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Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to December 2001.

The products are under continuous development. Vehicles and components produced after the above date may therefore have different specifications and repair methods. When this is believed to have a significant bearing on this manual, supplementary service bulletins will be issued to cover the changes.

The new edition of this manual will update the changes.

In service procedures where the title incorporates an operation number, this is a reference to an S.R.T. (Standard Repair Time).

Service procedures which do not include an operation number in the title are for general information and no reference is made to an S.R.T.

The following levels of observations, cautions and warnings are used in this Service Documentation:

Note: Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

Caution: Indicates an unsafe practice where damage to the product could occur.

Warning: Indicates an unsafe practice where personal injury or severe damage to the product could occur.

Danger: Indicates an unsafe practice where serious personal injury or death could occur.

Volvo Trucks North America, Inc.
Greensboro, NC USA

Order number: PV776-TSP151476

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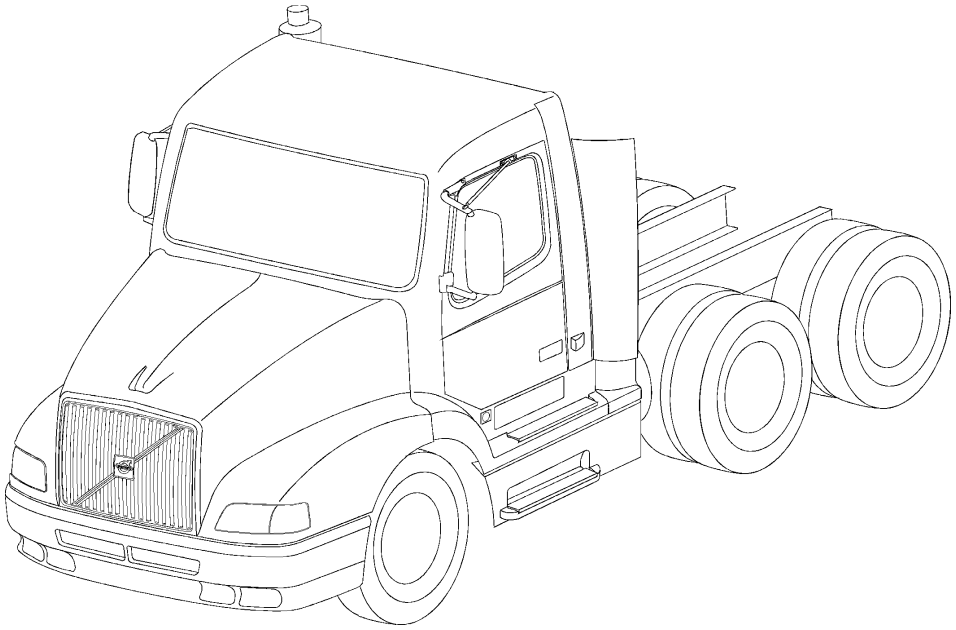
General

Preventive Maintenance, General



Introduction

This manual describes inspection and lubrication requirements during the Basic Service of Volvo VN/VHD vehicles. The purpose for doing the preventive maintenance is to ensure that the vehicle is safe and roadworthy over its full lifetime.

The driver is taking part in the continuous preventive maintenance program by completing the required Daily Pre-trip Inspection. This is a purely visual inspection that is designed to detect any obvious problems that would make the vehicle unsafe to take on the road. Added to the Pre-trip Inspection is the Preventive Maintenance Program that is typically carried out by trained personnel using a systematic approach to cover all important components of the new vehicle.

Preventive Maintenance is a planned vehicle maintenance program that provides an orderly series of servicing and inspecting procedures. A well applied maintenance program realizes the investment made in the vehicle. The difference between a poorly maintained vehicle and a well maintained vehicle will not show up until later mileage. Good maintenance is necessary to assure the designed life expectancy of the vehicle and its individual components.

Maintenance Coverage

There is no firm maintenance program that will apply to all operations. A basic maintenance program is not difficult to set up; to make the program the most effective takes time and effort, and is based around the needs and experiences of each individual operation. The program in this service manual covers all types of Volvo VN/VHD vehicles with medium to high mileage and sometimes high loads.

Use this established maintenance program as a base to tailor an individual maintenance program for customers that have requirements that are outside of the scope of this program.

To establish an individual program, look at information sources that are usually available, such as:

Driver’s repair or complaint reports.
Unusual parts usage.
Repetitive failures or problems found in inspection.
Unscheduled maintenance or repairs.
Road failures.

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Program Structure

This maintenance program has been based on the progress in vehicle technology and increases in oil quality to simplify the maintenance.

For simplified scheduling, the program has tied maintenance to logical time or mileage limits that make it easy to anticipate needed servicing. For the majority of on-highway operators, the 24,000 km (15,000 miles) or 4 months schedule can be used with little change.

It is important that the scheduled intervals are followed as limits. Maintenance can be done before either 24,000 km (15,000 miles) have been reached or before 4 months are up but must be made at or before either the mileage or the time limit has been reached.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175–001, and any appropriate vendor literature.

Advantages

A well-planned preventive maintenance program offers the following advantages:

- The lowest attainable maintenance cost.
- Maximum vehicle uptime.
- Better fuel economy.
- Reduced road failures; greater dependability.
- Increased customer confidence, better public relations.
- Less possibility of accidents due to defective equipment.
- Fewer driver complaints.

Regardless of the planning and the details of the maintenance program, the success of the program hinges on the caliber of workmanship in performing the actual inspection. A major cause of failure is a “pencil inspection;” that is, the mechanic checks off each operation as being OK without making the actual inspection. A “pencil inspection” defeats the purpose of the inspection, which is to detect an impending failure.

Maintenance Form

A Service Manual is issued detailing the current inspection forms. Forms are created for different users but all with the same references to this document. When the inspection point is carried out, check the box if the item is OK. If further work, such as adjustment, repair, etc., needs to be performed, record this information and go on with the next inspection point. Items noted as being faulty or in need of adjustment need to be shown to the customer and scheduled for repair.

There are many time — and/or mileage-based — service items that are not listed on the form. Look at the end of this document for a listing of additional components that may need to be serviced, depending on the mileage or time since last service.

Maintenance Records

It is important to use the inspection form together with other reports to come up with the best maintenance program for a specific application. Use driver’s reports, complaints, parts usage, repetitive failures, previous repair orders, road failures, etc. to build a maintenance history.

Records should be collected over the lifetime of the vehicle to form a permanent vehicle record file. The vehicle file should be used to customize the operational maintenance needs.

The “Driver Inspection Form” is also required by Federal law. The use of this inspection report makes the driver a part of the maintenance program and places direct responsibility on the driver to report problems that may come up during operation. When properly used, there should be no excuse for a defective vehicle being in service.

Basic Inspection

Note: The included Basic Service checklist is an original copy. The document can be updated without notice.

The Basic inspection is carried out at a maximum of 24,000 km (15,000 miles) or 4 months, whichever comes first.

All inspection points are to be carried out as verification of function or condition. Any defects are noted on the inspection form for later correction, if so ordered by the vehicle owner.

Note: The standard repair time for performing the Basic Service Preventive Maintenance is based on inspection and Oil and Filter Change, without repair or adjustment.

Annual Inspection

The Annual inspection is carried out yearly in addition to a Basic inspection. This inspection is designed to open up components for inspection or using test equipment to record performance.

The ideal time to carry out the Annual inspection is right before the hardest season, which means just before winter in the cold weather climates and just before summer in the hot weather climates.

For further information refer to “Annual Preventive Service Manual”, Publication Number 177–501.

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Other Inspection

There are additional service points that are carried out at specific mileage or time intervals. These are not part of the Preventive Maintenance Basic time. They should be scheduled as an adjustment or repair job carried out at the same time as the Preventive Maintenance, and are listed in this document as reminders only.

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Noise Emissions

Volvo Trucks North America, Inc. 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, Inc. was designed, built and equipped to conform, to all applicable U.S. EPA Noise Control Regulations, at the time it left the control of Volvo Trucks North America, Inc.

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

Tampering with Noise Control System

Federal law prohibits the following acts or the causing thereof:

(1) The removal or rendering inoperative by any person, other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use;

or

(2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

Noise Shields and Insulation

Removing or rendering inoperative the engine and/or transmission noise deadening panels, shields or insulating materials.

Removing or rendering inoperative the cab tunnel or hood noise insulating materials.

Removing or rendering inoperative any truck body mounted sound insulation components and/or shields (e.g., cab or fender shields, skirts, wheel housing splash shields, etc.).

Engine Control and Fuel Systems

Removing or rendering inoperative, or modifying the engine control system (such a the ECU or the fuel system components) in order to allow the engine to operate outside of the manufacturer's specifications (e.g., exceeding the manufacturer's engine speed limits).

Cooling System

Removing or rendering inoperative cooling system components (e.g., temperature-controlled fan clutch, fan shroud, fan ring, recirculation shields, etc.).

Exhaust System

Removing or rendering inoperative exhaust system components (e.g., muffler, pipes, clamps, etc.).

Air Intake System

Removing or rendering inoperative air intake/induction system components (e.g., filter, filter housing, ducts, etc.).

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Safety Advice

DANGER

Never operate a diesel engine in an area where hydrocarbon vapors (gasoline for example) are present or are suspected to be present. Hydrocarbon vapors can enter the air intake and make the engine overspeed, causing severe damage and/or explosion or fire. Serious personal injury or death can occur.

DANGER

Always chock the wheels before working under the vehicle to prevent it from rolling. Failure to do so can result in unexpected vehicle movement and serious personal injury or death could occur.

DANGER

When entering and exiting the cab, use caution. Always have a firm hand hold and/or stable foot position before transferring weight to that position. Do not carry anything when entering or exiting. Make sure the soles of your shoes and the cab steps are free from dirt, grease, oil or moisture before using the steps. Failure to do so can result in a fall, and serious personal injury or death may occur.

DANGER

If using a jack and/or jack stands, choose proper fault-free equipment. Failure to do so can result in equipment failures and personal injury or death may occur.

Note: During the Preventive Maintenance inspection, check the condition of warning labels on the vehicle. If a label is damaged or defaced to the point where the message cannot be read, note on the inspection form to have it replaced.

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Specifications

Engine

General

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” Publication Number 175–001, and any appropriate vendor literature.

In a modern diesel engine it is very important to have regular oil changes. The demands of pulling high loads, pulling at high elevations, extreme high or low temperatures and longer service intervals, make the choice of correct oil a hard task. The Volvo dealer, the engine manufacturer or the oil manufacturer has the expertise to analyze driving conditions and to recommend what oil gives the best protection and economy.

Oil

The engine oil has the task of lubricating, sealing, cooling and cleaning the engine. Filtering the intake air and using a low sulfur fuel helps the oil protect the engine parts. With better engine designs and improved oils, the service intervals have steadily increased. The interval choice depends on the engine manufacturer specifications. Make sure the correct oil type and also the correct viscosity are chosen for the mileage interval driven.

Periodic oil testing is recommended. The test results give a continuous picture of the health of the engine and can warn well in advance of a problem developing.

The intervals will not cover all applications. In on/off highway driving, severe off highway, continuous stop-and-go city driving and extremely high mileage, the oil change interval and preventive maintenance schedule need to be customized for the best protection and economy. The intervals listed in these specifications are guidelines that should be used in establishing a correct maintenance program.

CAUTION

Adding unknown additives may put the engine at risk of failure. There are many aftermarket oil additives that claim improved performance if added to the engine oil. Each oil type recommended already contains additives that have been tested by a collaboration with engine and oil manufacturers.

Synthetic oil is offered as an alternative to the traditional petroleum based oil for the engines. The ability of synthetic oil to protect the engine is better than regular oil but its life is the same as for regular oil. This is because of the combustion by-products that contaminate the oil. These contaminates will make the change intervals the same as for regular oil. However, in extreme driving conditions, a synthetic oil may be the only choice for the application.

Note: It is not recommended to mix synthetic oils with petroleum-based oils.

Coolant

The engine coolant protects the cooling system from freezing or boil over problems. It also protects against corrosion and cylinder liner pitting. Coolant requirements are based on the additive levels present in the cooling system. To be able to run the cooling system as long as 2 years between coolant changes, there must be a replenishment of additives as they are used up. Testing should be done regularly to be sure the additive levels are within recommended levels.

Never run the engine with only water in the cooling system. Always use a mixture of clean water and a recommended antifreeze. The mixture should never be less than 40% antifreeze and 60% clean water or more than 60% antifreeze and 40% clean water.

Note: For further information on Long life coolant refer to Service Bulletin 260–002, “Texaco Extended Life Coolant.”

CAUTION

Long life coolant is colored red for identification purposes, so as not to mistake it for conventional, green coolant. Long life coolant will test as out of additives (SCA), but SCA should not be added.

Fuel

The sulfur content in low-sulfur fuel has been regulated to a maximum of 0.05% per weight for No.2–D diesel fuel. For fuels that have a sulfur content of 0.5% by weight and above, most engine manufacturers are requiring that oil is changed at shorter intervals. Sulfur creates highly acidic pollutants in the oil that break down the additives at a higher rate. If fuel with a higher sulfur content is used, the engine manufacturers recommend that the oil change intervals be reduced.

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VOLVO ENGINES

Note: It is not recommended to mix synthetic oils with petroleum based oils.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Maximum change intervals are 40,000 km (25,000 miles) if using oil that meets the Volvo Drain Specification (VDS). If the oil does not meet the requirements according to VDS, change intervals should be 24,000 km (15,000 miles). Contact Volvo or a Volvo authorized dealer to obtain a list of approved VDS oils.

Shorter oil change intervals maybe required if the engine is operating in a dusty environment or if frequent stops and starts are made (see oil change interval below).

Supplemental coolant additives are recommended for all Volvo cooling systems. Antifreeze alone does not provide sufficient corrosion protection for heavy duty diesel engines.

If the fuel has a sulfur content exceeding 0.5% by weight, halve the indicated maximum mileage intervals.

Oil filters should always be changed when changing oil.

CUMMINS ENGINES

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

If engine is operating in ambient temperatures consistently below - 20 °C (0 °F) or above 40 °C (100 °F), perform maintenance at shorter intervals. Shorter intervals are also required if the engine is operating in a dusty environment or if frequent stops and starts are made.

Oil filters should always be changed when changing oil.

Supplemental coolant additives are recommended for all Cummins cooling systems. Antifreeze alone does not provide sufficient corrosion protection for heavy duty diesel engines.

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DETROIT DIESEL ENGINES

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

The use of fuels with a sulfur content above 0.5% by weight will require more frequent oil changes. Refer to Detroit Diesel Publications for details. More frequent oil changes are also required if the engine is operating in a dusty environment or if frequent stops and starts are made (see oil change interval below).

Oil filters should always be changed when changing oil.

Supplemental coolant additives are recommended for all Detroit Diesel cooling systems. Antifreeze alone does not provide sufficient corrosion protection for heavy duty diesel engines.

Note: The Detroit Diesel Engine is installed in earlier VN vehicles (from 1996–2000) only.

CATERPILLAR ENGINES

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Caterpillar does NOT recommend an automatic extension of oil drain intervals with high quality oil, low sulfur fuel and non-severe duty driving. Oil drain intervals can only be extended with an oil analysis program containing the following elements: oil condition and wear metals, trend analysis, fuel consumption and oil consumption.

In areas where fuel sulfur content exceeds 1.5%, choose an oil with a total base number that is within the API CF-4 or CG-4 categories and shorten the oil change period based on oil analysis.

Shorter oil change intervals are required if the engine is operating in a dusty environment or if frequent stops and starts are made (see oil change interval below).

Oil filters should always be changed when changing oil.

Supplemental coolant additives are recommended for all Caterpillar cooling systems. Antifreeze alone does not provide sufficient corrosion protection for heavy duty diesel engines.

Note: Caterpillar Engines were installed in later model VN vehicles (from 1996–1999) only.

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Transmission

Includes Volvo, Eaton Fuller, Meritor, and Allison HD Transmissions

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

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Rear Axle

Includes Volvo, Arvin Meritor, and Eaton Dana Rear Axles

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

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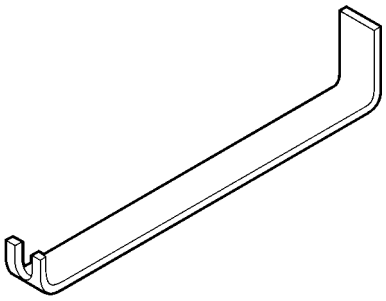
Tools

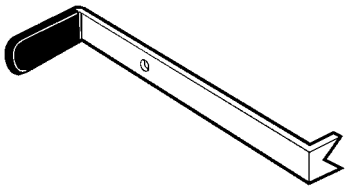
Special Tools and Special Equipment

The following special tools are recommended for use in the preventive maintenance inspection. Special tools can be ordered through Volvo Special Tools program in the parts ordering system or already from Kent-Moore by calling (800) 328–6657. (Kent-Moore tools are preceded by a J.) Please refer to the specific tool number when ordering.

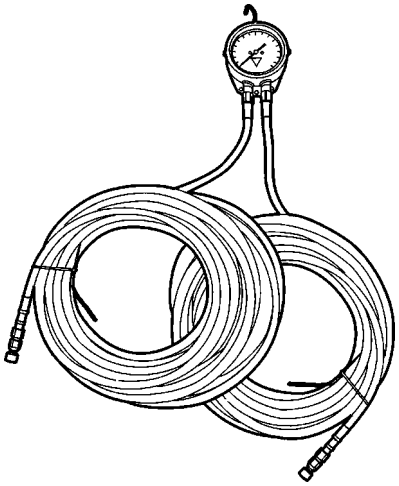
Special Tools



J-42942
ABS Sensor Adjustment Tool
(Kent-Moore)

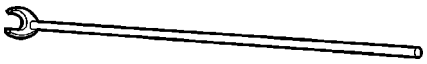


J-42189
Airline Release Tool
(Kent-Moore)

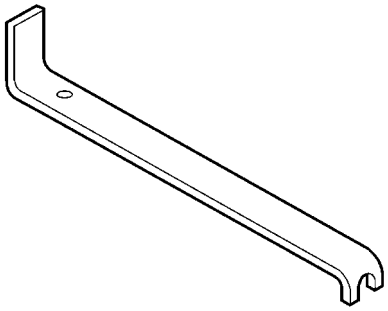


J-44399
Air System Tester

J-44773
Airline Release Tool



J-44769
Wheel Speed Sensor Extractor



J-44966
Wheel Speed Sensor Remover for Heavy Duty Steer Axle and Aluminum Hub

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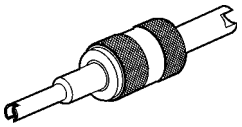
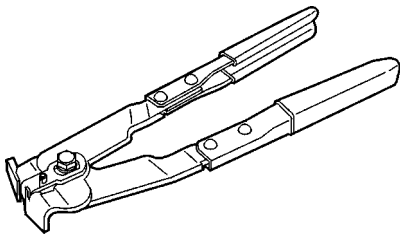
Special Tools (Continued)

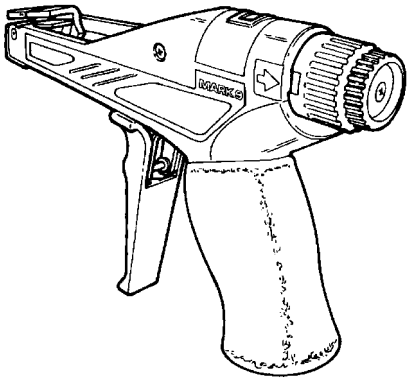


J-44302
A/C Schrader Valve Core Removal Tool

J-443338
Oil Dipstick for A/C Compressor

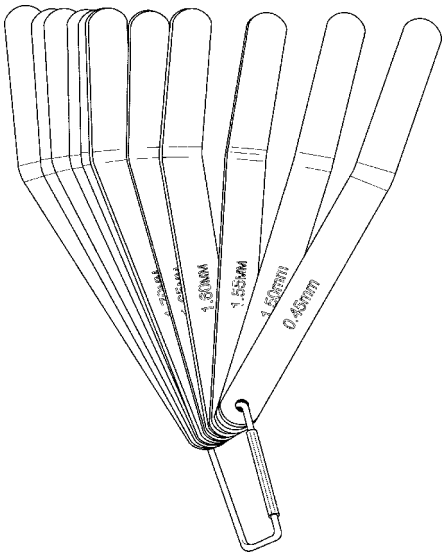


J-22610
Drive Shaft Boot Camp Pliers

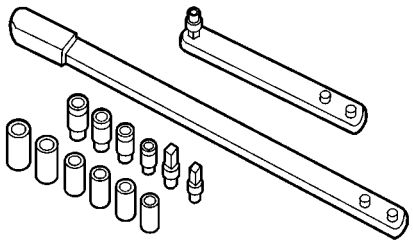


J-43143

J-43143
Tie Strap Tensioner



J-41610
Feeler Gauge Set



J-44392
Fan Belt Tensioner Tool

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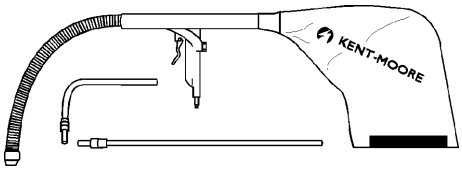
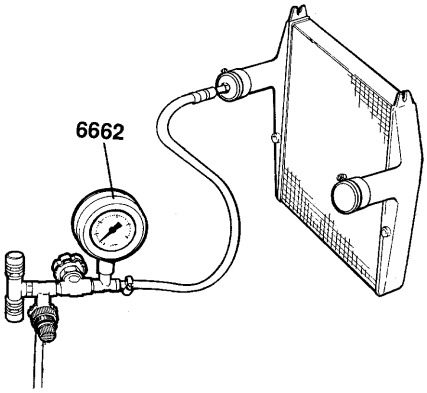
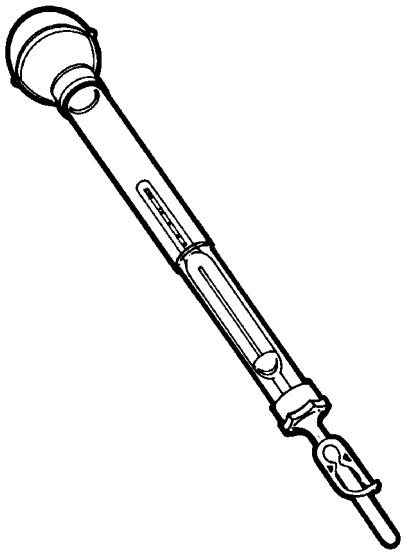
Special Tools (Continued)



