

Service Manual

Section 2 (25–29)

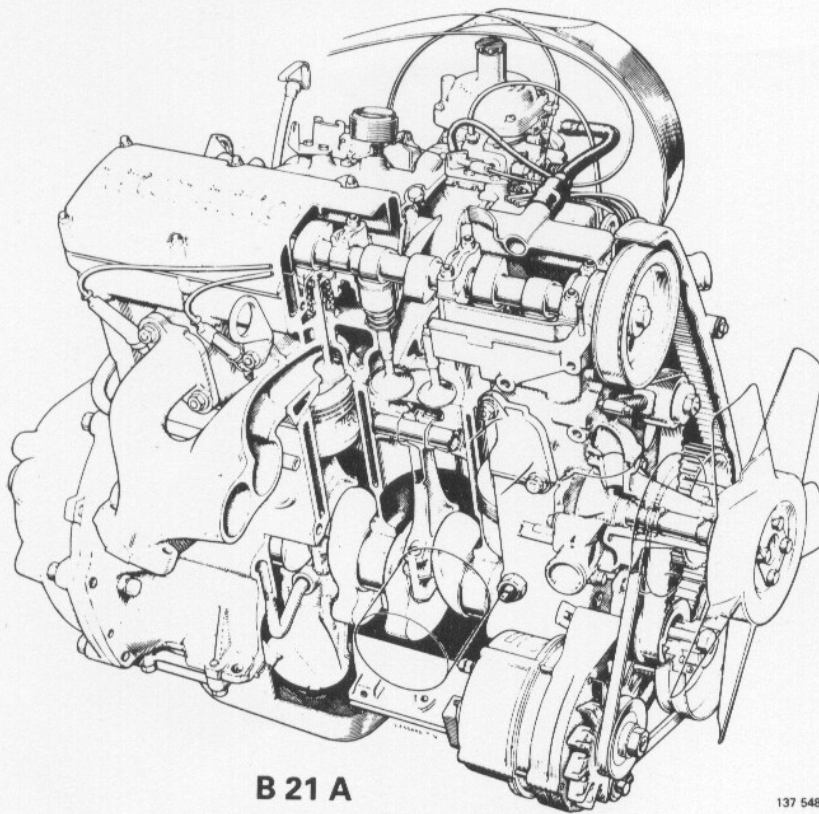
● Repairs
and maintenance

Engines B 17, B19,
B 21, B 23

240 1975–1985

VOLVO

B 17, B 19, B 21, B 23 engines

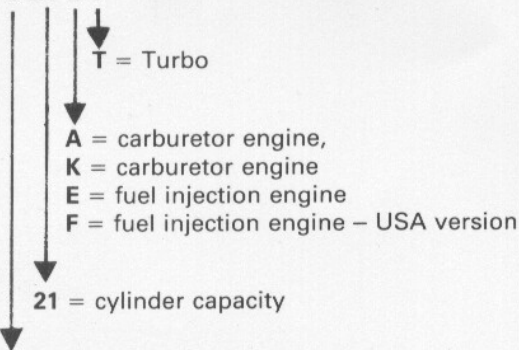


B 21 A

137 548

What do the designations mean?

B 21 E T



B 21 = basic engine

B 23 = a **B 21** with larger bore and higher compression ratio

B 19 = a **B 21** with smaller bore

B 17 = a **B 19** with shorter stroke

This manual covers the following engine types:

Engine type	Model year
B 17 A	1979–1984
B 19 A	1977–1984
B 19 K	1984
B 19 E	1977–1984
B 19 ET	1982–1984
B 21 A	1975–1984
B 21 E	1975–1983
B 21 ET	1981–1984
B 21 F-5 ¹	1976–1984 ³
B 21 F-8 ²	1982
B 21 F-9 ⁴	1981–1982
B 21 FT ⁵	1981–1985
B 23 A	1981–1984
B 23 E	1979–1984
B 23 F (LH-Jetronic)	1983–1984

Remarks

¹ B 21 F-5 = CI system with Bosch ignition system.

² B 21 F-8 = LH Jetronic injection system with Chrysler ignition system

³ Discontinued 1982 in USA & Canada.
Superseded by B 21 F-8.

⁴ B 21 F-9 = CI system with Chrysler ignition.

⁵ Intercooler introduced as a running change on 1984 models during the spring of 1984.

Volvos are sold in versions adapted for different markets. These adaptations depend on many factors including legal, taxation and market requirements.

This manual may therefore show illustrations and text which do not apply to cars in your country.

Contents

	Page
Important	2
Specifications	2
Special tools	6
Group 25 Intake and exhaust systems	7
Group 26 Cooling system	78
Group 27 Engine controls	92

Index page 102

Order No.: TP 30163/2

This book supersedes the following service manuals:

- Section 2 (25-29): Order No. TP 30163/1
- Section 2 (25): Order No. TP 30296/1

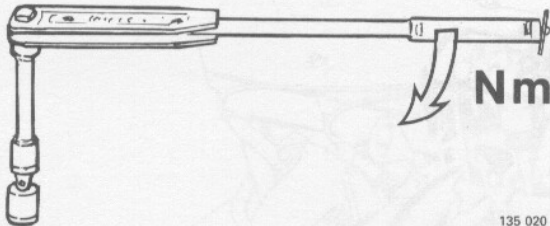
TP 30163/2

6000.2.85
Printed in U.S.A.

©1985, Volvo of America Corporation

We reserve the right to make modifications without prior notification

Important information



135 020

Torques

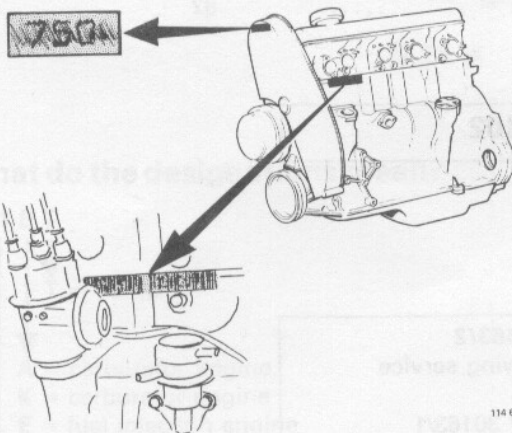
There are two types of torques specified in this book:

- I. Tightening torque **40 Nm (30 ft lb)** = given for parts which must be tightened with a torque wrench.
- II. Torque 40 Nm (30 ft lb) = nominal value, the parts need not necessarily be tightened with a torque wrench.

The specifications section includes torque only for those parts which must be tightened with a torque wrench.

Specifications

Group 20 General



Engine type designation, serial number, and part number

You will find this engraved on a plate on the left-hand side of the engine.

1977 models --: additional plate on timing gear cover, showing last three digits of part number.

Group 25 Intake and exhaust systems

TURBO ENGINES

Charge pressure

B 19/21 ET

	Checking	Setting
At 3,500 rpm full load	kPa 60–70 (lb/in ²) (8.5–9.9)	64–70 (9.1–9.9)

B 21 FT without intercooler

At 4,000 rpm full load	kPa 40–48 (lb/in ²) (5.7–6.8)	42–48 (6.0–6.8)
------------------------------	--	--------------------

B 21 FT with intercooler

At 3,000 rpm full load	kPa 50–58 (lb/in ²) (7.1–8.2)	55 (7.8)
------------------------------	--	-------------

Fuel enrichment

B 19/21 ET

Control pressure (warm engine) at zero charge pressure (idling) 345–375 kPa
(49–53 lb/in²)
at charge pressure 45 kPa (6.4 lb/in²) 265–295 kPa
(38–42 lb/in²)

B 21 FT

Pressure contact blocks the Lambda-sond system at a charge pressure of 20.3 kPa
(2.9 lb/in²)

Pressure sensor

B 19/21 ET

Cut-out pressure, approx. 85–95 kPa
(12.1–13.5 lb/in²)

B 21 FT

Cut-out pressure, approx. 65–75 kPa
(9.2–10.7 lb/in²)

B 21 FT with intercooler

Cut-out pressure, approx. 100–110 kPa
(14.2–15.6)

Ignition retardation

B 19/21 ET

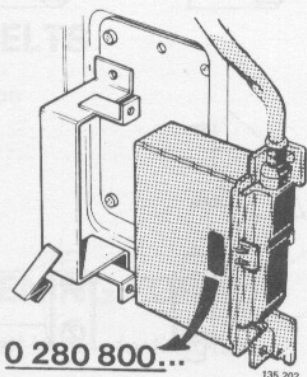
At charge pressure 30 kPa (4.3 lb/in²) 3–7°

B 21 FT

At charge pressure 36 kPa (5.1 lb/in²) 6–10°

LAMBDA-SOND SYSTEM

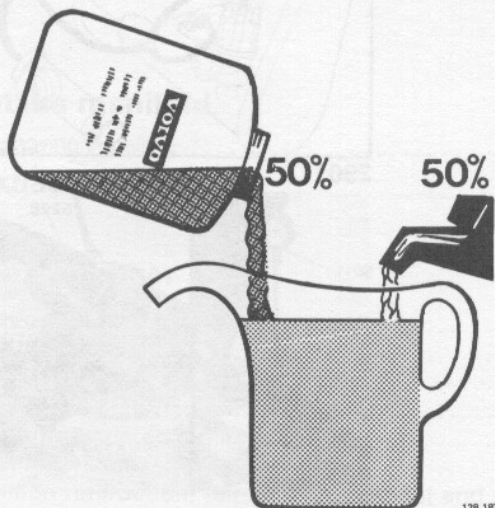
Control unit



Different control units are used depending on the year and engine type. These are identified by the number on the cover (last three figures).

Group 26 Cooling system

GENERAL



Since aluminum is used in the engines, active corrosion protection is necessary in the coolant to help prevent corrosion damage.

Use genuine Volvo coolant type C (**blue-green**) diluted with clean water in proportions of 50/50. This mixture helps to prevent corrosion and frost damage.

- Never top-up the cooling system with water alone. Use genuine Volvo coolant diluted with clean water in proportions of 50/50.
- The coolant should be changed regularly since the corrosion-protective additives in the coolant lose their effectiveness in time.

Capacity, manual gearbox	9.5 litres (10 US qts)
with automatic transmission	9.3 litres (9.8 US qts)

EXPANSION TANK

The pressure valve in the cap opens at:

excess pressure	65–85 kPa (9.2–12.1 lb/in ²)
partial vacuum	7 kPa (1.0 lb/in ²)

THERMOSTAT

	Model 1	Model 2	Model 3
Marking	82	87	97
Starts to open at	81–83°C	86–88°C	91–93°C
Fully open at	92°C	97°C	102°C

FAN BELTS

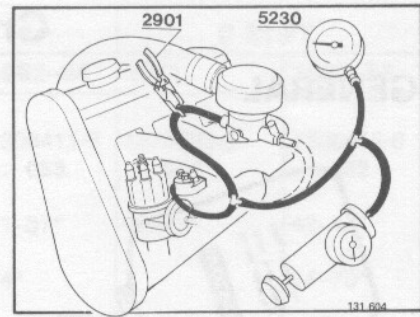
Designation	
model 1	HC 38x925
model 2	HC 38x913

TIGHTENING TORQUE

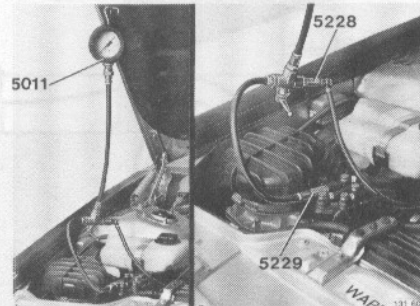
Fan bolt, self-locking for fixed fan	9 Nm (7 ft.lb)
--	----------------

Special tools

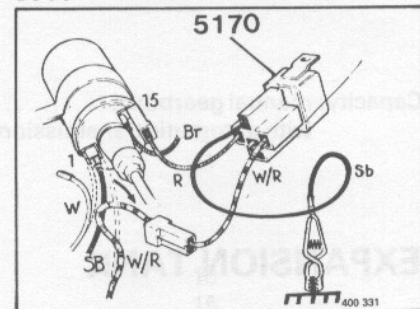
999	Description
2901-0	Tongs: for pinching hose
5011-5	Pressure gauge: for measuring control pressure
5015-6	Allen Key: for adjusting CO
5151-9	Connection: checking CO (Lambda-sond system)
5170-9	Test relay: checking the Lambda-sond system
5228-5	Nipple: for connecting 5011
5229-3	Nipple: for connecting 5011
5230-1	Pressure gauge: for measuring charge pressure etc.
5250-9	Key: removing/installing Lambda-sond.



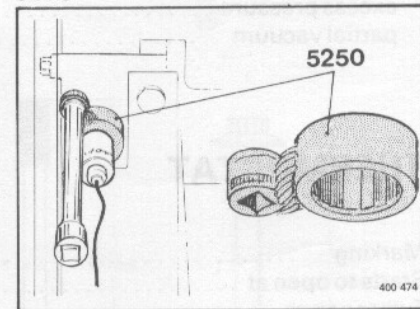
2901



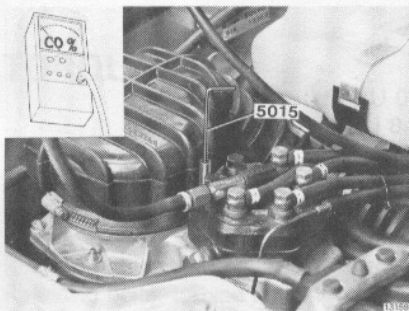
5011



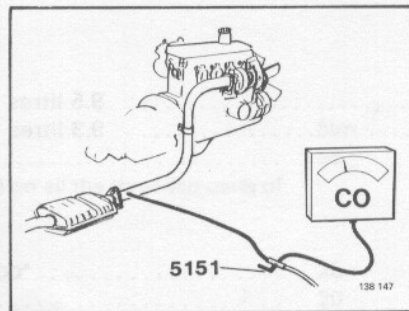
5170



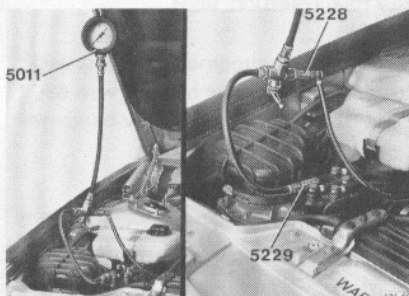
5250



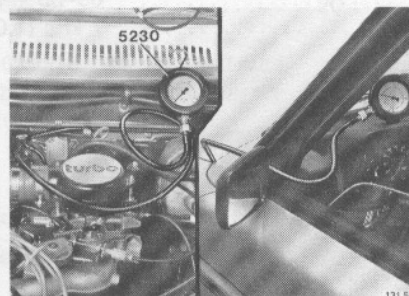
5015



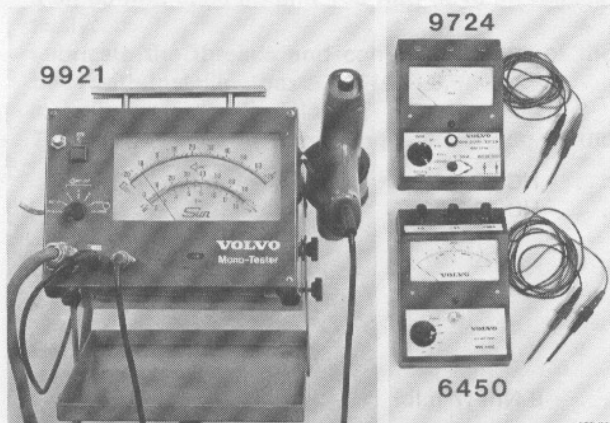
5151



5228, 5229



5230



For trouble-shooting of the Lambda-sond system the following items are also needed:

- rev counter and dwell meter, for example Volvo Mono-Tester 999 9921-1
- Ohmmeter, for example Volvo ohmdiode meter 999 9724-0
- Test lamp and voltmeter, for example Volvo Volt-Amp meter 999 6450-4.

Group 25 Intake and exhaust systems

	Operation	Page
Intake manifold		
Removing/installing	A1-9	8
Exhaust manifold	B1-3	12
Turbocharger		
Important information	C1-4	13
Trouble-shooting	D1	14
Routing of fuel lines	E1	15
Charge pressure, checking/adjusting	F1-9	16
Pressure actuator, replacement	G1-4	18
Control system for charge pressure	H1-10	19
Ignition retardation, full-load enrichment and pressure sensor		
B 19/21 ET	I1-8	22
B 21 FT	J1-7	24
Wastegate, replacing	K1-9	26
Modifications	L1-6	28
Quick check	M1	30
Removing, cleaning/checking, installing	N1-40	30
Clips, pressure hoses	O1-2	40
Installing mounting bracket on earlier models	P1-12	41
Exhaust pipe and muffler	Q1-2	44
Crankcase ventilation	R1-9	45
Catalytic converter	S1-3	48
Air pump	T1-6	49
Pulsair system	U1-7	51
Exhaust gas recirculation (EGR)		
On/off system	V1-11	53
Stepless system, A engines	X1-3	56
F engines model 1	Y1-14	57
E/F engines, models 2 & 3	Z1-11	61
Cleaning (all systems)	AA1	64
Resetting warning lamp (F engines)	AB1	65
Lambda-sond system		
Positioning of components	AC1	66
Connection of vacuum hoses	AC2	67
Wiring diagram	AC3	67
General	AC4-5	68
Fault symptoms	AC6	69
Trouble-shooting (checking the system)	AC7-42	69
Lambda-sond, checking/replacing	AD1-3	77

A. Intake manifold

Removal

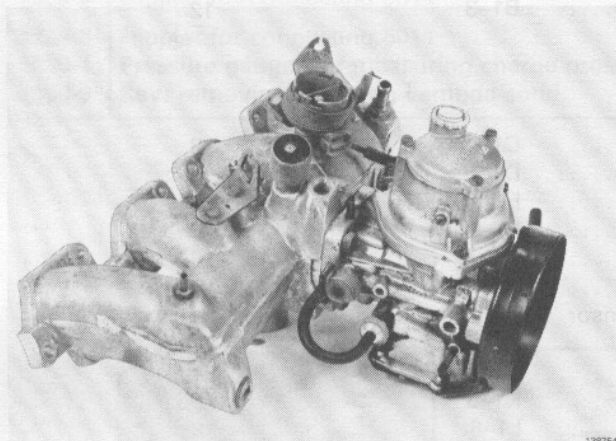
A1

Drain the coolant

The level must be below the inlet pipe.

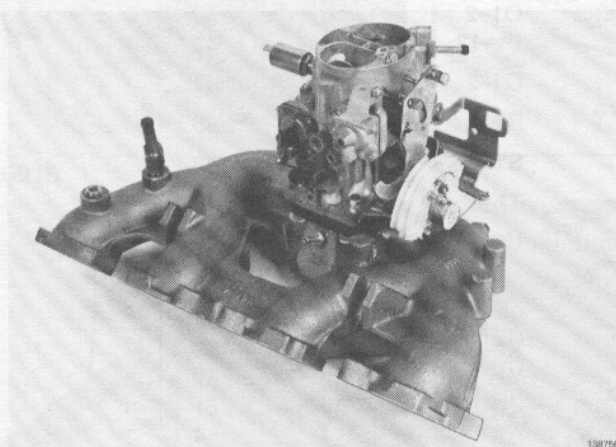
A2

Remove the inlet pipe



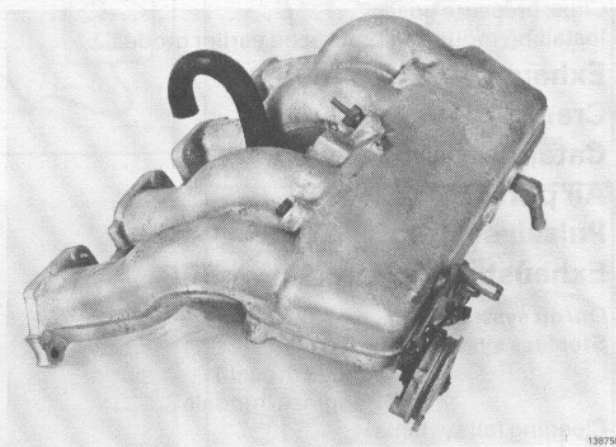
138754

A engines



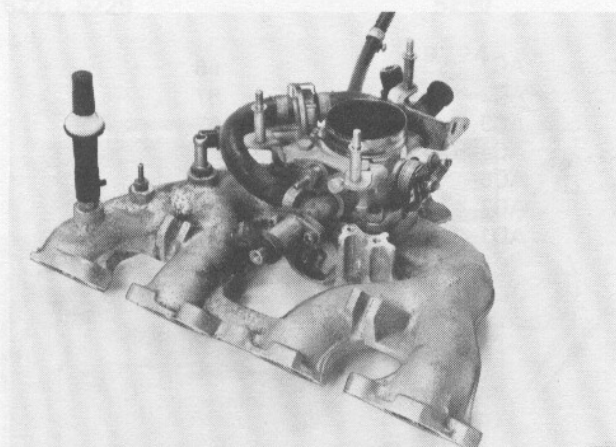
138756

K engines



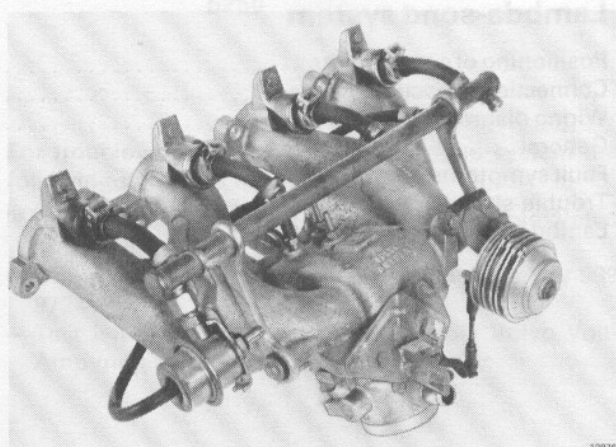
138758

E/F engines



138760

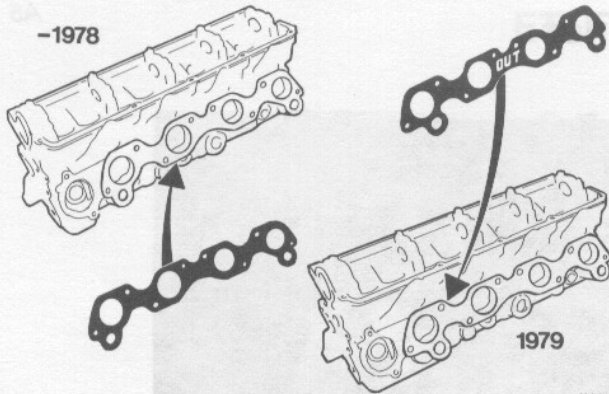
ET/FT engines



138762

F engines with LH jetronic fuel system

A3

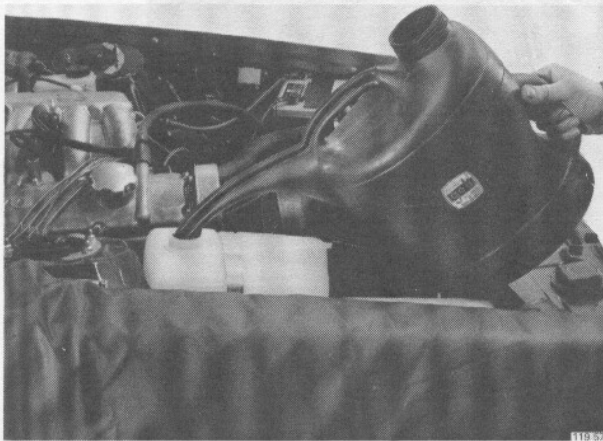


Installing

Use new gaskets. **NOTE!** Early- and late-production types. The early production version is not reversible and must be fitted with the OUT marking facing outwards (see illustration). On the late production cylinder head (1979-) only a late production gasket can be used.

