



Engine - Vehicles With: Manual Transmission (12.41.01.99)

Special Service Tools



Engine lifting Cradle
303-1141

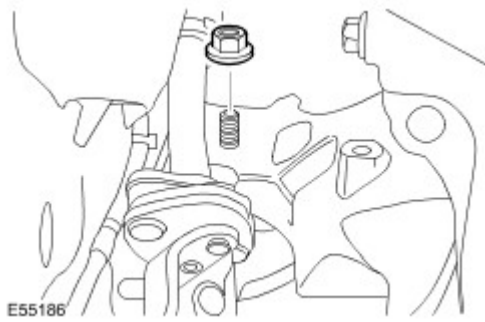
Installation

All vehicles

1. **NOTE :**
If a new engine assembly is being installed, remove the EGR coolant cross over pipe and intake air shutoff throttle from the new engine, before installing the engine lifting cradle. Engine installation will also require removal of the oil pan and oil strainer pick-up pipe.
Install the engine.
 - ▶ Install the lifting chains.
 - ▶ Raise the engine.
 - ▶ Clean the component mating faces.
 - ▶ Clean the locating dowels.
2. Carefully lower the engine until approximately 35mm above engine mounts.
 - ▶ With assistance align the engine to the transmission and engine mounts.
3. Install the RH engine mount bracket.
 - ▶ Tighten the four retaining bolts to 115 Nm (85 lb.ft).



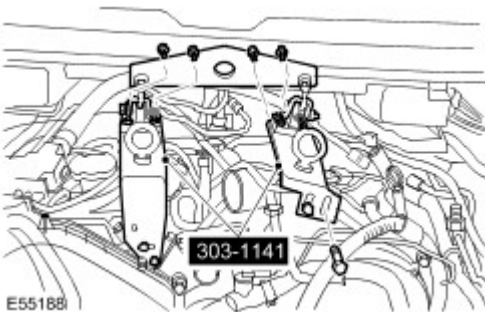
4. Install the RH engine mount retaining nut.
 - ▶ Tighten the nut to 90 Nm (66 lb.ft).



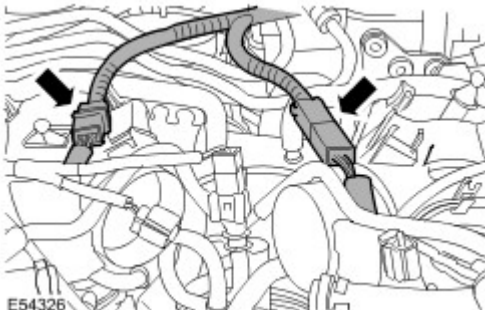
5. Install the LH engine mount retaining nut.
▶ Tighten the nut to 90 Nm (66 lb.ft).



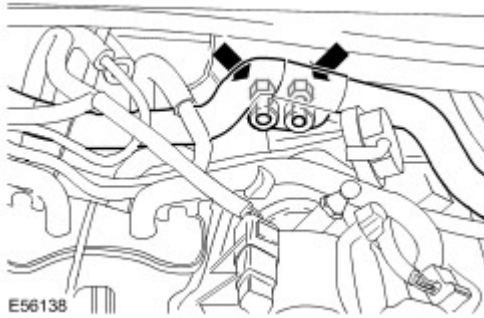
6. Release the lifting equipment from the engine lifting cradle.
7. Remove the engine lifting cradle.
▶ Remove the eight retaining bolts.



8. Connect the two glow plug electrical connectors.



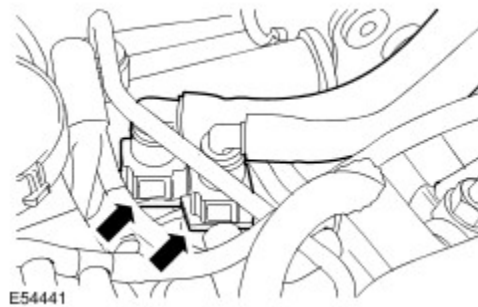
9. Install the exhaust gas recirculation (EGR) coolant cross-over pipe.
- ▶ Install the two retaining bolts.
 - ▶ Tighten to 13 Nm (10 lb.ft).



