DESCRIPTION AND OPERATION (Continued)

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.

THREADED HOLE REPAIR

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

METRIC SYSTEM

DESCRIPTION

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.

CONVERSION FORMULAS AND EQUIVALENT VALUES

MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
in-lbs	x 0.11298	= Newton Meters (N·m)	N·m	x 8.851	= in-lbs
ft-lbs	x 1.3558	= Newton Meters (N·m)	N·m	x 0.7376	= ft-lbs
Inches Hg (60° F)	x 3.377	= Kilopascals (kPa)	kPa	x 0.2961	= Inches Hg
psi	x 6.895	= Kilopascals (kPa)	kPa	x 0.145	= psi
Inches	x 25.4	= Millimeters (mm)	mm	x 0.03937	= Inches
Feet	x 0.3048	= Meters (M)	M	x 3.281	= Feet
Yards	x 0.9144	= Meters	M	x 1.0936	= Yards
mph	x 1.6093	= Kilometers/Hr. (Km/h)	Km/h	x 0.6214	= mph
Feet/Sec	x 0.3048	= Meters/Sec (M/S)	M/S	x 3.281	= Feet/Sec
mph	x 0.4470	= Meters/Sec (M/S)	M/S	x 2.237	= mph
Kilometers/ Hr. (Km/h)	x 0.27778	= Meters/Sec (M/S)	M/S	x 3.600	Kilometers/Hr. (Km/h)

COMMON METRIC EQUIVALENTS

1 inch = 25 Millimeters	1 Cubic Inch = 16 Cubic Centimeters
1 Foot = 0.3 Meter	1 Cubic Foot = 0.03 Cubic Meter
1 Yard = 0.9 Meter	1 Cubic Yard = 0.8 Cubic Meter
1 Mile = 1.6 Kilometers	

Refer to the Metric Conversion Chart to convert torque values listed in metric Newton- meters (N·m). Also, use the chart to convert between millimeters (mm) and inches (in.)

TORQUE REFERENCES

DESCRIPTION

Individual Torque Charts appear at the end of many Groups. Refer to the Standard Torque Specifications Chart for torque references not listed in the individual torque charts.

SERVICE PROCEDURES (Continued)

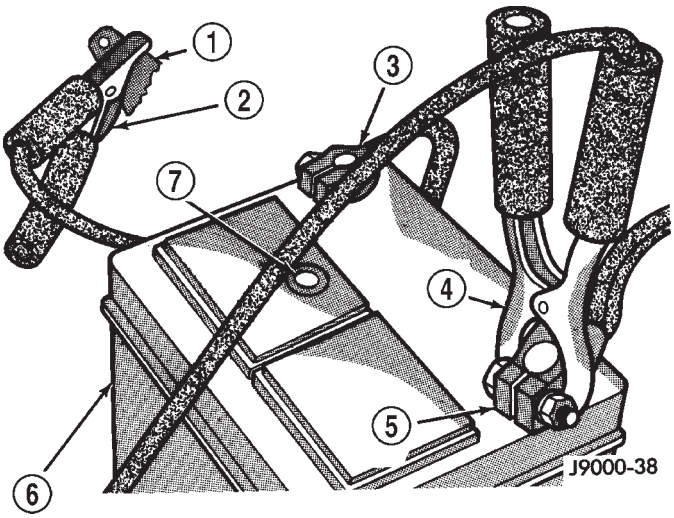


Fig. 1 Jumper Cable Clamp Connections

1 – ENGINE GROUND
2 – NEGATIVE JUMPER CABLE
3 – BATTERY NEGATIVE CABLE
4 – POSITIVE JUMPER CABLE
5 – BATTERY POSITIVE CABLE
6 – BATTERY
7 – TEST INDICATOR

TOWING RECOMMENDATIONS

A vehicle equipped with SAE approved wheel lift-type towing equipment can be used to tow all vehicles. When towing a 4WD vehicle using a wheel-lift towing device, use tow dollies under the opposite end of the vehicle. A vehicle with flatbed device can also be used to transport a disabled vehicle (Fig. 2).

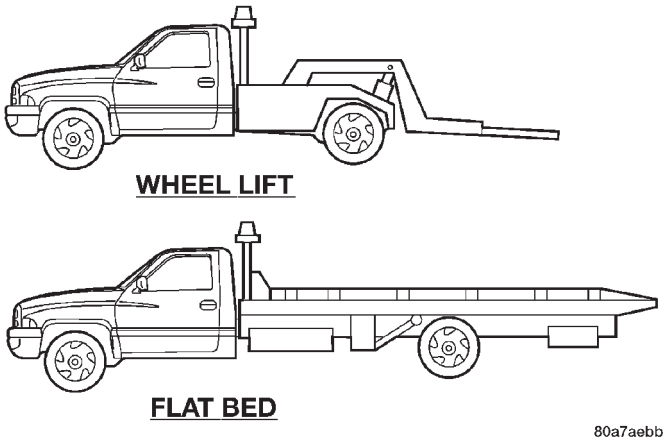


Fig. 2 Tow Vehicles With Approved Equipment

SAFETY PRECAUTIONS

CAUTION: The following safety precautions must be observed when towing a vehicle:

- Secure loose and protruding parts.
- Always use a safety chain system that is independent of the lifting and towing equipment.
- Do not allow towing equipment to contact the disabled vehicle's fuel tank.
- Do not allow anyone under the disabled vehicle while it is lifted by the towing device.
- Do not allow passengers to ride in a vehicle being towed.
- Always observe state and local laws regarding towing regulations.
- Do not tow a vehicle in a manner that could jeopardize the safety of the operator, pedestrians or other motorists.
- Do not attach tow chains, T-hooks, or J-hooks to a bumper, steering linkage, drive shafts or a non-reinforced frame hole.
- Do not tow a heavily loaded vehicle. Use a flatbed device to transport a loaded vehicle.

GROUND CLEARANCE

CAUTION: If vehicle is towed with wheels removed, install lug nuts to retain brake drums or rotors.

A towed vehicle should be raised until lifted wheels are a minimum 100 mm (4 in) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or steep rises in the road.

RAMP ANGLE

If a vehicle with flatbed towing equipment is used, the approach ramp angle should not exceed 15 degrees.

TOWING WHEN KEYS ARE NOT AVAILABLE

When the vehicle is locked and keys are not available, use a flat bed hauler. A wheel-lift device can be used on 4WD vehicles provided **all the wheels are lifted off the ground using tow dollies.**

TWO-WHEEL-DRIVE VEHICLE TOWING

Chrysler Corporation recommends that a vehicle be towed with the rear end lifted, whenever possible.

WARNING: WHEN TOWING A DISABLED VEHICLE AND THE DRIVE WHEELS ARE SECURED IN A WHEEL LIFT OR TOW DOLLIES, ENSURE THE TRANSMISSION IS IN THE PARK POSITION (AUTOMATIC TRANSMISSION) OR A FORWARD DRIVE GEAR (MANUAL TRANSMISSION).

WARNING: ENSURE VEHICLE IS ON A LEVEL SURFACE OR THE WHEELS ARE BLOCKED TO PREVENT VEHICLE FROM ROLLING.