NOTE!

New inlet pipes of latest models have some unthreaded holes. Use self-tapping bolts in these holes.



Installing the inlet pipe

Operation

A engines, see	A4
K engines, see	A5
E/F engines, see	A6
ET/FT engines, see	A7
F engines with LH-jetronic fuel system	A8

A9

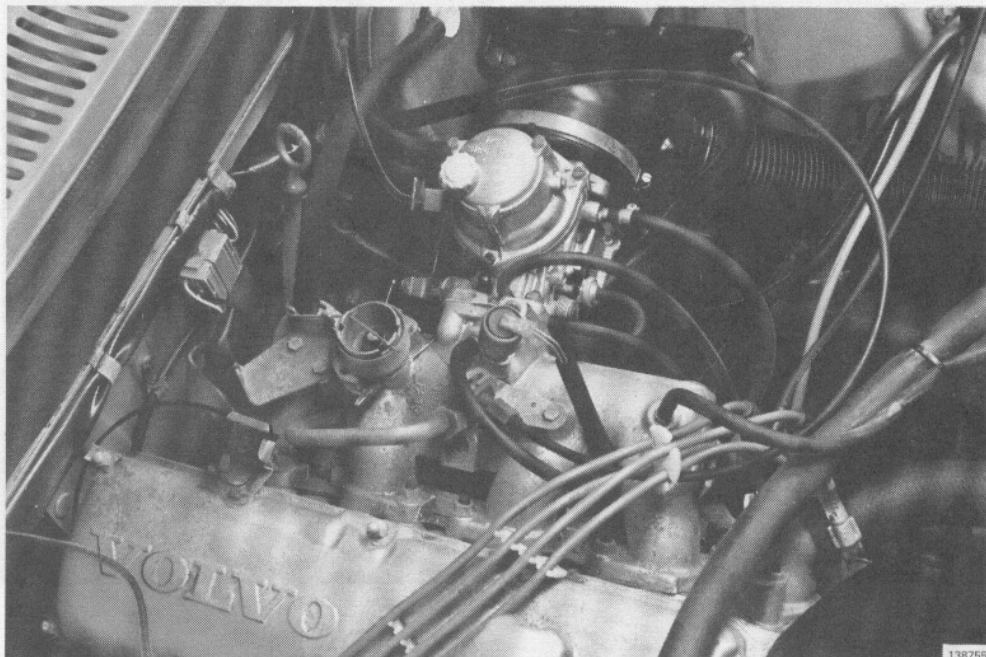
Fill with coolant

Close the cock on the lefthand side of the engine. Fill the expansion tank up to max. with genuine Volvo coolant, diluted with clean water. Mixing proportion: 50/50.

Run the engine until warm, check for leakage and, if necessary, top up with coolant.

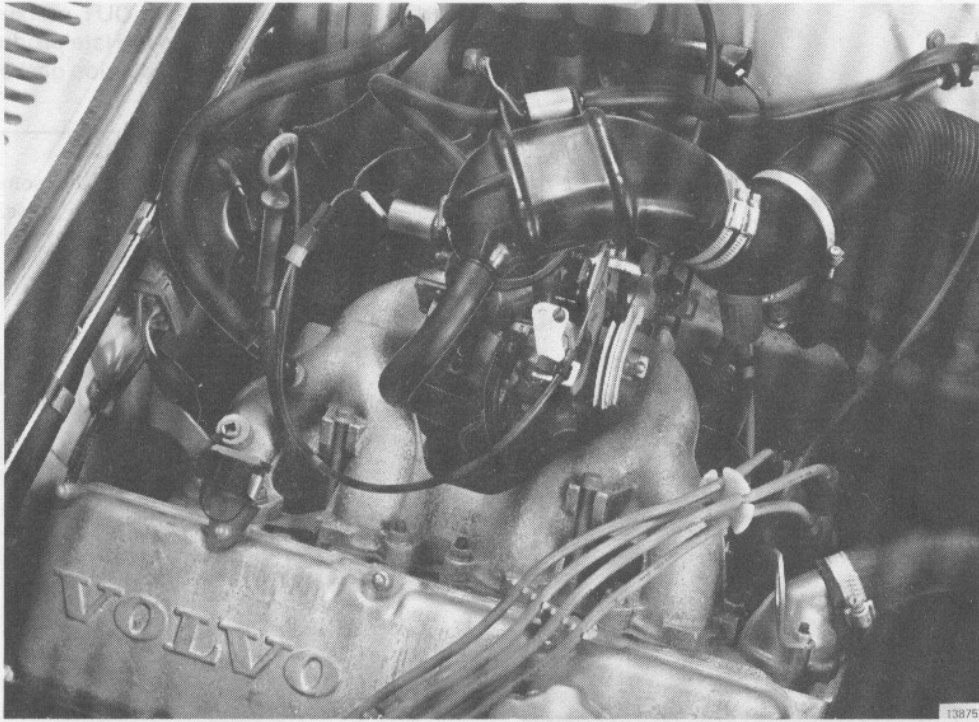
A engines

A4



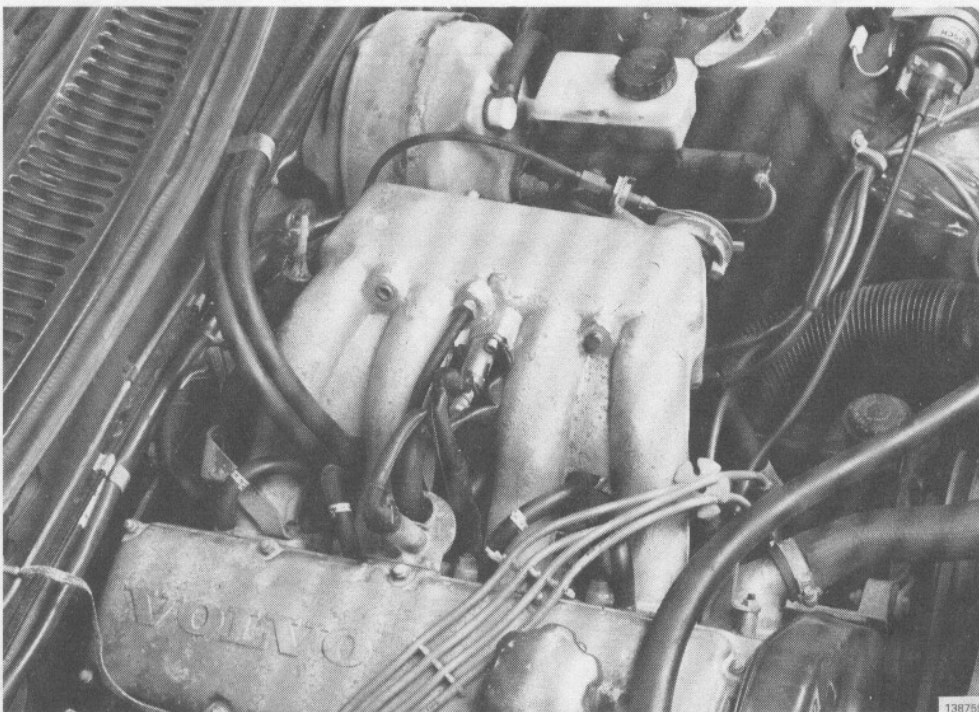
K engines

A5



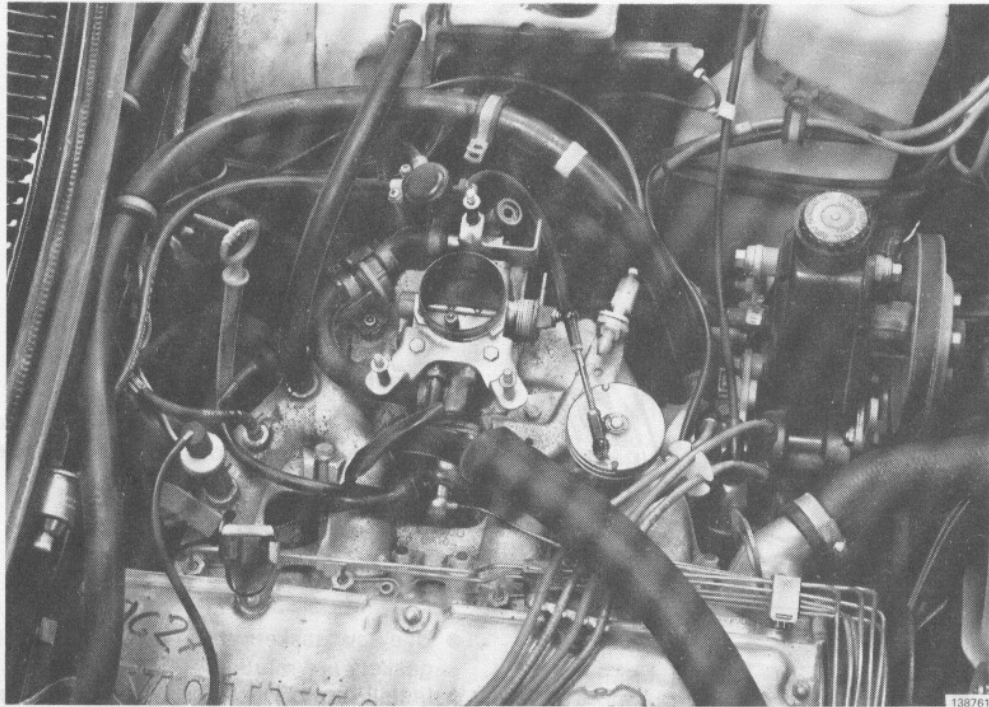
E/F engines

A6



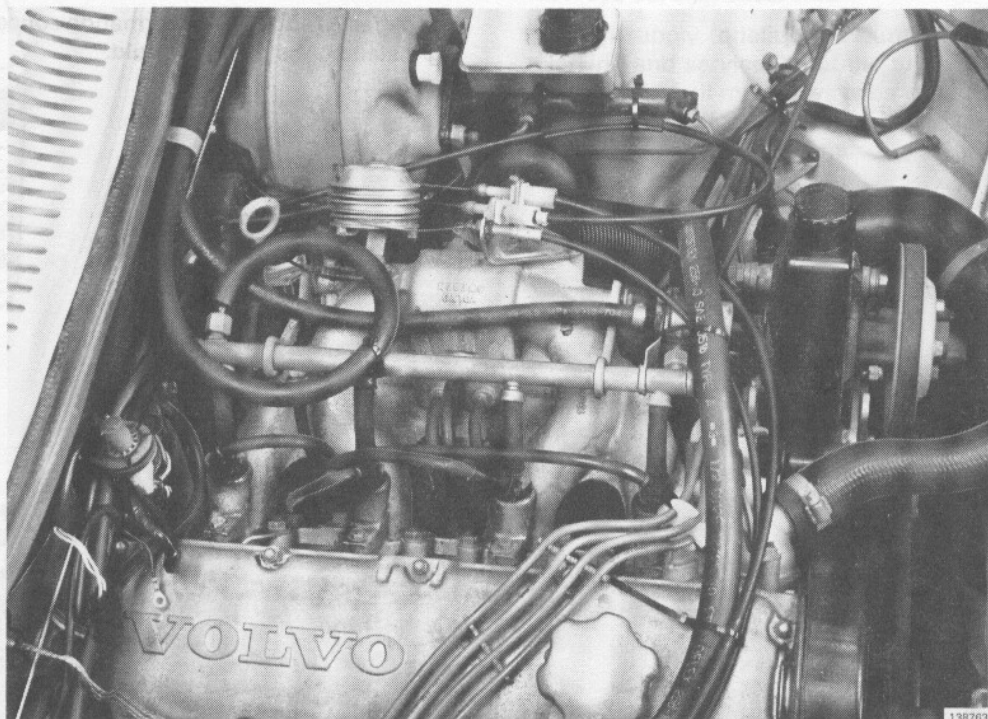
ET/FT engines

A7

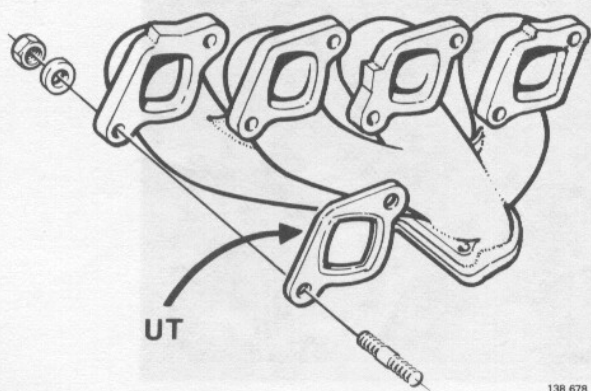


F engines with LH jetronic fuel system

A8



B. Exhaust manifold



B1

Removing

- Remove the exhaust pipe from the manifold.
- Remove the manifold from the cylinder head.

B2

Installing

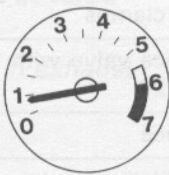
- Use new gaskets when installing. The outside of the gaskets are marked "UT".
- Install the manifold on the cylinder head.
- Install the exhaust pipe on the exhaust manifold.

B3

Turbo engines

See pages 30 and 36 for information concerning removing/installing exhaust manifold.

C. Turbo, important information



C1

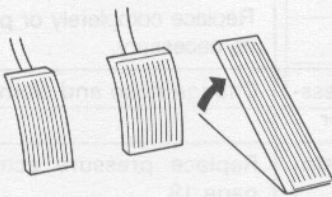
Never race an engine directly after start

Allow it to idle for a while to ensure the turbocharger is lubricated.

C2

Allow the engine to idle before switching off

If the engine is switched off at high revs the turbocharger will rotate for a long time without lubrication. Idling for a short time before switching off also helps to reduce turbocharger temperature.

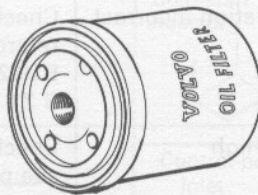
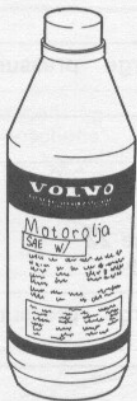


131 618

C3

Ensure oil and filter changes are carried out at the correct service intervals

The oil supply (quality and purity) is essential to the working and service life of the turbocharger. The correct grade of oil must always be used and precautions taken to prevent the ingress of dirt etc. into the oilways during servicing operations.

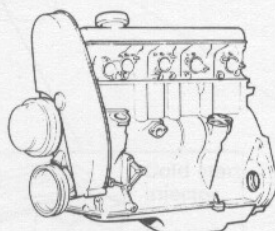


131 620

C4

Do not use sealers when repairing the engine

If a sealant is used it may enter the lubrication system and block the oilways to the turbocharger.



131 623

D. Turbo, trouble-shooting

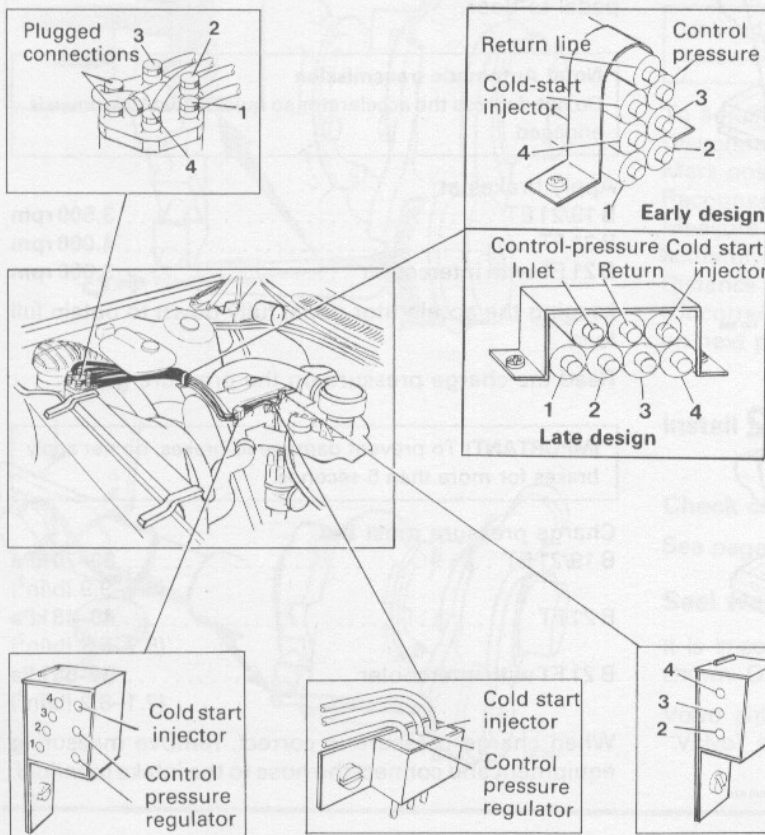
Fault <i>Symptom</i>	Reason	Check/remedy
Charge pressure too low <i>Low output</i> <i>Boost pressure gauge reading low</i>	Air cleaner clogged	Replace air cleaner insert
	Throttle control incorrectly adjusted	Adjust
	Engine fault (low compression, incorrect valve clearance, poor fuel supply)	Check and 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 valve stuck in open position (fully or partly)	Replace valve with housing, see page 26
	Exhaust system partly blocked	Replace
	Charge pressure incorrectly adjusted	Check/adjust charge pressure, see page 16
Charge pressure too high <i>The engine knocks at high output</i> <i>Boost pressure gauge pointer moves into red sector</i> <i>Pressure sensor cuts out (engine stops)</i>	Turbocharger faulty	Replace completely or partially as necessary.
	Leakage in hose between compressor housing and pressure actuator	Change hose and clamps
	Pressure actuator (diaphragm) damaged	Replace pressure actuator, see page 18
	Wastegate valve stuck in closed position	Replace relief valve with housing, see page 26
Engine knocks	Charge pressure incorrectly adjusted	Check/adjust charge pressure, see page 16
	Fuel not suitable, (octane too low)	Change fuel
	Ignition setting/retardation incorrect	Check/adjust ignition setting & retardation. B19/21 ET, see page 22 B 21 FT, see page 24
Metallic noise from wastegate valve	Charge pressure too high	Check/adjust charge pressure, see page 16
	Preheating plates loose or cracked	Replace, tighten
	Housing for wastegate or exhaust pipe loose	Tighten
	Wastegate valve loose in guide	Replace valve with housing, see page 26

Continued on next page

Fault Symptom	Reason	Check/remedy
Noise or vibrations from turbocharger	Preheating plates loose or cracked	Replace, tighten
	Leakage in intake or exhaust system	Tighten loose connections, replace gaskets, seals etc.
	Poor lubrication of turbocharger	Check oil pressure and oil flow to turbo. If fault remains after remedial measures, replace turbo
	Imbalance on turbo shaft, turbine wheel or compressor wheel because of damage	Replace turbo
Oil leakage at turbo shaft seals <i>Oil smoke in exhaust gases</i>	Air cleaner clogged (oil leakage on inlet side gives white smoke)	Replace air cleaner insert
	Exhaust system loose or leaking	Tighten or replace system
	Excessive pressure in crankcase	Clean crankcase ventilation, see page 45 Check the crankcase ventilation hose, see page 46
	Return oil pipe clogged	Clean the return oil pipe
	Turbo shaft seals damaged	Replace turbocharger

E. Turbo, routing of fuel lines

E1



Clean the connections carefully before loosening the lines. Make sure that the lines do not rub against anything.

F. Turbo, charge pressure, checking/adjusting

Special tool: 5230

Important! Excessively high charge pressure can cause serious damage to engine.

F1

Disconnect the solenoid valve
(Applies only to B 21 FT with intercooler)

Separate the connector.

F2

Connect test equipment

Connect pressure gauge **5230** between charge air over-pressure switch hose and nipple on intake manifold.

Place pressure gauge on dashboard.

