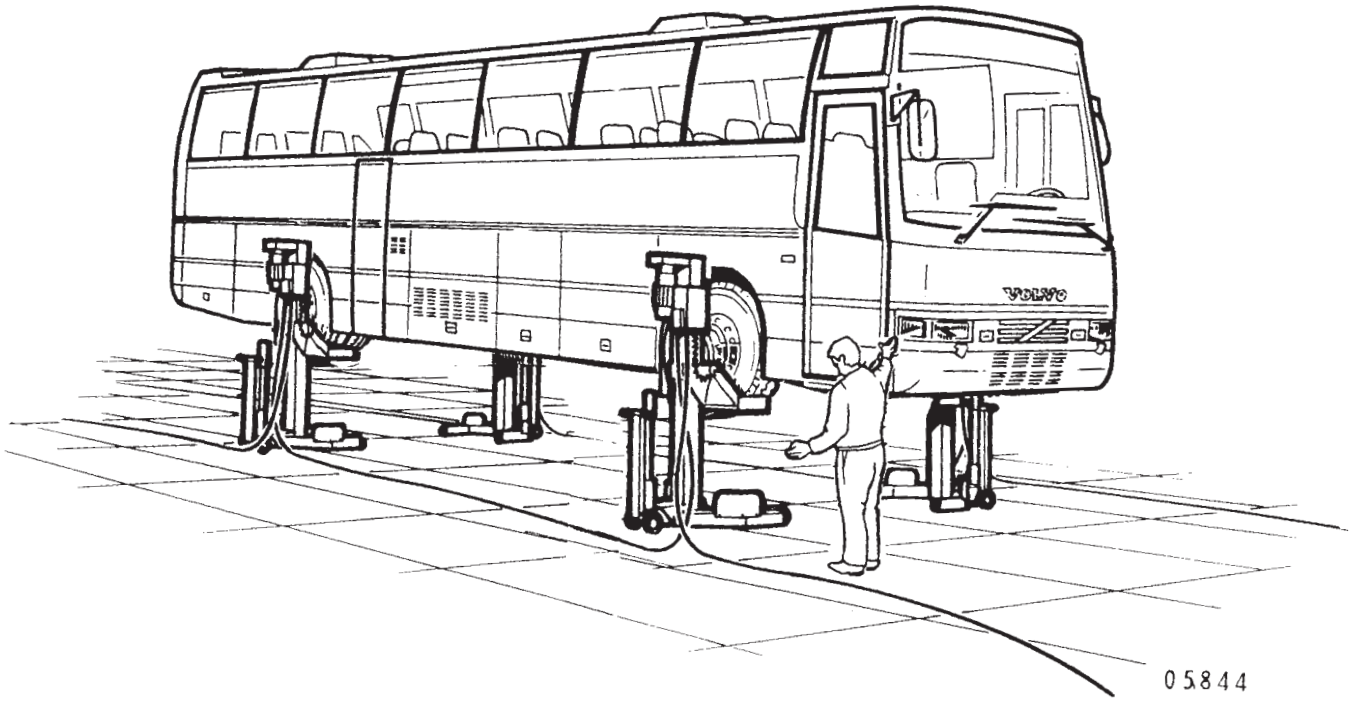
Service Manual
Buses

Section **17**

Service and Maintenance
B10M, B10B

TP 15580/1

VOLVO


VOLVO
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Contents

This Service Manual contains a comprehensive description of the servicing procedures required for preventive maintenance on B10M (from chassis no. 20001-) and B10B buses.

The principle of preventive maintenance is very important for traffic safety, the environment and not least for the bus company's economy.

Order number: TP 15580/1

Service Programme

The programme consists of the following parts:

- Function Check and Test Driving
- Basic Service, Chassis/Annual Service, chassis
- Basic Service, Body/Annual Service, body
- Lube Service

Function Check and Test Driving

Gives you a snap diagnosis of possible faults. Should, therefore, be regarded as an important part of the overall service programme. These checks will also give you some idea of the general condition of the bus and the servicing it may require. They draw particular attention to points that must be checked extra thoroughly during the Basic Service. Even the Driver's Report, see page 4, should be able to give you some idea of what you should look out for; naturally the Driver's Report can never completely replace the Function Check and Test Driving.

Basic Service, chassis/Annual Service, chassis

This covers all the chassis parts and components. Mounted to the chassis are some of those parts that are particularly exposed to wear. Should the customer so wish, this part of the service programme can be offered separately but should include a check on the safety equipment.

Basic Service, Body/Annual Service, body

Here all the most important parts of the body are checked.

Lube Service

A suitable time for lubrication and oil changes is after the other service work, since replacement of seals, etc., very often require oil to be topped up.

What is meant by chassis lubrication is the lubrication of all grease nipples with a grease gun and level checks for the engine, transmission, etc.

Each chassis lubrication should also include a check on the fluid level in batteries, cooling system and clutch fluid reservoir.

Service interval

Recommended service interval for Basic Service and lubrication: every 3rd month or max.

20 000 km for city and suburban buses
30 000 km for intercity buses
40 000 km for long-distance buses.

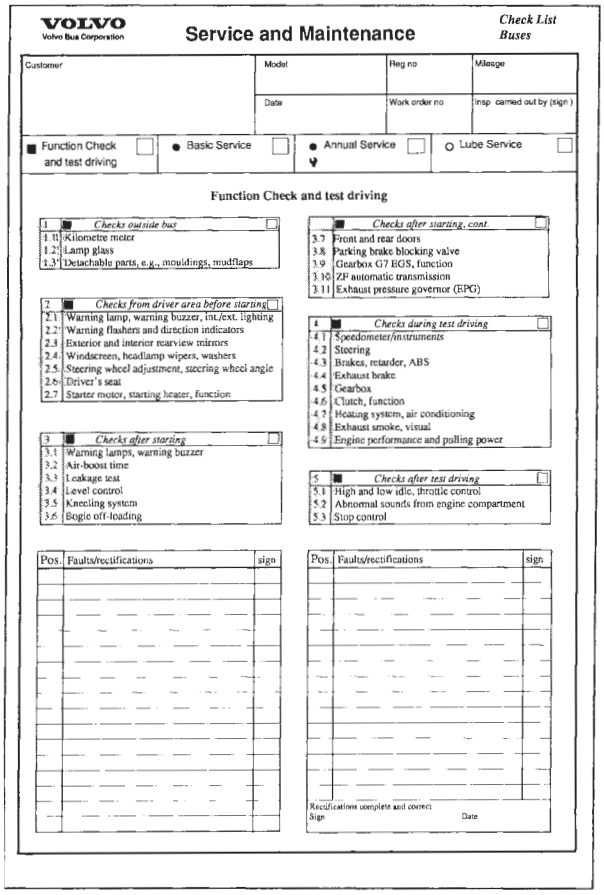
The Annual Service should be carried out irrespective of the distance driven.

Engine oil can be selected from either of two alternatives: VDS oil or API CD oil. For oil classified according to VDS (Volvo Drain Specification) the intervals between oil changes are longer than for other oils, as can be seen from the lube chart.

Washing

The bus should be washed regularly, not only to maintain its exterior and interior finish, but also to protect against corrosion.

Service check list



VOLVO
Volvo Bus Corporation

Service and Maintenance

Check List Buses

Customer	Model	Reg no	Mileage
	Date	Work order no	Insp. carried out by (sign.)

■ Function Check and test driving ● Basic Service ● Annual Service ○ Lube Service

Function Check and test driving

1 ■ *Checks outside bus*
1.1 Kilometre meter
1.2 Lamp glass
1.3 Detachable parts, e.g., mouldings, mudflaps

2 ■ *Checks from driver area before starting*
2.1 Warning lamp, warning buzzer, int./ext. lighting
2.2 Warning flashers and direction indicators
2.3 Exterior and interior rearview mirrors
2.4 Windscreen, headlamp wipers, washers
2.5 Steering wheel adjustment, steering wheel angle
2.6 Driver's seat
2.7 Starter motor, starting heater, function

3 ■ *Checks after starting*
3.1 Warning lamps, warning buzzer
3.2 Air-boost time
3.3 Leakage test
3.4 Level control
3.5 Kneeling system
3.6 Bogie off-loading

Checks after starting, cont.
3.7 Front and rear doors
3.8 Parking brake blocking valve
3.9 Gearbox G7 EGS, function
3.10 ZF automatic transmission
3.11 Exhaust pressure governor (EPG)

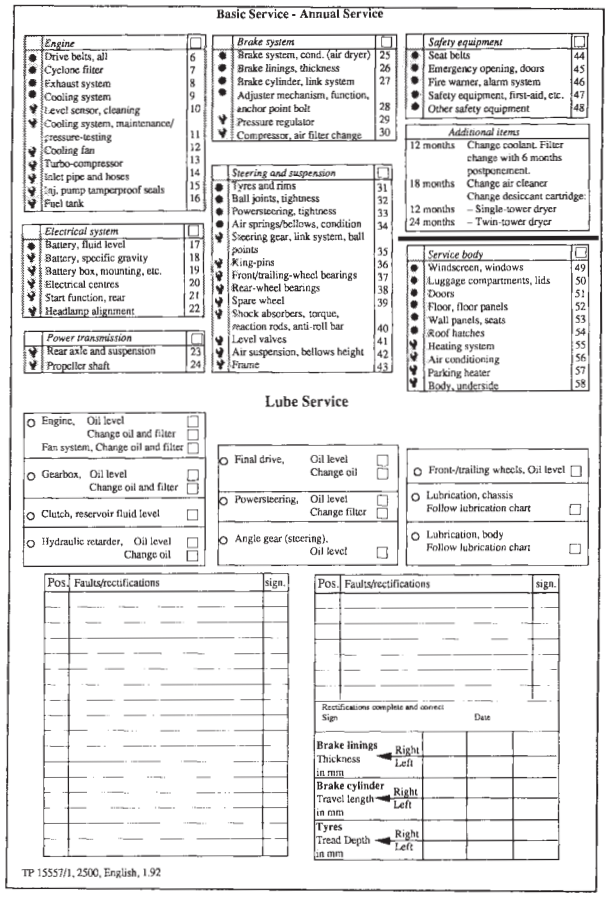
4 ■ *Checks during test driving*
4.1 Speedometer/instruments
4.2 Steering
4.3 Brakes, retarder, ABS
4.4 Exhaust brake
4.5 Gearbox
4.6 Clutch, function
4.7 Heating system, air conditioning
4.8 Exhaust smoke, visual
4.9 Engine performance and pulling power

5 ■ *Checks after test driving*
5.1 High and low idle, throttle control
5.2 Abnormal sounds from engine compartment
5.3 Stop control

Pos.	Faults/rectifications	sign

Rectifications complete and correct
Sign Date

Front



Basic Service - Annual Service

Engine
6 Drive belts, all
7 Cyclone filter
8 Exhaust system
9 Cooling system
10 Level sensor, cleaning
Cooling system, maintenance/ pressure-testing 11
12 Cooling fan
13 Turbo-compressor
14 Inlet pipe and hoses
15 Inj. pump tamperproof seals
16 Fuel tank

Electrical system
17 Battery, fluid level
18 Battery, specific gravity
19 Battery box, mounting, etc.
20 Electrical centres
21 Start function, rear
22 Headlamp alignment

Power transmission
23 Rear axle and suspension
24 Propeller shaft

Brake system
25 Brake system, cond. (air dryer)
26 Brake linings, thickness
27 Brake cylinder, link system
28 Adjuster mechanism, function, anchor point bolt
29 Pressure regulator
30 Compressor, air filter change

Steering and suspension
31 Tyres and rims
32 Ball joints, tightness
33 Powersteering, tightness
34 Air springs/bellows, condition
Steering gear, link system, ball points 35
36 King-pins
37 Front/trailing-wheel bearings
38 Rear-wheel bearings
39 Spare wheel
Shock absorbers, torque, reaction rods, anti-roll bar 40
41 Level valves
42 Air suspension, bellows height
43 Frame

Safety equipment
44 Seat belts
45 Emergency opening, doors
46 Fire warner, alarm system
47 Safety equipment, first-aid, etc.
48 Other safety equipment

Additional items
12 months Change coolant. Filter change with 6 months postponement.
18 months Change air cleaner
Change desiccant cartridge:
12 months – Single-tower dryer
24 months – Twin-tower dryer

Service body
49 Windscreen, windows
50 Luggage compartments, lids
51 Doors
52 Floor, floor panels
53 Wall panels, seats
54 Roof hatches
55 Heating system
56 Air conditioning
57 Parking heater
58 Body, underside

Lube Service

○ Engine, Oil level / Change oil and filter
Fan system, Change oil and filter
○ Gearbox, Oil level / Change oil and filter
○ Clutch, reservoir fluid level
○ Hydraulic retarder, Oil level / Change oil

○ Final drive, Oil level / Change oil
○ Powersteering, Oil level / Change filter
○ Angle gear (steering), Oil level

○ Front-/trailing wheels, Oil level
○ Lubrication, chassis Follow lubrication chart
○ Lubrication, body Follow lubrication chart

Pos.	Faults/rectifications	sign.

Rectifications complete and correct
Sign Date

		Right	Left
Brake linings	Thickness in mm		
Brake cylinder	Travel length in mm		
Tyres	Tread Depth in mm		

TP 15557/1, 2500, English, 1.92

Rear

■ Function Check and Test Driving

is divided up into 5 check stages:

- Outside the bus
- From the driver's area before starting
- After starting
- During test driving
- After test driving

Jot down any faults noticed. Several check points require a fault to be further checked by a workshop (more details about this on page 15).

● Basic Service

To be carried out at the recommended service interval.

● Annual Service

To be carried out every 12th month and involves all the programme's servicing points.

○ Lube Service

Lubricate the bus according to the lubrication chart.

Check oil levels and change oil and oil filters at the interval recommended.

Driver's Report

The Driver's Report is an excellent means for quickly remedying any faults. Simple remedies can be carried out at the daily inspection, or the Driver's Report can be used for planning a necessary visit to the workshop.

Given below is a list of possible faults listed in a Driver's Report. To save time it is important that the driver pinpoints faults discovered as accurately as possible:

Engine:	overheats, weak power, difficult to start, low oil pressure, low oil level.
Power transmission:	slips, noisy operation, 1st/reverse difficult to engage.
Brakes:	pulls to one side, poor operation, grabs, parking brake inoperative.
Front end:	imbalance, steering wheel shimmies, bumpy, heavy steering.
Fluid leakage:	inside bus, under bus, front, rear.
Compressed air:	slow charging, rapid pressure drop.
Tyres:	worn, punctured, damaged.
Driver's seat:	sinks, loose, cannot be adjusted.
Wipers:	don't function, blades worn, poor wiping, left, right.
External lighting:	parking lights, full/dipped beams, brake lights, direction indicators, tail lights, position lights.
Internal lighting:	driver's area, roof, doors, instruments.
Instruments:	speedometer fluctuates, gauges don't function.
Heating/ventilation:	defroster, floor heater, fans inoperative, too hot, too cold.
Stop signal:	signal lamp, buzzer, signal activator does not function.
Damage inside the bus:	seats, backrests, upholstery.
Rearview mirrors:	attachments loose, glass cracked.

Special Tools

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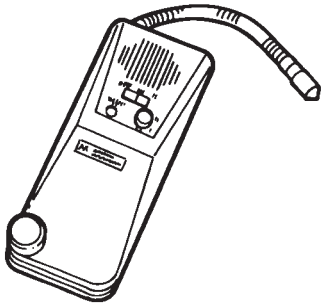

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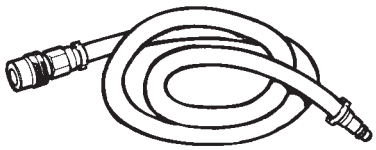

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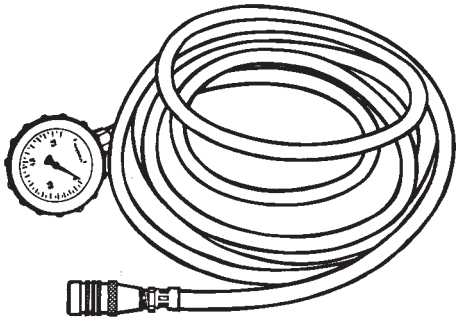

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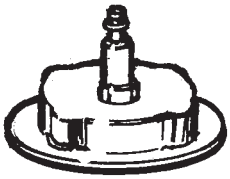

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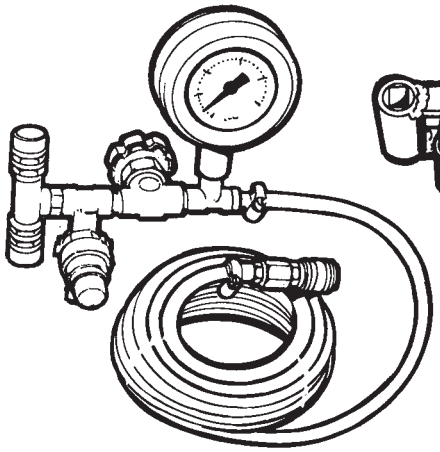

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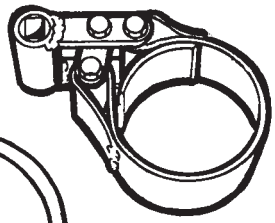

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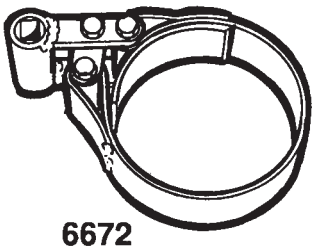

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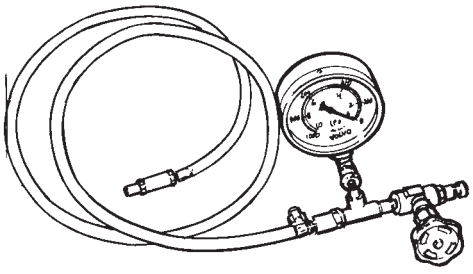

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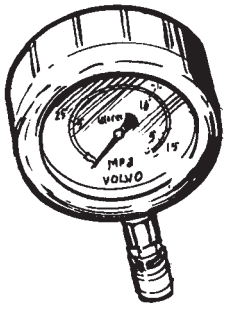

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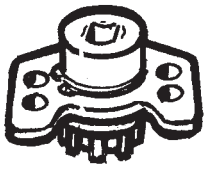

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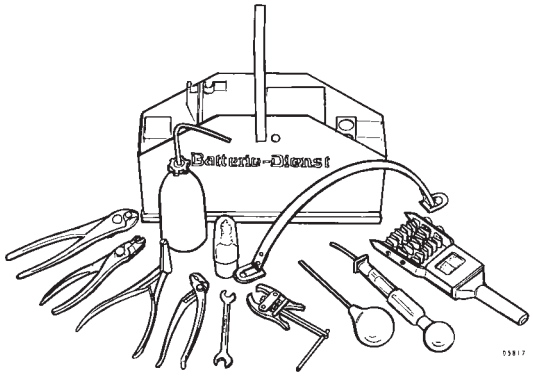
Special Tools, cont.



