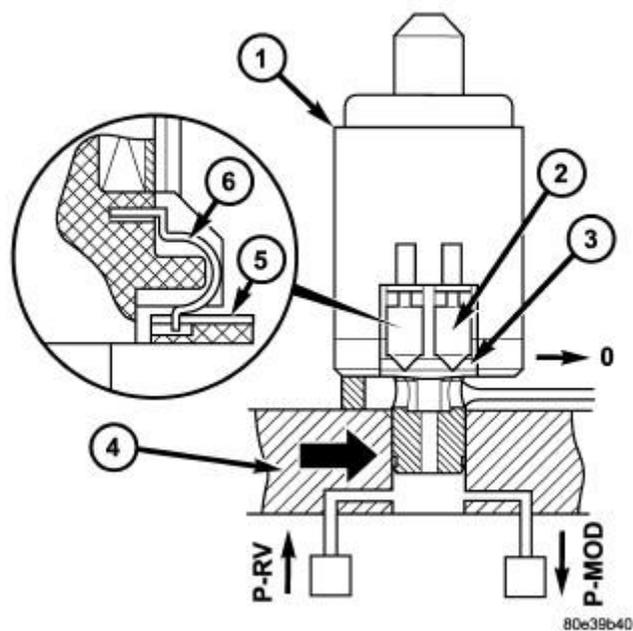


Fig. 205: Cutaway View Of Modulating Pressure Control Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - MODULATING PRESSURE CONTROL SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING SHIFT PLATE
5 - CONDUCTOR TRACK
6 - CONTACT SPRING

The modulating pressure regulating solenoid valve (1) assigns a proportional pressure to the current which is controlled by the TCM according to the load. Refer to **Fig. 205**.

TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE

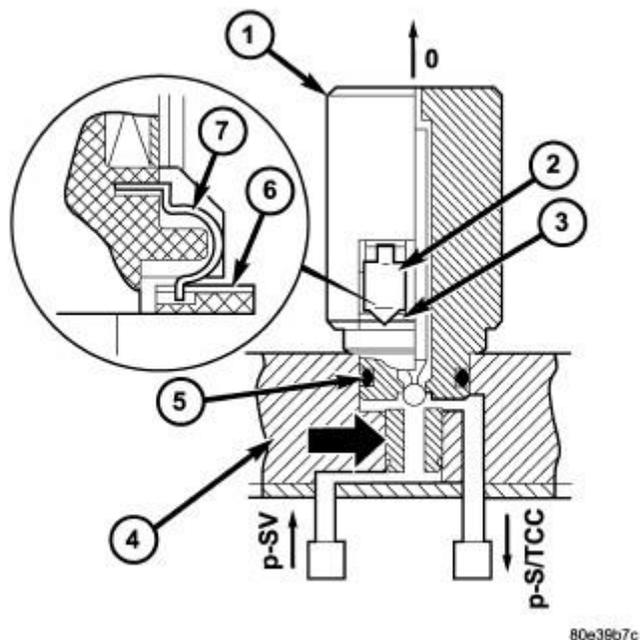


Fig. 206: Cutaway View Of Torque Converter Lockup Clutch PWM Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCKUP CLUTCH PWM SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING OF SHIFT PLATE
5 - O-RING
6 - CONDUCTOR TRACK
7 - CONTACT SPRING

The torque converter lockup PWM solenoid (1) valve converts pulse-wave-modulated current controlled by the TCM into the appropriate hydraulic control pressure (p-S/TCC). Refer to **Fig. 206**.

SHIFT PRESSURE CONTROL SOLENOID VALVE

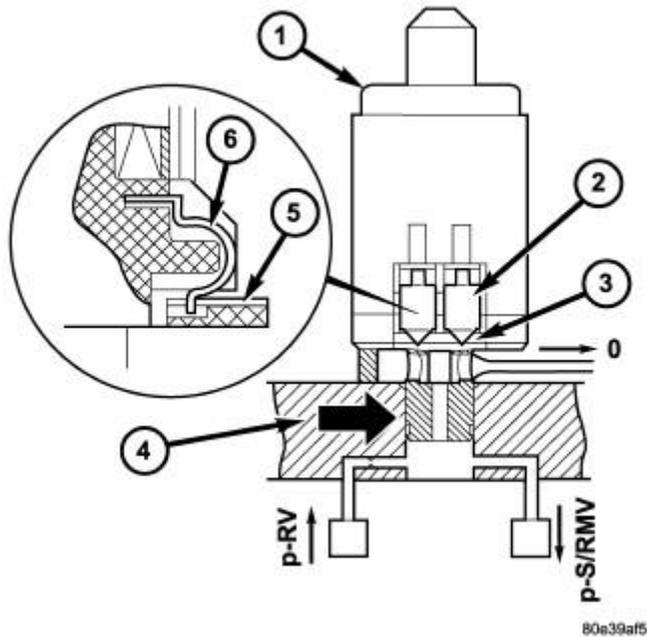


Fig. 207: Cutaway View Of Shift Pressure Control Solenoid Valve
 Courtesy of CHRYSLER LLC

1 - SHIFT PRESSURE CONTROL SOLENOID VALVE
2 - CONTACT SPRING
3 - CONDUCTOR TRACK
4 - VALVE HOUSING SHIFT PLATE
5 - CONDUCTOR TRACK
6 - CONTACT SPRING

The shift pressure regulating solenoid valve (1) assigns a proportional pressure to the current which is controlled by the TCM according to the load. Refer to **Fig. 207**.

TORQUE CONVERTER

DESCRIPTION

DESCRIPTION

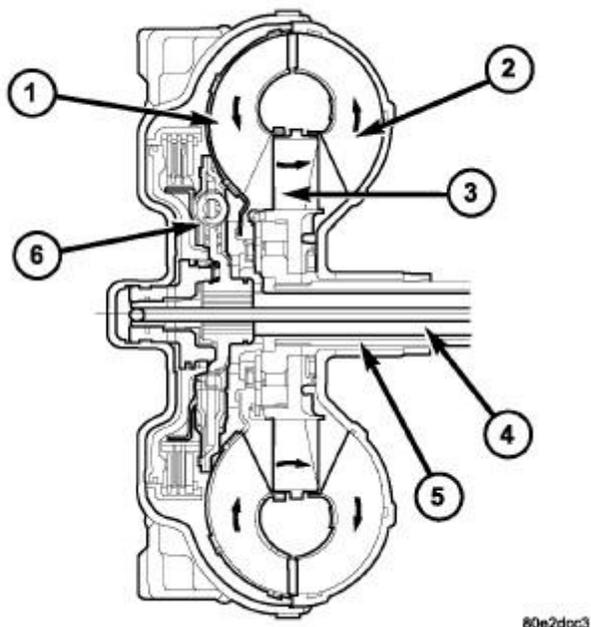


Fig. 208: Cutaway View Of Torque Converter
 Courtesy of CHRYSLER LLC

1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - TURBINE DAMPER

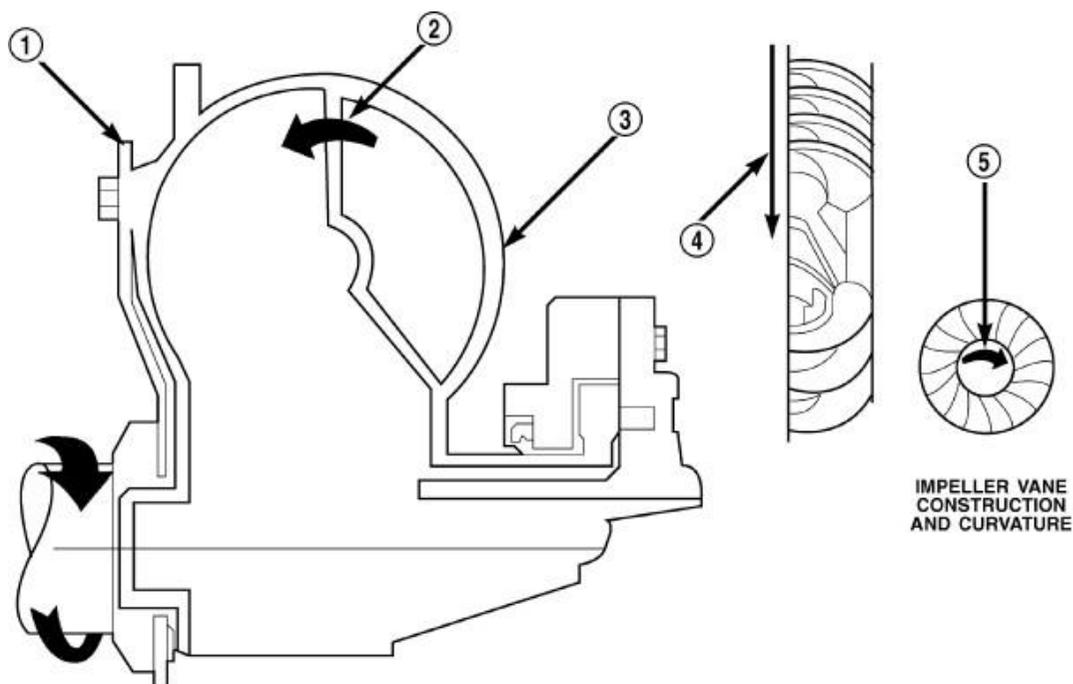
CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid.

The torque converter is a hydraulic device that couples the engine crankshaft to the transmission. Refer to **Fig. 208**. The torque converter consists of an outer shell with an internal turbine (1), a stator (3), an overrunning clutch, an impeller (2), 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 through fifth gears. The torque converter hub drives the transmission oil (fluid) pump.

A turbine damper (6) has been added for some applications to help improve vehicle noise, vibration, and harshness (NVH) characteristics.

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

IMPELLER



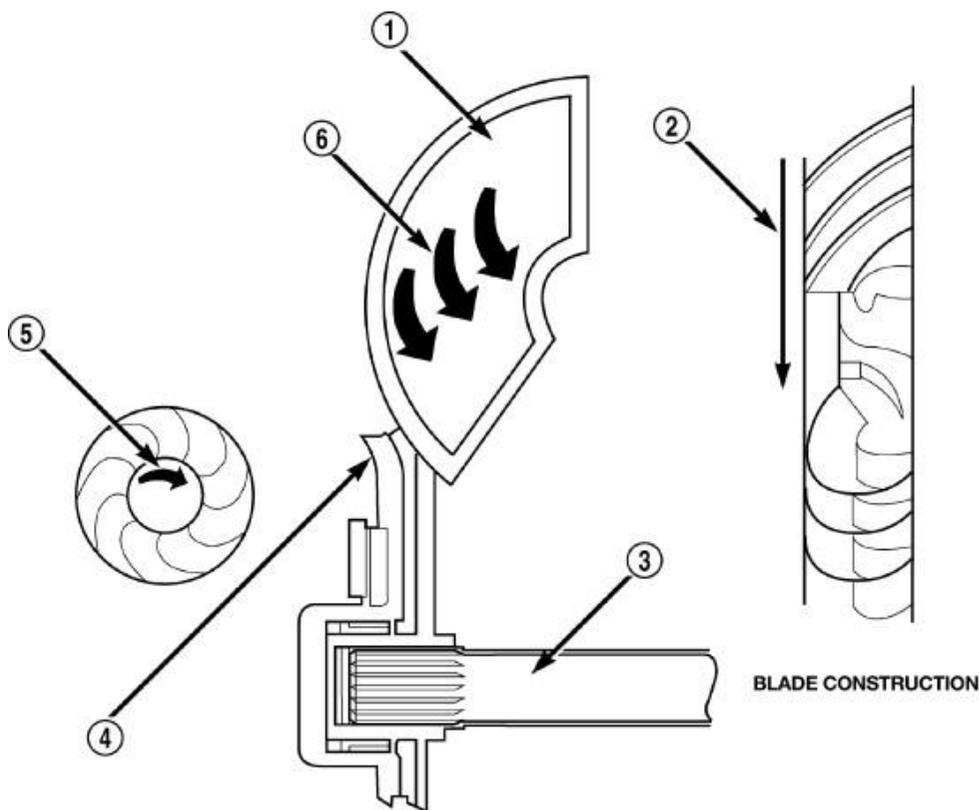
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Fig. 209: Identifying Impeller
 Courtesy of CHRYSLER LLC

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

The impeller (3) is an integral part of the converter housing. Refer to **Fig. 209**. 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 members of the system.

TURBINE



80bfe26b

Fig. 210: Identifying Turbine
 Courtesy of CHRYSLER LLC

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

The turbine (1) is the output, or driven, member of the converter. Refer to **Fig. 210**. 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.

STATOR

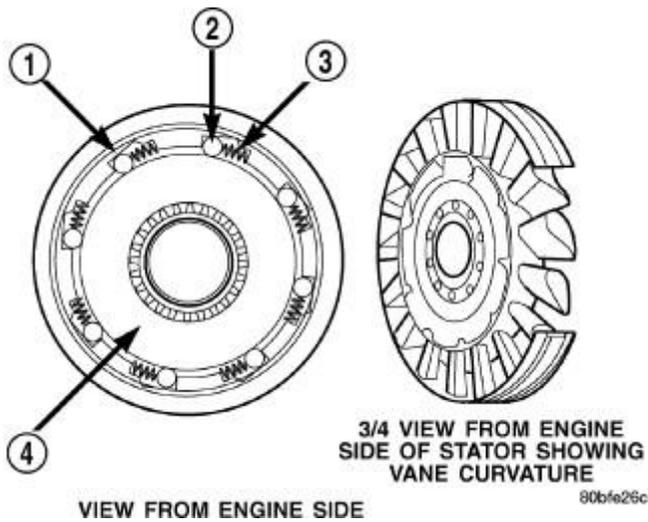
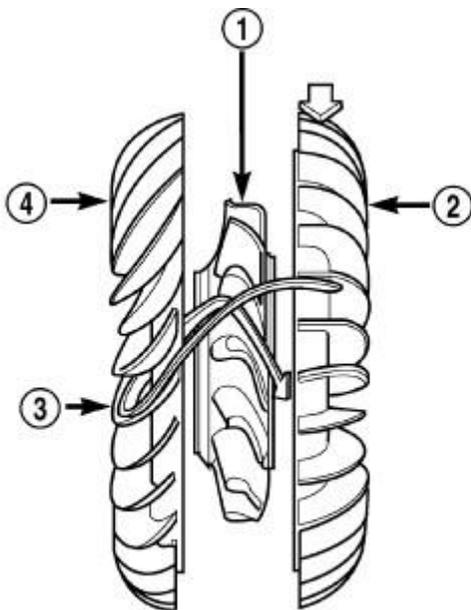


Fig. 211: Identifying Over-Running Clutch

Courtesy of CHRYSLER LLC

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

The stator assembly (1-4) is mounted on a stationary shaft which is an integral part of the oil pump. Refer to **Fig. 211**.



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Fig. 212: Identifying Stator Components

Courtesy of CHRYSLER LLC

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

The stator (1) is located between the impeller (2) and turbine (4) within the torque converter case. Refer to **Fig. 212**. The stator contains a freewheeling clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the freewheeling clutch, the torque multiplication feature of the torque converter is operational.