DIAGNOSIS AND TESTING (Continued)

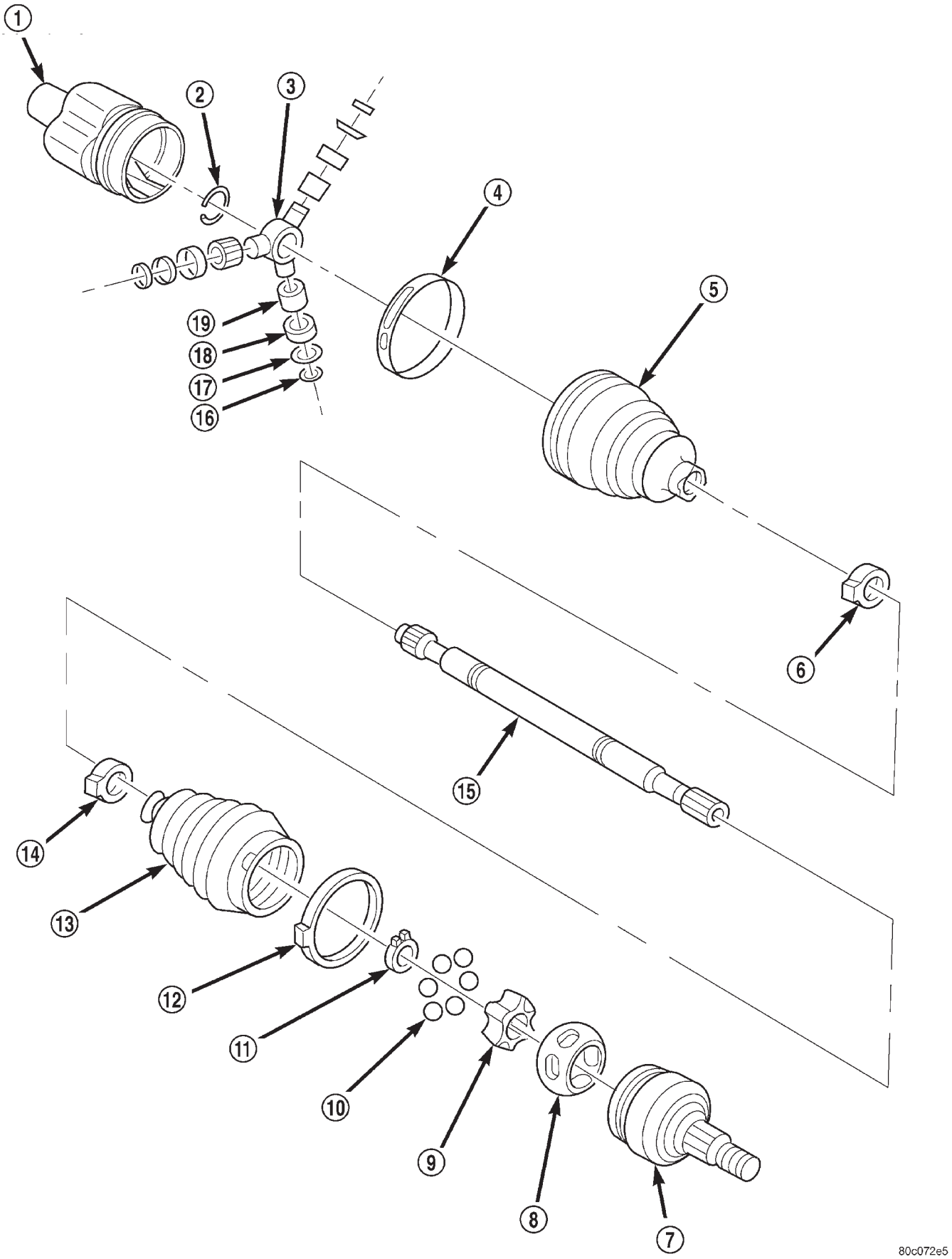


Fig. 1 C/V Drive Shaft Components

DESCRIPTION AND OPERATION

BRAKE SYSTEM

DESCRIPTION

This vehicle is equipped with front disc brakes and rear drum brakes. The front disc brakes consist of single piston calipers and ventilated rotors. The rear brakes are dual brake shoe, internal expanding units with cast brake drums. The parking brake mechanism is cable operated and connected to the rear brake secondary shoes. Power brake assist is standard equipment. A vacuum operated power brake booster is used for all applications.

Two antilock brake systems are used on this vehicle. A rear wheel antilock (RWAL) brake system is standard. An all-wheel antilock brake system (ABS) is available as an option.

SERVICE WARNINGS & CAUTIONS

DESCRIPTION

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. USE A VACUUM CLEANER SPECIFICALLY DESIGNED FOR THE REMOVAL OF ASBESTOS FIBERS FROM BRAKE COMPONENTS. IF A SUITABLE VACUUM CLEANER IS NOT AVAILABLE, CLEANING SHOULD BE DONE WITH A WATER DAMPENED CLOTH. DO NOT SAND, OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DISPOSE OF ALL RESIDUE CONTAINING ASBESTOS FIBERS IN SEALED BAGS OR CONTAINERS TO MINIMIZE EXPOSURE TO YOURSELF AND OTHERS. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION AND THE ENVIRONMENTAL PROTECTION AGENCY FOR THE HANDLING, PROCESSING, AND DISPOSITION OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

CAUTION: Never use gasoline, kerosene, alcohol, motor oil, transmission fluid, or any fluid containing mineral oil to clean the system components. These fluids damage rubber cups and seals. Use only fresh brake fluid or Mopar brake cleaner to clean or flush brake system components. These are the only cleaning materials recommended. If system contamination is suspected, check the fluid for dirt, discoloration, or separation into distinct layers. Also check the reservoir cap seal for distortion. Drain and flush the system with new brake fluid if contamination is suspected.

CAUTION: Use Mopar brake fluid, or an equivalent quality fluid meeting SAE/DOT standards J1703 and DOT 3. Brake fluid must be clean and free of contaminants. Use fresh fluid from sealed containers only to ensure proper antilock component operation.

CAUTION: Use Mopar multi-mileage or high temperature grease to lubricate caliper slide surfaces, drum brake pivot pins, and shoe contact points on the backing plates. Use multi-mileage grease or GE 661 or Dow 111 silicone grease on caliper slide pins to ensure proper operation.

BRAKE PEDAL

DESCRIPTION

A suspended-type brake pedal is used. The pedal is attached to the pedal support bracket with a pivot pin and bushings. The booster push rod is attached to the pedal with a clip. The pedal, bushings, pivot pin and support bracket are all serviceable components.

OPERATION

The brake pedal is attached to the booster push rod. When the pedal is depressed, the primary booster push rod is depressed which move the booster secondary rod. The booster secondary rod depress the master cylinder piston.

STOP LAMP SWITCH

DESCRIPTION

The plunger type stop lamp switch is mounted on a bracket attached to the brake pedal support.

CAUTION: The switch can only be adjusted during initial installation. If the switch is not adjusted properly a new switch must be installed.

OPERATION

The brake lamp switch is used to for the brake lamp, speed control and brake sensor circuits. The brake lamp circuit is open until the plunger is

DIAGNOSIS AND TESTING (Continued)

other operating conditions are causing engine overheating. (The heat range rating refers to the operating temperature of a particular type spark plug. Spark plugs are designed to operate within specific temperature ranges. This depends upon the thickness and length of the center electrodes porcelain insulator.)