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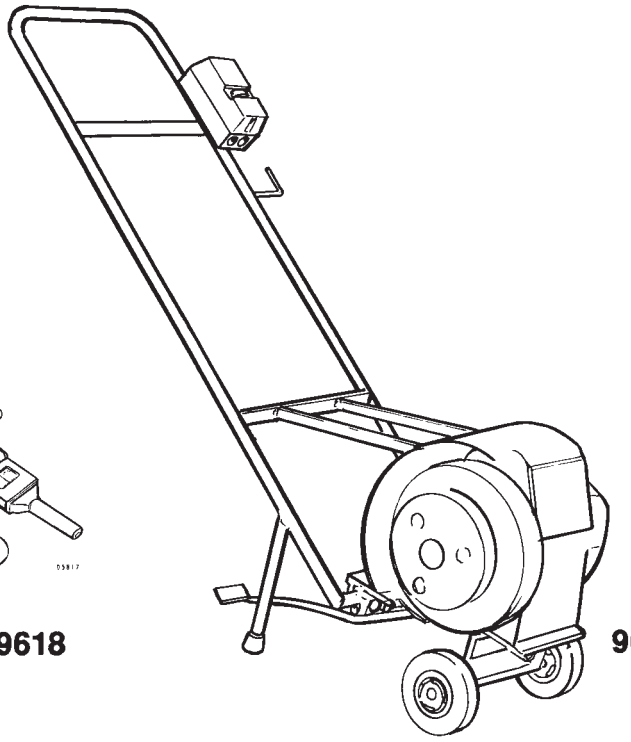

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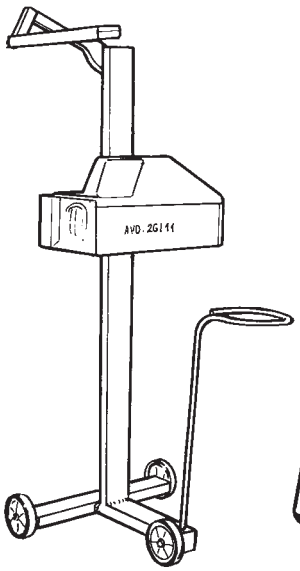

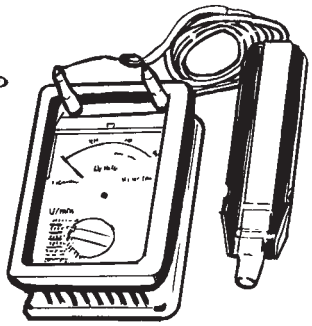

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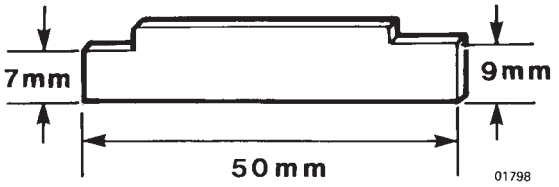


Dimensions of tools for measuring brake linings (not stocked by Volvo). Z-cam 5 mm and 7 mm resp.

(999)	
5144	Leakage detector, temperature control unit
6049	Hose for draining coolant
6065	Pressure gauge for measuring fuel gauge pressure
6066	Connection nipple, used with 6065
6223	Nipple for checking turbo charging pressure
6441	Connection cap for pressure testing cooling system
6662	Pressure tester for checking cooling system
6670	Fuel filter tool

(999)	
6672	Oil filter tool
6831	Pressure-drop indicator, air cleaner
6926	Pressure gauge compressed-air system (0-16 bar)
8152	Crank tool for engine crankshaft
9618	Battery service kit
9677	Wheel spinner
9695	Light-beam aligner
9795	Rev counter

Function Check and Test Driving

1 ■ **Checks outside bus**

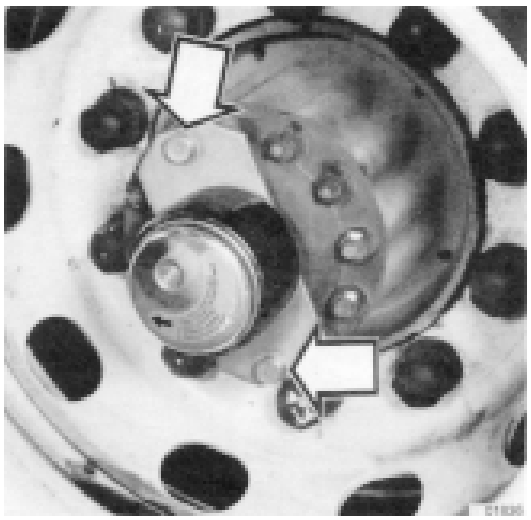
1.1	– Kilometre meter
1.2	– Lamp glass
1.3	– Detachable parts, e.g., moulding, mudflaps

2 ■ **Checks from driver's area, before starting**

2.1	– Warning lamps, warning buzzer, internal and external lighting
2.2	– Warning flashers and direction indicators
2.3	– External and internal rearview mirrors
2.4	– Windscreen wipers, washers

1 Checks outside bus

Check the kilometre meter by inserting a slip of paper for stamping before test driving. After the test drive, re-stamp the paper slip to check that the counter unit is working. Also check to make sure that the meter is anti-theft sealed.



Inspect the lamp glass for the direction indicators, front and rear lights. Check for loose items, moulding, mudflaps, etc.

2 Checks from driver's area, before starting

Turn the starting key to the "check position" and check that the indicator and warning lamps light and that the warning buzzer sounds.

Check that the internal and external lighting, the hazard warning flashers and the direction indicators function.

Check the windscreen washing and that the windscreen wipers wipe clean. Check that the wipers park in their correct position. If fitted, check headlamp wipers, washers.

2 ■ **Checks from driver's area, before starting, cont.**

2.5	– Steering wheel adjustment, steering wheel angle
2.6	– Driver's seat
2.7	– Starter motor, starting heater, function

3 ■ **Checks after starting**

3.1	– Warning lamps, warning buzzer
3.2	– Air-boost time

2 Checks from driver's area, before starting, cont.

Adjusting the steering wheel

Check the steering column's height adjustment function by depressing the pedal and setting the steering wheel to its various elevations. Also check its locking function by ensuring that the steering wheel remains in the selected elevation position when the pedal is released.

Check the steering wheel angle function by adjusting the angle with the lever underneath the steering wheel. Check that the steering wheel does not alter its inclination angle when the lever is being moved back to its initial position.

Driver's seat

Check the seat attachments and adjustment devices, the slide rails and pivot points, and that the seat remains at the position in which it is locked.

Starter motor, starting heater, function

The start revs for the starter motor should be normal. Listen for any unusual sounds.

Check the starting heater function and timer relay. The coolant temperature decides when the starting heater cuts-in. Above +40°C, no cut-in. The starting heater can be on for a max. 50 seconds at approx. –10°C.

3 Checks after starting

The oil pressure lamp should go out after the engine has started.

The coolant level warning lamp should continue to light a second or two after the starting key has been turned.

The parking brake warning lamp should light when the parking brake is activated. When the brake is released, the lamp should continue to light until pressure has risen to approx. 510 kPa (5.1 kg/cm²).

The warning lamp for the service brakes should light as long as the pressure in the air tanks is below 460–520 kPa (4.6–5.2 kp/cm²).

The charging warning lamp(s) should go out once the engine starts.

The indicator lamp for the anti-lock brakes should light.

Pressure-boost time – brake system

Apply the parking brake. Run the engine at approx. 1000 r/min and check the time it takes to boost the system.

Depress the brake pedal several times until the pressure is below 200 kPa (2 kp/cm²).

Normal boost: pressure rises from 200 to 400 kPa (2–4 kp/cm²) in 1 to 2 minutes, when both circuits are boosted at the same time, or 30 seconds to 1 minute when one of the circuits is boosted; engine speed 1000 r/min. The boost capacity indicates the compressor condition and function.

3 ■ **Checks after starting, cont.**

3.3	– Leakage test
3.4	– Level control (in the event of faults, refer to page 15)
3.5	– Kneeling system (—"—)
3.6	– Bogie off-loading
3.7	– Front and rear doors
3.8	– Parking brake, blocking valve

3 Checks after starting, cont.

Leakage test – brake system

Boost the system to max. 700 kPa (7.0 kp/cm²), depress the brake pedal, release the parking brake and stop the engine.

Hold the brake pedal depressed for 2 minutes and read-off the air pressure gauges. Check that the pressure drop is not greater than 40 kPa (0.4 kp/cm²).

If the pressure drop is greater, visually inspect all compressed-air lines, brake lines and hoses for leakage, scuffing or other damage that could arise from, e.g., squeezing. Listen for leakage also at the feed lines.

Level control

Check the level control function up and down.

It is possible that a bus has only level raising. The same switch on the dashboard is used for raising and lowering the normal driving position level.

Kneeling system

Check the kneeling function. Check that it stops when the switch is released. Kneeling and raising to the normal position must not take too long.

Bogie off-loading

Check the off-load function for the trailing wheels (bogie bus). If the indicator lamp lights, this points to less pressure in the bellows on the trailing wheels.

Front and rear doors

Open and close the front and rear doors.

Check that they open and close at reasonable speed and that they slow up when approaching the end positions.

Parking brake, blocking valve

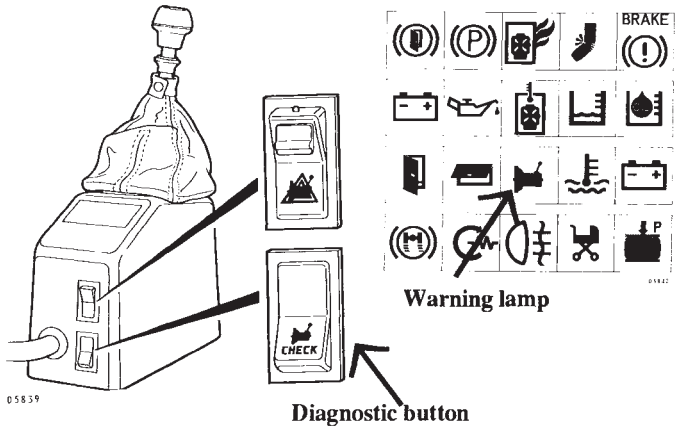
Check the parking brake on and off function.

Check the function of the blocking valve by dropping the pressure in the brake system to below 340–400 kPa (3.4–4.0 kp/cm²). This should automatically apply the parking brake.

3 ■ **Checks after starting, cont.**

3 Checks after starting, cont.

Gearbox G7 EGS, function check



Push in the diagnostic button. Code 13, one long and three short flashes on the indicator lamp, indicates a speed lower than 300 r/min or that the engine has stopped.

Depress the clutch pedal and hold it depressed while pushing in the diagnostic button. Code 11, one long and one short flash, shows that the sensor next to the clutch pedal is correctly adjusted.

Start the engine, release the clutch pedal, push in the diagnostic button again. No fault code will register on the indicator lamp if the system is functioning correctly.

With the engine still running and the clutch pedal depressed, check that the gear lever engages smoothly without jamming and that the neutral position is correctly adjusted between 4th and 5th gear position.

Engage a gear, stop the engine. Check that the gearbox and gear lever change automatically to the neutral position without the warning lamp starting to flash.

With the starting key in the O-position (inhibitor cylinder inactivated), move the gear lever to a gear position. Turn the starting key to the Drive position and check that the inhibitor cylinder in the shift control automatically moves the gear lever to the neutral position.

ZF automatic transmission

Safety system

1. Check that the engine cannot start with the transmission in the "DRIVE" position.
2. Depress the "N" position button, start the engine, depress the selector button in "DRIVE". The selected gear should not engage. Lightly depress the brake pedal. The gear should then engage. It shouldn't engage if engine speed exceeds 900 r/min.

Exhaust pressure governor

Let the engine idle. When the parking brake is applied, engine speed should drop if the exhaust pressure governor is functioning properly, providing coolant temperature does not exceed +70°C.

4 ■ **Checks during test driving**

4 Checks during test driving

Speedometer/Instruments

Check that the speedometer/tachograph, tachometer and other instruments are functioning.

Steering

Check the power steering's off-load function at both end positions and that there is a clear change in sound just before full wheel lock. Check that the wheel free-roll is sufficient when driving on potted roads and at full wheel lock.

Drive the bus slowly and turn the steering wheel to check that the steering feels normal without vibrations, imbalance, steering-wheel shimmy and that it is not heavy. Steer the bus so that the front wheels run over holes in the road. Check that the bus runs straight ahead. Listen for unusual noises.

Brakes

Check that the brakes operate correctly and neither pull nor grab. The air gauges should give normal readings. Check parking brake application by trying to drive the bus with the parking brake on.

Buses with anti-lock brakes (ABS)

The ABS indicator lamp should go out at a speed of 7–8 km/h. If it doesn't, or if it goes out and lights again, then there is something wrong with the system, which must be put right.

Hydraulic and electric retarder

Check the retarder while driving on a road. Set the switch, located next to the brake pedal, to the "on" position. Increase speed to about 70 km/h and depress the brake pedal approx. 9–12 mm (or move the hand control to the first position). Check/feel that braking starts.

Apply the retarder a further step and check that the braking increases.

Exhaust brake

Test the exhaust brake function during driving by depressing the foot switch. Check within the speedometer blue sector.

Gearbox G7 EGS

During driving, check that all gear positions function normally without unusual delay.

Note! Move the gear lever from a gear position to neutral and from neutral to a gear position without depressing the clutch pedal. Check that the warning lamp and the warning buzzer activate after about a delay of 1 second.

If all the gears can be engaged and disengaged without any problems during driving, carry out the following:

Note any fault codes. Clear stored fault codes by keeping the diagnostic button pushed in while turning the starting key to the "Drive" position.

4 ■ **Checks during test driving, cont.**

4.5 – Gearbox, cont.

4 Checks during test driving, cont.

Gearbox G8, manual

The G8 is a low/high range gearbox, with gears 1 to 4 in the low range and gears 5 to 8 in the high range.

Low/high range is selected by means of a switch on the gear lever.

Select low range and drive in all the low range gears. Select high range and drive in all the high range gears.

The high range lamp should light when your in the high gear range.

Check for smooth gear operation allround.

Check the range inhibitor function by switching to low range at approx. 45–50 km/h and engaging neutral. Keep the clutch pedal depressed. Low range should engage when speed has dropped to about 35–40 km/t and the high range lamp should go out. This is a built-in safety arrangement to prevent incorrect gear changing.

Automatic transmissions, all

At part throttle check that the transmission functions smoothly.

Check the kick-down function. In the event of uneven operation, refer to Test Driving on page 16.

Voith automatic transmission

Safety system

Brake the bus to a standstill. Keep your foot on the brake pedal. The transmission should automatically disengage. Ease up on the brake pedal and the transmission should revert to the pull position.

4 ■ **Checks during test driving, cont.**

4.6	– Clutch, function
4.7	– Heating system, air conditioning, function
4.8	– Exhaust smoke, visual
4.9	– Engine performance and pulling power

5 ■ **Checks after test driving**

5.1	– High and low idle, throttle control
5.2	– Unusual noises in engine compartment
5.3	– Stop control

4 Checks during test driving, cont.

Clutch

Check the clutch function. In the event of problems, refer to page 17.

Heating system, air conditioning

Check the heating and ventilation. The controls should be easy to operate and to stop where set.

The fans for the heating and air conditioning should operate when the switch is moved to the various positions. Listen for unusual noise.

Exhaust smoke

With abnormal exhaust smoke, check

1 Smoke density
2 Pre-injection angle
3 Injectors

Concerning the above check measures, refer to page 17.

Engine performance and pulling power

With poor performance, check

1 Fuel filter
2 Pressure-drop indicator, air cleaner
3 Fuel pressure gauge
4 Pre-injection angle
5 Boost pressure

Concerning the above check measures, refer to pages 17–18.

5 Checks after test driving

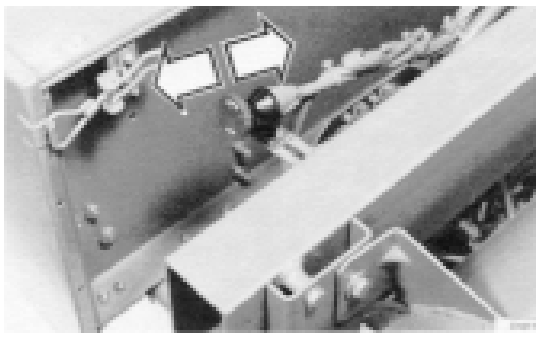
Low idle 550/600 r/min
High idle 2450/2550 r/min

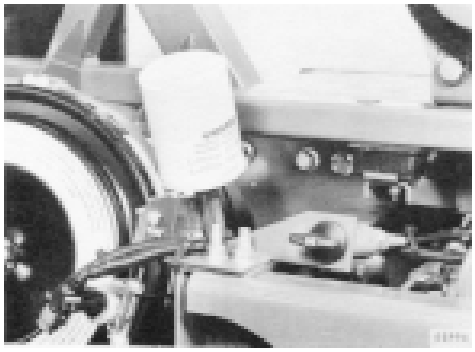
Note: The low idle for a bus with automatic transmission must not go below 500 r/min with the selector lever in the D-position.

Check the throttle control function, return travel, etc. In the event of problems, refer to page 19.

Let the engine run at high idle, open the engine compartment panel and listen for unusual noises from the alternator, drive belts, cooling fan journals and valve noise from the engine. With excessive valve noise, adjust the valves.

Round off by checking the function of the manual stop control.





