

Service Manual

Repairs and maintenance

Section 1 (17)

7,500 Mile
Maintenance Service
1984
DL, GL
GLE (Canada)
Turbo, Diesel

VOLVO

Contents

| | <i>Operation</i> | <i>Page</i> |
|---|------------------|-------------|
| Introduction | | 1 |
| Volvo 7,500 Mile Maintenance Service Chart | | 2 |
| 7,500 Mile Maintenance Service Procedures | | |
| Controls and lighting | 1-18 | 10 |
| In car | A1-A6 | 15 |
| Exterior | B1-B3 | 17 |
| On lift | | |
| - Tires, wheels | C1-C4 | 18 |
| - Front end | D1-D10 | 19 |
| - Brakes | E1-E4 | 22 |
| - Power transmission | F1-F4 | 23 |
| - Rear end | G1-G2 | 24 |
| - Exhaust system, Diesel | H1 | 25 |
| - Rear axle, manual transmission | I1-I2 | 25 |
| - Engine oil and filter: | | |
| *Gasoline engines | J1-J2 | 26 |
| *Diesel engine | J3-J4 | 27 |
| Under hood: | | |
| - Engine cooling system | K1-K2 | 28 |
| - Fluids | K3-K5 | 28 |
| - Replacing automatic transmission fluid | L1-L10 | 29 |
| B21 and B23 | | |
| - Miscellaneous | M1-M3 | 33 |
| - Adjust valves | N1-N15 | 34 |
| - Replace timing gear belt | O1-O7 | 37 |
| B21A/Canada: | | |
| - Miscellaneous | P1-P15 | 39 |
| - CO emissions check | Q1-Q16 | 44 |
| B21F-Turbo: | R1-R16 | 49 |
| B23F: | S1-S7 | 55 |
| D24 diesel: | | |
| - Miscellaneous | a1-a7 | 58 |
| - Valve clearance adjustment | b1-b12 | 60 |
| - Idle speeds | c1-c6 | 63 |
| - Setting engine controls | d1-d7 | 64 |
| - Compression test | e1-e10 | 67 |
| - Checking/adjusting injectors | f1-f8 | 70 |
| - Replacing timing gear belts | g1-g33 | 73 |
| Road test | | 82 |

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7,500 Mile 12,500 km Maintenance Service

Introduction

These maintenance instructions are presented in a "Work Related Sequence". Step by step procedures are designed to assist the technician in performing the tasks in an efficient and logical manner.

Volvo Maintenance Service Chart

The Volvo Maintenance Service procedures are listed on the following pages (see chart). They appear in the same order as in the Warranties and Maintenance Records Manual supplied with each new vehicle. The certificates in the manual should be signed by the Service Manager, dated and stamped.

The chart, as well as the operations inside the manual, lists the **actual mileage** when the service inspection should be performed.

Great care has been exercised to make the chart easy to read. Grouping of mileage and services facilitate finding of intervals for the service operations.

Emissions

Items marked EMISSIONS have been determined part of emission related service maintenance program.

These items require service maintenance at mileage intervals shown to ensure trouble-free operation.

EMISSIONS

Service every 7,500 miles = 12,500 km

Service at:

15-30-45-60-75-90-105-120-thousand miles
25-50-75-100-125-150-175-200-thousand km

EMISSIONS

Service at:

30-60-90-120-thousand miles
50-100-150-200-thousand km

EMISSIONS

Volvo 7,500 Mile (12,500 km) Maintenance Service Chart

Controls and lighting

| | | | |
|---|------------------------------|----|-----------------------|
| 1 | Hazard warning flasher | 10 | Parking lights |
| 2 | Blower | 11 | Brake lights |
| 3 | Heater controls | 12 | Tail lights |
| 4 | Rear demist | 13 | Back-up lights |
| 5 | AIR COND control | 14 | Reflectors and lenses |
| 6 | Horn | 15 | Fill washer fluid |
| 7 | Turn signals | 16 | Wiper blades |
| 8 | Headlights and LIGHTS switch | 17 | Wiper control |
| 9 | Instrument panel lights | 18 | Washer jets |

In car

| | |
|----|----------------------------|
| A1 | Power brake function |
| A2 | Pressure test brake system |
| A3 | Parking brake |
| A4 | Warning lights |
| A5 | Auto trans shift control |
| A6 | Steering |

All items on this page should
be inspected at 7,500 mile =
= 12,500 km intervals:

| miles | km |
|-----------|---------|
| 7,500 = | 12,500 |
| 15,000 = | 25,000 |
| 22,500 = | 37,500 |
| 30,000 = | 50,000 |
| 37,500 = | 62,500 |
| 45,000 = | 75,000 |
| 52,500 = | 87,500 |
| 60,000 = | 100,000 |
| 67,500 = | 112,500 |
| 75,000 = | 125,000 |
| 82,500 = | 137,500 |
| 90,000 = | 150,500 |
| 97,500 = | 162,500 |
| 105,000 = | 175,000 |
| 112,500 = | 187,500 |
| 120,000 = | 200,000 |

Exterior - lubrication

| | |
|----|-------------|
| B1 | Hood hinges |
| B2 | Door hinges |
| B3 | Trunk lid |

On lift

Tires, wheels

| | |
|----|---------------------|
| C1 | Tires |
| C2 | Tire pressure |
| C3 | Wheel bearing play |
| C4 | Wheel bearing noise |

Front end

| | |
|-----|-----------------------------|
| D1 | Front shock absorbers |
| D2 | Front springs |
| D3 | Steering gear |
| D4 | Steering rack |
| D5 | Control arm bushings, strut |
| D6 | Steering rod play |
| D7 | Ball joints |
| D8 | Steering rod ends |
| D9 | Control arms |
| D10 | Stabilizer bar and links |

7,500 = 12,500
15,000 = 25,000
22,500 = 37,500
30,000 = 50,000
37,500 = 62,500
45,000 = 75,000
52,500 = 87,500
60,000 = 100,000
67,500 = 112,500
75,000 = 125,000
82,500 = 137,500
90,000 = 150,000 km

miles

• • • • •
• • • • •
• • • • •
• • • • •
• • • • •

E1
E2
E3
E4

Brakes

Brake hoses
Brake lines
Parking brake
Wheel brakes

• • • • •
• • • • •
• • • • •
• • • • •
• • • • •

F1
F2
F3
F4

Power transmission

Clutch play
B21F-Turbo and B23F:
clutch negative play
Auto trans: shift control
Propeller shaft

• • • • •
• • • • •
• • • • •
• • • • •

G1
G2

Rear end

Rear shock absorbers
Rear suspension

• • • • •
• • • • •
• • • • •
• • • • •

H1
H2
H3

Exhaust system

B21-Turbo
B23F
D24 diesel

• • • • •
• • • • •
• • • • •
• • • • •

I1
I2

Fluids

Rear axle
M46 manual transmission

EMISSIONS
EMISSIONS

• • • • •
• • • • •
• • • • •
• • • • •

J1-J2
J3-J4

Engine oil and filter:
Gasoline engines
(NOTE: Turbo intervals!)
Diesel engine

EMISSIONS
EMISSIONS

• • • • •
• • • • •
• • • • •
• • • • •

K1
K2

Engine cooling system:
Check anti-freeze
Replace coolant

• • • • •
• • • • •
• • • • •
• • • • •

K3
K4
K5

Fluids:
Brake fluid level
Power steering gear
Battery

• • • • •
• • • • •
• • • • •
• • • • •

K3
K4
K5

• • • • •
• • • • •
• • • • •
• • • • •

K3
K4
K5

• • • • •
• • • • •
• • • • •
• • • • •

L1-L10
L11

Automatic transmission

Replace fluid
Check oil level

EMISSIONS

• • • • •
• • • • •
• • • • •
• • • • •

M1
M2
M3

B21 and B23 (all)

Auto trans: adjust kickdown cable
Engine controls
Drive belt tension

EMISSIONS
EMISSIONS

• • • • •
• • • • •
• • • • •
• • • • •

M1
M2
M3

• • • • •
• • • • •
• • • • •
• • • • •

N1-N15
01-07

Adjust valves
Replace timing gear belt

| | | | | | | | | | | | | |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|-------|
| 7,500 = 12,500 | 15,000 = 25,000 | 22,500 = 37,500 | 30,000 = 50,000 | 37,500 = 62,500 | 45,000 = 75,000 | 52,500 = 87,500 | 60,000 = 100,000 | 67,500 = 112,500 | 75,000 = 125,000 | 82,500 = 137,500 | 90,000 = 150,000 | km |
| | | | | | | | | | | | | miles |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|--------|--------------------------------|
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P1 | Exhaust system |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P2 | Damper oil level |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P3 | Choke control |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P4 | Breaker points, rotor etc |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P5 | Dwell angle |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P6 | Pulsair |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P7 | Positive crankcase ventilation |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P8 | Replace spark plugs |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P9 | Lubricate distributor |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P10 | Check/adjust timing |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P11 | EGR valve operation |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P12 | Clean fuel pump strainer |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P13 | Replace air filter cartridge |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P14 | Check centrifugal advance |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | P15 | Check fuel lines |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | Q1-Q16 | CO emissions check |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|------------------------|--|
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R1 | Tighten nuts, exhaust pipe to turbo |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R2 | Check turbo seal |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R3 | Torque clamp screws |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | Check of turbo system: | |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R4-R5 | Connect instrument |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R6 | Check timing retard |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R7 | Check full load enrichment system |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R8 | Check overload protection switch |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R9 | Lubricate distributor |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R10 | Replace air filter cartridge |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R11 | Replace spark plugs |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R12-R13 | Replace oxygen sensor, reset light |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R14 | Replace fuel filter |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R15 | Positive crankcase ventilation - same: adverse conditions |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | R16 | Replace fuel tank filter |

EMISSIONS
EMISSIONS

EMISSIONS

7,500 = 12,500
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30,000 = 50,000
37,500 = 62,500
45,000 = 75,000
52,500 = 87,500
60,000 = 100,000
67,500 = 112,500
75,000 = 125,000
82,500 = 137,500
90,000 = 150,000

km
miles

B23F

Replace air filter cartridge

Replace spark plugs

Replace oxygen sensor,
reset light**EMISSIONS
EMISSIONS****EMISSIONS**

S5 Replace fuel filter

S6 Positive crankcase ventilation

- same; adverse conditions

S7 Replace fuel tank filter

D24 diesel

a1 Drain condensate

a2 Positive crankcase ventilation

a3 Cooling system pressure check

EMISSIONS

a4 Replacing air filter cartridge

EMISSIONS

a5 Replace fuel filter

EMISSIONS

a6 Check fuel lines

EMISSIONS

a7 Drive belt tension

EMISSIONS

b1-b12 Valve clearance adjustment

EMISSIONS

c1-d7 Engine controls

EMISSIONS

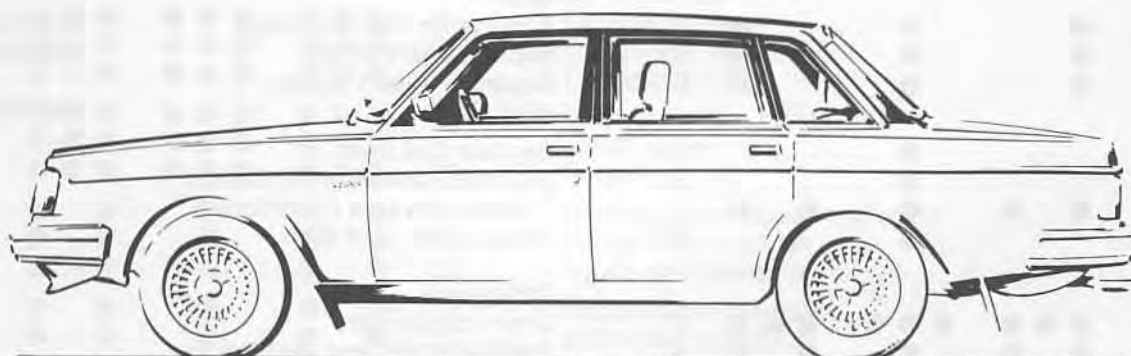
Maintenance services at 75,000 mile intervals:

e1-e10 Compression test

f1-f8 Checking/adjusting injectors

g1-g33 Replacing timing gear belts

Road test



133594

Item OK Adjust

Engine

| | | | |
|----|-----|-----|---|
| 1 | ___ | ___ | Starting ability |
| 1 | ___ | ___ | Fast idle (cold engine) |
| 3 | ___ | ___ | Idle (warm engine) |
| 4 | ___ | ___ | No stalls on acceleration or deceleration |
| 5 | ___ | ___ | No noise from engine |
| 6 | ___ | ___ | Normal warm up |
| 7 | ___ | ___ | Normal engine operation |
| 8 | ___ | ___ | Normal acceleration |
| 9 | ___ | ___ | Leaks |
| 10 | ___ | ___ | Reinstall hardware removed at factory |

Electrical

| | | | |
|---|-----|-----|------------------------------|
| 1 | ___ | ___ | Starter/alternator operation |
| 2 | ___ | ___ | Wipers/washers |
| 3 | ___ | ___ | Ignition and steering lock |
| 4 | ___ | ___ | Instruments, control lights |

Drive train

| | | | |
|---|-----|-----|-------------------|
| 1 | ___ | ___ | Clutch adjustment |
| 2 | ___ | ___ | Clutch operation |

Manual transmission

| | | | |
|---|-----|-----|-------------------|
| 1 | ___ | ___ | Correct operation |
|---|-----|-----|-------------------|

Item OK Adjust

Automatic transmission

| | | | |
|----|---|---|---|
| 1 | — | — | Gear selector play |
| 2 | — | — | Starter operation only in P and N |
| 3 | — | — | Run to normal operating temperature |
| 4 | — | — | No slippage at stall speed |
| 5 | — | — | Upshift |
| 6 | — | — | No slippage during shifting |
| 7 | — | — | Kick down |
| 8 | — | — | Upshift with kick down |
| 9 | — | — | Gear selector in 2, downshift and braking |
| 10 | — | — | Gear selector in 1, downshift and braking |
| 11 | — | — | Park position operation |
| 12 | — | — | Drive shafts and bearing noises |

Brakes

| | | | |
|---|---|---|---------------------------|
| 1 | — | — | Power assist |
| 2 | — | — | No pull when braking hard |
| 3 | — | — | Pedal pulsation |
| 4 | — | — | "Spongy" brake pedal |
| 5 | — | — | Parking brake |

Steering

| | | | |
|---|---|---|------------------------------------|
| 1 | — | — | Correct steering |
| 2 | — | — | Steering wheel position and return |
| 3 | — | — | Steering wheel effort |
| 4 | — | — | Steering looseness |
| 5 | — | — | Power steering function |

Springs and wheels

| | | | |
|---|---|---|----------------------|
| 1 | — | — | No suspension noises |
| 2 | — | — | Rear axle tight |
| 3 | — | — | Tire unbalance |

Body and equipment

| | | | |
|---|---|---|----------------------------|
| 1 | — | — | Accessory operation |
| 2 | — | — | Heater and heater controls |
| 3 | — | — | Speed noises |
| 4 | — | — | Body noises |
| 5 | — | — | Visible defects |
| 6 | — | — | Clean steering wheel etc |
| 7 | — | — | Note faults detected |
| 8 | — | — | Check off |
| 9 | — | — | Remedy faults |



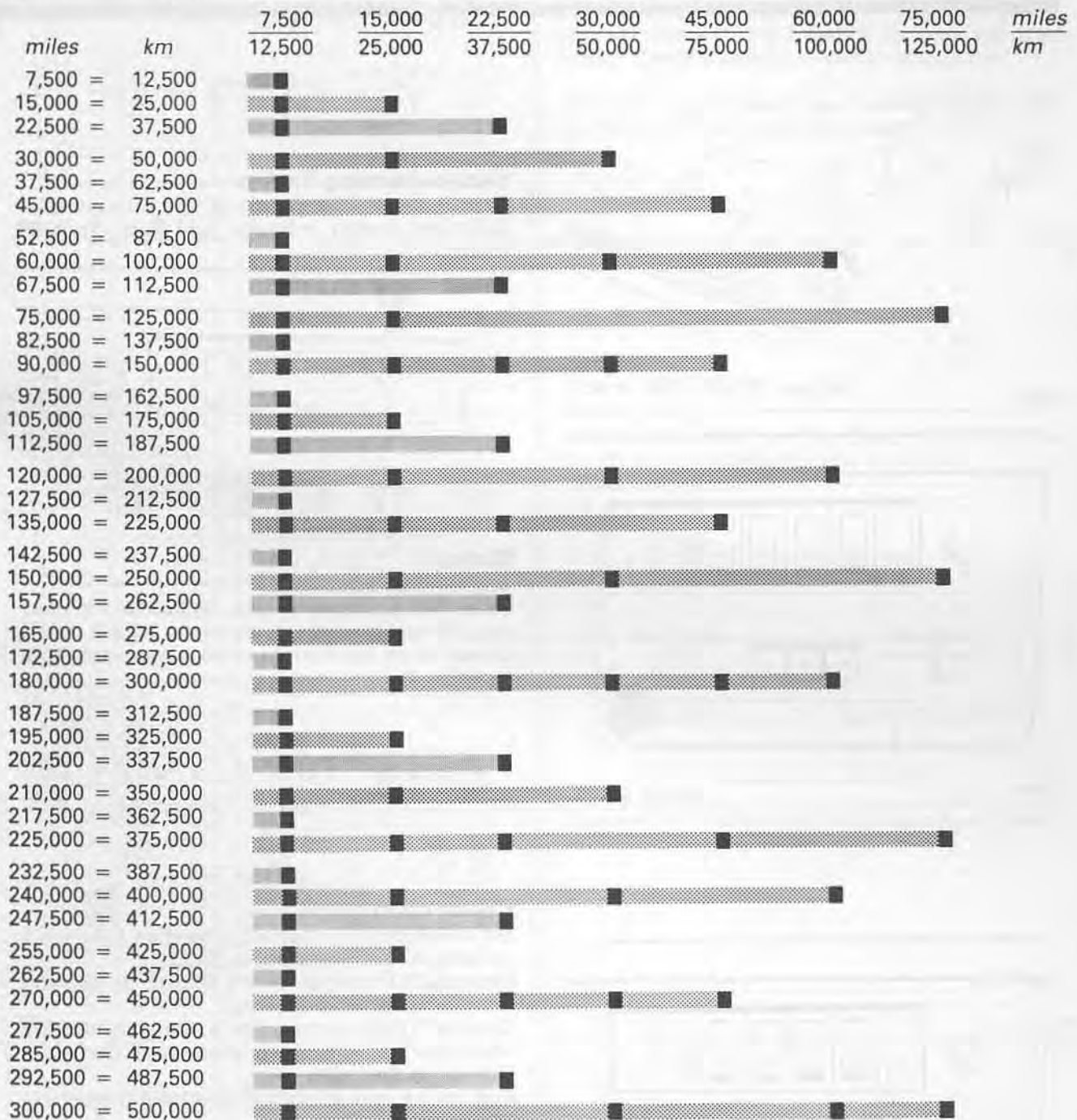
Services beyond 90,000 miles = 150,000 km

The service charts list mileage up to 90,000 miles = 150,000 km. Space and readability sets a limit. On the following page is a list that goes to 300,000 miles = 500,000 km. It cross references actual mileage when a service should be performed and what interval services should be performed at that mileage.

| Mileage | | Service |
|---------|---------|---------------------------------------|
| 90,000 | 150,000 | Oil and filter change |
| 100,000 | 160,000 | Spark plug change |
| 110,000 | 170,000 | Water pump and timing belt inspection |
| 120,000 | 180,000 | Brake fluid change |
| 130,000 | 190,000 | Transmission fluid change |
| 140,000 | 200,000 | Engine oil change |
| 150,000 | 210,000 | Spark plug change |
| 160,000 | 220,000 | Water pump and timing belt inspection |
| 170,000 | 230,000 | Brake fluid change |
| 180,000 | 240,000 | Transmission fluid change |
| 190,000 | 250,000 | Engine oil change |
| 200,000 | 260,000 | Spark plug change |
| 210,000 | 270,000 | Water pump and timing belt inspection |
| 220,000 | 280,000 | Brake fluid change |
| 230,000 | 290,000 | Transmission fluid change |
| 240,000 | 300,000 | Engine oil change |
| 250,000 | 310,000 | Spark plug change |
| 260,000 | 320,000 | Water pump and timing belt inspection |
| 270,000 | 330,000 | Brake fluid change |
| 280,000 | 340,000 | Transmission fluid change |
| 290,000 | 350,000 | Engine oil change |
| 300,000 | 360,000 | Spark plug change |
| 310,000 | 370,000 | Water pump and timing belt inspection |
| 320,000 | 380,000 | Brake fluid change |
| 330,000 | 390,000 | Transmission fluid change |
| 340,000 | 400,000 | Engine oil change |
| 350,000 | 410,000 | Spark plug change |
| 360,000 | 420,000 | Water pump and timing belt inspection |
| 370,000 | 430,000 | Brake fluid change |
| 380,000 | 440,000 | Transmission fluid change |
| 390,000 | 450,000 | Engine oil change |
| 400,000 | 460,000 | Spark plug change |
| 410,000 | 470,000 | Water pump and timing belt inspection |
| 420,000 | 480,000 | Brake fluid change |
| 430,000 | 490,000 | Transmission fluid change |
| 440,000 | 500,000 | Engine oil change |

Services at the
mileages indicated
below - -----

----- include service operations performed at these intervals:



Procedures

Controls and lighting



133556

1700.013

1

Hazard warning flasher.

Press in switch. Check that all four turn indicator lights and switch indicator light flash. Turn off switch.



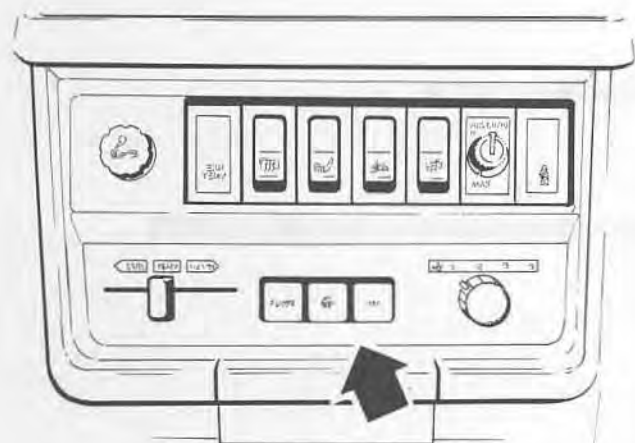
130690

1700.035

2

Blower.

Turn on ignition switch. Check that blower is off with FAN control in position Off and operates in positions 1-2-3-4. Allow blower to run for a brief period at maximum rpm (position 4).



130691

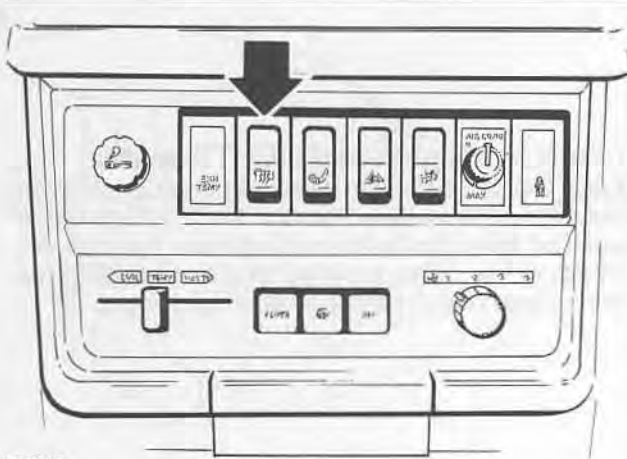
1700.034

3

Heater controls.

Set all controls in positions where air flow vents are closed. Heater control on COLD. Depress DEF control. Check that air is blowing from defroster vent openings. Depress FLOOR control. Check that air is blowing from floor vent openings. Also check that air is blowing to rear seat. Run engine until at normal operating temperature. Check that air exiting vents is still cold. Set heater control to WARM. Check that heated air now exits vents. Check that air exits from all outlets on instrument panel. Switch off blower. Check that REC (recirculate) valve operates. Listen to valve functioning when depressing control. Stop engine.

4



130610

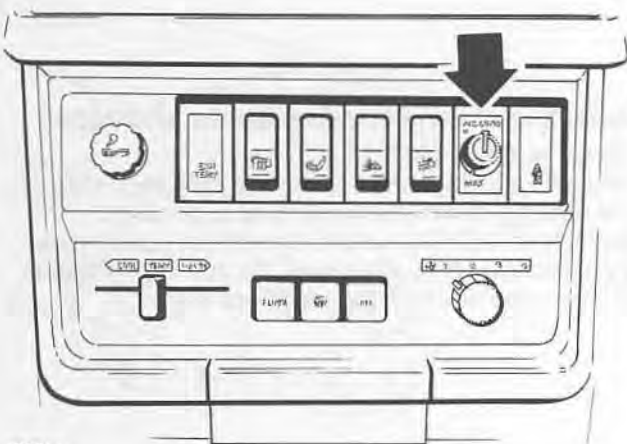
Check electrically heated rear window (demist).

Actuate REAR DEMIST switch for rear window heater. Check that light in switch comes on.

Switch is a spring-back type. System remains ON for 10-15 minutes unless key is turned OFF.

1700.008

5



130611

Check AIR COND control.

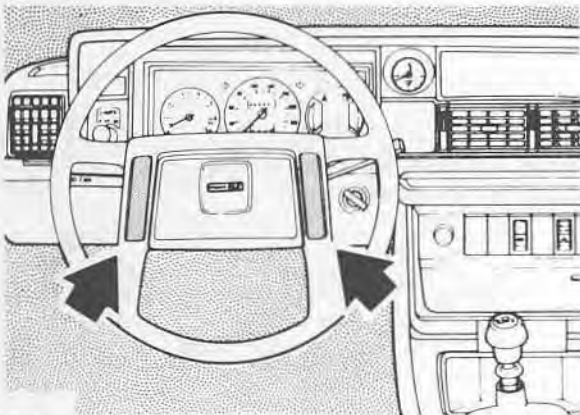
Start engine.

Actuate AIR COND switch. Check that magnetic clutch functions, visually and by sound.

Switch engine off.

1700.009

6



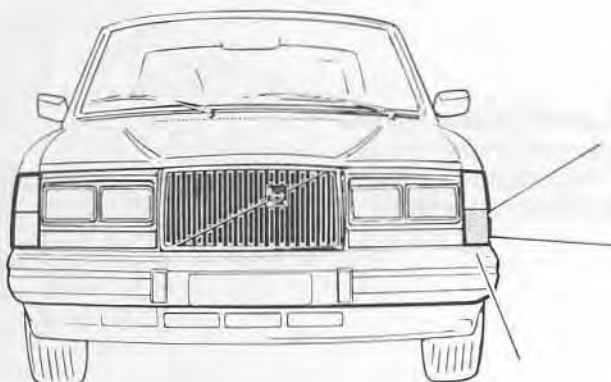
130612

Check horn.

Depress horn contacts at alternate places. Check that horn operates at all points.

1700.011

7

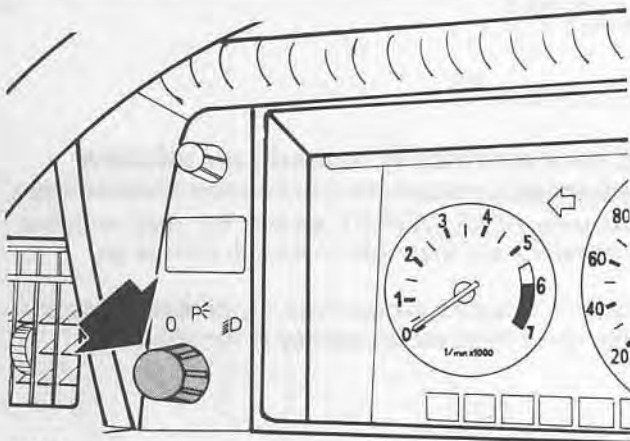


133555

Check turn signals.

Check that left and right front and rear turn indicator lights as well as indicator lights on instrument panel flash. Check that lever returns to neutral after turning steering wheel.

1700.012

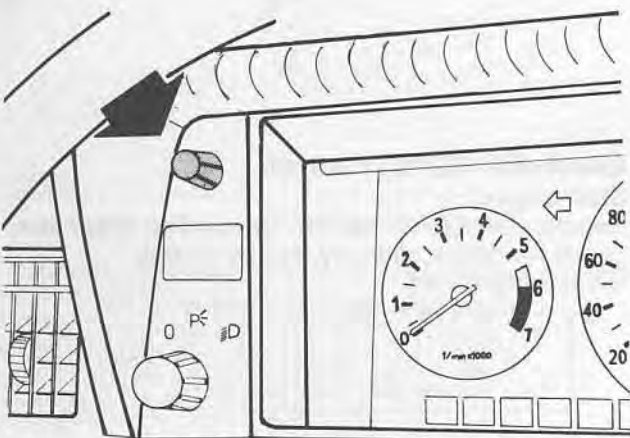


133207

Check headlights and LIGHTS switch.

Place LIGHTS switch in headlight position. Switch between high and low beams. Check in high beam position that headlights and indicator light are on. Check in low beam position that low beam lights are on and high beam indicator light is out.

1700.015



133208

Check instrument panel lights and lights in gear shift control.

Must be accomplished either in a darkened area or by looking directly at lamp lens (opening). Switch on LIGHTS switch. Check that light intensity increases and decreases by turning rheostat first clockwise, then counterclockwise.

1700.014

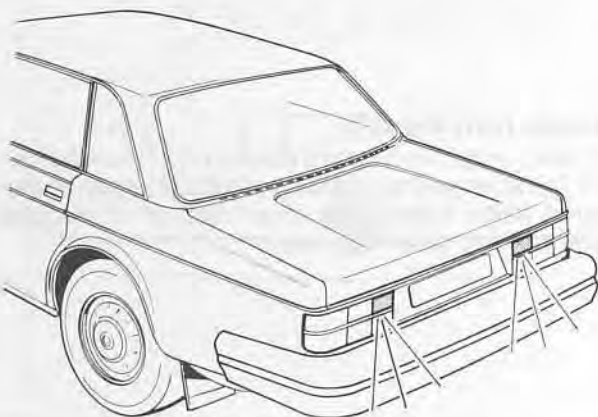


133557

Check parking lights.

Check that all lights are on.

1700.017



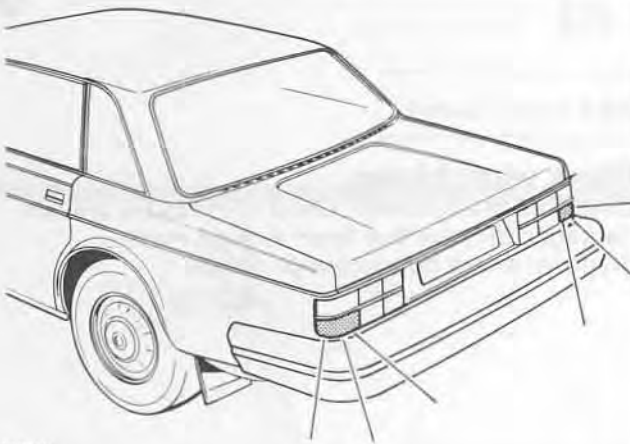
133558

Check brake lights.

