

ELECTRICALLY HEATED SYSTEMS

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DESCRIPTION AND OPERATION

INTRODUCTION

For proper operation of the Rear Window Defogger system refer to the Owner's Manual.

Vehicles equipped with an electrically heated rear window defogger also have a 90 amp generator.

The system consists of a rear glass with two vertical bus bars and a series of electrically connected grid lines fired on the inside surface. The Body Control Module (BCM) operates a relay located in the trunk area on all models.

Vehicles with Rear Window Antenna refer to Group 8F, Audio Systems.

Circuit protection is provided by a fusible link, located in the charging circuit, for the heated grid circuit and by a fuse for the relay control circuit.

When the rear window defogger relay is ON, current is directed to the rear defogger grid lines. The heated grid lines heat the rear glass to clear the surface of fog or frost.

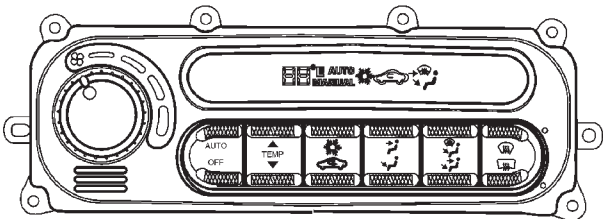
CAUTION: Grid lines can be damaged or scraped off with sharp instruments, care should be taken in cleaning glass or removing foreign materials, decals or stickers. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

REAR WINDOW DEFOGGER CONTROL SYSTEM

The Rear Window Defogger electrical system involves the operation of the Heater-A/C or ATC Control Head, the Body Control Module (BCM), and the rear Window Defogger Relay and wiring. The passenger can push the Rear Window Defogger button on the Heater-A/C or ATC Control to defog the rear glass.

The system will only operate when the ignition switch is in the run position. Once the Rear Window Defogger button is pushed, the button indicator will light and the system will operate for a period of time and then automatically turn off. Refer to the owner's manual for operation of the A/C-Heater or ATC control.

The A/C-Heater or the ATC control sends a signal to the BCM, which indicates to the BCM that the operator wants the rear window grid to heat. Refer to the A/C-Heater or ATC Control section of the service manual for details on how these modules interact. An output wire from the BCM connects to the coil of the rear window defogger relay. The other side of the coil is connected to a fuse. The BCM turns on the relay by connecting the output line of the BCM to vehicle ground. The relay contacts will then close supplying vehicle power to the rear window defogger grid.



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Fig. 1 ATC Control Head

DIAGNOSIS AND TESTING

SERVICE PROCEDURES

Electrically Heated Rear window defogger operation can be easily checked in three steps:

- (1) Use ATC or Heater-A/C self diagnostics or DRB III scan tool to check fault codes to check Control but-

DIAGNOSIS AND TESTING (Continued)

tion operation. Note this does not check the EBL system. There are no fault codes that can check for the EBL grid, relay, or wiring. Refer to steps 2 and 3 for system test.

(2) Perform system test with voltmeter.

Check voltages at rear grid relay and refer to Rear Window Defogger Relay Test table.

A/C-HEATER AND ATC CONTROL HEAD

Refer to Group 24, Heating and Air Conditioning for instructions on how to use the DRB III scan tool or the control head self-diagnostics to test the part. The problem is not with the control head if no trouble codes are found. The next step should be to check the rest of the system after the A/C-Heater or ATC control is checked.

