FASTENER USAGE

DESCRIPTION - FASTENER USAGE

WARNING: USE OF AN INCORRECT FASTENER MAY RESULT IN COMPONENT DAMAGE OR PERSONAL INJURY.

Figure art, specifications and torque references in this Service Manual are identified in metric and SAE format.

During any maintenance or repair procedures, it is important to salvage all fasteners (nuts, bolts, etc.) for reassembly. If the fastener is not salvageable, a fastener of equivalent specification must be used.

DESCRIPTION - THREADED HOLE REPAIR

Most stripped threaded holes can be repaired using a Helicoil®. Follow the manufactures recommendations for application and repair procedures.

INTERNATIONAL VEHICLE CONTROL & DISPLAY SYMBOLS

DESCRIPTION - INTERNATIONAL SYMBOLS

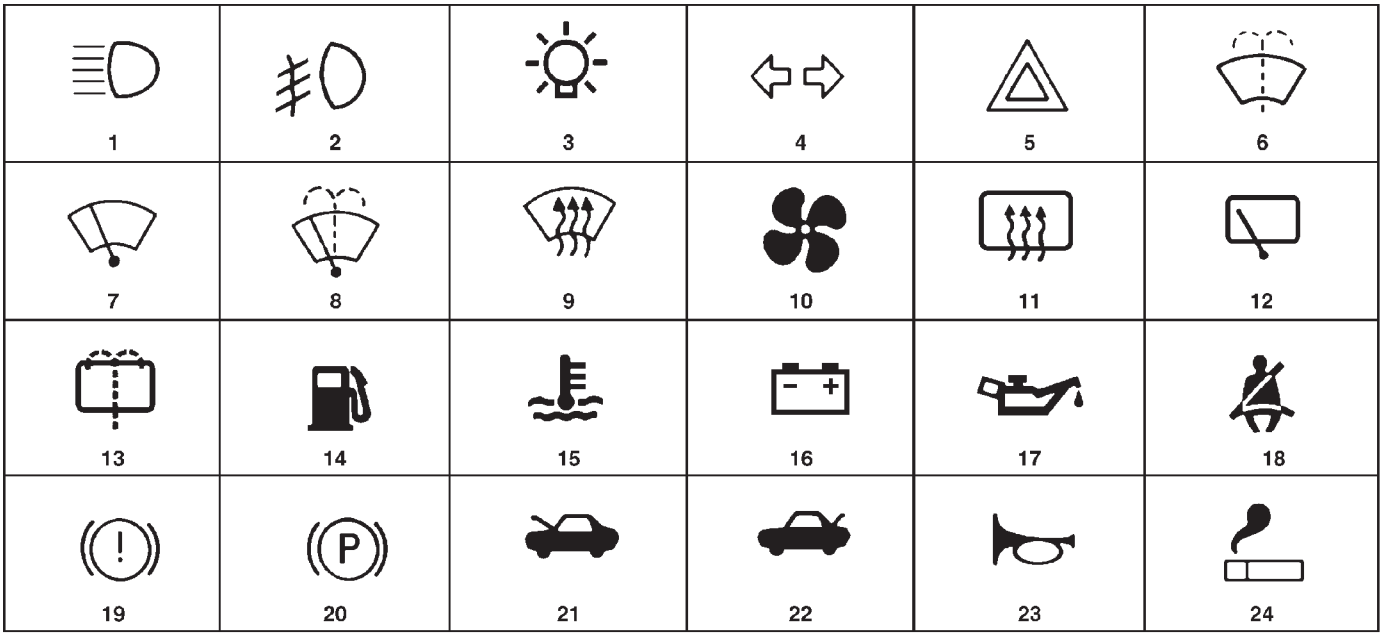
The graphic symbols illustrated in the following International Control and Display Symbols Chart are used to identify various instrument controls. The symbols correspond to the controls and displays that are located on the instrument panel.

METRIC SYSTEM

DESCRIPTION - METRIC SYSTEM

The metric system is based on quantities of one, ten, one hundred, one thousand and one million .

The following chart will assist in converting metric units to equivalent English and SAE units, or vise versa.



80be4788

International Symbols

1	High Beam	13	Rear Window Washer
2	Fog Lamps	14	Fuel
3	Headlamp, Parking Lamps, Panel Lamps	15	Engine Coolant Temperature
4	Turn Warning	16	Battery Charging Condition
5	Hazard Warning	17	Engine Oil
6	Windshield Washer	18	Seat Belt
7	Windshield Wiper	19	Brake Failure
8	Windshield Wiper and Washer	20	Parking Brake
9	Windscreen Demisting and Defrosting	21	Front Hood
10	Ventilating Fan	22	Rear hood (Decklid)
11	Rear Window Defogger	23	Horn
12	Rear Window Wiper	24	Lighter

FRONT AXLE - 216FBI (Continued)

(31) Rotate the differential case several times to seat the side bearings.

(32) Position the indicator plunger against a ring gear tooth (Fig. 19).

(33) Push and hold ring gear upward while not allowing the pinion gear to rotate.

(34) Zero dial indicator face to pointer.

(35) Push and hold ring gear downward while not allowing the pinion gear to rotate. Dial indicator reading should be between 0.12 mm (0.005 in.) and 0.20 mm (0.008 in.). If backlash is not within specifications transfer the necessary amount of shim thickness from one side of the housing to the other (Fig. 20).

(36) Verify differential case and ring gear runout by measuring ring to pinion gear backlash at eight locations around the ring gear. Readings should not vary more than 0.05 mm (0.002 in.). If readings vary more than specified, the ring gear or the differential case is defective.

After the proper backlash is achieved, perform Gear Contact Pattern Analysis procedure.

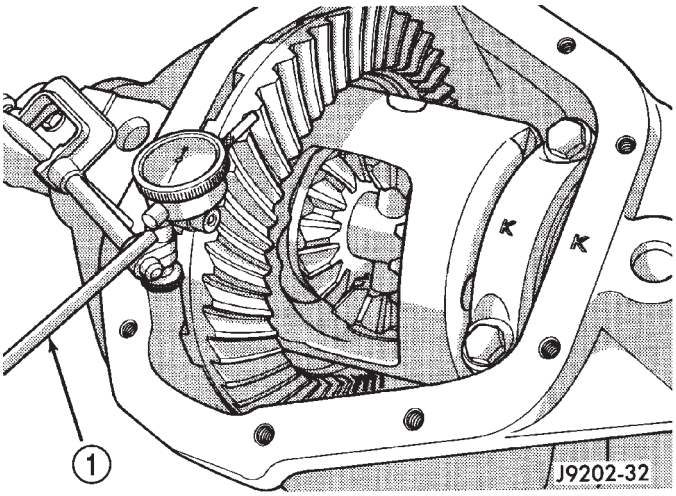


Fig. 19 Ring Gear Backlash Measurement

1 - DIAL INDICATOR

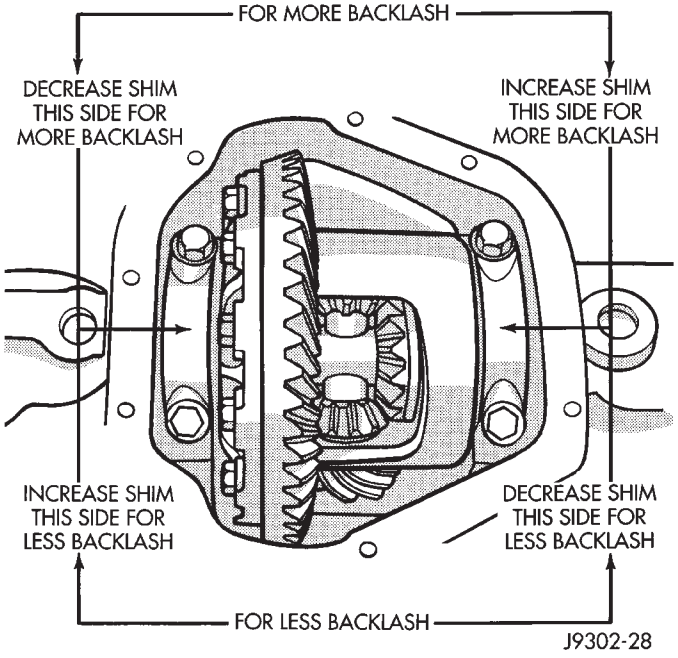


Fig. 20 Backlash Shim

GEAR CONTACT PATTERN

The ring and pinion gear contact patterns will show if the pinion depth is correct. It will also show if the ring gear backlash has been adjusted correctly. The backlash can be adjusted within specifications to achieve desired tooth contact patterns.

