Foreword

DO NOT Remove this manual from the vehicle. It contains important operational and safety information that is needed by all drivers and owners of this vehicle.

This manual contains information concerning the safe operation of your vehicle. It is extremely important that this information is read and understood before the vehicle is operated. This manual also contains a considerable amount of information concerning the vehicle, such as vehicle identification, Preventive Maintenance recommendations and a log for your service records. Please keep this in the vehicle at all times. Information from other component manufacturers is supplied in separate manuals in the Owners Package.

Note: It is important that this manual stay with the vehicle when it is sold. Important safety information must be passed on to the new customer. The service information contained in this manual gives the owner important information about maintaining the vehicle but is not intended as a substitute for the Preventive Maintenance Service Manual and must not be regarded as such.

The National Highway Traffic Safety Administration (NHTSA) and VOLVO Group North America, LLC should be informed immediately if you believe that the vehicle has a defect that could cause a crash, injury or death.

Contact NHTSA by calling the Auto Safety Hotline at 1 (888) 327-4236, by writing to NHTSA, U.S. Department of Transportation, Washington, DC 20590, by TTY at 1 (800) 424-9153, or visit their website at www.nhtsa.dot.gov.

VOLVO Group North America, LLC

Greensboro, NC USA

Order number: PV776-22171527

Tampering with Gaseous Emission Control Systems Prohibited

The Federal Clean Air Act prohibits the removal or rendering inoperative of any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with Federal Emission Regulations by:

1 Any person prior to its sale and delivery to the ultimate purchaser, or

2 Any manufacturer or distributor after its sale and delivery to the ultimate purchaser, or

3 Any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines following its sale and delivery to the ultimate purchaser, or

4 Any person who operates a fleet of motor vehicles following its sale and delivery to the ultimate purchaser.

Note: For specifics of the prohibited vehicle/engine modifications refer to the VOLVO Bodybuilder documentation.

Engines Other than VOLVO

For specific information on engines other than VOLVO, refer to the engine vendors publications.

Engine Gaseous Emission Control Systems

Warranty Maintenance

Note: For emission control systems information on engines other than VOLVO, refer to the engine vendor’s publication

- EGR Differential Pressure
- Ambient Air Temperature (AAT)

18 SCR

- Aftertreatment Selective Catalytic Reduction (SCR) Catalyst
- Aftertreatment Diesel Exhaust Fluid (DEF) Pump
  - Aftertreatment DEF Dosing Absolute Pressure Sensor
  - Aftertreatment DEF Return Valve
- Aftertreatment DEF Dosing Valve
- Aftertreatment DEF Tank
- Aftertreatment DEF Tank Heater/Sender
- Aftertreatment DEF Tank Heater
- Aftertreatment DEF Tank Heater Valve
- Aftertreatment DEF Tank Temperature Sensor
- Aftertreatment DEF Level Sensor
- Aftertreatment DEF Heated Lines

19. Instrument Cluster (Repair of microprocessor , OBD MIL, Real Time Clock, Aftertreatment DEF Tank Gauge and, Aftertreatment DEF Tank Low Level Indicator)

20. Exhaust Gas Piping (from Turbocharger to Aftertreatment System)

21. Data Link Connector (DLC)

Engine Gaseous Emissions Control System Warranty

The emission warranty for the diesel particulate filter and SCR Systems covers defects in workmanship only. Normal maintenance, such as cleaning ash from the filter at regular maintenance intervals and cleaning the Aftertreatment fuel injector on Diesel Oxidation Catalyst (DOC) DPF systems, is not covered by the emission warranty. With the Thermal Regeneration DPF system, cleaning the ignition electrodes and fuel injection nozzle at the regular maintenance intervals is considered normal maintenance and not covered by the emission warranty.

Note: In response to customer requests, VOLVO Trucks North America, may build vehicles with engines supplied by other manufacturers. In these cases, each engine manufacturer through its service organization, is responsible for emission control systems warranty on all parts of the engine assembly, as furnished.

Noise Emissions

VOLVO Trucks North America warrants to the first person who purchases this vehicle for purposes other than resale and to each subsequent purchaser, that this vehicle as manufactured by VOLVO Trucks North America was designed, built and equipped to conform, at the time it left the control of VOLVO Trucks North America, with all applicable U.S. EPA Noise Control Regulations.