Depress brake pedal. Check that brake lights come on with light pressure on pedal.

1700.018

12



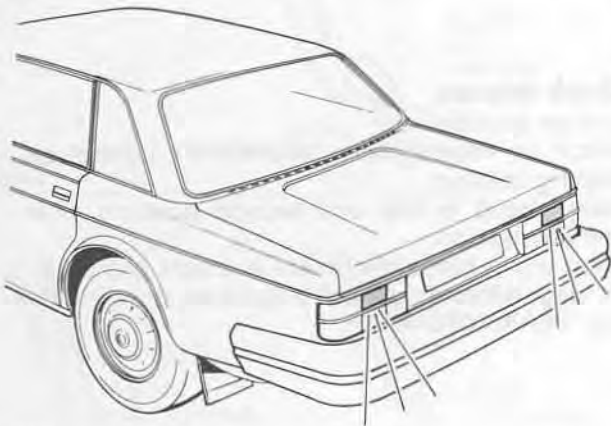
133559

Check tail lights.

Check that all lights are on.

1700.019

13



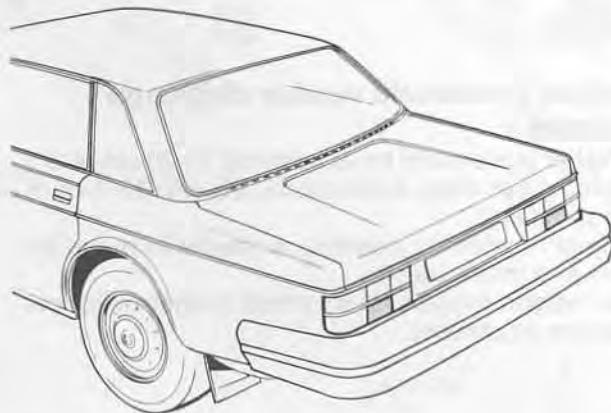
133560

Check back-up lights.

Set shift selector to reverse.
Check that both lights are on.

1700.020

14



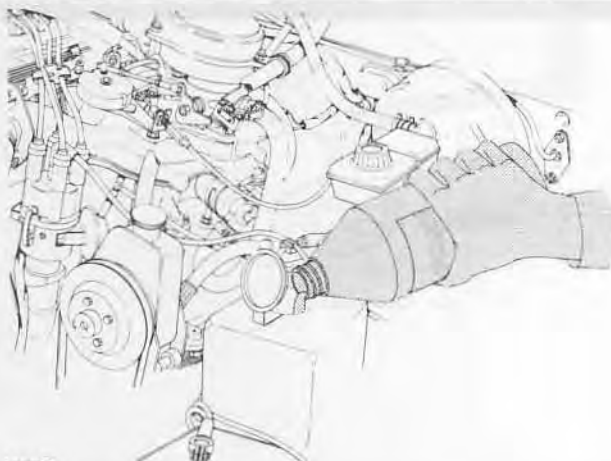
133563

Check rear reflectors and lenses.

Check that reflectors and lenses are not damaged.

1700.052

15

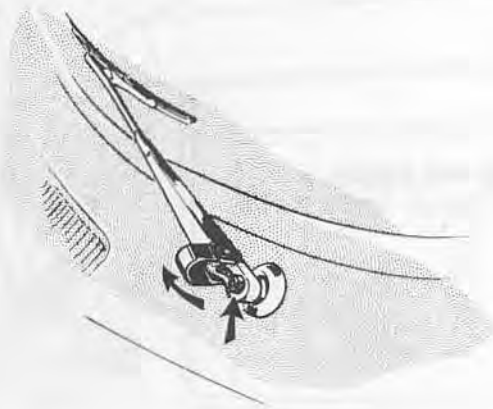


133570

Fill washer fluid reservoir.

Use clean water and solvent. In below freezing conditions use washer solvent anti-freeze.

1700.072



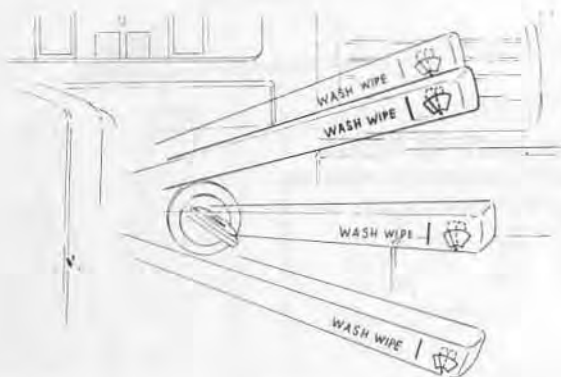
131425

Check wiper blades.

Check blade alignment. Check that blades are not damaged and are free from foreign matter.

Wagons: check tail gate wiper blade.

1700.071



124013

Check wipers.

Turn on ignition key.

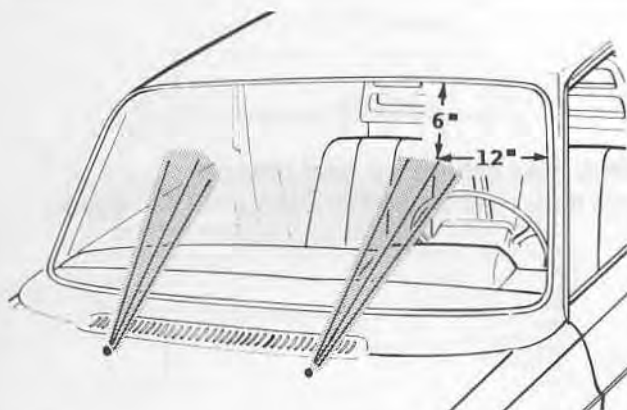
Switch on wipers, using WASH/WIPER control on steering column.

Check speed in first and second position, plus interval position.

Check wiper blade alignment and park position.

For wagon models: Check tailgate wiper by actuating REAR/WIPER/WASH.

1700.059



133691

Adjust windshield washer discharge nozzles.

Washer jets should hit windshield 10-20 cm (4-8") from upper edge and approx. 35 cm (12") from door pillar.

Adjust nozzles by inserting a needle in metal insert and rotate insert.

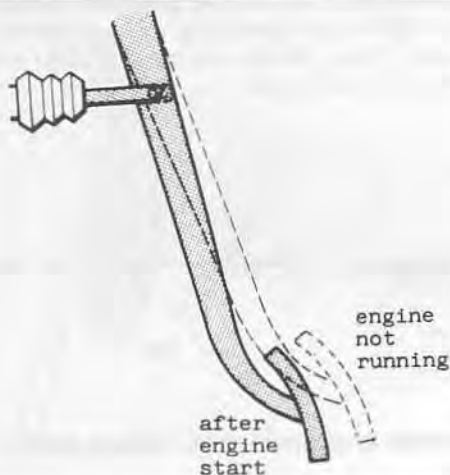
For wagon models: Also check tailgate window washer alignment.

1700.069

In car

Service every 7,500 miles = 12,500 km

A1



133595

1700.030

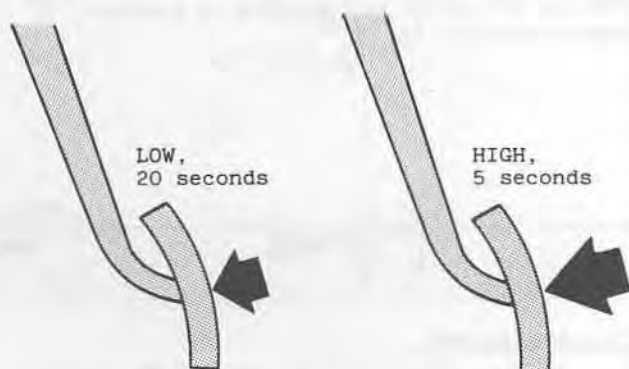
Check power brake function.

Remove vacuum by depressing brake pedal 5 times.

Depress brake pedal, start engine.

Pedal position should drop slightly if power brake functions.

A2



133708

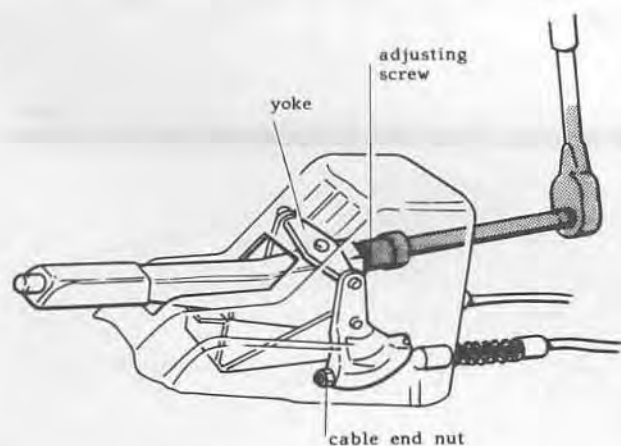
1700.031

Pressure test brake system.

Keep brake pedal depressed 20 seconds with low pedal pressure.

Repeat with high pedal pressure for 5 seconds. Pedal position must not drop. A drop indicates brake fluid leakage or booster vacuum leak.

A3



133200

1700.032

Check parking brake.

Apply parking brake. Adjust if it is not fully applied after pulling 10-11 notches.

After adjustment, adequate braking power should be obtained after pulling 2-8 notches, pulling force approx. 65 lbs. Adjust through rear of parking brake console.

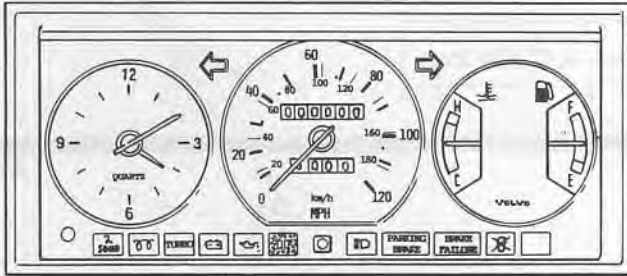
Check that catch is operating correctly.

Check that indicator light on instrument panel goes on. Release lever and check that light is out when lever is in bottom position.

Yoke should be at right angles to parking brake lever.

If yoke is askew, use nuts at cable ends to adjust. There should always be at least 2 mm thread protruding.

A4



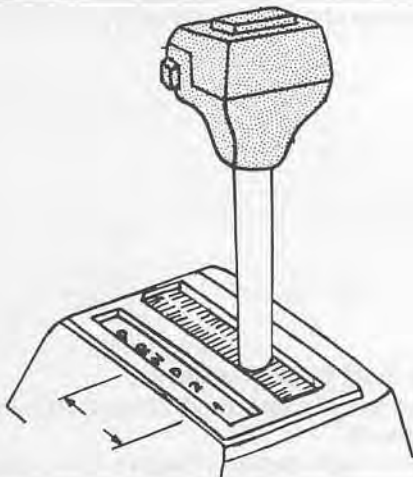
Check warning lights.

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

130608

1700.006

A5



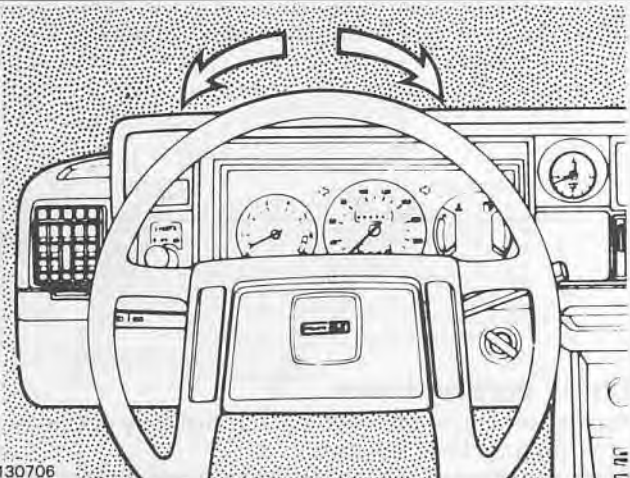
Automatic transmission, check shift control.

Clearance in position "D" toward position "N" shall be the same as clearance in position "2" toward position "1".

133222

1700.026

A6



Check steering.

Turn steering wheel back and forth with wheels resting on ground.
Check steering wheel play with wheels pointing straight forward.
Jack up front end and place stands under control arms close to wheels.
Turn steering wheel fully to right and left positions. Check steering effort and steering gear for play.

130706

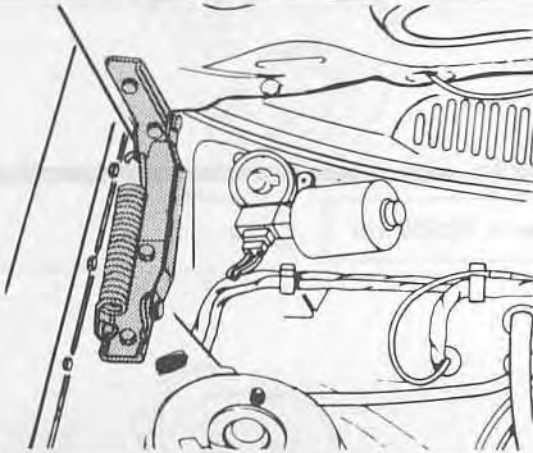
1700.033

Exterior – lubrication

Service every 7,500 miles = 12,500 km

B1

133596

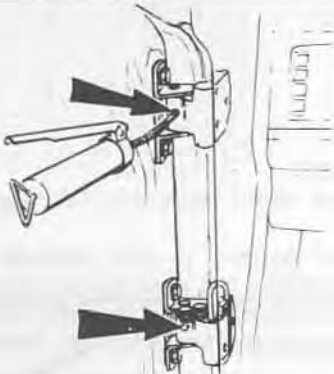


Lubricate hood hinges.
Use oil can and heavy oil.

1700.061

B2

118557



Lubricate door hinges, door stops and striker plates.

Lubricate door hinges with heavy oil. Use door wax to lubricate door stops.

Check that latches lock in both outer and inner positions.

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

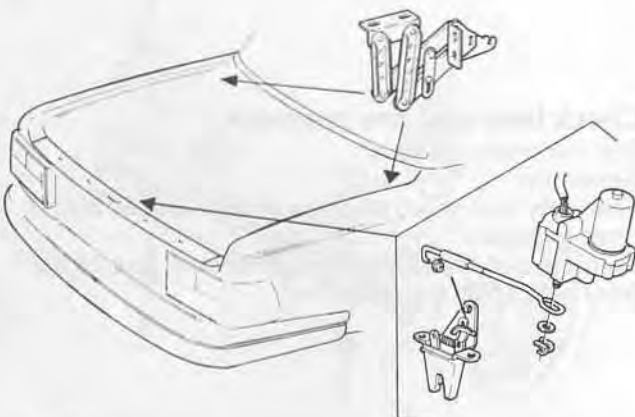
118558



1700.068

B3

133598



Lubricate trunk lid (tail gate for wagons).
Lubricate lid/gate hinges. Use heavy oil.

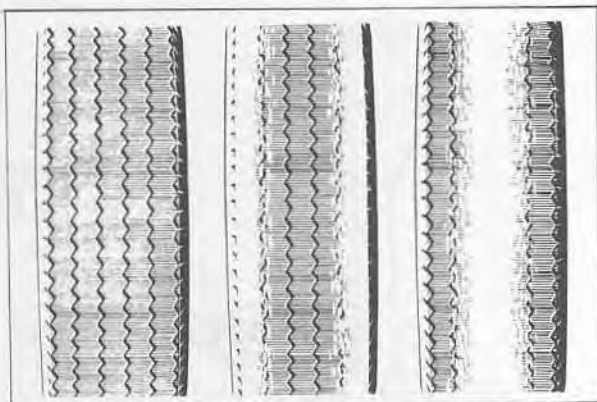
1700.063

On lift

Tires, wheels

Service every 7,500 miles = 12,500 km

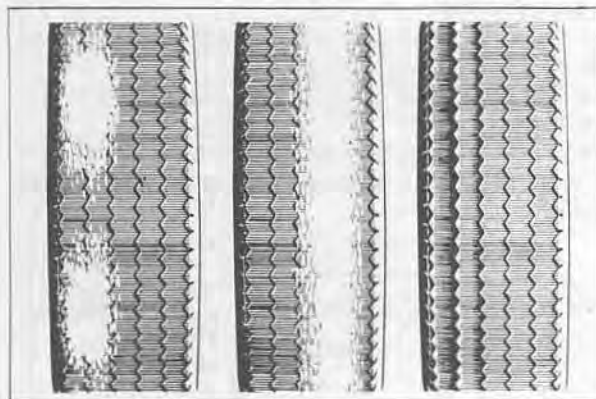
C1



normal wear

air pressure
too low

air pressure
too high



wheel
unbalance

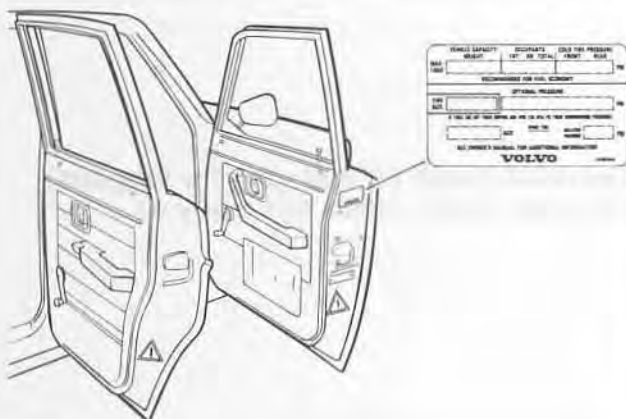
incorrect
camber

incorrect
toe-in

104769 + 104770

1700.106

C2



133567

1700.065

Check tires.

Check tread depth. Minimum allowable is 1 mm (=1/32").

Check wear pattern. It may indicate unbalance, incorrect camber, toe-in or incorrect tire pressure. Check that tires mounted on both front and both rear wheels are the same (radial, cross-ply, tread, studded).

Check tires and tire pressure.

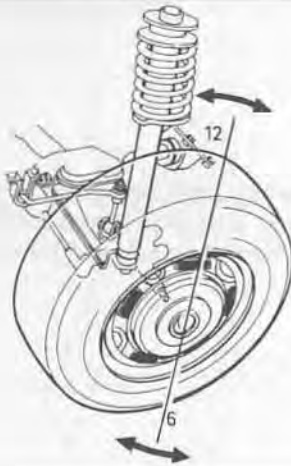
See tire pressure label.

Generally:

Economy and max 5 persons in vehicle: use 36 psi front and rear.

Comfort and max 3 persons in vehicle: use 26 psi front and 27-30 psi rear.

C3



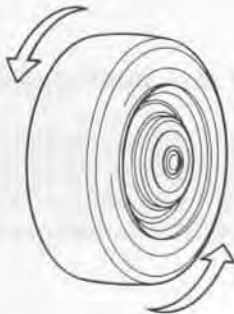
124029

Check wheel bearing play.

Rock the wheel at 12 and 6 o'clock position. If there is play, wheel bearings should be serviced immediately.

1700.107

C4



Check wheel bearing noise.

Let the wheel rotate freely after spinning. Check wheel bearing for noise. Wheel bearings which are not adjusted properly can cause noise.

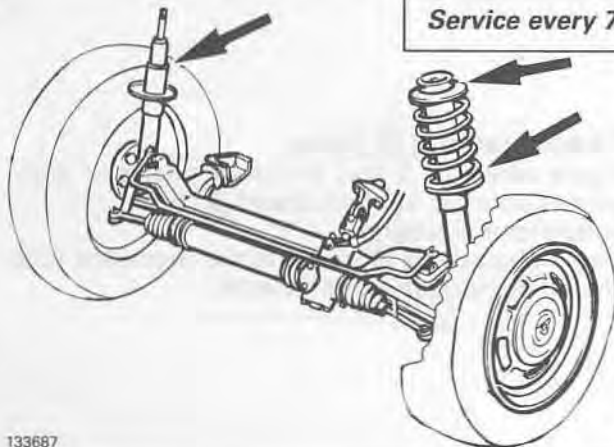
118561

1700.108

Front end

D1

Service every 7,500 miles = 12,500 km



133687

Check front shock absorbers.

Visually check shock absorbers for leakage.

NOTE:

Do not mistake moisture on shock absorber for leakage.

1700.109. M1

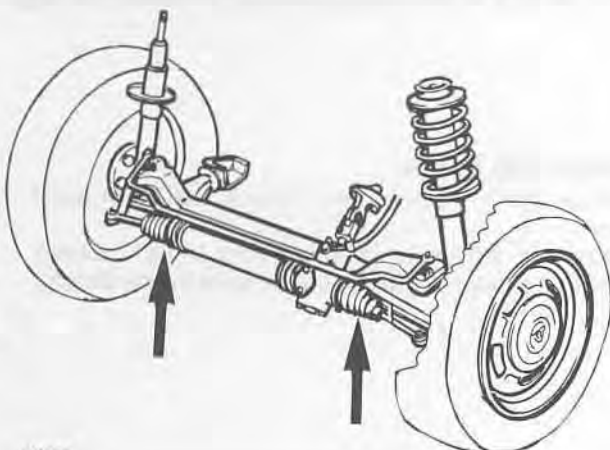
D2

Check front springs.

Check spring attachment and condition.

1700.110

D3



133688

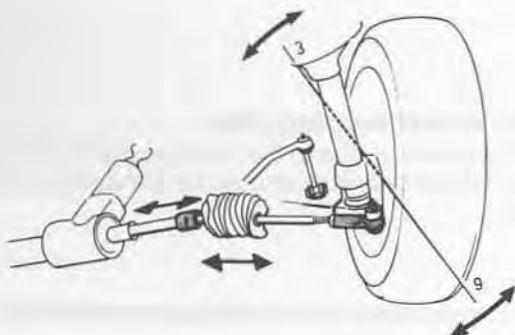
Check steering gear.

Check steering gear rubber bellows for damage.

Check that steering gear is firmly attached by trying to move it by hand.

1700.111

D4



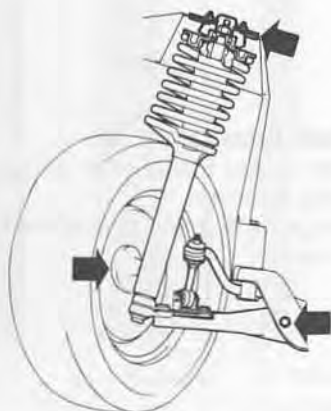
124031

1700.112

Check steering rack for play.

Jiggle wheel at 3 and 9 o'clock positions. Check play along axis of the rack and inner steering rod joint.

D5



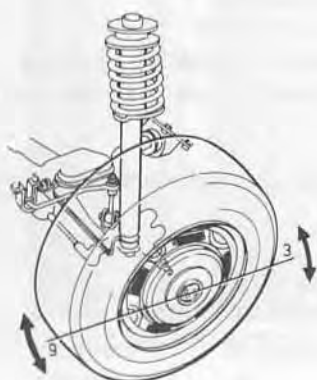
118564

1700.113

Check control arm bushings and strut attachment.

Turn wheels fully to each side and jiggle wheel at 12 and 6 o'clock positions for each extreme. Check control arm bushings, shock absorber spindle and upper strut attachment for play.

D6



124030

1700.114

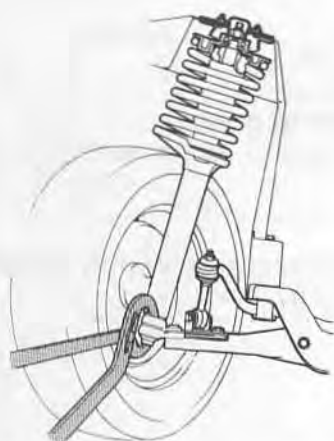
Check steering rod play.

Jiggle wheel at 3 and 9 o'clock positions with wheels pointing straight ahead.

Judgement guideline:

Play along radius of wheel is not permitted and should be remedied immediately.

D7



118564

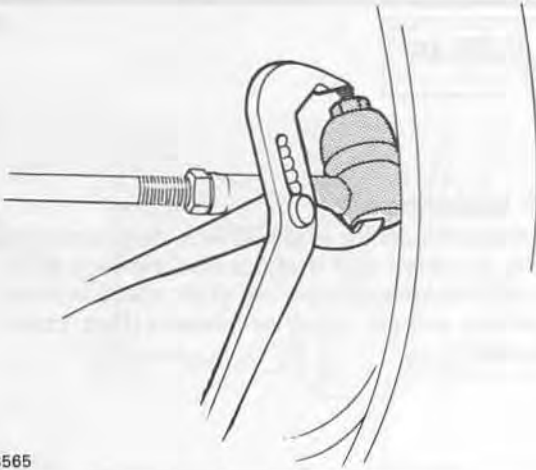
1700.115

Check ball joints.

Vehicle resting on wheels. Check ball joint axial play.

Maximum play permitted is 3 mm (=1/8"). Check rubber bellows. If damaged, service immediately.

D8



118565

Check steering rod ends.

Check rubber seals for damage. Check that nuts are locked. If not, correct immediately.

Check steering rod for damage. Jiggle with a pair of pliers. Check that joint does not have any wear. Squeeze joints with a pair of pliers to check for axial play, as shown in illustration.

Rubber seal damaged = service immediately.

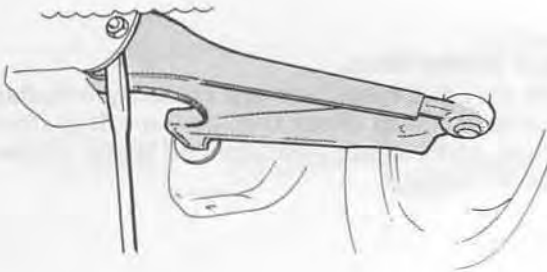
Rod damaged = service immediately.

Joint worn = service immediately.

Maximum allowable axial play for joint = 3 mm (=1/8").

1700.116

D9



118566

Check control arms.

Check control arms for damage.

Check control arm bushings using a pry bar as shown in illustration.

Check for wear, cracks or other damage.

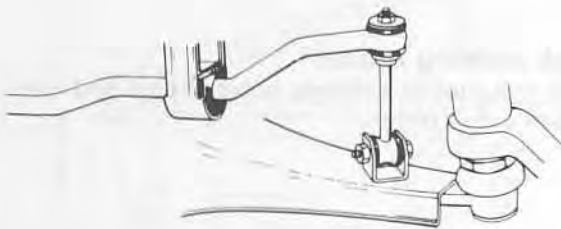
Control arm damaged = service immediately.

Bushing play = service immediately.

Bushing damaged = service immediately.

1700.117

D10



118567

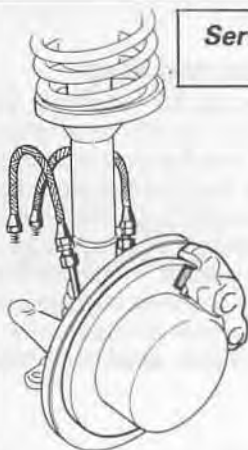
Check stabilizer bar and links.

Check attachment and rubber bushings.

1700.118

Brakes**E1**

**Service every 7,500 miles = 12,500 km
EXCEPT AS STATED**

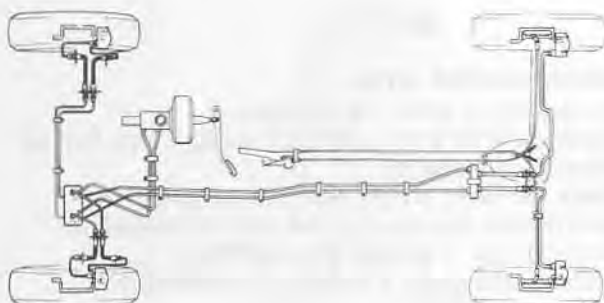


118507

Check brake hoses.

Check brake hoses for leaks. Check that hoses are correctly installed and that connections are tight. Check that brake hoses are not chafed and are free from sharp edges or other objects that could cause wear.

1700.092

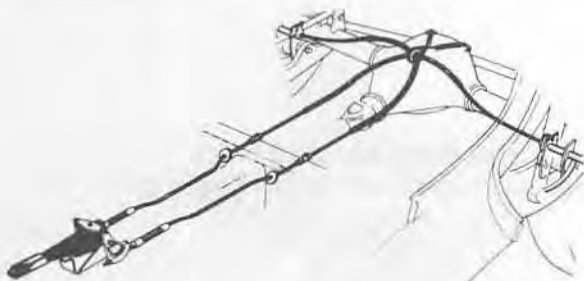
E2

129396

Check brake lines.

Check that all brake lines are correctly installed and secured. Also check that they are free from damage and do not rub against sharp edges. Check for leakage.

1700.093

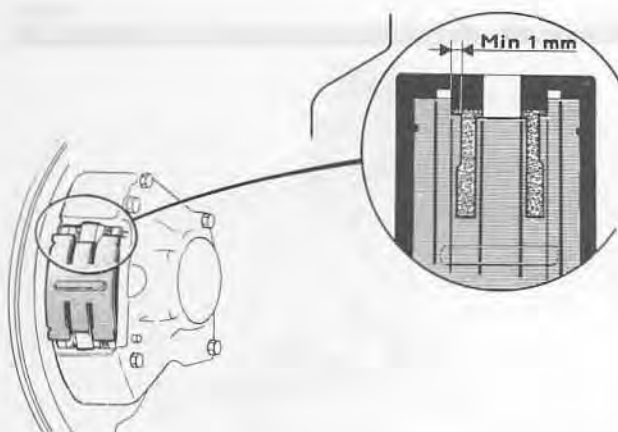
E3

129570

Check parking brake.

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

1700.119

E4

118612

Service at:

15-30-45-60-75-90-thousand miles

25-50-75-100-125-150-thousand km

Intervals: 15,000 miles = 25,000 km

Check wheel brakes.

Remove wheels. Check pad thickness with mirror and wire gauge 3 mm = 0.12".

If pad thickness is less than 3 mm (wire gauge cannot be inserted), pads are considered worn.

If wire gauge fits but little clearance is left, pads will have to be replaced within less than 15,000 miles.

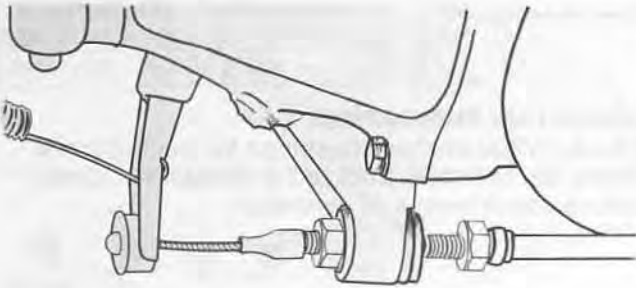
Check for signs of leakage at caliper or connection.