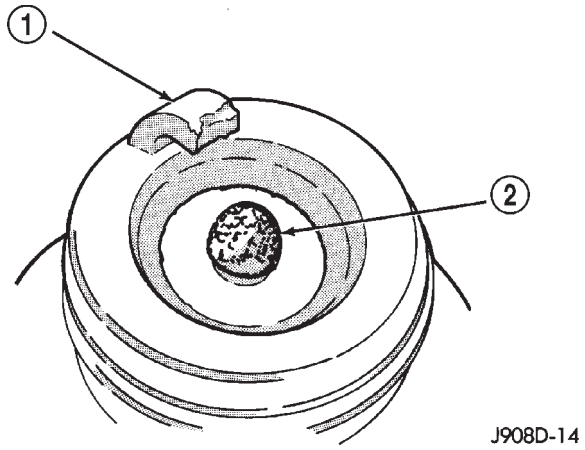


Fig. 18 Preignition Damage

1 – GROUND ELECTRODE STARTING TO DISSOLVE
2 – CENTER ELECTRODE DISSOLVED

SPARK PLUG OVERHEATING

Overheating is indicated by a white or gray center electrode insulator that also appears blistered (Fig. 19). The increase in electrode gap will be considerably in excess of 0.001 inch per 2000 miles of operation. This suggests that a plug with a cooler heat range rating should be used. Over advanced ignition timing, detonation and cooling system malfunctions can also cause spark plug overheating.

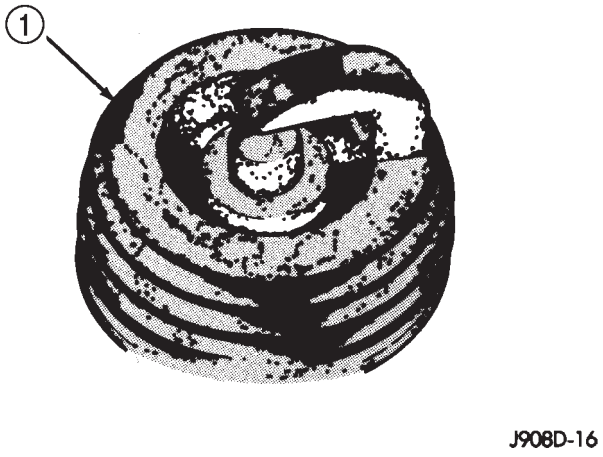


Fig. 19 Spark Plug Overheating

1 – BLISTERED WHITE OR GRAY COLORED INSULATOR

IGNITION SWITCH AND KEY LOCK CYLINDER

ELECTRICAL DIAGNOSIS

For ignition switch electrical schematics, refer to Ignition Switch in Group 8W, Wiring Diagrams.

MECHANICAL DIAGNOSIS (KEY DIFFICULT TO ROTATE)

Vehicles equipped with an automatic transmission and a floor mounted shifter: a cable is used to connect the interlock device in the steering column assembly, to the transmission floor shift lever. This interlock device is used to lock the transmission shifter in the PARK position when the key lock cylinder is rotated to the LOCKED or ACCESSORY position. The interlock device within the steering column is not serviceable. If repair is necessary, the steering column assembly must be replaced. Refer to Group 19, Steering for procedures.

If the ignition key is difficult to rotate to or from the LOCK or ACCESSORY position, it may not be the fault of the key cylinder or the steering column components. The brake transmission shift interlock cable may be out of adjustment. Refer to Brake Transmission Shift Interlock Cable Adjustment in Group 21, Transmissions for adjustment procedures.

Vehicles equipped with an automatic transmission and a steering column mounted shifter: an interlock device is located within the steering column. This interlock device is used to lock the transmission shifter in the PARK position when the key lock cylinder is in the LOCKED or ACCESSORY position. If it is difficult to rotate the key to or from the LOCK or ACCESSORY position, the interlock device within the steering column may be defective. This device is not serviceable. If repair is necessary, the steering column assembly must be replaced. Refer to Group 19, Steering for procedures.

Vehicles equipped with a manual transmission and a floor mounted shifter: on certain models, a lever is located on the steering column behind the ignition key lock cylinder. The lever must be manually operated to allow rotation of the ignition key lock cylinder to the LOCK or ACCESSORY position. If it is difficult to rotate the key to the LOCK or ACCESSORY position, the lever mechanism may be defective. This mechanism is not serviceable. If repair is necessary, the steering column assembly must be replaced. Refer to Group 19, Steering for procedures.

On other models, the ignition key cylinder must be depressed to allow it to be rotated into the LOCK or ACCESSORY position. If it is difficult to rotate the key to the LOCK or ACCESSORY position, the lock mechanism within the steering column may be defective. This mechanism is not serviceable. If repair is

DESCRIPTION AND OPERATION (Continued)

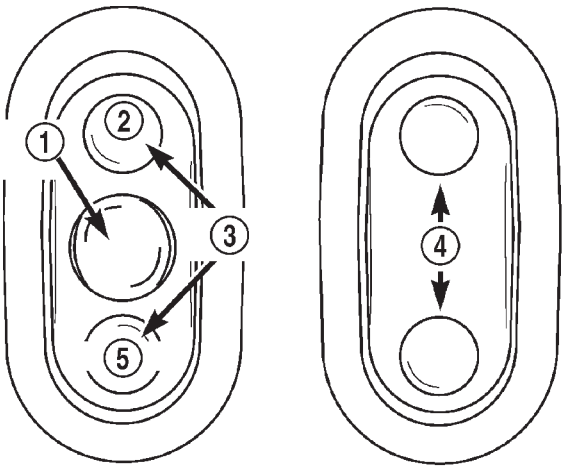


Fig. 1 Remote Radio Switches

1 – PRESET SEEK
2 – UP
3 – SEEK
4 – VOLUME
5 – DOWN

receiver. The electronic circuitry within the radio is programmed to respond to these remote radio switch status messages by adjusting the radio settings as requested.

For diagnosis of the CTM or the CCD data bus, the use of a DRB scan tool and the proper Diagnostic Procedures manual are recommended. For more information on the features and control functions for each of the remote radio switches, see the owner's manual in the vehicle glove box. For complete circuit diagrams, refer to **Audio System** in the Contents of Group 8W - Wiring Diagrams.

SPEAKER SYSTEM

DESCRIPTION

STANDARD

The standard equipment speaker system includes speakers in four locations. One full-range 16.5 centimeter (6.5 inch) diameter speaker is located in each front door. There is also one full-range 16.5 centimeter (6.5 inch) diameter speaker located in each rear door.

PREMIUM

The optional premium speaker system features eight Infinity model speakers in six locations. Each of the standard speakers in the front doors is replaced with Infinity model speakers, and an additional 6.9 centimeter (2.75 inch) diameter Infinity dome tweeter is mounted high in the front door trim panels. The standard speakers in the rear doors are each replaced with an Infinity 16.5 centimeter (6.5 inch) diameter coaxial unit. The premium speaker system also includes an additional Infinity power amplifier. The total available power of the premium speaker system is about 100 watts.

OPERATION

STANDARD

Each of the four full-range speakers used in the standard speaker system is driven by the amplifier that is integral to the factory-installed radio receiver. For complete circuit diagrams, refer to **Audio System** in the Contents of Group 8W - Wiring Diagrams.

PREMIUM

The eight Infinity speakers used in the premium speaker system are all driven by the radio receiver through an Infinity power amplifier. For complete circuit diagrams, refer to **Audio System** in the Contents of Group 8W - Wiring Diagrams.

POWER AMPLIFIER

DESCRIPTION

Models equipped with the Infinity premium speaker package have a separate power amplifier unit. This power amplifier is rated at 100 watts output. The power amplifier unit is mounted to the right cowl side inner panel under the passenger side end of the instrument panel. The power amplifier unit can be accessed for service by removing the trim from the right cowl side inner panel.

The power amplifier unit should be checked if there is no sound output noted from the speakers. For diagnosis of the power amplifier, refer to **Speaker** in the Diagnosis and Testing section of this group. The power amplifier cannot be repaired or adjusted and, if faulty or damaged, the unit must be replaced.

