TURBO-COMPRESSOR

Repairs and Maintenance

Section	Group
2	25

Turbo-compressor
B21F-Turbo

1981—

VOLVO

Contents

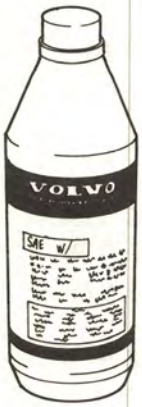
Indicates changes in text and/or specification in this manual.

Order Number: TP 30345/3

IMPORTANT!

Satisfactory lubrication is essential for the durability of the turbo-compressor. It is lubricated by engine oil pressure. There are two important rules to observe when driving a turbo-compressor equipped engine:

- **Let engine idle after start.**
  This will provide initial lubrication. Do not race engine immediately after start.
- **Let engine return or drop to idle speed before shut-off.**
  If the engine is shut off while running at high rpm, the turbo-compressor will run for a long time. This will harm the turbo-compressor as the engine does not provide continued lubrication after stopping.
  Idling before shut-off will also reduce turbine temperatures.



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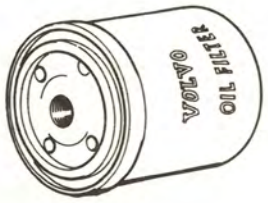


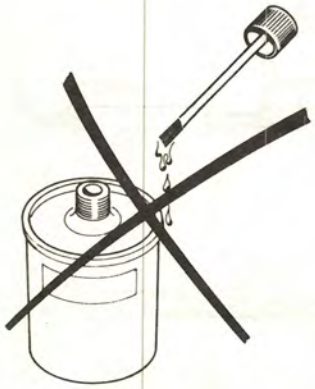
131620

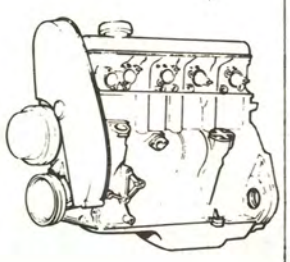
LUBRICATION

Proper lubrication is of vital importance to the turbo compressor. It receives its lubrication from the engine lubricating system. To maintain adequate lubricating oil supply and pressure, it is imperative that the engine oil be changed and the oil filter replaced at regular intervals (twice as often as non-turbo engines). Use engine oil meeting Volvo specifications and viscosity requirements. See maintenance service schedules for additional information.

CAUTION:

Follow the oil/oil filter replacement intervals outlined in the maintenance-service schedules.





131623

Never use sealing compounds when repairing engine.

It can get into engine lubricating system and clog oil passage in turbo-compressor.

Volvo does not recommend the use of oil additives as they can adversely affect the turbo-compressor.

Specifications

Maximum charge pressure, B21FT without intercooler	42–48 kPa	6.0–6.8 psi
B21FT with intercooler	50–58 kPa	7.1–8.2 psi

Measured while driving, throttle pedal fully depressed and brake pedal depressed to achieve engine speed 4000 rpm (non-intercooled models) or 3000 rpm (intercooled models).

Pressure regulator.

Starts to open wastegate at compressor pressure, B21FT without intercooler	41 kPa	6.0 psi
B21FT with intercooler	57 kPa	8.1 psi

Wastegate actuator.

Control rod stroke of	10 mm	3/8″

Pressure switch for enrichment at acceleration.

Closes (and grounds terminal 7 of Lambda sond electronic module) when compressor pressure reaches	20.3±2 kPa	2.9±0.3 psi

Overload protection switch.

Opens ground circuit for fuel pump relay at pressure, B21FT without intercooler	70±5 kPa	10±0.7 psi
B21FT with intercooler	105±5 kPa	15±0.7 psi

Spark timing.

Max. advance	15°	
Max retard	8°	
... at compressor pressure	36 kPa	5.1 psi

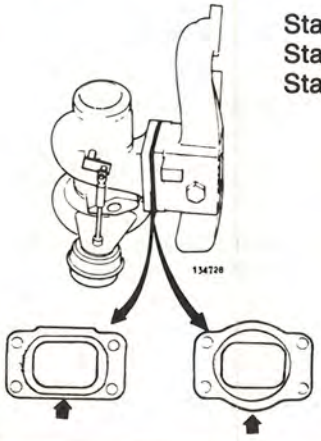
Tightening torques

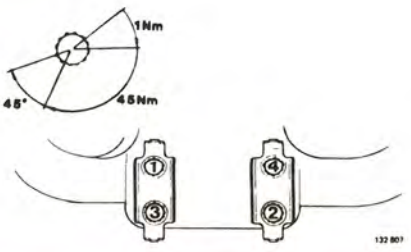
Use lock fluid	P/N 116035-9	
... on following bolt connections:		
Nuts, retaining front exhaust pipe to turbo	25 Nm	18 ft.lbs.
Bolts, retaining turbine housing	20 Nm	15 ft.lbs.
Bolts, retaining compressor housing	18 Nm	13 ft.lbs.
Bolts, retaining rear housing, with wastegate, to turbine housing	20 Nm	15 ft.lbs.

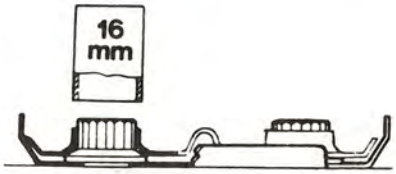
Bolts, retaining turbo-compressor to manifold:

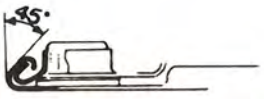
- Lubricate bolt threads and contact surfaces with rustproofing agent — P/N 282036-3
- Tighten bolts in three stages and in sequence shown below:

Stage 1	1 Nm	0.7 ft.lbs.
Stage 2	45 Nm	33 ft.lbs.
Stage 3	Additional 45°	

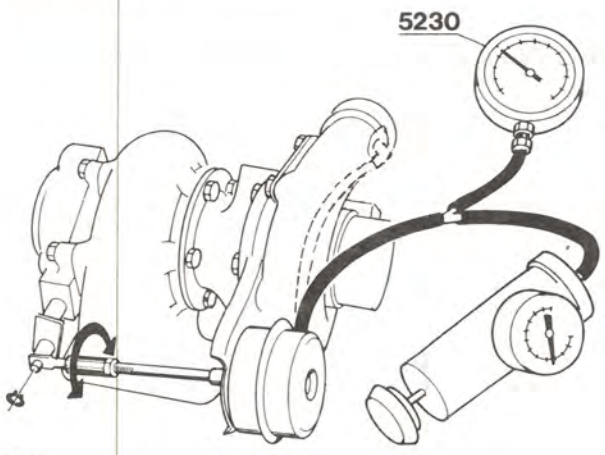








Special tools



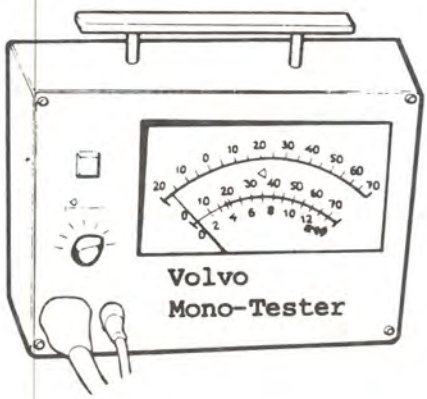
130914

Pressure gauge

capable of accurately measuring pressures 0–100 kPa = 0–15 psi.

Pressure pump

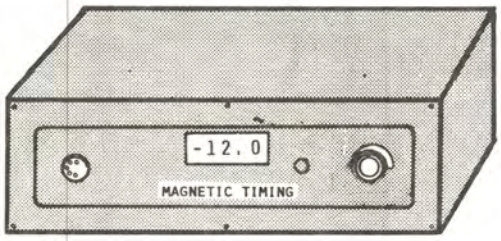
to pump pressures for gauge above. Standard radiator pressure pump can be used.



130640

MONOTESTER

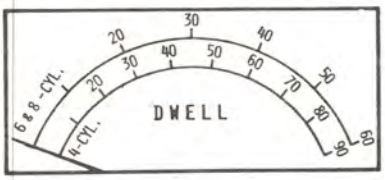
If not available, use a magnetic timing unit.



130683

Magnetic timing unit

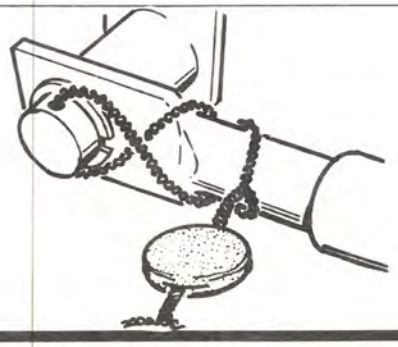
If not available, standard timing light can be used with decreased accuracy.



130847

Good quality dwell meter

capable of accurately measuring 70° with 4-cyl setting. Used to measure lambda system duty cycle.

