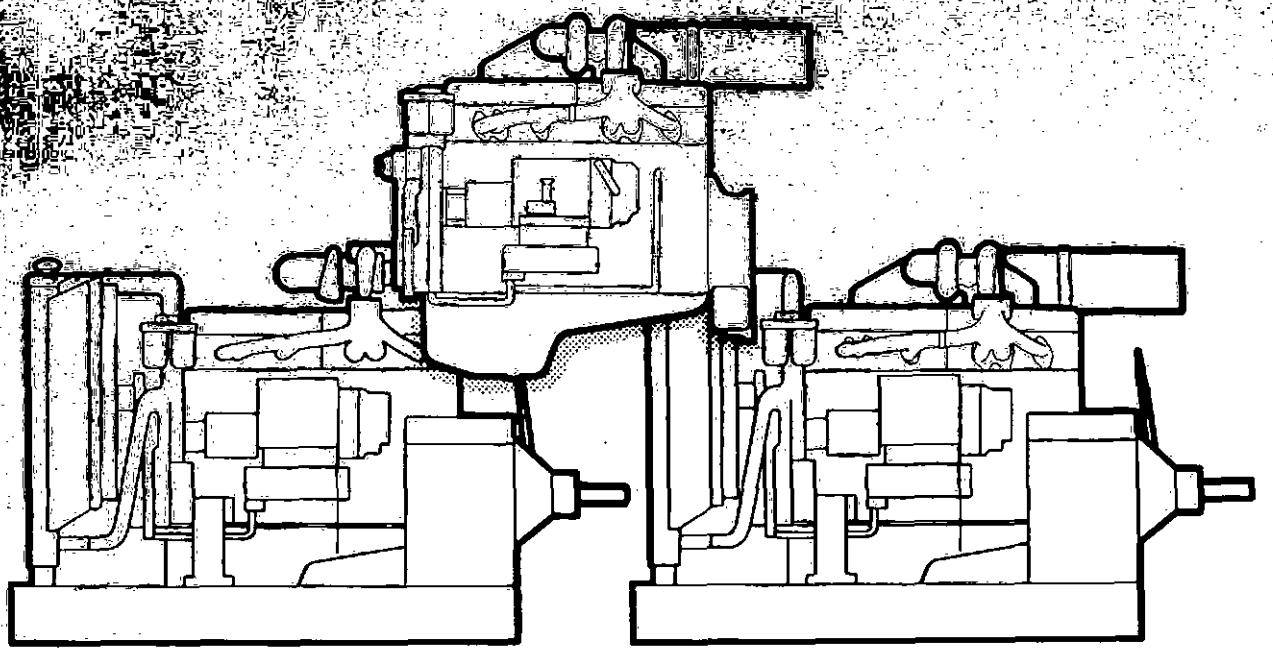
Publ. No. 7730384-0
5–1986

INSTRUCTION BOOK

DIESEL ENGINES

TD61A, ACE, AG, AP, AW, TID61AG, TD71A, ACE, AG, AP, AW, TID71A, AG, AP



VOLVO

Introduction

Read this book

This instruction book provides helpful information for running and maintaining your Volvo Penta product(s).

The contents herein do not apply to any particular specification. Each engine is supplied from Volvo Penta in accordance with the order.

Check engine and components to be able to find relevant parts of this book. **Read this book carefully before taking the engine into operation.**

Warranty

A service and warranty book which states the Volvo Penta International Limited Warranty should have been provided by the selling dealer. If you have not received this publication contact the nearest Volvo Penta Importer for a copy.

Some markets provide due to local laws and regulations other warranty conditions which are issued by the local Volvo Penta importer as a supplement to the *Volvo Penta warranty. Contact the local Volvo Penta importer to obtain such* conditions where applicable.

For products operating in the USA special warranty conditions and documents apply. To be sure of obtaining the correct US documentation contact the local distributor.

Warranty Registration Card – Delivery card

The Warranty Registration Card (US markets) Delivery Card (other markets) should be filled out and sent in by the selling dealer. Ensure this has been done, *as refusal of warranty can occur if no proof of delivery date can be provided.*

Volvo Penta service

Volvo Penta has built up an extensive dealer net to support you with service and parts. These dealers have the necessary special tools, test equipment and stocks of parts to provide the service. When requesting service or parts always quote the complete type and serial no from the number plate.

Owner

Name:.....

Address: .....

Tel: .....

Nearest Volvo Penta Service Dealer

Name:.....

Address: .....

Tel: .....

Engine data

Type of engine ..... Serial no.....

Disengageable clutch type/no.....

Supplement to Instruction book

Diesel engines T(I)D61, T(I)D71 (Publ. No. 7731826-9)

New industrial engine versions:

TD610M replaces TD61A
TD610G, -GH and TWD610G, -GH replaces TD61AG and TID61AG
TD710G, -GH and TWD710G, -GH replaces TD71AG and TID71AG

Explanation of engine designation codes

T	= Turbocharged	0	= Execution or output level
W	= Watercooled charged air cooler	M	= Mobile
D	= Diesel engine	G	= Genset
6	= Swept volume in litres	H	= High engine output power
1	= Generation		

The instructions given in the Instruction book for TD61, TID61, TD71 and TID71 apply for the above engine types with the following exceptions:

NOTE! From a practical point of view this supplement replaces earlier supplement (Publ. No. 7734045-3) for the engine models TD610M, TD610G, -GH, TWD610G, -GH and TWD710G, -GH.

The most important new features are:

TD610M

- Changed injection pump setting (fuel quantity).
- New injectors (nozzles).
- New turbocharger.

TD610G, -GH

- TD610GH: New higher power output setting (Standby).
- Injection pump, setting: 23° ±0.5° B.T.D.C.
- Tubular oil cooler introduced.

VOLVO PENTA

TWD610G, -GH

- TWD610GH: New higher power output setting (Standby).
- Injection pump, setting: 16° ±0.5° B.T.D.C.
- New turbocharger.
- Tubular oil cooler introduced.

TD710G, -GH

- TD710GH: New higher power output setting (Standby).
- New piston rings. "Keystone" type (trapezoidal shaped) upper piston ring
- New pistons (adjusted to fit the new piston rings)
- New exhaust valves.
- New injection pump with pressure equalizer
  Injection pump, setting: 20° ±0,5° B.T.D.C.
- New turbocharger.
- Oil capacity incl. lube oil filter approx.*: min. 20 litres, max. 27 litres,
  (min. 4.4 Imp. gals, max. 5.9 Imp. gals),
  (min. 5.3 US gals, max. 7.1 US gals).

*Also applies to TD71AG, -AP from engine No. xxxx/30629.

TWD710G, -GH

- TWD710GH: New higher power output setting (Standby).
- New exhaust valves.
- New injection pumps (engines with mechanical and electronic governors).
  Injection pump, setting (in both cases): 17° ±0.5° B.T.D.C.
- Oil capacity incl. lube oil filter approx.*: min. 20 litres, max. 27 litres,
  (min. 4.4 Imp. gals, max. 5.9 Imp. gals),
  (min. 5.3 US gals, max. 7.1 US gals).

*Also applies to TID71AG, -AP from engine No. xxxx/30629.

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VOLVO PENTA

AB Volvo Penta

Technical Information

S-405 08 Göteborg, Sweden

INSTRUCTION BOOK

Diesel engines

TD61A,-ACE,-AG,-AP,-AW · TID61AG
TD71A,-ACE,-AG,-AP,-AW · TID71A,-AG,-AP

Index

PRESENTATION

The engines are 6 cylinder, in-line, 4 stroke diesel engines. They are direct injected and are equipped with thermostat controlled water cooling. The engines are lubricated by a pressure lubricating system where an oil pump feeds lubricating oil to all the lubricating points. On diesel engines models TD71 and TID71 the pistons are cooled by lubricating oil being fed through special jets, located in the engine block, to the cooling channels in the pistons.

The engines are further equipped with wet, replaceable cylinder liners.

All engine models are equipped with an exhaust driven turbocharger, being lubricated and cooled by the engine lubricating oil.

The engine models TID61 and TID71 are also fitted with a water cooled intercooler (charge air cooler), reducing the temperature of the inlet air, making it possible to increase the engine output even more. The combustion- and exhaust temperatures are also reduced.

