

# Fuel Charging and Controls - Fuel Charging and Controls

Diagnosis and Testing

## Inspection and Verification

1. **1.** Verify the customer concern.
2. **2.** Confirm which, if any, warning lights and/or messages were displayed on the instrument cluster.

• NOTE: If any warning lights and/or messages were displayed when the fault occurred, refer to the Driver Information table for DTCs associated with the display, then to the DTC index table for possible sources and actions. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition is switched **ON**, the warning will not reflag until the routine does run. See the DTC summaries for drive cycle routines.

3. **3.** Visually inspect for obvious signs of mechanical or electrical damage.

### Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none"> <li>● Engine oil level</li> <li>● Cooling system coolant level</li> <li>● Fuel contamination</li> <li>● Throttle body</li> <li>● Poly-vee belt</li> </ul>	<ul style="list-style-type: none"> <li>● Fuses</li> <li>● Wiring harness</li> <li>● Electrical connector(s)</li> <li>● Sensor(s)</li> <li>● Engine control module (ECM)</li> <li>● Transmission control module</li> <li>● Check spark plug type. Only resisted plugs should be fitted. Refer to specifications section for gap</li> <li>● Relay date codes. If the date on the relay is between R6 k1 and R6 k8, replace the relay</li> </ul>

4. **4.** Verify the following systems are working correctly:
  - Air intake system
  - Cooling system
  - Charging system
5. **5.** If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
6. **6.** Where the Jaguar approved diagnostic system is available, complete the S93 report before clearing any or all fault codes from the vehicle.

• NOTE: If a DTC cannot be cleared, then there is a permanent fault present that flags again as soon as it is cleared (the exception to this is P1260, which will only clear following an ignition **OFF/ON** cycle after rectification).

7. **7.** If the cause is not visually evident and the Jaguar approved diagnostic system is not available, use a fault code reader to retrieve the fault codes before proceeding to the Diagnostic Trouble Code (DTC) Index Chart, or the Symptom Chart if no DTCs are set.

• NOTE: If the DTC flagged was not present for two or more consecutive cycles, it is classed as temporary, and will be deleted following three cycles during which no fault was present. This could result in a reported warning light/message with no stored DTCs. If a fault is present for three consecutive cycles, the DTC becomes permanent, and will remain in the module's memory for 40 drive cycles (a cycle is an ignition **OFF/ON**, which will occur during the owner's normal use of the vehicle. No action on the part of the technician is necessary to perform this cycle. A drive cycle is a series of conditions needed to make the on-board diagnostic routine run, and may need a specific action on the part of the technician. See the DTC summaries for drive cycle routines).

8. **8.** Using the Jaguar approved diagnostic system where available, and a scan tool where not, check the freeze frame data for information on the conditions applicable when the fault was flagged. The format of this will vary, depending on the tool used, but can provide information useful to the technician in diagnosing the fault.



**CAUTION:** When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00.

• NOTE: When performing electrical voltage or resistance tests, always use a digital multimeter (DMM) accurate to 3 decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