OPERATION

The power amplifier receives fused battery current from a fuse in the Junction Block (JB) at all times. The internal circuitry of the power amplifier switches the amplifier on based upon a fused 12 volt output signal that is received from the radio receiver whenever the radio is turned on. The power amplifier receives the sound signal inputs for four speaker channels from the radio receiver, then sends the amplified speaker outputs for each of those channels to the eight speakers. For complete circuit diagrams, refer to **Audio System** in the Contents of Group 8W - Wiring Diagrams.

DIAGNOSIS AND TESTING (Continued)

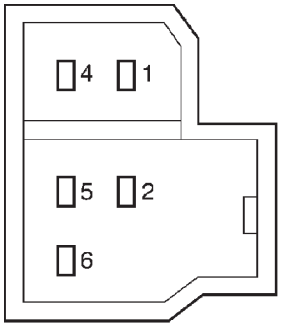
CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMP SWITCH ON (LOW BEAMS ON), ONE LOW BEAM ON AND BOTH HIGH BEAMS DIM.	1. Headlamp feed circuit shorted to ground.	1. Check wiring circuit from right headlamp fuse to headlamp. Repeat for left side. Trace short circuit in wiring and repair. Refer to Group W.
HEADLAMP SWITCH ON (HIGH BEAMS ON), ONE HIGH BEAM ON AND BOTH LOW BEAMS DIM.	1. Headlamp feed circuit shorted to ground.	1. Check wiring circuit from right headlamp fuse to headlamp. Repeat for left side. Trace short circuit in wiring and repair. Refer to Group W.
HEADLAMP SWITCH ON, ONE HEADLAMP FILAMENT WILL BE AT FULL INTENSITY AND ALL OTHER FILAMENTS ARE ON AND DIM.	1. Blown headlamp fuse.	1. Trace short circuit and replace fuse. Refer to Group 8W.
	2. Open circuit from headlamp fuse to headlamp.	2. Repair open headlamp circuit, refer to Group 8W.
1. HEADLAMPS STAY ON WITH KEY OUT (DRLM EQUIPPED VEHICLES).	1. Failed DRLM	1. Replace DRLM.
*Canada vehicles must have lamps ON.		

FOG LAMP

CONDITION	POSSIBLE CAUSES	CORRECTION
FOG LAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF.	1. Loose or corroded battery cables.	1. Clean and secure battery cable clamps and posts.
	2. Loose or worn generator drive belt.	2. Adjust or replace generator drive belt.
	3. Charging system output too low.	3. Test and repair charging system. Refer to Group 8A,
	4. Battery has insufficient charge.	4. Test battery state-of -charge. Refer to Group 8A.
	5. Battery is sulfated or shorted.	5. Load test battery. Refer to Group 8A.
	6. Poor lighting circuit Z3-ground.	6. Test for voltage drop across Z3-ground locations. Refer to Group 8W.
FOG LAMP BULBS BURN OUT FREQUENTLY	1. Charging system output too high.	1. Test and repair charging system. Refer to Group 8A.
	2. Loose or corroded terminals or splices in circuit.	2. Inspect and repair all connectors and splices. Refer to Group 8W.
FOG LAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE	1. Charging system output too low.	1. Test and repair charging system. Refer to Group 8A.
	2. Poor lighting circuit Z3-ground.	2. Test for voltage drop across Z3-ground locations. Refer to Group 8W.
	3. High resistance in fog lamp circuit.	3. Test amperage draw of fog lamp circuit.

DIAGNOSIS AND TESTING (Continued)

NOTE: Because this switch contains active electronic elements for the Auto-down feature, this switch function cannot be checked with a continuity test. If the problem being diagnosed involves this function, reconnect the switch to its wire harness connector, connect the battery negative cable and turn the ignition switch to the On position. Back probe the wire harness connector cavity for switch pin number 8 and check for the proper switch output while actuating the switch. With the switch in the Up position, there should be continuity to ground at pin 8. With the switch in the Down position, there should be battery voltage at pin 8.



PASSENGER WINDOW SWITCH	
SWITCH POSITION	CONTINUITY BETWEEN
OFF	1 & 4, 2 & 5
UP	1 & 6, 2 & 5
DOWN	1 & 4, 5 & 6

80c0717a

Fig. 2 Power Window Switch Continuity - Passenger Doors

POWER WINDOW MOTOR

For circuit descriptions and diagrams, refer to 8W-60 - Power Windows in Group 8W - Wiring Diagrams. Before you proceed with this diagnosis, confirm proper switch operation. See Power Window Switch in the Diagnosis and Testing section of this group.

(1) Disconnect and isolate the battery negative cable. Remove the trim panel from the door with the inoperative power window.

(2) Unplug the power window motor wire harness connector. Apply 12 volts across the motor terminals to check its operation in one direction. Reverse the connections across the motor terminals to check the operation in the other direction. Remember, if the window is in the full up or full down position, the motor will not operate in that direction by design. If OK, repair the circuits from the power window motor to the power window switch as required. If not OK, replace the faulty motor.

(3) If the motor operates in both directions, check the operation of the window glass and lift mechanism through its complete up and down travel. There should be no binding or sticking of the window glass or lift mechanism through the entire travel range. If not OK, refer to Group 23 - Body to check the window glass, tracks, and regulator for sticking, binding, or improper adjustment.

REMOVAL AND INSTALLATION

POWER WINDOW SWITCH

DRIVER SIDE FRONT DOOR

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim panel from the inside of the driver side front door. Refer to Group 23 - Body for the procedures.

(3) From the back side of the trim panel, remove the screws that secure the power window and lock switch unit to the switch bezel in the door trim panel opening.

(4) Remove the power window and lock switch and the switch bezel from the door trim panel.

(5) Reverse the removal procedures to install. Tighten the mounting screws to 2.2 N·m (20 in. lbs.).

PASSENGER DOOR

(1) Disconnect and isolate the battery negative cable.

(2) Remove the trim panel from the inside of the front or rear passenger door. Refer to Group 23 - Body for the procedures.

(3) With a small thin-bladed screwdriver, gently pry the snap clips at the sides of the power window switch receptacle on the back of the door trim panel switch bezel and pull the switch out of the receptacle.

(4) Reverse the removal procedures to install. Be certain that both of the switch snap retainers in the receptacle on the back of the door trim panel switch bezel are fully engaged.

POWER WINDOW MOTOR

The power window motor and mechanism is integral to the power window regulator unit. If the power window motor or mechanism is faulty or damaged, the entire power window regulator unit must be replaced. Refer to Group 23 - Body for the window regulator service procedures.

REMOVAL AND INSTALLATION (Continued)