TORQUE CONVERTER CLUTCH (TCC)

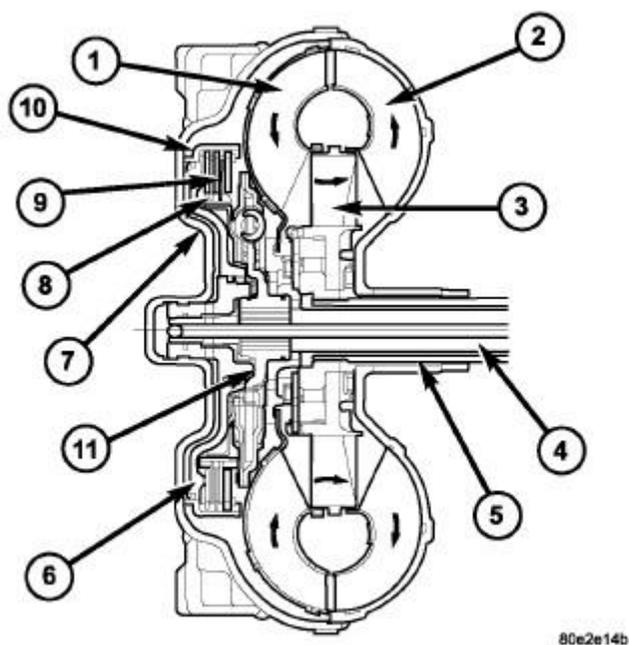


Fig. 213: Identifying Torque Converter Components
 Courtesy of CHRYSLER LLC

1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - PISTON
7 - COVER SHELL
8 - INTERNALLY TOOTHED DISC CARRIER
9 - CLUTCH PLATE SET
10 - EXTERNALLY TOOTHED DISC CARRIER

11 - TURBINE DAMPER

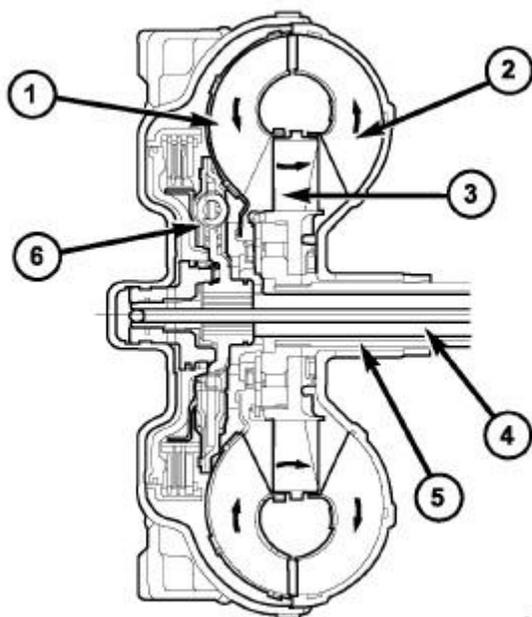
The TCC (9) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Refer to **Fig. 213**. Although the fluid coupling provides smooth, shock-free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston with friction material was added to the turbine assembly to provide this mechanical lock-up.

In order to reduce heat build-up in the transmission and buffer the powertrain against torsional vibrations, the TCM can duty cycle the torque converter lock-up solenoid to achieve a smooth application of the torque converter clutch. This function, referred to as Electronically Modulated Converter Clutch (EMCC) can occur at various times depending on the following variables:

- Shift lever position
- Current gear range
- Transmission fluid temperature
- Engine coolant temperature
- Input speed
- Throttle angle
- Engine speed

OPERATION

OPERATION



80e2doc3

Fig. 214: Cutaway View Of Torque Converter

Courtesy of CHRYSLER LLC

1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - TURBINE DAMPER

The converter impeller (driving member) (2), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. Refer to **Fig. 214**. The converter turbine (driven member) (1), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft (4).

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

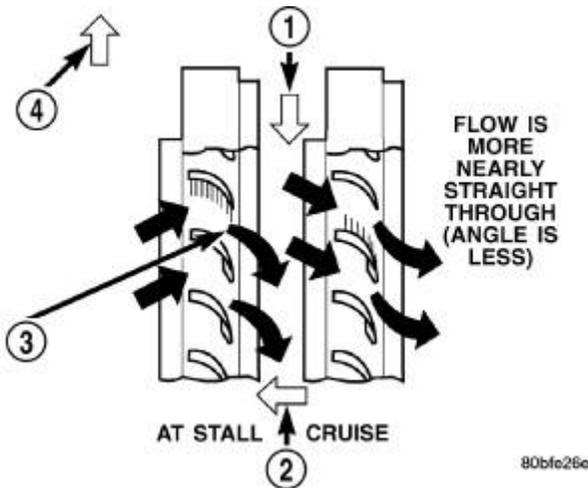


Fig. 215: Identifying Stator Operation

Courtesy of CHRYSLER LLC

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 multiplication is achieved by locking the stator's over-running clutch to its shaft. 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 counterclockwise direction. Refer to **Fig. 215**. 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 2.0:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such a 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.

TORQUE CONVERTER CLUTCH (TCC)

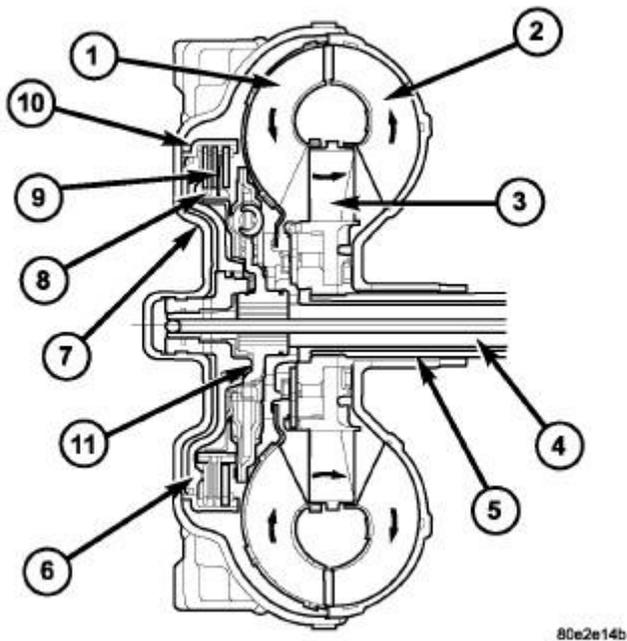


Fig. 216: Identifying Torque Converter Components
 Courtesy of CHRYSLER LLC

1 - TURBINE
2 - IMPELLER
3 - STATOR
4 - INPUT SHAFT
5 - STATOR SHAFT
6 - PISTON
7 - COVER SHELL
8 - INTERNALLY TOOTHED DISC CARRIER
9 - CLUTCH PLATE SET
10 - EXTERNALLY TOOTHED DISC CARRIER
11 - TURBINE DAMPER

In a standard torque converter, the impeller (2) and turbine (1) are rotating at about the same speed and the stator (3) is freewheeling, providing no torque multiplication. By applying the turbine's piston and friction material (9), a total converter engagement can be obtained. Refer to **Fig. 216**. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The clutch can be engaged in second, third, fourth, and fifth gear ranges.

The TCM controls the torque converter by way of internal logic software. The programming of the software provides the TCM with control over the torque converter solenoid. There are four output logic states that can be applied as follows:

- No EMCC
- Partial EMCC
- Full EMCC
- Gradual-to-no EMCC

NO EMCC

Under No EMCC conditions, the TCC Solenoid is OFF. There are several conditions that can result in NO EMCC operations. No EMCC can be initiated due to a fault in the transmission or because the TCM does not see the need for EMCC under current driving conditions.

PARTIAL EMCC

Partial EMCC operation modulates the TCC Solenoid (duty cycle) to obtain partial torque converter clutch application. Partial EMCC operation is maintained until Full EMCC is called for and actuated. During Partial EMCC some slip does occur. Partial EMCC will usually occur at low speeds, low load and light throttle situations.

FULL EMCC

During Full EMCC operation, the TCM increases the TCC Solenoid duty cycle to full ON after Partial EMCC control brings the engine speed within the desired slip range of transmission input speed relative to engine rpm.

GRADUAL-TO-NO EMCC

This operation is to soften the change from Full or Partial EMCC to No EMCC. This is done at mid-throttle by decreasing the TCC Solenoid duty cycle.

REMOVAL

REMOVAL

1. Remove transmission and torque converter from vehicle. Refer to **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

INSTALLATION

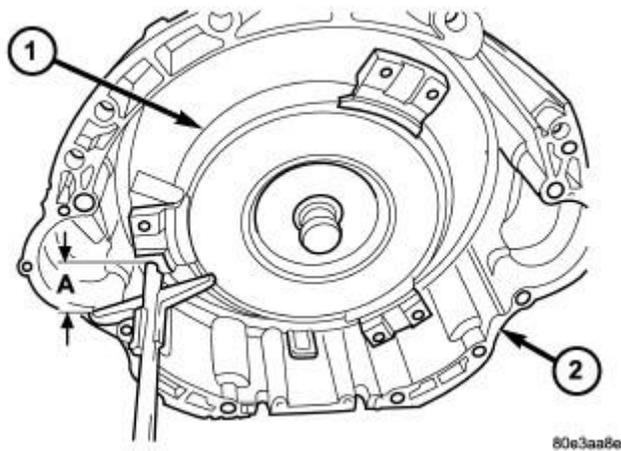


Fig. 217: Measuring Torque Converter Installation Depth
Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER
2 - TRANSMISSION HOUSING

Check converter hub and drive flats for sharp edges, burrs, scratches, or nicks. Polish the hub and flats 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 oil pump seal lip with transmission fluid.
2. Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or converter hub 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. Refer to **Fig. 217**. Surface of converter lugs should be at least 19 mm (3/4 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.
9. Fill the transmission with the recommended fluid.

UNIT, ELECTROHYDRAULIC CONTROL

DESCRIPTION

DESCRIPTION

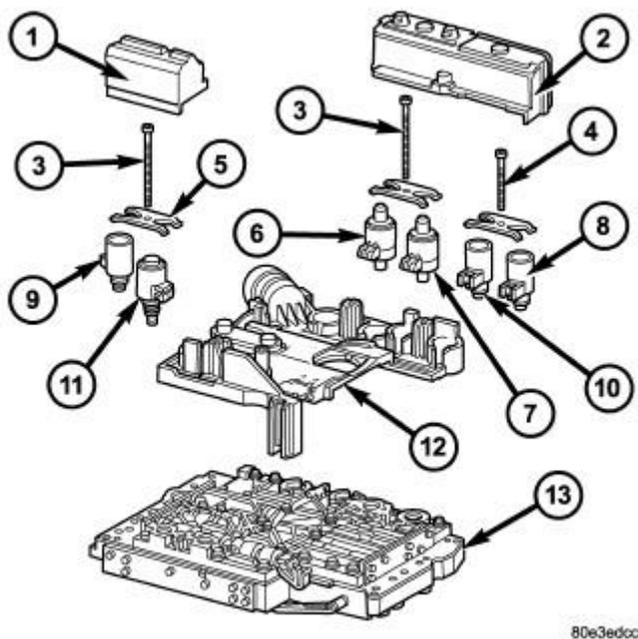


Fig. 218: Electrohydraulic Control Unit Components

Courtesy of CHRYSLER LLC

1 - SOLENOID CAP (if equipped)
2 - SOLENOID CAP (if equipped)
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID

10 - 1-2/4-5 SHIFT SOLENOID

11 - 2-3 SHIFT SOLENOID

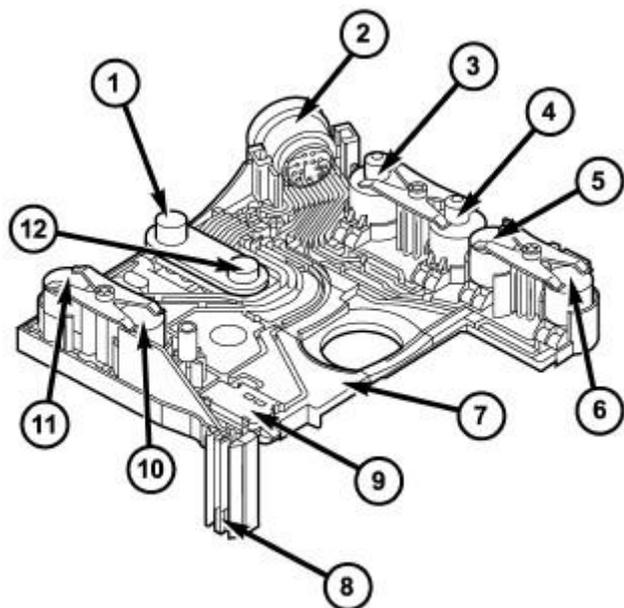
12 - ELECTRICAL CONTROL UNIT

13 - SHIFT PLATE

The electrohydraulic control unit comprises the shift plate (13) made from light alloy for the hydraulic control and an electrical control unit (12). Refer to **Fig. 218**. The electrical control unit (12) comprises of a supporting body made of plastic, into which the electrical components (1 - 11) are assembled. The supporting body is mounted on the shift plate (13) and screwed to it.

Strip conductors inserted into the supporting body make the connection between the electrical components and a plug connector. The connection to the wiring harness on the vehicle and the transmission control module (TCM) is produced via this 13-pin plug connector with a bayonet lock.

ELECTRICAL CONTROL UNIT



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Fig. 219: Identifying Electrical Control Unit Components

Courtesy of CHRYSLER LLC

1 - N3 SPEED SENSOR

2 - PLUG CONNECTOR

3 - MODULATING PRESSURE REGULATING SOLENOID

4 - SHIFT PRESSURE REGULATING SOLENOID

5 - 1-2/4-5 SHIFT SOLENOID

6 - 3-4 SHIFT SOLENOID

7 - ELECTRICAL CONTROL UNIT

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee

8 - TRANSMISSION TEMPERATURE SENSOR

9 - STARTER INTERLOCK CONTACT

10 - 2-3 SHIFT SOLENOID

11 - TORQUE CONVERTER LOCK-UP SOLENOID

12 - N2 SPEED SENSOR

The electric valve control unit (7) consists of a plastic shell which houses the RPM sensors (1, 12), regulating solenoid valves (3, 4), solenoid valves (5, 6, 10), the TCC solenoid valve (11), the park/neutral contact (9), and the transmission oil temperature sensor (8). Refer to **Fig. 219**. Conductor tracks integrated into the shell connect the electric components to a plug connection (2). This 13-pin plug connection (2) establishes the connection to the vehicle-side cable harness and to the transmission control module (TCM). With the exception of the solenoid valves, all other electric components are fixed to the conductor tracks.

HYDRAULIC CONTROL UNIT

WORKING PRESSURE (LINE PRESSURE OR OPERATING PRESSURE) (P-A)

The working pressure provides the pressure supply to the hydraulic control and the transmission shift elements. It is the highest hydraulic pressure in the entire hydraulic system. The working pressure is regulated at the working pressure regulating valve in relation to the load and gear. All other pressures required for the transmission control are derived from the working pressure.

LUBRICATION PRESSURE (P-SM)

At the working pressure regulating valve surplus oil is diverted to the lubrication pressure regulating valve, from where it is used in regulated amounts to lubricate and cool the mechanical transmission components and the torque converter. Furthermore, the lubrication pressure (p-Sm) is also used to limit the pressure in the torque converter.

SHIFT PRESSURE (P-S)

The shift pressure is determined by the shift pressure regulating solenoid valve and the shift pressure regulating valve. The shift pressure:

- Regulates the pressure in the activating shift element during the shift phase.
- Determines together with the modulating pressure the pressure reduction at the deactivating shift element as regulated by the overlap regulating valve.
- Initializes 2nd gear in limp-home mode.

MODULATING PRESSURE (P-MOD)

The modulating pressure influences the size of the working pressure and determines together with the shift pressure the pressure regulated at the overlap regulating valve. The modulating pressure is regulated at the modulating pressure regulating solenoid valve, which is under regulating valve pressure. The modulating pressure is variable and relative to the engine load.

REGULATING VALVE/CONTROL VALVE PRESSURE (P-RV)

The regulating valve pressure is regulated at the regulating valve pressure regulating valve in relation to the working pressure (p-A) up to a maximum pressure of 8 bar (116 psi). It supplies the modulating pressure regulating solenoid valve, the shift pressure regulating solenoid valve and the shift valve pressure regulating valve.

SHIFT VALVE PRESSURE (P-SV)

The shift valve pressure (p-SV) is derived from the regulating valve pressure (p-RV), is regulated at the shift valve pressure regulating valve and is then present at the:

- 1-2 and 4-5 shift solenoid valve.
- 3-4 shift solenoid valve.
- 2-3 shift solenoid valve.
- Torque converter lockup solenoid valve.
- 3-4 and 2-3 shift pressure shift valve.

The shift valve pressure (p-SV) controls the command valves via the upshift/downshift solenoid valves.

