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<td></td>
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<td>− Miscellaneous ...................................</td>
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</tr>
<tr>
<td>− Replace timing gear belt ........................</td>
<td></td>
</tr>
<tr>
<td>B21A/Canada: .....................................</td>
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<td>− CO emissions check ................................</td>
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<td>B21F-Turbo: ......................................</td>
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<td>− Replace timing gear belts ........................</td>
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</table>

TP 30600/1
7500.08.83
Printed in U.S.A.
# 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.

<table>
<thead>
<tr>
<th>EMISSIONS</th>
<th>7,500 miles = 12,500 km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service at:</td>
<td></td>
</tr>
<tr>
<td>15–30–45</td>
<td>60–75–90–105–120 thousand miles</td>
</tr>
<tr>
<td>25–50–75</td>
<td>100–125–150–175–200 thousand km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service at:</th>
<th>EMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30–60–90</td>
<td>120 thousand miles</td>
</tr>
<tr>
<td>50–100–150–200 thousand km</td>
<td></td>
</tr>
</tbody>
</table>
### Group 17, 7,500 Mile Maintenance Service

#### Chart

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

<table>
<thead>
<tr>
<th>Controls and lighting</th>
<th>In car</th>
<th>Exterior – lubrication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Blower</td>
<td>A2. Pressure test brake system</td>
<td>B2. Door hinges</td>
</tr>
<tr>
<td>4. Rear demist</td>
<td>A4. Warning lights</td>
<td>On lift</td>
</tr>
<tr>
<td>5. AIR COND control</td>
<td>A5. Auto trans shift control</td>
<td>Tires, wheels</td>
</tr>
<tr>
<td>7. Turn signals</td>
<td></td>
<td>C2. Tire pressure</td>
</tr>
<tr>
<td>8. Headlights and LIGHTS switch</td>
<td></td>
<td>C3. Wheel bearing play</td>
</tr>
<tr>
<td>10. Parking lights</td>
<td></td>
<td>Front end</td>
</tr>
<tr>
<td>11. Brake lights</td>
<td></td>
<td>D1. Front shock absorbers</td>
</tr>
<tr>
<td>12. Tail lights</td>
<td></td>
<td>D2. Front springs</td>
</tr>
<tr>
<td>14. Reflectors and lenses</td>
<td></td>
<td>D4. Steering rack</td>
</tr>
<tr>
<td>15. Fill washer fluid</td>
<td></td>
<td>D5. Control arm bushings, strut</td>
</tr>
<tr>
<td>16. Wiper blades</td>
<td></td>
<td>D6. Steering rod play</td>
</tr>
<tr>
<td>17. Wiper control</td>
<td></td>
<td>D7. Ball joints</td>
</tr>
<tr>
<td>18. Washer jets</td>
<td></td>
<td>D8. Steering rod ends</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D9. Control arms</td>
</tr>
</tbody>
</table>

| | | D10. Stabilizer bar and links |

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

<table>
<thead>
<tr>
<th>miles</th>
<th>km</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,500</td>
<td>12,500</td>
</tr>
<tr>
<td>15,000</td>
<td>25,000</td>
</tr>
<tr>
<td>22,500</td>
<td>37,500</td>
</tr>
<tr>
<td>30,000</td>
<td>50,000</td>
</tr>
<tr>
<td>37,500</td>
<td>62,500</td>
</tr>
<tr>
<td>45,000</td>
<td>75,000</td>
</tr>
<tr>
<td>52,500</td>
<td>87,500</td>
</tr>
<tr>
<td>60,000</td>
<td>100,000</td>
</tr>
<tr>
<td>67,500</td>
<td>112,500</td>
</tr>
<tr>
<td>75,000</td>
<td>125,000</td>
</tr>
<tr>
<td>82,500</td>
<td>137,500</td>
</tr>
<tr>
<td>90,000</td>
<td>150,000</td>
</tr>
<tr>
<td>97,500</td>
<td>162,500</td>
</tr>
<tr>
<td>105,000</td>
<td>175,000</td>
</tr>
<tr>
<td>112,500</td>
<td>187,500</td>
</tr>
<tr>
<td>120,000</td>
<td>200,000</td>
</tr>
</tbody>
</table>
Group 17, 7,500 Mile Maintenance Service

