Document Title: **Engine, description**	Function Group: **200**	Information Type: **Service Information**	Date: **2014/7/30**
Profile: **ART, A25D [GB]**			

Engine, description

Engine D10, description

Machine	Place of manufacture, serial number		
	EU	US	Brazil
A25D	11001–12999	61001–61118	71001–71999
A30D	10001–11999	60001–60093	70001–72999

The engine is a straight six cylinder, direct-injected diesel with 9.6 litres cylinder capacity, turbo, intercooler and electronically controlled fuel injection. The valve mechanism receives its movement from the camshaft via valve rods and rocker arms.
The injection pump is equipped with a smoke limiter for torque limitation of the engine. The injectors are mounted in copper sleeves that are pressed into the cylinder head and directly surrounded by the coolant.
The engine also has an electronic control unit (E-ECU), located on the right radiator bow.

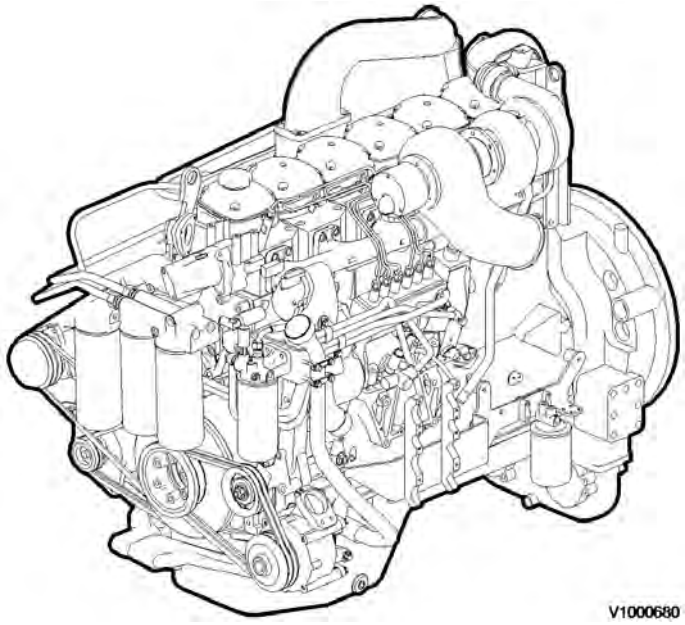

Figure 1
Engine D10B, left side

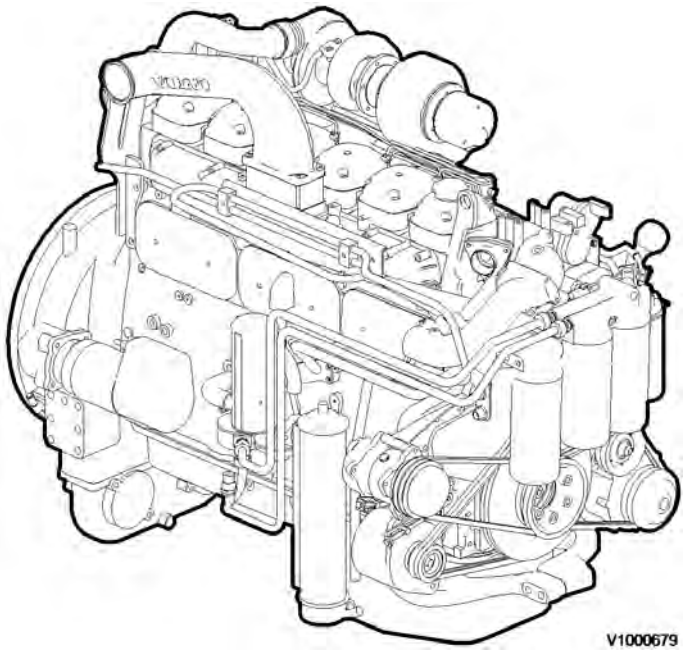

Figure 2
Engine D10B, right side

Engine D9, description

Machine	Place of manufacture, serial number		
	EU	US	Brazil
A25D	13001–	–	72000–
A30D	12001–	–	73000–

Engine D9 is a straight six cylinder, direct-injected diesel with 9.4 litres cylinder capacity, turbo, intercooler and electronically controlled fuel injection. The valve mechanism receives its movement from the camshaft via valve rods and rocker arms.
The engine has an overhead camshaft and unit injectors, which are centred above the pistons and controlled by the camshaft and a control unit (E-ECU). The control unit is located on the engine's left side.