1700.120

Power transmission

F1

Service every 7,500 miles = 12,500 km



133689

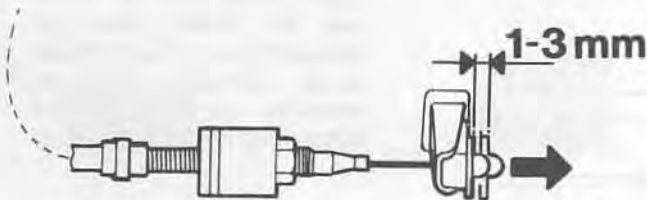
Diesel.

Check clutch play.

Check free play of clutch fork. It should be 3-5 mm = 1/8"-3/16".

1700.121. M1

F2



133690

B21F-Turbo+ B23F.

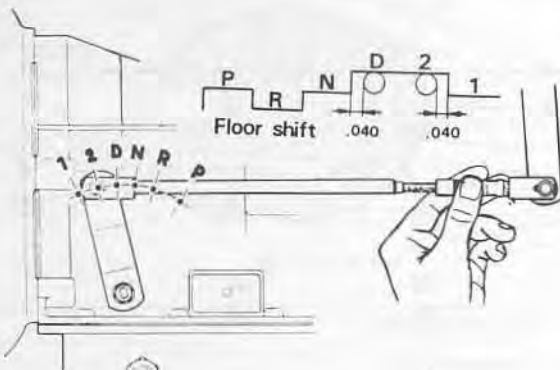
Clutch negative play.

Throw-out bearing has a small pre-load applied by a spring at pedal bracket. Pedal and clutch fork must have a free movement rearward (=negative play) to allow for wear.

Free movement **rearward** should be 1-3 mm = approx. 5/64".

1700.122

F3



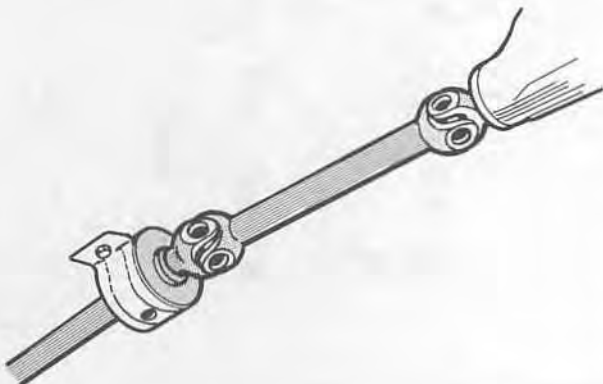
118571

Automatic transmission: Adjust shift control.

Clearance between positions D and N shall be the same as clearance between position 2 and 1. If necessary, adjust at the bottom end of gear selector.

1700.123

F4



Check propeller shaft and support bearings.

Check that U-joint bolts are tight. Turn shafts to find out if U-joints are worn.

Check support bearings and retainer for play.

Check that rubber bellows are not worn or damaged and are correctly installed.

1700.124

Rear end

Service every 7,500 miles = 12,500 km

G1

G2

Check rear shock absorbers.

Manually check shock absorber attachment.
Check for leaks.

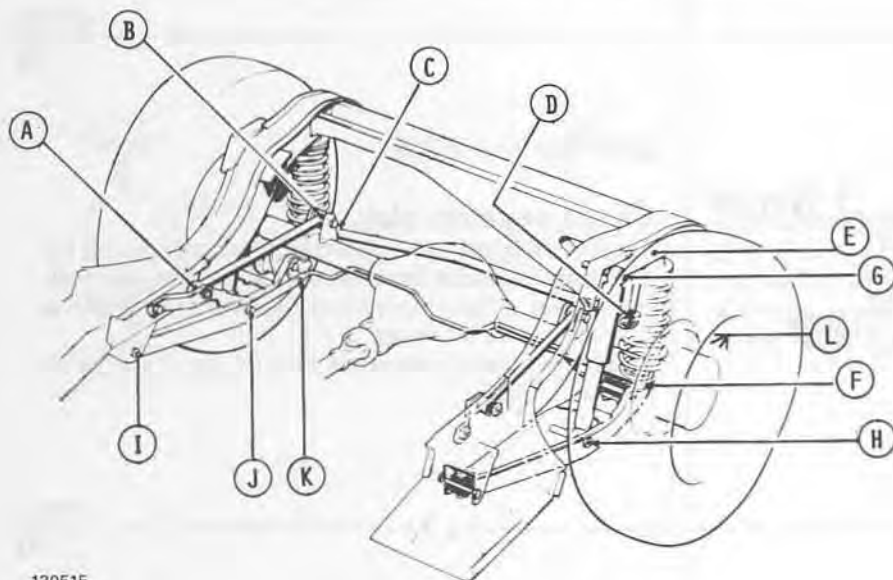
Do not mistake moisture on shock absorber for leakage.

Check rear suspension.

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

1700.125. M1

1700.128

**NOTE:**

There is no need to retor-
que all bolts, nuts etc
unless parts are found to be
loose. Specifications are
provided as a guide for
tightening loose hardware.

130515

1700.489

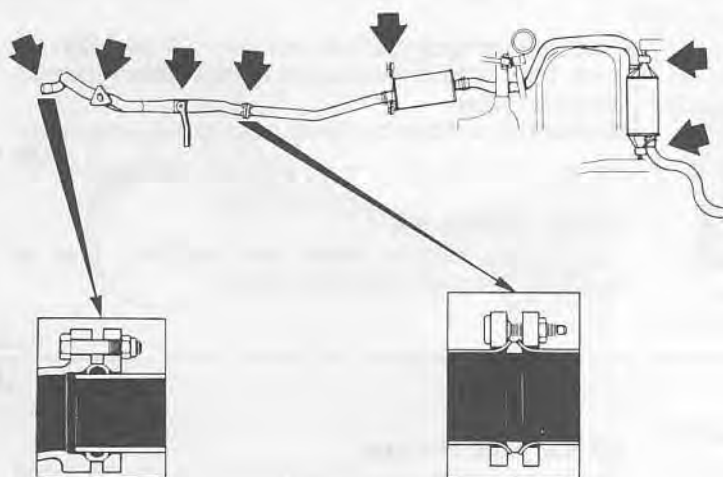
| | | Nm | ft. lbs. |
|---------------------------------|--|-----|----------|
| Reaction rod: | | | |
| A | Body attachment | 85 | 62 |
| B | Rear axle attachment | 85 | 62 |
| Track rod (Panhard rod): | | | |
| C | Rear axle attachment | 60 | 44 |
| D | Body attachment | 85 | 62 |
| Rear Spring: | | | |
| E | Upper attachment | 45 | 32 |
| F | Lower attachment | 19 | 14 |
| Shock absorber: | | | |
| G | Upper attachment | 85 | 62 |
| H | Lower attachment | 85 | 62 |
| Trailing arm: | | | |
| I | Body attachment | 110 | 80 |
| F | Rear attachment (at rear axle) | 125 | 90 |
| Stabilizer: | | | |
| J | Front attachment (=shock absorber) | 85 | 62 |
| K | Rear attachment | 45 | 32 |
| Wheels: | | | |
| L | Nuts, tightened criss-cross | 115 | 85 |

Service at:
 15-30-45-60-75-90-thousand miles
 25-50-75-100-125-150-thousand km
 Intervals: 15,000 miles = 25,000 km

Check exhaust system.

Check condition, alignment and suspension.

1700.238



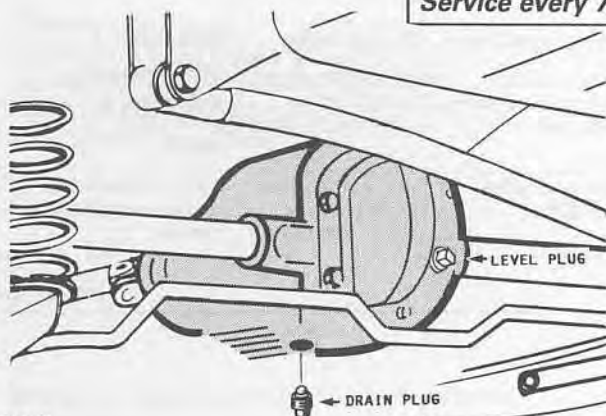
D24 Diesel

129575

EMISSIONS

Service every 7,500 miles = 12,500 km

11



133573

Check rear axle.

Check for leakage and oil level.

Oil level should be up to filler plug hole.

Fluid type: API GL-5 (MIL-L-2105 B or C)

Viscosity: SAE 90

When temperature is steadily below 15°F = -10°C, use API GL-5 SAE 80 W oil.

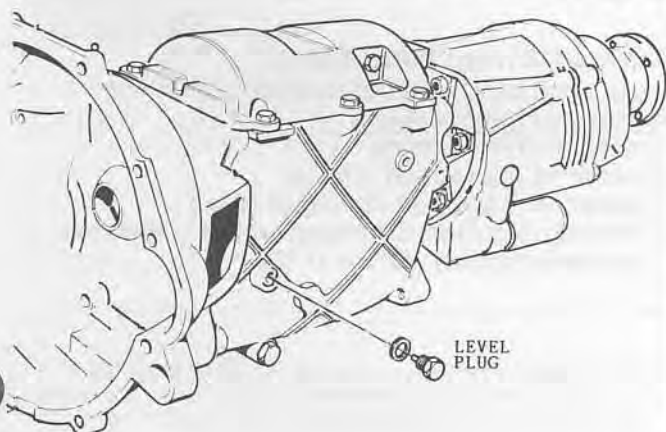
Use oils with proper additives for cars equipped with limited slip differential.

1700.098

EMISSIONS

Service every 7,500 miles = 12,500 km

12



Manual 4-speed transmission with overdrive, M46.

Check for leakage and oil level. Oil level should be up to filler plug hole. Transmission and overdrive are lubricated by the same oil.

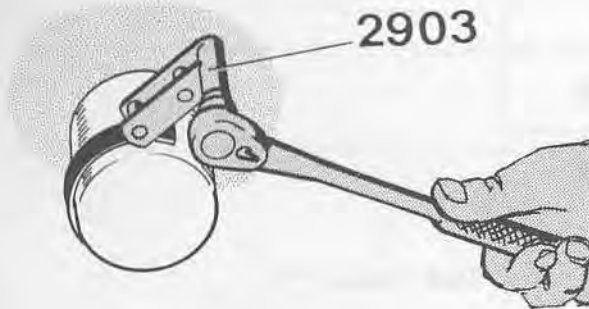
Fluid type: Automatic Transmission Fluid type F or G.

133681

1700.102

Gasoline engines**EMISSIONS**

Service every 7,500 miles = 12,500 km

NOTE: Turbo frequency, twice as often.**Replace oil filter.**

J1

Oil filter is normally replaced at 15,000 mile intervals. However, any adverse conditions require oil filter change more often.

Use special tool 2903 to remove old oil filter. Oil new filter rubber seal. Check installation instructions on filter.

Screw on oil filter by hand, retorque if necessary.

1700.189. M1

Drain engine oil.

Check that engine does not leak oil, fuel or coolant. Reinstall oil drain plug.

133682

1700.188

J2

Gasoline engines**Quality:**

According to API Service SF (minimum). (Oils with specifications SF, SF/CC and SF/CD comply.) Synthetic or semisynthetic oils may be used if specifications comply.

Fuel-saving oils are recommended. When using such oils, oil change intervals recommended by Volvo **must** be followed.

Oil and filter changes

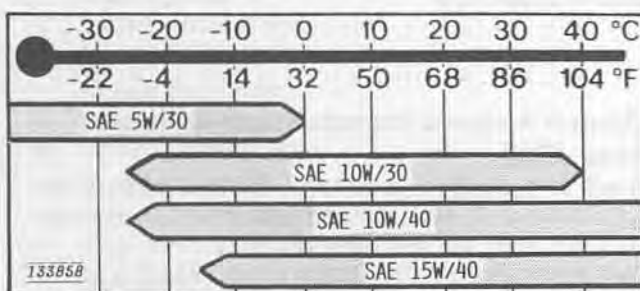
Replaced first time at 600-1,200 mile(1,000-2,000 km) inspection.

Subsequent changes: Mileage or time interval (whichever comes first). See chart below:

| Driving conditions | Without Turbo | With Turbo |
|--|---|--|
| Driving under adverse conditions - see below | Each 7,500 miles (12,500 km) or every third month | Each 3,750 miles (6,250 km) or every third month |
| Normal driving conditions | Each 7,500 miles (12,500 km) or every sixth month | 3,750 miles (6,250 km) or every sixth month. |

1700.190

1700.197. M1

Viscosity: (stable ambient temperatures)

SAE 15W/40 is recommended for use in extreme driving conditions that involve high oil temperature and consumption e.g. mountain driving with frequent decelerations or fast motorway driving.

Note however the lower temperature limits.

1700.192

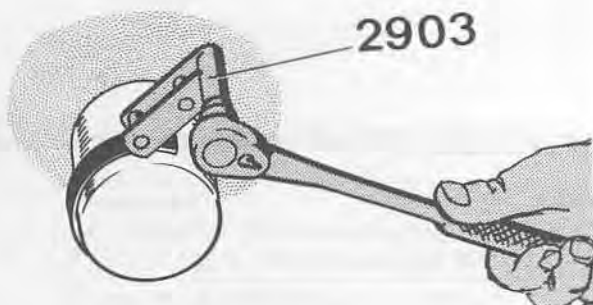
1700.198

Adverse driving conditions:

- sustained driving in dusty/sandy conditions
- sustained trailer hauling
- sustained hill climbing
- sustained high speed driving
- sustained low speed driving or idling
- when driving short distances(7 miles = 10 km) at low temperatures (32°F = 0° C).

Diesel engine**EMISSIONS**

Service every 7,500 miles = 12,500 km

J3**Replace oil filter.**

Oil filter is normally replaced at 15,000 mile intervals. However, any adverse conditions require oil filter change more often.

Use special tool 2903 to remove old oil filter. Oil new filter rubber seal. Check installation instructions on filter.

Screw on oil filter by hand, retorque if necessary.

1700.189

Oil filter, diesel.

If replacing oil filter separately (no oil change) add **0.8 liter = 0.85 US qt.**

1700.196, M1

J4**Drain engine oil.**

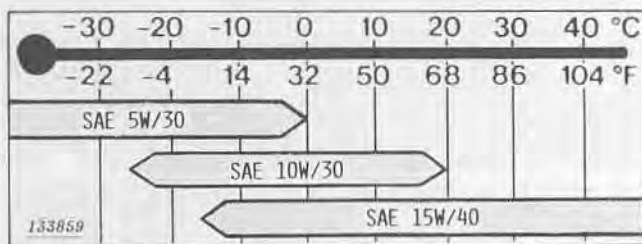
Check that engine does not leak oil, fuel or coolant. Reinstall oil drain plug.

1700.188

Quality:

According to API Service CD (minimum). Oils with specifications SE/CD and SF/CD comply. Synthetic or semisynthetic oils may be used if specifications comply.

1700.193, M1

Viscosity: (stable ambient temperatures)

1700.194

Oil and filter changes.

Replaced first time at 600-1,200 mile (1,000-2,000 km) inspection.

Subsequent changes: Mileage or time interval (whichever comes first). See chart below:

| Driving conditions | Oil change interval |
|--|---|
| Driving under adverse conditions - see below | Each 7,500 miles (12,500 km) or every third month with oil filter change every second oil change. |
| Normal driving conditions | Each 7,500 miles (12,500 km) or every sixth month with oil filter change every second oil change. |

Adverse driving conditions:

- sustained driving in dusty/sandy conditions
- sustained trailer hauling
- sustained hill climbing
- sustained high speed driving
- sustained low speed driving or idling
- when driving short distances (7 miles = 10 km) at low temperatures (32°F = 0°C).

1700.198

Capacities:**D24:**

Excl. oil filter: **6.2 liters** = 6.6 US qts

Incl. oil filter: **7.0** = 7.4 US qts

Difference between Min. and Max: **1.0 liters** = 1 US qt.

SAE 15W/40 is recommended for use in extreme driving conditions that involve high oil temperature and consumption e.g. mountain driving with frequent decelerations or fast motorway driving.

Note however the lower temperature limits.

1700.192

031.202

Engine cooling system

K1

Service every 7,500 miles = 12,500 km

Volvo all weather Anti-Freeze Type C (blue-green) should be used all year round. Cooling system should always contain water plus anti-freeze, even during summer. Experience has also shown that extremely weak anti-freeze solutions (10-20 %) provide poor rust protection. For this reason ratio of anti-freeze/summer coolant to water should be 1 to 1.

Coolant: check anti-freeze.

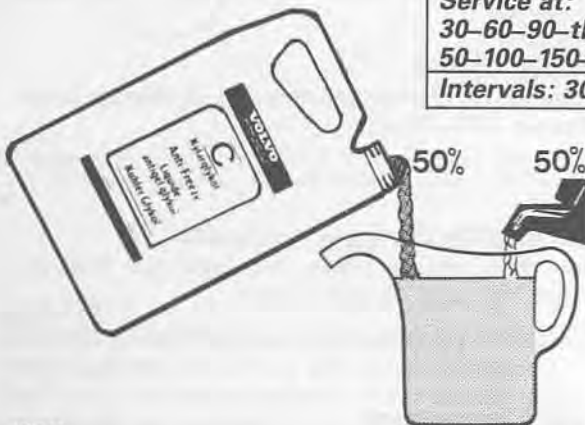
Check coolant freezing point. Fill coolant (50% water, 50 % anti-freeze) to correct level.

1700.169

1700.173

Service at:**30-60-90-thousand miles****50-100-150-thousand km****Intervals: 30,000 miles = 50,000 km**

K2

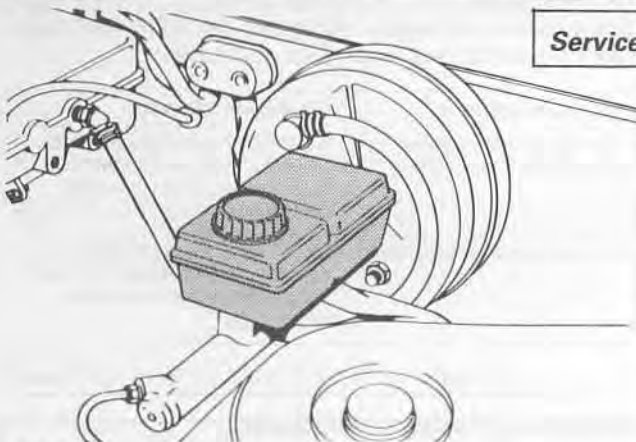


133542

1700.171

Fluids**Service every 7,500 miles = 12,500 km**

K3



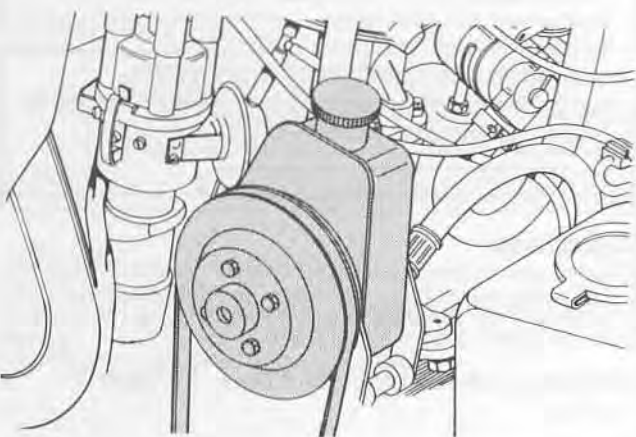
133543

1700.177

Brake fluid level.

In engine compartment, check brake lines and brake fluid reservoir for leaks. Check brake fluid level without removing cap. If brake fluid has to be refilled, use brake fluid according to specification DOT 4.

K4



133544

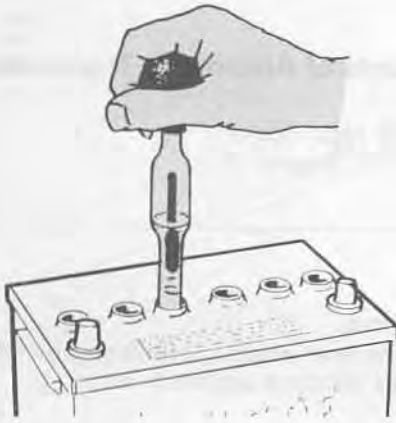
1700.178, M1

Check oil level of power steering reservoir.

If necessary, fill Automatic Transmission Fluid to normal level.

Check fluid level with engine idling while fluid is still hot from driving. Wipe reservoir clean. Fluid level should be within markings on dipstick which is attached to cover.

K5



133571

Battery.

Check battery electrolyte level. (Fill with distilled water only.)

Check battery holddown bracket for tightness and that cables are secured.

Automatic transmission: replace fluid

1700.176

| | |
|--|------------------|
| Service at: | EMISSIONS |
| 22,5–45–67,5–90–thousand miles | |
| 37,5–75–112,5–150–thousand km | |
| Intervals: 22,500 miles = 37,500 km | |

For Volvos with automatic transmission, an optional Volvo automatic transmission oil cooler must be installed when trailer weight exceeds 2,000 lbs = 908 kgs.

Overdrive should not be used while towing.

Observe legal requirements of the state in which the vehicles are registered.

Check condition of Automatic Transmission Fluid.

Discoloration and smell can be caused by heavy engine loads, such as towing.

If this is the case, remove and clean oil pan, oil strainer and particle magnet. Follow procedures outlined in L7–L10.

Under normal conditions, drain fluid by removing drain plug.

Follow procedures outlined in L2–L6.

L1

Draining through drain plug

1700.490



136087

Drain automatic transmission.

Remove drain plug and drain. Reinstall drain plug.

WARNING:

Oil can be scalding hot if vehicle was recently driven.

L2



136088

Disconnect oil cooler return pipe from rear end of transmission.

Connect one end of a transparent plastic hose to oil cooler return pipe. Let other end of plastic hose end in engine bay with a drip pan beneath hose end.

1700.491

L3

1700.492

L4



Fill 2 quarts of Automatic Transmission Fluid.

BW55: ATF type F or G.
AW70/AW71: Dexron II.

1700.493

Run engine.

Start engine and let idle. Switch engine OFF when air bubbles become visible in hose.

1700.494

Fill 2 quarts of Automatic Transmission Fluid.

BW55: ATF type F or G.
AW70/AW71: Dexron II.

1700.493

Run engine.

Start engine and let idle. Switch engine OFF when air bubbles become visible in hose.

1700.494

L5



133906

Check condition of Automatic Transmission Fluid.

Fluid must not carry impurities, discoloration or smell.

1700.495

L6



136088

Reconnect return pipe to automatic transmission.

1700.496

Fill 2 quarts of Automatic Transmission Fluid.

BW55: ATF type F or G.
AW70/AW71: Dexron II.

1700.493

Adjust fluid level as described in L11.

1700.497

Removing oil pan

L7



133692

Drain automatic transmission.

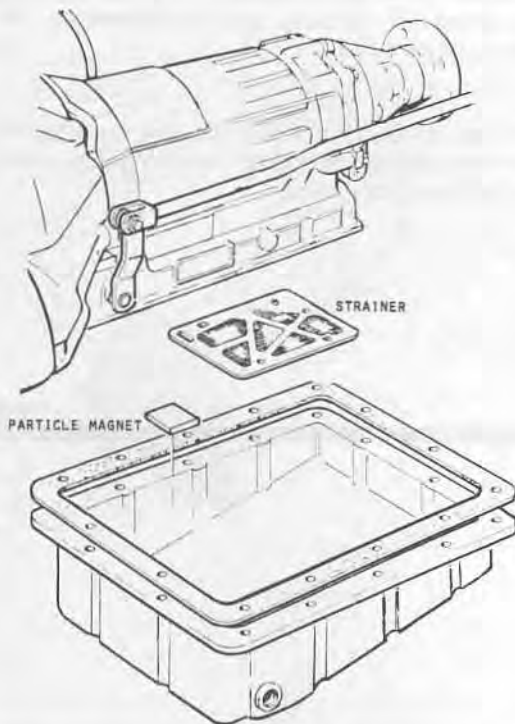
Disconnect filler tube at pan and drain.

WARNING!

Oil can be scalding hot if vehicle was recently driven.

1700.454

L8



133693

Remove oil pan.

Clean oil pan, strainer and particle magnet.

NOTE!

Also clean oil cooler.

1700.455, M1

L9

Reinstall oil pan and filler tube.

Apply oil to pan gasket prior to installation. Use new gasket.

Torques:

| | Nm | ft.lbs. |
|------------------------------|----|---------|
| – Filler tube connector..... | 90 | 65 |
| – Pan bolts: | | |
| BW55, yellow marking | 8 | 6 |
| BW55, blue marking | 10 | 7 |
| AW70/AW71 | 5 | 3.5 |

1700.456

L10

Fill oil.

Total oil capacity cannot be refilled. Approx. 3.4 liters = 3.6 qts was drained, the rest being stored in torque converter and control systems.

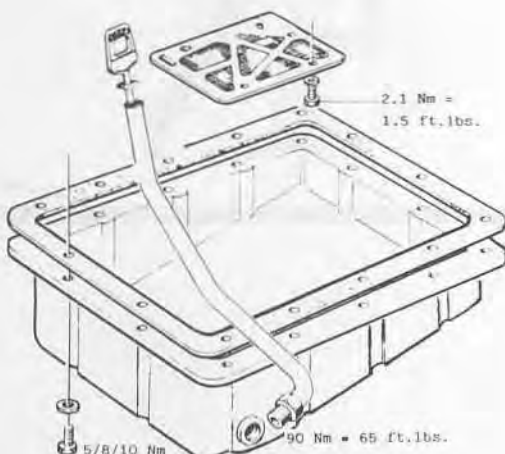
Fill 2.9 liters = 3 US qts of Automatic Transmission Fluid:

- BW55: ATF type F or G.
- AW70/AW71: Dexron II.

DO NOT start engine until oil is filled.

Start engine and adjust oil level as described in next operation.

1700.457, M1

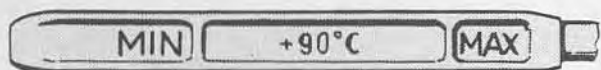


133694

Dipstick markings.



Cold oil – oil temperature $+105^{\circ}$ ($+40^{\circ}\text{C}$). This is a normal temperature for transmission after idling for about 10 minutes. At oil temperature below $+40^{\circ}\text{C}$, level may be below MIN mark.



Warm oil – oil temperature $+195^{\circ}\text{F}$ ($+90^{\circ}\text{C}$). This temperature is obtained when driving for about 30 minutes. At oil temperature above $+90^{\circ}\text{C}$, level may be above MAX mark.

Service every 7,500 miles = 12,500 km

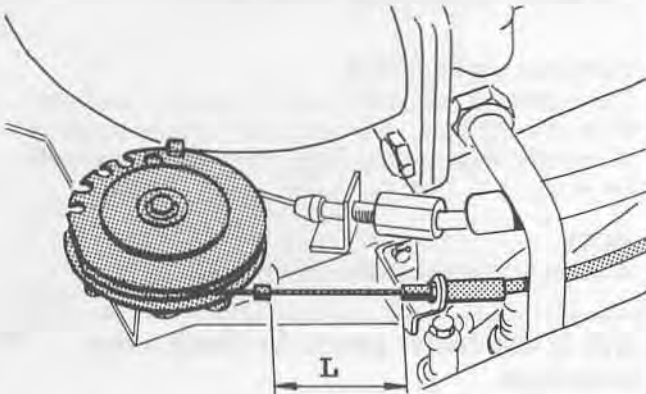
Check oil level for automatic transmission.

If necessary, fill Automatic Transmission Fluid to normal level. When checking fluid level, car should be on level ground in PARK position with engine idling. If topping up is necessary, fill through dipstick tube.

NOTE:

Dipstick has graduations for hot and cold transmission fluid. When checking fluid level use clean rag that will not leave lint.

Following operations refer to B21 and B23 (all)



Service every 7,500 miles = 12,500 km

M1

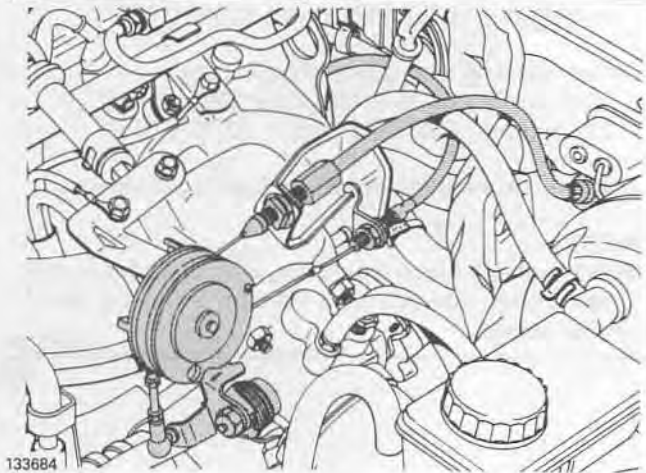
**Automatic transmission:
Adjust kickdown cable.**

Check cable length at closed and open throttle (engine off). Adjust if necessary. Open throttle measurement should be checked with throttle pedal in car depressed, NOT by actuating linkage by hand.

Closed throttle: $L = 1 \text{ mm} = 0.04''$

Open throttle: $L = 51 \text{ mm} = 2.01''$

1700.185



Service every 7,500 miles = 12,500 km

M2

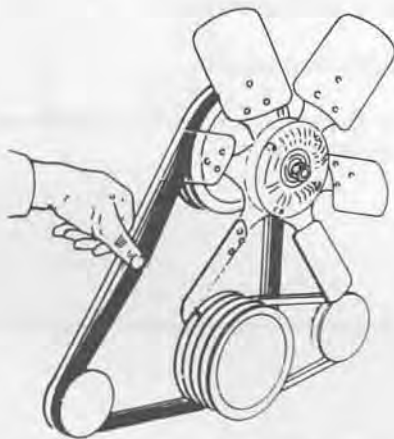
Check engine controls

Check joints, bushings and throttle shaft for wear. Check that cable, links and springs are serviceable and correctly installed. Adjust play. Lubricate joints, using a light oil.

NOTE:

Do not apply lubricant to cable.

1700.271



| | |
|-------------------------------------|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

M3

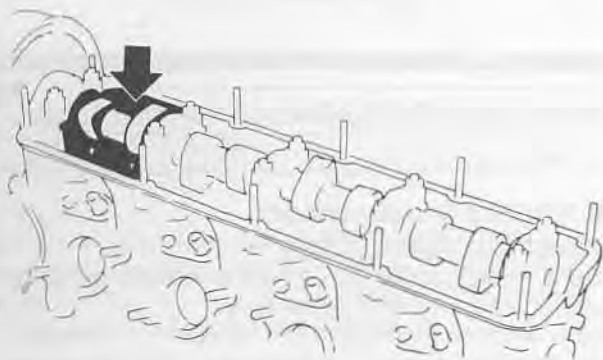
Check drive belt tension.

