

Engine Ignition - V6 4.0L Petrol -

General Specification

Item	Specification
* Spark plugs - Platinum:	
Make	Motorcraft
Type	AGSF 24PM
** Gap	1.4 mm (0.055 in)
+ Spark plugs - Copper:	
Make	Motorcraft
Type	SGSF 22L
++ Gap	1.4 mm (0.055 in)
Ignition coils:	
Make	Denso
Type	'Coil near plug'

* May be used with either LEADED or UNLEADED fuels but if used with LEADED fuel, they must be replaced at 15,000 mile (24,000 km) intervals

** Plugs must not be 're-gapped' in service, if gap is not as specified, plug(s) must be replaced

+ May only be used with LEADED fuel

++ New plugs must have the gap set to 1.4 mm (0.055 in) prior to installation, plugs must not be 're-gapped' in service, if gap is not as specified, plug(s) must be replaced

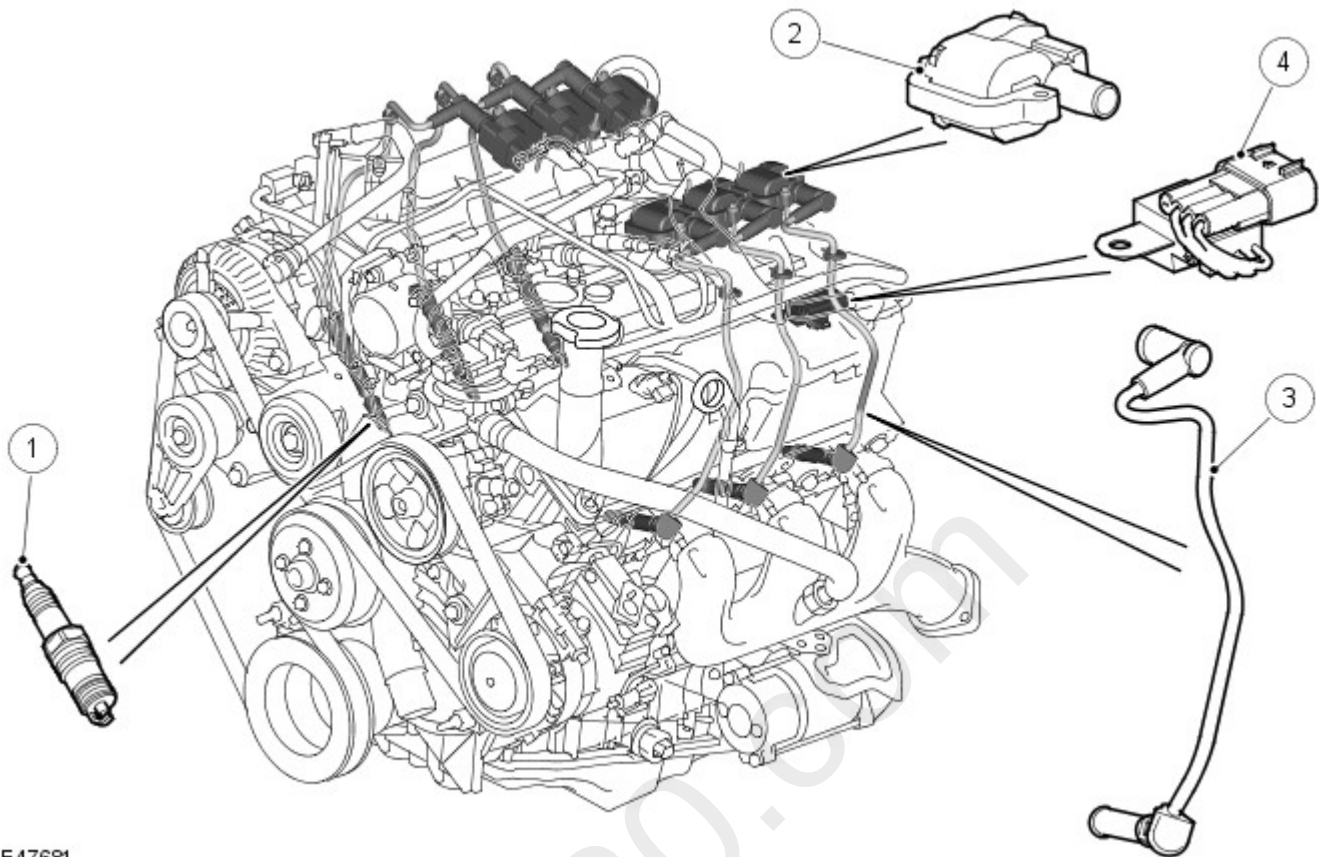
Torque Specifications

Description	Nm	lb-ft
Ignition coil bolt/stud	6	4
Spark plugs - Platinum or copper	18	13

Engine Ignition - V6 4.0L Petrol - Engine Ignition

Description and Operation

COMPONENT LOCATIONS



E47681

Item	Part Number	Description
1	-	Spark plug
2	-	Ignition coil
3	-	Spark plug wire
4	-	Capacitor

GENERAL