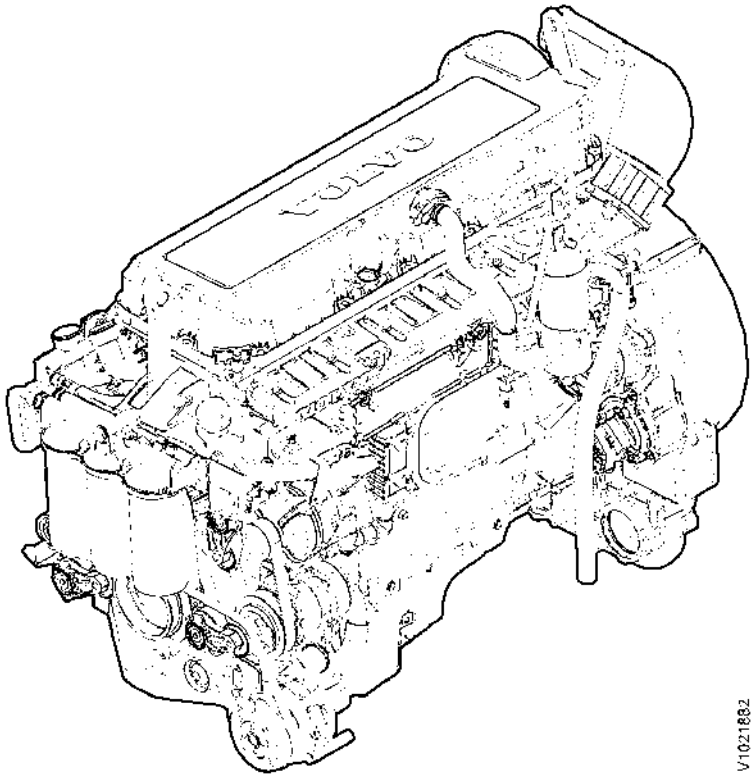

Figure 3
V1021882

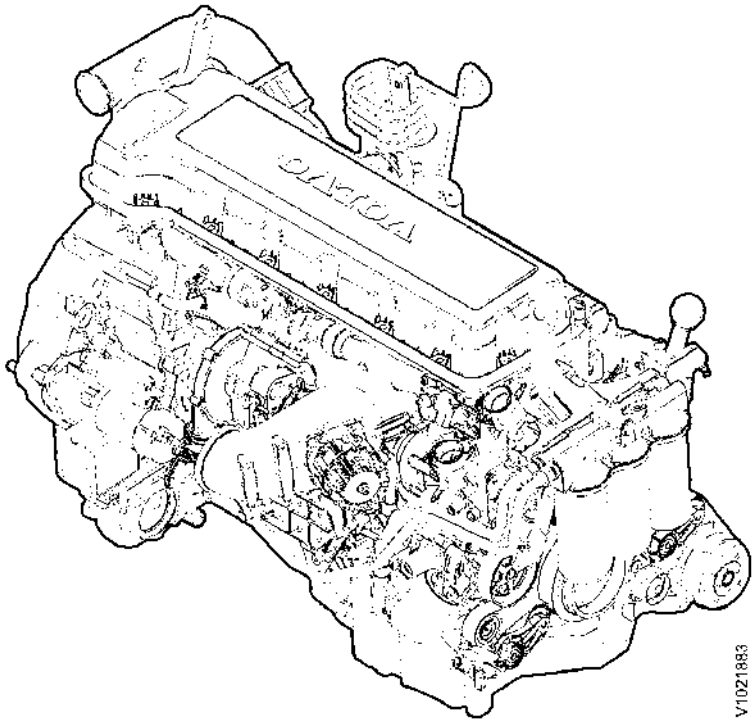

Figure 4
V1021883

Document Title: **Engine, sensor positions**	Function Group: **200**	Information Type: **Service Information**	Date: **2014/7/30**
Profile: **ART, A25D [GB]**			

Engine, sensor positions

Control unit sensors

The following is a brief summary of the parts on the engine. There are a number of other parts that affect the system, for example, the throttle pedal sensor.

The central part of the system, the control unit is positioned on the left side of the engine. All cable connectors for the engine's sensors are of DIN–standard and are connected in a so-called cable box.

