

Evaporative Emissions

Preliminary Inspection

1. Visually inspect for obvious signs of mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
<ul style="list-style-type: none">• Engine oil level• Cooling system coolant level• Fuel level• Fuel contamination/grade/quality• Throttle body• Poly-vee belt	<ul style="list-style-type: none">• Fuses• Wiring harness• Electrical connector(s)• Sensor(s)• Engine control module (ECM)

2. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
3. If the concern is not visually evident, verify the symptom and proceed with diagnosis, using the Jaguar approved diagnostic system, where available.
4. Where K-Line or Vacutec equipment is available, it should be used as an aid to diagnosis. The equipment must be capable of testing to the 0.020 thou standard. (2001 MY on).

Diagnostic Drive Cycles

Following the setting of a DTC, the appropriate repairs must be carried out, and the normal operation of the system checked. This will be done by performing a series of drive cycles which will enable the vehicle to operate the evaporative emissions system as a function check. For details of the drive cycles, <<303-14>> ECM adaptations.

Diagnostic Trouble Code (DTC) index/Symptom Chart

1. 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).

2. 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.
3. 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.

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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
Difficulty in filling	<ul style="list-style-type: none">• Restriction in the vapor line between the fuel tank and the carbon canister outlet/atmospheric port	Check for free flow of air.
Fuel smell	<ul style="list-style-type: none">• Adaptations incomplete• Purge valve inoperative	Carry out the adaptations procedure, <<303-14>> Check purge valve operation.
Message center display (see below)	<ul style="list-style-type: none">• Fuel filler cap missing/not tightened after refuelling	Check fuel filler cap condition and fitment.

Driver Information

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:

A trip is an ignition **OFF**, 30 seconds delay, ignition **ON** cycle, plus a minimum coolant temperature increase of 22°C (40°F) after which the coolant temperature should reach a minimum 71°C (160°F)

Warning Light	Message	Default Mode	DTC
Red	Check Engine (after two trips)	ECM default. (Canister purge inhibited, adaptive fuel metering inhibited)	P0442, P0444, P0445, P0447, P0448.
Red	Check Engine (after two trips)	None	P0452, P0453.

Diagnostic Trouble Code (DTC) index

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Diagnostic Trouble Code	Description	Possible Source	Action
P0442	System leak detected (small, 0.040 inches)	<ul style="list-style-type: none"> Fuel tank filler cap seal defective System leak (canister damage, pipework damage) Canister close valve leaking Fuel tank leak 	Check filler cap, system pipework, fuel tank, Goto <<A>> .
P0443	Canister purge valve malfunction	<ul style="list-style-type: none"> Canister purge valve failure (not fully closed) 	For canister purge valve test, Goto <> .
P0444	Canister purge valve circuit open circuit	<ul style="list-style-type: none"> Canister purge valve to ECM drive circuit; open circuit, high resistance Canister purge valve failure. 	For canister purge valve circuit tests, Goto <<C>> .
P0445	Canister purge valve circuit short circuit	<ul style="list-style-type: none"> Canister purge valve to ECM drive circuit; short circuit to ground Canister purge valve failure. 	For canister purge valve circuit tests, Goto <<C>> .
P0446	Canister Close Valve (CCV) malfunction	<ul style="list-style-type: none"> Fuel tank to atmospheric port line restricted CCV failure (stuck closed) 	For canister close valve (CCV) tests, Goto <<D>> .
P0447	Canister Close Valve (CCV) circuit open circuit.	<ul style="list-style-type: none"> CCV power supply circuit; open circuit, short circuit CCV to ECM drive circuit; open circuit, high resistance, short circuit to B+ voltage CCV failure 	For CCV circuit tests, Goto <<E>> .
P0448	Canister Close Valve (CCV) circuit short circuit	<ul style="list-style-type: none"> Canister close valve to ECM drive circuit; short circuit to ground Canister close valve failure 	For CCV circuit tests, Goto <<E>> .
P0450	Fuel Tank Pressure (FTP) sensor malfunction	<ul style="list-style-type: none"> FTP sensor failure 	For FTP sensor test, Goto <<F>> .
P0452	Fuel tank Pressure (FTP) sensor circuit; low voltage (low pressure)	<ul style="list-style-type: none"> FTP sensor disconnected FTP sensor to ECM sense circuit; open circuit, short circuit to ground FTP sensor to splice in sensor supply circuit; open circuit, high resistance FTP sensor failure 	For FTP sensor circuit tests, Goto <<G>> .
P0453	Fuel tank Pressure (FTP) sensor circuit; high voltage (high pressure)	<ul style="list-style-type: none"> FTP sensor to splice in sensor ground circuit; open circuit, high resistance FTP sensor to ECM sense circuit; open circuit, short circuit to high voltage FTP sensor failure 	For FTP sensor circuit tests, Goto <<G>> .

