Repairing Your Rear-Window Defroster

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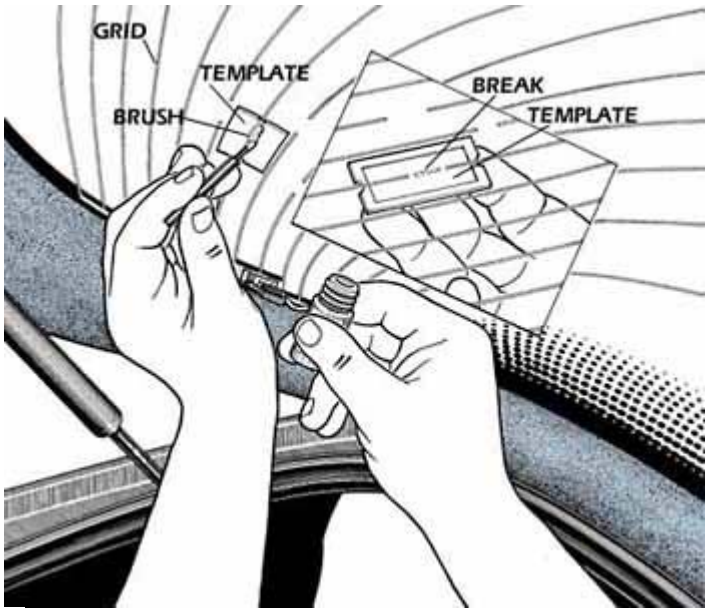

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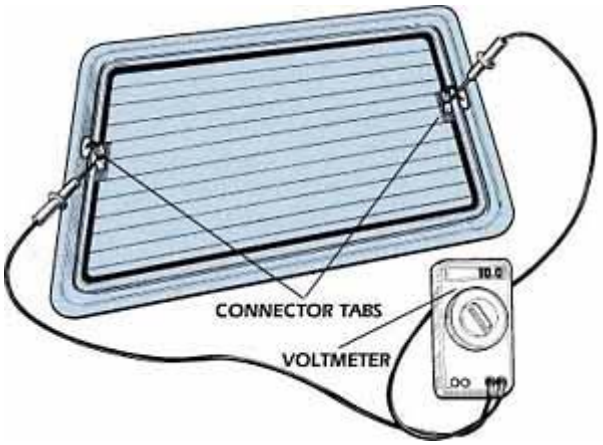
It was a dark and stormy night. Snow has covered the entire car to a depth of several inches. It takes a few minutes to clear the snow, and by then the engine has warmed up enough to melt the frost clinging to the inside of the windshield, and has actually made inroads to the frost on the side windows. But the rear-window defroster clears only a narrow strip near the top and bottom of the window, leaving a wide strip of glass as translucent as a barrister's door, and absolutely no visibility to the rear.

Repairing minor breaks in the continuity of the defroster grid lines is as simple as masking them and using a special conductive paint. A worse scenario: The rear-window defroster grid has packed it in completely, requiring you to either drive blind (bad idea), or resort to scraping the rear window clear with your trusty wooden-handled snow scraper (really bad idea).

Danger!
Let us make this perfectly clear: Do not try to scrape hard frost from a rear window equipped with a heater grid. The resistance wires are silk-screened, essentially painted, onto the glass. They are very easy to scratch,

and will not work properly if the scratch breaks the continuity along the wire. This means that it's possible for boxes, furniture or any other hard object one might place in a car to scratch the wire. Even a credit card can damage it. Don't cram stuff into the back, and don't let the load shift backward in your minivan so that it touches the glass. If your window has a defroster grid, the only thing that should ever touch the glass is a soft cloth dampened with window cleaner. If you must clean the rear glass, scrub gently, and in the direction of the grid, not across it.

You don't want to have to replace the glass to effect this repair. The compound-curve style of rear window is several hundred dollars, and a large hatchback's backlite on, say, a Camaro, can easily top a grand or more. Add to this installation at the dealership or a glass shop—it's definitely not covered by insurance.



Check for 12 volts at the grid's terminals to see if the circuits to the rear of the car are intact.

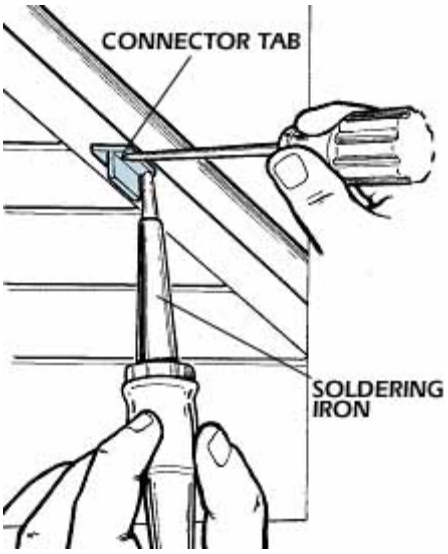
No Heat At All

Suppose your defroster grid doesn't work at all. First, check the obvious: Is the fuse okay? Defroster grids draw a lot of current (10 to 20 amps), and if the fuse is undersize, it won't last. If the fuse doesn't look blown, check with your voltmeter—with the key on and the defroster on, you should see 12 volts at both fuse terminals.

If the voltage is fine, the problem is somewhere in the wiring or at the grid. Check the connections from the wiring harness to the grid. It's easy for the terminals at the grid to become damaged. Generally, the tab that's attached to the glass breaks off, leaving you with a dangling wire and no way to reattach it. You have two repair options here: soldering and gluing.

If you know how to solder and have a high-capacity soldering iron or gun, solder the tab back on. It may take a third hand to hold the tab against the grid while you solder it. There's usually a metal strip laid on the glass under the silk-screening. Clean the surfaces with alcohol and use 60-40 rosin-core solder. Work fast, because excess heat may crack the glass.