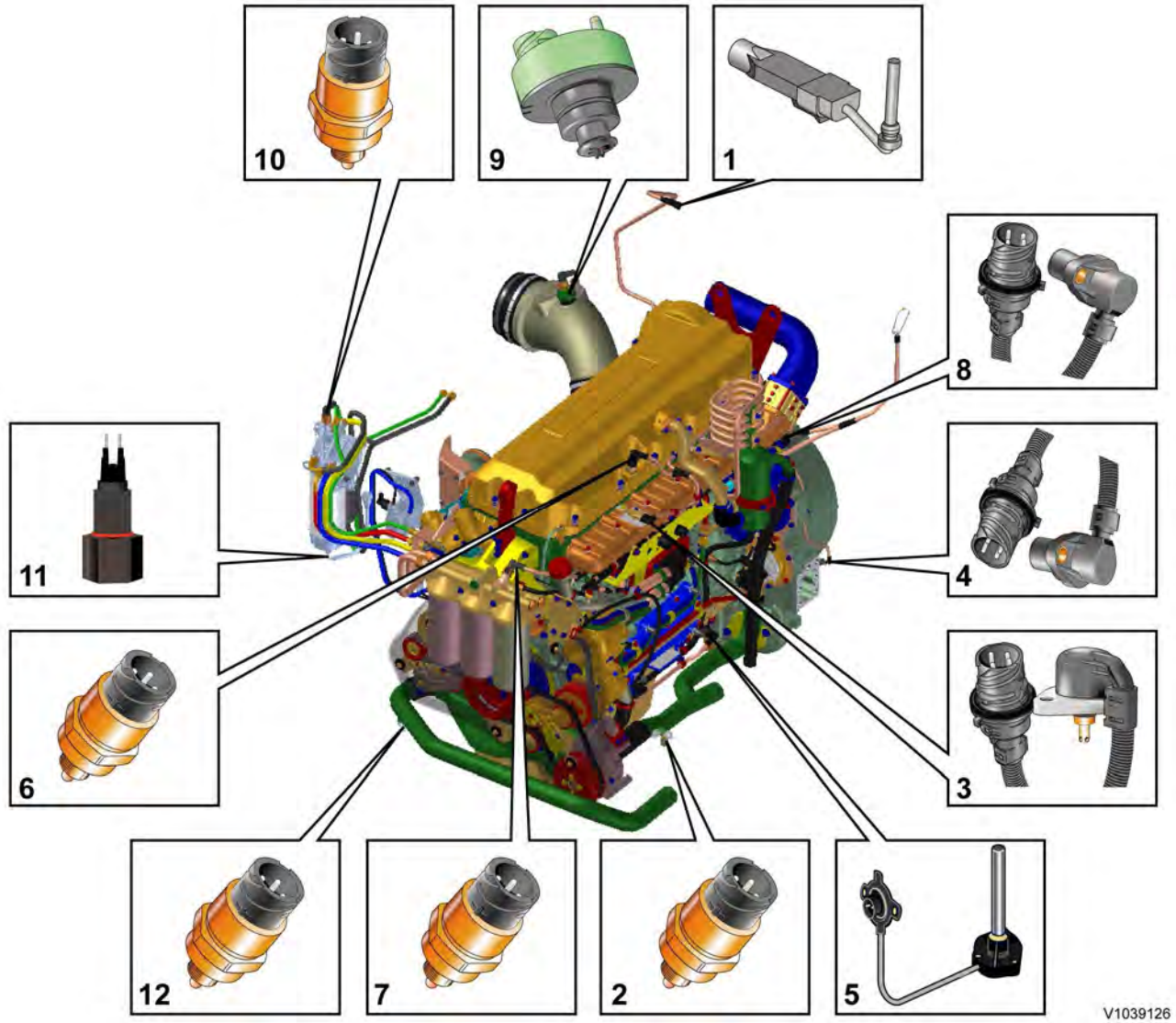

Figure 1
Engine D9, sensors (some have double functions)

1. Sensor for coolant level, SE2603
2. Sensor for coolant temperature, cooling circuit converter, SE2601
3. Sensor for charge air pressure/temperature, SE2507/SE2508
4. Tachometer sensor, flywheel, SE2701

5. Sensor for oil level/temperature, SE2205/SE2202
6. Sensor for crankcase pressure, SE2509
7. Sensor for oil pressure, SE2203
8. Camshaft sensor, engine position, SE2703
9. Sensor for air pressure/temperature, SE2501/SE2502
10. Sensor for feed pressure, fuel, SE2301
11. Sensor for water indicator, SE2302
12. Sensor for coolant temperature, cooling circuit engine/retarder, SE2602

Document Title: **Engine, identification**	Function Group: **200**	Information Type: **Service Information**	Date: **2014/7/30**
Profile: **ART, A25D [GB]**			

Engine, identification

Identification plate 1
Engine designation, serial number, part number and assembly plant are stamped in one field on the engine block's left front edge.