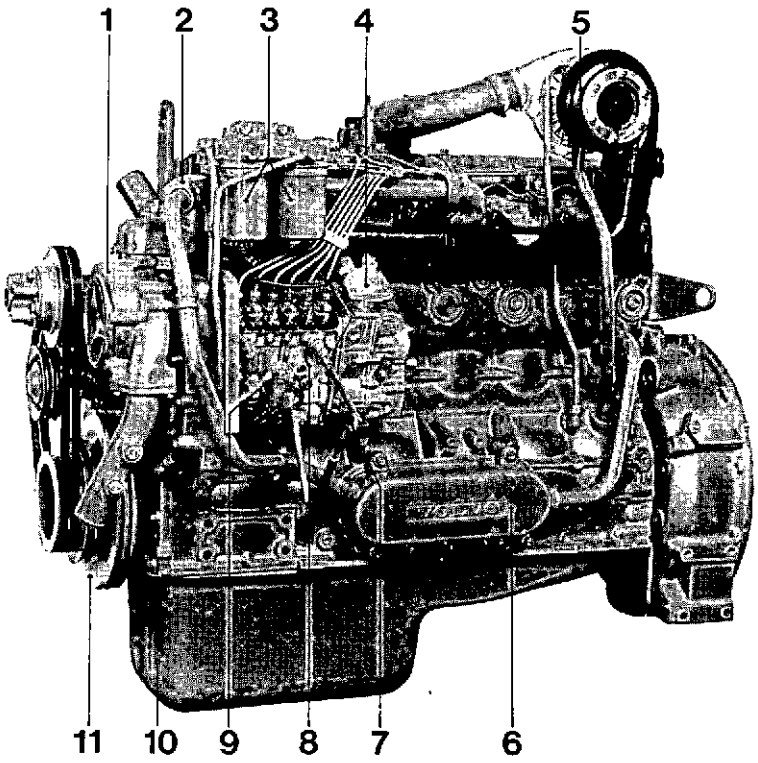


Fig. 1 TD61A

1. Coolant pump
2. Thermostat housing
3. Fuel filters
4. Smoke limiter
5. Turbocharger
6. Oil cooler
7. Oil dipstick
8. Fuel injection pump
9. Fuel feed pump (manual)
10. Oil pan
11. Torsional vibrations damper

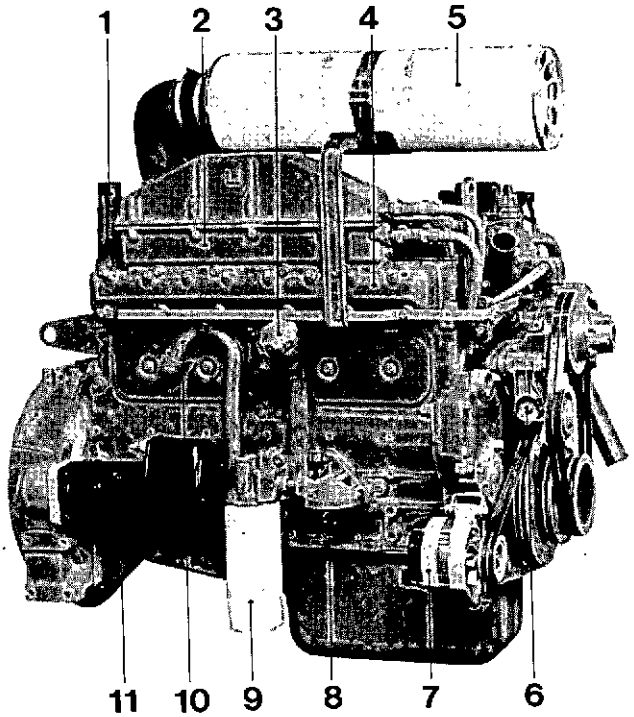


Fig. 2 TID61AG*

1. Relay for el. starter element
2. Charge air cooler
3. Filler cap for lubricating oil (as an alternative located at the rear of the timing gear casing)
4. Inlet manifold with electrical starter element
5. Air filter
6. Automatic belt tensioner
7. Alternator
8. By-pass filter connection for lubricating oil (optional)
9. Lubricating oil filter
10. Crankcase ventilation
11. Starter motor

* The letter -G denotes an engine intended for genset-operation.

Location of number plate (all engine models):

On the left hand side of the engine block, the rear part (below the exhaust manifold).

Number plate, example

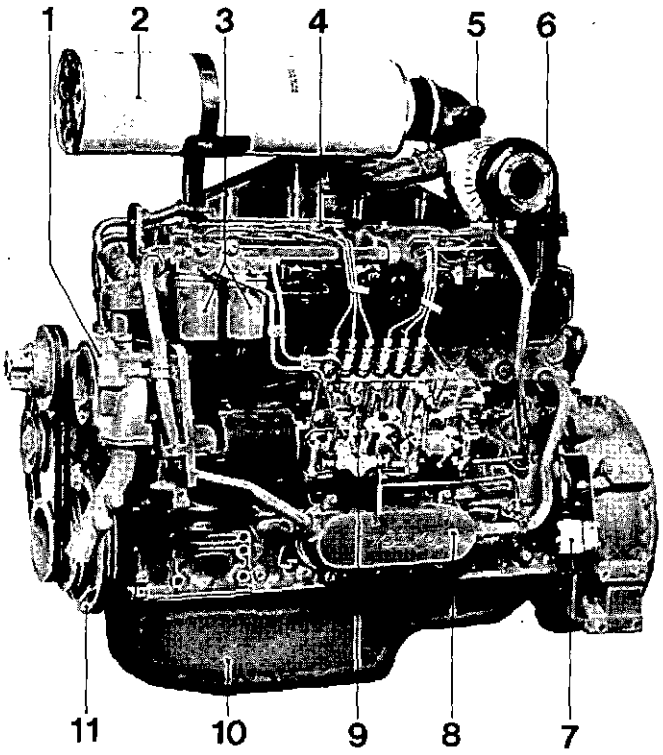


Fig. 3 TID71AG*

1. Coolant pump
2. Air filter
3. Fuel filters
4. Charge air cooler
5. Pressure drop indicator
6. Turbocharger
7. Stop solenoid
8. Oil cooler
9. Fuel injection pump
10. Oil pan
11. Torsional vibrations damper

* The letter -G denotes an engine intended for genset-operation.

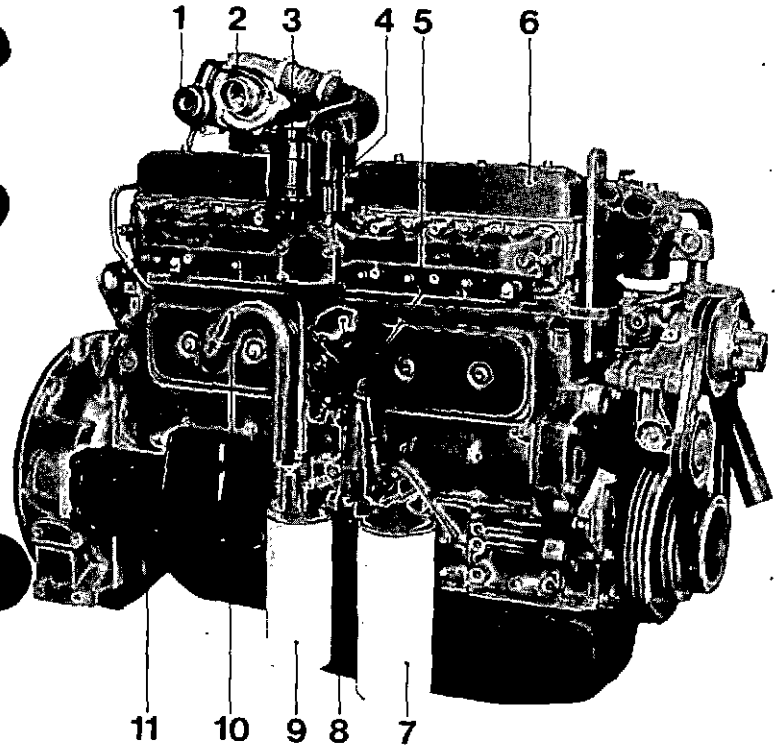
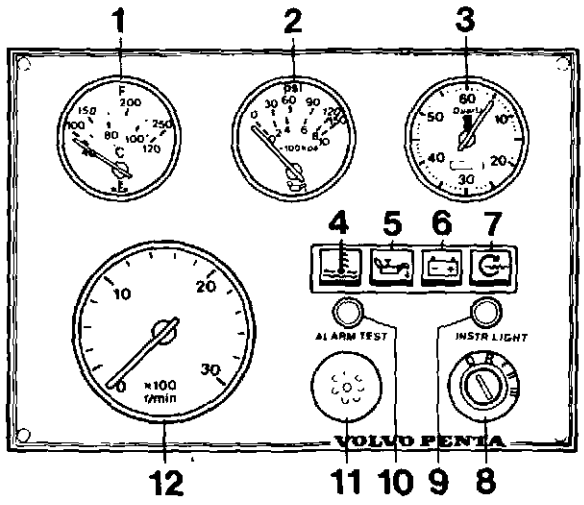


Fig. 4 TD71AW*

1. Actuator for the wastegate valve
2. Turbocharger
3. Relay for electrical starter element
4. Starter element
5. Oil dipstick
6. Valve cover
7. By-pass filter for the lubricating oil
8. Filler cap for lubricating oil (as an alternative located at the rear of the timing gear casing)
9. Lubricating oil filter
10. Crankcase ventilation
11. Starter motor

* The letter -W denotes that the engine is equipped with a turbocharger with a wastegate valve and intended for use in mobile equipment.