After faults have been noted in any of the following functions during the test driving:

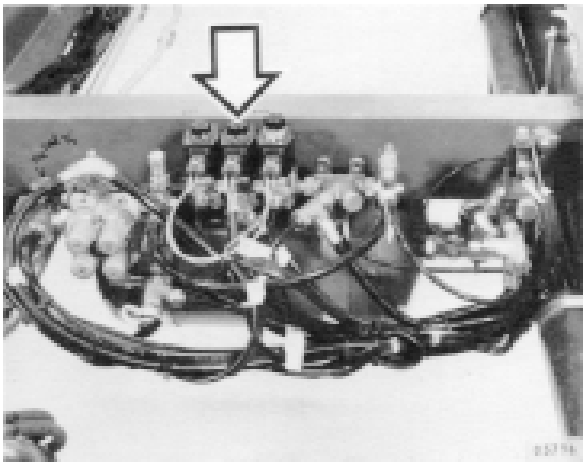
Check in a workshop:

3.4	Level control
3.5	Kneeling system
4.5	Gearbox
4.6	Clutch
4.8	Exhaust smoke
4.9	Engine pulling power
5.1	High and low idle, throttle control

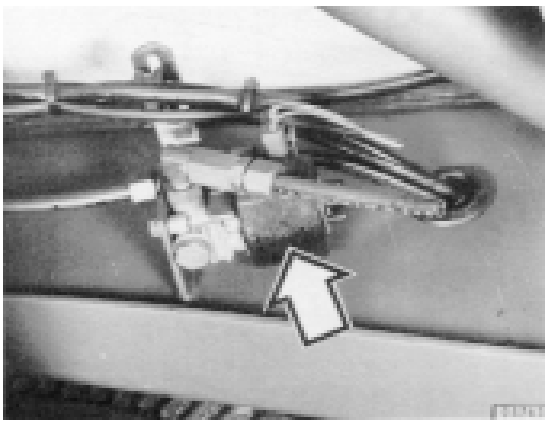
Level control

Available as optional equipment is a level control system for raising and lowering the bus ground clearance by approx. 80 mm. There is also an alternative with only level raising. The bus is raised and lowered from its normal driving level by a switch on the instrument panel.

Check that the air bellows are not fully emptied when lowering the level. The relief valve in the solenoid valve outlet should close at a pressure of 120–160 kPa.



Solenoid valve, raising the level



Solenoid valve, lowering the level, rear axle (one in each frame member)

Kneeling system

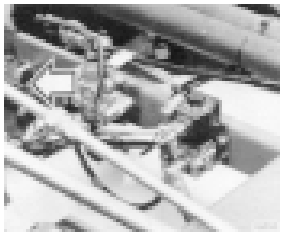
As a variant, the bus can be fitted with a kneeling system that facilitates boarding at bus stops. The kneeling function is operated by a switch on the instrument panel.

Kneeling is achieved by rapidly discharging the air bellows at the front entrance door via a solenoid valve in the line between the air bellows and the front axle levelling valve. During kneeling, separate solenoid valves block the air bellows on the opposite side of the front axle and also the feed line to the levelling valve.

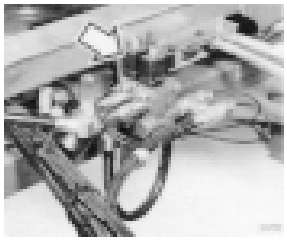
An extra, 25-litre air tank is required for the bus to return rapidly to the drive position after boarding.

> ⚠ **WARNING!** Make sure the bus is properly jacked up or placed over a pit when checking the kneeling system, otherwise there may not be enough room to use a dolly or lie underneath the bus when air is drained from the front air suspension bellows.

The distance (A) between the inductive sensor and the indicator plate should be 0.5–1.0 mm. To adjust, move the inductive sensor in its attachment bracket.



Inductive sensor, level position



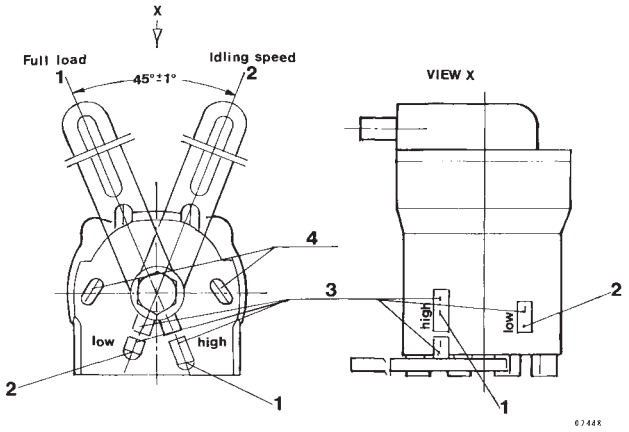
Solenoid valves: feed, filling, air bellows

The location of the valve may differ according to bus type.

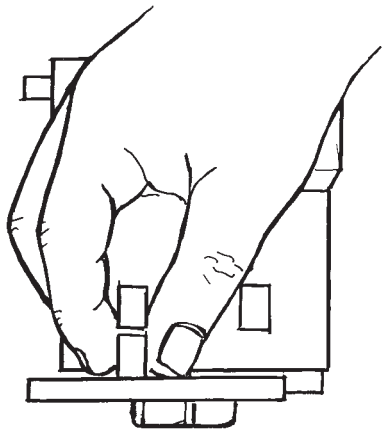
ZF electric modulator

When the injection pump throttle arm is in the full throttle position, the setting arm cam must coincide with the longer setting cam (1) on the modulator. You can check this with your fingers, both at the end and top side cams (1).

When the injection pump throttle arm is at low idle, the setting arm cam should coincide with the shorter setting cam (2) on the modulator. Any adjustment to the modulator setting must be down in the full load position.



1. Full load position
2. Low idle
3. Setting cams
4. Setting arm stop cams

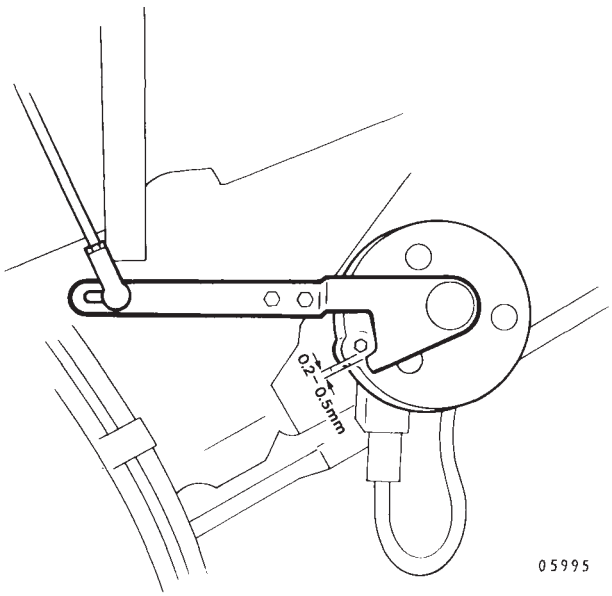


For more detailed information, refer to Service Manual, Section 4 (43), Gearboxes.

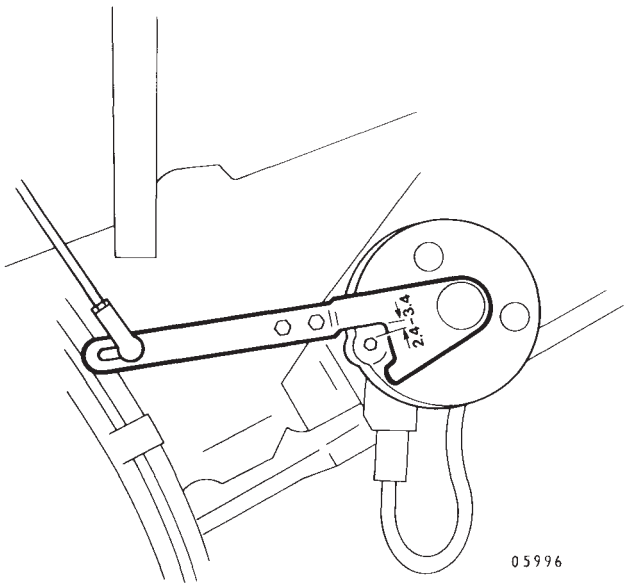
Voith electric modulator

When the injection pump on the drag link is at low idle, the modulator lever should coincide with the stop bolt on the modulator. The lever should be 0.2–0.5 mm from the modulator stop bolt. Any adjustment must be done to modulator control drag link.

When the injection pump drag link is at full throttle, the modulator lever should be 2.4–3.4 mm from the modulator stop bolt.



Low idle



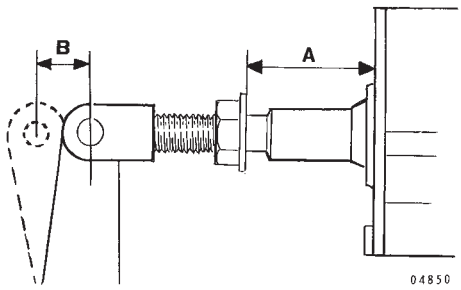
Full load position

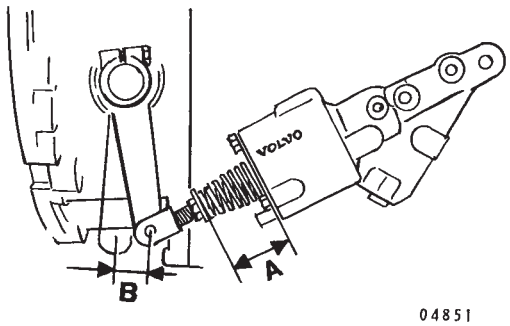
Servo-operated clutch control

In the event of leakage or if clutching is heavy-footed, the servo cylinder has to be adjusted.

For clutch servo with part no. 1655639, the servo cylinder distance "A" should be between 45 and 32 mm. This distance should be between 40 and 32 mm for the servo cylinder on the clutch servo with part no. 1655435. Let an assistant depress the clutch pedal and measure the servo plunger travel "B" which should be between 28 and 30 mm for the pressing-type clutch.

For the pulling-type clutch (fig. below) the travel should be 30–32 mm.





Exhaust smoke

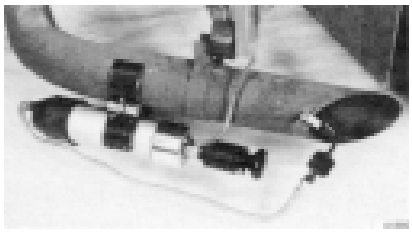
Smoke density test

With abnormal exhaust smoke, measure the density with a smoke density gauge.

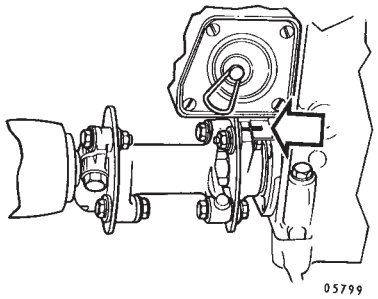
The Bosch smoke density gauge uses replaceable filter discs in a suction pump that sucks up a specified volume of smoke from the engine's exhaust system. An evaluator then measures photoelectrically the extent to which the filter discs are blackened.

The density is measured with a fully loaded engine at approx. 1400 r/min. Otherwise follow the instructions of the manufacturer of the instrument.

Smoke density must not exceed legislated levels (varies for different markets).



Checking the pre-injection angle



The pre-injection angle need only be checked/adjusted in the event of abnormal engine exhaust smoke, or if the engine's performance is poor and/or if the pump coupling seal wire has changed position.

The correct basic setting of the pre-injection angle is important to the engine's combustion cycle. It is also of great importance to fuel consumption, engine pulling power and the exhaust emissions. Concerning the pre-injection angle setting, refer to Service Manual, Section 2 Engine.

Injectors

Check the injectors only if there are symptoms of abnormal exhaust smoke and poor engine performance. The injectors are removed from the engine and tested on an injector tester. Opening pressure and tightness are most important. Spray pattern and chatter are more difficult to assess and do not provide any sure indication of the condition of the injector. Instructions on how to adjust the opening pressure after replacing injectors, thrust springs, etc., are to be found in Service Manual, Section 2, Engine.

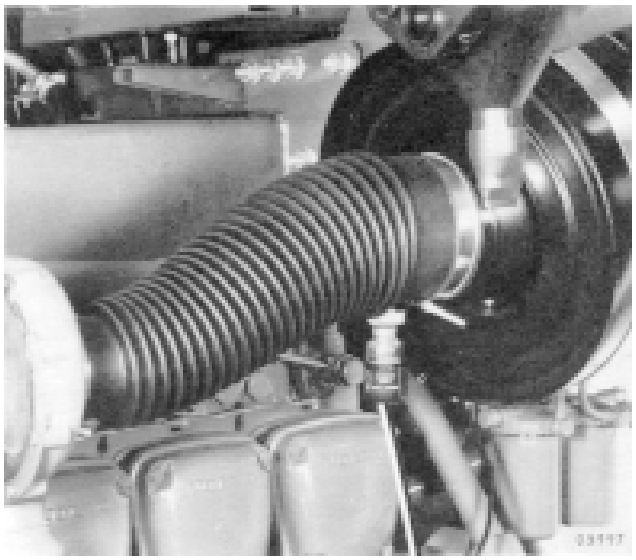
Engine pulling power

Fuel filter
The presence of solid contaminants in the fuel will determine how often the filters must be replaced. If a check reveals condensation water in the fuel tank, the filters should be replaced when draining the fuel tank.

The normal interval for filter replacement is once a year. Always change both filters at the same time.

The filters should not be replaced too often since filterability improves after they have been in use for some time.

Pressure-drop indicator, air cleaner
As far as air blockage is concerned, the filter insert should only be changed if the pressure-drop indicator display is red. Vibrations can cause cracks in the filter elements and for this reason we recommend filter replacement after 18 months, even if the indicator display is not red.

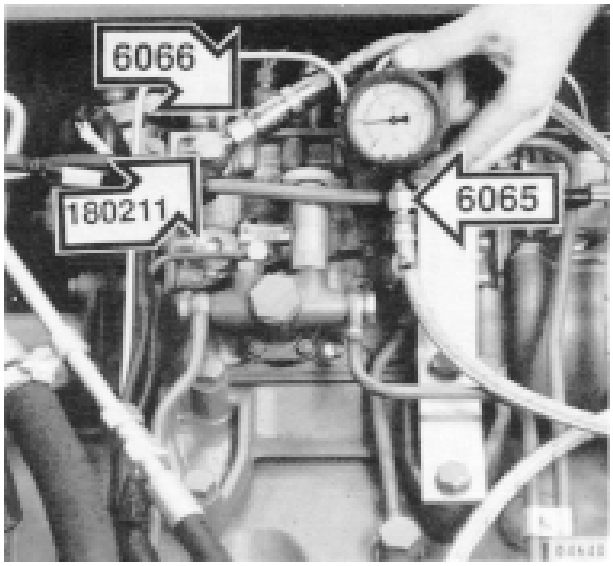


Depress the release button when replacing filter

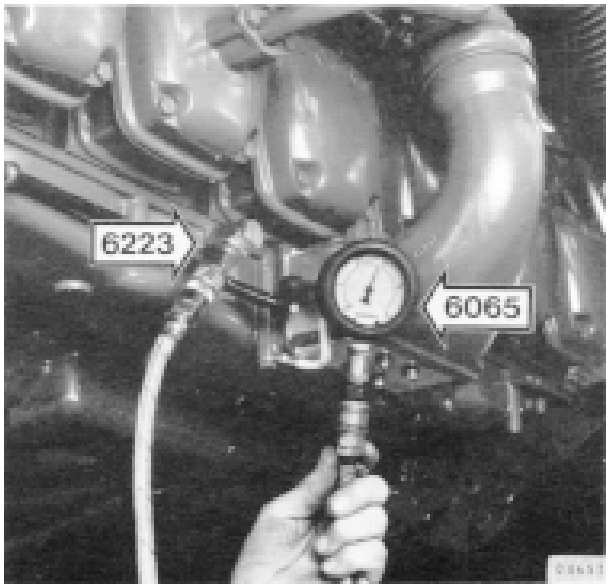
Pressure-drop indicator

Fuel feed pressure
Before measuring the fuel feed pressure, increase engine speed and then lower it to low idle when reading off. Read-off the pressure within 1 minute. The fuel feed pressure must be min. 100 kPa (1.0 kp/cm²).

Low fuel pressure can be caused by contaminated fuel filters, a faulty relief valve or a defective fuel feed pump.



Boost pressure
Before checking the boost pressure, in the event engine output is low, check the air cleaner, the fuel system and the engine compression pressure (concerning instructions, refer to Service Manual, Section 2, Engine). With low boost pressure, check turbo rotation (see 12-months' check).



High and low idle, throttle control

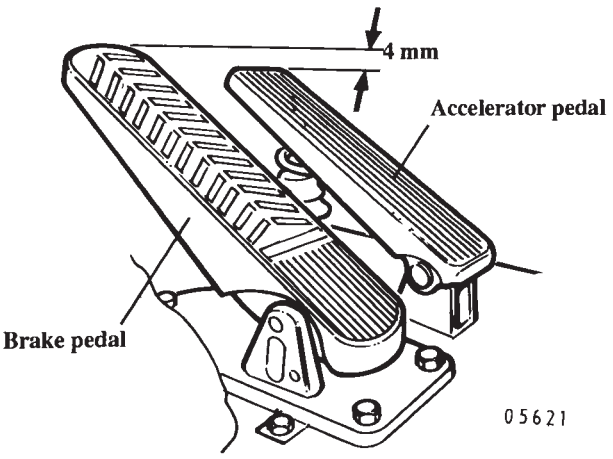
Mechanical throttle control
Check that the injection pump gives full throttle and that the accelerator pedal returns to low idle when released.

Check the four return springs, their mounting and condition.

Check that the throttle wire functions smoothly when depressing the accelerator pedal. If the pedal feels stiff, check to make sure the wire is not kinked or has sharp bends that impede its movements. Make sure the wire does not go near any hot areas and parts. If the wire control binds, replace it. Lubricate links and levers if stiff. Levers and ball joints must not be loose.