Identification plate 2
A decal with the software's ID-number, the engine's serial number and assembly plant is located on the valve cover to ensure installation of correct ECU on the engine in production. On the back of the ECU, there is a decal indicating its hardware number. The E-ECU is located on the engine's left side.

Assembly plants:
A = Skövde, Sweden
E = Curitiba, Brazil
F = Flen, Sweden
L = Lyon, France

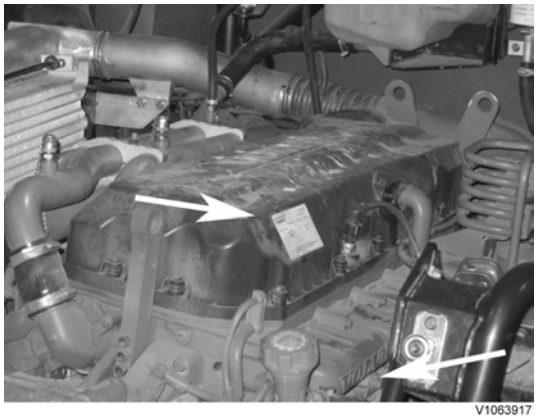
V1063917

Figure 1

Identification plate 3
The certification decal is located on the valve cover as well as on the left side, at the back of the machine's front frame inside of the steps.

V1063918

Document Title: **Compression test**	Function Group: **210**	Information Type: **Service Information**	Date: **2014/7/30**
Profile: **ART, A25D [GB]**			

Compression test

Op nbr 210-002

9998009 Adapter
9998532 Extractor
9988539 Pressure gauge

Condition: Valves correctly adjusted, see 214 Valves, adjusting

1. Place the machine in service position.
2. Clean thoroughly around the injectors, also around the connections for the fuel pressure lines and leak-off fuel lines.

WARNING

The fuel pressure lines are pre-shaped and may not be altered for any reason.

If a pre-shaped fuel line is bent or deformed, there is a great risk that it will rupture.

A damaged fuel pressure line must always be changed!

Removing

3. Remove the fuel pressure lines. The pipes are clamped in two groups of three, and the clamping should not be loosened.

NOTICE

Fit protective caps on all injectors and on the injection pump's connections.

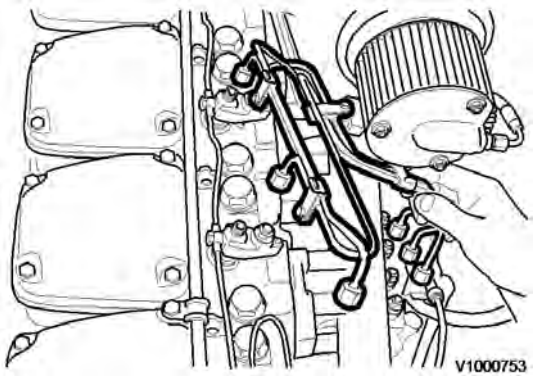

Figure 1

4. Unplug the connector for sensor SE2308 and remove the bracket.
5. Remove the leak-off fuel line between the injectors.

NOTE!
If compression check is to be performed on cylinder 6, loosen and fold aside the pipe between the turbocharger and intercooler.

6. Remove the nuts for the injector yokes and remove the yokes.

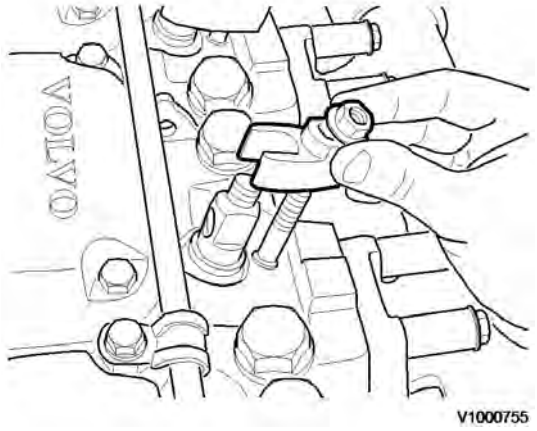

Figure 2

7. Remove the rubber seals around the injectors.

8. Remove the injector on cylinder no. 1 by twisting the injector and pulling up at the same time. If needed, use 9998532 Extractor to remove the injector.

