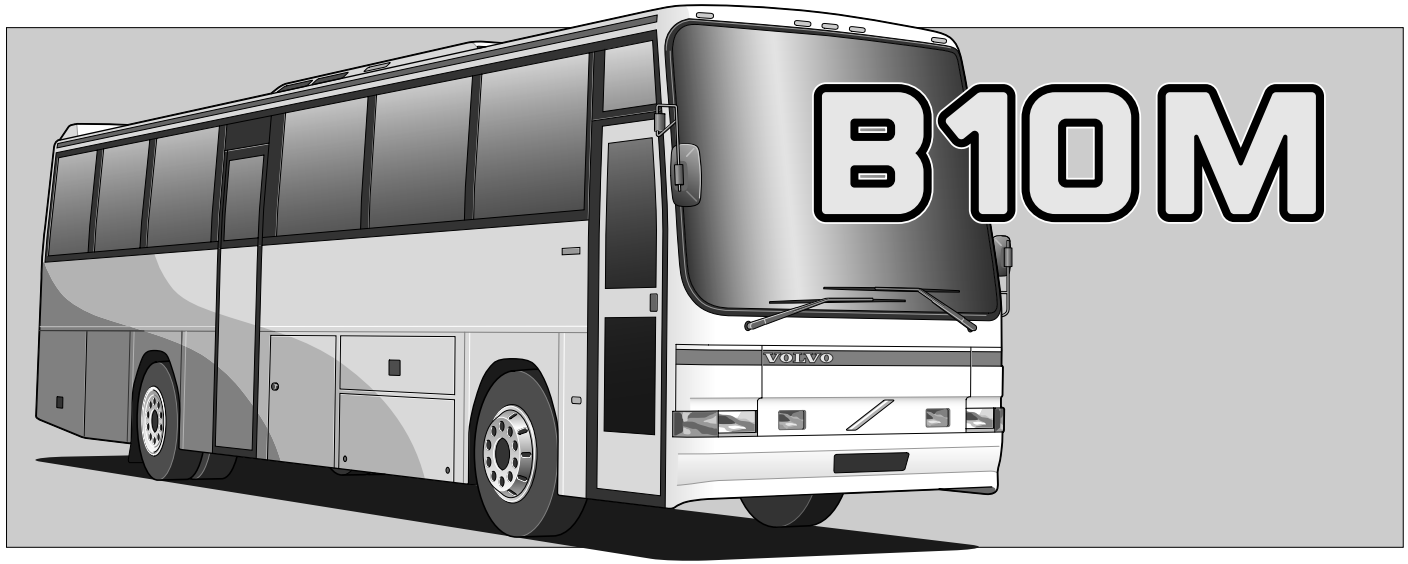
Driver's Manual



VOLVO

Keep this manual in the bus!

Read it thoroughly. It contains important information for the driver.

This driver's manual deals with driving and maintenance of your B10M. Service reliability, long service life and good environmental properties characterize this bus – properties that undoubtedly agree with your own demands and expectations. To achieve what you expect from this bus, we advise you to read this manual carefully. We strongly recommend that you follow our advice regarding driving and maintenance.

The manual is intended to be used as both an instruction manual and a reference book. Therefore, the manual contains some numerical data which is useful to know when searching for specific data. If there is anything else you wonder over regarding service and maintenance of your B10M, you are welcome to contact your dealer.

Due to the fact that much of the equipment in the bus is fitted by different body manufacturers, this manual will deal mainly with the chassis.

The body manufacturer is responsible for information on e.g. radio/loudspeaker system, heating system or air-conditioning.

Technical data, construction details, descriptions and illustrations were up to date when this manual was published.

Volvo Bussar AB reserve the right to make changes to the bus specifications without prior notification.

VOLVO

Volvo Bus Corporation

March 1999

Driver's responsibility – safety

- As the driver of the vehicle, you are responsible for the safety and comfort of the passengers during the journey. Therefore, please do not drive the vehicle until you are familiar with and understand what the indicator lights, warning lights and instruments indicate and warn for. You should also be familiar with how controls and safety equipment should be used.

- As the driver of the vehicle you should be aware of the vehicles weight and loading capacity. See instructions on warning stickers, the vehicle's registration book and on the identification plate.

- As the driver of the vehicle you should foresee risks to your passengers.

- As the driver of the vehicle you are responsible for making sure that the safety equipment is used and is in working order. Check regularly therefore the working order of safety belts, emergency door opening, clamping strips, fire extinguishers and first aid equipment.

- The vehicles braking system works on compressed air. Never drive if the air pressure is too low or if you discover other problems with the brakes.

- Be observant of faults in the steering. The vehicle can be steered even if the power steering is not working, although this will result in heavy steering.

- Follow the recommended service and maintenance program to ensure the bus's condition and safety. Instructions can be found in the Service Manual; "Service and Maintenance".

- Remember it requires special knowledge, access to information and special tools to be able to carry out reliable repairs.
- **Never** crawl under the bus if it is only supported by a jack. Use approved vehicle supports or a solid pallet in case of punctures or wheel changes. Lifting device should stand on a horizontal surface. The wheels which are not to be lifted should be blocked so as to ensure that vehicle will not begin to roll.
- Retighten the wheel nuts after approximately 200 km if the wheel has been removed.
- Tighten the wheel nuts every 6 months regardless of whether the wheels have been removed or not.
- Observe that the bus tyres and rims should be approved for the intended load and speed in accordance with the current laws.
- Be observant of exhaust and fuel smells. Possible leaks should be immediately taken care of at the garage.
- **Besides on these pages, information of special importance to safety can also be found in other places in this manual. Such information is marked in the following way:**

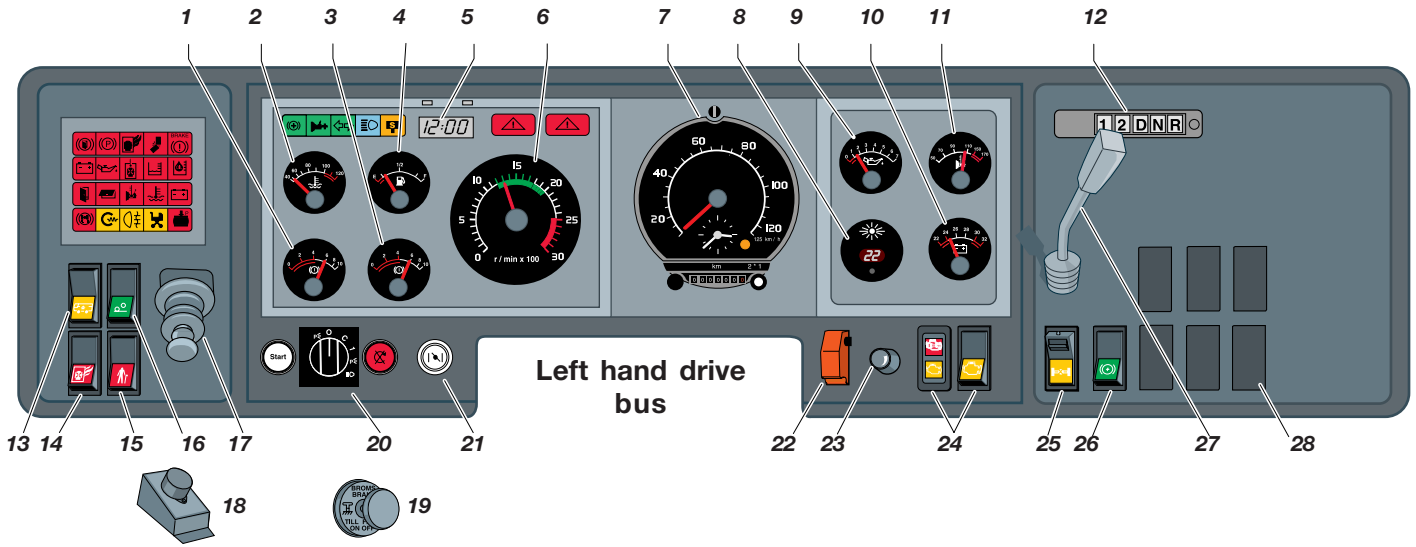
⚠Warning!

This warning stresses that an accident will occur or may occur if the instructions are not followed. An accident can cause personal injuries, possible deaths or serious damage to property.

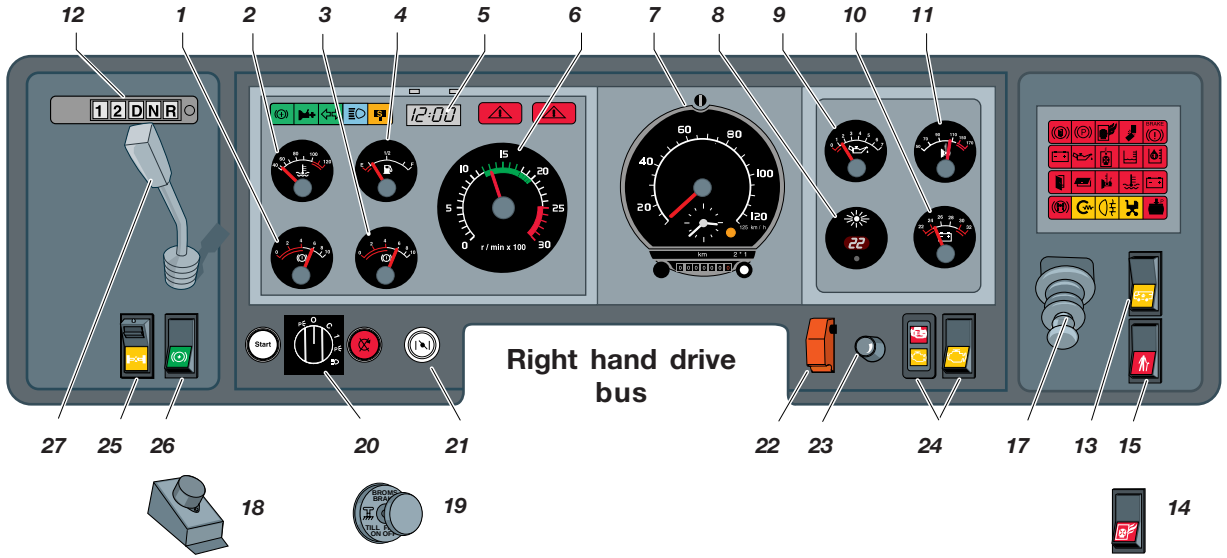
Pay attention to warning and indicator lights!

Their purpose is to warn of danger.

Dashboard



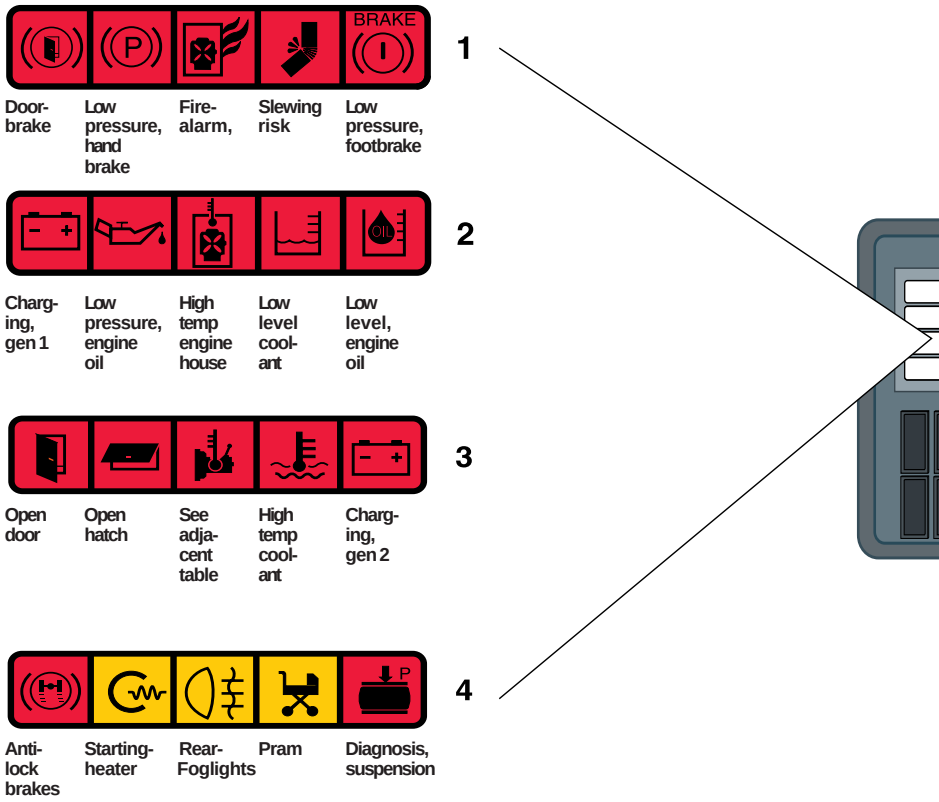
The illustrations show the most common switch locations, but there can be variations. Symbols and explanations of functions are, however, always accurate.

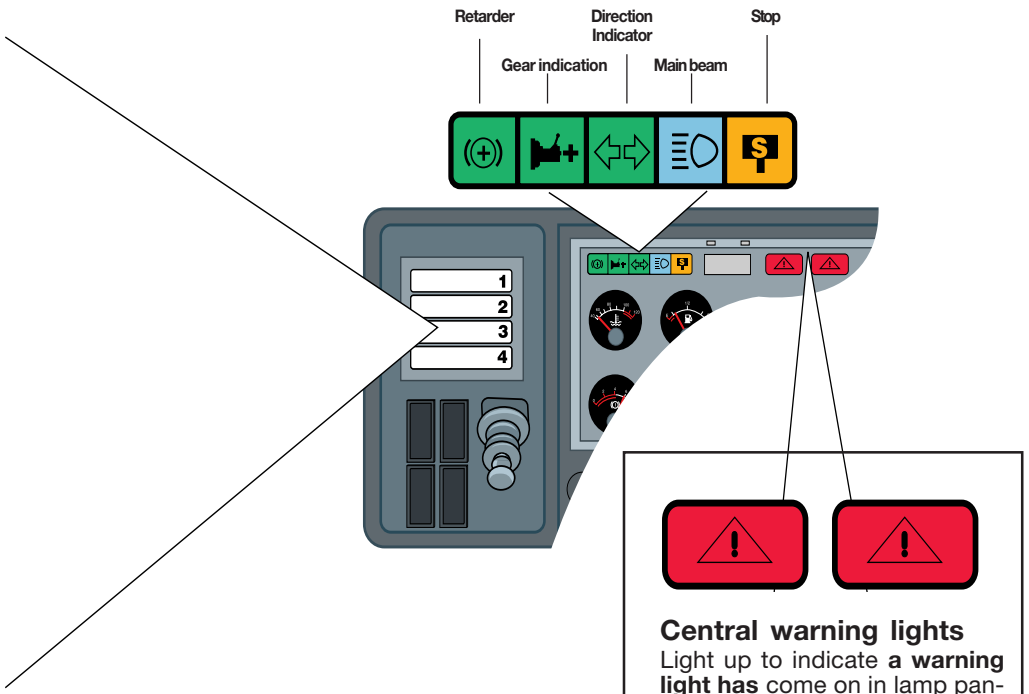


13. Levelling control 30
14. Fire alarm system 12
15. Kneeling 30
16. Bogie lift 32
17. Handbrake control 22
18. Exhaust brake 27
19. Blocking valve 23
20. Light switch 13
    or
20. Feed switch with start and stop buttons 14
21. Starting heater 14
22. Emergency cut-out 12
23. Instrument lighting, rheostat 15
24. EDC engine control system 39, 82, 85
25. Differential lock 32
26. Retarder switch 28
27. Hand control, retarder 28

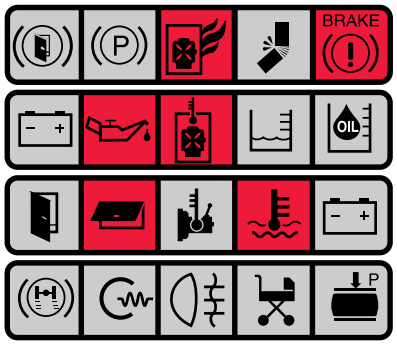
Warning and indicator lights, see next page

Warning and indicator lights





Central warning lights
Light up to indicate **a warning light has** come on in lamp panel row 1–3.



Buzzer
Sounds when one of these warning lights comes on.

Controls on steering column

Direction indicators Dipswitch and main beam flash

Push the direction indicator lever until resistance can be felt (1). The lever will spring back from this position when it is released. Used when changing lanes and when making other small changes in direction.

When the lever is pushed past the ”pressure point” to position 2, the direction indicators will be active until the steering wheel is turned back to a neutral position or when manually reset.

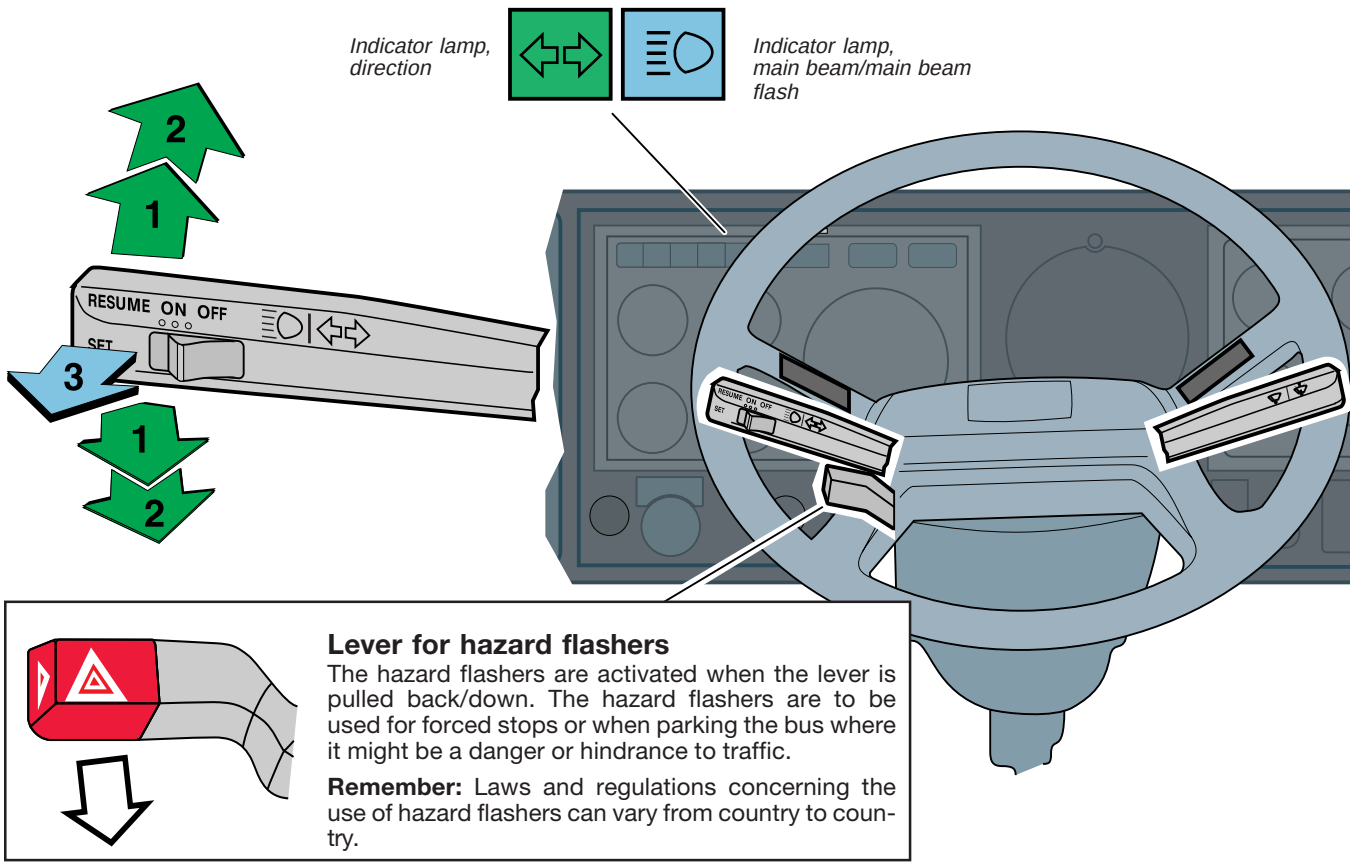
When the light switch is on, the main/dipped beams can be selected by pulling the lever towards the steering wheel (3).

When the light switch is not on, the function for main beam can be utilized (”main beam flash”) by pulling the lever in the same direction.

Cruise control

Buses with the EDC electronic engine control system are also equipped with cruise control and the possibility to regulate idling speed.

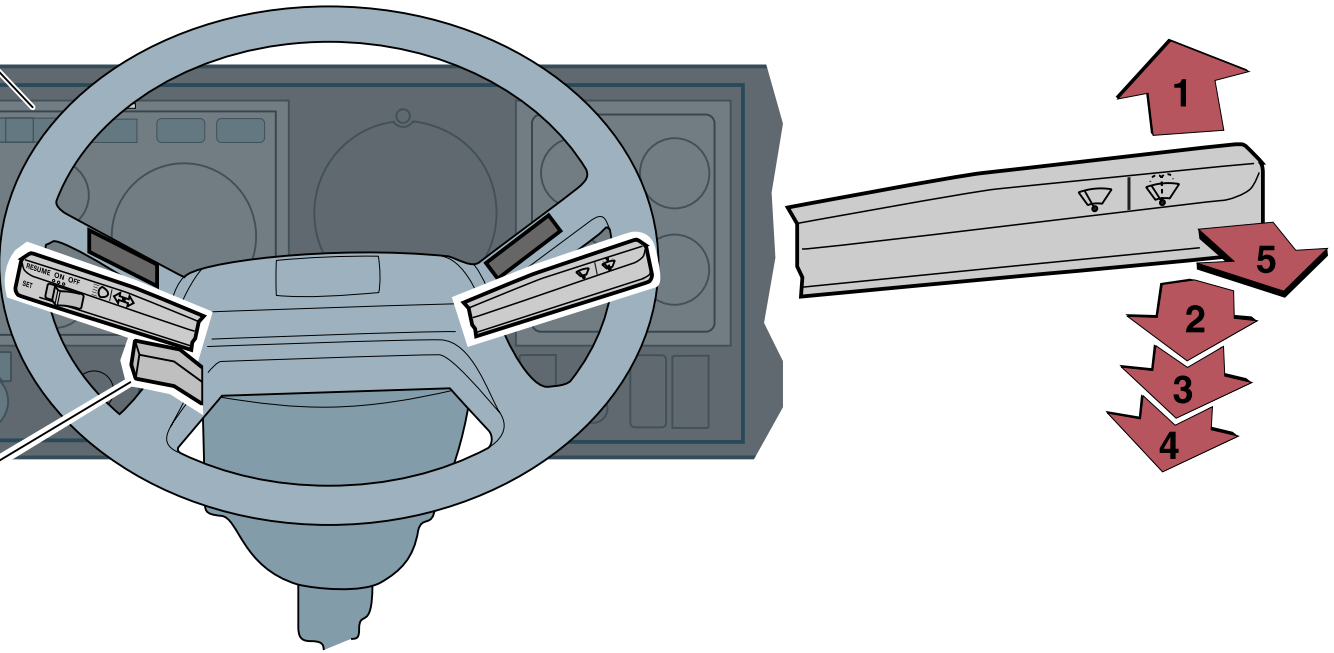
Read more about this in the chapter ”Driving”.



Lever for hazard flashers

The hazard flashers are activated when the lever is pulled back/down. The hazard flashers are to be used for forced stops or when parking the bus where it might be a danger or hindrance to traffic.

Remember: Laws and regulations concerning the use of hazard flashers can vary from country to country.



Windscreen wiper/washer Headlight cleaner

Position (1) is intended for intermittent wiping.

Used when driving in mist or fog for example. Intermittent wiping is fitted by the coach-builder and included in most bus models.

Like the direction indicators, the windscreen wipers have a spring loaded pressure point (2), in which position the wipers operate for as long as the lever is held there.

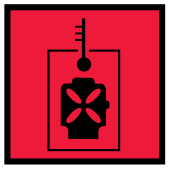
When the lever is moved past the pressure point (to position 3), the windscreen wipers will operate at normal speed.

In position (4), the windscreen wipers operate at an increased rate.

When the lever is pulled towards the steering wheel (5), the windscreen washers + headlight cleaners will be activated. The windscreen wipers are also activated and continue to wipe 2–3 times after the lever has been released.

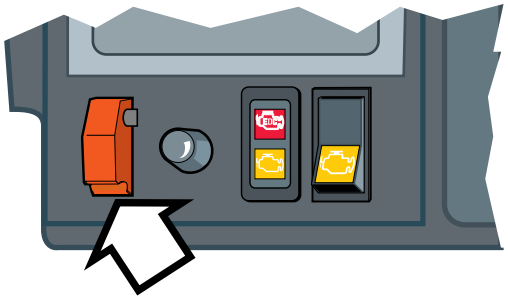
Fire safety

Fire alarm



High engine compartment temperature

Switch for checking fire alarm system.



Fire alarm system

When the spring-loaded switch for the alarm system is activated, the warning lights for fire, high engine compartment temperature and the central warning light will come on and the buzzer will sound. This procedure will check that the fire alarm system is working.

⚠ Warning!

If any of these warning lights come on while driving:

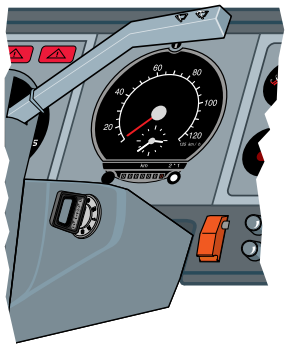
Stop the bus and break the current using the emergency cut-off switch (or the battery master switch if there is no emergency cut-off switch).

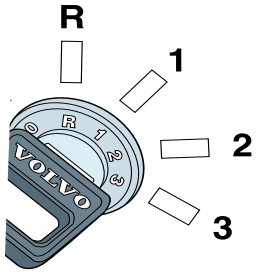
At the slightest hint of danger – ensure passenger safety!

Emergency cut-out (option)

When the emergency cut-out is activated everything electrical is cut off with the exception of the hazard flashers and communication radio if fitted. On certain models the fuel supply is also cut off.

Start and light controls

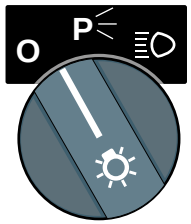




Starting switch

Starting switch controls start/stop, voltage feed, indicator and warning lights. If there is a steering lock, this will be activated when the key is removed from the starting switch.

0 *Neutral position (steering lock and stop position)*
R *Radio position*
1 *Drive position*
2 *Check position for indicator and warning lights*
3 *Starting position*



O *Lights off (alt. day running lights)*

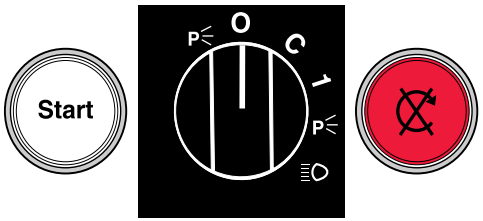
P *Parking light*

Main/dipped beam

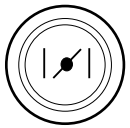
Light switch

Switches for parking lights and main/dipped beam for buses with starting switch. Located on the left-hand side of the steering wheel on the dashboard.

With the light switch in the 0-position the day running lights, if fitted, will come on when the starter key is turned to the drive position. With the switch in the parking light position the day running lights are not activated (only used when parking). In the position main/dipped beam, all external lights will be functional.



Start button *Feed switch* *Stop button*



Activate

Indicator lamp

Feed switch and start/stop buttons

Certain buses have pushbuttons for start/stop and a feed switch for the power supply instead of a starter switch and a light switch. The feed switch and start/stop buttons are located with the light switch at the bottom of the dashboard on the left-hand side of the steering column.

The feed switch is a knob with 6 different positions:

P		*Destination sign lighting*
O		*Neutral position*
C		*Check position for indicator and warning lights*
1	*Drive*	*Day running lights on*
P		*Parking light on*
≡O		*Main/dipped beam on*

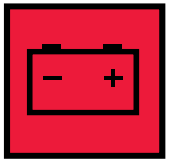
Starting heater

When the button is pressed in, only one impulse is needed, the starting heater (pre-heating) will be connected and the indicator lamp comes on.

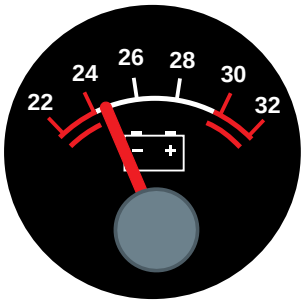
The amount of time that the starting heater is connected is controlled by the coolant temperature.

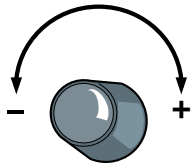
See the chapter on start of engine for information on the starting procedure,

Other electrical components and lights



The light is on: generator not charging!