Instrument panel

Instruments

1. Coolant temperature, normally 75–95°C (167–203°F) during operation.
2. Oil pressure, normally 300–500 kPa (3–5 kp/cm^2 or 43–71 p.s.i.) (at idling speed not lower than 150 kPa (1.5 kp/cm^2 or 21 p.s.i.).
3. Hour recorder.
4. Warning light (coolant) is coming alight and the alarm goes on at a temperature above 95°C (203°F) and/or if the coolant level is too low.*

   This warning light also comes alight (alarm not sounding) if fault should occur in the charging circuit.

   * Is valid for engines with coolant level switch.
5. Warning light (low oil pressure) is coming alight and the alarm sounds if the oil pressure drops below approx 150 kPa (1.5 kp/cm^2 or 21 p.s.i.)
6. Warning light coming alight if the charging current from the alternator should cease.
7. Indicator light, indicating that the pre-heating element is engaged.
8. Key switch.

   Position 0 = The key can be inserted and removed respectively
   R = Stopping position
   I = Position for operation
   II = Pre-heating element engaged
   III = Starter motor engaged

   Before every new starting attempt, the key must be returned to position R (stopping position).
9. Switch–instrument lighting.
10. Switch–alarm testing.
11. Alarm (horn).
12. Engine tachometer. Reading value to be multiplied by 100 to get number of revolutions/minute.

Quality requirements

Fuel – lubricants – coolant.

Diesel fuel satisfying the demands according to DIN51601, CEC-ERF-D1, ASTM-D975-No 2-D or the Volvo Group Standard 97863-02 can be used. Lowest possible content of sulphur must be the target.*

Lubricating oil of a quality according to the below table must be used:

Designation	Standard
CD*	API (American Petroleum Institute)
MIL-L-2104C	US Government's Military Spec.

* In case prolonged oil change intervals are to be followed a VDS-approved CD-oil must be used. See further the maintenance scheme on page 9.
Remark: VDS = Volvo Drain Specification.

Lubricating Grease: On the disengageable clutch a lithium based grease must be used i.e. the Volvo Penta Special Grease or Shell Alvania 2, Mobilith 22 or ESSO ROMEX MP.

Coolant: At a time when there is a risk of freezing, a mixture of 50 % Volvo Penta Ethylene Glycol and 50 % water should be used. This mixture can be used the whole year. When there is no risk of freezing, water mixed with the **Volvo Penta anti-corrosion additive p/n 1141526-2** can be used. Mixing ratio 1:30. Never mix the anti-corrosion additive with ethylene glycol. Foam can be formed and with subsequent reduction of the cooling capacity. Top up with a package (1/2 litre) every 400 hours of operation.

Changing the coolant and flushing the cooling system should be made once a year.

OPERATION

New engine

A new engine should not be run with full load during the first 10 hours of operation. Check the instruments carefully during this period in order to discover possible abnormal conditions of the engine in time.

NOTE! Check the valve clearance on a new or re-conditioned engine for the first time after 100–200 hours of operation.

If the engine is equipped with a disengageable clutch, the clutch must be carefully inspected and checked during the very first days of operation. Adjustment of the clutch may prove necessary to compensate for the wear of the discs. See further under point 4, page 9 (800 hours of operation).

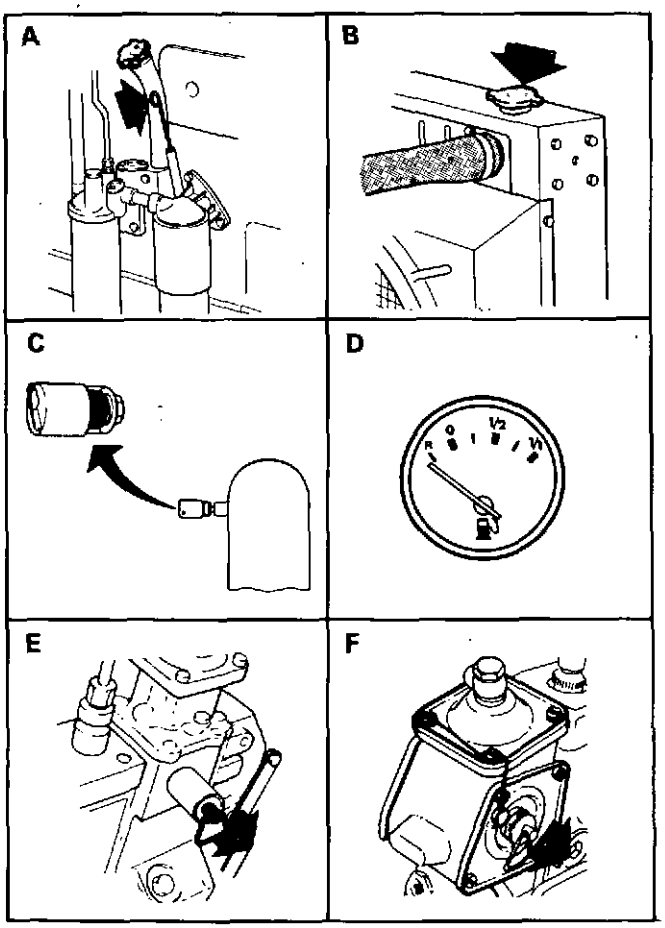
Prior to starting

1. Check before starting:
   - A. The lubricating oil level: Should be between the "Min" and "Max" marks on the oil dipstick. Don't run the engine with too low an oil level. The engine might seize with subsequent expensive repairs. Also don't fill up above the "Max" level.
     Should a reduction gear be fitted, check the oil level for this unit as well.
   - B. The coolant level: The coolant level should be approx 5 cm (2") below the sealing edge of the cover or between the "Min" and "Max" marks on the expansion tank (optional equipment). Open the cover carefully if the engine is warm.
   - C. The air filter indicator: If the "window" of the air filter indicator is showing "red", the filter must be replaced. Re-set the indicator afterwards.
   - D. The fuel quantity.
2. Engage the main switch.
3. Disengage the clutch, if fitted, and move the speed control lever to its max. position.
4. Turn the key to position (I) and make sure that the warning lights 1, 2 and 3 are coming alight.
5. **Engines with smoke limiter:** Engage the cold starting device if the engine is cold and the temperature below +5°C (+41°F). Engage the cold starting device by **pulling the shaft** (fitted with an eyelet) underneath the smoke limiter at the rear end of the fuel injection pump ("E") on TD61A and in the smoke limiter at the front of the fuel injection pump ("F") on T(I)D71A. On the remaining engine models the engagement is automatic when the speed control lever is set to max. position.
6. Push "Alarm Test" and check that the alarm sounds. The alarm goes out when the button is released.

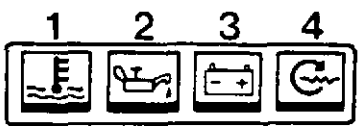
Starting

1. Turn the key to the pre-heating position (II). Release the key when the indicator light (4) lights up. (When the engine is warm, the key can be turned directly to position III, the starting position).
2. Start the engine when the indicator light (4) goes out (after approx. 50 seconds) by turning the key to the starting position (III).
3. Release the key and reduce the revs after starting. As the key passes over position II the pre-heating element is again engaged for about 50 seconds.
   Don't overspeed the engine! 1400–1500 rpm is recommended until the engine starts to become warm. Also don't run the engine on low, critical engine speeds. This is valid especially when the engine is rigidly coupled to large masses.
4. Engage the disengageable clutch, if such is installed, **at a maximum rpm of 800.**

Warning! Never use a starting aid such as a spray or its equivalent. This might cause an explosion inside the inlet manifold with subsequent damage to personnel.



