

Service Manual

Volvo 240 1975

VOLVO

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Service Procedures
Description and theory of operation

Service Procedures generally start with Specifications and Tools pertaining to the section.

The Section Number (1 digit) and Group Number (2 digits, the first one always being the same as the Section Number) guide all parts of the Volvo Publication Systems: Service Manuals, Flat Rate Manuals, Service Bulletins, as well as Spare Part Catalogue etc.

The repair instructions generally assume that special tools are used. They are based on experience gained from method studies. Similar results may be obtained with other working methods, but we are convinced that the instructions in this Manual will achieve the best results in the shortest possible time.

AB VOLVO

Göteborg ● Sweden

Section 1

Servicing and Maintenance

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7500-Mile Service

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7500-Mile Service

Introduction

This maintenance instruction manual is printed in a "Work Method Sequence" — a recommended step by step work procedure to assist in performing the maintenance in an efficient and logical manner.

NOTE

Do not add or eliminate any work steps until the *complete maintenance schedule* has been studied or performed.

MAINTENANCE INTERVALS

- 7 500 miles — All maintenance items shown are to be serviced or inspected every 7 500 miles
- 15 000 miles — Any maintenance item shown at 15 000 miles is to be *added* to the 7 500 mile items at *each* 15 000 mile interval (15 000; 30 000; 45 000; 60 000; 75 000; and 90 000 mile intervals)
- 30 000 miles — Any maintenance item shown at 30 000 miles is to be *added* to the 7 500 mile *and* 15 000 mile items at *each* 30 000 mile interval (30 000; 60 000; 90 000 mile intervals)
- 45 000 miles — Any maintenance item shown at 45 000 miles is to be *added* to the 7 500 mile, 15 000 mile, and 30 000 mile intervals at *each* 45 000 mile interval (45 000 and 90 000 mile intervals)

Specifications

ENGINE

	Metric	US measurem.
Valve clearance	0.40–0.45 mm	0.016–0.018"
CO	1.0–1.5 %	(AIR INJECTION DISCONNECTED)
Engine idle speed		
Manual transmission	900 rpm	
Automatic transmission	800 rpm	
Fuel pressure		
Control pressure, hot engine	4.5–5.2 kp/cm ²	64–74 psi
cold engine	3.7 ± 0.2 kp/cm ²	52.5 ± 2.5 psi
Rest pressure	1.5–2.5 kp/cm ²	23–34 psi
	1.7–2.4 kp/cm ²	24–34 psi
Engine oiling system		
Oil capacity, incl. oil filter	3.75 dm ³	4.0 US qts
Radiator test		
(no noticeable pressure drop within 30 seconds)	0.7 kp/cm ²	10 psi

ELECTRICAL SYSTEM

Battery

Voltage	12.0 V
Starting voltage	9.5 V
Specific gravity of electrolyte:	
Fully charged battery	1.28
When re-charging is required	1.21

Alternator

Control voltage (measured between battery poles) 13.0–15.0 V

Ignition coil

Starting voltage	minimum 20 kV
Voltage available	maximum 25 kV

Spark plugs

Gap	0.7–0.8 mm	0.028–0.032"
Torque	3.5–4.0 kpm	25–29 lb.ft.

Distributor dwell angle

Max. variation at various rpms with
connected and disconnected vacuum unit 2°

Ignition timing

At 600–800 rpm, vacuum unit disconnected	5° BTDC
At 2 500 rpm, vacuum unit disconnected:	
Manual transmission	21–26° BTDC
Automatic transmission	22–27° BTDC
At 600–800 rpm, vacuum unit connected (retard)	2° BTDC to 2° ATDC

POWER TRANSMISSION

Clutch

Clutch fork play	3—4 mm	0.12—0.16"
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Transmission oil capacity

M 40	0.75 dm ³	0.8 US qts
M 41	1.6 dm ³	1.7 US qts
BW 35	6.4 dm ³	6.8 US qts

Rear axle oil capacity	1.3 dm ³	1.2 US qts
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FRONT END

Wheel alignment, unloaded vehicle

Camber	+1° to 1.5°	
Toe-in	4.5—7.5 mm	0.18—0.30"

WHEELS

Tires

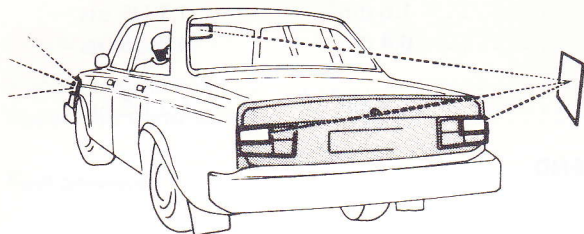
Smallest permissible thread depth	1 mm	3/64"
Tightening torque for wheel nuts	10—14 kpm	75—100 lb.ft.

Tire pressure

Front	1.8 kp/cm ²	26 psi
Rear	1.9 kp/cm ²	27 psi

Safety and /or Convenience Item Inspection

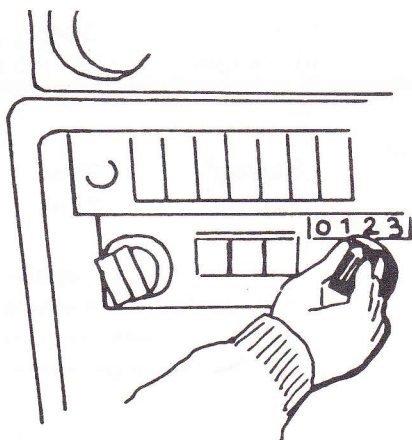
(TO BE PERFORMED AT CUSTOMER'S REQUEST)



Hazard warning flasher

Press in the switch. Check that all turn signal lights flash and that the control light in the switch also flashes.

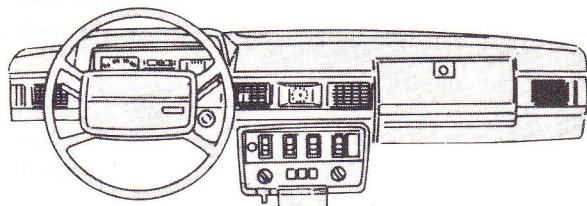
Switch off.



Blower

Check that the blower works in all positions.

Let the blower run on max. rpm.



Heater controls

Put all controls in positions where all valves are closed. Heater control on Cold.

Open the defroster valve. Check that air is blowing.

Open the floor valve. Check that the air is blowing.

Check that air is blowing to the rear seat.

Run the engine until hot.

Check that the air still is cold.

Open the heater control. Check that the air blows warm.

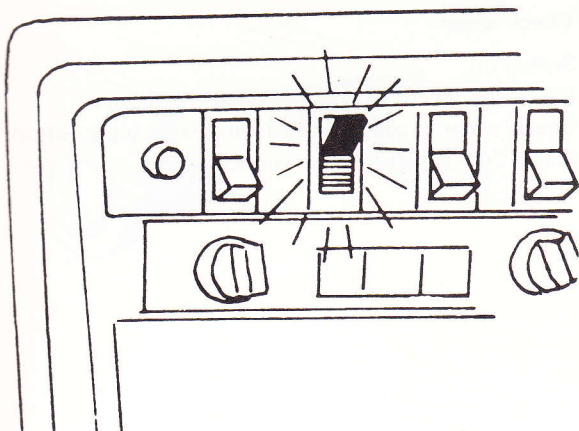
Check that air blows from all outlets on the instrument panel.

Switch off the blower.

Check that the Rec valve operates (listen to valve functioning when depressing the button).

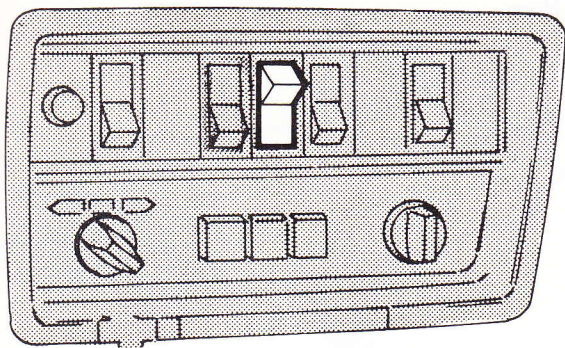
Stop the engine.

Turn the ignition key to driving position.



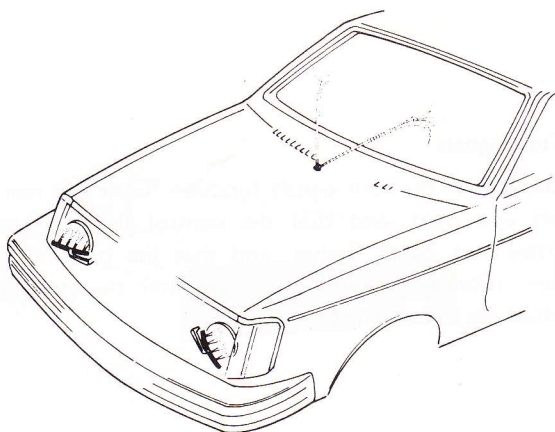
Electrically heated rear window

Press in the switch for the electrically heated rear window. Check that the light in the switch comes on. Switch off.



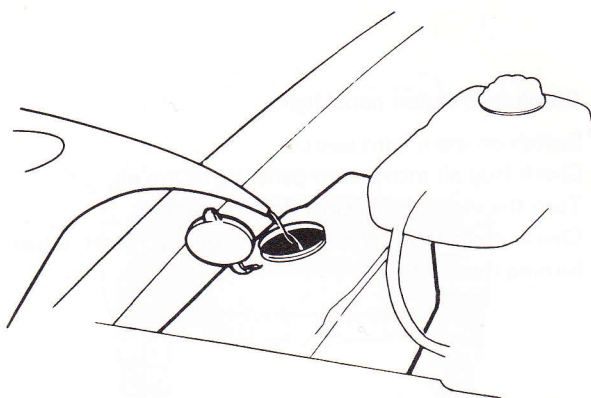
Check AC

Press in the AC switch. Check that the magnetic clutch functions.



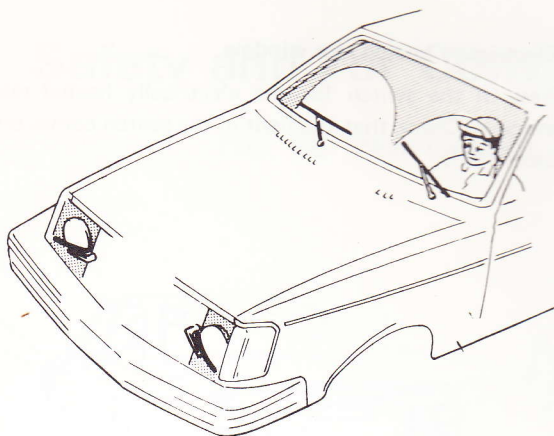
Window washer

Check that the window washer operates.
Model 245: check tail gate washer.



Fill washer fluid reservoir

Fill washer fluid.
For model 245: also fill the tail gate washer reservoir.



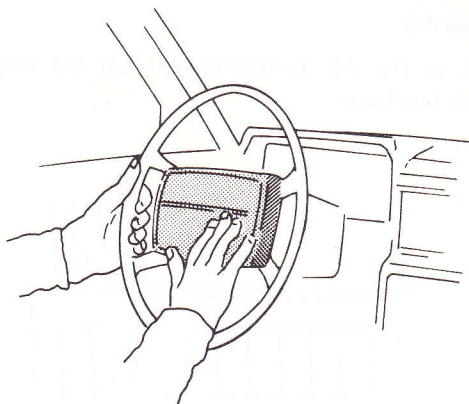
Check wiper

Switch on.

Check the speeds in first and second positions.

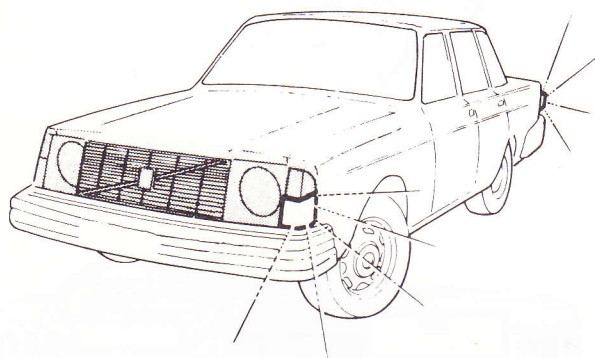
Check wiper blade alignment and stopping position.

Model 245: check tail gate window wiper.



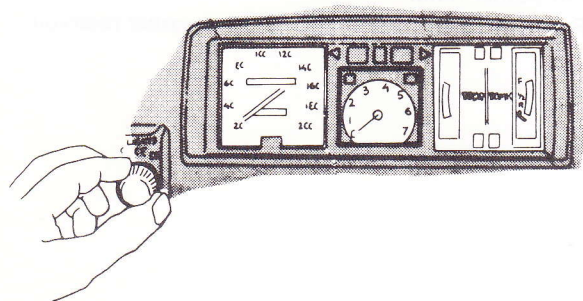
Horn

Depress the horn bar on various places. Check that the horn operates.



Turn signals

Check that the turn signals function, front and rear, left and right, and that the control light on the instrument panel flashes, and that the turn signal lever returns to middle position after the steering wheel has been turned.



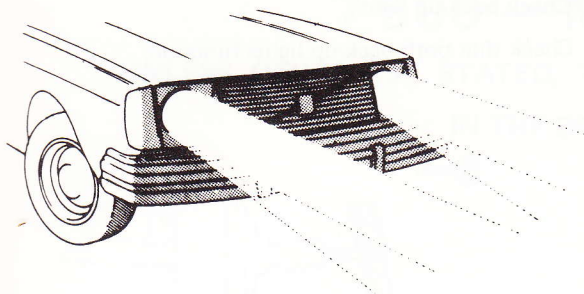
Check instrument panel lights

Switch on main light switch.

Check that all instrument panel lights are on.

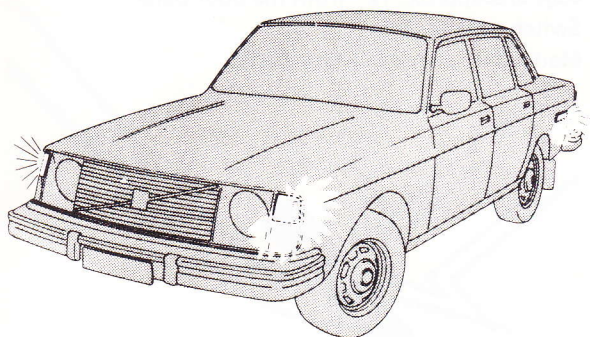
Turn the instrument panel light rheostat.

Check that the light increases or decreases when turning the knob.



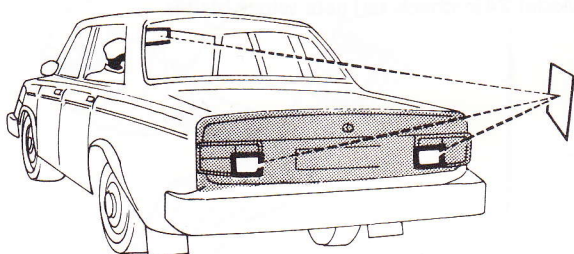
Check headlights and light switch

Put the light switch in high beam position. Switch between high and low beams, using the shifting lever. Check in high beam position that headlights and indicator light are on. Check in low beam position that low beam lights are on and the high beam indicator light is out.



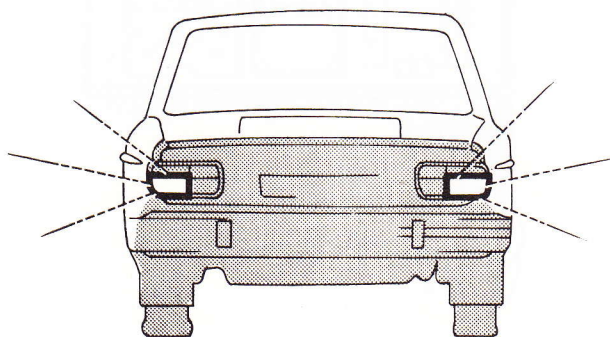
Check parking lights and side marker lights

Check that all lights function.



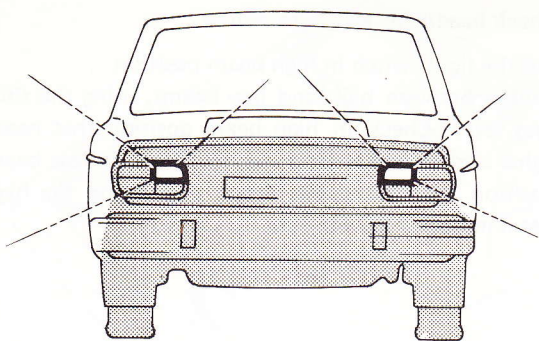
Check brake light function

Depress the brake pedal. Check brake light function.



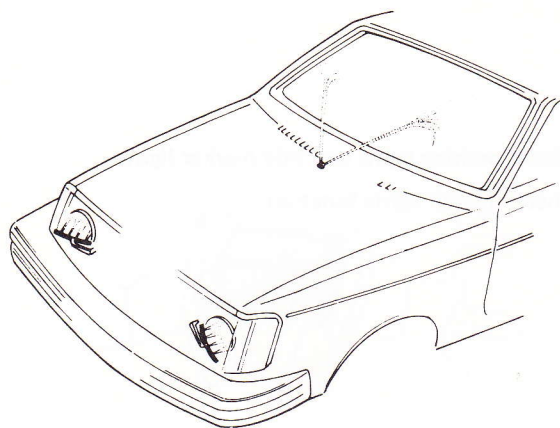
Check tail lights

Check that the tail lights function.