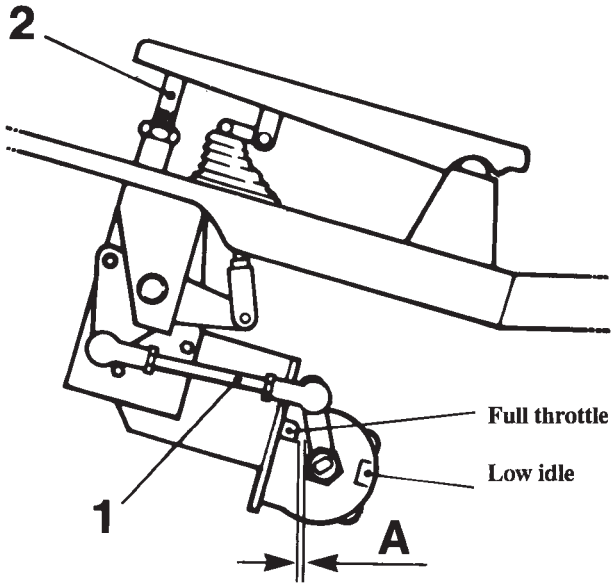
Electric throttle – position sensor and accelerator pedal
At low idle, that is, when the lever on the position sensor is against the low idle stop, the accelerator pedal should be parallel with the brake pedal, measured on the entire length of the accelerator pedal.

Max. permitted deviation: 4 mm above the brake pedal. If necessary adjust the pull rod (1). (Fig above right.)

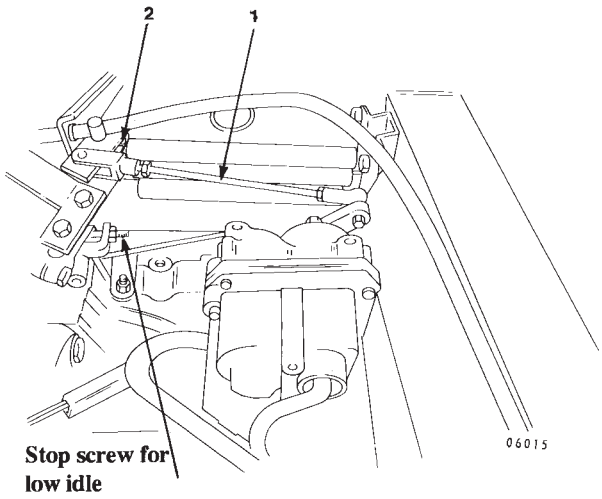


At full throttle, the stop screw (2) under the accelerator pedal should be adjusted to get a clearance between the lever and position sensor and its full throttle stop.

The following clearances apply (A):
Automatic transmission with kick-down .... 1 ± 0,5 mm
Manual gearbox ..... 5 ± 0,5 mm



Adjusting the stall motor
Check/adjust the drag link (1) (below) and the lever (2) to get a clearance of 1 mm between the top screw and throttle arm at full throttle, and also so that the throttle arm is against the low idle stop during idling.

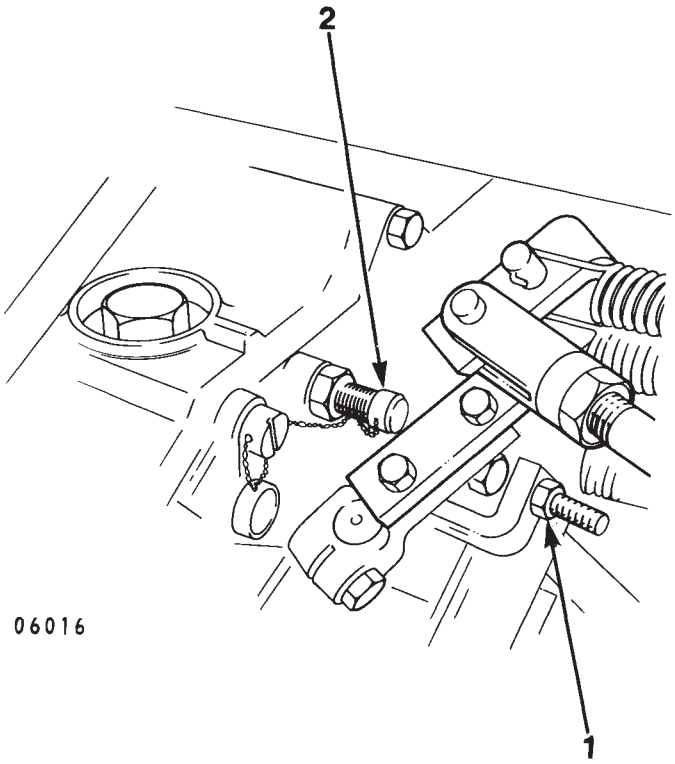


Check that all three return springs are in position.

High idle speed

Note: The stop screw for the high idle speed is tamperproof sealed. This seal may be broken only by specially trained (authorized) mechanics.

1. Before starting the engine, check that the throttle arm is against the high idle stop screw (2).
2. Run the engine warm to normal working temperature.
3. Depress the accelerator pedal and check the high idle speed.
4. If necessary adjust speed to 2450–2550 r/min. Fit a tamperproof seal as shown below.



Low idle speed

1. Run the engine warm to normal working temperature.
2. Check the speed at low idle.
3. If necessary, adjust speed to 550 r/min by screwing in or out the stop screw (1).

Note: For buses with automatic transmission, the low idle speed must not go below 500 r/min with the selector lever in the D-position.

Service – Chassis

Additional points

Every	*12 months*	**Change coolant. Change filter with 6 months' extension.**
	18 months	**Change air cleaner**
	24 months	**Air dryer, change desiccant cartridge**

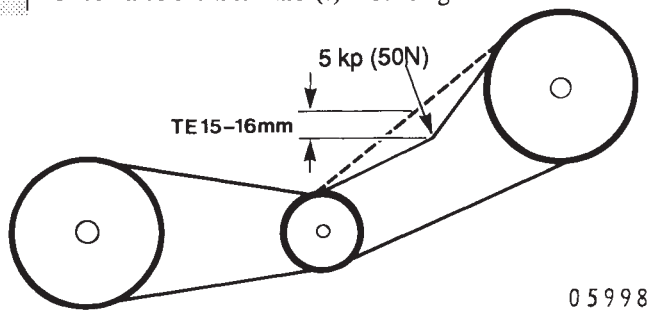
Engine

6

Drive belts (all), B10B

Check the condition and tension on all drive belts. Adjust belt tension. Worn belts must be replaced in pairs. Two checks should be carried out after a new fan belt has been installed: check 1 at 500-1500 km; check 2 at 3000–5000 km.

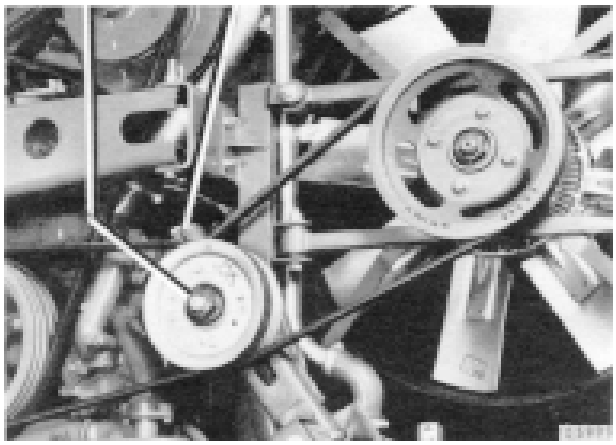
Check also the alternator(s) mounting.



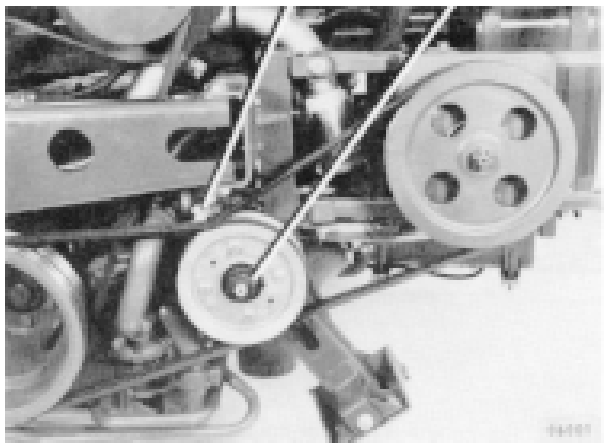
Belt-driven cooling fan

Lock nut (slackened before adjusting)

Adjusting screw belt tension

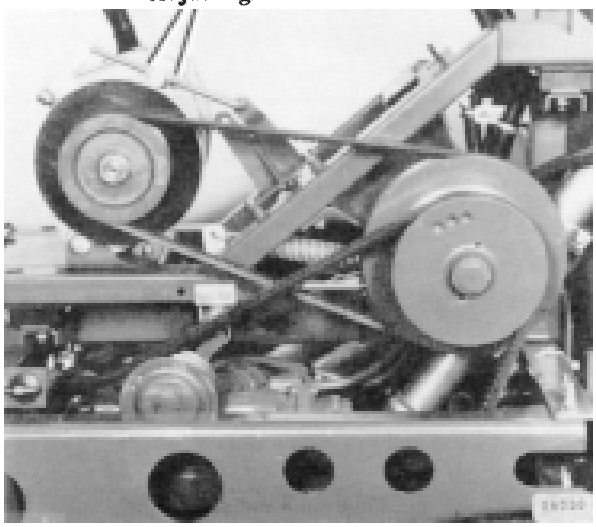


Hydraulic-driven cooling fan (early prod.)



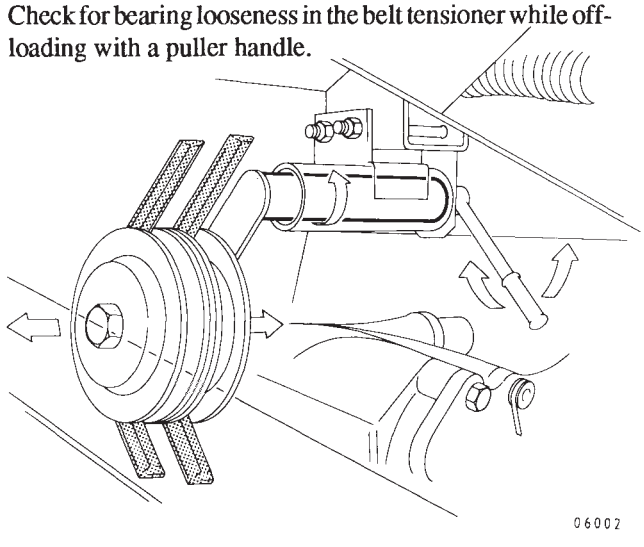
Adjusting alternator drive belts

Adjusting



Drive belts and automatic belt tensioner

Check for bearing looseness in the belt tensioner while off-loading with a puller handle.



6

Drive belts (all), B10M

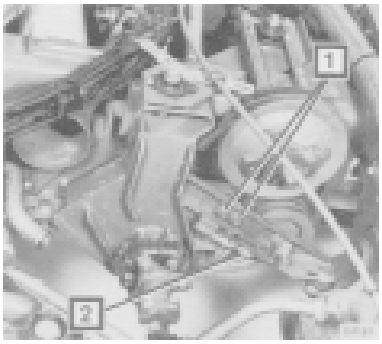
Check the fan drive belts, their condition and tension.

Check the fan drive mounting, for loose bearings and for slide joints (applies to prop. shaft drive fan).

Belt driven cooling fan

Check the drive belts for wear on the edges.

Check/adjust the belt tension. Worn belts must be replaced in pairs, even if only one of them is worn.

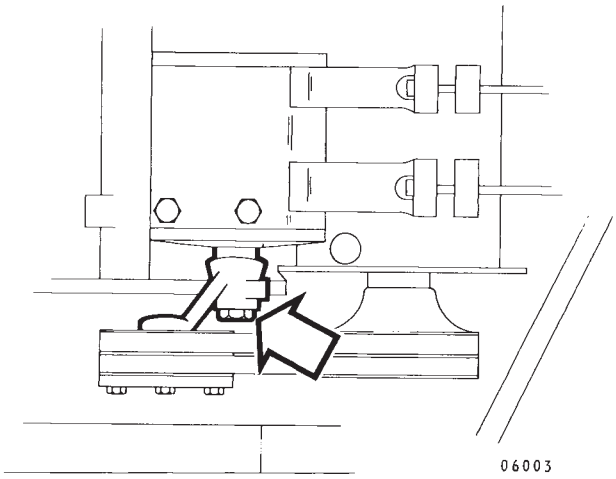


1. Lock nut for tensioning roller
2. Tensioning screw

The belts are properly adjusted when they can be deflected max. 10 mm midway between the pulleys.

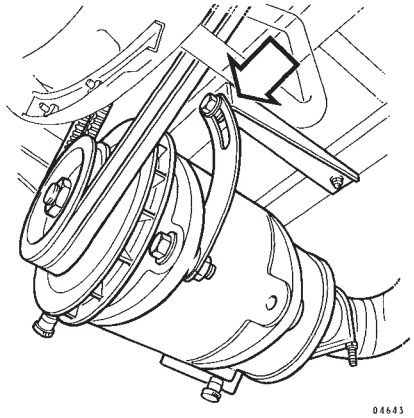
Fan prop. shaft

Check for looseness in the carrier bearings, universal joints and splines. The spider must not bind. Check the rubber coupling between the engine and the fan shaft. Replace if worn. Refer to Service Manual, Section 2, Engine.



Alternator mounted on engine

Manual belt tensioner. Check for bearing looseness. Check the belt tensioner.



Manual belt tensioner
Alternator mounted behind the radiator.

7

Cyclone filter

Check that the rubber valves are in good condition and do not leak. If a valve leaks, the air will flow through the valve instead of through the filter.

The rubber valves are evacuated by squeezing them.

8

Exhaust system

Check the following: tightness of joints, condition and mounting of brackets and rubber mounts, condition of exhaust pipe and silencer (tap with a hammer).

9

Cooling system

Check the radiator and fan shroud mounting. If necessary clean the radiator cell system and round the fan shroud.

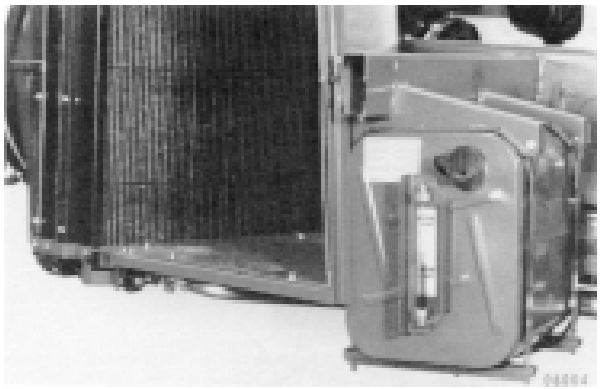
10

Level sensor, cleaning

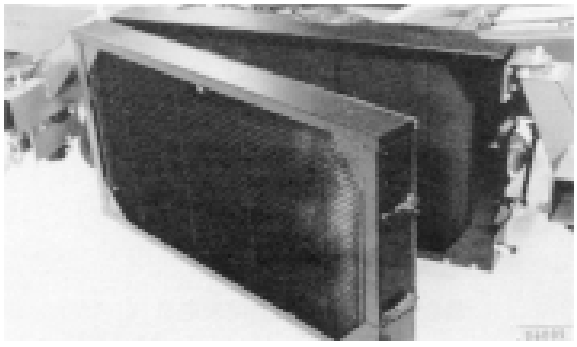
Radiator

Any dirt on the outside of the radiator fins will impede the air flowing through the radiator. This will impair the efficiency of the cooling system and reduce cooling capacity. The radiator is cleaned by directing pressurized water or air from the cooling fan side.

NOTE! High pressure flushing may damage the radiator fins. With the prevalence of grease, use a degreaser.



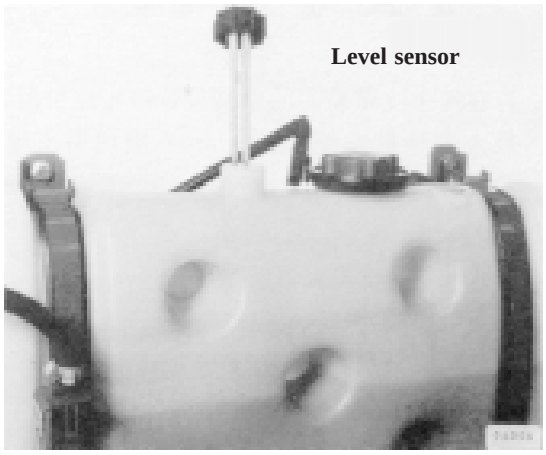
Rear-mounted radiator



Side-mounted radiator

Level sensor

Because of the different kinds of impurities in the coolant, the level sensor should be removed from the expansion tank and scraped clean.



11

Cooling system, maintenance/pressure testing

Pressure-test the cooling system. Inspect all hoses for hardness, cracks, separation, etc. Also inspect the heating system for leakage. Replace parts if necessary.

Concerning changing coolant and filter, refer to "Additional points" in the Service Check List.

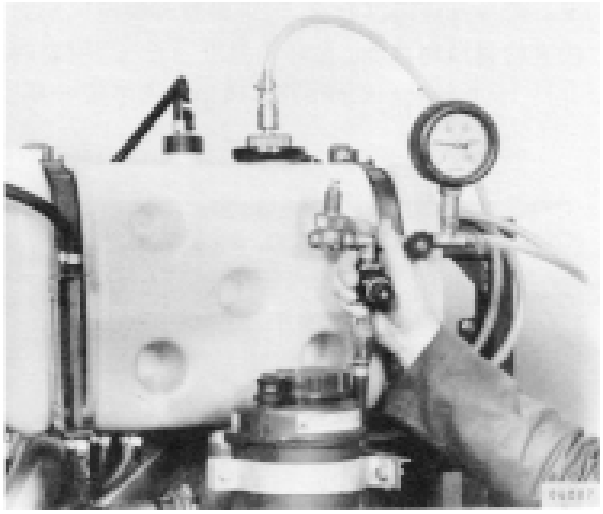
During the winter, check the coolant anti-freeze protection. If necessary, adjust the glycol/water mix to provide protection to suit local conditions. See below.

Coolant

⚠ **Warning!** Anti-freeze (glycol) is poisonous.

Glycol (anti-freeze) mixture	40%	45%	55%	60%
Protection down to	–25°C –13°F	–30°C –23°F	–40°C –40°F	–56°C –69°F

Note: The Volvo coolant concentration must be between 40 and 60%. Lower than 40% will not provide sufficient protection against rust, in some cases the rusting may even increase. Never mix different coolant types.