OVERLAP PRESSURE (P- U)

The overlap pressure controls the shift component pressure reduction during a shift phase. The pressure in a shift element as it disengages is controlled during the shift phase depending on engine load (modulating pressure) and the pressure in the shift element as it engages. The adjusted pressure is inversely proportional to the transmission capability of the shift element being engaged (controlled overlap).

WORKING PRESSURE REGULATING VALVE (OPERATING PRESSURE)

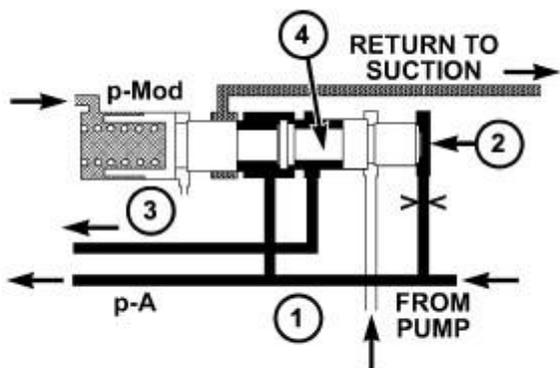


Fig. 220: Working Pressure Regulating Valve
 Courtesy of CHRYSLER LLC

1 - PRESSURE FROM K1/K2
2 - END FACE

3 - TO TORQUE CONVERTER REGULATING VALVE

4 - WORKING PRESSURE REGULATING VALVE

The working pressure regulating valve (4) is located in the valve housing of the shift plate. Refer to **Fig. 220**. It regulates the primary pressure of the hydraulic system.

TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE

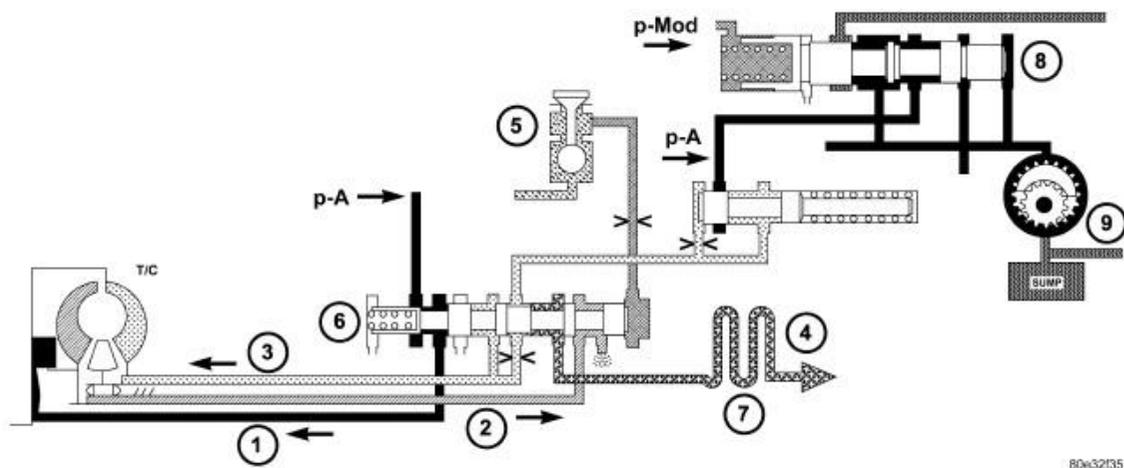


Fig. 221: Torque Converter Lockup Clutch Regulating Valve

Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH

2 - TORQUE CONVERTER OUTPUT

3 - TORQUE CONVERTER INPUT

4 - LUBRICATION

5 - TORQUE CONVERTER LOCK-UP SOLENOID

6 - TORQUE CONVERTER LOCK-UP CLUTCH REGULATING VALVE

7 - OIL COOLER

8 - LINE PRESSURE REGULATING VALVE

9 - OIL PUMP

The torque converter lock-up clutch regulating valve (6) is located in the valve housing of the electrohydraulic control module. Refer to **Fig. 221**. The valve is responsible for the hydraulic control of the torque converter lockup clutch and distribution of the lubricating oil.

OVERLAP REGULATING VALVE

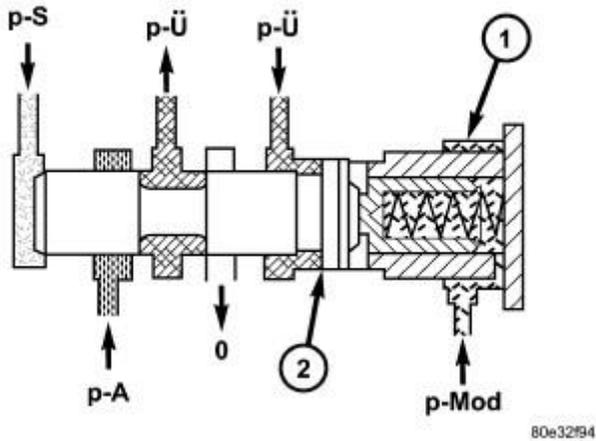


Fig. 222: Cutaway View Of Overlap Regulating Valve
 Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - OVERLAP REGULATING VALVE |
| 2 - ANNULAR SURFACE ON OVERLAP REGULATING VALVE |

Each shift group is assigned one overlap regulating valve (1). Refer to **Fig. 222**. The 1-2 / 4-5 overlap regulating valve is installed in the shift valve housing; the 2-3 and 3-4 overlap regulating valves are installed in the valve housing. The overlap regulating valve regulates the pressure reduction during a shift phase.

COMMAND VALVE

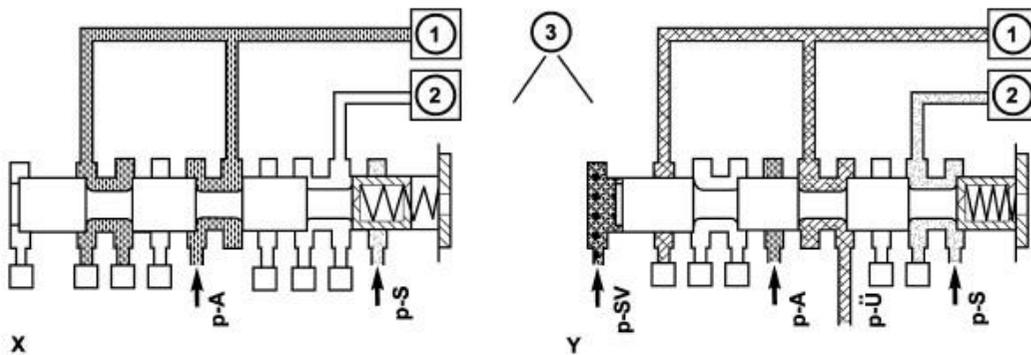


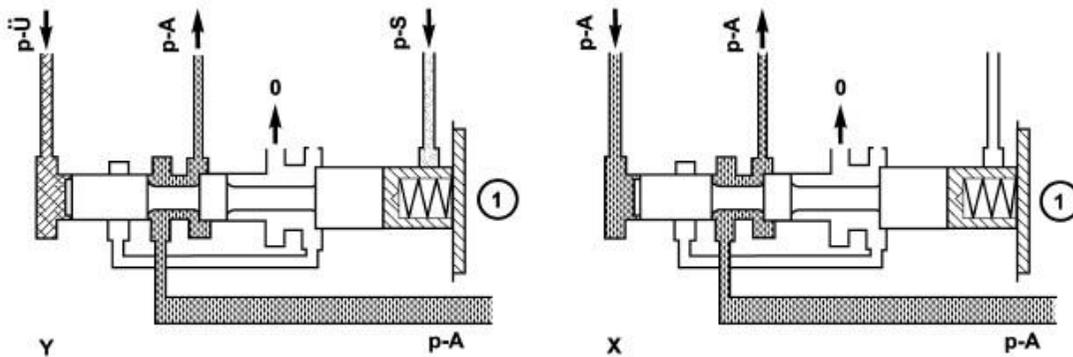
Fig. 223: Cutaway View Of Command Valve
 Courtesy of CHRYSLER LLC

- | |
|-----------------------|
| 1 - HOLDING CLUTCH B1 |
| 2 - DRIVING CLUTCH K1 |

3 - 1-2/4-5 COMMAND VALVE

Each shift group possesses one command valve (3). Refer to **Fig. 223**. The 1-2 / 4-5 and 2-3 command valves are installed in the shift valve housing, the 3-4 command valve is installed in the valve housing. The command valve switches the shift group from the stationary phase to the shift phase and back again.

HOLDING PRESSURE SHIFT VALVE



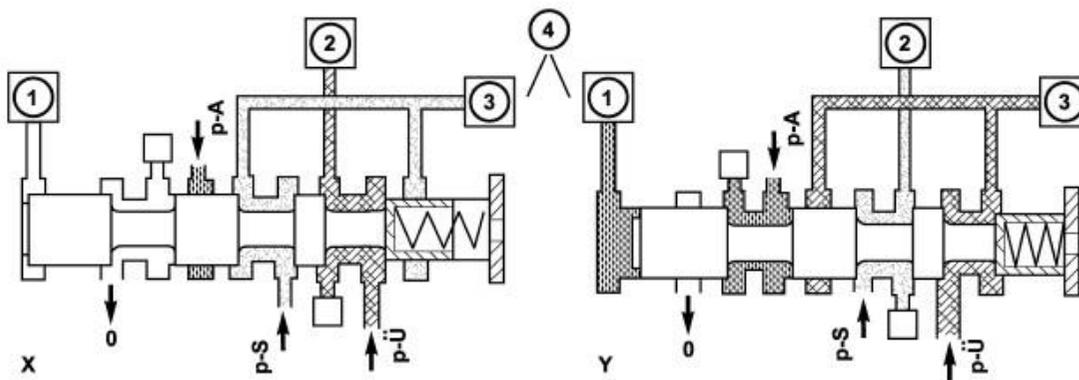
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Fig. 224: Identifying Shift Valve Holding Pressure
 Courtesy of CHRYSLER LLC

1 - HOLDING PRESSURE SHIFT VALVE

Each shift group possesses one holding pressure shift valve (1). Refer to **Fig. 224**. The 1-2 / 4-5 and 2-3 holding pressure shift valves are installed in the shift valve housing; the 3-4 holding pressure shift valve is installed in the valve housing. The holding pressure shift valve allocates the working pressure to one actuator of a shift group.

SHIFT PRESSURE SHIFT VALVE



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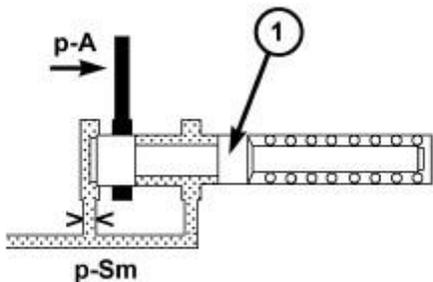
Fig. 225: Identifying Shift Pressure Shift Valve Components

Courtesy of CHRYSLER LLC

1 - 1-2/4-5 COMMAND VALVE
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B1
4 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE

Each shift group possesses one shift pressure shift valve (4). Refer to **Fig. 225**. The 1-2 / 4-5 and 2-3 shift pressure shift valves are installed in the shift valve housing; the 3-4 shift pressure shift valve is installed in the valve housing. It assigns the shift pressure (p-S) to the activating actuator and the overlap pressure (p-U) regulated by the overlap regulating valve to the deactivating actuator.

LUBRICATION PRESSURE REGULATING VALVE



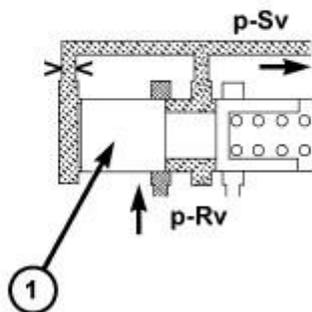
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Fig. 226: Lubrication Pressure Regulating Valve
Courtesy of CHRYSLER LLC

1 - LUBRICATION PRESSURE REGULATING VALVE

The lubrication pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. Refer to **Fig. 226**. The valve controls the fluid to lubricate and cool the mechanical part of the transmission, and limits the pressure in the torque converter.

SHIFT PRESSURE REGULATING VALVE



80e33db3

Fig. 227: Shift Pressure Regulating Valve

Courtesy of CHRYSLER LLC

1 - SHIFT PRESSURE REGULATING VALVE

The shift pressure regulating valve (1) is located in the valve housing of the shift plate. Refer to **Fig. 227**. It regulates the shift pressure (p-S).

REGULATING VALVE PRESSURE REGULATING VALVE

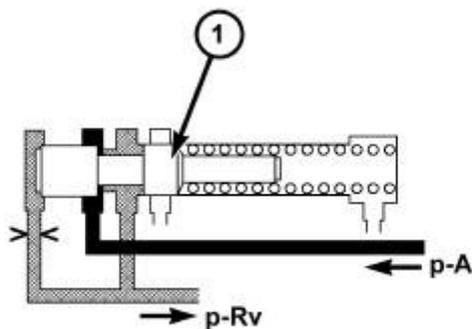


Fig. 228: Regulating Valve Pressure Regulating Valve

Courtesy of CHRYSLER LLC

1 - REGULATING VALVE PRESSURE REGULATING VALVE

The regulating valve pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. Refer to **Fig. 228**. It regulates the regulating valve/control valve pressure (p-RV).

SHIFT VALVE PRESSURE REGULATING VALVE

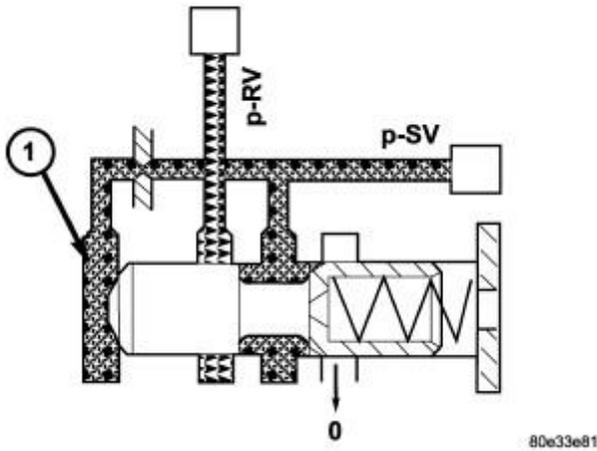


Fig. 229: Shift Valve Pressure Regulating Valve
 Courtesy of CHRYSLER LLC

1 - SHIFT VALVE PRESSURE REGULATING VALVE

The shift valve pressure regulating valve (1) is located in the valve housing of the electrohydraulic control module. Refer to **Fig. 229**. It regulates the shift valve pressure (p-SV).

OPERATION

OPERATION

ELECTRICAL CONTROL UNIT

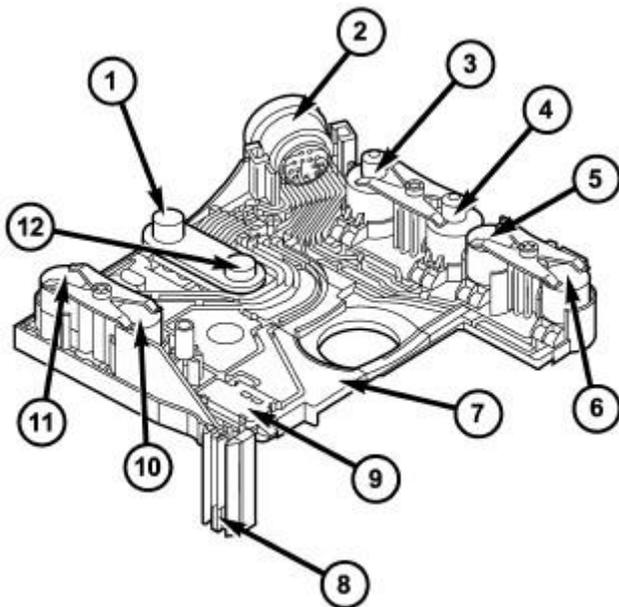


Fig. 230: Identifying Electrical Control Unit Components
 Courtesy of CHRYSLER LLC

1 - N3 SPEED SENSOR
2 - PLUG CONNECTOR
3 - MODULATING PRESSURE REGULATING SOLENOID
4 - SHIFT PRESSURE REGULATING SOLENOID
5 - 1-2/4-5 SHIFT SOLENOID
6 - 3-4 SHIFT SOLENOID
7 - ELECTRICAL CONTROL UNIT
8 - TRANSMISSION TEMPERATURE SENSOR
9 - STARTER INTERLOCK CONTACT
10 - 2-3 SHIFT SOLENOID
11 - TORQUE CONVERTER LOCK-UP SOLENOID
12 - N2 SPEED SENSOR

Signals from the transmission control module (TCM) are converted into hydraulic functions in the electric valve control unit (7). Refer to **Fig. 230**. The RPM sensors (1, 12), starter interlock contact (9), and transmission oil temperature sensor (8) of the electric valve control unit (7) supply the TCM with input signals. The solenoid valves are controlled by the TCM and trigger the hydraulic functions.