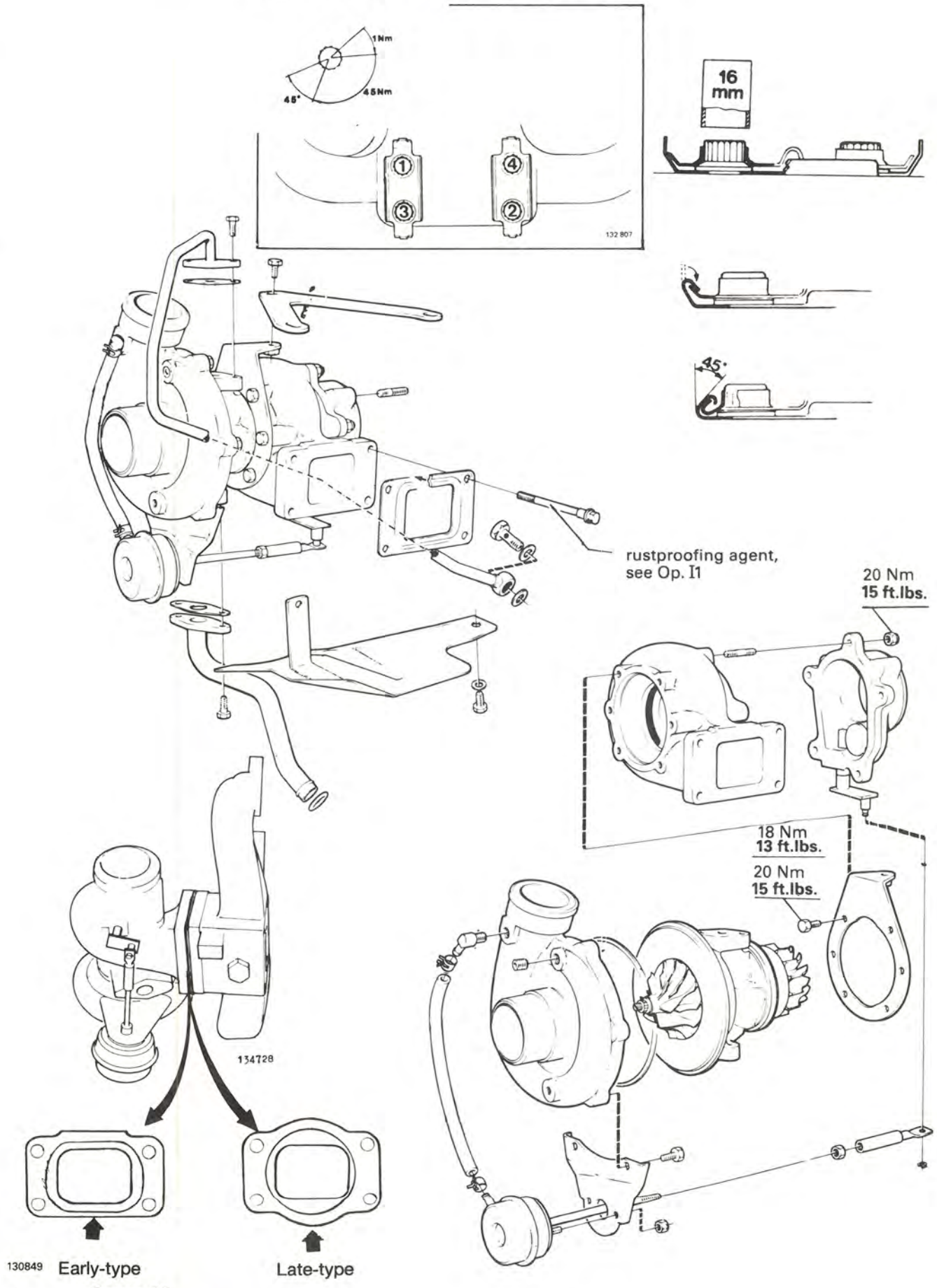


130848

Anti-tamper seal tongs

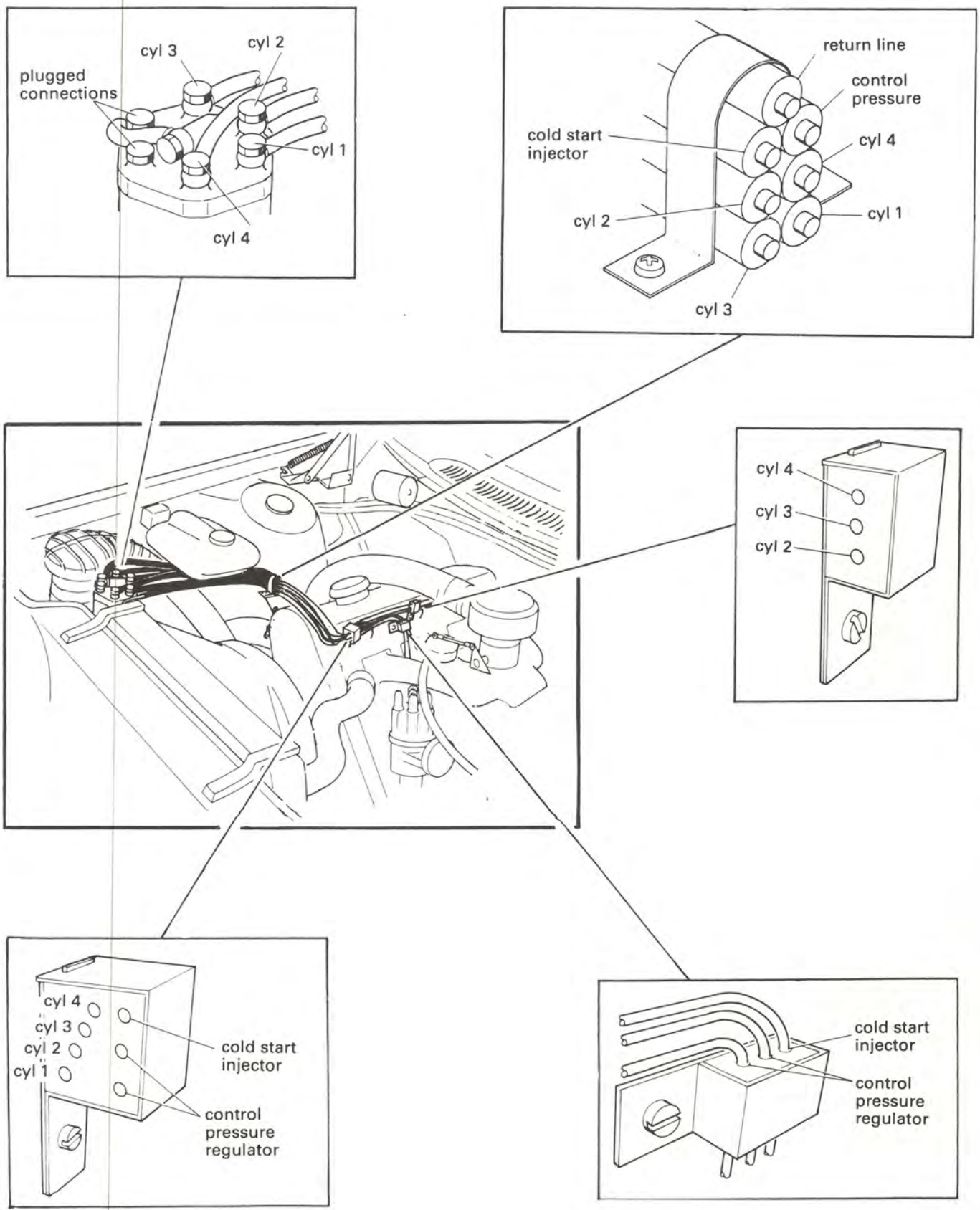
Volvo P/N 998 6408–4, or similar.
(anti-tamper seal 998 5962–1)

Turbo-compressor, exploded view



Routing of fuel lines

Clean connections thoroughly before disconnecting lines.
Make sure that fuel lines do not rub against other parts.

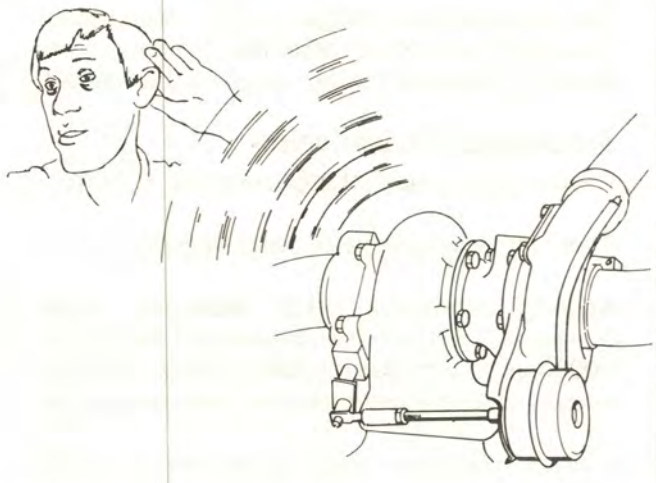


Fault tracing

FAULT Symptom	Reason	Check/remedy
Charge pressure too low *Low output* *Turbo gauge reading low.*	Air cleaner clogged	Replace air cleaner insert
	Throttle control incorrectly adjusted	Adjust
	Engine fault (low compression, incorrect valve clearance, poor fuel supply)	Check and remedy as required
	Leakage between compressor housing and cylinder head or between cylinder head and turbine housing	Replace damaged gaskets, connections, etc. tighten screws, nuts, clamps
	Wastegate stuck in open position (fully or partly)	Replace wastegate and housing, see op. D1–D5
	Exhaust system partly blocked	Replace
	Charge pressure incorrectly adjusted	Check/adjust charge pressure, see op. A1–A5
	Turbo compressor faulty	Replace complete or requisite parts
Charge pressure too high *Engine pings (knocks) at high output* *Turbo gauge pointer moves into red sector.* *Pressure sensor cuts-out (engine stops).*	Leakage in hose between compressor housing and pressure actuator	Replace hose and clamps
	Pressure actuator (diaphragm) damaged	Replace pressure actuator see op. C1–C3
	Wastegate stuck in closed position.	Replace wastegate and housing, see op. D1–D5
	Charge pressure incorrectly adjusted	Check/adjust charge pressure, see op. A1–A5
Engine knocks	Fuel not suitable (octane number too low)	Replace fuel
	Ignition setting/retardation incorrect	Check/adjust ignition setting and retardation, see op. B1–B6
	Charge pressure too high	Check/adjust charge pressure, see op. A1–A5
Metallic noise from wastegate	Preheating plates loose or cracked	Replace, tighten
	Housing for wastegate or exhaust pipe loose	Tighten
	Wastegate loose in guide	Replace wastegate and housing, see op. D1–D5

FAULT **Symptom**	**Reason**	**Check/remedy**
Noise or vibrations from turbo-compressor	Pre-heating plates loose or cracked	Replace, tighten
	Leakage in intake or exhaust system	Tighten loose connections, replace gaskets, seals, etc.
	Leakage between wastegate housing and turbine housing	Install gasket (P/N 1367108-6)
	Poor lubrication of turbo compressor	Check oil pressure and oil flow to turbo. If fault still remains after any remedial measures, replace turbo compressor.
	Imbalance on turbo shaft, turbine wheel or compressor wheel because of damage	Replace turbo compressor
Oil leakage at turbo shaft seals *Oil smoke in exhaust gases*	Air cleaner clogged (oil leakage on inlet side gives blue smoke)	Replace air cleaner insert
	Exhaust system loose or leaks	Tighten or replace system
	Excessive pressure in crankcase	Clean crankcase ventilation
	Return oil pipe clogged	Clean return oil line
	Turbo shaft seals damaged	Check shaft clearance Replace turbo compressor
	Drain hose from oil trap damaged or pinched	Check position and condition of hose (Oil pan must be removed.)

Quick check of turbo-compressor



130918

Switch off engine and at the same time listen to turbo-compressor.

With engine at idle, turbo-compressor will normally coast down in 15–20 seconds. If engine RPM is high, oil temperature high–and consequently viscosity and internal friction low–turbo-compressor might rotate 1–2 minutes after engine has stopped. If not:

Disconnect inlet hose at compressor housing.

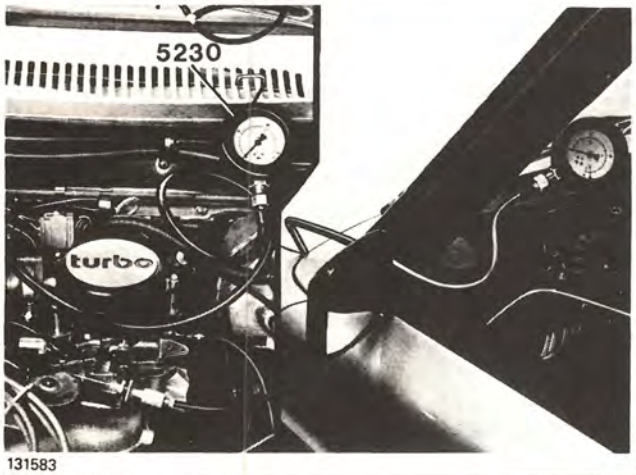
Check that:

– Compressor wheel rotates freely.

Compressor and turbine wheels do not scrape against compressor housing when wheel is pushed radially or pulled axially.

Checking/adjusting charge pressure
Special tool: pressure gauge 5230

CAUTION:
Excessive charge pressure may damage the engine.

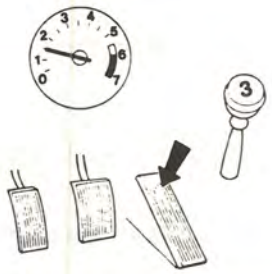


131583

A1

Connect pressure gauge (Volvo 5230)
Connect pressure gauge to hose from intake manifold to pressure sensor. Route hose into the car so that gauge can be read from driver's position.

Start engine
Drive on roads until engine is at normal operating temperature.


131619

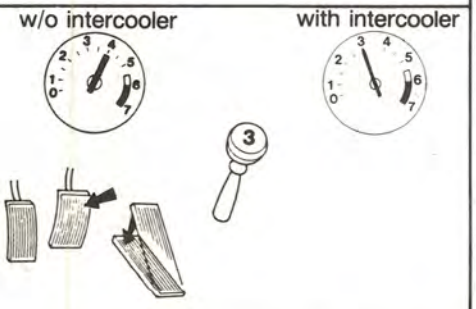
A2

Check charge pressure.
Manual Transmission.

Drive in third gear at approx. 1500 rpm.

Then depress accelerator pedal to floor.

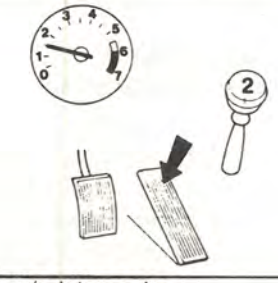
Keeping accelerator pedal depressed, apply brakes at 4000 rpm (non-intercooled models) or 3000 rpm (intercooled models). Maintain that rpm while reading charge pressure on pressure gauge.



130856

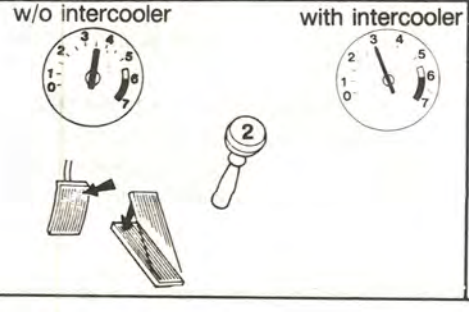
Correct maximum charge pressure;
without intercooler: 42-48 kPa = 6.0-6.8 psi
@ 20°C = 68°F
44-50 kPa = 6.2-7.1 psi
@ 0°C = 32°F
with intercooler: 50-58 kPa = 7.1-8.2 psi

NOTE:
Too low maximum charge pressure may indicate faults with components other than the turbo-compressor. See Fault Tracing section in this Manual.



Automatic Transmission
Drive in second gear at approximately 1500 rpm.

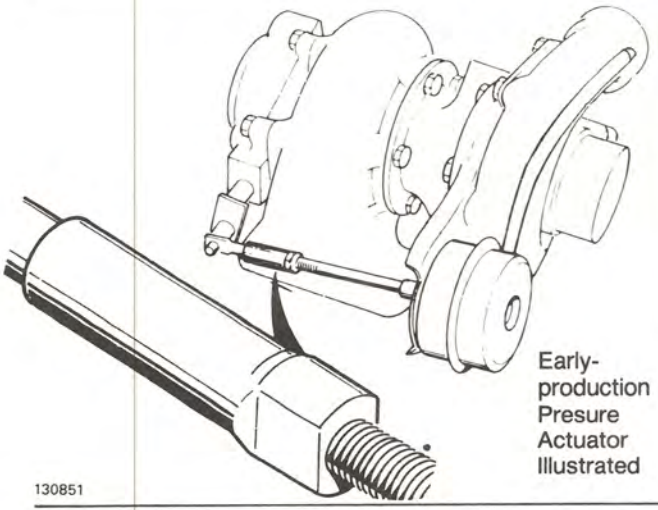
Then depress accelerator pedal to floor.



Keeping accelerator pedal depressed, apply brakes at 3500 rpm (non-intercooled models) or 3000 rpm (intercooled models). Maintain that rpm while reading charge pressure on pressure gauge.

Correct maximum charge pressures are given above.

Adjusting Charge Pressure.