(1) Apply a thin coat of hydrated ferric oxide or equivalent to the drive and coast side of the ring gear teeth.

(2) Wrap, twist and hold a shop towel around the pinion yoke to increase the turning resistance of the pinion. This will provide a more distinct contact pattern.

(3) With a boxed end wrench on the ring gear bolt, rotate the differential case one complete revolution in both directions while a load is being applied from shop towel.

The areas on the ring gear teeth with the greatest degree of contact against the pinion teeth will squeegee the compound to the areas with the least amount of contact. Note and compare patterns on the ring gear teeth to Gear Tooth Contact Patterns chart (Fig. 21)and adjust pinion depth and gear backlash as necessary.

BRAKE PADS/SHOES (Continued)

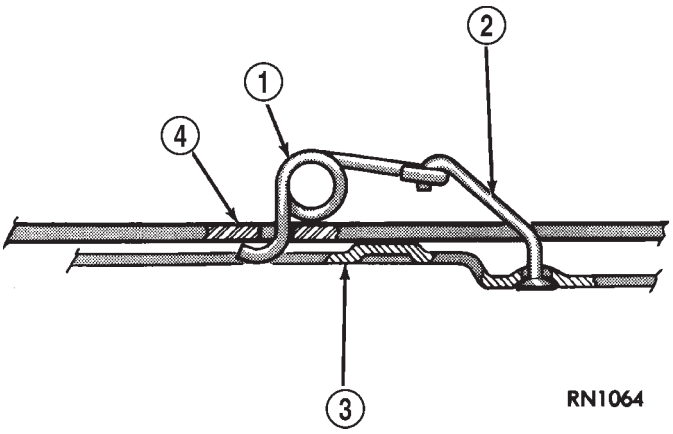


Fig. 53 Hold-Down Spring And Pin Attachment

1 - SHOE HOLD DOWN SPRING
2 - HOLD DOWN PIN
3 - BACKING PLATE
4 - BRAKE SHOE WEB

(6) Position adjuster lever return spring on pivot.
(7) Install adjuster lever.
(8) Attach adjuster cable to adjuster lever. Be sure cable is properly routed.
(9) Adjust brake shoes to drum with brake gauge.

MASTER CYLINDER

DESCRIPTION

A two-piece master cylinder is used on all models. The cylinder body containing the primary and secondary pistons is made of aluminum. The removable fluid reservoir is made of nylon reinforced with glass fiber. The reservoir stores reserve brake fluid for the hydraulic brake circuits. The reservoir is the only serviceable component.

The fluid compartments of the nylon reservoir are interconnected to permit fluid level equalization. However, the equalization feature does not affect circuit separation in the event of a front or rear brake malfunction. The reservoir compartments will retain enough fluid to operate the functioning hydraulic circuit.

Care must be exercised when removing/installing the master cylinder connecting lines. The threads in the cylinder fluid ports can be damaged if care is not exercised. Start all brake line fittings by hand to avoid cross threading.

The cylinder reservoir can be replaced when necessary. However, the aluminum body section of the master cylinder is not a repairable component.

NOTE: If diagnosis indicates that an internal malfunction has occurred, the aluminum body section must be replaced as an assembly.

OPERATION

The master cylinder bore contains a primary and secondary piston. The primary piston supplies hydraulic pressure to the front brakes. The secondary piston supplies hydraulic pressure to the rear brakes.

DIAGNOSIS AND TESTING - MASTER CYLINDER/POWER BOOSTER

(1) Start engine and check booster vacuum hose connections. A hissing noise indicates vacuum leak. Correct any vacuum leak before proceeding.
(2) Stop engine and shift transmission into Neutral.
(3) Pump brake pedal until all vacuum reserve in booster is depleted.
(4) Press and hold brake pedal under light foot pressure. The pedal should hold firm, if the pedal falls away master cylinder is faulty (internal leakage).
(5) Start engine and note pedal action. It should fall away slightly under light foot pressure then hold firm. If no pedal action is discernible, power booster, vacuum supply, or vacuum check valve is faulty. Proceed to the POWER BOOSTER VACUUM TEST.
(6) If the POWER BOOSTER VACUUM TEST passes, rebuild booster vacuum reserve as follows: Release brake pedal. Increase engine speed to 1500 rpm, close the throttle and immediately turn off ignition to stop engine.
(7) Wait a minimum of 90 seconds and try brake action again. Booster should provide two or more vacuum assisted pedal applications. If vacuum assist is not provided, booster is faulty.

POWER BOOSTER VACUUM TEST

(1) Connect vacuum gauge to booster check valve with short length of hose and T-fitting (Fig. 54).
(2) Start and run engine at curb idle speed for one minute.
(3) Observe the vacuum supply. If vacuum supply is not adequate, repair vacuum supply.
(4) Clamp hose shut between vacuum source and check valve.
(5) Stop engine and observe vacuum gauge.
(6) If vacuum drops more than one inch HG (33 millibars) within 15 seconds, booster diaphragm or check valve is faulty.

POWER BOOSTER CHECK VALVE TEST

(1) Disconnect vacuum hose from check valve.
(2) Remove check valve and valve seal from booster.
(3) Use a hand operated vacuum pump for test.
(4) Apply 15-20 inches vacuum at large end of check valve (Fig. 55).

CHARGING (Continued)

INSPECTION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some charging system circuits are checked continuously, and some are checked only under certain conditions.

Refer to Diagnostic Trouble Codes in; Powertrain Control Module; Electronic Control Modules for more DTC information. This will include a complete list of DTC's including DTC's for the charging system.

To perform a complete test of the charging system, refer to the appropriate Powertrain Diagnostic Procedures service manual and the DRB® scan tool. Perform the following inspections before attaching the scan tool.

(1) Inspect the battery condition. Refer to 8, Battery for procedures.

(2) Inspect condition of battery cable terminals, battery posts, connections at engine block, starter solenoid and relay. They should be clean and tight. Repair as required.

(3) Inspect all fuses in both the fuseblock and Power Distribution Center (PDC) for tightness in receptacles. They should be properly installed and tight. Repair or replace as required.

(4) Inspect generator mounting bolts for tightness. Replace or tighten bolts if required. Refer to the Generator Removal/Installation section of this group for torque specifications.

(5) Inspect generator drive belt condition and tension. Tighten or replace belt as required. Refer to Belt Tension Specifications in 7, Cooling System.

(6) Inspect automatic belt tensioner (if equipped). Refer to 7, Cooling System for information.

(7) Inspect generator electrical connections at generator field, battery output, and ground terminal (if equipped). Also check generator ground wire connection at engine (if equipped). They should all be clean and tight. Repair as required.

SPECIFICATIONS

GENERATOR RATINGS

TYPE	PART NUMBER	RATED SAE AMPS	ENGINES	MINIMUM TEST AMPS
DENSO	56028920AB	136	3.9L/5.2L/5.9L GAS	100
DENSO	56029913AA	117	3.9L/5.2L/5.9L GAS	90
BOSCH	56028237AB	117	3.9L/5.2L/5.9L GAS	90
BOSCH	56028238AB	136	3.9L/5.2L/5.9L GAS	100
DENSO	56027221AD	136	5.9L DIESEL	120
BOSCH	56028239AB	136	5.9L DIESEL	120
BOSCH	56028560AA	136	8.0L	100
DENSO	56028920AC	136	8.0L	100

SPECIFICATIONS - TORQUE - GENERATOR/CHARGING SYSTEM

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Generator Mounting Bolts—Gas Engine	41	30	
Generator Upper Mounting Bolt—Diesel Engine	54	40	
Generator Pivot Bolt/Nut—Diesel Engine	54	40	
Generator Mounting Bracket-to-Engine Bolt—Diesel Engine	24	18	
Generator B+ Cable Eyelet Nut	12	9	108

HEADLAMP SWITCH (Continued)

(1) Disconnect and isolate the battery negative cable. Remove the headlamp switch from the instrument panel. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - REMOVAL) for the procedures. Unplug the headlamp switch wire harness connectors. Check for continuity between the left door jamb switch sense circuit cavity of the headlamp switch wire harness connector and a good ground. There should be continuity with the driver door open, and no continuity with the driver door closed. If OK, go to Step 2. If not OK, repair the circuit to the driver door jamb switch as required.

