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2020.0 DEFENDER (LE), 303-13B

EVAPORATIVE EMISSIONS - INGENIUM I6 3.0L PETROL (G2400981)

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PRINCIPLES OF OPERATION

For a detailed description of the Evaporative Emissions system, refer to the relevant Description and Operation section in the workshop manual. REFER to: [Evaporative Emissions](#) (303-13B Evaporative Emissions - INGENIUM I6 3.0L Petrol, Description and Operation).

INSPECTION AND VERIFICATION

ⓘ CAUTION:

Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

△ NOTES:

- If a control module or a component is at fault or may be at fault and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual, or determine if any prior approval program is in operation, prior to the installation of a new module/component.
- When performing voltage or resistance tests, always use a digital multimeter that has the resolution ability to view 3 decimal places. For example, on the 2 volts range can measure 1 mV or 2 kΩ range can measure 1 Ω. When testing resistance always take the resistance of the digital multimeter leads into account.
- Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests.

1. Verify the customer concern
2. Visually inspect for obvious signs of damage and system integrity

Visual Inspection

MECHANICAL	ELECTRICAL
■ Fuel filler cap ■ Fuel filler neck ■ Fuel pipes ■ Fuel tank ■ Evaporative emissions canister ■ Secondary evaporative emissions canister (If installed)	■ Fuses ■ Wiring harnesses and connectors ■ Purge valve ■ Purge valve sensor ■ Diagnostic Module Tank Leakage (DMTL) pump ■ Diagnostic Module Tank Leakage (DMTL) changeover valve

MECHANICAL	ELECTRICAL
■ Purge valve ■ Diagnostic Module Tank Leakage (DMTL) filter ■ Diagnostic Module Tank Leakage (DMTL) pump ■ Reservoir	

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index

5. Check JLR claims submission system for open campaigns. Refer to the corresponding bulletins and SSMS which may be valid for the specific customer complaint and complete the recommendations as required

SYMPTOM CHART

SYMPTOM	POSSIBLE CAUSES	ACTION
Difficulty in filling fuel tank	■ Restriction in the vapor line between the fuel tank and the carbon canister outlet/atmospheric port	■ Inspect for restrictions /damage, etc (see visual inspection)
Fuel smell	■ Fuel system leak ■ Purge valve inoperative	■ Inspect for leaks ■ Inspect the operation of the purge valve
CHECK FUEL FILLER CAP displayed on message center and only evaporative emission system leak DTCs P0442/P0456/P0457 set	■ Fuel system leak detected	■ Refer to the sections below regarding the diagnostic routine and the special tools. GO to Pinpoint Test A.
Malfunction Indicator Lamp (MIL) illuminated and only evaporative emission system leak DTCs P043E/P043F/P0440/P0442/P0444/P0451/P0452/P0453/P0456/P0458/P0459/P0497/P144B/P2400/P2401/P2402/P2404/P2405/P2406/P2407/P240A/P240B/P240C/P2418/P2419/P2420 set	■ Fuel system leak detected	■ Refer to the sections below regarding the diagnostic routine and the special tools. GO to Pinpoint Test A.
DMTL system related DTCs P043E/P043F/P0442/P2400/P2401/P2402/P2404/P2405/P2406/P2407/P240A/P240B/P240C/P2418/P2419/P2420 set	■ Diagnostic Module Tank Leakage (DMTL) system fault	■ Refer to the sections below regarding the

SYMPTOM	POSSIBLE CAUSES	ACTION
		diagnostic routine and the special tools. GO to Pinpoint Test A .

DIAGNOSTIC ROUTINE

NOTES:

- The Evaporative System Diagnostic Check routine will not run if the battery state of charge is too low. To proceed, connect the Jaguar Land Rover approved Vehicle Battery Conditioner / Power Supply.
- The Evaporative System Diagnostic Check routine will not run if the fuel level is too low (<15%). To proceed, add the correct grade of fuel as necessary.