Check back-up light

Check that both back-up lights function.

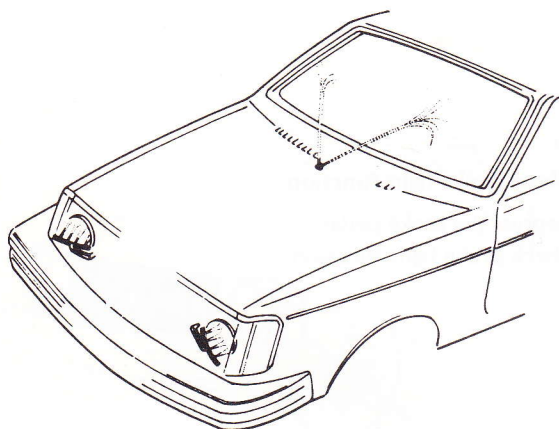


Adjust washer jets

The jets should hit the window 4-8" from the upper edge and approx. 12" from the door pillar.

Switch off the wiper.

Model 245: check tail gate washer.

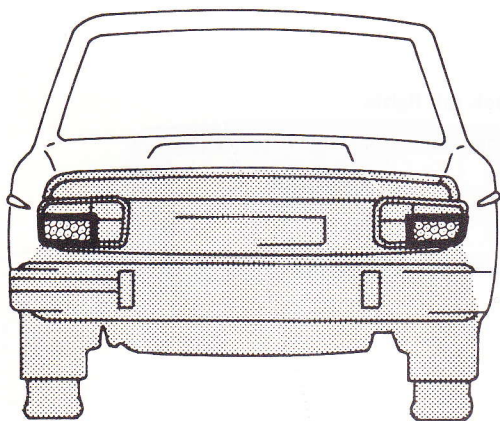


Check wiper blade condition

Check blade alignment.

Check that the blades are in order and free from impurities.

Model 245: check tail gate wiper blades.



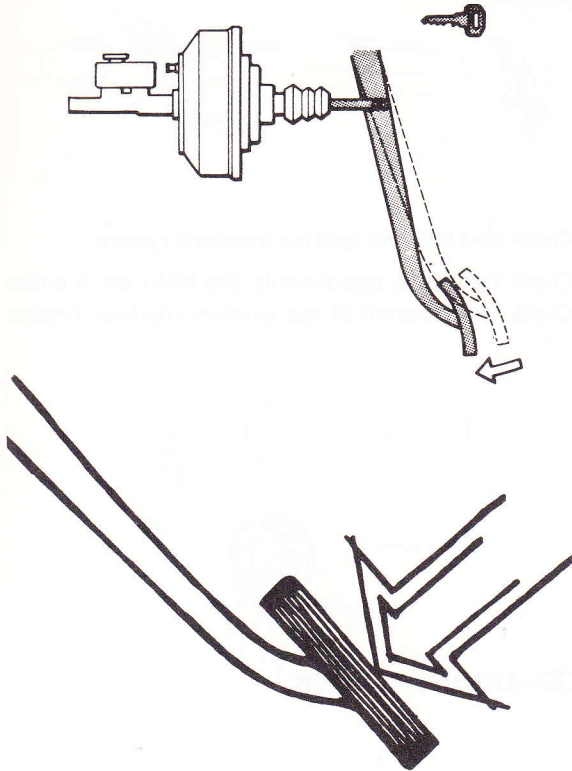
Reflectors and lenses

Check for damages.

7 500 — Mile Service

UNLESS OTHERWISE STATED, THE INTERVALS ARE 7 500 MILES.

IN THE DRIVER'S SEAT



Check power brake function

Remove vacuum by depressing the pedal 5 times.

Depress the brake pedal.

Start the engine.

The pedal position should drop if the power brake functions.

Release the pedal.

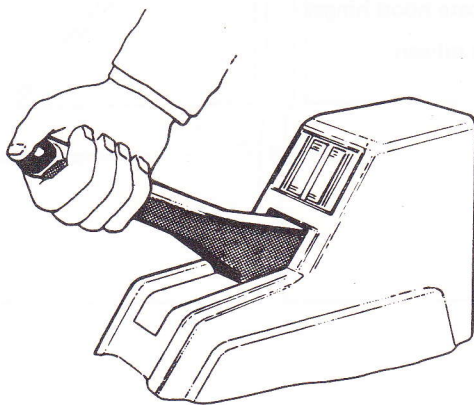
Pressure-test the brake system

Keep the brake pedal depressed 20 seconds with low pedal pressure.

Repeat with high pedal pressure for 5 seconds.

The pedal position may not drop (signs of leakage).

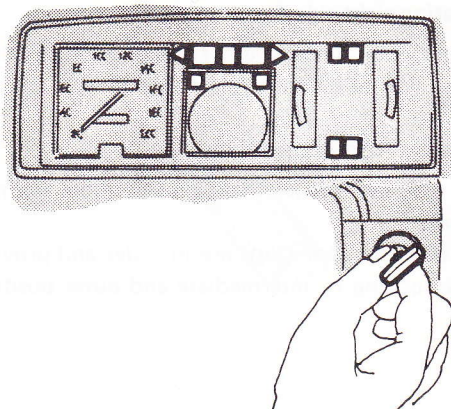
Release the pedal.



Check parking brake play

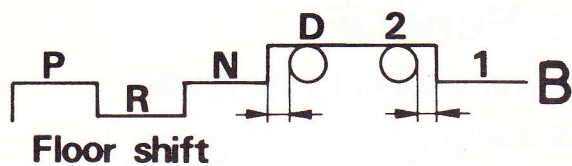
Apply the parking brake. Full brake effect should be reached after 4—5 notches. Check that the catch is working.

Check that a reminder light functions.



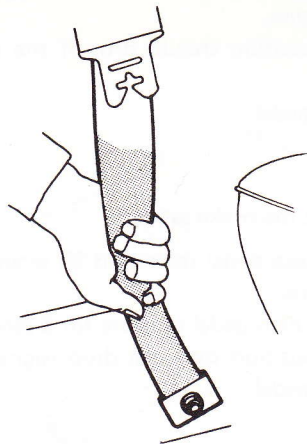
Warning lights

Turn the ignition key to driving position. Check that warning lights for charging, bulb failure, brake failure and oil pressure come on. Start the engine. Check that the lights go out.



Check gear selector control for automatic transmission

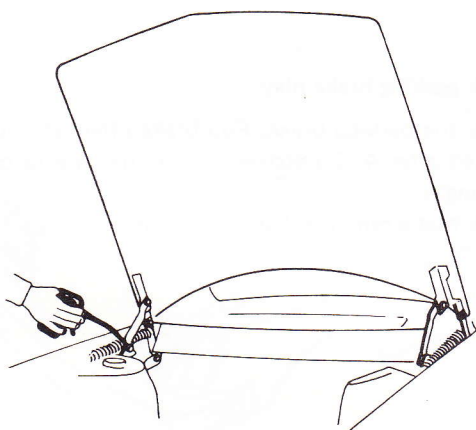
The play in position D towards position N shall be greater or the same as the play in position 2 towards position 1.



Check seat belt and ignition interlock system

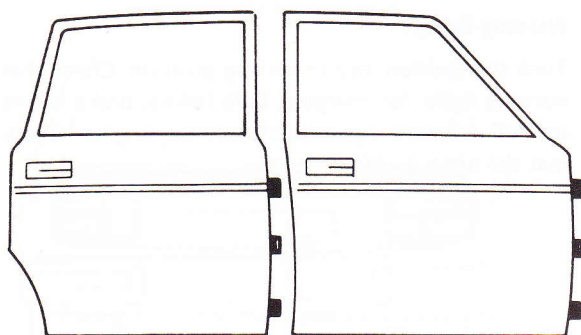
Check that belts, attachments and locks are in order.
Check the function of the ignition interlock system.

CAR EXTERIOR—HOOD—DOORS—TRUNK



Lubricate hood hinges

Use an oil can.

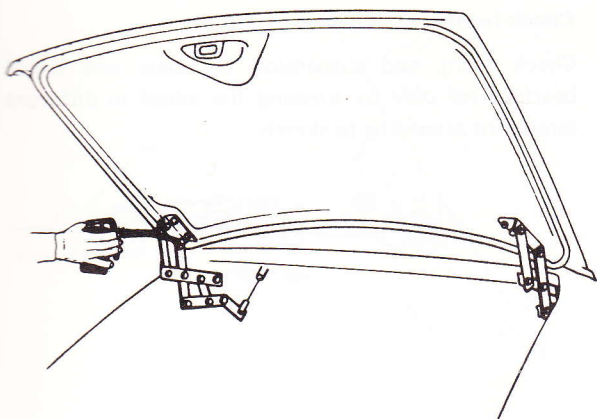


Lubrication right side doors

Lubricate door hinges, door stops and striker plates.
Use door wax to lubricate the door stops.

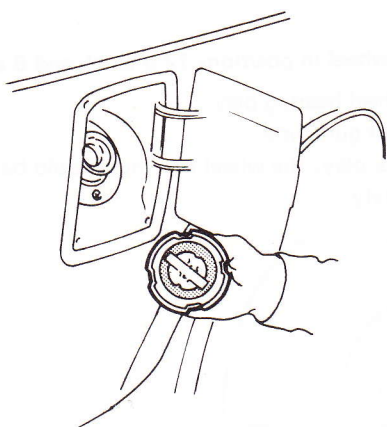
Door latches and door stops

Check that the latches lock in both outer and inner positions.
Check that the door stops are in order and provide a positive locking in intermediate and outer positions.



Trunk lid (for model 245: tail gate), lubrication

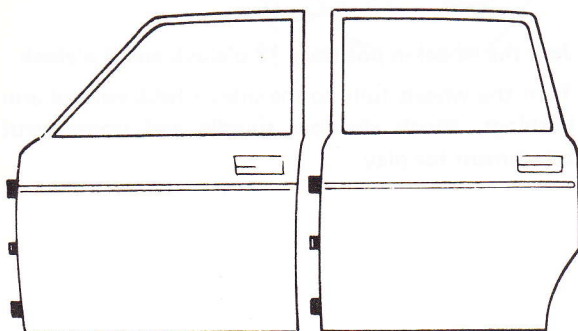
Lubricate lid/gate hinges.



30 000 miles

Check filler cap gasket

Check gasket and sealing surfaces for damages.



Lubrication left side doors

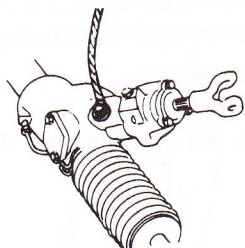
Lubricate door hinges, door stops and striker plates. Use door wax to lubricate the door stops.

Door latches and door stops

Check that the latches lock in both outer and inner positions.

Check that the door stops are in order and provide a positive locking in intermediate and outer positions.

FRONT END—ON THE HOIST



Check steering gear

Turn the steering wheel back and forth with the wheels resting on the floor.

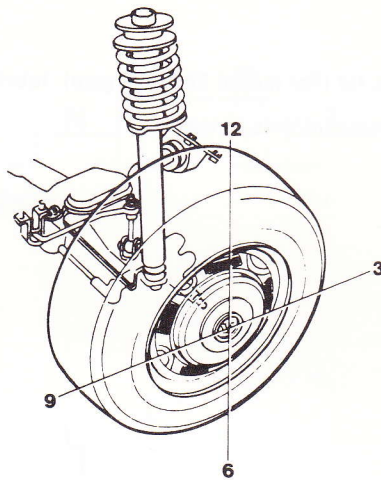
Check steering wheel play with the wheels pointing straight forwards.

Jack up the front end and put stands under the control arms close to the wheels.

Turn the steering wheel fully to right and left positions.

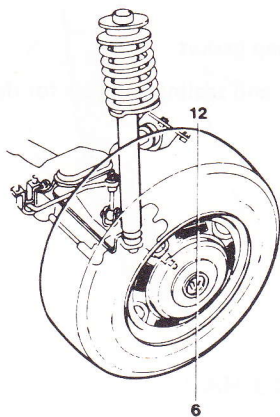
Check steering effort.

Check steering gear for play.



Check front end suspension for wear

Check front end suspension for wear and wheel bearings for play by pressing the wheel in different directions according to sketch.

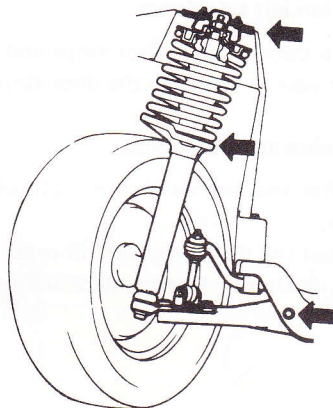


Jerk the wheel in positions 12 o'clock and 6 o'clock

Check wheel bearing play.

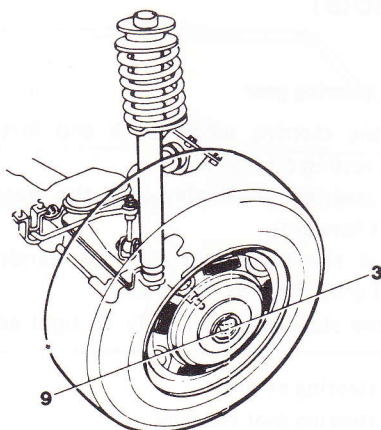
Judgement guideline:

If there is play, the wheel bearings should be serviced immediately.



Jerk the wheel in positions 12 o'clock and 6 o'clock

Turn the wheels fully to the sides. Check control arm bushings, shock absorber spindle and upper strut attachment for play.

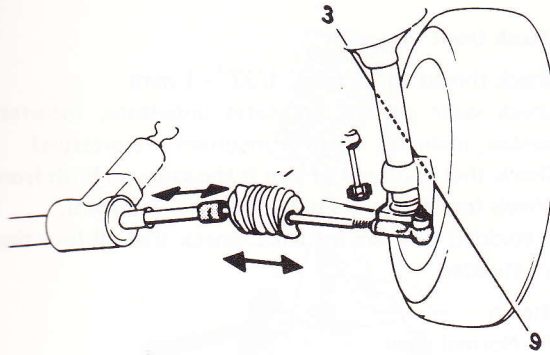


Jerk the wheel in positions 3 o'clock and 9 o'clock (the wheels pointing straight forwards)

Check steering rod play.

Judgement guideline:

Radial play is not permitted and should be remedied immediately.



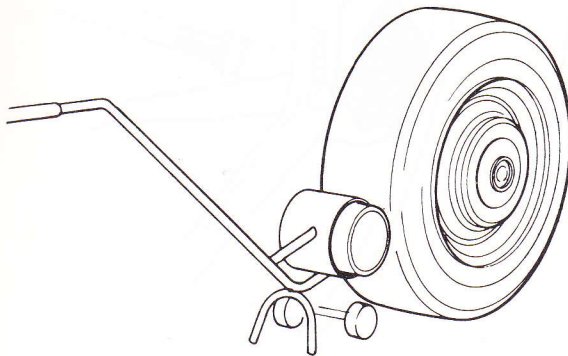
Jerk the wheel in positions 3 o'clock and 9 o'clock

Check rack axial play and inner steering rod joint.

Judgement guideline:

Maximum play for rack: $0.08'' = 2 \text{ mm}$.

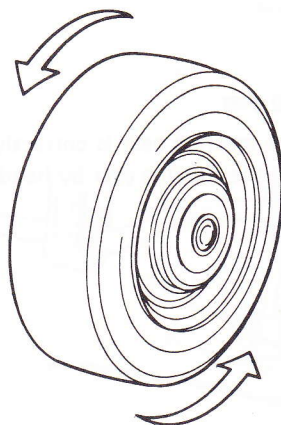
Maximum play for steering rod: $0.04'' = 1 \text{ mm}$.



Check front wheel balance

Spin the front wheel with a wheel spinner.

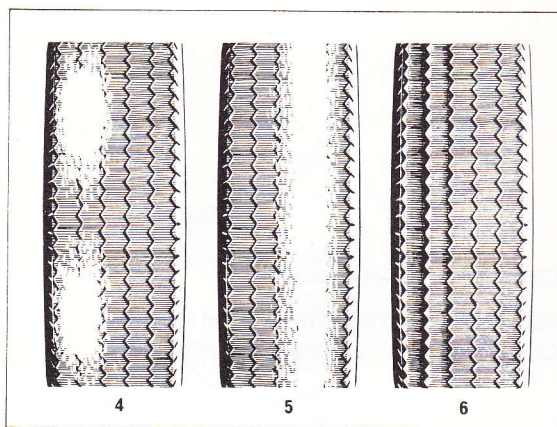
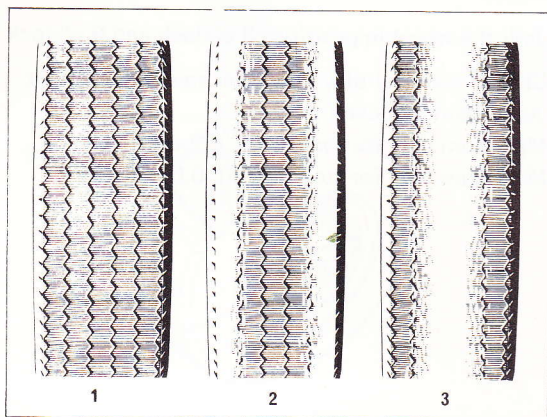
Check balance by observing vibrations.



