

## Checking defroster health by measuring the resistance of the grid

When rear window defrosters fail the reason is not always obvious. This can lead to considerable frustration when attempting to repair the defroster. This Technical Bulletin shows how to make several critical electrical measurements that will help in troubleshooting most defrosters.

### Defrosters, what the parts do

Rear window defrosters provide rapid heating to clear mist, snow and ice providing a good view out the rear window even in winter driving conditions, a very important safety feature.

These defrosters are large resistive surface heaters. The heating is supplied by a grid pattern of thin brown horizontal lines or elements on the rear window. These elements are made from an electrically conductive paste normally silk-screened to the glass surface and fired at high temperature during production.

The fine horizontal elements are connected to the wider side buss bars typically oriented vertically on each side of the window to form a grid. Electrical power and ground are supplied to the defroster by two metal tabs that connect to a high-amperage circuit which when activated provides rapid heating effective in clearing vehicle rear windows.

### Why electrical resistance matters

How well a defroster works is dependent on several factors but the warming of the elements is critical. How warm the elements become is dependent on the electrical resistance of the material used to make the defroster and the operational voltage.

Measuring the voltage and resistance of the defroster can go a long way toward determining the overall health of the defroster and offers several important clues to successfully repair the unit potentially avoiding the high cost of glass replacement.

This measurement requires a multi-meter capable of measuring 12 volt DC systems and resistance and some knowledge of its use.

### Measuring defroster voltage and resistance

Both the operational voltage supplied to the defroster and the resistance are critical to the unit's heating performance. Operational voltage is measured when the vehicle is running which insures the alternator output is measured.

While voltage is important, an accurate measurement of resistance is critical to a reliable result. This measurement requires a multi-meter capable of measuring resistance accurately.

The following page provides a step-by-step guide to measuring the voltage and resistance of a defroster.

## Bulletin 118



Measure defroster electrical properties to help in troubleshooting.



Typical rear window defroster



Start vehicle to measure voltage

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## Measuring defroster Voltage and Resistance

1. Start the vehicle and turn on the defroster. The vehicle must be running for an accurate reading of the alternator voltage which is critical.
2. Turn on the volt meter and set it to measure 12 volt DC. See your meter's manual as needed.
3. Measure the defroster voltage by placing one lead on each of the metal defroster tabs.\* Record the voltage in box "V" at right and turn off the vehicle.
4. Now change the setting on the voltmeter to measure resistance and select the lowest resistance value. See your meter's manual as needed.
5. Disconnect the defroster from power by removing the connectors on the defroster tabs. Connectors can have locking mechanisms that must be pressed to disengage from the tab.
6. Touch both leads from the meter to ONE of the tabs, but not touching each other, pressing the leads firmly onto the tab.
7. Measure and record the resistance in box "CR"
8. Measure the resistance of the grid by touching the leads to each tab, one on each side of the defroster (shown in step 3) again pressing the leads firmly onto the tabs. Record this reading in box "DR".
9. Subtract DR from CR – this is the estimated resistance of your defroster, and should lie between 0.5 and 4 ohms. Enter this value in "R"

To determine the estimated current (amperage) the defroster will use, divide the Voltage (V) by the estimated resistance (R). This number should be well under 25 amps in most cases.

\* If Measuring a Clear View Defroster with modulation expect the voltage reading on the meter to vary . This is normal.

### What does it all mean?

Low voltage readings from the vehicle can mean faulty alternator output, damaged wiring or a bad relay in the defroster circuit.

High resistance readings can mean several of the defroster elements or lines are broken, the defroster is worn or the connection between the tab and the defroster surface is not what it should be.

Low resistance in a Clear View Defroster can mean problems in the installation of the defroster particularly the conductive buss bar layout not conforming to Attachment Two of the instructions.

V
Voltage w/ Vehicle Running

CR	Ω
On tab Calibration Resistance	

DR	Ω
Measured Defroster Resistance	

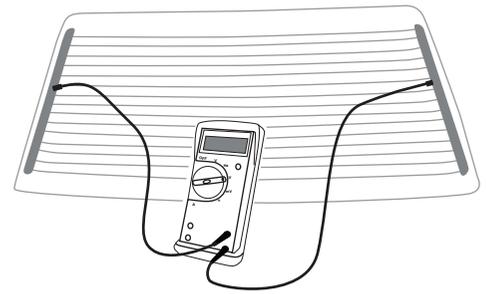
R	Ω
Estimated Defroster Resistance	

Amperage Calculation Example

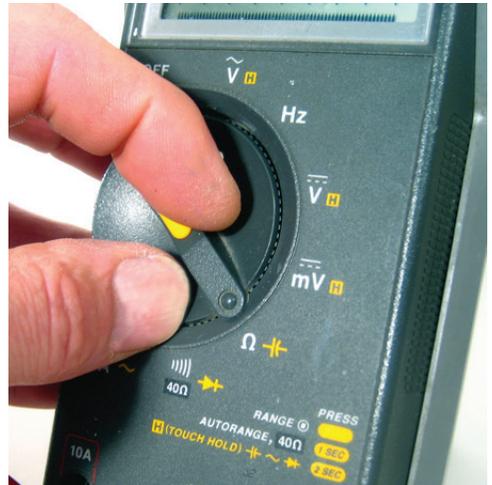
$$\frac{V}{R} = (I)\text{Amps}$$

Amperage Calculation

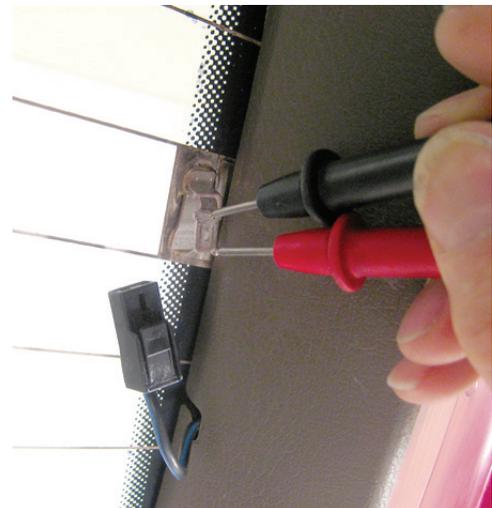
$$\frac{V}{R} = \boxed{I}$$



STEP 3. Start the vehicle to measure defroster voltage.



STEP 4. Change the meter to measure resistance



STEP 6. Zero the meter by pressing leads on one tab.

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