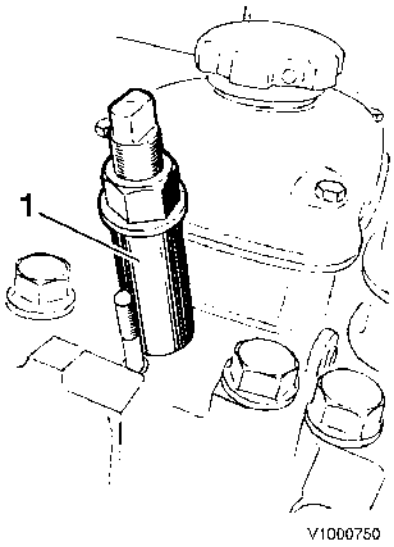

Figure 3

9. Install 9998009 Adapter and tighten it down with the injector's attaching yoke and nut.
Tightening torque: **50 Nm(37 lbf ft)**.
NOTE!
Check that the compression gauge's seal ring is intact.

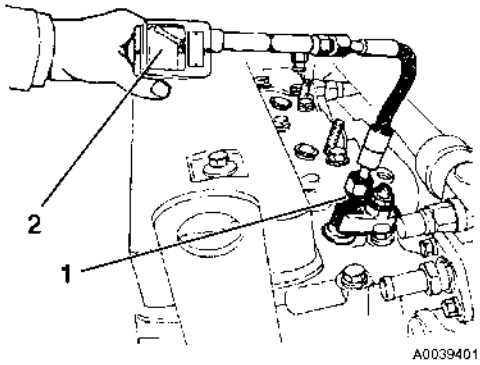

Figure 4

1. 9998009 Adapter
2. 9988539 Pressure gauge

10. Connect 9988539 Pressure gauge.

11. Press in the Safety stop. The safety stop is located on the right side of the operator's panel. This is to prevent fuel from flowing out from the pressure valves on the injection pump when the engine is turned with the starter motor.

12. Check that the gearshift selector is in neutral.

13. Turn over the engine with the starter motor for 5 seconds and read off the value.

14. Remove the checking equipment and refit the injector with new copper washer and rubber seal.
Tightening torque: **50 Nm(37 lbf ft)**.

15. Perform compression check on cylinders 2, 3, 4, 5 and 6 in the same way as for cylinder 1.
Normal compression pressure is **3.8 MPa (38 bar)(551 psi)** at 180 rpm.

NOTICE

A difference of up to 10% in compression between cylinders is acceptable and does not indicate a need for further action, i.e. reconditioning of the valves.

Installing

16. Fit the yokes and the nuts.
Tightening torque: **50 Nm(37 lbf ft).**

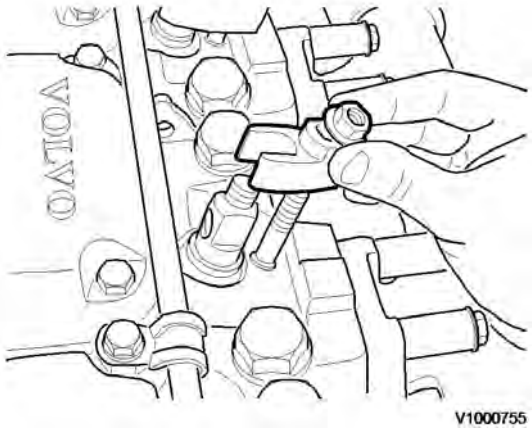

Figure 5

17. Fit the leak-off fuel line, use new copper washers.
NOTE!

If compression check has been performed on cylinder 6, fit the pipe between the turbo and the intercooler.

WARNING

The fuel pressure lines are pre-shaped and may not be altered for any reason.

If a pre-shaped fuel line is bent or deformed, there is a great risk that it will rupture.

A damaged fuel pressure line must always be changed!

18. Fit the fuel pressure lines. Make sure that the area is clean and that the fuel pressure lines are not bent or altered in any way. Tighten the pressure line nuts.
Tightening torque: **15–25 Nm(11–18 lbf ft)**.