Check conditions of front wheel bearings

Also check the wheel bearings for noise.

NOTE: Wheel bearings which are not tight can cause noise.



Check front tires

Check thread depth (min. $1/32'' = 1 \text{ mm}$).

Check wear pattern (indicates unbalance, incorrect camber, incorrect toe-in or incorrect tire pressure).

Check that the type of tire is the same on both front wheels (radial — cross-ply — thread — studded).

If studded tires are installed, check that all four tires are studded.

Shown:

1 = Normal wear

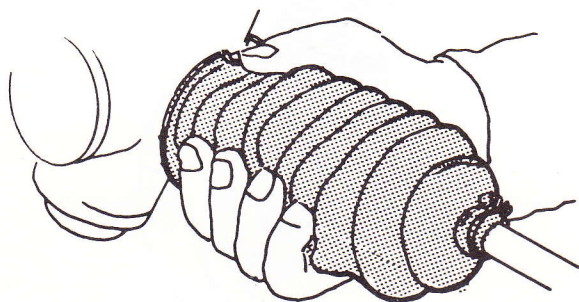
2 = Air pressure too low

3 = Air pressure too high

4 = Wheel unbalance

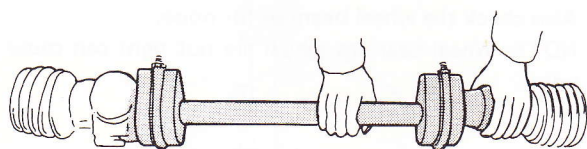
5 = Incorrect camber

6 = Incorrect toe-in



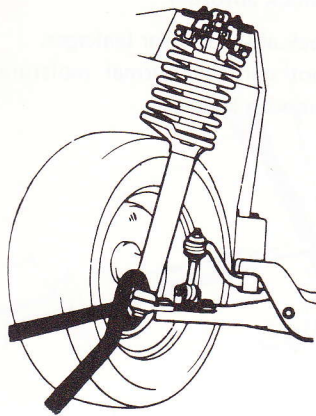
Check rubber bellows

Check the steering gear rubber bellows for damages.



Check steering gear

Check that the steering gear is correctly attached by trying to move the steering gear by hand.



Check ball joints

Vehicle resting on the wheels.

Use special tool for check.

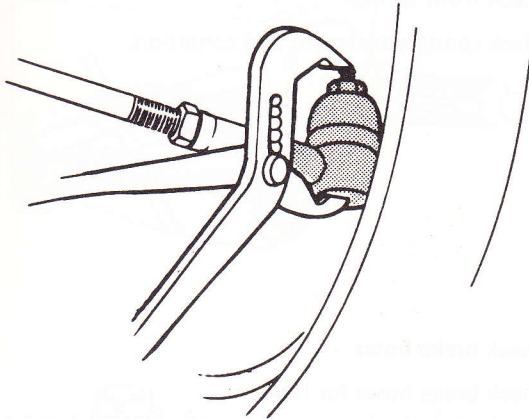
Check rubber bellows.

Guidelines:

Tool does not fit = Service immediately

Rubber seals damaged = Service immediately

Axial play: max. $5/32'' = 5 \text{ mm}$.



Check steering rod

Check rubber seals for damages.

Check that the nuts are locked. If not, correct immediately.

Check steering rods for damages.

Turn the steering rods with a pair of pliers.

Check that the joint does not have any wear edge.

Tighten the joints with a pair of pliers.

Check for axial play.

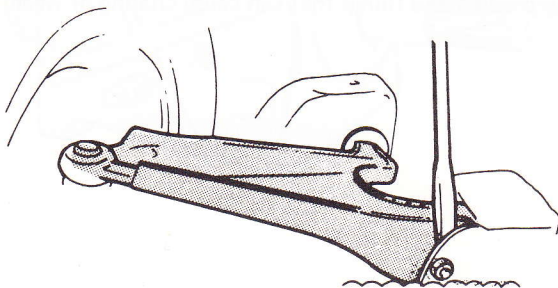
Judgement guidelines:

Rubber seal damaged = Service immediately

Rod damaged = Service immediately

Joint worn = Service immediately

Axial play for joint = Max. $1/8'' = 3 \text{ mm}$.



Check control arms

Check the control arms for damages.

Check control arm bushings, using a pry bar.

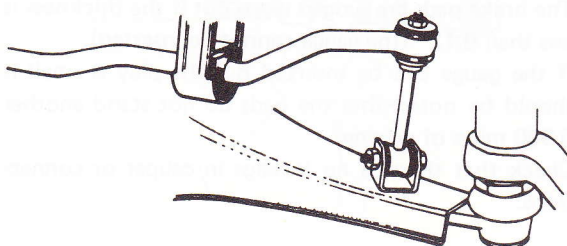
Check for wear, cracks or other damages.

Guidelines:

Control arm damaged = Service immediately

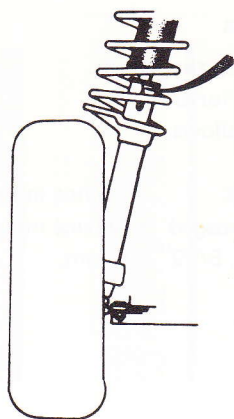
Bushing play = Service immediately

Bushing damaged = Service immediately



Check stabilizer

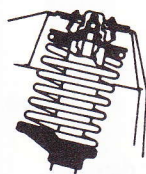
Check attachment and rubber bushing.



Check front shock absorber

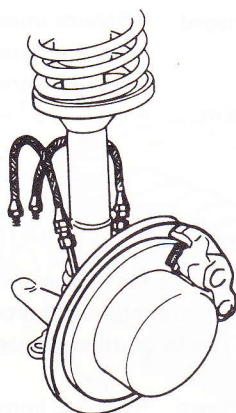
Check the shock absorbers for leakages.

NOTE: Do not confuse normal moisture from the shock absorber with leakage.



Check front springs

Check spring attachment and condition.



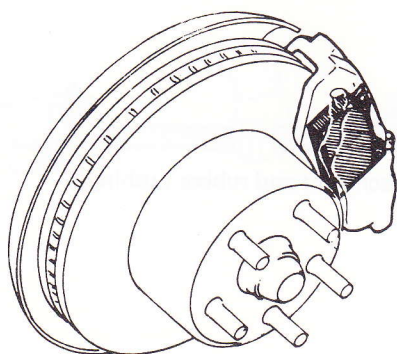
Check brake hoses

Check brake hoses for leaks.

Check that the hoses are correctly installed and not loosely attached.

Check that the brake hoses are not chafed.

Check that the brake hoses otherwise are free from sharp edges and things that can cause chafing or wear.



Check front wheel brakes

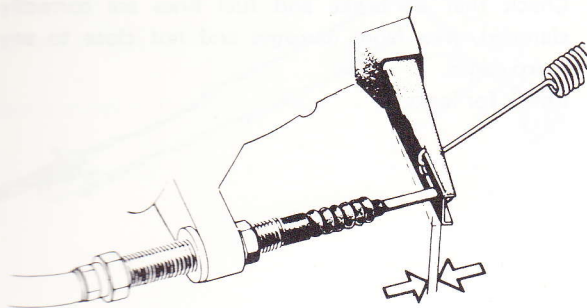
Use a mirror and a gauge 0.12" = 3 mm to check the thickness of the brake pads.

The brake pads are judged worn out if the thickness is less than 0.12" (the gauge cannot be inserted).

If the gauge can be inserted but the play is small it should be noted that the pads do not stand another 6 000 miles of driving.

Check that there is no leakage in caliper or connections.

UNDER THE CAR



Check clutch play

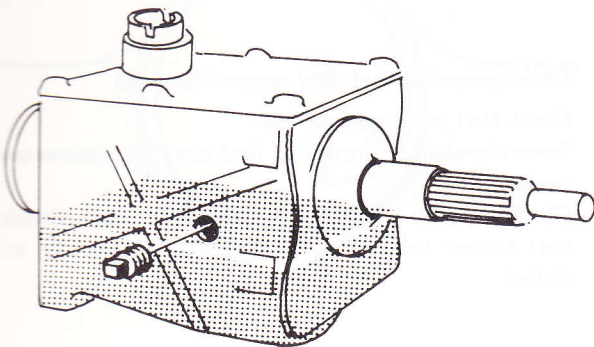
Check the free play of the clutch fork.

It should be $0.12 - 0.2'' = 3-5$ mm.

Hydraulic clutch control, check master and slave cylinder for leaks. (Brake fluid acc. to DOT3 or DOT4)

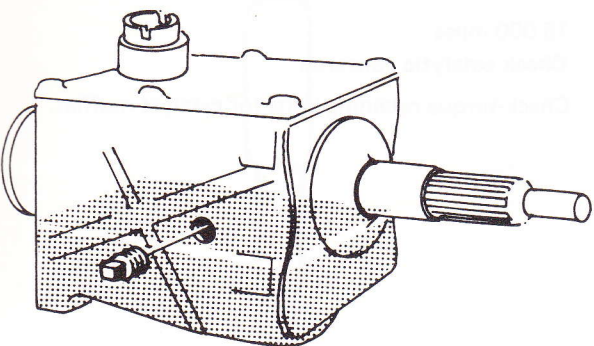
Adjust clutch play

Adjust the play for the clutch fork.



Check transmission

Check for oil leaks.



30 000 miles

Manual transmission, change oil

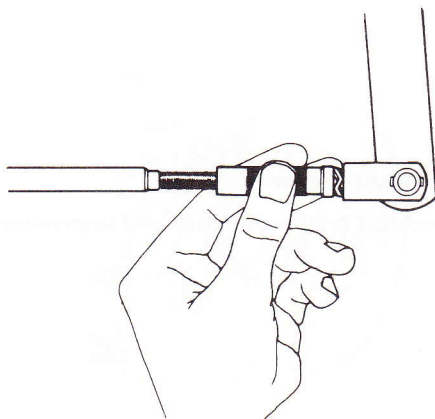
Remove drain and level plugs. Clean the plugs and install the drain plug.

Fill oil and install the level plug.

Check for leaks.

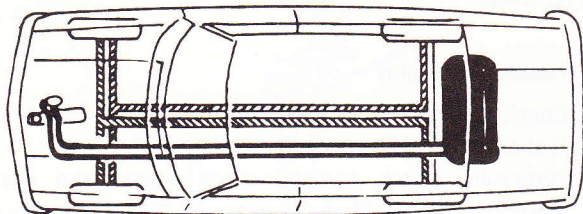
Standard transmission: Capacity 0.8 qt transmission oil SAE 80W/90 or SAE 80/90.

W. overdrive: 1.7 qts engine oil SAE30 or SAE20W/40.



Automatic transmission, adjust gear selector

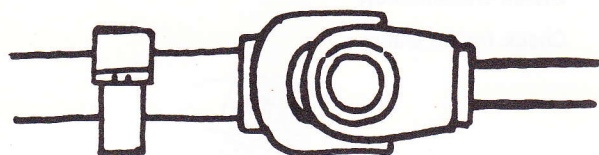
Floor shift.



Check brake and fuel lines

Check that all brake and fuel lines are correctly clamped, free from damages and not close to any sharp edges.

Check for leaks.

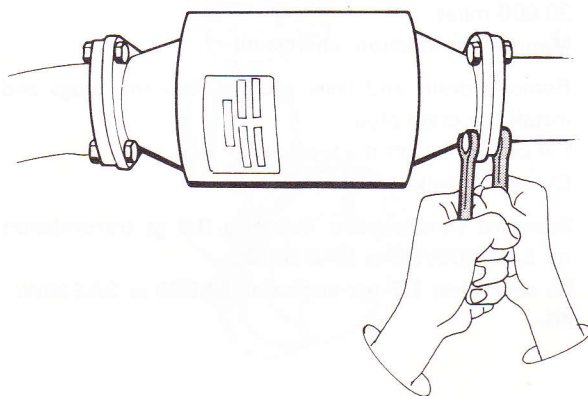


Check propeller shaft and support bearings

Check that joint bolts are tight.

Turn the shafts in order to find out if the joints are worn.

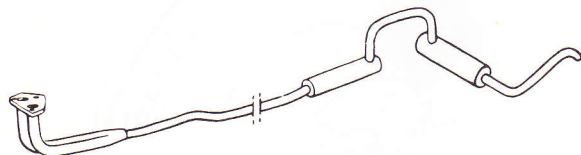
Check support bearings and retainer for play. Check that rubber bellows are in order and correctly installed.



15 000 miles

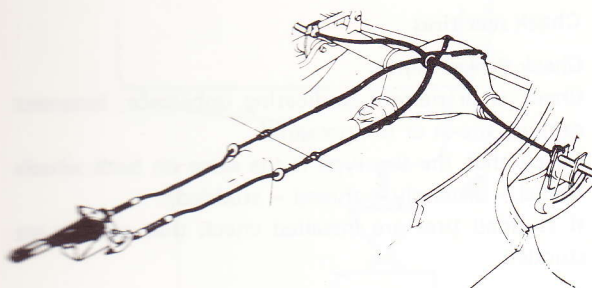
Check catalytic converter

Check-torque retaining bolts for catalyst muffler.



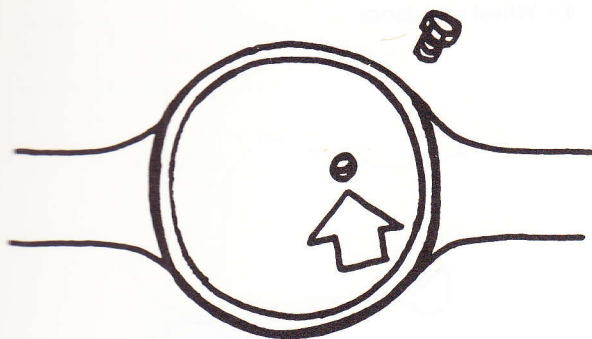
Check exhaust system

Check exhaust system condition and suspension.



Check parking brake

Check that rubber bellows, outer cables and suspensions are in order.



Check rear axle

Check for oil leaks.

Check rear axle oil level

If necessary fill oil to correct level.

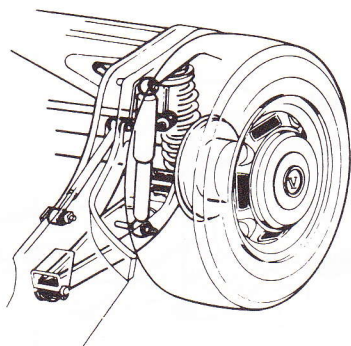
Capacity: 1.75 qts (1.6 dm³)

Oil quality: Rear axle oil according to MIL-L-2105 B,
Viscosity: SAE 90 (SAE 80 when the temperature is steadily below 15°F (-10°C))



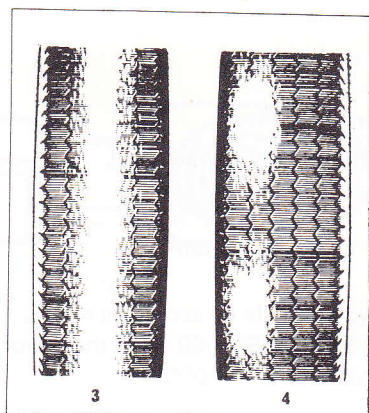
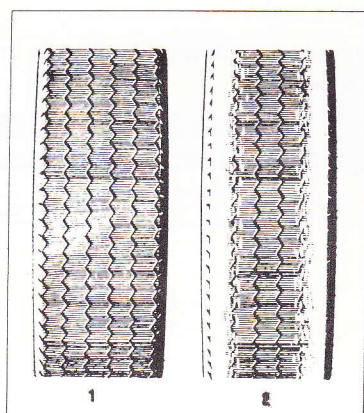
Check rear shock absorbers

Check shock absorber attachment by hand.
Check for leaks.



Check rear axle suspension

Use a pry bar to check bushings for trailing arms, brake reaction rods, track rod and stabilizer.
Check spring attachment and condition.



Check rear tires

Check thread depth.

Check wear pattern (indicating unbalance, incorrect camber, toe-in or tire pressure).

Check that the tire type is the same on both wheels (radial – cross-ply – thread – studded).

If studded tires are installed check that all tires are studded.

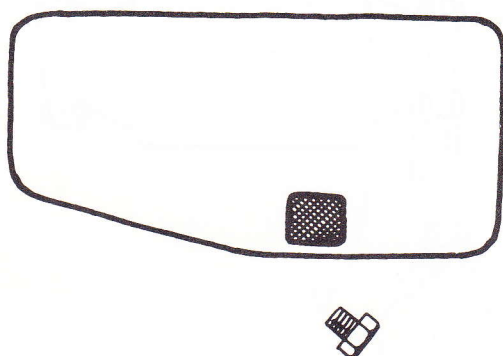
Shown:

1 = Normal wear

2 = Air pressure too low

3 = Air pressure too high

4 = Wheel unbalance



15 000 miles

Clean tank fuel filter

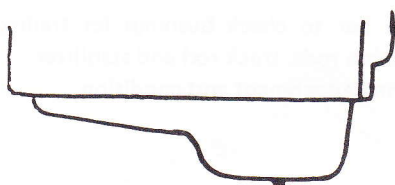
Drain the fuel tank.

Remove the filter through the drain plug hole.