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P0455	System leak detected (large)	<ul style="list-style-type: none"> • Filler cap missing • Filler cap seal defective • System leak (canister/pipework damage) • CCV stuck open • Purge valve to engine purge pipe, damaged/blocked/leaking • Purge valve operating vacuum hose leak/blockage • Purge valve failure • Fuel tank leak 	Check filler cap, system pipework, fuel tank, Goto <<A>> . For canister purge valve flow check, Goto <<H>> .
P0456	System leak detected (small, 0.020 inches)	<ul style="list-style-type: none"> • Fuel tank filler cap seal defective • System leak (canister damage, pipework damage) • Canister close valve leaking • Fuel tank leak 	Check filler cap, system pipework, fuel tank, Goto <<A>> .

Pinpoint Tests

A : P0442, P0456; SYSTEM LEAK DETECTED (SMALL/VERY SMALL)

NOTE:

For K-Line or Vacutec equipment connection, see bulletin 05.1-29, or Vacutec operating instructions

NOTE:

From the instructions, select the appropriate equipment setting for the DTC (P0442 indicates a leak of 0.040 inches, P0456 indicates a leak of 0.020 inches).

A1 : CHECK PIPEWORK, ETC FOR LEAKS

1. Carry out a visual inspection of all accessible pipes, connectors and components. Rectify any faults noted.
2. Using K-line or Vacutec equipment, check the joints/connections in the following order;

- Filler cap
- Canister purge valve
- Underfloor purge line connectors
- Carbon canister connections and vapor hoses
- Canister close valve and it's atmospheric port (disconnect the air vent tube if necessary).

•Was a fault found?

-> Yes

Rectify the fault as necessary. Repeat the K-line or Vacutec test. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above.

-> No

Possible intermittent fault with vapor hoses, O-ring seals. Carefully check condition of hoses and seals.

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Replace any suspect seals. Repeat the K-line or Vacutec test. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above.

B : P0443; CANISTER PURGE VALVE MALFUNCTION

B1 : CHECK THE CANISTER PURGE VALVE FOR INTERNAL LEAKS

1. Disconnect the outlet pipe from the canister purge valve (pipe from purge valve to crankcase breather tube).
2. Using a hand-held vacuum pump, apply a vacuum to the outlet port of the canister purge valve

•Does the canister purge valve hold vacuum?

-> Yes

No fault found with canister purge valve. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above.

-> No

INSTALL a new canister purge valve. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above.

C : P0444, P0445; PURGE VALVE CIRCUIT OPEN/SHORT CIRCUIT

C1 : CHECK THE PURGE VALVE DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the **OFF** position.
2. Disconnect the battery negative terminal.
3. Disconnect the ECM electrical connector, EM80.
4. Disconnect the purge valve electrical connector, LF58.
5. Measure the resistance between EM80, pin 01, (UY) and LF58, pin 02 (UY).

•Is the resistance greater than 5 ohms?

-> Yes

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see 'diagnostic drive cycles' above.

-> No

Goto <<C2>>

C2 : CHECK THE PURGE VALVE DRIVE CIRCUIT FOR SHORT TO GROUND

1. Reconnect the battery negative terminal.
2. Measure the resistance between LF58, pin 02 (UY) and GROUND.

•Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

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-> **No**

INSTALL a new purge valve, CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

D : P0446; CANISTER CLOSE VALVE (CCV) STUCK CLOSED OR RESTRICTED FLOW

NOTE:

Depending on the severity of the blockage, it is possible that some level of difficulty has been experienced during a fuel fill operation.

D1 : CHECK FOR FREE FLOW OF AIR

1. Check for free flow of air through the following, paying particular attention to kinked or flattened pipes:

- Filter
- Interconnecting pipe (filter to CCV)
- Canister Close Valve (CCV)
- Interconnecting pipe (CCV to carbon canister)
- Carbon canister
- Interconnecting pipe between carbon canisters and to fuel tank
- Fuel tank vapor port

•Was a fault found?

-> **Yes**

Rectify the fault as necessary. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> **No**

Recheck the DTCs. Carry out a full Evaporative system monitor drive cycle.

E : P0447, P0448; CANISTER CLOSE VALVE CIRCUIT OPEN/SHORT CIRCUIT

E1 : CHECK THE CCV DRIVE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the **OFF** position.
2. Disconnect the battery negative terminal.
3. Disconnect the ECM electrical connector, EM80.
4. Disconnect the CCV electrical connector, BT14.
5. Measure the resistance between EM80, pin 02, (O) and BT14, pin 01 (O).

•Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see 'diagnostic drive cycles' above.

-> **No**

Goto <<E2>>

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E2 : CHECK THE CCV DRIVE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Reconnect the battery negative terminal.
2. Measure the resistance between BT14, pin 01, (O) and GROUND.