- Chart -

<table>
<thead>
<tr>
<th>Mileage Range</th>
<th>Maintenance Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,500 - 12,500</td>
<td>Brakes: E1 (Brake hoses), E2 (Brake lines), E3 (Parking brake), E4 (Wheel brakes)</td>
</tr>
<tr>
<td>12,500 - 15,000</td>
<td>Power transmission: F1 (Clutch play), F2 (B21F-Turbo and B23F: clutch negative play), F3 (Auto trans: shift control), F4 (Propeller shaft)</td>
</tr>
<tr>
<td>15,000 - 22,500</td>
<td>Rear end: G1 (Rear shock absorbers), G2 (Rear suspension)</td>
</tr>
<tr>
<td>22,500 - 30,000</td>
<td>Exhaust system: H1 (B21-Turbo), H2 (B23F), H3 (D24 diesel)</td>
</tr>
<tr>
<td>30,000 - 37,500</td>
<td>Fluids: I1 (Rear axle), I2 (M46 manual transmission)</td>
</tr>
<tr>
<td>37,500 - 45,000</td>
<td>Engine oil and filter: J1-J2 (Gasoline engines), J3-J4 (Diesel engine)</td>
</tr>
<tr>
<td>45,000 - 50,000</td>
<td>Engine cooling system: K1 (Check anti-freeze), K2 (Replace coolant)</td>
</tr>
<tr>
<td>50,000 - 60,000</td>
<td>Fluids: K3 (Brake fluid level), K4 (Power steering gear), K5 (Battery)</td>
</tr>
<tr>
<td>60,000 - 67,500</td>
<td>Automatic transmission: L1-L10 (Replace fluid), L11 (Check oil level)</td>
</tr>
<tr>
<td>67,500 - 75,000</td>
<td>EMISIONS: M1 (Auto trans: adjust kickdown cable), M2 (Engine controls), M3 (Drive belt tension), M4 (B21 and B23 (all)): L1-L10 (Replace fluid), L11 (Check oil level), N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>75,000 - 80,000</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>80,000 - 87,500</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>87,500 - 100,000</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>100,000 - 112,500</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>112,500 - 125,000</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>125,000 - 137,500</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
<tr>
<td>137,500 - 160,000</td>
<td>EMISIONS: N1-N15 (Adjust valves), 01-07 (Replace timing gear belt)</td>
</tr>
</tbody>
</table>
Group 17, 7,500 Mile Maintenance Service

- Chart -

<table>
<thead>
<tr>
<th>Miles</th>
<th>7,500 = 12,500 = 25,000 = 37,500 = 50,000 = 62,500 = 75,000 = 87,500 = 100,000 = 125,000 = 150,000</th>
</tr>
</thead>
</table>

**B21A/Canada**

- 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

**B21F-Turbo**

- R1: Tighten nuts, exhaust pipe to turbo
- R2: Check turbo seal
- R3: Torque clamp screws
- 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**
Group 17, 7,500 Mile Maintenance Service

- Chart -

<table>
<thead>
<tr>
<th>Miles</th>
<th>Maintenance Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,500</td>
<td>Replace air filter cartridge</td>
</tr>
<tr>
<td>12,000</td>
<td>Replace spark plugs</td>
</tr>
<tr>
<td>15,000</td>
<td>Replace oxygen sensor, reset light</td>
</tr>
<tr>
<td>22,500</td>
<td>Replace fuel filter</td>
</tr>
<tr>
<td>30,000</td>
<td>Positive crankcase ventilation</td>
</tr>
<tr>
<td>37,500</td>
<td>Replace fuel tank filter</td>
</tr>
<tr>
<td>50,000</td>
<td>DR24 diesel</td>
</tr>
<tr>
<td>52,500</td>
<td>Drain condensate</td>
</tr>
<tr>
<td>57,500</td>
<td>Positive crankcase ventilation</td>
</tr>
<tr>
<td>62,500</td>
<td>Cooling system pressure check</td>
</tr>
<tr>
<td>69,000</td>
<td>Replacing air filter cartridge</td>
</tr>
<tr>
<td>75,000</td>
<td>Replace fuel filter</td>
</tr>
<tr>
<td>92,500</td>
<td>Check fuel lines</td>
</tr>
<tr>
<td>100,000</td>
<td>Drive belt tension</td>
</tr>
<tr>
<td>125,000</td>
<td>Valve clearance adjustment</td>
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<td>137,500</td>
<td>Engine controls</td>
</tr>
<tr>
<td>150,000</td>
<td>Maintenance services at 75,000 mile intervals:</td>
</tr>
<tr>
<td></td>
<td>Compression test</td>
</tr>
<tr>
<td></td>
<td>Checking/adjusting injectors</td>
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<tr>
<td></td>
<td>Replacing timing gear belts</td>
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# Road test