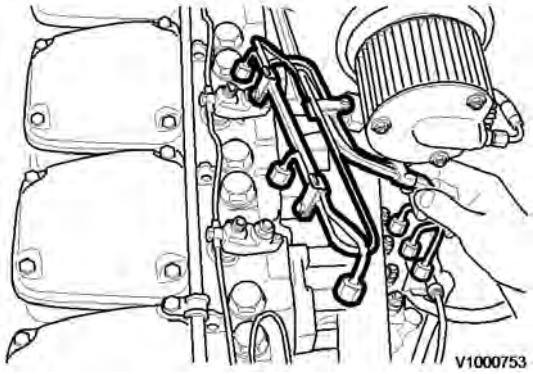

Figure 6

19. Fit the bracket and sensor SE2308.

20. Restore the stop function. Start the engine and check to make sure that there are no leaks.

21. Run the engine with increased engine speed for approx. 5 minutes to remove any remaining air.

Document Title:	Function Group:	Information Type:	Date:
Cylinder compression, PC test	**210**	**Service Information**	**2014/7/30**
Profile: **ART, A25D [GB]**			

Cylinder compression, PC test

Connect the VCADS Pro computer and carry out 21006-3 Cylinder compression, test.
(21006-3) This test indicates if there is any deviation in compression in any cylinder in relation to the other cylinders.

Document Title: **Compression test**	Function Group: **210**	Information Type: **Service Information**	Date: **2014/7/30**
Profile: **ART, A25D [GB]**			

Compression test

Op nbr 210-002

9990006 Puller
9990185 Lifting tool
9996400 Impact puller
9998599 Cleaning tool
9998248 Adapter
9998248 Adapter
9998248 Adapter
9998248 Adapter
9998248 Adapter
9998248 Adapter
9993590 Gear wheel
88880003 Bracket
9988539 Pressure gauge
88820016 Setting tool

This operation also includes the tools and times needed for required parts of the following actions:

- 191 Service positions
- 237 Unit injector, adjusting pretension
- 233 Fuel system, bleeding
- 214 Valves, adjusting

Removing

1. Place the machine in service position, see 191 Service positions.
2. Lower the front grill and pump up the engine hood.
3. Drain the cylinder head to avoid fuel in the engine oil. Open the connection by the return line on the cylinder head and install a hose.


V1061153

Figure 1

4. Loosen the feed hose from the connection by the ECU. Use an air nozzle to get out all of the fuel. Lead the feed hose into a container Since the feed pump will pump out fuel during the test, the container's volume must be at least 5 litres (1.3 US gal).

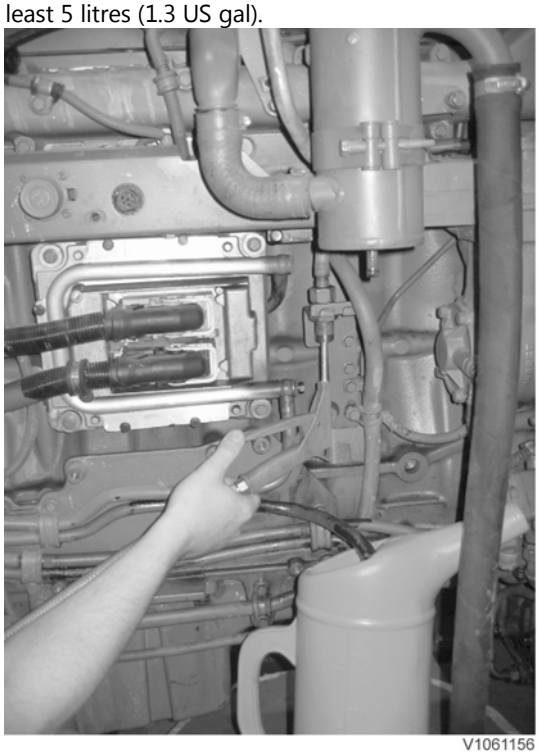

Figure 2

5. Secure the expansion tank with a strap, and then loosen the bracket for the expansion tank.

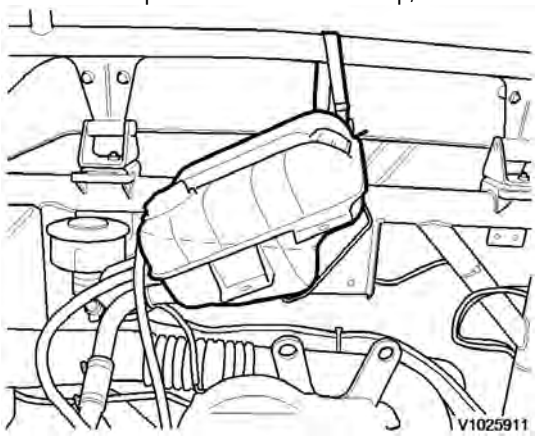

Figure 3

6. Remove the engine's front lifting eye. This is done to enable installation of the lifting tool on the rocker arm bridge.

