

Document Title: Engine and transmission, removing	Function Group: 210	Information Type: Service Information	Date: 2014/7/8 0
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Engine and transmission, removing

Op nbr 210-073

This operation also includes required tools and times for applicable parts of the following operations:

- [191 Service positions](#)
- [173 Coolant, change](#)
- [900 Vacuum pump, connection](#)
- [715 Protective plate, removing](#)
- [821 Engine hood, removing](#)



WARNING

Changing control units between machines, when troubleshooting or repairing, may not take place for any reason without reprogramming.

Incorrect individual settings in the control unit may result in personal injury or machine damage.

For reprogramming and read-out of software, see "VCADS Pro User manual".

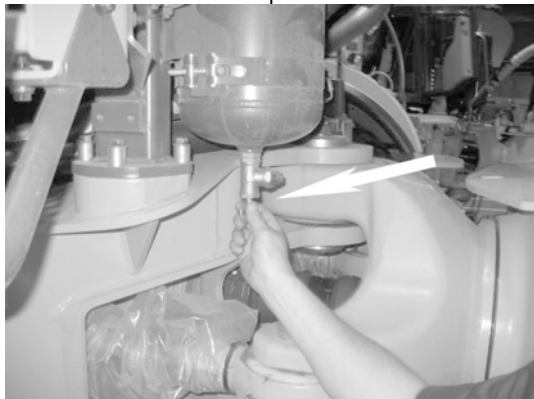
1. Place the machine in service position, see [191 Service positions](#).

NOTE!

If the height between the workshop floor and the overhead crane member is less than 450 cm (15 ft), the engine hood shall be removed. If higher, the engine unit can be lifted out with the engine hood left on the machine.

See: [821 Engine hood, removing](#)

2. Drain the machine's compressed air tank. Press in the valve to release the air.



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Figure 1

3. Remove the front and rear underbody skid plates, see [715 Protective plate, removing](#).

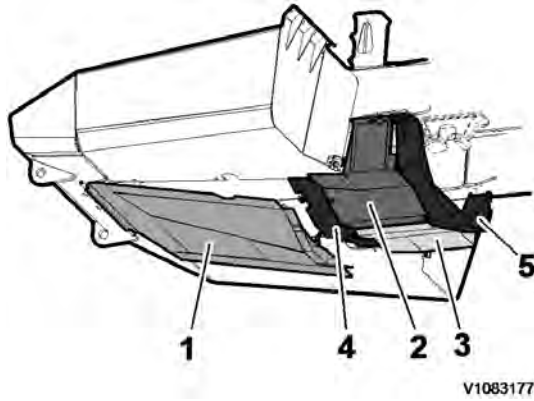


Figure 2
Underbody skid plates

1. Front underbody skid plate
 2. Rear underbody skid plate, left
 3. Rear underbody skid plate, right
 4. Front cross member
 5. Rear cross member
4. Loosen the oil drain bracket and move it aside. Fasten it so that it follows along with the engine when it is lifted out of the machine.

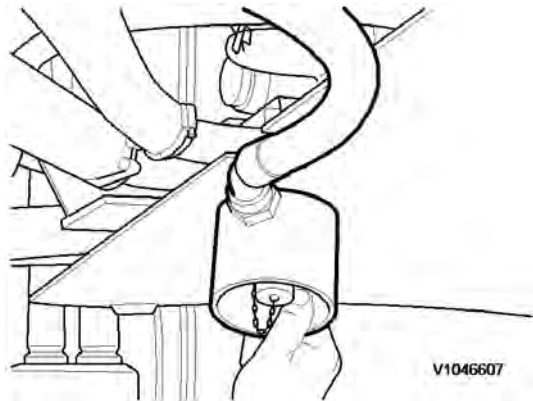


Figure 3

5. Drain the coolant, see [173 Coolant, change](#).
6. Drain the transmission oil. Connect the drain hose to the drain connection. Insert the drain hose into a suitable container.

NOTE!

Take care of waste oil/fluids in an environmentally sound manner.

NOTE!

The oil drain hose is inserted in the pipe for the ladder on the inside of the front grill.