<table>
<thead>
<tr>
<th>Item</th>
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<th>Adjust</th>
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<tr>
<td><strong>Engine</strong></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Starting ability</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Fast idle (cold engine)</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Idle (warm engine)</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>No stalls on acceleration or deceleration</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>No noise from engine</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Normal warm up</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Normal engine operation</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Normal acceleration</td>
</tr>
<tr>
<td>9</td>
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<td>Leaks</td>
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<td>10</td>
<td></td>
<td>Reinstall hardware removed at factory</td>
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<td><strong>Electrical</strong></td>
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<td>1</td>
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<td>Starter/alternator operation</td>
</tr>
<tr>
<td>2</td>
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<td>Wipers/washers</td>
</tr>
<tr>
<td>3</td>
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<td>Ignition and steering lock</td>
</tr>
<tr>
<td>4</td>
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<td>Instruments, control lights</td>
</tr>
<tr>
<td><strong>Drive train</strong></td>
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<td></td>
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<tr>
<td>1</td>
<td></td>
<td>Clutch adjustment</td>
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<td>Clutch operation</td>
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<td><strong>Manual transmission</strong></td>
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</tr>
<tr>
<td>1</td>
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<td>Correct operation</td>
</tr>
<tr>
<td>Item</td>
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<td>Adjust</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Automatic transmission</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Gear selector play</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Starter operation only in P and N</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Run to normal operating temperature</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>No slippage at stall speed</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Upshift</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>No slippage during shifting</td>
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<tr>
<td>7</td>
<td></td>
<td>Kick down</td>
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<tr>
<td>8</td>
<td></td>
<td>Upshift with kick down</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Gear selector in 2, downshift and braking</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Gear selector in 1, downshift and braking</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Park position operation</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Drive shafts and bearing noises</td>
</tr>
<tr>
<td><strong>Brakes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Power assist</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>No pull when braking hard</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Pedal pulsation</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>&quot;Spongy&quot; brake pedal</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Parking brake</td>
</tr>
<tr>
<td><strong>Steering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Correct steering</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Steering wheel position and return</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Steering wheel effort</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Steering looseness</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Power steering function</td>
</tr>
<tr>
<td><strong>Springs and wheels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>No suspension noises</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Rear axle tight</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Tire unbalance</td>
</tr>
<tr>
<td><strong>Body and equipment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>Accessory operation</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Heater and heater controls</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Speed noises</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Body noises</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Visible defects</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Clean steering wheel etc</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Note faults detected</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Check off</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Remedy faults</td>
</tr>
</tbody>
</table>
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.
Group 17, 7,500 Mile Maintenance Service

--- Chart ---

Services at the mileages indicated below:

<table>
<thead>
<tr>
<th>miles</th>
<th>km</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,500</td>
<td>12,500</td>
</tr>
<tr>
<td>15,000</td>
<td>25,000</td>
</tr>
<tr>
<td>22,500</td>
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<td>292,500</td>
<td>487,500</td>
</tr>
<tr>
<td>300,000</td>
<td>500,000</td>
</tr>
</tbody>
</table>

--- include service operations performed at these intervals: ---
Procedures
Controls and lighting

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

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).

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.
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.

Check AIR COND control.
Start engine.
Actuate AIR COND switch. Check that magnetic clutch functions, visually and by sound.
Switch engine off.

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

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.
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.

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.

Check parking lights.
Check that all lights are on.

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

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

Check rear reflectors and lenses.
Check that reflectors and lenses are not damaged.