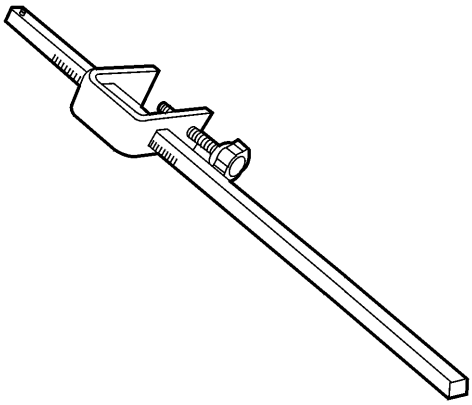
PT 5900
Chip Vacuum



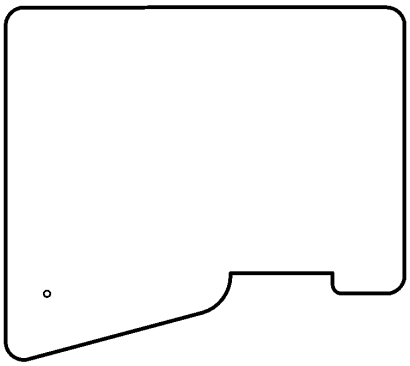
9998142
Charge Air Cooler Pressure Tester



J-38641-B
Diesel Fuel Hydrometer



J-44544
Ride Height Gauge



000700
Rim Flange Wear Gauge

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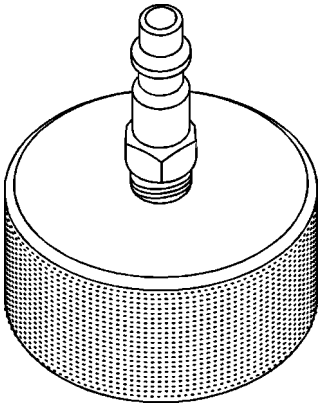
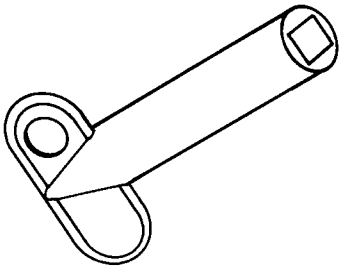
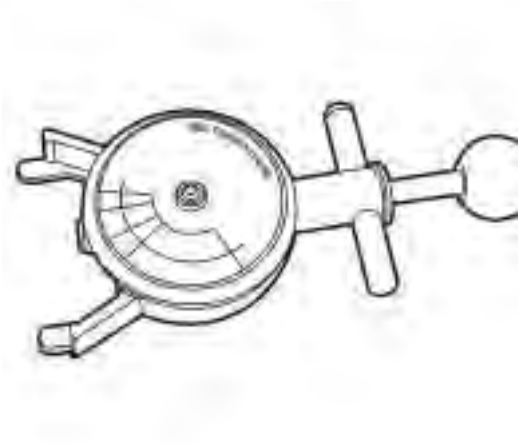
Other Special Equipment



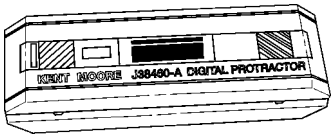
J-42397-A
Coolant Pressure Test Adapter



1089953
Bulb Removal Tool

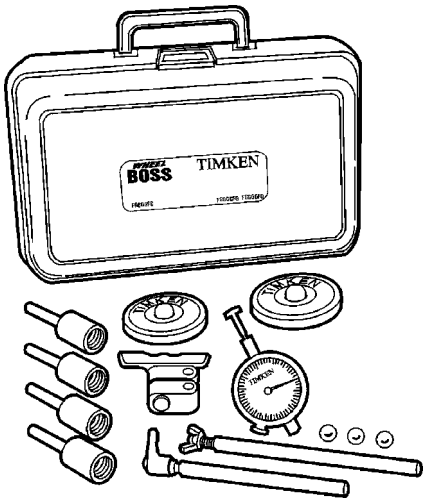


J-23600-B
Belt Tension Gauge

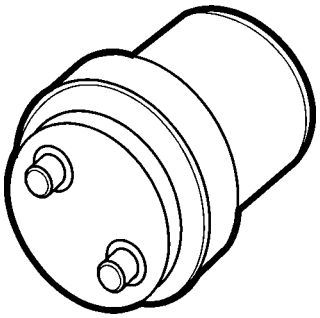


J-38460-A Digital Inclinometer

J-36795
Tandem Axle Calipers



3093472
Timken Wheel End Play Gauge



9996791
Spring Pin Socket

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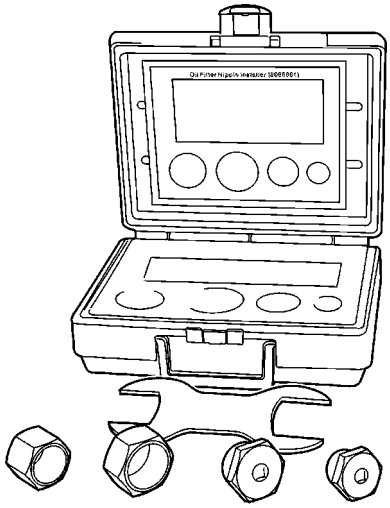
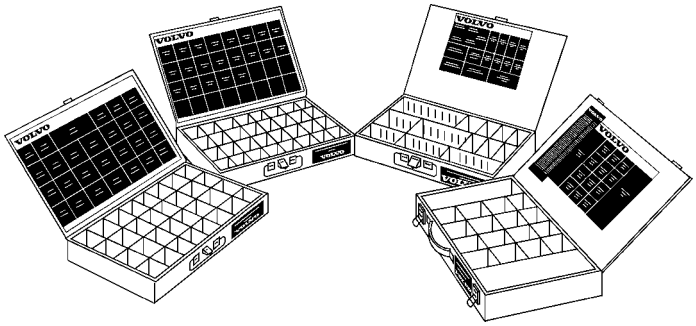
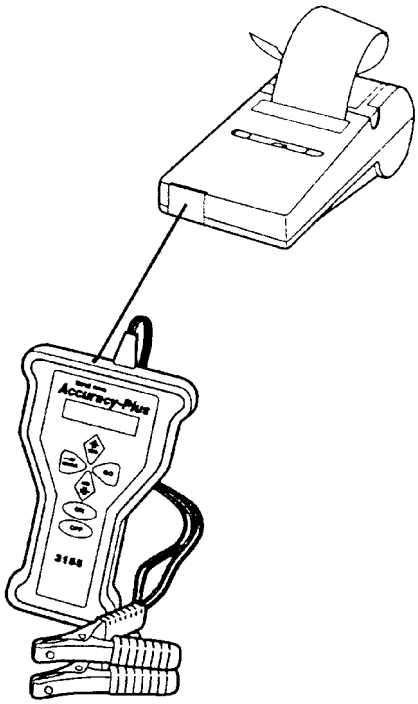
Other Special Equipment (Continued)



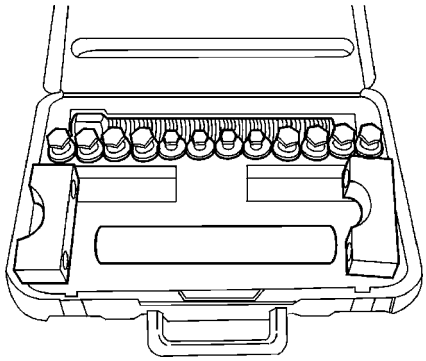
9998691
Oil Filter Nipple Installer Kit



3947553, 3949521, 3946522, 3949523
Terminal and Shim Kits



J-44701
Battery Tester Kit



J-44778, J-44779
Driveshaft U-Joint and Yoke Kits

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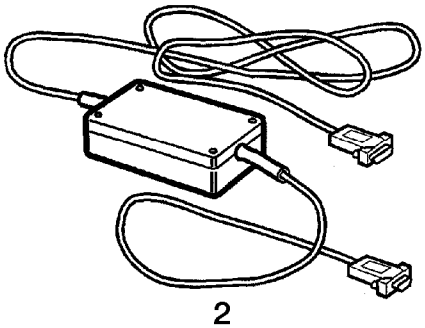
VCADS Pro Tools

The following hardware is used to operate VCADS Pro. The tools can be ordered from Volvo Trucks North America; please refer to the specific tool number when ordering.

1



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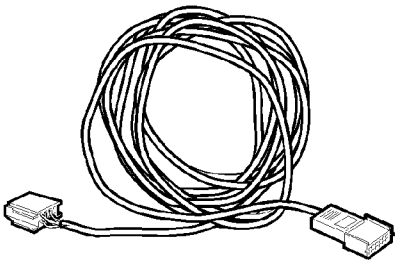

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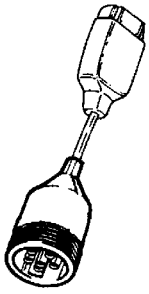

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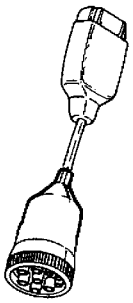

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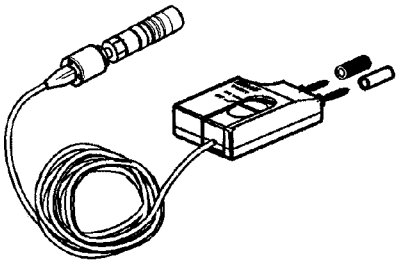

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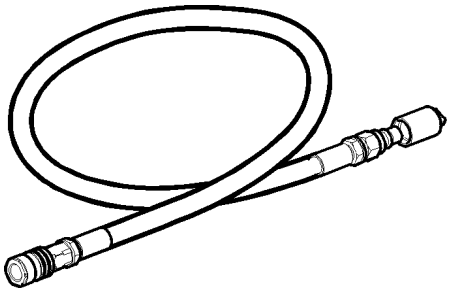

7

1 PC tool-package

2 9998555, Communication interface unit

3 9812331, Extension cable

4 J-43999, 6 pin Diagnostic adapter (for VN vehicles prior to 1999)

5 J-43939, 9 pin Diagnostic adapter (for VN vehicles built from January 1999)

6 9998496, Pressure gauge

7 9998495, Air Pressure Hose

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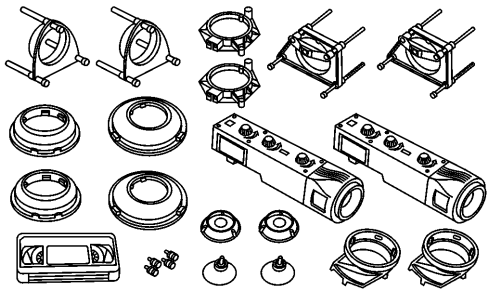
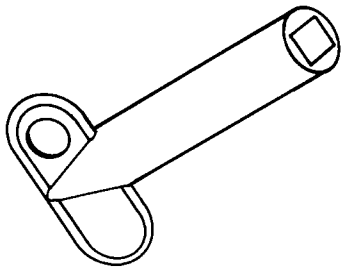
Lighting System, Special Tools

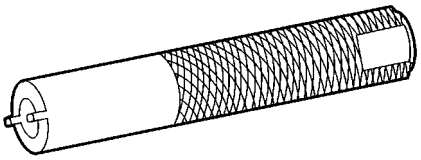
The tools listed below are used to complete maintenance on the Lighting System for Volvo Trucks. They may be obtained from Volvo or, where indicated, from Kent Moore at (800) 328-6657.



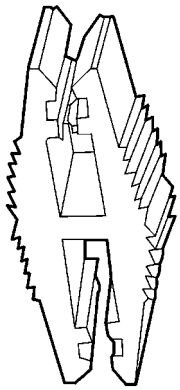
J-25300-D
Headlight Aiming Kit (Kent Moore)



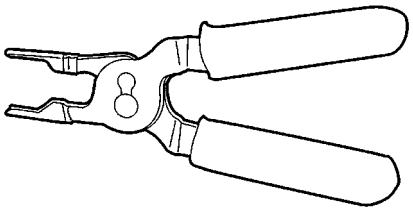
1089953
Lamp Removal Tool (Volvo)



J-42395
Rheostat Removal Tool (Kent Moore)



20378326
Fuse Puller Tool (Volvo)



J-43244
Relay Puller Tool (Kent Moore)

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Preventive Maintenance Inspection Bay

Location

Preventive Maintenance is logically carried out at the same time as lubrication of the vehicle. It is then natural to use a bay with a grease pit to be assigned and equipped for Preventive Maintenance. If a pit is not available, a regular workshop bay can be used, with jacks added to the necessary equipment.

The bay needs to be well lit so inspection can be done without having to use a flashlight (unless inspecting in the frame).

Equipment

Inspection bay equipment should be specifically assigned to that bay and not be shared with the rest of the shop. The floor equipment should have floor space for storage in between using them and tools should be hung on boards or stored in a cabinet for easy overview and access.

Install mirrors in four corners of the bay so one person can do a lighting function check without having to leave the cab or rely on a spotter. Mirrors do not need to be larger than truck door mirrors. Any type of equipment that allows inspection by one person instead of having to use a helper, makes inspection easier and faster.

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Design and Function

Clutch

General

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Hydraulic fluid in the clutch system collects moisture from the air and will eventually hold enough moisture to affect the metal surfaces in the system unless removed. Replace the fluid at the recommended intervals or more frequently.

The clutch pedal play (1) is given by the clearance between the plunger and the piston (1a) in the master cylinder. Thus the pedal will always have a play, regardless of the clutch adjustment. The correct play is adjusted with the upper adjusting screw (1b) in the pedal carrier.

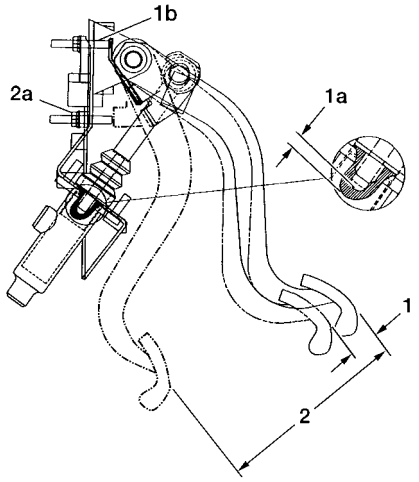

Fig. 1: Clutch

Volvo Clutch Slave Cylinder

Slave cylinder stroke (**A**) is 29 ± 1 mm (1.14 ± 0.04 in.). The clutch pedal throw (2 - Figure 1) gives the stroke. The lower adjusting screw (2a) limits the pedal throw and thereby the clutch slave cylinder stroke.

Distance B should never be exceeded. The distance is adjusted by removing the fork from the lever and reposition lever on the cross shaft.

Distance C is set when the clutch is new. During wear of clutch, the distance will decrease. Readjustment should not be needed before it is time to reface the clutch disc.

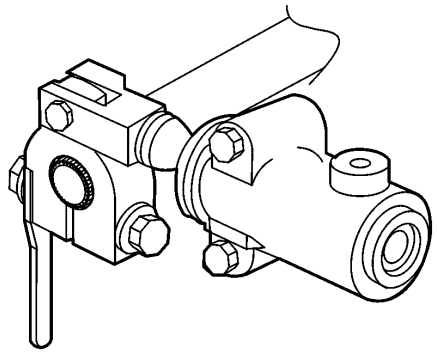

Fig. 2: Volvo Clutch Slave Cylinder

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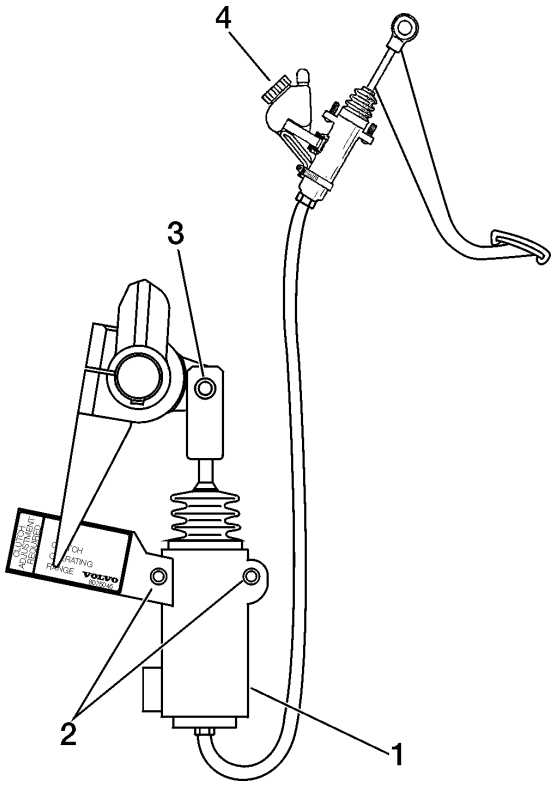
Other Clutch Slave Cylinder

A slave cylinder for any non-Volvo clutch has a wear indicator. When the indicator is out of the operating range, it is time to adjust the clutch.

To get the slave cylinder throw into the accepted range, adjust the clutch plate until the indicator is in the operating range again.



1 Slave Cylinder

2 Mounting Bolts

3 Clutch Clevis Pin

4 Clutch Master Cylinder and Reservoir (Found on the Bulkhead in the Engine Coupling)

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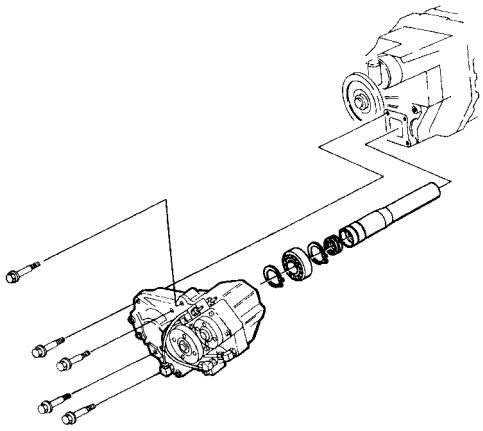
Power Take-off

Volvo PTO

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Volvo PTO’s mount directly to the transmission and do not need separate oil fill and check. Make sure there is extra oil filled in the transmission for the PTO volume.



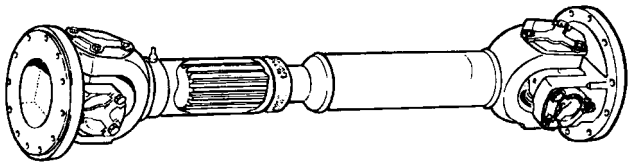
CAUTION

Transmission oil heat exchanger should be installed when using PTO continuously over 15 minutes at a time or with a continuous power output over 55 kW (75 hp). Without heat exchanger, the oil can overheat and transmission damage may follow.

If the application has a remotely installed pump or blower with a driveshaft connection, the driveshaft U-joints need to be greased at every maintenance interval or more often, depending on usage. Use a lithium based grease with EP additives and of the consistency of NLGI No. 2.

Driveshaft

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.



Use a lithium-based grease with EP additives with a consistency of NLGI No. 2. Do not use conventional chassis grease.

The driveshaft U-joints must be lubricated correctly for the bearings to receive grease. The most common case of U-joint failure is incorrect greasing. Always make sure that grease is coming out of all four seals. If one seal fails to purge old grease, move the driveshaft from side to side while applying gun pressure. This allows for greater clearance on the thrust end of the bearing that is not purging. New grease flushes abrasive contaminants from each bearing and assures that the bearing is filled properly.

DANGER

Failure to correctly grease the driveshaft U-joints or slip-joints can lead to component failure which can result in separation of the driveshaft from the vehicle. A separated driveshaft can result in major component damage and loss of vehicle control, and can cause serious personal injury or death.

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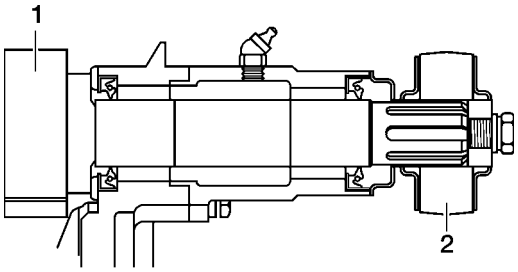
Brakes

Brake Cams and Slack Adjusters

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Lubricate the brake cam bushings using a lithium based grease with EP additives and consistency NLGI No. 2. Fill grease until old grease has been pushed out past the seal and new grease can be seen flowing.