If necessary adjust. It should be possible to depress drive belts $5-10 \text{ mm} = 3/16-5/16''$ halfway between pulleys.

1700.241

B21 and B23 adjust valves

N1



120777

| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

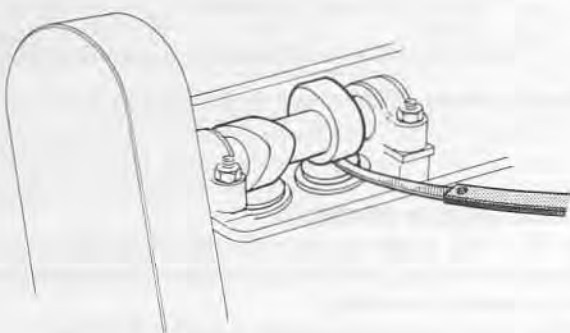
Remove valve cover.

Turn camshaft to position for firing No 1 cylinder. Both cam lobes for No 1 cylinder should point up at equally large angles. Pulley timing mark should be at 0°.

NOTE:

Always turn **crankshaft** (center bolt).

1700.400



118668

Cyl. 1: use feeler gauge to check valve clearance.

N2

When **checking**, clearance should be:

cold engine: 0.25-0.45 mm = 0.010-0.018"

hot engine: 0.30-0.50 mm = 0.012-0.020"

When **setting**, clearance should be:

cold engine: 0.35-0.40 mm = 0.014-0.016"

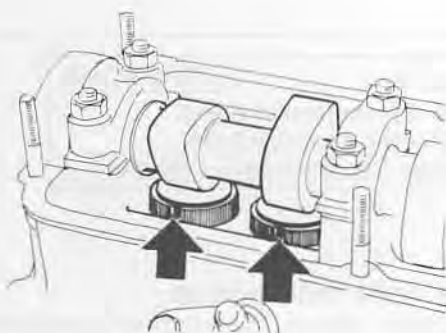
hot engine: 0.40-0.45 mm = 0.016-0.018"

Same clearance for intake and exhaust valves.

NOTE:

Always check valve clearance with cylinder at top dead center. Always turn 1/4 turn after top dead center to **set**.

1700.401. M1



120778

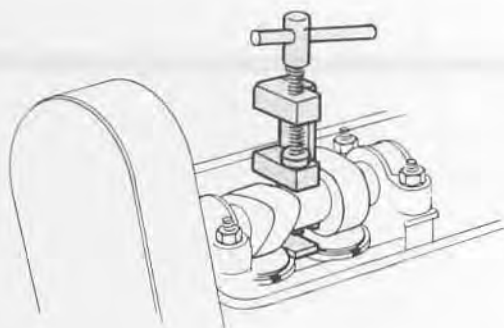
If clearance is incorrect:

Line up valve depressors.

Turn valve depressors so that notches are at right angle to engine center line.

1700.402

N4



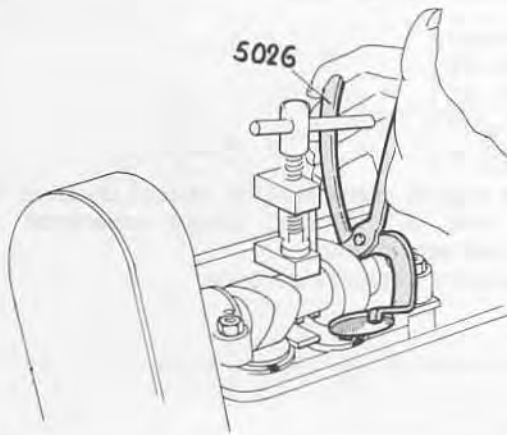
118669

Attach tool 5022 and depress valve depressors.

Screw down tool spindle until depressor groove is just above edge and accessible with pliers.

1700.403

N5

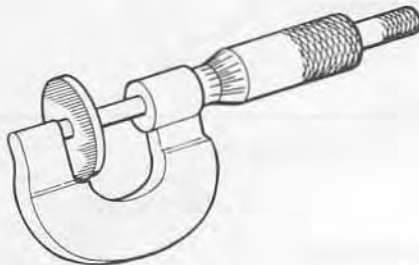


118670

Use tool 5026 to remove disc.

1700.404

N6



118671

Use micrometer to measure disc thickness. Calculate thickness of disc to be used.

Example:

Measured clearance 0.50 mm. Correct clearance 0.40 mm. Difference +0.10 mm.

Measured thickness on existing disc: 3.80 mm. Correct thickness on new disc will thus be 3.80 + 0.10 mm = 3.90 mm.

1700.405

N7



119745

Discs available.

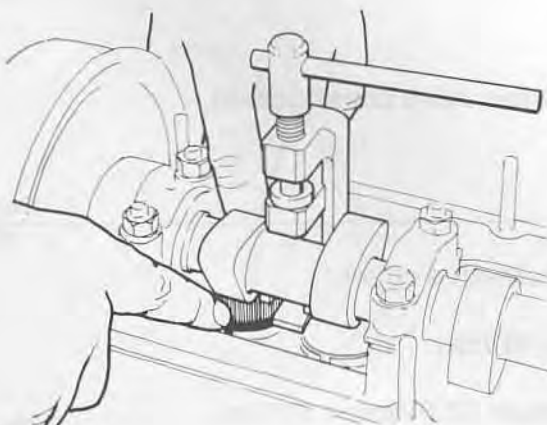
From 3.30 to 4.50 mm in increments of 0.05 mm.

NOTE:

Install discs with marks **down**.

1700.406

N8



120779

Position new disc.

It should be oiled.

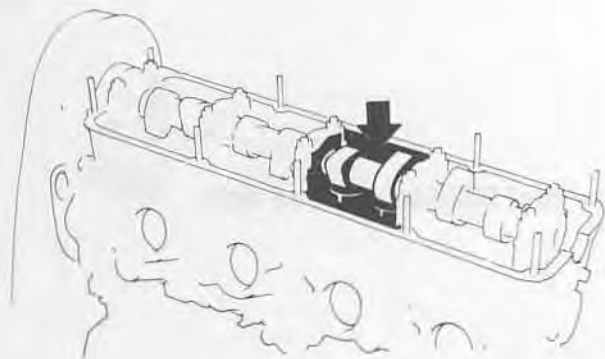
1700.407

N9

Remove tool 5022.

1700.408

N10



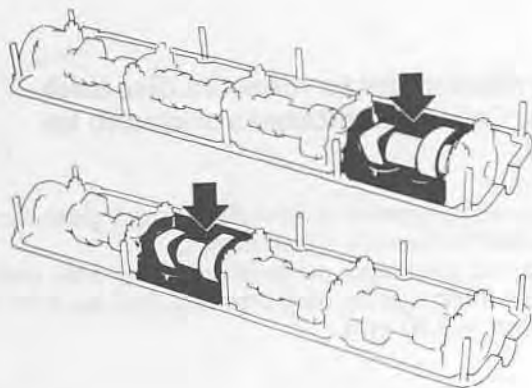
120780

Cyl. 3:

Rotate engine crankshaft to correct position for firing No. 3. cylinder. Check clearance as described previously. If necessary, correct clearance.

1700.409

N11



120781

Cyl. 4:

Repeat procedure.

1700.410

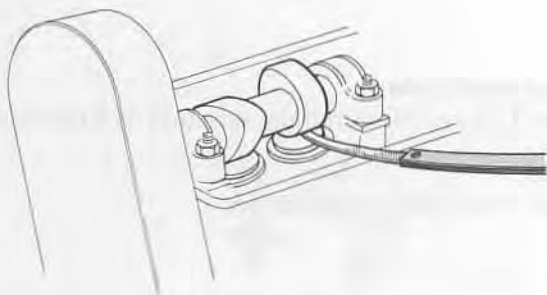
N12

Cyl. 2:

Repeat procedure.

1700.411

N13



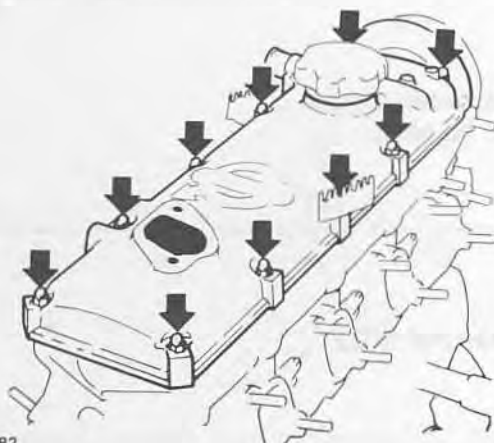
118668

Re-check on all cylinders.

Turn engine a few turns before checking.

1700.412

N14



120782

Position valve cover gasket.

1700.413

N15

Install valve cover.

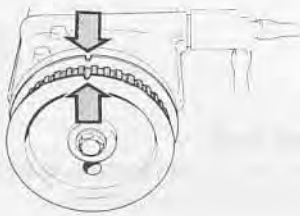
Hex 10 mm.

Torque: 12.5 Nm = 9 ft.lbs.

1700.414

B21 and B23: replace timing gear belt

01



Service at:
45–90–thousand miles
75–150–thousand km
Intervals: 45,000 miles
= 75,000 km

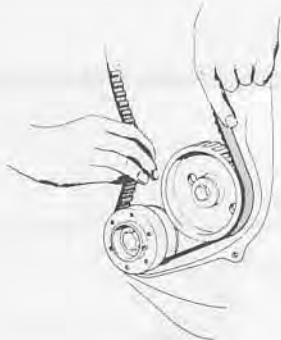
Line up timing belt.

Remove valve cover and rotate engine to line up camshaft marks (shown), crankshaft and intermediate shaft marks. Remove old belt.

124187

1700.416

02



Install new timing belt.

Timing belt should be in good condition and free from grease and dirt.

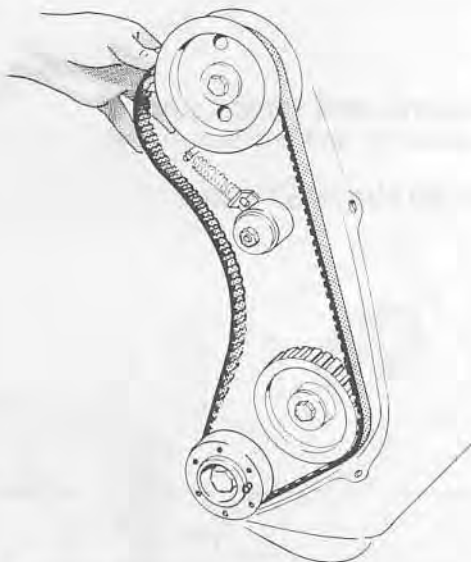
First place timing belt on crankshaft sprocket and then on intermediate shaft sprocket.

New belts have yellow marks. Two lines on timing belt should fit toward crankshaft marks. Next mark should then fit toward intermediate shaft marks, etc.

124188

1700.417

03

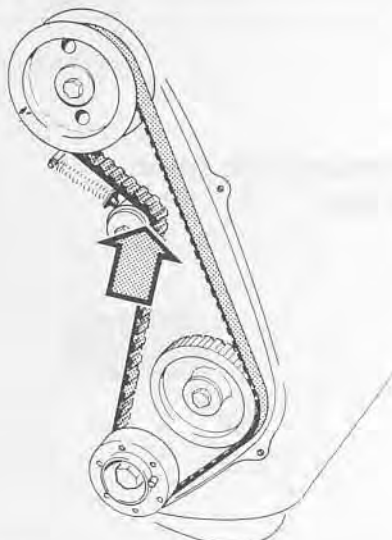


Stretch on tension side and fit timing belt on camshaft sprocket.

124189

1700.418

04



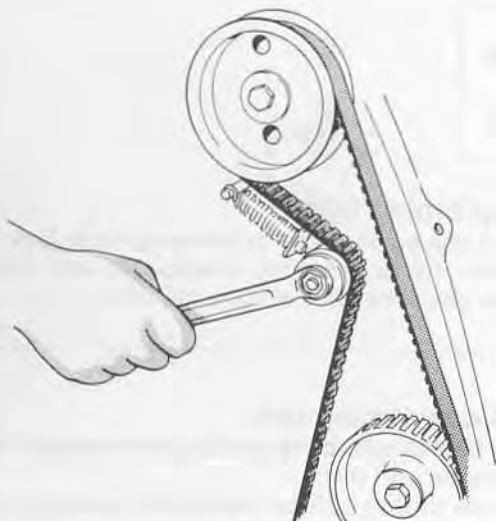
Fit timing belt on tensioner roller.

Use of tools may damage timing belt.

124190

1700.419

05



Tension timing belt.

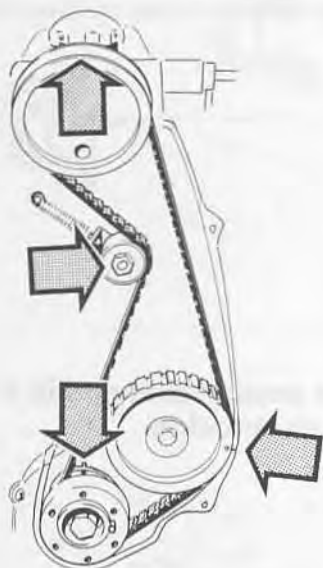
Loosen tensioner nut to let spring tension act on roller and thus tension timing belt.
Tighten nut.

Hex 17 mm

124191

1700.420

06



Check marks and torque nut.

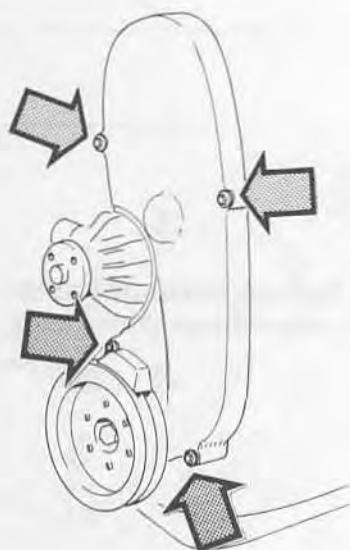
Rotate clockwise and re-check marks.

Torque: 50 Nm = 37 ft.lbs.

124192

1700.421

07



Install timing gear cover.

Hex 10 mm

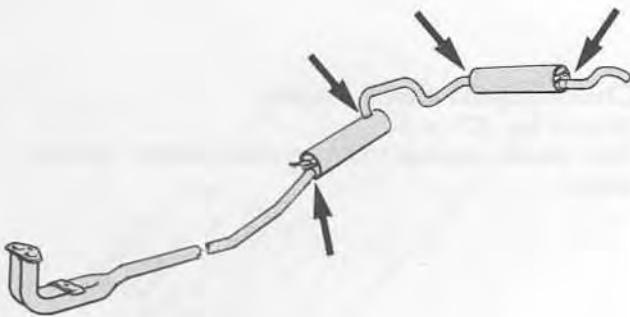
124193

1700.422

B21A/Canada

Service every 12,500 km

P1



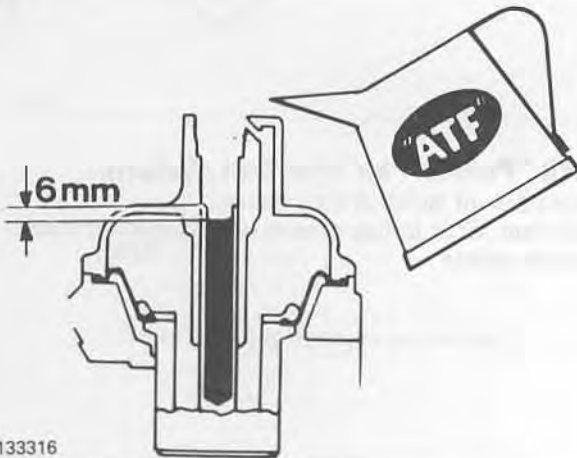
133700

Check exhaust system.

Check condition, alignment and suspension.

1700.238

P2



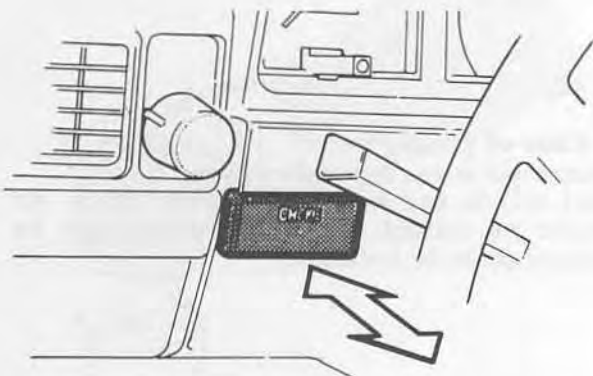
133316

Check damper oil level.

Automatic Transmission Fluid to 6 mm from top of cylinder.

1700.217

P3



129569

Check choke control.

Check operation of choke control. Check that indicator light comes on when choke control is engaged.

1700.218

P4



Breaker points, check condition.

Worn points may indicate defective capacitor.

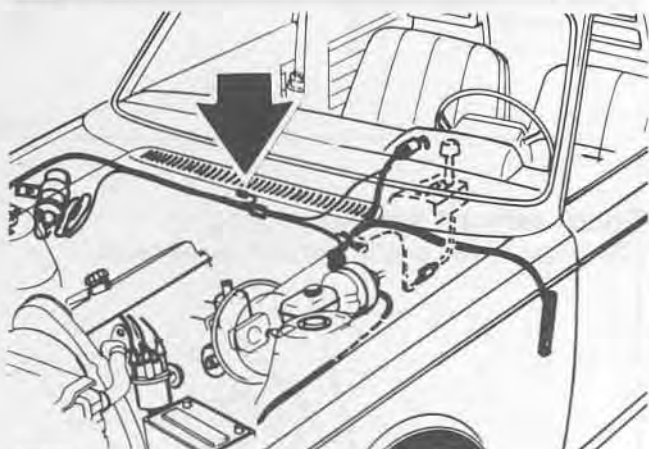
Rotor, cap and cables, check condition.

Also check rubber seals and attachments

118676

1700.245

P5



Check/adjust dwell angle.

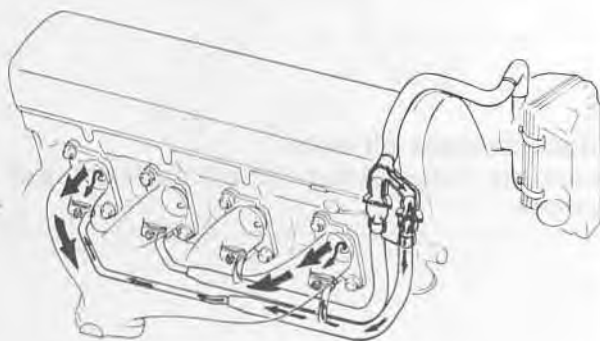
Should be: $62^\circ \pm 3^\circ$.

Run starter motor from remote starter pick-up point.

130695

1700.219

P6



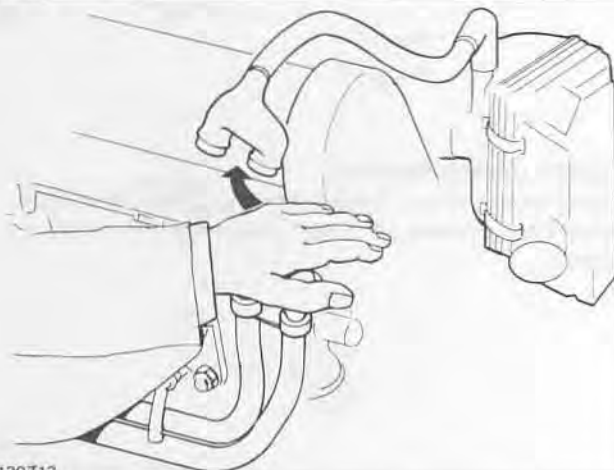
Check "Pulsair" air injection system.

Disconnect air hose at air cleaner.

Check that air is being drawn in and that no back pressure exists.

127165

1700.254



In case of problems:

Disconnect hoses at Pulsair valves.

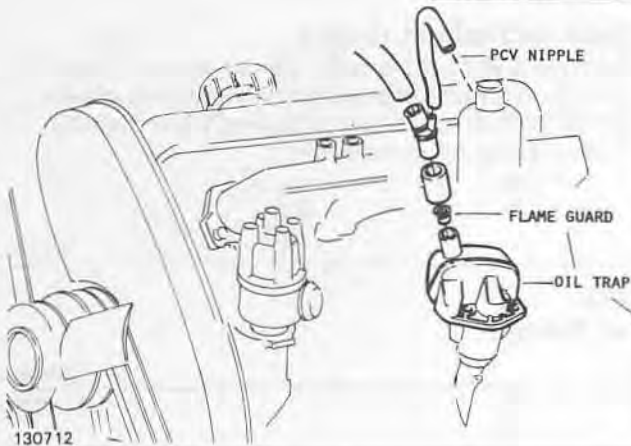
Start engine and hold hand above valves. Air should be sucked in through valves and no exhaust gases be forced out.

130713

1700.255

Service following at:
25-50-75-100-125-150-thousand km
Intervals: 25,000 km

P7



130712

NOTE:

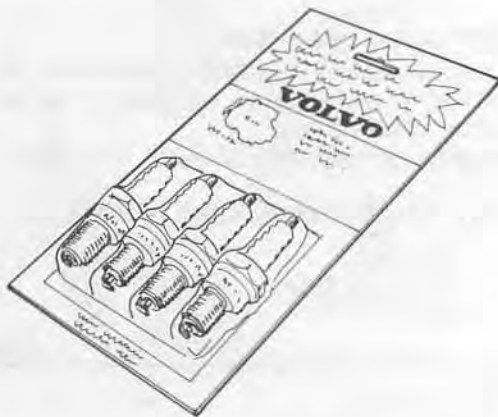
Driving under adverse conditions (for instance city driving under hot conditions) requires service more often (15,000 mile intervals). Volvo recommends cleaning flame guard at 15,000 mile intervals.

Positive crankcase ventilation.

Check hoses for condition and clogging. Clean nipple and flame guard.

1700.239

P8



127523

Replace spark plugs.

Spark plugs must be tightened to specific torque for proper operation and to avoid damage to threads.

Spark plug removal and installation must be performed when engine is cold (low reading on temperature gauge).

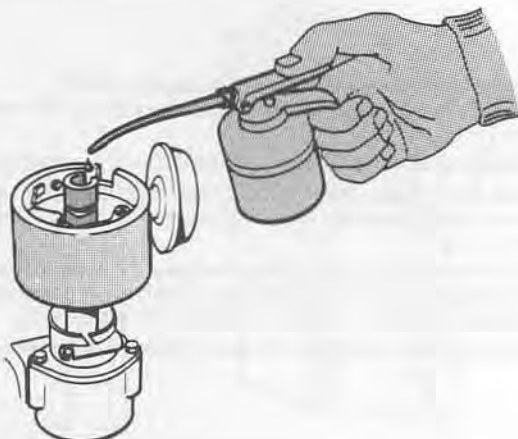
1700.240

B21A
Gap
Torque (plug threads not oiled)

Volvo P/N 273592-6 (set of four)
or Bosch W7DC
0.7-0.8 mm = 0.028-0.032"
20-30 Nm = 15-18 ft. lbs.

031.309

P9



133677

Lubricate distributor.

Remove rotor and lubricate felt wick in distributor shaft center sparingly.

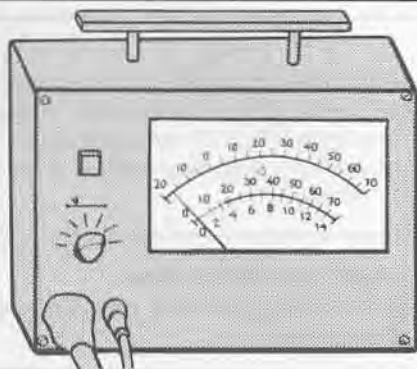
NOTE:

Maximum amount of oil required is 1-2 drops.

1700.257

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

1700.205



P10

Check and adjust timing.

Disconnect vacuum hoses. Disengage air conditioner. Run engine at a sufficiently low idle speed, 700-800 rpm to avoid any influence from distributor centrifugal advance system.

1700.220

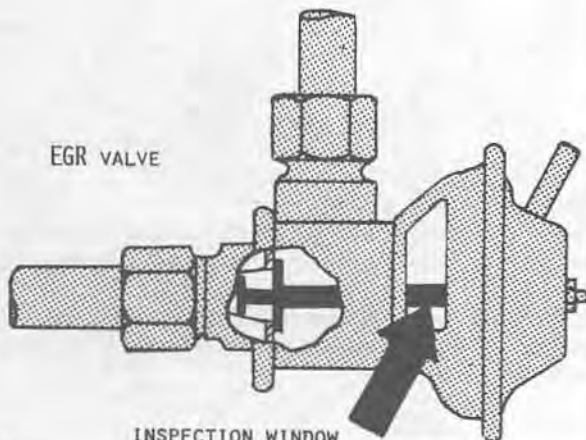
B21A:

7° at 750 rpm.

031.301

P11

EGR VALVE



INSPECTION WINDOW

129568

Check EGR valve operation.

Increase engine speed. Observe movement of EGR valve rod in observation window in valve housing when valve opens.

Release throttle quickly and observe that valve closes.

If inoperative; check solenoid valve operation.

1700.249

In case of problems:

Perform a more thorough function test.

Function test.

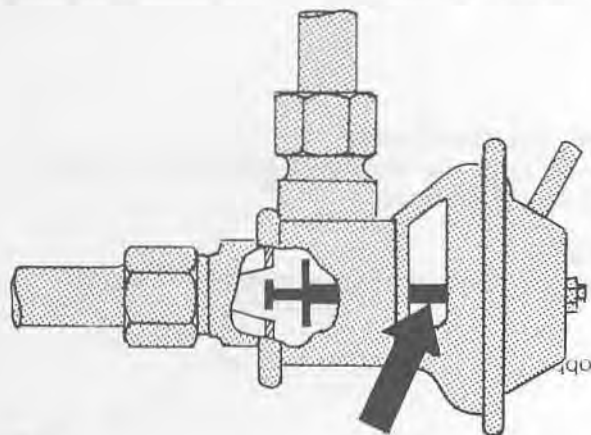
1. Cold engine, coolant temperature below + 55° C.

EGR valve should be closed at all speeds with a cold engine. Start engine.

Increase rpm and check that EGR valve does not open. Check by observing control rod, see illustration.

If EGR valve opens, it is an indication that thermostatic valve is defective and should be replaced. It should not open until coolant temperature has reached + 55-60° C = 130-140° F.

1700.250



128708

2. Warm engine, coolant temperature above + 60° C.

EGR valve should open at rpms above idle speed with warm engine.

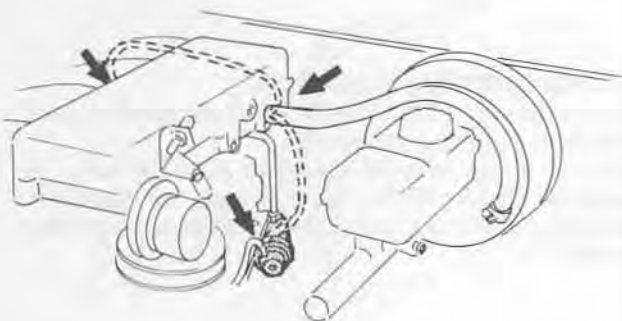
Run engine until it reaches normal operating temperature.

Increase rpm above idle speed. Check that the EGR valve opens. If it does not open, trace fault according to instructions below.

Let engine idle. Check that EGR valve closes. If it does not close, disconnect vacuum hose at EGR valve. If EGR valve closes now, it indicates a defective vacuum amplifier. Try a new one.

If EGR valve does not close, it is stuck. Remove and clean.

1700.251



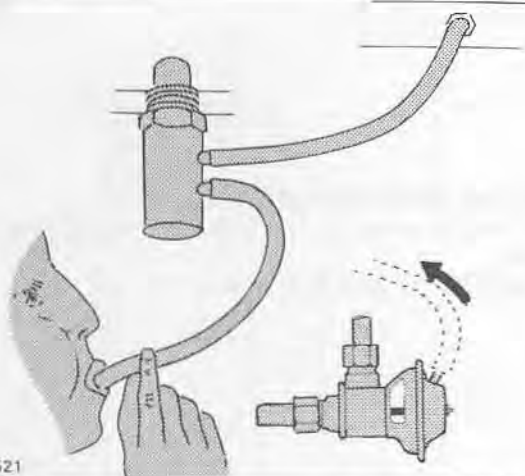
128399

Alternative test method.

An alternative test method is to use the strong vacuum created in engine intake manifold at idle. The connection is used for vacuum control of ignition distributor or for power brake unit.

If this vacuum is connected to EGR valve when engine is idling, valve should open. Exhaust gases are diverted to engine and it should run very poorly or stop.

1700.252



128521

Checking thermostatic valve.

(Wax thermostat).

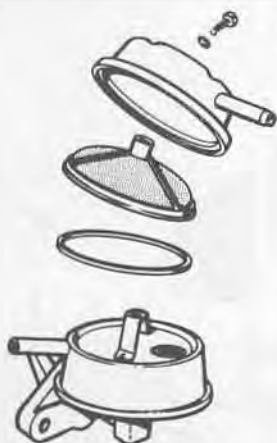
Engine at operating temperature but not running.

Disconnect vacuum hose at EGR valve and vacuum amplifier (connection marked "R"). Use mouth to blow through and check that thermostatic valve is open and vacuum lines not obstructed.

If thermostatic valve does not open, first check that coolant temperature is high enough to open. Coolant temperature should be well above + 60° C = 140° F.

1700.253

Service following at:
50-100-150-thousand km
Intervals: 50,000 km

P12

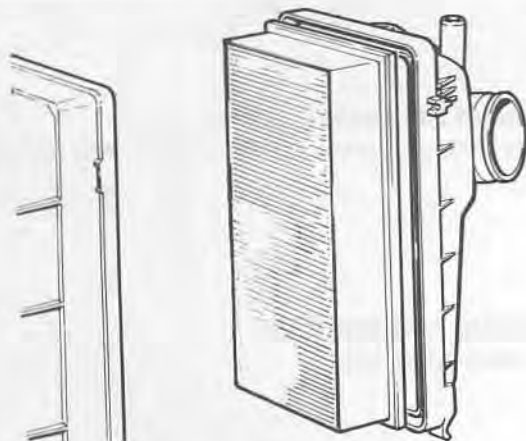
129566

Clean fuel pump strainer.

Also clean fuel pump sludge accumulator.

Carefully check seal and sealing surfaces before re-installing.

1700.242

P13

130707

Replace air filter cartridge.

