Published: Feb 1, 2007

Specifications

Torque Specifications

Description	Nm	lb-ft
Air cleaner bolts	13	10
A/C compressor low-pressure and high-pressure refrigerant lines bolt	30	22
Charge air cooler to radiator bolts	20	15
Charge air cooler inlet and outlet hose clips	3	2
Charge air cooler bracket bolts	9	7
Air cleaner outlet pipe clips	3	2

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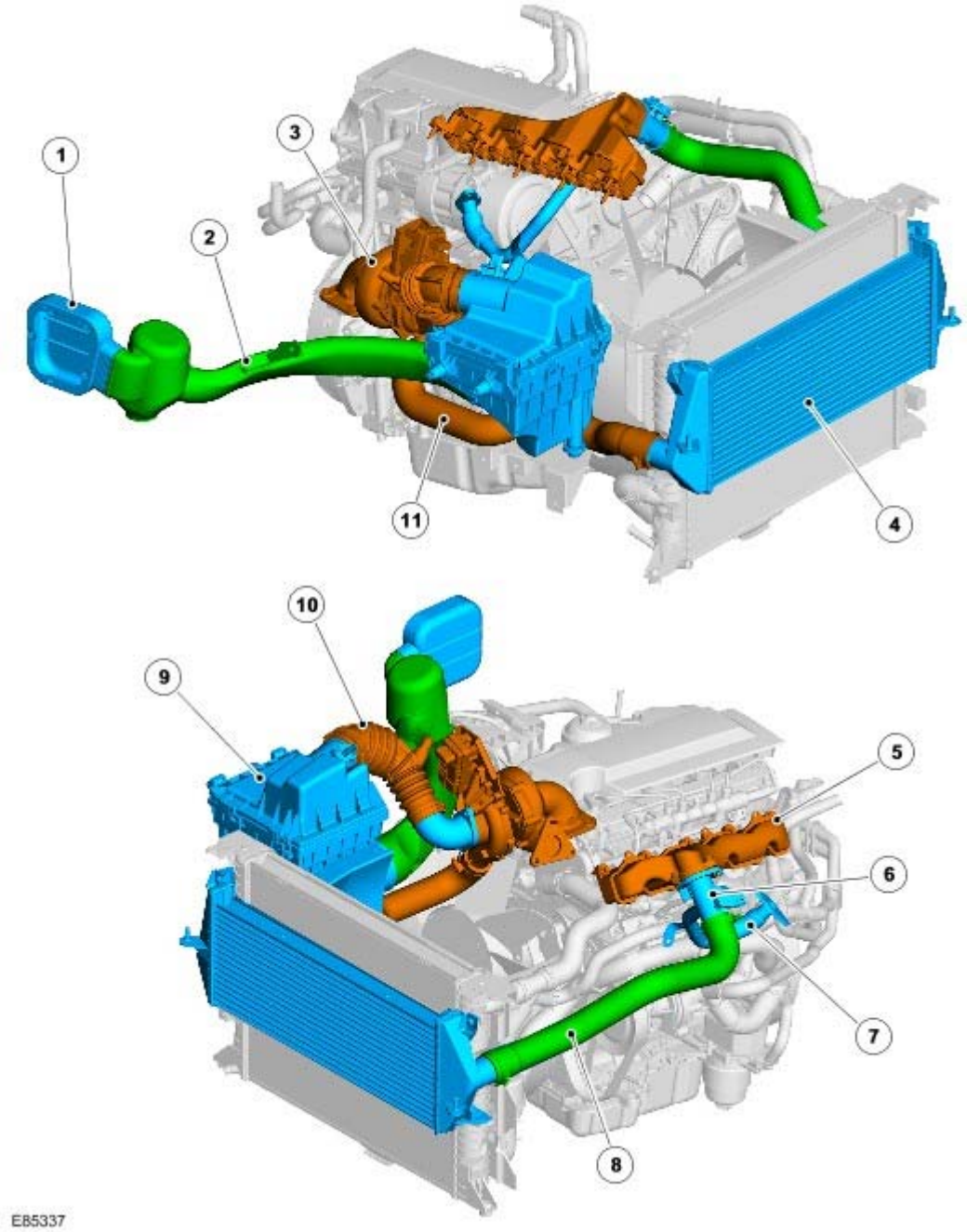
Intake Air Distribution and Filtering