Charging

The warning light is on when the generator is not charging. If the light comes on while driving this means that there is a fault in the electrical system or that the generator belts are slipping.

To avoid damage to the bus's electronics, the charging system is equipped with a guard that "shuts down" the generator if it supplies overvoltage (transients). The warning light will also go in this instance. The transient guard is reset when the engine is turned off and restarted.

The warning light should light up when the starter key is in the drive position and the engine is not running. When the engine starts, the light should go out .

Buses with two generators have two warning lights; one for each generator.

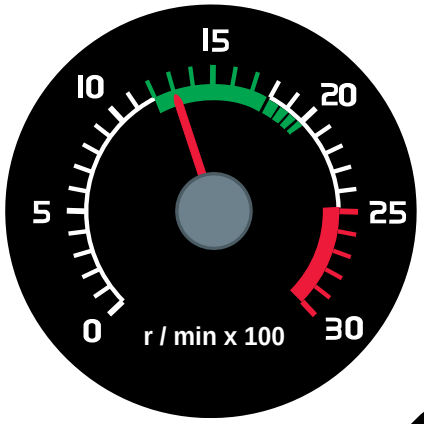
Voltmeter (option)

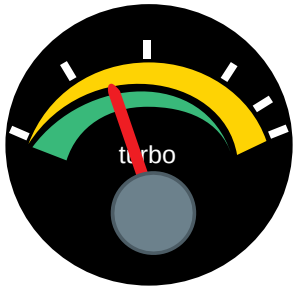
Indicates the battery's electrical system voltage. If the indicator goes into the lower red zone, the generator and charge regulator should be checked. If the indicator goes into the upper red zone, the charge regulator should be checked.

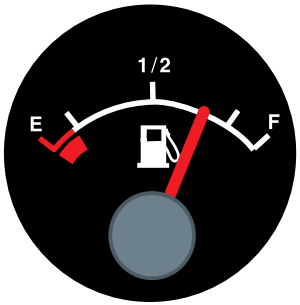
Instrument lighting, rheostat

Turning clockwise gives stronger instrument lighting, turning anti-clockwise gives weaker.

Engine







Engine speed

To achieve better performance with increased engine service life, it is wise to maintain correct engine speed.

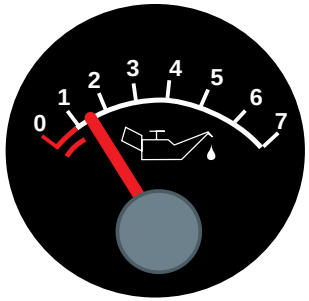
1. The engine has less pulling power in the engine speed areas below the green zone. High load at low engine speeds increases fuel consumption and the risk of overheating.
2. Inside the green zone, optimum pulling power and fuel economy will be obtained. When driving, the engine speed should be kept in this zone as much as possible. Inside the green-striped engine speed zone the pulling power is also high, but the fuel economy somewhat lower.
3. Never let the needle go into the red.

Turbo pressure "econometer" (option)

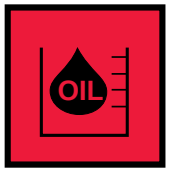
Indicates overpressure in the engine intake manifold. When driving on level roads the pointer should remain on a low level (wide green zone) for best fuel economy.

Fuel level

States the relative amount of fuel in the fuel tank. Fuel tank volume and the fuel tank location may vary between different models.



If the light comes on: stop immediately!



If the light comes on: stop immediately!

Lubricant pressure

– Warm engine ..... 300–500 kPa
3–5 kp/cm^2
– Idling, minimum ..... 50 kPa
0.5 kp/cm^2

Lubricating oil pressure gauge is optional.

Low oil pressure

The warning light comes on when the oil pressure in the engine goes below 50 kPa (0.5 kp/cm^2). If it comes on while driving: stop the engine **immediately** and investigate the cause. The warning light should light up when the starter key is in the drive position and the engine is not running. When the engine starts the warning light should go out.

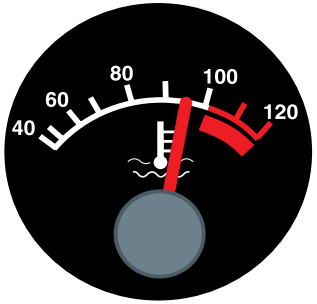
Low oil level

The warning light comes on if the oil level in the engine oil tank gets too low. Stop the engine and check the oil level in the level glass on the oil tank. Check for possible leaks. When filling oil, be sure to use the right grade. Read more about changing/topping up oil in the chapter ”Service and Maintenance”.

⚠ Warning!

If either or both of the lamps go on while driving:
Stop and turn off the engine immediately!

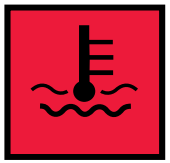
There will otherwise be a great risk of serious engine damage!



Coolant temperature

Indicates the temperature in the engine coolant system and thereby the engine operating temperature. Under very hot conditions, the indicator may reach up to the edge of the red zone.

The bus must not be driven with the indicator in the red zone. When the warning light comes on, see below.



If the light comes on: stop immediately!

High coolant temperature

The light comes on when the maximum permitted coolant temperature is exceeded.

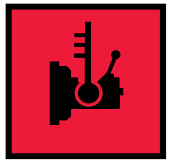
If the light comes on while driving: Stop the engine and check the temperature gauge reading. If the indicator is in the red zone, the coolant temperature is so high that the bus should not be driven.

If the cause can not be found: Contact a garage.

If the light comes on: stop immediately!

Low coolant level

If this light comes on while driving: Stop and check the level in the coolant system expansion tank. Check the coolant system for leaks before topping up.



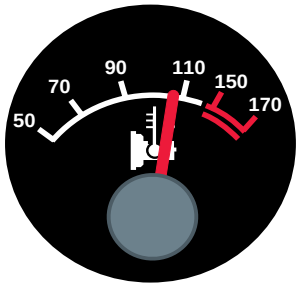
High oil temperature

This lamp is fitted on buses with automatic transmission. (Buses with G8 EGS gearboxes have a similar

the same position on the lamp panel. Read about the function of the lamp in the chapter ”If anything happens”.)

The lamp will go on if the oil temperature in the gearbox gets too high.

Reduce speed or disengage the retarder if the lamp goes on. If the temperature still does not drop, you must stop the bus. Engage neutral and raise the engine speed for a few seconds. If the temperature does not drop immediately, the oil level may be too low or there may be a fault in the gearbox oil cooling.



Oil temperature gauge

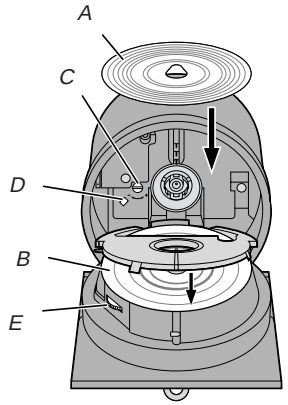
Fitted on buses with ZF automatic gearbox.

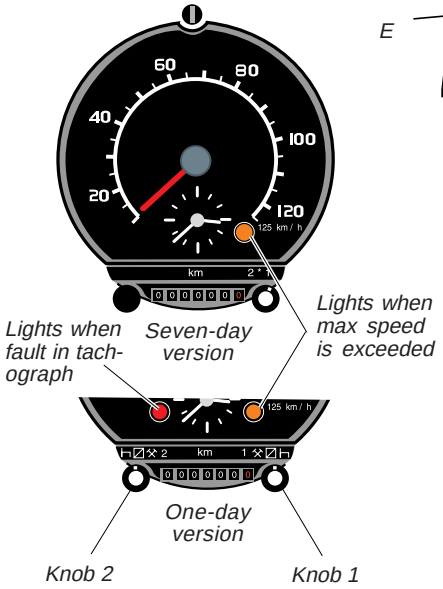
Indicates oil temperature in °C. Normal oil temperature is 90–100°C. The temperature normally rises when the retarder is used.

Measures when oil temperature too high: see above.

Tachograph/speedometer

Open tachograph
A Driver's tachograph disc
B Co-driver's tachograph disc
C Setting warning signals
D Reading speed
E Setting time






other working time than driving time


standby-time, journey time, waiting time


rest time

The tachograph automatically registers your driving time, speed, standstill time, number of stops and driven km (alt miles). On the display, you can also read the time and number of kilometres driven. (alt miles).

When registering a change of driver on the tachograph, the reset knob should be set by the new driver to "his/her" start position before starting a new journey.

The most common form of one-day tachographs accommodates two tachograph discs. One for driver (A) and one for the second driver (B). The current driver should have his tachograph disc placed on top (on top seen when the tachograph is open). Registering of driving data according to the first paragraph of this page is done on that tachograph disc (irrespective of knob 1's position).

If a second driver's tachograph disc is not needed, it should be replaced with a plastic disc. The tachograph disc holder should never be empty.

Knobs 1 (for the main driver) and 2 (for the second driver) must be set according to the captions by the symbols if anything other than driving time is to registered correctly.

If the law does not stipulate a tachograph, the bus will have a standard speedometer.

Speed limiter

DH10A-engine: Road speed limitation is a built-in function in the electronic engine control system. Maximum top-speed can be programmed by authorized personnel to a desired speed or in accordance with national regulations.

THD102-engine: A separate speed limiter is an option.

Setting warning signal

Open the tachograph.

The level for the speed warning signal is set by turning the set screw (C), which is located just above where the speed can be read (D), to the right or left.

Setting the clock

1. Open the tachograph and set the exact time using the toothed setting wheel (E). The second hand in the middle of the clock shows that the clock is working.
2. Check that the actual time corresponds with the time that can be read on the tachograph disc's time scale at the red marking. On setting the clock, the difference for example between 04.00 and 16.00 must be taken into account. (Applies to one-day tachographs). It is possible that the clock must be put forward 12 hours.

Changing the tachograph disc

One-day tachograph

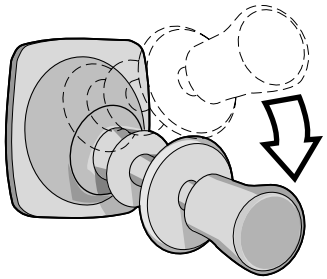
1. Fill in the tachograph disc's inner section: driver, bus's registration no. and current meter reading.
2. Open the tachograph.
3. Lay the completed tachograph disc face up in the holder and push it down. The second driver's tachograph disc should be placed under the hinged dividing plate and the current driver's tachograph disc on top. Make sure the egg-shaped hole is not damaged. Close the tachograph – the tachograph disc is now held automatically in place.
4. After finishing work, yet no later than 24 hours after, the tachograph disc should be removed and the current date, meter reading at end of journey and distance travelled should be filled in.

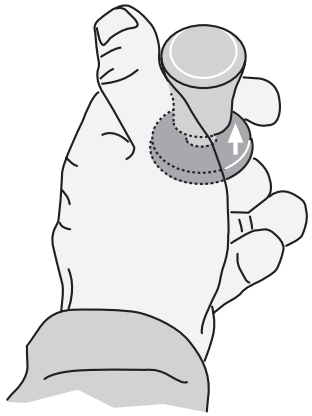
Seven-day tachograph

1. Fill in tachograph disc's inner section (see instructions for the one-day tachograph). Only the first tachograph disc in the bunch needs to be provided with handwritten information.
2. Open the tachograph.
3. Loosen the clamping ring by turning to the left and remove. Insert the bunch of tachograph discs so that the current time ends up in the middle of the red marking, which is placed under the detach knife. Centre the bunch over the tachograph disc holder.
4. Turn the bunch of tachograph discs so that the exact time on the top disc is in the middle of the red marking.

   NOTE! – The inserted bunch of tachograph discs should only be turned in the direction of the arrow.
5. Once the correct time is set, the bunch of tachograph discs can be pressed into the holder.
6. Fit the clamping ring on the holder with the locking pins down and lock with a short turn to the right (bayonet fitting).
7. Close the tachograph.
8. After no later than seven days, the registered bunch of tachograph discs must be removed from the tachograph. Complement the information on the first tachograph disc according to the instructions for the one-day tachograph.

Handbrake





Handbrake control

The handbrake works on the drive wheels. When the hand control is in the forward position, with charged air pressure system and blocking valve depressed (see ”Blocking valve”) the handbrake is released.

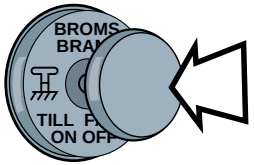
When the control is pulled backwards the handbrake is gradually engaged and it is fully engaged when the control is in its rear locked position. Always check that the handbrake is locked in position.

Articulated buses that have a rigid trailer axle also have a handbrake on this axle.

⚠ Warning!

Never leave the bus without applying the handbrake and locking it.

To release the handbrake control from the locked position, lift the ring upwards.



If the light comes on: stop immediately!

Blocking valve, handbrake

If for some reason the air brake system is empty, due to the bus being parked a long period of time for example, the handbrake can not be released until the blocking valve has been pushed in.

Even if the hand control for the handbrake is in its forward position, the brake will not release until the blocking valve is pushed in. It can be released only when the air brake system warning light has gone out.

Low air-pressure, handbrake

The warning light comes on when the handbrake is applied or if the air pressure in the handbrake circuit is too low to allow the handbrake to be released.

The warning light will stay on until the pressure has reached approximately 540 kPa (5.4 kp/cm^2).

⚠ Warning!

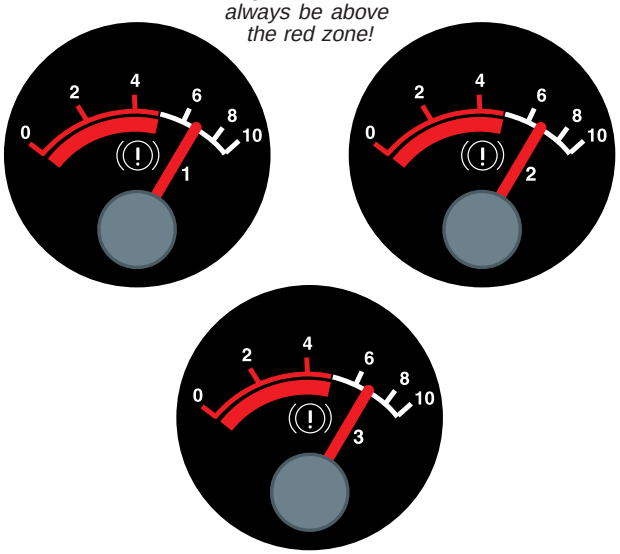
Never begin driving as long as the warning light is on. Stop immediately if it comes on while driving:

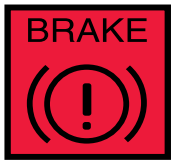
There is a risk that the handbrake can be applied unintentionally.

If a fault occurs in the footbrake system while driving, the handbrake can be used as an emergency brake.

Footbrake

While driving, the indicators should always be above the red zone!





If the light comes on while driving; Stop immediately!

Air-pressure gauge

Gauge1 indicates the pressure in the pressure chamber for the first axle brake circuit and gauge 2 the pressure in the pressure chamber for the second axle brake circuit. While driving, the indicators should be above the red zone.

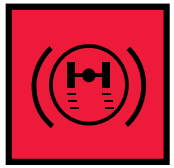
Articulated buses have a third air-pressure gauge which shows the pressure in the pressure chamber for the trailer. This gauge is located in the group of instruments on the right of the steering wheel.

Low air pressure, footbrake

The warning light is connected to both brake circuits and comes on if the air-pressure in either of the circuits drops below 490 kPa (4.9 kp/cm^2).

Never begin driving as long as the warning light is on.

If the light comes on while driving: stop the engine immediately and investigate the cause.



If the light comes on while driving:

THE SYSTEM IS NOT FUNCTIONING

Anti-lock brakes (option)

This indicator light is connected if the bus has anti-lock brakes, ABS.

The ABS-system is not at fault when the indicator light comes on when the starter key is turned to drive position. The indicator light will go out after a couple of seconds when the system has finished performing its tests.

If the light does not come on when the starter key is turned to the ignition position, then there is something wrong with the indicator light or its power supply.

If the light does not go out, or if it comes on again during driving, then a fault has occurred in the ABS-system. See also below under ASR.

The bus can be driven even if the ABS-light comes on while driving. The systems circuits are diagonally connected to the wheels. This means if a fault should occur on the ABS-system, the operation of the diagonal circuit at fault will be disconnected. The normal braking function on the faulty circuit is however fully functional and works like a normal brake circuit when applied.

Anti-spin regulation (option)

Anti-spin regulation, ASR, prevents the drive wheels from spinning when starting and when driving in slippery conditions. If wheel spin occurs, the spinning drive wheel is brought to a halt and/or the throttle speed is reduced, all depending on the driving conditions. ASR is a fully automatic system integrated with ABS-brakes and the engine control system.

There are no warning lights, controls or switches for the ASR-system but due to the fact that the ASR- and ABS-systems are integrated, the indicator light for the ABS also indicates electrical faults in the ASR-system.

Brakes, others

Slewing warning

Emergency disengagement of slewing brake

Be extremely careful when operating emergency disengagement as it was activated to prevent the bus from being damaged.

Light is on: do not drive!

Anti-slewing system

When reversing an articulated bus, the trailer coach may slew to such an angle that the chassis or gaiter may be damaged. There is a warning light and automatic brake system fitted to prevent this from occurring.

Slewing warning

This warning light goes on when the angle between the bus and the coach approaches the critical value (can occur when reversing). Like all other red warning lights, this one will activate the central warning lights.

Slewing brake

If the trailer coach does not stop slewing, the slewing brake will automatically stop the bus.

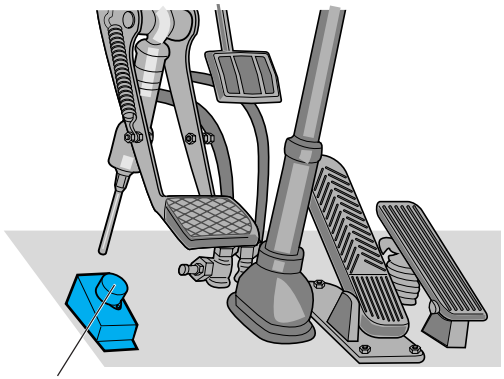
Emergency disengagement of slewing brake

Press in this switch to continue after the slewing brake has been applied. As long as the critical angle is exceeded, this switch must be held in so that the bus can be manoeuvred (straightened).

Door brake

The warning light goes on when the brake system is applied for opening the exit doors or kneeling. Goes out when the doors are closed or kneeling has returned to normal position.

Light is on: the door brake is applied



Switch for exhaust brake

Door brake

The door brake is fitted by the coach-builder. This function is common on local buses and long-distance coaches. The door brake ensures that the bus cannot be driven with an open door. Lit warning light indicates that the brake is applied due to an open door.

Clamping strips

Clamping strips in doors are optional but are available to increase passenger safety. If doors are prevented from closing, the clamping strips sense this and the doors automatically return to the open position. If the bus has clamping strips their function should be regularly checked.

Exhaust brake

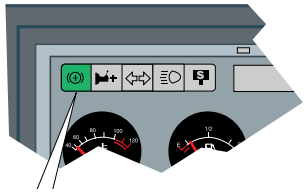
The exhaust brake is a complement to the footbrake system and is activated by a foot switch. The exhaust brake is included in the engine exhaust pressure regulator.

Just like the retarder, the exhaust brake affects only the drive axle. This means that it should not be used in slippery conditions as the bus can easily skid when only the driving axle is braked.

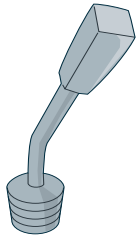
Read more on braking with the exhaust brake in the chapter ”Driving”.

⚠ Warning!

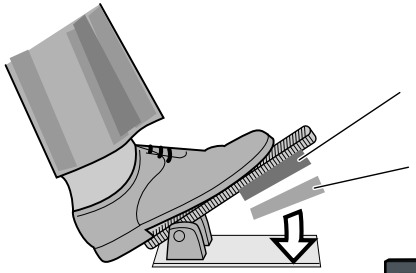
The exhaust brake only affects the drive wheels. Braking only the drive wheels may cause skidding on slippery roads.



The indicator light is on while retarder braking is in progress.



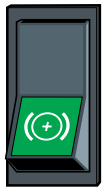
Hand lever for retarder



Braking with retarder.

Braking with both retarder and wheel brakes.

Brake pedal



Switch to interrupt retarder activation via brake pedal

Retarder

Buses with automatic transmission have the retarder integrated in the gearbox and manual buses can be fitted with an optional electromagnetic or hydraulic retarder.

The retarder is a complement to the ordinary braking system. Correctly used, a retarder will increase the service life of the wheel brake linings many times over.

The retarder has no braking effect when the wheels are stationary or rotating slowly. It can therefore not be used as a parking brake or to lock the wheels.

The first stretch of travel when the brake is depressed, before the wheel brakes are applied, will activate the retarder. See adjacent illustration.

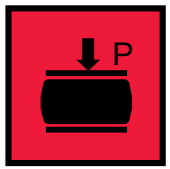
To avoid problems on slippery roads, for example, the activation of the retarder **via the brake pedal** can be turned off with a switch.

Many buses with retarder also have a lever on the dashboard. The retarder will be engaged gradually as the lever is pulled towards you.

Read more about braking with retarder in the chapter ”Driving”.

⚠ Warning!

The retarder only affects the drive wheels and can therefore cause skidding in slippery conditions. Disconnect the retarder function via the brake pedal with the switch and do not use the hand lever on slippery roads.



⚠ Warning!

Crush risk!

The electronic suspension system operates only while the engine is running. If the engine was stopped with the bus raised, it will return to normal level when the engine is restarted.

Suspension system

The bus is equipped with electronically controlled air springs; ECS – Electronic Controlled Suspension.

Function of indicator lights on buses with ECS:

1. Light goes on when starter key is turned to driver position. Once the engine has started, the suspension system control unit will perform a test. During this time the lamp will stay on. If no faults are detected (see point 4), the lamp will go out after about two seconds.
2. The lamp will flash slowly if the pressure in the suspension system is too low.
3. The lamp will flash rapidly when the bus has not reached the desired position (with respect to kneeling and levelling), i.e. the bus is moving towards the desired end position or normal position. The lamp will flash at the same rate if the bus is driven faster than 30 km/h in high or low position (levelling control).
4. The lamp is also used to indicate faults and as a diagnosis lamp. If the diagnosis system detects a fault, the lamp will light up and stay on. Read more about diagnosing the suspension system in the chapter ”If anything happens”.

⚠ Warning!

Ensure that this can be carried out without risk for anyone being trapped between the bus and the kerb.

Levelling control (option)

Levelling control raises or lowers the entire bus and should not be confused with kneeling. (See below). There are two versions of levelling control. One where the bus can be raised and lowered and another where the bus can be raised only.

Version with raise and lower:

Pressing the top of the switch will raise the bus. Increased ground clearance will then be obtained temporarily when driving onto a ferry, for example.

Pressing the bottom of the switch will lower the bus to its lowest position. Can be used when loading/unloading luggage for example.

Version with raise only:

Pressing the **bottom** of the switch will raise the bus.

Pressing the top of the switch will return the bus to normal level.

Levelling control must only be used temporarily.

Kneeling (option)

Kneeling means the bus is lowered only by the entry door. Push down the lock button while holding in the bottom of the switch until the bus reaches the desired kneeling level. The bus will stop being lowered when the switch is released.

After pressing the top of the switch briefly, the bus will return to normal level without it being possible to stop anywhere in between.

(If the customer desires, the bus's kneeling system can be programmed so that the bus returns to normal level if the switch is released before the lowest position has been reached.))

Other instruments and indicator lights

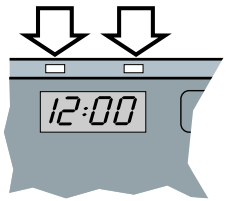
Temperature gauge (option)

Can be connected in two different ways.

- Gauge in combination with switch.

  In one switch position, the exterior temperature will be displayed; in the other switch position, the interior temperature in the bus will be displayed.
- Gauge displaying only exterior temperature.

Both versions have a warning function for slippery conditions. A lamp in the gauge goes on when the temperature drops below +2°C.



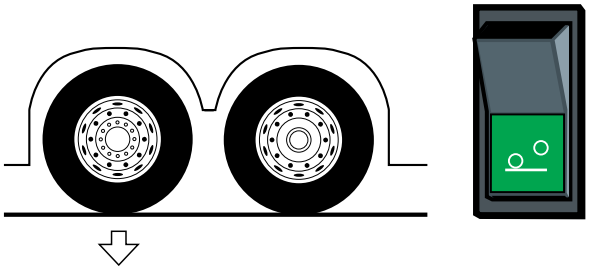
Clock and tripmeter (option)

Right button:
Select clock or tripmeter function.

Setting the clock when this is displayed. (See also below.) Hours and minutes can be set with the button. The setting will change until the button is released.

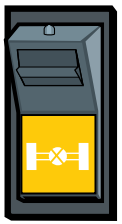
Left button:
Resetting the tripmeter when this is displayed.

Setting the clock when this is displayed. Press once and the hours will flash, set the hours with the right-hand button. Press once more to ”lock” the hours and the minutes will start to flash. Set the minutes with the right-hand button. Press a third time to return to normal display.



Bogie

Pressing the bottom of the switch will release compressed air from the bogie air bellows as long as it is depressed. The rear axle weight will then be transferred to the drive axle only, which is an advantage when pulling away on slippery surfaces.



Engaging the differential lock while either wheel is spinning will inevitably cause damage to the differential lock's toothed coupling.

Differential lock (option)

Release the catch and press the switch to engage the differential lock.

The following must be observed when engaging:

Engage a suitable gear, depress the clutch, engage the differential lock. Carefully release the clutch pedal with the clutch slipping.

The differential lock may be used on slippery surfaces only. Engage just before the bus reaches the slippery surface. It can be engaged while in motion, irrespective of speed, and also under load but not in bends or during wheel spin.

See page 25 if the bus is equipped with ASR.

Door open

The Indicator lamp comes on if a door is open. It is often necessary that the handbrake be applied before a door can be opened.

Hatch open

Indicator lamp comes on if a hatch/flap/cover (equipped with indicator) is open.

Stop

Comes on when a passenger has signalled for the bus to stop.

Rear fog lights

The indicator light is on when the rear fog lights are on.

NOTE! The laws and regulations concerning the use of rear fog lights vary from country to country.

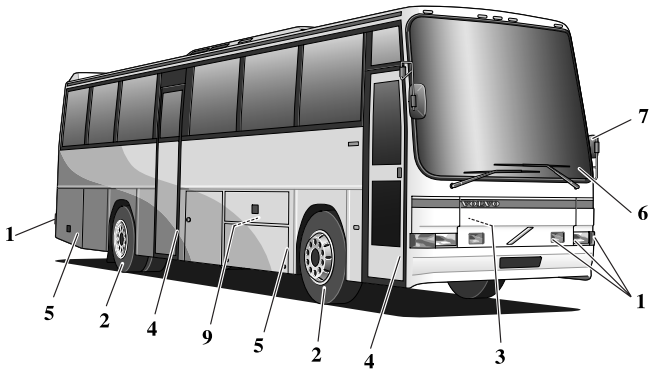
Pram

The light comes on after the pram signal has been pressed. Goes out when the doors close.

Follow our driving instructions!

The manner in which the bus is driven has a great bearing on the bus's reliability, economy and service life.
The following chapter contains most of what is relevant to starting and driving.

Daily inspection



8

⚠ Warning!

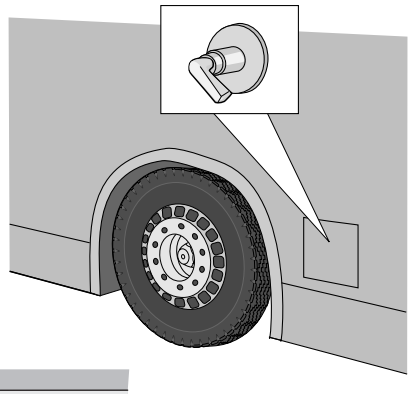
For safety reasons, check the following before driving off:

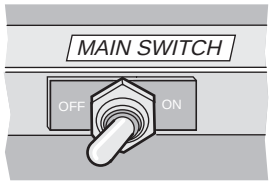
1. Headlights, direction indicators and other lighting.
2. Tyres.
3. Washer fluid.
4. Doors, clamping strips.
5. Luggage and engine hoods.
6. Dashboard indicator and warning lights (see page 39).
7. Position of rear-view mirrors.
8. Safety equipment.

For operational reliability, check the following before driving off:

9. Engine oil level.
10. Coolant level. **Always** top up with a 50-50 mixture of Volvo coolant and water – all-year-round!
11. Oil level in hydraulic coolant fan and oil pump drive belt.