• NOTE: Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

**Symptom Chart**

Symptom	Possible source	Action
Engine cranks, but does not fire	<ul style="list-style-type: none"> <li>● Security system /Immobiliser engaged</li> <li>● Throttle contaminated</li> <li>● Harness damage</li> <li>● Fuel pump relay</li> <li>● Fuel system</li> <li>● Refer to service action S491</li> </ul>	<p>Contact dealer technical support for information on security system. Check bulletins for throttle cleaning procedure. For fuel pump relay circuit tests, GO to Pinpoint Test <u>E...</u> Check fuel pressure, REFER to Section <u>310-00 Fuel System - General Information</u>. Check for associated DTCs. Check service actions.</p>
Engine cranks and fires, but will not start	<ul style="list-style-type: none"> <li>● Fuel pump relay</li> <li>● Throttle contaminated               <ul style="list-style-type: none"> <li>● Purge valve</li> <li>● Fuel pump</li> </ul> </li> <li>● Engine coolant temperature (ECT) sensor               <ul style="list-style-type: none"> <li>● Spark plugs fouled</li> <li>● Ignition coil failure(s)</li> </ul> </li> <li>● Check for water ingress into spark plug wells</li> <li>● HT short to ground (tracking) check rubber boots for cracks/damage</li> <li>● Cylinder compression loss (short-term. Refer to bulletin; 303-52)</li> <li>● Refer to service action S491</li> </ul>	<p>For fuel pump relay tests, GO to Pinpoint Test <u>E...</u> Check bulletins for throttle cleaning procedure. For evaporative emissions tests, REFER to Section <u>303-13 Evaporative Emissions</u>. Check fuel pressure, REFER to Section <u>310-00 Fuel System - General Information</u>. For ECT sensor circuit tests, REFER to Section <u>303-14 Electronic Engine Controls</u>. For ignition system, REFER to Section <u>303-07 Engine Ignition</u>. Check bulletins and service actions.</p>
Difficult to start cold	<ul style="list-style-type: none"> <li>● Rochester valve               <ul style="list-style-type: none"> <li>● Battery</li> </ul> </li> <li>● Throttle contaminated               <ul style="list-style-type: none"> <li>● Fuel pump</li> </ul> </li> <li>● Engine coolant temperature (ECT) sensor               <ul style="list-style-type: none"> <li>● Purge valve</li> </ul> </li> <li>● Cylinder compression loss (short-term. Refer to bulletin; 303-52)</li> <li>● Blocked part-load breather (service action S474)</li> <li>● Refer to service action S491</li> </ul>	<p>For rochester valve tests, REFER to Section <u>303-14 Electronic Engine Controls</u>. For battery information, REFER to Section <u>414-01 Battery, Mounting and Cables</u>. Check bulletins for throttle cleaning procedure. Check fuel pressure, REFER to Section <u>310-00 Fuel System - General Information</u>. For ECT sensor circuit tests, REFER to Section <u>303-14 Electronic Engine Controls</u>. For evaporative emissions tests, REFER to Section <u>303-13 Evaporative Emissions</u>. Check bulletins and service actions.</p>
Difficult to start hot	<ul style="list-style-type: none"> <li>● Rochester valve</li> <li>● Purge valve</li> <li>● Throttle contaminated               <ul style="list-style-type: none"> <li>● Fuel pump</li> </ul> </li> <li>● Engine coolant temperature (ECT) sensor</li> <li>● Blocked part-load breather (service action S474)               <ul style="list-style-type: none"> <li>● Injector leak</li> </ul> </li> </ul>	<p>For Rochester valve test, REFER to Section <u>303-14 Electronic Engine Controls</u>. For injector leak test, REFER to technical service bulletin, 303-39. Check fuel pressure, For evaporative emissions components, REFER to Section <u>303-13 Evaporative Emissions</u>. For ECT sensor tests, REFER to Section <u>303-14 Electronic Engine Controls</u>.</p>
Difficult to start after hot soak (vehicle standing after engine has reached operating temperature)	<ul style="list-style-type: none"> <li>● Rochester valve</li> <li>● Throttle contaminated               <ul style="list-style-type: none"> <li>● Purge valve</li> <li>● Fuel pump</li> </ul> </li> <li>● Engine coolant temperature</li> </ul>	

	<ul style="list-style-type: none"> <li>● (ECT) sensor</li> <li>● Blocked part-load breather (service action S474) <ul style="list-style-type: none"> <li>● Injector leak</li> </ul> </li> </ul>	
Engine stalls soon after start	<ul style="list-style-type: none"> <li>● Fuel pump relay <ul style="list-style-type: none"> <li>● ECM relay</li> </ul> </li> <li>● Throttle contaminated <ul style="list-style-type: none"> <li>● CMP/CKP sensor synchronization malfunction <ul style="list-style-type: none"> <li>● Harness</li> <li>● Fuel pump</li> </ul> </li> </ul> </li> <li>● MAF sensor malfunction</li> <li>● Engine coolant temperature (ECT) sensor <ul style="list-style-type: none"> <li>● Fuel lines</li> <li>● Air leakage</li> </ul> </li> <li>● Fuel pressure regulator</li> </ul>	<p>For fuel pump relay tests, GO to Pinpoint Test <a href="#">E...</a></p> <p>For ECM relay tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>Check bulletins for throttle cleaning procedure. For CMP/CKP sensor tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>Check fuel pressure, REFER to Section <a href="#">_310-00 Fuel System - General Information</a>.</p> <p>For MAF sensor and ECT sensor tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>For fuel line information, REFER to Section <a href="#">_310-01 Fuel Tank and Lines</a>.</p> <p>For intake system information, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>For fuel pressure regulator check, GO to Pinpoint Test <a href="#">D...</a></p>
Engine hesitates/poor acceleration	<ul style="list-style-type: none"> <li>● Fuel pump</li> <li>● Exhaust gas recirculation (EGR) <ul style="list-style-type: none"> <li>● Air leakage</li> </ul> </li> <li>● Stop lamp switch</li> <li>● Throttle sensors <ul style="list-style-type: none"> <li>● Throttle motor</li> </ul> </li> <li>● Spark plugs fouled</li> <li>● Check for water ingress into spark plug wells <ul style="list-style-type: none"> <li>● Ignition coil failure(s)</li> </ul> </li> <li>● HT short to ground (tracking) check rubber boots for cracks/damage <ul style="list-style-type: none"> <li>● ECM failure</li> </ul> </li> </ul>	<p>Check fuel pressure, REFER to Section <a href="#">_310-00 Fuel System - General Information</a>.</p> <p>For EGR information, REFER to Section <a href="#">_303-08 Engine Emission Control</a>.</p> <p>For intake system information, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>For stop lamp switch information, refer to the wiring diagrams. For throttle position sensor and throttle motor relay tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>For ignition system, REFER to Section <a href="#">_303-07 Engine Ignition</a>. Contact dealer technical support for advice on possible ECM failure.</p>
Engine backfires	<ul style="list-style-type: none"> <li>● Fuel pump</li> <li>● Air leakage</li> <li>● MAF sensor</li> <li>● HO2 sensors</li> <li>● Spark plugs</li> <li>● Check for water ingress into spark plug wells</li> <li>● HT short to ground (tracking) check rubber boots for cracks/damage <ul style="list-style-type: none"> <li>● Ignition coil failure(s)</li> </ul> </li> </ul>	<p>Check fuel pressure, REFER to Section <a href="#">_310-00 Fuel System - General Information</a>.</p> <p>For intake system information, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>For MAF and HO2 sensor circuit tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>For ignition system, REFER to Section <a href="#">_303-07 Engine Ignition</a>.</p>
Engine surges	<ul style="list-style-type: none"> <li>● Air leakage</li> <li>● Fuel pump</li> <li>● Stop lamp switch <ul style="list-style-type: none"> <li>● MAF sensor</li> <li>● Harness</li> </ul> </li> <li>● Throttle sensors <ul style="list-style-type: none"> <li>● Throttle motor</li> </ul> </li> <li>● Spark plugs</li> <li>● Check for water ingress into spark plug wells</li> <li>● HT short to ground (tracking) check rubber boots for cracks/damage <ul style="list-style-type: none"> <li>● ECM failure</li> </ul> </li> </ul>	<p>For intake system information, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>Check fuel pressure, REFER to Section <a href="#">_310-00 Fuel System - General Information</a>.</p> <p>For stop lamp switch information, refer to the wiring diagrams. For MAF sensor, throttle position sensor and throttle motor relay tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>For ignition system, REFER to Section <a href="#">_303-07 Engine Ignition</a>. Contact dealer technical support for advice on possible ECM failure.</p>