(2) Remove the Central Timer Module (CTM) from its mounting bracket to access the CTM wire harness connectors. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - REMOVAL) for the procedures. Unplug the 14-way CTM wire harness connector. Remove the key from the ignition lock cylinder. Check for continuity between the key-in ignition switch sense circuit cavity of the 14-way CTM wire harness connector and a good ground. There should be no continuity. If OK, go to Step 3. If not OK, repair the short circuit as required.

(3) Check for continuity between the key-in ignition switch sense circuit cavities of the 14-way CTM wire harness connector and the headlamp switch wire harness connector. There should be continuity. If OK, go to Step 4. If not OK, repair the open circuit as required.

(4) Check for continuity between the left front door jamb switch sense circuit terminal and the key-in ignition switch sense circuit terminal of the headlamp switch. There should be no continuity with the switch in the Off position, and continuity with the switch in the park or head lamps On position. If OK,(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/BODY CONTROL/CENTRAL TIMER MODUL - DIAGNOSIS AND TESTING) If not OK, replace the faulty headlamp switch.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cluster bezel from the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(3) Remove the three screws that secure the headlamp switch to the instrument panel (Fig. 17).

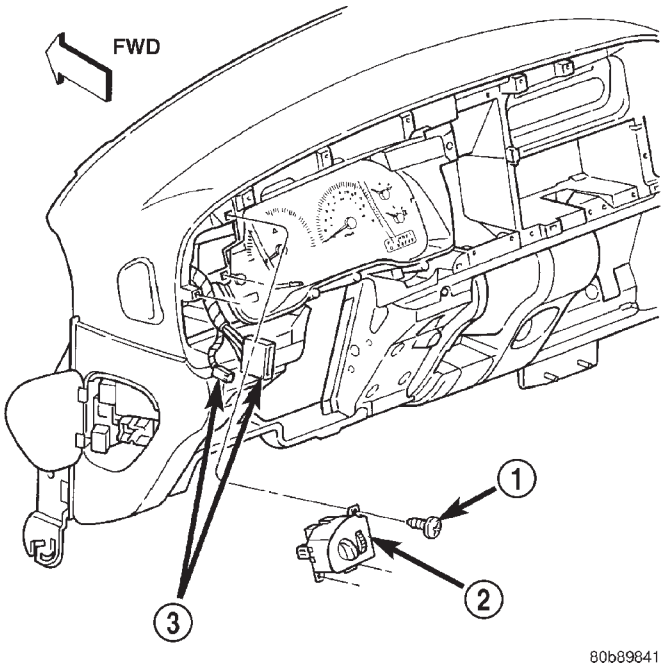


Fig. 17 Headlamp Switch Removal

1 - SCREWS (3)
2 - HEADLAMP SWITCH
3 - INSTRUMENT PANEL WIRE HARNESS CONNECTORS

(4) Pull the headlamp switch away from the instrument panel far enough to access the instrument panel wire harness connectors.

(5) Disconnect the two instrument panel wire harness connectors for the headlamp switch from the connector receptacles on the back of the switch.

(6) Remove the headlamp switch from the instrument panel.

SPEED CONTROL

TABLE OF CONTENTS

SPEED CONTROL

DESCRIPTION - SPEED CONTROL SYSTEM

Gas Engines and/or Diesel With Automatic Trans.

The speed control system is operated by the use of a cable and a vacuum controlled servo. Electronic control of the speed control system is integrated into the Powertrain Control Module (PCM). The controls consist of two steering wheel mounted switches. The switches are labeled: ON/OFF, RES/ACCEL, SET, COAST, and CANCEL.

The system is designed to operate at speeds above 30 mph (50 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

Diesel With Manual Trans.

The speed control system is fully electronically controlled by the Engine Control Module (ECM). **A cable and a vacuum controlled servo are not used if the vehicle is equipped with a manual transmission and a diesel engine. This is a servo-less system.** The controls consist of two steering wheel mounted switches. The switches are labeled: ON/OFF, RES/ACCEL, SET, COAST, and CANCEL.

The system is designed to operate at speeds above 30 mph (50 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

DESCRIPTION - VEHICLE SPEED INPUT

Gas Engines and/or Diesel With Automatic Trans.

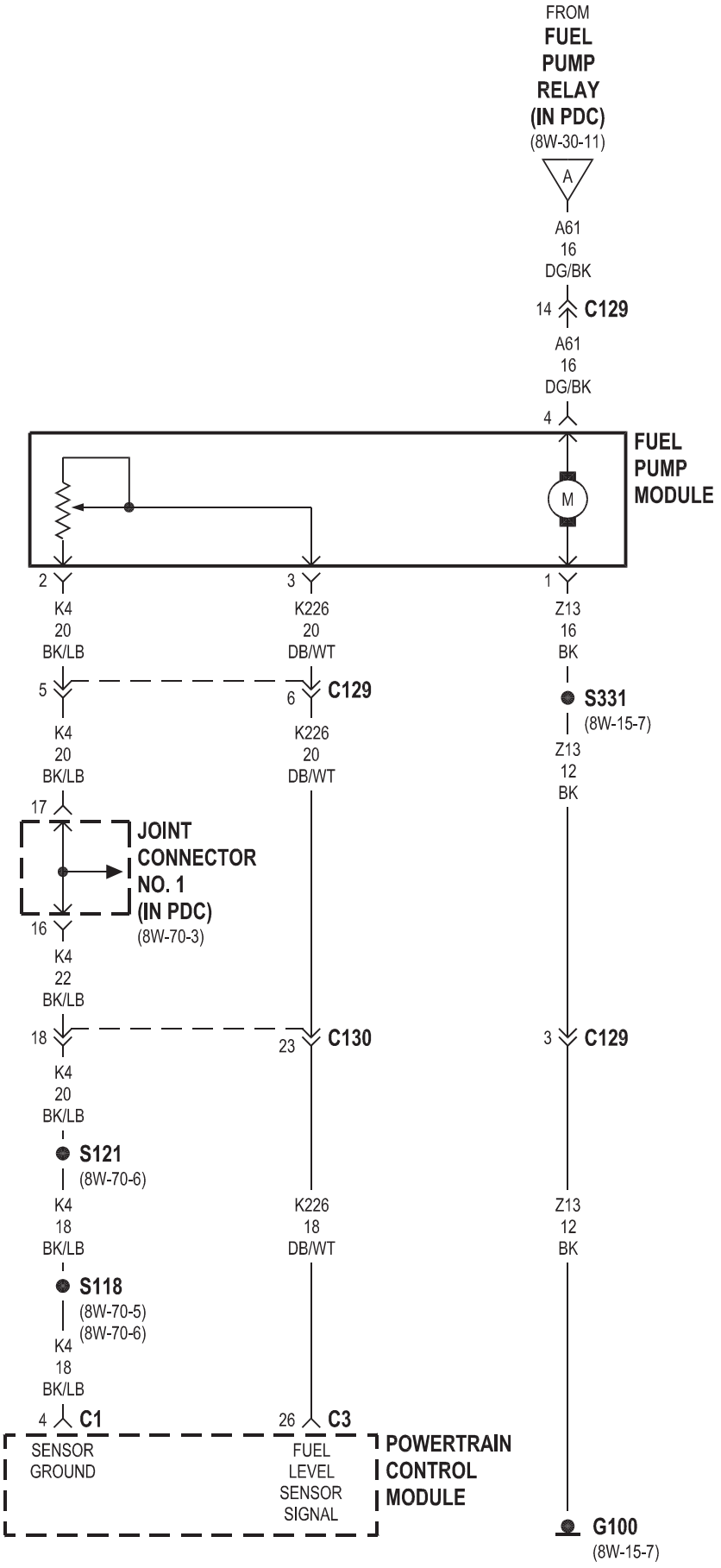
The Vehicle Speed Sensor (VSS) is no longer used for any Dodge Truck.

