

Published: 11-May-2011

Glow Plug System -

Torque Specifications

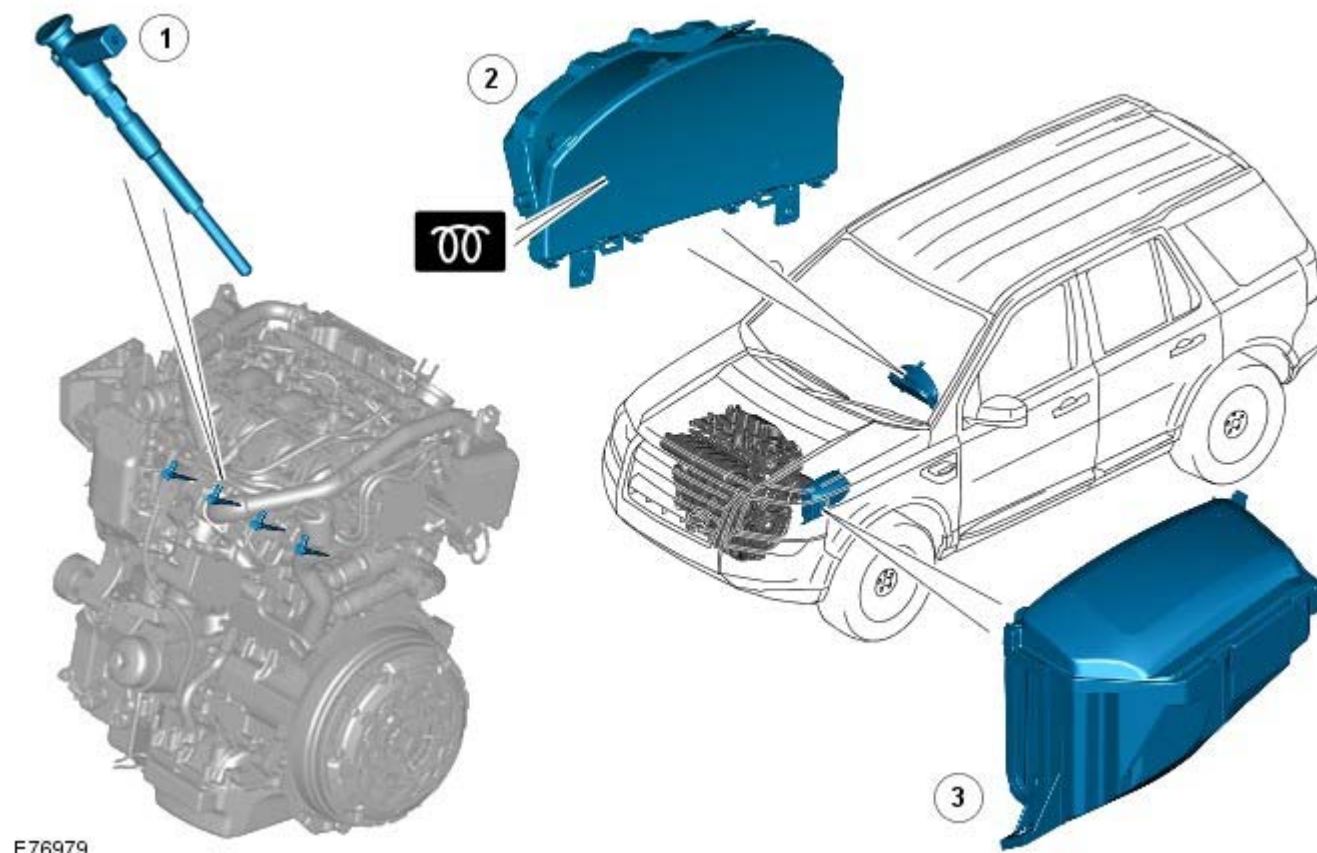
Description	Nm	lb-ft
Glow plugs	10	7

Part Number Glow Plug System - Glow Plug System

Description and Operation

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COMPONENT LOCATION



E76979

Item	Part Number	Description
1	-	Glow plugs
2	-	Glow plug warning indicator lamp
3	-	BJB

OVERVIEW

A glow plug is installed in the inlet side of each cylinder, to heat the combustion chambers before and during cranking. This aids cold starting, reduces emissions and engine noise when idling from a cold engine.

A wiring harness on each bank of glow plugs is connected to a separate relay and fusible link in the BJB (battery junction box). Each glow plug is grounded through its fixing in the cylinder head. Operation of the glow plug relays is controlled by the ECM, which also controls the illumination of the glow plug indicator in the instrument cluster.

Each glow plug is a tubular heating element which contains a spiral filament encased in magnesium oxide powder. At the tip of the tubular heating element is the heater coil. Behind the heater coil, and connected in series, is a control coil. The control coil regulates the current to the heater coil to safeguard against overheating.

