



## Engine - Vehicles With: Manual Transmission (12.41.01.99)

### Special Service Tools

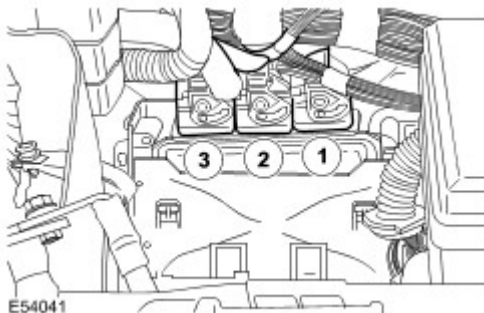


Engine lifting Cradle  
303-1141

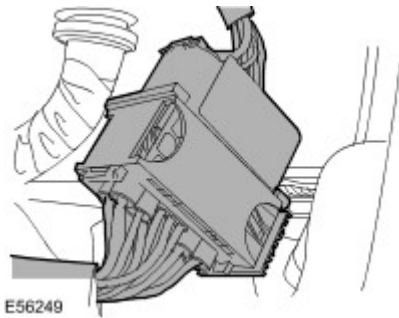
### Removal

#### All vehicles

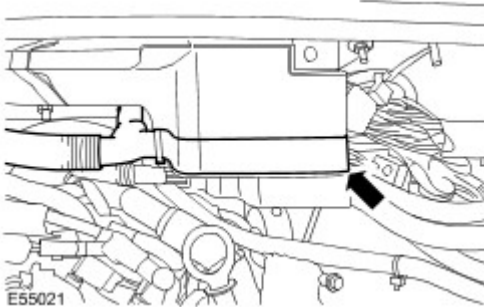
1. Disconnect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)
2. Remove the engine cover. For additional information, refer to [Engine Cover - 2.7L Diesel \(12.30.50\)](#) (Section 501-05)
3. Evacuate the A/C system. For additional information, refer to [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging \(82.30.02\)](#) (Section 412-00)
4. Remove the battery tray. For additional information, refer to [Battery Tray \(76.10.30\)](#) (Section 414-01)
5. Remove the engine control module (ECM) cover.
6. **NOTE :**  
Right hand drive shown, for Left hand drive reverse the sequence.  
Disconnect the three engine harness electrical connectors in the order shown.



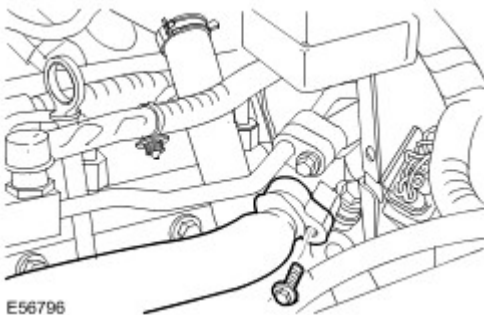
7. Disconnect the engine wiring harness.




8. Release the engine wiring harness from the bulkhead.



9. Disconnect the A/C compressor low pressure line.
- Reposition the A/C compressor low pressure pipe.
  - Install blanking caps to the exposed ports.

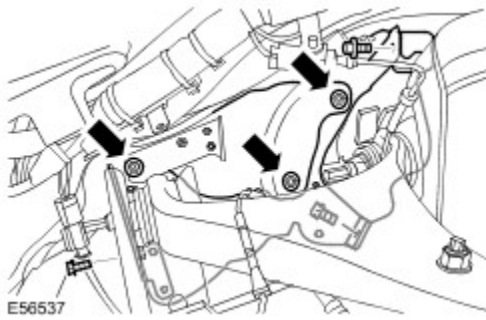


10. Remove the auxiliary battery tray. For additional information, refer to [Auxiliary Battery Tray \(76.10.31\)](#) (Section 414-01)

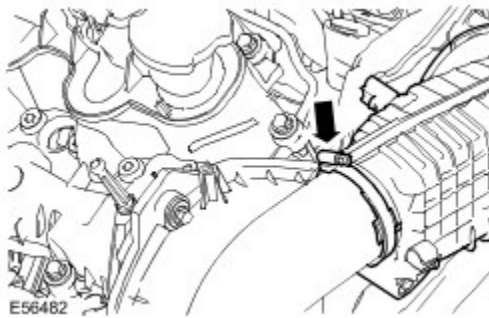
11.  **WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

Raise and support the vehicle.