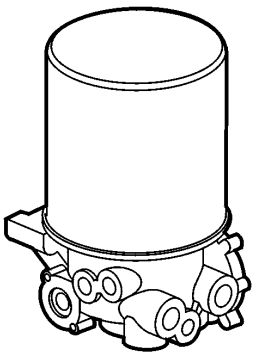
Lubricate the slack adjusters using a lithium based grease with EP additives and consistency NLGI No. 2. Fill grease until old grease has been pushed out past the splined shaft area, and adjustment pawl and new grease can be seen flowing.



Air Dryers

Air dryers have internal maintenance systems that clean out the accumulated moisture frequently and can therefore work with long maintenance intervals. Eventually the drying medium will be filled up and the cartridge will need to be changed. Change cartridge when there is more water being drained in the daily emptying of the tank than usual. This is a progressive development and the time interval will be different from application to application.

Dryer manufacturers recommend changing cartridge every 2 to 3 years but intervals need to be adjusted for application. The only dryer with regular maintenance is the Midland, where the coalescent filter needs changing every year.



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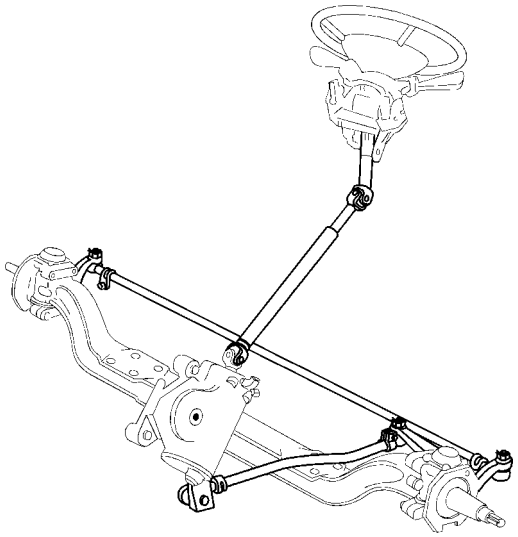
Steering System

Steering Linkage and Knuckles



For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Lubricate the Steering shaft and drag link.

Lubricated the tie rod.

TRW steering gears have a seal at the sector shaft that needs greasing **with a hand gun** every 4 months or more often if the weather and road conditions are severe.

Sheppard steering gears have seals at input shaft and at the sector shaft that need greasing **with a hand gun** every 4 months or more often if the weather and road conditions are severe.

No axial movement is allowable when 100 lbs. of hand pressure is applied. Use hand pressure only, do not check using pliers, wrenches or any other tools.

For all VHD Axle Back models, the steering shaft U-joints should be inspected to see that the plastic caps are intact. Complete this inspection every 4 months. A shorter inspection period interval may be required if the vehicle is operated under severe driving conditions.

For VHD Axle Forward models, grease the steering shaft U-joints every 4 months. A shorter maintenance interval may be required if the vehicle is operated under severe driving conditions.

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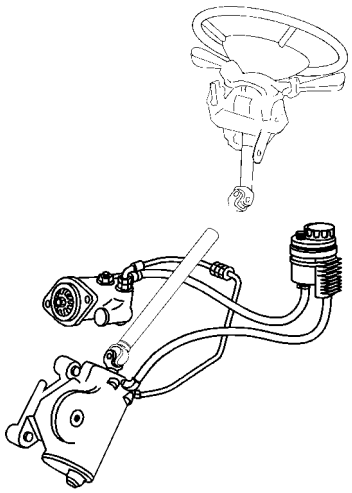
Steering System

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

A darkened fluid indicates a steering system that is running hotter than normal and the fluid is overheated. Troubleshoot the reason for overheating and change fluid.

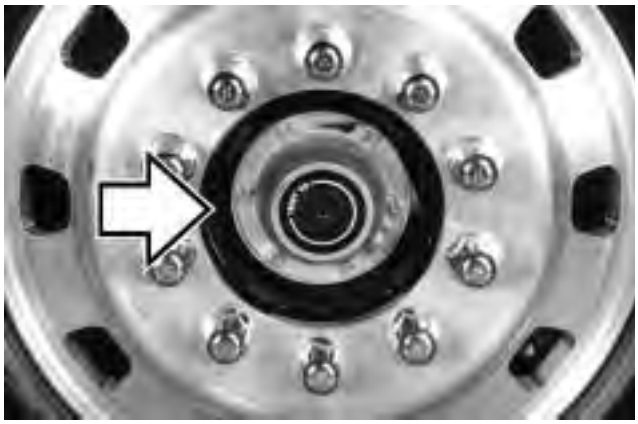


Hubs

Oil Lubricated Hubs

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components,” publication number 175–001, and appropriate vendor literature.

Hubs are generally oil lubricated and should be lubricated during maintenance. Change oil when the hub is removed for repairs.



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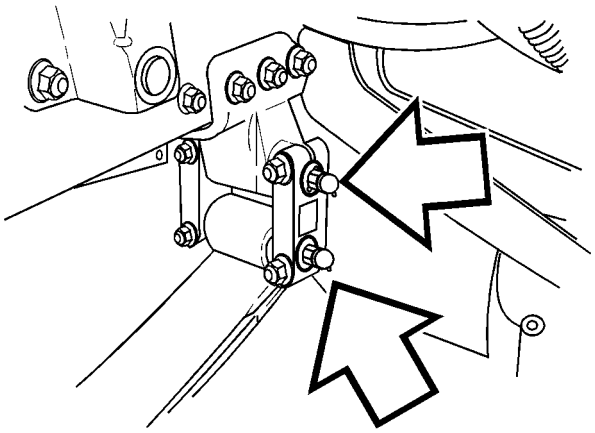
Chassis

Springs and Suspension

Note: For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Lubricate spring pins using a lithium based grease with EP additives and the consistency of NLG1 No.2. Fill grease until old grease has been pushed out past the seal on both sides and new grease can be seen flowing. If grease is not flowing through, use a prybar to lever down the spring ends to open up for the grease to flow. To perform this procedure the axle must be free hanging. Refer to the proper Service Publication in Function Group 7.

Wear tolerance for the spring pin and bushing is 5 mm (3/16 in.).



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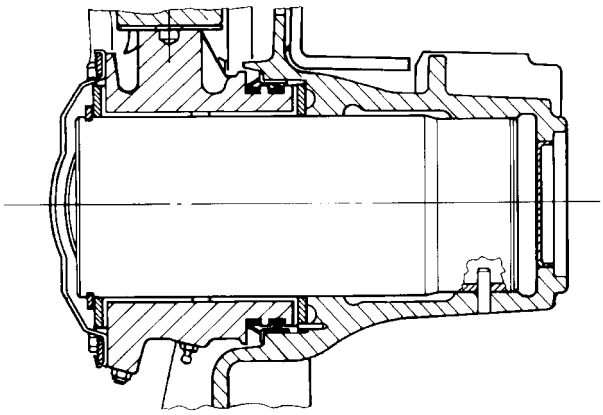
T-Ride Equalizer Beam

Note: For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

In regular over-the-road operations the T-Ride should follow the normal lubrication schedule.

It is extremely important that the equalizer beam is well lubricated in any off-road or on/off-road operation. If there are other severe duty constraints, for example driving in water, lubricate more frequently, up to once per day, if necessary.

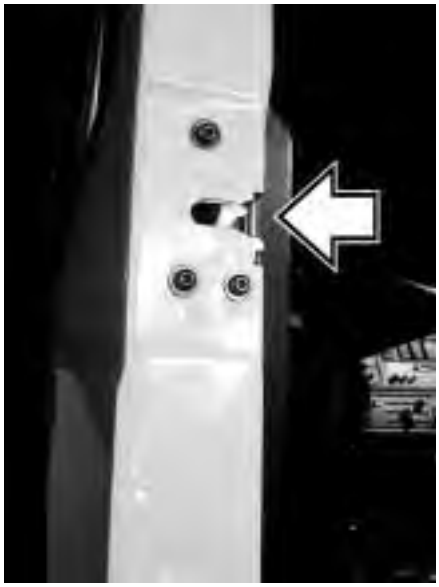
Note: For further information on the T-Ride Equalizer Beam, Function Group 7, “Rear Suspension, T-Ride”.



Cab

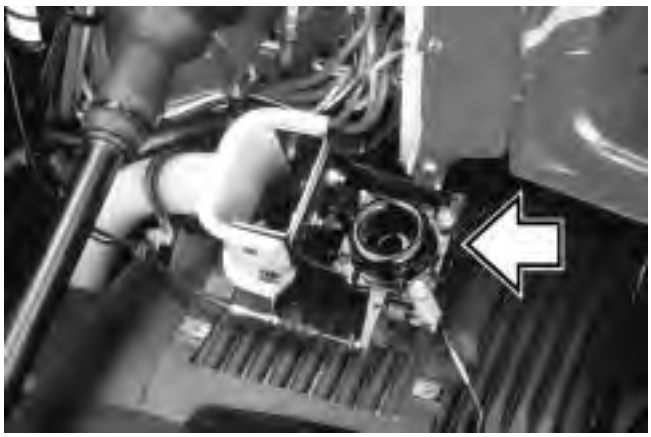
Doors

Door lock mechanism should be greased once per year using white lithium grease. Coat the door stop arm with grease every year.



Hood

Hood lock lever is coated with teflon and should not need any conventional lubrication. If the lever is working hard or binds, try cleaning first. Clean and lubricate scissor latch at the base of the cone receptacle with white lithium grease.



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Preventive Maintenance

Basic Service

Including Lubrication and Oil Change

Date:	Model:	Reg. No.:
Time:	Vehicle Identification Number:	Engine:
	Dealer Code:	Transmission
	Name:	Rear Axle:

X = Corrected without comment √ = Correction not needed N = Not relevant or applicable

	Lubrication, Oil and Fluid Level Check	
1	Chassis Lubrication	
2	Cab Lubrication	
3	Change Engine Oil and Filters	
4	Check Oil Level in Manual Transmission	
5	Check Oil Level in Automatic Transmission	
6	Check Oil Level in PTO (Power Take-Off)	
7	Check Oil Level in Retarder	
8	Check Oil Level in Transfer Case	
9	Check Oil Level in Front Drive Axle	
10	Check Oil Level in Rear Drive Axle	
11	Check Oil Level in Hydraulic Axle Lift	
12	Check Oil Level in Power Steering	
13	Check Oil Level in Hubs for Oil Lubricated Wheel Bearings	
14	Check Oil Level in Cab Tilt Pump (If equipped)	
15	Check Fluid Level in Clutch Fluid Reservoir	
16	Check Coolant Freeze Protection and Coolant Level (Check SCA Level)	
17	Check Fluid Levels in Windshield Wiper and Headlamp Wiper Reservoirs	
18	Check Air Dryer	

	Cab Checks	
19	Check Warning and Control Lamps	
20	Check for Fault Codes in the Vehicle Electronic Control Unit	

	Cab Checks	
21	Check for Fault Codes in the Engine Electronic Control Unit	
22	Check for Fault Codes in the ABS, anti-lock brakes	
23	Check for Fault Codes in Transmission	
24	Function Check of Parking Heater	
25	Check Retarder Control	
26	Check Sealing on Main Brake Circuit (Service)	
27	Check Gear Shift and Clutch Pedal	

	External Checks	
28	Function Check of External Lamps	
29	Check Mirrors and Reflectors	
30	Function Check of Wipers and Washers	
31	Check Battery Mounting, Connections and Fluid Levels	
32	Check Fuel Tank, Hoses, Pipes, and Mounting Straps	
33	Check Fuel Tank Ventilation Filter	
34	Check Water Seperator for Fuel System	
35	Check Tire Wear	

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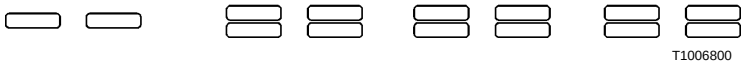
	Engine Compartment Checks	
36	Check Alternator Mounting and Electrical Connections	
37	Check Drive Belts	
38	Check Radiator Fan, Fan Shroud and Fan Ring with Rubber Seal	
39	Check Radiator, Hoses and Pipes	
40	Check Engine and Engine Driven Power Take-Off for Leaks	
41	Check Fuel Pipes and Lines	
42	Check for Exhaust Leakage	
43	Check Intercooler Pipes and Hoses	
44	Check A/C Compressor Mounting	
45	Check A/C Hoses, Fittings, Switches, and Wires	

	Front Suspension, Steering System Checks	
46	Check Gaiters/Plastic Covers and clearance for Ball Joints	
47	Check Servo Pump and Steering Gear	
48	Check Steering Shaft Joint, Hoses and Pipes for Power Steering	

	Checks Beneath the Vehicle	
49	Check Sealing on Front and Drive Axle	
50	Check Slack in Mechanical Linkage for Clutch	
51	Check Gearbox, Transfer Case, and Power Take-Off for Leakage	

	Checks Beneath the Vehicle	
52	Check the Oil Cooler and Transmission for Leakage	
53	Check Retarder for Leakage	
54	Check Drive Shaft, Universal Joints, Sliding Joints and Support Bearings	
55	Check Sealing of Rear Axle and Hub Reduction Gear	
56	Check Bearing Clearance in Pinion and Rear Axle Input Shaft	
57	Check Exhaust Pipe, Silencer, or Particulate Filter	
58	Check Springs and U-Bolts	
59	Check Central Lubrication System	
60	Check Suspension and Air Springs	
61	Check Rear Wheel Bearing Clearance	
62	Check Front Wheel Bearing Clearance	
63	Check Brake Linings	
64	Check Brake Cylinders, Levers and Forks	
65	Check Brake Disc and Calipers	
66	Check Braker Levers, Slack Adjusters, and Brake Drums	

	Test Driving	
67	Check After Start	
68	Check During Test Driving	
69	Check After Test Driving	
70	Finish	

Note: The values seen from cab and backwards are noted in the squares below											
Brake Linings - measured thickness in mm (in.)	Right										
	Left										
Braker Lever, Slack Adjuster, Brake Drums - measured stroke in mm (in.)	Right										
	Left										
Notes on wear pattern on tires	Right										
	Left										

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Comments

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Reception

W1000068

When the customer drops off the vehicle, the service reception starts the paperwork and prepares the forms needed for the preventive maintenance. Ask the customer about problems that have been noticed while driving the vehicle. Ask questions that will make the job easier for the technician to find problem sources:

— Irregular tire wear?

— Unusual noise?

— Unusual vibration?

— Leaks?

— Other operation problems?

As the vehicle is approached, check for signs of leakage, general appearance, body damage, etc. Walk around the vehicle. Note on the PM inspection form if any leaks or problems are found.

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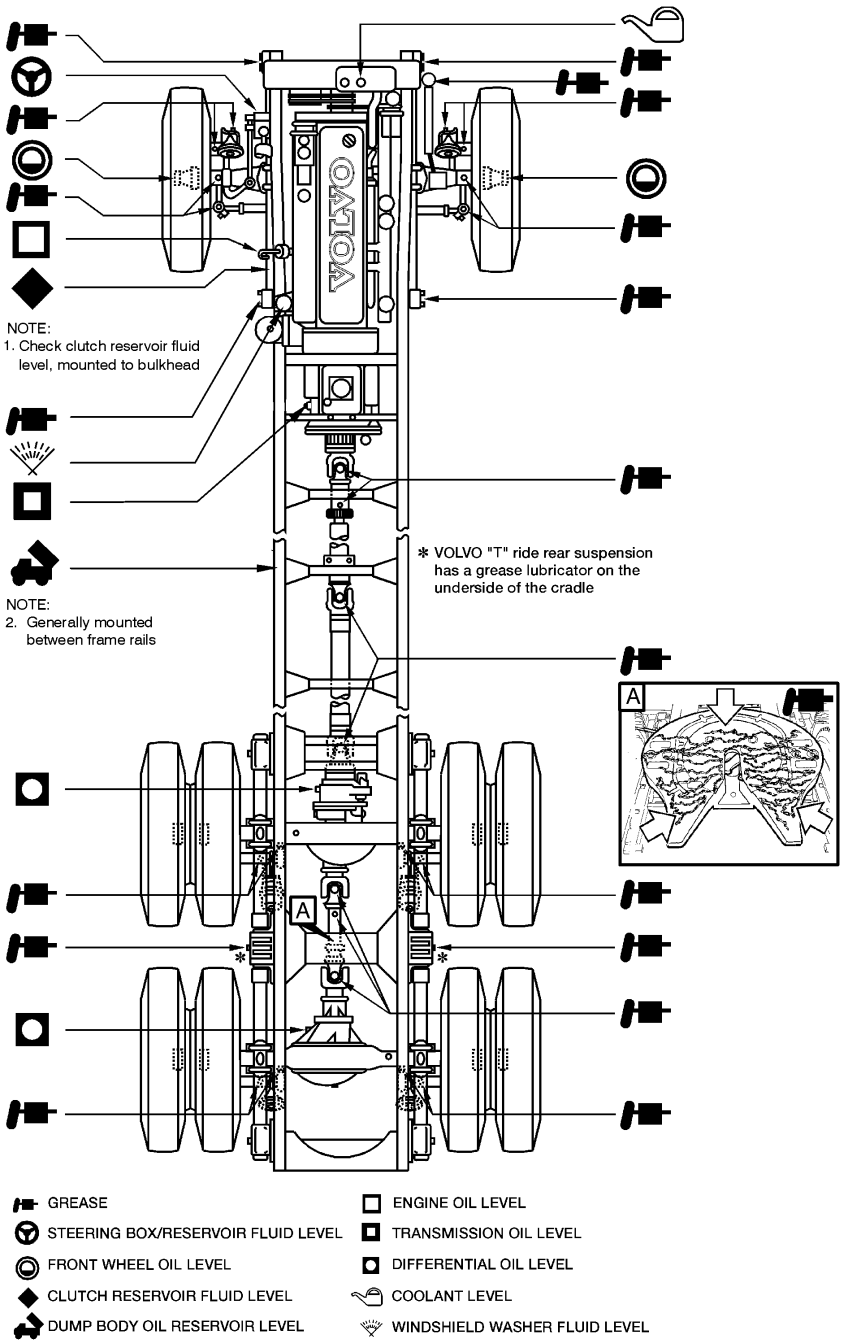
Lubrication

Make sure that grease fittings are cleaned off before filling grease. Dirt on the fitting that is not cleaned off is pushed into the part with the new grease. Always fill grease to the point where old grease and contaminants are forced out from the part and only new grease comes out. If grease cannot be filled so old grease is forced out or if new grease exits without pushing old grease out, note this on the form for repair. If a fitting does not accept lubrication due to damage or internal stoppage, replace with a new fitting.

Do not heat the part for better grease application where rubber or plastic parts are involved.

Remove excess grease from fittings, spring shackles and other surfaces.



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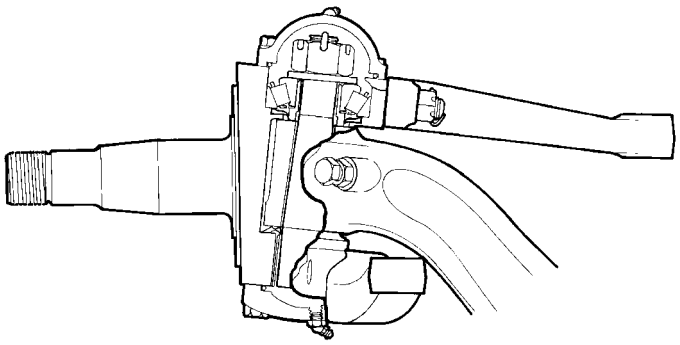


1	Chassis Lubrication

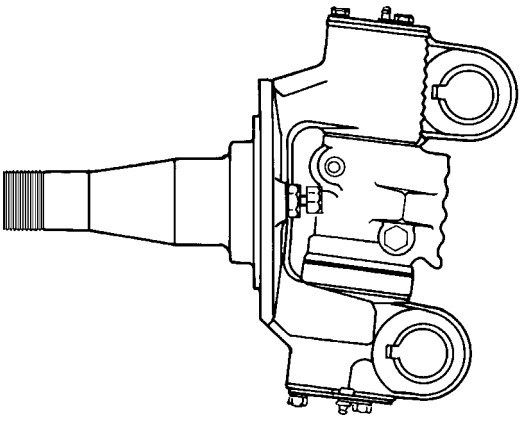
Note: For VN vehicles only.

Front Axle Steering Knuckles

Note: For further information concerning the steering system refer to Function Group 6.

Volvo: Two grease fittings on each side: one on the top knuckle cover (fill with grease until the old grease is forced out past the top seal), one on the bottom cover (fill with grease until the old grease is forced out past the bottom seal).

Note: Lubrication of the Volvo axle should be done with the wheels on the ground!



Front Axle Steering Knuckles

Meritor and Eaton: Raise the axle so the wheels are off the ground before attempting to grease the steering knuckles.
Two grease fittings on each side: one on the top knuckle cover, fill with grease until the old grease is forced out past the top seal; one on the bottom cover, fill with grease until the old grease is forced out past the bottom seal.