The Evaporative System Diagnostic Check routine will initially measure the reference current drawn by the diagnostic module tank leakage pump, and then energise the changeover valve to pressurise the fuel tank. The combustible gas detector is then used to identify the source of a leak. The routine takes approximately 10 minutes may be performed up to 3 times to allow time to test the entire fuel system.

SPECIAL TOOLS

COMBUSTIBLE GAS DETECTOR

The combustible gas detector is used to detect petrol vapor leaks. Before testing, perform the proving and calibrating routines.

WARNING:

Do not use the combustible gas detector if the proving routine or the calibration routine cannot be completed successfully.

CAUTION:

The combustible gas detector and its rechargeable batteries will be damaged if the batteries are installed in the wrong orientation.

NOTE:

The combustible gas detector should be switched on and calibrated in a non-contaminated environment.

Proving Routine

Perform the following steps to test the combustible gas detector:

1. Rotate the sensitivity control fully counter-clockwise

2. Set the combustible gas detector power switch to 'ON'
3. Check the battery warning indicator - The batteries must be recharged if the warning indicator is **not** illuminated
4. Allow the combustible gas detector to warm up (approximately 30 seconds)
5. Slowly rotate the sensitivity control fully clockwise - Check that the ticking rate increases and ultimately becomes a siren
6. When testing is complete, set the combustible gas detector power switch to 'OFF'

Calibration Routine

Perform the following step to calibrate the combustible gas detector:

7. Slowly rotate the sensitivity control until a rapid ticking is audible - the detector is now set to 'high sensitivity' mode and this is suitable for detecting small leaks. Alternatively, if the siren sounds repeatedly during testing, rotate the sensitivity control until a slow ticking is audible - the detector is now set to 'low sensitivity' mode and this is suitable for detecting the source of large leaks

Testing

The fuel tank must be pressurised during leak testing. To achieve this, use the Jaguar Land Rover approved diagnostic equipment to perform routine - Evaporative System Diagnostic Check. Test the fuel system components for leaks in the following order:

- Fuel filler cap
- Purge valve
- Diagnostic module tank leakage module
- Fuel tank
- Filler neck / vapor hose

PURGE VALVE HOSE BUNGS

A leaking (not closing fully) purge valve is identified in the Pinpoint Tests by performing the test routine with a bung installed in the purge hose.

LEAK REPAIRS

Each component joint in the fuel system is a potential leak path. For further information regarding the installation of hoses and seals, refer to the relevant section of the workshop manual.

The fuel filler cap is the only component that is frequently disturbed and as such is the most likely leak path. When installing the fuel filler cap, it should be tightened securely (until 3 clicks are heard) to make sure the system is free from leaks.

The diagnostic module tank leakage pump is not sealed internally at the electrical connector. The wiring harness connector contains grommets and a conventional seal. This connector must be installed securely to make sure the system is free from leaks.

SMOKE TESTING

Smoke testing should be used to identify a leak only when instructed by Retailer/Authorized Repairer Technical Support. Refer to the manufacturer's instructions for information regarding using the smoke test equipment. Smoke may be introduced into the fuel system through the purge hose, the fuel filler neck or the DMTL filter housing. When introducing smoke through the DMTL filter housing, use the Jaguar Land Rover approved diagnostic equipment to perform routine - (0x407F) Fuel System Leak Check (DMTL) - to make sure that the DMTL changeover valve is energised and the DMTL pump is running.

PINPOINT TESTS

PINPOINT TEST A : DTC READ	
A1: DTC READ	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Using the Jaguar Land Rover approved diagnostic equipment, check the powertrain control module for related DTCs
	Are any purge valve DTCs set? Yes Refer to the relevant DTC Index and rectify any purge valve faults before proceeding. GO to Pinpoint Test B . No GO to Pinpoint Test B .