7. Remove the hose from the oil trap and remove the valve cover.

8. The condition for reading off correct compression pressure is that the valve clearance is correct. See: 214 Valves, adjusting

9. Remove the IEGR control valve's electrical connections and wipe clean around the control valve. Remove the valve.

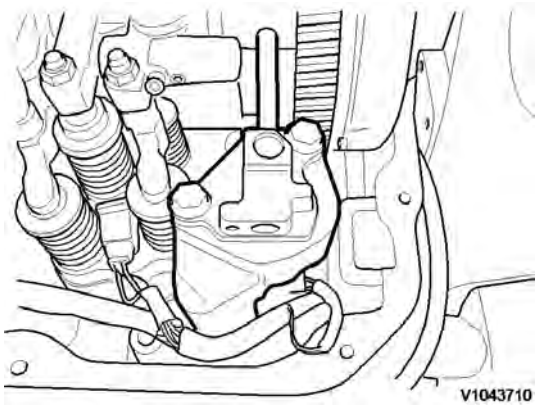

Figure 4

10. Loosen the bolts for the rocker arm shaft, evenly distributed across the rocker arm shaft to avoid shear stresses. Remove the bolts.
    Lift away the rocker arm shaft with tool 9990185 and 88880003.
    Rocker arm shaft's weight: : **approx. 30 kg (66 lbs)**

11. Clean very thoroughly around the unit injector. Remove the electrical connection. Remove the bolt for the attaching yoke. Remove the injector together with the attaching yoke. Use 9996400 Impact puller, 9990262 Adapter, and 9990006 Puller. Remove the other unit injectors in the same way.
    NOTE!
    Place each injector in separate new plastic bags. Mark which cylinder they were installed in. It is important to not mix up the injectors since they are classed for a certain cylinder.

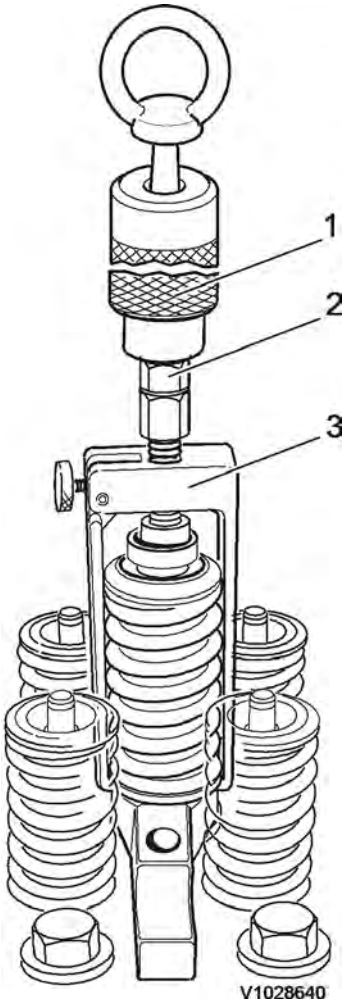

Figure 6

1. 9996400, Impact hammer
2. 9990262, Adapter
3. 9990006, Puller

12. Clean the copper sleeve with the brush/brushes included in kit 9998599.

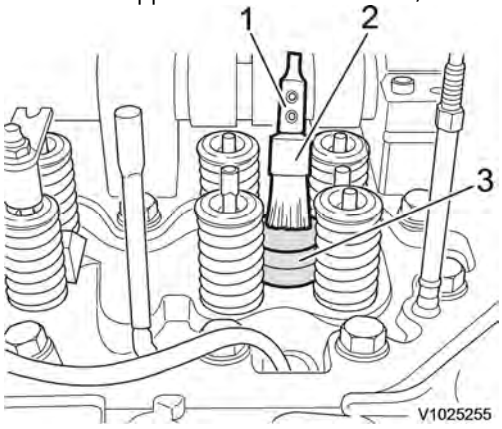

Figure 7

1. Extension
2. Brush
3. Protective sleeve

13. Check that all adapters have O-rings and seal against the copper sleeve. Install adapters 9998248 in the unit injectors' place in the cylinder head.