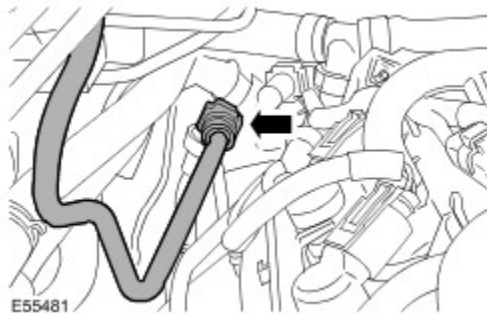
10. Connect both EGR coolant cross-over pipe hoses.
- ▶ Remove the hose clamps.



11. Connect the low-pressure fuel lines.
- ▶ Remove the blanking caps from the ports.

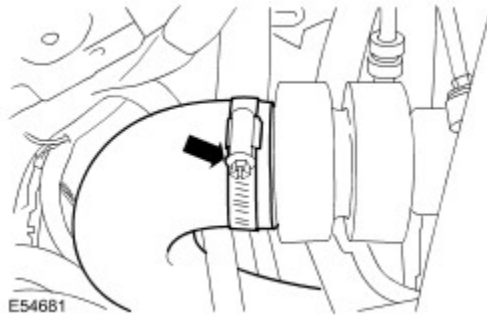


12. Connect the brake booster vacuum hose.
- ▶ Remove the blanking caps from the ports.



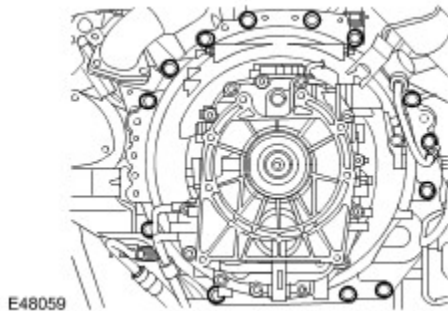
13. Install the turbocharger outlet to charge air cooler inlet pipe connecting hose.

▶ Tighten the clip.



14. **NOTE :**
Transfer case shown removed for clarity.
Install the transmission retaining bolts.

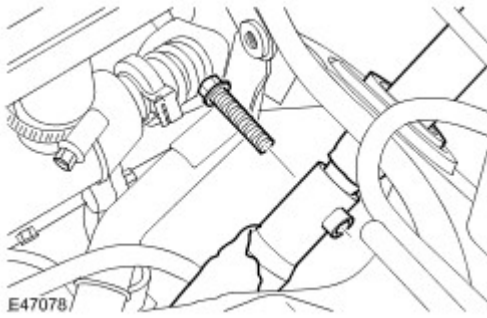
▶ Tighten the bolts to 45 Nm (33 lb.ft).



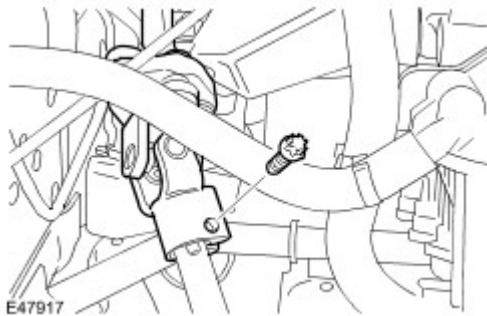
Left-hand drive vehicles

1. Connect the steering column lower shaft to the steering column.

▶ Tighten the new bolt to 25 Nm (18 lb.ft).