Pressure-testing the cooling system

If the cooling system has to be frequently topped-up with coolant, it should be pressure-tested. Topping-up after filling may indicate air in the system.

Connect pressure tester 6662 and cap (999) 6441 to the expansion tank and apply a pressure of 70 kPa (0.7 kp/cm²). If the pressure drops, then there is leakage in the cooling system. Find out where the leak is and remedy it.

12

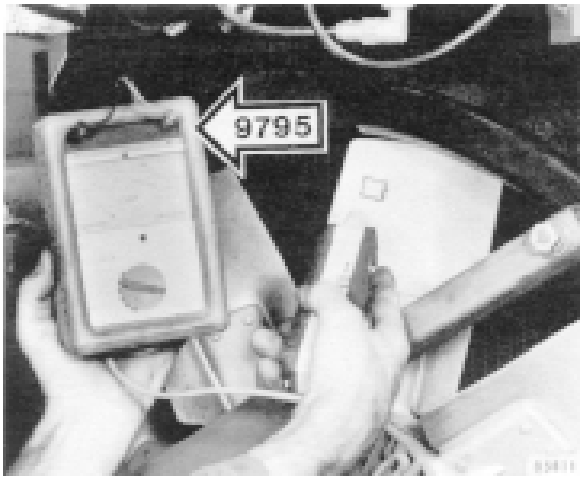
Cooling fan

Check mounting and bearing clearance. The fan should be replaced if there is bearing looseness or other damage.

Electric cooling fan: Check-measure the electric brushes.

Thermostat-regulated fan

If engine temperature is too high, check the function of the fan with an optical speed gauge. If the coolant temperature rises, the fan function can be checked by temporarily locking the fan and checking. With an ambient temperature of 25°C, the fan speed should not rise when engine speed is increased to 1500 r/min.



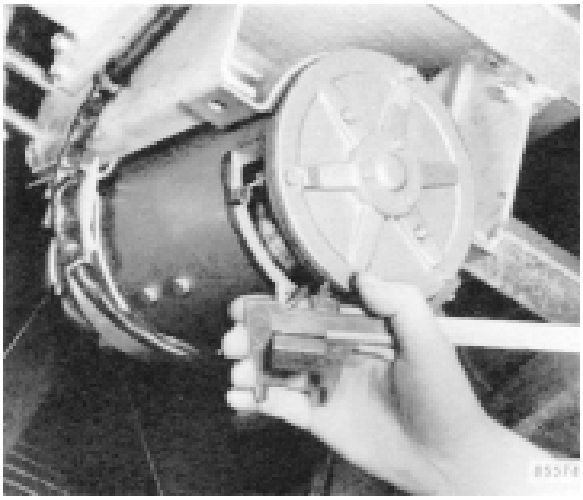
Electric cooling fan

Measuring the electric brushes

Min. 18 mm. The wear can also be checked by measuring the brush seats in the holders. If the brushes are 4–5 mm below the edge of the holders, the brushes must be replaced.

Check to make sure both brushes sit correctly in the holders and brush smoothly against the commutator. Measure the length of the brushes. If any is worn down to half its original length (min. meas. 18 mm), both brushes must be replaced.

Check the commutator. It should have a shiny, smooth surface for the brush travel. If the surface is uneven and coked, this must be removed by lathing (refer to instructions for disassembling electric motors).



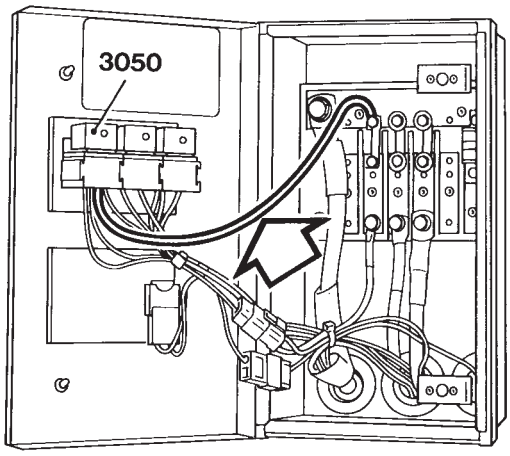
If engine temperature is too high, check fan function with an optical speed gauge.

12 **Cooling fan (cont.)**

Measuring the fan speed

Tape one of the fan blades to hold the fan. Bracket the temp. sensor (see fig. below) if the temperature isn't enough to start the fan.

Note: The fan operates only after the engine has started and the alternator has started charging.
This means that the bus must be placed over a pit to measure the fan speed. If this is not possible and to avoid the risk of the engine being involuntarilly started, turn off the engine switch in the box. Then proceed as follows:
Disconnect terminal 86 for relay 3050. Start the fan by connecting an extra cable between the fuse bar and terminal 86, relay 3050.



05576

Measure the fan speed by pointing the speed gauge at the fan. Read off. Correct fan speed, see below.

> ⚠ **WARNING!** Observe great care when the fan is rotating.

Electric cooling fan data:

Volt	A	r/min
24	27,5	1900–2000
27	35	2000–2100

If the speed is wrong, look up "Measuring the electric brushes" on page 26.

12

Cooling fan, cont.

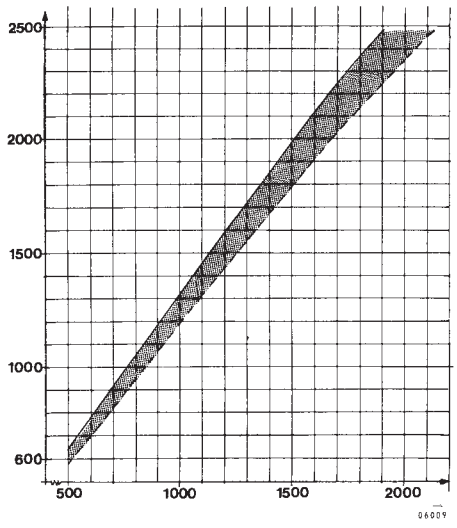
Engine temperature too high: Check fan function with an optical speed guage.

WARNING! Observe great care when the fan is rotating.

Hydraulic cooling fan, B10M

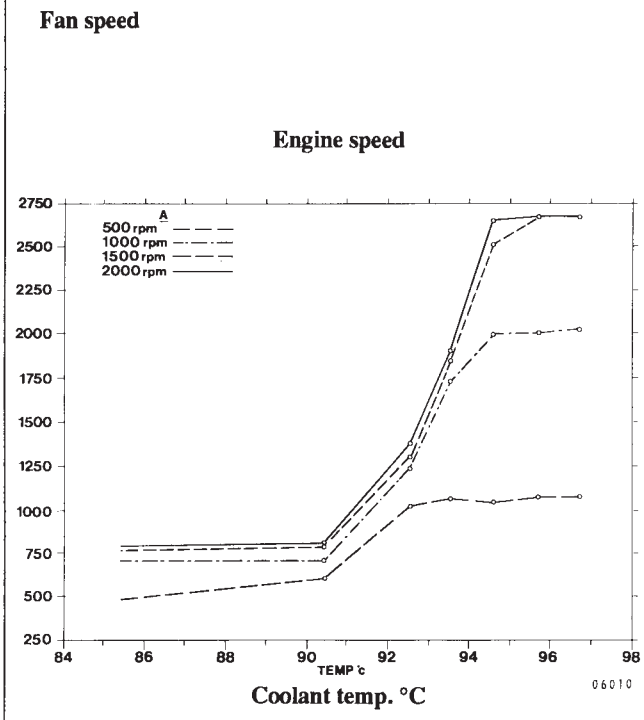
First check the oil level in the hydraulic tank and then the fan speed at different engine speeds. Note that the fan normally runs 25–30% faster than the bus engine. If all check data is confined to the shaded section of the diagram below, then there is nothing wrong with the system.

If the fan speed is too low – down to 10% under the lower limit on the diagram, probably there is something wrong with the check valve or the safety valve.



Hydraulic cooling fan, B10B

The hydraulic pump is regulated by a thermostat. Example: At an engine speed of 1000 r/min and a coolant temperature of 86–90°C, the fan speed should be approx. 700 r/min. At temperatures above 94°C, the fan speed should be about 2000 r/min.



Fan speed in relation to coolant temperature.

13

Turbo-compressor

Check the compressor gear for cleanliness and damage, that it rotates easily and that axial and radial clearances feel normal. The compressor wheel must not scrape against the compressor housing, when the gear is moved axially. Check the compressor oil line for damage.

14

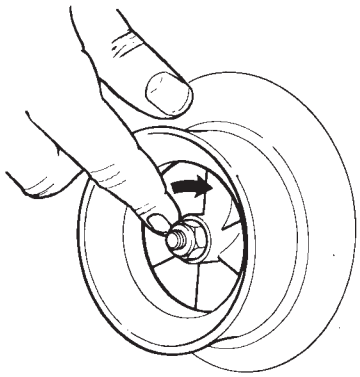
Inlet pipes and hoses

Check that hoses and pipes are securely fitted and that the joints are tight.

Turbo-compressor

> ⚠ **WARNING!** Make sure the turbo-compressor has cooled before inspecting. Particularly the exhaust side can be very, very hot.

A dirty and oily compressor, a compressor housing not properly tightened can have a negative effect on the boost pressure and this in turn can lower engine output and increase fuel consumption.



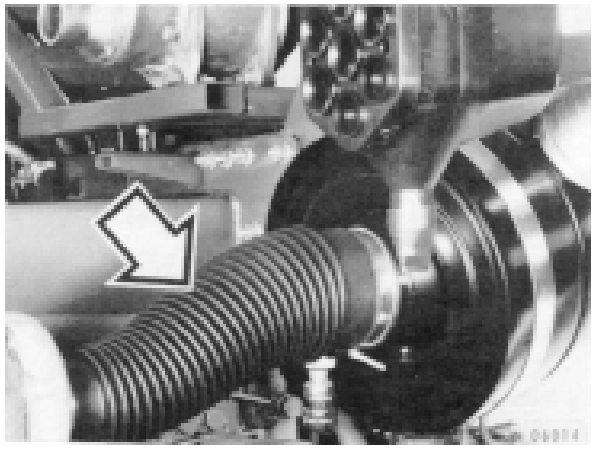
With the inlet hose removed from the compressor housing, check and if necessary clean the turbo-compressor mounted on the engine.

When refitting the inlet hose, make sure it is correctly tightened to the compressor housing.

Inlet pipes and hoses

On the clean side of the air cleaner, the inlet pipe and hose must be absolutely without fault and the connections to the air cleaner and turbo-compressor must not let in unfiltered air. An untight connection could lead to a lot of dust and impurities getting into the engine and result in unnecessary cylinder wear.

Important! The hose must be replaced if the coiled wire in the inlet hose between the air cleaner and the turbo is damaged.



15

Injection pump, tamperproof sealing

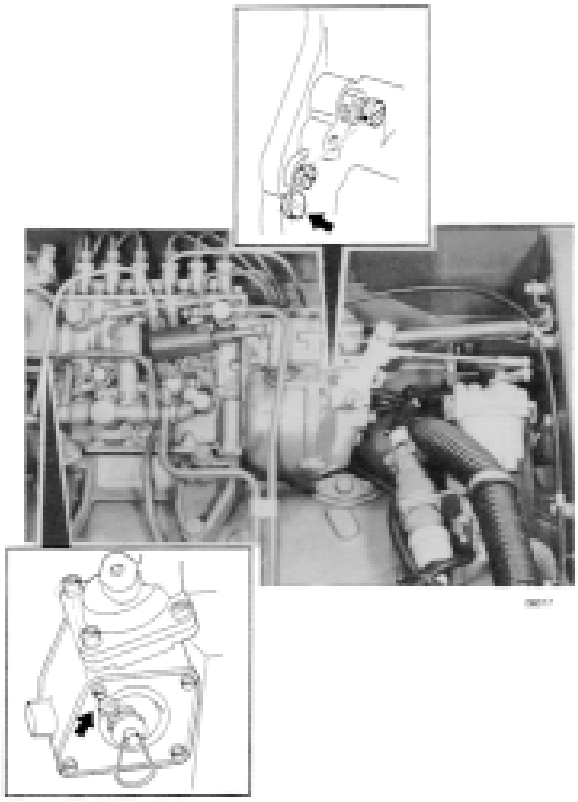
Check the tamperproof seals on the governor, smoke limiter, max. fuel flow.

16

Fuel tank

Drain any condensation water and check the fuel tank for cracks and its mounting.

Tamperproof seals



The injection pump should be tamperproof sealed in such a way that the pump cannot be reset to greater full flow or a higher max. speed. Used for the sealing are shear-off bolts, sealing wire, lead seals and approved sealing pliers. The sealing wire must be double-wound inside the sealing. A broken seal may point to unauthorized adjustment, in which case the pump should be checked on a test bench in accordance with the Diesel Test Standards.

Fuel tank

The simplest way to avoid condensation in the fuel tank is to have, on an average, a lot of fuel in the tank. As soon as an area inside the tank is not covered by fuel, condensation there can develop.

Before draining condensation water and impurities, the bus should have been stationary for several hours to give the impurities a chance to collect in the bottom of the tank. The tank can be drained without emptying it by slackening the plug several turns and letting the fuel run out until it is free from contamination. **The drain plug must not be removed.**

Check-tighten the tensioning bands if they have moved position.

Electrical system

17 ● **Batteries**

Check the fluid level in all the cells. If necessary, add distilled water (accumulator water). Check that the batteries are fitted securely and the battery cables are not damaged.

18 Check the specific gravity with a battery hydrometer. If necessary, add distilled water (accumulator water).

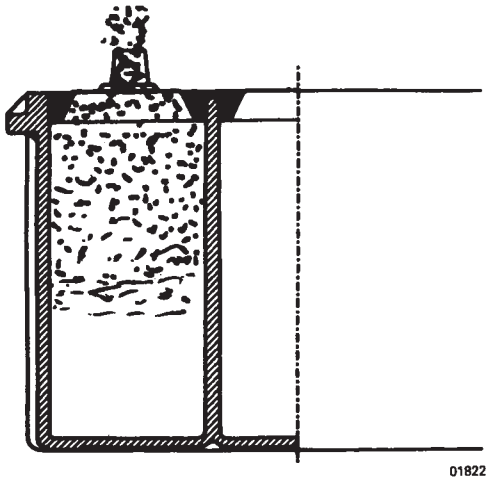
19 Check the condition of the battery box and its attachments to the chassis. If necessary, lift out the batteries and clean the box and apply a protective coating of paint.

Batteries

WARNING! Protect eyes and exposed skin when servicing batteries. Do not allow a naked flame near the batteries.

Correct fluid level is about 5 mm (0.2 in) above the cell plates. Check the batteries for the following indications of excess charging:

- Excessive gas from cells gives off an odour.
- Very low fluid level.
- Acid boil-over.



Clean the outside of the batteries. Spray the pole shoes with rustproofing.

Specific gravity of batteries at +20°C

Battery fully charged	1,28
Battery needs charging	1,24
Replace battery	with more than 0.05 variation between any two cells.

The specific gravity of the electrolyte gives a definite indication of the battery charge condition.

In the event the bus is difficult to start, check the batteries under load, see Service Manual, Section 3, Batteries and alternators.

Check the date stamp on the batteries. Replacement of batteries older than three years is recommended.

Never use standard batteries along with so-called "freedom" or "easy-maintenance" batteries, since their properties differ far too much.

(999) 9618 Battery service tools

20

Electrical centres

Check the electrical connections. Discoloured connections indicate poor contact. Remedy.

21

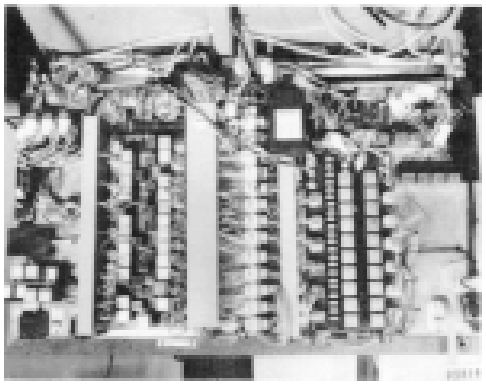
Starting function, rear

Check the starting function from the rear electrical centre.

Electrical centres

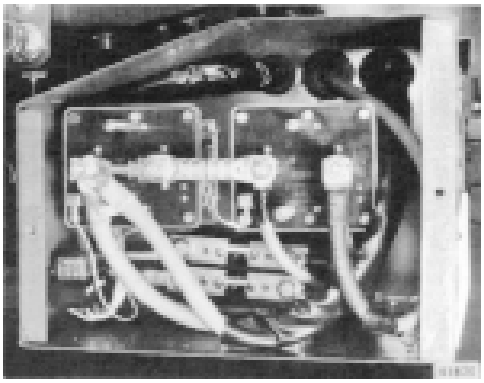
Visually inspect relays, connections and other parts in the main electrical centre, the battery box electrical centre and the rear electrical centres.

Electrical connections must have good contact and for this reason must not be corroded. Remedy if necessary.



Main electrical centre

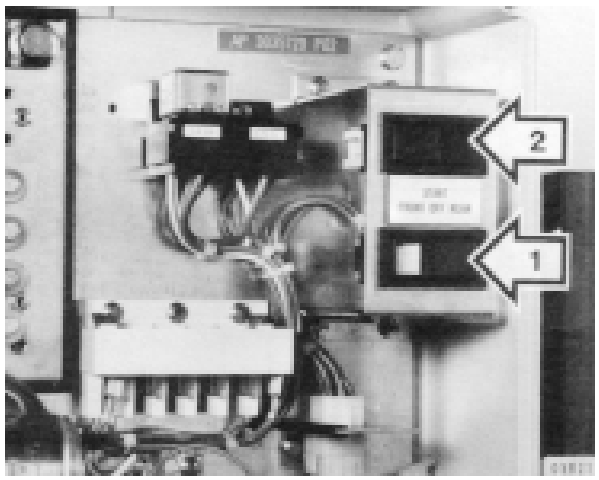
Electrical centre, battery box (B10M)



Electrical centre, battery box (B10B)

Starting function, B10B

Check the rear starting function. Switch on main switch on the battery box. Turn the starting switch to drive. Go back to the engine and turn the switch to "Rear". Start the engine with the start switch. Check that the engine starts. Then switch off with the manual stop control. Go to the front and check that the engine cannot be started with the start key. Return to the rear and turn the switch to "FRONT".