PINPOINT TEST B : DIAGNOSTIC MODULE TANK LEAKAGE TESTS	
B1: DIAGNOSTIC MODULE TANK LEAKAGE TEST 1	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Evaporative System Diagnostic Check - and use the combustible gas detector to inspect for leaks
	Was a leak detected around the fuel filler cap? Yes GO to B2. No GO to B3.
B2: DIAGNOSTIC MODULE TANK LEAKAGE TEST 2	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Tighten the fuel filler cap securely (until 3 clicks are heard)
	2 Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Evaporative System Diagnostic Check - and use the combustible gas detector to inspect for leaks

B2: DIAGNOSTIC MODULE TANK LEAKAGE TEST 2	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	Test passed? Yes Repair complete. Advise the customer to always tighten the fuel filler cap securely (until 3 clicks are heard) No GO to B3.
B3: DIAGNOSTIC MODULE TANK LEAKAGE TEST 3	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Consider the previous test results
	Was a leak detected by the routine? Yes GO to B4. No Diagnostic module tank leakage system circuit fault. Check DTCs and refer to the relevant DTC Index. Repair the circuit fault as necessary. GO to Pinpoint Test E.
B4: DIAGNOSTIC MODULE TANK LEAKAGE TEST 4	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Consider the previous test results
	Was the source of the leak identified? Yes Repair as necessary. GO to Pinpoint Test E. No GO to Pinpoint Test C.

PINPOINT TEST C : BLOCKED DMTL FILTER TESTS	
C1: BLOCKED DMTL FILTER TEST 1	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 NOTE: When the vehicle has been exposed to cold ambient temperatures, it is possible for the DMTL filter to become blocked with snow or ice. This can cause a leak to be detected in error as the DMTL pump will be unable to pressurise the fuel tank within the prescribed time.	
	1 Inspect the DMTL filter for restrictions/blockages
	Is a restriction or blockage present? Yes Repair as necessary. GO to Pinpoint Test E. No GO to Pinpoint Test D.

PINPOINT TEST D : PURGE HOSE BUNG TESTS

D1: PURGE HOSE BUNG TEST 1

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
 NOTE: This test is performed when a DTC indicates that a leak is present but an external leak has not been identified using the combustible gas detector.	
	1 Disconnect the purge hose from the purge valve
	2 Install the appropriate bung to the purge hose
	3 Using the combustible gas detector, inspect for fuel vapor near the bung; allow fuel vapor to dissipate before proceeding
	4 Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Evaporative System Diagnostic Check - and use the combustible gas detector to inspect for leaks
	Test passed? Yes Remove the bung. Install a new purge valve. GO to Pinpoint Test E . No GO to D2 .

D2: PURGE HOSE BUNG TEST 2

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Consider the results of the previous test
	Was the source of the leak identified? Yes Repair as necessary. GO to Pinpoint Test E . No GO to D3 .

D3: PURGE HOSE BUNG TEST 3

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Remove the bung
	2 Reconnect the purge hose to the purge valve
	3 Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Evaporative System Diagnostic Check - and use the combustible gas detector to inspect for leaks
	Was the source of the leak identified? Yes Repair as necessary. GO to Pinpoint Test E . No Install a new diagnostic module tank leakage module. GO to Pinpoint Test E .

PINPOINT TEST E : REPAIR VALIDATION TESTS	
E1: REPAIR VALIDATION TEST 1	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	1 Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Evaporative System Diagnostic Check - and use the combustible gas detector to inspect for leaks
	Test passed? Yes Repair complete No Contact Retailer/Authorized Repairer Technical Support

DTC INDEX

For a list of Diagnostic Trouble Codes (DTCs) that could be set on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code Index - INGENIUM I6 3.0L Petrol, Vehicles With: MHEV, DTC: Powertrain Control Module \(PCM\) B1087-88 to P0634-00](#) (100-00 General Information, Description and Operation).

cmjjaGFyZG1vbnRvbjsyMDIwLTA5LTE3VDA5OjEyOjI5LjgzMFo7OTAuMTk5LjEyMS4xMTc7