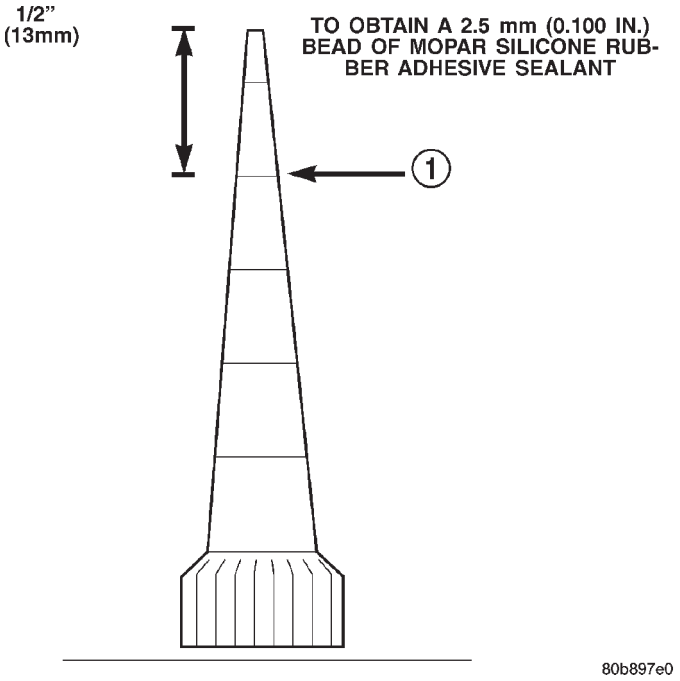


Fig. 119 Cutting Aplicator to Achieve 2.5mm (0.100 in.) Bead

1 – CUT HERE

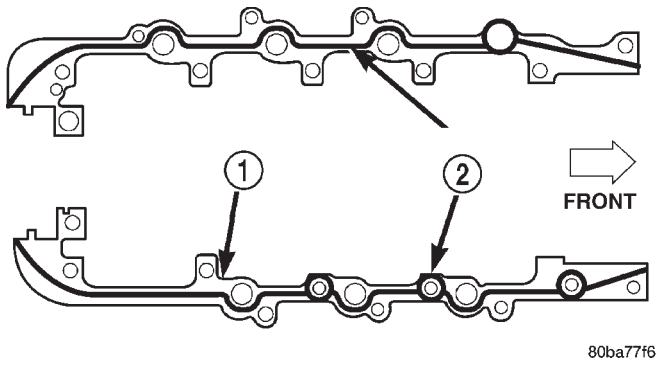


Fig. 120 Cylinder Block-to-Bedplate Sealent Bead Location

1 – CYLINDER BLOCK
2 – SEALANT BEAD LOCATION

(6) Coat the crankshaft main bearing journals with clean engine oil and position the bedplate onto the cylinder block.

NOTE: Lubricate the bedplate retaining bolts with clean engine oil prior to installation.

(7) Install the bedplate retaining bolts, making sure to place the stud bolts in the correct location, Torque the bolts in the sequence shown (Fig. 121).

- Tighten bolts **A – L** to 54 N·m (40 ft. lbs.)
- Tighten bolts **1–10** to 2.8 N·m (25 in. lbs.)
- Turn bolts **1–10** an additional 90°.
- Tighten bolts **A1– A6** to 27 N·m (20 ft. lbs.)

(8) Measure crankshaft end play. Refer to Crankshaft Main Bearings in this section for procedure.

(9) Install the connecting rods and measure side clearance. Refer to Connecting Rod Bearings in this section for procedure.

(10) Position the oil pan gasket/windage tray, using a new o-ring, install the oil pickup tube. Torque the bolt to 28N·n (20 ft. lbs.) torque the nuts to 28N·m (20 ft. lbs.).

(11) Install the oil pan. Torque the retaining bolts to 15 N·m (11 ft. lbs.) in the sequence shown (Fig. 122).

(12) Install the engine.

FLEXPLATE

REMOVAL

(1) Remove the transmission. Refer to Group 21, Transmission and Transfer Case for procedure.

(2) Remove the bolts and flexplate.

INSTALLATION

(1) Position the flexplate onto the crankshaft and install the bolts hand tight.

(2) Tighten the flexplate retaining bolts to 60 N·m (45 ft. lbs.) in the sequence shown (Fig. 123).

(3) Install the transmission.

OIL PUMP

REMOVAL

(1) Remove the oil pan and pick-up tube. Refer to the procedure in this section.

(2) Remove the timing chain cover. Refer to the procedure in this section.

(3) Remove the timing chains and tensioners. Refer to Timing Chain and Sprockets in this section.

(4) Remove the four bolts, primary timing chain tensioner and the oil pump.

INSTALLATION

(1) Position the oil pump onto the crankshaft and install two oil pump retaining bolts.

(2) Position the primary timing chain tensioner and install the two retaining bolts.

(3) Tighten the oil pump and primary timing chain tensioner retaining bolts to 28 N·m (250 in. lbs.) in the sequence shown (Fig. 124).

(4) Install the secondary timing chain tensioners and timing chains.

(5) Install the timing chain cover.

(6) Install the pick-up tube and oil pan.

SPECIFICATIONS

5.2L ENGINE SPECIFICATIONS

ENGINE SPECIFICATIONS

DESCRIPTION	SPECIFICATION
GENERAL SPECIFICATIONS	
Engine Type	90° V-8 OHV
Bore and Stroke	99.3 x 84.0 mm (3.91 x 3.31 in.)
Displacement	5.2L (318 c.i.)
Compression Ratio	9.1:1
Firing Order	1–8–4–3–6–5–7–2
Lubrication	Pressure Feed— Full Flow Filtration
Cooling System	Liquid Cooled— Forced Circulation
Cylinder Block	Cast Iron
Crankshaft	Nodular Iron
Cylinder Head	Cast Iron
Combustion Chambers	Wedge-High Swirl Valve shrouding
Camshaft	Nodular Cast Iron
Pistons	Aluminum Alloy w/strut
Connecting Rods	Forged Steel
Cylinder Compression Pressure (Min.)	689.5 kPa (100 psi)
CAMSHAFT	
Bearing Diameter	
No. 1	50.800 – 50.825 mm (2.000 – 2.001 in.)
No. 2	50.394 – 50.419 mm (1.984 – 1.985 in.)
No. 3	50.013 – 50.038 mm (1.969 – 1.970 in.)
No. 4	49.606 – 49.632 mm (1.953 – 1.954 in.)
No. 5	39.688 – 39.713 mm (1.5625 – 1.5635 in.)
Bearing Journal Diameter	
No. 1	50.749 – 50.775 mm (1.998 – 1.999 in.)
No. 2	50.343 – 50.368 mm (1.982 – 1.983 in.)
No. 3	49.962 – 49.987 mm (1.967 – 1.968 in.)
No. 4	49.555 – 49.581 mm (1.951 – 1.952 in.)
No. 5	39.637 – 39.662 mm (1.5605 – 1.5615 in.)
Bearing to Journal Clearance	
Standard	0.0254 – 0.0762 mm (0.001 – 0.003 in.)
Service Limit	0.127 mm (0.005 in.)
End Play	0.051 – 0.254 mm (0.002 – 0.010 in.)
CONNECTING RODS	
Piston Pin bore Diameter	24.966 – 24.978 mm (0.9829 – 0.9834 in.)
Side Clearance	0.152 – 0.356 mm (0.006 – 0.014 in.)
CRANKSHAFT	
Rod Journal	
Diameter	53.950 – 53.975 mm (2.124 – 2.125 in.)
Out of Round (Max.)	0.0254 mm (0.001 in.)
Taper (Max.)	0.0254 mm (0.001 in.)
Bearing Clearance	0.013 – 0.056 mm (0.0005 – 0.0022 in.)
Service Limit	0.0762 mm (0.003 in.)