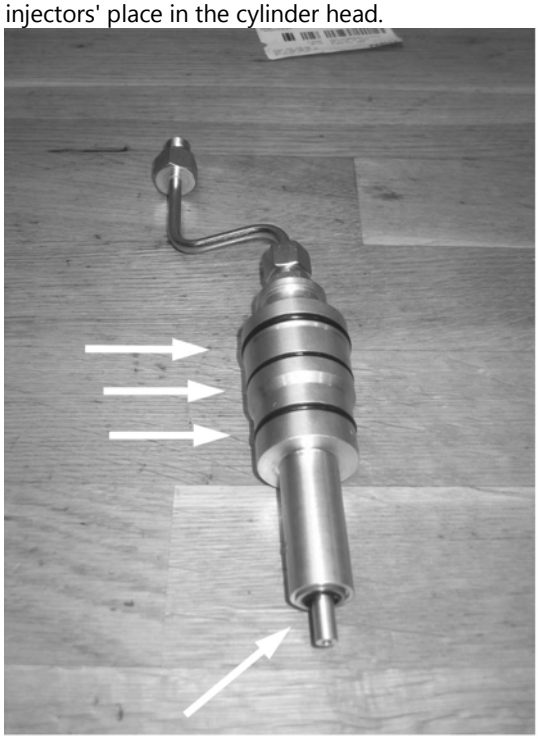

Figure 8

14. Tighten down the adapter with the unit injector's attaching yoke. Tightening torque: **40 Nm (30 lbf ft)**.
NOTE!
Keep in mind that the tightening torque here is only for holding the adapter during the test

Figure 9

15. Install the rocker arm bridge with the lifting tool 9990185. Tighten the bolts along the whole rocker arm shaft to prevent warping and to make sure that the guide pins fit in the camshaft's support bearing. See 214 Rocker arm shaft, tightening torques.

16. Install the rubber bands so that they are located between the adapter and the unit injector's rocker arm. This is done so that the rocker arm will not rattle.


V1059646

Figure 10

17. Install the IEGR control valve. Check that the seal ring is placed correctly before the bolts for the IEGR control valve are tightened.
    NOTE!
    The parking brake must be applied when cranking the engine with the starter motor.

18. Connect compression gauge 9988539 to adapter 9998248 on the first cylinder. Run the engine with the starter motor until the needle on the compression gauge stops (max. compression value). Repeat the procedure for the other cylinders. On a new engine, the compression pressure is normally approx. 30 bar. Low compression pressure on all cylinders indicates worn cylinder liners and/or worn piston rings. When comparing the compression pressure in the different cylinders and you detect any cylinder with lower pressure, this may be due to leaking valves, cracked piston rings, worn cylinder liner, or leaking cylinder head gasket. In case of this, Engine, overhauling should be done. Uniformity between the cylinders' compression pressure is the most important and should not exceed 20%.

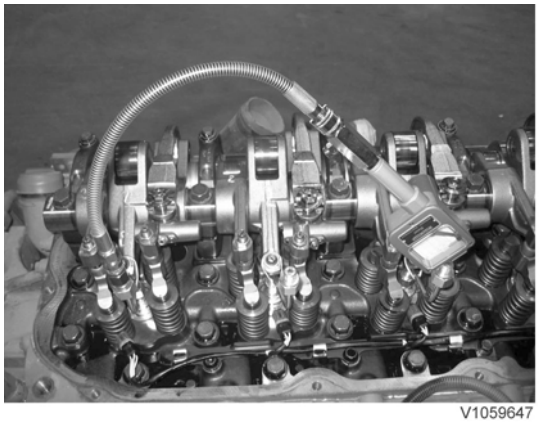
V1059647

Figure 11

NOTE!
Do not run the starter motor for longer than 10 seconds at a time, with intervals of 60 seconds.

Assembling

19. Loosen the bolts for the rocker arm shaft evenly across the entire shaft, so that the rocker arm shaft is not subjected to transverse loading. Remove the bolts and install lifting tool 9990185 and 88880003. Carefully lift away the rocker arm shaft.

20. Remove the compression gauge 9998539 and adapters 9998248.

21. Install the unit injectors in the places where they were installed from the beginning with new O-rings and centre the unit injectors between the valve springs. Install the attaching yokes. Tightening torque: see 230 Tightening torque, fuel system