HYDRAULIC CONTROL UNIT

WORKING PRESSURE REGULATING VALVE (LINE PRESSURE OR OPERATING PRESSURE)

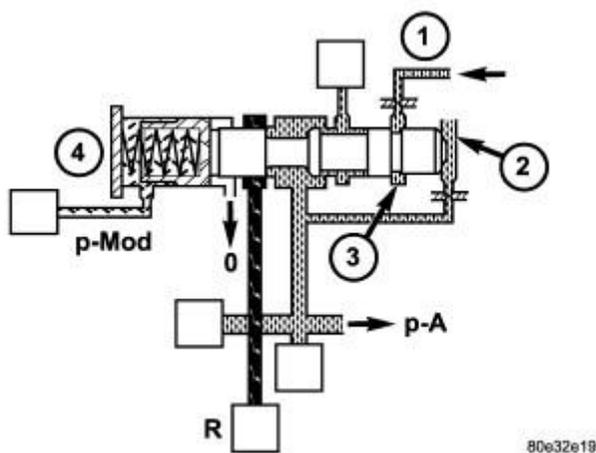


Fig. 231: Working Pressure Regulating Valve
 Courtesy of CHRYSLER LLC

1 - PRESSURE FROM K1/K2
2 - END FACE
3 - ANNULAR SURFACE

4 - WORKING PRESSURE REGULATING VALVE

The working pressure (p-A) is regulated at the working pressure regulating valve (4) in relation to load (modulating pressure, p-Mod) and gear (K1 or K2 pressure) (1). Refer to **Fig. 231**. The spring in the working pressure regulating valve sets a minimum pressure level (basic pressure).

TORQUE CONVERTER LOCKUP CLUTCH REGULATING VALVE

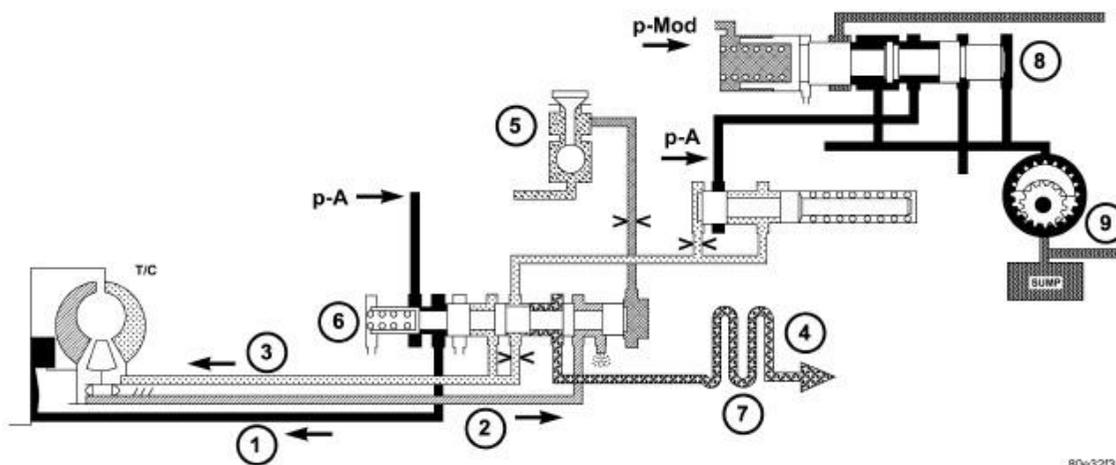


Fig. 232: Torque Converter Lockup Clutch Regulating Valve
Courtesy of CHRYSLER LLC

1 - TORQUE CONVERTER LOCK-UP CLUTCH
2 - TORQUE CONVERTER OUTPUT
3 - TORQUE CONVERTER INPUT
4 - LUBRICATION
5 - TORQUE CONVERTER LOCK-UP SOLENOID
6 - TORQUE CONVERTER LOCK-UP CLUTCH REGULATING VALVE
7 - OIL COOLER
8 - LINE PRESSURE REGULATING VALVE
9 - OIL PUMP

The torque converter lockup clutch regulating valve (6) regulates the torque converter lock-up clutch working pressure (p-TCC) in relation to the torque converter clutch control pressure (p-S/TCC). Refer to **Fig. 232**. According to the size of the working pressure (p-A), the torque converter lockup clutch is either Engaged,

Disengaged, or Slipping. When the regulating valve (6) is in the lower position, lubricating oil flows through the torque converter and oil cooler (7) into the transmission (torque converter lockup clutch unpressurized). In its regulating position (slipping, torque converter lockup clutch pressurized), a reduced volume of lubricating oil flows through the annular passage bypassing the torque converter and passing direct through the oil cooler into the transmission. The rest of the lubricating oil is directed via the throttle "a" into the torque converter in order to cool the torque converter lockup clutch.

OVERLAP REGULATING VALVE

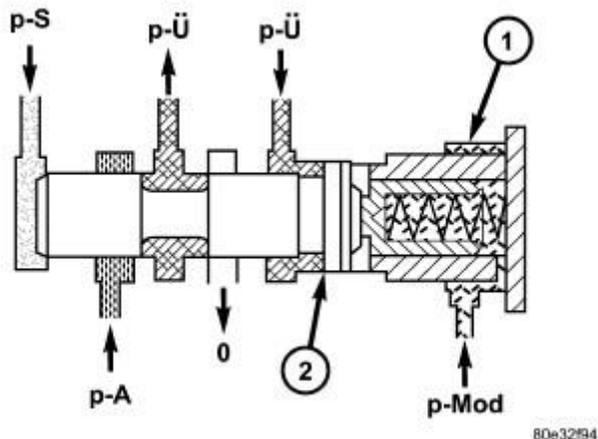


Fig. 233: Cutaway View Of Overlap Regulating Valve

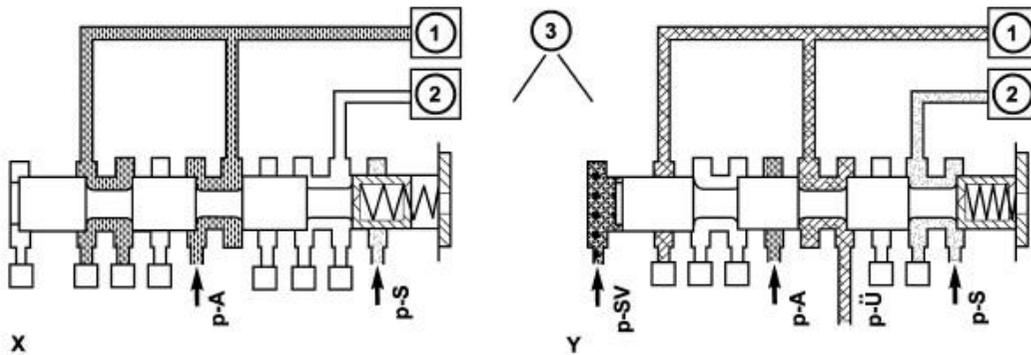
Courtesy of CHRYSLER LLC

1 - OVERLAP REGULATING VALVE

2 - ANNULAR SURFACE ON OVERLAP REGULATING VALVE

During the shift phase the pressure in the deactivating shift actuator is regulated in relation to the engine load (modulating pressure, p-Mod) and the pressure in the activating actuator. Refer to **Fig. 233**. The regulated pressure is inversely proportional to the transfer capacity of the activating shift actuator (regulated overlap).

COMMAND VALVE



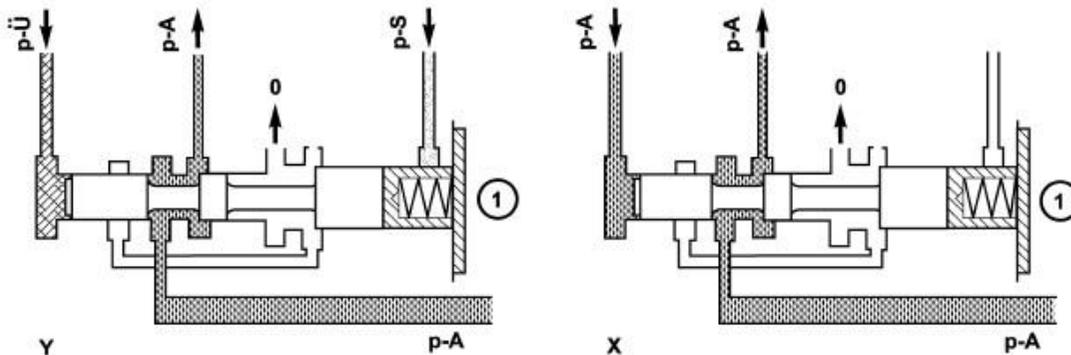
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Fig. 234: Cutaway View Of Command Valve
 Courtesy of CHRYSLER LLC

- | |
|---------------------------|
| 1 - HOLDING CLUTCH B1 |
| 2 - DRIVING CLUTCH K1 |
| 3 - 1-2/4-5 COMMAND VALVE |

When the end face is unpressurized (stationary phase), the working pressure (p-A) is directed to the actuated shift element. If the end face of the command valve is subjected to the shift valve pressure (p-SV) (shift phase), then the shift pressure (p-S) is switched to the activating element and the overlap pressure (p-U) is switched to the deactivating element. Refer to **Fig. 234**.

SHIFT VALVE HOLDING PRESSURE



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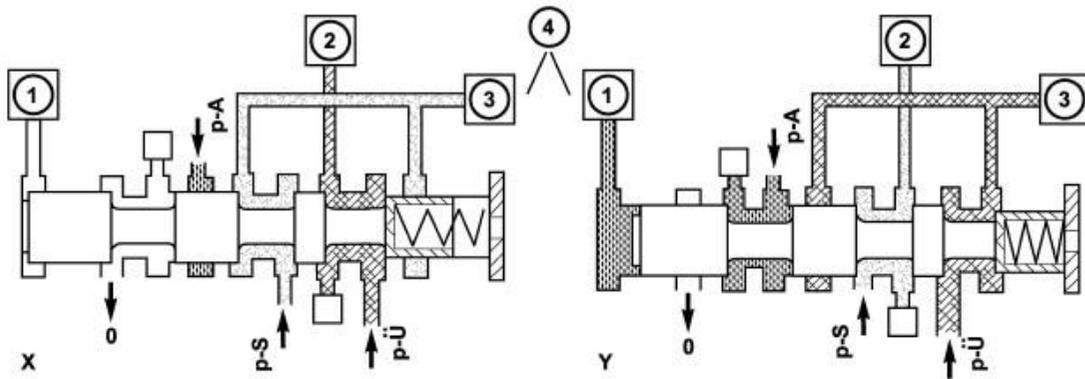
Fig. 235: Identifying Shift Valve Holding Pressure
 Courtesy of CHRYSLER LLC

- | |
|----------------------------------|
| 1 - HOLDING PRESSURE SHIFT VALVE |
|----------------------------------|

The holding pressure shift valve (1) is actuated by the pressures present at the end face in the actuators and a

spring. Refer to **Fig. 235**. It assigns the working pressure (p-A) to the actuator with the higher pressure (taking into account the spring force and the effective surface area). The other element of the shift group is then unpressurized. The valve switches over only during the shift phase and only at a certain pressure ratio between the overlap pressure (p- U) and the shift pressure (p-S).

SHIFT PRESSURE SHIFT VALVE



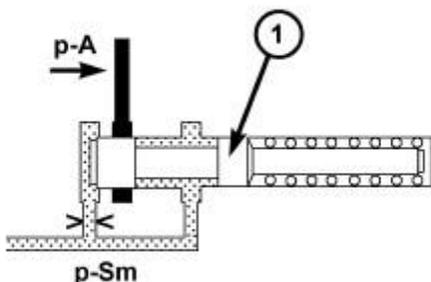
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Fig. 236: Identifying Shift Pressure Shift Valve Components
 Courtesy of CHRYSLER LLC

1 - 1-2/4-5 COMMAND VALVE
2 - DRIVING CLUTCH K1
3 - HOLDING CLUTCH B1
4 - 1-2/4-5 SHIFT PRESSURE SHIFT VALVE

When the multiple-disc brake B1 (3) is activated, the working pressure (p-A) is applied to the end face of the 1-2 / 4-5 shift pressure shift valve (4) via the command valve (1). Refer to **Fig. 236**. Its shift state is maintained during the shift phase by substituting the shift element pressure acting on its end face (and which is variable during the shift phase) with a corresponding constant pressure. When the multi-plate clutch K1 (2) is activated, the end face of the shift valve is unpressurized during the stationary and shift phases, so the shift state is maintained during the shift phase in this case too.

LUBRICATION PRESSURE REGULATING VALVE



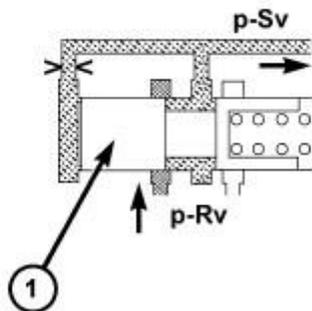
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Fig. 237: Lubrication Pressure Regulating Valve
Courtesy of CHRYSLER LLC

1 - LUBRICATION PRESSURE REGULATING VALVE

At the working pressure regulating valve surplus oil is diverted to the lubrication pressure regulating valve (1), from where the lubrication pressure ($p-Sm$) is used in regulated amounts to supply the transmission lubrication system including the torque converter. Refer to **Fig. 237**.

SHIFT PRESSURE REGULATING VALVE



80e33db3

Fig. 238: Shift Pressure Regulating Valve
Courtesy of CHRYSLER LLC

1 - SHIFT PRESSURE REGULATING VALVE

The shift pressure is determined by the shift pressure regulating solenoid valve and the shift pressure regulating valve (1). Refer to **Fig. 238**. In addition, pressure from the clutch K2 is also present at the annular surface of the shift pressure regulating valve. This reduces the shift pressure in 2nd gear.

REGULATING VALVE PRESSURE REGULATING VALVE

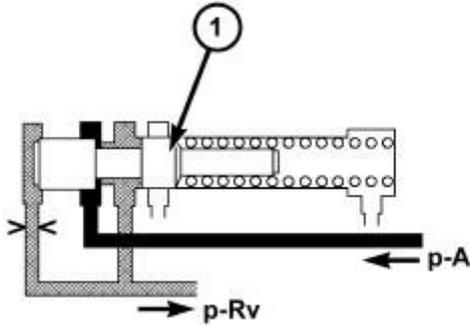


Fig. 239: Regulating Valve Pressure Regulating Valve
Courtesy of CHRYSLER LLC

1 - REGULATING VALVE PRESSURE REGULATING VALVE

The regulating valve pressure ($p\text{-RV}$) is set at the regulating valve pressure regulating valve (1) in relation to the working pressure ($p\text{-A}$) as far as the maximum pressure. Refer to **Fig. 239**.