DESCRIPTION AND OPERATION (Continued)

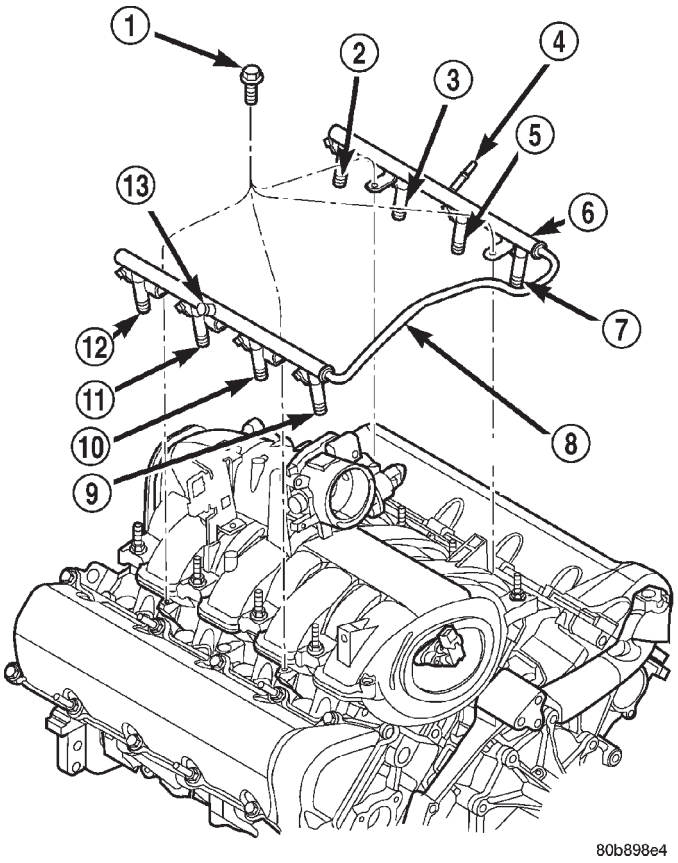


Fig. 6 Fuel Injector Rail—4.7L V-8 Engine

1 – MOUNTING BOLTS (4)
2 – INJ.#7
3 – INJ.#5
4 – QUICK-CONNECT FITTING
5 – INJ.#3
6 – FUEL INJECTOR RAIL
7 – INJ.#1
8 – CONNECTOR TUBE
9 – INJ.#2
10 – INJ.#4
11 – INJ.#6
12 – INJ.#8
13 – PRESSURE TEST PORT CAP

CAUTION: Remove fill cap before servicing any fuel system component to relieve tank pressure. If equipped with a California emissions package and a Leak Detection Pump (LDP), the cap must be tightened securely. If cap is left loose, a Diagnostic Trouble Code (DTC) may be set.

FUEL TUBES/LINES/HOSES AND CLAMPS

DESCRIPTION

Also refer to Quick-Connect Fittings.

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL SYSTEM PRESSURE RELEASE PROCEDURE IN THIS GROUP.

The lines/tubes/hoses used on fuel injected vehicles are of a special construction. This is due to the higher fuel pressures and the possibility of contaminated fuel in this system. If it is necessary to replace these lines/tubes/hoses, only those marked EFM/EFI may be used.

If equipped: The hose clamps used to secure rubber hoses on fuel injected vehicles are of a special rolled edge construction. This construction is used to prevent the edge of the clamp from cutting into the hose. Only these rolled edge type clamps may be used in this system. All other types of clamps may cut into the hoses and cause high-pressure fuel leaks.

Use new original equipment type hose clamps.

QUICK-CONNECT FITTINGS

DESCRIPTION

Different types of quick-connect fittings are used to attach various fuel system components, lines and tubes. These are: a single-tab type, a two-tab type or a plastic retainer ring type. Some are equipped with safety latch clips. Some may require the use of a special tool for disconnection and removal. Refer to Quick-Connect Fittings Removal/Installation for more information.

CAUTION: The interior components (o-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

DIAGNOSIS AND TESTING

FUEL PUMP PRESSURE TEST

Use this test in conjunction with the Fuel Pump Capacity Test, Fuel Pressure Leak Down Test and Fuel Pump Amperage Test found elsewhere in this group.

Check Valve Operation: The electric fuel pump outlet contains a one-way check valve to prevent fuel flow back into the tank and to maintain fuel supply line pressure (engine warm) when pump is not operational. It is also used to keep the fuel supply line full of gasoline when pump is not operational. After the vehicle has cooled down, fuel pressure may drop

DIAGNOSIS AND TESTING (Continued)

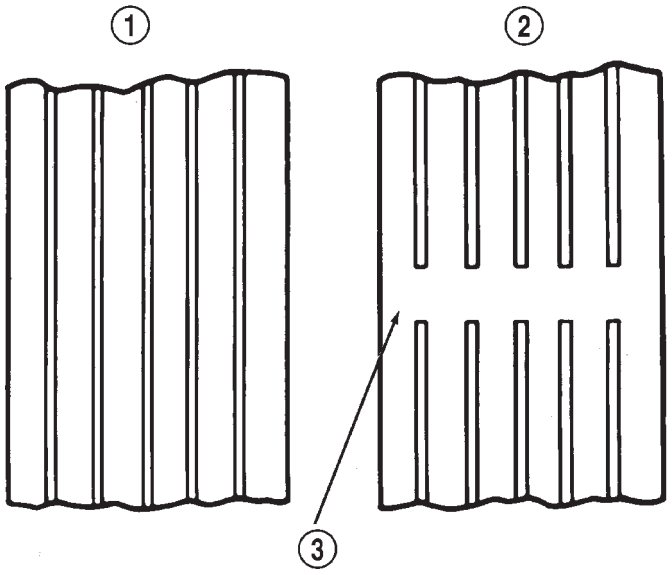


Fig. 4 Tread Wear Indicators

1 – TREAD ACCEPTABLE
2 – TREAD UNACCEPTABLE
3 – WEAR INDICATOR

SERVICE PROCEDURES

ROTATION

Tires on the front and rear operate at different loads and perform different steering, driving, and braking functions. For these reasons they wear at unequal rates and tend to develop irregular wear patterns. These effects can be reduced by rotating the tires at regular intervals. The benefits of tire rotation are:

- Increase tread life
- Maintain traction levels
- A smooth, quiet ride

The suggested method of tire rotation is (Fig. 6). Other rotation methods can be used, but they will not provide all the tire longevity benefits.

MATCH MOUNTING

Wheels and tires are match mounted at the factory. This means that the high spot of the tire is matched to the low spot on the wheel rim. Each are marked with a bright colored temporary label on the outboard surface for alignment. The wheel is also marked permanently on the inside of the rim in the tire well. This permanent mark may be a paint dot or line, a permanent label or a stamped impression such as an X. An optional location mark is a small spherical indentation on the vertical face of the outboard flange on some non styled base steel wheels. The tire must be removed to locate the permanent mark on the inside of the wheel.

Before dismounting a tire from its wheel, a reference mark should be placed on the tire at the valve