Key switch



Warning lights

During operation

Check that the instruments show normal readings. The engine must **never be operated** at too low an oil pressure or too high a coolant temperature.

NOTE! On engines being operated continuously the lubricating oil level must be checked at least every 8 hours of operation. **Stop the engine prior to the checking.**

WARNING! Never start the engine or run it respectively with the oil filler cap removed. Then there is a risk of loss of oil.

When in danger of freezing

Check in due time that the coolant is sufficiently "strong" to protect the engine against freezing. Usually the coolant contains 50 % water and 50 % Volvo Penta ethylene glycol, which protects against freezing down to approx. –40°C (–40°F). The point of freezing can be lowered to –56°C (–69°F) by having a mixture of 60 % glycol and 40 % water. **Spirit of any kind is not allowed to be used in the cooling system.**

Stopping

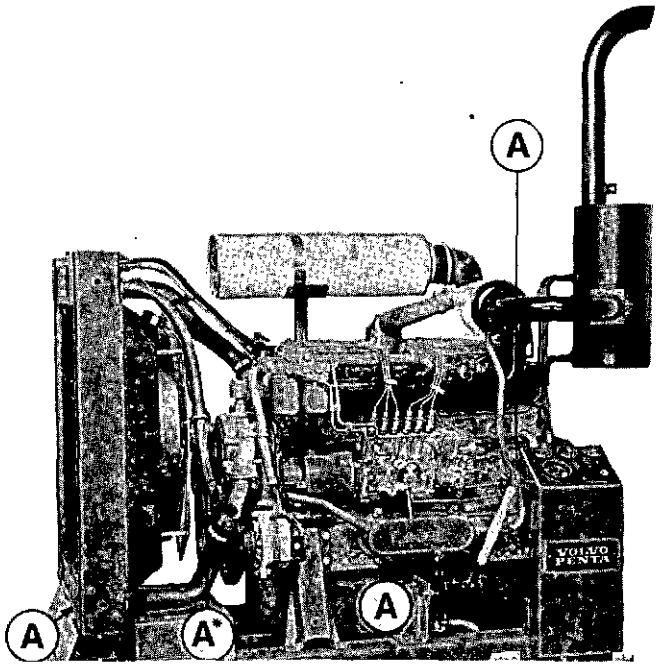
1. Let the engine run on idling during a couple of minutes without load. This in order to obtain a temperature compensation.
2. Depending on execution a) or b):

   a) Put the key in position "R".
   b) Pull the stop control.
3. Always position the key in pos. "0" after stopping to avoid the batteries being discharged. If the engine will be non-operational for several days, the main switch should also be disconnected.
   Never disconnect the main switch while the engine is running. The voltage regulator might then be damaged.
4. **During periods of severe cold**: (Valid for engines with manual stop): Return the stop control to its operational position and put the speed control in its max. position once the engine has come to a standstill. Engage the cold starting device on engines with a smoke limiter. These steps will facilitate the next starting while the control rod is easier to move to the cold starting posiotion while the engine is still warm.

Draining the cooling system

Prior to draining, the engine must be stopped and the filler cap removed. Then open the draining cocks on the engine and on the radiator, see the picture. Don't forget the drain plugs under the coolant pump* and oil cooler. Check the installation to make sure that there are no additional cocks on pipes to heaters or some such arrangement. Make sure that all the coolant drains off to avoid damages due to freezing in case only water has been used in the system.

* Remove the cover of the coolant pump if a draining plug is not fitted.

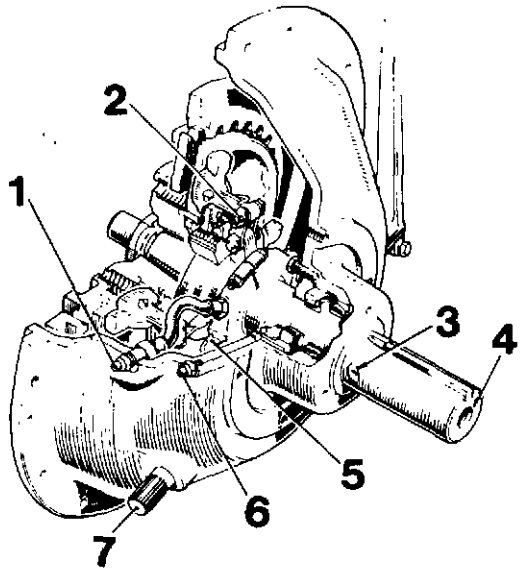


A = Drain cocks/plugs for coolant

* Late prod.

Disengageable clutch

Points of lubrication



1. *Release bearing, grease nipple*
2. Link
3, 4 Alternative locations of grease nipple for the inner support bearing. Later manufacture of clutches might have bearings "greased for life", in which case there are no nipple
5. Yoke ends
6. Main bearings, grease nipple
7. Cross shaft

TAKING THE ENGINE OUT OF SERVICE

Inhibiting the engine when taking it out of service

Out of service for a time up to 2 months

Should the out-of-service-time not exceed at time of 2 months it will be sufficient to start the engine every 14 days and to run it warm.

If there is a risk of freezing, the anti-freezing properties of the coolant must be checked and if necessary reinforced in order to avoid damages.

Out of service for a time exceeding two months

If the out-of-service-time should extend over a period up to 8 months, there is no need to use a special inhibiting oil. The properties of the Volvo Penta lubricating oil include sufficient anti-corrosion additives to last this time. Change the engine lubricating oil and the oil filter prior to the interruption of service. Check to make sure that the anti-freezing properties of the coolant are sufficient.

In case a long-time-inhibiting must be made, special inhibiting oils must be used. Such oils are available through most oil company outlets.

Attach a notice to the engine containing date of the inhibition, the type of oil used and the type of inhibition.

Install covers, if necessary, over the air intake, the exhaust pipe and the engine.

Recommissioning the engine

1. Remove covers over the engine, air intake and exhaust pipe if covers have been used.
2. Remove external inhibiting agent by washing the engine with white spirit.
3. Close the drain cocks and fill up the cooling system, that is if the coolant has been drained off.
4. Use the correct type of lubricating oil and fill up the engine, that is if the lubricating oil has been drained off. Install a new oil filter in case the filter has not been changed at the same time as the changing of the oil to Volvo Penta lubricating oil at the time of inhibiting the engine. Check the oil level in the gearbox or gear, if such are installed.
5. *Connect the batteries.*
6. Install new fuel filters, vent the fuel system and start the engine. See under "Operation". Run the engine warm on high idling speed before adding load.
7. Check that there are no leakages from oil, fuel or coolant.

ELECTRICAL SYSTEM

Starting the engine with an auxiliary battery

Warning!

The batteries (especially the auxiliary batteries) contain oxyhydrogen gas, being very explosive. A spark, which can result from connecting the cables to the auxiliary battery wrongly, is sufficient for a battery to explode and cause a lot of damage.

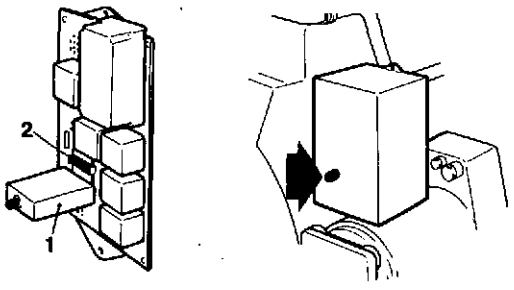
1. Check that the cables to the auxiliary battery are connected (either in series or in parallel) in a way that the rated voltage coincides with that of the engine system.
2. Start by connecting the red cable (+) to the auxiliary battery and then to the empty battery. Then the black cable (–) to the auxiliary battery and then finally the same cable to a point **a bit away from the empty batteries,** for example at a main switch on the minus wire *or at the point of connection of the minus wire to the* starter motor.
3. Start the engine. **NOTE! Do not touch the connections during the starting attempt (creating sparks!) and don't bend down over any of the batteries.**
4. Remove the cables to the auxiliary battery, however, in a reversed sequence compared to the installation. **NOTE! Under no circumstances remove the ordinary battery cables to the ordinary batteries!**

Electrical welding

Disconnect the wires to the alternator and insulate the wire ends. Don't attach the minus clamp of the welding unit to the engine or in a way that current can pass through any of the bearings.