130851

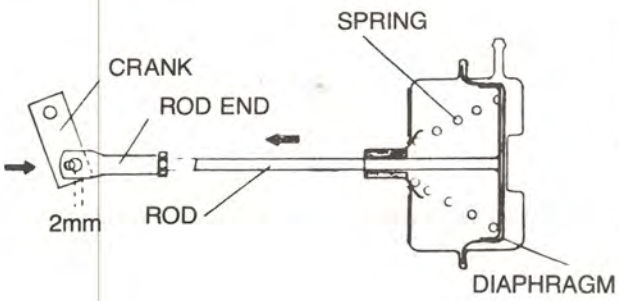
Early-production Presure Actuator Illustrated

NOTE:

Pressure actuator installed in early-production cannot be adjusted. Sleeve is crimped to actuator rod.

If pressure actuator must be replaced, see instructions, section "Replacing pressure actuator" in this manual.

Late-production pressure actuator can be adjusted if the lead seal is broken. Be sure to reseal actuator after adjustment.

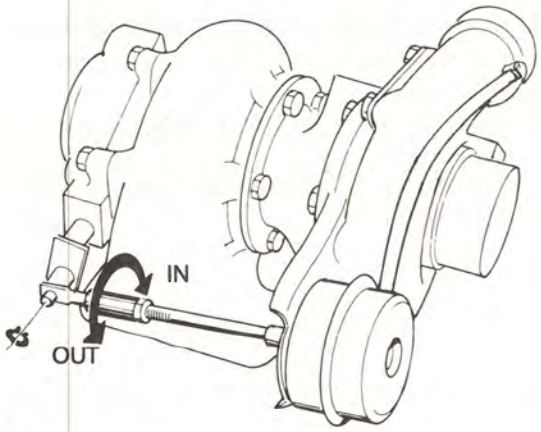


Checking actuating rod clearance.

IMPORTANT.

A clearance of 2mm should be maintained between the diaphragm and the bottom of the actuator. To check, allow spring pressure to draw actuating diaphragm to rest against bottom of actuator (actuating rod disconnected). Adjust to obtain 2mm clearance as shown. Reconnect actuator rod and recheck pressure.

A4



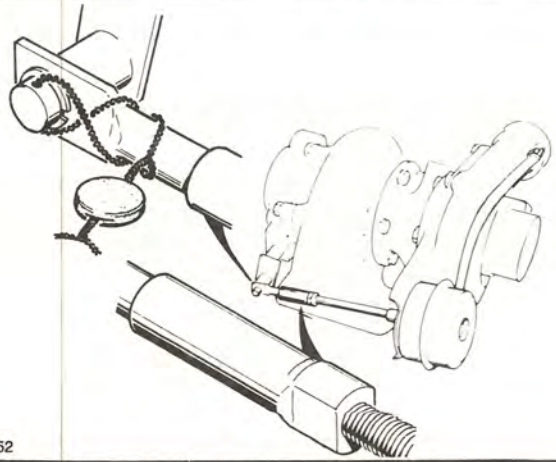
130916

Adjustable, late-production pressure actuator:

Loosen lock nut. Remove lock ring. To adjust, turn sleeve on pressure actuator rod. One turn on sleeve will alter pressure approx. **2 kPa** = 0.28 psi. Screwing IN sleeve INcreases charge pressure, screwing OUT sleeve decreases charge pressure.

After adjustment: install new lock ring and tighten lock nut.

A5



130852

Anti-tamper seal.

It is important to wind wire* tightly around actuator rod, as shown. Otherwise seal will loosen due to vibrations.

Volvo anti-tamper seal tongs, part number 998 6408–4, have "Volvo" stamped on grips. (anti-tamper seal, part number 998 5962–1)

NOTE:

Tampering with Emmision Control components may be a violation to Federal regulation's law.

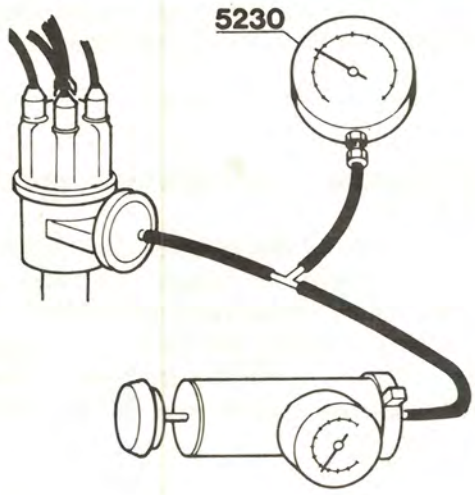
**Use mechanic's wire*

Checking:

- **Timing retard**
- **Lambda system duty cycle**
- **Full load enrichment system**
- **Overload protection switch**

Equipment:

Pressure pump. (Volvo P/N 998–5496)
Pressure gauge (Volvo P/N 999–5230)
Magnetic Timing Unit (alt. timing light)
High quality dwell meter (scale min. 70° on 4-cyl setting)



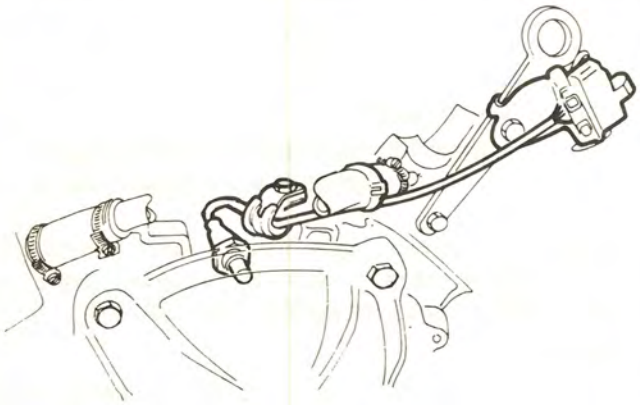
130639

B1

Connect pressure pump and gauge.

Use pump and gauge normally used to test radiator pressure.

- Volvo tools: pump 998–5496 and pressure gauge 999–5230.
  Connect to distributor air pressure unit. Plug hose removed.

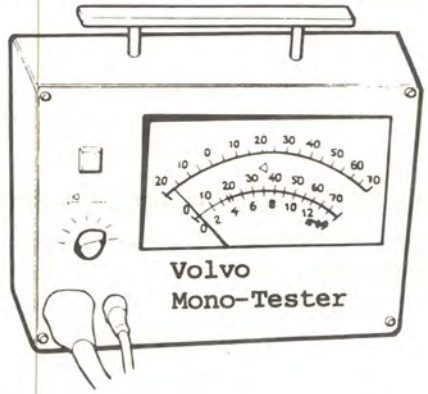


130675

B2

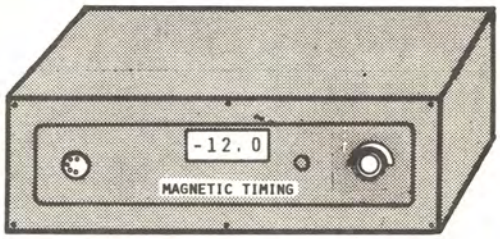
Connect instrument for checking ignition timing.

It is preferred to use instruments connected to engine's timing sensor. Provides increased accuracy and safety. In addition, following checks can be made by one man.



130640

Instruments used are Volvo Mono-Tester or "Magnetic Timing Units" equipped with proper adapter.



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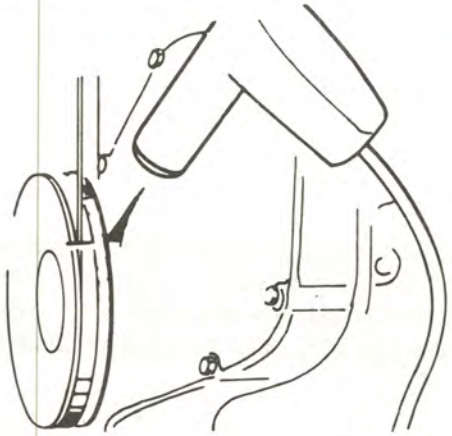
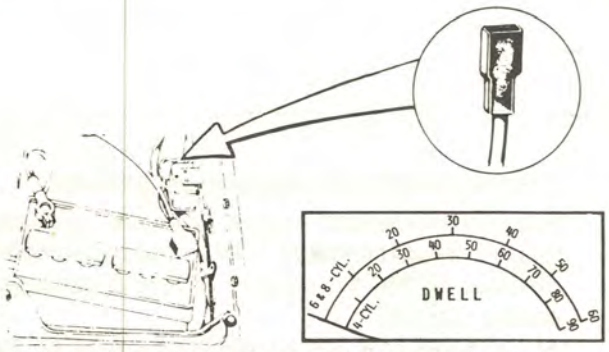


129305

Standard timing light.

Can be used if no other instruments are available. Decreased accuracy is a consequence.

B3



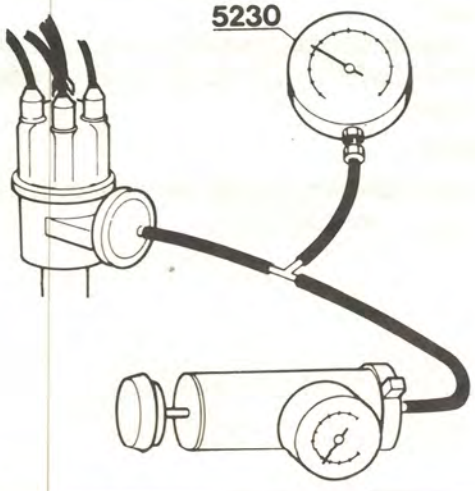
NOTE: Illustration show early-type connector

130676

Connect instrument to check Lambda system duty cycle.

For this purpose a high quality dwell meter can be used. Scale must extend to at least 70° (4-cyl, setting).
Dwell meter is connected to Lambda sond service pick-up.

B4

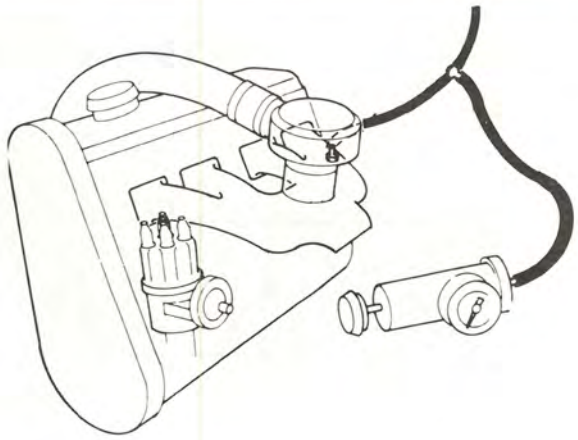


130639

Check timing retard.

Start engine, run at idle. Note ignition timing. Pump pressure to **36 kPa** = 5.1 psi.
Ignition timing should retard **6–10°**. In case of incorrect reading: check distributor, replace distributor pressure unit, as appropriate. Re-install and clamp pressure hose.

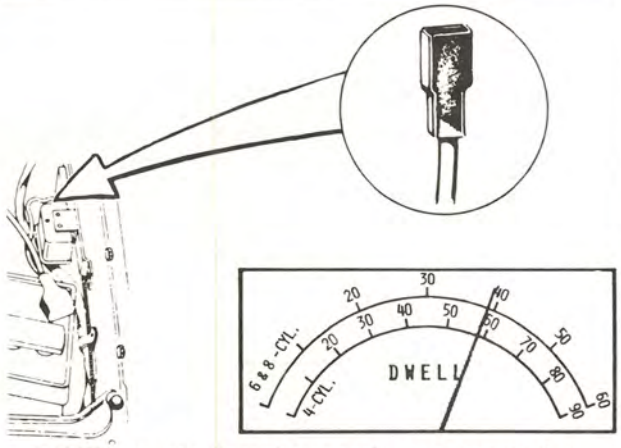
B5



130643

Check full load enrichment system.

Connect air pressure pump and gauge in line leading from intake manifold to pressure switch on firewall.



NOTE: Illustration show early-type connector

130677

Engine running, pump air pressure until dwell meter (measuring duty cycle of lambda sond system) displays steady reading of **68° ± 2°**. Air pressure reading at that instant should be **20.3 kPa**=2.9 psi.

B6

130678

Check overload protection switch.

Pump pressure until engine stalls. Air pressure reading should be **70kPa** = 10 psi (non-intercooled models); or **100-115 kPa** = 14.2-15.6 psi (intercooled models).

At the same time the air pressure gauge on the instrument panel should go to red and red "Turbo" warning light in instrument cluster should illuminate.

In case of incorrect reading: replace overload protection switch (inside firewall, close to clutch pedal bracket).

NOTE:

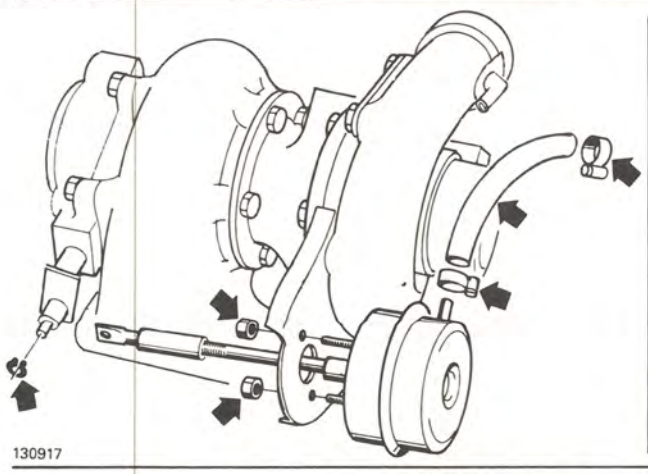
Late-production models are not equipped with "Turbo" warning light.