F3

Run engine until warm

(Test drive).

F4

Measure charge pressure

Drive in third gear (second gear with automatic transmission) at approximately 1,500 rpm.

Accelerate to full throttle by depressing the accelerator pedal to floor.

Note! Automatic transmission

Do not depress the accelerator so quickly that kick-down is engaged.

Apply brakes at:

B 19/21 ET	3,500 rpm
B 21 FT	4,000 rpm
B 21 FT with intercooler	3,000 rpm

keeping the accelerator pedal fully down to obtain full load.

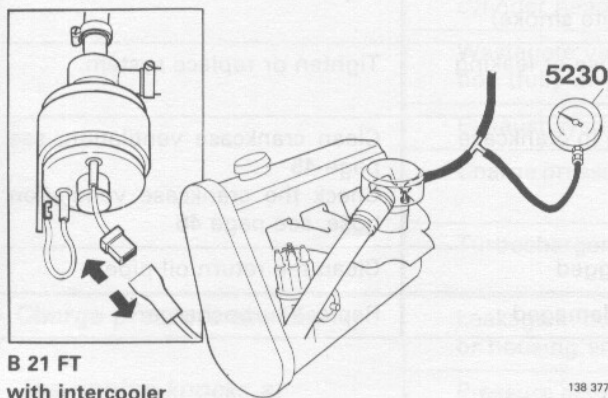
Read the charge pressure on the pressure gauge.

IMPORTANT! To prevent damage to brakes, do not apply brakes for more than 5 seconds.

Charge pressure must be:

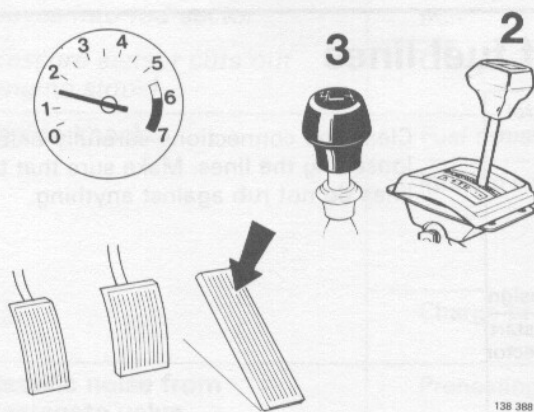
B 19/21 ET	60–70 kPa (8.5–9.9 lb/in ²)
B 21 FT	40–48 kPa (5.7–6.8 lb/in ²)
B 21 FT with intercooler	50–58 kPa (7.1–8.2 lb/in ²)

When charge pressure is correct, remove measuring equipment and connect the hose to the intake manifold.

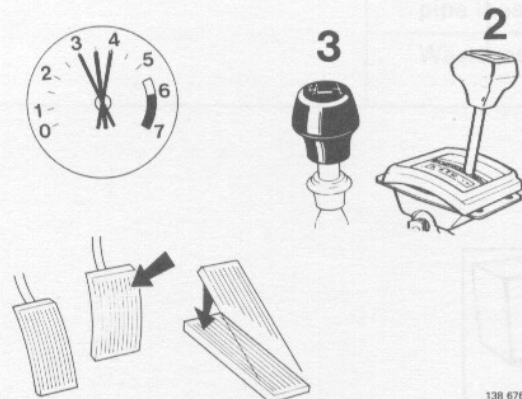


B 21 FT with intercooler

138 377



138 388



138 676

Adjusting charge pressure

Operation F5-9

Note! Wastegate actuator of early design cannot be adjusted. It is sealed by riveting the adjusting sleeve to the link rod. If faulty, the actuator must be replaced; see page 18.

F5

Adjust charge pressure

Remove the seal and the circlip. Adjust pressure by turning the sleeve on the link rod.

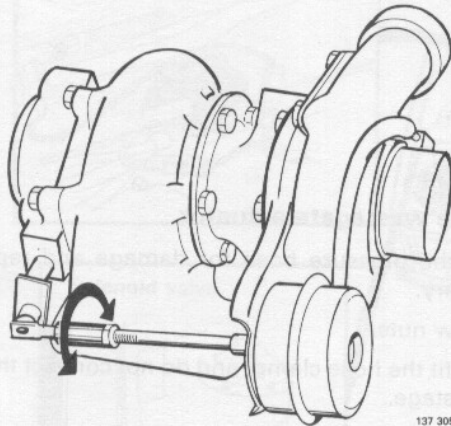
IMPORTANT! Do not turn the link rod as this may damage the diaphragm in the actuator.

One turn of the sleeve gives a pressure change of approx. 2 kPa (0.3 lb/in²).

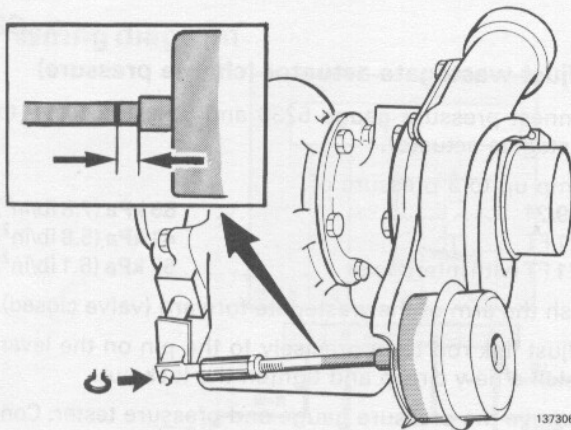
If the sleeve is turned:

- in, the charge pressure increases
- out, the charge pressure decreases.

B 19/21 ET	64-70 kPa (9.1-9.9 lb/in ²)
B 21 FT	42-48 kPa (6.0-6.8 lb/in ²)
B 21 FT with intercooler	55 kPa (7.8 lb/in ²)



137 305



137 306

F6

Check basic position of link rod

Link rod travel must be between 2-6 mm (0.08-0.24 in) to obtain correct operating function.

To adjust:

- Disconnect rod sleeve from lever.
- Mark position of rod at wastegate actuator.
- Reconnect sleeve to lever.
- Measure distance between mark and wastegate actuator.
- Distance = **2-6 mm** (0.08-0.24 in).
- If incorrect, replace wastegate actuator, see instructions on next page.

F7

Install new circlip

F8

Check charge pressure

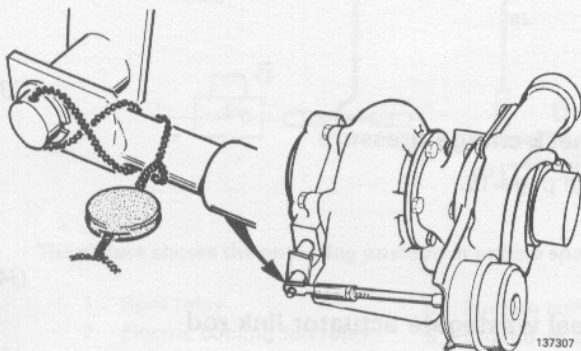
See page 16.

F9

Seal wastegate actuator

It is important to wind wire tightly around the sleeve as shown. Otherwise seal will loosen due to vibrations.

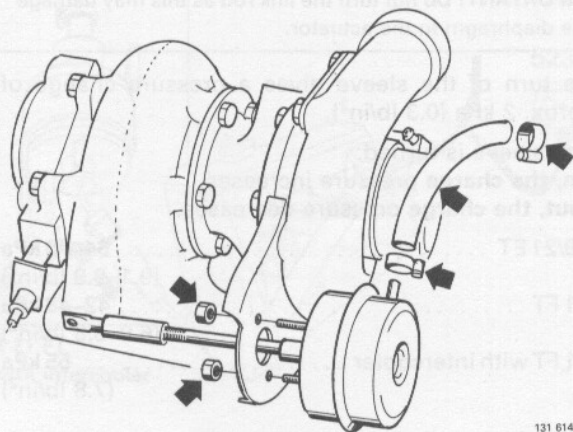
Volvo anti-tamper seal tongs, part No. 9986408-4 have "Volvo" stamped on grips.



137 307

G. Turbo, replacement of wastegate actuator

Special tool: 5230



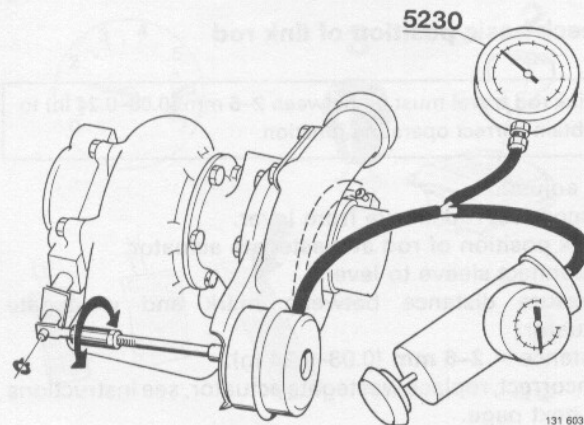
G1

Replace wastegate actuator

Check the pressure hose for damage and replace if necessary.

Use new nuts.

Do not fit the hose clamp, and do not connect the hose at this stage.



G2

Adjust wastegate actuator (charge pressure)

Connect pressure gauge 5230 and pressure tester to wastegate actuator.

Pump up to a pressure of:

B 19/21	55 kPa (7.8 lb/in ²)
B 21 FT	41 kPa (5.8 lb/in ²)
B 21 FT with intercooler	57 kPa (8.1 lb/in ²)

Push the arm of the wastegate forward (valve closed).

Adjust link rod to fit precisely to the pin on the lever. Install a new circlip and tighten the lock nut.

Remove the pressure gauge and pressure tester. Connect the pressure hose (hose clamp).

G3

Check charge pressure

See page 16.

G4

Seal wastegate actuator link rod

See page 17.

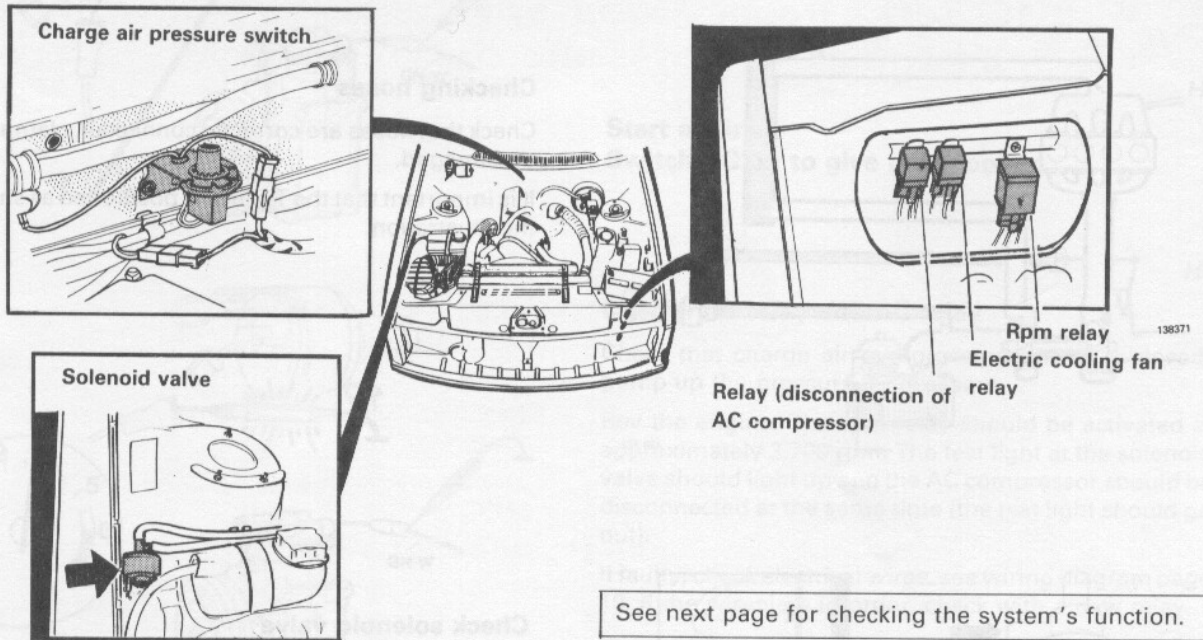
H. Control system for charge pressure

Only B 21 FT with intercooler

Special tool: 5230

Positioning of components (factory-installed intercooler)

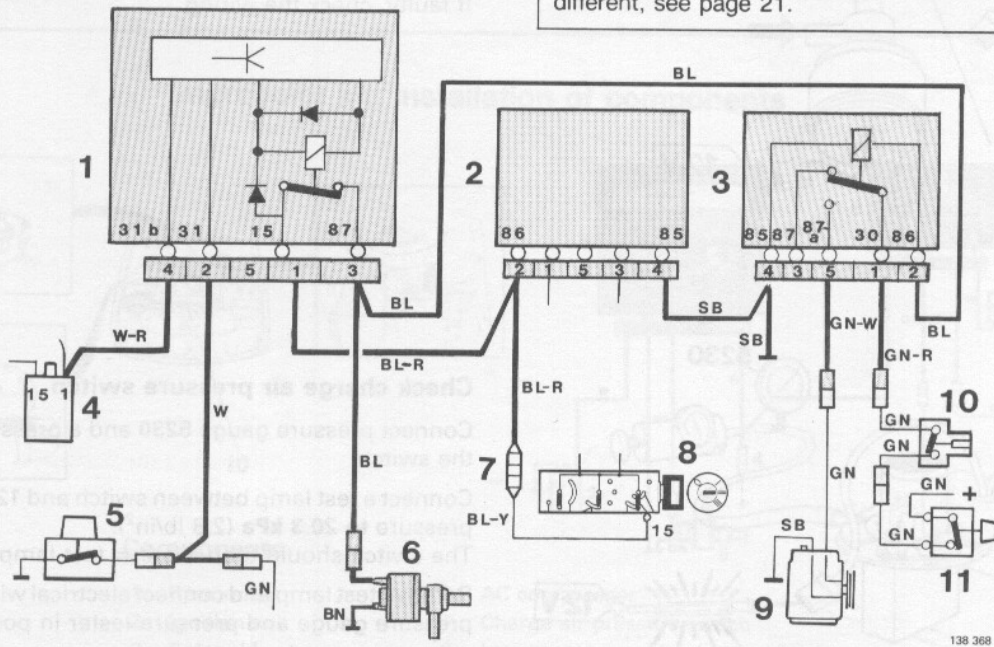
H1



See next page for checking the system's function.

Wiring diagram

NOTE! On cars equipped with intercooler kits the electrical connections and placing of the components are different, see page 21.

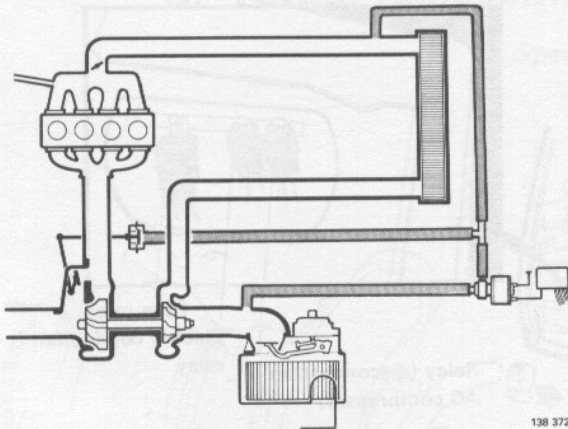


The picture shows the operating position at engine speeds exceeding 3,700 rpm and charge pressure exceeding 20 kPa (2.8 lb/in²)

- | | | | |
|--|------------------------------|-----------------|-----------------------------------|
| 1 Rpm relay | 4 Ignition coil | 7 Fuse No. 13 | 10 Low pressure switch (in dryer) |
| 2 Electric cooling fan relay | 5 Charge air pressure switch | 8 Ignition | 11 Switch (circuit closed) |
| 3 Relay (disconnection of AC compressor) | 6 Solenoid valve | 9 AC compressor | |

Checking system function

Operations H3-9

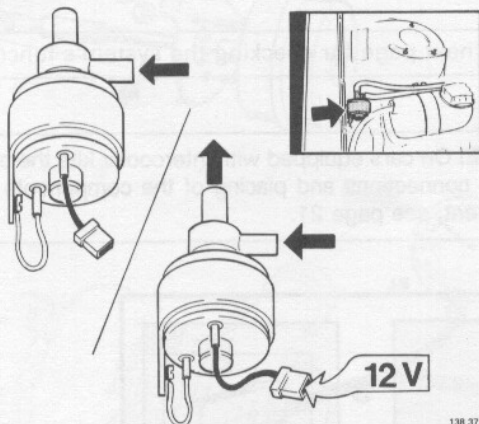


H3

Checking hoses

Check that hoses are correctly connected, clamped and undamaged.

It is important that the T-piece is positioned as shown in the illustration.

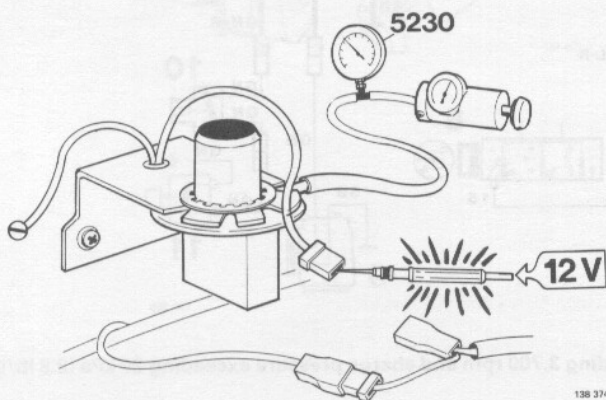


H4

Check solenoid valve

Check function of valve by blowing through it. Normally the valve should be closed.

Connect 12 V to the valve. The valve should then open. If faulty, check the wiring.



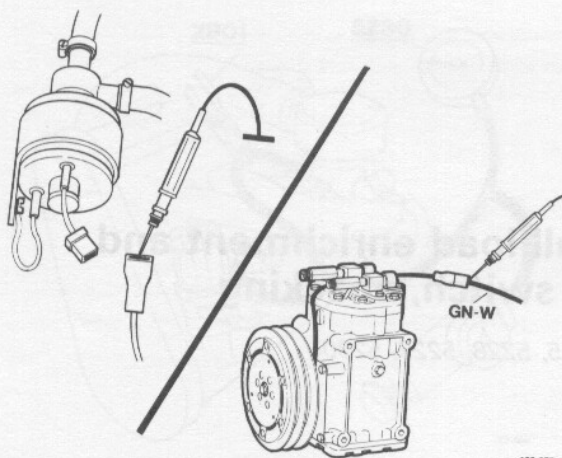
H5

Check charge air pressure switch

Connect pressure gauge **5230** and a pressure pump to the switch.

Connect a test lamp between switch and 12 V. Pump up pressure to **20.3 kPa** (2.8 lb/in²). The switch should then close = test lamp light up.

Remove test lamp and connect electrical wire. Leave the pressure gauge and pressure tester in position.



H6

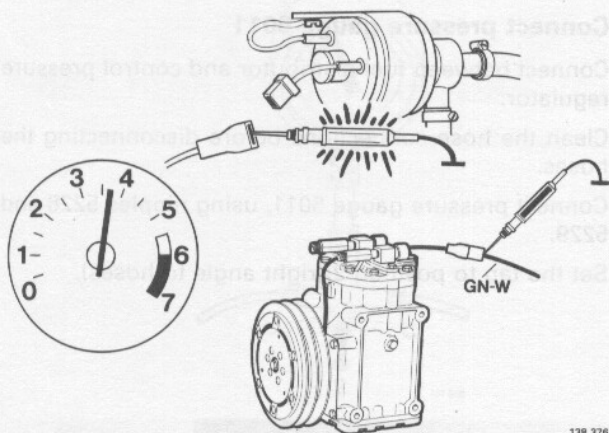
Connect test light

Connect a light at the solenoid valve, between the contact piece and frame.

Connect another light at AC compressor, between wire and frame.

H7

**Start engine
Switch AC on to give max cooling**



H8

Check rpm relay and AC relay

Check that charge air overpressure switch is closed; pump up the pressure if necessary.

Rev the engine. The rpm relay should be activated at approximately 3,700 rpm. The test light at the solenoid valve should light up and the AC compressor should be disconnected at the same time (the test light should go out).

If faulty, check electrical wires, see wiring diagram page 19. If the wires are in order, check with a new relay.

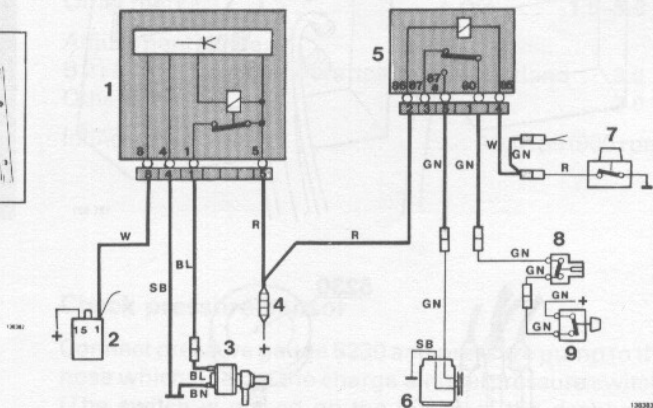
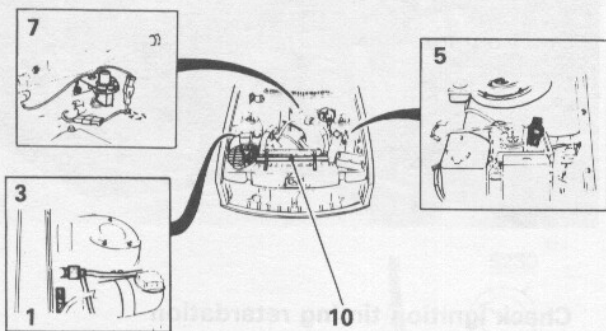
H9

Restore to original condition

Remove the instrument.
Connect electrical wire, hose.