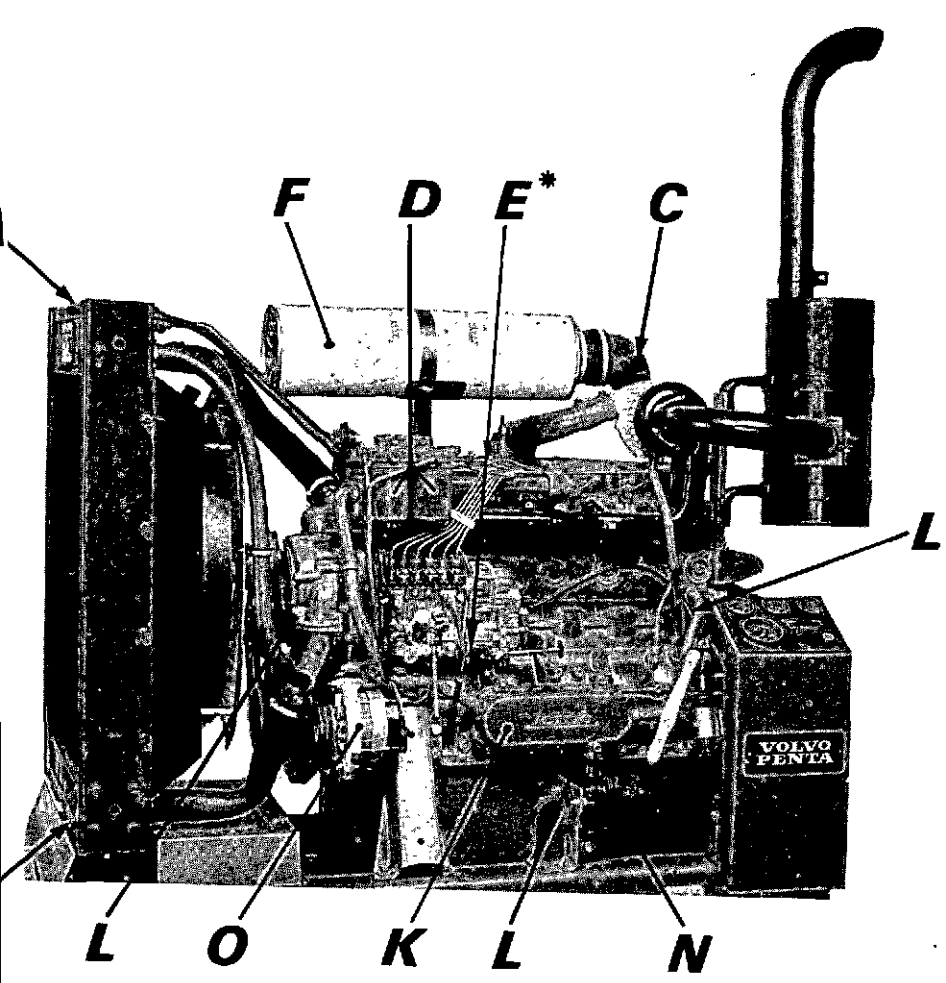
Fuses

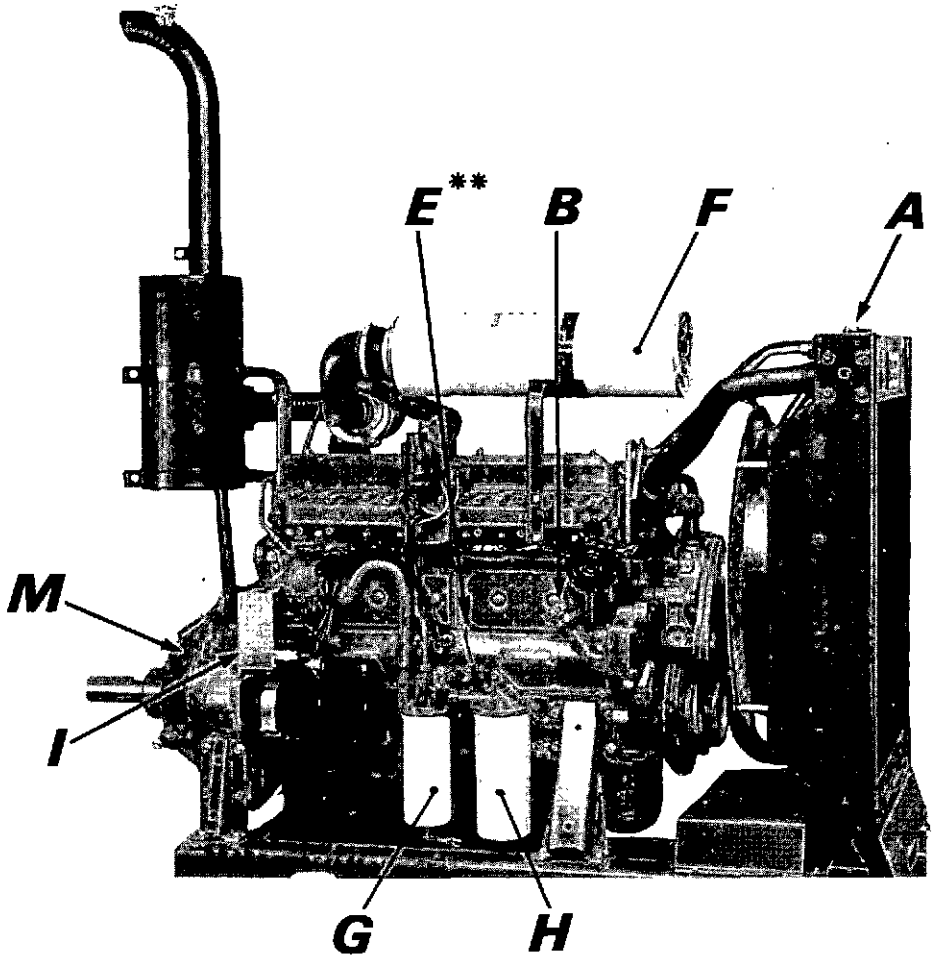
The engines are equipped with an 8 A automatic fuse (1) and a 5 A normal fuse (2), both located in the junction box. The automatic fuse is re-set by pushing the button on the outside of the junction box.



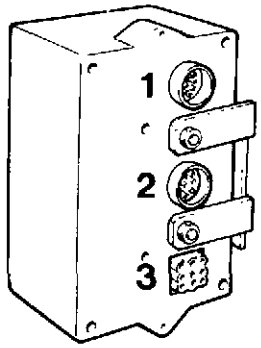
MAINTENANCE SCHEME

The descriptions are valid in general for the 61-series as well as for the 71-series of engines.



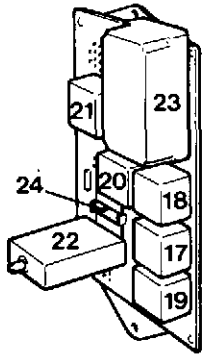


ELECTRICAL WIRING DIAGRAMS



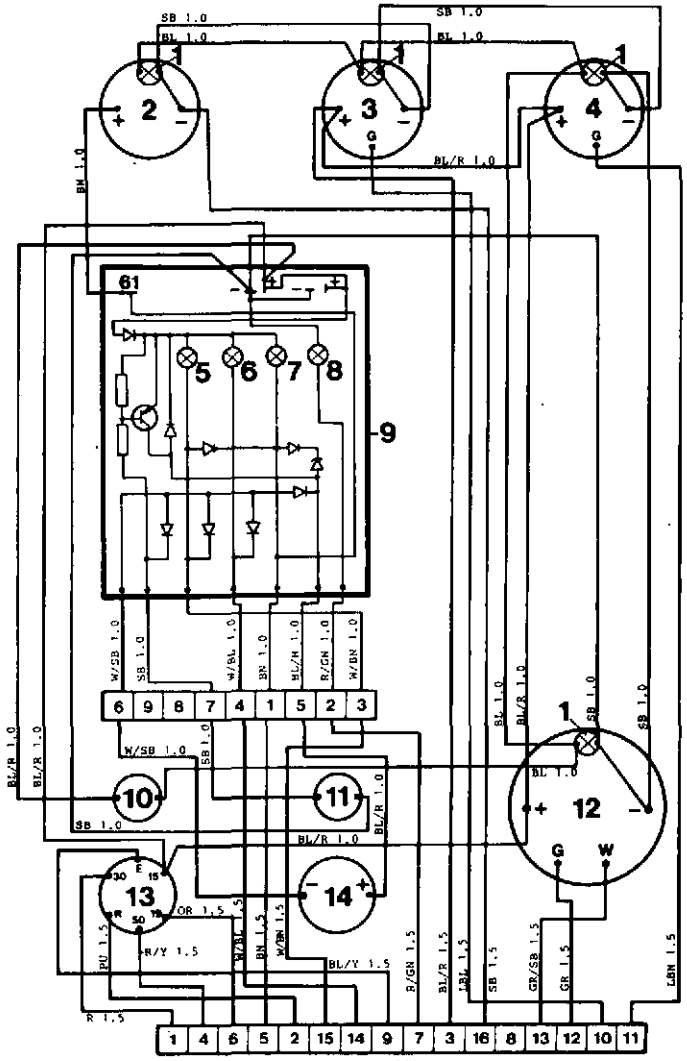
Connector box

16-pole connector for engine wire harness (senders, switches etc.)
16-pole connector for the instrument panel harness
9-pole connector for the engine wire harness (starter motor, stop solenoid and horn)