COMPONENT LOCATION



Item	Part Number	Description
1		Air intake
2		Dirty air duct
3		Turbocharger
4		Charge air cooler
5		Air intake manifold
6		Mass airflow sensor housing and EGR (exhaust gas recirculation) connection
7		EGR (exhaust gas recirculation) connection tube
8		Charge air cooler to intake manifold tube

9		Air cleaner box
10		Air cleaner box to turbo tube
11		Turbo charger to charge air cooler tube

OVERVIEW

Air is drawn in from the vehicle exterior via the RH (right-hand) wing mounted intake duct, along the inside of the wing to the air cleaner box intake. Once the air has passed through the air cleaner it is drawn along a duct to the turbocharger. From the turbo charger the air is forced through the charge air cooler up to the intake manifold.

AIR CLEANER BOX

The air cleaner box is located on the inside of the right hand fender. The air cleaner box is attached to the vehicle by four rubber mounts, 2 on the side to the inside of the inner fender and two on the base of the box. The box contains a replaceable paper filter element.

CHARGE AIR COOLER

The charge air cooler is located in front of the radiator and is secured to the radiator by 2 bolts at the top and 2 location points at the bottom. Air is forced through the charge air cooler by the turbocharger. Cooling the air makes it more dense improving combustion.

Published: Mar 12, 2007

Intake Air Distribution and Filtering

Overview

For information on description and operation:
Intake Air Distribution and Filtering

Inspection and Verification

1 . Verify the customer concern.

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

Mechanical	Electrical
• Hoses and ducts: condition and fitment • Air cleaner element condition and fitment • Restricted air intake • Vacuum hoses condition and fitment • Pipework to/from turbocharger: condition and fitment • Turbocharger: condition and fitment • Charge air cooler	• Fuse(s) • Wiring harness(es) • Loose or corroded electrical connector(s) • Mass air flow (MAF) sensor • Manifold absolute pressure/temperature (MAPT) sensors • Intake air temperature (IAT) sensor IAT sensor 1 is part of the MAF sensor

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 . Use the approved diagnostic system or a scan tool to retrieve any diagnostic trouble codes (DTCs) before moving onto the symptom chart or DTC index.

Make sure that all DTCs are cleared following rectification.

Make sure that all DTCs are cleared following rectification.

Symptom Chart

Symptom	Possible causes	Action
Vehicle does not start/hard starting	• Restricted/blocked air intake • Restricted/blocked air cleaner element	Check the intake air system for blockages or restriction. Rectify as necessary.
Poor performance	• Intake air system fault • Turbocharger fault(s) • Exhaust gas recirculation (EGR) valve fault • Low fuel pressure • Restricted exhaust system	Check the intake air system for blockages or restriction. Rectify as necessary. Check for DTCs indicating a turbocharger, EGR valve or fuel pressure fault. Rectify as necessary. Check the exhaust system for evidence of damage or restriction. Rectify as necessary.
Excessive intake noise	• Intake air leak after the turbocharger • Intake pipe disconnected/damaged after the air cleaner • Air cleaner assembly incorrectly assembled/damaged	Check the intake air system for loose or disconnected hoses or ducts. Check the hoses and ducts for damage, splits, etc. Rectify as necessary.

DTC Index

NOTE:

If a control module or 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 program is in operation, before the replacement of a component.

NOTE:

Generic scan tools may not read the codes listed, or may read only 5-digit codes. Match the 5 digits from the scan tool to the first 5 digits of the 7-digit code listed to identify the fault (the last 2 digits give extra 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.

NOTE:

For a full list of engine control module (ECM) DTCs:

