

## Jaguar V12 HE engine fuel injection power resistor connector maintenance.

### **Background**

The V12 HE motor installed in the Jaguar XJS, in 5.3 litre or 6.0 litre form, uses fuel injection and transistorised ignition to provide the fuel and spark to the cylinders. There are a number of common faults that can occur, mainly though age and lack of maintenance, that can cause engine failures and failure to start.

Common faults with these systems are, in no particular order:

- On all versions of the engine, injector harness cracking and shorting to earth because of heat in the engine bay, leading to cylinder flooding caused by constantly open injectors;
- On Lucas ignition variants, poor connection between the Lucas amplifier and the ECU, owing to the cable exiting the amplifier deteriorating in the heat of the engine bay, or even the amplifier itself failing though age and heat stress;
- On Marelli ignition versions, amplifier to distributor wiring cracking and shorting, again due to engine bay heat, engine speed sensors (one the flywheel and on the crankshaft front pulley) failing. Also, the double height Marelli distributor shorting out and disabling one bank of the ignition, leading to exhaust pipe fuel fires.
- Incorrectly gapped spark plugs and old high tension leads can also stress the ignition systems so that they fail.

Regular maintenance and preventative renewing of these items will ensure that failures are extremely rare. The downloadable book by Kirbert Palm entitled “Experience in a book – help for the XJS owner” deals comprehensively with these matters and is recommended for all serious owners and maintainers of the V12 XJS.

### **An unusual failure mode**

Although mentioned in the Kirbert Palm book, the writer has recently experienced a less well known and far less common failure mode of the fuel injection system. The writer’s car is a 1985 V12 HE coupe with the Lucas ignition system and the 5.3 litre V12 engine. On this car, as on all previous HE versions of the engine and on all subsequent versions of the V12 as installed in the XJS including Marelli ignition versions, the fuel injection system incorporates a Power Resistor located on the right hand side front of the engine bay, just behind the headlight nacelle. This unit is plugged into the main harness and if it is unplugged, the engine will not start because the injectors will not open and deliver fuel to the cylinders as intended. (see attached photo of the unit). **Beware that several other models of Jaguar and other UK manufactured cars, use a power resistor that looks exactly the same and has the same name, but their electrical characteristics are different. Only Lucas PR2 power resistor, Lucas number 73196B, Jaguar part number DAC 2044, is correct for the HE V12.**

The writer’s car started perfectly normally and ticked over for 20 minutes while some other maintenance work was tested for correct operation. The engine was then switched off for about 20 minutes. Whereupon when the writer tried to start the car, it turned over but would not fire. Brief investigation indicated the spark plugs were completely dry, in spite of the engine having been cranked for several seconds four or five times. The bone dry plugs implying no fuel at all was entering the cylinders, this being the cause of the failure to start. The spark plugs also had bright white-coloured deposits on them, indicating ultra-lean running, implying that even when the car had been ticking over, the injectors had not been opening for the correct length of time.

As the injector loom was fairly new it was unlikely to be the cause, however the power resistor is such an essential item for injector operation, it seemed the best thing to examine next. The power resistor was unplugged from the main loom and both halves of the 10 pin multiplug connector (one on the loom and the other on the power resistor) were cleaned with a toothbrush and electrical contact cleaner from an aerosol. The power resistor is bolted to the bodywork by two small bolts that screw into captive nuts. It is

easiest to clean the connector on the unit when it is unbolted, as the connector faces downwards and is hard to get at otherwise.

Once both the loom plug and the power resistor plug halves had been cleaned, the power resistor was reconnected to the loom, the ignition key turned and the engine started immediately. The power resistor was then bolted back to the bodywork.

### **Maintenance advice**

The design of the power resistor multiplug is not as good as modern connectors. However it is by no means bad. It is just that, over the space of nearly 30 years, the plug pins and the sockets they go into can gradually develop a build up of light corrosion sufficient to prevent the very low amperage electrical current being properly conducted.

Therefore, when owners are doing their annual maintenance, such as spark plug changes, high tension lead examination for deterioration, oil changes, and so on, it is strongly recommended to unplug the loom from the power resistor and clean both halves of the connector with contact cleaner.

After having done this work, the writer's V12 started noticeably more quickly, indeed practically instantaneously, and ticked over more evenly.