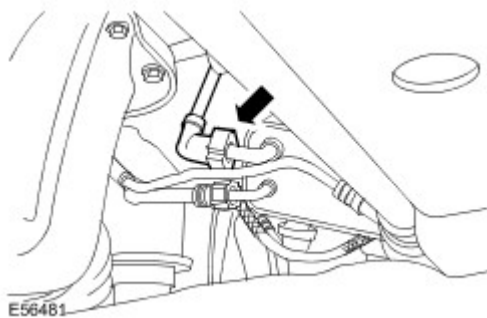


2. Connect the universal joint to the steering gear.
 - ▶ Install new patchlock bolt and tighten to 25 Nm (18 lb.ft).



All vehicles

1. Install the oil strainer pick-up assembly. For additional information, refer to [Oil Pump Screen and Pickup Tube \(12.60.20\)](#) (Section 303-01)
2. Connect the fuel cooler line.
 - ▶ Remove the blanking caps from the ports.



3. Install the turbocharger heat shield.
 - ▶ Install the two retaining bolts.
 - ▶ Tighten to 10 Nm (7 lb.ft).



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- 4 . Install the differential mounting bracket heat shield.

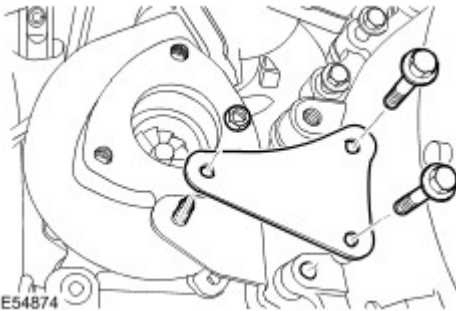
► Tighten to 10 Nm (7 lb.ft).



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- 5 . Install the turbocharger support bracket.

► Tighten the retaining nut and two bolts to 22 Nm (16 lb.ft).



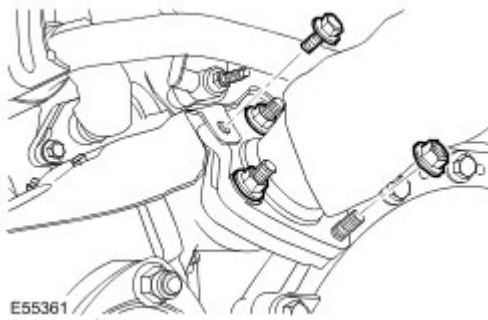
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- 6 . Install the exhaust cross-over pipe.

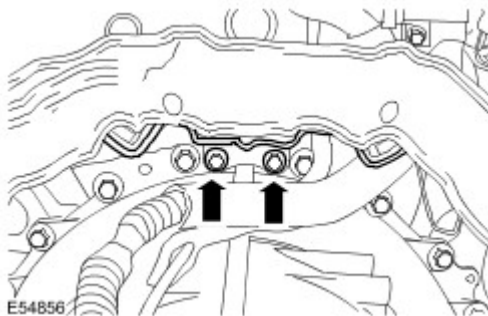
- Install new gaskets.
- Install new retaining nuts.
- Tighten the nuts to 22 Nm (16 lb. ft).
- Install the exhaust manifold heatshield retaining bolt.
- Tighten the bolt to 10 Nm (7 lb.ft).



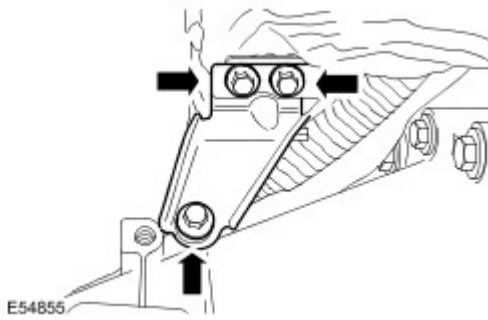
7. Attach the exhaust cross-over pipe to the LH exhaust manifold.
- ▶ Install new retaining nuts.
 - ▶ Install the exhaust manifold heatshield retaining bolt.
 - ▶ Tighten the nuts to 22 Nm (16 lb. ft).
 - ▶ Tighten the bolt to 10 Nm (7 lb.ft).