SHIFT VALVE PRESSURE REGULATING VALVE

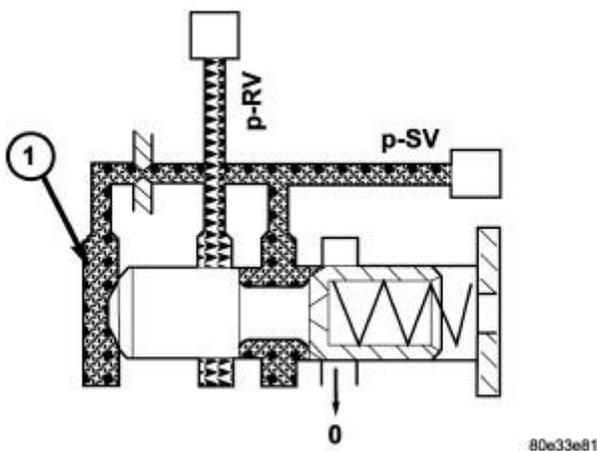


Fig. 240: Shift Valve Pressure Regulating Valve
Courtesy of CHRYSLER LLC

1 - SHIFT VALVE PRESSURE REGULATING VALVE

The non-constant regulating valve pressure ($p\text{-RV}$) is regulated to a constant shift valve pressure ($p\text{-SV}$) at the shift valve pressure regulating valve (1) and is used to supply the 1-2 and 4-5 / 3-4 / 2-3 solenoid valves and the

torque converter lockup clutch PWM solenoid valve. Refer to **Fig. 240**.

REMOVAL

REMOVAL

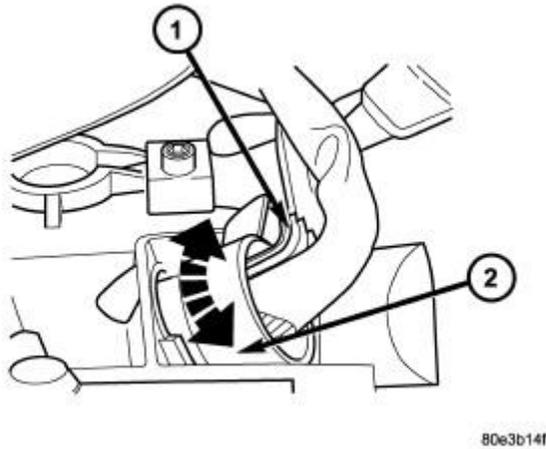


Fig. 241: Removing 13-Pin Plug Connector
Courtesy of CHRYSLER LLC

1 - PLUG CONNECTOR

2 - ADAPTER PLUG

1. Move selector lever to position "P".
2. Raise vehicle.
3. Disconnect 13-pin plug connector (1). Refer to **Fig. 241**. Turn bayonet lock of the adapter plug (2) anti-clockwise.

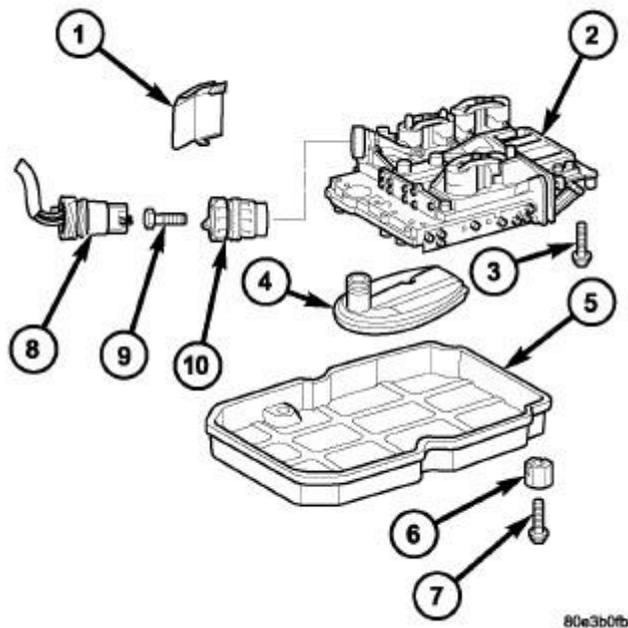


Fig. 242: Electrohydraulic Unit Components
 Courtesy of CHRYSLER LLC

1 - HEAT SHIELD
2 - ELECTROHYDRAULIC UNIT
3 - BOLT
4 - OIL FILTER
5 - OIL PAN
6 - CLAMPING ELEMENT
7 - BOLT
8 - 13-PIN PLUG CONNECTOR
9 - BOLT
10 - ADAPTER PLUG

4. Loosen the adapter plug bolt (9) and remove from the adapter plug (10) from the transmission housing. Refer to **Fig. 242**.
5. Detach oil pan (5).
6. Remove oil filter (4).
7. Unscrew Torx® socket bolts (3) and remove electrohydraulic control module (2).

DISASSEMBLY

DISASSEMBLY

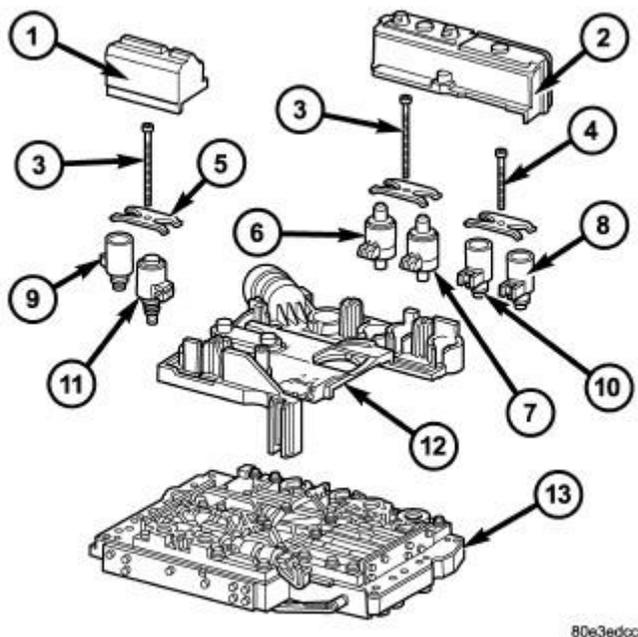


Fig. 243: Electrohydraulic Control Unit Components
 Courtesy of CHRYSLER LLC

1 - SOLENOID CAP (if equipped)
2 - SOLENOID CAP (if equipped)
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID
10 - 1-2/4-5 SHIFT SOLENOID
11 - 2-3 SHIFT SOLENOID
12 - ELECTRICAL CONTROL UNIT
13 - SHIFT PLATE

1. Remove electrohydraulic unit from the vehicle. Refer to **UNIT, ELECTROHYDRAULIC CONTROL, REMOVAL**.
2. Remove solenoid caps (1, 2) if equipped.
3. Unscrew Torx® socket bolts (3, 4).

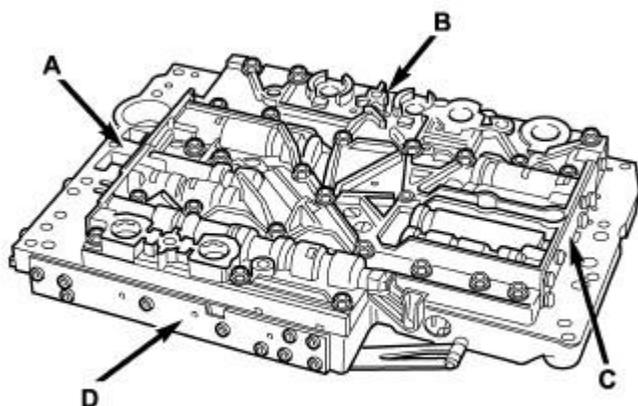
NOTE: Pay attention to the different lengths of the Torx® socket bolts.

4. Remove leaf springs (5).

5. Withdraw solenoid valves (6 - 11) from shift plate (13).

NOTE: Check O-rings on solenoid valves for damage and replace if necessary.

6. Bend away retaining lug on stiffening rib on transmission oil temperature sensor.
7. Remove electrohydraulic control module (12) from the shift plate (13).



80e3ee2b

Fig. 244: Shift Valve Group Locations
 Courtesy of CHRYSLER LLC

A - OPERATING AND LUBRICATING PRESSURE REGULATING VALVES AND 2-3 OVERLAP VALVE
B - 1-2/4-5 SHIFT GROUP AND SHIFT, SHIFT VALVE, AND REGULATING VALVE PRESSURE REGULATING VALVES
C - 3-4 SHIFT GROUP
D - 2-3 SHIFT GROUP, TCC LOCK-UP AND B2 REGULATING VALVES

8. Note the locations of the major shift valve group components for assembly reference.
 - A - Operating and Lubricating Pressure Regulating valves and 2-3 Overlap valve
 - B - 1-2/4-5 Shift Group and Shift, Shift Valve, and Regulating Valve Pressure Regulating Valves
 - C - 3-4 Shift Group
 - D - 2-3 Shift Group, TCC Lock-up, and B2 Regulating Valves

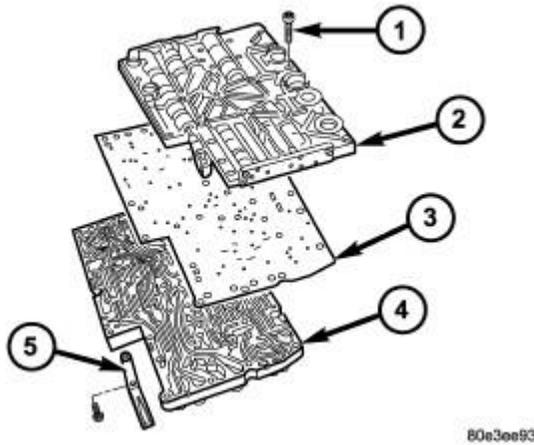
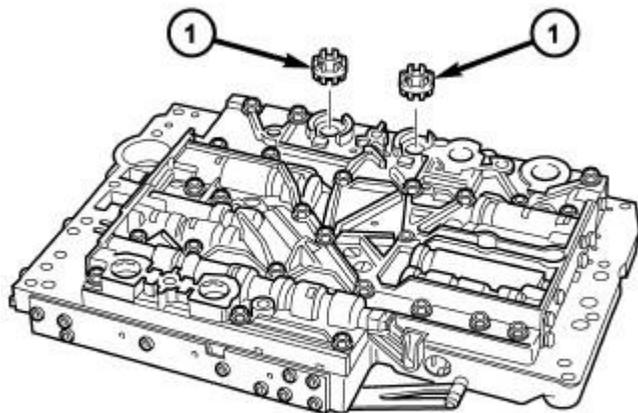


Fig. 245: Shift Plate Components
 Courtesy of CHRYSLER LLC

1 - BOLTS - 29
2 - VALVE HOUSING
3 - SEALING PLATE
4 - VALVE BODY
5 - LEAF SPRING

NOTE: Pay great attention to cleanliness for all work on the shift plate. Fluffy cloths must not be used. Leather cloths are particularly good. After dismantling, all parts must be washed and blown out with compressed-air, noting that parts may be blown away.

9. Unbolt leaf spring (5).
10. Unscrew Torx® bolts (1).
11. Remove valve housing (2) from valve body (4).
12. Remove sealing plate (3).

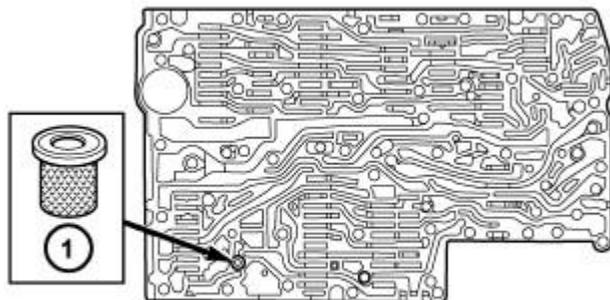


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Fig. 246: Solenoid Valve Strainer Locations
Courtesy of CHRYSLER LLC

1 - SOLENOID VALVE STRAINERS

13. Remove the strainers (1) for the modulating pressure and shift pressure control solenoid valves from the valve housing. Refer to **Fig. 246**.

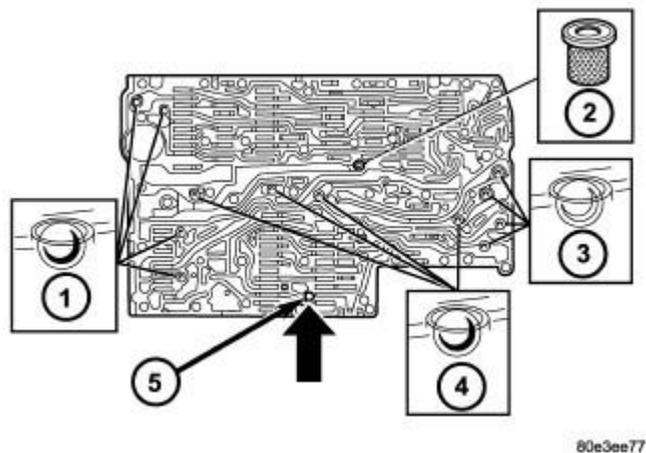


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Fig. 247: Converter Lock-Up Solenoid Valve Strainer Location
Courtesy of CHRYSLER LLC

1 - CONVERTER LOCK-UP SOLENOID STRAINER

14. Remove the strainer (1) in the inlet to torque converter lock-up control solenoid valve.



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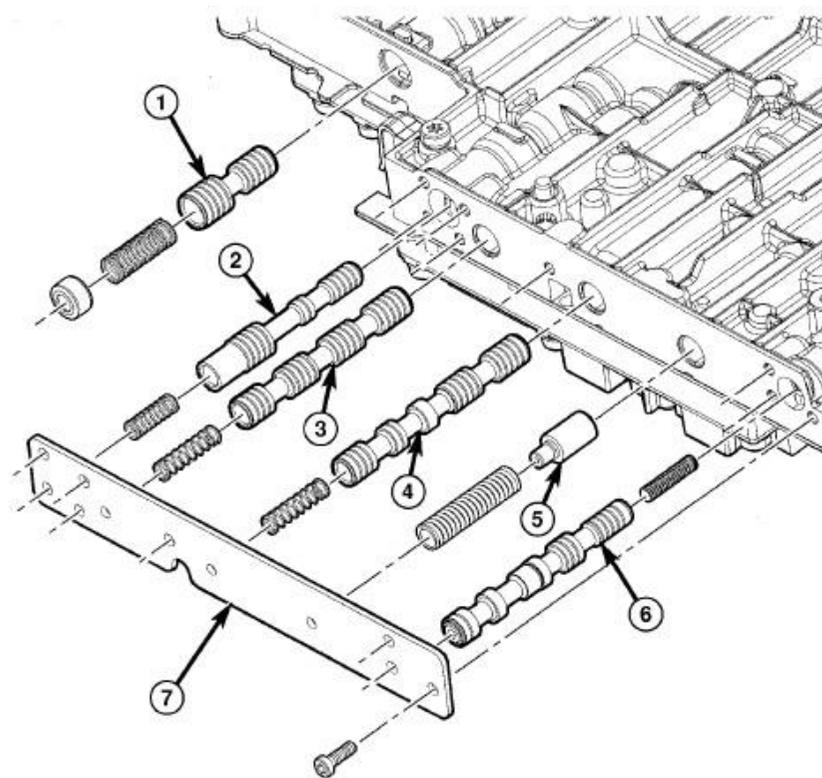
Fig. 248: Check Balls & Strainer Location

Courtesy of CHRYSLER LLC

1 - STEEL CHECK BALLS
2 - CENTRAL STRAINER
3 - STEEL CHECK BALLS
4 - PLASTIC CHECK BALLS
5 - PLAIN DOWEL PIN

NOTE: A total of 12 valve balls are located in the valve body, four made from plastic (4) and eight from steel (1, 3).

15. Note the location of all check balls (1, 3, 4) and the central strainer (2) for re-installation. Remove all check balls (1, 3, 4) and the central strainer (2).