If you aren't confident about your soldering skills, or aren't ready to take a chance on cracking an expensive piece of glass, there's another way. The dealership and most auto parts stores can sell you a special electrically conductive epoxy to bond the tab back on. If it's wintertime, you'll need to work in a heated garage, and have the vehicle inside long enough for it to warm up to at least 65 degrees F. Again, clean the area with alcohol. Mask the glass with tape to keep from getting epoxy smeared on it. Mix up a sparing amount of epoxy and hardener. Put some epoxy on the tab, and use an ice pick to hold it in place for the 10 minutes or so it will take for the epoxy to harden. You can use a wooden stick or the end of your dampened finger to smear the epoxy within a minute or two of application to improve the cosmetics of the repair. Although the epoxy will set up rapidly, don't attempt to reattach the wiring until it's had 24 hours at 65 degrees F or more to cure and achieve its full strength. The repair will never be as strong as the original wire, so you'll need to be particularly careful not to damage it in the future.



Experienced solderers might want to try to solder the tab back onto the window.

Deeper Problems

Fuse okay? Grid attached to the glass everywhere, but simply no defrosting action at all? Look for a bad switch, relay or timer. For this you'll need a schematic diagram, or considerable experience in troubleshooting wiring problems. Start at the fuse and trace the wiring. If the switch is bad, you'll be able to jumper the switch and get 12 volts beyond there for diagnosis. But you may need to replace the timer—which may be integrated into a larger box of electrical controls buried under the dash. Consult the factory shop manual or the POPULAR MECHANICS CD-ROM for your car for a detailed diagnostic procedure. If those aren't available to you, you'll have to find the problem the old-fashioned way. Trace the current path from the fuse, to the switch, to the timer, and on back to the window. Remember, the timer will turn off the current within 5 to 10 minutes, so you'll need to keep track of the timer's time window or you'll be looking for current that's not supposed to be there.

Somewhere in the circuit there will be a relay to switch the high current necessary for the grid's operation. This may or may not be integral with the timer. A diagnostic procedure would be to jumper the relay's terminals to see if the relay is bad. You can either jump 12 volts to the relay's coil to make it pull in, or bypass the relay with a large-gauge jumper to see if the grid's wiring is intact between the relay and the window. A seperate relay should be inexpensive and available at any auto parts store, but if it's in the same package with the timer you'll pay as much as a hundred bucks.

Don't try to bypass the timer. Rear-window defrosters draw a substantial amount of current—10 to 20 amps depending on the application. Most modern cars use a timer circuit to turn the grid off after a reasonable length of time. There are two reasons for this. The first is to reduce the electrical load on the alternator, which (especially

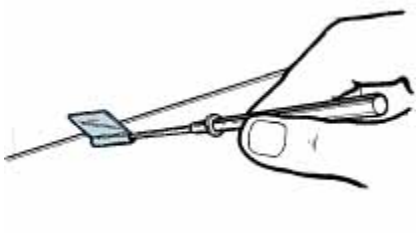
during the wintertime) also supplies electricity for the headlights, heater fan and windshield wipers. Couple that with the extra demands on the battery for starting in cold weather, and there may simply not be enough alternator capacity to keep the battery charged adequately.

The second reason is simpler—the grid will overheat if it's left on too long. Imagine accidentally leaving it on during a long trip on a summer day. The heat from the grid added to the heat of the sun may crack the glass or contribute to deterioration of the window's rubber gaskets.

If you need to replace the timer or switch, you'll probably have to go to the car dealer for the parts.

Easy Fixes

Suppose your grid has several lines that don't heat. You may be able to find the break by simply inspecting the silk-screened grid along its length. This will be easier on hatchbacks, minivans and SUVs because you can open the back up and look at the lines against the sky. Sedans will require you to crawl into the back and poke your head into the area above the rear deck. Otherwise, you'll need to drag out the trusty DC voltmeter and hunt for it electrically.



Small flags of aluminum foil on your probes will prevent further damage.

Set your voltmeter for the 20-volt scale, and attach a couple of postage-stamp-size pieces of aluminum foil to the leads. This will prevent the probes from scratching the grid. You can simply lay the aluminum-foil tabs on the glass and press lightly with one finger to make connection with the grid. If the window is large, it may help to have another pair of hands.

Start by measuring the voltage across the entire length of the grid. With the key on and the defroster turned on you should see 12 volts on the meter with one tab at either end of the grid. Now move one tab to the center of the grid and measure again. The voltage should read 12 volts if the break is between the tabs, less if the break is outside of the tabs. Similarly, measure the voltage on a grid line that is working properly, and you should see approximately 6 volts at the center, because you've just turned your defroster grid into a giant rheostat. By moving the tab along the damaged line, you'll see 12 volts on the meter until you reach the break, where the voltage will drop considerably all at once. This should allow you to pinpoint the break.

Repairing the grid is simple. Many auto departments in large stores, and almost any dedicated auto parts store, can sell you a repair kit. Clean the area of the break with alcohol and a fresh, untinted paper towel. Don't use window cleaner, as it may leave a residue of wax or silicone. The kit will have an adhesive template to stick over the break, but you can use ordinary masking tape just as easily. The masking tape can be used to make a new line that exactly matches the width of your old grid, if the mask in the kit is too wide or narrow. Paint a stripe of the kit's conductive

paint across the break. Allow it to dry for 10 to 15 minutes and remove the mask.

If you have several grid lines that are damaged, simply repeat the process. If the lines are damaged in more than one place along their length, you'll have to go back to step one and find the next break.

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