1. Switch FRONT – OFF – REAR
2. Start button

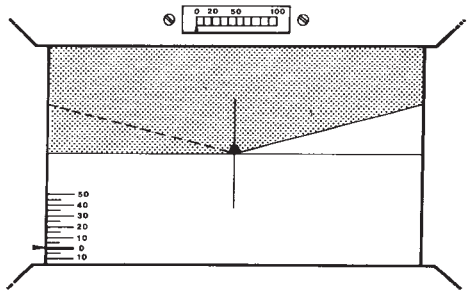
22

Aligning headlights

Check full beam and dipped beam alignment. If necessary, adjust.

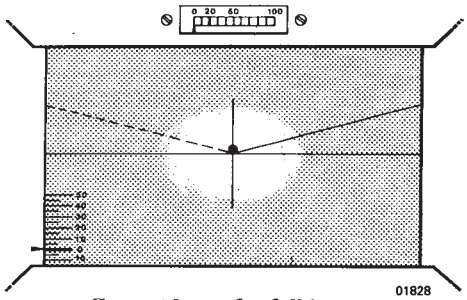
Aligning the headlights

Switch the headlights to dipped beam and check the right-hand top edges of the high-intensity zone on the aligner screen. Switch the headlights to full beam and check the centre of the high intensity zone on the screen. Adjust the aligning if necessary.



01827 H

Correct beam for dipped beam (RHD-traffic)



01828

Correct beam for full beam.

Note: Re-check the beam alignment whenever the bellows height is adjusted.

23

Rear axle and suspension

Check the final drive ventilation and the bolting.

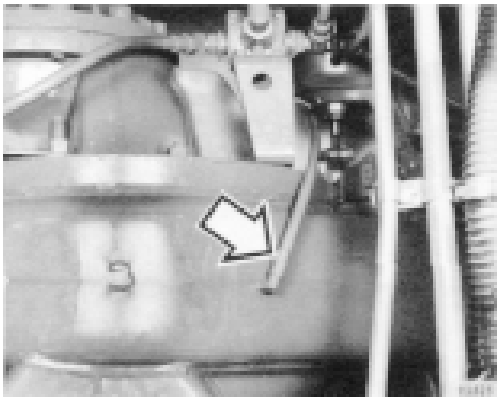
24

Propshaft

Check the universal joints for wear. Make sure they are not loose. Turn and lift the slip joints and check the splines for wear.

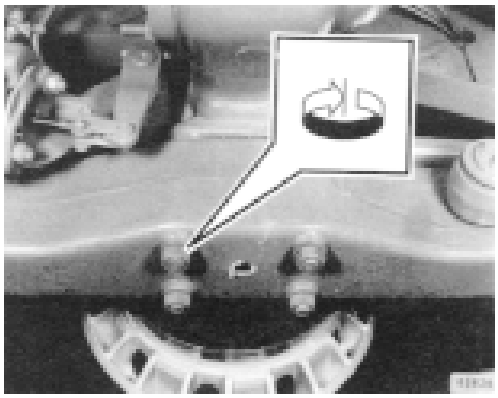
Rear axle

Ventilation



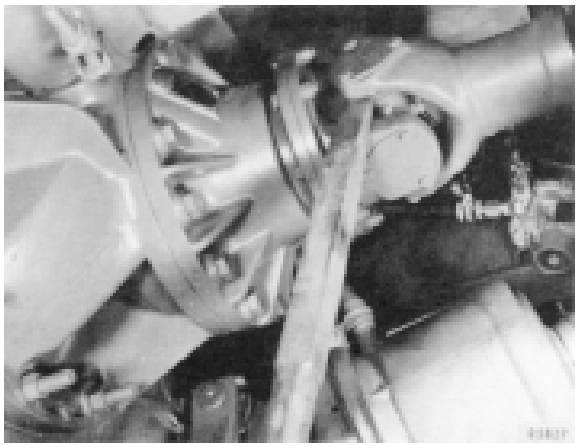
Bolting

If dirt deposits, paint, etc., show cracks, this indicates loose bolting. If this is the case, tighten up.



Propeller shaft

A light-metal lever can be used when checking the propeller shaft universal joints. The joinst must not be loose. If carrier bearings are installed, the rubber in the retainers or the screws for the carrier should not be loose. Worn splines can cause imbalance.



25

Brake system, drain (air dryer)

Check/drain condensation water from the air tanks.

Air dryer

If there is water in the system, check the twin-tower alternating function and replace the desiccant cartridge. Otherwise, check regularly at intervals of 24 months.

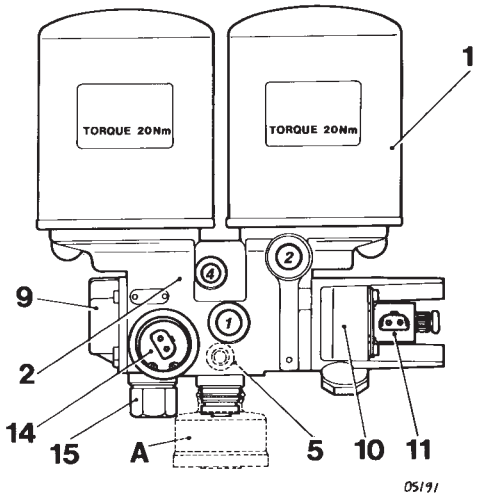
Brake system

Water in the air tanks indicates a faulty air dryer.

Checking the tower alternating function

Empty the compressed-air system. Start the engine. The solenoid valve should alternate between the towers at intervals of one minute. This is indicated by an even hissing sound. If no tower change takes place after more than one minute, the solenoid valve may not be getting current. Do not shift between + and –!

In the event of repairs to or replacement of the solenoid valve, refer to Air dryer, Section 5, Service Manual.



1. Desiccant cartridge
2. Dryer housing
5. Off-load valve
9, 10. Alternating valves
11. Solenoid valve
14. Heating device
15. Inhibitor valve (ramp filling)
A. Silencer (3028745)

Replacing the desiccant cartridge

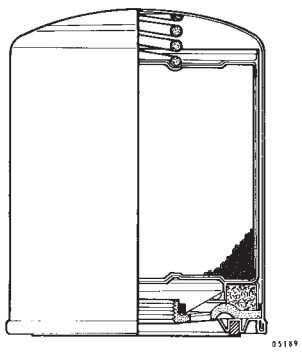
⚠ **WARNING!** Always make sure the system has been depressurized (see below) before opening up the compressed-air system.

Removal

- Drain the wet tank to evacuate all feed pressure.
- Pull loose the desiccant cartridge with a filter remover, ø 137 mm, e.g. 999 9179. Unscrew and remove the cartridge. Any pressure left in the air dryer will hiss out when the sealing ring releases.

Installing

- Clean the dryer housing sealing surface and apply a light layer of grease on the sealing ring and fit the new desiccant cartridge. Follow the instructions on the desiccant cartridge.



Desiccant cartridge

26

Brake linings

Check the thickness of the brake linings.

Brake linings, check

Check the thickness of the brake linings through the four inspection holes.

S-cam

Minimum thickness standard is 7 mm (oversize 9 mm). Barke linings have an indicator groove that shows how far the wear can go before replacement is necessary. If the linings are so worn that they won't last until the next servicing, they should be replaced.

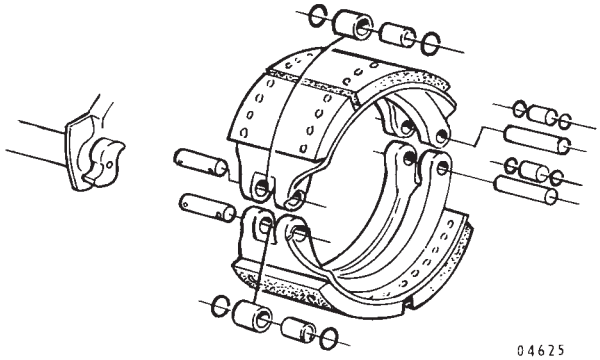
Z-cam

Minimum permitted thickness is 5 mm (oversize 6.5 mm). (At the inspection holes new linings should have a thickness of apporx. 13 mm.)

When lining thickness is down to 5 mm (or 6.5 mm), automatic slack adjustment ceases because of the stop ring. Increased wear increases the travel length.

When replacing the brake linings (S-cam)

Disassemble and clean the wheel brake mechanism and check the anchor bolts and brake rollers for wear. With wear, replace the bushings. Always change O-rings.



04625

Check the brake cam journalling for binding or abnormal looseness. Remedy if necessary.

Before assembling the parts, smear them with silicon grease 1161325.

Check-tighten the brake lever anchor bolt and for damage.

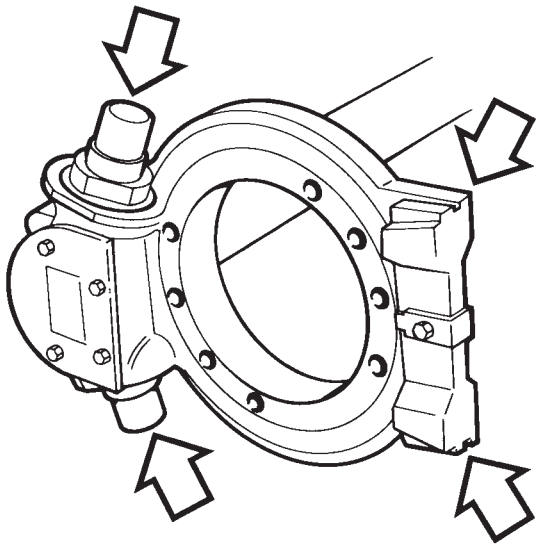
Apply the brake pedal and check the brake pressure at the brake cylinders. Also check the function of the load-sensing valve.

Check for air leakage. Remedy if necessary. Check the parking brake and blocking valve function.

When replacing brake linings (Z-cam)

Check the areas at the arrows (see below) for damage or corrosion. Make sure the dust cover for the lift heads are not damaged.

Note: Never apply the brakes with the drums removed as this would damage the slack adjuster mechanism. The parking brake is released by means of the release screw on the spring brake cylinders.



06011

Bus with anti-lock brakes, ABS

Clean the ratchet gears and check the throw, max. 0.3 mm. Make sure the sensors are recessed in the ratchet gears, that electric cables are not scuffed or clamped too tight.

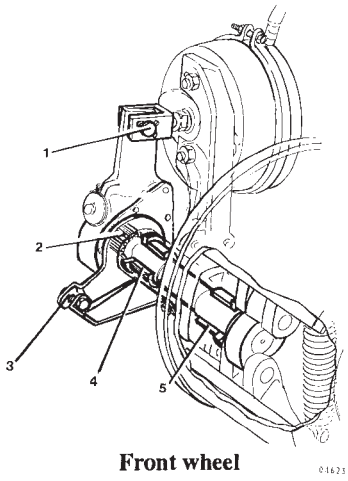
27

Brake cylinder linkage system

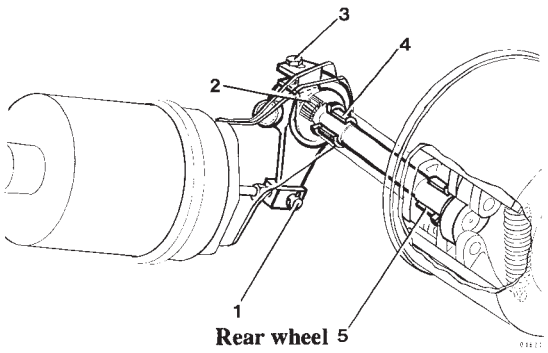
Check the link forks, brake cam-journalling for wear.

Wheel brake wear limits

S-cam



Front wheel

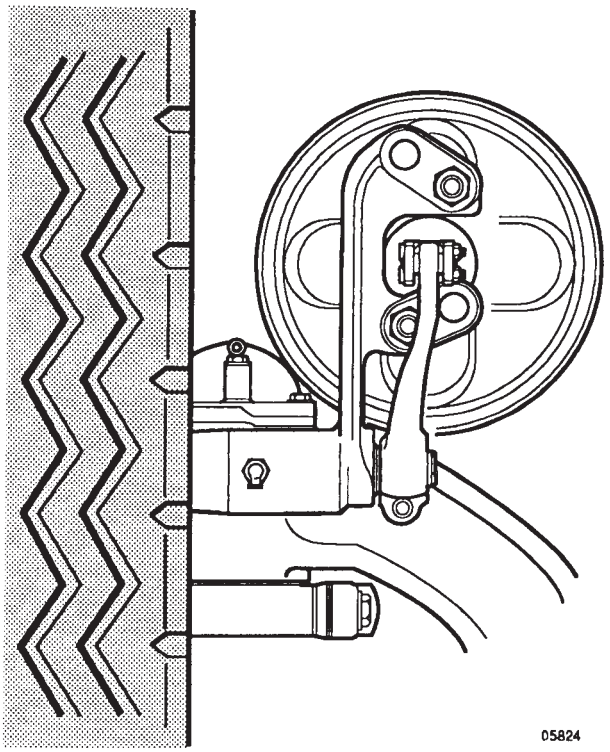


Rear wheel

Pos.	Diameter clearance	Wear limit, mm
1	Fork-clevis pin-lever	Total 3 mm wear Clevis pins, max. wear 0.40 mm on diameter
2	Slack adjuster, intermediate space for worm gear and worm gear	max. 0.33 mm 2 mm
4	Anchor point bolt-bracket	Anchor point bolt, journal min. ø 7.5 mm 2 mm
5	Outer bushing-brake cam	2 mm

Wheel brake wear limits

Z-cam



Brake cylinder, fork-lever	1.0 mm
Brake cam-journalling	0.5 mm

Tightening torques:

Brake cylinder fork	45 ± 5 Nm
Brake lever clamp bolt	85 ± 15 Nm

28

Slack adjuster mechanism, function

Check the slack adjuster travel.

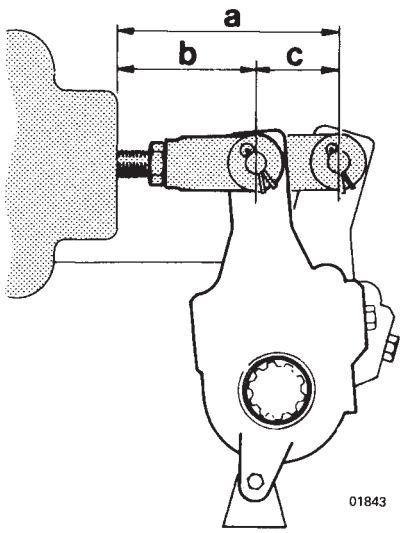
S-cam
Check-tighten the anchor point bolts and for damage. Wear must not exceed the limits given on the previous page.

Automatic slack adjusters, S-cam

To check the slack adjusters, block the wheels and release the parking brake if the bus is not jacked-up. Let an assistant depress and keep the brake pedal depressed.

Measure distance "a" (see fig.). Release the pedal and measure distance "b". The difference between "a" and "b" is the travel "c". If travel exceeds that given below, look up Service Manual, Section 5, Brakes for more detailed instructions.

Note that travel must be the same for both wheels on the same axle if braking is to be even.



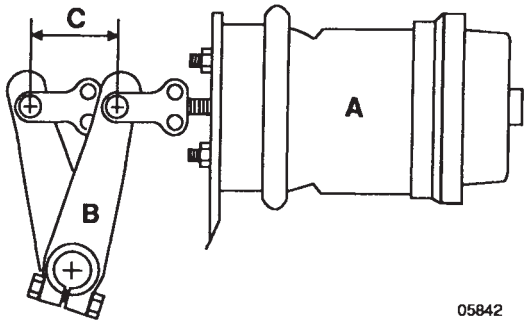
Brake lever travels

At brake pressure of 600 kPa (6.0 kp/cm²):

Front wheels	25–35 mm
Rear wheels/bogie	30–40 mm
Artic wheels, steered	25–35 mm
non-steered	30–40 mm

Slack adjusters, Z-cam

The function of the automatic slack adjuster mechanism is checked by measuring the brake lever travel C.



To check the travels, block the wheels and release the parking brake if the bus is not jacked up. Let an assistant depress the brake pedal and keep it depressed.

The brake cylinders work best with travel between 20 and 50 mm.

Travel must never exceed 51 mm at 6 bars.

Minimum permitted travel at 6 bars is 17 mm. The difference in travel on one and the same shaft must not exceed 5 mm.

29

Cut-in, cut-out pressure

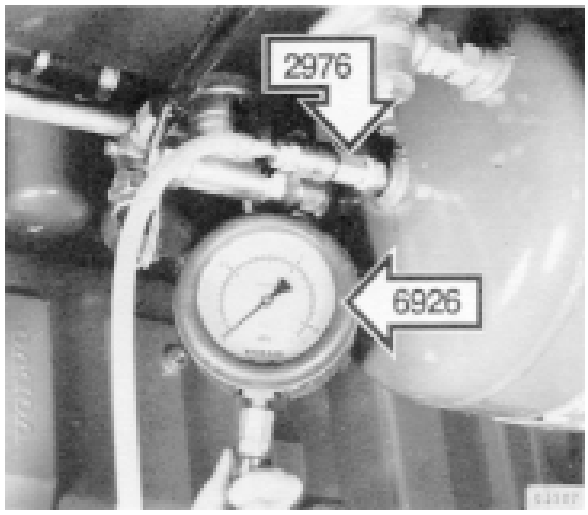
Apply the parking brake. Check the cut-in and cut-out pressure.

30

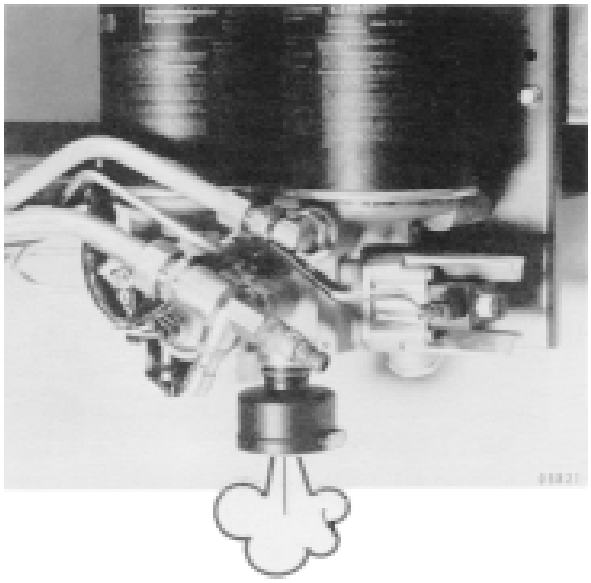
Compressor, changing air cleaner (B10B)

Checking the cut-in and cut-out pressure.