Battery master switch

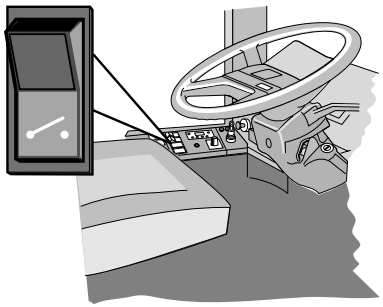




The battery master switch must be in the on position for the electrical system to work. A common coach-builder solution is to place the knob for the battery master switch by either the passenger door or by the drivers seat.

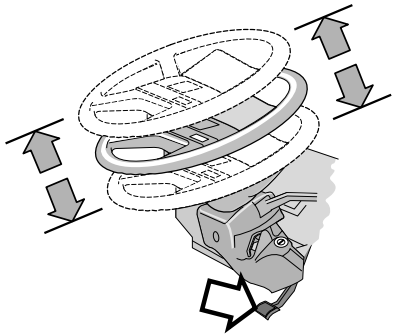
Never break the current when the engine is running!

After finishing a shift, especially when the bus is to be parked for longer periods (i.e. overnight), the battery master switch should be turned off. Otherwise there is a risk that the batteries will discharge if any power sources were to be left on. However, there are a small number of power sources which are intended to function even when the battery master switch is turned off.

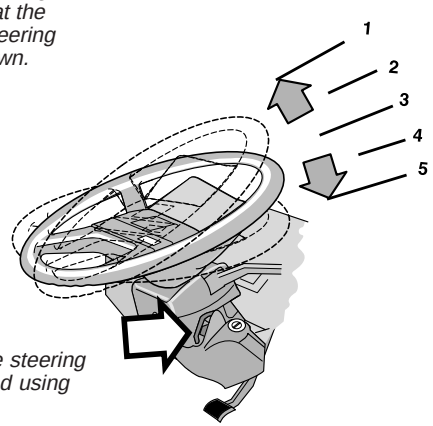


Other types of battery master switches may also be present, i.e. a toggle switch placed on the side panel by the driver's seat or a switch behind the cover to the front headlight on the door side of the bus. These switches work in the same way as the control knob, i.e. they are used to switch the battery master switch on and off.

Steering wheel, driver's seat



The height of the steering wheel is adjusted to the desired position by pushing down the pedal while at the same pulling up the steering wheel or pushing it down.



The angle of the steering wheel is adjusted using the lever.

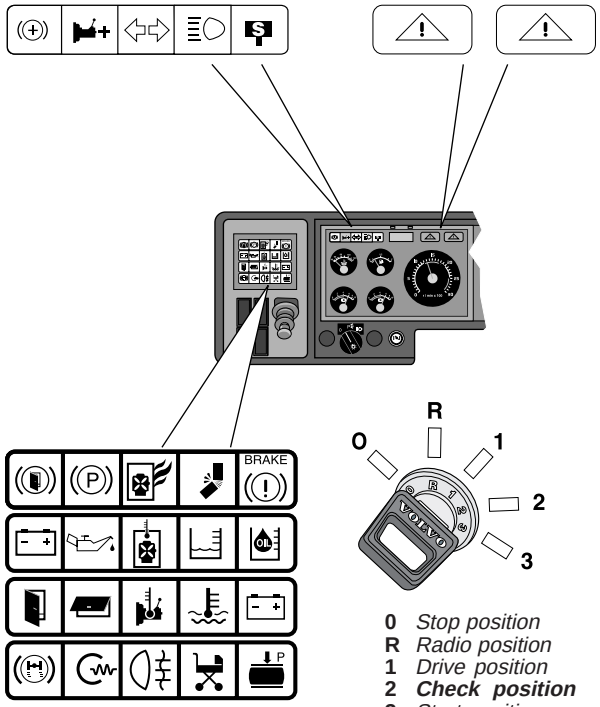
Make sure you place yourself in a correctly seated position by adjusting the driver seat and steering wheel *before* starting your work shift. This is important, otherwise you may get tired unnecessarily. Through this action you will ensure your passengers a safe and comfortable journey.

⚠ Warning!

The steering wheel must **never** be adjusted while driving. Any attempt can result in uncontrolled steering movements which endanger passenger safety.

Safety belts

If the bus is equipped with safety belts in the driver's seat, front passenger seat, centre seat, etc., it is the driver's responsibility to see that they are used. Safety belts are the best protection in the event of an accident and are also very effective during emergency braking!



0 *Stop position*
R *Radio position*
1 *Drive position*
2 ***Check position***
3 *Start position*

Before starting

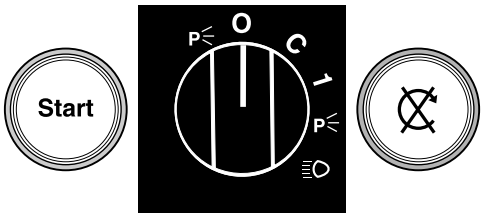
Check warning and indicator lights by turning the starter key (or the feed switch, see illustration on next page) to check position.

All the indicator and warning lights, including the central warning lights, should go on and a buzzer sound when the starter key (or feed switch) is in check position.

Before starting, the handbrake must be applied and the gear selector/gear lever must be in neutral position.

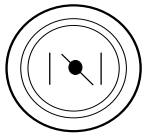
EDC internal test

If your bus is fitted with a DH10A engine (with Electronic Diesel Control), there will be a diagnostic lamp on the dashboard (see page 86) that goes on constantly when the starter key/feed switch is turned to drive position. Provided there is operating pressure in the brake circuits, it should go out when the brake pedal is depressed for about 4 seconds. The EDC internal test must be performed after engine start and the lamp must go out before cruise control can be used.

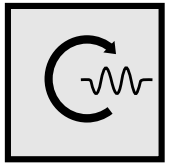


Start button *Feed switch* *Stop button*

P *Destination sign lighting*
O *Neutral position*
C *Check position for indicator and warning lights*
1 *Drive position* *Day running lights on*
P *Parking light on*
Main/dipped beam on



Pushbutton for starting heater



Indicator light for starting heater

Starting a cold engine

To prevent exhaust smoke when starting the engine, the intake air should be heated if the ambient temperature is 10°C or below. Do this:

Turn the starter key/feed switch to drive position and push the starting heater button (illustration on next page). Preheating will start and continue for up to 50 seconds depending on the temperature of the coolant. The indicator lamp will go on while preheating is active.

When the lamp has gone out, turn the key to start position (press the start button on buses with feed switch). Do not touch the accelerator pedal on buses with EDC. The correct amount of fuel will be supplied automatically. It may be necessary to depress the accelerator pedal on buses without EDC. Release the accelerator once the engine has started so that the engine does not race.

Press the starting heater button again once the engine has started and the starting heater will be activated for as long as it did before starting. (The indicator light will go on during this time as well.) This will reduce visible exhaust smoke.

Do not race the engine when cold! Keep the engine speed at 500–700 rpm until the lamp goes out. This is the time required for the engine to build up oil pressure.

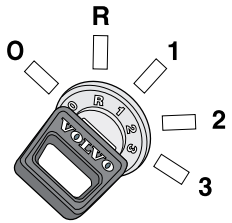
The engine may well be after-heated even if the intake air was not heated before start if the engine smokes.

If the engine misfires, press the starting heater for more preheating.

Repeat the entire starting procedure if the engine does not start or if it stops.

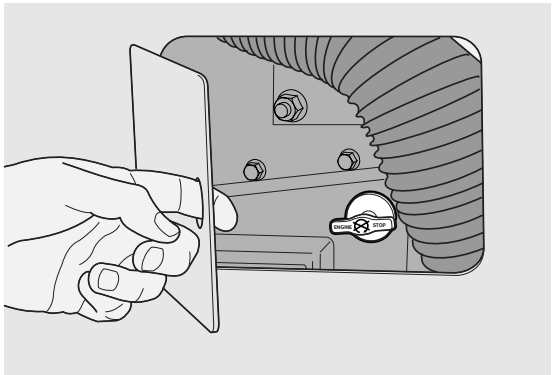
⚠ Warning!

Start gas must not be used. Risk for explosion!



0 *Stop position*
R *Radio position*
1 *Drive position*
2 *Check position*
3 *Start position*

Alternatives: Starter key above, feed switch with start and stop button on previous page.



Mechanical stop control.
Used to stop the engine when being "run" from the engine compartment and as an emergency stop.

Starting a warm engine

Start directly by turning the key to the starter position (or turn the feed switch to the drive position and push the start button on buses with feed switches).

The accelerator pedal does not normally need to be pressed when the engine is warm. (Engines with the EDC fuel control system

always get the right amount of fuel automatically – even when cold.)

Allow the engine to run at 500–700 rpm the first ten seconds.

Especially for engines with EDC

If the coolant temperature is under 50°C the engine speed is limited to a maximum of approx.1000 rpm during the first seconds after starting. This is done to ensure an adequate lubrication of all engine parts. At –10°C the limitation is for about 15 seconds and the warmer the coolant the shorter the limitation time. There is no limitation at temperatures above 50°C.

A fast idling speed (approx. 600 rpm)

will apply until the coolant temperature exceeds approx. 45°C.

Exhaust pressure governor

The exhaust pressure governor is activated automatically when the coolant temperature is under 70°C and the handbrake is applied.

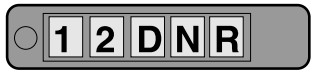
When the handbrake is released or the temperature reaches 70°C, the exhaust pressure governor will be automatically disconnected. The EP-governor accelerates the heating of the engine.

Engine shut-down

The engine is turned off when the key is turned to the stop position (for buses with a feed switch, press the stop button).

A mechanical stop control for the shut-down of the engine is located on the left-hand side in front of the radiator core assembly. There is a special flap in the side of the body to enable access to this control.

Automatic gearbox



***G**ear selector.*
When changing from forward gears to reverse the neutral position N has to be engaged first. The illustrated button arrangement is standard design. Other designs have another number of buttons.

Warning function on ZF automatic gearboxes

When shift duration (slip duration) is too long, this will be indicated by the engaged gear selector button flashing. (Engaged button is normally on constantly.)

Contact your garage immediately when the gear selector button flashes!

Continues driving could cause aggravated damage to the gearbox.

If the bus is unable to be driven after the handbrake has been released, check to see if the blocking valve is depressed.

Start

The engine can only be started with the gear selector in position **N**

Cold engine should idle for 1–2 minutes so as to avoid damage to the gearbox.

Pulling away

With the bus at a standstill and the engine idling, a suitable gear can be selected. **To eliminate the mistake of a gear being selected from the N-position without sitting in the drivers seat, the gear can not be selected until the brake pedal is depressed.** If the brake pedal is not depressed within 2 seconds of the selector button be pressed in, you must return to the N-position.

Release the handbrake and drive off.

Driving forwards

In normal traffic conditions use the D position.

If automatic shifting in heavy traffic or in climbing ”fluctuates” – i.e. shifts up and down often – the nearest lower gear should be chosen using the gear selector. While driving, each forward gear selection can be pre-selected.

If gear position 2 or 1 is used at higher speeds than the corresponding driving position, changing down will first occur when the maximum engine speed is not exceeded.

R — *Reverse gear*
NOTE! The bus should be at a standstill when selecting gear position R.

N — *Neutral position.*

D — *Normal drive position – economic driving.*

2 — *Heavy traffic in difficult driving conditions. (Also applies to gear position 3 where appropriate)*

1 — *Short trips.*
Shift up to higher gear does not take place.

⚠ Warning!

There is no parking position on automatic gearboxes. The handbrake must **always** be applied when parking.

Automatic neutral position

ZF gearboxes are available – and Voith always has a function – that enables the neutral position to be selected automatically in the following circumstances: Accelerator pedal released + footbrake pedal depressed + bus stationary. When none to the above instructions are fulfilled, the previously selected gear will be engaged and the journey can continue.

Kick-down.

The accelerator pedal's wide open throttle position can be felt through resistance in the pedal. If greater acceleration is required, for example when overtaking, depress the accelerator pedal past this point to engage kick-down. Gear change then occurs at a higher engine speed.

Reversing

Reverse is selected with position R. Gear changes between forward/reverse can only be achieved after the N button is pressed in.

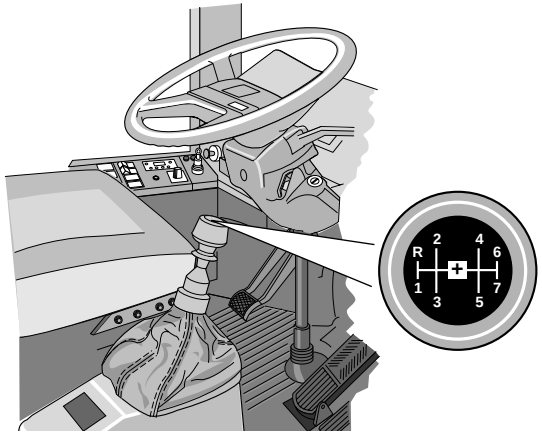
Braking

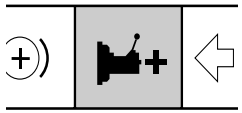
Automatic gearboxes have integrated retarders. Read about breaking with retarder earlier in this chapter in the section "Brakes".

Stopping and parking

N-position should be selected and the handbrake applied when the driver temporarily leaves the seat or when the engine is stopped.

G8 EGS manual gearbox





The indicator lamp goes on when +gear (pushbutton) is engaged

Important!
Always depress the clutch pedal completely when changing gear.

Volvo G8 EGS

The G8 EGS is fully synchromesh with eight forward gears and one reverse gear. The gear lever has seven forward gear positions and one pushbutton in the lever knob for the eighth forward gear, "+ position".

The indicator light will go on continuously when the + position is engaged.

Lever movement is transmitted to the gearbox through an electropneumatic shifting system called EGS (Easy Gear Shift). The actual gearbox is similar to the G8 MGS, i.e. a 4x2 speed range gearbox. The EGS electronic control system makes it possible to program the relationship lever position – gear position.

On delivery from the factory, the shifting system is programmed 1, 2, 3, 4, 5, 6, 7 and 7+ in ascending gear ratio sequence, where 7+ is activated with the pushbutton on the gear lever knob.

The system can be programmed to resemble the earlier G7 EGS gearbox, (ascending gear ratio sequence) 1, 2, 2+, 3, 4, 5, 6 and 7, where 2+ is the pushbutton on the gear lever knob. Gear ratio number 3 in the gearbox (corresponding with lever position 2+) is not often used when driving under light loads.

See next page for detailed shifting instructions.

Driving

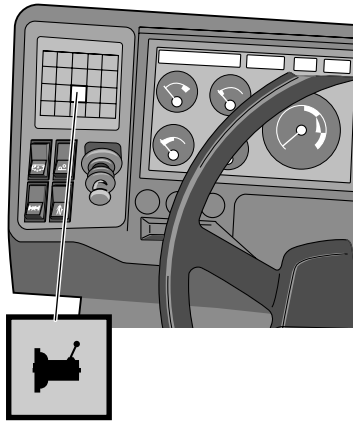
When the starting key is turned to drive position before starting, the shifting system's diagnostic lamp will go on (see next page) for 1 second. This is to check the electrical functions of the system. The lamp will stay on if there is a fault. It will not be possible to engage a gear.

The engine must be running and the clutch pedal fully depressed before a gear can be engaged.

⚠ Warning!

Even though the gear lever can be move to a gear position when engine is stationary, this does not mean that a gear is engaged in the gearbox.

The handbrake must **therefore always** be applied when parking.



Diagnostic lamp EGS.

When changing down at high speed, especially when skipping one or more gear positions, the gear lever will lock in neutral temporarily to protect the shifting system from overrevving.

Making regular use of this overrevving protection will strain the gearbox controls and synchromesh and should therefore be avoided.

Parking

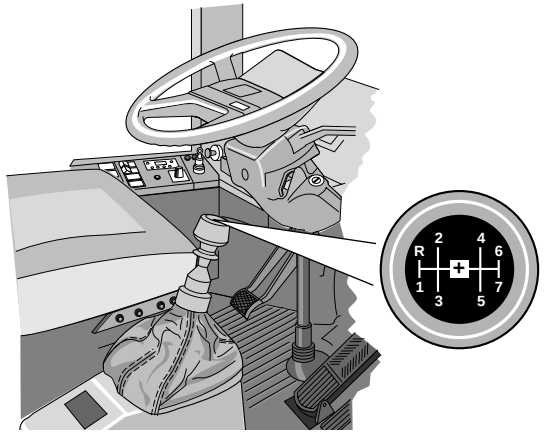
Even though the gear lever can be move to a gear position when engine is stationary, this does not mean that a gear is engaged in the gearbox.

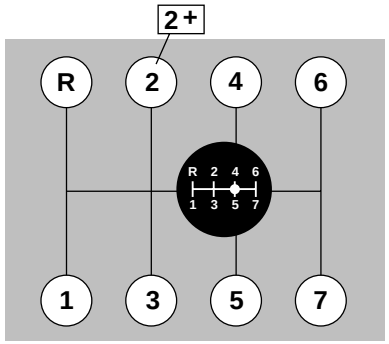
The handbrake must **therefore always** be applied when parking.

A buzzer will sound if the engine is turned off without the handbrake being applied.

Diagnostic lamp

Read more about G8 EGS fault symptoms and diagnosis in the chapter ”If anything happens”.





Shifting program, alternative 2+

R and 1 *Reverse gear and first gear are blocked and can be engaged only if the release ring is lifted towards the gear lever knob.*

First is used for ranging and pulling away on steep inclines.

2 *Second is normally used for starting.*

2–2+ *Leave the gear lever in position 2. Press down the button on the gear lever to shift to 2+. Usually used when driving on steep inclines where tight gear steps are needed to retain traction.*

2–3 *(It does not matter if you shift from 2 or 2+.) Press the lever slightly to the left while moving it to lever position three.*

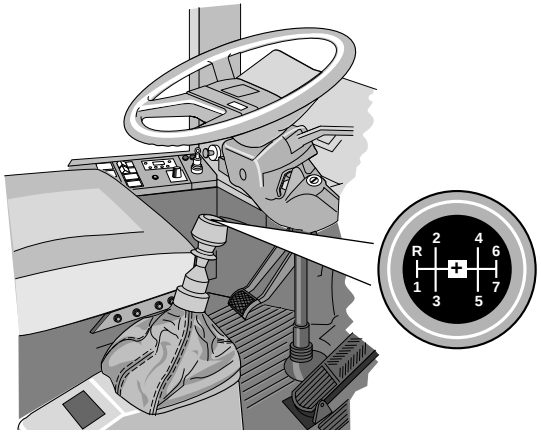
3–4 *Disengage third and let the lever find neutral position before moving it towards position four.*

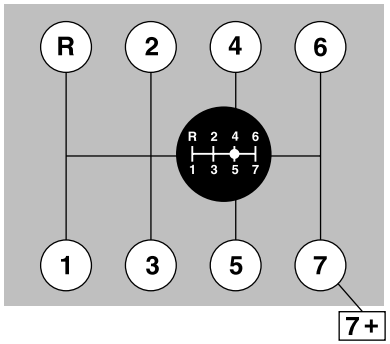
4–5 *Move the lever down towards fifth, releasing hand pressure slightly as the lever passes neutral position.*

5–6 *Move the lever with slight pressure to the right when shifting up to lever position six.*

6–7 *Press the lever lightly to the right while moving it down to lever position seven.*

With this alternative, lever position seven gives the highest gear.





Shifting program, alternative 7+

R and 1 *Reverse gear and first gear are blocked and can be engaged only if the release ring is lifted towards the gear lever knob.*

First is used for ranging and pulling away on steep inclines.

2 *Second is normally used for starting.*

2–3 *Press the lever lightly to the left while moving it towards lever position three.. Usually used when driving on steep inclines where tight gear steps are needed to retain traction. This gear can usually be skipped.*

2–4/3–4 *Disengage the previous gear and let the lever find neutral position before moving it to lever position four..*

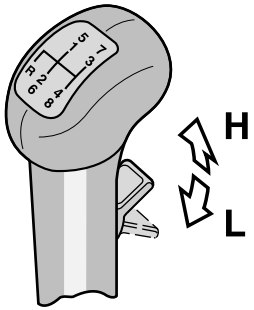
4–5 *Move the lever down towards fifth, releasing hand pressure slightly as the lever passes neutral position.*

5–6 *Move the lever with slight pressure to the right when shifting up to lever position six.*

6–7 *Press the lever lightly to the right while moving it down to lever position seven.*

7–7+ *Press the button on the lever knob to shift to highest gear.*

G8 MGS manual gearbox



Low range should be engaged when reversing so that full control of the bus is retained.

Volvo G8 MGS

G8 MGS is a fully synchromesh mechanical range gearbox with eight forward gears and one reverse gear. *Reverse gear can be engaged in both low and high range but we recommend against attempting to reverse in high range due to the high gear ratio.*

Lever movement is transferred manually to the gearbox by link rods. Shifting between low and high range is performed electronically.

Shifting

The bus is normally started in second gear. It is often possible to go directly to fourth. When shifting up, the gear lever should be kept still a moment in neutral before engaging the next gear.

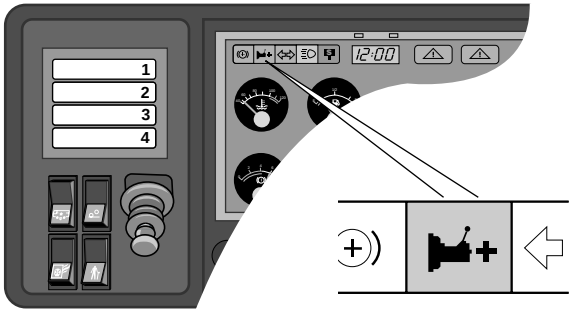
NOTE! The toggle switch for the range gear should be in LOW position before starting.

R Press the lever to the left and then down to engage reverse.

1 Engage first with a slight press to the left and then up. First is used for ranging and pulling away on steep inclines.

*2 Engage second with a light press to the left and then down. Second **is the usual starting gear.***

(2–3) Disengage second. Let the lever find neutral position before moving it to the right and up towards third position. Used when driving on steep inclines where tight gear steps are needed to retain traction. (Under light loads, third can be skipped.)



The indicator lamp goes on when high range is engaged

(3–4) Gently move the lever towards fourth position. "Rest" when passing neutral.

2–4 Disengage second. Let the lever find neutral position before moving it to the right/down towards fourth position.

*4–5 Move the toggle switch on the gear lever from **low** position to **high** while still in fourth gear. Disengage fourth and move the lever left/up (a certain spring load must be overcome).*

5–6 Move the lever down past neutral (with a slight press to the left to overcome the spring load). "Rest" when passing neutral.

6–7 Disengage sixth. Move the gear lever right/up towards seventh position.

7–8 Move the lever down towards eighth. "Rest" when passing neutral.

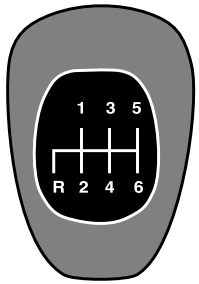
Downshifting is performed in reverse order from above

E.g. from:

*5–4 Move the toggle switch down from **high** to **low** just before changing gear. Disengage fifth. Let the lever take its right-hand position and move it down to fourth.*

- The spring will always push the gear lever to the right!
- The gearbox is blocked from downshifting from high to low range at speeds above 35 km/h!

S6-85 manual gearbox



R = Reverse

ZF S6-85

S6-85 is a fully synchromesh mechanical gearbox with six forward gears and one reverse gear.

Lever movement is transferred to the gearbox by two control cables.

Shifting

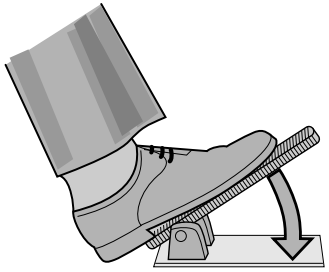
The gearbox is fitted with a spring system that makes the gear lever seek a position between gear position 3 and 4 if a gear is not engaged.

First gear is engaged by moving the lever to the left and then up. Engage second by moving the lever straight down. Hold against the force directed to the right while passing neutral position. Disengage second and let the gear lever find neutral position. Move the lever straight up towards third position. Fourth straight down. To engage fifth gear, disengage fourth and press the gear lever with some force to the right and then up. Engage sixth by moving the lever straight down. Hold against the spring force directed to the left while passing neutral position.

We recommend pausing for a moment when passing neutral position whenever changing gear.

Shifting down is performed in much the same way. Let the lever find neutral position before moving it to the lower gear with constant force.

Engage reverse by moving the gear lever to the left from neutral position with enough force to overcome the resistance between gear positions one and two, and then down.



Footbrake

If the wheel brakes are used without caution when driving down steep and long inclines, they will heat up very quickly to extreme temperatures. As this is normally accompanied with low speeds, the brakes will not be cooled as efficiently as on level roads.

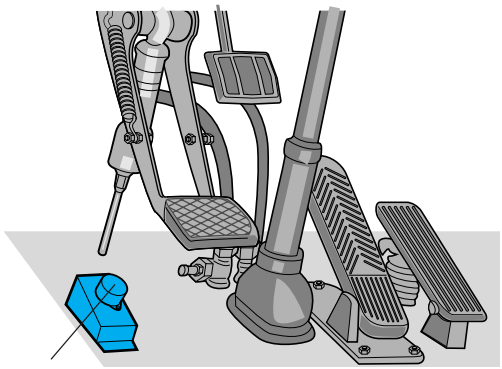
Select the same gear when driving downhill on long and steep inclines as you would when driving uphill. The engine braking capacity will then be utilized to maximum and the brakes will be saved. Utilize the exhaust brake/retarder first when driving downhill with the wheel brakes being used as supplementary braking (most buses have at least one of these auxiliary braking systems).

Do not pump the brakes if they are needed when driving downhill, as this will only use up the compressed air. Brake just hard enough and then release the pedal completely or to retarder position. Heat builds up very quickly in the brakes, causing brake lining wear and reduced brake efficiency.

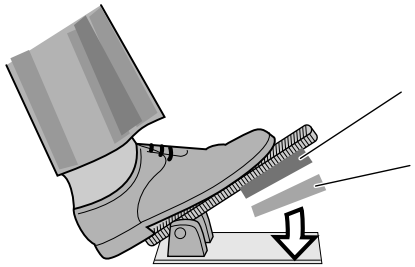
See the following pages on exhaust brakes and retarder.

⚠ Warning!

Select the **same** gear **before driving downhill** on long and steep inclines as you would when driving up the same hill. The engine braking capacity will then be utilized to maximum and the brakes will be saved.



Switch for exhaust brake



Braking with retarder.

Braking with both retarder and wheel brakes.

Exhaust brake (option)

The exhaust brake is a complement to the wheel braking system. It is activated with a foot switch. The exhaust brake is included in the engine exhaust pressure regulator.

Activating:

– release the accelerator

– then press down the foot switch

Exhaust braking will cease when the foot switch is released.

The exhaust brake is most effective at high engine speeds but never activate it when the tachometer needle is in the red.

Retarder

A retarder is optional on a manual gearbox. It is standard equipment in automatic transmissions (integrated).

The retarder, like the exhaust brake, is a complement to the ordinary braking system. Correctly used, they will increase the service life of the brake linings many times over.

Therefore, always use these auxiliary systems first when braking the bus.

To utilize the advantages of the retarder for smooth braking, the brake pedal must not be pressed farther than that the retarder is just engaged, i.e. 1–3 cm.

Some versions of retarder can also be activated with a hand control. See further in the text.

The retarder has no braking effect when the wheels are stationary or rotating slowly. It can therefore not be used as a parking brake or to lock the wheels.

⚠ Warning!

The auxiliary braking systems described here (exhaust brake/retarder) work only on the drive wheels. Braking only the drive wheels may cause skidding on slippery roads.

Switch to interrupt retarder activation via brake pedal

Heat and cooling

All braking develops heat.

A hydraulic retarder is cooled by the engine cooling system. This applies to the hydraulic retarder (optional) together with manual gearboxes as well as the retarder integrated in automatic gearboxes.

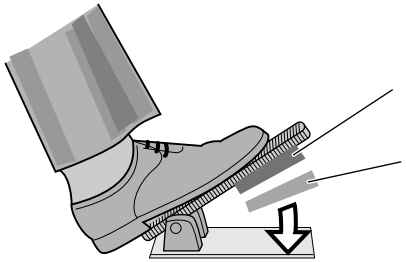
The retarder may overheat in extreme situations. Therefore, always observe the coolant temperature. Automatic gearboxes have a warning light in the lamp panel, which goes on when the oil temperature in the gearbox gets too high. (ZF automatic gearboxes also have an oil temperature gauge in the dashboard.)

If the coolant and/or gearbox oil get too hot during retarder braking, the retarder should be disengaged if the traffic conditions allow.

As usual, the engine's cooling capacity increases if the engine speed is increased and this will accelerate retarder cooling.