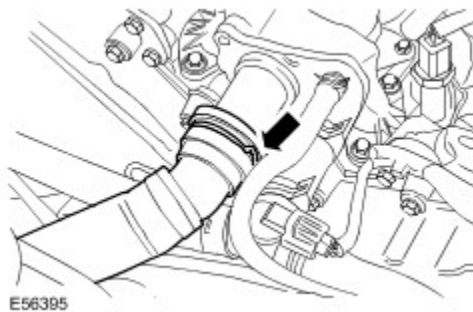
12. Remove the front wheels and tires.
13. Remove the upper suspension arm and brake line heat shields for access.



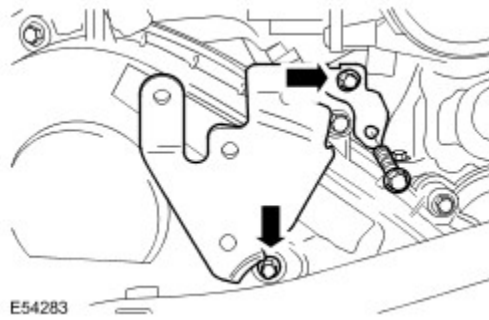
14. Remove the radiator assembly. For additional information, refer to [Radiator \(26.40.01\)](#) (Section 303-03)
15. Disconnect the thermostat housing coolant hoses. For additional information, refer to [Thermostat \(26.45.01\)](#) (Section 303-03)
16. Remove the intake air shutoff throttle. For additional information, refer to [Intake Air Shutoff Throttle \(19.70.32\)](#) (Section 303-04)
17. Remove the intake air shutoff throttle elbow.
  - ▶ Loosen the clip.



18. Disconnect the coolant top hose from the cylinder head coolant outlet assembly.
  - ▶ Release the clip.

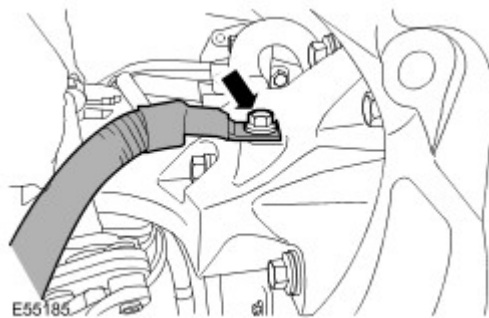



19. Remove the intake air shutoff throttle elbow support bracket.
  - ▶ Remove the three retaining bolts.



20. Remove the generator. For additional information, refer to [Generator \(86.10.02\)](#) (Section 414-02)

21. Disconnect the engine earth strap.  
▶ Remove the retaining bolt.

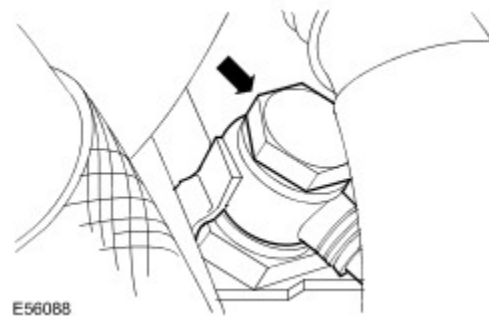


22.  **CAUTION:** If power steering fluid comes into contact with the paintwork, the affected area must be immediately washed down with cold water.

 **CAUTION:** Make sure the timing blade on the high-pressure pipe union is not damaged.

Disconnect the power steering high-pressure pipe union.

- ▶ Remove and discard the two sealing washers.
- ▶ Install blanking caps to the exposed ports.
- ▶ Allow the fluid to drain into a container.