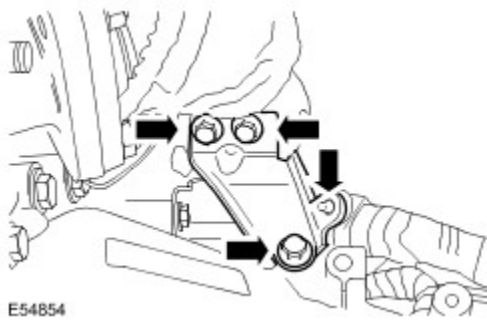
8. Secure the exhaust cross-over pipe center support bracket.
- ▶ Tighten the retaining bolts to 25 Nm (18 lb.ft).



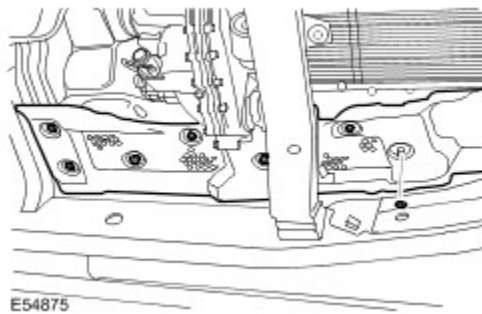
9. Install the exhaust cross-over pipe RH support bracket.
- ▶ Align the exhaust cross-over pipe support bracket assembly.
 - ▶ Tighten the retaining bolts to 25 Nm (18 lb.ft).



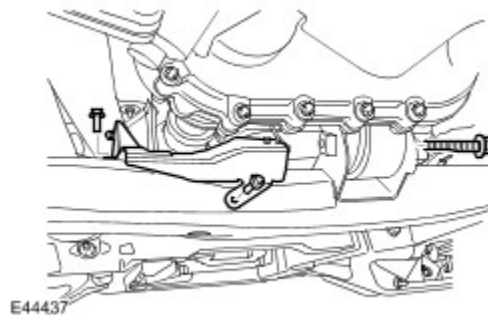
10. Install the exhaust cross-over pipe LH support bracket.
- Tighten the retaining bolts to 25 Nm (18 lb.ft).
 - Attach the wiring harness.



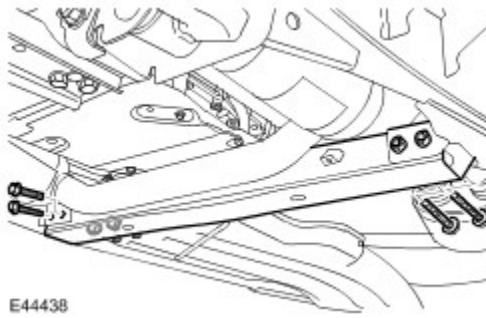
11. Install the exhaust heat shield.
- Install the seven retaining nuts.



12. Remove the transmission support insulator through-bolt.
- Support the transfer case.

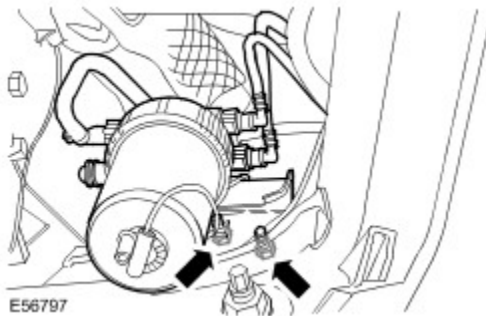


13. Remove the crossmember.
▶ Remove the 4 nuts and bolts.

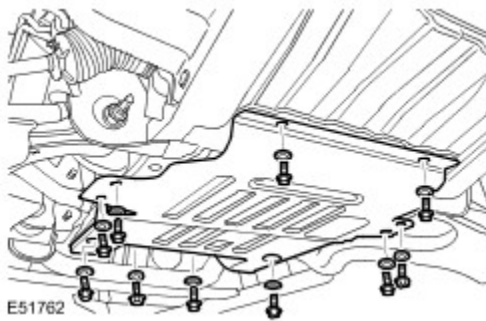


14. Install the exhaust system. For additional information, refer to [Exhaust System \(30.10.08\)](#) (Section 309-00)

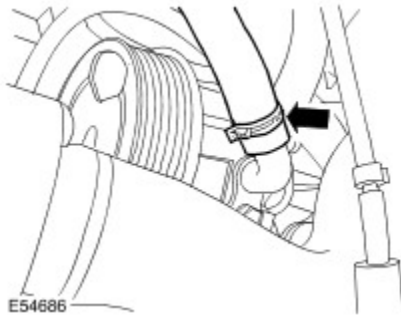
15. Install the fuel filter.
▶ Install the two retaining bolts and tighten to 10 Nm (7 lb.ft).
▶ Connect the four fuel lines.