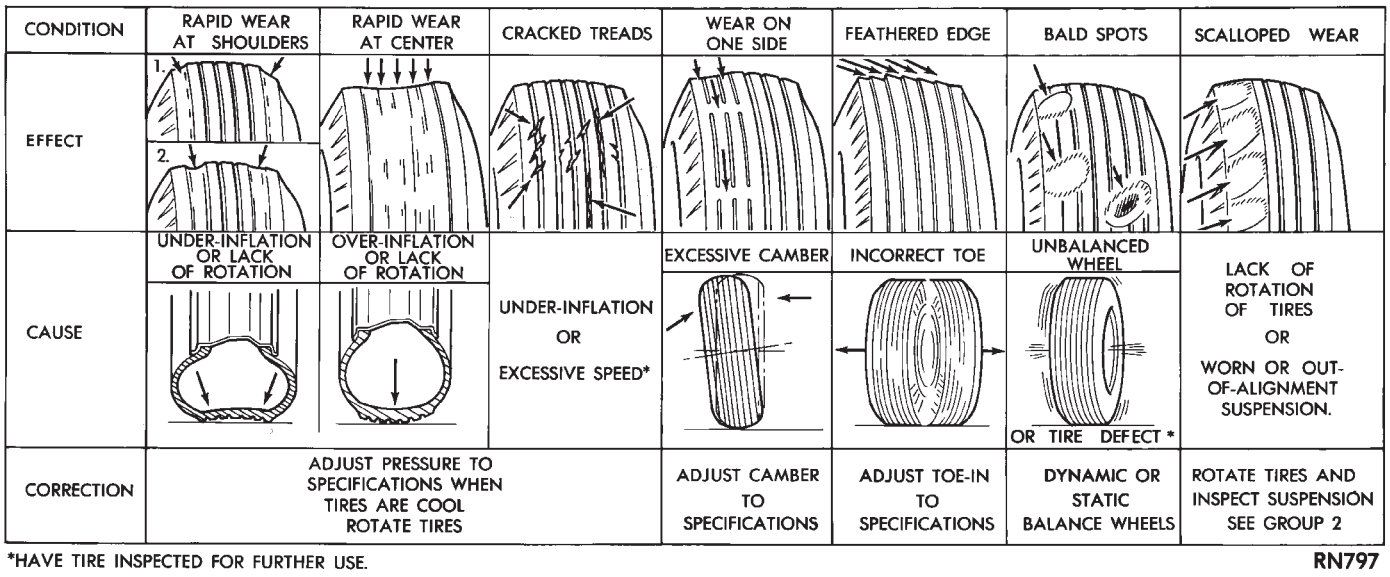


Fig. 5 Tire Wear Patterns

TIRE NOISE OR VIBRATION

Radial-ply tires are sensitive to force impulses caused by improper mounting, vibration, wheel defects, or possibly tire imbalance.

To find out if tires are causing the noise or vibration, drive the vehicle over a smooth road at varying speeds. Note the noise level during acceleration and deceleration. The engine, differential and exhaust noises will change as speed varies, while the tire noise will usually remain constant.

REMOVAL AND INSTALLATION (Continued)

(4) Install screws attaching floor console to floor pan (Fig. 98).
(5) Install forward and rearward cup holder inserts.

FLOOR CARPET

FRONT CARPET REMOVAL

(1) Remove floor console, if equipped.
(2) Remove front seats.
(3) Remove center console, if equipped.
(4) Remove 2nd row seats.
(5) Remove 3rd row seats, if equipped.
(6) Remove front and rear door sill trim.
(7) Remove lower left and right cowl trim.
(8) Remove left and right B-pillar trim.
(9) Remove left and right quarter panel trim.
(10) Loosen gas pedal bracket.
(11) Remove rear fresh air vent.
(12) Route wiring through carpet.
(13) Remove carpet from vehicle (Fig. 99).

FRONT CARPET INSTALLATION

(1) Position carpet in vehicle and align all holes.
(2) Route all wire harnesses through openings in carpet.
(3) Install front and rear door sill trim.
(4) Install quarter panel trim.
(5) Install B-pillar trim.
(6) Install lower cowl trim.
(7) Tighten gas pedal bracket.
(8) Install 3rd row seats, if equipped.
(9) Install 2nd row seats.
(10) Install rear fresh air vent.
(11) Install center console, if equipped.
(12) Install front seats.
(13) Install floor console, if equipped.

REAR CARPET REMOVAL

(1) Remove 3rd row seats, if equipped.
(2) Remove 3rd row seat belt/buckles, if equipped.
(3) Remove left and right quarter panel trim.
(4) Remove liftgate scuff plate.
(5) Remove screws attaching cargo compartment lid hinge to floor.
(6) Remove carpet from vehicle (Fig. 99).

REAR CARPET INSTALLATION

(1) Position carpet in vehicle and align all holes.
(2) Install screws attaching cargo compartment lid hinge to floor.
(3) Install liftgate scuff plate.
(4) Install quarter panel trim.
(5) Install 3rd row seat belt/buckles, if equipped.
(6) Install 3rd row seats, if equipped.

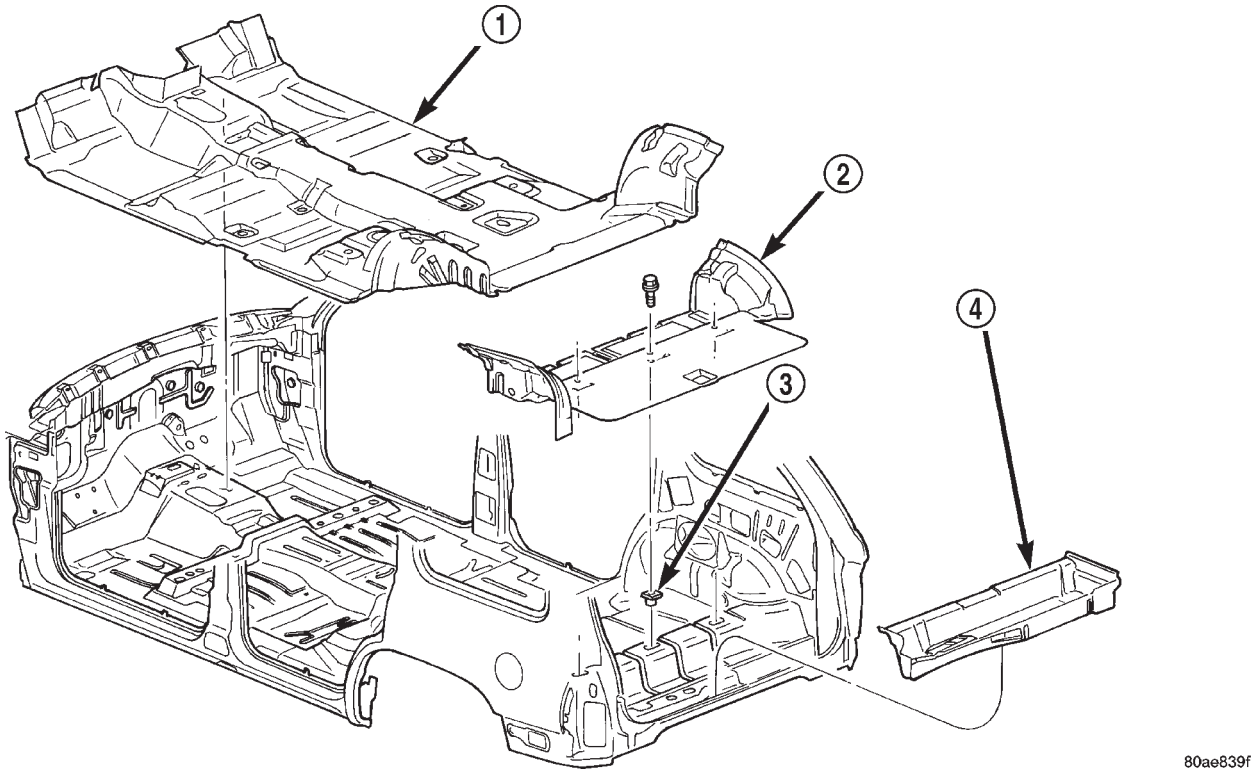


Fig. 99 Floor Carpet

1 – FRONT CARPET
2 – REAR CARPET
3 – STORAGE COMPARTMENT LINER
4 – PLASTIC PUSH-IN NUT

DESCRIPTION AND OPERATION (Continued)

OPERATION

The filter-drier performs a filtering action to prevent foreign material in the refrigerant from contaminating the expansion valve. A desiccant bag is mounted inside the filter-drier canister to absorb any moisture which may have entered and become trapped within the refrigerant system. In addition, during periods of high demand air conditioner operation, the filter-drier acts as a reservoir to store surplus refrigerant.

The filter-drier cannot be repaired. If the filter-drier is faulty or damaged, or if the refrigerant system has been contaminated or left open to the atmosphere for an indeterminable period, it must be replaced.

HEATER AND AIR CONDITIONER

DESCRIPTION

All vehicles are equipped with a common heater-A/C housing assembly (Fig. 4). The system combines air conditioning, heating, and ventilating capabilities in a single unit housing mounted under the instrument panel.