The green lamp (see next page "Fault indication") that is normally on constantly when the retarder is active will flash as long as a separate retarder together with manual gearbox is too hot. It also has a thermostat that reduces braking power when the retarder is too hot.

An electromagnetic retarder is cooled by the passing air. If it becomes too hot during long braking periods, the braking capacity will be reduced.



Braking with retarder.

Braking with both retarder and wheel brakes.

The green indicator light will go on when the retarder is active (illustration at bottom of next page).

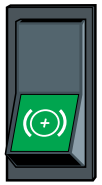
Retarder in automatic gearboxes:

Retarder hand control is available as an option. The hand control and foot control (brake pedal) both have three stages up to full retarder effect.

The hand control has 5 stages but stages 4 and 5 have no effect in combination with automatic gearboxes.

Electromagnetic retarder together with manual gearbox:

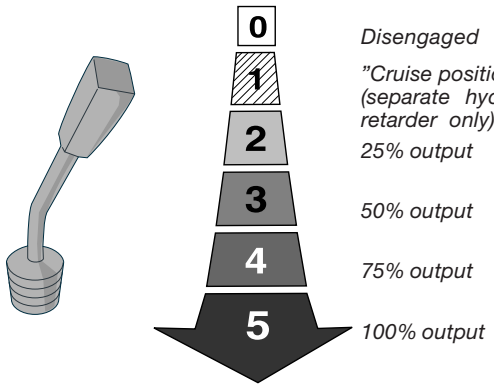
This retarder hand control has four active positions, providing 25%, 50%, 75% and 100% of full retarder output. Foot control via the brake pedal gives 25%, 50% and 75%.



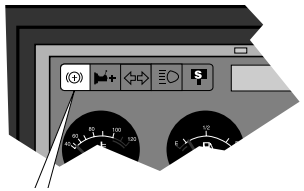
Switch to interrupt retarder activation via brake pedal.

⚠ Warning!

Disengage the retarder with the switch on slippery roads so that it cannot be activated with the brake pedal.



Retarder hand control



Retarder indicator light

Hydraulic retarder together with manual gearbox:

Besides a 0-position, the hand control has a further five positions Position 1 is "cruise position".

Explanation, see below. In positions 2–5, 25%, 50%, 75% and 100% of the retarder's braking capacity will be utilized respectively. Foot control is also engaged in stages providing 25%, 50% and 75% braking capacity. Maximum braking capacity is therefore greatest using the hand control.

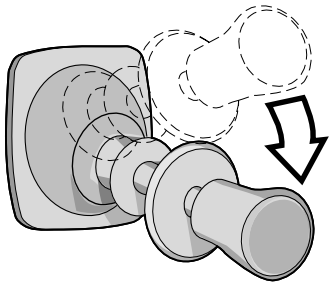
This retarder has integrated ("cruise control") that interacts with the engine control system. If the retarder's hand control is moved to position 1, the bus will retain its current speed when the accelerator pedal is released. The same also applies when the brake pedal or clutch pedal is released. I.e. cruise control is activated at the new increased speed when the accelerator pedal is released after overtaking or the new reduced speed when the brake pedal is released after braking.

Unlike "normal" cruise control systems that work only through the engine management system, this cruise control system also activates the retarder. The bus will therefore not roll faster downhill when cruise control is active.

Fault indication

The following applies only to the separate hydraulic retarder together with manual gearboxes.

If the green retarder lamp goes on continuously when the retarder is not being used (flashes if overheated), this will indicate a fault in the retarder. Depending on how serious the fault is, the result may be that the retarder works at reduced effect or not at all. Contact a Volvo workshop for diagnosis and repair.



Parking

Always apply handbrake when parking. Move control back to locked position to apply.

> **⚠ Warning!**
>
> The handbrake may only be used in emergencies while the bus is moving!
>
> The handbrake affects only the drive wheels and therefore has only limited braking capacity and can cause skidding.

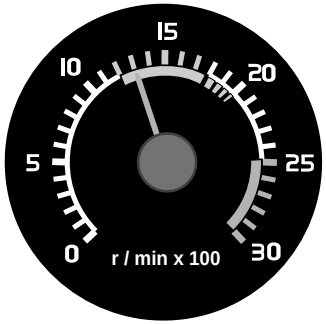
Emergency brake

The handbrake can be used as an emergency brake if the footbrake system should malfunction.

When using as emergency brake: gradually move the control back to parking position.

Hold in the lock all the time! Otherwise, the control will stick in locked position.

As the handbrake only affects the drive wheels, the braking distance will be longer than when using the normal braking system. Braking the drive axle only means there is increased risk of skidding. Therefore, use the handbrake only in emergencies while the bus is moving!

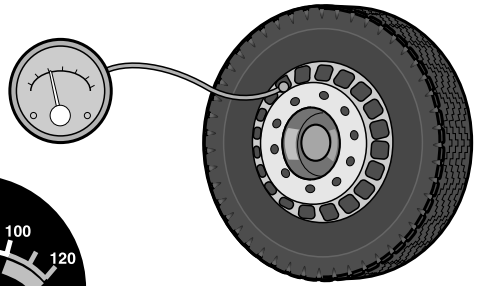


Avoid unnecessary and rapid acceleration.

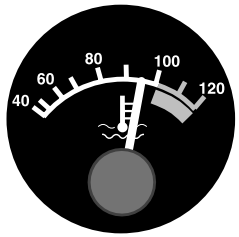
Avoid jerky driving.

Constant road speed and correct engine speed give the lowest consumption.

Tachometer in green zone



Correct tyre pressure



Correct engine temperature

Economic driving

Correct driving techniques will considerably affect fuel consumption. There will also be less wear on the bus and the passengers will have a more comfortable ride.

Only a fraction of the engine output is required when the bus is moving at an even speed. The engine will use a minimum of fuel. When the accelerator is depressed and the bus starts to accelerate, a greater portion of the engine output is utilized. Fuel consumption will increase considerably.

It may be necessary to brake just afterwards, which will make it an expensive increase in speed. **Advanced planning and constant speed gives high passenger comfort and best economy.**

Treat the accelerator pedal with care and change gear at the correct engine speed. Buses with automatic transmission: keep a light foot on the accelerator and allow the gearbox to shift at low engine speeds. Avoid using kick-down.

The engine speed range that gives the best fuel economy is marked in green on the tachometer.

Do not change down until the engine speed has dropped to the bottom of the green zone when driving uphill.

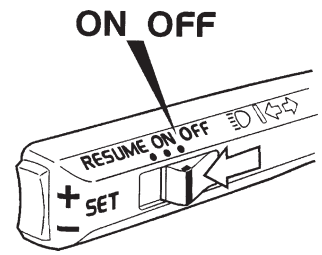
Accept a certain drop in speed when driving uphill. Ease up on the accelerator **before** the crown of a hill and do not depress it if it is downhill on the other side.

High speed will always mean increased fuel consumption. Remember: Twice the speed will quadruple air resistance.

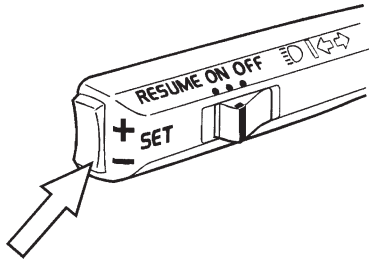
Use good roads. If it is possible to choose your route: avoid bad roads with hills and many stops.

Radial tyres have low rolling resistance, but check the air pressure regularly. Sufficient pressure makes the tyres roll easier and reduces wear.

Cruise control



Make sure the switch is "ON"



The retarder interacts with the cruise control system on buses with G8-EGS gearbox and hydraulic retarder. Read more about this on page 55.

Cruise Control

The following description applies to buses with Electronic Diesel Control only.

The EDC internal test must be performed before cruise control can be engaged (see section "Starting the engine" in this chapter).

Max and min speed limits for cruise control depend on how the control unit is programmed.

Press briefly on the toggle switch "SET+" position once the bus has reached the desired speed. The slide switch should be "ON". The bus will now try to retain the speed it had when the button was released.

The set speed can be increased by pressing the "SET+" button again or reduced by pressing "SET–".

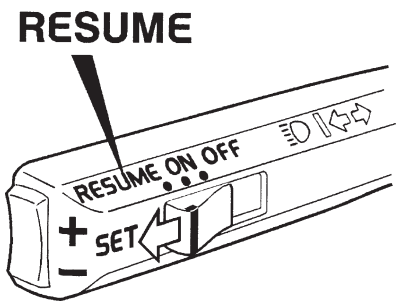
Cruise control can be disengaged by moving the slide switch to "OFF" or by pressing either the brake pedal or the clutch pedal.

Make a practice of always using the brake or clutch peal to disengage cruise control. This is so that you will react automatically in a critical situation with as few actions as possible.

Cruise control is also disengaged if the retarder is activated or if the accelerator pedal is depressed manually to a position corresponding to a speed greater than the current cruise control setting for longer than two minutes.

The control unit stores the latest speed setting during the trip. This can be restored by moving the button to "RESUME", provided the speed has dropped below the programmed minimum speed for the resume function.

continued on next page



*A **temporary** change in engine idling speed can be obtained if the toggle switch is activated to "SET+" or "SET–", without holding down the brake pedal. If the slider is moved to "RESUME", the engine will run at a pre-programmed fast idle speed and if the slider is moved to "OFF", the engine will drop to the lowest idling speed. These changes of engine speed are not stored in the control unit. Even with only small changes in idling speed, the clutch pedal should be released (handbrake applied and neutral selected on buses with automatic transmission).*

continued from previous page

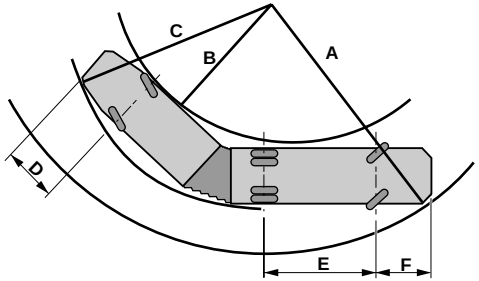
The stored speed will be cleared when the engine is stopped. Consequently, a previously set speed can not be restored once the engine has been turned off.

Setting basic idling speed
The following description applies to buses with Electronic Diesel Control only).

If the engine is warm (above 45°C), the bus is stationary and the clutch pedal is released (handbrake applied and neutral selected on buses with automatic transmission), the idling speed can be set with the switches on the direction indicator stalk.

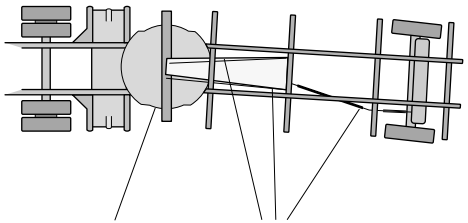
– Keep the brake pedal depressed. Move the slider to "RESUME" and hold it there for at least 4 seconds.
– Keep the brake pedal depressed and release the slider to neutral position. The lowest idling speed (530 rpm) will then be obtained.
– The engine speed can be changed by pressing "SET+" or "SET–" repeatedly. Each press will increase/decrease the idling speed by about 10 rpm (within the adjustable interval). When the desired speed has been reached, reactivate "RESUME" for at least 4 seconds and then release it to neutral position.
– Release the brake pedal. The new idling speed will then be stored. The stored speed will be applied as the idling speed until a new one is stored.

Articulated bus



Steering geometry, articulated bus with steering trailer coach

A *Outer turning radius*
B *Inner turning radius*
C *Clearance rear outer corner*
D *Rear overhang, trailer coach*
E *Wheelbase, tractor coach*
F *Front overhang, tractor coach*



Fifth wheel *Link rods*

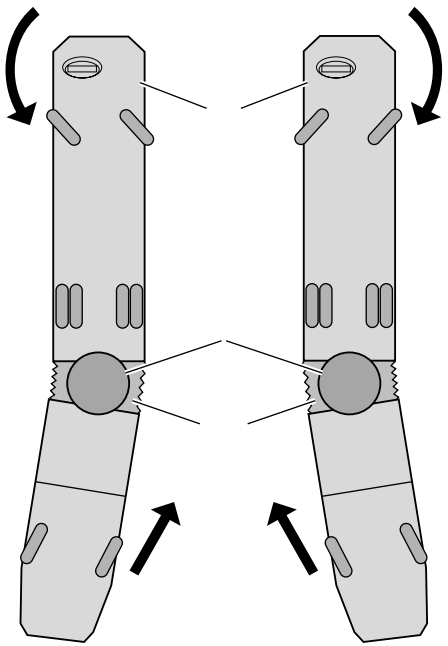
Driving an articulated bus

The turning radii and clearances of an articulated bus depend on the body overhang, wheelbase, location of fifth wheel and the steering ratio between the fifth wheel and the wheels of the trailer coach. The illustration shows the steering geometry of an articulated bus with steering trailer coach.

The difference between the outer turning radius (A) and the inner turning radius (B) is the turning breadth.

The B10M articulated bus consists of a tractor coach, corresponding to a normal twin axle bus, and a trailer coach. The tractor and trailer coaches are connected together through a fifth wheel and a gaiter. The trailer coach is available in two versions; with steering and without steering wheels. The following applies only to articulated buses with steered trailer coach as this is the most common design.

The trailer coach wheels are steered via link rods connected to the fifth wheel. As a change in angle occurs between the tractor and trailer coaches, the wheels will always turn to a certain degree so that the trailer coach follows the tractor coach. This reduces the space needed for turning. The differences in driving characteristics between an articulated bus with steered trailer coach and a normal twin axle bus are not especially great. Only in extreme situations can the swing of the trailer coach be so great that special caution need be observed, for example, when leaving a bus stop bay where the tractor and trailer coaches have been stopped in a straight line and close to the kerb. In such cases, full steering wheel lock should be avoided. If an obstacle requires full steering lock, there must be enough room for the rear end of the trailer coach to swing out approx. 0.5 m to the side.



Direction of trailer coach wheels when steering left alternatively right (steered trailer coach)

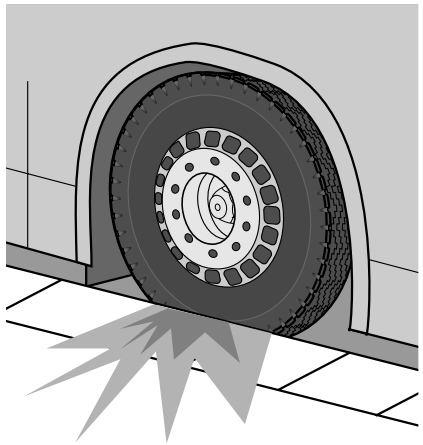
Reversing an articulated bus

Use very small steering wheel movements when reversing with a steered trailer coach to prevent it from slewing. When reversing in a **straight** line, use the rear-view mirror to make sure the tractor coach and the trailer coach are standing in a straight line before starting to reverse. If the trailer coach slews round, turn the steering wheel in the same direction, i.e. if the trailer coach slews to the left, turn the steering wheel to the left until the trailer coach straightens up.

When reversing round a **corner**, start with very small steering wheel movements in the opposite direction until the desired turning angle is obtained. Then turn the steering wheel immediately in the same direction as the trailer coach. Adjust the turning angle by turning the steering wheel more or less in the direction of the trailer coach.

Remember

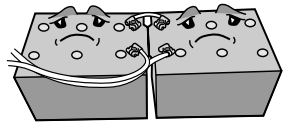
- Adjust the rear-view mirrors so that the best possible field of vision is obtained for turning.
- Always use small steering wheel movements when reversing an articulated bus. Keep sufficient sideways clearance.
- Adjust your speed when reversing an articulated bus. Observe the danger of slewing!
- Great care must always be taken when reversing an articulated bus!



Power steering

Never try to turn the bus by pushing hard on the steering wheel if the front wheels are blocked sideways for any reason, against the kerb for example. High pressure on the steering wheel will increase pressure in the power steering system and cause overheating that may damage the oil pump.

The bus can be steered even when the power steering system is malfunctioning. If the power steering suddenly ceases, it may feel like the steering is locked. This is not the case however, but great force will be required to turn the steering wheel.

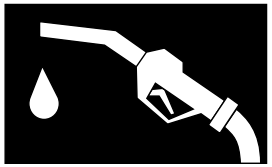


Tips for summer driving

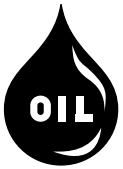
Remember that if the air conditioning/fans are run for long periods with the engine stationary, this will strain the battery.

Never remove the engine thermostat to lower the engine temperature. This will only impair engine cooling.

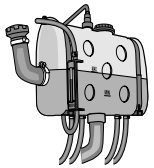
Tips for winter driving



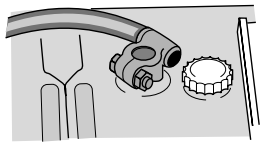
Use winter fuel! It reduces the risk of deposits in the fuel system. The build up of condensation in the fuel tank can be avoided by keeping the fuel tank well filled.



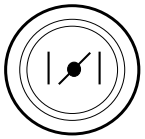
Oils must have the correct viscosity for winter use in order to provide adequate lubrication even in cold weather.



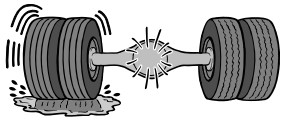
The cooling system must be treated with antifreeze. This must also include the windscreen and headlamp washer reservoirs.



The battery should be in good condition. Cold reduces the capacity of the batteries.



If abnormal exhaust smoke occurs, after-heat the engine by pressing the cold start button.



Depress the accelerator carefully when pulling away in case there are ice patches. The reverse gear differential can be damaged if one of the drive wheels spins.

There is no risk of this happening on buses with ASR. They pull away with ”normal” acceleration. The ASR system will make sure the bus has optimum grip.

Does your bus have differential lock? See page 32 for how it is used.

Something unforeseen can occur.

Even though your **Volvo** is high-quality, you may still experience faults that must be rectified before continuing your journey. Sometimes, the fault may be easy to find and simple to rectify but it is also possible that the cause of the fault is difficult to locate. This chapter is intended to increase your knowledge on the operation of the bus.

If you are interested in reading a more detailed description of the bus's design, get a copy of Volvo Bus Service Manuals – contact your nearest Volvo dealer.

Volvo Action Service

When problems arise that you can not handle yourself, there is help at hand 24 hours a day, 365 days a year. This help is called **Volvo Action Service** and is available in many parts of the world.

Contact your importer/ Volvo dealer for more information.

In an emergency:

- First: Contact your nearest Volvo garage.
- Second: (daytime) Contact the importer. In your **Service Guide** on the page with each country's importer, you will find the telephone number.
- Third: Ring **Volvo Action Service,** any time of the day or night. The telephone number can be found in the Service Guide on the page with the details of importers.

Volvo Action Service can also be reached via the Internet on the following addresses:

Europe: www.ase.volvo.be

Brazil: www.volvo.com.br

Peru: www.volvo.com.pe

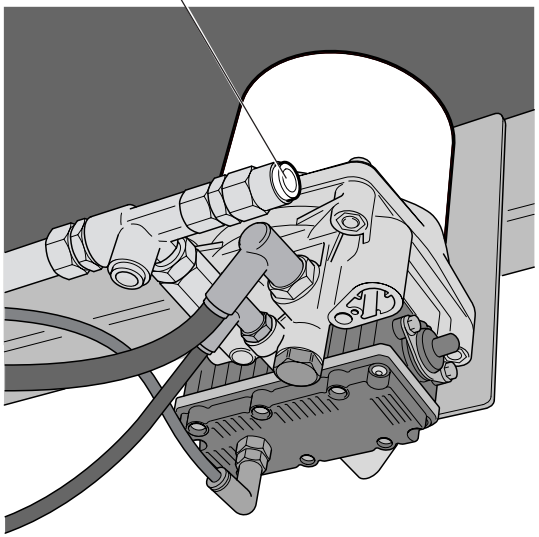
Please give accurate information to the garage when you request help over the phone. Always have the VIN number ready.

⚠ Warning!

The bus is heavy to steer when being towed!

The power steering only works when the engine is running.

Location of nipple for refilling from outside. Can also be positioned elsewhere by the coach-builder.



The power steering does not work when being towed. The steering will be very heavy!

When towing

If the towing distance exceeds:

– 100 m for bus with G8 manual gearbox

– 200 m for bus with automatic gearbox

– 100 km for bus with ZF S6-85 manual gearbox

the propeller shaft or the rear axle drive shaft **must** be removed. The reason for this is that the gearbox can otherwise be damaged due to insufficient lubrication.

When towing longer distances, take care not to allow the handbrake to be applied due to air leaking out.

If the bus is to be moved or towed and the engine can not be started to enable the compressor to charge the compressed air system, do the following: Fill the handbrake circuit brake cylinder with air so that the handbrake can be released before towing.

When there is access to dry, clean compressed air the compressed air system can be filled through the external air nipple. The nipple is on the air dryer which located in one of two places depending on the bus version, either on the crossmember between the left front and rear wheels or in the middle of the bus, just in front of the rear axle. The air dryer can either be a ”one tower”, as illustrated here, or a ”two tower” model.

As long as there is air in the system, the bus can brake as usual. When there is no air, the handbrake circuit spring brake will be applied.

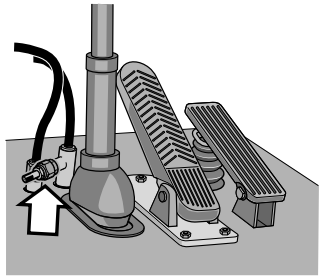
If there no compressed air of suitable quality available, the handbrake circuit spring brake can be disengage in one of the two ways described on the following pages.

Releasing the handbrake

⚠ Warning!

Before releasing the handbrake, make sure the bus can not start rolling.

Block the bus wheels or connect the drawbar to the tow truck.



Pump nipple

⚠ Warning!

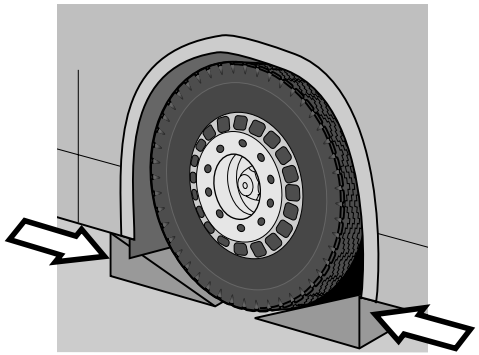
Use the drawbar when towing!

When the handbrake is released with compressed air from a tyre in this way, the bus can be braked with the handbrake but **not** with the foot brake.

Releasing the handbrake with compressed air from the bus tyre

1. Always start by blocking the wheels, or by connecting the drawbar to the tow truck so that the bus can not start rolling when the brake is disengaged.
2. Connect the clamp head of the enclosed tyre inflation hose to the tyre valve.
3. Lower the handbrake to the drive position.
4. Press the other end of the hose against the pump nipple located by the pedals. Press in the blocking valve. The lines to the parking section of the brake cylinders are now filled from the tyre. The handbrake will be released provided the pressure in the tyre exceeds 5 kp/cm^2 (500 kPa), fully released at 5.8–6.6 kp/cm^2 (580–660 kPa).

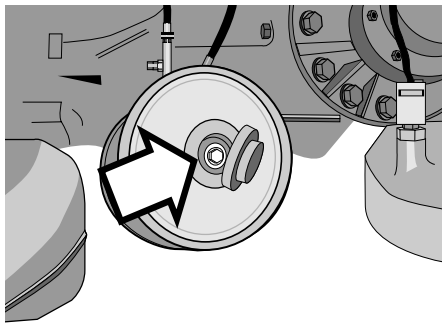
   The bus's air-pressure gauge will not give a reading. Filling can be interrupted as soon as the transfer flow has ceased.
5. The bus can now be towed. Note that towing in this case must be done with a drawbar or similar since the bus is without brakes.



⚠ Warning!

Block the bus wheels or connect the drawbar to the tow truck.

Check before releasing the handbrake that the bus can not start rolling!



Mechanical release of handbrake

Mechanical release of handbrake

1. Always start by blocking the wheels or by connecting the drawbar to the tow truck, so that the bus can not start rolling when the brake is released.
2. There is a screw located on both the drive shaft brake cylinders behind a plastic cap. They should be unscrewed until the brakes release. Use the intended spanner from the toolkit or a 24 mm socket and ratchet spanner. Count the number of rotations, this will make resetting easier.
3. The bus can now be towed. Observe that towing in this case **must** be done with a drawbar or similar since the bus is totally without brakes.
4. **Don't forget to reset the screws to their original position and to put on the plastic caps when towing is finished!**

⚠ Warning!

When the handbrake is released mechanically, the bus can not be braked with the footbrake or the handbrake.

The drawbar must therefore be used when towing in this instance!

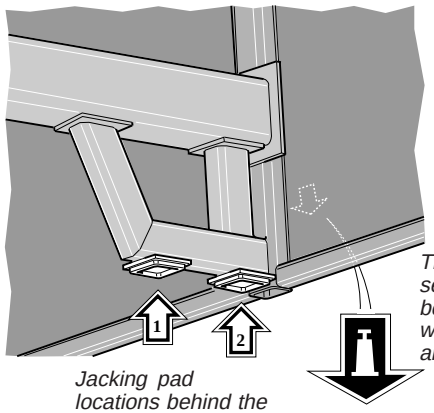
Changing wheels

Preparations for a puncture

1. Make sure the bus is standing on a level, horizontal surface that is firm. Put on the hazard warning lights and place warning triangles!
2. Take out the spare tyre and jacks, socket wrench, adapter, etc., from the toolbox.
3. Block up in front and behind the wheels remaining on the ground (part no. 1611874, option).
4. Remove any rim covers and undo the wheel nuts about 2 turns.
5. Make sure the handbrake is applied. **NB! Not applicable for punctures in rear wheels.**

A Front wheel puncture:

6. Place one of the jacks in the inner (1) of the two jacking points behind the front wheel marked with a symbol on the body. **Make sure the jack is vertically under the jacking point.** Then, lift as far as possible with this jack.
7. Then, place the other jack under the outer jacking point (2) and turn the screw to increase the lifting height. **Make sure the jack is vertically under the jacking point.** Lift the bus so that tyre goes free. Do not disturb the first jack!
8. Remove the wheel nuts and lift off the wheel.
9. Clean the mating surfaces and lift on the spare wheel.
10. Screw on the wheel nuts. Then, lower the bus so that the wheel can not be rotated and tighten the nuts according to the tightening diagram (see page 72) to a torque of 300 Nm. Tighten in a second stage to 625 Nm.
11. Remove the jacks in reverse order.
12. Fit the rim cover. Retrieve the warning triangles.
13. The wheel nuts **must** be retightened after 200 km.

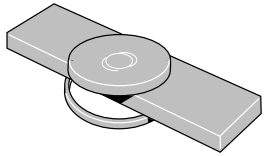


Jacking pad locations behind the front axle.

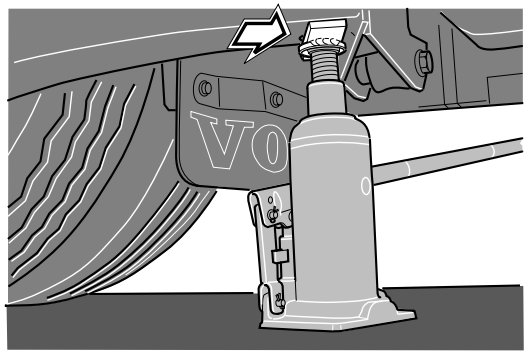
The symbol can be seen on the side of the body and indicates where the jack points are located.

B Rear wheel puncture:

6. Make sure steps 1–5 have been carried out. (See previous page.)
7. Use the rear hole in the air suspension member together with the adapter for the jack. This label on the side of the body marks the place. Remove the plastic protective plug from the hole! **Make sure the jack is vertically below the jacking point and that the adapter is engaged in the hole.** Screw up the jack as necessary.
8. Lift the bus high enough for the wheel to go free from the ground.
9. Remove the wheel nuts and lift off the wheel/wheels.
10. Clean the mating surfaces and lift on the spare wheel.
11. Screw on the wheel nuts. Lower the bus so that the wheel can not rotate and tighten the nuts according to the tightening diagram overleaf. Tighten a first stage to a torque of 300 Nm and then in a second stage to 625 Nm.
12. Remove the jack and replace the plastic plug.
13. Fit the rim cover where applicable. Retrieve the warning triangles.
14. The wheel nuts **must** be retightened after 200 km.



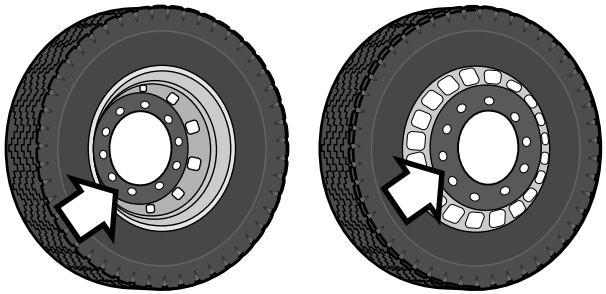
To prevent the jack from sliding, this adapter (part no. 3178753) must be engaged in the hole on the air suspension member. Supplied in toolkit.