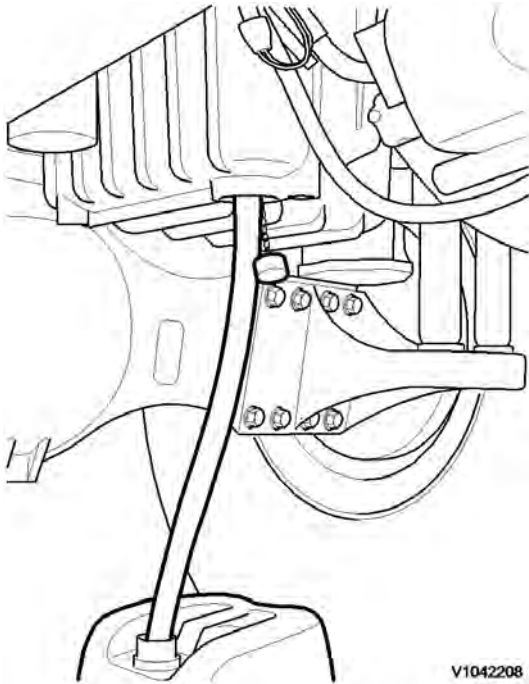


Figure 4

7. Loosen the bolts and unhook the bracket for the brake cooling oil's breather filter. Loosen the bolt and swing out the radiator.

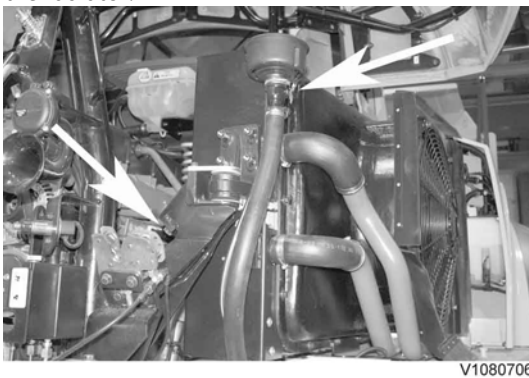


Figure 5

8. Loosen and remove the belt guard.



Figure 6

The figure shows engine D16

9. Loosen the three belt tensioners with a ratchet handle and remove the belts.



Figure 7

The figure shows engine with EGR.

10. Mark up and remove the connection (AL 3201), the plus cable, and the ground cable from the alternator.

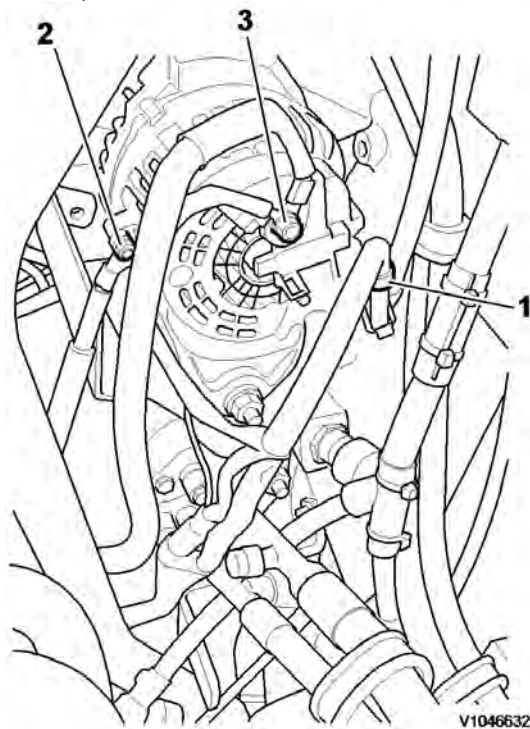


Figure 8



Do not disconnect or loosen connections for the air conditioning unit (AC). Risk of gas leakage.

11. Remove the bracket for the belt guard and loosen the AC compressor. Loosen the electric connections for control current to the AC compressor and remove the bolts that hold the AC compressor. Loosen the connections for the air pump (only EGR-engine).