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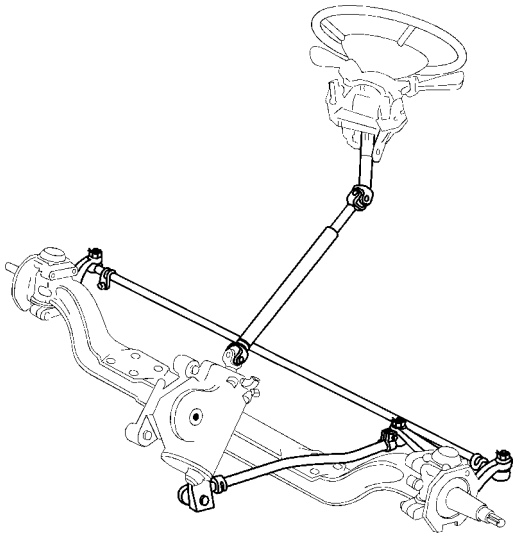


Steering Linkage

Note: Greasable drag links are also available as an option.

1 Lubricate the Steering shaft and drag link.

2 Lubricated the tie rod.

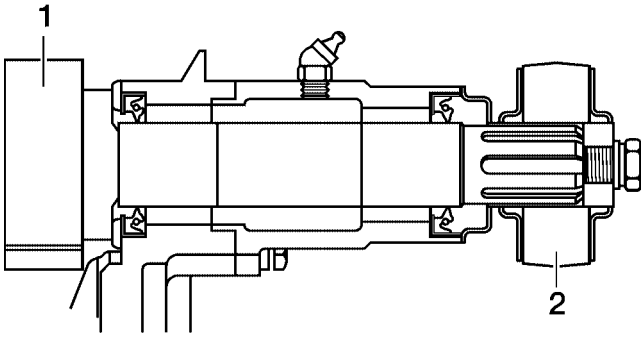
TRW steering gears have a seal at the sector shaft that needs greasing **with a hand gun** every 4 months or more often if the weather and road conditions are severe.

Sheppard steering gears have seals at input shaft and at the sector shaft that need greasing **with a hand gun** every 4 months or more often if the weather and road conditions are severe.

No axial movement is allowable when 100 lbs. of hand pressure is applied. Use hand pressure only, do not check using pliers, wrenches or any other tools.

For all VHD Axle Back models, the steering shaft U-joints should be inspected to see that the plastic caps are intact. Complete this inspection every 4 months. A shorter inspection period interval may be required if the vehicle is operated under severe driving conditions.

For VHD Axle Forward models, grease the steering shaft U-joints every 4 months. A shorter maintenance interval may be required if the vehicle is operated under severe driving conditions.



Brake Cams

Note: Meritor systems have special brake lubrication requirements. Refer to proper literature in Function Group 5.

There is one grease fitting on each cam for front and rear wheel brakes. Fill with grease until old grease is forced out past the end seal and only uncontaminated grease is visible.

Note: Parking brake should be released so grease can penetrate properly throughout the brake cam.

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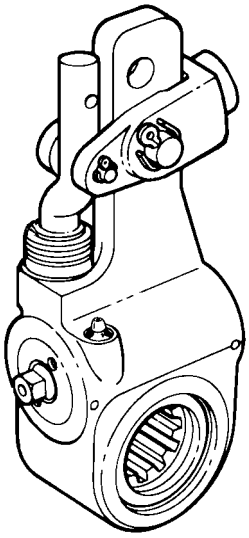
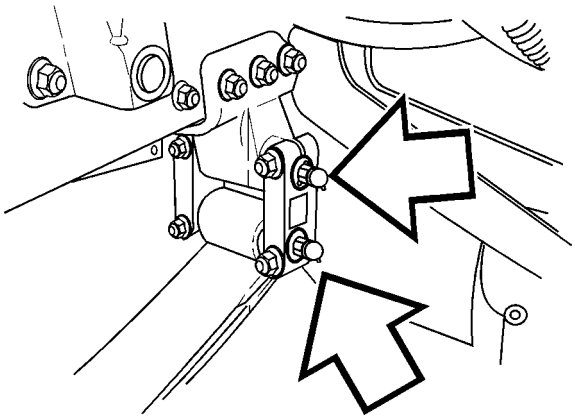


Slack Adjusters

Note: For further information refer to literature in Function Group 5.

There is one grease fitting per slack adjuster. Fill with grease until old grease is forced out past the splined center and adjustment pawl area, and only uncontaminated grease is visible.



Front Spring Pins

Note: For further information refer to literature in Function Group 7.

1 Raise the front end of the truck up with a jack.

2 Place jack stands underneath the frame rails on both sides to relieve the suspension of any weight. Lower the jack so that the front axle hangs free.

3 Place jack stands underneath the frame rails on both sides to relieve the suspension of any weight. Lower the jack so that the front axle hangs free.

4

Note: Volvo only uses Chevron Grease EP #2.

Then thoroughly grease through the grease fitting until the lubricant emerges past the bushing seals, cleaning out all contaminants.

5 After letting the truck down, grease the entire spring and bushing area again to ensure complete lubrication coverage.

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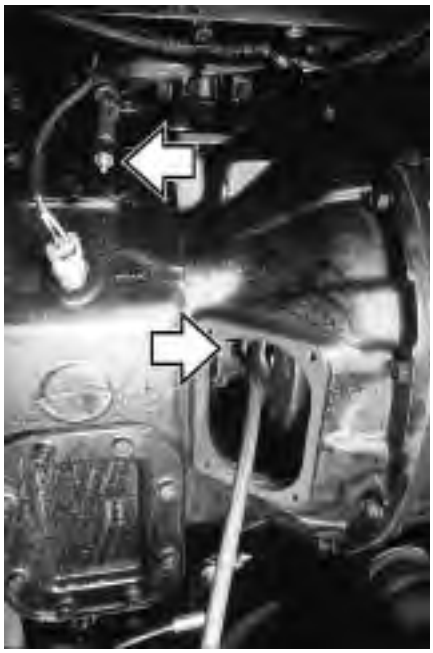
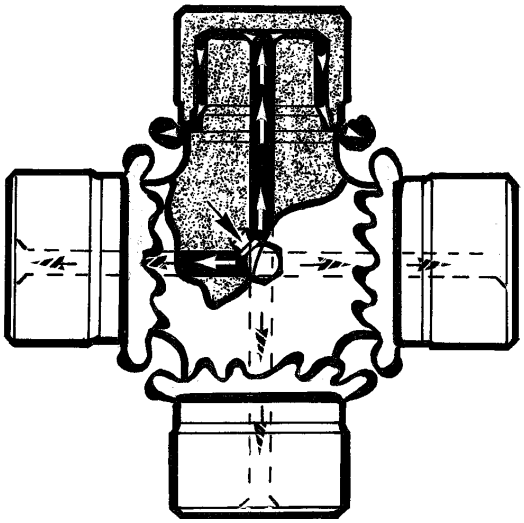


Clutch Bearing and Cross Shaft

The Volvo Clutch Release Bearing is sealed for life and does not need lubrication. However, the cross shaft must still be lubricated.

Vendor clutch cross shafts and release bearings need to be lubricated. The cross shaft bearings are remotely lubricated by a hose. The grease fitting is located on the right side of the bell housing.

Grease the release bearing — but do not overgrease.



Driveshafts

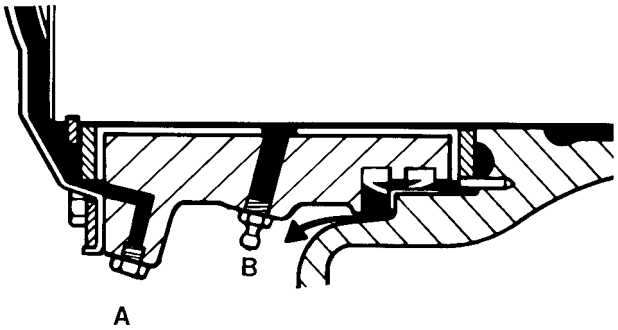
When greasing a driveshaft U-joint, it is very important that grease comes out of each of the four bearings. If grease does not come out of a seal, move the shaft from side to side.

If a U-joint cannot be fully greased, note it on the form for further inspection.

⚠ CAUTION

An ungreased U-joint bearing will fail after a short time.

If vehicle is equipped with a PTO that has a driveshaft, lubricate its U-joints.



Volvo T-Ride

1 Remove the pressure relief valve located at A and install a grease fitting.

2 Remove the grease fitting at B

3 Fill with grease through A fitting until grease oozes out of B.

4 Install the grease fitting at B and fill it with grease until it oozes out around the entire seal (See arrow).

5 Remove the grease fitting at A and reinstall the pressure relief valve.

It is important that the bearing is completely filled with grease. This becomes very important if vehicle operates in wet areas. If operating in places where driving through water, lubricate daily to force water out of bearing area.

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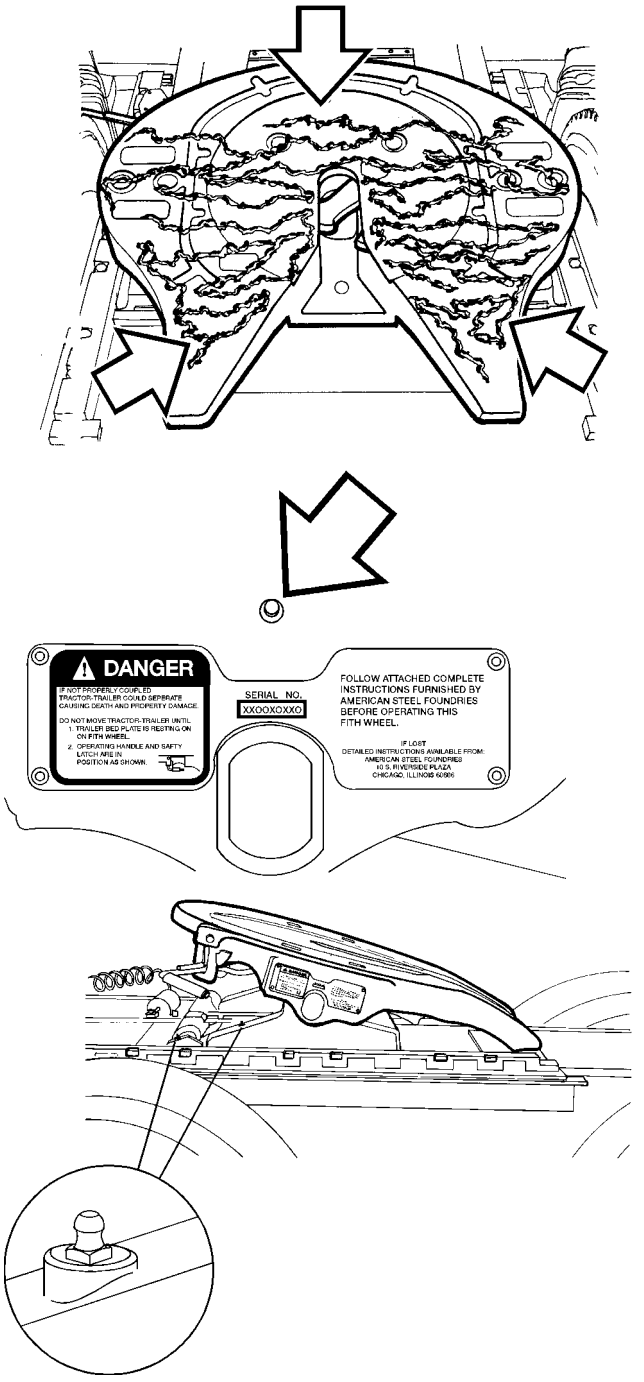

Fifth Wheel

Note: For further information refer to Function Group 9.

Lubricate the plate pivot points and slide mechanism. Apply a heavy coat of grease on top of the plate.

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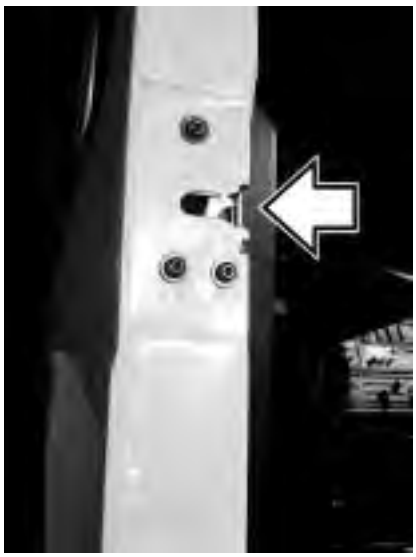

2 Cab Lubrication

Lubricate Door Locks

1 Grease door locks with white lithium grease as needed.

2 Clean excess grease off of the painted areas of the door.

3 Clean and lubricate scissor latch at the base of the cone receptacle with white lithium grease.

Steering Gear

Note: For further information refer to literature in Function Group 6

TRW and Sheppard steering gears may have severe weather seals at input shaft or sector shaft that need greasing.

⚠ CAUTION

Lubricate with a hand grease gun only. High pressure grease application may unseat or damage seal.

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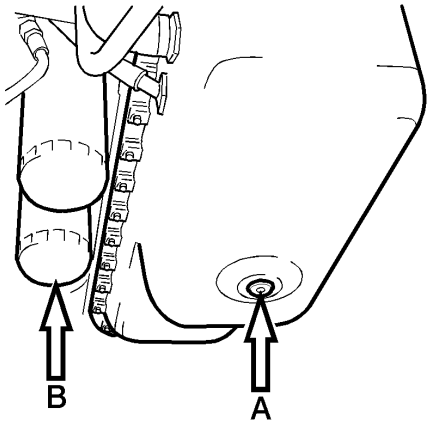
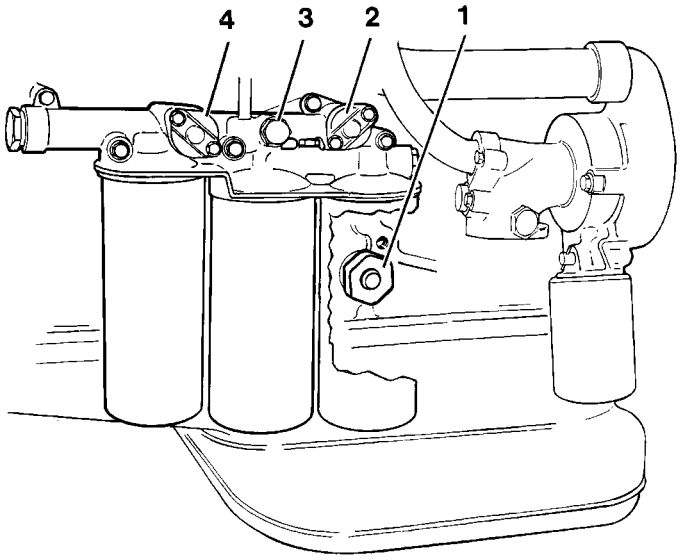


A	Oil Plug
B	Oil Filter



1	Regulator Valve
2	Bypass Valve for Oil
3	Overflow Valve for Oil Filters (By-pass)
4	Reducing Valve

3	**Change Engine and Oil Filters**

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Change engine oil and filters. If required by customer, take a sample of the oil for analysis.

Note: Make sure the oil type is correct and has the correct viscosity. The two are not the same and are equally important in giving the right protection for the engine.

Oil Change

DANGER

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

WARNING

Serious burns can result from contact with a hot engine or engine oil. Take precautions when draining the oil. Wear gloves and let the engine cool down before draining.

CAUTION

Prolonged contact with the used engine oil may be harmful. Use rubber gloves when handling used oil. Wash skin thoroughly if it comes in contact with used oil.

It is important to drain as much oil as possible. Try to change oil immediately after driving, when the oil is warm. Always replace the oil filters when changing oil.

Note: It is not recommended to mix synthetic oils with petroleum based oils.

Note: Always dispose of oil according to Federal and local regulations. Used oil disposed of inappropriately can contaminate nature, waterways, community drinking water, and kills wildlife.

Note: For Oil Change Intervals for the D7 and D12 Engines refer to Function Group 2.

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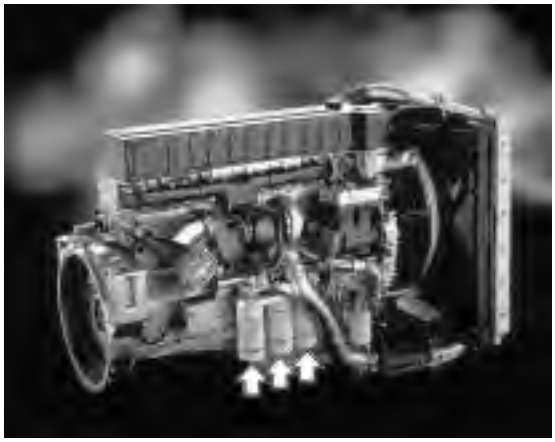
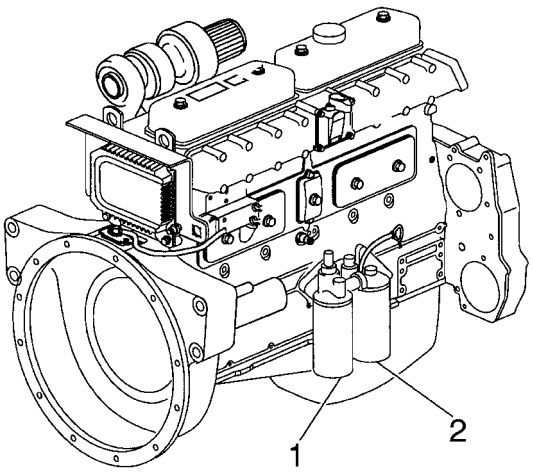


D12 Oil Filters



D7 Oil Filters

1	Full-flow Filter
2	Bypass Filter

Oil Filters

DANGER

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

CAUTION

Use only the engine manufacturer's oil filter for replacement. Use of an oil filter not built to specification could result in severe damage to bearings, crankshaft, etc. as a result of unfiltered oil entering the lubrication system.

Note: Always dispose of oil according to Federal and local regulations. Used oil disposed of inappropriately can contaminate nature, waterways, community drinking water, and kills wildlife.

Install new filters as follows:

- Coat the filter gasket with oil.
- Install the filter and turn it by hand until the gasket makes contact with the sealing surface.
- Then turn the filter an additional 3/4 turn.

Oil Level Check

Note: Do not let the oil level drop below the lower marking on the dipstick. Do not overfill so the level is above the upper marking on the dipstick.

Wait five minutes after shutting off the engine before checking the oil level. This gives the oil time to drain back to the oil pan.

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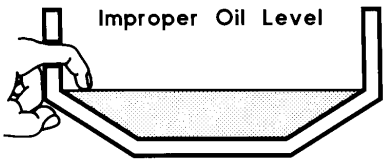

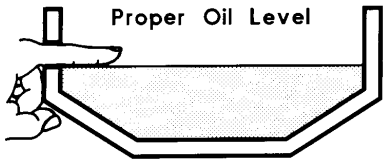

4	Check Oil Level In Manual Transmission

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Note: Synthetic oil is not recommended for the Volvo transmissions.

Volvo:

See specifications for conventional oil and filter change intervals. Ensure that the filter cover is secure after changing the filter.

Fuller:

See specifications for conventional oil and filter change intervals.

Synthetic lubricant: No initial oil change is necessary. See specifications for the conventional oil and filter change intervals.

Meritor:

See specifications for conventional oil and filter change intervals.

Synthetic lubricant: No initial oil change is necessary. See specifications for the conventional oil and filter change intervals.

Note: It is not recommended to mix synthetic oils with petroleum based oils.

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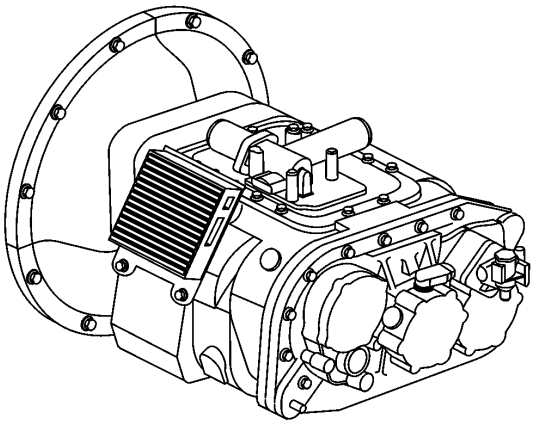

5	Check Oil Level in Automatic Transmission

DANGER

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

Note: For further information refer to “Transmission” page 12.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Transmission fluid cools, lubricates, and transmits hydraulic power. Always maintain proper fluid level. If fluid level is too low, the torque converter and clutches do not receive an adequate supply of fluid and the transmission overheats. If the level is too high, the fluid aerates causing the transmission to shift erratically and overheat. Fluid may be expelled through the breather or dipstick tube when the fluid level is too high.

Transmission fluid check:

1 Clean all dirt from around the end of the fluid fill tube before removing the dipstick. Do not allow dirt or foreign matter to enter the transmission. Dirt or foreign matter in the hydraulic system may cause undue wear of transmission parts, make valves stick, and clog passages. Check the fluid level using the following procedure and record the level in your maintenance log.

2 Always check the fluid level reading with the engine running at least twice. Consistency is important to maintaining accuracy of the reading. If inconsistent readings persist, check the transmission breather to be sure it is clean and unclogged.

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Cold Check:

Note: The fluid level rises as its temperature rises. Do not fill above the Cold Run band if the transmission fluid is below normal operating temperatures.

1 The purpose of the cold check is to determine if the transmission has enough fluid to be operated safely until a hot check can be made.

2 Run the engine for at least one minute. Apply service brake. Shift to Drive (D) and operate the engine for 30 seconds at 1000 to 1500 rpm; then shift to Reverse (R) to clear the hydraulic system of air. Then shift to Neutral (N) and allow the engine to idle (500 to 800 rpm).