This warranty covers this vehicle as designed, built and equipped by VOLVO Trucks North America, and is not limited to any particular part, component or system of the vehicle manufactured by VOLVO Trucks North America Defects in design, assembly or in any part, component or system of the vehicle as manufactured by VOLVO Trucks North America, which, at the time it left the control of VOLVO Trucks North America caused noise emissions to exceed Federal standards, are covered by this warranty for the life of the vehicle.

Note: To track all maintenance to the Noise Control System utilize the “Noise Control Log”, page 163.

Noise Control System, Operator Inspection and Maintenance Requirements

A Noise Control System Maintenance Log is located in this manual. This log should be used to document all Noise Control System related maintenance, whether the maintenance results from a specific noise control system inspection, or a deficiency identified during another general maintenance event.

If additional log space is needed, further entries may be added on a separate sheet of paper. Store these additions with the main log to preserve a comprehensive record. It is recommended that copies of all noise emissions related maintenance invoices be retained.

The following Noise Control System inspection and maintenance instructions contain suggested maintenance intervals. These intervals may need adjustment in order to best accommodate the specific vehicle usage. The following instructions only concern Noise Emissions related items and do not address or modify any general vehicle maintenance requirements.

The following elements make up the Noise Control System:

- Noise Shielding and Insulation Devices
- Cooling System
- Exhaust System/DPF System
- Air Intake/Air Induction System
- Engine Control, EGR and Fuel Systems
- Selective Catalytic Reduction (SCR)

Crushing or Cutting Prevention

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and chock the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

WARNING

DO NOT work near the fan with the engine running or the ignition in the ON position. The engine fan can engage at any time without warning. Anyone near the fan when it turns on could be seriously injured.

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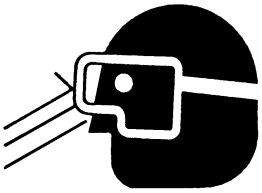
Never attempt adjustments or repairs while the engine is running, see your authorized VOLVO Truck dealer.

Inspect the fan blade assembly before service for cracks or loose mounting before starting the engine. *Never* stand alongside a rotating fan assembly, particularly at high fan speeds.

Wear protective glasses when striking objects to avoid injury to your eyes. Chips or other debris can fly off objects that are struck. Make sure no one can be injured by flying debris before striking any object.



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Component	Operation	Km (Miles)/Maximum Months/Hours
Coolant Filter (D11, D13 and D16)	Change	80 000 (50,000) or 6 months, whichever comes first
Coolant Filter, Extended Life (ELC) (D11, D13 and D16)	Change	240 000 (150,000) or 12 months, whichever comes first
Coolant Conditioner Euro 4	Change	Traditional coolants requiring Supplemental Coolant Additive (SCA) 80 000 (50,000) or 6 months
Valves/Injectors (D11 and D13)**	Initial Adjust	200 000 (125,000) or 12 months, whichever comes first
Valves/Injectors (D11 and D13) **	Adjust	400 000 (250,000) or 24 months, whichever comes first
Valves/Injectors (D16) **	Initial Adjust	100 000 (60,000) or 6 months, whichever comes first
Valves/Injectors (D16) **	Adjust	200 000 (125,000) or 12 months, whichever comes first
Drive Belts Pinnacle (Highway)	Change	500 000 (300,000) or 36 months, whichever comes first
Drive Belts VHD Euro 4 (Vocational)	Change	240 000 (150,000) or 12 months, whichever comes first
Accessory Drive Belt Pinnacle (Highway)	Change	500 000 (300,000) or 36 months, whichever comes first
Accessory Drive Belt VHD Euro 4 (Vocational)	Change	240 000 (150,000) or 12 months, whichever comes first
Aftertreatment Diesel Particulate Filter (DPF)	Clean	400 000 (250,000) or 4,500 hours, whichever comes first
Aftertreatment Diesel Exhaust Fluid (DEF) Pump Filter (D11, D13 and D16)	Change	First Change; 161 000 (100,000) or 3200 hours, or 3 years whichever comes first. After: 240 000 (150,000) or 4800 hours or three (3) years, whichever comes first
Aftertreatment Diesel Exhaust Fluid (DEF) Tank Filler Neck Filter Cleaning (D11, D13 and D16)	Clean	280 000 (175,000) or 12 months, whichever comes first

• Condition of brake drums. With brakes released, look for a noticeable gap between lining and drum. (This check cannot be made if dust covers are in place.) For additional information on the disc brake check refer to “Disc Brake Check”, page 121.