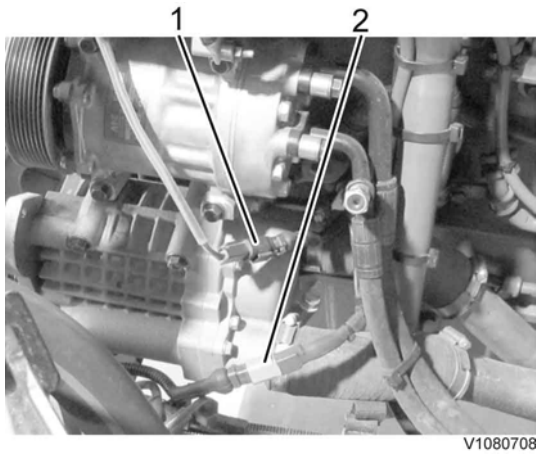


Figure 9
Connectors

1. AC Compressor
2. Air pump (only EGR-engine)

12. Lay aside the AC compressor with hoses.

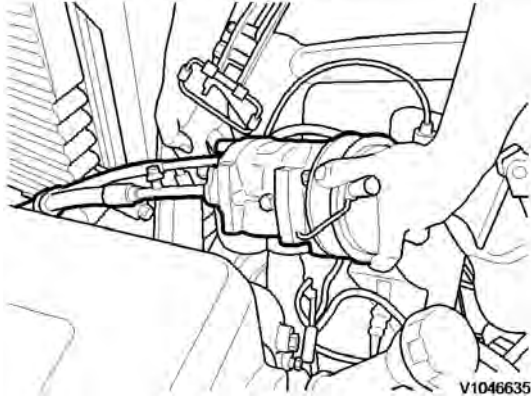


Figure 10

13. For engine with EGR: Loosen the connections for inlet and outlet air. Secure the pump with a tensioning strap and remove it. Remove the bolts that hold the air pump. Plug open air connections.

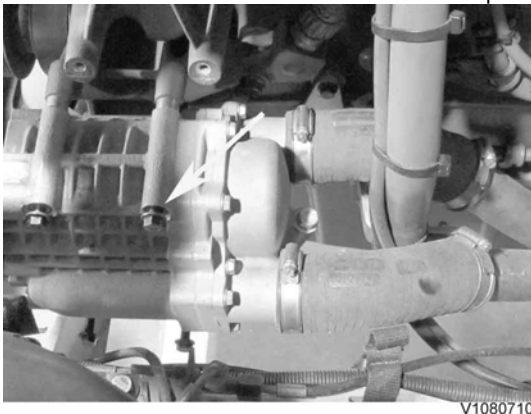


Figure 11

14. Unplug the connector (EL). Remove the cable clamp.



Figure 12

15. Loosen the plus cable for the preheating coil and the hose to the compressed air pipe. On D13, the preheating coil is installed with the connections facing down.

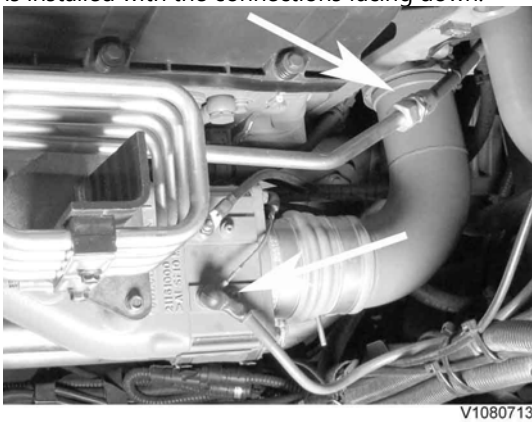


Figure 13

The figure shows the preheating coil on engine D16

16. For engine **without** EGR: Loosen the air connection for PWM-valve, PWM 2501, for the exhaust brake.

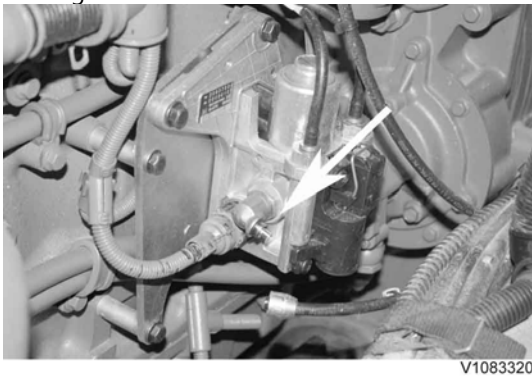
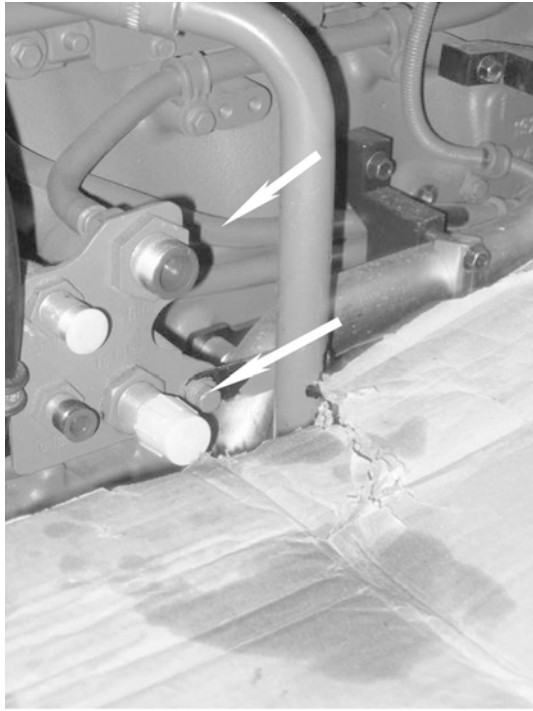