Intercooler kit; installation of components

H10



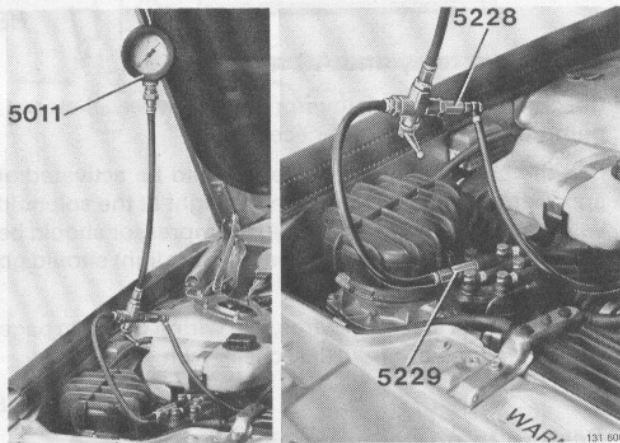
Components

- | | |
|--|----------------------------------|
| 1 Rpm relay | 6 AC compressor |
| 2 Ignition coil | 7 Charge air pressure switch |
| 3 Solenoid valve | 8 Low pressure switch (in dryer) |
| 4 Fuse No. 12 | 9 Switch (circuit breaker) |
| 5 Relay (disconnection of AC compressor) | 10 Intercooler |

100303

I. B 19/B 21 ET retardation, full load enrichment and charge air overpressure switch, checking

Special tools: 2901, 5011, 5015, 5228, 5229, 5230



11

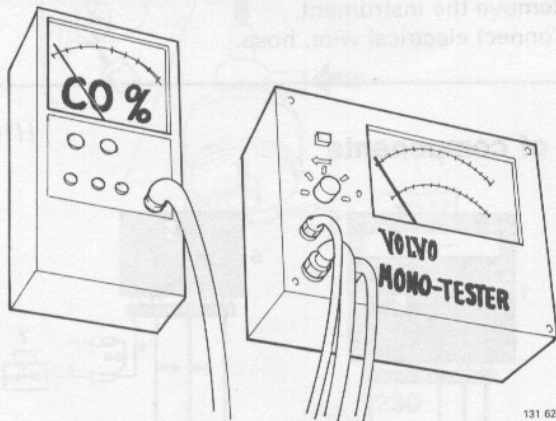
Connect pressure gauge 5011

Connect between fuel distributor and control pressure regulator.

Clean the hose connections before disconnecting the hoses.

Connect pressure gauge 5011, using nipples 5228 and 5229.

Set the tap to position 2 (right angle to hoses).



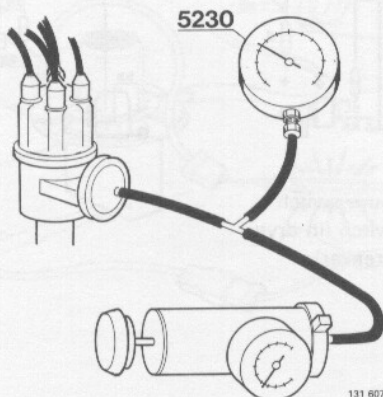
12

Connect CO meter and Volvo Mono-Tester

(A stroboscopic timing light can be used instead of a Mono-Tester.)

13

Start engine



14

Check ignition timing retardation

Connect pressure gauge 5230 and a pressure pump to the distributor.

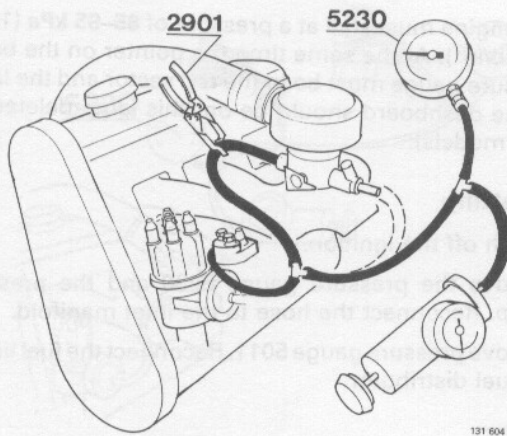
Read ignition setting.

Pump up to a pressure of 30 kPa (4.3 lb/in²).

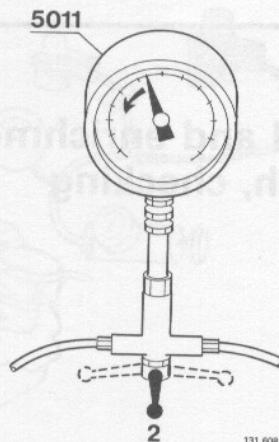
Ignition retardation should be 3–7°.

Remove pressure gauge and pressure pump. Reconnect hose from the distributor to the inlet manifold.

Ignition setting: 15° B.T.D.C at 11.7–13.3 rps (700–800 rpm), hose disconnected.



131 604



131 608

Check fuel enrichment

The engine must be running.

Pinch the hose between the control pressure regulator and the nipple on the inside of the inlet pipe. Use tongs **2901**.

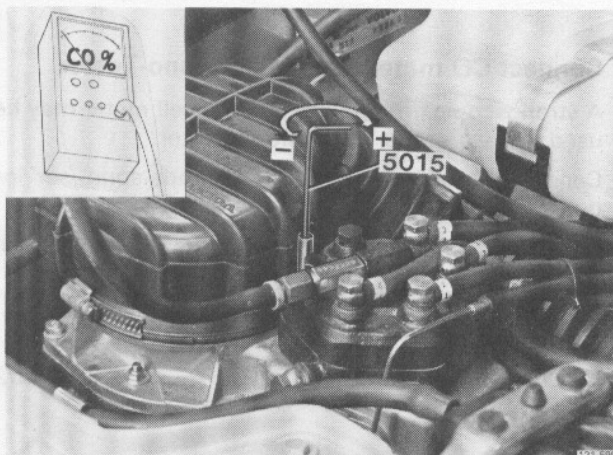
Remove the hose from the nipple on the outside of the throttle housing. Connect pressure gauge **5230** and pressure pump.

Check that the control pressure regulator is warm by reading off pressure gauge **5011**. The control pressure should be **345–375 kPa** (49–53 lb/in²).

Pump the pressure up to **45 kPa** (6.4 lb/in²). The control pressure should then drop to **265–295 kPa** (38–42 lb/in²).

Remove the pressure pump, pressure gauge **5230** and tongs **2901**. Reconnect the hose to the throttle housing.

Fuel enrichment is necessary to ensure the internal cooling of the engine. If the fuel-air mixture is too lean, this will raise the combustion chamber temperature with risk of overheating.



131 599

Check/adjust CO content

Use key **5015** for the adjustment.

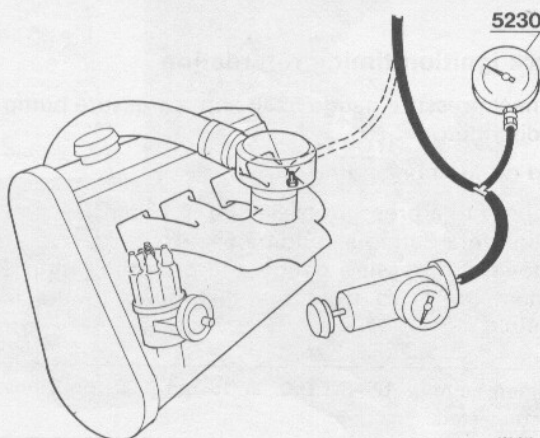
Check value:

B 21 ET, 1983 Nordic countries and Switzerland	2.5–3.5 %
Other markets	1.0–3.0 %

Adjustment value:

B 21 ET 1983 Nordic countries and Switzerland ..	3.0 %
Other markets	2.0 %

Idling speed **15.0 rps** (900 rpm)



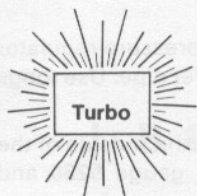
131 610

Check pressure sensor

Connect pressure gauge **5230** and pressure pump to the hose which goes to the charge air overpressure switch. (The switch is placed on the inside of the dashboard above the pedal carrier).

Pump up the pressure until the engine stops (the switch cuts out the ground connection for the pump relay).

IMPORTANT! Do not exceed **120 kPa** (17 lb/in²). This could damage the dashboard boost pressure gauge.



The engine must stall at a pressure of **85–95 kPa** (12.1–13.5 lb/in²). At the same time the pointer on the boost pressure gauge must be in the red sector and the lamp on the dashboard should be on (this lamp deleted on later models).

18

Resetting

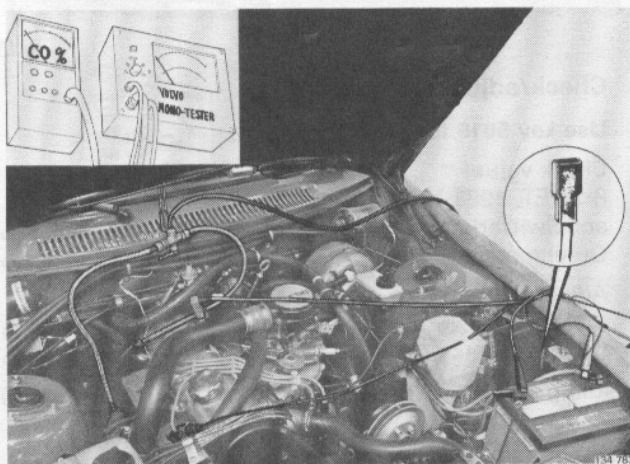
Switch off the ignition.

Remove the pressure gauge 5230 and the pressure pump. Reconnect the hose to the inlet manifold.

Remove pressure gauge 5011. Reconnect the fuel line to the fuel distributor.

J. B 21 FT ignition retardation, full load and enrichment and charge air overpressure switch, checking

Special tool: 5230, 5015



J1

Connect CO meter and Volvo Mono-Tester

A stroboscopic timing light and a dwell meter may be used instead of the Volvo Mono-Tester.

Connect Mono-Tester to the Lambda-sond service outlet.

Connect CO meter to the outlet in the exhaust pipe in front of the catalytic converter.

J2

Start engine

J3

Check ignition timing retardation

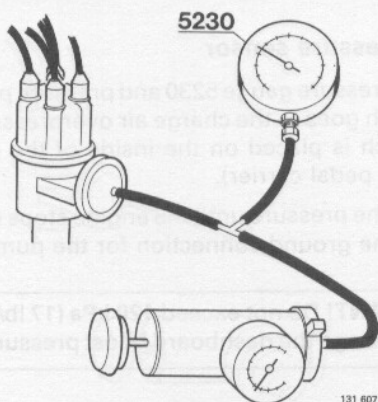
Connect pressure gauge **5230** and a pressure pump to the distributor.

Read off ignition setting.

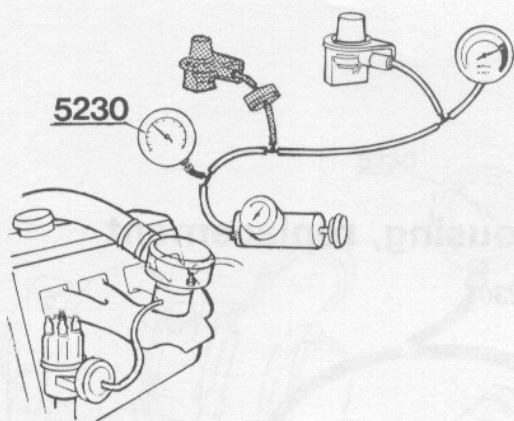
Pump up to a pressure of **36 kPa** (5.1 lb/in²). Ignition retardation should be **6°–10°**.

Remove the pressure gauge and pressure pump. Reconnect the hose from the distributor to the inlet manifold.

Ignition setting: **12° B.T.D.C.** at 15 rps (900 rpm), hose disconnected.



J4

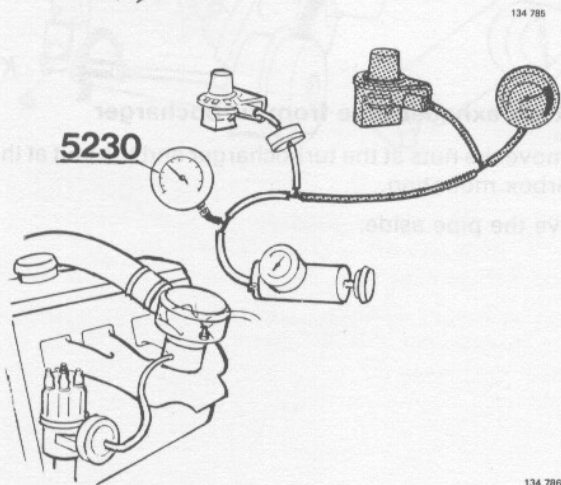


Check fuel enrichment

Connect pressure gauge 5230 and pressure pump to the hose from the inlet pipe.

Engine must be running.

Pump up pressure to 20.3 kPa (2.8 lb/in²). The dwell meter should then read 64°-70° (overpressure switch cuts out the ground pin for Lambda-sond's control unit).



Check charge air overpressure switch

Engine running.

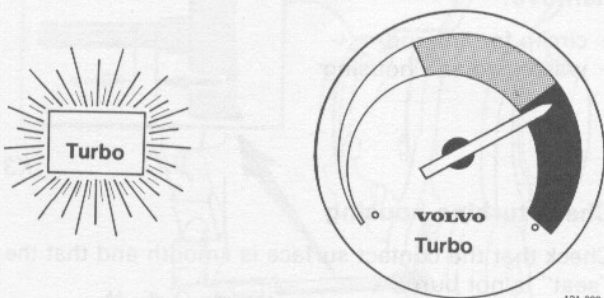
Pump up the pressure until the engine stops (pressure sensor cuts out).

IMPORTANT! Do not exceed 120 kPa (17 lb/in²) or dashboard pressure gauge may be damaged.

The engine should stall at a pressure of:

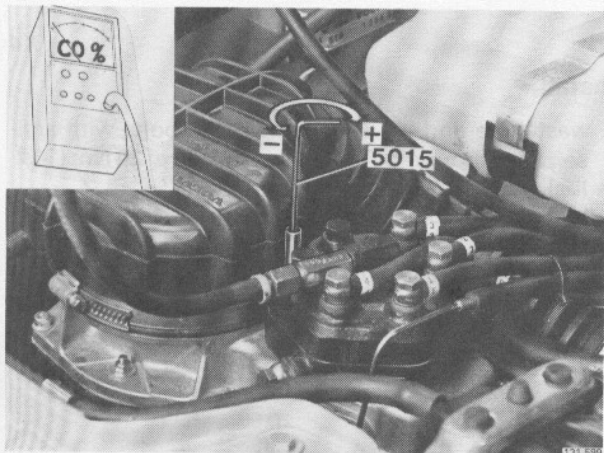
B 21 FT	65-75 kPa (9.2-10.7 lb/in ²)
B 21 FT with intercooler	100-110 kPa (14.2-15.6 lb/in ²)

At the same time the pointer in the car's charge pressure gauge must be in the red sector and the lamp in the instrument should be on (on later models this lamp has been deleted).



Switch off engine. Remove pressure gauge 5230 and pressure pump

Connect the pipe to the inlet manifold.



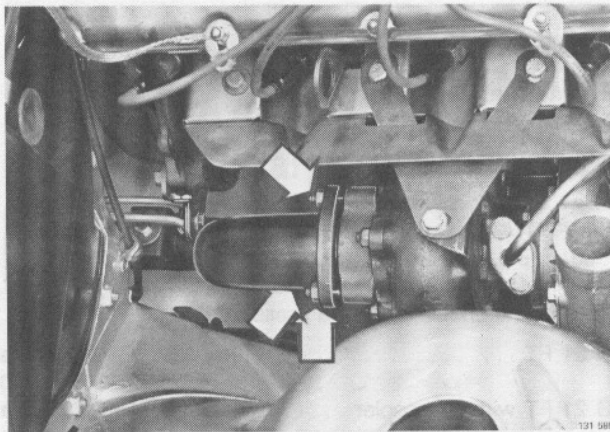
Check/adjust CO content

Use key 5015 for adjustment.

CO, check value	0.7-1.3 %
adjustment value	1.0 %
Idling speed	15.0 rps (900 rpm)

K. Turbo, wastegate with housing, replacement

Special tool: 5230

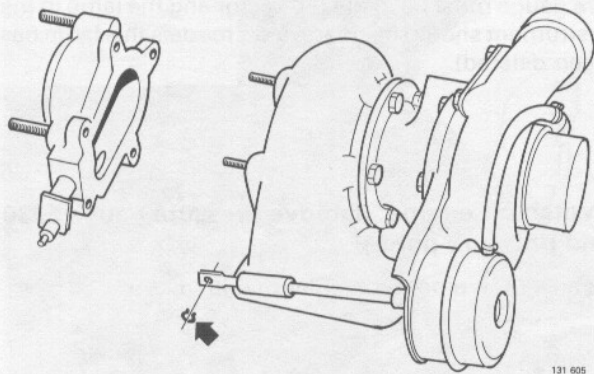


K1

Detach exhaust pipe from turbocharger

Remove the nuts at the turbocharger and the bolt at the gearbox mounting.

Move the pipe aside.



K2

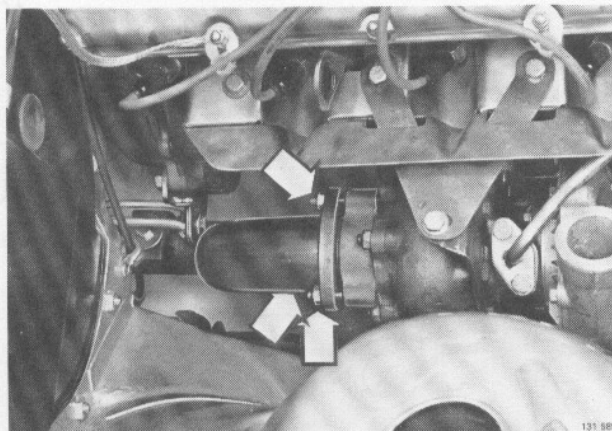
Remove:

- circlip for link rod
- wastegate and housing

K3

Check turbine housing

Check that the contact surface is smooth and that the "seat" is not burnt.



K4

Install:

- wastegate and housing. Smear the bolts with anti-seize compound.* Tighten to a torque of **20 Nm** (14 ft lbs).
- the exhaust pipe. Smear the studs with anti-seize compound.* Tighten to a torque of **25 Nm** (18 ftlbs).
- gearbox front mounting bolt

* Part No. 1 116 035-9.

K5

Adjust wastegate actuator

Note! Wastegate actuator of previous design cannot be adjusted. It is sealed by riveting the adjusting sleeve to the link rod. If faulty, the actuator must be replaced, see page 18.

Connect pressure gauge **5230** and pressure pump to the actuator.

Pump up to a pressure of:

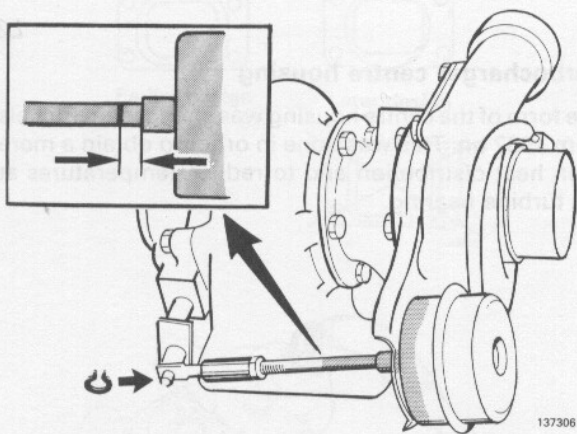
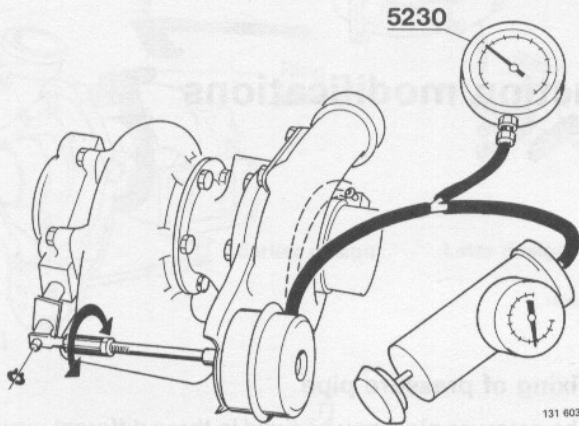
B 19/21 ET	55 kPa (7.8 lb/in ²)
B 21 FT	41 kPa (5.8 lb/in ²)
B 21 FT with intercooler	57 kPa (8.1 lb/in ²)

Push the arm of the wastegate forward (closed valve).

Adjust the rod so that it fits exactly to the pin on the lever.

IMPORTANT! Do not turn the rod as this may damage the diaphragm in the actuator.

Remove the pressure gauge and pressure pump. Connect the pressure hose (hose clip).



K6

Check position of link rod

Link rod travel must be between 2–6 mm to obtain correct operating function.

To adjust:

Disconnect rod sleeve from lever.

Mark position of rod at wastegate actuator.

Reconnect sleeve to lever.

Measure distance between mark and wastegate actuator.

Distance = **2–6 mm** (0.08–0.24 in)

If incorrect, replace wastegate actuator, see instructions on page 18.

K7

Install new circlip.

K8

Check charge pressure

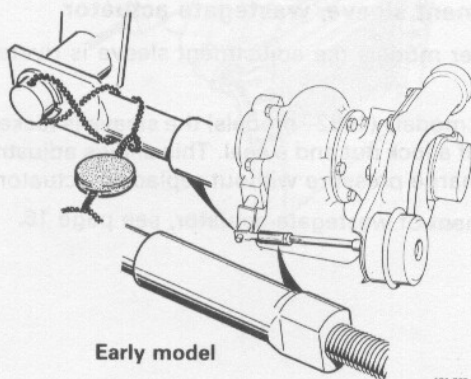
See page 16.