• Condition of brake hoses: check for any chafing.

• Check brake chamber mounting bolts and brackets.

• Check slack adjusters and chamber push rod travel. With brakes applied or released, look for conspicuously different positions of the slack adjusters for proper brake adjustment..

• Check spring brakes.

Step 12: Rear of Trailer Area

Lights and Reflectors

• Rear clearance, identification and tail lights clean, operating and proper color.

• Reflectors clean and proper color.

Cargo Securement

• Cargo properly blocked, braced, tied, chained, etc.

• Tailboard up and properly secured. End gates free from damage, properly secured in stake pockets.

• Canvas or tarp (if required) properly latched down to prevent water damage, tearing, billowing or blockage of either mirrors or tail lights.

• Rear doors securely closed, latched or locked; required security seals in place.

• Underside guard in place: not cracked, bent or broken.

Step 13: Left Rear Trailer Wheels Area

Dual Wheels, One or Two Axles

• Check condition of wheels and rims. Especially look for cracks, lock rings missing, bent or broken spacers, studs, missing clamps or lug nuts.

• Check condition of tires: properly inflated, no serious cuts, bulges, tread wear or any signs of misalignment; valve stems not touching wheels, rims or brake drums; valve caps in place and no objects stuck between the wheels.

• Check that both tires are of same type, for example, not mixed radial and bias type and that their circumferences are matched.

• Check wheel bearing and hub: no obvious leaking on outside or inside wheel.

Suspension

• Condition of springs (leaf or air), spring hangers, shackles and U-bolts.

Supplemental Fuel Enhancers

⚠	**CAUTION**
Supplemental additives are not recommended because of a high risk of injection system problems or engine damage.	

There are many aftermarket products available today which are intended to be added by the customer. They generally increase operating cost without providing benefits. Included are a variety of independently marketed products which claim to be:

- Cetane improvers
- Emission control additives
- Detergents
- Combustion improvers
- Smoke suppressants
- Cold weather flow improvers

Note: Repair expenses resulting from malfunctions in the fuel system or with engine components when fuel enhancers have been used are not covered under warranty.

Some fuel additives can be used to provide temporary relief, but they do not replace good fuel handling practices. These products can be used:

- Isopropyl Alcohol Use 1/2 liter per 450 liters (1 pint per 125 gallons) of fuel for winter freeze-up protection.
- Biocide For treatment of microbe growth or black slime. Follow manufacturers instruction for treatment.

Oil Additives

CAUTION

Extra oil additives must never be added to any engine oil used. Additives such as break-in oils, top oils, graphitizers, and friction reducing liquids are not necessary and may even harm the engine.

Using oils to the quality standards recommended in this manual makes the use of extra oil additives unnecessary, as these oils already contain a balanced treatment of additives.

Oil Consumption

Once the engine is stopped, check the oil level daily. If the engine has just been stopped and it is warm, wait approximately five minutes to allow the oil to drain back to the oil pan before checking. Add oil as necessary.

Note: DO NOT overfill engine with oil.

All diesel engines are designed to consume some oil, so it is normal to add oil periodically. An engine used in heavy-duty operation will consume more oil than one in normal operation.

To assist you in measuring your oil usage please refer to the Fuel and Oil Record on “Fuel and Oil Record”, page 166.

Diesel Exhaust Fluid (DEF)

Diesel Exhaust Fluid (DEF) is a reactant that's key to the SCR process. It's a nontoxic, aqueous solution of urea and water. Urea is a compound of nitrogen that turns to ammonia when heated. It is used in a variety of industries, perhaps most commonly as a fertilizer in agriculture. The fluid is not flammable, nor is it dangerous when handled normally. However, it is highly corrosive to metal, particularly copper and aluminium. Read the separate section concerning the handling of DEF solution. Only use approved DEF fluid.