Vehicle speed and distance covered are measured by the Rear Wheel Speed Sensor. The sensor is mounted to the rear axle. A signal is sent from this sensor to the Controller Antilock Brake (CAB) computer. A signal is then sent from the CAB to the Powertrain Control Module (PCM) to determine vehicle speed and distance covered. The PCM will then determine strategies for speed control system operation.

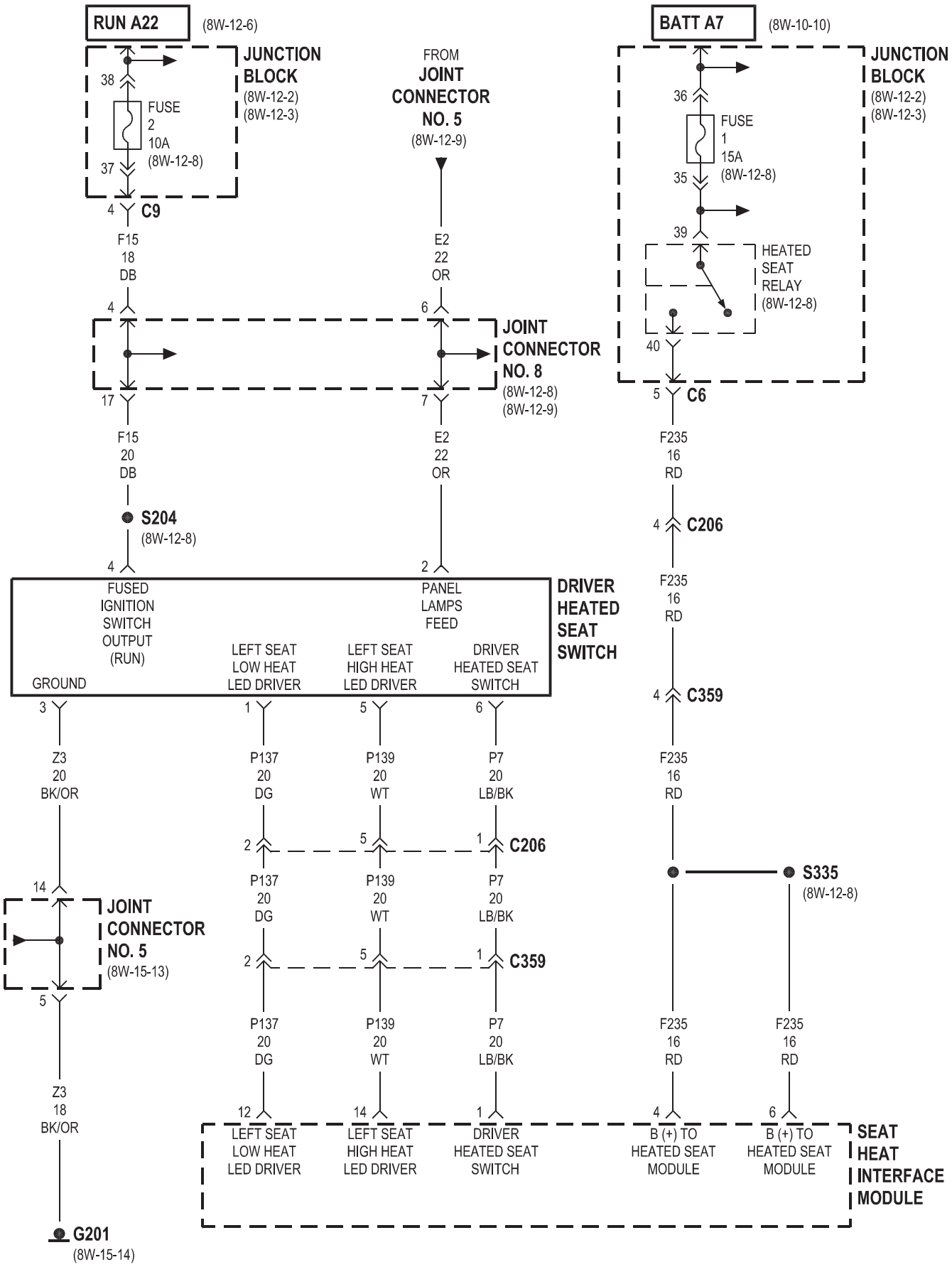
Diesel With Manual Trans.

The Vehicle Speed Sensor (VSS) is no longer used for any Dodge Truck.

Vehicle speed and distance covered are measured by the Rear Wheel Speed Sensor. The sensor is mounted to the rear axle. A signal is sent from this sensor to the Controller Antilock Brake (CAB) computer. A signal is then sent from the CAB to the Engine Control Module (ECM) to determine vehicle speed and distance covered. The ECM will then determine strategies for speed control system operation.


FROM
FUEL
PUMP
RELAY
(IN PDC)
(8W-30-11)
A
A61
16
DG/BK
14
C129
A61
16
DG/BK
4
FUEL
PUMP
MODULE
M
2
3
1
K4
20
BK/LB
K226
20
DB/WT
Z13
16
BK
5
6
C129
S331
(8W-15-7)
K4
20
BK/LB
K226
20
DB/WT
Z13
12
BK
17
JOINT
CONNECTOR
NO. 1
(IN PDC)
(8W-70-3)
16
K4
22
BK/LB
18
23
C130
3
C129
K4
20
BK/LB
S121
(8W-70-6)
K4
18
BK/LB
K226
18
DB/WT
Z13
12
BK
S118
(8W-70-5)
(8W-70-6)
K4
18
BK/LB
4
C1
26
C3
SENSOR
GROUND
FUEL
LEVEL
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE
G100
(8W-15-7)

HEATED SEATS



CONNECTOR/GROUND LOCATIONS (Continued)