K9

Seal wastegate actuator

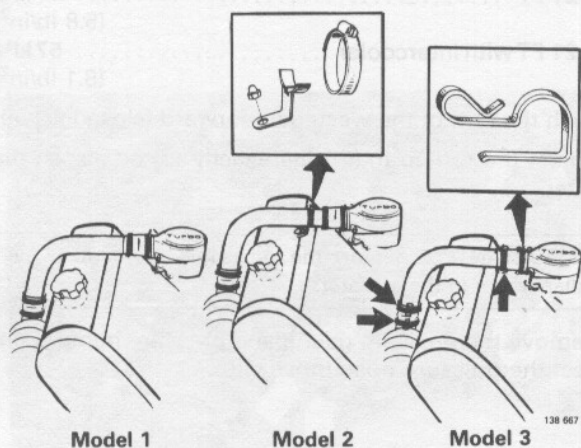
It is important to wind wire tightly around the sleeve as shown. Otherwise seal will loosen due to vibrations.

Volvo anti-tamper seal tongs, Part No. 9986408-4 have "Volvo" stamped on grips.



Early model

L. Turbocharger, production modifications



L1

Fixing of pressure pipe

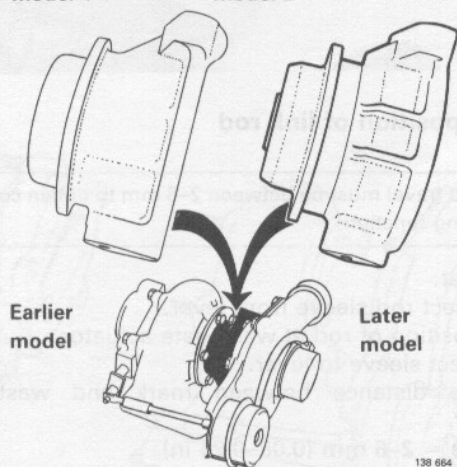
The pressure pipe may be fixed in three different ways:

Model 1 Hose clips only (1981–82).

Model 2 Hose clips and a bracket between the pressure pipe and the cylinder head (1982).

Model 3 Hose clips and hoseholder (1984–).

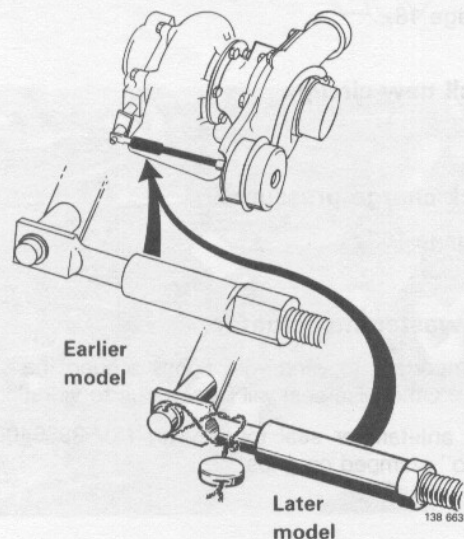
Fixing by means of holder and hoseclips replaces previous designs and may also be refitted to earlier models. See page 40.



L2

Turbocharger centre housing

The form of the centre housing was changed on models from 1982 on. This was done in order to obtain a more even heat distribution and to reduce temperatures at the turbine bearing.



L3

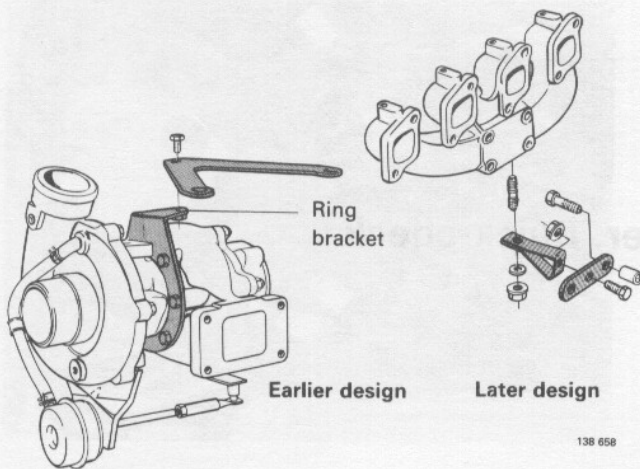
Adjustment sleeve, wastegate actuator

On earlier models the adjustment sleeve is riveted to the rod.

On later models (1982– models) the sleeve is locked by means of a lock nut and a seal. This allows adjustment of the charge pressure without replacing actuator.

Adjustment of wastegate actuator, see page 16.

L4



Turbocharger support bracket

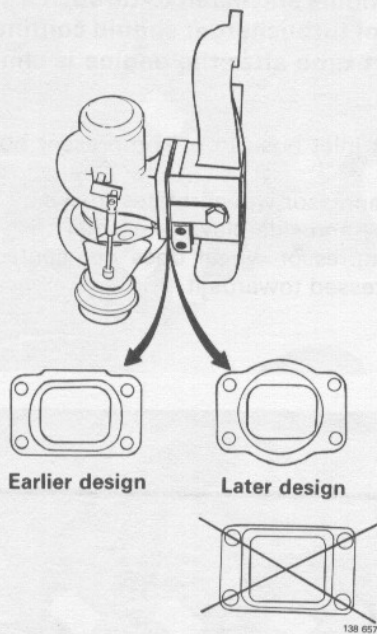
Earlier models are equipped with a ring bracket and a support bracket which is connected between the turbocharger and inlet manifold.

A new type of support bracket was introduced on 1983 models. The bracket is connected between the turbocharger and cylinder block.

It is possible to install the new support bracket on earlier models (see page 41).

IMPORTANT! When fitting a new support bracket to turbochargers equipped with a ring bracket, see fig, do not detach the old support bracket. This prevents turbo-whine from being amplified by the ring bracket.

L5



Sealing flange: turbocharger to exhaust manifold

The sealing flange is one of two types.

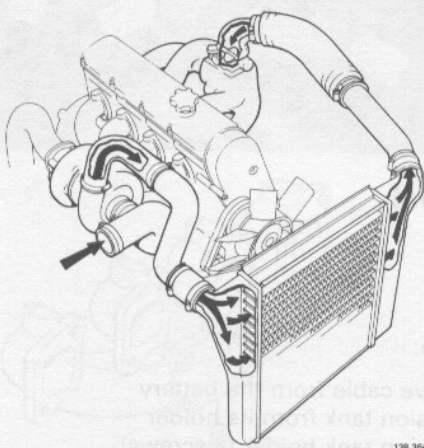
Earlier models: sealing flange with a straight flange and gasket.

Later models: labyrinth seal (curved top of flange fits into turbocharger). The seal between the exhaust manifold and turbocharger is not installed.

This change was introduced on 1981 models.

IMPORTANT! Do not interchange components of earlier and later design.

L6



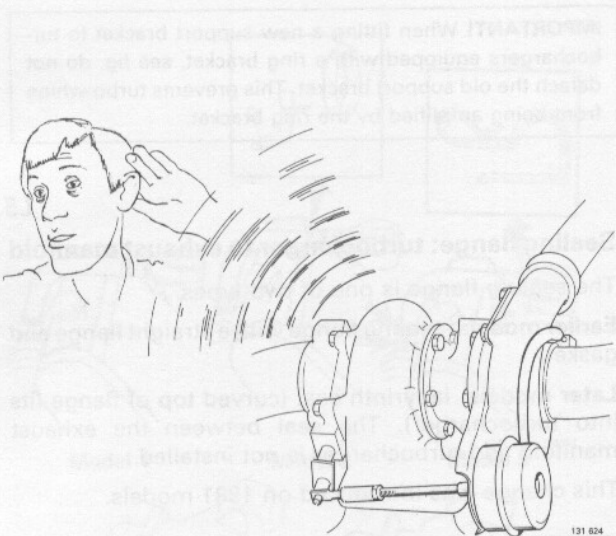
B 21 FT intercooler

Intercoolers were introduced on B 21 FT during the 1984 model year.

The major differences between B 21 FT and B 21 FT intercooler are:

- charge pressure control system (rpm relay + solenoid valve) on intercooler versions
- relay for disengagement of AC compressor on intercooler versions

M. Turbocharger, quick-check



M1

Turn off engine and listen to turbocharger. Rotating parts of turbocharger should continue to spin for a short time after the engine is shut off

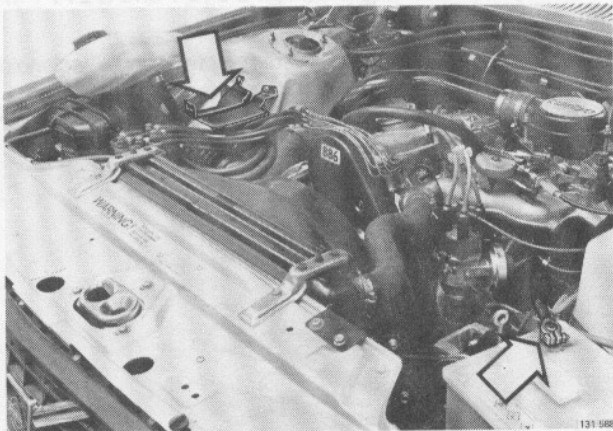
If not:

Disconnect inlet hose from compressor housing and check,

- that compressor wheel rotates freely
- axial play and side play are normal
- that compressor wheel does not contact housing when pressed towards it

N. Turbocharger

Special tool: 5230

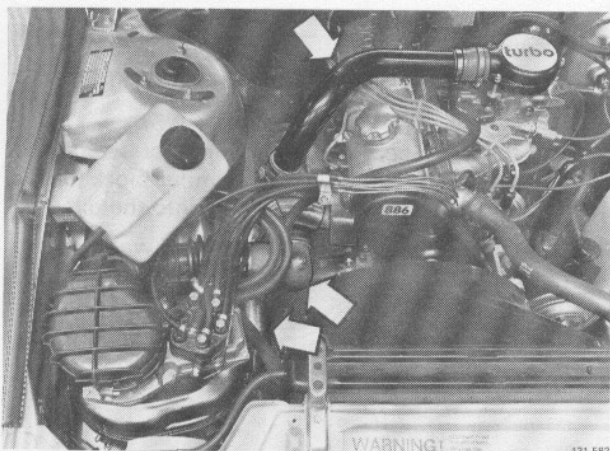


Removal

N1

Remove:

- negative cable from the battery
- expansion tank from its holder
- expansion tank holder (3 screws)

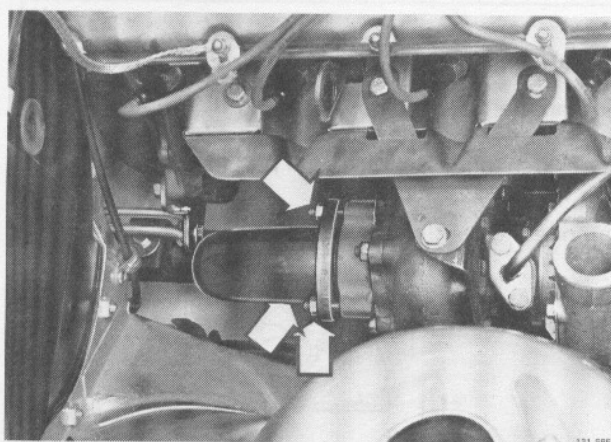


N2

Remove:

- preheating hose between the plate and air cleaner
- pipe and rubber bellows between the fuel distributor and the turbocharger. Withdraw the crankcase ventilation hose from the pipe
- pipe and connection between the turbocharger and inlet manifold, or between the turbo and the inter-cooler (B 21 FT with intercooler)

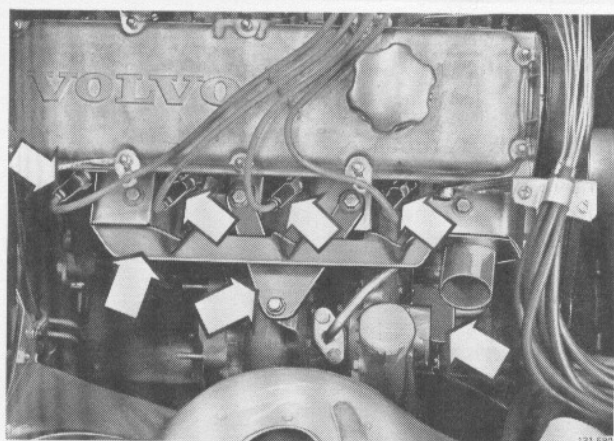
Cover the turbocharger inlet and outlet holes, to prevent dirt and dust entering the turbocharger.



N3

Detach exhaust pipe from turbo

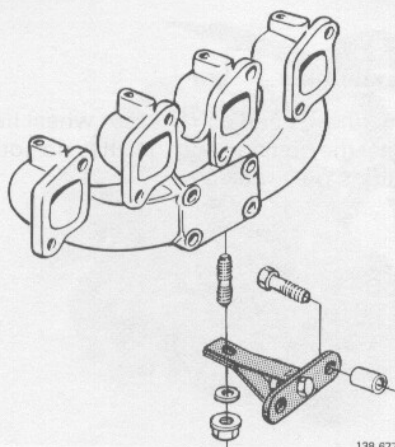
Push the pipe to one side.



N4

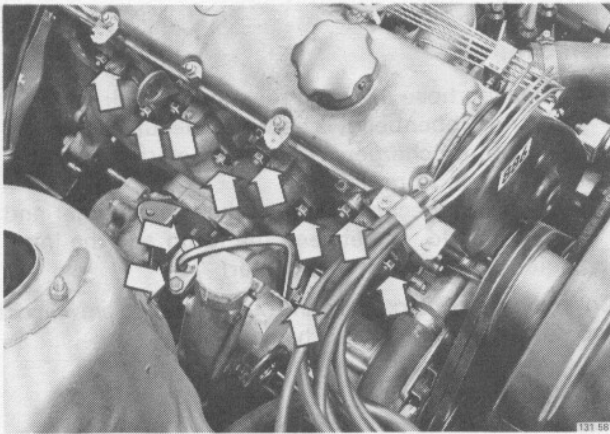
Remove:

- ignition leads from spark plugs
- upper heat-guard plate
- support bracket between the turbo and the manifold (earlier design)
- lower heat-guard plate (unscrew retaining screw underneath the manifold)
- support bracket between the manifold and cylinder block (later design)



138 677

Turbocharger removal



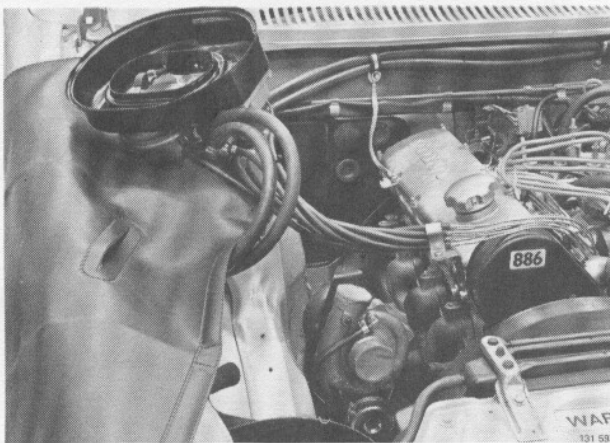
N5

Remove oil delivery pipe and manifold retaining nuts and washers

Remove the oil pipe clamp, retaining screws on the turbo and the banjo union in the cylinder block (under the manifold). Make sure no dirt gets into the oilways.

Remove the manifold retaining nuts and washers. Let one nut remain loosely installed in order to keep the manifold in position.

Remove the oil delivery pipe. Cover the openings on the turbo.

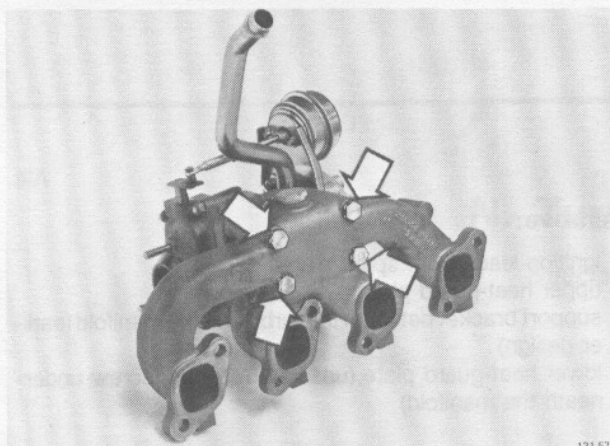


N6

Detach fuel distributor from air cleaner

Slacken the clamps. Move the fuel distributor and the lower section of the air cleaner up onto the righthand wheel arch (place some kind of protection on the wheel arch first).

Remove the air cleaner insert.



N7

Remove turbocharger and manifold

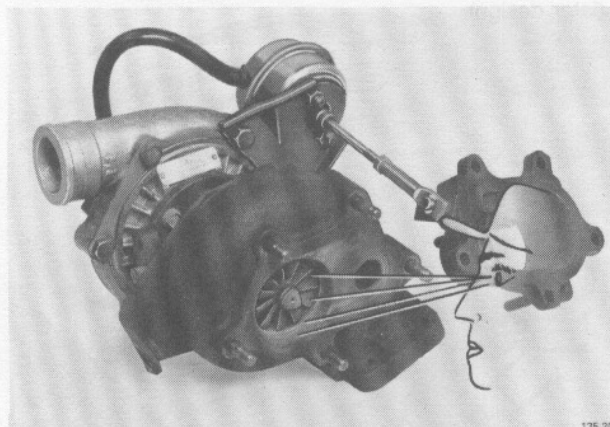
Take off the remaining retaining nut and washer.

Lift forwards and upwards.

Remove manifold gaskets and the O-ring for the oil return pipe from the cylinder block.

N8

Remove turbocharger from manifold

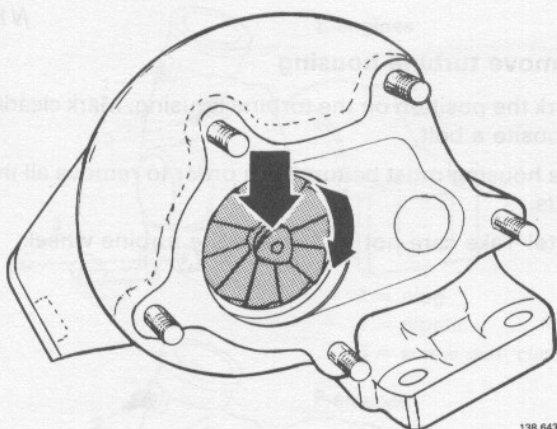


N9

Check the axial play

Check that the turbine and compressor wheel have not scraped against the housing and that they do not scrape when the shaft is pulled axially.

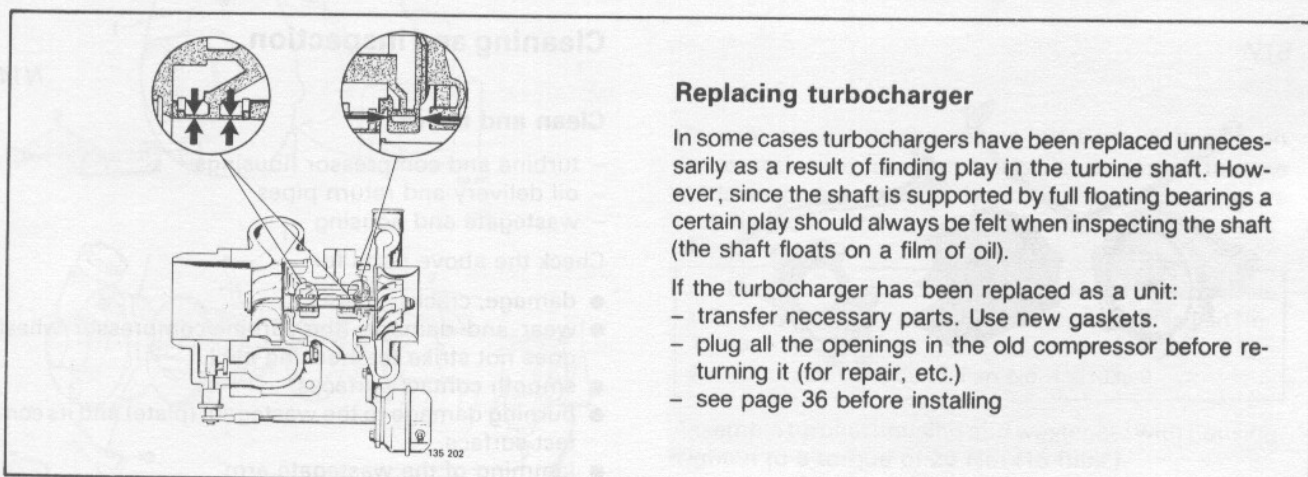
N10



138 643

Check the radial play

Check that the turbine and compressor wheel do not scrape in the housing when depressed sideways and turned at the same time.

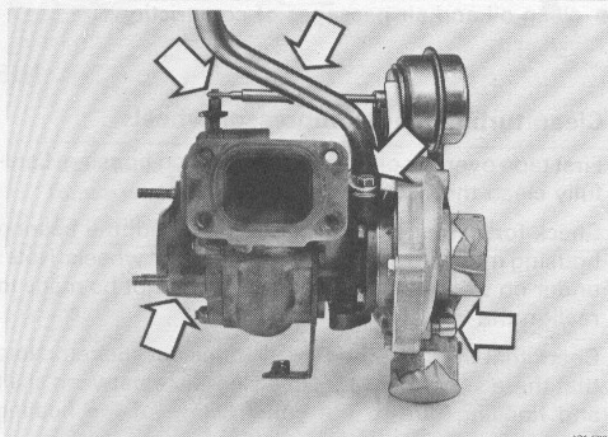


Replacing turbocharger

In some cases turbochargers 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).