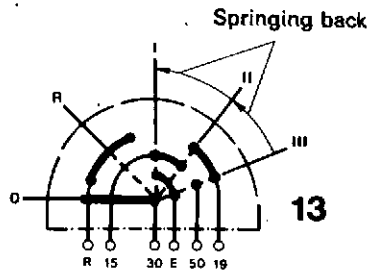
Connector box

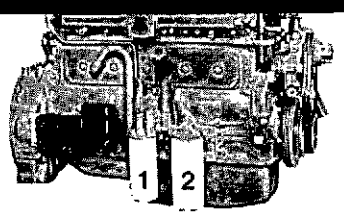
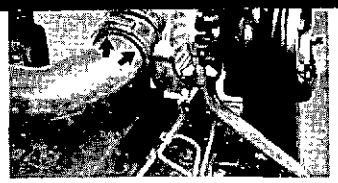
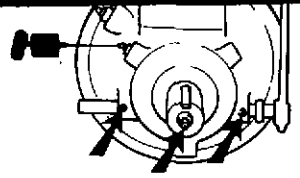
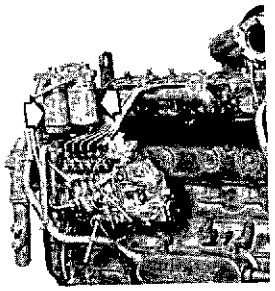
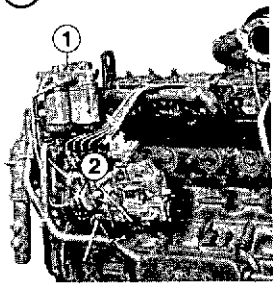
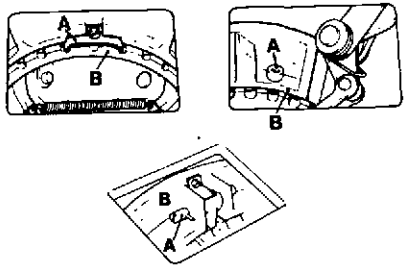
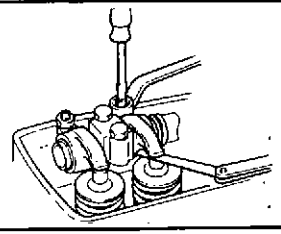
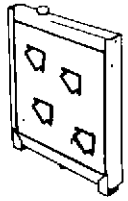
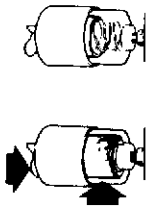
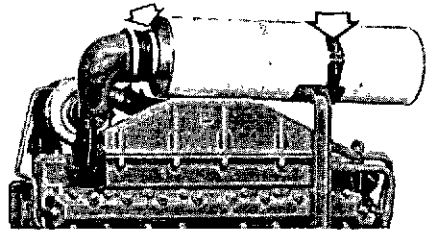
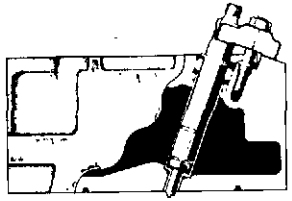
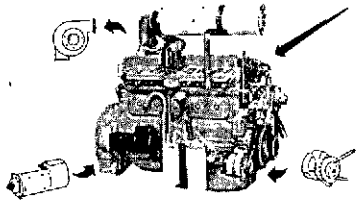
7.* Stop relay (current on for solenoid during operation)
8. Start relay
9. Stop relay
0. Interlocking relay (-P-exec.)
21. Ground relay
22. Automatic fuse, 8 A (horn and stop solenoid)
23. Time relay
24. Fuse, 5 A (controlling currents)



INSTRUMENT PANEL

1. Instrument lighting
2. Hour recorder
3. Oil pressure gauge
4. Coolant temperature gauge
5. Warning light, coolant temperature
6. Warning light, oil pressure
7. Warning light, battery charging
8. Indicator light, pre-heating
9. Circuit card
10. Switch, instrument lighting
11. Switch, alarm testing
12. Tachometer
13. Key switch
14. Alarm
15. 16-pole connector (to "27")



	3. Lubricate the moving parts of the clutch, the inner support bearing (if there is a grease nipple) and the main bearings. 4. Top up the rust protection in the cooling system by adding 1/2 l anti-corrosion additive, 1141526-2 (**only** applicable where anti-freeze has **not** been used).				up with oil and start the engine. Check that there is no oil leakage and check the oil level. 3. Grease sparingly. (20–30 grams for the main bearings). Quality, see point 1 at the top of this table). A few drops of oil on the inner link arms.
y rs	1. *Drain the sludge collector in the* fuel tank when possible. 2. Replace the fuel filters. 3. Vent the fuel system. 4. Check and adjust the disengageable clutch. The discs must not slip after engagement.	② 	③ 	④ 	2. Replace the fuel filters in a way similar to the one used for the oil filters (tighten 1/2 turn). Cleanliness! No dirt must enter the fuel system. 3. Vent! Open the screw (1). Turn the pump handle (2) anti-clockwise, pump out approx. 0.5 litre (abt. 1 pt). Tighten the screw. 4. **Stillstanding engine!** Release the catch (A) and turn the ring (B) so that the engagement lever will move somewhat sluggishly when engaging. Lock the catch.
ry 0 rs	1. Have **authorized service personnel** checking the valve clearance. 2. Clean the radiator externally.	① 	② 		1. The engine must be at stillstand, cold or at normal operating temperature when the valve clearances are checked. 2. Use a mild detergent. Never hold an air nozzle or water nozzle closer than 0.5 m (20") to the radiator in order to avoid damages.
ding eand at t the ed	Replace the complete air filter.	 			Replace the filter when the filter indicator indicates a **"red field"** after the engine has been stopped. Re-set the indicator! NOTE! Don't touch the filter until the indicator is indicating a whole "red field"! Discard the old filter. Cleaning and re-using the old filter is prohibited!
ry 0 rs nen ed	1. Have **authorized service personnel** checking the injectors. 2. Have **authorized service personnel** checking the condition of the turbocharger. Also a check of the general condition of the engine and its equipment, (incl. the starter motor and the alternator).	① 	② 		1. If necessary replace the injectors with adjusted ones and hand over the old ones to an authorized service workshop.

ging intervals depending on the time of operation, the sul-ntent of the fuel and the quality of the lubricating oil:

ervals apply also to engines in "Stand-by" operation.)

lity in nce with -system	The sulphur content of the fuel in % by weight: <0.5	0.5–1.0	>1,0*
	every 200 hrs (12 months)[1]	every 100 hrs (12 months)[1]	–
S- ed)**	every 400 hrs (24 months)[2]	every 200 hrs (24 months)[2]	every 100 hrs (12 months)[1]

[1] The oil must be changed at least once a year, even if the number of operational hours has not been reached.

[2] The oil must be changed at least every other year, even if the number of operational hours has not been reached.

* **NOTE!** If a diesel fuel with a sulphur content above 1.0 % by weight is used, a lubricating oil with a TBN >15 is recommended. (TBN = Total Base Number.)

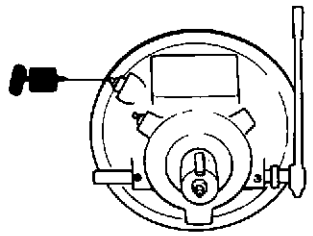
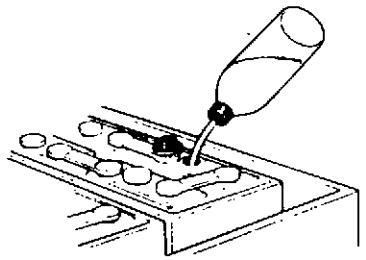
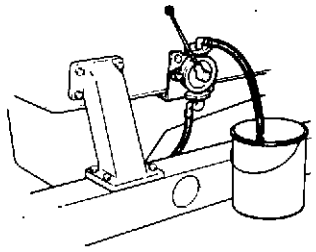
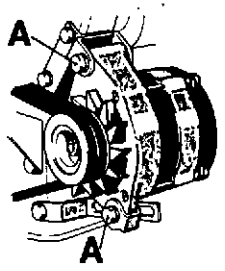
** VDS = Volvo Drain Specification.