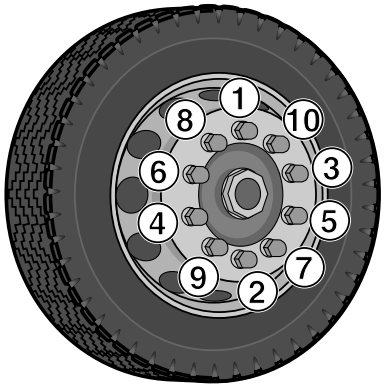


⚠ Warning!

- Before jacking up - empty the bus from passengers.
- Apply the handbrake *unless repairing a puncture in the rear wheel.*
- **Never** crawl under the bus when it is raised on the jack only. Block up the bus with approved blocks.
- Block up in front and behind the wheels remaining on the ground.
- Lifting and blocking devices should stand on a firm and level surface.
- Always retighten wheel nuts after approx. 200 km.

Read more about changing wheels overleaf!





Read about control tightening overleaf!

Changing a wheel

Clean the brake drum and rim contact surfaces thoroughly and make sure they are smooth and that the wheel nut thrust washers are not damaged. Pay special attention to mating rim surfaces on dual mounting. Make also sure that the threads on the wheel studs and wheel nuts are not damaged and oil them lightly.

Tightening the wheel

Single wheel

1. Lift the wheel onto the hub so that it centres on the hub centre shoulders. Fit two wheel nuts diametrically opposite.
2. Fit the other wheel nuts and tighten them so that the wheel is against the hub mating surface.
3. Tighten the wheel nuts in the illustrated order to 200 Nm.
4. Tighten a further 90° in the same order.

Dual mounted wheels

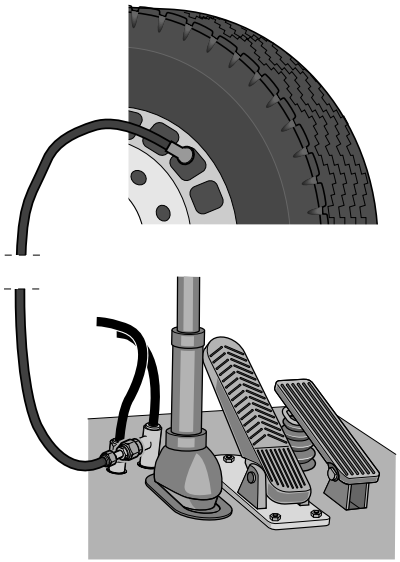
To facilitate fitting dual mounted aluminium wheels, use two guide sleeves VOLVO no. 9996833.

1. Fit the guide sleeves (aluminium wheel). Lift the inner wheel onto the hub so that it centres on the hub centre shoulders.
2. Then, lift on the outer wheel. Make sure the valve is diametrically opposite the valve on the inner wheel.
3. Fit the wheel nuts. Remove any guide sleeves and fit the remaining wheel nuts. Tighten the wheel nuts as for a single wheel. (Steps 3 and 4 above.)

⚠ Warning!

Retighten the wheel nuts **after approximately 200 km** if the wheel has been removed.

Retighten the wheel nuts **every 6 months** regardless of whether the wheels have been removed or not.



Control tightening

Tightening torque must not be below 670 Nm on any wheel nut.

If the tightening torque should be below 670 Nm on any of the wheel nuts, all nuts must be loosened and the wheel retightened as instructed on the previous page.

Tyre inflation

When necessary, the tyres can be inflated using the bus's compressed air system. Do this:

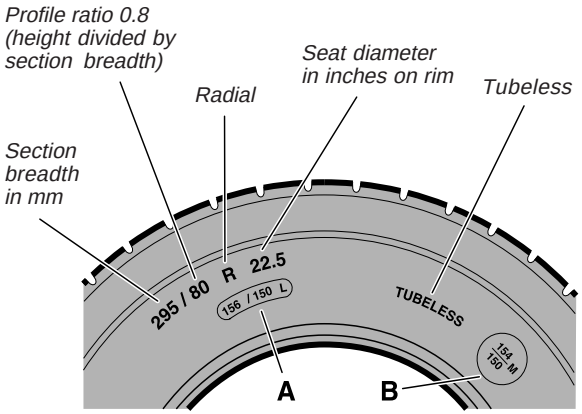
NOTE! Handbrake does **not** require releasing.

1. Connect the clamp head of the tyre inflation hose to the pump nipple on the tyre to be inflated.
2. Press the other end of the tyre inflation hose to the pump nipple next to the steering shaft.
3. If necessary, start the engine to charge the compressor. The highest pressure possible in the tyre is the same as the pressure in the braking system.

⚠ Warning!

Make sure that no one is in the near vicinity when inflating tyres!

A damaged or wrongly fitted tyre can explode when inflating.



⚠ Warning!

- Air leaks in tubeless tyres must not be rectified by fitting an inner tube. There is risk of air pockets forming. These can cause tyre explosion.

- Replace damaged rims.

- Replace damaged tyres. Cuts in the tread can be repaired provided the repair is carried out in a professional manner.

- Make sure the new tyres are approved for the intended weight and speed when changing tyres!

Tyre choice

Load and speed indexes are stamped on the tyres. The index indicates the highest permitted load and speed for the tyre. In the example below, (A) is:

156: index for highest load per tyre when single-mounted

150: index for highest load per tyre when dual-mounted

L: speed index

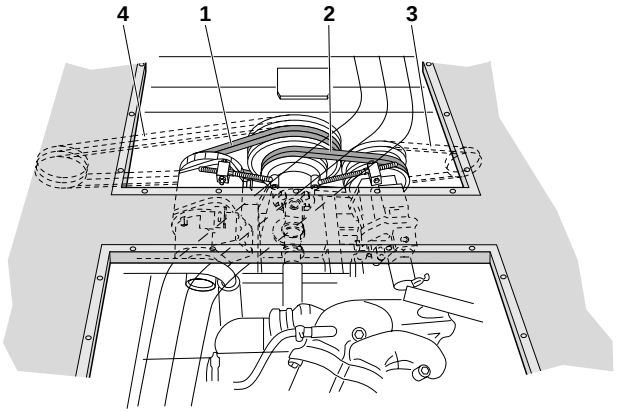
Certain tyres have a further index (B), which indicates that the tyre may be used with heavier loads at lower speeds, or vice versa.

Load index (Li) and corresponding permitted max. load per tyre in kg.

Li	*load per tyre*	*Li*	*load per tyre*	*Li*	*load per tyre*
139	*2430*	*146*	*3000*	*153*	*3650*
140	*2500*	*147*	*3075*	*154*	*3750*
141	*2575*	*148*	*3150*	*155*	*3875*
142	*2650*	*149*	*3250*	*156*	*4000*
143	*2725*	*150*	*3350*	*157*	*4125*
144	*2800*	*151*	*3450*	*158*	*4250*
145	*2900*	*152*	*3550*	*159*	*4375*

Speed index and corresponding permitted max. speed in km/h.

Speed index	*E*	*F*	*G*	*J*	*K*	*L*	*M*	*N*
Speed	*70*	*80*	*90*	*100*	*110*	*120*	*130*	*140*



Belts viewed from above/behind through the cover over the engine.

⚠ Warning!

Turn off the battery master switch when working on the belts to prevent the engine from being started.

Drive belts to auxiliary equipment

Belt-driven auxiliary equipment is always fitted directly in front of the engine. The belts are accessible for control, tensioning and replacement through the cover over the engine.

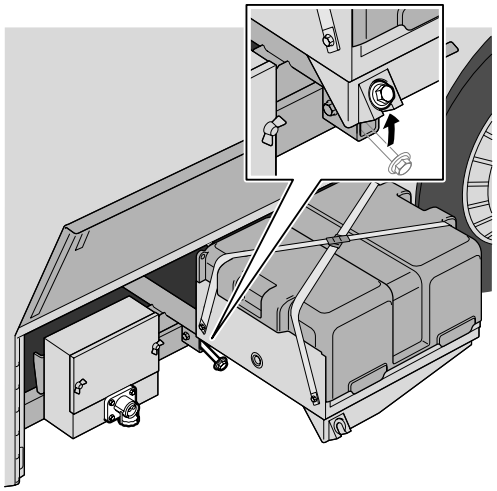
To avoid damaging the tensioning device, **both** fastening points must be loosened before turning the adjusting nut/screw!

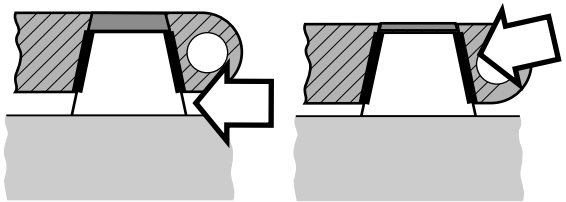
Always change both belts in a pair at the same time.

Belt/s to:	**Type:**	**Volvo part no.**
1. alternator 2x55A and 2x80A	HC38 x 1200	976490
1. alternator 115A and 180A	HC50 x 1150	966846
2. hydraulic pump for fan	HC50 x 1150	966846
3. engine compartment fan for encl. engine compartment	HC38 x 1050	978522
4. A/C compressor	Not supplied by Volvo	

Check belt tension twice after changing. First check after 500–1500 km and second check after 3000–5000 km.

Electrical system





Mounted incorrectly, terminal not bottoming

Mounted correctly, bottoming

Battery lead terminal fitted to battery

Changing batteries

Observe that when changing batteries, both should have the same capacity and be the same age.

Batteries must be connected with the correct polarity. Incorrect connection will seriously damage the electrical system.

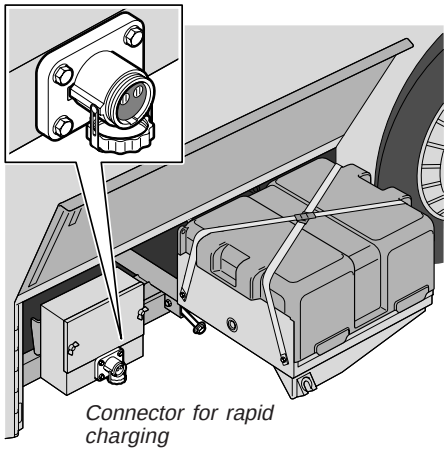
Do not disconnect the batteries while the engine is still running.

Make a practice of always remove the ground connection (negative terminal) first and connecting it last when changing batteries. In this way, you will avoid the risk of shorting with tools between the positive terminal and the battery box, for instance.

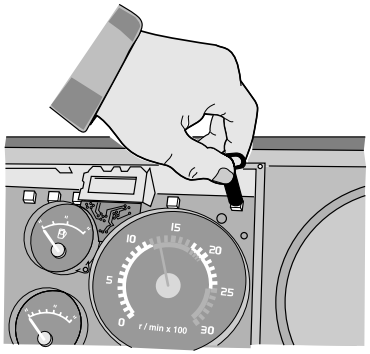
Clean the battery poles and the battery lead terminals before connecting them. After connecting them, they must be treated with anti-corrosion agent.

Battery boxes in various designs are available from Volvo. Battery installation may also have been carried out by the coach-builder. Battery box and rapid charge connector (see next page) may therefore be located and designed differently to that illustrated.

If a battery lead terminal has been connected incorrectly, the battery pole must be reamed. Otherwise, the contact surface between the battery pole and the terminal will be insufficient when the terminal is reconnected correctly. It also increases the risk of oxide forming in the space between the top of the battery pole and the terminal.



Connector for rapid charging



Rapid charging and start help

The bus has a connection for an external power supply.

NOTE! The rapid charge connection can be positioned differentially than illustrated here since the bus can have a different battery installation.

When rapid charging, the battery master switch should be turned off so as to avoid overvoltage to the bus's electricity consumers.

NB! The connector is not dimensioned for start help.

If start help is required, use additional batteries connected in parallel to the existing bus battery.

Note the polarity. Plus to plus and minus to minus!

Changing bulbs in dashboard

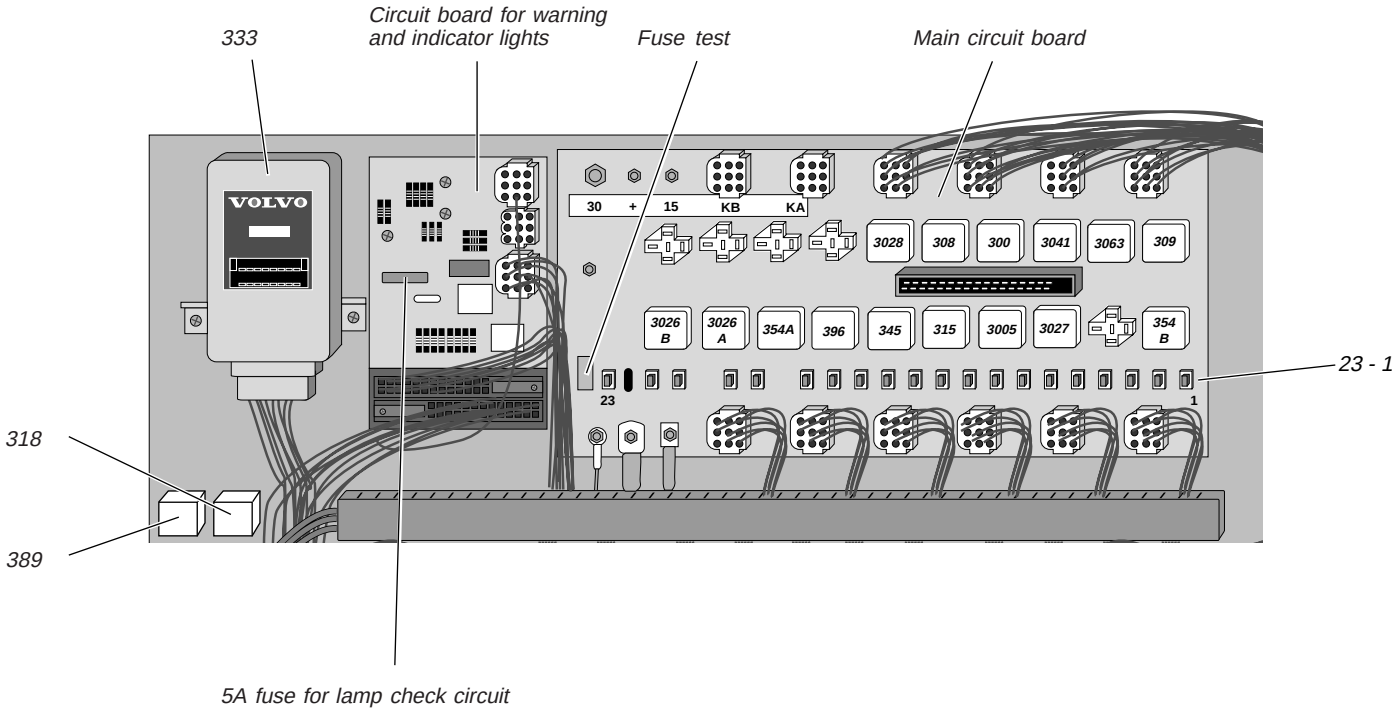
Dashboard illumination lamps:

1. Unscrew the dashboard rim and remove it.
2. Unscrew the instrument for which the lamp is to be changed. Lift away the instrument.
3. It is easiest to change the lamp with square spanner 1089953-2.

Indicator/warning lights:

1. Unscrew the indicator light panel and lift it.
2. Change the lamps with the same square spanner as above.

Electrical distribution boxes



Fuses on main circuit board

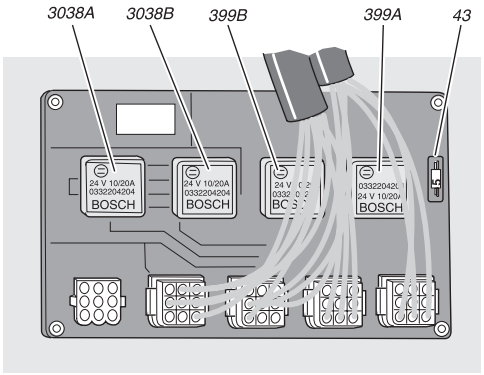
Fuse	Amperage	Circuit
1–2	8A	Parking lights, dashboard illum.
3–4	8A	Main beam, main beam indicator
5–6	8A	Dipped beam
7	8A	Indicator lights, Warning light suspension, Reverse light S6-85, Differential lock
8	8A	Starting heater, Engine shut-down
9	8A	Warning lights, Instruments, Speedometer/tachograph, Central warning lights, Coolant level warning
10	8A	Start inhibitor circuits, Reverse light, G8 EGS/automatic, Gearbox
11	8A	Fire alarm
13	8A	Battery master switch, Clock/ tripmeter, Clock in tachograph
14	8A	Feed switch, Starting switch, Starting circuit, Buzzer, Voltmeter, Handbrake warning,
15	8A	Air dryer, ABS/ASR, ECS (levelling control, kneeling)
16	8A	+ to body (via KB1)
17	16A	Starter circuit
18	16A	Parking lights, Headlights, Instrument lighting
19	8A	+15 to body (via KB6)
20	15A	+15 to body (via relay 3026B)
21	25A	+ to body
22	10A	+ to body (via KB3)
23	8A	Brake lights

Relays on main circuit board

Relay	Circuit
300	Headlights, main/dipped beam
308	Brake lights
309	Parking lights
315	Starting switch
345	Start inhibitor, body (option)
354A	Start position
354B	Additional start position (in holder marked 3029)
396	Start position, neutral, gearbox
3005	Handbrake, charge activated buzzer
3026A	+15 to chassis via feed switch/starting switch
3026B	Additional +15 to body via feed switch/ starting switch
3027	Fire alarm, lamp and buzzer
3028	Reverse light
3029	See 354B
3041	Indicator light, retarder (in holder marked 381)
3063	Engine shut-down

Other relays in main distribution box

Relay	Circuit
318	Exhaust pressure regulator
333	Timer control, starting heater
389	Indicator light, starting heater

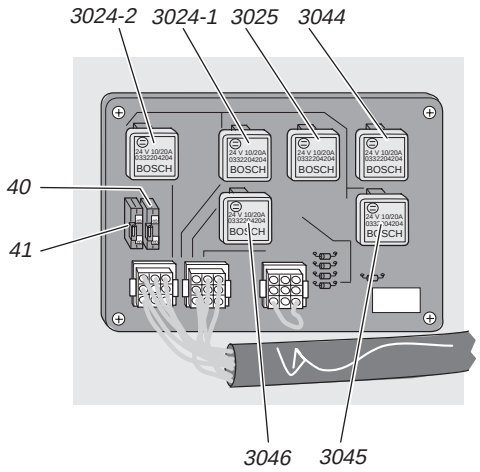


Fuses and relays on EGS circuit board

Fuse	Amperage	Circuit
43	5A	Control unit supply

(EGS control system is supplied from fuse ”10” on the main circuit board)

Relay	Circuit
399A	Safety relay, neutral position
399B	Control unit supply
3038A	Polarity reverse, start inhibitor
3038B	Polarity reverse, reverse light

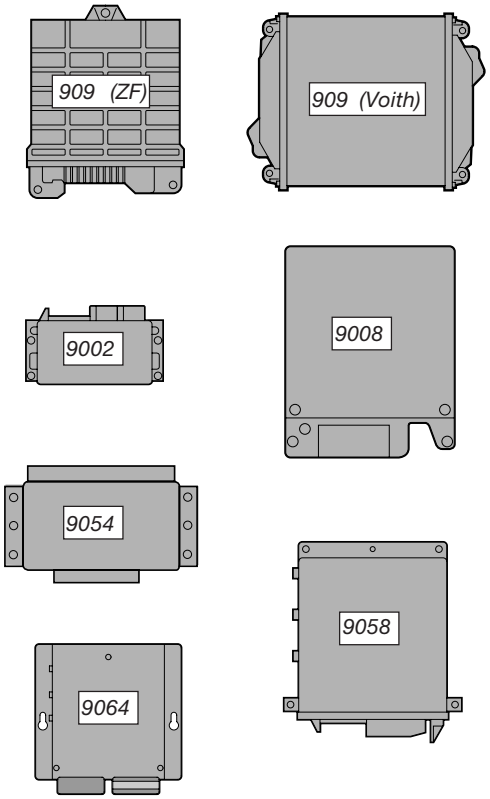


Fuses and relays on ABS circuit board

Fuse	Amperage	Circuit
40	8A	Control unit supply 1
41	8A	Control unit supply 2

(ABS control system is supplied from fuse ”15” on the main circuit board)

Relay	Circuit
3024-1	Control unit supply 1
3024-2	Control unit supply 2
3025	Indicator light
3044	Block for gearbox lock-up (automatic)
3045	Block for gearbox lock-up (automatic)
3046	Retarder disengagement



Control units

The electronic control units normally present on a B10M chassis are shown here in silhouette and to the same scale.

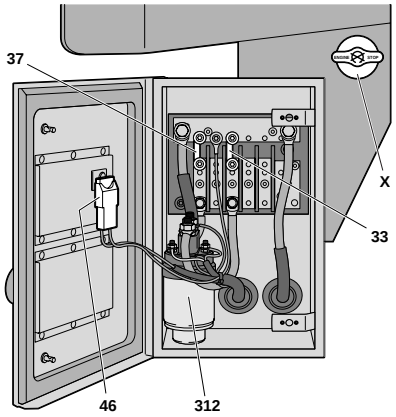
909	Automatic gearbox
9002	ECS suspension system
9008	ABS (ASR)
9054	Hydraulic retarder
9058	EDC fuel control system
9064	Electromagnetic retarder
9059	Gearbox G8 EGS. Usually located behind the driver. See control unit on page 92.

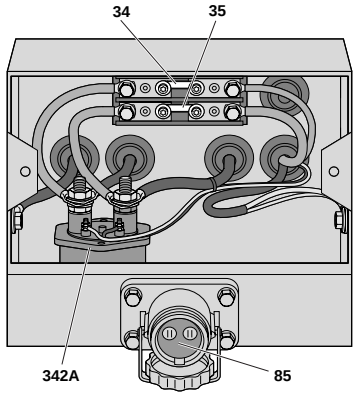
Other fuses and relays

On additional electrical distribution box

Fuse	Amperage	Circuit
44	5A	EDC controls
45	10A	EDC system, supply

Relay	Circuit
354B*	ECS supply
397	Cruise function, hydraulic retarder 1
398	Cruise function, hydraulic retarder 2
3014	Indicator light, levelling control
3060	EDC relay box
3104	Injection timing adjuster, DH10A-360 engine





Fuses and relay in junction box in front of core assembly

Fuse	Amperage	Circuit
33	150A	Starting heater
37	200A	Electric retarder
46	10A	Reserve supply EDC

Relay	Circuit
312	Starting heater

No.	Description
X	Mechanical engine shut-down

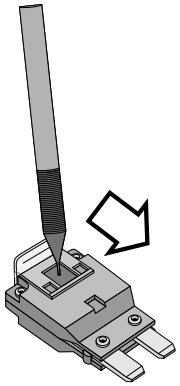
Fuses and relays in electrical distribution box in front end of battery box

Applies to buses with original battery box (located under the driver's position).

Fuse	Amperage	Circuit
34	80A	Supply to electrical distribution box after battery master switch (”+30”)
35	80A	Supply to electrical distribution box before battery master switch (”+”)

Relay	Circuit
342A	Electric battery master switch

No.	Description
85	Rapid charge socket



Resetting a circuit breaker

General information

The first measure to take when carrying out fault tracing of the electrical system is to check the fuses. Both fuses and circuit breakers are included in the bus's electrical system.

A tripped circuit breaker can be seen by the protruding red reset button. Remove the fuse from the holder and reset it by inserting a pen or small screwdriver through the "window" on the side of the fuse.

If the same fuse blows repeatedly, the bus must be driven to a garage for service to the electrical system.

Even an apparently intact fuse may require testing. If a fuse is suspected of being defective, remove it from its location and press it into the socket on the far left of the row fuses on the main distribution box (position 24). There is a green LED above this position that will go on if the fuse is intact. The battery master switch must be on while performing this test.

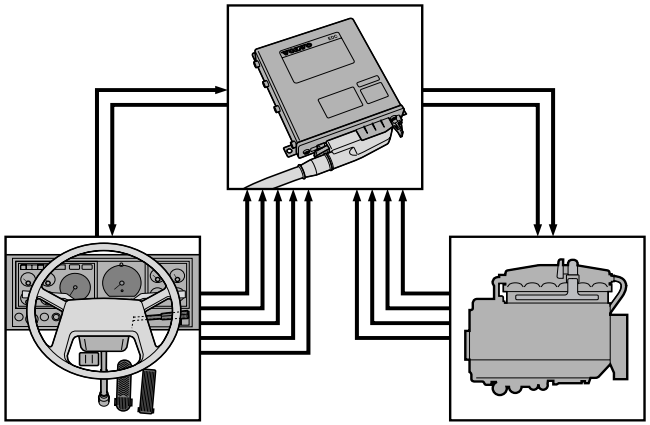
Starting problems

Make sure you follow the starting instructions in the chapter "Driving", especially in cold weather.

A number of symptoms and possible causes of engine problems can be found in the table on the next page.

Other possible causes of engine problems (starting or performance) *may be* air in the fuel system, clogged fuel filter or a vacuum in the fuel tank.

Symptom:	*Check/rectify:*
Starter motor not cranking.	– Is the battery master switch on? – Is the gear lever in neutral position or the clutch pedal depressed? (Does not apply to buses with S6-85 gearbox.) – Are the batteries charged? Turn on the headlights. If they do not come on or are dim, the batteries may be in poor condition. There may be a bad connection on the battery cables. Check also the ground connection via the engine. Clean contact surfaces and charge the batteries. – Are the fuses in the electrical distribution box in front of the battery box (see page 82) and circuit breakers ”10” and ”17” in the main electrical distribution box intact (not triggered)? – Check relays 315 starting switch 345 start inhibitor, body 354A starting position 396 starting position, neutral Try replacing the relay with another one that is not needed for starting. See main electrical distribution box on page 78.
Starter motor cranking engine too slowly. ***(Engine will not start)***	– Battery or its connections in poor condition? Turn on the headlights. If they do not come on or are dim, the batteries may be in poor condition. There may be a bad connection on the battery cables. Check also the ground connection via the engine. Clean contact surfaces and charge the batteries.
Starter motor cranking but engine will not start ***or starts but emits abnormal exhaust smoke. (Cold weather.)***	– Fuse 150A for starting heater (”33”) in electrical distribution box in front of the core assembly. See page 82. – Fuse 8A for starting heater (”8”) in main electrical distribution box.. See page 78.
Starter motor cranking but engine will not start.	– Has the mechanical stop control in the engine compartment been pulled out? – Fuel supply system. Read more on the following pages.



The control unit receives information on:

accelerator position
bus speed
footbrake active
clutch pedal depressed (if fitted)
exhaust brake active (if fitted)
charge air pressure
charge air temperature
coolant temperature
engine speed
idle speed change

The control unit sends signals on (governs):

fuel quantity
engine shut-down

The control unit stores and displays fault codes (diagnosis).

Engines with type designation DH10A have electronically control injector pump while the THD102 engine has mechanically controlled injector pump. (This section does not apply to buses with THD 102).

The DH10A control system is called EDC (Electronic Diesel Control).

The advantages of the EDC system is its accuracy in fuel control and that it can communicate with other electronic control systems for various functions, e.g. ABS and ASR.

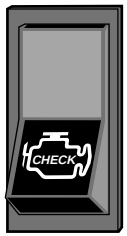
Power supply, fuses

With a fault-free power supply, the EDC control unit will have dual safety against power cuts and the power supply indicator light will be off. (Illustration of lamp, see next page.)

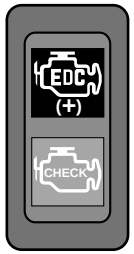
If there is a break in the normal power supply to the control unit, fuse 45 (10A) in the main distribution box, the lamp will go on continuously. Current is then fed over fuse 46 (10A) in the electrical distribution box in front of the core assembly. The bus can be driven as normal even if the lamp comes on but to avoid the risk of a complete power failure, which will cause the engine to stall, we recommend allowing a Volvo garage to rectify the fault as soon as possible.

If fuse 44 (5A) in the main distribution box has blown, it will not be possible to adjust the idling speed and the cruise control will not work.

(Note: fuses 44, 45 and 46 are fitted in separate holders).



Diagnostics switch



Indicator lamp, power supply. See previous page!

Diagnostic lamp. See below!

Diagnostics

In the EDC system, there is a diagnostic function that indicates through a warning light if a fault has occurred.

The following rule of thumb applies when turning the starter key to the drive position:

No light: (directly after the voltage is turned on)

The control unit receiving no voltage or the diagnostic lamp is faulty. Check the EDC system fuses and change where needed, See the previous page. Check and change the diagnostic lamp if needed . Try starting.