If the turbocharger has been replaced as a unit:

- transfer necessary parts. Use new gaskets.
- plug all the openings in the old compressor before returning it (for repair, etc.)
- see page 36 before installing



131 096

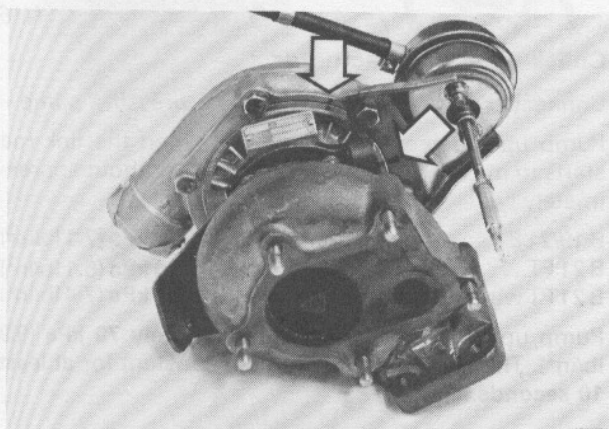
Disassembly

Note: Volvo does not recommend the disassembly of a turbocharger in a car still covered by the New-Car Warranty.

N11

Remove:

- the pressure hose from the nipple on the compressor housing
- the return oil pipe
- the circlip on the arm of the relief valve
- the wastegate and housing



131 589

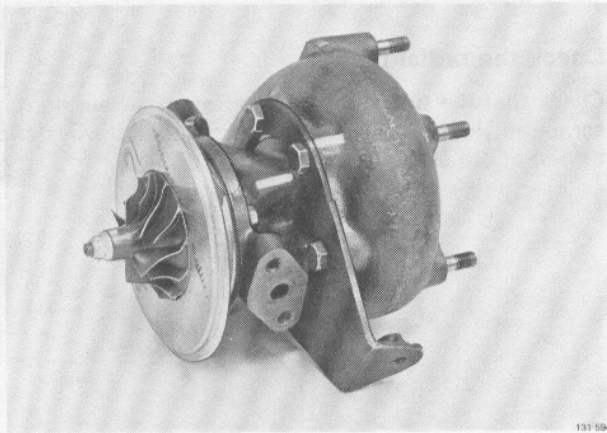
N12

Remove turbine housing

Mark the location of the turbine housing and the console for the pressure actuator. The marking must be done carefully in order to allow reinstallation of components in their original positions; otherwise, the connections between the turbo compressor and the engine will not fit correctly.

The housing must be turned in order to remove all bolts.

Note! Take care not to damage the compressor wheel.



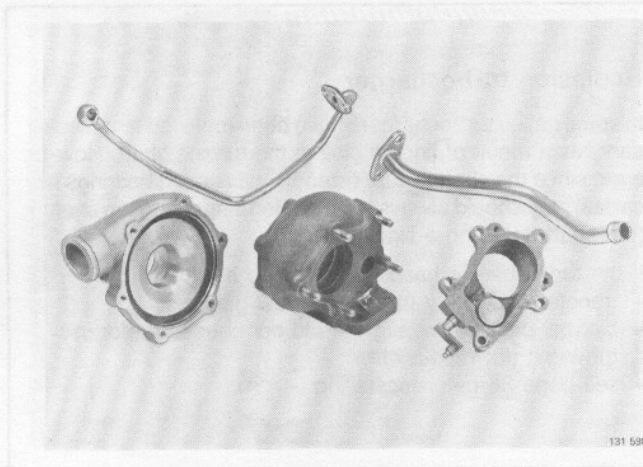
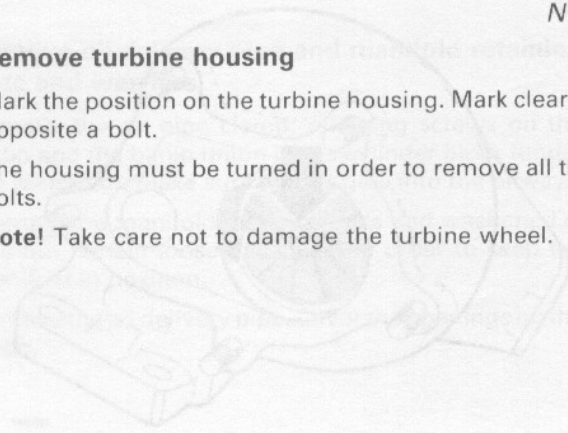
N13

Remove turbine housing

Mark the position on the turbine housing. Mark clearly, opposite a bolt.

The housing must be turned in order to remove all the bolts.

Note! Take care not to damage the turbine wheel.



Cleaning and inspection

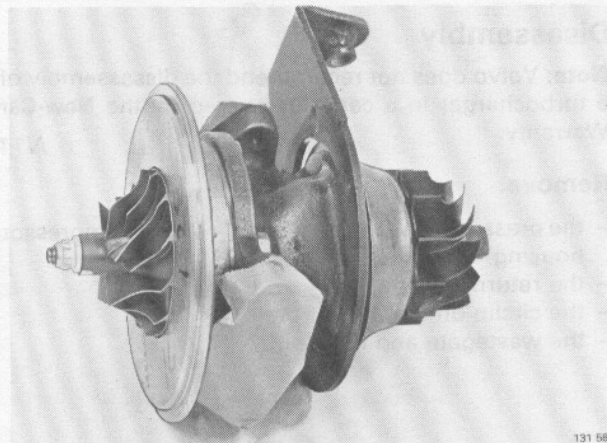
N14

Clean and check:

- turbine and compressor housings
- oil delivery and return pipes
- wastegate and housing

Check the above parts for:

- damage, cracks
- wear and damage (the turbine/compressor wheel does not strike the housing etc.)
- smooth contact surfaces
- burning damage to the wastegate (plate) and its contact surface
- jamming of the wastegate arm
- clean oil and air passages of constrictions



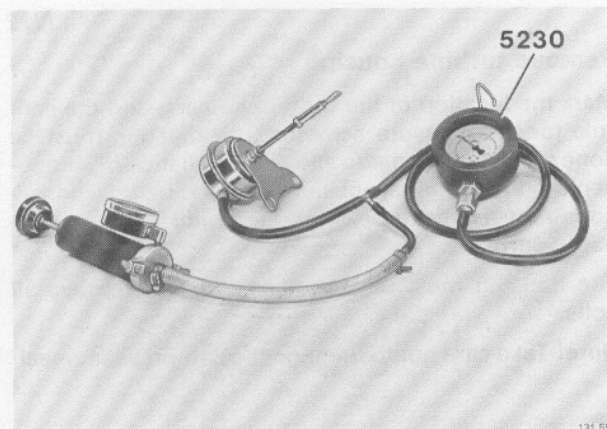
N15

Clean turbine and compressor wheels

First tape over the oilways in the bearing housing. Carefully clean the wheels to avoid damage.

Check for damage and wear. If damaged, the bearing housing must be replaced, complete with wheels. Note: under no circumstances must any attempt be made to realign the wheel blades.

Check that the shaft runs easily, does not stick etc. Note that there should always be a clearance between shaft and housing due to the construction of the floating bearings.



N16

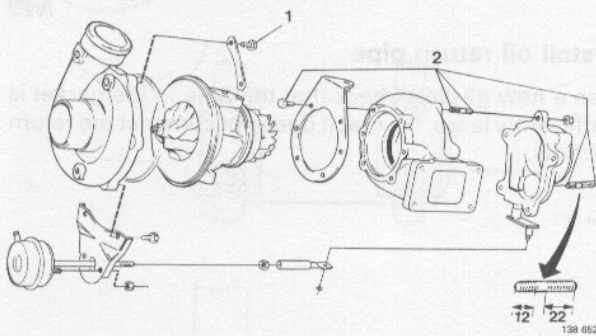
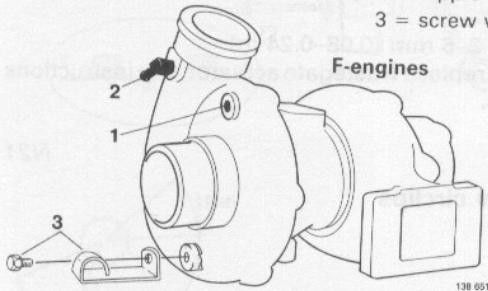
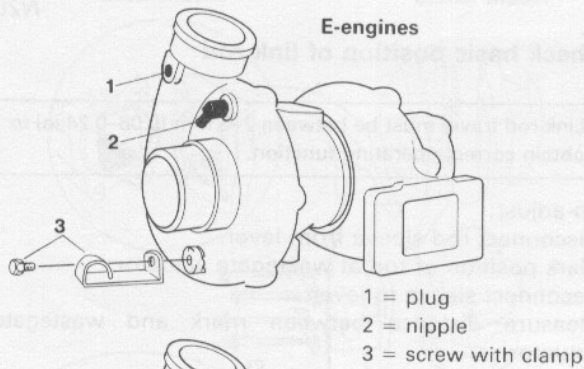
Check wastegate actuator

Connect pressure gauge 5230 and a pressure pump.

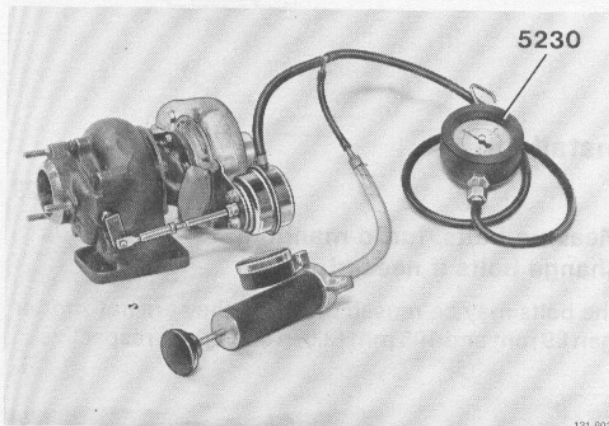
Pump up the pressure and check when the link rod starts to move. This should take place at about approximately

B 19/21 ET	50 kPa (7.1 lb/in ²)
B 21 FT	36 kPa (5.1 lb/in ²)
B 21 FT with intercooler	52 kPa (7.4 lb/in ²)

Pump up to a pressure of approximately **70 kPa** (9.9 lb/in²). The pressure must remain constant for at least **10 seconds**.



Suitable tools for tightening to correct torque:
Torque wrench P.N. 1158687-2
Open ended spanner 13 mm. P.N. 1158961-1



Assembly

Take care not to damage the wheels. Use new gaskets.

With new compressor housing: N17

Transfer nipple, plug and screw with clamp

Use thread sealer, Part No. 1161053-2 when installing the parts.

Note! Nipple and plug location differ for the E and F engines of earlier models.

On later models different housings are used for E and F engines.

N18

Assemble turbocharger

On some bolts, thread sealer must be used, and on some, anti-seize compound. It is also important that the studs are installed correctly. If not, the charge pressure may be incorrect.

- 1 = Use new screws. In an emergency the old screws can be used provided these are coated with thread sealer (Part No. 1161053-2).
- 2 = Anti-seize compound, Part No. 1161035-9.

Assemble turbine housing and wastegate with housing. Tighten to a torque of **20 Nm** (15 ftlbs.).

Install a new gasket for the compressor housing on the bearing housing. The housings must be turned in order to install all the bolts.

Install the housings according to the alignment marks made when disassembling. Tighten all bolts **evenly all around**.

- Tighten to the following torques:
- turbine housing **20 Nm** (15 ftlbs)
 - compressor housing **18 Nm** (13 ftlbs)

N19

Adjust pressure actuator

Connect pressure gauge **5230** and pressure pump to the pressure actuator.

- Pump up to a pressure of:
- B 19/21 ET **55 kPa** (7.8 lb/in²)
 - B 21 FT **41 kPa** (5.8 lb/in²)
 - B 21 FT with intercooler **57 kPa** (8.1 lb/in²)

Push the wastegate arm forward (closed valve).

Adjust rod so that it fits exactly on the pin on the arm.

Disconnect pressure gauge and pressure pump. Connect the hose to the compressor housing (hose clamp).

Note! Pressure actuator of earlier design cannot be adjusted. This is sealed by the sleeve being riveted to the actuator rod. If faulty, the pressure actuator must be replaced, see page 18.

N20

Check basic position of link rod

Link rod travel must be between 2–6 mm (0.08–0.24 in) to obtain correct operating function.

To adjust:

Disconnect rod sleeve from lever.

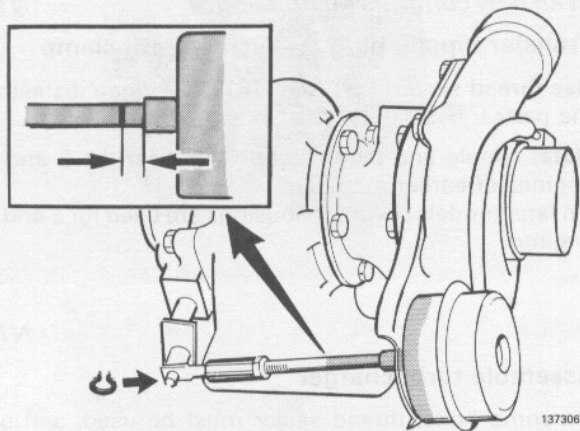
Mark position of rod at wastegate actuator.

Reconnect sleeve to lever.

Measure distance between mark and wastegate actuator.

Distance = **2–6 mm** (0.08–0.24 in)

If incorrect, replace wastegate actuator, see instructions on page 18.



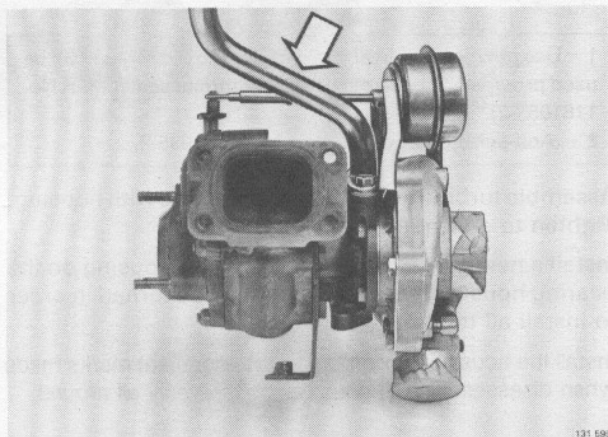
N21

Install new circlips

N22

Install oil return pipe

Use a new gasket. Check that the hole in the gasket is sufficiently large, i.e. that it does not constrict the return oil flow.

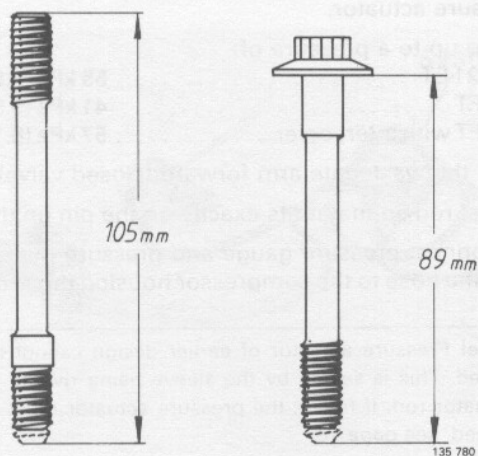


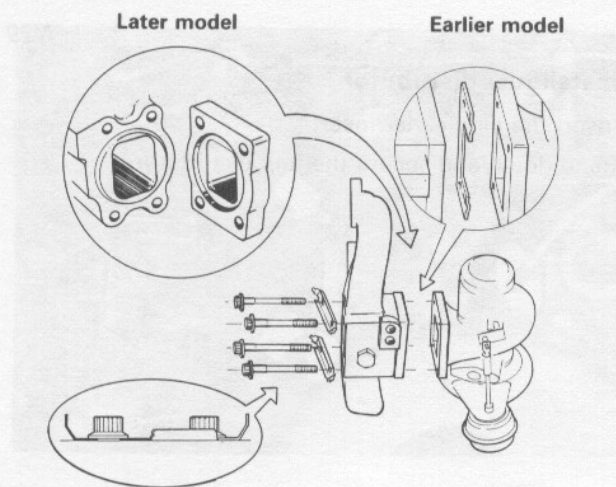
Installation

N23

Measure bolts, turbo-manifold Change bolts if needed

The bolts may be reused provided they are not shorter than 89 mm and 105 mm (3.5 in and 4.1 in) respectively.





132 806

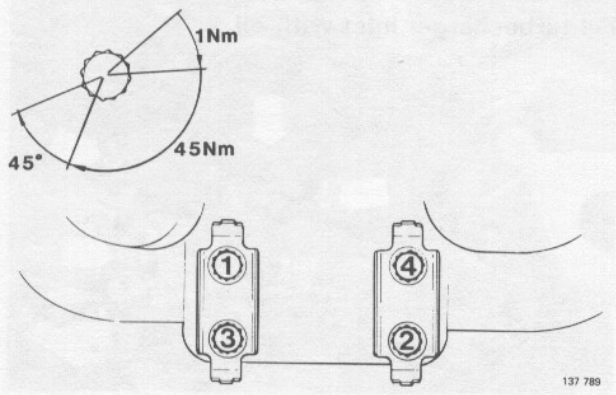
N24

Assemble turbocharger and manifold

Earlier model: Turn the gasket between manifold and turbo with the outward curve towards the turbo.

Smear the threads of the bolts and contact surfaces with assembly paste, Part No. 1161078-9. The assembly paste prevents the inner securing plate from being deformed by the frictional forces when tightening.

Install inner securing plate and bolts.



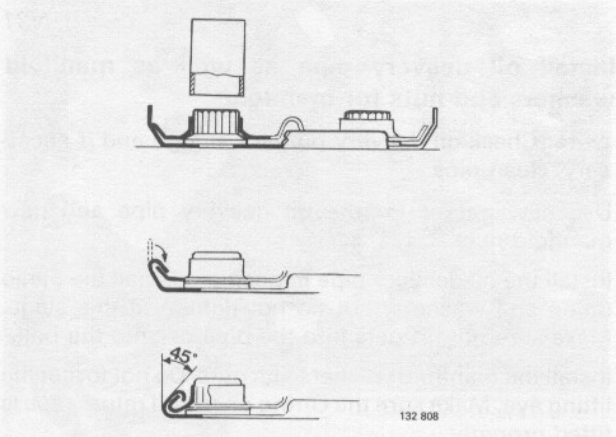
137 789

N25

Tighten bolts (nuts) with the following torque

In the following sequence and in three stages:

- I 1 Nm (9 inlb)
- II 45 Nm (33 ftlb)
- III 45°



132 808

N26

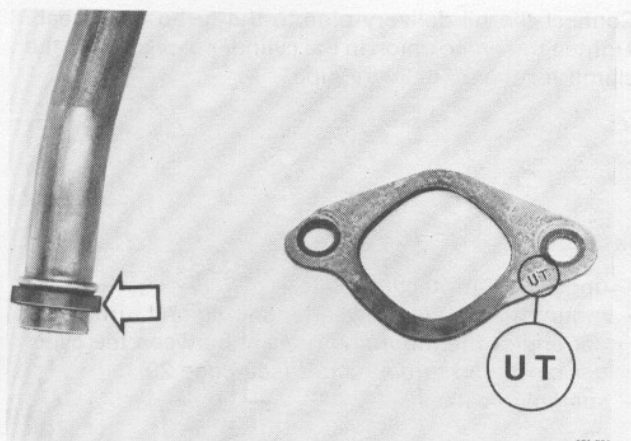
Install outer securing plate

Knock the securing plate in position. Use a hammer and sleeve.

N27

Bend in the inner securing plate

It is particularly important that the securing plate for the upper bolts is bent inwards at least 45°. This must be done because the gap between the bolts and the engine is small.



131 591

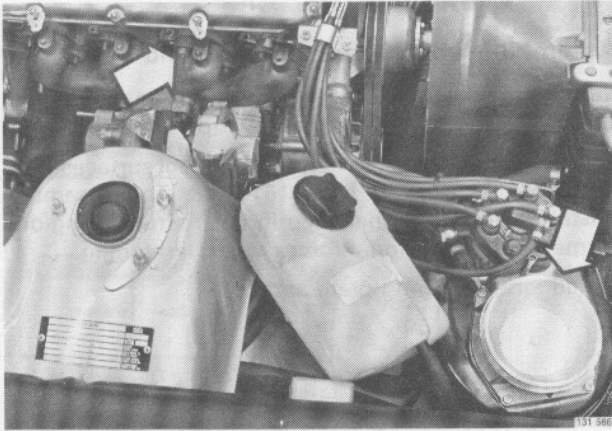
N28

Lift turbocharger with manifold into position

Install new manifold gaskets, the marking UT must face away from the engine.

Install a new O-ring on the oil return pipe. Coat the O-ring with a little grease.

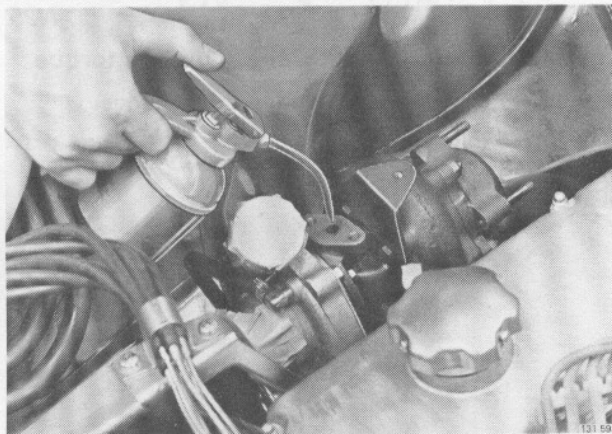
Lift into position and guide the oil return pipe through the hole in the cylinder block. Ensure that the O-ring is installed properly. Install a washer and nut (new nut) to hold the turbocharger and manifold in position.