OPERATION

There are three phases of glow plug heating: Pre heating, crank heating and post heating. The ECM (engine control module) determines the heating times from the ECT (engine coolant temperature). The lower the ECT (engine coolant temperature), the longer the heating times.

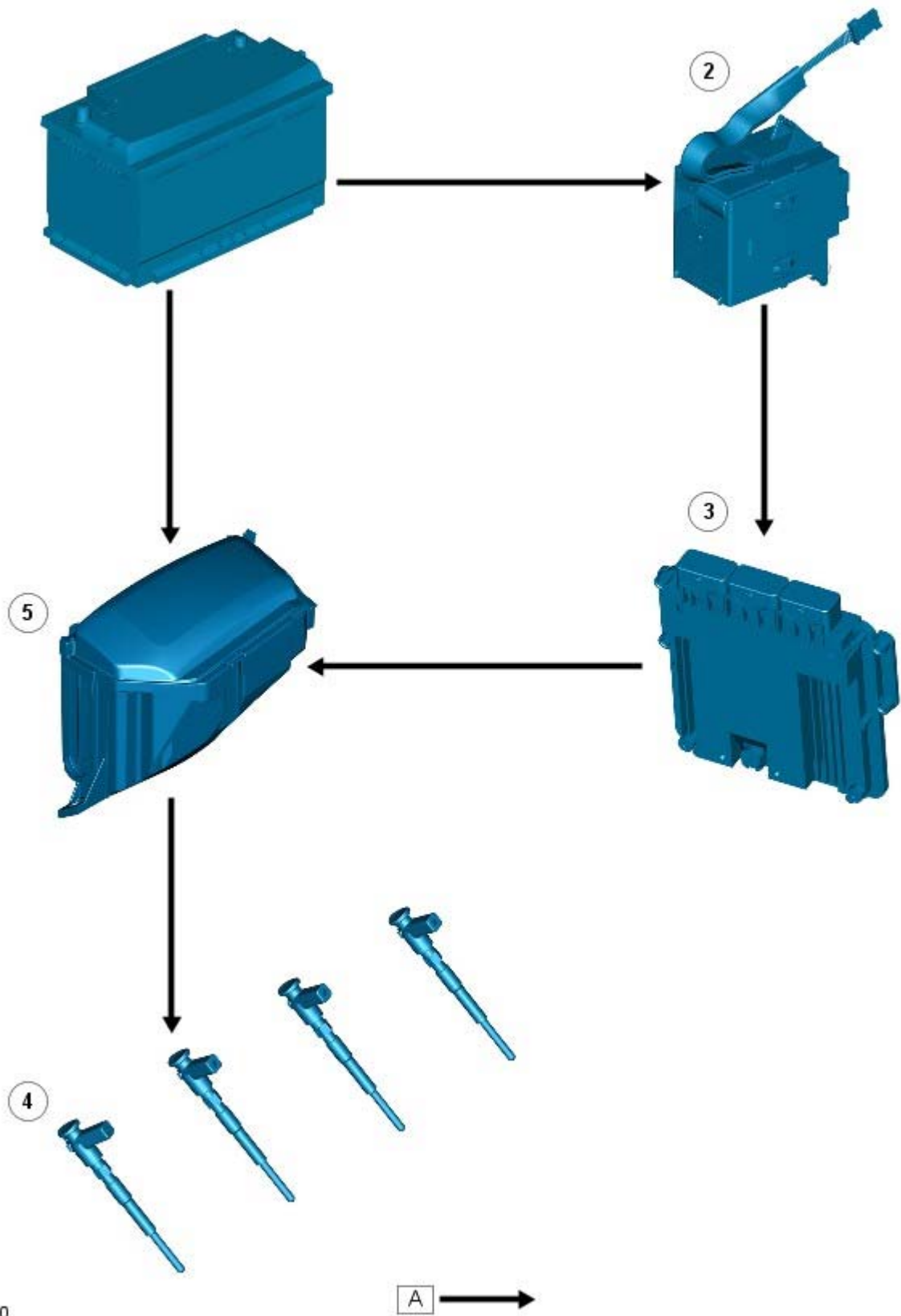
When the ignition switch is switched to mode II, the ECM (engine control module) calculates any required heating times and, if heating is required, energizes the glow plug relays in the BJB (battery junction box). When pre heating is required, the ECM (engine control module) also sends a message to the instrument cluster, on the high speed CAN (controller area network) bus, to request illumination of the glow plug indicator. The glow plug indicator remains illuminated for the duration of the pre heating phase, or until the ignition switch is turned to the crank position, whichever occurs first. If required, the ECM (engine control module) keeps the glow plug relays energized during cranking and for the duration of any post heating phase.