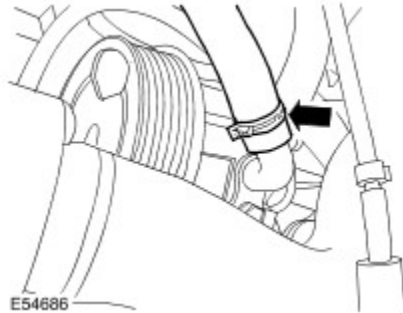


23.  **CAUTION:** If power steering fluid comes into contact with the paintwork, the affected area

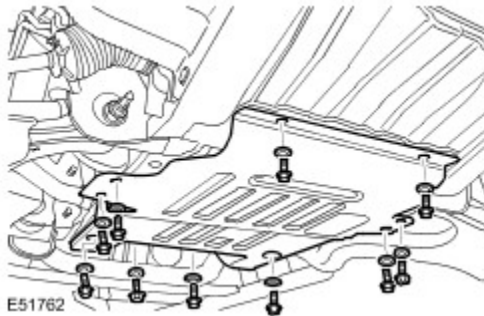
**must be immediately washed down with cold water.**

Disconnect the power steering pump supply hose.

- Clamp the power steering pump supply hose to minimise fluid loss.
- Install blanking caps to the exposed ports.

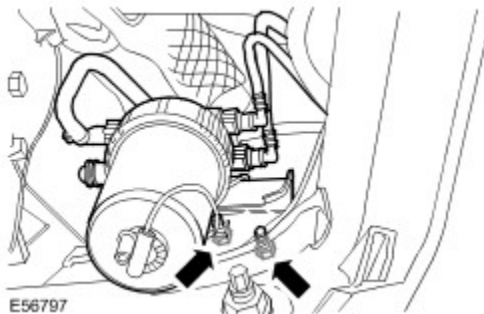


- 24 . Remove the engine undershield.



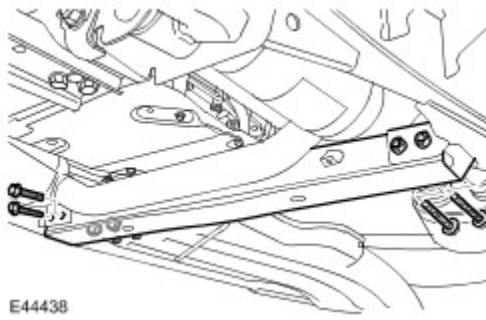
- 25 . Remove the fuel filter.

- Position a container to collect the fluid spillage.
- Disconnect the four fuel lines.
- Remove the two support bracket retaining bolts.

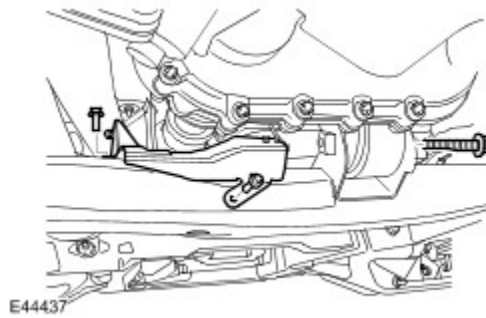


- 26 . Remove the exhaust system. For additional information, refer to [Exhaust System \(30.10.08\)](#) (Section 309-00)

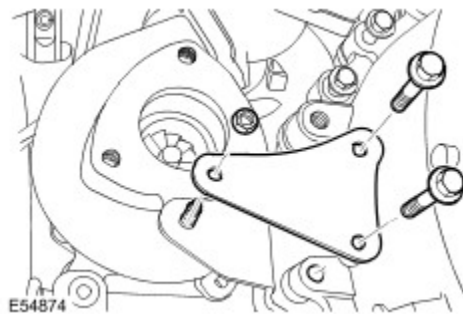
- 27 . Install the crossmember.
- Install the four nuts and bolts.



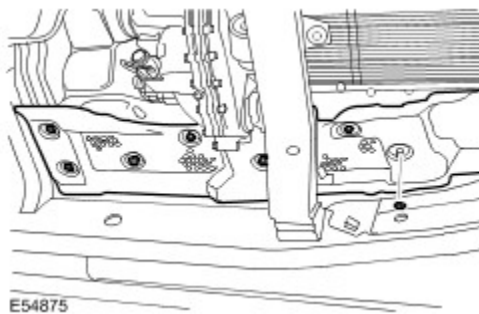
- 28 . Install the transmission support insulator through-bolt.