On constantly: (bus stationary with idling engine)

Normally, straight after the voltage is turned on and before the brake test is carried out. The diagnostic lamp should go out after pressing and holding the brake pedal for a few seconds.

If the light continues to shine then there is a fault in the control unit which will be working under ”emergency control”. The engine can be started but it will have a reduced output and a lower maximum engine speed! Contact your Volvo-garage as soon as possible.

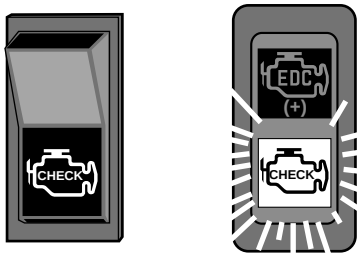
Fault indication! See next page.

Flashing:

The EDC system monitors the sensors, functions and regulator actuators. Possible faults are stored in the control unit memory.

Depending on how serious the extent of the fault is, the consequences can lead to reduced engine speed or that the engine output is reduced.

Flashing (continued):

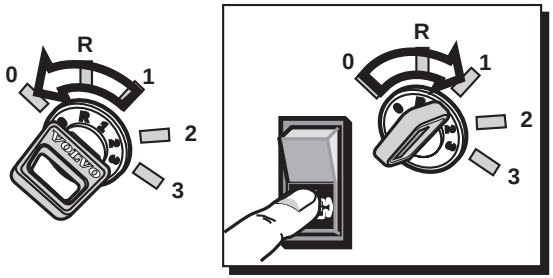


Have the starter key/ supply current switch in the drive position, press in the diagnostic switch. Release the switch after a few seconds and count the number of flashes from the diagnostic lamp. Note the number. The number of flashes corresponds to the fault codes. See below.

Push in the diagnostic switch again and check to see if there is more than one fault. Continue until the first recorded number of flashes returns.

Fault code/ Diagnosis	*Probable fault*
1 B	*Control unit incorrectly connected*
2 S	*Control unit not programmed*
3 HE	*Brake indicator faulty or not checked*
4 SE	*Main and auxiliary engine speed signals missing (engine stationary)*
5 B	*Main engine speed signal incorrect*
6 HE	*Auxiliary engine speed signal faulty*
7 B	*Speedo readings show abnormally high speeds*
8 B	*Vehicle speed signal faulty*
9 B	*Charge air temperature higher then 90°C*
10 B	*Charge air temperature abnormally low*
11 B	*Charge air temperature higher then 100°C*
12 B	*Coolant temperature abnormally low*
13 B	*Coolant temperature abnormally high*

Fault code/ Diagnosis	*Probable fault*
14 B	*Turbo pressure abnormally low*
15 B	*Turbo pressure abnormally high*
16 B	*Accelerator pedal indicates abnormal low voltage*
17 B	*Accelerator pedal indicates abnormallhigh voltage*
18 BE	*Cruise control faulty*
19 B	*Internal fault in the control unit*
20–22 B	*Control rod position (injector pump) faulty*
23 B	*Probable internal system fault*
Note:	*"S" indicates that warning light off* *"B" indicates flashing warning light* *"H" indicates warning lamp on constantly* *"E" indicates the fault is not stored in the fault memory*



Clearing fault codes after performed measures

– Turn the starter key to position ”0”.
– Keep the diagnostic switch pushed in while at the same time turning the starter key to the drive position. Do not release the switch.
– Keep it pushed in for approximately 3 seconds. Release the switch.

Inspection

– From the drive position, turn the starter key to position ”0” and then back again to the drive position. The following information will now be provided by the diagnostic system.

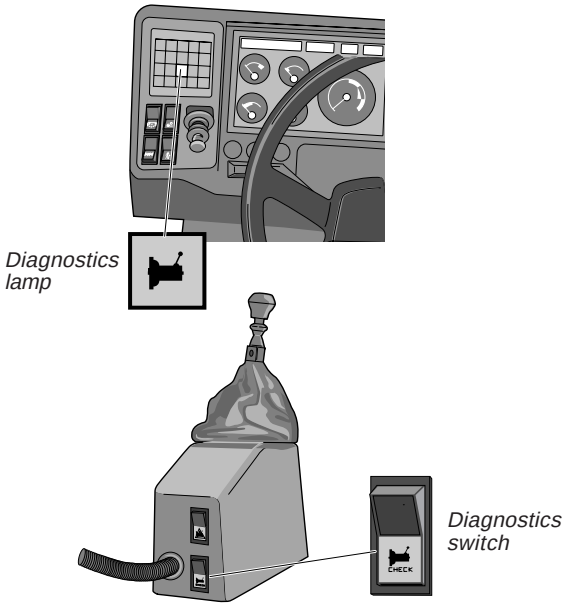
	Diagnostic lamp on constantly	Fault code indicated when diagnostic switch pushed in
Starter key in drive, engine stationary	Yes	3 and 4
After brake check	No	4
After engine start	No	No fault code

When the engine has been started and the brake check performed, the diagnostic lamp should be off

Clutch

Symptom:	*Check/rectify:*
No declutch when pedal depressed.	– Check the level in the clutch fluid reservoir. – If low, fill to correct level. Depress the clutch pedal and watch for leaks in the hydraulic lines. – Keep the clutch pedal depressed for two minutes. During this time, the servo cylinder piston should not return to its rest position. If it does, check whether there is hydraulic fluid leaking from the servo cylinder. If the piston returns without any visible leaks, there may be air in the hydraulic system or the seals on the master cylinder may be damaged. – If there only a minor leak or no leak at all, fill to the correct level with clutch fluid. – Rectify any leaks.
Pedal must be depressed with great force before clutch will disengage.	– Check and adjust the stroke of the servo cylinder. – Change leaking seals in the servo cylinder.

Gearbox G8 EGS



Fault in EGS system

The EGS system is powered via fuse ”10” on the main circuit board (see page 78) and fuse ”43” on the EGS circuit board (see page 80).

The EGS diagnostic lamp will go on for one second when the engine is started. This is the time it takes for the EGS system to perform its internal check. If the lamp does not go out after this time, or if it goes on while driving, there is a major fault in the system. In most cases, it will not then be possible to change gear.

Diagnostics

There is a diagnostic program integrated in the electronic control unit. It can be activated with the diagnostic switch as follows:

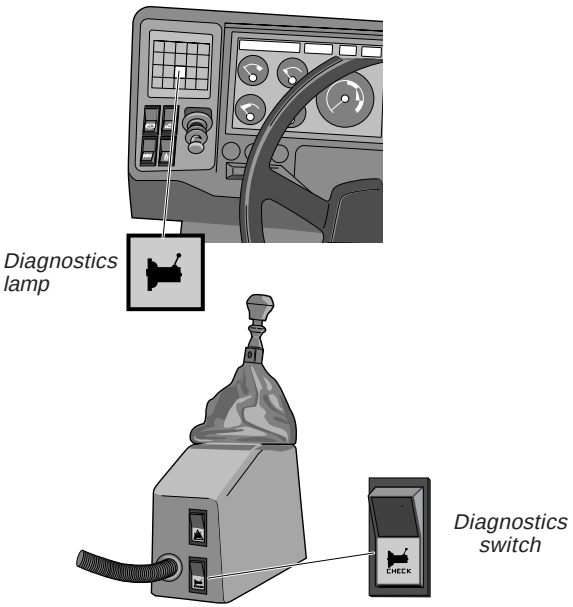
– Put the starter key in drive position.

– With the gear lever in neutral and the bus stationary, press the bottom of the diagnostic switch.

– A fault will be indicated by the diagnostic lamp flashing at two different rates (resulting in a fault code, see the fault code table).

– Slow rate indicates the fault code in tens, fast rate in ones. Example: one slow and one fast flash indicates fault code 11, two slow and three fast indicates fault code 23.

– Check to see whether there are any other faults present by pressing the diagnostic switch again. If there any further fault codes present, they will be displayed. (Repeat the procedure until the first fault code returns.)



Fault codes

Fault codes are grouped as follows:

11–13 Service information
21–45 Faults affecting the gearbox
56 Faults affecting the declutch sensor
61–66 Faults affecting engine speed, vehicle speed and gear lever carrier.

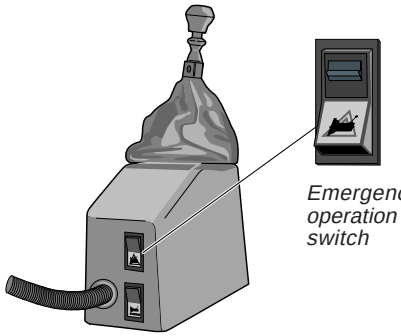
Clearing fault codes

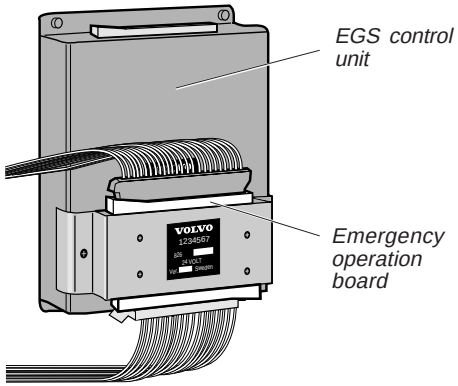
Once a fault has been rectified, the stored fault codes are cleared in the following way.

– Put the starter key in 0-position.
– Press the diagnostic switch and keep pressing it while turning the starter key to drive position.
– Wait until the diagnostic lamp gives two short flashes and one long (after 2–3 seconds).
– Release the diagnostic switch.

Emergency operation system

The bus has two emergency operation systems:





Integral emergency operation system
The first emergency operation system to be engaged is the one that is integrated with the ordinary control unit. It can be engaged with the emergency operation switch. The engine must be running and the bus must be stationary when engaging. Emergency operation can not be disengaged with the engine running and if it is still required, it must be re-engaged each time the engine is started. The diagnostic lamp will flash when this emergency operation system is active.

Gear positions 1–5 and reverse should now work, gear positions 6 and 7 and the +gear are blocked. Shifting is performed slower than normal.

Separate emergency operation board
If it is still impossible to change gear, the emergency operation board can be engaged as follows:

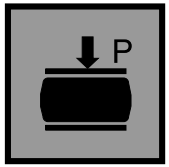
– Depress the catch on the upper connector on the control unit. Lift off the connector starting at the end where the catch is.
– Plug this connector to the upper terminal block on the emergency operation board.
– Unplug the lower connector from the control unit. Connect it to the lower terminal block on the emergency operationboard.

It should now be possible to change gear with limited shifting functions, meaning gear 1–4 and reverse. Safety function present in the ordinary control unit are **not** included in the emergency operation board. This means that special attention must be paid to engine speed when changing gear.

⚠ Warning!

Crush risk!

Remember that kneeling reduces ground clearance.



Warning and diagnostic lamp

Located on the bottom right of the lamp panel

Suspension system

The bus is equipped with ECS, Electronic Controlled Suspension,

The ECS system compares preprogrammed values in the control unit with signals from level sensors fitted between the bus chassis and the wheel axles. Aided by these signals and any other signals from levelling control and kneeling switches, the control unit governs valves that distribute air at the correct pressure to the air suspension bellows to keep the bus at the desired height irrespective of the load.

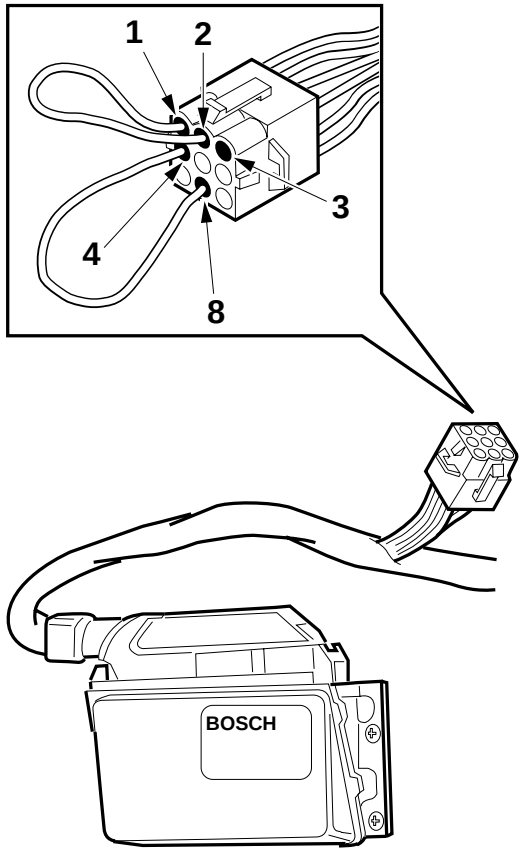
Suspension height during normal operation and maximum value for raising and lowering the bus can be changed, within certain limits, by an authorized person after reprogramming the control module.

Fault tracing – ECS

The warning and diagnostic lamp has several functions. These are described under the heading ”Suspension” in the ”Instruments and controls” chapter.

The first measure to take if the suspension is reacting abnormally is to de-energize the system by turning off the operating voltage and then restarting the engine. This simple measure (”reset”) can occasionally solve intermittent problems.

Continued on next page



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The suspension system is powered via fuse no. 15.

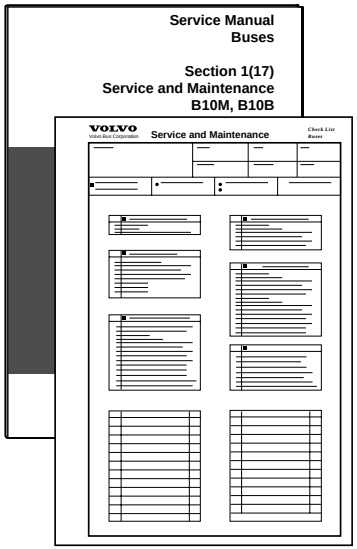
Fault tracing is normally carried out with a computer (PC). A simpler form of diagnosis can be performed with a few cable ends only. Locate the 9-pin connector marked ”DIA” hanging on the cable harness from the suspension control unit. For safety reasons, the suspension is connected so that it is activated (and controlled) only once the engine has been started. (Actually: when the alternator is charging.) In order to retrieve fault codes from the warning and diagnostic lamp, the engine must be running or pins ”1” and ”2” in the connector coupled together with a cable end. Temporarily couple together pins ”4” and ”8”. The lamp on the dashboard will start to flash any fault codes (see table below) when this coupling is broken. Fault codes can be cleared by jumping pins ”4” and ”8” as above and placing another cable between pins ”3” and ”8”.

No.of flashes	Fault	Check/Rectify
2	Solenoid valves connections/leads	Valve block with electric
3	Voltage to level sensor	Voltage on pins 27-9/26-28/30-31/14-29 should be 5 V
4	Tachograph signal w. connect./leads	Tachograph speed signal
5	Level sensor	Level sensor with levers, connections and leads
6	Control period	Air leaks, pressure, pressure sensor, solenoid valves, speed signal, level sensor
7	Switches and leads	Switches and connections
8	SO diagnosis	Diagnostic function
9	Control unit	Control unit
10	Normal height setting	Adjust normal bus height
11	Software fault	Control unit

Remember...

- Regular service is needed to keep the bus in perfect working order and to maintain a high standard of passenger safety.
- The correct choice of oil, regular oil level checks and changing oil and filters in accordance with recommendations is crucial for the lifetime of the components.

Maintenance and warranty



Service program

To be able to maintain the buses original characteristics during its lifetime, regular maintenance is required in accordance with the service program.

Service and maintenance should be performed at a Volvo garage. At the garage there is trained staff, special tools and the required service manuals needed for a high standard of quality. To compliment this they also use Volvo original parts, which have the same quality as the components used in the Volvo factory.

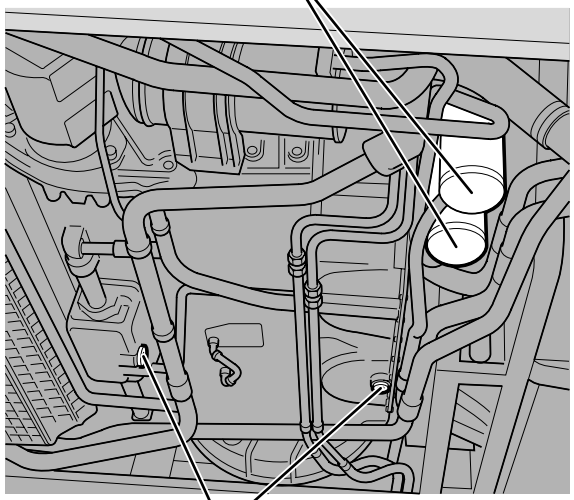
The service program for preventive maintenance consists of a *basic service every 3 months or at intervals of a maximum of 25 000 km for urban driving, 35 000 km for scheduled traffic and 45 000 km for long distance and tourism plus a major service every 12 months.*

Instructions for oil and filter changes plus lubrication are on the following pages.

Always use new (never reconditioned) oil supplied by well known manufacturers! The oil and fuel must fulfil the required standards.

Warranty

A condition of the Volvo warranty is that the bus should be maintained according to our recommendations. Instructions can be found in the Volvo service manual ”Service and Maintenance”. Where possible, allow the dealer who supplied the bus to perform the service.



Draining engine oil
(+ a plug in the bottom of the oil reservoir, see text)

⚠ Warning!

Hot oil can cause burn injuries.

Change engine oil

Modern, low-emission engines put great demands on the engine oil. Oil complying with VDS-2 is recommended.

Oil change intervals

Every 3 months. The max. mileage specified below must not be exceeded, however.

If oil change intervals exceed 30,000 km, the ”Long life” full-flow filter, part no. 478736, must be used.

Using oil complying with **VDS-2** (Volvo Drain Specification 2):

– Urban and suburban traffic ..... max 25 000 km
– Interurban traffic ..... max 35,000 km
– Long distance and tourist ..... max 45,000 km

Example: VDS-2 SAE 15W/40, Volvo part number 1161976 (208 litres), 1161975 (20 litres).

Using oil complying with **VDS** (Volvo Drain Specification):

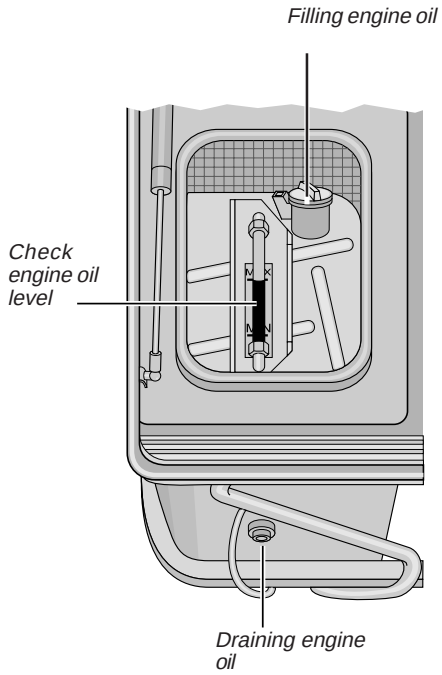
– Urban and suburban traffic ..... max 20,000 km
– Interurban traffic ..... max 30,000 km
– Long distance and tourist ..... max 40,000 km

Using oil with specification API CE, CF, CF-4, CG-4 or ACEA E1-96, E2-96, E3-96:

– Urban and suburban traffic ..... max 15,000 km
– Interurban traffic ..... max 20,000 km
– Long distance and tourist ..... max 20,000 km

If the limit of max. 0.5 weight percent content of sulphur in the fuel in exceeded, the specified mileages must be halved.

Drain the oil immediately after driving while it flows easily.



There are three plugs for draining. One on the bottom edge of the dry sump, one by the oil pocket on the inspection hatch and one on the bottom of the oil reservoir. The engine oil reservoir is located in the rear right corner of the bus.

Do not mistake the engine oil reservoir for the oil tank to the hydraulic cooling fan operation on buses fitted with such. The tanks are fitted beside each other on certain buses fitted with hydraulic cooling fan operation. The fan drive oil is red.

It essential that all the plugs are removed or a large amount of oil be otherwise be left in the engine. This has a bearing on the oil change interval.

Oil is filled through the oil reservoir filler pipe.

Oil change volume
Approx. 50 litres including oil filter.

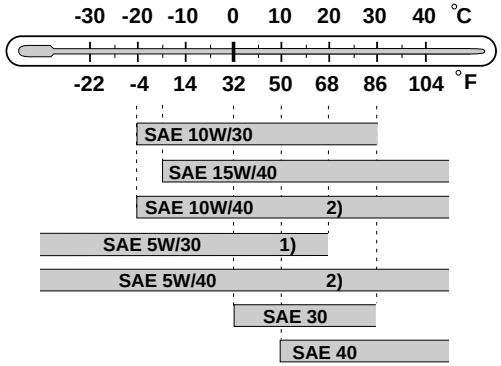
Recommended oil viscosity, see overleaf.

Change oil filter

The oil filter should be changed at the same time as the engine oil. (If oil change intervals exceed 30,000 km, the ”Long life” full-flow filter must be used.)

1. Wash the outside of the filter consoles to prevent dirt form entering when the new filter is fitted.
2. Undo the old filter with filter wrench 999 6672. Scrap old filters.

Temperatures refer to constant ambient temperatures.



1) Fully synthetic and/or VDS/VDS-2 oil.
2) VDS-2 oil only.

3. Moisten the rubber gaskets on the new filter elements with oil. Screw on the elements by hand until the gaskets make contact with the sealing surfaces. Then, turn a further 1/2 to 3/4 of a revolution.
4. Fill with oil and start the engine. Check the tightness around the filters.

NB! The filters must not be cleaned – replacement is the only measure that may be taken.

Filling oil and checking level

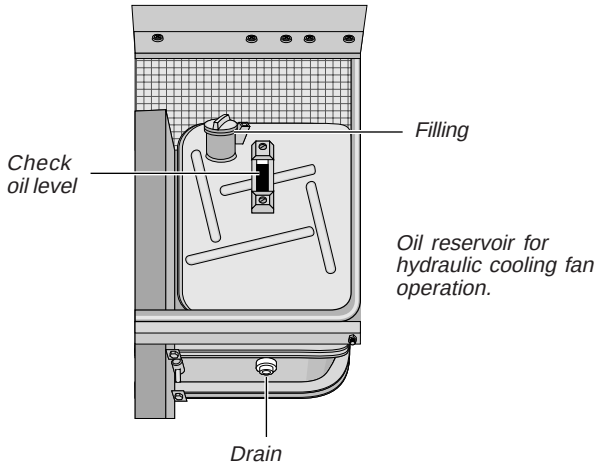
Engine oil is filled through the oil reservoir filler pipe.

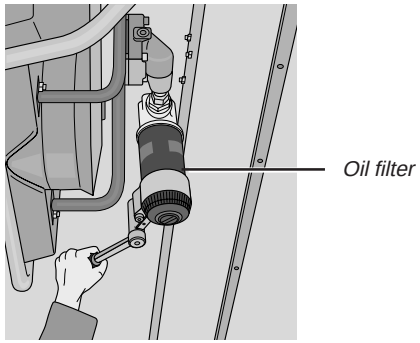
After oil changes and other maintenance, check the level of the oil in the oil reservoir level glass. It should be between the MAX and MIN markings. The check should be carried out with the engine idling.

Fill to MAX level when changing oil.

A continuous check of the oil level is carried out while driving using the oil level warning light.

Hydraulic cooling fan operation





Change oil and filter

Oil and filter should be changed every 120,000 km.

Fan drive oil is red.

1. Drain the oil through the drain hole in the bottom of the oil reservoir.
2. Unscrew and scrap the old filter.
3. Moisten the new filter rubber gasket with oil. Screw on the filter by hand until the gasket makes contact with the sealing surface. Then, turn a further 1/2 to 3/4 of a revolution.
4. Fill with oil to the top of the level glass.
5. Start the engine. Check the tightness around the filter.
6. Stop the engine, check the oil level and top up to the top of the level glass if necessary.

Oil change volume
Approx. 33 l including oil filter.

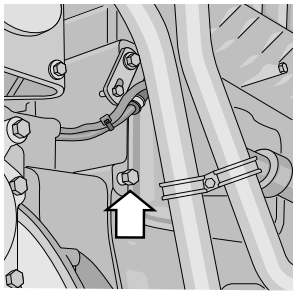
Oil grades
ATF Dexron IID (Volvo part. no. 1161282 for 208 l package and 1161934 for 20 l package).

Check oil level

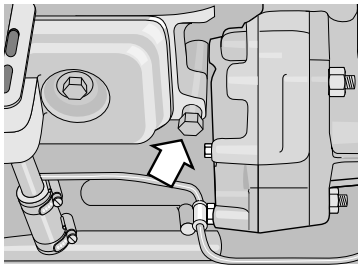
The oil level should be in close to the top of the level glass. Do not overfill!

⚠ Warning!

Coolant is toxic and dangerous if swallowed.
Protect eyes.
Avoid skin contact – use protective gloves.



The plug is located in the engine block close to the flywheel cover.



Besides these two illustrated drain points on the engine, there is a plug in the oil cooler on the front of the engine. (See also adjacent text).

The plug in the engine block is located by the compressor.

Change coolant

Coolant should be changed **every other year** on buses **without coolant filter**.

Coolant should be changed **every four years** on buses **with coolant filter**. Note that the coolant filter must be changed every 6 months. Read more about changing filter overleaf.

A mixture of 50% anti-freeze and 50% water is recommended for the cooling system (and the heating system).

Never use coolant with less than 40% anti-freeze. This also applies when topping up. Anti-freeze protects the system against rust and freezing.

Volvo coolant is recommended even when coolant is not required to protect against frost. It provided good protection against corrosion.

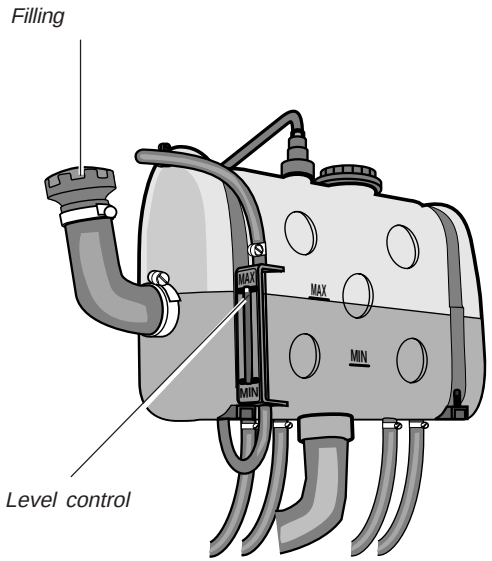
Draining coolant

All drain points must be open to completely drain the system. The expansion tank cap should also be removed when draining.

The number and location of the drain points vary between buses of different design. Common drain points are at the bottom of the radiators (NB! both radiators) and three drain points on the engine.

If the bus is fitted with manual gearbox and hydraulic retarder or automatic gearbox, the pipes to and from the transmission's oil cooler must also be drained of coolant. They hold a large volume!

Take care with hot coolant. Risk for burn injuries!



Filling and level control of coolant

Before filling: prepare a mixture of anti-freeze and pure water. Fill coolant through the filler neck in the expansion tank. The expansion tank is accessible through the rear engine cover. Fill slowly to avoid air pockets in the system.

The heater valves should be open and the heating system turned on while filling.

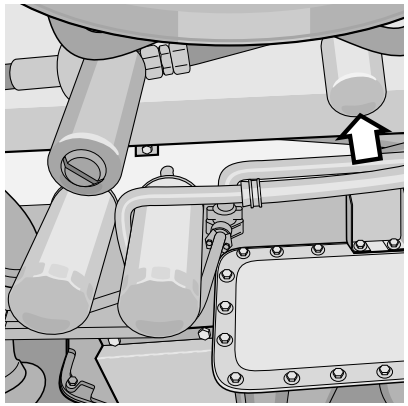
On buses with roof-mounted air conditioning systems, where the level of coolant is above the level in the expansion tank, the coolant must be pumped up by starting the system's circulation pump.

Gradually top up through the expansion tank until the cooling system is completely full. Check the coolant level after running the engine warm.

It should be between the MAX and MIN markings on the expansion tank.

Use the same mixture when topping up. Never fill with cold coolant in a warm engine! The difference in temperature may fracture the engine.

A continuous check of the coolant level is carried out while driving using the coolant level warning light.



Coolant filter

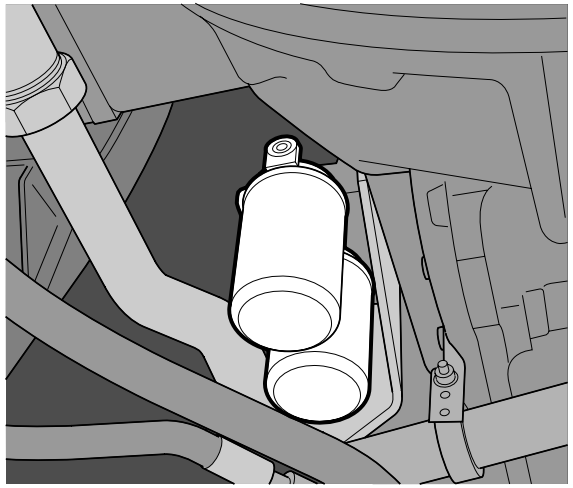
A coolant filter is optional. It filters the coolant and **adds anti-corrosion agent**.