3 With the engine running, remove the dipstick from the tube and wipe clean.

4 Insert the dipstick into the tube and remove. Check the fluid level reading. Repeat the check procedure to verify reading.

5 If the fluid level is within the “COLD RUN” band, the transmission may be operated until the fluid is hot enough to perform a “HOT RUN” check. If the fluid level is not within the “COLD RUN” band, add or drain as necessary to bring it to the middle of the “COLD RUN” band.

6 Perform a hot check at the first opportunity after the normal operating temperature of 71–93 °C (160–200 °F) is reached.

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Hot Check:

Note: The fluid must be hot to insure an accurate check. The fluid level rises as the temperature increases.

1 Operate the transmission in Drive (D) range until normal operating temperature is reached:

- sump temperature 71–93 °C (160–200 °F)
- converter-out temperature 82–104 °C (180–220 °F)

2 Park the vehicle on a level surface and shift to Neutral (N). Apply the parking brake and chock the wheels. Allow the engine to idle (500–800 rpm).

3 With the engine running, remove the dipstick from the tube and wipe clean. Insert the dipstick into the tube and remove.

4 Check the fluid level reading. Repeat the check procedure to verify the reading.

5 If the fluid level is not within the “HOT RUN” band, add or drain as necessary to bring the fluid level to within the “HOT RUN” band.

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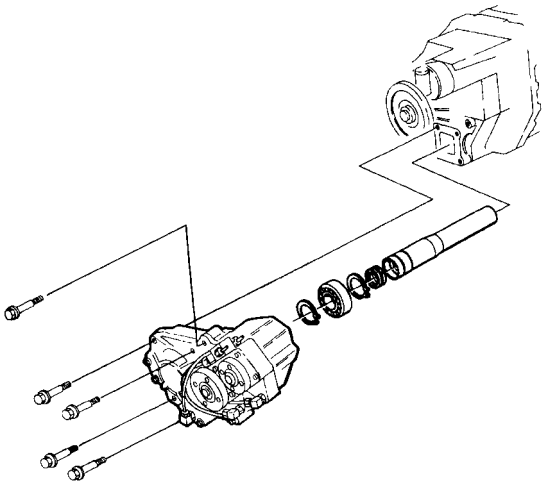

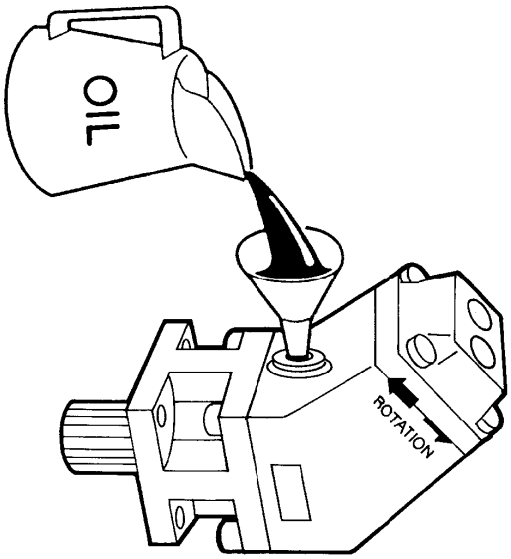

6	Check Oil Level in PTO (Power Take-Off)

Note: For further information refer to Function Group 4.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Power Take-Off

Volvo PTO

Volvo PTOs mount directly to the transmission and do not need separate oil fill or checks. Make sure there is extra oil filled in the transmission for the PTO volume.

⚠ CAUTION

Transmission oil heat exchanger should be installed when using PTO continuously over 15 minutes at a time or with a continuous power output over 55 C.W.O. (75 hp). Without heat exchanger, the oil can overheat and cause damage to the transmission.

If the application has a pump that is installed separately or a blower with a driveshaft connection, the driveshaft U-joints need to be greased at every maintenance interval or more often, depending on usage. Use a lithium based grease with EP additives and of the consistency of NLGI No. 2.

Side Engine Mounted PTO

⚠ CAUTION

During operation, the pump must always be filled with oil. Otherwise, damage to the pump will result.

Engine mounted PTOs mount directly to the engine and need to be checked before vehicle operation. Make sure the pump remains filled.

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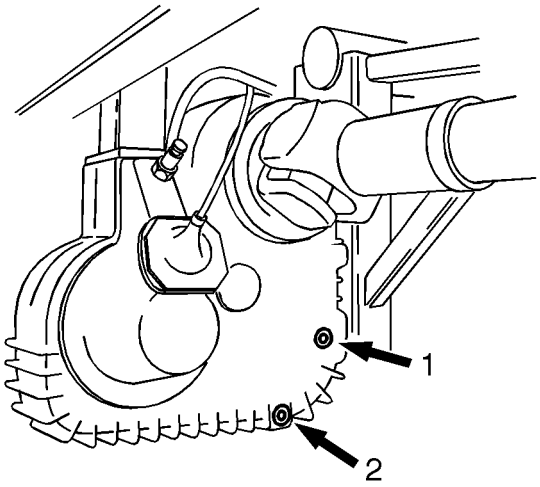
7	Check Oil Level in Retarder

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

To ensure the correct oil level in the retarder the oil level should be checked when the retarder is warm.

8	Check Oil Level in Transfer Case

Remove the level/filler plug and check that the oil level reaches up to the edge of the filler hole.



1	Level/Fill Plug
2	Drain Plug

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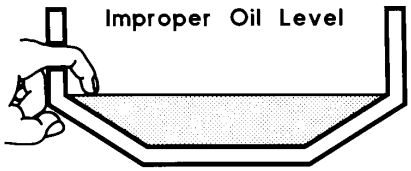
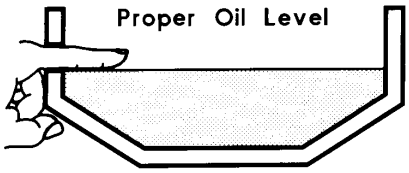
1	Level/Fill Plug
2	Drain Plug





9	Check Oil Level in Front Drive Axle

Note: For further information refer to Function Group 6.

Checking and Draining Oil

WARNING

Serious burns can result from contact with a hot engine or engine oil. Take precautions when draining the oil. Wear gloves and let the engine cool down before draining.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Check the oil level through the top plug. The oil should be level with the hole. Add oil if necessary.

Drain oil through the bottom plug. Drain oil immediately after driving the vehicle, so that the oil is hot.

Note: Also check the rear axle ventilation for blockage. Blockage can cause extreme pressure in the axle and create leaks.

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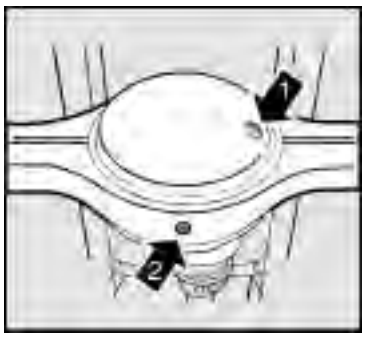
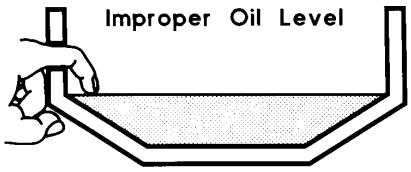
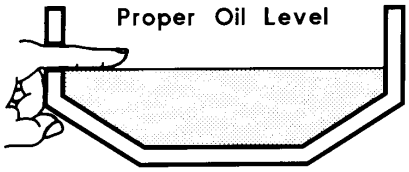


1	Level/Fill Plug
2	Drain Plug





10	Check Oil Level in Rear Drive Axle

Note: For further information refer to Function Group 6.

Checking and Draining Oil

WARNING

Serious burns can result from contact with a hot engine or engine oil. Take precautions when draining the oil. Wear gloves and let the engine cool down before draining.

Check the oil level through the top plug. The oil should be level with the hole. Add oil if necessary.

Drain oil through the bottom plug. Drain oil immediately after driving the vehicle, so that the oil is hot.

Note: Also check the rear axle ventilation for blockage. Blockage can cause extreme pressure in the axle and create leaks.

11	Check Oil Level in Hydraulic Axle Lift

Not applicable in VN/VHD vehicles.

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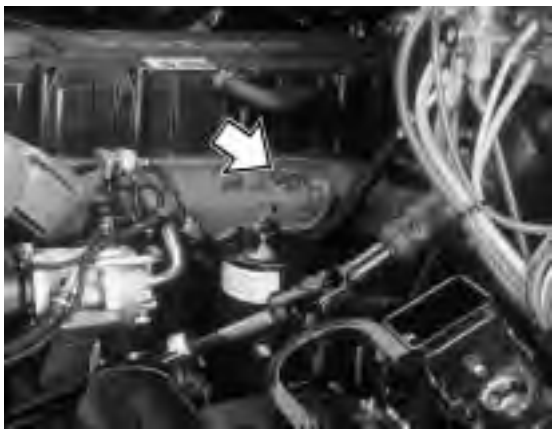

12	Check Oil Level in Power Steering

Note: For further information refer to Function Group 6.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Darkened fluid indicates that the power steering system is running hotter than normal and overheating the fluid. Report the problem too and service the vehicle at a Volvo Truck Dealer.

13	Check Oil Level in Hubs for Oil Lubricated Wheel Bearings

Note: For further information refer to Function Group 7.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Front Wheel Hubs

DANGER

Failure to keep wheel bearings properly adjusted can result in accelerated tire wear, poor handling, and in extreme cases, wheel separation from the hub or from the spindle resulting in loss of vehicle control and serious personal injury or death.

Note: It is not recommended to mix synthetic oils with petroleum oils.

The front wheel hubs are lubricated with several types of oil. It is acceptable to use either synthetic or petroleum based oils (Synthetic oils are not recommended for Volvo Axles).

Change the Hub lubricant during routine hub maintenance.

14	Check Oil Level in Cab Tilt Pump (If equipped)

Not applicable for VN/VHD vehicles.

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15	Check Oil Level in Clutch Fluid Reservoir

Note: For further information refer to Function Group 4.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Check that the fluid level is in even with the LEVEL line below the filler neck of the fluid reservoir.

16	Check Coolant Freeze Protection and Coolant Level (Check SCA Level)

WARNING

Do not remove the cap to the coolant surge tank while the engine and radiator are still hot. Scalding fluid and steam may be blown out under pressure if the cap is removed too soon.

CAUTION

Ensure that the coolant is not a long life product. SCA cannot be added to this type of coolant.

Draw coolant for testing. Adjust coolant as necessary and change the filter if needed.

Supplement coolant additive (SCA) level remains between 0.4 to 0.8 units/liter (1.5 and 3.0 SCA units/gallon).

See each engine manufacturer’s recommendation for filter change intervals and additive replenishment.

17	Check Fluid Levels in Windshield Wiper and Headlamp Wiper Reservoirs

Check fluid level in the washer fluid container regularly. Add if necessary.

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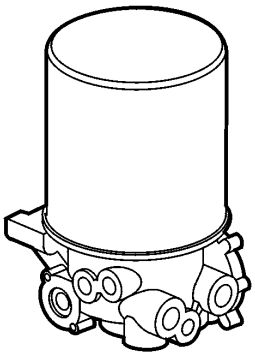

18	Check Air Dryer

Air Dryers

For further information refer to Function Group 5.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Air Dryers have internal maintenance systems that clean out the accumulated moisture frequently and can therefore work with long maintenance intervals. Eventually the drying medium fills up and needs replacement. Change the cartridge when the medium is filling up more than usual. This service rate varies upon the application.

Dryer manufacturers recommended changing cartridge every two to three years but intervals vary per application. The only dryer with regular maintenance is the Midland, which requires changing of the coalescent filters every year.

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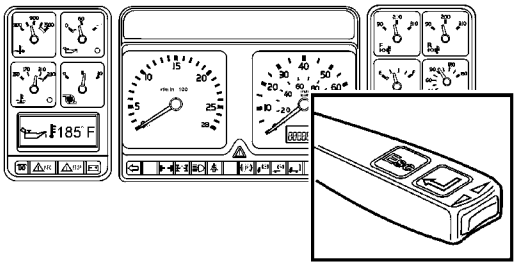
Cab



19	Check Warning and Control Lamps

For further information refer to Function Group 8.

For further information concerning component specifications see service information in Group 1, “Oil and Filter Change Intervals for Volvo Components, All Models”, Publication Number 175-001, and any appropriate vendor literature.

Check all indicators on the instrument cluster. Turn the ignition on. Wait until the instrument cluster has gone through the start-up cycle. Press the MODE button until the diagnostic window shows DIAGNOSTICS MENU. Press the down button twice and the SET button once. The diagnostic window reads BULB TEST?. Press SET and the internal check program lights up all indicators. If any bulb is not functioning, note it on the checklist.

Press the down and SET buttons once and the check program tests the buzzer functions. Three different durations of the tone are heard.

Press down the SET buttons again and the check program tests the gauges. Most electronic controlled gauges go to half range, full range and then back to rest three times.

Press the down and SET buttons again for testing the diagnostic display. The display alternates between light and dark. If any defects are noted cite them on the checklist. Return the diagnostic display to the clock by pressing the MODE button five times.

To perform the ABS “chuff-test”, turn the ignition off. Press down the foot brake and then turn the ignition back on again. Listen through the side window that the ABS self-check goes through the cycle twice. Each pass operates the ABS modulator valves once, which results in a brief puff of air being released from each valve. The ABS indicator turns on and off twice and then remains on.

Note: For VN/VHD vehicles with the Traction Control System (TCS) five ’chuffs’ occur for each valve.

If the vehicle is equipped with a Volvo engine, the engine preheater indicator stays on three to four seconds. If the coolant temperature is over 50 °C (120 °F), the preheater is not engaged. If the coolant temperature is below 50 °C (120 °F), the preheater progressively engages longer depending on the coldness of the coolant. If the indicator stays on, there is a problem in the preheater circuit.

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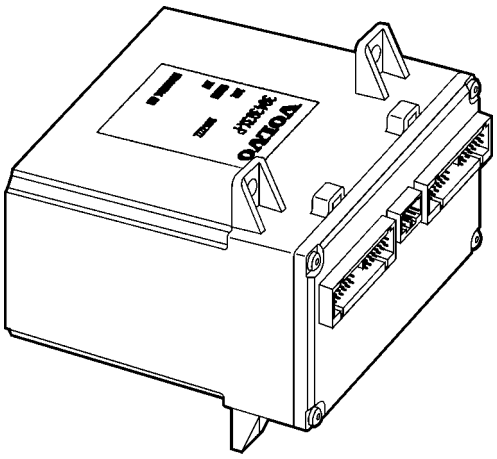

20	Check for Fault Codes in the Vehicle Electronic Control Unit

The instruments and engine control units, are always included in the system. Other included control units depend on the vehicle variant, legal requirements, and the vehicle specifications.

The control units are:

- Driver information display
- Instrument Cluster
- Vehicle Control Unit
- Engine Control Unit
- ABS Control Unit
- EBS Control Unit
- Air Suspension Control Unit
- Retarder Control Unit
- Load Indicator Control Unit
- SRS (Airbag) Control Unit
- Anti-Theft Control Unit

Ensure the engine is switched off during the service check and the starter key is in the drive position (I).

The control lever on the right-hand side of the wheel is used to communicate and display any fault codes on the instrument's driver information display.

1 Read any fault codes by using the control lever and display. These fault codes are saved in the vehicle's control units.

2 Write down any fault codes displayed and then correct the faults.

3 After correction, clear the fault codes.

Note: Fault codes can also be traced using a diagnostic program run through a PC.

Note: Refer to pertinent VCADS Pro Tool documentation.

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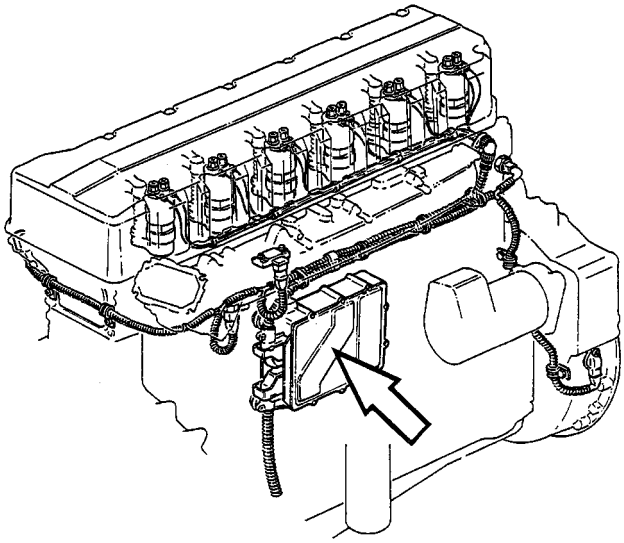
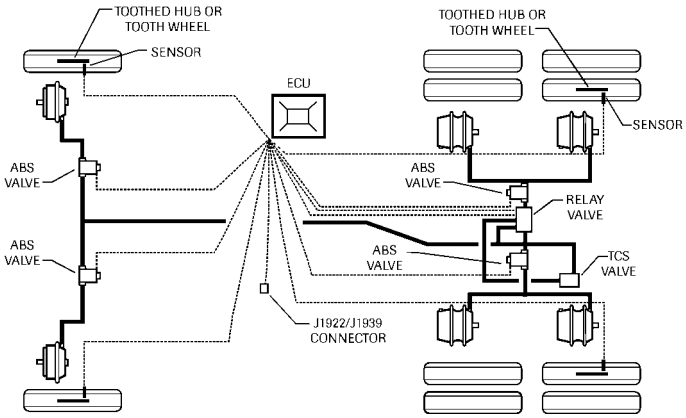


Engine ECU



21	Check for Fault Codes in the Engine Electronic Control Unit

Use Service Information in Function Group 23 as a reference.

When reading fault codes perform the following:

- The engine is off.
- The parking brake is applied.
- The starter key is in the drive position (I).

1 Read on the instrument cluster display that no fault codes are saved in the ECU.

Note: Fault codes can also be traced using a diagnostic program run through a PC.

Note: Refer to pertinent VCADS Pro Tool documentation.

22	Check for Fault Codes in the ABS, anti-lock brakes

Note: Use Service Information in Function Group 59 as a reference.

To complete the Fault Code Check for ABS perform the following:

1 Check that no fault codes are saved in the ABS ECU.

2 Write down any fault codes that require correction.

Note: Fault codes can also be traced using a diagnostic program run through a PC.

Note: Refer to pertinent VCADS Pro Tool documentation.

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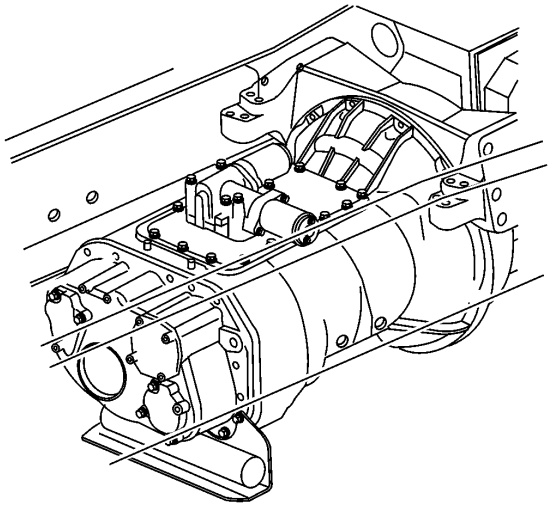

23	Check for Fault Codes in Transmission

Note: Use Service Information in Function Group 4 as a reference.

To complete the Fault Code Check for Transmission perform the following:

1 Check that no fault codes for the Transmission are displayed in the instrument cluster.

2 Write down any fault codes require correction.

Note: Fault codes can also be traced using a diagnostic program run through a PC.

Note: Refer to pertinent VCADS Pro Tool documentation.

24	Function Check of Parking Heater

DANGER

Check the heater and ensure that the exhaust is not blocked or leaking. Fumes from the exhaust can cause personal injury or death.

If the vehicle is equipped with a parking heater, start the vehicle and run the parking heater for fifteen minutes to perform a function check.

Note: Do not stop the parking heater until it has been allowed to run fifteen minutes or the function check will be inaccurate.

Note and correct any faults.

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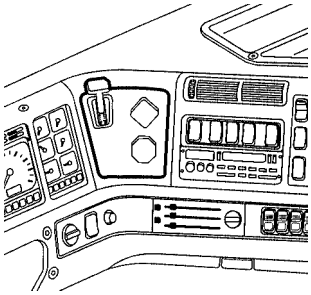
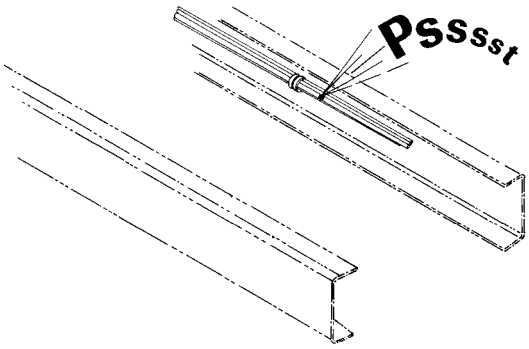
25	Check Retarder Control

Ensure that the control's steps are well-defined and that the control stops in the set position.