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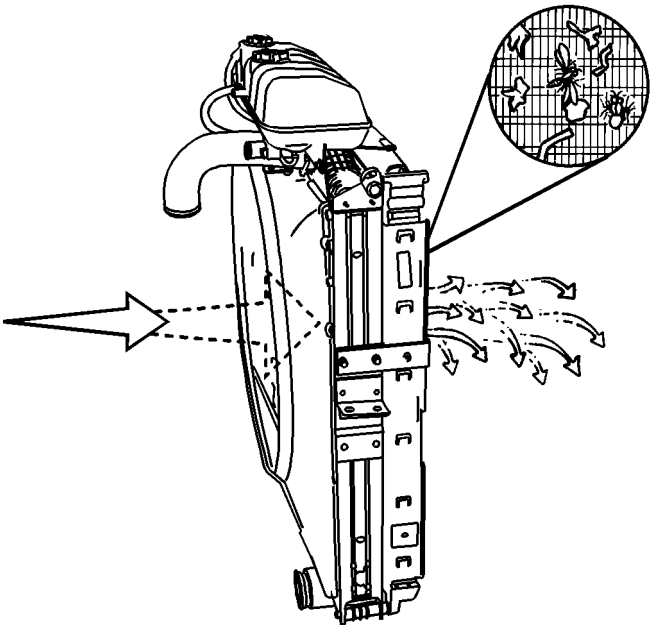


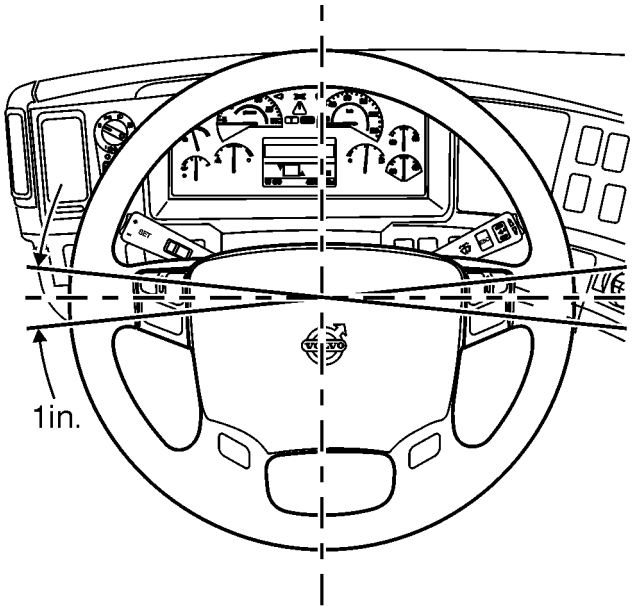
Cleaning Charge Air Cooler and Radiator
(typical radiator shown)

Inspect the charge air cooler for cracks at every inspection. DO NOT operate the vehicle with a damaged or broken charge air cooler. To do so would void the warranty and the engine will not meet emission regulation requirements.

Steering and Brakes Maintenance

Steering System

Excessive play in the steering system is checked by turning the steering wheel while the engine is stopped. With the front wheels pointing straight ahead, turn the steering wheel until the front wheel starts moving. Then, turn the steering wheel the other way until the front wheel moves. Play should not be more than 25 mm (1 in) at the rim of the steering wheel. If the steering play is excessive, check the steering linkage for looseness, wear, etc. Make necessary repairs before driving the vehicle.