To avoid adding too much anti-corrosion agent, the filter must **not** be changed at the same time as the coolant but six months after the first coolant change and then every 6 months.

Close the valve on the filter housing before removing the filter so that the coolant does not run out. Open = pin vertical, closed = pin horizontal. Use a filter wrench to loosen the filter if necessary.

Moisten the rubber gasket on the new filter with oil. Screw on the filter by hand until the gasket makes contact with its sealing surface. Then, turn a further 1/2–3/4 of a revolution. Do not forget to **open the valve** on the filter housing.

Fuel system



Fuel filter

Fuel

Always observe cleanliness when refuelling and working with the fuel system. Always use a diesel fuel of high quality supplied by a well known oil company.

In low winter temperatures, use a special winter fuel supplied by these well known oil companies. Winter fuel is more volatile and reduces the risk for wax deposits.

Fuel requirements, see under the heading ”Data, specifications” in the chapter ”Technical Data”.

The injector pump should be sealed according to applicable regulations.

The seal on the injector pump may only be broken by an authorized mechanic. If the seal is broken by someone un authorized, all warranties will become void.

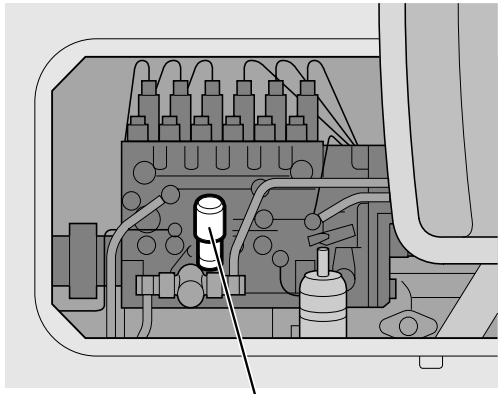
Fuel filter

The degree of purity of the fuel is of great importance for the lifetime of the filter. Symptoms of a blocked filter are deteriorated engine output and starting problems.

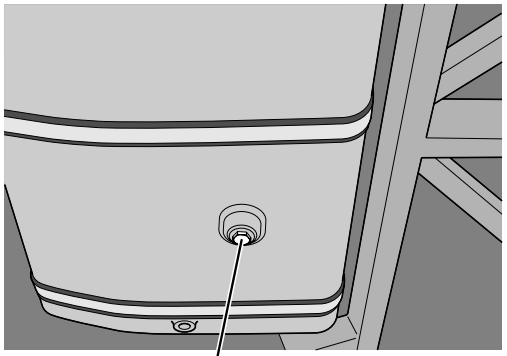
The recommended interval for changing the filter is once a year but this period can be lengthened if great cleanliness is observed.

If the engine feels abnormally weak, it can be due to a blocked fuel filter. Read in the service manual on how the fuel feed pressure is measured.

The fuel filters are located on the right-hand side of the engine and is accessible from below. Depending on the engine model, they are to be found under the starter motor or in the middle of the engine. They are smaller than the oil filters located further back on the right-hand side of the engine.



Hand pump



Fuel tank plug

Hand pump

After working on the fuel system (e.g. when changing a fuel filter) or when the fuel tank has been run dry, the fuel needs to be pumped in manually. Approximately 15 pumps with the hand pump is usually sufficient.

The fuel system does not usually require bleeding after running out of fuel, but it is wise after changing the fuel filter to open the air nipple on the filter console and pump a few times with the hand pump. By doing this you fill the empty filters with fuel.

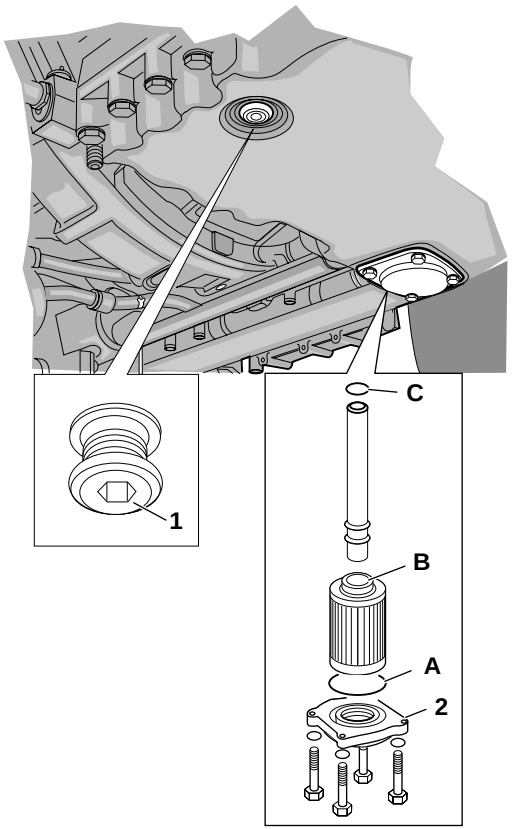
Condensation

Once a year, suitably in the autumn, the fuel tank bottom plug should be removed to allow for possible sludge and condensation to run out . By doing this, the risk of water getting into the engine and causing running problems is avoided. Do this:

1. Place a receptacle under the fuel tank.
2. Loosen the plug and unscrew it until water starts running out of the plug's drain hole. Do not unscrew the plug **completely**. Otherwise, you will empty the tank!
3. Let it run until pure fuel comes out.
4. Screw in the plug.

If condensation is found in the fuel tank during this check, the filters should be changed while the tank is being drained.

Automatic gearbox ZF HP-series



Changing oil and filter

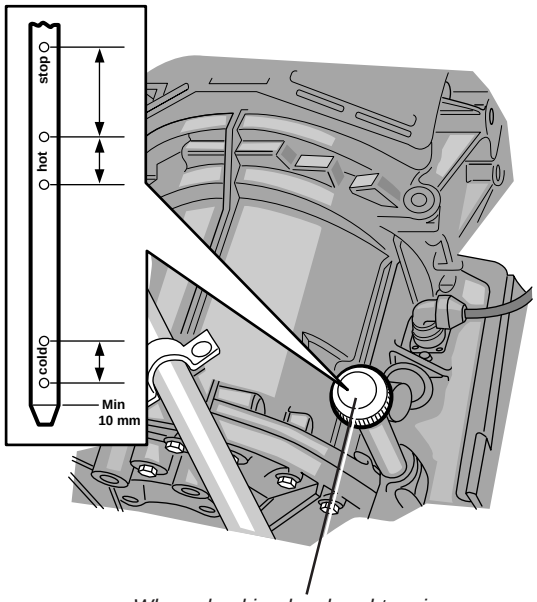
– Oil and filter should be changed every 30,000 km. Alternatively every 90,000 km when using Volvo ”Synthetic oil”. (See page 111 Oil grades.)

– But at least once a year.

1. Drain off the oil through the drain plug (1) while the gearbox is warm. Remove the oil filter cap (2) and the filter. Any oil remaining in the oil cooler does not have to be drained.
2. Change oil filter, always use a new sealing ring (A) on the cap. If the oil suction pipe has followed up with the oil filter from the gearbox casing, it must be refitted with a new O-ring (C). Make also sure that the upper O-ring (B) on the oil filter is in place and intact.

   Tightening torque for oil filter cap screws: 25 Nm.
3. Fit the drain plugs and tighten them, tightening torque plug (1) 50 Nm.
4. Fill at least 12 litres of oil in the gearbox when changing oil. Approx. 20 litres when filling a dry gearbox. The oil level should remain in the area marked ”stop” on the dipstick. This relatively high level is because oil runs from the torque converter down to the gearbox when the bus is stationary.

   Top up as necessary, start the engine and check the level according to directions in ”Level control”.



When checking level and topping up, make sure the vent holes in the cap are not clogged.

Oil change volume
Approx. 17 l.

Check oil level

Warm gearbox (80°–90°C oil temperature)

The check is performed with the engine at a low idling speed, approx. 500–600 rpm.

The oil level should remain in the area marked ”hot” on the dipstick.

Top up if the oil level is too low.

Cold gearbox (oil temperature under approx. 30°C)

The check is performed with the engine at a low idling speed, approx. 500–600 rpm.

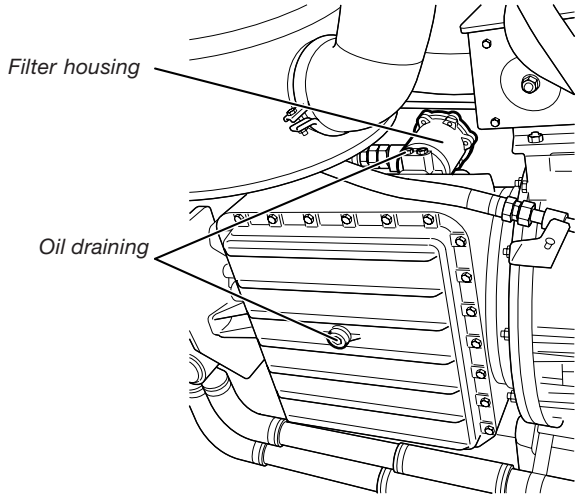
The oil level should remain in the area marked ”cold” on the dipstick.

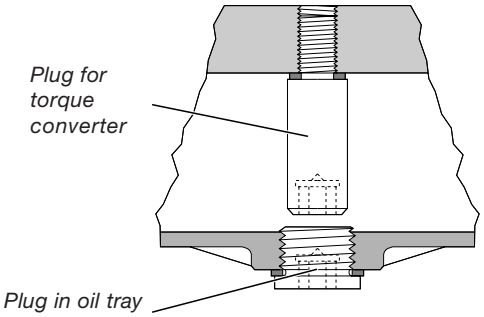
Top up if the oil level is too low.

NOTE! In extremely cold weather conditions the oil level directly after starting may be below the area marked ”cold”, despite being correct when the gearbox is warm. However, the level must not go below 10 mm on the dipstick if warming up is to be permitted. This is why certain dipsticks have a ”min” marking or a ball at the bottom of the stick.

Warm up the gearbox and perform the final check according to the above instructions (80°–90°C). Top up oil if needed.

Automatic gearbox Voith 863, 864





Changing oil and filter

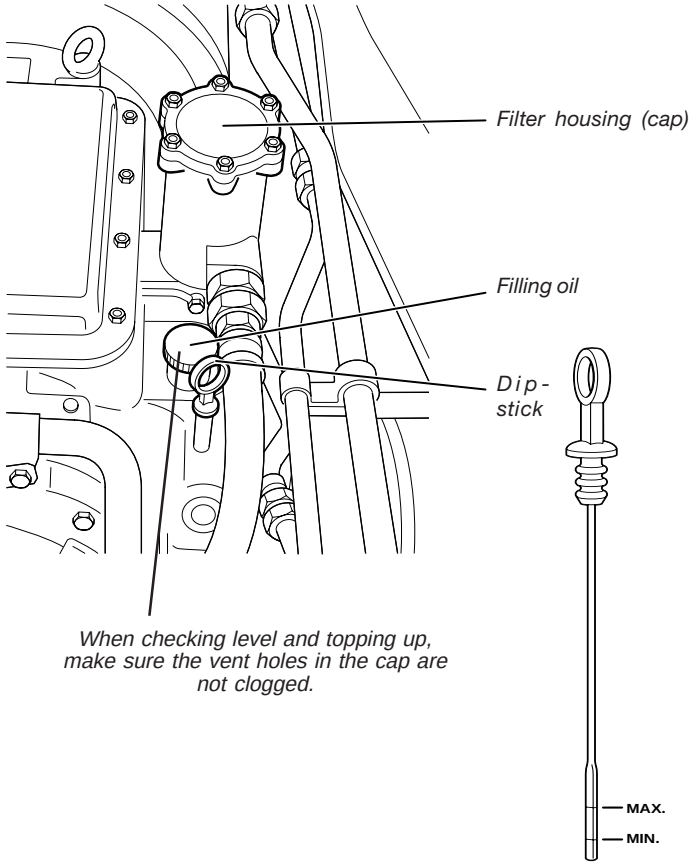
– Oil and filter inserts should be changed every 60 000 km, or at least once a year. Alternatively every 120 000 km when using Volvo “Synthetic oil”, or at least every third year. (see next page, Oil grades)

1. Drain the oil in the oil pan by removing the plug in the middle of the pan. Drain the oil while still warm.
2. Empty the torque converter by removing the plug which is accessible through the drain hole in the oil pan.
3. Screw in both plugs (with new copper gaskets) and tighten to 50 Nm.
4. Drain any oil in the filter housing through the drain hole at the bottom of the filter housing.
5. Remove the filter housing cap.
6. Change the filter insert and the sealing ring in the bottom of the filter housing. Put the cap back on after having replaced the gasket. Turn the white side of the gasket downwards.
7. Screw back the filter housing plug and tighten to 25 Nm.

Oil capacity
Approx. 23 litres on oil change.

Approx. 25 litres when filling a dry gearbox.

Specified volumes are approximate. After filling oil, always check the level with the dipstick according to the instructions on the next page!



When checking level and topping up, make sure the vent holes in the cap are not clogged.

Oil grades

Change 60 000 km: ATF Dexron IID. Must comply to Volvo standard 1273,35 specification 97335. (Volvo part. no. 1161282 for 208 l package and 1161934 for 20 l package).

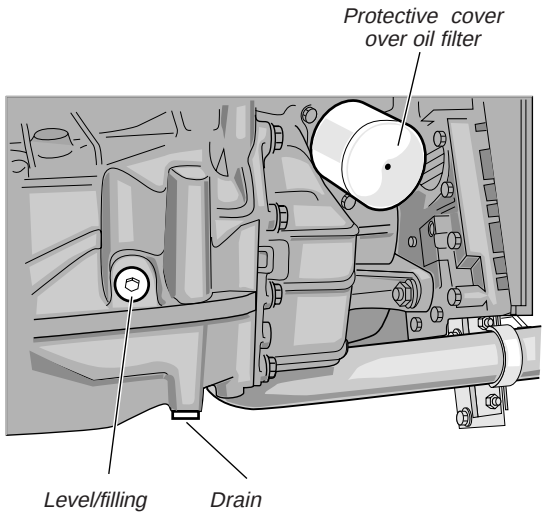
Change 120 000 km: Volvo ”Synthetic oil”. Complies to Volvo standard 1273,31 specification 97331. (Volvo part. no. 1161906 for 208 l packing and 1161904 for 20 l packing.)

Check oil level

Drive the bus until the gearbox has reached normal working temperature, in other words at least 60°C. (Gearbox oil normally has approximately the same temperature as the bus coolant.) Stop on a level surface, engage the handbrake and let the engine idle with the gear selector in the N position.

Wipe the dipstick dry and with the engine running measure the oil level in the usual way. The oil level should be between the marks on the dipstick. Top up with the necessary amount of oil through the oil filler. The difference between ”min” and ”max” is approximately 2.5 litres.

Manual gearbox G8 EGS, G8 MGS



The illustration shows the location of the oil filter on buses with retarder. On buses without retarder, the oil filter is located on the end of the gear box.

Check oil level

Check the oil level at every basic service. Unscrew the plug in the level/filler hole. The oil level should reach the bottom of the hole.

Change gearbox oil and oil filter

– every 120,000 km to Volvo STD 1273,05 specification 97305. (Example: SAE 80W/90 part no. 1161933 for 20 litre pack. 1161280 for 208 pack.)

– or at least once a year.

Halve the interval for changing when driving long periods at altitudes over 2000 m above sea level.

Drain the oil while still warm. The filter is located under a protective cover. Remove it and unscrew the filter (filter spanner 999 6671).

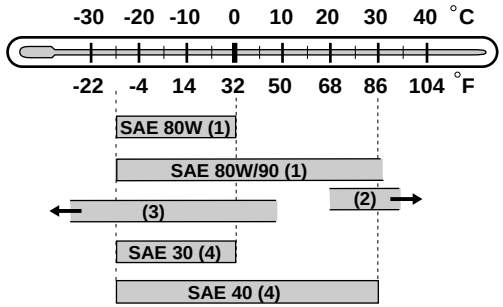
Fit a new filter. Check filter tightness before refitting the cover. Fill up to the correct level.

Start the engine and run it for about one minute. Check the tightness around the filter. Check the oil level and adjust if necessary.

Make sure the O-ring sealing between the filter console and the protective cover is located in its groove on the filter console and that the filter console and the inside of the cover are both clean. Lubricate the O-ring. Refit the protective cover on the oil filter.

Oil change when using
Volvo 97307* transmission fluid ..... Max. 180,000 km
But at least once a year
When using other brands ..... Max. 120,000 km
But at least once a year

* Part number: 116 1950



Temperatures refer to constant ambient temperatures.

1. *Transmission fluid.*
2. *When driving in temperatures above 30°C or when driving long periods at altitudes over 2000 m above sea level, a transmission fluid with viscosity SAE 85W/140 or SAE 140 is recommended.*
3. *Volvo "Synthetic oil" is recommended at low temperatures.*
4. *Engine oil. Note that multigrade oil must not be used.*

Oil change volume
9 l including oil filter.

Oil grades
– Transmission fluid complying with Volvo STD 1273,05 specification 97305. (Example: SAE 80W/90 part no. 1161933 for 20 litre pack, 1161280 for 208 litre pack.)

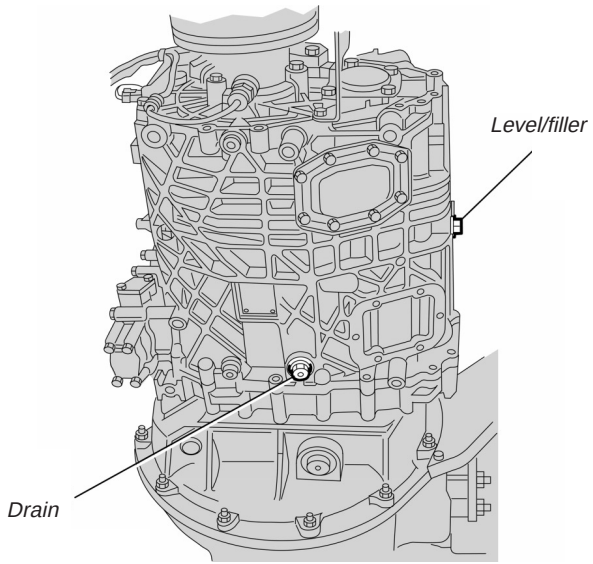
alternatively:

– Engine oil API CE, CF, CF-4 or CG-4 (ACEA E1-96, E2-96 or E3-96). Only branded oil from well known manufacturers should be used. Recycled oil, so-called low-price oil must not be used.

Recommended at low temperatures, see viscosity scale note 3:

– Volvo "Synthetic oil" (part no. 1161904 for 20 litre pack, 1161906 for 208 litre pack).

Manual gearbox ZF S6-85



Check oil level

Check the oil level at every basic service. Unscrew the plug in the level/filler hole. The oil level should reach the bottom of the hole.

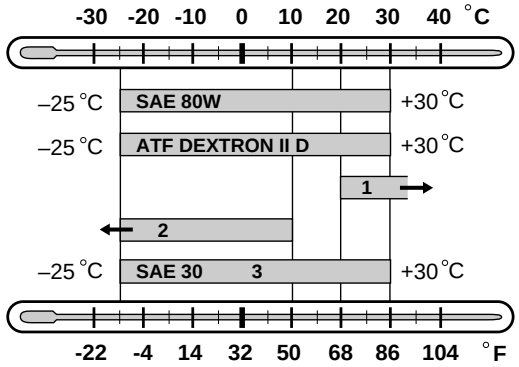
Change gearbox oil

– every 90,000 km

– but at least once a year.

Halve the interval for changing when driving long periods at altitudes over 2000 m above sea level.

Drain the oil through the drain hole while still warm.



Temperatures refer to constant ambient temperatures.

1. *When driving in temperatures above 30°C or when driving long periods at altitudes over 2000 m above sea level, a transmission fluid with viscosity SAE 80W/90, 85W/90 or 90 is recommended.*
2. *Volvo "Synthetic oil" is recommended at low temperatures.*
3. *Engine oil. Note that multigrade oil must not be used.*

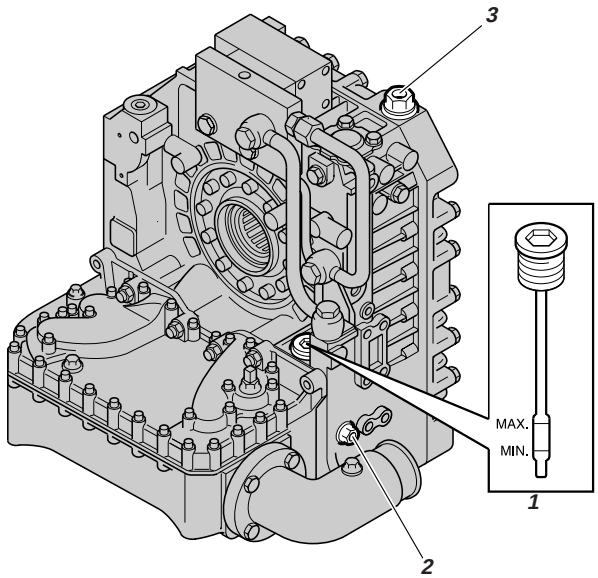
Oil change volume
11.5 litres.

Oil grades

- Transmission fluid API GL-4
- ATF Dexron IID. Must comply to Volvo standard 1273,35 specification 97335. (Volvo part. no. 1161282 for 208 l packing and 1161934 for 20 l packing.)
- Engine oil API CE, CF, CF-4 or CG-4 (ACEA E1-96, E2-96 or E3-96). Only branded oil from well known manufacturers should be used. Recycled oil, so-called low-price oil must not be used.

  Recommended at low temperatures, see viscosity scale:
- Volvo "Synthetic oil" (part no. 1161904 for 20 litre pack, 1161906 for 208 litre pack).

Hydraulic retarder



Check oil level

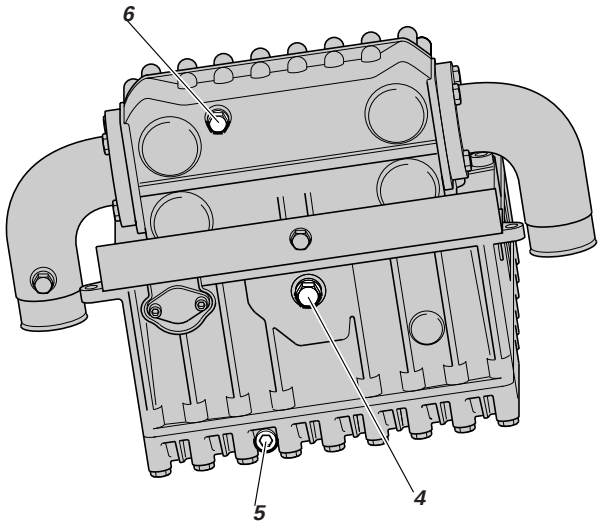
1. Check the oil level when the retarder oil is warn (min. 60°C). The bus must be level.
2. Activate the retarder fully (stage 5) for about 5 seconds. Repeat twice. Shut off and allow the oil to settle (approx. 5 minutes).
3. Check the oil level with either the dipstick (1) or through the level hole (2) on the left-hand side of the retarder housing. The level should reach between the min. and max marks on the dipstick or to the bottom of the level hole. Top up if needed. The difference in volume between ”min” and ”max” is approximately 1 litre.

   Fill slowly when topping up through the top plug (3). Filling too rapidly may cause oil to leak out through the ventilation channel. Change sealing washers. Tightening torque, plugs: 80 Nm.

Oil grades

Oil change interval: 120,000 km, single-grade engine oil SAE 10W, 20W-20, 30, grade API CC/SF.

Oil change interval: 180,000 km, synthetic oil SAE 5W-40, 5W-50, 10W-40, 10W-30 or higher.



Change retarder oil

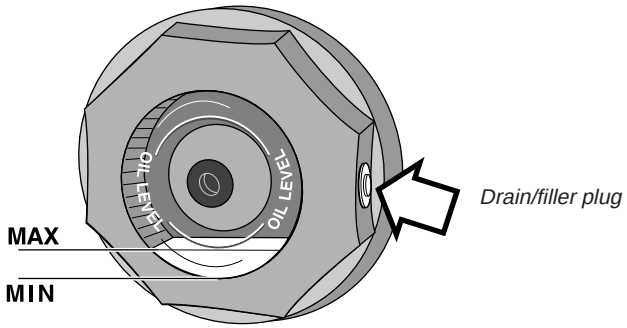
The oil should be changed every 120,000 km if single-grade oil is used, 180,000 if synthetic oil is used.

1. Activate the retarder fully (stage 5) for about 5 seconds. Repeat twice. Disengage the retarder and turn off the battery master switch.
2. Unscrew the oil drain plug (4) from the bottom of the retarder while the oil is still warm. Drain off the oil.
3. Unscrew the plug for the oil pan blocking valve (5), which is located on the bottom of the retarder at the rear. Drain off any leak oil.

   Note that the plug (6) in the bottom of the heat exchanger is for draining **coolant**.
4. Fit a new sealing washer to each plug. Tighten the large plug to 150 Nm and the small one to 66 Nm.
5. Measure up exactly 6 litres of oil. Fill either through the filler hole on top of the retarder (3), the dipstick hole (1) or the level hole (2) on the left-hand side.
6. Check the oil level as described on the previous page.
7. **NB!** Directly after changing oil: Engage the retarder in stage 2 at least three times so that the oil will be distributed to all the bearings and seals.

It is extremely important to have the correct oil level in the retarder as the oil directly affects the braking capacity of the retarder.

Front wheel hub, Clutch



Drain/filler plug

Check hub oil level

The oil level should be between the marks on the hub.

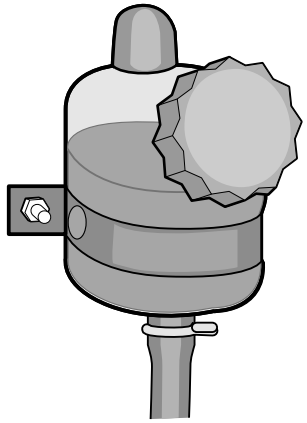
Change oil only when working on the hub, if impurities have entered while exposing or if the oil is discoloured.

Drain and fill through the plug in each hub.

Oil change volume
Approx. 0.3 litres per wheel.

Oil grades
Engine oil SAE 30.

Rear axle gear oil must not be used.



Check clutch fluid level

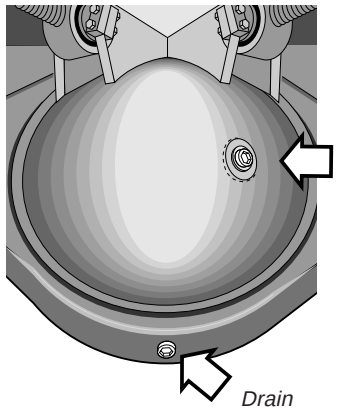
Check the level at every basic service. The level should be in the middle of the reservoir.

Change fluid every three years, annually when driving at altitudes above 2000 m.

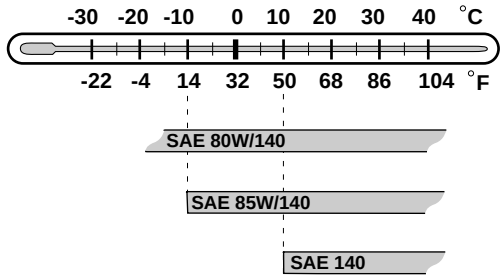
Fluid
Use brake fluid complying with DOT 4 (SAE J 1703) requirements.

Volvo part. no 1381074.

Change hydraulic fluid in good time!
When under great strain or driving at high altitudes, heat radiation from the engine and gearbox may cause steam bubbles in the hydraulic fluid if it is old. The clutch will not work (no declutch) until the oil has cooled.



Temperatures refer to constant ambient temperatures.



Check oil level

Check the oil level at every basic service. Unscrew the level/ filler plug when checking. The oil level should reach to the hole.

Use the same grade of oil for topping up.

NB! Check also that the rear axle gear ventilation is not blocked. This is essential to avoid leaks caused by over-pressure in the rear axle.

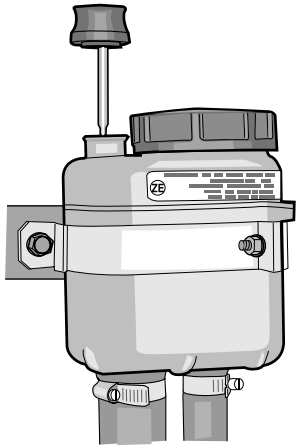
Oil change volume
Approx. 20 l.