Figure 14

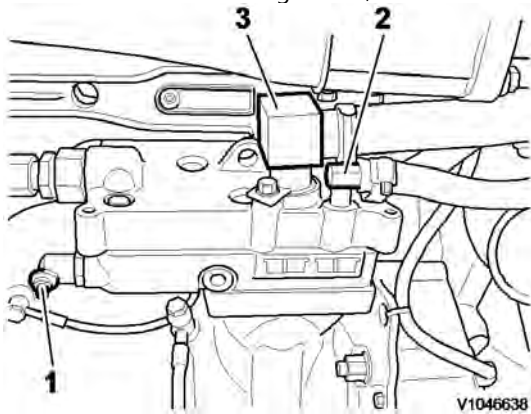
17. Loosen and plug the fuel connections.



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Figure 15

18. Loosen and remove the signal line, and the coolant hose from the compressor. Plug the connections.



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Figure 16

1. Signal line
2. Water hose
3. Suction hose

19. Loosen the hoses for the expansion tank. Unplug the level sensor's connector (SE2603) down on the expansion tank. Loosen the four bolts for the foot step and lift it away.

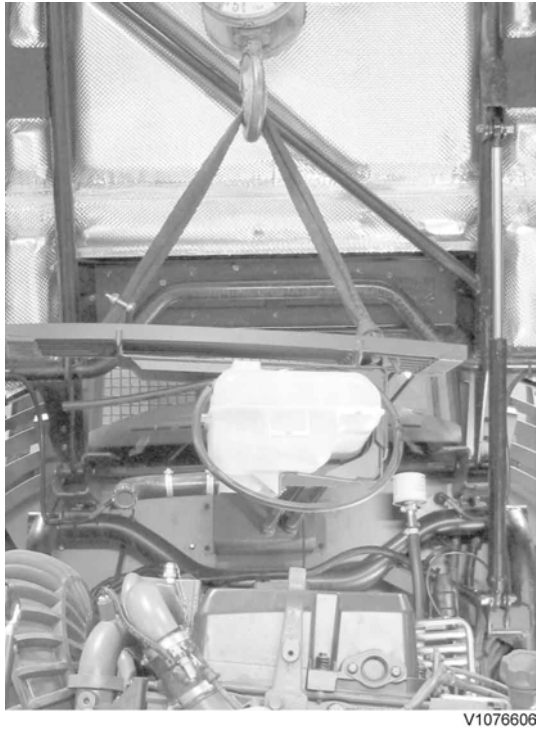


Figure 17
Expansion tank, bracket and foot step

20. Loosen the connection for the sensor (SE2501 and SE2502) in the inlet pipe.



Figure 18

21. Loosen the hoses for the cab heater.

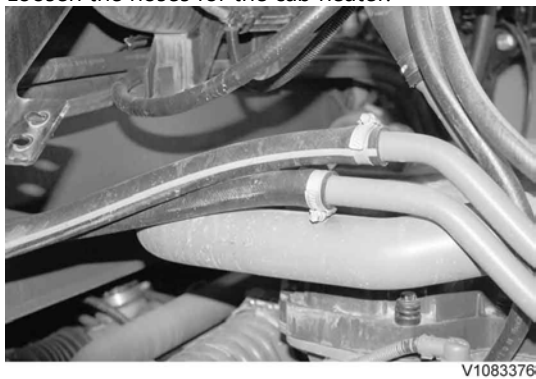


Figure 19

22. Remove the U-shaped rubber hose to the turbo. For engine with EGR: Loosen the line to the air pump from the sleeve in the inlet manifold's underside. Loosen the bracket in the inlet manifold's front end. Remove the rear bracket and lift away the pipe.