The 4.0L engine ignition system has a single platinum tipped spark plug per cylinder, with each spark plug powered by a separate remote ignition coil. The three ignition coils for each cylinder bank are grouped together on the related side of the air inlet manifold. The ignition coils are directly driven by the Engine Control Module (ECM).

Power for the ignition coils is supplied from the main relay and a fuse in the Battery Junction Box (BJB).

Each ignition coil contains a power stage to switch the current in the primary circuit. The ECM controls the switching with a signal to the power stage. A capacitor is connected in parallel with the power supplies to the ignition coils, to suppress Radio Frequency Interference (RFI). The ECM monitors operation of the ignition coils using a feedback signal from each of the power stages. If a fault is detected the ECM stores an appropriate fault code.

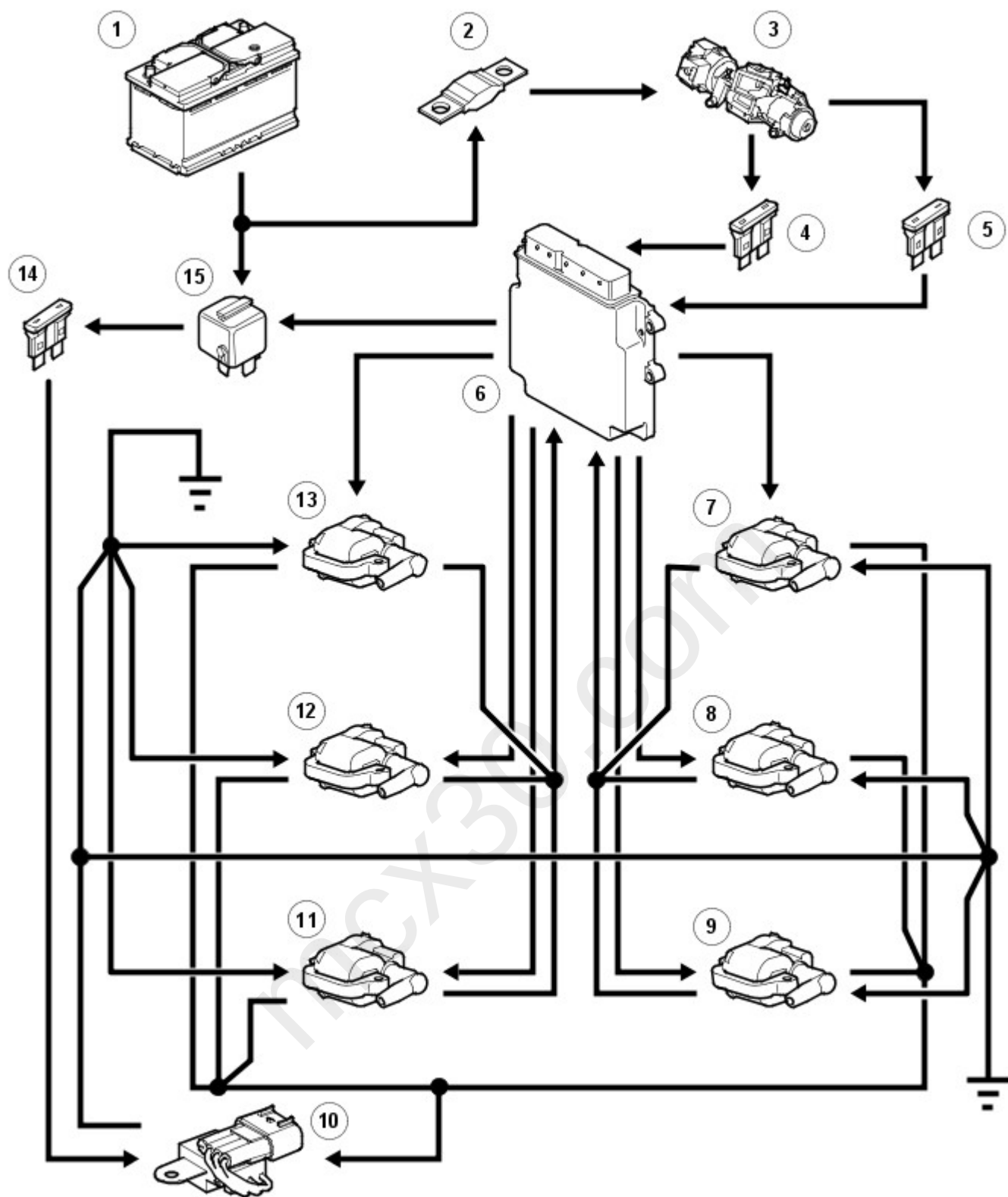
The ECM varies the dwell time of the ignition coils depending on battery voltage and engine speed, to ensure a constant energy level is produced in the secondary coil each time the power stage is switched. This ensures a good spark is always produced by the spark plug without excessive primary current flow, thus avoiding overheating or damage to the ignition coils.