If longer change intervals are wanted compared to what has been stated here, the condition of the oil must be controlled by the oil manufacturer by regular lubricating oil tests.

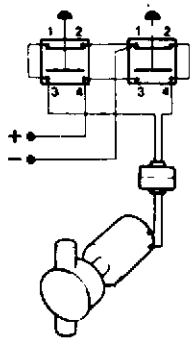
A. Coolant. Cap for checking and filling-up.
B. Engine lubricating oil. Filling-up cap.
C. Indicator indicating the degree of clogging of the air filter.
D. Fine-filters for the fuel.
E. Oil dipstick (*T(I)D61, **T(I)D71)
F. Air filter
G. Oil filter
H. By-pass filter
I. Automatic fuse. Push to re-set
K. Oil cooler
L. Drain cock/plugs for the coolant
M. Clutch
N. Oil scavenging pump
O. Alternator

The time intervals are approximate values, valid for normal conditions of operation.
Note! Stop the engine before starting the service work.

every day, prior to start or every 8 hours if the engine is in continuous duty: The engine oil level, the coolant level and the air filter indicator. Engine at standstill.

of ion	Action	The sequence numbers under "Action", relate to the respective pictures and the instructions in the right hand column with the same number.	Instructions
/ s	1. Lubricate the throw-out bearing of the disengageable clutch. 2. Check the batteries. 3. Check for leakages (coolant, luboil, fuel).	(1)  (2) 	1. Clutch, grease: Volvo Penta Special Grease, Shell Alvania 2, Mobilith 22, Esso Romex MP (Lithium based). Every 50 hours of operation if the clutch is engaged/disengaged often (15–20 times daily or more). Otherwise every 400 hours of operation. **Don't grease too much** in order to prevent grease from being pushed out. 2. Destilled water, 10 mm (0.40") above the cell plates, not more.
/ s	1. Change the oil in the engine*. *The oil changing interval is very much depending on the fuel quality and conditions of operation. See the table above. 2. Check/tension the V-belts.	(1)  (2) 	1. Oil quality CD in accordance with the API-system. 2. Ease off the screws (A) before stretching the alternator V-belts. Should be possible to depress the V-belts approx. 10 mm (0.40") between the pulleys. Worn V-belts operating in pairs are replaced simultaneously. The fan belts are equipped with a automatic stretching device.
/ s	1. Replace the lubricating oil filter (1) and the by-pass filter (2). (On the 61-series the by-pass filter is optional equipment). 2. Check and make sure that air lines and oil lines to the turbocharger are not leaking.	(1)  (2)  (3) 	1. Use a special tool to remove the oil filters. Lubricate the gasket and install the new filters by hand and tighten them until the gasket touches the contact surface. Then tighten them a further 3/4 turn. Top

Same position numbers as in the engine wiring diagram.



gested connection of the oil sca-
ing pump (scavenging and filling-
Wire area 1.5 mm².

Connected when the stop solenoid is
live during operation
Connected when the stop solenoid is
live at stopping
Minus-connections
Diodes (available only on engines with
automatic stop)

colours

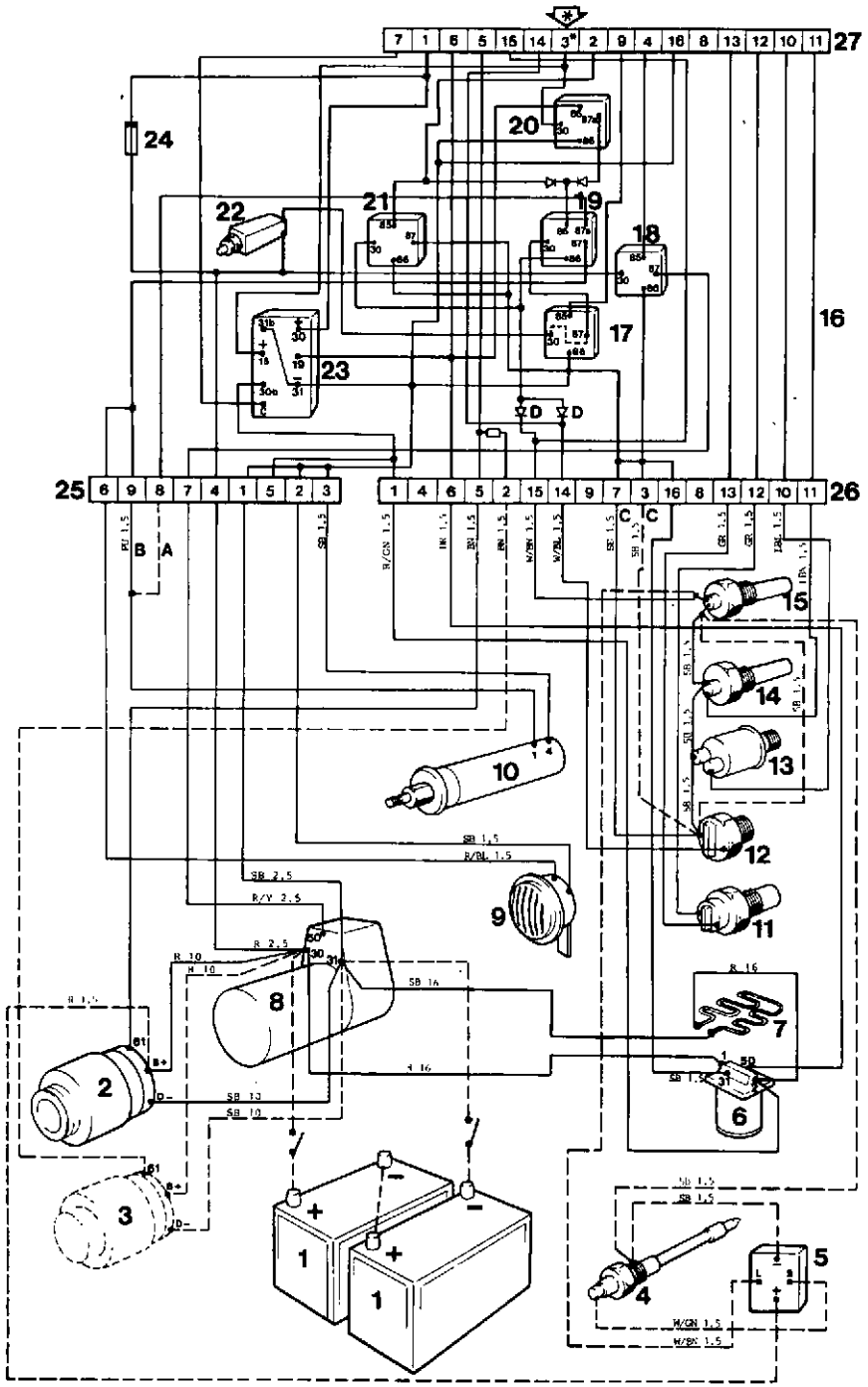
= Blue		OR	= Orange
= Light blue		PU	= Purple
= Brown		R	= Red
= Light brown		SB	= Black
= Green		W	= White
= Grey		Y	= Yellow

areas in mm²

tion mm²/AWG*

erican Wiring Gauge

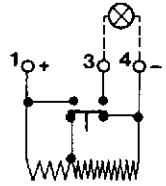
²	1.0	1.5	2.5	10	16
G	16 (17)	15 (16)	13	7	5



ENGINE

1. Battery
2. Alternator
3. Optional alternator
4. Coolant level switch
5. Relay
6. Relay, starting element
7. Starting element
8. Starter motor
9. Horn
10. Stop solenoid
11. Tachometer sender
12. Oil pressure switch
13. Oil pressure sender
14. Coolant temperature sender
15. Coolant temperature switch
16. Circuit card
17. Stop relay** (installed only when the stop solenoid is live during operation. When the stop solenoid is to be live when stopping, a cut-over is made between 30 and 87 – the dotted line)
18. Start relay**
19. Stop relay**
20. Interlocking relay (-P exec.)**
21. Ground relay**
22. Semi-automatic fuse, 8A** (Horn and stop solenoid)
23. Time relay**
24. Fuse, 5 A (controlling currents)**
25. 9-pole connector**
26. 16-pole connector**
27. 16-pole connector** (for instrument panel harness)

* Must be dead during starting.
** Located in the connector box.