Fill washer fluid reservoir.
Use clean water and solvent. In below freezing conditions use washer solvent anti-freeze.
Check wiper blades.
Check blade alignment. Check that blades are not damaged and are free from foreign matter.
Wagons: check tail gate wiper blade.

Check wipers.
Turn on ignition key.
Switch on wipers, using WASH/WIPE 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/WIPE/WASH.

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.
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.

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.

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.
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.

Automatic transmission, check shift control.
Clearance in position "D" toward position "N" shall be the same as clearance in position "2" toward position "1".

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.
Exterior – lubrication

Service every 7,500 miles = 12,500 km

Lubricate hood hinges.
Use oil can and heavy oil.

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.

Lubricate trunk lid (tail gate for wagons).
Lubricate lid/gate hinges. Use heavy oil.
Group 17, 7,500 Mile Maintenance Service

- Tires, wheels -

On lift

Tires, wheels

Service every 7,500 miles = 12,500 km

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.
**Group 17, 7,500 Mile Maintenance Service**

**Front end**

---

**C3**

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

---

**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.

---

**Front end**

---

**D1**

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

**Check front shock absorbers.**
Visually check shock absorbers for leakage.

**NOTE:**
Do not mistake moisture on shock absorber for leakage.

---

**D2**

**Check front springs.**
Check spring attachment and condition.

---

**D3**

**Check steering gear.**
Check steering gear rubber bellows for damage.

Check that steering gear is firmly attached by trying to move it by hand.
Group 17, 7,500 Mile Maintenance Service

Front end

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.

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.

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.

Check ball joints.
Vehicle resting on wheels. Check ball joint axial play.
Maximum play permitted is 3 mm (=1/8\textquotedbl). Check rubber bellows. If damaged, service immediately.
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").

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.

Check stabilizer bar and links.
Check attachment and rubber bushings.
Brakes

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

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.

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.

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

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.
Group 17, 7,500 Mile Maintenance Service

---

**Power transmission**

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

---

**Diesel.**

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

---

**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".

---

**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.

---

**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.
**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.

---

**NOTE:**
There is no need to retorque all bolts, nuts etc unless parts are found to be loose. Specifications are provided as a guide for tightening loose hardware.

---

<table>
<thead>
<tr>
<th>Component</th>
<th>Nm</th>
<th>ft. lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction rod:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Body attachment</td>
<td>85</td>
<td>62</td>
</tr>
<tr>
<td>B Rear axle attachment</td>
<td>85</td>
<td>62</td>
</tr>
<tr>
<td>Track rod (Panhard rod):</td>
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<td></td>
</tr>
<tr>
<td>C Rear axle attachment</td>
<td>60</td>
<td>44</td>
</tr>
<tr>
<td>D Body attachment</td>
<td>85</td>
<td>62</td>
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<tr>
<td>Rear Spring:</td>
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<tr>
<td>E Upper attachment</td>
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<tr>
<td>F Lower attachment</td>
<td>19</td>
<td>14</td>
</tr>
<tr>
<td>Shock absorber:</td>
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<td></td>
</tr>
<tr>
<td>G Upper attachment</td>
<td>85</td>
<td>62</td>
</tr>
<tr>
<td>H Lower attachment</td>
<td>85</td>
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<td>Trailing arm:</td>
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<tr>
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<td>F Rear attachment (at rear axle)</td>
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<td>Stabilizer:</td>
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</tr>
<tr>
<td>J Front attachment (=shock absorber)</td>
<td>85</td>
<td>62</td>
</tr>
<tr>
<td>K Rear attachment</td>
<td>45</td>
<td>32</td>
</tr>
<tr>
<td>Wheels:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L Nuts, tightened criss-cross</td>
<td>115</td>
<td>85</td>
</tr>
</tbody>
</table>
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.

EMISSIONS
Service every 7,500 miles = 12,500 km

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.

EMISSIONS
Service every 7,500 miles = 12,500 km

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.
**Gasoline engines**

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

**NOTE:** Turbo frequency, twice as often.

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.

Drain engine oil.