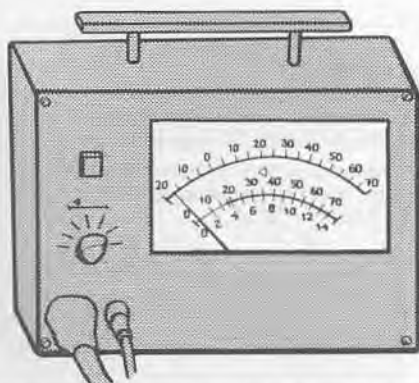
When driving under dirty and dusty conditions, air filter cartridge should be replaced more often.

1700.462

For dry, dusty, polluted regions an air filter cartridge with superior filtering ability is available. It should be used only in such regions. Replacement intervals depend on operating conditions.

1700.463. M1

P14



133701

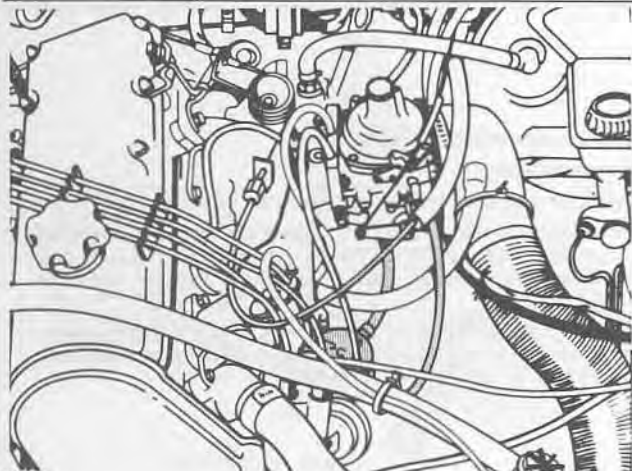
Check centrifugal advance.

Run engine at 2,500 rpm (= 1,250 distributor rpm).
Vacuum unit disconnected.

Timing point should increase considerably, to approx. 25-30° BTDC. No increase, or small increase, indicates defective distributor mechanism.

1700.248

P15



133698

Check fuel lines for tightness.

Check that there are no fuel leaks in engine compartment.

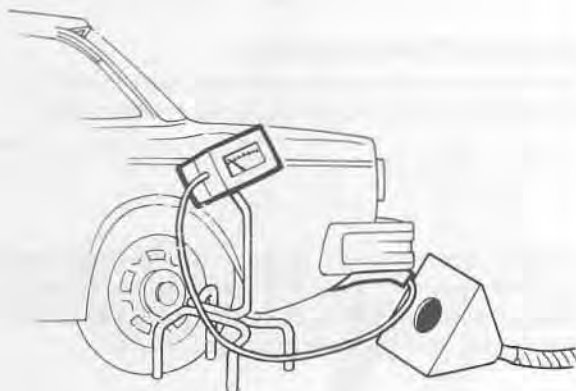
Also check for oil and fluid leaks.

1700.256

CO emissions check B21A, Canada

| |
|---|
| <p>Service at: 25-50-75-100-125-150-thousand km Intervals: 25,000 km</p> |
|---|

Q1



118519

Connect CO-meter.

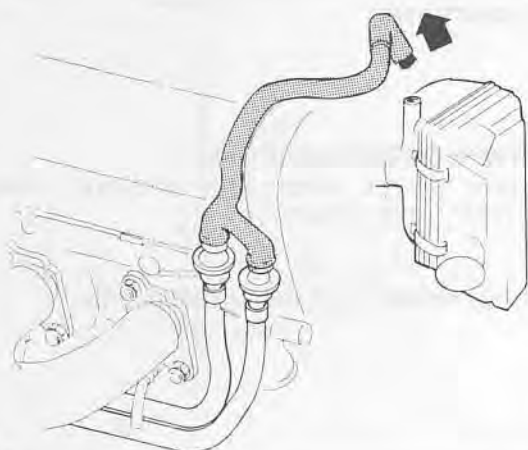
Insert probe approx. 40 cm = 16" into exhaust pipe.

Connect tachometer.

For measuring rpm.

1700.221

Q2



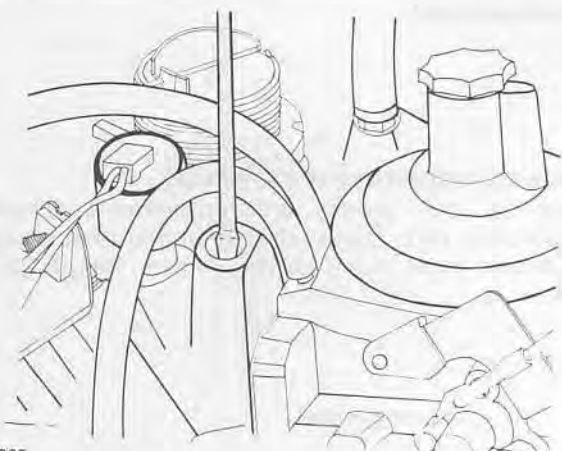
130696

Disconnect Pulsair.

Disconnect hose from air cleaner. Plug disconnected end.

1700.222

Q3



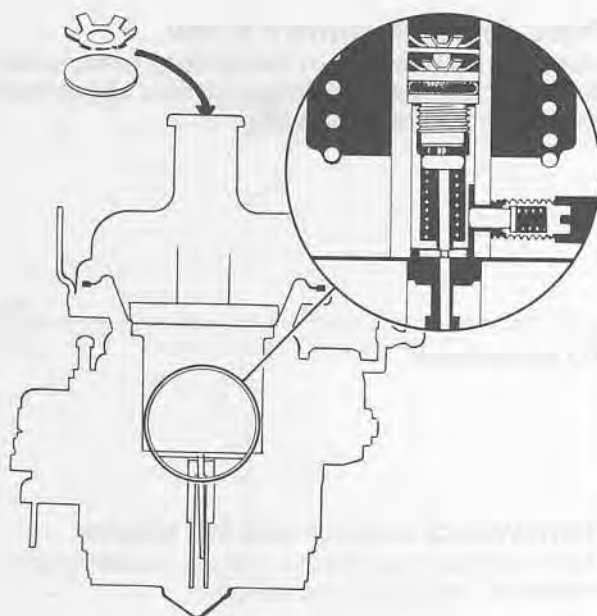
133209

Adjust idle speed.

Engine at normal operating temperature. During and after CO adjustment, idle speed should be: 900 ± 50 rpm.

1700.224

Q4



133545

Check CO.

CO values of 2.5-4.0 % are permitted, provided engine runs properly. Prior to readings increase engine speed momentarily to 1500 rpm to allow cold fuel to enter carburetor.

1700.225

Q5

CO setting.

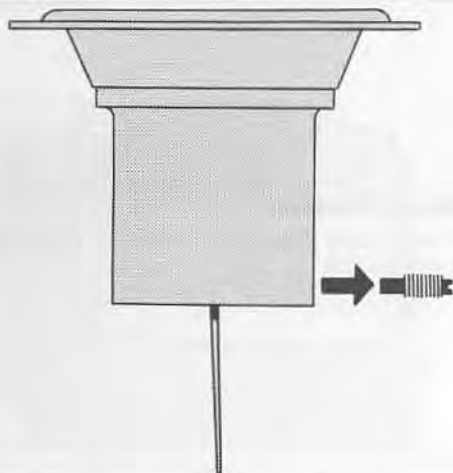
Initial CO setting is made at the factory and should not need to be changed. The CO adjustment screw is sealed from access. If CO is outside limits, and all other causes for incorrect CO readings have been checked, use the procedures that follow.

1700.485

CO adjustment.

If CO is outside limits, it should be set to 3 %. The adjustment screw is sealed with a flat washer and a lock washer.

1700.486



133546

CO adjustment:

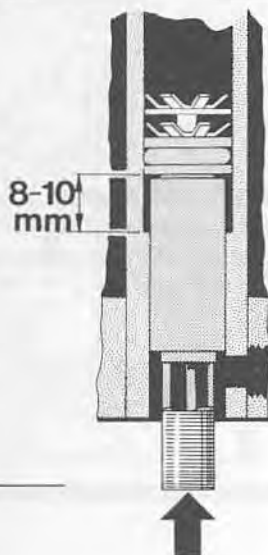
Q6

Remove piston assembly.

Remove piston, diaphragm and fuel needle assembly from carburetor.

Remove retaining screw for fuel needle.

1700.230



133547

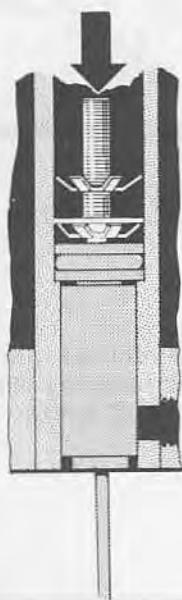
CO adjustment:

Q7

Press up adjustment assembly.

Press up fuel needle and adjustment screw approx. 8-10 mm. Use a tube, outer diameter max. 7 mm and inner diameter min. 3 mm, length 100 mm.

1700.231



133548

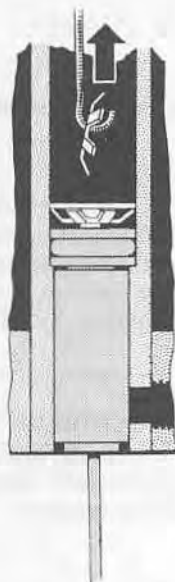
CO adjustment:

Q8

Press down adjustment screw.

Use a punch max. 3 mm diameter to press down adjustment screw to bottom position. Upper lock washer should remain at top.

1700.232



133549

CO adjustment:

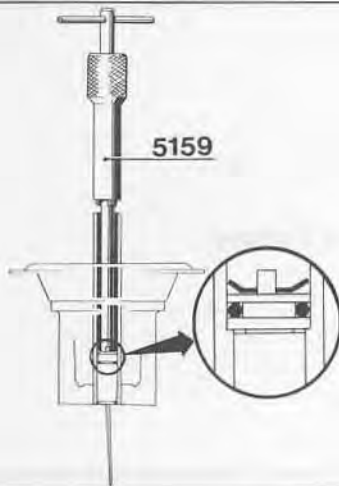
Q9

Remove lock washer and flat washer.

Turn lock washer sideways and use a steel wire to remove it. Shake out flat washer.

1700.233

Q10



133550

CO adjustment:

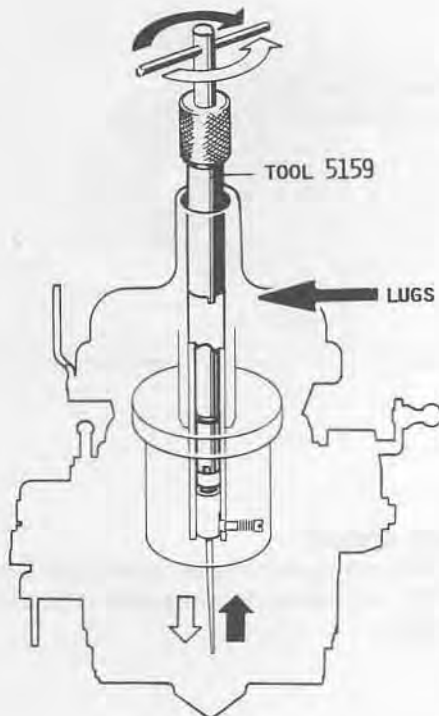
Press down lower lock washer.

Use tool 5159.

Install retaining screw for fuel needle. Install piston, diaphragm and needle assembly in carburetor.

1700.234

Q11



133202

CO adjustment:

Prior to checking CO:

- Check damper oil level.
- Install damper plunger.
- Momentarily rev engine to 3000 rpm (50 r/s)

1700.235

CO adjustment:

Q12

Adjust CO.

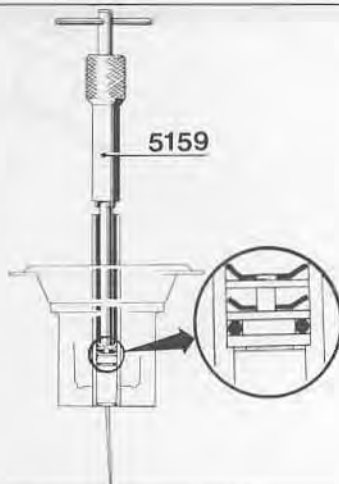
Use tool 5159 to adjust fuel needle position in carburetor. Adjusting range is approx. 4 turns. Turning tool clockwise increases CO, counter-clockwise reduces CO.

Make sure tool lugs grip recesses in air valve spindle. Otherwise carburetor diaphragm may become damaged.

1700.236

CO adjustment:

Q13



133551

Install CO adjustment seal.

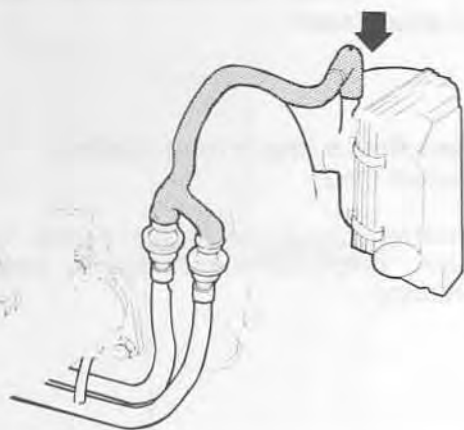
Remove damper oil. Use paper to absorb it or remove piston and pour it out.

Install **new** flat washer and **new** lock washer. Use tool 5159.

Fill damper oil and install damper plunger.

1700.237

Q14

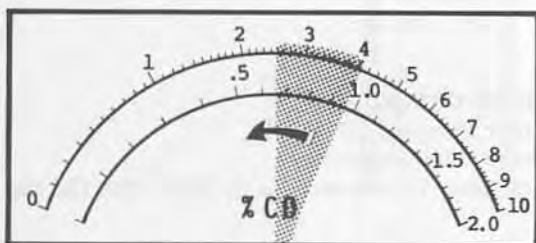


Reconnect Pulsair.

130692

1700.228

Q15

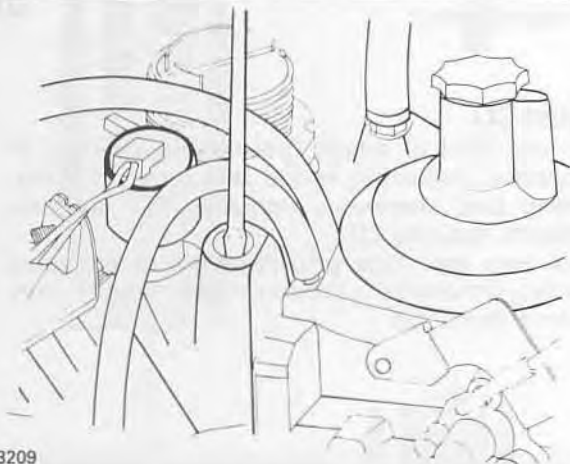


Check that CO drops.
To confirm that Pulsair is functioning.

130693

1700.229

Q16



Adjust idle speed.
Engine at normal operating temperature. During and after CO adjustment, idle speed should be: 900 ± 50 rpm.

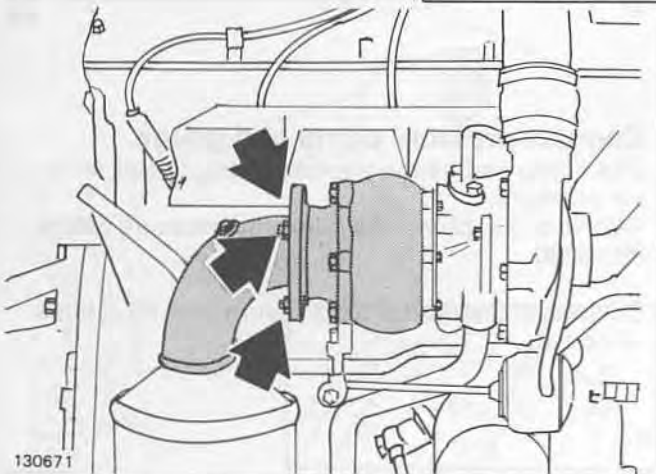
133209

1700.224

B21F-Turbo

Service every 7,500 miles = 12,500 km

R1



Tighten nuts, check for leakage.

Exhaust pipe to turbo (three nuts)

Hex: 13 mm

Torque: 22-25 Nm 16-18 ft.lbs.

1700.213

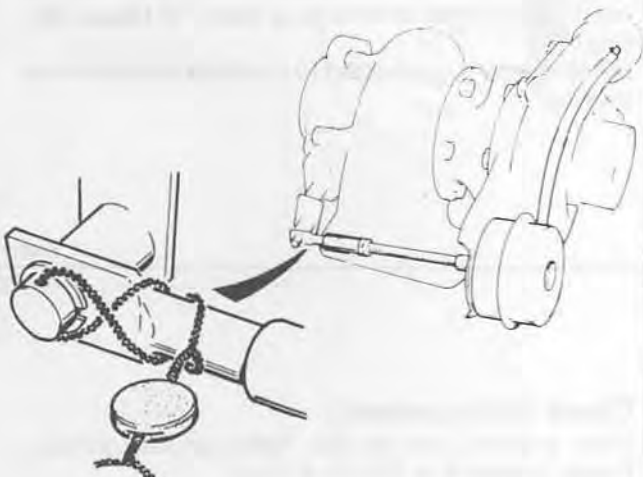
R2

B21F-Turbo:

Check adjustment sealing.

Seal on control rod from pressure regulator to wastegate actuator must be unbroken and intact. Seal can be a compressed sleeve nut or wire and lead seal.

1700.104, M1



Anti-tamper seal.

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

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

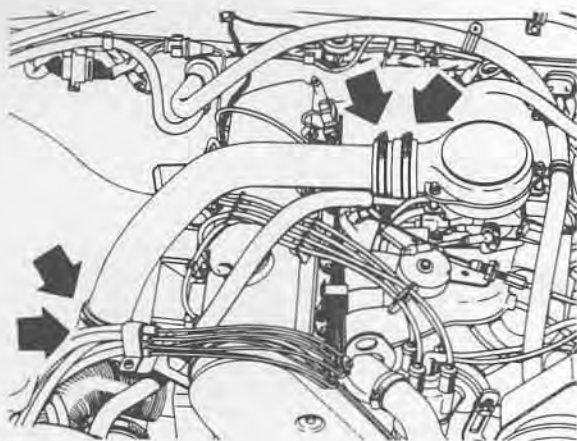
NOTE:

Tampering with emission control components may be a violation of Federal regulation.

133212

1700.105

R3



133224

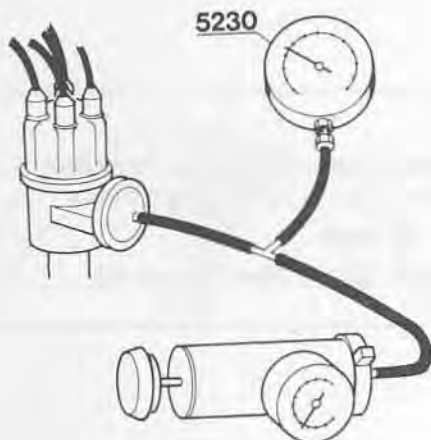
Torque clamp screws.

Four clamps, two at each end of intermediate pipe between compressor and throttle housing, should be torqued.

Torque: 3 Nm = 2.5 ft.lbs.

1700.202

R4



130639

Connect pressure pump and gauge.

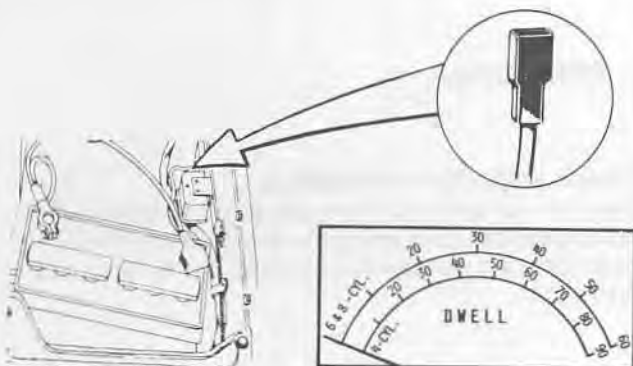
Use pump and gauge normally used to test radiator pressure.

– Volvo tools: pump 998-5496 and pressure gauge 999-5230.

Connect to distributor air pressure unit. Plug hose removed.

1700.203

R5



130676

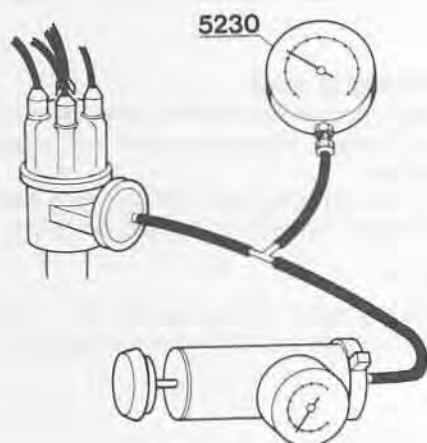
Connect instrument to check Lambda system duty cycle.

For this purpose a high quality dwell meter can be used. Scale must extend to at least 70° (4-cyl. setting).

Dwell meter is connected to Lambda sond service pick-up.

1700.207

R6



130639

Check timing retard.

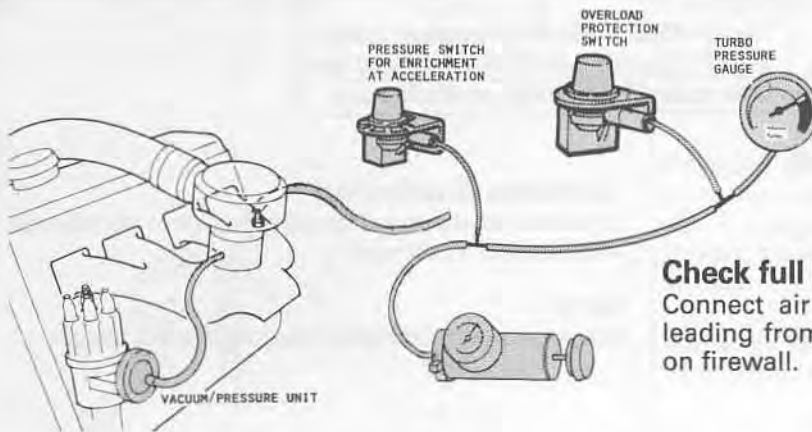
Start engine, run at idle. Note ignition timing. Pump pressure to 36 kPa = 5 psi.

Ignition timing should retard 6-10°. In case of incorrect reading: check distributor, replace distributor pressure unit, as appropriate.

Reinstall and clamp pressure hose.

1700.208

R7

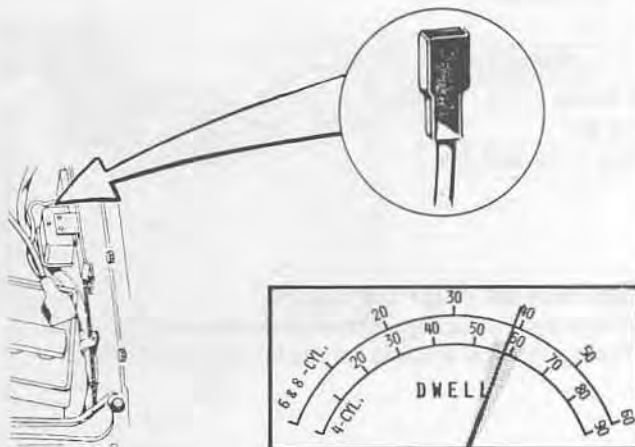


Check full load enrichment system.

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

130711

1700.209



Engine running, pump air pressure until dwell meter (measuring duty cycle of Lambda sond system) displays steady reading of 58.5° (56-62° allowed). Air pressure reading at that instant should be 20.3 kPa = 2.9 psi.

130677

1700.210

R8



Check overload protection switch.

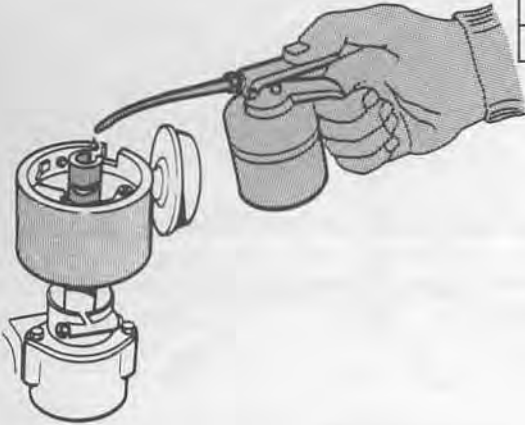
Pump pressure until engine stalls. Air pressure reading should be 70 kPa = 10 psi.

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

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

130678

1700.211



Service at:
 15-30-45-60-75-90-thousand miles
 25-50-75-100-125-150-thousand km
Intervals: 15,000 miles = 25,000 km

R9

Lubricate distributor.

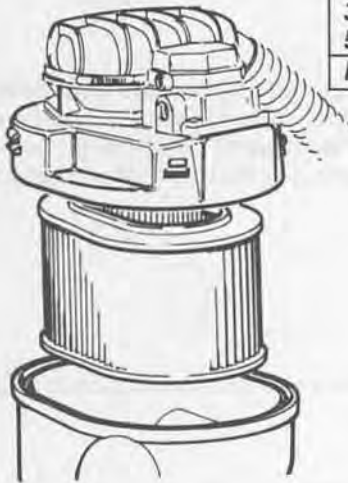
Remove rotor and lubricate felt wick in distributor shaft center sparingly.

NOTE:

Maximum amount of oil required is 1-2 drops.

133697

1700.257



Service at:
 30-60-90-thousand miles
 50-100-150-thousand km
Intervals: 30,000 miles = 50,000 km

EMISSIONS

R10

Replace air filter cartridge.

When driving under dirty and dusty conditions, air filter cartridge should be replaced more often.

130708

1700.462



Service at:
 30-60-90-thousand miles
 50-100-150-thousand km
Intervals: 30,000 miles = 50,000 km

EMISSIONS

R11

Replace spark plugs.

Spark plugs must be tightened to specific torque for proper operation and to avoid damage to threads.

Spark plug removal and installation must be performed when engine is cold (low reading on temperature gauge).

127523

1700.240

B21F-Turbo

Gap

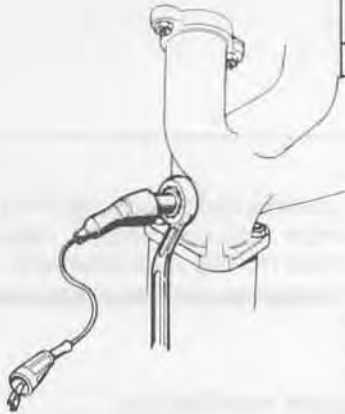
Torque (plug threads not oiled)

"Super" spark plug Volvo P/N 273594-2 (set of four)
 or Bosch WR7DS

0.7-0.8 mm = 0.028-0.032"

20-30 Nm = 15-22 ft. lbs.

031.310



| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30–60–90–thousand miles | |
| 50–100–150–thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

R12

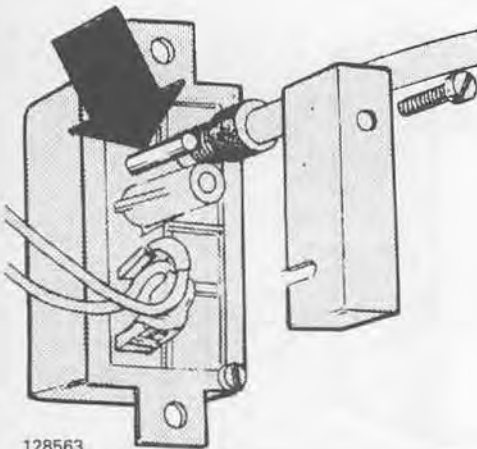
Replace oxygen sensor.

Apply anti-seize compound "Never-Seez" to sensor threads prior to installation. Coat entire thread. Do not apply compound to slotted part of sensor.

Torque: 55 ± 5 Nm = 40 ± 4 ft.lbs.
Check electrical connections.

120995

1700.466



| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30–60–90–thousand miles | |
| 50–100–150–thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

R13

Reset Lambda-sond reminder light.

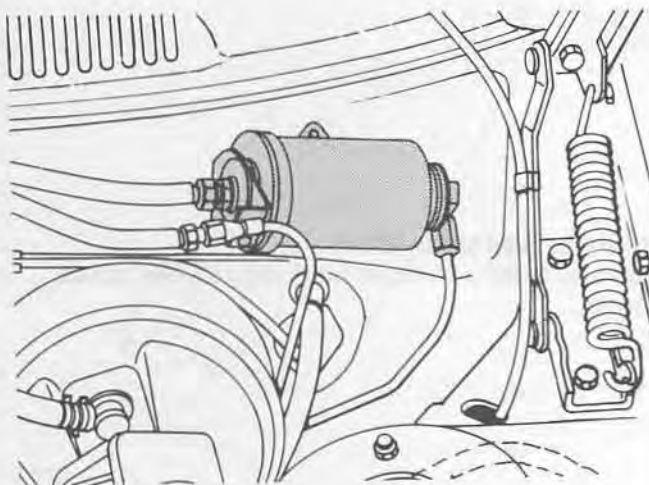
Remove panel and switch cover. Press button. Re-install cover panel.

128563

1700.467

| |
|---------------------------------------|
| Service at: 60,000 miles = 100,000 km |
| Intervals: 60,000 miles = 100,000 km |

R14



Replace fuel filter.

Fuel filter located on firewall. Note flow direction arrow on filter

133703

1700.425

Service at: 60,000 miles = 100,000 km
Intervals: 60,000 miles = 100,000 km

R15



NOTE:

Driving under adverse conditions (for instance city driving under hot conditions) requires service more often (15,000 mile intervals).

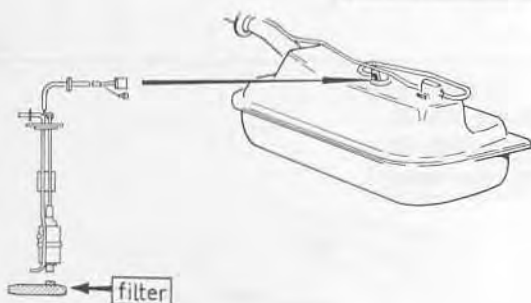
Positive crankcase ventilation.

Check hoses for condition and clogging. Clean nipple.

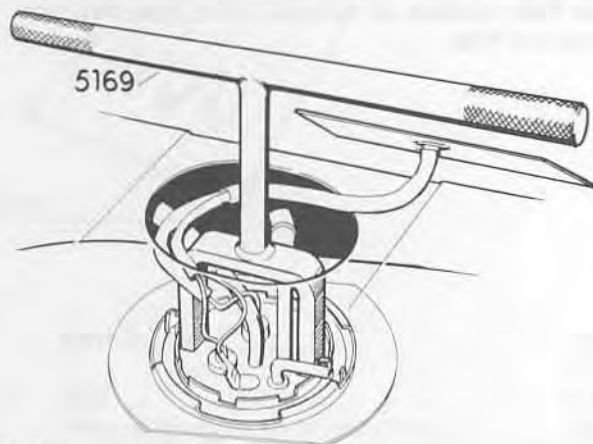
1700.498

Service at: 60,000 miles = 100,000 km
Intervals: 60,000 miles = 100,000 km

R16



124032



Replace fuel tank filter.