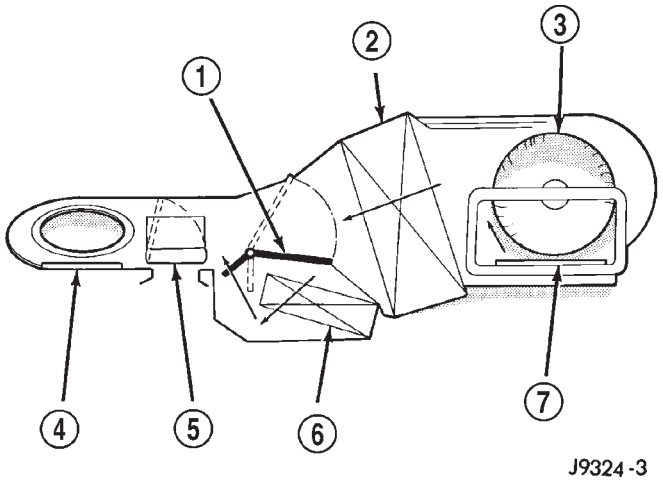


Fig. 4 Common Blend-Air Heater-Air Conditioner System - Typical

1 – TEMPERATURE BLEND/AIR DOOR
2 – EVAPORATOR CORE
3 – BLOWER
4 – PANEL DEFROST DOOR
5 – HEAT DEFROST DOOR
6 – HEATER CORE
7 – RECIRCULATING AIR DOOR

OPERATION

Outside fresh air enters the vehicle through the cowl top opening at the base of the windshield, and passes through a plenum chamber to the heater-A/C system blower housing. Air flow velocity can then be adjusted with the blower motor speed selector switch on the heater-A/C control panel. The air intake openings must be kept free of snow, ice, leaves, and other obstructions for the heater-A/C system to receive a sufficient volume of outside air.

It is also important to keep the air intake openings clear of debris because leaf particles and other debris that is small enough to pass through the cowl plenum screen can accumulate within the heater-A/C housing. The closed, warm, damp and dark environment created within the heater-A/C housing is ideal for the growth of certain molds, mildews and other fungi. Any accumulation of decaying plant matter provides an additional food source for fungal spores, which enter the housing with the fresh air. Excess debris, as well as objectionable odors created by decaying plant matter and growing fungi can be discharged into the passenger compartment during heater-A/C system operation.

The heater and air conditioner are blend-air type systems. In a blend-air system, a blend-air door controls the amount of unconditioned air or cooled air from the evaporator that is allowed to flow through, or around, the heater core. A temperature control knob on the heater-A/C control panel determines the discharge air temperature by moving a cable, which operates the blend-air door. This allows an almost immediate manual control of the output air temperature of the system.

The mode control knob on the heater-A/C control panel is used to direct the conditioned air to the selected system outlets. The mode control switch uses engine vacuum to control the mode doors, which are operated by vacuum actuator motors.

The outside air intake can be shut off by selecting the recirculation mode (Max A/C) with the mode control knob. This will operate a vacuum actuated recirculating air door that closes off the outside fresh air intake and recirculates the air that is already inside the vehicle.

A large central duct delivers conditioned air from the front heater-A/C housing to the second and third seat floor panel foot wells. A damper door in this duct can be adjusted by the second seat passengers with a manual control located on a mini-console just behind the split bench seat center cushion, or located on the upper rear surface of the floor console on models with the optional bucket seats. The split bench seat control has two positions: On or Off. The bucket seat control has three positions: On, Off and a third position that directs air flow through a pair of adjustable barrel outlets mounted high on the rear surface of the floor console.

The air conditioner for all models is designed for the use of non-CFC, R-134a refrigerant. The air conditioning system has an evaporator to cool and dehumidify the incoming air prior to blending it with the

DESCRIPTION AND OPERATION (Continued)

sensor could have difficulty changing beyond the threshold value.

OXYGEN SENSOR HEATER MONITOR

If there is an oxygen sensor (O2S) shorted to voltage DTC, as well as a O2S heater DTC, the O2S fault MUST be repaired first. Before checking the O2S fault, verify that the heater circuit is operating correctly.

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperature 300° to 350°C (572 ° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. This maintains a 14.7 to 1 Air Fuel (A/F) ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxide (NOx) from the exhaust.

The voltage readings taken from the O2S sensor are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O2S sensor is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O2S sensor must be tested to ensure that it is heating the sensor properly.

The O2S sensor circuit is monitored for a drop in voltage. The sensor output is used to test the heater by isolating the effect of the heater element on the O2S sensor output voltage from the other effects.

LEAK DETECTION PUMP MONITOR (IF EQUIPPED)

The leak detection assembly incorporates two primary functions: it must detect a leak in the evaporative system and seal the evaporative system so the leak detection test can be run.

The primary components within the assembly are: A three port solenoid that activates both of the functions listed above; a pump which contains a switch, two check valves and a spring/diaphragm, a canister vent valve (CVV) seal which contains a spring loaded vent seal valve.

Immediately after a cold start, between predetermined temperature thresholds limits, the three port solenoid is briefly energized. This initializes the pump by drawing air into the pump cavity and also closes the vent seal. During non test conditions the vent seal is held open by the pump diaphragm assembly which pushes it open at the full travel position. The vent seal will remain closed while the pump is cycling due to the reed switch triggering of the three port solenoid that prevents the diaphragm assembly from reaching full travel. After the brief initialization period, the solenoid is de-energized allowing atmospheric pressure to enter the pump cavity, thus permitting the spring to drive the diaphragm which forces air out of the pump cavity and into the vent system. When the solenoid is energized and de energized, the cycle is repeated creating flow in typical diaphragm pump fashion. The pump is controlled in 2 modes:

Pump Mode: The pump is cycled at a fixed rate to achieve a rapid pressure build in order to shorten the overall test length.

Test Mode: The solenoid is energized with a fixed duration pulse. Subsequent fixed pulses occur when the diaphragm reaches the Switch closure point.

The spring in the pump is set so that the system will achieve an equalized pressure of about 7.5” H20. The cycle rate of pump strokes is quite rapid as the system begins to pump up to this pressure. As the pressure increases, the cycle rate starts to drop off. If there is no leak in the system, the pump would eventually stop pumping at the equalized pressure. If there is a leak, it will continue to pump at a rate representative of the flow characteristic of the size of the leak. From this information we can determine if the leak is larger than the required detection limit (currently set at.040” orifice by CARB). If a leak is revealed during the leak test portion of the test, the test is terminated at the end of the test mode and no further system checks will be performed.

After passing the leak detection phase of the test, system pressure is maintained by turning on the LDP's solenoid until the purge system is activated. Purge activation in effect creates a leak. The cycle rate is again interrogated and when it increases due to the flow through the purge system, the leak check portion of the diagnostic is complete.

The canister vent valve will unseal the system after completion of the test sequence as the pump diaphragm assembly moves to the full travel position.

Evaporative system functionality will be verified by using the stricter evap purge flow monitor. At an appropriate warm idle the LDP will be energized to seal the canister vent. The purge flow will be clocked up from some small value in an attempt to see a shift in the 02 control system. If fuel vapor, indicated by a shift in the 02 control, is present the test is passed. If not, it is assumed that the purge system is not functioning in some respect. The LDP is again turned off and the test is ended.

MISFIRE MONITOR

Excessive engine misfire results in increased catalyst temperature and causes an increase in HC emissions. Severe misfires could cause catalyst damage. To prevent catalytic convertor damage, the PCM monitors engine misfire.