Connect-up a pressure gauge as shown in the fig. Lower the wet tank pressure to approx. 1.0 MPa (10 kp/cm²). Start the engine and let it run at low idle. Read-off the pressure (pressure gauge 6926) when the pointer stops rising and the air dryer drain valve opens (denoted by a powerful hissing sound).



The cut-out pressure should be 1.18–1.22 MPa (11.8–12.2 kp/cm²). Lower the pressure in the circuit tanks by lightly braking. At the same time an assistant can feel with his hand the air dryer drain valve. Read off the pressure (pressure gauge 6926) when air stops flowing out of the air dryer and the pointer starts to rise.



The cut-in pressure should be 0.11–0.16 MPa (1.1–1.6 kp/cm² lower than the cut-out pressure.

Note: A small amount of air hisses out of the air dryer also during charging due to the air dryer's blow-clean function.

31

Tyres and rims

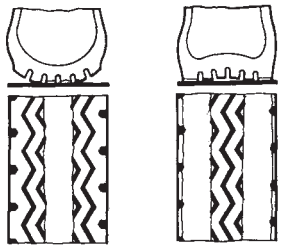
Check tyres for damage and wear caused by imbalance, incorrect tyre pressure and/or incorrect wheel alignment.

Tyres and rims

Tyre damage can also be caused by hefty braking, overloading, etc.

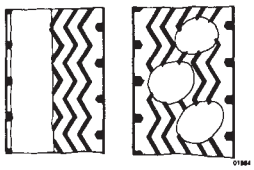
Tyre pressure has an effect on the fuel consumption: 1 kp/cm² too low pressure will increase fuel consumption by 1 litre/100 km.

Tyres must have at least the minimum legislated tread depth.



Too high **Too low**

Incorrect air pressure in tyres



Camber incorrect **Caster incorrect, imbalance or vibrations**

Laterally directed wear (raw edge) indicates toe-in problems. Toe-in wear tendencies on the drive wheels may be due to an incorrectly angled axle.

Toe-in incorrect.

Wheel alignment

Even wear on the tyres indicates that the bus has properly adjusted wheel angles. Where this is the case, a regular check on the wheel alignment is normally not required. It is only first when there are complaints about the condition of the bus when driving and/or there are signs of tyre wear that such a check should be carried out.

Lopsided air bellows can be a sign that the axle is at an angle.

A complete wheel alignment check involves measuring the following:

- Tracking
- Toe-in
- Camber
- Caster
- Max. curve angle and curve-angle difference.

Toe and heel wear on the drive wheels may be due to improperly installed dual wheels.

32

Ball joints

Check to make sure the seals are properly in position and are not damaged. Check the dust covers on the ball joints. If a dust cover is damaged, the ball joint must be replaced.

33

Power steering

Check that the steering gear with its hoses and pipes does not leak oil.

34

Air spring bellows

Check that the air spring bellows are not damaged.

35

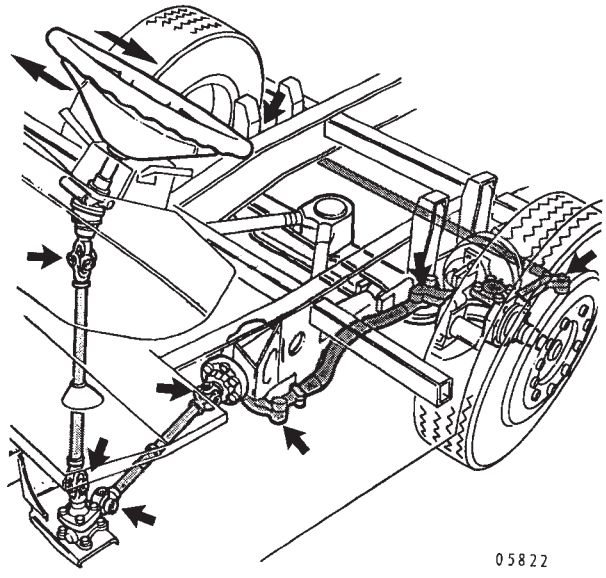
Steering gear, drag links, ball joints

Without off-loading the wheels, check the steering gear, ball joints and slip joints for wear.

Steering, check

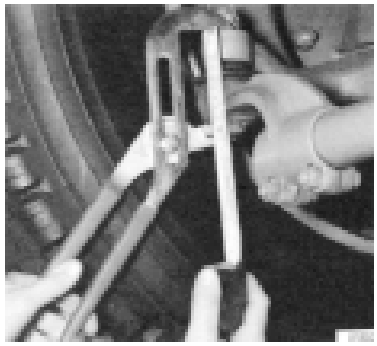
Let an assistant lightly turn the steering wheel one way and then the other. Check the steering gear and links underneath the bus.

The max. permitted play in the steering shaft slip joints is 1.5 mm. Max. total play including link joint movement is 5 mm.



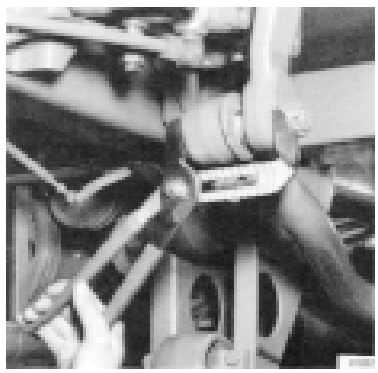
Ball joints, check

Check the axial play on the ball joints with polygrip pliers and a measuring tape. Max. permitted axial play is 2 mm.



Checking ball joint tie-rod axial play.

Max. permitted wear 2 mm.



Checking ball joint, drag link axial play.

Max. permitted wear 2 mm.

36

King pins

Raise the front end. Apply the brakes and measure the full wheel locks.

37

Front wheel bearings/bogie wheel bearings

Use a wheel spinner and check wheel balance and bearing noise.

38

Rear wheel bearings

Raise the rear end, release the parking brake and check the bearing clearance.

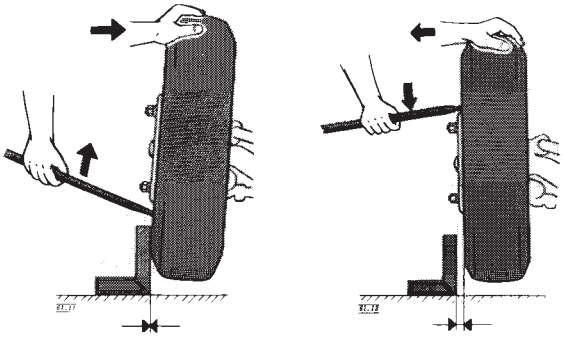
39

Spare wheel

Spare wheel and retainer. Check the condition and mounting.

King pins, check

King-pin wear must not be more than indicated on the table at the point you are measuring. This corresponds to a bushing diametrical wear of 2 mm.

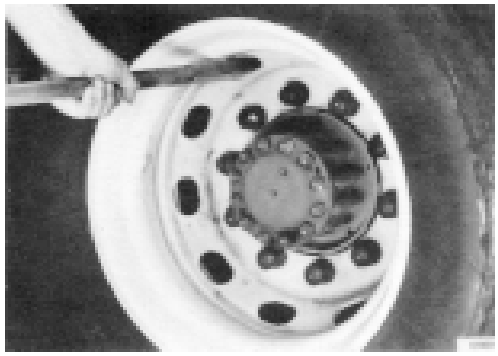


Front wheel bearings/trailing wheel bearings, check

If the bearing is noisy, this indicates that the rollers or races are damaged. Fit new bearings. Fill with oil (engine oil SAE 30).

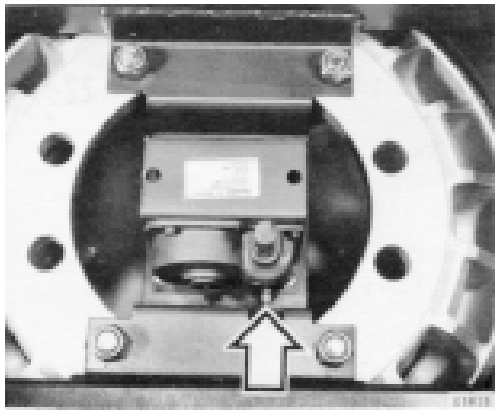
Rear wheel bearings, check

Check rear-wheel bearing clearance by prying the wheel up with a crow bar in one of the holes. If play is noticeable, the bearing should be adjusted. Clearance should be 0.04–0.12 mm.



Spare wheel (B10B)

To inspect the spare wheel attachment, remove the panel in the floor. The spare wheel elevator should be greased once a year.



40

Shock absorbers, torque rods, reaction rods, anti-roll bar

Check that shock absorbers and brackets are securely mounted.

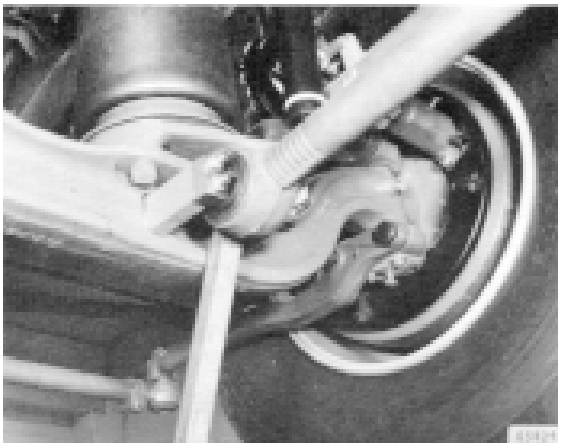
The rubber journals for the torque and reaction rods must be tight. Check the rubber bushings.

Shock absorbers

A special test machine is required for a full and proper check on the condition of the shock absorbers. Unless the noise comes from the rubber bushings for the shock absorber attachments, a noisy shock absorber can be said to be used up and should be replaced. Oil moisture on the outside of the shock absorber can be accepted, but not drops.

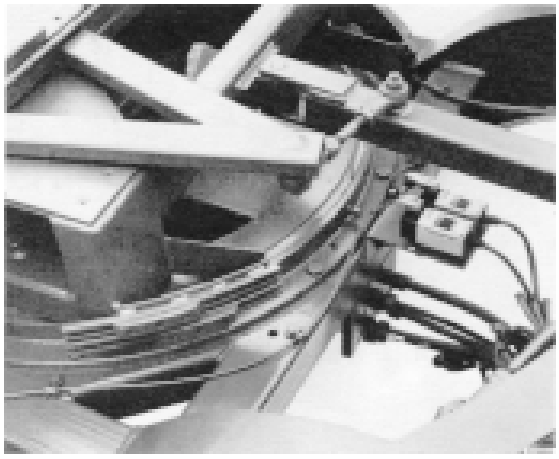
Torque rods and reaction rods

Check the rubber bushings in the anti-roll bar, torque rods and reaction rods, using a jemmy bar.



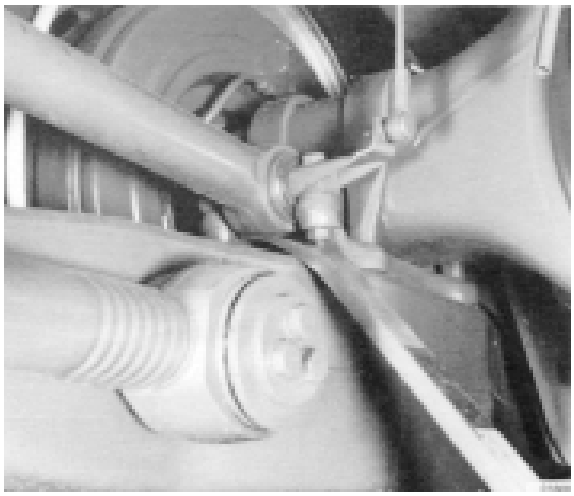
Artic bus (B10M), turntable

Check the turntable anchorage points, rubber buffers, hoses, etc., from inside the bus or from underneath, with the bellows open.



Anti-roll bar

If there are signs of wear on the anti-roll bar in the area of the rubber bushings, then probably these have started to rotate. If this is the case, it's time to replace the rubber bushings.



41

Levelling valves

Check the mountings for the levelling valves.

Check and if necessary remedy any leakage at the connections.

42

Air bellows height

Check the height of the bellows.

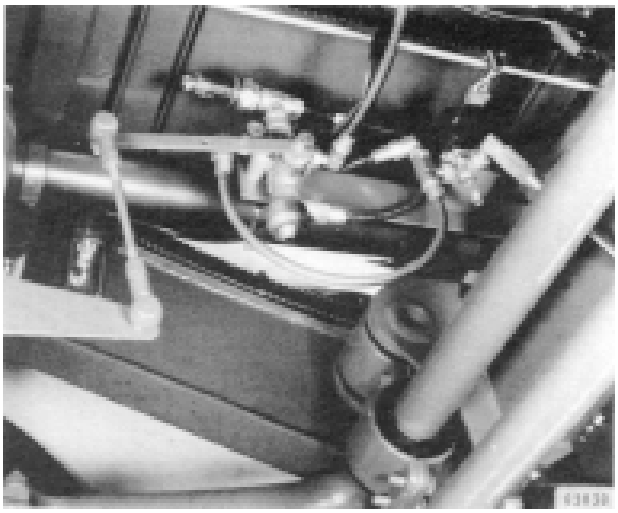
43

Frame

Visually check the chassis frame, crossmembers and body attachments for cracks, rust and loose bolting.

Levelling valves

Inspect the valves for loose joints, air leaks and worn bushings.

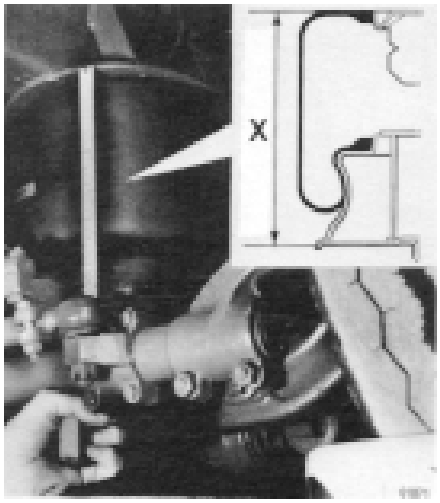


Bellows height, check

Place the bus on a flat surface, check that the tyre pressure is correct and that the compressed-air system is charged.

Then measure the bellows height, distance X, between the mounting plates, see table below. If adjustment is necessary, refer to Service Manual, Section 7.

It is important that all the air bellows have the right height on both sides of the respective shafts. A difference in heights here will affect the driving and will only increase wear on tyres.



Bellows height (mm)

B10M

Front axle (also steered artic shaft)	239 ± 3
Front axle kneeling type with recess for upper bellows plate	279 ± 3
Rear axle and artic axle (non-steered))	249 ± 3

B10B

Front axle	279 ± 3
Rear axle	249 ± 3

Safety equipment

44

Seat belts

The seat belts, seat belt anchorages and lock functions must be in good condition. The belts must not scuff against sharp edges.

45

Emergency opening doors

Check the function.

Driver's seat

Check the seat belts for the driver and guide (if there is one), and the lock mechanism.

Passenger seats

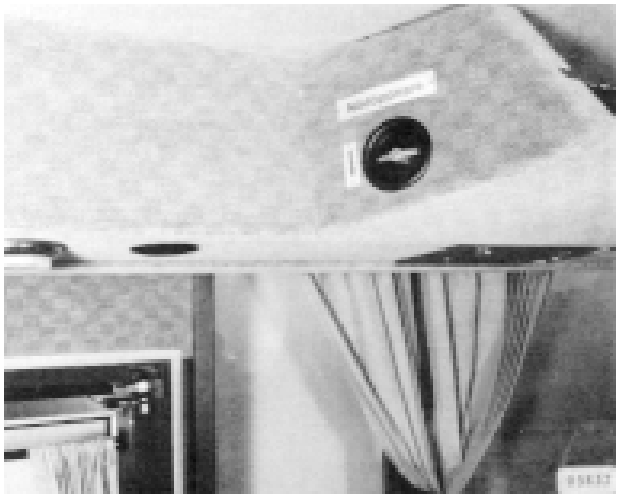
The placing of the seat belts may differ due to legislation on the various markets. Described here are some examples:

1. Front passenger row
2. Seats behind the toilet
3. Rear centre seat, etc.

Emergency opening, doors

Check the function by turning the opening handle. Air should escape and the door should open under hand pressure.

Check that the signs are in position showing where the emergency opening handle is located and the direction in which the handle should be turned to open the door.



46

Fire warner and alarm system

Check the electric cables for the engine compartment fire warning system.

Check to make sure the fire extinguishers are in place.

47

Safety equipment; first-aid kit, warning triangle, warning signs, instructions, etc.

Check that these safety items are where they should be and are in usable condition.

48

Other safety equipment

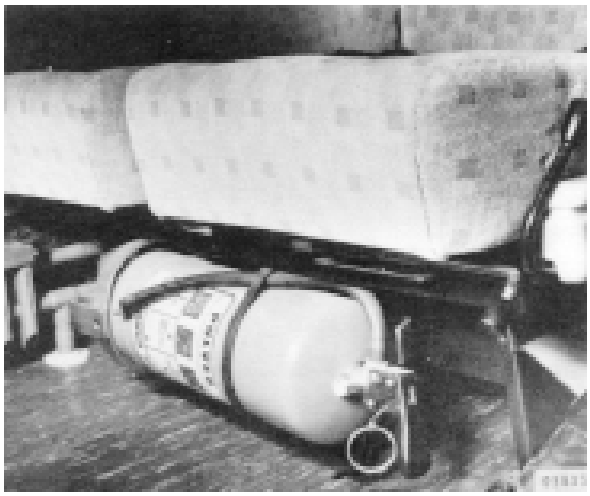
Check that the hammer for breaking out side windows is in the place intended.

Fire extinguishers

Check that the pressure gauge indicator is within the green sector.