16. Install the engine undershield.



17. Connect the power steering supply hose.
▶ Remove the blanking caps from the ports.
▶ Remove the hose clamp.



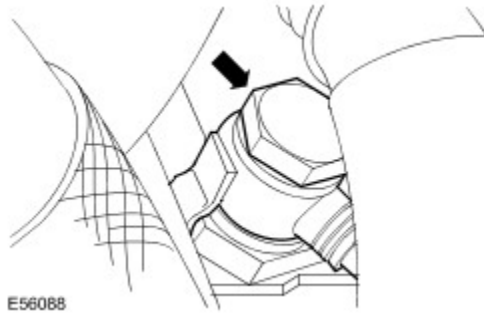
18 .



CAUTION: Make sure the timing blade on the high-pressure pipe union is correctly seated.

Connect the power steering high-pressure pipe union.

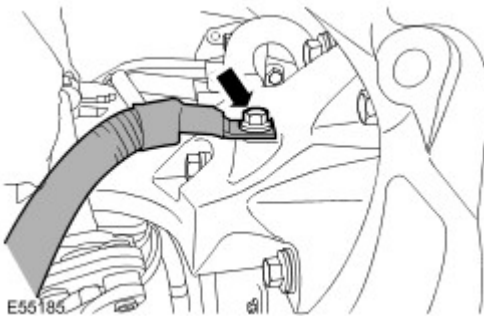
- Remove the blanking caps from the ports.
- Install new sealing washers.
- Tighten the union to 25 Nm (18 lb.ft).
- Remove the container.



19 .

Connect the engine earth strap.

- Install the retaining bolt.



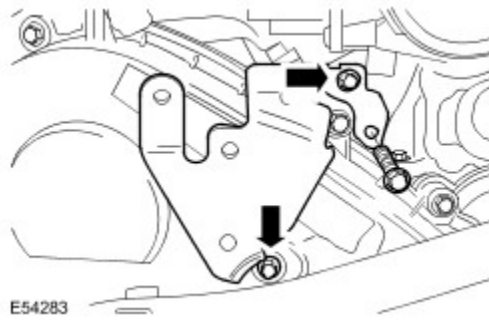
20 .

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

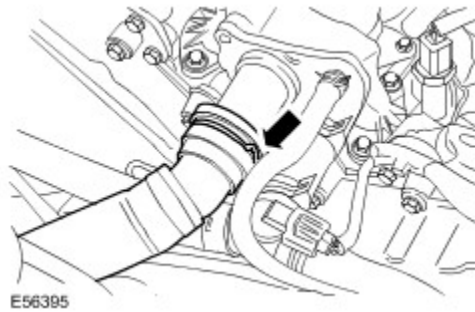
21 .

Install the intake air shutoff throttle elbow support bracket.

- Install the three retaining bolts and tighten to 10 Nm (7 lb.ft).



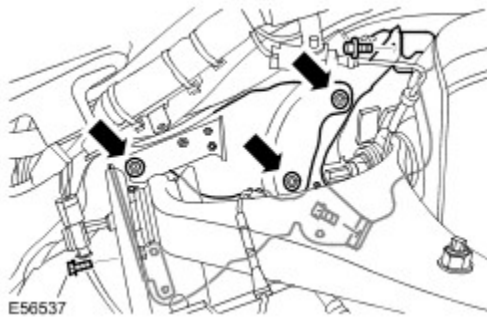
- 22 . Connect the coolant top hose to the cylinder head coolant outlet assembly.
▶ Install the coolant hose retaining clip.



- 23 . Install the intake air shutoff throttle elbow.
▶ Tighten the clip.