NOTE!

Always cover open air connections with plastic bags and rubber bands. Sand, dust and other particles in these connections can cause engine breakdown.

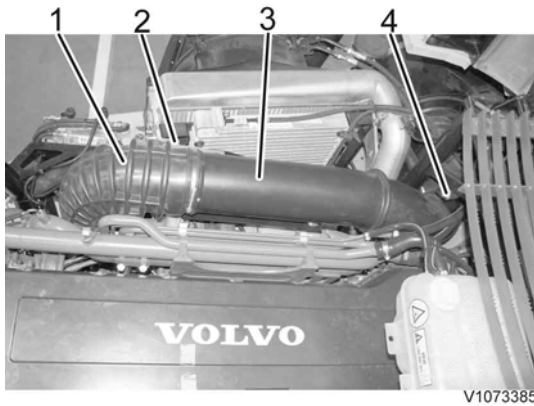


Figure 20

1. Rubber hose
 2. Front bracket
 3. Inlet manifold
 4. Rear bracket
- 23.
- Remove the bolts holding the upper and lower charge-air pipe to their brackets.
 - Remove the connector for the boost pressure sensor (only EGR-engine).
 - Loosen and remove the inlet pipes to the charge-air cooler.
 - Open the fasteners and remove the heat shield blanket.
 - Remove the exhaust pipe from the turbo to the back end of the flex hose.
 - Cover the openings, also on the exhaust pipe.

NOTICE

Always cover open air connections with a plastic bag and rubber bands. Gravel, dust and other particles in these connections may result in engine failure!

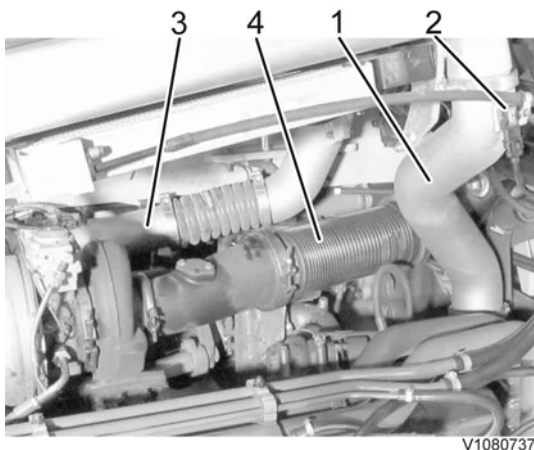


Figure 21

1. Upper charge-air pipe
2. Sensor SE2512 (only EGR-engine)
3. Lower charge-air pipe
4. Flex hose

24. Loosen the bracket for the tank's breather filter and the two bolts in the front bracket. Swing out the charge-air cooler and remove the starter motor's ground cable.



Figure 22

25. Loosen the hose for the front, lower coolant pipe.



Figure 23

View from below

26. Loosen the hose between engine and radiator at the joint in front of the cab.

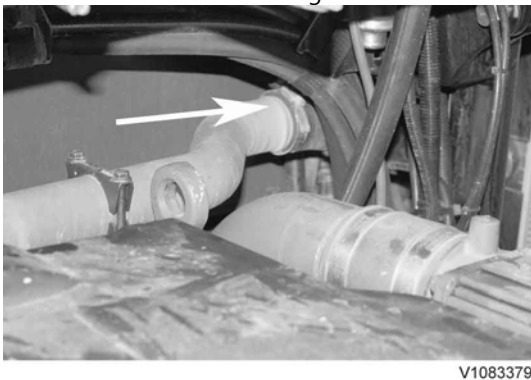


Figure 24

27. For machines with EGR-engine: Loosen the hose to the air pump at the connection in front of the cab.

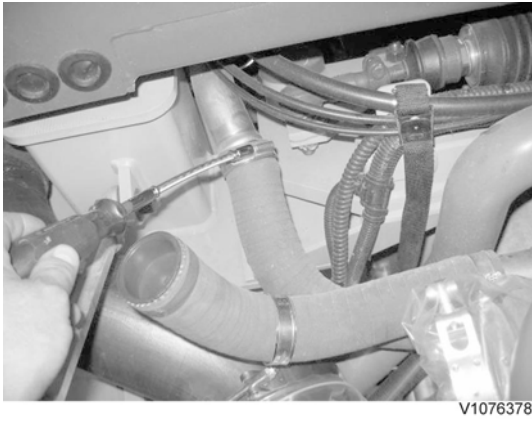


Figure 25

28. Loosen the starter motor's plus cable from the cable box. Disconnect the cable from the machine so that it follows along when the engine is lifted.