26	Check Sealing on Main Brake (Service)

To perform the check of the Main Brake Seal perform the following:

1 Start engine.

2 Charge the Compressed Air System to 7.5 bar (109 psi).

3 Shut off engine.

4 Release the parking brake.

5 Apply the foot pedal for a minimum of five minutes. Use a pedal jack whenever appropriate.

6 Use a Dual Pressure Gauge to ensure that the pressure drop doesn't exceed .10 bar (1.57 psi) per minute.

7 Listen for air leaks.

8 Disconnect the Dual Pressure Gauge from the compressed air tank.

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27	Check Gear Shift and Clutch Pedal

To perform a service check on the Gear Shift and Clutch Pedal complete the following:

1 Move the gearshift to range and split gear positions. Listen to the sound when passing through neutral and checking the range gear. The control lamp should light up when the high split gear is engaged.

2 Check, on the automatic transmission, that the engine can only be started when the gear selector is in neutral (N).

3 Check that there is no excessive play in the gearshift.

4 Check that the gear stick gaiter fits tightly and is not cracked.

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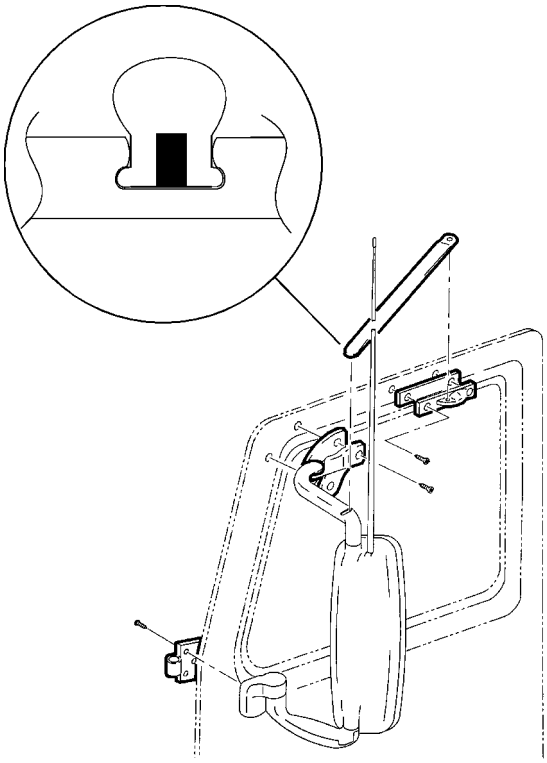
External Checks

28	Function Check of External Lamps

To perform a function check of the External Lamps perform the following:

1 Check all external lighting for functionality.

2 Check that all lamps are in good condition.



29	Check Mirrors and Reflectors

To perform a function check of the mirrors and reflectors complete the following:

1 Check that the rear view mirrors are in good working condition and remain in position when set.

2 Check the attachments for the rear view mirrors and ensure they are functional.

3 Check the reflectors for functionality and that none are missing.

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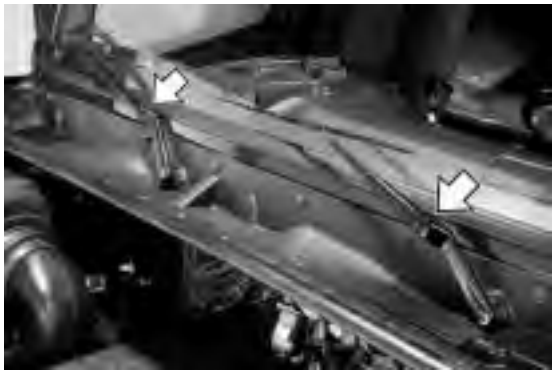

30	Function Check of Wipers and Washers

Check the wiper arm tension and condition of the wiper blades.

31	Check Battery Mounting, Connections and Fluid Levels

To complete a function check of the battery mounting, and connections, complete the following:

1 Inspect battery hold-downs for proper placement and tightness.

2 Make sure the connections are free from corrosion.

3 Inspect cables for proper length, chafing and proper routing.

4 Check terminals for tightness and cracks.

5 Remove any corrosion from cable ends and battery posts.

6 After cleaning, spray corrosive preventive on posts, terminals and general area around them.

7 Ensure that the battery ground connections from the engine to the frame are secure and free from corrosion.

Note: The battery ground connection goes directly to the starter motor.

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32	Check Fuel Tank, Hoses, Pipes and Mounting Straps

To complete a service check of the fuel tank, hoses, pipes and mountings complete the following:

1 Check the fuel tank mounts.

2 Check the fuel tank straps and J-brackets and ensure they are tight and that the tanks haven't rotated.

3 Inspect the fuel tank brackets for cracks.

4 Check the fuel lines for proper routing, wear and leaks.

Note: Ensure that the fuel lines are not routed too close to the exhaust system.

33	Check Fuel Tank Ventilation Filter

To complete a service check of the fuel tank ventilation filter complete the following:

1 Inspect the tanks for damage, leaks and corrosion.

2 Inspect tank vents.

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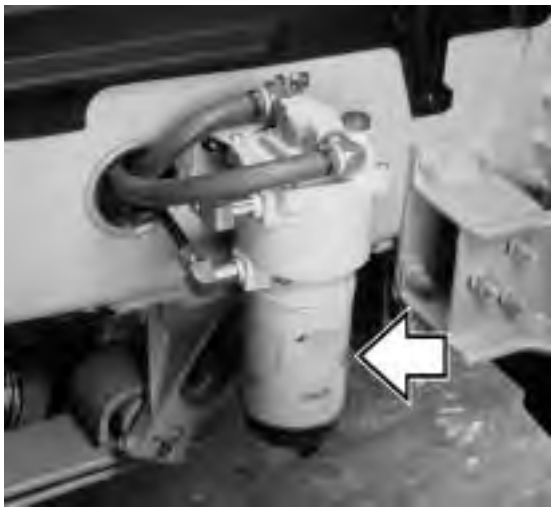

34	Check Water Separator for Fuel System

For further information refer to Function Group 2.

Note: If the filter is not being changed, drain the water separator.

1 Check the primary fuel filter.

2 Write date and mileage on filter when changed.

3 Check the secondary fuel filter.

4 Write date and mileage on filter when changed.

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35	Check Tire Wear and Wheel Alignment

Tire Wear

For further information refer to Function Group 7.

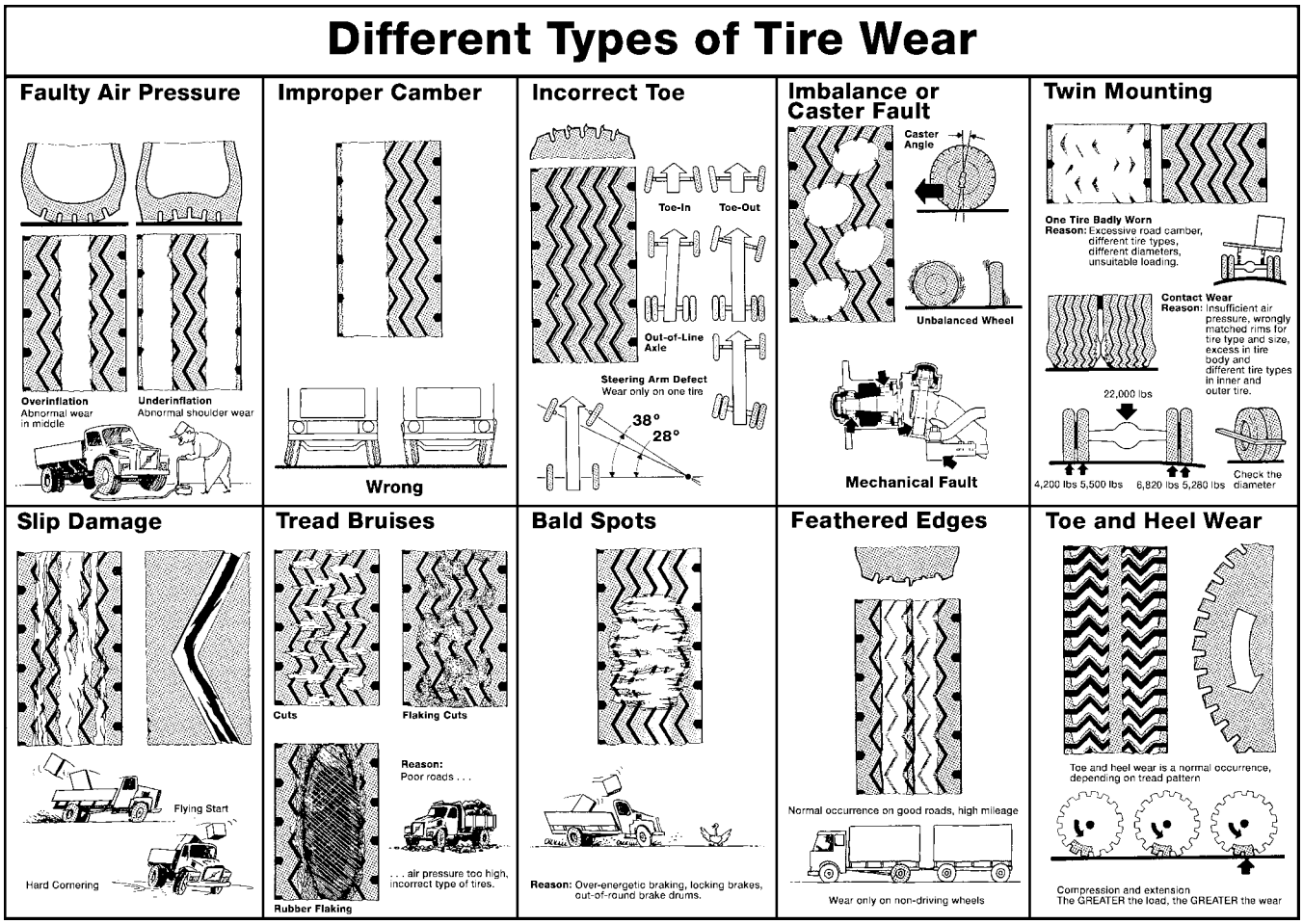
1 Examine each tire tread for unusual wear patterns. Refer to chart below for typical tread patterns.

2 Measure tread depth.

3 Check tire pressure and leak-test valve stems.

4 Check the Rim Flange wear on Aluminum Wheels every time the tire is replaced.

Note: Be advised, the main causes of tire wear are faulty air pressure, incorrect toe adjustment, and incorrect drive tire alignment or thrust angles, which causes pushing or scrubbing of the steer tires. Feathered edges of the tires is and early symptom of tire wear.



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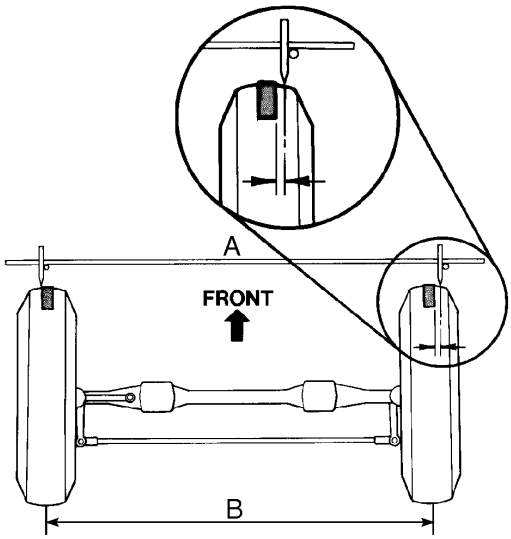
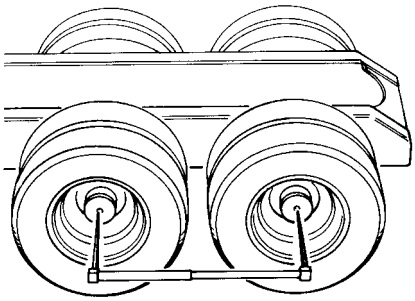


Total Vehicle Alignment



Rear Tandem Alignment

Wheel Alignment

Check Total Wheel Alignment. For further information refer to Service Bulletin 601–006, “Wheel Alignment, Steer and Drive Axles, VN/VHD.”

Note: For Total Vehicle Alignment, if A is less than B then a Toe In problem exists.

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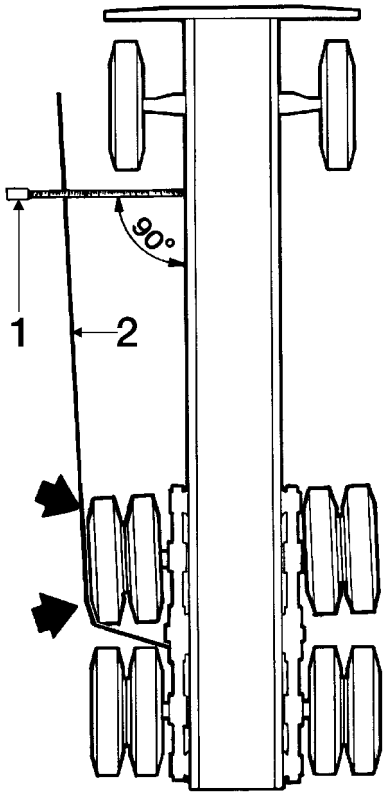
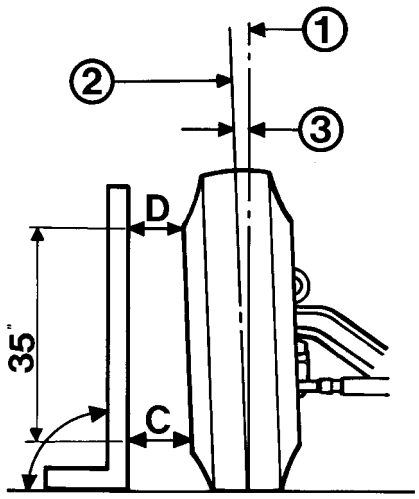


Vehicle Thrust Angle

Thrust

Measure and compare thrust for both the left and right side of the vehicle. Acceptable differences depends upon wheel base.



1 Vertical Line
2 Wheel Center Line
3 Camber Angle(C - D)

Camber

The Camber is set by the axle manufacturer to Volvo specifications and is not adjustable.

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Engine Compartment Checks

36	Check Alternator Mounting and Electrical Connections

For further information refer to Function Groups 2 and 3.

Charging System

An alternator with an integrated regulator is used to supply power to the vehicle electrical system. The charging system voltage should be checked periodically to prevent overcharging or undercharging the batteries and to detect any voltage drop in the wiring.

37	Check Drive Belts

DANGER

Ensure that the engine cannot be started while working around the fan area. Failure to do so may result in serious personal injury or death.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

To perform a function check of the Drive Belts complete the following:

1 Check fan belts for correct tension.

2 Inspect the belts for wear, cracks and fraying.

3 Check along the belts for proper alignment.

4 Visually inspect hubs and pulleys for wear and damage.

5 Inspect the vibration damper for leaks or any surface damage.

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38	Check Radiator Fan, Fan Shroud and Fan Ring with Rubber Seal

For further information refer to literature in Function Group 2.

DANGER

Ensure that the engine cannot be started while working around the fan area. Failure to do so may result in serious personal injury or death.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

Perform the Check of the Hubs and Pulleys as follows:

1 Inspect fan blades for any damage.

2 Ensure there is enough clearance between the fan blade tips and the fan ring in the shroud.

Note: The minimum clearance is 3 mm (0.12 in.) at any point around the fan ring.

3 Loosen the belts and rotate the fan hub assembly. Check for roughness and binding in the bearings. Check that the end play does not exceed 1.5 mm (1/16 in.).

4 Check fan clutch for lining wear or air leaks. Lubricate fan hub, if applicable.

5 Inspect the idler pulley for cracks.

6 Check for bearing roughness and binding.

7 Inspect the belt driven water pump for bearing wobble and any evidence of leakage.

8 Check the radiator package mounts.

9 Inspect rubber cushions for wear.

10 Inspect fan shroud rubber molding and all fasteners for wear and tightness.

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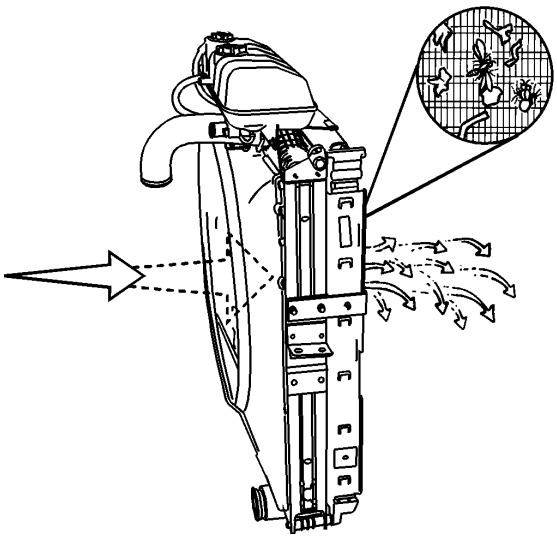
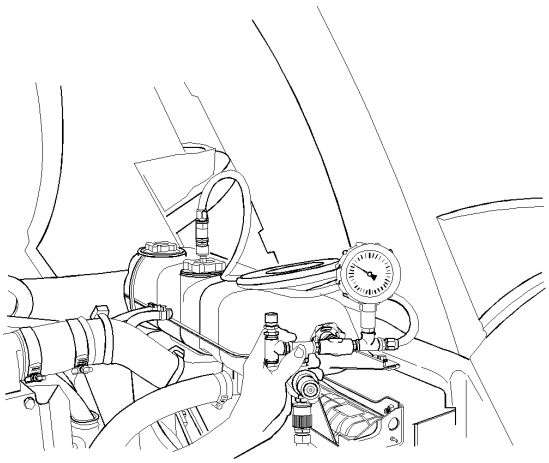




39 Check Radiator, Hoses and Pipes

Note: For further information refer to literature in Function Group 2.

WARNING

Do not remove the cap from the coolant surge tank while the engine and radiator are still hot. Scalding fluid and steam may be blown out by pressure if the cap is removed while the engine and radiator are hot.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

Perform the Check of the Radiator, Hoses and Pipes as follows:

1 Check the front area of the radiator package for dirt and debris that hinders the air flow.

2 Clean the radiator package with compressed air or water pressure, blowing or pushing from the inside out.

Note: Air pressure should not exceed 2 bar (30 psi) for the radiator and charge air cooler cores.

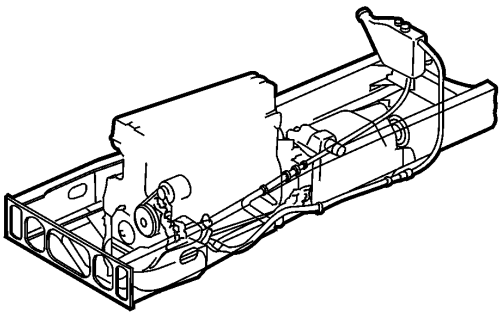
Note: If there is damage to the cooling fins, straighten them out so air can flow freely.

3 Check for fluid leaks on or around the engine.

Note: Inspect the mating surfaces, auxiliary component attaching areas and hookup, hoses and pipes.

4 Pump up pressure in the relief valve, with the heater controls open, to .75 bar (11 psi). Leave under pressure for five to ten minutes. Look for leaks, wear, cracking and distortion on hoses and tubing.

5 Check the hose clamps for tightness.



40 Check Engine and Engine Driven Power Take-Off for Leaks

Note: For further information refer to literature in Function Group 2.

To complete a check of the engine and engine driven Power Take-Off complete the following:

1 Check that the engine does not leak oil or coolant.

2 Check that the fittings, flanges and hose connections are tight.

3 Check that hoses or pipes are not chaffed or are cracked.

4 Check that the PTO or lines do not leak oil.

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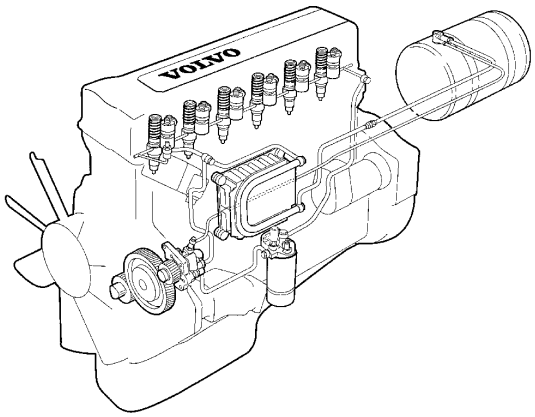
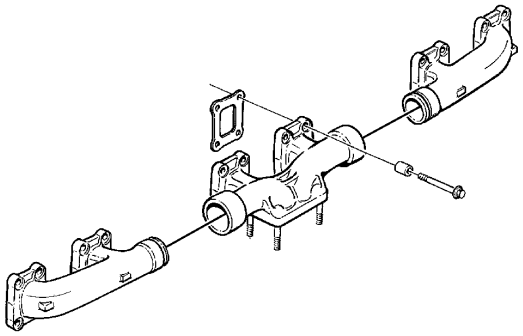


41 Check Fuel Pipes and Lines

Note: For further information refer to literature in Function Group 2.

To complete a check of the fuel pipes and fuel lines complete the following:

1 Check that the hose and pipe fittings for the fuel lines don't leak.



Exhaust Manifold

42 Check for Exhaust Leakage

Note: For further information refer to literature in Function Group 2.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to "Noise Emissions" page 6.