Replacing pressure actuator

Equipment:

Pressure pump (Volvo P/N 998-5496)
Pressure gauge (Volvo P/N 999-5230)

C1

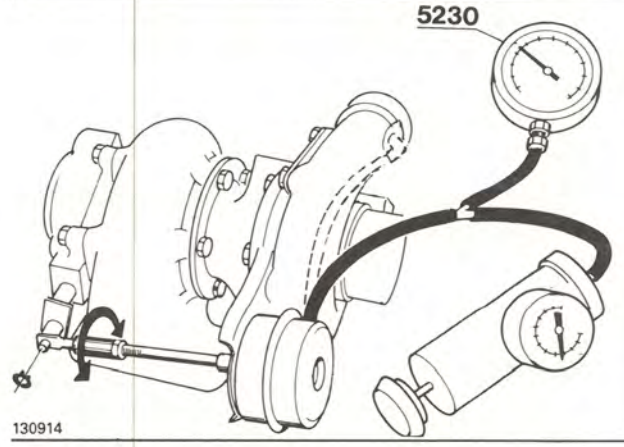


130917

Use standard procedures to replace pressure actuator.

Install **new** nuts. Check pressure hose for damage, replace as necessary.
DO NOT install hose clamp, DO NOT connect hose to compressor.

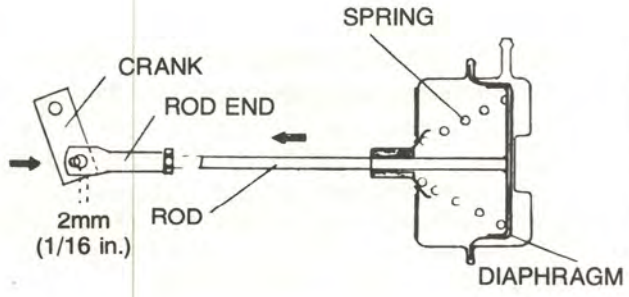
C2



130914

Adjusting charge pressure.

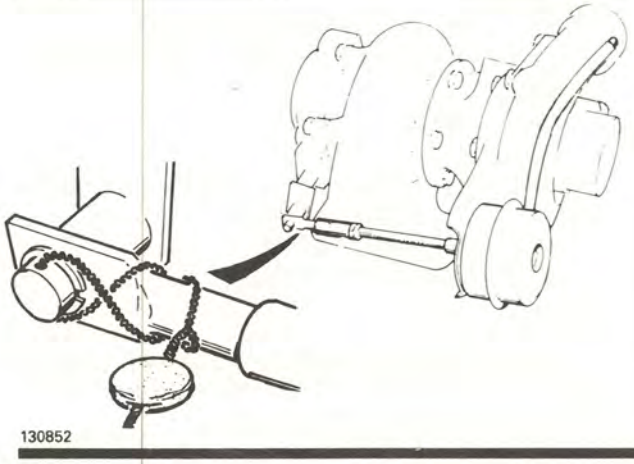
Connect pressure pump and pressure gauge to pressure actuator.
Pump pressure to **41 kPa** = 6 psi (non-intercooled models); or **57 kPa** = 8.1 psi (intercooled models). Push wastegate lever forward to wastegate closed position. Adjust rod end to fit precisely on lever pin. Install **new** lock ring. Tighten lock nut. Disconnect pressure pump and pressure gauge. Connect and clamp hose to compressor.



Checking actuating rod clearance.

A clearance of 2mm = 1/16 in. should be maintained between the diaphragm and the bottom of the actuator. To check, allow spring pressure to draw actuating diaphragm to rest against bottom of actuator (actuating rod disconnected). Adjust to obtain 2mm clearance as shown. Reconnect actuator rod and recheck pressure.

C3



130852

Anti-tamper seal.

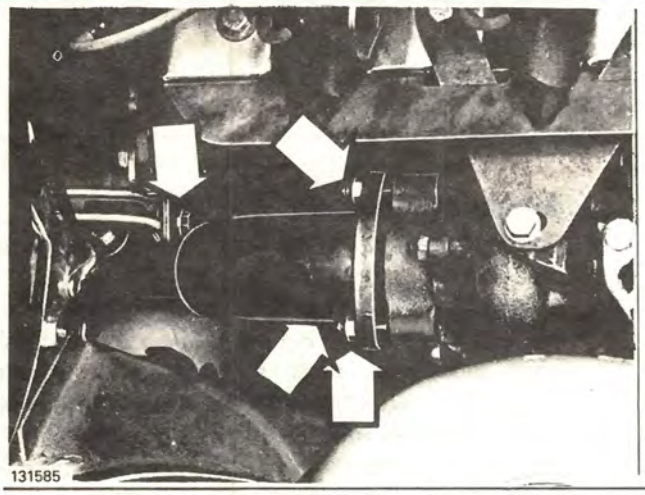
It is important to wind wire tightly round actuator rod, as shown, otherwise seal will loosen due to vibrations.
Volvo anti-tamper seal tongs, P/N 998 6408-4, have "Volvo" stamped on grips. (anti-tamper seal: P/N 998 5962-1)

NOTE:

Tampering with emission control components may be a violation of Federal and State laws.

Replacing wastegate and wastegate housing

Equipment:
Pressure pump (Volvo P/N 998-5496)
Pressure gauge (Volvo P/N 999-5230)


131585

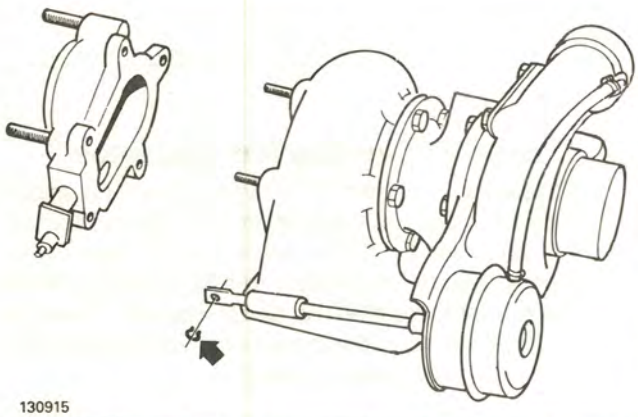
D1

Disconnect exhaust pipe.

Remove nuts securing exhaust pipe to turbo-compressor. Remove transmission front mount bolt.
Push exhaust pipe aside.

NOTE:

For easier removal, spray studs with antirust fluid prior to removal.


130915

Remove.

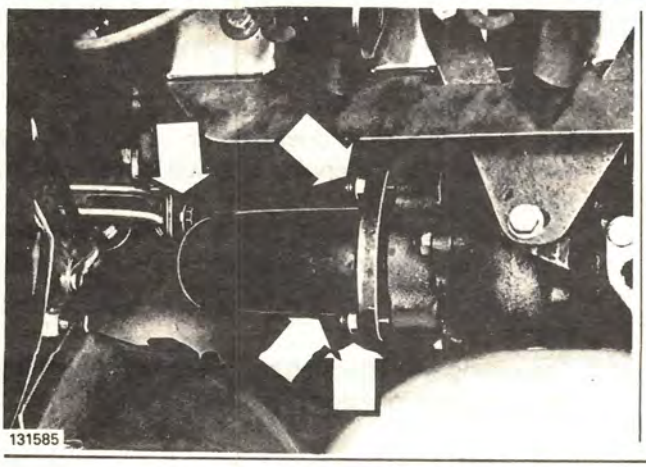
D2

Remove lock ring for pressure actuator rod.
Remove wastegate and wastegate housing.

Check.

Check that turbine housing contact surface is smooth and that wastegate seat is not burned.

Check that the turbine housing is free from cracks. If cracks are found, the turbo-compressor will have to be replaced. Remove any carbon deposits from contact surface and check that the surfaces are undamaged. Inspect the threads and, if necessary, replace studs (drill out broken studs).


131585

Install.

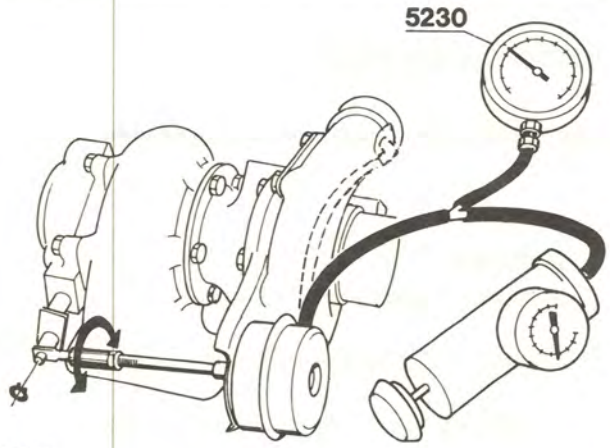
D3

Install wastegate and wastegate housing.
Apply anti-seize compound, Volvo P/N 1161035-9, to bolts.
Torque to: **20 Nm** = 15 ft.lbs.

Connect exhust pipe. Apply anti-seize compound, Volvo P/N 1161035-9, to studs.
Torque to: **25 Nm** = 18 ft.lbs.
Install transmission front mount bolt.

NOTE:

To correct leakage between the turbine housing and the wastegate housing, install a gasket (P/N 1367108-6) between the housings.

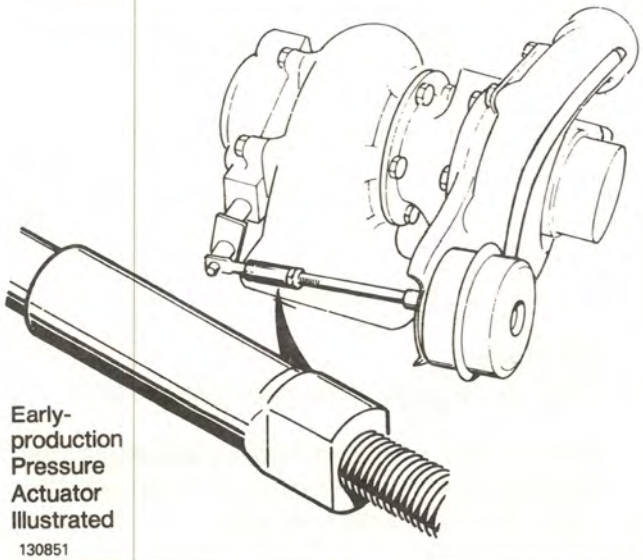


130914

D4

Adjust pressure actuator.

Connect pressure pump and pressure gauge to pressure actuator.
Pump pressure to **41 kPa** = 6.0 psi (non-intercooled models); or **57 kPa** = 8.1 psi (intercooled models). Push wastegate lever forward to wastegate closed position. Adjust rod end to fit precisely on lever pin. Install new lock ring. Tighten lock nut. Disconnect pressure pump and pressure gauge. Connect and clamp hose to compressor.



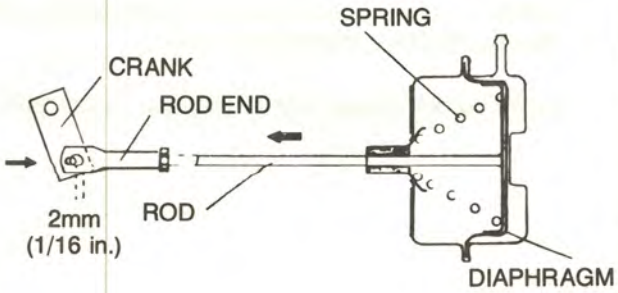
Early-production Pressure Actuator Illustrated

130851

NOTE:

Pressure actuator installed in early-production cannot be adjusted. Sleeve is crimped to actuator rod.
If pressure actuator must be replaced, see instructions, section "Replacing pressure actuator" in this manual.

Late-production pressure actuator can be adjusted if the lead seal is broken.
Be sure to reseal actuator after adjustment.

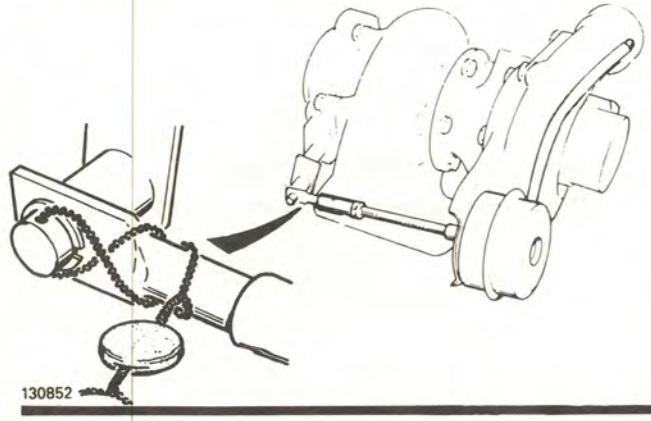


D4a

Checking actuating rod clearance.