Electronic Engine Controls

DTC	Description	Possible causes	Action
P00952F	Intake air temperature (IAT) sensor 2 circuit - signal erratic	**NOTE:** The IAT sensor 2 is part of the manifold absolute pressure temperature (MAPT) sensor ● IAT sensor 2 circuit: open circuit ● IAT sensor 2: short circuit to power ● IAT sensor 2: short circuit to ground ● IAT sensor 2 fault	Check the IAT sensor 2 and circuits. Refer to the electrical guides. Install a new MAPT sensor if necessary. Manifold Absolute Pressure and Temperature (MAPT) Sensor Clear the DTCs and test for normal operation.
P009511	Intake air temperature (IAT) sensor 2 circuit - circuit short to ground	**NOTE:** The IAT sensor 2 is part of the manifold absolute pressure temperature (MAPT) sensor ● IAT sensor 2: short circuit to ground ● IAT sensor 2 fault	Check the IAT sensor 2 and circuits. Refer to the electrical guides. Install a new MAPT sensor if necessary. Manifold Absolute Pressure and Temperature (MAPT) Sensor Clear the DTCs and test for normal operation.
P009515	Intake air temperature (IAT) sensor 2 circuit - circuit short to battery or open	**NOTE:** The IAT sensor 2 is part of the manifold absolute pressure temperature (MAPT) sensor ● IAT sensor 2: open circuit ● IAT sensor 2: short circuit to power ● IAT sensor 2 fault	Check the IAT sensor 2 and circuits. Refer to the electrical guides. Install a new MAPT sensor if necessary. Manifold Absolute Pressure and Temperature (MAPT) Sensor Clear the DTCs and test for normal operation.
P010029	Mass or volume air flow A circuit - signal invalid	● Restricted air intake path ● Check for leak between mass air flow (MAF) sensor and turbocharger ● MAF sensor fault ● Turbocharger fault ● Exhaust gas recirculation (EGR) valve fault	Check the intake air system for leaks, restrictions, etc. Check for related DTCs. Rectify as necessary. Clear the DTCs and test for normal operation.

P010036	Mass or volume air flow A circuit - signal frequency too low	• Mass air flow (MAF) sensor circuit: short circuit to ground • MAF sensor circuit: short circuit to power • MAF sensor circuit: open circuit • MAF sensor fault	Check the MAF sensor and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P010037	Mass or volume air flow A circuit - signal frequency too high	• Mass air flow (MAF) sensor circuit: short circuit to ground • MAF sensor circuit: short circuit to power • MAF sensor circuit: open circuit • MAF sensor fault	Check the MAF sensor and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P010064	Mass or volume air flow A circuit - signal plausibility failure	• Mass air flow (MAF) sensor circuit: short circuit to ground • MAF sensor circuit: short circuit to power • MAF sensor circuit: open circuit • MAF sensor fault	Check the MAF sensor and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P01102F	Intake air temperature (IAT) sensor 1 circuit - signal erratic	**NOTE:** The IAT sensor 1 is part of the mass air flow (MAF) sensor • IAT sensor 1 circuit: short circuit to power • IAT sensor 1 circuit: short circuit to ground • IAT sensor 1 circuit: open circuit • IAT sensor 1 fault	Check the IAT sensor 1 and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P011011	Intake air temperature (IAT) sensor 1 circuit - circuit short to ground	**NOTE:** The IAT sensor 1 is part of the mass air flow (MAF) sensor • IAT sensor 1 circuit: short circuit to ground • IAT sensor 1 fault	Check the IAT sensor 1 and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P011015	Intake air temperature (IAT) sensor 1 circuit - circuit short to battery or open	**NOTE:** The IAT sensor 1 is part of the mass air flow (MAF) sensor • IAT sensor 1 circuit: short circuit to power • IAT sensor 1 circuit: open circuit • IAT sensor 1 fault	Check the IAT sensor 1 and circuit. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P110200	Mass air flow (MAF) sensor in range but lower than expected	• Intake air path fault • MAF sensor circuit: short circuit to ground • MAF sensor circuit: short circuit to power • MAF sensor circuit: open circuit • MAF sensor fault	Check the intake air system for leaks, restrictions, etc. Check the MAF sensor and circuits. Refer to the electrical guides. Install a new MAF sensor if necessary. Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.
P110300	Mass air flow (MAF) sensor in range but	• Intake air path fault • MAF sensor circuit: open circuit • MAF sensor circuit: short	Check the intake air system for leaks, restrictions, etc. Check the MAF sensor and circuits. Refer to the electrical guides. Install a new MAF sensor if necessary.

	higher than expected	circuit to ground ● MAF sensor circuit: short circuit to power ● MAF sensor fault	Mass Air Flow (MAF) Sensor (19.22.25) Clear the DTCs and test for normal operation.