- 29 . Remove the turbocharger support bracket.  
▶ Remove the retaining nut and two bolts.

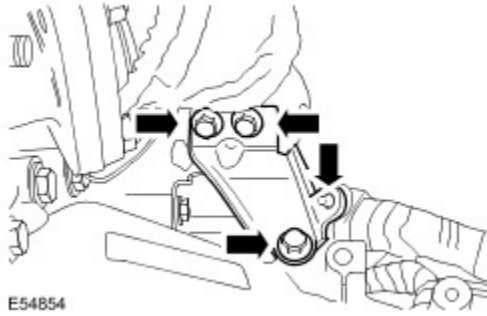


- 30 . Remove the exhaust heat shield.  
▶ Remove the seven retaining nuts.



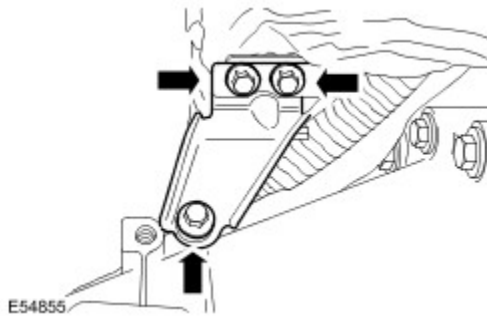
- 31 . Remove the exhaust cross-over pipe LH support bracket.  
▶ Remove the three retaining bolts.

- Release the transmission wiring harness.



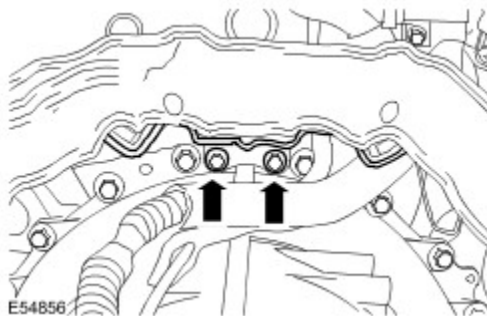
32. Remove the exhaust cross-over pipe RH support bracket.

- Remove the three retaining bolts.



33. Remove the exhaust cross-over pipe center support bracket.

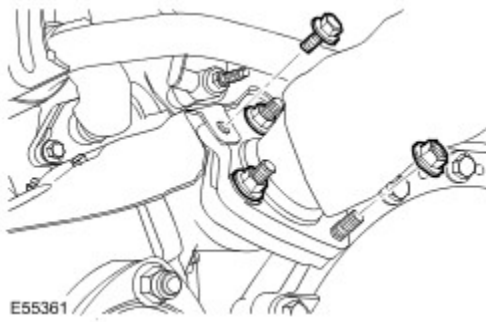
- Remove the two retaining bolts.



34. Release the exhaust cross-over pipe from the LH exhaust manifold.

- Remove the exhaust manifold heatshield retaining bolt.  
► Remove and discard the three retaining nuts.





- 35 . Remove the exhaust cross-over pipe.
- Remove the exhaust manifold heatshield retaining bolt.
  - Remove and discard the three retaining nuts.
  - Remove and discard the two gaskets.

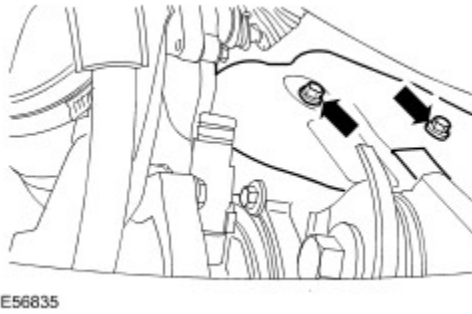


- 36 . Remove the differential mounting bracket heat shield.
- Remove the two retaining bolts.

