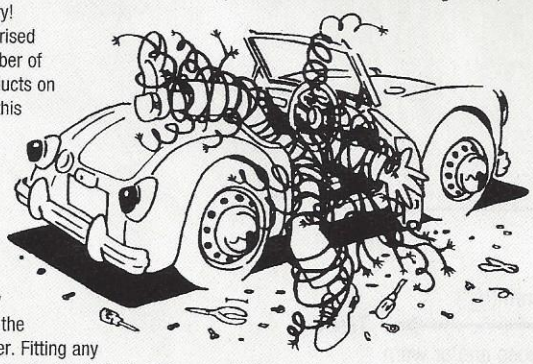
Diagnosing Wiring Troubles! (Words of Wisdom to Live and Drive By)

Does your car let you down every time you try to start it, or those wipers only work when it is not raining? Perhaps the indicators go dim every time you apply the brakes, and the horn only operates when the lights are off.

Before you go out to buy new lights, horns, switch gear, voltage rectifiers and anything else that carries an electrical current, it may be worthwhile spending time checking out the wiring rather than shelling out on new parts.

Quite often I have found that electrical components supposedly faulty, are perfectly all right, i.e., "blown" headlamps which are intact, switches that work when connected to a multi-tester, horns that stop making funny gurgling noises and operate correctly when connected to the battery for a test.

Many electrical faults are caused by two frequently overlooked factors, either working separately, or together to produce a variety of interesting visual and sometimes pyrotechnic effects. The first of these factors is simply caused by age and the climate - electro-rheumatism if you like. The second is caused by that stalwart of the motoring world, Captain Accessory!



I am always surprised by the large number of good quality products on the market (and this does include radios, etc.) which are let down either by the cheap, easy-to-use connectors sold with the kit, or by "hash wiring" on the part of the installer. Fitting any accessory should be dealt with in the same way that any other task should be undertaken on a vehicle - properly. Connections should be mechanically and electrically sound.

The worst electrical problems I have faced have been caused by "bodged" wiring or faulty connections. Easy-to-use connectors often provide me with hours of entertainment, as does unwrapping electrical insulation tape to find wires that have been just cut, stripped back and twisted together. It always works for a while!

And it's not bodged wiring - some products are of an appalling quality. For example, I have tried various different HT leads in my car to "improve the quality of the spark", "reduce resistance", and "provide better ignition". Most of these leads have been useless. It doesn't matter two hoots that the PTFE casing and superior quality copper core offers less resistance than the normal standard item - what matters is that if the cap doesn't fit the spark plug, it will just bounce off. One famous make had such appalling connections that it would not fit into the standard Lucas distributor.

If you are going to tackle any electrical work for your car, then do it properly and do it once. Throw away those cheap connectors and get the right tools to do the job properly - because I can guarantee that if you don't, that one day you'll wish you had - or even worse, you'll get rid of the car because it keeps going wrong. (I've picked up a few cheap cars like that which sing after two or three hours with a soldering iron!)

Get the Right Tools:

1. Soldering Iron - Get one with: 5 to 15 watts output, stay clean tips, decent stand, and PTFE leads (which make the iron easy to handle.

2. You probably already own one of those multi-purpose devices that cuts, strips wires and fits connectors. Throw it in the trash. Buy instead: Long Nose Pliers, Side Cutters, Wire Strippers, Insulation Tape, and Solder (60 - 40 lead/tin mix with flux incorporated).

3. Connectors - Get the type of connectors that are already in use on your car - spade connectors and bullet connectors (that can be soldered) and throw the crimp connectors into a bin!

Three important safety tips:

1. Disconnect the Battery

A fully charged battery can use around 120 amps to turn over a cold car engine. Making a mistake and accidentally connecting the positive to the earth can have some interesting affects, i.e.:

i. Any wire involved in a direct connection will act like a fuse and melt (this includes HT wire).

ii. The battery could explode if an HT wire does not fuse quickly enough.

iii. 120 amps is enough to weld your screwdriver to any object very easily.

iv. You can receive nasty burns if you use yourself as a suitable earthing point.

(Remember DC current differs from AC in that it does not change direction - once you get to grips with DC it won't let go!)

2. Holding the soldering iron

Never grab the soldering iron if it starts to fall. Sounds obvious, but there are still plenty of electrical engineers around who hold out their left hand when greeting somebody!

3. Suitable wiring

Finally, make sure that the wires you are using have the correct current capacity for the power they have to take. Using cable that is too thin is the electrical equivalent of reducing three lanes of motor way into one - total breakdown - if the current is much higher than the wire, the wire will act like a fuse and melt.

Making Connections

1. Spade connectors

Strip back 1/4" of wire without ripping out half of the strands, (if you have never used wire strippers before, have plenty of practice with some old bits of wire) twist the strands together and solder the bare end.

Always heat the wire with the soldering iron and apply the solder to the wire while it is still in contact with the iron. The wire must be hot enough for the solder to flow into the wire strands - but don't keep the iron there for too long, otherwise the outer sleeve of the wire will melt back. It is an art worth learning.

Do not apply solder to the iron and then try to "blob" the solder on to the wire - it never works because the solder "dries out" as the flux evaporates, and then the resulting joint can become brittle and prone to breaking (aka "Dry Joint").

Once cool, fit a spade connector sheath over the wire and then crimp the connector to the wire as shown in the diagram The crimping makes a mechanically sound connection, but this is not enough. Returning to the soldering iron, you then need to apply heat to solder the wire to the connector to ensure an enduring connection, just like they do at the factory.

2. Bullet connectors

Bullet connectors are needed where (A) two separate lengths of wire are to be joined together or (B) where an extra wire is to be added to a main feed.

Many bullet connectors can be crimped on as well as soldered to enhance the quality of their connection, but the stock items used by BL tend to be a bit more tricky and can only be soldered - so you must ensure that the soldered connection is not dry!

Strip back 3/8" of cable and solder the strands. Insert in the end of the bullet - it may help to "kink" the strands slightly to keep the bullet in place - and then re-apply the soldering iron to the top of the bullet. Allow it to heat up and then apply the solder through the hole at the top of the bullet so that it can run inside, attaching the cable to the wall of the connector.

The advantage of these connectors is that, if corroded, the connector block can be thrown away and a new one fitted without having to do any more soldering. Also, they can provide multiple outlets for power, but watch out for that current overload on the original feed wire!

The disadvantage is that the connector is a mechanical fit and prone to electrical failure when corroded, which is why many cars start going wrong after five year's use!

An Extra Fuse Box

If you are accessory mad, the use of a fuse box with a direct link to the solenoid may provide a safe, efficient answer, rather than connecting countless new wires onto an overburdened wire feed.

Again, make sure that the wire, from the feed to the box has sufficient capacity to deal with any load place upon it (an in-line fuse may further protect the entire system).

Is it worth the effort you might ask? Yes! A clean job is a good job!

1. If it's soldered, then the connections will be better, stopping niggling electrical failures and dangerous burn-outs; the connectors are cheaper too.

2. The proper connectors often allow easier access for repair of equipment.

3. Stops wires from sparking and equipment lasts longer.

4. It looks better, too!

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