Published: Jan 22, 2007

Air Cleaner (19.10.01)

Removal

All vehicles

1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

Vehicles with air conditioning

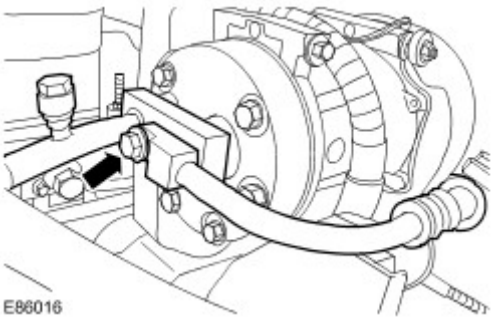
2 . Recover the air conditioning (A/C) refrigerant.
For additional information, refer to Air Conditioning (A/C) System Recovery, Evacuation and Charging (82.30.02)

3 .

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

Disconnect the A/C compressor low-pressure and high-pressure refrigerant lines.

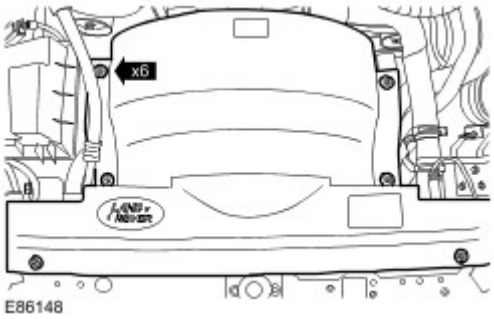
- Remove the bolt.
- Remove and discard the O-ring seal.



All vehicles

4 . Remove the cooling fan upper shroud.

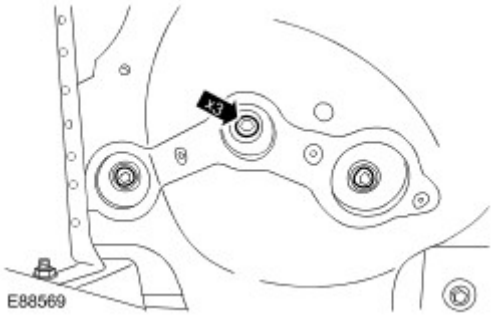
- Release the 6 clips.



5 . Remove the air cleaner element.
For additional information, refer to Air Cleaner Element (19.10.10)

6 . Release the air cleaner.

Remove the 3 bolts.



7 . Remove the air cleaner.

1) Disconnect the air cleaner intake pipe.

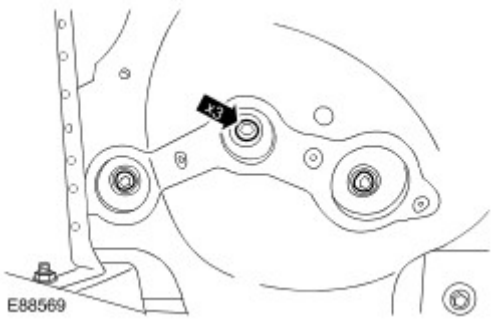
2) Remove the air cleaner.

Installation

All vehicles

1 . To install, reverse the removal procedure.

Tighten to 13 Nm (10 lb.ft).



Vehicles with air conditioning

2 . **NOTE:**

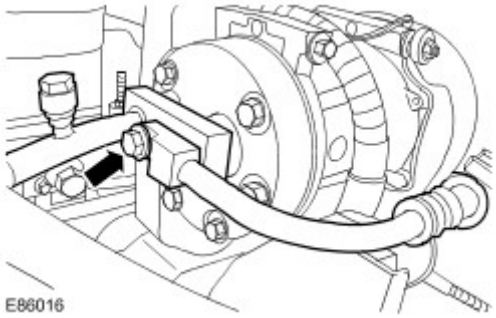
Coat the compressor O-ring seals in clean refrigerant oil prior to installation.

NOTE:

Remove and discard the blanking caps.

Tighten to 30 Nm (22 lb.ft).

Install new O-ring seals.