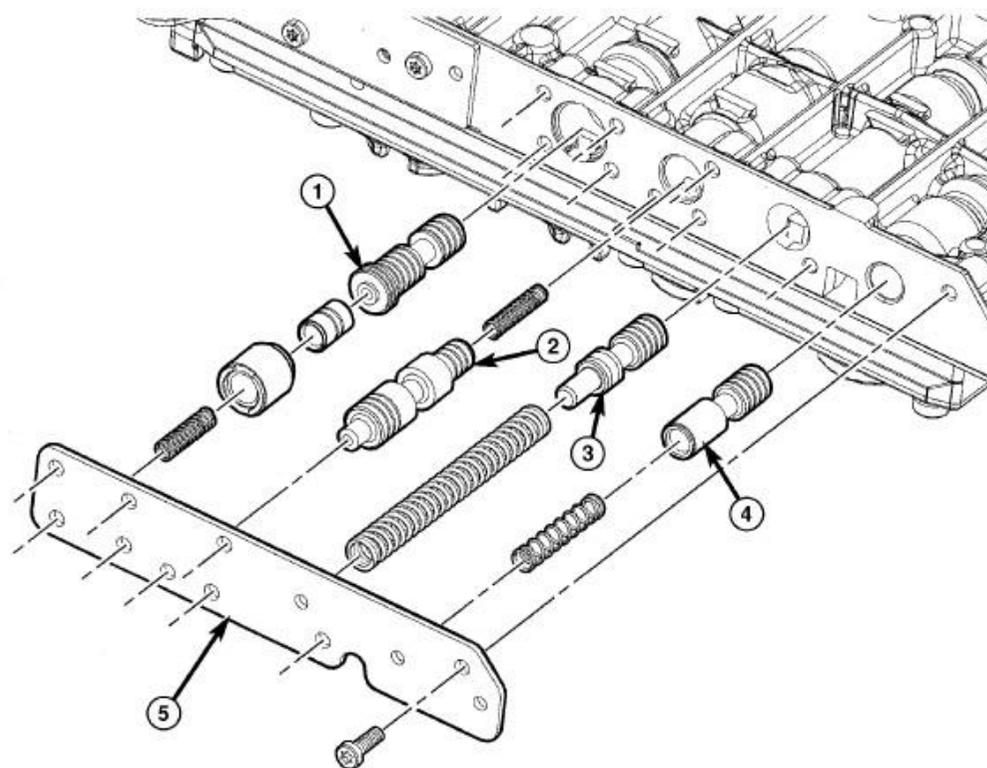


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Fig. 249: Lower Valve Body Section 1
 Courtesy of CHRYSLER LLC

1 - B2 SHIFT VALVE	5 - TCC DAMPER VALVE - if equipped
2 - 2-3 HOLDING PRESSURE SHIFT VALVE	6 - TCC LOCK-UP REGULATOR VALVE
3 - 2-3 COMMAND VALVE	7 - SIDE COVER
4 - 2-3 SHIFT PRESSURE	

16. Remove the screws holding the side cover (7) to the valve body and valve housing.
17. Remove the B-2 Shift Valve assembly (1), 2-3 Holding Pressure Valve assembly (2), 2-3 Command Valve assembly (3), 2-3 Shift Pressure assembly (4), TCC Damper Valve (5) if equipped and the TCC Lock-Up Regulator Valve assembly (6) from the valve body.
18. Check all valves for ease of movement and shavings.

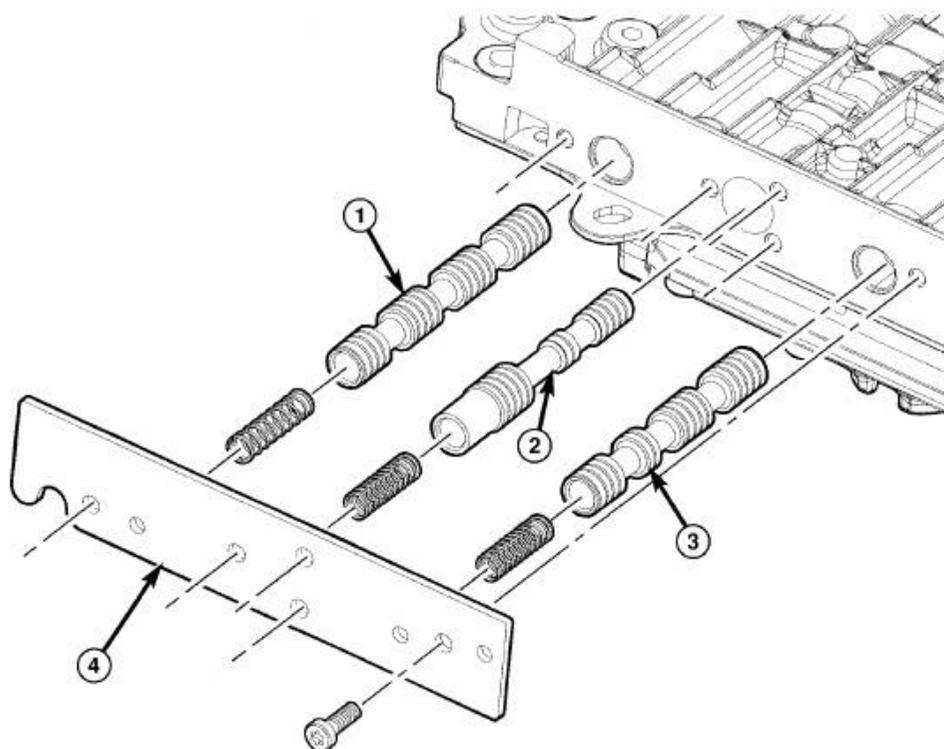


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Fig. 250: Lower Valve Body Section 2
 Courtesy of CHRYSLER LLC

- | | |
|--|--|
| 1 - 1-2 / 4-5 OVERLAP REGULATING SLEEVE AND PISTON | 4 - SHIFT SOLENOID PRESSURE REGULATING VALVE |
| 2 - SHIFT PRESSURE REGULATING VALVE | 5 - SIDE COVER |
| 3 - CONTROL VALVE PRESSURE REGULATOR | |

19. Remove the screws holding the side cover (5) to the valve body and valve housing.
20. Remove the 1-2 / 4-5 Overlap Regulating Valve, Sleeve, and Piston assembly (1), Shift Pressure Regulating Valve assembly (2), Control Valve Pressure Regulator assembly (3), and the Shift Solenoid Pressure Regulating Valve (4) from the valve body.
21. Check all valves for ease of movement and shavings.



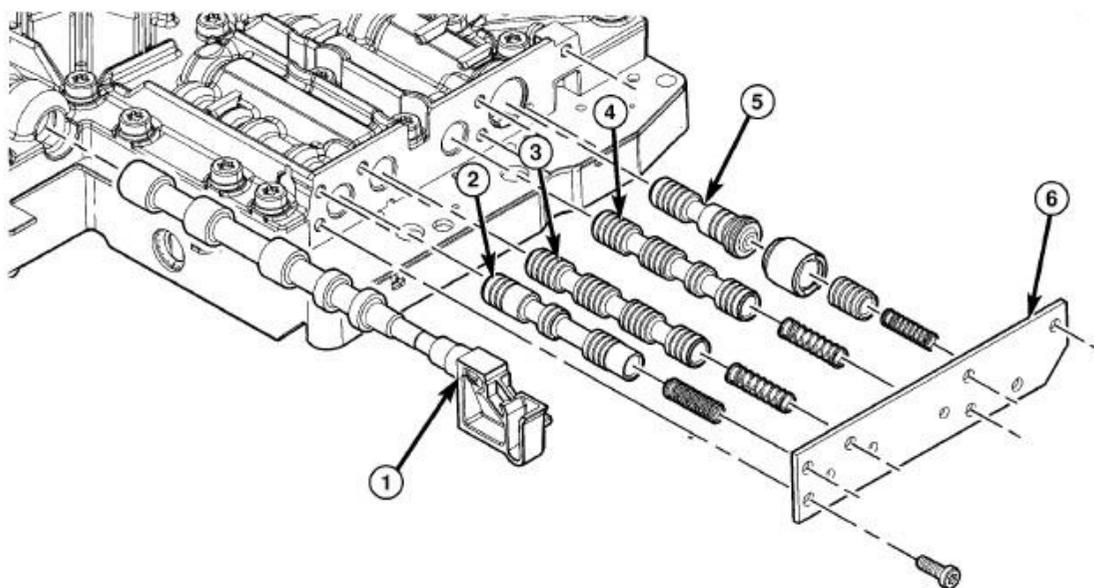
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Fig. 251: Lower Valve Body Section 3
 Courtesy of CHRYSLER LLC

1 - 1-2 / 4-5 COMMAND VALVE	3 - 1-2 / 4-5 SHIFT PRESSURE
2 - 1-2 / 4-5 HOLDING PRESSURE SHIFT VALVE	4 - SIDE COVER

22. Remove the screws holding the side cover (4) to the valve body and valve housing.
23. Remove the 1-2 / 4-5 Command valve assembly (1), 1-2 / 4-5 Holding Pressure Shift Valve (2) and the 1-2 / 4-5 Shift Pressure Shift Valve assembly (3) from the valve body.
24. Check all valves for ease of movement and shavings.

NOTE: The sleeves and pistons of the overlap regulating valves must not be mixed up.

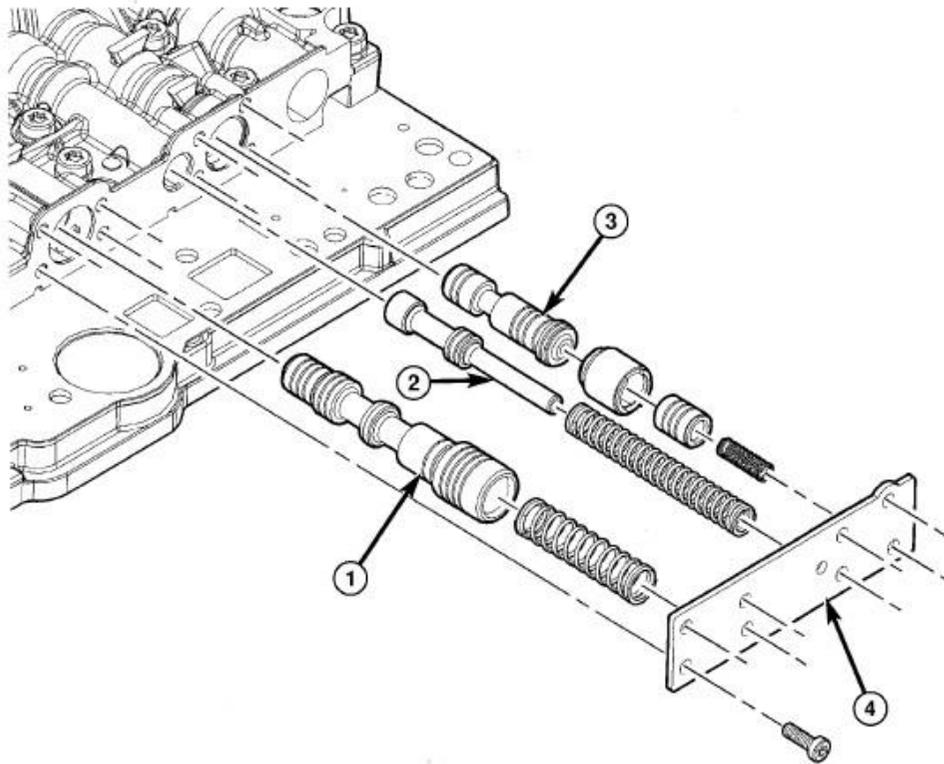


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Fig. 252: Upper Valve Body Section 1
 Courtesy of CHRYSLER LLC

1 - SELECTOR VALVE	4 - 3-4 SHIFT PRESSURE
2 - 3-4 HOLDING PRESSURE SHIFT VALVE	5 - 3-4 OVERLAP REGULATING VALVE, SLEEVE, AND PISTON
3 - 3-4 COMMAND VALVE	6 - SIDE COVER

25. Remove the screws holding the side cover (6) to the valve body and valve housing.
26. Remove the sector valve (1).
27. Remove 3-4 Holding Pressure Shift Valve assembly (2), 3-4 Command Valve assembly (3), 3-4 Shift Pressure Shift Valve assembly (4) and the 3-4 Overlap Regulating Valve Sleeve and Piston assembly (5) from the valve body.
28. Check all valves for ease of movement and shavings.

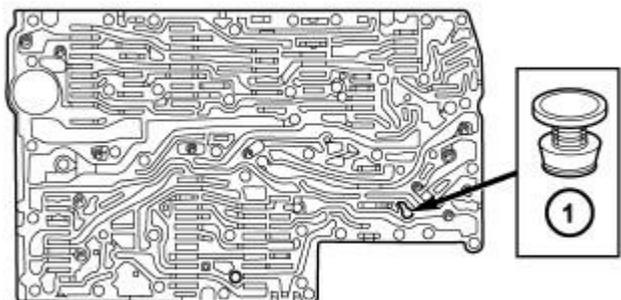


81c34240

Fig. 253: Upper Valve Body Section 2
 Courtesy of CHRYSLER LLC

1 - LINE PRESSURE REGULATING VALVE	3 - 2-3 OVERLAP REGULATING VALVE, SLEEVE, AND PISTON
2 - LUBRICATING PRESSURE REGULATING VALVE	4 - SIDE COVER

29. Remove the screws holding the side cover (4) to the valve body and valve housing.
30. Remove the Line Pressure Regulating Valve assembly (1), Lubricating Pressure Regulating Valve assembly (2) and the 2-3 Overlap Regulating Valve, Sleeve and Piston assembly (3) from the valve body.
31. Check all valves for ease of movement and shavings.



80e3ee48

Fig. 254: Pressure Feed Valve Location

Courtesy of CHRYSLER LLC

1 - PRESSURE FEED VALVE

32. Remove the pressure supply valve (1) from the valve body.

CLEANING

CLEANING

NOTE: Fine and extremely fine metallic particles have been known affect valve operation in this transmission. While these particles may be to small to see with the naked eye, they can cause flares, or momentary going into neutral, on shifts.

Clean and flush the valve housings, valves, plugs, springs, and separator plates thoroughly with a standard parts cleaning solution only. Do not use gasoline, kerosene, or any type of caustic solution.

Do not immerse any of the electrical components in cleaning solution. Clean the electrical components by wiping them off with dry shop towels only.

Dry all except the electrical parts with compressed air. Make sure all passages are clean and free from obstructions. **Do not use rags or shop towels to dry or wipe off valve body components. Lint from these materials can stick to valve body parts, interfere with valve operation, and clog filters and fluid passages.**

INSPECTION

INSPECTION

Inspect all of the valve body mating surfaces for scratches, nicks, burrs, or distortion. Use a straightedge to check surface flatness. Minor scratches may be removed with crocus cloth using only very light pressure.

2011 Jeep Grand Cherokee

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Minor distortion of a valve body mating surface may be corrected by smoothing the surface with a sheet of crocus cloth. Position the crocus cloth on a surface plate, sheet of plate glass or equally flat surface. If distortion is severe or any surfaces are heavily scored, the valve body will have to be replaced. If crocus cloth is used be certain to flush valve body thoroughly.

Inspect the valves and plugs for scratches, burrs, nicks, or scores. Minor surface scratches on steel valves and plugs can be removed with crocus cloth but **do not round off the edges of the valve or plug lands.** Maintaining sharpness of these edges is vitally important. The edges prevent foreign matter from lodging between the valves and plugs and the bore.

Inspect all the valve and plug bores in the valve body. Use a penlight to view the bore interiors. Replace the valve body if any bores are distorted or scored. Inspect all of the valve body springs. The springs must be free of distortion, warpage or broken coils.

Trial fit each valve and plug in its bore to check freedom of operation. When clean and dry, the valves and plugs should drop freely into the bores.

Valve body bores do not change dimensionally with use. If the valve body functioned correctly when new, it will continue to operate properly after cleaning and inspection. It should not be necessary to replace a valve body assembly unless it is damaged in handling.

ASSEMBLY

ASSEMBLY

CAUTION: Make certain all valves and springs are assembled correctly. Failure to follow this caution may result in transmission failure.