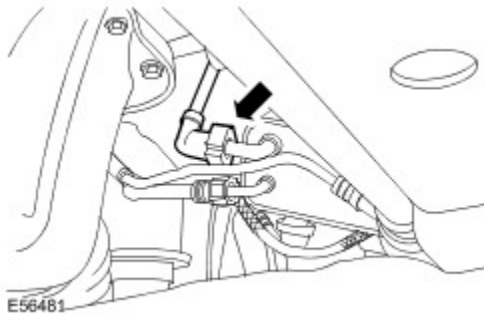


- 37 . Remove the turbocharger heat shield.
- Remove the two retaining bolts.

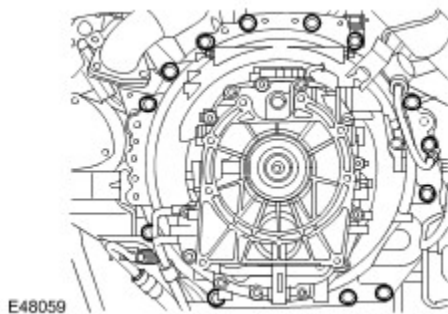




- 38 . Disconnect the fuel cooler line.  
▶ Install blanking caps to the exposed ports.

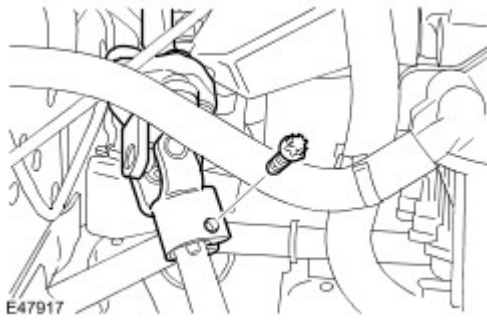


- 39 . Remove the oil strainer pick-up assembly. For additional information, refer to [Oil Pump Screen and Pickup Tube \(12.60.20\)](#) (Section 303-01)
- 40 . **NOTE :**  
Transfer case shown removed for clarity.  
Remove the 15 transmission retaining bolts.



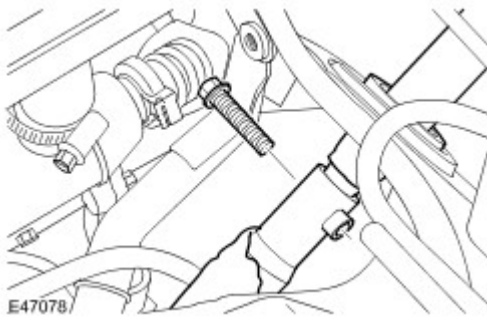
## Left-hand drive vehicles

- 1 . **NOTE :**  
Make sure the steering is in the straight ahead position.  
Release the universal joint from the steering gear.  
▶ Remove and discard the bolt.



2. Disconnect the steering column lower shaft from the steering column.

- ▶ Note the fitted position.
- ▶ Remove and discard the bolt.



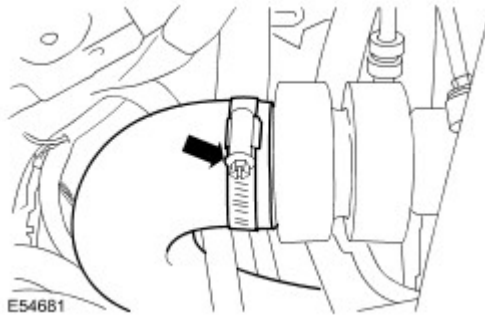
## All vehicles

1. Remove the LH engine mount retaining nut.

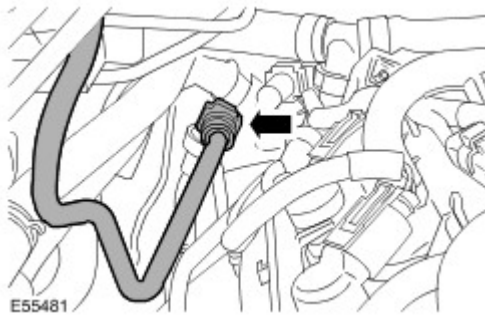


2. Remove the turbocharger outlet pipe to charge air cooler connecting hose.

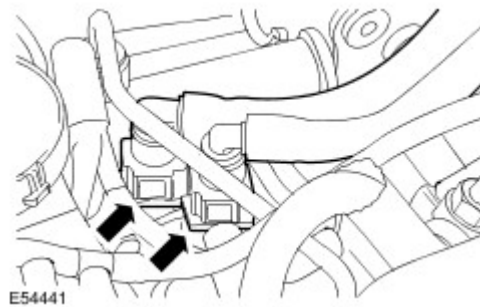
- ▶ Release the clip.