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

**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:

<table>
<thead>
<tr>
<th>Driving conditions</th>
<th>Without Turbo</th>
<th>With Turbo</th>
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</thead>
<tbody>
<tr>
<td>Driving under adverse conditions - see below</td>
<td>Each 7,500 miles (12,500 km) or every third month</td>
<td>Each 3,750 miles (6,250 km) or every third month</td>
</tr>
<tr>
<td>Normal driving conditions</td>
<td>Each 7,500 miles (12,500 km) or every sixth month</td>
<td>3,750 miles (6,250 km) or every sixth month</td>
</tr>
</tbody>
</table>

**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.*

**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

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.

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

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

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:

<table>
<thead>
<tr>
<th>Driving conditions</th>
<th>Oil change interval</th>
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</thead>
<tbody>
<tr>
<td>Driving under adverse conditions – see below</td>
<td>Each 7,500 miles (12,500 km) or every third month with oil filter change every second oil change.</td>
</tr>
<tr>
<td>Normal driving conditions</td>
<td>Each 7,500 miles (12,500 km) or every sixth month with oil filter change every second oil change.</td>
</tr>
</tbody>
</table>

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).

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.
Engine cooling system

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.

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

Intervals: 30,000 miles = 50,000 km

Replace coolant.
Remove reservoir filler cap. Drain coolant by disconnecting lower radiator hose. Fill with new coolant (50% water, 50% antifreeze). Use only Volvo coolant Type C, blue-green. Re-install filler cap.

Fluids

Service every 7,500 miles = 12,500 km

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.

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.
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

**Service at:**
<table>
<thead>
<tr>
<th>EMISSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5-45-67.5-90—thousand miles</td>
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<tr>
<td>37.5-75-112.5-150—thousand km</td>
</tr>
</tbody>
</table>

**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.

Draining through drain plug

**Drain automatic transmission.**
Remove drain plug and drain. Reinstall drain plug.

**WARNING:**
Oil can be scalding hot if vehicle was recently driven.

**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.
Fill 2 quarts of Automatic Transmission Fluid.
BW55: ATF type F or G.
AW70/AW71: Dexron II.

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

Fill 2 quarts of Automatic Transmission Fluid.
BW55: ATF type F or G.
AW70/AW71: Dexron II.

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

Check condition of Automatic Transmission Fluid.
Fluid must not carry impurities, discoloration or smell.

Reconnect return pipe to automatic transmission.

Fill 2 quarts of Automatic Transmission Fluid.
BW55: ATF type F or G.
AW70/AW71: Dexron II.

Adjust fluid level as described in L11.
Removing oil pan

Drain automatic transmission.
Disconnect filler tube at pan and drain.

**WARNING!**
Oil can be scalding hot if vehicle was recently driven.

Remove oil pan.
Clean oil pan, strainer and particle magnet.

**NOTE!**
Also clean oil cooler.

Reinstall oil pan and filler tube.
Apply oil to pan gasket prior to installation. Use new gasket.

**Torques:**

<table>
<thead>
<tr>
<th></th>
<th>Nm</th>
<th>ft.lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filler tube connector</td>
<td>90</td>
<td>65</td>
</tr>
<tr>
<td>Pan bolts:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW55, yellow marking</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>BW55, blue marking</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>AW70/AW71</td>
<td>5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

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.
Group 17, 7,500 Mile Maintenance Service
- Checking automatic transmission fluid -

**Dipstick markings.**

**Cold oil** - oil temperature +105°F (+40°C). This is a normal temperature for transmission after idling for about 10 minutes. At oil temperature below +40°C, level may be below MIN mark.

**MIN +40°C MAX**

**Warm oil** - oil temperature +195°F (+90°C). This temperature is obtained when driving for about 30 minutes. At oil temperature above +90°C, level may be above MAX mark.

**MIN +90°C MAX**

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**

**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: \( L = 51 \text{ mm} = 2.01" \)

**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.

**Service at:**

<table>
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<th>EMISSIONS</th>
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<tr>
<td>30-60-90-thousand miles</td>
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<tr>
<td>50-100-150-thousand km</td>
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</table>

Intervals: 30,000 miles = 50,000 km

**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.
**B21 and B23 adjust valves**

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

**EMISSIONS**

**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).

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

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.