The ECM calculates the ignition timing for individual cylinders from:

- Engine speed.
- Camshaft position.
- Engine load.
- Engine temperature.
- The knock control function.
- On automatic transmission models, the shift control function.
- The idle speed control function.

ENGINE IGNITION CONTROL DIAGRAM

- NOTE: A = Hardwired connections



A →

E47682

Item	Part Number	Description
1	-	Battery
2	-	Fusible link 11E, BJB
3	-	Ignition switch
4	-	Fuse 25P, ignition feed, Central Junction Box (CJB)
5	-	Fuse 60P, crank feed, CJB
6	-	ECM
7	-	Ignition coil 6
8	-	Ignition coil 5
9	-	Ignition coil 4
10	-	Capacitor
11	-	Ignition coil 1

12	-	Ignition coil 2
13	-	Ignition coil 3
14	-	Fuse 17E, BJB
15	-	Main relay

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Engine Ignition - V6 4.0L Petrol - Engine Ignition

Diagnosis and Testing

Principles of Operation

For a detailed description of the engine ignition system and operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: [Engine Ignition](#) (303-07A Engine Ignition - V6 4.0L 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 checked and/or the donor vehicle.

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

1. **1.** Verify the customer concern.
2. **2.** Visually inspect for obvious signs of mechanical and electrical damage.

Visual Inspection

Mechanical	Electrical
● Engine oil level ● Cooling system coolant level ● Fuel level ● Fuel contamination/grade/quality ● Exhaust gas recirculation (EGR) valves	● Fuses ● Wiring harness ● Loose or corroded electrical connectors ● Ignition coils ● Sensor(s) ● Engine Control Module (ECM) ● Transmission Control Module (TCM)

3. **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. **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.