IMPORTANT:

A clearance of 2mm = 1/16 in. should be maintined between the diaphragm and the bottom of the actuator. To check, allow spring pressure to draw actuating diaphragm to rest against bottom of actuator (actuating rod disconnected). Adjust to obtain 2mm clearance as shown. Reconnect actuator rod and recheck pressure.



130852

Anti-tamper seal.

D5

It is important to wind wire* tight around actuator rod, a shown. Otherwise seal will loosen due to vibrations.
Volvo anti-tamper seal tongs, Part Number 998 6408-4, have "Volvo" stamped on grips. (anti-tamper seal, Part Number 998 5962-1)

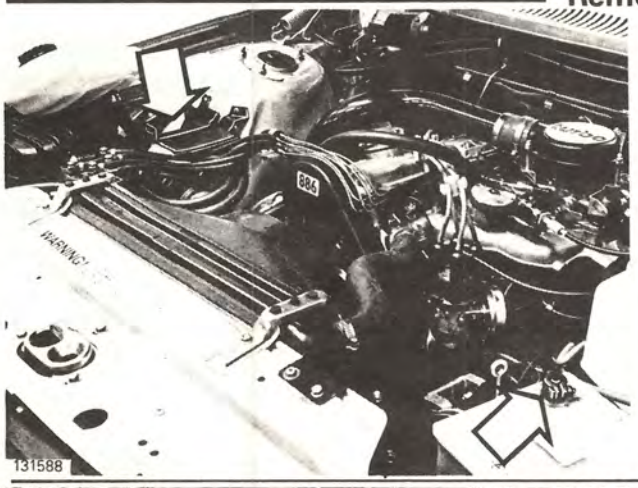
NOTE:

Tampering with emission control components may be a violation of Federal and State laws.

**Use mechanic's wire*

Removing/installing turbo-compressor

Removing

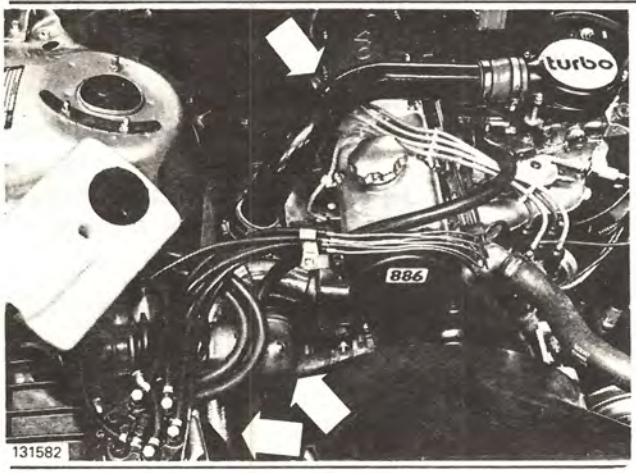


E1

Remove.
Disconnect battery ground cable.

Disconnect expansion tank from retainer.

Remove expansion tank retainer (3 screws).



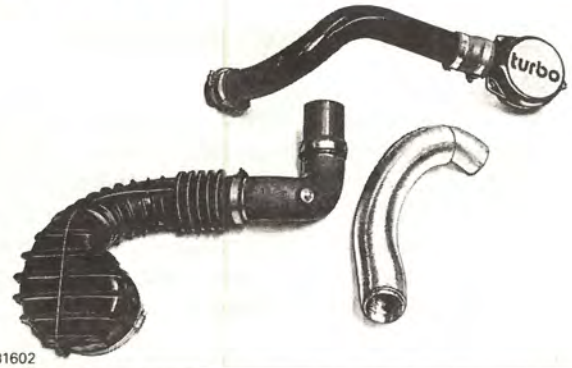
E2

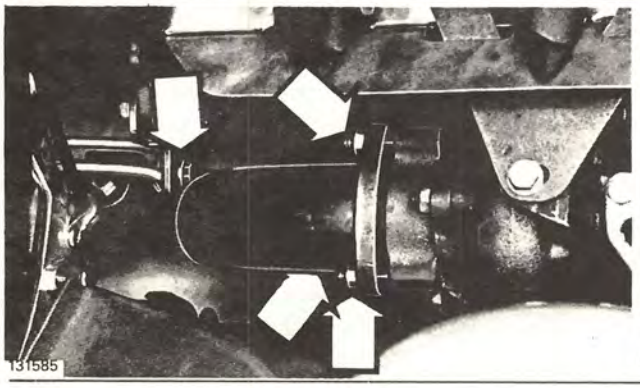
Remove
Remove preheater hose to air cleaner.

Remove pipe and rubber bellows between air/fuel control unit and turbo-compressor. Pull out crankcase ventilation hose from pipe.

Remove pipe and pipe connector(s) between turbo-compressor and intake manifold (non-intercooled models), or between turbo-compressor and intercooler (intercooled models).

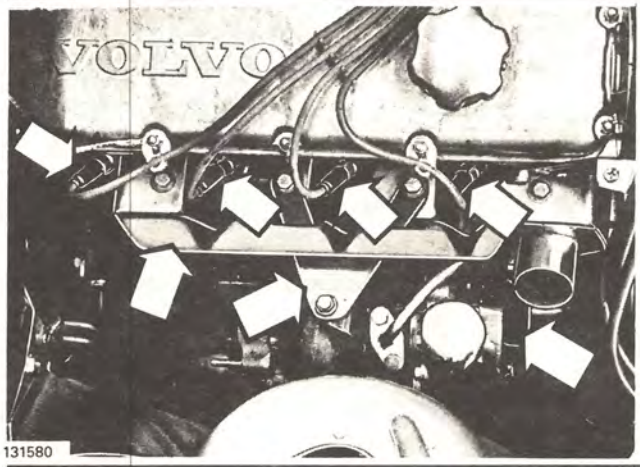
Cover turbo-compressor intake and outlet ports.





E3

Disconnect exhaust pipe.
Disconnect exhaust pipe and push aside.



131580

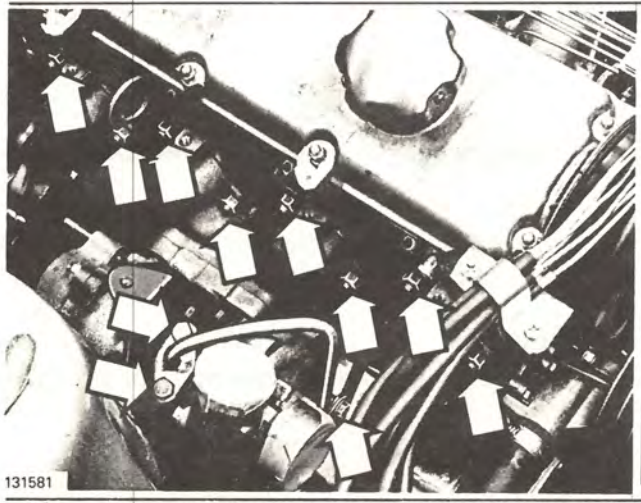
E4

Remove.

Disconnect high tension wires at spark plugs.

Remove upper heat shield. Remove brace between turbo and manifold.

Remove lower heat shield (one retaining screw underneath manifold).



131581

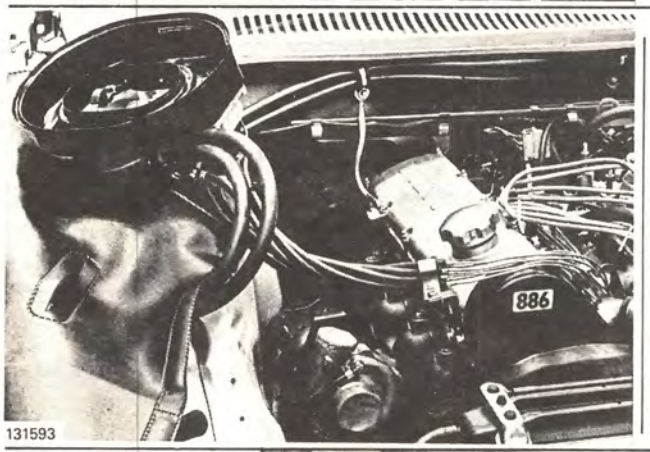
E5

Remove delivery oil pipe.

Remove oil pipe clamp, retaining screws on turbo and pipe connection screw in cylinder block under manifold. DO NOT allow any dirt to enter oilways.

Remove manifold retaining screws and washers. Let one nut remain in position to keep manifold in position.

Remove delivery oil pipe. Cover opening on turbo.



131593

E6

Disconnect air/fuel control unit.

Loosen clamps. Move air/fuel control unit with lower section of air cleaner up to right side wheel housing (place appropriate kind of protection on the wheel housing).

Remove air cleaner filter.

134250

E7

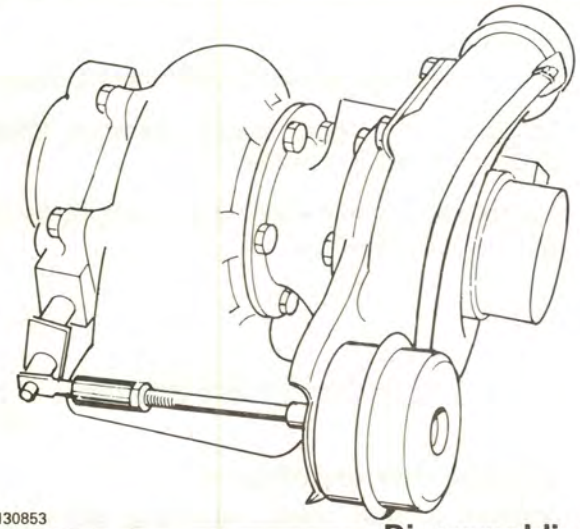
Remove turbo-compressor and manifold.

Remove remaining nut and washer. Lift assembly forward and up.

Remove manifold gaskets. Disconnect return oil pipe O-ring from cylinder block.

E8

Disconnect turbo-compressor from manifold.



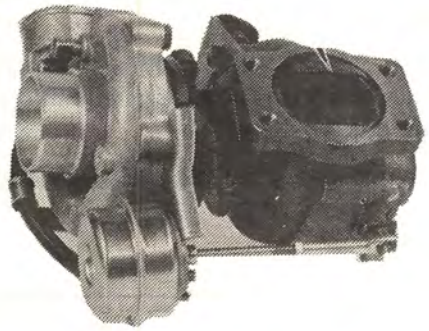
130853

If turbo-compressor assembly is being replaced:

- Transfer necessary parts. Replace gaskets.
- Plug all openings in the old turbo-compressor prior to return for repair.
- See operations I1-I13 for installing new turbo-compressor.

Disassembling turbo-compressor

F1



NOTE:
During the period of the New-Car Warranty, the turbo-compressor should be replaced as a unit.

Remove.

Remove pressure hose from nipple on compressor housing.

Remove oil return pipe.

Remove lock ring on wastegate lever.

Remove wastegate and wastegate housing.

F2

131589

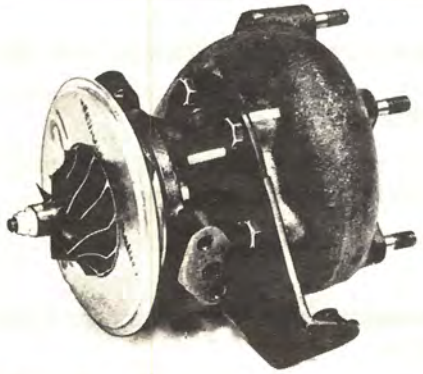
Remove compressor housing.

Mark location of pressure actuator on compressor housing and bracket. This must be done accurately to ensure parts are reinstalled to initial position. Otherwise turbo-compressor will not fit to engine.

Housing must be turned to gain access to all bolts.

CAUTION!
Be careful not to damage turbine wheel.

F3



131594

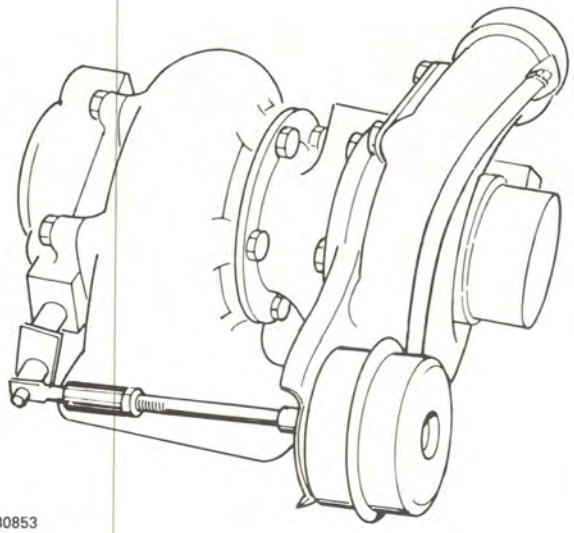
Remove turbine housing.

Mark location of turbine housing clearly opposite a bolt.
Housing must be turned to gain access to all bolts.

CAUTION!
Be careful not to damage turbine wheel.

Cleaning and inspecting

G1



130853

Replacing turbo-compressor

In some cases turbo-compressors have been replaced unnecessarily as a result of finding play in the turbine shaft. However, since the shaft is supported by full floating bearings a certain play should always be felt when inspecting the shaft (the shaft floats on a film of oil).