**If clearance is incorrect:**

**Line up valve depressors.**

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

**Attach tool 5022 and depress valve depressors.**

Screw down tool spindle until depressor groove is just above edge and accessible with pliers.
Use tool 5026 to remove disc.

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.

Discs available.
From 3.30 to 4.50 mm in increments of 0.05 mm.

NOTE:
Install discs with marks down.

Position new disc.
It should be oiled.

Remove tool 5022.
Cyl. 3:
Rotate engine crankshaft to correct position for firing No. 3 cylinder. Check clearance as described previously. If necessary, correct clearance.

Cyl. 4:
Repeat procedure.

Cyl. 2:
Repeat procedure.

Re-check on all cylinders.
Turn engine a few turns before checking.

Position valve cover gasket.

Install valve cover.
Hex 10 mm.
Torque: 12.5 Nm = 9 ft.lbs.
B21 and B23: replace timing gear belt

Service at:
45–90–thousand miles
75–150–thousand km

Intervals: 45,000 miles ≈ 75,000 km

01

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

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.

03

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

04

Fit timing belt on tensioner roller.
Use of tools may damage timing belt.
Tension timing belt.
Loosen tensioner nut to let spring tension act on roller and thus tension timing belt.
Tighten nut.
Hex 17 mm

Check marks and torque nut.
Rotate clockwise and re-check marks.
Torque: 50 Nm = 37 ft.lbs.

Install timing gear cover.
Hex 10 mm
B21A/Canada

Service every 12,500 km

Check exhaust system.
Check condition, alignment and suspension.

Check damper oil level.
Automatic Transmission Fluid to 6 mm from top of cylinder.

Check choke control.
Check operation of choke control. Check that indicator light comes on when choke control is engaged.
Breaker points, check condition.  
Worn points may indicate defective capacitor.

Rotor, cap and cables, check condition.  
Also check rubber seals and attachments

Check/adjust dwell angle.  
Should be: $62^\circ \pm 3^\circ$.  
Run starter motor from remote starter pick-up point.

Check "Pulsair" air injection system.  
Disconnect air hose at air cleaner.  
Check that air is being drawn in and that no back pressure exists.

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

**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.

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).

B21A

| Gap | 0.7–0.8 mm = 0.028–0.032" |
| Torque (plug threads not oiled) | 20–30 Nm = 15–18 ft. lbs |

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

**NOTE:**
Maximum amount of oil required is 1-2 drops.
Instruments used are Volvo Mono-Tester or "Magnetic Timing Units" equipped with proper adapter.

**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.

**B21A:**
7° at 750 rpm.

**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.

**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.

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.
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.

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 $+60^\circ C = 140^\circ F$.

Clean fuel pump strainer.
Also clean fuel pump sludge accumulator. Carefully check seal and sealing surfaces before re-installing.

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

Check fuel lines for tightness.
Check that there are no fuel leaks in engine compartment.
Also check for oil and fluid leaks.

CO emissions check
B21A, Canada

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

Connect CO-meter.
Insert probe approx. 40 cm = 16" into exhaust pipe.

Connect tachometer.
For measuring rpm.
Disconnect Pulsair.
Disconnect hose from air cleaner. Plug disconnected end.

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

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.

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.

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.
**Group 17, 7,500 Mile Maintenance Service**  
* B21A CO check *

**CO adjustment:**

Remove piston assembly.
Remove piston, diaphragm and fuel needle assembly from carburetor.

Remove retaining screw for fuel needle.

**CO adjustment:**

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.

**CO adjustment:**

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.

**CO adjustment:**

Remove lock washer and flat washer.
Turn lock washer sideways and use a steel wire to remove it. Shake out flat washer.
**CO adjustment:**

**Press down lower lock washer.**
Use tool 5159.
Install retaining screw for fuel needle. Install piston, diaphragm and needle assembly in carburetor.

**CO adjustment:**

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

**CO adjustment:**

Adjust CO.
Use tool 5159 to adjust fuel needle position in carburetor. Adjusting range is approx. 4 turns. Turning tool clockwise increases CO, counterclockwise reduces CO. Make sure tool lugs grip recesses in air valve spindle. Otherwise carburetor diaphragm may become damaged.