To perform a check of the exhaust system complete the following:

1 Check the exhaust flex line for routing.

2 Ensure that nothing that is affected by heat is near the exhaust flex line.

3 Check for signs of exhaust leaks.

4 Check for leaks on the exhaust ports on the cylinder heads, at the intake and exhaust manifolds and flanges.

5 Check for leaks on the jointing clamp for the exhaust pipe.

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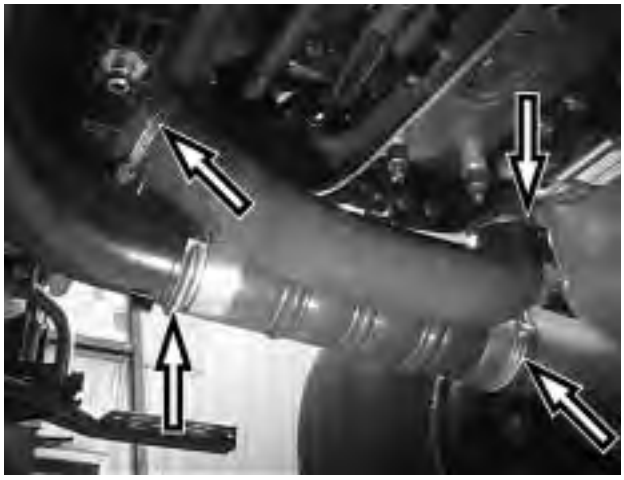
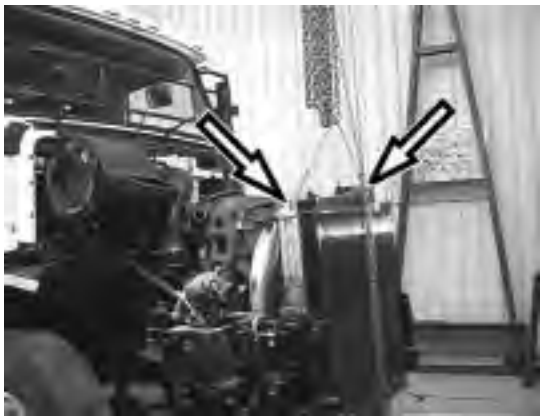




43 Check Intercooler Pipes and Hoses

Note: For further information refer to literature in Function Group 2.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

WARNING

Always wear appropriate eye protection to prevent the risk of eye injury due to contact with debris or fluids.

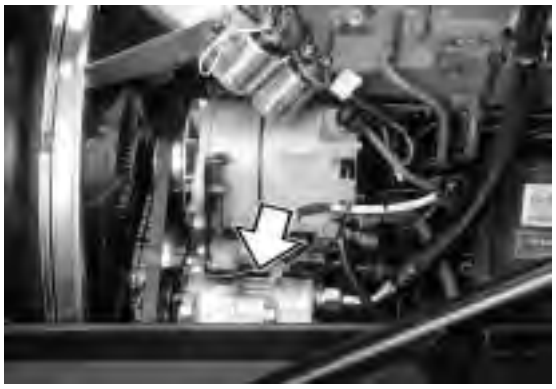
To perform a check of the Intercooler Pipes and hoses complete the following:

- Inspect the charge-air-cooler for cracks.

Note: Do not operate the vehicle with a damaged or broken charge-air-cooler. This voids the warranty and the engine will not meet emission regulation requirements.

The best method to clean the package is to use air pressure or water stream. Clean from the back of the core. Air pressure should not exceed 30 psi (200 kPa) for radiator and charge-air-cooler cores. The use of fin comb is also a good tool to loosen bugs and dirt from the fins.

Note: If the dirt cannot be cleaned off, consult your Volvo Truck dealer.



44 Check A/C Compressor Mounting

Note: For further information refer to literature in Function Group 2.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

To perform a check of the A/C Compressor mounting complete the following:

1 Check A/C Compressor mounts for secureness and cracks.

2 Inspect the compressor exterior for leaks.

3 Check the fluid level and list the type of oil used.

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Cab Climate Control Unit

Recovery/Recharge Unit Area

45	Check A/C Hoses, Fittings, Switches, and Wires

Note: For further information refer to literature in Function Group 2.

WARNING

Do not remove the cap to the coolant surge tank while the engine and radiator are still hot. Scalding fluid and steam may be blown out under pressure if the cap is taken off to soon.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

To perform a check of the A/C Hoses, Fittings, Switches, and Wires complete the following:

1 Pump up to where the relief valve releases (heater controls should be open) at 75 kPa (11 psi). Leave under pressure for five to ten minutes. Check for leaks, wear, cracking and distortion on hoses and tubing.

2 Check hose fittings for tightness and damage.

3 Check damaged wires and switches.

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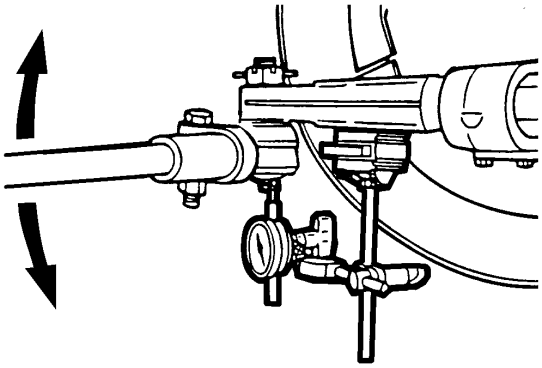
Front Suspension, Steering System Checks



46	Check Gaiters/Plastic Covers and clearance for Ball Joints

Note: For further information refer to literature in Function Group 6.

To perform a check of the Gaiters/Plastic Covers and clearance for the Ball Joints complete the following:

1 Check that all Gaiters/Plastic Covers are undamaged.

2 Check joints for play by manually pushing and pulling each ball stud.

47	Check Servo Pump and Steering Gear

Note: For further information refer to literature in Function Group 6.

To perform a check of the Servo Pump and Steering Gear complete the following:

1 Check the steering shaft, drag link and tie-rod. Inspect for damage or external wear.

2 Check joints for play by manually pushing and pulling each ball stud.

3 Check the steering gear for leakage around the seal areas and hydraulic fittings. Inspect frame to gear, or frame to bracket to gear fasteners for signs of looseness or cracks.

4 Check axial and radial king pin wear.

5 Check pitman arm for damage. Check that the fastener to the sector shaft is not showing signs of looseness.

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48	Check Steering Shaft Joint, Hoses an Pipes for Power Steering

Note: For further information refer to literature in Function Group 6.

To perform a check of the Steering Shaft Joint, Hoses and Pipes for Power Steering perform the following:

1 Check the Steering Shaft Joint for leaks, cracks and other damage.

2 Check the hoses for the Power Steering for leaks.

3 Check the pipes for the Power Steering for cracks and other damage.

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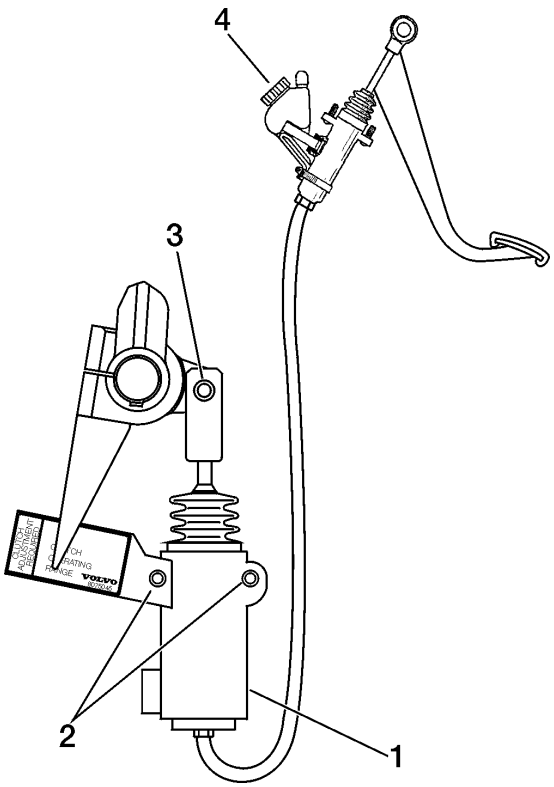
Checks Beneath the Vehicle

49	Check Sealing on Front and Rear Drive Axle

Note: For further information refer to literature in Function Group 7.

To perform a check of the sealing on the Front and Rear Drive Axles complete the following:

- Check hub for leakage around front and rear drive axle shaft flange.



1 Slave Cylinder

2 Mounting Bolts

3 Clutch Clevis Pin

4 Clutch Master Cylinder and Reservoir

50	Check Slack in Mechanical Linkage for Clutch

Note: For further information refer to literature in Function Group 4.

To perform a check of the slack in the mechanical linkage for the Clutch complete the following:

- Check Shift Tower for proper mechanical linkage.

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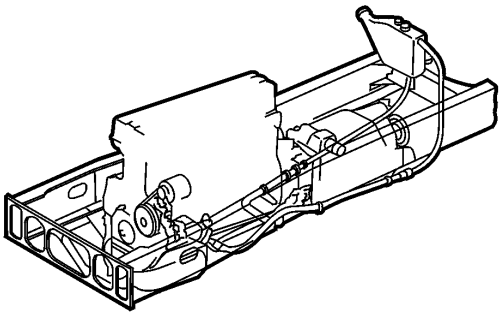
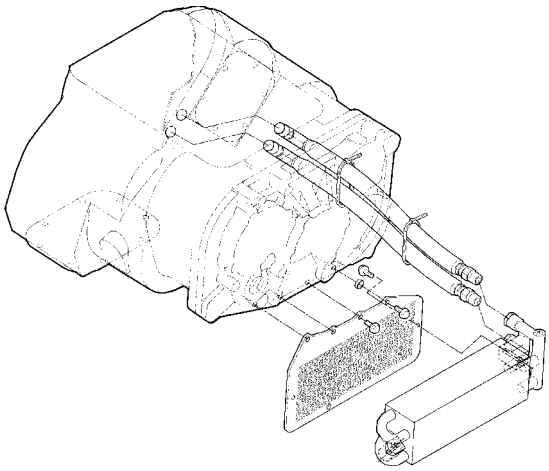


51	Check Gearbox, Transfer Case, and Power Take-Off Mounting and Sealing

Note: For further information refer to literature in Function Group 2.

To perform a check of the Gearbox, Transfer Case, and Power Take-Off complete following:

- Visually check the Gearbox for any leaks.
- Visually check the Transfer Case for any leaks.
- Visually check the PTO and attached hoses for any leaks.



52	Check the Oil Cooler and Transmission Mounting and Sealing

Note: For further information refer to literature in Function Group 2.

To perform a check of the Oil Cooler and Transmission complete the following:

1 Check the top of the transmission. Inspect the top covers for leakage, shift lever for leakage and wear. Inspect lower shift boot condition.

2 On the Oil Cooler check the coolant lines for proper routing and that there are no leaks.

If the Oil Cooler is air cooled complete the following:

1 Check transmission cooler for oil leaks.

2 Check that the air flow is free through the core.

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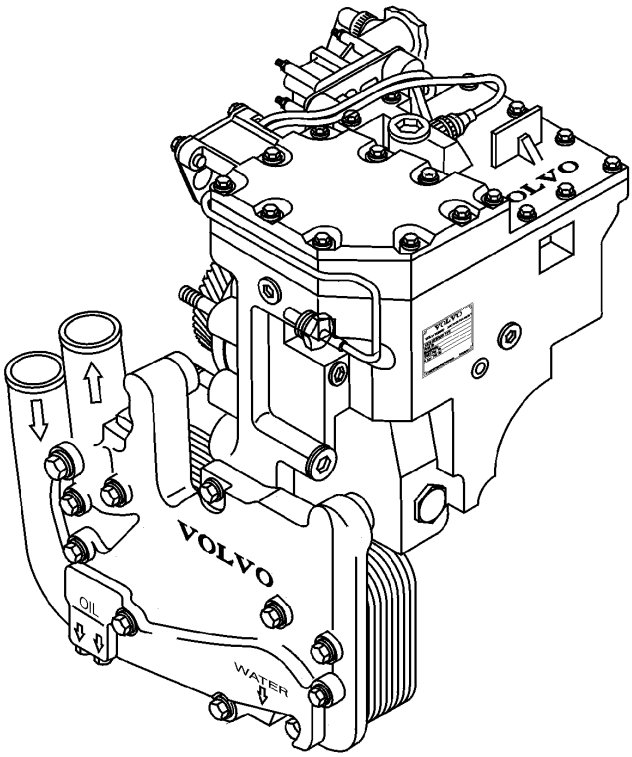

53	Check Retarder Sealing

To perform a check of the Retarder Sealing complete the following:

- Check the Retarder Sealing for any cracks or leaks.

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54	Check Drive Shaft, Universal Joints, Sliding Joints and Support Bearings

Note: For further information refer to literature in Function Group 4.

To perform a check of the driveshaft, Universal Joints, Sliding Joints and Support Bearings complete the following:

1 Check transmission output shaft bearing for wear. Move the flange up and down; bearing play should not be larger than 1.5 mm (1/16 in.).

2 Check for oil leaks past the transmission output shaft seal.

Note: There is a difference between sweating and a leak. If oil is seeping past the seal after cleaning, there is a leak.

3 Check driveshaft U-joints and slip joint for play. There should exist no noticeable play in the U-joint bearings. The slip joint radial play maximum is 0.18 mm (0.007 in.).

4 The driveshaft tube should be straight and have no damage or missing weights. Remove any build-up of foreign material such as undercoating, concrete, etc.

5 Check the torque of driveshaft bolts 170 Nm (125 ± 10 ft-lb).

6 Check center bearing mounting.

7 Check rear axle pinion bearing for wear and leaks past the seal.

Note: The Volvo CT EV87 front tandem gear input shaft has a large play for the input shaft bearing. This is normal and does not have any damaging effect on the transfer gear-during rotation, the shaft is balanced so that the clearance is insignificant. If there is no oil leakage there is no reason for concern about this play.

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55	Check Sealing of Rear Axle and Hub Reduction Gear

Note: For further information refer to literature in Function Group 7.

To perform a check of the Sealing on the Rear Axle and Hub Reduction Gear complete the following:

1 On the Rear Axle, inspect around the mating surfaces for leaks past the gasket.

2 Check brake chamber and air tubing condition.

3 Check Hub Reduction Gear for any leaks or cracked sealant.

56	Check Bearing Clearance in Pinion and Rear Axle Input Shaft

Note: For further information refer to literature in Function Group 7.

To perform a check of the Bearing Clearance in the Pinion and Rear Axle complete the following:

1 Use a dial indicator to check bearing clearance in the Pinion and Rear Axles. The clearance should be within 0.04 to 0.12 mm (0.001 to 0.005 in.).

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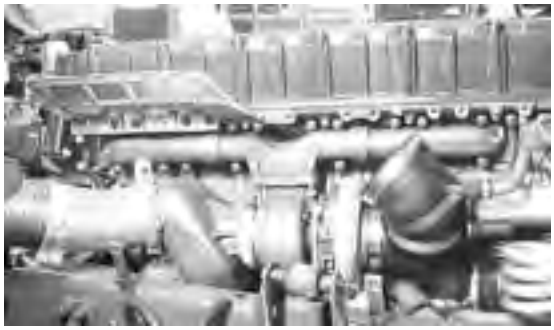


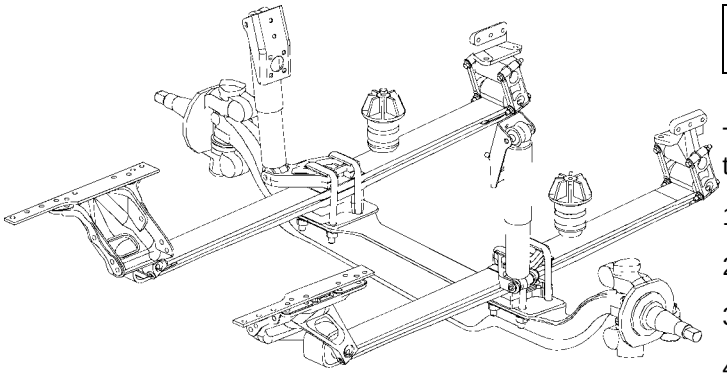
57	Check Exhaust Pipe, Silencer, or Particulater Filter

Note: For further information refer to literature in Function Group 2.

Note: This check is also considered Noise Emissions Control Maintenance, which is required maintenance for any Volvo vehicle. For further information on Noise Emissions refer to “Noise Emissions” page 6.

To perform a check of the exhaust pipe, Silencer or Particulater complete the following

- Check if there is exhaust leakage around the exhaust ports on the cylinder heads, at the intake and exhaust manifolds, and at the flanges; exhaust pipe(s), Silencer or Particulate Filter.
- Check if there is exhaust leakage at the jointing clamp for the front exhaust pipe.



58	Check Springs and U-Bolts

To perform a check of the Springs and U-bolts complete the following:

1 Check the springs for damaged or broken leaves.

2 Check the spring bushing location in the spring eye.

3 Inspect the U-bolts for signs of movement or wear.

4 Check that the spring center is aligned with the center of the spring pad on the front axle beam. Verify this alignment by inspecting the underside of the spring to see if there are any signs of movement between the spring and the axle member.

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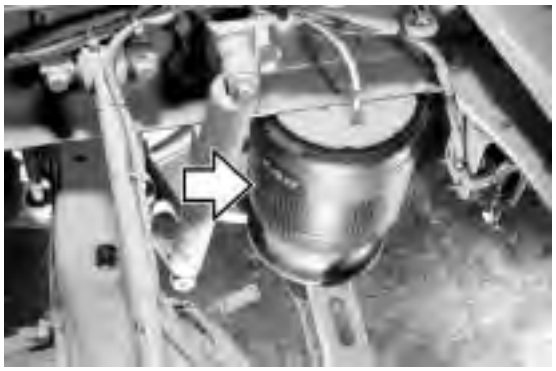
59	Check Central Lubrication System

Not applicable to VN/VHD vehicles.



60	Check Air Suspension and Air Springs

Note: For further information refer to literature in Function Group 7.

To perform a check of the Air Suspension and Air Springs complete the following:

1 Check suspension torque rods and the top shock absorber mounts for wear and looseness.

2 Inspect all spring hanger, torsion leaves and suspension fasteners to the axle.

3 Inspect all air springs for wear and cracks.

4 Check ride height of air suspension.

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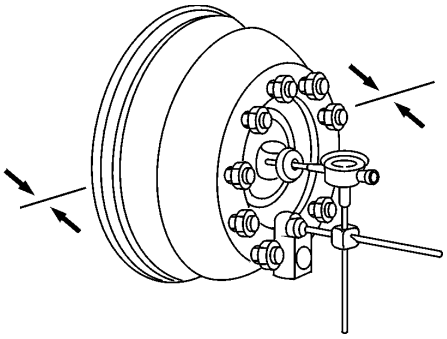
61	Check Rear Wheel Bearing Clearance

Note: For further information refer to literature in Function Group 7.

To perform a check of the rear wheel bearing clearance complete the following:

- Check wheel bearings with a dial indicator. Bearing axial clearance should be within 0.04 to 0.12 mm (0.001 to 0.005 in.).



62	Check Front Wheel Bearing Clearance

Note: For further information refer to literature in Function Group 7.

To perform a check of the front wheel bearing clearance complete the following:

- Check wheel bearings with a dial indicator. Bearing axial clearance should be within 0.04 to 0.12 mm (0.001 to 0.005 in.).

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63	Check Brake Linings

Note: For further information refer to literature in Function Group 5.

To perform a check of the Brake Linings complete the following:

- Measure the brake lining through the inspection holes in the backing plates. See each manufacturer's specifications for minimum lining thickness.

64	Check Brake Cylinders, Levers and Forks

Note: For further information refer to literature in Function Group 5.

To perform a check of the Brake Cylinders, Levers and Forks complete the following:

1 Remove the wheel and brake drums.

2 Inspect the brake cylinders, levers and forks for signs of wear, warp or cracks.

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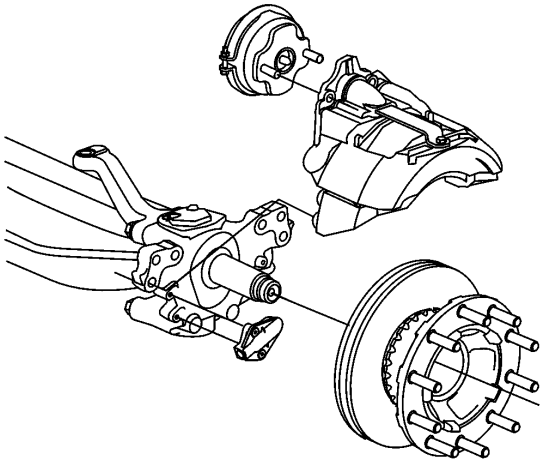


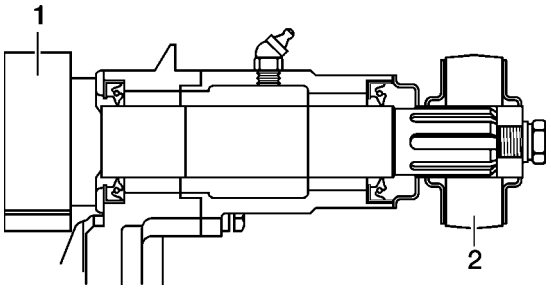
65 Check Brake Disc and Calipers

Note: For further information refer to literature in Function Group 5.