The ECM (engine control module) monitors the drive circuit of the glow plug relays for plausibility of operation, continuity, and

short and open circuits. If a fault is detected, the ECM (engine control module) stores a related fault code and permanently illuminates the glow plug indicator while the ignition switch is in mode II.

CONTROL DIAGRAM

NOTE: A = Hardwired



E76980

Item		Description
1		Battery
2		Start/stop switch and control module

3		ECM
4		Glow plugs
5		BJB

Glow Plug System - Glow Plug System

Diagnosis and Testing

Principles of Operation

For a detailed description of the glow plug system, refer to the relevant Description and Operation section in the workshop manual.

REFER to: [Glow Plug System](#) (303-07B Glow Plug System, 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.

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

Visual Inspection

Electrical
<ul style="list-style-type: none"> ● Fuse(s) ● Glow plug relay ● Engine management control relay ● Wiring harness ● Electrical connector(s) ● Glow plug(s) ● Engine control module (ECM)

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.

DTC Index

NOTE: If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

NOTE: Generic scan tools may not read the codes listed, or may read only five digit codes. Match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give additional information read by the manufacturer approved diagnostic system).

NOTE: When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three 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.

NOTE: Inspect connectors for signs of water ingress, and pins for damage and/or corrosion.

NOTE: If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
P038000	Glow Plug/Heater Circuit A	<ul style="list-style-type: none"> ● Glow plug system fault - failure of a glow plug, relay failure, short circuit in a glow plug or over current 	Carry out the pinpoint tests associated with this DTC using the manufacturer approved diagnostic system
P038300	Glow Plug Control Module Control Circuit Low	<ul style="list-style-type: none"> ● Glow plug relay control circuit - short to ground 	Refer to electrical circuit diagrams and check glow plug relay control circuit for short to ground
P038400	Glow Plug Control Module Control Circuit High	<ul style="list-style-type: none"> ● Glow plug relay control circuit - short to power 	Refer to electrical circuit diagrams and check glow plug relay control circuit for short to power
P138A00	Glow Plug Control Module Control Circuit Range/Performance	<ul style="list-style-type: none"> ● Glow plug relay excess temperature 	Carry out the pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

DTC	Description	Possible Cause	Action
P138B00	Glow Plug Control Module System Voltage	<ul style="list-style-type: none">● Glow plug system fault - short circuit in a glow plug, over-current or relay stuck	Carry out the pinpoint tests associated with this DTC using the manufacturer approved diagnostic system

Glow Plug System - Glow Plugs

Removal and Installation

Removal



CAUTION: Extreme cleanliness must be exercised when handling these components.

NOTE: The TD4 engine cylinders are numbered from the rear of the engine (transmission end). Therefore, Number 1 cylinder and number 1 injector are located at the rear of the engine.

NOTE: Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).



2. **WARNING:** Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

3. Remove the intake manifold.

Refer to: [Intake Manifold](#) (303-01B Engine - TD4 2.2L Diesel, Removal and Installation).

4. **CAUTIONS:**

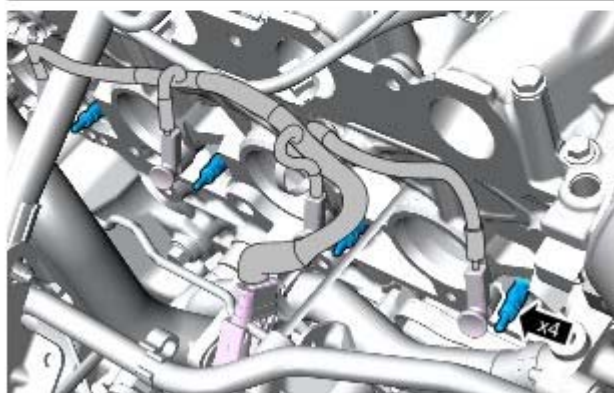
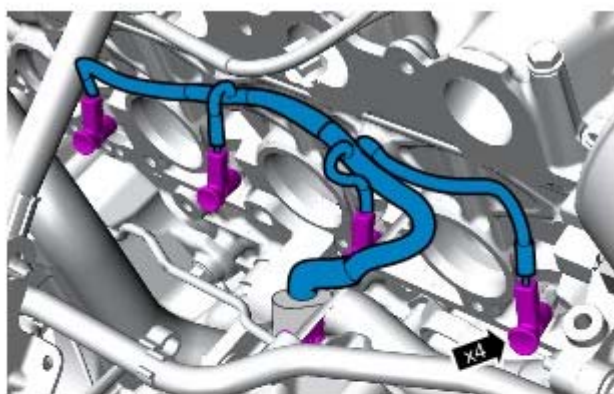


Make sure that the area around the component is clean and free of foreign material.



Make sure that all openings are sealed. Use new blanking caps.

Torque: 10 Nm



E 85569

Installation

1. To install, reverse the removal procedure.