Engine detonates/knocks	<ul style="list-style-type: none"> <li>● Fuel pump</li> <li>● HO2 sensors</li> <li>● Air leakage</li> <li>● Blocked part-load breather (service action S474)</li> <li>● Mass air flow (MAF) sensor</li> </ul>	<p>Check fuel pressure. REFER to Section <a href="#">_310-00 Fuel System - General Information</a>.</p> <p>For HO2 sensor circuit tests, check for DTC indicating which sensor and follow indicated pinpoint test. For intake system information, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>Check service action S474. For MAF sensor circuit tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p>
No throttle response	<ul style="list-style-type: none"> <li>● Throttle sensors</li> <li>● Throttle motor</li> </ul>	<p>For throttle position sensor and throttle motor relay tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p>
Poor throttle response	<ul style="list-style-type: none"> <li>● Throttle sensors</li> <li>● Throttle motor</li> <li>● Air leakage</li> <li>● Mass air flow (MAF) sensor</li> </ul>	<p>For throttle position sensor and throttle motor relay tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p> <p>For intake system, REFER to Section <a href="#">_303-12 Intake Air Distribution and Filtering</a>.</p> <p>For MAF sensor tests, REFER to Section <a href="#">_303-14 Electronic Engine Controls</a>.</p>

### Driver Information Chart

• NOTE: Use this table to identify DTCs associated with the message center display, then refer to the DTC index for possible sources and actions.

• NOTE: For definitions of Default Modes, see the foot of this table.

Warning light	Message	Default Mode	DTC
Red	Engine Failsafe Mode	Limp-Home	P1224
Red	Engine Failsafe Mode	Limp-Home	P1229
Red	Engine Failsafe Mode	Limp-Home	P0122, P0123,
Red	Engine Failsafe Mode	Limp-Home	P0222, P0223
Red	Engine Failsafe Mode	Limp-Home	P0121
Red	Engine Failsafe Mode	Limp-Home	P1122, P1123
Red	Engine Failsafe Mode	Limp-Home	P1222, P1223
Red	Engine Failsafe Mode	Limp-Home	P1121, P1632
Red	Engine Failsafe Mode	Limp-Home	P1251, P0560, P1658
Red	Engine Failsafe Mode	Limp-Home	P1631
Red	Engine Failsafe Mode	Limp-Home	P1611
Red	Engine Failsafe Mode	Limp-Home	P1633
Red	Engine Failsafe Mode	Limp-Home	P1609
Red	Engine Failsafe Mode	Limp-Home	P0506, P0507
Red	Engine Failsafe	Limp-Home	P1656