Measuring radial clearance

Remove the wastegate valve and housing.
Check that the turbine wheel has not scored the turbine housing or scores when the shaft is moved axially.
The turbine wheel should be pressed to one side while rotating the turbine wheel. If the turbine wheel rubs against the housing, replace the turbo-compressor.

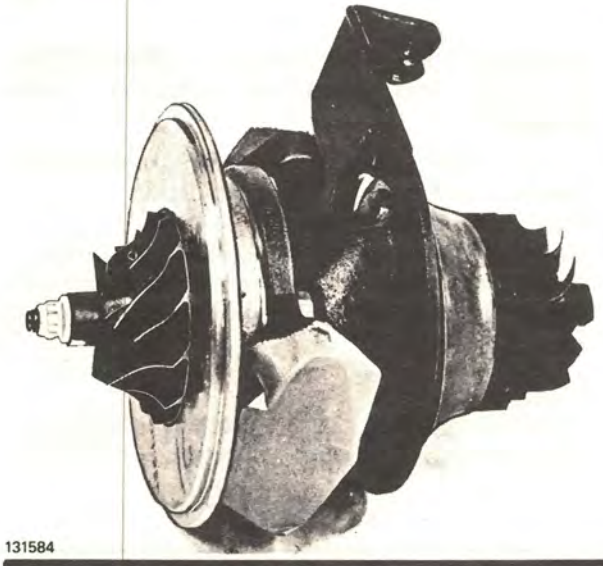
131598

G2

Clean and check:

- Turbine and compressor housings.
- Delivery oil pipe and return oil pipe.
- Wastegate and wastegate housing.

Check these parts for:
- Damage, cracks.
- Wear (that turbine or compressor wheel does not strike housing, etc).
- Smooth contact surfaces.
- Burning damage to wastegate (plate and its contact surface.
- Jamming wastegate lever.
- Clean oil and air passages, free from restrictions.



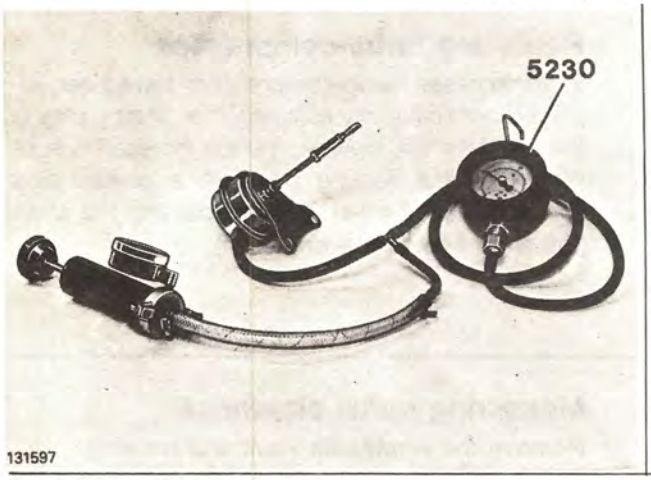
131584

G3

Clean turbine and compressor wheels.

First cover oilways in turbine housing with tape to prevent dirt from entering.
Be very careful when cleaning wheels to avoid damage.
Check for damage and wear. In case of damage, bearing housing assembly complete with wheels must be replaced. Wheel blades must under no circumstances be aligned. Check that shaft runs easily and does not stick. Note that there should always be a clearance between shaft and housing due to design of floating bearings.

Assembling turbo-compressor



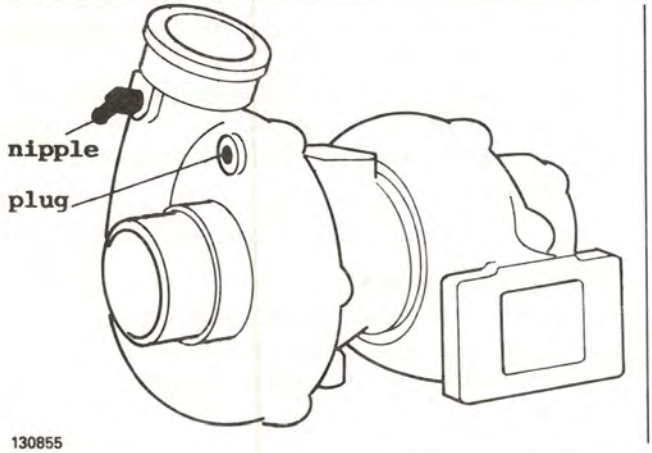
131597

G4

Check pressure actuator.

Connect pressure pump and pressure gauge. Pump pressure and note when actuator rod starts to move. This should happen at a pressure of approx. **41 kPa** = 6 psi (non-intercooled models); or **57 kPa** = 8.1 psi (intercooled models).

Pump pressure to **70 kPa.** This test pressure should remain constant for at least 10 seconds.



130855

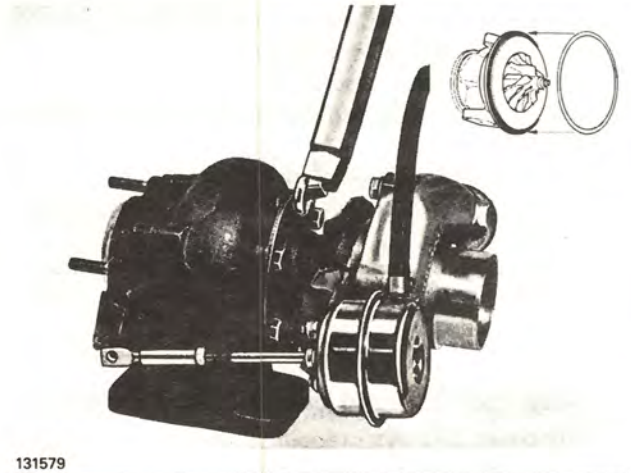
H1

General:

- Use new gaskets.
- Be careful not to damage wheels.

With new compressor housing:

Transfer nipple and plug.



131579

H2

Install turbine housing and wastegate.

Apply anti-seize compound, Volvo P/N 1161035-9, to bolts.

Torque bolts to **20 Nm** = 15 ft.lbs.

H3

Assemble turbine housing, compressor housing and pressure actuator with bracket.

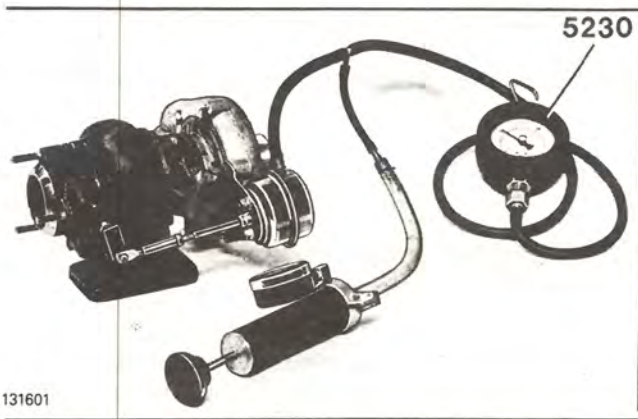
Install **new** gasket between compressor housing and bearing housing.
Apply anti-seize compound to bolts.
Housings must be turned to install all bolts.
Attach housings according to marks made when disassembling. Tighten bolts evenly all round.

Torques:

– turbine housing	**20 Nm** = 15 ft.lbs.
– compressor housing	**18 Nm** = 13 ft.lbs.

Special tools for torqueing:

– torque wrench	P/N 1158687-2
– open end wrench	P/N 1158961-1



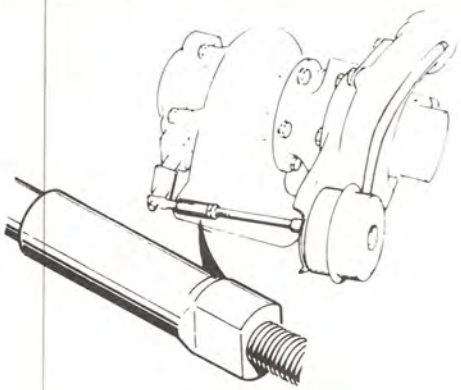
131601

H4

Adjust pressure actuator.

Connect pressure pump and pressure gauge to pressure actuator.
Pump pressure to **41 kPa** = 6 psi (non-intercooled models); or **57 kPa** = 8.1 psi (intercooled models). Push wastegate lever forward to wastegate closed position. Adjust rod end to fit precisely on lever pin. Install **new** lock ring. Tighten lock nut.

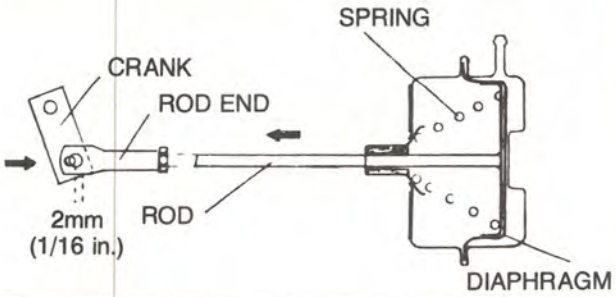
Disconnect pressure pump and pressure gauge. Connect and clamp hose to compressor. (See "Checking actuating rod clearance")



130851

NOTE!

Pressure actuator installed on early-production models cannot be adjusted. Sleeve is crimped to actuator rod.
If pressure actuator must be replaced, see instructions, section "Replacing pressure actuator" in this model.

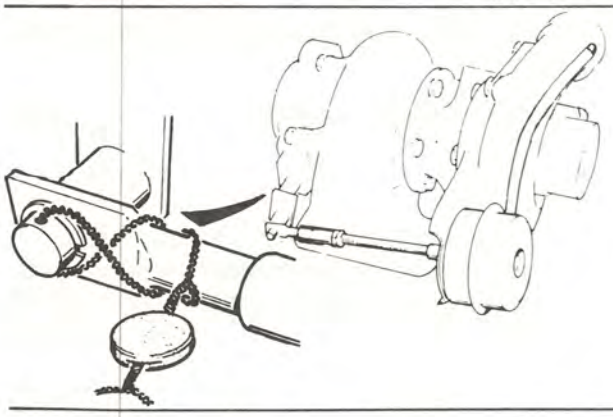


Checking actuating rod clearance.

IMPORTANT

A clearance of 2mm = 1/16 in. should be maintained between the diaphragm and the bottom of the actuator. To check, allow spring pressure to draw actuating diaphragm to rest against bottom of actuator (actuating rod disconnected). Adjust to obtain 2mm clearance as shown. Reconnect actuator rod and recheck pressure.

H5



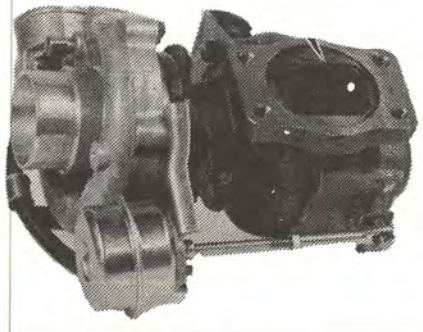
Anti-tamper seal.

It is important to wind wire* tight round actuator rod, as shown. Otherwise seal will loosen due to vibrations.

Volvo anti-tamper seal tongs, Part Number 998 6408-4, have "Volvo" stamped on grips. (anti-tamper seal, Part Number 998 5962-1)

**Use mechanic's wire*

H6



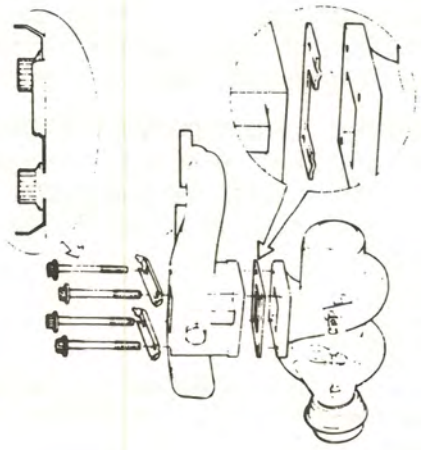
134250

Install oil return pipe.

Use **new** gasket. Make sure gasket hole does not restrict return oil flow.

Installing turbo-compressor

I1

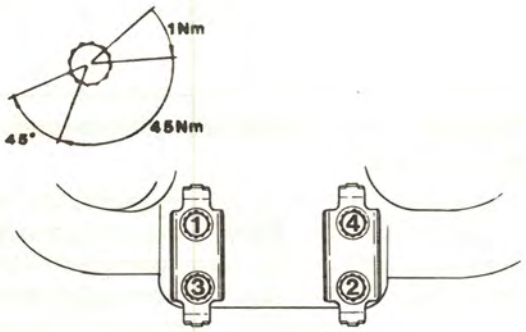


Assemble turbo-compressor and manifold.

Make sure no loose parts remain in turbo-compressor. Cover inlet and outlet holes.
Position gasket between manifold and turbo so that extension faces turbo.

Lubricate bolt threads and contact surfaces with rustproofing agent, Volvo P/N 282036-3.