Wiring diagram, stop solenoid

TECHNICAL DATA

General

	TD61, TID61	TD71, TID71
Number of cylinders	6	6
Swept volume ... litres (in^3)	5.48 (334)	6.73 (411)
Low idling, genset engines, appr. ... rpm	1300	1300
TD61AP,-AW ... rpm	650	–
other models ... rpm	600	
Valve clearance, cold or hot engine, inlet ... mm (in)	0.40 (0.0157)	
outlet ... mm (in)	0.55 (0.0217)	
Weight, engine less clutch, approx.:		
TD61AP and T(I)D71AP resp. ... kg (lbs)	870 (1918)	1022 (2253)
Remaining T(I)D61 and T(I)D71 resp. ... kg (lbs)	630 (1389)	760 (1676)

Fuel system

Fuel injection pump, setting:		
TD61AG and TD71AG resp.	20°±0,5° BTDC	16° BTDC
TID61AG and TID71AG resp.	18° BTDC	12° BTDC
TD61AW	22°±0.5° BTDC	–
Remaining TD61 and TD71, TID71 resp	25°±0.5° BTDC	20°±0.5° BTDC
Injectors, opening pressure ... MPa (kp/cm^2 = p.s.i)	25 (255 = 3627)	
setting pressure, (new spring) ... MPa (kp/cm^2 = p.s.i.)	25.5–26.3 (260–268 = 3698–3812)	

Lubricating system

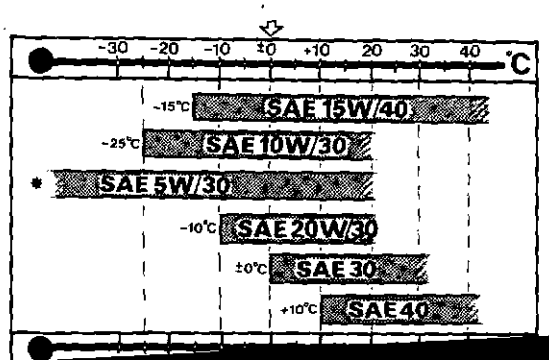
Oil pressure, hot engine at operational speed ... kPa (kp/cm^2 = p.s.i.)	300–500 (3–5 = 43–71)	
Oil pressure, hot engine at idling speed ... kPa (kp/cm^2 = p.s.i.)	min. 150 (1.5 = 21)	
Oil capacity incl. oil filter(s),[1] appr.:		
Standard oil sump ... litres (Imp.gals/US gals)	min. 16(3.5/4.2) max. 22 (4.8/5.8)	min. 21 (4.6/5.6)[2] max. 29 (6.4/7.7)[2]
Shallow oil sump ... litres (Imp. gals/US gals)	min 9 (2.0/2.4) max. 14 (3.1/3.7)	min. 12 (2.6/3.2) max. 19 (4.2/5.0)
Deep oil sump for large inclinations ... litres (Imp.gals/US gals)	min. 14 (3.1/3.7) max. 20 (4.4/5.3)	–
Oil sump of vehicle version ... litres (Imp.gals/US gals)	–	min. 20 (4.4/5.3) max. 27 (5.9/7.1)
Oil quality accord. to API-system ...	CD[3]	

[1] The lubr. oil filter holds appr. 2 (0.4/0.5) and the by-pass filter appr. 3 (0.7/0.8) litres (Imp.gals/US gals).

[2] For an execution for large inclinations, min. 18 (4.0/4.8), max. 25 (5.5/6.6) litres (Imp.gals./US gals.) applies.

[3] See also pages 4 and 9 regarding prolonged oil changing intervals.

Viscosity at different air temperatures ...
(The temperature values apply to constant outside air temperature.)



* Synthetic- or semisynthetic oil.
NOTE! **Only** SAE 5W/30 is allowed.

Cooling system

	TD61, TID61	TD71, TID71
Coolant volume with Volvo Penta standard radiator, approx. litres (Imp.gals/US gals)	36 (7.9/9.5)	39 (8.6/10.3)
Thermostat starts opening at °C (°F)		80–84 (176–183)
fully open at °C (°F)		93–97 (199–207)

Electrical system

System voltage V	24
Alternator, output, approx. W	1500 (or 1200)
Battery capacity (2x12V) Ah	143
Battery electrolyte density at +20°C (68°F):	
fully charged battery g/cm^3	1.265–1.290
to be re-charged at g/cm^3	1.230

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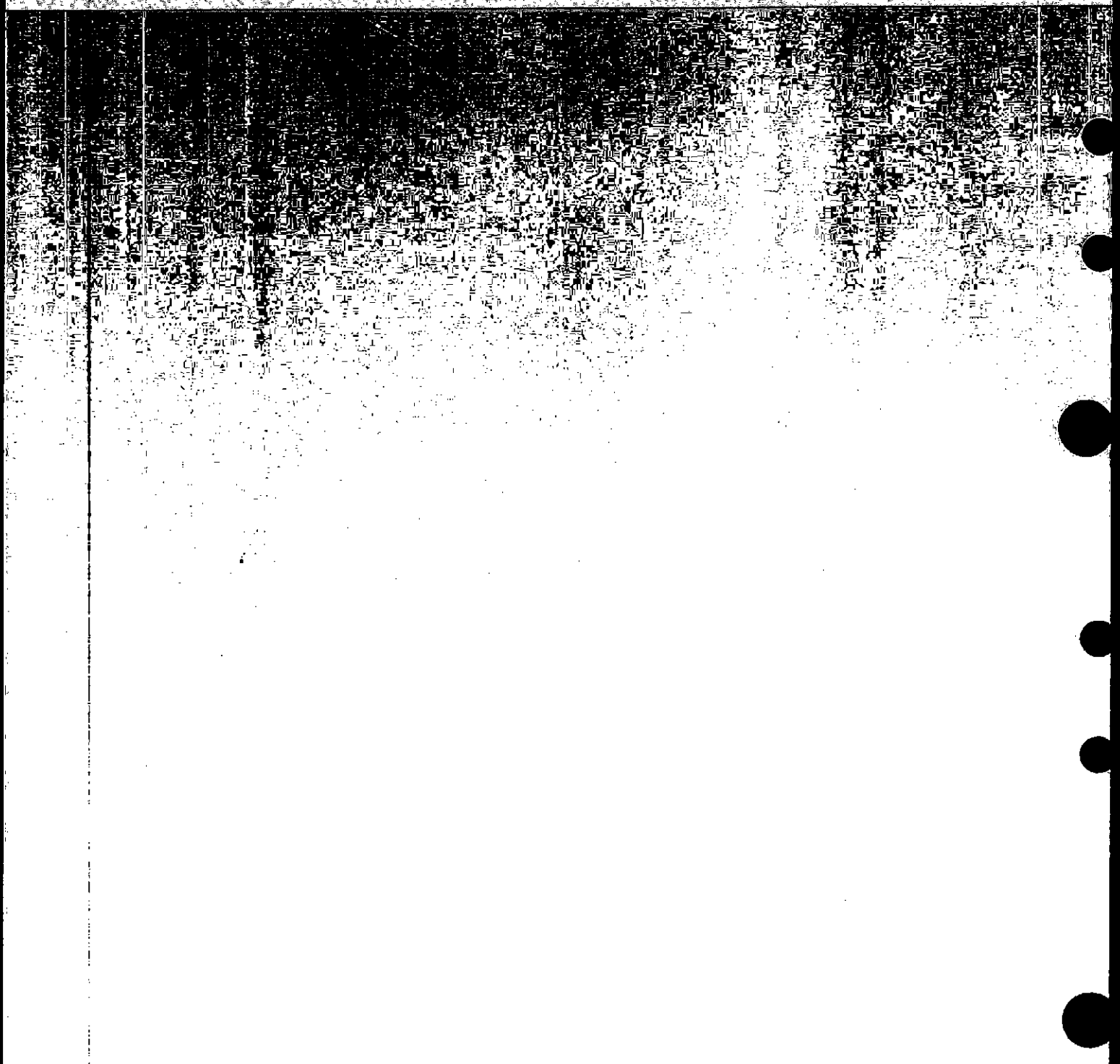

VOLVO