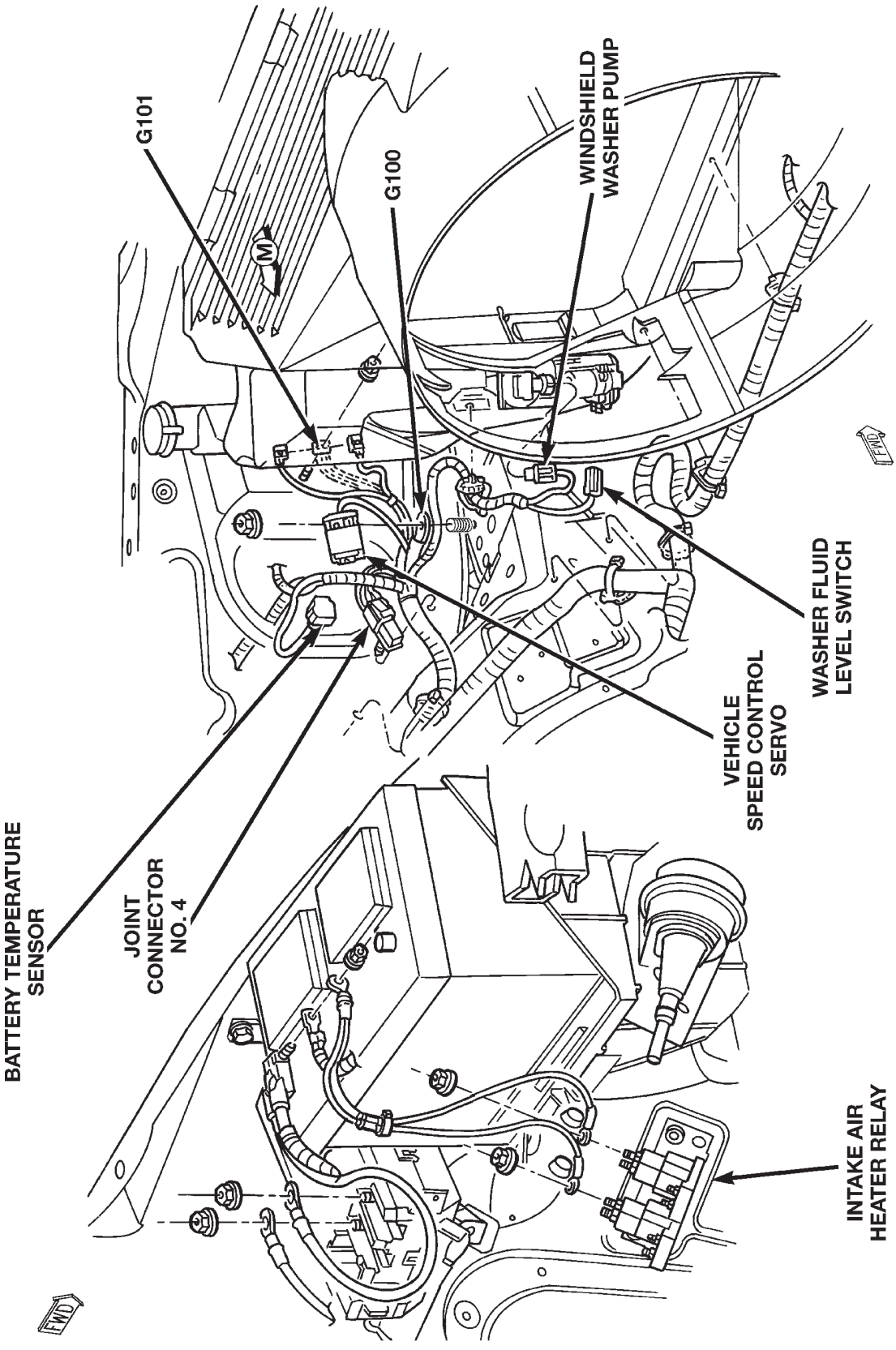


Fig. 16 UNDER HOOD

CRANKSHAFT OIL SEAL - REAR (Continued)

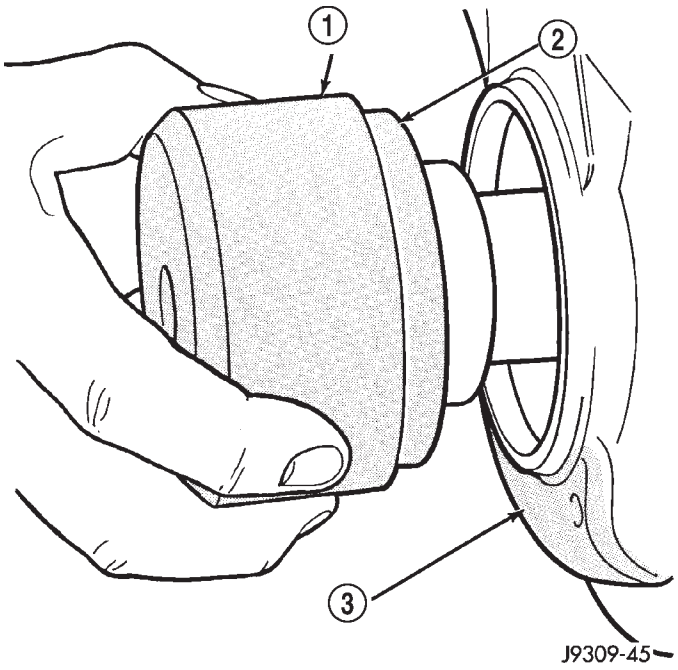


Fig. 29 Position Tool and Seal onto Crankshaft

1 - SPECIAL TOOL 6635
2 - OIL SEAL
3 - TIMING CHAIN COVER

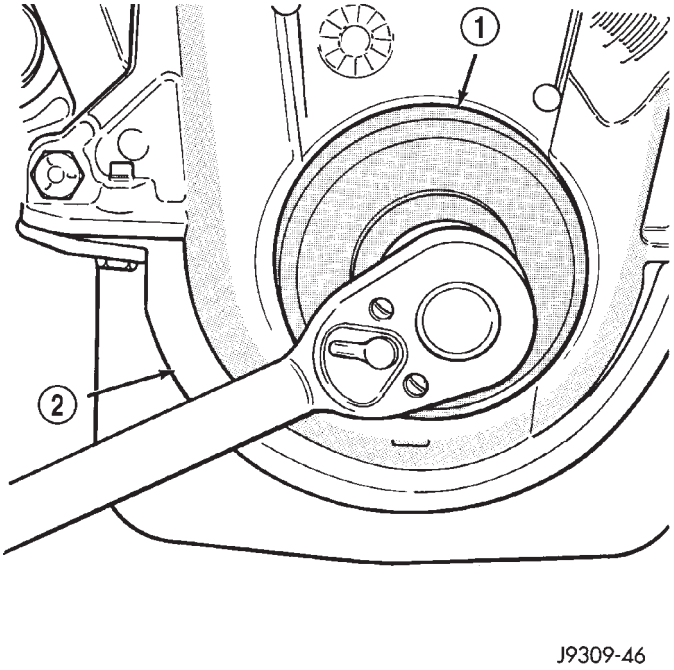


Fig. 30 Installing Oil Seal

1 - SPECIAL TOOL 6635
2 - TIMING CHAIN COVER

OPERATION

The crankshaft seals prevent oil from leaking from around the crankshaft, either from the rear of the engine or from the engine front cover.

REMOVAL

The service seal is a two piece, Viton seal. The upper seal half can be installed with crankshaft removed from engine or with crankshaft installed. When a new upper seal is installed, install a new lower seal. The lower seal half can be installed only with the rear main bearing cap removed.

UPPER SEAL —CRANKSHAFT REMOVED

(1) Remove the crankshaft (Refer to 9 - ENGINE/ ENGINE BLOCK/CRANKSHAFT - REMOVAL). Discard the old upper seal.

UPPER SEAL—CRANKSHAFT INSTALLED

(1) Remove the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
(2) Remove the oil pump (Refer to 9 - ENGINE/ LUBRICATION/OIL PUMP - REMOVAL).
(3) Remove the rear main bearing cap. Remove and discard the old lower oil seal.
(4) Carefully remove and discard the old upper oil seal.

LOWER SEAL

(1) Remove the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
(2) Remove the oil pump (Refer to 9 - ENGINE/ LUBRICATION/OIL PUMP - REMOVAL).
(3) Remove the rear main bearing cap and discard the old lower seal.

INSTALLATION

The service seal is a two piece, Viton seal. The upper seal half can be installed with crankshaft removed from engine or with crankshaft installed. When a new upper seal is installed, install a new lower seal. The lower seal half can be installed only with the rear main bearing cap removed.

UPPER SEAL —CRANKSHAFT REMOVED

(1) Clean the cylinder block rear cap mating surface. Be sure the seal groove is free of debris. Check for burrs at the oil hole on the cylinder block mating surface to rear cap.
(2) Lightly oil the new upper seal lips with engine oil.
(3) Install the new upper rear bearing oil seal with the white paint facing toward the rear of the engine.
(4) Position the crankshaft into the cylinder block.
(5) Lightly oil the new lower seal lips with engine oil.

CYLINDER HEAD (Continued)

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL

(1) Disconnect the negative cable from the battery.
(2) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
(3) Remove the heat shields (Fig. 8).

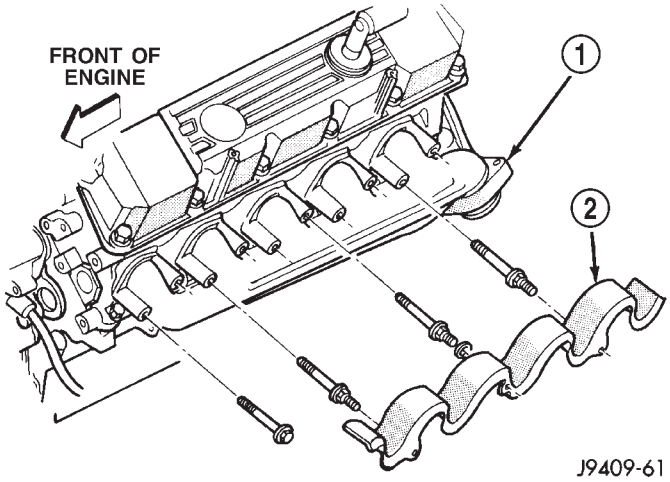


Fig. 8 Spark Plug Wire Heat Shields (Left Side Shown)

1 - EXHAUST MANIFOLD
2 - HEAT SHIELD

(4) Remove the intake manifold-to-generator bracket support rod. Remove the generator (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL).
(5) Remove closed crankcase ventilation system.
(6) Disconnect the evaporation control system.
(7) Remove the air cleaner.
(8) Perform the Fuel System Pressure release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE). Disconnect the fuel line (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/QUICK CONNECT FITTING - STANDARD PROCEDURE).
(9) Disconnect accelerator linkage and if so equipped, the speed control and transmission kick-down cables.
(10) Remove coil pack and bracket (Fig. 9).