Install fuel distributor

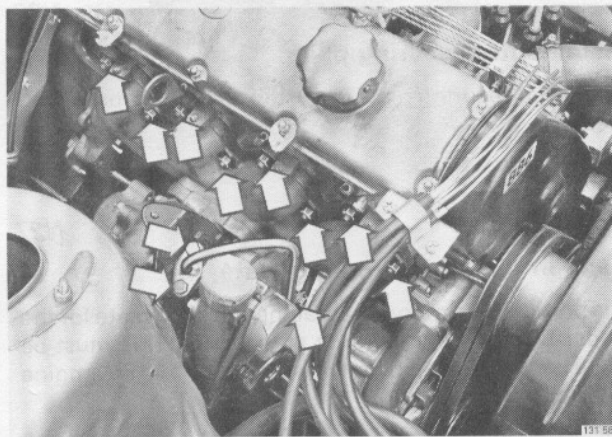
Insert the air cleaner insert.
Bend down and secure the fuel distributor.

N29



Fill turbocharger inlet with oil

N30



Install oil delivery pipe as well as manifold washers and nuts for manifold

Note: Check oil delivery pipe for sludge and if necessary, clean pipe

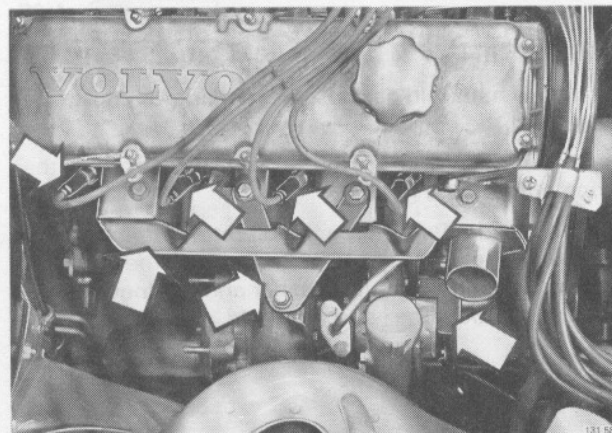
Use new gasket for the oil delivery pipe and new manifold nuts.

Install the oil delivery pipe in position. Install the banjo union and washers, but do not tighten at this stage. Make sure no dirt gets into the pipe or onto the bolt.

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

Connect the oil delivery pipe to the turbo (new seal). Tighten the banjo union in the cylinder block. Install the clamp for the oil delivery pipe.

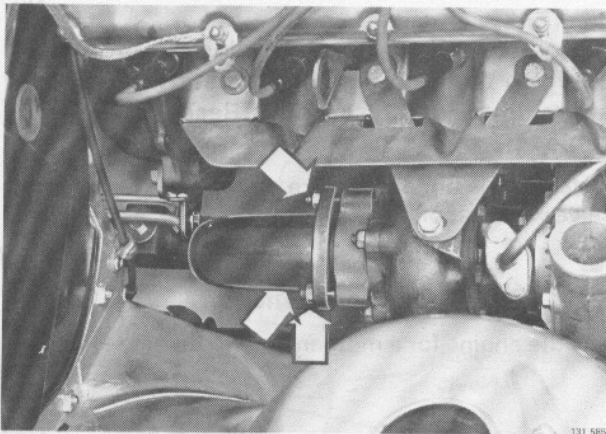
N31



Install:

- upper heat-protection plate
- mounting bracket between manifold and turbocharger and/or the mounting bracket between the cylinder block and turbocharger (see page 29)
- sparkplug cables

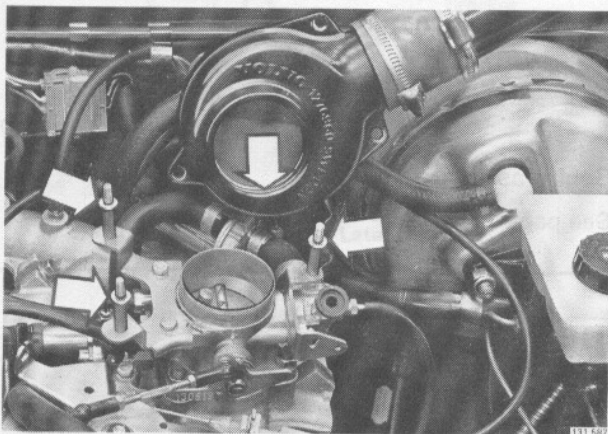
N32



N33

Install:

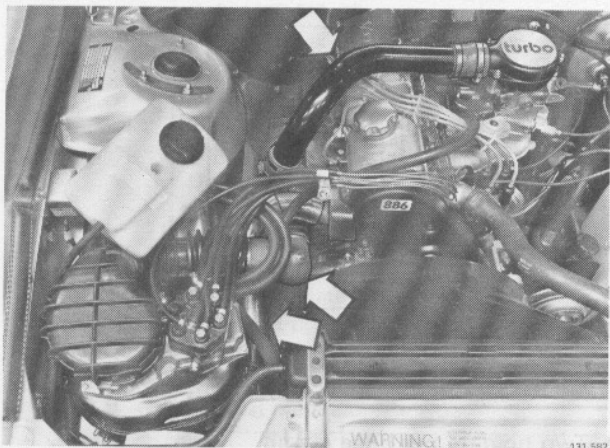
- exhaust pipe. Smear the studs with anti-seize compound. Tighten to a torque of **25 Nm (18 ftlbs)**
- transmission front mounting



N34

Check that:

- throttle housing stud washers are in position
- O-ring sits correctly and is undamaged
- connecting hoses/pipes are in a good condition and do not contain loose particles. Replace hardened or cracked hoses

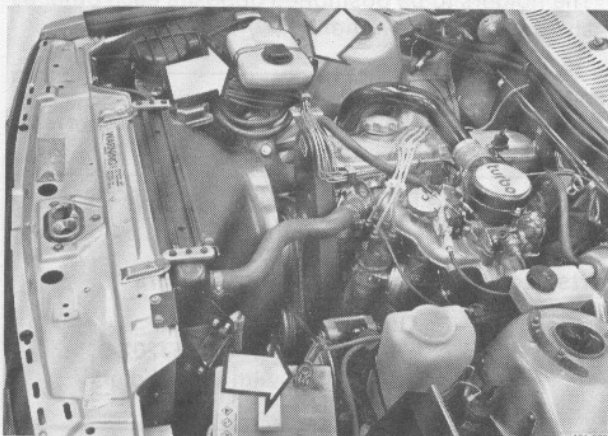


N35

Install:

- the pipe with rubber bellows between the fuel distributor and the turbo. Connect the hose for the positive crankcase ventilation
- the preheating hose between the plate and the air cleaner
- the pipe between the turbo and the inlet manifold or between the turbo and the intercooler (B 21 FT with intercooler)

Make sure that the hoses/pipes are properly installed and that the hose clamps are tightened.



N36

Install:

- holder for the expansion tank
- expansion tank
- battery cable

N37

Disconnect brown electric cable (from terminal 15) from the ignition coil. Run starter motor for approximately 30 seconds. Reconnect electric cable

Note: This is done to ensure that the turbocharger receives lubrication.

N38

Start engine and check function

Idle the engine for a moment or two before revving up.

N39

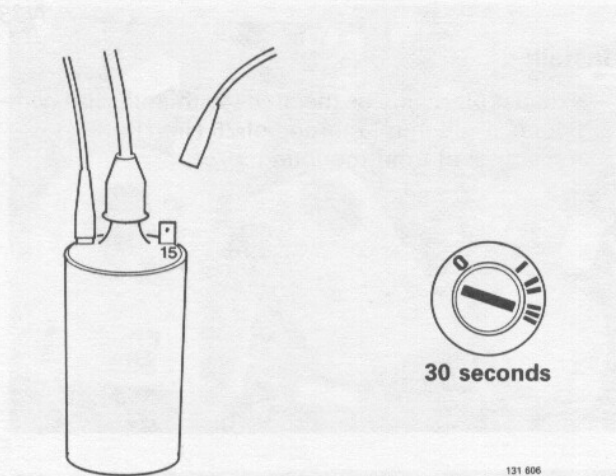
Check/adjust charge pressure

See page 16.

N40

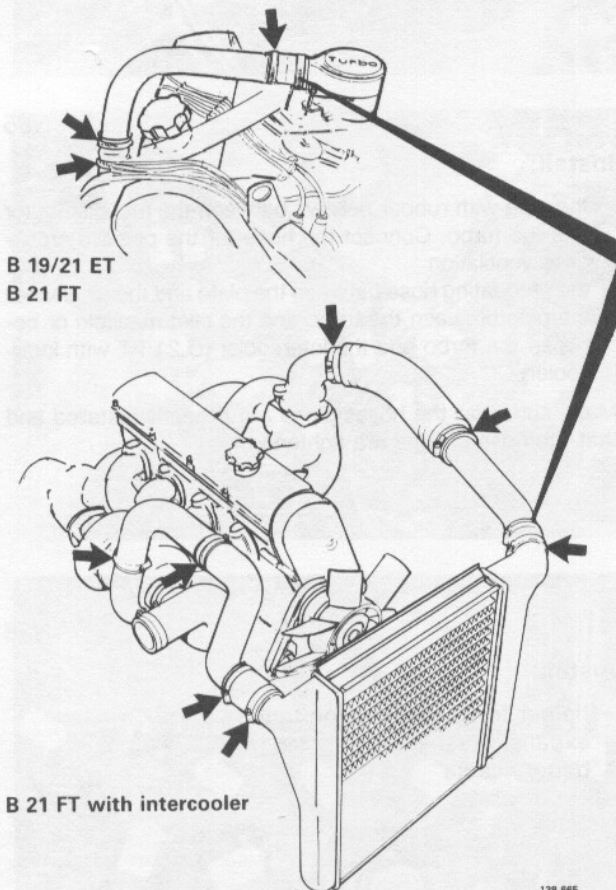
Seal wastegate actuator

See page 17.



131 606

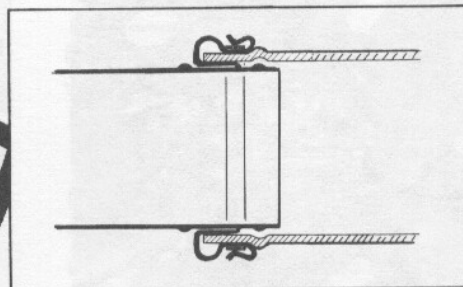
O. Air delivery pipe, clamping



B 19/21 ET
B 21 FT

B 21 FT with intercooler

138 665



O1

- Two holders per hose clamp
- The holders to be positioned opposite each other as shown in the illustration.

IMPORTANT

When installing the holders, make sure that they do not rest against the shoulders of the pipe.

O2

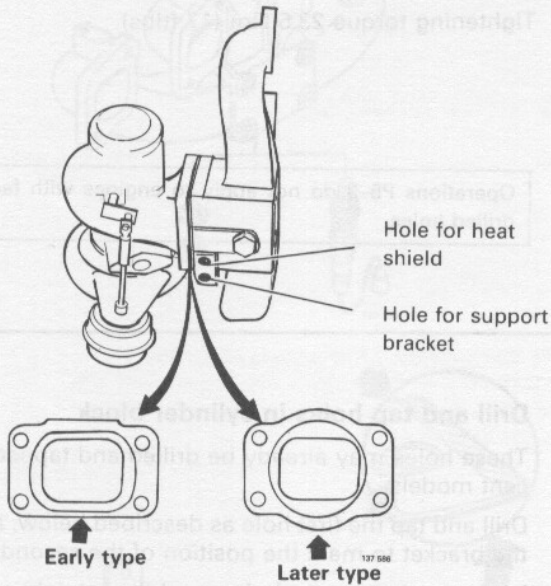
Parts required when installing holders

Part	Quantity	P/N.
Holder	8	1357202-9
	16	(B 21 FT with intercooler)

P. Installing new type of support bracket

Operations P1-11

P1



Check type of exhaust manifold and turbocharger

If the hole for the support bracket screw is already threaded, it is not necessary to order the parts shown in parentheses at the bottom of the list shown below.

If there is not a hole it will be necessary to fit a new exhaust manifold.

The exhaust manifold can be identified by checking the turbocharger flange facing the exhaust manifold.

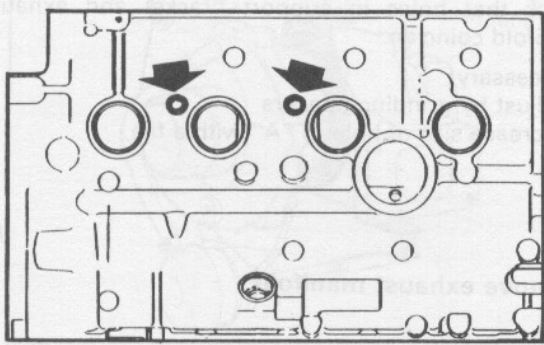
- straight flange = early type
- rounded flange = late type (introduced in production in July 1981)

Required parts

Description	Part number	Qty
Support bracket	1 336 265-2	1
Stay	1 336 266-0	1
Spacer	1 257 499-2	2
Bolt, M6S M8x35	940 132-4	2
Stud, PS M8x32*	1 336 261-1	1
Bolt, M6FS M8x16	946 440-5	1
Washer	419 401-5	1
Flange nut	948 645-7	2
Exhaust manifold gasket	463 846-6	4
O-ring (oil return pipe)	1 306 264-1	1
Copper washers for delivery pipes	18 671-8	2
Gasket for above	420 475-6	1
Turbocharger bolts**	1 317 067-5	4)
Outer lock plate	1 326 586-3	2)
Inner lock plate	1 326 222-5	2)
Exhaust manifold, early type	1 336 238-9	1)
Exhaust manifold gasket, early type	1 276 689-5	1)
Exhaust manifold, late type	1 336 237-1	1)

* Stud 1336261-1 is made of a special nickel alloy and must not be exchanged for any other type of stud.

** To be replaced only as required, see operation A12.



137 581

P2

Remove and dismantle turbocharger – manifold

See page 30, N1-8.

Cover oilways to prevent dirt and dust entering turbocharger.

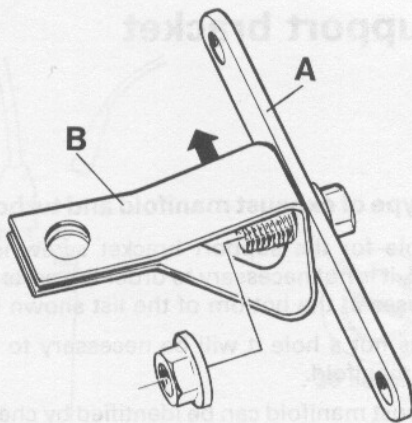
Turbocharger – manifold assembly should only be dismantled if the manifold is to be replaced.

P3

Remove exhaust manifold

Grind cast lugs flush using an emery cloth

P4

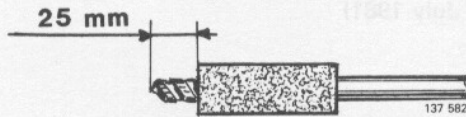


Assemble support bracket

Press "B" as far to the rear as possible when tightening.
Tightening torque 23.5 Nm (17 ftlbs).

Operations P5-9 do not apply to engines with factory-drilled holes.

P5



Drill and tap holes in cylinder block

These holes may already be drilled and tapped on recent models.

Drill and tap the first hole as described below, and use the bracket to mark the position of the second.

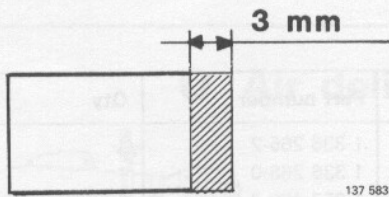
It is important that the holes are drilled at right angles to the face.

Mark centre of lug on cylinder block.

Drill a 4 mm diam. centering hole. Then drill a 6.8 mm diam. hole to a depth of 25 mm (1.0 in). (Attach a piece of adhesive tape or hose to the drill to indicate the depth).

Tap the hole using a M8 tap to a depth of 20 mm (0.8 in).

P6

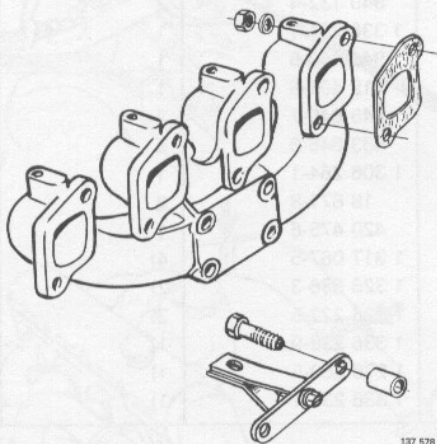


Cut spacers to size

Remove 3 mm (0.1 in).

Note: This is **not** necessary on engines with factory drilled holes.

P7



Mount new exhaust manifold on engine

- Use the **old** gaskets as it is necessary to remove the manifold at a later stage, prior to final installation.
- Attach support bracket with spacers to cylinder block.

P8

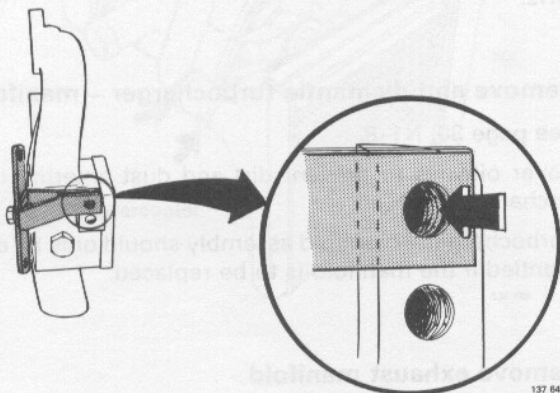
Check position

Check that holes in support bracket and exhaust manifold coincide.

If necessary:

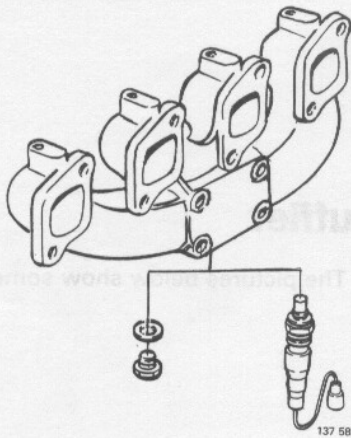
- adjust by grinding spacers
- increase size of hole in "A" with a file

P9



Remove exhaust manifold

P10

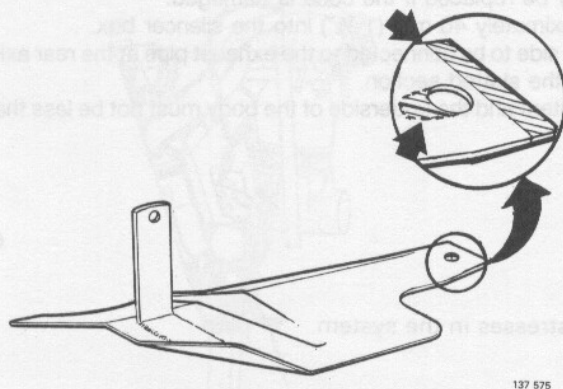


Transfer following parts to new exhaust manifold

- B 19/21 ET: plug and gasket
- B 21 FT: Lambda-sond.

Apply assembly paste P/N 1 161035-9 to threads.

P11



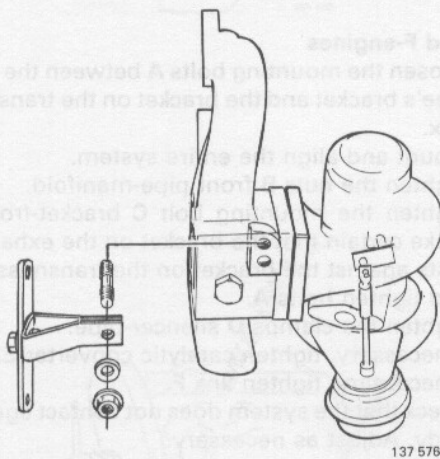
Modify lower heat shield

Note! Part number for modified heat shield = 1 336060-7.

Hold shield in position and drill out rear hole to coincide with hole in exhaust manifold.

Cut rear edge of plate to allow a space for the new support bracket.

P12

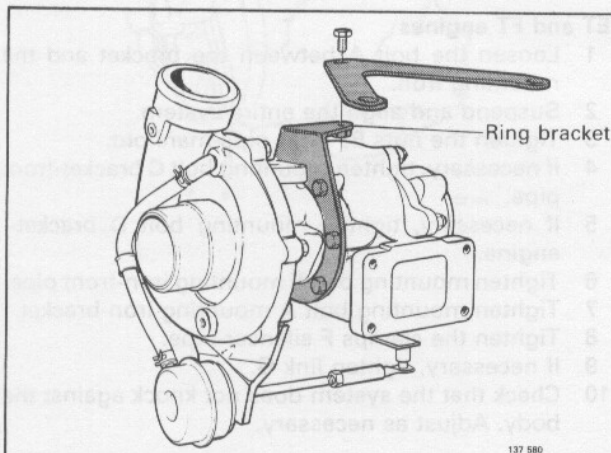


Install turbocharger – manifold

Install:

- turbocharger with manifold
- support bracket
- front exhaust manifold

See page 36, and N23-40.



IMPORTANT! When fitting a new support bracket to turbochargers equipped with a ring bracket (see fig), do not detach the old support bracket. This prevents turbo whine from being amplified by the ring bracket.

Q. Exhaust pipe and muffler

Type of exhaust system fitted to vehicle depends on model and market. The pictures below show some designs.