Clean the filter.

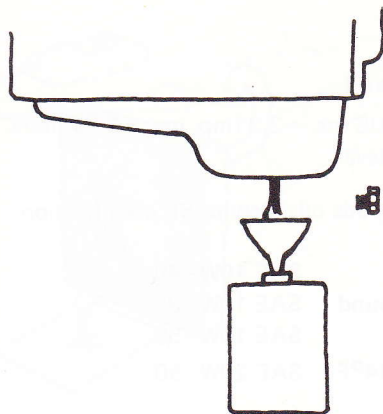
Install filter and plug.

Fill fuel.



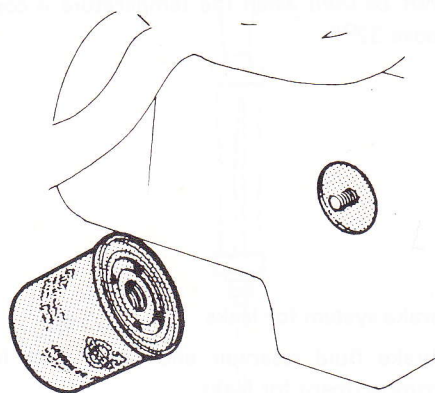
Engine

Check for leaks.



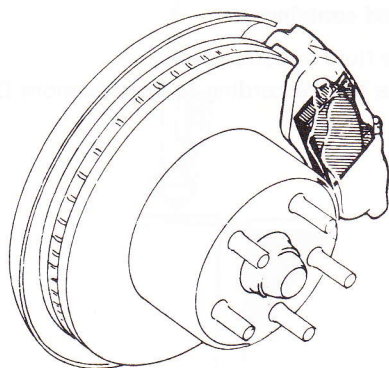
Drain engine oil

Remove drain plug.
Replace copper seal.
Re-install plug.



Change oil filter

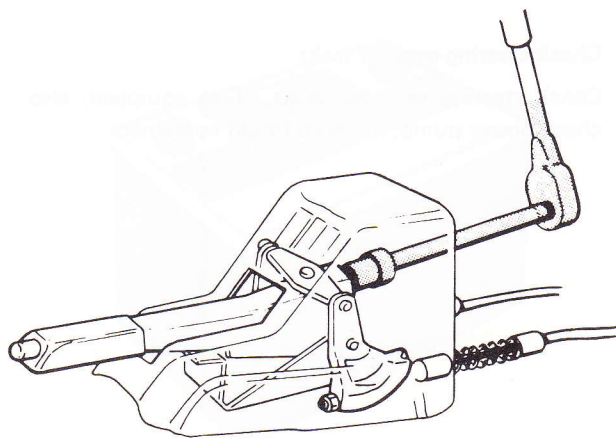
Remove filter.
Oil the rubber seal on new filter.
Screw on the filter by hand until it just touches the cylinder block.
Screw on the oil filter a further half turn by hand.



Rear disc brakes, check wheel brakes

Check the pad thickness with the help of a mirror and a wire gauge (0.12").

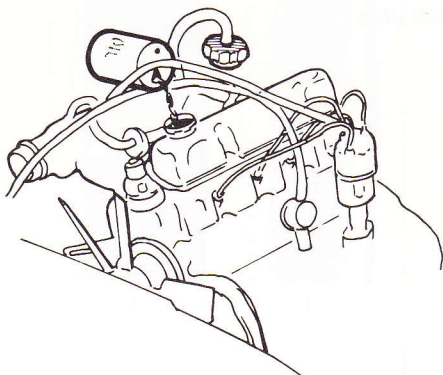
If the pad thickness is less than 0.12" (the wire gauge does not fit), the pads are judged worn-out. If the wire gauge fits but the play is small, it should be noted that the pads will not last another 6 000 miles. Check calipers and connections for leaks.



Adjust parking brake

Adjust brake shoes.
Adjust wires so that full braking effect is obtained after 4–5 notches.
Re-install wheels.

UNDER THE HOOD



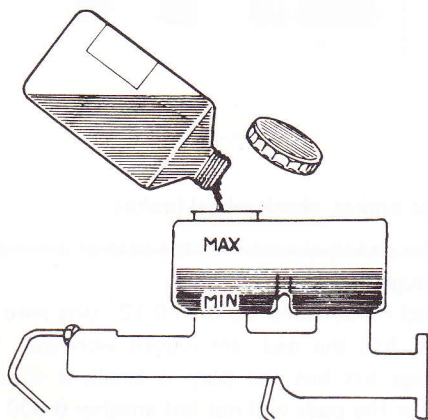
Fill engine oil

B 20: 4.0 US qts. = 3.3 Imp. qts. = 3.75 liters.
Check oil level.

Use Multigrade oils, Service SE classification.

	SAE 10W-40
All year round	SAE 10W-30
	SAE 10W-50
Above + 14°F (-10°)	SAE 20W-50

At very low temperatures (below 0° F) multigrade oil SAE 5W-20 is recommended. However, this oil should not be used when the temperature is continuously above 32°F.

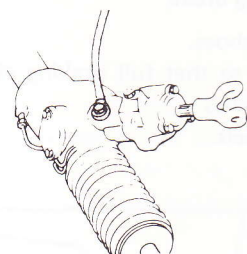


Check brake system for leaks

Check brake fluid reservoir and brake lines in the engine compartment for leaks.
Check brake fluid level.

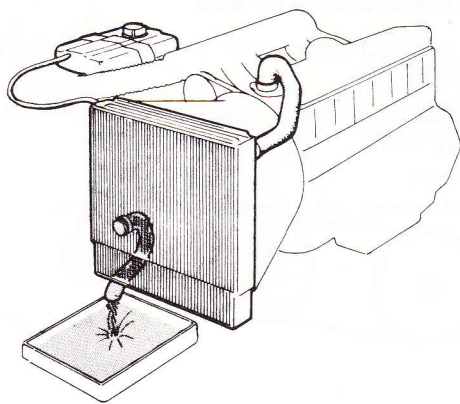
Brake fluid container

Fill brake fluid to correct level.
Use brake fluid according to Specifications DOT 3 or DOT 4.



Check steering gear for leaks

Check steering gear for leaks. If so equipped, also check power pump, hoses and fluid container.



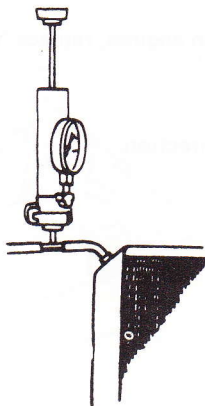
30 000 miles
Change coolant

Remove radiator filler cap. Drain coolant by disconnecting lower radiator hose at the radiator. Re-install lower radiator hose, fill new coolant (50 % water, 50 % anti-freeze). Re-install filler cap.



Coolant, check anti-freeze

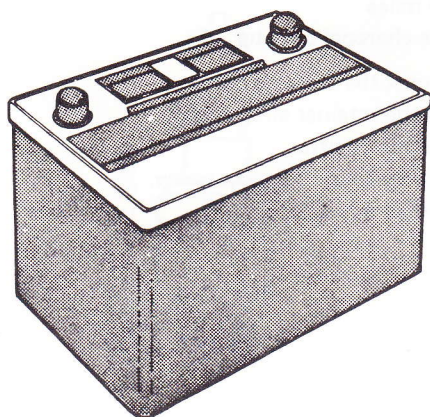
Check coolant freezing point.
 Fill fluid to correct level (mixture 50-50).
 If the overflow container is empty, check the radiator level.



15.000 miles

Cooling system, attach pressure tester

Pump up and check the pressure.
 $10 \text{ psi} = 0.7 \text{ kp/cm}^2$.
 If pressure declines, check for visible leaks. Check conditions of all hoses and connections. Remove pressure gauge.

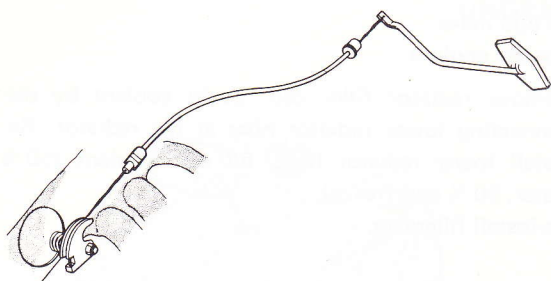


Battery, check mounting

Check that the battery is securely tightened.

Battery

Fill distilled water to correct level.
 Clean the battery studs and apply grease.
 Tighten the battery securely.



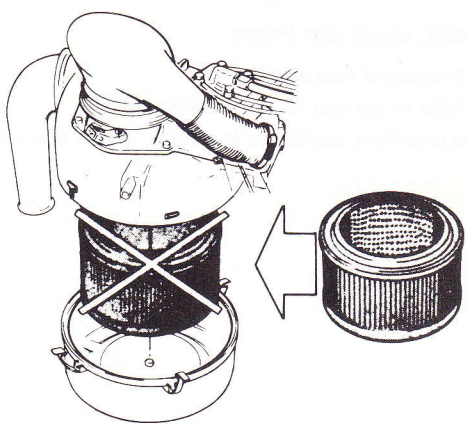
Check engine controls for wear

Check joints, bushings and throttle valve shaft for wear.

Check that cable, links and springs are in order and correctly fitted.

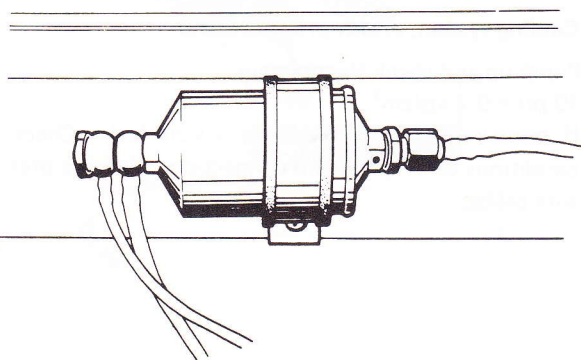
Adjust play.

Lubricate joints, use a light oil.



30 000 miles

Replace air filter cartridge

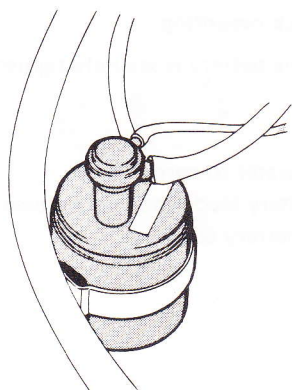


30 000 miles

For CI injection engines, replace fuel filter

Replace filter.

NOTE: Flow direction.



45 000 miles

Replace charcoal canister

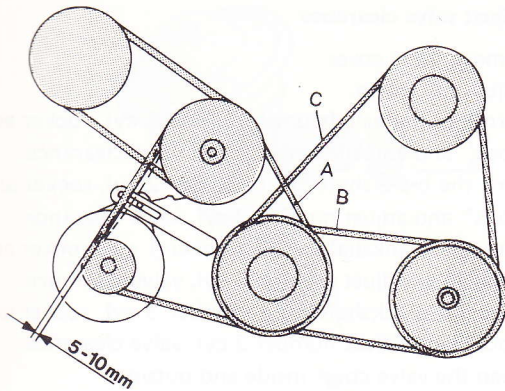
Disconnect the canister hoses.

Loosen the retainer strap screw.

Replace the canister.

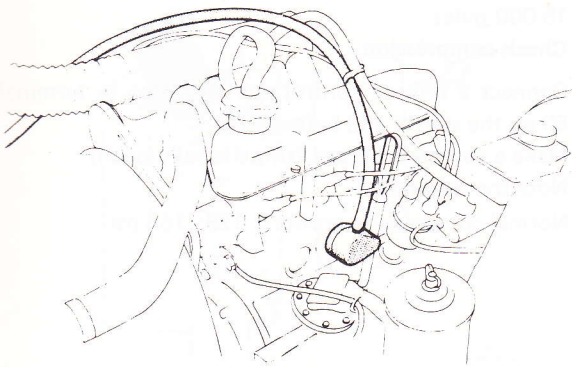
Tighten the retaining strap screw.

Re-connect hoses.



Drive belts

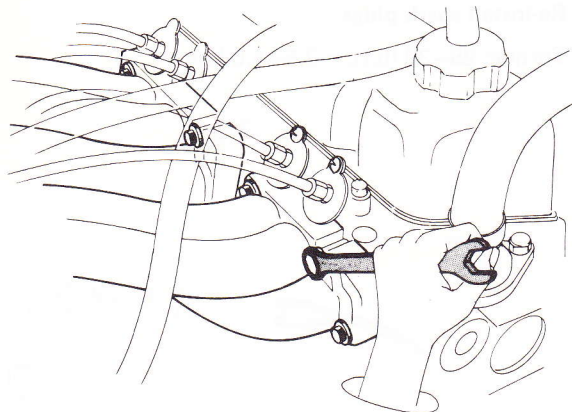
Adjust if necessary the belt tension so that the belts in the middle between the pulleys can be depressed approx. $1/4-3/8''$.



15 000 miles

Positive crankcase ventilation

Check hoses for condition and clogging.
Remove and clean intake manifold valve.
Replace flame guard.
Clean oil filler cap.



15 000 miles

Check tightness of intake and exhaust manifolds

Check torque nuts.
Check for visible leaks.

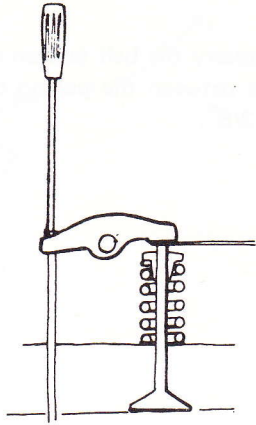


15.000 miles

Spark plugs

Replace spark plugs. Set gap to $0.028-0.032''$ (0.7–0.8 mm)

Spark plugs: Bosch W 200 T35 or corresponding.



Adjust valve clearance

Remove valve cover.

Adjust the valves.

Turn the crankshaft until number 4 cyl. rocker arms "rock" and adjust number 1 cyl. valve clearance.

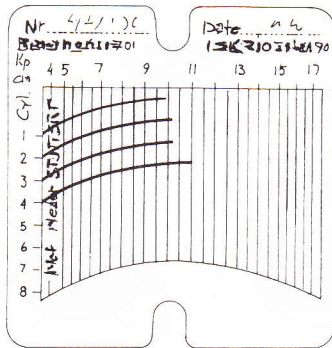
Turn the crankshaft until number 2 cyl. rocker arms "rock" and adjust number 3 cyl. valve clearance.

Turn the crankshaft until number 1 cyl. rocker arms "rock" and adjust number 4 cyl. valve clearance.

Turn the crankshaft until number 3 cyl. rocker arms "rock" and adjust number 2 cyl. valve clearance.

Clean the valve cover inside and outside.

Install with new gasket if necessary.



15 000 miles

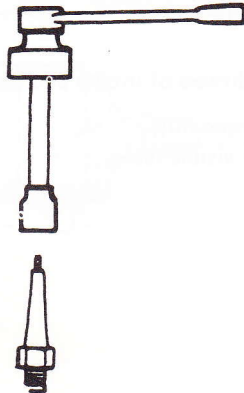
Check compression

Connect a remote control starter switch to terminal 50 on the starter and battery plus.

Make a compression test (throttle fully open).

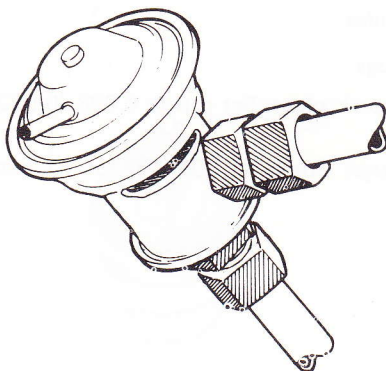
Note the readings.

Normal compression pressure: 128—156 psi.



Re-install spark plugs

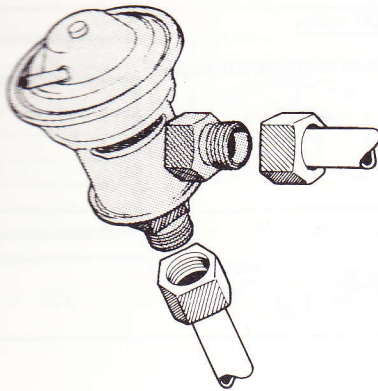
Torque: 25—30 lb.ft. = 3.5—4.0 kpm.



15 000 miles

Clean EGR valve

Clean the EGR valve and the intake manifold nipple.



30 000 miles

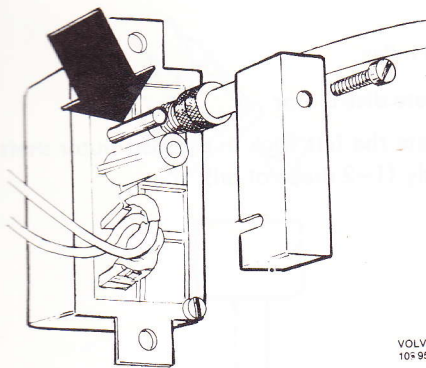
Replace EGR valve

Disconnect the lines to the valve.

Remove the vacuum hose.

Replace the EGR valve.

Re-connect hose and lines.