To perform a check of the brake discs and calipers complete the following:

1 Remove the wheel.

2 Inspect the brake discs and calipers for signs of wear or damage.



66 Check Brake Levers, Slack Adjusters, and Brake Drums Travel

Note: For further information refer to literature in Function Group 5.

To perform a check of the brake lever, slack adjuster, and brake drums travel complete the following:

1 Remove the wheel and brake drums.

2 Inspect brake lever for signs of wear or damage.

3 Check the slack adjuster throw and operation.

Note: Maximum throw allowed is: 5 1/2 in. slack adjuster: 25-30 mm (1-1 1/4 in.); 6 in. slack adjuster: 20-25 mm (3/4-1 in.).

4 Verify that the length of both slack adjusters on an axle is of the same length.

5 Inspect the brake drums for oil, cracks, heat spots or heavy wear.

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Test Driving

67	Check After Start

Check Clutch Operation

Note: For further information refer to literature in Function Group 4.

DANGER

Read through the road test section to become familiar with what needs to be checked before taking the vehicle on the road. Do not read while operating the vehicle-loss of vehicle control may occur.

Start the test drive by checking clutch pedal play and clutch operation. Clutch pedal play should be 4 to 10 mm (0.15 to 0.40 in.), which is the clearance between the pedal plunger and the piston in the master cylinder.

On VN/VHD vehicles with clutch brake, check function by depressing clutch pedal to within 6 to 12 mm (1/2 to 1 in.) from the floor while engaging a gear. There should be no grating of the engagement teeth when the clutch brake is engaged.

Check Parking Brake and Clutch Slip

Note: For further information refer to literature in Function Groups 4 and 5.

Check for parking brake holding power and also for clutch slippage by engaging direct gear, not allowing the engine speed to go above 1000 rpm and attempt to drive off with the parking brake still applied. The parking brake should hold the vehicle stationary while letting the clutch up slowly to the point where the engine almost stalls or stops.

If the clutch slips or the truck moves forward during this operation, note on form for later inspection of either the clutch or spring brake operation.

Release parking brake and start driving. Check that the parking brakes are released quickly and that no brake drag can be felt.

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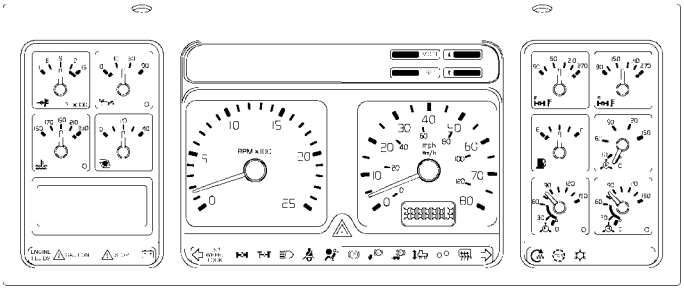
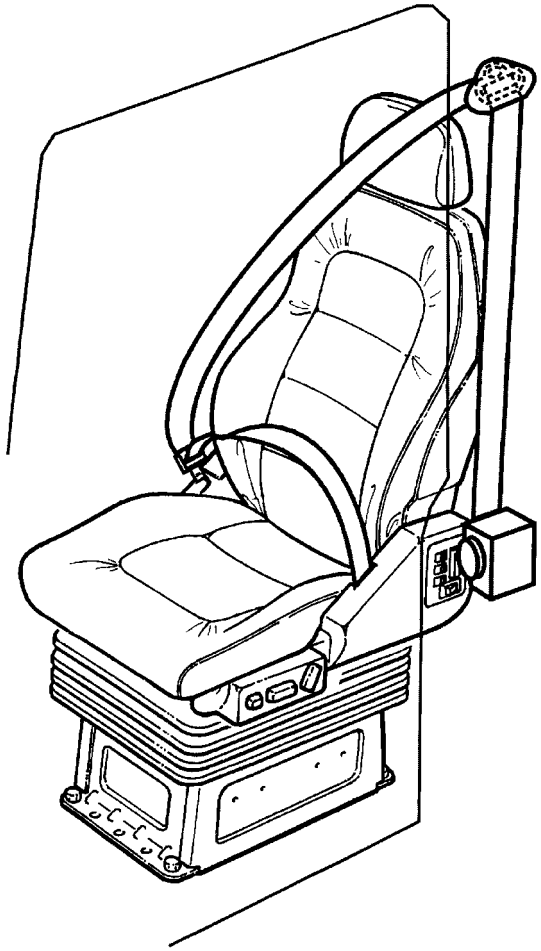


Check Instruments and Gauges

Note: For further information refer to literature in Function Group 3.

Check all instruments and gauges for proper function.

If possible, check the odometer against a measured mile.



Check Safety Restraints

Note: For further information refer to literature in Function Group 8.

DANGER

Failure to properly inspect and maintain the safety belts can cause serious personal injury or death.

DANGER

A damaged safety belt, whether visibly damaged or not, could result in serious personal injury in the event of an accident. The safety belt system should be replaced every five years.

1 Check the belts, buckles, latch plates, retractors, anchorages, and guide loops to ensure that they are working properly.

2 Check for loose/damaged parts (without disassembling) that could keep the restraint system from working properly.

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Check Horns

Note: For further information refer to literature in Function Group 8.

Sound both the air horn (1) and the electrical horn (2). Each should have a strong, even tone.

68 Check During Test Driving

Check Clutch Operation

Note: For further information refer to literature in Function Group 4.

During driving check for smooth operation and engagement when shifting gears. Look for uneven engagement and/or unusual noise.

Wheel Brake Application and Release

Note: For further information refer to literature in Function Group 5.

⚠ DANGER

To do the brake test safely, ensure there are no other vehicles within 300 yards when testing, or perform the test in a off-road area where there is no traffic. Performing a brake test in traffic may lead to an accident, and cause personal injury or death.

During the first part of driving, check the wheel brakes. Check for even application and release. Make sure the vehicle does not pull to the side when the brakes are applied and that the noise is not generated while braking.

Whether a truck is equipped with ABS brakes or not, the bobtail proportioning valve will operate as designed, regulating air brake pressure going to the rear wheel brakes while not hooked up to a semi-trailer. Rear wheels should not lock up during moderate braking when in bobtail mode.

Note: The rear wheels may lock intermittently while driving unloaded under 30 km/h (20 mph) even when equipped with ABS brakes. This is normal in unloaded operation.

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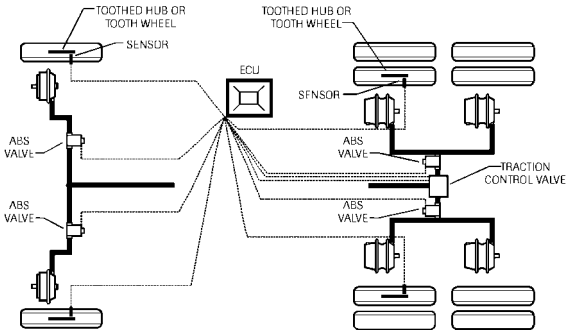

Check ABS System

Note: For further information refer to literature in Function Group 5.

DANGER

To do the brake test safely, ensure there are no other vehicles within 300 yards when testing, or perform the test in a off-road area where there is no traffic. Performing a brake test in traffic may lead to an accident, and cause personal injury or death.

Check the ABS system by attempting to lock up the wheels during hard braking. The vehicle should come to a controlled stop. Brake from a speed of 50 to 55 km/h (30 to 35 mph). Make a full brake application.

Note: The rear wheels may lock intermittently while driving unloaded under 30 km/h (20 mph) even when equipped with ABS brakes. This is normal in unloaded operation.

Also check that the ABS telltale indicator comes on and goes out at approximately 8 km/h (5 mph).

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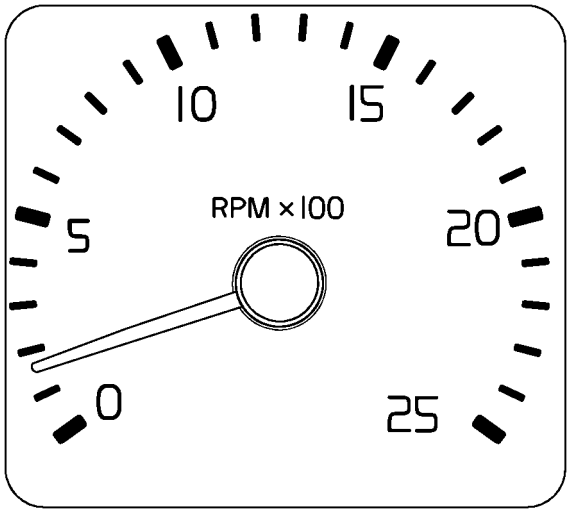

Check Engine Controls and Performance

Note: For further information refer to literature in Function Group 3.

Check engine controls and performance while moving through the gears. Accelerator pedal should work smoothly and without any hesitation in engine response. Engine should accelerate smoothly and without hesitation, misses or surges. Also check the exhaust through the mirrors for excessive smoke during acceleration.

During acceleration in a low gear, let engine go to full speed on a flat stretch of road. Note maximum engine speed. Check each engine manufacturer's specifications for correct speed.

Check Engine Brakes

Note: For further information refer to literature in Function Group 3.

DANGER

When operating a tractor bobtail without a trailer or on slippery roads, the engine brake switch must be in the "OFF" position. Failure to follow these instructions can result in loss of vehicle control and serious personal injury or death.

If the engine is equipped with an exhaust brake (only on Volvo) or an engine brake, check the effectiveness of the retarding force when the brake is engaged.

Engine Brake (D12)

The engine brake has two operation modes, high and low, that are selected by one or two switches on the dashboard. Make sure the brake function disengages by:

- Either depressing accelerator or clutch pedal.
- Engine speed goes under 1000 rpm (1000 r/min).
- Vehicle speed goes under 2 mph (3 km/h).
- Turbo boost pressure going over 50 kPa (7 psi)
- Engaging PTO.
- Engaging ABS.

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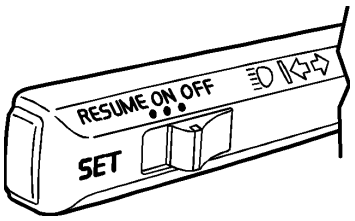
Check Transmission Operation

Note: For further information refer to literature in Function Group 4.

Check the transmission for smooth operation through the gear pattern. Listen for any unusual noise during shifting. Check for excessive play in the shift lever.

Drive vehicle in all gears and listen for any unusual differences in sound between the gears.



Check Cruise Control

Note: For further information refer to literature in Function Group 3.

If equipped, engage cruise control. It should engage and disengage smoothly. Make sure the engine does not surge when in cruise control mode.

Check the resume, accelerate and coast functions. Verify that the cruise control is disengaged by the off switch, clutch operation and brake application.

Check Steering System

Note: For further information refer to literature in Function Group 6.

On the highway the steering should operate precisely and without shimmies, tracking or vibration. When operated at low speed and close quarters doing full turns, the steering should operate without binding in any spot.

Check for Other Noise

Check for unusual noise or vibration that can be contributed to a problem. Listen for unusual:

— Road noises

— Wind noises

— Mechanical noises

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Check Heater and Air Conditioning

Note: For further information refer to literature in Function Group 8.

Check function of heater and air conditioning. Operate the controls and let the fan run on all speeds.

Note: In the summertime, the shut-off valves for the heater may be closed for the season. Open valves before testing heater.

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69 Check After Test Driving

Check Pneumatic Switches

Note: For further information refer to literature in Function Group 8.

If vehicle is equipped with a pneumatic 5th wheel sliding release, operate release mechanism while listening through door or have a helper check the function. Verify that the telltale indicator on the instrument cluster lights up.

Note: If vehicle air pressure is below approximately 720 kPa (75 psi), pneumatic switches will not function. This is a safety lockout for the air brake system.

Operate the differential lock switch(es). Verify engagement by listening to the lock mechanism operating and that the telltale indicator lights up on the instrument cluster.

If equipped with air suspension levelling switch, operate the switch. Verify function by watching the chassis being lowered. Verify that the telltale indicator lights up on the instrument cluster.

Make sure the lock function of each switch works so that the switch can not be engaged without operating the lock.

Check Steering Column Adjustment

Note: For further information refer to literature in Function Group 6.

Press down the release pedal and move the steering wheel column through its possible positions. It should be possible to move the steering column without binding or using excessive force. When the pedal is released, the column should be firmly locked in place.

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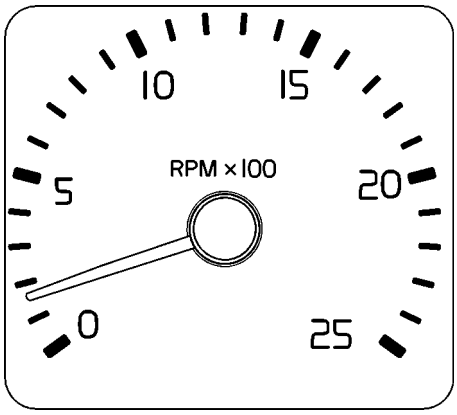
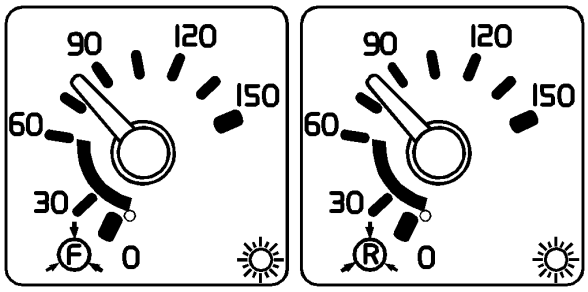


Engine Low Idle

Note: For further information refer to literature in Function Group 3.

Record the engine low idle speed. Listen for idling problems such as surging, missing or unusual noise. See each engine manufacturer's specification for correct idle speed.

Record low and high oil pressure.



Check Low Air Warning Switches

Note: For further information refer to literature in Function Group 8.

Pump the brake pedal while observing the air gauges. As the air pressure is lowering, verify the compressor governor cut-in pressure and the low air warning switches cut-in pressure. Check that both indicator lights in the lower right corner and the Master Warning indicator lights up and make sure the buzzer sounds.

Governor cut-in should be at 790 ± 35 kPa (115 ± 5 psi). The low air warning switches should close at a minimum pressure of 420 kPa (60 psi).

Check Manifold Dash Valve

Note: For further information refer to literature in Function Group 8.

Start the manifold dash valve check by pulling out the yellow knob (Parking). At the same time the red knob (Trailer air supply) should also pop out. Press both knobs in.

Note: The gauges should only be used for general reference. Gauge accuracy below 275 kPa (40 psi) is low.

Lower the air pressure, by pumping the foot brake valve, to the point where the red knob pops out. Verify that this happens at a pressure of 275 ± 35 kPa (40 ± 5 psi).

Hold the red knob in manually and decrease the pressure further. At a pressure of 210 ± 35 kPa (30 ± 5 psi), a tripper valve starts to exhaust the air supply to the trailer. This is the non-override function working. Release the red knob.

Continue to decrease air pressure until the yellow knob pops out. This should happen at a pressure of 170 ± 35 kPa (25 ± 5 psi). Now try to push in both knobs. They should not stay in on their own.

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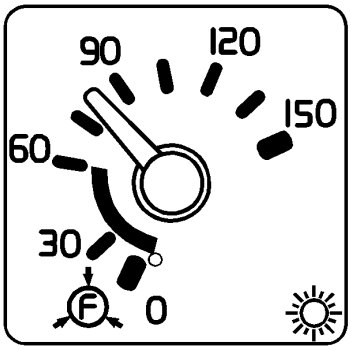

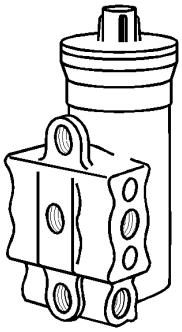

Check Compressor Loading

Note: For further information refer to literature in Function Group 5.

Raise the air pressure until it is 5.8 bar (85 psi). Time the air pressure build time from that point with the engine at full speed. The pressure should reach 6.9 bar (100 psi) in 25 seconds or less. Verify that the governor cutout is at 9 ± .34 (130 ± 5 psi).

Listen for unusual noises from the compressor while it is running under load and unloaded.

When the governor cuts out, check for air dryer exhaust function by listening for the air release from the air dryer through the door or window.

Check Wipers and Washer

Note: For further information refer to literature in Function Group 9.

Check the windshield wipers and washer from inside the cab. Wipers should operate smoothly and without any binding in the sweep. Listen for any unusual noise. The blades should clear the swept area without leaving streaks or missing any spots.

Check the intermittent mode function.

Note: To shorten the interval time, move the lever to normal wipe position, and then to the interval wipe position again when the next wiper sweep is desired. This way, the interval can be programmed between 1–10 seconds.

Operate the windshield washer and check that the spray pattern covers the windshield effectively.

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70 Finish

Drive Vehicle; Check Fluids

Drive the vehicle around the block to settle the oil and to verify any points that were found during the inspection.

Check all fluid levels. Make sure there are no signs of leakage after changing oils or filters.

Clean

Clean all areas that have been dirtied during the test drive. As a courtesy to the customer, be especially careful about making sure the cab area is as clean or cleaner than when the vehicle came into the shop.

Attach a new maintenance sticker.

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Additional Time Based Maintenance

Every:
Year

Volvo Engine

Adjust valves on the VE D7C and the D12 engine every 12 months, regardless of mileage. Preadjust the D7C engine initially at 6 to 8 months. Preadjust the D12 at 3 months. See engine manual for specifications and procedures.

Every:
Two Years

Engine Coolant

Engine coolant needs to be changed every two years unless the maximum mileage has been reached before that. See specification section for each engine manufacturer's mileage recommendation.

Caterpillar: Coolant Extender Added

If using long-life coolant in a Caterpillar engine, add coolant extender every second year.

Clutch Hydraulic Fluid

Change the hydraulic fluid in the hydraulic system for the clutch. The clutch hydraulic system fluid collects moisture from the air and will eventually hold enough moisture to affect the metal surfaces in the system unless removed.

Drain fluid by removing the lid for the fluid container and then drain through the bleed fitting on the clutch slave cylinder into a container.

Use bleeder tool 999 6928 to refill the hydraulic system with new fluid. Use fluid to specification DOT 4.

Fan Hubs

Check clutch lining condition and thickness every 80,000 km (50,000 miles). Use lining wear gauges where applicable.

Inspect engagement mechanism for air leaks.

Every:
Two to Three Years

Air Dryers

The exchange interval of the air dryer cartridge is heavily dependent on how often the compressor cycles off and on and if the climate is hot and moist or cool and dry.

Do not use a dryer cartridge for more than three years. It may have to be changed before that. If a lot of fluid is collecting in the wet tank, then the desiccant in the dryer may be saturated and needs to be changed.

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Every:
Three Years

Caterpillar: Engine Valves and Injector Preload

Engine valve lash adjustment is checked and, if necessary, adjusted every third year. At the same time, adjust the injector preload. Refer to the Caterpillar Service Manual for correct procedure.

Caterpillar: Engine Compression Brake Slave Piston Lash

If the engine is equipped with an engine compression brake, adjust the slave piston lash after the engine valves are adjusted. Make the adjustment with the engine stopped. Refer to the Caterpillar Service manual for adjustment information.

Every:
Four Years

Caterpillar: Long-Life Coolant Change

At every fourth year or 6000 hours of operation, change coolant if Long-life coolant is used.

Use only clean water to flush out cooling system. Replace the coolant filter at the same time.

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Additional Mileage Based Maintenance

Every:
80,000 km (50,000 miles)

Eaton Fuller and Meritor Transmissions

Regular oil change intervals when petroleum oil is used are at every 80,000 km (50,000 miles). See specification section for oil types and viscosities.

Every:
96,000 km (60,000 miles)

Caterpillar: Initial Valve Lash/Injector Preload

Do an initial check on engine valve clearance and injector preload, between
19,000 and 96,000 km (12,000 and 60,000 miles). Adjust if necessary.

Every:
120,000 km (75,000 miles)

Volvo Transmission

Regular oil change intervals for Volvo transmissions are at every 120,000 km (75000 miles). See specification section for oil types and viscosities.

Volvo Rear Axle

Regular oil change intervals for Volvo rear axle is at every
120,000 km (75,000 miles). See specification section for oil types and viscosities.

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Every:
190,000 km (120,000 miles)

Detroit Diesel: Engine Valve Clearance and Injector Height

Check valve clearance and injector height. Adjust each as necessary. For specific information refer to Detroit Diesel Service Manual.

Cummins: Overhead Set Adjustment

Check valve clearance and injector adjustment. Adjust each as necessary. For specific information refer to Cummins Service Manual.

Every:
240,000 km (150,000 miles)

Steering System Fluid Change

Change steering system hydraulic fluid every 240,000 km (150,000 miles). Use Dexron® II or Dexron® III.

If the fluid is very dark in color, there may have been heat problems in the system. Note on the inspection form for follow-up.

Every:
385,000 km (240,000 miles)

Cab Fresh Air Filter Change

Change cab fresh air filter at 385,000 km (240,000 miles). If the vehicle is driven in dusty conditions, the filter may have to be changed more often.

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Feedback

One of our objectives is that workshop personnel should have access to correct and appropriate service manuals where it concerns fault tracing, repairs and maintenance of Volvo trucks.
In order to maintain the high standards of our literature, your opinions and experience when using this manual would be greatly appreciated.
If you have any comments or suggestions, make a copy of this page, write down your comments and send them to us, either via telefax or mailing directly to the address listed below.

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