Figure 26

Work in the cab

29. Remove the rear and middle floor mat in the cab.
30. Remove the middle part in the cab floor.
31. Loosen the rear floor plate with operator's seat and slide it back as far as possible in the cab.



Figure 27

32. Remove connector SE4307 and SE4215 from the transmission's rear end. Remove the connection for sensor SE4218. Loosen the cable clamp and cut the cable tie.

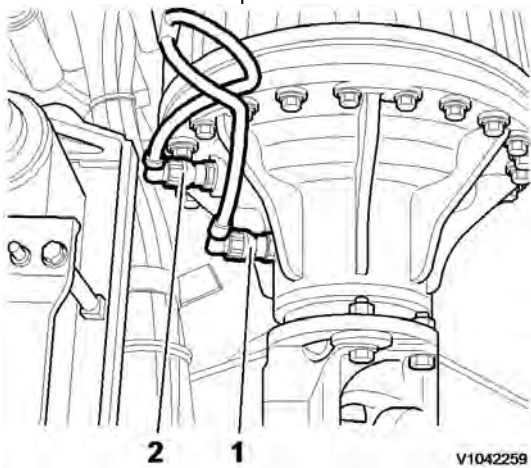


Figure 28

1. SE 4307
2. SE 4215

33. Remove the breather hose on the transmission. Plug the connections.

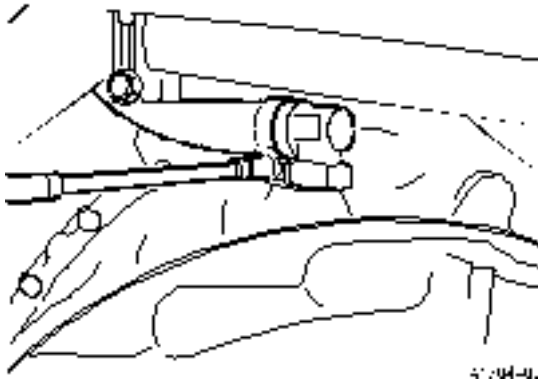


Figure 29

34. Remove the oil dipstick.
35. Remove the oil filler hose and the hose for the oil level dipstick from the transmission.



Figure 30

36. Loosen the cooling oil hoses to the transmission up by the SAE-connection. Plug the connections. Fasten the hoses against the back end of the transmission with a tensioning strap.

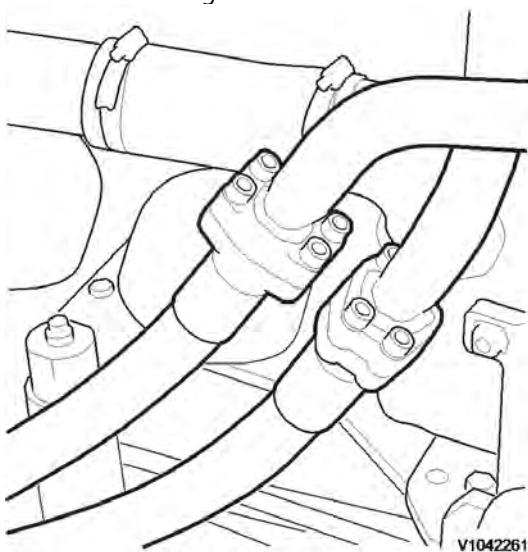


Figure 31

37. Secure the propeller shaft with straps so that it cannot slide apart, and remove the bolts in the front bolted joint.

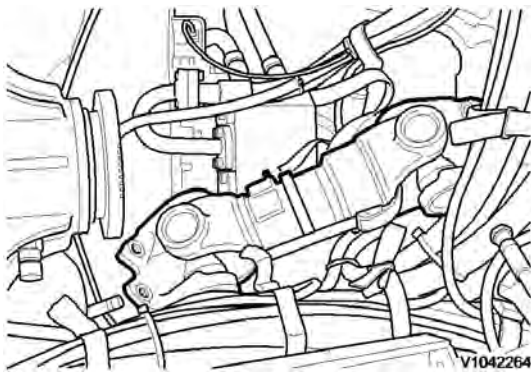


Figure 32

Work under the machine

38. Remove the cannon connector from the transmission's connector (EH). Loosen and remove the connector for pressure sensors and the cable's clamps.