3. Disconnect the brake booster vacuum hose from the brake vacuum pump.  
▶ Install blanking caps to the exposed ports.



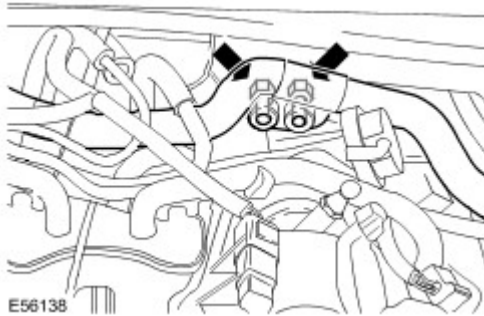
4. Disconnect the low-pressure fuel lines.  
▶ Install blanking caps to the exposed ports.  
▶ Release the low-pressure fuel lines from the securing bracket.



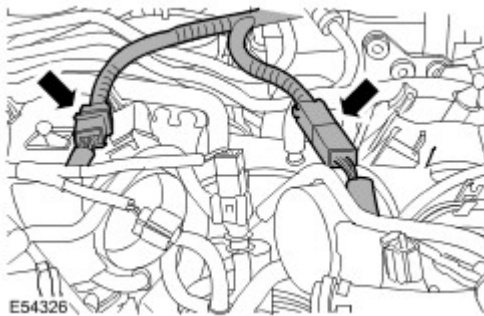
5. Disconnect both exhaust gas recirculation (EGR) coolant cross-over pipe hoses.  
▶ Clamp the EGR coolant hoses to minimize coolant loss.



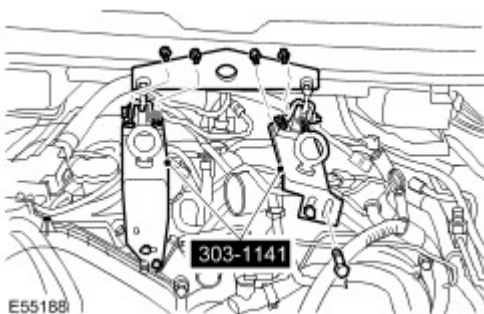
- 6 . Remove the EGR coolant cross-over pipe.
- Remove the two retaining bolts.
  - Clamp the EGR coolant hoses to minimize coolant loss.



- 7 . Disconnect the glow plug electrical connectors.
- Disconnect the 2 electrical connectors.

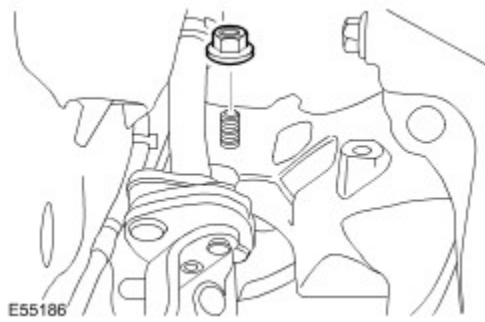


- 8 . Install the engine lifting cradle.
- Install the eight retaining bolts.






- 9 . Attach the lifting equipment to the engine lifting cradle.
- Support the engine with the lifting equipment.

- 10 . Remove the RH engine mount retaining nut.



11. Remove the RH engine mount bracket.  
▶ Remove the four retaining bolts.



12.  **WARNING:** Secure the transmission to the transmission jack.
-  **CAUTION:** Make sure the torque converter remains connected to the transmission.
-  **CAUTION:** Care must be taken to avoid damaging the steering rack and differential.
- Carefully and progressively raise and remove the engine.
- ▶ Using a transmission jack, support the transmission.
  - ▶ Release the engine from the engine mounts and the transmission.

13. Disconnect the lifting chains.