Symptom Chart

Symptom	Possible Causes	Action
Engine cranks, but does not fire	● Engine breather system disconnected/restricted ● Ignition system ● Fuel system ● Electronic engine control	Ensure the engine breather system is free from restriction and is correctly installed. Check for ignition system, fuel system and electronic engine control DTCs and refer to the relevant DTC Index
Engine cranks and fires, but will not start	● Evaporative emissions purge valve ● Fuel pump ● Spark plugs ● HT short to ground (tracking) check rubber boots for cracks/damage ● Ignition system	Check for evaporative emissions, fuel system and ignition system related DTCs and refer to the relevant DTC Index
Difficult cold start	● Engine coolant level/anti-freeze content ● Battery ● Electronic engine controls ● Exhaust Gas Recirculation (EGR) valve stuck open ● Fuel pump ● Purge valve	Check the engine coolant level and condition. Ensure the battery is in a fully charged and serviceable condition. Check for electronic engine controls, engine emissions, fuel system and evaporative emissions system related DTCs and refer to the relevant DTC Index
Difficult hot start	● Injector leak ● Electronic engine control ● Purge valve ● Fuel pump ● Ignition system ● EGR valve stuck open	Check for injector leak, install new injector as required. Check for electronic engine controls, evaporative emissions, fuel system, ignition system and engine emission system related DTCs and refer to the relevant DTC Index
Difficult to start after hot soak (vehicle standing, engine off, after engine has reached operating temperature)	● Injector leak ● Electronic engine control ● Purge valve ● Fuel pump ● Ignition system ● EGR valve stuck open	Check for injector leak, install new injector as required. Check for electronic engine controls, evaporative emissions, fuel system, ignition system and engine emission system related DTCs and refer to the relevant DTC Index

Symptom	Possible Causes	Action
Engine stalls soon after start	- Breather system disconnected/restricted - ECM relay - Electronic engine control - Ignition system - Air intake system restricted - Air leakage - Fuel lines	Ensure the engine breather system is free from restriction and is correctly installed. Check for electronic engine control, ignition system and fuel system related DTCs and refer to the relevant DTC Index. Check for blockage in air filter element and air intake system. Check for air leakage in air intake system
Engine hesitates/poor acceleration	- Fuel pressure, fuel pump, fuel lines - Injector leak - Air leakage - Electronic engine control - Throttle motor - Restricted accelerator pedal travel (carpet, etc) - Ignition system - EGR valve stuck open - Transmission malfunction	Check for fuel system related DTCs and refer to the relevant DTC Index. Check for injector leak, install new injector as required. Check for air leakage in air intake system. Ensure accelerator pedal is free from restriction. Check for electronic engine controls, ignition, engine emission system and transmission related DTCs and refer to the relevant DTC Index
Engine backfires	- Fuel pump/lines - Air leakage - Electronic engine controls - Ignition system	Check for fuel system failures. Check for air leakage in intake air system. Check for electronic engine controls, ignition system related DTCs and refer to the relevant DTC Index
Engine surges	- Fuel pump/lines - Electronic engine controls - Throttle motor - Ignition system	Check for fuel system failures. Check for electronic engine controls, throttle system and ignition system related DTCs and refer to the relevant DTC Index
Engine detonates/knocks	- Fuel pump/lines - Air leakage - Electronic engine controls	Check for fuel system failures. Check for air leakage in intake air system. Check for electronic engine controls related DTCs and refer to the relevant DTC Index
No throttle response	- Electronic engine controls - Throttle motor	Check for electronic engine controls and throttle system related DTCs and refer to the relevant DTC Index
Poor throttle response	- Breather system disconnected/restricted - Electronic engine control - Transmission malfunction - Traction control event - Air leakage	Ensure the engine breather system is free from restriction and is correctly installed. Check for electronic engine controls, transmission and traction control related DTCs and refer to the related DTC Index. Check for air leakage in intake air system

DTC Index

For a list of Diagnostic Trouble Codes (DTCs) that could be logged on this vehicle, please refer to Section 100-00. REFER to: [Diagnostic Trouble Code \(DTC\) Index - DTC: Engine Control Module \(PCM\) 4.0L V6](#) (100-00 General Information, Description and Operation).