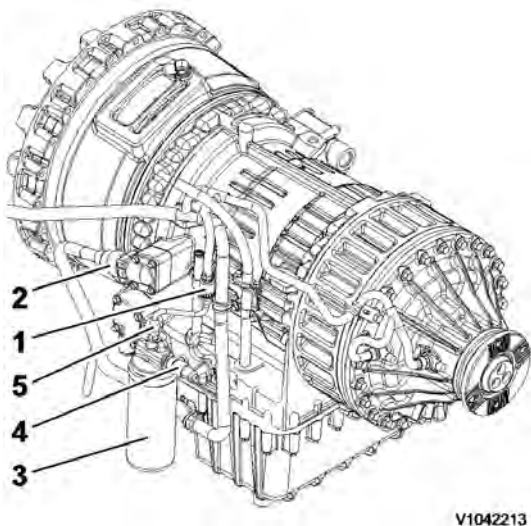


Figure 33

1. Clamp
2. Cannon connector
3. Oil filter
4. Monitor sensor oil filter, SE 4218
5. Sensor main oil pressure, SE 4219

39. Loosen the bracket holding the sensor's connector to the transmission. Remove the main oil filter with bracket from the transmission. Plug the connection.



Figure 34

40. Remove the cooling oil filter from the transmission, and cover the connection on the filter housing.

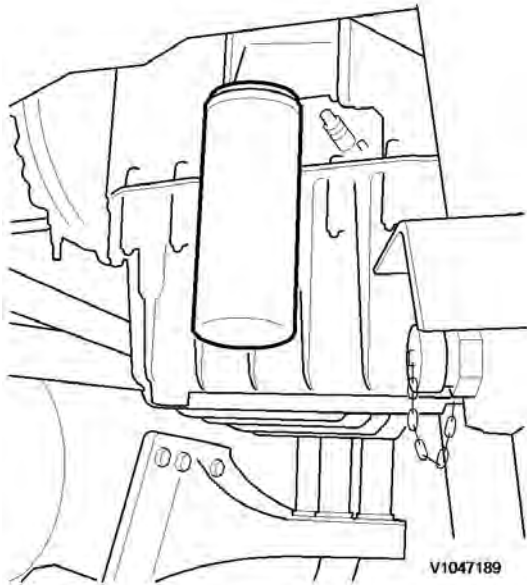
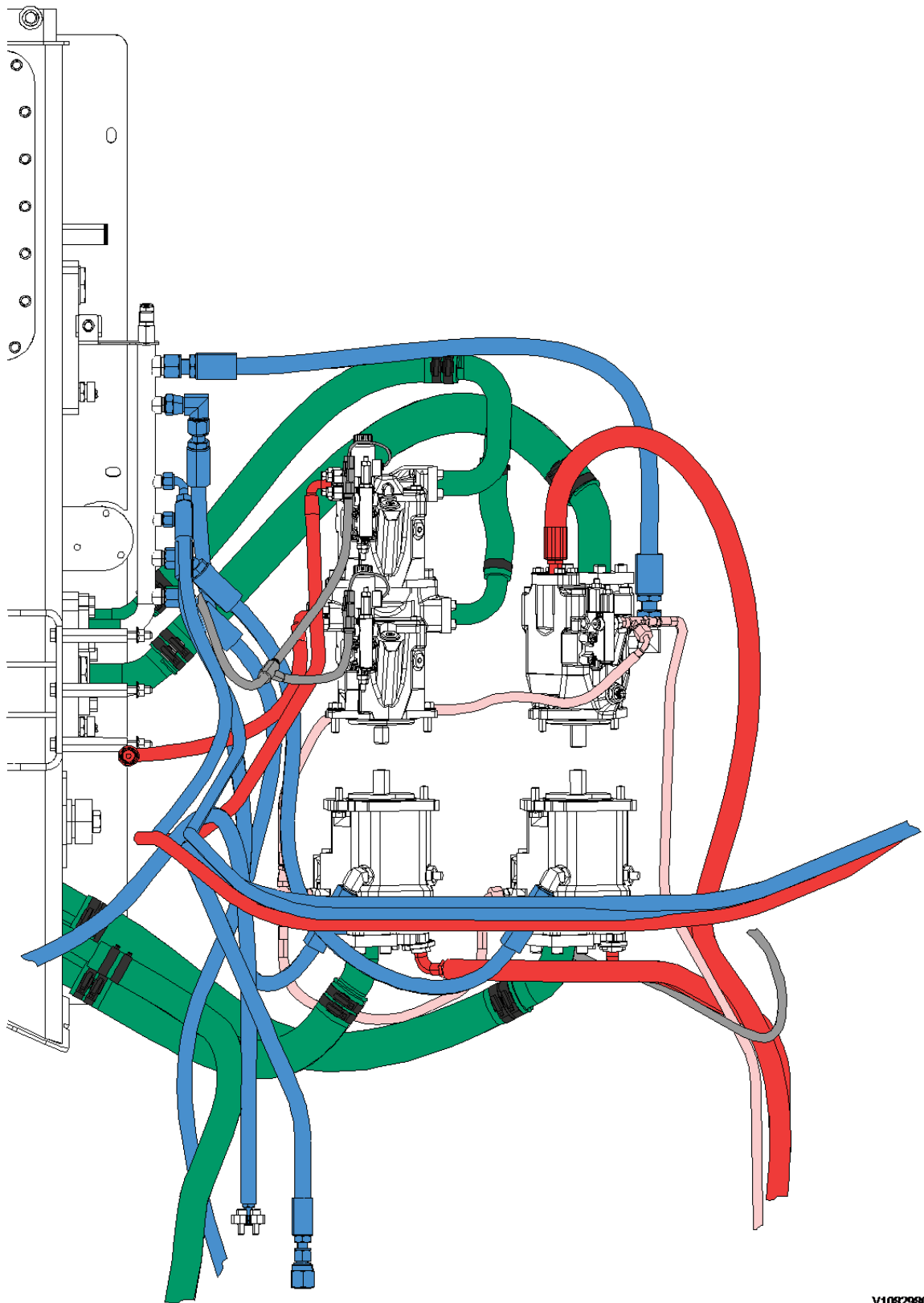