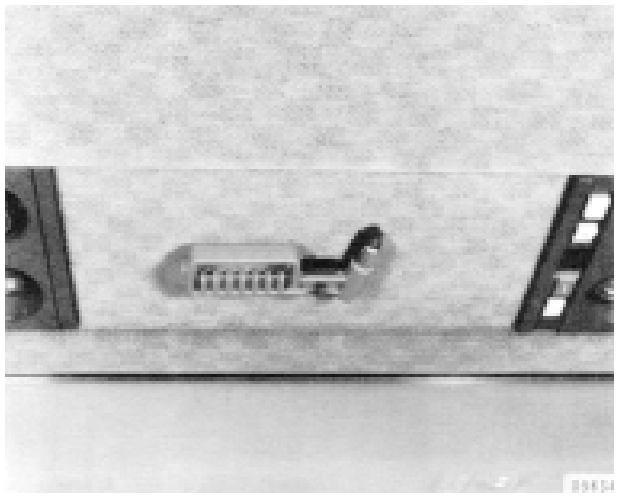
A used fire extinguisher must be re-charged as soon as possible.

Also check that the fire extinguisher sign is in its proper position.



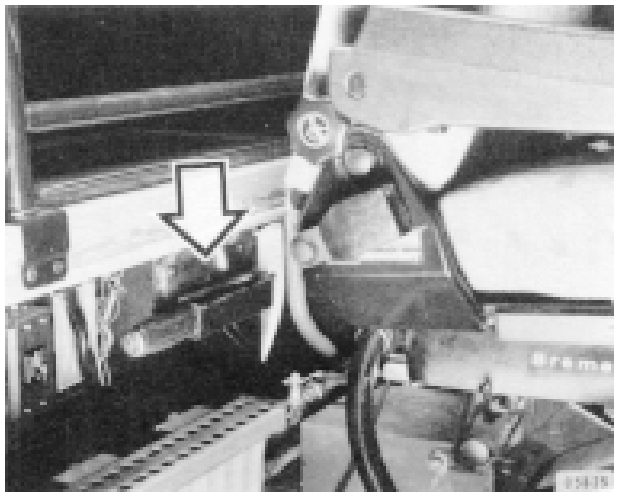
Window-breaking hammers

These hammers are very often situated next to the side windows. They may also be fixed somewhere above the passengers. If a bus has plastic roof hatches, each hatch must have a hammer next to it.



Fire axe

Check to make sure the fire axe is in the place intended behind the driver.



Service – Body

Service – Body

49

Windscreen and windows

Check the windscreen and all windows for cracks, sharp edges, etc. Make sure the windows are not loose. Check that slide windows can be opened and closed.

50

Luggage compartments, lids

Check suspension, damping cylinders and hold devices of the luggage compartment lids.

Windscreen and windows

The trim moulding round the windscreen must not be loose in its attachment. Otherwise the windscreen must be removed and the moulding replaced.

Where damage to the outer glass layer has penetrated to the laminate and if this is within the driver's normal field of vision, the windscreen should be replaced.

It is possible to repair minor windscreen damage by means of a special repair fluid, after air has been sucked from the damaged part. The repair fluid is then hardened by means of a special UV-lamp.

Luggage compartment lids

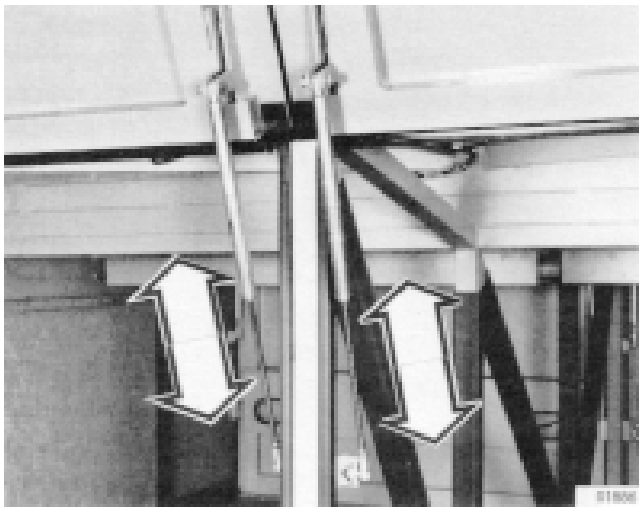
The hold devices should be able to keep the luggage compartment lids closed. The damping cylinders should be able to keep them open.

Check the lighting.

A luggage sleigh should be able to run easily on its rails, but also check the sleigh's lock device.

If the spare wheel is fitted in the luggage compartment, check to make sure it is properly secured.

Concerning greasing lids, refer to the lubrication chart.



Luggage compartment lids

51

Doors

Opening and closing function. The sealing strips round doors and door openings should be lubricated with silicone.

City buses
Check passenger door operation (photocell automatic function, hinges, ball joints and guides).

Sensor edges for doors
Check that the sensor edges function and that the warning buzzer sounds when the edges press together. If not, check the plastic hose for leakage, also where it is connected to the door seal.

Door cylinders
Make sure the cam plate, contact and contact holder are properly fitted. Every other year the door cylinders should be disassembled, cleaned and greased (applies to city buses). Use Bosch Ft 1v5 grease.

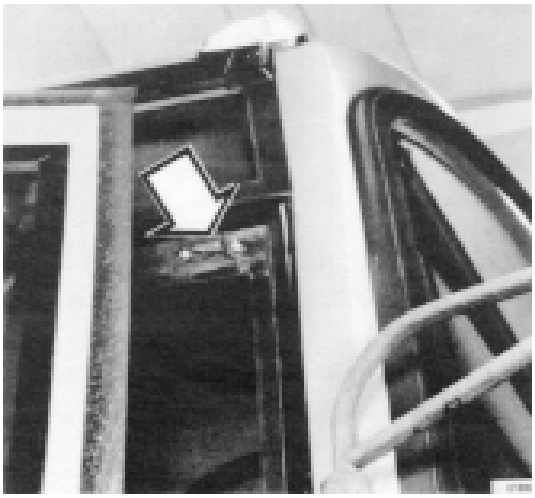
Opening and closing function

Check that doors open and close at a reasonable speed and that door speed functions at the end positions.

Where a door is fitted with an automatic opener, check the automatic mechanism. Very often it is built into the door mechanism.

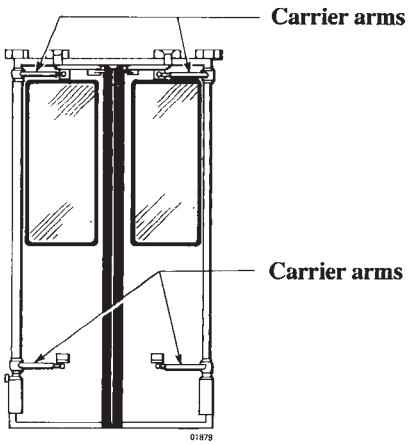
The rotating movement of the drive device stops should a passenger fasten between the door panel and the door opening. But the cylinder piston will continue its movement. This movement is transferred to an electric micro-contact next to the journal. This activates the solenoid valve to open the door.

Note: For doors where the door mechanism lifts the door into its locked position at the end of the closing travel, it is particularly important that the damping is properly adjusted so that the door goes into and remains in the locked position when closed.



Doors (city bus)

The door seals should press together when the doors close. Otherwise the carrier arms must be adjusted. The doors should be flush with the body side. Check the mechanisms that keep the doors closed.



Double swing door

Sensor edges for doors

Normal type city bus door
Rear doors: The sensor edge must be able to open the doors automatically whenever something has fastened in between.

The standard arrangement is where air inside the sealing strips form a pressure wave that activates the diaphragm in an electric switch. Tightness is therefore extremely important to the function. If the automatic mechanisms reacts too late, normally adjustment to the switch is all that is required.

The automatic mechanism should function during closing. Check to make sure the end position switch switches off the mechanism when the door is open.

52 ●

Floor and floor panels

Check the floor, floor panels and mats for defects that can cause accidents.

53 ●

Wall panels, seats

Check the wall panels (upholstery) for damage and missing screws.

54 ●

Roof hatches

Check the opening and closing function.

55 ●

Heating system

Defroster filter, roof ventilation. If necessary change the defroster filter at the heating fan air intake and also the roof ventilation filter.

56 ↯

Air conditioning

Check the compressor drive belts. Start and run the system for about 10 minutes.

Check the leve and for moisture in the refrigerant cartridge (dryer). Top-up if level is low. With moisture in the system, replace the refrigerant cartridge (dryer). Replace the air intake filter insert.

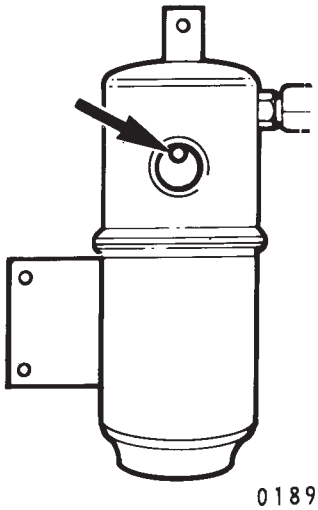
Air conditioning

The most important measure when servicing the air conditioning is to check to see whether there is any moisture in it.

Quite commonly the air conditioning does not work if there is no refrigerant (or if the level is too low).

Refrigerant, level

The large white ball in the sight window must be in the upper position, otherwise refrigerant must be added to the system. Lightly tap with a plastic mallet the sight window to check that the ball has not stuck, if it is not in the upper position.



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⚠ **WARNING!** Safety goggles and gloves must be worn and skin protected whenever handling refrigerant. Used refrigerant must be emptied into a special cartridge, see instructions (adjacent page). Never discharge refrigerant near naked flames, cigarettes, etc. High temperature can develop into poisonous gases.

Moisture indication

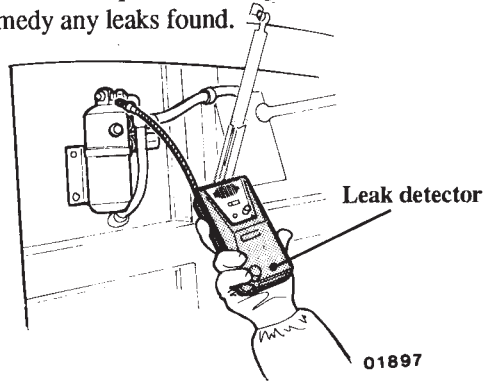
The small blue ball in the sight window is the moisture indicator for the system. When it changes to a white or a pale pink colour, this indicates that there is moisture in the system. In which case, replace the refrigerant cartridge (dryer).

Test running

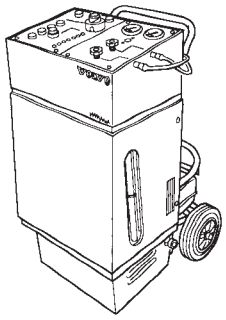
When test running the air conditioning system, check after 5 minutes that the temperature differential (inside/outside) is approx. 8–10°C.

Leak detection test

If the dryer contains too little refrigerant, check all unions and other components for tightness with a leak detector. Remedy any leaks found.



Emptying and filling refrigerant



Recovery of refrigerant R12 with station 981 2402

For the moment the R12 (Freon) is the refrigerant that is used in air conditioning systems. Recent environmental legislation stipulates that different types of Freon can be preserved and recovered in a satisfactory way, that is, not dumped on nature.

To meet these demands and at the same time achieve rational handling, Volvo now has a station (981 2402) for emptying, cleaning and recovering the Freon. With this station, the system can also be vacuum-pumped to facilitate filling.

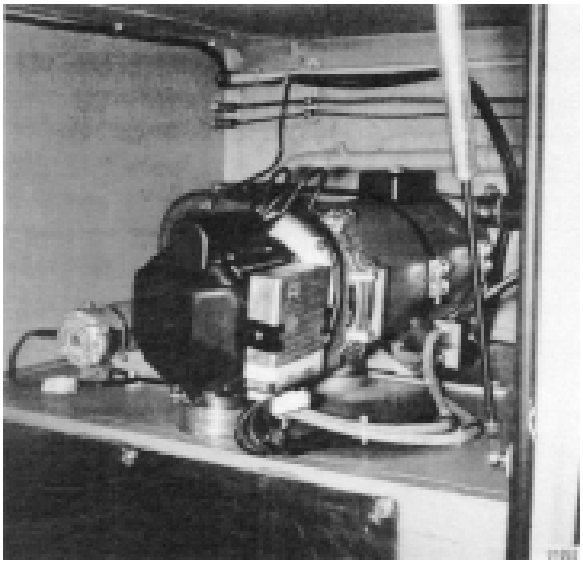
57

Parking heater

Periodically inspect.

Parking heater

Some checking and preventive measures should be carried out before the heater is put into operation during the cold time of the year. Listed below are the measures which should be taken, with reservation for the different makes of heaters.



Periodical inspection

Checking/cleaning

Fuel pump, combustion head, photocell, solenoid valve, nozzle, combustion pipe, heat exchanger, combustion air intake and exhaust pipe.

Replacing the fuel filter

Function check

Heater electrical motor, melt fuse, operating thermostat, fan thermostat in timer. Start and run the heater for about 10 minutes.

Adjusting

Fuel pump and ignition electrodes

Check for leakage

Coolant side, fuel lines.

58

Body, underside

Check for damage to the rustproofing or check for damaged parts, particularly those that are exposed.

Artic bus B10M, check artic bellows.

Body, underside

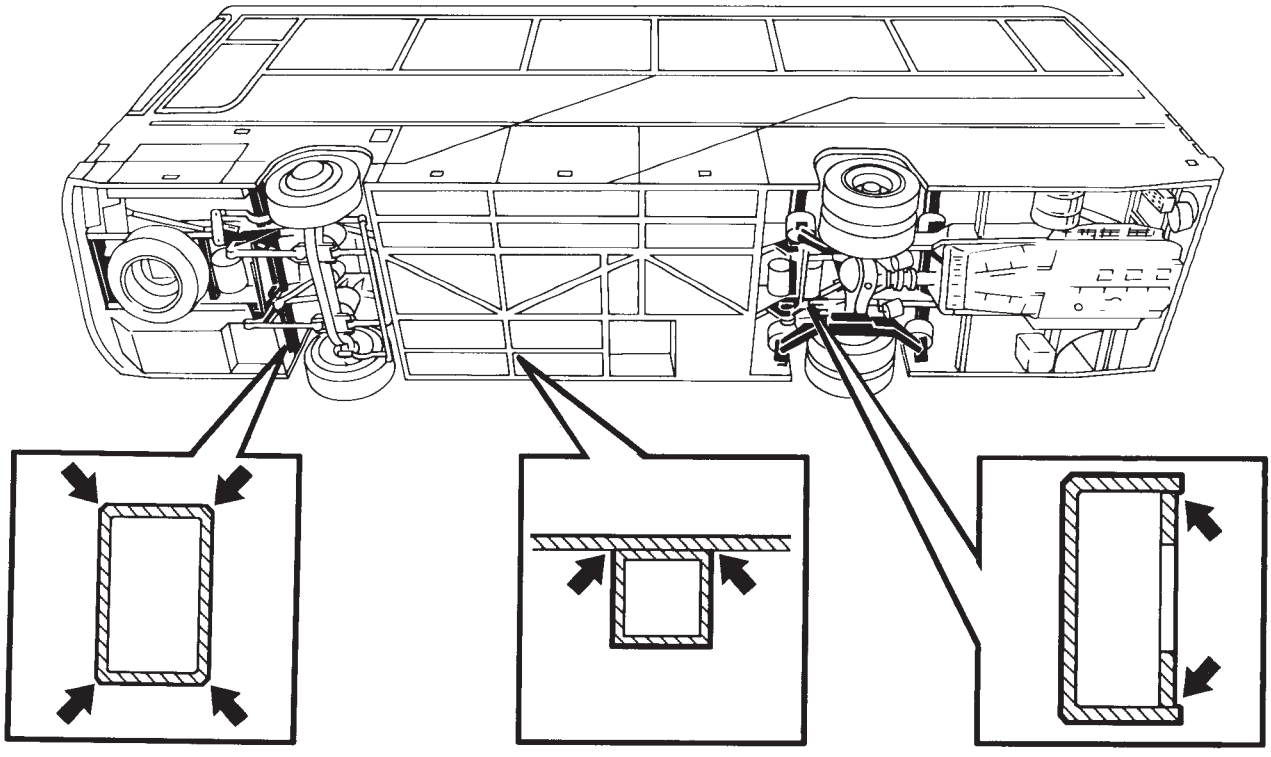
A proper check cannot be carried out unless the underside of the bus is properly washed. Normally this should be done at least once a year. After cleaning and drying, check the rust protection. Sections not properly rust protected must be treated with rustproofing. Rust damage must be put right. Preventive measures must be taken in the event of moisture damage, drain holes, etc.

Repair or replace damaged parts. Paint damage should preferably be remedied at the first servicing opportunity.

Towing device

Check mounting and condition.

Make sure any bolting is not loose. If the towing device is for a trailer, check also the contacts for lighting, brakes and direction indicators.



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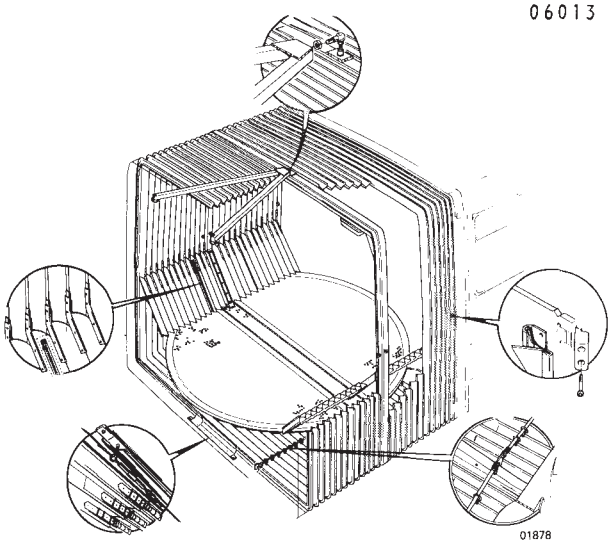
Bellows, B10M, artic

Check the condition of the tensioning bands on the underside of the bellows.

Check the tensioning devices that prevent the underside of the bellows from sinking.

Check the drag link attachment to the portal bows.



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References to Service Bulletins

Volvo Bus Corporation
Göteborg, Sweden

TP 15580/1 English