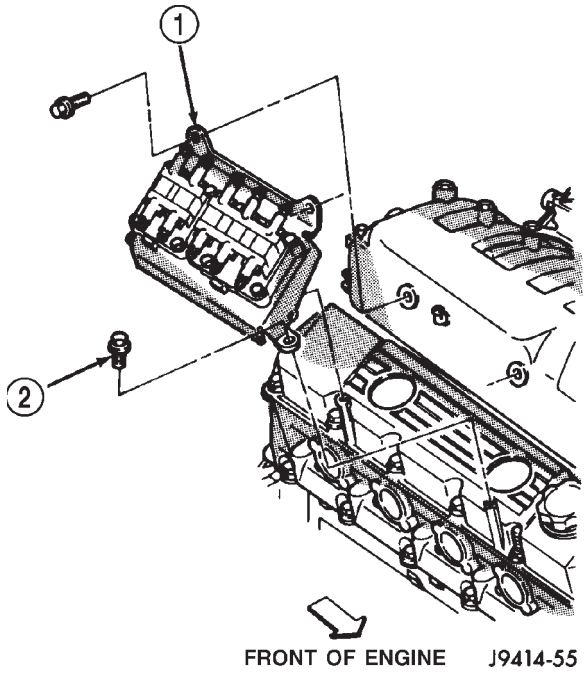


Fig. 9 Coil Pack and Bracket

1 - COIL PACKS AND BRACKET
2 - MOUNTING BOLTS (4)

(11) Disconnect the coil wires.
(12) Disconnect heat indicator sending unit wire.
(13) Disconnect heater hoses and bypass hose.
(14) Remove upper intake manifold and throttle body as an assembly (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
(15) Remove cylinder head covers and gaskets (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
(16) Remove the EGR tube. Discard the gasket, for right side only.
(17) Remove lower intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL). Discard the flange side gaskets and the front and rear cross-over gaskets.
(18) Disconnect exhaust pipe from exhaust manifold.
(19) Remove exhaust manifolds and gaskets (Refer to 9 - ENGINE/MANIFOLDS/EXHAUST MANIFOLD - REMOVAL).
(20) Remove rocker arm assemblies and push rods (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER

FUEL RAIL (Continued)

(7) 3.9L (V-6) engine only: Disconnect electrical connector at intake manifold air temperature sensor. Do not remove sensor.

(8) Disconnect fuel tube (line) at side of fuel rail. Refer to Quick-Connect Fittings for procedures,

(9) Remove the remaining fuel rail mounting bolts.

(10) Gently rock and pull the **left** fuel rail until the fuel injectors just start to clear the intake manifold. Gently rock and pull the **right** fuel rail until the fuel injectors just start to clear the intake manifold. Repeat this procedure (left/right) until all fuel injectors have cleared the intake manifold.

(11) Remove fuel rail (with injectors attached) from engine.

(12) Remove the clip(s) retaining the injector(s) to fuel rail (Fig. 30) or (Fig. 31).

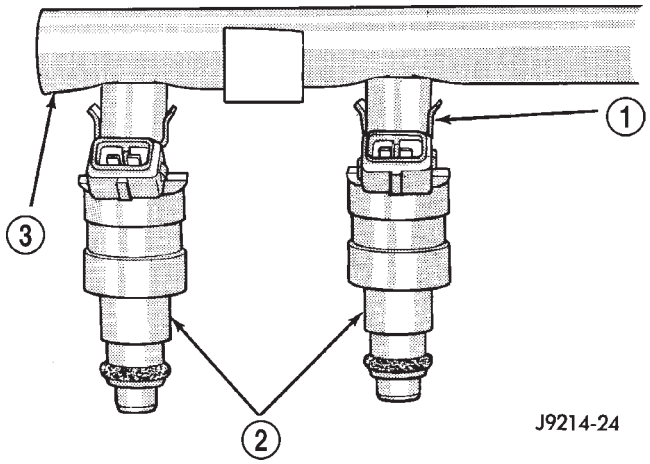


Fig. 30 Fuel Injector Mounting—Typical

1 - CLIP
2 - INJECTOR
3 - FUEL RAIL

REMOVAL - 8.0L

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE EVEN WITH THE ENGINE OFF. BEFORE SERVICING FUEL RAIL, FUEL SYSTEM PRESSURE MUST BE RELEASED.

(1) Remove negative battery cable at battery.

(2) Remove air cleaner housing and tube.

(3) Perform fuel pressure release procedure. Refer to Fuel Delivery System section of this group.

(4) Disconnect throttle body linkage and remove throttle body from intake manifold. Refer to Throttle Body removal in this group.

(5) Remove ignition coil pack and bracket assembly (Fig. 32) at intake manifold and right engine valve cover (four bolts).

(6) Remove upper half of intake manifold. Refer to Engines for procedures.

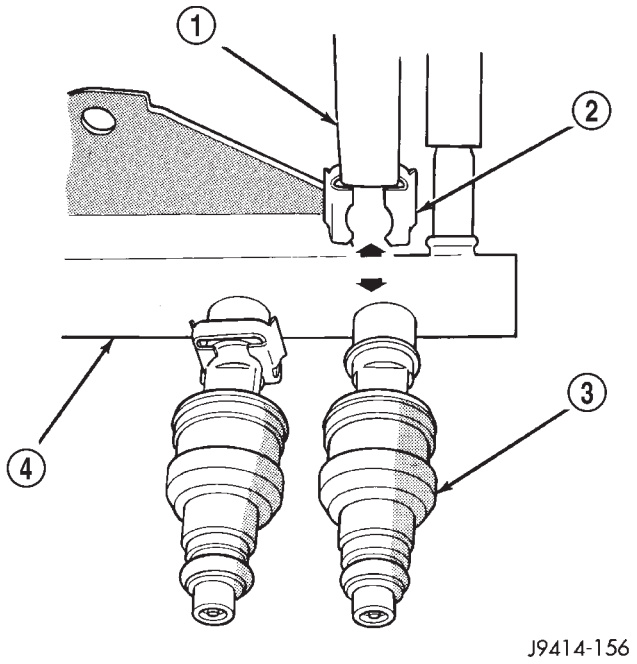


Fig. 31 Injector Retaining Clips—Typical Injector

1 - PLIERS
2 - INJECTOR CLIP
3 - FUEL INJECTOR
4 - FUEL RAIL

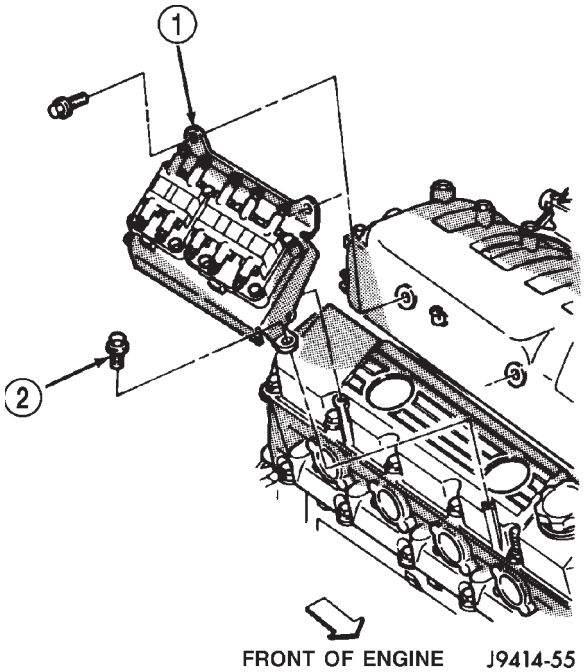


Fig. 32 Ignition Coil Pack and Mounting Bracket—8.0L V-10 Engine

1 - COIL PACKS AND BRACKET
2 - MOUNTING BOLTS (4)

FUEL INJECTION PUMP (Continued)