I2

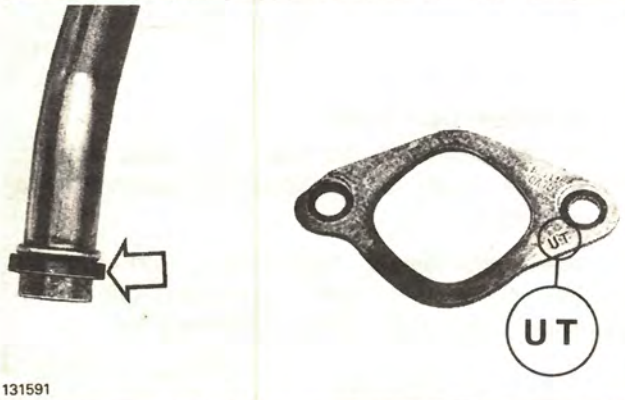


Torque bolts.

Use sequence shown in illustration and in three stages:

Stage 1	1 Nm	0.7 ft.lbs.
Stage 2	45 Nm	33 ft.lbs.
Stage 3	Additional 45°	

I3



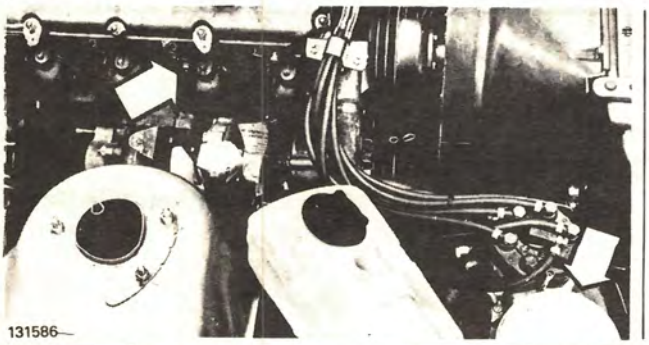
131591

Install turbo-compressor and manifold assembly.

Use new manifold gaskets, word "UT" away from engine.
Install new O-ring on oil return pipe. Lightly grease O-ring.

Lift return oil pipe into position. Guide it through hole in cylinder block. Make sure O-ring seats properly. Install one washer and nut to hold turbo-compressor and manifold assembly in position.

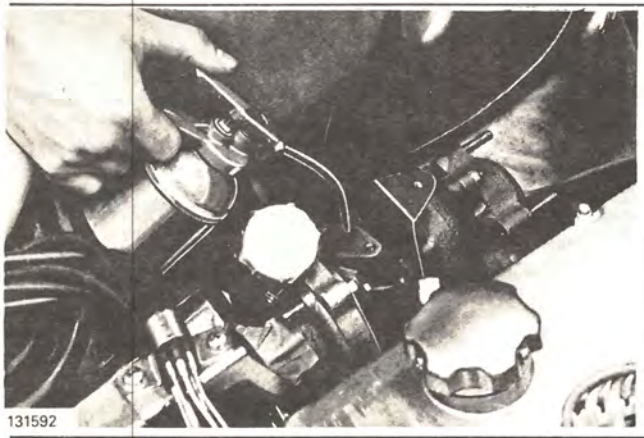
I4



131586

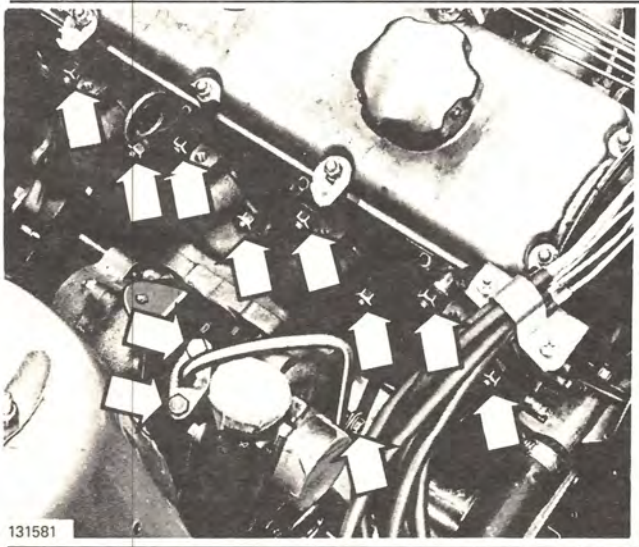
Install air/fuel control unit.

Install air cleaner filter. Attach air/fuel control unit.


131592

I5

Fill turbo-compressor oil inlet with oil.


131581

I6

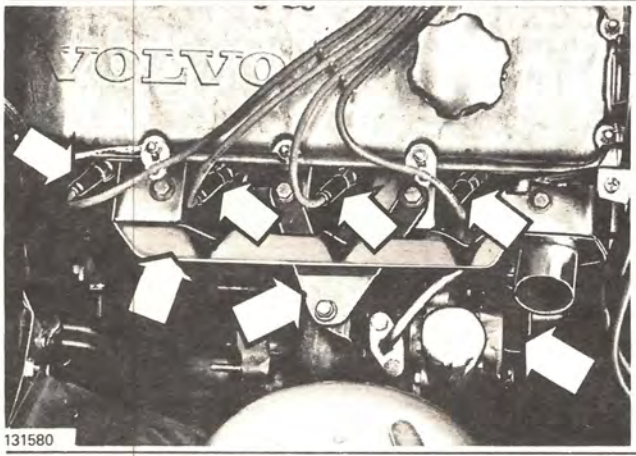
Install delivery oil pipe and manifold nuts.

Use new gaskets for delivery oil pipe and new manifold nuts.

Position delivery oil pipe. Install connection screw finger tight. Make sure no dirt enters pipe or clings to bolt.

Install manifold washers and nuts. Do not forget lifting eye. Make sure O-ring on oil return pipes is positioned properly.

Connect delivery oil pipe to turbo-compressor, use new seals. Install delivery oil pipe clamp. **Tighten connection for delivery oil pipe.**


131580

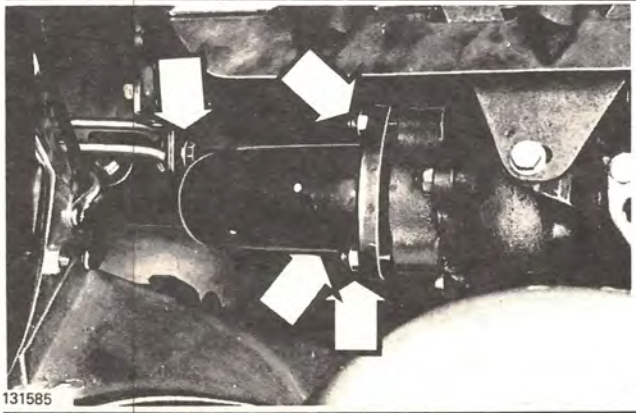
I7

Install.

Install upper and lower heat shields.

Install brace between manifold and turbo-compressor.

Connect high tension wires at spark plugs.

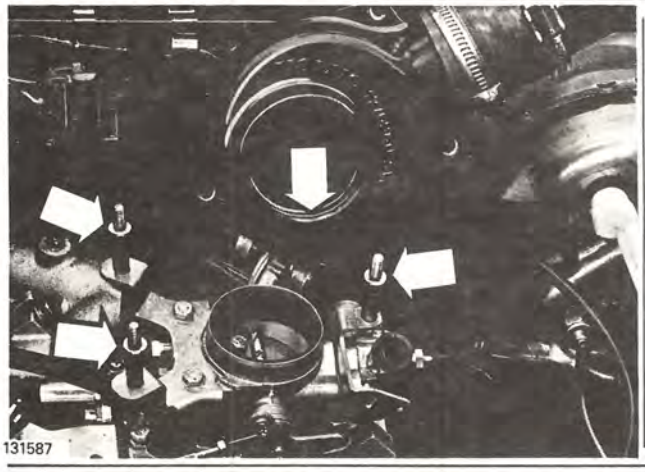

131585

I8

Install.

Connect exhaust pipe. Apply anti-seize compound, Volvo P/N 1161035-9, on studs. Torque to **25 Nm** = 18 ft.lbs.

Install transmission front mount.


131587

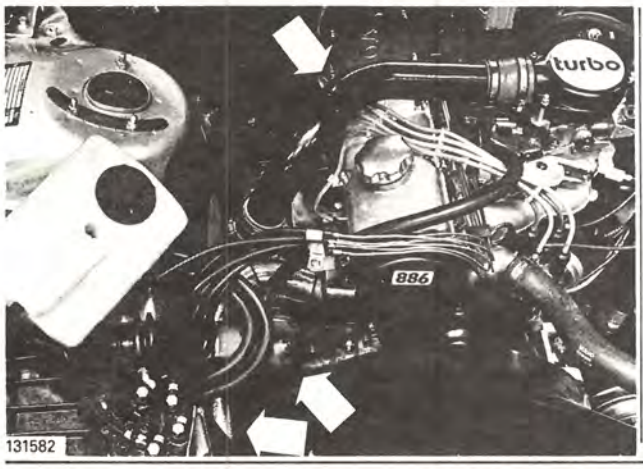
I9

Check.

Make sure throttle housing stud washers are correctly positioned.

Make sure O-ring seats correctly and is undamaged.

Make sure connecting hoses and pipes are in good condition and do not contain any loose particles. Replace hardened or cracked hoses.



131582

I10

Install.

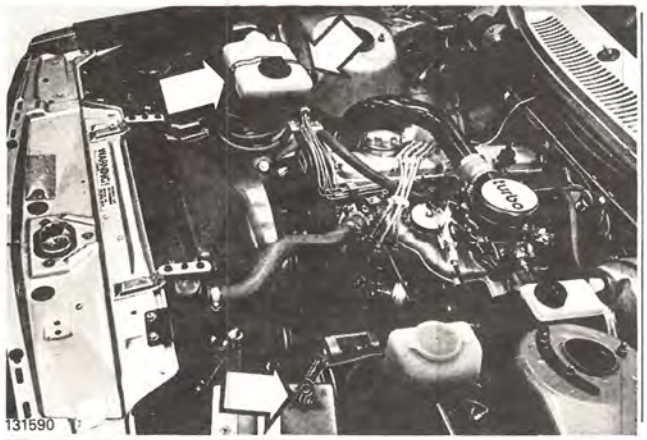
Install pipe and rubber bellows between air/fuel control unit and turbo-compressor. Connect hose for crankcase ventilation.

Install preheater hose to air cleaner.

Install pipe between turbo-compressor and intake manifold (non-intercooled models); or between turbo-compressor and intercooler (intercooled models). Make sure hoses, pipes and hose clamps are tight.

NOTE:

To reduce vibration of the turbo-compressor-to-intake-manifold pipe on early-production models, a bracket (P/N 1332063-5) and hose clamp (P/N 966656-1) may be installed atop the cramshaft cover.

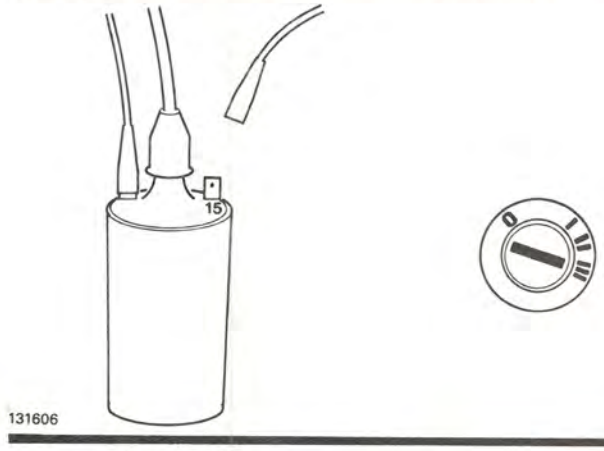

131590

I11

Install.

Install retainer for expansion tank and expansion tank.

Connect battery ground cable.



131606

I12

IMPORTANT:
Run starter motor.

Disconnect brown wire at terminal 15 on ignition coil. Run starter motor for approx 30 seconds to ensure that turbo-compressor receives lubricating oil.

Reconnect wire at terminal 15 on ignition coil.