Use tool 5169 to remove and reinstall fuel gauge sender.

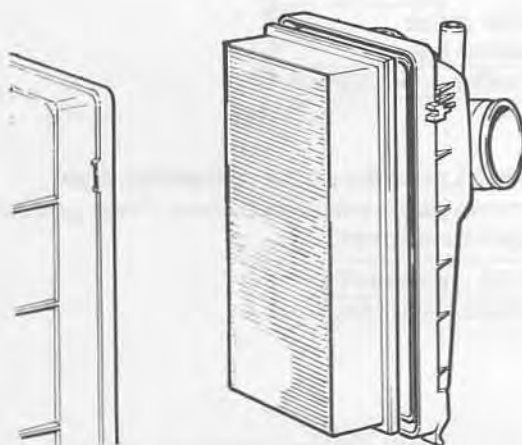
123125

1700.424

B23F

| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

S1

**Replace air filter cartridge.**

When driving under dirty and dusty conditions, air filter cartridge should be replaced more often.

1700.462

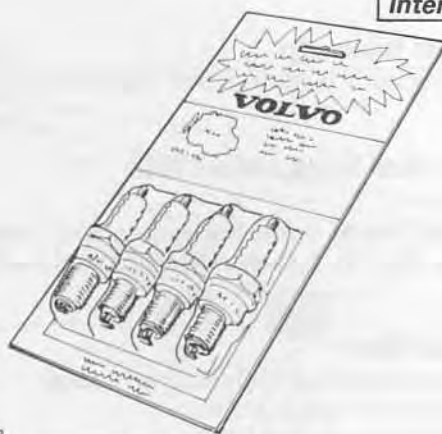
For dry, dusty, polluted regions an air filter cartridge with superior filtering ability is available. It should be used only in such regions. Replacement intervals depend on operating conditions.

130707

1700.463. M1

| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

S2

**Replace spark plugs.**

Spark plugs must be tightened to specific torque for proper operation and to avoid damage to threads.

Spark plug removal and installation must be performed when engine is cold (low reading on temperature gauge).

127523

1700.240

| | |
|---------------------------------------|---|
| B23F | "Super" spark plug Volvo P/N 273594-2 (set of four) or Bosch WR7DS |
| Gap | 0.7-0.8 mm = 0.028-0.032" |
| Torque (plug threads not oiled) | 20-30 Nm = 15-22 ft. lbs. |

031.312



120995

| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

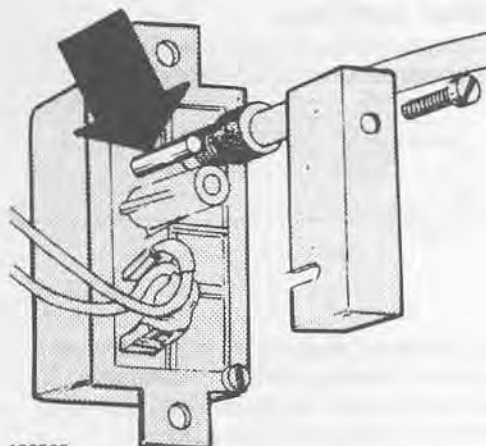
S3

Replace oxygen sensor.

Apply anti-seize compound "Never-Seez" to sensor threads prior to installation. Coat entire thread. Do not apply compound to slotted part of sensor.

Torque: 55 ± 5 Nm = 40 ± 4 ft.lbs.
Check electrical connections.

1700.466



128563

| Service at: | EMISSIONS |
|-------------------------------------|-----------|
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

S4

Reset Lambda-sond reminder light.

Remove panel and switch cover. Press button. Re-install cover panel.

1700.467



| |
|---------------------------------------|
| Service at: 60,000 miles = 100,000 km |
| Intervals: 60,000 miles = 100,000 km |

S5

LH-Jetronic:**Replace fuel filter**

Fuel filter located underneath car, under left rear seat.

Remove fuel filler cap

To prevent vacuum in tank when replacing fuel filter

Disconnect fuel lines at fuel filter.**Important:**

Have a vessel ready when loosening fuel filter connections. Fuel in fuel system (not tank) will come out.

Replace fuel filter

Remove clamp retaining fuel filter to bracket.

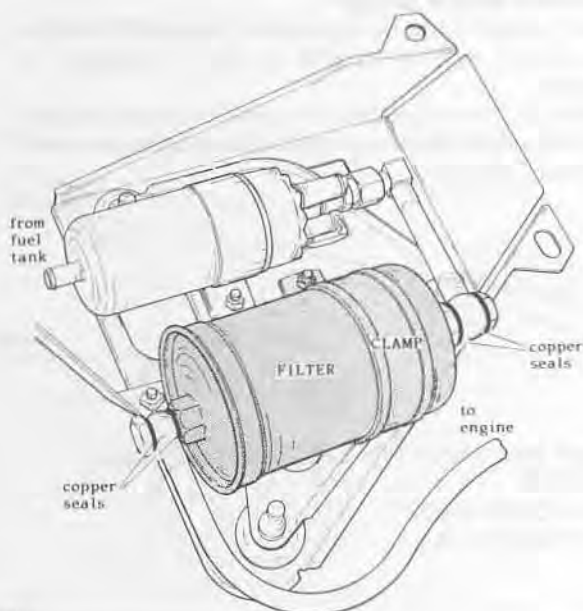
Transfer bracket to new fuel filter.

Note flow direction on fuel filter.

Install fuel filter and clamp assembly to bracket.

Check fuel flow direction on fuel filter.**Connect fuel lines to fuel filter.**

Make sure copper seals are correctly installed.

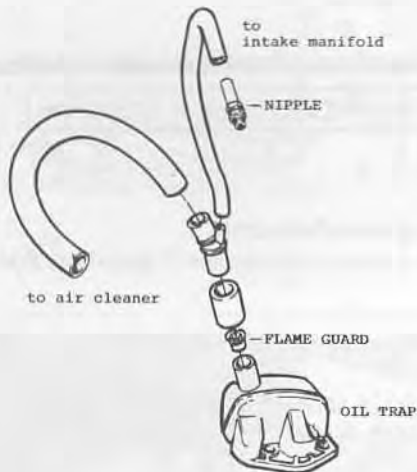
Install fuel filler cap.

133201

1700.428

Service at: 60,000 miles = 100,000 km
 Intervals: 60,000 miles = 100,000 km

S6

**NOTE:**

Driving under adverse conditions (for instance city driving under hot conditions) requires service more often (15,000 mile intervals). Volvo recommends cleaning flame guard at 15,000 mile intervals.

Positive crankcase ventilation.

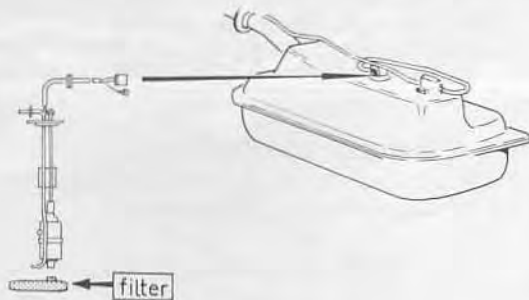
Check hoses for condition and clogging. Clean nipple and flame guard.

130999

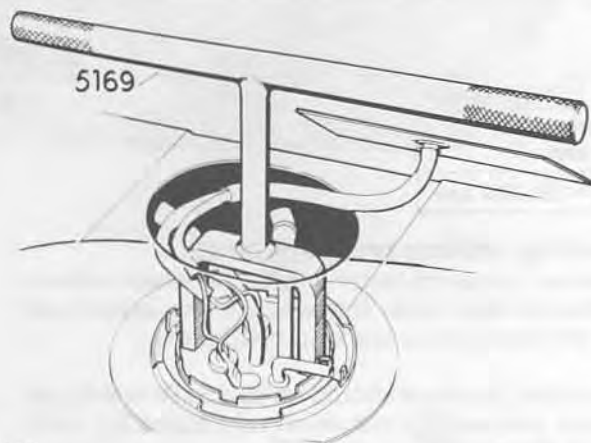
1700.239

Service at: 60,000 miles = 100,000 km
 Intervals: 60,000 miles = 100,000 km

S7



124032



123125

1700.424

Replace fuel tank filter.

Use tool 5169 to remove and reinstall fuel gauge sender.

D24 diesel



Service every 7,500 miles = 12,500 km

a1

Draining condensate.

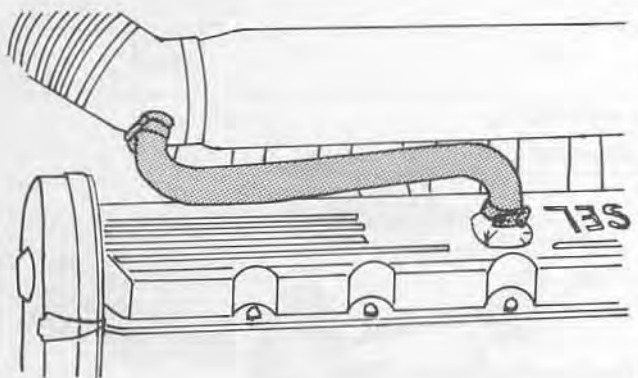
Position a pan under screw 2 to collect condensate.

Loosen bleeder screw 1 several turns.

Loosen drain screw 2. Drain until clean fuel flows out. Tighten screw.

Tighten bleeder screw 1.

1700.320



a2

**Service at: 15-30-45-60-75-90-thousand miles
25-50-75-100-125-150-thousand km**

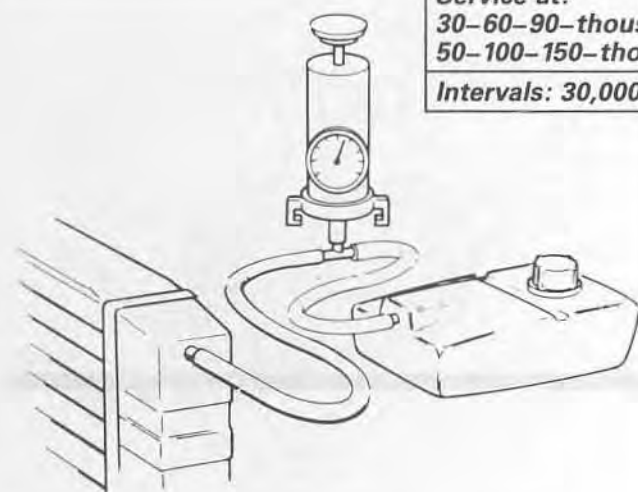
Intervals: 15,000 miles = 25,000 km

Positive crankcase ventilation.

Remove hose. Clean hose and connections. Check hose for damages, replace if necessary.

Hose must be installed so that no oil will drain into air intake manifold.

1700.322



**Service at:
30-60-90-thousand miles
50-100-150-thousand km**

Intervals: 30,000 miles = 50,000 km

EMISSIONS

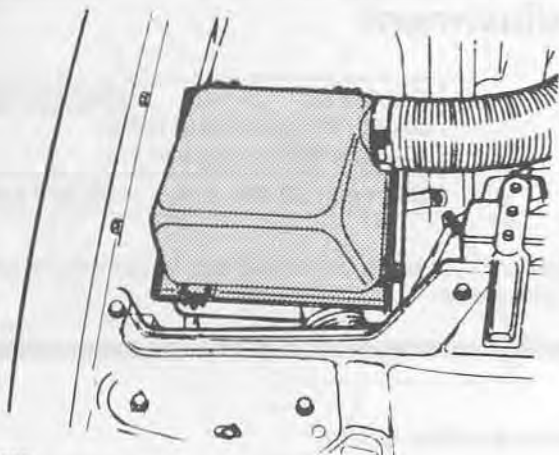
a3

Cooling system pressure check.

Connect pressure tester in hose between radiator and expansion tank. This way cooling system will be checked in true working conditions.

Cap relief pressure should be 65-85 kPa = 9-12 psi. When pumped, pressure should stand for minimum 30 seconds.

1700.172



129585

| | |
|--|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

a4

Replace air filter cartridge.

For dry, dusty, polluted regions an air filter cartridge with superior filtering ability is available. It should be used only in such regions. Replacement intervals depend on operating conditions.

1700.463, M1



128254

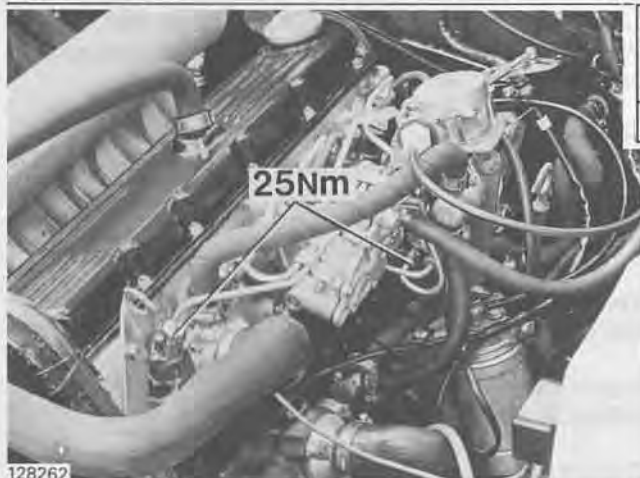
| | |
|--|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

a5

Replacing fuel filter.

Position oil filter wrench as high up on fuel filter as possible. Remove filter. Apply diesel fuel to rubber seal on new filter. Install seal. Tighten **by hand** until seal makes tight fit. Then tighten 1/4 turn **by hand**. DO NOT use any tools to install fuel filter. Start engine and check for leakage. If rubber seal does not seal properly, air will be sucked into system and impair operation.

1700.321, M1



128262

| | |
|--|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

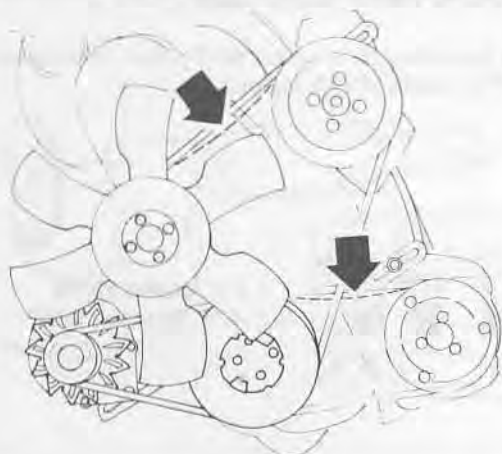
a6

Fuel lines.

Check for leaks from supply and return lines, as well as from delivery pipe system and fuel system components.

Repair as necessary. Torque for delivery pipes is 25 Nm = 18 ft.lbs.

1700.323



133229

| | |
|--|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

a7

Check drive belt tension.

If necessary adjust. It should be possible to depress drive belts 5-10 mm = 3/16-5/16" halfway between pulleys.

1700.241

Valve clearance adjustment

Special tools: 5195 Pliers

For removing valve depressor disc.

5196 Press tool

For valve depressors

Service at:

EMISSIONS

30-60-90-thousand miles

50-100-150-thousand km

Intervals: 30,000 miles = 50,000 km

After repairs to the cylinder head, for example grinding valves, replacing camshaft etc, valve clearance should be re-checked after driving 1000-2000 km = 600-1,200 miles.

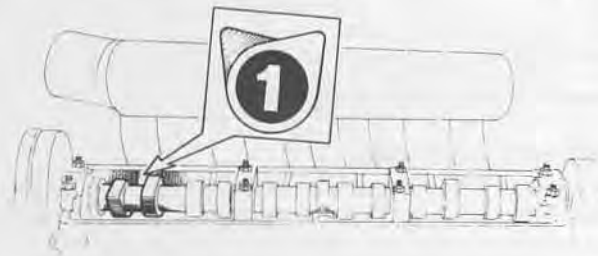
1700.289

b1

Remove valve cover

1700.285

b2



128155

Cylinder No. 1.

Use a 27 mm - 1-1/16" socket on vibration damper bolt to turn engine to position for firing on No. 1 cylinder. Both cam lobes for No. 1 cylinder should point up at equally large angles. Flywheel timing mark at 0.

1700.286

b3

Check valve clearance for cylinder No. 1.

Valve clearance, cold engine (= at room temperature):

Intake valves:

0.15-0.25 mm = 0.006-0.010".

Exhaust valves:

0.35-0.45 mm = 0.014-0.018".

Valve clearances, warm engine (= near operating temperature):

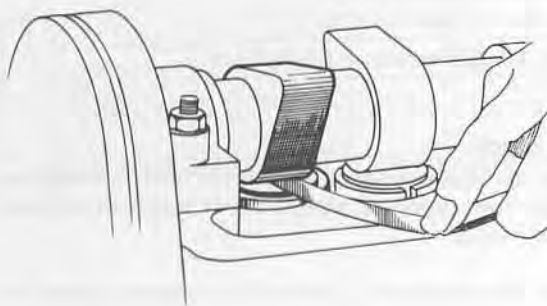
Intake valves:

0.20-0.30 mm = 0.008-0.012".

Exhaust valves:

0.40-0.50 mm = 0.016-0.020".

No adjustment is required if valve clearances are within these check values.

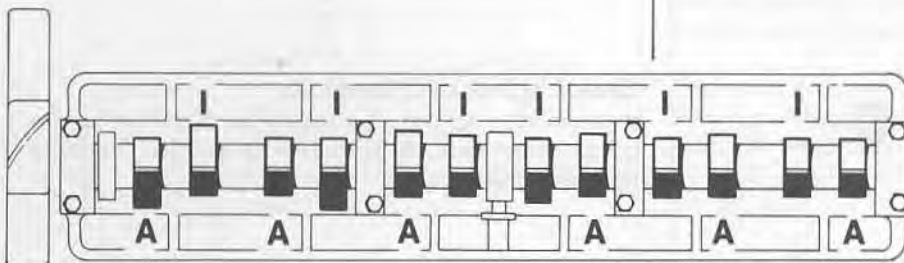


128156

NOTE:

Always check valve clearance with cylinder at top dead center. Always turn 1/4 turn after top dead center to set.

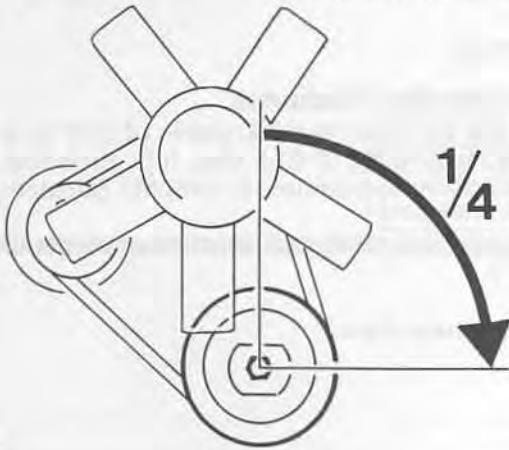
1700.499



I = intake valve
A = exhaust valve

128157

1700.290

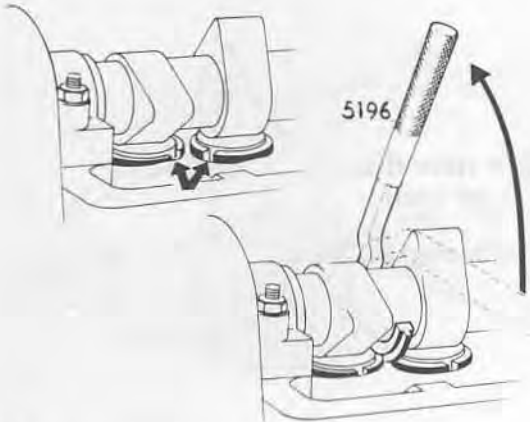
Incorrent clearance, adjustment required**b4**

133522

1700.287

Turn engine approx. 1/4 turn.

Engine must not be at top dead center when setting valve clearance. With piston at top there is no space for depressing.

b5

128159

1700.288

Depress valve depressors.

Line up valve depressors. Turn them so that notches point slightly inward. Use tool **5196** to depress valve depressors. Depressor grooves must be above the face so that disc can be gripped with pliers **5195**.

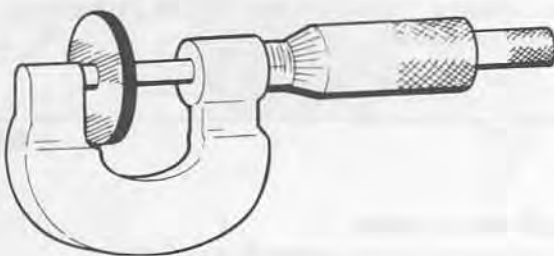
b6

128160

1700.291

Remove disc.

Use pliers **5195**.

b7

118671

1700.292

Calculate thickness of disc to be used.

Valve clearances when setting:

Cold engine:

Intake valves: **0.20 mm** = 0.008".

Exhaust valves: **0.40 mm** = 0.016".

Warm engine:

Intake valves: **0.25 mm** = 0.010".

Exhaust valves: **0.45 mm** = 0.018".

Use micrometer to measure disc thickness.



128161

b8

Calculate disc thickness.

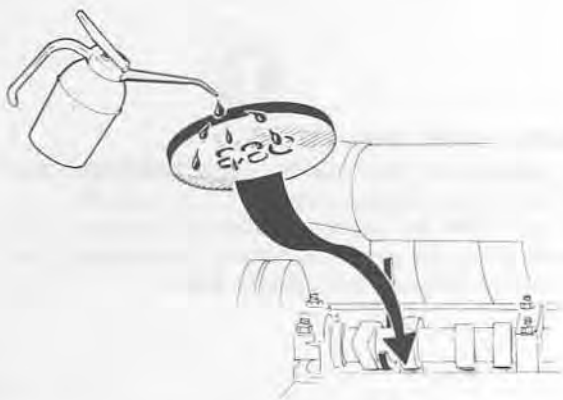
Discs are available in thicknesses of 3.00 to 4.25 mm in increments of 0.05 mm. It is advisable to use metric measurements to simplify calculation.

(US: approx. 0.1181" to 0.1673" in increments of 0.002").

Use only new discs.

1700.293

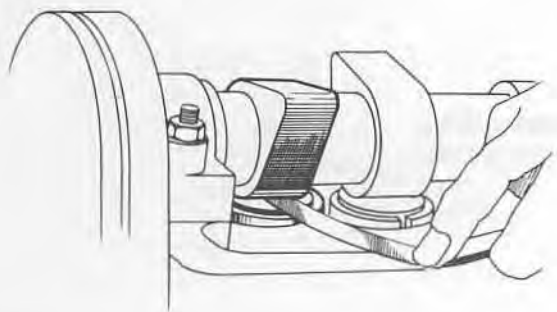
b9



128162

1700.294

b10



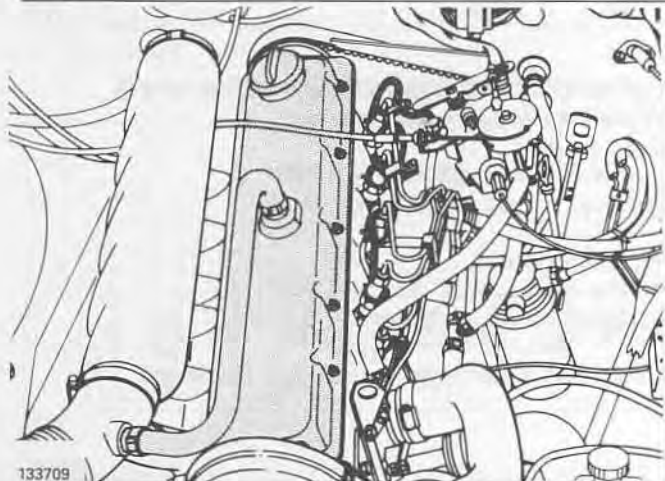
128156

1700.295, M1

b11

Check/set valve clearance for remaining cylinders.

Use following cylinder sequence:
1-5-3-6-2-4



133709

1700.296

b12

Recheck valve clearance for all cylinders.

Rotate engine several turns before rechecking.
Adjust if necessary.

Install valve cover.

Use new valve cover gasket if required.

1700.297

Setting idle speeds

| | |
|-------------------------------------|------------------|
| Service at: | EMISSIONS |
| 30-60-90-thousand miles | |
| 50-100-150-thousand km | |
| Intervals: 30,000 miles = 50,000 km | |

c1

Connect tachometer.

Use Volvo Monotester and adapter 9950. If Volvo Monotester is not available, use photo-electric tachometer (Volvo P/N 999 9795-9 or 999 0901-2, or similar).

1700.298

c2

Run engine to normal operating temperature.

1700.299

c3

Check/adjust low idle speed.

Should be 750 ± 50 rpm. Apply tamper seal on screw and lock nut with paint after adjustment.

1700.300

c4

Check/adjust high idle speed.

Maximum speed is 5200 ± 100 rpm. Apply tamper seal on screw and lock nut with paint after adjustment. DO NOT race engine longer than absolutely necessary.

1700.301

c5

Remove instrument.

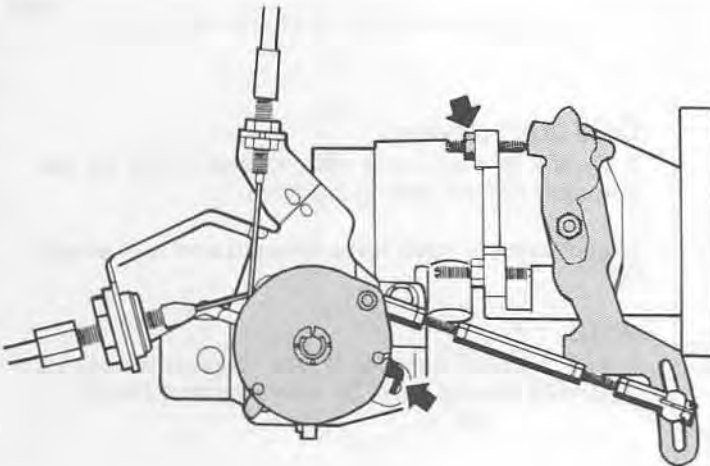
1700.302

c6

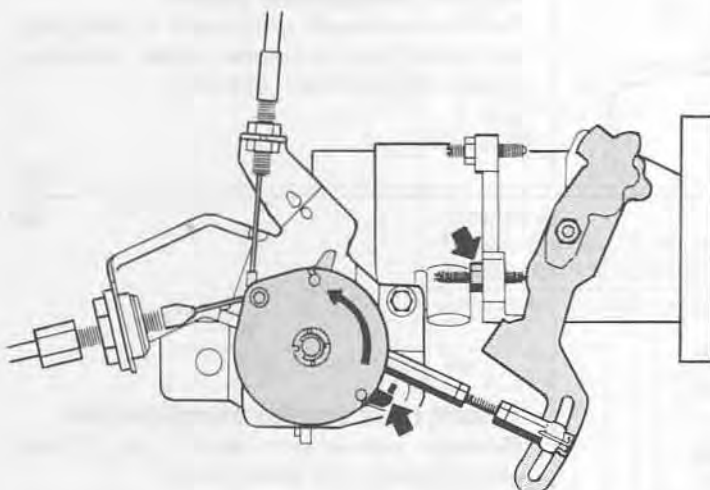
Check/adjust engine controls.

This should always be done after idle adjustment.

1700.303



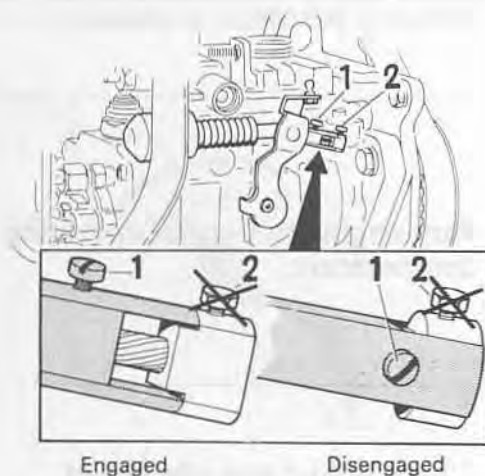
133712



133713

Setting engine controls

Service at:
30-60-90-thousand miles
50-100-150-thousand km
Intervals: 30,000 miles = 50,000 km



Cold start device.

If engine is cold, cold start device must be disengaged before setting controls.

Loosen screw 1, push lever forward and turn sleeve 90°.

NOTE:

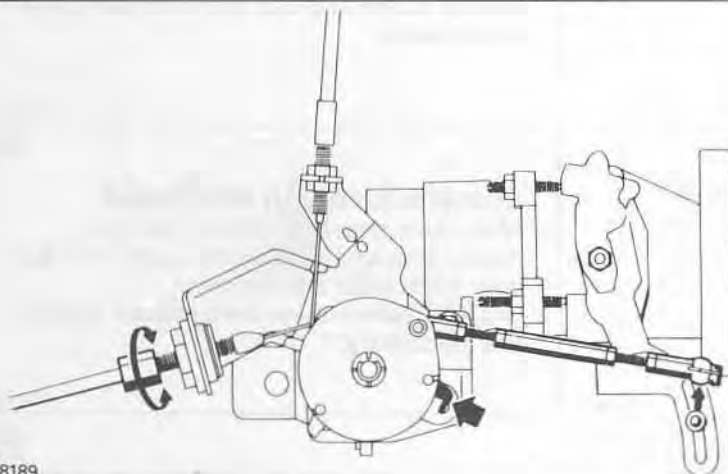
DO NOT touch screw 2. If this screw is loosened, cold start device must be re-set on test bench.

d1

128169

1700.326

d2



Disconnect link rod at lever on injection pump.

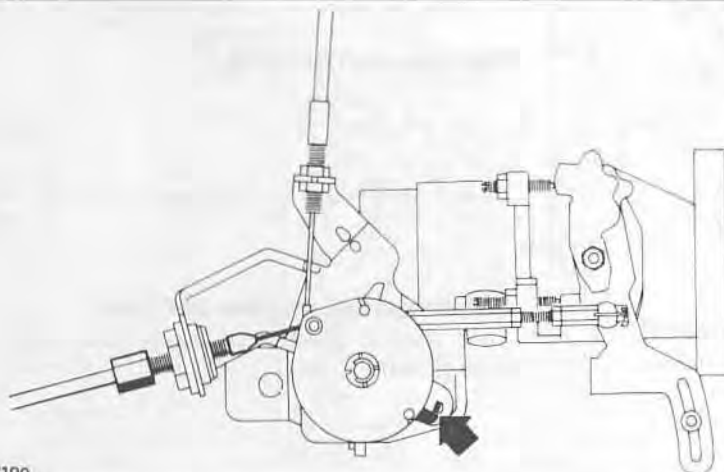
Adjust accelerator cable

Turn cable sheath until cable is stretched but does not influence pulley position. Pulley should touch idle stop.