**CO adjustment:**

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.
Reconnect Pulsair.

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

Adjust idle speed.
Engine at normal operating temperature. During and after CO adjustment, idle speed should be: 900 ± 50 rpm.
**B21F-Turbo**

Service every 7,500 miles = 12,500 km

**Tighten nuts, check for leakage.**
Exhaust pipe to turbo (three nuts)
Hex: 13 mm
Torque: 22-25 Nm 16-18 ft.lbs.

**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.

**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.
**Group 17, 7,500 Mile Maintenance Service**

- B21F-Turbo -

---

**R3**

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

Torque: $3 \text{ Nm} = 2.5 \text{ ft.lbs.}$

---

**R4**

**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.

---

**R5**

**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 $70^\circ$ (4-cyl. setting).
Dwell meter is connected to Lambda sond service pick-up.

---

**R6**

**Check timing retard.**
Start engine, run at idle. Note ignition timing.
Pump pressure to $36 \text{ kPa} = 5 \text{ psi}.$
Ignition timing should retard 8-10'. In case of incorrect reading: check distributor, replace distributor pressure unit, as appropriate.
Reinstall and clamp pressure hose.
**Check full load enrichment system.**
Connect air pressure pump and gauge in line leading from intake manifold to pressure switch on firewall.

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.

**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).
Group 17, 7,500 Mile Maintenance Service  
– B21F-Turbo –

**Lubricate distributor.**  
Remove rotor and lubricate felt wick in distributor shaft center sparingly.  
**NOTE:**  
Maximum amount of oil required is 1-2 drops.

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

**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).

---

**B21F-Turbo**  
“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.
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: $55 \pm 5 \text{ Nm} = 40 \pm 4 \text{ ft.lbs.}$
Check electrical connections.

Reset Lambda-sond reminder light.
Remove panel and switch cover. Press button. Reinstall cover panel.

Replace fuel filter.
Fuel filter located on firewall. Note flow direction arrow on filter.
Group 17, 7,500 Mile Maintenance Service

- B21F-Turbo -

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

**Intervals: 60,000 miles = 100,000 km**

---

**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.

---

**Replace fuel tank filter.**
Use tool 5169 to remove and reinstall fuel gauge sender.
Group 17, 7,500 Mile Maintenance Service
- B23F -

B23F

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

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

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.

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

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).

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.
**Group 17, 7,500 Mile Maintenance Service**

**- B23F -**

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### Service at: 30-60-90-thousand miles

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<td>50-100-150-thousand km</td>
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<tr>
<td>Intervals: 30,000 miles = 50,000 km</td>
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</table>

**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:** $55 \pm 5$ Nm = $40 \pm 4$ ft.lbs.

Check electrical connections.

---

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

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<tr>
<td>Intervals: 60,000 miles = 100,000 km</td>
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**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.**

---

**Reset Lambda-sond reminder light.**

Remove panel and switch cover. Press button. Reinstall cover panel.
Service at: 60,000 miles = 100,000 km
Intervals: 60,000 miles = 100,000 km

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.

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

Replace fuel tank filter.
Use tool 5169 to remove and reinstall fuel gauge sender.
D24 diesel

Service every 7,500 miles = 12,500 km

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.

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.

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

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.
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.

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.

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.

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.
Valve clearance adjustment

Special tools: 5195 Pliers
For removing valve depressor disc.

5196 Press tool
For valve depressors

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.

Remove valve cover

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.

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.
Incorrect clearance, adjustment required

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.

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.

Remove disc.
Use pliers 5195.

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.
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.

Position new disc.
It should be oiled.
Install with marks DOWN.

Check/set valve clearance for remaining cylinders.
Use following cylinder sequence:
1-5-3-6-2-4

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.
Setting idle speeds

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<td><strong>Intervals:</strong> 30,000 miles = 50,000 km</td>
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**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).

**Run engine to normal operating temperature.**

**Check/adjust low idle speed.**
Should be 750 ± 50 rpm. Apply tamper seal on screw and lock nut with paint after adjustment.

**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.

**Remove instrument.**

**Check/adjust engine controls.**
This should always be done after idle adjustment.
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.

Losen 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.

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.