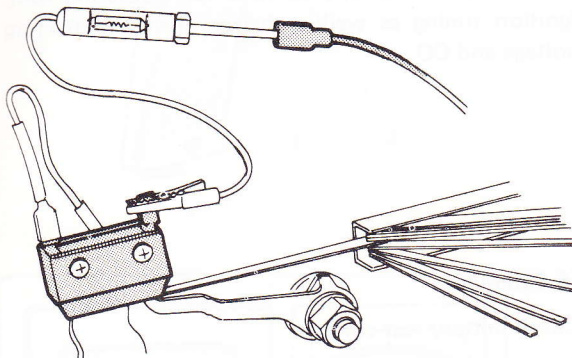
VOLVO
10-953

15 000 miles

Reset EGR-reminder light

Remove panel and switch cover.

Press button. Reinstall panel & cover.



15 000 miles

Check throttle switch

Remove wire connection. Connect a test light to wire and switch.

Position a feeler gauge $0.056'' = 1.4 \text{ mm}$ between the throttle adjustment screw and stop. The light should be on. Replace the feeler gauge with one $0.072'' = 1.8 \text{ mm}$ thick. The light should be out. If the adjustment is correct, disconnect test light and feeler gauge and re-connect wire to switch.

If the adjustment is not correct, adjust as below:

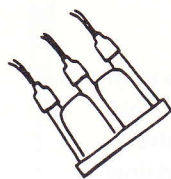
15 000 miles

Adjust throttle switch

Position a feeler gauge $0.060'' = 1.5 \text{ mm}$ between the throttle adjustment screw and stop. Loosen the lock nut for the throttle switch adjustment screw. Screw out the screw until it is free. Then screw in the screw again until the light comes on. Lock the lock nut. Check as described above.

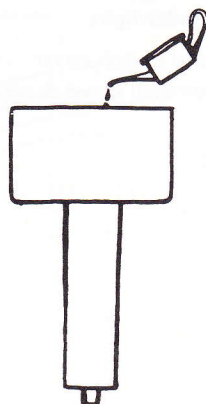
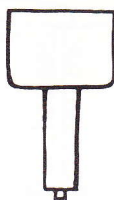
Remove test light and feeler gauge. Re-connect wire to switch.

Switch off ignition.



15 000 miles

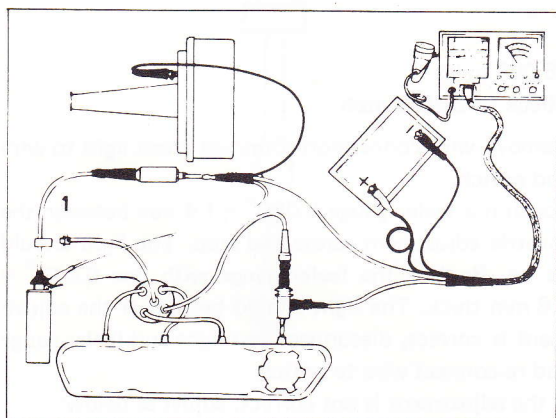
Remove distributor cap



15 000 miles

Lubricate distributor

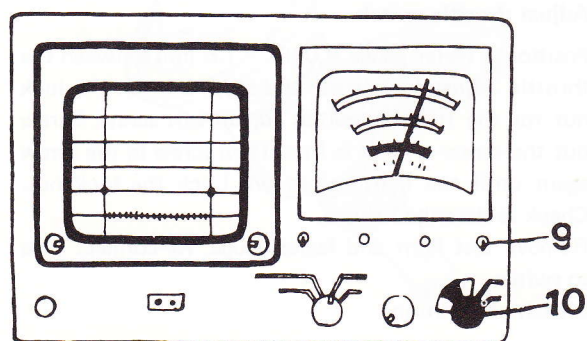
Lubricate the felt wick in the distributor shaft center sparingly (1–2 drops of oil).



15 000 miles

Connect engine test instrument and CO meter

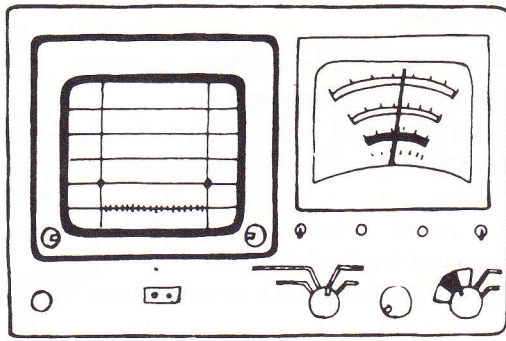
Connect the Volvo Tester to the car electrical system as shown. The ignition cable 1 from the cap center terminal should not be connected to the adapter. With other instrument connect for measuring rpm, ignition timing as well as battery rest and starting voltage and CO.



15 000 miles

Check battery rest voltage

Check that the toggle switch is in position "18V". Put switch 10 in position "VOLT" (green marking). Read the battery rest voltage on the instrument green range. The voltage should be at least 12.0 volts. If the voltage is lower the battery should be checked and charged or replaced.



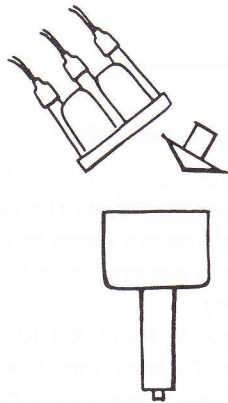
15 000 miles

Test battery starting voltage

Use the remote control starter switch to actuate the starter. The battery starting voltage on the instrument should be at least 9.5 volts. Lower voltage may be caused by a defective battery or starter.

If the starter operating speed is below normal, it might be caused by too high resistance in cables or in the starter itself, or by the engine needing excessive output.

If the starter operates unevenly it might be caused by a defective starter motor or a defective flywheel ring gear or uneven engine compression.

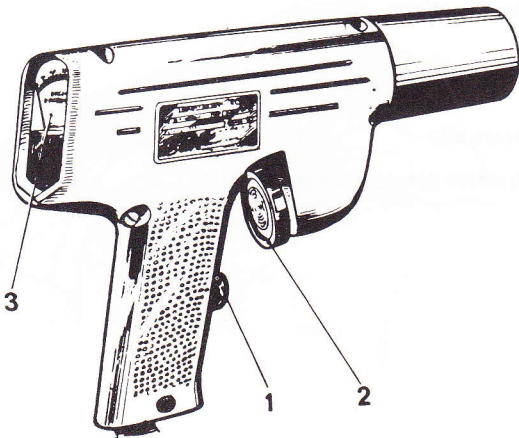


15 000 miles

Check and install distributor cap

Check cap and rotor for cracks. Check high tension leads. Install rotor and distributor cap.

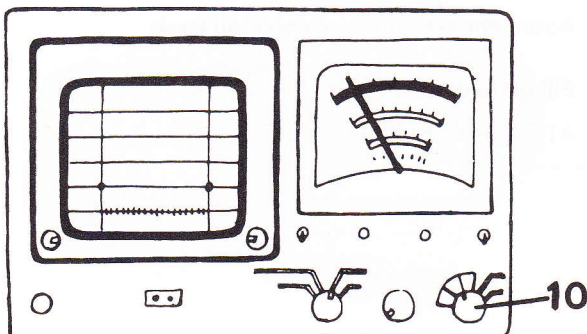
Start the engine.



15 000 miles

Check and adjust timing

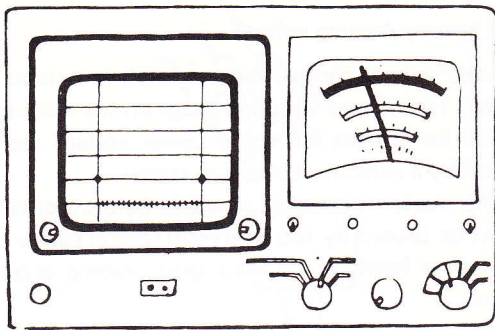
Put the pointer instrument control 10 in position "7500". Disconnect the distributor vacuum unit. Run the engine with speed according to Specifications. Check that the basic timing is correct.



30 000 miles

Check centrifugal advance

Run the engine at 2 500 rpm and read the timing. If the reading is not according to the Specifications, the centrifugal advance in the distributor is incorrect.



15 000 miles

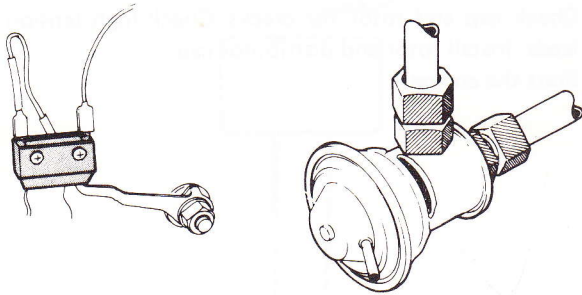
Check vacuum retard

Adjust the speed to 600–800 rpm.

Connect distributor vacuum unit and read the timing. Check the reading according to the Specifications for the engine.

If the retard is too low, the hose connection or vacuum unit is defective.

Check vacuum hoses and hose connections.



15 000 miles

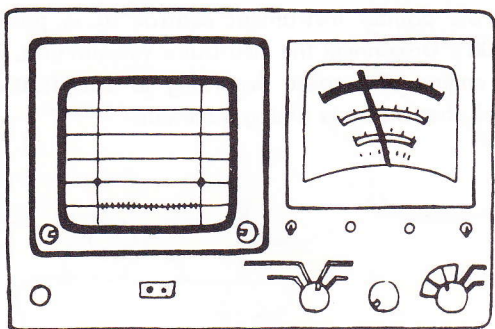
Check exhaust gas recirculation

Remove the venturi hose (1) from the vacuum amplifier. Connect a test hose to the vacuum amplifier and use mouth or vacuum pump to provide vacuum. The EGR valve may not open, that is, the engine does not change running.

Check that the vacuum stands for 10 seconds.

Retain vacuum and loosen wire from micro switch.

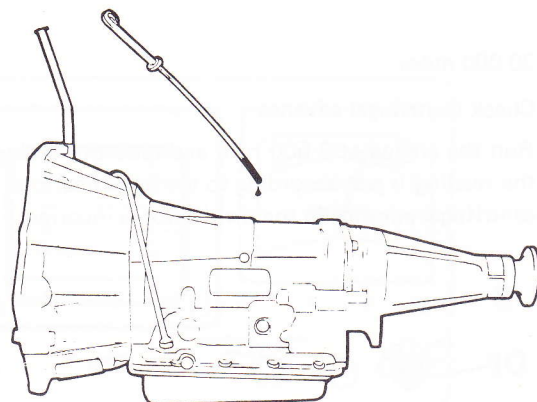
The EGR valve should open, that is the engine should run erratically or stop. Re-connect wire and venturi hose. Rev up the engine and check that the EGR valve functions.



15 000 miles

Adjust idle

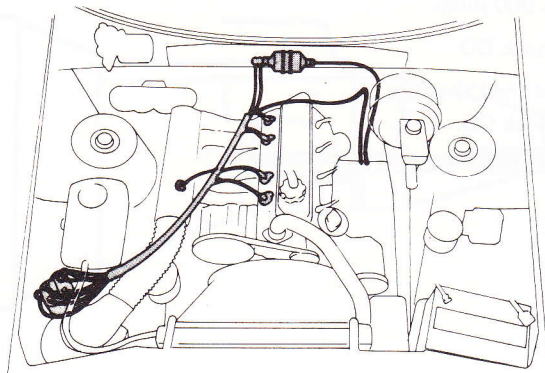
Adjust to correct idle speed.



Automatic transmission, check oil level:

Fill oil to correct level.

ATF type F (FLM).

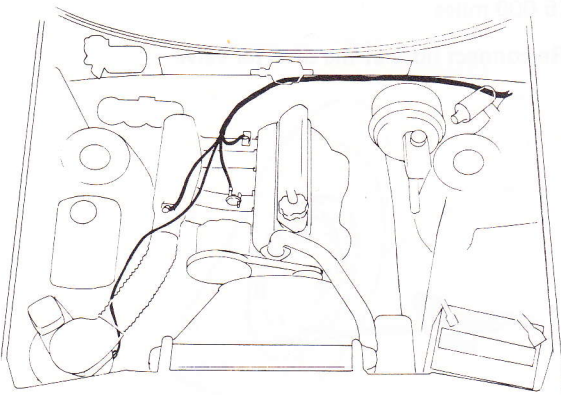


30 000 miles

Check fuel lines for tightness

Check that there are no fuel leaks in the engine compartment.

Also, check for oil leaks.

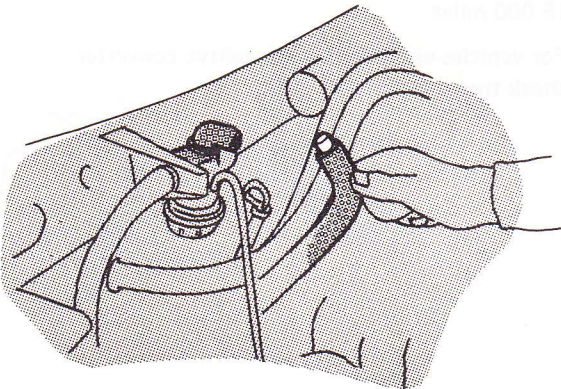


15 000 miles

Check electrical wires

Check electrical wires and connections for fuel injection system.

Stop the engine.

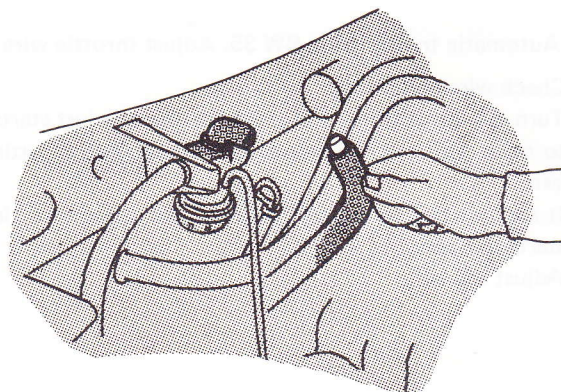


15 000 miles

Air injection reactor (air-pump), disconnect hose

Remove backfire valve hose at the diverter valve. Create vacuum by mouth or vacuum pump to check that the backfiring valve functions.

Plug the hose, start the engine.



15 000 miles

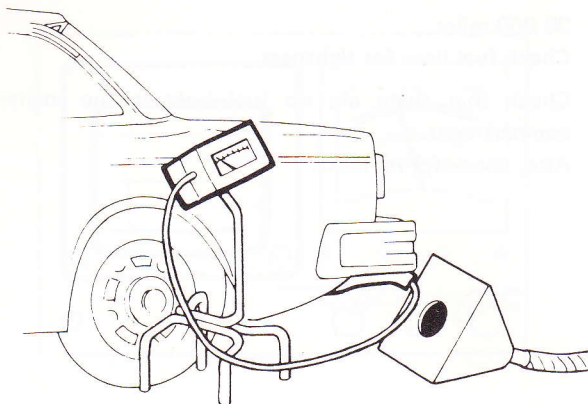
Air injection reactor, check

Let the engine idle.

Air should blow only from the diverter valve upper outlet. Rev up engine to 3 000–3 500 rpm.

Release the throttle control fast.

The air should now only flow from the valve lower ventilation hole.



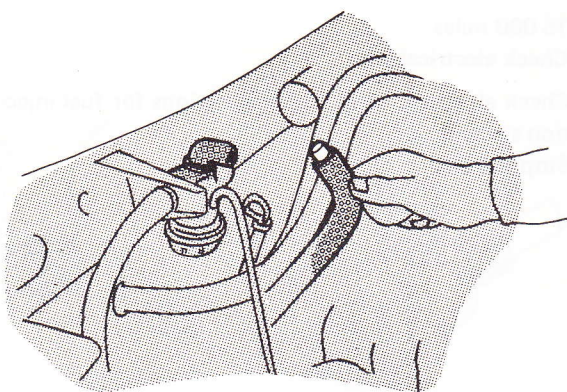
15 000 miles

Check CO

Set the CO gauge.

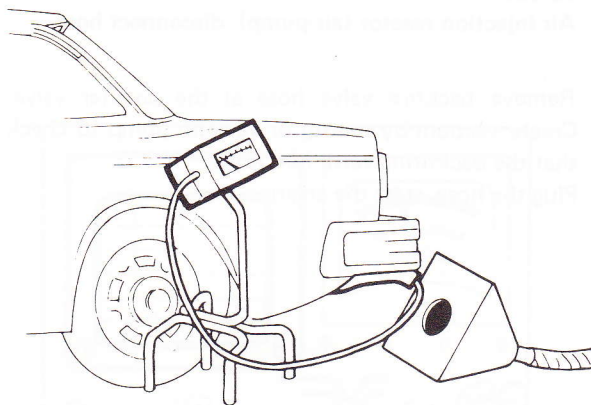
Check CO.

If necessary, adjust CO to 1–1.5 %.



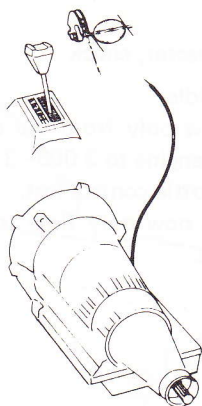
15 000 miles

Re-connect hose at the diverter valve



15 000 miles

For vehicles equipped with catalytic converter:
check that CO drops to 0–0.5 %.