128189

1700.327

d3



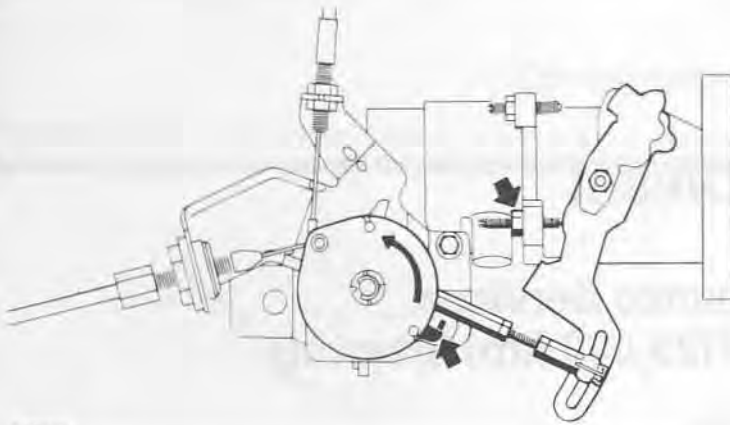
Check max accelerator position

Depress accelerator pedal fully. Pulley should touch full speed stop.

128190

1700.328

d4



128192

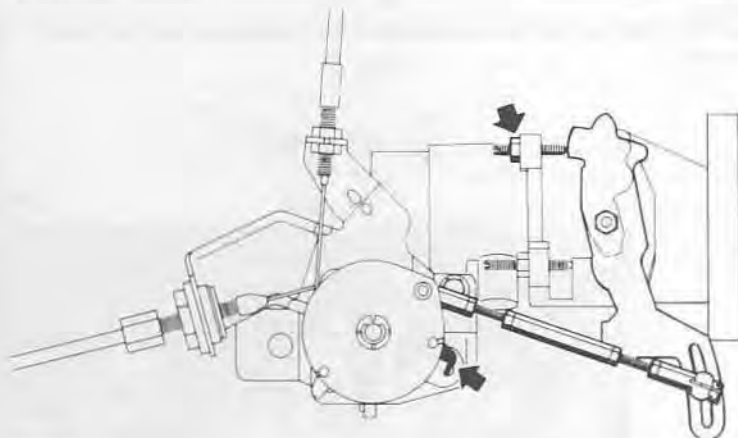
Connect link rod to injection pump lever.

Adjust link rod in max. position

Turn pulley to max. position. Adjust link rod length so that injection pump lever touches max. speed adjusting screw.

1700.329

d5



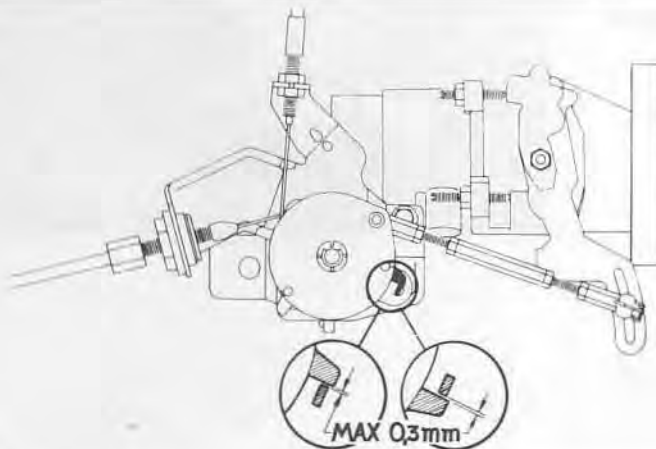
128193

Adjust link rod in idle position

Return pulley to idle stop. Move link rod ball joint in oblong hole in injection pump lever until lever touches idle adjusting screw.

1700.330

d6



128194

Re-adjust link rod

Repeat operations 7 and 8 until control is correctly adjusted.

A clearance of max 0.3 mm = 0.012" is permitted between pulley and max. speed stop.

1700.331

Re-connect cold start device
(If disconnected)

d7

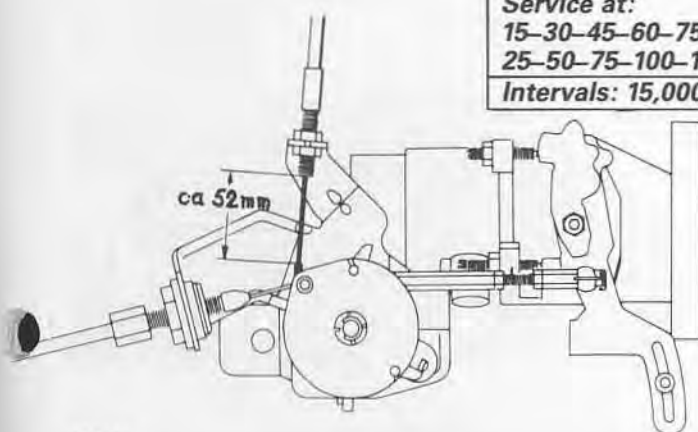
Service at:
15-30-45-60-75-90-thousand miles
25-50-75-100-125-150-thousand km
Intervals: 15,000 miles = 25,000 km

Automatic transmission:
Adjust kickdown cable.

Depress accelerator pedal to floor. Kickdown cable should move approx. 52 mm = 2.05" between end positions.

Kickdown cable should be stretched in idle position and distance between kickdown cable clip and cable sheath should be 0.25-1.00 mm = 0.01-0.04".

1700.277



128191

Diesel

Maintenance Services at 75,000 mile (125,000 km) intervals

The following maintenance service items are to be performed at 75,000 mile (125,000 km) intervals.

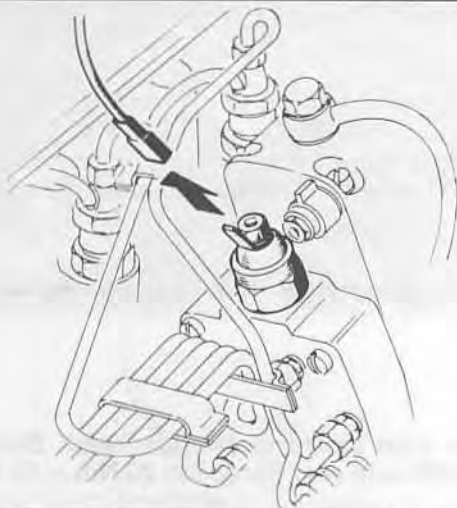
Read through and understand these items so that they are known should it be necessary to perform them at an earlier interval (i.e. during repairs etc).

| | |
|------------------------------------|--------|
| Compression test | e1-e10 |
| Checking/adjusting injectors | f1-f7 |
| Replacing timing gear belts | g1-g33 |

Compression test

Service intervals:
75,000 miles = 125,000 km

Special tool: 5191 Adapter (nipple) to connect compression tester.



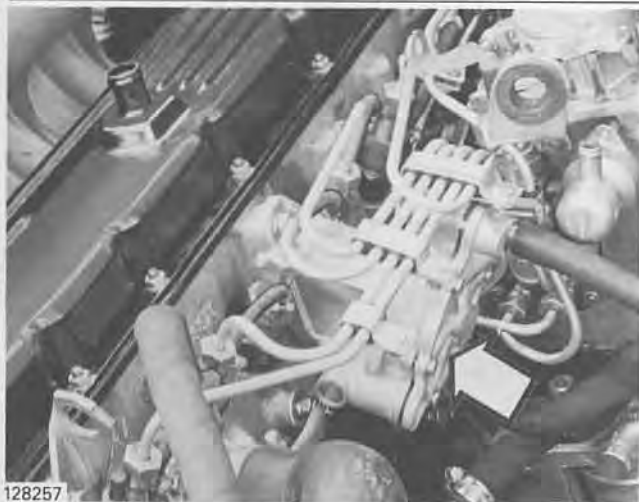
128150

e1

Disconnect wire at stop valve.

Injection pump will not pump fuel and fuel spill is thereby avoided.

1700.334



128257

e2

Remove vacuum pump and vacuum pump plunger.

1700.335

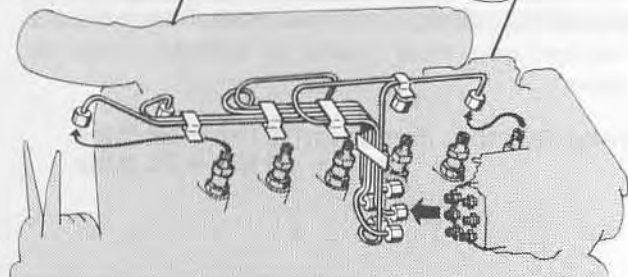


Clean.

Thoroughly clean fuel delivery pipes and connections.

1700.336

e4



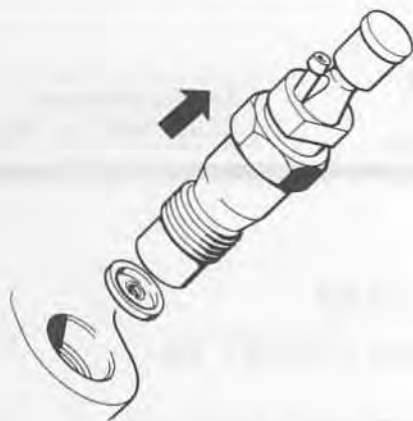
128151

1700.337

Remove fuel delivery pipes.

Plug all connections to prevent dirt from entering fuel system.

e5



Remove injectors.

Use 27 mm socket (Volvo P/N 1158146) = 1-1/16". Lift out heat shields under injectors. Otherwise they will fly up during compression test.

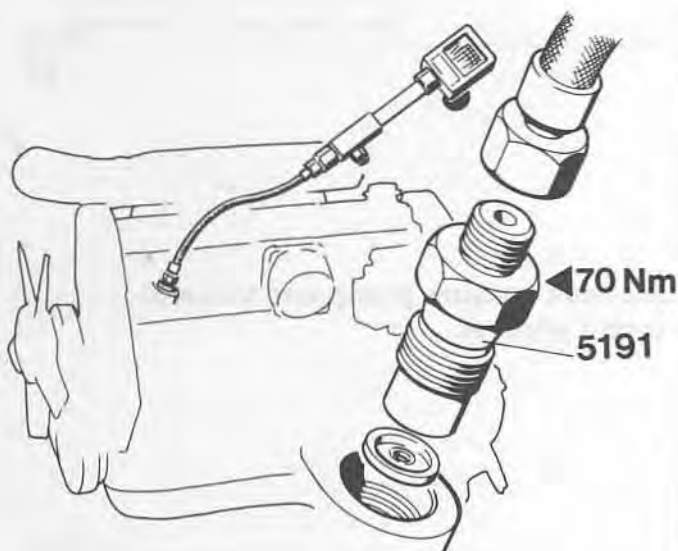
After removing injectors, injector test scheduled at 75,000 miles = 125,000 km, should be performed.

128152

1700.338

Compression test

e6



Position heat shield in cylinder head, Screw in nipple **5191** and seal. Torque to **70 Nm** = 50 ft.lbs.

Connection compression tester to nipple 5191.

Run engine with starter motor and read compression pressure.

1700.339

Correct compression pressures:

- New engine: **3.2 MPa** = 455 psi.
- Minimum: **2.4 MPa** = 340 psi.
- Max. difference between cylinders: **0.8 MPa** = 115 psi.

128153

1700.340

e7



Install injectors.

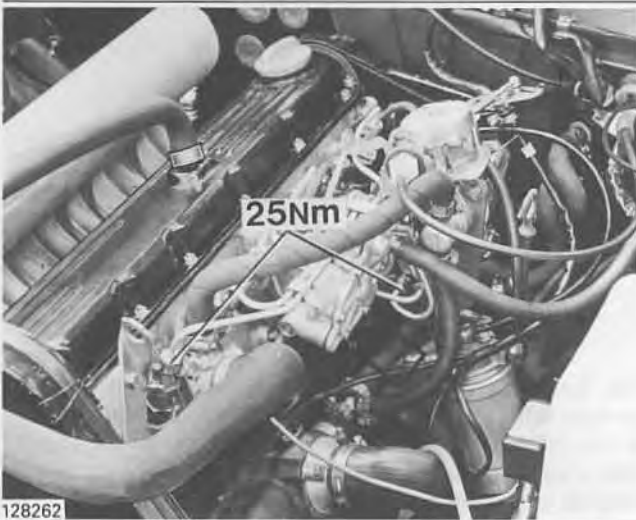
Position new heat shield in cylinder head as shown.

Install injectors. Torque to: **70 Nm** = 50 ft.lbs.
25 Nm = 20 ft.lbs.

128154

1700.341

e8



Install fuel delivery pipes.

Torque to:
25 Nm = 18 ft.lbs.

1700.342

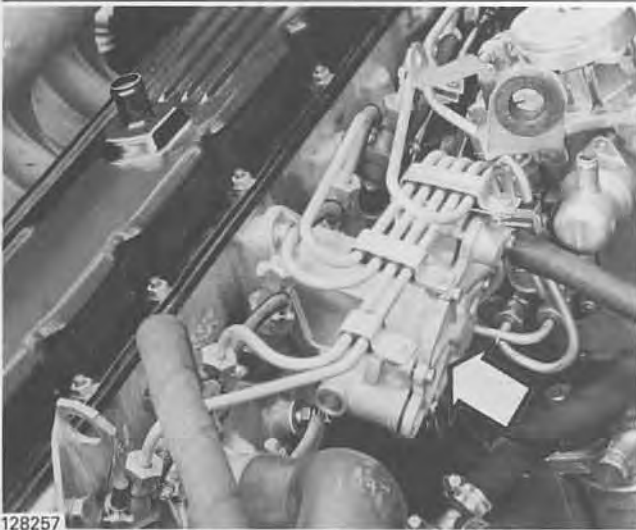
e9



Connect wire to stop valve.

1700.343

e10



Install vacuum pump plunger and vacuum pump.

Check O-ring on vacuum pump, replace if necessary.

1700.344

Checking/adjusting injectors

Service only in case of injector malfunction.

CAUTION.

Extreme cleanliness must be observed when working with injectors. Any contamination will cause malfunction of the fuel system.

Tests and repairs should be accomplished in a dirt and dust free areas.

For testing, only use test oil or filtered diesel oil. Gasoline **MUST NOT** be used. Volatile fuels may cause explosion.

1700.350

WARNING.

The fuel jet during testing **MUST NOT** come in contact with any part of the human body. Because of the high pressure, the fuel can penetrate the skin and cause severe injury. There are many examples of blood poisoning and amputation. Many states require operation of air evacuation equipment during testing of diesel injectors. The fuel fumes may be dangerous if inhaled.

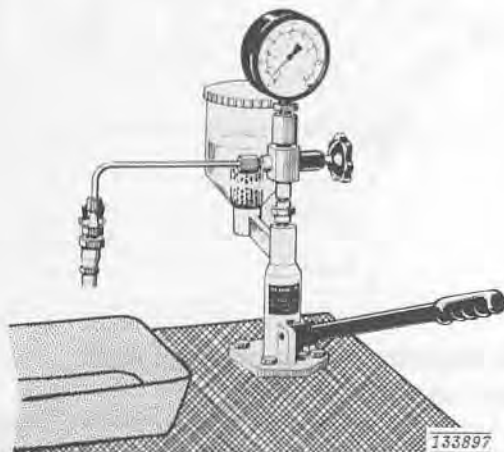
1700.351

When testing, opening pressure and injector tightness are most important. Spray pattern and injection sound are more difficult to assess. They do not give any satisfactory indication of nozzle condition.

One must consider that real injection is into a completely different environment than the test bay. Quite often injectors function satisfactorily in the engine in spite of questionable spray pattern and injection sound.

1700.352

f1



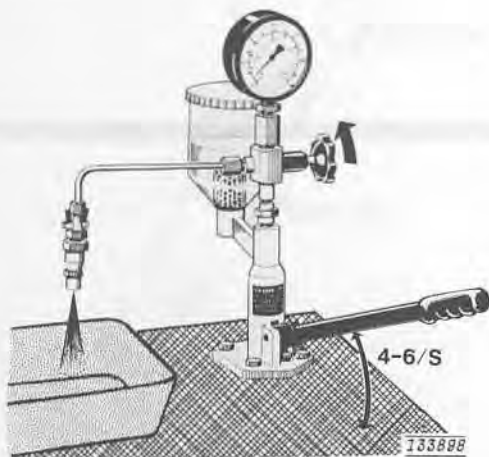
133897

Install injector in injector tester.

Seal fuel return line connections with rubber plugs and hose clamps.

1700.353

f2



133898

Check spray pattern.

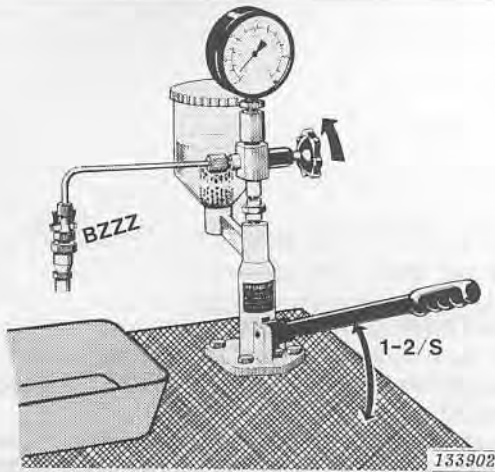
Pressure gauge disengaged.

Pump with short, quick strokes (4-6 strokes per second).

Spray jet should be fairly compact and stop abruptly. Injector must not drip.

1700.354

f3



Check injection sound.

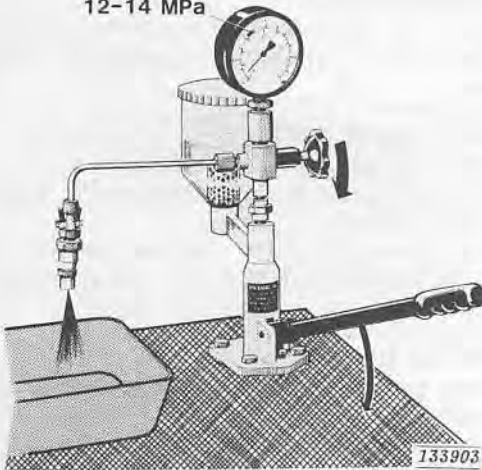
Pressure gauge disengaged.

Slowly depress tester lever fully (1-2 strokes per second).

A correct injector will whirl during spray.

1700.355

12-14 MPa



Check injector opening pressure.

Pressure gauge engaged.

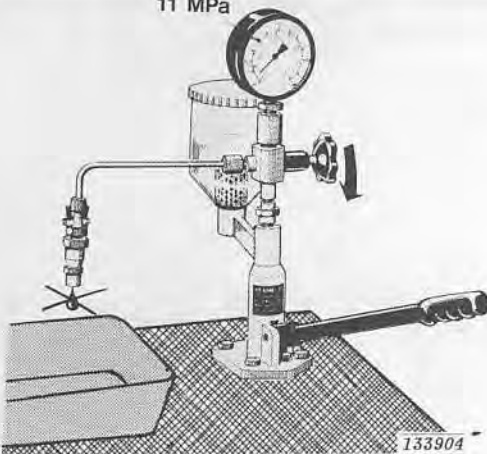
Slowly depress lever and read injector opening pressure.

It should be **12-13 MPa** = 1700-1850 psi.

If opening pressure is incorrect, first perform leak test (next operation) before adjusting.

1700.356

11 MPa



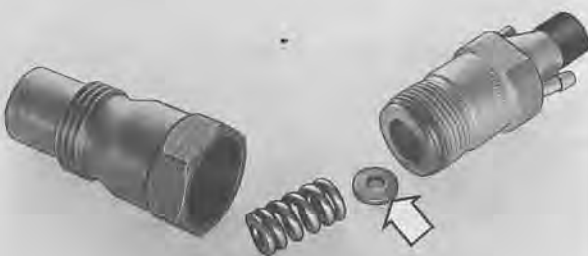
Leak test.

Pressure gauge engaged.

Wipe injector nozzle. Pump pressure **11 MPa** = 1560 psi and retain this pressure for 10 seconds. There must be no fuel drip from nozzle. A moist nozzle is acceptable.

1700.357

f6



Adjusting injector opening pressure.

Opening pressure is adjusted by washers. Washers are available in thicknesses 1.00-1.95 mm = 0.040"-0.0768" in increments of 0.05 mm = 0.002".

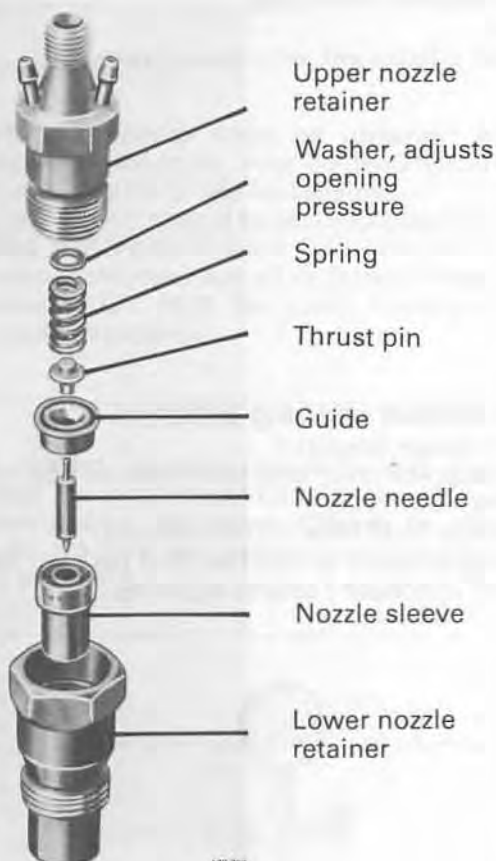
A 0.05 mm thicker washer will increase opening pressure by approx. **5 kPa** = 7 psi.

For disassembling injectors, see instructions that follow.

128269

1700.358

f7



128 263

Disassembling injectors.

- Make sure outside of injector is clean.
- Disassemble injector. Parts **MUST NOT** become damaged.
- If a nozzle needle is dropped, it cannot be reused.
- Immerse parts in clean diesel oil immediately after disassembling.
- Make sure all parts for one injector are stored together and not mixed with parts from other injectors.

Clean and check parts.

- Use clean diesel oil to clean all parts.
- Use nozzle cleaner tool to clean nozzle needle and nozzle sleeve.
- Replace damaged parts. Nozzle needle and nozzle sleeve are matched and replaced as an assembly.

Assembling injectors.

- Use clean gasoline to clean storage grease from new parts.
- Then immerse new parts in diesel oil prior to assembly.
- Assemble injector. Torque to **70 Nm** = 50 ft.lbs.
- Re-test injector.

128263

1700.359

f8



128270

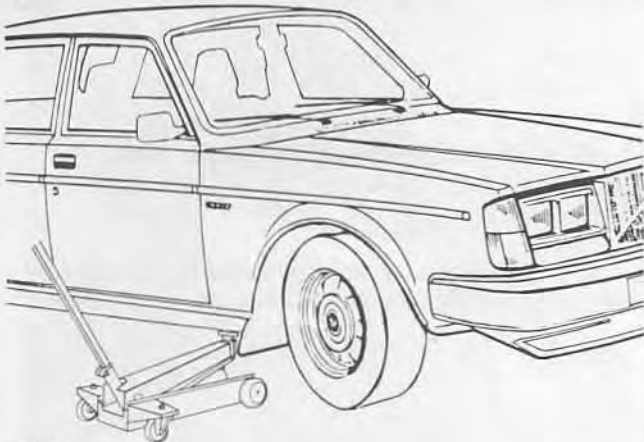
1700.360

- Replace:**
- Timing gear belt for camshaft
 - Timing gear belt for injection pump
 - Idler pulley for camshaft timing gear belt

Service intervals:
75,000 miles = 125,000 km

1700.365

g1



133704

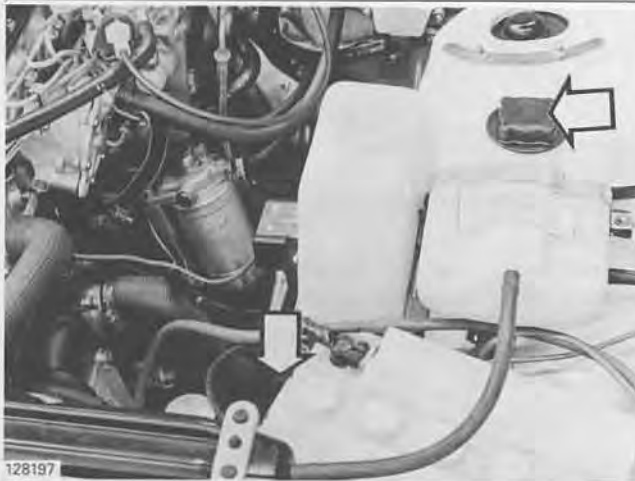
Disconnect battery ground cable.

Jack up vehicle.

Use front jack support. When draining coolant, it runs along splash guard under engine and does not mess floor.
Place vessel under left steering rod.

1700.366

g2



128197

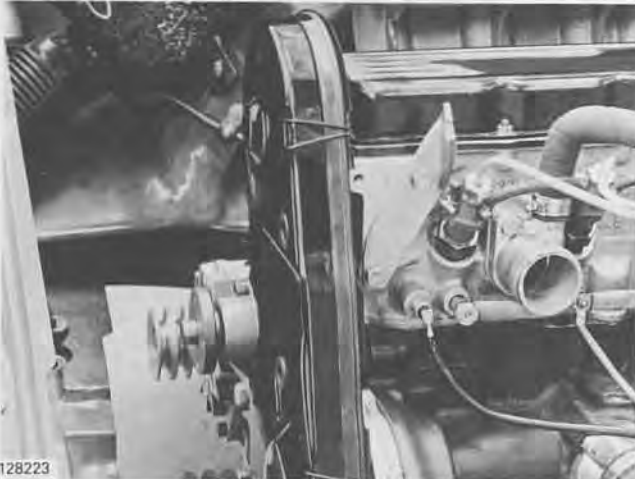
Drain coolant.

Remove expansion tank cap.

Disconnect lower radiator hose at radiator.
Disconnect lower hose at thermostat for cold start device. Point hose downward and drain engine coolant. There are no drain cocks.
Lower vehicle and remove jack.

1700.366

g3

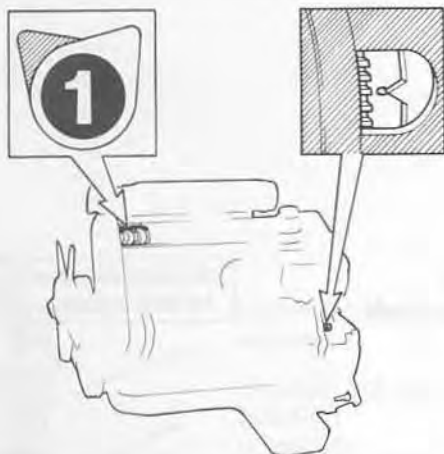


128223

Remove:

- radiator.
- cooling fan with spacer and pulley.
- fan belt.
- drive belt for power steering pump.
- timing gear belt cover.
- valve cover.

1700.367



128163

g4

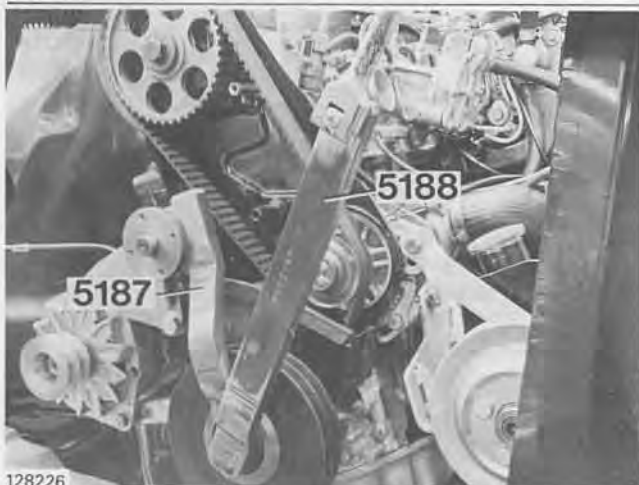
Set cylinder No. 1 to top dead center and injection.

Use a 27 mm = 1-1/16" socket on vibration damper bolt to turn engine to position for injection of cylinder No. 1.

Both cam lobes should point up at equally large angles.

Flywheel timing mark at 0.

1700.368



128226

g5

Remove vibration damper center bolt.

Use wrench 5187 to hold. Use wrench 5188 to remove bolt.

It might be necessary to turn engine slightly to permit wrench 5187 to rest on cooling fan journal.

1700.369



128227

g6

Check that cylinder No. 1 is at top dead center.

If necessary, adjust flywheel to 0-mark. Use wrench 5187 to turn engine.

1700.370



128228

g7

Remove vibration damper.

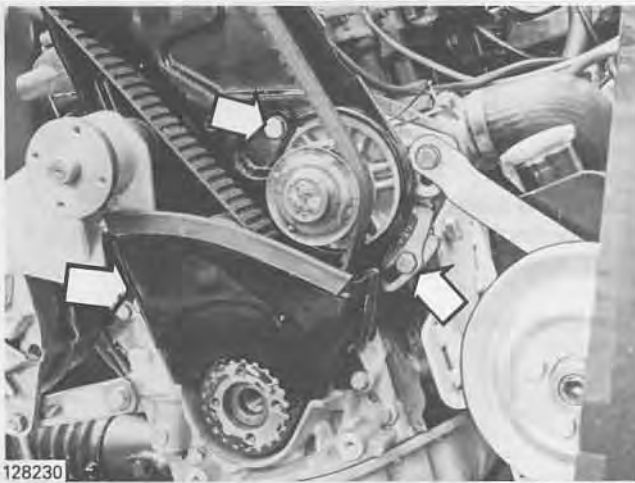
Remove four screws, inhex 6 mm. Pull vibration damper.

NOTE:

Vibration damper and crankshaft gear may be stuck together. Tap them apart.

1700.371

g8



Remove lower belt shield.

Release retaining bolts for coolant pump. Loosen and remove timing gear belt.

1700.372

g9



Replace idler pulley.

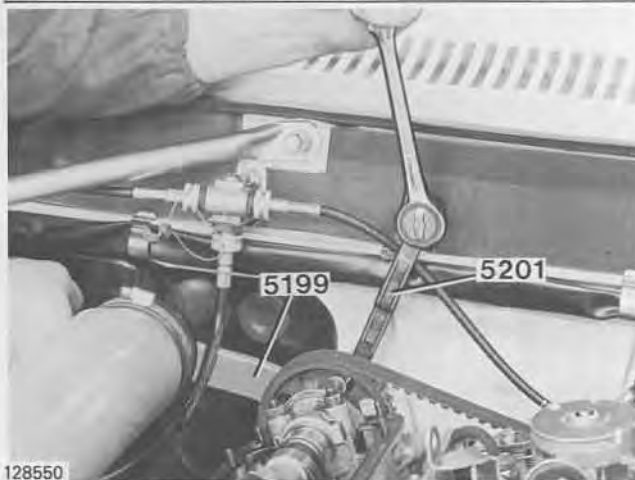
MUST be replaced when replacing timing gear belt.