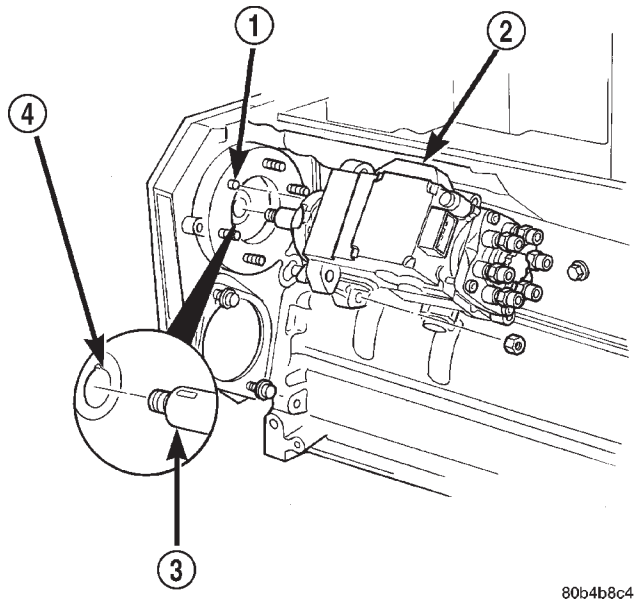
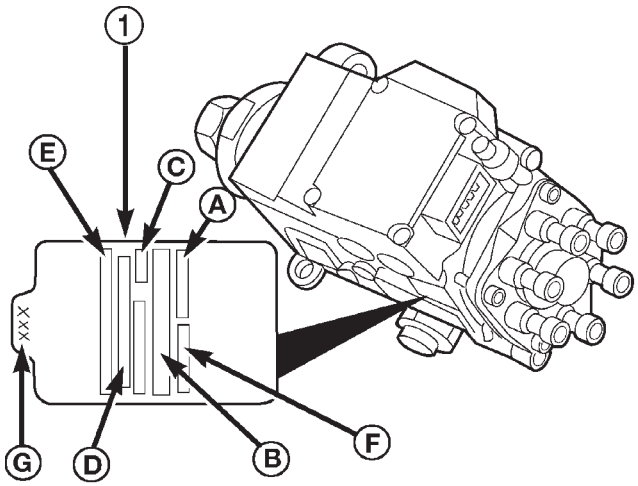


Fig. 34 Injection Pump Installation

1 - DOWEL
2 - PUMP
3 - PUMP SHAFT TAPER
4 - INJECTION PUMP GEAR TAPER



A. ORDER NUMBER
B. BOSCH PART NUMBER
C. FACTORY CODE
D. CUMMINS PART NUMBER
E. MANUFACTURE DATE
F. PUMP SERIAL NUMBER
G. LAST THREE DIGITS OF KEY PART NUMBER

80b4b8c9

Fig. 35 Injection Pump Data Plate Location

1 - PUMP DATA PLATE

(5) Clean pump gear and pump shaft at machined tapers (Fig. 34) with an evaporative type cleaner such as brake cleaner.

Keyway Installation:

(6) The pump/gear keyway has an arrow and a 3–digit number stamped at top edge (Fig. 33). Position keyway into pump shaft with **arrow pointed to rear of pump.** Also be sure 3–digit number stamped to top of keyway is same as 3–digit number stamped to injection pump data plate (Fig. 35). If wrong keyway is installed, a diagnostic trouble code may be set.

(7) Position pump assembly to mounting flange on gear cover while aligning injection pump shaft through back of injection pump gear. When installing pump, dowel (Fig. 34) on mounting flange must align to hole in front of pump.

(8) After pump is positioned flat to mounting flange, install four pump mounting nuts and tighten finger tight only. Do not attempt a final tightening at this time. **Do not attempt to tighten (pull) pump to gear cover using mounting nuts. Damage to pump or gear cover may occur. The pump must be positioned flat to its mounting flange before attempting to tighten mounting nuts.**

(9) To prevent damage or cracking of components, tighten nuts/bolts in the following sequence:

(a) Install injection pump shaft washer and nut to pump shaft. Tighten nut **finger tight only.**

(b) Install 2 rear/lower pump mounting bolts **finger tight only.**

(c) Do preliminary tightening of injection pump shaft nut to 30 N·m (15–22 ft. lbs.) torque. **This is not the final torque.**

(d) Tighten 4 pump mounting nuts to 43 N·m (32 ft. lbs.) torque.

(e) Tighten 2 rear/lower pump bracket-to-pump bolts 24 N·m (18 ft. lbs.) torque.

(f) Do final tightening of injection pump shaft nut to 170 N·m (125 ft. lbs.) torque. Use barring tool to prevent engine from rotating when tightening gear.

(10) Install canister (Fig. 24) to gear cover.

(11) Install crankcase vent hose (Fig. 24) to canister and install hose clamp.

(12) Using new gaskets, install fuel return line and overflow valve to side of injection pump (Fig. 23). Tighten overflow valve to 24 N·m (18 ft. lbs.) torque.

(13) Using new gaskets, install fuel supply line to side of injection pump and top of fuel filter housing (Fig. 23). Tighten banjo bolts to 24 N·m (18 ft. lbs.) torque.

(14) Install all high-pressure fuel lines, intake air tube, accelerator pedal position sensor, air intake housing, engine oil dipstick tube, wiring clips, electrical cables at intake heaters and engine lifting bracket. Refer to High-Pressure Fuel Line Removal/Installation. All of these items are covered in this procedure.

MANUAL - NV5600 (Continued)

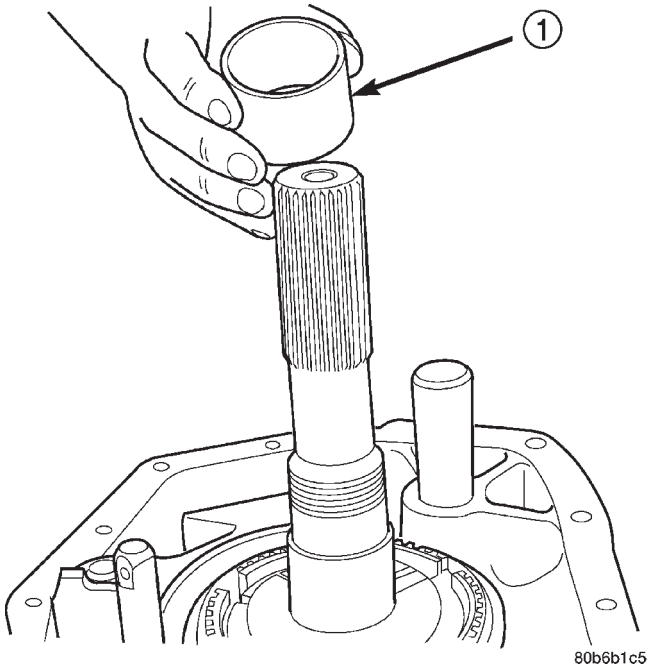


Fig. 25 REVERSE BEARING SLEEVE

1 - REVERSE GEAR BEARING SLEEVE

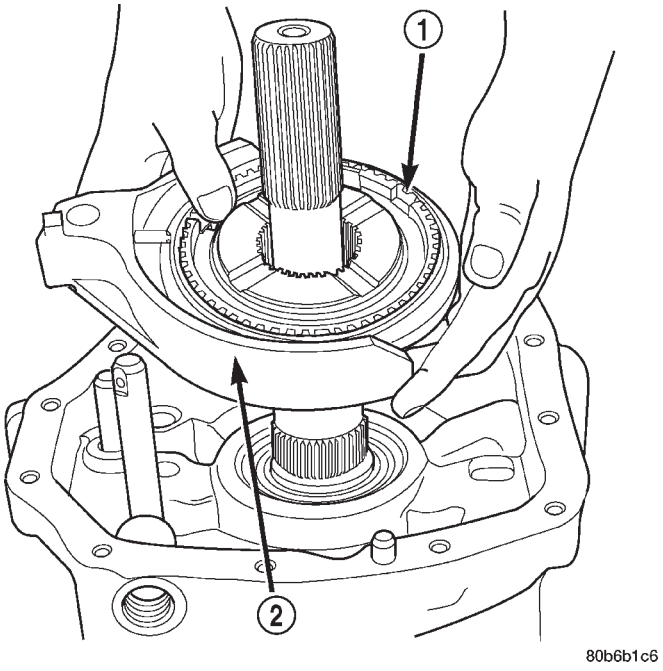


Fig. 26 REVERSE SHIFT FORK

1 - REVERSE SYNCHRO
2 - REVERSE SHIFT FORK

TRANSMISSION GEAR CASE

(1) Remove remaining bolts holding the transmission gear case to the clutch housing.