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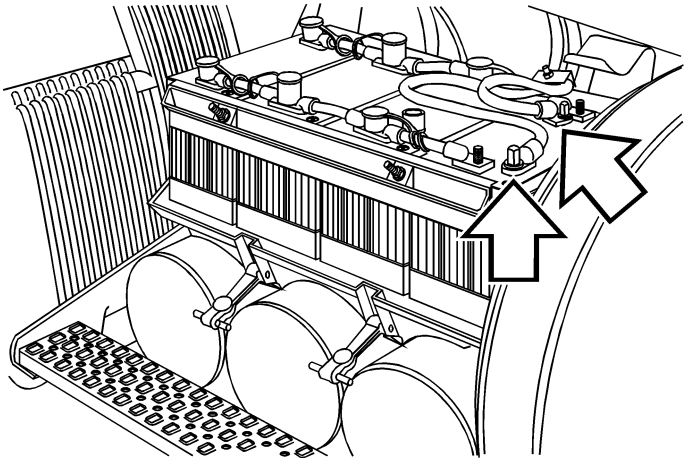

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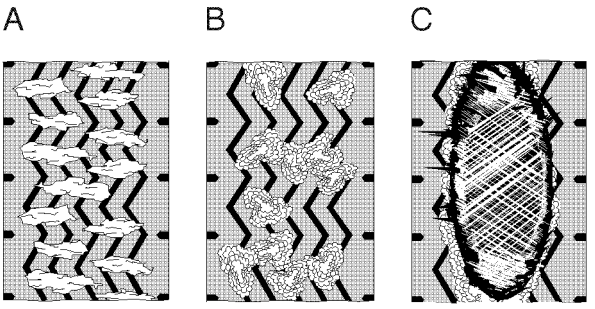
Battery Terminals

When disconnecting battery terminals, always disconnect the ground terminal first. When reconnecting, always connect the ground terminal last. Disconnecting battery cables may result in a loss of preset radio controls, radio programming and require refreshing.

Cuts in the Tire Tread

A. Cuts
B. Flaking cuts
C. Rubber flaking

Cuts are due to poor roads, air pressure too high or incorrect tire type.



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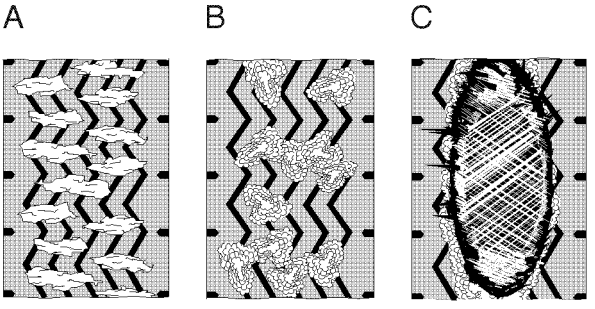
Cuts in the Tire Tread

A. Cuts
B. Flaking cuts
C. Rubber flaking

Cuts are due to poor roads, air pressure too high or incorrect tire type.



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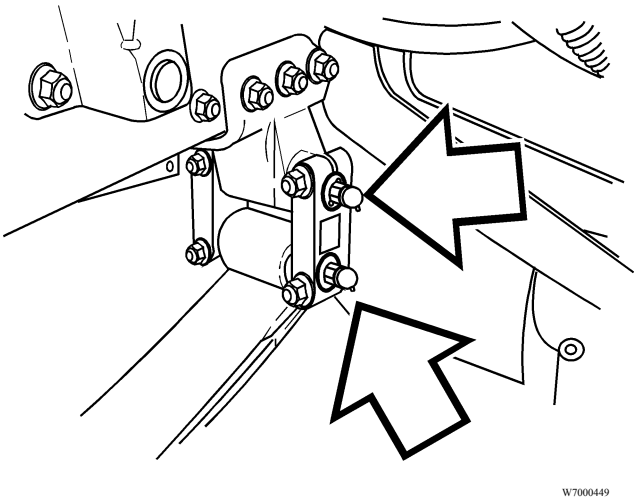
Spring Bushings

When lubricating the springs, lift the axle off of the floor, suspend the frame with axle stands and lower the axle. The spring bushings are now in the position where grease can be added to the contact surfaces. If the spring bushings are greased without taking the load off, high wear and lower lifetime will occur because grease is not able to reach the contact surfaces. If the vehicle is being driven in severe climates with a lot of wet, slushy, highly dusty roads, or in off-road service, increase the frequency of spring bushing lubrication.



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Grease Fittings

Rubber Bushings

Rubber bushings are used for extended service life. If your vehicle is equipped with rubber bushings DO NOT lubricate them. Replace the leaf spring if it is damaged or has premature or excessive wear.