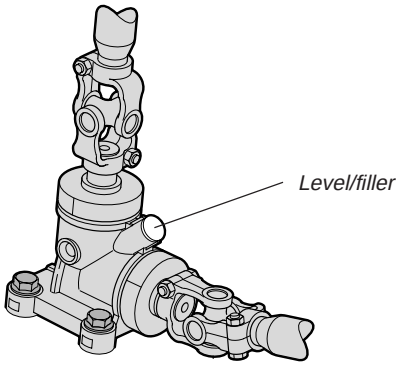
Oil change interval for rear axle.

RAEV 80/85
Oil change when using
Volvo 97312* transmission fluid ..... Max. 180,000 km
But at least once a year
Oil change when using
standard oil ..... Max. 120,000 km
But at least once a year.

* Part number 116 1949.

Steering





Steering servo

Change oil and filter

The oil is only changed if work is to be performed on the power steering.

The filter (inside the reservoir) should be changed every 90 000 km or at least once a year.

Oil grades

ATF Dexron IID (Volvo part. no. 1161282 for 208 l package and 1161934 for 20 l package).

Check oil level

Check the level in the oil reservoir with the dipstick.

The check should be performed with the engine at a standstill. The level should be at MAX. If it is lower, top up with the engine at a standstill so as to prevent air getting drawn in.

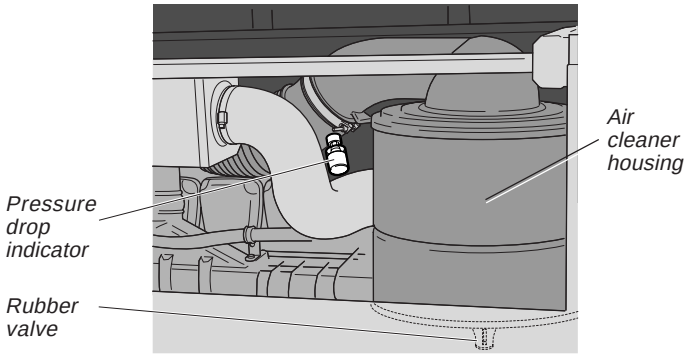
Angle gear

Oil grades

ATF Dexron IID (part. no. see above).

Check oil level

The angle gear is located by the lower end of the steering column. Check the oil level at every basic service. The oil should reach the filling plug.

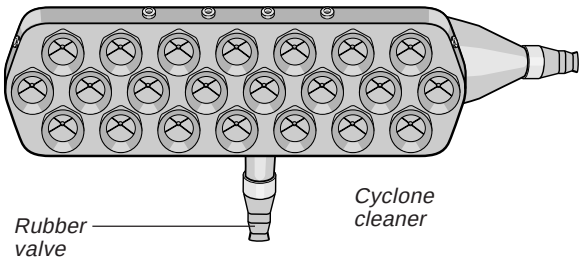


Air cleaner, filter insert

If the pressure drop indicator shows red, this means that the filter insert is blocked and needs to be changed. Vibrations can cause cracks in the filter insert which is why we recommend changing the filter every 18 months even if there is no reading from the indicator. The pressure drop indicator and filter insert are accessible through the flap on the right-hand side of the bus. The air cleaner filter cannot be cleaned, it can only be changed.

Both filter inserts should be changed at the same time for those buses that have double inserts (One with a smaller inner diameter inside the other).

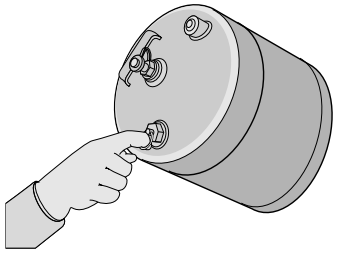
The air cleaner filter cannot be cleaned. It (they) should be changed.



Rubber valves

Regularly empty the rubber valves. On the air cleaner housing and the cyclone cleaner, the rubber valves are located underneath each unit. (Cyclone cleaner is optional.)

Check that the rubber valves are tight and intact. If they are not tight, air will pass through them instead of passing through the cyclone cleaner and filter. If the rubber valve is damaged or not tight, it should be changed.



For maximum safety – drain the primary tank often!

If there is a risk of freezing, the primary tank should be drained daily.

Draining compressed air system

The compressed air tanks are equipped with manual drain valves. The valves are opened by pulling the ring sideways.

The primary tank should be drained regularly to enable inspection of the compressor and air dryer. When the primary tank is drained regularly there is less risk of damage or accidents due to defects in the compressor or air dryer. Feel the air current with your hand! The air should feel dry. **Please note that the purpose of draining is to establish if there is damp or oil in the compressed air.**

Oil found in the air is a sign of damage to the compressor. Oil found in the air from the compressor also destroys the drying agent in the air dryer.

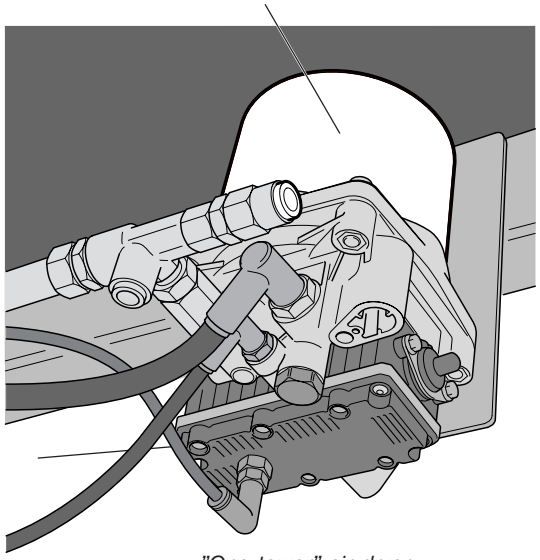
If damp or oil is found the drying agent reservoir should be changed and the other compressed air tanks drained.

Make also sure that the bus is not filled with insufficiently dry air from for example a ramp or the garage air system.

⚠ Warning!

Damp air in the compressed air system means that there is a large risk for brake drop out due to the brake valves freezing in cold weather.

Cover on drying agent cartridge



”One tower” air dryer

⚠ Warning!

Release all the air in the primary tank before removing the drying agent reservoir/s.

Air dryer

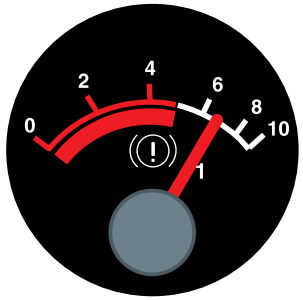
The compressed air system is equipped with an air dryer. It separates damp from the air, which prevents valves in the system from freezing. Depending on the bus model, the air dryer has either ”one tower” or ”two tower”. In other words it has either one or two drying agent reservoirs. The illustrated air dryer has a drying agent cartridge under a cover. The cover is held in place with four screws.

Separated water is automatically drained away. Dehumidification of the compressed air occurs through the ceramic/-a filter. It/they should be changed every other year or when oil or water is found after draining the compressed air tanks. See the previous page.

The best time for inspection of the air dryer is late summer, in good time before the start of the winter period.

Changing drying agent reservoir.

The air dryer is located in front of the left drive wheel. When changing, please follow the instructions supplied with the new drying agent reservoir/s carefully.

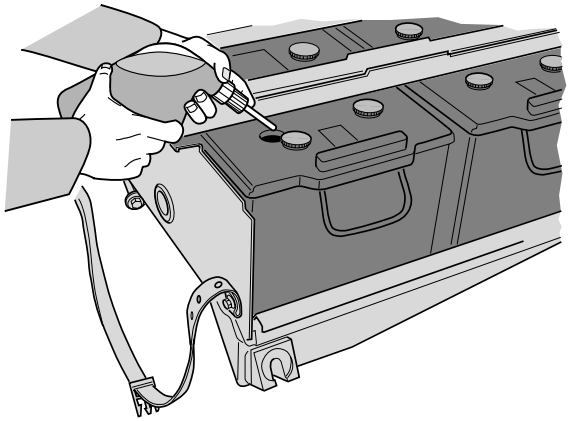


Charging time – braking system

Pump the brake pedal a number of times until the pressure goes under 200 kPa (2kp/cm2)

Run the engine at approx. 1000 rpm.

Increase of pressure from 200 till 400 kPa (2–4 kp/cm^2) should be reached in 1 to 2 minutes. The charge capacity indicates the condition and working order of the compressor.

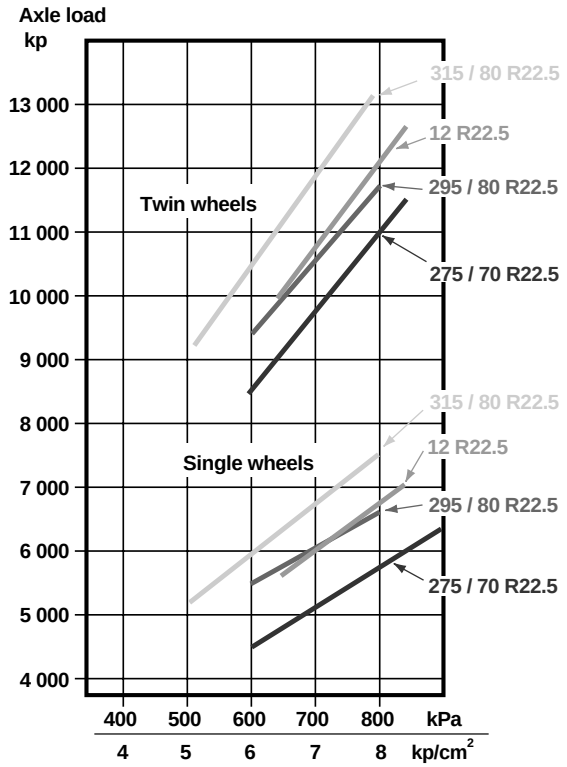


Battery fluid

The fluid level should be 10mm above the battery cells. Top up with distilled water if the fluid level is too low.

Don't overfill, if the acid spills out it can cause damage.

Check also to see that the cables are properly attached when checking the level.



Tyres

Observe that the air pressure in the diagram applies to *cold* tyres. Already after a couple of kilometres driving, the temperature in the tyres, and therefore even the air pressure, has risen to a value approximately 0.8–1.9 kp/cm^2(80–190 kPa) higher than with cold tyres.

With warm tyres, the air pressure should only be adjusted if the tyre needs to be inflated.

The graphs are general and it is advised that the tyre manufacturer's recommendations are followed. According to these, certain kinds of driving can warrant an increase in tyre pressure of 0.5–1.0 kp/cm^2 (50–100 kPa).

Dual mounted wheels

With dual mounted wheels, use only tyres of the same type and roughly the same diameter, or with a maximum diameter difference of 6 mm between tyres fitted together. Make sure the tyre pressure is the same in both tyres.

Check the tread condition and tyre pressure regularly!

Lubricating schedule

Lubricating service

Interval
Every 3 months or max 45,000 km in tourist and long distance traffic, max 35,000 km in interurban traffic or max 25,000 km in urban and suburban traffic.

Scope
Lubrication and level checks as below.
(Major service is additional every 12 months.)

Note that intervals for changing oil (fluid) and filter vary between different components and grades of oil. See page references adjacent.

Lubrication
Lubrication covers all points marked with a grease gun on the illustration overleaf and lubrication of the body.

Grade, grease:

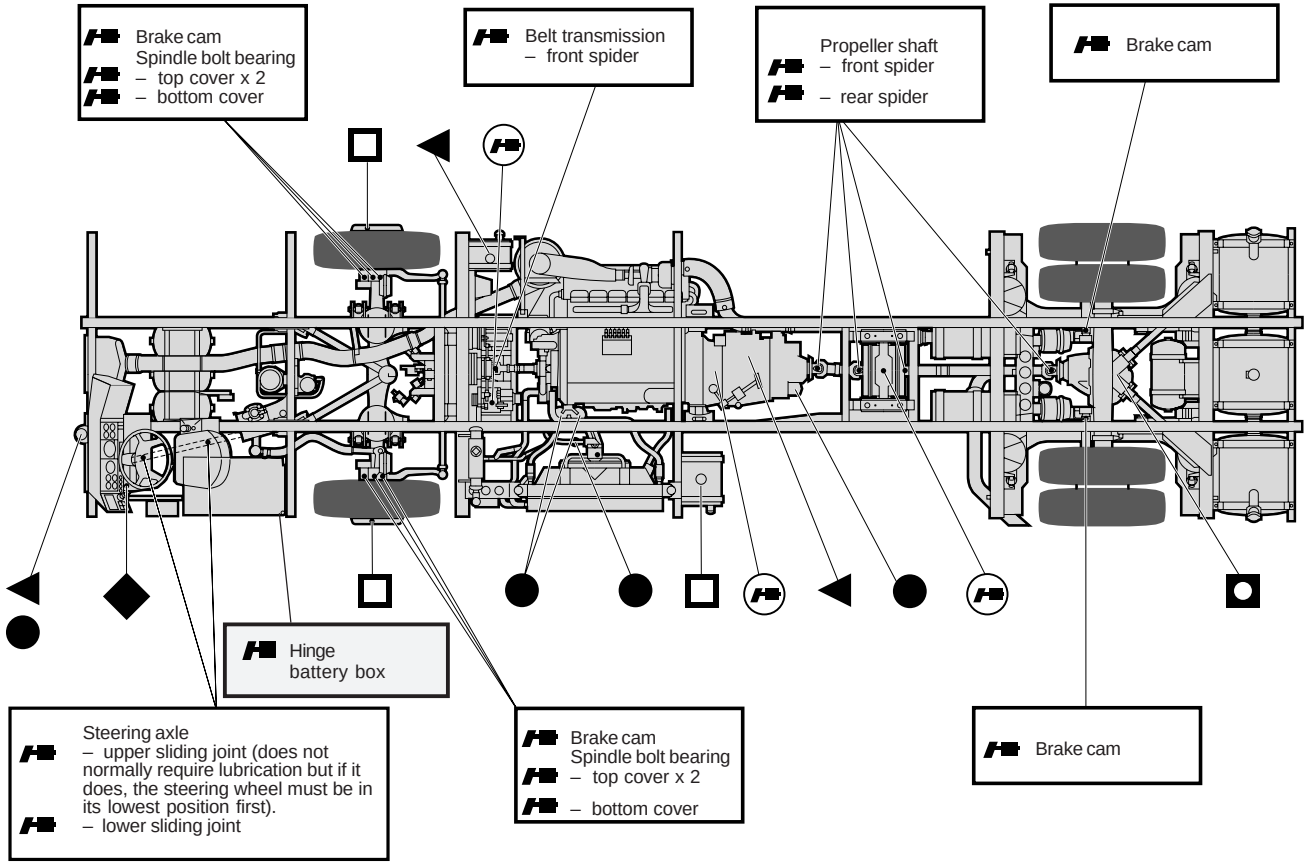
= Lithium based grease with EP additive and consistence to NLGI no. 2. Volvo part. no 1161315.

= High temperature grease Volvo part no. 1161251.

Body
Doors and hatches/covers: nipples to be lubricated with grease, otherwise a few drops of oil on each hinge (if they are the type that can be lubricated). Lubricate lock cylinders. Rubber mouldings on doors and hatches/covers should be lubricated with silicone.

Level controls	**More info on page:**
– Clutch	118
– Battery	124
– Front wheel hub	118
– Rear axle	119
– Hydraulic retarder	116
– Gearbox	108–115
– Hydraulic cooling fan operation	102
– Steering servo and angle gear	120
– Coolant	104

Changing oil and filter	
– Engine	Oil and filter changed at least every lubricating service (depending on oil grade) See page 99.
Electric retarder	Supertelmaco 3 grease. Volvo part no. 1161344. Must not be mixed with other grease! Lubricated every 40,000 km.

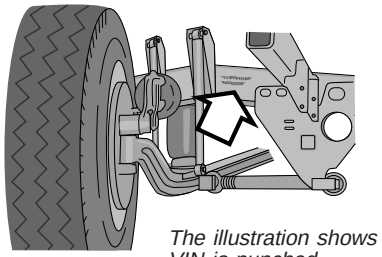

Brake cam
Spindle bolt bearing
– top cover x 2
– bottom cover
Belt transmission
– front spider
Propeller shaft
– front spider
– rear spider
Brake cam
Hinge
battery box
Steering axle
– upper sliding joint (does not normally require lubrication but if it does, the steering wheel must be in its lowest position first).
– lower sliding joint
Brake cam
Spindle bolt bearing
– top cover x 2
– bottom cover
Brake cam

Remember...

When contacting your Volvo garage or when ordering spare parts, the type designation and serial number of the chassis (and the components) must be specified.

Type plates

Vehicle Identity Number (VIN)
Punched on front right frame side, in front of wheel. Most visible at full right-hand wheel lock.



The illustration shows where the VIN is punched.

Example: * YV3 1M A4 1 8 *
* X A 56789 *

where YV3 is manufacturer (= Volvo Bussar AB, Sweden)
1M chassis version (= B10M)
A4 engine version (= DH10A245)
(A6=DH10A285, A7=DH10A360,
2B=THD102KB, 2D=THD102KD,
2F=THD102KF)
1 braking system (= air brakes)
8 check digit
X model year (= 1999)
A assembly plant (= Borås, Sweden)
56789 VIN

Engine type designation, component number and serial number
Punched on top of engine block by injector pump.

Gearbox type designation and serial number
ZF manual gearbox: Plate underneath gearbox.

Volvo manual gearbox and ZF/Voith automatic gearboxes: Plate on top of gearbox.

Rear axle gear component number, serial number and gear ratio
Plate on right-hand side of pinion housing.

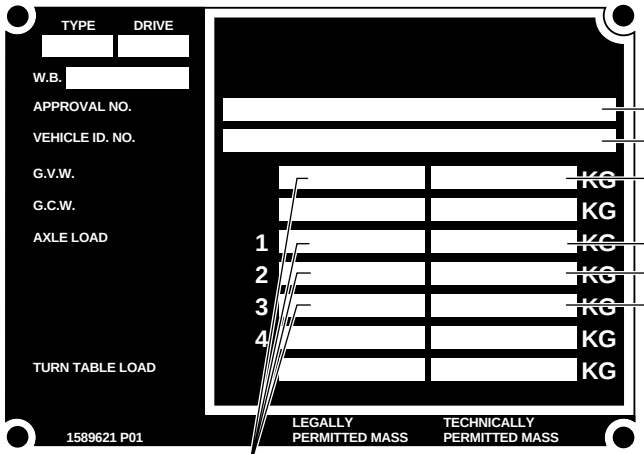
Hydraulic retarder serial number and version
Stamped on rear left side of retarder housing.

Electrical retarder serial number and version
Plate on bottom of retarder.

Identification plate

The identification plate is divided into a regulated section, inside the inner frame of the plate, and three boxes for chassis type, drive and wheelbase. The latter are not used for buses, only for trucks.

On buses, the identification plate is located by the driver's seat and contains the following information:



If national gross vehicle weight or axle weight regulations are prescribed to lower levels then the recommended, the general agent/importer should stipulate this on the left side of the type plate with the levels that apply.

In the case of special national approval being required the approval number should be marked on the type plate by the general agent/ importer.

The V.I.N.-number, i.e. the same number that can be found on the frame member can also be found here.

Max gross vehicle weight, technical in kg. Technical weight refers to the weight the bus was constructed for.

Max front axle weight, technical,in kg.

Max rear axle weight, technical, in kg.

(in applicable cases max axle pressure, technical, in kg for the 3rd axle)

Engine

6-cylinder 4-stroke turbocharged diesel engine with overhead valves and direct injection.

Cylinder bore ..... 120.65 mm
Cylinder stroke ..... 140.00 mm
Cylinder capacity ..... 9.6 dm^3
Compression ratio THD102 ..... 16.0:1
Compression ratio DH10A-360 ..... 18.0:1
Compression ratio DH10A-245/-285 ..... 20.0:1

DH10A-245
Output kW (hp) 180 (245)
at rps (rpm) 33 (2000)
Torque Nm (kgf m) 1200 (122)
at rps (rpm) 18–24 (1100–1450)

DH10A-285
Output kW (hp) 210 (285)
at rps (rpm) 33 (2000)
Torque Nm (kgf m) 1200 (122)
at rps (rpm) 22–24 (1300–1450)

DH10A-360
Output kW (hp) 265 (360)
at rps (rpm) 34 (2050)
Torque Nm (kgf m) 1500 (153)
at rps (rpm) 20 (1200)

Other power outputs than specified above can be found on the DH10A which fulfil special legal, customer or adaptation requirements.

THD102KF
Output kW (hp) 180 (245)
at rps (rpm) 37 (2200)
Torque Nm (kgf m) 1050 (107)
at rps (rpm) 21 (1250)

THD102KB
Output kW (hp) 210 (286)
at rps (rpm) 37 (2200)
Torque Nm (kgf m) 1200 (122)
at rps (rpm) 21 (1250)

THD102KD
Output kW (hp) 250 (340)
at rps (rpm) 37 (2200)
Torque Nm (kgf m) 1400 (143)
at rps (rpm) 21 (1250)

Output and torque to ISO 1585.

DH10A engines comply with emission requirements in accordance with EURO 2 THD102KF, THD102KB comply with emission requirements in accordance with EURO 1.

Fuel requirements
Fuel shall comply with current legislation and national and international standards at the least, e.g.

EN590 (with nationally adapted cold requirements), ASTM D 975 No 1-D and 2-D, JIS KK 2204.

Sulphur content in the fuel must not exceed 0.5% by weight. If this is the case: Observe the revised oil change interval (page 99).

Electrical equipment

No. of batteries ..... 2 pcs.
Voltage ..... 24 V
Battery capacity ..... 170 or 220 Ah
Alternator/s
max charge current ..... 2x55, 2x80, 115, 140 or 180 A
Starter motor output ..... 5.4 kW (7 hp)

Clutch

For G8 E/MGS gearbox KFD117E
Outer diameter ..... Ø 430 mm
Friction surface ..... 2000 cm^2

For S6-85 gearbox KFD116B
Outer diameter ..... Ø 400 mm
Friction surface ..... 1753 cm^2

Manual gearboxes

VOLVO G8 EGS (Easy Gear Shift)
Mechanical 8-speed fully synchromesh gearbox. Lever movement transferred to gearbox through an electropneumatic shifting system. For a description of the difference between the two G8 EGS gearbox variants: 2+ and 7+, see the chapter ”Driving”.

VOLVO G8 MGS (Mechanical Gear Shift)
Mechanical 8-speed fully synchromesh gearbox. Lever movement is transferred to the gearbox by control rods.

Gearbox			Gear ratio
EGS ”2+”	EGS ”7+”	MGS	
1	1	1	9.13:1
2	2	2	6.42:1
2+	3	3	4.77:1
3	4	4	3.75:1
4	5	5	2.44:1
5	6	6	1.71:1
6	7	7	1.27:1
7	7+	8	1.00:1
Reverse	Reverse	Reverse	13.69:1

ZF S6-85

Mechanical 6-speed fully synchromesh gearbox. Lever movement is transferred to the gearbox by control rods.

Gear	Gear ratio
1	7.72:1
2	4.42:1
3	2.85:1
4	1.91:1
5	1.30:1
6	1.00:1
Reverse	7.09:1

Automatic gearbox

ZF 4HP500/590, 5HP500/590/600
Fully automatic gearbox with retarder. Shifting points are controlled by an electronic unit.

Gear	Gear ratio		
	4HP500	**5HP500**	**5HP600**
torque converter	**4HP590** 2.16:1	**5HP590** 2.16:1	2.44:1
1	3.43:1	3.43:1	3.43:1
2	2.01:1	2.01:1	2.01:1
3	1.42:1	1.42:1	1.42:1
4	1.00:1	1.00:1	1.00:1
5	–	0.83:1	0.83:1
Reverse	4.84:1	4.84:1	4.84:1

VOITH D863.3/D864.3
Fully automatic gearbox. Shifting points are controlled by an electronic unit. Torque converter functions also as a retarder.

Gear hydraulic step	**D863.3** Gear ratio	**D864.3** Gear ratio
(engine DH10A)	4.96:1–1.36:1	4.96:1–1.36:1
(engine THD102K)	5.20:1–1.36:1	5.20:1–1.36:1
2	1.36:1	1.36:1
3	1.00:1	1.00:1
4	–	0.73:1
Reverse (DH10A)	4.80:1	4.80:1
Reverse (THD102K)	5.00:1	5.00:1

Automatic gearbox

Allison MT 647
Fully automatic 4-speed gearbox. Shifting points are controlled hydraulically.

Gear	Gear ratio
torque converter	2.20:1
1	3.58:1
2	2.09:1
3	1.39:1
4	1.00:1
Reverse	5.67:1

Rear axle

All final drives are single gear hypoid type with denomination EV85.

The speed of the bus at any given engine speed depends on the type of gearbox, rear axle ratio and tyre dimension. For comparison, the speed at 2000 rpm and 295/80-22.5" tyres is shown here for various gearboxes and rear axle ratios.

	3.31:1	3.56:1	3.78:1	4.25:1	4.87:1	5.43:1
D863.3 D864.3	159	148	139	124	108	97
5HP500/ 590/600	140	130	122	109	95	85
G8 E/MGS, S6-85, 4HP500/590	116	108	101	90	79	71

The control system for the DH10 engine makes it possible to limit the top speed to a desired value. Speed limitation is available as an option for the THD102 engine.

Retarder

Automatic gearboxes have integrated hydraulic retarder.

Hydraulic retarder or electromagnetic retarder are available as alternative options together with the G8 E/MGS gearbox.

An electromagnetic retarder is available as an option together with the S6-85 gearbox.

Braking system

Pneumatic brakes complying with EG braking system with separate circuits for front and rear wheels. Air dryer. Automatic brake adjustment.

Brake lining width,
- front axle ..... 203 mm
- drive axle ..... 254 mm
- trailing wheel axle (bogie)..... 178 mm
- trailer coach axle, steered ..... 203 mm
- trailer coach axle, rigid ..... 254 mm

Brake area,
- front axle ..... 3055 cm^2
- rear axle ..... 3810 cm^2
- trailing wheel axle (bogie)..... 2675 cm^2
- trailer coach axle, steered ..... 3055 cm^2
- trailer coach axle, rigid ..... 3810 cm^2

Braking system operating pressure ..... 7,5±0,1 kp/cm^2

Compressor capacity at
max. operating pressure and
33 rps (2000 rpm) ..... 9,0 dm^3/s (540 l/min)

Compressed air system can be rapid charged from external system.

Handbrake: Air controlled spring brake applied on drive wheels. Application is stepless using a control on the dashboard. Articulated buses that have a rigid trailer axle also have a spring brake on this axle.

Steering gear

Dome nut type power steering with integrated servo unit. Approx. 4.7 steering wheel turns between lock.

Max. wheel deflection 50–51½

with 315/80-22.5" tyres 46½

Steering wheel diameter..... 500 mm

Wheel suspension/Springs

The bus is equipped with air springs that are **electronically controlled** by two sensors on the front axle and two on the drive axle.

Frame

B10M has longitudinal pressed U-girders with welded square profile crossmembers .

Wheels and tyres

Steel rims fastened with 10 bolts:

Rims	Tyres
8,5 x 20"	11.00–20"
	12.00–20"
8.25 x 22.5"	295/80–22.5"
9.00 x 22.5"	315/80–22.5"
9.00–22.5" (steel)	

The above are normal wheel and tyre dimensions. Other dimensions are available. Aluminium rims are optional.

Fuel tank

Located behind the rear axle
Capacity ..... 2 x 150 litres
Capacity ..... 3 x 150 litres

The tanks above are supplied by Volvo. Other tanks may be fitted by the coach-builder.

Weights

Two-axle version
Max front axle weight ..... 7500 kg
Max drive axle weight ..... 10500/12000 kg
Max gross vehicle weight ..... 18000/19000 kg

Three-axle version
Bogie version
Max front axle weight ..... 7500 kg
Max bogie axle weight, drive axle ..... 10600 kg
Max bogie axle weight, trailing wheel axle ..... 5400 kg
Max gross vehicle weight ..... 23500 kg

Articulated bus
Max front axle weight ..... 7500 kg
Max axle weight, drive axle ..... 10500/12000 kg
Max axle weight, steered axle, trailer ..... 8000 kg
Max axle weight, rigid axle, trailer ..... 10500 kg
Max gross vehicle weight ..... 25500–28500 kg

The above weights are general. National deviations may occur.

Vehicle documents (type certificate) specifies permitted weights for your bus and its wheel/tyre equipment!

Notes

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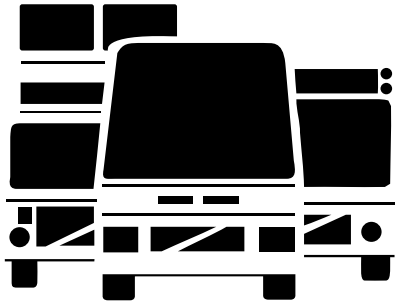

VOLVO

Volvo Bus Corporation

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