Remove center bolt. Use puller **5202** to remove idler pulley.

Tap new idler pulley into position. Install center bolt.

1700.373

g10



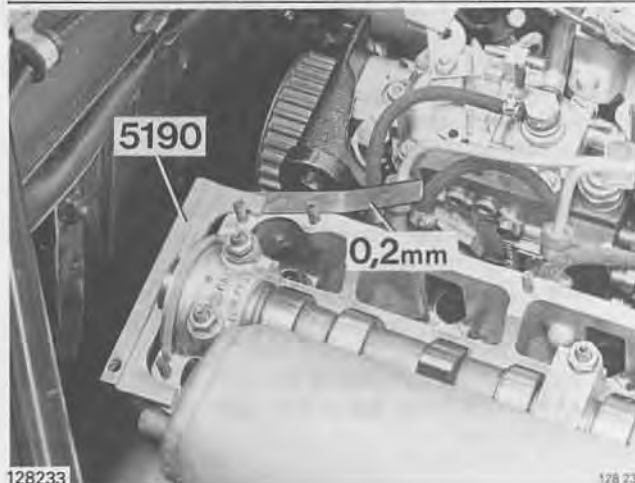
Remove rear gear on camshaft.

Use wrench **5199** to hold rear gear. Use wrench **5201** to remove center bolt.

Make sure camshaft is not rotated.

1700.374

g11

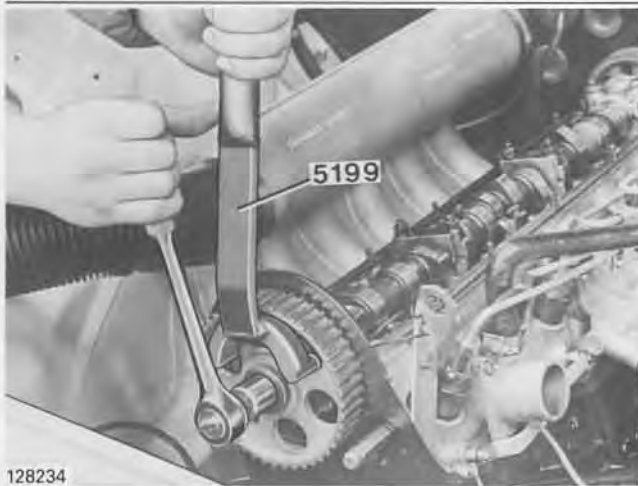


Lock camshaft in position.

Lift valve cover gasket. Install gauge **5190** in groove on camshaft gear rear end. Position a **0.2 mm = 0.008"** feeler gauge under left side of gauge **5190**.

The 0.2 mm gap is to compensate for clearances in timing gears.

1700.375



128234

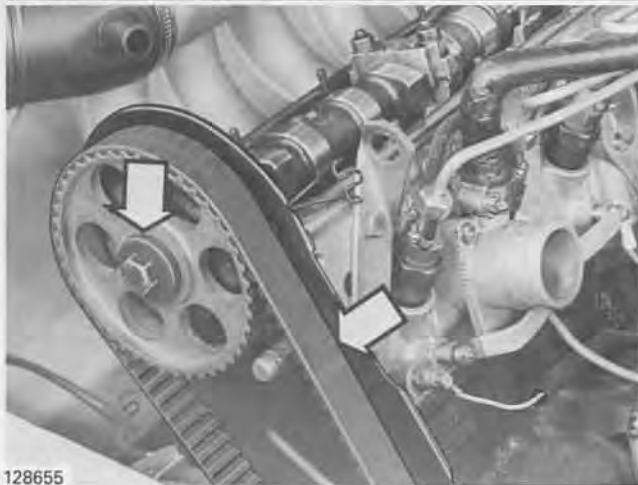
g12

Remove camshaft front gear.

Use wrench **5199** to hold gear. Camshaft **MUST NOT** rotate.

Tap gear loose from camshaft tapered end.

1700.376



128655

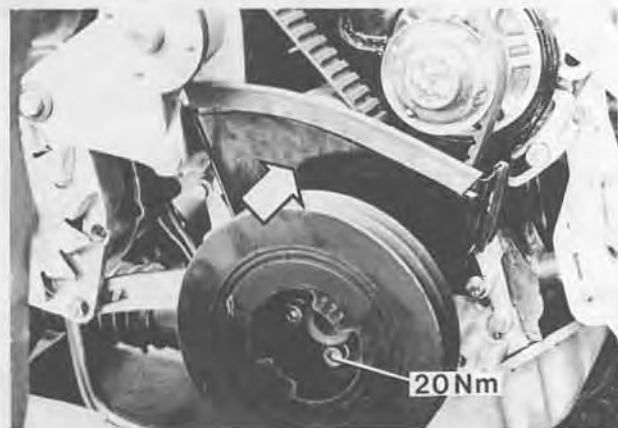
g13

Install gear belt and camshaft front gear.

Make sure gear belt fits securely on gears.

Install center bolt finger tight. Gear must be allowed to rotate. Camshaft **MUST NOT** rotate.

1700.377



128229

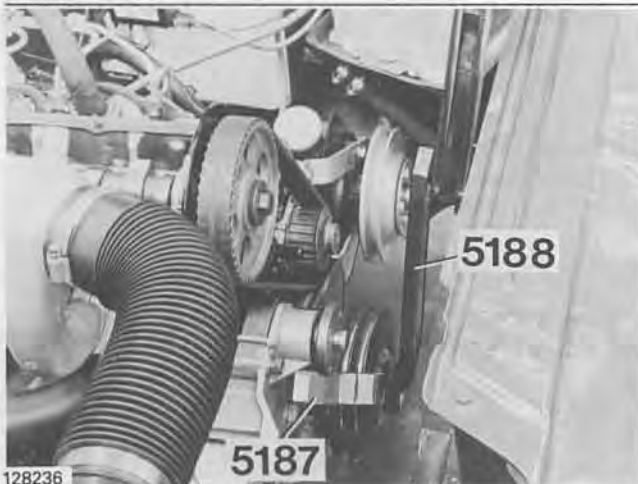
g14

Install lower belt shield and vibration damper.

Vibration damper fits one way only. There is a pin on crankshaft gear to locate vibration damper.

Install 6 mm inhex bolts. Torque to:
20 Nm = 15 ft.lbs.

1700.378



128236

g15

Install center bolt.

Apply sealing agent (P/N 277961-9) to bolt threads and contact surfaces.

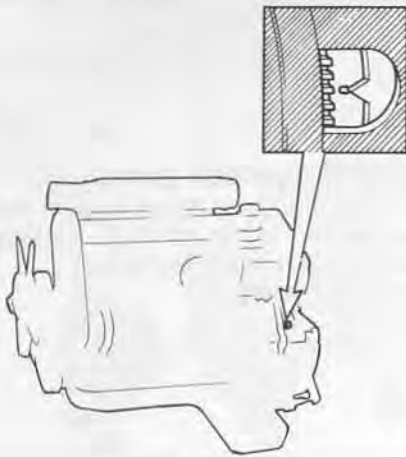
Use wrench **5187** to hold vibration damper. It can rest on cooling fan journal. Use wrench **5188** to torque center bolt to:
350 Nm = 255 ft.lbs.

NOTE:

This torque only applies if wrench **5188** is used. Torque wrench must be in line with wrench **5188**.

1700.379

g16



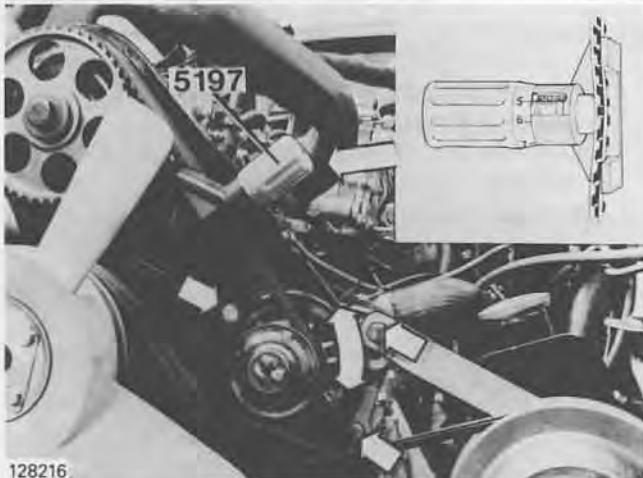
Check that cylinder No. 1 is at top dead center.

Flywheel mark at 0.

128175

1700.380

g17



Tension timing gear belt.

Use coolant pump to adjust timing gear belt tension.

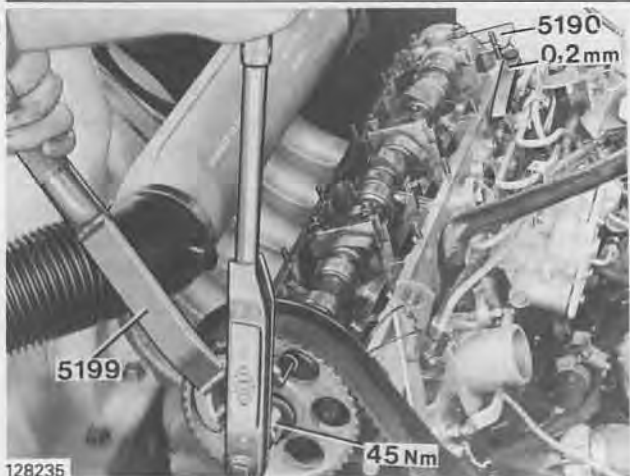
Install belt tension gauge **5197** on timing gear belt. Set gauge to 12.5. Tension timing gear belt until mark on plunger is flush with gauge sleeve.

Depress timing gear belt heavily by hand. Recheck timing gear belt tension. Adjust if required.

128216

1700.381

g18



Tighten camshaft front gear.

Use wrench **5199** to hold gear. Make sure camshaft or gear does not rotate.

Torque center bolt to:

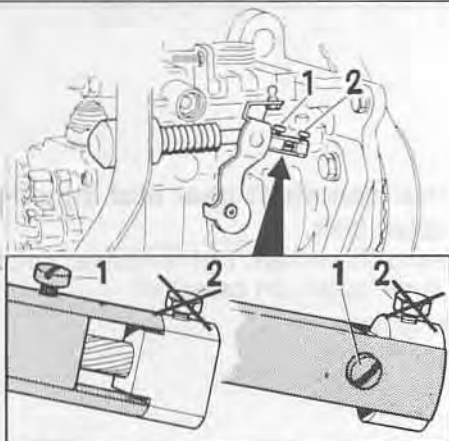
45 Nm = 33 ft.lbs.

Remove gauge 5190 and feeler gauge.

128235

1700.382

g19



Disconnect cold start device.

Loosen screw 1. Push lever forward. Rotate sleeve 90°.

Push lever back against stop.

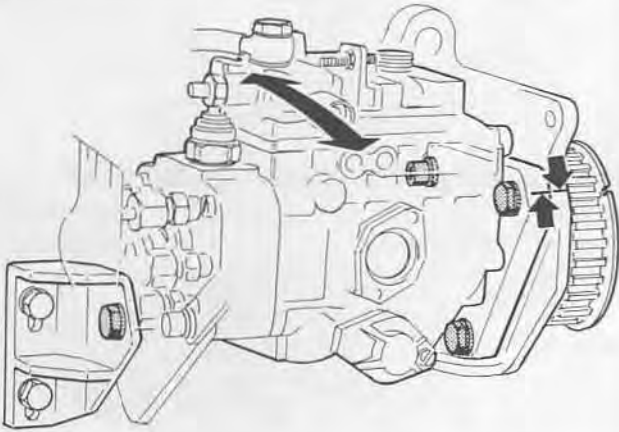
NOTE:

DO NOT touch screw 2. If it is loosened, cold start device must be re-set on test bench.

128169

1700.383

g20



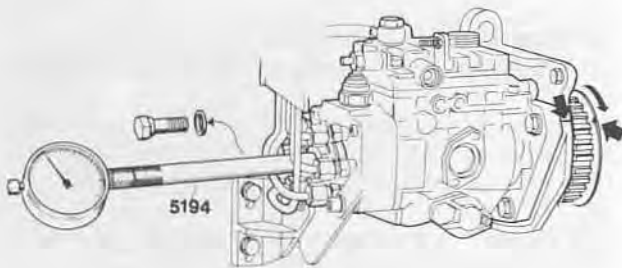
128167

Basic setting of injection pump.

Loosen injection pump retaining screws (in hex 6 mm). Turn injection pump so that markings on injection pump and bracket coincide. Tighten retaining screws.

1700.384

g21



128177

Install indicator gauge.

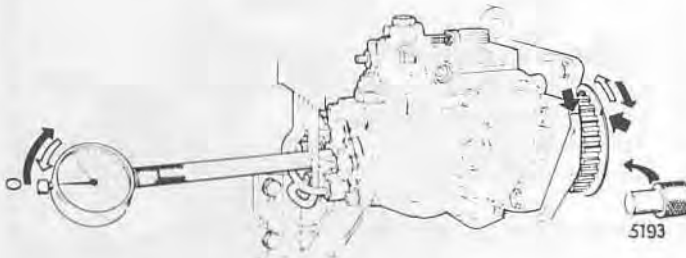
Use stop 5193 to lock injection pump gear. Cylinder No. 1 should be at position for injection.

Remove plug of injection pump distributor. Install holder 5194 and an indicator gauge with a measuring range of 0-3 mm. Set indicator gauge at approx. 2 mm.

Turn injection pump clockwise until marks on injection pump gear and bracket coincide.

1700.385

g22



128670

Set indicator gauge.

Turn injection pump gear slightly counterclockwise until indicator gauge is at minimum reading.

Set indicator gauge at zero. Turn injection pump gear clockwise until marking on injection pump gear and bracket coincide.

Use stop 5193 to lock injection pump gear in this position. Insert stop through a hole in injection pump gear and into a hole in bracket.

1700.386

g23



128654

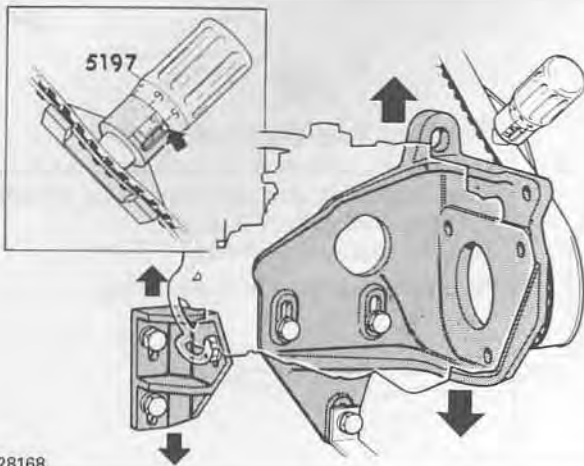
Install rear camshaft gear and injection pump drive belt.

Install gear on camshaft. Tighten center bolt finger tight so it can rotate on camshaft.

Install drive belt.

1700.387

g24



128168

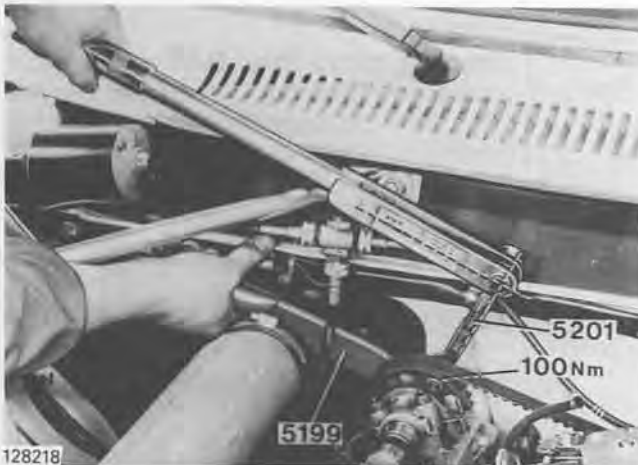
Tension injection pump gear belt.

Use injection pump bracket to tension gear belt. Use belt tension gauge 5197 to set belt tension. Install gauge on belt and set it to 12.5. Tension belt until mark on plunger is flush with tool sleeve. Tighten injection pump retaining screws.

Depress belt heavily by hand. Re-check belt tension. Adjust if required.

1700.388

g25



128218

Set injection pump.

Install wrench 5199 to hold camshaft rear gear. Install wrench 5201 with a torque wrench. It should be at a right angle to wrench 5201 to give correct readings.

Use wrench 5199 to turn camshaft gear until the indicator gauge registers 0.85 mm = 0.0334".

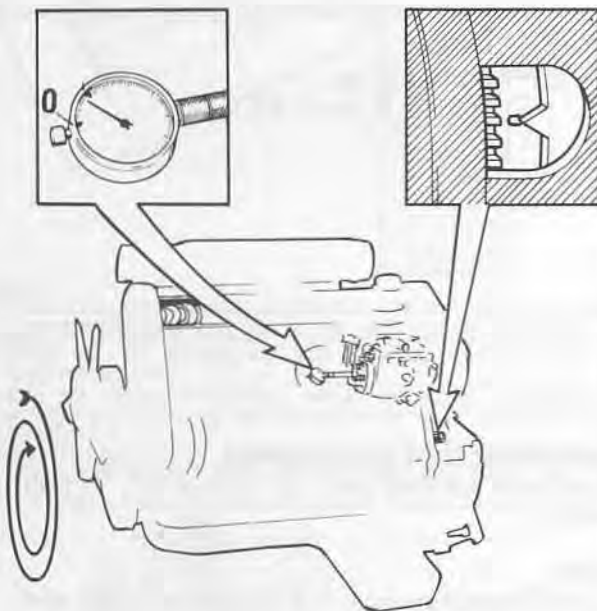
Hold camshaft gear in this position while tightening center bolt to 100 Nm = 73 ft.lbs. Camshaft or gear must not change position.

1700.389

g26

Remove stop 5193.

1700.390



128173

Check injection pump setting.

Turn engine two full turns until cylinder No. 1 is at top dead center and injection (= both cam lobes for cylinder No. 1 should point up equally large angles, flywheel timing mark at 0). Indicator gauge should now read 0.85 mm = 0.0334".

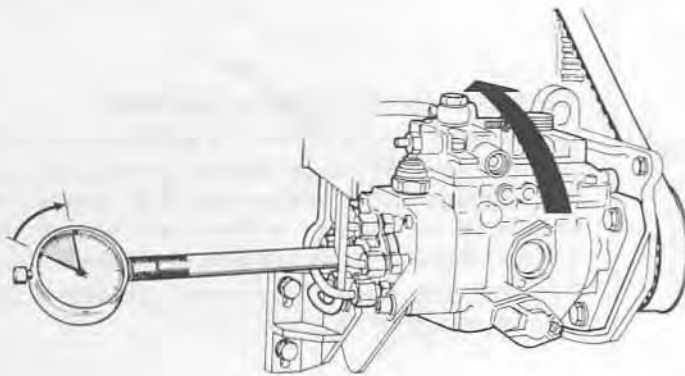
Correct reading:

Tighten injection pump retaining screws. Then continue from op. 29.

Incorrect reading:

Re-adjust according to instructions.

1700.391



128668

g27

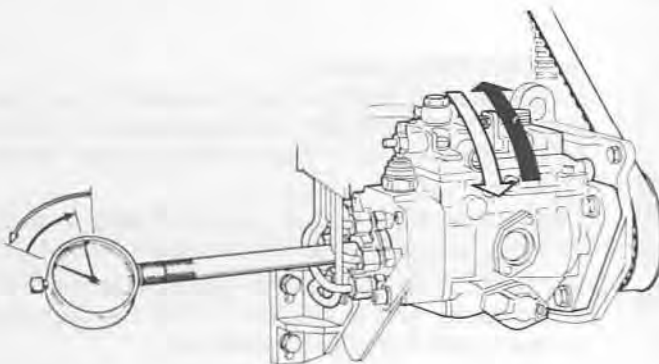
Reading less than 0.85 mm:

Loosen injection pump retaining screws. Turn injection pump inward to obtain reading **0.85 mm = 0.0334"**.

Tighten retaining screws.

Re-check injection pump setting.

1700.392



128671

g28

Reading more than 0.85 mm:

Loosen injection pump retaining screws. Then turn injection pump outward until reading on indicator gauge is approx. 0.75 mm = 0.029". Then turn inward to obtain reading **0.85 mm = 0.0334"**.

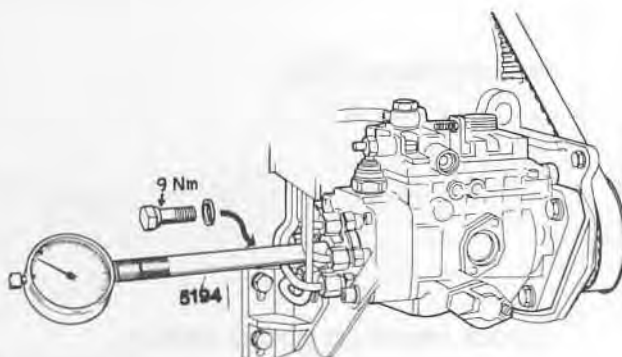
Tighten retaining screws.

Re-check injection pump setting.

NOTE:

Injection pump **MUST NOT** be tapped or knocked as this will alter settings.

1700.393



128174

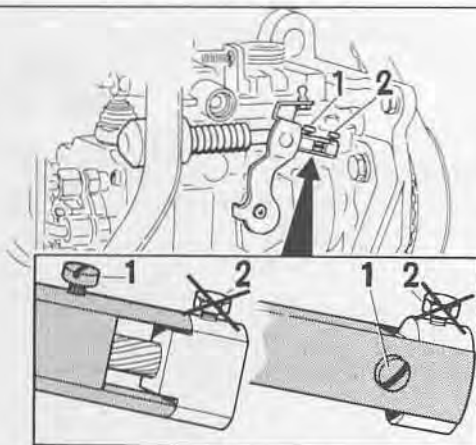
g29

Remove indicator gauge and gauge holder.

Install plug.

Torque: **9 Nm = 6.5 ft.lbs.**

1700.394



Engaged

Disengaged

128169

g30

Reconnect cold start device.

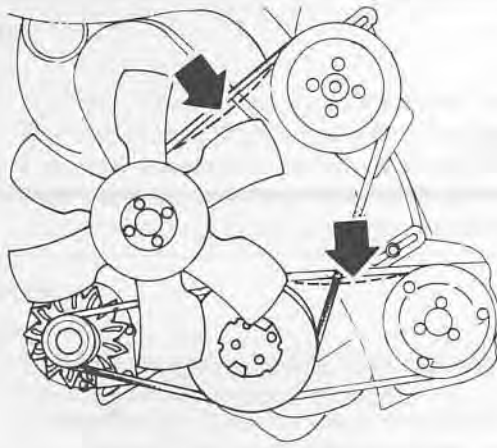
Push lever forward and turn sleeve 90°. Tighten screw 1.

NOTE:

DO NOT touch screw 2. If it is loosened, cold start device must be re-set on test bench.

1700.395

g31



133229

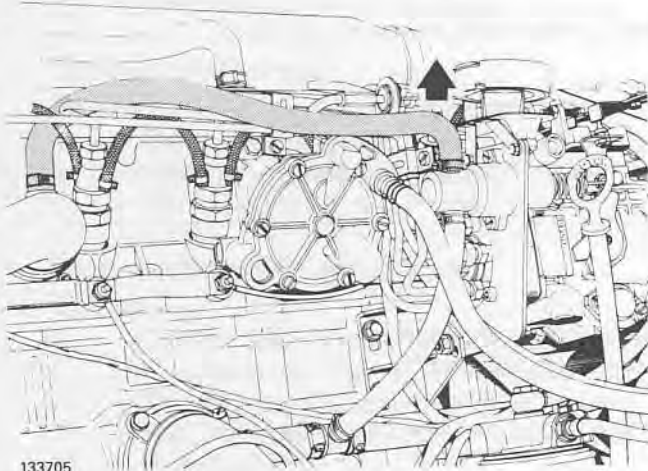
Install.

Install cooling fan with spacer and pulley. Torque retaining bolts to **9 Nm** = 6.5 ft.lbs. Install fan belt and power steering pump drive belt. Adjust belt tension.

Install radiator and radiator hoses. Install splash guard under engine.

1700.396

g32



133705

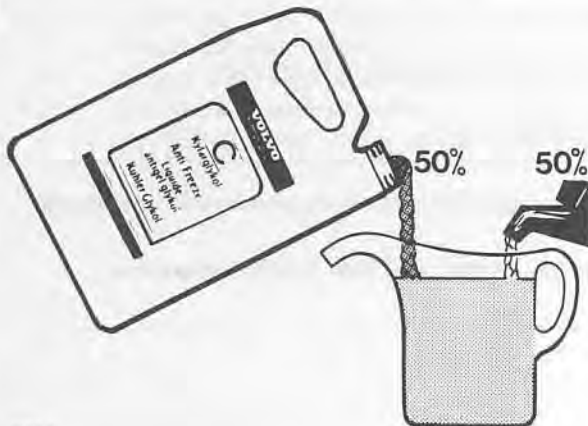
Prepare bleeding of cooling system.

Disconnect upper hose at cold start device. Place vessel under hose end. Hold hose end in level with expansion tank top.

Using this method will bleed cooling system quickly and efficiently and eliminate air pockets.

1700.363

g33



133542

VOLVO ORIGINAL KYLVÄTSKA TYP C ÄR PÅFYLLED. KYLSYSTEMET ÄR FROST-SKYDDAT TILL -30°C. EFTERFYLLEÅRET RUNT MED EN DEL VATTEN OCH EN DEL VOLVO KYLVÄTSKA TYP C.

FILLED WITH GENUINE **VOLVO** COOLANT TYPE C. COOLING SYSTEM IS PROTECTED TO -22°F. TOP UP YEAR ROUND WITH HALF WATER AND HALF VOLVO COOLANT TYPE C.

REMPLI DE LIQUIDE ANTIGEL **VOLVO** TYPE C VALABLE JUSQU'À -22°F/-30°C. REMPLIR EN TOUTE SAISON AVEC MOITIÉ EAU MOITIÉ ANTIGEL TYPE C.

1297524



133477

Volvo all weather Anti-Freeze Type C (blue-green) should be used all year round. Cooling system should always contain water plus anti-freeze, even during summer. Experience has also shown that extremely weak anti-freeze solutions (10-20 %) provide poor rust protection. For this reason ratio of anti-freeze/summer coolant to water should be 1 to 1.

1700.169

Fill coolant.

Manual transmission: 9.4 liters = 10 US qts – 9.4 liters = 10 US qts

Automatic transmission:
– 9.2 liters = 9.8 US qts

Flush cooling system prior to filling **new** coolant. Otherwise refill old coolant.

Set heat control to MAX. Start engine and run at increased idle speed for 5 minutes while refilling coolant.

Reconnect hose at cold start device. Fill expansion tank **FULL** (above MAX) and install cap.

1700.362

Road test

Engine

Check and adjust as necessary:

- 1 – Starting ability, cold and hot engine.
 - 2 – Fast idle.
 - 3 – Correct idle speed and no misfiring.
 - 4 – That the engine does not stall when accelerating or decelerating after throttle movements.
 - 5 – That there are no abnormal noises from valves, timing gears, crankshaft or pistons and connecting rods, water pump etc.
 - 6 – That normal operating temperature is reached within a reasonable warm-up period.
 - 7 – That the engine does not behave abnormally.
 - 8 – That the acceleration is normal and that the engine operates smoothly.
 - 9 – Open the hood. Check for visible leaks.
 - 10 – That hardware removed at factory is reinstalled and that everything is in order.
-

Electrical

Check:

- 1 – That starter and alternator operate correctly and without abnormal noises.
 - 2 – That wipers and washers operate correctly and are correctly aligned.
 - 3 – That steering lock operates correctly.
 - 4 – That instruments and control lights operate correctly and that no abnormal noises are noticed.
-

Drive train

Check:

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

Manual transmission

Check:

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

Automatic transmission

Check:

- 1 – That the gear selector play is correct.
 - 2 – That the starter operates only in position P or N and the back-up lights operate in position R only.
 - 3 – Run the transmission to normal operating temperature.
 - 4 – That there is no slippage at stall speed in position D and R (see Service Manual).
 - 5 – Upshift 1–2 and 2–3 by accelerating on part throttle with the gear selector in position D.
 - 6 – That the engine does not slip during shifting, which would indicate that a brake or clutch slips.
 - 7 – Employ kick-down operation and check downshift.
 - 8 – If traffic conditions permit, retain kick-down position and check that upshift occurs at correct speeds.
 - 9 – Place the gear selector in position 2 and check downshift and engine braking.
 - 10 – Place the gear selector in position 1 and check downshift and engine braking.
 - 11 – If possible, park on incline and check holding capability in position P and that the gear selector does not move out of position P by itself.
 - 12 – That drive shafts, rear axle or drive shaft bearings do not generate vibrations or abnormal noises.
-

Brakes

Check:

- 1 – That the power assist functions when braking by noting pedal pressure.
 - 2 – That the brakes do not pull when braking hard.
 - 3 – That brake discs are not out-of-round or warped by noting pedal pulsation or movement.
 - 4 – That the brakes are correctly adjusted and that the brake pedal does not feel "spongy".
 - 5 – That the parking brake is correctly adjusted and operates correctly.
-

Steering

Check:

- 1 – That the steering is correct and that the vehicle does not pull or is unstable.
 - 2 – Steering wheel position and return when driving.
 - 3 – That the steering wheel effort is normal.
 - 4 – Steering looseness.
 - 5 – That power steering functions correctly.
-

Springs and wheels

Check:

- 1 – That there are no abnormal noises from shock absorbers or rear wheel suspension.
 - 2 – When driving that the rear axle is tight.
 - 3 – Tire unbalance or out-of-roundness, when driving.
-

Body and interior equipment

Check:

- 1 – That all dealer installed accessories operate correctly.
 - 2 – That heater and heater controls operate correctly.
 - 3 – That there are no abnormal speed noises.
 - 4 – That there are no abnormal body noises (rattle, vibrations etc.)
 - 5 – Visible defects.
 - 6 – Wipe off steering wheel and gear selector.
Clean all other soiled or dirty areas caused by the maintenance procedures.
 - 7 – Faults detected should, if not previously noted, be noted in the service record.
 - 8 – Check off group and note the fault.
 - 9 – Faults normally remedied at the service should not be noted. Make sure all faults are remedied before the customer picks up his car.
-



VOLVO SUPPORTS VOLUNTARY
MECHANIC CERTIFICATION
BY THE N.I.A.S.E.

(USA ONLY)

Service literature

*Your
most important
special tool*

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