NAG1 VALVE BODY SPRING DIMENSION

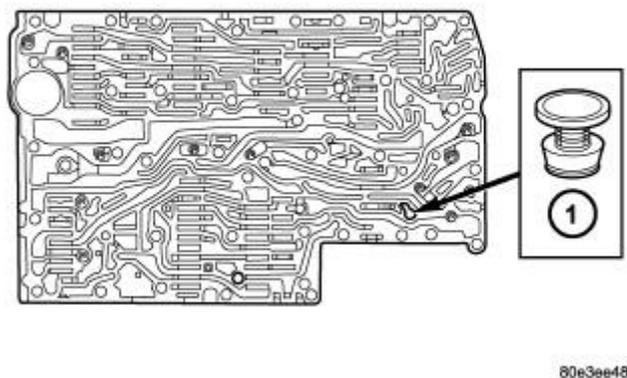
VALVE	SPRING FREE LENGTH	TOTAL COILS
2-3 Holding	18.8 - 19.6 mm (0.74 - 0.77 in.)	12
T/C Clutch Damper	37.5 - 38.5 mm (1.48 - 1.51 in.)	19.5
1-2 / 4-5 Overlap	20.95 - 21.65 mm (0.82 - 0.85 in.)	14.5
Shift Pressure Regulator	22.4 - 23.6 mm (0.88 - 0.93 in.)	14.5
Control Valve Pressure Regulator	79.2 - 82.4 mm (3.12 - 3.24 in.)	29
Shift Solenoid Pressure Regulating Valve	32.6 - 34.4 mm (1.28 - 1.35 in.)	15.5
T/C Clutch (LU) Regulator	22.8 - 23.6 mm (0.90 - 0.93 in.)	18.5
B2 Shift Valve	25.8 - 27.0 mm (1.01 - 1.06 in.)	16.5
3/4 Over Lap	21.0 - 20.4 mm (0.83 - 0.80 in.)	13
3-4 Holding, 1-2 / 4-5 Holding, 1-2 / 4-5 Shift Pressure	21.1 - 22.5 mm (0.83 - 0.88 in.)	14
3-4 Command, 3-4 Shift Pressure, 1-2 / 4-5 Command, 2-3 Shift Pressure, 2-3 Command	23.9 - 25.3 mm (0.94 - 1.00 in.)	11.5

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee

Lubricating Pressure Regulating Valve	64.8 - 68.2 mm (2.55 - 2.68 in.)	24
2-3 Overlap	16.9 - 18.7 mm (0.66 - 0.74 in.)	13
Line Pressure Regulator	43.8 - 46.2 mm (1.72 - 1.82 in.)	13.5

NOTE: Pay great attention to cleanliness for all work on the shift plate. Fluffy cloths must not be used. Leather cloths are particularly good. After dismantling, all parts must be washed and blown out with compressed-air, noting that parts may be blown away.



80e3ee48

Fig. 255: Pressure Feed Valve Location
Courtesy of CHRYSLER LLC

1 - PRESSURE FEED VALVE

1. Install the pressure supply valve (1) into the valve body. Refer to [Fig. 255](#).

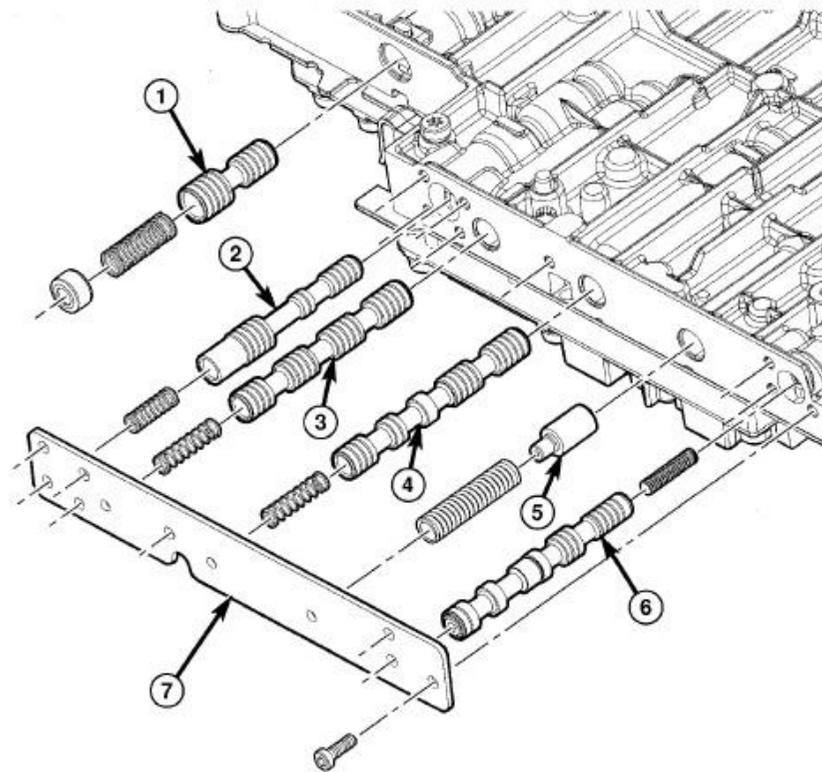
NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
2-3 Holding (2)	18.8 - 19.6 mm (0.74 - 0.77 in.)	12
T/C Clutch Damper (5)	37.5 - 38.5 mm (1.48 - 1.51 in.)	19.5
T/C Clutch (LU)	22.8 - 23.6 mm (0.90 -	18.5

2011 Jeep Grand Cherokee

2011 AUTOMATIC TRANSMISSION NAG1 - Service Information - Grand Cherokee

Regulator (6)	0.93 in.)	
B2 Shift Valve (1)	25.8 - 27.0 mm (1.01 - 1.06 in.)	16.5
2-3 Shift Pressure (4), 2-3 Command (3)	23.9 - 25.3 mm (0.94 - 1.00 in.)	11.5



81c337a1

Fig. 256: Lower Valve Body Section 1
Courtesy of CHRYSLER LLC

1 - B2 SHIFT VALVE

2 - 2-3 HOLDING PRESSURE SHIFT VALVE

3 - 2-3 COMMAND VALVE

5 - TCC
DAMPER
VALVE - if
equipped

6 - TCC
LOCK-UP
REGULATOR
VALVE

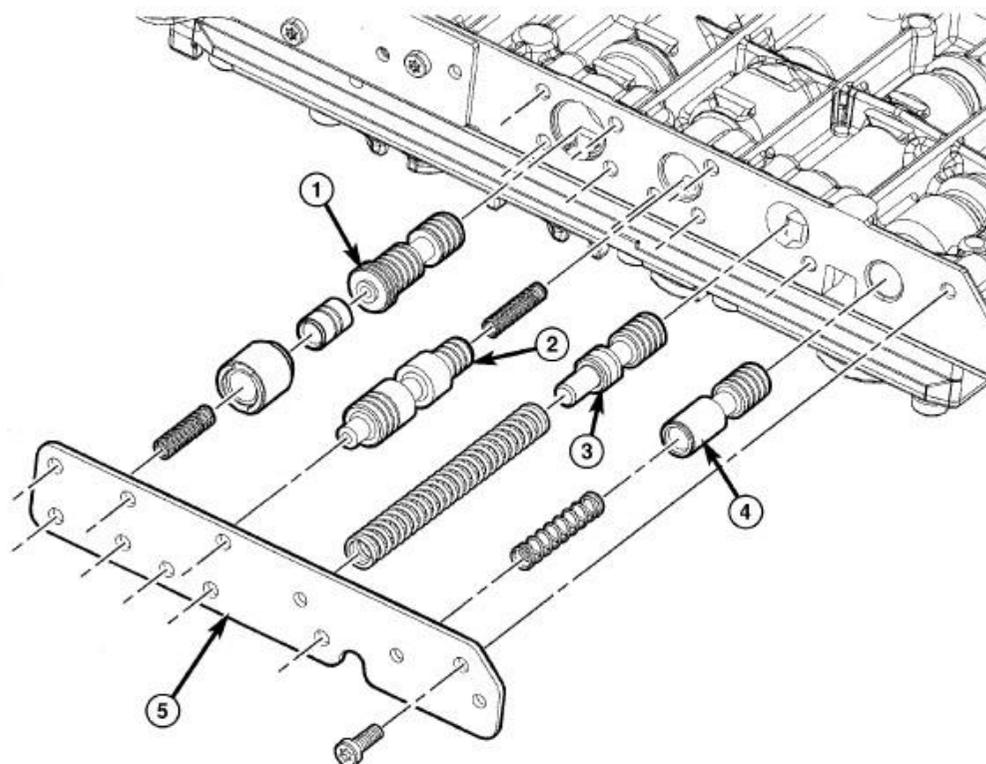
7 - SIDE
COVER

4 - 2-3 SHIFT PRESSURE

2. Lubricate and install the B-2 Shift Valve assembly (1), 2-3 Holding Pressure Valve assembly (2), 2-3 Command Valve assembly (3), 2-3 Shift Pressure Shift Valve assembly (4), TCC Damper Valve (5) if equipped and the T/CC Lock-Up Regulator Valve assembly (6) into the valve body.
3. Install the side cover and the screws holding the side cover (7) to the valve body and valve housing. Tighten the screws to 4 N.m (35 in.lbs.).

NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
1-2 / 4-5 Overlap (1)	20.95 - 21.65 mm (0.82 - 0.85 In.)	14.5
Shift Pressure Regulator (2)	22.4 - 23.6 mm (0.88 - 0.93 in.)	14.5
Control Valve Pressure Regulator (3)	79.2 - 82.4 mm (3.12 - 3.24 in.)	29
Shift Solenoid Pressure Regulating Valve (4)	32.6 - 34.4 mm (1.28 - 1.35 in.)	15.5



81c337b4

Fig. 257: Lower Valve Body Section 2
 Courtesy of CHRYSLER LLC

- | | |
|--|--|
| 1 - 1-2 / 4-5 OVERLAP REGULATING SLEEVE AND PISTON | 4 - SHIFT SOLENOID PRESSURE REGULATING VALVE |
| 2 - SHIFT PRESSURE REGULATING VALVE | 5 - SIDE |

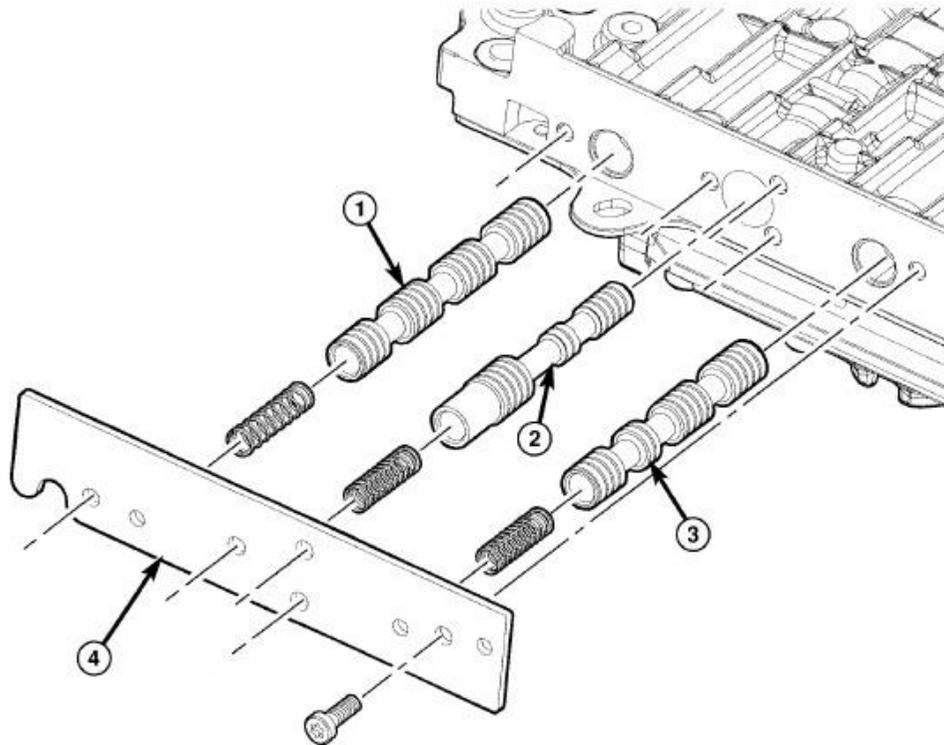
COVER

3 - CONTROL VALVE PRESSURE REGULATOR

4. Lubricate and install the 1-2 / 4-5 Overlap Regulating Valve, Sleeve, and Piston assembly (1), Shift Pressure Regulating Valve assembly (2), Control Valve Pressure Regulator Valve assembly (3) and Shift Solenoid Pressure Regulating Valve assembly (4) into the valve body.
5. Install the side cover and the screws holding the side cover (5) to the valve body and valve housing. Tighten the screws to 4 N.m (35 in.lbs.).

NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
1-2 / 4-5 Holding (2), 1-2 / 4-5 Shift Pressure (3)	21.1 - 22.5 mm (0.83 - 0.88 in.)	14
1-2 / 4-5 Command (1)	23.9 - 25.3 mm (0.94 - 1.00 in.)	11.5



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Fig. 258: Lower Valve Body Section 3
 Courtesy of CHRYSLER LLC

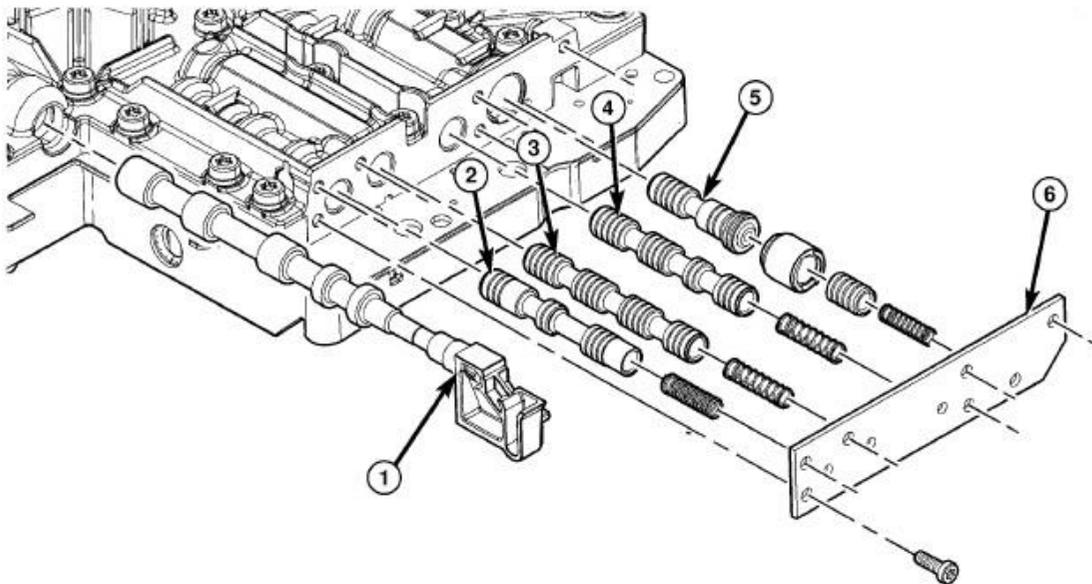
1 - 1-2 / 4-5 COMMAND VALVE	3 - 1-2 / 4-5 SHIFT PRESSURE
2 - 1-2 / 4-5 HOLDING PRESSURE SHIFT VALVE	4 - SIDE COVER

6. Lubricate and install the 1-2 / 4-5 Command valve assembly (1), 1-2 / 4-5 Holding Pressure Shift Valve

- (2) and the 1-2 / 4-5 Shift Pressure assembly (3) into the valve body.
7. Install the side cover and the screws holding the side cover (4) to the valve body and valve housing. Tighten the screws to 4 N.m (35 in.lbs.).

NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
3/4 Over Lap (5)	20.4 - 21.0 mm (0.80 - 0.83 in.)	13
3-4 Holding (2)	21.1 - 22.5 mm (0.83 - 0.88 in.)	14
3-4 Command (3), 3-4 Shift Pressure (4)	23.9 - 25.3 mm (0.94 -1.00 in.)	11.5



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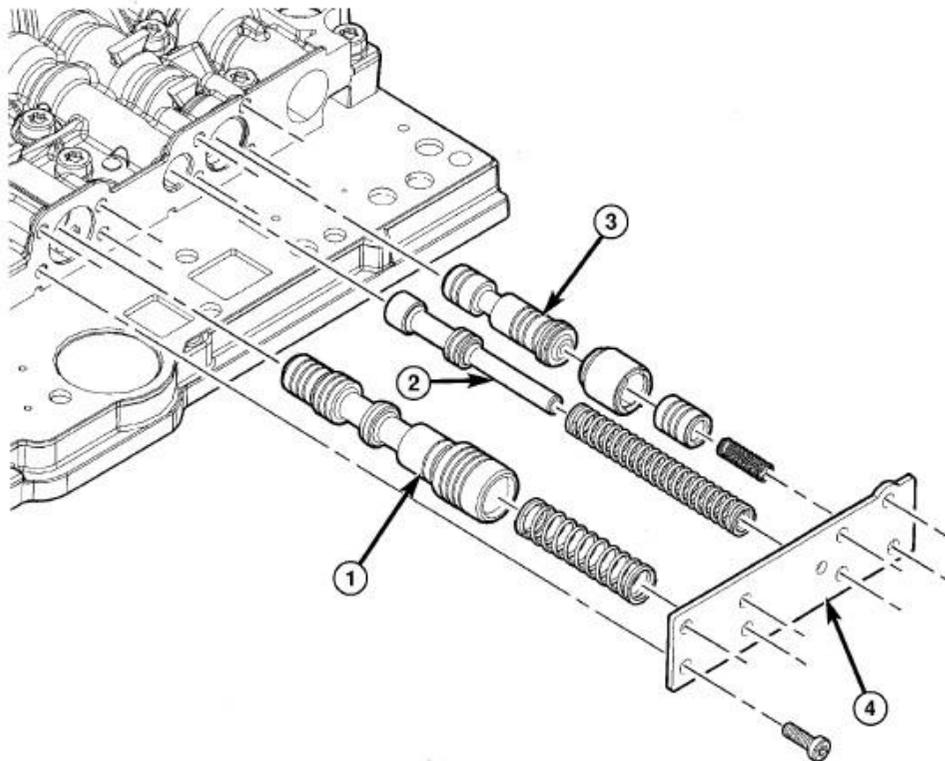
Fig. 259: Upper Valve Body Section 1
 Courtesy of CHRYSLER LLC

1 - SELECTOR VALVE	4 - 3-4 SHIFT PRESSURE
2 - 3-4 HOLDING PRESSURE SHIFT VALVE	5 - 3-4 OVERLAP REGULATING VALVE, SLEEVE, AND PISTON
3 - 3-4 COMMAND VALVE	6 - SIDE COVER

8. Lubricate and install the sector valve (1).
9. Lubricate and install 3-4 Holding Pressure Shift Valve assembly (2), 3-4 Command Valve assembly (3), 3-4 Shift Pressure assembly (4) and the 3-4 Overlap Regulating Valve Sleeve and Piston assembly (5) into the valve body.
10. Install the side cover and the screws holding the side cover (6) to the valve body and valve housing. Tighten the screws to 4 N.m (35 in.lbs.).

NAG1 VALVE BODY SPRING DIMENSION

VALVE	SPRING FREE LENGTH	TOTAL COILS
Lubricating Pressure Regulating Valve (2)	64.8 - 68.2 mm (2.55 - 2.68 in.)	24
2-3 Overlap (3)	16.9 - 18.7 mm (0.66 - 0.74 in.)	13
Line Pressure Regulator (1)	43.8 - 46.2 mm (1.72 - 1.82 in.)	13.5



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Fig. 260: Upper Valve Body Section 2
 Courtesy of CHRYSLER LLC

1 - LINE PRESSURE REGULATING VALVE	3 - 2-3 OVERLAP REGULATING VALVE, SLEEVE, AND PISTON
2 - LUBRICATING PRESSURE REGULATING VALVE	4 - SIDE COVER

11. Lubricate and install the Operating Pressure Regulating Valve assembly (1), Lubricating Pressure Regulating Valve assembly (2) and the 2-3 Overlap Regulating Valve, Sleeve and Piston assembly (3) into the valve body.
12. Install the side cover and the screws holding the side cover (6) to the valve body and valve housing. Tighten the screws to 4 N.m (35 in.lbs.).

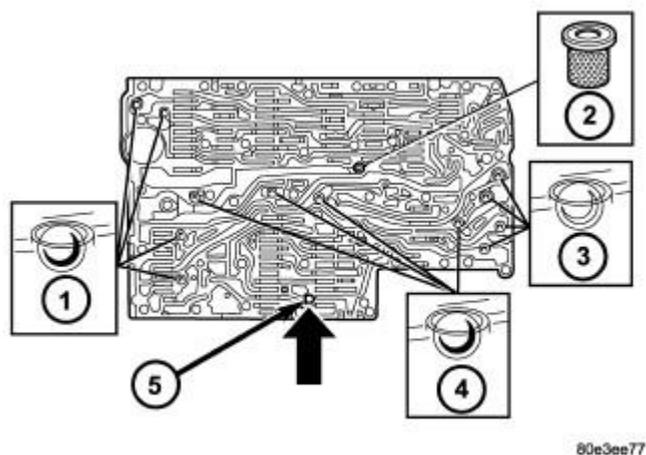


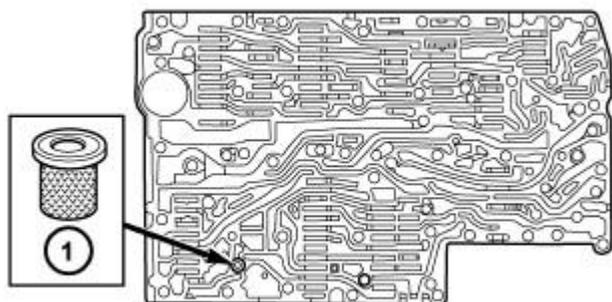
Fig. 261: Check Balls & Strainer Location

Courtesy of CHRYSLER LLC

1 - STEEL CHECK BALLS
2 - CENTRAL STRAINER
3 - STEEL CHECK BALLS
4 - PLASTIC CHECK BALLS
5 - PLAIN DOWEL PIN

NOTE: A total of 12 valve balls are located in the valve body, four made from plastic (4) and eight from steel (1, 3).

13. Install all check balls (1, 3, 4) and the central strainer (2). Refer to **Fig. 261**.

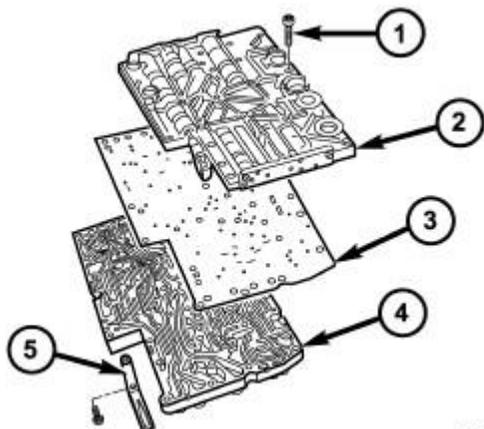


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Fig. 262: Converter Lock-Up Solenoid Valve Strainer Location
 Courtesy of CHRYSLER LLC

1 - CONVERTER LOCK-UP SOLENOID STRAINER

14. Install the strainer (1) in the inlet to torque converter lock-up control solenoid valve. Refer to **Fig. 262**.



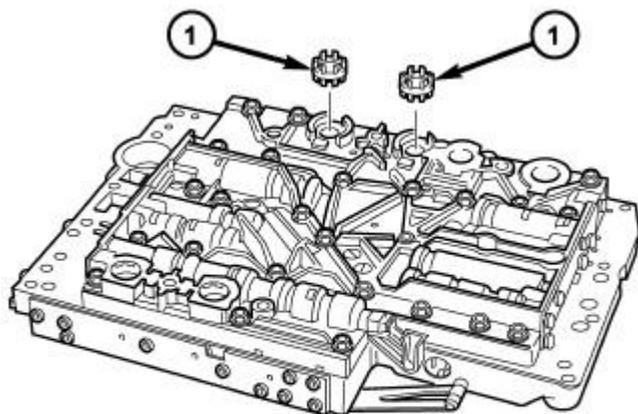
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Fig. 263: Shift Plate Components
 Courtesy of CHRYSLER LLC

1 - BOLTS - 29
2 - VALVE HOUSING
3 - SEALING PLATE
4 - VALVE BODY
5 - LEAF SPRING

15. Position the sealing plate (3) onto the valve body (4). Refer to **Fig. 263**.
16. Install the valve housing (2) onto the valve body (4) and sealing plate (3).

17. Install the shift plate Torx® bolts (1). Refer to **Fig. 263**. Tighten the bolts to 8 N.m (71 in.lbs.).
18. Install leaf spring (5). Refer to **Fig. 263**.



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Fig. 264: Solenoid Valve Strainer Locations
Courtesy of CHRYSLER LLC

1 - SOLENOID VALVE STRAINERS

19. Install the strainers (1) for the modulating pressure and shift pressure control solenoid valves into the valve housing. Refer to **Fig. 264**.

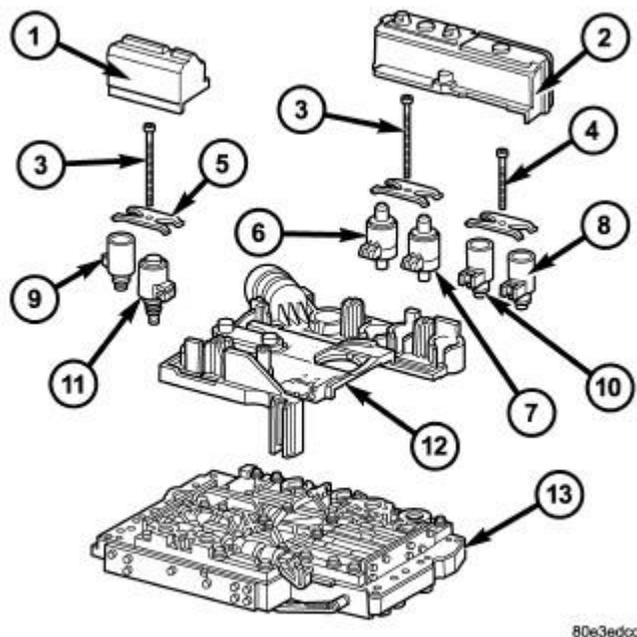


Fig. 265: Electrohydraulic Control Unit Components
 Courtesy of CHRYSLER LLC

1 - SOLENOID CAP (if equipped)
2 - SOLENOID CAP (if equipped)
3 - BOLT - M6X32
4 - BOLT - M6X30
5 - LEAF SPRING
6 - MODULATING PRESSURE REGULATING SOLENOID VALVE
7 - SHIFT PRESSURE REGULATING SOLENOID
8 - 3-4 SHIFT SOLENOID
9 - TORQUE CONVERTER LOCK-UP SOLENOID
10 - 1-2/4-5 SHIFT SOLENOID
11 - 2-3 SHIFT SOLENOID
12 - ELECTRICAL CONTROL UNIT
13 - SHIFT PLATE

20. Install the electrohydraulic control module (12) onto the shift plate (13). Refer to **Fig. 265**.
21. Bend the retaining lug on stiffening rib on transmission oil temperature sensor to retain the electrohydraulic control module.
22. Install the solenoid valves (6 - 11) into shift plate (13).

NOTE: Check O-rings on solenoid valves for damage and replace if necessary.

23. Install the leaf springs (5).
24. Install the Torx® socket bolts (3, 4). Refer to **Fig. 265**. Tighten the bolts to 8 N.m (71 in.lbs.).

NOTE: Pay attention to the different lengths of the Torx® socket bolts.

25. Install the solenoid caps (1, 2) if equipped.
26. Install the electrohydraulic unit into the vehicle.

INSTALLATION

INSTALLATION

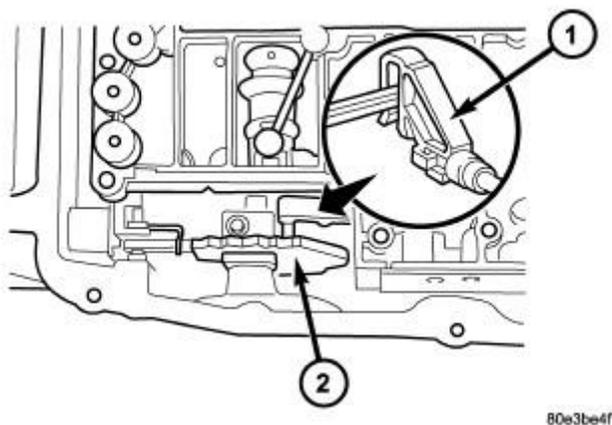


Fig. 266: Selector Valve & Detent Plate
Courtesy of CHRYSLER LLC

1 - SELECTOR VALVE

2 - DETENT PLATE

1. Position the electrohydraulic unit in the transmission housing.
2. Insert selector valve (1) in driver of detent plate (2). Refer to **Fig. 266**. When installing the electrohydraulic control module in the transmission housing, the plastic part of the selector valve (1) must engage in the driver of the detent plate (2).

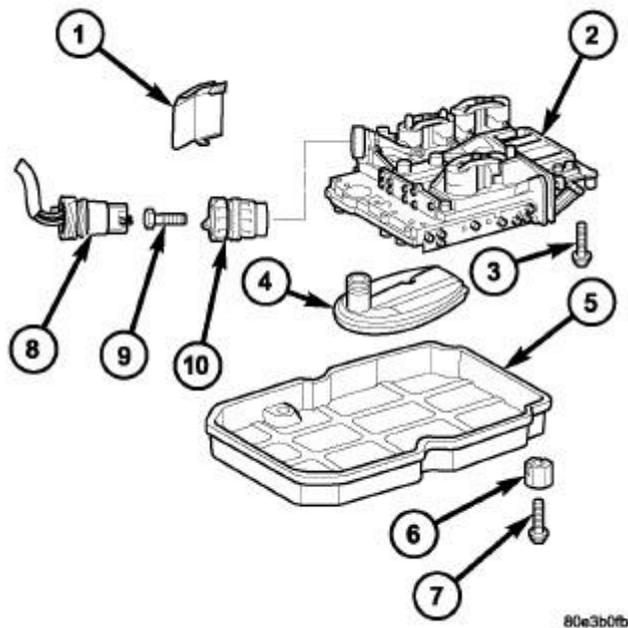
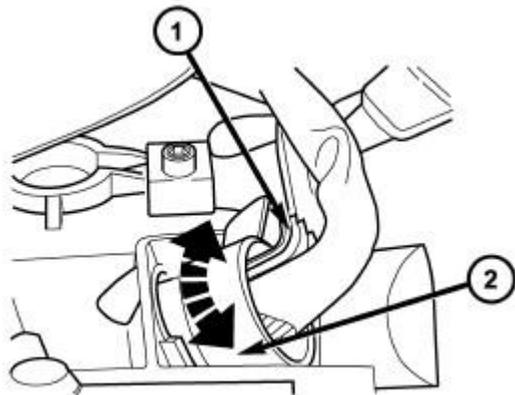


Fig. 267: Electrohydraulic Unit Components
 Courtesy of CHRYSLER LLC

1 - HEAT SHIELD
2 - ELECTROHYDRAULIC UNIT
3 - BOLT
4 - OIL FILTER
5 - OIL PAN
6 - CLAMPING ELEMENT
7 - BOLT
8 - 13-PIN PLUG CONNECTOR
9 - BOLT
10 - ADAPTER PLUG

3. Install the Torx® socket bolts (3) and torque to 8 N.m (71 in. Refer to **Fig. 267**.lbs.).
4. Install a new oil filter (4). Refer to **Fig. 267**.
5. Install oil pan (5) and torque the oil pan bolts to 8 N.m (71 in. Refer to **Fig. 267**.lbs.).
6. Install the adapter plug (10) into the transmission housing and tighten the bolt (9) to 2. Refer to **Fig. 267.5** N.m (22 in.lbs.).



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Fig. 268: Installing Plug Connector
Courtesy of CHRYSLER LLC

1 - PLUG CONNECTOR

2 - ADAPTER PLUG

7. Check O-ring on plug connector (1), and replace if necessary. Refer to **Fig. 268**.
8. Install the plug connector (1) into the adapter plug (2). Turn bayonet lock of adapter plug (2) clockwise to connect plug connector (1).
9. Fill the transmission with the correct oil using the standard procedure. Refer to **FLUID AND FILTER, STANDARD PROCEDURE**.