SYSTEM TEST

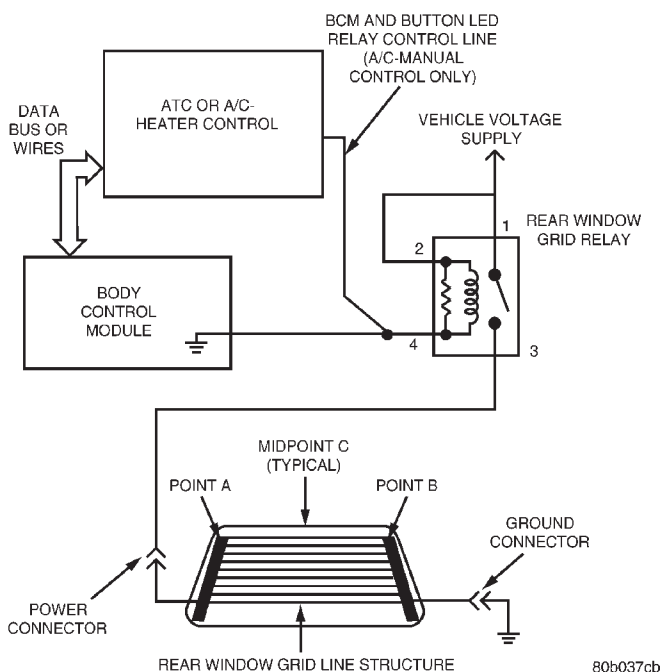
(1) Start engine. With the engine running, push the Rear Window Defogger button on the ATC or Manual A/C Heater Control Head. The button LED indicator should light. If the EBL indicator does not light on the **MANUAL-A/C HEATER CONTROL**, then there may be a wiring problem. This may also indicate that the BCM will not complete the circuit to ground that is required to energize the EBL relay coil (non-ATC vehicles only). Refer to EBL Relay Test. On ATC vehicles, the LED indicator may light when the BCM failed to complete the circuit to ground required to energize the EBL relay coil.

(2) Using a DC voltmeter with a 0-15 volt range, connect the negative lead to a known good vehicle electrical ground.

(3) Touch the positive bus bar and check voltage. The voltage should be above 11 volts. Push the Rear Window Defogger button to turn off the indicator. The measured voltage should be 0 volts. If these voltages are correct then the problem is with the Rear Window Grid or Grid ground electrical connection. Go to the Grid Lines test to check the Grid and ground connection.. If there is no voltage to the rear window defogger grid when the system is ON, then go to the Fuse and Electrical Short Test.

GRID TEST

The horizontal grid line and vertical bus bar line is printed and fired on the inside surface of the rear window glass. These comprise and electrical circuit. The electrically conductive lines are composed of a silver ceramic material which when fired on glass becomes bonded to the glass and is highly resistant to abrasion. It is possible, however, that a break may occur in an individual grid line resulting in no current flow through the line. To detect breaks in grid lines, the following procedure is required:



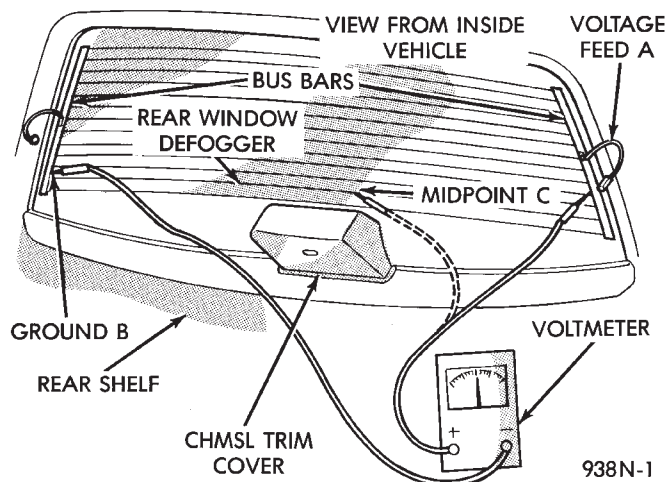
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Fig. 2 System Electrical Circuit

(1) Stop the engine. Connect the negative lead of a 0-25 volt range voltmeter to a known good vehicle electrical ground.

(2) Start the engine and push the rear window defogger button to turn on the system.

(3) Touch the ground side (point B) of the Rear Window Defogger Grid. The voltage measured should be below 1 volt. If the voltage is greater than 1 volt then check the voltage on each grid line at the Mid-Point with the positive lead. If the voltage is not approximately 6 volts or half the voltage measured on the positive rear window grid bus bar, then the grid line is bad. The break in the grid can be found by moving the probe along the line until the voltage changes. The area where the voltage changes is where the open circuit is.