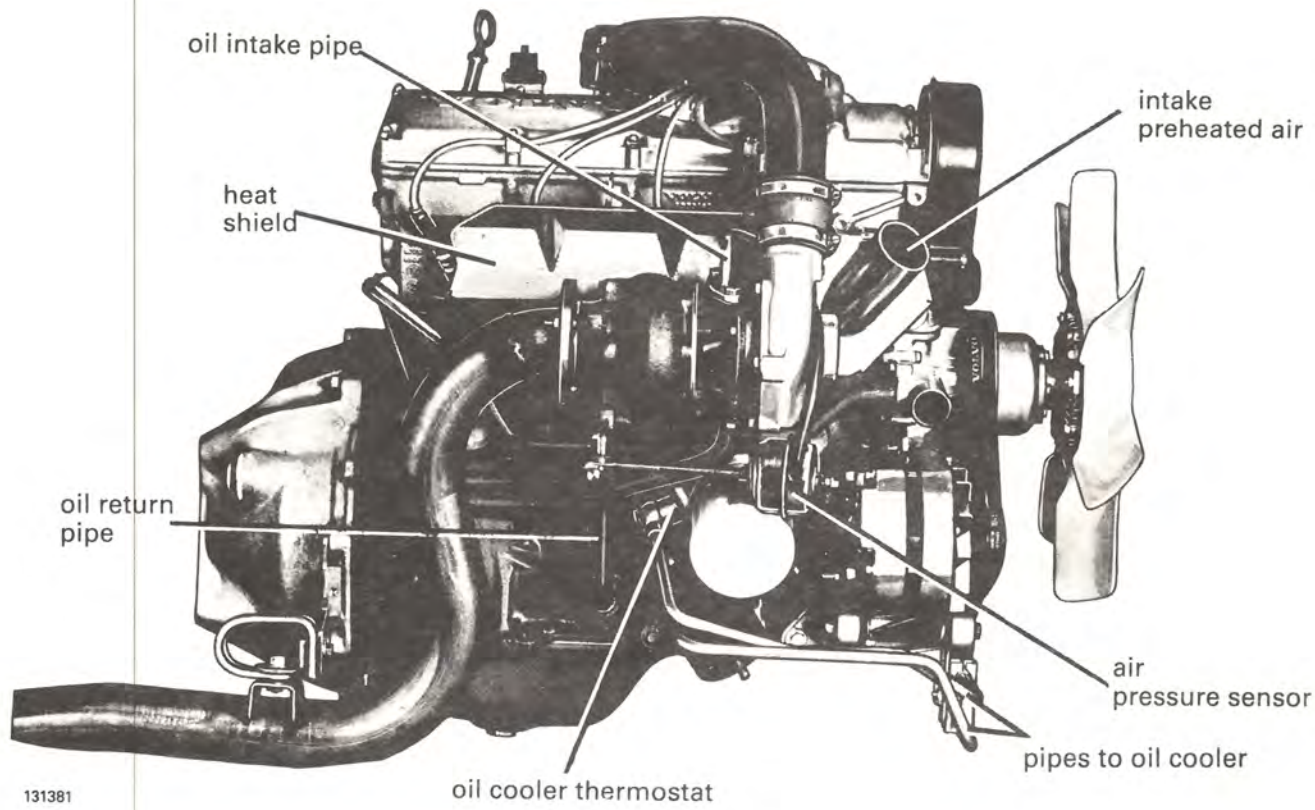
I13

Start engine.

Let idle for a while before increasing speed.

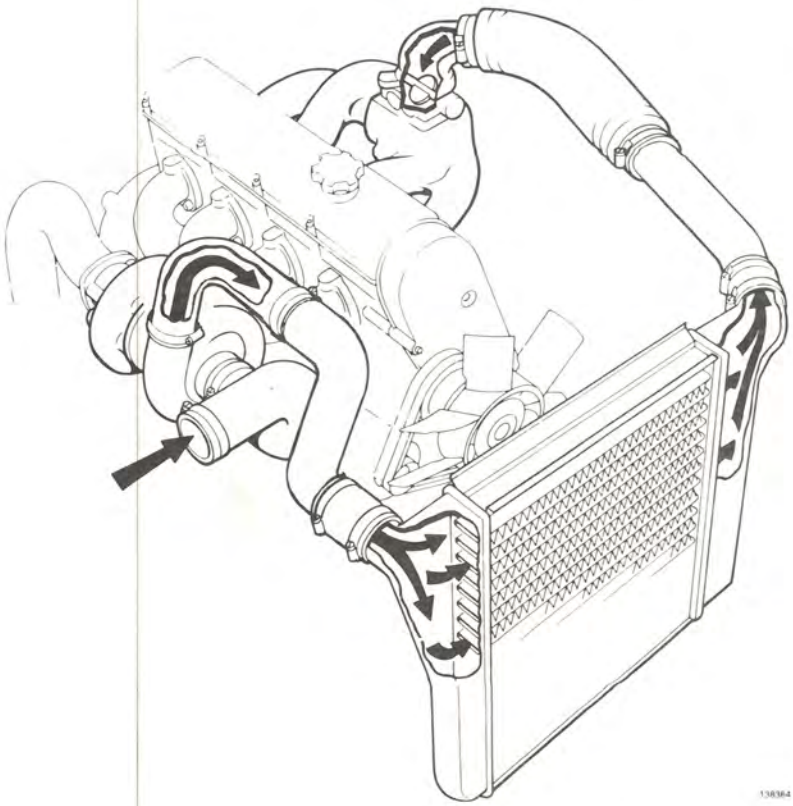
Non-intercooled Turbo Engine

(Catalytic converter not shown.)



131381

Intercooled Turbo Engine



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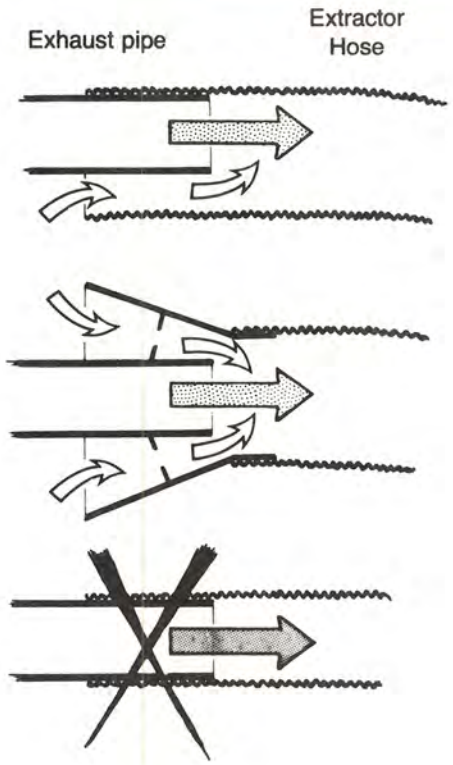


132083

Exhaust Extraction

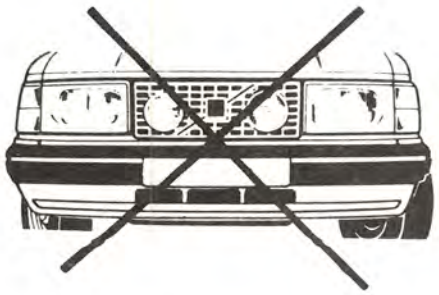
The following applies to turbo-engined cars connected to an extractor hose in the workshop:

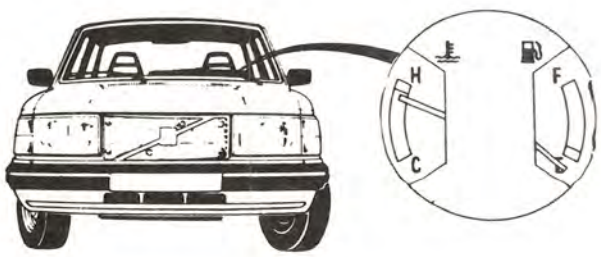
If very powerful exhaust gas extraction system is used, there is risk that oil will be drawn into the exhaust system past the turbo-charger gaskets.

This would cause the sound-damping material in the exhaust system to be soaked in oil, and cause blue exhaust smoke to be emitted from the exhaust for a long time. Such a condition could be misinterpreted as a turbo inner oil leakage and could result in unnecessary repairs.

Very powerful exhaust gas extraction systems can also lead to incorrect results when checking/ adjusting the CO level.

TO AVOID THESE POTENTIAL SITUATIONS USE AN EXTRACTOR HOSE WHICH DOES NOT CREATE A SEALED SYSTEM.





Turbo Engine Cooling

The heat generated by turbo engined vehicles is higher than by non-turbo engined vehicles. Good air flow through the radiator and oil cooler is therefore essential to obtain effective cooling.

Auxiliary lamps mounted in or in front of the grille will restrict the air flow and reduce the cooling ability.

Auxiliary lamps should therefore be mounted in or in front of the spoiler (air dam) on either side of the air intake.

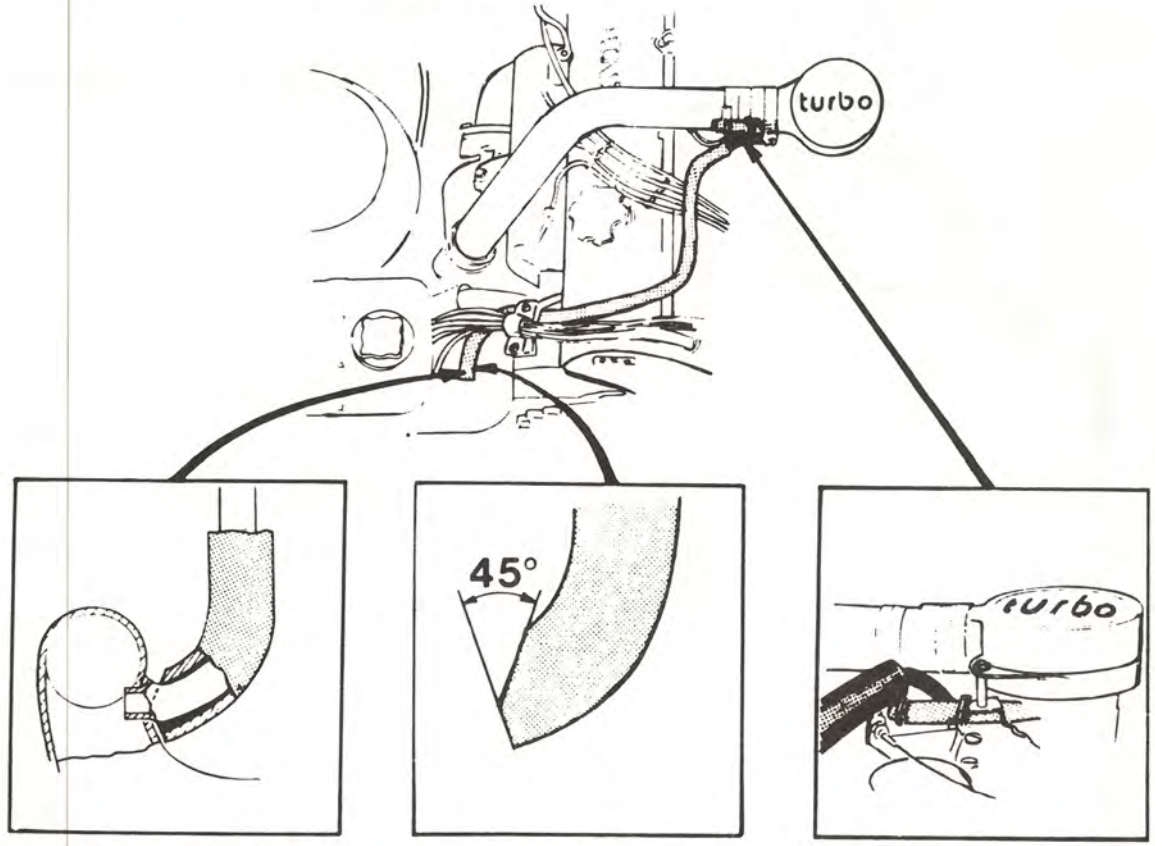
When radiator covers are used, it is important to keep a check on the coolant temperature and take care not to drive long distances at high coolant temperatures.

Crankcase ventilation hose Turbo (overpressure-vacuum leak)

An incorrectly fitted crankcase ventilation hose to the intake manifold can cause difficulties when starting. (The air-flow sensor plate does not lift.)

The crankcase ventilation hose kinks at the lower connection to the intake manifold with the result that an overpressure is formed in the crankcase. This blocks the oil return from the turbocharger which in turn causes oil to leak on to the turbocharger shaft seals.

It is therefore important to check that the hose is not kinked at the nipple on the oil trap, next to the cold start injector or between the fuel line bracket and the line elbow.



Press the crankcase ventilation hose up to the bottom of the union.

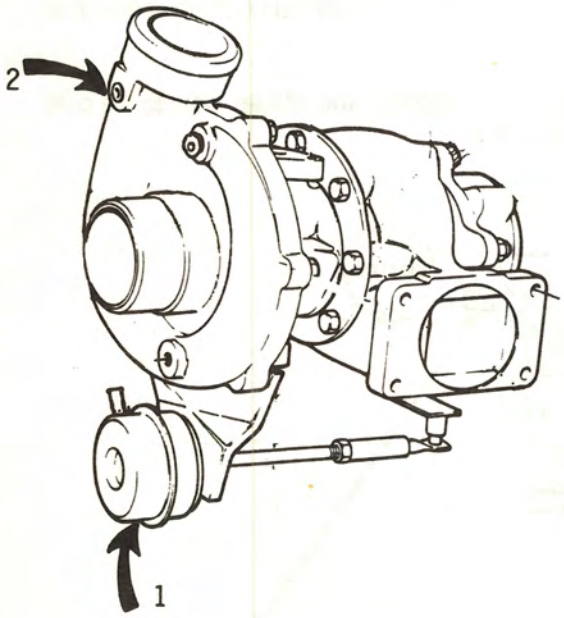
The heat insulation hose should then be fitted tightly to the elbow.

The heat insulation hose should be cut to half the diameter of the hose at a 45° angle.

The crankcase ventilation hose should be routed above the cold start injector.

Replacement of turbo-compressor in vehicle with dealer-installed intercooler kit

When replacing a turbocharger on a B21FT with dealer installed Intercooler Kit, the following parts must be transferred from the defective unit to the exchange unit.



1. Wastegate actuator

2. Plug on compressor housing.

Check and, if necessary, adjust boost pressure after installation.

Check value at 3,000 rpm, full load **50-58 kPa** (7.1-8.2 PSI).

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