Q1

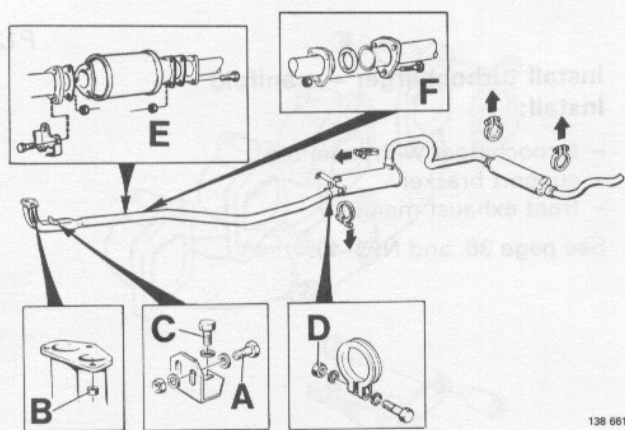
General

- Use new gaskets.
- The steel cone at the link should only be replaced if the cone is damaged.
- The exhaust pipe must project approximately 40 mm (1 1/2") into the silencer box.
- The rear muffler is marked "IN" on the side to be connected to the exhaust pipe at the rear axle.
- Position the clamps on the centre of the slotted section.
- The clearance between the exhaust system and the underside of the body must not be less than 20 mm (3/4").

Q2

Installing complete system

Follow the sequence below to avoid stresses in the system



138 661

A, E and F-engines

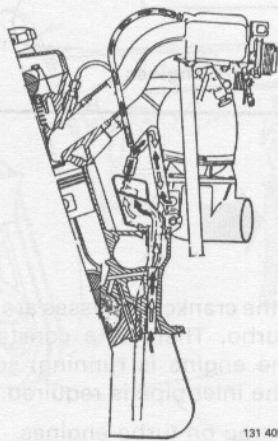
- 1 Loosen the mounting bolts **A** between the exhaust pipe's bracket and the bracket on the transmission box.
- 2 Mount and align the entire system.
- 3 Tighten the nuts **B** front pipe-manifold.
- 4 Tighten the mounting bolt **C** bracket-front pipe. Make certain that the bracket on the exhaust pipe rests against the bracket on the transmission box and tighten bolts **A**.
- 5 Tighten the clamps **D** silencer-pipe.
- 6 If necessary, tighten catalytic converter **E**.
- 7 If necessary, tighten link **F**.
- 8 Check that the system does not contact against the body. Adjust as necessary.

ET and FT engines

- 1 Loosen the bolt **A** between the bracket and the mounting iron.
- 2 Suspend and align the entire system.
- 3 Tighten the nuts **B**; front pipe-manifold.
- 4 If necessary, tighten mounting bolt **C** bracket-front pipe.
- 5 If necessary, tighten mounting bolt **D** bracket-engine.
- 6 Tighten mounting bolt **E** mounting iron-front pipe.
- 7 Tighten mounting bolt **A** mounting iron-bracket.
- 8 Tighten the clamps **F** silencer-pipe.
- 9 If necessary, tighten link **G**.
- 10 Check that the system does not knock against the body. Adjust as necessary.

138 660

R. Crankcase ventilation

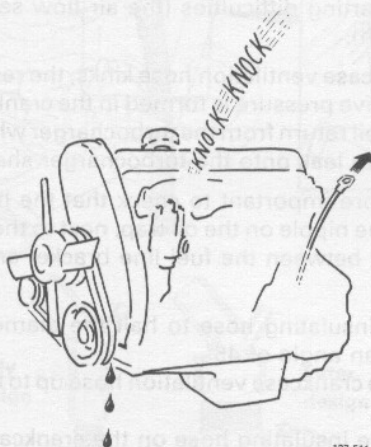


R1

Cleaning/checking

- clean/check hoses
- clean the calibrated nipple (does not apply to turbo engines)
- clean/replace flame trap (does not apply to turbo engines).

A, E, F-engines 1975–80. see page	46
Turbo engines see page	46
A, E, F-engines 1981–85 see page	47



R2

Blocked flame trap/blocked system

A blocked flame trap will cause the crankcase ventilation system to malfunction and result in high crankcase pressure.

Symptoms are:

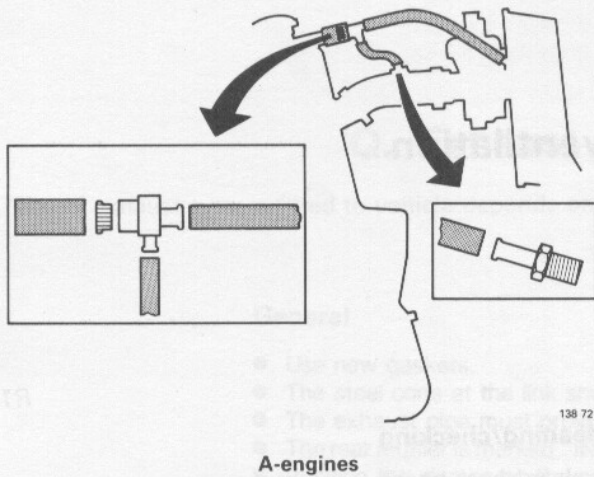
- oil dipstick "jumps out" of the pipe
- oil leakage at the seals in the cylinder block
- seals need not always be replaced if they are leaking due to a blocked flame trap. Fix the flame trap, clean the engine and check whether the seals are leaking or not
- the engine knocking (change to a new flame trap if necessary).

Reasons for a blocked flame trap may be:

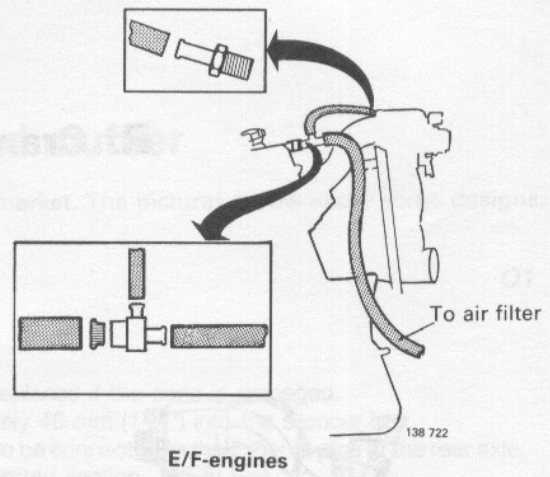
- too long intervals between changing the engine oil
- the engine oil used is of inferior quality

R3

A, E and F-engines 1975–80



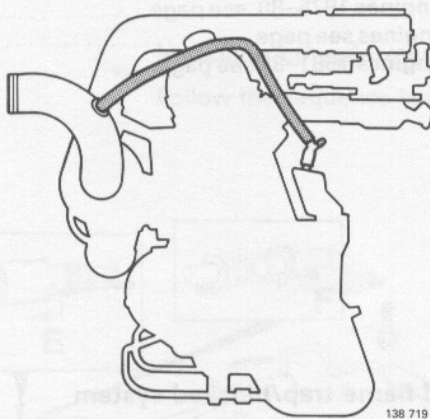
A-engines



E/F-engines

Turbo engines

R4



On turbo engines the crankcase gasses are vented "upstream" of the turbo. There is a constant negative pressure when the engine is running, so no further connection with the inlet pipe is required.

There is no flame trap on turbo engines.

R5

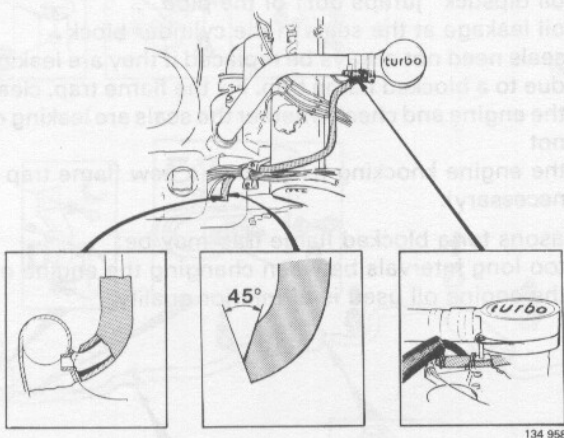
Crankcase ventilation hose

An incorrectly installed crankcase ventilation hose may result in starting difficulties (the air flow sensor plate does not lift).

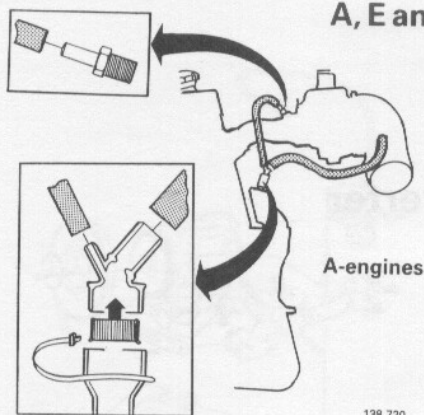
If the crankcase ventilation hose kinks, the result will be that a positive pressure is formed in the crankcase. This blocks the oil return from the turbocharger which in turn causes oil to leak onto the turbocharger shaft seals.

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.

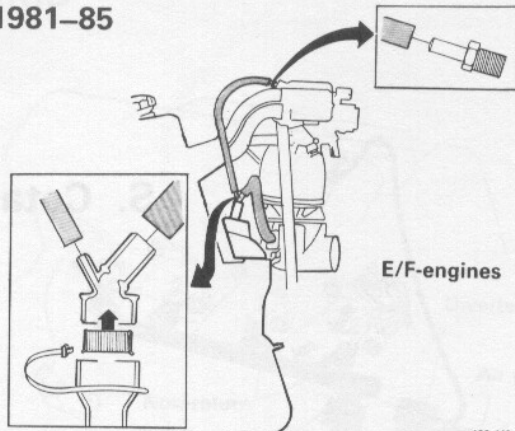
- 1 Cut the insulating hose to half the diameter of the hose at an angle of 45°.
- 2 Press the crankcase ventilation hose up to the bead in the pipe.
Install the insulating hose on the crankcase ventilation hose so that it fits tightly against the pipe.
- 3 Pull the crankcase ventilation hose over the cold start injector.



A, E and F-engines 1981-85

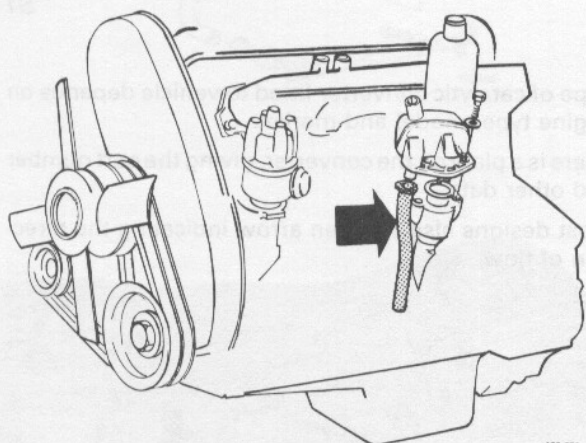


138 720



138 449

R6



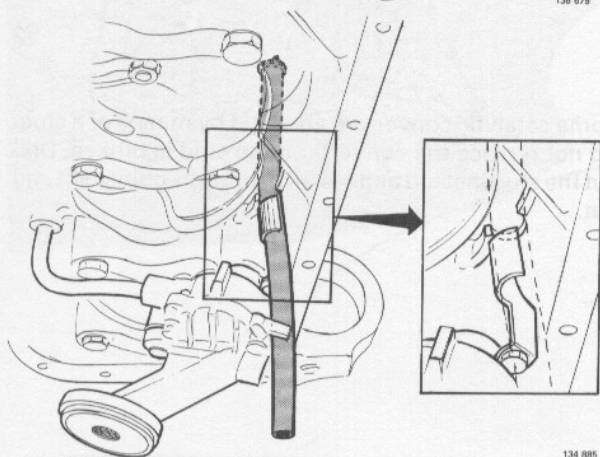
138 678

Drain hose

To ensure that the crankcase ventilation functions correctly the drain hose must be correctly installed, with the outlet underneath the oil level in the oil sump.

If the drain hose is incorrectly installed or if it is too short, it is possible that the crankcase ventilation will not function. The hose may, in addition, make contact with the crankshaft and be damaged.

R7

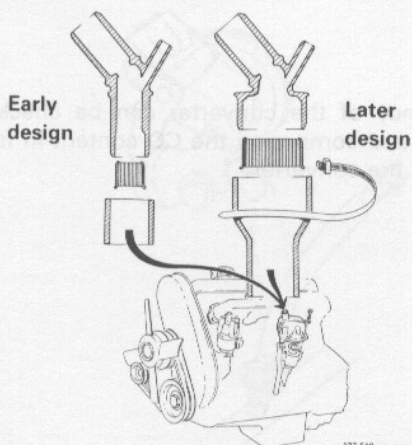


134 985

When removing oil trap:

Make sure that the drain hose does not come up as well. If so, the oil sump must be removed to ensure that the hose takes up the correct position when installed.

R8



137 510

Flame trap

Parts of a later design were introduced on models 1983. If need be, these can also be installed on cars of an earlier model.

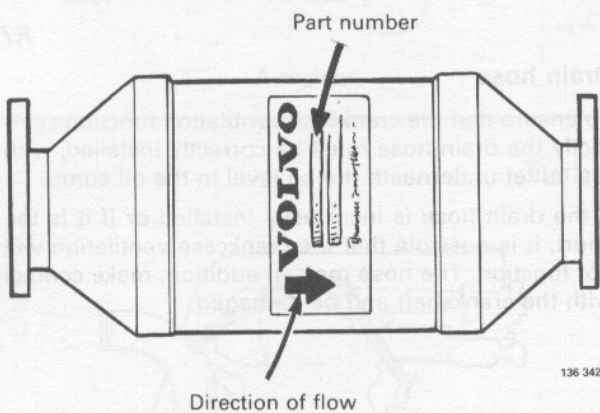
Flame trap of a later design has larger channels and a larger diameter than those of a previous design.

Note (Applies to both designs)

- The flame trap must be checked and, if necessary, cleaned/replaced at ordinary service intervals.
- The flame trap must be **positioned in the T-piece**.

R9

S. Catalytic converter

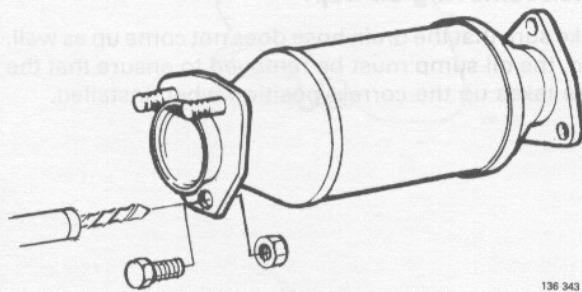


S1

Type of catalytic converter fitted to vehicle depends on engine type, model and market.

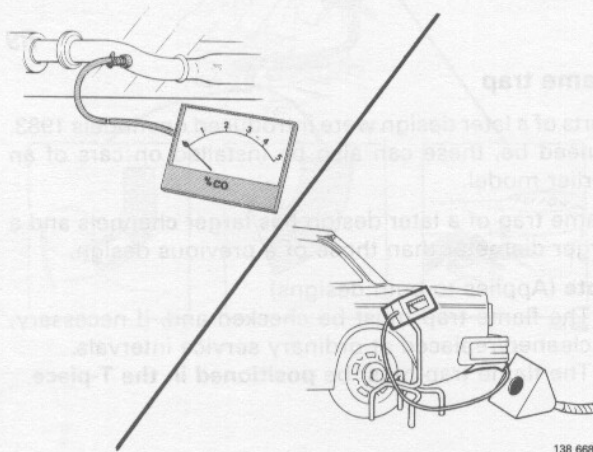
There is a plate on the converter, giving the part number and other data.

Most designs also have an arrow indicating the direction of flow.



S2

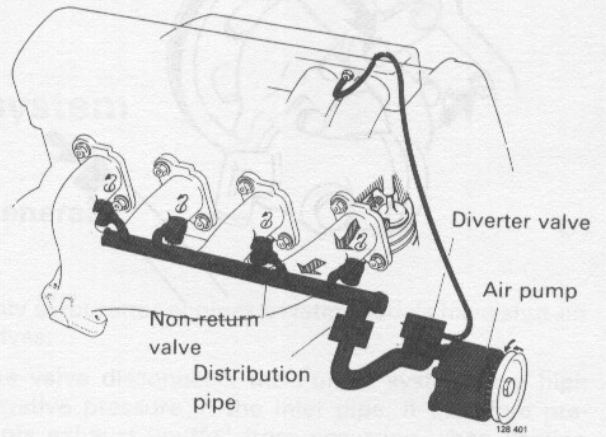
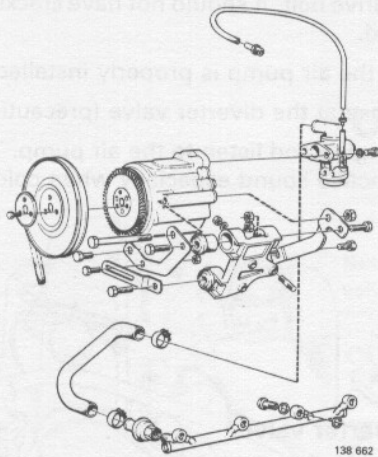
Some catalytic converters are fixed by means of a stud. Do not replace the converter if the stud is broken. Drill out the stud instead and install a through-going bolt and nut.



S3

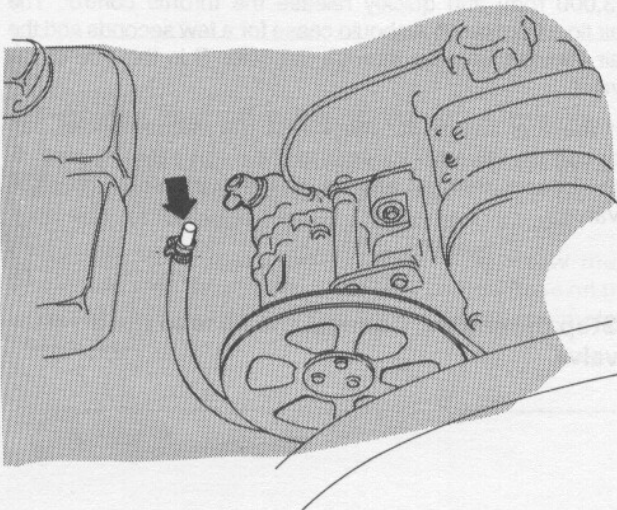
The efficiency of the converter can be checked by measuring and comparing the CO content in front of and behind the converter.

T. Air pump



IMPORTANT

- The air pump must not be dismantled or lubricated. If faulty, it must be replaced as a complete unit.
- Never block the outlet from the diverter valve because this may damage the air pump.



118 685

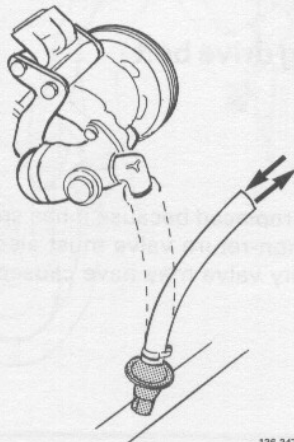
T1

General

The air pump must be disconnected and plugged when checking/adjusting the CO content, since the values will otherwise be incorrect.

IMPORTANT

Under no circumstances must the CO content be adjusted after the air pump has been connected.



136 347

Checking system function

Operations T2-5.

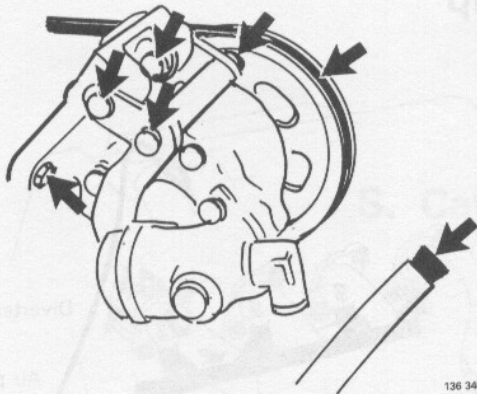
T2

Check non-return valve

Remove the hose from the diverter valve.

Blow and suck alternately in the hose to check the function of the non-return valve.

T3



Check air pump with drive belt

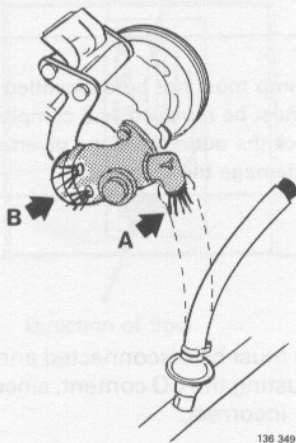
Check the drive belt; it should not have cracks, be worn or damaged.

Check that the air pump is properly installed.

Plug the hose at the diverter valve (precaution).

Start the engine and listen to the air pump. The pump has a distinctive sound especially when cold.

T4



Check diverter valve

The hose from the diverter valve must be plugged.

Let the engine idle. Air should now be blown out from the outlet of the diverter valve (A).

Increase the engine speed to approximately 50 rps (3,000 rpm) and quickly release the throttle control. The air flow from outlet A should cease for a few seconds and the air should come out through the holes B in the side of the valve.

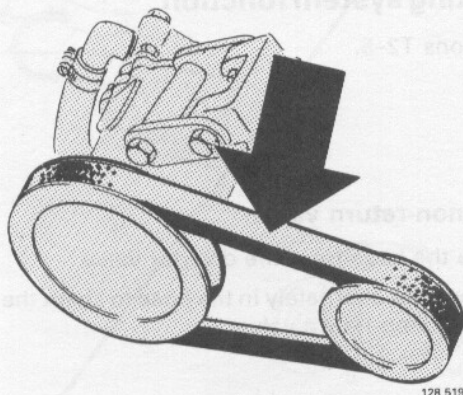
If there is any fault, check first the vacuum hose between the diverter valve and the engine's inlet pipe. If the hose is without any faults, test with a new diverter valve.

T5

Stop the engine. Connect the hose to the diverter valve

Changing drive belt

T6



If the belt is replaced because it has snapped, the function of the non-return valve must also be checked because a faulty valve may have caused the damage.