Engine Ignition - V6 4.0L Petrol - Spark Plugs

Removal and Installation

Removal

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the engine cover.
For additional information, refer to: [Engine Cover - V6 4.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

3.  **CAUTION:** It is important to twist the spark plug wire boot while pulling upward to avoid possible damage to the spark plug wire.

- **NOTE:** Note the fitted position.

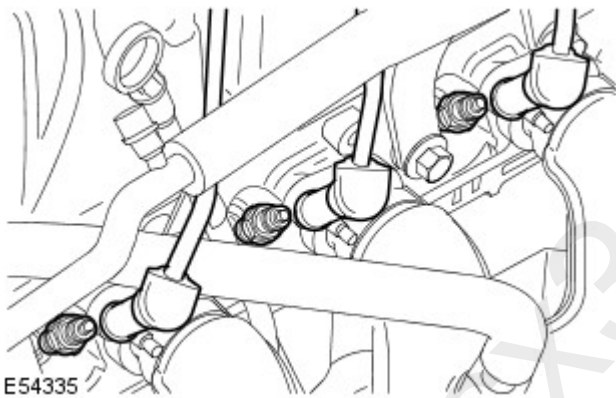
Disconnect the high tension (HT) electrical connectors.

4.  **WARNING:** Eye protection must be worn.

- **NOTE:** Use compressed air to remove any foreign material from the spark plug wells.

Clean the area surrounding the spark plugs.

5. Remove the spark plugs.



Installation

1.  **CAUTION:** Prior to fitting new copper spark plugs, check that the electrode gaps are set to 1.4 mm, adjust if necessary. Existing platinum or copper spark plugs must not be re-gapped in service; if the electrode gap is incorrect new spark plugs must be fitted.

- **NOTE:** Do not apply lubricant to the threads.

Install the spark plugs.

- Check the spark plug gap, refer to specifications.
- Tighten the spark plugs to 18 Nm (13 lb.ft).

2.  **CAUTION:** Install spark plug wires to positions noted on removal. Do not cross wires.

Connect the HT electrical connectors.

- Apply silicone grease to inside of spark plug boot.

3. Install the engine cover.
For additional information, refer to: [Engine Cover - V6 4.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).

4. Connect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00

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Engine Ignition - V6 4.0L Petrol - Ignition Coil

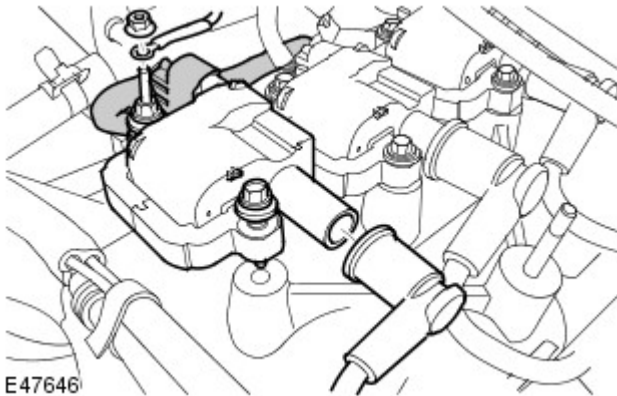
Removal and Installation

Removal

- NOTE: Note: Ignition coils 2 ,3, 5 & 6 have harness retaining clips that need to be detached before removal.

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the engine cover.
For additional information, refer to: [Engine Cover - V6 4.0L Petrol](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).
3. Disconnect the ignition lead from the coil.
4. Remove the ignition coil.

- Disconnect the ignition coil electrical connector.
- Remove the nut.
- Remove the ground cable.
- Fully loosen the stud.
- Fully loosen the bolt.



Installation

1. To install, reverse the removal procedure.
 - Tighten the bolt to 6 Nm (4 lb.ft).
 - Tighten the stud to 6 Nm (4 lb.ft).
 - Install the ground cable.
 - Tighten the nut to 6 Nm (4 lb.ft).
 - Connect the ignition coil electrical connector.
 - Connect the ignition lead to the coil.