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Electrical gremlins – make your mechanic's job easier and save money

This article specifically deals with *simple electrical problems* and certainly does NOT encourage DIY attempts to mess with critical components affecting the ECU, HEVAC, air suspensions, ignition, immobiliser and so on. However, problems with lights, trailer wiring, a faulty horn, windscreen washers and wipers are not only common, but are relatively easy to trace or even fix.

A significant component of the cost of fixing faults is the diagnosis of the problem, namely which of many possible components is the culprit. A trained mechanic will invariably find the cause fairly quickly because he/she will have encountered something similar beforehand but some preliminary work by the owner will achieve several things:

- It helps to make the driver aware of possible similar problems in the future, many of which may be very simple in origin
- It allows the owner to describe more precisely what is wrong, so saving the mechanic's time.
- In many cases, the fault may be rectified by the owner, eliminating the inconvenience of having the vehicle out of action.

Start with the simple stuff

Most of the time, a broken fuse is likely to be the cause of a simple electrical failure. Of course, there will be a reason why that fuse blew but it may be as simple as vibration or water ingress in or near the failed component.

Look in the vehicle's owner's manual (yes it should be kept permanently in a side pocket of a door or in the glove box). The index will refer to the pages where all of the fuse numbers and their functions will be listed. Remove the cover and locate the relevant fuse, Remove and examine it. If the internal wire is broken, just replace the fuse and test the item that had failed to work. Most of the time, it will now work correctly.

If the fuse blows again

It will be necessary to investigate what caused the fuse to blow. Again, check the simple things first, starting at the electrical item that has failed to work.

- If this is a lamp, check the bulb (LEDs will rarely fail but incandescent or halogen bulbs are prone to failure). Remove any covers or clips to get at the bulb, look at its colour – if it is cloudy or black, that pretty much identifies a failure. If it looks OK, remove it carefully (use a tissue or latex glove – not bare fingers that will deposit acid onto the surface)
- First use the multimeter switched to ohms to check if there is a circuit between the *fitting and any earth point* (any metal part of the body should do). If you cannot get a zero reading, you have a bad earth – generally requiring

nothing more than abrading the surface of the contacts. Check again to see if the lamp is working.

- LOOK carefully at all of the wiring between the failed item and any relay or the battery. If there is a burnt or frayed wire, you have found the source of your problem and can probably fix it *temporarily* with nothing more complicated than some electrical tape. However, do NOT assume this is a permanent solution – the defective wire MUST be replaced properly
- If that has not eliminated the problem, fit a new fuse if necessary and turn on the relevant switch. With your test probe (see below) check to see if there is power to the bulb. If so, you have identified the bulb as the culprit. If not, you will have to work your way up the wiring until you get a live power supply. The problem will then almost certainly be a worn or broken wire.
- Remember that many circuits only become active when the ignition is ON (the horn may be an exception). For this reason, put the ignition into the “accessory” position before making this test and/or start the vehicle and turn the headlights on. It may be necessary to check with the lights both on “high” and “low” depending on how the failed lamp becomes active.
- **WARNINGS** – Do not probe any wires connected to the air bag or the ECU to avoid creating further damage. Also do not touch any wire with your fingers OR “short” any two components. All you want to do is determine if there is power. This is the advantage of the test probe over the multimeter because it requires only a single point of contact for the test. With a meter, you need to put one probe onto the “hot” wire and the other onto ground (an earth point)

About relays and circuits

Relays eliminate direct connections between the battery and component items. Generally, one wire from the relay comes FROM the battery, a second wire connects the relay to the switch, one or more wires connect to the component (the horn, light or whatever) and one wire connects to ground (earth). If you have identified a wire that should be, but is no longer delivering power to the component, use a test lead direct to the battery *only for a few seconds* OR use the multimeter.

Essential tools

There is no substitute for having a test probe PLUS a multimeter to determine instantly when a wire is broken, an earth-lead is defective and/or which wire goes where. It will also measure the voltage between two critical points, examples of this being given below. In the “ohms” setting, it is invaluable for checking earth (ground) continuity – probably the most common cause of component failure.

There are two main types of meter – analogue and digital. Digital meters cost from under \$20 to many hundreds of dollars. The really cheap ones are not particularly accurate, but they are plenty good enough for most simple tasks. The biggest problem is not the instruments, but the very fine easily-broken wires in the probes. You will go through many leads before the meter fails.



Digital meter



Analogue meter



Test probe

Other tools and bits of considerable use

Your tool kit should include the following:

- A sharp knife (the snap-off blade types are best)
- A head torch – (try finding something that fell under the hood without one)
- A magnet on a telescopic extension (for recovering dropped bolts etc)
- Sandpaper for cleaning contacts
- Electrical or self-amalgamating insulating tape
- Flat-blade and Philips/Posidrive screwdrivers in several sizes
- A pair of long-nose pliers
- A selection of fuses to suit your particular vehicle – probably both cylindrical glass and flat blade fuses will be needed.
- A few lengths of auto wire in various colours
- One long (2 metre) length of auto wire fitted with "crocodile" clips on each end. (You will be surprised how useful this simple device will be to reach between a wire under the bonnet and a meter placed where you can see it from the driving position.
- A selection of both male and female crimp connectors
- A cheap crimping tool
- A replacement trailer connection unit (if appropriate) because these things fall apart almost by looking at them.

Finally

Please remember. Reading this article will NOT turn you into a professional auto electrician. Stick with simple stuff to make jury repairs to get you home. Then take the vehicle to an expert as soon as possible.

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