(2) Remove the shift socket roll pin with a 6mm (7/32 inch) punch and hammer.

(3) Install Fixture 8232 to the transmission gear case.

(4) Attach an engine crane or equivalent to Fixture 8232 and remove the transmission gear case from the clutch housing (Fig. 27).

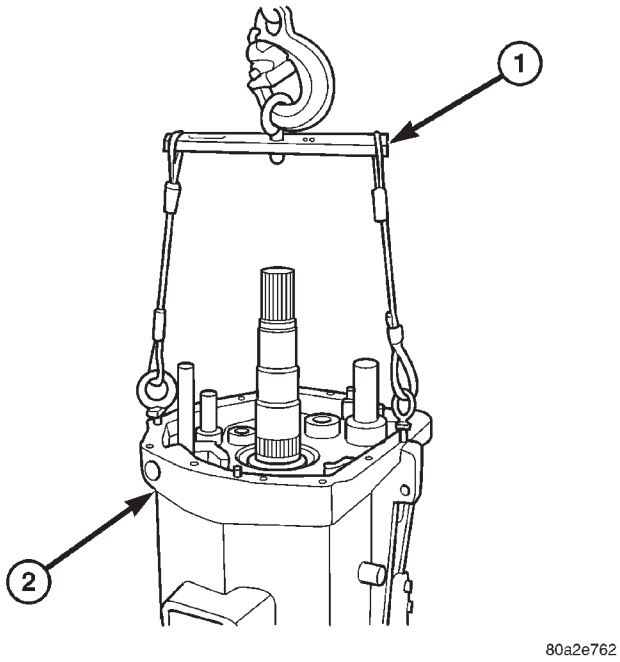


Fig. 27 TRANSMISSION LIFT

1 - FIXTURE 8232
2 - TRANSMISSION CASE

(5) Remove rear output shaft and countershaft bearing races from the transmission gear case with a brass drift and hammer.

GEARTRAIN

(1) Remove bolts holding the 5-6 crossover bracket to the clutch housing (Fig. 28).

(2) Attach Fixture 8232 to the output shaft and countershaft (Fig. 29).

(3) Attach an engine crane or equivalent to Fixture 8232 and raise the geartrain approximately 1/4 in. from the clutch housing.

(4) Remove 5-6 crossover bracket from the clutch housing.

(5) Lower the geartrain back into the clutch housing.

(6) Install Holding Tool 8242 (Fig. 30) onto the 5-6 synchro and tighten the screw to hold the 5-6 synchro together during the removal operation.

NOTE: Pay attention to the order of the shift fork arms at the primary shift rail when they are in the Neutral position.

VALVE BODY (Continued)

MANUAL VALVE

The manual valve (Fig. 265) 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 side of the valve body. The valve is connected mechanically by either a cable or linkage to the gear-shift mechanism. The valve is held in each of its positions by a spring-loaded roller or ball that engages the “roostercomb” of the manual valve lever.

CONVERTER CLUTCH LOCK-UP VALVE

The torque converter clutch (TCC) lock-up valve controls the back (ON) side of the torque converter clutch. When the PCM energizes the TCC solenoid to engage the converter clutch piston, pressure is applied to the TCC lock-up valve which moves to the right and applies pressure to the torque converter clutch.

CONVERTER CLUTCH LOCK-UP TIMING VALVE

The torque converter clutch (TCC) lock-up timing valve is there to block any 4-3 downshift until the TCC is completely unlocked and the clutch is disengaged.

SHUTTLE VALVE

The assembly is contained in a bore in the valve body above the shift valves. When the manual valve is positioned in the Drive range, throttle pressure acts on the throttle plug of the shuttle valve (Fig. 257) to move it against a spring, increasing the spring force on the shuttle valve. During a part or full throttle 1-2 upshift, the throttle plug is bottomed by throttle pressure, holding the shuttle valve to the right against governor pressure, and opening a by–pass circuit. The shuttle valve controls the quality of the kickdown shift by restricting the rate of fluid discharge from the front clutch and servo release circuits. During a 3-2 kickdown, fluid discharges through the shuttle by-pass circuit. When the shuttle valve closes the by-pass circuit, fluid discharge is restricted and controlled for the application of the front band. During a 2-3 “lift foot” upshift, the shuttle valve by-passes the restriction to allow full fluid flow through the by-pass groove for a faster release of the band.

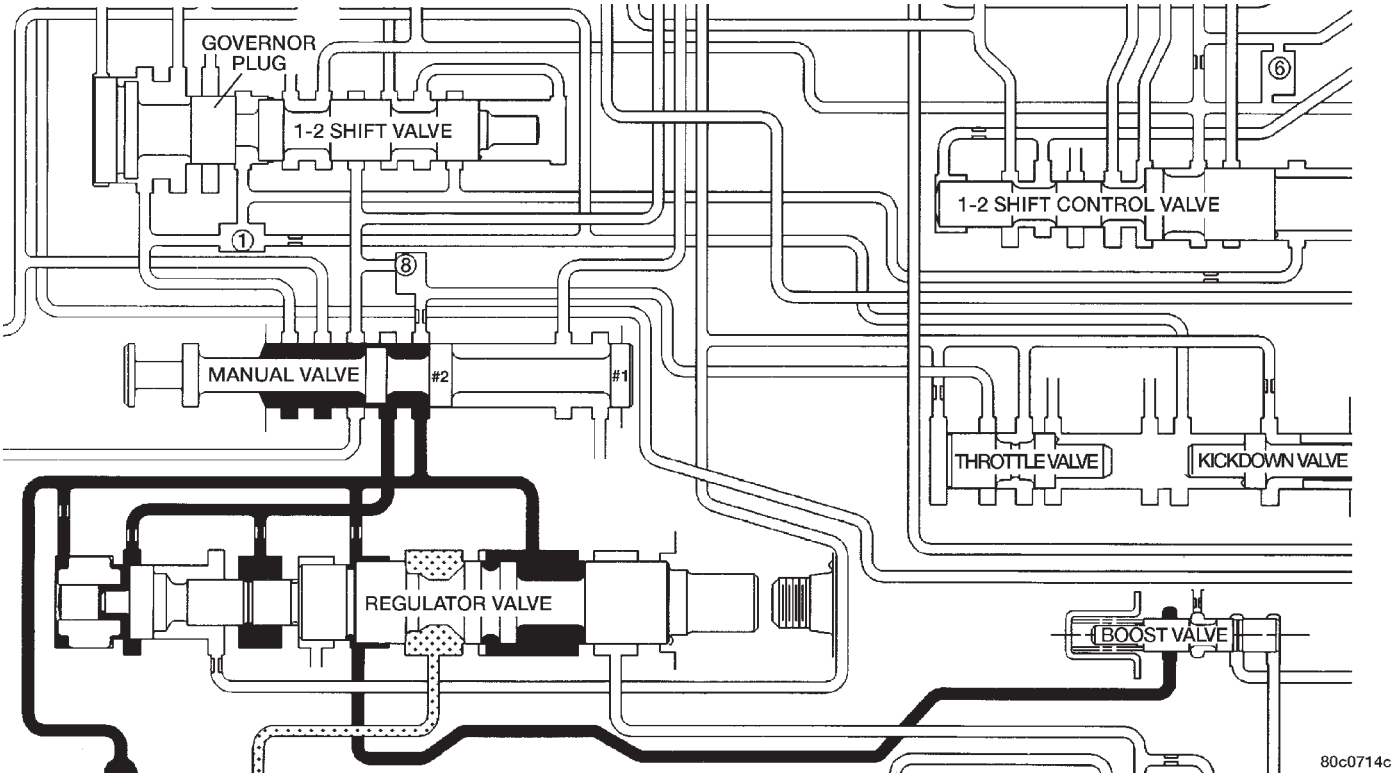


Fig. 265 Manual Valve