•Is the resistance less than 10,000 ohms?

-> Yes

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> No

INSTALL a new CCV. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above. If the DTC is repeated, contact dealer technical support for advice on possible ECM failure.

F : P0450; FUEL TANK PRESSURE (FTP) SENSOR MALFUNCTION

NOTE:

This test will involve the use of a scan tool capable of reading fuel tank pressure.

F1 : CHECK FTP SENSOR FUNCTION

1. Turn the ignition switch to the **OFF** position.
2. Disconnect the FTP sensor electrical connector, FT02.
3. Connect a slave sensor to the harness.
4. Turn the ignition switch to the **ON** position.
5. Monitor the fuel tank pressure.
6. Close the sensor port with a finger, and press lightly.

•Does the pressure alter?

-> Yes

INSTALL a new fuel tank pressure sensor. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> No

Check the circuit between the FTP sensor and the ECM. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

G : P0452, P0453; FUEL TANK PRESSURE (FTP) SENSOR LOW/HIGH VOLTAGE

G1 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR HIGH RESISTANCE

1. Turn the ignition switch to the **OFF** position.
2. Disconnect the battery negative terminal.
3. Disconnect the ECM electrical connector, EM81.
4. Disconnect the FTP sensor electrical connector, FT02.

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5. Measure the resistance between EM81, pin 16 (RG) and FT02, pin 02 (RG).

•Is the resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see 'diagnostic drive cycles' above.

-> **No**

Goto <<G2>>

G2 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Reconnect the battery negative terminal.

2. Measure the resistance between EM81, pin 16 (RG) and GROUND.

•Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> **No**

Goto <<G4>>

G3 : CHECK THE FTP SENSOR SENSE CIRCUIT FOR SHORT CIRCUIT TO HIGH VOLTAGE

1. Turn the ignition switch to the **ON** position.

2. Measure the voltage between FT02, pin 02 (RG) and GROUND.

•Is the voltage greater than 3 volts?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> **No**

Goto <<G4>>

G4 : CHECK THE FTP SENSOR SIGNAL GROUND CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal.

2. Reconnect the ECM electrical connector, EM81.

3. Disconnect the ECM electrical connector, EM82.

4. Disconnect the ECM electrical connector, EM83.

5. Measure the resistance between EM82, pin 07 (BG) and FT02, pin 01 (BG).

6. Measure the resistance between EM83, pin 13 (BG) and FT02, pin 01 (BG).

•Is either resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. This circuit includes harness splice, EMS02. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For

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additional information, see 'diagnostic drive cycles' above.

-> **No**

Goto <<G5>>

G5 : CHECK THE FTP SENSOR SIGNAL GROUND CIRCUIT FOR SHORT CIRCUIT TO GROUND

1. Reconnect the battery negative terminal.
2. Measure the resistance between FT02, pin 01 (BG) and GROUND.

•Is the resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> **No**

Goto <<G6>>

G6 : CHECK THE FTP SENSOR POWER SUPPLY CIRCUIT FOR HIGH RESISTANCE

1. Disconnect the battery negative terminal.
2. Measure the resistance between EM82, pin 01 (OY) and FT02, pin 03 (OY).
3. Measure the resistance between EM83, pin 05 (OY) and FT02, pin 03 (OY).

•Is either resistance greater than 5 ohms?

-> **Yes**

REPAIR the high resistance circuit. This circuit includes harness splice, EMS01. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see 'diagnostic drive cycles' above.

-> **No**

Goto <<G7>>

G7 : CHECK THE FTP SENSOR WIRING FOR SHORT CIRCUIT TO EACH OTHER

1. Measure the resistance between FT02, pins 01 (BG) and 02 (RG).
2. Measure the resistance between FT02, pins 02 (RG) and 03 (OY).

•Is either resistance less than 10,000 ohms?

-> **Yes**

REPAIR the short circuit. For additional information, refer to the wiring diagrams. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.

-> **No**

INSTALL a new FTP sensor. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. For additional information, see 'diagnostic drive cycles' above.

H : P0455; SYSTEM LEAK DETECTED (LARGE)

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H1 : CHECK THE CANISTER PURGE VALVE FOR FLOW

1. Run the engine.
2. Make sure the canister purge valve is operating.
3. Using a flowmeter (or a small piece of paper) at the CCV inlet tube, confirm flow through the canister purge valve.

•Is there flow through the canister purge valve?

-> **Yes**

Possible intermittent fault with vapor hoses, O-ring seals. Carefully check condition of hoses and seals. Replace any suspect seals. Repeat the K-line or Vacutec test. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle. Recheck DTCs. For additional information, see 'diagnostic drive cycles' above.

-> **No**

INSTALL a new canister purge valve. CLEAR the DTC. Carry out a full Evaporative system monitor drive cycle.