All vehicles

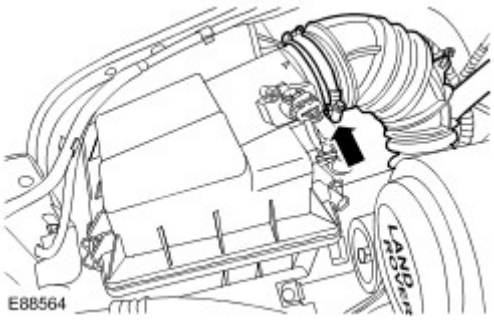
3 . Connect the battery ground cable.
For additional information, refer to Battery Connect

Published: Jul 17, 2007

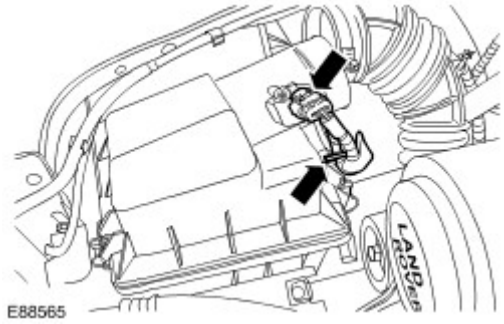
Air Cleaner Element (19.10.10)

Removal

1 . Release the air cleaner outlet pipe.
- Release the clip.



2 . Disconnect the mass air flow (MAF) sensor electrical connector.
- Release the wiring harness.



3 . Remove the air cleaner housing cover.

4 . Remove the air cleaner element.

Installation

1 . **CAUTION: Make sure that the air cleaner housing cover rear fixing tangs are correctly located.**

NOTE:

Clean the base of the air cleaner.

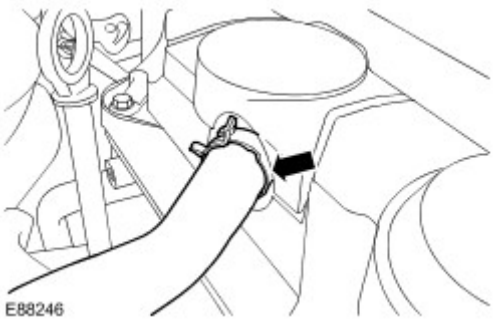
To install, reverse the removal procedure.

Published: Dec 22, 2006

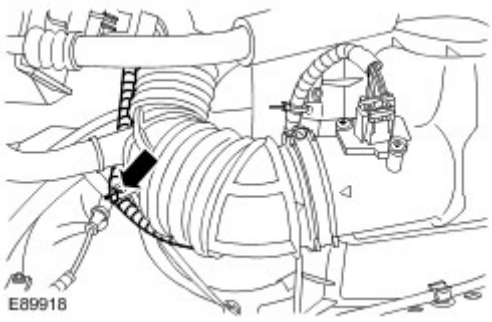
Air Cleaner Outlet Pipe

Removal

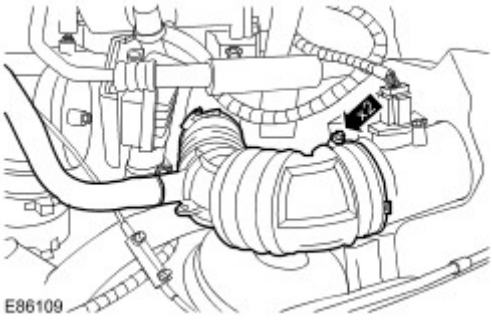
1 . Release the positive crankcase ventilation (PCV) hose from the valve cover.
   - Release the clip.



2 . Release the mass air flow (MAF) sensor wiring harness.



3 . Remove the air cleaner outlet pipe.
   - Release the 2 clips.



Installation

1 . To install, reverse the removal procedure.

Published: Jan 30, 2007

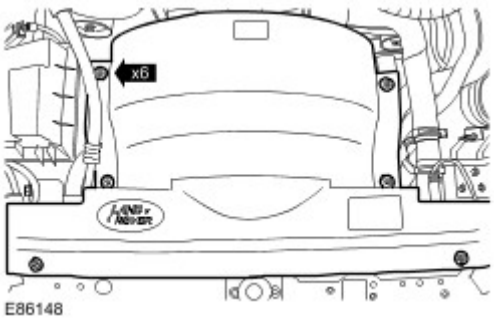
Charge Air Cooler (19.46.19)

Removal

1 . Disconnect the battery ground cable.
For additional information, refer to Battery Disconnect and Connect

2 . Remove the radiator grille.
For additional information, refer to Radiator Grille (76.55.03)

3 . Remove the cooling fan upper shroud.
Release the 6 clips.