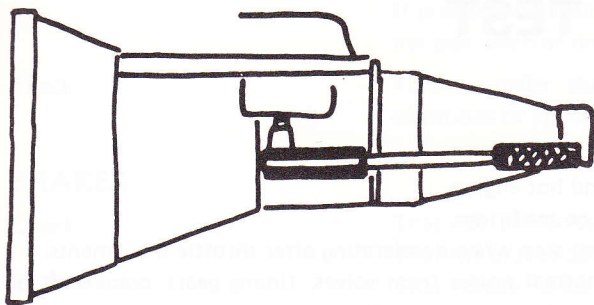
Automatic transmission BW 35: Adjust throttle wire

Check wire condition.

Turn the throttle control until the throttle just starts to open. Observe the automatic transmission throttle wire.

It should start to pull at the same time as the throttle starts to open.

Adjust the wire.

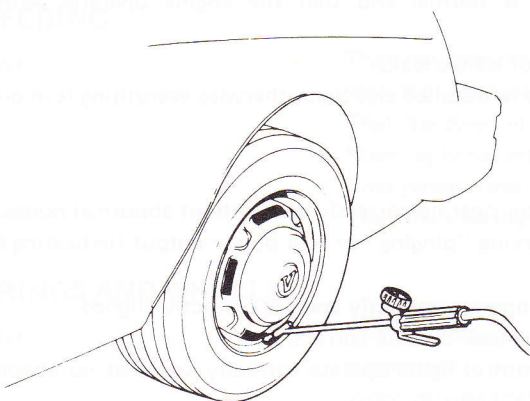


30 000 miles

Automatic transmission BW 35, adjust rear band

The 240 series are provided with a hole in the propeller shaft tunnel. It is accessible after the mats have been unfolded and the rubber plug has been removed. Adjust as follows:

- 1 Loosen the lock nut for the adjustment screw.
- 2 Use special socket SVO 2535 and connect the torque gauge to the adjustment screw. Torque the screw to 10 lb.ft. = 1.4 kpm. Back 1 turn.
- 3 Tighten the lock nut and restore.



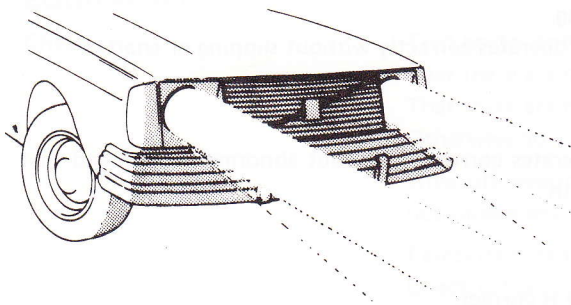
Tires

Check tire pressure, cold tires.

Max. pressures 32 psi.

Front: 26 psi.

Rear: 26 psi (full load, 30–32 psi)



Check headlight alignment

Check alignment.

15 000 miles

Adjust headlight alignment

Adjust alignment.

ROAD TEST

ENGINE

Check:

- Starting ability, cold and hot engine.
- Correct idle speed and no misfirings.
- That the engine does not stop when decelerating after throttle movements.
- That there are no abnormal noises from valves, timing gears, crankshaft or pistons and connecting rods, water pump etc.
- That normal operating temperature is reached within a normal warm-up period.
- That the engine does not continue "dieseling" after the ignition has been shut off or otherwise behaves abnormally.
- That the acceleration is normal and that the engine operates without disturbances.
- Open the hood. Check for visible leaks.
- That "Service Parts" are re-installed and that otherwise everything is in order.

ELECTRICAL SYSTEM

Check:

- That starter and alternator operate correctly and without abnormal noises.
- Ignition timing by observing "pinging" or low power output (indicating high resp. low timing).
- That wipers and washer operate correctly and are correctly aligned.
- That ignition and steering lock operate correctly.
- That instruments and control lights operate correctly and that no abnormal noises are noticed.

POWER TRANSMISSION

Check:

- That the clutch is correctly adjusted and that there are no abnormal noises from the throw-out bearing.
- That the clutch otherwise operates correctly without slipping or chatter.

Manual transmission

Check:

- That the transmission operates correctly, without abnormal noises, and that shifting operation is smooth.

Automatic transmission

Check:

- That the gear selector play is correct.
That the starter operates only in positions P and N and the back-up light in position R only.
- Run the transmission to normal operating temperature.

Check:

- That there is no slipping at stall speed in position D and R (see Workshop Manual).
- Upshift 1-2 and 2-3 by accelerating on part throttle with the gear selector in position D.
- That the engine does not "break loose" during shifting, which would indicate slippage.
- Make kick-down operations and check downshift.
- If traffic circumstances permit, retain kick-down position and check that upshift occurs at correct speeds.
- Change the gear selector to position 2.
- Downshift and engine braking should occur.
- Change the gear selector to position 1 and check downshift and engine braking.

- If possible, park on incline and check parking operation in position P and that the gear selector does not move out of position P by itself.
- Check:
- That propeller shafts, rear axle or drive shaft bearings do not generate vibrations or abnormal noises.

BRAKES

- Check:
- That the power assist functions when braking by observing pedal pressure.
 - That the brakes do not pull when braking hard.
 - That brake discs are not out-of-round or warped by observing pedal movements.
 - That the brakes are correctly adjusted and that the brake pedal does not feel "spongy".
 - That the parking brake is correctly adjusted and operates correctly.

STEERING

- Check:
- That the steering is correct and that the vehicle does not pull or is unstable.
 - Steering wheel position and return when driving.
 - That the steering wheel effort is normal.
 - Steering looseness.
 - That power steering functions correctly.
 - That the steering wheel is aligned when driving straight forward.

SPRINGS AND WHEELS

- Check:
- That there are no abnormal noises from shock absorbers or rear wheel suspension.
 - When driving that rear axle does not indicate looseness.
 - Tire unbalance or out-of-round, when driving.

BODY AND EXTERIOR EQUIPMENT

- Check:
- That heater and heater controls operate correctly.
 - That there are no abnormal speed noises.
 - That there are no abnormal body noises (rattle, vibrations etc.).
 - Otherwise no visible defects.
 - Wipe off steering wheel and gear selector. Check that the workshop visit has not caused any unwanted spots.
 - Faults detected should, if not previously noted, be noted in the check list.
 - Check off group and note the fault.
 - Faults which normally should be remedied at the service should not be noted.
 - Make sure, however, that they are remedied before the customer picks up his car.

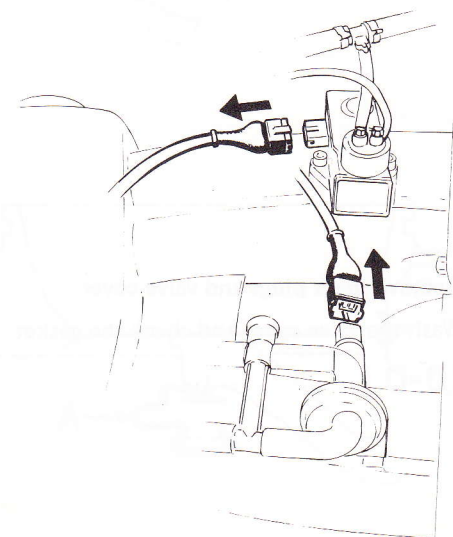
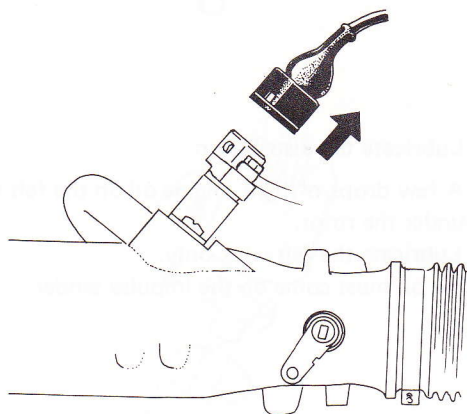
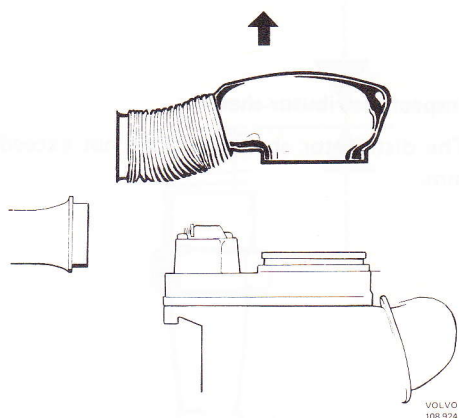
CI System

Servicing and tune-up

System servicing

The System Servicing is supposed to be performed when a malfunction not exactly can be pin-pointed to a specific component (using the Service Diagnosis Chart or otherwise).

The System Servicing includes all steps, except procedures labelled "When faulty".



Tune-Up

The Tune-Up is supposed to be performed when a customer wants the engine checked and adjusted, preparing for a long distance trip for instance.

Tune-Up includes points marked*.

NOTE: The System Servicing and the Tune-Up should be performed when the engine is cold, that means it has been shut off for so long time that it has the ambient temperature.

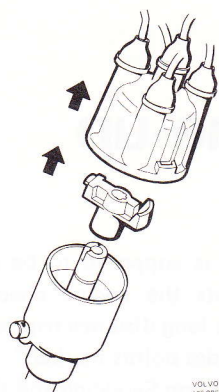
* 1. Remove rubber bellow

Exercise due care when removing rubber bellow. Damages can cause leaks.

Check that rubber bellow and O-ring are not damaged.

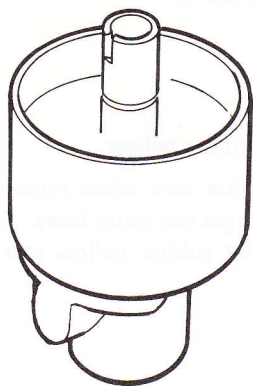
* 2. Disconnect the cold start connector

3. Disconnect the connectors at control pressure regulator and auxiliary air valve



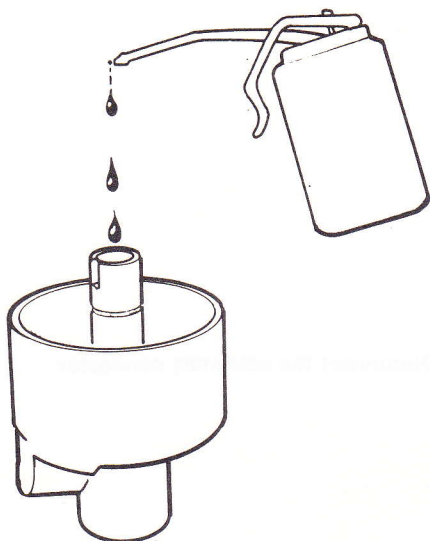
- * 4. Remove the distributor cap with high tension leads and the rotor

Clean and check cap and rotor for cracks and damages. Replace damaged parts.



- * 5. Inspect distributor shaft

The distributor shaft play may not exceed 0.1 mm.

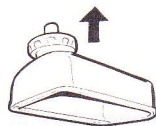


- * 6. Lubricate the distributor:

A few drops of light engine oil on the felt wick under the rotor.

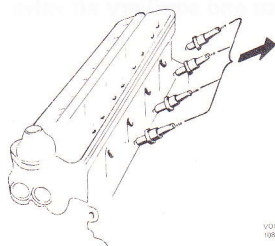
Lubricate the felt wick only.

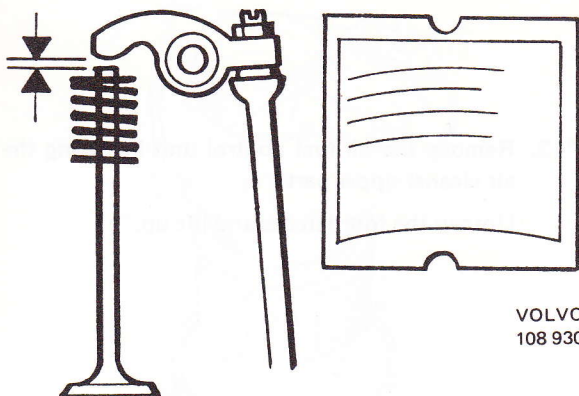
No oil must come on the impulse sender.



- * 7. Remove spark plugs and valve cover

Wash the valve cover and check the gasket.





*** 8. Adjust the valves and install the valve cover**

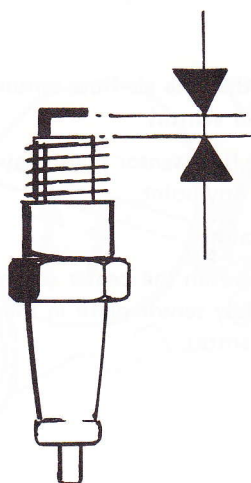
Valve clearance 0.40–0.45 mm = 0.018"–0.020".

Adjust the valves with the piston at top dead center.

Check the gasket before re-installation of the valve cover.

9. Compression test

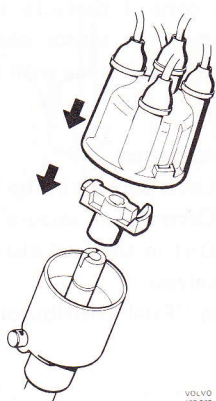
Use a remote starter switch and a gauge.



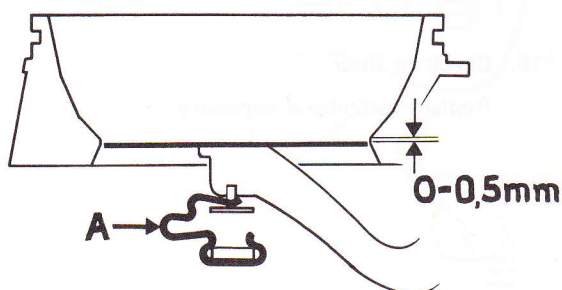
***10. Check the spark plugs**

Adjust the spark plugs or replace if necessary.

Install the spark plugs.



***11. Install rotor and distributor cap with high tension leads**

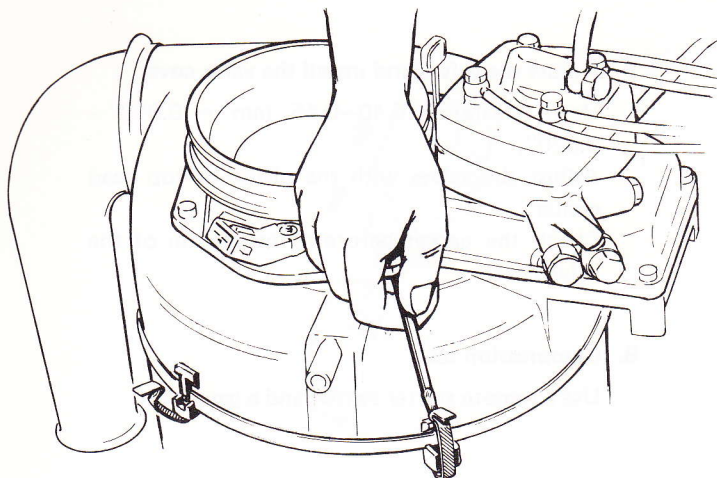


***12. Check the rest position of the air flow sensor plate**

The air flow sensor plate upper side should be in level with or no more than 1 mm lower than the air venturi lower edge:

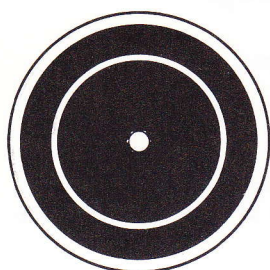
If misaligned:

Adjust by bending the wire A under the sensor plate.

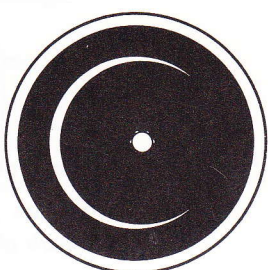


- *13. Remove the air-fuel control unit including the air cleaner upper part**

Unsnap the four latches and lift up.



A



B

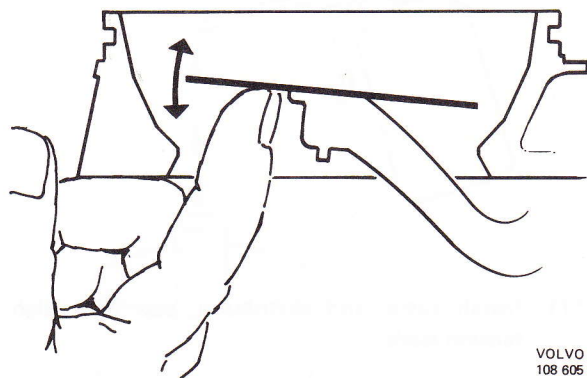
VOLVO
108 604

- *14. Check that the air flow sensor plate is centered in the air venturi**

The air flow sensor plate may not touch at the edge at any point.

When faulty:

Loosen the center screw and align the air flow sensor plate in the middle of the air venturi.



VOLVO
108 605

- *15. Check that the throttle plate does not seize, or bind, by moving it from stop to stop**

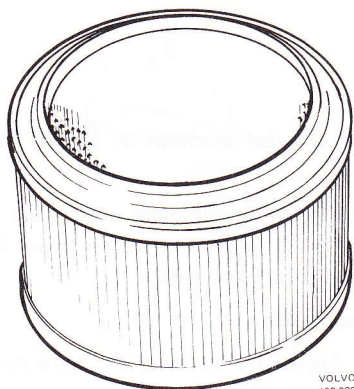
NOTE: The control pressure will cause some resistance when the sensor plate is lifted. Do not confuse this resistance with a seizure.

