

# FUEL PUMP ELECTRICAL FAILURES

The high pressure electric fuel pump still uses a simple permanent magnet direct current (DC) series-wound wet electric motor to drive an incorporated mechanical pump - there's not a lot that can fail early in its life. An internal fault is one reason a pump will stop working, other possible causes are fuel contaminants and oxidised fuel, as is failure of the power supply to the pump, or the pumps ground connection.

The most likely reason behind a stopped or intermittent operating pump is a bad electrical connection, i.e. a lack of continuity in the vehicle's fuel pump electrical circuit. It could be in the pump power circuit (battery to pump via fuse and relay), or in the pump control circuit; airflow meter, ECU, current controller, or a ground connection anywhere in the pumps electrical circuit.

Modern vehicles have sophisticated electrical connectors, and use more components in pump circuits, e.g. they may use up to three relays, particularly those with 2 stage pumps, forced induction and non-return/dead end systems – along with multiple control units. Bad connections in vehicle electrics are well known to auto technicians, and in the fuel pump circuit they may occur at connections on circuit components, between wiring harness sections (under bonnet, interior, rear, fuel tank), or at the pump itself. All this adds up to the potential for connector-related problems to increase numerically.

Older vehicles use wire terminal connector types that are more at risk are those that rely on an interference fit for contact – any relaxation of the tension that creates the necessary interference will induce a problem. This type of bad connection is usually the result of excessive heat caused by high electrical current draw at the pump connection. This is the cause of the problem encountered on many vehicles where a high pump current draw, together with too-small wire conductor size, results in overheating of the wire connector terminals in the connector block, and those on either side will melt and deform on the pump module tank flange

Discoloured terminals and/or discolouration or melted and distortion of the plastic connector housings is evidence of this type of bad connection which can usually be found by 'wriggling' a powered connector - excessive force is not necessary and may even create a problem where none existed. The simple act of disconnecting and reconnecting may (temporarily) restore a connection, leading to the erroneous conclusion that the pump was faulty.

Corrosion caused by moisture ingress into a connector assembly will potentially cause a bad connection which may not be obvious without careful inspection. Since it's harder for moisture to get out than in to a connector, only dismantling, drying and removing the corrosion will restore the connection in the long term. This type of bad connection will invariably be (temporarily) restored after disconnection/reconnection.

Potential bad connections are not confined to fuel pump electrical power and control circuits – they can also occur at ground (earth) points. Loose connectors and wire terminals, broken wire conductors, loose fasteners and corrosion (rust, battery acid, etc) at the attachment point are all potential causes. Some bad connections can only be determined by internal inspection of the connector, others are plainly obvious.

## ***Tech Tip:***

What appears to be repeat fuel pump failures may really be a failure of the electrical connectors in the pump module flange. Whenever a fuel pump module is removed from the vehicles, the electrical connector between a) the vehicle harness and the module connector, and b) the fuel pump/fuel gauge sender wiring and the module connector, should be checked for damage. Causes of connection failure include vibration and prolonged high loads on the vehicle's electrical system.

Any electrical connections which show signs of terminal discolouration, or melted plastic around the terminals, must be replaced. Contact the experts at Goss for any further info