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Fig. 3 Grid Line Test

DIAGNOSIS AND TESTING (Continued)

FUSE AND ELECTRICAL SHORT TEST

- (1) Stop engine.
- (2) Check the fuse supplying power to the rear glass grid relay. If the fuse is good, then go to the Rear Window Defogger Relay test. If the fuse is open, then go to Step 4.
- (3) Locate the ground lug that connects the negative lead of the rear window grid to ground. Remove the screw holding the ground lug and isolate it from any vehicle ground.
- (4) Connect one lead of an ohmmeter to the negative ground lug of the rear window grid (with the lug still not connected to a vehicle ground), and check the resistance to a known good vehicle ground. If the ohmmeter indicates less than 10 ohms, then the rear window defogger grid is shorting to the vehicle ground and must be replaced. If the ohmmeter indicates more than 100 ohms of resistance, then go to Step 7.
- (5) Disconnect the rear window defogger grid voltage feed wire from the vehicle harness. If the ohmmeter still indicates less than 10 ohms, then the rear

window defogger grid is shorting to the vehicle ground and must be replaced. If the ohmmeter indicates more than 100 ohms of resistance, then go to Step 7.

- (6) There is a problem with the circuits that connect to the rear window defogger relay. Refer to Group 8W, Wiring Diagrams for circuit descriptions. Check wiring with an ohmmeter to verify proper wiring connections to the rear window defogger relay. If no problems are found, then replace the fuse and try running the system.

REAR WINDOW DEFOGGER RELAY

- (1) Stop engine. Connect the negative lead of a 0-15 volt range voltmeter to a known good vehicle electrical ground.
- (2) Reconnect rear window grid connections disconnected during the Fuse and Electrical Short Test. Start engine and with the system OFF, check the voltages present at the rear window defogger relay and rear window defogger grid. Refer to the Rear Window Defogger Relay Test table for diagnosis.

DIAGNOSIS AND TESTING (Continued)

REAR WINDOW DEFOGGER RELAY TEST

POTENTIAL PROBLEM	SYSTEM ON OR OFF WITH ENGINE RUNNING	VOLTAGE AT REAR WINDOW DEFOGGER RELAY POINT TO GOOD VEHICLE GROUND				VOLTAGE AT REAR WINDOW DEFOGGER GRID TO GOOD VEHICLE GROUND	
		1	2	3	4	A	B
NO PROBLEM. VOLTAGES AS EXPECTED WITH THE SYSTEM OFF.	OFF	MORE THAN 11	MORE THAN 11	0	MORE THAN 11	0	0
NO PROBLEM. VOLTAGES AS EXPECTED WITH THE SYSTEM ON.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	MORE THAN 11	LESS THAN 1.0
RELAY CONTACTS NOT CLOSING. REPLACE RELAY.	ON	MORE THAN 11	MORE THAN 11	0	LESS THAN 1.0	0	0
WIRING OPEN BETWEEN BODY CONTROL MODULE AND REAR WINDOW DEFOGGER RELAY, OR, DEFECTIVE BODY CONTROL MODULE.	ON	MORE THAN 11	MORE THAN 11	0	MORE THAN 11	0	0
POOR CONNECTION BETWEEN PIN 3 OF RELAY AND POSITIVE CONNECTION ON REAR WINDOW DEFOGGER GRID CIRCUIT.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	0	0
POOR CONNECTION TO GROUND ON NEGATIVE SIDE OF REAR WINDOW DEFOGGER GRID.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	MORE THAN 11	MORE THAN 11
POOR WIRING CONNECTION BETWEEN PINS 1 TO 2 OF THE REAR WINDOW DEFOGGER RELAY.	ON	MORE THAN 11	0	0	0	0	0
OPEN FUSE OR OPEN WIRING CONNECTION TO PIN 1 OF REAR WINDOW DEFOGGER RELAY.	ON	0	0	0	0	0	0
RELAY CONTACTS SHORTED. REPLACE RELAY. REAR WINDOW DEFOGGER WILL NOT TURN OFF.	OFF	MORE THAN 11	MORE THAN 11	MORE THAN 11	MORE THAN 11	MORE THAN 11	0

SERVICE PROCEDURES

REPAIR GRID LINES, TERMINALS AND PIGTAILS

The repair of the grid lines or the terminal is possible using the Mopar® Repair Package or equivalent.

(1) Mask repair area so conductive epoxy can be extended onto the line or the bus bar (Fig. 4).