When faulty:

Possible causes:

- A. Lever seizure in the housing.
- B. Lever pivot seizure in the housing.
- C. Dirt in the fuel distributor (plunger seizes).

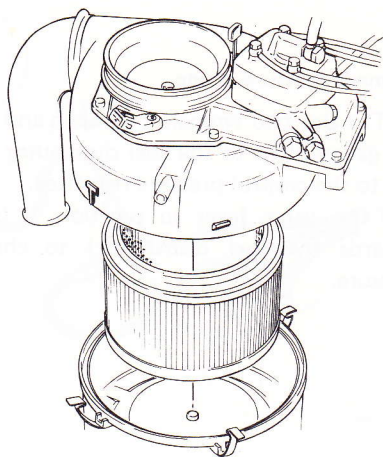
Remedy: See "Fuel Distributor Service", page 36.



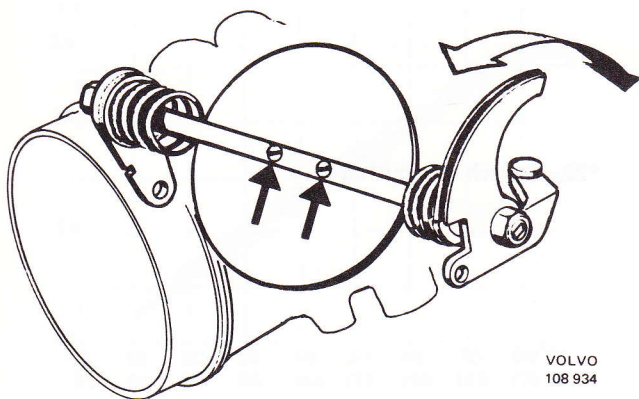
VOLVO
108 933

- *16. Check air filter**

Replace cartridge if necessary.



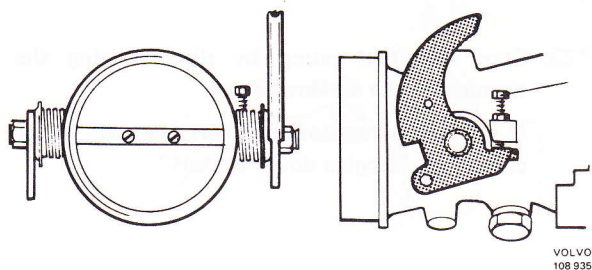
- *17. Install the air-fuel control unit including the air cleaner upper part**



- *18. Check throttle plate**

Check that the throttle plate does not seize, or bind, by moving it from stop to stop.

VOLVO
108 934



- *19. Check that the throttle plate closes**

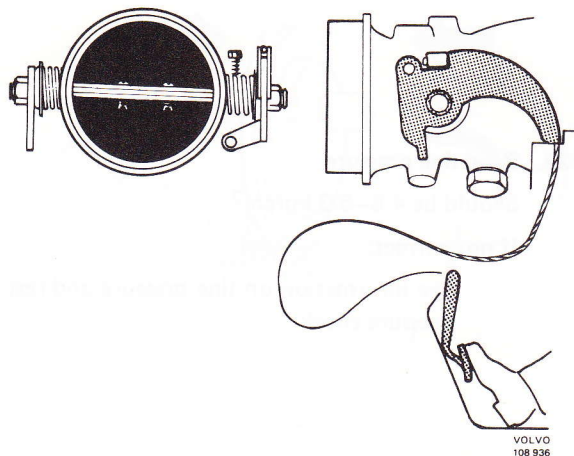
Adjust if necessary:

Loosen stop nut. Turn screw out until it releases from stop.

Turn in screw so that it just touches stop, then another 1/2 turn. Lock the stop nut.

When appropriate, adjust micro switch screw.

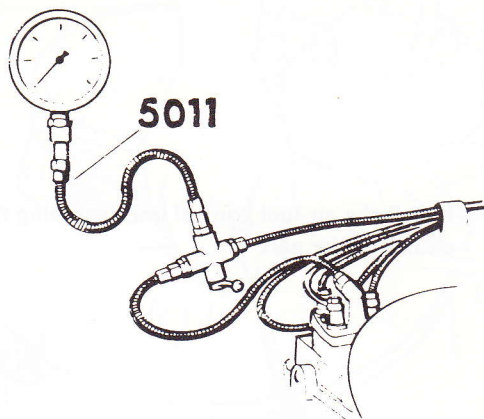
VOLVO
108 935



- *20. Check that the throttle plate opens completely**

The throttle shaft lever should touch the full throttle stop when the throttle pedal is fully depressed.

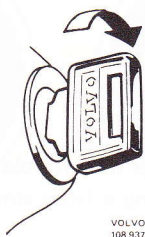
VOLVO
108 936



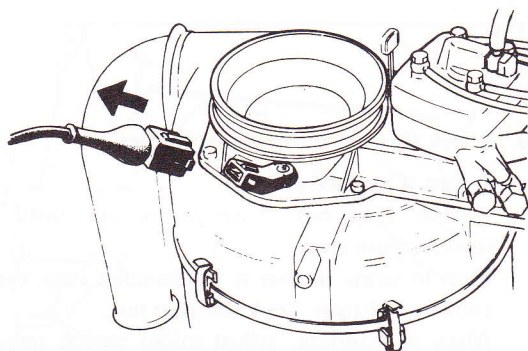
***21. Connect pressure gauge**

NOTE: Use two wrenches to open and connect the gauge 5011 to the fuel distributor and the line to the control pressure regulator.

Put the valve lever in position 1 (pointing towards the fuel distributor) to check line pressure.

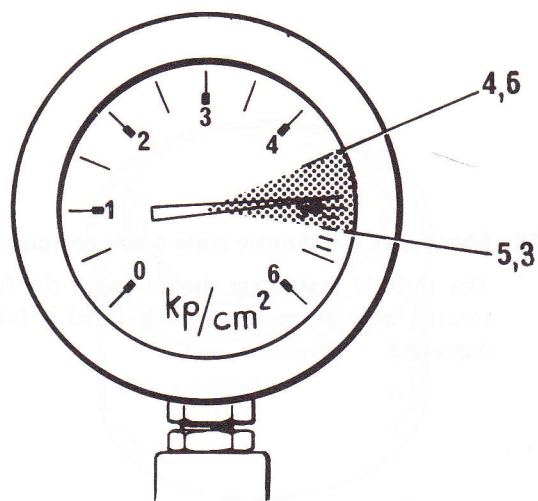


***22. Switch on ignition**



***23. Start the fuel pump by disconnecting the terminal at the air flow sensor**

If the fuel pump does not start, see page 18 for symptoms "Engine does not start".

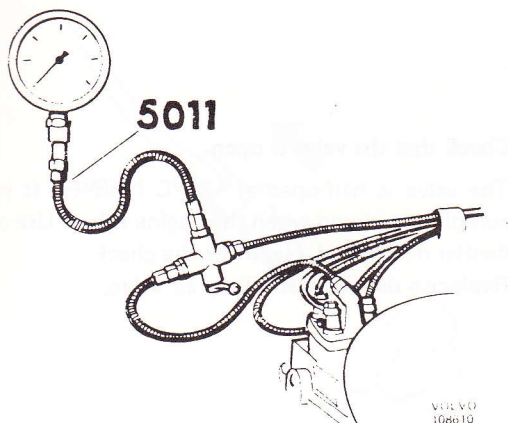


***24. Read line pressure**

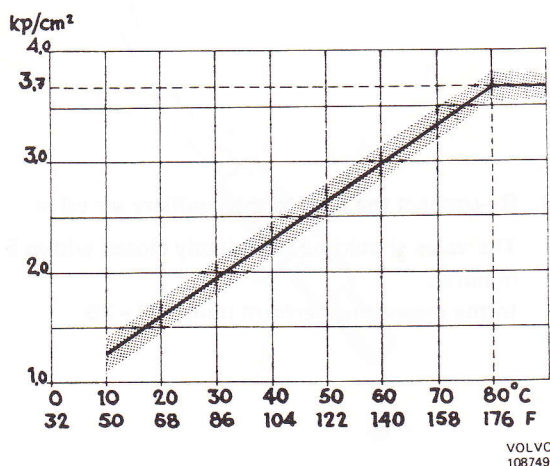
Should be 4.6–5.3 kp/cm².

If not correct:

See information on line pressure and rest pressure check.



- *25. Put the gauge lever in position 2 for testing the control pressure



26. Read the control pressure

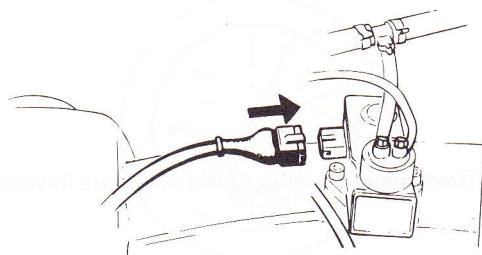
See chart for correct control pressure at various ambient temperatures.

For instance: At +20°C (=68°F) the control pressure should be 1.6 ± 0.15 kp/cm² = 22.7 ± 2.1 psi.

If incorrect:

If the control pressure is too low, try a new control pressure regulator.

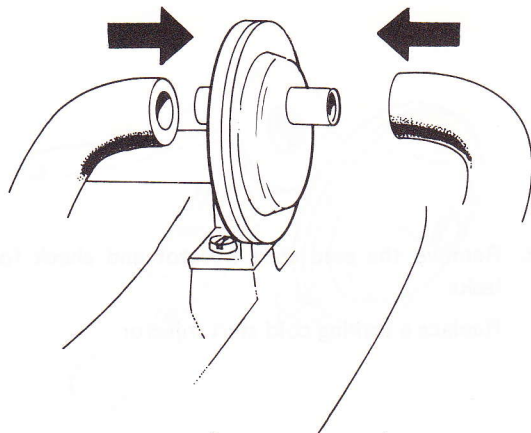
If the control pressure is too high, check if the re-circulation line is clogged. If it is open, try a new control pressure regulator.



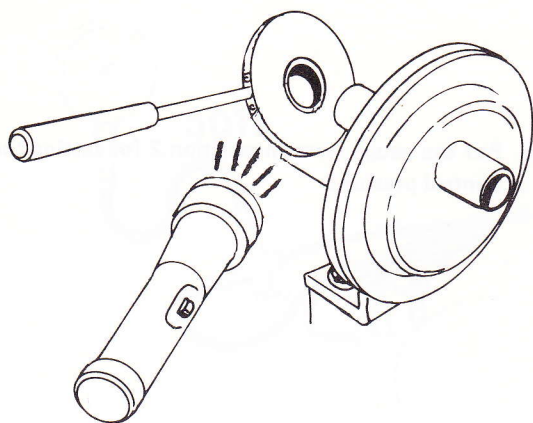
27. Re-connect the connection at the control pressure regulator terminal

Within 3 minutes the control pressure should rise to 3.7 ± 0.2 kp/cm² = 52.5 ± 2.8 psi.

In the meantime, perform steps 28–34.

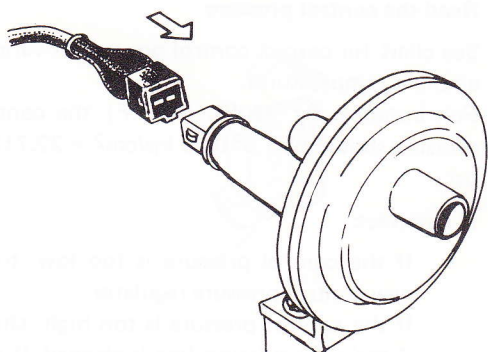


28. Remove the hoses at the auxiliary air valve



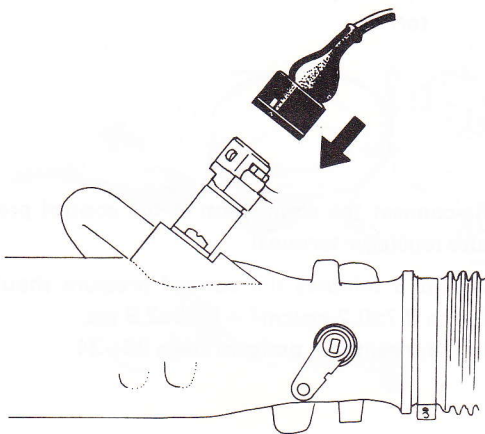
29. Check that the valve is open

The valve is half-open at +20°C (=68°F). It is completely closed when the engine is hot. Use a dentist mirror and a light for the check. Replace a defective auxiliary air valve.

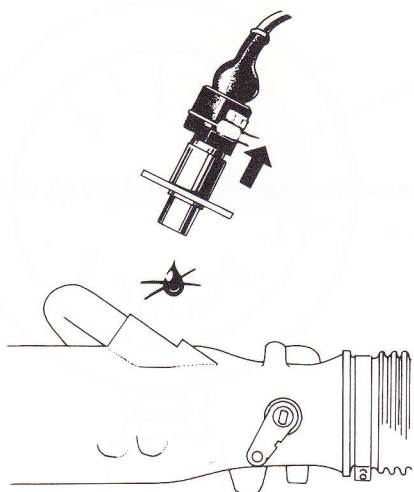


30. Re-connect the plug to the auxiliary air valve

The valve should be completely closed within 5 minutes. In the meantime, perform points 31–35.

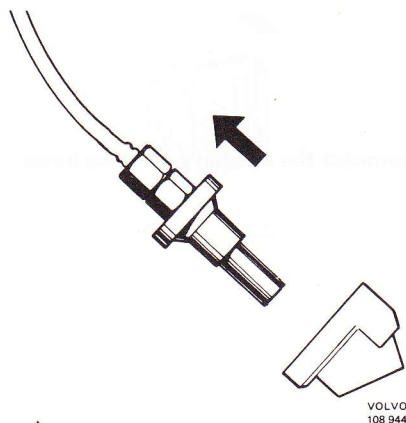


***31. Re-connect the plug to the cold start injector**



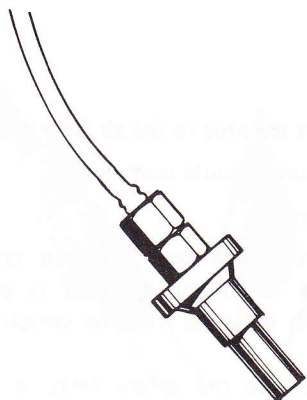
32. Remove the cold start injector and check for leaks

Replace a leaking cold start injector.



VOLVO
108 944

33. Remove the injectors



VOLVO
108 945

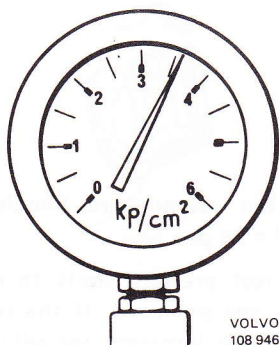
34. Check the fuel distributor for interior leaks

Observe the injectors.

The injectors may get wet but must not drip.

If all injectors drip: fuel distributor plunger may be seized. Remove and clean, see "Distributor overhaul", page 36.

The O-rings in the cylinder may also be defective. In that case the fuel distributor should be replaced.



VOLVO
108 946

35. Check that the control pressure has risen to $3.7 \pm 0.2 \text{ kp/cm}^2 = 52.5 \pm 2.8 \text{ psi}$.

If incorrect:

If the control pressure has not risen, use a test light to check if the terminal is live. If it is dead, the wire is defective.

If it is live, the control pressure regulator should be replaced.

If the control pressure is incorrect, the control pressure regulator should also be replaced.

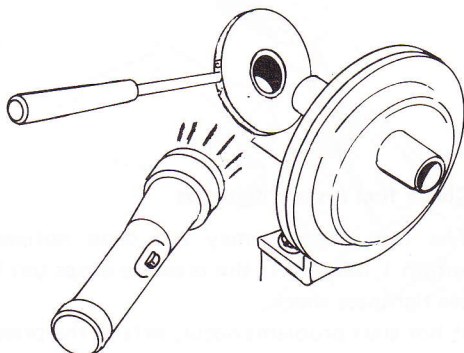
36. Check that the auxiliary air valve has changed position, see points 29 and 30

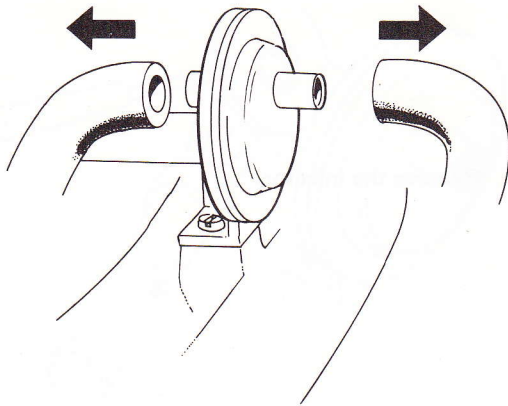
When faulty:

If the valve has not closed, proceed as follows:

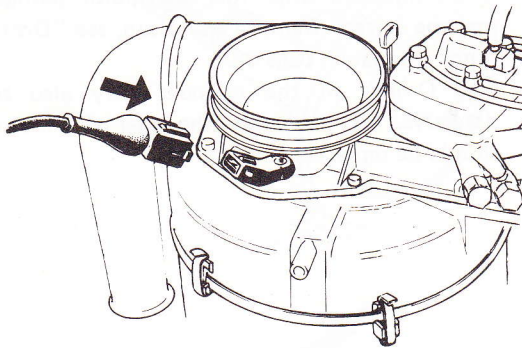
A. Tap lightly on the auxiliary air valve. It is OK if it closes. (The engine vibrations normally contribute to closing.)