Figure 35

41. Remove the connection for the fan pumps' PWM-valves (PWM 2602, PWM 2601), and for the PWM-valve for pump shut-off (PWM 9133), located on the right rear pump.
42. Loosen and plug the LS-hose for the right rear pump, loosen and plug the remaining pressure and leak-oil hoses. Loosen and plug the pumps' suction hoses. (See [900 Vacuum pump, connection](#))



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Figure 36

1. Green – Suction hoses
2. Blue – Pump housing drain
3. Red – Pressure hoses
4. Grey – Control current to PWM-valves
5. Pink – Signal lines LS

Engine lift

43. Secure the engine and transmission with lifting devices that are rated for the relevant load. Use shackles in all lifting eyes and secure a ratchet block in the front lifting eye.

Weight (approx.):

D13	2200 kg (4850 lbs)
D16	2370 kg (5225 lbs)



Figure 37
Lifting engine D13

NOTE!

To prevent the engine's angle from exceeding the critical angle, check and adjust the length of the chains. This is necessary to prevent incorrect loading of the lifting eyes.

Front chain	varies during the lift, however, may never be shorter than 975 mm (38.4 in)
Rear chains	1,000 mm (39.4 in)

44. Remove the pin for the grill's right stay. Remove the bolts that hold the post. Move the post with the damper to the right, place a wooden block under the main filter so that the water trap's drain point is not loaded. Secure with a strap by the bracket for the charge-air cooler.

NOTE!

Do not use the foot steps in the grill after the stay has been removed.

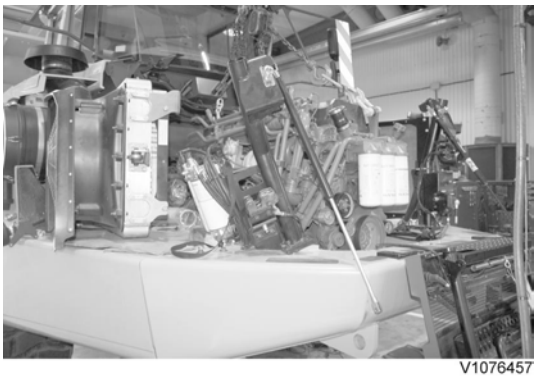


Figure 38

45. Remove the bolts for the front engine mount.

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