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2020.0 DEFENDER (LE), 303-06C

STARTING SYSTEM - INGENIUM I6 3.0L PETROL

[G2400969]

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PRINCIPLES OF OPERATION

For a detailed description of the Starting System, refer to the relevant Description and Operation section in the workshop manual. REFER to: [Starting System](#) (303-06C Starting System - 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

MECHANICAL	ELECTRICAL
■ Starter motor ■ Belt integrated starter generator ■ Engine (turns freely)	■ Battery ■ Battery terminal clamps ■ Fuses ■ Starter relay ■ Wiring harnesses and connectors ■ Accelerator pedal position sensor ■ Brake pedal switch ■ Transmission Control Switch (TCS) ■ Smart key ■ Ignition switch ■ Auto stop/start switch ■ Powertrain control module

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

NOTE:

The belt integrated starter generator is used to perform all engine cranks when the ambient temperature is above -5°C. The starter motor is used for engine cranks when the ambient temperature is -5°C or below.

SYMPTOM	POSSIBLE CAUSES	ACTION
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SYMPTOM	POSSIBLE CAUSES	ACTION
The engine does not crank (starter motor /belt integrated starter generator does not turn)	■ Battery/charging system fault ■ Engine management system fault ■ Transmission control switch not set to Park or Neutral ■ Smart key not present /recognized ■ Starter relay fault ■ Starter motor / belt integrated starter generator ground circuit open circuit, high resistance ■ Starter motor solenoid circuit short circuit to ground, open circuit, high resistance ■ Starter motor / belt integrated starter generator power circuit short circuit to ground, open circuit, high resistance ■ Engine seized	■ Refer to the relevant section of the workshop manual and inspect the battery and charging system. Rectify as necessary ■ Using the Jaguar Land Rover approved diagnostic equipment, check the powertrain control module for related DTCs and refer to the relevant DTC index ■ Set the transmission control switch to Park or Neutral and retest ■ Check that the smart key is present and recognized ■ Inspect the operation of the starter relay. Rectify as necessary ■ Refer to the electrical circuit diagrams and inspect the starter motor / belt integrated starter generator ground circuit for open circuit, high resistance. Repair the wiring harness as necessary ■ Refer to the electrical circuit diagrams and inspect the starter motor solenoid circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new starter motor solenoid as necessary ■ Refer to the electrical circuit diagrams and inspect the starter motor / belt integrated starter generator power circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new starter motor / belt integrated starter generator as necessary ■ Check that the engine turns freely
The engine does not crank (starter motor /belt integrated starter generator does turn)	■ Starter motor / belt integrated starter generator incorrectly installed ■ Starter motor / belt integrated starter generator internal failure ■ Drive plate ring gear damaged	■ inspect the installation of the starter motor / belt integrated starter generator. Rectify as necessary ■ Inspect the operation of the starter motor / belt integrated starter generator. Rectify as necessary ■ Inspect the drive plate ring gear teeth for damage, foreign objects, etc. Rectify as necessary

SYMPTOM	POSSIBLE CAUSES	ACTION
Engine cranks too slowly	■ Battery/charging system fault ■ Starter motor / belt integrated starter generator ground circuit open circuit, high resistance ■ Starter motor / belt integrated starter generator power circuit short circuit to ground, open circuit, high resistance ■ Starter motor / belt integrated starter generator internal failure ■ Engine oil grade incorrect	■ Refer to the relevant section of the workshop manual and inspect the battery and charging system. Rectify as necessary ■ Refer to the electrical circuit diagrams and inspect the starter motor / belt integrated starter generator ground circuit for open circuit, high resistance. Repair the wiring harness as necessary ■ Refer to the electrical circuit diagrams and inspect the starter motor / belt integrated starter generator power circuit for short circuit to ground, open circuit, high resistance. Repair the wiring harness or install a new starter motor / belt integrated starter generator as necessary ■ Inspect the operation of the starter motor / belt integrated starter generator. Rectify as necessary ■ Check the engine oil grade. Rectify as necessary
Engine cranks too fast	■ Timing chain failure ■ Engine cylinder compressions too low	■ Inspect the integrity of the timing chains. Rectify as necessary ■ Refer to the relevant section of the workshop manual and test the engine cylinder compressions. Rectify as necessary
Starter motor/belt integrated starter generator excessively noisy	■ Starter motor / belt integrated starter generator incorrectly installed ■ Starter motor / belt integrated starter generator internal failure ■ Drive plate ring gear damaged	■ Inspect the installation of the starter motor / belt integrated starter generator. Rectify as necessary ■ Inspect the operation of the starter motor / belt integrated starter generator. Rectify as necessary ■ Inspect the drive plate ring gear teeth for damage, foreign objects, etc. Rectify as necessary

SYMPTOM	POSSIBLE CAUSES	ACTION
Auto stop/start system inoperative	- Auto stop/start system inhibited - Driver error /expectation - Recent DTC clear - System fault - Auto stop/start system fault	 NOTE: 'Auto stop/start fault' will be displayed in the instrument panel cluster message centre when the system is inoperative due to a fault. - Refer to the Auto Stop/Start System Inhibits table for possible inhibit conditions - Auto stop/start system inhibited due to driver error/expectation: Explain/demonstrate the auto stop/start system to the driver - Auto stop/start system inhibited due to a recent DTC clear (and a drive cycle not completed): Road test the vehicle at a speed of 48 to 80 km/h (30 to 50 mph) for 2 to 3 minutes, allow the engine to idle, auto stop/start will now activate - Auto stop/start system inhibited due to battery condition: Using the Jaguar Land Rover approved diagnostic equipment, perform routine - Power Supply Service Mode Diagnostic Routine - Using the Jaguar Land Rover approved diagnostic equipment, check the powertrain control module for related DTCs and refer to the relevant DTC index

AUTO STOP/START SYSTEM INHIBITS

The inhibit conditions listed below will not set Diagnostic Trouble Codes (DTCs) but will set flags which can be viewed using the Jaguar Land Rover approved diagnostic equipment - Datalogger / Powertrain Control Module (PCM). Normal auto stop/start system operation will resume when an inhibit condition is no longer present, but the battery related inhibits may persist for some time.



NOTES:

- Performing a DTC clear on a petrol (gasoline) engine vehicle will inhibit the auto stop/start system.
- Do not reset the Battery Monitoring System (BMS) to rectify battery condition inhibits. This may temporarily restore auto stop/start system operation but will lead to a recurrence of the fault.

INHIBITS

INHIBITS

- Auto stop/start off switch has been operated by driver
- DTC clear performed
- Brake pedal not fully pressed
- Accelerator pedal not released
- Hood open detected
- Driver door detected open
- Driver seatbelt not fastened
- After reversing, the vehicle's speed has not exceeded 16 km/h (10 mph)
- A gearshift paddle has been used to select a gear
- All terrain progress control special program selected
- Climate control demand exceeds calibrated threshold
- Heated windshield operating
- Trailer connected
- Engine coolant temperature below threshold
- Engine oil temperature below threshold
- Catalytic converter outside either pre or post calibration range
- Battery state of charge low
- Battery cold cranking capability below threshold
- Ambient temperature above 40°C (104°F)
- Ambient temperature below -5°C (23°F)

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).