B. Use a test light to check the plug. If the test light does not come on, check for an open circuit. If the test light does come on, try a new auxiliary air valve.





37. Re-connect the auxiliary air valve hoses



***38. Re-connect the plug to the air flow sensor**

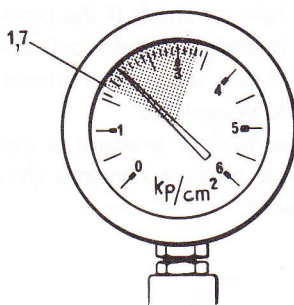
The fuel pump should now stop.

When faulty:

If the pump does not stop, check if it stops when the terminal is grounded, which indicates that the switch is defective.

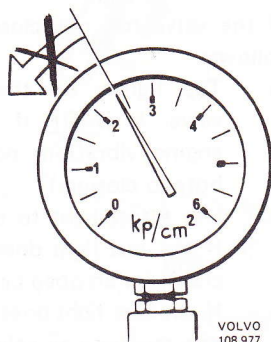
Otherwise the safety relay is defective and should be replaced.

NOTE: Do not confuse the relays. The safety relay does not have any black ground connection.



***39. Check the rest pressure. Should be min. 1.7 $\text{kp/cm}^2 = 24 \text{ psi}$**

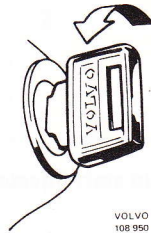
If the rest pressure starts to drop within 1 minute, see point 40. If the rest pressure is constant but incorrect, see adjustment of line and rest pressure.



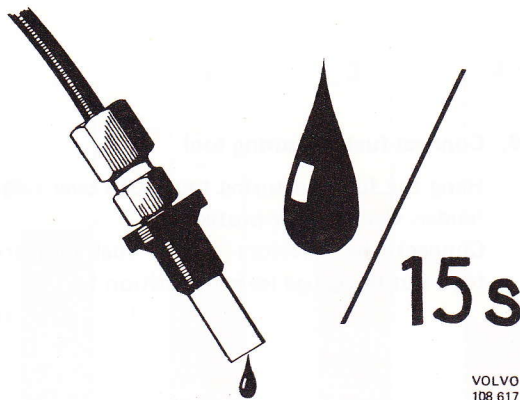
***40. Check fuel system tightness**

The rest pressure may not drop noticeably within 1 minute. If the pressure drops too fast, see tightness check.

If hot start problems occur, extend the pressure drop test. Pressure should still exist after 20 minutes.



41. Ignition off



42. Check all injectors for leaks at rest pressure

Lift the air flow sensor plate so that the metering slots open.

The injectors must not leak more than 1 drop in 15 seconds.

Replace leaking injectors.

NOTE: if all injectors leak the reason may be an excessive pressure.



43. Ignition on

44. Test cold start injector

Hold the cold start injector over cup or glass, run the starter, and check that the cold start injector sprays.

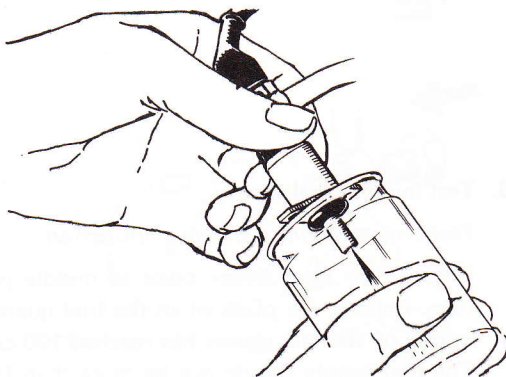
The cold start injector should spray for 12 seconds at engine temperature $-20^{\circ}\text{C} = -4^{\circ}\text{F}$. Higher temperatures decrease the injection time and it ceases completely at temperatures above $+35^{\circ}\text{C} = 95^{\circ}\text{F}$.

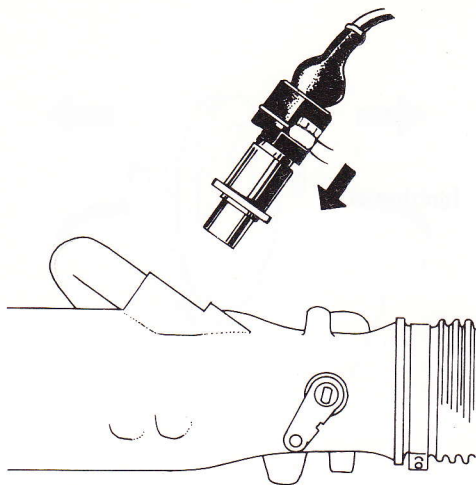
When faulty:

Use a test light to check that the cold start injector wires are live when the starter is running.

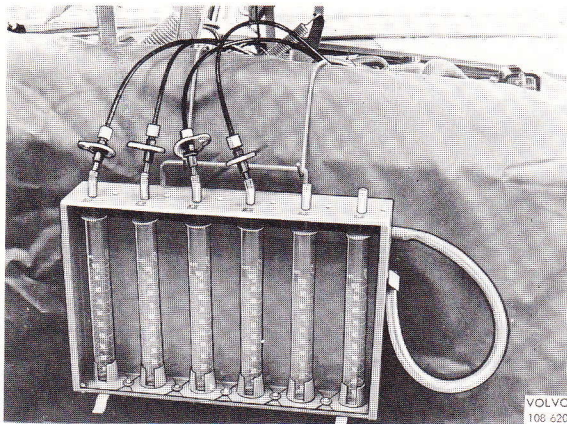
The injector is faulty if the light comes on.

If the wires are not live the wires or the thermal time switch are defective.



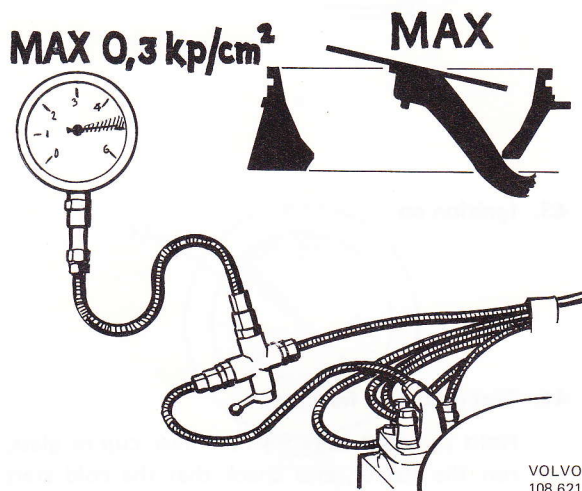


45. Re-install the cold start injector



46. Connect fuel measuring tool

Hang the fuel measuring tool 5014 over side of fender. Use a fender protector. Connect the injectors to the fuel measuring tool. Put the gauge lever in position 1.

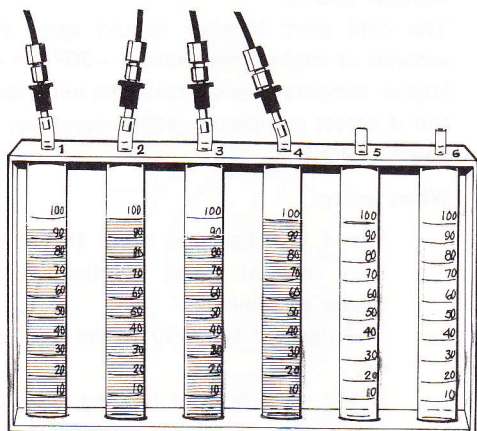


47. Check fuel supply

Lift the air flow sensor plate to highest position and keep it there for 4 seconds. The line pressure may drop no more than 0.3 kp/cm².

If the pressure drops more than 0.3 kp/cm², the cause may be:

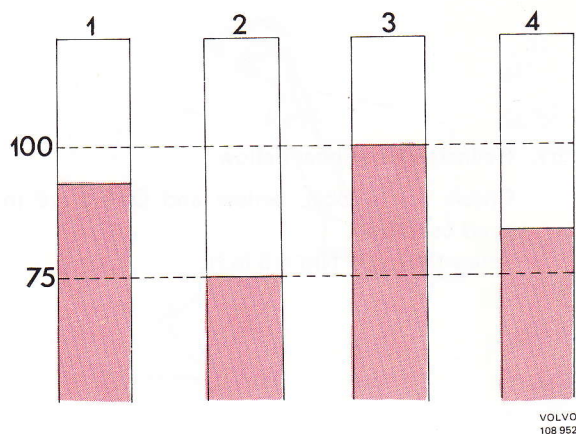
- A. Too little fuel in the tank.
- B. Fuel lines and filter clogged.
- C. Fuel line leaking, or insufficient pump capacity, try a new pump.



48. Test injector fuel supply

Test only at definite engine malfunction.

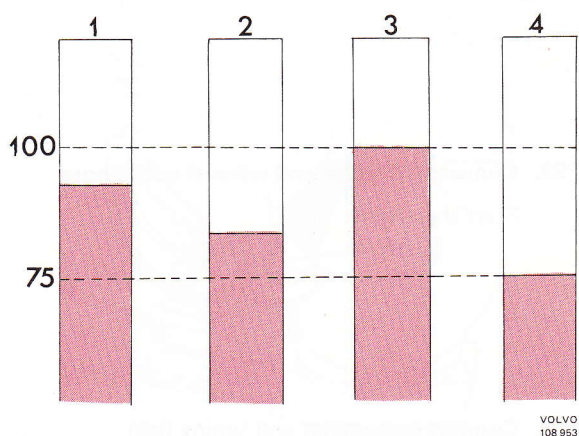
Lift the air flow sensor plate to middle position. Release the plate when the fuel quantity in one of the test glasses has reached 100 cm³. The fuel supply should not be more than 15 % different.



More than 15 % different:

Shift the fuel line for the injector feeding too little, No. 2 in the picture, with one of the other, for instance, No. 4

Re-test the amount of fuel. If the same injector is low again, it is defective and should be replaced with a new one.

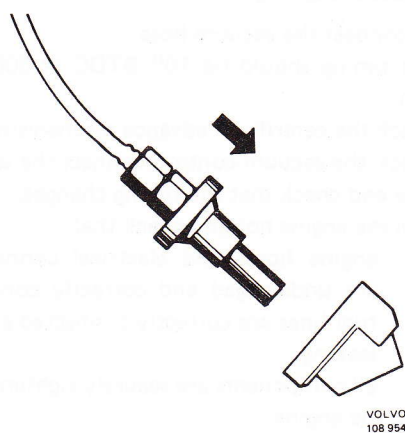


If, on the other hand, the fault moves to the other injector, the distributor is clogged or defective.

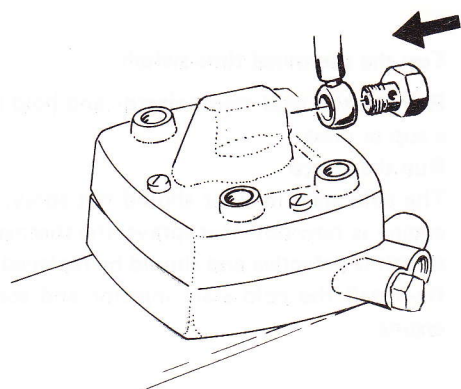
Clean the fuel distributor, see page 37 "Cleaning control plunger".

NOTE: The fuel distributor must under no circumstances be disassembled.

Do not clean the slots.

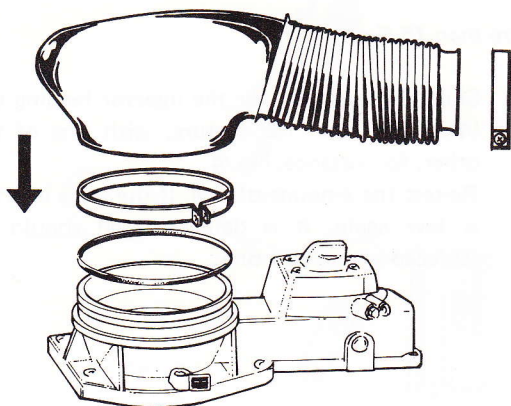


***49. Re-install the injectors**



***50. Disconnect test equipment**

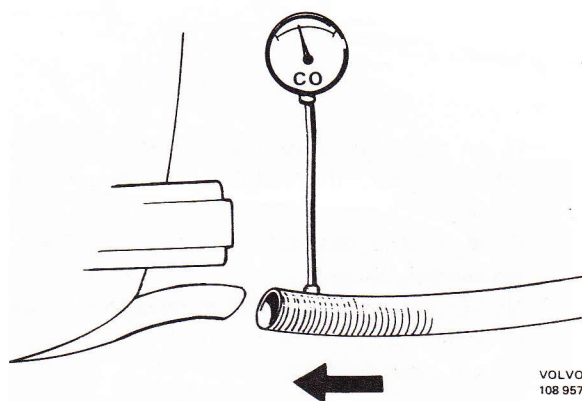
Re-connect the line from the control pressure regulator to the fuel distributor.



***51. Re-install the rubber bellow**

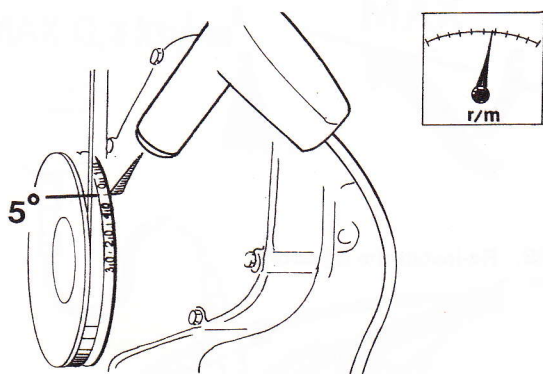
Check that rubber bellow and O-ring are in good condition.

Screw torque: 7 Nm = 5 lb.ft.



***52. Connect CO gauge and exhaust outlet hose**

Start the engine.



***53. Connect tachometer and timing light**

Adjust the timing

Disconnect the vacuum hose

The timing should be 10° BTDC at 600–800 rpm.

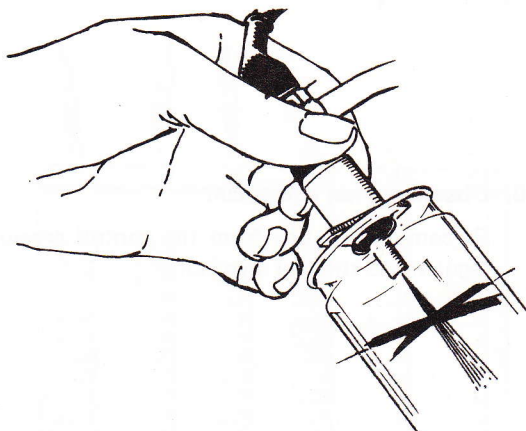
Check the centrifugal advance mechanism.

Check the vacuum control: connect the vacuum hose and check that the timing changes.

Run the engine hot and check that:

- engine hoses and electrical connections are undamaged and correctly connected
- fuel lines are correctly connected and not leaking
- all components are securely tightened.

Stop the engine.



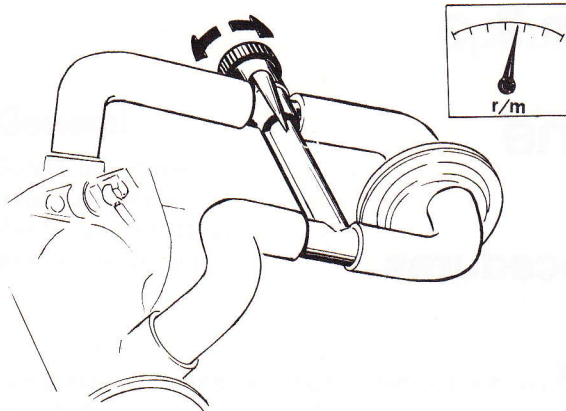
54. Test the thermal time switch

Remove the cold start injector and hold it over a cup or glass.

Run the starter.

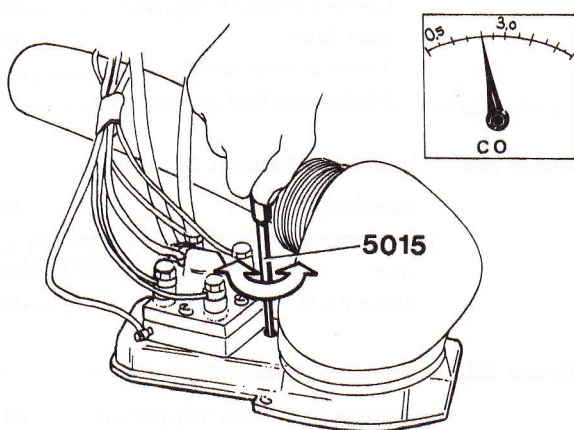
The cold start injector should not spray, as the engine is now hot. If it sprays, the thermal time switch is defective and should be replaced.

Re-install the cold start injector and start the engine.



***55. Check, if necessary adjust, idle speed**

The idle rpm should be:
 automatic transmission: 800 rpm
 manual transmission: 900 rpm.



***56. Check, if necessary adjust, CO**

The CO should be 0.5–3.0 %
 (USA 1.5 %)

Stop the engine

Disconnect:

- Tachometer
- Remote control starter switch
- CO meter
- Exhaust outlet hose

NOTE: Remove idle adjustment tool before engine is revved (lever may get damaged).