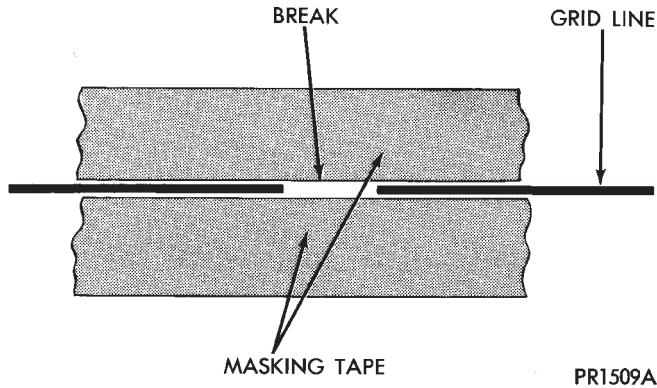


Fig. 4 Grid Line Repair

(2) Follow instructions in repair kit for preparing damaged area.

(3) Remove package separator clamp and mix plastic conductive epoxy thoroughly. Fold in half and cut center corner to dispense epoxy.

(4) For grid line, mark off area to be repaired with masking tape or a template (Fig. 4).

(5) Apply conductive epoxy through slit in masking tape. Overlap both ends of the break by 19 mm (3/4 inch).

(6) For a terminal or pigtail replacement, mask adjacent areas so epoxy can be extended onto line as well as bus bar. Apply a thin layer of epoxy to area where terminal was fastened and to adjacent line.

(7) Apply a thin layer of conductive epoxy on terminal and place terminal on desired location. To prevent terminal from moving while the epoxy is curing, it must be wedged or clamped.

(8) Carefully remove masking tape from grid line.

CAUTION: Do not allow the glass surface to exceed 204°C (400°F), glass may fracture.

(9) Allow epoxy to cure 24 hours at room temperature or use heat gun with a 260°-371°C (500°-700°F) range for 15 minutes. Hold gun approximately 254 mm (10 inches) from repaired area.

(10) After conductive epoxy is properly cured remove wedge from terminal and check out operation of rear window defogger. Do not attach connectors until curing is complete.

WARNING: REPAIR KIT MAY CAUSE SKIN OR EYE IRRITATION. CONTAINS EPOXY RESIN AND AMINE TYPE HARDENER, HARMFUL IF SWALLOWED. AVOID CONTACT WITH SKIN AND EYES. FOR SKIN, WASH AFFECTED AREAS WITH SOAP AND WATER. DO NOT TAKE INTERNALLY. IF TAKEN INTERNALLY, INDUCE VOMITING; CALL A PHYSICIAN IMMEDIATELY. IF IN CONTACT WITH EYES, FLUSH WITH PLENTY OF WATER. USE WITH ADEQUATE VENTILATION. DO NOT USE NEAR FIRE OR FLAME. CONTENTS CONTAIN 3 PERCENT FLAMMABLE SOLVENTS.

KEEP OUT OF REACH OF CHILDREN.

REMOVAL AND INSTALLATION

HEATER-A/C ATC CONTROL

Refer to Group 8E, Instrument Panel and Systems for proper Removal and Installation procedures.

REAR WINDOW DEFOGGER RELAY

REMOVAL

(1) Disconnect battery negative remote cable from remote ground post (Fig. 5).

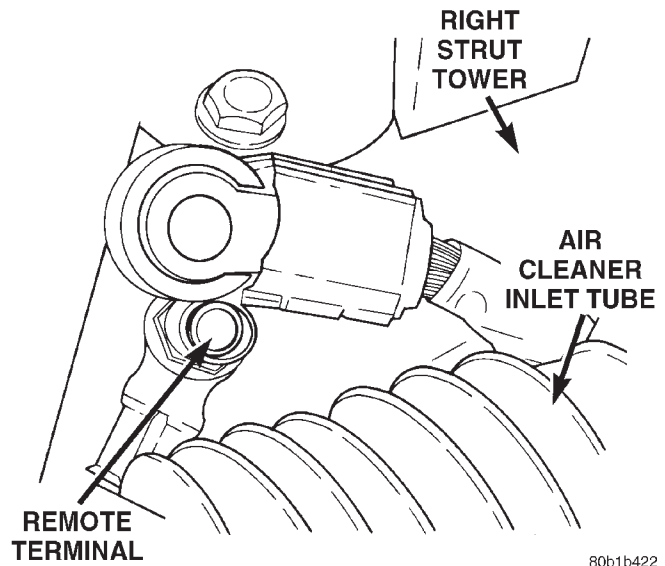


Fig. 5 Negative Battery Cable Remote Terminal

(2) Open trunk. Reach behind trunk carpet and pull out on relay.

(3) Remove relay from vehicle.

INSTALLATION

For installation, reverse the above procedures.