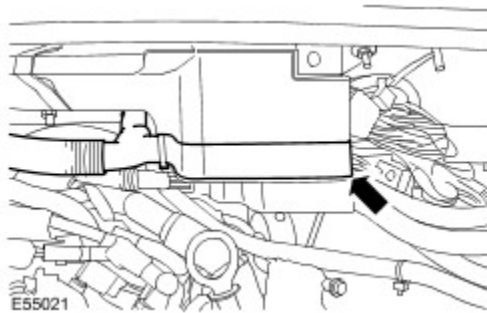


- 24 . Install the intake air shutoff throttle. For additional information, refer to [Intake Air Shutoff Throttle \(19.70.32\)](#) (Section 303-04)
- 25 . Install the viscous fan assembly. For additional information, refer to [Cooling Fan \(26.25.19\)](#) (Section 303-03)
- 26 . Connect the thermostat housing coolant hoses. For additional information, refer to [Thermostat \(26.45.01\)](#) (Section 303-03)
- 27 . Install the radiator assembly. For additional information, refer to [Radiator \(26.40.01\)](#) (Section 303-03)
- 28 . Install the upper suspension arm and brake line heat shields.

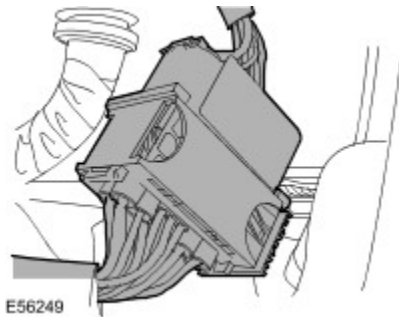


29 . Install the front wheels and tires.

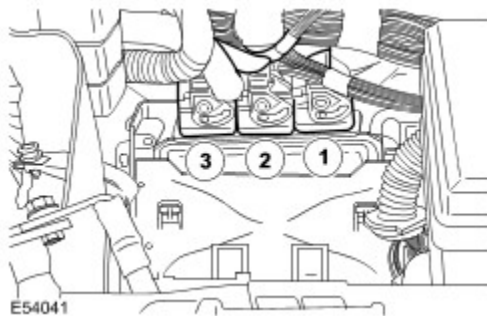
30 . Attach the engine wiring harness to the bulkhead.



31 . Connect the engine wiring harness.



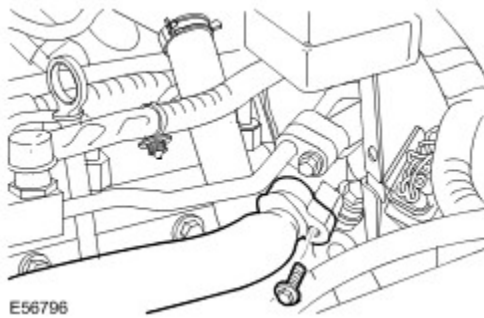
32 . Connect the three engine harness electrical connectors.



33 . Install the ECM cover.

34 . Connect the A/C compressor low pressure line.

- ▶ Remove the blanking caps from the ports.
- ▶ Install a new O-ring seal.
- ▶ Tighten the retaining bolt to 9 Nm (7 lb.ft).



- 35 . Install the auxiliary battery tray. For additional information, refer to [Auxiliary Battery Tray \(76.10.31\)](#) (Section 414-01)
- 36 . Install the battery tray. For additional information, refer to [Battery Tray \(76.10.30\)](#) (Section 414-01)
- 37 . Check and top-up the engine oil.
- 38 . Recharge the A/C system. For additional information, refer to [Air Conditioning \(A/C\) System Recovery, Evacuation and Charging \(82.30.02\)](#) (Section 412-00)
- 39 . Install the engine cover. For additional information, refer to [Engine Cover - 2.7L Diesel \(12.30.50\)](#) (Section 501-05)
- 40 . Connect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)
- 41 . Fill and bleed the power steering system. For additional information, refer to [Power Steering System Filling and Bleeding](#) (Section 211-00)