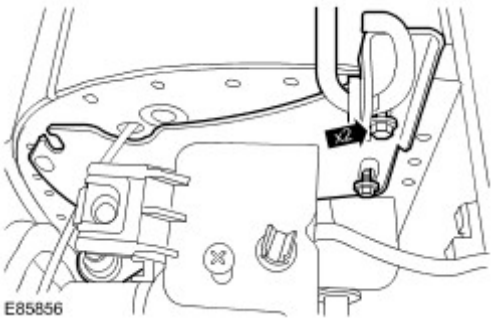
4 . Remove the hood latch panel.
For additional information, refer to Hood Latch Panel (76.16.22)

5 . **NOTE:**
RH shown, LH similar.

Remove the 2 O-rings.

6 . **NOTE:**
RH shown, LH similar.

Remove the 2 charge air cooler brackets.
Remove the 4 bolts.



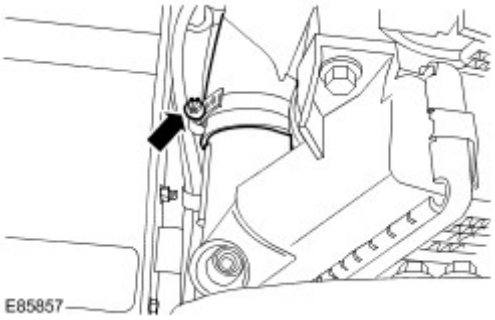
7 .

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

NOTE:

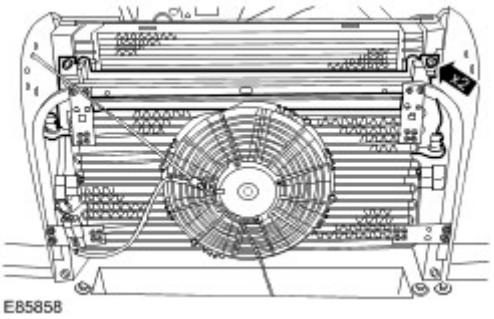
RH shown, LH similar.

Disconnect the charge air cooler inlet hose and charge air cooler outlet hose.



8 . Remove the charge air cooler.

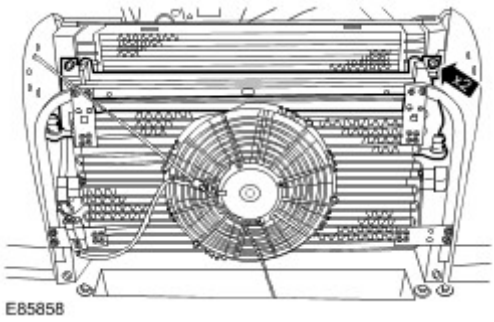
- Remove the 2 bolts.



Installation

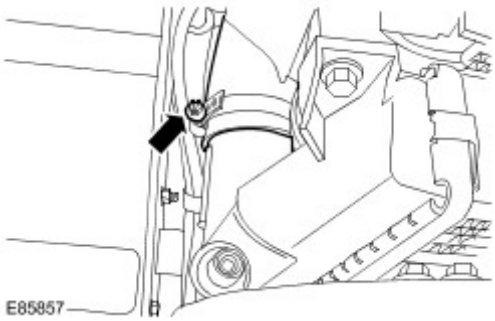
1 . To install, reverse the removal procedure.

- Tighten to 20 Nm (15 lb.ft).

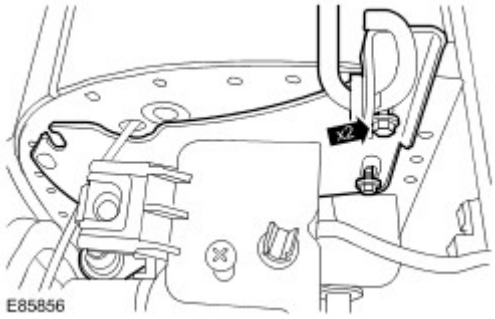


2 . **NOTE:**
Remove and discard the blanking caps.

Tighten to 3 Nm (2 lb.ft).



3 . Tighten to 9 Nm (7 lb.ft).



4 . Connect the battery ground cable.
For additional information, refer to Battery Connect