Check max accelerator position
Depress accelerator pedal fully. Pulley should touch full speed stop.
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.

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.

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.

Re-connect cold start device
(If disconnected)

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".
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

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

Disconnect wire at stop valve.
Injection pump will not pump fuel and fuel spill is thereby avoided.

Remove vacuum pump and vacuum pump plunger.

Clean.
Throughly clean fuel delivery pipes and connections.

Remove fuel delivery pipes.
Plug all connections to prevent dirt from entering fuel system.
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.

Compression test

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.

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.

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.
1. Install fuel delivery pipes.  
   Torque to:  
   $25 \text{ Nm} = 18 \text{ ft.lbs}.$

2. Connect wire to stop valve.

3. Install vacuum pump plunger and vacuum pump.  
   Check O-ring on vacuum pump, replace if necessary.
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.

**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.

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.

**Install injector in injector tester.**

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

**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.
Check injection sound.
Pressure gauge disengaged.
Slowly depress tester lever fully (1-2 strokes per second).
A correct injector will whir during spray.

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.

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.

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.
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.

Prepare injector for installation or storage
Remove injector from tester. Install protective caps on pipe connection.
Protect nozzle from damage when installing injector.
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

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**Disconnect battery ground cable.**

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

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**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.

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

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.

Check that cylinder No. 1 is at top dead center.
If necessary, adjust flywheel to 0-mark. Use wrench 5187 to turn engine.

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.
Group 17, 7,500 Mile Maintenance Service

-D24 diesel: timing gear belts-

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

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.

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.

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.
Remove camshaft front gear.
Use wrench 5199 to hold gear. Camshaft MUST NOT rotate.

Tap gear loose from camshaft tapered end.

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.

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.

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.
Check that cylinder No. 1 is at top dead center.
Flywheel mark at O.

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.

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.

Disconnect cold start device.
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.
Basic setting of injection pump.
Loosen injection pump retaining screws (inhex 6 mm). Turn injection pump so that markings on injection pump and bracket coincide. Tighten retaining screws.

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.

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.

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.
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.

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.

Remove stop 5193.

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.
Reading less that 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.

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.

Remove indicator gauge and gauge holder. Install plug. Torque: 9 Nm = 6.5 ft.lbs.

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.
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.

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.

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.

Fill coolant.
Manual transmission: 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.
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.
Check and adjust the transmission:

1. Test the electrical and fluid pressure.
2. Check the wiring harness and test connections.
3. Test the motor and all related equipment.
4. Check the fluid levels and test the operation.
5. Check the fluid and all related equipment.
6. Check the fluid levels and test the operation.
7. Check the fluid and all related equipment.
8. Check the fluid levels and test the operation.
9. Check the fluid and all related equipment.
10. Check the fluid levels and test the operation.

Check:

1. Check the rear axle and oil seal.
2. Check the rear axle and oil seal.
3. Check the rear axle and oil seal.
4. Check the rear axle and oil seal.

Check:

1. Check the front axle and oil seal.
2. Check the front axle and oil seal.
3. Check the front axle and oil seal.
4. Check the front axle and oil seal.

Check:

1. Check the clutch operation and pedal travel.
2. Check the clutch operation and pedal travel.
3. Check the clutch operation and pedal travel.
4. Check the clutch operation and pedal travel.

Check:

1. Check the brake lines and brake shoes.
2. Check the brake lines and brake shoes.
3. Check the brake lines and brake shoes.
4. Check the brake lines and brake shoes.

Check:

1. Check the transmission operation and gear selection.
2. Check the transmission operation and gear selection.
3. Check the transmission operation and gear selection.
4. Check the transmission operation and gear selection.

Check:

1. Check the steering and suspension.
2. Check the steering and suspension.
3. Check the steering and suspension.
4. Check the steering and suspension.

Check:

1. Check the electrical system.
2. Check the electrical system.
3. Check the electrical system.
4. Check the electrical system.

Check:

1. Check the front suspension.
2. Check the front suspension.
3. Check the front suspension.
4. Check the front suspension.

Check:

1. Check the rear suspension.
2. Check the rear suspension.
3. Check the rear suspension.
4. Check the rear suspension.
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(USA ONLY)

Service literature

Your most important special tool